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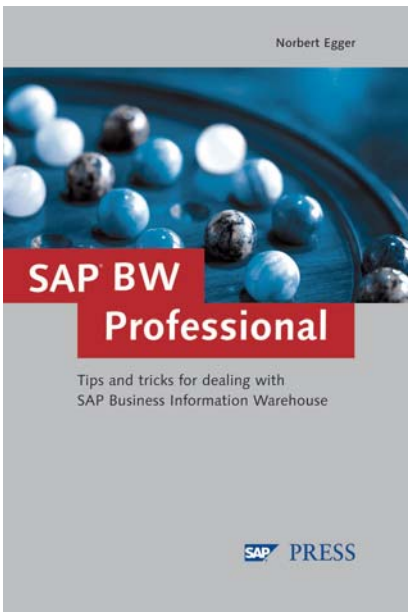
Tips and tricks for dealing with SAP Business Information Warehouse



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6 Using Sample Solutions to Show the Important Functions of the Query Designer in SAP BW 3.x

Since SAP BW 3.0, SAP also offers a best-practice data warehouse solution in the area of reporting. The optimizations and expansions in the Query Designer represent the core of the improvements. This chapter explains the basic functions and significant changes in SAP BW 3.x.

6.1 Introduction

6.1.1 Calling Up the Query Designer and Creating Queries

Analyses and reports in SAP BW are based on SAP Business Explorer (SAP BEx) queries. You create these queries with the Query Designer, which has been available as a stand-alone PC application since SAP BW 3.0. This application can either be called up via the menu, as a link, or directly (via the executable file wdbrlog.exe) (see Figure 6.1, Step 1). After starting SAP, you must log on to the SAP BW system by entering your user ID and password. Then, you must confirm your logon by clicking on the **OK** button (see Figure 6.1, Steps 2 and 3).

Starting the Query Designer

After logon, the Query Designer is started. To configure a new query, click the **New** button (see Figure 6.1, Step 4). In the **Open Query** pop-up, click the **InfoAreas** button. The InfoArea tree with the respective InfoProviders is displayed. This must then be opened such that the InfoProvider to be used is displayed. Highlight the InfoProvider that you want and select it by clicking on the **OK** button (see Figure 6.1, Steps 5 to 7).

Query Designer: technical name

The selected InfoProvider is then displayed in the **Query Designer: New Query** popup (see Figure 6.1, Step 8). By clicking on the **Technical Name** button, you can display the SAP BW keys (see Figure 6.1, Step 9 and the following figures). This is the starting basis for creating queries.

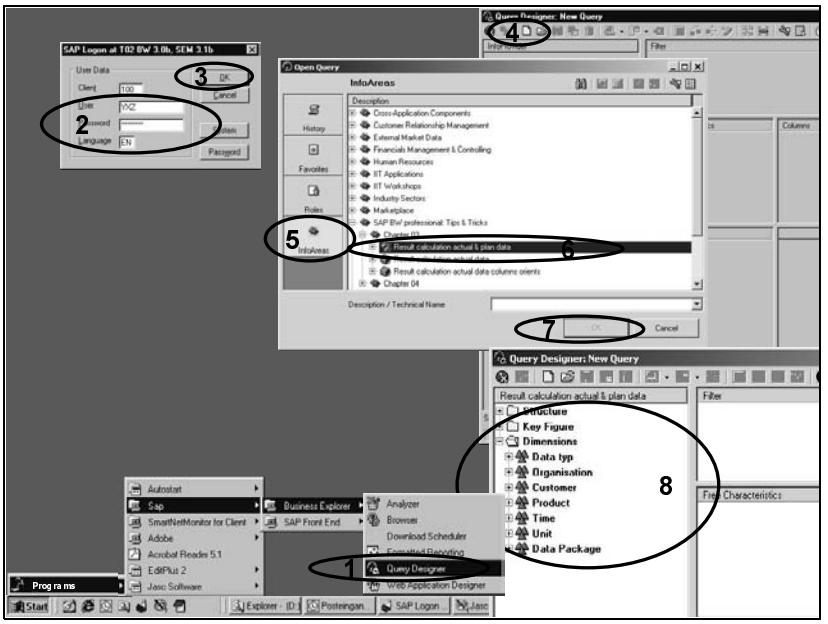

Figure 6.1 Starting the Query Designer with InfoProvider Selection

6.1.2 Including Characteristics and Keys in the Query

Row and column elements

The result of a query is displayed primarily via a table with similarly configured rows and columns. For the respective rows and columns, selections and calculations can be required. For example, this particular table can consist of columns with keys (in the example: "Gross sales," "Direct sales reduction," and "Standard sales revenue," as well as "COGS" and rows (in the example: Fiscal year/period).

Filter Elements

If global selections are necessary, they can be defined as filter elements (in the example, the SAP "Fiscal year variant," the "Currency Type," and the "Value Type" "Actual").

Free Characteristics

If selections or changes to the row or column criteria are necessary, elements of the type "Free Characteristics" can be defined (in the example these are the "Fiscal year," "Country," and "Region").

Including InfoObjects in queries

You should now define the named query elements. In the Query Designer, you can display the relevant components (those to be selected) of the InfoProvider by opening the object tree in the left frame and clicking the ⊞ (see Figure 6.2). Using drag & drop, you can move the necessary InfoObjects (characteristics and keys) into the frames for filter values, free characteristics, rows, and columns (see Figure 6.2).

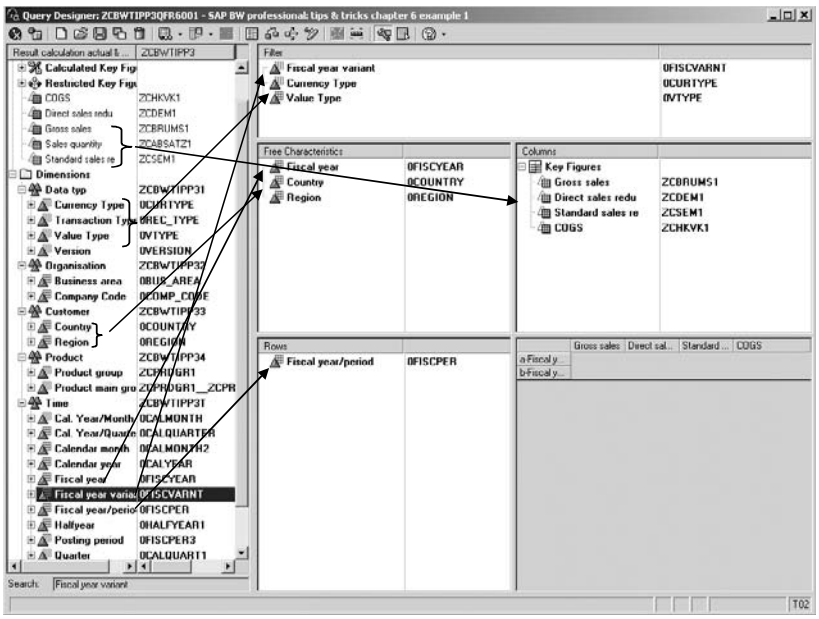

Figure 6.2 Including Characteristics and Keys as Query Elements Using Drag & Drop

6.1.3 Selections (Restricting)

In general, selections are necessary for queries. Selections are required, for example, so that a particular data type is displayed explicitly (in the example: Value Type "Actual"). In addition, selections can be necessary so that no nonsensical summations occur (from SAP R/3, the CO-PA data can also be provided in addition to the result area currency, for example, also in the accounting sector currency; in the example, a nonsensical doubling of the values is avoided using the selection of the currency type "Result area currency"). Finally, technical selections can be necessary in order to achieve better characteristic displays (in the example, the fiscal year variant "Calendar year, 4 spec. periods" is selected, so that the key display of "Periods/year" occurs without the prefix K4).

Selecting filter values

The global restrictions are defined in that on a characteristic in the filter frame the context-sensitive menu is opened using the right mouse button and the function **Restrict** is selected (see Figure 6.3, Step 1). Then, the **Selection for fiscal year variant** pop-up opens. Select the value that you want and click the **Add** button (right-arrow button) to add the value (see Figure 6.3, Steps 2 to 4). After confirming this restriction by clicking on the **OK** button, the restriction is included in the query (see Figure 6.3, Step 5).

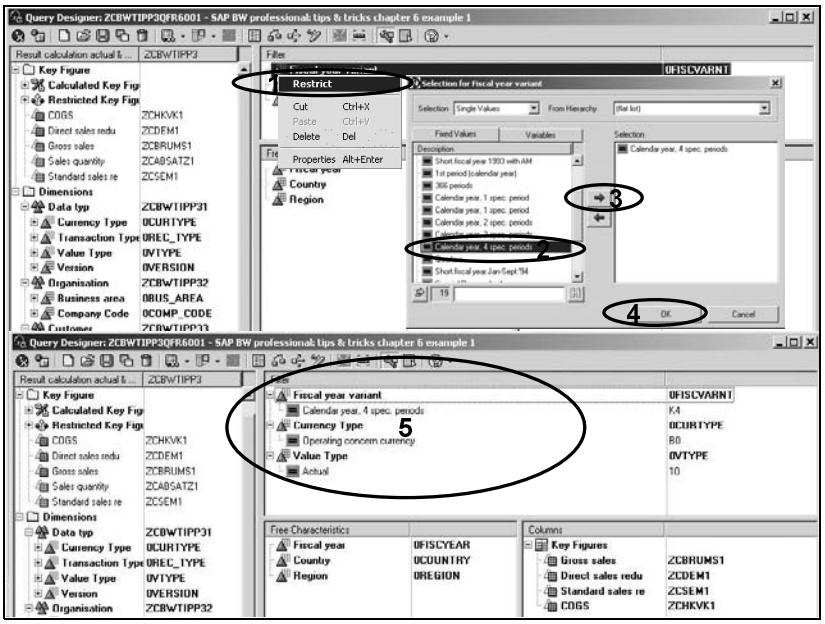

Figure 6.3 Definition of Restrictions for Global Selections

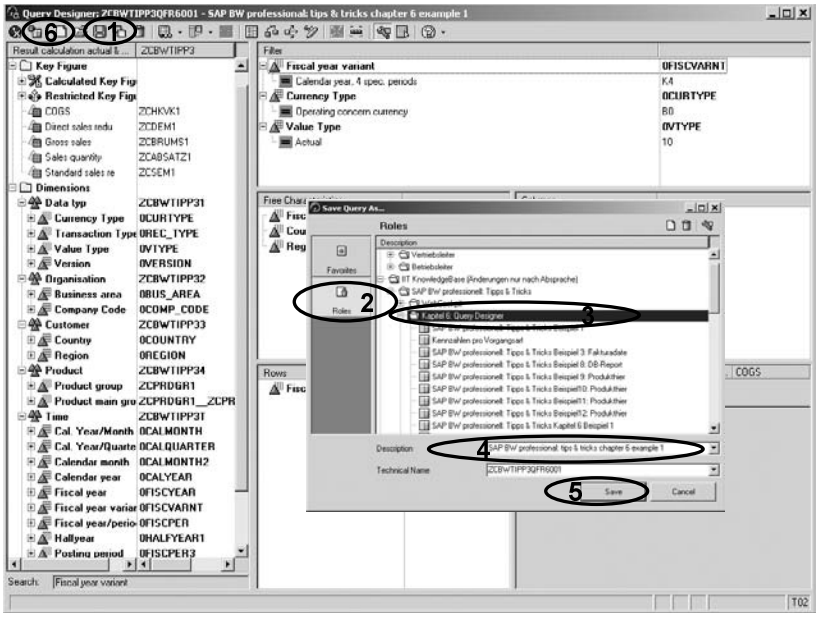

Figure 6.4 Saving the Query

6.1.4 Saving Queries

Saving queries

After you have defined the query, you must save it. To save the query in a role or in Favorites, click on the **Save query** button (see Figure 6.4, Step 1). In the **Save Query As...** pop-up, you must select the storage location (Roles or Favorites) (see Figure 6.4, Steps 2 and 3). After entering the description and technical name, click on the **Save** button (see Figure 6.4, Steps 4 and 5). Now, you can execute the query.

6.1.5 Executing a Query

Executing a query

To start the query in the HTML browser, click on the **Query on the Web** button (see Figure 6.4, Step 6). The SAP default Web template displays the result table (see Figure 6.5).

Displaying filter values

When you click on the **Info** button, the selected filter values are listed in the query configuration (see Figure 6.5, Step 1). To display the result table again, click on the **Table** button to display the result table once again (see Figure 6.5, Step 2).

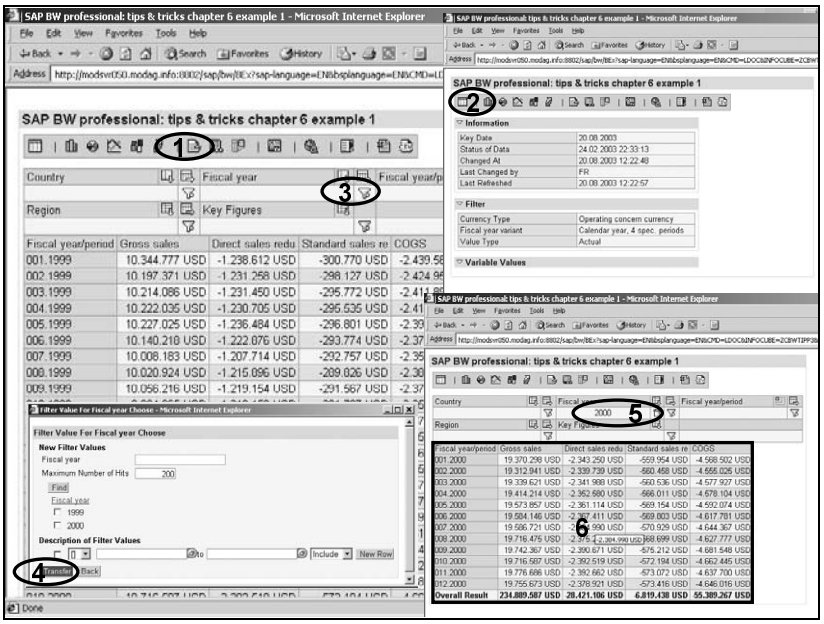

Figure 6.5 Execution of the Query and Navigation: Display of the Filter Values and Selection via Free Characteristics

Selection via free characteristics

If, during the query execution, dynamic selections should occur, in addition to the static filter values, then selection can occur for the corresponding element (characteristic or structural element, for example, a key figure) in the navigation block by clicking on the **Filter value** button (in the example: selection of the fiscal year 2000, so that only the periods 001.2000 to 012.2000 are listed) (see Figure 6.5, Step 3). In the **Filter Value For Fiscal year Choose** pop-up, you can select the value that you want (see Figure 6.5, Step 4). After making your selection, the newly selected data is displayed in the browser (see Figure 6.5, Steps 5 and 6).

Changing drilldown

You can also make selections on the basis of the values in the rows and columns. Open the context-sensitive menu and select the value that you want by highlighting it (see Figure 6.6, Step 1). If you only want to display the selection, you must select **Keep Filter Value**. If in the same step a change of the query drilldown should be made (in the example: display of the countries in the columns for selection of the key "Gross sales"), then you must select the function **Filter and drilldown according to ...** (see Figure 6.6, Steps 2 and 3).

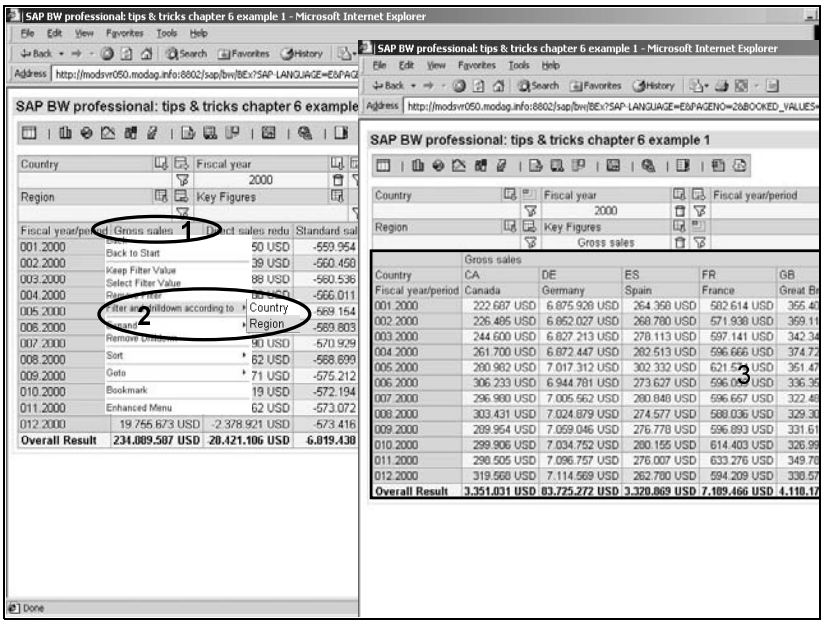

Figure 6.6 Navigation in the Query: Filtering via Free Characteristics and Table Elements with Change of the Drilldown

6.2 Reusable Objects

6.2.1 The Concept

In practice, the same elements are often required in different queries. This axiom holds true for calculations (calculated keys), restricted keys, and structures of keys or characteristics. In order to store these elements without duplicating them, you can save them as reusable objects. Then, these query elements will be available for all queries that use the respective InfoProvider.

6.2.2 Calculated Keys

Formula

If a total should be calculated from different keys, then the formula function is available for the following, for example:

Gross sales
./. Direct revenue reductions
./. Default revenue reductions

./. Full manufacturing costs
= Marginal income II

You can then define this formula directly in the query. Depending on the construction of the query, you must open the context-sensitive menu on the key node on the row or column, using the right mouse button, while concurrently clicking on the **New Formula** function (see Figure 6.7, Steps 1 and 2). In the **Edit Formula** popup, the keys are copied into the **Edit Formula** window using drag & drop and they are linked with the required operators (in the example, the keys are saved according to the plus or minus sign in the InfoCube and therefore per this example must be linked with a plus sign (+)). Then, you can enter the description and complete the formula definition by clicking on the **OK** button (see Figure 6.7, Steps 3 to 5). After that, the formula will be available in the query (see Figure 6.7, Step 6).

During query execution, this formula behaves like the physical keys (see Figure 6.8).

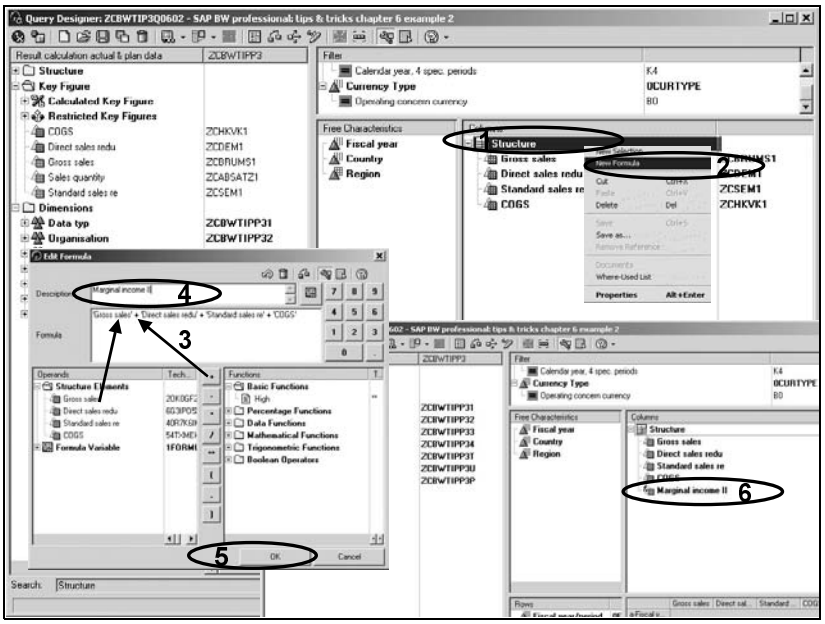

Figure 6.7 Definition of the Formula in the Query

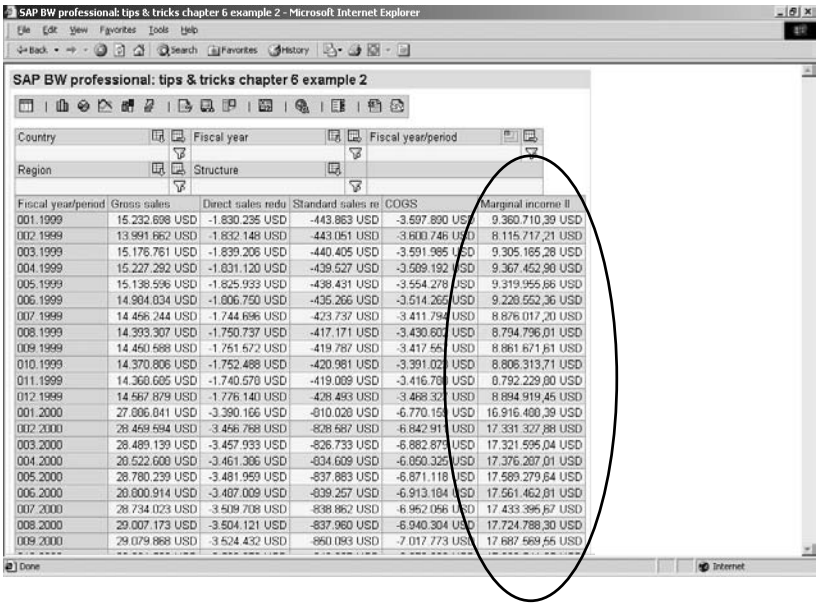

Figure 6.8 Query with Formula

Problem of local formula definition

In practice, however, using the (local) formula conceals the problem that this formula must be defined anew in each query. Besides this unnecessary additional effort, there also exists the problem of inconsistent definitions that arise, thereby contributing to the usage of flawed and contradictory information. The person responsible for creating the query must therefore be sufficiently familiar with the (in practice more complex) data model for such a definition – this basic condition is often not fulfilled. Therefore, reusable formulas (= calculated keys) are recommended. This definition also occurs in the Query Designer.

Defining calculated keys

In the left frame, open the context-sensitive menu on the **Key** folder symbol using the right mouse button and select the function **New Calculated Key Figure** (see Figure 6.9, Steps 1 and 2). In the **New Calculated Key Figure** pop-up, make the definition according to the formula (see the definition of the formula) and confirm the entry by clicking on the **OK** button (see Figure 6.9, Steps 3 to 5). In the **Properties of the Calculated Key Figure** pop-up, enter the technical name and also confirm this entry by clicking on **OK** (see Figure 6.9, Steps 6 and 7). In the Query Designer, the calculated key is then available in the **Calculated Key Figure** folder and it can be included in the query definition like a physical key using drag & drop (see Figure 6.9, Steps 8 and 9). During query execution, the calculated key behaves like the physical keys (see Figure 6.9, Step 10).

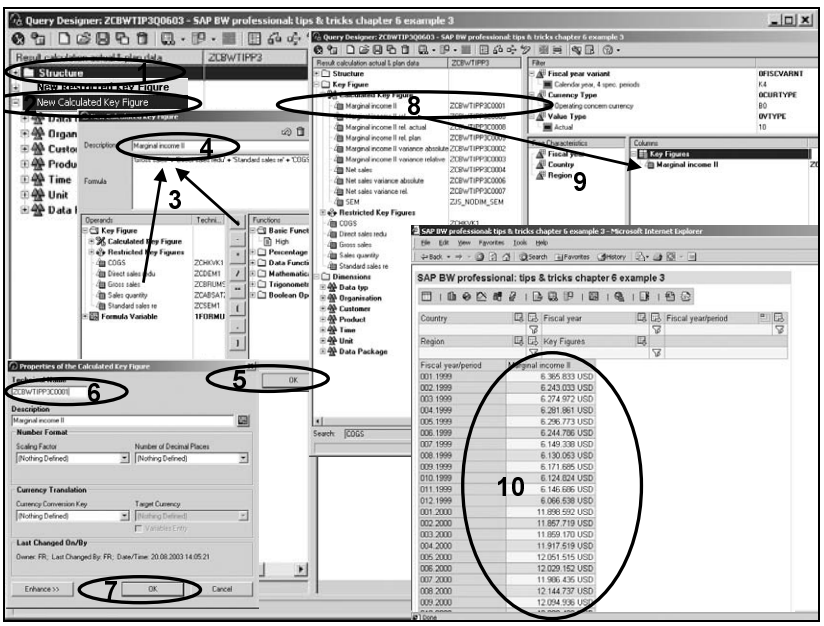

Figure 6.9 Definition and Use of the Calculated Key

6.2.3 Restricted Keys

In productive applications, calculated keys are also usually separate entities. Only in a dedicated context do these receive meaningful contents. For example, actual data is often compared to budgeted data. Calculated keys and global filters are not suited for this kind of data. Such requirements are mapped via restricted keys: a key—in the example "Marginal income II"—is restricted in one column to actual and in another column to budgeted values.

Locally restricted keys

In the Query Designer, such selection combinations (key and characteristic restrictions) can be created as local definitions. To do this—depending on the query construction—open the context-sensitive menu on the title column or row by right-clicking the mouse button and selecting the **New Structure** function in the pop-up menu that displays (see Figure 6.10, Steps 1 and 2). Subsequently, in the corresponding frame, an empty **Structure** appears (see Figure 6.10, Step 3). Again, right-click with the mouse to open a context-sensitive menu and select **New Selection** (see Figure 6.10, Step 4). The **New Selection** pop-up opens, in which, using drag & drop, the required key and characteristic selection occurs (in the example: "Marginal Income II" and Value Type = "Actual") and a description is entered (see Figure 6.10, Steps 5 and 6). After you click on the **OK** button, this definition is available in the query (see Figure 6.10, Steps 7 and 8). During execution, this selection also behaves like a physical key (see Figure 6.10, Step 9).

Problem of the locally restricted keys

This definition also behaves correctly in reporting; however, the same problems exist as when executed for the local formula: in practice, the use of the (local) selection conceals the problem that this selection must be defined anew in each query. Besides the unnecessary additional effort, there also exists the problem of inconsistent definitions that arise, thereby contributing to the usage of flawed and contradictory information. The person who creates the query must therefore be sufficiently familiar with the (in practice more complex) data model for such a definition. Therefore, reusable selections (restricted keys) are recommended.

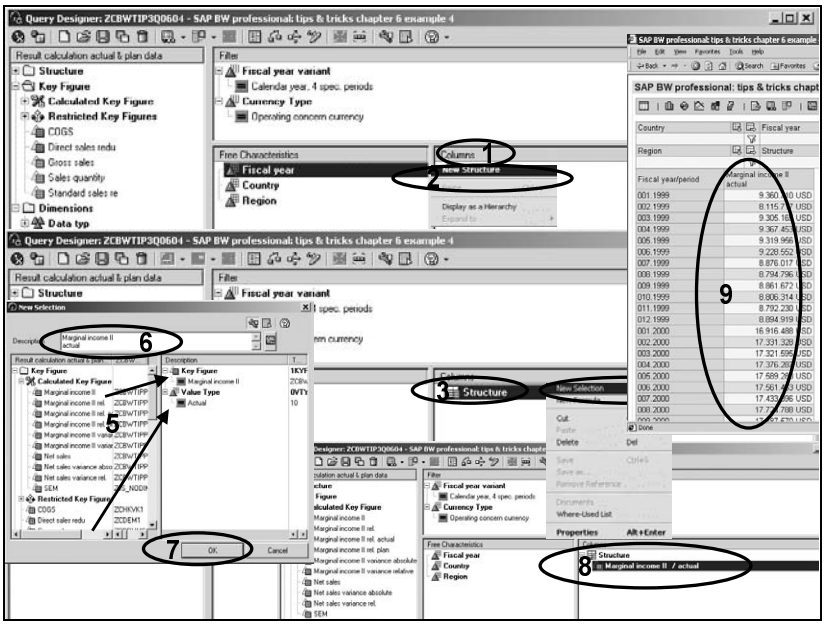

Figure 6.10 Selections of Keys and Characteristic Values in the Query

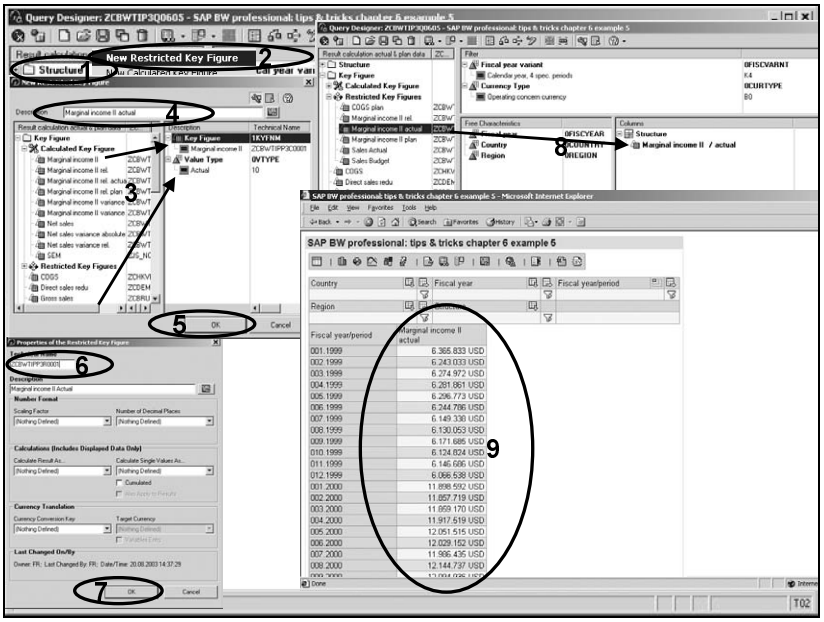

Figure 6.11 Definition and Use of the Restricted Key

Defining the restricted key

In the left frame, right-click to open the context-sensitive menu on the **Key** folder symbol and select the **New Restricted Key Figure** function (see Figure 6.11, Steps 1 and 2). In the **New Restricted Key Figure** pop-up, make the definition according to the local selection (see the definition of the locally-restricted key) and confirm the entry by clicking on the **OK** button (see Figure 6.11, Steps 3 to 5). In the **Properties of the Restricted Key Figure** pop-up, enter the technical name and confirm this entry by clicking on **OK** (see Figure 6.11, Steps 6 and 7). In the Query Designer, the calculated key is then available in the **Restricted Key Figures** folder and you can include it in the query definition like a physical key using drag & drop. It also behaves as physical keys do (see Figure 6.11, Steps 8 and 9). An innovation in SAP BW Release 3.x is the possibility of using calculated keys for the definition of restricted keys and vice versa.

6.2.4 Definition of Calculated and Restricted Keys with Mutual Dependence

Basis: calculated keys

As a rule, during the definition of queries, restricted keys are required (for example, "DB II actual" and "DB II plan," therefore, the key "DB II" with the restriction value type: 020). Both keys are based on a calculation scheme as described in Section 6.2.2, for which the use of calculated keys was recommended (see calculated key "DB II" in Section 6.2.2.). That is, the restricted keys are configured using the definition of the calculated keys (see Section 6.2.3)

This use of calculated and restricted keys minimizes the definition effort, ensures consistent principles—thanks to the common basis—and enables the adjustment of properties in a location.

Basis: restricted keys

Nearly as frequently, calculations are required that are based on restricted keys (in the example, Marginal income variance as difference or percentage variance from "Marginal income II actual" to "Marginal income II plan"). The calculated keys are configured using the definition of either the restricted or other calculated keys.

The procedure for the key "Marginal income II variance absolute" (for the absolute variance) should now be presented here. After the restricted keys "Marginal income II actual" and "Marginal income II plan" are configured in the Query Designer, right-click with the mouse button to open the context-sensitive menu on the **Calculated Key Figure** folder and select the **New Calculated Key Figure** function (see Figure 6.12, Steps 1 and 2). The **New Calculated Key Figure** pop-up opens. Use drag & drop to move the restricted keys "Marginal income II actual" and "Marginal

income II plan" into the **Formula** window. By clicking on the [-] button, the operator is inserted (see Figure 6.12, Steps 3 to 5).

After you have entered the description for the restricted key, you can complete the definition by clicking on the **OK** button (see Figure 6.12, Steps 6 and 7). After you enter the technical name and click on the **OK** button in the **Properties of the Calculated Key Figure** pop-up, this key is based on the restricted keys and calculated with the calculated key (see Figure 6.12, Steps 8 and 9).

For the definition of the key "Marginal income II variance relative" (for the relative variance), the same procedure is selected using the operator **Percentage Variance (%)** from the list of functions (**Percentage Functions** folder) in the **New Calculated Key Figure** pop-up (see Figure 6.12, Steps 10 to 16).

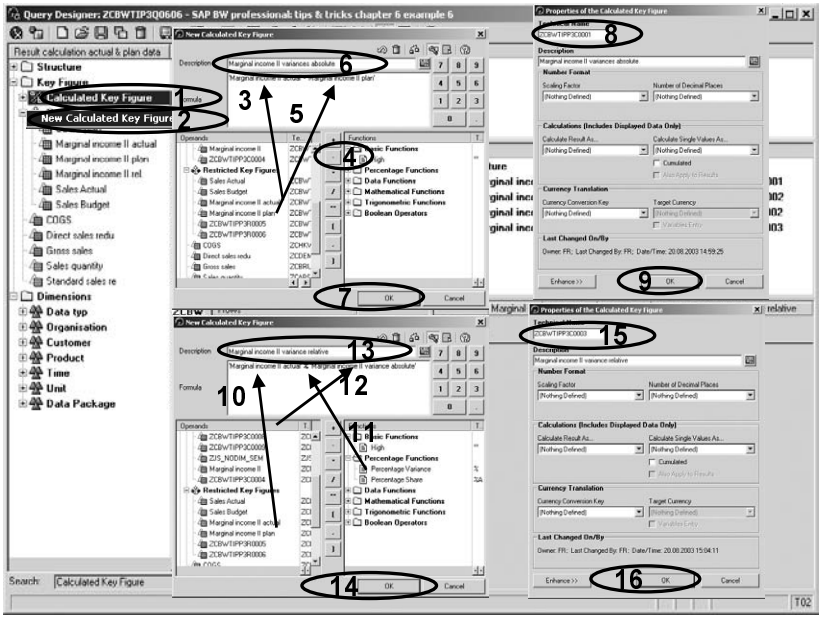

Figure 6.12 Calculated Keys on the Basis of Restricted Keys

Using drag & drop, you can copy the calculated and restricted keys into the query (see Figure 6.13, Steps 1 to 3). A problem that frequently arises from this kind of calculation is the default display of a number of nonsensical decimal places (see Figure 6.13, Step 4). We will address this issue in Section 6.3.1.

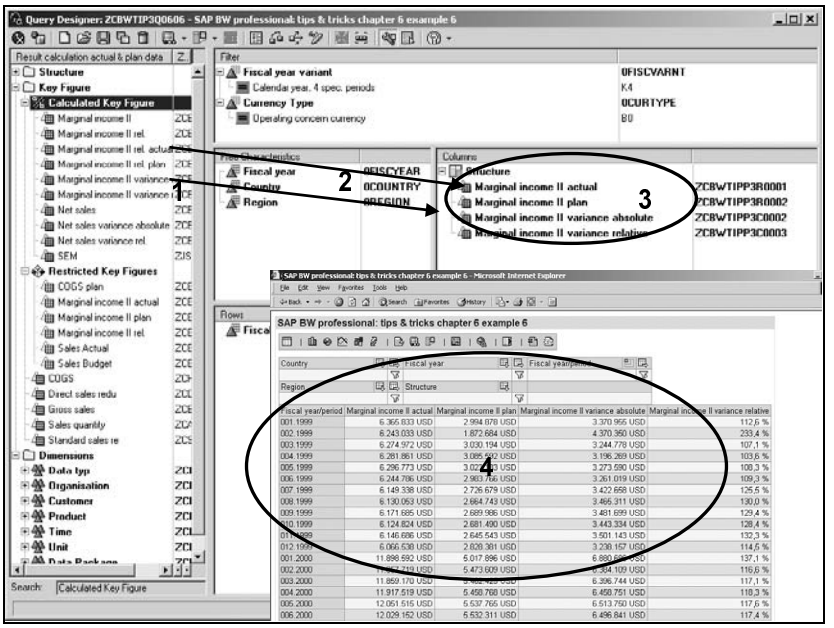

Figure 6.13 Calculated and Restricted Keys in the Query

6.2.5 Structures

Local structures

With the query definition completed according to Figure 6.13, a local structure (in this case: key structure) is formed. This structure is problematic because the definition must be made anew in each query. In addition to the necessary corresponding effort (in practice these structures are often very complex), there is the danger of inconsistent definitions (and therefore, erroneous information).

Reusable structures

To avoid this problem, the Query Designer enables you to create *reusable structures*. Reusable structures can then be copied into various queries. If the structure is changed, then all affected query definitions are changed in the same manner.

To create reusable structures, you would do the following. (Note that the starting point is a structure defined in the Rows or Columns frame in the Query Designer.) Right-click to open the context-sensitive menu on the folder (in the example: **Keys**) and select the function **Save as...** (see Figure 6.14, Steps 1 and 2). In the **Save Structure As...** popup, enter the technical name and description. After you click on the **OK** button to confirm the entries, the structure is stored globally for the InfoProvider (see Figure 6.14, Steps 3 to 5). In the Query Designer, there is a new folder **Structure** for this in the left frame with the inventory elements (see Fig-

ure 6.14, Step 6). In the query, the description and technical name are included for this structure (see Figure 6.14, Step 7). In queries to be defined anew, the reusable structure can be copied from the left frame into the query rows and columns using drag & drop.

Characteristic structures

During query execution, reusable structures behave like local definitions. For many reports, in addition to such key structures, it is also necessary to define characteristic structures. The bases for these characteristic structures are, for example, demands for the formation of interim totals, which cannot be mapped using other solution approaches.

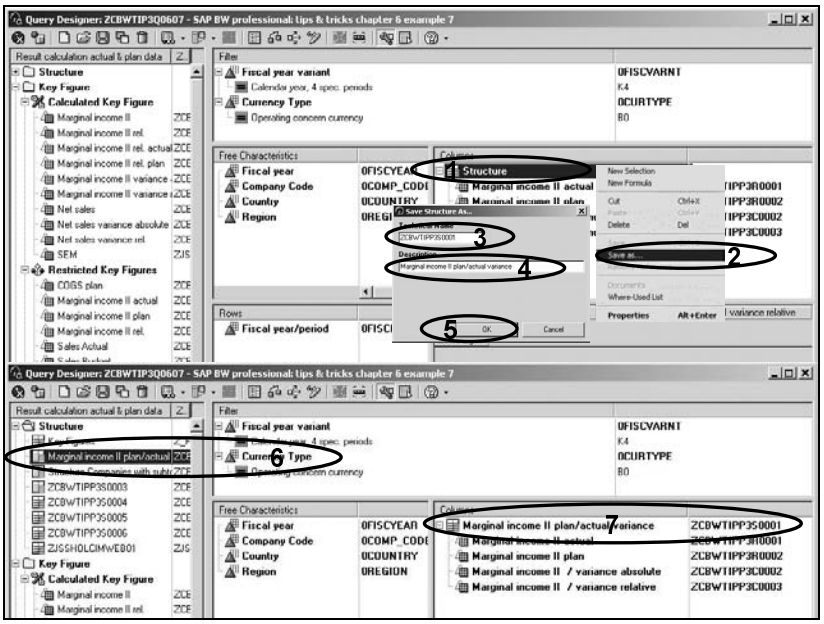

Figure 6.14 Delivery of a Reusable Structure

In the example, interim totals must be formed in addition to a detailed listing and a total row for the European and U.S. companies. In addition, in two footers, the shares of the European and U.S. companies of the total must be displayed as a percentage. While the sum total (i.e., the interim totals) and the total could be displayed alternatively using a hierarchy or using navigation attributes, the simultaneous display of shares without structure cannot be mapped. The detailed specification displayed in Table 6.1 emerges with the master data provided.

Row	Company Code or Formula	Company Code
1	IIT Deutschland GmbH, Flörsheim	Company Code 0001
2	IIT Consulting AG, Vienna	Company Code 2000
3	IIT Consulting AG, Madrid	Company Code 2100
4	IIT Consulting AG, London	Company Code 2200
5	IIT Consulting AG, Paris	Company Code 2300
6	IIT Consulting AG, Rome	Company Code 2400
7	IIT Consulting AG, Amsterdam	Company Code 2500
8	IIT Consulting AG, Brussels	Company Code 5000
9	IIT Consulting AG, Moscow	Company Code 6000
10	IIT Consulting AG, Oslo	Company Code R100
11	IIT Consulting AG, Copenhagen	Company Code R300
12	European companies	Total of rows 1 to 11
13	IIT Consulting AG, Boston	Company Code 3000
14	IIT America, Los Angeles	Company Code 4000
15	U.S. companies	Total of rows 13 to 14
16	Total [Is this right as positioned in the column for Company Code or Formula?]	Total of rows 12 and 15 [???]
17	Share of European companies	Share rows 12 to 16
18	Share of U.S. companies	Share rows 15 to 16

Table 6.1 Construction of the Structure for the Company Overview

Creation of selections as structure elements

A structure must be created as preparatory work. In the Query Designer, right-click the mouse button on the title of the **Rows** frame to open the context-sensitive menu. Select the **New Structure** function (see Figure 6.15, Steps 1 and 2). In the Query Designer, an empty structure is displayed in the **Rows** frame. On this **Structure** folder, open the context-sensitive menu, again using the right mouse button, and select the **New Selection** function (see Figure 6.15, Steps 3 and 4). In the **New Selection** pop-up that opens, select the company code 0001 and use drag & drop to move the code from the template frame into the selection frame (right) (see Figure 6.15, Step 5). Then, enter the description text and confirm the selection by clicking on the **OK** button (see Figure 6.15, Steps 6 and 7).

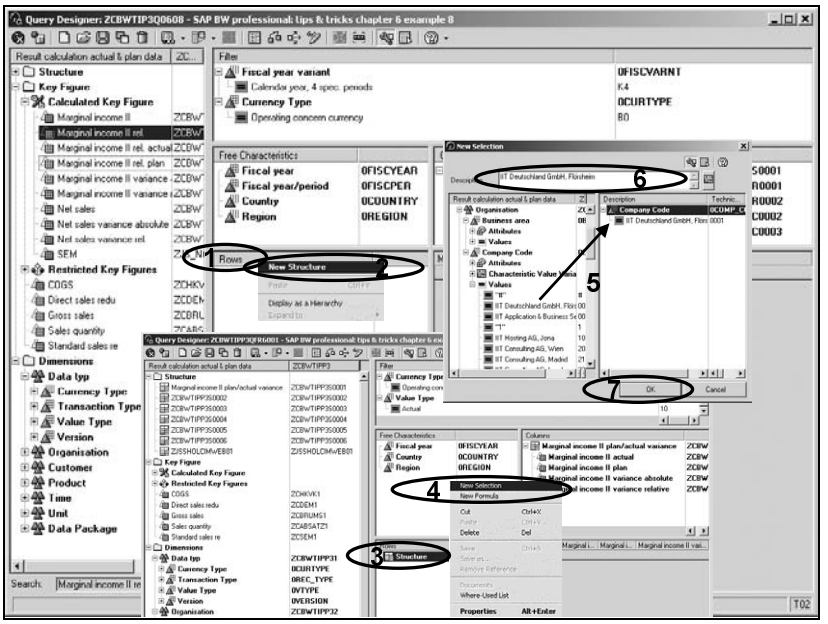

Figure 6.15 Creation of the Elements with Fixed Value Selections

This selection is therefore taken over into the query as a structure element (see Figure 6.16, Step 1). For the additional company codes of the rows 2 to 11, you must repeat Steps 3 to 7 from the detailed specification according to Figure 6.15.

Creation of the total rows

The interim totals are defined as formula. In the Query Designer, right-click on the **Structure** folder in the **Rows** frame to open the context-sensitive menu. Select the **New Formula** function (see Figure 6.16, Steps 2 and 3). In the **New Formula** pop-up, the structural elements (rows 1 to 11) must be taken over into the formula using drag & drop and they must each be linked using the operator **+** (see Figure 6.16, Steps 4 and 5). Then, you must enter the description and confirm the definition by clicking on the **OK** button (see Figure 6.16, Steps 6 and 7). The interim total is taken over into the query definition as a row element (see Figure 6.16, Step 8).

Then, for the example with the company codes 3000 and 4000 (according to the detailed specification, rows 13 to 14), you must repeat Steps 3 to 7 according to Figure 6.15. For the interim total (according to the detailed specification, row 15), you must repeat Steps 2 to 7 according to Figure 6.16. Then, the total line (according to the detailed specification, row 16) must be formed either according to Figure 6.16 via formula (row

12 plus 16) or according to Figure 6.15—which is more reliable with respect to new companies—with a restriction-free row.

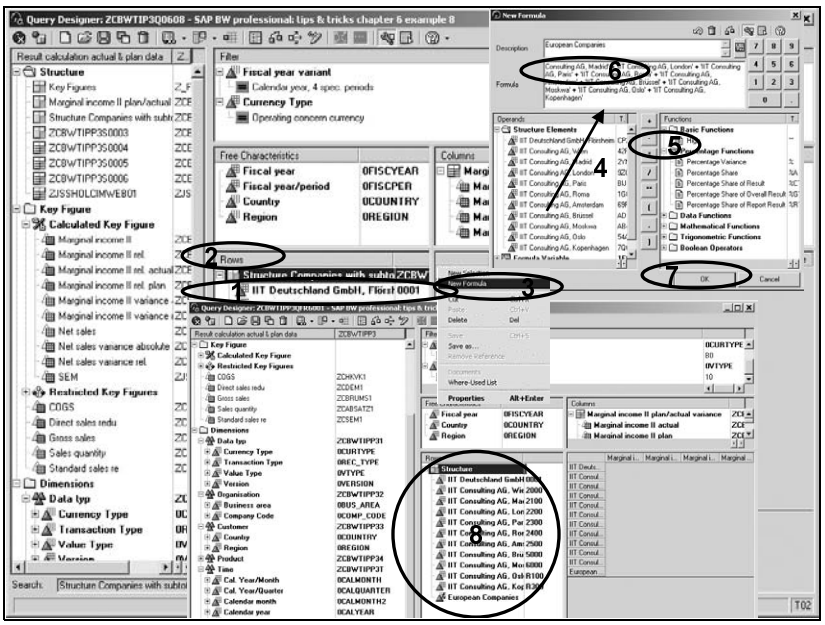

Figure 6.16 Takeover of the Selection of Companies and the Definition of the Interim Total

Mapping of the percentage shares

Thus all required individual positions and total rows are available in the query definition (see Figure 6.17, Step 1). Henceforth, there remains from the detailed specification the mapping of the percentage shares of the interim totals of the total. In the Query Designer, right-click on the **Structure** folder in the **Rows** frame to open the context-sensitive menu. Select the **New Formula** function (see Figure 6.17, Steps 2 and 3). In the **New Formula** pop-up, using drag & drop, ensure that the structural element with the first interim total (row 12) is taken over into the formula. Also using drag & drop, the function percentage share (**%A**) must be taken over into the formula and then into the query element **Total** (see Figure 6.17, Steps 4 to 6).

Then, enter the description and confirm that the definition is taken over by clicking on the **OK** button (see Figure 6.17, Steps 7 and 8). The percentage share of the first interim total is therefore taken over in the query definition. You must repeat this procedure for the second interim total (row 15) (see Figure 6.17, Step 9).

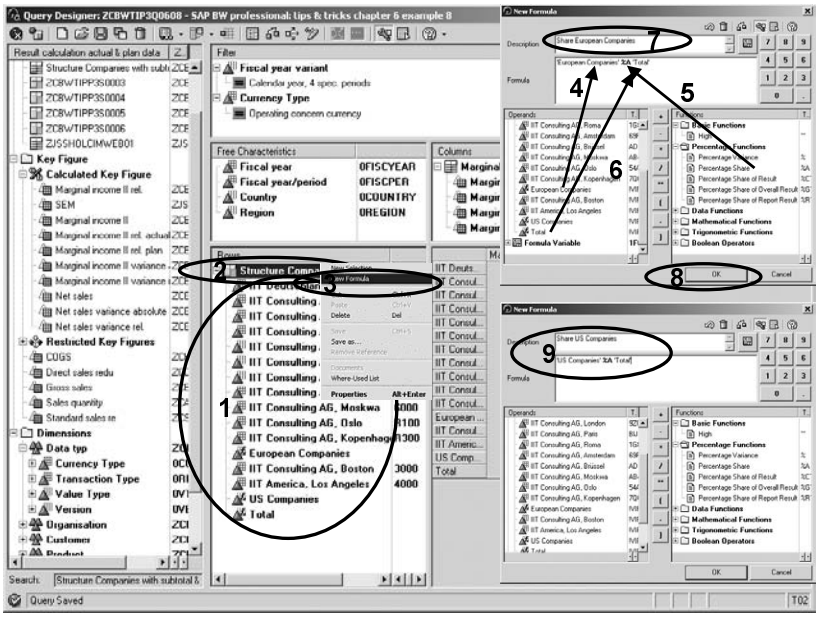

Figure 6.17 Acquisition of the Shares of the Interim Totals for the Total

Reusable structure

The detailed specification is mapped in the query as a local structure. In order to make this local structure available as a reusable object, you must right-click on the **Structure** folder in the **Rows** frame to open the context-sensitive menu. Select the **Save as...** function (see Figure 6.18, Steps 1 and 2). In the **Save Structure As...** pop-up, specify the technical name and description. Then, confirm the entries by clicking on the **OK** button (see Figure 6.18, Steps 3 to 5).

In the inventory frame, the new reusable structure is provided under the **Structure** folder. Similarly, the structure in the **Rows** frame receives the description and the name of the stored object (see Figure 6.18, Steps 6 and 7).

During the query execution, the data of the entire structure is displayed (see Figure 6.18, Step 8). The display of the query result also contains (in the rows with the percentage shares) the problem of display with a non-sensical number of places after the decimal point (see Section 6.3.1 on the display of keys). In addition to the nonsensical display, the formulas produce nonsensical values except in the columns "Marginal income II actual" and "Marginal income II plan." For more information, see Section 6.3.1 on the property "Formula collision."

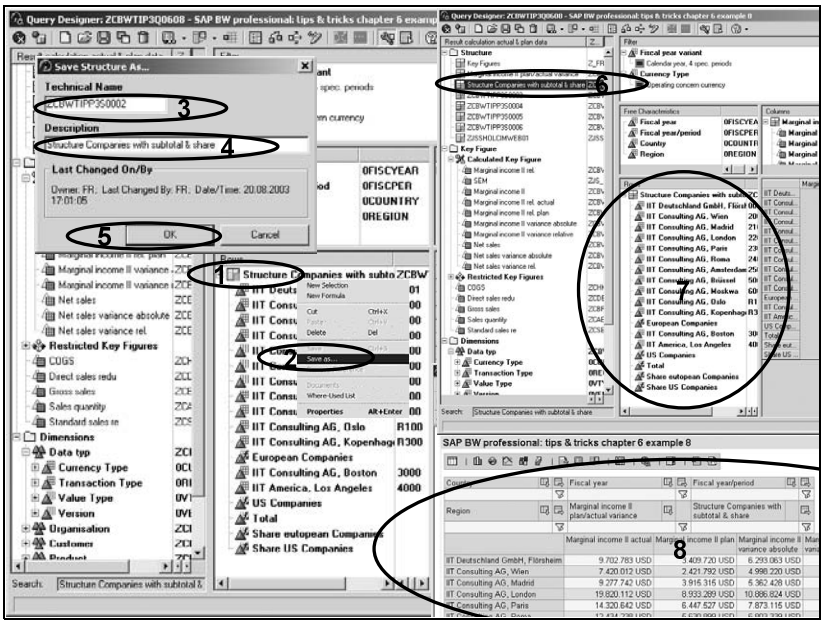

Figure 6.18 Saving a Local Structure as a Reusable Structure

6.3 Properties of Query Elements

6.3.1 Properties of Keys

Local and global properties

The properties of keys can be configured in different places in SAP BW. In queries, the properties of keys can be adjusted in two different places: if the setting occurs in local objects in the **Rows** or **Columns** frame, this setting affects only the changed query. If the setting occurs in global objects in the **Rows** or **Columns** frame, or in the (left) inventory frame, this setting affects all queries that use the changed element.

Changeable properties

On keys, the following properties can be changed:

- The description
- The display (e.g., highlighting)
- The numeric display (e.g., number of decimal places and sign reversal)
- The calculations (e.g., cumulative or non-cumulative)
- The currency conversion

Description

The description can be changed statically or dynamically (for dynamic change see Section 6.7.5). A static change can be necessary if, for example, another text or a multi-line title is required. In the example here, the

texts of the Marginal income II variance columns require a greater column width than that of the actual data; however, the table width available for the output is often a problem. With a two-line and abbreviated display, the available space is used more efficiently.

In order to change the column title "Marginal income II variance absolute" to the two-line display

Marginal income II
variance absolute

in the Query Designer, right-click on the **Columns** frame to open a context-sensitive menu and select the **Properties** function (see Figure 6.19, Steps 1 and 2). In the **Properties of the Selection/Formula** pop-up, specify the desired column title in the **Description** field and click on the **OK** button (see Figure 6.19, Steps 3 and 4). The changes are taken over into the query definition (see Figure 6.19, Step 5) and displayed according to the query after saving (see Figure 6.19, Step 6).

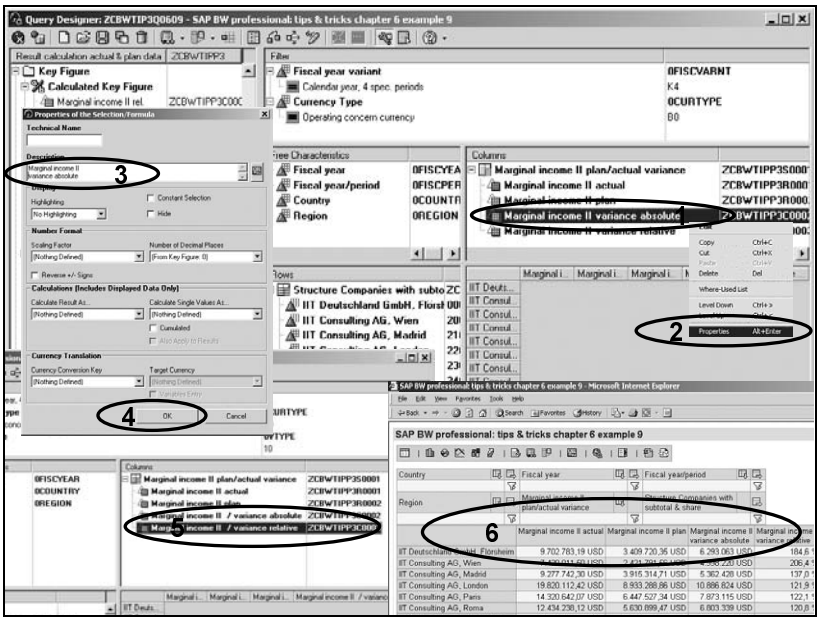

Figure 6.19 Changing the Column Title (Description)

Number display

In the default display of amounts, nearly all currencies are displayed with two decimal places. This type of setting is not practical for many reports. Therefore, you can change the numeric display, for example, in the calculated key "Marginal income II." This has the advantage that you can

implement a change that will affect both restricted keys based on this calculated key and therefore the structure itself.

In the Query Designer, right-click on the calculated key "Marginal income II" to open the context-sensitive menu and select the **Properties** function (see Figure 6.20, Steps 1 and 2). In the **Properties of the Calculated Key Figure** pop-up, activate the **Number of Decimal Places** drop-down box and select the value that you want (see Figure 6.20, Step 3). Click on the **OK** button (see Figure 6.20, Step 4) to save the value. The changed setting will now display during the execution of the query: in the example, the columns "Marginal income II actual" and "Marginal income II plan" appear without places after the decimal point (see Figure 6.20, Step 5).

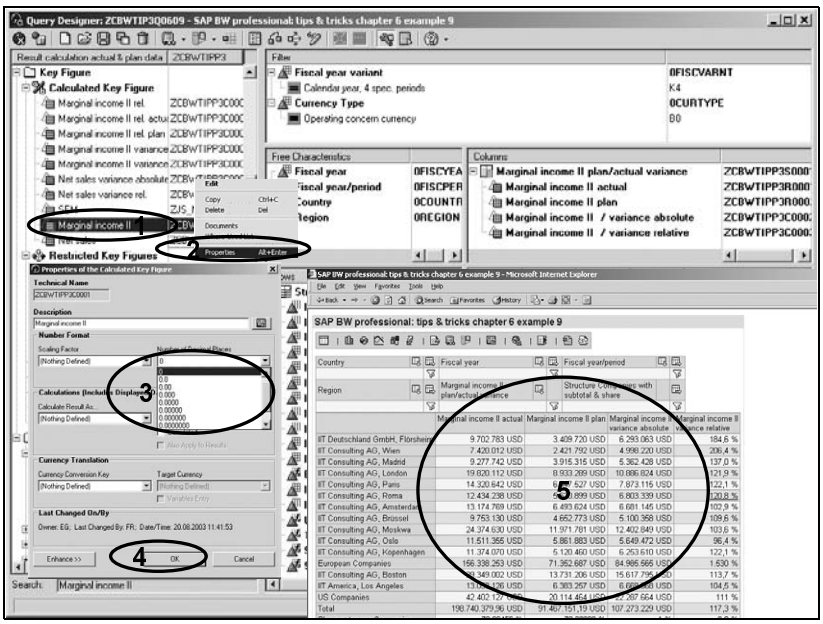

Figure 6.20 Changing the Numeric Display in the Calculated Key

So that the columns "Marginal income II variance absolute" and "Marginal income II variance relative" are displayed with a desired number of decimal places, you can set the properties for these in the same manner—either for the calculated keys or in the structure.

Calculations

If, in a query with a row feature (e.g., "Company code"), you should not display the amount of a physical, calculated, or restricted key, but you should dynamically display the share of the companies of the total, then you can map this information with the property "Calculate individual values as ..." .

In the Query Designer, right-click on the key "Marginal income II actual" in the **Rows** frame to open the context-sensitive menu and select the **Properties** function (see Figure 6.21, Steps 1 and 2). In the **Properties for the Selection/Formula** pop-up, activate the **Calculate Single Values As...** drop-down box and select the setting **Normalize Overall Result** (see Figure 6.21, Step 3). Click on the **OK** button (see Figure 6.21, Step 4) to save the setting. Now, the changed setting will display during the execution of the query: instead of the display of amounts, the display of the percentage shares of the total will appear (see Figure 6.21, Step 5).

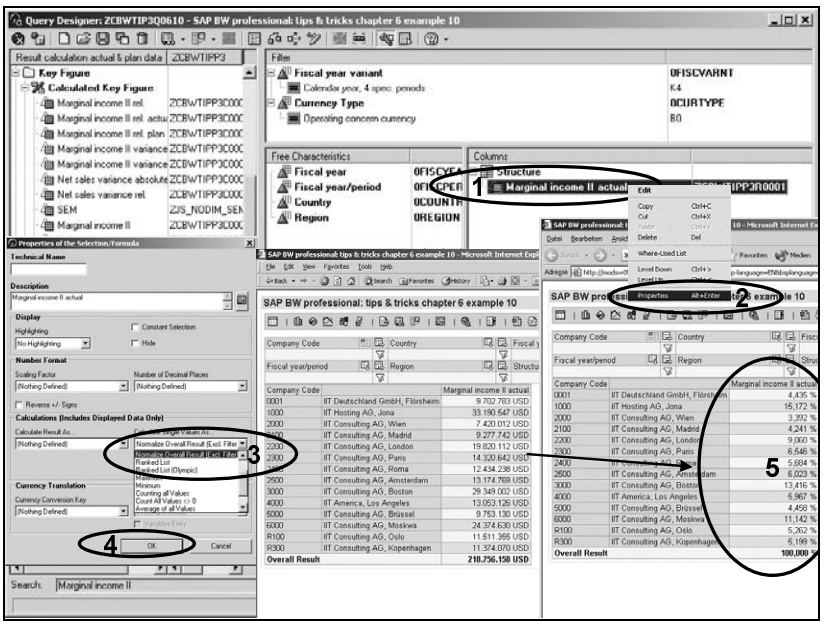

Figure 6.21 Calculation: Normalization of Total Result

Currency conversion

The SAP currency conversion functionality is also available in SAP BW: for example, the currency conversion can occur at the booking time and during query execution. The currency conversion during the query execution can be selected either during the execution or in the query design. In the query design, the configuration of the currency conversion occurs in the course of the properties of keys.

In this example, the amount in the original currency (here: "USD") is contrasted with the amount converted into Euros in an additional key column. Here, two columns with the same data content (here: "Marginal income II actual") must be defined with corresponding column titles.

To set the currency conversion, right-click on the desired column to open the context-sensitive menu and select the **Properties** function (see Figure 6.22, Steps 1 and 2). In the **Properties of the Selection/Formula** pop-up, activate the **Currency Conversion Key** drop-down box and select the desired conversion type (in the example: "Currency Conversion Key ZK03 (ZK03)") (see Figure 6.22, Step 3). Then, in the property's **Target Currency** drop-down list, select the desired currency (in the example: "Euro") (see Figure 6.22, Step 4). Click on the **OK** button to save the setting. The settings are taken over into the query (see Figure 6.22, Step 5). After you save the setting, during query execution, the display of the two currencies occurs on the basis of the set conversion type and the stored conversion exchange rate (see Figure 6.22, Steps 6 and 7).

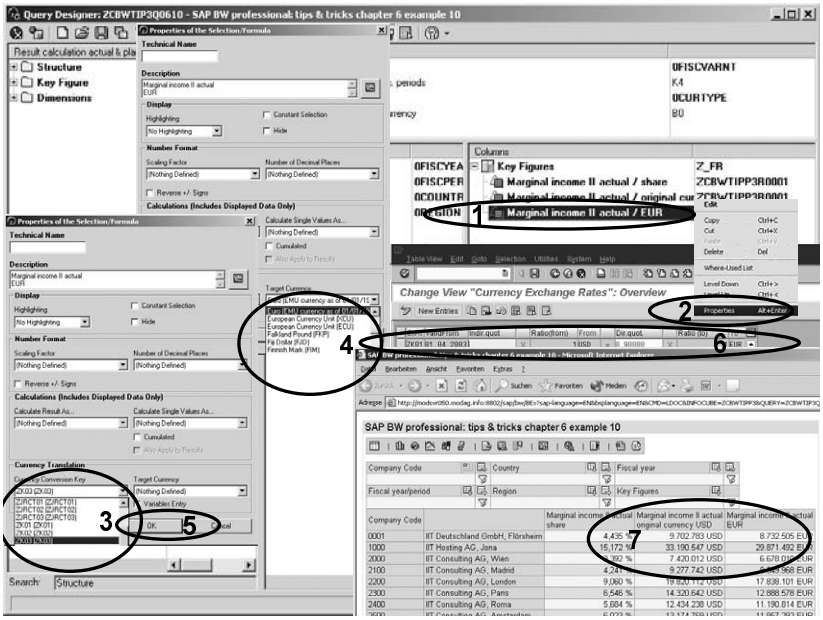

Figure 6.22 Currency Conversion in the Query

6.3.2 Properties of Characteristics and Structural Elements

For characteristics and structural elements, which have no keys, you can set properties regarding display and processing logic.

Characteristic display

For characteristics that contain keys and texts, you can set the characteristic display in the Query Designer. If, for example, the display of company codes should be changed so that only the company code designa-

tion appears in a query, proceed as follows: right-click on the desired characteristic to open the context-sensitive menu and select the **Properties** function (see Figure 6.23, Steps 1 and 2). In the **Characteristic Properties for Characteristic Company Code** pop-up, in the **Display As** section, activate the **Key and Name** drop-down box and select the setting **Name** (see Figure 6.23, Step 3).

Click on the **OK** button to save the setting. The settings are taken over into the query (see Figure 6.23, Step 4). After you save the setting, the changed display of the characteristic occurs during query execution (see Figure 6.23, Step 5).

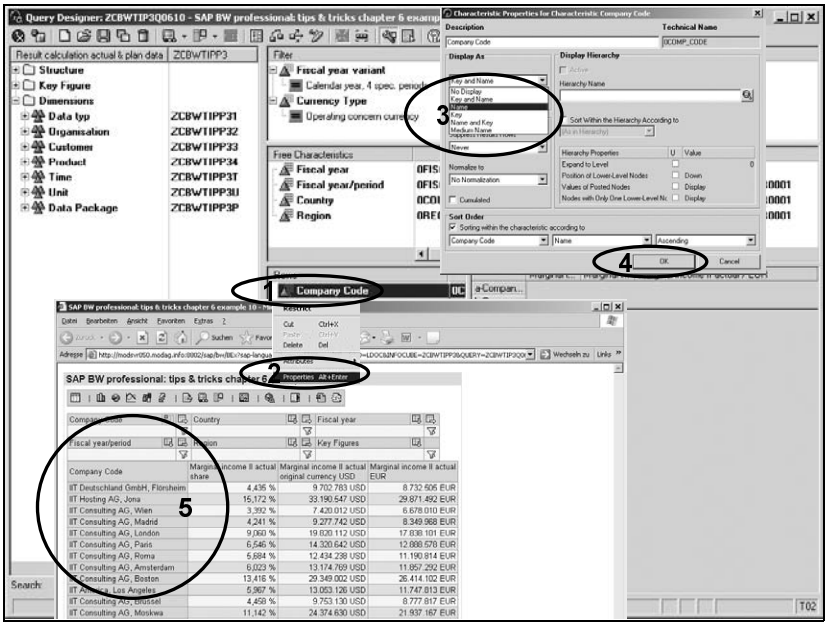

Figure 6.23 Characteristic Display

Sorting

For row and free characteristics, you can set the sorting in the Query Designer. Right-click on the desired characteristic to open the context-sensitive menu and select the **Properties** function (see Figure 6.24, Steps 1 and 2). In the **Characteristic Properties for Characteristic Company Code** pop-up, activate the **Sort Order** checkbox (see Figure 6.24, Steps 3 and 4). As for the characteristic-relevant sorting criterion, select the characteristic or attribute in the left drop-down box (see Figure 6.24, Step 4). Specify in the middle drop-down box whether sorting should occur according to name or key (see Figure 6.24, Step 5). Then, specify whether the sorting direction should be ascending or descending in the right drop-down box

(see Figure 6.24, Step 6). Click on the **OK** button to save the settings. The settings are now taken over into the query (see Figure 6.24, Step 7). After you save the settings, the changed sorting settings of the characteristic are applied during query execution (see Figure 6.24, Step 8).

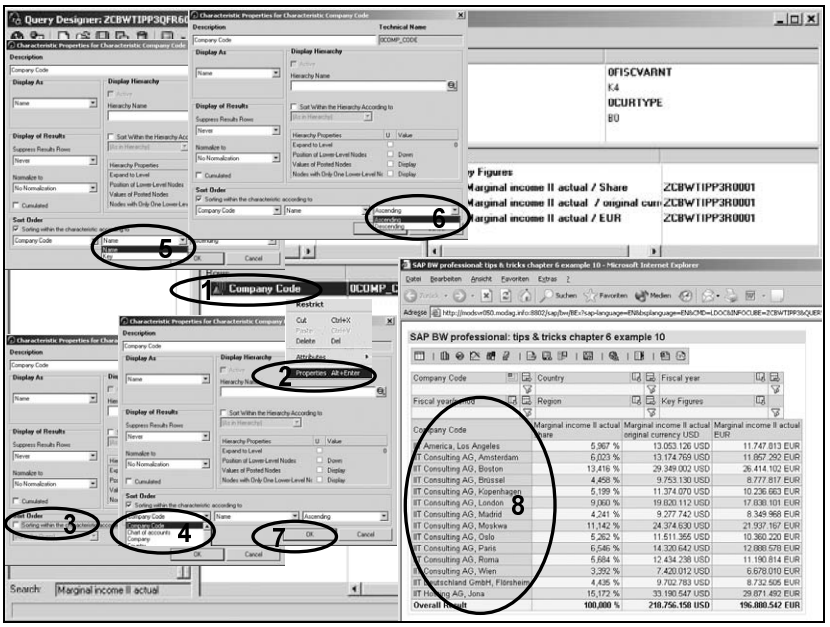

Figure 6.24 Setting the Sorting Properties

Highlighting

The setting of properties is also available for characteristic structures. On the one hand, highlighting of total rows, and so forth, is especially required in fixed structures.

Right-click on the desired row or column element to open the context-sensitive menu and select the **Properties** function (see Figure 6.25, Steps 1 and 2). In the **Properties of the Selection/Formula** popup, activate the **Highlighting** drop-down box and select the desired value (see Figure 6.25, Step 3). Click on the **OK** button to save the setting. The settings are taken over into the query (see Figure 6.25, Step 4). After you save the settings, the changed display is applied during query execution (see Figure 6.25, Step 5).

Although the attributes considered for highlighting are difficult to recognize using SAP style sheets, you can use the many offerings of Web technology to assist you (i.e., individual style sheets, color and font attributes, etc.).

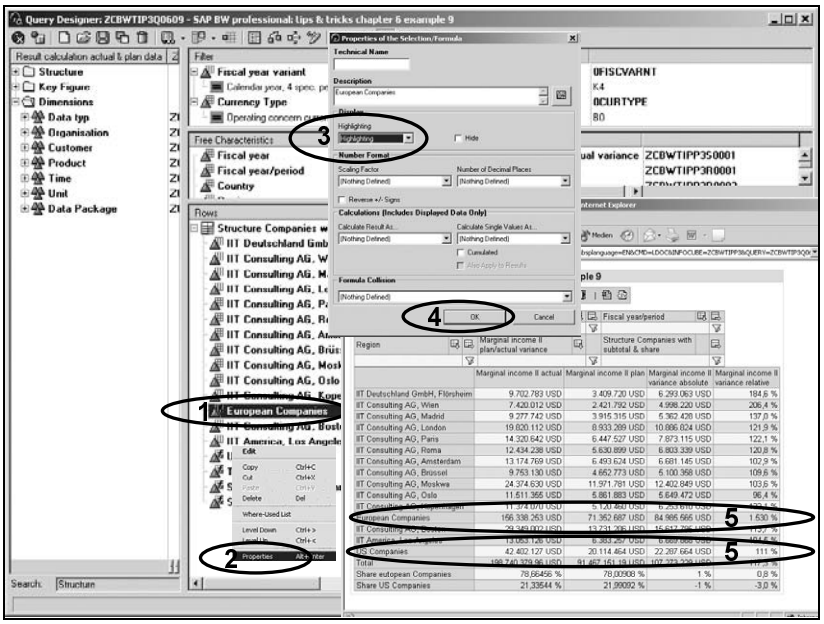

Figure 6.25 Highlighting of Structural Elements (Here: Rows)

As you can discern from Figure 6.25, attributes for customizing key display—such as the number of decimal places to be displayed—are available. These properties are especially relevant if formula collisions arise in queries with structures in rows and columns that produce nonsensical displays (see Figures 6.25 and 6.26). By setting the number of decimal places in the characteristic structure, you can correct this display.

Formula collision

When you examine the result table in Figure 6.25, you'll notice the nonsensical values in both right columns in the two bottom rows—as a result of a formula collision. In the example, instead of the actual share of the European and U.S. companies of the variance in the column "Marginal income II variance absolute," the non-expressive absolute difference of the shares of both company interim totals is displayed as a result of the default formula priority of the column formulas. To realize a correct display, therefore, the formula collision property is available.

Right-click on the desired row or column element (in the example: the rows **Share of European companies** and **Share of U.S. companies**) to open the context-sensitive menu and select the **Properties** function (see Figure 6.26, Steps 1 and 2). In the **Properties of the Selection/Formula** pop-up, activate the **Formula Collision** drop-down box and select the value result from this formula (see Figure 6.26, Step 3). Click on the **OK**

button to save the setting. The settings are taken over into the query (see Figure 6.26, Step 4). After you save the settings, the changed formula priority is applied during query execution and the formula is applied (in the example, the sensible **RowFormula** (see Figure 6.26, Step 5).

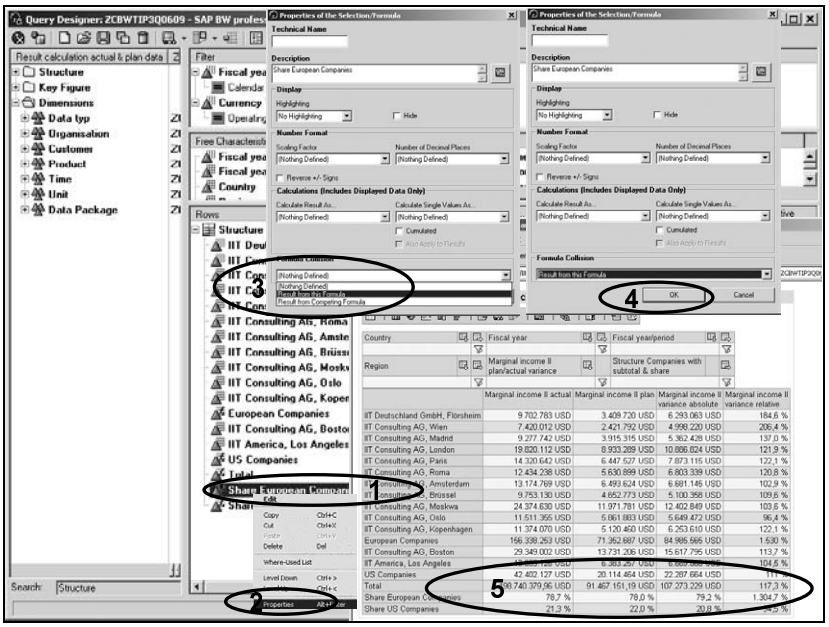

Figure 6.26 Setting of the Query Behavior in Case of Formula Collisions

6.4 Hierarchies

6.4.1 Introduction

The hierarchical display of data is very significant for professional reporting. On the one hand, much reporting-relevant data is organized hierarchically: the aggregation across materials occurs based on the product hierarchy; the aggregation across customers occurs based on the customer hierarchy; the structure of the balance sheet and the income statement follows a hierarchical structure, and so forth.

In many databases, data warehouses, and management information systems, hierarchies are mapped exclusively across attributes or summarizing characteristics. This type of mapping is suitable for only some of the demands. Because most hierarchies are not leveled (that is, not all "leaves" are on the same hierarchical level), the correct mapping of hierarchies is vital for many analytic demands.

With SAP BW, SAP provides a complete solution for the correct mapping and use of hierarchies. This solution organizes the master data object (characteristic "account," "customer," "material," etc.) into hierarchies, which can be used for each evaluation in which a hierarchy-bearing characteristic is used.

6.4.2 The Use of Hierarchies in the Query Designer

Hierarchy display in the leading column

If there are one or several hierarchies for a characteristic, you can set these hierarchies in the Query Designer as a display property. During query execution, the specified hierarchy is displayed.

Right-click on the desired characteristic (in the example: "Country") to open the context-sensitive menu and select the **Properties** function (see Figure 6.27, Steps 1 and 2). In the **Characteristic Properties for Characteristic...** pop-up, click on the button for hierarchy selection (see Figure 6.27, Step 3). The **Select Hierarchy** pop-up opens. Select the desired hierarchy by highlighting it and confirm your selection by clicking on the **OK** button (see Figure 6.27, Steps 4 and 5). Then, enter the selected hierarchy (in this example: "Country") in the **Characteristic Properties for Characteristic...** pop-up and click on the **OK** button to confirm your selection. The settings are taken over into the query definition (see Figure 6.27, Steps 6 and 7).

The setting that displays the characteristic as hierarchy during query execution is visualized in the Query Designer (see Figure 6.28, Step 1). During execution of the query, the hierarchy is displayed according to the customizing settings you applied (see Figure 6.28, Step 2). In addition to the functions possible for lists of characteristic values (navigation and editing of the settings by clicking on a value, etc.) with the hierarchy, there are also additional functions available: by clicking on the hierarchy node symbol (▼ for opened and ▶ for closed partial trees), you can open or close the entire hierarchy and/or a partial tree (see Figure 6.28, Step 3). Also, the context-sensitive menu offers special functions (activate/deactivate hierarchy, expand the entire hierarchy up to a specified level, etc.) for hierarchies on hierarchy nodes or hierarchy leaves (that is, characteristic values).

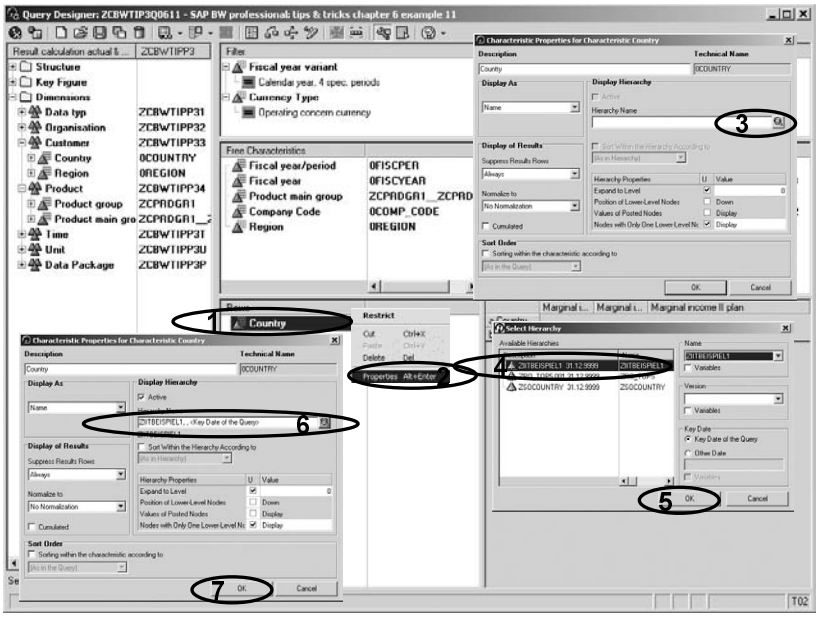

Figure 6.27 Configuration of the Hierarchy Display in the Query Designer

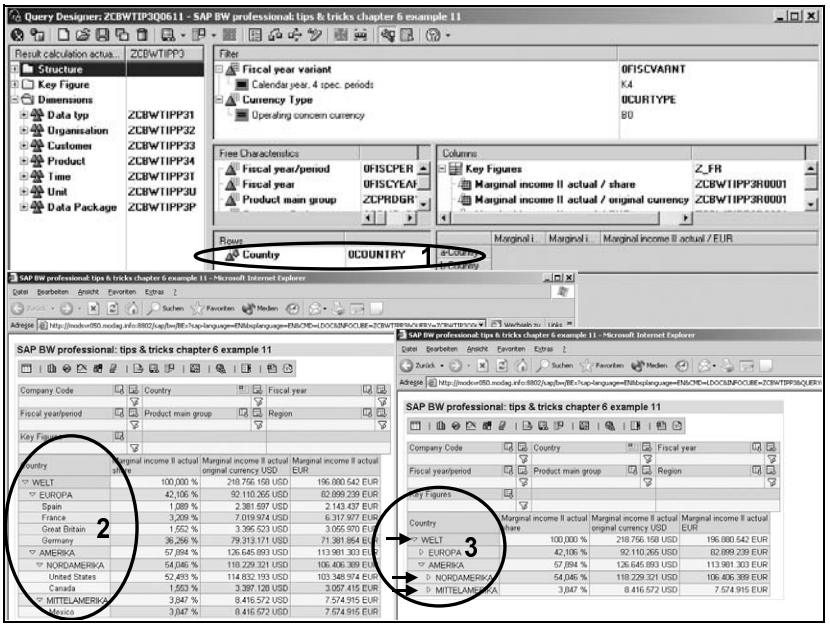

Figure 6.28 Display of the Hierarchy During Query Execution

The same steps are required if you want to display a hierarchy in the columns. During the execution of a query, the same functions are available (see Figure 6.29).

Horizontal hierarchy display

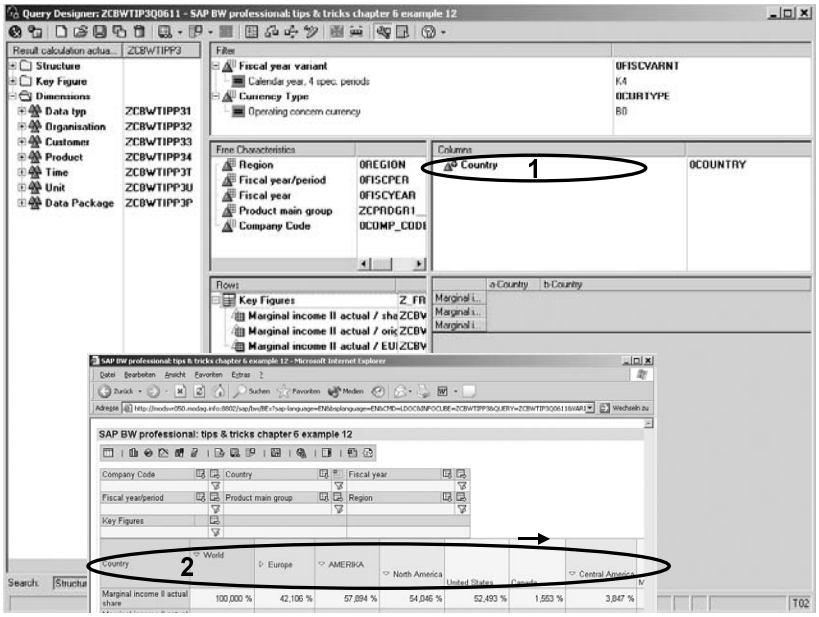

Figure 6.29 Hierarchy Navigation in the Columns

You can also display various hierarchies simultaneously in the rows and columns. The mixed display of hierarchies and characteristics has been supported since SAP BW 3.0. The display can occur without additional settings (see Figure 6.30, variant 1: hierarchy and characteristic, variant 2: characteristic and hierarchy).

Hierarchy and characteristic displayed mixed

If desired, the mixture of hierarchies and characteristic values can also be displayed hierarchically: in the Query Designer, right-click on the title of the **Rows** frame to open the context-sensitive menu and select the **Display as a Hierarchy** function (see Figure 6.31, Steps 1 and 2). Afterwards, the hierarchy symbol is added to the frame title (see Figure 6.31, Step 3). After you save the query, all breakdowns in the row—regardless of whether they are hierarchy or characteristic breakdowns, or a mixture of hierarchies and characteristics—are displayed hierarchically (see Figure 6.31, Step 4, as well as Figure 6.32, Steps 1 and 2).

Displaying hierarchy and characteristic breakdown as hierarchy

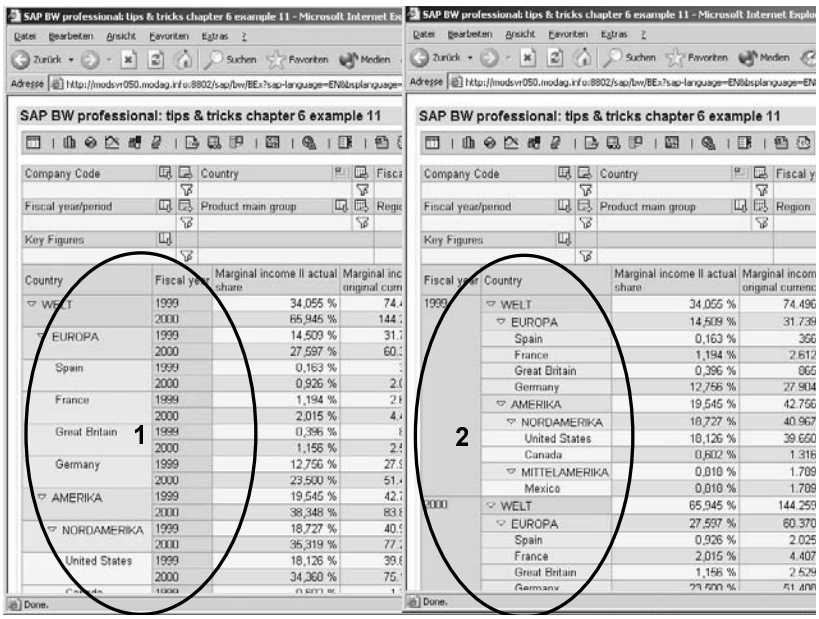

Figure 6.30 Hierarchy and Characteristic Displayed Mixed

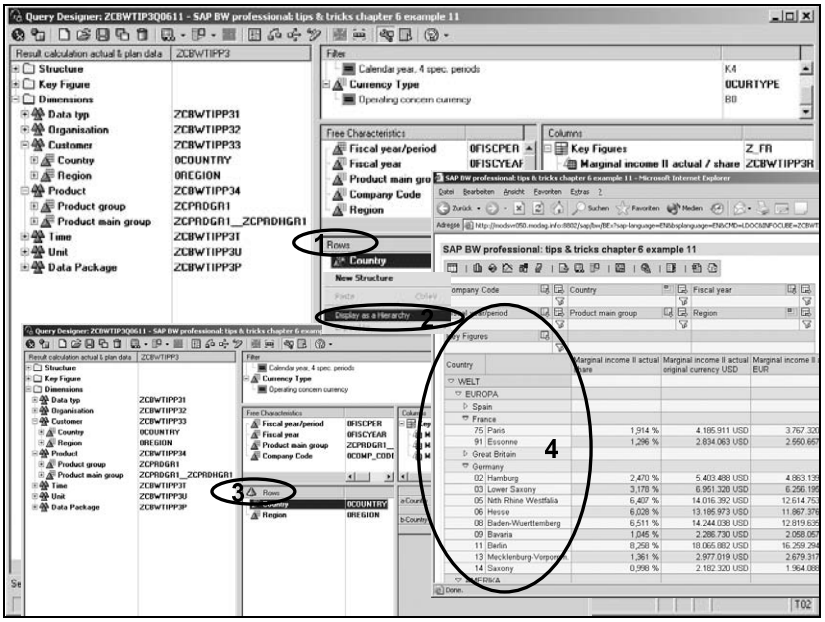

Figure 6.31 Hierarchies and Characteristic Drilldowns as Hierarchy

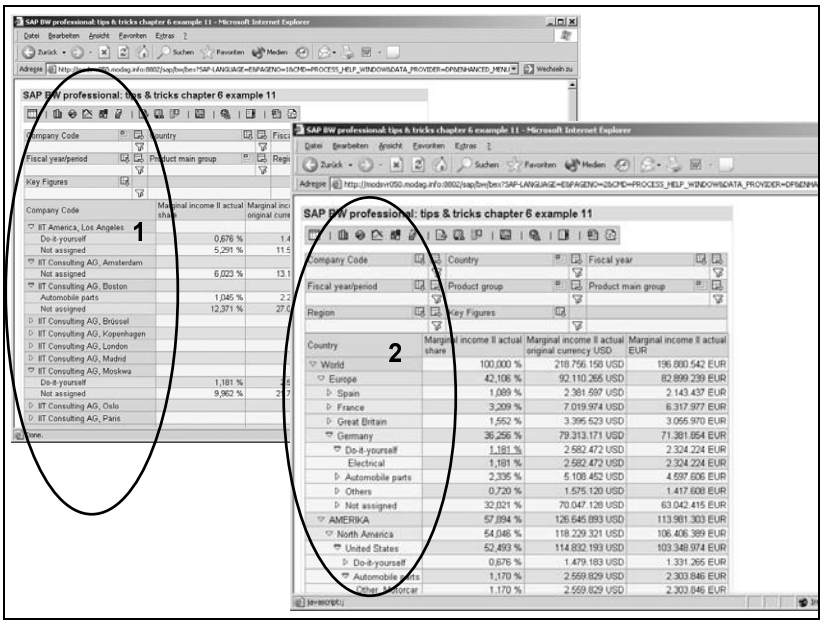

Figure 6.32 Characteristics as Hierarchies and Mixed Hierarchies

Key hierarchies can be formed via the function **Display as a Hierarchy** (see Figure 6.33, Step 1) and the option of the hierarchical arrangement of keys (leveling function). **Key hierarchy**

As preparation, you can use drag & drop to copy all desired keys into the Rows frame. After that, you can use the Level Down function as often as necessary to display the keys in hierarchy nodes or hierarchy leaves until these leaves are positioned on the key tree as desired. In the Query Designer, right-click on the key to be positioned and select the Level Up function (see Figure 6.33, Steps 2 and 3). After you save the setting, the keys behave like a hierarchy during query execution (see Figure 6.33, Step 4). Therefore, the aggregation behavior and the calculation of the respective keys is not changed.

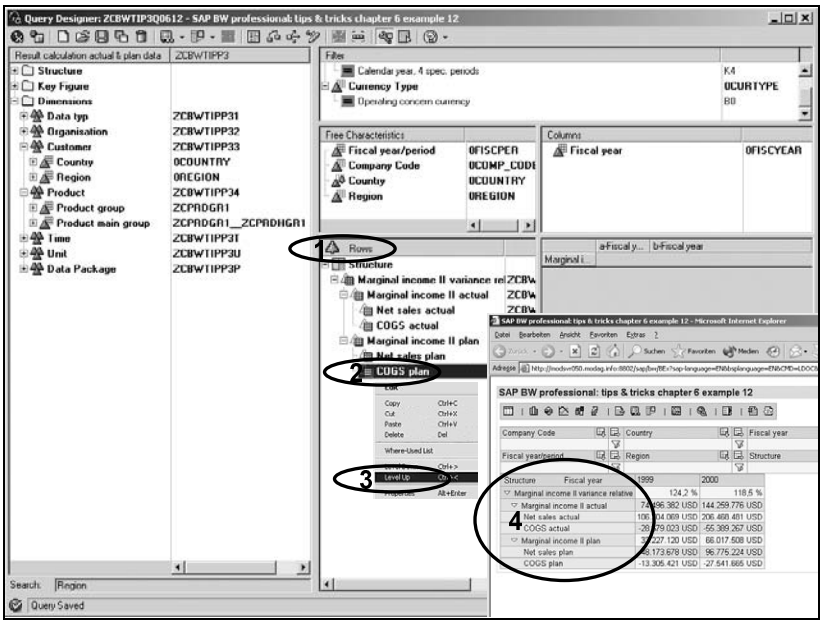

Figure 6.33 Visualization of the Key Hierarchies

6.5 Conditions

6.5.1 The Concept and the Available Types of Conditions in SAP Business Explorer

Principle of the Conditions

Conditions control the restriction of the result area in SAP BW queries; however, they have no influence on result rows—the result row corresponds to the result row of the query without this condition. Several conditions can be defined for a query. They are connected logically with AND; that is, different conditions affect the query simultaneously, insofar as all are active.

Available types of conditions

Using conditions, you can restrict the view of the data of a query as follows:

- **Absolute conditions**
  A row is filtered independently of the other rows if its reference value exceeds a particular threshold value. The available restrictions are:
  - Equal to/not equal to
  - Less than/greater than
  - Less than or equal to/greater than or equal to
  - Between/not between

- **Ranking lists**
  Here, all rows of the displayed list are considered and their relationship to one another determines whether the row will be displayed. Ranking lists are always sorted automatically. The following operations are available for the creation of ranking lists:
  - Top N, bottom N: the ranking lists reflect a particular number.
  - Top percent, bottom percent: the ranking lists reflect a certain percentage.
  - Top total, bottom total: the ranking lists represent a particular total value.

6.5.2 The Use of Conditions in SAP Business Explorer

Conditions of the type "absolute condition"

An example of the application of an absolute condition is the analysis of the relevant markets by eliminating low-ranked values. In the example, all regions with 5,000,000 Euros and more must be displayed; the other regions must be excluded from the display.

Click on the **Condition** button in the Query Designer and select the **New Condition** function (see Figure 6.34, Steps 1 and 2). In the **Define Condition** pop-up, a description is specified, and via activation or deactivation of the **Active** option, you determine whether or not the condition should be applied automatically during query execution (see Figure 6.34, Steps 3 and 4).

Because this absolute condition is not practical in every drill-down state (if an additional drilldown—for example, according to periods—occurs within the regions), click on the option box under the property **Evaluate the conditions displayed below for single characteristics or combinations of characteristics** and select the desired characteristic (in the example, the "Region") (see Figure 6.34, Steps 5 and 6). Then, click on the **New** button to see the display of drop-down boxes and input fields for specifying the condition (see Figure 6.34, Step 7). Activate the drop-down box for selecting the keys and select the desired key (in the example: "Marginal income II actual EUR") (see Figure 6.34, Step 8). Then, click on the drop-down box for selecting the operator, and select the desired operation (in the example: "Greater than or equal to") (see Figure 6.34, Step 9). Specify the desired threshold value in the **Values** input field, and then click on the **Transfer** button (see Figure 6.35, Steps 1 and 2).

The condition is then adopted into the list. Complete the definition of the condition by clicking on the **OK** button (see Figure 6.35, Steps 3 and 4).

After you save the defined condition, it is applied automatically during query execution (see Figure 6.35, Step 5).

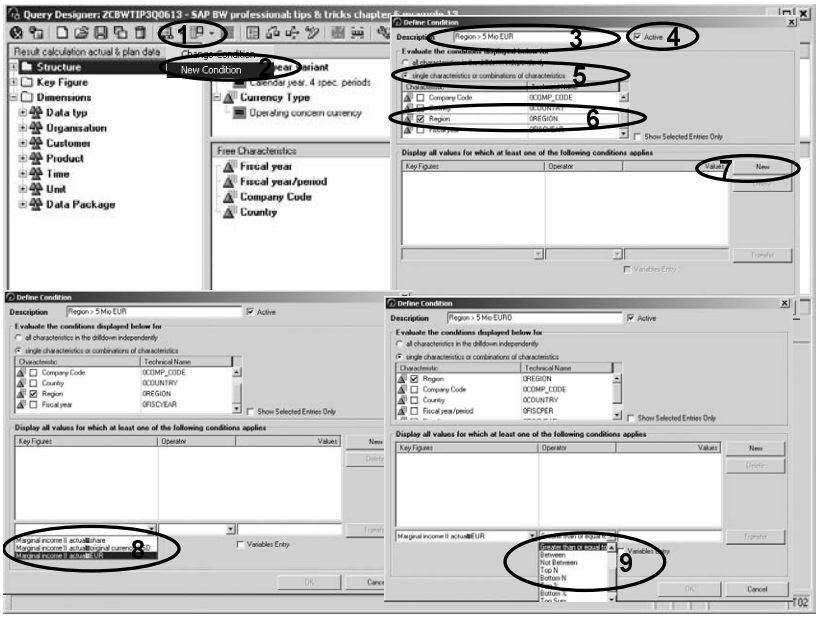

Figure 6.34 Absolute Condition, Part 1

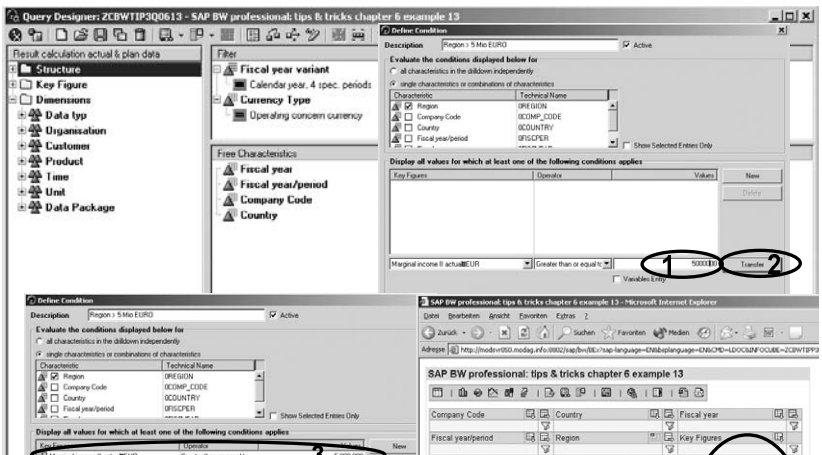

Figure 6.35 Absolute Condition, Part 2

Conditions of the type "ranking list"

An example for the application of a ranking list is the analysis of the relevant values of the drill-down characteristic "Selection" of the respective top values. In the example, those values should be listed independently for all characteristics in the drilldown that collectively represent at least 80% of the total result.

The definition is analogous to that of the absolute condition. Deviating from the example with an absolute ranking list, in the present example, the condition is applied for all characteristics in the breakdown. As operator, **Top %** is selected and the associated percentage value (in the example: 80%) is entered (see Figure 6.36, Steps 1 to 4).

You conclude the definition of the condition by clicking on the **OK** button (see Figure 6.36, Step 5). After you save the definition, the condition is applied automatically during query execution (see Figure 6.36, Step 6). As many values as necessary are displayed in the list (automatically sorted in ascending order) until the threshold value is reached, or it is exceeded for the first time.

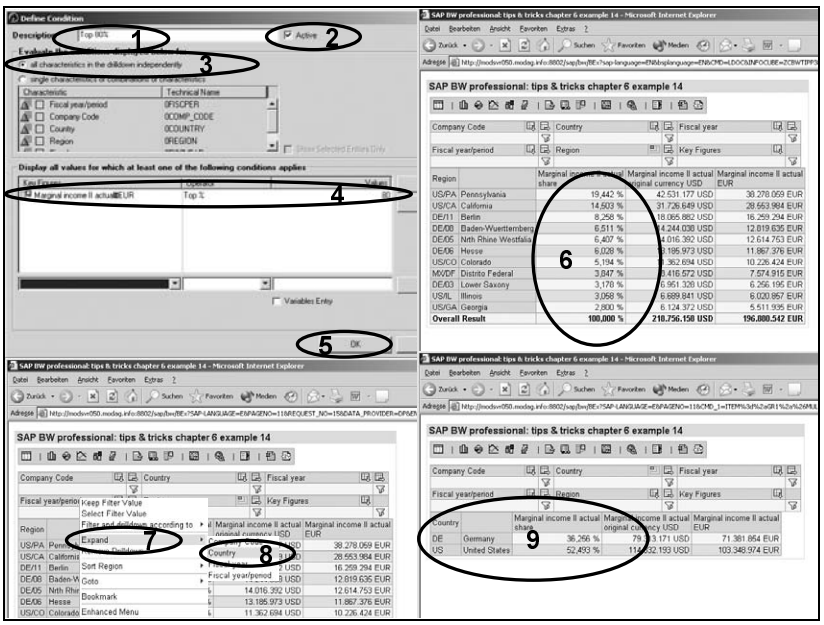

Figure 6.36 Ranking List Condition

If, in the query, you navigate to another list criterion (in the example: via context-sensitive menu to "Country"), then the defined condition is applied to this characteristic as well (see Figure 6.36, Steps 7 to 9).

Definition of conditions during query execution

To ensure that conditions will not simply be defined statically in the Query Designer, you can also define conditions during the execution of a query (see Figure 6.37).

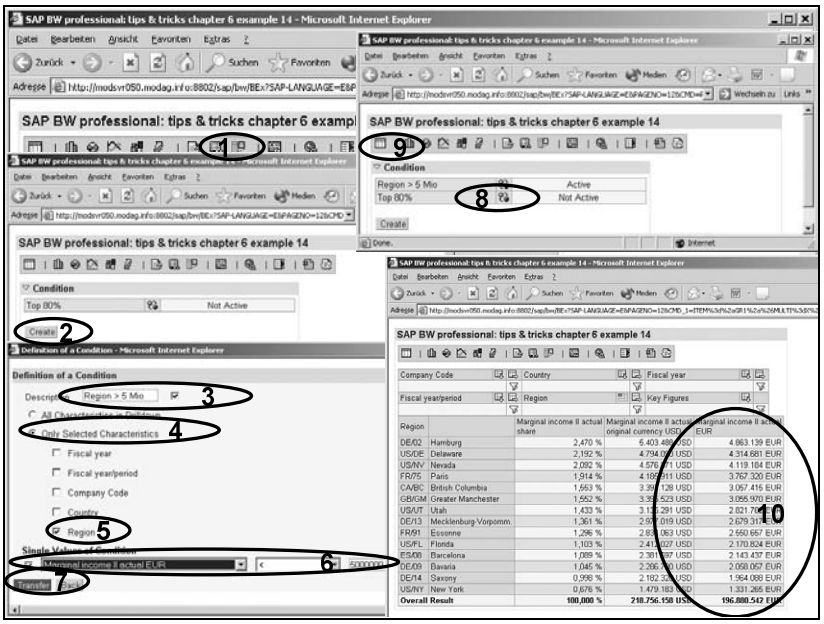

Figure 6.37 Definition of a Condition During Query Execution

In a displayed query, you must select the **Conditions** function by right-clicking (see Figure 6.37, Step 1). Then, the list is displayed with the already existing conditions. Click the **Create** button (see Figure 6.37, Step 2). The **Definition of a Condition** window opens. There, like the previous description of a condition, all required specifications and selections must be made (see Figure 6.37, Steps 3 to 7): in the example, all regions are selected in which fewer than 5 million "Marginal income II" was achieved. After you click on the **Transfer** button, the program returns to the list of conditions. If conditions contradict each other and the AND link of the conditions is not desired, you can simply click on the **Not Active** button (see Figure 6.37, Step 8).

To apply the defined condition in runtime, click on the **Table** button, and the result table is displayed (see Figure 6.37, Steps 9 and 10).

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