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Introduction to Data Grids

Data grids are tables. In SAS Business Rules Manager, you can use a data grid as the value of a table cell. For example, suppose you have a table containing the data for all of the insurance policies for all of your customers. This table might look like the table shown in Table 1.1.

<table>
<thead>
<tr>
<th>PolicyHolder</th>
<th>PolicyNumber</th>
<th>YearlyPremium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smyth, Joe</td>
<td>453975R398</td>
<td>439.50</td>
</tr>
<tr>
<td>Smyth, Joe</td>
<td>987348P210</td>
<td>132.90</td>
</tr>
<tr>
<td>Dupree, Marcel</td>
<td>983092B228</td>
<td>334.00</td>
</tr>
<tr>
<td>Dupree, Marcel</td>
<td>274933P412</td>
<td>219.25</td>
</tr>
</tbody>
</table>
Alternatively, you can use a data grid to store the policy information as represented in Figure 1.1.

**Figure 1.1 Insurance Policy Table Using Data Grids**

<table>
<thead>
<tr>
<th>PolicyHolder</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smyth, Joe</td>
<td>PolicyNumber</td>
</tr>
<tr>
<td></td>
<td>453975R398</td>
</tr>
<tr>
<td></td>
<td>987348P210</td>
</tr>
<tr>
<td>Dupree, Marcel</td>
<td>PolicyNumber</td>
</tr>
<tr>
<td></td>
<td>983092B228</td>
</tr>
<tr>
<td></td>
<td>274933P412</td>
</tr>
</tbody>
</table>

The information in the data grid column is represented by a JavaScript Object Notation (JSON) string. For example, if the table shown in Figure 1.1 is changed to use a data grid, the table is serialized as shown in Table 1.2.

**Table 1.2 Serialized Insurance Policy Table**

<table>
<thead>
<tr>
<th>PolicyHolder</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smyth, Joe</td>
<td>[&quot;metadata&quot;: [&quot;POLICYNUMBER&quot;: &quot;string&quot;],</td>
</tr>
<tr>
<td></td>
<td>&quot;YEARLYPREMIUM&quot;: &quot;decimal&quot;], &quot;data&quot;: [&quot;453975R398&quot;, 439.50,</td>
</tr>
<tr>
<td></td>
<td>&quot;987348P210&quot;, 132.90]]]</td>
</tr>
<tr>
<td>Dupree, Marcel</td>
<td>[&quot;metadata&quot;: [&quot;POLICYNUMBER&quot;: &quot;string&quot;],</td>
</tr>
<tr>
<td></td>
<td>&quot;YEARLYPREMIUM&quot;: &quot;decimal&quot;], &quot;data&quot;: [&quot;983092B228&quot;, 324.00,</td>
</tr>
<tr>
<td></td>
<td>&quot;274933P412&quot;, 219.35]]]</td>
</tr>
</tbody>
</table>

To process the data in the data grid, you could define a term named Policies of type DATAGRID and use the functions described in Chapter 3, “Data Grid Functions,” on page 13 to process the data. For example:

DATAGRID_GET(Policies, 'PolicyNumber', 2)

For policy holder Joe Smyth, this function call returns 987348P210.

**Note:** In this example, you define terms for only the PolicyHolder and Policies columns. You do not define terms for the PolicyNumber and YearlyPremium columns within the data grid.
How to Use Data Grids In SAS Business Rules Manager

Important: You cannot use data grids in decision condition expressions or models. If you need to use a value calculated from a data grid in a decision condition expression, calculate the value in a rule set, assign the value to an action term, and then use the action term in the decision condition expression.

1. In SAS Management Console, enable the use of data grids by setting the `brm.datagrid.type.enabled` configuration property to `true` and verifying that the `brm.runtime.codetype` property is set to `DS2`.

2. Use the `%DCM_SERIALIZEGRID` macro to serialize your data grid into a JavaScript Object Notation (JSON) string. The data grid must be serialized if it is used in a rule flow that meets either of the following criteria:
   - The rule flow is used in a test.
   - The rule flow is published for use in SAS Data Integration Studio.

   Note: Data grids that are used in jobs that are deployed to SAS Micro Analytic Service are automatically serialized when a job that uses the data grids is sent to the service. If your job is deployed only to SAS Micro Analytic Service, you do not need to use the `%DCM_SERIALIZEGRID` macro to serialize the data grids.

3. To combine data from multiple tables into one table, use the `%DCM_MERGESERIALIZEDGRIDS` macro. This macro merges multiple data grids and scalar data together into one table.

   Note: If you write the serialized data grid term to a Base SAS table, the maximum size of the JSON string is 32,767 characters. The default size is 10,485,760 characters.


5. Define terms for the table columns that contain the data grid. Select Data Grid as the data type. See “Defining Data Grid Terms” on page 4 and “Create a Term” in SAS Business Rules Manager: User’s Guide for more information.

   Important: Defining terms for each column in the data grid is not necessary. Data grid columns are referred to by character literals, not by terms.

6. Use the functions described in Chapter 3, “Data Grid Functions,” on page 13 to access or modify data grid terms.

   Note: You can nest function calls. For example:

   `datagrid_count(datagrid_subsetByValue(assets, 'Asset_Type', 'Savings'))`

7. When you test SAS Business Rules Manager content that uses the data grid term, map the data grid term to the column in the input table that contains the data grid JSON string.
Enable the Use of Data Grids In SAS Business Rules Manager

The `brm.datagrid.type.enabled` and `brm.runtime.codetype` configuration properties in SAS Management Console enable the use of data grids and data grid functions in rule sets. You must have administrator privileges to enable the use of data grids.

To enable the use of data grids:

1. Complete the following steps in SAS Management Console:
   a. On the **Plug-ins** tab, select **Application Management** ⊲ **Configuration Manager** ⊲ **SAS Application Infrastructure** ⊲ **Enterprise Decision Manager 3.2**.
   b. Right-click **Business Rules Manager Web 3.2** and select **Properties**. The Business Rules Manager Web 3.2 Properties dialog box appears.
      
      *Note:* If you have migrated to SAS Business Rules Manager 3.2, SAS Management Console displays the release number that you migrated from. For example, if you migrated from SAS Business Rules Manager 2.2, SAS Management Console displays **Business Rules Manager 2.2**.
   c. On the **Advanced** tab, set the `brm.datagrid.type.enabled` property to **true**.
      
      *Note:* Click ☑ to enable editing for a property.
   d. Set the `brm.runtime.codetype` property to **DS2**.
   e. Click **OK** to close the Business Rules Manager Web 3.2 Properties dialog box.
2. Restart SASServer7. You must restart the server in order for changes to configuration properties to take effect.

Working with Rule Sets and Decisions That Reference Data Grid Terms

**Defining Data Grid Terms**

Data grid terms can be imported, exported, created, edited, and added to rule sets in the same way as other terms. When you are creating or importing data grid terms, the following guidelines apply:

- Domain values are not applicable to data grid terms.
- The columns within a data grid can contain only character or numeric data.
- In the SAS Business Rules Manager interface, define terms for only the columns that contain the data grids. Defining terms for each column in the data grid is not necessary. Data grid columns are referred to by character literals, not by terms.
Testing and Publishing Rule Flows and Decisions

When you are testing or publishing a rule flow that uses data grids, the following guidelines apply:

- You can publish rule flows that use data grids for use by SAS Data Integration Studio, but you cannot publish them as stored processes. See “Publish a Rule Flow” in *SAS Business Rules Manager: User’s Guide* for more information.

- Data grids and data grid functions are supported only in DS2 code. They are not supported for SAS DATA Step (DS1) code. See the description of the \texttt{brm.runtime.codetype} property in “Enable the Use of Data Grids In SAS Business Rules Manager” on page 4 for more information.

- The DS2 code generated by SAS Business Rules Manager can be executed in-database by the SAS Code Accelerator.

- When you are testing a rule flow or decision that uses DATAGRID terms, the DATAGRID terms must be mapped to character variables. When you are running a decision using the SAS Micro Analytic Service, the DATAGRID terms must be specified as a DATAGRID parameter.

- Data grids are not supported by SAS Real-Time Decision Manager or by risk products such as SAS Risk Dimensions and SAS Risk and Finance Workbench.

- In a decision, you cannot map DATAGRID terms to model variables.
Chapter 2
Data Grid Macros

Data Grid Macros Available in SAS Business Rules Manager

Dictionary

%DCM_SERIALIZEGRID

Creates a table in which one of the columns contains a JSON string that represents a data grid.

Note: This macro trims both leading and trailing spaces from the character strings in data grid columns.

Syntax

%DCM_SERIALIZEGRID (GRIDCOLNAME=data_grid_column_name,
GRIDSOURCETABLE=table_name,
OUTPUTTABLE=results_table,
<CLASSVARS=class_variable1<class_variable2...>>
<GRIDCOLS=column1<column2...>)

Required Arguments

GRIDCOLNAME=data_grid_column_name
specifies the name for the serialized data grid column in the results table.

GRIDSOURCETABLE=table_name
specifies the table that contains the columns that are to be serialized into a data grid.

OUTPUTTABLE=results_table
specifies the name of the results table that contains the data grid column.

Optional Arguments

CLASSVARS=class_variable1 <class_variable2...>
specifies the class variables that control how the data is grouped into data grids. If you specify one class variable, the results table contains one data grid for each value of the class variable. If you specify more than one class variable, a separate data grid is created for each combination of values for the class variables. The class variables are written to the output results table.

GRIDCOLS=column1 <column2...>
specifies the names of the columns that are to be serialized into the data grid. If you do not specify this option, all of the columns in the table are serialized except for the columns specified by the CLASSVARS= option.

Example: Serializing the Assets Table

The following example serializes (creates JSON strings) the assets data for each customer in the mylib.assets table. The output table is named assetsGrid, and the data grid column in the output table is named Assets. The data in the mylib.assets table is grouped by the class variable custName, so the output table contains one row for each value of custName.

```%dcm_serializeGrid(
    gridSourceTable=mylib.assets,
    gridColName=Assets,
    outputTable=assetsGrid,
    classvars=custName);
```

<table>
<thead>
<tr>
<th>CustName</th>
<th>AssetType</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKelly, Sara</td>
<td>Property, Primary</td>
<td>212000</td>
</tr>
<tr>
<td>MacKelly, Sara</td>
<td>Property, Investment</td>
<td>125000</td>
</tr>
<tr>
<td>Smyth, Joe</td>
<td>Property, Primary</td>
<td>234500</td>
</tr>
</tbody>
</table>
**Table 2.2  assetGrid Results Table**

<table>
<thead>
<tr>
<th>CustName</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKelly, Sara</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[{&quot;metadata&quot;: [{&quot;ASSETTYPE&quot;: &quot;string&quot;}, {&quot;VALUE&quot;: &quot;decimal&quot;}]], &quot;data&quot;: [{&quot;Property, Primary&quot;: 212000}, {&quot;Property, Investment&quot;: 125000}]}</td>
</tr>
<tr>
<td>Smyth, Joe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[{&quot;metadata&quot;: [{&quot;ASSETTYPE&quot;: &quot;string&quot;}, {&quot;VALUE&quot;: &quot;decimal&quot;}]], &quot;data&quot;: [{&quot;Property, Primary&quot;: 234500}]}</td>
</tr>
</tbody>
</table>

---

**%DCM_MERGESERIALIZEDGRIDS**

Merges tables that contain data grids that have been serialized with the %DCM_SERIALIZEGRIDS macro with a table that contains scalar data.

**Note:** This macro trims both leading and trailing spaces from the character strings in data grid columns.

**Syntax**

```
%DCM_MERGESERIALIZEDGRIDS (
    MERGETABLE=table_name,
    MERGEKEY=merged_table_key,
    OUTPUTTABLE=results_table,
    GRIDTABLES=data_grid1 <data_grid2> ...,
    GRIDMERGEKEYS=data_grid_key1 <data_grid_key2> ...,
    GRIDCOLUMNS=data_grid_column1 <data_grid_column2> ...)
```

**Required Arguments**

- **MERGETABLE=** *table_name*
  - Specifies the name of the table that contains the scalar data.

- **MERGEKEY=** *merged_table_key*
  - Specifies the name of the key column in the table specified by the MERGETABLE= argument.

  **Note:** You can specify only one merge column key. The %DCM_MERGESERIALIZEDGRIDS macro does not support merges based on multiple key values.

- **OUTPUTTABLE=** *results_table*
  - Specifies the name of the table that contains the results of the merge.

- **GRIDTABLES=** *data_grid1 <data_grid2> ...*
  - Specifies the names of the tables that contain the data grid columns that are to be merged into the results table. The data grid columns must contain a serialized data grid produced by the %DCM_SERIALIZEGRID macro.

  **Interaction** For each data grid that is to be merged into the results table, the name of the data grid table, merge key, and data grid column must be...
specifies the names of the key columns in the tables specified by the GRIDTABLES= argument.

Interaction: The first key specified must be the key for the first table specified in the GRIDTABLES= argument, the second key must be the key for the second table, and so on.

GRIDCOLUMNS=data_grid_column1 <data_grid_column2> ...

specifies the names of the data grid columns in the tables specified by the GRIDTABLES= argument.

Interaction: The first column specified must be the name of the data grid column in the first table specified in the GRIDTABLES= argument, the second key must be the name of the data grid column in the second table, and so on.

Example: Merging Debts and Assets Data Grids with Loan Request Information

The following example merges the scalar data in the mylib.loanRequests table with the data grid columns in the tables debtsGrid and assetGrid. The key column for the scalar table and the data grid tables is custName. The data grid columns in the resulting output table, mylib.loadRequestData, are named Debts and Assets.

```bash
%dcm_mergeSerializedGrids(
    mergeTable=mylib.loanRequests,
    mergekey=Customer,
    outputTable=mylib.loadRequestData,
    gridTables=debtsGrid assetsGrid,
    gridMergeKeys=custName custName
    gridColumns=Debts Assets);
```

Table 2.3  mylib.loanrequests Merge Table

<table>
<thead>
<tr>
<th>RequestID</th>
<th>RequestedAmt</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME4922Mac01</td>
<td>20000</td>
<td>MacKelly, Sara</td>
</tr>
<tr>
<td>NC2W497Smy03</td>
<td>80495</td>
<td>Smyth, Joe</td>
</tr>
</tbody>
</table>

Table 2.4  debtsGrid Data Grid Table

<table>
<thead>
<tr>
<th>CustName</th>
<th>Debts</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKelly, Sara</td>
<td>[&quot;metadata&quot;:{&quot;DEBTTYPE&quot;:&quot;string&quot;},&quot;BALANCE&quot;:&quot;decimal&quot;],</td>
</tr>
<tr>
<td></td>
<td>[&quot;data&quot;:[&quot;Mortgage&quot;,80053.16],&quot;CreditCard&quot;,2143.68]]]</td>
</tr>
</tbody>
</table>
### Table 2.5  assetsGrid Data Grid Table

<table>
<thead>
<tr>
<th>CustName</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKelly, Sara</td>
<td>[&quot;metadata&quot;: [&quot;ASSETTYPE&quot;: &quot;string&quot;], &quot;VALUE&quot;: &quot;decimal&quot;], &quot;data&quot;: [[&quot;Property, Primary&quot;, 212000], [&quot;Property, Investment&quot;, 125000]]</td>
</tr>
<tr>
<td>Smyth, Joe</td>
<td>[&quot;metadata&quot;: [&quot;ASSETTYPE&quot;: &quot;string&quot;], &quot;VALUE&quot;: &quot;decimal&quot;], &quot;data&quot;: [[&quot;Property, Primary&quot;, 234500]]</td>
</tr>
</tbody>
</table>

### Table 2.6  mylib.loanRequestData Results Table

<table>
<thead>
<tr>
<th>RequestID</th>
<th>RequestAmt</th>
<th>Customer</th>
<th>Debts</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME4922Mac01</td>
<td>20000</td>
<td>MacKelly, Sara</td>
<td>[&quot;metadata&quot;: [&quot;DEBTTYPE&quot;: &quot;string&quot;], &quot;BALANCE&quot;: &quot;decimal&quot;], &quot;data&quot;: [[&quot;Mortgage&quot;, 80053.16], [&quot;CreditCard&quot;, 2143.68]]</td>
<td>[&quot;metadata&quot;: [&quot;ASSETTYPE&quot;: &quot;string&quot;], &quot;VALUE&quot;: &quot;decimal&quot;], &quot;data&quot;: [[&quot;Property, Primary&quot;, 212000], [&quot;Property, Investment&quot;, 125000]]</td>
</tr>
<tr>
<td>NC2497Smy03</td>
<td>80495</td>
<td>Smyth, Joe</td>
<td>.</td>
<td>[&quot;metadata&quot;: [&quot;ASSETTYPE&quot;: &quot;string&quot;], &quot;VALUE&quot;: &quot;decimal&quot;], &quot;data&quot;: [[&quot;Property, Primary&quot;, 234500]]</td>
</tr>
</tbody>
</table>
Chapter 3

Data Grid Functions

Using Data Grid Functions

You must use SAS Business Rules Manager data grid functions to process data grid terms. SAS Business Rules Manager supplies several functions for use with data grids.
**Comparison Operators**

You can use any of the following operators with functions that compare values such as the DATAGRID_FILTEREDGET, DATAGRID_FILTEREDSETALL, and DATAGRID_MATCHCOUNT functions.

**Table 3.1 Comparison Operators**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ, =, ==</td>
<td>Equals</td>
</tr>
<tr>
<td>NE, !=, ^=, &lt;&gt;</td>
<td>Not equal to</td>
</tr>
<tr>
<td>GT, &gt;</td>
<td>Greater than</td>
</tr>
<tr>
<td>LT, &lt;</td>
<td>Less than</td>
</tr>
<tr>
<td>LE, &lt;=</td>
<td>Less than or equal to</td>
</tr>
<tr>
<td>GE, &gt;=</td>
<td>Greater than or equal to</td>
</tr>
</tbody>
</table>

**Enable Logging for Data Grid Functions**

You can enable logging for data grid functions by adding the DCM_WSLogAppender definition to the logconfig.xml file on your workspace server. To enable logging, add the following code to the file `SAS-configuration-directory\Lev1\SASApp\WorkspaceServer\logconfig.xml`. Add this code after the WSLogAppender definition and before the immutable logger definitions.

```xml
<appender name="DCM_WSLogAppender" class="sLogAppender">
  <param name="LogName" value="WSLOG"/>
  <layout>
      <param name="ConversionPattern" value="%-5p:  %m"/>
  </layout>
</appender>

<logger name="App.SASDCM">
  <level value="Info"/>
  <appender-ref ref="DCM_WSLogAppender"/>
</logger>
```

**Data Grid Functions Available in SAS Business Rules Manager**

Functions are categorized by the types of values that they return or type of operation they perform. Each function belongs to one of the following categories:
Create, Update, or Delete
Create, copy, or clear the data in a data grid.

Information
Return information about an entire data grid or about a column or row in the data grid.

Join or Append
Join or append two data grids.

Retrieve Values
Retrieve values from a data grid.

Set Values
Set the value of cells in a data grid.

Statistical
Perform statistical calculations on values in the data grid.

Subset and Sort
Subset or sort a data grid.

The following table provides brief descriptions of the data grid functions.

<table>
<thead>
<tr>
<th>Category</th>
<th>Language Elements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create, Update, or Delete</td>
<td>DATAGRID_COPY (p. 16)</td>
<td>Returns a copy of the specified data grid, or returns an empty data grid if the operation is unsuccessful.</td>
</tr>
<tr>
<td>Information</td>
<td>DATAGRID_COUNT (p. 17)</td>
<td>Returns the number of rows in the specified data grid, or returns a negative number if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_DISTINCTROWCOUNT (p. 17)</td>
<td>Returns the number of unique rows in the specified data grid, or returns a negative number if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_GRIDMATCHCOUNT (p. 22)</td>
<td>Returns the number of rows for which the value in the specified column in one data grid matches the value in the specified column in another data grid, or returns a negative number if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_MATCHCOUNT (p. 25)</td>
<td>Returns the number of rows in the specified column for which the specified comparison evaluates to true, or returns a negative number if an error occurs.</td>
</tr>
<tr>
<td>Join or Append</td>
<td>DATAGRID_INNERJOIN (p. 22)</td>
<td>Performs an inner join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_LEFTJOIN (p. 23)</td>
<td>Performs a left join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_RIGHTJOIN (p. 27)</td>
<td>Performs a right join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.</td>
</tr>
<tr>
<td>Retrieve Values</td>
<td>DATAGRID_FILTEREDGET (p. 18)</td>
<td>Returns the value in the first row in the specified column for which the specified comparison evaluates to true. If the operation is unsuccessful, the function returns an empty string for character values or a missing value (.) for numeric values.</td>
</tr>
</tbody>
</table>

Data Grid Functions Available in SAS Business Rules Manager 15
<table>
<thead>
<tr>
<th>Category</th>
<th>Language Elements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DATAGRID_GET (p. 21)</td>
<td>Returns the value of the cell in the specified row and column. If the operation is unsuccessful, the function returns an empty string for character values or a missing value (.) for numeric values.</td>
</tr>
<tr>
<td>Set Values</td>
<td>DATAGRID_FILTEREDSET (p. 19)</td>
<td>Sets the value in the specified row and column to the specified value if the specified comparison evaluates to true. The function returns 1 if the operation is successful and a negative number if the operation is unsuccessful.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_FILTEREDSETALL (p. 20)</td>
<td>Sets the cell in the specified column to the specified value for each row for which the specified comparison evaluates to true. The function returns the number of cells that were set to the specified value, or it returns a negative number if the operation is unsuccessful.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_SET (p. 28)</td>
<td>Assigns the specified value to the specified row and column. The function returns 1 if the operation is successful, or returns a negative number if it is unsuccessful.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_SETALL (p. 28)</td>
<td>Assigns the specified value to all rows in the specified column. The function returns 1 if the operation is successful, or returns a negative number if it is unsuccessful.</td>
</tr>
<tr>
<td>Statistical</td>
<td>DATAGRID_MAX (p. 25)</td>
<td>Returns the maximum value for the specified column, or returns a missing value (.) if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_MEAN (p. 26)</td>
<td>Returns the mean value for the specified column, or returns a missing value (.) if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_MEDIAN (p. 26)</td>
<td>Returns the median value for the specified column, or returns a missing value (.) if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_MIN (p. 27)</td>
<td>Returns the minimum value that appears in the specified column, or returns a missing value (.) if an error occurs.</td>
</tr>
<tr>
<td></td>
<td>DATAGRID_SUM (p. 30)</td>
<td>Returns the sum of the values in the specified column, or returns a missing value (.) if an error occurs.</td>
</tr>
<tr>
<td>Subset and Sort</td>
<td>DATAGRID_SUBSETBYVALUE (p. 29)</td>
<td>Returns a data grid that contains the rows for which the specified comparison evaluates to true, or returns an empty data grid if the operation is unsuccessful.</td>
</tr>
</tbody>
</table>

**Dictionary**

**DATAGRID_COPY**

Returns a copy of the specified data grid, or returns an empty data grid if the operation is unsuccessful.

**Category:** Create, Update, or Delete
**DATAGRID_COPY**

Returns the number of rows in the specified data grid, or returns a negative number if an error occurs.

**Syntax**

\[ \text{DATAGRID\_COPY} \ (dataGrid) \]

**Required Argument**

*dataGrid*  
 specifies the name of the data grid. This argument must be a term of type DATAGRID.

---

**DATAGRID\_COUNT**

Returns the number of unique rows in the specified data grid, or returns a negative number if an error occurs.

**Category:** Information

**Returns data type:** INTEGER

**Syntax**

\[ \text{DATAGRID\_COUNT} \ (dataGrid) \]

**Required Argument**

*dataGrid*  
 specifies the name of the data grid. This argument must be a term of type DATAGRID.

---

**DATAGRID\_DISTINCTROWCOUNT**

Returns the number of unique rows in the specified data grid, or returns a negative number if an error occurs.

**Category:** Information

**Returns data type:** INTEGER

**Syntax**

\[ \text{DATAGRID\_DISTINCTROWCOUNT} \ (dataGrid) \]

**Required Argument**

*dataGrid*  
 specifies the name of the data grid. This argument must be a term of type DATAGRID.
**DATAGRID_FILTEREDGET**

Returns the value in the first row in the specified column for which the specified comparison evaluates to true. If the operation is unsuccessful, the function returns an empty string for character values or a missing value (.) for numeric values.

**Category:** Retrieve Values  
**Returned data type:** STRING, DOUBLE  
**Tip:** This function returns a value for only the first row in which the comparison evaluates to true. To find all rows for which a specified comparison evaluates to true, use the “DATAGRID_SUBSETBYVALUE” function.

**Syntax**

`DATAGRID_FILTEREDGET(dataGrid, columnReturned, filterColumn, operator, termOrValue)`

**Required Arguments**

`dataGrid`  
specifies the name of the data grid. This argument must be a term of type DATAGRID.

`columnReturned`  
specifies the name of the column whose value you want to know. You can specify a column name in single quotation marks or a term that evaluates to a column name.

`filterColumn`  
specifies the name of the column whose value is to be compared to `termOrValue`. You can specify a column name in single quotation marks or a term that evaluates to a column name.

`operator`  
specifies one of the following operators shown in “Comparison Operators” on page 14. You can specify the name of a character variable that evaluates to one of these operators, or you can specify the operator enclosed in single quotation marks.

`termOrValue`  
specifies the value to compare to the value of `filterColumn`. You can specify a number, a character string enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as `filterColumn`.

**Details**

The DATAGRID_FILTEREDGET function compares the value in `filterColumn` to the specified `termOrValue` by using the comparison operator. The comparison is as follows:

`filterColumn operator termOrValue`

For the first row for which the comparison evaluates to true, this function returns the value of `columnReturned`. 

---

18 Chapter 3 • Data Grid Functions
Example

The following example determines whether the value of the riskGroup column is equal to Low, and if so, returns the value of the approvalStatus column:

\[
\text{DATAGRID\_FILTEREDGET(DebtEval,'approvalStatus','riskGroup','EQ','Low')}
\]

DATAGRID\_FILTEREDSET

Sets the value in the specified row and column to the specified value if the specified comparison evaluates to true. The function returns 1 if the operation is successful and a negative number if the operation is unsuccessful.

**Category:** Set Values

**Returned data type:** INTEGER

**Syntax**

\[
\text{DATAGRID\_FILTEREDSET(dataGrid, columnToAssign, rowNumber, filterColumn, operator, termOrValue, valueToAssign)}
\]

**Required Arguments**

- **dataGrid**
  - specifies the name of the data grid. This argument must be a term of type DATAGRID.

- **columnToAssign**
  - specifies the name of the column to be assigned the specified value. You can specify a column name in single quotation marks or a term that evaluates to a column name.

- **rowNumber**
  - specifies the row number that contains the cell to be assigned the specified value. You can specify a number or a term that evaluates to a number.

- **filterColumn**
  - specifies the name of the column whose value is to be compared to termOrValue. You can specify a column name in single quotation marks or a term that evaluates to a column name.

- **operator**
  - specifies one of the following operators shown in “Comparison Operators” on page 14. You can specify the name of a character variable that evaluates to one of these operators, or you can specify the operator enclosed in single quotation marks.

- **termOrValue**
  - specifies the value to compare to the value of filterColumn. You can specify a number, a character string enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as filterColumn.

- **valueToAssign**
  - specifies the value to assign to the cell at rowNumber, columnToAssign. You can specify a number, a character value enclosed in single quotation marks, or the name of a term.
Details

The DATAGRID_FILTEREDSET function compares the value of `filterColumn` to the value of `termOrValue` using the comparison operator. The comparison is as follows:

```
filterColumn  operator  termOrValue
```

If the comparison evaluates to true, this function sets the value of `rowNumber,columnToAssign` to the value specified by `valueToAssign`.

Example

For the data grid row specified by the value of the `customer` variable, the DATAGRID_FILTEREDSET function sets the column `riskGroup` to `High` if the value of the `Debts` column is greater than the value of `assets` term:

```
DATAGRID_FILTEREDSET(DebtEval,'riskGroup',customer,'debts','GT',assets,'High')
```

---

**DATAGRID_FILTEREDSETALL**

Sets the cell in the specified column to the specified value for each row for which the specified comparison evaluates to true. The function returns the number of cells that were set to the specified value, or it returns a negative number if the operation is unsuccessful.

- **Category:** Set Values
- **Returned data type:** INTEGER
- **Note:** This function returns the number of cells that were set to the specified value.

**Syntax**

```
DATAGRID_FILTEREDSETALL(dataGrid, columnToAssign, filterColumn, operator, termOrValue, valueToAssign)
```

**Required Arguments**

- `dataGrid` specifies the name of the data grid. This argument must be a term of type DATAGRID.
- `columnToAssign` specifies the name of the column to be assigned the specified value. You can specify a column name in single quotation marks or a term that evaluates to a column name.
- `filterColumn` specifies the name of the column whose value is to be compared to `termOrValue`. You can specify a column name in single quotation marks or a term that evaluates to a column name.
- `operator` specifies one of the following operators shown in “Comparison Operators” on page 14. You can specify the name of a character variable that evaluates to one of these operators, or you can specify the operator enclosed in single quotation marks.
**termOrValue**

specifies the value to compare to the value of `filterColumn`. You can specify a number, a character string enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as `filterColumn`.

**valueToAssign**

specifies the value to assign to the appropriate cells in `columnToAssign`. You can specify a number, a character value enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as `columnToAssign`.

**Details**

For each row in the data grid, the DATAGRID_FILTEREDSETALL function compares the value of `filterColumn` to the value of `termOrValue` by using the comparison operator. The comparison is as follows:

`filterColumn operator termOrValue`

If the comparison evaluates to true, this function sets the value of the cell in column `columnToAssign` to the value specified by `valueToAssign`.

**Example**

This example sets the value of the cell in column `riskGroup` to the value of the `highGroup` term for all rows in the data grid `DebtEval` for which the value of the `Debts` column is greater than the value of the `assets` term:

```
DATAGRID_FILTEREDSETALL(DebtEval,'riskGroup','debts','GT',assets,highGroup)
```
**rowNumber**
specifies the row number in the data grid. You can specify a number or a term that evaluates to a number.

---

### DATAGRID_GRIDMATCHCOUNT

Returns the number of rows for which the value in the specified column in one data grid matches the value in the specified column in another data grid, or returns a negative number if an error occurs.

**Category:** Information
**Returned data type:** INTEGER

**Syntax**

`DATAGRID_GRIDMATCHCOUNT(dataGrid1, dataGrid2, column1, column2)`

**Required Arguments**

- `dataGrid1`
- `dataGrid2`

  specifies the names of data grids. These arguments must be terms of type DATAGRID.

- `column1`
- `column2`

  specifies the name of the column in `dataGrid1` that you want to compare to a column in `dataGrid2`. You can specify a column name in single quotation marks or a term that evaluates to a column name.

**Details**

The DATAGRID_GRIDMATCHCOUNT function returns the number of rows in which the value of `dataGrid1, column1` match the value of `dataGrid2, column2`.

---

### DATAGRID_INNERJOIN

Performs an inner join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.

**Category:** Join or Append
**Returned data type:** DATAGRID

**Syntax**

`DATAGRID_INNERJOIN(dataGrid1, dataGrid2, keyColumn1, keyColumn2)`

**Details**

The DATAGRID_INNERJOIN function performs an inner join between two data grids based on the specified key columns.
Required Arguments

dataGrid1
dataGrid2
    specifies the names of the two data grids to be joined.

keyColumn1
    specifies the name of the key column in dataGrid1. You can specify a column name in single quotation marks or a term that evaluates to a column name.

keyColumn2
    specifies the name of the key column in dataGrid2. You can specify a column name in single quotation marks or a term that evaluates to a column name.

Details

The DATAGRID_INNERJOIN function performs an inner join of two data grids for which dataGrid1.keyColumn1 equals dataGrid2.keyColumn2 and returns a data grid that contains the results of the join.

When the column names in the two data grids are identical, the columns from the left side of the join are added to the resulting data grid.

DATAGRID_LEFTJOIN

Performs a left join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.

Category: Join or Append
Returned data type: DATAGRID

Syntax

DATAGRID_LEFTJOIN (dataGrid1, dataGrid2, keyColumn1, keyColumn2)

Required Arguments

dataGrid1
dataGrid2
    specifies the names of the two data grids to be joined.

keyColumn1
    specifies the name of the key column in dataGrid1. You can specify a column name in single quotation marks or a term that evaluates to a column name.

keyColumn2
    specifies the name of the key column in dataGrid2. You can specify a column name in single quotation marks or a term that evaluates to a column name.

Details

The DATAGRID_INNERJOIN function performs a left join of two data grids for which dataGrid1.keyColumn1 equals dataGrid2.keyColumn2 and returns a data grid that contains the results of the join.
When the column names in the two data grids are identical, the columns from the left side of the join are added to the resulting data grid.

**DATAGRID_LOOKUPMATCHCOUNT**

Returns the number of rows for which the value in the specified column matches a lookup key in the specified lookup table, or returns a negative number if an error occurs.

<table>
<thead>
<tr>
<th>Valid in:</th>
<th>Condition and action expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>INTEGER</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_LOOKUPMATCHCOUNT('lookupTable', dataGrid, column)
```

**Required Arguments**

- `'lookupTable'` specifies the name of the lookup table.
- `dataGrid` specifies the name of the data grid. This argument must be a term of type DATAGRID.
- `column` specifies the name of the column in the data grid whose value is compared to the key values in the lookup table. You can specify a column name in single quotation marks or a term that evaluates to a column name.

**DATAGRID_LOOKUPSUBSET**

Returns a data grid that contains the rows for which the value in the specified column matches a lookup key in the specified lookup table, or returns an empty data grid if the operation is unsuccessful.

<table>
<thead>
<tr>
<th>Valid in:</th>
<th>Action expressions only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>DATAGRID</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_LOOKUPSUBSET('lookupTable', dataGrid, column)
```

**Required Arguments**

- `'lookupTable'` specifies the name of the lookup table.
- `dataGrid` specifies the name of the data grid. This argument must be a term of type DATAGRID.
column
specifies the name of the column in the data grid whose values are compared to the key values in the lookup table. You can specify a column name in single quotation marks or a term that evaluates to a column name.

---

**DATAGRID_MATCHCOUNT**

Returns the number of rows in the specified column for which the specified comparison evaluates to true, or returns a negative number if an error occurs.

<table>
<thead>
<tr>
<th>Category</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data</td>
<td>INTEGER</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_MATCHCOUNT (dataGrid, filterColumn, operator, termOrValue)
```

**Required Arguments**

- **dataGrid**
  specifies the name of the data grid. This argument must be a term of type DATAGRID.

- **filterColumn**
  specifies the name of the column whose value is to be compared to termOrValue. You can specify a column name in single quotation marks or a term that evaluates to a column name.

- **operator**
  specifies one of the following operators shown in “Comparison Operators” on page 14. You can specify the name of a character variable that evaluates to one of these operators, or you can specify the operator enclosed in single quotation marks.

- **termOrValue**
  specifies the value to compare to the value of filterColumn. You can specify a number, a character string enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as filterColumn.

---

**DATAGRID_MAX**

Returns the maximum value for the specified column, or returns a missing value (.) if an error occurs.

<table>
<thead>
<tr>
<th>Category</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_MAX (dataGrid, column)
```
**Required Arguments**

*dataGrid*

specifies the name of the data grid. This argument must be a term of type DATAGRID.

*column*

specifies the name of the column in the data grid. You can specify a column name in single quotation marks or a term that evaluates to a column name.

---

**DATAGRID_MEAN**

Returns the mean value for the specified column, or returns a missing value (.) if an error occurs.

<table>
<thead>
<tr>
<th>Category:</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Syntax**

`DATAGRID_MEAN (dataGrid, column)`

**Required Arguments**

*dataGrid*

specifies the name of the data grid. This argument must be a term of type DATAGRID.

*column*

specifies the name of the column in the data grid. You can specify a column name in single quotation marks or a term that evaluates to a column name.

---

**DATAGRID_MEDIAN**

Returns the median value for the specified column, or returns a missing value (.) if an error occurs.

<table>
<thead>
<tr>
<th>Category:</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Syntax**

`DATAGRID_MEDIAN (dataGrid, column)`

**Required Arguments**

*dataGrid*

specifies the name of the data grid. This argument must be a term of type DATAGRID.
column
specifies the name of the column in the data grid. You can specify a column name in single quotation marks or a term that evaluates to a column name.

---

**DATAGRID_MIN**

Returns the minimum value that appears in the specified column, or returns a missing value (.) if an error occurs.

<table>
<thead>
<tr>
<th>Category</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_MIN(dataGrid, column)
```

**Required Arguments**

- **dataGrid**
  - specifies the name of the data grid. This argument must be a term of type DATAGRID.

- **column**
  - specifies the name of the column in the data grid. You can specify a column name in single quotation marks or a term that evaluates to a column name.

---

**DATAGRID_RIGHTJOIN**

Performs a right join of two data grids and returns the resulting data grid, or returns an empty data grid if the operation is unsuccessful.

<table>
<thead>
<tr>
<th>Category</th>
<th>Join or Append</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type</td>
<td>DATAGRID</td>
</tr>
</tbody>
</table>

**Syntax**

```
DATAGRID_RIGHTJOIN(dataGrid1, dataGrid2, keyColumn1, keyColumn2)
```

**Required Arguments**

- **dataGrid1**
  - specifies the names of the two data grids to be joined.

- **dataGrid2**
  - specifies the names of the two data grids to be joined.

- **keyColumn1**
  - specifies the name of the key column in dataGrid1. You can specify a column name in single quotation marks or a term that evaluates to a column name.
**keyColumn2**

specifies the name of the key column in `dataGrid2`. You can specify a column name in single quotation marks or a term that evaluates to a column name.

**Details**

The `DATAGRID_RIGHTJOIN` function performs a right join of two data grids for which `dataGrid1.keyColumn1` equals `dataGrid2.keyColumn2`. It returns a data grid that contains the results.

When the column names in the two data grids are identical, the columns from the right side of the join are added to the resulting data grid.

---

**DATAGRID_SET**

Assigns the specified value to the specified row and column. The function returns 1 if the operation is successful, or returns a negative number if it is unsuccessful.

<table>
<thead>
<tr>
<th>Category:</th>
<th>Set Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>INTEGER</td>
</tr>
</tbody>
</table>

**Syntax**

`DATAGRID_SET` *(dataGrid, column, rowNumber, termOrValue)*

**Required Arguments**

- **dataGrid**
  - specifies the name of the data grid. This argument must be a term of type `DATAGRID`.

- **column**
  - specifies the name of the column whose value is to be set. You can specify a column name in single quotation marks or a term that evaluates to a column name.

- **rowNumber**
  - specifies the number of the row to be set. You can specify a number or a term that evaluates to a number.

- **termOrValue**
  - specifies the value to be assigned to `column`. You can specify a number, a character value enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as `column`.

---

**DATAGRID_SETALL**

Assigns the specified value to all rows in the specified column. The function returns 1 if the operation is successful, or returns a negative number if it is unsuccessful.

<table>
<thead>
<tr>
<th>Category:</th>
<th>Set Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>INTEGER</td>
</tr>
</tbody>
</table>
Syntax

\textbf{DATAGRID\_SETALL} \((data\text{Grid}, column, termOrValue)\)

\textbf{Required Arguments}

\textit{data\text{Grid}}

specifies the name of the data grid. This argument must be a term of type \text{DATAGRID}.

\textit{column}

specifies the name of the column whose values are to be set.

\textit{termOrValue}

specifies the value to be assigned to \textit{column}. You can specify a number, a character value enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as \textit{column}.

\textbf{DATAGRID\_SUBSETBYVALUE}

Returns a data grid that contains the rows for which the specified comparison evaluates to true, or returns an empty data grid if the operation is unsuccessful.

\textbf{Syntax}

\textbf{DATAGRID\_SUBSETBYVALUE} \((data\text{Grid}, filter\text{Column}, operator, termOrValue)\)

\textbf{Required Arguments}

\textit{data\text{Grid}}

specifies the name of the data grid. This argument must be a term of type \text{DATAGRID}.

\textit{filter\text{Column}}

specifies the name of the column whose value is to be compared to \textit{termOrValue}. You can specify a column name in single quotation marks or a term that evaluates to a column name.

\textit{operator}

specifies one of the following operators shown in “Comparison Operators” on page 14. You can specify the name of a character variable that evaluates to one of these operators, or you can specify the operator enclosed in single quotation marks.

\textit{termOrValue}

specifies the value to compare to the value of \textit{filter\text{Column}}. You can specify a number, a character string enclosed in single quotation marks, the name of a term, or an expression. The value that you specify must be or must evaluate to the same data type as \textit{filter\text{Column}}.
Details
The DATAGRID_SUBSETBYVALUE function compares the value of filterColumn to termOrValue by using the comparison operator. The comparison is as follows:

\[ \text{filterColumn} \quad \text{operator} \quad \text{termOrValue} \]

The function returns a data grid that contains all of the rows for which the comparison evaluates to true.

**DATAGRID_SUM**

Returns the sum of the values in the specified column, or returns a missing value (\( \cdot \)) if an error occurs.

<table>
<thead>
<tr>
<th>Category:</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned data type:</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

**Syntax**

\[
\text{DATAGRID\_SUM (dataGrid, column)}
\]

**Required Arguments**

- **dataGrid**
  - specifies the name of the data grid. This argument must be a term of type DATAGRID.

- **column**
  - specifies the name of the column in the data grid. You can specify a column name in single quotation marks or a term that evaluates to a column name.
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