Dashboard Designer
Creating a Dashboard
Providing Data
  Supported Data Sources
  Connecting to SQL Databases
  Connecting to OLAP cubes
  Binding to Microsoft Excel Workbooks
  Binding to CSV Files
  Binding to Extract Data Sources
  Data Processing Modes
Working with Data
  Edit Connection Parameters
  Using the Query Builder
  Using the Query Editor
  Manage SQL Queries
  Filter Queries
  Pass Query Parameters
  Stored Procedures
  Preview Data
  Creating Calculated Fields
Adding Dashboard Items
  Binding Dashboard Items to Data
    Binding Dashboard Items to Data
    Hidden Data Items
    Binding Dashboard Items to Data in OLAP mode
Designing Dashboard Items
  Chart
  Scatter Chart
  Grid
  Pies
  Cards
  Gauges
  Pivot
Choropleth Map
Geo Point Maps
Range Filter
Date Filter
Images
Text Box
Treemap
Filter Elements
Dashboard Item Group
Tab Container
Data Shaping
  Summarization
  Grouping
  Sorting
  Filtering
  Top N
Formatting Data
Interactivity
  Master Filtering
  Drill-Down
  Neutral Filter Mode
Appearance Customization
  Conditional Formatting
  Coloring
  Data Display Formatting
Data Analysis
  Aggregations
  Expression Constants, Operators, and Functions
  Window Calculations
  Using Dashboard Parameters
Converting Dashboard Items
Dashboard Layout
  Dashboard Title
  Dashboard Item Caption
  Dashboard Items Layout
Undo and Redo Operations
Automatic and Manual Updates
Saving a Dashboard
Printing and Exporting
UI Elements
  Data Source Browser
  Data Items Pane
  Print Preview
Dashboard Viewer
Data Presentation
  Data Presentation Basics
  Master Filtering
  Drill-Down
  Dashboard Layout
Dashboard Parameters
  Requesting Parameter Values
Printing and Exporting
Dashboard Items
  Chart
  Scatter Chart
  Grid
  Pies
  Cards
  Gauges
  Pivot
  Choropleth Map
  Geo Point Maps
  Range Filter
  Date Filter
  Image
  Text Box
  Treemap
  Filter Elements
  Tab Container
Dashboard Designer

The **Dashboard Designer** provides an intuitive UI that facilitates data binding and shaping, and layout design. Many of these normally complex tasks can be accomplished with a simple drag-and-drop operation, allowing you to start creating dashboards immediately.

Creating Dashboards

The following topics will guide you through the process of creating a dashboard.

- Creating a Dashboard
- Providing Data
- Working with Data
- Adding Dashboard Items
- Binding Dashboard Items to Data
- Designing Dashboard Items
- Data Shaping
- Interactivity
- Appearance Customization
- Data Analysis
- Converting Dashboard Items
- Dashboard Layout
- Undo and Redo Operations
- Automatic and Manual Updates
- Saving a Dashboard

Printing and Exporting

The Dashboard Designer provides the capability to print or export the individual items of a dashboard, as well as the entire dashboard.

- Printing and Exporting
UI Elements

The topics in this section describe the main elements of a Dashboard Designer application.

- UI Elements
Creating a Dashboard

When you run an application containing the Dashboard Designer, it already contains an empty dashboard. To create a new dashboard, click the **New** button in the ribbon **Home** tab.
Providing Data

The topics in this section describe how to provide data to be visualized in the dashboard.

This section contains the following topics.

- Supported Data Sources
- Connecting to SQL Databases
- Connecting to OLAP cubes
- Binding to Microsoft Excel Workbooks
- Binding to CSV Files
- Binding to Extract Data Sources
- Data Processing Modes
## Supported Data Sources

The Dashboard Designer allows you to establish a connection to various data sources such as SQL databases, Microsoft Excel workbooks, XML/CSV data files or OLAP cubes.

The following data source types are supported.

- SQL Data Source
- OLAP Data Source
- Microsoft Excel Workbooks/CSV Files

### SQL Data Source

To connect to various SQL databases, the Dashboard Designer requires corresponding providers to be installed on the client machine. The table below lists the supported data sources and the required data providers.

<table>
<thead>
<tr>
<th>SQL DATA SOURCE</th>
<th>SUPPORTED VERSIONS</th>
<th>PROVIDER</th>
<th>DATABASE PROVIDER ASSEMBLY</th>
<th>DOWNLOAD LINK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Access</td>
<td>2000 or higher</td>
<td>Microsoft Jet OLE DB Provider / Microsoft Access Database Engine (ACE)</td>
<td>System.Data.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>Microsoft SQL Server CE</td>
<td>3.5, 4.0</td>
<td>.NET Framework Data Provider for SQL Server Compact</td>
<td>System.Data.SqlServerCe.dll</td>
<td>Included in .NET Framework</td>
</tr>
<tr>
<td>Amazon Redshift</td>
<td>n/a</td>
<td>.NET data provider for PostgreSQL</td>
<td>Npgsql.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>Google BigQuery</td>
<td>n/a</td>
<td>DevExpress.DataAccess.BigQuery ADO.NET provider</td>
<td>DevExpress.DataAccess.BigQuery.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>Teradata</td>
<td>13.0 or higher</td>
<td>.NET Data Provider for Teradata</td>
<td>Teradata.Client.Provider.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>SQL DATA SOURCE</td>
<td>SUPPORTED VERSIONS</td>
<td>PROVIDER</td>
<td>DATABASE PROVIDER ASSEMBLY</td>
<td>DOWNLOAD LINK</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------</td>
<td>----------</td>
<td>----------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>SAP Sybase Advantage</td>
<td>Advantage Database Server 9.1 or higher</td>
<td>Advantage .NET Data Provider</td>
<td>Advantage.Data.Provider.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>SAP Sybase ASE</td>
<td>Sybase Adaptive Server 12.0 or higher</td>
<td>SAP Sybase ASE Database Client</td>
<td>Sybase.Data.AseClient.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>SAP SQL Anywhere</td>
<td>11 or higher</td>
<td>SAP SQL Anywhere Database Client</td>
<td>iAnywhere.Data.SQLAnywhere.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>IBM DB2</td>
<td>9.5 or higher</td>
<td>ADO.Net client from IBM</td>
<td>IBM.Data.DB2.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>Firebird</td>
<td>1.5 or higher, Dialect 3</td>
<td>Firebird ADO.NET Data Provider</td>
<td>FirebirdSql.Data.Firebird.dll, FirebirdSql.Data.FirebirdClient.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>MySQL</td>
<td>4.1 or higher</td>
<td>ADO.NET driver for MySQL</td>
<td>MySql.Data.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>Pervasive PSQL</td>
<td>9.x or higher</td>
<td>PSQL ADO.NET Data Provider</td>
<td>Pervasive.Data.SqlClient.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>7.x or higher</td>
<td>.NET data provider for PostgreSQL</td>
<td>Npgsql.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>VistaDB</td>
<td>4, 5</td>
<td>VistaDB ADO.NET Provider</td>
<td>VistaDB.5.NET40.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>SQLite</td>
<td>3.x</td>
<td>ADO.NET provider for SQLite</td>
<td>System.Data.SQLite.dll</td>
<td>Download link</td>
</tr>
<tr>
<td>XML file</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**OLAP Data Source**

To use the OLAP data source, the Dashboard Designer requires Microsoft Analysis Services OLE DB and Microsoft ADOMD.NET providers to be installed on the client machine. To learn more, see Data providers used for Analysis Services connections.

The following OLAP servers are supported.

- Microsoft SQL Server 2000 Analysis Services
- Microsoft SQL Server 2005 Analysis Services
- Microsoft SQL Server 2008 Analysis Services
- Microsoft SQL Server 2008 R2 Analysis Services
- Microsoft SQL Server 2012 Analysis Services (Multi-dimensional mode)
- Microsoft SQL Server 2014 Analysis Services (Multi-dimensional mode)
- Microsoft SQL Server 2016 Analysis Services (Multi-dimensional mode)

**Microsoft Excel Workbooks/CSV Files**

The following Microsoft Excel/text formats are supported.

- XLS
- XLSX
- XLSM
- CSV
Connecting to SQL Databases

The Dashboard Designer provides the capability to connect to multiple types of SQL databases using the Data Source wizard. This tutorial describes how to establish a connection to any supported database and select the required data.

To connect to a SQL database in the Dashboard Designer, follow the steps below.

1. Click the **New Data Source** button in the Data Source ribbon tab.

2. On the first page of the invoked Data Source Wizard dialog, select **Database** and click Next.

3. On the next page, select the required data provider and specify the required connection parameters.
For instance, if you selected the Microsoft SQL Server data provider, the following options should be specified.

- **Server name**
  
  Specify the name of the MS SQL server to which the connection should be established.

- **Authentication type**
  
  Specify the authentication mode of the MS SQL Server. You can choose whether to use Windows authentication or Server authentication.

- **User name**
  
  Specify the user name used to authenticate to the MS SQL server.

- **Password**
  
  Specify the password used to authenticate to the MS SQL server.

- **Database**
  
  Select the database that contains required data.

4. After you have specified the required connection parameters, click **Next** and specify how to select data from the database.
Select the **Query** option and run the **Query Builder** by clicking the **Run Query Builder...** button. The Query Builder allows you to choose the required tables/columns visually and passes the resulting SQL query to the **SQL String** editor. Click **Finish** to create the data source.

Select the **Stored Procedure** option to select one of the **stored procedures** from the database.

Click **Next**.

5. On the final page, you can optionally add **query parameters** and **preview** data.

Click **Finish** to create the data source.
Connecting to OLAP cubes

The Dashboard Designer provides the capability to connect to an OLAP cube in the Microsoft Analysis Services database using the Data Source wizard.

To connect to an OLAP cube in the Dashboard Designer, do the following steps.

1. Click the New Data Source button in the Data Source ribbon tab.

2. On the first page of the invoked Data Source Wizard dialog, select Olap and click Next.

3. On the next page, choose the required Connection type. The following types are available.
   - Server
   - Local cube file
   - Custom connection string

Server

If you selected Server, the following options are available.
- **Server name**
  Specify the name of the OLAP server to which the connection should be established.

- **UserId**
  Specify the user name used to authenticate to the OLAP server.

- **Password**
  Specify the password used to authenticate to the OLAP server.

- **Catalog**
  Select a data catalog that contains cubes.

- **Cube Name**
  Select a cube that provides OLAP data.

Click **Finish** to create a data source.

**Local Cube File**

If you selected **Local cube file**, specify the path to the required OLAP cube. To locate the cube, click the ellipsis button next to the Database field.
Click **Finish** to create a data source.

**Custom Connection String**

If you selected **Custom connection string**, specify a connection string in the **Custom connection string** editor.

Click **Finish** to create a data source.
Binding to Microsoft Excel Workbooks

The Dashboard Designer allows you to select required data from Microsoft Excel workbooks (XLS, XLSX or XLSM). You can select all data from the specified worksheet or you can select the cell range referenced by the specified defined/table name.

To bind a dashboard to a Microsoft Excel workbook, do the following.

1. Click the **New Data Source** button in the **Data Source** ribbon tab.

![New Data Source button](image)

2. On the first page of the invoked **Data Source Wizard** dialog, select **Microsoft Excel workbook / CSV file** and click **Next**.

![Data Source Wizard](image)

3. On the next page, locate the required workbook by clicking an ellipsis button and selecting the file.
Click **Next**.

**Note**

If the workbook is protected by a password, the following window will be invoked.

Specify a password in the **Password** field and click **OK**. Note that if you enable the **Save password** flag, the password will be saved to a dashboard definition as plain text.

4. Then, specify import settings used to extract data from the workbook.
The following options can be specified.

- **Use values of the first row as field names** - Specifies whether to use the values of the first row as field names. If you disable this option, field names will be generated automatically.
- **Skip empty rows** - Specifies whether or not to include the empty rows into the resulting data source.
- **Skip hidden rows** - Specifies whether to ignore hidden rows when importing data to a data source.
- **Skip hidden columns** - Specifies whether to ignore hidden columns when importing data to a data source.

Click **Next**.

5. On the next page, you can select the worksheet containing the required data, the table or the defined name referring to the specified cell range.

Click **Next**.
6. On the final page, you can select columns to be included to a data source and specify their settings. The **Name** column allows you to specify the column name while **Type** allows you to specify its type.

Click **Finish** to create a data source. This creates the data source and displays its fields in the Data Source Browser.
Binding to CSV Files

The Dashboard Designer allows you to select data from CSV files.

To bind a dashboard to a CSV file, do the following.

1. Click the **New Data Source** button in the **Data Source** ribbon tab.

2. On the first page of the invoked **Data Source Wizard** dialog, select the **Microsoft Excel workbook / CSV file** and click **Next**.

3. On the next page, locate the required CSV file by clicking the ellipsis button and selecting the file.
Click **Next**.

4. Then, specify import settings used to extract data from the CSV file.

The following options can be specified:

- **Use values of the first row as field names** - Specifies whether to use the values of the first row as field names. If you disable this option, field names will be generated automatically.
- **Skip empty rows** - Specifies whether or not to include the empty rows into the resulting data source.
- **Trim Blanks** - Specifies whether to remove all leading and trailing white-space characters from each value in the CSV document.
- **Encoding** - Specifies the character encoding of the CSV document. You can use the **Detect automatically** option to specify whether character encoding is automatically determined.
- **Newline type** - Specifies the character used to identify a new line in a CSV document. You can use the **Detect automatically** option to specify whether the character used to identify a new line is automatically determined.
- **Value separator** - Specifies a character used to separate values in a CSV document. You can use the **Detect automatically** option to specify whether the character used to separate values in a CSV document is determined automatically.
- **Culture** - Specifies the culture information used to parse the data being imported.
- **Text Qualifier** - Specifies the character that encloses values in the CSV document.

Click **Next**.

5. On the final page, you can select columns to be included to a data source and specify their settings. The **Name** column allows you to specify the column name while **Type** allows you to specify its type.

![Data Source Wizard](image)

Click **Finish** to create a data source. This creates the data source and displays its fields in the **Data Source Browser**.
Binding to Extract Data Sources

The Dashboard Designer allows you to create a data extract that is a compressed snapshot of data obtained from the existing data source. This data is saved to a local file and can be updated from the original data source at any time.

Note

Note that data extracts cannot be created for the OLAP data sources.

To create a new data extract from the existing data source, perform the following steps.

1. Click the **New Data Source** button in the **Data Source** ribbon tab.

2. On the first page of the invoked **Data Source Wizard** dialog, select **Data extract** and click **Next**.

3. On the next page, select whether to create a new data extract or establish a connection to an existing one.
To create a new data extract, select **Create a new data extract from the existing data source** and specify the required **Data Source** and **Data Member**. Click **Next**.

To establish a connection to an existing data extract, select **Load an existing data extract from a file** and locate the required *.dat file. Click **Finish**.

4. **(Conditional)** The next page only appears if you are creating the data extract based on the Entity Framework or Object data sources, and allows you to select the required fields.

5. On the next page, you can specify the filter used to extract data. To learn how to specify the filter criteria, see [Filter Data via the Filter Editor](#).
You can also limit the number of extracted rows by enabling the **Limit rows to extract** option and specifying the required number of rows. Click **Next**.

**Note**

Use the **Preview** button to see the data that will be placed into the resulting data extract.

6. **(Conditional)** The next page only appears if the original data source contains **parameters** (for instance, the SQL query is filtered using a dashboard parameter).

7. On the final page, specify a path to the file that will contain the resulting data extract.
Click **Finish**. This creates the data extract and displays its fields in the Data Source Browser. You can use this data extract as a regular data source.
Data Processing Modes

DevExpress Dashboard supports two data processing modes that are used to perform data-related operations (such as grouping, filtering, etc).

- In **server mode**, data-related operations are performed on the database server side. For instance, when you apply **filtering** to a dashboard item, the Dashboard Designer requests the required data automatically by sending a query containing a corresponding SELECT statement with the specified WHERE clause.
- In **client mode**, data-related operations are performed on the workstation side. In this mode, a compressed snapshot of aggregated data is loaded into a workstation memory. This reduces memory consumption and improves the speed of client-side data shaping operations using several techniques: data compression, various data grouping and multi-threading algorithms, etc.

**Tip**
Note that performance in **server/client** modes depends on multiple factors such as database structure, server workload, etc. To decide which mode to use, test both.

**Note**
In **OLAP** mode, data processing is performed using the **server mode** specified for the Analysis Services instance. To learn more, see [Determine the Server Mode of an Analysis Services Instance](#).

Change Data Processing Mode

Different data source types allow you to manage the current data processing mode in different ways.

- For **SQL data sources**, you can switch between data processing modes manually. To enable or disable **server mode** for the **selected** data source, use the **Server Mode** button located on the **Data Source** ribbon tab.

**Server mode** is supported for the SQL data sources created using the Data Source wizard and supplied with data using the Query Builder.

- **Excel Data Source** supports **client mode** only.
- **Extract Data Source** works in **client mode**.

Server Mode Limitations

In **server mode**, the Dashboard does not have simultaneous access to bound data in its entirety. This imposes some limitations.

- **Stored procedures** are not supported in server mode.
- Stored procedures executed using custom SQL are not supported in server mode.
- Some **calculated fields** cannot be evaluated in server mode.
- The **Count Distinct** summary function is not supported for the following database engines:
  - Microsoft Access
  - Microsoft SQL Server CE
- The **Median** summary function is supported for the Oracle data provider only.
- The **Bound Image** and **Grid** dashboard items cannot display images from the following types of databases:
  - Microsoft SQL Server
Data Processing Errors

The Dashboard Designer provides the capability to display errors that occurred during data processing operations (such as changing measure summary types, calculation errors, etc.). For instance, the Grid below shows an error when the summary type of the Extended Price measure is set to Median in server mode.

To see the error message, hover the mouse pointer over the icon.
The topics in this section describe how to work with data in a connected data source.

This section contains the following topics.

- Edit Connection Parameters
- Using the Query Builder
- Using the Query Editor
- Manage SQL Queries
- Filter Queries
- Pass Query Parameters
- Stored Procedures
- Preview Data
- Creating Calculated Fields
Edit Connection Parameters

After you connected to the data store and selected the required data, you can edit the connection parameters used to establish a connection.

To edit connection parameters for the selected data source, click the Edit Connection button in the Data Source ribbon tab.

In the invoked Connection Editor dialog, click Next.

On the next page, you can specify new connection parameters.
<table>
<thead>
<tr>
<th>Provider</th>
<th>Microsoft SQL Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server name</td>
<td>localhost</td>
</tr>
<tr>
<td>Authentication</td>
<td>Windows authentication</td>
</tr>
<tr>
<td>User name</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>Northwind</td>
</tr>
</tbody>
</table>
Using the Query Builder

In the **Query Builder** dialog, you can add data tables and views to the data source, and select which columns to include. The Query Builder automatically joins the related tables, so all you need to do is drag-and-drop.

- **Add Tables**
- **Join Tables**
- **Edit Column Settings**
- **Filter Data**
- **Customize SQL Query**
- **Preview Data**

**Add Tables**

To add the required tables/views to a data source, double-click the table (or view) or drag-and-drop it from the **Tables** pane onto the **Diagram** pane.

Then, select the required columns.
Join Tables

Note that if at least one table has been added to the Diagram pane, the Tables pane highlights tables that have a relationship with any of the recently added tables.

To join the already added table with another table, do one of the following.

- Click the + button next to the foreign key column (SupplierID and CategoryID in the image above).
- Drag and drop the highlighted table from the Tables pane to Diagram pane.

The Query Builder will display a relationship between tables.

To edit this relation, select it and use its context menu.
The following commands are available.

- **Edit Relation** - Allows you to edit the selected relation. Clicking this menu item invokes the Join Editor dialog.

First, check the join type. You can specify it in the **Join type** combo box (*Inner join* or *Left outer join*). To edit column and table names in the existing condition, click the name you wish to replace and choose a different name from the popup menu.

**Note**

Note that the Join Editor dialog will be invoked automatically if you join tables that do not have a relationship at the database level.

- **Delete Relation** - Removes the selected relation. Note that this action removes the joined table(s).

### Edit Column Settings

After you have added the tables and selected the required columns, you can change settings for each column in the **Grid** pane.

The following settings are available for each column.

- **Use Column** to select the required column from the combo box or add a new column. If necessary, you can customize a column expression. To do this, click the ellipsis button for the required column and specify the **expression** in the invoked Expression Editor dialog.

- The **Table** column displays corresponding table names.

- The **Alias** column allows you to specify the column alias.

  **Note**

   Note that aggregated columns should always have an alias.
The **Output** column allows you to choose whether to include specific columns to the query.

- Use the **Sorting type** combo box to specify the sort order of column values. The **Sort order** column allows you to specify the order in which several columns are sorted.
- The **Group By** statement is used in conjunction with the aggregate functions to group the result-set by one or more columns.
- The **Aggregate** option allows you to specify the aggregate function used to aggregate column values.

**Note**

Note that you should apply aggregation/grouping either to all columns or to none of them.

## Filter Data

To filter data in the Query Builder, click the **Filter...** button. This will invoke the **Filter Editor** dialog, which allows you to build filter criteria.

![Filter Editor](image)

To learn more, see [Filter Queries](#).

## Customize SQL Query

**Important**

Note that the Query Builder does not allow you to use custom SQL queries by default.

After you add the required tables, you can customize the automatically generated SQL query. To do this, enable the **Allow Edit SQL** check box and edit the SQL query displayed in the **SQL** pane.
For instance, you can add a WHERE clause to the SQL expression.

**Note**

Note that if you edit the automatically generated query and uncheck the Allow Edit SQL check box, your changes will be discarded, and the generated query will be restored.

**Preview Data**

The Query Builder allows you to preview data for the created SQL query. To do this, click the Preview Results... button.

This invokes the Data Preview window containing data returned after executing the query.
Using the Query Editor

The **Query Editor** dialog allows you to create new SQL queries or edit the existing queries created using the **Data Source** wizard. Optionally, you can add **query parameters**.

The Query Editor can contain two pages depending on the current query.

1. The first page allows you to specify the query or select the **stored procedure**.

   ![Query Editor](image)

   You can choose the following options to create/modify a query.

   - Select the **Query** option and run the **Query Builder** by clicking the **Run Query Builder...** button. The Query Builder allows you to choose the required tables/columns visually and displays the resulting SQL query within the **SQL String** editor.
   - If available, select the **Stored Procedure** option to select one of the **stored procedures** from the database.

2. The second page of the Query Editor allows you to add or modify **query parameters**.
<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter 1</td>
<td>String</td>
<td></td>
<td>Beverages</td>
</tr>
</tbody>
</table>
Manage SQL Queries

After you connect to the data store and select the required data, you can edit the resulting query/stored procedure or add another query/stored procedure to the data source.

To manage queries for the current data source, use buttons from the Query group in the Data Source ribbon tab.

You can perform the following actions.

- **Add Query** - Adds a new query to the data source. Clicking this button invokes the Query Editor dialog that allows you to create a new query by invoking the Query Builder or to select the existing stored procedure.
- **Edit** - Modifies the selected query/stored procedure using the Query Editor.
- **Rename** - Renames the selected query.
- **Filter** - Filters the selected query. To learn more, see the Filter Queries topic.
- **Delete** - Removes the selected query.
Filter Queries

SQL queries constructed in the Query Builder can be filtered by including WHERE clauses to the query. Filtering can be applied to either underlying or aggregated data. You can also limit the number of returned records when filtering data.

- **Invoke the Filter Editor**
- **Filter Data**
- **Add Limits**

**Invoke the Filter Editor**

To filter data in the Query Builder, click the **Filter...** button... in the **Data Source** ribbon tab...

... or use a corresponding button within the Query Builder. This will invoke the Filter Editor dialog, which allows you to build filter criteria.

The **Filter** tab allows you to filter underlying data while the **Group Filter** tab provides the capability to filter data aggregated on the server side.

**Filter Data**

In the Filter Editor, you can compare a field value with the following objects.

- **A static value** (represented by the icon). Click this button to switch to the next item mode (“another field value”) to compare the field value with another field value.
- **Another field value** (represented by the icon). Click this button to switch to the next item mode (“parameter value”) to compare the field value with a parameter value.
- **A parameter value** (represented by the icon). Click this button to switch back to the initial mode (“static value”) to compare the field value with a static value.

Thus, you can pass the query parameter to the filter string. To do this, click the button, then click the button and finally click
In the invoked popup menu, you can choose from the following options.

- **Add Query Parameter** - allows you to create a new query parameter. The following dialog will be invoked.

  ![Create Query Parameter](image)

  In this dialog, you can specify a parameter’s name (Name), type (Type) and value (Value).

  If the current query already contains query parameters, they will be displayed within the popup menu.

- **Bind to** - allows you to pass a dashboard parameter to a filter string. You can choose from the list of predefined dashboard parameters or create a new dashboard parameter by selecting Add Dashboard Parameter. If you selected Add Dashboard Parameter, the following dialog will be invoked.

  ![Add Dashboard Parameter](image)
In this dialog, you can specify settings of the dashboard parameter to be created. To learn more, see Creating Parameters.

After you specified the required settings, click OK. A new dashboard parameter along with a new query parameter will be created. Note that created dashboard and query parameters will be bound automatically.

The Group Filter tab of the Filter Editor allows you to apply filtering to grouped/aggregated data fields by including HAVING clauses to the query. Grouping and aggregation are managed by the Group By and Aggregate options in the Query Builder. To learn more, see the Edit Column Settings paragraph in the Query Builder topic.

**Add Limits**

The Filter Editor also allows you to limit the number of returned records. To do this, enable the Select only checkbox and specify the number of records to be returned.

You can also skip the required number of records in the returned dataset by specifying the records starting with index value.

**Note**

Note that the Sorting type should be specified in the Query Builder to enable the capability to skip the specified number of records. To learn how to apply sorting, see the Edit Column Settings paragraph in the Query Builder topic.
Pass Query Parameters

The Query Builder allows you to add query parameters when creating a filter criteria. To specify settings of an added query parameter, click Next in the Query Editor dialog.

On the next page, add a new parameter (using the Add button) and specify its settings.

- **Name** - Specifies a parameter’s name.
- **Type** - Specifies the parameter’s type.
- **Expression** - Specifies whether an expression is used to specify a parameter’s value.
- **Value** - Specifies the parameter’s value. If the Expression check box is checked, you can invoke the Expression Editor dialog to specify the required expression or select an existing dashboard parameter to pass to the SQL query.

Use the Remove button to remove query parameters.

Click the Preview... button to preview the query result. Then, click Finish to complete query modification.
Stored Procedures

If you use a stored procedure to supply the dashboard with data, you should specify the stored procedure parameters. In the Query Editor dialog, select the required stored procedure and click Next.

On the next page, you can specify the parameter settings.

- **Name** - Displays the parameter name.
- **Type** - Displays the parameter type.
- **Expression** - Specifies whether the expression is used to specify a parameter value.
- **Value** - Specifies a parameter value. If the Expression check box is checked, you can invoke the Expression Editor dialog to specify the required expression or select an existing dashboard parameter to use it as a stored procedure parameter.

Click the Preview... button to preview the query result. Then, click Finish to complete query modifying.
Preview Data

The Query Editor and Query Builder allow you to preview data returned after a query/stored procedure execution. To do this, click the Preview... button.

This invokes the Data Preview window containing data returned after executing the current query/stored procedure.
Creating Calculated Fields

The Dashboard Designer provides the capability to create calculated fields that allow you to apply complex expressions to data fields that are obtained from the dashboard’s data source. You can use these fields in data visualizations as regular data source fields.

- Creating a Calculated Field
- Editing a Calculated Field

Note

Note that calculated fields are not supported for {OLAP} data sources.

Creating a Calculated Field

After you have created a data source, you can add a new calculated field based on the existing data source fields.

To create a calculated field, select the required data source (and the required query/data member, if applicable) in the Data Source Browser and click the Add Calculated Field button in the Ribbon’s Data Source tab...

...or right-click the Field List and select Add Calculated Field in the context menu.

This invokes the Expression Editor dialog, which allows you to specify an expression that will be used to obtain calculated field values. Here, you can construct the required expression.
You can use the following elements in expressions.

- **Functions**
  - **Note**
  
  To learn how to use **Aggregate** functions, see **Aggregations**. The **Expression Operators, Functions and Constants** topic lists the functions (**DateTime**, **Math**, **String**, etc.) supported by expressions.

- **Operators**
- **Columns**
- **Constants**
- **Parameters**

After the expression has been specified, click **OK**. This displays a new calculated field in the data source structure.

Now you can specify the required calculated field type, change its default name, etc.

**Editing a Calculated Field**

To edit a calculated field, use its context menu.
This menu contains the following items.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit Expression...</td>
<td>Invokes the Expression Editor dialog, which allows you to change an expression for an existing calculated field.</td>
</tr>
<tr>
<td>Field Type</td>
<td>Specifies the type of the calculated field.</td>
</tr>
<tr>
<td>Rename</td>
<td>Changes the calculated field name.</td>
</tr>
<tr>
<td>Delete</td>
<td>Removes the existing calculated field from the data source.</td>
</tr>
</tbody>
</table>
Adding Dashboard Items

To create a dashboard item in the Dashboard Designer, click the corresponding button in the Home ribbon tab.

This creates an empty dashboard item, and displays the required data sections for binding this item to data (for instance, the image below displays the Pivot dashboard item and corresponding data sections).

Perform the following steps to design a dashboard item.

- **Bind** the dashboard item to data.
- Perform the required **data shaping** operations (such as grouping, sorting and filtering).
- Use the **interactivity** features to enable interaction between various dashboard items.
- Adjust the dashboard item’s **position and size** and specify the **dashboard item caption** settings.
- Specify specific dashboard item settings based on its type. To learn more, see Designing Dashboard Items.

After you have created and designed the dashboard item, you can create an exact copy. To do this, click the **Duplicate** button in the Home ribbon tab...

... or use the dashboard item’s context menu. To remove the dashboard item from the dashboard, use the **Delete** button or the corresponding item in the context menu.
Binding Dashboard Items to Data

This section consists of the following topics.

- Binding Dashboard Items to Data
- Hidden Data Items
- Binding Dashboard Items to Data in OLAP mode
Binding Dashboard Items to Data

This topic explains how to bind the newly created dashboard item to data source fields, to display data.

- Binding Concepts
- Create Binding
- Modify Binding
- Clear Binding

Binding Concepts

To bind dashboard items to data in the Dashboard Designer, the DATA ITEMS pane is used.

Each dashboard item type has a specific set of data sections, such as Values, Arguments and Series in the chart, Columns and Sparklines in the grid, and Values, Columns and Rows in the pivot grid. Each data section corresponds to a particular dashboard item area or element, and should be mapped to data to be displayed within this area/element.

Mapping is performed using data items - objects that are used to bind a dashboard item to data source fields. Data items are used to link the dashboard item to the required data source fields and, thus, visualize data within the dashboard item.

Another key concept in data binding is the data item container, which represents a set of data items. It can contain either a single data item or multiple data items, and allows you to specify various options related to how a specific dashboard item visualizes data.

The data item can process data in two ways - as dimensions or measures. This depends on the data section to which the data item is assigned, and the type of the data item container.

- dimension - a data item whose values are not intended to be summarized.

These values can be of any type - string, date-time or numeric. In any case, the dashboard does not summarize the dimension values, but groups identical values. You can perform grouping, sorting, or display the top values for the dimension values.
You can also customize **data format** settings for numeric and date-time values. To access the data shaping settings, use the data item’s **menu button**.

For instance, dimensions are used to provide data for the chart argument axis, pivot grid column and row headers.

- **measure** - a data item whose values are summarized before they are used in the dashboard.

  These values can be of any type - numeric, date-time or string. In any case, the dashboard will calculate an appropriate **summary** function against measure values. You can also customize the **data format** settings that affect how summary values are displayed. To access these settings, use the data item’s **menu button**.

For example, measures are used to provide data for the chart’s Y-axis, and to calculate pivot cell values.

Specific data sections display **Options buttons** for each data item container. Use these buttons to invoke a dialog that allows you to specify the settings of this data item container. These settings affect how a particular dashboard item’s area/element displays the provided data.

**Create Binding**

The DATA ITEMS pane displays data sections of the selected dashboard item. It can be used to add, rearrange or remove data items.

To bind a dashboard item to data, select the dashboard item. Then choose the required data field from the **Data Source Browser** and drop it onto the appropriate section in the DATA ITEMS pane.

You can remove the data item by dragging it outside the DATA ITEMS pane.

To learn how to bind a specific dashboard item to data, see the **Providing Data** topic for the required dashboard item.

To rename the data item, click its menu button and select **Rename**, to invoke the **Rename Data Item** dialog.
Modify Binding

You can modify data binding by dragging data item containers within a data section. To do this, drag the data item container to the required position.

You can also modify data binding by dragging data items within the DATA ITEMS pane. This action has the following specifics.

- If you drag the data item to a new position, the settings specified for the corresponding data item container will be restored to the default values.
- If you drag the data item to an existing data item placeholder, the settings of the corresponding data item container will be applied.

Clear Binding

To remove all data items for a selected dashboard item, use the Remove Data Items button in the Home ribbon tab.

You can also do this via the dashboard item’s context menu.
Hidden Data Items

The **HIDDEN DATA ITEMS** area can be used to perform various **data shaping** and analysis operations by measures or dimensions that do not directly take part in the visual representation of data.

To create hidden data items, choose the required data field from the **Data Source Browser** and drop it onto the appropriate section in the HIDDEN DATA ITEMS area.

You can perform the following operations using hidden data items.

- Filtering
- Sorting
- Top N
- Conditional Formatting

**Filtering**

You can use **hidden dimensions** to apply filtering to the dashboard item. To do this, select the required hidden dimension in the Filter Editor dialog and specify the required condition.

For instance, the Grid on the image above is filtered by the first quarter of the **OrderDate (Quarter)** dimension.

**Sorting**

You can sort values of the specified dimension by the **hidden measure**. To do this, select the required measure from the dimension’s **Sort By** sub-menu.
For instance, categories displayed in the **Grid** on the image above are sorted by values of the hidden *Quantity (Sum)* measure.

### Top N

You can use hidden measures in **Top N** conditions. To do this, select the required measure from the **Measure** combo box in the **Top N Values** dialog.

For instance, the **Grid** on the image above displays top 5 categories for the *Quantity (Sum)* hidden measure.

### Conditional Formatting
You can create format rules based on hidden measures to apply conditional formatting to elements corresponding to visible values. To do this, use the Add Format Rule menu of the hidden measure.

For the Expression format condition, you can use the required hidden measure in the same manner as in the Filter Editor dialog.
Binding Dashboard Items to Data in OLAP mode

In **OLAP** mode, the cube schema is fetched automatically, and the Data Source Browser displays the entire OLAP cube structure.

![OLAP Cube Structure](image)

To visualize data from the OLAP cube, **drag-and-drop** measures, attributes or hierarchies onto the appropriate data sections in the **DATA ITEMS** area.

Note that OLAP measures can only be placed in the **Values** section, while dimension attributes and hierarchies can only be placed in other data sections.

**Note**

By default, the dashboard displays only dimension values that have intersections with measures in a cube. To show all available dimension values, add **hidden measures** to the dashboard item so that all dimension values of the dimension will have not be empty for at least one measure value of these measures.

OLAP hierarchies allow you to customize each level separately. To access hierarchy level options, invoke the data item menu for the hierarchy and then use the submenu that corresponds to the desired level.

![OLAP Hierarchy Menu](image)

**Note**

You can easily drill down through OLAP hierarchies using the **Drill-Down** feature.
Designing Dashboard Items

DevExpress Dashboard provides a number of visualization elements designed to present visual or textual information in a dashboard - dashboard items.

This section describes the available dashboard items.

- Chart
- Scatter Chart
- Grid
- Pies
- Cards
- Gauges
- Pivot
- Choropleth Map
- Geo Point Maps
- Range Filter
- Date Filter
- Images
- Text Box
- Treemap
- Filter Elements
- Dashboard Item Group
- Tab Container
Chart

The topics in this section describe the features available in the Chart dashboard item, and provide extensive information on how to create and customize charts in the Dashboard Designer.

This section is divided into the following subsections.

- **Providing Data**
  Provides information on how to supply the Chart dashboard item with data.

- **Series**
  Enumerates and describes different types of series that can be displayed within the Chart dashboard item.

- **Panes**
  Introduces the concept of chart panes (visual areas within a diagram that display chart series), and provides information on how to create them.

- **Interactivity**
  Describes features that enable interaction between the Chart and other dashboard items.

- **Coloring**
  Describes coloring capabilities of the Chart dashboard item.

- **Axes**
  Describes how to customize settings related to chart axes.

- **Legend**
  Provides information about the chart legend and its options.

- **Orientation**
  Describes how to toggle the chart’s orientation.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Chart dashboard item to data in the Designer.

- Binding to Data in the Designer
- Transposing Arguments and Series

Binding to Data in the Designer

The image below shows a sample Chart dashboard item that is bound to data.

To bind the Chart dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. The table below lists and describes the Chart’s data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>Contains data items against which the Y-coordinates of data points are calculated. The Options button next to the Value data item allows you to select the series type and specify different options. Note that some types of series accept several measures. To learn more, see the documentation for the required series type.</td>
</tr>
<tr>
<td>Arguments</td>
<td>Contains data items that provide values displayed along the X-axis of the chart.</td>
</tr>
<tr>
<td>Series</td>
<td>Contains data items whose values are used to create chart series.</td>
</tr>
</tbody>
</table>

Transposing Arguments and Series

The Chart dashboard item provides the capability to transpose chart arguments and series. In this case, data items contained in the Arguments section are moved to the Series section, and vice versa.
To transpose the selected Chart dashboard item, use the **Transpose** button in the **Home** ribbon tab.
Series

This section describes how to select a desired series type in the overview topic, and lists the variety of available series types.

The section consists of the following topics.

- **Series Overview**
  Provides information on how to specify a series type in the Dashboard Designer.

- **Bar Series**
  Lists the available types of bar series.

- **Point and Line Series**
  Lists the available types of point and line series.

- **Area Series**
  Lists the available types of area series.

- **Range Series**
  Lists the available types of range series.

- **Weighted Series**
  Lists the available types of weighted series.

- **Financial Series**
  Lists the available types of financial series.
Series Overview

The Chart dashboard item supports a variety of series types - from simple bar and line charts to complex candle stick and bubble graphs.

- Bar Series
- Point and Line Series
- Area Series
- Range Series
- Weighted Series
- Financial Series

This topic describes how to change the series type and specify various series options (for instance, how to use secondary axis or enable point labels).

- Series Types
- Series Options
- Series Point Labels

Series Types

To switch between series types in the Dashboard Designer, click the Options button next to the required data item (or placeholder) in the Values section.

In the invoked Series Options dialog, select the required series type and click OK.
You can also do this using the **Series Type** gallery in the **Design** Ribbon tab.

**Series Options**

To manage common series options, use the **Common Options** tab of the **Series Options** dialog.
- **Plot on secondary axis** - Specifies whether or not the secondary axis is used to plot the current series.

- **Ignore empty points** - Specifies whether or not empty points are ignored when plotting the current series.
  
  Note that this option is in effect for the Line, Area and Range Area series.

- **Show point markers** - Specifies whether or not to show point markers for the current series.
  
  Note
  
  Note that point markers are always shown when Master Filtering is enabled for the Chart dashboard item.

  Note that this option is in effect for the Line and Area series.

### Series Point Labels

The **Point Label Options** tab of the **Series Options** dialog allows you to enable series point labels and manage their settings.

![Series Options dialog](image)

- **Show point labels** - Specifies whether or not to show point labels for the current series.

- **Content** - Specifies the type of content displayed within point labels.

- **Overlapping mode** - Specifies the label overlap mode.

  Note
  
  This option is not in effect when the dashboard is displayed in the Web Viewer.

- **Orientation** - Specifies the orientation of point labels.

### Bar options

Note

These settings are in effect for Bar series only.

- **Show for zero values** - Specifies whether or not to show labels for points with zero values.

- **Position** - Specifies the position of point labels relative to bars.
Bar Series

Bar series visualize data using rectangular bars with lengths proportional to the values that they represent.

The following types of Bar series are available.

- Bar
- Stacked Bar
- Full-Stacked Bar

Bar

Bar series can be used to compare values across categories.

Stacked Bar

Stacked Bar series show the contribution of individual categories to the whole.

Full-Stacked Bar

Full-Stacked Bar series allow you to compare the percentage that each value contributes to a total across categories.
Point and Line Series

Point series visualize data as a set of individual numeric data points. Line series are used to connect numeric data points by different types of line segments.

The following types of Point and Line series are available.

- **Point**
- **Line**
- **Stacked Line**
- **Full-Stacked Line**
- **Step Line**
- **Spline**

**Point**

Point series visualize data as a set of individual numeric data points.

![Point Series Example](image)

**Line**

Line series connect numeric data points by straight line segments.

![Line Series Example](image)

**Stacked Line**

Stacked Line series can be used to show the trend of the contribution for each value.
**Full-Stacked Line**

Stacked Line series are useful for showing the trend of the percentage for each value.

**Step Line**

Step Line series use vertical and horizontal lines to connect the numeric data points forming a step-like progression.

**Spline**

Spline series plot a fitted curve through each numeric data point.
Area Series

Area series connect numeric data points by different types of line segments and fill the area between the line and X-axis/other series.

The following types of Point and Line series are available.

- **Area**
- **Stacked Area**
- **Full-Stacked Area**
- **Step Area**
- **Spline Area**
- **Stacked Spline Area**
- **Full-Stacked Spline Area**

**Area**

Area series connect numeric data points by straight line segments and fill the area between the line and X-axis.

![Area Series Graph](image1)

**Stacked Area**

Stacked Area series can be used to show the trend of the contribution for each value. Stacked Area series connect numeric data points by straight line segments and fill the area between the line and previous series.

![Stacked Area Series Graph](image2)

**Full-Stacked Area**


Full-Stacked Area series are useful to show the trend of the percentage for each value.

**Step Area**

Step Area series use vertical and horizontal lines to connect the numeric data points forming a step-like progression and fill the area between the line and X-axis.

**Spline Area**

Spline Area series plot a fitted curve through each numeric data point and fill the area between the line and X-axis.
**Stacked Spline Area**

Stacked Area series can be used to show the trend of the contribution for each value. Stacked Area series plot a fitted curve through each numeric data point, and fill the area between the line and previous series.

![Stacked Spline Area Chart]

**Full-Stacked Spline Area**

Full-Stacked Spline Area series are useful to show the trend of the percentage for each value.

![Full-Stacked Spline Area Chart]
Range Series

Range series are generally used to show variations in a specified time range like temperature, price, etc.

The following types of Range series are available.

- Range Bar
- Range Area

Data Binding Specifics

A range series is a space between two simple series displayed as a filled area (Range Area) or bars that stretch from a point in one series to the corresponding point in the other (Range Bar). Thus, you need to provide two measures instead of one to display a range series.

- **Value 1** - a measure against which the first set of values is calculated.
- **Value 2** - a measure against which the second set of values is calculated.

When you select the **Range Bar** or **Range Area** series type in the Designer, the DATA ITEMS area displays two data item placeholders. Drag and drop the required measures to corresponding placeholders.

Range Bar

Range Bar series are similar to Bar series except that they are drawn between a range of values.

Range Area

Range Area series are similar to Area series except that their areas are filled between a range of values.
Weighted Series

Weighted series allow you to visualize data in three dimensions.

The following types of Weighted series are available.

- Bubble

Data Binding Specifics

Data points in a weighted series present the following two measures.

- **Value** - the Y-coordinate of series points.
- **Weight** - the size of series points.

When you select the **Bubble** series type in the Designer, the **DATA ITEMS** area displays two data item placeholders. Drag and drop the required measures to corresponding placeholders.

Bubble

Bubble series are similar to **Point series** except that they allow you to provide an additional measure whose values are expressed in a bubble size.

![Bubble Series Example](image-url)
Financial Series

Financial series are used to illustrate stock prices.

The following types of Financial series are available.

- High-Low-Close
- Stock
- Candle Stick

Coloring Specifics

Note that financial series do not support a standard coloring mechanism used to color chart series points. The Chart dashboard item colors series points of financial series in the following way.

- **Black** if the price at the end of the previous period is lower than the price at the end of the current period.
- **Red** if the price at the end of the previous period is larger than the price at the end of the current period.

High-Low-Close

When you select the High-Low-Close series type in the Designer, the **DATA ITEMS** area displays three data item placeholders. High-Low-Close series require three measures to be provided.

- **High** - the maximum price within the specified period (the top of the series point).
- **Low** - the minimum price within the specified period (the bottom of the series point).
- **Close** - the price at the end of the specified period (the tick mark).

Stock

When you select the Stock series type in the Designer, the **DATA ITEMS** area displays four data item placeholders. Stock series require four measures to be provided.
- **Open** - the price at the beginning of the specified period (the left tick mark).
- **High** - the maximum price within the specified period (the top of the series point).
- **Low** - the minimum price within the specified period (the bottom of the series point).
- **Close** - the price at the end of the specified period (the right tick mark).

**Candle Stick**

When you select the Candle Stick series type in the Designer, the **DATA ITEMS** area displays four data item placeholders. Candle Stick series require four measures to be provided.

- **Open** - the price at the beginning of the specified period.
- **High** - the maximum price within the specified period (the upper shadow top).
- **Low** - the minimum price within the specified period (the lower shadow bottom).
- **Close** - the price at the end of the specified period.
**Panes**

The Chart dashboard item can contain any number of *panes*. Panes are visual areas within a diagram that display chart series. Each pane has its own **Y-axis** and displays a specific set of series. All panes in a chart share the same **X-axis**.

![Chart Example](chart_example.png)

To add a pane, click the **Add Pane** button (the icon) at the top right of the **DATA ITEMS** pane.

![Add Pane Button](add Pane.png)

Once a new pane is added, the Dashboard Designer creates another **Values** section in the **DATA ITEMS** pane.

![Values Section](values_section.png)

Use this section to provide data items that supply values to be displayed in the new pane (see **Providing Data** for details on data binding).

To remove a pane, click the **Remove Pane** button (the icon) displayed in the corresponding **Values** section.
This section describes features that enable interaction between the Chart and other dashboard items. These features include Master Filtering and Drill-Down.

The section contains the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The **Dashboard** allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more, see the **Master Filtering** topic, which describes filtering concepts common to all dashboard items.

The Chart dashboard item supports filtering by **argument**, **series** or **points**.

**Filtering by Arguments**

When filtering by arguments is enabled, you can click series points to make other dashboard items only display data related to selected argument values.

To enable filtering by arguments in the Designer, set the required **Master Filter mode** and click the **Arguments** button in the **Data** Ribbon tab (or the ° button if you are using the toolbar menu).

**Filtering by Series**

When filtering by series is enabled, you can click a series point to make other dashboard items only display data related to the selected series.

To enable filtering by series in the Designer, set the required **Master Filter mode** and click the **Series** button in the **Data** Ribbon.
Filtering by Points

When filtering by points is enabled, you can click an individual point to make other dashboard items display only data related to the selected point.

To enable filtering by points in the Designer, set the required **Master Filter mode** and click the **Points** button in the **Data** Ribbon tab.

Reset Filtering

To reset filtering, use the **Clear Master Filter** button in the Chart's caption area...

...or the corresponding command in the Chart's context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

The Chart dashboard item supports drill down on argument or series values.

Drill Down on an Argument

When drill down on arguments is enabled, you can click a series point to view a detail chart for the corresponding argument value.

**Note**

When Filtering by Arguments is enabled, you can view the details by double-clicking a series point.

Drill down on arguments requires that the Arguments section contains several data items, from the least detailed to the most detailed item.

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill down on arguments, click the **Drill Down** button in the **Data** Ribbon tab (or the button if you are using the toolbar menu).

...and the **Arguments** button (or the button if you are using the toolbar menu).
Drill Down on a Series

When drill down on a series is enabled, you can click a series point (or corresponding legend item) to view a detail chart for the corresponding series.

![Chart](image)

**Note**

When **Filtering by Series** is enabled, you can view the details by double-clicking a series point.

Drill down on a series requires that the Series section contains several data items, from the least detailed to the most detailed item.

![Series Section](image)

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill down on a series, click the **Drill Down** button in the **Data** Ribbon tab (or the **button if you are using the toolbar menu)....

![Chart Tools](image)

...and the **Series** button (or the **button if you are using the toolbar menu).
Drill Up

To return to the previous detail level (drill up), use the **Drill Up** button within the Chart *caption* or in the context menu.
Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

By default, the Chart dashboard item colors different measures and series dimensions by hue. In the example below, series points corresponding to different countries (UK and USA) are painted in different colors.

**Note**

Note that the Chart dashboard item does not support coloring for the financial series.
Legend

A **legend** is an element of a chart that identifies **chart series** and series points (for instance, **colored points** corresponding to argument values).

This topic describes how to customize various legend settings.

**Visibility**

You can specify whether or not a chart should display a legend.

In the Designer, use the **Show Legend** button in the **Legend** section of the **Design** Ribbon tab.

**Position and Orientation**

To specify the legend’s position and orientation, select one of the predefined options from the gallery in the **Design** Ribbon tab.
Axes

The Chart dashboard item displays two axes by default: the X-axis and the Y-axis. The topics in this section describe how to customize axis settings.

The section contains the following topics.

- X-Axis
- Y-Axis
The **X-axis** is the axis of arguments.

This topic consists of the following sections.

- Common X-Axis Settings
- Numeric Formats
- DateTime Formats
- Continuous and Discrete X-Axes

### Common X-Axis Settings

To access X-axis settings, use the **X-Axis Settings** button in the **Diagram** section of the **Design** Ribbon tab.

This will invoke the **X-Axis Settings** dialog.

This dialog contains the following settings.
<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse</td>
<td>Allows you to reverse the X-axis. If the X-axis is reversed, its values are ordered from right to left.</td>
</tr>
<tr>
<td>Show X-axis</td>
<td>Allows you to hide and show the X-axis.</td>
</tr>
<tr>
<td>Show title</td>
<td>Allows you to hide and show the X-axis title. You can choose whether to use the default text or specify a custom string.</td>
</tr>
<tr>
<td>Enable zooming</td>
<td>Allows you to enable zooming for the X-axis. The X-axis' scroll bar provides the capability to perform navigation in the zoomed diagram.</td>
</tr>
<tr>
<td>Limit visible points</td>
<td>Allows you to limit the number of points displayed on the chart's diagram along the X-axis. The X-axis' scroll bar provides the capability to perform navigation if the number of all points exceeds the number of visible points.</td>
</tr>
</tbody>
</table>

**Numeric Format X-Axis Settings**

If arguments are numeric, the X-Axis Settings dialog contains a Numeric Format tab. It allows you to specify the numeric display formats for X-Axis data, as described in the Formatting Data document.

![X-Axis Settings](image)

The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.

**Date Time Format X-Axis Settings**

For date and time arguments, the X-Axis Settings dialog displays a Numeric Format tab. It allows you to specify the date and time display formats for X-Axis data.
Using the dialog, you can override default formats applied according to the data grouping type, as described in the Grouping document. The following image shows the Date Time Format tab in the dialog when the grouping type is set to Exact Date. Click the Reset to Default button to return all format settings back to their default values.

The tab contains settings described in detail in the Formatting Data document.

**Continuous and Discrete X-Axes**

If the dimension in the Arguments section contains numeric data, the Chart can create either a continuous X-axis or a discrete X-axis.

<table>
<thead>
<tr>
<th>CONTINUOUS X-AXIS</th>
<th>DISCRETE X-AXIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a continuous axis is used, the distance between argument values is proportional to their values.</td>
<td>On a discrete axis, all argument values are an equal distance from each other.</td>
</tr>
</tbody>
</table>

To specify the X-axis type in the Designer, invoke the data item menu for the argument dimension and select the axis type.
Note that the continuous X-axis is not supported in OLAP mode.
**Y-Axis**

The **Y-axis** is the numerical axis of values.

To access the Y-axis settings, use the **Y-Axis Settings** button in the **Diagram** section of the **Design** Ribbon tab.

This will invoke the **Y-Axis Settings** dialog.

Use the combo box at the top to select the **pane** for the Y-axis settings you need to edit.

### Common Settings

The dialog contains the following settings.

- **Always show zero level** - Specifies whether or not the axis' zero level is visible. If this option is unchecked, the visible axis range is defined based on the values plotted in the chart.
- **Reverse** - Allows you to reverse the X-axis. If the X-axis is reversed, its values are ordered from top to down.
- **Show grid lines** - Allows you to hide and show grid lines for the Y-axis.
- **Show Y-axis** - Allows you to hide and show the Y-axis.
- **Show title** - Allows you to hide and show the Y-axis title. You can choose whether to use the default text or specify a custom string.
- **Logarithmic scale** - Specifies whether the axis should display its numerical values using a logarithmic scale. The combo box next to this option allows you to select the logarithmic base from one of the predefined values.

## Numeric Format

The **Numeric Format** tab allows you to specify the numeric display formats for Y-Axis data, as described in the [Formatting Data](#) document.

![Y-Axis Settings](image)

The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.
You can rotate the Chart so that the X-axis becomes vertical, and the Y-axis becomes horizontal.

To rotate a Chart in the Designer, use the **Rotate** button in the **Diagram** group of the **Design** Ribbon tab.
Scatter Chart

The topics in this section describe the features available in the **Scatter Chart** dashboard item, and provide information on how to create and customize scatter charts in the **DevExpress Dashboard Suite**.

This section is divided into the following subsections:

- **Providing Data**
  Provides information on how to supply the Scatter Chart dashboard item with data.

- **Interactivity**
  Describes features that enable interaction between the Scatter Chart and other dashboard items.

- **Coloring**
  Describes coloring capabilities of the Scatter Chart dashboard item.

- **Legend**
  Provides information about the chart legend and its options.

- **Axes**
  Describes how to customize settings related to chart axes.

- **Orientation**
  Describes how to toggle the chart's orientation.

- **Labels**
  Provides information about point labels and tooltips that contain descriptions of data points.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Scatter Chart dashboard item to data in the Designer.

- Binding to Data in the Designer
- Transposing X- and Y-axis

Binding to Data in the Designer

The image below shows a sample Scatter Chart dashboard item that is bound to data.

To bind the Scatter Chart dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes Scatter Chart data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Axis</td>
<td>Contains the data item against which the X-coordinates of data points are calculated.</td>
</tr>
<tr>
<td>Y-Axis</td>
<td>Contains the data item against which the Y-coordinates of data points are calculated.</td>
</tr>
<tr>
<td>Weight</td>
<td>Contains the data item whose values are used to calculate the weight of data points.</td>
</tr>
<tr>
<td>Arguments</td>
<td>Contains data items providing scatter chart arguments that are used to create data points.</td>
</tr>
</tbody>
</table>

Transposing X- and Y-axis

The Scatter Chart dashboard item provides the capability to transpose its axes. In this case, the data item contained in the X-Axis section is moved to the Y-Axis section, and vice versa.
To transpose the selected Scatter Chart dashboard item, use the **Transpose** button in the **Home** ribbon tab.
Interactivity

This section describes features that enable interaction between the Scatter Chart and other dashboard items. These features include Master Filtering and Drill-Down.

The section contains the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

The Scatter Chart dashboard item supports filtering by points that correspond to specific argument values or their combinations.

When Master Filtering is enabled, you can click a point (or multiple points by holding down the CTRL key) to make other dashboard items only display data related to the selected point(s).

To learn how to enable Master Filtering in the Designer, see the Master Filtering topic.

To reset filtering, use the Clear Master Filter button in the Chart’s caption area, or the Clear Master Filter command in the context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

When drill-down is enabled, you can click a point to view the details.

![Drill-Down Diagram]

**Note**

When Master Filtering is enabled, you can view the details by double-clicking a point.

Drill-down requires that the Arguments section contain several dimensions, from the least to the most detailed dimension.

![Dimension Options]

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes. To learn more about OLAP mode, see Binding Dashboard Items to Data in OLAP mode.

To enable drill-down, click the Drill Down button in the Data Ribbon tab (or the button if you are using the toolbar menu).

To return to the previous detail level (drill up), use the Drill Up button in the caption of the Scatter Chart dashboard item, or the Drill Up command in the context menu.
**Coloring**

Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

By default, the Scatter Chart dashboard item does not color its arguments. If necessary, you can change this behavior. For instance, the image below displays the Scatter Chart dashboard item whose Product Category points are colored by hue.
Legend

A **legend** is an element of a scatter chart that identifies chart points (for instance, *colored points* corresponding to argument values).

This topic describes how to customize various legend settings.

**Visibility**

You can specify whether or not a chart should display a legend.

In the Designer, use the **Show Legend** button in the **Legend** section of the **Design** Ribbon tab.

**Position and Orientation**

To specify the legend's position and orientation, select one of the predefined options from the gallery in the **Design** Ribbon tab.
Axes

Scatter Chart X and Y-axes are numerical axis of values. You can specify various axes settings to change visual data presentation.

To access X and Y-axis settings, use the **X-Axis Settings/Y-Axis Settings** buttons in the **Diagram** section of the **Design** Ribbon tab.

This will invoke the **X-Axis Settings/Y-Axis Settings** dialog.

In this dialog, you can specify the following settings.

- **Always show zero level** - Specifies whether or not the axis' zero level is visible. If this option is unchecked, the visible axis range is defined based on the values plotted in the chart.

  □ **Note**

  Note that the **X-Axis Settings** dialog does not contain this option.
The **Reverse** - Allows you to reverse the axis. If the axis is reversed, its values are ordered from top to down.

- **Show grid lines** - Allows you to hide and show grid lines for the axis.
- **Show axis** - Allows you to hide and show the axis.
- **Show title** - Allows you to hide and show the axis title. You can choose whether to use the default text or specify a custom string.
- **Logarithmic scale** - Specifies whether or not the axis should display its numerical values using a logarithmic scale. The combo box next to this option allows you to select the logarithmic base from one of the predefined values.

The **Numeric Format** tab allows you to specify the numeric display formats for axis data, as described in the [Formatting Data](#) document.

The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.
Orientation

You can rotate the Scatter Chart so that the X-axis becomes vertical, and the Y-axis becomes horizontal.

To rotate a Chart in the Designer, use the Rotate button in the Diagram section of the Design Ribbon tab.
Labels

The Scatter Chart display can display **point labels** that contain descriptions for data points, and provide **tooltips** with additional information.

Point Labels

To manage the visibility of point labels, click the **Point Labels** button in the **Design** ribbon tab.

In the invoked **Point Label Settings** dialog, enable the **Show point labels** check box to show point labels.

You can specify the following settings for point labels:

- **Content** - Specifies the type of content displayed within point labels. You can select one of the following options.
  - **Values** - Point labels show summary values from X and Y-axes.
  - **Argument** - Point labels show argument values.
  - **Argument and values** - Point labels show argument values and corresponding summary values.
  - **Weight** - Point labels show the weight summary value.
  - **Argument and weight** - Point labels show the argument value and the corresponding weight summary value.

- **Overlapping mode** - Specifies the label overlap mode. The following options are available.
  - **Hide overlapping labels** - If two or more labels overlap, some of them are automatically hidden to avoid overlapping.
  - **None** - The overlapping resolving algorithm is disabled.
  - **Reposition overlapping labels** - The default algorithm to re-position point labels in a random way, and avoid
overlapping labels.

- **Orientation** - Specifies the orientation of point labels. The following options are available.
  - *Default* - A point label is displayed in its default orientation.
  - *Rotate to the Right* - A point label is rotated 90 degrees clockwise.
  - *Rotate to the Left* - A point label is rotated 90 degrees counter clockwise.
The topics in this section describe the features available in the Grid dashboard item, and provide extensive information on how to create and customize grids in the Dashboard Designer.

This section consists of the following subsections.

- **Providing Data**
  Provides information about how to supply the Grid dashboard item with data.

- **Columns**
  Describes different types of grid columns.

- **Interactivity**
  Describes features that imply interaction between the Grid and other dashboard items.

- **Conditional Formatting**
  Describes the conditional formatting feature that provides the capability to apply formatting to grid cells whose values meet the specified condition.

- **Totals**
  Describes totals that allow you to calculate summaries against values displayed within Grid columns.

- **Layout**
  Describes the Grid's layout options.

- **Style**
  Describes the Grid's style settings.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the [Binding Dashboard Items to Data](#) topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Grid dashboard item to data in the Designer.

The image below shows a sample Grid dashboard item that is bound to data.

![Sample Grid dashboard item](image)

To bind the Grid dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes a Grid’s data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columns</td>
<td>Contains data items that provide values for grid columns. The <em>Options</em> button next to the <em>Column</em> data item allows you to select the <strong>column type</strong> and specify their options.</td>
</tr>
<tr>
<td>Sparkline</td>
<td>Contains a data item that provides arguments for sparkline columns. To learn more, see <a href="#">Sparkline Column</a>.</td>
</tr>
</tbody>
</table>
The topics in this section describe the different types of grid columns, and contain information on when to use each column type and how to customize them based on the type.

This section consists of the following topics.

- **Column Type Overview**
  Provides general information about column types and describes how to change the type of a particular column.

- **Dimension Column**
  Describes dimension column specifics.

- **Hyperlink Column**
  Describes hyperlink column specifics.

- **Measure Column**
  Describes measure column specifics.

- **Delta Column**
  Describes delta column specifics.

- **Sparkline Column**
  Describes sparkline column specifics.
Column Type Overview

The Grid dashboard item supports four types of columns.

- **Dimension Column**
  Displays values in the bound data item "as is".

- **Hyperlink Column**
  Allows you to display hyperlinks in the Grid dashboard item.

- **Measure Column**
  Displays summaries calculated against data in the bound data item.

- **Delta Column**
  Bound to two measures, it calculates summaries for both measures, and displays the difference between these summaries.

- **Sparkline Column**
  Displays values in the bound data item using sparklines.

When you drop a data item into the **Columns** section, the type for the new column is determined automatically, based on the data type.

**Column Type Indication**

The type of the column is indicated within the corresponding data item container in the DATA ITEMS area.

<table>
<thead>
<tr>
<th>ICON</th>
<th>COLUMN TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>📍</td>
<td>Dimension Column</td>
</tr>
<tr>
<td>🏷</td>
<td>Hyperlink Column</td>
</tr>
<tr>
<td>📈</td>
<td>Measure Column</td>
</tr>
</tbody>
</table>
### Changing Column Type

To change the column type, click the column type indicator. In the invoked **Column Options** window, select the required column type in the **Column type** section.
Dimension Column

The **dimension column** displays values from the bound data item “as is”.

If the dimension column is bound to a data source containing images, it can display images.
Hyperlink Column

A hyperlink column allows you to display hyperlinks in the Grid dashboard item.

You can provide hyperlinks as a separate data column, or they can be automatically created at run-time from any column using the specified URI pattern.

In this document, the sample data source contains four fields: country name, official country name, Wikipedia country page’s URI and the GDP value.

The following sections describe how to create hyperlink columns in more detail:

- Data Field Containing Uri Values
- Uri Pattern

Data Field Containing Uri Values

Drag the Name data field from the Data Source tree view to the column's data item container. The data field is automatically processed as dimension. Drag and drop the GDP data field to another column’s data item container. The data field is recognized as measure and summarized.

Drop the Link field between the Name and the GDP (Sum) data items. The Grid recognizes this field as dimension and displays links as plain text.
Click the **Column Type Indicator** button next to the *Name* data item and change its type to **Hyperlink**.

The Grid displays column values as clickable hyperlinks allowing you to navigate to the Wiki’s pages.

You can bind the Display value and URI value to different data fields. Click the *New Column* data item placeholder and change its type to **Hyperlink**.

Drag and drop the *OfficialName* field to the *Display Value* data item placeholder to display official country names. Drag and drop
the **Link** field to the **Uri** data item placeholder to specify URIs.

The grid displays official country names with links obtained from the **Link** data source field.

![Dashboard interface with grid displaying official country names with links](image)

**Uri Pattern**

In this case, a specified URI pattern is used to generate links.

Drag the **Name** data field from the Data Source tree view to the column’s data item container. The data field is automatically processed as **dimension**. Drag and drop the GDP data field to another column’s data item container. The data field is recognized as **measure** and summarized.

![Dashboard interface with GDP by Country](image)

Click the **Column Type Indicator** button next to the Name data item and change its type to **Hyperlink**. Specify the **URI Pattern** option as follows:

```
https://en.wikipedia.org/wiki/{0}
```

The `{0}` placeholder is replaced with the **Name** data item value. The links are generated for country names and displayed in the grid as illustrated in the following picture.
### GDP by Country

<table>
<thead>
<tr>
<th>Name</th>
<th>GDP (Gsm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>2.47M</td>
</tr>
<tr>
<td>Germany</td>
<td>3.48M</td>
</tr>
<tr>
<td>United States</td>
<td>18.6M</td>
</tr>
</tbody>
</table>
Measure Column

A measure column displays summaries calculated against data in a bound data item.

Values in the measure column can be displayed as text or represented by bars.

To select between these modes, invoke the Column Options window (see Column Type Overview to learn how to do this) and select Value or Bar.

If bars are displayed, use the Always show zero level check box to specify whether the bar’s zero level is always visible.
Delta Column

A **delta column** calculates summaries against two measures, and displays the difference between these summaries. This difference can be indicated with a numeric value displayed within the delta element and an additional delta indication.

![Delta Column Example](image)

Data Binding Specifics

Delta columns are bound to two measures that provide two values: the **Actual** value and the **Target** value. The difference between these values is displayed in the column.

When you switch the column type to **Delta**, the data item container is changed, to accept the Actual and Target measures.

![Data Binding Specifics](image)

Display Mode

Values in the delta column can be displayed as text, or represented by bars.

![Display Mode Example](image)

To select between these modes, invoke the **Column Options** window (see the **Column Type Overview** topic to learn how to do this) and select **Value** or **Bar**.

![Column Options](image)

If bars are displayed, use the **Always show zero level** check box to specify whether the bar’s minimum value is zero (checked) or an automatically selected value that ensures that the difference between bars is clearly displayed (unchecked).
Delta Values and Indication

If the display type is set to Value, the Column Options window displays options that allow you to configure delta values and indication.

You can specify which values should be displayed in the delta column. To do this, use the Value type combo box in the Column Options window.

<table>
<thead>
<tr>
<th>ACTUAL VALUE</th>
<th>ABSOLUTE VARIATION</th>
<th>PERCENT VARIATION</th>
<th>PERCENT OF TARGET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales vs Target</td>
<td>+5.32 % ▲</td>
<td>+5.32 % ▲</td>
<td>105.32 % ▲</td>
</tr>
<tr>
<td>$13.4M ▲</td>
<td>-0.95 % ▼</td>
<td>-0.95 % ▼</td>
<td>99.05 % ▼</td>
</tr>
<tr>
<td>$10.6M ▼</td>
<td>+8.02 % ▲</td>
<td>+8.02 % ▲</td>
<td>108.02 % ▲</td>
</tr>
<tr>
<td>$8.3M ▼</td>
<td>-1.51 % ▼</td>
<td>-1.51 % ▼</td>
<td>98.49 % ▼</td>
</tr>
</tbody>
</table>

To specify the condition for displaying delta indication, use the Result indication combo box in the Column Options window.

<table>
<thead>
<tr>
<th>GREATER IS GOOD</th>
<th>LESS IS GOOD</th>
<th>WARNING IF GREATER</th>
<th>WARNING IF LESS</th>
<th>NO INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales vs Target</td>
<td>+5.32 % ▲</td>
<td>+5.32 % ▲</td>
<td>+5.32 % ▲</td>
<td>-5.32 % ▼</td>
</tr>
<tr>
<td>$13.4M ▲</td>
<td>-0.95 % ▼</td>
<td>-0.95 % ▼</td>
<td>-0.95 % ▼</td>
<td>-0.95 % ▼</td>
</tr>
<tr>
<td>$10.6M ▼</td>
<td>+8.02 % ▲</td>
<td>+8.02 % ▲</td>
<td>+8.02 % ▲</td>
<td>+8.02 % ▲</td>
</tr>
<tr>
<td>$8.3M ▼</td>
<td>-1.51 % ▼</td>
<td>-1.51 % ▼</td>
<td>-1.51 % ▼</td>
<td>-1.51 % ▼</td>
</tr>
</tbody>
</table>

The Format tab allows you to specify the numeric display format for different value types, as described in the Formatting Data document.
The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.

**Comparison Tolerance**

The comparison tolerance allows you to specify more advanced conditions for displaying delta indication. For instance, you can set a specific indication to be displayed when the actual value exceeds the target value by 10% or by $2K.

Use the **Threshold type** combo box to select whether you wish to specify the comparison tolerance in percentage values or in absolute values. Then use the **Threshold value** box to specify the comparison tolerance.
Sparkline Column

A **sparkline column** visualizes the variation in summary values over time.

<table>
<thead>
<tr>
<th>Category/Name</th>
<th>Extended Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beverages</td>
<td>$49.1K – $20.3K</td>
</tr>
<tr>
<td>Condiments</td>
<td>$9.99K – $7.32K</td>
</tr>
<tr>
<td>Produce</td>
<td>$4.23K – $15.8K</td>
</tr>
</tbody>
</table>

**Data Binding Specifics**

The sparkline column is bound to a measure providing sparkline values and to a dimension providing a date-time interval.

**Sparkline Options**

You can control sparkline appearance settings using the **Column Options** dialog. To invoke this dialog, click the column type indicator (»«).

<table>
<thead>
<tr>
<th>SPARKLINE OPTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show start/end values</td>
<td>Species whether or not to display sparkline start/end values within a grid cell.</td>
</tr>
<tr>
<td>SPARKLINE OPTIONS</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sparkline view type</td>
<td>Defines the view type of a sparkline. Sparkline view types include <strong>Line</strong>, <strong>Area</strong>, <strong>Bar</strong>, and <strong>Win/Loss</strong>.</td>
</tr>
<tr>
<td>Highlight min/max points</td>
<td>Specifies whether or not to highlight the minimum/maximum points of a sparkline.</td>
</tr>
<tr>
<td>Highlight start/end points</td>
<td>Specifies whether or not to highlight the start/end points of a sparkline.</td>
</tr>
</tbody>
</table>
Interactivity

This section describes features that enable interaction between the Grid and other dashboard items. These features include Master Filtering and Drill-Down.

The section consists of the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

Configure Master Filters in the Designer

The Grid dashboard item supports filtering by rows.

When Master Filtering is enabled, you can click a grid row (or multiple rows by holding down the CTRL key) to make other dashboard items only display data related to the selected record(s).

To learn how to enable Master Filtering in the Designer, see the Master Filtering topic.

To reset filtering, use the Clear Master Filter button (the icon) in the grid’s caption area, or the Clear Master Filter command in the grid’s context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

The **Grid** dashboard item supports drill-down for rows.

When drill-down is enabled, you can click a grid row to view the details.

![Grid dashboard item](image)

**Note**

When **Master Filtering** is enabled, you can view the details by double-clicking a grid row.

Drill-down requires that the **Columns** section contains several dimensions at the top, from the least detailed to the most detailed dimension.

![Data items](image)

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill-down, click the **Drill Down** button in the Data Ribbon tab (or the button if you are using the toolbar menu).

![Drill Down button](image)

To return to the previous detail level (drill up), use the **Drill Up** button (the icon) within the grid’s caption area, or the **Drill Up** command in the grid’s context menu.
Conditional Formatting

The Grid dashboard item supports the conditional formatting feature that provides the capability to apply formatting to grid cells whose values meet the specified condition. This feature allows you to highlight specific cells or entire rows using a predefined set of rules. To learn more about conditional formatting concepts common for all dashboard items, see the Conditional Formatting topic.

- Conditional Formatting Overview
- Create a Format Rule
- Edit a Format Rule

Conditional Formatting Overview

The Grid dashboard item allows you to apply conditional formatting to data items providing data to the following column types.

- dimension column;
- measure column;
- sparkline column.

**Note**

Note that you can use hidden measures to specify a condition used to apply formatting to visible values.

New appearance settings are applied to grid cells corresponding to the target dimension/measure values.

Create a Format Rule

To create a new format rule for the Grid’s dimension/measure, do one of the following.

- Click the Options button next to the required measure/dimension, select Add Format Rule and choose the condition.

- Right-click the column header corresponding to the required measure/dimension and select Add Format Rule.
Use the **Edit Rules** dialog.

Depending on the selected format condition, the dialog used to create a format rule for Grid contains different settings. For instance, the image below displays the **Greater Than** dialog corresponding to the **Value** format condition.

The **Apply to row** check box allows you to specify whether to apply the formatting to the entire grid row.

### Edit a Format Rule

To edit format rules for the current Grid dashboard item, use the following options.

- Click the **Edit Rules** button in the **Home** ribbon tab or use corresponding item in the Grid context menu.
- Click the **menu button** for the required data item and select **Edit Rules**. As an alternative, right-click the column header corresponding to the required data item and select **Edit Rules**.

All of these actions invoke the **Edit Rules** dialog containing existing format rules. To learn more, see **Conditional Formatting**.
Totals

The Grid dashboard item enables you to add a summary value (a total) calculated against displayed values of an individual column, and show the result under this column. Note that you can add any number of totals for each column. For example, you can obtain the number of column records, average or maximum value, etc.

This topic describes how to create, edit or clear totals.

The topic consists of the following sections.

- **Totals Overview**
- **Create and Edit Totals**
- **Clear Totals**

**Totals Overview**

You can use the following summary functions when creating totals.

- **Count** - The number of records.

- **Sum** - The sum of the values.

\[
\text{Sum} = \sum_{i} v_i
\]

- **Min** - The smallest value.

- **Max** - The largest value.

- **Average** - The average of the values.

\[
\bar{v} = \frac{1}{n} \cdot \sum_{i} v_i
\]

- **Auto** - The total is calculated using the type of summary function specified for the measure corresponding to the current Grid column. Note that in this case, the total is calculated based on values of the corresponding data field from the underlying data source. Note that the Auto type is not supported when the Grid is bound to the OLAP data source.

You can create totals using different sets of summary functions. This depends on the type of the data source field providing data for the target column.

<table>
<thead>
<tr>
<th>ICON</th>
<th>DATA SOURCE FIELD TYPE</th>
<th>SUPPORTED TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon]</td>
<td>Boolean</td>
<td>Count</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Byte</td>
<td>Count</td>
</tr>
<tr>
<td>ICON</td>
<td>DATA SOURCE FIELD TYPE</td>
<td>SUPPORTED TOTALS</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>📅</td>
<td>Date-time</td>
<td>Min, Max, Count</td>
</tr>
<tr>
<td>📊</td>
<td>Numeric</td>
<td>All available types</td>
</tr>
<tr>
<td>🎨</td>
<td>String</td>
<td>Min, Max, Count</td>
</tr>
</tbody>
</table>

Important

Note that the Auto type is available only for the Measure column.

Create and Edit Totals

To create a total, use the context menu of the column header. Right-click the required column header, select Add Total and specify the type of summary function used to calculate a total.

To change the total type, right-click the required total and select a new total type.

Clear Totals

You can delete one total or all the totals in a particular column.

- To delete a single total, right-click a total and select Remove.
To delete all column totals, right-click the column header and select **Clear Totals** in the invoked context menu.
Layout

The Grid dashboard item allows you to customize its layout in various ways. You can manage the width of grid columns, specify the visibility of column headers, enable cell merging, etc.

To do this, use the **Layout** and **Column Width Mode** groups in the **Design** Ribbon tab.

**Column Width Modes**

The Grid dashboard item allows you to manage column widths using different modes. Use buttons in the **Column Width Mode** group to manage the column width modes.

The following modes are available.

**AutoFit to Contents**

The grid adjusts columns to the minimum width required to completely display their content automatically. If the entire content cannot be displayed within the dashboard item, horizontal scrolling is enabled.

**AutoFit to Grid**

The grid adjusts the width of all columns to fit their content in an optimal way. If you are changing the size of the dashboard item, the width of columns is changed proportionally.

**Manual**

The grid allows you to adjust column widths manually.

In this mode, you can adjust the width of individual columns in the following ways.

- Specify the width of the required column by dragging the right edge of the column header.

  ![Example grid](image)

  In this case, all columns preserve their relative size when the grid width is changed.

- Specify the column width and fix it by right-clicking the required column header and selecting **Fix Width**.
You can also specify the fixed column width by selecting **Column Width...** This invokes the **Column Width** window that allows you to specify the width of the column in characters.

- Fit the column width to its content and fix it by right-clicking the required column header and selecting **Fit to Content**.

### Column Header

Use the **Column Headers** button to toggle column header visibility.

### Cell Merging

The Grid allows you to merge neighboring cells with identical values. To do this, use the **Merge Cells** button.

**Note**

Note that **banded rows** are not available when cell merging is enabled.

### Word Wrapping

The word wrapping feature enables the capability to display cell content on multiple lines if the size of a dashboard item is insufficient to completely display the cell content on a single line.
The word wrapping feature is not in effect when the **AutoFit to Contents** column width mode is enabled.
Style

The Grid dashboard item allows you to specify various style settings.

To do this, use the **Style** group in the **Design** Ribbon tab.

- **Grid Lines**
- **Banded Rows**

Grid Lines

The **Horizontal Lines** and **Vertical Lines** buttons control grid line visibility.

Banded Rows

To paint the background of odd and even rows differently, use the **Banded Rows** button.

Note

Note that banded rows are not available when cell merging is enabled.
Pies

The Pie dashboard item displays a series of pies or donuts that represent the contribution of each value to a total.

This section consists of the following subsections:

- **Providing Data**
  Describes how to supply the Pie dashboard item with data.

- **Interactivity**
  Describes features that enable interaction between the Pie dashboard item and other items.

- **Coloring**
  Describes coloring capabilities of the Pie dashboard item.

- **Layout**
  Describes layout options of the Pie dashboard item.

- **Labels**
  Explains how to customize data labels and tooltips.

- **Style**
  Describes how to select the style of pie charts.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Pie dashboard item to data in the Designer.

- Binding to Data in the Designer
- Transposing Arguments and Series

Binding to Data in the Designer

The image below shows a sample Pie dashboard item that is bound to data.

To bind the Pie dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes Pie's data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>Contains data items that define the share of pie segments. In case of negative measure values, Pie uses their absolute values.</td>
</tr>
<tr>
<td>Arguments</td>
<td>Contains data items that provide values used to label pie segments.</td>
</tr>
<tr>
<td>Series</td>
<td>Contains data items whose values are used to label pie charts.</td>
</tr>
</tbody>
</table>

Transposing Arguments and Series

The Pie dashboard item provides the capability to transpose pie arguments and series. In this case, data items contained in the Arguments section are moved to the Series section, and vice versa.
To transpose the selected Pie dashboard item, use the **Transpose** button in the **Home** ribbon tab.
Interactivity

This section describes features that enable interaction between the Pie dashboard item and other items. These features include Master Filtering and Drill-Down.

The section contains the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

The Pie dashboard item supports filtering by argument or series values.

Filtering by Arguments

When filtering by arguments is enabled, you can click a pie segment to make other dashboard items only display data related to the selected argument value.

To enable filtering by arguments in the Designer, set the required Master Filter mode and click the Arguments button in the Data Ribbon tab (or the button if you are using the toolbar menu).

Filtering by Series

When filtering by series is enabled, you can click a pie to make other dashboard items display only data related to the selected pie.

To enable filtering by series in the Designer, set the required Master Filter mode and click the Series button in the Data Ribbon tab (or the button if you are using the toolbar menu).
Filtering by Points

When filtering by points is enabled, you can click a single pie segment to make other dashboard items display only data related to the selected segment.

To enable filtering by points in the Designer, set the required Master Filter mode and click the Points button in the Data Ribbon tab.

Reset Filtering

To reset filtering, use the Clear Master Filter button (the icon) in the caption area of the Pie dashboard item, or the Clear Master Filter command in the Pie’s context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

The Pie dashboard item supports drill-down on argument or series values.

Drill Down on an Argument

When drill down on an argument is enabled, you can click a pie segment to view a detail diagram for the corresponding argument value.

Note

When Filtering by Arguments is enabled, you can view the details by double-clicking a pie segment.

Drill down on an argument requires that the Arguments section contains several data items, from the least detailed to the most detailed item.

Note

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill down on an argument, click the Drill Down button in the Data Ribbon tab (or the button if you are using the toolbar menu)...

...and the Arguments button (or the button if you are using the toolbar menu).
Drill Down on a Series

When drill down on a series is enabled, you can click a pie chart to view a detail diagram for the corresponding series value.

Note

When *Filtering by Series* is enabled, you can view the details by double-clicking a pie chart.

Drill down on a series requires that the Series section contains several data items, from the least detailed to the most detailed item.

Note

In *OLAP* mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill down on a series, click the *Drill Down* button in the *Data* Ribbon tab (or the button if you are using the toolbar menu)...
...and the **Series** button (or the button if you are using the toolbar menu).

![Pie dashboard item](image)

## Drill Up

To return to the previous detail level (drill up), use the **Drill Up** button (the icon) in the caption area of the Pie dashboard item, or the **Drill Up** command in the context menu.
Coloring

Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

By default, the Pie dashboard item colors its segments in the following way.

- If the Pie dashboard item contains measures (the Values section) and series dimensions (the Series section), only values corresponding to different measures are colored by hue.
- If the Pie dashboard item contains arguments (the Arguments section), different argument values are colored by hue.

If necessary, you can change the default behavior. For instance, the image below shows the Pie dashboard item whose measures and argument values are colored by hue.
Layout

The Pie dashboard item allows you to specify the number of columns or rows in which individual diagrams are arranged.

To control how pies are arranged, use the buttons in the Content Arrangement group of the Design Ribbon tab.

By default, the Auto Arrange option is enabled, which automatically resizes pies to fit within the dashboard item.

You can also specify the number of columns in which pies are arranged. Click the Arrange in Columns button and specify the appropriate number in the Count field.

Similarly, you can arrange pies in a specific number of rows.
You can specify which information should be displayed within data labels and tooltips. To do this, use the **Data Labels** and **Tooltips** buttons in the **Labels** group of the **Design** Ribbon tab.

These buttons invoke a drop-down menu that is similar for both buttons. This menu allows you to specify which values are displayed within data labels or tooltips.
Style

The **Pie** dashboard item allows you to select whether diagrams should be painted as **pies** or **donuts**.

To select the diagram style, use the **Pie** and **Donut** buttons in the **Style** section of the **Design** Ribbon tab.
The **Card** dashboard item displays a series of cards. Each card illustrates the difference between two values. This difference can be expressed as an absolute value, an absolute variation or a percentage variation.

This section consists of the following subsections:

- **Providing Data**
  Provides information about how to supply the Card dashboard item with data.

- **Layout**
  Describes how to manage the position and visibility of elements within a card.

- **Delta**
  Provides an overview of the Card dashboard item's capability to display the difference between two parameters.

- **Sparkline**
  Provides an overview of the Card dashboard item's capability to visualize data using sparklines.

- **Formatting**
  Shows how to format values displayed within a card.

- **Interactivity**
  Describes features that enable interaction between the Card dashboard item and other items.

- **Cards Arrangement**
  Describes how to arrange cards within the Card dashboard item.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Card dashboard item to data in the Designer.

Binding to Data in the Designer

The image below shows a sample Card dashboard item that is bound to data.

To bind the Card dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes Card data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cards</td>
<td>Contains data items used to calculate values displayed within cards. Data items are arranged in containers. Each data item container can hold two data items. The first item contains actual data and the second item (optional) contains target data. If both items are provided, cards show the difference between actual and target values. You can fill several data item containers in the Cards section and use the Values drop-down menu to switch between the provided values. To invoke the Values menu, click the “Values” icon in the dashboard item caption or use its context menu. This drop-down menu is available if the Series section is not empty. Otherwise, a separate card is created for each data item container, and all cards are displayed simultaneously.</td>
</tr>
<tr>
<td>Series</td>
<td>Contains data items whose values are used to label cards.</td>
</tr>
<tr>
<td>Sparkline</td>
<td>Provide a dimension whose data will be used to visualize values using sparklines.</td>
</tr>
</tbody>
</table>
The Card dashboard item allows you to manage the position and visibility of elements displayed on cards. These elements include actual and target values, a delta indicator and corresponding delta values, a sparkline, etc.

To manage the position and visibility of card elements, choose a predefined layout template and customize its settings.

- Available Layout Templates
- Default Layout
- Change Layout

## Available Layout Templates

The table below contains information about the available layout templates:

<table>
<thead>
<tr>
<th>LAYOUT TYPE</th>
<th>EXAMPLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stretched</td>
<td><img src="image" alt="Stretched Example" /></td>
<td>The Stretched layout template arranges card elements so that they occupy an entire card area.</td>
</tr>
<tr>
<td>Centered</td>
<td><img src="image" alt="Centered Example" /></td>
<td>The Centered layout template is used to center card elements so that they occupy a specified width/height.</td>
</tr>
<tr>
<td>Compact</td>
<td><img src="image" alt="Compact Example" /></td>
<td>The Compact layout template is used to arrange card elements so that they occupy the minimum area.</td>
</tr>
<tr>
<td>Lightweight</td>
<td><img src="image" alt="Lightweight Example" /></td>
<td>The Lightweight layout template displays the minimum set of elements within a card.</td>
</tr>
</tbody>
</table>

For all layout types, you can change the visibility of its elements, or you can specify the display value type for data-bound elements. To learn more, see the Change Layout paragraph below.

## Default Layout

The Card dashboard item uses the Stretched layout template that arranges card visual elements in the following way by default:
To learn more about the available value types and visual elements, see Change Layout.

**Note**

Delta Indicator and delta values (such as Percent Variation or Absolute Variation) are colored depending on delta settings. To learn how to manage delta settings, see Delta.

**Change Layout**

To change a card’s layout in the Dashboard Designer, click the Options button (the icon) displayed next to the data item container in the Cards section.

This invokes the Card Settings dialog.

On the Layout Options tab, select the required layout type in the Select template list and specify its settings:

- **Min width** - Specifies the minimum width of the card content.
- **Max width** - Specifies the maximum width of the card content. Use the Auto option to determine the maximum width
You can show/hide the following values and visual elements within the card:

<table>
<thead>
<tr>
<th>VALUE</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Displays values of the last (bottommost) dimension placed in the <strong>Series</strong> section.</td>
<td><em>Microsoft Office Keyboard</em></td>
</tr>
<tr>
<td>Subtitle</td>
<td>Displays combined values of all dimensions except the last (bottommost) dimension.</td>
<td><em>Technology - Computer Peripherals</em></td>
</tr>
<tr>
<td>Absolute Variation</td>
<td>An absolute difference between the actual and target value (see <strong>Delta</strong>).</td>
<td>+18.1K</td>
</tr>
<tr>
<td>Actual Value</td>
<td>A summary value for a measure placed in the <strong>Actual</strong> placeholder.</td>
<td>$392K</td>
</tr>
<tr>
<td>Card Name</td>
<td>A card name.</td>
<td><em>Revenue vs. Target</em></td>
</tr>
<tr>
<td>Percent of Target</td>
<td>A percent of a target value (see <strong>Delta</strong>).</td>
<td>104.85 %</td>
</tr>
<tr>
<td>Percent Variation</td>
<td>A percent difference between the actual and target value (see <strong>Delta</strong>).</td>
<td>4.85 %</td>
</tr>
<tr>
<td>Target Value</td>
<td>A summary value for a measure placed in the <strong>Target</strong> placeholder.</td>
<td>$374K</td>
</tr>
<tr>
<td>Dimension (Name)</td>
<td>Allows you to display values of a specific dimension placed in the <strong>Series</strong> section.</td>
<td><em>Technology</em></td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>Delta Indicator</td>
<td>Indicates whether the actual value is less or greater than the target value (see <strong>Delta</strong>).</td>
<td>▲</td>
</tr>
<tr>
<td>Sparkline</td>
<td>Visualizes the variation of actual or target values. To learn more, see <strong>Sparkline</strong>.</td>
<td></td>
</tr>
</tbody>
</table>

Use the **Apply to All Cards** button to propagate the specified layout settings to all cards corresponding to **Actual-Target** pairs. The **Reset** button resets all setting to their default values.
Delta

Cards allow you to visualize the difference between the actual and target values using special delta values and a delta indicator. If the default layout is used (Stretched layout type), the card displays the following delta values/elements:

- **Delta Indicator** - Indicates whether the actual value is less or greater than the target value.
- **Percent Variation** and **Absolute Variation** - delta values that show a difference between the actual and target value. You can also display the **Percent of Target** value. To do this, customize the card’s layout.

To customize settings that relate to the calculation and display of delta values/elements, use the Options button (the icon) displayed next to the data item container in the Cards section.

In the invoked Card Settings dialog, go to the Delta Options tab:

Then, specify the following settings:

- **Result Indication** - You can specify the condition for displaying delta indication.
- **Greater is Good** - The ‘good’ indication is displayed if the actual value exceeds the target value; if the target value exceeds the actual value, the ‘bad’ indication displays.

- **Less is Good** - The ‘bad’ indication displays if the actual value exceeds the target value; if the target value exceeds the actual value, the ‘good’ indication displays.

- **Warning if Greater** - A warning is displays only if the actual value exceeds the target value.

- **Warning if Less** - A warning is displays only if the target value exceeds the actual value.

- **No Indication** - Indication does not display.

- **Threshold type / Threshold value** - For instance, you can specify that a specific indication should display when the actual value exceeds the target value by 10% or by $2K. Use the Threshold type combo box to select whether you wish to specify the comparison tolerance in percentage values or absolute values. Then use the Threshold value box to specify the comparison tolerance.
Sparkline

Sparklines can be used to visualize the variation of actual or target values (for instance, over time).

To learn how to display the sparkline for different layout types, see Layout.

- Data Binding Specifics
- Change Sparkline Options

Data Binding Specifics

You need to provide a date-time or numeric dimension whose data is used as argument values to display a sparkline within the card.

If you have provided both actual and target values, a sparkline visualizes the actual value's variation.

Change Sparkline Options

To manage sparkline settings, click the Options button (the icon) displayed next to the data item container. In the invoked Card Settings dialog, go to the Sparkline Options tab:
The following options are available:

<table>
<thead>
<tr>
<th>SPARKLINE OPTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sparkline view type</td>
<td>Defines the sparkline's view type. Sparkline data points can be represented as <strong>area</strong>, <strong>line</strong>, <strong>bars</strong>, or <strong>win</strong> and <strong>loss</strong> squares.</td>
</tr>
<tr>
<td>Highlight min/max points</td>
<td>Specifies whether to highlight the minimum/maximum points of a sparkline.</td>
</tr>
<tr>
<td>Highlight start/end points</td>
<td>Specifies whether to highlight the start/end points of a sparkline.</td>
</tr>
</tbody>
</table>
The Card dashboard item formats the actual and target values displayed within cards using format settings specified for data items. Click the options buttons (the icon) displayed next to the data item container in the Cards section to change format settings for other values.

In the invoked Card Settings dialog, go to the Format Options tab and use the Select value type option to specify which values’ format settings should change.

You can change format settings for the following value types:

- Actual Value
- Target Value
- Absolute Variation
- Percent of Target
- Percent Variation

To learn more about format settings, see Formatting Numeric Values in the Formatting Data topic.
Interactivity

This section describes features that enable interaction between the Card dashboard item and other items. These features include Master Filtering and Drill-Down.

The section contains the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When Master Filtering is enabled, you can click a card (or multiple cards by holding down the CTRL key) to make other dashboard items only display data related to the selected card(s).

To learn how to enable Master Filtering in the Designer, see the Master Filtering topic.

To reset filtering, use the Clear Master Filter button (the icon) in the caption of the Card dashboard item, or the Clear Master Filter command in the Card’s context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

When drill-down is enabled, you can click a card to view the details.

![Image showing drill-down results]

**Note**

When Master Filtering is enabled, you can view the details by double-clicking a card.

Drill-down requires that the Series section contains several dimensions, from the least to the most detailed dimension.

![Series section showing drill-down]

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill-down, click the Drill Down button in the Data Ribbon tab (or the button if you are using the toolbar menu).

![Data Ribbon with Drill Down button]

To return to the previous detail level (drill up), use the Drill Up button (the icon) in the caption of the Card dashboard item, or the Drill Up command in the Card’s context menu.
Cards Arrangement

The **Card** dashboard item allows you to specify the number of columns or rows in which individual cards are arranged.

Use the buttons in the **Content Arrangement** group of the **Design** Ribbon tab to control how cards are arranged.

The **Auto Arrange** option is enabled by default, which automatically resizes cards to fit within the dashboard item.

![Dashboard screenshot with cards arranged in columns and rows]

You can also specify the number of columns in which cards are arranged. Click the **Arrange in Columns** button and specify the appropriate number in the **Count** field.

![Dashboard screenshot with specific column count]

Similarly, you can arrange cards in a specific number of rows.

![Dashboard screenshot with specific row count]
Gauges

The **Gauge** dashboard item displays a series of gauges. Each gauge can communicate two values - one with a needle and the other with a marker on the scale.

![Sales vs Target by Product Category](image)

This section consists of the following subsections:

- **Providing Data**
  Provides information about how to supply the Gauge dashboard item with data.

- **Delta**
  Provides an overview of the Gauge dashboard item's capability to display the difference between two parameters.

- **Gauge Scale**
  Describes options that relate to the gauge scales.

- **Interactivity**
  Describes features that enable interaction between the Gauge dashboard item and other items.

- **Layout**
  Describes layout options of the Gauge dashboard item.

- **Style**
  Provides information about how to specify the gauge style.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Gauge dashboard item to data in the Designer.

The image below shows a sample Gauge dashboard item that is bound to data.

To bind the Gauge dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes Gauge's data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauges</td>
<td>Contains data items used to calculate values displayed by gauges. Data items are arranged in containers. Each data item container can hold two data items. The first item contains actual data and the second item (optional) contains target data. If both items are provided, gauges show the difference between actual and target values. You can fill several data item containers in the Gauges section and use the Values drop-down menu to switch between the provided values. To invoke the Values menu, click the icon in the dashboard item caption. This drop-down menu is available if the Series section is not empty. Otherwise, a separate gauge is created for each data item container, and all gauges are displayed simultaneously.</td>
</tr>
<tr>
<td>Series</td>
<td>Contains data items whose values are used to label gauges.</td>
</tr>
</tbody>
</table>
Delta

Gauges allow you to display the difference between the *actual* and *target* values of a particular parameter. This difference is called *delta*.

Delta is shown with a *delta indicator* (indicating whether the actual value is less than or greater than the target value) and *delta values* (representing this difference as an absolute value or a variation).

To customize settings that relate to the calculation and display of deltas, use the options buttons (the 🌟 icon) displayed next to the data item container in the Gauges section of the DATA ITEMS pane.

These buttons invoke the **Gauge Options** dialog.

Use it to define the condition for displaying delta indication, specify which delta values should be displayed, and introduce the comparison tolerance.

- **Delta Values**
- **Delta Indication**
- **Comparison Tolerance**

**Delta Values**

You can specify which values should be displayed within gauges. Use the *Value type* combo box in the **Gauge Options** window.
to select the value that will be displayed as the delta value.

<table>
<thead>
<tr>
<th>VALUE TYPE</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Value</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>Absolute Variation</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Percentage Variation</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>Percentage of Target</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

### Delta Indication

You can specify the condition for displaying delta indication. To do this, use the **Result indication** combo box in the **Gauge Options** window.

- **Greater is Good** - The ‘good’ indication is displayed if the actual value exceeds the target value; if the target value exceeds the actual value, the ‘bad’ indication is displayed.

![Image](image5.png)

- **Less is Good** - The ‘bad’ indication is displayed if the actual value exceeds the target value; if the target value exceeds the actual value, the ‘good’ indication is displayed.

![Image](image6.png)
- No Indication - Indication is not displayed.

- Warning if Greater - A warning is displayed if the actual value exceeds the target value; otherwise, no indication is displayed.

- Warning if Less - A warning is displayed if the target value exceeds the actual value; otherwise, no indication is displayed.

**Comparison Tolerance**

The comparison tolerance allows you to create more advanced conditions for displaying delta indication. For instance, you can specify that a specific indication should be displayed when the actual value exceeds the target value by 10% or by $2K.

Use the **Threshold type** combo box to select whether you wish to specify the comparison tolerance in percentage values or in absolute values. Then use the **Threshold value** box to specify the comparison tolerance.
Gauge Scale

By default, the Gauge dashboard item automatically determines the range of the gauge scales based on the values they display.

![Gauge Scale](image)

You can override this behavior and specify the maximum and minimum values on the scale.

To do this, invoke the **Gauge Options** window using the **Options** button displayed in the data item container in the Gauges section of the DATA ITEMS pane.

In the **Gauge Options** window, uncheck the **Auto** check box for the maximum or minimum value, and specify this value in the corresponding field.

![Gauge Options](image)

The **Format** tab allows you to specify the numeric display formats for different value types, as described in the **Formatting Data** document.
The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.
Interactivity

This section describes features that enable interaction between the Gauge dashboard item and other items. These features include Master Filtering and Drill-Down.

The section contains the following topics.

- Master Filtering
- Drill-Down
Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When master filtering is enabled, you can click a gauge (or multiple gauges by holding down the CTRL key) to make other dashboard items only display data related to the selected gauge(s).

To learn how to enable master filtering in the Designer, see the Master Filtering topic.

To reset filtering, use the Clear Master Filter button (the icon) in the caption of the Gauge dashboard item, or the Clear Master Filter command in the Gauge's context menu.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

When drill-down is enabled, you can click a gauge to view the details.

![Gauges 1]

**Note**

When Master Filtering is enabled, you can view the details by double-clicking a gauge.

Drill-down requires that the Series section contains several dimensions, from the least detailed to the most detailed dimension.

![Series]

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill-down, click the Drill Down button in the Data Ribbon tab (or the button if you are using the toolbar menu).

![Single Master Filter Multiple Master Filter Drill Down]

To return to the previous detail level (drill up), use the Drill Up button (the icon) in the caption of the Gauge dashboard item, or the Drill Up command in the Gauge’s context menu.
The Gauge dashboard item allows you to specify the number of columns or rows in which individual gauges are arranged.

To control how gauges are arranged, use the buttons in the Content Arrangement group of the Design Ribbon tab.

By default, the Auto Arrange option is enabled, which automatically resizes gauges to fit within the dashboard item.

You can also specify the number of columns in which gauges are arranged. Click the Arrange in Columns button and specify the appropriate number in the Count field.
Similarly, you can arrange pies in a specific number of rows by clicking the **Arrange in Rows** button.
Style

The **Gauge** dashboard item allows you to select the gauge type.

The following types are supported.

**Full Circular:**

![Gauge Full Circular](image)

**Half Circular:**

![Gauge Half Circular](image)

**Left-Quarter Circular:**

![Gauge Left-Quarter Circular](image)

**Right-Quarter Circular:**

![Gauge Right-Quarter Circular](image)
To select the gauge type, use the buttons in the **Style** group of the **Design** Ribbon tab.
The **Pivot** dashboard item displays a cross-tabular report that presents multi-dimensional data in an easy-to-read format.

![Pivot Dashboard Screenshot]

This section consists of the following subsections:

- **Providing Data**
  
  Explains how to supply the Pivot dashboard item with data.

- **Interactivity**
  
  Describes features that enable interaction between the Pivot and other dashboard items.

- **Conditional Formatting**
  
  Describes the conditional formatting feature that provides the capability to apply formatting to cells whose values meet the specified condition.

- **Layout**
  
  Describes the Pivot dashboard item’s layout options.

- **Expanded State**
  
  Describes how to specify whether to expand column/row groups by default.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Pivot dashboard item to data in the Designer.

- Binding to Data in the Designer
- Transposing Columns and Rows

Binding to Data in the Designer

The image below shows a sample Pivot dashboard item that is bound to data.

To bind the Pivot dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes a Pivot’s data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>Contains data items used to calculate values displayed in the pivot table.</td>
</tr>
<tr>
<td>Columns</td>
<td>Contains data items whose values are used to label columns.</td>
</tr>
<tr>
<td>Rows</td>
<td>Contains data items whose values are used to label rows.</td>
</tr>
</tbody>
</table>

Transposing Columns and Rows

The Pivot dashboard item provides the capability to transpose pivot columns and rows. In this case, data items contained in the Columns section are moved to the Rows section and vice versa.
To transpose the selected Pivot dashboard item, use the **Transpose** button in the **Home** ribbon tab.
Interactivity

This document describes the features that enable interaction between the **Pivot** and other dashboard items. These features include **Master Filtering**.

Master Filtering

The Dashboard allows you to use any data-aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more, see the **Master Filtering** topic, which describes filtering concepts common to all dashboard items.

Data displayed in the Pivot dashboard item can be filtered by other master filter items. You can prevent the pivot from being affected by other master filter items using the **Ignore Master Filters** button on the **Data** Ribbon tab.
Conditional Formatting

The Pivot dashboard item supports the conditional formatting feature that provides the capability to apply formatting to cells whose values meet the specified condition. This feature allows you to highlight specific cells or entire rows/columns using a predefined set of rules. To learn more about conditional formatting concepts common for all dashboard items, see the Conditional Formatting topic.

- Conditional Formatting Overview
- Create a Format Rule
- Edit a Format Rule

Conditional Formatting Overview

The Pivot dashboard item allows you to use conditional formatting to measures placed in the Values section and dimensions placed in the Columns/Rows sections.

Note

Note that you can use hidden measures to specify a condition used to apply formatting to visible values.

New appearance settings are applied to pivot data cell or cells corresponding to column/row field values.

Create a Format Rule

To create a new format rule for the Pivot's dimension/measure, do one of the following.

- Click the Options button next to the required measure/dimension, select Add Format Rule and choose the condition.
- Use the Edit Rules dialog.

Depending on the selected format condition, the dialog used to create a format rule for Pivot contains different settings. For instance, the image below displays the Greater Than dialog invoked for the measure.
This dialog contains the following settings specific to Pivot.

- **Intersection mode** specifies the level on which to apply conditional formatting to pivot cells. The following levels are supported.
  1. *Auto* - Identifies the default level. For the Pivot dashboard item, *Auto* identifies the *First Level*.
  2. *First Level* - First level values are used to apply conditional formatting.
  3. *Last Level* - The last level values are used to apply conditional formatting.
  4. *All Levels* - All pivot data cells are used to apply conditional formatting.
  5. *Specific Level* - Values from the specific level are used to apply conditional formatting.

- If you specified the **Intersection mode** as *Specific Level*, use the **Row dimension** and **Column dimension** combo boxes to set the specific level.
- The **Apply to row** and **Apply to column** check boxes allow you to specify whether to apply the formatting to the entire pivot row/column.

**Note**

If you are creating a new format rule for the dimension from the **Columns/Rows** section, the corresponding format condition dialog would not contain any Pivot specific settings.

**Edit a Format Rule**

To edit format rules for the current Grid dashboard item, use the following options.

- Click the **Edit Rules** button in the **Home** ribbon tab or use corresponding item in the Pivot context menu.
- Click the **menu button** for the required data item and select **Edit Rules**.

All of these actions invoke the **Edit Rules** dialog containing existing format rules. To learn more, see Conditional Formatting.
This topic describes how to control the Pivot dashboard item layout, the visibility of totals and grand totals, etc.

- **Layout Type**
- **Totals Visibility**
- **Totals Position**
- **Values Visibility**
- **Values Position**
- **Reset Layout Options**

### Layout Type

If the Pivot dashboard item contains a hierarchy of dimensions in the **Rows** section, you can specify the layout used to arrange values corresponding to individual groups.

<table>
<thead>
<tr>
<th>LAYOUT TYPE</th>
<th>EXAMPLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact</td>
<td><img src="image" alt="Compact Example" /></td>
<td>Displays values from different Row dimensions in a single column. Note that in this case totals are shown at the top of a group, and you cannot change totals position.</td>
</tr>
<tr>
<td>Tabular</td>
<td><img src="image" alt="Tabular Example" /></td>
<td>Displays values from different Row dimensions in separate columns.</td>
</tr>
</tbody>
</table>

Use the **Layout** button in the **Design** ribbon tab to change the Pivot layout.

### Totals Visibility

You can control the visibility of totals and grand totals for the entire Pivot dashboard item. For instance, the image below displays the Pivot dashboard item with the disabled row totals.
To manage the visibility of totals and grand totals, use the **Totals** and **Grand Totals** buttons in the **Design** ribbon tab, respectively.

These buttons invoke a popup menu that allows you to manage the visibility of column and row totals/grand totals separately.

Moreover, you can control the visibility of totals for individual dimensions/measures by using the data item’s context menu (Show Totals and Show Grand Totals options).

**Totals Position**

If necessary, you can change the Pivot dashboard item’s totals/grand totals position. For instance, in the image below the row totals are moved from the bottom to the top.
To manage totals position, use the **Row Totals Position** and **Column Totals Position** buttons in the **Design** ribbon tab.

**Values Visibility**

The Pivot dashboard item can contain several measures in the **Values** section to hide summary values corresponding to specific measures. For instance, the image below shows the Pivot with hidden **Quantity** values.

<table>
<thead>
<tr>
<th></th>
<th>UK</th>
<th>LSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extended Price (Sum)</td>
<td>Quantity (Sum)</td>
</tr>
<tr>
<td>2015</td>
<td>$27.8K</td>
<td>1.2K</td>
</tr>
<tr>
<td>Q1</td>
<td>$38.1K</td>
<td>1.6K</td>
</tr>
<tr>
<td>Q2</td>
<td>$53.3K</td>
<td>1.8K</td>
</tr>
<tr>
<td>Q3</td>
<td>$41.3K</td>
<td>1.7K</td>
</tr>
<tr>
<td>Q4</td>
<td>$79.1K</td>
<td>3.0K</td>
</tr>
<tr>
<td>Q5</td>
<td>$44.7K</td>
<td>1.5K</td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To do this, use the **Show Values** command in the measure menu.

**Values Position**

The Pivot dashboard item allows you to control the position of headers used to arrange summary values corresponding to different measures. For instance, you can display values in columns or rows.
To manage this position, use the **Values Position** button in the **Design** ribbon tab.

![Values Position](image)

**Reset Layout Options**

To reset layout options, click the **Reset Layout Options** button in the **Design** ribbon tab.

![Reset Layout Options](image)
Expanded State

If the Columns or Rows section contains several data items, the Pivot column and row headers are arranged in a hierarchy and make up column and row groups.

![Expanded State](image)

You can collapse and expand row and column groups using the ‹ and › buttons. However, the current expanded state of column and row groups do not save in the dashboard definition. If necessary, you can specify the default expanded state using the Initial State button in the Design ribbon tab.

![Initial State](image)

This button invokes the popup menu that allows you to select whether column and row groups should be collapsed or expanded by default.
Choropleth Map

The topics in this section describe the features available in the **Choropleth Map** dashboard item.

The Choropleth Map dashboard item allows you to colorize the required areas in proportion to the provided values.

This section consists of the following subsections:

- **Providing Maps**
  
  Describes how to use default dashboard maps or provide custom maps.

- **Providing Data**
  
  Explains how to supply the Choropleth Map dashboard item with data.

- **Map Coloring**
  
  Details how to color map shapes based on the values provided.

- **Map Navigation**
  
  Explains how to manage map zooming and scrolling.

- **Interactivity**
  
  Describes features that enable interaction between the Choropleth Map and other dashboard items.

- **Labels**
  
  Describes how to display additional information related to map shapes.

- **Legend**
  
  Explains the map legend and its options.
Providing Maps

This document explains how to use the default DevExpress Dashboard maps, or provide custom maps.

Default Maps

DevExpress Dashboard ships with a set of default maps showing various parts of the world. The following maps are included.

- **World Countries** - a world map.
- **Europe** - a map of Europe.
- **Asia** - a map of Asia.
- **North America** - a map of North America.
- **South America** - a map of South America.
- **Africa** - a map of Africa.
- **USA** - a map of the USA.
- **Canada** - a map of Canada.

**Note**

Note that the **World Countries** map has a lower level of detail than maps of specific regions and may not contain some countries. As an alternative, you can load a custom map with the required granularity.

To select the required default map, use the **Default Map** button in the **Open** group of the **Design** ribbon tab.

As an alternative, use the corresponding command in the map context menu.

Custom Maps

DevExpress Dashboard uses a **Shapefile** vector format to provide custom maps. Commonly, this format includes two file types.

- **.shp** file - holds map shapes (points/lines/polygons).
- **.dbf** file - contains attributes for each shape.

To open an existing shapefile, use the **Load Map** or **Import Map** button in the Ribbon, or the command in the context menu (**Load Map...** or **Import Map...**).

In the invoked dialog, locate the required **.shp** file. Note that custom maps created in the Cartesian coordinate system are not supported.
If the map is opened using the **Load Map** button, the dashboard XML definition will contain the path to a map shapefile. If the map is opened using the **Import Map** button, the dashboard XML definition will contain the map itself.

**Note**

Attributes from the corresponding `.dbf` file located in the same directory will be included in the map automatically.

## Map Attributes

After you select the default map or a custom map, you can view supplemental information (such as the name of the country, state, etc.). To do this, click the **Options** button next to the **Attribute** placeholder.

In the invoked **Map Attribute Binding** dialog, click **Preview**.

This table displays the available attributes for the current map. Each set of attribute values is related to a specific map shape.

To learn how to bind the map attribute to a data source field, see the **Providing Data** topic.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Choropleth Map dashboard item to data in the Designer.

The image below shows a sample Choropleth Map dashboard item that is bound to data.

To bind the Choropleth Map dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. The Choropleth Map provides two data item groups for data binding: DATA ITEMS and TOOLTIP DATA ITEMS. Tables below list the available data sections.

**DATA ITEMS**

- **Attribute** - Allows you to associate map shapes with data source field values.

  To associate map shapes with data source field values, drag-and-drop the required dimension to the data item’s placeholder and select the required attribute in the Map Attribute Binding dialog. To invoke this dialog, click the Options button (the icon) next to the Attribute placeholder.

  Select the required attribute and click OK.

- **Maps** - Contains data items whose values are used to color map shapes. Map shape colors vary based on the map type.

  Click the Options button (the or icon depending on the map type) next to the Value placeholder and select the required map type in the invoked Choropleth Map Options dialog.
If you select **Value**, the Choropleth map colors map shapes depending on the values provided. To learn more, see [Map Coloring](#).

If you select **Delta**, the Choropleth map colors map shapes depending on the difference between two values. To learn how to specify delta indication settings, see [Delta](#).

**Note**

You can fill several data item containers in the **Maps** section and use the **Values** drop-down menu to switch between the provided values. To invoke the **Values** menu, click the 📊 icon in the dashboard item caption.

**TOOLTIP DATA ITEMS**

- **Measures** - Allows you to add supplementary content to the tooltips. Drag and drop the required measures to provide additional data.
Map Coloring

The **Choropleth Map** dashboard item colors map shapes depending on the data provided.

For instance, you can visualize a sales amount or population density.

---

### Palette and Scale Settings

The **Choropleth Map** automatically selects palette and scale settings to color map shapes.

If you need to customize these settings, click the **Options** button next to the data item that contains these values.

This invokes the **Choropleth Map Options** dialog.
You can specify the following settings in this window.

- **Color palette** - allows you to specify the start and end color of the palette.
- **Scale settings** - specifies whether a percent scale or an absolute scale is used to define a set of colors. You can specify the number of levels that represent the number of colors used to color the map.
- **Preview** is used to display a full set of palette colors generated based on the start/end colors and the number of levels. Use the Allow Edit check box to automatically change the generated colors or specify value ranges for each color.

To learn how to display a map legend, see Legend.

Also, the Choropleth Map allows you to visualize the difference between the actual and target values of a particular parameter. To learn more, see the Delta topic.
Delta

The Choropleth Map allows you to indicate the difference between the actual and target values of a particular parameter. This difference is called delta.

Delta Options

To specify delta indication settings, click the Options button next to the data item container.

This invokes the Choropleth Map Options dialog. When the map type is set to Delta, this dialog contains the following settings.
- **Value Type**

  You can specify which values to display within map tooltips. Use the **Value type** combo box to select the value that will be displayed as the delta value.

<table>
<thead>
<tr>
<th>VALUE TYPE</th>
<th>TOOLTIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual value</td>
<td><img src="california.png" alt="tooltip" /></td>
</tr>
<tr>
<td>Absolute variation</td>
<td><img src="california.png" alt="tooltip" /></td>
</tr>
<tr>
<td>Percent variation</td>
<td><img src="california.png" alt="tooltip" /></td>
</tr>
<tr>
<td>Percent of target</td>
<td><img src="california.png" alt="tooltip" /></td>
</tr>
</tbody>
</table>

- **Result Indication**

  You can specify the condition that will be used to select the indicator color. To do this, use the **Result indication** combo box.

<table>
<thead>
<tr>
<th>RESULT INDICATION</th>
<th>AREA COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater is good</td>
<td>![greater.png]</td>
</tr>
<tr>
<td>Less is good</td>
<td>![less.png]</td>
</tr>
<tr>
<td>Warning if greater</td>
<td>![warning.png]</td>
</tr>
</tbody>
</table>
• **Threshold type** and **Threshold value**

You can specify that a required indicator should only be displayed when the difference between the actual and target values exceeds a specified value. For instance, the actual value exceeds the target value by 10%, or by $2K.

Use the **Threshold type** combo box to select whether you wish to specify the threshold in percentage values or in absolute values. Then use the **Threshold value** box to specify the threshold value.

The **Format** tab allows you to specify the numeric display formats for for different value types, as described in the Formatting Data document.

![Choropleth Hop Options](image)

The tab contains the following settings.

- **Format type** - Specifies format types for numeric values.
- **Unit** - Specifies the unit to convert the numeric values.
- **Precision** - Specifies the number of fractional digits to display.
- **Currency** - Specifies the currency symbol and format provided by the current culture settings.
- **Culture** - Specifies the name of a culture that defines the currency symbol and format.
- **Include group separator** - Specifies whether separators should be inserted between digit groups.
Map Navigation

The Choropleth Map dashboard item allows you to perform navigation actions such as zooming and scrolling.

The Dashboard Designer allows you to specify the initial zooming/scrolling state for the Choropleth map using the mouse.

You can disable the capability to scroll/zoom the map using the **Lock Navigation** button in the **Design** ribbon tab.

Use the **Full Extent** button to display the entire map within the dashboard item.
Interactivity

This document describes the **Master Filtering** feature, which enables interaction between the **Choropleth Map** and other dashboard items.

**Master Filtering**

The **Dashboard** allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more about the filtering concepts common to all dashboard items, see the **Master Filtering** topic.

When Master Filtering is enabled, you can click a shape (or multiple shapes by holding down the **CTRL** key) to make other dashboard items only display data related to the selected shape(s).

To learn how to enable Master Filtering in the Designer, see the **Master Filtering** topic.

To reset filtering, use the **Clear Master Filter** button (the ▼ icon) in the map’s **caption**, or the **Clear Master Filter** command in the map’s context menu.
Labels

A Choropleth map provides the capability to display titles within map shapes and allows you to manage what data to show in the shape tooltips.

To manage map titles and tooltips, click the **Shape Labels** button in the **Design** ribbon tab.

This invokes the **Shape Label Settings** dialog.

In this dialog, you can specify attributes whose values will be displayed within shapes and tooltips. Use the button to preview the available attributes and their values for the current map.

**Shape Titles**

The **Title attribute** option allows you to select the attribute whose values are displayed within corresponding map shapes.

You can also use the **Include summary value** option to add summary values to shape titles.

**Tooltips**

The **Choropleth Map** dashboard item displays a tooltip that shows information related to a hovered shape.
You can choose whether to use a binding attribute to display as the title of shape tooltips (the Use binding attribute option) or specify a custom attribute using the Tooltip attribute option.

The Choropleth Map also allows you to add supplementary content to the tooltips using the TOOLTIP DATA ITEMS area. To learn more, see the Providing Data topic.
Legend

A legend is an element of a map that shows values corresponding to each color.

| $5.5M | $6.5M | $7.5M | $8.5M | $9.5M |

Visibility

To display a legend within a map, use the Show Legend button in the Legend group of the Design Ribbon tab.

Position and Orientation

To specify the legend's position and orientation, select one of the predefined options from the gallery in the Design Ribbon tab.
Geo Point Maps

The topics in this section describe various types of Geo Point Map dashboard items that allow you to place callouts, bubbles or pies on the map using geographical coordinates.

This section consists of the following subsections.

- **Map Types Overview**
  Lists the available types of Geo Point maps and their features.

- **Providing Maps**
  Explains how to use default dashboard maps or provide custom maps.

- **Geo Point Map | Bubble Map | Pie Map**
  Describe specific capabilities of various Geo Point Map types.

- **Clustering**
  Describes the feature that enables grouping of neighboring map objects.

- **Interactivity**
  Describes features that enable interaction between the Geo Point maps and other dashboard items.

- **Labels**
  Describes how to display additional information related to map shapes.

- **Map Navigation**
  Explains how to manage map zooming and scrolling.
The Dashboard Designer allows you to create three types of Geo Point maps.

- The **Geo Point Map** dashboard item allows you to place callouts on the map using geographical coordinates.

- The **Bubble Map** dashboard item allows you to place bubbles on the map. Each bubble can represent data using its weight and color.

- The **Pie Map** dashboard item allows you to display pies on the map. Each pie visualizes the contribution of each value to the total.

To create the required Geo Point Map dashboard item, use the Geo Point Maps button in the Home ribbon tab.
To learn more about common capabilities of all Geo Point map types, see the following topics.

- **Providing Maps**
  
  Explains how to use default dashboard maps or provide custom maps.

- **Clustering**
  
  Describes the feature that enables grouping of neighboring map objects.

- **Interactivity**
  
  Describes features that enable interaction between the Geo Point maps and other dashboard items.

- **Labels**
  
  Describes how to display additional information related to map shapes.

- **Map Navigation**
  
  Explains how to manage map zooming and scrolling.
Providing Maps

This document explains how to use the default DevExpress Dashboard maps, or provide custom maps.

Default Maps

DevExpress Dashboard ships with a set of default maps showing various parts of the world. The following maps are included.

- **World Countries** - a world map.
- **Europe** - a map of Europe.
- **Asia** - a map of Asia.
- **North America** - a map of North America.
- **South America** - a map of South America.
- **Africa** - a map of Africa.
- **USA** - a map of the USA.
- **Canada** - a map of Canada.

**Note**

Note that the **World Countries** map has a lower level of detail than maps of specific regions and may not contain some countries. As an alternative, you can load a custom map with the required granularity.

To select the default map, use the **Default Map** button in the **Design** ribbon tab.

![Default Map button](image)

As an alternative, use the corresponding command in the map’s context menu.

Custom Maps

DevExpress Dashboard uses a **Shapefile** vector format to provide custom maps. Commonly, this format includes two file types.

- **.shp** file - holds map shapes (points/lines/polygons).
- **.dbf** file - contains attributes for each shape.

To open an existing shapefile, use the **Load Map** or **Import Map** button in the Ribbon, or the command in the context menu (**Load Map...** or **Import Map...**).

![Load/Import Map buttons](image)

In the invoked dialog, locate the required **.shp** file. Note that custom maps created in the Cartesian coordinate system are not supported.
If the map is opened using the **Load Map** button, the **dashboard XML definition** will contain the path to a map shapefile. If the map is opened using the **Import Map** button, the dashboard XML definition will contain the map itself.

**Note**

Attributes from the corresponding .dbf file located in the same directory will automatically be included in the map.
Geo Point Map

The Geo Point Map dashboard item allows you to place callouts on the map using geographical coordinates.

Topics in this section describe specific capabilities of the Geo Point Map dashboard item.

- Providing Data
Providing Data

This topic describes how to bind the Geo Point Map dashboard item to data using the Dashboard Designer.

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner (see Binding Dashboard Items to Data for details). The only difference is in the data sections that these dashboard items have.

The image below shows a sample Geo Point Map dashboard item that is bound to data.

![Sample Geo Point Map dashboard item bound to data](image)

Note that the Geo Point Map provides two data item groups for data binding: DATA ITEMS and TOOLTIP DATA ITEMS. Tables below list the available data sections.

### DATA ITEMS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>Accepts a dimension used to provide geographic latitude.</td>
</tr>
<tr>
<td>Longitude</td>
<td>Accepts a dimension used to provide geographic longitude.</td>
</tr>
<tr>
<td>Value</td>
<td>Accepts values related to geographic points. These values are displayed within map callouts.</td>
</tr>
</tbody>
</table>

### TOOLTIP DATA ITEMS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>Accepts dimensions allowing you to add supplementary content to the tooltips.</td>
</tr>
<tr>
<td>Measures</td>
<td>Accepts measures allowing you to add summaries to the tooltips.</td>
</tr>
</tbody>
</table>
Bubble Map

The **Bubble Map** dashboard item allows you to place bubbles on the map. Each bubble can represent data using its weight and color.

Topics in this section describe specific capabilities of the Bubble Map dashboard item.

- Providing Data
- Coloring
- Legends
Providing Data

This topic describes how to bind the Bubble Map dashboard item to data using the Dashboard Designer.

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner (see Binding Dashboard Items to Data for details). The only difference is in the data sections that these dashboard items have.

The image below shows a sample Bubble Map dashboard item that is bound to data.

![Bubble Map dashboard item](image)

Note that the Bubble Map provides two data item groups for data binding: DATA ITEMS and TOOLTIP DATA ITEMS. Tables below list the available data sections.

**DATA ITEMS**

- **Latitude** - Accepts a dimension used to provide geographic latitude.
- **Longitude** - Accepts a dimension used to provide geographic longitude.
- **Weight** - Accepts a measure used to evaluate the bubble's weight.
- **Color** - Accepts a measure used to evaluate the bubble's color.

The Bubble Map dashboard item automatically selects palette and scale settings used to color bubbles. To customize these settings, click the Options button next to the Color placeholder. This invokes the Color Scale Options dialog, which allows you to specify the palette and scale options. To learn how to use this dialog, see Coloring.

**TOOLTIP DATA ITEMS**

- **Dimensions** - Accepts dimensions allowing you to add supplementary content to the tooltips.
- **Measures** - Accepts measures allowing you to add summaries to the tooltips.
Coloring

The Bubble Map dashboard item automatically selects palette and scale settings used to color bubbles depending on the provided values.

To customize these settings, click the Options button next to the Color placeholder. This invokes the Color Scale Options dialog, which allows you to specify the palette and scale options.

You can specify the following settings in this window.

- **Color palette** - allows you to specify the start and end color of the palette.
- **Scale settings** - specifies whether a percent scale or an absolute scale is used to define a set of colors. You can specify the number of levels that represent the number of colors used to color the map.
- **Preview** is used to display a full set of palette colors generated based on the start/end colors and the number of levels. Use the Allow Edit check box to automatically change the generated colors or specify value ranges for each color.
Legends

Bubble Map provides two types of legends used to identify map objects - color and weighted legends.

- Color Legend
- Weighted Legend

Color Legend

The color legend helps you to identify which colors correspond to specific values.

| $3.5M | $4.17M | $6.75M | $8.33M | $9.91M |

To display a color legend within a map, use the Show Color Legend button in the Color Legend section of the Design Ribbon tab.

To specify the legend's position and orientation, select one of the predefined options from the gallery in the Design Ribbon tab.

Weighted Legend

The weighted legend allows you to identify values corresponding to specific bubble sizes.

To select the required weighted legend type, use the Show Weighted Legend button in the Weighted Legend section of the Design Ribbon tab.

To specify the legend's position, select one of the predefined options from the gallery in the Design Ribbon tab.
Pie Map

The Pie Map dashboard item allows you to display pies on the map. Each pie visualizes the contribution of each value to the total.

Topics in this section describe specific capabilities of the Pie Map dashboard item.

- Providing Data
- Pie Options
- Coloring
- Legends
Providing Data

This topic describes how to bind the Pie Map dashboard item to data using the Dashboard Designer.

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner (see Binding Dashboard Items to Data for details). The only difference is in the data sections that these dashboard items have.

The image below shows a sample Pie Map dashboard item that is bound to data.

Note that the Pie Map provides two data item groups for data binding: DATA ITEMS and TOOLTIP DATA ITEMS. Tables below list the available data sections.

**DATA ITEMS**

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>Accepts a dimension used to provide geographic latitude.</td>
</tr>
<tr>
<td>Longitude</td>
<td>Accepts a dimension used to provide geographic longitude.</td>
</tr>
<tr>
<td>Values</td>
<td>Accepts measures used to calculate pie values. In case of negative measure</td>
</tr>
<tr>
<td>Argument</td>
<td>Allows you to provide data for pie arguments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>Accepts dimensions allowing you to add supplementary content to the tooltips.</td>
</tr>
<tr>
<td>Measures</td>
<td>Accepts measures allowing you to add summaries to the tooltips.</td>
</tr>
</tbody>
</table>
Pie Options

The Pie Map dashboard item allows you to take into account the weight of pies. In this case, the relative sizes of the pies depend on the corresponding summary values.

To enable this capability, use the **Weighted Pies** button in the **Design** ribbon tab.
Coloring

Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

The Pie Map dashboard item allows you to manage the coloring of segments corresponding to various dimension values/measures. For instance, the image below illustrates the Pie Map dashboard item whose argument values are colored by hue.
Legends

The Pie Map provides two types of legends used to identify map objects - color and weighted legends.

- Color Legend
- Weighted Legend

Color Legend

The color legend helps you to identify which colors correspond to specific argument values.

To display a color legend within a map, use the Show Color Legend button in the Color Legend section of the Design Ribbon tab.

To specify the legend's position and orientation, select one of the predefined options from the gallery in the Design Ribbon tab.

Weighted Legend

The weighted legend allows you to identify values corresponding to specific pie sizes.

Note

The Pie Map dashboard item does not display the weighted legend if weighed pies are disabled.

To select the required weighted legend type, use the Show Weighted Legend button in the Weighted Legend section of the Design Ribbon tab.
To specify the legend's position, select one of the predefined options from the gallery in the **Design** Ribbon tab.
Clustering

When a Geo Point map contains a large number of objects (callouts, bubbles or pies), showing each object individually on the map is not useful. The Dashboard Designer provides the capability to group neighboring map objects. This feature is called Clustering.

For instance, the Geo Point Map dashboard item combines callouts to bubbles.

The Bubble Map and Pie Map dashboard items cluster bubbles/pies with other bubbles/pies.

To enable clustering in the Designer, use the Enable Clustering button in the Data ribbon tab.
Interactivity

This document describes the **Master Filtering** capability, which enables interaction between the **Geo Point Map** and other dashboard items.

**Master Filtering**

The **Dashboard** allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more about the filtering concepts common to all dashboard items, see the **Master Filtering** topic.

When Master Filtering is enabled, you can click a callout/bubble/pie (or multiple callouts/bubbles/pies by holding down the **CTRL** key) to make other dashboard items only display data related to the selected callout(s)/bubble(s)/pie(s).

![Map and Table Example](image)

**Note**

When you select a **clustered** bubble or pie, master filtering is applied by all points that are clustered into this bubble/pie.

To learn how to enable Master Filtering in the Designer, see the **Master Filtering** topic.

To reset filtering, use the **Clear Master Filter** button (the Ⓐ icon) in the map's caption, or the **Clear Master Filter** command in the context menu.
Labels

Geo Point maps provide the capability to display titles within map shapes and allows you to add supplementary content to the callout/bubble/pie tooltips.

Shape Titles

To manage map titles, click the Shape Title button in the Design ribbon tab.

This invokes the Shape Title Settings dialog.

In this dialog, you can specify attributes whose values will be displayed within shapes. Use the button to preview the available attributes and their values for the current map.

The Title attribute option allows you to select the attribute whose values are displayed within corresponding map shapes.

Tooltips

Geo Point maps also allow you to add supplementary content to the callout/bubble/pie tooltips using the TOOLTIP DATA ITEMS area. To learn more, see the Tooltip Data Items paragraph in the Providing Data topic.
Map Navigation

Geo Point maps allow you to perform navigation actions such as zooming and scrolling.

The Dashboard Designer allows you to specify the initial zooming/scrolling state for the Geo Point map using the mouse.

You can disable the capability to scroll/zoom the map using the Lock Navigation button in the Design ribbon tab.

Use the Full Extent button to display the entire map within the dashboard item.
Range Filter

The **Range Filter** dashboard item allows you to apply filtering to other dashboard items. This item displays a chart with selection thumbs that allow you to filter out values displayed along the argument axis.

This section consists of the following subsections.

- **Providing Data**
  
  Explains how to supply the Range Filter dashboard item with data.

- **Series**
  
  Enumerates and describes different types of series that can be displayed within the Range Filter dashboard item.

- **Interactivity**
  
  Describes features that enable interaction between the Range Filter and other dashboard items.

- **Predefined Ranges**
  
  Shows you how to add predefined date-time periods that can be used to perform a selection (for instance, *year-to-date* or *quarter-to-date*).

- **Coloring**
  
  Describes coloring capabilities of the Range Filter dashboard item.
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic.

The only difference is in the data sections that the required dashboard item has. This topic describes how to bind a Range Filter dashboard item to data in the Designer.

The image below shows a sample Range Filter dashboard item that is bound to data.

To bind the Range Filter dashboard item to data, drag and drop a data source field to a placeholder contained in one of the available data sections. A table below lists and describes Range Filter data sections.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>Contains data items against which the Y-coordinates of data points are calculated.</td>
</tr>
<tr>
<td>Argument</td>
<td>Contains a data item that provides values displayed along the horizontal axis of the Range Filter. Filtering is performed based on these values. Note that the Options button (the 🌟 icon) allows you to create predefined ranges used to select the required date-time interval.</td>
</tr>
<tr>
<td>Series</td>
<td>Contains data items whose values are used to create chart series.</td>
</tr>
</tbody>
</table>
Series

The Range Filter dashboard item supports various Line and Area series types.

To switch between series types in the Designer, click the options button next to the required data item in the Values section. In the invoked Series Type dialog, select the required series type and click OK.

You can also do this using the buttons in the Series Type group of the Design Ribbon tab.

The Range Filter supports the following series types.

**Line:**

**Stacked Line:**

**Full-Stacked Line**

**Area:**
Stacked Area:

Full-Stacked Area:
Interactivity

This document describes the features that enable interaction between the Range Filter and other dashboard items. These features include Master Filtering.

Master Filtering

The Dashboard allows you to use any data-aware dashboard item as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

Master filtering is always enabled for the Range Filter dashboard item. This Range Filter displays a chart with selection thumbs that allow you to filter out values displayed along the argument axis.

To enable filtering across data sources for the Range Filter, use the Cross-Data-Source Filtering button in the Data Ribbon tab.

You can enable/disable ignoring of other master filter items using the Ignore Master Filters button in the Data Ribbon tab.
Predefined Ranges

The Range Filter dashboard item allows you to add a number of predefined date-time periods that can be used to perform a selection (for instance, *year-to-date* or *quarter-to-date*).

To add a period, click the *Options* button (the 🌋 icon) next to the *Argument* placeholder or use the *Edit Periods* button in the ribbon’s *Design* tab. This invokes the *Edit Periods* dialog.

To add the selected period, use the ➔ button or double-click this period.

This period will be added to the right pane of the Edit Periods dialog. The following settings are available for the added period:

- **Caption** - Specifies the caption corresponding to the period.
• **Period** - Displays the date-time interval corresponding to the period.
• **Default** - Allows you to use the selected period as the default selection in the Range Filter dashboard item.

If necessary, you can customize the selected period by clicking the **Edit** button in the Edit Periods dialog. This invokes the **Period** dialog.

![Period dialog](image)

**Note**

Note that the **Edit** dialog above contains the displayed periods (**Year, Quarter, Month, Day**) if the **group interval** of the Range Filter argument is set to **Day-Month-Year**.

This dialog allows you to add the following periods.

- **Year** - A period duration is measured in years.
  - **Previous Year** - Identifies the entire previous year.
  - **This Year** - Identifies the entire current year.
  - **Next Year** - Identifies the entire next year.
  - **Last Years** - Identifies a specific number of previous years. Use the **Include current** option to specify whether or not the period is ended with the current year.
  - **Next Years** - Identifies a specific number of following years. Use the **Include current** option to specify whether or not the period starts from the current year.
  - **Year-to-date** - A period from the beginning of the current year and up to the current day.

- **Quarter** - Period duration is measured in quarters.
  - **Previous Quarter** - Identifies the entire previous quarter.
  - **This Quarter** - Identifies the entire current quarter.
  - **Next Quarter** - Identifies the entire next quarter.
  - **Last Quarter** - Identifies a specific number of previous quarters. Use the **Include current** option to specify whether or not the period ends with the current quarter.
  - **Next Quarter** - Identifies a specific number of following quarters. Use the **Include current** option to specify whether or not the period starts from the current quarter.
  - **Quarter-to-date** - A period from the beginning of the current quarter and up to the current day.

- **Month** - Period duration is measured in months.
  - **Previous Month** - Identifies the entire previous month.
  - **This Month** - Identifies the entire current month.
- **Next Month** - Identifies the entire next month.
- **Last Month** - Identifies a specific number of previous months. Use the **Include current** option to specify whether or not the period ends with the current month.
- **Next Month** - Identifies a specific number of the following months. Use the **Include current** option to specify whether or not the period starts with the current month.
- **Month-to-date** - A period from the beginning of the current month and up to the current day.

- **Day** - Period duration is measured in days.
  - **Previous Day** - Identifies the entire previous day.
  - **This Day** - Identifies the entire current day.
  - **Next Day** - Identifies the entire next day.
  - **Last Day** - Identifies a specific number of previous days. Use the **Include current** option to specify whether or not the period ends with the current day.
  - **Next Day** - Identifies a specific number of the following days. Use the **Include current** option to specify whether or not the period starts with the current day.

- **Custom** - A custom period.
  - Allows you to specify a period with the custom boundaries (**Start point** and **End point**).

You can specify the following settings for the start/end boundaries.

- **None** - The selection will begin from the start/end of the visible range.
- **Fixed** - Allows you to select a specific date value using the calendar.

- **Flow** - Allows you to select a relative date value. The **Interval** option specifies the interval between the current date and the required date. The **Offset** option allows you to set the number of such intervals.

  **Note**

  Note that the **Offset** option can accept negative and positive values. Negative values correspond to dates before the current date, while positive values correspond to future dates.
Coloring

Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

By default, the Range Filter dashboard item colors different measures and series dimensions by hue. The image below illustrates the Range Filter dashboard item whose series points corresponding to different categories are colored in different colors.
Date Filter

The **Date Filter** dashboard item allows you to filter dashboard data based on the selected data range. The range can be relative (Last 3 Months), use fixed dates (01-01-2018), or presets (Month-to-date). You can also filter dates before or after a specified date.

The DateFilter item displays a set of intervals that can be used as quick filters.

![Date Filter Intervals](image)

End-users can click the button to invoke the Date Picker:

![Date Picker](image)

**Add a New Date Filter to the Dashboard**

To create a Date Filter item, click the **Filter Elements** drop-down button in the **Insert** group on the **Home** ribbon page and select **Date Filter**.

![Filter Elements](image)

**Bind to Data**

Use the **Data Items Pane** to perform data binding. Drag the dimension field from the **Data Source Browser** to the data item, and click the **Options** button to select **group intervals**.

![Data Items Pane](image)
Filter Type

A filter can be a DateTime value, DateTime range or infinite interval before or after a specified date.

To specify the filter type, click the drop-down **Filter Type** in the ribbon (Date Filter Tools contextual tab -> Design page -> Layout group):

Date Picker

The DateFilter item contains a Date Picker - a button with a drop-down calendar. This button initially displays "Click to set filter".

The calendar drops down when the end user:

- clicks the button without a specified range (the button with the "Click to set filter" caption)
- clicks the icon on the button with the specified datetime range.

A drop-down calendar may contain a single calendar control (the Filter Type is Exact, Before or After) or two calendar controls (the
Filter Type is Between).

When the user selects the date, the Date Picker caption displays information about that date (date range) and the icon. The caption text is constructed from a custom string with date placeholders. If the user clicks the caption, the Date Picker button acts as a checked button to apply the date range (checked) or reset the date filter (unchecked) to its default value. When the user clicks the icon, the drop-down calendar appears and enables the user to select another date range.

To show or hide the Date Picker component, click the Show Date Picker check button in the ribbon (Date Filter Tools contextual tab -> Design page -> Layout group):

![Show Date Picker](image)

**Display Format**

To specify the date-time value format, use the Format submenu in the data item menu, as described in the Formatting Data topic.

To specify a custom string displayed in the Date Picker component, use the Edit Names dialog. To invoke the dialog, right-click the DateFilter item and click the Edit Names... menu item or click the Edit Names button in the Design Ribbon tab.

![Edit Names](image)

You can include placeholders in a custom string. The (0) placeholder is the interval’s start, the (1) placeholder is the interval’s end.

**Create Quick Filters**

Quick Filters are buttons displayed within the DateFilter item. Each button has a DateTime range assigned to it. You can click the button to apply that range as a Date filter. The button is checked until the end-user clicks the same button once more to reset the filter to its default value. The button becomes unchecked if the end user clicks another button.

![Quick Filters](image)

The item’s context menu contains commands with the same captions that act as quick filters.

A newly created DateFilter dashboard item has no quick filters. To add a quick filter:
in the dashboard designer, click the Options button (the \( \text{_circle} \) icon) next to the Argument placeholder
or select the Edit Periods command in the context menu
or click the Edit Periods in the ribbon (Date Filter Tools contextual tab-> Design page -> Interactivity group):

This invokes the Edit Periods dialog. You can select a predefined range or add a custom period, specify the quick filter’s range and caption.

Arrange Quick Filters

Quick filters in the DateFilter item can be arranged horizontally or vertically. The default mode is auto height, in which quick filters are displayed horizontally and the dashboard item shrinks automatically to fit the items and save space.

To specify the arrangement mode, click the Arrangement Mode drop-down in the ribbon (Date Filter Tools contextual tab-> Design page -> Layout group):

Auto Height Arrangement Mode:

Vertical Arrangement Mode:
<table>
<thead>
<tr>
<th>Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click to set filter</td>
</tr>
<tr>
<td>Year-to-date</td>
</tr>
<tr>
<td>Last Year</td>
</tr>
<tr>
<td>This Month</td>
</tr>
</tbody>
</table>

Horizontal Arrangement Mode:
Images

The Dashboard Designer allows you to add images to a dashboard.

You can either add a static image or you can use the Bound Image as a detail item along with the Master Filtering feature.

- Image Types Overview
- Providing Images
- Interactivity
- Image Settings
Image Types Overview

The Dashboard Designer allows you to create two types of an Image dashboard item.

- The Image dashboard item allows you to add static images to a dashboard.

- The Bound Image dashboard item can be bound to a set of images (for instance, stored in the database). You can use the Bound Image as a detail item along with the Master Filtering feature.

To create the required Image dashboard item, use the Images button in the Home ribbon tab.
Providing Images

Providing Static Images

To load an image to a dashboard item, use the Load Image and Import Image buttons in the Ribbon, or commands in the context menu (Load Image... and Import Image..., respectively).

These commands invoke the Open dialog, which allows you to locate the desired image.

The Load Image command saves the path to the image in the dashboard definition, while the Import Image command saves the image itself.

Binding the Bound Image to Data

The Bound Image dashboard item provides the Attribute data section containing the corresponding placeholder.

Specify the binding mode for the Bound Image by clicking the Options button (the icon) next to the Attribute placeholder. This invokes the following dialog.

This dialog provides two options.

- **Binary Array** - Use this mode if images are stored in the data source as byte arrays.
- **URI** - Use this mode to locate images accessible by a predefined URI. In this case, the data source field should return strings
that are parts of URIs to these images.

For instance, the URI pattern in the form below specifies the path to the folder containing the required images.

![Image Binding Options](image.png)

Data source field values will be inserted to the position of the \(0\) placeholder. Thus, the Bound Image maps the current dimension value with the image placed at the specified URI.

**Note**

Note that the Bound Image can display only a single image simultaneously. If *Master Filtering* is not applied to the Bound Image, it selects the displayed image in the following ways.

- In the **Binary Array** mode, the displayed image cannot be predicted precisely as a result of sorting limitations for the `image/binary` data types. Use the *Master Filtering* feature to display the specified image.
- In the **URI** mode, the Bound Image displays an image corresponding a first attribute value taking into account the attribute’s sort order.
Interactivity

This document describes the features that enable interaction between the **Bound Image** and other dashboard items. These features include **Master Filtering**.

**Master Filtering**

The Dashboard allows you to use most of the data-aware dashboard items as a filter for other dashboard items (**Master Filter**). To learn more, see the **Master Filtering** topic, which describes filtering concepts common to all dashboard items.

Data displayed in the **Bound Image** dashboard item can be filtered by other master filter items. For instance, the **Bound Image** below shows an image corresponding to a category selected in the **Grid** dashboard item.

You can prevent the Bound Image from being affected by other master filter items using the **Ignore Master Filters** button on the **Data** ribbon tab.
Image Settings

You can customize the representation of Image and Bound Image dashboard items in different ways.

Image Alignment

To specify how the image is aligned within the dashboard item, use the Alignment group in the Design ribbon tab.

Image Size Mode

You can specify the image size mode that defines how the image fits within the dashboard item.

To do this, use the Size Mode group in the Ribbon’s Design tab.

The following table illustrates each size mode in two cases: when the image is smaller than the dashboard item, and vice versa.

<table>
<thead>
<tr>
<th>IMAGE SMALLER THAN DASHBOARD ITEM</th>
<th>IMAGE LARGER THAN DASHBOARD ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="clip.png" alt="Image" /></td>
<td><img src="clip.png" alt="Image" /></td>
<td>The image is clipped if it is larger than the Image dashboard item.</td>
</tr>
<tr>
<td><img src="stretch.png" alt="Image" /></td>
<td><img src="stretch.png" alt="Image" /></td>
<td>The image is stretched or shrunk to fit the size of the Image dashboard item.</td>
</tr>
<tr>
<td><img src="squeeze.png" alt="Image" /></td>
<td><img src="squeeze.png" alt="Image" /></td>
<td>If the dimensions of the Image dashboard item exceed those of the image it contains, the image is shown in full-size. Otherwise, the image is resized to fit the dimensions of the Image dashboard item.</td>
</tr>
<tr>
<td><img src="zoom.png" alt="Image" /></td>
<td><img src="zoom.png" alt="Image" /></td>
<td>The image is sized proportionally (without clipping), so that it best fits the Image dashboard item. If the aspect ratio of the Image dashboard item is the same as the aspect ratio of the image, it will be resized to fit into the Image dashboard item while maintaining its aspect ratio. Otherwise, the image will be resized in the closest fitting dimension (either the height or the width), and the remaining dimension will be resized while maintaining the image’s aspect ratio.</td>
</tr>
</tbody>
</table>
Use the **Text Box** dashboard item to display rich text within a dashboard.

You can either add a static text or you can use the Text Box as a detail item along with the Master Filtering or Filtering features.

- Editing Text
- Providing Data
- Interactivity
Editing Text

To edit the text within the Text Box, click the **Edit** button in the ribbon’s **Design** tab or use the corresponding item in the context menu.

This adds the **Text Box Editor** context category to the Dashboard Designer’s ribbon and allows you to modify the content within the Text Box.

To learn how to edit the content within the Text Box, see **Rich Text Editor**. After you change the document, click **Edit** again to finish editing.

**Note**

Note that the Text Box can be **bound** to data. To learn how to do this, see **Providing Data**.
Providing Data

The Text Box dashboard item can be bound to data as other data-aware dashboard items. To do this, perform the following steps.

1. Drop the Name, RetailPrice and Description data source fields from the Products table to the Values section of the Text Box.

![Image of Text Box with data fields]

Note that summary types of the created measures are Min, Sum and Min, respectively.

2. Click the Edit button in the Design ribbon tab and add the Name, Retail Price and Description strings to the document.

![Image of Text Box with added strings]

3. Place the pointer next to Name, right-click the document and select Insert Field (or use the Insert Field button in the ribbon). Then, click the Select value placeholder and select the Name (Min) measure.

![Image of Insert Field dialog]

4. Perform the third step for Retail Price and Description.

![Image of Inserted data fields]

5. Click the Edit button again to leave the editing mode. The Text Box will show data in the following way.

![Image of Text Box with data]

You can use this Text Box as a detail item along with the Master Filtering feature to filter data according to the selected product.
Interactivity

This document describes the features that enable interaction between the Text Box and other dashboard items. These features include Master Filtering.

Master Filtering

The Dashboard allows you to use most of the data-aware dashboard items as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

Data displayed in the Text Box dashboard item can be filtered by other master filter items. For instance, the Text Box below shows data corresponding to a product selected in the List Box dashboard item.

You can prevent the Text Box from being affected by other master filter items using the Ignore Master Filters button on the Data ribbon tab.
Use the Treemap dashboard item to visualize data in nested rectangles that are called tiles.

This section is divided into the following subsections.

- Providing Data
- Interactivity
- Layout
- Grouping
- Coloring
- Labels
Providing Data

The Dashboard Designer allows you to bind various dashboard items to data in a virtually uniform manner. To learn more, see the Binding Dashboard Items to Data topic. The only difference is in the data sections that the required dashboard item has.

The Treemap dashboard item has the **Values** and **Arguments** data sections that provide numeric and discrete categorical data, respectively. The steps below provide the most common scenarios of binding a Treemap to data.

1. Drop the **Sales** and **Profit** fields to the **Values** section.

   ![First step diagram]

   The Treemap will draw two tiles whose sizes correspond to the **Sales** and **Profit** summary values.

2. Drop the **Product Category** field to **Arguments**.

   ![Second step diagram]

   Treemap will create individual tiles for all categories. You can switch between **Sales** and **Profit** values by clicking the icon in the item’s caption or you can use its context menu.

3. Drop the child **Product Sub-Category** field into **Arguments**.

   ![Third step diagram]
The Treemap will visualize all combinations of categories and corresponding sub-categories using individual tiles.

4. If the Arguments section contains several dimensions, you can group child tiles by values of the parent dimension. To group sub-categories inside corresponding categories, click the CategoryName menu button and select Group Tiles.

Sub-category tiles will be grouped into category groups.
Interactivity

This section describes features that enable interaction between the Treemap dashboard item and other items. These features include Master Filtering and Drill-Down.

The section contains the following topics:

- Master Filtering
- Drill-Down
Master Filtering

The **Dashboard Designer** allows you to use any data aware dashboard item as a filter for other dashboard items. To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

The Treemap dashboard item supports filtering by tiles/groups.

When Master Filtering is enabled, you can click a tile or group caption (or multiple tiles/groups by holding down the CTRL key) to make other dashboard items only display data related to the selected tile/group(s).

![Treemap dashboard example](image)

**Note**

If the Single Master Filter is used, you can select only tiles corresponding to the bottommost level.
Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

When drill-down is enabled, you can click a tile to view its details.

**Note**

When Master Filtering is enabled, you can view the details by double-clicking a tile.

Drill-down requires that the Arguments section contains several dimensions, from the least detailed to the most detailed dimension.

**Note**

In OLAP mode, you can perform drill-down for either a hierarchy data item or several dimension attributes.

To enable drill-down, click the Drill Down button in the Data Ribbon tab (or the button if you are using the toolbar menu).

To return to the previous detail level (drill up), use the Drill Up button in the caption of the Treemap dashboard item, or the Drill Up command in the context menu.

**Note**

Grouping is not in effect when the drill-down is enabled.
The following algorithms are available.

<table>
<thead>
<tr>
<th>ALGORITHM</th>
<th>EXAMPLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slice and Dice</td>
<td><img src="image" alt="Slice and Dice example" /></td>
<td>This layout algorithm divides the space between items, slicing it in the specified direction depending on item value.</td>
</tr>
<tr>
<td>Squarified</td>
<td><img src="image" alt="Squarified example" /></td>
<td>The Squarified algorithm arranges tiles so that their width/height ratio will be closer to 1.</td>
</tr>
<tr>
<td>Striped</td>
<td><img src="image" alt="Striped example" /></td>
<td>This algorithm is a modified version of the Squarified algorithm. The difference here is that tiles are drawn side by side as columns or rows.</td>
</tr>
</tbody>
</table>

You can also set a layout direction to specify an arrangement of tiles depending on their sizes. To do this, click the **Layout Direction** button and select the required direction.

- **Bottom Left - Top Right** - Arrange tiles from the bottom-left to the top-right corner.
- **Bottom Right - Top Left** - Arrange tiles from the bottom-right to the top-left corner.
- **Top Left - Bottom Right** - Arrange tiles from the top-left to the bottom-right corner.
- Top Right - Bottom Left - Arrange tiles from the top-right to the bottom-left corner.
If you use several arguments in the Treemap, you can group tiles corresponding to child values by parent values. For instance, the following Treemap dashboard item displays combinations of categories and sub-categories.

To group sub-categories inside corresponding categories, click the Product Category menu button and select Group Tiles.

Product tiles will be grouped into category groups.

Note that the icon will be displayed within the Product Category dimension.
Coloring

Certain dashboard items provide the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item. To learn more about coloring concepts common for all dashboard items, see the Coloring section.

By default, the Treemap dashboard item colors its tiles in the following way.

- If the Treemap dashboard item contains only measures (the Values section), values corresponding to different measures are colored by hue.
- If the Treemap dashboard item contains arguments (the Arguments section), values corresponding to the first argument are colored by hue.

If necessary, you can change the default behavior. For instance, the image below shows the Treemap dashboard item whose measures and argument values are painted with the same color.
Labels

The Treemap displays **labels** that contain descriptions for tiles and **groups**, and provide **tooltips** with additional information.

You can specify which information should be displayed within tile and group labels separately. To do this, use the **Labels** and **Tooltips** buttons in the Design Ribbon tab.

Use buttons within the **Tile Labels/Group Labels** ribbon groups to manage tile and group labels, respectively. These buttons invoke the drop-down menu, which is similar for all buttons.
Filter Elements

Filter elements represent a special type of dashboard item that allows you to apply filtering to other dashboard items.

Topics in this section.

- Filter Elements Overview
- Providing Data
- Interactivity
Filter Elements Overview

The **Dashboard Designer** allows you to create filter elements that used to filter other dashboard items.

- Combo Box
- List Box
- Tree View
- Date Filter

To add the required filter element to the dashboard, use the **Filter Elements** button in the **Home** ribbon tab.

### Combo Box

The **Combo Box** dashboard item allows you to select a value(s) from the drop-down list.

You can switch the combo box type in the ribbon **Design** tab.

<table>
<thead>
<tr>
<th>COMBO BOX TYPE</th>
<th>EXAMPLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td><img src="example_image" alt="Combo Box Standard Example" /></td>
<td>Allows you to select only a single value.</td>
</tr>
<tr>
<td><strong>Checked</strong></td>
<td><img src="example_image" alt="Combo Box Checked Example" /></td>
<td>Allows you to select multiple values in the invoked drop-down list.</td>
</tr>
</tbody>
</table>

### List Box

The **List Box** dashboard item allows you to select a value(s) from the list.

You can switch the list box type in the ribbon **Design** tab.
**List Box Type** | **Example** | **Description**
--- | --- | ---
**Checked** | ![Checked Example](image) | Allows you to select multiple values in the list box.

**Radio** | ![Radio Example](image) | Allows you to select only a single value in the radio group.

**Tree View**

The **Tree View** dashboard item displays values in a hierarchical way and allows you to expand/collapse nodes.

You can manage the initial expanded state of filter values using the **Auto Expand** button in the **Design** ribbon tab.

**Date Filter**

The **Date Filter** dashboard item allows you to filter dashboard data based on the selected data range. The range can be relative (Last 3 Months), use fixed dates (01-01-2018), or presets (Month-to-date). You can also filter dates before or after a specified date.

The **DateFilter** item displays a set of intervals that can be used as quick filters.
| Click to set filter | This Year | Last Year | Last Quarter |

See [Date Filter](#) for details.
Providing Data

This topic describes how to bind filter elements to data using the **Dashboard Designer**.

The Dashboard Designer allows you to bind various dashboard items to data in a consistent manner (see Binding Dashboard Items to Data for details), the only difference being the data sections that these dashboard items comprise.

**Binding Overview**

All filter elements provide the **Dimensions** data section, which accepts dimensions used to provide filter values.

To learn about the specifics of binding various filter elements to data, see the table below.

<table>
<thead>
<tr>
<th>DASHBOARD ITEM</th>
<th>DATA SECTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combo Box</td>
<td></td>
<td>The Combo Box filter element can contain several dimensions at the <strong>Dimensions</strong> data section. In this case, the drop-down list will contain combinations of dimension values.</td>
</tr>
<tr>
<td>List Box</td>
<td></td>
<td>The List Box filter element can contain several dimensions at the <strong>Dimensions</strong> data section. In this case, the list will contain combinations of dimension values.</td>
</tr>
<tr>
<td>Tree View</td>
<td></td>
<td>The Tree View filter element allows you to display dimension values in a hierarchical way. This can be the set of dimensions with different <strong>group intervals</strong> (for instance, Year/Quarter/Month) or the set of related dimensions (for instance, geographical data such as continents/countries/cities).</td>
</tr>
</tbody>
</table>
Interactivity

This document describes the filtering capabilities supported by filter elements. You can use filter elements to apply master filtering to other dashboard items or introduce hierarchical filtering by adding several connected filters.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

Important

Note that filter elements do not support Master Filter selection modes. You can switch the selection mode by changing the type of the required filter element.

Depending on the filter element type, you can select a value(s) to make other dashboard items display only data related to the selected value(s).

Filter Element Options

Standard Combo Box and Radio List Box filter elements have the (Allow Empty Filter) option that enables the filter mode without selected items. To enable the mode, click the Allow Empty Filter button in the Design ribbon tab.
The **Enable Search** button displays the search box that allows you to search and filter as you type:
Dashboard Item Group

DevExpress Dashboard provides the capability to combine dashboard items into a group. The dashboard item group serves two main purposes:

- Combine dashboard items within the dashboard into a separate layout group.
- Manage interaction between dashboard items within and outside the group.

For instance, you can combine related filter elements and data visualization dashboard items into a group.

Create a Group

To create a new group, use the Group button in the Home ribbon tab.

You can add dashboard items to a group and manage item layout using drag-and-drop. To learn how to manage a group's caption, see the Dashboard Item Caption topic.

Note

Note that a dashboard item group cannot be added to another group.

Interactivity

The dashboard item group provides the capability to manage interaction between dashboard items within and outside the group.

The Master Filter button allows you to specify whether the current group allows you to filter external dashboard items using master filter items contained within the group. If this option is disabled, master filter items contained within the group can filter only dashboard items from this group.

The Ignore Master Filters button allows you to isolate dashboard items contained within the group from being filtered using external master filter items.
Tab Container

The **Tab container** dashboard item allows you to split the dashboard layout into several pages. Common filter controls for large elements in a dashboard can be located on a separate tab page.

To create a tab container, use the **Tab Container** button in the **Home** ribbon tab:

A newly created tab container contains an empty tab page (**Page 1**).
Click the + (plus) icon to add an empty page to the tab container. You can use drag-and-drop to add dashboard items to a tab page and manage the layout. Tab containers cannot be nested, so you cannot add a tab container to another tab container. However, a tab container can contain item groups.

See the Dashboard Item Caption topic to learn how to manage a tab container’s caption.

**Tab Order**

To change the tab page order, click the Reorder Tabs button on the Tab settings group.

![Reorder Tabs button](image)

The Tabs Order dialog is invoked.

![Tabs Order dialog](image)

Click up and down arrows to change the order of the tab pages in the tab container.

**Display Item as Page**

The tab caption is above the caption of the content element on the page. If a tab page contains a single element, the Display Item as Page feature is activated. It merges the dashboard item with a tab page and displays a single caption, as illustrated below.

![Display Item as Page](image)
To disable the *Display Item as Page* feature, use one of the following methods:

- Select the tab page and click the **Display Item as Page** button in the **Layout** group on the **Design** ribbon tab of the **Page Tools** contextual tab set.

  ![Display Item as Page](image1)

- Select the **Display Item as Page** command in the tab page context menu.

### Selection

Click the element’s border or use the item’s context menu to select a page or a tab container:

![Context Menu](image2)

### Interactivity

The tab page allows you to manage the *interaction* between dashboard items inside and outside the page.

The **Master Filter** button (in the **Interactivity** group on the **Data** ribbon tab of the **Page Tools** contextual tab set) controls whether the current tab page allows you to filter dashboard items outside the page using master filter items contained within the page. If this button is switched off, master filter items in the page can filter only dashboard items in this page.

**Note**

The default tab page behaves opposite to the default group. While the group isolates filter items from the outside, the tab page does not change the item’s data interactivity behavior.

![Master Filter](image3)

The **Ignore Master Filters** button (in the **Interactivity** group on the **Data** ribbon tab of the **Page Tools** contextual tab set) allows you to isolate dashboard items contained within the page from external master filter items.

![Ignore Master Filters](image4)
Data Shaping

This section describes how to perform various data shaping operations (such as grouping, sorting and filtering) in the Dashboard Designer.

The section contains the following topics.

- Summarization
- Grouping
- Sorting
- Filtering
- Top N

- Formatting Data
Summarization

To obtain numeric values that should be displayed within a dashboard item, Dashboard calculates a summary function against the specified measure.

The following sections are available.

- **Summary Function Types**
- **Changing Summary Type**

**Summary Function Types**

The following summary functions are available.

- **Count** - The number of values (excluding Null and DBNull values).
  
  This is the only summary type that can be calculated against non-numeric data.

- **Count Distinct** - The number of distinct values.

- **Sum** - The sum of the values.
  
  $$Sum = \sum_i v_i$$

- **Min** - The smallest value.

- **Max** - The largest value.

- **Average** - The average of the values.
  
  $$\bar{v} = \frac{1}{n} \sum_i v_i$$

- **StdDev** - An estimate of the standard deviation of a population, where the sample is a subset of the entire population.
\[
StdDev = \sqrt{\frac{1}{n-1} \cdot \sum_{i} (v_i - \bar{v})^2}
\]

- **StdDevP** - The standard deviation of a population, where the population is the entire data to be summarized.

\[
StdDevP = \sqrt{\frac{1}{n} \cdot \sum_{i} (v_i - \bar{v})^2}
\]

- **Var** - An estimate of the variance of a population, where the sample is a subset of the entire population.

\[
Var = \frac{1}{n-1} \cdot \sum_{i} (v_i - \bar{v})^2
\]

- **VarP** - The variance of a population, where the population is the entire data to be summarized.

\[
VarP = \frac{1}{n} \cdot \sum_{i} (v_i - \bar{v})^2
\]

- **Median** - The median of the values (excluding Null and DBNull values). A median is the number separating the higher half of a value range from the lower half.

**Changing Summary Type**

By default, Dashboard calculates **Sum** for numeric measures and **Count** for measures that contain another type of data.

You can change the summary function type for numeric measures. To do this in the Designer, invoke the data item menu and select the desired summary type. Less common summary types are organized in the **More** submenu.

![Data Item Menu](image)

In the Designer, you can access the More submenu to select different summary types.
Grouping

The **Dashboard Designer** allows you to group dimension values and display summaries for entire groups rather than individual values.

You can arrange dimension values in groups of different sizes by specifying the appropriate **group interval**. For instance, date-time values can be grouped by years, months, quarters, etc.

This topic lists the supported text and date-time group intervals, and describes how to change the group interval.

The following sections are available.

- Text Group Intervals
- Date-Time Group Intervals
- Changing Group Interval

**Text Group Intervals**

String values support the following grouping intervals.

- **No Grouping** - each value is displayed “as is”.
- **Alphabetical** - values are grouped alphabetically (e.g., A, B, C, ... Z).

**Date-Time Group Intervals**

Date-time values support the following group intervals.

---

**Note**

Examples in the table below are formatted using the default settings. To learn how to customize format settings, see [Formatting Data](#).

<table>
<thead>
<tr>
<th>GROUP INTERVAL</th>
<th>DESCRIPTION</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Values are grouped by the year.</td>
<td>2010, 2011, 2012</td>
</tr>
<tr>
<td>Quarter</td>
<td>Values are grouped by the quarter.</td>
<td>Q1, Q2, Q3, Q4</td>
</tr>
<tr>
<td>Month</td>
<td>Values are grouped by the month.</td>
<td>January, February, March, ... December</td>
</tr>
<tr>
<td>Day</td>
<td>Values are grouped by the day of the month.</td>
<td>1, 2, 3, ... 31</td>
</tr>
<tr>
<td>Hour</td>
<td>Values are grouped by the hour.</td>
<td>0, 1, 2, ... 23</td>
</tr>
<tr>
<td>Minute</td>
<td>Values are grouped by the minute.</td>
<td>0, 1, 2, ... 59</td>
</tr>
<tr>
<td>Second</td>
<td>Values are grouped by the second.</td>
<td>0, 1, 2, ... 59</td>
</tr>
<tr>
<td>Day of the Year</td>
<td>Values are grouped by the day of the year.</td>
<td>1, 2, 3, ... 365</td>
</tr>
<tr>
<td>Day of the Week</td>
<td>Values are grouped by the day of the week.</td>
<td>Sunday, Monday, Tuesday, ... Saturday</td>
</tr>
<tr>
<td>Week of the Year</td>
<td>Values are grouped by the week of the year.</td>
<td>1, 2, 3, ... 52</td>
</tr>
</tbody>
</table>
To specify the group interval in the Designer, invoke the data item menu and select the desired group interval. Less common group intervals are organized in the More submenus.
Sorting

The Dashboard Designer allows you to easily change the sort order of values within a dashboard item. You can also enable sorting by parameter values.

- Changing Sort Order
- Sorting by Measure Values
- OLAP Sorting Specifics

Changing Sort Order

The sort order of dimension values is indicated with an arrow.

To change the sort order in the Designer, click the data item. You can also toggle sorting from the data item menu.

Sorting by Measure Values

Dashboard allows you to sort dimension values by summary values calculated for a specific measure.

To enable sorting by measure in the Designer, use the Sort by submenu in the dimension’s menu.

You can also sort dimension values by the values of hidden measures.

OLAP Sorting Specifics

In OLAP mode, you can use the following options to specify the sort order for attribute members.
- **No Sorting** - Specifies the default server sorting for the current attribute.
- **Sort by** - Allows you to choose the OLAP member property by whose values sorting is performed:
  - **(Value)** - sorting is performed by member values;
  - **(Display Text)** - sorting is performed by captions associated with members;
  - **(Key)** - sorting is performed by member keys;
  - **(ID)** - sorting is performed by member IDs.
Filtering

The Dashboard allows you to filter a query of the SQL Data Source or apply filtering to a specific data-aware dashboard item.

This topic describes how to enable and reset filtering.

**Apply Filtering**

To configure filtering, select the target dashboard item and do one of the following.

- If you are using a Ribbon menu, click the **Edit Filter** button in the **Data** tab.

- Right-click a dashboard item and select **Edit Filter** from its context menu.

This will invoke the **Filter Editor** dialog. Use this dialog to build filter criteria with a convenient tree-like interface.
You can use hidden dimensions within the Filter Editor dialog, allowing you to filter data based on their values.

**Clear Filtering**

To clear filtering in the Designer, select the target dashboard item and do one of the following.

- If you are using a Ribbon menu, click the **Clear** button in the **Data** tab.

- Right-click a dashboard item and select **Clear** from its context menu.

**OLAP Filtering Specifics**

You cannot apply filtering by building complex filter criteria in OLAP mode. Instead, you can filter dimension attributes and hierarchies by manually selecting the values you wish (or do not wish) to include in the dashboard.

For dimension attributes, the Filter Editor contains a list of all values. You can select the values that you wish to display.

For hierarchies, a tree is displayed instead, allowing you to filter individual values at any hierarchy level.
The Top N feature allows you to display only a limited number of values that correspond to the highest or lowest values of a particular measure.

To display the top values in a dimension, select Top N from the data item menu.

This invokes the Top N Values dialog.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Specifies whether top or bottom values should be displayed.</td>
</tr>
<tr>
<td>Count</td>
<td>The number of values to be displayed.</td>
</tr>
<tr>
<td>Measure</td>
<td>The parameter that will determine the top or bottom value.</td>
</tr>
<tr>
<td>Show &quot;Others&quot; value</td>
<td>If enabled, all values that are not the top/bottom values are consolidated in the &quot;Others&quot; value.</td>
</tr>
</tbody>
</table>

You can use the hidden measure as a parameter that will determine the top or bottom value.
Formatting Data

Dashboard allows you to customize various data format settings for numeric and date-time values.

- Formatting Numeric Values
- Formatting Date-Time Values
- Currency Formatting Specifics

Formatting Numeric Values

To specify a format for numeric values, select Format from the data item menu.

This invokes the **Numeric Format** window.

<table>
<thead>
<tr>
<th>FORMAT TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Format settings are automatically determined based on the data type.</td>
</tr>
<tr>
<td>General</td>
<td>Converts a number to the most compact of either fixed-point or scientific notation, depending on the type of the number.</td>
</tr>
<tr>
<td>Number</td>
<td>Converts a number to a string of the “-d,ddd,ddd..” form where “-” indicates a negative number symbol (if required), “d” indicates a digit (0-9), “,” indicates a group separator, and “.” indicates a decimal point symbol.</td>
</tr>
</tbody>
</table>
### Currency

Converts a number to a string that represents a currency amount. To learn about currency formatting specifics, see the [Currency Formatting Specifics](#) section of this document.

### Scientific

Converts a number to a string of the "-d.ddd...E+ddd" or "-d.d.ddd...e+ddd" form where each "d" indicates a digit (0-9).

### Percent

Multiplies a number by 100 and converts it to a percentage string.

Other format settings are in effect for only specific format types.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
<th>FORMAT TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>The unit to which values should be converted.</td>
<td>Number, Currency</td>
</tr>
<tr>
<td>Precision</td>
<td>The number of fractional digits that should be displayed.</td>
<td>Scientific, Percent</td>
</tr>
<tr>
<td>Currency</td>
<td>Defines the currency sign and format settings that should be used to display currency values. To learn about currency formatting specifics, see the Currency Formatting Specifics section of this document.</td>
<td>Currency</td>
</tr>
<tr>
<td>Currency culture</td>
<td>For currencies used in a region with several cultures, specifies the culture that defines format settings.</td>
<td>Currency</td>
</tr>
<tr>
<td>Include group separator</td>
<td>Specifies whether or not separators should be inserted between digit groups.</td>
<td>Number, Currency, Percent</td>
</tr>
</tbody>
</table>

### Formatting Date-Time Values

To specify a format for date-time values, use the **Format** submenu in the data item menu.
This submenu lists the available format types that depend on the selected group interval (for details on group intervals, see Grouping).

**Note**

Specific group intervals do not have format options. This means that corresponding values can only be presented in a single manner. The **Format** submenu is not displayed for such group intervals.

The following list shows format types by group interval.

- **Year**
  - *Full* - The full year pattern (Example: 6/15/2017 1:45:30 PM -> 2017 (en-US)).
  - *Abbreviated* - The year from 00 to 99 (Example: 6/15/2017 1:45:30 PM -> 17 (en-US)).

- **Quarter**
  - *Full* - The full quarter pattern (Example: 6/15/2017 1:45:30 PM -> Q2 (en-US)).
  - *Numeric* - The quarter from 1 through 4 (Example: 6/15/2017 1:45:30 PM -> 2 (en-US)).

- **Month**
  - *Full* - The full name of the month (Example: 6/15/2017 1:45:30 PM -> June (en-US)).
  - *Abbreviated* - The abbreviated name of the month (Example: 6/15/2017 1:45:30 PM -> Jun (en-US)).
  - *Numeric* - The month from 1 through 12 (Example: 6/15/2017 1:45:30 PM -> 6 (en-US)).

- **Hour**
  - *Long* - Long hour pattern, 12-hour format (Example: 6/15/2017 1:45:30 PM -> 1:00 PM).
  - *Short* - Short hour pattern, 24-hour format (Example: 6/15/2017 1:45:30 PM -> 13).

- **Day of Week**
  - *Full* - The full name of the day of the week (Example: 6/15/2017 1:45:30 PM -> Monday (en-US)).
  - *Abbreviated* - The abbreviated name of the day of the week (Example: 6/15/2017 1:45:30 PM -> Mon (en-US)).
  - *Numeric* - The day of the week from 1 through 7 (Example: 6/15/2017 1:45:30 PM -> 2 (en-US)).

- **Day-Month-Year**
  - *Short* - Short date pattern (Example: 6/15/2017 1:45:30 PM -> 6/15/2017 (en-US)).
The list below illustrates format types related to the **Exact Date** group interval.

- **Year**
  - Full - The full year pattern (Example: 6/15/2017 1:45:30 PM -> 2017 (en-US)).
  - Abbreviated - The year from 00 to 99 (Example: 6/15/2017 1:45:30 PM -> 17 (en-US)).

- **Quarter**
  - n/a - The default year and full quarter pattern (Example: 6/15/2017 1:45:30 PM -> Q2 2017 (en-US)).

- **Month**
  - n/a - The default year pattern and the full name of the month (Example: 6/15/2017 1:45:30 PM -> June, 2017 (en-US)).

- **Day**
  - Long - Long date pattern (Example: 6/15/2017 1:45:30 PM -> Monday, June 15, 2017 (en-US)).
  - Short - Short date pattern (Example: 6/15/2017 1:45:30 PM -> 6/15/2017 (en-US)).

- **Hour**
  - Long - Long date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> Monday, June 15, 2017 1:00 PM (en-US)).
  - Short - Short date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> 6/15/2017 1:00 PM (en-US)).
  - Time only - Long time pattern (Example: 6/15/2017 1:45:30 PM -> 1:00 PM (en-US)).

- **Minute**
  - Long - Long date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> Monday, June 15, 2017 1:45 PM (en-US)).
  - Short - Short date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> 6/15/2017 1:45 PM (en-US)).
  - Time only - Long time pattern (Example: 6/15/2017 1:45:30 PM -> 1:45 PM (en-US)).

- **Second**
  - Long - Long date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> Monday, June 15, 2017 1:45:30 PM (en-US)).
  - Short - Short date pattern, long time pattern (Example: 6/15/2017 1:45:30 PM -> 6/15/2017 1:45:30 PM (en-US)).
  - Time only - Long time pattern (Example: 6/15/2017 1:45:30 PM -> 1:45:30 PM (en-US)).

---

**Currency Formatting Specifics**

The Dashboard allows you to specify a currency format at two levels: for the entire dashboard and for individual data items.
1. **Data Item Currency**

To specify which currency to use for a particular data item, select **Format** from the data item menu.

In the **Numeric Format** dialog, select **Currency** in the **Format type** field and use the **Currency** combo box to select the required currency.

**Note**

This option only affects the way values are displayed. The Dashboard **does not** convert monetary amounts from one currency to another.

For regions with several cultures, you can also select the culture that will be used to format currency values.

You can also apply the default dashboard currency by selecting **Use dashboard settings** in the **Currency** field.

2. **Dashboard Currency**
You can also specify the default currency for the dashboard. This setting will be applied to dashboard items that have no currency defined.

To set the dashboard currency, click the **Currency** button in the Ribbon.

This invokes the **Dashboard Currency** window. In this window, select the required currency using the **Currency** combo box.

**Note**

This option only affects the way values are displayed. The Dashboard **does not** convert monetary amounts from one currency to another.

For regions with several cultures, you can also select the culture that will be used to format currency values.

Additionally, you can specify the client culture that should be used for the dashboard by selecting the **Use client system settings** item. In this instance, the current system culture will be used in WinForms applications, and the client culture will be used in Web applications.
Interactivity

This section describes features that enable interaction between various dashboard items. These features include Master Filtering and Drill-Down.

The section consists of the following topics.

- Master Filtering
- Drill-Down
- Neutral Filter Mode
Master Filtering

The **Dashboard** allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). You can select elements in a **Master Filter** item (grid records, chart bars, pie segments, etc.) to filter data in other dashboard items by the selected values.

**Master Filtering Overview**

Dashboard items can be divided into four groups by their master filtering capabilities.

1. **Data visualization dashboard items** allow you to enable master filtering by specifying the selection mode. The following dashboard items allow you to manage their master filtering mode.
   - Chart
   - Scatter Chart
   - Grid
   - Pies
   - Cards
   - Gauges
   - Choropleth Map
   - Geo Point Maps
   - Treemap

   To learn how to manage master filtering for these items, see **Master Filter Settings**.

2. **Filter elements** represent a special type of dashboard item whose main purpose is to apply filtering to other dashboard items. This capability is always enabled for these dashboard items.

   The following filter elements are available.
   - Combo Box
   - List Box
   - Tree View

   Instead of switching between standard master filtering modes, some filter elements allow you to switch their type.
This allows you to select a single value or multiple values.

To learn more, see the Filter Elements section.

3. **Range Filter** is a special type of dashboard item that displays a chart with selection thumbs and allows you to filter out values displayed along the argument axis.

To learn more, see the Range Filter section.

4. **Dashboard item group** allows you to manage interaction between dashboard items in and out of the group.

To learn more about the interactivity capabilities of the dashboard item group, see the Interactivity paragraph in the Dashboard Item Group topic.

## Master Filter Settings

### Master Filtering Modes

The Master Filter item supports two selection modes.

- **Multiple** - Allows you to select multiple elements in the Master Filter item.
- **Single** - Allows you to select only one element in the Master Filter item. When this mode is enabled, the default selection will be set to a Master Filter element. You can change this selection, but cannot clear it.

To enable/disable master filtering, use the **Multiple Master Filter** or **Single Master Filter** buttons in the Data Ribbon tab.

### Note

If the selected dashboard item contains several types of elements that can be used for filtering, the Ribbon or Toolbar will provide the appropriate buttons to switch between these types (e.g., the Arguments and Series buttons in the Chart). For details, refer to the documentation for individual dashboard items in the Designing Dashboard Items section.

### Filtering Across Data Sources

When different items in a dashboard are bound to different data sources, you can specify that a particular Master Filter should be applied across data sources. This means that it will apply filtering to fields with matching names in all data sources.

Fields are matched by their full names. For fields in other data sources to be affected by Master Filtering, their names must match the name of the field in the current data source, and they must belong to the same hierarchy level so that their full names also match. For instance, `Customer.City` and `Customer.Address.City` will not be treated as matching fields.

To enable filtering across data sources, use the **Cross-Data-Source Filtering** button in the Data Ribbon tab.

### Preventing Items from Being Filtered

You can prevent specific dashboard items from being affected by Master Filters. To do this, use the **Ignore Master Filters** button in the Data Ribbon tab.
Apply Filtering

To learn how to apply filtering in a specific dashboard item, refer to the Master Filtering topic in the Interactivity section for this item.
Drill-Down

Dashboard provides the **Drill-Down** feature, which allows you to change the detail level of data displayed in a dashboard item. The Drill-Down feature enables users to drill down to display detail data, or drill up to view more general information.

- Enable Drill-Down
- Perform Drill-Down

Enable Drill-Down

Drill-down requires that the **data section** contains several dimensions...

... or a hierarchy data item (in **OLAP mode**).

To enable drill-down, click the **Drill-Down** button in the **Data** Ribbon tab (or the **button if you are using the toolbar menu).

**Note**

If the selected dashboard item contains several types of elements that can be used for drill-down, the Ribbon or Toolbar will provide the appropriate buttons to switch between these types (e.g., **Arguments** and **Series** buttons in a Chart). For details, refer to the documentation for the individual dashboard items in the **Designing Dashboard Items** topic.

The following dashboard items support the Drill-Down feature.
Perform Drill-Down

To learn how you can drill down using a particular dashboard item, refer to the Drill-Down topic in the Interactivity section for this item.
Neutral Filter Mode

The filter elements show all items selected by default, to indicate that no filtering is currently taking place. Starting from this state, users typically begin each filtering operation by deselecting All, before they select individual items.

An extra click is required to begin any actual filtering operation, because the standard filter mode shows all items selected. This is not an optimal implementation for performance reasons, because it generates filtering criteria that are evaluated by the data layer and/or the database.

The dashboard in the image below illustrates how the filter elements are initialized in standard filter mode.

To solve these issues, the Neutral Filter Mode is implemented. It is neutral in the sense that it does not apply any criteria to the data source in its default state, resulting in improved performance.

All items are shown deselected. This means that an extra click is no longer required in the most common scenarios, and this
behavior is familiar to end users from websites world-wide.

Built-in UI does not provide a command to switch the filter mode. Reload a dashboard after switching the mode.

The **Neutral Filter Mode** helps in a situation when there is a potential “dead lock”, due to the fact that multiple filter elements influence each other. The **Clear Master Filter** button resets the filters.
Appearance Customization

The topics in this section describe how to customize the appearance of a dashboard or any of its elements using conditional formatting and coloring.

This section contains the following topics:

- Conditional Formatting
- Coloring
- Data Display Formatting
Conditional Formatting

The Dashboard Designer provides the capability to apply formatting to dashboard item elements whose values meet the specified condition. This feature allows you to highlight specific elements using a predefined set of rules.

To learn more about specifics of using a conditional formatting feature for different dashboard items, see the following topics.

- Conditional Formatting - Grid
- Conditional Formatting - Pivot

The current topic describes the following common concepts.

- Conditional Formatting Overview
- Create a Format Rule
- Specify Appearance Settings
- Edit a Format Rule

Conditional Formatting Overview

Comparison rules used in conditional formatting can be divided into the following groups.

- **Value** - Allows you to compare static values (such as Greater Than, Less Than, Between, etc.).
- **Top-Bottom** - Highlights a specific number of topmost/bottommost values.
- **Average** - Highlights values above the average value or below the average value.
- **A Date Occurring** - Allows you to highlight date-time values that fall into a specified interval.
- **Expression** - Allows you to use complex conditions to apply formatting. You can also pass dashboard parameters to expressions.
- **Icon Ranges** - Allows you to apply formatting by displaying specific icons for different ranges of values. You can select a predefined set of icons or use a specific icon for each range.
- **Color Ranges** - Allows you to apply formatting using specific colors for different ranges of values. You can select a predefined set of colors or use custom appearance settings to highlight values within specified ranges.
- **Gradient Ranges** - Allows you to apply formatting using gradient color scales.
- **Bar** - Allows you to visualize numeric values using bars. You can also color bars corresponding to positive and negative values using different colors.
- **Bar Color Ranges** - Allows you to visualize numeric values using bars whose colors are contained in the specified color set.
- **Bar Gradient Ranges** - Allows you to visualize numeric values using bars whose colors are contained in the specified color gradient.
You can create comparison rules for measures or dimensions. The list below shows format conditions that can be applied to different types of data items.

- **Measure/numeric Dimension**
  - Value
  - Top-Bottom
  - Average
  - Expression
  - Icon Ranges
  - Color Ranges
  - Gradient Ranges
  - Bar
  - Bar Color Ranges
  - Bar Gradient Ranges

- **String Dimension**
  - Value with the condition type set to Equal To, Not Equal To or Text that Contains
  - Expression

- **Date-time Dimension**
  - Value
  - A Date Occuring for dimensions with the continuous date-time group interval
  - Expression
  - Icon Ranges
  - Color Ranges
  - Gradient Ranges
  - Bar
  - Bar Color Ranges
  - Bar Gradient Ranges

**Create a Format Rule**

To create a new rule used to apply formatting according to the required condition, do the following.

1. Choose a measure/dimension by whose values a format condition will be calculated. Click the measure/dimension menu button, select *Add Format Rule* and choose the condition.
2. This invokes the dialog that depends on the selected format condition and the type of dashboard item. For instance, the image below displays the Greater Than dialog corresponding to the Value format condition for the Grid dashboard item.

![Greater Than dialog]

In this dialog, specify settings specific for the selected condition (for instance, specify a value to compare with dimension/measure values). To learn more, see the documentation for the required condition.

3. Specify appearance settings applied to elements whose values meet the specified condition.

4. Specify the data item to whose values conditional formatting is applied using the Apply to combo box. Thus, you can create a format rule for one data item and apply new appearance settings to the other data item. You can also create format rules for hidden measures and apply formatting to values of visible data items.

**Note**

Different dashboard items can provide additional capabilities for creating a new format rule. To learn more, refer to documentation for the required dashboard item.

### Specify Appearance Settings

When creating a new format rule, you can select the required appearance settings applied according to the current format condition. All format conditions allow you to customize appearance settings in a similar manner. For instance, the Value format condition allows you to specify appearance settings in the following way:

- The **Appearance** tab allows you to choose the predefined background color/font.
The **Icons** tab allows you to add the predefined icon.

Use the **Custom Appearance** area in the **Appearance** tab to add presets containing custom appearance settings. To add a new preset, click an empty square. This invokes the **Custom Style Settings** dialog, allowing you to specify the required appearance settings.

In this dialog, you can specify the background/foreground colors and font settings. Click **Create** to add a preset. The created preset will be displayed in the **Custom Appearance** area.

**Edit a Format Rule**

To edit format rules for the selected dashboard item, click the **Edit Rules** button in the **Home** ribbon tab.

As an alternative, use the **Edit Rules** data item's menu item or the corresponding item in the dashboard item's context menu.
This invokes the **Edit Rules** dialog containing existing format rules for this dashboard item.

![Edit Rules Dialog]

This dialog allows you to perform the following actions.

- To edit the selected rule, use the **Edit** button or double-click the required rule.
- To delete the selected rule, use the **Delete** button.
- To reorder format rules, use the Up and Down buttons (the ↑ and ↓ icon, respectively). Reordering of rules allows you to specify the priority of rules from higher (a bottommost rule) to lower (a topmost rule).
- To enable/disable the required rule, use the corresponding check box on the left column.
- To create a new rule, click the **Add** button and select the required format condition. The calculated by combo box allows you to select the measure/dimension by whose values a format rule is applied.
- To filter format rules by the specified data item, use the **Filter by** combo box.

To clear all rules for the specified data item, use the **Clear Rules** button in the data item’s context menu.
The **Value** format condition allows you to compare static values (such as Greater Than, Less Than, Between, etc.).

The following condition types are supported for measures or date-time dimensions:

- **Greater Than/Greater Than or Equal To**

  The "Greater Than"/"Greater Than or Equal To" format conditions allow you to apply formatting to elements whose values are greater than/greater than or equal to the specified value. For instance, the following image displays a Grid dashboard item whose **Extended Price** cells are filled in green if their values are Greater Than 150 000.

  ![Greater Than Example](image_url)

  This format condition can be applied to measures or date-time dimensions.

- **Less Than/Less Than or Equal To**

  The "Less Than"/"Less Than or Equal To" format conditions allow you to apply formatting to elements whose values are less than/less than or equal to the specified value. For instance, the following image displays a Grid dashboard item whose **Extended Price** cells are filled in red if their values are Less Than 150 000.

  ![Less Than Example](image_url)

  This format condition can be applied to measures or date-time dimensions.

- **Equal To/Not Equal To**

  The "Equal To"/"Not Equal To" format conditions allow you to apply formatting to elements whose values are equal to/not equal to the specified value. For instance, the following image displays a Grid dashboard item whose **Sales Person** cells are filled in blue if their values are equal to 'Robert King'.
This format condition can be applied to measures, string or date-time dimensions.

- **Between/Not Between**

  The "Between"/"Not Between" format conditions allow you to apply formatting to elements whose values are between/not between the specified values. For instance, the following image displays a Grid dashboard item whose Extended Price cells are filled in orange if their values are Between 100 000 and 200 000.

  This format condition can be applied to measures or date-time dimensions.

- **Text That Contains**

  The “Text That Contains” format condition allows you to apply formatting to elements whose values contain the specified text. For instance, the following image displays a Grid dashboard item whose Sales Person cells are in cyan if their values contain the ‘An’ text.

  This format condition can be applied to measures, string or date-time dimensions.
The **Top-Bottom** format conditions allow you to highlight a specific number of topmost/bottommost values. You can specify this number as an absolute or percent value.

The following condition types are supported for measures:

- **Top N**

  The "Top N" format condition allows you to apply formatting to elements whose values are ranked at the top. For instance, the following image displays a Grid dashboard item whose top 3 *Extended Price* values filled in green.

- **Bottom N**

  The "Bottom N" format condition allows you to apply formatting to elements whose values are ranked at the bottom. For instance, the following image displays a Grid dashboard item whose bottom 40 percent *Extended Price* values are filled in red.
Average

The **Average** format conditions allow you to highlight values above or below an average value.

The following condition types are supported for measures:

- **Above Average/Above or Equal Average**

  The "Above Average"/"Above or Equal Average" format conditions allow you to apply formatting to elements whose values are above/above or equal to the average. For instance, the following image displays a Grid dashboard item whose *Extended Price* values that are above average (~ 141 000) filled in green.

- **Below Average/Below or Equal Average**

  The "Below Average"/"Below or Equal Average" format conditions allow you to apply formatting to elements whose values are below/below or equal to the average. For instance, the following image displays a Grid dashboard item whose *Extended Price* values that are below average (~ 141 000) filled in red.
Icon Ranges

Icon Ranges allow you to use predefined or custom sets of icons to apply conditional formatting to different ranges of values.

To format values according the required condition, click the data item menu button, select Add Format Rule | Icon Ranges and choose the required icon set.

This invokes the Range Set dialog containing the set of value ranges and corresponding icons. The Grid dashboard item on the right displays the default formatting applied using the predefined set of 3 icons.

This dialog allows you to change the following options specific to Icon Ranges.

- The Format Style combo box allows you to change the icon set used to apply formatting.
- The Use % ranges check box specifies whether the percent or absolute scale is used to generate ranges.

**Note**

Note that this option is not available for date-time dimensions.
• To change the icon displayed for values corresponding to the specified range, click the button next to the required icon and select a new icon.

![Image of icon selection](image)

Select **No Style** to disable the indication for the required range.

• You can change range boundaries by specifying the required values.

![Image of range selection](image)

**Note**

Note that a new value should fall into a range between corresponding values of the previous and next range.

• To change the comparison logic for the required range, click the comparison sign and select the required option.

![Image of comparison selection](image)

The greater or equal sign includes the smallest value of the current interval while the greater sign excludes the smallest value from the current interval and includes it in the next interval.

• Use the **Add** and **Delete** buttons to add new ranges or delete the selected range respectively. Note that new range is added below the selected range.
Color Ranges

Color Ranges allow you to use predefined sets of colors to apply conditional formatting to different ranges of values. You can also use custom appearance settings for specific ranges.

To format values according the required condition, click the data item menu button, select **Add Format Rule | Color Ranges** and choose the required icon set.

This invokes the **Range Set** dialog containing the set of value ranges and corresponding appearance settings. The Grid dashboard item on the right displays the default formatting applied using the predefined set of 3 colors.

This dialog allows you to change the following options specific to Icon Ranges.

- The **Format Style** combo box allows you to change the color set used to apply formatting.
- The **Use % ranges** check box specifies whether the percent or absolute scale is used to generate ranges.

**Note**

Note that this option is not available for date-time dimensions.
To change the appearance settings applied to values corresponding to the specified range, click the button next to the required color and select a new color or specify custom appearance settings. To learn how to specify custom settings, see the Specify Appearance Settings paragraph in the Conditional Formatting topic.

Select No Style to disable the indication for the required range.

You can change range boundaries by specifying the required values.

Note

Note that a new value should fall into a range between corresponding values of the previous and next range.

To change the comparison logic for the required range, click the comparison sign and select the required option.

The greater or equal sign includes the smallest value for the current interval while the greater sigh excludes the smallest value from the current interval and includes it in the next interval.

Use the Add and Delete buttons to add new ranges or delete the selected range respectively.
Gradient Ranges

Gradient Ranges allow you to use predefined color gradients to apply conditional formatting to different ranges of values. You can also use specific colors to generate custom gradients.

To format values according the required condition, click the measure menu button, select **Add Format Rule | Color Ranges** and choose the required color gradient.

This invokes the **Gradient Ranges** dialog containing the set of value ranges and corresponding appearance settings. The Grid dashboard item on the right displays the default formatting applied using the predefined Red-Blue gradient.

This dialog allows you to change the following options specific to Gradient Ranges.

- **Number of ranges** allows you to specify the number of ranges used to classify values. Click the **Generate Ranges** button to generate a new gradient scale according to the specified number of ranges.
The **Use % ranges** check box specifies whether the percent or absolute scale is used to generate ranges.

**Note**

Note that this option is not available for date-time dimensions.

- To change the specific color in the gradient, click the button next to the required color and select a new color or specify a custom background color. This allows you to create a color gradient based on more than two colors. In this case, the specified colors are marked with an empty square.

![Custom Appearance](image)

To learn how to specify a custom color, see the **Specify Appearance Settings** paragraph in the **Conditional Formatting** topic.

- You can change range boundaries by specifying the required values.

![Ranges](image)

**Note**

Note that a new value should fall into a range between corresponding values of the previous and next range.

- To change the comparison logic for the required range, click the comparison sign and select the required option.

![Comparison](image)

The **greater or equal** sign includes the smallest value in the current interval while the **greater** sign excludes the smallest value from the current interval and includes it in the next interval.
A Date Occurring

A Date Occurring format condition allows you to highlight date-time values that fall into a specified interval. Note that this format condition can be applied to dimensions with the continuous date-time group interval.

To format values according the Date Occurring condition, click the menu button of the required dimension and select Add Format Rule | A Date Occurring.

This invokes the A Date Occurring dialog that allows you to select a date-time interval(s) whose value should be formatted.

The following intervals are supported.

- **Is beyond this year** - Dates that follow the current year.
- **Is later this year** - Dates of the current year starting from the following month.
- **Is later this month** - Dates of the current month that follow the next week.
- **Is later this week** - Dates of the current week starting from the day after tomorrow.
• **Is next week** - Dates that belong to the following week.
• **Is tomorrow** - Tomorrow.
• **Is today** - Today.
• **Is yesterday** - Yesterday.
• **Is earlier this week** - Dates of the current week that are prior to yesterday.
• **Is last week** - Dates of the previous week.
• **Is earlier this month** - Dates of the current month that are prior to the previous week.
• **Is earlier this year** - Dates of the current year that are prior to the current month.
• **Is prior to this year** - Dates that are prior to the current year.
• **Empty** - Does not specify any condition.
• **Beyond** - Dates that belong to the month in three-months time and beyond.
• **ThisWeek** - Dates that belong to the current week.
• **ThisMonth** - Dates that belong to the current month.
• **MonthAfter1** - Dates that belong to the following month.
• **MonthAfter2** - Dates that belong to the month in two-months time.
• **MonthAgo1** - Dates that belong to the previous month.
• **MonthAgo2** - Dates that belong to the month two months ago.
• **MonthAgo3** - Dates that belong to the month three months ago.
• **MonthAgo4** - Dates that belong to the month four months ago.
• **MonthAgo5** - Dates that belong to the month five months ago.
• **MonthAgo6** - Dates that belong to the month six months ago.
• **Earlier** - Dates that belong to the month seven months ago and earlier.
An Expression format condition allows you to use complex conditions to apply formatting.

To format values according to the Expression condition, click the menu button of the required data item and select **Add Format Rule | Expression**.

This invokes the **Expression** dialog that allows you to specify the required expression. For instance, the following image displays a Grid dashboard item whose rows are filled in green if the Extended Price/Quantity values are greater than 150,000 and 7,500, respectively.

You can pass static values when creating conditions or pass a dashboard parameter to apply conditional formatting dynamically. To learn more, see **Passing Parameter Values**.
The **Bar** format condition allows you to visualize numeric values using bars. You can also paint bars corresponding to positive and negative values using different colors.

To format values according to the Bar condition, click the menu button of the required data item and select **Add Format Rule | Bar**.

This invokes the **Bar** dialog that allows you to specify the required settings. For instance, the following image displays a **Grid** dashboard item whose **Extended Price** cell contains data bars corresponding to numeric values.

This dialog allows you to change the following options specific to the Bar format condition.
By default, lengths of the shortest and longest bars correspond to minimum and maximum values, respectively. If necessary, you can specify values corresponding to the shortest and longest bars manually. To do this, change the type of minimum/maximum value from **Automatic** to **Number** or **Percent**, and specify the required values.

**Style Settings** and **Negative Style Settings** allow you to specify style settings used to color data bars corresponding to positive and negative values, respectively. To learn how to specify custom style settings, see the **Specify Appearance Settings** paragraph in the **Conditional Formatting** topic.

- The **Allow negative axis** option allows you to specify whether negative data bars are displayed in the direction opposite to the positive data bars.
- The **Draw axis** option specifies whether to draw the vertical axis between positive and negative data bars.
- The **Show bar only** option specifies whether to show bars without corresponding values.
Bar Color Ranges

Bar Color Ranges allow you to visualize numeric values using bars whose colors are contained in the specified color set.

To format values according to the required condition, click the data item menu button, select **Add Format Rule | Bar Color Ranges** and choose the required color set.

This invokes the **Color Range Bar** dialog containing the set of value ranges and corresponding colors. The Grid dashboard item on the right displays the default formatting applied using the predefined set of 3 colors.

This dialog allows you to change the following options specific to Bar Color Ranges.

- The **Format Style** combo box allows you to change the color set used to apply formatting.
- The **Use % ranges** check box specifies whether the percent or absolute scale is used to generate ranges.

**Note**

Note that this option is not available for numeric dimensions.
To change the appearance settings applied to values corresponding to the specified range, click the button next to the required color and select a new color or specify custom appearance settings. To learn how to specify custom settings, see the Specify Appearance Settings paragraph in the Conditional Formatting topic.

Select No Style to disable the indication for the required range.

You can change range boundaries by specifying the required values.

**Note**

Note that a new value should fall into a range between corresponding values of the previous and next range.

To change the comparison logic for the required range, click the comparison sign and select the required option.

The greater or equal sign includes the smallest value for the current interval, while the greater sign excludes the smallest value from the current interval and includes it in the next interval.

Use the Add and Delete buttons to add new ranges or delete the selected range respectively.
Bar Gradient Ranges

The Bar Gradient Ranges allow you to visualize numeric values using bars whose colors are contained in the specified color gradient.

To format values according the required condition, click the measure menu button, select Add Format Rule | Bar Gradient Ranges and choose the required color gradient.

This invokes the Bar Gradient Ranges dialog containing the set of value ranges and corresponding appearance settings. The Grid dashboard item on the right displays the default formatting applied using the predefined Red-Blue gradient.

This dialog allows you to change the following options specific to Bar Gradient Ranges.

- **Number of ranges** allows you to specify the number of ranges used to classify values. Click the Generate Ranges button to generate a new gradient scale according to the specified number of ranges.

- The **Use % ranges** check box specifies whether the percent or absolute scale is used to generate ranges.
**Note**

Note that this option is not available for numeric dimensions.

- To change the specific color in the gradient, click the button next to the required color and select a new color or specify a custom background color. This allows you to create a color gradient based on more than two colors. In this case, the specified colors are marked with an empty square.

![Color Gradient Example](image)

To learn how to specify a custom color, see the **Specify Appearance Settings** paragraph in the **Conditional Formatting** topic.

- You can change range boundaries by specifying the required values.

![Range Boundaries Example](image)

**Note**

Note that a new value should fall into a range between corresponding values of the previous and next range.

- To change the comparison logic for the required range, click the comparison sign and select the required option.

![Comparison Logic Example](image)

The **greater or equal** sign includes the smallest value in the current interval while the **greater** sign excludes the smallest value from the current interval and includes it in the next interval.
Coloring

The Dashboard Designer provides the capability to manage coloring of dashboard item elements. You can choose whether to use a global color scheme providing consistent colors for identical values across the dashboard or a local color scheme that provides an independent set of colors for each dashboard item. The Dashboard Designer also allows you to edit colors automatically assigned from the default palette.

The section contains the following topics.

- Coloring Concepts
- Customizing a Color Scheme
Coloring Concepts

The Dashboard Designer provides you with the capability to color dashboard item elements by associating dimension values/measures and specified colors. You can choose whether to use a global color scheme to provide consistent colors for identical values or specify a local color scheme for each dashboard item.

- Supported Dashboard Items
- Color Schemes
- Coloring Dimensions and Measures

Supported Dashboard Items

DevExpress Dashboard allows you to manage coloring for the following dashboard items.

- Chart
- Scatter Chart
- Pie
- Pie Map
- Range Filter
- Treemap

Color Schemes

The dashboard provides two ways of coloring dashboard item elements.

- Using a global color scheme that provides consistent colors for identical values across the dashboard. The image below shows the dashboard containing Pie and Chart dashboard items. Pie segments and chart series points corresponding to 'Beverages', 'Condiments' and 'Diary Products' dimension values are colored using identical colors from the default palette.

To use global colors for coloring dashboard item elements, click the Global Colors button in the Design ribbon tab.

**Important**

When a global color scheme is used, the dashboard reserves automatically generated colors for certain values regardless of the filter state.

- Using a local color scheme that provides an independent set of colors for each dashboard item.

To use local colors for coloring dashboard item elements, click Local Colors in the Design ribbon tab.
Important

When a local color scheme is used, the dashboard reassigns palette colors when the filter state is changed.

**Coloring Dimensions and Measures**

Dashboard items allow you to manage the coloring of individual dimensions or all dashboard item measures using predefined coloring modes.

<table>
<thead>
<tr>
<th>COLORING MODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Dimension values/measures are colored by default. To learn how specific dashboard items color their elements by default, see the <strong>Coloring</strong> topic for the corresponding dashboard item.</td>
</tr>
<tr>
<td>Hue</td>
<td>Dimension values/measures are colored by hue. If coloring by hue is enabled, a data item indicates this using the <strong>H</strong> indicator.</td>
</tr>
<tr>
<td>None</td>
<td>Dimension values/measures are colored with the same color.</td>
</tr>
</tbody>
</table>

**Coloring Dimension Values**

To specify the coloring mode for the required dimension, click the dimension’s **menu button** and use the **Color by** submenu. For instance, the image below shows the Chart dashboard item whose ‘Country’ dimension is colored by hue.

**Coloring Measures**

To specify the coloring mode for dashboard item measures, click the **menu button** of any measure and use the **Color by** submenu. For instance, the image below shows the Pie dashboard item whose measures are colored by hue.

If you enabled coloring by hue for several dimensions/measures, all combinations of dimension values/measures will be automatically colored using different colors from the default palette. To learn how to customize these colors, see **Customizing a**
Customizing a Color Scheme

The Dashboard Designer provides the capability to edit colors contained in global and local color schemes. You can select the required color from the default dashboard palette or specify a custom color.

- Invoke a Color Scheme Dialog
- Edit Colors
- Add a New Value
- Add a New Color Table

Invoke a Color Scheme Dialog

To edit colors, use the Color Scheme dialog. You can invoke this dialog in the following ways.

- To edit colors in a global color scheme, use the Edit Colors button in the Home ribbon tab or the Edit Colors button in the dashboard item’s Design tab.

![Global Colors](image1)

- To edit colors in a local color scheme, use the Edit Colors button in the contextual Design ribbon tab.

![Local Colors](image2)

Let's consider a Chart dashboard item whose dimensions and measures are colored by hue using local colors.

![Chart Dashboard Item](image3)

For this dashboard item, the Color Scheme dialog will contain combinations of all dimension values and a specific measure.
In this dialog, you can perform the following actions.

- **Edit automatically assigned colors** or specify new colors.
- **Add new values** to a color table.
- **Add new color tables** containing values whose colors are not yet assigned.

## Edit Colors

You can customize automatically assigned colors in several ways.

- To retain the automatically assigned color for the selected value, right-click the required value in the **Value** column and select **Retain this color**.

This reserves the current palette color for the selected value.

- You can select another palette color by clicking the required cell in the **Color** column.

- To specify a custom color, click **More Colors...** and pick any color using the RGB or HSB color model in the invoked **Select Color** dialog.
You can reset the customized color for the selected value using the **Reset** menu item.

### Add a New Value

The **Color Scheme** dialog allows you adding a new value with the specified color to the selected color table. To do this, click the **New Value**... button.

In the invoked **New Value** dialog, specify the dimension values, add the required measures and click **OK**. This creates a new value whose color can be specified as described in **Edit Colors**.
You can remove manually added values using the **Remove** context menu item.

---

### Add a New Color Table

The **Color Scheme** dialog also allows you to add a new color table containing values whose colors are not yet assigned. To do this, click **New Color Table**... button.

In the invoked dialog, specify the data source, add the required dimensions and enable the **‘MeasureNames’ Dimension** checkbox if you need to add measures to a color table.

Click **OK** to add the color table to a color scheme. Then, you can add values to this table (see **Add a New Value**) and specify its colors (see **Edit Colors**).
Data Display Format

The DevExpress Dashboard allows you to specify format settings for numeric and date-time values, as described in the Formatting Data document. However, certain data labels and delta values can be formatted independently to give you more ways to improve data readability and optimize screen space usage.

Visual elements whose format can be customized are different for different dashboard items. For more information refer to the topics listed below.

- Chart X-Axis Format
- Chart Y-Axis Format
- Scatter X and Y Axes Formats
- Grid Delta Column Formats
- Gauge Scale Label Format
- Choropleth Map Delta Format
- Card Formats
Data Analysis

This section describes how to perform advanced data analysis using the aggregate and window functions, dashboard parameters, etc.

The section consists of the following topics.

- Aggregations
- Window Calculations
- Using Dashboard Parameters
- Expression Constants, Operators, and Functions
Topics in this section describe functions used to introduce additional aggregation levels to prepare underlying data.

- Summary Level Aggregations
- Intermediate Level Aggregations
Summary Level Aggregations

The Dashboard Designer allows you to perform aggregations when constructing a calculated field expression. This allows you to evaluate calculated fields on a summary level.

In the Dashboard Designer, you can use the following set of predefined aggregate functions.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggr(SummaryExpression, Dimensions)</td>
<td>Aggregates underlying data using the detail level specified by a predefined set of dimensions and a specified summary function. To learn more, see Intermediate Level Aggregations.</td>
</tr>
<tr>
<td>Avg(Value)</td>
<td>Returns the average of all the values in the expression.</td>
</tr>
<tr>
<td>Count()</td>
<td>Returns the number of values.</td>
</tr>
<tr>
<td>CountDistinct(Value)</td>
<td>Returns the number of distinct values.</td>
</tr>
<tr>
<td>Max(Value)</td>
<td>Returns the maximum value across all records.</td>
</tr>
<tr>
<td>Min(Value)</td>
<td>Returns the minimum value across all records.</td>
</tr>
<tr>
<td>Median(Value)</td>
<td>Returns the median of the values.</td>
</tr>
<tr>
<td>Sum(Value)</td>
<td>Returns the sum of all values.</td>
</tr>
<tr>
<td>Var(Value)</td>
<td>Returns an estimate of the variance of a population where the sample is a subset of the entire population.</td>
</tr>
<tr>
<td>Varp(Value)</td>
<td>Returns the variance of a population where the population is the entire data to be summarized.</td>
</tr>
<tr>
<td>StdDev(Value)</td>
<td>Returns an estimate of the standard deviation of a population where the sample is a subset of the entire population.</td>
</tr>
<tr>
<td>StdDevp(Value)</td>
<td>Returns the standard deviation of a population where the population is the entire data to be summarized.</td>
</tr>
</tbody>
</table>
These functions can be used for all types of numeric fields. After creating such calculated fields, you can use them as measures contained in an OLAP cube.
Intermediate Level Aggregations

The Dashboard can aggregate and summarize data on different levels.

- The **Query Builder** allows you to prepare an underlying data source before analyzing data. You can apply grouping, sorting, summarization and other data shaping operations during data selection.
- **Dashboard items** aggregate and summarize data at a visualization level using dimensions and measures, respectively. To learn more, see Binding Dashboard Items to Data.
- The **Aggr** function allows you to introduce an intermediate detail level that is not related to the visualization level. This allows you to create custom aggregations at different levels and combine these aggregations with existing visualizations.

Overview

The **Aggr** function aggregates and summarizes underlying data using the detail level specified by a predefined set of dimensions and a specified summary function. This function can be used during the creation of a new calculated field in the Expression Editor.

The **Aggr** function has the following syntax.

\[
\text{Aggr}(\text{summaryExpression, dimension1, dimension2, ...})
\]

The first argument is a summary expression calculated against a specific data source field. The next arguments are the set of dimensions whose values are aggregated and used to calculate summaries specified using the first argument. For instance, the following function calculates sums of sales for each product within the specified category.

\[
\text{Aggr}(\text{Sum([Sales]), [Category], [Product]})
\]

If you created the calculated field that includes the **Aggr** function and dropped the created field into an existing dashboard item, the Dashboard joins the resulting aggregation with the already displayed data. This means that you can add data with the increased or decreased granularity to the dashboard item. There are two main scenarios.

- **In the first scenario, an aggregation has a less detailed granularity than visualized data.**

In this scenario, an underlying data source contains the list of orders for two categories and corresponding products.

<table>
<thead>
<tr>
<th>Order ID</th>
<th>Category</th>
<th>Product</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beverages</td>
<td>Chai</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Beverages</td>
<td>Chai</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Beverages</td>
<td>Coffee</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Beverages</td>
<td>Coffee</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Confections</td>
<td>Chocolate</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>Confections</td>
<td>Chocolate</td>
<td>55</td>
</tr>
<tr>
<td>7</td>
<td>Confections</td>
<td>Biscuits</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>Confections</td>
<td>Biscuits</td>
<td>35</td>
</tr>
</tbody>
</table>

To aggregate this data by individual categories, create a calculated field with the following expression.

\[
\text{Aggr}(\text{Sum([Sales]), [Category]})
\]

The following internal table will be generated for this calculated field.
The sample Grid dashboard item contains more detailed data and includes the following columns: Category, Product and the sum of Sales.

<table>
<thead>
<tr>
<th>Category</th>
<th>Product</th>
<th>Sales (Sum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beverages</td>
<td>Chai</td>
<td>$25</td>
</tr>
<tr>
<td>Beverages</td>
<td>Coffee</td>
<td>$55</td>
</tr>
<tr>
<td>Confections</td>
<td>Biscuits</td>
<td>$60</td>
</tr>
<tr>
<td>Confections</td>
<td>Chocolate</td>
<td>$95</td>
</tr>
</tbody>
</table>

If you drop the created calculated field to the Grid, the sum of sales for each category will be repeated for each Grid row.

For instance, you can use these values later to calculate a contribution of each product to a category’s sales.

- An aggregation has a more detailed granularity than visualized data.

To aggregate this data by categories and products, create a calculated field with the following expression.

```
Aggr(Sum([Sales]), [Category], [Product])
```

The following internal table will be generated for this calculated field.

<table>
<thead>
<tr>
<th>Order ID</th>
<th>Category</th>
<th>Product</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beverages</td>
<td>Chai</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Beverages</td>
<td>Chai</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Beverages</td>
<td>Coffee</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Beverages</td>
<td>Coffee</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Confections</td>
<td>Chocolate</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>Confections</td>
<td>Chocolate</td>
<td>55</td>
</tr>
<tr>
<td>7</td>
<td>Confections</td>
<td>Biscuits</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>Confections</td>
<td>Biscuits</td>
<td>35</td>
</tr>
</tbody>
</table>

Drop the created calculated field to the Grid and set its summary type to Min. The Grid will display minimum product sales within each category.
Example 1 - Best/Worst Sales by Year

The following example shows how to display best and worst monthly sales for each year.

In this example, the Chart dashboard item shows the sum of sales by different years. The Sales field is placed in the Values section and the OrderDate (with the Year group interval) is placed in the Arguments section.

To display sales by the best/worst months for each year, create a new calculated field with the following expression.

\[ \text{Aggr}(\text{Sum}([\text{Sales}]), \text{GetYear}([\text{OrderDate}]), \text{GetMonth}([\text{OrderDate}])) \]

Drop this field (Sales by Year/Month in the image below) to the Values section and set its summary type to Max. Then, drop this field to Values again and set its summary type to Min. The Chart will visualize sales by the best/worst months in a year.

Example 2 - Percent of Total

This example will demonstrate how to calculate a contribution of individual quarter sales to year sales.

In this example, the Pivot dashboard item displays the sum of sales by year/quarter. The Sales field is placed in the Values section and the hierarchy of OrderDate fields (with the Year and Quarter group intervals) is placed in Rows.
To calculate a contribution of each quarter to a year sales, do the following.

- Calculate totals for each year using the `Aggr` function by creating the following calculated field.

```
Aggr(Sum([Sales]), GetYear([OrderDate]))
```

Set the name of the created field to `Sales by Year`.

- Calculate a contribution of each quarter to year sales by creating the following calculated field.

```
Sum([Sales]) / Max([Sales by Year])
```

Name this field `Percent of Total` and drop it to `Values` to see the result.

**Example 3 - Customer Acquisition**

In this example, a customer acquisition will be evaluated by grouping customers by the quarter/year of their first purchase to compare sales contributions.

The `Chart` dashboard item below visualizes sales by quarter/year.
The following expression determines the minimum order date (the first purchase date) per customer.

\[ \text{Aggr}(\text{Min}(\text{GetDateQuarterYear}([\text{OrderDate}]), [\text{CustomerID}])) \]

Set the name of the created field to \textit{Customer First Order} and drop this field to the \textbf{Series} section to see the result.

\[ \text{Aggr}(\text{CountDistinct}([\text{OrderID}]), [\text{CustomerID}]) \]

\textbf{Example 4 - Customer Order Count}

In this example, you will learn how to divide customers count by the number of orders they made.

The Chart below shows the number of orders that is made by each customer.

The calculated field below evaluates the number of unique orders made by each customer.

\[ \text{Aggr}(\text{CountDistinct}([\text{OrderID}]), [\text{CustomerID}]) \]
Set the name of this field to *Customer Order Count* and drop this field to arguments. Then, drop the *CustomerID* field to **Values** and change its summary type to **Count Distinct**.

The Chart will show the number of customers that made a specific number of orders.

**Example 5 - Best Product Sales by Year**

This scenario requires the use of nested aggregations. In this example, the dashboard will show products with the best sales in a year along with sales values.

The initial Grid dashboard item shows sales of all products by year (the *OrderDate* column with the **Year** group interval and the *Sales* column). The data source also contains the *ProductName* field.

To implement this scenario, perform the following steps.

- Create the calculated field that will return product sales for individual years.

  \[
  \text{Aggr}(\text{Sum}([\text{Sales}]), \text{GetYear}([\text{OrderDate}]), [\text{ProductName}])
  \]

  Set its name to *Product Sales by Year*.

- Create the calculated field that will return maximum sales values.

  \[
  \text{Aggr}(\text{Max}([\text{Product Sales by Year}]), \text{GetYear}([\text{OrderDate}]))
  \]

  Set its name to *Max Product Sales by Year*.

- Finally, create a calculated field returning the name of the product with the best sales and a corresponding sales value.

  \[
  \text{Iif}([\text{Max Product Sales by Year}] = [\text{Product Sales by Year}], [\text{ProductName}] + ' ($ ' + [\text{Product Sales by Year}] + ')', \text{null})
  \]
Specify the name as *Best Sales Product*. Then, drop this field to the **Columns** section to see the result.
Expression Constants, Operators, and Functions

The DevExpress Dashboard uses criteria language that you can use in various DevExpress products for building expressions. An expression is a string that evaluates some value. The criteria language is based on the cross-platform library with some additions and subtractions specific for dashboards. This topic details basic and dashboard-specific constants, operators, and functions.

The tables below contain constants, operators, and functions you can use in dashboard expressions.

### Constants

<table>
<thead>
<tr>
<th>CONSTANT</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>String constants</td>
<td>Wrap string constants in apostrophes. If a string contains an apostrophe, double the apostrophe.</td>
<td>[Country] == 'France' or [Name] == 'O''Neil'</td>
</tr>
<tr>
<td>Date-time constants</td>
<td>Wrap date-time constants in '##.##.##-##-##-##:##:##.##'</td>
<td>[OrderDate] &gt;= #2018-03-22 13:18:51.94944#</td>
</tr>
<tr>
<td>True</td>
<td>Represents the Boolean True value.</td>
<td>[InStock] == True</td>
</tr>
<tr>
<td>False</td>
<td>Represents the Boolean False value.</td>
<td>[InStock] == False</td>
</tr>
<tr>
<td>Enumeration</td>
<td>Specify an enumeration value using its underlying integer value. Note that you cannot specify an enumeration value using its qualified name.</td>
<td>[Status] == 1</td>
</tr>
<tr>
<td>Guid</td>
<td>Wrap a Guid constant in curly braces. Use Guid constants in a relational operation with equality or inequality operators only.</td>
<td>[OrderID] == {513724e5-17b7-4ec6-abc4-0eae12c72c1f}</td>
</tr>
<tr>
<td>Numeric</td>
<td>Specify different numeric constant types in a string form using suffixes: Int32 (int) - t, Int16 (short) - ts, Byte (byte) - b, Double (double) - d, Single (float) - sf, Decimal (decimal) - m,</td>
<td>[Price] == 25.0m</td>
</tr>
<tr>
<td>?</td>
<td>Represents a null reference that does not refer to any object. We recommend using the IsNull unary operator (for example, &quot;[Region] is null&quot;) or the IsNull logical function (for example, &quot;IsNull([Region])&quot;) instead.</td>
<td>[Region] != ?</td>
</tr>
</tbody>
</table>

You can build parameterized criteria using any number of positional parameters. To do this, add parameter placeholders (question mark characters) to a criteria expression to identify parameter positions and provide a list of parameter values. When building criteria, parameter placeholders are substituted with parameter values in values in the order they are listed.

```csharp
```

The following two examples are identical, but the second one allows you to avoid formatting errors.

```csharp
CriteriaOperator.Parse("[OrderDate] >= #1/1/2009#")

CriteriaOperator.Parse("[OrderDate] >= ?", new DateTime(2009, 1, 1))
```

When parameters are not specified, a parameter placeholder is substituted with null.

```csharp
CriteriaOperator.Parse("[Region] != ?")
```

### Operators
<table>
<thead>
<tr>
<th>OPERATOR</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Adds the value of one numeric expression to another or concatenates two strings.</td>
<td>[UnitPrice] + 4 or [FirstName] + ' ' + [LastName]</td>
</tr>
<tr>
<td>-</td>
<td>Finds the difference between two numbers.</td>
<td>[Price1] - [Price2]</td>
</tr>
<tr>
<td>*</td>
<td>Multiplies the value of two expressions.</td>
<td>[Quantity] * [UnitPrice] * (1 - [BonusAmount])</td>
</tr>
<tr>
<td>/</td>
<td>Divides the first operand by the second.</td>
<td>[Quantity] / 2</td>
</tr>
<tr>
<td>%</td>
<td>Returns the remainder (modulus) obtained by dividing one numeric expression by another.</td>
<td>[Quantity] % 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performs a bitwise inclusive OR on two numeric expressions.</td>
</tr>
<tr>
<td>&amp;</td>
<td>The bitwise AND operator.</td>
<td>[Flag] &amp; 10</td>
</tr>
<tr>
<td>^</td>
<td>Performs a bitwise exclusive OR on two numeric expressions.</td>
<td>[Flag1] ^ [Flag2]</td>
</tr>
<tr>
<td>==</td>
<td>Returns true if both operands have the same value; otherwise, it returns false.</td>
<td>[Quantity] == 10</td>
</tr>
<tr>
<td>=</td>
<td>Returns true if both operands have the same value; otherwise, it returns false.</td>
<td>[Quantity] = 10</td>
</tr>
<tr>
<td>!=</td>
<td>Returns true if the operands do not have the same value; otherwise, it returns false.</td>
<td>[Country] != 'France'</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less than operator. Used to compare expressions.</td>
<td>[UnitPrice] &lt; 20</td>
</tr>
<tr>
<td>&lt;=</td>
<td>Less than or equal to operator. Used to compare expressions.</td>
<td>[UnitPrice] &lt;= 20</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater than or equal to operator. Used to compare expressions.</td>
<td>[UnitPrice] &gt;= 30</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater than operator. Used to compare expressions.</td>
<td>[UnitPrice] &gt; 30</td>
</tr>
<tr>
<td>In (,)</td>
<td>Tests for the existence of a property in an object.</td>
<td>[Country] In ('USA', 'UK', 'Italy')</td>
</tr>
<tr>
<td>Between ()</td>
<td>Specifies a range to test. Returns true if a value is greater than or equal to the first operand and less than or equal to the second operand.</td>
<td>[Quantity] Between (10, 20)</td>
</tr>
<tr>
<td>And</td>
<td>Performs a logical conjunction on two Boolean expressions.</td>
<td>[InStock] And ([ExtendedPrice] &gt; 100)</td>
</tr>
<tr>
<td>&amp;&amp;</td>
<td>Performs a logical conjunction on two Boolean expressions.</td>
<td>[InStock] &amp;&amp; ([ExtendedPrice] &gt; 100)</td>
</tr>
<tr>
<td>OPERATOR</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Or</td>
<td>Performs a logical disjunction on two Boolean expressions.</td>
<td>[Country] == 'USA' Or [Country] == 'UK'</td>
</tr>
<tr>
<td></td>
<td>Performs a logical disjunction on two Boolean expressions.</td>
<td>[Country] == 'USA'</td>
</tr>
<tr>
<td>~</td>
<td>Performs a bitwise negation on a numeric expression.</td>
<td>~[Roles] = 251</td>
</tr>
<tr>
<td>Not</td>
<td>Performs a logical negation on a Boolean expression.</td>
<td>Not [InStock]</td>
</tr>
<tr>
<td>!</td>
<td>Performs a logical negation on a Boolean expression.</td>
<td>![InStock]</td>
</tr>
<tr>
<td>+</td>
<td>Returns a numeric expression's value (a unary operator).</td>
<td>+[Value] = 10</td>
</tr>
<tr>
<td>-</td>
<td>Returns the negative of a numeric expression’s value (a unary operator).</td>
<td>-[Value] = 20</td>
</tr>
<tr>
<td>Is Null</td>
<td>Returns true if an expression is a null reference, the one that does not refer to any object.</td>
<td>[Region] is null</td>
</tr>
</tbody>
</table>

**Functions**

**Aggregate Functions**

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggr(SummaryExpression, Dimensions)</td>
<td>Aggregates underlying data using the detail level specified by a predefined set of dimensions and a specified summary function.</td>
<td>Aggr(Sum([Sales]), [Category], [Product])</td>
</tr>
<tr>
<td>Avg(Value)</td>
<td>Returns the average of all the values in the expression.</td>
<td>Avg([Profit])</td>
</tr>
<tr>
<td>Count()</td>
<td>Returns the number of values.</td>
<td>Count()</td>
</tr>
<tr>
<td>CountNotNull(Value)</td>
<td>Returns a number of non-null objects in a collection.</td>
<td>CountNotNull([Orders])</td>
</tr>
<tr>
<td>CountDistinct(Value)</td>
<td>Returns the number of distinct values.</td>
<td>CountDistinct([Orders])</td>
</tr>
<tr>
<td>Max(Value)</td>
<td>Returns the maximum value across all records.</td>
<td>Max([Profit])</td>
</tr>
<tr>
<td>Min(Value)</td>
<td>Returns the minimum value across all records.</td>
<td>Min([Profit])</td>
</tr>
<tr>
<td>Mode(Value)</td>
<td>Returns the mode of the values.</td>
<td>Mode([Profit])</td>
</tr>
<tr>
<td>Median(Value)</td>
<td>Returns the median of the values.</td>
<td>Median([Profit])</td>
</tr>
<tr>
<td>Sum(Value)</td>
<td>Returns the sum of all values.</td>
<td>Sum([Profit])</td>
</tr>
<tr>
<td>Var(Value)</td>
<td>Returns an estimate of the variance of a population, where the sample is a subset of the entire population.</td>
<td>Var([Orders])</td>
</tr>
<tr>
<td>Varp(Value)</td>
<td>Returns the variance of a population, where the population is the entire data to be summarized.</td>
<td>Varp([Orders])</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>StdDev(Value)</td>
<td>Returns an estimate of the standard deviation of a population, where the sample is a subset of the entire population.</td>
<td>StdDev(Orders)</td>
</tr>
<tr>
<td>StdDevp(Value)</td>
<td>Returns the standard deviation of a population, where the population is the entire data to be summarized.</td>
<td>StdDevp(Orders)</td>
</tr>
</tbody>
</table>

### Window Functions

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last()</td>
<td>Returns the number of rows from the current row to the last row in the window.</td>
<td>Last()</td>
</tr>
<tr>
<td>First()</td>
<td>Returns the number of rows from the current row to the first row in the window.</td>
<td>First()</td>
</tr>
<tr>
<td>Index()</td>
<td>Returns the index of the current row in the window.</td>
<td>Index()</td>
</tr>
<tr>
<td>Size()</td>
<td>Returns the number of rows in the window.</td>
<td>Size()</td>
</tr>
<tr>
<td>Lookup(SummaryExpression, Position)</td>
<td>Returns the value of the expression in a target position specified as a relative offset from the current position.</td>
<td>Lookup(Sum(Sales), 3)</td>
</tr>
<tr>
<td>RankCompetition(SummaryExpression, [ 'asc'</td>
<td>'desc'] )</td>
<td>Returns the standard competition rank for the current row in the window.</td>
</tr>
<tr>
<td>RankDense(SummaryExpression, [ 'asc'</td>
<td>'desc'] )</td>
<td>Returns the dense rank for the current row in the window.</td>
</tr>
<tr>
<td>RankUnique(SummaryExpression, [ 'asc'</td>
<td>'desc'] )</td>
<td>Returns the unique rank for the current row in the window.</td>
</tr>
<tr>
<td>RankModified(SummaryExpression, [ 'asc'</td>
<td>'desc'] )</td>
<td>Returns the modified competition rank for the current row in the window.</td>
</tr>
<tr>
<td>RankPercentile(SummaryExpression, [ 'asc'</td>
<td>'desc'] )</td>
<td>Returns the percentile rank for the current row in the window.</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>RunningAvg(SummaryExpression)</td>
<td>Returns the running average of the specified expression from the first row to the current row.</td>
<td>RunningAvg(Sum([Sales]))</td>
</tr>
<tr>
<td>RunningCount(SummaryExpression)</td>
<td>Returns the running count of the specified expression from the first row to the current row.</td>
<td>RunningCount(Sum([Sales])) -</td>
</tr>
<tr>
<td>RunningMax(SummaryExpression)</td>
<td>Returns the running maximum of the specified expression from the first row to the current row.</td>
<td>RunningMax(Sum([Sales]))</td>
</tr>
<tr>
<td>RunningMin(SummaryExpression)</td>
<td>Returns the running minimum of the specified expression from the first row to the current row.</td>
<td>RunningMin(Sum([Sales]))</td>
</tr>
<tr>
<td>RunningSum(SummaryExpression)</td>
<td>Returns the running sum of the specified expression from the first row to the current row.</td>
<td>RunningSum(Sum([Sales]))</td>
</tr>
<tr>
<td>WindowAvg(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the average of the expression within the window, which is defined using offsets from the current row.</td>
<td>WindowAvg(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowCount(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the count of the expression within the window.</td>
<td>WindowCount(Sum([Sales]), First()+2, Last())</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>WindowCountDistinct(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the distinct count of the expression within the window.</td>
<td>WindowCountDistinct(Sum(Sales)), First(), Last()</td>
</tr>
<tr>
<td>WindowMax(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the maximum of the expression within the window.</td>
<td>WindowMax(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowMin(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the minimum of the expression within the window.</td>
<td>WindowMin(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowMode(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the mode of the expression within the window.</td>
<td>WindowMode(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowMedian(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the median of the expression within the window.</td>
<td>WindowMedian(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowSum(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the sum of the expression within the window.</td>
<td>WindowSum(Sum([Sales]), First()+2, Last())</td>
</tr>
<tr>
<td>WindowVar(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the variance of the expression within the window.</td>
<td>WindowVar(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowVarp(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the biased variance of the expression within the window.</td>
<td>WindowVarp(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowStdDev(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the sample standard deviation of the expression within the window.</td>
<td>WindowStdDev(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>WindowStdDevp(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the biased standard deviation of the expression within the window.</td>
<td>WindowStdDevp(Sum([Sales]), First(), Last())</td>
</tr>
<tr>
<td>Total(SummaryExpression)</td>
<td>Returns the total based on values from the underlying data source for the specified expression in a calculation window.</td>
<td>Total(Sum([Sales]))</td>
</tr>
</tbody>
</table>
Note that window functions cannot be used inside Aggr.

## Date-time Functions

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AddDays(Date, DaysCount)</td>
<td>Returns a date-time value that is the specified number of days from the specified DateTime.</td>
<td>AddDays([OrderDate], 30)</td>
</tr>
<tr>
<td>AddHours(Date, HoursCount)</td>
<td>Returns a date-time value that is the specified number of hours from the specified DateTime.</td>
<td>AddHours([StartTime], 2)</td>
</tr>
<tr>
<td>AddMilliSeconds(Date, MilliSecondsCount)</td>
<td>Returns a date-time value that is the specified number of milliseconds from the specified DateTime.</td>
<td>AddMilliSeconds([StartTime], 5000)</td>
</tr>
<tr>
<td>AddMinutes(Date, MinutesCount)</td>
<td>Returns a date-time value that is the specified number of minutes from the specified DateTime.</td>
<td>AddMinutes([StartTime], 30)</td>
</tr>
<tr>
<td>AddMonths(Date, MonthsCount)</td>
<td>Returns a date-time value that is the specified number of months from the specified DateTime.</td>
<td>AddMonths([OrderDate], 1)</td>
</tr>
<tr>
<td>AddSeconds(Date, SecondsCount)</td>
<td>Returns a date-time value that is the specified number of seconds from the specified DateTime.</td>
<td>AddSeconds([StartTime], 60)</td>
</tr>
<tr>
<td>AddTicks(Date, TicksCount)</td>
<td>Returns a date-time value that is the specified number of ticks from the specified DateTime.</td>
<td>AddTicks([StartTime], 5000)</td>
</tr>
<tr>
<td>AddTimeSpan(Date, TimeSpan)</td>
<td>Returns a date-time value that is from the specified DateTime for the given TimeSpan.</td>
<td>AddTimeSpan([StartTime], [Duration])</td>
</tr>
<tr>
<td>AddYears(Date, YearsCount)</td>
<td>Returns a date-time value that is the specified number of years from the specified DateTime.</td>
<td>AddYears([EndDate], -1)</td>
</tr>
<tr>
<td>DateDiffDay(startDate, endDate)</td>
<td>Returns the number of day boundaries between two non-nullable dates.</td>
<td>DateDiffDay([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffHour(startDate, endDate)</td>
<td>Returns the number of hour boundaries between two non-nullable dates.</td>
<td>DateDiffHour([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffMilliSecond(startDate, endDate)</td>
<td>Returns the number of millisecond boundaries between two non-nullable dates.</td>
<td>DateDiffMilliSecond([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffMinute(startDate, endDate)</td>
<td>Returns the number of minute boundaries between two non-nullable dates.</td>
<td>DateDiffMinute([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffMonth(startDate, endDate)</td>
<td>Returns the number of month boundaries between two non-nullable dates.</td>
<td>DateDiffMonth([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffSecond(startDate, endDate)</td>
<td>Returns the number of second boundaries between two non-nullable dates.</td>
<td>DateDiffSecond([StartTime], Now())</td>
</tr>
<tr>
<td>DateDiffTick(startDate, endDate)</td>
<td>Returns the number of tick boundaries between two non-nullable dates.</td>
<td>DateDiffTick([StartTime], Now())</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>DateDiffYear(startDate, endDate)</td>
<td>Returns the number of year boundaries between two non-nullable dates.</td>
<td>DateDiffYear([StartTime], Now())</td>
</tr>
<tr>
<td>GetDate(DateTime)</td>
<td>Extracts a date from the defined DateTime.</td>
<td>GetDate([OrderDateTime])</td>
</tr>
<tr>
<td>GetDateHour(DateTime)</td>
<td>Extracts the date part with the hour value from the defined DateTime.</td>
<td>GetDateHour([Order])</td>
</tr>
<tr>
<td>GetDateHourMinute(DateTime)</td>
<td>Extracts the date part with the hour and minute values from the defined DateTime.</td>
<td>GetDateHourMinute([Order])</td>
</tr>
<tr>
<td>GetDateHourMinuteSecond(DateTime)</td>
<td>Extracts the date part with the hour, minute, and second values from the defined DateTime.</td>
<td>GetDateHourMinuteSecond([Order])</td>
</tr>
<tr>
<td>GetDateMonthYear(DateTime)</td>
<td>Extracts the date with the month and year from the defined DateTime.</td>
<td>GetDateMonthYear([Order])</td>
</tr>
<tr>
<td>GetDateQuarterYear(DateTime)</td>
<td>Extracts the date with the quarter and year from the defined DateTime.</td>
<td>GetDateQuarterYear([Order])</td>
</tr>
<tr>
<td>GetDay(DateTime)</td>
<td>Extracts a day from the defined DateTime.</td>
<td>GetDay([Order])</td>
</tr>
<tr>
<td>GetDayOfWeek(DateTime)</td>
<td>Extracts a day of the week from the defined DateTime.</td>
<td>GetDayOfWeek([Order])</td>
</tr>
<tr>
<td>GetDayOfYear(DateTime)</td>
<td>Extracts a day of the year from the defined DateTime.</td>
<td>GetDayOfYear([Order])</td>
</tr>
<tr>
<td>GetHour(DateTime)</td>
<td>Extracts an hour from the defined DateTime.</td>
<td>GetHour([StartTime])</td>
</tr>
<tr>
<td>GetMilliSecond(DateTime)</td>
<td>Extracts milliseconds from the defined DateTime.</td>
<td>GetMilliSecond([Start])</td>
</tr>
<tr>
<td>GetMinute(DateTime)</td>
<td>Extracts minutes from the defined DateTime.</td>
<td>GetMinute([Start])</td>
</tr>
<tr>
<td>GetMonth(DateTime)</td>
<td>Extracts a month from the defined DateTime.</td>
<td>GetMonth([Start])</td>
</tr>
<tr>
<td>GetSecond(DateTime)</td>
<td>Extracts seconds from the defined DateTime.</td>
<td>GetSecond([Start])</td>
</tr>
<tr>
<td>GetTimeOfDay(DateTime)</td>
<td>Extracts the time of the day from the defined DateTime in ticks.</td>
<td>GetTimeOfDay([Start])</td>
</tr>
<tr>
<td>GetWeekOfMonth(DateTime)</td>
<td>Extracts the week of the month from the defined DateTime.</td>
<td>GetWeekOfMonth([Order])</td>
</tr>
<tr>
<td>GetWeekOfYear(DateTime)</td>
<td>Extracts the week of the year from the defined DateTime.</td>
<td>GetWeekOfYear([Order])</td>
</tr>
<tr>
<td>GetYear(DateTime)</td>
<td>Extracts a year from the defined DateTime.</td>
<td>GetYear([Start])</td>
</tr>
<tr>
<td>IsApril(DateTime)</td>
<td>Returns True if the specified date falls within April.</td>
<td>IsApril([Order])</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>IsAugust(DateTime)</td>
<td>Returns True if the specified date falls within August.</td>
<td>IsAugust([OrderDate])</td>
</tr>
<tr>
<td>IsDecember(DateTime)</td>
<td>Returns True if the specified date falls within December.</td>
<td>IsDecember([OrderDate])</td>
</tr>
<tr>
<td>IsFebruary(DateTime)</td>
<td>Returns True if the specified date falls within February.</td>
<td>IsFebruary([OrderDate])</td>
</tr>
<tr>
<td>IsJanuary(DateTime)</td>
<td>Returns True if the specified date falls within January.</td>
<td>IsJanuary([OrderDate])</td>
</tr>
<tr>
<td>IsJuly(DateTime)</td>
<td>Returns True if the specified date falls within July.</td>
<td>IsJuly([OrderDate])</td>
</tr>
<tr>
<td>IsJune(DateTime)</td>
<td>Returns True if the specified date falls within June.</td>
<td>IsJune([OrderDate])</td>
</tr>
<tr>
<td>IsLastMonth(DateTime)</td>
<td>Returns True if the specified date falls within the previous month.</td>
<td>IsLastMonth([OrderDate])</td>
</tr>
<tr>
<td>IsLastYear(DateTime)</td>
<td>Returns True if the specified date falls within the previous year.</td>
<td>IsLastYear([OrderDate])</td>
</tr>
<tr>
<td>IsMarch(DateTime)</td>
<td>Returns True if the specified date falls within March.</td>
<td>IsMarch([OrderDate])</td>
</tr>
<tr>
<td>IsMay(DateTime)</td>
<td>Returns True if the specified date falls within May.</td>
<td>IsMay([OrderDate])</td>
</tr>
<tr>
<td>IsNextMonth(DateTime)</td>
<td>Returns True if the specified date falls within the next month.</td>
<td>IsNextMonth([OrderDate])</td>
</tr>
<tr>
<td>IsNextYear(DateTime)</td>
<td>Returns True if the specified date falls within the next year.</td>
<td>IsNextYear([OrderDate])</td>
</tr>
<tr>
<td>IsNovember(DateTime)</td>
<td>Returns True if the specified date falls within November.</td>
<td>IsNovember([OrderDate])</td>
</tr>
<tr>
<td>IsOctober(DateTime)</td>
<td>Returns True if the specified date falls within October.</td>
<td>IsOctober([OrderDate])</td>
</tr>
<tr>
<td>IsSameDay(DateTime)</td>
<td>Returns True if the specified date/time values fall within the same day.</td>
<td>IsSameDay([OrderDate])</td>
</tr>
<tr>
<td>IsSeptember(DateTime)</td>
<td>Returns True if the specified date falls within September.</td>
<td>IsSeptember([OrderDate])</td>
</tr>
<tr>
<td>IsThisMonth(DateTime)</td>
<td>Returns True if the specified date falls within the current month.</td>
<td>IsThisMonth([OrderDate])</td>
</tr>
<tr>
<td>IsThisWeek(DateTime)</td>
<td>Returns True if the specified date falls within the current week.</td>
<td>IsThisWeek([OrderDate])</td>
</tr>
<tr>
<td><strong>FUNCTION</strong></td>
<td><strong>DESCRIPTION</strong></td>
<td><strong>EXAMPLE</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>IsYearToDate(DateTime)</td>
<td>Returns True if the specified date falls within the year-to-date period. This</td>
<td>IsYearToDate([OrderDate])</td>
</tr>
<tr>
<td></td>
<td>period starts from the first day of the current year and continues to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>current date (including the current date).</td>
<td></td>
</tr>
<tr>
<td>IsThisYear(DateTime)</td>
<td>Returns True if the specified date falls within the current year.</td>
<td>IsThisYear([OrderDate])</td>
</tr>
<tr>
<td>LocalDateTimeDayAfterTomorrow()</td>
<td>Returns a date-time value corresponding to the day after Tomorrow.</td>
<td>AddDays(LocalDateTimeDayAfterTomorrow(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeLastMonth()</td>
<td>Returns the DateTime value corresponding to the first day of the previous</td>
<td>AddMonths(LocalDateTimeLastMonth(), 5)</td>
</tr>
<tr>
<td></td>
<td>month.</td>
<td></td>
</tr>
<tr>
<td>LocalDateTimeLastWeek()</td>
<td>Returns a date-time value corresponding to the first day of the previous week.</td>
<td>AddDays(LocalDateTimeLastWeek(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeLastYear()</td>
<td>Returns the DateTime value corresponding to the first day of the previous year.</td>
<td>AddYears(LocalDateTimeLastYear(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeNextMonth()</td>
<td>Returns a date-time value corresponding to the first day of the next month.</td>
<td>AddMonths(LocalDateTimeNextMonth(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeNextWeek()</td>
<td>Returns a date-time value corresponding to the first day of the following week.</td>
<td>AddDays(LocalDateTimeNextWeek(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeNextYear()</td>
<td>Returns a date-time value corresponding to the first day of the following year.</td>
<td>AddYears(LocalDateTimeNextYear(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeNow()</td>
<td>Returns a date-time value corresponding to the current moment in time.</td>
<td>AddDays(LocalDateTimeNow(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeThisMonth()</td>
<td>Returns a date-time value corresponding to the first day of the current month.</td>
<td>AddMonths(LocalDateTimeThisMonth(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeThisWeek()</td>
<td>Returns a date-time value corresponding to the first day of the current week.</td>
<td>AddDays(LocalDateTimeThisWeek(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeThisYear()</td>
<td>Returns a date-time value corresponding to the first day of the current year.</td>
<td>AddYears(LocalDateTimeThisYear(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeToday()</td>
<td>Returns a date-time value corresponding to Today.</td>
<td>AddDays(LocalDateTimeToday(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeTomorrow()</td>
<td>Returns a date-time value corresponding to Tomorrow.</td>
<td>AddDays(LocalDateTimeTomorrow(), 5)</td>
</tr>
<tr>
<td>LocalDateTimeTwoMonthsAway()</td>
<td>Returns the DateTime value corresponding to the first day of the following</td>
<td>AddMonths(LocalDateTimeTwoMonthAway(), 5)</td>
</tr>
<tr>
<td></td>
<td>month.</td>
<td></td>
</tr>
<tr>
<td>LocalDateTimeTwoWeeksAway()</td>
<td>Returns the DateTime value corresponding to the first day of the following</td>
<td>AddDays(LocalDateTimeTwoWeeksAway(), 5)</td>
</tr>
<tr>
<td></td>
<td>week.</td>
<td></td>
</tr>
<tr>
<td><strong>FUNCTION</strong></td>
<td><strong>DESCRIPTION</strong></td>
<td><strong>EXAMPLE</strong></td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><code>LocalDateTimeTwoYearsAway()</code></td>
<td>Returns the DateTime value corresponding to the first day of the following year.</td>
<td><code>AddYears(LocalDateTimeTwoYearsAway(), 5)</code></td>
</tr>
<tr>
<td><code>LocalDateTimeYearBeforeToday()</code></td>
<td>Returns the DateTime value corresponding to the day one year ago.</td>
<td><code>AddYears(LocalDateTimeYearBeforeToday(), 5)</code></td>
</tr>
<tr>
<td><code>LocalDateTimeYesterday()</code></td>
<td>Returns a date-time value corresponding to Yesterday.</td>
<td><code>AddDays(LocalDateTimeYesterday(), 5)</code></td>
</tr>
<tr>
<td><code>MakeDateTime(Year, Month, Day)</code></td>
<td>Returns a date value constructed from the specified Year, Month and Day.</td>
<td><code>MakeDateTime(2018, 5, 5)</code></td>
</tr>
<tr>
<td><code>MakeDateTime(Year, Month, Day, Hour)</code></td>
<td>Returns a date value constructed from the specified Year, Month, Day and Hour.</td>
<td><code>MakeDateTime(2018, 5, 5, 20)</code></td>
</tr>
<tr>
<td><code>MakeDateTime(Year, Month, Day, Hour, Minute)</code></td>
<td>Returns a date value constructed from the specified Year, Month, Day, Hour and Minute.</td>
<td><code>MakeDateTime(2018, 5, 5, 20, 18)</code></td>
</tr>
<tr>
<td><code>MakeDateTime(Year, Month, Day, Hour, Minute, Second)</code></td>
<td>Returns a date value constructed from the specified Year, Month, Day, Hour, Minute and Second.</td>
<td><code>MakeDateTime(2018, 5, 5, 20, 18, 30)</code></td>
</tr>
<tr>
<td><code>Now()</code></td>
<td>Returns the current system date and time.</td>
<td><code>AddDays(Now(), 5)</code></td>
</tr>
<tr>
<td><code>ToDateTime(Value)</code></td>
<td>Converts Value to a DateTime value.</td>
<td><code>ToDateTime([Orders])</code></td>
</tr>
<tr>
<td><code>Today()</code></td>
<td>Returns the current date. Regardless of the actual time, this function returns midnight of the current date.</td>
<td><code>AddMonths(Today(), 1)</code></td>
</tr>
<tr>
<td><code>UtcNow()</code></td>
<td>Returns the current system date and time, expressed as Coordinated Universal Time (UTC).</td>
<td><code>AddDays(UtcNow(), 7)</code></td>
</tr>
</tbody>
</table>

**Logical Functions**

```
<table>
<thead>
<tr>
<th>Iif(Expression1, True_Value1, ..., ExpressionN, True_ValueN, False_Value)</th>
<th>Returns one of several specified values depending upon the values of logical expressions.</th>
</tr>
</thead>
</table>
```

The function can take $2N+1$ arguments ($N$ - the number of specified logical expressions):

- Each odd argument specifies a logical expression;
- Each even argument specifies the value that is returned if the previous expression evaluates to `true`;
- ...  
- The last argument specifies the value that is returned if the previously evaluated logical expressions yielded `false`.  

`Iif(Name = 'Bob', 1, Name = 'Dan', 2, Name = 'Sam', 3, 0)`
<table>
<thead>
<tr>
<th>IsNull(Value)</th>
<th>Returns True if the specified Value is NULL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISNULL([ORDERDATE])</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IsNull(Value1, Value2)</th>
<th>Returns Value1 if it is not set to NULL; otherwise, Value2 is returned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISNULL([SHIPDATE], [REQUERDDATE])</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IsNullOrEmpty(String)</th>
<th>Returns True if the specified String object is NULL or an empty string; otherwise, False is returned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISNULLOREMPTY([PRODUCTNAME])</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ToBoolean(Value)</th>
<th>Converts Value to an equivalent Boolean value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ToBoolean([Value])</td>
<td></td>
</tr>
</tbody>
</table>

**Math Functions**

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abs(Value)</td>
<td>Returns the given numeric expression's absolute, positive value.</td>
<td>Abs(1 - [Discount])</td>
</tr>
<tr>
<td>Acos(Value)</td>
<td>Returns a number's arccosine (the angle in radians, whose cosine is the given float expression).</td>
<td>Acos([Value])</td>
</tr>
<tr>
<td>Asin(Value)</td>
<td>Returns a number's arcsine (the angle in radians, whose sine is the given float expression).</td>
<td>Asin([Value])</td>
</tr>
<tr>
<td>Atn(Value)</td>
<td>Returns a number's arctangent (the angle in radians, whose tangent is the given float expression).</td>
<td>Atn([Value])</td>
</tr>
<tr>
<td>Atn2(Value1, Value2)</td>
<td>Returns the angle whose tangent is the quotient of two specified numbers in radians.</td>
<td>Atn2([Value1], [Value2])</td>
</tr>
<tr>
<td>BigMul(Value1, Value2)</td>
<td>Returns an Int64 containing the full product of two specified 32-bit numbers.</td>
<td>BigMul([Amount], [Quantity])</td>
</tr>
<tr>
<td>Ceiling(Value)</td>
<td>Returns the smallest integer that is greater than or equal to the numeric expression.</td>
<td>Ceiling([Value])</td>
</tr>
<tr>
<td>Cos(Value)</td>
<td>Returns the angle's cosine, in radians.</td>
<td>Cos([Value])</td>
</tr>
<tr>
<td>Cosh(Value)</td>
<td>Returns the angle's hyperbolic cosine, in radians.</td>
<td>Cosh([Value])</td>
</tr>
<tr>
<td>Exp(Value)</td>
<td>Returns the float expression's exponential value.</td>
<td>Exp([Value])</td>
</tr>
<tr>
<td>Floor(Value)</td>
<td>Returns the largest integer less than or equal to the numeric expression.</td>
<td>Floor([Value])</td>
</tr>
<tr>
<td>Log(Value)</td>
<td>Returns a specified number's natural logarithm.</td>
<td>Log([Value])</td>
</tr>
<tr>
<td>Log(Value, Base)</td>
<td>Returns the logarithm of a specified number in a specified Base.</td>
<td>Log([Value], 2)</td>
</tr>
</tbody>
</table>
### Log10

Returns a specified number's base 10 logarithm.

\[
\text{Log10}(\text{Value})
\]

### Max

Returns the maximum value from the specified values.

\[
\text{Max}(\text{Value1}, \text{Value2})
\]

### Min

Returns the minimum value from the specified values.

\[
\text{Min}(\text{Value1}, \text{Value2})
\]

### Power

Returns a specified number raised to a specified power.

\[
\text{Power}(\text{Value}, \text{Power})
\]

### Rnd

Returns a random number that is less than 1, but greater than or equal to zero.

\[
\text{Rnd}() * 100
\]

### Round

Rounds the given value to the nearest integer.

\[
\text{Round}(\text{Value})
\]

### ToDecimal

Converts Value to an equivalent decimal number.

\[
\text{ToDecimal}(\text{Value})
\]

### ToDouble

Converts Value to an equivalent 64-bit double-precision floating-point number.

\[
\text{ToDouble}(\text{Value})
\]

### ToFloat

Converts Value to an equivalent 32-bit single-precision floating-point number.

\[
\text{ToFloat}(\text{Value})
\]

### ToInt

Converts Value to an equivalent 32-bit signed integer.

\[
\text{ToInt}(\text{Value})
\]

### ToLong

Converts Value to an equivalent 64-bit signed integer.

\[
\text{ToLong}(\text{Value})
\]

### String Functions

#### Ascii

Returns the ASCII code value of the leftmost character in a character expression.

\[
\text{Ascii}(\text{String})
\]

#### Char

Converts an integerASCIICode to a character.

\[
\text{Char}(\text{Number})
\]

#### CharIndex

Returns the starting position of String1 within String2, beginning from the zero character position to the end of a string.

\[
\text{CharIndex}(\text{String1}, \text{String2})
\]
<table>
<thead>
<tr>
<th><strong>FUNCTION</strong></th>
<th><strong>DESCRIPTION</strong></th>
<th><strong>EXAMPLE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CharIndex(String1, String2, StartLocation)</td>
<td>Returns the starting position of String1 within String2, beginning from the StartLocation character position to the end of a string.</td>
<td>CharIndex('e', 'deveXpress', 2)</td>
</tr>
<tr>
<td>Concat(String1, ..., StringN)</td>
<td>Returns a string value containing the concatenation of the current string with any additional strings.</td>
<td>Concat('A', ' '), [ProductName])</td>
</tr>
<tr>
<td>EndsWith(String1, SubString1)</td>
<td>Returns True if the end of String1 matches SubString1; otherwise, False is returned.</td>
<td>EndsWith([Description], 'The end.')</td>
</tr>
<tr>
<td>Insert(String1, StartPosition, String2)</td>
<td>Inserts String2 into String1 at the position specified by StartPosition</td>
<td>Insert([Name], 0, 'ABC-')</td>
</tr>
<tr>
<td>Len(Value)</td>
<td>Returns an integer containing either the number of characters in a string or the nominal number of bytes required to store a variable.</td>
<td>Len([Description])</td>
</tr>
<tr>
<td>Lower(String)</td>
<td>Returns String in lowercase.</td>
<td>Lower([ProductName])</td>
</tr>
<tr>
<td>PadLeft(String, Length)</td>
<td>Left-aligns the defined string’s characters, padding its left side with white space characters up to a specified total length.</td>
<td>PadLeft([Name], 30)</td>
</tr>
<tr>
<td>PadLeft(String, Length, Char)</td>
<td>Left-aligns the defined string’s characters, padding its left side with the specified Char up to a specified total length.</td>
<td>PadLeft([Name], 30, '&lt;')</td>
</tr>
<tr>
<td>PadRight(String, Length)</td>
<td>Right-aligns the defined string’s characters, padding its left side with empty space characters up to a specified total length.</td>
<td>PadRight([Name], 30)</td>
</tr>
<tr>
<td>PadRight(String, Length, Char)</td>
<td>Right-aligns the defined string’s characters, padding its left side with the specified Char up to a specified total length.</td>
<td>PadRight([Name], 30, '&gt;')</td>
</tr>
<tr>
<td>Remove(String, StartPosition)</td>
<td>Deletes all the characters from this instance, beginning at a specified position.</td>
<td>Remove([Name], 3)</td>
</tr>
<tr>
<td>Remove(String, StartPosition, Length)</td>
<td>Deletes a specified number of characters from this instance, beginning at a specified position.</td>
<td>Remove([Name], 0, 3)</td>
</tr>
<tr>
<td>Replace(String, SubString2, String3)</td>
<td>Returns a copy of String1, in which SubString2 has been replaced with String3.</td>
<td>Replace([Name], 'The ', '')</td>
</tr>
<tr>
<td>Reverse(String)</td>
<td>Reverses the order of elements within String.</td>
<td>Reverse([Name])</td>
</tr>
<tr>
<td>StartsWith(String1, SubString1)</td>
<td>Returns True if the beginning of String1 matches SubString1; otherwise, False.</td>
<td>StartsWith([Title], 'The best')</td>
</tr>
<tr>
<td>Substring(String, StartPosition, Length)</td>
<td>Retrieves a substring from String. The substring starts at StartPosition and has a specified Length.</td>
<td>Substring([Description], 2, 3)</td>
</tr>
<tr>
<td>Substring(String, StartPosition)</td>
<td>Retrieves a substring from String. The substring starts at StartPosition.</td>
<td>Substring([Description], 2)</td>
</tr>
<tr>
<td>ToStr(Value)</td>
<td>Returns a string representation of an object.</td>
<td>ToStr([ID])</td>
</tr>
<tr>
<td>Trim(String)</td>
<td>Removes all leading and trailing SPACE characters from String.</td>
<td>Trim([ProductName])</td>
</tr>
</tbody>
</table>
### Operator Precedence

When an expression contains multiple operators, their precedence controls the order in which expression elements are evaluated.

- Literal values
- Parameters
- Identifiers
- OR (left-associative)
- AND (left-associative)
- `==`, `!=`
- `<`, `>`, `<=`, `>=`
- `-`, `+` (left-associative)
- `*`, `/`, `%` (left-associative)
- `NOT`
- unary `-`
- `In`
- `Iif`
- `Trim()`, `Len()`, `Substring()`, `IsNull()`
- `[]` (for set-restriction)
- `'()'`

The default precedence can be changed by grouping elements with parentheses. For instance, the operators are performed in a default order in the first of the following two code samples. In the second code sample, the addition operation is performed first, because its associated elements are grouped with parentheses, and the multiplication operation is performed last.

\[
\text{Amount} == 2 + 48 * 2
\]

\[
\text{Amount} == (2 + 48) * 2
\]

### Case Sensitivity

Operators are case insensitive. Although field values' case sensitivity depends on the data source.

**Note**

A data source affects certain operators' behavior. For instance, by default, the SQL Server Express 2005 is configured as case insensitive. In this case, the following expression always evaluates to **true**:

\[
\text{Lower(} \text{Name} \text{)} == \text{Upper(} \text{Name} \text{)}
\]

### Escape Keywords

You can mark a keyword-like field name with an escape character (@ sign). In the expression below, the `CriteriaOperator.Parse` method interprets `@Or` as the field named "Or", not the logical operator OR.

\[
\text{@Or} = 'value'
\]

### Escape Characters

Use a backslash (\) as an escape character for characters in expressions. Examples:
Window Calculations

Window calculations provide the capability to apply specific computations to measure values and allow you to perform different analytical tasks such as to compute running totals, percentages of totals, differences, etc.

Topics in this section.

- Window Calculations Overview
- Window Definition
- Creating Window Calculations
- Calculation Functions Reference
- Window Calculation Limitations
Window Calculations Overview

Window calculations provide the capability to apply specific computations to measure values and allow you to perform different analytical tasks such as to compute running totals, percentages of totals, differences, etc.

The Dashboard Designer allows you to apply window calculations to values of the specified measure. The following calculation types are supported.

- **Running Total** - Allows you to calculate a cumulative total for a set of measure values.

<table>
<thead>
<tr>
<th>Sales</th>
<th>Running Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>80</td>
</tr>
<tr>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

  Example: 20 + 10, 25 + 20 + 10

- **Moving Calculation** - Allows you to apply a moving calculation, which uses neighboring values to calculate a total. Note that neighboring values are specified using offsets from the currently processed value.

<table>
<thead>
<tr>
<th>Sales</th>
<th>Moving</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>70</td>
</tr>
<tr>
<td>25</td>
<td>70</td>
</tr>
<tr>
<td>20</td>
<td>45</td>
</tr>
</tbody>
</table>

  Example: StartOffset=1; EndOffset=1

  Example: 10 + 20 + 25, 25 + 25 + 25, 25 + 20 + 10

- **Difference** - Allows you to compute differences between measure values.

<table>
<thead>
<tr>
<th>Sales</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>-5</td>
</tr>
</tbody>
</table>

  Example: 20 - 10, 25 - 20, 25 - 25

- **Percent of Total** - Allows you to calculate a contribution of individual measure values to a total.
- **Rank** - Allows you to rank values of the specified measure.

<table>
<thead>
<tr>
<th>Sales</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10.00 %</td>
</tr>
<tr>
<td>20</td>
<td>20.00 %</td>
</tr>
<tr>
<td>25</td>
<td>25.00 %</td>
</tr>
<tr>
<td>25</td>
<td>25.00 %</td>
</tr>
<tr>
<td>20</td>
<td>20.00 %</td>
</tr>
</tbody>
</table>

Note that the computing of calculations depends on two factors.

- The type of the **dashboard item**.

  In this case, you need to specify a calculation **direction** that depends on the dashboard item type. For instance, the **Pivot** dashboard item provides the capability to apply calculations along with its columns or rows.

- The set of dimensions that are used to calculate measure values.

  In this case, a calculation **direction** depends on the dimensions’ order.

In both cases, measure values participating in a calculation fall into a specified **window**. To learn more, see [Window Definition](#).

To learn how to create a calculation in the Dashboard Designer, see [Creating Window Calculations](#).
Window Definition

A window definition specifies a window that limits measure values participating in a calculation. To learn more, see Window Calculations Overview.

Dashboard Item Window Definition

The following table lists window definitions in terms of the Pivot dashboard item. A calculation is performed using the Index function along the following directions.

<table>
<thead>
<tr>
<th>DIRECTION</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
<th>EXAMPLE DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columns</td>
<td>A calculation is performed horizontally through Pivot columns.</td>
<td><img src="image1" alt="Example" /></td>
<td>In this example, a window is a combination of Country/Category dimensions.</td>
</tr>
<tr>
<td>Rows</td>
<td>A calculation is performed vertically through Pivot rows.</td>
<td><img src="image2" alt="Example" /></td>
<td>In this example, a window is a combination of Year/Quarter dimensions.</td>
</tr>
<tr>
<td>Columns / Rows</td>
<td>A calculation is performed horizontally through Pivot columns, then rows.</td>
<td><img src="image3" alt="Example" /></td>
<td>In this example, a window is the entire pivot table.</td>
</tr>
<tr>
<td>Rows / Columns</td>
<td>A calculation is performed vertically through Pivot rows, then columns.</td>
<td><img src="image4" alt="Example" /></td>
<td>In this example, a window is the entire pivot table.</td>
</tr>
<tr>
<td>Columns within Groups</td>
<td>A calculation is performed horizontally through Pivot columns within groups.</td>
<td><img src="image5" alt="Example" /></td>
<td>In this example, a window is a combination of the Country/Category and Year dimensions.</td>
</tr>
<tr>
<td>Rows within Groups</td>
<td>A calculation is performed vertically through Pivot rows within groups.</td>
<td><img src="image6" alt="Example" /></td>
<td>In this example, a window is a combination of the Year/Quarter and Country dimensions.</td>
</tr>
<tr>
<td>Columns / Rows within Groups</td>
<td>A calculation is performed horizontally through Pivot columns then rows within groups.</td>
<td><img src="image7" alt="Example" /></td>
<td>In this example, a window is a combination of Country/Year dimensions.</td>
</tr>
<tr>
<td>Rows / Columns within Groups</td>
<td>A calculation is performed vertically through Pivot rows, then columns within groups.</td>
<td><img src="image8" alt="Example" /></td>
<td>In this example, a window is a combination of Country/Year dimensions.</td>
</tr>
</tbody>
</table>

*Group* - an area that is limited by a set of values corresponding to the bottommost partitioning dimensions.

Specific Window Definition

If necessary, you can manually specify the set of dimensions that fall into the window. These dimensions are called window dimensions.
For instance, the Index function is applied to measure values of the pivot table below using the OrderDate (Year) and Country window dimensions.

The **Specific Window Definition** dialog allows you to do this.
Creating Window Calculations

The Dashboard Designer allows you to add a window calculation for numeric measures. To do this, invoke the data item menu and select the required calculation type.

The image above shows a calculation menu of the Pivot dashboard item. The following items are available.

- **Percent of Column Grand Total** - Calculates a contribution of individual measure values to a column grand total.
- **Percent of Row Grand Total** - Calculates a contribution of individual measure values to a row grand total.
- **Percent of Grand Total** - Calculates a contribution of individual measure values to a grand total.
- **Running Summary along Columns** - Calculates a cumulative total for measure values along columns (horizontally).
- **Running Summary along Rows** - Calculates a cumulative total for measure values along rows (vertically).
- **Difference along Columns** - Calculates differences between measure values along columns (horizontally).
- **Difference along Rows** - Calculates differences between measure values along rows (vertically).
- **Percent Difference along Columns** - Calculates percentage differences between measure values along columns (horizontally).
- **Percent Difference along Rows** - Calculates percentage differences between measure values along rows (vertically).
- **Rank along Columns** - Ranks measure values along columns (horizontally).
- **Rank along Rows** - Ranks measure values along rows (vertically).
- **Rank along Cells** - Ranks measure values along cells (throughout the entire pivot table).
- **Custom...** - Allows you to create a custom calculation by specifying various settings. Clicking this item invokes the Customize Calculation dialog that allows you to add additional customizations to calculations.
To learn more, see descriptions of the available calculations below.

**Note**

Note that the list of available items in this menu can be changed by the Dashboard Designer dynamically. For instance, if the Pivot dashboard item does not contain dimensions in the **Rows** section, menu items related to rows will be disabled.

**Running Total**

The Running Total calculation can be used to compute a cumulative total for the specified measure across a window. For example, the Grid below displays cumulative sales across all quarters.

<table>
<thead>
<tr>
<th>Order Year</th>
<th>Order Quarter</th>
<th>Sales</th>
<th>Running Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Q1</td>
<td>$138K</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$143K</td>
<td>$138K</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>$154K</td>
<td>$281K</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>$152K</td>
<td>$433K</td>
</tr>
<tr>
<td>2016</td>
<td>Q1</td>
<td>$298K</td>
<td>$631K</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$142K</td>
<td>$1.05M</td>
</tr>
</tbody>
</table>

The Customize Calculation dialog provides the following settings for the Running Total calculation.
- **Running along** - Specifies a window and direction used to calculate running totals.
- **Summary function** - Specifies a summary function used to apply calculation. To learn more about the available summary functions, see the Summary Function Types in the summary function topic.

**Moving Calculation**

The Moving calculation uses neighboring values to calculate a total. For example, the Grid below shows a moving average across all quarters.

<table>
<thead>
<tr>
<th>Order Year</th>
<th>Order Quarter</th>
<th>Sales</th>
<th>Moving Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Q1</td>
<td>$130K</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$143K</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>$154K</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>$132K</td>
<td>$150K</td>
</tr>
<tr>
<td>2016</td>
<td>Q1</td>
<td>$238K</td>
<td>$211K</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$142K</td>
<td>$207K</td>
</tr>
</tbody>
</table>

The Customize Calculation dialog provides the following settings for the Moving calculation.

- **Moving along** - Specifies a window and direction used to apply a calculation.
- **Summary function** - Specifies a summary function used to apply a calculation. To learn more about the available summary functions, see the Summary Function Types in the summary function topic.
- **Start offset / End offset** - Specify start/end offsets from the currently processed value. For instance, if you specified offsets as 1/1, the previous and next values will be used along with the current value to apply the Moving calculation.

**Difference**

The Difference calculation can be used to compute the difference between measure values across a window. For example, the Grid below shows absolute differences between quarterly sales.

<table>
<thead>
<tr>
<th>Order Year</th>
<th>Order Quarter</th>
<th>Sales</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Q1</td>
<td>$130K</td>
<td>$4.89K</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$143K</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>$154K</td>
<td>$10.8K</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>$132K</td>
<td>$27.7K</td>
</tr>
<tr>
<td>2016</td>
<td>Q1</td>
<td>$238K</td>
<td>$117K</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$142K</td>
<td>($156K)</td>
</tr>
</tbody>
</table>
The Customize Calculation dialog provides the following settings for the Difference calculation.

- **Calculate along** - Specifies a window and direction used to calculate differences.

- **Difference from** - Specifies the value used to calculate the difference. The following values are available: Previous, Next, First and Last.

You can also use the **Percent Difference** option to specify whether the absolute or percentage difference is displayed.

### Percent of Total

A calculation is used to compute a percentage of the total for the specified measure across a window. For example, the Grid below shows a contribution of individual quarterly sales to total sales.

<table>
<thead>
<tr>
<th>Order Year</th>
<th>Order Quarter</th>
<th>Sales</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Q1</td>
<td>$138K</td>
<td>13.67 %</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$143K</td>
<td>13.54 %</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>$154K</td>
<td>14.55 %</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>$182K</td>
<td>17.18 %</td>
</tr>
<tr>
<td>2016</td>
<td>Q1</td>
<td>$288K</td>
<td>28.22 %</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$142K</td>
<td>13.44 %</td>
</tr>
</tbody>
</table>

The Customize Calculation dialog provides the following settings for the Percent of Total calculation.
- **Percent of Total** - Specifies a window and direction used to apply a Percent of Total calculation.

### Rank

Use the Rank calculation to compute rankings for the specified measure across a window. For example, the Grid below shows a ranking of sales for individual quarters.

<table>
<thead>
<tr>
<th>Order Year</th>
<th>Order Quarter</th>
<th>Sales</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Q1</td>
<td>$138K</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$143K</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>$159K</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>$112K</td>
<td>2</td>
</tr>
<tr>
<td>2016</td>
<td>Q1</td>
<td>$238K</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>$142K</td>
<td>8</td>
</tr>
</tbody>
</table>

The Customize Calculation dialog provides the following settings for the Rank calculation.

- **Rank along** - Specifies a window and direction used to rank values.
- **Rank type** - Specifies the type of ranking. The following rank types are available: Unique, Competition, Dense, Modified and Percentile.
• **Order** - Specifies the order of ranking. You can select *Ascending* or *Descending*.

**Expression**

Use Expression to specify a custom calculation by adding the required *calculation functions* inside the measure expression.

Click the **Edit in Expression Editor** button to invoke the **Expression Editor** and specify the required expression.

The Expression type provides the **Calculate along** option that specifies the *window and direction* used to calculate differences. Note that this option is in effect if the expression contains a *calculation function*.
## Calculation Functions Reference

This topic contains the descriptions of window functions that can be used to specify measure expressions.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Example</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last()</td>
<td>Returns the number of rows from the current row to the last row in the window.</td>
<td>Last()</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>First()</td>
<td>Returns the number of rows from the current row to the first row in the window.</td>
<td>First()</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Index()</td>
<td>Returns the index of the current row in the window.</td>
<td>Index()</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>Size()</td>
<td>Returns the number of rows in the window.</td>
<td>Size()</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>Lookup(SummaryExpression, Position)</td>
<td>Returns the value of the expression in a target position specified as a relative offset from the current position.</td>
<td>Lookup(Sum([Sales]), 3)</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>RankCompetition(SummaryExpression, 'asc')</td>
<td>Returns the standard competition rank for the current row in the window.</td>
<td>RankCompetition(Sum([Sales]), 'asc')</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>RankDense(SummaryExpression, 'asc')</td>
<td>Returns the dense rank for the current row in the window.</td>
<td>RankDense(Sum([Sales]), 'asc')</td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
<tr>
<td>RankUnique(SummaryExpression, 'asc')</td>
<td>Returns the unique rank for the current row in the window.</td>
<td>RankUnique(Sum([Sales]), 'asc')</td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>RankModified(SummaryExpression, 'asc')</td>
<td>Returns the modified competition rank for the current row in the window.</td>
<td>RankModified(Sum([Sales]), 'asc')</td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>RankPercentile(SummaryExpression, 'desc')</td>
<td>Returns the percentile rank for the current row in the window.</td>
<td>RankPercentile(Sum([Sales]), 'desc')</td>
<td><img src="image10.png" alt="Image" /></td>
</tr>
<tr>
<td>RunningAvg(SummaryExpression)</td>
<td>Returns the running average of the specified expression from the first row in the window to the current row.</td>
<td>RunningAvg(Sum([Sales]))</td>
<td><img src="image11.png" alt="Image" /></td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
<td>IMAGE</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>RunningCount(SummaryExpression)</td>
<td>Returns the running count of the specified expression from the first row in the window to the current row.</td>
<td>RunningCount(Sum([Sales]))</td>
<td></td>
</tr>
<tr>
<td>RunningMax(SummaryExpression)</td>
<td>Returns the running maximum of the specified expression from the first row in the window to the current row.</td>
<td>RunningMax(Sum([Sales]))</td>
<td></td>
</tr>
<tr>
<td>RunningMin(SummaryExpression)</td>
<td>Returns the running minimum of the specified expression from the first row in the window to the current row.</td>
<td>RunningMin(Sum([Sales]))</td>
<td></td>
</tr>
<tr>
<td>RunningSum(SummaryExpression)</td>
<td>Returns the running sum of the specified expression from the first row in the window to the current row.</td>
<td>RunningSum(Sum([Sales]))</td>
<td></td>
</tr>
<tr>
<td>WindowAvg(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the average of the expression within the window, which is defined using offsets from the current row.</td>
<td>WindowAvg(Sum([Sales]), First(), Last())</td>
<td></td>
</tr>
<tr>
<td>WindowCount(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the count of the expression within the window.</td>
<td>WindowCount(Sum([Sales]), First()+2, Last())</td>
<td></td>
</tr>
<tr>
<td>WindowCountDistinct(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the distinct count of the expression within the window.</td>
<td>WindowCountDistinct(Sum([Sales]), First(), Last())</td>
<td></td>
</tr>
<tr>
<td>WindowMax(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the maximum of the expression within the window.</td>
<td>WindowMax(Sum([Sales]), First(), Last())</td>
<td></td>
</tr>
<tr>
<td>WindowMin(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the minimum of the expression within the window.</td>
<td>WindowMin(Sum([Sales]), First(), Last())</td>
<td></td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DESCRIPTION</td>
<td>EXAMPLE</td>
<td>IMAGE</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>WindowMedian(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the median of the expression within the window.</td>
<td>WindowMedian(Sum(Sales), First(), Last())</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>WindowSum(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the sum of the expression within the window.</td>
<td>WindowSum(Sum(Sales), First() + 2, Last())</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>WindowVar(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the variance of the expression within the window.</td>
<td>WindowVar(Sum(Sales), First(), Last())</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>WindowVarp(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the biased variance of the expression within the window.</td>
<td>WindowVarp(Sum(Sales), First(), Last())</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>WindowStdDev(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the sample standard deviation of the expression within the window.</td>
<td>WindowStdDev(Sum(Sales), First(), Last())</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>WindowStdDevp(SummaryExpression, StartOffset, EndOffset)</td>
<td>Returns the biased standard deviation of the expression within the window.</td>
<td>WindowStdDevp(Sum(Sales), First(), Last())</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>Total(SummaryExpression)</td>
<td>Returns the total for the specified expression in a calculation window. Note that the Total function calculates the total based on values from the underlying data source.</td>
<td>Total(Sum(Sales))</td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Important**

Note that window functions cannot be used inside `Aggr`. 
Window Calculation Limitations

Supported Dashboard Items

Window calculations can be applied to measures of the following dashboard items.

- Chart
- Grid
- Pies
- Cards
- Gauges
- Pivot
- Range Filter

Data Shaping Limitations

The use of calculations imposes the following limitations related to data shaping features.

- Sorting by measure cannot be applied if the target measure has a calculation applied.
- Top N cannot be applied if its target measure has a calculation.
Using Dashboard Parameters

You can use **dashboard parameters** when it is necessary to pass data of a certain type to a dashboard (e.g., to pass a specific value to the data source filter string or a calculated field).

The topics in this section describe how to use dashboard parameters.

- Creating Parameters
- Passing Parameter Values
- Requesting Parameter Values
Creating Parameters

This topic explains how to create a new dashboard parameter and specify its settings.

- Creating Parameters in the Dashboard Designer
- Look-Up Editor Settings

Creating Parameters in the Dashboard Designer

To create dashboard parameters in the Dashboard Designer, do the following:

1. Click the Parameters button on the Ribbon’s Data Source tab.

![Parameters button in Dashboard Designer](image)

2. In the invoked dialog, click the Add button to add a new parameter.

![Add new parameter dialog](image)

3. Specify the following settings.
   - **Visible** - Specifies whether or not the parameter editor is visible in the Dashboard Parameters dialog.
   - **Allow Null** - Specifies whether or not a null value can be passed as a parameter value.
   - **Allow Multiselect** - Specifies whether or not multi-selection is enabled for the current parameter. The following limitations are applied to parameters with multi-selection enabled.
     - Use the is any of or is none of operators to pass a multi-select parameter to a filter criteria or to the Expression format condition.
     - Use the In or Not In operators to pass a multi-select parameter to a calculated field expression.
     - Stored procedures used in the SQL data source do not support multi-select parameters.
   - **Name** - Specifies the parameter name. When creating and modifying parameter names, follow the rules below.
     - A name can contain letters, numbers and underscores.
     - A name cannot contain spaces.
     - A name cannot be an empty string.
- The dashboard cannot contain parameters with the same name.
- Names are case-sensitive. For example, you can create the names Parameter and PARAMETER.

- **Description** - Specifies the parameter’s description. The parameter’s description is the value displayed in the **Parameter Name** column of the Dashboard Parameters dialog.
- **Look-Up Settings** - Specifies the parameter’s look-up editor settings.
- **Select All Values** - Specifies whether or not all parameter values should be selected in the initial state of the Dashboard Viewer.

  Note that this option is in effect when **Allow Multiselect** is set to true.

- **Type** - Specifies the parameter type.
- **Value** - Specifies the default parameter’s value. Note that when **Allow Multiselect** is set to true, the Value option allows you to select multiple parameter values.

  Then, click **OK** to add the created parameters to the dashboard.

### Look-Up Editor Settings

There are three types of look-up editor settings that can be specified for a parameter. Select the required type from the **LookUpSettings** drop-down list.

- **No Look-Up** - set the Value to use a static value as a parameter.

  ![No Look-Up](image)

- **Static List** - click the ellipsis button to add static values for the current dashboard parameter.

  ![Static List](image)

  In this case, the Value specifies the default parameter’s value.

- **Dynamic List** - allows you to use a list of values from the existing data source as a parameter. You need to select the required **Data Source** from the list of available data sources and data members for the dashboard parameter’s display name and value, respectively.
1. First, select the required **Data Source** from the list of available data sources. For the **SQL** data source, select the required **Data Member** that specifies the query from the selected **Data Source**.

2. Then, specify data members for the dashboard parameter’s value and display name using **Value Member** and **Display Member**, respectively.

3. If necessary, specify the data member used to sort parameter values using the **Sort By** option. **Sort Order** specifies the required sort order.

   **Note**

   To learn how to create a data source for a dashboard parameter, see [Providing Data](#).

   Note that you cannot specify an **OLAP** data source as the data source for the dashboard parameter in the Dashboard Designer.
Passing Parameter Values

In this topic, you will learn how to pass parameter values to a dashboard.

- SQL Queries
- Filtering
- Conditional Formatting
- Calculated Fields
- Window Calculations

SQL Queries

The Dashboard Designer provides the capability to use a dashboard parameter as an SQL query/stored procedure parameter. To pass a dashboard parameter to an SQL query/stored procedure in the Data Source wizard or Query Editor, do the following.

- Create a query parameter or select the required stored procedure parameter.
- Enable the Expression checkbox for this parameter and select the required dashboard parameter in the Value column.

If necessary, you can select Expression editor... and specify an expression to bind a query parameter to a dashboard parameter using custom logic.

Filtering

You can filter the specified query of the SQL Data Source or apply filtering to a specific dashboard item according to the current parameter value(s) using the Filter Editor.

In the Filter Editor, you can compare a field value with the following objects.

- A static value (represented by the ₅ icon). Click this button to switch to the next item mode (“another field value”), to compare the field value with another field value.
- Another field value (represented by the ⬅️ icon). Click this button to switch to the next item mode (“parameter value”), to compare the field value with a parameter value.
- A parameter value (represented by the ⚪️ icon). Click this button to switch back to the initial mode (“static value”), to compare the field value with a static value.

Thus, to compare a field value with a parameter value, click the ₅️ button, then click the ⬅️ button.
Conditional Formatting

You can apply conditional formatting to a specific dashboard item according to the current parameter value when creating the Expression format condition. In the Expression dialog, you can compare a field value with parameter values in the same manner as in the Filter Editor dialog.

Calculated Fields

You can use parameters when constructing expressions for calculated fields. This allows you to dynamically evaluate values of the calculated field depending on the current parameter value.

To include the required parameter in the calculated field expression, click Parameters in the Expression Editor dialog and double-click the required parameter.

Window Calculations

You can use parameters when customizing expressions for window calculations. This allows you to apply a calculation dynamically, depending on the current parameter value.
\[ \text{WINDOWAVG}(\text{Sum}([\text{Extended Price}]), 0, \text{offsetParam}) \]

<table>
<thead>
<tr>
<th>Functions</th>
<th>Operators</th>
<th>Constants</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>WindowAvg</td>
<td>WindowAvg</td>
<td>WindowMax</td>
<td>WindowMax</td>
</tr>
<tr>
<td>WindowMin</td>
<td>WindowMin</td>
<td>WindowMedian</td>
<td>WindowMedian</td>
</tr>
<tr>
<td>WindowStdDev</td>
<td>WindowStdDev</td>
<td>WindowStdDev</td>
<td>WindowStdDev</td>
</tr>
<tr>
<td>WindowSum</td>
<td>WindowSum</td>
<td>WindowVar</td>
<td>WindowVar</td>
</tr>
</tbody>
</table>

*WindowAvg(Expression, StartOffset, EndOffset)*

Returns the average of the expression within the window, which is defined using offsets from the current row.
Requesting Parameter Values

The dashboard provides a built-in **Dashboard Parameters** dialog, which provides the capability to change dashboard parameter values. This dialog is created automatically, depending on the parameter type and visibility settings.

To invoke the **Dashboard Parameters** dialog in the Dashboard Designer, click the **Parameters** button in the dashboard title. Depending on the visibility state of the created dashboard parameters, this invokes the following dialog.

Select the required parameter values in the **Dashboard Parameters** dialog and click the **Submit** button to apply the changes.

To reset the changes to the default values, click the **Reset** button.
Converting Dashboard Items

The Dashboard Designer provides the capability to convert data-bound dashboard items to another type. To convert the selected dashboard item to another type, use the Convert button in the ribbon’s Home tab or the corresponding command in the item’s context menu.

The Dashboard Designer always preserves the following settings for data-bound dashboard items.

- The set of data items used to bind the dashboard item to data.
- Data shaping settings of data items and their names.
- A custom name displayed within the dashboard item caption.

The following settings are kept if the dashboard item is being converted to an item that also supports this feature.

- Master Filtering settings (e.g., the specified master filter mode) and Drill-Down settings (e.g., the target dimension).
- Conditional Formatting settings.
- Coloring settings.
- Calculation settings.

For different types of dashboard items, some specific settings can be preserved. For example, the following settings are preserved.

- Legend settings for the Chart/Scatter Chart dashboard items.
- Series types for the Chart/Range Filter dashboard items.
- Element arrangement settings for the Pie/Card/Gauge dashboard items.
- Caption settings for the Pie/Gauge dashboard items.
- Navigation settings for Choropleth Map/Geo Point Maps.
- The attribute whose values are displayed within shape titles for Choropleth Map/Geo Point Maps.
- Legend settings for the Choropleth Map/Geo Point Maps.
- Clustering settings for Geo Point Maps.
Dashboard Layout

This section describes the features related to the Dashboard layout.

The section consists of the following topics.

- Dashboard Title
- Dashboard Item Caption
- Dashboard Items Layout
Dashboard Title

The **Dashboard Title** is located at the top of the dashboard surface. It can contain text or image content.

If you are using the Ribbon menu in the **Dashboard Designer**, you can change title settings by clicking the **Title** button.

This invokes the **Dashboard Title** dialog, which allows you to change the text within the dashboard title, add an image, etc.

This dialog allows you to specify the following options.

- **Visible** - Specifies whether or not the dashboard title is visible.
- **Show Master Filter state** - Specifies whether or not to show the state of master filter items in the dashboard title.

When you hover over the filter icon (τ), all master filters applied to the dashboard are displayed in the invoked popup.
- **Alignment** - Specifies the alignment of the dashboard title.

- **Load button** - Allows you to specify the image displayed within the dashboard title. In this case, the dashboard definition will contain the URL to access the image.

- **Import button** - Allows you to specify the image displayed within the dashboard title. In this case, the dashboard definition will contain an image as a byte array.

The dashboard title can contain command buttons.

- **Export To button** - allows you to print/export the dashboard. To learn more about printing and exporting, see the Printing and Exporting topic.

- **Parameters** button - allows you to modify dashboard parameter values. To learn more about parameters, see the Using Dashboard Parameters topic.
Dashboard Item Caption

Each dashboard item has a caption that is displayed at the top of the item. The caption contains static text along with other information, as well as command buttons.

To show or hide the caption of a dashboard item, click the **Show Caption** button in the **Design** Ribbon tab...

...or right-click the item when designing the dashboard, and click the **Show Caption** menu item.

**Note**

The caption of the Range Filter dashboard item is not visible by default.

The caption of the Dashboard item contains the following information and buttons, depending on the dashboard item type:

- **Dashboard Item Name** - represents the static text within a dashboard item’s caption.
- **Data Item Container Name** - represents the name of the data item container. To learn more about data item containers, see the Providing Data topic for the corresponding dashboard item.

You can change the default name of the dashboard item or data item container using the **Edit Names** dialog. To invoke this dialog, right-click the item when designing the dashboard, and click the **Edit Names** menu item (alternatively, you can use the **Edit Names** button in the **Design** Ribbon tab).
- **Drill-Down** value - shows the value or values from the current drill-down hierarchy. To learn more, see the Drill-Down topic.
- **Export to** button - allows you to print or export a dashboard item. To learn how to print individual dashboard items, see the Printing and Exporting topic.
- **Values** button - invokes a drop-down menu that allows you to switch between the provided values (in the pie, card, gauge and map dashboard items). To learn more, see the Providing Data topic for the corresponding dashboard item.
- **Clear Master Filter** button - allows you to reset filtering when a dashboard item acts as the Master Filter. To learn more, see the Master Filtering topic in the Interactivity section for the corresponding dashboard item.
- **Drill Up** button - allows you to return to the previous detail level when the drill-down capability is enabled for this item. To learn more, see the Drill-Down topic in the Interactivity section for the corresponding dashboard item.
- **Clear Selection** button - allows you to clear the selection inside an item.
- **Initial Extent** button - restores the Map dashboard items' default size and position.
- **Select Date Time Periods** button / menu - allows you to select date-time periods for the Range Filter.
- **Multiselection** button - allows you to filter data by selecting multiple elements in dashboard items.
- **Maximize** button - expands any dashboard item into the whole dashboard size to examine data in greater detail. Refer to Dashboard Items Layout for more information.
- **Restore** button - restores the expanded item to its initial state.
Dashboard Items Layout

The Dashboard Designer provides the capability to arrange and resize dashboard items and groups in various ways, using simple drag-and-drop operations.

- Layout Concepts
- Item Resizing
- Maximize and Restore Item
- Item Positioning

Layout Concepts

The dashboard arranges dashboard items and groups using layout items and layout groups. They are special containers that are used to present a dashboard layout as a hierarchical structure.

- A layout item is used as a container that displays an individual dashboard item.
- A layout group is used as a container that is used to arrange layout items (or other layout groups) either horizontally or vertically. At the same time, layout groups are used as containers that display dashboard item groups.

Thus, a dashboard layout is hierarchically arranged from the root layout group to bottommost layout items, which display individual dashboard items.

Item Resizing

You can resize individual items/groups of items by dragging their edges.
By default, a 2x2 layout group of dashboard items is horizontally oriented and contains two child layout groups. This arranges dashboard items in two ‘columns’ and allows you to set a different height for items in different columns. You can switch the orientation of the 2x2 group to \textbf{Vertical} using the indicator at the group intersection.

This allows you to specify different widths for dashboard items in different ‘rows’. The table below lists and describes different modes.

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>RESULT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Indicator" /></td>
<td><img src="image" alt="Result" /></td>
<td>Orient the layout group horizontally and allows you to change the height of individual items and the width of ‘columns’.</td>
</tr>
<tr>
<td><img src="image" alt="Indicator" /></td>
<td><img src="image" alt="Result" /></td>
<td>Orient the layout group vertically and allows you to change the width of individual items and the height of ‘rows’.</td>
</tr>
</tbody>
</table>

**Maximize and Restore Item**

You can expand any dashboard item into the whole dashboard size to examine data in greater detail. The expanded dashboard item size in this case is the same as the root layout group.

- To maximize a dashboard item, click the \textbf{Maximize} button in the dashboard item caption.
To restore the item size, click **Restore**.

---

**Item Positioning**

You can change the position of a dashboard item by using drag-and-drop and one of the following approaches.

- If the caption of the dashboard item is visible, click it and hold down the left mouse button while dragging the item.
- If the caption of the dashboard item is not visible, click the icon in the top left corner, and hold down the left mouse button while dragging the item.

Depending on the required dashboard item position, a new layout group is created (if required) to maintain the arrangement of items. Thus, the dashboard item can be inserted to the desired area of a new or existing dashboard layout group.

The following table illustrates how a dashboard item is dragged.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Select the required dashboard item." /></td>
<td>Select the required dashboard item.</td>
</tr>
<tr>
<td><img src="image" alt="Drag the dashboard item to the expected area. The drag indicator will show possible positions for the dashboard item." /></td>
<td>Drag the dashboard item to the expected area. The <strong>drag indicator</strong> will show possible positions for the dashboard item.</td>
</tr>
<tr>
<td><img src="image" alt="Move the mouse cursor to the required position. The drop indicator highlights the hovered position." /></td>
<td>Move the mouse cursor to the required position. The <strong>drop indicator</strong> highlights the hovered position.</td>
</tr>
</tbody>
</table>
Then, the *drop indicator* sequentially displays areas that can be occupied by the dashboard item. Release the left mouse button when the drop indicator displays the required area.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td>Then, the <em>drop indicator</em> sequentially displays areas that can be occupied by the dashboard item. Release the left mouse button when the drop indicator displays the required area.</td>
</tr>
<tr>
<td><img src="image2.png" alt="Diagram" /></td>
<td>The dashboard item is moved to a new position.</td>
</tr>
</tbody>
</table>
Undo and Redo Operations

The **Dashboard Designer** keeps track of all user actions, and allows you to undo or repeat them using the **Undo/Redo** buttons.

To undo/redo the last action, use the following buttons.

To undo/redo several actions at once, click the arrow next to **Undo/Redo** button and select the actions in the list that you want to undo/redo.
Automatic and Manual Updates

When you perform a data-aware operation in the Dashboard Designer (for instance, change the binding of a specified dashboard item or apply filtering), the dashboard sends a query to a data source and updates itself automatically according to the returned data. If the dashboard is bound to a large data source, updating the dashboard according to each change can consume a significant amount of time. In this case, you can disable automatic updates and update the dashboard manually when needed.

Automatic updates are enabled by default and can be managed using the Automatic Updates button in the Home ribbon tab.

Click this button to disable automatic updates. In this case, the dashboard item will not be updated automatically according to each change. Imagine that you have a Grid dashboard item containing the dimension and measure columns. If you change the sort order of the Sales Person column or change the summary type of the Extended Price column, the Grid will be shaded and will display the icon within its caption.

This indicates that this dashboard item requires the update to reflect changes. To update the Grid manually, click the Update button in the Home ribbon tab.

Note that the state of the Automatic Updates option is saved to the dashboard XML definition but affects only the Dashboard Designer.

Note

Note that automatic updates are disabled if you click the Cancel button on the loading panel when performing a time-consuming operation.
Saving a Dashboard

A dashboard provides the capability to save a dashboard definition (dashboard items, data sources, data binding, layout settings, etc.) to an XML file, and restore the dashboard from an XML file.

**Saving a Dashboard**

Once a dashboard is designed, you can save its definition to an XML file. In the **Dashboard Designer**, this can be accomplished in the following ways.

- You can save the dashboard by clicking the **Save** or **Save As** button in the Ribbon menu of the Designer.

  ![Save Button](image)

  This invokes the **Save As** dialog, which allows you to locate the folder in which you wish to store your file.

- The dashboard can be saved when the window containing the Dashboard Designer is closed. If the dashboard has been modified since the last save, a save confirmation dialog will be invoked.

  ![Save Confirmation](image)

**Loading a Dashboard**

A dashboard previously saved to an XML file can be loaded to the Dashboard Designer.

You can open the dashboard by clicking the **Open** button in the Ribbon menu of the Designer.

![Open Button](image)

This invokes the **Open File** dialog, which allows you to locate the required dashboard XML file.
Printing and Exporting

The Dashboard Designer provides the capability to print or export an entire dashboard and individual items.

- Printing and Exporting Dashboards
- Printing and Exporting Dashboard Items

Printing and Exporting Dashboards

To print or export the entire dashboard, click the button in the dashboard title area and choose the required action.

**Print Preview...**

Allows you to customize the document before printing/exporting. For instance, the following settings can be changed: the orientation and size of the printed page, page margins, etc.

**Export to PDF**

Invokes a corresponding dialog that allows you to export a dashboard to a PDF file with specific options. The following options are available.

- **Page Layout** - Specifies the page orientation used to export a dashboard. You can select between Portrait, Landscape, and Auto. Note that in the Auto mode, page orientation is selected automatically depending on the horizontal and vertical sizes...
of a dashboard.

- **Size** - Specifies the standard paper size (for instance, *Letter* or *A4*).
- **Show Title** - Specifies whether or not to apply the dashboard title to the exported document title.
- **Title** - Specifies the title of the exported document.

- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard.

  □ Note

  Note that this option is in effect when *Page Layout* is set to a value different from *Auto*.

- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard is scaled.

  □ Note

  This option is in effect if *Scale Mode* is set to *Use Scale Factor*.

- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard.

  □ Note

  This option is in effect if *Scale Mode* is set to *Auto Fit to Page Width*.

- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between *Below* and *Separate Page*.

**Export to Image**

Invokes a corresponding dialog that allows you to export a dashboard to an image in the specified format. The following options are available.

![Export To Image - Sales Overview](image.png)

- **Image Format** - Specifies the image format in which the dashboard is exported. The following formats are available: *PNG*, *JPEG*, and *GIF*.
- **Show Title** - Specifies whether or not to apply the dashboard title to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export a dashboard.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.

**Export to Excel**

Invokes a corresponding dialog that allows you to export dashboard's data to the Excel file. The following options are available:
- **Excel Format** - Specifies the Excel workbook format in which the dashboard's data is exported. You can select between XLSX and XLS.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Sheet.

Specify the required options in the invoked dialog and click the Export button to export the dashboard. To reset changes to the default values, click the Reset button.

### Printing and Exporting Dashboard Items

To print or export a dashboard item, click the button in its caption and choose the required action.

- **Print Preview...** - Allows you to customize the document before printing/exporting.
- **Export to PDF** - Invokes a corresponding dialog that allows you to export a dashboard to a PDF file with specific options.
- **Export to Image** - Invokes a corresponding dialog that allows you to export a dashboard to image in the specified format.
- **Export to Excel** - Invokes a corresponding dialog that allows you to export a dashboard item’s data to the Excel workbook or CSV file.

To learn more about printing/exporting specifics of different dashboard items, see the Printing and Exporting topic for the required dashboard item.
UI Elements

The topics in this section describe the main elements of a Dashboard Designer application.

This section consists of the following topics.

- Data Source Browser
- Data Items Pane
- Print Preview
The **Data Source Browser** allows you to navigate through dashboard data sources. It displays the data source structure and allows you to **bind dashboard items** to the required data source fields using drag-and-drop operations. The Data Source Browser also enables you to manage **calculated fields**.

The Data Source Browser contains the following elements.

- **Data Source** drop-down list - allows you to select the required data source.
- **Query/Data Member** drop-down list - allows you to select the required query or data member.

- The following **Command buttons** are available.
  
  - The button groups fields by type.

  - The **↓** and **↑** buttons are used to switch the sort order.

  - The **↻** button is used to refresh the Field List.

- **Field List** displays data source fields. You can drag these fields to the **data item placeholders** to specify data binding.

The Data Source Browser identifies the following data field types.

<table>
<thead>
<tr>
<th>ICON</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="icon.png" alt="1" /></td>
<td>Boolean</td>
</tr>
<tr>
<td><img src="icon.png" alt="2" /></td>
<td>Byte</td>
</tr>
<tr>
<td><img src="icon.png" alt="3" /></td>
<td>Date-time</td>
</tr>
<tr>
<td><img src="icon.png" alt="4" /></td>
<td>Numeric</td>
</tr>
<tr>
<td><img src="icon.png" alt="5" /></td>
<td>String</td>
</tr>
<tr>
<td><img src="icon.png" alt="6" /></td>
<td>Calculated field</td>
</tr>
</tbody>
</table>
Data Items Pane

The **DATA ITEMS** pane is placed side-by-side with the **Data Source Browser**, and allows you to create and modify data binding using drag-and-drop operations.

To learn how to bind dashboard items to data source fields, see the **Binding Dashboard Items to Data** topic.

The **DATA ITEMS** pane can contain the following elements.

- **Data Item placeholder** - used to create a data binding using drag-and-drop operations.
- **Data Item** - identifies a data binding by mapping to a particular data source field. Each data item has the **Data Item menu** button, used to invoke a menu that allows you to perform various **data shaping** operations.
- **Data Section** - corresponds to a particular dashboard item area or element.
- **Data Item container** - used to provide **data item** sets (e.g., for calculating the difference between two measures). Data item containers have **Options** buttons that allow you to change specific dashboard item settings (e.g., to switch between chart series types or grid column types).
- **Sort indicator** - shows the current sort order for the data item.
- **Coloring indicator** - indicates whether coloring by hue is enabled for the data item.

Specific dashboard items have command buttons that allow you to perform various operations, for instance, to add a new pane to the chart dashboard item.
Print Preview

This document describes the Print Preview window, which displays the dashboard/dashboard item as it will appear on paper.

Specific Options

In the Print Preview, you can change the orientation and size of the printed page, specify the margins, scale the document, etc. To learn more, see Print Preview for WinForms.

You can also customize printing options specific to a dashboard/dashboard item. To do this, click the Options button in the Print group. When previewing the dashboard, the following Options dialog will be invoked.

- **Show Title** - Specifies whether or not to show the dashboard title/dashboard item caption as the printed document title.
- **Title** - Specifies the title of the printed document.
- **Include Filters** - Allows you to include master filter values to the printed document.
- **Include Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.
This dialog can contain different options, depending on the dashboard item. To learn more, see the documentation for the required dashboard item.
Dashboard Viewer

The Dashboard Viewer provides the capability to display dashboards in Windows Forms applications.

Data Presentation

The topics in this section provide information on how the Dashboard Viewer presents data.

- Data Presentation Basics
- Master Filtering
- Drill-Down
- Dashboard Layout

Dashboard Parameters

This topic describes how to change dashboard parameter values.

- Requesting Parameter Values

Printing and Exporting

A Dashboard Viewer provides the capability to print or export both individual items of a dashboard, as well as the entire dashboard.

- Printing and Exporting

Dashboard Items

Dashboard items are used to present information in various ways.

- Chart
- Scatter Chart
- Grid
- Pies
- Cards
- Gauges
- Pivot
- Choropleth Map
- Geo Point Maps
- Range Filter
- Image
- Text Box
- Treemap
- Filter Elements
Data Presentation Basics

The **Dashboard Viewer** is used to present dashboards in Windows Forms applications. A wide range of dashboard items are used to display visual or textual information.

<table>
<thead>
<tr>
<th>DASHBOARD ITEM</th>
<th>IMAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart</td>
<td>![Chart Image]</td>
<td>Displays data graphically using bars, lines, points, etc.</td>
</tr>
<tr>
<td>Scatter Chart</td>
<td>![Scatter Chart Image]</td>
<td>Visualizes relationships between numeric variables.</td>
</tr>
<tr>
<td>Grid</td>
<td>![Grid Image]</td>
<td>Presents data in tabular form.</td>
</tr>
<tr>
<td>Pies</td>
<td>![Pies Image]</td>
<td>Displays a series of pies or donuts that represent the contribution of each value to the total.</td>
</tr>
<tr>
<td>Cards</td>
<td>![Cards Image]</td>
<td>Performs a series of cards, each illustrating the difference between two values.</td>
</tr>
<tr>
<td>Gauges</td>
<td>![Gauges Image]</td>
<td>Visualizes data within a series of gauges.</td>
</tr>
<tr>
<td>Pivot</td>
<td>![Pivot Image]</td>
<td>Displays cross-tabular reports and allows you to analyze multi-dimensional data.</td>
</tr>
<tr>
<td>Choropleth Map</td>
<td>![Choropleth Map Image]</td>
<td>Colorizes areas in proportion to the provided values.</td>
</tr>
<tr>
<td>DASHBOARD ITEM</td>
<td>IMAGE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Geo Point Map</td>
<td><img src="image1.png" alt="Geo Point Map Image" /></td>
<td>Displays callouts on the map using geographical coordinates.</td>
</tr>
<tr>
<td>Bubble Map</td>
<td><img src="image2.png" alt="Bubble Map Image" /></td>
<td>Displays bubbles on the map using geographical coordinates.</td>
</tr>
<tr>
<td>Pie Map</td>
<td><img src="image3.png" alt="Pie Map Image" /></td>
<td>Places pies on the map using geographical coordinates.</td>
</tr>
<tr>
<td>Range Filter</td>
<td><img src="image4.png" alt="Range Filter Image" /></td>
<td>Allows you to apply filtering by dragging selection thumbs along the argument axis.</td>
</tr>
<tr>
<td>Images</td>
<td><img src="image5.png" alt="Images Image" /></td>
<td>Displays images.</td>
</tr>
<tr>
<td>Text Box</td>
<td><img src="image6.png" alt="Text Box Image" /></td>
<td>Displays rich text within a dashboard.</td>
</tr>
<tr>
<td>Treemap</td>
<td><img src="image7.png" alt="Treemap Image" /></td>
<td>Visualizes data in nested rectangles.</td>
</tr>
<tr>
<td>Combo Box</td>
<td><img src="image8.png" alt="Combo Box Image" /></td>
<td>Allows you to select a value(s) from the drop-down list.</td>
</tr>
<tr>
<td>List Box</td>
<td><img src="image9.png" alt="List Box Image" /></td>
<td>Allows you to select a value(s) from the list.</td>
</tr>
</tbody>
</table>
The Dashboard Viewer enables interaction between various dashboard items. These features include **Master Filtering** and **Drill-Down**.

- Master Filtering
- Drill-Down

To learn more about the dashboard layout, see the [Dashboard Layout](#) topic.

<table>
<thead>
<tr>
<th>DASHBOARD ITEM</th>
<th>IMAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree View</td>
<td><img src="image" alt="Tree View Image" /></td>
<td>Displays values in a hierarchical way and allows you to filter other dashboard items by selecting parent/child values.</td>
</tr>
</tbody>
</table>
Master Filtering

The Dashboard allows you to use any data-aware dashboard item as a filter for the entire dashboard (Master Filter). You can select elements in a Master Filter item (chart bars, pie segments, grid records, etc.) to filter data in the rest of the dashboard by the selected values.

### Master Filtering Modes

The Master Filter item supports two selection modes.

- **Multiple**
  
  Allows you to select multiple elements in the Master Filter item.

  To clear the selection in the Master Filter item, use the Clear Master Filter button in the dashboard item’s caption.

- **Single**
  
  Allows you to select only one element in the Master Filter item. When this mode is enabled, the default selection will be set to a Master Filter element. You can change this selection, but cannot clear it.

To learn how to filter dashboard data via a specific dashboard item, refer to the documentation for this item in the Dashboard Items section.
Drill-Down

Dashboard provides the **drill-down** feature, which allows you to change the detail level of data displayed in a dashboard item. This feature allows you to drill down to display the details, or drill up to view more general information.

To learn how to drill down using a particular dashboard item, refer to the documentation for this item in the **Dashboard Items** topic.

To return to the previous detail level (drill up), use the **Drill Up** button (the icon) in the dashboard item's caption, or the corresponding command in the context menu.
Dashboard Layout

This topic describes the features related to the dashboard layout.

- Dashboard Title
- Dashboard Item Caption
- Resizing Dashboard Items

Dashboard Title

The Dashboard Title is located at the top of the Dashboard. The dashboard title can contain text or image content, elements selected in the master filter item and command buttons.

When you hover over the filter icon (τ), all master filters applied to the dashboard are displayed in the invoked popup.

The dashboard title can contain the following command buttons.

- **Export To** button (the icon) - allows you to print/export the dashboard. To learn more about printing and exporting, see the Printing and Exporting topic.
- **Parameters** button (the icon) - allows you to modify dashboard parameter values. To learn how to modify dashboard parameter values, see the Requesting Parameter Values topic.

Dashboard Item Caption

Each dashboard item has a caption that is displayed at the top of this item. The caption contains static text along with other information, as well as command buttons.
The caption of the Dashboard item contains the following information and buttons, depending on the dashboard item type:

- **Dashboard Item Name** - represents the static text within a dashboard item’s caption.
- **Data Item Container Name** - represents the name of the data item container.
- **Drill-Down value** - shows value(s) from the current drill-down hierarchy. To learn more, see the Drill-Down topic.
- **Export to** button - allows you to print or export a dashboard item. To learn how to print individual dashboard items, see the Printing and Exporting topic.
- **Values** button - invokes a drop-down menu that allows you to switch between provided values (in the pie, card, gauge and map dashboard items). To learn more, see the Data Presentation Basics topic for the corresponding dashboard item.
- **Clear Master Filter** button - allows you to reset filtering when a dashboard item acts as the Master Filter. To learn more, see the Interactivity topic for the corresponding dashboard item.
- **Drill Up** button - allows you to return to the previous detail level when the drill-down capability is enabled for this item. To learn more, see the Interactivity topic for the corresponding dashboard item.

**Resizing Dashboard Items**

The Dashboard Viewer provides the capability to resize dashboard items.

You can resize individual items (or a group of items) by dragging their edges.
Requesting Parameter Values

The Dashboard Viewer provides a built-in **Dashboard Parameters** dialog, which allows you to change dashboard parameter values.

This dialog can be used to apply filtering to dashboard data.

To invoke the **Dashboard Parameters** dialog in the Dashboard Viewer, click the **Parameters** button (the icon) in the dashboard title.

Select the required parameter values in the **Dashboard Parameters** dialog and click the **Submit** button to apply the changes.

To reset changes to the default values, click the **Reset** button.
Printing and Exporting

The Dashboard Viewer provides the capability to print or export an entire dashboard and individual items.

- Printing and Exporting Dashboards
- Printing and Exporting Dashboard Items

**Printing and Exporting Dashboards**

To print or export the entire dashboard, click the button in the dashboard title area and choose the required action.

- **Print Preview...**
  
  Allows you to customize the document before printing/exporting. For instance, the following settings can be changed: the orientation and size of the printed page, page margins, etc.

- **Export to PDF**
  
  Invokes a corresponding dialog that allows you to export a dashboard to a PDF file with specific options. The following options are available:

  ![Export to PDF dialog]

  - **Page Layout** - Specifies the page orientation used to export a dashboard. You can select between Portrait, Landscape, and Auto. Note that in the Auto mode, page orientation is selected automatically depending on the horizontal and vertical sizes.
of a dashboard.

- **Size** - Specifies the standard paper size (for instance, Letter or A4).
- **Show Title** - Specifies whether or not to apply the dashboard title to the exported document title.
- **Title** - Specifies the title of the exported document.

- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard.

  □ Note

  Note that this option is in effect when **Page Layout** is set to a value different from **Auto**.

- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard is scaled.

  □ Note

  This option is in effect if **Scale Mode** is set to **Use Scale Factor**.

- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard.

  □ Note

  This option is in effect if **Scale Mode** is set to **Auto Fit to Page Width**.

- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

**Export to Image**

Invokes a corresponding dialog that allows you to export a dashboard to an image in the specified format. The following options are available:

- **Image Format** - Specifies the image format in which the dashboard is exported. The following formats are available: **PNG**, **JPEG**, and **GIF**.
- **Show Title** - Specifies whether or not to apply the dashboard title to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export a dashboard.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.

**Export to Excel**

Invokes a corresponding dialog that allows you to export dashboard's data to the Excel file. The following options are available:
Excel Format - Specifies the Excel workbook format in which the dashboard’s data is exported. You can select between XLSX and XLS.

Include | Filters - Allows you to include master filter values to the exported document.

Include | Parameters - Allows you to include parameter values to the exported document.

Position - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Sheet.

Specify the required options in the invoked dialog and click the Export button to export the dashboard. To reset changes to the default values, click the Reset button.

Printing and Exporting Dashboard Items

To print or export a dashboard item, click the button in its caption and choose the required action.

- **Print Preview...** - Allows you to customize the document before printing/exporting.
- **Export to PDF** - Invokes a corresponding dialog that allows you to export a dashboard to a PDF file with specific options.
- **Export to Image** - Invokes a corresponding dialog that allows you to export a dashboard to image in the specified format.
- **Export to Excel** - Invokes a corresponding dialog that allows you to export a dashboard item’s data to the Excel workbook or CSV file.

To learn more about printing/exporting specifics of different dashboard items, see the Printing and Exporting topic for the required dashboard item.
Dashboard Items

The DevExpress Dashboard provides a number of visualization elements (dashboard items) designed to effectively present visual or textual information in a dashboard.

This section describes the available dashboard items.

- Chart
- Scatter Chart
- Grid
- Pies
- Cards
- Gauges
- Pivot
- Date Filter
- Choropleth Map
- Geo Point Maps
- Range Filter
- Image
- Text Box
- Treemap
- Filter Elements
The topics in this section describe the **Chart** dashboard item, which visualizes data in XY-diagrams of different kinds - from line and bar charts to candle stick and bubble charts.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Chart dashboard item presents data visually using different types of series.

A series represents a grouping of related data points. The most important characteristic of a series is its type, which determines a particular visual representation of data.

The Chart dashboard item includes the following series types.

- **Bar** series displays data as sets of rectangular bars with lengths proportional to the values that they represent.
- **Point** and **Line** series display data as standalone points or points joined by a line.
- **Area** series displays data by a line that joins points, and the shaded area between the line and the argument axis.
- **Range** series is the area between two simple series displayed as a shaded area, or bars that stretch from a point in one series to the corresponding point in another series.
- **Weighted** series displays data using a third dimension, expressed by a bubble’s size.
- **Financial** series are useful in analyzing stock and bond prices, as well as the behavior of commodities.

**Tooltip**

The Chart dashboard item can display a tooltip that shows information on a hovered series point.
Interactivity

This topic describes features that enable interaction between the Chart and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

The Chart dashboard item supports filtering by argument or series values.

- **Filtering by Arguments**

  When filtering by arguments is enabled, you can click series points to make other dashboard items display only data related to selected argument values.

- **Filtering by Series**

  When filtering by series is enabled, you can click a series point to make other dashboard items display only data related to the selected series.

- **Filtering by Points**

  When filtering by points is enabled, you can click a individual point to make other dashboard items display only data related to the selected point.
To reset filtering, use the **Clear Master Filter** button in the Chart's caption, or corresponding command in the Chart’s context menu.

---

**Drill-Down**

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see **Drill-Down**.

The Chart dashboard item supports drill-down on argument or series values.

- **Drill Down on Arguments**

  When drill-down on arguments is enabled, you can click a series point to view a detail chart for the corresponding argument value.

- **Drill-Down on a Series**

  When drill-down on a series is enabled, you can click a series point (or corresponding legend item) to view a detail chart for the corresponding series.

---

**Note**

When **Filtering by Arguments** is enabled, you can view the details by double-clicking a series point.
When **Filtering by Series** is enabled, you can view the details by double-clicking a series point.

To return to the previous detail level (drill up), use the **Drill Up** button within the Chart *caption* area, or the corresponding command in the Chart’s context menu.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes printing/exporting specifics for the Chart dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

If you are printing the Chart dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Size Mode** - Allows you to specify the print size mode for the Chart dashboard item.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF

The following options are available when exporting the Chart dashboard item to a PDF.
- **Page Layout** - Specifies the page orientation used to export a Chart dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Size Mode** - Specifies the export size mode for the Chart dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Chart dashboard item. To reset changes to the default values, click the **Reset** button.

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies of the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- Include | Parameters - Allows you to include parameter values to the exported document.
- Position - Specifies the master filter and parameter values’ position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
Scatter Chart

The topics in this section describe the Scatter Chart dashboard item, which visualizes summaries using numerical X/Y-axes and the size of data points.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Scatter Chart dashboard item visualizes summaries using three dimensions: the X-axis, the Y-axis and the size of data points.

Point Labels and Tooltips

The Scatter Chart dashboard item can display point labels and tooltips that show information on data points. To see a tooltip, hover over the required point.
Interactivity

This topic describes features that enable interaction between the Scatter Chart and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When Master Filtering is enabled, you can click a point (or multiple points by holding down the CTRL key) to make other dashboard items only display data related to the selected point(s).

To reset filtering, use the Clear Master Filter button (the icon) in the Chart's caption area, or the Clear Master Filter command in the Chart's context menu.

Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see Drill-Down.

When drill-down is enabled, you can click a point to view the details.
When **Master Filtering** is enabled, you can view the details by double-clicking a point.

To return to the previous detail level (drill up), use the **Drill Up** button (the icon) within the Chart's caption area or the **Drill Up** command in the Chart’s context menu.
Printing and Exporting

The Dashboard allows you to print/export individual dashboard items, or the entire dashboard. See the Printing and Exporting topic to learn more about printing concepts common to all dashboard items.

This topic describes printing/exporting specifics for the Scatter Chart dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

You can customize the following options (via the Options button) before printing the Scatter Chart dashboard item using the Print Preview:

- **Show Title** - Specifies whether to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the printed document title.
- **Size Mode** - Allows you to specify the Scatter Chart dashboard item's print size mode.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the master filter and parameter values' position in the printed document. You can select from Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. Click the Reset button to reset changes to the default values.

Export To PDF

The following options are available when exporting the Chart dashboard item to a PDF:
- **Page Layout** - Specifies the page orientation used when exporting a Scatter Chart dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document’s title.
- **Size Mode** - Specifies the Scatter Chart dashboard item’s export size mode.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select from **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Scatter Chart dashboard item. Click the **Reset** button to reset changes to the default values.

---

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document’s title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select between *Below* and *Separate Page*.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.

**Export To Excel**

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

![Export To Excel - Sales by Product Category](image)

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select from *Below* and *Separate Sheet*.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.
Grid

The topics in this section describe the Grid dashboard item, which displays data in a two-dimensional table.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The **Grid** displays data in a two-dimensional table that supports four types of columns.

- The **dimension column** displays values from the bound data item “as is”.
- The **measure column** displays summaries calculated from data in the bound data item.
- The **delta column**, bound to two measures, calculates summaries for both measures, and displays the difference between these summaries.
- The **sparkline column** visualizes the variation of summary values over time.

### Sort Grid Rows

To sort records by a column’s values and replace existing sort conditions that are applied to the current or other columns, click the target column’s header until an **Up** or **Down** arrow icon is displayed within the header. The **Up** and **Down** arrows indicate ascending and descending sort orders, respectively.

To sort records by a column’s values while preserving existing sort conditions, click a column header while holding the **SHIFT** key until an **Up** or **Down** arrow icon is displayed within the header.

To remove sorting by a column, click a column header while holding down the **CTRL** key.

### Filter Grid Data

To filter grid data, click the filter button (the 🔍 icon) and select the required filter value in the invoked filter dropdown list.
Click **Custom** to construct filter criteria involving up to two conditions. This will invoke the **Custom AutoFilter** dialog, allowing you to compare a column with one or two values.

To clear the filter applied to a specific column, invoke the filter dropdown list and click **All**.

To clear all filter criteria, click the **Close Filter** button within the Filter Panel.

**Tooltips**

A Grid dashboard item can display a tooltip when the mouse pointer is hovered over the bar in the measure column.

The tooltip shows the value in the measure column as text.

When the mouse pointer is hovered over the cell in the sparkline column, the tooltip can display start/end values and minimum/maximum values.
Start: $1.39M
End: $5.33M
Min: $1.39M
Max: $16.39M
Interactivity

This topic describes features that enable interaction between the Grid and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When Master Filtering is enabled, you can click a grid row (or multiple rows by holding down the CTRL key) to make other dashboard items only display data related to the selected record(s).

To reset filtering, use the Clear Master Filter button (the icon) in the Grid’s caption area, or the Clear Master Filter command in the Grid’s context menu.

Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see Drill-Down.

The Grid dashboard item supports drill-down for rows.

When drill-down is enabled, you can click a grid row to view the details.

Note

When Master Filtering is enabled, you can view the details by double-clicking a grid row.

To return to the previous detail level (drill up), use the Drill Up button (the icon) within the Grid’s caption area, or the Drill Up command in the Grid’s context menu.
**Printing and Exporting**

**Dashboard** allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a **Grid** dashboard item.

- **Printing**
- **Export To PDF**
- **Export To Image**
- **Export To Excel**

**Printing**

If you are printing the Grid dashboard item using the **Print Preview**, you can customize the following options (via the **Options** button) before printing.

![Options dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Print Headers on Every Page** - Specifies whether to print column headers of the Grid dashboard item on every page.
- **Fit to Page Width** - Specifies whether the size of the grid dashboard item is changed according to the width of the exported page.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between **Below** and **Separate Page**.

Specify the required options in the **Options** dialog and click the **Submit** button to apply the changes. To reset changes to the default values, click the **Reset** button.

**Export To PDF**
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Print Headers on Every Page** - Specifies whether to print column headers of the Grid dashboard item on every page.
- **Fit to Page Width** - Specifies whether the size of the grid is changed according to the width of the exported page.
- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard item is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Grid dashboard item. To reset changes to the default values, click the **Reset** button.

## Export To Image

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:
- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
The topics in this section describe the Pie dashboard item, which displays a series of pies or donuts that represent the contribution of each value to a total.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The **Pie** dashboard item displays a series of pies or donuts that represent the contribution of each value to a total.

### Tooltip

A Pie dashboard item can display a tooltip that shows information about the hovered pie segment.
Interactivity

This topic describes features that enable interaction between the Pie and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

The Pie dashboard item supports filtering by argument or series values.

- Filtering by Arguments

  When filtering by arguments is enabled, you can click a pie segment to make other dashboard items only display data related to the selected argument value.

- Filtering by a Series

  When filtering by a series is enabled, you can click a pie to make other dashboard items display only data related to the selected pie.

- Filtering by a Points

  When filtering by points is enabled, you can click a single pie segment to make other dashboard items display only data related to the selected segment.
To reset filtering, use the **Clear Master Filter** button (the icon) in the caption area of the Pie dashboard item, or the **Clear Master Filter** command in the context menu.

**Drill-Down**

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see **Drill-Down**.

The Pie dashboard item supports drill-down on argument or series values.

- **Drill Down on Arguments**

  When drill-down on arguments is enabled, you can click a pie segment to view a detail diagram for the corresponding argument value.

- **Drill-Down on a Series**

  When drill-down on a series is enabled, you can click a pie chart to view a detail diagram for the corresponding series value.

**Note**

When **Filtering by Arguments** is enabled, you can view the details by double-clicking a pie segment.
**Note**

When **Filtering by Series** is enabled, you can view the details by double-clicking a pie chart.

To return to the previous detail level (drill-up), use the **Drill Up** button (the icon) in the **caption** area of the Pie dashboard item, or the **Drill Up** command in the context menu.
Printing and Exporting

**Dashboard** allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a **Pie** dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

**Printing**

If you are printing the Pie dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

![Options Dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Auto Arrange Content** - Specifies whether pies are arranged automatically on the printed document.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

**Export To PDF**
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Auto Arrange Content** - Specifies whether pies are arranged automatically in the exported document.
- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard item is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Pie dashboard item. To reset changes to the default values, click the **Reset** button.

## Export To Image

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:
Show Title - Specifies whether to apply the dashboard item caption to the exported document title.
Title - Specifies of the exported document's title.
Image Format - Specifies the image format in which the dashboard item is exported.
Resolution (dpi) - Specifies the resolution (in dpi) used to export the dashboard item.
Include | Filters - Allows you to include master filter values to the exported document.
Include | Parameters - Allows you to include parameter values to the exported document.
Position - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- Excel Format - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- Separator - Specifies the string used to separate values in the exported CSV document.
- Include | Filters - Allows you to include master filter values to the exported document.
- Include | Parameters - Allows you to include parameter values to the exported document.
- Position - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
The topics in this section describe the **Card** dashboard item, which displays a series of cards. Each card can display a single value, or show the difference between two values.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Card dashboard item displays a series of cards. Each card illustrates the difference between two values. This difference can be expressed as an absolute value, an absolute variation or a percentage variation.

The Card dashboard item can illustrate this difference for various sets of values. You can switch between these sets using the Values button (the 📊 icon) in the dashboard item caption area or in the context menu.

Tooltip

A Card dashboard item can display a tooltip for cards containing a sparkline. When the mouse pointer is hovered over the sparkline, the tooltip can display start/end values and minimum/maximum values.
Interactivity

This topic describes features that enable interaction between the Card and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more, see the Master Filtering topic, which describes filtering concepts common to all dashboard items.

When Master Filtering is enabled, you can click a card (or multiple cards by holding down the CTRL key) to make other dashboard items only display data related to the selected card(s).

Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see Drill-Down.

When drill-down is enabled, you can click a card to view the details.

Note

When Master Filtering is enabled, you can view the details by double-clicking a card.

To return to the previous detail level (drill up), use the Drill Up button (the icon) in the caption area of the Card dashboard item, or the Drill Up command in the context menu.
Printing and Exporting

**Dashboard** allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a **Card** dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

**Printing**

If you are printing the Card dashboard item using a **Print Preview**, you can customize the following options (via the **Options** button) before printing.

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Auto Arrange Content** - Specifies whether or not cards are arranged automatically on the printed document.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between **Below** and **Separate Page**.

Specify the required options in the **Options** dialog and click the **Submit** button to apply the changes. To reset changes to the default values, click the **Reset** button.

**Export To PDF**
Export To PDF - Sales by Category

- **Page Layout**: Specifies the page orientation used to export a dashboard item.
- **Size**: Specifies the standard paper size.
- **Show Title**: Specifies whether or not to apply the dashboard item caption to the exported document title.
- **Title**: Specifies the title of the exported document.
- **Auto Arrange Content**: Specifies whether or not cards are arranged automatically in the exported document.
- **Scale Mode**: Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor**: Specifies the scale factor (in fractions of 1) by which a dashboard item is scaled.
- **Auto Fit Page Count**: Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters**: Allows you to include master filter values to the exported document.
- **Include | Parameters**: Allows you to include parameter values to the exported document.
- **Position**: Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the Card dashboard item. To reset changes to the default values, click the Reset button.

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:
- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies of the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.

## Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.
Gauges

The topics in this section describe the **Gauge** dashboard item, which displays a series of gauges.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The **Gauge** dashboard item displays a series of gauges. Each gauge can communicate two values - one with a needle and the other with a marker on the scale.

The **Gauge** dashboard item can illustrate the difference for various sets of values. You can switch between these sets using the **Values** button (the ![icon](image)) in the dashboard item **caption** or in the context menu.
Interactivity

This topic describes features that enable interaction between the **Gauge** and other dashboard items. These features include **Master Filtering** and **Drill-Down**.

**Master Filtering**

The **Dashboard** allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more about filtering concepts common to all dashboard items, see the **Master Filtering** topic.

When **Master Filtering** is enabled, you can click a gauge (or multiple gauges by holding down the **CTRL** key) to make other dashboard items only display data related to the selected gauge(s).

![Master Filtering Example](image)

To reset filtering, use the **Clear Master Filter** button (the icon) in the **caption** area of the **Gauge** dashboard item, or the **Clear Master Filter** command in the context menu.

**Drill-Down**

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more, see **Drill-Down**.

When drill-down is enabled, you can click a gauge to view the details.

![Drill-Down Example](image)

**Note**

When **Master Filtering** is enabled, you can view the details by double-clicking a gauge.

To return to the previous detail level (drill up), use the **Drill Up** button (the icon) in the **caption** area of the **Gauge** dashboard item, or the **Drill Up** command in the context menu.
Printing and Exporting

**Dashboard** allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a **Gauge** dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

**Printing**

If you are printing a Gauge dashboard item using the **Print Preview**, you can customize the following options (via the **Options** button) before printing.

![Options dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Auto Arrange Content** - Specifies whether or not gauges are arranged automatically on the printed document.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between **Below** and **Separate Page**.

Specify the required options in the **Options** dialog and click the **Submit** button to apply the changes. To reset changes to the default values, click the **Reset** button.

**Export To PDF**
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Gauge caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Auto Arrange Content** - Specifies whether or not gauges are arranged automatically in the exported document.
- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard item is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Gauge dashboard item. To reset changes to the default values, click the **Reset** button.

### Export To Image

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:
- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document’s title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select between *Below* and *Separate Page*.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.

## Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

![Export To Excel - Sales by Product Category](image)

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select from *Below* and *Separate Sheet*.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.
Pivot

The Pivot dashboard item displays a cross-tabular report that presents multi-dimensional data in an easy-to-read format.

<table>
<thead>
<tr>
<th>States</th>
<th>Units Sold</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>36.4K</td>
<td>$1.19M</td>
</tr>
<tr>
<td>Washington</td>
<td>20.8K</td>
<td>$622K</td>
</tr>
<tr>
<td>Texas</td>
<td>19.3K</td>
<td>$655K</td>
</tr>
<tr>
<td>Florida</td>
<td>12.1K</td>
<td>$383K</td>
</tr>
<tr>
<td>Oregon</td>
<td>8.54K</td>
<td>$279K</td>
</tr>
<tr>
<td>Tennessee</td>
<td>7.9K</td>
<td>$253K</td>
</tr>
<tr>
<td>Mississippi</td>
<td>5.46K</td>
<td>$189K</td>
</tr>
</tbody>
</table>

Expanding and Collapsing Groups

To expand and collapse row and column groups, use the ▶ and ▼ buttons, respectively.

<table>
<thead>
<tr>
<th>Q1 Total</th>
<th>UK</th>
<th>USA</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Total</td>
<td>$124K</td>
<td>$317X</td>
<td>$441K</td>
</tr>
<tr>
<td>Q1 Total</td>
<td>$79.1K</td>
<td>$218K</td>
<td>$298K</td>
</tr>
<tr>
<td>January</td>
<td>$235.5K</td>
<td>$618.7K</td>
<td>$954.2K</td>
</tr>
<tr>
<td>February</td>
<td>$32.9K</td>
<td>$56.6K</td>
<td>$99.4K</td>
</tr>
<tr>
<td>March</td>
<td>$20.7K</td>
<td>$84.2K</td>
<td>$105K</td>
</tr>
<tr>
<td>Q2</td>
<td>$44.7K</td>
<td>$97.4K</td>
<td>$142K</td>
</tr>
<tr>
<td>Grand Total</td>
<td>$124K</td>
<td>$317X</td>
<td>$441K</td>
</tr>
</tbody>
</table>
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a Pivot dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

If you are printing the Pivot dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

![Options dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Print Headers on Every Page** - Specifies whether to print column headers of the Pivot dashboard item on every page.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Pivot caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Print Headers on Every Page** - Specifies whether or not to print column headers of the Pivot dashboard item on every page.
- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which a dashboard item is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Pivot dashboard item. To reset changes to the default values, click the **Reset** button.

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:
- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies of the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

### Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
Choropleth Map

The topics in this section describe the Choropleth Map dashboard item, which colorizes the required areas in proportion to the provided values.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Choropleth Map dashboard item colorizes map areas in the following two ways.

- Based on the values provided.
- By indicating the difference between the actual and target values of a particular parameter.

You can switch between the provided values using the Values button (the icon) in the map's caption area, or by using the context menu.

Map Zooming and Scrolling

You can use the mouse wheel to change the current zoom level for the map. To scroll the map, hold down the left mouse button and drag it.

To move to the initial zooming and scrolling state, select the Initial Extent menu item in the map's context menu.
Tooltip

The Choropleth Map dashboard item can display a tooltip that shows information on a hovered area.
Interactivity

This document describes the features that enable interaction between the Choropleth Map and other dashboard items. These features include **Master Filtering**.

**Master Filtering**

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (**Master Filter**). To learn more about filtering concepts common to all dashboard items, see the **Master Filtering** topic.

When Master Filtering is enabled, you can click a shape (or multiple shapes by holding down the **CTRL** key) to make other dashboard items only display data related to the selected shape(s).

You can also select multiple shapes in the following way.

- Hold the **SHIFT** key and the left mouse button;
- Drag the mouse pointer to mark an area that includes the desired shapes;
- Release the left mouse button. All shapes within the area will be selected.

To reset filtering, use the **Clear Master Filter** button (the icon) in the Map’s caption, or the **Clear Master Filter** command in the context menu.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a Choropleth Map dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

If you are printing the Choropleth Map dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Size Mode** - Allows you to specify the print size mode for the Choropleth Map dashboard item.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Choropleth Map caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Size Mode** - Specifies the export size mode for the Choropleth Map dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Choropleth Map dashboard item. To reset changes to the default values, click the **Reset** button.

### Export To Image

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document’s title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
Position - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
Geo Point Maps

The topics in this section describe various types of Geo Point Map dashboard items which places callouts, bubbles or pies on the map using geographical coordinates.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Dashboard supports three types of Geo Point maps.

- The **Geo Point Map** dashboard item allows you to place callouts on the map using geographical coordinates.

- The **Bubble Map** dashboard item allows you to place bubbles on the map. Each bubble can represent data via its weight and color.

- The **Pie Map** dashboard item allows you to display pies on the map. Each pie visualizes the contribution of each value to the total.

Map Zooming and Scrolling

You can use the mouse wheel to change the current zoom level for a map. To scroll the map, hold down the left mouse button and drag it.

To move to the initial zooming and scrolling state, click the Initial Extent menu item in the map's context menu.
A Geo Point Map dashboard item can display a tooltip that shows information on a hovered callout/bubble/ pie.
Interactivity

This document describes the capabilities that enable interaction between Geo Point maps and other dashboard items. These capabilities include Master Filtering.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When Master Filtering is enabled, you can click a callout/bubble/pie (or multiple callouts/bubbles/pies by holding down the CTRL key) to make other dashboard items only display data related to the selected callout(s)/bubble(s)/pie(s).

You can also select multiple callouts/bubbles/pies in the following way.

- Hold the SHIFT key and the left mouse button;
- Drag the mouse pointer, to mark an area that includes the desired elements;
- Release the left mouse button. All elements within the area will be selected.

To reset filtering, use the Clear Master Filter button (the 🛑 icon) in the Map’s caption area, or the Clear Master Filter command in the context menu.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a Geo Point Map dashboard items.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

If you are printing the Geo Point Map dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Size Mode** - Allows you to specify the print size mode for the Geo Point Map dashboard item.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Geo Point Map caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Size Mode** - Specifies the export size mode for the Geo Point Map dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Geo Point Map dashboard item. To reset changes to the default values, click the **Reset** button.

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies of the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
• **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.

**Export To Excel**

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values’ position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the **Export** button to export the dashboard item. Click the **Reset** button to reset changes to the default values.
Range Filter

The **Range Filter** dashboard item allows you to apply filtering to other dashboard items. This item displays a chart with selection thumbs that allow you to filter out values displayed along the argument axis.

To reset filtering, use the **Clear Master Filter** command in the context menu.
Printing and Exporting

**Dashboard** allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the **Printing and Exporting** topic.

This topic describes the specifics of printing/exporting a **Range Filter** dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

## Printing

If you are printing the Range Filter dashboard item using the **Print Preview**, you can customize the following options (via the **Options** button) before printing.

![Options dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Size Mode** - Allows you to specify the print size mode for the Range Filter dashboard item.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between **Below** and **Separate Page**.

Specify the required options in the **Options** dialog and click the **Submit** button to apply the changes. To reset changes to the default values, click the **Reset** button.

## Export To PDF
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Range Filter caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Size Mode** - Specifies the export size mode for the Range Filter dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Range Filter dashboard item. To reset changes to the default values, click the **Reset** button.

**Export To Image**

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
● Include | Parameters - Allows you to include parameter values to the exported document.

● Position - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

Export To Excel

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- Show Title - Specifies whether to apply the dashboard item caption to the exported document title.
- Title - Specifies of the exported document's title.
- Image Format - Specifies the image format in which the dashboard item is exported.
- Resolution (dpi) - Specifies the resolution (in dpi) used to export the dashboard item.
- Include | Filters - Allows you to include master filter values to the exported document.
- Include | Parameters - Allows you to include parameter values to the exported document.
- Position - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
Date Filter

The **Date Filter** dashboard item allows you to filter dashboard data based on the selected data range. The range can be relative (Last 3 Months), use fixed dates (01-01-2018), or presets (Month-to-date). You can also filter dates before or after a specified date.

The DateFilter item displays a set of intervals that can be used as quick filters. The predefined intervals are also available in the context menu.

You can click the button to invoke the Date Picker:

![Date Picker](image)

The DateFilter item contains a Date Picker - a button with a drop-down calendar. This button initially displays "Click to set filter".

The calendar drops down when you:

- click the button without a specified range (the button with the "Click to set filter" caption)
- click the icon on the button with the specified datetime range.
A drop-down calendar may contain a single calendar control (the Filter Type is Exact, Before or After, one calendar ele, ) or two calendar controls (the Filter Type is Between).

When you select the date, the Date Picker caption displays information about that date (date range) and an icon. The caption text is constructed from a custom string with date placeholders. If you click the caption, The Date Picker button acts as a checked button to apply the date range (checked) or reset the date filter (unchecked) to its default value. When you the icon, the drop-down calendar appears and enables the user to select another date range.

**Quick Filters**

Quick Filters are buttons displayed within the DateFilter item. Each button has a DateTime range assigned to it. You can click the button to apply that range as a Date filter. The button is checked until you click the same button once more to reset the filter to its default value. The button becomes unchecked if you click another button.

Quick Filters

---

**Arrange Quick Filters**

Quick filters in the DateFilter item can be arranged horizontally or vertically. The default mode is *auto height*, in which quick filters are displayed horizontally and the dashboard item shrinks automatically to fit the items and save space.

**Auto Height Arrangement Mode:**

---

**Vertical Arrangement Mode:**

---

**Horizontal Arrangement Mode:**

---
The **Image** dashboard item is used to display images within a dashboard.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting an Image dashboard item.

- Printing
- Export To PDF
- Export To Image

Printing

If you are printing the Image dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

![Options dialog](image)

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Scale Mode** - Specifies the mode for scaling when printing an image.
- **Scale Factor** - Specifies the scale factor (in fractions of 1) by which an image is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of an image.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Image caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Scale Mode** - Specifies the mode for scaling when exporting a dashboard item.
- **Scale Factor** - Specifies the scale factor (in fractions of 1), by which a dashboard item is scaled.
- **Auto Fit Page Count** - Specifies the number of horizontal/vertical pages spanning the total width/height of a dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between **Below** and **Separate Page**.

Specify the required options in this dialog and click the **Export** button to export the Image dashboard item. To reset changes to the default values, click the **Reset** button.

### Export To Image

- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Show Title** - Specifies whether or not to apply the Image caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.

Specify the required options in this dialog and click the **Export** button to export the Image dashboard item. To reset changes to the default values, click the **Reset** button.
The **Text Box** dashboard item is used to display rich text within a dashboard.

---

**Desktop LCD 21**

*Production Start:* 31-Mar-10

*Consumer Rating:* 3 of 5

*Retail Price:* $170

*Best Sales Year:* 2015

*Best Sales Company:* ACME

The 21” Brilliance LCD Computer Monitor is changing the way people display computer signals. It’s amazing build quality and high precision design means you get the best possible computer picture for the best possible price. It delivers crystal-clear images with mind-blowing video. The bottom-line is simple, this Monitor offers Full HD resolution with 240Hz refresh rate.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing and exporting concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a Text Box dashboard item.

- Printing
- Export To PDF
- Export To Image

Printing

If you are printing a Text Box dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

![Options dialog]

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF

![Export To PDF dialog]
- **Page Layout** - Specifies the page orientation used to export a dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the Text Box caption to the exported document.
- **Title** - Specifies the title of the exported document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Text Box dashboard item. To reset changes to the default values, click the **Reset** button.

### Export To Image

- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Show Title** - Specifies whether or not to apply the Text Box caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.

Specify the required options in this dialog and click the **Export** button to export the Text Box dashboard item. To reset changes to the default values, click the **Reset** button.
The Treemap dashboard item visualizes data in nested rectangles that are called *tiles*.

- Data Presentation Basics
- Interactivity
- Printing and Exporting
Data Presentation Basics

The Treemap dashboard item visualizes data in nested rectangles that are called tiles.

![Treemap example]

Labels and Tooltips

The Treemap displays labels that contain descriptions for tiles and groups, and provide tooltips with additional information.

![Treemap with labels and tooltips example]
Interactivity

This topic describes features that enable interaction between the Treemap and other dashboard items. These features include Master Filtering and Drill-Down.

Master Filtering

The Dashboard allows you to use any data aware dashboard item as a filter for other dashboard items (Master Filter). To learn more about filtering concepts common to all dashboard items, see the Master Filtering topic.

When Master Filtering is enabled, you can click a tile/group caption (or multiple tiles/group captions by holding down the CTRL key) to make other dashboard items only display data related to the selected tile(s).

To reset filtering, use the Clear Master Filter button (the icon) in the Treemap’s caption area, or the Clear Master Filter command in the Treemap’s context menu.

Drill-Down

The built-in drill-down capability allows you to change the detail level of data displayed in dashboard items on the fly. To learn more about drill-down concepts common to all dashboard items, see the Drill-Down topic.

When drill-down is enabled, you can click a tile to view its details.

Note

When Master Filtering is enabled, you can view the details by double-clicking a tile.
Printing and Exporting

Dashboard allows you to print/export individual dashboard items, or the entire dashboard. To learn more about printing concepts common to all dashboard items, see the Printing and Exporting topic.

This topic describes the specifics of printing/exporting a Treemap dashboard item.

- Printing
- Export To PDF
- Export To Image
- Export To Excel

Printing

If you are printing the Treemap dashboard item using the Print Preview, you can customize the following options (via the Options button) before printing.

- **Show Title** - Specifies whether or not to apply the dashboard item caption to the printed document title.
- **Title** - Specifies the title of the printed document.
- **Size Mode** - Allows you to specify the print size mode for the Treemap dashboard item.
- **Include | Filters** - Allows you to include master filter values to the printed document.
- **Include | Parameters** - Allows you to include parameter values to the printed document.
- **Position** - Specifies the position of the master filter and parameter values in the printed document. You can select between Below and Separate Page.

Specify the required options in the Options dialog and click the Submit button to apply the changes. To reset changes to the default values, click the Reset button.

Export To PDF

The following options are available when exporting the Treemap dashboard item to a PDF.
- **Page Layout** - Specifies the page orientation used to export a Treemap dashboard item.
- **Size** - Specifies the standard paper size.
- **Show Title** - Specifies whether or not to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the title of the exported document.
- **Size Mode** - Specifies the export size mode for the Treemap dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the position of the master filter and parameter values in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the **Export** button to export the Treemap dashboard item. To reset changes to the default values, click the **Reset** button.

### Export To Image

All data-bound dashboard items provide the same set of options when exporting them to an Image format. The following options are available:

- **Show Title** - Specifies whether to apply the dashboard item caption to the exported document title.
- **Title** - Specifies the exported document's title.
- **Image Format** - Specifies the image format in which the dashboard item is exported.
- **Resolution (dpi)** - Specifies the resolution (in dpi) used to export the dashboard item.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select between Below and Separate Page.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.

## Export To Excel

Data visualized within all data-bound dashboard items can be exported to the required Excel format. The following options are available:

![Export To Excel - Sales by Product Category](image)

- **Excel Format** - Specifies the Excel format in which the dashboard item is exported. You can use the XLSX, XLS or CSV formats.
- **Separator** - Specifies the string used to separate values in the exported CSV document.
- **Include | Filters** - Allows you to include master filter values to the exported document.
- **Include | Parameters** - Allows you to include parameter values to the exported document.
- **Position** - Specifies the master filter and parameter values' position in the exported document. You can select from Below and Separate Sheet.

Specify the required options in this dialog and click the Export button to export the dashboard item. Click the Reset button to reset changes to the default values.
The topics in this section describe the **Filter Elements** dashboard items used to apply master filter to other items.

- Filter Elements Overview
- Neutral Filter Mode
Filter Elements

Filter elements provide the capability to filter other dashboard items.

- Combo Box
- List Box
- Tree View
- Date Filter

Combo Box

The Combo Box dashboard item allows you to select a value(s) from the drop-down list.

- The Standard type allows you to select only a single value.

![Combo Box Example](image)

- The Checked type allows you to select multiple values in the invoked drop-down list.

![Checked Combo Box Example](image)

List Box

The List Box dashboard item allows you to select a value(s) from the list.

- The Checked type allows you to select multiple values in the list box.

![List Box Example](image)

- The Radio type allows you to select only a single value in the radio group.
**Tree View**

The **Tree View** dashboard item displays values in a hierarchical way and allows you to expand/collapse nodes.

**Date Filter**

The **Date Filter** dashboard item allows you to filter dashboard data based on the selected data range. The range can be relative (Last 3 Months), use fixed dates (01-01-2018), or presets (Month-to-date). You can also filter dates before or after a specified date.

The DateFilter item displays a set of intervals that can be used as quick filters.
Neutral Filter Mode

The filter elements show all items selected by default, to indicate that no filtering is currently taking place. Starting from this state, users typically begin each filtering operation by deselecting All, before they select individual items.

An extra click is required to begin any actual filtering operation, because the standard filter mode shows all items selected. This is not an optimal implementation for performance reasons, because it generates filtering criteria that are evaluated by the data layer and/or the database.

To solve these issues, the Neutral Filter Mode is implemented. It is neutral in the sense that it does not apply any criteria to the data source in its default state, resulting in improved performance.

All items are shown deselected. This means that an extra click is no longer required in the most common scenarios, and this behavior is familiar to end users from websites world-wide.

Built-in UI does not provide a command to switch the filter mode. Reload a dashboard after switching the mode.

The Neutral Filter Mode helps in a situation when there is a potential "dead lock", due to the fact that multiple filter elements influence each other. The Clear Master Filter button resets the filters.
Tab Container

The **Tab container** dashboard item allows you to split the dashboard layout into several pages. Common filter controls for large elements in a dashboard can be located on a separate tab page.

Click the tab page's header to switch between tab pages: