# Contents

Preface ............................................................................................................................................................ v
  Audience ...................................................................................................................................................... vii
  Documentation Accessibility ................................................................................................................... vii
  Related Resources ................................................................................................................................... vii
  Conventions............................................................................................................................................... vii

1 Getting Started with Oracle Data Visualization Desktop
   About Oracle Data Visualization Desktop........................................................................................ 1-1
   Getting Started with Samples ................................................................................................................ 1-1

2 Exploring Your Content
   Typical Workflow for Exploring Content ............................................................................................ 2-1
   Choosing Data Sources ......................................................................................................................... 2-2
   Adding Data Elements to Visualizations ............................................................................................ 2-3
   Adding Data Elements to Drop Targets ............................................................................................. 2-3
   Adding Data Elements to Visualization Drop Targets ....................................................................... 2-4
   Adding Data Elements to a Blank Canvas ......................................................................................... 2-6
   Adding Advanced Analytics to Visualizations .................................................................................. 2-7
   Sorting Data in Visualizations ............................................................................................................. 2-7
   Adjusting the Canvas Layout ............................................................................................................... 2-8
   Changing Visualization Types ............................................................................................................. 2-8
   Adjusting Visualization Properties .................................................................................................... 2-10
   Working with Color.............................................................................................................................. 2-10
   Color in Visualizations ......................................................................................................................... 2-11
   Setting Visualization Colors ............................................................................................................... 2-11
   Undoing and Redoing Edits .................................................................................................................... 2-15
   Reversing Visualization Edits .............................................................................................................. 2-15
   Refreshing Visualization Content ......................................................................................................... 2-15
   Exploring Data Using Filters ................................................................................................................ 2-16
   About Filters and Filter Types ............................................................................................................. 2-16
   How Visualizations and Filters Interact .............................................................................................. 2-17
   About Automatically Applied Filters ................................................................................................ 2-18
3 Adding Your Own Data

Typical Workflow for Adding Data from Data Sources ................................................................. 3-1
About Data Sources ..................................................................................................................... 3-2
Adding a Spreadsheet as a Data Source ..................................................................................... 3-2
  About Adding a Spreadsheet as a Data Source ...................................................................... 3-3
  Adding a Spreadsheet as a Data Source in Data Visualization Desktop .............................. 3-4
  Adding a Spreadsheet as a Data Source from Excel Using the Smart View Plug-In .......... 3-4
  Adding a Spreadsheet as a Data Source in Data Visualization Desktop .............................. 3-5
Connecting to Oracle Applications Data Sources ..................................................................... 3-6
  Creating Oracle Applications Connections ............................................................................. 3-6
  Composing Data Sources from Oracle Applications Connections .................................. 3-7
  Editing Oracle Applications Connections ............................................................................... 3-7
  Deleting Oracle Applications Connections ........................................................................... 3-8
Connecting to Database Data Sources .......................................................................................... 3-8
  Creating Database Connections .............................................................................................. 3-8
  Creating Data Sources from Databases .................................................................................. 3-8
  Editing Database Connections .................................................................................................. 3-9
  Deleting Database Connections ............................................................................................... 3-9
Adding Data to a Project .............................................................................................................. 3-10
Exploring a Data Source with Smart Insights ........................................................................... 3-10
Modifying Uploaded Data Sources ............................................................................................ 3-12
D Data Visualization SDK Reference

About the Oracle Data Visualization SDK ................................................................. D-1
Using the Data Visualization SDK to Create Plug-ins .............................................. D-2
Creating the Visualization Plug-in Development Environment ............................... D-3
Creating a Skeleton Visualization Plug-in ................................................................. D-3
Creating a Skeleton Skin or Unclassified Plug-in .................................................... D-4
Developing a Visualization Plug-in ........................................................................... D-5
Running Data Visualization in SDK Mode and Testing the Visualization ................ D-5
Validating the Visualization Plug-in .......................................................................... D-5
Building, Packaging, and Deploying the Visualization Plug-in ............................... D-6
Deleting Plug-ins from the Development Environment ........................................... D-6
Preface

Learn how to explore data using Oracle Data Visualization Desktop.

Topics

• Audience
• Related Resources
• Conventions

Audience

*Oracle Data Visualization Desktop User’s Guide* is intended for business users who use Oracle Data Visualization Desktop to upload data, analyze data within visualizations, work with their favorite projects, and import and export their projects.

Documentation Accessibility


Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit [http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info](http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info) or visit [http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs](http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs) if you are hearing impaired.

Related Resources

These related Oracle resources provide more information.

• Oracle Business Analytics Product Information
• Oracle Community Forum
• Oracle Data Visualization Desktop Installation Download
• Oracle Data Visualization Samples

Conventions

Conventions used in this document are described in this topic.
Text Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>boldface</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td><strong>italic</strong></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td><strong>monospace</strong></td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
</tr>
</tbody>
</table>

Videos and Images

Your company can use skins and styles to customize the look of the Oracle Business Intelligence application, dashboards, reports, and other objects. It is possible that the videos and images included in the product documentation look different than the skins and styles your company uses.

Even if your skins and styles are different than those shown in the videos and images, the product behavior and techniques shown and demonstrated are the same.
This topic describes the benefits of using Oracle Data Visualization Desktop and explains how to get started using the samples provided.

Topics:

- About Oracle Data Visualization Desktop
- Getting Started with Samples

About Oracle Data Visualization Desktop

You can use Oracle Data Visualization Desktop to explore analytical data visually and on an individual basis.

Oracle Data Visualization Desktop makes it easy to visualize your data so you can focus on exploring interesting data patterns. Just upload data files or connect to Oracle Applications or a database, select the elements that you’re interested in, and let Oracle Data Visualization Desktop find the best way to visualize it. Choose from a variety of visualizations to look at data in a specific way.

Oracle Data Visualization Desktop’s benefits include:

- A personal, single-user desktop application.
- Offline availability.
- Completely private analysis.
- Full control of data source connections.
- Direct access to on-premises data sources.
- Lightweight single-file download.
- No remote server infrastructure.
- No administration tasks.

Getting Started with Samples

Use the samples provided to discover all the capabilities of Oracle Data Visualization Desktop, and to learn the best practices.

Because these samples use business functions such as trending, binning, forecasting, and clustering, you can use them as a quick reference when you create your own visualization.
The sample data set is based on Sales Orders data and contains meaningful
dimensions, distributions, examples of data wrangling, calculated columns, and more.

You can optionally download the samples during installation. If you didn’t download
the samples during installation, then you can still get them by uninstalling and then
reinstalling Oracle Data Visualization Desktop. Your personal data isn’t deleted if you
uninstall and reinstall Oracle Data Visualization Desktop.
Exploring Your Content

This topic describes the many ways that you can explore and work with content.

Topics:

• Typical Workflow for Exploring Content
• Choosing Data Sources
• Adding Data Elements to Visualizations
• Adding Advanced Analytics to Visualizations
• Sorting Data in Visualizations
• Adjusting the Canvas Layout
• Changing Visualization Types
• Adjusting Visualization Properties
• Working With Color
• Undoing and Redoing Edits
• Reversing Visualization Edits
• Refreshing Visualization Content
• Exploring Data Using Filters
• Exploring Data in Other Ways
• About Composing Expressions
• Creating Calculated Data Elements
• Building Stories
• Identifying Content with Thumbnails
• Viewing Streamlined Content
• Using Search and BI Ask

Typical Workflow for Exploring Content

Here are the common tasks for exploring content.
Choosing Data Sources

Before you can begin to explore data in a project, you must select a data source for that information. You can select Oracle Applications, databases, or uploaded data files as your data sources.

1. In the Add Data Source dialog, select the appropriate data source containing the data that you want to visualize. This dialog opens automatically when you create a new project.

2. Click Add to Project.
Note: To add data sources to an existing project, right-click the Data Elements pane, and then click **Add Data Source**. When you add two or more data sources to a project, they must match. Sometimes the system matches them automatically, but sometimes you need to match them manually using the **Source Diagram** option. If the data sources don’t match, then the additional data sources you added aren’t displayed in the Data Elements pane, but are displayed in the Data Sources pane. See **Blending Data That You Added**.

Adding Data Elements to Visualizations

You can add data elements to visualizations in various ways.

**Topics:**

- Adding Data Elements to Drop Targets
- Adding Data Elements to Visualization Drop Targets
- Adding Data Elements to a Blank Canvas

Adding Data Elements to Drop Targets

After you select the data sources for your project, you can begin to add data elements such as measures and attributes to visualizations. A drop target is the visualization element (for example, Columns) onto which you can drop a compatible data element (for example, Category) from the data source.

Here are some of the ways that you can add data elements to drop targets:

- Drag and drop one or more data elements from the Data Elements pane to drop targets in the Explore pane.

  The data elements are automatically positioned in the best drop target in the Explore pane, and if necessary the visualization changes to optimize its layout.
• Double-click data elements in the Data Elements pane to add them to the Explore pane.

• Replace a data element in the Explore pane by dragging it from the Data Elements pane and dropping it over an existing data element already in the Explore pane.

• Swap data elements in the Explore pane by dragging a data element already inside the pane and dropping it over another data element in the pane.

• Remove a data element from the Explore pane by clicking the X in the data element token.

Adding Data Elements to Visualization Drop Targets

You can use visualization drop targets to help you position data elements in the optimal locations for exploring content.

• When you drag and drop a data element over to a visualization (but not to a specific drop target), you’ll see a blue outline around the recommended drop targets in the visualization. In addition, you can identify any valid drop target because you’ll see a green plus sign icon appear next to your data element.
**Note:** If you aren’t sure where to drag and drop any data element, then drag and drop the data element anywhere over the visualization instead of to a specific drop target.

After you drop data elements into visualization drop targets or when you move your cursor outside of the visualization, the drop targets disappear.

- To display the drop targets again in the visualization, on the visualization toolbar, click **Show Assignments**. You can also do this to keep the visualization drop targets in place while you work.
Adding Data Elements to a Blank Canvas

You can add data elements directly from the Data Elements pane to a blank canvas.

Confirm that you’re working in the Prepare canvas. Drag one or more data elements to the blank canvas or between visualizations on the canvas. A visualization is automatically created and the best visualization type and layout are selected. For example, if you add time and product attributes and a revenue measure to a blank canvas, the data elements are placed in the best locations and the Line visualization type is selected.
Note: If there are visualizations already on the canvas, then you can drag and drop data elements between them.

Adding Advanced Analytics to Visualizations

Advanced Analytics are statistical functions that you apply to enhance the data displayed in visualizations for example, Clusters, Outliers, and Trend Lines.

As well as the Analytics menu options available in the user interface, you can also use analytics functions to create your own calculated columns that reference statistical scripts. See Evaluate_Script in Analytics Functions.

You use advanced analytics options to augment existing visualizations for example, to highlight outliers or overlay trendlines, and you can easily apply them to a visualization.

Prerequisites

Before you can use analytic options in Oracle Data Visualization:

• Use the 'Install Advanced Analytics' Start Menu option to install the correct version of Oracle R.  
  See FAQs for Installing Oracle Data Visualization Desktop.

• Create an analysis or chart to which you can apply one or more analytic options.

Using Analytic Options

1. To display the available analytic options, click the Analytics magnifying glass icon from the menu.

2. Apply an option to the chart by:

   • Drag and drop: Click an analytic option from the menu and drag it either to the palette, or onto a visualization.

   • Right-click: Right-click anywhere on a visualization, and select an analytic option from the menu.

Sorting Data in Visualizations

Sometimes you’re working with a lot of data in visualizations. To optimize your view of that data, you need to sort it.
1. In the Explore pane, click the data element you want to sort.

![Sort pane](image)

2. Select **Sort**.

3. Select a sort option such as **A to Z** or **Low to High**. The available sort options are based on the data element you’re sorting.

**Adjusting the Canvas Layout**

You can adjust the look and feel of visualizations on the Visualize canvas to make them more visually attractive. For example, you can create a visualization and then copy it to the canvas. You can then modify the data elements in the duplicated visualization, change the visualization type, and then resize it.

- To customize the width and height pixels of the canvas on the project toolbar, click **Canvas Settings** and then select **Canvas Properties**. By default, the canvas is automatically sized based on the size of your browser window.

- To add another canvas tab, go to the row of canvas tabs at the bottom of the canvas page and select **Add Canvas**.

- To delete a visualization from the canvas, right-click it and select **Delete Visualization**.

- To rearrange a visualization on the canvas, drag and drop the visualization to the location (the space between visualizations) where you want it to go. The target drop area is displayed with a blue outline.

- To resize a visualization, use your cursor to drag the edges to size it.

- To copy a visualization on the canvas, right-click it and select **Copy Visualization**.

- To paste a copied visualization on the canvas, right-click the canvas and select **Paste Visualization**.

**Changing Visualization Types**

You can change visualization types to maximize the graphical representation of the data you’re exploring.

The visualization type is automatically chosen based on the selected data elements. However, this is true when you create a new visualization by dragging data elements to a blank area on the canvas. After a visualization is created, dragging additional data elements to it won’t change the visualization type automatically.
1. Select a visualization on the canvas, and on the visualization toolbar, click **Change Visualization Type**.

![Visualization toolbar](image)

**Note:** You can also add a new visualization to the canvas by dragging it from the Visualizations pane to the canvas.

![Visualizations pane](image)

2. In the View Select dialog, select a visualization type. For example, change the visualization type from Bar to Stacked Bar.

**Note:** You can choose any visualization type, but the visualization types that are highlighted in blue are the recommended ones based on the data elements you select and where they’re positioned on the canvas.

![Visualization types](image)

When you change the visualization type, the data elements are moved to matching drop target names. If an equivalent drop target doesn’t exist for the new
visualization type, then the data elements are moved to a drop target labeled **Unused**. You can then move them to the drop target you prefer.

### Adjusting Visualization Properties

You generally don’t need to change visualization properties because the default selections cover most cases. You might want to make adjustments such as hiding the legend, changing axis labels, or adding a URL link.

- On the active visualization toolbar, click **Menu**, and then select **Properties** to display the Properties dialog.

The properties you can edit depend on the type of visualization you’re handling.

- Adjust visualization properties:

<table>
<thead>
<tr>
<th>Properties Tab</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics</td>
<td>Add reference lines, trend lines, and bands to display at the minimum or maximum values of a measure included in the visualization.</td>
</tr>
<tr>
<td>Axis</td>
<td>Set horizontal and vertical value axis labels and start and end axis values.</td>
</tr>
<tr>
<td>Data Sets</td>
<td>Override the way the system automatically blends data from two data sources.</td>
</tr>
<tr>
<td>Edge Labels</td>
<td>Show or hide row or column totals and wrap label text.</td>
</tr>
<tr>
<td>General</td>
<td>Format titles, position the legend, and customize descriptions.</td>
</tr>
<tr>
<td>Action</td>
<td>Add URLs or links to insights in Tile, Image, and Text Box visualizations. If you use Chrome for Windows or Android, the Description text field displays a <strong>Dictate</strong> button (microphone) that you can use to record the description via audio.</td>
</tr>
<tr>
<td>Style</td>
<td>Set the background and border color for Text visualizations.</td>
</tr>
<tr>
<td>Values</td>
<td>Specify data value display options including the aggregation method such as sum or average, and number formatting such as percent or currency.</td>
</tr>
</tbody>
</table>

### Working with Color

This topic covers how you can work with color to enhance visualizations.
Color in Visualizations

You can work with color to make visualizations more attractive, dynamic, and informative. You can color a series of measure values (for example, Sales or Forecasted Sales) or a series of attribute values (for example, Product and Brand).

The Visualize canvas has a Color drop target where you can put a measure column, attribute column, or set of attributes columns. Note how the canvas assigns color to the columns that are included in the Color drop target:

- When a measure is in the Color drop target, then you can select different measure range types (for example, single color, two color, and three color) and specify advanced measure range options (for example, reverse, number of steps, and midpoint).
- When you have one attribute in the Color drop target, then the stretch palette is used by default. Color palettes contain a set number of colors (for example, 12 colors), and those colors repeat in the visualization. The stretch palette extends the colors in the palette so that each value has a unique color shade.
- If you have multiple attributes in the Color drop target, then the hierarchical palette is used by default, but you can choose to use the stretch palette, instead. The hierarchical palette assigns colors to groups of related values. For example, if the attributes in the Color drop target are Product and Brand and you have selected Hierarchical Palette, then in your visualization, each brand has its own color, and within that color, each product has its own shade.

Setting Visualization Colors

Use the Visualize canvas to modify the visualization’s color. Your color choices are shared across all visualizations on the canvas, so if you change the series or data point color in one visualization, then it appears on the other visualizations.

Accessing Color Options

- In the Visualize canvas, click Color. The available color options depend on how the measures and attributes are set up in your visualization.

Changing the Color Palette

The application includes several color palettes. Each palette contains 12 colors, but you can use the color stretching option to expand the colors in the visualization.
1. In the Visualize canvas, click **Color** and select **Manage Assignments**. The Manage Color Assignments dialog is displayed.

2. Locate the **Series Color Palette** and click the name of the color palette used in the visualization (for example, Default or Alta).

![Manage Color Assignments](image)

3. From the list, select the color palette that you want to apply to the visualization.

**Managing Color Assignments**

Instead of using the palette’s default colors, you can use the Manage Color Assignments feature to choose specific colors to fine-tune the look of your visualizations.

1. In the Visualize canvas, click **Color** and select **Manage Assignments**. The Manage Color Assignments dialog is displayed.

2. If you’re working with a measure column, you can do the following:

   - Click the box containing the color assigned to the measure. From the color picker dialog, select the color that you want to assign to the measure. Click **OK**.
   - Hover over the measure name and click **Edit option** to expand the panel containing the measure’s color information. Click **Measure Options** to change the color range, if necessary. Note that the first six color range options are determined by the selected series color palette, but six standard color ranges are also available (for example, two color and stoplight three color).
• Specify how you want the color range to be displayed for the measure (for example, reverse the color range, pick a different color range, and specify how many shades you want in the color range).

3. If you’re working with an attribute column, then click the box containing the color assignment that you want to change. From the color picker dialog, select the color that you want to assign to the value. Click OK.
Resetting Colors
You can experiment with visualization colors and then easily revert to the visualization’s original colors.

In the Visualize canvas, click **Color** and select **Reset Visualization Colors**.

Applying or Removing the Stretch Palette
Color palettes have a set number of colors, and if your visualization contains more values than the number of color values, then the palette colors are repeated. Use the Stretch Palette option to expand the number of colors in the palette. Stretch coloring adds light and dark shades of the palette colors to give each value a unique color. For some visualizations, stretch coloring is used by default.

In the Visualize canvas, click **Color** and click **Stretch Palette** to turn this option on or off.

Applying or Removing the Hierarchical Palette
The hierarchical palette assigns color groups for certain attributes. For example, if your visualization contains Revenue, Product, and Brand, and Product and Brand are in the color drop area, then each brand has its own color, and within that color each product has its own shade. For some visualizations, hierarchical coloring is used by default. In some cases, you can toggle between Hierarchical Palette and Stretch Palette.

When two attributes (for example, Brand, Product) are colored hierarchically and then the attributes are reordered, the application maintains the color hierarchy as Brand, Product. To switch the order of the hierarchical coloring after switching the order of the attributes in the visualization, you must reset the visualization colors or turn hierarchical coloring off and then on again. The application doesn’t use metadata to determine the hierarchical order of attributes (for example, Year, Month), it uses only the order of the attributes in the Color drop target for the ordering of the hierarchy.
In the Visualize canvas, click **Color** and click **Hierarchical Palette** to turn this option on or off.

You can switch the color hierarchy for the attributes. The order of the attributes in the Color drop target determines the hierarchical order of the attributes. When two attributes (for example, Brand, Product) are colored hierarchically and then the attributes are reordered (for example, Product, Brand), the application maintains the original color hierarchy (for example, as Brand, Product).

1. In the Visualize canvas, click **Color** and click **Hierarchical Palette** to turn this option off.

2. In the Visualize canvas, click **Color** and click **Hierarchical Palette** to turn this option back on.

**Applying a Repeating Color Palette**

In some cases, you might want to use a repeating color palette in your visualization. If your visualization contains more values than colors in the palette, then the colors are reused and aren’t unique.

1. In the Visualize canvas, click **Color** and click **Hierarchical Palette** to turn this option off.

2. In the Visualize canvas, click **Color** and click **Stretch Palette** to turn this option off.

**Undoing and Redoing Edits**

You can quickly undo your last action and then redo it if you change your mind. For example, you can try a different visualization type when you don’t like the one you’ve just selected, or you can go back to where you were before you drilled into the data. These options are especially useful as you experiment with different visualizations.

On the project toolbar, click the **Undo Last Edit** or the **Redo Last Edit** button.

**Reversing Visualization Edits**

You can easily cancel the edits you make in a project. For example, if you move data elements to different drop targets in a visualization, and you decide you don’t like those changes, you can easily reverse your changes.

To reverse any edits that you made in a project since you last saved it, on the project toolbar click **Canvas Settings** and select **Revert to Saved**.

**Refreshing Visualization Content**

To see if a newer set of data is available for exploration in a project, you can refresh the data source data and metadata.

- On the project toolbar click **Canvas Settings** and select **Refresh Data**. This action clears the data cache and reruns queries that retrieve the latest data from the data sources. This data is then displayed on the canvas.
Click **Canvas Settings** on the project toolbar and select **Refresh Data Sources**. This action refreshes the data and any project metadata such as a column name change in the uploaded data source.

### Exploring Data Using Filters

This topic describes how you can use filters to exclude data that you’re less interested in exploring, and instead focus on key data.

**Topics:**

- About Filters and Filter Types
- How Visualizations and Filters Interact
- About Automatically Applied Filters
- Creating Filters on a Project
- Creating Filters on a Visualization
- Creating Filters on a Canvas
- Moving Filter Panels
- Applying Range Filters
- Applying List Filters
- Applying Date Filters
- Building Expression Filters

### About Filters and Filter Types

Filters reduce the amount of data shown in visualizations, canvases, and projects. The types of filters you can use are Range, List, Date, and Expression.
Filter types are automatically determined based on the data elements you choose as filters.

- Range filters are generated for data elements that are number data types and that have an aggregation rule set to something other than none. Range filters are applied to data elements that are measures, and that limit data to a range of contiguous values, such as revenue of $100,000 to $500,000. Or you can create a range filter that excludes (as opposed to includes) a contiguous range of values. Such exclusive filters limit data to noncontiguous ranges (for example, revenue less than $100,000 or greater than $500,000). See Applying Range Filters.

- List filters are applied to data elements that are text data types and number data types that are not aggregatable. See Applying List Filters.

- Date filters use calendar controls to adjust time or date selections. You can either select a single contiguous range of dates, or you can use a date range filter to exclude dates within the specified range. See Applying Date Filters.

- Expression filters let you define more complex filters using SQL expressions. See Building Expression Filters.

How Visualizations and Filters Interact

There are several ways to specify how visualizations and filters interact.

How Filters Interact

Note how filters are applied and interact:

- Filter Bar: Any filters that are added to the filter bar are applied to all visualizations on all canvases in the project. These project-level filters are always applied first, before any filters you include on the visualizations.

- Filter Bar with Limit Values Applied: If you add more than one filter to the filter bar, then by default the filters restrict each other based on the values that you select. For example, if you have filters for Product Category and Product Name, and if you set the Product Category filter to Furniture and Office Supplies, then the options in the Product Name filter value pick list is limited to the product names of furniture and office supplies. However, you can use the Limit Values option to remove or limit how the filters in the filter bar restrict each other.

- Filters on Visualizations: Filters that you specify on an individual visualization are applied to only that visualization after the filters on the filter bar are applied. If you select the Use as Filter option and select the data points that are being used as a filter in the visualization, then filters are generated in the other visualizations.

How Visualizations Interact

You use the Synchronize Visualizations setting to specify how the visualizations on your canvas interact. By default, visualizations are linked for automatic synchronization. You can deselect Synchronize Visualizations to unlink your visualizations and turn automatic synchronization off.
When **Synchronize Visualizations** is on (selected), then all filters on the filter bar and actions that produce filters (such as Drill, Keep Selected, Remove Selected) are applied to all visualizations on the canvas. For example, if you have a canvas with multiple visualizations and you drill into one of the visualizations, a corresponding filter is added to the filter bar and it affects all visualizations on the canvas. Note that any visualization-level filters are applied to only the visualization.

When **Synchronize Visualizations** is off (deselected), then analytic actions such as Drill or Keep Selected affect only the visualization to which you applied the action. In this mode, the filters are displayed in a small gray filter bar within each visualization.

**About Automatically Applied Filters**

By default, the filters in the filter bar and filter drop target are automatically applied. However, you can turn this behavior off if you want to manually apply the filters.

When **Auto-Apply Filters** is selected, then the selections you make in the filters bar or filters drop target are immediately applied to the visualizations. When **Auto-Apply Filters** is off (deselected), the selections you make in the filters bar or filters drop aren’t applied to the canvas until you click the **Apply** button in the list filter panel.

To turn off **Auto-Apply**, go to the filters bar, click **Actions**, and then select **Auto-Apply Filters**.

**Creating Filters on a Project**

You can add filters to limit the data that’s displayed in all the visualizations on all of the canvases in your project.

For example, you can add a filter so that all of the visualizations in the project show only data for the years 2012, 2013, and 2014.

Other ways you can limit the data in visualizations:

- Instead of or in addition to adding filters to the canvas, you can add filters to individual visualizations. See **Creating Filters on a Visualization**.

- You can add a filter control to the canvas. A filter control is a type of visualization that allows you to choose which data to display in the other visualizations on the
canvas. For example, you can provide a list of customer names that the user can select or deselect. See Creating Filters on a Canvas.

- There are several options that you can use to define how filters interact with each other. See Specifying How Visualizations Interact with One Another.

Any filters included on the canvas are applied before the filters chosen from an individual visualization.

1. Go to the Data Elements pane and drag a data element to the filter bar.

2. Set the filter values. How you set the values depends upon the data type that you’re filtering.
   - Apply a range filter to filter on columns such as Cost or Quantity Ordered. See Applying Range Filters.
   - Apply a list filter to filter on columns such as Product Category or Product Name. See Applying List Filters.
   - Apply a date filter to filters on columns such as Ship Date and Order Date. See Applying Date Filters.

3. (Optional) Click the filter’s Menu and hover over the Limit Values option to specify how the filter interacts with the other filters in the filter bar. Note the following:
   - By default, the Auto option causes the filter to limit other related filters in the filter bar.
     For example, if you have filters for Product Category and Product Name, and if you set the Product Category filter to Furniture and Office Supplies, then the options in the Product Name filter value pick list is limited to the product names of furniture and office supplies. You can select None to turn this limit functionality off.
   - You can specify any individual filter in the filter bar that you don’t want to limit.
     For example, if you have filters for Product Category, Product Sub Category, and Product Name, and in the Limit Values option for the Product Category filter you click Product Sub Category, then the product subcategory filter shows all values and not a list of values limited by what you select for Product Category. However, the values shown for Product Name is limited to what you select for Product Category.

4. (Optional) Click the Filters Bar Menu and select Auto Apply Filters to turn off the automatic apply. When you turn off the automatic apply, then each filter’s selection displays an Apply button that you must click to apply the filter to the visualizations on the canvas.

Creating Filters on a Visualization

You can add filters to limit the data that’s displayed in a specific visualization on the canvas.

Visualization filters can be automatically created by drilling, selecting Keep Selected, or selecting Remove Selected on the visualization’s Menu when the Synchronize Visualizations option in the project’s Canvas Settings menu is turned off.
Instead of or in addition to adding filters to an individual visualization, you can add filters to the project or to an individual canvas. See Creating Filters on a Project. Any filters included on the canvas are applied before the filters that you add to an individual visualization.

1. Confirm that the Explore pane is displayed.

2. In the canvas, click to select the visualization that you want to add a filter to.

3. From the Data Elements pane, drag a data element to the Filter drop target.

4. In the Filter drop target, click the data elements name and set the filter values. How you set the values depends upon the data type that you’re filtering.

   - To set filters on columns such as Cost or Quantity Ordered, see Applying Range Filters.
   - To set filters on columns such as Product Category or Product Name, see Applying List Filters.
   - To set filters on columns such as Ship Date and Order Date, see Applying Date Filters.

5. (Optional) Click the Filters Bar Menu and select Auto Apply Filters to turn off automatic apply for all filters on the canvas and within the visualization. When you turn off automatic apply, then each filter’s selection displays an Apply button that you must click to apply the filter to the visualization.

Creating Filters on a Canvas

You can use any visualization on the canvas to filter the other visualizations on the canvas, or you can add a specific visualization to function as a filter control. A filter control allows you to select and deselect items to be displayed in the other visualizations on the canvas.

For example, in the Filter Controls pane, you add the List filter control for Product Category. Then, you switch to the Data Elements pane and create a stacked bar visualization that includes Sales, Forecasted Sales, Product Category, and Order Year. In the filter control, you can select and deselect categories to specify whichever
forecasted yearly sales data that you want to analyze.

Or if the visualizations on the canvas are similar, then you can set the **Use as Filter** option to use the selections that you make in one visualization to filter the other similar visualizations on the canvas.

1. Click **Filter Controls** to display the Filter Controls pane.

2. Select a filter control type and drag it to the canvas. The filter control is displayed as a visualization on the canvas.

3. Click **Data Elements** to switch to the Data Elements pane.

4. In the data elements pane, locate the data element you want to filter by and drag it to the filter control on the canvas.

5. Add other filters to the filter bar and visualizations to the canvas as needed.
   
   • Add filters to individual visualizations. See **Creating Filters on a Visualization**.
   
   • Add filters to the project. See **Creating Filters on a Project**.
   
   • Use several options to define how filters interact with each other. See **Specifying How Visualizations Interact with One Another**.

6. Optional. To use the selections that you make in one visualization to filter similar visualizations on the canvas, go to the visualization’s **Menu** and select the **Use as Filter** option.

**Moving Filter Panels**

You can move filter panels from the filter bar to a different spot on the canvas.

When you expand filters in the filter bar, it can block your view of the visualization that you’re filtering. Moving the panels makes it easy to specify filter values without having to collapse and reopen the filter selector.

• To detach a filter panel from the filter bar, place the cursor at the top of the filter panel until it changes to a scissors icon, then click it to detach the panel and drag it to another location on the canvas.
• To reattach the panel to the filter bar, click the reattach panel icon.

Applying Range Filters

You use Range filters for data elements that are number data types and that have an aggregation rule set to something other than none.

Range filters are applied to data elements that are measures. Range filters limit data to a range of contiguous values, such as revenue of $100,000 to $500,000. Or you can create a range filter that excludes (as opposed to includes) a contiguous range of values. Such exclusive filters limit data to two noncontiguous ranges (for example, revenue less than $100,000 or greater than $500,000).

1. Click the filter to view the Range list.
2. In the Range list, click By to view the Selections list.
   All members that are being filtered have check marks next to their names.
3. Optionally, in the Selections list, for any selected member that you want to remove from the list of selections, click the member.
   The check mark disappears next to the previously selected member.
4. Optionally, in the Selections list, for any non selected member that you want to add to the list of selections, click the member.
   A check mark appears next to the selected member.
5. Optionally, set the range that you want to filter on by moving the sliders in the histogram. The default range is from minimum to maximum, but as you move the sliders, the Start field and End field adjust to the range you set.
6. Click outside of the filter to close the filter panel.
Applying List Filters

List filters are applied to data elements that are text data types and non aggregatable number data types. After you add a list filter, you can change the selected members that it includes and excludes.

1. Click the filter to view the Selections list.
2. Optionally, to the left of the Selections list, use the Search field to find the members you want to add to the filter.
3. Locate the member you want to include and click it to add it to the Selections list. You can locate members to include in two ways:
   - Scroll through the list of members.
   - Search for members. You can use the wildcards * and ? for searching.
4. Optionally, in the Selections list, you can click a member to remove it from the list.
5. Optionally, in the Selections list, you can click the eye icon next to a member to cause it to be filtered out but not removed from the selections list.
6. Optionally, in the Selections list, you can click the actions icon at the top, and select Exclude Selections to exclude the members in the Selections list.
7. Optionally, click Add All or Remove All at the bottom of the filter panel to add or remove all members to or from the Selections list at one time.
8. Click outside of the filter panel to close it.
9. Optionally, to clear the filter selections or remove all filters at one time, right-click in the filter bar, and then select Clear Filter Selections or Remove All Filters.
10. Optionally, to remove a single filter, right-click the filter in the filter bar, and then select Remove Filter.

Applying Date Filters

Date filters use calendar controls to adjust time or date selections. You can select a single contiguous range of dates, or use a date range filter to exclude dates within the specified range.

1. Click the filter to view the Calendar Date list.
2. In Start, select the date that begins the range that you want to filter.
   Use the Previous arrow and Next arrow to move backward or forward in time, or use the drop-down lists to change the month or year.
3. In End, select the date that ends the range that you want to filter.
4. Optionally, to start over and select new dates, in the filter, click Action and then select Clear Filter Selections.
5. Click outside of the filter to close the filter panel.
Building Expression Filters

Using expression filters, you can define more complex filters using SQL expressions. Expression filters can reference zero or more data elements.

For example, you can create the expression filter "Sample Sales"."Base Facts"."Revenue" < "Sample Sales"."Base Facts"."Target Revenue". After applying the filter, you see only the items that didn’t achieve their target revenue.

You build expressions using the Expression Builder. You can drag and drop data elements to the Expression Builder and then choose operators to apply. Expressions are validated for you before you apply them. See About Composing Expressions.

1. On the filter bar, click Action and then select Add Expression Filter.
2. In the Expression Filter panel, compose an expression.
3. In the Label field, give the expression a name.
4. Click Validate to check if the syntax is correct.
5. When the expression filter is valid, then click Apply. The expression is applied to the visualizations on the canvas.

Exploring Data in Other Ways

While adding filters to visualizations helps you narrow your focus on certain aspects of your data, you can take a variety of other analytic actions to explore your data (for example, drilling, sorting, and selecting). When you take any of these analytic actions, the filters are automatically applied for you.

Here are some of the analytic actions that you can take when you right-click content in visualizations:

- Use Sort to sort attributes in a visualization, such as product names from A to Z. If you’re working with a table view, then the system always sorts the left column first. In some cases where specific values display in the left column, you can’t sort the center column. For example, if the left column is Product and the center column is Product Type, then you can’t sort the Product Type column. To work around this issue, swap the positions of the columns and try to sort again.

- Use Drill to drill to a data element, and drill through hierarchies in data elements, such as drilling to weeks within a quarter. You can also drill asymmetrically using multiple data elements. For example, you can select two separate year members that are columns in a pivot table, and drill into those members to see the details.
• Use **Drill to [Attribute Name]** to directly drill to a specific attribute within a visualization.

• Use **Keep Selected** to keep only the selected members and remove all others from the visualization and its linked visualizations. For example, you can keep only the sales that are generated by a specific sales associate.

• Use **Remove Selected** to remove selected members from the visualization and its linked visualizations. For example, you can remove the Eastern and Western regions from the selection.

• Use **Add Reference Line or Band** to add a reference line to highlight an important fact depicted in the visualization, such as a minimum or maximum value. For example, you might add a reference line across the visualization at the height of the maximum Revenue amount. You also might add a reference band to more clearly depict where the minimum and maximum Revenue amounts fall on the Revenue axis.

**Note:** To add a reference band to a visualization, right-click it and select **Add Reference Line** to display the Properties dialog. On the Analytics tab, in the **Method** field, toggle **Line** to **Band**. See Adjusting Visualization Properties.

### Composing Expressions

You can compose an expression to use in an expression filter or in a calculation. For both expression filters and calculations, you use the Expression Builder. Expressions that you create for expression filters must be Boolean (that is, they must evaluate to true or false). Expressions that you create for calculations aren’t limited in this way.

**Note:** While you compose expressions for both expression filters and calculations, the end result is different. A calculation becomes a new data element that you can add to your visualization. An expression filter, on the other hand, only appears in the filter bar and can’t be added as a data element to a visualization. You can create an expression filter from a calculation, but you can’t create a calculation from an expression filter. See Creating Calculated Data Elements and Building Expression Filters.

You can compose an expression in various ways:

• Directly enter text and functions in the Expression Builder.

• Add data elements from the Data Elements pane (drag and drop, or double-click).

• Add functions from the function panel (drag and drop, or double-click).

See also Expression Editor Reference.

### Creating Calculated Data Elements

You can create a new data element (typically a measure) to add to your visualization. For example, you can create a new measure called **Profit** that uses the **Revenue** and **Discount Amount** measures.

1. Start the Add Calculation dialog in one of two ways:
At the bottom of the Data Elements pane, click **Add Calculation**.

In the Data Elements pane, right-click the **My Calculations** folder and select **Add Calculation**.

2. In the Expression Builder, compose an expression. See About Composing Expressions and Expression Editor Reference.

3. Optionally, click **Validate**.

4. In the field, enter a data element name.

5. Click **Save**.

The new data element is created and you can use it in your visualizations as you would any other data element. For example, in visualization drop targets or in filters.

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### Building Stories

This topic covers how you capture insights and group them into stories.

#### Topics

- Capturing Insights
- Shaping Stories

#### Capturing Insights

As you explore data in visualizations, you can capture memorable information within an insight. Insights are active in that they can be changed and refined as many times as you need before you’re ready to share them with others.

Using insights, you can take a snapshot of any information that you see in a visualization and keep track of any moments of sudden realization while you work with the data. You can share insights in the form of a story, but you don’t have to. Your insights can remain a list of personal moments of realization that you can go back to, and perhaps explore more. You can combine multiple insights in a story. You can also link insights to visualizations using the Interaction property. See Adjusting Visualization Properties.

**Note:** Insights don’t take a snapshot of data. They take a snapshot only of the project definition at a certain point in time.

1. On the project toolbar, click **Add Insights**.

2. Select the Narrate canvas.

**Note:** You can also press Ctrl-I to quickly create an insight.
3. To change the name of the insight, right-click the insight’s tab and select **Rename**. Enter the new name of the insight.

4. To include or exclude the insight from the story, right-click the insight’s tab and select **Include in Story**. Names of excluded tabs display in italics.

5. To enter a description of the insight, select **Story Navigator**. A field displays where you can type a description of the insight.

6. Continue adding insights to build a story about your data exploration.

The story builds in the Narrate canvas. Each insight has a tab.

**Shaping Stories**

After you begin creating insights within a story, you can cultivate the look and feel of that story. For example, you can include another insight or hide an insight title.

**Note:** You can have only one story in a project.

1. Go to the Narrate canvas.

2. To change the name of an insight, right-click its tab and select **Rename**. Enter a new name for the insight.

3. To include an insight in the story, right-click its tab and select **Include in Story**. Names of excluded tabs are displayed in italic text.

4. To enter a description of an insight, select **Story Navigator**. A field is displayed where you can enter a description of the insight.
5. Rearrange an insight within a story by dragging and dropping the insight’s tab to
the desired position. A dark blue line tells you where the insight will be positioned.

Identifying Content with Thumbnails

You can quickly identify content on the Home page and within projects using
thumbnails.

- **Project thumbnails** on the Home page show what projects look like when opened.
  Project thumbnails are regenerated when projects are saved.

- **Insight thumbnails** give you a preview of what a project looks like when the
  selected insight is applied. Insight thumbnails are regenerated whenever the
  insights are updated. Insight tooltips are displayed when you hover your mouse
  pointer over an insight in the insight list or over a circle in the Story Navigator.

See Capturing Insights and Building Stories.

Viewing Streamlined Content

You can use the presentation mode to view a project and its visualizations without the
visual clutter of the canvas toolbar and authoring options.

1. On the canvas toolbar, click **Presentation Mode**.

   The project is displayed in presentation mode.

2. To return to the interaction mode, click **Presentation Mode**.

Using Search and BI Ask

This topic describes how you can search for objects, projects, and columns. This topic
also describes how you can use BI Ask to create spontaneous visualizations.

**Topics:**

- Indexing Data for Search and BI Ask
- Visualizing Data with BI Ask
- Searching for Projects and Visualizations
- Search Tips

Indexing Data for Search and BI Ask

When you search or use BI Ask, the search results are determined by what information
has been indexed.

Every two minutes, the system runs a process to index your saved objects, project
content, and data source column information. The indexing process also updates the
index file to reflect any objects, projects, or data sets that you deleted from your
system so that these items are no longer displayed in your search results.
For all data sources, the column metadata is indexed. For example, column name, the
data type used in the column, aggregation type, and so on. Column data is indexed for
Excel spreadsheet and .CSV data source columns with 1,000 or fewer distinct rows.
Note that no database column data is indexed and therefore that data isn’t available in
your search results.

Visualizing Data with BI Ask

Use BI Ask to enter column names into the search field, select them, and quickly see a
visualization containing those columns. You can use this functionality to perform
spontaneous visualizations without having to first build a project.

1. Click the **Find content or visualize** field.

2. Enter your criteria. As you enter the information, the application returns search
results in a drop-down list. If you select an item from this drop-down list, then
your visualized data is displayed.

   - What you select determines the data source for the visualization, and all other
criteria that you enter is limited to columns or values in that data source. The
name of the data source you’re choosing from is displayed in the right side of
the **Find content or visualize** field. Note the following BI Ask search and
visualization example:

![Visualized Data Example](image)

   - You can use the **Find content or visualize** field to search for projects and
visualizations or to use BI Ask. When you enter your initial search criteria, the
drop-down list contains BI Ask results, which are displayed in the **Visualize
data using** section of the drop-down list. Your initial search criteria also build a
search string to find projects and visualizations. That search string is displayed
in the **Search results containing** section of the drop-down list and is flagged
with the magnifying glass icon. See **Search Tips**.
• Excel and .CSV data source columns with 1,000 or less distinct rows are indexed and available as search results. No database data source data values are indexed and available as search results.

3. Enter additional criteria in the search field, select the item that you want to include, and the application builds your visualization.

4. Optional. Enter the name of the visualization that you want your results to be displayed in. For example, enter scatter to show your data in a scatter plot chart, or enter pie to show your data in a pie chart.

The visualization types that you can specify in BI Ask are: area chart, bar chart, bubble chart, funnel chart, gauge, geo map, geographical map, heat map, horizontal bar chart, horizontal stacked bar chart, line bar chart, line chart, pareto chart, pie chart, pipeline, pivot table, radar chart, scatter plot chart, stacked bar chart, tree map, vertical bar chart, vertical stacked bar chart, and waterfall chart.

5. Optional. Click Change Visualization Type to apply a different visualization to your data.

6. Optional. Click Open in Data Visualization to further modify and save the visualization.

7. To clear the search criteria, in the Find content or visualize field, click the X icon.

**Searching for Projects and Visualizations**

From the Home page you can quickly and easily search for saved objects.

Folders and thumbnails for objects that you have recently worked with are displayed on the Home page. Use the search field to locate other content.

Note that in the search field you can also use BI Ask to create spontaneous visualizations. See Visualizing Data with BI Ask.

1. Click the Find content or visualize field.

2. Enter your search criteria by typing either keywords or the full name of an object such as a folder or project. As you enter your criteria, the system builds the search string in the drop-down list. See Search Tips.

The drop-down list contains results that match saved objects, but also can contain BI Ask search results. To see object matches (for example, folders or projects), click the row with the magnifying glass icon (located at the top of the drop-down list in the Search results containing section). Note that any BI Ask matches are displayed in the Visualize data using section of the drop-down list and are flagged with different icons.
3. Click Enter to run the search.

   The objects that match your search are displayed in the Home page.

4. To clear the search criteria, in the Find content or visualize field, click the X icon.

Search Tips

You must understand how the search functionality works and how to enter valid search criteria.

Wildcard Searches

You can use the asterisk (*) as a wildcard when searching. For example, you can specify *forecast to find all items that contain the word “forecast.” However, using two wildcards to further limit a search returns no results (for example, *forecast*).

Meaningful Keywords

When you search, use meaningful keywords. If you search with keywords such as by, the, and in it returns no results. For example, if you want to enter only by in the search field to locate two projects called “Forecasted Monthly Sales by Product Category” and “Forecasted Monthly Sales by Product Name,” then it returns no results.

Items Containing Commas

If you use a comma in your search criteria the search returns no results. For example, if you want to search for quarterly sales equal to $665,399 and enter 665,399 in the search field, then no results are returned. However, entering 655399 does return results.

Date Search

If you want to search for a date attribute, you search using the year-month-date format. Searching with the month/date/year format (for example, 8/6/2016) doesn’t produce any direct matches. Instead, your search results contain entries containing 8 and entries containing 2016.

Searching in Non-English Locales

When you enter criteria in the search field, what displays in the drop-down list of suggestions can differ depending upon your locale setting. For example, if you’re using an English locale and enter sales, then the drop-down list of suggestions contains items named sale and sales. However, if you’re using a non-English locale such as Korean and type sales, then the drop-down list of suggestions contains only items that
are named *sales* and items such as *sale* aren’t included in the drop-down list of suggestions.

For non-English locales, Oracle suggests that when needed, you search using stem words rather than full words. For example, searching for *sale* rather than *sales* returns items containing *sale* and *sales*. Or search for *custom* to see a results list that contains *custom*, *customer*, and *customers*.

**Frequency of Indexing**

If you create or save a project or create a data source and then immediately try to search for the saved project, project content, or column information, then it’s likely that your search results won’t contain matches for these items. If this happens, then wait a few minutes for the indexing process to run, and retry your search. The system automatically runs the indexing process every two minutes.

**Searching for Data Values**

Excel and .CSV data source columns with 1,000 or less distinct rows are indexed and are returned in your search results. Note that database data source data values aren’t indexed and won’t be included in your search results.
Adding Your Own Data

You can add your own data to visualizations for analysis and exploration.

**Topics:**
- Typical Workflow for Adding Data from Data Sources
- About Data Sources
- Adding a Spreadsheet as a Data Source
- Connecting to Oracle Applications Data Sources
- Connecting to Database Data Sources
- Adding Data to a Project
- Exploring a Data Source with Smart Insights
- Modifying Uploaded Data Sources
- Using Data Flows to Curate Data Sources
- Blending Data That You Added
- Changing Data Blending
- Refreshing Data that You Added
- Updating Details of Data that You Added
- Deleting Data Sources
- Managing Data Sources

**Typical Workflow for Adding Data from Data Sources**

Here are the common tasks for adding data from data sources.

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a connection</td>
<td>Create a connection if the data source that you want to use is either Oracle Applications or a database.</td>
<td>Connecting to Oracle Applications Data Sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connecting to Database Data Sources</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td>More Information</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Create a data source</td>
<td>Upload data from a file such as a spreadsheet. Retrieve data from Oracle Applications and from databases if the data isn’t already cached. Creating a data source from Oracle Applications or a database requires you to create a new connection or use an existing connection.</td>
<td>Creating Data Sources from Databases</td>
</tr>
<tr>
<td>Blend data</td>
<td>Blend data from one data source with data from another data source.</td>
<td>Blending Data That You Added</td>
</tr>
<tr>
<td>Refresh data</td>
<td>Refresh data for the files when newer data is available. Or refresh the cache for Oracle Applications and databases if the data is stale.</td>
<td>Refreshing Data that You Added</td>
</tr>
<tr>
<td>Extend uploaded data</td>
<td>Add new columns to the data source.</td>
<td>Modifying Uploaded Data Sources</td>
</tr>
</tbody>
</table>

### About Data Sources

A data source is any tabular structure. You get to see data source values after you load a file or send a query to a service that returns results (for example, another Oracle Business Intelligence system or a database).

A data source can contain any of the following:

- **Match columns**: These contain values that are found in the match column of another source, which relates this source to the other (for example, Customer ID or Product ID).

- **Attribute columns**: These contain text, dates, or numbers that are required individually and aren’t aggregated (for example, Year, Category Country, Type, or Name).

- **Measure columns**: These contain values that should be aggregated (for example, Revenue or Miles driven).

You can analyze a data source on its own, or you can analyze two or more data sources together, depending on what the data source contains.

### Working with Matching

If you use multiple sources together, then at least one match column must exist in each source. The requirements for matching are:

- The sources contain common values (for example, Customer ID or Product ID).

- The match must be of the same data type (for example, number with number, date with date, or text with text).

### Adding a Spreadsheet as a Data Source

You can add a spreadsheet to use as a data source.
About Adding a Spreadsheet as a Data Source

Data source files from a Microsoft Excel spreadsheet file must have the XLSX extension (signifying a Microsoft Office Open XML Workbook file). You can also add Comma Separated Value files with the .CSV extension.

Before you can upload a Microsoft Excel file as a data source, you must structure the file in a data-oriented way and it mustn’t contain pivoted data. Note the following rules for Excel tables:

- Tables must start in Row 1 and Column 1 of the Excel file.
- Tables must have a regular layout with no gaps or inline headings. An example of an inline heading is one that repeats itself on every page of a printed report.
- Row 1 must contain the table’s column names. For example, Customer Given Name, Customer Surname, Year, Product Name, Amount Purchased, and so on. In this example:
  - Column 1 has customer given names.
  - Column 2 has customer surnames.
  - Column 3 has year values.
  - Column 4 has product names.
  - Column 5 has the amount each customer purchased for the named product.
- The names in Row 1 must be unique. Note that if there are two columns that hold year values, then you must add a second word to one or both of the column names to make them unique. For example, if you have two columns named Year Lease, then you can rename the columns to Year Lease Starts and Year Lease Expires.
- Rows 2 onward are the data for the table, and they can’t contain column names.
- Data in a column must be of the same kind because it’s often processed together. For example, Amount Purchased must have only numbers (and possibly nulls), enabling it to be summed or averaged. Given Name and Surname must be text as they might be concatenated, and you may need to split dates into their months, quarters, or years.
- Data must be at the same granularity. A table can’t contain both aggregations and details for those aggregations. For example, if you have a sales table at the granularity of Customer, Product, and Year, and contains the sum of Amount Purchased for each Product by each Customer by Year. In this case, you wouldn’t include Invoice level details or a Daily Summary in the same table, as the sum of Amount Purchased wouldn’t be calculated correctly. If you have to analyze at invoice level, day level, and month level, then you can do either of the following:
– Have a table of invoice details: Invoice Number, Invoice Date, Customer, Product, and Amount Purchased. You can roll these up to day or month or quarter.

– Have multiple tables, one at each granular level (invoice, day, month, quarter, and year).

**Adding a Spreadsheet as a Data Source in Data Visualization Desktop**

You can add an Excel spreadsheet or a CSV file as a Data Visualization data source. Before you add a spreadsheet as a data source, do the following:

- Confirm that you have either an Excel spreadsheet in .XLSX format or a .CSV file to use as the data source.
- For an Excel spreadsheet, ensure that it contains no pivoted data.

1. Click Data Source in the Create section.
   The Create New Data Source dialog is displayed.
2. Click File and browse to select a suitable (unpivoted) XLSX file or a CSV file.
3. Click Open to upload and open the selected spreadsheet in Data Visualization.
   The Create Source from dialog is displayed.
4. Make any required changes to Name, Description, or to column attributes.
5. Click OK to save your changes and create the data source.
6. If a data source with the same name already exists:
   - Click Yes if you want to overwrite the existing data source.
   - Click No if you want to update the data source name.

**Adding a Spreadsheet as a Data Source from Excel Using the Smart View Plug-In**

The Smart View Plug-In enables you to publish an XLSX spreadsheet or a CSV file from Excel and use it as a data source.

If your Excel spreadsheet contains pivot data, you first un-pivot the spreadsheet data to flatten it before publishing. You don’t need to un-pivot a CSV file because it doesn’t support pivoted data. Before you publish the spreadsheet, you can modify characteristics, like column heading names.

Before you use the Smart View Plug-In, confirm you’ve done the following:

- Installed the latest version of Oracle Smart View for Office. To find the download, go to Oracle Smart View for Office.
- Confirmed that you have either an Excel spreadsheet in .XLSX format or a .CSV file, to use as the data source.
- Restarted all MS Office applications.

Follow these steps to publish an Excel spreadsheet or CSV file to use it as a data source:
1. Open your Excel (.XLSX) spreadsheet or .CSV file in Microsoft Excel.

2. Click the **DV Desktop** tab.
   
   (Optional) Enter the result of the step here.

3. If you’re publishing a .XLSX file with no pivot data or a .CSV file, skip the next step.

4. If you’re publishing a .XLSX file with pivot data, follow these steps:
   
   If you select an area of data cells, the data cells that you select are published.

   - **Note:** Don’t include grand totals when you select an area of data cells to publish.

   a. Select the upper-left numeric data cell, or select an area of data cells that you want to publish.

   b. Click **Unpivot**.

   c. Click **OK**.

5. If required, format the new sheet content in Excel (for example, edit column heading names).

6. In the **DV Desktop** tab, click **Publish** to publish the new sheet.

7. Click **OK** to confirm.
   
   If Data Visualization isn’t running, it starts automatically.

8. If a data source exists with the same name, the Create or Reload Data Source window is displayed.
   
   a. Select **Reload** to update the existing data source with the new data.

   b. Select **Create New** to publish the sheet as a new data source.

   A new sheet is created, such as sheetExample_1.

9. If working with a new sheet, you can make changes to the data source before publishing.

10. Click **OK** to publish.

    Data Visualization creates and displays a new data source that you can update, re-pivot, or apply changes to as needed.

    - **Note:** If you later delete the Excel file created when un-pivoting, the data source created in Data Visualization is no longer linked to the Excel file.

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**Adding a Spreadsheet as a Data Source from Windows Explorer**

You can add a spreadsheet as a data source from within Windows Explorer.

1. Open Windows Explorer and navigate to the spreadsheet file (.XLSX or .CSV) that you want to use as a data source.
2. Right-click the spreadsheet file icon.

3. Click Open with from the menu.

Oracle DV Desktop is listed as a selectable menu option if Data Visualization is installed.

4. Select Oracle DV Desktop.

5. If a data source with the same name already exists, the Create or Reload Data Source window is displayed.

   • Click Reload and click OK to overwrite the existing data source with the same name.
     If you choose to reload, you don’t need to follow the final step, and the new data source overwrites the existing data source.

   • Click Create New, and complete one of the following options:
     – Enter a new name, and click OK.
     – To save using an autogenerated data source name, click OK.

6. Make any required changes to the Name and Description columns or to column attributes, and click OK.

   Your spreadsheet is added as a data source and available in Data Visualization.

Connecting to Oracle Applications Data Sources

You can connect to Oracle Applications and create data sources that help you visualize, explore, and understand your Oracle Applications data.

Topics:

• Creating Oracle Applications Connections
• Composing Data Sources from Oracle Applications Connections
• Editing Oracle Applications Connections
• Deleting Oracle Applications Connections

Creating Oracle Applications Connections

You can create connections to Oracle Applications and use those connections to create data sources.

1. In the Data Sources page, go to the Create pane, and click Connection.

2. In the Create New Connection dialog, click the Oracle Applications icon.

3. In the Add a New Connection dialog, enter a name for the connection, the URL location of the catalog, the login name, and login password.

4. In the Authentication field, specify if you want the users to be prompted to log in to access data from the Oracle Applications data source. If you select Always use this username and password, then the login name and password you provide for the connection is always used and users aren’t prompted to log in. If you select
Require users to enter their own username and password, then users are prompted to enter their user names and passwords to use the data from the Oracle Applications data source. Users required to log in see only the Oracle Applications data that they have the permissions, privileges, and role assignments to see.

5. Click Save.

You can now create data sources from the connection. See Composing Data Sources From Oracle Application Connections.

Composing Data Sources from Oracle Applications Connections

After you create Oracle Applications connections, you can use those connections to create data sources to use in projects.

You must create the Oracle Applications connection before you can create a data source for it. See Creating Connections.

1. In the Data Sources page, go to the Create pane, and click Data Source.

2. In the Create New Data Sources page, click the connection to the Oracle Applications that you want to use for your data source.

3. In the Create Source dialog, browse or search for and select the analysis that you want to use. Note the following options:

   • Click Enter Logical SQL to display the Logical SQL Statement field. Use this field to write a SQL statement to fetch the data that you want to use in your data source.
   
   • Click Refresh Data to view a snapshot of the data in the analysis you selected.
   
   • Click the General icon at the top of the dialog to specify a name and description for the data source.

4. Click OK.

The new data source is created and is included in the Oracle Applications section of the Display pane. The data source contains a cached copy of the data in the analysis that you selected, and you can refresh the data and metadata from that data source, as needed.

Editing Oracle Applications Connections

You can edit Oracle Applications connections. For example, you must edit a connection if your system administrator changed the Oracle Applications login credentials.

1. In the Data Sources page, go to the Display pane, and click Connections.

2. Locate the connection that you want to edit and click its Options icon and select Edit.

3. In the Edit Connection dialog, edit the connection details. Note that you can’t see or edit the password that you entered when you created the connection. If you need to change the connection’s password, then you must create a new connection. See Creating Oracle Applications Connections.
4. Click Save.

Deleting Oracle Applications Connections

You can delete an Oracle Applications connection. For example, if your list of connections contains unused connections, then you can delete them to help you keep your list organized and easy to navigate.

1. In the Data Sources page, go to the Display pane, and click Connections.
2. Locate the connection that you want to delete and click its Options icon and select Delete.
3. When asked if you want to delete the connection, click Yes.

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**Note:** If the connection contains any data sources, then you must delete the data sources before you can delete the connection.

Connecting to Database Data Sources

You can create, edit and delete database connections, and create data sources from databases which lets you use these data sources to better understand the data using Oracle Data Visualization.

**Topics:**

- Creating Database Connections
- Creating Data Sources from Databases
- Editing Database Connections
- Deleting Database Connections

Creating Database Connections

You can create connections to databases and use those connections to source data in projects.

1. In the Data Sources page, go to the Create pane, and click Connection.
2. In the Create New Connection dialog, click the icon for the database type that you want to create a connection for (for example Oracle Database or DB2).
3. In the Add a New Connection dialog, enter a name for the connection, and then enter the required connection information, such as Host, Port, and so on.
4. Click Save.

You can now begin creating data sources from the connection. See Creating Data Sources from Databases.

Creating Data Sources from Databases

After you create database connections, you can begin creating data sources for those connections for use in projects.
You must create the database connection before you can create a data source for it. See *Creating Database Connections*.

1. In the Data Sources page, go to the Create pane, and click **Data Source**.

2. In the Create New Data Sources page, click the connection to the database that you want to use for your data source.

3. In the Create Source dialog, browse or search for and double-click the table that you want to use. Add the columns that you want to include in the data source.

4. Complete the Create Source dialog fields as necessary. Note the following options:

   - Click **Enter Logical SQL** to display the **Logical SQL Statement** field. Use this field to write a SQL statement to fetch the data that you want to use in your data source.
   
   - Click **Refresh Data** to view a snapshot of the data in the columns that you selected.
   
   - Click the **Filter** icon at the top of the dialog to create column data filters. After you add a filter, click **Refresh Data** to review the filtered data.
   
   - Click the **General** icon at the top of the dialog to specify a name and description for the data source.
   
   - Click the **General** icon and change the Query Mode for a database table. The default is **Live** because database tables are typically large and shouldn’t be copied to Oracle Data Visualization. If your table is small, then select **Auto** and the data is copied into the cache if possible. If you select **Auto**, you must refresh the data when it’s stale.

5. Click **OK**.

The new data source is created and is included in the Databases section of the Display pane. The data source contains a cached copy of the data, and you can refresh the data and metadata from that data source, as needed.

**Editing Database Connections**

You can edit a database connection for example, to change the name.

1. In the Data Sources page, go to the Display pane, and click **Connections**.

2. Locate the connection that you want to edit and click it’s **Options** icon and select **Edit**.

3. In the Edit Connection dialog, edit the connection details. Note that you cannot see or edit the password that you entered when you created the connection. If you need to change the connection’s password, then you must create a new connection. See *Creating Database Connections*.

4. Click **Save**.

**Deleting Database Connections**

You can delete a database connection for example if the database password has changed.
1. In the Data Sources page, go to the Display pane, and click **Connections**.

2. Locate the connection that you want to delete and click its **Options** icon and select **Delete**.

3. When asked if you want to delete the connection, click **Yes**.

   **Note:** If the connection contains any data sources, then you must delete the data sources before you can delete the connection.

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**Adding Data to a Project**

You can add data from existing data sources to your new or existing projects to better fit your requirements.

1. You can add a data source to a project in two ways:
   - If you’re creating a new project, then go to the Home page and in the Create pane, click **Project**.
   - If you’re working with an existing project, then open the project and in the Data Elements pane right-click and select **Add Data Source**.

2. In the Add Data Source dialog, browse or search for the data source that you want to add to the project. When you locate the data source, click it to select it and then click **Add to Project**.

3. Build your project using the columns that are displayed in the Data Elements pane. Or if needed, explore or modify the data source to better fit your project.
   - You can create new columns, edit columns, and hide and show columns in the data source. See **Modifying Uploaded Data Sources**.
   - If your project contains two data sources, then you can blend the data from one data source with the other. See **Blending Data That You Added** and **Changing Data Blending**.
   - You can review your data source’s columns to better understand its data. See **Exploring a Data Source with Smart Insights**.

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**Exploring a Data Source with Smart Insights**

You can use smart insights for an at-a-glance assessment of your data source, and to quickly understand the information that its data contains.

The Prepare canvas provides two views of the data in your data source: Data view and Visual view. The Data view shows you a row-by-row snapshot of the data in the data source, however, it doesn’t help you determine how to best report on the data. The Visual view provides a visualization for each column, so you can quickly understand the distribution of the data in each column, including a row count for each attribute. The data with the most useful information is displayed at the top of the Visual view. To gain further information about your data, you can use the **Summarize by** field to show a specific measure’s effect on the individual columns.

Note how Oracle Data Visualization presents information about the data source’s columns:
• The most useful column information is presented first.

• The type of visualizations shown is based on the column type. For text attributes, a horizontal bar chart is used. For date and time columns, a line chart is used. For numeric columns, a vertical bar chart is used.

• Within a visualization, the most meaningful and useful values are shown.

• You can mouse over a visualization to get more information about a specific aspect of a column’s data. For example, for the Product Category column, you can see the amount of revenue for each category, or for each region, you can see the number of rows or data.

• You can analyze columns differently by using the Summarize by field to apply a measure to them. For example, if you summarize the data source by the Revenue measure, then you’ll see revenue by product name, revenue by state, revenue by city, and so on.

• The number of bars shown in a horizontal bar chart depends on how the data is distributed. Typically ten bars are shown and all other data is displayed in a bar called Other. However, if 20% or more of the data falls into the Other bar, then the system breaks that data into the number of bars needed to give you a clearer picture of how the data is distributed. For example, if you’re working with a retail data source and you’re viewing the insights visualization for Sales by Order Month, and more than 40% of the sales happened in November and December, then the system adds two more bars to the visualization.

• Based on the data, bins that represent ranges are shown. For example, if the column is Product Category, the visualization shows each product category based on number of rows using the 0, 100K, 200K, and so on bins.

Example of summarizing columns by a measure: You can use the Summarize by field to show the column values based on a specific measure. Note that in the following example the Summarize by field is set to Row count, which is the default:

![Sample Project](image)

Compare the preceding screenshot with the following one, which shows the Summarize by field set to the Profit measure. Note how the Visual view provides a different view of information contained in the columns.
Use these steps to summarize columns using a measure.

1. Create a new project or open an existing project.

2. In the Project Editor, go to the Prepare canvas and click the Visual icon.

3. In the Visual view, you can do the following:
   - Use the Summarize by field to select the measure that you want to apply to your columns.
   - Click the Options icon to show or hide null values in the visualization, or to include or hide the OTHER bar in horizontal bar chart visualizations.

Modifying Uploaded Data Sources

You can modify uploaded data sets to help you further curate (organize and integrate from various sources) data in projects. This is also sometimes referred to as data wrangling.

You can create new columns, edit columns, and hide and show columns for a data set. The column editing options depend on the column data type (date, strings, or numeric). These options do the work for you by invoking a logical SQL function that edits the current column or creates a new one in the selected data set.

For example, you can select the Convert to Text option for the Population column (number data type). It uses the formula of the Population column, and wraps it with a logical SQL function to convert the data to text and adds that newly converted data text column to the data set. Note that the original Population column isn’t altered.

Modifying data sets can be very helpful in cases where you haven’t been able to perform joins between data sources because of dirty data. You can create a column group or build your own logical SQL statement to create a new column that essentially you scrub data (amend or remove data in the database that isn’t correct in some way).

1. In the Project Editor, click the Prepare canvas.

2. If there is more than one uploaded data set in the project, then go to the tabs at the bottom of the window and select the data set that you want to work with. Only the first 100 records in the selected data set are displayed.
3. Click **Options** for the column that you want to work with, and then select an option.
- **Concatenate** takes two columns and concatenates them to create a new column.

- **Edit Column** edits the current column and can be used to reformat a source column without creating a second column and hiding the original column.

- **Hide** hides the column in the Data Elements pane and in visualizations on the canvas. If you want to see hidden columns, click **Hidden columns** (ghost icon) on the page header. You can then unhide individual columns or unhide them at the same time.

- **Group** lets you create your own custom groups. For example, you can group States together into custom Regions. Or you can categorize dollar amounts into groups indicating small, medium, and large.

- **Replace** lets you replace bits of words in a column and create a new column with the string that you entered.

- **Split** lets you to split a specific column value into parts. For example, you can split a column called Name into first and last name.

- **Uppercase** creates a column with the values in all capital letters and the **Lowercase** option creates a new column with the values all in lowercase.

Data wrangling doesn't modify the original columns in the data set. Instead, it creates duplicate columns.

4. Click **Save**.
Using Data Flows to Curate Data Sources

You can use data flows to produce curated (maintained, organized, and integrated) data sources.

Topics:

- About Data Flows
- Creating Data Flows
- Running Data Flows

About Data Flows

Data flows let you take one or more data sources and organize and integrate them to produce a curated set of data that you can use to easily create effective visualizations.

You use the Data Visualization’s data flow editor to select specific data from existing data sources, apply transformations, add joins and filters, remove unwanted columns, add new derived measures, add derived columns, and add other operations. The data flow is then run to produce a data source that you can use to create complex visualizations.


Creating Data Flows

You can create a data flow from one or more data sources. Data flows are a way to produce a curated data source that you can use to easily and efficiently create meaningful visualizations.

The following image shows the Data Flow editor. You use this editor to build your data flow by adding steps and specifying details for those steps. You can select columns, add columns, rename columns, add or adjust aggregates, add filters, add another data set, and add joins. You add steps in the workflow diagram pane and specify details for that step in the workbench pane.
1. In the Data Sources page, go to the Create pane and click **Data Flow**.

2. In the Add Data Source dialog, select the data source that you want to base your data flow on. You can select only one data source in this dialog; if needed, you can add additional data sources later. Click **Add**.

   The Data Flow editor is displayed and the columns from the selected data source are displayed in the Data Elements pane. The data source name is displayed in the workflow diagram pane.

3. In the Data Flow editor, go to the workflow diagram pane and right-click the data source icon. Select **Add Step**.

4. From the Add Step window, click the step that you want to add and provide the required details in the workbench pane. Add as many steps as necessary. Note the following:

   - The Data Elements pane is updated based on the step that you’ve selected from the data flow or the step that you’re working on for the data flow. For example, if you add a Select Columns step, remove some columns, and then add an Aggregate step to the data flow, then the Data Elements pane you see while working on the Aggregate step shows only the columns that you specified in the previous Select Columns step.

   - By default, the workbench pane shows the Step Details view. However, you can click the Preview view option on the workbench pane to see how the data looks with the adjustments that you’re making in the current step.

   - Use the **Add Data** step option to add another data source and join it to the other data sources in your data flow. To create a join, press Ctrl on your keyboard and click the steps that you want to join, right-click, and select **Join**.

   - Oracle Data Visualization validates all of the steps in the data flow as you add them to or delete them from the data flow.

   - If you’re adding an expression (in an Add Column step or Filter step), then you must click **Apply** to finalize the step. If you add a new step to the diagram without clicking **Apply**, then your expression won’t be applied, and the next step that you add won’t use the correct data.
You can create filters by adding a filters step and dragging and dropping columns from the Data Elements pane.

If the data source contains aggregates, then they are displayed when you add an aggregate step. To add a column to the aggregate, hover over the column name, click Actions, and click Aggregate. To remove an aggregate from the selected aggregate list, hover over the aggregate’s name, click Actions, and click Group By.

5. Optional. To delete a step from the workflow diagram, right-click the step and select Delete. Note that deleting a step might make the other steps in the data flow invalid, as indicated by red X icons displayed for the invalid steps.

6. When you’ve finished adding steps to the data flow diagram, decide if you want to save the data flow or just execute it without saving it. Note the following options:

   - Click Save Data Flow to save but not run the data flow. Note that you can save a data flow that contains validation errors. When you save a data flow, it’s displayed in the Display pane of the Data Sources page, in the Data Flows area.

   - If your data flow contains no validation errors, and you’ve added a Save Data step at the end of your data flow, then click Execute data flow. Note that you can’t run a data flow that contains validation errors. After you run the data flow, the resulting data source is displayed in the Display pane of the Data Sources page. Click All Data Sources to see your data source in the list. When you execute a data flow without saving it, the data flow isn’t saved and isn’t displayed in the Data Flows list. Therefore, the data flow isn’t available for you to modify or run.

Running Data Flows

You can run a saved data flow to create a corresponding data source or to refresh the data in the data source created from the data flow.

Currently you must manually run the data flow to create or refresh the corresponding data source. For existing data sources, run the data flow if you know the columns and data from the data source used to build the data flow have changed.

1. In the Data Sources page, go to the Data Flows pane and locate the data flow that you want to run.

2. Click the data flow’s Options icon and select Run. Note the following information:

   - To run a saved data flow, it must have a Save Data step as its final step. To add this step to the data flow, click the data flow’s Options icon and select Edit. After you’ve added the step, save the data flow and try to run it again.

   - When running a data flow to create a new database data source, set the database’s query mode to Live. Setting the query mode to Live allows the data flow to access data from the database (versus the data cache) and pushes any expensive operations such as joins to the database. See Managing Data Sources.

   - When running a data flow to update a database data source, the data used is as specified in the source database’s query mode. If the query mode is Auto, then cached data is used. If the query mode is set to Live, then the data flow gets data directly from the database.
• Complex data flows take longer to run. While the data flow is running, you can go to and use other parts of the application, and then come back to the Data Flows pane to check the status of the data flow.

• You can cancel a long-running data flow. To do so, go to the Data Flows pane, click the data flow’s Options icon and select Cancel.

• If it’s the first time you’ve run the data flow, then a new data source is created and you can find it in the Display pane of the Data Source page by clicking All Data Sources. The data source contains the name that you specify on the data flow’s Save Data step. If you’ve run the data flow before, then the resulting data source already exists and its data is refreshed.

Blending Data That You Added

You might have a project where you added two data sources. You can blend data from one data source with data from another data source.

For example, Data Source B might contain new dimensions that extend the attributes of Data Source A. Or Data Source B might contain new facts that you can use alongside the measures that already exist in Data Source A.

When you add more than one data source to a project, the system tries to find matches for the data that’s added. It automatically matches external dimensions where they share a common name and have a compatible data type with attributes in the existing data source.

You can specify how you want the system to blend your data. See Changing Data Blending.

1. Add data to your project. See Adding Data to a Project.

2. In the Data Sources pane, click Source Diagram.

3. Click the number along the line that connects the external source to the newly loaded source to display the Connect Sources dialog.

   Note: Items that were never explicitly matched together may be matched by the system. For example, Customer.Person_Name is matched to Employee.Name, and Employee.Name is matched to Spouse.Given_Name.

4. In the Connect Sources dialog, make changes as necessary.

   a. To change the match for a column, click the name of each column to select a different column from the external data source or between sources.

   Note: If columns have the same name and same data type, then they’re recognized as a possible match. You can customize this and specify that one column matches another by explicitly selecting it even if its name isn’t the same. You can select only those columns with a matching data type.

   b. Click Add Another Match, and then select a column from the external sources to match.
c. For a measure that you’re uploading for the first time, specify the aggregation type such as Sum or Average.

d. Click the X to delete a match.

5. Click OK to save the matches.

Changing Data Blending

If your project includes data from two data sources that contain a mixture of attributes and values, and there are match values in one source that don’t exist in the other, then sometimes the system might omit rows of data that you may want to see.

In such cases, you need to specify which source takes precedence over the other for data blending.

For example, we have two data sources (Source A and Source B), which include the following rows. Note that Source A doesn’t include IN-8 and Source B doesn’t include IN-7.
The following results are displayed if the **All Rows** data blending option is selected for Source A and the **Matching Rows** data blending option is selected for Source B. Because IN-7 doesn’t exist in Source B, the results contain null Rep and null Bonus.

The following results are displayed if the **Matching Rows** data blending option is selected for Source A and the **All Rows** data blending option is selected for Source B. Because IN-8 doesn’t exist in Source A, the results contain null Date and null Revenue.

The visualization for Source A includes Date as an attribute, and Source B includes Rep as an attribute, and the match column is Inv#. Under dimensional rules, these attributes can’t be used with a measure from the opposite table unless the match column is also used.

There are two settings for blending tables that contain both attributes and measures. These are set independently in each visualization based on what columns are used in the visualization. The settings are **All Rows** and **Matching Rows** and these describe what rows from a source the system uses when returning data to be visualized.

The system automatically assigns data blending according to the following rules:

- If a match column is in the visualization, then the sources with the match column are set to **All Rows**.
- If an attribute is in the visualization, then its source is set to **All Rows** and the other sources are set to **Matching Rows**.
- If multiple attributes are in the visualization and all come from the same source, then that source is set to **All Rows** and the other sources are set to **Matching Rows**.
- If attributes come from multiple sources, then the source listed first in the project’s elements panel is set to **All Rows** and the other sources are set to **Matching Rows**.

Use this procedure to change data blending:

1. Select a visualization on the canvas, and in the visualization toolbar click **Menu**, then click **Properties**.
2. In the Properties dialog, click **Data Sets**.
3. In the Data Sets tab, click **Auto** and then select **Custom** to view how the system determined blending.
4. Adjust the blending settings as necessary.
   • At least one source needs to be assigned to All Rows.
   • If both sources are All Rows, then the system assumes that the tables are purely dimensional.
   • You can’t assign both sources to Matching Rows.

**Refreshing Data that You Added**

After you add data, the data might change, so you must refresh the data from its source.

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**Note:**

Rather than refresh a data source, you can replace it by loading a new data source with the same name as the existing one. However, replacing a data source can be destructive and is discouraged. Only replace a data source if you understand the consequences:

• Replacing a data source breaks projects that use the existing data source if the old column names and data types aren’t all present in the new data source.

• Any data wrangling (modified and new columns added in the data stage), is lost and projects using the data source are likely to break.

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You can refresh data from all source types: databases, files, and Oracle Applications.

**Databases**

For databases, the SQL statement is rerun and the data is refreshed.

**Excel**

To refresh a Microsoft Excel file, you must ensure that the newer spreadsheet file contains a sheet with the same name as the original one. In addition, the sheet must contain the same columns that are already matched with the source.

**Oracle Applications**

You can reload data and metadata for Oracle Applications data sources, but if the Oracle Applications data source uses logical SQL, reloading data only reruns the statement, and any new columns or refreshed data won’t be pulled into the project. Any new columns come into projects as hidden so that existing projects that use the data source aren’t affected. To be able to use the new columns in projects, you must unhide them in data sources after you refresh. This behavior is the same for file-based data sources.

1. In the Data Sources page, go to the Display pane, and locate the data source that you want to refresh.

2. Click the Options menu and select **Reload Data**. The Reload Data dialog is displayed.
3. If you’re reloading a spreadsheet and the file is no longer in the same location or has been deleted, then the Reload Data dialog prompts you to locate and select a new file to reload into the data source.

4. The Reload Data dialog indicates that your data was reloaded successfully. Click OK.

The original data is overwritten with new data, which is displayed in visualizations in the project after the visualization is refreshed.

**Updating Details of Data that You Added**

After you add data, you can inspect its properties and update details such as the description and aggregation.

1. In the Data Sources page, go to the Display pane, and locate the data source that you want to update.

2. Click the Options menu and select **Inspect**. The Data Source dialog is displayed.

3. Inspect the properties and update the description of the data as appropriate.

   Note that if you’re working with a file-based data source, and spreadsheet you used to create the data source has been moved or deleted, then the connection path is crossed out in the Data Source dialog. You can reconnect the data source to its original source file, or connect it to a replacement file by right-clicking the data source in the Display pane and in the Options menu select **Reload Data**. You can then browse for and select the file to load to the data source.

4. Optionally, change the Query Mode for a database table. The default is **Live** because database tables are typically large and shouldn’t be copied to cache. If your table is small, then select **Auto** and the data is copied into the cache if possible. If you select **Auto**, then you’ll have to refresh the data when it’s stale.

5. In the Columns area, specify whether to change a column to a measure or attribute as appropriate. For measures, specify the aggregation type, such as **Sum** or **Average**.

6. Click **OK** to save your changes.

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**Note:** You can also inspect data sources on the Data Sources page. See **Managing Data Sources**.

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**Removing Data that You Added**

You can remove data that you’ve added from an external source.

If you remove data, then it’s removed from the project. Removing data differs from deleting data. See **Deleting Data that You Added**.

1. In the Data Sources pane, right-click the data that you want to remove.

2. Select **Remove from Project** to remove data from the data sources list.

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**Deleting Data Sources**

You can delete data sources when you need to free up space on your system.
Deleting permanently removes the external source and breaks any projects that use this data source.

1. In the Data Sources page, go to the Display pane, locate the data source that you want to update, and click the data source’s Options menu.

2. Select Delete to erase the data from storage and delete the data source.

**Managing Data Sources**

You can use the Data Sources page to see all of the available data sources.

You can also use the Data Sources page to examine data source properties, change column properties such as the aggregation type, and delete data sets that you no longer need to free up space. Data storage quota and space usage information is displayed, so that you can quickly see how much space is free.

1. On the Home page, click **Data Sources**.

2. On the Data Sources page, locate the data source that you want to manage, and click **Options**. The options available in the drop-down list depend on the data source type.

3. Optionally, use the **Inspect** option to review data source columns and change the data source properties. For example, you can change the Product Number column’s aggregation type to Minimum.

4. Optionally, use the **Inspect** option to change whether to treat data source columns as measures or attributes.

   You can’t change how a column is treated if it’s already matched to a measure or attribute in the data model. For more information about removing matches, see **Blending Data That You Added**.

5. Optionally, use the **Inspect** option to change the Query Mode for a database table. The default is **Live** because database tables are typically large and shouldn’t be copied to cache. If your table is small, then select **Auto** and the data is copied into the cache if possible. If you select **Auto**, then you have to refresh the data when it’s stale.

6. Optionally, download a data source created from a Microsoft Excel file by clicking **Options** and selecting **Download Excel**. Note that the columns in the download match the columns in the file that you originally uploaded. Any derived columns that you added in the Visualization editor’s Prepare canvas aren’t included in the data source download.

7. Optionally, update data for a data source created from a Microsoft Excel file or Oracle Applications by clicking **Options** and selecting **Reload Data**.
You can import and export projects to share them with other users. You can also print projects and convert them to formats such as PDF and PPT.

Topics:
- Importing and Exporting Projects
- Printing a Visualization, Canvas, or Story
- Converting a Visualization, Canvas, or Story
- Writing Visualization Data to a CSV File
- Emailing a PDF or PPT File of a Visualization, Canvas, or Story

Importing and Exporting Projects
You can import projects and applications from other users and sources, and export projects to make them available to other users.

Topics:
- Importing an Application or Project
- Exporting a Project as an Application
- Exporting a Folder as an Application
- Emailing an Exported Application

Importing an Application or Project
You can import an application or project provided by another user or from an external source such as Oracle Fusion Applications. This lets you benefit from using the features of Oracle Data Visualization to work with data from more diverse sources.

The import includes everything that you need to use the application or project. For example, associated data sets, connection string, connection credentials, and stored data.

1. Optional. To create a folder where you import the application file or project. On the Home page, click Options and select New Folder. In the New Folder dialog, type a name for the folder and click Create.

2. On the Home page, click Options, and select Import. Or optionally, click the new folder or an existing folder, click Options, and select Import.
3. In the Import dialog, click Select File. Optionally, you can drag a project or application file onto the dialog.

4. In the Open dialog, locate the application file or project to import. Click Open.

5. If an object with the same name already exists in your system, then choose to replace the existing object or cancel the import. See When I import a project, I get an error stating that the project, data source, or connection already exists.

**Exporting a Project as an Application**

You can export a project as an application that can be imported and used by other users so that they can benefit from your application project data.

The export produces a .DVA file that includes everything you need to use the application. For example, associated data sets, connection string, connection credentials, and stored data.

1. Open the project that you want to export. Or on the Home page, locate the project that you want to export.

2. If you’re working in a project, then click Canvas Settings and select Export. If you’re working on the Home page, click Actions and select Export.

3. If you’re exporting an application that uses an Excel data source and you want to include the data with the export, then click the Include Data option. If retrieving the data requires connection credentials, then enter and confirm the password.

4. If your project includes data from an Oracle Applications or a database data source and Include Data is selected, then you must enter a password that’s sent to the database for authentication when the user opens the application to access the data. Clear the Include Data option if you don’t want to include the password with the exported project. If you clear this option, then the users must enter the password when opening the application to access the data.

5. Leave the E-mail option deselected. If you select this option, then the Save As dialog isn’t displayed.

6. Click Save.

**Exporting a Folder as an Application**

You can export a folder that contains one or more projects as an application so that it can be imported and used by other users.

The export produces a .DVA file that includes everything you need to use the application. For example, associated data sets, connection string, connection credentials, and stored data.

1. On the Home page, locate the folder containing the project or projects that you want to export.

2. Click Options and select Export Application.

3. If you’re exporting an application that uses an Excel data source and you want to include the data with the export, then click the Include Data option. If retrieving the data requires connection credentials, then enter and confirm the password.
4. If your project includes data from an Oracle Applications or a database data source and Include Data is selected, then you must enter a password that’s sent to the database for authentication when the user opens the application and accesses the data. Clear the Include Data option if you don’t want to include the password with the exported project. If you clear this option, then users must enter the password when opening the application to access the data.

5. Leave the E-mail option deselected. If you select this option, then the Save As dialog isn’t displayed.

6. Click Save.

### Emailing an Exported Application

You can choose to automatically email the .DVA file for an exported application. This enables other users to use the application in Oracle Data Visualization.

The export produces a .DVA file that includes everything you need to use the application. For example, associated data sets, connection string, connection credentials, and stored data.

1. On the Home page, locate the project or folder containing the project or projects that you want to export.

2. Click Actions and select Export.

3. If you’re exporting an application that uses an Excel data source and you want to include the data with the export, then click the Include Data option. If retrieving the data requires connection credentials, then enter and confirm the password.

4. If your project includes data from an Oracle Applications or a database data source and Include Data is selected, then you must enter a password that’s sent to the database for authentication when the user opens the application and accesses the data. Clear the Include Data option if you don’t want to include the password with the exported project. If you clear this option, then the users must enter the password when opening the application to access the data.

5. Select the Email as Attachment option.

6. Click OK.

Your email client opens a new partially composed email with the .DVA file attached. Note that when you select the E-mail option, it doesn’t produce a .DVA file that you can save. To produce a .DVA file that you can save, you must deselect the E-mail option before clicking OK.

### Printing a Visualization, Canvas, or Story

You can print one or more of your project’s visualizations, canvases, or stories.

1. Go to the Print dialog using one of these actions:
   - For a whole or single canvas, or whole or single story, click Share Project on the project toolbar and then select Print.
   - For a specific visualization, locate the visualization that you want to print, click Menu on the visualization toolbar, hover over Share, and then select Print. Or right-click in the visualization, hover over Share, and then select Print.
2. If you want to print a whole canvas, single canvas, whole story, or single story, then specify what you want to print in the **Canvas Pages** and **Story Pages** fields.

3. In the Print dialog, specify paper size and orientation, if necessary. Click **Print**. The browser's print dialog is displayed.

4. Specify other printing preferences such as which printer to use and how many copies to print and click **Print**.

### Converting a Visualization, Canvas, or Story

You can convert one or more of your project's visualizations, canvases, or stories to PDF or PPT either to distribute or use in a presentation.

1. Go to the Export as PDF or Export as PPT dialog using one of these actions:
   - For a whole or single canvas, whole or single story, click **Share Project** on the project toolbar and then select **As PDF** or **As PPT**.
   - For a specific visualization, locate the visualization that you want to print, click **Menu** on the visualization toolbar, hover over **Share**, and then select **As PDF** or **As PPT**. Or right-click in the visualization, hover over **Share**, and then select **As PDF** or **As PPT**.

2. In the Export dialog, specify paper size and orientation, if necessary.

3. Leave the **E-mail** option deselected. If you select this option, then the Save As dialog isn't displayed.

4. Click **Export**. The Save As dialog is displayed.

5. Name the file and browse to the location where you want to save the file. Click **Save**.

### Writing Visualization Data to a CSV File

You can write the data from a visualization to a `.CSV` file. This lets you open and update the visualization data in a compatible application such as Excel.

1. Locate the visualization with data that you want to write to the CSV format, and click **Menu** on the visualization toolbar, hover over **Share**, and then select **Data**. The Save As dialog is displayed.

2. Name the file and browse to the location where you want to save the file. Click **Save**.

### Emailing a PDF or PPT File of a Visualization, Canvas, or Story

You can choose to email a PDF or PPT file of a visualization, canvas, or story.

1. Go to the Export as PDF or Export as PPT dialog using one of these actions:
   - For a whole or single canvas, whole or single story, click **Share Project** on the project toolbar and then select **Export as PDF** or **Export as PPT**.
   - For a specific visualization, locate the visualization that you want to print, click **Menu** on the visualization toolbar, hover over **Share**, and then select **As PDF** or **As PPT**. Or right-click in the visualization, hover over **Share**, and then select **As PDF** or **As PPT**.
2. In the Export dialog, specify paper size and orientation, if necessary.

3. Select E-mail.

4. Click Export.

Your email client opens a new partially composed email with the export file attached. Note that when you select the E-mail option, it doesn’t produce a file that you can save. To produce a file that you can save, you must clear the E-mail option before clicking Export.
This topic describes common problems that you might encounter when using Oracle Data Visualization Desktop and explains how to solve them.

Topics

- When I import a project, I get an error stating that the project, data source, or connection already exists
- Oracle Support needs a file to help me diagnose a technical issue
- I need to find more information about a specific issue

Troubleshooting General Issues

This topic describes common problems that you might encounter when working with Oracle Data Visualization Desktop and explains how to solve them.

When I import a project, I get an error stating that the project, data source, or connection already exists

When you’re trying to import a project, you might receive the following error message:

“There is already a project, data source or connection with the same name as something you are trying to import. Do you want to continue the import and replace the existing content?”

This error message appears because one or more of the components exported with the project is already on your system. When a project is exported, the outputted .DVA file includes the project’s associated data sources and connection string. To resolve this error, you can either click OK to replace the components on your system, or you can click Cancel and go into your system and manually delete the components.

This error message is also displayed when the project you’re trying to import contains no data. When you export a project without data, the project’s and data sources’ metadata are included in the .DVA. To resolve this issue, you can click OK to replace the components on your system, or you can click Cancel and go into your system and manually delete the data source or connection that’s causing the error.

Oracle Support needs a file to help me diagnose a technical issue

If you’re working with the Oracle Support team to resolve a specific issue, they may ask you to generate a diagnostic dump file. To generate this file, do the following:

1. Open the command prompt and change the directory to the Data Visualization Desktop installation directory (for example, C:\Program Files\Oracle Data Visualization).
2. Type diagnostic_dump.cmd and then provide a name for the .zip output file (for example, output.zip).

3. Press the Enter key to execute the command.
   
   You can find the diagnostic output file in your Data Visualization Desktop installation directory.

I need to find more information about a specific issue

The community forum is another great resource that you can use to find out more information about the problem you’re having. You can find the community forum here:

https://community.oracle.com/community/business_intelligence/data-visualization
This reference provides answers to frequently asked questions for Oracle Data Visualization Desktop.

**Topics:**
- FAQs for Installing Oracle Data Visualization Desktop

**FAQs for Installing Oracle Data Visualization Desktop**
Common questions about installing Oracle Data Visualization Desktop and installing Oracle R are identified in this topic.

**Topics:**
- How do I install Oracle R for Data Visualization Desktop?
- Why can’t I install Data Visualization Desktop on my computer?
- How can I get the most current version of Data Visualization Desktop?

**How do I install Oracle R for Data Visualization Desktop?**
Oracle R is an optional component and not automatically installed with Data Visualization Desktop. If you want to use advanced analytics with Data Visualization Desktop (for example, the trendline and outlier functions), then you must install the Oracle R version distributed with Data Visualization Desktop.

To install the required version of Oracle R, click the Oracle R installer shortcut from the Oracle Data Visualization Desktop Windows Start menu. This installation enables Oracle R for the corresponding Data Visualization Desktop installation, only. No other installation of Oracle R works with Data Visualization Desktop.

If the required version of Oracle R is uninstalled, then Oracle R won’t be available to subsequent Data Visualization Desktop installations or upgrades. However, once installed and enabled, Oracle R doesn’t have to be reinstalled or upgraded, and works with any version of Data Visualization Desktop.

**Why can’t I install Data Visualization Desktop on my computer?**
To successfully install Data Visualization Desktop on your computer, you must have administrator privileges. If you try to install Data Visualization Desktop without administrator privileges, then the following error message is displayed: “Error in creating registry key. Permission denied.”

To check to see if you have the required administrator privileges, go to Windows Control Panel and check your user accounts. If you don’t have administrator privileges, then see your company’s technical support person to help you set up the needed privileges.
How can I get the most current version of Data Visualization Desktop?

If you open Data Visualization Desktop when a newer version is available, then you see a message telling you to go to Oracle Technology Network to download the latest version of the Data Visualization Desktop installer.

You can find the current version of the installer on Oracle Technology Network. See Oracle Data Visualization Desktop Installation Download.
This topic describes the expression elements that you can use in the Expression Editor.

**Topics:**
- SQL Operators
- Conditional Expressions
- Functions
- Constants
- Types

### SQL Operators

SQL operators are used to specify comparisons between expressions. You can use various types of SQL operators.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BETWEEN</td>
<td>Determines if a value is between two non-inclusive bounds. For example: &quot;COSTS&quot;.&quot;UNIT_COST&quot; BETWEEN 100.0 AND 5000.0. BETWEEN can be preceded with <strong>NOT</strong> to negate the condition.</td>
</tr>
<tr>
<td>IN</td>
<td>Determines if a value is present in a set of values. For example: &quot;COSTS&quot;.&quot;UNIT_COST&quot; IN(200, 600, 'A')</td>
</tr>
<tr>
<td>IS NULL</td>
<td>Determines if a value is null. For example: &quot;PRODUCTS&quot;.&quot;PROD_NAME&quot; IS NULL</td>
</tr>
<tr>
<td>LIKE</td>
<td>Determines if a value matches all or part of a string. Often used with wildcard characters to indicate any character string match of zero or more characters (%) or any single character match (_). For example: &quot;PRODUCTS&quot;.&quot;PROD_NAME&quot; LIKE 'prod%'</td>
</tr>
</tbody>
</table>

### Conditional Expressions

You use conditional expressions to create expressions that convert values.

The conditional expressions described in this section are building blocks for creating expressions that convert a value from one form to another.
### Note:

- In CASE statements, AND has precedence over OR
- Strings must be in single quotes

<table>
<thead>
<tr>
<th>Expression</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASE (If)</td>
<td>CASE</td>
<td>Evaluates each WHEN condition and if satisfied, assigns the value in the corresponding THEN expression.</td>
</tr>
<tr>
<td></td>
<td>WHEN score-par &lt; 0 THEN 'Under Par'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WHEN score-par = 0 THEN 'Par'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WHEN score-par = 1 THEN 'Bogey'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WHEN score-par = 2 THEN 'Double Bogey'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELSE 'Triple Bogey or Worse'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>

| CASE (Switch) | CASE Score-par | Also referred to as CASE (Lookup). The value of the first expression is examined, then the WHEN expressions. If the first expression matches any WHEN expression, it assigns the value in the corresponding THEN expression. |
|              | WHEN -5 THEN 'Birdie on Par 6' |
|              | WHEN -4 THEN 'Must be Tiger' |
|              | WHEN -3 THEN 'Three under par' |
|              | WHEN -2 THEN 'Two under par' |
|              | WHEN -1 THEN 'Birdie' |
|              | WHEN 0 THEN 'Par' |
|              | WHEN 1 THEN 'Bogey' |
|              | WHEN 2 THEN 'Double Bogey' |
|              | ELSE 'Triple Bogey or Worse' |
|              | END |

### Functions

There are various types of functions that you can use in expressions.

**Topics:**

- Aggregate Functions
- Calendar Functions
- Conversion Functions
- Display Functions
- Mathematical Functions
- String Functions
- System Functions
- Time Series Functions
Aggregate Functions

Aggregate functions perform operations on multiple values to create summary results.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td>Avg(Sales)</td>
<td>Calculates the average (mean) of a numeric set of values.</td>
</tr>
<tr>
<td>Bin</td>
<td>Bin(UnitPrice BY ProductName)</td>
<td>Selects any numeric attribute from a dimension, fact table, or measure containing data values and places them into a discrete number of bins. This function is treated like a new dimension attribute for purposes such as aggregation, filtering, and drilling.</td>
</tr>
<tr>
<td>Count</td>
<td>Count(Products)</td>
<td>Determines the number of items with a non-null value.</td>
</tr>
<tr>
<td>First</td>
<td>First(Sales)</td>
<td>Selects the first non-null returned value of the expression argument. The First function operates at the most detailed level specified in your explicitly defined dimension.</td>
</tr>
<tr>
<td>Last</td>
<td>Last(Sales)</td>
<td>Selects the last non-null returned value of the expression.</td>
</tr>
<tr>
<td>Max</td>
<td>Max(Revenue)</td>
<td>Calculates the maximum value (highest numeric value) of the rows satisfying the numeric expression argument.</td>
</tr>
<tr>
<td>Median</td>
<td>Median(Sales)</td>
<td>Calculates the median (middle) value of the rows satisfying the numeric expression argument. When there are an even number of rows, the median is the mean of the two middle rows. This function always returns a double.</td>
</tr>
<tr>
<td>Min</td>
<td>Min(Revenue)</td>
<td>Calculates the minimum value (lowest numeric value) of the rows satisfying the numeric expression argument.</td>
</tr>
<tr>
<td>StdDev</td>
<td>StdDev(Sales)</td>
<td>Returns the standard deviation for a set of values. The return type is always a double.</td>
</tr>
<tr>
<td>StdDev_Pop</td>
<td>StdDev_Pop(Sales)</td>
<td>Returns the standard deviation for a set of values using the computational formula for population variance and standard deviation.</td>
</tr>
<tr>
<td>Sum</td>
<td>Sum(Revenue)</td>
<td>Calculates the sum obtained by adding up all values satisfying the numeric expression argument.</td>
</tr>
</tbody>
</table>

Analytics Functions

Analytics functions allow you to explore data using models such as trendline and cluster.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trendline</td>
<td>TRENDLINE(revenue, (calendar_year, calendar_quarter, calendar_month) BY (product), 'LINEAR', 'VALUE')</td>
<td>Fits a linear or exponential model and returns the fitted values or model. The numeric_expr represents the Y value for the trend and the series (time columns) represent the X value.</td>
</tr>
</tbody>
</table>
### Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>CLUSTER((product, company), (billed_quantity, revenue), 'clusterName', 'algorithm=k-means;numClusters=%1;maxIter=%2;useRandomSeed=FALSE;enablePartitioning=TRUE', 5, 10)</td>
<td>Collects a set of records into groups based on one or more input expressions using K-Means or Hierarchical Clustering.</td>
</tr>
<tr>
<td>Outlier</td>
<td>OUTLIER((product, company), (billed_quantity, revenue), 'isOutlier', 'algorithm=mvoutlier')</td>
<td>This function classifies a record as Outlier based on one or more input expressions using K-Means or Hierarchical Clustering or Multi-Variate Outlier detection Algorithms.</td>
</tr>
<tr>
<td>Regr</td>
<td>REGR(revenue, (discount_amount), (product_type, brand), 'fitted', '')</td>
<td>Fits a linear model and returns the fitted values or model. This function can be used to fit a linear curve on two measures.</td>
</tr>
<tr>
<td>Evaluate_Script</td>
<td>EVALUATE_SCRIPT('filerepo://obiee.Outliers.xml', 'isOutlier', 'algorithm=mvoutlier;id=%1;arg1=%2;arg2=%3;useRandomSeed=False;', customer_number, expected_revenue, customer_age)</td>
<td>Executes an R script as specified in the script_file_path, passing in one or more columns or literal expressions as input. The output of the function is determined by the output_column_name.</td>
</tr>
</tbody>
</table>

### Calendar Functions

Calendar functions manipulate data of the data types DATE and DATETIME based on a calendar year.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current_Date</td>
<td>Current_Date</td>
<td>Returns the current date.</td>
</tr>
<tr>
<td>Current_Time</td>
<td>Current_Time(3)</td>
<td>Returns the current time to the specified number of digits of precision, for example: HH:MM:SS.SSS If no argument is specified, the function returns the default precision.</td>
</tr>
<tr>
<td>Current_TimeStamp</td>
<td>Current_TimeStamp(3)</td>
<td>Returns the current date/timestamp to the specified number of digits of precision.</td>
</tr>
<tr>
<td>DayName</td>
<td>DayName(Order_Date)</td>
<td>Returns the name of the day of the week for a specified date expression.</td>
</tr>
<tr>
<td>DayOfMonth</td>
<td>DayOfMonth(Order_Date)</td>
<td>Returns the number corresponding to the day of the month for a specified date expression.</td>
</tr>
<tr>
<td>DayOfWeek</td>
<td>DayOfWeek(Order_Date)</td>
<td>Returns a number between 1 and 7 corresponding to the day of the week for a specified date expression. For example, 1 always corresponds to Sunday, 2 corresponds to Monday, and so on through to Saturday which returns 7.</td>
</tr>
<tr>
<td>DayOfYear</td>
<td>DayOfYear(Order_Date)</td>
<td>Returns the number (between 1 and 366) corresponding to the day of the year for a specified date expression.</td>
</tr>
<tr>
<td>Function</td>
<td>Example</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Day_Of_Quarter</td>
<td>Day_Of_Quarter(Order_Date)</td>
<td>Returns a number (between 1 and 92) corresponding to the day of the quarter for the specified date expression.</td>
</tr>
<tr>
<td>Hour</td>
<td>Hour(Order_Time)</td>
<td>Returns a number (between 0 and 23) corresponding to the hour for a specified time expression. For example, 0 corresponds to 12 a.m. and 23 corresponds to 11 p.m.</td>
</tr>
<tr>
<td>Minute</td>
<td>Minute(Order_Time)</td>
<td>Returns a number (between 0 and 59) corresponding to the minute for a specified time expression.</td>
</tr>
<tr>
<td>Month</td>
<td>Month(Order_Time)</td>
<td>Returns the number (between 1 and 12) corresponding to the month for a specified date expression.</td>
</tr>
<tr>
<td>MonthName</td>
<td>MonthName(Order_Time)</td>
<td>Returns the name of the month for a specified date expression.</td>
</tr>
<tr>
<td>Month_Of_Quarter</td>
<td>Month_Of_Quarter(Order_Date)</td>
<td>Returns the number (between 1 and 3) corresponding to the month in the quarter for a specified date expression.</td>
</tr>
<tr>
<td>Now</td>
<td>Now()</td>
<td>Returns the current timestamp. The Now function is equivalent to the Current_TimeStamp function.</td>
</tr>
<tr>
<td>Quater_Of_Year</td>
<td>Quarter_Of_Year(Order_Date)</td>
<td>Returns the number (between 1 and 4) corresponding to the quarter of the year for a specified date expression.</td>
</tr>
<tr>
<td>Second</td>
<td>Second(Order_Time)</td>
<td>Returns the number (between 0 and 59) corresponding to the seconds for a specified time expression.</td>
</tr>
<tr>
<td>TimeStampAdd</td>
<td>TimeStampAdd(SQL_TSI_MONTH, 12, Time.&quot;Order Date&quot;)</td>
<td>Adds a specified number of intervals to a timestamp, and returns a single timestamp. Interval options are: SQL_TSI_SECOND, SQL_TSI_MINUTE, SQL_TSI_HOUR, SQL_TSI_DAY, SQL_TSI_WEEK, SQL_TSI_MONTH, SQL_TSI_QUARTER, SQL_TSI_YEAR</td>
</tr>
<tr>
<td>TimeStampDiff</td>
<td>TimeStampDiff(SQL_TSI_MONTH, Time.&quot;Order Date&quot;, CURRENT_DATE)</td>
<td>Returns the total number of specified intervals between two timestamps. Use the same intervals as TimeStampAdd.</td>
</tr>
<tr>
<td>Week_Of_Quarter</td>
<td>Week_Of_Quarter(Order_Date)</td>
<td>Returns a number (between 1 and 13) corresponding to the week of the quarter for the specified date expression.</td>
</tr>
<tr>
<td>Week_Of_Year</td>
<td>Week_Of_Year(Order_Date)</td>
<td>Returns a number (between 1 and 53) corresponding to the week of the year for the specified date expression.</td>
</tr>
<tr>
<td>Year</td>
<td>Year(Order_Date)</td>
<td>Returns the year for the specified date expression.</td>
</tr>
</tbody>
</table>
## Conversion Functions

Conversion functions convert a value from one form to another.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast</td>
<td><code>Cast(hiredate AS CHAR(40)) FROM employee</code></td>
<td>Changes the data type of an expression or a null literal to another data type. For example, you can cast a <code>customer_name</code> (a data type of Char or Varchar) or <code>birthdate</code> (a datetime literal).</td>
</tr>
<tr>
<td>IfNull</td>
<td><code>IfNull(Sales, 0)</code></td>
<td>Tests if an expression evaluates to a null value, and if it does, assigns the specified value to the expression.</td>
</tr>
<tr>
<td>IndexCol</td>
<td><code>SELECT IndexCol(VALUEOF (NQ_SESSION.GEOGRAPHY_LEVEL), Country, State, City), Revenue FROM Sales</code></td>
<td>Uses external information to return the appropriate column for the signed-in user to see.</td>
</tr>
<tr>
<td>NullIf</td>
<td><code>SELECT e.last_name, NULLIF(e.job_id, j.job_id) &quot;Old Job ID&quot; FROM employees e, job_history j WHERE e.employee_id = j.employee_id ORDER BY last_name, &quot;Old Job ID&quot;;</code></td>
<td>Compares two expressions. If they are equal, then the function returns null. If they aren’t equal, then the function returns the first expression. You can’t specify the literal NULL for the first expression.</td>
</tr>
<tr>
<td>To_DateTime</td>
<td><code>SELECT To_DateTime (©2009-03-0301:01:00©, ©yyyy-mm-dd hh:mi:ss©) FROM sales</code></td>
<td>Converts string literals of dateTime format to a DateTime data type.</td>
</tr>
</tbody>
</table>

## Display Functions

Display functions operate on the result set of a query.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BottomN</td>
<td><code>BottomN(Sales, 10)</code></td>
<td>Returns the n lowest values of expression, ranked from lowest to highest.</td>
</tr>
<tr>
<td>Filter</td>
<td><code>Filter(Sales USING Product = 'widgit')</code></td>
<td>Computes the expression using the given preaggregate filter.</td>
</tr>
<tr>
<td>Mavg</td>
<td><code>Mavg(Sales, 10)</code></td>
<td>Calculates a moving average (mean) for the last n rows of data in the result set, inclusive of the current row.</td>
</tr>
<tr>
<td>Msum</td>
<td><code>SELECT Month, Revenue, Msum(Revenue, 3) as 3_MO_SUM FROM Sales</code></td>
<td>Calculates a moving sum for the last n rows of data, inclusive of the current row. The sum for the first row is equal to the numeric expression for the first row. The sum for the second row is calculated by taking the sum of the first two rows of data, and so on. When the nth row is reached, the sum is calculated based on the last n rows of data.</td>
</tr>
</tbody>
</table>
### Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTile</td>
<td>Ntile(Sales, 100)</td>
<td>Determines the rank of a value in terms of a user-specified range. It returns integers to represent any range of ranks. The example shows a range from 1 to 100, with the lowest sale = 1 and the highest sale = 100.</td>
</tr>
<tr>
<td>Percentile</td>
<td>Percentile(Sales)</td>
<td>Calculates a percent rank for each value satisfying the numeric expression argument. The percentile rank ranges are from 0 (1st percentile) to 1 (100th percentile), inclusive.</td>
</tr>
<tr>
<td>Rank</td>
<td>Rank(Sales)</td>
<td>Calculates the rank for each value satisfying the numeric expression argument. The highest number is assigned a rank of 1, and each successive rank is assigned the next consecutive integer (2, 3, 4,...). If certain values are equal, they are assigned the same rank (for example, 1, 1, 1, 4, 5, 5, 7...).</td>
</tr>
<tr>
<td>Rcount</td>
<td>SELECT month, profit, Rcount(profit) FROM sales WHERE profit &gt; 200</td>
<td>Takes a set of records as input and counts the number of records encountered so far.</td>
</tr>
<tr>
<td>Rmax</td>
<td>SELECT month, profit, Rmax(profit) FROM sales</td>
<td>Takes a set of records as input and shows the maximum value based on records encountered so far. The specified data type must be one that can be ordered.</td>
</tr>
<tr>
<td>Rmin</td>
<td>SELECT month, profit, Rmin(profit) FROM sales</td>
<td>Takes a set of records as input and shows the minimum value based on records encountered so far. The specified data type must be one that can be ordered.</td>
</tr>
<tr>
<td>Rsum</td>
<td>SELECT month, revenue, Rsum(revenue) as RUNNING_SUM FROM sales</td>
<td>Calculates a running sum based on records encountered so far. The sum for the first row is equal to the numeric expression for the first row. The sum for the second row is calculated by taking the sum of the first two rows of data, and so on.</td>
</tr>
<tr>
<td>TopN</td>
<td>TopN(Sales, 10)</td>
<td>Returns the n highest values of expression, ranked from highest to lowest.</td>
</tr>
</tbody>
</table>

### Mathematical Functions

The mathematical functions described in this section perform mathematical operations.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abs</td>
<td>Abs(Profit)</td>
<td>Calculates the absolute value of a numeric expression.</td>
</tr>
<tr>
<td>Acos</td>
<td>Acos(1)</td>
<td>Calculates the arc cosine of a numeric expression.</td>
</tr>
<tr>
<td>Asin</td>
<td>Asin(1)</td>
<td>Calculates the arc sine of a numeric expression.</td>
</tr>
<tr>
<td>Atan</td>
<td>Atan(1)</td>
<td>Calculates the arc tangent of a numeric expression.</td>
</tr>
<tr>
<td>Atan2</td>
<td>Atan2(1, 2)</td>
<td>Calculates the arc tangent of ( y/x ), where ( y ) is the first numeric expression and ( x ) is the second numeric expression.</td>
</tr>
<tr>
<td>Function</td>
<td>Example</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ceiling</td>
<td>Ceiling(Profit)</td>
<td>Rounds a noninteger numeric expression to the next highest integer. If the numeric expression evaluates to an integer, the CEILING function returns that integer.</td>
</tr>
<tr>
<td>Cos</td>
<td>Cos(1)</td>
<td>Calculates the cosine of a numeric expression.</td>
</tr>
<tr>
<td>Cot</td>
<td>Cot(1)</td>
<td>Calculates the cotangent of a numeric expression.</td>
</tr>
<tr>
<td>Degrees</td>
<td>Degrees(1)</td>
<td>Converts an expression from radians to degrees.</td>
</tr>
<tr>
<td>Exp</td>
<td>Exp(4)</td>
<td>Sends the value to the power specified. Calculates $e$ raised to the n-th power, where $e$ is the base of the natural logarithm.</td>
</tr>
<tr>
<td>ExtractBit</td>
<td>Int ExtractBit(1, 5)</td>
<td>Retrieves a bit at a particular position in an integer. It returns an integer of either 0 or 1 corresponding to the position of the bit.</td>
</tr>
<tr>
<td>Floor</td>
<td>Floor(Profit)</td>
<td>Rounds a noninteger numeric expression to the next lowest integer. If the numeric expression evaluates to an integer, the FLOOR function returns that integer.</td>
</tr>
<tr>
<td>Log</td>
<td>Log(1)</td>
<td>Calculates the natural logarithm of an expression.</td>
</tr>
<tr>
<td>Log10</td>
<td>Log10(1)</td>
<td>Calculates the base 10 logarithm of an expression.</td>
</tr>
<tr>
<td>Mod</td>
<td>Mod(10, 3)</td>
<td>Divides the first numeric expression by the second numeric expression and returns the remainder portion of the quotient.</td>
</tr>
<tr>
<td>Pi</td>
<td>Pi()</td>
<td>Returns the constant value of pi.</td>
</tr>
<tr>
<td>Power</td>
<td>Power(Profit, 2)</td>
<td>Takes the first numeric expression and raises it to the power specified in the second numeric expression.</td>
</tr>
<tr>
<td>Radians</td>
<td>Radians(30)</td>
<td>Converts an expression from degrees to radians.</td>
</tr>
<tr>
<td>Rand</td>
<td>Rand()</td>
<td>Returns a pseudo-random number between 0 and 1.</td>
</tr>
<tr>
<td>RandFromSeed</td>
<td>Rand(2)</td>
<td>Returns a pseudo-random number based on a seed value. For a given seed value, the same set of random numbers are generated.</td>
</tr>
<tr>
<td>Round</td>
<td>Round(2.166000, 2)</td>
<td>Rounds a numeric expression to n digits of precision.</td>
</tr>
<tr>
<td>Sign</td>
<td>Sign(Profit)</td>
<td>This function returns the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1 if the numeric expression evaluates to a positive number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• -1 if the numeric expression evaluates to a negative number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 0 if the numeric expression evaluates to zero</td>
</tr>
<tr>
<td>Sin</td>
<td>Sin(1)</td>
<td>Calculates the sine of a numeric expression.</td>
</tr>
<tr>
<td>Sqrt</td>
<td>Sqrt(7)</td>
<td>Calculates the square root of the numeric expression argument. The numeric expression must evaluate to a nonnegative number.</td>
</tr>
<tr>
<td>Tan</td>
<td>Tan(1)</td>
<td>Calculates the tangent of a numeric expression.</td>
</tr>
<tr>
<td>Function</td>
<td>Example</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Truncate</td>
<td>Truncate(45.12345, 2)</td>
<td>Truncates a decimal number to return a specified number of places from the decimal point.</td>
</tr>
</tbody>
</table>

### String Functions

String functions perform various character manipulations. They operate on character strings.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascii</td>
<td>Ascii('a')</td>
<td>Converts a single character string to its corresponding ASCII code, between 0 and 255. If the character expression evaluates to multiple characters, the ASCII code corresponding to the first character in the expression is returned.</td>
</tr>
<tr>
<td>Bit_Length</td>
<td>Bit_Length('abcdef')</td>
<td>Returns the length, in bits, of a specified string. Each Unicode character is 2 bytes in length (equal to 16 bits).</td>
</tr>
<tr>
<td>Char</td>
<td>Char(35)</td>
<td>Converts a numeric value between 0 and 255 to the character value corresponding to the ASCII code.</td>
</tr>
<tr>
<td>Char_Length</td>
<td>Char_Length(Customer_Name)</td>
<td>Returns the length, in number of characters, of a specified string. Leading and trailing blanks aren’t counted in the length of the string.</td>
</tr>
<tr>
<td>Concat</td>
<td>SELECT DISTINCT Concat ('abc', 'def') FROM employee</td>
<td>Concatenates two character strings.</td>
</tr>
<tr>
<td>Insert</td>
<td>SELECT Insert('123456', 2, 3, 'abcd') FROM table</td>
<td>Inserts a specified character string into a specified location in another character string.</td>
</tr>
<tr>
<td>Left</td>
<td>SELECT Left('123456', 3) FROM table</td>
<td>Returns a specified number of characters from the left of a string.</td>
</tr>
<tr>
<td>Length</td>
<td>Length(Customer_Name)</td>
<td>Returns the length, in number of characters, of a specified string. The length is returned excluding any trailing blank characters.</td>
</tr>
<tr>
<td>Locate</td>
<td>Locate('d' , 'abcdef')</td>
<td>Returns the numeric position of a character string in another character string. If the character string isn’t found in the string being searched, the function returns a value of 0.</td>
</tr>
<tr>
<td>LocateN</td>
<td>Locate('d' , 'abcdef', 3)</td>
<td>Like Locate, returns the numeric position of a character string in another character string. LocateN includes an integer argument that enables you to specify a starting position to begin the search.</td>
</tr>
<tr>
<td>Lower</td>
<td>Lower(Customer_Name)</td>
<td>Converts a character string to lowercase.</td>
</tr>
<tr>
<td>Octet_Length</td>
<td>Octet_Length('abcdef')</td>
<td>Returns the number of bytes of a specified string.</td>
</tr>
<tr>
<td>Position</td>
<td>Position('d', 'abcdef')</td>
<td>Returns the numeric position of strExpr1 in a character expression. If strExpr1 isn’t found, the function returns 0.</td>
</tr>
</tbody>
</table>
### Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat</td>
<td><code>Repeat('abc', 4)</code></td>
<td>Repeats a specified expression ( n ) times.</td>
</tr>
<tr>
<td>Replace</td>
<td><code>Replace('abcd1234', '123', 'zz')</code></td>
<td>Replaces one or more characters from a specified character expression with one or more other characters.</td>
</tr>
<tr>
<td>Right</td>
<td><code>SELECT Right('123456', 3) FROM table</code></td>
<td>Returns a specified number of characters from the right of a string.</td>
</tr>
<tr>
<td>Space</td>
<td><code>Space(2)</code></td>
<td>Inserts blank spaces.</td>
</tr>
<tr>
<td>Substring</td>
<td><code>Substring('abcdef' FROM 2)</code></td>
<td>Creates a new string starting from a fixed number of characters into the original string.</td>
</tr>
<tr>
<td>SubstringN</td>
<td><code>Substring('abcdef' FROM 2 FOR 3)</code></td>
<td>Like Substring, creates a new string starting from a fixed number of characters into the original string. SubstringN includes an integer argument that enables you to specify the length of the new string, in number of characters.</td>
</tr>
<tr>
<td>TrimBoth</td>
<td><code>Trim(BOTH '_' FROM '_abcdef_')</code></td>
<td>Strips specified leading and trailing characters from a character string.</td>
</tr>
<tr>
<td>TrimLeading</td>
<td><code>Trim(LEADING '_' FROM '_abcdef')</code></td>
<td>Strips specified leading characters from a character string.</td>
</tr>
<tr>
<td>TrimTrailing</td>
<td><code>Trim(TRAILING '_' FROM 'abcdef_')</code></td>
<td>Strips specified trailing characters from a character string.</td>
</tr>
<tr>
<td>Upper</td>
<td><code>Upper(Customer_Name)</code></td>
<td>Converts a character string to uppercase.</td>
</tr>
</tbody>
</table>

### System Functions

The `USER` system function returns values relating to the session.

It returns the user name you signed in with.

### Time Series Functions

Time series functions are aggregate functions that operate on time dimensions.

The time dimension members must be at or below the level of the function. Because of this, one or more columns that uniquely identify members at or below the given level must be projected in the query.

<table>
<thead>
<tr>
<th>Function</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodrolling</td>
<td><code>SELECT Month_ID, Periodrolling (monthly_sales, -1, 1)</code></td>
<td>Computes the aggregate of a measure over the period starting ( x ) units of time and ending ( y ) units of time from the current time. For example, <code>PERIODROLLING</code> can compute sales for a period that starts at a quarter before and ends at a quarter after the current quarter.</td>
</tr>
<tr>
<td>Function</td>
<td>Example</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Forecast</td>
<td>FORECAST(numeric_expr, ([series]), output_column_name, options, [runtime_bound_options])</td>
<td>Creates a time-series model of the specified measure over the series using either Exponential Smoothing or ARMIA and outputs a forecast for a set of periods as specified by numPeriods.</td>
</tr>
</tbody>
</table>

### Constants

You can use constants in expressions.

Available constants include Date, Time, and Timestamp.

<table>
<thead>
<tr>
<th>Constant</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>DATE [2014-04-09]</td>
<td>Inserts a specific date.</td>
</tr>
<tr>
<td>Time</td>
<td>TIME [12:00:00]</td>
<td>Inserts a specific time.</td>
</tr>
<tr>
<td>TimeStamp</td>
<td>TIMESTAMP [2014-04-09 12:00:00]</td>
<td>Inserts a specific timestamp.</td>
</tr>
</tbody>
</table>

### Types

You can use data types, such as CHAR, INT, and NUMERIC in expressions.

For example, you use types when creating CAST expressions that change the data type of an expression or a null literal to another data type.
This topic describes the software development kit (SDK) that you can use to develop and deploy visualization plug-ins to your Data Visualization installation.

**Topics:**
- About the Oracle Data Visualization SDK
- Using the Data Visualization SDK to Create Plug-ins
- Creating the Visualization Plug-in Development Environment
- Creating a Skeleton Visualization Plug-in
- Creating a Skeleton Skin or Unclassified Plug-in
- Developing a Visualization Plug-in
- Running Data Visualization in SDK Mode and Testing the Visualization
- Validating the Visualization Plug-in
- Building, Packaging, and Deploying the Visualization Plug-in
- Deleting Plug-ins from the Development Environment

**About the Oracle Data Visualization SDK**
The Oracle Data Visualization SDK provides a development environment where you can create and develop custom visualization plug-ins and deploy them to your Data Visualization installation.

**Scripts**
Your installation of Oracle Data Visualization includes the scripts that you use to create a development environment and create skeleton visualization plug-ins. The scripts are located in this directory: `<your_installation_directory>/tools/bin`

For example, C:\Program Files\Oracle Data Visualization Desktop\tools\bin

Note the following script names and descriptions:
- **bicreatenv**: Run this script to create the development environment where you develop your plug-ins.
- **bicreateplugin**: Run this script to create a skeleton visualization to quickly get started on developing your custom plug-in.
• **bideleteplugin**: Run this script to delete a plug-in from your development environment.

• **bivalidate**: Run this script with the `gradlew validate` command to call the bivalidate script. The bivalidate script validates whether the JSON configuration files are properly formatted and contain appropriate visualization configuration.

### Other Resources

These resources help you develop your custom visualization plug-ins:

• **circlePack sample** — The circlePack sample is included in your development environment. You can deploy and use this sample immediately. However, the sample is designed for you to use with the provided tutorial to learn how to develop a visualization plug-in. You can also copy the sample and use it as a template for the visualization plug-ins that you want to create.

The circlePack sample is located in `<your_development_directory>`\`\src\sampleviz\sample-circlepack`

For example, `C:\OracleDVDev\src\sampleviz\sample-circlepack`

• **Other visualization plug-in samples** — You can download plug-in examples from the Oracle Data Visualization Download Page.

• **Tutorial** — The tutorial contains information and instructions to help you understand how to create a robust visualization plug-in. This tutorial provides step-by-step instructions for modifying the circlePack sample included in your plug-in development environment.

[Tutorial]

• **JS API documentation** — This documentation contains JavaScript reference information that you need to develop a visualization plug-in. See Data Visualization SDK JavaScript Reference.

### Using the Data Visualization SDK to Create Plug-ins

This topic tells you how to create visualization plug-ins using the Data Visualization SDK.

**Topics:**

• Creating the Visualization Plug-in Development Environment
• Creating a Skeleton Visualization Plug-in
• Creating a Skeleton Skin or Unclassified Plug-in
• Developing a Visualization Plug-in
• Running Data Visualization in SDK Mode and Testing the Visualization
• Validating the Visualization Plug-in
• Building, Packaging, and Deploying the Visualization Plug-in
• Deleting Plug-ins from the Development Environment
Creating the Visualization Plug-in Development Environment

You need to set the PATH environment variable and create the development environment before you can create visualization plug-ins.

1. Using the command prompt, create an empty development directory. For example, C:\OracleDVDev.

2. Set the PATH environment variable. For example,

   set DVDESKTOP_SDK_HOME="C:\Program Files\Oracle Data Visualization Desktop"
   set PLUGIN_DEV_DIR=C:\OracleDVDev
   REM add tools\bin to path:
   set PATH=%DVDESKTOP_SDK_HOME%\tools\bin;%PATH%

3. Run the bicreateenv script included in your installation to create the development environment in the empty directory. For example,

   cd C:\OracleDVDev
   bicreateenv

   For information about the options available for running this script, see the script's command-line help. For example,

   C:\OracleDVDev>bicreateenv -help

   The complete development environment, including build.gradle and gradlew, is created in the directory that you specified.

4. (Optional) If you’re working behind a web proxy, then you need to set gradle.properties to point to your proxy. The gradle.properties are located in your development environment, for example C:\OracleDVDev \gradle.properties.

   Use the following example to set your gradle.properties:

   systemProp.https.proxyHost=www-proxy.somecompany.com
   systemProp.https.proxyPort=80
   systemProp.https.nonProxyHosts=*.somecompany.com|*.companyaltname.com

Creating a Skeleton Visualization Plug-in

After you create a skeleton visualization plug-in in your development environment, you then develop it into a robust visualization plug-in and deploy it to your Data Visualization environment.

1. Run the bicreateplugin script included in your installation to create a skeleton visualization. Use the following syntax:

   bicreateplugin viz --subType --id --name

   • <subType> is the type of visualization that you want to create. Your choices are:

     - basic: Use this option to create a visualization that doesn’t use any data from Data Visualization or use any data model mapping. This is like the Image and Text visualization types delivered with Data Visualization. For example, you can use this visualization type to show an image or some text that’s coded into the plug-in or from a configuration. You can use this type of visualization to improve formatting.
- **dataviz**: This type renders data from data sources registered with Oracle Data Visualization into a chart or table or some other representation on the screen. It also responds to marking events from other visualizations on the same canvas and publish interaction events to affect other visualizations on the same canvas.

- **embeddableDataviz**: This type renders data from data sources registered with Oracle Data Visualization into the cells of a trellis visualization. It also responds to marking events from other visualizations on the same canvas and publish interaction events to affect other visualizations on the same canvas.

- **<id>** is your domain and the name that you want to give the visualization directory and components in your development environment. For example, `com-company.basicviz`.

- **<name>** is the name of the visualization plug-in that you test, deploy, and use in Data Visualization projects.

For example to create a basic visualization, name its development directory `com-company-basicviz`, and name the visualization plug-in `helloViz`, enter and run the following command:

```bash
C:\OracleDevDir>bicreateplugin viz -subType basic -id com.company.basicviz -name helloViz
```

2. Optional. Open the script's command-line help for information about the options available for running this script. For example, `C:\OracleDVDev>bicreateplugin -help`

When you run the `bicreateplugin -viz` command for the first time, the system creates the `customviz` directory in the following location:

```bash
<your_development_environment>\src\customviz
```

All custom visualization development directories that you create are added to this directory.

For example, `C:\OracleDVDev\src\customviz\com-company-basicviz`

### Creating a Skeleton Skin or Unclassified Plug-in

The `bicreateplugin -unclassified` command creates an empty plug-in with `plugin.xml`, localization bundles, and is a starting point for other Oracle Data Visualization plug-ins. The `bicreateplugin -skin` command creates a skeleton skin plug-in.

1. Run the `createplugin` script included in your installation to create a skeleton plug-in. Use one of the following syntaxes:

   ```bash
   bicreateplugin -skin -<id>
   bicreateplugin -unclassified -<id>
   ```

   - **<id>** is your domain and the name that you want to give the visualization. For example, `com-company.newskin`

   For example, to create a skin plug-in, enter and run the following command:

   ```bash
   C:\OracleDevDir>bicreateplugin skin -id com.company.newskin
   ```
Developing a Visualization Plug-in

After you create the skeleton visualization plug-in, you can use resources provided by Oracle to help you develop your plug-in.

The directories for dataviz and embeddableDataviz types include the datamodelhandler.js file, which contains the physical-to-logical data mapping format. This file also tells Data Visualization how to render itself on the screen and pass user interactions to the server.

- Use the tutorial to learn how to perform development tasks such as implement data mapping.
- Use the JS API documentation to learn how to add dependencies. See Data Visualization SDK JavaScript Reference.

Running Data Visualization in SDK Mode and Testing the Visualization

You can run Oracle Data Visualization in SDK mode from your browser when you’re developing your visualization plug-in or when you want to test your visualization plug-in.

1. Execute the `gradlew run` command. For example, `C:\OracleDevDir>gradlew run`

   After you run the command, note the following results:
   - Data Visualization opens in SDK mode in your default browser. Use the browser’s JavaScript debugger to test and debug the application.
   - The visualization that you created is available in the Visualizations pane of Data Visualization.
   - A system tray is displayed in the operating system’s toolbar and includes three links: Launch Browser, which you use to launch or relaunch your default browser to display Data Visualization; Copy URL to Clipboard, which you can use to copy the URL and paste it into a different browser; and Shutdown, which you use to shut down the development browser.

2. Test your visualization by dragging and dropping it to a project’s canvas and adding data elements.

3. If necessary, continue developing the visualization plug-in. When working in SDK mode in the browser, you can update the JS definition and refresh the browser to see your changes.

Validating the Visualization Plug-in

After you’ve tested your visualization plug-in and before you can package and deploy it, you must validate it.

1. Run the `gradlew validate` command. For example,

   ```
   cd C:\OracleDVDev
   .\gradlew validate
   ```
This step validates whether the JSON configuration files are properly formatted and contain appropriate visualization configuration. If the validation discovers any errors, then the system displays error messages.

2. To check for errors in the JavaScript source files, use your browser’s development tools.

Building, Packaging, and Deploying the Visualization Plug-in

After you validate the visualization plug-in, you have to build and package it, and then copy the resulting distributions into your Data Visualization installation directory.

The build and package process runs for all of the visualizations in your development directory, and each plug-in is contained in its own .ZIP file. There’s no way to build and package specific visualizations. If you want to exclude visualizations from the build and package process, then you have to move the visualizations that you want to exclude out of your development directory, or delete them from the directory before you perform the build. See Deleting Plug-ins from the Development Environment.

1. Run the `gradlew build` command. For example,

   ```
   cd C:\OracleDVDev
   .\gradlew clean build
   ```

   A build directory is added to your development environment. For example, C:\OracleDVDev\build\distributions. This directory contains a .ZIP file for each visualization. The .ZIP file’s name is the one that you gave the visualization when you created its skeleton. For example, basicviz.zip.

2. Copy the .ZIP files to your Data Visualization installation directory. For example, %localappdata%\DVDesktop\plugins.

Deleting Plug-ins from the Development Environment

You can use the `bideleteplugin` script provided with Data Visualization to delete the unneeded plug-ins from your development environment.

The build and package process includes all of the visualizations contained in your development directory. There is no way to build and package specific visualizations. To exclude any unwanted visualizations from the build, you can delete them before you perform the build and package process.

1. If you want to delete a visualization plug-in, then run the `bideleteplugin` command, using the following syntax:

   ```
   cd C:\<your_development_directory>
   bideleteplugin viz -id <name_of_your_domain>.<name_of_viz_plugin>
   ```

2. If you want to delete an unclassified plug-in, then run the `bideleteplugin` command, using the following syntax:

   ```
   cd C:\<your_development_directory>
   bideleteplugin unclassified -id <name_of_your_domain>.<name_of_unclassified_plugin>
   ```

3. If you want to delete a skin plug-in, then run the `bideleteplugin` command, using the following syntax:
cd C:\<your_development_directory>
bideleteplugin skin -id <name_of_your_domain>.<name_of_skin_plugin>