# Oracle® Fusion Middleware

User's Guide for Oracle Data Visualization Desktop

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Oracle Fusion Middleware User's Guide for Oracle Data Visualization Desktop,

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# Preface

Learn how to explore data using Oracle Data Visualization Desktop.

**Topics**

- Audience

- Related Resources

- Conventions

## Audience

The *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

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc`.

**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` or visit `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

## Conventions

Conventions used in this document are described in this topic.

**Text Conventions**

| Convention | Meaning |
| --- | --- |
| **boldface** | Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary. |
| *italic* | Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values. |
| `monospace` | Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter. |

**Videos and Images**

Skins and styles customize the look and feel of Oracle Business Intelligence, dashboards, reports, and other objects. Videos and images used in this guide may not have the same skin or style that you are using, but the behavior and techniques shown are the same.

**1**

# Getting Started with Oracle Data Visualization Desktop

This topic describes how to get started with Oracle Data Visualization Desktop.

**Topics:**

- About Oracle Data Visualization Desktop

- Getting Started with Samples

## About Oracle Data Visualization Desktop

Oracle Data Visualization Desktop enables you 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 patterns and outliers. Just upload data files or connect to Oracle Applications or a database, select the elements you are interested in, and let Oracle Data Visualization Desktop find the best way to visualize it. Of course you can choose from a variety of visualizations yourself if you want to look at data in a specific way.

Oracle Data Visualization Desktop's benefits include:

- A personal, single-user desktop application.

- Is available offline.

- Completely private analysis.

- Personal control of data source connections.

- Direct access to on-premise data sources.

- Lightweight single file download.

- No remote server infrastructure.

- No administration tasks.

## Getting Started with Samples

You can use the Oracle Data Visualization Desktop samples to discover Oracle Data Visualization Desktop's capabilities and learn best practices.

The Oracle Data Visualization Desktop samples include several business-like insights that highlight the product's features. You can use the samples as a quick-reference when you are creating your own visualizations. For example, the samples illustrate the use of functions such as trending, binning, forecasting, and clustering.

The data set included with the samples is based on Sales Orders data. The data set contains meaningful dimensionality and distributions, examples of data wrangling, calculated columns, and more.

You can optionally download the samples during installation. If you did not download the samples during installation, then you can still get them by uninstalling and then reinstalling Oracle Data Visualization Desktop (your personal data will not be lost if you uninstall and reinstall).

# 2

# Exploring Your Content

This topic describes how to explore your content.

**Topics:**

## Typical Workflow for Exploring Content

Here are the common tasks for exploring content.

| Task | Description | More Information |
|------|-------------|-----------------|
| Select data sources | Select external data sources for a project. | Choosing Data Sources |
| Add data elements | Add data elements from a selected data source to visualizations. | Adding Data Elements to Visualizations |
| Adjust the canvas layout | Add, remove, and rearrange visualizations. | Adjusting the Canvas Layout |
| Filter content | Streamline the content shown in visualizations. | Exploring Data Using Filters |
| Set visualization interaction properties | Specify how visualizations synchronize. | Specifying How Visualizations Interact with One Another |

## 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.

If you installed the sample data, then you can immediately use the sample data as a data source.

To choose data sources in a project:

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.

   For more information, see Adding Data from Data Sources.
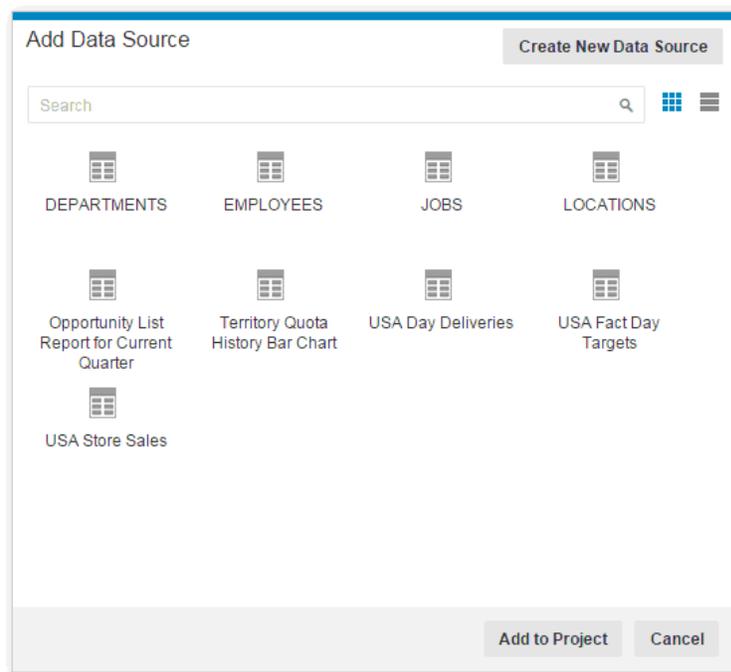
**2.** Click **Add to Project**.

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**Note:** To add data sources to an existing project, right-click the Data Elements pane, and then click the **Add Data Source** link. When you add two or more data sources to a project, they must be matched. Sometimes the system matches them automatically, but sometimes you need to match them manually using the **Source Diagram** option. If the data sources are not matched, then the additional data sources you added don't display in the Data Elements pane, but will display in the Data Sources pane. See Blending Data that You Added for more information about how to match data sources.

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# Adding Data Elements to Visualizations

This topic describes how you add data elements to visualizations.

**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.
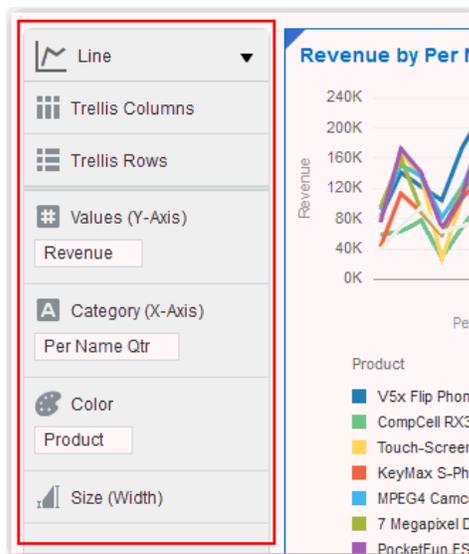


Here are some of the ways you can add data elements to drop targets:

- You can drag and drop one or more data elements from the Data Elements pane to drop targets in the Explore pane or double-click data elements in the Data Elements pane to add them.

  The data elements are automatically positioned in the best drop target in the Explore pane, and the visualization type may also change to optimize the visualization layout.
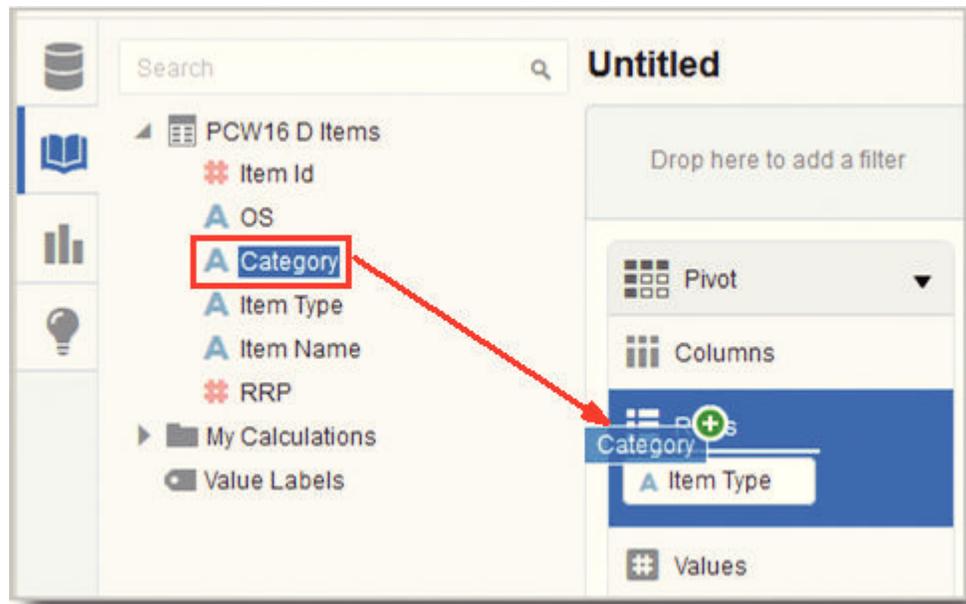
- You can replace a data element in the Explore pane by dragging it from the Data Elements pane and dropping it over an existing data element already in the Explore pane.

- You can 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.

- You can 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.

To add data elements to visualization drop targets:

- If you drag and drop a data element over to a visualization (but not on a specific drop target), a blue outline displays around the recommended drop targets in the visualization. If you drop the data element in the visualization, it is automatically shuttled to the best drop target.

  Also, you see a green plus icon next to the data element when it is over a valid drop target.

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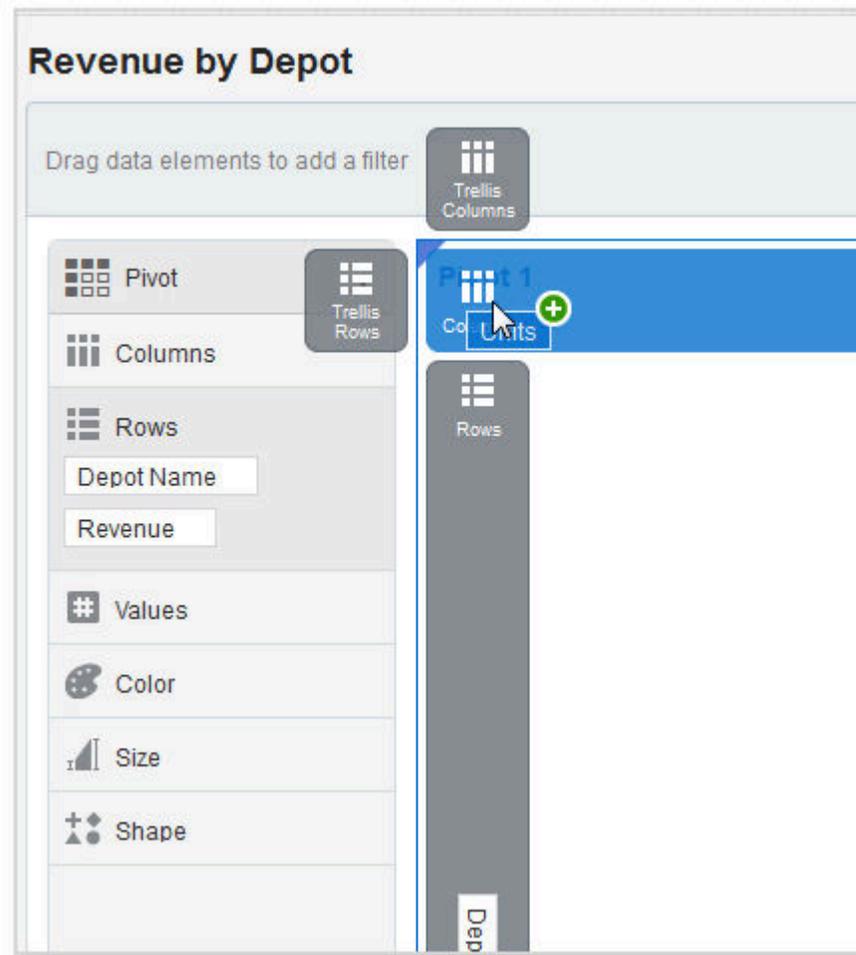
**Note:**  If you are not sure where to drag and drop any data element, simply drag and drop the data element anywhere over the visualization, and not to a specific drop target. The data element is automatically added to the best drop target on the canvas.

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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.
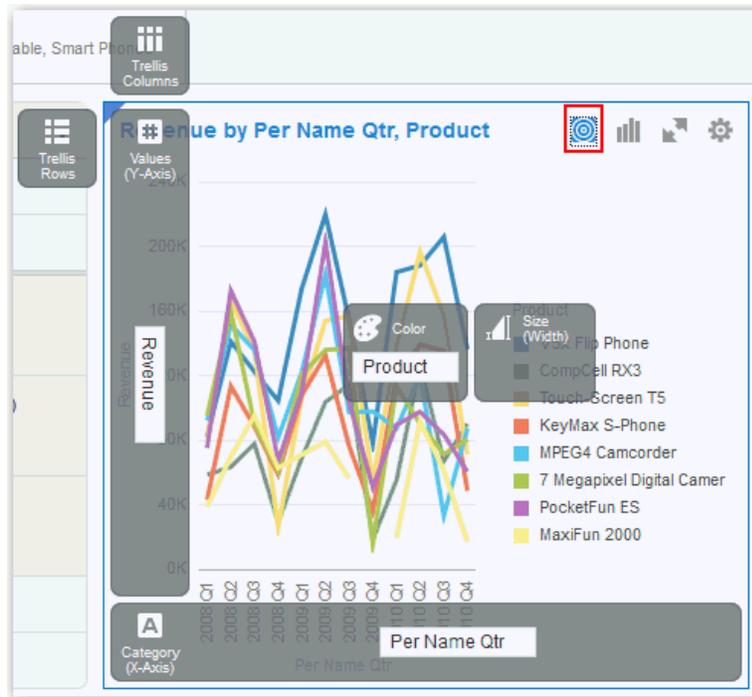
For more information on adding, removing, or moving data elements, see Adding Data Elements to Drop Targets.

## Adding Data Elements to a Blank Canvas

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

To add data elements to a blank canvas:

Confirm that you are working in the Visualize 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 visualization type of Line is selected.
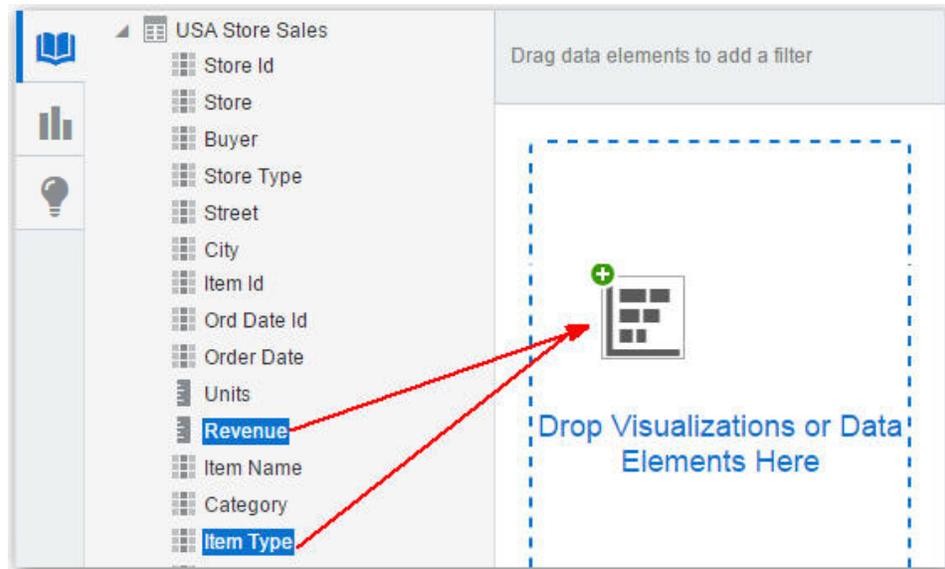
> **Note:** If there are visualizations already on the canvas, then you can drag and drop data elements between them.

## Sorting Data in Visualizations

There may be times when you are working with a lot of data in visualizations and you need to sort it to optimize your view of the data.

To sort data in a visualization:

1. In the Explore pane, click the data element you want to sort.
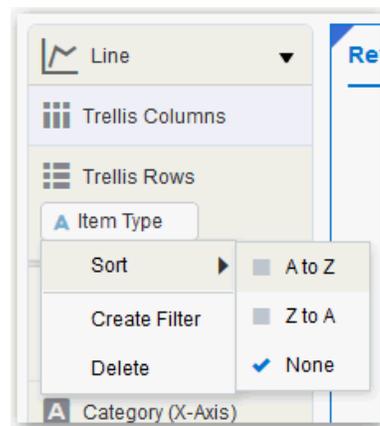


2. Select **Sort**.

3. Select a sort option such as **A to Z** or **Low to High**. The sort options available are based on the data element you are 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 adjust the Visualize canvas layout:

- To customize the width and height pixels of the canvas, click **Canvas Settings** on the project toolbar, 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 highlighted in blue.

- 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 are exploring.

The visualization type is automatically chosen based on the selected data elements. However, this is only true when you create a new visualization by dragging data elements to a blank area on the canvas. Once a visualization is created, dragging additional data elements to it won't change the visualization type automatically.

To change visualization types:

1. Select a visualization on the canvas, and on the visualization toolbar, click **Change Visualization Type**.



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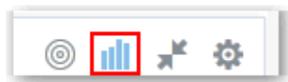
**Note:** You can also add a new visualization to the canvas by dragging it from the Visualizations pane to the canvas.

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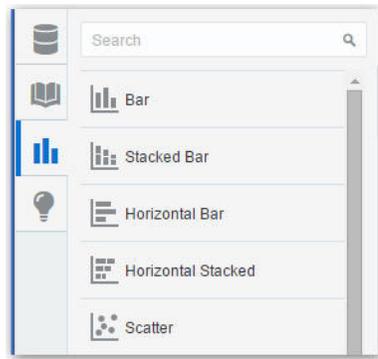
**2.** In the View Select dialog, select a visualization type. For example, change the visualization type from Bar to Stacked Bar.

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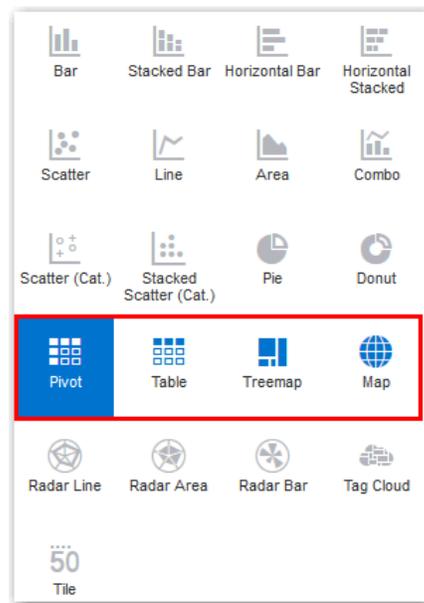


When you change the visualization type, the data elements are moved to matching drop target names. If an equivalent drop target does not exist for the new visualization type, then the data elements are moved to a drop target labeled "Unused". You can then move them to the drop target you prefer.

## Adjusting Visualization Properties

You generally don't need to change visualization properties as 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.

To adjust visualization properties:

- On the active visualization toolbar, click **Menu**, and then select **Properties** to display the Properties dialog.
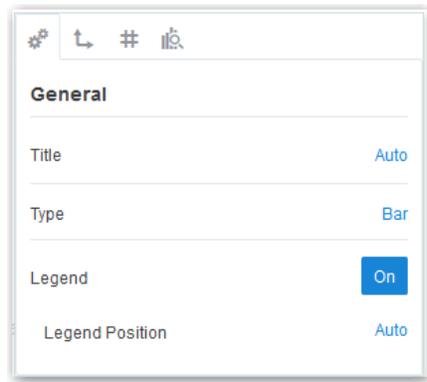
The properties you can edit depend on the type of visualization you are handling.

• Adjust visualization properties:

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

# Working With Color

This topic covers working with color in projects and visualizations.

**Topics:**

• Color in Visualizations

• Setting Visualization Colors

## 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.

To change the color in your visualization, see Setting Visualization Colors.

## 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**

To access color options:

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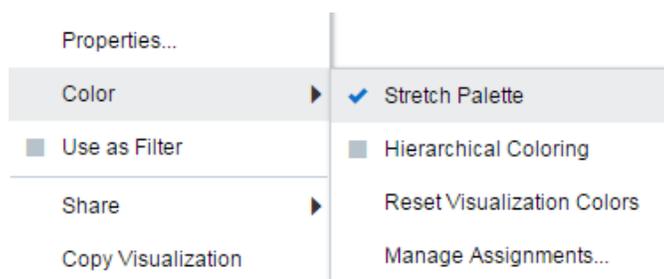


**Changing the color palette**

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.

To change the color palette:

1. In the Visualize canvas, click **Menu** and then put your mouse over **Color** and select **Manage Assignments**. The Manage Color Assignments dialog displays.

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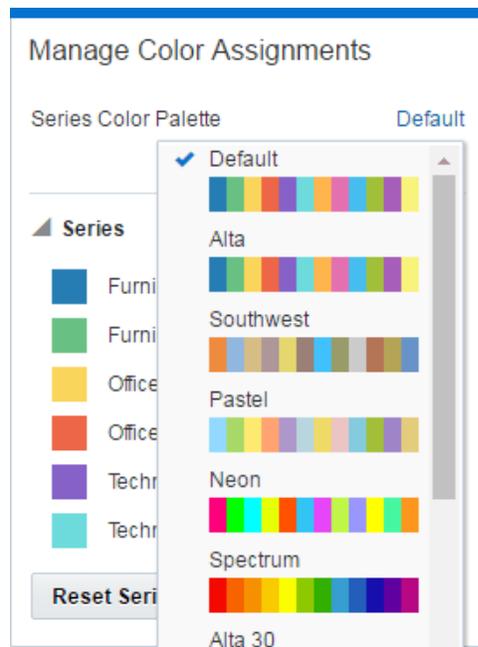


3. From the list, select the color palette that you want to apply to the visualization.

**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.

To manage color assignments:

1. In the Visualize canvas, click **Menu** and then put your mouse over **Color** and select **Manage Assignments**. The Manage Color Assignments dialog displays.

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

    • Click on 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).
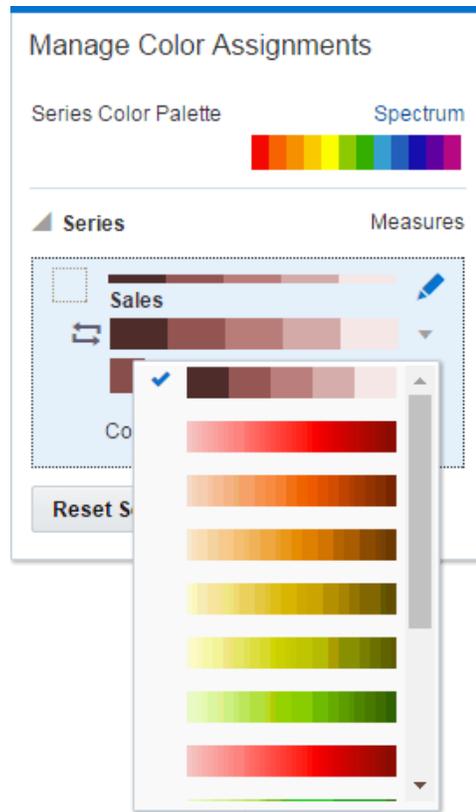
- Specify how you want the color range to display for the measure (for example, reverse the color range, pick a different color range, and specify how many shades you want in the color range).
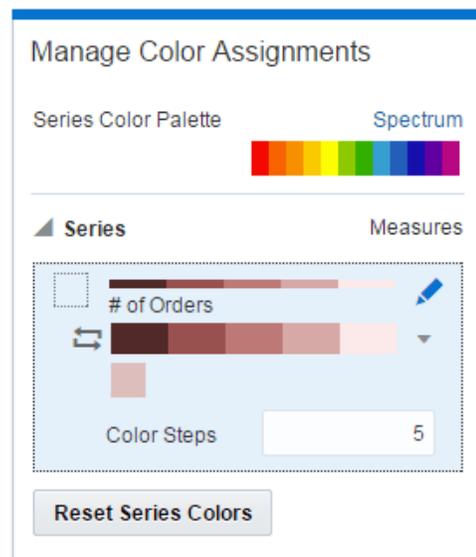


3. If you are working with an attribute column, then click the box containing the color assignment that you want to change. From the color picker dialog, select the color that you want to assign to the value. Click **OK**.
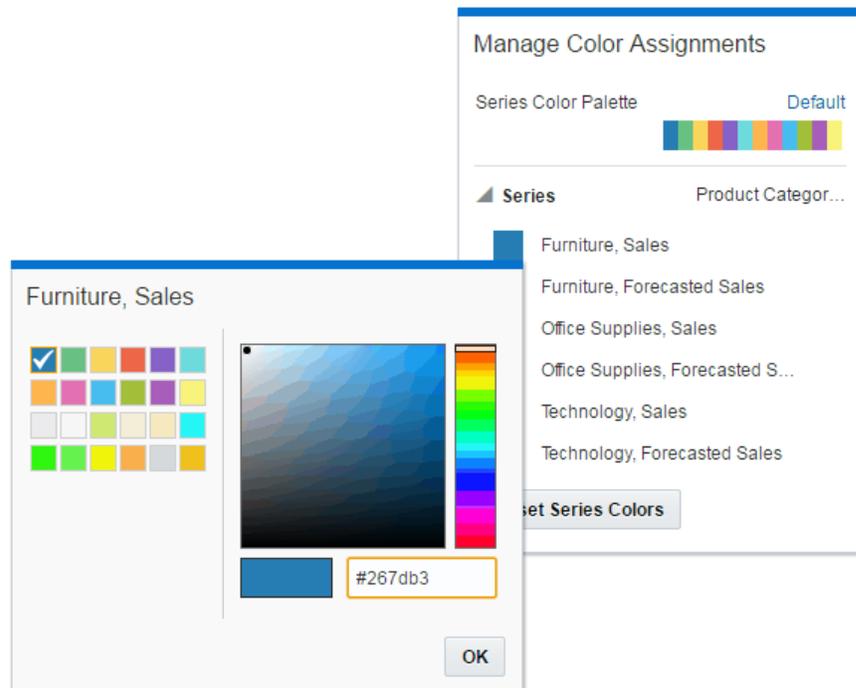
## Resetting Colors

You can experiment with visualization colors and then easily revert back to the visualization's original colors.

To reset colors:

- In the Visualize canvas, click **Menu** and then put your mouse over **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.

To apply or remove the stretch palette:

- In the Visualize canvas, click **Menu** and then put your mouse over **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 will have its own color, and within that color each product will have its own shade. For some visualizations, hierarchical coloring is used by default. In some case you can toggle between Hierarchical Palette and Stretch Palette.

When two attributes (for example, Brand, Product ) have been colored hierarchically and then the attributes are reordered, the application maintains the color hierarchy as Brand, Product. In order to switch the order of the hierarchical coloring after switching

the order of attributes in the visualization, the user needs to reset the visualization colors or turn hierarchical coloring off and then on again. The application does not use metadata to determine the hierarchical order of attributes ( for example, Year, Month ), it only uses the order of the attributes in the color drop zone for the ordering of the hierarchy.

To apply or remove the hierarchical palette:

- In the Visualize canvas, click **Menu** and then put your mouse over **Color** and click **Hierarchical Palette** to turn this option on or off.

To switch the attributes' color hierarchy:

The order of the attributes in the Color drop target determines the hierarchical order of the attributes. When two attributes (for example, Brand, Product ) have been 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 **Menu** and then put your mouse over **Color** and click **Hierarchical Palette** to turn this option off.

2. In the Visualize canvas, click **Menu** and then put your mouse over **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 used over and are not unique.

To apply a repeating color palette:

1. In the Visualize canvas, click **Menu** and then put your mouse over **Color** and click **Hierarchical Palette** to turn this option off.

2. In the Visualize canvas, click **Menu** and then put your mouse over **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 have just selected, or you can go back to where you were before a drill. These options are especially useful as you experiment with different visualizations.

To undo and redo visualization edits:

Click the **Undo Last Edit** or **Redo Last Edit** buttons on the project toolbar.



# Reversing Visualization Edits

You can easily back out of 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, click **Canvas Settings** on the project toolbar and select **Revert to Saved**.

## Refreshing Visualization Content

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

To refresh the data and metadata displayed in a project:

- Click **Canvas Settings** on the project toolbar and select **Refresh Data**. This action clears the data cache and reruns queries to retrieve the latest data from the data sources to display on the canvas.

- Click **Canvas Settings** on the project toolbar and select **Refresh Data Sources**. This action refreshes the data and also any project metadata such as a column name change in the uploaded data source.
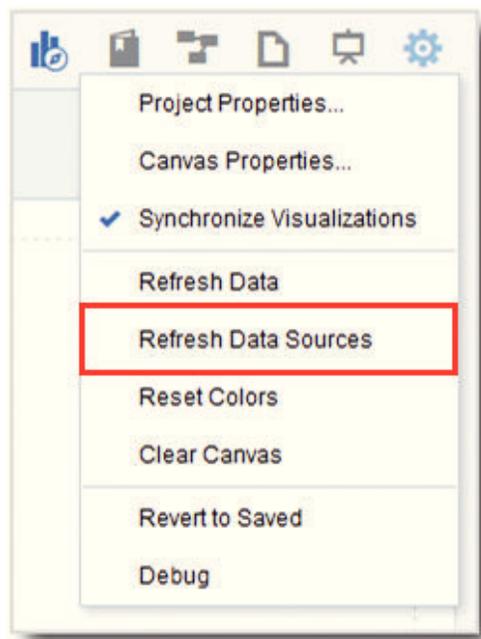


## Exploring Data Using Filters

This topic describes how you can use filters to explore the data in visualizations.

**Topics:**

- About 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. 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 incontiguous 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 non-aggregatable number data types. 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 enable you to 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 will be 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 the **Use as Filter** option is selected and when the user selects data points in the

visualization being used as a filter, 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 uncheck **Synchronize Visualizations** to unlink your visualizations and turn automatic synchronization off.
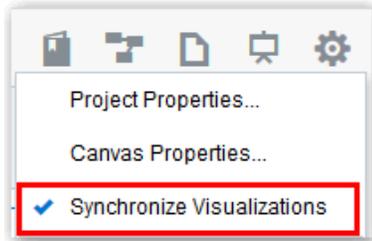


When **Synchronize Visualizations** is on (checked), then all filters on the filter bar and actions that produce filters (such as **Drill**, **Keep Selected**, **Remove Selected**) are applied to all visualizations on the canvas. For example, if you have a canvas with multiple visualizations and you drill in 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 (unchecked), 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 (unchecked), the selections you make in the filters bar or filters drop are not 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**.
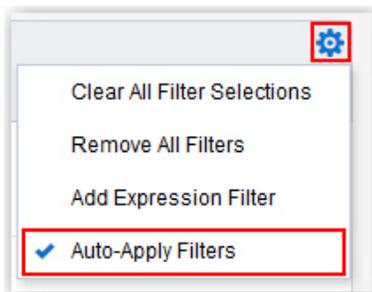


## Creating Filters on a Project

You can add filters to limit the data that displays 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.

There are other ways to limit the data that displays in your visualizations:

- Instead of or in addition to adding filters to the canvas, you can add filters to individual visualizations. For more information, 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. For more information, see Creating Filters on a Canvas.

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

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

To add a filter to the project:

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 are filtering.

   - See Applying Range Filters for information about setting filters on columns such as Cost or Quantity Ordered.

   - See Applying List Filters for information about setting filters on columns such as Product Category or Product Name.

   - See Applying Date Filters for information about setting filters on columns such as Ship Date and Order Date.

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 will be limited to the product names of furniture and office supplies. You can select **None** to turn this auto limit functionality off.

   - You can specify any individual filter in the filter bar that you do not 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 will show all values and not a list of values limited by what you select for Product Category. However, the values shown for Product Name will be limited to what you select for Product Category.

4. (Optional) Click the Filters Bar **Menu** and select **Auto Apply Filters** to turn off auto apply. When you turn off auto 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 displays in a specific visualization on the canvas.

Visualization filters can be automatically created by drilling, choosing **Keep Selected**, or choosing **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. For more information, see Creating Filters on a Project. Any filters included on the canvas are applied before the filters you add to an individual visualization.

To add a filter to a 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.
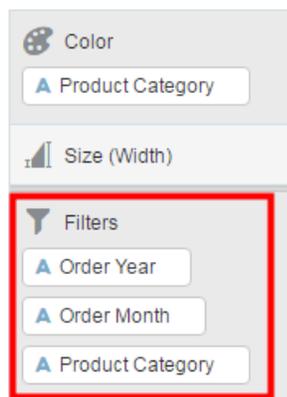


4. In the filter drop target, click the data elements name and set the filter values. How you set the values depends upon the data type that you are filtering.

   • See Applying Range Filters for information about setting filters on columns such as Cost or Quantity Ordered.

   • See Applying List Filters for information about setting filters on columns such as Product Category or Product Name.

   • See Applying Date Filters for information about setting filters on columns such as Ship Date and Order Date.

5. (Optional) Click the Filters Bar **Menu** and select **Auto Apply Filters** to turn off auto apply for all filters on the canvas and within the visualization. When you turn off auto 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 display 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 which forecasted yearly sales data you want to analyze.



Or if the visualizations on the canvas are similar, 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.

To add a filter to 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 displays 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.

   • You can add filters to individual visualizations. For more information, see Creating Filters on a Visualization

   • You can add filters to the project. For more information, see Creating Filters on a Project.

   • There are several options that you can use to define how filters interact with each other. For more information, 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 you are 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, then click it to detach the panel and drag it to another location on the canvas.
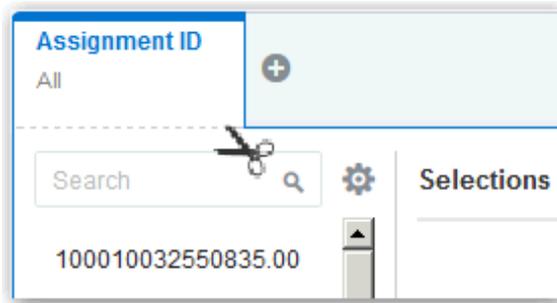


- To reattach the panel to the filter bar, click the reattach panel icon.
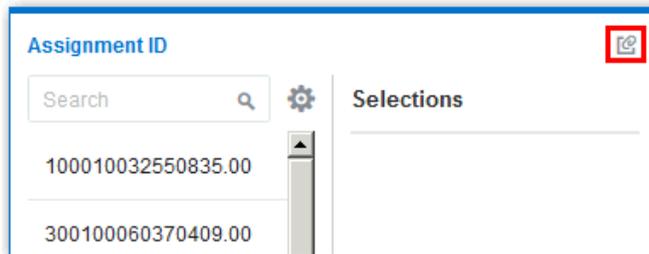


## Applying Range Filters

Range filters are used 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 incontiguous ranges (for example, revenue less than $100,000 or greater than $500,000).

To use a range filter:

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 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 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 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.

To use a list filter:

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 once.

8. Click outside of the filter panel to close it.

9. Optionally, to clear the filter selections or remove all filters at once, 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 either select a single contiguous range of dates, or you can use a date range filter to exclude dates within the specified range.

To use a date filter:

1.  Click the filter to view the **Calendar Date** list.

2.  In **Start**, select the date that begins the range 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 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 off the filter to close the filter panel.

## Building Expression Filters

Expression filters enable you to 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 only see the items that did not 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.

To build an expression filter:

1.  On the filter bar, click **Action** and then select **Add Expression Filter**.

2.  In the Expression Filter panel, compose an expression. For more information, see About Composing Expressions.

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—such as drilling, sorting, and selecting. When you take the analytic actions described in this topic, the filters are automatically applied for you.

```
Drill to Month, Offices
Drill ...
Keep Selected
Remove Selected

Add Reference Line ...

Properties...

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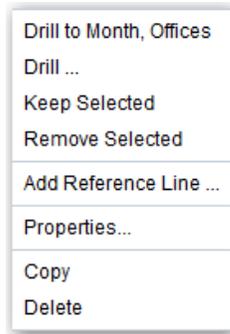
Here are some of the analytic actions that you can take when you right-click content in visualizations:

- Use **Sort** to sort attributes in a visualization, such as product names from A to Z. If you are 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 cannot sort the center column. For example, if the left column is Product and the center column is Product Type, then you cannot 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**. For more information, see Adjusting Visualization Properties.

## About 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 are not 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 cannot be added as a data element to a visualization. An expression filter can be created from a calculation, but a calculation cannot be created from an expression filter. For more information, see Creating Calculated Data Elements and Building Expression Filters.

You can compose an expression in various ways:

- You can directly enter text and functions in the Expression Builder by typing.

- You can add data elements from the Data Elements pane (drag and drop, or double-click).

- You can add functions from the function panel (drag and drop, or double-click).

For more information about expression elements, see Expression Editor Reference.

# Creating Calculated Data Elements

You can use the Add Calculation dialog to create a new data element—typically a measure—to add to your visualization. For example, you can create a new measure called Profit. This new data element might involve the Revenue and Discount Amount measures.

To add a calculation:

1. Launch 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.

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.

# Building Stories

This topic covers how you capture insights, group them into stories, and share them with others.

**Topics:**

- Capturing Insights

- Shaping Stories

## Capturing Insights

As you delve into data in visualizations, you can capture key information within an insight. Insights are live in that they can be changed and polished as many times as you need before you are ready to share them with others.

Insights enable you to take a snapshot of the information you see in a visualization, and help you remember "ah ha" moments while you work with the data. You can share insights in the form of a story, but you don't have to. They can simply remain as a list of personal "ah ha" moments that you can use to go back to, and perhaps explore further. You can combine multiple insights in a story and you can link them to visualizations. For more information about linking insights to visualizations, see Adjusting Visualization Properties.

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

To create an insight:

1.  Click **Add Insights** on the project toolbar.

> **Note:**   You can also press the control key and "I" on your keyboard to quickly create an insight.

2.  Select the Narrate canvas.

3.  To change the name of the insight, right-click the insight's tab and select **Rename**. Type the insight's new name.

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.
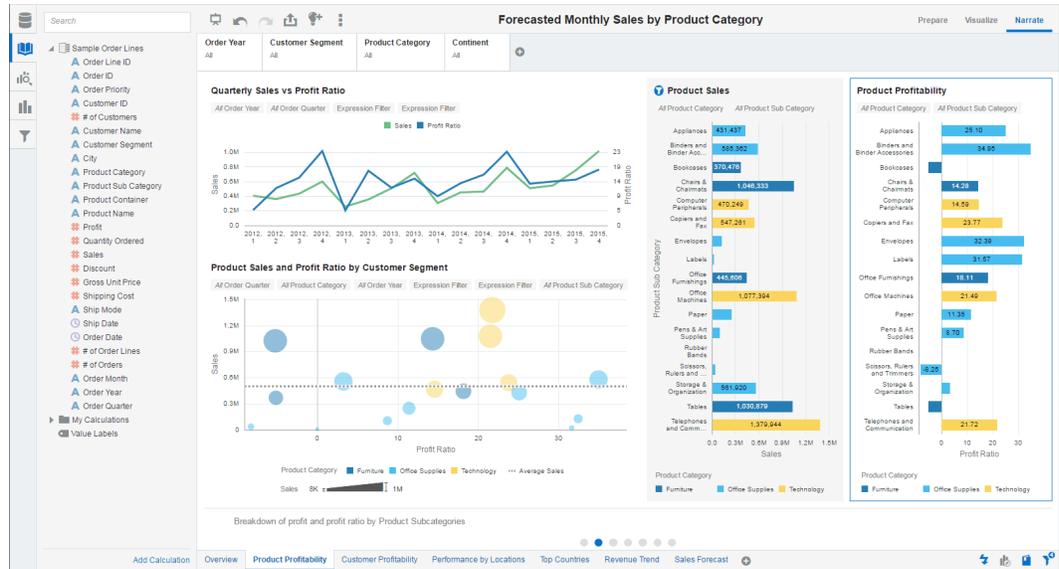
(Optional) Enter the result of the procedure here.

## Shaping Stories

Once 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.

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

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To shape a story:

1. Navigate to the Narrate canvas.

2. To change the name of an insight, right-click its tab and select **Rename**. Type the insight's new name.

3. To include or exclude an insight from the story, right click its tab and select **Include in Story**. Names of excluded tabs display in italics.

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

Thumbnails enable you to quickly identify content on the Home Page and within projects.

- **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 display when you hover your mouse pointer over an insight in the insight list or over a circle in the Story Navigator.

  For more information, see Capturing Insights and Building Stories.

## Viewing Streamlined Content

You can use presentation mode to explore and view projects in the most streamlined way possible, that is without the canvas toolbar or authoring options.

To view content in presentation mode:

- Click **Presentation Mode** on the canvas toolbar.
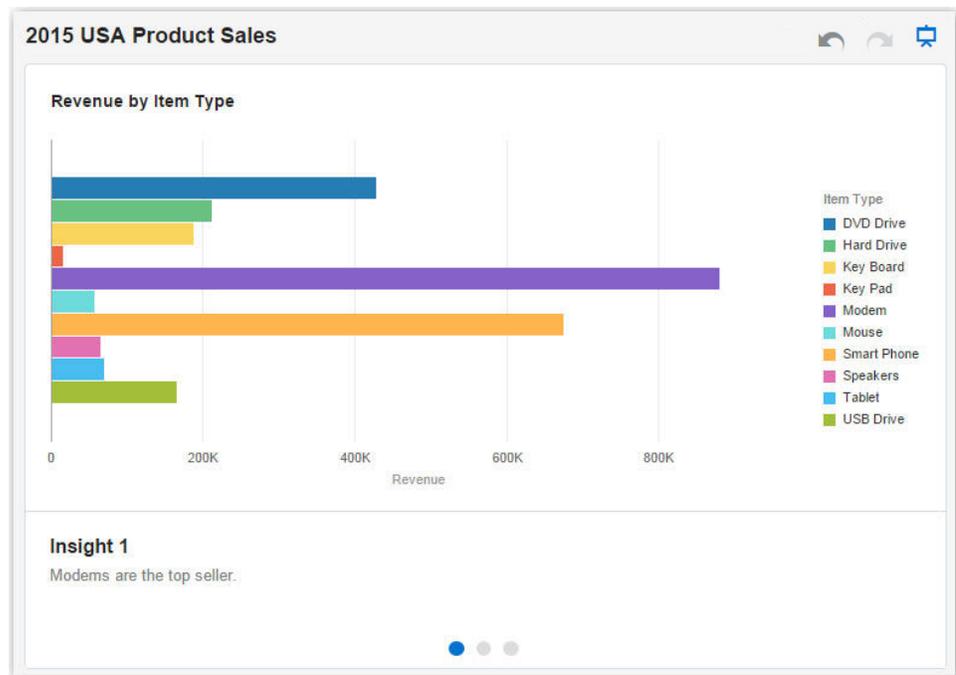




In presentation mode, view-only users can still hide, open and edit current filter selections, and explore stories, insights and discussions, but they can't change anything. View-only users can toggle presentation mode on or off.

> **Tip:** Collapse the filter bar before launching presentation mode to maximize the canvas space for viewing visualizations.

- To return to interaction mode, click **Presentation Mode**.

## Using Search and BI Ask

This topic describes how to search for objects, projects, and columns. This topic also describes how to use BI Ask to create on the fly visualizations.

**Topics**

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## How Data is Indexed 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 no longer displays 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 is not available in your search results.

## Visualizing Data with BI Ask

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

To visualize data using BI Ask:

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

2. Type your criteria. As you type, the application returns search results in a dropdown window. If you select an item from this dropdown window, then your visualized data displays. Note the following information:

   - What you select determines the data source for the visualization, and all other criteria that you type is limited to columns or values in that data source. The name of the data source you are choosing from displays in the right side of the **Find content or visualize** field. Note the following BI Ask search and visualization example:
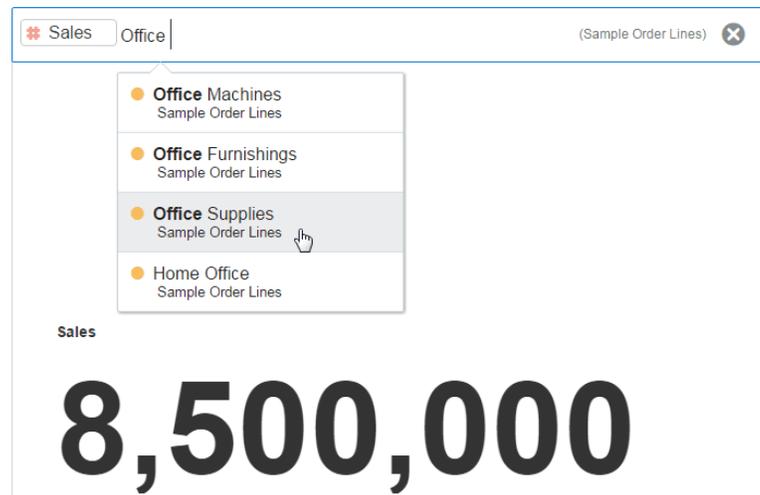
- You can use the **Find content or visualize** field to search for projects and visualizations or to use BI Ask. When you type your initial search criteria, the dropdown window contains BI Ask results, which display in the **Visualize data using** section of the dropdown window. Your initial search criteria also builds a search string to find projects and visualizations. That search string displays in the **Search results containing** section of the dropdown window and is flagged with the magnifying glass icon. Note the following example of the dropdown window and its contents:
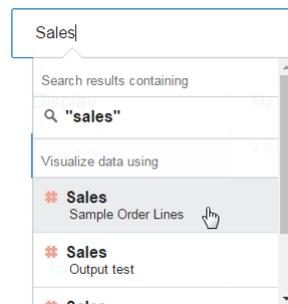


- For more information about typing your search criteria, see Search Tips.

- 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. Type additional criteria in the search field, select the item you want to include, and the application builds your visualization.

4. Optional. Type the name of the visualization that you want your results to display in. For example, type scatter to show your data in a scatter plot chart, or type 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, click the **X** icon in the **Find content or visualize** field.

## 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 display 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 on the fly visualizations. For more information, see Visualizing Data with BI Ask.

To find content from the Home Page:

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

2. Enter your search criteria by either typing keywords or the full name of an object such as a folder or project. As you type, the system builds the search string in the dropdown window. Note the following information:

   • The dropdown window contains results that match saved objects, but also can contain BI Ask search results. To see object matches (for example, folders or projects), click on the row with the magnifying glass icon (located at the top of the dropdown window in the **Search results containing** section). Note that any BI Ask matches display in the **Visualize data using** section of the dropdown window and are flagged with different icons. Note the following example of the dropdown window and its contents:
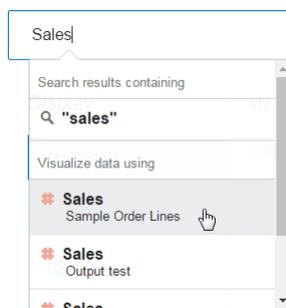


   • For information about search terms to use, see Search Tips

3. Press **Enter** to run the search.

   The objects that match your search display in the Home Page.

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

## Search Tips

It is important to understand how the search functionality works and how you can 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 searching, be sure to use meaningful keywords. Searching with keywords such as *by*, *the*, and *in* returns no results. For example, if you want to type 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 no results are returned.

### Items Containing Commas

Using a comma in your search criteria returns no results. For example, if you want to search for quarterly sales equal to $665,399 and type 665,399 in the search field, then no results are returned. However, typing 655399 will return results.

### Date Search

To search for a date attribute, search using the year-month-date format. Searching with the month/date/year format (for example, 8/6/2016) does not produce any direct matches. Instead your search results contain entries containing 8 and entries containing 2016.

### Searching in Non-English Locales

When you type in the search field, what displays in the dropdown suggestion list can differ depending upon your locale setting. For example, if you are using an English locale and type "sales," then the suggestion list contains items named "sale" and "sales." However, if you are using a non-English locale such as Korean and type "sales," then the suggestion list only contains items that are named "sales" and items such as "sale" are not included in the suggestion list.

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" will return 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, chances are your search results will not contain matches for these items. If this happens, wait a few minutes for the indexing process to run, and then 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 are not indexed and will not be included in your search results.

# 3

# Adding Your Own Data

This topic describes how to add your own data for analysis and exploration.

**Topics:**

## Typical Workflow for Adding Data from Data Sources

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

| Task | Description | More Information |
| --- | --- | --- |
| Add a connection | Create a connection if the data source you want to use is either Oracle Applications or a database. | Connecting to Oracle Applications Data Sources<br><br>Connecting to Database Data Sources |

| Task | Description | More Information |
|------|-------------|------------------|
| Create data source | Upload data from a file such as a spreadsheet. Retrieve data from Oracle Applications and from databases if the data is not already cached.<br><br>Creating a data source from Oracle Applications or a database requires you to create a new connection or use an existing connection. | Composing Data Sources from Databases |
| Blend data | Blend data from one data source with data from another data source. | Blending Data that You Added<br>Changing Data Blending |
| Refresh data | Refresh data for files when newer data is available. Or refresh cache for Oracle Applications and databases if the data is stale. | Refreshing Data that You Added |
| Extend uploaded data | Add new columns to the data source. | Modifying Uploaded Data Sources |

# About Data Sources

A data source is any tabular structure. The data source's data values are provided when 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 containing 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 containing text, dates, or numbers that are required individually and are not aggregated (for example, Year, Category Country, Type, or Name).

- Measure columns containing 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 will 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).

# 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) and be a maximum size of 50 MB.

Before you can upload a Microsoft Excel file as a data source, it must be structured in a data oriented way. Note the following rules for Excel tables:

- Tables need to start in Row 1 and Column 1 of the Excel file.

- Tables need to have a regular layout. There should be no gaps and inline headings. An example of an inline heading is a heading 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 that 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, 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 cannot contain column names.

- Data in a column must be of the same kind because it is often processed together. For example, Amount Purchased should only have numbers (and possibly nulls) so it can be summed or averaged. Given Name and Surname should be text as they may need to be concatenated, and dates may need to be split into their months, quarters, or years.

- Data must be at the same grain. A table should not contain both aggregations and details for those aggregations. For example, suppose you have a sales table at the grain of Customer, Product, and Year, and contains the sum of Amount Purchased for each Product by each Customer by Year. In this case, you would not include Invoice level details or a Daily Summary in the same table, as the sum of Amount Purchased would not be calculated correctly. If you need 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. These can be rolled up to day or month or quarter.

  - Have multiple tables, one at each grain (invoice, day, month, quarter, and year).

# Connecting to Oracle Applications Data Sources

This topic covers the process for connecting to and using Oracle Applications data sources.

**Topics:**

- Creating Oracle Applications Connections

- Composing Data Sources From Oracle Application 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 source data in projects.

To create Oracle Applications connections:

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 gotten 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 will always be used and users will not be prompted to log in. If you select **Require users to enter their own username and password**, then users will be prompted to enter their user names and passwords to use the data from the Oracle Applications data source. Users required to login will only see the Oracle Applications data that they have the permissions, privileges, and role assignments to see.

5. Click **Save**.

   You can now begin creating data sources from the connection. For more information, see Composing Data Sources From Oracle Application Connections.

## Composing Data Sources From Oracle Applications Connections

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

To create data sources from Oracle Applications 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, and you can refresh the data and metadata from that data source, as needed.

## Editing Oracle Applications Connections

There may be times when you need to edit Oracle Applications connections. For example, the credentials or URL changed for the Oracle Applications.

To edit Oracle Applications connections:

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. For more information about the options on the Edit Connection dialog, see Creating Oracle Applications Connections.

4. Click Save.

## Deleting Oracle Applications Connections

There may be times when you need to delete an Oracle Applications connection. For example, you may want to temporarily connect to Oracle Applications for testing, and then delete it later when the testing is complete.

To delete Oracle Applications connections:

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 it's **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, you must delete the data sources before you can delete the connection

# Connecting to Database Data Sources

This topic covers the process for connecting to and using databases as data sources.

**Topics:**

- Creating Database Connections

- Composing 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.

To create database connections:

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. For more information, see Composing Data Sources from Databases.

## Composing Data Sources from Databases

After you create database connections, you can begin creating data sources for those connections for use in projects.

To create data sources from 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 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 Data Visualization. If your table is small, then choose **Auto** and the data is copied into the cache if possible. If you select **Auto**, you will have to refresh the data when it is 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

There may be times when you need to edit database connections.

To edit database connections:

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. For more information about the options on the Edit Connection dialog, see Creating Database Connections.

4. Click **Save**.

## Deleting Database Connections

There may be times when you need to delete a database connection.

To delete database connections:

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 it's **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, you must delete the data sources before you can delete the connection.

# Adding Data to a Project

You can add data from existing data sources to your new or exsiting projects.

To add data to a project:

1. You can add a data source to a project in two ways:

   • If you are creating a new project, then go to the Home page and in the Create pane, click **Project**.

   • If you are 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 displays 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. For more information, 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. For more information, see Blending Data that You Added and Changing Data Blending.

   • You can review your data source's columns to better understand its data. For more information, see Exploring a Data Source with Smart Insights.

# Exploring a Data Source with Smart Insights

You can use smart insights for an at a glance assessment of your data source and quickly understand the information 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 does not 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 displays at the top of the Visual view. And to gain further information about your data, you can use the **Summarize by** field to show a specific measure's impact on the individual columns.

**Note how Data Visualizer 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 non-numeric or text attributes, a horizontal bar chart is used. For date and time columns, a line chart is used. And 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 will 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. Normally 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 will break that data into the number of bars needed to give you a clearer picture of how the data is distributed. For example, if you are working with a retail data source and are 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 will show 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:
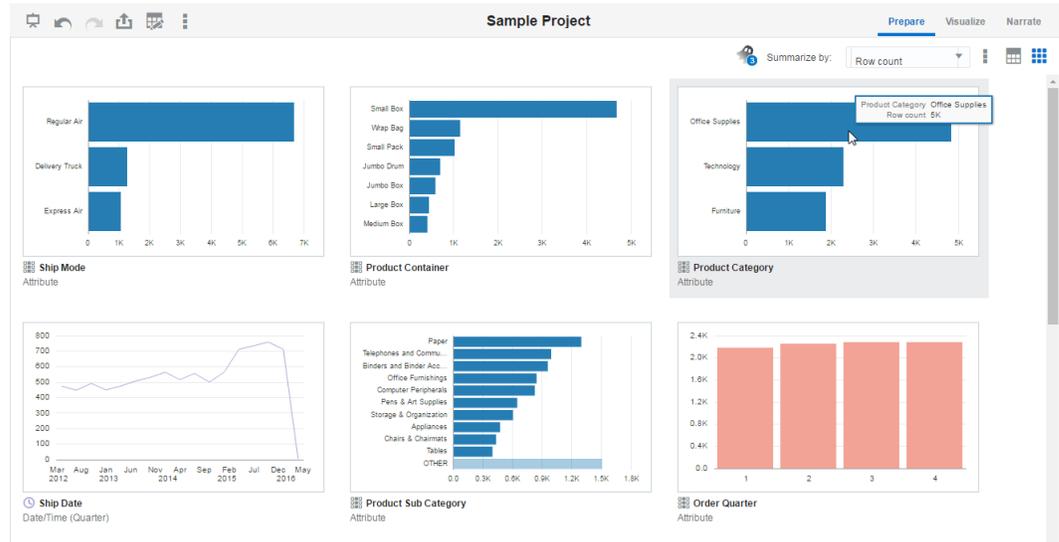


Compare the above screen shot with the below screen shot, which shows the **Summarize by** field set to the Profit measure. Note how the Visual view provides a different view of information contained in the columns.
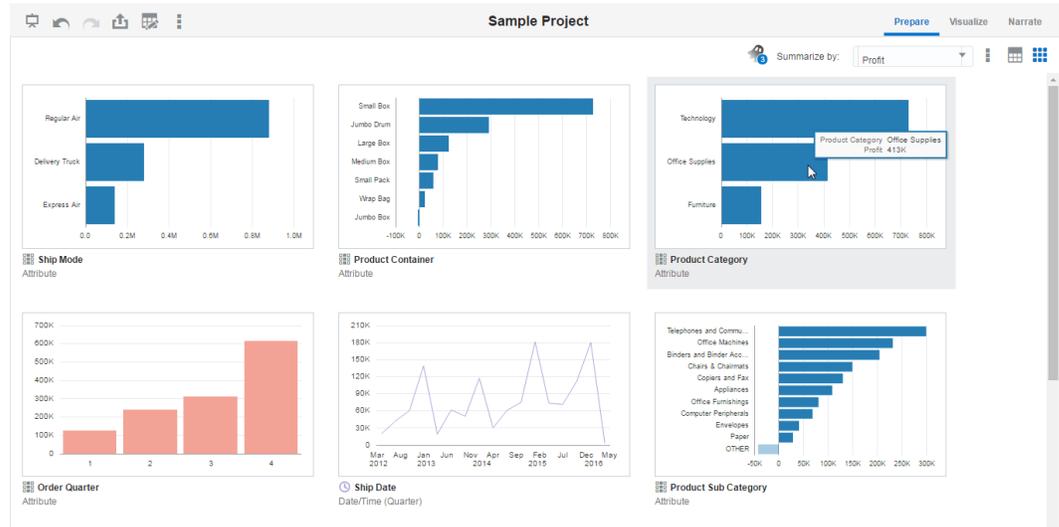


To explore data with Smart Insights:

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 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 is not altered.

Modifying data sets can be very helpful in cases where you may not have 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 enables you to scrub the data.

To modify uploaded data sets:

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

2. If there are 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 you want to work with. Only the first 100 records in the selected data set display.

| A Order Line ID | A Order ID | A Order P... | A Customer ID |
|---|---|---|---|
| 1 | 88525 | Not Specified | 2 |
| 10 | 90194 | High | 6 |
| 100 | 91256 | Not Specified | 36 |
| 1000 | 88930 | High | 382 |
| 1001 | 88934 | Not Specified | 382 |
| 1002 | 88934 | Not Specified | 382 |
| 1003 | 88928 | Critical | 383 |
| 1004 | 88928 | Critical | 383 |
| 1005 | 88931 | High | 383 |
| 1006 | 90342 | Medium | 385 |
| 1007 | 90346 | Medium | 385 |
| 1008 | 90342 | Medium | 386 |
| 1009 | 90342 | Medium | 386 |
| 101 | 91256 | Not Specified | 37 |
| 1010 | 90343 | Critical | 386 |
| 1011 | 90350 | Not Specified | 386 |
| 1012 | 90350 | Not Specified | 386 |
| 1013 | 90339 | High | 387 |
| 1014 | 90340 | High | 387 |

Source Diagram  **Sample Orders**  Sample Order Lines  ⊕

**3.** Click **Options** for the column 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 all at once.

- **Group** enables you to 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** enables you to replace bits of words in a column and create a new column with the string you entered.

- **Split** enables you to split a specific column value into parts. For example, you could 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 lower case.

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

4. Save your changes.

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**Note:** When you edit a data set in this way, it affects all projects that use the data set. So, for example, if another user has a project that uses the data set you modified, and they open the project after the you change the data set, they see a message in their project that indicates that the data set has been modified.

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# Using Data Flows to Curate Data Sources

This topic describes how you can use data flows to produce curated data sources.

**Topics**

- About Data Flows

- Creating Data Flows

- Running Data Flows

## About Data Flows

Data flows allow you to 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.

For more information, see Creating Data Flows and Running Data Flows.

## 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.

To create a work flow:

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 displays and the columns from the selected data source display in the Data Elements pane. The data source name displays 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 popup 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 updates based on the step you have selected from the data flow or the step you are 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, 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 you are 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**.

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

   - If you are 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 will not applied and the next step you add will not 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 display when you add an aggregate step. To add a column to 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 displaying on 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 displays in the Data Sources page's Display pane, 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 cannot run a data flow that contains validation errors. After you run the data flow, the resulting data source displays in the Data Sources page's Display pane. Click the All Data Sources link to see your data source in the list. When you execute a data flow without saving it, the data flow is not saved and does not display in the Data Flows list and therefore is not 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, you should run the data flow if you know the columns and data from the data source used to build the data flow have changed.

To run a data flow:

1. In the Data Sources page, go to the Data Flows pane and locate the data flow 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, the database's query mode should be set 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. For information about setting the database's query mode, 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 navigate to and use other parts of the application and then comes 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 is the first time you've run the data flow, then a new data source is created and you can find it in the Data Source page's Display pane by clicking the All Data Sources link. The data source contains the name you specify on the data flow's Save Data step. If you've run the data flow before, then the resulting data source already exist 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 the other.

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 is 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. For more information, see Changing Data Blending.

To blend data that you added:

1. Add data as described in 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 are recognized as a possible match. You can customize this and specify that one column matches another by explicitly selecting it even its name is not 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.
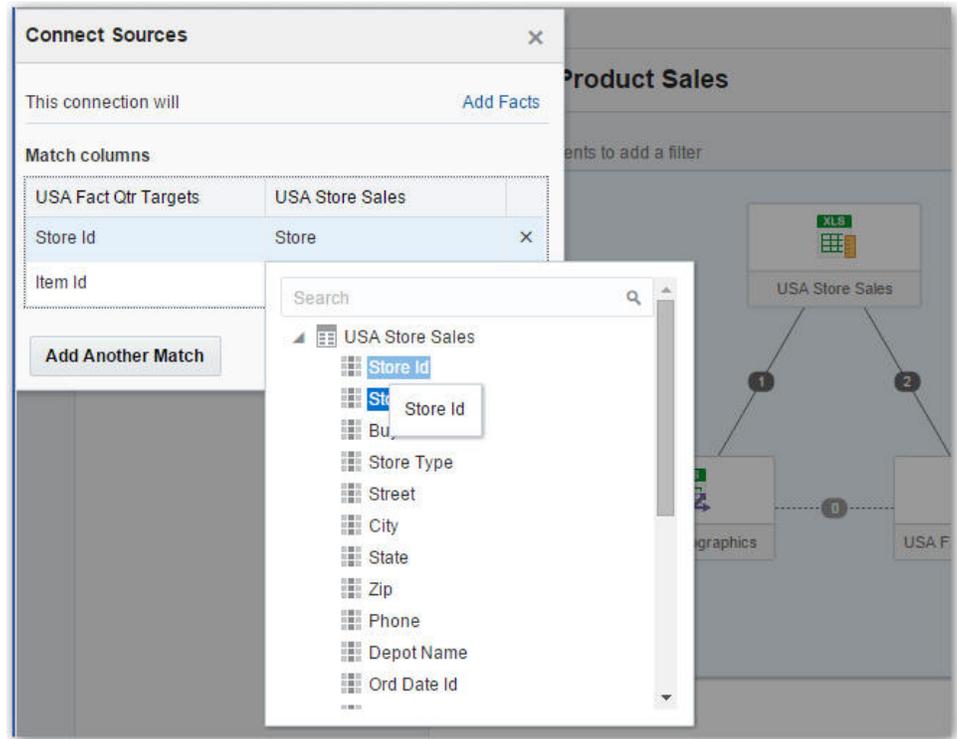


c. For a measure that you are uploading for the first time, specify the aggregation type such as Sum or Average.

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 do not exist in the other, then sometimes the system could 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 does not include IN-8 and Source B does not include IN-7.

**T1 - Source A**

| Inv# | Date | Rev |
|---|---|---|
| IN-1 | 1/1/2015 | 100.00 |
| IN-2 | 1/1/2015 | 200.00 |
| IN-3 | 1/1/2015 | 300.00 |
| IN-4 | 1/2/2015 | 400.00 |
| IN-5 | 1/2/2015 | 500.00 |
| IN-6 | 1/2/2015 | 600.00 |
| IN-7 | 1/3/2016 | 800.00 |

**T2 - Source B**

| Inv# | Rep | Bonus |
|---|---|---|
| IN-1 | Billie | 1.00 |
| IN-2 | Joe | 2.00 |
| IN-3 | Kim | 3.00 |
| IN-4 | Billie | 4.00 |
| IN-5 | Joe | 5.00 |
| IN-6 | Kim | 6.00 |
| IN-8 | Mika | 8.00 |

The following results display 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 does not exist in Source B, the results contain null Rep and null Bonus.



**T4 - SA All SB Match -- no Mika**

| Date | Rep | Rev | Bonus |
|---|---|---|---|
| 1/1/2015 | Billie | 100.00 | 1.00 |
| | Joe | 200.00 | 2.00 |
| | Kim | 300.00 | 3.00 |
| 1/2/2015 | Billie | 400.00 | 4.00 |
| | Joe | 500.00 | 5.00 |
| | Kim | 600.00 | 6.00 |
| 1/3/2016 | (null) | 800.00 | (null) |

**T5 - SA All SB Match -- no Mika**

| Date | Rev | Bonus |
|---|---|---|
| 1/1/2015 | 600.00 | 6.00 |
| 1/2/2015 | 1,500.00 | 15.00 |
| 1/3/2016 | 800.00 | (null) |

**T6 - SA All SB Match -- no Mika**

| Rep | Rev | Bonus |
|---|---|---|
| Billie | 500.00 | 5.00 |
| Joe | 700.00 | 7.00 |
| Kim | 900.00 | 9.00 |
| (null) | 800.00 | (null) |

The following results display 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 does not exist in Source A, the results contain null Date and null Revenue.



**T7 - SA Match SB All -- No 3Jan**

| Date | Rep | Rev | Bonus |
|---|---|---|---|
| 1/1/2015 | Billie | 100.00 | 1.00 |
| | Joe | 200.00 | 2.00 |
| | Kim | 300.00 | 3.00 |
| 1/2/2015 | Billie | 400.00 | 4.00 |
| | Joe | 500.00 | 5.00 |
| | Kim | 600.00 | 6.00 |
| (null) | Mika | (null) | 8.00 |

**T8 - SA Match SB All -- No 3Jan**

| Date | Rev | Bonus |
|---|---|---|
| 1/1/2015 | 600.00 | 6.00 |
| 1/2/2015 | 1,500.00 | 15.00 |
| (null) | (null) | 8.00 |

**T9 - SA Match SB All -- No 3Jan**

| Rep | Rev | Bonus |
|---|---|---|
| Billie | 500.00 | 5.00 |
| Joe | 700.00 | 7.00 |
| Kim | 900.00 | 9.00 |
| Mika | (null) | 8.00 |

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 cannot 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 the 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 will use when returning data to be visualized.

The system auto 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, 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, 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**.

To change data blending:

1. Select a visualization on the canvas, and in the visualization toolbar click **Menu** and the click **Properties**.

2. In the Properties dialog, click **Data Sets**.

3. In the Data Sets tab, click the Auto link 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 cannot assign both sources to Matching Rows.

# Refreshing Data that You Added

After you add data, the data might change and you will need to 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 will break projects that use the existing data source if the old column names and data types are not all present in the new data source.

- Any data wrangling, that is, modified and new columns added in the data stage, will be lost and projects using the data source will probably 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 re-run 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 are not impacted. To be able to use the new columns in projects, you must unhide them in data sources after you do a refresh. This behavior is the same for file based data sources.

To refresh data that you added:

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 displays.

3. If you are 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 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 displays.

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

   Note that if you are 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 will be 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 the application. If your table is small, then choose **Auto** and the data is copied into the cache if possible. If you select **Auto**, you will have to refresh the data when it is 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.

> **Note:**   You can also inspect data sources on the Data Sources page. For more information, see Managing Data Sources.

## 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 any projects that use this data source will break.

To delete a 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 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 in order to free up space. Data storage quota and space usage information are displayed, so that you can quickly see how much space is free.

To manage data sources:

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

2. On the Data Sources page, locate the data source 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 could 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 is already matched to a measure or attribute in the data model. For more information on 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 the application. If your table is small, then choose **Auto** and the data is copied into the cache if possible. If you select **Auto**, you will have to refresh the data when it is 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 will match the columns that were in the file that you originally uploaded. Any derived columns that you added in the Visualization editor's Prepare canvas are not 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**.

**4**

# Importing, Exporting, and Sharing Projects

This topic describes how to import and export projects to share them with other users. This chapter also describes how to print projects and convert projects to formats such as PDF and PPT.

**Topics:**

- Importing and Exporting Projects

- Printing a Visualization, Canvas, or Story

- Converting a Visualization, Canvas, or Story

- Outputting a Visualization's Data

- Emailing a PDF or PPT of a Visualization, Canvas, or Story

## Importing and Exporting Projects

This topic explains how to import projects and applications from other users and sources and how to 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 external source such as Oracle Fusion Applications.

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

To import an application or project:

1. Optional. On the Home Page, click **Options** and select **New Folder** to create a folder where you will import the application file or project. 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, choose to replace the existing object or cancel the import. For more information, 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.

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

To export a project as an application:

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 are working in a project, then click **Canvas Settings** and select **Export**. If you are working on the Home Page, click **Actions** and select **Export**.

3. If you are 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 is sent to the database for authentication when the user opens the application and accessing the data. Clear the **Include Data** option if you do not 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 and accessing the data.

5. Leave the **E-mail** option deselected. If you select this option, then the Save As dialog will not display.

6. Click **Save**.

## Exporting a Folder as an Application

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

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

To export an application:

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 are 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 application or a database data source and **Include Data** is selected, then you must enter a password that is sent to the database for authentication when the user opens the application and accessing the data. Clear the **Include Data** option if you do not 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 and accessing the data.

5. Leave the **E-mail** option deselected. If you select this option, then the Save As dialog will not display.

6. Click **Save**.

## Emailing an Exported Application

You can choose to automatically email the .DVA file for an exported application.

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

To email an exported application:

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 are 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 is sent to the database for authentication when the user opens the application and accessing the data. Clear the **Include Data** option if you do not 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 and accessing 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 choose the **E-mail** option, it does not produce a .DVA file that you can save. To produce a .DVA file that you can save, you must clear 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.

To print a visualization, canvas, or story:

1. Launch 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 displays.

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.

To convert a visualization, canvas, or story:

1. Launch 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 will not display.

4. Click **Export**. The Save As dialog displays.

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

# Outputting a Visualization's Data

You can ouput a visualization's data to a .CSV file.

To output a visualization's data:

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

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

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

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

To email a visualization, canvas, or story:

1. Launch 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 choose the **E-mail** option, it does not 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**.

# A

# Troubleshooting

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 are 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 also appears when the project you are 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 is causing the error.

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

If you are 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 are having. You can find the community forum here:

https://community.oracle.com/community/business_intelligence/data-visualization

# B

# Frequently Asked Questions

This reference provides answers to frequently asked questions for Oracle Data Visualization Desktop.

**Topics:**

FAQs for Installing Oracle Data Visualization Desktop and Oracle R

## FAQs for Installing Oracle Data Visualization Desktop and Oracle R

Common questions about installing Oracle Data Visualization Desktop and 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 will work with Data Visualization Desktop.

If the required version of Oracle R is uninstalled, then Oracle R will not be available to subsequent Data Visualization Desktop installations or upgrades. However, once installed and enabled, Oracle R does not have to be reinstalled or upgraded, and will work 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 you will receive the following error message: "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 do not 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 and there is a newer version available, then a message pops up telling you to go to Oracle Technology Network to download the latest version of the Data Visualization Desktop installer.

The Oracle Technology Network location where you can find the current version of the installer is here:

http://www.oracle.com/technetwork/middleware/oracle-data-visualization/downloads/oracle-data-visualization-desktop-2938957.html

# C

# Expression Editor Reference

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.

| Operator | Description |
| --- | --- |
| BETWEEN | Determines if a value is between two non-inclusive bounds. For example: `"COSTS"."UNIT_COST" BETWEEN 100.0 AND 5000.0` BETWEEN can be preceded with NOT to negate the condition. |
| IN | Determines if a value is present in a set of values. For example: `"COSTS"."UNIT_COST" IN(200, 600, 'A')` |
| IS NULL | Determines if a value is null. For example: `"PRODUCTS"."PROD_NAME" IS NULL` |
| LIKE | 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: `"PRODUCTS"."PROD_NAME" LIKE 'prod%'` |

## 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

| Expression | Example | Description |
| --- | --- | --- |
| CASE (If) | CASE<br>WHEN score-par < 0 THEN 'Under Par'<br>WHEN score-par = 0 THEN 'Par'<br>WHEN score-par = 1 THEN 'Bogey'<br>WHEN score-par = 2 THEN 'Double Bogey'<br>ELSE 'Triple Bogey or Worse'<br>END | Evaluates each WHEN condition and if satisfied, assigns the value in the corresponding THEN expression.<br><br>If none of the WHEN conditions are satisfied, it assigns the default value specified in the ELSE expression. If no ELSE expression is specified, the system automatically adds an ELSE NULL. |
| CASE (Switch) | CASE Score-par<br>WHEN -5 THEN 'Birdie on Par 6'<br>WHEN -4 THEN 'Must be Tiger'<br>WHEN -3 THEN 'Three under par'<br>WHEN -2 THEN 'Two under par'<br>WHEN -1 THEN 'Birdie'<br>WHEN 0 THEN 'Par'<br>WHEN 1 THEN 'Bogey'<br>WHEN 2 THEN 'Double Bogey'<br>ELSE 'Triple Bogey or Worse'<br>END | 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.<br><br>If none of the WHEN expressions match, it assigns the default value specified in the ELSE expression. If no ELSE expression is specified, the system automatically adds an ELSE NULL.<br><br>If the first expression matches an expression in multiple WHEN clauses, only the expression following the first match is assigned. |

# 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.

| Function | Example | Description |
| --- | --- | --- |
| Avg | Avg(Sales) | Calculates the average (mean) of a numeric set of values. |
| Bin | Bin(UnitPrice BY ProductName) | 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. |
| Count | Count(Products) | Determines the number of items with a non-null value. |
| First | First(Sales) | 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. |
| Last | Last(Sales) | Selects the last non-null returned value of the expression. |
| Max | Max(Revenue) | Calculates the maximum value (highest numeric value) of the rows satisfying the numeric expression argument. |
| Median | Median(Sales) | 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. |
| Min | Min(Revenue) | Calculates the minimum value (lowest numeric value) of the rows satisfying the numeric expression argument. |
| StdDev | StdDev(Sales) StdDev(DISTINCT Sales) | Returns the standard deviation for a set of values. The return type is always a double. |
| StdDev_Pop | StdDev_Pop(Sales) StdDev_Pop(DISTINCT Sales) | Returns the standard deviation for a set of values using the computational formula for population variance and standard deviation. |
| Sum | Sum(Revenue) | Calculates the sum obtained by adding up all values satisfying the numeric expression argument. |

## Analytics Functions

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

| Function | Example | Description |
| --- | --- | --- |
| Trendline | TRENDLINE(revenue, (calendar_year, calendar_quarter, calendar_month) BY (product), 'LINEAR', 'VALUE') | 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. |

| Function | Example | Description |
|---|---|---|
| Cluster | `CLUSTER((product, company), (billed_quantity, revenue), 'clusterName', 'algorithm=k-means;numClusters=%1;maxIter=%2;useRandomSeed=FALSE;enablePartitioning=TRUE', 5, 10)` | Collects a set of records into groups based on one or more input expressions using K-Means or Hierarchical Clustering. |
| Outlier | `OUTLIER((product, company), (billed_quantity, revenue), 'isOutlier', 'algorithm=mvoutlier')` | 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. |
| Regr | `REGR(revenue, (discount_amount), (product_type, brand), 'fitted', '')` | Fits a linear model and returns the fitted values or model. This function can be used to fit a linear curve on two measures. |
| Evaluate_Script | `EVALUATE_SCRIPT('filerepo://obiee.Outliers.xml', 'isOutlier', 'algorithm=mvoutlier;id=%1;arg1=%2;arg2=%3;useRandomSeed=False;', customer_number, expected_revenue, customer_age)` | 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. |

## Calendar Functions

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

| Function | Example | Description |
|---|---|---|
| Current_Date | `Current_Date` | Returns the current date. |
| Current_Time | `Current_Time(3)` | Returns the current time to the specified number of digits of precision, for example: HH:MM:SS.SSS<br>If no argument is specified, the function returns the default precision. |
| Current_TimeStamp | `Current_TimeStamp(3)` | Returns the current date/timestamp to the specified number of digits of precision. |
| DayName | `DayName(Order_Date)` | Returns the name of the day of the week for a specified date expression. |
| DayOfMonth | `DayOfMonth(Order_Date)` | Returns the number corresponding to the day of the month for a specified date expression. |
| DayOfWeek | `DayOfWeek(Order_Date)` | 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. |
| DayOfYear | `DayOfYear(Order_Date)` | Returns the number (between 1 and 366) corresponding to the day of the year for a specified date expression. |

| Function | Example | Description |
|---|---|---|
| Day_Of_Quarter | Day_Of_Quarter(Order_Date) | Returns a number (between 1 and 92) corresponding to the day of the quarter for the specified date expression. |
| Hour | Hour(Order_Time) | 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. |
| Minute | Minute(Order_Time) | Returns a number (between 0 and 59) corresponding to the minute for a specified time expression. |
| Month | Month(Order_Time) | Returns the number (between 1 and 12) corresponding to the month for a specified date expression. |
| MonthName | MonthName(Order_Time) | Returns the name of the month for a specified date expression. |
| Month_Of_Quarter | Month_Of_Quarter(Order_Date) | Returns the number (between 1 and 3) corresponding to the month in the quarter for a specified date expression. |
| Now | Now() | Returns the current timestamp. The Now function is equivalent to the Current_Timestamp function. |
| Quater_Of_Year | Quarter_Of_Year(Order_Date) | Returns the number (between 1 and 4) corresponding to the quarter of the year for a specified date expression. |
| Second | Second(Order_Time) | Returns the number (between 0 and 59) corresponding to the seconds for a specified time expression. |
| TimeStampAdd | TimeStampAdd(SQL_TSI_MONTH, 12,Time."Order Date") | Adds a specified number of intervals to a timestamp, and returns a single timestamp.<br><br>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 |
| TimeStampDiff | TimeStampDiff(SQL_TSI_MONTH, Time."Order Date",CURRENT_DATE) | Returns the total number of specified intervals between two timestamps.<br><br>Use the same intervals as TimeStampAdd. |
| Week_Of_Quarter | Week_Of_Quarter(Order_Date) | Returns a number (between 1 and 13) corresponding to the week of the quarter for the specified date expression. |
| Week_Of_Year | Week_Of_Year(Order_Date) | Returns a number (between 1 and 53) corresponding to the week of the year for the specified date expression. |
| Year | Year(Order_Date) | Returns the year for the specified date expression. |

## Conversion Functions

Conversion functions convert a value from one form to another.

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

## Display Functions

Display functions operate on the result set of a query.

| Function | Example | Description |
|---|---|---|
| BottomN | `BottomN(Sales, 10)` | Returns the *n* lowest values of expression, ranked from lowest to highest. |
| Filter | `Filter(Sales USING Product = 'widgit')` | Computes the expression using the given preaggregate filter. |
| Mavg | `Mavg(Sales, 10)` | Calculates a moving average (mean) for the last *n* rows of data in the result set, inclusive of the current row. |
| Msum | `SELECT Month, Revenue, Msum(Revenue, 3) as 3_MO_SUM FROM Sales` | Calculates a moving sum for the last *n* rows of data, inclusive of the current row.<br><br>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 *n*th row is reached, the sum is calculated based on the last *n* rows of data. |

| Function | Example | Description |
|---|---|---|
| NTile | `Ntile(Sales, 100)` | 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. |
| Percentile | `Percentile(Sales)` | 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. |
| Rank | `Rank(Sales)` | 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...). |
| Rcount | `SELECT month, profit, Rcount(profit) FROM sales WHERE profit > 200` | Takes a set of records as input and counts the number of records encountered so far. |
| Rmax | `SELECT month, profit, Rmax(profit) FROM sales` | 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. |
| Rmin | `SELECT month, profit, Rmin(profit) FROM sales` | 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. |
| Rsum | `SELECT month, revenue, Rsum(revenue) as RUNNING_SUM FROM sales` | 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. |
| TopN | `TopN(Sales, 10)` | Returns the *n* highest values of expression, ranked from highest to lowest. |

## Mathematical Functions

The mathematical functions described in this section perform mathematical operations.

| Function | Example | Description |
|---|---|---|
| Abs | `Abs(Profit)` | Calculates the absolute value of a numeric expression. |
| Acos | `Acos(1)` | Calculates the arc cosine of a numeric expression. |
| Asin | `Asin(1)` | Calculates the arc sine of a numeric expression. |
| Atan | `Atan(1)` | Calculates the arc tangent of a numeric expression. |
| Atan2 | `Atan2(1, 2)` | Calculates the arc tangent of $y/x$, where $y$ is the first numeric expression and $x$ is the second numeric expression. |

| Function | Example | Description |
| --- | --- | --- |
| Ceiling | `Ceiling(Profit)` | Rounds a noninteger numeric expression to the next highest integer. If the numeric expression evaluates to an integer, the `CEILING` function returns that integer. |
| Cos | `Cos(1)` | Calculates the cosine of a numeric expression. |
| Cot | `Cot(1)` | Calculates the cotangent of a numeric expression. |
| Degrees | `Degrees(1)` | Converts an expression from radians to degrees. |
| Exp | `Exp(4)` | Sends the value to the power specified. Calculates $e$ raised to the n-th power, where $e$ is the base of the natural logarithm. |
| ExtractBit | `Int ExtractBit(1, 5)` | 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. |
| Floor | `Floor(Profit)` | Rounds a noninteger numeric expression to the next lowest integer. If the numeric expression evaluates to an integer, the `FLOOR` function returns that integer. |
| Log | `Log(1)` | Calculates the natural logarithm of an expression. |
| Log10 | `Log10(1)` | Calculates the base 10 logarithm of an expression. |
| Mod | `Mod(10, 3)` | Divides the first numeric expression by the second numeric expression and returns the remainder portion of the quotient. |
| Pi | `Pi()` | Returns the constant value of pi. |
| Power | `Power(Profit, 2)` | Takes the first numeric expression and raises it to the power specified in the second numeric expression. |
| Radians | `Radians(30)` | Converts an expression from degrees to radians. |
| Rand | `Rand()` | Returns a pseudo-random number between 0 and 1. |
| RandFromSeed | `Rand(2)` | Returns a pseudo-random number based on a seed value. For a given seed value, the same set of random numbers are generated. |
| Round | `Round(2.166000, 2)` | Rounds a numeric expression to $n$ digits of precision. |
| Sign | `Sign(Profit)` | This function returns the following:<br>• 1 if the numeric expression evaluates to a positive number<br>• -1 if the numeric expression evaluates to a negative number<br>• 0 if the numeric expression evaluates to zero |
| Sin | `Sin(1)` | Calculates the sine of a numeric expression. |
| Sqrt | `Sqrt(7)` | Calculates the square root of the numeric expression argument. The numeric expression must evaluate to a nonnegative number. |
| Tan | `Tan(1)` | Calculates the tangent of a numeric expression. |

| Function | Example | Description |
|----------|---------|-------------|
| Truncate | `Truncate(45.12345, 2)` | Truncates a decimal number to return a specified number of places from the decimal point. |

## String Functions

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

| Function | Example | Description |
|----------|---------|-------------|
| Ascii | `Ascii('a')` | 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. |
| Bit_Length | `Bit_Length('abcdef')` | Returns the length, in bits, of a specified string. Each Unicode character is 2 bytes in length (equal to 16 bits). |
| Char | `Char(35)` | Converts a numeric value between 0 and 255 to the character value corresponding to the ASCII code. |
| Char_Length | `Char_Length(Customer_Name)` | Returns the length, in number of characters, of a specified string. Leading and trailing blanks are not counted in the length of the string. |
| Concat | `SELECT DISTINCT Concat ('abc', 'def') FROM employee` | Concatenates two character strings. |
| Insert | `SELECT Insert('123456', 2, 3, 'abcd') FROM table` | Inserts a specified character string into a specified location in another character string. |
| Left | `SELECT Left('123456', 3) FROM table` | Returns a specified number of characters from the left of a string. |
| Length | `Length(Customer_Name)` | Returns the length, in number of characters, of a specified string. The length is returned excluding any trailing blank characters. |
| Locate | `Locate('d' 'abcdef')` | Returns the numeric position of a character string in another character string. If the character string is not found in the string being searched, the function returns a value of 0. |
| LocateN | `Locate('d' 'abcdef', 3)` | 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. |
| Lower | `Lower(Customer_Name)` | Converts a character string to lowercase. |
| Octet_Length | `Octet_Length('abcdef')` | Returns the number of bytes of a specified string. |
| Position | `Position('d', 'abcdef')` | Returns the numeric position of *strExpr1* in a character expression. If *strExpr1* is not found, the function returns 0. |

| Function | Example | Description |
|---|---|---|
| Repeat | `Repeat('abc', 4)` | Repeats a specified expression $n$ times. |
| Replace | `Replace('abcd1234', '123', 'zz')` | Replaces one or more characters from a specified character expression with one or more other characters. |
| Right | `SELECT Right('123456', 3) FROM table` | Returns a specified number of characters from the right of a string. |
| Space | `Space(2)` | Inserts blank spaces. |
| Substring | `Substring('abcdef' FROM 2)` | Creates a new string starting from a fixed number of characters into the original string. |
| SubstringN | `Substring('abcdef' FROM 2 FOR 3)` | 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. |
| TrimBoth | `Trim(BOTH '_' FROM '_abcdef_')` | Strips specified leading and trailing characters from a character string. |
| TrimLeading | `Trim(LEADING '_' FROM '_abcdef')` | Strips specified leading characters from a character string. |
| TrimTrailing | `Trim(TRAILING '_' FROM 'abcdef_')` | Strips specified trailing characters from a character string. |
| Upper | `Upper(Customer_Name)` | Converts a character string to uppercase. |

## 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.

| Function | Example | Description |
|---|---|---|
| Periodrolling | `SELECT Month_ID, Periodrolling (monthly_sales, -1, 1)` | 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, PERIODROLLING can compute sales for a period that starts at a quarter before and ends at a quarter after the current quarter. |

| Function | Example | Description |
|---|---|---|
| Forecast | `FORECAST(numeric_expr, ([series]), output_column_name, options, [runtime_binded_options] )` | 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. |

## Constants

You can use constants in expressions.

Available constants include Date, Time, and Timestamp.

| Constant | Example | Description |
|---|---|---|
| Date | `DATE [2014-04-09]` | Inserts a specific date. |
| Time | `TIME [12:00:00]` | Inserts a specific time. |
| TimeStamp | `TIMESTAMP [2014-04-09 12:00:00]` | Inserts a specific timestamp. |

## 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.

# D

# Data Visualization SDK Reference

This topic describes the Data Visualization SDK.

**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 install of Oracle Data Visualization includes the scripts 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** — This script is used with the `gradlew validate` command. When you run the `gradlew validate` command, it calls the bivalidate script.

**Other Resources**

These resources will 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 out of the box. 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's location is `<your_development_directory>\src\sampleviz\sample-circlepack`

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

- **Other visualization plug-in samples** — Oracle provides plug-in examples here: http://www.oracle.com/technetwork/middleware/bi-foundation/data-visualization-2954126.html

- **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** — Contains JavaScript reference information that you need to develop a visualization plug-in. For more information, see Data Visualization SDK JavaScript Reference.

# Using the Data Visualization SDK to Create Plug-ins

This topic describes 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.

To create the development environment:

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:\OracleDVDev
    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 commandline help. For example,

    ```
    C:\OracleDVDev> bicreateenv -help
    ```

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

4.  (Optional) If you are 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.

To create a skeleton visualization:

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

    ```
    bicreateplugin -viz -<subtype> -<id>
    ```

    Where:

    *   `<subtype>` is the type of visualization you want to create. Your choices are:

        *   `basic` — Use this option to create a visualization that does not 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 is hard coded into the plug-in or gotten 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 respond 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 you want to give the visualization. For example, `com-company.basicviz`.

For example to create a basic visualization and name it basicviz, enter and run the following command:

```
C:\OracleDevDir>bicreateplugin viz – subtype basic – id
com.company.basicviz
```

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

When you run the *createplugin -viz* command for the first time, the system creates the customviz directory in the following location.
`<your_development_environment>\src\customviz`

All custom visualizations that you create are added to this directory.

For example, `C:\OracleDVDev\src\customviz`

## 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.

To create a skeleton skin or unclassified plug-in:

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

```
bicreateplugin -skin -<id>
```

```
bicreateplugin -unclassified -<id>
```

Where:

•   `<id>` is your domain and the name 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:

```
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 on the screen and pass user interactions to the server.

To develop the visualization plug-in:

- Use the tutorial to learn how to perform development tasks such as implement data mapping.

  🖥 Tutorial

- Use the .JS API documentation to learn how to add dependencies. For more information, 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 are developing your visualization plug-in or when you want to test your visualization plug-in.

To run the visualization:

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 displays 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 shutdown 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 have tested your visualization plug-in and before you can package and deploy it, you must validate it.

To validate the plug-in:

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

```
cd C:\OracleDVDev
.\gradlew validate
```

   This step only 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 is 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. To delete visualizations from your development directory, see Deleting Plug-ins from the Development Environment.

To build, package, and deploy the plug-in:

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 gotten from the name you assigned 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%\Oracle Data Visualization Desktop\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.

To delete plug-ins:

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>
```