

# Oracle® Analytics

## User's Guide for Oracle Analytics Desktop



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# Contents

## Preface

---

Audience	xvii
Documentation Accessibility	xvii
Diversity and Inclusion	xvii
Related Resources	xvii
Conventions	xviii

## 1 Get Started with Oracle Analytics Desktop

---

About Oracle Analytics Desktop	1-1
Install Oracle Analytics Desktop	1-1
Install Machine Learning and Advanced Analytics on Windows	1-2
Install Machine Learning and Advanced Analytics on Mac	1-2
Open Oracle Analytics Desktop	1-3
Get Started with Sample Workbook	1-3

## 2 Connect to Data Sources

---

About Data Sources	2-1
Manage Connections to Data Sources	2-2
Create a Connection to a Data Source	2-2
Edit a Data Source Connection	2-3
Delete a Data Source Connection	2-3
Database Connection Options	2-3
Connect to an Oracle Database	2-4
Connect to Oracle Analytic Views	2-5
Connect to Oracle Autonomous Data Warehouse	2-5
Connect to Oracle Autonomous Transaction Processing	2-6
Connect to an Application in Oracle Fusion Cloud Applications Suite	2-7
Create a Connection to Oracle Essbase	2-8
Connect to NetSuite	2-8
Connect to Oracle Talent Acquisition Cloud	2-9
Connect to Google BigQuery	2-9

Connect to a Database Using Delta Sharing	2-10
Connect to Dropbox	2-11
Connect to Google Drive or Google Analytics	2-12
Connect to Data Using JDBC	2-13
Create Generic ODBC Connections	2-14
Connect to Snowflake Data Warehouse	2-14

### 3 Connect to Your Data Using Datasets

---

What Are Datasets?	3-2
About Opening Datasets	3-2
View Available Connections	3-3
Data Sources Available for Use in Datasets	3-4
About the Dataset Editor	3-5
Create a Dataset From a Connection	3-9
Add Multiple Connections to a Dataset	3-10
Add a File to a Dataset Created From a Connection	3-11
Add a Table to a Dataset Using a SQL Statement	3-12
Understand Dataset Table Joins	3-13
Add Joins Between Dataset Tables	3-14
Disable Auto Joins in Datasets	3-15
Modify or Fix Joins in a Dataset	3-16
Add Joins When Table Columns Don't Match	3-17
Delete Joins from a Dataset	3-18
Include a Dataset Table in Data Source Queries	3-18
What is Preserve Grain?	3-19
Specify Which Table Determines Grain	3-20
Rearrange the Order of a Dataset's Tables	3-21
What are Quality Insights?	3-22
Enhance Your Data Using Quality Tiles	3-26
About Removing or Restoring Dataset Columns	3-31
Remove or Restore a Dataset Table's Columns	3-31
Filter a Dataset Table	3-32
Specify Whether a Dataset Table Is Cached or Live	3-33
View a Dataset Table's Original Formatting	3-35
Create Datasets from Files	3-36
About Files for Datasets	3-36
Create a Dataset from a File Uploaded from Your Computer	3-37
Create a Dataset from a File Uploaded from Dropbox or Google Drive	3-37
Add Multiple Files to a Dataset	3-38
Create a Dataset from a Subject Area in Oracle Fusion Cloud Applications Suite	3-39

Create a Dataset from an Analysis in Oracle Fusion Cloud Applications Suite	3-39
Create a Dataset from an Essbase Connection	3-40

## 4 Enrich and Transform Data

---

About Data Enrichment and Transformation in Oracle Analytics	4-1
Enrich and Transform Your Data	4-5
Accept Enrichment Recommendations	4-6
Transform Data	4-7
Replace Missing or Null Values in a Dataset	4-8
Transform Data Using Replace	4-9
Example Replace Transforms Using Regular Expressions	4-11
Convert Text Columns to Date or Time Columns	4-12
Adjust the Display Format of a Date or Number Column	4-13
Create a Bin Column When You Prepare Data	4-14
Configure Columns Properties in a Dataset	4-16
Hide or Delete a Column	4-18
Restore a Hidden or Deleted Column	4-19
Edit the Data Preparation Script	4-20
Add Columns to a Dataset	4-21
Create Calculated Data Elements in a Workbook	4-22
Enrich and Transform Reference	4-22
Transform Reference	4-22
Data Profiles and Semantic Recommendations	4-23
Semantic Type Categories	4-24
Semantic Type Recommendations	4-24
Recognized Pattern-Based Semantic Types	4-24
Reference-Based Semantic Types	4-25
Recommended Enrichments	4-25
Required Thresholds	4-26
Custom Knowledge Recommendations	4-26
General Custom Format Strings	4-26

## 5 Create Datasets Using Data Flows

---

About Data Flows	5-1
Database Support for Data Flows	5-2
What Steps Can I Use to Organize and Integrate My Data?	5-3
Database Analytics Functions	5-6
Graph Analytics Functions	5-7
Data Flow Steps for Training Machine Learning Models	5-8

Create a Dataset Using a Data Flow	5-8
Generate or Update a Dataset Using a Data Flow	5-9
Reuse a Data Flow	5-9
Configure Incremental Processing in a Data Flow	5-10
Specify a New Data Indicator for a Data Source	5-10
Apply Incremental Processing in a Data Flow	5-11
Process Data Using a Sequence of Data Flows	5-11
Manage Your Data Flows	5-13

## 6 Manage Datasets

---

Dataset Type Icons	6-1
View a List of Datasets and Information About Them	6-2
Reload a Dataset's Data	6-2
About Reloading a Dataset's Data	6-2
Reload Data from the Workbook Editor	6-3
Reload an Individual Table in a Dataset	6-4
Reload Tables in a Dataset	6-5
Reload a Dataset's Files	6-6
View a Dataset's Reload History	6-7
View or Download a Reload Job's Log Files	6-8
Inspect a Dataset's Properties	6-9
Rename a Dataset and Change Its Description	6-9
Copy a Dataset's Object ID	6-10
View a Dataset's Data Elements	6-10
Download a Dataset's Source File	6-11
Duplicate a Dataset	6-11
Delete a Dataset	6-11

## 7 Visualize and Analyze Data

---

Begin to Build a Workbook and Create Visualizations	7-2
Open a Workbook in Edit Mode	7-2
Configure a Workbook to Open in Edit Mode	7-2
Work with a Workbook's Datasets	7-3
Add Datasets to a Workbook	7-3
Replace a Dataset in a Workbook	7-4
Remove a Dataset from a Workbook	7-5
Modify a Workbook's Datasets	7-5
Blend Datasets	7-6
Understand Blending	7-6

About Mismatched Values in Blended Data	7-7
Blend Datasets	7-9
Change Data Blending in a Visualization	7-10
Build a Visualization by Adding Data	7-11
Different Methods to Add Data	7-11
Create the Best Visualization For Selected Data Elements	7-11
Add Data to a Visualization	7-12
Use the Assignment Panel to Add Data to the Visualization	7-16
Create a Visualization from Another Visualization	7-17
Modify a Visualization's Tooltips	7-17
About Visualization Types	7-18
Bar Graphs	7-18
Filter and Other Visualization Types	7-19
Geospatial Graphs	7-20
Grid Graphs	7-20
Line Graphs	7-20
Network Graphs	7-21
Pie and Treemap Graphs	7-21
Scatter Graphs	7-22
Enhance Data in Visualizations with Statistical Analytics	7-22
Before You Start with Statistical Analytics	7-22
What Statistical Analytics Can I Add to Visualizations?	7-24
Add Statistical Analytics to Visualizations	7-26
Add Reference Lines to Visualizations	7-28
Use Spark Charts to Examine Trends	7-28
Sort Data in Visualizations	7-29
Undo and Redo Edits	7-30
Create a Custom Error Message for Visualizations with No Data	7-30
About Refreshing a Workbook's Data	7-30
Refresh a Workbook's Data	7-31
Pause Data Queries in a Workbook	7-32
Work with Canvas Properties	7-32
Update Canvas Properties	7-32
About Canvas Layout Properties	7-33
Align Visualizations Using Canvas Grid Guidelines	7-33
About Brushing Between Visualizations on a Canvas	7-34
About Synchronizing Visualizations in a Canvas	7-35
About Canvas Data Refresh Properties	7-35
Copy and Paste a Visualization or Canvas	7-36
Copy and Paste a Visualization's Data	7-37
Work with Multiple Visualizations on a Canvas	7-37

Update Common Properties for Multiple Visualizations on a Canvas	7-37
Copy and Paste Multiple Visualizations on a Canvas	7-38
Delete Multiple Visualizations on a Canvas	7-38
Change Visualization Types	7-38
About Visualization Properties	7-39
Adjust Visualization Properties	7-39
Set Visualization Border Properties	7-41
Set Visualization Shadow Properties	7-41
Change Display Names in Tables and Pivots	7-42
Change the Size of Data Points in Visualizations	7-42
Change the Pattern and the Width of Lines in Graphs	7-42
Highlight Important Data Events with Conditional Formatting	7-43
What Can I Do with Conditional Formatting?	7-43
Format Data with Existing Conditional Format Rules	7-46
Add Conditional Formatting to Data	7-46
Example - Compare a Measure to a Set of Thresholds	7-49
Example - Compare a Measure to a Target or Goal	7-51
Example - Compare a Measure to a Complex Expression Value	7-52
Example - Compare a Measure to a Percentage of a Value	7-53
Example - Add Emojis to Highlight Values	7-54
Apply Color to Visualizations	7-56
About Color Assignments in Visualizations	7-57
Access Color Options	7-57
Change the Color Palette	7-58
Assign Colors to Columns	7-59
Format Numeric Values of Columns	7-60
Format Numeric Values of Visualizations	7-60
Set Scale Options for Numbers and Currency Values	7-61
Set Currency Symbols for Visualizations	7-61
Add Notes to Visualizations	7-62
Add Notes to a Visualization	7-62
Connect a Note to Data Points in a Visualization	7-63
Show or Hide a Note's Data Point Connectors	7-63
Delete a Note's Data Connectors	7-64
Show or Hide a Visualization's Notes	7-64
Sort, Drill, and Select Data in Visualizations	7-65
Overview of My Calculations	7-66
Create a Calculation Based on a Cluster or Outlier	7-68
Analyze Data with Explain	7-70
What is Explain?	7-70
What Are Insights?	7-70



Use Explain to Discover Data Insights	7-71
About the Warning for Data Issues in Visualizations	7-73
Set Workbook Thumbnails	7-73
Set Visualization Loading Overlay Opacity	7-73

## 8 Filter Your Data

---

About Filters and Filter Types	8-1
How Datasets Interact with Filters	8-2
How the Number of Datasets Affects Filters	8-2
About Automatically Applied Filters	8-4
Filter Data in a Workbook	8-5
Specify a Filter's Selection Values	8-9
Enable or Disable the Limit By Setting from the Filters Bar	8-10
Display or Hide Filter Values in the Filters Bar	8-11
Filter Data in a Visualization	8-12
Customize the Label of Visualization Filters	8-13
Disable Multiple Select for Visualization List Filters	8-13
Use the Dashboard Filter	8-14
About Dashboard Filters	8-14
Filter Data Using a Dashboard Filter Visualization	8-15
Overview to Filtering and Animating Visualizations Using a Slider Dashboard Filter	8-17
Filter and Animate Visualizations using a Slider Dashboard Filter	8-21
Change the Scope of Filters Between the Main Filter Bar and Visualizations	8-24
Use a Visualization as a Filter	8-24
About Filter Personalizations	8-25
Apply Different Filter Types	8-25
Apply Range Filters	8-26
Apply Top Bottom N Filters	8-26
Apply List Filters	8-27
Apply Date Range Filters	8-28
Apply Relative Time Filters	8-28
Filter Data Using an Expression Filter	8-29
Use Role-Based Filters	8-30
About Role-Based Filters	8-30
Filter a Dataset Based on Application Role	8-33
Example One - Apply a Simple Role-Based Filter in a Workbook	8-35
Example Two - Apply Multiple Role-Based Filters in a Workbook	8-37

## 9 Create and Use Parameters

---

What Are Parameters?	9-1
About System Parameters	9-2
About Parameter Properties	9-2
About Modifying and Deleting Parameters	9-4
Create a Parameter	9-4
Create a Parameter that Uses a Logical SQL Query for a Double Column	9-6
Syntax for Referencing Parameters	9-7
Bind Parameters to Filters	9-8
About Binding Parameters to Filters	9-8
Create and Bind a Parameter to a Filter	9-8
Create and Bind a Parameter to a List Box Dashboard Filter	9-9
Create and Bind a Parameter to a Double Column Type Filter	9-9
Bind an Existing Parameter to a Filter	9-10
Use Parameters in Workbooks	9-10
Use a Parameter in the Filter Bar	9-11
Use a Parameter as a Dashboard Filter Control	9-12
Use a Parameter in a Visualization's Title	9-13
Use a Parameter as a Visualization's Axis Label	9-14
Use a Parameter in a Tile Visualization's Measure Label	9-15
Use a Parameter in an Expression Filter	9-15
Use a Parameter in a Workbook Calculation	9-16
Use an Analytics Link Data Action to Pass Parameter Values	9-16
Use a URL Navigation Data Action to Pass Parameter Values	9-17
Bind a Parameter to a Reference Line or Band	9-18

## 10 Apply Map Backgrounds and Map Layers to Enhance Visualizations

---

About Map Backgrounds	10-1
Enhance Visualizations with Map Backgrounds	10-2
Use Different Map Backgrounds in a Workbook	10-3
Interpret Data Values with Color and Size in Map Visualizations	10-3
Add Custom Map Layers	10-4
Update Custom Map Layers	10-6
Switch to Use Another Map Layer	10-6
Apply Multiple Data Layers to a Single Map Visualization	10-6
Use an Image as a Map Background and Draw Map Layer Shapes on the Image	10-7
Upload an Image as a Map Background	10-7
Draw Custom Map Layer Shapes on an Uploaded Image	10-8
Associate a Dataset with Map Layer Shapes Drawn on an Uploaded Image	10-9
Assign a Map Layer to a Data Column	10-9

Auto Focus on Data for a Map Visualization	10-10
Configure Zoom in Map Visualizations	10-10
Review Location Matches for a Map Visualization	10-10
Create Heatmap Layers on a Map Visualization	10-12
Create Cluster Layers on a Map Visualization	10-13
Represent Point Data with Custom Icons on a Map	10-13
Select Points or Area on a Map	10-14
Represent Line Data Using Size and Color on a Map	10-14
Make Map Layers and Backgrounds Available to Users	10-15
Use a Map Background as the Default	10-15
Add Map Backgrounds	10-15
Add Google Map Backgrounds	10-16
Add Baidu Map Backgrounds	10-16
Add Web Map Service (WMS) Backgrounds	10-16
Add Tiled Web Map (XYZ) Backgrounds	10-17
Web Map Background Troubleshooting Tips	10-18
Add an Outline to Points and Shapes on a Map	10-19
Add Data Labels to a Map	10-19

## 11 Use Data Actions

---

Create Data Actions to Connect Visualization Canvases	11-1
Create Data Actions to Connect to External URLs from Visualization Canvases	11-2
About Creating HTTP API Data Actions	11-3
Create HTTP Data Actions	11-4
Use Data Actions to Connect to Oracle Analytics Publisher Reports	11-5
About Creating Data Actions to Connect to Oracle Analytics Publisher Reports	11-5
Create Data Actions to Connect to Oracle Analytics Publisher Reports	11-5
Create Custom Column Names in Data Actions to Pass in Oracle Analytics Publisher Report URLs	11-6
Invoke Data Actions from Visualization Canvases	11-7
How Data Actions Affect Filters	11-7

## 12 Create Custom Data Action Plug-ins

---

About Data Action Plug-ins and the Data Actions Framework	12-1
Data Action Categories	12-2
Data Action Context	12-3
Data Action Code Design	12-4
Data Action Model Classes	12-4
Data Action Service Classes	12-6
Data Action Code Interactions	12-8

Example Data Action plugin.xml File	12-8
Data Action Plug-in Files and Folders	12-9
Choose the Best Data Action Class to Extend	12-10
AbstractDataAction Class	12-10
DataActionKOModel Class	12-11
CanvasDataAction Class	12-12
EventDataAction Class	12-12
AbstractHTTPDataAction Class	12-13
URLNavigationDataAction Class	12-13
HTTPAPIDataAction Class	12-14
Generate Data Action Plug-ins from a Template	12-15
Generated Folders and Files	12-15
Extend a Data Action Base Class	12-16
Choose Which Data Action Inherited Methods to Override	12-18
Test, Package, and Install Your Data Action	12-21
Use an Upgrade Handler for Knockout Model Changes	12-22
Upgrade Data Action Plug-ins	12-22
Data Action Plug-in File Reference	12-23
Data Action plugin.xml File Example	12-23
Data Action plugin.xml File Properties Section - tns:obiplugin	12-24
Data Action plugin.xml File Resources Section - tns:resources	12-25
Data Action plugin.xml File Extensions Section - tns:extension	12-27

## 13 Use Other Functions to Visualize Data

---

Identify Content with Tooltips	13-1
Manage Custom Plug-ins	13-2
Compose Expressions	13-2
Use the Search Bar to Visualize Data from the Home Page	13-3
Find Data, Workbooks, and Visualizations	13-3
How Is Data Indexed?	13-3
Search for Content	13-4
Search Options	13-4
Search Tips	13-5
Save Your Changes Automatically	13-6
Sort the Items in a Page	13-6

## 14 Build a Presentation Flow

---

What Is a Presentation Flow?	14-1
What Are Auto and Manual Modes in Present?	14-2

Switch Between Auto and Manual Modes in Present	14-2
Open the Presentation Flow	14-3
Specify the Canvases Layout in Present	14-3
Rearrange the Canvases in Present	14-4
Duplicate a Canvas in Present	14-4
Remove a Duplicate Canvas in Present	14-5
Hide a Canvas in Present	14-6
Display a Hidden Canvas in Present	14-7
About Moving or Hiding Visualizations on a Canvas in Present	14-7
Change a Visualization's Placement on a Canvas in Present	14-8
Reset a Canvas in Present	14-8
Set the Workbook Properties in Present	14-9
Specify Workbook Canvas Navigation in Present	14-9
Show or Hide the Workbook Header Bar in Present	14-10
Modify the Workbook Header Title in Present	14-11
Modify the Workbook Header Color in Present	14-12
Add an Image to the Workbook Header in Present	14-12
Show or Hide the Zoom Control in Present	14-14
Specify Workbook Zoom Control Options in Present	14-14
Show or Hide the Workbook Toolbar in Present	14-15
Select Workbook Toolbar Options in Present	14-15
Show or Hide the Workbook Filter Bar in Present	14-15
Specify Workbook Filter Options in Present	14-16
Show or Hide Workbook Filters in Present	14-16
Specify the Workbook Visualization Actions in Present	14-16
Change the Workbook Canvases Visualization Alignment in Present	14-17
Turn On or Off All Workbook and Canvas Actions in Present	14-17
Specify Personalization Options in Present	14-18
Set Canvas Properties in Present	14-18
Specify Canvas Filter Actions in Present	14-19
Show or Hide Canvas Filters in Present	14-19
Select Canvas Visualization Toolbar Options in Present	14-19
Specify Canvas Visualization Menu Options in Present	14-20
Show or Hide Canvas Visualizations in Present	14-21
Specify Canvas Zoom Control Options in Present	14-21
Show or Hide Canvas Notes in Present	14-22
Preview a Presentation Flow	14-22

## 15 Use Oracle Analytics Predictive Models and Oracle Machine Learning Models

---

Create and Use Oracle Analytics Predictive Models	15-1
What Are Oracle Analytics Predictive Models?	15-1
How Do I Choose a Predictive Model Algorithm?	15-3
Train a Predictive Model Using AutoML in Oracle Autonomous Data Warehouse	15-6
Create and Train a Predictive Model	15-7
Inspect a Predictive Model	15-8
View a Predictive Model's Details	15-9
Assess a Predictive Model's Quality	15-9
What Are a Predictive Model's Related Datasets?	15-10
Find a Predictive Model's Related Datasets	15-13
Add a Predictive Model to a Workbook	15-14
Evaluate Machine Learning Models Using Lift and Gain Charts	15-14
Overview to Using Lift and Gain Charts	15-15
Generate Predictive Data for Lift and Gain Charts	15-16
Evaluate a Machine Learning Model Using a Lift and Gain Chart	15-17
Use Oracle Machine Learning Models in Oracle Analytics	15-18
How Can I Use Oracle Machine Learning Models in Oracle Analytics?	15-18
Register Oracle Machine Learning Models in Oracle Analytics	15-19
Inspect Registered Oracle Machine Learning Models	15-19
View a Registered Model's Details	15-19
What Are a Registered Model's Views?	15-20
View a Registered Model's Views List	15-21
Visualize a Registered Oracle Machine Learning Model's View	15-22
Apply a Predictive or Registered Oracle Machine Learning Model to a Dataset	15-22

## 16 Import, Export, and Share

---

Import a Workbook File	16-1
Export a Workbook or Folder as a File	16-2
Share a Workbook URL with a Specific Canvas Selected	16-3
Export a Visualization From the Visualize or Present Page	16-3
Export Formatted Data from a Visualization to Excel	16-4
Export a Visualization's Data to a CSV File	16-4
Email Workbooks and Folders	16-5
Email a File of a Visualization, Canvas, or Dashboard	16-5
Print a Visualization, Canvas, or Dashboard	16-6

## A Frequently Asked Questions

---

Oracle Analytics Desktop Installation FAQs	A-1
Oracle Analytics Desktop Workbook and Data Source FAQs	A-2
Oracle Analytics Desktop Printing and Exporting FAQs	A-2

## B Troubleshoot Visualization Issues

---

## C Accessibility Features and Tips

---

Start Oracle Analytics Desktop with Accessibility Features Enabled	C-1
Keyboard Shortcuts for Visualizations	C-1
Keyboard Shortcuts for Data Flow	C-3

## D Data Sources and Data Types Reference

---

Supported Data Sources	D-1
About the Oracle Applications Connector	D-5
Certification - Supported Data Types	D-6
Supported Base Data Types	D-6
Supported Data Types by Database	D-6

## E Data Preparation Reference

---

Transform Reference	E-1
Column Menu Options for Quick Data Transformations	E-2

## F Expression Editor Reference

---

SQL Operators	F-1
Functions	F-3
Aggregate Functions	F-3
Analytics Functions	F-7
Conversion Functions	F-8
Date and Time Functions	F-9
Date Extraction Functions	F-10
Display Functions	F-12
Evaluate Functions	F-14
Mathematical Functions	F-14
Running Aggregate Functions	F-16
String Functions	F-17

System Functions	F-21
Time Series Functions	F-21
Constants	F-24
Types	F-25
Conditional Expressions	F-25
Best Practices For Using CASE statements in Analyses and Visualizations	F-27

## G Oracle Analytics Desktop SDK Reference

---

Oracle Analytics Desktop SDK	G-1
Scripts	G-1
Other Resources	G-2
Create the Visualization Plug-in Development Environment	G-2
Create a Skeleton Visualization Plug-in	G-3
Create a Skeleton Skin or Unclassified Plug-in	G-4
Develop a Visualization Plug-in	G-4
Run in SDK Mode and Test the Plug-in	G-4
Validate the Visualization Plug-in	G-5
Build, Package, and Deploy the Visualization Plug-in	G-5
Delete Plug-ins from the Development Environment	G-6



# Preface

Learn how to explore data using Oracle Analytics Desktop.

## Topics

- [Audience](#)
- [Documentation Accessibility](#)
- [Related Resources](#)
- [Conventions](#)

## Audience

*User's Guide for Oracle Analytics Desktop* is intended for business users who upload and query data sources, create visualizations to analyze data, build and work with workbooks, and import and export workbooks.

## Documentation Accessibility

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## Related Resources

These related Oracle resources provide more information.

- [Oracle Analytics Product Information](#)
- [Oracle Community Forum](#)
- [Oracle Analytics Desktop Installation Download](#)
- [Oracle Analytics Library](#)

# Conventions

Conventions used in this document are described in this topic.

## Text Conventions

Convention	Meaning
<b>boldface</b>	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
<code>monospace</code>	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

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Even if your skins and styles are different than those shown in the videos and images, the product behavior and techniques shown and demonstrated are the same.

# 1

## Get Started with Oracle Analytics Desktop

This topic describes the benefits of using Oracle Analytics Desktop, how to install it, and how to get started using the sample workbook.



### Topics:

- [About Oracle Analytics Desktop](#)
- [Install Oracle Analytics Desktop](#)
- [Install Machine Learning and Advanced Analytics on Windows](#)
- [Install Machine Learning and Advanced Analytics on Mac](#)
- [Open Oracle Analytics Desktop](#)
- [Get Started with Sample Workbook](#)

## About Oracle Analytics Desktop

Use Oracle Analytics Desktop to experience standalone data exploration and visualization as a desktop download.

Oracle Analytics Desktop enables you to visualize and explore your data from multiple sources or for analysis and investigation of your local datasets. Just upload data files or connect to Oracle Applications or a database, select the elements you're interested in, and let Oracle Analytics Desktop find the best way to visualize it. Choose from various visualizations to look at data in a specific way.

Oracle Analytics Desktop previews the self-service visualization capabilities of Oracle Analytics Cloud and Oracle Analytics Server. Oracle Analytics Desktop is a free download provided under the Oracle Technology Network license. Oracle Analytics Desktop isn't intended for production use, and isn't covered by Oracle's support policy.

## Install Oracle Analytics Desktop

Anyone can install Oracle Analytics Desktop on Windows or Mac.

You can install and use Oracle Analytics Desktop to learn more about Oracle Analytics functionality, or to use it as a stand-alone development environment where you can create workbooks and export them to share with other Oracle Analytics Desktop users or to import into Oracle Analytics Cloud.

Go to this page to find the installer and read about system requirements: [Oracle Analytics Desktop Installation Download](#).

For more about the installation, see [Oracle Analytics Desktop Installation FAQs](#) and [Installation and Configuration Issues and Workarounds](#).

1. Use the above link to go to the Oracle Analytics Desktop Download page to locate the current version of the installer.
2. Click **Download** and in the Oracle Software Delivery Cloud page review and accept the license agreement, and click the **Platforms** drop-down button and select one or more platforms to install Oracle Analytics Desktop onto. Click off the field to enter your selection.
3. Confirm your selection, click **Download**, and specify where on your computer to save the installer .zip file. If needed, enable your browser's popups for edelivery.oracle.com.

This step adds the **Oracle Download Manager** file to your computer, which you use to complete the installer download.

4. Go to the download location that you chose, locate and open the **Oracle Download Manager** file, confirm the installer's download destination, and click **Next** to start the installer .zip download.
5. After the download completes, click **Open Destination** to locate the .zip that contains the installer.
6. Extract the .zip file and launch the installer (.exe file for Windows or .pkg file for Mac). Follow the instructions provided on the screens to complete the installation.

## Install Machine Learning and Advanced Analytics on Windows

Machine learning and advanced analytics are optional components that aren't included in the Oracle Analytics Desktop Windows installation. Install machine learning if you want to use Diagnostics Analytics (Explain), Machine Learning Studio, or advanced analytics.

1. Go to the Windows Start menu, browse to Oracle, and click **Install DVML**.  
Terminal is launched and `BiPython_Framework.exe` downloads.
2. The installer starts on completion of the download. Follow the displayed instructions to install machine learning to the selected install path.
3. Click **Finish** to close the installer.
4. When prompted, press any key to close the terminal window.
5. If Oracle Analytics Desktop was running during the installation, then restart it.

## Install Machine Learning and Advanced Analytics on Mac

Machine learning and advanced analytics are optional components that aren't included in the Oracle Analytics Desktop Mac installation. Install machine learning if you want to use Diagnostics Analytics (Explain), Machine Learning Studio, or advanced analytics.

1. Double-click the application **Oracle Analytics Desktop Configure Python** in Finder under the Applications folder that contains Oracle Analytics Desktop.  
Terminal is launched and `BiPython_Framework.pkg` downloads.

2. The installer starts on completion of the download. Follow the displayed instructions to install machine learning to the selected install path. Enter an administrator user name and password to run the installation.
3. Click **Close** after the installation is completed.

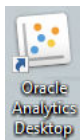
The Machine Learning Framework was installed in `/Library/Frameworks/DVMLruntime.framework`

4. If Oracle Analytics Desktop was running during the installation, then restart it.

## Open Oracle Analytics Desktop

You can open the Oracle Analytics Desktop application from a desktop shortcut or by locating it from the start menu (for Windows) or in Applications (for Mac).

This is the desktop shortcut icon:



The shortcut icon is available on your desktop if you selected the **Create desktop shortcut** option when you installed Oracle Analytics Desktop, or if you manually created a shortcut on your computer after installation.

1. To open Oracle Analytics Desktop from a shortcut icon, locate the shortcut on your desktop and double-click (for Windows) or click it (for Mac).
2. To open Oracle Analytics Desktop from your computer:
  - If you're using Windows, click **Start**, browse to and open the Oracle folder, and click **Oracle Analytics Desktop**.
  - If you're using Mac, go to Finder, click Applications, and locate and click **Oracle Analytics Desktop**.

## Get Started with Sample Workbook

Use the sample workbook provided to explore and discover Oracle Analytics Desktop's capabilities. Sample Workbook is designed to teach you best practices, which you can then use to create your own workbooks.

Sample Workbook uses the Sample Order Lines and Sample States spreadsheets as its datasets. The visualizations included in Sample Workbook illustrate how to create different views of the data and arrange them on multiple canvases to provide a comprehensive look at the data.

You can choose to download Sample Workbook during installation. If you didn't download Sample Workbook during installation, then you can still get it by uninstalling and then reinstalling Oracle Analytics Desktop. Your personal data isn't deleted when you uninstall and reinstall.

Oracle also provided examples designed to help you enhance your data visualizations. The examples are `.dva` files that you can re-use with your own data. See Oracle Analytics Examples Library.

# 2

## Connect to Data Sources

Create data source connections to access the data that you want to analyze and explore. Examples of data sources are: a database, Oracle applications, or a snowflake data warehouse.

### Topics:

- [About Data Sources](#)
- [Manage Connections to Data Sources](#)
- [Connect to an Oracle Database](#)
- [Connect to Oracle Analytic Views](#)
- [Connect to Oracle Autonomous Data Warehouse](#)
- [Connect to Oracle Autonomous Transaction Processing](#)
- [Connect to an Application in Oracle Fusion Cloud Applications Suite](#)
- [Create a Connection to Oracle Essbase](#)
- [Connect to NetSuite](#)
- [Connect to Oracle Talent Acquisition Cloud](#)
- [Connect to Google BigQuery](#)
- [Connect to Dropbox](#)
- [Connect to Google Drive or Google Analytics](#)
- [Connect to Data Using JDBC](#)
- [Create Generic ODBC Connections](#)
- [Connect to Snowflake Data Warehouse](#)

## About Data Sources

You can connect to many types of data source, such as Cloud databases, on-premises databases, and many commonly used applications, such as Dropbox, Google Drive, and Amazon Hive.

You create a connection for each data source that you want to access in Oracle Analytics. Once connected, you can visualize your data to create insights.

A data source is any tabular structure. You see data source values after you load a file or send a query to a service that returns results.

A data source can contain any of the following:

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

- **Attribute columns** - These contain text, dates, or numbers that are required individually and aren't aggregated, for example, Year, Category Country, Type, or Name.
- **Measure columns** - These contain values that should be aggregated, for example, Revenue or Miles driven.

You can analyze a data source on its own, or you can analyze two or more data sources together, depending on what the data source contains. If you use multiple sources together, then at least one match column must exist in each source. The requirements for matching are:

- The sources contain common values, for example, Customer ID or Product ID.
- The match must be of the same data type, for example, number with number, date with date, or text with text.

## Manage Connections to Data Sources

You can create, update, remove, and share connections to data sources.

### Topics:

- [Create a Connection to a Data Source](#)
- [Edit a Data Source Connection](#)
- [Delete a Data Source Connection](#)
- [Database Connection Options](#)

## Create a Connection to a Data Source

You can create a connection to enable you to analyze data in that data source.

1. On the Home page, click **Create**, and then click **Connection**.
2. In the Select Connection Type dialog box, click the icon for the connection type that you want. For example, **Oracle Database**.
3. Enter the required connection information such as host, port, username, password, and service name.
4. Optional: Select an **Authentication** option for your connection..
  - **Always use these credentials** - Oracle Analytics always uses the login name and password you provide for the connection. Users aren't prompted to log in.
  - **Require users to enter their own credentials** - Oracle Analytics prompts users to enter their own user name and password for the data source. Users can only access the data for which they have the permissions, privileges, and role assignments.
  - (Displayed if Oracle Analytics supports impersonation for this database type) **Use the active user's credentials** - Oracle Analytics doesn't prompt users to sign in to access the data. The same credentials they used to sign in to Oracle Analytics are also used to access this data source.
5. Click **Save**.

You can now begin creating workbooks or datasets using this connection. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Edit a Data Source Connection

You can update a data source's connection details.

If you're editing an SSL connection to an Oracle Database and you need to use a new `cwallet.sso` file, in the **Client Wallet** field, click **Select** to browse for the `cwallet.sso` file. Ask your administrator for the location of the `cwallet.sso` file.

1. On the Home page click the Navigator, select **Data**, and then click **Connections**.
2. Hover over the connection that you want to edit. To the right of the highlighted connection, click **Actions menu**, and select **Inspect**.
3. In the Inspect dialog, edit the connection details.

You can't see the current password or Logical SQL for connections. If you need to change these, create a new connection.

4. Click **Save**.

## Delete a Data Source Connection

You can remove a data source connection from Oracle Analytics Cloud. For example, you must delete a database connection and create a new connection when the database's password has changed.

If the connection contains any datasets, then you must delete the datasets before you can delete the connection.

1. Go to the Data page and select **Connections**.
2. Hover over the connection that you want to delete. To the right of the highlighted connection, click **Actions menu**, and select **Delete**.
3. Click **Yes**.

## Database Connection Options

When you specify connection details using the Create Connection dialog or Inspect dialog, some database types have extra configuration options.

### General Options

- When you create connections to Oracle Databases, you can connect in two ways using the **Connection Type** option:
  - **Basic** - Specify the **Host**, **Port**, and **Service Name** of the database.
  - **Advanced** - In the **Connection String** field specify the Single Client Access Name (SCAN) ID of databases running in a RAC cluster. For example:

```
sales.example.com =(DESCRIPTION= (ADDRESS_LIST= (LOAD_BALANCE=on)
(FAILOVER=ON) (ADDRESS=(PROTOCOL=tcp) (HOST=123.45.67.111) (PORT=1521))
(ADDRESS=(PROTOCOL=tcp) (HOST=123.45.67.222) (PORT=1521))
(ADDRESS=(PROTOCOL=tcp) (HOST=123.45.67.333) (PORT=1521)))
(CONNECT_DATA=(SERVICE_NAME= salesservice.example.com)))
```



- **Enable Bulk Replication** - If you're loading a dataset for a workbook, then this option should be turned off and you can ignore it. This option is reserved for data analysts and advanced users for replicating data from one database to another database.

#### Authentication Options

- **Always use these credentials** - Oracle Analytics always uses the login name and password you provide for the connection. Users aren't prompted to log in.
- **Require users to enter their own credentials** - Oracle Analytics prompts users to enter their own user name and password for the data source. Users can only access the data for which they have the permissions, privileges, and role assignments.
- (Displayed if Oracle Analytics supports impersonation for this database type) **Use the active user's credentials** - Oracle Analytics doesn't prompt users to sign in to access the data. The same credentials they used to sign in to Oracle Analytics are also used to access this data source.

## Connect to an Oracle Database

You can create a connection to a database and use the connection to access data, build a dataset, and visualize data.



You can't use remote connections to save a dataset from a Data Flow.

1. On the Home page, click **Create**, then click **Connection**.
2. In Create Connection dialog, click the connection type, for example, **Oracle Database**.
3. Enter a unique name for the new connection, and database connection details.
  - If you're not creating an SSL connection, specify the connection information for the database, such as the hostname, port, credentials, service name and so on.
  - If you're creating an SSL connection, in the **Client Wallet** field, click **Select** to browse for the `cwallet.sso` file. Ask your administrator for the location of the `cwallet.sso` file.
4. Use the **Connection Type** option to specify how you'd like to connect.
  - When you create connections to Oracle Databases, you can connect in two ways using the **Connection Type** option:

– **Basic** - Specify the **Host**, **Port**, and **Service Name** of the database.

– **Advanced** - In the **Connection String** field specify the Single Client Access Name (SCAN) ID of databases running in a RAC cluster. For example:

```
sales.example.com =(DESCRIPTION= (ADDRESS_LIST=
(Load_Balance=on) (FAILOVER=ON) (ADDRESS=(PROTOCOL=tcp)
(HOST=123.45.67.111) (PORT=1521)) (ADDRESS=(PROTOCOL=tcp)
(HOST=123.45.67.222) (PORT=1521)) (ADDRESS=(PROTOCOL=tcp)
(HOST=123.45.67.333) (PORT=1521))) (CONNECT_DATA=(SERVICE_NAME=
saleservice.example.com)))
```

- **Enable Bulk Replication** - If you're loading a dataset for a workbook, then this option should be turned off and you can ignore it. This option is reserved for data analysts and advanced users for replicating data from one database to another database.
5. Click **Save**.
  6. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to Oracle Analytic Views

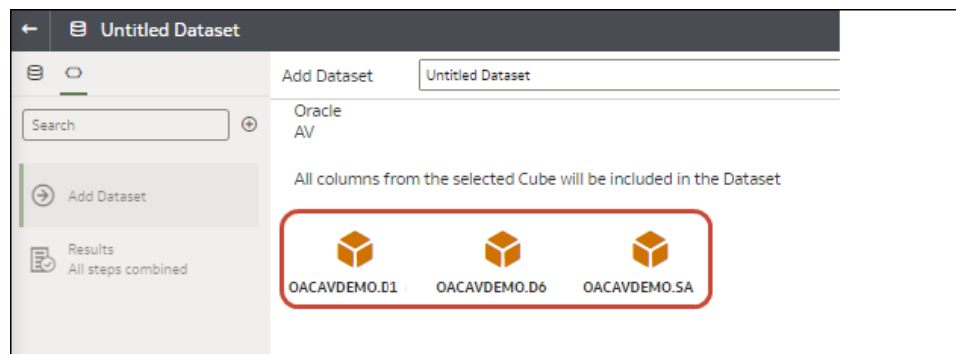
You can create a connection to Analytic Views in an Oracle Database to access data, build a dataset, and visualize data.

Dataset authors can use this connection type to consume Oracle Analytic Views data, including multi-dimensional objects, without having to understand the complexities of Java database connectivity (JDBC).

1. On the Home page, click **Create**, then click **Connection**.
2. Click **Oracle Analytic Views** and enter the connection details.
  - For **Connection Type**, select **Basic** to connect by specifying **Host** as an Internet Protocol (IP) address, **Port**, and **Service Name** for the Oracle database. For example, **Host** = *<IP address>*, **Port** = 9018, and **Service Name** = PDBORCL.
  - Alternatively, select **Advanced** to connect by specifying a **Connection String**. For example, (DESCRIPTION = (ADDRESS\_LIST = (ADDRESS = (PROTOCOL = TCP) (HOST = *<IP address>*) (PORT = 9018))) (CONNECT\_DATA = (SERVICE\_NAME = PDBORCL)))
3. Click **Save**.

You can now create datasets using the connection and build workbooks.

When you create a dataset using the connection, select one of the cubes listed in the database. Then build a workbook using that dataset and start visualizing your data.



## Connect to Oracle Autonomous Data Warehouse

You can create a connection to Oracle Autonomous Data Warehouse and use the connection to access data.

You can connect to Oracle Autonomous Data Warehouse using security certificates downloaded from Oracle Autonomous Data Warehouse to a wallet (known as mTLS, or

Mutual Transport Layer Security), or without a wallet (known as TLS, or Transport Layer Security). See [About TLS Authentication](#). The credentials wallet file secures communication between Oracle Analytics and Oracle Autonomous Data Warehouse. The wallet file (for example, `wallet_ADWC1.zip`) that you upload must contain SSL trusted certificates, to enable SSL on your Oracle Database Cloud connections.

### Tutorial

1. Before you create connections to Oracle Autonomous Data Warehouse, you must obtain the client credentials zip file containing the trusted certificates that enable Oracle Analytics to connect to Oracle Autonomous Data Warehouse.

See Download Client Credentials (Wallets) in *Using Oracle Autonomous Database Serverless*.

The credentials wallet file secures communication between Oracle Analytics and Oracle Autonomous Data Warehouse. The wallet file (for example, `wallet_ADWC1.zip`) that you upload must contain SSL certificates, to enable SSL on your Oracle Database Cloud connections.

2. On the Home page, click **Create** then click **Connection**.
3. Click **Oracle Autonomous Data Warehouse**.
4. Enter a user-friendly **Connection Name** and **Description**.
5. For **Encryption Type**:
  - To connect without a credentials wallet file, select **TLS** as the **Encryption Type**, enter a **Connection String**, then enter a **Username** and **Password** of a user in Oracle Autonomous Data Warehouse.
  - To connect using a credentials wallet file, select **Mutual TLS** as the **Encryption Type**, then click **Select** and browse for and select the Client Credentials wallet file that you downloaded from Oracle Autonomous Data Warehouse (for example, `wallet_ADWC1.zip`), then enter a **Service Name**. The **Client Credentials** field displays the `cwallet.sso` file.
6. Click **Save**.

You can now create datasets from the connection.

## Connect to Oracle Autonomous Transaction Processing

You can create a connection to Oracle Autonomous Transaction Processing and use the connection to access data.

1. Before you create connections to Oracle Autonomous Data Warehouse, you must obtain the client credentials zip file containing the trusted certificates that enable Oracle Analytics to connect to Oracle Autonomous Data Warehouse.

See Download Client Credentials (Wallets) in *Using Oracle Autonomous Database Serverless*.


The credentials wallet file secures communication between Oracle Analytics and Oracle Autonomous Data Warehouse. The wallet file (for example, `wallet_ADWC1.zip`) that you upload must contain SSL certificates, to enable SSL on your Oracle Database Cloud connections.

2. On the Home page, click **Create** then click **Connection**.
3. Click **Oracle Autonomous Transaction Processing**.

4. Enter a user-friendly **Connection Name** and **Description**.
5. For **Encryption Type**:  
 To connect without a credentials wallet file, select **TLS**, then skip to the next step.  
 To connect using a credentials wallet file, select **Mutual TLS**, then click **Select** and browse for and select the Client Credentials wallet file that you downloaded from Oracle Autonomous Data Warehouse (for example, wallet\_ADWC1.zip). The **Client Credentials** field displays the `cwallet.sso` file.
6. For the **TLS** connection type (without a wallet), enter a **Connection String**, the **Username** and **Password** of a user in Oracle Autonomous Data Warehouse.
7. Click **Save**.
8. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to an Application in Oracle Fusion Cloud Applications Suite

Create a connection to an application in Oracle Fusion Cloud Applications Suite to visualize data from that application. For example, you can connect to Oracle Fusion Cloud Financials with Oracle Transactional Business Intelligence. You can also connect to Oracle BI Enterprise Edition.

1. On the Data page or Home page, click **Create**, then click **Connection**.
2. Click **Oracle Applications**. 
3. Enter the connection details.
4. For **URL**, enter the URL for Fusion Applications Suite with Oracle Transactional Business Intelligence or Oracle BI EE.
5. Under **Authentication**, specify how you'd like to authenticate the connection:
  - **Always use these credentials** - Oracle Analytics always uses the login name and password you provide for the connection. Users aren't prompted to log in.
  - **Require users to enter their own credentials** - Oracle Analytics prompts users to enter their own user name and password for the data source. Users can only access the data for which they have the permissions, privileges, and role assignments.
  - **Use the active user's credentials** - Oracle Analytics doesn't prompt users to sign in to access the data. The same credentials they used to sign in to Oracle Analytics are also used to access this data source. Make sure that the Oracle Analytics user exists in Oracle Transactional Business Intelligence .
6. Save the details.

You can now create datasets from the connection.

The connection is visible only to you (the creator), but you can create and share datasets for it.

## Create a Connection to Oracle Essbase

You can create a connection to Oracle Essbase 11g and use the connection to access source data.

1. On the Home page, click **Create**, and then click **Connection**.
2. Click **Oracle Essbase**.
3. Enter the connection details.
4. For **DSN** (data source name), enter the agent URL for your data source.

If you want to connect to an Oracle Essbase 11g database, enter the hostname and agent port number on which Oracle Essbase is running. Use the format:

hostname:port

For example: `essbase.example.com:1423`

The default port is 1423.

Your Essbase administrator must open agent port 1423 and server ports in the range 30000-34000 to allow the connection.

5. For **Username** and **Password**, enter user credentials with access to the Essbase data source.
6. Under **Authentication**, specify how you'd like to authenticate the connection:
  - **Always use these credentials** - Oracle Analytics always uses the login name and password you provide for the connection. Users aren't prompted to log in.
  - **Require users to enter their own credentials** - Oracle Analytics prompts users to enter their own user name and password for the data source. Users can only access the data for which they have the permissions, privileges, and role assignments.
  - (Displayed if Oracle Analytics supports impersonation for this database type) **Use the active user's credentials** - Oracle Analytics doesn't prompt users to sign in to access the data. The same credentials they used to sign in to Oracle Analytics are also used to access this data source.
7. Save the details.

You can now create datasets from the connection.

## Connect to NetSuite

Connect to a NetSuite (NetSuite2.com) data source to visualize ERP and CRM data.

1. On the Home page, click **Create** and then click **Connection**.
2. Click **Oracle Netsuite**.
3. Enter the connection details.

To obtain the connection details for your NetSuite application, go to the NetSuite Portal home page, and navigate to **Settings** then **Set up SuiteAnalytics Connect**.

In **Role ID**, make sure that you specify the ID for a role name that doesn't contain spaces or special characters. Role names containing spaces or special characters can cause data flows to fail with an internal or syntax error.

4. Save the details.
5. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to Oracle Talent Acquisition Cloud

You can create a connection to Oracle Talent Acquisition Cloud and use the connection to access data.

1. On the Home page, click **Create** and then click **Connection**.
2. Click **Oracle Talent Acquisition** and enter the connection details.
3. For **Host**, enter the URL for the Oracle Talent Acquisition data source.  
For example, if the Oracle Talent Acquisition URL is `https://example.taleo.net`, then the connection URL that you must enter is `https://example.taleo.net/smartorg/Bics.jss`.
4. Select an **Authentication** option.
  - Select **Always use these credentials**, so that the login name and password you provide for the connection are always used and users aren't prompted to log in.
  - Select **Require users to enter their own credentials** when you want to prompt users to enter their user name and password to use the data from the Oracle Talent Acquisition Cloud data source. Users are required to log in see only the data that they have the permissions, privileges, and role assignments to see.
5. Click **Save**.
6. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to Google BigQuery

You can create a connection to a Google BigQuery database and use the connection to visualize data in a BigQuery project.

Before you start, note the following:

- Creating a connection to Google BigQuery is resource-intensive. It's best to create one connection and share it with other users, rather than having multiple users create their own connection.
  - Oracle Analytics builds a cache of tables and schemas for each project in Google BigQuery. You should limit the projects, tables, and schemas to only those required for the analysis.
  - Depending on the amount of Google BigQuery data, creating a connection can take up to several hours, so allow time for this process to complete.
  - After the connection is created, allow time before you use the connection to start analyzing your data.
1. In Google BigQuery, create a Service Account.

- a. Add a role (for example, BigQuery User) with the permission `bigquery.jobs.create` to the Service Account.
  - b. Add Users to the role.
  - c. Add a JSON key.
2. On the Oracle Analytics Home page, click **Create**, and then click **Connection**.
  3. Click **BigQuery**.
  4. Enter the connection details.
    - In **Connection Name**, specify a user-friendly name to identify the connection details in Oracle Analytics.
    - In **Project**, specify the BigQuery project you want to analyze using the name exactly as defined in Google BigQuery (case-sensitive).
    - In **Service Account Email**, specify the email address used to log into Google BigQuery.
    - In **Service Account Private Key**, upload the Service Account Private Key (JSON format).

5. Save the details.

You can now create analytics dataset workbooks based on your Google BigQuery data. When you create a dataset, you navigate to BigQuery tables and select the data facts and measures to analyze. Alternatively, you can use a SQL Query to get the data directly.

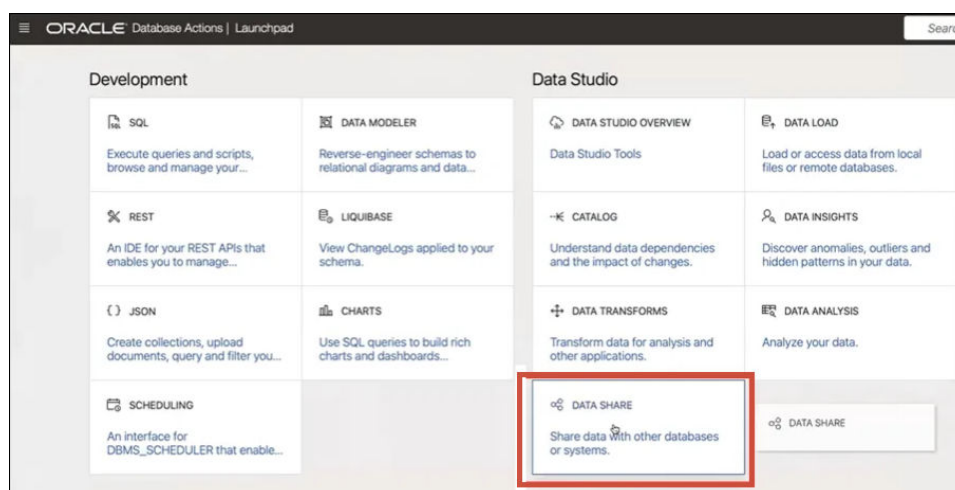
## Connect to a Database Using Delta Sharing

You can connect to some databases using the Delta Sharing protocol, for example, Oracle Autonomous Database, and visualize the data.

The Delta Sharing protocol provides secure data access without direct access to the source.

Use the connection to create a dataset and build workbooks. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created. Save the dataset and use it to build workbooks.

Before you start, ask the target database administrator to set up a delta sharing area and share it with you. For example, in Oracle Autonomous Database, an administrator creates a Data Share area, and shares it with you so that you receive a email containing an activation link. The link enables you to download a JSON file containing profile details required to create a connection in Oracle Analytics.



1. Contact the database administrator to request a data share.
2. In the activation email that you receive from the database administrator, click the activation link.
3. In the activation dialog, click **Get Profile Information**.  
A credentials file for the target database is downloaded to your local area in JSON format.
4. On the Oracle Analytics Home page, click **Create**, and then click **Connection**.
5. In Create Connection, click **Delta Share**.
6. Enter a **Connection Name** and optional **Description**.
7. In **Connection Type**, select a type suitable for your data source. For example:
  - For Oracle Autonomous Database, select **Client Credentials**.
  - For DataBricks, select **Bearer Token**.
8. Click **Import File** then select the JSON file containing connection details.  
Oracle Analytics populates the rest of the input fields with values from the import file.
9. Click **Save**.

You're now ready to create a workbook and start visualizing your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created and create a workbook.

## Connect to Dropbox

You can create a connection to Dropbox and use the connection to access data.

 [LiveLabs Sprint](#)

Before you start, set up a Dropbox application. See the Dropbox documentation.

1. In Console, register the following domains as safe in the Safe Domains page:
  - api.dropboxapi.com
  - \*.dropbox.com



2. On the Oracle Analytics Home page, click **Create**, and then click **Connection**.
3. Click **Dropbox**.
4. Enter a **Connection Name** and optional **Description**.
5. Copy the URL displayed in the **Redirect URL** field.
6. In the Dropbox application, sign-in, and paste the **Redirect URL** URL into the Dropbox **OAuth 2 Redirect URIs** field, then click **Add**.
7. In Dropbox, copy the key in the **App Key** field.
8. In Oracle Analytics, paste the **App Key** key into the **Client ID** field.
9. In Dropbox, locate the **App Secret** field, then click **Show** and copy the value.
10. In Oracle Analytics, paste the **App Secret** value into the **Client Secret** field, then click **Authorize**.
11. In the Dropbox prompt to authorize the connection, click **Allow**.  
The Create Connection dialog refreshes and displays the name of the Dropbox account and associated email account.
12. Save the connection.
13. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to Google Drive or Google Analytics

You can create a connection to Google Drive or Google Analytics and use the connection to access data.

Before you start, set up a Google Drive or Google Analytics application. See the Google documentation.

We recommend that you use the latest Google Analytics connector, which supports column-listing.

1. In Console, register the following domains as safe in the Safe Domains page:  
`api.google.com`  
`*.google.com`
2. On the Oracle Analytics Home page, click **Create**, then click **Connection**.
3. Click **Google Drive** or **Google Analytics** to display the Create Connection dialog.
4. Enter a **Connection Name** and optional **Description**.
5. Copy the URL displayed in the **Redirect URL** field.
6. In the Google application, on the Credentials page, paste the **Redirect URL** value into the Google "Authorized redirect URIs" field, then click **Add**.
7. In Google, on the Credentials page copy the "Client secret" value and the "Client ID" value.
8. In Oracle Analytics, paste the Google 'Client secret' value into the **Client Secret** field.
9. In Oracle Analytics, paste the Google 'Client ID' into the **Client ID** field.

10. In the Google application, copy the "Account ID" from the Account details and copy the "Property ID" from the Property details.

In the Google administration settings, navigate to Account, then Account details to obtain the "Account ID", and navigate to Property details to obtain the "Property ID".

11. In Oracle Analytics, use the "Account ID" and "Property ID" that you copied in the previous step to specify the **Account ID** value and the **Property ID** value, then click **Authorize**.
12. In the Google prompt to authorize the connection, click **Allow**.  
The Create Connection dialog refreshes and displays the name of the Google account, and its associated email account.
13. Save the connection.
14. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

## Connect to Data Using JDBC

You can use JDBC to connect to databases that aren't listed as connection types on the Create Connection dialog.

You use drivers in a JDBC JAR file to connect to databases.

Check with your administrator that the JDBC driver version must match the database version, even when using an Oracle database. A version mismatch can result in data issues.

For the connection criteria:

- Avoid using instance-specific connection names such as host names, because the same connection can be configured against different databases in different environments, for example, development and production.
  - Check the driver documentation and the JAR file for specifying the URL of your JDBC data sources.
  - Find the driver class name in the JAR file or from wherever you downloaded the JAR file.
  - When you install a JDBC driver locally, make sure that it doesn't have the same driver class as an existing driver. If you do install two drivers with the same driver class, you'll get a connection error when you use this connection (for example, `Failed to save connection Invalid hostname.`).
  - For the **URL** value, specify the JDBC URL, for example, `jdbc:oracle:thin:@host:port/database`.
  - For the **Driver Class Name** value, use the name specified in the JDBC driver download pack that you're using, for example, `oracle.jdbc.driver.OracleDriver`.
1. On the Data or Home page, click **Create**, then click **Connection**.
  2. In the Create Connection dialog, locate and click the **JDBC** icon.
  3. Enter the connection criteria.
  4. Click **Save**.

You can now create datasets from the connection.

If you import a workbook containing a JDBC connection into an Oracle Analytics installation where the JDBC driver isn't installed, the import still works. However, the connection doesn't

work when you try to run the workbook or Data Flow. You must recreate the JDBC connection and JDBC driver to a suitable data source.

## Create Generic ODBC Connections

You can create generic ODBC connections to databases and use the connections to access data sources. For example, to connect to databases and database versions that aren't listed with the default connection types.

You can only use generic ODBC connections to connect on Windows systems.

1. Confirm that the appropriate database driver is installed on your computer.

You must have the required database driver installed on your computer to create an ODBC Data Source Name (DSN). If you need to install a database driver, use installation instructions provided by the organization that supplies the database driver.

2. Create the new ODBC data source in Windows.
  - a. In Windows, locate and open the ODBC Data Source Administrator dialog.
  - b. Click the **System DSN** tab, and then click **Add** to display the Create New Data Source dialog.
  - c. Select the driver appropriate for your data source, and then click **Finish**.
  - d. The remaining configuration steps are specific to the data source you want to configure.

Refer to the documentation for your data source.

3. Create the generic ODBC data source.
  - a. On the Data or Home page, click **Create**, then click **Connection**.
  - b. In the Create Connection dialog, locate and click the **ODBC** icon.
  - c. Enter the connection criteria. Note the following:
    - **Name** - Any name that uniquely identifies the connection.
    - **DSN** - The name of the system DSN that you set up on your computer.
  - d. Click **Save**.

You can now create datasets from the connection.

If you import a workbook containing an ODBC connection into an Oracle Analytics Desktop installation where the ODBC DSN doesn't exist, and the ODBC driver isn't installed, the import still works. However, the connection doesn't work when you try to run the workbook or Data Flow. You must recreate the ODBC connection, and recreate the ODBC DSN, and ODBC driver to a suitable data source.

## Connect to Snowflake Data Warehouse

You can create a connection to Snowflake Data Warehouse and use the connection to access data.

See format guidelines, <https://docs.snowflake.net/manuals/user-guide/connecting.html>.

1. On the Home page, click **Create**, and then click **Connection**.
2. Click **Snowflake Data Warehouse**.
3. Enter a Connection Name.
4. In **Hostname**, enter the host account name using one of the following formats:
  - For Amazon Web Services US West, use `<account>.snowflakecomputing.com`
  - For all other regions on Amazon Web Services, use `<account>.<region>.snowflakecomputing.com`
  - For all regions on Microsoft Azure, use `<account>.<region>.azure.snowflakecomputing.com`

Where `account` is the Snowflake account name that you want to use to access the data, for example: `exampleaccountname.snowflakecomputing.com`.

5. For **Username** and **Password**, enter user credentials with access to the Snowflake data source.
6. For **Database Name**, enter the name of the database containing the schema tables and columns that you want to connect to.
7. For **Warehouse**, enter the name of the warehouse containing the database, schema tables and columns that you want to connect to. For example, `Example-WH`.
8. Click **Save**.
9. Use the connection to connect to your data. For example, from the Home page, click **Create**, then click **Dataset**, then select the connection that you just created.

# 3

## Connect to Your Data Using Datasets

This topic describes how to use a data source connection to create a dataset.

### Topics

- [What Are Datasets?](#)
- [About Opening Datasets](#)
- [View Available Connections](#)
- [Data Sources Available for Use in Datasets](#)
- [About the Dataset Editor](#)
- [Create a Dataset From a Connection](#)
- [Add Multiple Connections to a Dataset](#)
- [Add a File to a Dataset Created From a Connection](#)
- [Add a Table to a Dataset Using a SQL Statement](#)
- [Understand Dataset Table Joins](#)
- [Add Joins Between Dataset Tables](#)
- [Disable Auto Joins in Datasets](#)
- [Modify or Fix Joins in a Dataset](#)
- [Add Joins When Table Columns Don't Match](#)
- [Delete Joins from a Dataset](#)
- [Include a Dataset Table in Data Source Queries](#)
- [What is Preserve Grain?](#)
- [Specify Which Table Determines Grain](#)
- [Rearrange the Order of a Dataset's Tables](#)
- [What are Quality Insights?](#)
- [Enhance Your Data Using Quality Tiles](#)
- [About Removing or Restoring Dataset Columns](#)
- [Remove or Restore a Dataset Table's Columns](#)
- [Filter a Dataset Table](#)
- [Specify Whether a Dataset Table Is Cached or Live](#)
- [View a Dataset Table's Original Formatting](#)
- [Create Datasets from Files](#)
- [Create a Dataset from a Subject Area in Oracle Fusion Cloud Applications Suite](#)
- [Create a Dataset from an Analysis in Oracle Fusion Cloud Applications Suite](#)

- [Create a Dataset from an Essbase Connection](#)

## What Are Datasets?

Datasets are self-service data models that you build specifically for your data visualization and analysis requirements.

A dataset can be based on one table, spreadsheet, or file. Or a dataset can be a self-service data model that contains multiple tables with relationships defined between the tables.

You can create datasets from data from files that you upload, or SaaS applications, Oracle Analytics reports, and many relational and big data sources that you build connections to. See [Data Sources Available for Use in Datasets](#).

Datasets are subsets of the file or data source's data that you curate and shape to meet your specific analytics and visualization needs. A dataset contains data source connection information, tables, the columns you specify, and the data enrichments and transformations that you apply.

You can use a dataset in multiple workbooks and in data flows. If you change a dataset, changes affect all workbooks and data flows that use the dataset.

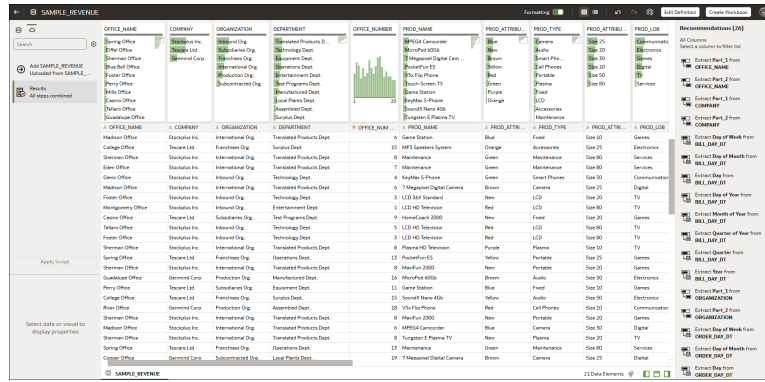
When you create and build a dataset, you can:

- Choose between many types of connections or spreadsheets.
- Create datasets based on data from multiple tables in a database connection, Oracle data source, or a local subject area. And create datasets based on data from tables in different connections and subject areas. For example, you can build a dataset that includes tables from an Autonomous Data Warehouse connection, tables from a Spark connection, and tables from a local subject area.
- Specify joins between tables.
- Transform and enrich the columns in the dataset.

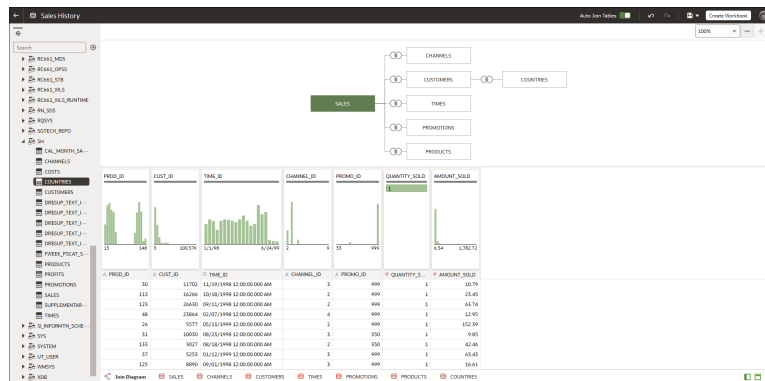
## About Opening Datasets

The type of data source a dataset uses determines how you navigate the user interface when you create a new dataset, and when you open an existing dataset by itself or from a workbook.

When you create or open a dataset that uses Oracle EPM Cloud, Oracle Essbase, or Google Analytics, the dataset is displayed in the Transform editor.



When you create or open a dataset with multiple tables, the dataset is displayed in the Dataset editor.



When working in a workbook, use the **Data** tab to view and open the workbook's datasets. The dataset determines which editor Oracle Analytics opens.

- If the dataset is based on Oracle EPM Cloud, Oracle Essbase, or Google Analytics, then the Transform editor is opened in a new window.
- If the dataset contains multiple tables, then the Dataset editor is opened in a new window.

## View Available Connections

A dataset uses one or more connections to data sources to access and supply data for analysis and visualization.

Your list of connections contains the connections that you built. View the connections list to determine if the connections that you need to create datasets already exist. You can also use the connections list to access more information about a specific connection and decide if it can supply the data that you need to build a specific dataset, for example, the type of database it connects to and information about its data elements.



**Note:**

You can create datasets with multiple tables from most data sources. Exceptions include Oracle EPM Cloud, Oracle Essbase, or Google Analytics.

If you need to create a connection, see [Create a Connection to a Data Source](#).

1. In the Home Page, click **Navigator** and then click **Data**.
2. Click the **Connections** tab to view your connections list.

## Data Sources Available for Use in Datasets

Learn which data sources you can use in datasets. You can use most data sources to create datasets that contain multiple tables.

### Oracle Data Sources

You can use one or more of these Oracle data source connections to create a dataset containing multiple tables.

- Oracle Fusion Cloud Applications Suite (Use the **Oracle Applications** connection type)
- Oracle Autonomous Data Warehouse
- Oracle Autonomous Transaction Processing
- Oracle Database
- Oracle NetSuite
- Oracle Service Cloud

### Other Data Sources

You can use one or more of these data source connections to create a dataset containing multiple tables.

- Amazon EMR
- Amazon Redshift
- Apache Hive
- DB2
- Dropbox
- Files (XLSX, XLS, CSV, and TXT)
- Google Drive
- GreenPlum
- HortonWorks Hive
- IBM BigInsights Hive
- Impala (Cloudera)
- Informix



- MapR Hive
- Microsoft Azure SQL Database
- MongoDB
- Pivotal HD Hive
- PostgreSQL
- Salesforce
- Snowflake
- Spark
- SQL Server
- Sybase ASE
- Sybase IQ
- MySQL

#### **Data Sources Not Available for Multiple Table Datasets**

These data source connections aren't available to create or include in a dataset containing multiple tables.

- Oracle Fusion Cloud Enterprise Performance Management (EPM)
- Oracle Essbase
- Google Analytics

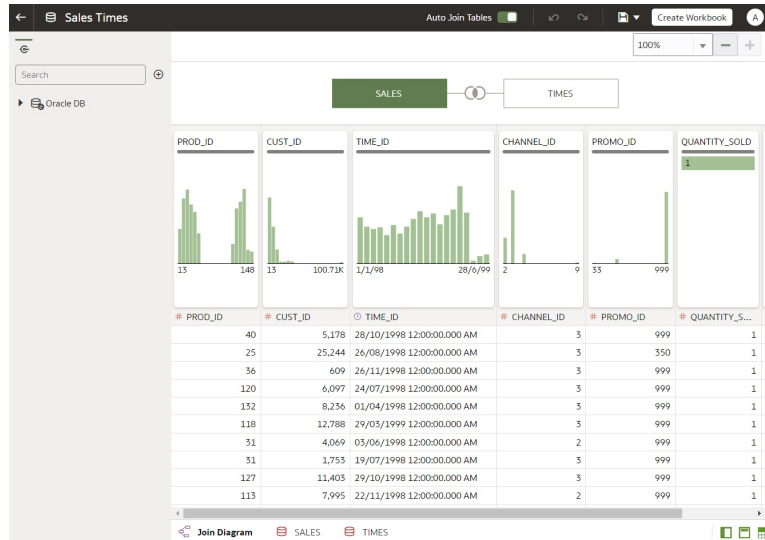
## About the Dataset Editor

Use the Dataset editor to create or edit a dataset that includes tables, joins, and enriched data.

When you create a dataset from a connection that supports datasets with multiple tables, Oracle Analytics displays the Dataset editor. See [Data Sources Available for Use in Datasets](#).

You can't create datasets with multiple tables from Oracle EPM Cloud, Oracle Essbase, or Google Analytics connections. Use the Transform editor for connections that don't support datasets with multiple tables.

Each Dataset editor feature and what you can do with it is explained here:



- **Connections Pane**

This pane displays the data source connection's schemas and tables, and uploaded files. To add a table or file from the Connections Pane to the Join Diagram, drag and drop it from the list to the diagram or double-click it. You can add more than one table or file.

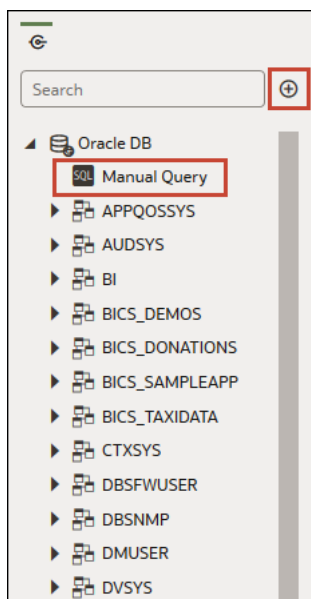
Click **Add** to open the Add Connection or Open File dialog where you can select or create another connection or select a file to add to the dataset.

Use **Search** to find a schema, table, or file displayed in the Connections pane.

To write a SQL statement to create a table, drag and drop the Manual Query item to the diagram. Then go to the diagram and double-click the Manual Query table to access the SQL editor.

 **Note:**

Use Manual Query when a JDBC connection doesn't provide a schema and tables listing.

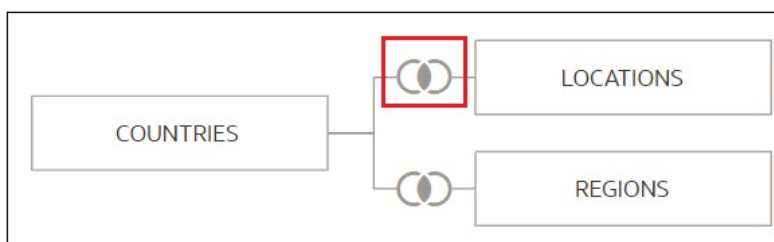


- **Join Diagram**

The Join Diagram displays all of the tables and joins in the dataset. Drag and drop tables to reorder them in the diagram.

When you select a table, the Preview Data area displays a sample of the table's data. If you double-click a table, then the Transform editor is displayed where you transform or enrich the table's data.

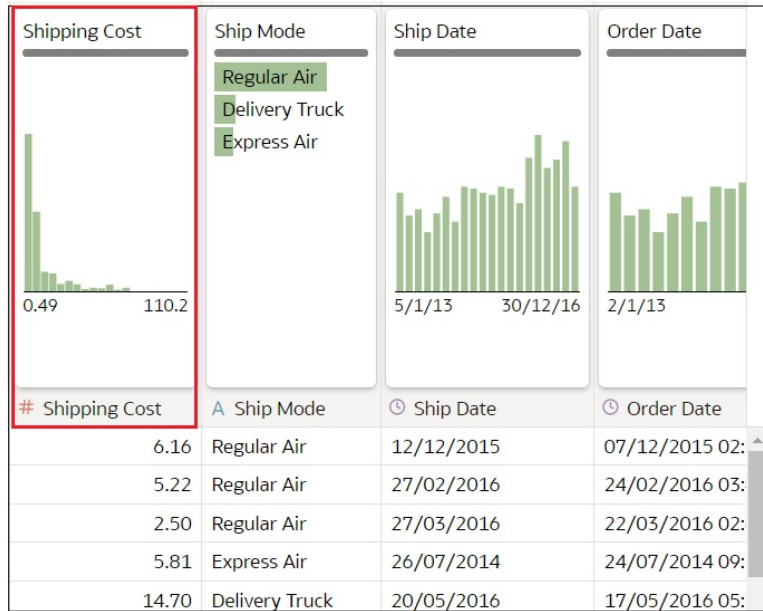
The diagram's join links and icons indicate which tables are joined and the type of join used. A join is created when you drag and drop one table onto another. If you click on a join, the Join editor is displayed where you can view, update, or fix it.



- **Data Preview**

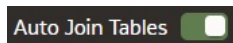
The data preview area displays a data sample for the table selected in the **Join Diagram**. From the data preview area you can click a column's type attribute to change its type. For example, change the CALENDAR\_YEAR column from a measure to an attribute.

By default, a quality insight tile is displayed for each column. Quality Insights uses a representative sample of the column's data to determine information about the column's data quality. See [What are Quality Insights?](#)



- **Auto Join Tables Toggle Button**

The **Auto Join Tables** toggle button determines if joins are automatically created when you drag and drop tables onto the Join Diagram. By default Oracle Analytics creates joins, but in some cases you might want to turn off automatic join creation and manually create table joins.



- **Dataset Table Page Tabs**

The Dataset editor displays a tab for each table in the dataset. Click a table tab to go to the Transform editor to transform or enrich the table's data. The tabs also display at the bottom of the Transform editor. Use them to navigate to other tables or back to the Join Diagram.



- **Dataset Editor Toggle Buttons**

These buttons control which parts of the Dataset editor are displayed.



This button hides or displays the connections panel:



This button hides or displays the quality tiles:



This button hides or displays the preview data area:



## Create a Dataset From a Connection

When you create a dataset, you can add tables from one or more data source connections, add joins, and enrich data.



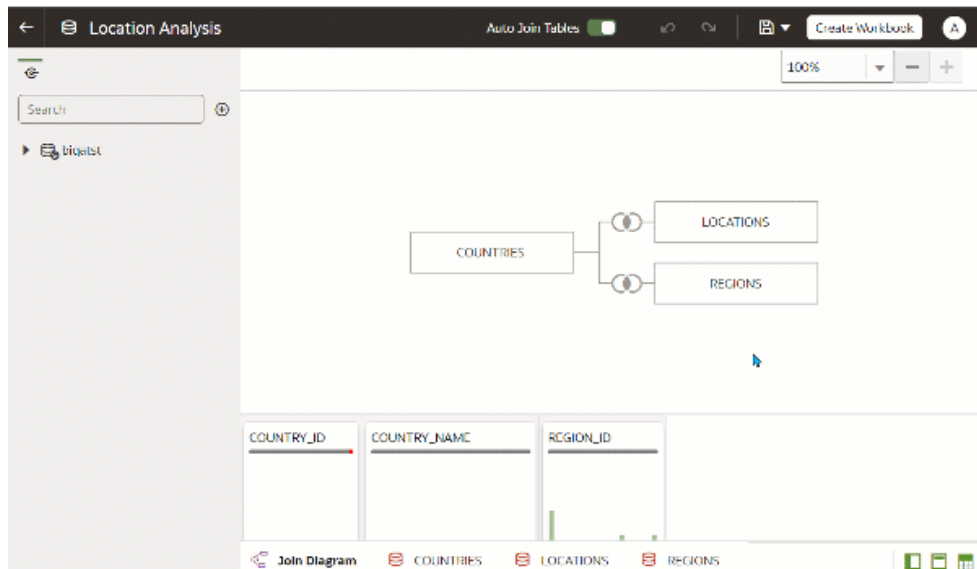
Before you create the dataset, you can check to see if the data source connections you need already exist. See [View Available Connections](#).

### Note:

You can create datasets with multiple tables from most data sources. Exceptions include Oracle EPM Cloud, Oracle Essbase, or Google Analytics.

1. On the Home page, click **Create** and then click **Dataset**.
2. In the Create Dataset dialog, select a connection.
3. In the Dataset editor, go to the **Connections** pane and browse or search for a schema.
4. Optional: If you want to build the dataset's table joins manually rather than have Oracle Analytics automatically create them, then deselect the **Auto Join Tables** toggle to turn off automatic join creation.
5. Click the schema to view a list of its tables. Drag and drop tables to the **Join Diagram**. If you know the fact table, then add it first before you add dimension tables. The fact table must be the left-most table in the **Join Diagram**.  
By default, the dataset you're building includes any table joins defined in the data source. If no joins exist in the data source then Oracle Analytics identifies and adds joins.
6. Optional: To add data from additional data sources, go to the **Connections** pane, click **Add**, and then click **Add Connection** or **Add File** to select and add another connection or file to the dataset.
7. Optional: If you added another connection or a file, then from the **Connections** pane, click the new connection's schema to open it, and drag and drop tables to the **Join Diagram**.
8. Optional: When you drag and drop a table to the **Join Diagram** from some data sources such as Fusion Applications Suite subject areas, then no columns are displayed. Go to the **Table Page Tabs**, click the subject area table, and use the **Transform Editor** to specify which columns to include in the table. Click **OK**.
9. In the **Join Diagram**, inspect, modify, add, or delete joins.

- To inspect or modify a join, click the join to open the Join editor and inspect or modify the join type and join conditions.
  - To add a join, locate the table that you want to join, hover over it to select it, and then click and drag and drop it on to the table that you want to join it to. Open the Join editor to inspect or update the join type and conditions.
  - To delete a join, hover over the join icon and click **Delete Join**.
10. Click **Save**.
  11. Enter a name and click **OK**.
  12. To prepare a table's data, go to the tab row at the bottom of the Dataset editor and click the table's tab. Alternatively, from the Join Diagram, double-click the table, or right-click the table and select **Open**.



13. Use the Transform editor to perform any data transformations or enrichments. Click **Save Dataset**.
14. To edit a table's definition such as columns to include or exclude and data access, in the Transform editor, click **Edit Definition** and make any changes. Click **OK** and then click **Save Dataset**.

## Add Multiple Connections to a Dataset

A dataset can include more than one connection. Adding more connections allows you to access and join all of the tables and data that you need to build your dataset.

A dataset can contain a combination of connections and files. See [Add a File to a Dataset Created From a Connection](#).

Most connections are available for you to add. Exceptions include Oracle EPM Cloud, Oracle Essbase, or Google Analytics.

Before you create the dataset, you can check to see if the data source connections you need already exist. See [View Available Connections](#).

If you drag a subject area or analysis to the **Join Diagram**, then no columns are displayed. You must use the **Transform Editor** to specify which columns to include in the subject area's dataset table.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the Connections pane, click **Add**, and click **Add Connection**.
5. In the Add Connection dialog, locate and click a connection to add it to the Connections pane.
6. In the Connections pane, confirm that the connection you selected was added.
7. Click **Save**.

## Add a File to a Dataset Created From a Connection

A dataset can contain tables created from files and connections.

Most connections are available for you to add to a dataset. Exceptions include Oracle EPM Cloud, Oracle Essbase, or Google Analytics.

Before you add a connection, you can check to see if the data source connections you need already exist. See [View Available Connections](#).

If you drag a subject area or analysis to the **Join Diagram**, then no columns are displayed. You must use the **Transform Editor** to specify which columns to include in the subject area's dataset table.

Before you upload a file, confirm that the file meets these requirements:

- The file is either an Excel spreadsheet in .XLSX or .XLS format, a CSV file, or a TXT file.
  - The spreadsheet contains no pivoted data.
  - The spreadsheet is structured properly for import and use as a dataset. See [About Files for Datasets](#).
1. On the Home page, click **Navigator** and then click **Data**.
  2. Click the **Datasets** tab.
  3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
  4. Locate the file:
    - If the file you want to add is located on your computer, then in the Connections pane, click **Add**, and click **Add File**.
    - If the file you want to add is located in Dropbox or Google Drive, then in the Connections pane, click **Add**, and then click **Add Connection**.
  5. Browse for and select the file that you want to upload.
  6. Optional: If you're uploading a CSV or TXT file, then in the **Separated By, Thousand Separator**, and **Decimal Separator** fields, confirm or change the default delimiters.

To specify a custom delimiter, choose Custom in the **Separated By** field and enter the character you want to use as the delimiter. In the CSV or TXT file, a custom delimiter must be one character. The following example uses a pipe (|) as a delimiter: Year|Product|Revenue|Quantity|Target Revenue| Target Quantity.

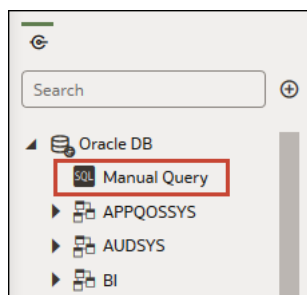
7. Click **OK** to add the file to the dataset.
8. In the Connections pane, confirm that the file was added.
9. Click **Save**.

## Add a Table to a Dataset Using a SQL Statement

You can write a source-specific SQL SELECT statement to query a connection's data and create a table in a dataset. This manual query option is available for most connection types.

Use the manual query option to create tables when you don't want to use a connection's tables in the dataset but instead want to target specific information. Or use the manual query option when the data source connection doesn't provide a schema listing. The SQL statement you use is determined by the data source connection type.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.  
Make sure that you open a dataset that's based on database tables. These are displayed with the database icon .
4. In the Data panel, Connections pane, locate and expand the connection that you want to query, and locate the **Manual Query** option.



5. Drag and drop **Manual Query** to the Join Diagram to create a table shell.
6. Double-click the Manual Query table.
7. Confirm that **Enter SQL** is selected.
8. In the **Statement** field, enter the SQL statement.
9. Optional: Click **Get Preview Data** to verify that you're querying the correct data.
10. Click **OK**.
11. Optional: To modify the SQL statement, go to the **Table Page Tabs**, and select the tab for the table you created. Click **Edit Definition** and use the **Statement** field to edit the SQL statement.



# Understand Dataset Table Joins

A dataset can have multiple tables. The table joins you add indicate the relationships between the dataset's tables.

## Tutorial

By default, when you drag and drop tables to the Join diagram to create a multiple table dataset, any joins that are defined in the data source are automatically created between tables in the dataset. Oracle Analytics also automatically creates joins based on the column name matches it finds between the tables. When defining your dataset, be sure to add the most detailed table first. This is usually the primary table for your analysis. For example, the Sales table. Then add the remaining tables like Products, Customers, Channels, and so on that provide context for your analysis. If you're adding tables from a dataset that is dimensionally modeled or a transactional table, then the most detailed table is possibly a fact table with measures.

In some cases you might want to build a dataset's joins manually. For example, if your dataset contains too many matching columns and it's time consuming for you to delete the unnecessary matches. In such cases you can turn off automatic joins for your dataset. See [Disable Auto Joins in Datasets](#).



If you're creating a dataset based on facts and dimensions and if joins already exist in the source tables, then joins are automatically created in the dataset. If you're creating a dataset from multiple connections and schemas, then you manually define the joins between tables. To do this, drag and drop a dimension table onto a fact table and specify the type of join to use and the join columns. You can create a join on more than one column. The columns that you're joining must be attribute columns and have the same data format.




Oracle EPM Cloud, Oracle Essbase, or Google Analytics aren't available for you to add and join to in a dataset that contains multiple tables. When you're working in a workbook and include data from different datasets, for example a dataset containing multiple tables from Oracle Autonomous Data Warehouse and a dataset containing data from Oracle EPM Cloud, then you use blending to match the columns. See [Blend Datasets](#).

## Note:

To analyze data based on two star schemas, create a dataset for each star schema, add the datasets to a workbook, and then blend the datasets.

The Join Diagram displays join icons representing the type of joins used between tables and if any joins are incomplete. Join icons are Venn diagram thumbnails that represent the join type.

Icon	Description
	Indicates an inner join. When this icon is selected, it's displayed in blue. An inner join returns rows from the left table that match with the rows from the right table.
	Indicates a left join. When this icon is selected, it's displayed in blue. The left join returns all rows from the left table with the matching rows if available from the right table. If there is no matching row found from the right table, then the left join contains null values for the columns of the right table.

Icon	Description
	Indicates a right join. When this icon is selected, it's displayed in blue. The right join returns all rows from the right table with the matching rows if available from the left table. If there is no matching row found from the left table, then the right join contains null values for the columns of the left table.
	Indicates a full outer join. When this icon is selected, it's displayed in blue. The full outer join returns a result set that contains all rows from both left and right tables, with the matching rows from both sides where available. If there is no match, then the missing side has nulls.
	The dashed line indicates an incomplete join. When this icon is selected, it's displayed in blue. When this icon isn't selected, it's displayed in yellow. Click the icon to open the Join editor and assign or fix the join.

## Add Joins Between Dataset Tables

Add joins to indicate relationships between a fact table and the dimension tables.

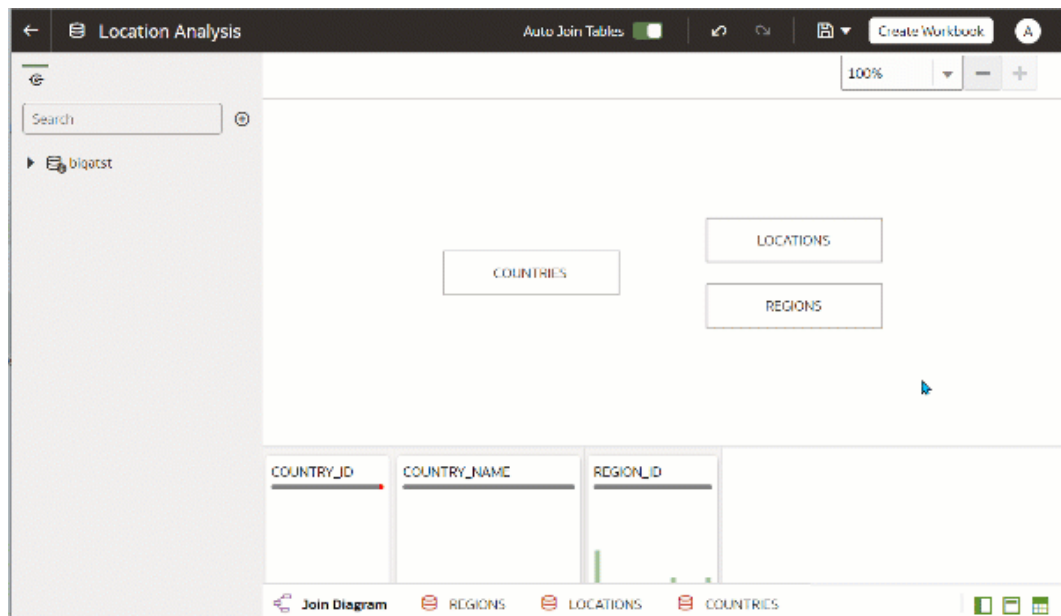
### Tutorial

By default, when you drag and drop tables to a dataset, any joins defined in the data source are automatically created between the dataset's tables. Oracle Analytics also automatically creates joins based on the column name matches it finds between the tables. However, Oracle Analytics can't always figure out how to automatically build joins. In such cases, you must manually add joins before you can save the dataset.

If your dataset table contains deleted columns, then those columns aren't available to use in joins. If your dataset table contains hidden columns, then those columns are available to use in joins. See [Hide or Delete a Column](#).

For information about using joins, see [Understand Dataset Table Joins](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the table that you want to join to another table.  
Make sure that the fact table is the left-most table in the **Join Diagram**.
5. Click the table and then drag and drop the selected table onto the target table that you want to join it to.  
The join icon is displayed in blue.
6. Optional: Click the join to open the Join dialog and inspect the join.



## Disable Auto Joins in Datasets

You can use the **Auto Join Tables** toggle button to prevent Oracle Analytics from creating joins when you add tables to your dataset.

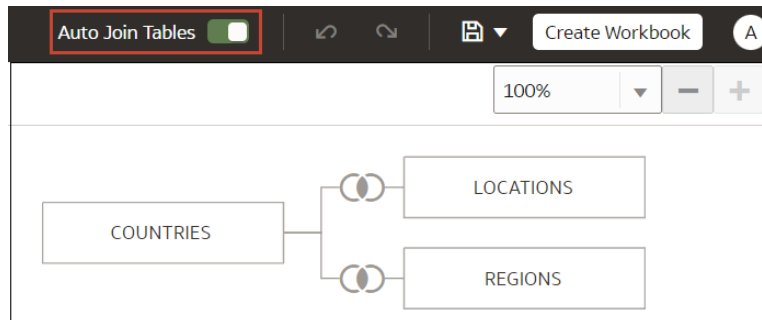
By default, when you drag and drop tables to a dataset, any joins defined in the data source are automatically created between the dataset's tables. Oracle Analytics also automatically creates joins based on the column name matches it finds between the tables.

In some cases you might want to build the dataset's joins rather than have Oracle Analytics build joins for you. For example, if your datasets contains too many matching columns and it's time consuming for you to delete the unnecessary matches. In such cases you deselect the **Auto Join Tables** toggle button to turn off automatic joins.

Deselecting **Auto Join Tables** doesn't remove the dataset's existing joins, so you must remove those joins manually.

After you turn off automatic joins and add tables to the dataset, you must manually add joins before you can save the dataset. For information about creating dataset table joins, see [Add Joins Between Dataset Tables](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. Click the **Join Diagram** tab.
5. Click **Auto Join Tables** to prevent Oracle Analytics from automatically creating joins for tables you add to the dataset.



## Modify or Fix Joins in a Dataset

You can modify any joins that were automatically added to the dataset and fix any incomplete or broken joins.

### Note:

Each table in the dataset must be joined to one or more tables.

This icon indicates an incomplete join:



For information about using joins, see [Understand Dataset Table Joins](#).

If the columns that you need to create joins aren't listed in the Join dialog, then you can update the columns to make them available for joins. See [Add Joins When Table Columns Don't Match](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the join, hover over it, and click it to open the Join dialog.
5. Optional: Click the join type and select a new type. The join type that you select determines the join icon in the Join Diagram.
6. Optional: To modify a join condition, click a table's join column name and pick a different column to join on.
7. Optional: To add another join condition, click **Add Join Condition** and select a join column for each table.

Join COSTS - PROMOTIONS

Inner

COSTS		PROMOTIONS
PROMO_ID	=	PROMO_ID
Select a column	=	Select a column

+ Add Join Condition

8. Click **Save**.

## Add Joins When Table Columns Don't Match

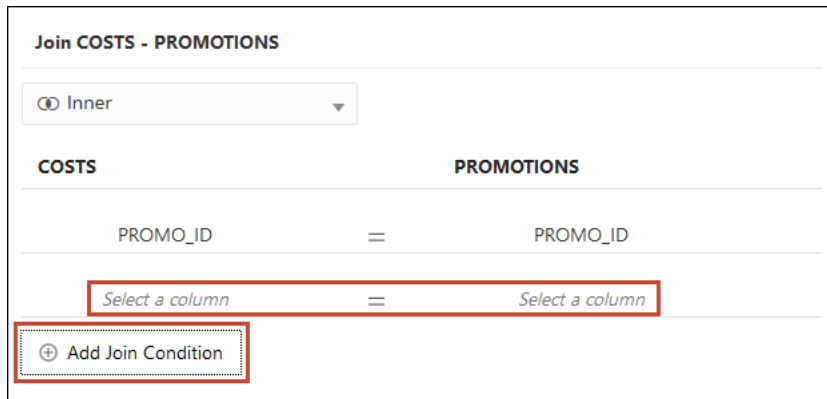
If your dataset's column data doesn't match between tables, then you can transform the column's data into the format required to create joins.



Video

Examples of transformations include changing the data type, splitting or concatenating data in the column, or enriching the column data. The list of available transformation menu options for a column depends on the type of data in that column. See [Transform Reference](#) and [Column Menu Options for Quick Data Transformations](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the table with the column that you want to transform.
5. Right-click the table and select **Open**.
6. In the Transform editor, locate the column that you want to transform and click **Options**.
7. From the menu, select a transformation and complete any required fields.
8. Click **Save Dataset** and then click the **Join Diagram** tab.
9. In the Join Diagram, click and hold the table to select it and then drag and drop the selected table onto the target table that you want to join it to.
10. In the **Join Diagram** locate the join that you just added, hover over it, and click it to open the Join dialog.
11. Optional: Click the join type and select a new type. The join type that you select determines the join icon in the Join Diagram.
12. Optional: To add a join condition, click **Add Join Condition** and select a join column for each table.

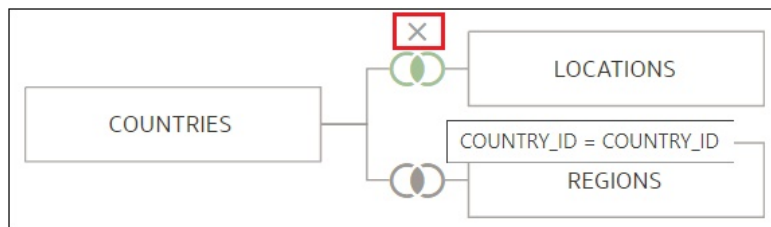


13. Click **Save**.

## Delete Joins from a Dataset

You can delete any table join from a dataset.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the join, hover over it, and click **X**.



5. Click **Save**.

## Include a Dataset Table in Data Source Queries

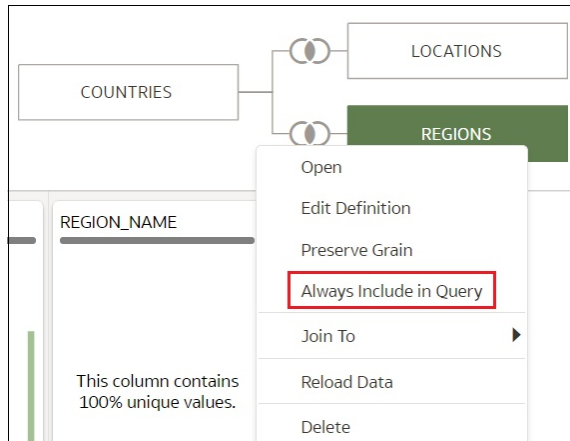
Oracle Analytics generates source-specific optimized queries for each visualization. During this process, a dataset is treated as a data model in that only the tables needed to satisfy a visualization are used in the query.

However, there are scenarios where you may want to use a table in the query even if the table isn't queried in the visualization. In these scenarios, you can set the table to **Always Include in Query**. For example, you may want to see only Sales where a product is associated but the visualization is based on only Customer and Sales. Or you may want to apply a date filter to all visualizations in a workbook.

Oracle Analytics prunes any of the dataset's tables not used in the visualization or not specified to be included in the query.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.

3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the table, right-click, and select **Always Include in Query**.



5. Click **Save Dataset**.

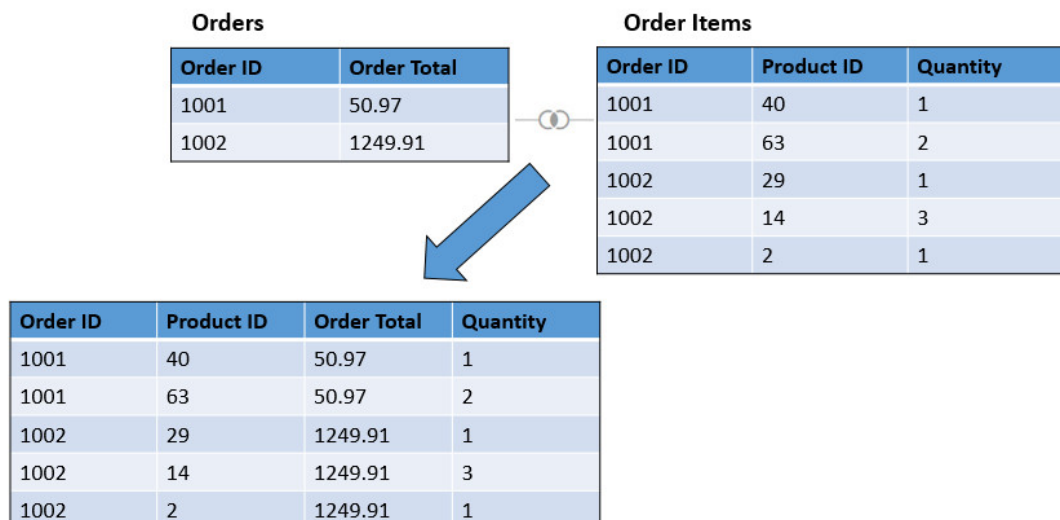
## What is Preserve Grain?

By default a dataset's grain is determined by the table with the lowest grain, but you can use the preserve grain setting to specify which table determines the dataset's grain.

See [Specify Which Table Determines Grain](#).

You can create a measure in any table in a dataset. However, this can cause the measure on one side of a one-to-many or many-to-many relationship to be duplicated. In cases like this you can set the table on one side of the cardinality to **Preserve Grain** to keep its level of detail.

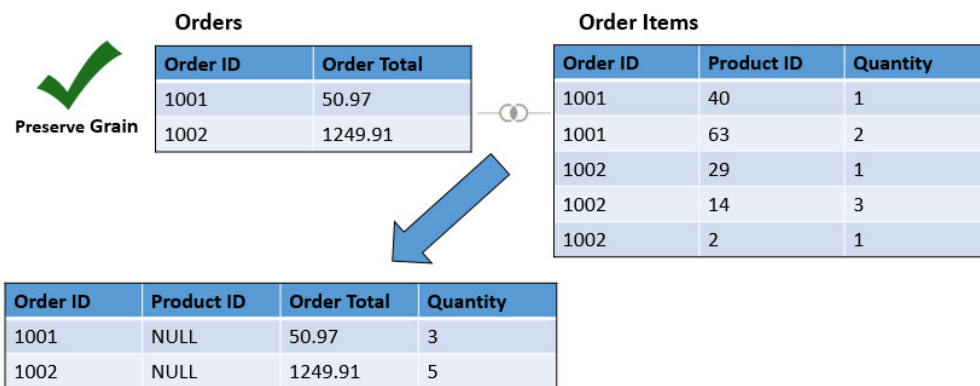
For example, if you have an Orders table and an Order Items table, join them on the Order ID column, and query them, then the Order Total is duplicated for each order item. This is because the Order Items table has the lower grain.



However, if you want the query results to show data at the Orders table's level, then in the Dataset Editor's Data Diagram, you set the Orders table to **Preserve Grain**.

 **Note:**

In the following example, the Product ID column is NULL because there are multiple values for PRODUCT for each Order. The Values are set to NULL to preserve the grain at the Order level.



## Specify Which Table Determines Grain

By default the table with the lowest grain determines a dataset's grain, but you can change which dataset table determines grain.

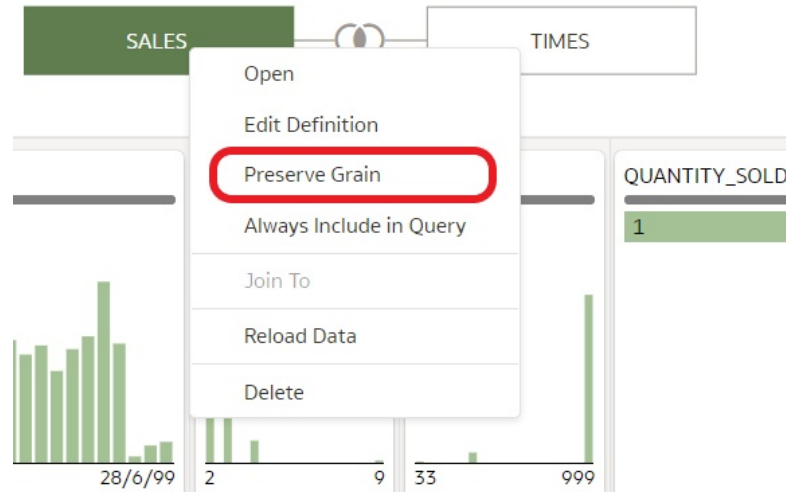
Any table in the dataset can contain a measure. However, this can cause the measure on one side of a one-to-many or many-to-many relationship to be duplicated and produce unexpected query result. In cases like this you can set the table on one side of the cardinality to **Preserve Grain** to keep its level of detail.

For an example of why you'd change a table's grain, see [What is Preserve Grain?](#)

When you set a table to **Preserve Grain**, a green bar is displayed at the top of table in the Join Diagram. This green bar indicates which table's grain the dataset uses.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** locate the table, right-click, and select **Preserve Grain**.





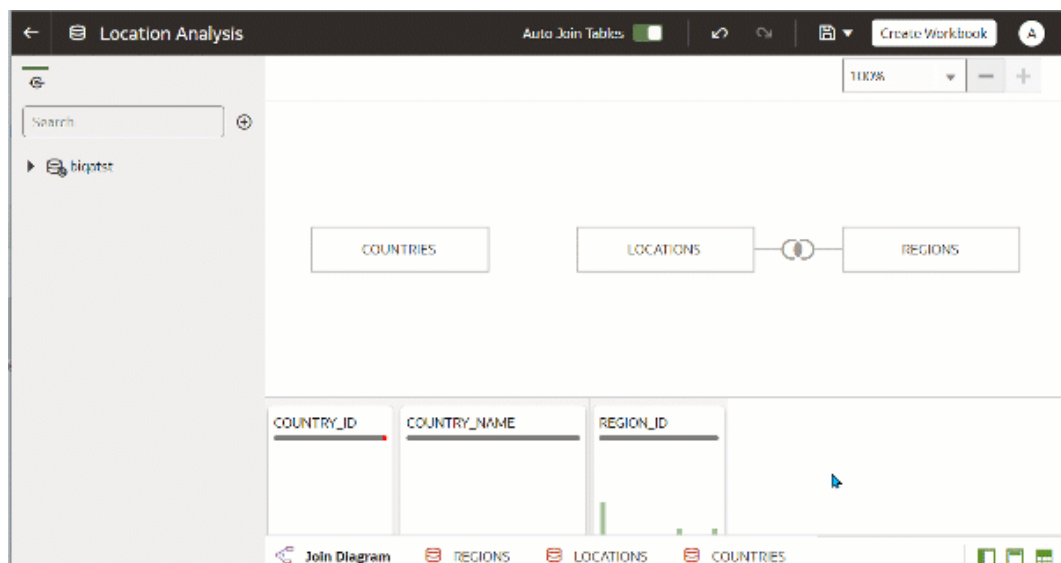
5. Click **Save Dataset**.

## Rearrange the Order of a Dataset's Tables

When you include a dataset in a workbook, the Workbook Editor's **Data Panel** displays the dataset's tables as folders and in the same order that you added them to the dataset.

In the Dataset editor's **Table Page Tabs** you can drag and drop tables into an order that makes it easy for you to locate the folders and columns that you use most often in visualizations.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Table Page Tabs** locate the table that you want to reposition.
5. Click and hold, and then drag and drop the table to a different position on the tabs bar.



6. Click **Save Dataset**.

## What are Quality Insights?

Oracle Analytics automatically analyzes data quality to help you cleanse and enrich your data.

When you edit a table in the join diagram or transform editor, Oracle Analytics analyzes the quality of the data and provides a visual summary known as a quality insight in a tile above each column. Quality insights enable you to explore your data, and use a visual overview of the content to assess and improve data quality. The quality summary is based on a sample of the data, but changes that you make are applied to all of your data. Quality insights display a frequency tile for text or a histogram for dates and numbers.

City	State	Postal_Code	Country	Latitude	Longitude
This column contains 100% unique values.	This column contains 99.22% unique values.	This column contains 99.22% unique values.	This column contains 96.53% unique values.	This column contains 96.53% unique values.	This column contains 100% unique values.
Abra Pampa	Jujuy	AR101514	Argentina	-22.71	-65.69
Adelaide	South Australia	AU101679	Australia	-34.93	138.60
Ahmedabad	Dadra and Nagar Haveli	IN101449	India	23.030	72.580
Ahmednagar	Maharashtra	IN11439	India	19.110	74.750
Albany	New York	US10878	United States	44.620	-123.0
Aomori	Aomori	JP101537	Japan	40.825	140.71

Quality tiles enable you to:

- **Explore** - Explore your data in real time using instant filtering, which enables you to temporarily filter data across all column in the table. You can filter on multiple values at the same time.

City	State	Postal_Code
Belfast	EN	E1 1
Birmingham	Alabama	GB101409
Bristol	California	GB101410
Cardiff	Nordrhein-Westfalen	GB101432
Edinburgh	Ciudad de Buenos Ai...	GB101483
Glasgow	Colorado	GB101484
Leeds	Jujuy	GB101490
Liverpool	Karnataka	GB101491
London	Western Cape	GB101493
Manchester	Arkansas	GB101495

A City	A State	A Postal_Code
Belfast	EN	GB101409
Birmingham	EN	GB101495
Bristol	EN	GB101490
Cardiff	EN	GB101410
Edinburgh	EN	GB101432
Glasgow	EN	GB101496

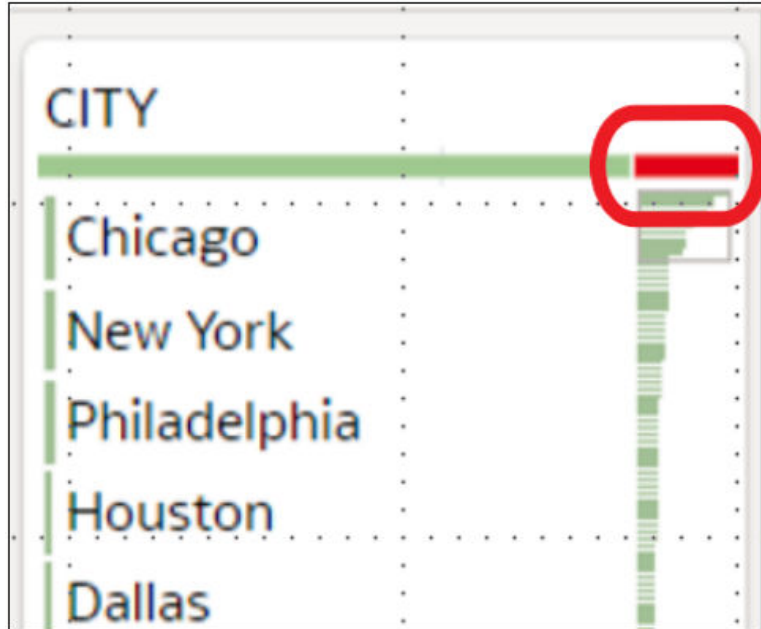
The value being filtered is marked with a green box. Filters aren't added to the data preparation script.

- **Review** - Use the interactive visualizations such as bar charts and histograms to evaluate your data and identify anomalies and outliers.

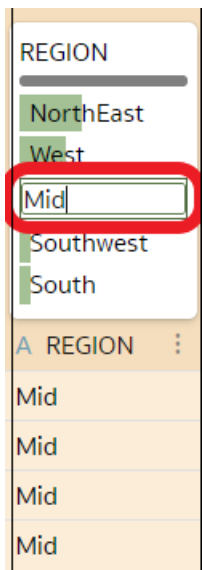
CREDIT_CARD_L...	REGION	HOUSE_OWNER...	N_TRANS_WEB...	BUY_INSURANCE
	NorthEast West Midwest Southwest South			No Yes
A CREDIT_CAR...	A REGION	A HOUSE_OWN...	A N_TRANS_WE...	A BUY_INSURA...
1100	West	1	1600	Yes
900	South	1	5000	Yes
600	NorthEast	1	414	No
2500	NorthEast	1	1400	Yes
1100	NorthEast	0	900	No

The quality tiles at the top of each column provide an instant assessment of the quality of content in that column based on a deep semantic understanding of the data.

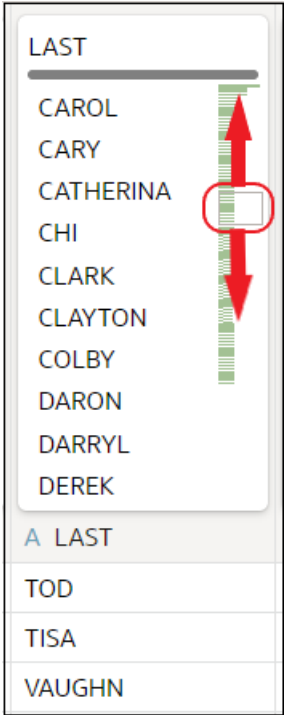
- **Assess** - Hover over the quality bar to see a popup summary showing the percentage of valid and invalid values. Click on areas marked in red to filter on invalid values.



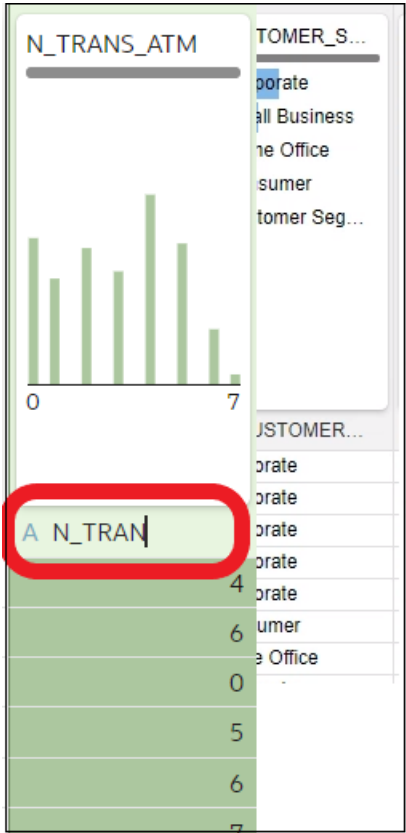
- **Replace or correct** - When you've identified anomalies and outliers, use inline replace to correct values. You get immediate feedback on the improvements to the data quality on the quality bar.



- **Scroll** - Navigate large datasets using the scrollable mini-map.






- **Rename columns** - Create more readable column names easily.



Make sure that you toggle the **Quality Tiles** option bottom right to display quality tiles.

A LAST	A N_MORTGAGES	A CAR_OWNER...
TOD	1	
TISA	1	
VAUGHN	1	
CHARLES	1	
LAVERN	0	
STEPHAN	1	
ANGFI O	1	

V\_APPLY 31 Data Elements   

## Enhance Your Data Using Quality Tiles

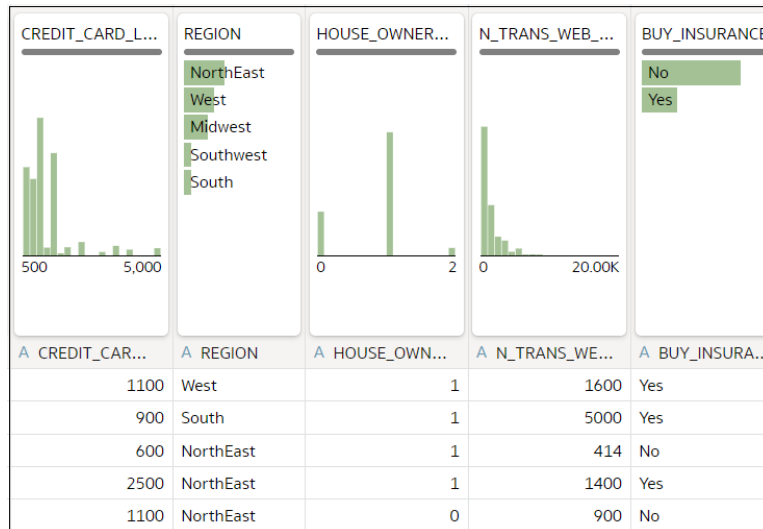
When you edit a dataset in the transform editor, Oracle Analytics displays a quality tile for each data column, which displays a visual summary of data quality and enables you to analyze data quality and enhance your data.

- On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

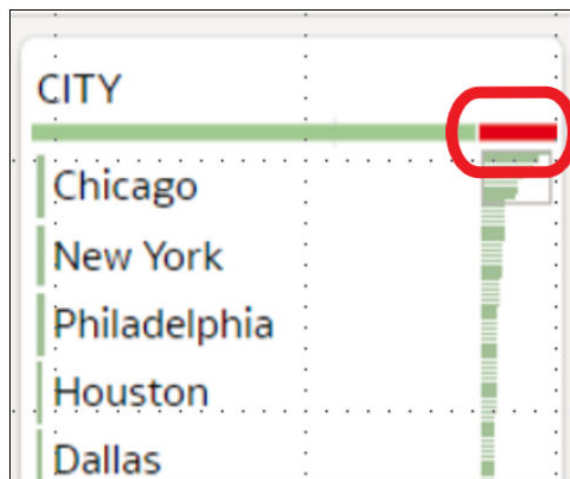
 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

- Use the quality insights to get an instant assessment of the quality of content in that column based on a deep semantic understanding of the data.



For example, hover over a quality bar to see how many valid and invalid values are in the column. Click on areas marked in red to filter on invalid values.



3. To explore your data by applying a temporary filter, click one or more values to use as a filter.

Oracle Analytics highlights filter values with a green box. To unfilter a value, click the value again.

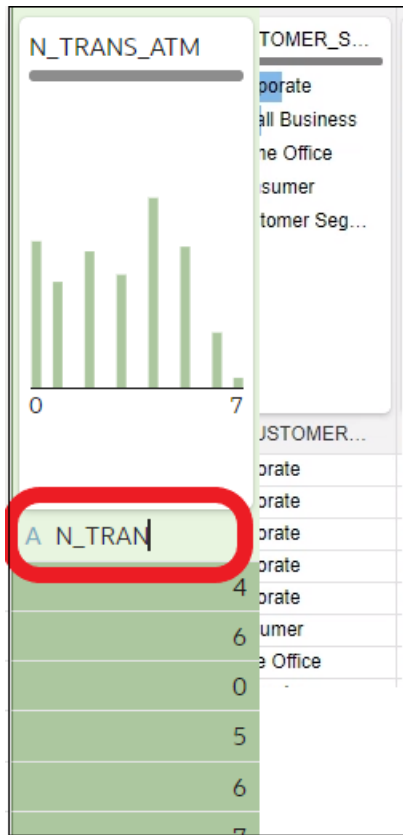
City	State	Postal_Code
Belfast	EN	E1 1
Birmingham	Alabama	GB101409
Bristol	California	GB101410
Cardiff	Nordrhein-Westfalen	GB101432
Edinburgh	Ciudad de Buenos Ai...	GB101483
Glasgow	Colorado	GB101484
Leeds	Jujuy	GB101490
Liverpool	Karnataka	GB101491
London	Western Cape	GB101493
Manchester	Arkansas	GB101495
A City	A State	A Postal_Code
Belfast	EN	GB101409
Birmingham	EN	GB101495
Bristol	EN	GB101490
Cardiff	EN	GB101410
Edinburgh	EN	GB101432
Glasgow	EN	GB101496

When you filter on values, Oracle Analytics updates all data columns to instantly display only the rows relating to the filter values you selected. If you filter a value nearer the bottom of a long list, you might have to scroll down the list to locate it so that you can deselect the value.

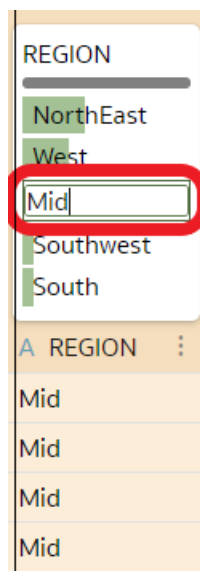
**Note:** Temporary filters that you apply in quality tiles aren't saved with your data (that is, aren't added to the data preparation script).

4. To rename a column, click the column name to edit the value.



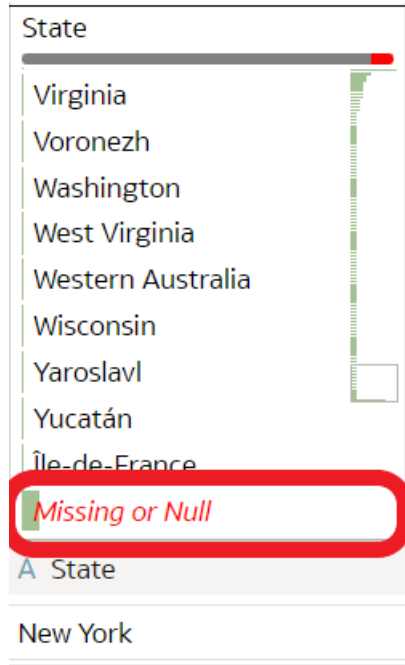


5. To edit values.
  - a. In the quality tile, double-click the value you want to change.

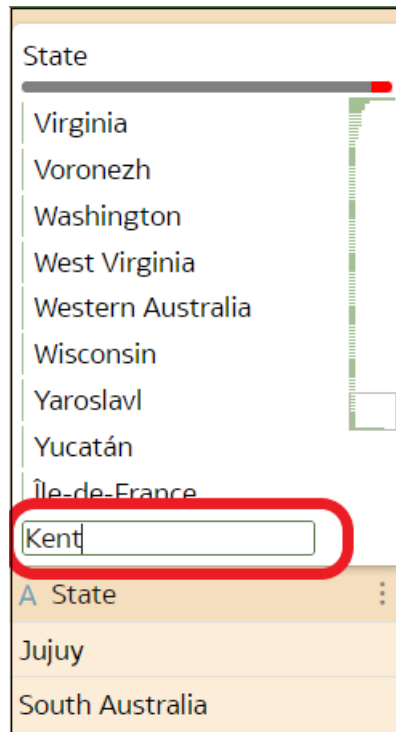


- b. Oracle Analytics inserts the value that you specify into every row that contained the original value.
6. To fix null or missing values:

- a. In the quality tile, scroll to the last value in the list.  
If your data has missing values, you see **Missing or Null** highlighted in red.



- b. Double-click **Missing or Null**, then enter the value you want to use.  
Oracle Analytics inserts the value that you specify into every Missing or Null row.



Changes that you apply in the quality insight tiles are added to the data preparation script (except for filters).

## About Removing or Restoring Dataset Columns

Removing columns doesn't permanently delete them from the table, and you can re-add the removed columns as needed for enrichments and transformations, or for inclusion in the visualizations that you create from the dataset.

It's important to understand that removing a column is different than deleting a column from a dataset:

- Use Edit Definition to *remove* a column.
- The Transform editor doesn't indicate which columns were removed, and removing a column doesn't add a step to the Preparation Script Panel. To confirm which columns were deleted or to re-add them, go to Edit Definition.
- Use the Transform editor to *delete* a column.
- Deleting a column creates a step in the Preparation Script Panel. Remove the step to restore the column.

You can create dataset filters on removed columns.

In some cases profiling and generating quality insights for a table that contains many columns can be time and resource-intensive. If you're working with a table with many columns and want to increase system performance, Oracle recommends that you remove any columns that you don't need before you perform any enrichments or transformations.

See [Hide or Delete a Column](#) and [Remove or Restore a Dataset Table's Columns](#).

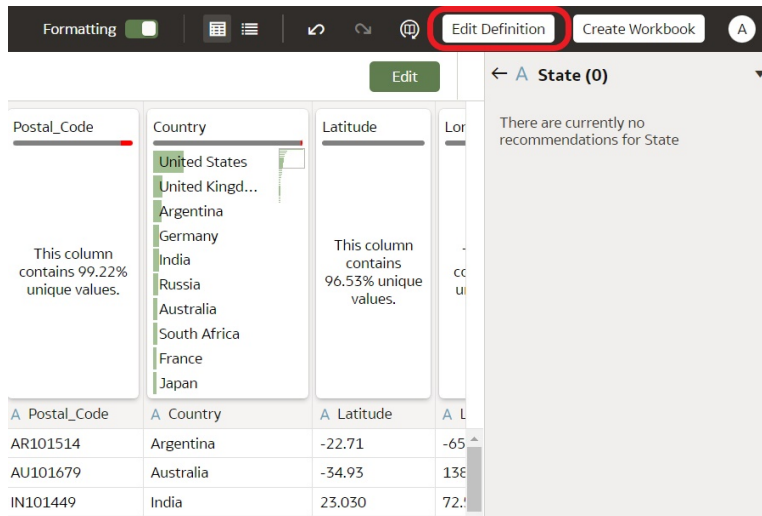
## Remove or Restore a Dataset Table's Columns

You can remove columns from a dataset table when the dataset doesn't need the columns, and you can restore any removed columns.

See [About Removing or Restoring Dataset Columns](#).

When you remove or restore a column, those changes are displayed in the table's view in the Transform editor. Oracle Analytics warns you if the column you've chosen to remove is used in the Transform editor's Preparation Script pane. But Oracle Analytics won't warn you if the column you've chosen to remove is used in a workbook or visualization.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** go to the **Table Page Tabs** and click the table that you want to work with.
5. In the Transform editor, click **Edit Definition**.



6. (Optional) To remove columns, either click **Remove All** to remove all columns, or select the columns that you want to remove and click **Remove Selected**.
7. (Optional) To re-add columns, either click **Add All** to add all columns not included in the table, or select the columns that you want to add and click **Add Selected**.
8. Click **OK**.

## Filter a Dataset Table

In most cases when you add a table to the dataset, all of the table's column values are included. You can add filters so that the table contains only the values needed in the dataset.

For information about using filters, see [About Filters and Filter Types](#).

Applying a filter to a column limits everything in the table. For example, if a table contains data for every world region, you can create a filter on the `COUNTRY_REGION` column and set its value to Americas so that your table's columns contain data for North, Central, and South America.

If you add more than one filter to the dataset, by default the filters limit each other. For example, if you add a filter on the `COUNTRY_REGION` column and set its value to Americas and then add a filter on the `COUNTRY` column, the `COUNTRY` column's filter selection values are limited to the names of countries in the Americas, for example, Canada, Brazil, and Panama.

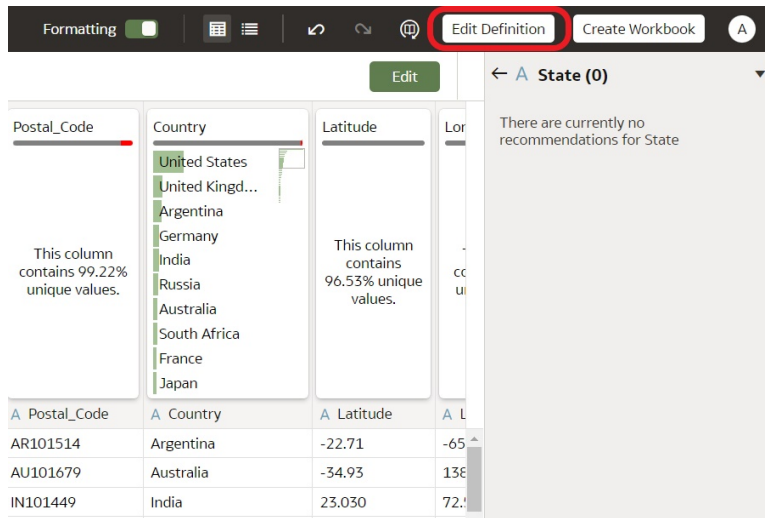
Any filters that you apply limit what is displayed in the table's quality tiles, the Transform editor, and the table's data preview.

You can create filters on columns that have been removed from the table. See [Remove or Restore a Dataset Table's Columns](#).

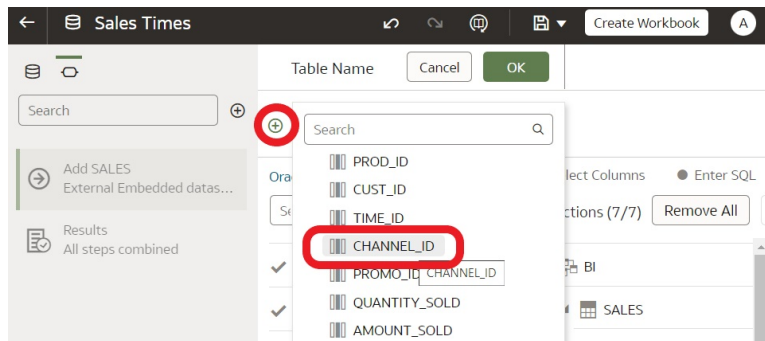
In some cases you might want to use the table's filter to query other visualizations in a workbook. See [Include a Dataset Table in Data Source Queries](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.

4. In the **Join Diagram** go to the **Table Page Tabs** and click the table that you want to work with.
5. In the Transform editor, click the **Edit Definition** button.



6. Click **Add Filter**.
7. Select the column that you want to filter by.



8. Select the filter's values.
9. Click off the filter.

## Specify Whether a Dataset Table Is Cached or Live

A dataset table's data access setting determines if the table's data is loaded into cache, or if the table gets its data directly from the data source.

You can set a table to **Automatic Caching** or **Live**.

- **Automatic Caching** - If you select this option, then the table loads or reloads its data into cache. This option can provide faster performance when you refresh a table's data from the **Transform** editor or from a workbook. Selecting this option causes the **Reload** menu option to display at the table and dataset level. This option is limited to 2GB of data after compression. If the data is larger than 2GB or if the data takes too long to load, the data access mode uses a live query if the connection

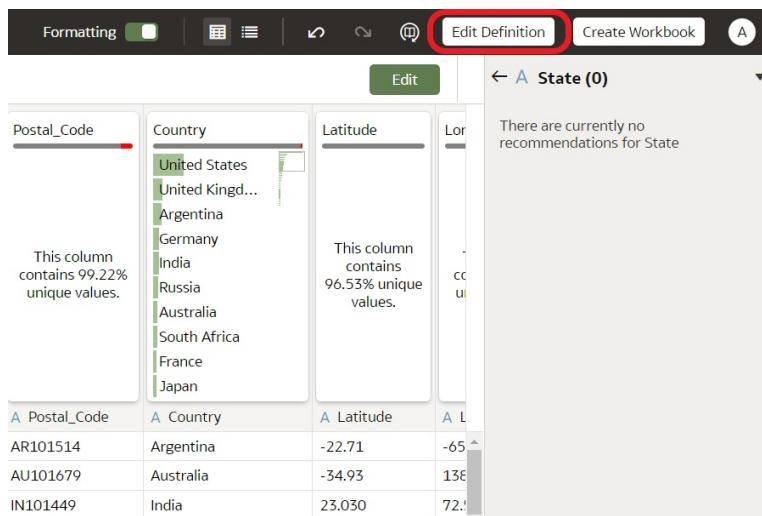
type supports it. If you want to use automatic caching and the data is larger than 2GB, then add column filters to the table, for example limit a date range to reduce the size of the data.

- **Live** - If you select this option, then the table gets its data directly from the data source. When a table is set to **Live**, the source system manages the table's data source queries. This option is useful when the data is stored in a high-performance system such as Oracle Autonomous Data Warehouse. It also ensures that the latest data is used.

In a dataset with multiple tables, some tables can use automatic caching and some can include live data. If you reload multiple tables using the same connection and the reloading of data on one table fails, then any tables set to use automatic caching are switched to use live data.

For best performance, set all tables in a dataset to access data in the same way. When the tables in one dataset are mixed between automatic caching and live data, the system must resolve joins and performance varies based on the amount of data needed from each table to complete the queries.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** go to the **Table Page Tabs** and click the table that you want to work with.
5. In the Transform editor, click **Edit Definition**.



6. Confirm that the data access panel is displayed.

If the data access panel isn't displayed, go to the right center edge of the window to locate and drag the handle to open the panel.

Name SALES

Description External Embedded dataset for datamoc

Connection Oracle DB

Data Access Automatic Caching

New Data Indicator Select Column

Created On Just now

Modified On Just now

Refreshed Just now

7. In the **Data Access** field, specify how you want the table to access its data.

Name PRODUCTS

Description External Embedded dataset for datamodel

Connection Oracle DB

Data Access Automatic Caching

New Data Indicator Live  
Latest data is always returned from the live source.

Created On

Modified On Automatic Caching  
Data from the live source may be cached for faster performance.

Refreshed 10:34 AM

8. Click **OK**.

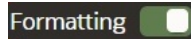
## View a Dataset Table's Original Formatting

By default Oracle Analytics applies formatting to the numbers and dates in the dataset. You can toggle this default formatting off to view numbers and dates as they're formatted in the dataset's data source.

For example, when Oracle Analytics's default formatting is applied, dates are displayed as 06/20/2019. But when default formatting is turned off, then dates are displayed as 2019-06-20.

You can toggle the default formatting off and on, but you can't save the default formatting. To modify a column's formatting, see [Adjust the Display Format of a Date or Number Column](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. In the **Join Diagram** go to the **Table Page Tabs** and click the table that you want to work with.
5. In the Transform editor, click the **Formatting** toggle on the tool bar to turn formatting off or on.



## Create Datasets from Files

You can create datasets from a range of files, including comma-separated value (\*.CSV), text (\*.TXT), and spreadsheets.

### Topics:

- [About Files for Datasets](#)
- [Create a Dataset from a File Uploaded from Your Computer](#)
- [Create a Dataset from a File Uploaded from Dropbox or Google Drive](#)
- [Add Multiple Files to a Dataset](#)

## About Files for Datasets

You can create datasets from Microsoft Excel spreadsheets (XLSX and XLS), Google Sheets, CSV files, and TXT files. The maximum file size you can upload is 250 MB and the data column limit for a single file is 250 columns.

You can upload and use files from your computer, or from Dropbox or Google Drive data source connections.

When you upload a file, you can use it only in the dataset that you uploaded it to. Because Oracle Analytics doesn't store an uploaded file, you must upload the file again to include it in another dataset.

### Formatting Rules for Excel Spreadsheet and Google Sheets Files

- Tables start in Row 1 and Column 1.
- Tables have a regular layout with no gaps, repeated column names, or inline headings. An example of an inline heading is one that's repeated on every page of a printed report.
- Row 1 contains the unique names of the columns in the table.
- Row 2 and greater contain the data for the table.
- Data in a column is of the same type. For example, don't use a phone number column to hold email addresses.
- Data is at the same granularity.

### Character Set Encoding Rules for CSV and TXT Files

- Encode source files using UTF-8.
- Before you edit your files, configure your text editor to use the appropriate font and script (or subset).



## Create a Dataset from a File Uploaded from Your Computer

You can upload spreadsheets from Microsoft Excel or Google Sheets, CSV files, and TXT files from your computer to create a dataset.

Confirm that the file that you want to upload meets these requirements:

- The file is either a Microsoft Excel (.XLSX or .XLS format) or Google Sheets spreadsheet, a CSV file, or a TXT file.
- Spreadsheets shouldn't contain pivoted data.
- Spreadsheets are structured properly for import and use as a dataset. See [About Files for Datasets](#).

1. On the Home page, click **Create** and then click **Dataset**.
2. In the Create Dataset dialog, either drag and drop a file to the dialog, or click **Drop data file here or click to browse** to browse your computer for a file to upload.
3. In the Create Dataset page's **Name** field, change the default dataset name if required.
4. Optional: If you're uploading a CSV or TXT file, use the **Separated By, Thousand Separator**, and **Decimal Separator** fields to configure the default delimiters.

To specify a custom delimiter, choose Custom in the **Separated By** field and enter the character you want to use as the delimiter. In the CSV or TXT file, a custom delimiter must be one character. The following example uses a pipe (|) as a delimiter: Year|Product|Revenue|Quantity|Target Revenue|Target Quantity.

5. Click **OK** to upload the file and create the dataset.

## Create a Dataset from a File Uploaded from Dropbox or Google Drive

You can upload spreadsheets from Microsoft Excel or Google Sheets, CSV files, and TXT files from Dropbox or Google Drive and use them to create a dataset.



### Note:

Files uploaded from Google Analytics aren't available to create or include in a dataset with multiple tables.

Confirm that the file that you want to upload meets these requirements:

- The file is either a Microsoft Excel (.XLSX or .XLS format) or Google Sheets spreadsheet, a CSV file, or a TXT file.
- Spreadsheets shouldn't contain pivoted data.
- Spreadsheets are structured properly for import and use as a dataset. See [About Files for Datasets](#).

1. On the Home page, click **Create** and then click **Dataset**.
2. In the Create Dataset dialog, select a connection.
3. Browse for and select the file that you want to upload.
4. In the Create Dataset page's **Name** field, change the default dataset name if required.

5. Optional: If you're uploading a CSV or TXT file, use the **Separated By, Thousand Separator**, and **Decimal Separator** fields to configure the default delimiters.  
  
To specify a custom delimiter, choose Custom in the **Separated By** field and enter the character you want to use as the delimiter. In the CSV or TXT file, a custom delimiter must be one character. The following example uses a pipe (|) as a delimiter: Year|Product|Revenue|Quantity|Target Revenue| Target Quantity.
6. Click **OK** to upload the file and create the dataset.

## Add Multiple Files to a Dataset

A dataset can include more than one file uploaded from your computer or from Dropbox or Google Drive.



### Note:

Files uploaded from Google Analytics aren't available to create or include in a dataset with multiple tables.

Before you add a file from a connection, confirm that the connection you need exists. See [View Available Connections](#).

A dataset can contain tables created from files and connections. See [Add a File to a Dataset Created From a Connection](#).

Confirm that the file that you want to upload meets these requirements:

- The file is either a Microsoft Excel (.XLSX or .XLS format) or Google Sheets spreadsheet, a CSV file, or a TXT file.
- The spreadsheet contains no pivoted data.
- The spreadsheet is structured properly for import and use as a dataset. See [About Files for Datasets](#).



### Tutorial

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Open**.
4. Locate the file:
  - If the file you want to add is located on your computer, then in the Dataset editor's Connections pane, click **Add**, and click **Add File**.
  - If the file you want to add is located on Dropbox or Google Drive, then in the Dataset editor's Connections pane, click **Add**, and then click **Add Connection**.
5. Browse for and select the file that you want to upload.
6. In the Create Dataset page's **Name** field, provide a name for the dataset table created from the file.
7. If you're uploading a CSV or TXT file, then in the **Separated By, Thousand Separator**, and **Decimal Separator** fields, confirm or change the default delimiters.

To specify a custom delimiter, choose Custom in the **Separated By** field and enter the character you want to use as the delimiter. In the CSV or TXT file, a custom delimiter must be one character. The following example uses a pipe (|) as a delimiter: Year|Product|Revenue|Quantity|Target Revenue| Target Quantity.

8. Click **OK** to add the file to the dataset.
9. In the Connections pane, confirm that the file was added.
10. Click **Save**.

## Create a Dataset from a Subject Area in Oracle Fusion Cloud Applications Suite

You can create a dataset from subject areas stored in an applications in Oracle Fusion Cloud Applications Suite. For example, Oracle Fusion Cloud Financials with Oracle Transactional Business Intelligence.

When you drag and drop a subject area to the **Join Diagram**, by default Oracle Analytics doesn't include any columns in the dataset table. You must specify which columns to include in the table.

Oracle Analytics doesn't automatically join tables created from subject areas. You need to manually join these tables. See [Understand Dataset Table Joins](#).

1. On the Home page, click **Create** and then click **Dataset**.
2. In the Create Dataset dialog, select a connection to the application you want to analyze.

Oracle Applications connections have this icon:



3. In the Dataset editor, go to the **Connections** pane and browse or search for a subject area.
4. Drag and drop one or more subject areas to the **Join Diagram**.
5. To add columns to a table, go to the **Table Page Tabs**, click a subject area table, and use the **Transform Editor** to specify which columns to include in the table. Click **OK**.
6. In the **Join Diagram**, locate the table that you want to join, hover over it to select it, and then click and drag and drop it on to the table that you want to join it to. Open the Join editor to inspect or update the join type and conditions.
7. Click **Save Dataset**.
8. Change the default name "New Dataset" displayed top left.

## Create a Dataset from an Analysis in Oracle Fusion Cloud Applications Suite

You can create a dataset based on analyses from applications in Oracle Fusion Cloud Applications Suite. For example, Oracle Fusion Cloud Financials with Oracle Transactional Business Intelligence.

Oracle Analytics doesn't automatically join tables created from analyses. You need to manually join these tables. See [Understand Dataset Table Joins](#).

1. On the Home page, click **Create** and then click **Dataset**.

2. In the Dataset editor, go to the **Connections** pane and browse or search for an analysis.
3. Drag and drop one or more analysis to the **Join Diagram**.
4. In the **Join Diagram**, locate the table that you want to join, hover over it to select it, and then click and drag and drop it on to the table that you want to join it to. Open the Join editor to inspect or update the join type and conditions.
5. Click **Save Dataset**.
6. Optional: Change the default name "New Dataset" displayed top left.

## Create a Dataset from an Essbase Connection

You can use an Essbase connection to create a dataset.



### Note:

Essbase connections aren't available to create or include in a dataset with multiple tables.

Datasets that use Oracle Essbase connections aren't available for blending.

Before you create the dataset, confirm that the data source connection you need exists. See [View Available Connections](#).

1. On the Home page, click **Create** and then click **Dataset**.
2. In the Create Dataset dialog, select the Essbase connection.
3. In the Transform editor's Add Dataset step, double-click the Essbase cube that you want to use in the dataset.
4. Optional: Select an **Alias** value.

If you select an alias value other than the default, then values from the selected alias table are displayed in visualizations that use this Essbase dataset.

5. Click **Add** to save the dataset and go to the Transform editor to transform and enrich the dataset's data.

# 4

## Enrich and Transform Data

Data preparation involves cleansing, standardizing, and enriching your dataset before you visualize the data.

You enrich and transform data to improve its quality and get it ready to visualize. Better quality data gives you better quality insights.

### Topics:

- [About Data Enrichment and Transformation in Oracle Analytics](#)
- [Enrich and Transform Your Data](#)
- [Accept Enrichment Recommendations](#)
- [Transform Data](#)
- [Replace Missing or Null Values in a Dataset](#)
- [Transform Data Using Replace](#)
- [Convert Text Columns to Date or Time Columns](#)
- [Adjust the Display Format of a Date or Number Column](#)
- [Create a Bin Column When You Prepare Data](#)
- [Configure Columns Properties in a Dataset](#)
- [Hide or Delete a Column](#)
- [Restore a Hidden or Deleted Column](#)
- [Add Columns to a Dataset](#)
- [Create Calculated Data Elements in a Workbook](#)
- [Edit the Data Preparation Script](#)
- [Enrich and Transform Reference](#)

## About Data Enrichment and Transformation in Oracle Analytics

Oracle Analytics makes it easy to enrich and transform your data before you make it available for analysis.

 [Tutorial](#)

### Set up your transform editor

Before you start, it's best to configure your transform editor by displaying the Data Panel, Recommendations Panel, and Quality Tiles. Use these toggle options displayed bottom right: **Toggle Data Panel** , **Toggle Column Action Panel** , and **Toggle Quality Tiles**

A RACEID	A DRIVERID	# LAP	A TIME	A DURATION	# MIL
1072	4	15	21:22:31	18.21.8	
852	18	3	14:09:46	26.046	
964	8	12	14:23:45	23.244	
865	815	39	14:57:38	19.677	
934	815	44	14:21:16	31.998	
866	5	42	15:00:15	21.704	
841	2	15	17:27:41	22.994	
978	815	23	13:45:01	28.942	
848	17	42	15:17:11	20.367	


### Navigate to the transform editor

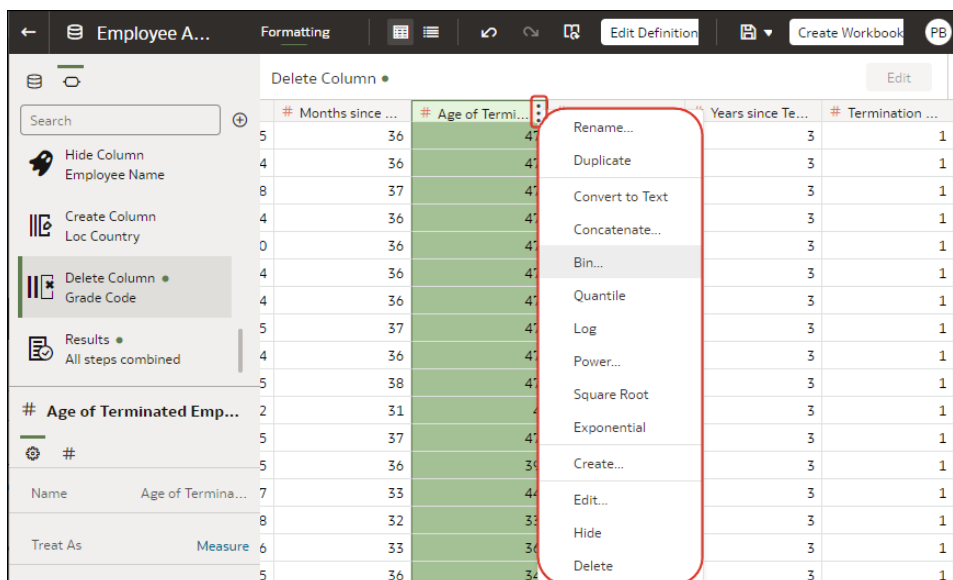
**From the workbooks editor** - If you open a workbook, click the Data page, and in the **Data Diagram**, select the dataset you want to prepare. If the dataset contains multiple tables, you see a **Join Diagram**, with a tab for each table. Select a table to open it in the transform editor.

**From the datasets editor** - If you open a dataset, you see the transform editor. If the dataset contains multiple tables, you see a **Join Diagram**, with a tab for each table. Select a table to open it in the transform editor.

The transform editor enables you to evaluate data quality, edit your metadata, and cleanse and transform your data.

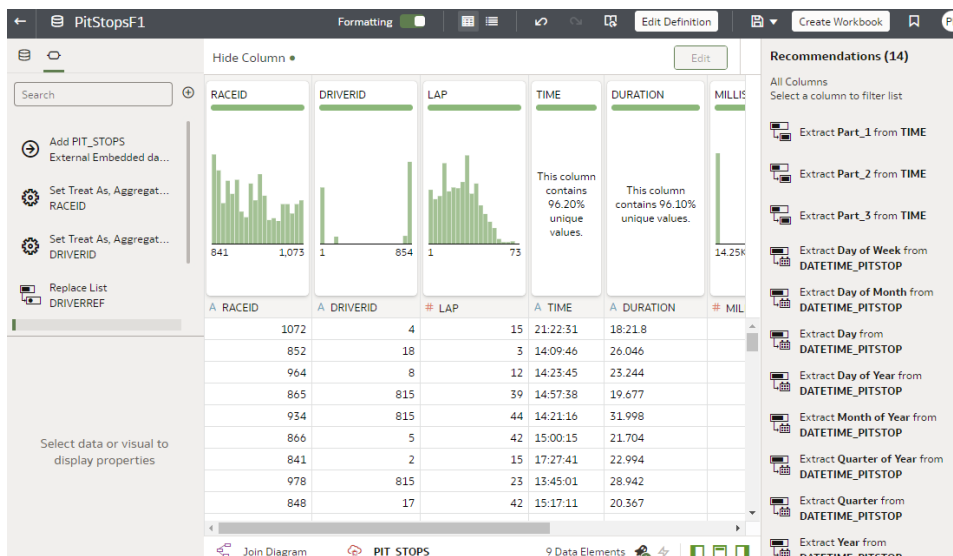
A RACEID	A DRIVERID	# LAP	A TIME	A DURATION	# MIL
1072	4	15	21:22:31	18.21.8	
852	18	3	14:09:46	26.046	
964	8	12	14:23:45	23.244	
865	815	39	14:57:38	19.677	
934	815	44	14:21:16	31.998	
866	5	42	15:00:15	21.704	
841	2	15	17:27:41	22.994	
978	815	23	13:45:01	28.942	
848	17	42	15:17:11	20.367	

To transform your data, click **Options** (the ellipsis top-right of the data column ) , and select a transformation option (for example, **Bin**, **Rename** or **Convert to Text**).



### Applying recommended transformations

When you create a workbook and add a dataset to it, the data undergoes column level profiling that runs on a representative sample of the data. After profiling the data, you can implement transformation and enrichment recommendations provided for the recognizable columns in the dataset. Click a recommendation in the right-hand Recommendations panel to implement it.



The following types of recommendations are provided to perform single-click transforms and enrichments on the data:

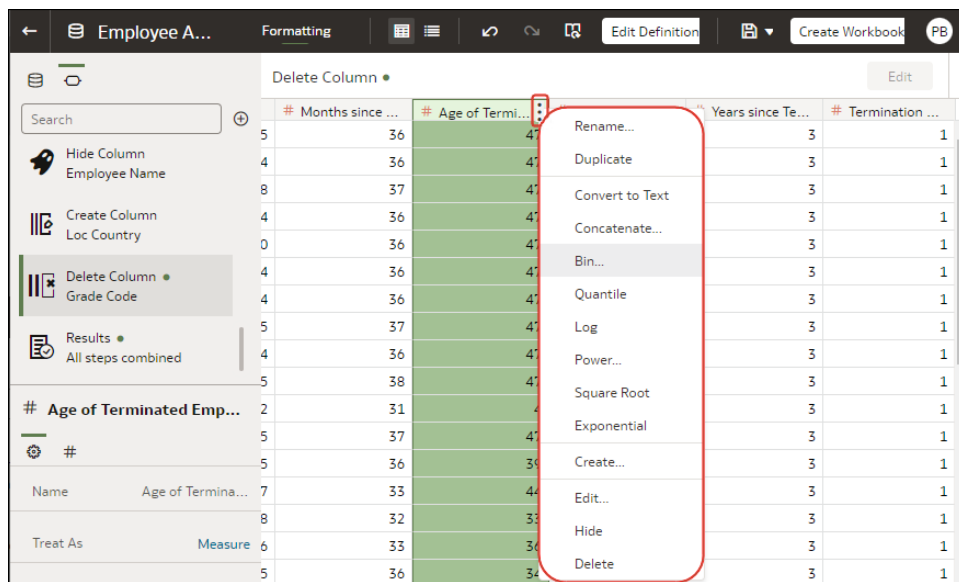
- Column concatenations, for example, adding a column with the person's first and last name.
- Date part extractions, for example, separating out the day of week from a date that uses a month, day, year format to make the data more useful in the visualizations.

- Delete columns containing sensitive fields.
- Duration enrichments for date columns, with Extract Age in Years, Months, or Days. For example, you might use the generated numeric column to assign data into bins, such as 0-3 months, 3-6 months, 6+ months, and so on.
- Global positioning system enrichments such as latitude and longitude for cities or zip codes.
- Obfuscation or masking of sensitive fields (full and partial).
- Part extractions, for example, separating out the house number from the street name in an address.
- Semantic extractions, for example, separating out information from a recognized semantic type such as domain from an email address.

### Applying your own transformations

In addition to the recommended transformations that you see in the Column Action Panel, you can create your own transformations in different ways:

- Use the **Options** menu at the top of each column to apply common transformations such as Rename, Uppercase, and Trim. See [Transform Data](#).



- Click **Add Preparation Step** in the Data Panel to add a column based on a custom transformation. You can build your column using a wide range of functions, for example, operators, math, aggregates, and conversion. See [Add Columns to a Dataset](#).
- Use the **Element** options pane in the bottom left hand corner of the Data Panel to select **Treat As** - Attribute or Measure, or change the default **Aggregation** type.

### How dataset transformations affect workbooks and data flows

The data transformation and enrichment changes that you apply to a dataset affect all workbooks and data flows that use the same dataset. When you open a workbook that shares the dataset, you see a message indicating that the workbook uses updated



data. When you refresh data in a dataset, the preparation script changes are automatically applied to the refreshed data.

## Enrich and Transform Your Data

Before you deploy your visualization workbooks, you typically enrich and transform your data. For example, you might rename data columns, fix cell phone data, or add calculations.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

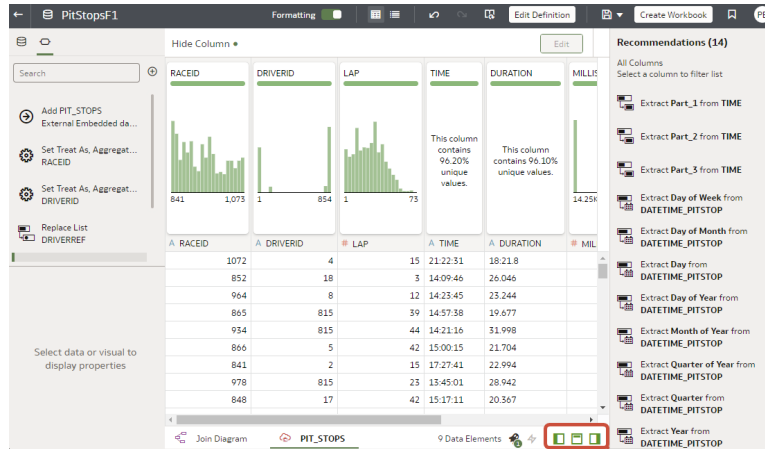
Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Select columns and use the enrich and transform tools to enhance your data.
  - Use the **Recommendations** panel to apply suggested enrichments and transformations.
  - Use the **Options** menu at the top of each column to apply common transformations such as Rename, Uppercase, and Trim.
  - From the **Options** menu at the top of a column, click **Edit** to enhance columns with functions and expressions from the Oracle Analytics functions library. For example, aggregates, strings, expressions, and math functions.
  - Click **Add Preparation Step** in the Data Panel to add a column based on a custom transformation. You can build your column using a wide range of functions and expressions from the Oracle Analytics functions library. For example, aggregates, strings, expressions, and math functions.
  - Use the properties pane at the bottom of the Data Panel to review and change a column's type and aggregation. For example, you might select **Treat As** and change from attribute to measure, or change the default **Aggregation** type from Sum to Average.
  - Use the Quality Insights tile above each column to explore and enrich your data.

When you edit data, a step is automatically added to the Preparation Script pane. A blue dot indicates that a step hasn't been applied.

3. To save your data preparation changes and apply them to your data, click **Save Dataset**.
4. If you're working in a workbook, click **Save** and click **Visualize** to review the enriched columns.

**Note:** It's best to configure your transform editor by displaying the Data Panel, Recommendations Panel, and Quality Insights. Use these toggle options displayed bottom right **Toggle Data Panel** , **Toggle Column Action Panel** , and **Toggle Quality Insights**.



## Accept Enrichment Recommendations

When you edit a dataset in the transform editor, Oracle Analytics suggests recommendations for enriching your data.

You can upload or open an existing dataset to modify the data using enrichment recommendations. After making the changes to the dataset, you can create a workbook.

If an enrichment recommendation adds information to data such as enhancing a zip code attribute column with the state name, a new column is added to the dataset containing the name of the states associated with the zip codes. When you select a recommendation, the change is added to the Preparation Script and is applied when you save the dataset or apply the preparation script. If you delete or undo the change, the recommendation is displayed once again as an available option in the Recommendations panel.

Enrichment recommendations enable you to enhance your data without requiring data scientist expertise.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

### Note:

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Select a column to enrich, then in the Column Action Panel (Recommendations) click recommendations to add them as steps to the Preparation Script.

 **Note:**

Make sure that you've toggled the **Toggle Column Action Panel** option bottom right to display recommendations.

3. Use the Preparation Script panel to review your data enrichments and make changes if required.  
For example, hover-over a step and click X to remove an enrichment.
4. To save your data preparation changes and apply them to your data, click **Save Dataset**.

## Transform Data


You can use the transform editor to enhance your data. For example, you might convert text to uppercase or trim leading and trailing spaces from data. Transform your data to make it more useful and powerful for content consumers.

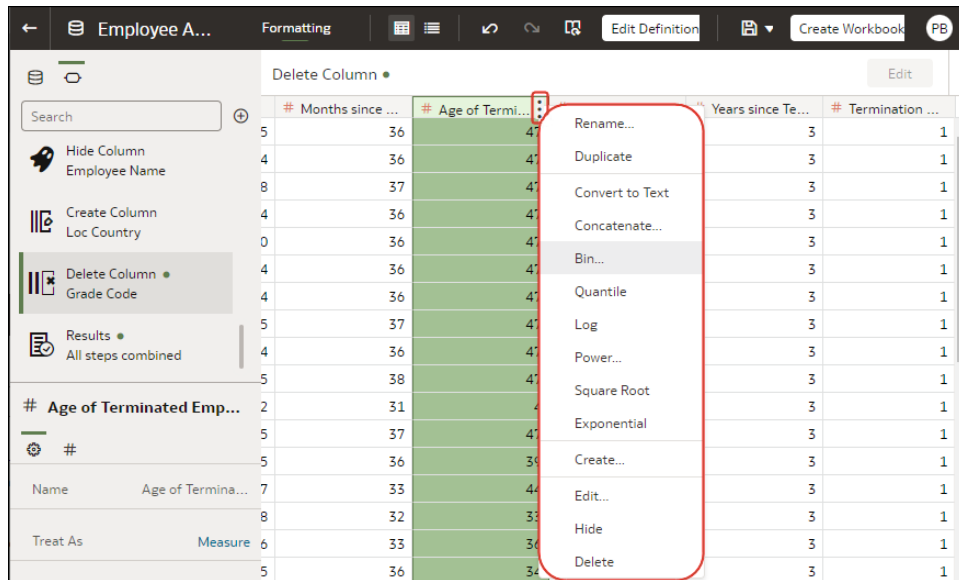
If you don't apply the transformation script and close the workbook or the dataset, you lose all the data transform changes you've performed.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Mouse-over the column you want to transform.
3. Click **Options** (the ellipsis top-right of the data column ) , and select a transformation option (for example, **Bin**, **Rename** or **Convert to Text**).



Oracle Analytics adds a step for the transform option you selected to the **Preparation Script** panel.

4. To save your data preparation changes and apply them to your data, click **Save Dataset**.

## Replace Missing or Null Values in a Dataset

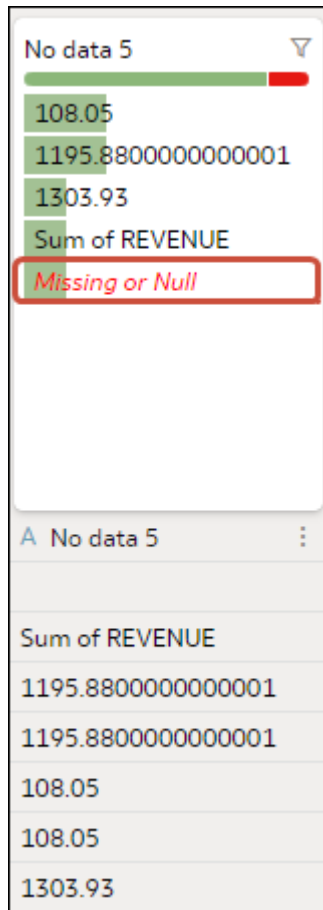
Replace missing or null values in a dataset column to cleanse your data. For example, if values are missing from a Month column, you might change them to January.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

### Note:

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Hover over or select the column that you want to transform.
3. In the quality tile at the top of a column, double-click **Missing or Null**.



4. Enter a value to replace missing or null values, then press Enter. For example, if values are missing from a Month column, you might enter "January".  
Oracle Analytics adds a step to the left-hand Preparation Script panel.
5. To save your data preparation changes and apply them to your data, click **Save**.

## Transform Data Using Replace

Transform data in a column using a simple pattern match or a regular (regex) expression. For example, in a State column, you might change CA to California.

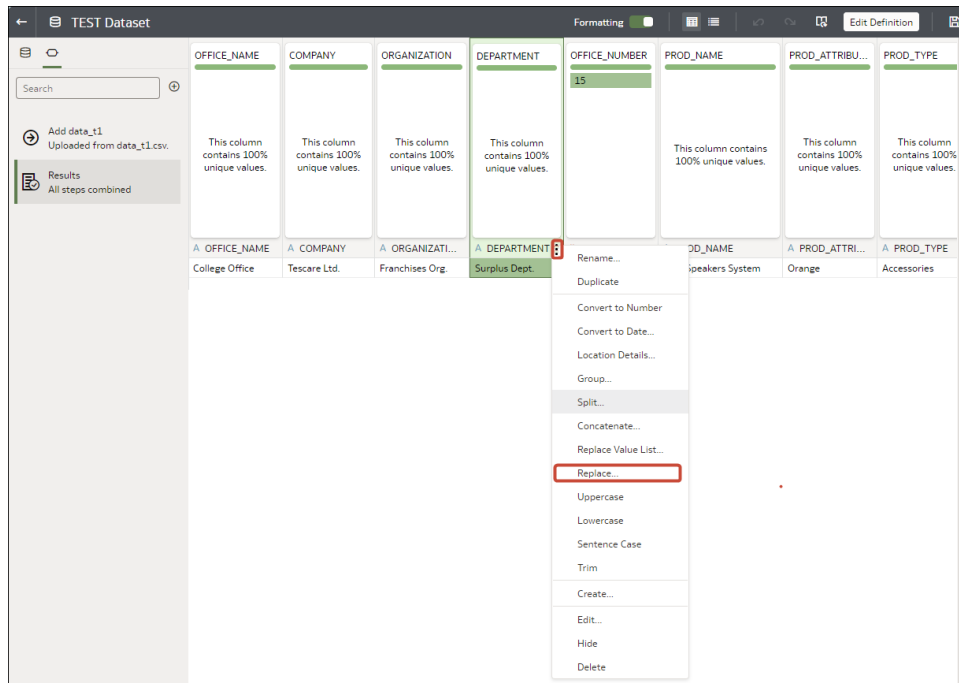
You can use any Perl Compatible Regular Expression (PCRE), which are also referred to as regex expressions. Transforms are applied to every applicable row in a dataset.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Hover over or select the text column that you want to transform.
3. Click **Options** at the base of the quality tile, then click **Replace**.



**Tip:** To replace more than one value at the same time, use the **Replace Value List** option.

4. In the Replace step editor, specify how you'd like to match values. For example:
  - Click **Use regular expression** to match using a complex regular expression (regex).
  - Click **Match entire values only** to change "male" to "M" but not "female" to "feM".
5. In the **String to replace** field and **New string** field, specify the literal text or regular expressions to search and replace (case-sensitive).

Examples:

- To change "2553 Bolman Court" to "2553 #Bolman# #Court#", select **Use regular expression**, enter `([A-Za-z]+)` in the **String to replace** field, and enter `#$1#` in the **New String** field.
- To change "male" with "M", select **Match entire values only**, enter `male` in the **String to replace** field, and enter `M` in the **New String** field. This changes "male" to "M" but won't change "female" to "feM".

When you complete both fields, you see a preview of the transformed data in the preview pane. Adjust the replace options until you get the transformation you want in the preview pane.

6. Click **Add Step**.

Oracle Analytics adds a step to the Preparation Script panel.

7. To save your data preparation changes and apply them to your data, click **Save**.

## Example Replace Transforms Using Regular Expressions

Here are just a few examples of using regular (regex) expressions to transform data.

In these examples, the Search Expression shows what to enter in the **String to replace** field, and the Replace Value shows what to enter in the **New string** field.

**Table 4-1 Example replace transforms**

Search Expression	Replace Value	Original Text	Replaced Text	Notes
@([a-z]+)(?=\.[a-z]{3})	@example	MichelePFalk@yahoo.com	MichelePFalk@example.com	This example replaces domain details in email addresses.
^Gray Grey\$	Silver	Grey Gray Graystone	Silver Silver Graystone	The ^\$ characters mean only look for entire string matches. The vertical bar is the regular expression for OR, so in this case the regular expression looks for either "Gray" or "Grey" and replace with "Silver". The string Graystone isn't transformed because the regular expression is looking for entire value matches only.
\d+	9999	8398 Park Street 123 Oracle Parkway	9999 Park Street 9999 Oracle Parkway	This regular expression looks for one "d" or more "+" digits and replaces them with "9999". The replace also works when the original text has only three digits.
([A-z]+)(\d+)	\$2	UA101654 US829383	101654 829383	This regular expression is looking for one "[A-z]" or more "+" consecutive letters followed by one "d" or more "+" digits - each of the two expressions is bounded by parentheses, which captures two groups - the first one ([A-z]) and the second one (\d+) - these groups are numbered automatically and can then be used in the replacement by using the dollar sign for the second group, for example, "\$2".
([A-z]+)(\d+)	Postal Code: \$2	UA101654 US829383	Postal Code: 101654 Postal Code: 829383	This example uses the same match expression as the previous example, except that it shows how to insert your own replacement text in addition to a group. Text can be inserted before and after a recalled match group.

## Convert Text Columns to Date or Time Columns


You can convert any text column to a date, time, or timestamp column.

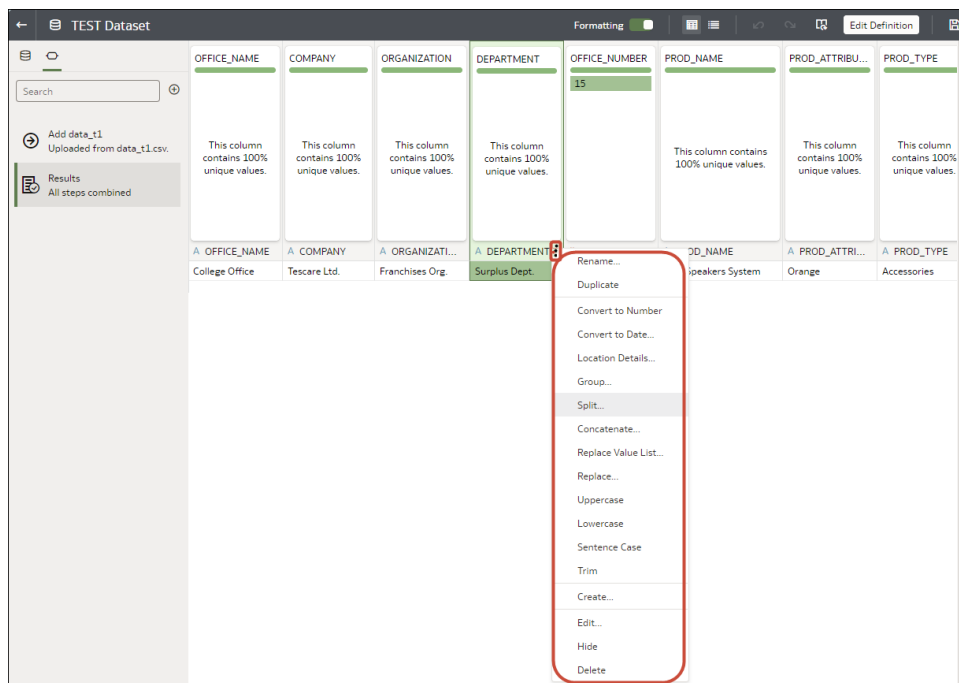
For example, you can convert an attribute text column to a true date column.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Hover over the column that you want to convert.
3. Click 



4. Select one of the conversion options, for example, **Convert to Number**, or **Convert to Date**.

Oracle Analytics adds a step to the Preparation Script panel.



- To save your data preparation changes and apply them to your data, click **Save Dataset**.  
The changes you make apply to all workbooks using that data source.

## Adjust the Display Format of a Date or Number Column

You can adjust the display format and granularity level of a date column.


### LiveLabs Sprint

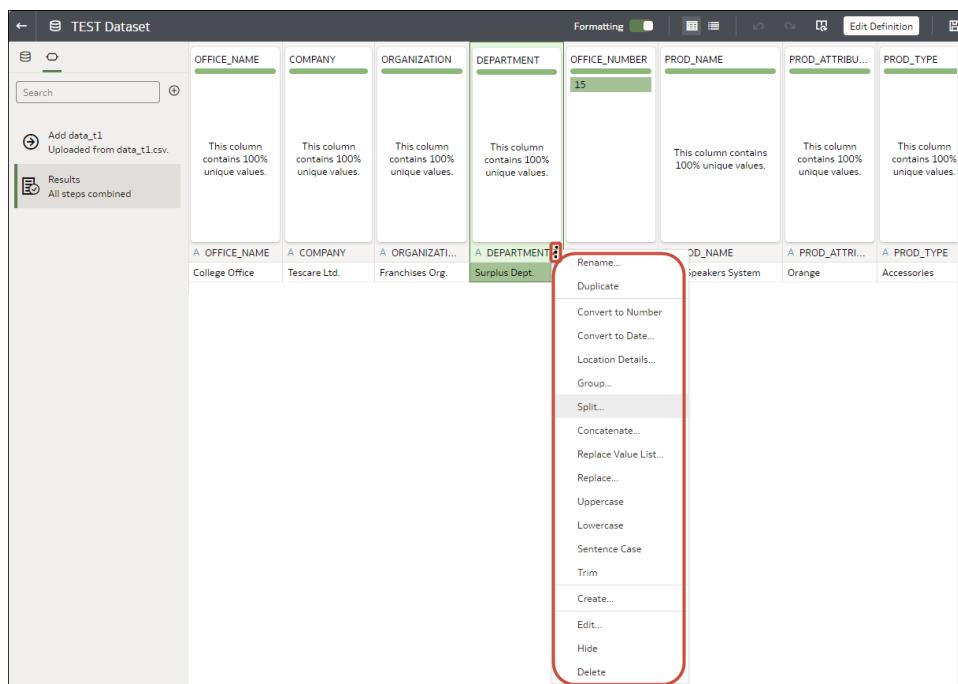
For example, you might want to change the format of a transaction date column from November 1, 2017 to 2017-11-01, or change the level of granularity from year to month.

- On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

### Note:

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

- Hover over the column you'd like to edit.
- Click 



4. To change the format of a date column, click **Convert to Date**, then click **Source Format** and select the format you want to use in the visualization.
5. To change the format of a number column, click **Edit**, and use functions in the functions library to change the format.

For example, to round up a number column DISCOUNT\_VALUE from two decimal places to no decimal places, specify `ROUND(DISCOUNT_VALUE, 0)`.

6. Click **Add Step**.  
Oracle Analytics adds a step to the Preparation Script panel.
7. To save your data preparation changes and apply them to your data, click **Save Dataset**.

## Create a Bin Column When You Prepare Data


Binning a measure creates a new column based on the value of the measure. For example, you might want to assign temperature values into two bin categories for less than or equal to 70 degrees and more than 70 degrees.

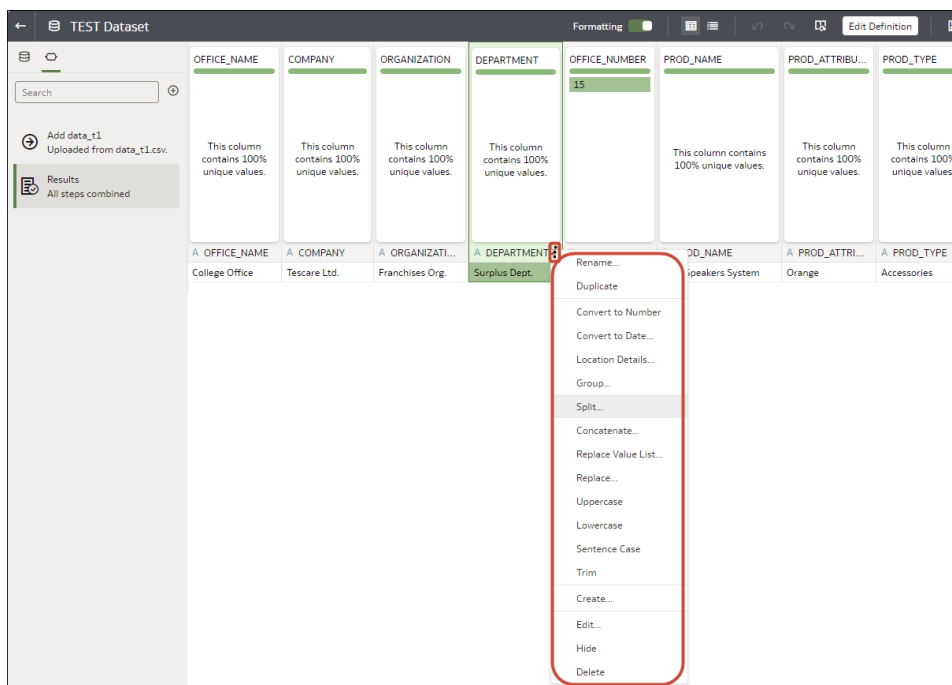
You can assign a value to the bin dynamically by creating the number of equal-sized bins or by explicitly specifying the range of values for each bin. You can create a bin column based on a data element.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

### Note:

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.



2. Select the column that you want to modify.
3. Click 



4. Select **Bin**.
5. In the Bin step editor, specify the options for the bin column.
  - Enter a number or use the arrows to increment or decrement the number of bins.
  - Based on your selection in the **Method** field, the range and count of the bins are updated.
    - In the **Manual** method, you select the boundary (that is, minimum and maximum) of each bin. You can also change the default name of each bin.
    - In the **Equal Width** method, the boundary of each bin is the same, but the count differs. Based on your selection in the **Bin Labels** field, the bin column labels are updated.
    - In the **Equal Height** method, the height of each bin is the same or very slightly different but the range is equal.
  - If you select the **Equal Width** method, click to select a dimension (that is, an attribute data element) on which to apply the bin.
6. Click **Add Step**.  
Oracle Analytics adds a step to the Preparation Script panel, ready to be applied when you click **Apply Script** or **Save Dataset**.
7. To save your data preparation changes and apply them to your data, click **Save Dataset**.

## Configure Columns Properties in a Dataset


In the transform editor you can edit the Data Type, Treat As, Aggregation, Hidden, or number format properties of a dataset column. For example, you might configure a number column as currency so that you can create financial reports.

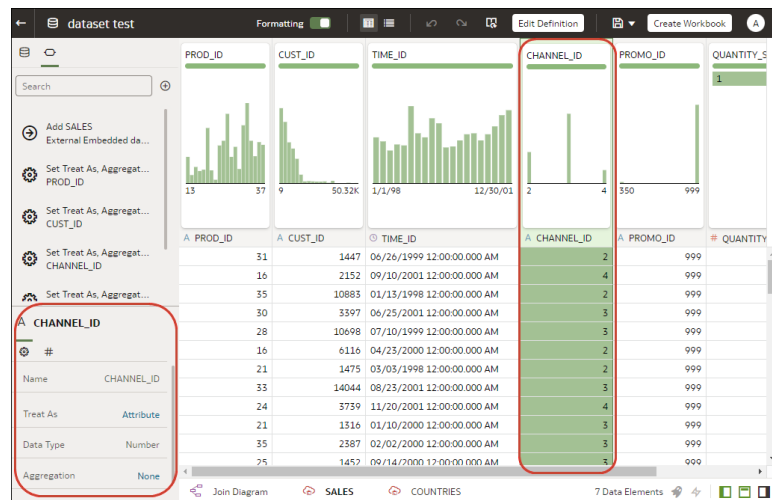
In Data view () , you configure the properties of one column at a time. In Metadata view () , you can update the properties of multiple columns at the same time. Oracle Analytics adds each property change to the Preparation Script panel. You can select to rollback changes using the Undo command.

1. On the Home page, open a dataset or workbook.
  - Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
  - Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.


 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. To configure the properties of one column:
  - a. From the toolbar, click **Data** () .
  - b. Select a column and use the properties pane at the bottom of the Data Panel to change the properties. For example, use **Number Format** to configure a number column as currency.



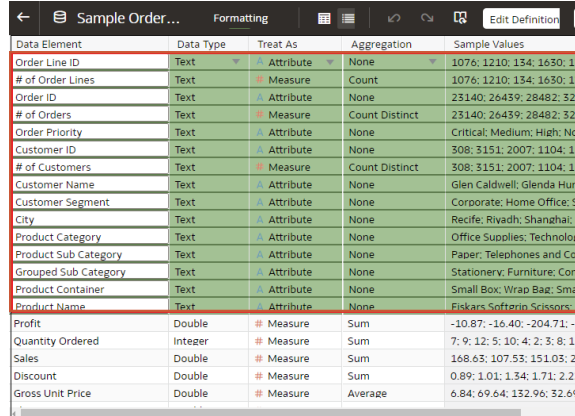
3. To update the **Data Type**, **Treat As**, **Aggregation** or **Hidden** properties of multiple columns at the same time:

- a. From the toolbar, click **Metadata** ()

Dataset columns are listed as **Data Elements**.

- b. Select multiple data elements to configure.

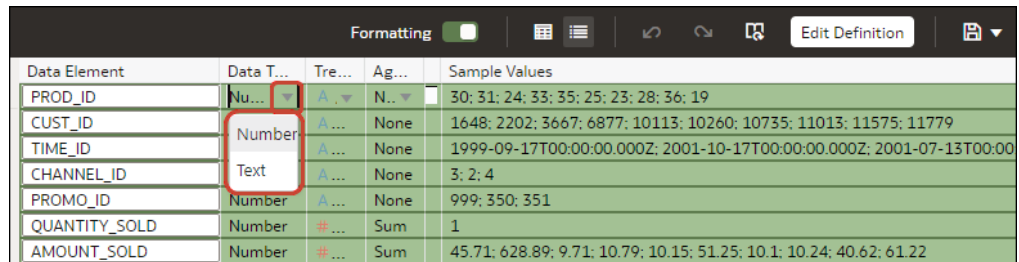
Oracle Analytics highlights selected data elements and displays an arrow in the first data element that you selected.



Data Element	Data Type	Treat As	Aggregation	Sample Values
Order Line ID	Text	Attribute	None	1076; 1210; 134; 1630; 17...
# of Order Lines	Text	Measure	Count	1076; 1210; 134; 1630; 17...
Order ID	Text	Attribute	None	23140; 26439; 28482; 328...
# of Orders	Text	Measure	Count Distinct	23140; 26439; 28482; 328...
Order Priority	Text	Attribute	None	Critical; Medium; High; No...
Customer ID	Text	Attribute	None	308; 3151; 2007; 1104; 11...
# of Customers	Text	Measure	Count Distinct	308; 3151; 2007; 1104; 11...
Customer Name	Text	Attribute	None	Glen Caldwell; Glenda Hum...
Customer Segment	Text	Attribute	None	Corporate; Home Office; S...
City	Text	Attribute	None	Recife; Riyadh; Shanghai; S...
Product Category	Text	Attribute	None	Office Supplies; Technolog...
Product Sub Category	Text	Attribute	None	Paper; Telephones and Com...
Grouped Sub Category	Text	Attribute	None	Stationery; Furniture; Com...
Product Container	Text	Attribute	None	Small Box; Wrap Bag; Sma...
Product Name	Text	Attribute	None	Fiskars Soften Scissors; M...
Profit	Double	Measure	Sum	-10.87; -16.40; -204.71; -2...
Quantity Ordered	Integer	Measure	Sum	7; 9; 12; 5; 10; 4; 2; 3; 8; 11
Sales	Double	Measure	Sum	168.63; 107.53; 151.03; 2.3...
Discount	Double	Measure	Sum	0.89; 1.01; 1.34; 1.71; 2.22...
Gross Unit Price	Double	Measure	Average	6.84; 69.64; 132.96; 32.69...

- c. Use the properties pane at the bottom of the Data Panel to change the properties. For example, you might set the **Aggregation** property of selected columns to Count.

You can also change properties by clicking the arrow in the first data element selected and selecting a configuration value from the drop-down list.

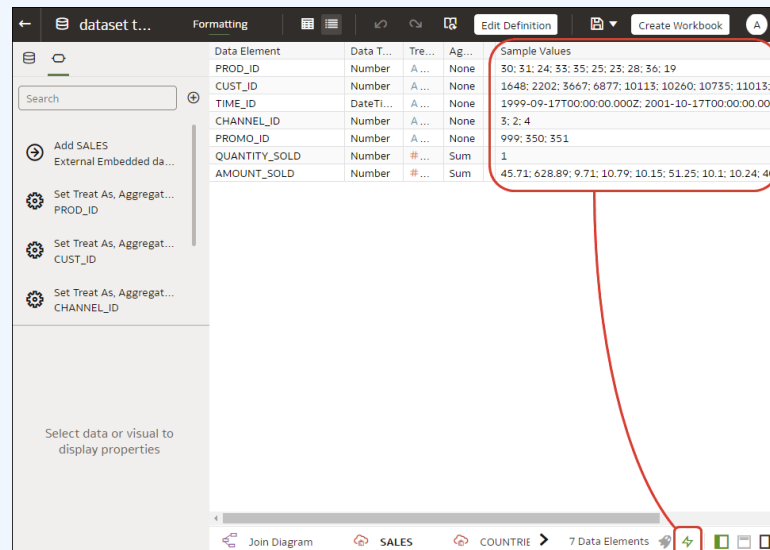


Data Element	Data T...	Tre...	Ag...	Sample Values
PROD_ID	Nu...	A...	N...	30; 31; 24; 33; 35; 25; 23; 28; 36; 19
CUST_ID	A...	A...	None	1648; 2202; 3667; 6877; 10113; 10260; 10735; 11013; 11575; 11779
TIME_ID	A...	A...	None	1999-09-17T00:00:00.000Z; 2001-10-17T00:00:00.000Z; 2001-07-13T00:00...
CHANNEL_ID	A...	A...	None	3; 2; 4
PROMO_ID	Number	A...	None	999; 350; 351
QUANTITY_SOLD	Number	#...	Sum	1
AMOUNT_SOLD	Number	#...	Sum	45.71; 628.89; 9.71; 10.79; 10.15; 51.25; 10.1; 10.24; 40.62; 61.22

**Note:**

You can improve performance in your data preparation by turning off

**Use sample data** (⚡) to stop generating the sample values displayed in the "Sample Values" column. The **Use sample data** option is displayed at the bottom right of the Metadata View.



## Hide or Delete a Column

In the Transform editor, you can hide or delete a column from the dataset. Hiding or deleting columns doesn't permanently remove them, and you can restore columns when needed.

It's important to understand that deleting a column is different than removing a column from a dataset:

- Use the Transform editor to *delete* a column.
- Deleting a column creates a step in the Preparation Script Panel. Remove the step to restore the deleted column.
- Use Edit Definition to *remove* a column.
- The Transform editor doesn't indicate which columns were removed, and removing a column doesn't add a step to the Preparation Script Panel. To confirm which columns were removed or to re-add them, go to Edit Definition.

Hidden columns are available for table joins. Deleted columns aren't available for table joins.


You can also hide columns in the dataset. Hiding a column is useful when you want to use a column to create a formula but don't need the column to display in the dataset. See [Remove or Restore a Dataset Table's Columns](#).

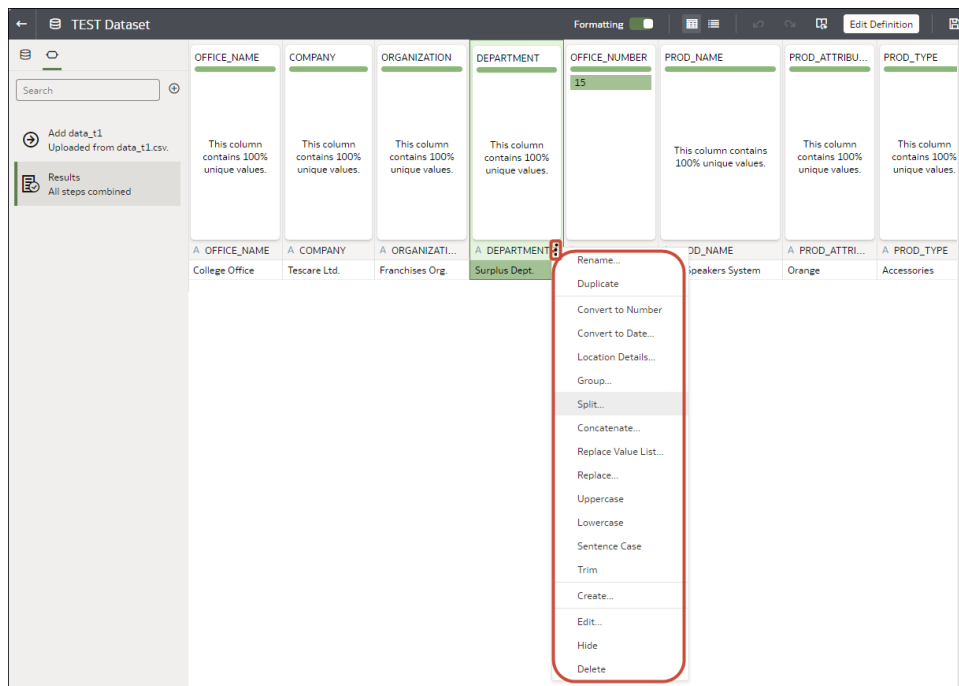
1. On the Home page, open a dataset or workbook.

- Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
- Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Hover over the column that you want to hide or delete.
3. Click 



4. Select **Hide** or **Delete**.

## Restore a Hidden or Deleted Column

In the Transform editor, you can restore any dataset columns that you hid or deleted.

If you don't see a column's **Delete Step** in the Preparation Script Panel, then the column might have been removed from the dataset. Use Edit Definition to confirm if the column has been removed instead of deleted. See [Remove or Restore a Dataset Table's Columns](#).

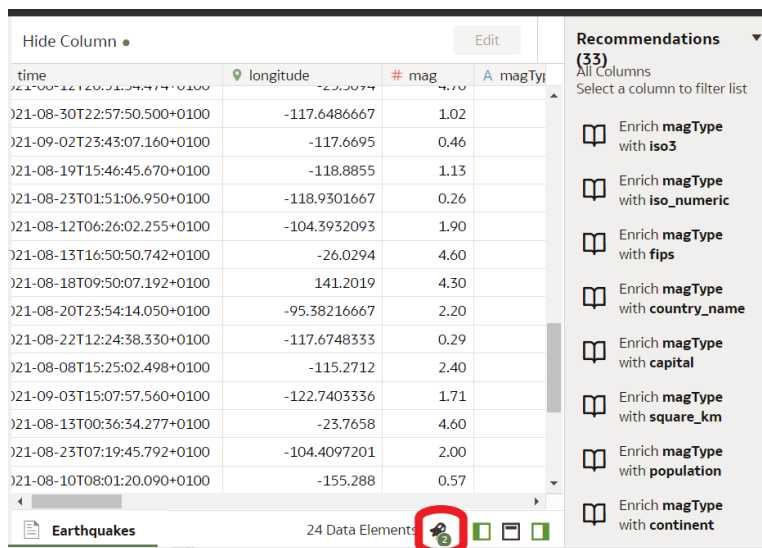
1. On the Home page, open a dataset or workbook.

- Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
- Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. To restore a hidden or deleted columns, go to the Preparation Script Panel and locate the Hide Column or Delete Column step.
3. Click **Delete Step**.
4. Optional: To unhide one or more hidden columns, in the Transform editor, click **Hidden columns** and click **Unhide All**.



time	longitude	# mag	magType
2021-08-30T22:57:50.500+0100	-117.6486667	1.02	
2021-09-02T23:43:07.160+0100	-117.6695	0.46	
2021-08-19T15:46:45.670+0100	-118.8855	1.13	
2021-08-23T01:51:06.950+0100	-118.9301667	0.26	
2021-08-12T06:26:02.255+0100	-104.3932093	1.90	
2021-08-13T16:50:50.742+0100	-26.0294	4.60	
2021-08-18T09:50:07.192+0100	141.2019	4.30	
2021-08-20T23:54:14.050+0100	-95.38216667	2.20	
2021-08-22T12:24:38.330+0100	-117.6748333	0.29	
2021-08-08T15:25:02.498+0100	-115.2712	2.40	
2021-09-03T15:07:57.560+0100	-122.7403336	1.71	
2021-08-13T00:36:34.277+0100	-23.7658	4.60	
2021-08-23T07:19:45.792+0100	-104.4097201	2.00	
2021-08-10T08:01:20.090+0100	-155.288	0.57	

## Edit the Data Preparation Script

You can edit the data transformation changes added to the Preparation Script. For example, you can edit, preview, or delete transformation steps before you apply them.

Both before and after you've applied recommended changes displayed in the Column Action Panel, you can edit the data transformation steps. The edit option isn't available for all types of transform steps.

The updates to the columns are applied only to the dataset and not to the visualization. To ensure that you see the most up-to-date data, on the Visualize canvas, click **Refresh Data**.

1. On the Home page, open a dataset or workbook.



- Select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
- Select the workbook that contains the dataset, click the **Actions menu**, select **Open**, then click **Data**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.

 **Note:**

Oracle Analytics displays a Data Diagram for single-table datasets or a Join Diagram for multi-table datasets.

2. Select a step in the Preparation Script pane and click **Edit Step**.
3. Select a transform step in the Preparation Script pane and click the pencil icon or **Edit Transform**.  
If a step isn't editable, a message is displayed when you hover over the pencil icon that editing for the transform step has been disabled.
4. In the step editor, update the fields to edit the data transform changes that are applied to the columns.
5. Click **OK** to update the column and close the step editor.
6. To save your data preparation changes and apply them to your data, click **Save**.

## Add Columns to a Dataset

You can develop your datasets by adding columns. For example, you might create a new column that concatenates columns ADDRESS\_LINE\_1, ADDRESS\_LINE\_2, and ADDRESS\_LINE\_3.

1. On the Home page, select the dataset, click the **Actions menu**, and then select **Open**. In the Data Diagram or Join Diagram, right-click a data source and click **Open** to display the transform editor.
2. In the transform editor, click **Add Preparation Step**.
3. In **Create Column**, enter a **Name** for the column, and in the expression box define an expression to add values to the column. For example, to concatenate values in columns **Category** and **Sub-category**, you might specify: `CONCAT(Category, Sub Category)`.  
Use the **f(x)** function picker to build an expression using operators, mathematical, string, and conversion functions.
4. Click **Validate** and review the new column in the data preview.
5. Click **Add Step**.  
Oracle Analytics adds a step to the Preparation Script panel.
6. To save your data preparation changes and apply them to your data, click **Save**.

## Create Calculated Data Elements in a Workbook

A calculated data element provides reusable functions that you can add to multiple visualizations in a workbook. For example, you might use a BIN function to classify AGE values into four buckets: 0 to 20, 21 to 40, 41 to 60, and 60 plus.

Calculated data elements are stored in the dataset's My Calculations folder and not in the workbook. Workbooks have a My Calculations folder for each dataset used (whether joined or not-joined).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select a canvas to work in.
3. Navigate to the bottom of the Data Panel, right-click **My Calculations**, and click **Add Calculation** to open the New Calculation dialog.
4. Enter a name.
5. Optional: Enter a description.  
The description displays in the tooltip when you hover over a calculation.
6. In the expression builder pane, compose and edit an expression.  
You can drag and drop a column into the expression builder pane only if the column is joined to the dataset.
7. Click **Validate**.
8. Click **Save**.

## Enrich and Transform Reference

Use this reference information to help you enrich and transform your data.

### Topics:

- [Transform Reference](#)
- [Data Profiles and Semantic Recommendations](#)
- [General Custom Format Strings](#)

## Transform Reference

Find out about the data transform options that you can access in the transform editor by right-clicking on a dataset column. For example, to categorize racing lap times in a dataset column, you might right-click the 'Lap Time' column and select **Bin**.

Option	Description
<b>Bin</b>	Creates your own custom groups for number ranges. For example, you can create bins for an Age column with age ranges binned into Pre-Teen, Young Adult, Adult, or Senior based on custom requirements.
<b>Convert to Date</b>	Changes the data type of the column to date and deletes any values that aren't dates from the column.

Option	Description
<b>Convert to Number</b>	Changes the data type of the column to number, which deletes any values that aren't numbers from the column.
<b>Convert to Text</b>	Changes the data type of a column to text.
<b>Create</b>	Creates a column based on a function.
<b>Duplicate</b>	Creates a column with identical content of the selected column.
<b>Edit</b>	Edits the column. For example, you can change the name, select another column, or update functions.
<b>Group, Conditional Group</b>	Select <b>Group</b> to create your own custom groups. For example, you can group States together with custom regions, and you can categorize dollar amounts into groups indicating small, medium, and large.
<b>Hide</b>	Hides the column in the Data Panel and in the visualizations. If you want to see the hidden columns, click <b>Hidden columns</b> (ghost icon) on the page footer. You can then unhide individual columns or unhide all the hidden columns at the same time.
<b>Log</b>	Calculates the natural logarithm of an expression.
<b>Lowercase</b>	Updates the contents of a column with the values all in lowercase letters.
<b>Power</b>	Raises the values of a column to the power that you specify. The default power is 2.
<b>Rename</b>	Allows you to change the name of any column.
<b>Replace</b>	Changes specific text in the selected column to any value that you specify. For example, you can change all instances of <i>Mister</i> to <i>Mr.</i> in the column.
<b>Sentence Case</b>	Updates the contents of a column to make the first letter of the first word of a sentence uppercase.
<b>Split</b>	Splits a specific column value into parts. For example, you can split a column called, Name, into first and last name.
<b>Square Root</b>	Creates a column populated with the square root of the value in the column selected.
<b>Uppercase</b>	Updates the contents of a column with the values in all uppercase letters.

## Data Profiles and Semantic Recommendations

When you create a dataset, Oracle Analytics performs column-level profiling to produce a set of semantic recommendations to repair or enrich your data. When you create workbooks, you can also include knowledge enrichments in your visualizations by adding them from the Data Panel.

These recommendations are based on the system automatically detecting a specific semantic type during the profile step. For example, datasets based on local subject areas are profiled using a simple Top N sample.

There are categories of semantic types such as geographic locations identified by city names, recognizable patterns as in credit cards, email addresses and social security numbers, dates, and recurring patterns. You can also create your own custom semantic types.

### Topics:

- [Semantic Type Categories](#)
- [Semantic Type Recommendations](#)
- [Recognized Pattern-Based Semantic Types](#)

- [Reference-Based Semantic Types](#)
- [Recommended Enrichments](#)
- [Required Thresholds](#)
- [Custom Knowledge Recommendations](#)

## Semantic Type Categories

Profiling is applied to various semantic types.

Semantic type categories are profiled to identify:

- Geographic locations such as city names.
- Patterns such as those found with credit cards numbers or email addresses.
- Recurring patterns such as hyphenated phrase data.

## Semantic Type Recommendations

Recommendations to repair, enhance, or enrich the dataset, are determined by the type of data.

Examples of semantic type recommendations:

- **Enrichments** - Adding a new column to your data that corresponds to a specific detected type, such as a geographic location. For example, adding population data for a city.
- **Column Concatenations** - When two columns are detected in the dataset, one containing first names and the other containing last names, the system recommends concatenating the names into a single column. For example, a *first\_name\_last\_name* column.
- **Semantic Extractions** - When a semantic type is composed of subtypes, for example a *us\_phone* number that includes an area code, the system recommends extracting the subtype into its own column.
- **Part Extraction** - When a generic pattern separator is detected in the data, the system recommends extracting parts of that pattern. For example if the system detects a repeating hyphenation in the data, it recommends extracting the parts into separate columns to potentially make the data more useful for analysis.
- **Date Extractions** - When dates are detected, the system recommends extracting parts of the date that might augment the analysis of the data. For example, you might extract the day of week from an invoice or purchase date.
- **Full and Partial Obfuscation/Masking/Delete** - When sensitive fields are detected such as a credit card number, the system recommends a full or partial masking of the column, or even removal.

## Recognized Pattern-Based Semantic Types

Semantic types are identified based on patterns found in your data.

Recommendations are provided for these semantic types:

- Dates (in more than 30 formats)
- US Social Security Numbers (SSN)

- Credit Card Numbers
- Credit Card Attributes (CVV and Expiration Date)
- Email Addresses
- North American Plan Phone Numbers
- US Addresses

## Reference-Based Semantic Types

Recognition of semantic types is determined by loaded reference knowledge provided with the service.

Reference-based recommendations are provided for these semantic types:

- Country names
- Country codes
- State names (Provinces)
- State codes
- County names (Jurisdictions)
- City names (Localized Names)
- Zip codes

## Recommended Enrichments

Recommended enrichments are based on the semantic types.

Enrichments are determined based on the geographic location hierarchy:

- Country
- Province (State)
- Jurisdiction (County)
- Longitude
- Latitude
- Population
- Elevation (in Meters)
- Time zone
- ISO country codes
- Federal Information Processing Series (FIPS)
- Country name
- Capital
- Continent
- GeoNames ID
- Languages spoken
- Phone country code

- Postal code format
- Postal code pattern
- Phone country code
- Currency name
- Currency abbreviation
- Geographic top-level domain (GeoLTD)
- Square KM

## Required Thresholds

The profiling process uses specific thresholds to make decisions about specific semantic types.

As a general rule, 85% of the data values in the column must meet the criteria for a single semantic type in order for the system to make the classification determination. As a result, a column that might contain 70% first names and 30% “other”, doesn't meet the threshold requirements and therefore no recommendations are made.

## Custom Knowledge Recommendations

Use custom knowledge recommendations to augment the Oracle Analytics system knowledge. Custom knowledge enables the Oracle Analytics semantic profiler to identify more business-specific semantic types and make more relevant and governed enrichment recommendations. For example, you might add a custom knowledge reference that classifies prescription medication into USP drug categories Analgesics or Opioid.

 [Tutorial](#)

## General Custom Format Strings

You can use general custom format strings to create custom time or date formats.

The table shows the general custom format strings and the results that they display. These allow the display of date and time fields in the user's locale.

General Format String	Result
[FMT:dateShort]	Formats the date in the locale's short date format. You can also type [FMT:date].
[FMT:dateLong]	Formats the date in the locale's long date format.
[FMT:dateInput]	Formats the date in a format acceptable for input back into the system.
[FMT:time]	Formats the time in the locale's time format.
[FMT:timeHourMin]	Formats the time in the locale's time format but omits the seconds.
[FMT:timeInput]	Formats the time in a format acceptable for input back into the system.
[FMT:timeInputHourMin]	Formats the time in a format acceptable for input back into the system, but omits the seconds.

General Format String	Result
[FMT:timeStamp Short]	Equivalent to typing [FMT:dateShort] [FMT:time]. Formats the date in the locale's short date format and the time in the locale's time format. You can also type [FMT:timeStamp].
[FMT:timeStampLong]	Equivalent to typing [FMT:dateLong] [FMT:time]. Formats the date in the locale's long date format and the time in the locale's time format.
[FMT:timeStampInput]	Equivalent to [FMT:dateInput] [FMT:timeInput]. Formats the date and the time in a format acceptable for input back into the system.
[FMT:timeHour]	Formats the hour field only in the locale's format, such as 8 PM.
YY or yy	Displays the last two digits of the year, for example 11 for 2011.
YYY or yyy	Displays the last three digits of the year, for example, 011 for 2011.
YYYY or yyyy	Displays the four-digit year, for example, 2011.
M	Displays the numeric month, for example, 2 for February.
MM	Displays the numeric month, padded to the left with zero for single-digit months, for example, 02 for February.
MMM	Displays the abbreviated name of the month in the user's locale, for example, Feb.
MMMM	Displays the full name of the month in the user's locale, for example, February.
D or d	Displays the day of the month, for example, 1.
DD or dd	Displays the day of the month, padded to the left with zero for single-digit days, for example, 01.
DDD or ddd	Displays the abbreviated name of the day of the week in the user's locale, for example, Thu for Thursday.
DDDD or dddd	Displays the full name of the day of the week in the user's locale, for example, Thursday.
DDDDD or ddddd	Displays the first letter of the name of the day of the week in the user's locale, for example, T for Thursday.
r	Displays the day of year, for example, 1.
rr	Displays the day of year, padded to the left with zero for single-digit day of year, for example, 01.
rrr	Displays the day of year, padded to the left with zero for single-digit day of year, for example, 001.
w	Displays the week of year, for example, 1.
ww	Displays the week of year, padded to the left with zero for single-digit weeks, for example, 01.
q	Displays the quarter of year, for example, 4.
h	Displays the hour in 12-hour time, for example 2.
H	Displays the hour in 24-hour time, for example, 23.
hh	Displays the hour in 12-hour time, padded to the left with zero for single-digit hours, for example, 01.
HH	Displays the hour in 24-hour time, padded to the left with zero for single digit hours, for example, 23.

---

<b>General Format String</b>	<b>Result</b>
m	Displays the minute, for example, 7.
mm	Displays the minute, padded to the left with zero for single-digit minutes, for example, 07.
s	Displays the second, for example, 2. You can also include decimals in the string, such as s.# or s.00 (where # means an optional digit, and 0 means a required digit).
ss	Displays the second, padded to the left with zero for single-digit seconds, for example, 02. You can also include decimals in the string, such as ss.# or ss.00 (where # means an optional digit, and 0 means a required digit).
S	Displays the millisecond, for example, 2.
SS	Displays the millisecond, padded to the left with zero for single-digit milliseconds, for example, 02.
SSS	Displays the millisecond, padded to the left with zero for single-digit milliseconds, for example, 002.
tt	Displays the abbreviation for ante meridiem or post meridiem in the user's locale, for example, p.m.
gg	Displays the era in the user's locale.

---



# 5

## Create Datasets Using Data Flows

Use data flows to combine, organize, and integrate data into datasets.



Use data flows to manipulate your data visually without requiring manual coding skills.

### Topics:

- [About Data Flows](#)
- [What Steps Can I Use to Organize and Integrate My Data?](#)
- [Create a Dataset Using a Data Flow](#)
- [Generate or Update a Dataset Using a Data Flow](#)
- [Reuse a Data Flow](#)
- [Configure Incremental Processing in a Data Flow](#)
- [Process Data Using a Sequence of Data Flows](#)
- [Manage Your Data Flows](#)

## About Data Flows

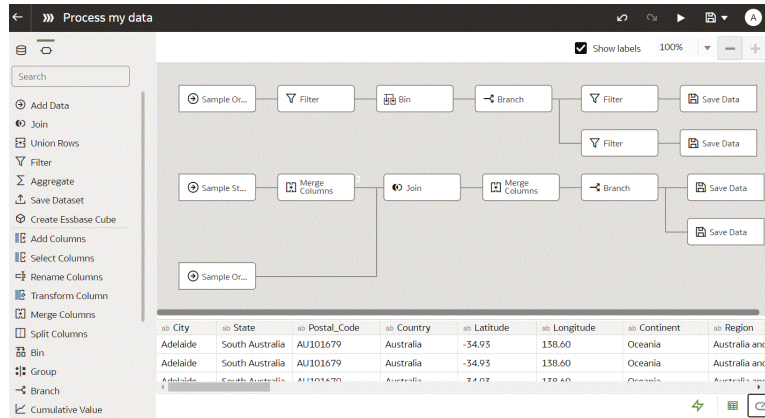
Data flows enable you to organize and integrate your data to produce curated datasets that your users can visualize.

Use data flows to manipulate your data visually without requiring manual coding skills.

For example, you might use a data flow to:

- Create a dataset.
- Combine data from different sources.
- Aggregate data.
- Train machine learning models or apply a predictive machine learning model to your data.
- Perform object detection, image classification, or text detection using artificial intelligence via the OCI Vision service.

You create data flows in the data flow editor.



To build a data flow, you add steps. Each step performs a specific function, for example, add data, join tables, merge columns, transform data, save your data. Use the data flow editor to add and configure your steps. Each step is validated when you add or change it. When you've configured your data flow, you execute it to produce or update a dataset.

When you add your own columns or transform data, you can use a wide range of SQL operators (for example, `BETWEEN`, `LIKE`, `IN`), conditional expressions (for example, `CASE`), and functions (for example, `Avg`, `Median`, `Percentile`).

## Database Support for Data Flows

With data flows you can curate data from datasets, subject areas, or database connections.

Use the **Add Data** step to add data to a data flow, and use the **Save Data** step to save output data from a data flow.

You can save the output data from a data flow in either a dataset or in one of the supported database types. If you save data to a database, you can transform the data source by overwriting it with data from the data flow. The data source and data flow tables must be in the same database and have the same name. Before you start, create a connection to one of the supported database types.

### Data Output

You can save output data from data flows to these database types:

- Oracle Autonomous Data Warehouse
- Oracle Autonomous Transaction Processing
- Oracle Database
- Apache Hive
- Hortonworks Hive
- MapR Hive
- Spark

### Data Input

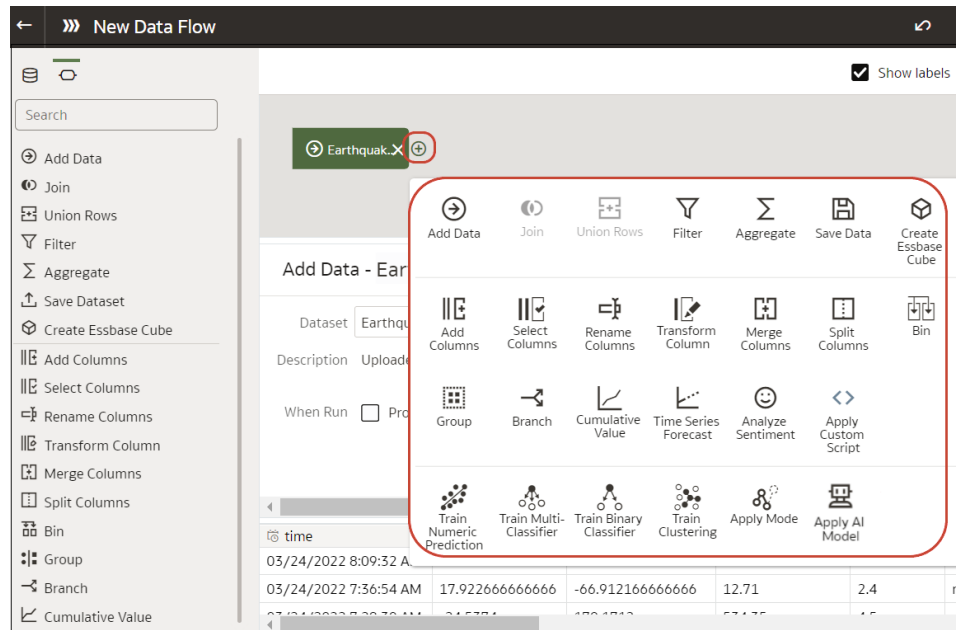
You can input data to data flows from most database types (except Oracle Essbase and EPM Cloud).

## What Steps Can I Use to Organize and Integrate My Data?

Use these steps in data flows to organize, integrate, and transform your data. For example, you might merge data sources, aggregate data, or perform geo-spatial analysis.

Steps enable you to transform your data visually without requiring coding skills.

Use the data flow editor to add steps to your data flows.



### Add Columns

Add custom columns to your target dataset. For example, you might calculate the value of your stock by multiplying the number of units in a `UNITS` column by the sale price in a `RETAIL_PRICE` column (that is, `UNITS * RETAIL_PRICE`).

### Add Data

Add data sources to your data flow. For example, if you're merging two datasets, you add both datasets to your data flow. See [Database Support for Data Flows](#).

### Aggregate

Create group totals by applying aggregate functions. For example, count, sum, or average.

### Analyze Sentiment

Detect sentiment for a given text column. For example, you might analyze customer feedback to determine whether it's positive or negative. Sentiment analysis evaluates text based on words and phrases that indicate a positive, neutral, or negative emotion. Based on the outcome of the analysis, a new column contains Positive, Neutral, or Negative.

### **Apply Model**

Analyze data by applying a machine learning model from Oracle Machine Learning or OCI Data Science. For example, you might have created a classification model to predict whether emails are spam or not spam. See [Apply a Predictive or Registered Oracle Machine Learning Model to a Dataset](#).

### **AutoML**

Use Oracle Autonomous Data Warehouse's AutoML capability to recommend and train a predictive model for you. The AutoML step analyzes your data, calculates the best algorithm to use, and registers a prediction model in Oracle Analytics. The analytics are computed in the database, not in Oracle Analytics. This step is available in the step selector when you're connected to a dataset based on Oracle Autonomous Data Warehouse.

### **Bin**

Assign data values into categories, such as high, low, or medium. For example, you might categorize values for `RISK` into three bins for low, medium, and high.

### **Branch**

Creates multiple outputs from a data flow. For example, if you have sales transactions data based on country, you might save data for United States in the first branch and data for Canada in the second branch.

### **Create Essbase Cube**

Create an Essbase cube from a spreadsheet or database.

### **Cumulative Value**

Calculate cumulative totals such as moving aggregate or running aggregate.

### **Database Analytics**

Perform advanced analysis and data mining analysis. For example, you can detect anomalies, cluster data, sample data, and perform affinity analysis. This step is available in the step selector when you're connected to a dataset based on Oracle database or Oracle Autonomous Data Warehouse. The analytics are computed in the database, not in Oracle Analytics. See [Database Analytics Functions](#).

### **Filter**

Select only the data that you're interested in. For example, you might create a filter to limit sales revenue data to the years 2020 through 2022.

### **Graph Analytics**

Perform geo-spatial analysis, such as calculating the distance or the number of hops between two vertices. This step is available in the step selector when you're connected to a dataset based on Oracle database or Oracle Autonomous Data Warehouse. The analytics are computed in the database, not in Oracle Analytics. See [Graph Analytics Functions](#).

### Group

Categorize non-numeric data into groups that you define. For example, you might put orders for lines of business `Communication` and `Digital` into a group named `Technology`, and orders for `Games` and `Stream` into a group named `Entertainment`.

### Join

Combine data from multiple data sources using a database join based on a common column. For example, you might join an `Orders` dataset to a `Customer_orders` dataset using a customer ID field.

### Merge

Combine multiple columns into a single column. For example, you might merge the street address, street name, state, and ZIP code columns into one column.

### Rename Columns

Change the name of a column to more meaningful. For example, you might change `CELL` to `Contact Cell Number`.

### Reorder Columns

Change the ordering of columns in the output dataset. For example, you might want to order columns alphabetically based on column name, or order columns based on data type (character, integer, and so on).

### Save Data

Specify where to save the data generated by the data flow. You can save the data in a dataset in Oracle Analytics or in a database. You can also specify runtime parameters, or change the default dataset name. See [Database Support for Data Flows](#).

### Select Columns

Specify which columns to include or exclude in your data flow (the default is to include all data columns).

### Split Columns

Extract data from within columns. For example, if a column contains `001011Black`, you might split this data into two separate columns, `001011` and `Black`.

### Time Series Forecast

Calculate forecasted values based on historical data. A forecast takes a time column and a target column from a given dataset and calculates forecasted values for the target column.

### Train <model type>

Train machine learning models using algorithms for numeric prediction, multi-classification, binary-classification and clustering. See [Data Flow Steps for Training Machine Learning Models](#).

When you've trained a machine learning model, apply it to your data using the **Apply Model** step.

### Transform Column

Change the format, structure, or values of data. For example, you might convert text to uppercase, trim leading and trailing spaces from data, or calculate a percentage increase in value.

### Union Rows

Merge the rows of two data sources (known as a UNION command in SQL terminology). You can match columns by order or name.

## Database Analytics Functions

Database analytics functions enable you to perform advanced analysis and data mining analysis, for example, detecting anomalies, clustering data, sampling data, and affinity analysis. Analytics Functions are available when you connect to an Oracle database or Oracle Autonomous Data Warehouse.

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To display the **Database Analytics** step in the data flow editor, you must connect to an Oracle database or Oracle Autonomous Data Warehouse.

Function Types	Description
Dynamic Anomaly Detection	Detect anomalies in your input data without a pre-defined model. For example, you might want to highlight unusual financial transactions.  When you deploy this function with large datasets, configure the partition columns to maximize performance.
Dynamic Clustering	Cluster your input data without a pre-defined model. For example, you might want to characterize and discover customer segments for marketing purposes.  When you deploy this function with large datasets, configure the partition columns to maximize performance.
Frequent Item Set	Discover relationships in your data by identifying sets of items that often appear together. This data mining technique is also known as association rule learning, affinity analysis, or in the retail industry as market basket analysis. If you use frequent item set as a market basket analysis tool, you might find that customers who buy shampoo also buy hair conditioner.  This operation is resource intensive and its performance depends on several factors, such as input dataset volume, cardinality of transaction id, and cardinality of Item value column. To avoid potential performance degradation on the database, try with a higher value of minimum support percent (default is 0.25) and gradually reduce it to accommodate more itemsets in your output.
Sampling Data	Selects a random sample percentage of data from a table. You simply specify the percentage of data you want to sample. For example, you might want to randomly sample ten percent of your data.

Function Types	Description
Text Tokenization	<p>Analyze textual data by breaking it down into distinct words and counting the occurrences of each word. When you run your data flow, Oracle Analytics creates a table in the database named <code>DR\$IndexName\$I</code>, which contains the token text and the token count related details. Use the <code>DR\$IndexName\$I</code> table to create a dataset.</p> <ul style="list-style-type: none"> <li>Under <b>Outputs</b>, use the <b>Create</b> option next to each field to select the columns to index.</li> <li>Under <b>Parameters</b>, then <b>Text Column</b>, click <b>Select a column</b> to select the field you'd like to break down into separate words. Use the <b>Reference Column&lt;number&gt;</b> options to include one or more columns in the output dataset.</li> </ul> <p>The database connection that you use for your data flow requires special database privileges. Check with your administrator that:</p> <ul style="list-style-type: none"> <li>Your database account has <code>grant EXECUTE on CTXSYS.CTX_DDL to schema name</code>.</li> <li>You use an Oracle Analytics connection with the same username as the schema where the source table exists. This is best practice to avoid access privilege issues when the data flow runs.</li> <li>The database table column you're analyzing has no existing <b>CONTEXT</b> index. If there's an existing <b>CONTEXT</b> index on the database table that you're analyzing, remove that index before you run the text tokenization data flow.</li> </ul>
Time Series	<p>Time Series is a data mining technique that forecasts target value based on a known history of target values. The input to time series analysis is a sequence of target values. It provides estimates of the target value for each period of a time window that can include up to 30 periods beyond the historical data.</p> <p>The model also computes various statistics that measure the goodness of fit to historical data. These statistics are available as an additional output dataset via a parameter setting.</p> <p><b>Note:</b> The Time Series algorithm is only available from Oracle database version 18c onwards.</p>
Un-pivoting Data	<p>Transpose data that's stored in columns into row format. For example, you might want to transpose multiple columns showing a revenue metric value for each year to a single revenue column with multiple value rows for the year dimension. You simply select the metric columns to transpose and specify a name for the new column. You get a new dataset with fewer columns and more rows.</p>

## Graph Analytics Functions

Graph analytics enable you to perform geo-spatial analysis. For example, you might calculate the distance or the number of hops between two vertices. To use graph analytics, connect to an Oracle database or Oracle Autonomous Data Warehouse (the analytics are computed in the database, not in Oracle Analytics).

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To display the **Graph Analytics** step in the data flow editor, you must connect to an Oracle database or Oracle Autonomous Data Warehouse.

Function Type	Description
Clustering	Finds connected components or clusters in a graph.

Function Type	Description
Node Ranking	Measure the importance of the nodes in a graph.
Shortest Path	Find the shortest path between two vertices in a graph.
Sub Graph	Find all nodes within a specified number (n) of hops of a given node.

## Data Flow Steps for Training Machine Learning Models

Oracle Analytics enables you to train machine learning models using steps in data flows. When you've trained a machine learning model, apply it to your data using the **Apply Model** step.

Step Name	Description
<b>AutoML</b> (requires Oracle Autonomous Data Warehouse use)	Use Oracle Autonomous Data Warehouse's AutoML capability to recommend and train a predictive model for you. The AutoML step analyzes your data, calculates the best algorithm to use, and registers a prediction model in Oracle Analytics.
<b>Train Binary-Classifier</b>	Train a machine learning model to classify your data into one of two predefined categories.
<b>Train Clustering</b>	Train a machine learning model to segregate groups with similar traits and assign them into clusters.
<b>Train Multi-Classifier</b>	Train a machine learning model to classify your data into three or more predefined categories.
<b>Train Numeric Prediction</b>	Train a machine learning model to predict a numeric value based on known data values.

## Create a Dataset Using a Data Flow

Use a data flow to curate data and create a dataset. For example, you might merge two datasets, cleanse the data, and output the results to a new dataset.

1. On the Home or Data page, click **Create** and select **Data Flow**.
2. In the Add Dataset dialog, select a dataset then click **Add**.  
You can add more data sources at any time by clicking **Add Step (+)**, then clicking **Add Data**.
3. Optional: In the Add Data pane, configure your data. For example, include or exclude columns, or rename columns.



4. Build your data flow:

For each function that you want to perform, click **Add a step (+)**, click the step type you want, then specify the properties in the Step editor pane.

**Tip:** Hover over the last step to display the **Add a step (+)** option. You can also edit your flow and add steps using **Options** in the Column header. For example, you can rename, reformat, merge, or transform columns.

5. Add a **Save Data** step to the end of your data flow.

6. Save your data flow.

You can start processing your data now by clicking **Run Data Flow**, or later using the **Data Flows** panel on the Data page (from the Home page, click **Navigator**, then click **Data**). You can access the generated dataset on the **Datasets** panel on the Data page.

## Generate or Update a Dataset Using a Data Flow

Run (that is, execute) a data flow to generate or update a dataset.

1. On the Home page, click **Navigator**, then **Data**, then **Data Flows**.
2. Start a data flow.
  - To start a data flow immediately, right-click a data flow and click **Run**.
  - To schedule a data flow to execute at a particular date and time, right-click a data flow, click **New Schedule**, then click **New**, and use the Data Flow dialog to specify a date and time and repeat cycle.

You can also run a data flow from the data flow editor by clicking **Run Data Flow**.

To view the dataset, from the Home page, click **Navigator**, then **Data** and navigate to the **Datasets** page.

## Reuse a Data Flow

In a data flow, you can add parameters so that users can specify the data source and output dataset to use at runtime.

1. On the Home page, click **Navigator**, then **Data**, then **Data Flows**.
2. Open your data flow.
3. In the Step editor pane, select the parameter prompt options to your steps. You can add parameters to the steps **Add Data**, **Save Data**, and **Create Essbase Cube**.
4. To specify the datasource at runtime, in an **Add Data** step, select the **When Run Prompt to select Dataset** option then provide the **Name** and **Prompt** values for the parameter.
5. To specify the output dataset at runtime, in a **Save Data** step, select the **When Run Prompt to specify Dataset** option, then provide the **Name** and **Prompt** values for the parameter.
6. To specify the output Essbase cube at runtime, in a **Save Data** step, select the **When Run Prompt to specify Dataset** option, then provide the **Cube**, **Application**, and **Prompt** values for the parameter.

When you run (or execute) the data flow, you see a Dataflow Prompt dialog, which enables you to either use the default values or specify alternative values. For example:

- If you added a parameter to specify the data source, you can either click **OK** to accept the default, or click the default dataset name displayed in the Sources section to display the Add Dataset dialog where you can select an alternative.
- If you added a parameter to specify the data target, you can either click **OK** to accept the default, or edit the default dataset name displayed in the Targets section to specify an alternative.

## Configure Incremental Processing in a Data Flow

Configure incremental processing to load only new or updated records from a database. You can deploy incremental processing if your data is sourced from a database (using a database connection).

Incremental processing keeps your data up-to-date, providing better quality insights.

Before you start, create a connection to one of the supported databases, for example Oracle, Oracle Autonomous Data Warehouse, Apache Hive, Hortonworks Hive, or Map R Hive.

1. Specify a new data indicator in the data source. See [Specify a New Data Indicator for a Data Source](#).
2. Apply incremental processing in your data flow. See [Apply Incremental Processing in a Data Flow](#).

## Specify a New Data Indicator for a Data Source

To configure incremental processing in a data flow, you first specify a new data indicator in the data source.

Before you start, create a connection to one of the supported databases, for example Oracle, Oracle Autonomous Data Warehouse, Apache Hive, Hortonworks Hive, or Map R Hive.

1. On the home page, click **Navigator**, then click **Data**
2. Select a dataset, click the **Actions menu** or right-click, then select **Open**.
3. In the **Join Diagram**, double-click the table that includes the incremental identifier you'd like to use.
4. Click **Edit Definition** on the toolbar.
5. Confirm that the data access panel is displayed.

If the data access panel isn't displayed, go to the center of the right edge of the window to locate the **Expand** option. Click **Expand** to open the panel.

Name SALES

Description External Embedded dataset for datamoc

Connection Oracle DB

Data Access Automatic Caching

New Data Indicator Select Column

Created On Just now

Modified On Just now

Refreshed Just now

6. From the **New Data Indicator** list, select a column to detect when new data is added.
7. Click **OK**.

You're now ready to apply incremental processing in your data flow.

## Apply Incremental Processing in a Data Flow

Apply incremental processing in a data flow to load only new or updated records from a database.

Before you start, create a connection to one of the supported databases, for example Oracle, Oracle Autonomous Data Warehouse, Apache Hive, Hortonworks Hive, or Map R Hive.

1. Create or open the data flow in which you want to apply incremental processing.
2. In the Data Flow editor select the **Save Data** step to display the Step editor pane.
3. In the **Dataset** field, specify the name of the input dataset (the dataset specified in the **Add Data** step).
4. At the **Save data to** option select **Database Connection**.
5. Click **Select Connection** and select a connection to one of the supported target databases.
6. In the **Data** field, specify the name of the target table that you're writing to.
7. In the **When run** option, select **Add new data to existing data**.
8. Click **Save**.

You're now ready to schedule your data flow to load new data regularly.

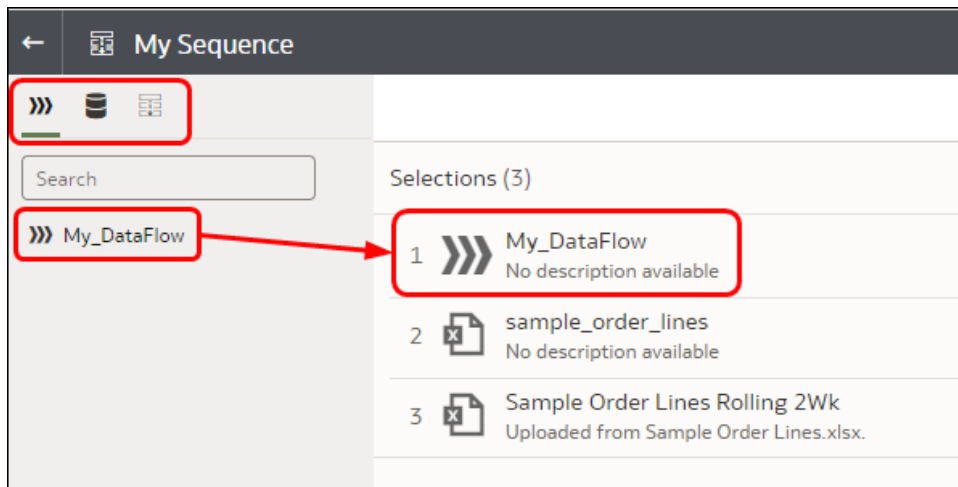
## Process Data Using a Sequence of Data Flows

A sequence is collection of data flows, datasets, or other sequences that you process together. They're useful when you want to run multiple data flows, datasets, or sequences, as a single transaction.



1. On the Home page click **Create** and select **Sequence**.

2. Click the default sequence name "New Sequence" top left, and change to a meaningful name, for example "My Sequence".
3. Add the items you want to process using the **Data Flows**, **Datasets**, and **Sequences** tabs to show items for selection.



- To add data flows, click **Data Flows**, then drag and drop one or more data flows to the **Selections** pane.
  - To add datasets, click **Datasets**, then drag and drop one or more datasets to the **Selections** pane.
  - To add other sequences, click **Sequences**, then drag and drop one or more sequences to the **Selections** pane.
4. Arrange the items in the sequence.
    - If you want to override the default order in which Oracle Analytics processes items, select the **Ordered** option and drag and drop items to change the order (numbered 1,2,3 and so on).  
If the **Ordered** option is deselected (the default setting), this triggers auto-dependency detection. Oracle Analytics takes into consideration inputs and outputs for each sequence item to determine the execution order, and executes items in parallel where necessary.
    - To remove items, hover over an item and click the ellipsis at the right-hand side, then click **Remove**.
  5. Click **Save**.
  6. Start the sequence.
    - To start the sequence immediately, click **Execute Sequence** in the sequence editor.
    - To start the sequence later, from the Home page, click the **Navigator**, then click **Data**, then **Sequence**. Right-click a sequence, then click **Run**.
    - To schedule a sequence to execute at a particular date and time, from the Home page, click the **Navigator**, then click **Data**, then **Sequence**. Right-click a sequence, then click **New Schedule**, then click **New**, and use the Schedule dialog to specify a date and time and repeat cycle.
  7. Manage the sequence process.

- To manage a sequence being processed, from the Home page, click the **Navigator**, then **Jobs**.
- To manage scheduled sequences, from the Home page, click the **Navigator**, then **Jobs**, then **Schedules**.

**Note:**

Sequences don't process copies of a data flow. When a sequence processes a data flow, copies of that data flow are ignored. If this happens, you see updates in the sequence logs accessed via the **History** tab on the Inspect panel.

## Manage Your Data Flows

Manage your data flows on the Data Flows page. For example, you might schedule when you process your data, or export a data flow so that you can migrate it to a different Oracle Analytics instance.

Manage your data flows so keep your data up-to-date, giving you better quality insights.

1. On the Home page, click **Navigator**, then **Data**, then **Data Flows**.
2. Hover over a data flow and use the **Actions menu** to access the options described in the table below.
  - Use **Run** to create or update your data using the data flow.
  - Use **Open/Open in a New Tab** to edit the data flow.
  - Use **New schedule** to create or update your data regularly.
  - Use **Inspect** to view general information about the data flow, such as the source and target data, when the flow was last executed, scheduled executions, and execution history. You can also use the **Access** tab to share data flows that you own.
  - Use **Export** to export a data flow with its dependent data and credentials as a .DVA file to the download folder of your machine. Use the export and import options to migrate data flows from one system to another or back up your data flows. When you export data flows, you can select what to include in the export file. For example, enable **Include Permissions** to include access permissions so that shared connections continue to work when you import the data flow. To import a data flow that you've downloaded, on the Data Flows page, click **Page Menu**, then click **Import Workbook/Flow**. Follow the on-screen instructions to select a local .DVA file to import. When you import the data flow, select **Import Permissions (if available)** to include access permissions so that shared connections continue to work.
  - Use **Delete** to remove the data flow from your system (there's no undo).

# 6

## Manage Datasets

This topic describes the different ways you can manage your datasets.






### Topics:

- [Dataset Type Icons](#)
- [View a List of Datasets and Information About Them](#)
- [Reload a Dataset's Data](#)
- [Inspect a Dataset's Properties](#)
- [Rename a Dataset and Change Its Description](#)
- [Copy a Dataset's Object ID](#)
- [View a Dataset's Data Elements](#)
- [Download a Dataset's Source File](#)
- [Duplicate a Dataset](#)
- [Delete a Dataset](#)

## Dataset Type Icons

A dataset's icon helps you identify the connection type or file it uses to source its data.

Dataset type icons are displayed in your list of datasets. See [View a List of Datasets and Information About Them](#).

Dataset Icon	Description
	Dataset uses two or more database connections. For example, Oracle Database and Oracle Analytics Warehouse.
	Dataset uses one database connection.
	Dataset uses an XLSX or XLS file.
	Dataset uses a CSV or TXT file.
	Dataset uses an Oracle Applications connection type. The Oracle Applications connection type can connect to: <ul style="list-style-type: none"><li>• Oracle Fusion Cloud Applications Suite (for example, Oracle Fusion Cloud Financials)</li><li>• On-premises Oracle BI Enterprise Edition deployments (if patched to an appropriate level)</li><li>• Another Oracle Analytics service</li></ul>

## View a List of Datasets and Information About Them

You can access, browse, sort, or search a list of datasets. From the dataset list, you can choose any available dataset to use in a workbook.

You can use the dataset list to find information about a specific dataset, for example which data source connection it uses, when it was created and last modified, and the name, data type, and aggregation of each dataset column.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Optional: Enter a term in the **Search** field to search the list for a specific dataset.
4. To check a dataset's details, click **Actions** and then click **Inspect**.
5. Optional: Click the General tab to find information about the dataset, such as the connection used to create it and the database type that the dataset gets its data from.
6. Optional: Click the Data Elements tab to find information that can help you decide if the dataset contains the data that you need for your workbook.

## Reload a Dataset's Data

Keep your analytics content up-to-date by reloading dataset data when it's been updated.

 [LiveLabs Sprint](#)

### Topics:

- [About Reloading a Dataset's Data](#)
- [Reload Data from the Workbook Editor](#)
- [Reload an Individual Table in a Dataset](#)
- [Reload Tables in a Dataset](#)
- [Reload a Dataset's Files](#)
- [View a Dataset's Reload History](#)
- [View or Download a Reload Job's Log Files](#)

## About Reloading a Dataset's Data

You can reload a dataset that uses a single file as its source, when one or more tables in the dataset are cached, or when the dataset is created from running a data flow. Or you can reload a datasets's files and tables individually.

Reloading data ensures that workbooks and visualizations contain current data. The most current data is displayed in workbooks and visualizations after the dataset reload is complete and you refresh the workbooks. See [Refresh a Workbook's Data](#).

How you reload data depends on the dataset's data source type.

### Data from External Connections

When you reload data for a dataset with an external connection, the dataset's SQL statement is rerun and the current data for the tables with the **Data Access** field set to **Automatic Caching** is loaded into cache.

If your dataset contains one or more tables with the **Data Access** field set to **Automatic Caching**, then you can use the **Data** page to reload the tables in the dataset. To reload individual tables, use the **Dataset** editor.

### Reload Excel, CSV, or TXT File

When you reload a Microsoft Excel file (XLSX or XLS), you must ensure that the newer spreadsheet file contains a sheet with the same name as the original file. And the sheet must contain the same columns that are in the dataset. The data reload fails if the file you load is missing columns.

When you reload a CSV or TXT file, make sure that it contains the same columns that are in the dataset. A reload will fail if the file you load is missing columns.

To reload a dataset that uses one file as its source, use the **Data** page or **Dataset** editor. If a dataset uses two or more files, then use the **Dataset** editor to manually reload each file. If a dataset uses a combination of files and external connections, then use the **Dataset** editor to manually reload each file.

### Oracle Fusion Cloud Applications Suite

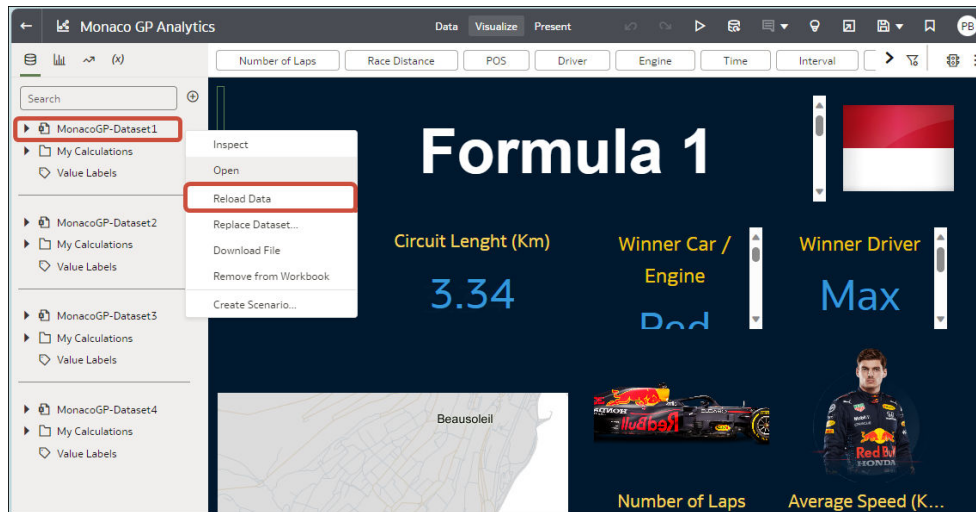
You can reload data and metadata for Fusion Applications Suite data sources. If the Fusion Applications Suite data source uses logical SQL, reloading data reruns the dataset's SQL statement.

## Reload Data from the Workbook Editor

When you're editing a workbook, you can reload data to update the workbook with the most up-to-date data.

1. On the Home page, locate the workbook and click **Open**.
2. Click the **Visualize** tab.
3. On the Data panel, right-click the table name and select **Reload Data**.





## Reload an Individual Table in a Dataset

Use the Dataset editor to reload data for an individual dataset table that uses a connection. Reloading queries the table's data source and loads the current data into cache.

If you want to reload a table that uses a file as its source, then see [Reload a Dataset's Files](#).

The Reload option is available for any dataset table with the **Data Access** field set to **Automatic Caching**.

Typically you reload all of the dataset's tables at the same time so that the data is consistent across all tables. But sometimes it makes sense to reload only one of the dataset's tables. For example, where you know that the data has changed in a fact table but not in any of the dimension tables.

Reloading doesn't update the table's Profile data preview information. To see the most current data in the data preview, re-profile the table after you reload the table.

1. On the Home page, click **Data** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that contains the table, click **Actions**, and then click **Reload Data**.

## Reload Tables in a Dataset

Use the Datasets tab to reload data for the dataset's tables that use connections and have the **Data Access** field set to **Automatic Caching**. Reloading queries the tables' data sources and loads the current data into cache.

### Note:

You can also programmatically reload data for an existing dataset that's based on a connection using the REST API. See [Reload data for a dataset](#) in the *REST API for Oracle Analytics Cloud*.

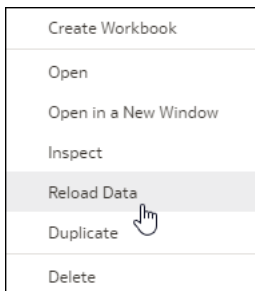
Reloading data ensures that workbooks and visualizations contain current data. The most current data is displayed in workbooks and visualizations after the dataset reload is complete and you refresh the workbooks.

If you want to reload a dataset that contains more than one table and uses files as its source, or if the dataset contains a combination of tables created from connections and files, then see [Reload a Dataset's Files](#).

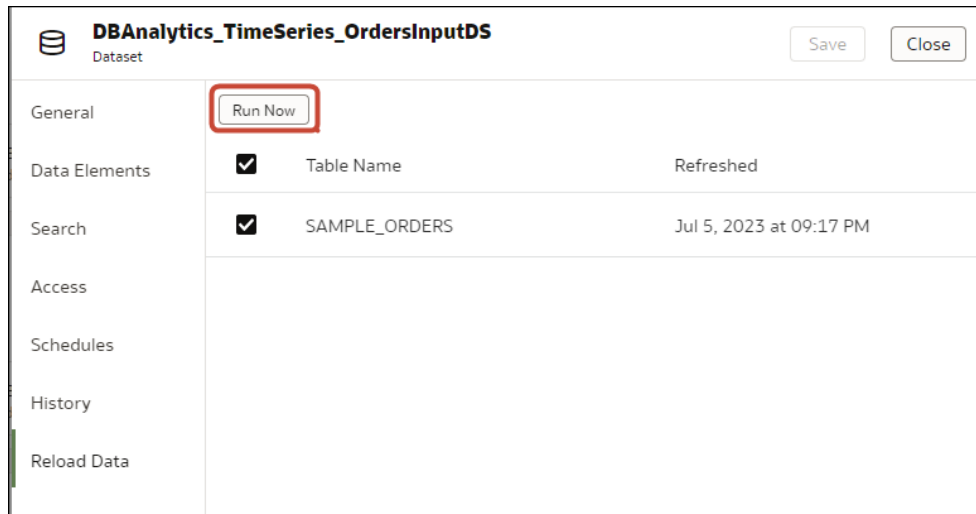
The **Reload Data** option is available for any dataset when the **Data Access** field is set to **Automatic Caching** for one or more table, and when the data source connection includes credentials for one or more table .

Dataset tables with the **Data Access** field set to **Live** aren't included in the reload. See [Specify Whether a Dataset Table Is Cached or Live](#)

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to reload, click **Actions**, then click **Reload Data**.



4. Select the tables that you'd like to reload then click **Run Now**.



## Reload a Dataset's Files

Reload data from the XLSX, XLS, CSV, or TXT files to make sure that you have the most up-to-date workbook content.

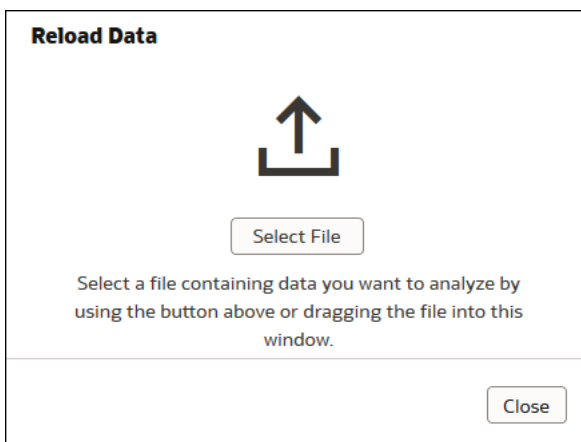
Reloading a dataset's files ensures that workbooks and visualizations contain current data. The most current data is displayed in workbooks and visualizations after the file reload is complete and you refresh the workbooks.

Note the following information:

- If a dataset contains one table and it uses a file as its source, then use the **Data** page or **Dataset** editor to reload the file.
- If a dataset uses two or more files, then use the **Dataset** editor to reload each file.
- If a dataset uses a combination of files and external connections, then use the **Dataset** editor to upload each file. See [Reload Tables in a Dataset](#).

For information about structuring spreadsheets to ensure a successful upload, see [About Files for Datasets](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to open, click **Actions**, and then click **Reload Data**.
4. In the Reload Data dialog, drag and drop the file onto the dialog or click **Select File** to browse for the file.



5. Click **OK**.

## View a Dataset's Reload History

Historical information is generated for dataset reloads at the job level and at the table level.

Use a dataset's reload history to find out information such as how the reload was executed (manually or by schedule), job status, start time, end time, and the amount of data reload in bytes. You can also drill into information about the job's reloaded tables. For example, the table's source name, reload status, and number of rows.

Oracle Analytics generates historical information when you reload datasets that use connections.

Oracle Analytics doesn't generate historical information and log files when you reload datasets that:

- Use only files.
- Use a connection and a file. Oracle Analytics generates historical information only for a dataset's tables that use a connection.
- Use an Oracle EPM Cloud or Oracle Essbase connection.

Log files are available for each data reload. See [View or Download a Reload Job's Log Files](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want reload history information for, click **Actions**, and then click **Inspect**.
4. Click the **History** tab.
5. Click a job in the list to go to the **General** tab to view its details.
6. Optional: Click the **Status** tab to view table information or to access a list of all reloaded tables. Click a table to view more reload information about it.

Sales History			
Job			
General	Task Name	Status	Duration
Status	DSET : Sales History - COUNTRIES	Completed	0 sec
	DSET : Sales History - PROMOTIONS	Completed	1 sec
	DSET : Sales History - SALES	Completed	4 sec
	DSET : Sales History - CUSTOMERS	Completed	2 sec
	DSET : Sales History - CHANNELS	Completed	1 sec
	DSET : Sales History - TIMES	Completed	1 sec
	DSET : Sales History - PRODUCTS	Completed	1 sec

## View or Download a Reload Job's Log Files


Log files are generated for dataset reloads at the job level and at the table level.

You can view and download logs at the dataset reload job level. You can also drill into the job's individual tables to view their log files. Use these logs to help you troubleshoot dataset reload issues.

For example, if you have an issue reloading data, the logs can help you determine if it's a problem with your configuration, such as an invalid or outdated password or an issue with too much data. In such cases, the log files contain time stamps for key operations and information on the number of records processed.

Oracle Analytics generates log files when you reload datasets that use connections.

Oracle Analytics doesn't generate historical information and log files when you reload datasets that:

- Use only files.
  - Use a connection and a file. Oracle Analytics generates log files only for a dataset's tables that use a connection.
  - Use an Oracle EPM Cloud or Oracle Essbase connection.
1. On the Home Page, click **Navigator** and then click **Data**.
  2. Click the **Datasets** tab.
  3. Locate the dataset that you want the reload logs for, click **Actions**, and then click **Inspect**.
  4. Click the **History** tab.
  5. Click the job that you want logs for.
  6. In the **General** tab, click the , (**Job details menu**) and select **View Log** to view the log, or select **Download Logs** to download the logs.
  7. Optional: If the job reloaded more than one table and you want to view log information for a specific table, then click **Status** and in the list locate and click the table's reload task name.
  8. Optional: Click **Job Task Menu** and select **View Log**.

Task Name	Task Details
DSET : Sales History - COUNTRIES	Name: DSET : Sales History - COUNTRIES
DSET : Sales History - PROMOTIONS	Source Name: 'Admin'/'Project Flink'
DSET : Sales History - SALES	Target Name: Data Set Storage
DSET : Sales History - CUSTOMERS	Status: Completed
DSET : Sales History - CHANNELS	Status Detail: Successfully ran with no errors
DSET : Sales History - TIMES	Start Time: Today at 01:52 PM
DSET : Sales History - PRODUCTS	End Time: Today at 01:52 PM
	Duration: 0 sec
	Number of Successful Rows: 23
	Read Throughput: 1277 rows per second
	Write Throughput: 23000 rows per second
	Data Size: 4195 bytes

## Inspect a Dataset's Properties

Access and view information to learn about the dataset, such as when it was created, when it was last modified, and a list of its data elements.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to inspect properties for, click **Actions**, and then click **Inspect**.
4. Click the tabs to navigate and inspect the dataset's properties.
5. Click **Close**.

## Rename a Dataset and Change Its Description

You can rename and change the description of any dataset.

Renaming a dataset doesn't affect a workbook's reference to the dataset, and any workbooks using the dataset display the new name and continue to work as designed. When you add a dataset to a workbook, the workbook connects to the dataset by the dataset's fixed object ID, which was assigned when the dataset was created and saved, and not by its name. See [Copy a Dataset's Object ID](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to rename, click **Actions**, and then click **Inspect**.
4. Click the **General** tab.
5. Go to the **Name** field and rename the dataset.
6. Go to the **Description** field and update the dataset's description.
7. Click **Save**.

## Copy a Dataset's Object ID

Each dataset has an assigned, unique, fixed object ID. You can use this ID to help find and troubleshoot Oracle Analytics errors and issues, or search log files.

The dataset's object ID, and not the dataset's name, is used to reference, track, and manage the dataset. In most cases, the object ID is based on the name that you provide when you create the dataset. Updating a dataset's name doesn't update its object ID. See [Rename a Dataset and Change Its Description](#).

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that with the ID that you want to copy, click **Actions**, and then click **Inspect**.
4. Click the **General** tab.
5. Go to the **Object ID** field and click the **Copy** button.

## View a Dataset's Data Elements

The data elements list contains information such as data element name, data type, and aggregation. You can use information about data elements to determine if the dataset contains data that you want to visualize and analyze.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to view data elements for, click **Actions**, and then click **Inspect**.
4. Click the **Data Elements** tab.

Sales History Dataset					
General	Name	Table Name	Data Type	Treat As	Aggregation
Data Elements	PROD_ID	SALES	Number	Match	None
Search	CUST_ID	SALES	Number	Attribute	None
Access	TIME_ID	SALES	Time	Match	None
Schedules	CHANNEL_ID	SALES	Number	Match	None
History	PROMO_ID	SALES	Number	Match	None
	QUANTITY_SOLD	SALES	Number	Measure	Sum
	AMOUNT_SOLD	SALES	Number	Measure	Sum
	CHANNEL_ID_1	CHANNELS	Number	Attribute	None
	CHANNEL_DESC	CHANNELS	Text	Match	None
	CHANNEL_CLASS	CHANNELS	Text	Match	None
	CHANNEL_CLASS_ID	CHANNELS	Number	Measure	Sum
	CHANNEL_TOTAL	CHANNELS	Text	Match	None
	CHANNEL_TOTAL_ID	CHANNELS	Number	Measure	Sum
	CUST_ID_1	CUSTOMERS	Number	Attribute	None

## Download a Dataset's Source File

You can download a file from a dataset that contains one table and one source file.

Here are some reasons why you would download a dataset's source file:

- You uploaded the dataset file, but deleted, lost, or misplaced the original file.
- You imported the workbook and need to access the original dataset file.

When you download a dataset's source file, by default the resulting file is the same format as the file used to create the dataset. However, you can change the file type if you choose to save the file.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to download, click **Actions**, and then click **Download File**.
4. When prompted, open or save the file.

## Duplicate a Dataset

You can duplicate any dataset. Duplicating a dataset and modifying the copy can be faster than creating and building a dataset from scratch.

You're the owner of the duplicate dataset. The default name of the duplicate dataset is the copied dataset's name appended with Copy. For example, SAMPLE\_REVENUE-Copy.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to duplicate, click **Actions**, and then click **Duplicate**.

## Delete a Dataset

Delete a dataset when it's no longer needed or you need to free up space on your system.

### Note:

Deleting a dataset permanently removes it and breaks any workbooks that use it. When you choose to delete a dataset, Oracle Analytics won't list workbooks that use the dataset. Before you delete a dataset you must be sure that it isn't used in any workbooks.

1. On the Home page, click **Navigator** and then click **Data**.
2. Click the **Datasets** tab.
3. Locate the dataset that you want to delete, click **Actions**, and then click **Delete**.



# 7

## Visualize and Analyze Data

This topic describes the many ways that you can visualize and analyze your data.



### Topics:

- [Begin to Build a Workbook and Create Visualizations](#)
- [Open a Workbook in Edit Mode](#)
- [Configure a Workbook to Open in Edit Mode](#)
- [Work with a Workbook's Datasets](#)
- [Build a Visualization by Adding Data](#)
- [About Visualization Types](#)
- [Enhance Data in Visualizations with Statistical Analytics](#)
- [Use Spark Charts to Examine Trends](#)
- [Create Calculated Data Elements in a Workbook](#)
- [Undo and Redo Edits](#)
- [About Refreshing a Workbook's Data](#)
- [Refresh a Workbook's Data](#)
- [Pause Data Queries in a Workbook](#)
- [Work with Canvas Properties](#)
- [Copy and Paste a Visualization or Canvas](#)
- [Copy and Paste a Visualization's Data](#)
- [Work with Multiple Visualizations on a Canvas](#)
- [Change Visualization Types](#)
- [Adjust Visualization Properties](#)
- [Highlight Important Data Events with Conditional Formatting](#)
- [Apply Color to Visualizations](#)
- [Format Numeric Values of Columns](#)
- [Set Currency Symbols for Visualizations](#)
- [Add Notes to Visualizations](#)
- [Format Numeric Values of Visualizations](#)
- [Sort, Drill, and Select Data in Visualizations](#)
- [Replace a Dataset in a Workbook](#)
- [Remove a Dataset from a Workbook](#)

- [Overview of My Calculations](#)
- [Create a Calculation Based on a Cluster or Outlier](#)
- [Analyze Data with Explain](#)
- [About the Warning for Data Issues in Visualizations](#)
- [Set Workbook Thumbnails](#)
- [Set Visualization Loading Overlay Opacity](#)

## Begin to Build a Workbook and Create Visualizations

To start a workbook, choose and add a dataset and then drag and drop its columns onto the Visualize page's canvas to create visualizations.

You create workbooks to store and organize your analytics content, such as graphs and charts.

### Tutorial

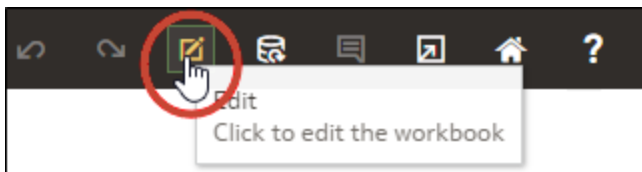
If you want to learn about the datasets that are available to you, then you can view a list of datasets and find out more information about each dataset. See [View a List of Datasets and Information About Them](#).

1. On the Home page, click **Create** and click **Workbook**.
2. In the Add Data dialog, click a dataset and then click **Add to Workbook**.
3. In the Data Panel, locate and drag and drop data columns onto the Visualize canvas to start building visualizations.
4. Click **Save**.

## Open a Workbook in Edit Mode

If you're a workbook author you can change a workbook that you open for viewing into a workbook that you can edit.

1. On the Home page, click a workbook to open it.
2. If the workbook opens for viewing, then click **Edit**.

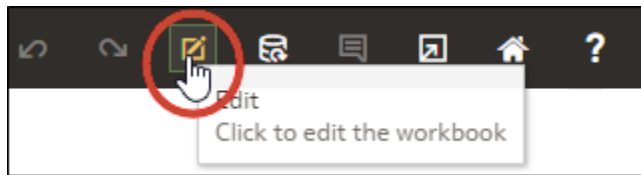


## Configure a Workbook to Open in Edit Mode

As a workbook author, you can make workbooks that you create open in Edit mode as the default behavior.

A workbook always opens in viewer mode unless you change its **Open as a Viewer** property.

1. On the Home page, click a workbook to open it.
2. Click **Edit** to open the workbook in edit mode and enable the display of workbook properties.



3. Click the workbook **Menu** and select **Workbook Properties**.
4. In the **Open as a Viewer** field, click **Off** for the workbook to open in edit mode by default.
5. Click **OK**.
6. Click **Go back**, then click **Save**.

## Work with a Workbook's Datasets

This topic describes what you need to know to work with a workbook's datasets.

### Topics:

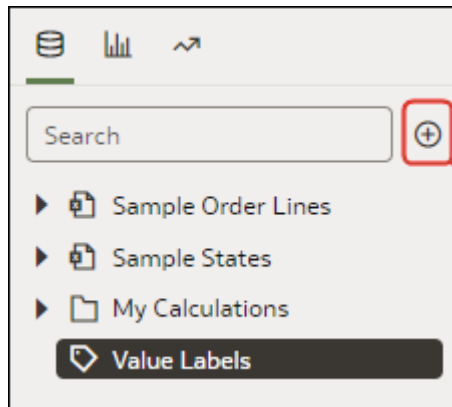
- [Add Datasets to a Workbook](#)
- [Replace a Dataset in a Workbook](#)
- [Remove a Dataset from a Workbook](#)
- [Modify a Workbook's Datasets](#)
- [Blend Datasets](#)

## Add Datasets to a Workbook

Your workbook can use more than one dataset.

When you add more than one dataset, Oracle Analytics blends the data. You can check the default blending, or update or add data blending between datasets. See [Blend Datasets](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Data panel, click **Add**, and select **Add Data**.



3. Select a dataset, then click **Add to Workbook**.

## Replace a Dataset in a Workbook

When you replace a dataset, Oracle Analytics suggests how you can re-map the columns from the dataset that you replaced to the replacement dataset. You can accept or update these suggested mappings.

For example, you might replace a workbook's test dataset with a production dataset. Or you can copy a workbook and its visualizations, and then use the duplicate workbook as a template. After you rename the duplicated workbook, you can add a different dataset.

When you replace the dataset, any data mapping that you specify is applied to the workbook. For example, if you map a data element to **None**, the specific data is removed from the workbook's visualizations, calculations, and filters.

1. On the Home page, select a workbook to use as a template, click the **Actions menu**, and then select **Open**.
2. From the Visualize page, click **Data**.
3. In the Data page, click the **Data Diagram**.
4. Locate the dataset to replace and click **Actions**.

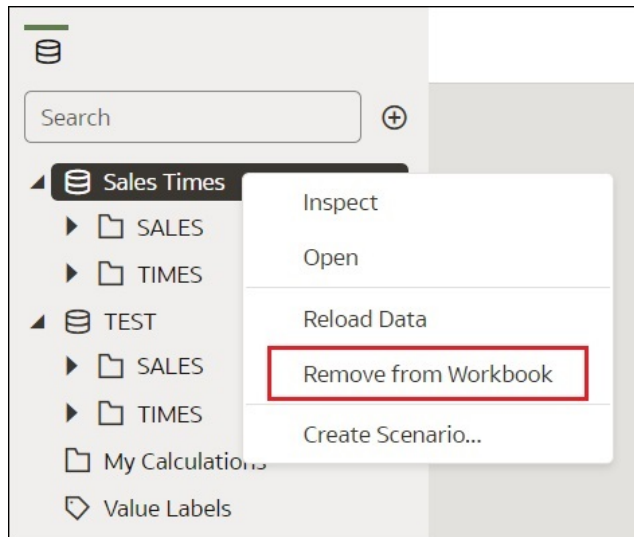


5. Select **Replace Dataset**.
6. In the Replace Dataset dialog, click the replacement dataset. Click **Select**.
7. Review, update, and specify the column mappings for the workbook's visualizations, calculations, and filters.
8. Click **Replace**.
9. Optional: If you want to add blending between datasets, then in the **Data Diagram**, click between the datasets that you want to blend, and in the Blend Data dialog add column matches.

## Remove a Dataset from a Workbook

You can remove a dataset from a workbook. When you do this, you remove all of the dataset's columns from the workbook's visualizations, filters, and calculations.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the **Visualize** canvas, go to the Data Panel pane, right-click the dataset that you want to remove, and select **Remove from Workbook**.



3. Click **Save**.

## Modify a Workbook's Datasets

You can use the Workbook Editor's **Data** page to navigate to the Dataset editor or Transform editor to view or modify a workbook's datasets.

When you locate a dataset's icon in the data diagram and click **Edit**, a new window opens that contains the editor that you use to view or modify the dataset. The Workbook Editor remains open in its own window and immediately reflects any saved dataset changes.

### Note:

A dataset can be used in multiple workbooks and data flows. Modifying a dataset impacts all workbooks and data flows that use the dataset.

See [About the Dataset Editor](#) and [Enrich and Transform Your Data](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the workbook editor, click **Data** to go to the Data page.
3. In the data diagram, locate the dataset and click its **Open** button.

The window that's displayed depends upon the dataset you selected:

- If the dataset uses an Oracle EPM Cloud, Oracle Essbase, or Google Analytics connection, then the Transform Editor is opened in a window.
  - If the dataset uses a connection that supports multiple tables (for example, Oracle Database or Oracle Autonomous Data Warehouse), then the Dataset Editor is opened in a window.
4. Optional: If the Dataset editor is displayed, click the tab for the table that you want to view or modify and the Transform Editor is displayed.
  5. Modify and save the dataset.

## Blend Datasets

This topic explains blending and how to blend a workbook's datasets.

### Topics:

- [Understand Blending](#)
- [About Mismatched Values in Blended Data](#)
- [Blend Datasets](#)
- [Change Data Blending in a Visualization](#)

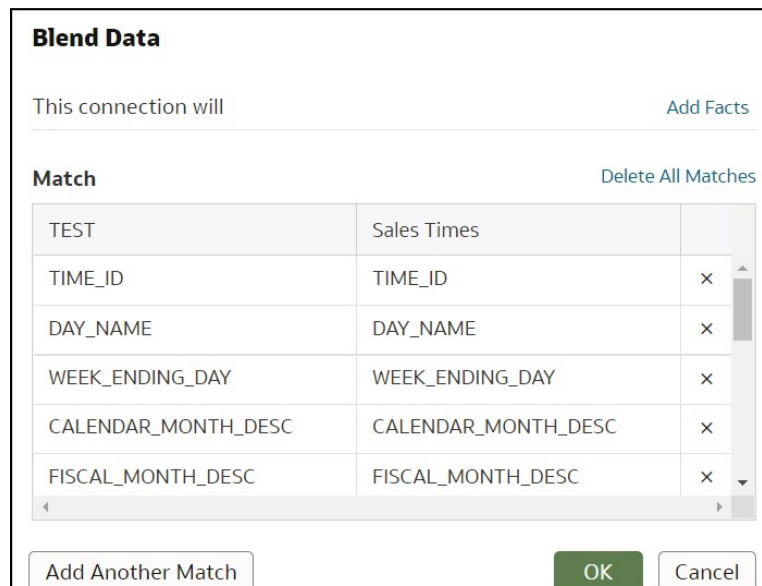
## Understand Blending

When you add more than one dataset to a workbook, Oracle Analytics tries to match columns between the datasets that you added. This matching is called blending.

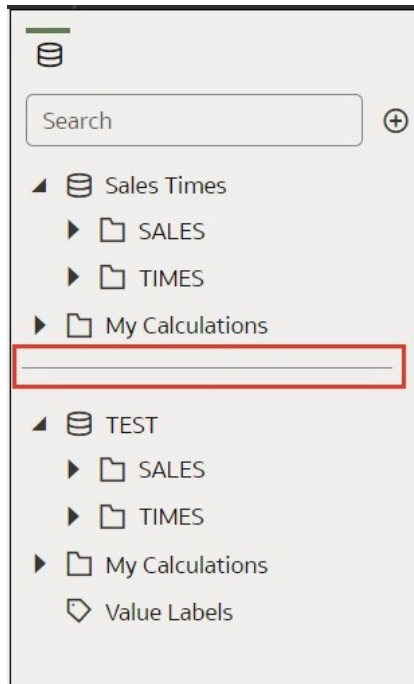


For example, Dataset A might contain new dimensions that extend the attributes of Dataset B. Or Dataset B might contain new facts that you can use alongside the measures that already exist in Dataset A.

Blending automatically matches external dimensions where they share a common name and have a compatible data type with attributes in the existing dataset.



Datasets that aren't blended are divided by a line in the workbook's Data Panel.



There are restrictions between data elements and visualizations when a workbook contains datasets that aren't blended. For example, if your workbook contains two datasets that aren't blended, then you can't include the data elements of one dataset in the filters, visualizations, or calculations of the other dataset.

Blending relationships are stored in the tables and not in the workbook. So any blending matches that you add or remove impact the other datasets that use the same tables.

Datasets that use Oracle Essbase or Oracle EPM Cloud connections aren't available for blending.

Your workbook might contain a dataset that includes tables from different connections and schemas. When a dataset contains multiple tables, the tables will contain joins. See [Understand Dataset Table Joins](#). In your workbook, you can blend datasets that contain multiple tables and joins. For example, you can add and blend datasets with multiple tables when you want your workbook to contain cross fact analysis.

## About Mismatched Values in Blended Data

In some cases when the rows of data that you expect to see in a dataset are missing, then you must specify which dataset to use for data blending.

Sometimes rows of data are missing when your workbook includes data from two datasets that contain a mixture of attributes and values, and there are match values in one source that don't exist in the other.

Suppose we have two datasets (Source A and Source B) with slightly different rows, as shown in the following image. Note that Source A doesn't include IN-8 and Source B doesn't 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 are displayed if you select the **All Rows** data blending option for Source A and select the **Matching Rows** data blending option for Source B. Because IN-7 doesn't exist in Source B, the results contain null Rep and null Bonus.

The screenshot shows the Tableau interface with Source A and Source B selected. The 'All Rows' option is selected for Source A and 'Matching Rows' for Source B. Three visualizations are shown:

- T4 - SA All SB Match -- no Mika**: A table with columns Date, Rep, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-7 with null values for Rep and Bonus.
- T5 - SA All SB Match -- no Mika**: A table with columns Date, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-7 with null values for Rep and Bonus.
- T6 - SA All SB Match -- no Mika**: A table with columns Rep, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-7 with null values for Rep and Bonus.

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

The screenshot shows the Tableau interface with Source A and Source B selected. The 'Matching Rows' option is selected for Source A and 'All Rows' for Source B. Three visualizations are shown:

- T7 - SA Match SB All -- No 3Jan**: A table with columns Date, Rep, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-8 with null values for Date and Revenue.
- T8 - SA Match SB All -- No 3Jan**: A table with columns Date, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-8 with null values for Date and Revenue.
- T9 - SA Match SB All -- No 3Jan**: A table with columns Rep, Rev, and Bonus. It shows data for IN-1 through IN-6, and IN-8 with null values for Date and Revenue.

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

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

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



- If the visualization contains a match column, then the system sets sources with the match column to **All Rows**.
- If the visualization contains an attribute, then the system sets its source to **All Rows** and sets the other sources to **Matching Rows**.
- If attributes in the visualization come from the same source, then the system sets the source to **All Rows**, and sets the other sources to **Matching Rows**.
- If attributes come from multiple sources, then the system sets the source listed first in the workbook's elements panel to **All Rows** and sets the other sources to **Matching Rows**.

## Blend Datasets

If your workbook contains multiple datasets, then you can blend data in one dataset with data in another dataset.

When you add more than one dataset to a workbook, the system tries to find matches for the data that's added. It automatically matches external dimensions where they share a common name and have a compatible data type with attributes in the existing dataset. Blending relationships are stored in the tables and not in the workbook. So any blending matches that you add or remove affects the other datasets that use the same tables.

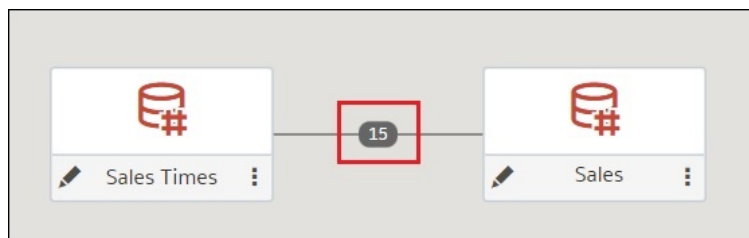
See [Understand Blending](#).

Datasets that use Oracle Essbase or Oracle EPM Cloud connections aren't available for blending.

### Note:

Datasets can include tables from different connections and schemas. These datasets use joins, which are defined in the Dataset editor. To reduce or eliminate blending in workbooks, Oracle suggests that whenever possible you create datasets that contain multiple tables and use joins. See [Create a Dataset From a Connection](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. To add another dataset to the workbook, then click **Data**, and in the Data page, go to the Data Panel, click **Add (+)**, and then **Add Dataset**.
3. In the Add Dataset dialog, select a dataset and click Add to Workbook.
4. In the Data page, go to the **Data Diagram** and locate the datasets to blend.
5. Click the number between the dataset icons.



6. Optional: To change the match for a column, click the name of the column and select a different column.  
  
If columns have the same name and same data type, then they're recognized as a possible match. You can customize this and specify that one column matches another by explicitly selecting it even if its name isn't the same. You can select only those columns with a matching data type.
7. Optional: Click **Add Another Match**, and in the table, select the columns that you want to join.
8. Optional: For a measure that you're uploading for the first time, specify the aggregation type such as *Sum* or *Average*.
9. Click **OK**.

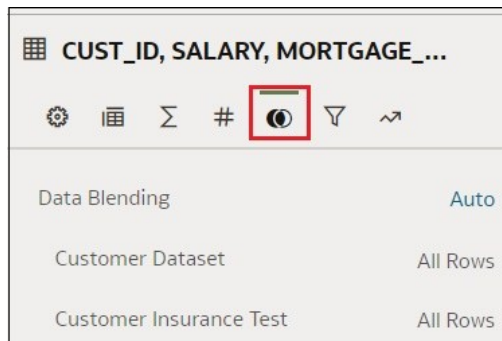
## Change Data Blending in a Visualization

You can modify a visualization's properties to override the workbook's data blending settings.

Datasets that use Oracle Essbase or Oracle EPM Cloud connections aren't available for blending.

See [Understand Blending](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the workbook, select a visualization, and in the Properties Panel click **Datasets**.



3. To change the default blending, click **Data Blending**, and select either **Auto** or **Custom**.  
  
If you choose **Custom**, you can set the blending to either **All Rows** or **Matching Rows**.
  - You must assign at least one source to **All Rows**.
  - If both sources are **All Rows**, then the system assumes that the tables are purely dimensional.
  - You can't assign both sources to **Matching Rows**.

## Build a Visualization by Adding Data

This topic describes how to add data to a visualization.

### Topics:

- [Create the Best Visualization For Selected Data Elements](#)
- [Add Data to a Visualization](#)
- [Create a Visualization from Another Visualization](#)
- [Modify a Visualization's Tooltips](#)

## Different Methods to Add Data

You can use different methods to add data from the Data Panel to create or update visualizations on a canvas.

Use one of the following methods to add data from the Data Panel:

- Drag data elements from the Data Panel and drop them onto the canvas.
- Select a data element or use Shift-click or Ctrl-click to select multiple data elements in the Data Panel, then right-click to select either a particular visualization type or the option to create a visualization automatically.
- Double-click a data element or use Shift-click or Ctrl-click to select multiple data elements in the Data Panel, then right-click to add them to the canvas.

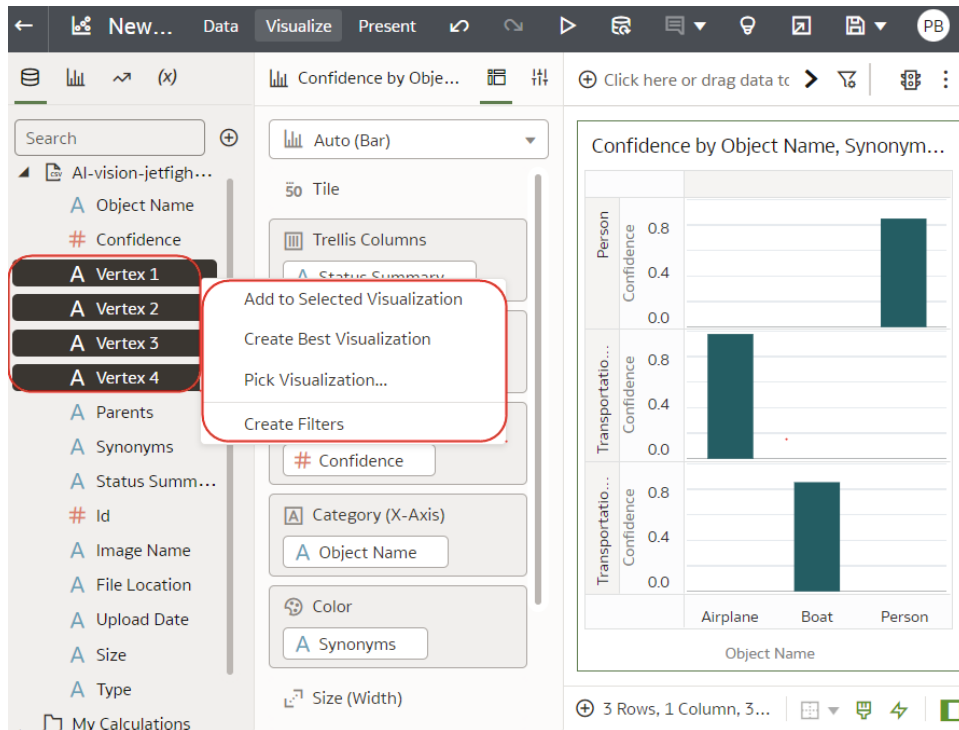
When you update an existing visualization, you can add data from the Data Panel onto the Grammar Panel or Assignments Pane on the canvas. You can move the data elements from one area to another in the Grammar Panel or Assignments Pane. The visualization is updated based on your selection.

You can create a visualization by selecting a visualization type from the Visualization tab of the Data Panel and adding data elements to the canvas.

## Create the Best Visualization For Selected Data Elements

When you select data elements in the Data Panel, Oracle Analytics can create the best visualization for you.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select the data you want to visualize by selecting one or more data elements on the Data Panel, right-click, and then click **Create Best Visualization**.



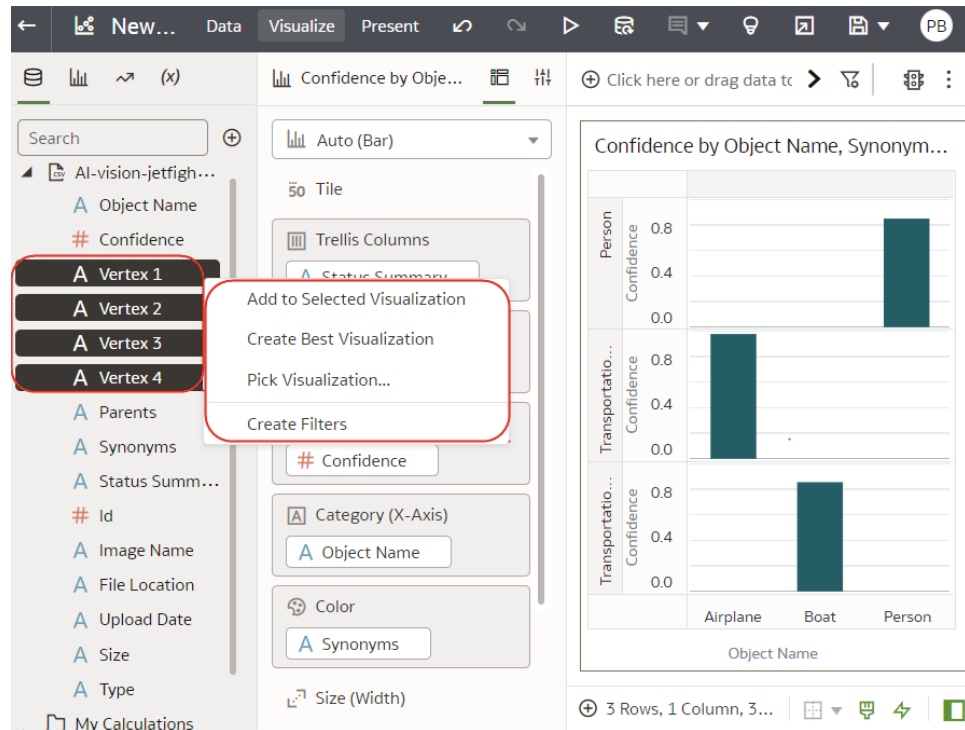
## Add Data to a Visualization

After you've selected the datasets for your workbook, you can begin to add data elements such as measures and attributes to visualizations.

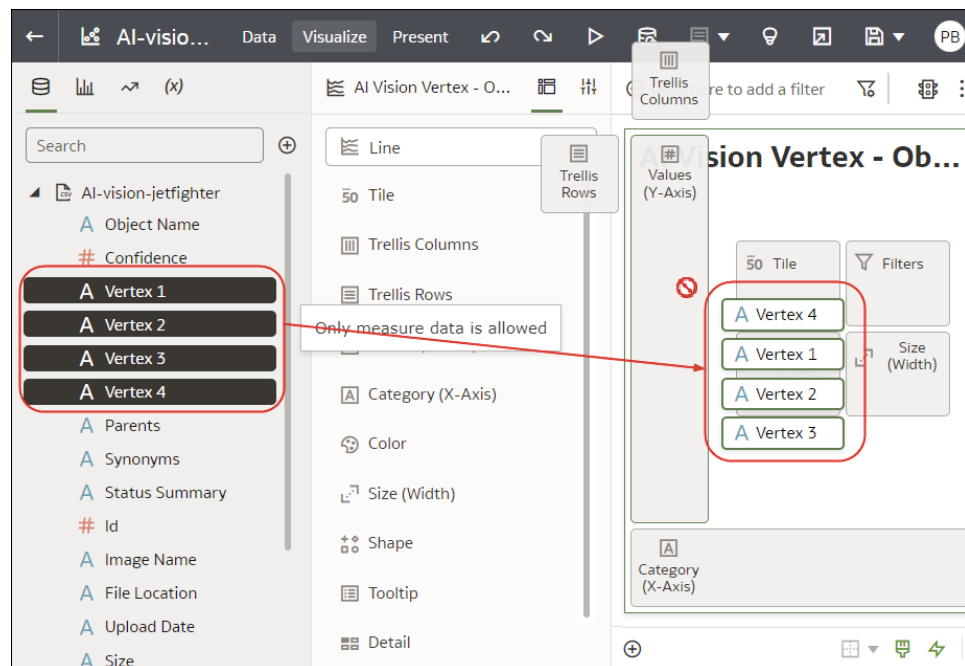
If you haven't already created a visualization, you need to create one. See [Begin to Build a Workbook and Create Visualizations](#).

You can select compatible data elements from the datasets and drop them onto the Grammar Panel in the Visualize canvas. Based on your selections, visualizations are created on the canvas. The Grammar Panel contains sections such as Columns, Rows, Values, and Category.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. If you created a workbook, then add a dataset to it.
3. Select the data you want to visualize by selecting one or more data elements on the Data Panel and then using one of the following methods:
  - Right-click, and click **Add to Selected Visualization**.

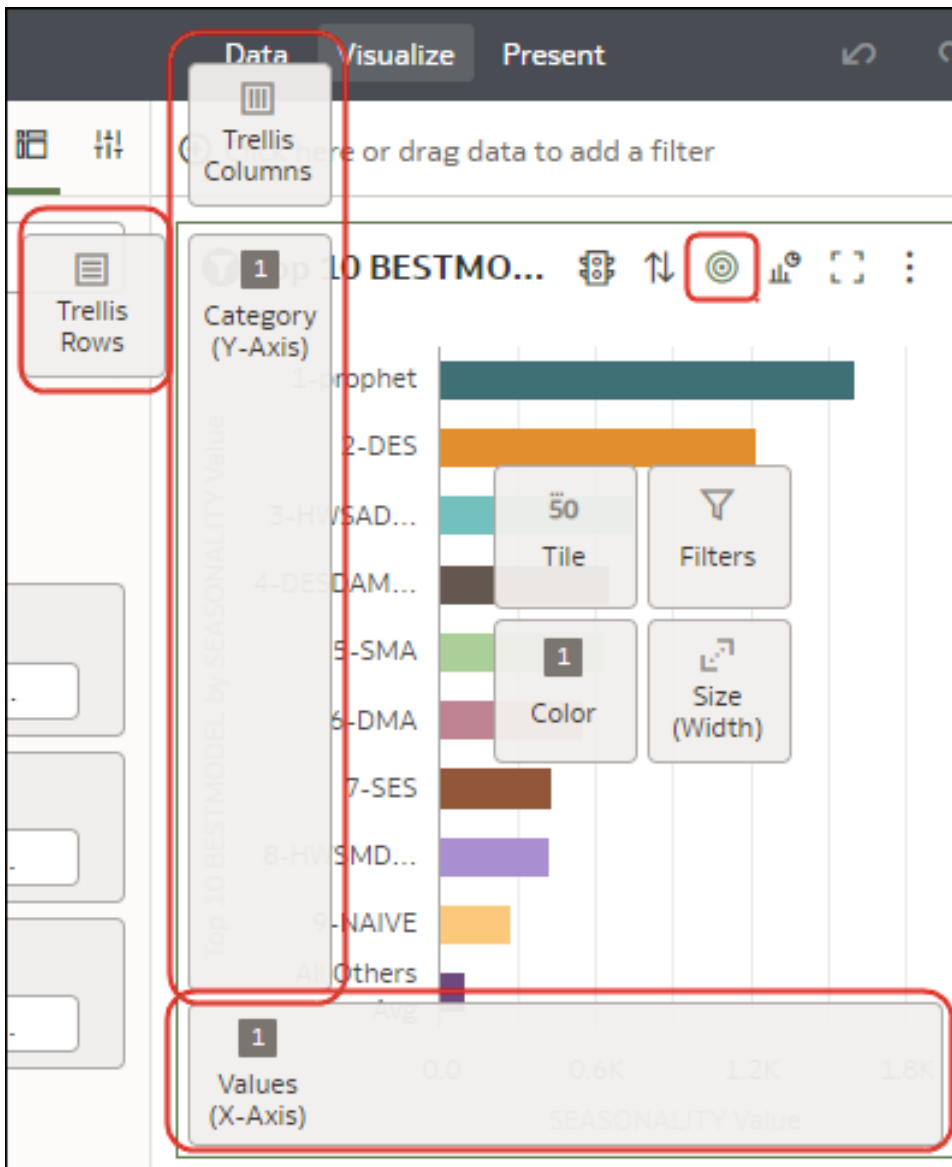


- Right-click, select **Pick Visualization**, and select a visualization type (for example, a table or heat map).
- Drag and drop them onto the visualization canvas or the Grammar Panel.



### Tips on adding data

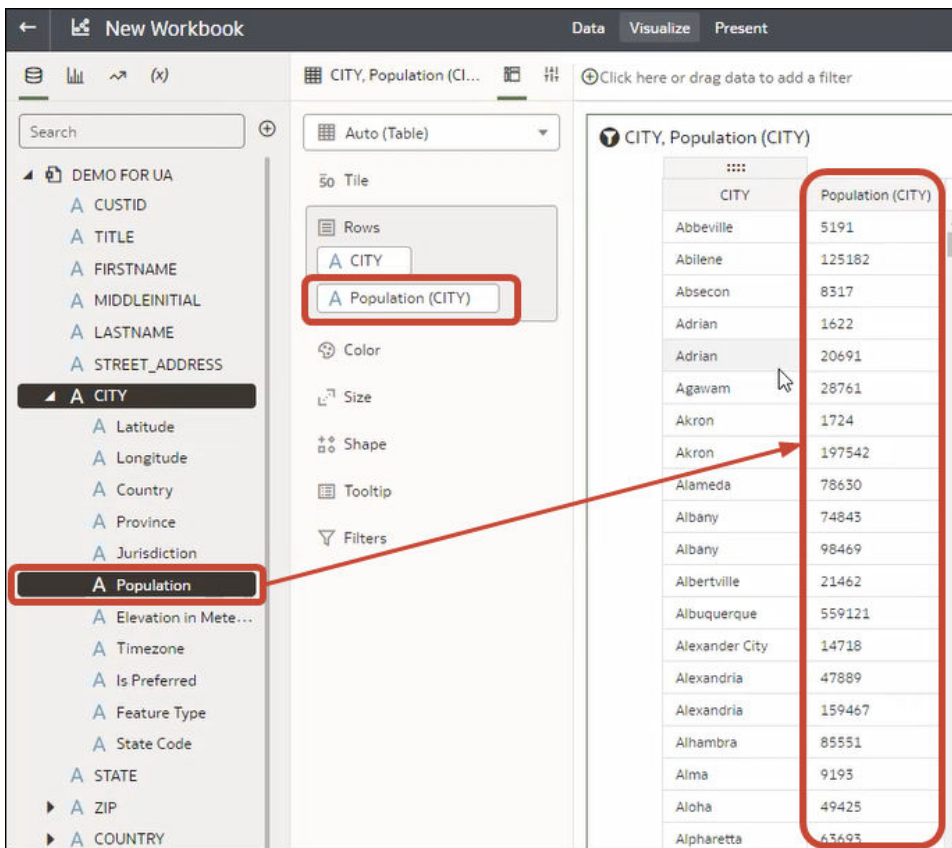
- To help you understand the components of a visualization, hover over it and click **Show Assignments** to annotate the visualization components, for example, the X-Axis and Y-Axis of a chart.



- Use the Grammar Panel to configure visualization components (for example, add, remove, re-order).

# CREDIT_BALANCE	
Name	CREDIT_BALA...
Treat As	Measure
Data Type	Number
Aggregation	Sum

- If a dataset is augmented with knowledge enrichments, you'll see knowledge enrichments in the element tree displayed just like regular data elements in the dataset. In this example, the Oracle Analytics administrator has added Population and other city-related data to Oracle Analytics. When you create a workbook based on the CITY dataset, you can add population and other data elements directly to your visualization.



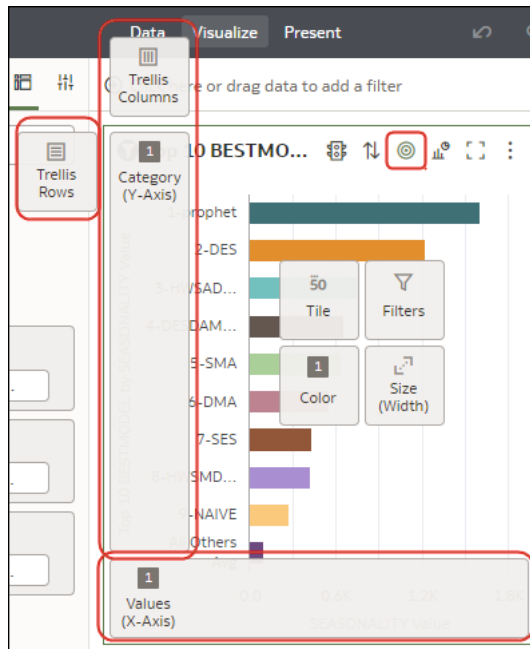
## Use the Assignment Panel to Add Data to the Visualization

You can use the Assignment Panel to help you position data elements in the optimal locations for exploring content.

A workbook must contain one or more datasets before you can add data elements to the Assignment Panel. The sections in the Assignment Panel are the same as in the Grammar Panel.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Hover over the visualization and click **Show Assignments** to show the visualization components, for example, the X-Axis and Y-Axis of a chart.





3. Drag a data element to the visualization and hover over assignments; you'll see a green cross when you're hovering over a valid assignment.
4. Drop the data element on the selected assignment.

## Create a Visualization from Another Visualization

You can create a visualization by dragging and dropping columns from one visualization to a new visualization.

Using this method helps you to model a new visualization based on an existing one by selecting columns directly from the existing visualization.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit** to enter the workbook in author mode.
3. Select the visualization you want to use as the source for creating a visualization.
4. Click **Grammar** at the top of the Grammar Panel to display the Grammar pane.
5. Drag and drop a column in the Grammar pane to the edge between visualizations to create a visualization on the canvas.
6. Select the source visualization and drag and drop more columns to the new visualization.

## Modify a Visualization's Tooltips

When you hover over a data point in a visualization, a tooltip displays and provides specific information about the data point. You can choose to see all tooltips or only the measures included in the Tooltip section of the Grammar Panel.

For example, if you create a simple bar chart visualization that shows revenue for countries in the Americas region, the tooltip displays the region's name, the country's name, and exact revenue amount. If you add Target Revenue to the Tooltip section of the Grammar Panel, then the target revenue amount is displayed in the tooltip and the user can easily compare

the actual revenues with the target revenues. Set the **Tooltip** field in the General Properties Pane to **Tooltip Grammar Only** if you want the tool tip to contain only the target revenue amount.

Note the following restrictions:

- You can drag and drop only measure columns to the Tooltip section in the Grammar Panel.
  - The Tooltip section in the Grammar Panel doesn't display for all visualization types.
1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
  2. Select a visualization on the canvas.
  3. Drag and drop one or more measure columns from the Data Panel to the Tooltip section in the Grammar Panel.

Hover the mouse pointer over a data point on the visualization to display the tooltip. Because the **Tooltip** field is set to **All Data** by default, the tooltip contains the data point's values for all columns included in the visualization. The data values for the columns that you added to the Tooltip section are displayed at the bottom of the tooltip.

4. Optional: Use the **Tooltip** field to display only the data values that you want or to turn off the tooltip.
  - If you want the tooltip to display data values for only the columns you dragged to the Tooltip section, then set the **Tooltip** field to **Tooltip Grammar Only**.
  - If you don't want the tooltip to be displayed, then confirm that there are no columns in the Tooltip section and set the **Tooltip** field to **Tool Tip Grammar Only**.

## About Visualization Types

Oracle Analytics includes many visualization types ready for you to use in almost any data analysis scenario.

- [Bar Graphs](#)
- [Filter and Other Visualization Types](#)
- [Geospacial Graphs](#)
- [Grid Graphs](#)
- [Line Graphs](#)
- [Network Graphs](#)
- [Pie and Treemap Graphs](#)
- [Scatter Graphs](#)

### Bar Graphs

Bar graphs are one of the most commonly used visualization types. You can use them to compare data across categories, identify outliers, and uncover historical high and low data points.

Visualization Type	More Information
Bar	Compares groups of data over time using one categorical variable in a vertical format and is best used to show large changes.
Boxplot	Depicts groups of numerical data through quartiles and identifies outliers in a vertical format.
Butterfly	Plots data as two horizontal bars with the same X-axis in the center and visually resembles butterfly wings.
Combo	Displays different types of data in different ways, all within the same graph.
Horizontal 100%	Graphs data in the form of horizontal rectangular bars where the length of each bar equals 100%.
Horizontal Bar	Graphs data in the form of horizontal rectangular bars where the length of the bars is proportional to the values they represent.
Horizontal Boxplot	Depicts groups of numerical data through quartiles and identifies outliers in a horizontal format.
Horizontal Stacked	Renders numeric values across two categorical variables in a horizontal bar format.
Overlay Chart	Enables advanced combination charts with a multi-layer grammar experience and support for stacked bar charts.
100% Stacked Bar	Displays numeric values across one categorical variable where the length of each vertical bar equals 100%. Data containing negative values extends the vertical bar below the baseline of 0%.
Stacked Bar	Extends the standard bar graph by looking at numeric values across two categorical variables instead of one and is best used to show the total sizes of groups.
Waterfall	Shows how a starting value of something becomes a final value, uses the X, Y, Z axes to display intermediate values, and is useful in executive presentations.

## Filter and Other Visualization Types

Use these visualization types to bring your data to life.

Visualization Type	More Information
Dashboard Filter	Enables users to filter content to view the data they're interested in. Format the filter to set display orientation (horizontal/vertical), add the Apply and Reset buttons, and turn wrap on or off. Displays in the Visualize canvas, Present canvas, and in presentation mode, and available for date, measure, and attribute columns. See <a href="#">Filter Data Using a Dashboard Filter Visualization</a> .
Language Narrative	Provides natural language descriptions of the attributes and measures in your dataset in the form of breakdown or trend.
List	Filters data on the workbook canvas as a list format visualization.
Spacer	Provides a space between visualizations on the workbook canvas; the space can include a line that you format to mark the boundary between visualizations.
Tag Cloud	Displays word-frequency analysis of text data, such as tags and keywords.

Visualization Type	More Information
Text Box	Provides a contained area to add text to the workbook canvas.
Tile	Provides a composite card style visualization to which you can add up to five measures, and specify the layout and positioning of labels and values for the primary and secondary measures. A tile grammar element is added automatically to the Grammar panel when you create a visualization.
Timeline	Depicts a sequential view of events or objects within a period of time.

## Geospacial Graphs

Geospacial graphs enable you to overlay your data on to a map with support for many common map APIs such as Google Maps, Mapbox, and EZ Map.

Visualization Type	More Information
Image	Uses an uploaded image as a background for maps or other visualizations.
Map	Displays geographically related data in a map format and most used to analyze the distribution or proportion of data in each region.
Multi-layer Map	Based on the Map graph and uses the data layer feature to display multiple data series (different sets of dimensions and metrics) on a single map visualization.
REST Background	Based on the Map graph and uses custom REST APIs to transform data into map backgrounds.

## Grid Graphs

Grid graphs use a row and column structure containing data or graphical representations of data and labels identifying the grid's contents.

Visualization Type	More Information
Correlation Matrix	Presents a table containing correlation coefficients between variables.
Grid Heat Map	Plots a main variable across two axis variables as a grid of colored squares.
Picto	Uses icons to visualize an absolute number, or the relative sizes of the different parts of a whole.
Pivot	Similar to a table but summarizes and aggregates groups of data values in columns and rows.
Table	Displays data in rows and columns in a tabular format.

## Line Graphs

Line graphs enable you to connect several distinct data points as a single continuous progression. You can use them to identify changes in one value relative to another.

Visualization Type	More Information
Area	Based on a line chart with the area between the axis and line filled in. These graphs show you the amount of change over time, and are useful for evaluating a total value across a trend.
100% Area	Based on the area graph but with the entire graph filled in to 100%.
Line	Depicts an entire series of values over time in a line format.
Radar Area	Based on the radar line graph but the areas between lines are filled in.
Radar Bar	Based on the radar line graph and presents multivariate data by plotting each variable on an axis and the data as a polygonal shape over all axes.
Radar Line	Displays multivariate data in the form of a two-dimensional chart of three or more quantitative variables represented on an axes starting from the same point.
Stacked Area	Based on the area graph and is useful for tracking not only the total value, but also seeing the breakdown of that total by groups.

## Network Graphs

Network graphs illuminate relationships between entities using lines, nodes, or other graphics.

Visualization Type	More Information
Chord Diagram	Represents flows or relationships between entities (many-to-many connections) and identifies where there are commonalities.
Circular Network	Based on the network graph, but shows how connections happen within a circular flow.
Network	Illustrates a schematic or network map and its connections.
Parallel Coordinates	Shows a set of points in an n-dimensional space with a backdrop consisting of n parallel lines, typically vertical, and equally spaced.
Sankey	Depicts a flow diagram in which the width of the arrows is proportional to the flow rate and are useful for performing material flow analysis.
Tree Diagram	Represents a series of independent events or conditional probabilities in a node tree diagram, where each node represents an event and is associated with the probability of that event.

## Pie and Treemap Graphs

Pie graphs show percentages of data as slices of data of a whole circle over a set timeframe and treemap graphs enable you to visualize different segments as smaller rectangles of data within a whole square.

Visualization Type	More Information
Donut	Based on the circular pie graph, but with a hollow center. It's divided into multiple segments in proportion with the related values.
Pie	Presents a circular statistical graphic divided into slices to illustrate numerical proportion.

Visualization Type	More Information
Sunburst	Displays hierarchical data where each level of the hierarchy is represented by one circle with the innermost circle as the top of the hierarchy.
Treemap	Depicts data grouped and nested in a hierarchical (or tree-based) structure and is useful for quickly identifying patterns.

## Scatter Graphs

Scatter graphs enable you to interpret the relationship between multiple variables, if any of the variables are a good predictor of another, or if the variables change on their own. You can make scatter graphs go even further by adding clusters or trend lines.

Visualization Type	More Information
Category	Shows you a set of vertices (or nodes) connected by links called edges (or arcs), which can also have associated directions.
Scatter	Uses dots to represent values for two numeric variables where the position of each dot on the horizontal and vertical axis indicates values for an individual data point. Scatter plots are good to use if you want to see the relationships between variables.
Stacked Category	Based on the category graph where values are stacked by category.

## Enhance Data in Visualizations with Statistical Analytics

Statistical Analytics enable you to highlight clusters or outliers, add forecasts, and show trend and reference lines in your workbooks.

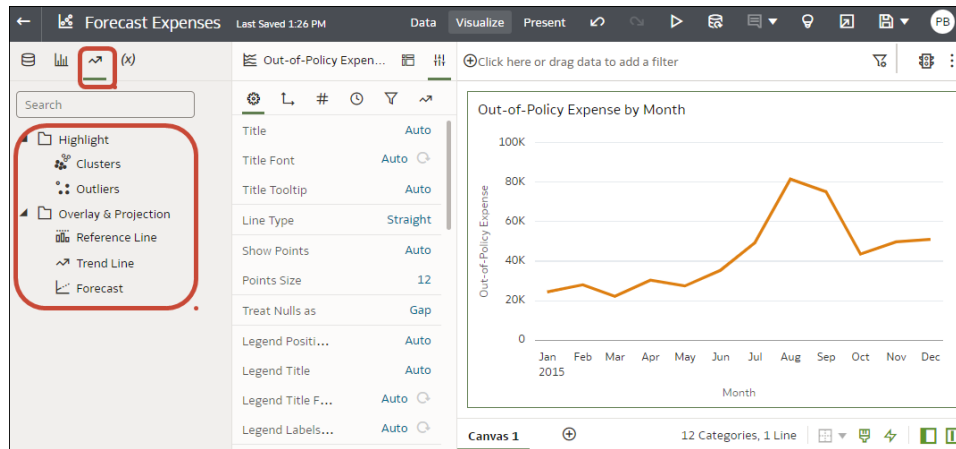
### Topics:

- [Before You Start with Statistical Analytics](#)
- [What Statistical Analytics Can I Add to Visualizations?](#)
- [Add Statistical Analytics to Visualizations](#)
- [Add Reference Lines to Visualizations](#)

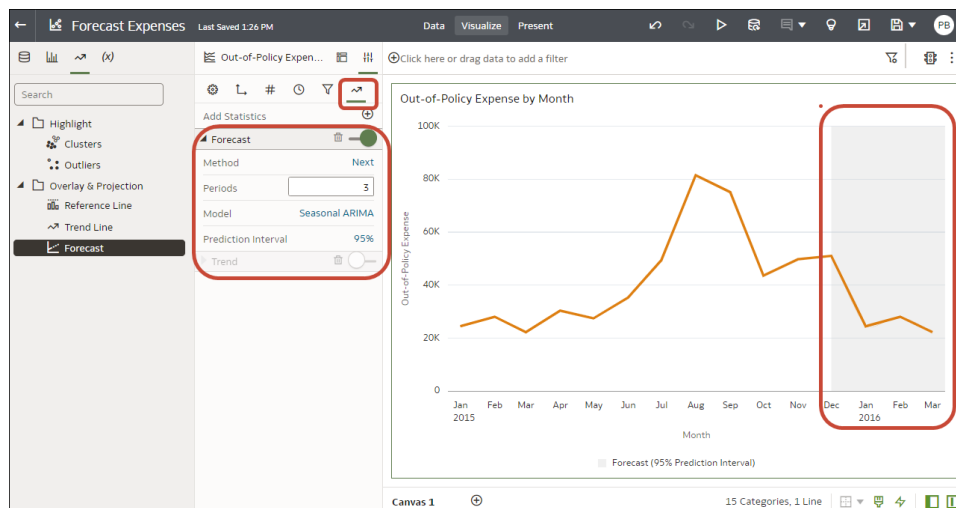
## Before You Start with Statistical Analytics

To add statistical analytics to your workbooks such as forecasts, outliers, and trend lines, you can either use ready-to-use analytics on the Analytics pane of the Data Panel, or use functions in expression builder if you need more control over the configuration.

Oracle Analytics enables you to add a range of statistical analytics from the Analytics pane of the Data Panel, which come fully configured so that you don't need to be a statistical expert to achieve results.



You configure basic options for these analytics on the Grammar panel. For example, if your visualization analyzes Out-of-Policy Expenses by Month, you might use the **Periods** option to specify the number of months to forecast (in this example, '3' forecasts three months January, February, and March from the final data point for December).



If you need more control over statistical settings, or you want to use the analytic in other visualizations, consider adding a calculation and use the expression builder to define the equivalent function. (From the Data pane on the Data Panel, click **Add (+)**, then **Create Calculation** to display the expression builder.) For example, you might use the FORECAST() function.

**New Calculation**

Name: My forecast  $f(x)$

Description: `FORECAST(measure, (dimension), output_column_name, options)`

Validate Cancel Save

Search

- Conversion
- System
- Expressions
- Time Series Calculations
  - Period Rolling
    - Forecast

**Forecast**

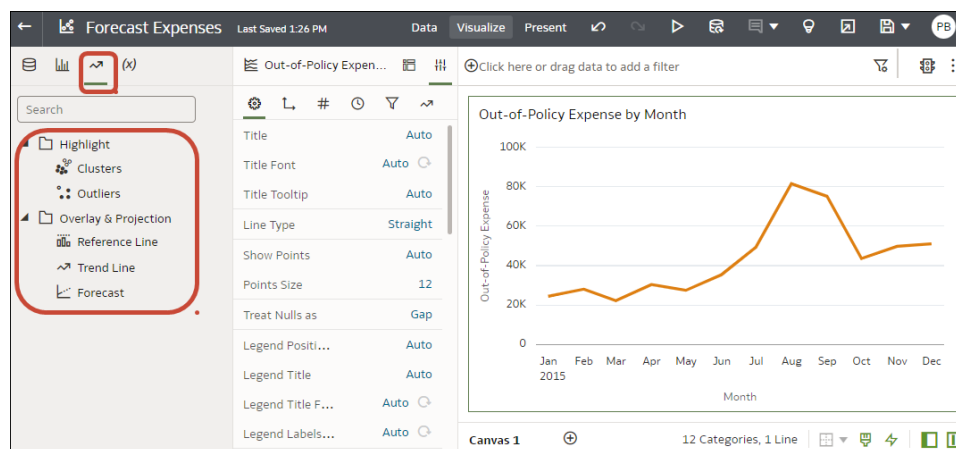
This function creates a time-series model of the specified measure over the series using either using *Exponential Smoothing* or *ARIMA* and

See [Create a Calculated Data Element](#).

You can also create a calculation based on a cluster or outlier that is stored in My Calculations, which enables you to reuse the calculation in other canvases in a workbook. See [Create a Calculation Based on a Cluster or Outlier](#).

## What Statistical Analytics Can I Add to Visualizations?

Add these statistical analytics to your visualizations to achieve better insights into your data.



### Forecast

The forecast function uses linear regression to predict future values based on existing values along a linear trend.

You can set a number of time periods in the future for which you want to predict the value, based on your existing time series data. See [Add Statistical Analytics to Visualizations](#).



Oracle supports these forecast model types:

- **Auto-Regressive Integrated Moving Average (ARIMA)** - Use if your past time series data is nonseasonal but provides enough observations (at least 50, but preferably more than 100 observations) to explain and project the future.
- **Seasonal ARIMA** - Use if your data has a regular pattern of changes that repeat over time periods. For example, seasonality in monthly data might be when high values occur during summer months and low values occur during winter months.
- **Exponential Triple Smoothing (ETS)** - Use to analyze repetitive time series data that doesn't have a clear pattern. This model type produces an exponential moving average that takes into account the tendency of data to repeat itself in intervals over time.

Alternatively, create a custom calculation using the `FORECAST` function to have more control over settings, or if you want to use the forecast in other visualizations. See [Time Series Functions](#).

### Clusters

The cluster function groups a set of objects in such a way that objects in the same group show more coherence and proximity to each other than to objects in other groups. For example, you can use colors in a scatter chart to show clusters of different groups. See [Add Statistical Analytics to Visualizations](#).

- **K-means clustering** - Use to partition "n" observations into "k" clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.
- **Hierarchical clustering** - Use to create a hierarchy of clusters built using either an agglomerative (bottom-up) approach, or a divisive (top-down) approach.

Alternatively, create a custom calculation using the `CLUSTER` function to have more control over settings, or if you want to use the cluster in other visualizations. See [Analytics Functions](#).

### Outliers

The outliers function displays data records that are located the furthest away from the average expectation of individual values. For example, extreme values that deviate the most from other observations fall into this category. Outliers can indicate variability in measurement, experimental errors, or a novelty. If you add outliers to a chart that already has clusters, then the outliers are depicted as different shapes.

Outliers can use K-means clustering or hierarchical clustering. See [Add Statistical Analytics to Visualizations](#).

Alternatively, create a custom calculation using the `OUTLIER` function to have more control over settings, or if you want to use the outlier in other visualizations. See [Analytics Functions](#).

### Reference Lines

The reference lines function defines horizontal or vertical lines in a chart that correspond to the X-axis or Y-axis values. See [Add Reference Lines to Visualizations](#).

- **Line** - You can choose to compute the line between average, minimum, or maximum. For example, in the airline industry, if passenger turnout is plotted against time, the reference line can show whether passenger turnout for a particular month is above or below average.

- **Band** - A band represents upper and lower range of data points. You can choose a custom option or a standard deviation function, and between average, maximum, and minimum. For example, if you're analyzing sales by month and you use a custom reference band from average to maximum, you can identify months where sales are above average, but below the maximum.

### Trend Lines

The trend line function indicates the general course of the metric in question. A trend line is a straight line connecting a number of points on a graph. A trend line helps you analyze the specific direction of a group of value sets in a visualization. See [Add Statistical Analytics to Visualizations](#).


- **Linear** - Use with linear data. Your data is linear if the pattern in its data points resembles a line. A linear trend line shows that your metric is increasing or decreasing at a steady rate.
- **Polynomial** - Use this curved line when data fluctuates. It's useful, for example, for analyzing gains and losses over a large dataset.
- **Exponential** - Use this curved line when data values rise or fall at increasingly higher rates. You can't create an exponential trend line if your data contains zero or negative values.

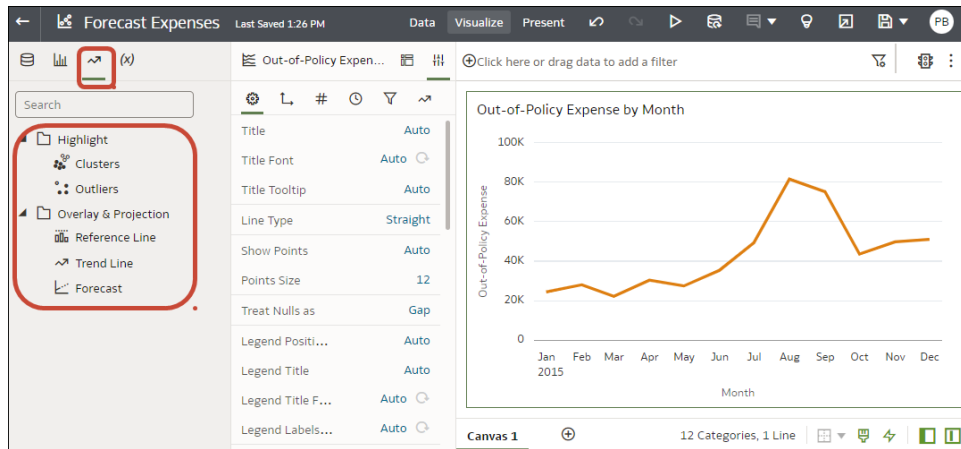
Alternatively, create a custom calculation using the `TRENDLINE` function to have more control over settings, or if you want to use the trend line in other visualizations. See [Analytics Functions](#).

## Add Statistical Analytics to Visualizations

Statistical analytics enable you to highlight clusters or outliers, add forecasts, and show trend and reference lines in your workbooks.

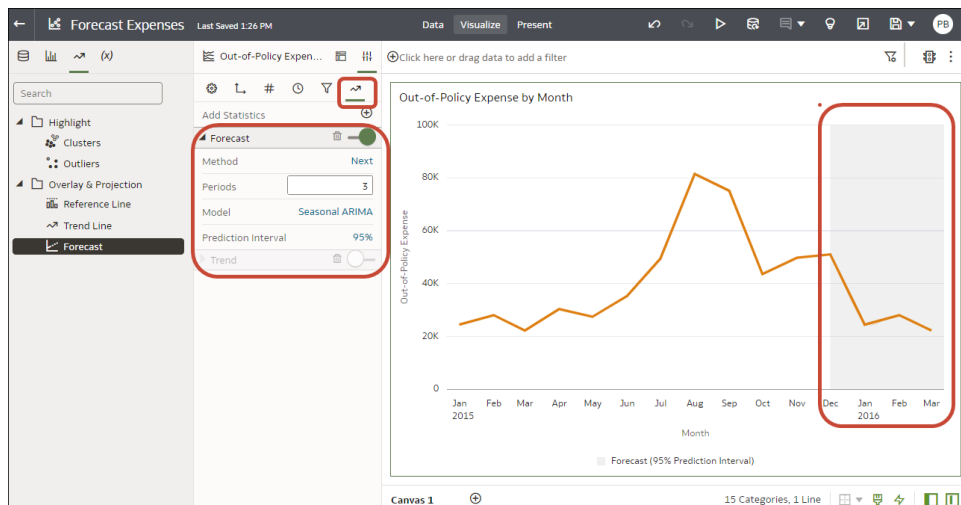
Before you can use analytic functions in visualizations, you must do the following:

- Install DVML.  
On Windows go to **Start**, browse to and expand your system's Oracle folder, and click **Install DVML**.  
On Mac, go to **Applications** and click **Oracle Analytics Desktop Configure Python**.
- Create a workbook or visualization that you can apply one or more analytic functions to.
  1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
  2. Make sure that you have the required data in your visualization for the type of analytics you want to add.  
For example, for a forecast, you need at least one time dimension and a measure or metric.
  3. In the Data Panel or Grammar Panel, click the **Analytics** icon 

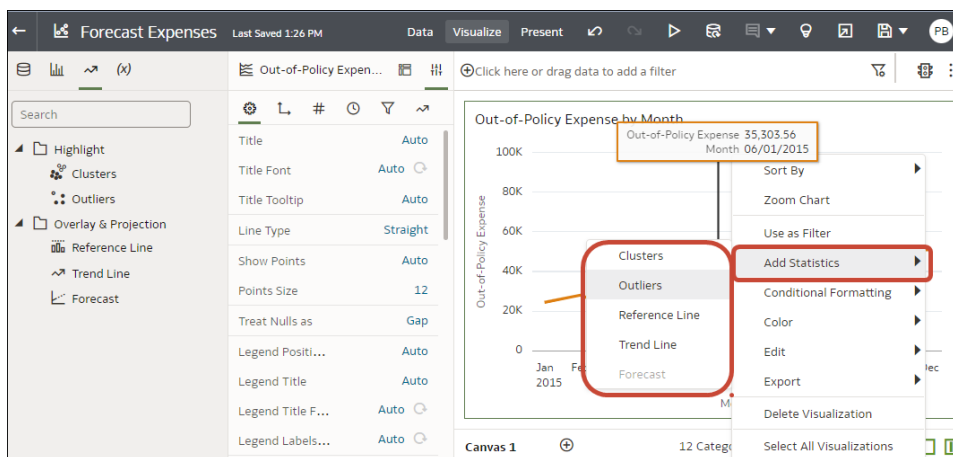


4. Drag and drop the analytic you want from the **Analytics** pane to a visualization.
5. To configure the analytic, use the Analytics pane on the Grammar panel.

For example, if you add a Forecast, you can change the model type or the number of periods to forecast.



### Add Statistics





## Add Reference Lines to Visualizations

Reference lines enable you to identify averages, medians, percentiles, and similar information in a visualization.

You can bind parameters to a visualization's reference line or band's date value or date range when you want to use a parameter value to place the reference line or band on the visualization. See [Bind a Parameter to a Reference Line or Band](#).

When you configure the reference line in the Analytics pane on the Grammar panel, you might for example, select the **Type** option to display a line or a band, use the **Function** option to change the default line to Average, Percentile, Top N, or use the **Z Order** option for date and date order columns to position the reference line in front or behind a visualization. If you select a non-date attribute column, for example City, you can choose a **Value**, for example Chicago, on which to display the reference line.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. In the Data Panel, click the **Analytics** icon .
3. Click **Add Statistics** , and select **Reference Line**.
4. Use **Column** to select a measure, date, or non-date attribute.
5. In the Analytics pane select properties to update.
6. Click **Save**.

## Use Spark Charts to Examine Trends

You can add a spark chart to a tile visualization to view aggregate data trends over time.

The red dot on the spark chart line shows the lowest value, and the green dot shows the highest value. The tooltip shows the first, last, lowest, highest and average aggregate values for the selected category. Hover your cursor anywhere over the spark chart to display the tooltip.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Close Auto Insights.

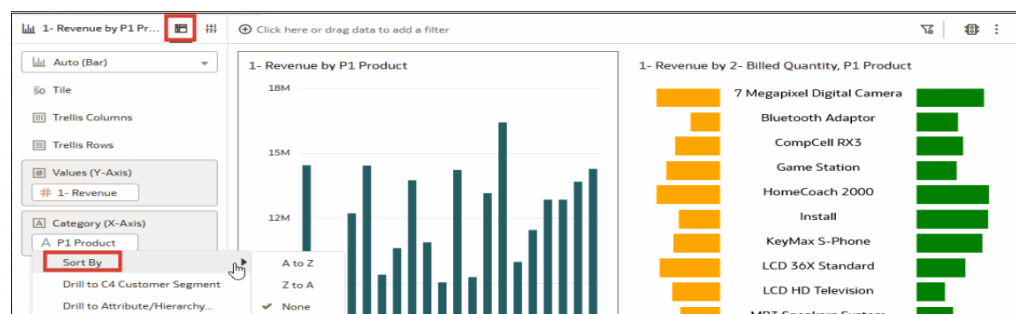
3. In the Data pane, drag a measure to the canvas.
4. In the Data pane drag a time-based data element to **Category (Chart)** to add a spark chart to the tile visualization. For example, select and drag **Month**.
5. If you want to add a filter, drag a data element from the Data pane to **Click here or drag data to add a filter**.  
For example, **Year**.  
The filter changes the spark line to show the trend for the filtered data.
6. If you want to change spark chart display settings, click General in the Properties pane.
  - Click **Chart** to display one of the following spark charts, Line with Area, Line, Bar, or Area.
  - Click **Color** to assign a color to the spark chart.
  - Click **Position** to place the chart after or below the primary tile measure.
  - Click **Width or Height** to specify the size of the spark chart.
  - Click **High/Low Marks** to hide or show the high and low marks, displayed as a green and a red dot.
  - Click **Reference Line** to display or remove a reference line. Use the **Average** option to display a reference line showing the average trend. Use the **None** option to remove the reference line.
7. Click **Save**.

## Sort Data in Visualizations

Sometimes you're working with a lot of data in visualizations. To optimize your view of that data in the workbook's visualization canvas, you need to sort it.

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, do one of the following:
  - In the main editing panel, right click the data element you want to sort, hover over **Sort By** next to the element label, and select a sorting option (for example, Low to High, High to Low, None).
  - In the Visualization Grammar Panel, **Grammar** pane, right click the data element you want to sort, hover over **Sort By** then click a sorting option (for example, Low to High, A to Z, None).



## Undo and Redo Edits

You can quickly undo your last action and then redo it if you change your mind. For example, you can try a different visualization type when you don't like the one you've just selected, or you can go back to where you were before you drilled into the data.

The undo and redo options are useful as you experiment with different visualizations. You can undo all the edits you've made since you last saved a workbook. However, in some cases, you can't undo and then redo an edit. For example, in the Create Dataset page, you've selected an analysis from an Oracle Application data source to use as a dataset in the workbook. In the next step, if you use the undo option to remove the dataset, you can't redo this change.

- To undo or redo an edit, go to the toolbar for the workbook or the dataset and click **Undo Last Edit** or **Redo Last Edit**. You can use these options only if you haven't saved the workbook since making the changes.



- When you're working on a workbook, click **Menu** on the workbook toolbar and select **Revert to Saved** to undo all the edits you've made since you last saved your workbook. **Revert to Saved** is enabled after you've saved the workbook for the first time. This option is automatically disabled if you select the **Auto Save** option.

## Create a Custom Error Message for Visualizations with No Data

You can create your own message that's displayed for visualizations that have no data to display in a workbook.

When the selected data elements and possibly the filters for a visualization don't produce results, the message 'No Data Found' is displayed. As the workbook author you can create a custom message to help explain why the visualization didn't display any results. For example, you might create a custom error message 'There is no data for the selected year' to display when a visualization contains no data. The message is displayed for all visualizations in the workbook.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click the workbook **Menu** and **Workbook Properties**.
3. For No Data Text click **Auto**, and select **Custom**.
4. Enter your custom error message text.
5. Click **OK**.

## About Refreshing a Workbook's Data

You should refresh the data in a workbook to ensure that it uses current data.

When you click the **Refresh Data** button for a workbook, it runs the queries for the visualizations on the canvas. How the datasets are configured and the data sources they use determines where the canvases get their refreshed data.

If a dataset table's access mode is set to **Live**, then the table bypasses any presentation caches to fetch new data from the source. If a datasets table's access is set to **Automatic Caching**, then the table re-queries the cached data.

Refreshing data doesn't trigger a data cache reload. Sometimes the cached data is stale, so if you refresh the data and the data isn't the most current, then the datasets may need to be reloaded. See [Reload a Dataset's Data](#).

Oracle recommends that you refresh a workbook's dataset rather than replace it. Replacing a dataset can be destructive. Don't replace a dataset unless you understand what can happen:

- If the columns and data types don't match between the existing dataset and the new dataset, then replacing a dataset breaks the workbooks that use the existing dataset.
- Any modified or added columns in the existing dataset are lost and workbooks using the dataset are likely to break.

## Refresh a Workbook's Data

Refresh the data in a workbook to ensure that your visualizations contain the most current data.

See [About Refreshing a Workbook's Data](#).

You can set the **Refresh Data when Canvas Is Opened**, **Auto Refresh Data**, and **Refresh Interval** properties to automatically refresh the canvas' data. See [About Canvas Data Refresh Properties](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, go to the workbook toolbar and click **Refresh Data**

The screenshot shows the Oracle BI interface with a pivot table titled "Avg Value of Players: Age (Rows) x Country of the Club (Columns)". The table has 17 rows representing age groups (17-36) and 12 columns representing countries (01-Club Spain, 02-Club Italy, 03-Club Greece, 04-Club Portugal, 05-Club German, 06-Club France, 07-Club Turkey, 08-Club Englan, 09-Club Russia, 10-Club Chile, All Others, Grand Total). The values are numerical, representing average player values. A context menu is open over the "FIFA\_18\_Players" dataset in the Data panel, with "Reload Data" highlighted. Other options include "Inspect", "Open", "Replace Dataset...", "Download File", "Remove from Workbook", and "Create Scenario...".

	01-Club Spain	02-Club Italy	03-Club Greece	04-Club Portugal	05-Club German	06-Club France	07-Club Turkey	08-Club Englan	09-Club Russia	10-Club Chile	All Others	Grand Total
17	522.2K	413.9K		537.5K	426.4K	448.2K	397.1K	229.4K	243.3K	200.0K	304.3K	322.5K
18	859.8K	1.1M	352.5K	740.0K	881.3K	1.8M	435.0K	257.8K	525.0K	550.0K	367.2K	578.8K
19	1.4M	1.3M	545.0K	1.7M	727.5K	1.2M	463.2K	713.8K	441.2K	1.2M	461.3K	717.8K
20	2.8M	1.3M	1.5M	3.4M	1.6M	2.1M	923.4K	1.1M	526.4K	5.4M	660.7K	1.2M
21	2.6M	2.5M	943.8K	3.2M	3.1M	2.5M	2.3M	1.7M	2.2M	1.2M	911.6K	1.7M
22	3.4M	3.6M	2.3M	4.0M	2.8M	3.6M	1.9M	2.2M	2.1M		1.1M	2.1M
23	5.2M	5.1M	4.2M	2.9M	5.2M	5.6M	2.7M	2.9M	2.4M	6.7M	1.1M	2.6M
24	5.2M	4.9M	4.6M	4.3M	5.5M	4.9M	3.3M	4.0M	2.5M	2.0M	1.5M	3.0M
25	8.6M	4.1M	5.9M	5.3M	4.7M	4.3M	2.6M	4.3M	3.5M	2.3M	1.7M	3.1M
26	7.6M	7.0M	4.3M	3.8M	4.4M	4.3M	3.2M	5.4M	5.5M	4.2M	1.7M	3.6M
27	8.0M	4.7M	3.9M	4.2M	4.8M	3.6M	4.0M	4.9M	4.2M	5.1M	1.5M	3.3M
28	7.8M	4.0M	4.6M	5.8M	7.3M	2.6M	3.1M	5.9M	2.3M	1.6M	1.6M	3.3M
29	6.9M	7.3M	5.5M	4.5M	3.7M	4.2M	3.4M	4.0M	2.7M	2.6M	1.7M	3.1M
30	11.0M	7.1M	4.0M	3.0M	3.5M	5.8M	3.5M	3.5M	3.6M	2.0M	1.5M	3.5M
31	7.1M	5.3M	5.9M	3.6M	3.7M	3.6M	3.9M	3.4M	4.1M	1.1M	1.5M	2.9M
32	4.4M	6.0M	1.4M	1.1M	3.1M	3.4M	3.5M	2.1M	3.2M		1.5M	2.4M
33	4.2M	2.2M	3.3M	4.3M	2.7M	2.0M	4.2M	1.3M	2.4M	1.2M	1.1M	1.6M
34	1.4M	1.8M	3.1M	2.1M	2.6M	1.5M	2.9M	1.6M	866.7K		693.4K	1.3M
35	2.0M	1.7M		450.0K	268.0K	1.0M	2.2M	1.6M	1.5M		738.4K	1.0M
36	1.8M	835.8K		1.4M	418.8K	547.9K	3.6M	512.4K	875.0K		325.7K	655.1K
Grand Total	5.4M	4.0M	3.8M	3.8M	3.3M	3.2M	2.9M	2.7M	2.7M	2.3M	1.2M	2.4M

**Tip:** To reload data for a specific dataset, on the Data or Visualize pane, right-click the dataset in the Data panel, and click **Reload Data**.

## Pause Data Queries in a Workbook

You can disable the Auto Apply Data option to pause issuing new queries as you change visualization content in a workbook.

You can quickly configure a visualization without having to wait for data updates after each change.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Visualize**.
3. Click the **Auto Apply Data** button to pause data queries.  
Data queries are temporarily disabled.
4. Make changes to a visualization in the workbook.  
Your changes are displayed but data isn't updated, and a bubble is displayed indicating the number of data requests that have been skipped.
5. Click the bubble if you want to refresh the data now.  
Data queries are still disabled.
6. Click the **Auto Apply Data** button to re-enable data queries.

## Work with Canvas Properties

You can work with canvas properties, such as layout, width, height, synchronizing visualizations on a canvas, and refreshing data.

### Topics:

- [About Canvas Layout Properties](#)
- [Update Canvas Properties](#)
- [Align Visualizations Using Canvas Grid Guidelines](#)
- [About Brushing Between Visualizations on a Canvas](#)
- [About Synchronizing Visualizations in a Canvas](#)
- [About Canvas Data Refresh Properties](#)

## Update Canvas Properties

You can use the canvas properties dialog to perform many different tasks. For example, add a description to display as a tooltip, change the layout, set brushing, synchronize visualizations, configure canvas refresh settings, and specify the background color and image.

You can also toggle grid settings and layout positioning options for a canvas. See [Align Visualizations Using Canvas Grid Guidelines](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Right-click a canvas tab and click **Canvas Properties**.



3. Update the canvas properties.
4. Click **Save**.

## About Canvas Layout Properties

You can configure the layout, width, and height of visualizations on a canvas.

You configure how visualizations are displayed in a canvas using canvas layout property settings.

### Layout

Configures whether visualizations are displayed in the canvas as freeform or auto fit.

- **Auto Fit** - Use to automatically arrange or correctly align visualizations on a canvas when there are multiple visualizations. You can also resize a visualization by dragging its edges to the appropriate dimensions.
- **Freeform** - Use to rearrange a visualization on the canvas using drag and drop to a space between visualizations where you want to place it. You can also resize a visualization by dragging its edges to the appropriate dimensions.  
The **Order Visualization** option (only available when you use the **Freeform** canvas layout) enables you to use **Bring to Front**, **Bring Forward**, **Send Backward**, or **Send to Back**, to move a visualization on a canvas with multiple visualizations.

### Width and Height

Use **Width**, and **Height** settings in conjunction with **Layout** settings to specify the layout size of visualizations in a canvas

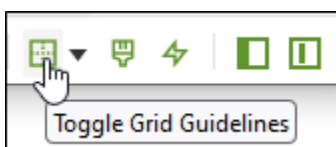
- **Screen** - Layout fits in the available screen space.  
Not available when you select **Freeform**.
- **Grow** - Layout automatically grows in height or width to accommodate a visualization at its optimal size.  
For example, if you add multiple visualizations, or rows of visualizations to a canvas, the layout grows so that the added visualizations display at their optimum size.
- **Fixed** - Layout uses the specified size.

## Align Visualizations Using Canvas Grid Guidelines

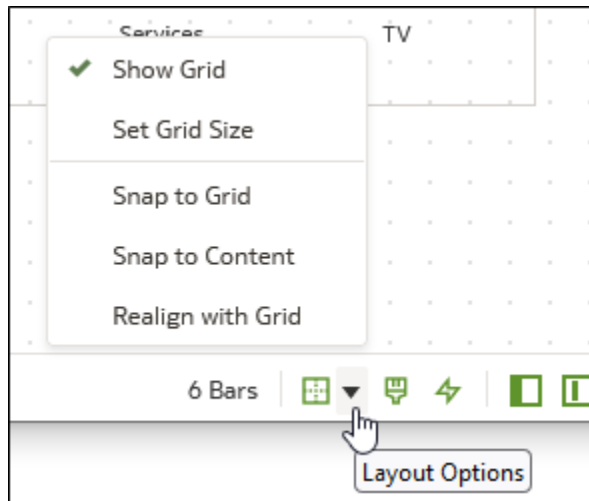
You can help to control the alignment of visualizations in a canvas using grid guideline settings when the canvas Layout property is set to **Freeform**.

You can use these settings to make it easier to align visualizations using canvas grid guideline settings.

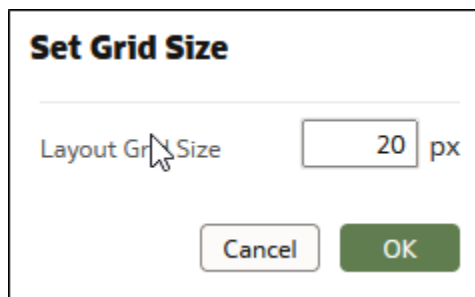
1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Toggle Grid Guidelines** to display grid guidelines.



3. Click **Layout Options**.



4. Click **Set Grid Size** and enter the distance in pixels between the grid guidelines.




5. Click and drag visualizations into the positions that you require them to be in on the canvas.
6. Click **Snap to Grid**, and **Realign with Grid** to automatically realign all of the visualizations in the canvas with their nearest grid guideline.

**Realign with Grid** becomes active when you select **Snap to Grid**, and you previously realigned visualizations away from the grid guidelines.

## About Brushing Between Visualizations on a Canvas

You can configure brushing on a canvas so that when a user selects data points in a visualization, the datapoints are automatically highlighted in other visualizations.

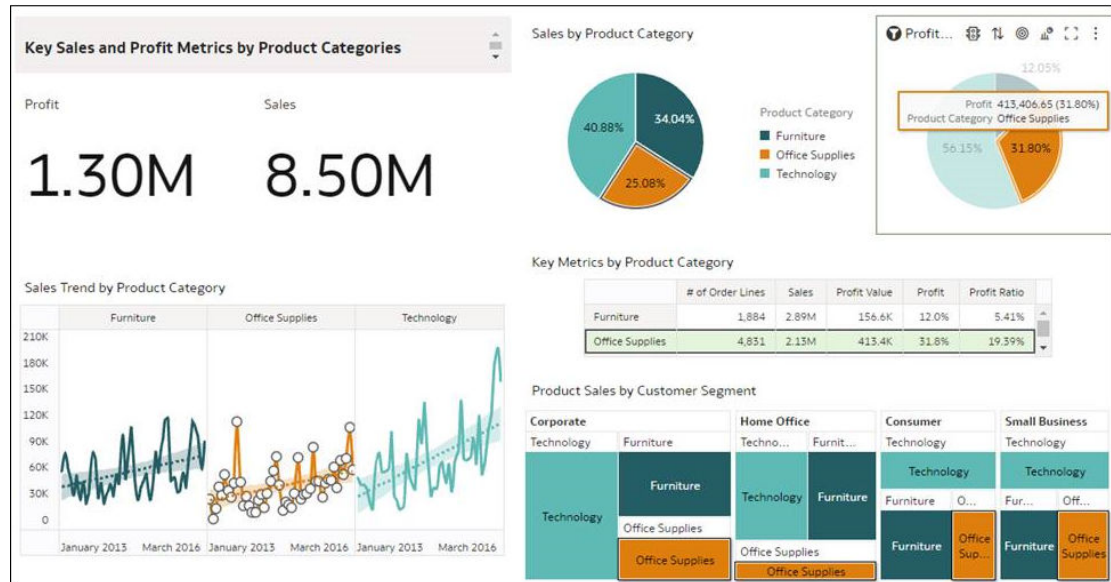
Brushing can only work when visualizations share the same dataset.

You can set the **Brushing**  canvas property to be **on** or **off**, for a selected canvas. See [Update Canvas Properties](#).

- **On** - If you select one or more data points in a visualization, then corresponding data points are highlighted in the other visualizations on the canvas that use the same dataset.

- **Off** - If you select one or more data points in a visualization, then corresponding data points are not highlighted in other visualizations on the canvas.

For example, if you select Office Supplies in the Pie chart and Brushing is set to **On**, then Office Supplies data points are also highlighted in the other visualizations on the canvas.



## About Synchronizing Visualizations in a Canvas

You can specify whether or not to synchronize Visualizations in a canvas.

You use the **Synchronize Visualizations** setting to specify how the visualizations on your canvas interact. By default, visualizations are linked for automatic synchronization.

When **Synchronize Visualizations** is set to **On**, and you add or remove data values from a visualization, this automatically adds or removes the values in corresponding visualizations. When **Synchronize Visualizations** is set to **Off**, this unlinks your visualizations and turns off automatic synchronization.

When **Synchronize Visualizations** is **On**, then all filters on the filter bar and actions that create filters, such as drill, apply to:

- All the visualizations in a canvas with a single dataset.
- All the visualizations of joined datasets with multiple datasets.

If a data element from a dataset is specified as a filter but isn't matched with the joined datasets, then the filter only applies to the visualization of the dataset that it was specified for.

When **Synchronize Visualizations** is set to **Off**, then analytic actions such as Drill affect only the visualization to which you applied the action.

## About Canvas Data Refresh Properties

You can configure canvas data to refresh when you open a canvas, or to refresh automatically at a specified interval.

You configure how canvas data is refreshed using canvas property settings.

### Refresh Data when canvas is opened

Configures whether to refresh data when a user opens the canvas.

- **On** - Use to refresh the data when the canvas is opened. The client and server caches are cleared every time the canvas is opened, ensuring that you see the current data.
- **Off** - Use to not refresh the data when the canvas is opened.

### Auto Refresh Data

Configures whether to automatically refresh the canvas data at specified time intervals.

- **Enabled** - Use to automatically refresh the canvas data using a **Refresh Interval** that you enter.
- **Disabled** - Use to not automatically refresh the canvas data.

### Auto start for viewers

Configures whether to start the automatic data refresh when the canvas is opened.

- **On** - Use to automatically refresh canvas data when the canvas is opened, and then at the specified intervals.
- **Off** - Use to not automatically start the canvas data at the specified refresh interval when the canvas is opened, until the user clicks **Refresh Data** in the workbook.

## Copy and Paste a Visualization or Canvas

You can copy and paste a visualization or canvas within the same workbook, to another open workbook, or to another workbook open in a different browser tab.

When you copy a visualization or canvas from one workbook to another, Oracle Analytics does the following:

- **Data** - The dataset for the pasted visualization or canvas is added to the target workbook. When you open or create the target workbook that you're pasting to, it doesn't need to include the dataset used by the visualization or canvas that you'll copy and paste.
- **Filters** - The filters in the target workbook and in the pasted visualization or canvas are maintained. You don't need to add the visualization or canvas filters to the target workbook. If there's a conflict between the target workbook and the pasted visualization or canvas filters, then the pasted filters won't overwrite the target's filters.
- **Color assignments** - The color scheme of the target workbook is applied to the pasted visualization or canvas.
- **Calculations** - If the same calculation name exists in the target workbook, then the pasted calculation is added and renamed.

Use the following steps to copy and paste a visualization or canvas:

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.

2. In the Visualize canvas, copy a visualization or canvas.
  - To copy a visualization, click its **Menu**, hover over **Edit**, and then click **Copy Visualization**.
  - To copy a canvas, right-click it and click **Copy Canvas**.
3. Navigate to a visualization or canvas and paste the object.
  - To paste a visualization into a canvas that contains visualizations, click an existing visualization's **Menu**, hover over **Edit**, and then click **Paste Visualization**.
  - To paste a visualization into a blank canvas, right-click the canvas bar and select **Add Canvas**. Right-click the new canvas, hover over **Edit**, and then click **Paste Visualization**.
  - To paste a canvas, right-click the canvas bar and then click **Paste Canvas**.

## Copy and Paste a Visualization's Data

You can copy all of a visualization's data to the clipboard and then paste the data to another application, like Word or Excel.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click a visualization's **Menu**, hover over **Edit**, and then click **Copy Data**.  
This copies the visualization data to the clipboard.
3. Open a target application and paste in the visualization's data.

## Work with Multiple Visualizations on a Canvas

You can work with multiple visualizations at the same time, update common visualization properties, copy and paste multiple visualizations, and delete multiple visualizations on a canvas.

### Topics:

- [Update Common Properties for Multiple Visualizations on a Canvas](#)
- [Copy and Paste Multiple Visualizations on a Canvas](#)
- [Delete Multiple Visualizations on a Canvas](#)

## Update Common Properties for Multiple Visualizations on a Canvas

You can update common properties for multiple selected visualizations on a canvas.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, use Ctrl-click to select multiple visualizations on the canvas.
3. In **Common Properties** click the property to change and apply your changes.  
Common property values are displayed when they share the same value for each of the selected visualizations.
4. Click **Save**.

## Copy and Paste Multiple Visualizations on a Canvas

You can copy and paste multiple selected visualizations on a canvas.

1. On the Home page, select a workbook that contains the visualizations you want to copy and paste, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, use Ctrl-click to select multiple visualizations on the canvas.
3. To copy the selected visualizations hover over the selected visualizations, use right-click, click **Edit**, and then click **Copy Visualizations**.
4. To paste the copied multiple visualizations, click a canvas location where you want to paste the copied visualizations, use Right-click and click **Paste Visualizations**.
5. Click **Save**.

## Delete Multiple Visualizations on a Canvas

You can delete multiple selected visualizations on a canvas.

1. On the Home page, select a workbook that contains the visualizations you want to delete, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, use Ctrl-click to select multiple visualizations.
3. Right-click, and select **Delete Visualizations**.
4. Click **Save**.

## Change Visualization Types

You can change visualization types to best suit the data you're exploring.

When you create a workbook and add data elements to the canvas, Auto Visualization mode chooses the most appropriate visualization type based on the selected data element. The Auto Visualization mode is on (selected) by default. If you add more data elements, the visualization type is automatically updated, and the best type is selected based on the data elements.

If you want to use a different visualization type, then you need to select it from the visualization type list. When you change the visualization type, Auto Visualization mode is turned off. When the Auto Visualization mode is off (deselected), adding more data elements to the canvas won't change the visualization type automatically.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select a visualization on the canvas, and on the visualization toolbar, click **Change Visualization Type**.
3. Select a visualization type. For example, select Treemap to change the visualization type from Pivot to Treemap.












When you change the visualization type, the data elements are moved to matching drop target names. If an equivalent drop target doesn't exist for the new visualization type, then the data elements are moved to a Grammar Panel section

labeled **Unused**. You can then move them to the Grammar Panel section you prefer.

## About Visualization Properties

You can customize the appearance and functionality of a visualization by changing its properties.

The options available in the Properties pane depend on the visualization type.

Property	Icon	Description
Action		Use to add a URL to tiles, images, and text box visualizations.
Analytics		Use to add advanced analytics functions.
Axis		Use to display or hide gridlines, to show or hide horizontal (x) and vertical (y) axis labels, and to update and format the axis label text.
Data Layers		Use with maps and overlay charts to add data layers, and to configure the settings for each data layer.
Date/Time Format		Use with date or time elements, to set display and format properties.
Edge Labels		Use with tables and pivot tables to update the header text for columns, to show or hide headers, to display null values for hierarchies in table columns and in pivot table columns and rows, and to format header text.
Filters		Use to change and format the filter title and selection names.
General		Use to change the title, tooltip, title format, legend, alignment, labels, line type, points settings, tile settings, style background, border, shadow, and other visualization settings.
Map		Use to control the zoom, the data focus, and to scale and select a background map.
Totals		Use with tables and pivot tables, to position and format totals.
Values		Use to change the display, placement, and format of data labels, and hide and display a Y2 axis.

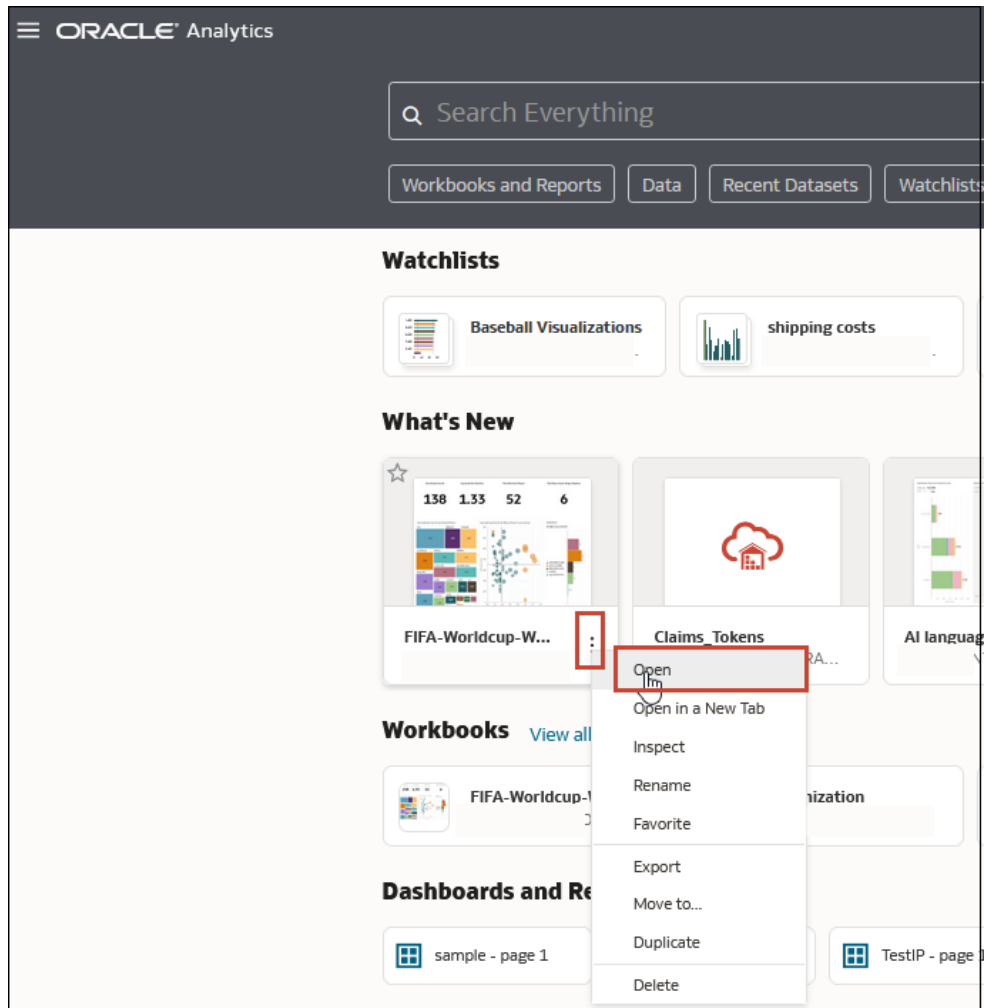
## Adjust Visualization Properties


You can customize how the visualizations in your workbook are displayed, for example, you can change the title, legend, labels, number format, background, border, and shadow.

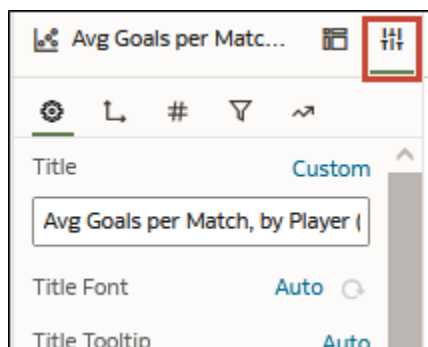
The tabs and fields displayed under the Properties pane depend on the type of visualization that you're working with.

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.



2. Click **Edit** to open the workbook in author mode.
3. In the Visualize canvas, select a visualization.
4. Use the tabs in the Properties pane  to adjust the visualization's properties as needed.





## Set Visualization Border Properties

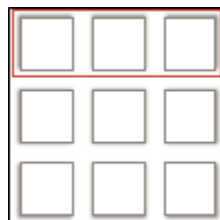
You can enhance the appearance of your visualizations by adding a border and specifying various properties such as line width, style, and color.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit** to open the workbook for editing.
3. In the Visualize canvas, select one or more visualizations to apply border settings to.
4. Click the **General** tab in the Properties pane.
5. In the **Border** field, click **None**, and then define the border settings:
  - Click **Square** or **Round** to create a standard border with square or round edges.
  - Click **Custom** to define your own border color, border width, edge radius, and line style (solid, dashed, or dotted line).
6. Click **Save**.

## Set Visualization Shadow Properties

You can specify shadow properties for one or more visualizations, including where the shadow appears, and other characteristics including shadow color.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit** to open the workbook for editing.
3. In the Visualize canvas, select one or more visualizations to apply border settings to.
4. Click the **General** tab in the Properties pane.
5. Click **Shadow** to display the options, and then define your shadow settings:
  - Click one of the squares to define the position of the shadow (for example, top-left, or top, or top-right).




- Click **Custom** to select **Shadow Color**, **Horizontal Offset** (the gap to the side before the shadow begins), **Vertical Offset** (the gap above before or below before the shadow begins), **Blur** (how blurred or solid the shadow is), and **Spread** (how far the shadow spreads).
6. Click **Save**.

## Change Display Names in Tables and Pivots

You can customize a visualization column name in tables and pivot tables by entering your own text.

The column name change is only a displayed name change and it does not change the column name in the dataset or in the source data.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit**.
3. In the workbook, select a table or pivot visualization.
4. Click **Properties**. In Properties, click **Edge Labels** .
5. Expand a column. In the **Display Header** row, click **Auto**, and then click **Custom**.
6. Enter the new custom display name for the column.
7. Click **Save**.

## Change the Size of Data Points in Visualizations

You can specify the size of points for visualizations with points, such as scatter, combo, area, radar, box plot, and line graphs.

You might want to change the size of points to make them easier to view. For example, when points overlap and it's difficult to identify individual points.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit**.
3. Select the visualization with data points.
4. Click **Properties**, and **General** and then expand **Points**.
5. When there's no measure in the Size grammar, click the **Size** row, enter a value to increase or decrease the points size or use the slider.
6. When there's a measure in the Size grammar:
  - To change the minimum points size, in the **Min Size** row, click **Auto**, select **Custom**, and enter a value.
  - To change the maximum points size enter a value in the **Max Size** row.
7. Click **Save**.

## Change the Pattern and the Width of Lines in Graphs

You can specify the line pattern and the line width in graphs such as line, area, combo, overlay, radar, reference, trend, or forecast graphs.

You might want to change the appearance of lines in a graph to make them easier to view. For example, you might use a dotted line for Sales to indicate that the Sales line is an estimate.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Edit**.
3. Select the graph that uses lines.
4. Click **Properties**.
5. If you want to change the default line pattern and width settings for all lines in this graph, select **General** and then expand **Line**.
  - To change the line pattern from Solid, click **Solid** and select **Dashed** or **Dotted**.
  - To change the line width, click the **Width** field, select a value, or click **Custom** and enter a number for the line width in pixels. For example, enter 2.5px.
6. If you want to change the line pattern and width to override the default value for a selected measure, select **Value**, and then expand the measure. For example, expand Sales.
  - To change the value of **Line Pattern**, click the current value, click **Auto**, and then select **Solid**, **Dashed**, or **Dotted**.
  - To change the value of **Line Width**, click the current value and select a value, or click **Custom** and enter a number in pixels. For example, enter 2.5px.
7. Click **Save**.

## Highlight Important Data Events with Conditional Formatting

Use conditional formatting to highlight important data events in your visualizations so that you can take action.

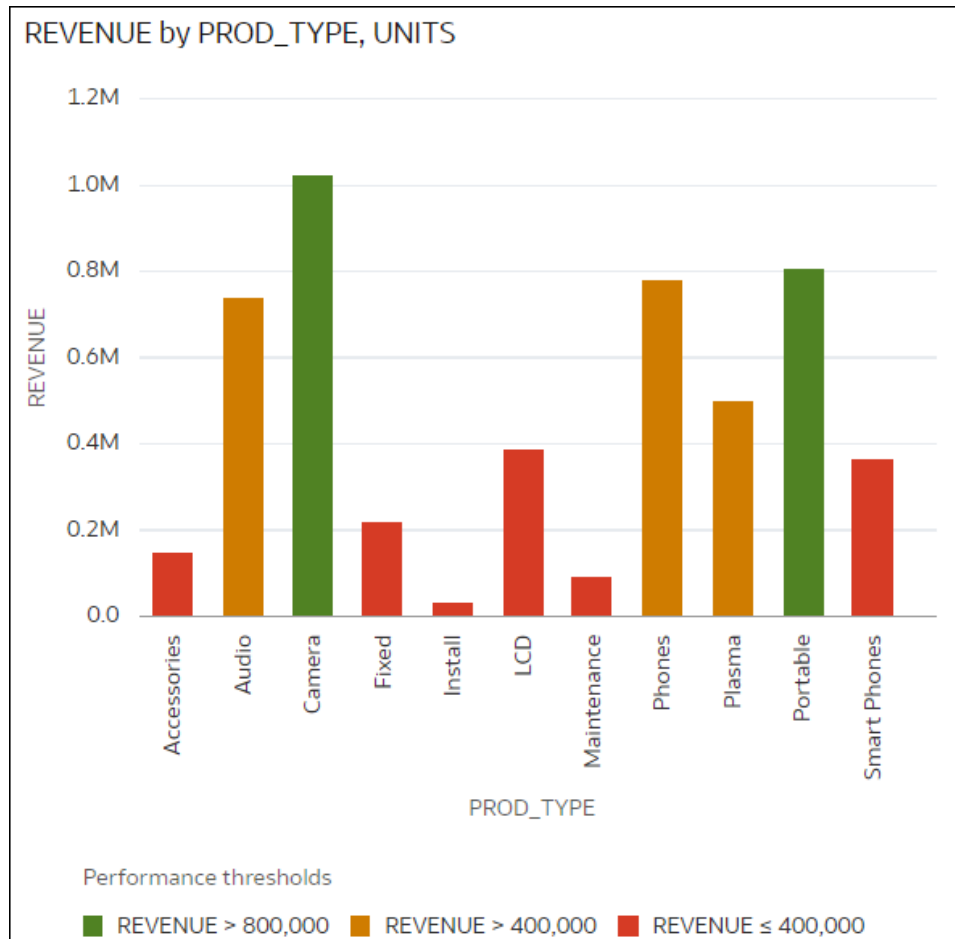


### Topics:

- [What Can I Do with Conditional Formatting?](#)
- [Format Data with Existing Conditional Format Rules](#)
- [Add Conditional Formatting to Data](#)
- [Example - Compare a Measure to a Set of Thresholds](#)
- [Example - Compare a Measure to a Target or Goal](#)
- [Example - Compare a Measure to a Complex Expression Value](#)
- [Example - Compare a Measure to a Percentage of a Value](#)
- [Example - Add Emojis to Highlight Values](#)

## What Can I Do with Conditional Formatting?

With conditional formatting, you apply rules to your data to highlight when something important happens. For example, you might use stoplight colors to show when revenues meet high, medium, and low thresholds.



You can make conditional formatting rules available at workbook level or visualization level.

Conditional formatting provides a way for business users to see events or changes in their data. For example, if users want to see when revenues meet high, medium, or low thresholds, you can create a conditional formatting rule that colors the revenue data points as green, orange, or red.

As a content author you can:

- Apply multiple rules at the same time.
- Apply multiple rules to a measure at the same time.
- Change the order in which rules are applied.
- Turn rules on and off.

Conditional formatting compares measures, such as revenue for a year, the number of units of a product, the number of students that didn't return to school during an academic year, with one of the following:

- A set of thresholds.  
For example, highlight values in red if my blood pressure is above 90 or under 70.
- A target or goal.  
For example, highlight values in red if my costs exceed my budget.

- A percentage of a target.  
For example, highlight values in green when I reach 80% of my sales goal.
- A complex expression.  
For example, highlight values in green when I achieve 5% growth in sales compared to the same period last year.

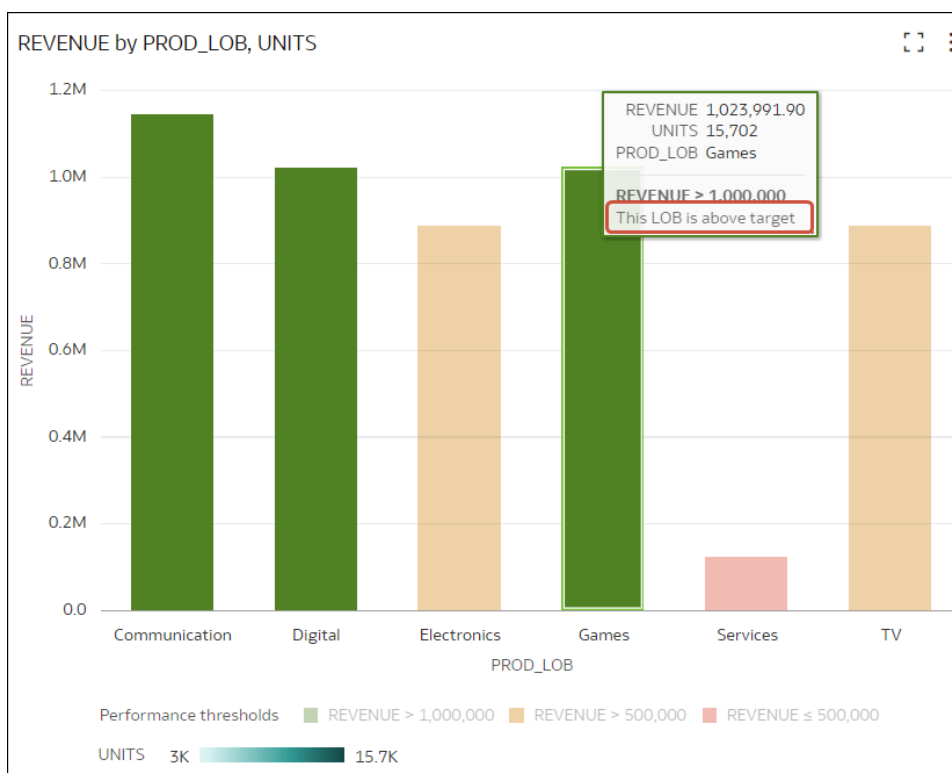
**Note:** You can't apply conditional formatting to sub-totals or grand totals in a pivot table.

You can:

- Format the fill color and color density.
- Format the font, font size, font color, and font style.
- Display emojis and icons (in Table, Pivot, or Tile visualizations).

You can also:

- Apply conditional formatting to maps.
- Add labels, tooltips, and legends. For example, when you hover over a data point, display a label "This LOB is above target" to identify the rule applied.



- Combine the formatting of values that match more than one rule, using the **Enable rule blending** option). For example, if rule 1 is revenue greater than one million and highlights in green with the italic Calibri font, and rule 2 is revenue less than target and highlights in red with the Monospace font, then a revenue greater than one million but less than target will have the italic Calibri font with the background highlighted in red. If you're applying multiple rules to a measure, the last rule that evaluates to true is the one that colors the item. For example, if rule 1 is revenue greater than one million and highlights in green, and rule 2 is revenue less than target and highlights in red, an item where revenue meets both criteria will highlight in red.

## Format Data with Existing Conditional Format Rules

To highlight important events in your data, you can activate or deactivate existing conditional formatting rules. For example, you might want to show when revenues meet high, medium, and low thresholds.

 [Video](#)

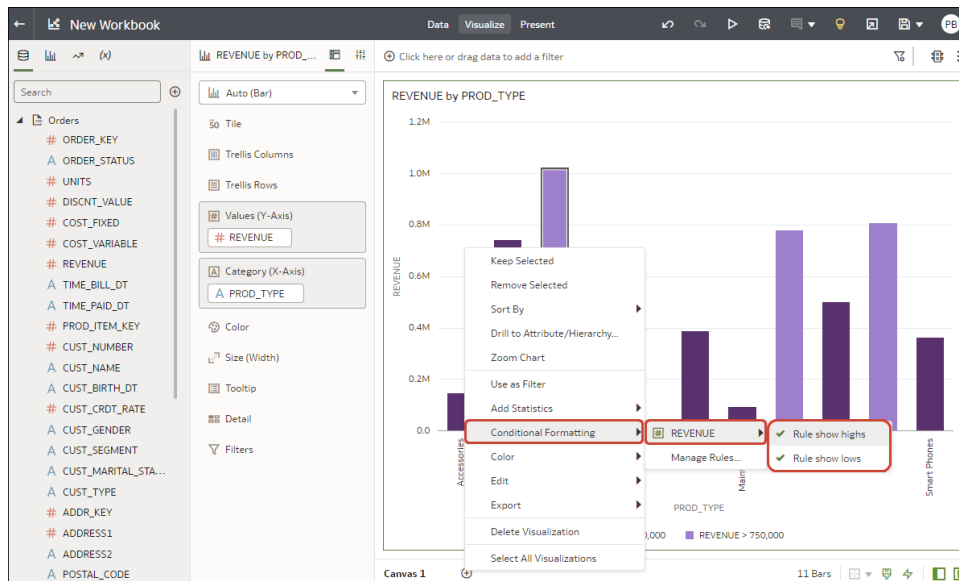
 [Tutorial](#)

1. On the Home page, select a workbook, click the **Actions** menu, and then select **Open**.
2. Click **Visualize**.
3. From the visualization editor, hover over a visualization, right-click, then select **Conditional Formatting** to show measures with rules available.

If a measure has no rules available, click **Manage Rules** to display the Conditional Formatting dialog, where you can create rules.

4. Click a measure (for example, REVENUE), to display rules available for measure.

In this example, REVENUE has two rules available, 'Rule show highs' and 'Rule show lows'. Active rules have a check mark.



5. Click on rules to activate or deactivate them.

## Add Conditional Formatting to Data


Add conditional formatting to highlight important events in your data. For example, you might want to show when occupancy rates for a rental property meet high, medium, and low thresholds.

 [Video](#)

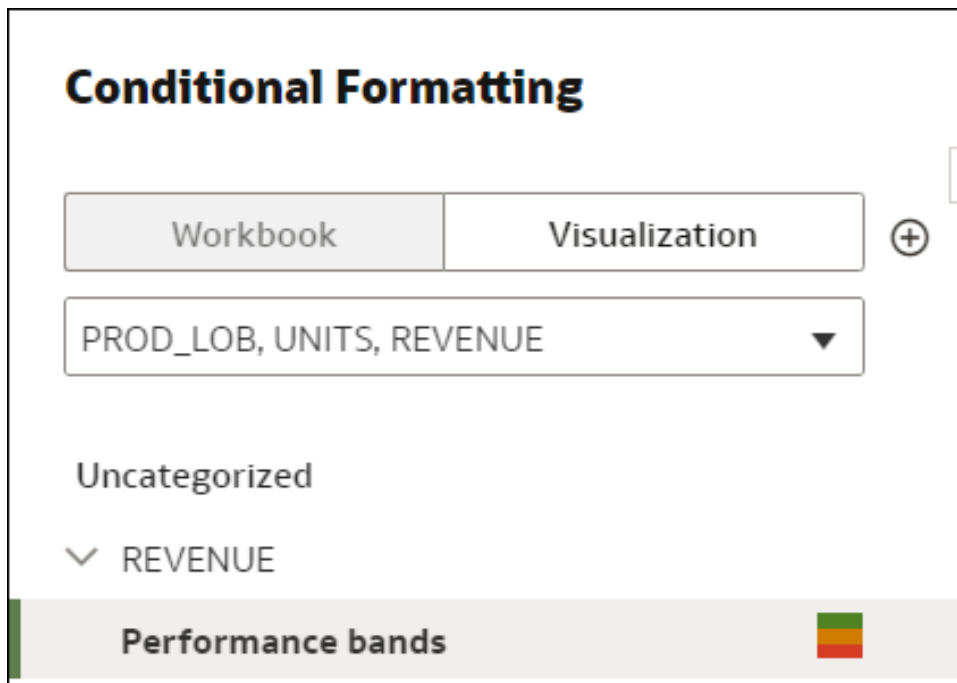
 Tutorial

**Note:** You can only display icons and emojis in Table, Pivot, or Tile visualizations.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Visualize**.

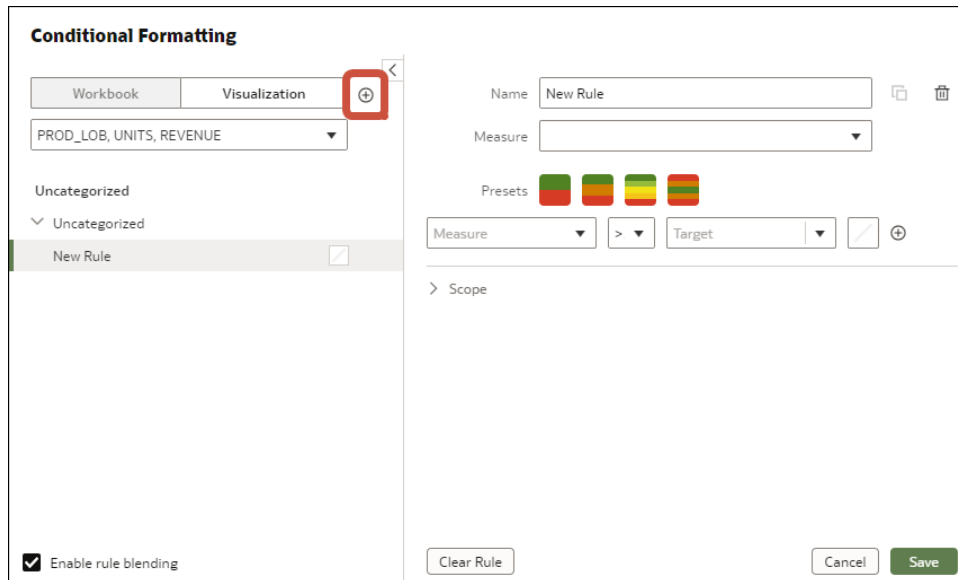
3. From the visualization toolbar, click **Conditional Formatting** (  ).

Existing rules are listed under their target measure. Rules are displayed as 'Uncategorized' until their target measure is specified. For example, in this screenshot, the rule "Performance bands" is listed under the measure REVENUE.



4. Click **Workbook** or **Visualization** to add conditional formatting to the whole workbook, or specific to a visualization.

**Tip:** If you need to start again, click **Add New Rule**.



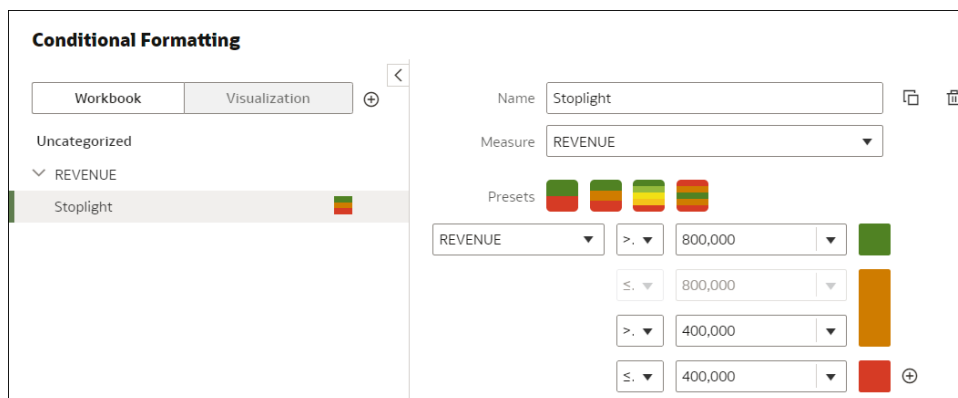
5. In **Name**, change the default name to a more user-friendly term.
6. In **Measure**, select the data measure that the rule evaluates.

For example, to highlight when revenue meet high, medium, and low thresholds, you might select REVENUE.

7. Use the operator field and adjacent value field to specify the threshold.

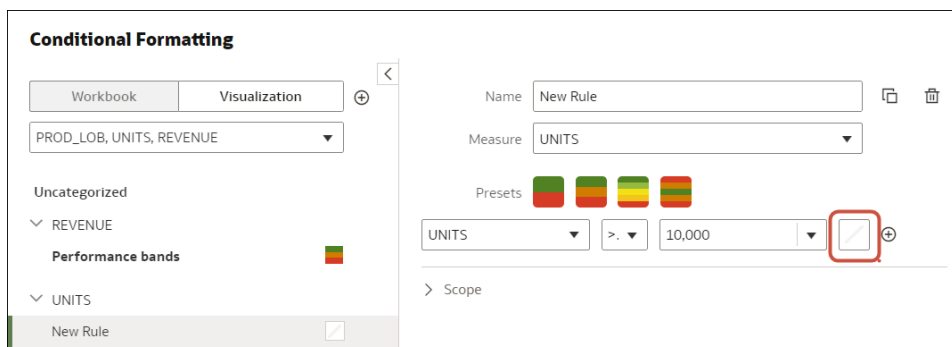
For example, to highlight REVENUE rates greater than 1,000,000, select the greater than symbol > in the operator field and enter 1,000,000 in the value field.

**Tip:** You can also create a rule by clicking one of the **Presets** and defining a value for each threshold. For example, click **3 Steps Threshold** to create a set of stoplight thresholds.



8. Click **Format** to configure the fill color, font, icon or emoji (tabular data), note, and legend for the new rule.





9. To add additional rules, repeat Steps 4 to 8.

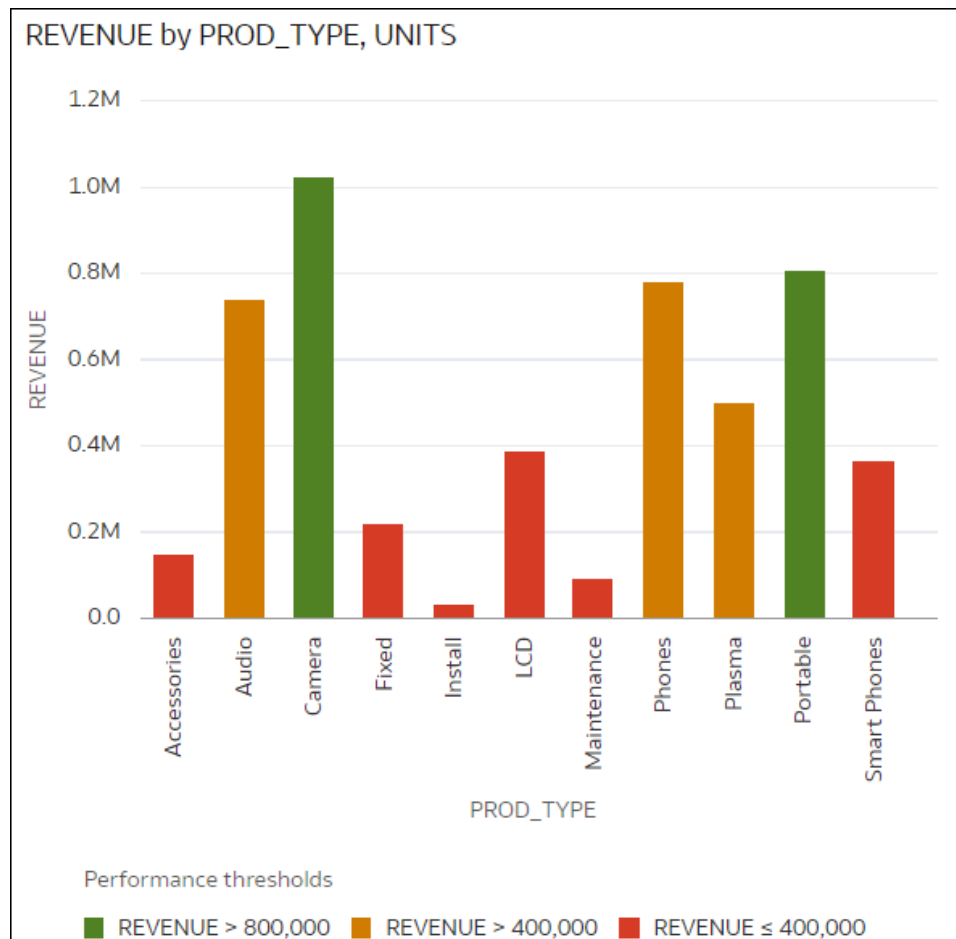
If you're applying multiple rules to the same measure, use the grab handles to position the rules in the order you want (rules at the top activate first), and click **Enable rule blending** if you want to combine text font and styling but retain background color differentiation.

10. Click **Save**.

## Example - Compare a Measure to a Set of Thresholds

This example shows how to use conditional formatting to compare a measure to low, medium, and high thresholds, also known as stoplight formatting.

In this example you highlight the revenue level for product types such as audio, phones, and accessories. You show the revenues over 800,000 in green, revenues between 400,000 and 800,000 in amber, and revenues below 400,000 in red.



Here's how to configure this example using the Conditional Formatting dialog.

- In the **Name** field, enter Stoplight.
- In the **Measure** field, select Revenue.
- In **Presets**, click **3 Steps Threshold** to display a three-step template.
- In the first step, select the greater than symbol > and enter 800,000 as the value.
- In the second step, select the greater than symbol > and enter 400,000 as the value.

**Conditional Formatting**

Workbook Visualization

Uncategorized

REVENUE

Stoplight

Name: Stoplight

Measure: REVENUE

Presets: [3 Steps Threshold]

REVENUE > 800,000 [Green]

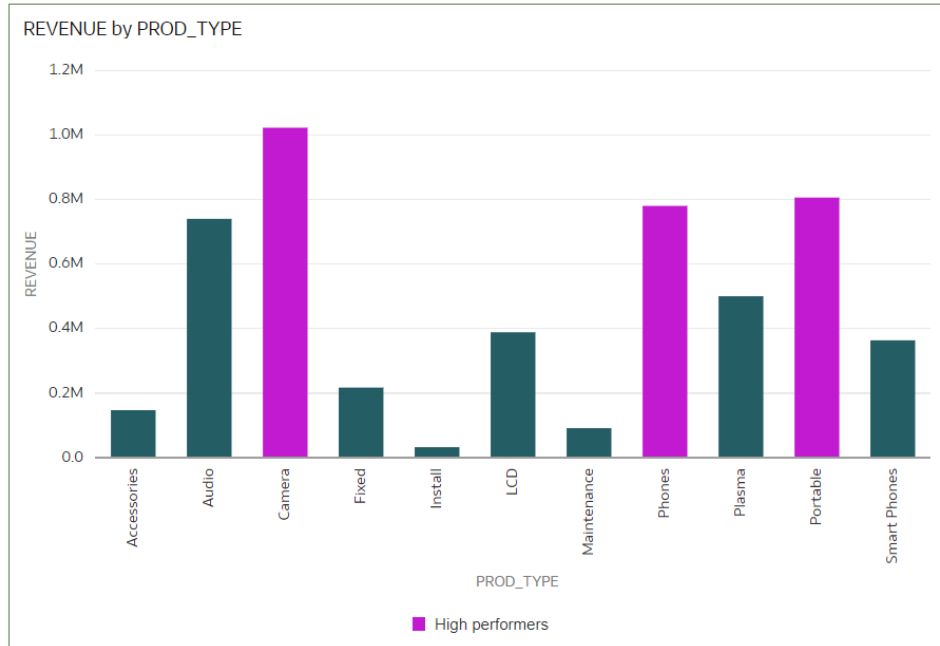
REVENUE > 400,000 [Orange]

REVENUE ≤ 400,000 [Red]

## Example - Compare a Measure to a Target or Goal

This example shows how to use conditional formatting to compare a measure to a target or goal.

In this example you highlight product types such as audio, phones, and accessories with a revenue of more than 750,000.



Here's how to configure this example using the Conditional Formatting dialog.

- In the **Name** field, enter High performers.
- In the **Measure** field, select Revenue.
- In the operator list, select the greater than symbol **>**, and in the value box, enter 750,000.
- Click **Format** to display the color picker and select a purple shade.

**Conditional Formatting**

Dataset Workbook Visualization

REVENUE

High performers

Name: High performers

Measure: REVENUE

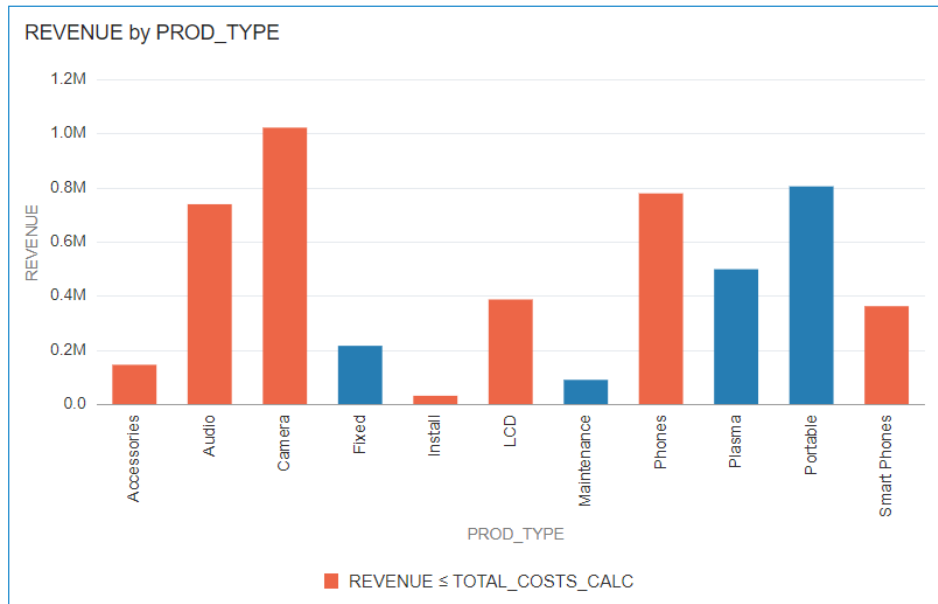
Presets: [Color swatches]

REVENUE > 750,000

## Example - Compare a Measure to a Complex Expression Value

This example shows how to use conditional formatting to compare a measure to a value calculated by an expression.

In this example, you compare revenue to total costs, which you calculate using an expression that sums fixed costs, variable costs, and discount value.



Here's how to configure this example using the Conditional Formatting dialog.

- In the **Name** field, enter Compare revenue to costs.
- In the **Measure** field, select Revenue.
- In the operator list, select the equal to or less than symbol  $\leq$ .
- In the value box, click the down arrow, then click **f(x)** to display the calculation editor.
- In the **Name** field, specify TOTAL\_COSTS\_CALC, and in the calculation field specify `COST_FIXED + COST_VARIABLE + DISCNT_VALUE`.

**Calculation**

Name: TOTAL\_COSTS\_CALC *f(x)*

COST\_FIXED + COST\_VARIABLE + DISCNT\_VALUE

Validate Cancel Save

- Validate the expression and click **Save**.
- Click **Format** to display the color picker and select a red shade.

**Conditional Formatting**

Dataset Workbook Visualization

Name: Compare revenue to costs

Measure: REVENUE

Presets: [Color swatches]

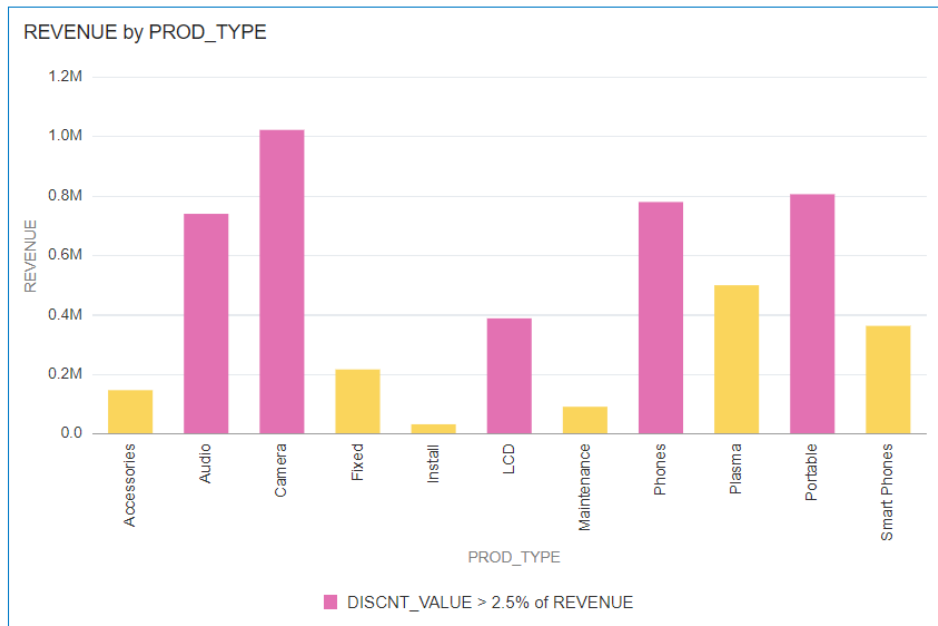
REVENUE ≤ TOTAL\_COSTS\_C... [Red swatch]

> Scope

## Example - Compare a Measure to a Percentage of a Value

This example shows how to use conditional formatting to compare a measure to a percentage of a value.

In this example you highlight product types such as audio, phones, and accessories where the discount value (stored in DISCNT\_VALUE) is greater than 2.5% of revenue.



Here's how to configure this example using the Conditional Formatting dialog.

- In the **Measure** field, select Revenue.
- In the drop down list below **Presets** select DISCNT\_VALUE.
- In the operator drop down list, select the greater than symbol '>', in the value box enter '2.5', and click %
- Click **Format** to display the color picker and select a purple shade.

## Example - Add Emojis to Highlight Values

This example shows how to use emojis in conditional formatting to highlight values.

In this example you highlight products types such as audio, phones, and accessories with an emoji where the revenue is greater than 700,000, in addition to spotlight formatting.

PROD\_LOB, PROD\_TYPE, UNITS, REVENUE

PROD_LOB	PROD_TYPE	UNITS	REVENUE
Communication	Phones	6,622	780,632.36
Communication	Smart Phones	4,142	363,871.65
Digital	Camera	8,555	1,023,235.09
Electronics	Accessories	2,792	147,311.94
Electronics	Audio	4,748	740,476.83
Games	Fixed	5,127	217,348.13
Games	Portable	10,575	806,643.77
Services	Install	2,881	32,733.01
Services	Maintenance	6,508	91,771.55
TV	LCD	1,537	388,825.84
TV	Plasma	1,454	500,511.00

Stoplight 🟡 REVENUE > 700,000 🟠 REVENUE 200,000 - 700,000 🔴 REVENUE ≤ 200,000

Here's how to configure this example using the Conditional Formatting dialog.

- Create a rule and click the **3 Steps Threshold** in **Presets**.
- Select REVENUE as the measure and configure the thresholds as greater than 700,000, between 200,000 and 700,000, and less than 200,000.
- Click **Format** for the greater than 700,000 threshold.

**Conditional Formatting**

Dataset Workbook Visualization

PROD\_LOB, PROD\_TYPE, UNITS, REVENUE

Orders

REVENUE

Stoplight

Name: Stoplight

Measure: REVENUE

Presets: [3 Steps Threshold]

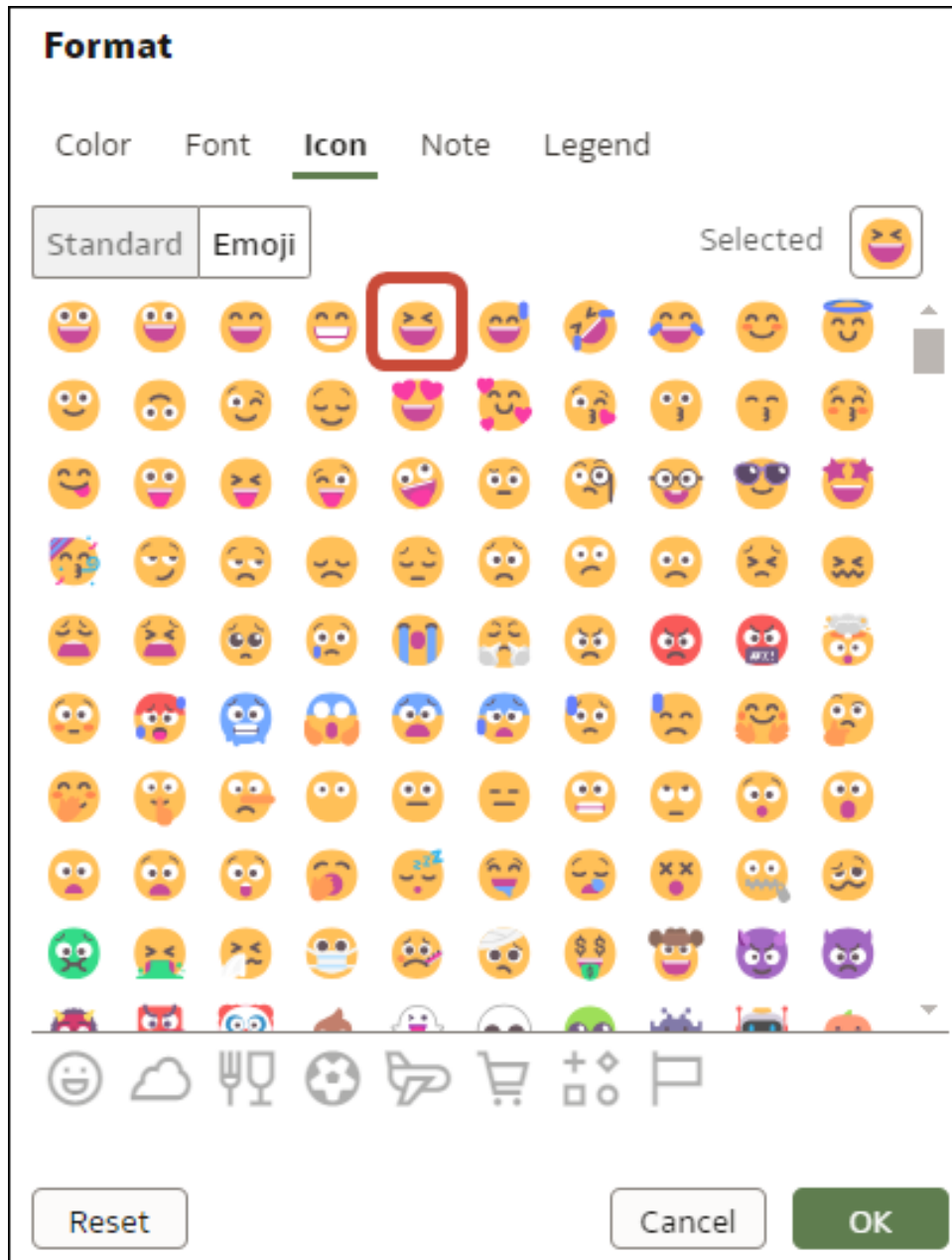
REVENUE > 700,000 [Format]

≤ 700,000

> 200,000

≤ 200,000

- Click **Icon**, then click **Emoji**, and select a smile emoji.



## Apply Color to Visualizations

Use color to enhance your visualizations. For example, you might change the default color palette for analyses in a workbook.

### Topics:

- [About Color Assignments in Visualizations](#)
- [Access Color Options](#)
- [Change the Color Palette](#)
- [Assign Colors to Columns](#)



## About Color Assignments 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).

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.

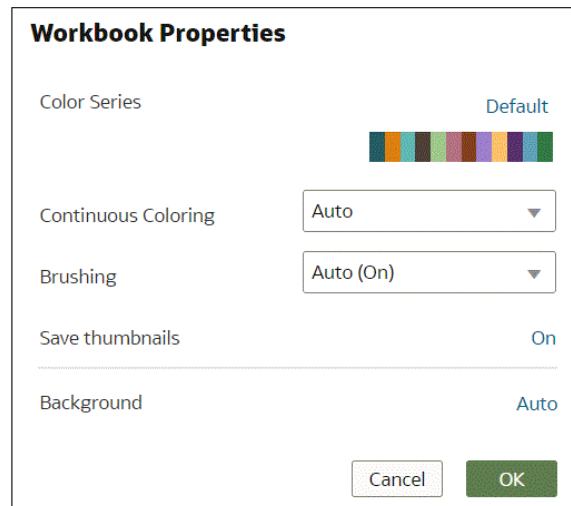
The **Visualize** canvas has a Color section in the Grammar Panel where you can put a measure column, attribute column, or set of attributes columns. The canvas assigns color to the columns that are included in the Color section:

- When a measure is in the Color section, 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've one attribute in the Color section, 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've multiple attributes in the Color section, 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 section are Product and Brand and you've selected Hierarchical Palette, then in your visualization, each brand has its own color, and within that color, each product has its own shade.

## Access Color Options

You can set color options for your workbook and for individual visualizations within your workbook.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. If you want to edit color options for the whole workbook:
  - a. Click **Menu** on the workbook toolbar and select **Workbook Properties**.
  - b. Use the **General** tab to edit the color series or continuous coloring.
3. If you want to edit color options for a visualization.
  - a. Select the visualization and click **Menu** or right-click.
  - b. Select **Color**. The available color options depend on how the measures and attributes are set up in your visualization.



- c. You can experiment with visualization colors and select **Reset Visualization Colors** to revert to the original colors.
- d. Select **Stretch Palette** to turn this option on or off. 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.

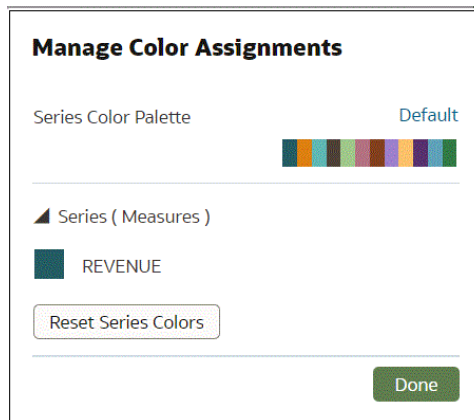
## Change the Color Palette

You can switch between the various color palettes until you find the one you want.

 [LiveLabs Sprint](#)

Each color palette contains 12 colors that you can apply to a visualization.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select a visualization to change the color palette for.
3. Click **Menu** or right-click and select **Color**, then select **Manage Assignments**.
4. Locate the **Series Color Palette** and click the color palette that's currently used in the visualization (for example, Default or Alta).

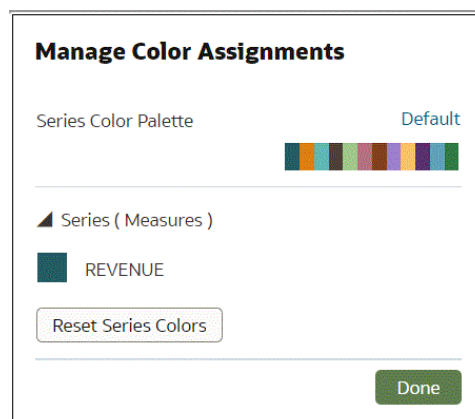


5. From the list, select the color palette that you want to apply to the visualization.

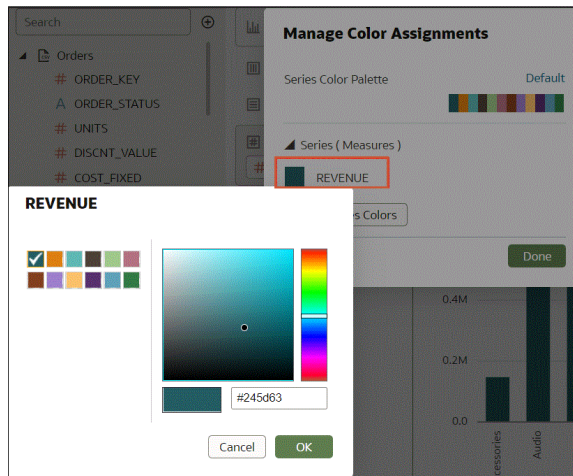
## Assign Colors to Columns

Instead of using the palette's default colors, you can choose specific colors to fine-tune the look of your visualizations.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select the visualization that you want to manage the colors for.
3. Click **Menu** on the visualization toolbar or right-click and select **Color**, then select **Manage Assignments**.
4. If you're working with a measure column, you can do the following:
  - Click the box containing the color assigned to the measure. From the color picker dialog, select the color that you want to assign to the measure. Click **OK**.
  - Specify how you want the color range to be displayed for the measure (for example, reverse the color range, pick a different color range, and specify how many shades you want in the color range).



5. If you're working with an attribute column, then click the box containing the color assignment that you want to change. From the color picker dialog, select the color that you want to assign to the value. Click **OK**.



## Format Numeric Values of Columns

You can format numeric values of a column in your visualizations using a wide range of ready-to-use formats. For example, you might change the aggregation type from Sum to Average.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Data Panel, select the column.
3. In the properties pane for the selected column, use the **General** or **Number Format** tabs to change the numeric properties.
  - **General** - Change the column name, data type, treat as (measure or attribute), and aggregation type.  
For example, to change how a number is aggregated, use the **Aggregation** option.
  - **Number Format** - Change the default format of a number column.
4. Click **Save**.

## Format Numeric Values of Visualizations

You can format numeric properties of a visualization using a wide range of ready-to-use formats.

For example, you can change how you display data labels, currency, decimal places, abbreviation preset to scale number or currency options, negative numbers, tooltip numbers, and aggregation method.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Visualize** and select a visualization.
3. In the properties pane for the selected visualization, use the **Values** tab to change the numeric properties.

For example, to change number format to display negative values in red, under **Number Format**, click **Negative Values** and select a red option, 123 or (\$123).

4. Click **Save**.

## Set Scale Options for Numbers and Currency Values

You can select an abbreviated preset scale option for a visualization column to display numbers or currency for thousands (K), millions (M), billions (B), or trillions (T).

You can change a column number scale format such as 32,810.00, to display in an abbreviated preset number scale format such as 32.81K. For example, select **K** to change a Sales column from displaying a value such as \$37,723.21 to display the same value as \$37.72K.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Visualize** and select a visualization.
3. In the properties pane for the selected visualization, select the **Values** tab and expand a measure column.
4. Under **Number Format**, click **Abbreviate**.
5. Select a value.
  - Select **On** if you want to automatically scale and abbreviate numbers.
  - Select a value if you want to choose a specific scale and abbreviation value.
  - Select **Off** if you want to disable abbreviations.
6. Click **Save**.

## Set Currency Symbols for Visualizations

You can set measure values in a visualization to display an appropriate currency symbol.

You can configure a measure to use a custom currency to display the symbol associated with a currency. For example, if you set a canvas filter to display a European Ledger, then the Euro symbol is displayed for each measure value that's associated with the custom currency property. The workbook data must contain a currency code column, for example, a Ledger Currency column. The currency code column enables the display of an appropriate currency symbol for the measure column, for example, a Profit column.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Properties panel for a selected measure, click the **Values** tab, click **Number Format**, and select **Currency**.
3. In the **Currency** field, click the currently displayed value and select **Custom**.
4. In the **Custom** field, add the column that determines the currency code.
5. Click **Save**.

# Add Notes to Visualizations

Annotate your visualizations with notes to call out areas of interest or emphasize specific data points.

## Topics:

- [Add Notes to a Visualization](#)
- [Connect a Note to Data Points in a Visualization](#)
- [Show or Hide a Note's Data Point Connectors](#)
- [Delete a Note's Data Connectors](#)
- [Show or Hide a Visualization's Notes](#)

## Add Notes to a Visualization

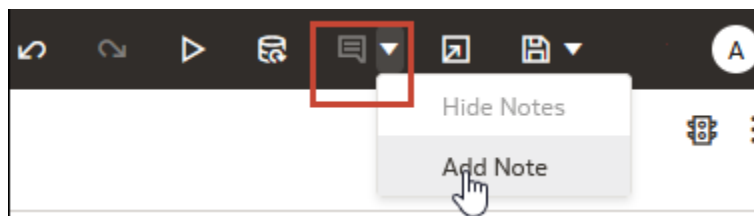
You can add notes to call out important information in a workbook's visualizations. You can use notes to annotate one or all of the visualizations in a canvas, or to emphasize specific data points in a visualization, such as columns in a table or clusters in a scatter plot.

There are many formatting options that you can use to customize a note's content. For example, you can choose font type, size, and color; add a bulleted or numbered list; and add URL links.

When you add a note, you can add data connectors to call out specific points in the visualization, or you can create the note and add or adjust the data point connectors later. See [Connect a Note to Data Points in a Visualization](#).

By default, the notes that you add are displayed, but you can hide a visualization's notes. See [Show or Hide a Visualization's Notes](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the workbook, click **Visualize**.
  - To add a note without data point connectors, click the **Notes** icon and select **Add Note**.
  - To add a note with data point connectors, go to the visualization where you want to add the note and hold down the Ctrl key and click up to ten data points that you want the note to connect to. Then click the **Notes** icon and select **Add Note**.



3. In the note box, enter the note text and use the formatting options to specify the note's font style, color, size, and so on.
4. Optional: To add a link to the note, highlight the note text that you want to make into a link. Click **Link** and in the Hyperlink dialog, enter a URL. Click **OK**.
5. Click **Save**.

## Connect a Note to Data Points in a Visualization

Add connectors to a note to identify specific data points in a visualization.

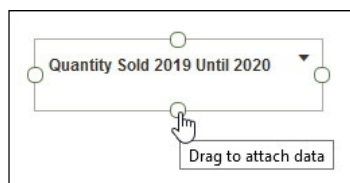
### LiveLabs Sprint

You can connect a note to up to ten data points on a visualization or canvas. You can't connect a note to a data point on these visualization types:

- Chord Diagram
- Correlation Matrix
- List
- Map
- Parallel Coordinates
- Tile

By default, a note's data point connectors are displayed, but you can hide them. See [Show or Hide a Note's Data Point Connectors](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Locate and hover over the note that you want to attach to data points. Click and hold a circle and drag the line to the data point that you want to connect the note to. You can connect a circle to multiple data points.

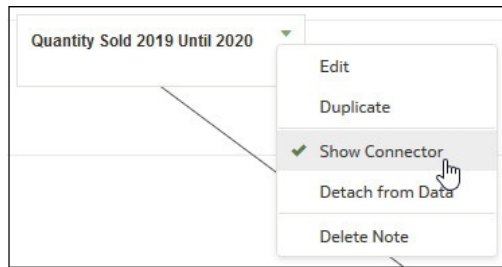


3. Click **Save**.

## Show or Hide a Note's Data Point Connectors

By default a note's data point connectors are displayed, but you can hide or show them as needed.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Locate and hover over the note with the connectors to hide or show. Click **Click to edit** and then click **Show Connector**.



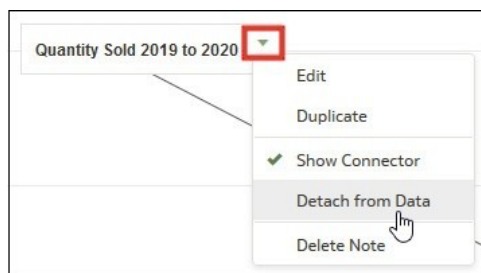
3. Click **Save**.

## Delete a Note's Data Connectors

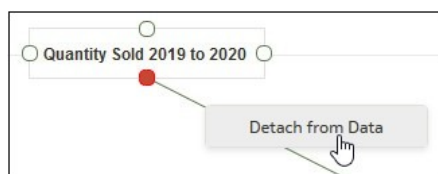
You can delete one or more of a note's data connectors.

Instead of deleting a note's data connectors, you can hide them. See [Show or Hide a Note's Data Point Connectors](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Optional: To delete all connectors, locate and hover over a note with connectors. Click **Click to edit** and then click **Detach from Data**.



3. Optional: To delete an individual connector, hover over and right-click a connector, and then click **Detach from Data**.



4. Click **Save**.

## Show or Hide a Visualization's Notes

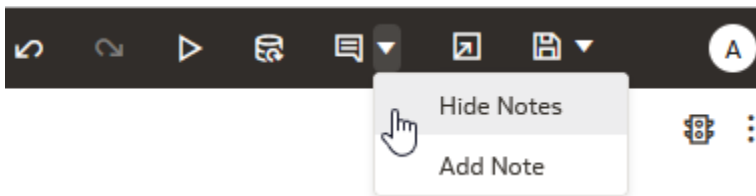
By default a workbook's visualization notes are displayed, but you can hide or show all notes.

If you create a presentation flow from a workbook, then all of the included canvases' notes are displayed in the dashboard even if you hide all notes in Visualize. In the Present page where you add canvases to create the presentation flow and workbook, you can use a canvas' **Notes** properties to show and hide individual notes for the

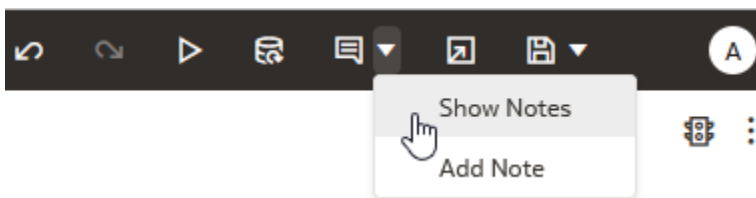


canvas. If your presentation flow and workbook contains multiple canvases, then you can set to show and hide individual notes for each canvas. See [Show or Hide Canvas Notes in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Optional: If the workbook's notes are displayed, then click **Hide Notes**.



3. Optional: If the workbook's notes aren't displayed, then click **Show Notes**.



4. Click **Save**.

## Sort, Drill, and Select Data in Visualizations

You can narrow your focus to explore certain aspects of your data by sorting, drilling, and selecting data.

### LiveLabs Sprint

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select a visualization and click **Menu**.
3. Select one of the following:
  - Click **Sort By** and then select **Custom**, or click **Sort** in the visualization tool bar to display the Sort Order dialog where you can sort one or more attributes in a visualization. You can create and view sorts, define sort attributes, arrange the sort order for multiple sorts, and view and resolve sort conflicts. You can also sort an attribute by a measure column that isn't used in the visualization. If the table includes subtotals or contains a dimension, then all column sorts on columns after the subtotal or dimension, are sorted in the subtotal group.
 

If you're working with a table view with multiple sorts, then the system always sorts the last column that you sorted first. In some cases where specific values display in the left column, you can't sort the center column. For example, if the left column is Product and the center column is Product Type, then you can't sort the Product Type column. To work around this issue, swap the positions of the columns and try to sort again.
  - Click **Drill** to create a drill to a data element, and to create a drill through hierarchies in data elements, for example you can create a drill to weeks within a quarter. You

can also create drills 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.

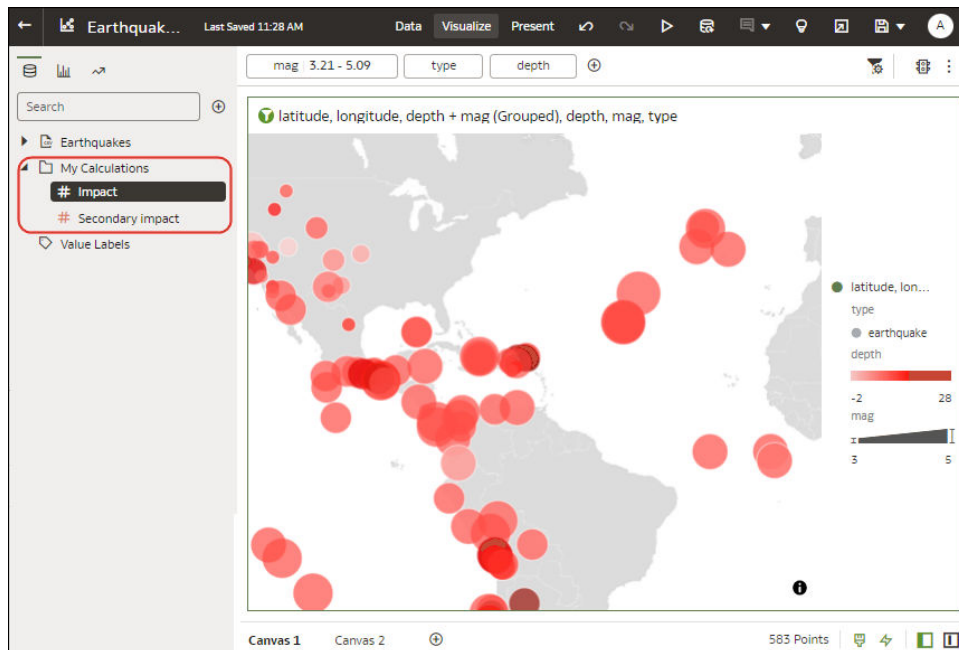
- Click **Drill to [Attribute Name]** to directly drill to a specific attribute within a visualization.
- Click **Keep Selected** to keep only the selected members and remove all others from the visualization and its linked visualizations. For example, you can keep only the sales that are generated by a specific sales associate.
- Click **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.

## Overview of My Calculations

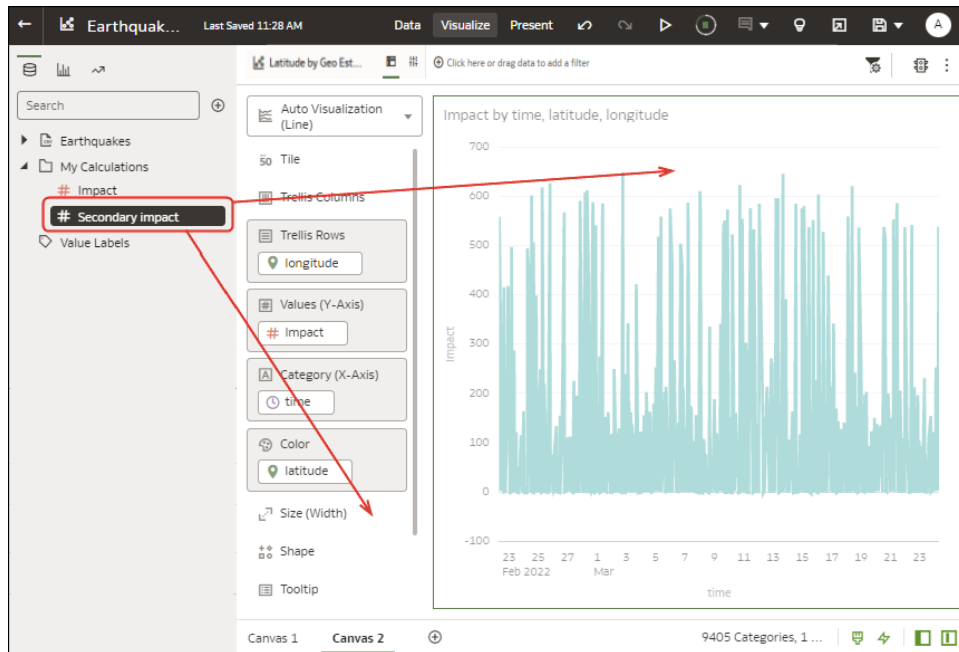
The **My Calculations** area enables you to manage and reuse calculations that you create in your workbooks.

When you create calculations, they're stored in the **My Calculations** area of the Data Panel, where you can reuse them in any canvas and visualization in the workbook. For example, if you have data elements for `height` and `width`, you might calculate `area` by multiplying height by width (that is, `height * width`). You can reuse the `area` calculation in other visualizations in the workbook.

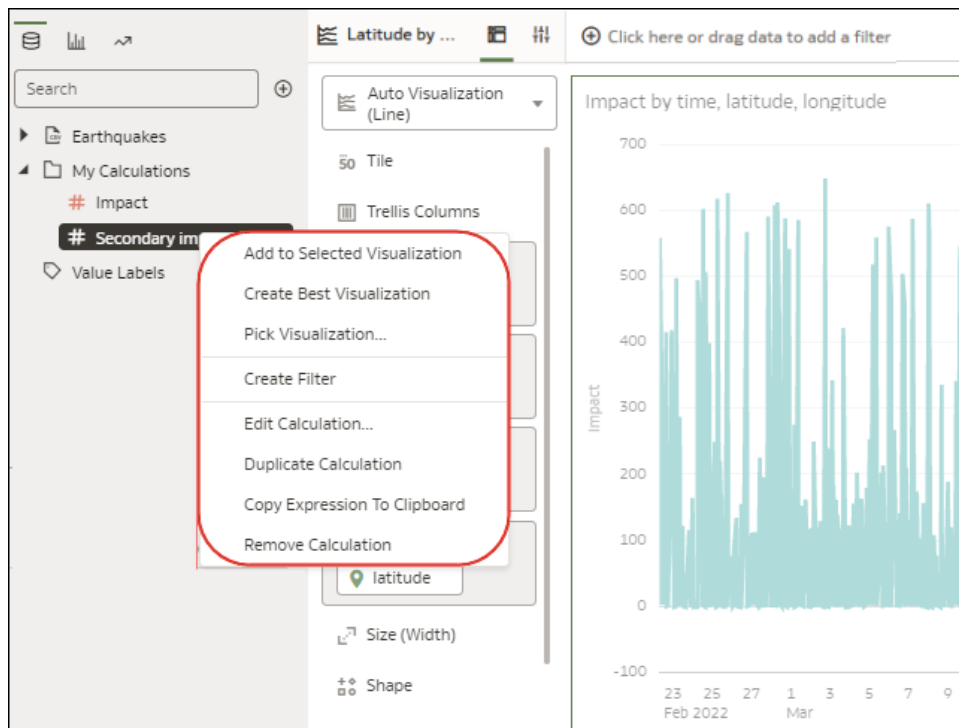
- In the workbook editor, review existing calculations in the My Calculations area, and select a calculation to display its attributes in the Data Panel.



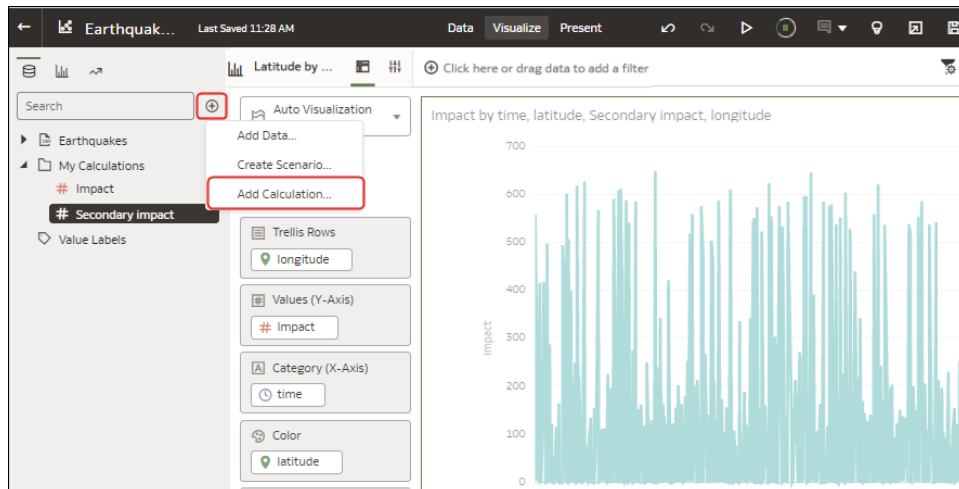
- To add a calculation to a visualization, drag it from the My Calculations area to the visualization or Grammar Panel.



- Right-click a calculation to its editing options. For example, you might add it to the selected visualization, use it to filter your data, or let Oracle Analytics choose the best visualization type for you (that is, **Create Best Visualization**).



- To calculate a new value to use in your workbook, click **Add**, then **Calculation** to display the New Calculation dialog, where you can specify the details (for example,  $height * width$ ). The new calculation is added to the My Calculations area.

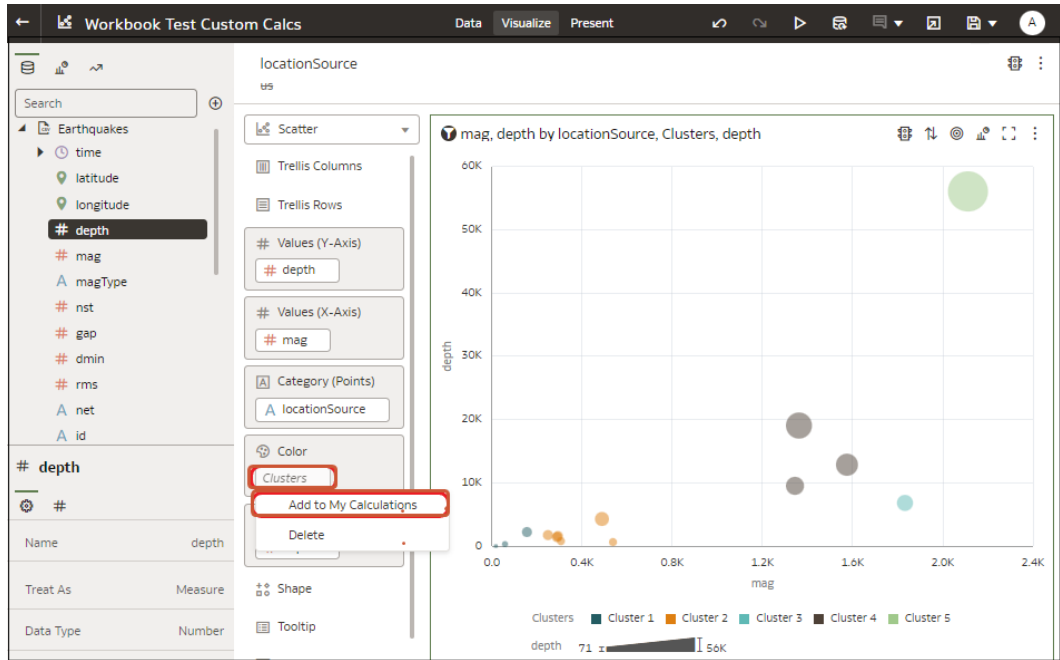


## Create a Calculation Based on a Cluster or Outlier

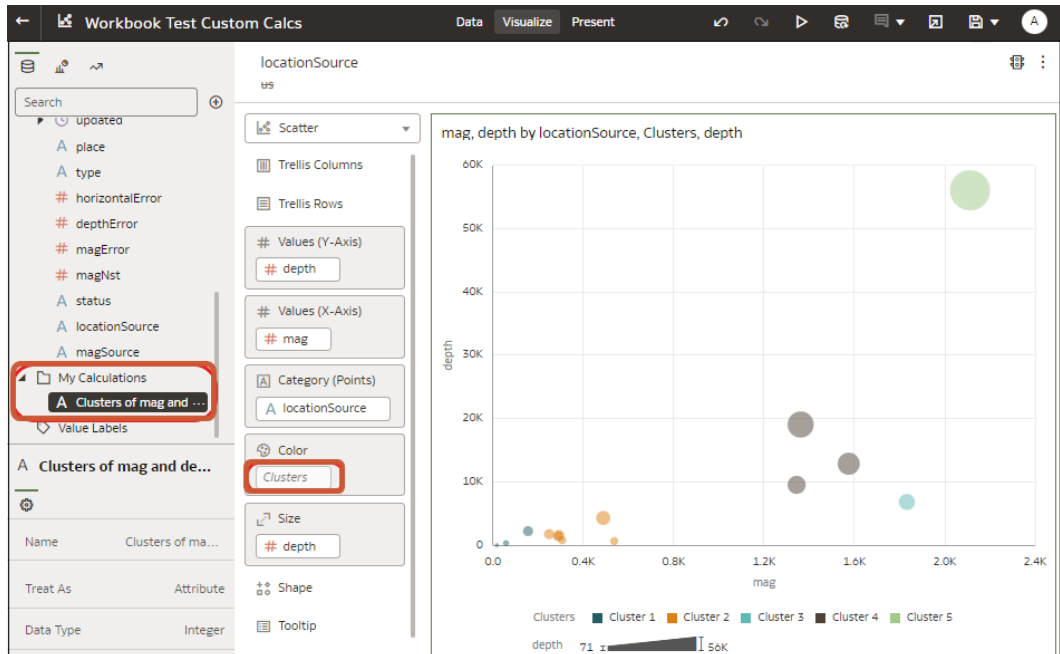
You can save the underlying formula that Oracle Analytics creates for clusters and outliers as a calculation and reuse it in other visualizations in the same workbook.

Creating a calculation like this enables you to analyze the same clusters or outliers across many visualizations with just a single click.

1. On the Home page, open or create a workbook with a graph visualization.  
For example, you might open a workbook that contains a Scatter graph.
2. In the Visualize canvas, hover over the visualization, right-click, then select **Add Statistics**.
3. To add a cluster, select **Clusters**, or to add an outlier, select **Outliers**.  
Oracle Analytics adds the cluster or outlier to the Grammar Panel.
4. In the Grammar Panel, click the **Clusters** or **Outliers** element, and select **Add to My Calculations** (or drag the element to the **My Calculations** area of the Data Panel).



You can use this calculation to analyze clusters and outliers in other visualizations in the workbook.



# Analyze Data with Explain

Explain uses machine learning to find useful insights about your data.

## Topics:

- [What is Explain?](#)
- [What Are Insights?](#)
- [Use Explain to Discover Data Insights](#)

## What is Explain?

Explain analyzes the selected column within the context of its dataset and generates text descriptions about the insights it finds. For example, for any column you'll find out basic facts, key drivers, segments that explain the column, and anomalies.



Explain uses Oracle's machine learning to generate accurate, fast, and powerful information about your data, and creates corresponding visualizations that you can add to your workbook's canvas.

Explain is for data analysts who might not know what data trends they're looking for, and don't want to spend time experimenting by either dragging and dropping columns onto the canvas, or using data flows to train and apply predictive models.

Explain is also a useful starting point for data analysts to confirm a trend that they're looking for in their data, and then use that information to create and tune predictive models to apply to other datasets.

## What Are Insights?

Insights are categories that describe the selected column within the context of its dataset.



The insights that Explain delivers are based on the column type or aggregation that you chose and will vary according to the aggregation rule set for the chosen metric. Explain generates only the insights that makes sense for the column type that you chose.

Insight Type	Description
Basic Facts	<p>Displays the basic distribution of the column's values. Column data is broken down against each of the dataset's measures. This insight is available for all column types.</p> <ul style="list-style-type: none"><li>• For a selected metric, this insight shows the distribution of the aggregated metric value for each member of each attribute column.</li><li>• For a selected attribute, this insight shows the value of each metric in the dataset across the member values of the attribute.</li></ul>

Insight Type	Description
Key Drivers	Shows the columns in the dataset that have the highest degree of correlation with the selected column outcome. Charts display the distribution of the selected value across each correlated attributes value. This tab displays only when explaining attribute columns, or when explaining a metric column that has an average aggregation rule.
Segments	Displays the key segments (or groups) from the column values. Explain runs a classification algorithm on the data to determine data value intersections and identifies ranges of values across all dimensions that generate the highest probability for a given outcome of the attribute. For example, a group of individuals of a certain age range, from a certain set of locations, with a certain range of years of education form a segment that has a very high probability of purchasing a given product. This tab displays only when explaining attribute columns.
Anomalies	Identifies a series of values where one of the (aggregated) values deviates substantially from what the regression algorithms expect.

## Use Explain to Discover Data Insights

When you select a column and choose the Explain feature, Oracle Analytics uses machine learning to analyze the column in the context of the dataset. For example, Explain searches the selected data for key drivers and anomalies.

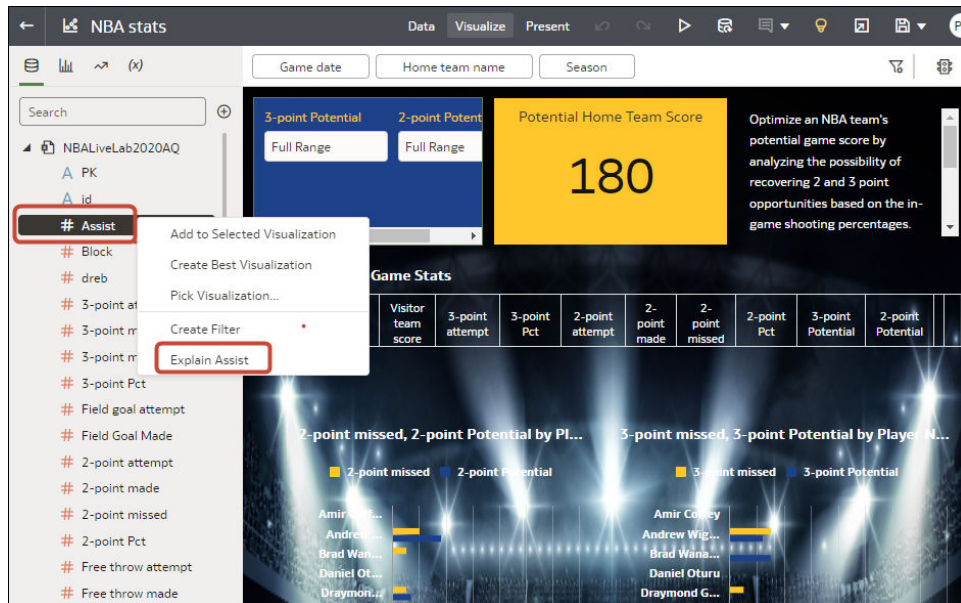
Explain displays its findings to you as text descriptions and visualizations, which you can add to your workbook's canvas.

### Tutorial

If you perform explain on a column and the results contain too many correlated and highly ranked columns (for example, ZIP code with city and state), then excluding some columns from the dataset so that Explain can identify more meaningful drivers. See [Hide or Delete a Column](#).

Explain is available after you install machine learning into your local Oracle Analytics Desktop directory. See [How do I install Machine Learning for Desktop?](#)

1. In the Home page, click **Create** and then **Workbook** to create a new workbook.
2. Click **Visualize** to open the Visualize page.
3. In the Data Panel, right-click a column and select **Explain <Data Element>**.

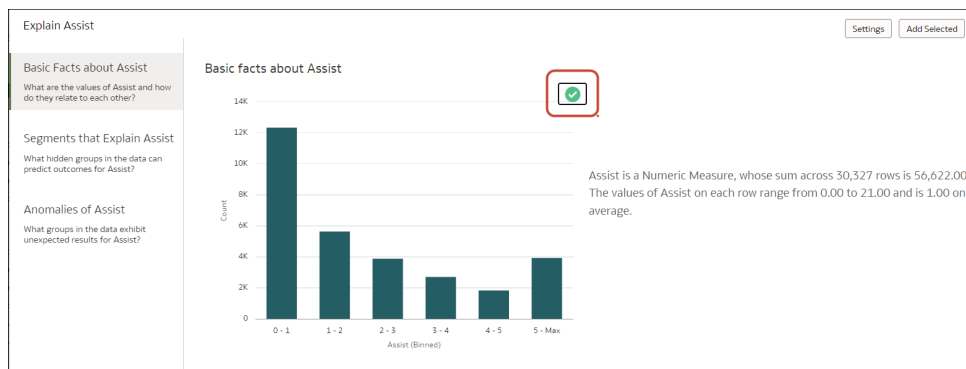


For Explain to successfully analyze an attribute, the attribute must have three to 99 distinct values.

The Explain dialog displays basic facts, anomalies, and other information about the selected column.

4. Review the suggested insights in other categories by clicking on the tabs. For example, Basic Facts about <attribute> or Anomalies of <attribute>.
5. For each insight that you want to include in your workbook's canvas, hover over it and click **Select for Canvas**.

You'll see a green tick (✔) next to selected items.



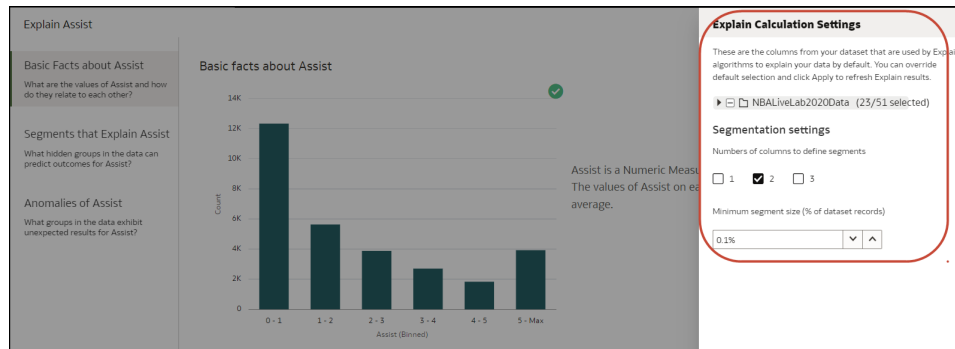
You can select multiple insights from any of the tabs.

6. Click **Add Selected** to add insights marked with a green tick on any of the tabs.

You can manage the Explain insights like any other visualizations you've manually created on the canvas.

To fine-tune the insights, click **Settings** to change which columns are analyzed and configure options for that category, for example, select the minimum size for segments.





## About the Warning for Data Issues in Visualizations

You see a data warning icon when the full set of data associated with a visualization isn't rendered or retrieved properly.

If the full set of data can't be rendered or retrieved properly, then the visualization displays as much data as it can as defined for the fixed limit, and the remaining data or values are either truncated or not displayed.

## Set Workbook Thumbnails

Data authors can show or hide the thumbnail for an individual workbook on the Home page. Hiding a workbook thumbnail can be useful for protecting sensitive data from being exposed to users that don't have the same access as the data author.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. If the workbook opens for viewing, click **Edit**.
3. Click **Menu** on the workbook toolbar and select **Workbook Properties**.
4. Set **Save thumbnails** to **On** to display a thumbnail for the workbook on the Home page or **Off** to hide it.
5. Click **OK**.
6. Click **Save**.

## Set Visualization Loading Overlay Opacity

Data authors can adjust the white overlay opacity around visualizations that displays while a workbook loads the data. Setting a lower opacity level can enable canvases with a dark background to show through while rendering visualizations.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. If the workbook opens for viewing, click **Edit**.
3. Click **Menu** on the workbook toolbar and select **Workbook Properties**.
4. Use the **Visualization Loading Overlay** slider to set the opacity of the visualization overlay to a value between 1-100, where 1 is transparent, and 100 is opaque.
5. Click **OK**.
6. Click **Save**.

# 8

## Filter Your Data

Use filters to focus in on just the data that you're interested in. For example, you might filter by Month and visualize data only for January, February, and March.

### Topics:

- [About Filters and Filter Types](#)
- [Filter Data in a Workbook](#)
- [Specify a Filter's Selection Values](#)
- [Enable or Disable the Limit By Setting from the Filters Bar](#)
- [Display or Hide Filter Values in the Filters Bar](#)
- [Filter Data in a Visualization](#)
- [Customize the Label of Visualization Filters](#)
- [Disable Multiple Select for Visualization List Filters](#)
- [Use the Dashboard Filter](#)
- [Change the Scope of Filters Between the Main Filter Bar and Visualizations](#)
- [Use a Visualization as a Filter](#)
- [Apply Different Filter Types](#)
- [About Filter Personalizations](#)

## About Filters and Filter Types

Oracle Analytics supports many types of filter to enable you to focus on the data in which you're interested in visualizations, canvases, and workbooks.

The Range, List, Date, and Expression filter types are specific to either a visualization, canvas, or workbook. Filter types are automatically determined based on the data elements you choose as filters, but you can also switch to select another compatible filter type.

- **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.
- **Expression filters** - Let you define more complex filters using SQL expressions.
- **List filters** - Applied to data elements that are text and date data types, and number data types that can't be aggregated. List filters are applied to the whole canvas or to a specific visualization on the canvas.
- **Range filters** - Generated for data elements that are number data types and that have an aggregation rule set to something other than none. Range filters are applied to data elements that are measures, and that limit data to a range of contiguous values, such as revenue of \$100,000 to \$500,000. Or you can create a range filter that excludes (as opposed to includes) a contiguous range of values. Such exclusive filters limit data to

noncontiguous ranges (for example, revenue less than \$100,000 or greater than \$500,000).

- **Relative Time** - Focus on values for a specified time period relative to today. For example, focus on the last three years, the next three years, or year to date.
- **Top and bottom filters** - Applied to measure and attribute data elements. You can specify whether to filter by top or bottom, specify the number of items to display, and which measure or attribute to limit by.

#### About Filtering Data in Workbooks

- If you've applied role-based filters to a dataset, workbook users only see data to which they've been given access. For example, users with the application role *North American Analyst* will only see North American sales data when they open a shared global sales workbook.
- If your workbook contains multiple datasets and some aren't joined, then there are restrictions for how you can use filters.
- Any visualization that doesn't use the data element of an active filter is grayed out.
- You can't specify data elements of a dataset as a filter of another dataset unless the datasets are joined.
- To select an alternative filter type for date or time filters, click the filter and select a different type. For example, for a Month element you might change the filter type from **Date Range** to **List** to focus in on individual months.

## How Datasets Interact with Filters

There are several ways that datasets can interact with filters in a workbook.

Various factors affect the interaction of datasets and filters in workbooks:

- The number of datasets within a workbook. See [How the Number of Datasets Affects Filters](#).
- The datasets that are blended or not blended (for a workbook with multiple datasets).
- The data elements (columns) that are matched between blended datasets.

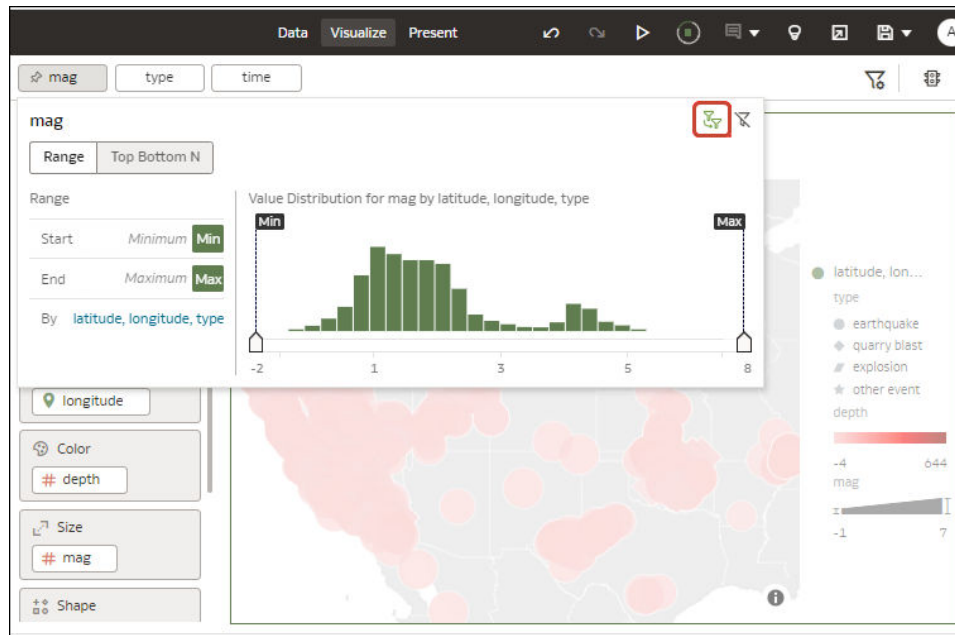
You can use the Data Diagram in the Data page of a workbook to:

- See blended and not-blended datasets.
- Blend or connect multiple datasets by matching the data elements in the datasets.
- Disconnect the datasets by removing matched data elements.

## How the Number of Datasets Affects Filters

Filters can interact differently with visualizations depending on the number of datasets, whether the datasets are joined, and what the filters are applied to.

You can filter all visualizations in a canvas or individual visualizations. Use the **Limit Values** options to remove or limit how the filters in the filter bar restrict each other.



### If there's a single dataset in a workbook

Single Dataset	Filter Interaction
Add a filter to the filter bar	It applies to all visualizations in the workbook.
Add a filter to a visualization	It is applied after filters on the filter bar are applied.
Add multiple filters	By default filters restrict each other based on the values that you select.

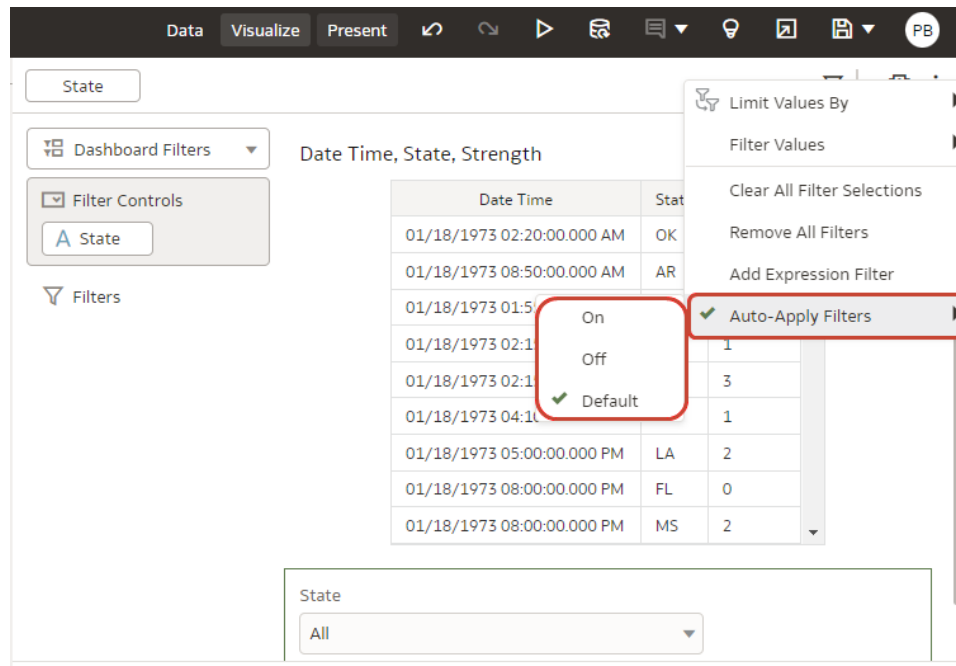
### If there're multiple datasets in a workbook

Multiple Datasets	Filter Interaction
If you add filters to the filter bar.	<ul style="list-style-type: none"> <li>The filters apply to all the visualizations using the joined datasets. For visualizations using the not-joined datasets, you must add a separate filter to each dataset.</li> <li>You can't specify data elements of a dataset as a filter of other datasets, if the two datasets aren't joined.</li> <li>If a data element of a dataset is specified as a filter, but doesn't match the joined datasets, then the filter applies only to the visualization of that particular dataset, and does not apply to other visualizations of joined or not-joined datasets.</li> <li>You can select <b>Pin to All Canvases</b> of a filter, to apply a filter to all canvases in the workbook.</li> </ul>
If you hover over a filter name to see the visualization to which the filter is applied.	Any visualizations that don't use the data element of the filter are grayed out.
If you add filters to visualizations	<ul style="list-style-type: none"> <li>If you specify a filter on an individual visualization, that filter applies to that visualization after the filters on the filter bar are applied.</li> <li>If you select the <b>Use as Filter</b> option and select the data points that are used as a filter in the visualization, then filters are generated in the other visualizations of joined datasets and matched data elements.</li> </ul>

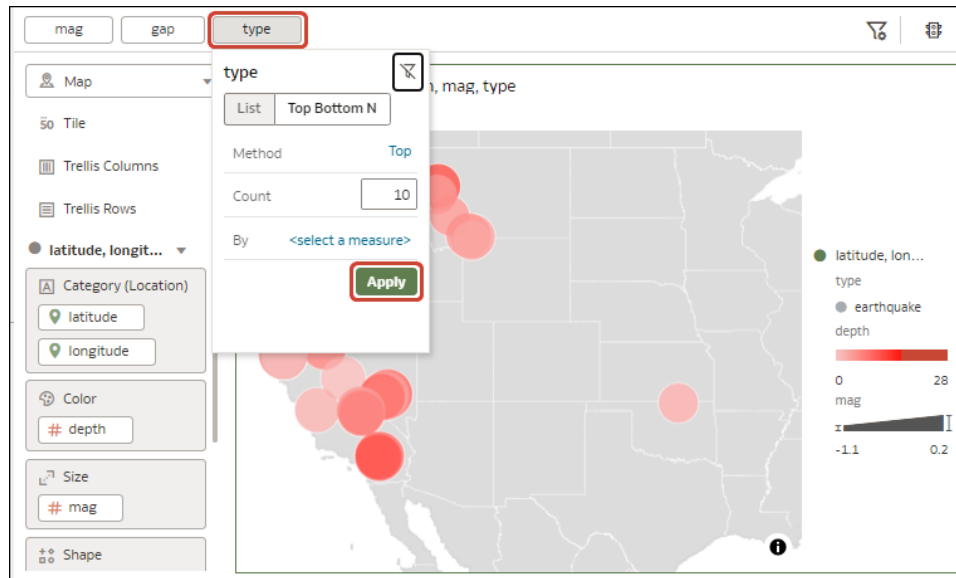
## About Automatically Applied Filters

By default, filters are automatically applied. However, you use **Auto-Apply Filters** options to turn this behavior off if you want to manually apply the filters.

To display the **Auto-Apply Filters** options, click Filter Bar Menu icon (🔍), then click **Auto-Apply Filters**. When the **Auto-Apply Filters** is turned on, the selections you make in the filter bar or filter drop target are immediately applied to the visualizations.



When **Auto-Apply Filters** is turned off, the selections you make in the filter bar or filter drop target aren't applied to the canvas until you click the **Apply** button in a filter panel.

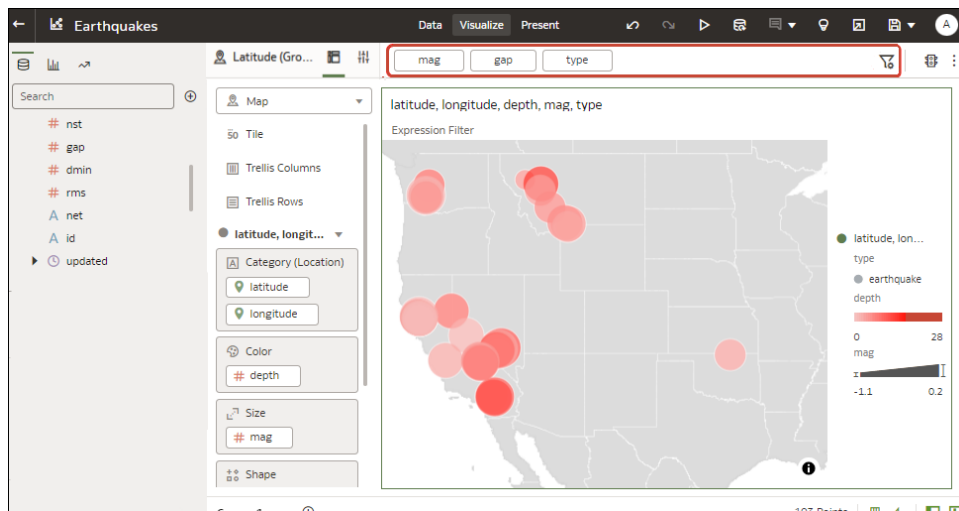



## Filter Data in a Workbook

Use filters in a workbook to focus in on the data that you're interested in. For example, you might filter by Month and visualize data only for January, February, and March.

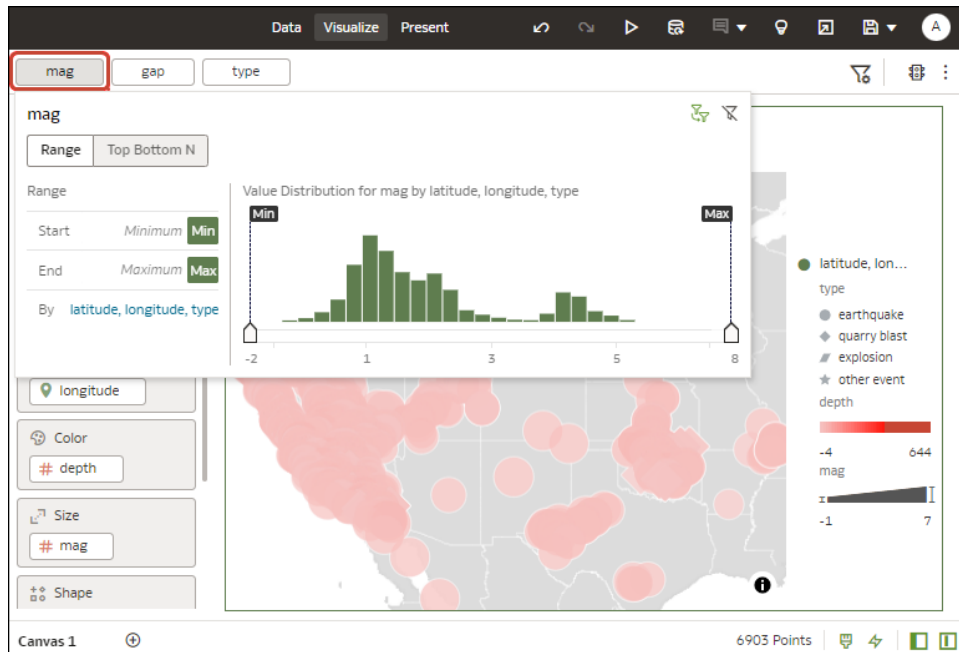
You can apply filters to one visualization, all visualizations in a canvas, or all canvases in a workbook.

1. On the Home page, select a workbook, click the **Actions menu**, select **Open**, then click **Edit**.
2. Navigate to a canvas, and display the Visualize pane.
3. Use the filter bar to update existing filters.

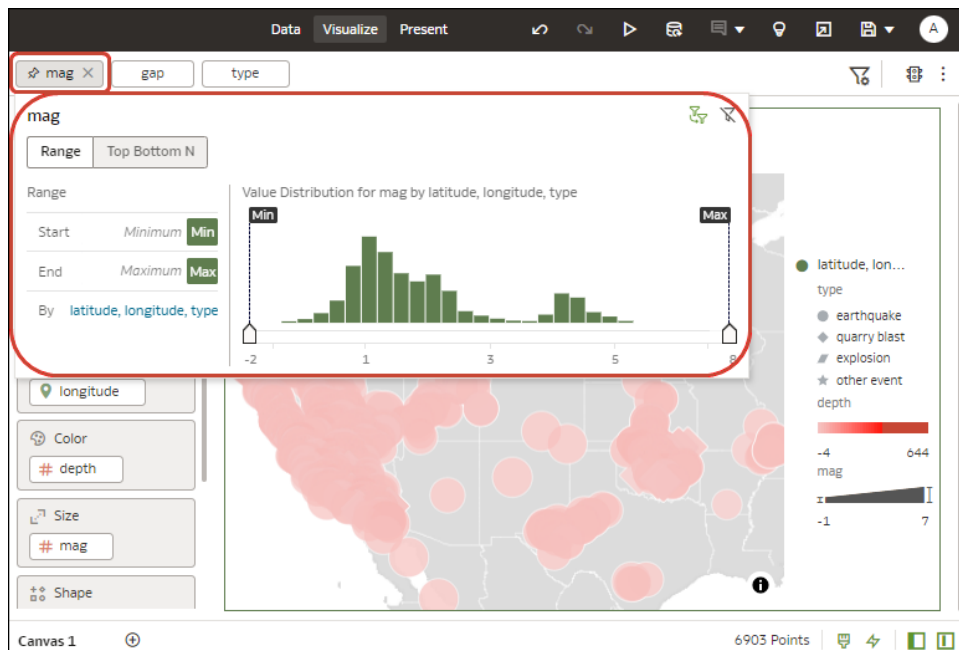


4. To change the default filter options, click the **Filter Bar Menu** icon on the filter bar (  ), and use the options displayed.

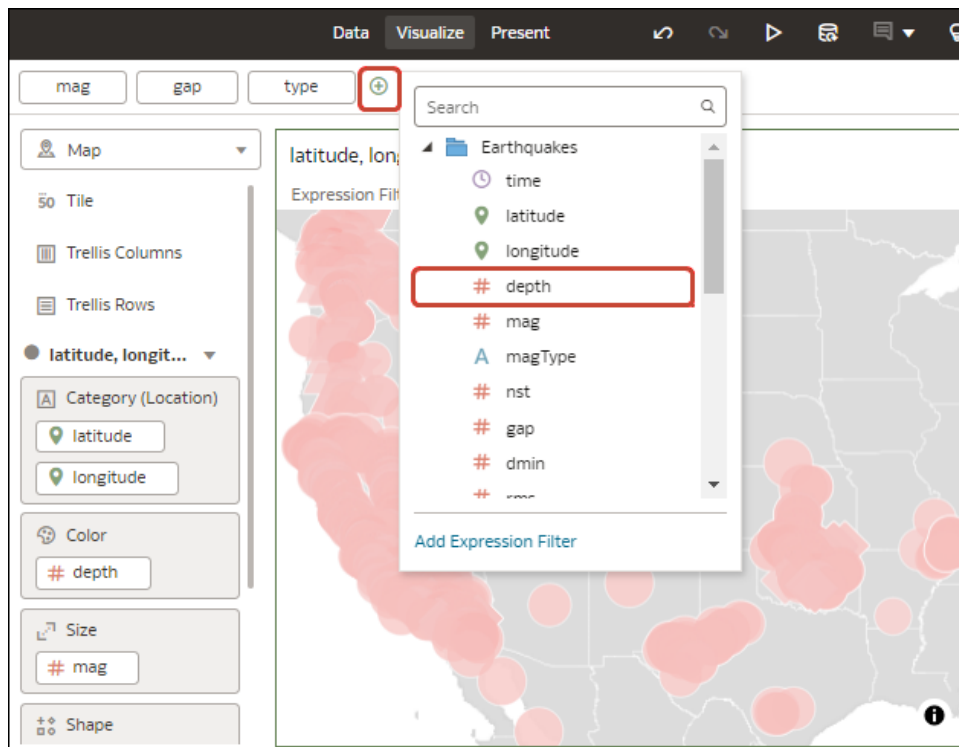
- To change an existing filter, click the filter on the filter bar.



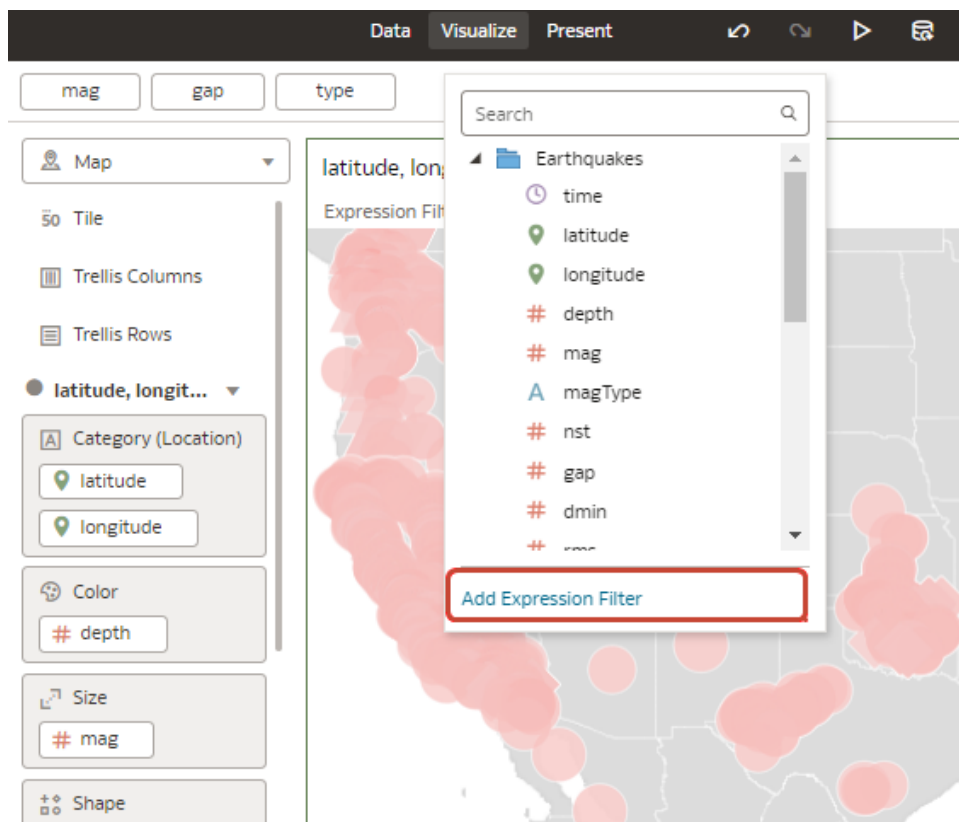
Use the options to configure that filter (for example, you might set the range, or disable the filter).



- To add a filter, hover over the filter bar, click **Add Filter (+)**, and select a data element to filter.

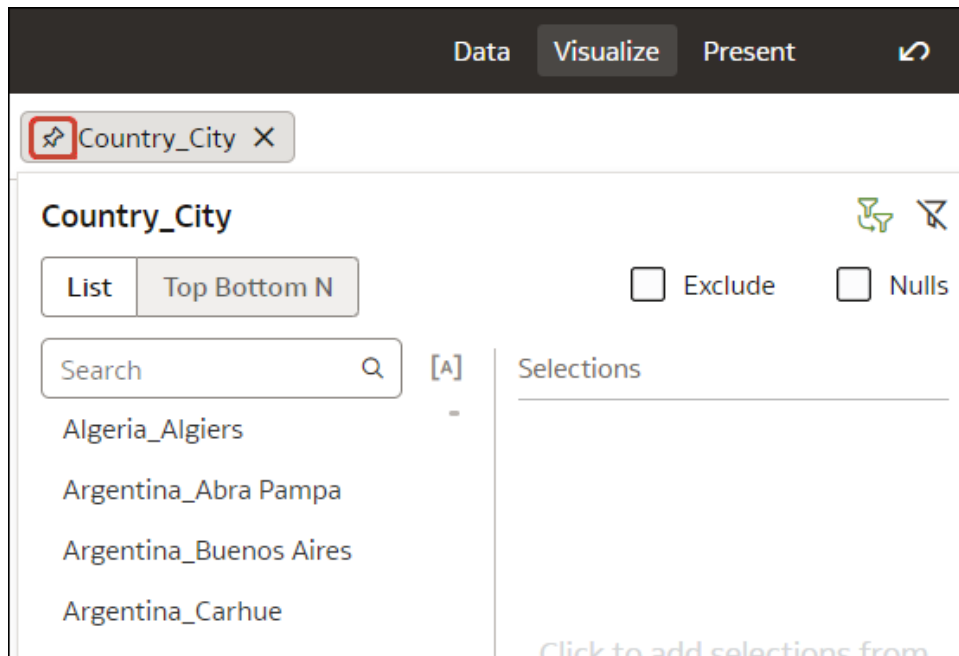


7. To add a complex filter using an expression (for example,  $\text{field1} + \text{field 2} > 100$ ), hover over the filter bar, click **Add Filter (+)**, then click **Add Expression Filter**.

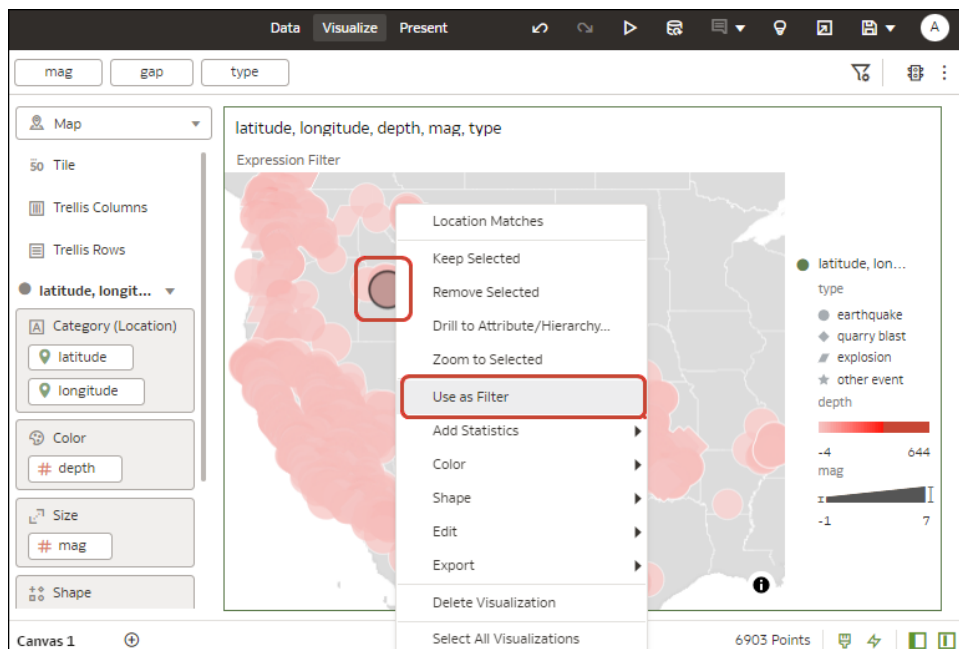




- To apply a filter to all canvases in a workbook, hover over the filter, and click **Pin to All Canvases** (the Pin icon).



- To filter on a visualization element, right-click the element and select **Use as Filter**.



The **Use as Filter** icon turns green when activated. 

## Specify a Filter's Selection Values

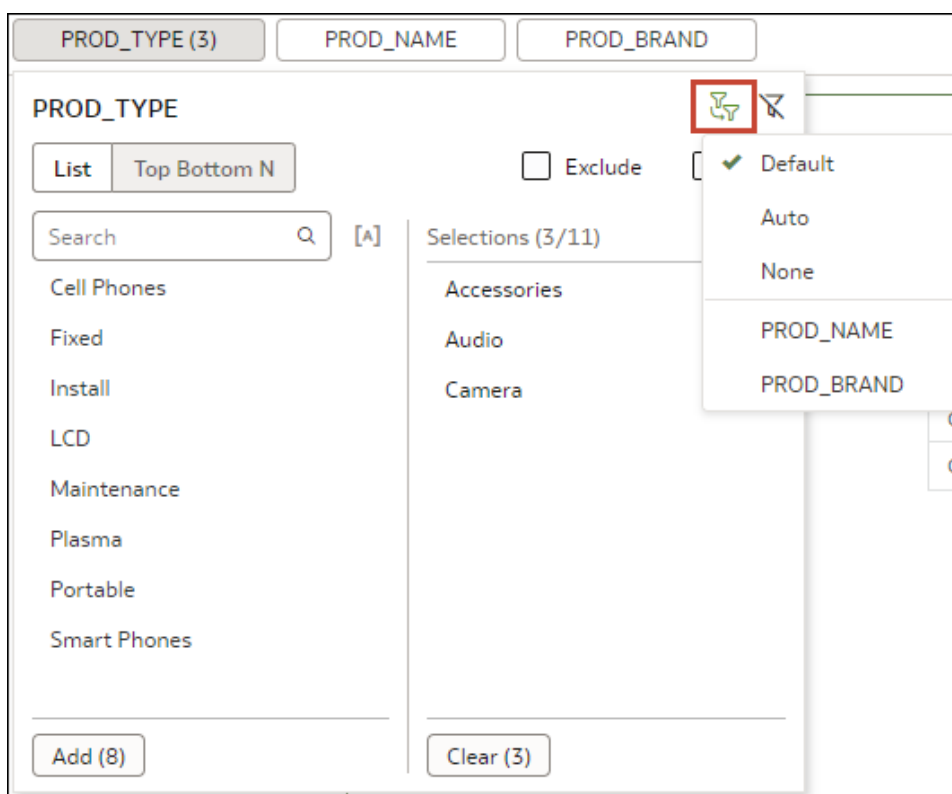
When you add a filter to a workbook, you can specify how the filter gets its selection values. For example, you can choose to use all column values for the filter, or you can choose another workbook filter to limit the filter's selection values.

You can choose from these options:

- **Default** - Limits the filter's selection values by other filters in the workbook. When you add a filter to the filter bar, the filter is set to **Default**.
- **Auto** - Preserves the default behavior (limits the filter by other filters in the workbook) when the **Filter Bar Menu's Limit Values By** option is set to **None**.
- **None** - Removes the filter's selection values limitations imposed by other filters.
- **<Filter Name>** - Limits the filter's selection values according to the filter that you choose. You can choose more than one filter.

For more information about the **Limit Values By** option on the **Filter Bar Menu** and how it controls an individual filter's selection values, see [Enable or Disable the Limit By Setting from the Filters Bar](#).

1. On the Home page, select a workbook, click the **Actions menu**, select **Open**, then click **Edit**.
2. Navigate to a canvas, and display the Visualize pane.
3. Drag and drop more than one workbook column to the filter bar, making sure to place them in the order that you want the filter selections to limit each other. For example, place Product Category before Product Name.
4. Select a filter to set selection values for and click **Limit Values**.



5. Select how you want to limit the filter's selection values.
6. Click **Save** to save the workbook.

## Enable or Disable the Limit By Setting from the Filters Bar

Use the **Limit Values By** filters bar icon to enable or disable all workbook filters with their **Limit Values** setting set to **Default**.

If your workbook contains many filters, then using the **Limit Values By** setting on the filter bar saves you time. Instead of manually switching each filter's **Limit Values** preference between **Default** and **None**, you can use the **Filter Bar Menu** to toggle between limited filter selection values and unlimited filter selection values.

For more information about the filter-level **Limit Values** setting, see [Specify a Filter's Selection Values](#).

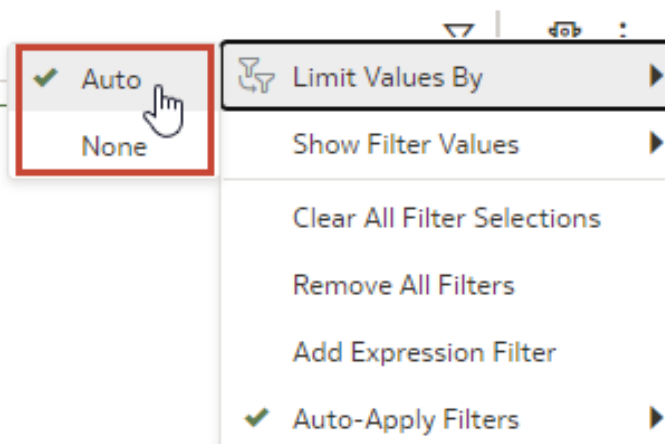
You can choose from these options:

- **Auto** - Displays filter selection values as specified in each filter's **Limit Values** setting.
- **None** - Ignores **Limit Values** set to **Default** for all filters and displays all selection values. Preserves the selection value limitations for any filters with **Limit Values** preferences set to **Auto** or **<Filter Name>**.

1. On the Home page, select a workbook, click the **Actions menu**, select **Open**, then click **Edit**.
2. Navigate to a canvas, and display the Visualize pane.
3. On the filter bar, click **Filter Bar Menu** and then hover over **Limit Values By**.



4. Click **Auto** to display limited selection values for filters, or click **None** to display all selection values for filters.



## Display or Hide Filter Values in the Filters Bar

You can configure workbook filters to display or hide filter values in the filter bar.

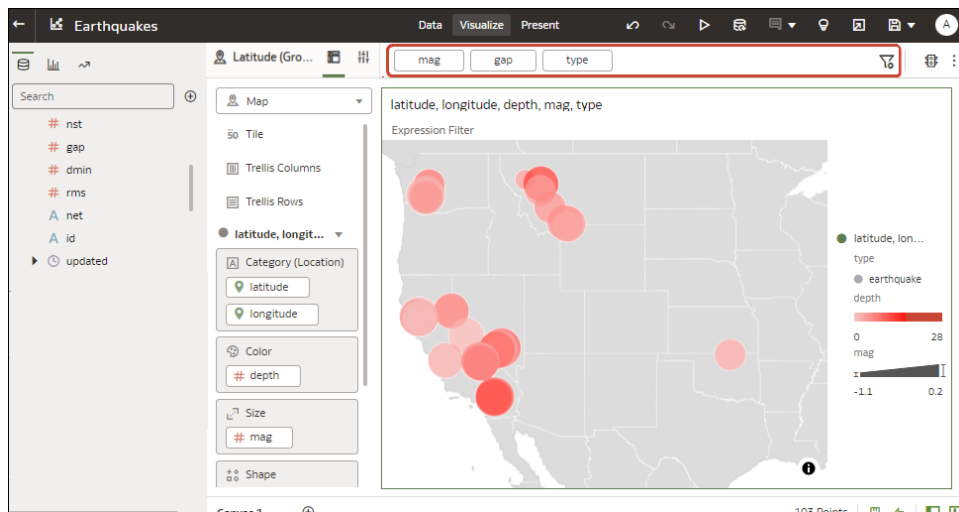
If your workbook contains filters, then you can use **Filter Values** on the **Filter Bar Menu** to configure how you show or hide filter values in the filter bar.

1. On the Home page, select a workbook, click the **Actions menu**, select **Open**, then click **Edit**.
2. Navigate to a canvas, and display the Visualize pane.
3. On the filter bar, click **Filter Bar Menu** and then hover over **Filter Values**.
4. Use the **Filter Values** options as follows:
  - Click **Show by Default** to display filter values for new filters that you add to the filter bar.
    - **Show by Default** is set to off by default. So when you create a new workbook and you create a new filter and select values, it doesn't show filter values because **Show by Default** is off.
    - If you set **Show by Default** to on, and then create a new filter and select values, it shows values for the new filter, but doesn't show values for the old filter. If you save the workbook, this preference is saved. If you then close the workbook and reopen it, the filter values are displayed exactly as you saved them.
  - Click **Show All** to display filter values for all filters in the filter bar. This setting doesn't override the **Show by Default** setting.
  - Click **Hide All** to hide filter values for all filters in the filter bar. This setting doesn't override the **Show by Default** setting.

## Filter Data in a Visualization

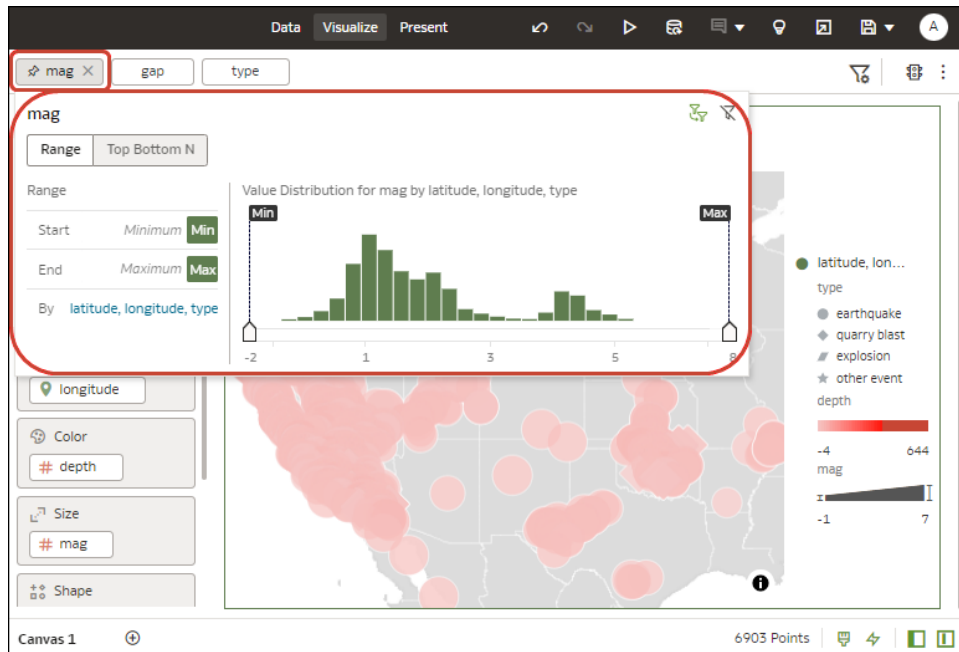
Use filters in a visualization to focus in on the data that you're interested in. For example, you might filter by Month and visualize data only for January, February, and March.

1. On the Home page, select a workbook, click **Actions**, select **Open**, then click **Edit**.
2. Select the visualization that you want to add a filter to.
3. Drag and drop data elements from the Data Panel to the filter bar.



To use data elements of a dataset as a filter in the visualization of another dataset, join the datasets before using the data elements as filters.

4. Click the filter to display filtering options to enable you to focus in on the data you want to analyze.



## Customize the Label of Visualization Filters

You can customize the label of a visualization filter to change the text from its default value. For example, you might want to change the default filter name of COUNTRY to Country.

1. On the Home page, select a workbook, click **Actions**, select **Open**, then click **Edit**.
2. Select the visualization containing the filter with a label that you want to customize.
3. Click **Properties** in the Grammar Panel.
4. Click **Filters**.
5. Expand the filter that you want to customize.
6. In the Label field, click **Auto** and select **Custom** from the context menu.
7. Enter your customized text.
8. Press the Enter key.

## Disable Multiple Select for Visualization List Filters

You can configure a visualization list filter to select only single values. For example, you must configure this setting to Off when you use a list filter to bind a parameter to a filter.

1. On the Home page, select a workbook, click **Actions**, select **Open**, then click **Edit**.
2. Select the visualization containing the list filter that you want to disable multiple value selection.
3. Click **Properties** in the Grammar Panel.
4. Click **Filters**.
5. Expand the list filter that you want to update.

6. In the **Multi Select** field, click **On** to change the value to **Off** and disable this list filter from being able to select multiple values.
7. Click **Save**.

## Use the Dashboard Filter

Use the information in this section to learn about and add a dashboard filter to a workbook canvas.

### Topics:

- [About Dashboard Filters](#)
- [Filter Data Using a Dashboard Filter Visualization](#)
- [Overview to Filtering and Animating Visualizations Using a Slider Dashboard Filter](#)
- [Filter and Animate Visualizations using a Slider Dashboard Filter](#)

## About Dashboard Filters

Dashboard filters allow the user to specify filter values for all of the visualizations on a workbook canvas at runtime.

At design time, you can add filters to the workbook's filter bar to limit the data that is included in all canvases on the workbook. After adding these filter, you normally hide them from the end user.

You can add dashboard filters to any of the dashboard's canvases to allow users to select their own values and view specific data for that canvas. At runtime, any dashboard filters values that the user specifies are applied on top of any workbook filters that you as the author added and hid at design time.

The dashboard filter type that you can add depends on the column type:

- **List** - Use to filter text, non-aggregatable numbers, and dates. This option allows you to include or exclude member, include nulls, toggle between list and top bottom n, and so on.
- **List Box** - Use to filter text, non-aggregatable numbers, and dates. This option provides a simple list of data values. The List Box dashboard filter type is similar to the List dashboard filter type, and by default contains the All option in the filter's list of selectable values. The List Box filter type doesn't allow users to multi-select values, and doesn't include the extra options that the List dashboard filter type provides, for example Top Bottom N, Exclude, Disable Filter, and so on.
- **Range** - Use to filter numeric type data element with an aggregation rule set to something other than none.
- **Slider** - Use to animate visualizations and show dynamically how your data changes over a given dimension such as time.
- **Top Bottom N** - Use to filter a measure or attribute and display its highest or lowest values.

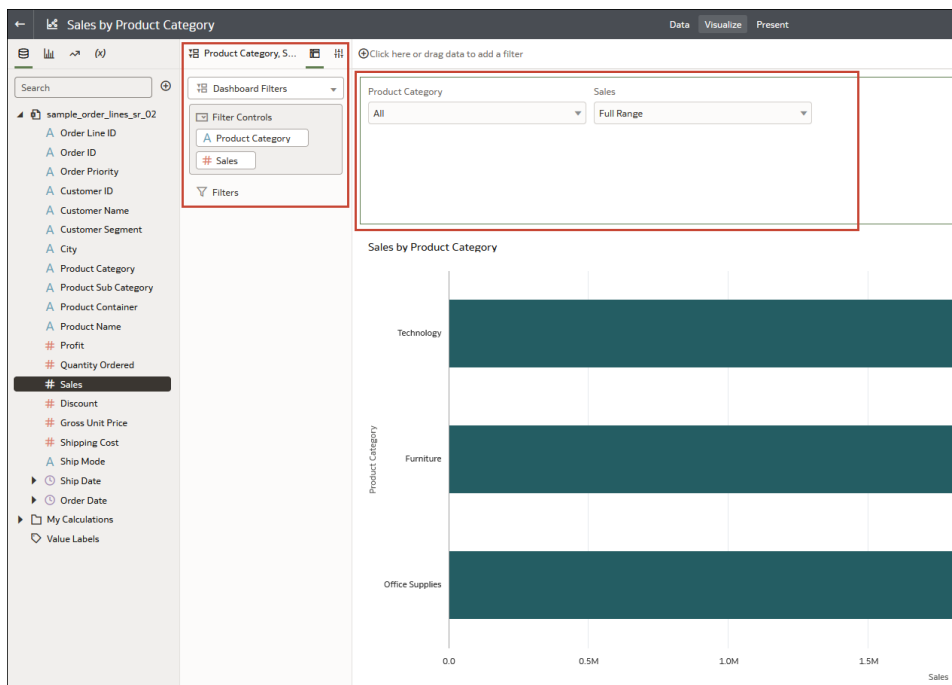
## Filter Data Using a Dashboard Filter Visualization

Use dashboard filters to build filter bars directly onto the workbook's canvases so that the end user can select the data they're interested in.

By default the dashboard filter's values are limited by other filters (workbook, canvas, and visualization filters). To configure a dashboard filter, select it and use the properties pane to specify display options.

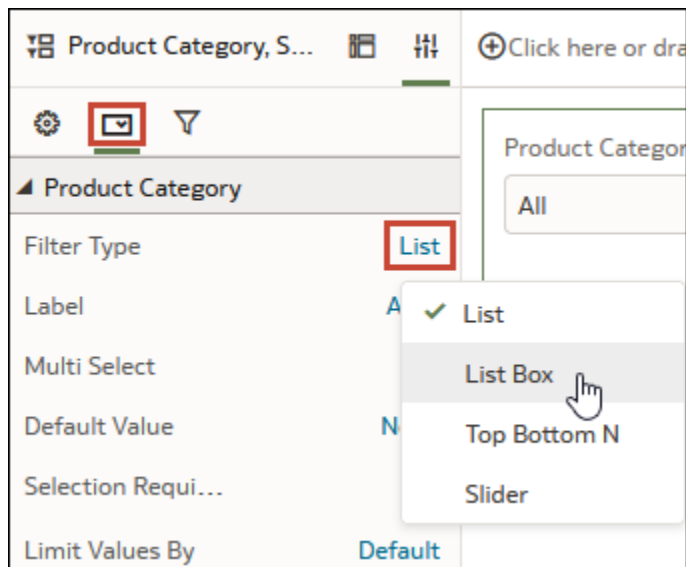
For more information about the dashboard filter types you can choose, see [About Dashboard Filters](#).

1. On the Home page, select a workbook, click **Actions**, select **Open**, and click **Edit**.
2. Click the **Visualize** tab.
3. In the Data Panel, click the **Visualizations** tab, and drag and drop **Dashboard Filters** to the canvas.
4. In the Data Panel, click the **Data** tab, and drag and drop one or more columns to the new dashboard filter to create the individual filters.

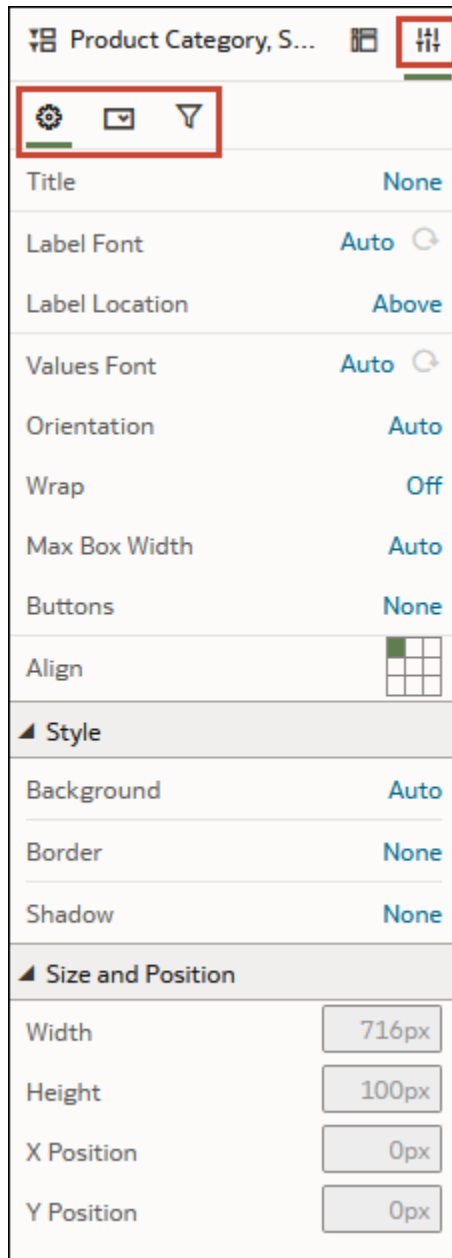


5. In the dashboard filter's Properties pane, click **Properties**, then click **Filter Controls**. Go to the **Filter Type** field and select the type of filter you want to include on the workbook.





6. Use the Properties pane's **General**, **Filter Controls**, and **Filters** tabs to change how the filter displays and behaves, for example, allow multi-select, limit values, label font, background color, and so on.



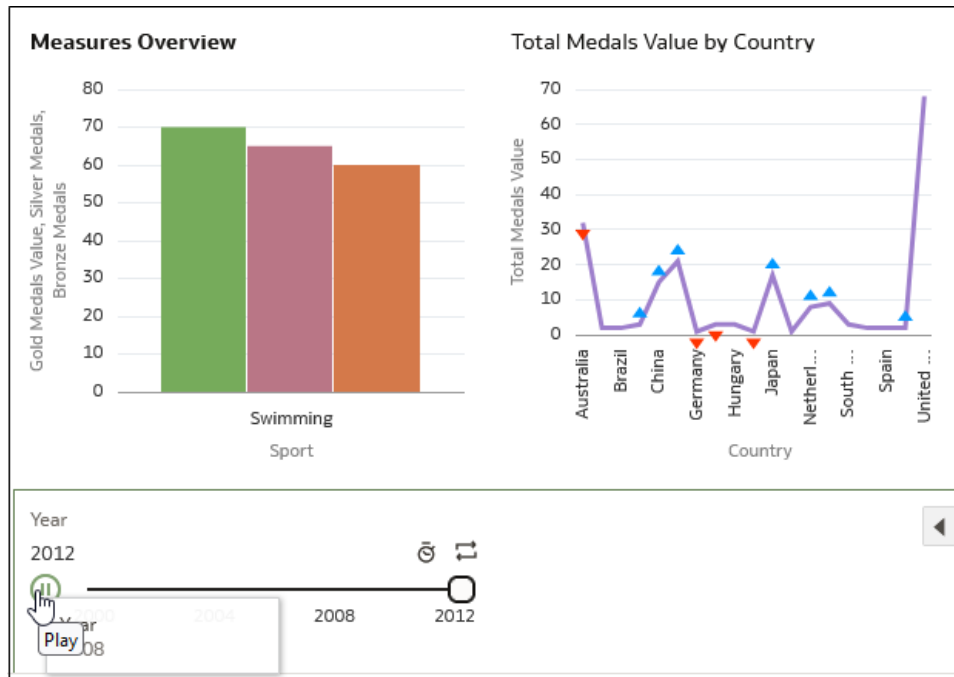
7. Click **Save**.

## Overview to Filtering and Animating Visualizations Using a Slider Dashboard Filter

You can add a slider dashboard filter to a canvas to animate visualizations and show dynamically how your data changes over a given dimension such as time.

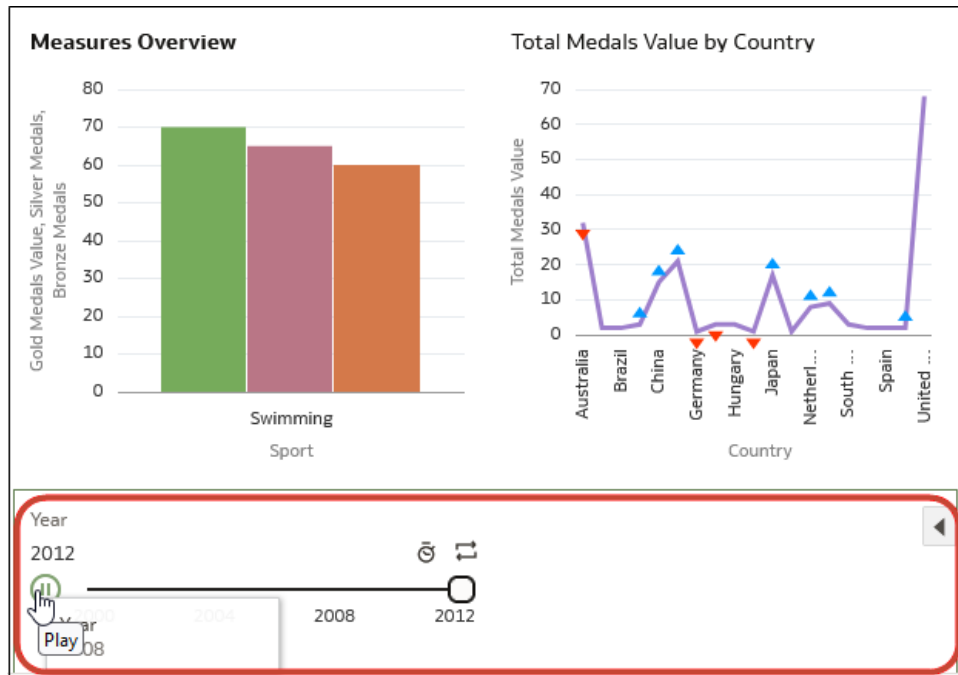
As a workbook author, you can configure a slider filter to enable dashboard consumers to select a dimension value interactively, or automatically play through dimension values, similar to a time-lapse video or animation.

For example, you might analyze the number of gold, silver, and bronze Olympic medals and total medals that countries won between 2000 and 2012. With auto-play set to *on*, the visualizations change dynamically as the filter automatically plays through the years. In this example, the first visualization shows the number of medals won in swimming, and the second visualization shows the number of medals won by country.

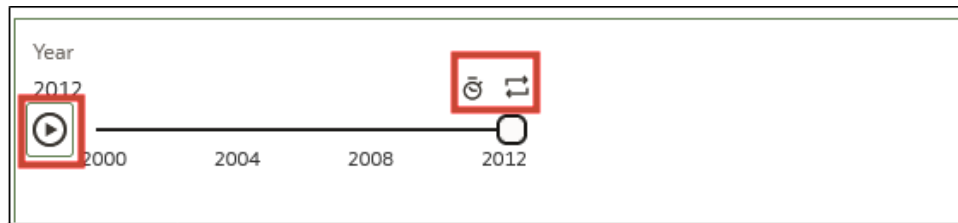


Features:

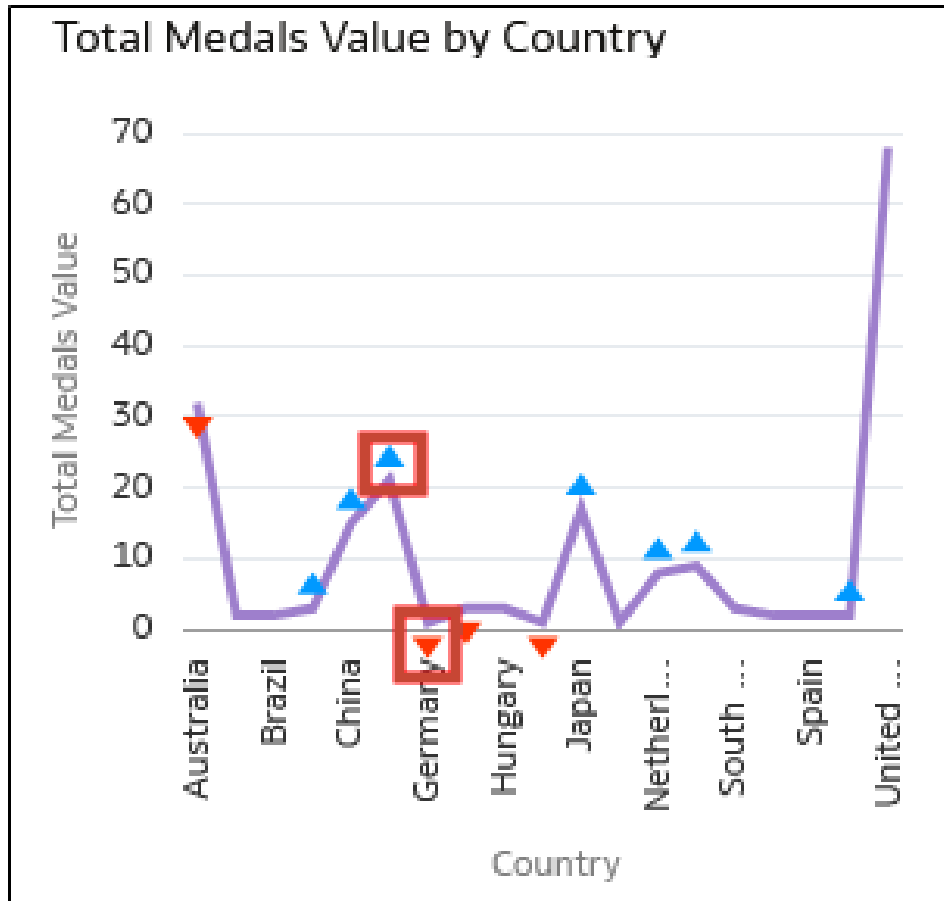
- The slider displays the dimension-based values, with animation controls **Play**, **Speed**, and **Repeat**.



- With auto-play enabled, consumers can use the **Play** button to start and stop the animation, and use the **Speed** option and **Repeat** to control the playback.

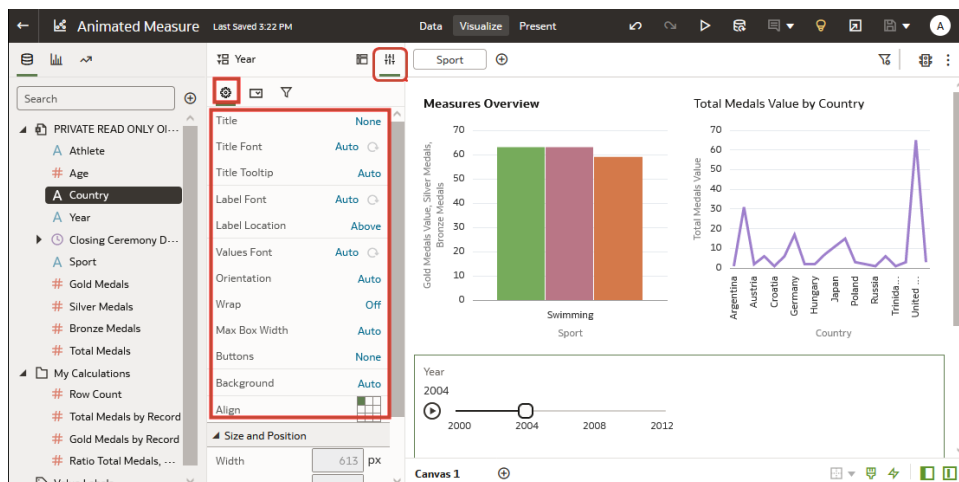


- In this example visualization, blue triangles pointing up indicate more medals won, and red triangles pointing down indicate fewer medals won.

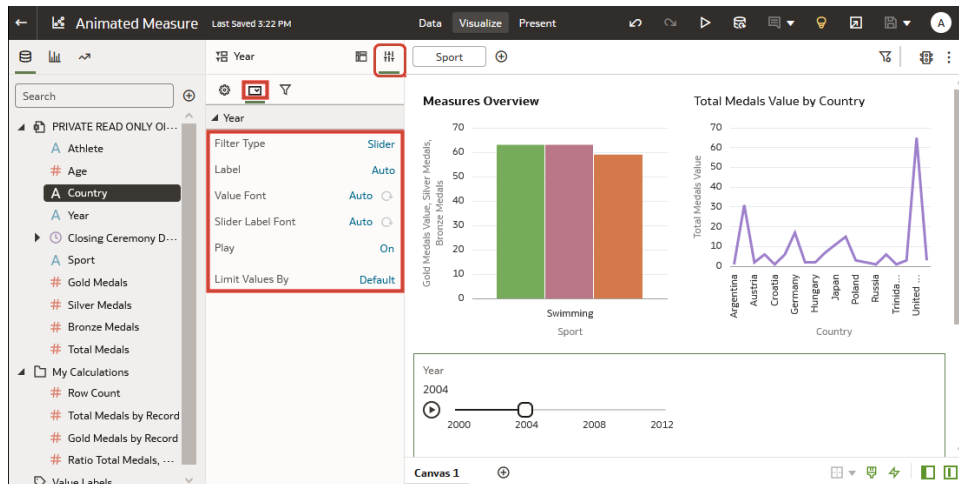


You can configure all aspects of a slider dashboard filter:

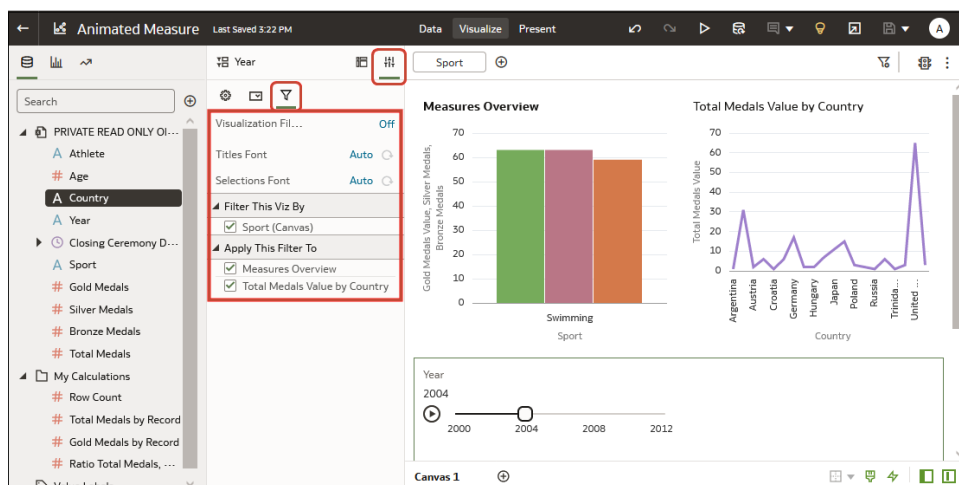
- On the **General** tab, you can change titles, fonts for titles, labels, and values, and other options such as background and alignment.



- On the **Filter Controls** tab, you can change labels, value fonts, and play options. To automatically play through the time values like an animation, set **Play** to *on*, or to enable dashboard consumers to select a time value interactively, set **Play** to *off*.



- On the **Filter** tab, you can choose fonts, and specify which visualizations are updated or 'played' by the dashboard filter.



## Filter and Animate Visualizations using a Slider Dashboard Filter

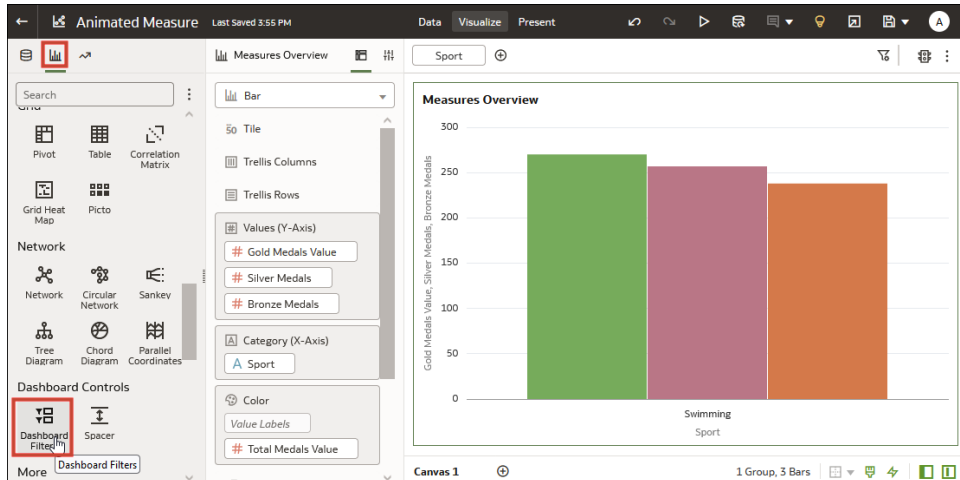
As a workbook author, you add a slider dashboard filter to a workbook canvas so that you can filter and animate visualizations to show dynamically how your data changes over a given dimension such as time.

For example, you might analyze the number of Olympic medals won between 2000 and 2012 in an animation showing the numbers changing over the years.

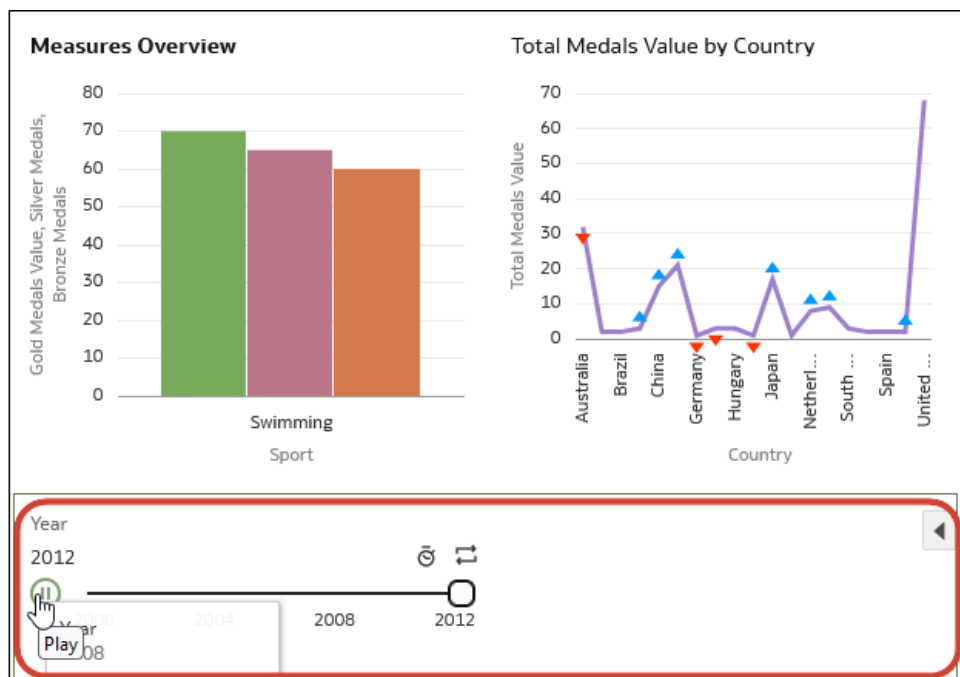
1. In a workbook, in the Visualize pane, add one or more visualizations for which a dimension can be used as a filter.

Make sure that each visualization includes the same dimension data. For example, you might want to filter data on Year so that you can analyze data between year 2000 and year 2012.

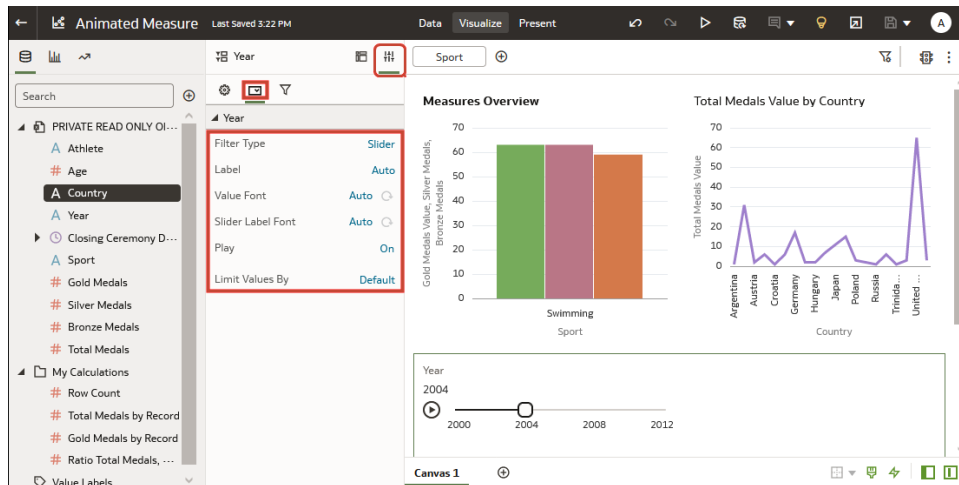
2. In the Data Panel, click **Visualizations**, scroll down to **Dashboard Controls**, then double-click **Dashboard Filters**.



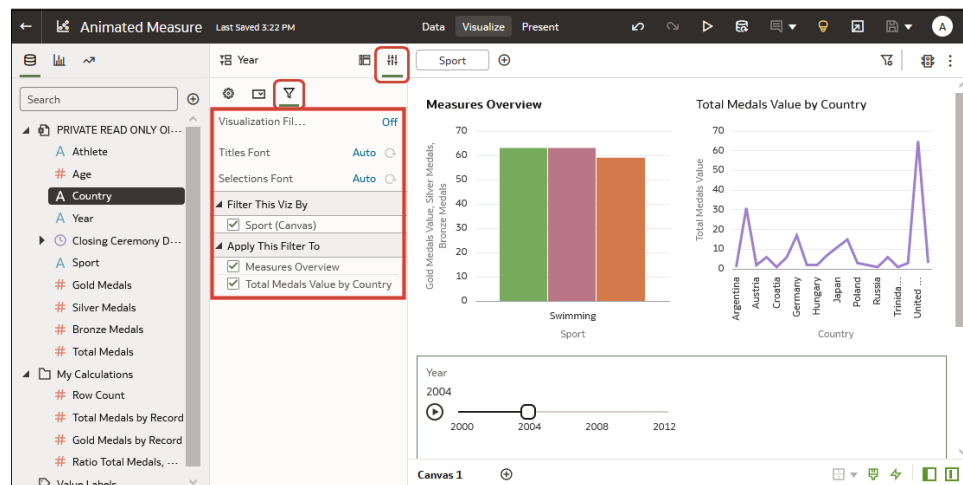
3. Click **Data** at the top of the Data Panel, then drag a dimension-based data element onto the new dashboard filter. For example, to analyze values over time you might add "Year" to the dashboard filter.



4. Click **Properties** on the Data Panel, then click **Filter Controls**, and click the **Filter Type** value (the default is **List**) and select **Slider**. You see the measure values displayed in the dashboard filter. For example, if you added "Year" to the dashboard filter, you might see 2000, 2001, and 2002.



5. In the properties panel at the bottom of the Data Panel, click **Filter Controls**, and use the **Play** option to turn auto-play off or on.
6. If you enabled play, click **Play** in the Slider Dashboard Prompt to see how your visualizations play with the default settings.
7. On the **Filters** tab in the Properties pane, use the options to change default settings:
  - On the **General** tab, you can change titles, fonts for titles, labels, and values, and other options such as background and alignment.
  - On the **Filter Controls** tab, you can change labels, value fonts, and play options. To automatically play through the time values like an animation, set **Play** to "On", or to enable dashboard consumers to select a time value interactively, set **Play** to "Off".
  - On the **Filters** tab, you can choose fonts, and specify which visualizations are played by the dashboard filter.





## Change the Scope of Filters Between the Main Filter Bar and Visualizations

You can change the scope of a filter by moving or copying it between the main filter bar and visualizations.

1. On the Home page, select a workbook, click the **Action Menu**, and then select **Open**, then **Edit**.
2. Click the **Visualize** tab.
3. Change the scope of a filter by moving or copying it between the main filter bar and visualizations.
  - **Move a main filter to a visualization** - Drag and drop to move a filter from the main filter bar to the **Grammar Panel** or into the visualization.
    - When **Pin to all Canvases** is selected, filters apply to the workbook, to all canvasses in the workbook, and to all visualizations on the canvasses.
    - When **Pin to all Canvases** isn't selected, filters apply to a canvas and to all visualizations on the canvas.
  - **Copy a main filter to a visualization** - Hold down the **Shift** key and drag and drop a filter from the main filter bar to the **Grammar Panel** or into the visualization.
  - **Move a visualization filter to the main filter bar** - Drag and drop a visualization filter from the **Grammar Panel** to the main filter bar. This moves the filter into the main filter bar and removes the filter from the visualization.
  - **Copy a filter between visualizations** - Drag and drop a visualization filter from the **Grammar Panel** into another visualization. This copies the filter into the selected visualization.
  - **Move a filter between visualizations** - Hold down the **Shift** key and drag and drop a visualization filter from the **Grammar Panel** into another visualization.


## Use a Visualization as a Filter

You can configure a visualization to filter other visualizations on the canvas. For example, if you select January in a Month filter, you focus in on January in other visualizations on the canvas.

If a workbook contains multiple datasets and some aren't joined, then there are restrictions for how you can use filters. To use data elements of a dataset as a filter in the visualization of another dataset, you must join both the datasets, before using the data elements as filters. Any visualization that doesn't use the data element of the filter is dimmed.

1. On the Home page, select a workbook, click the **Action Menu**, select **Open**, then click **Edit**.
2. Click the **Visualize** tab.
3. Hover over the visualization to use as a filter.

4. Click the **Use as Filter** icon  to activate.

The **Use as Filter** icon turns green when active. 

## About Filter Personalizations

Oracle Analytics can save end user's dashboard or visualization filter value selections and display them when the user reopens the workbook.

Filter personalizations save end users time because they can pick up where they left off with the workbook and don't have to set filter values for their data each time they open the workbook. While in the workbook, end users can click **Revert all changes** to change the filters values back to the values set by the workbook's author.

If you're a workbook author and change a workbook's filters, this is how those changes impact personalizations:

Change	Impact
Add filter	Retains user personalizations.
Hide filter	Retains user personalizations.
Disable filter	Removes user personalizations.
Delete filter	Removes user personalizations.

By default, personalizations are enabled for each workbook. As a workbook author, you can update the workbook's presentation flow to specify if the filter values persist when the user reopens the workbook. See [Specify Personalization Options in Present](#) and [What Is a Presentation Flow?](#)

### Note:

Administrators can switch off workbook personalization for the entire organization using the system setting **Enable Personalization in Workbooks**. See .

## Apply Different Filter Types

Different filter types enable you to focus in on the data that you're interested in.

### Topics:

- [Apply Range Filters](#)
- [Apply Top Bottom N Filters](#)
- [Apply List Filters](#)
- [Apply Date Range Filters](#)
- [Apply Relative Time Filters](#)
- [Filter Data Using an Expression Filter](#)

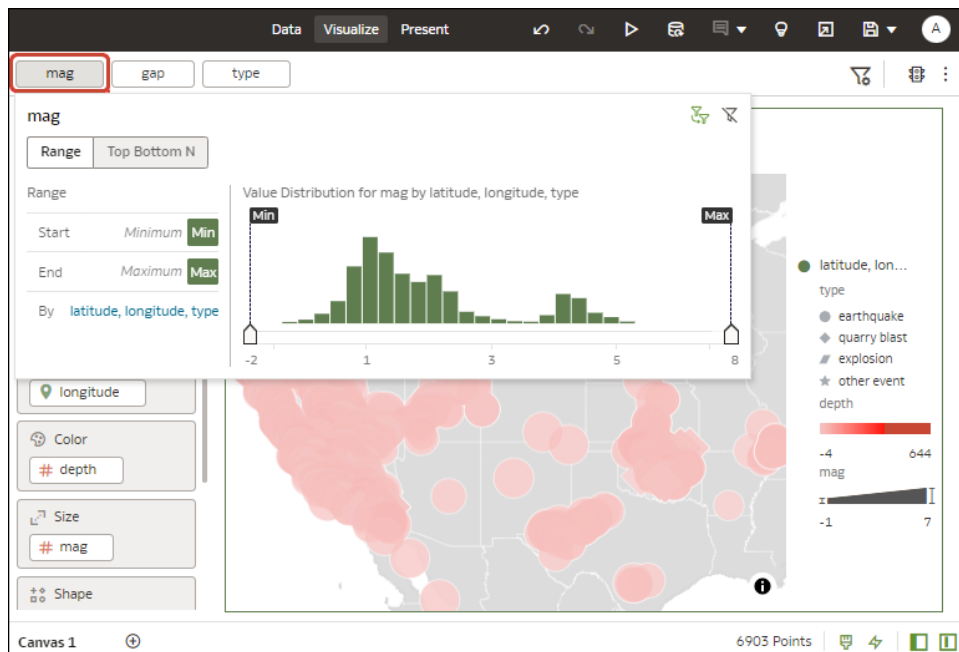
## Apply Range Filters

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

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

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, click the filter, then click **Range**.



3. Click **By** to view the selected list of Attributes, then configure the filter:
  - Click a member to remove or add it to the selected list.
  - Click the **Plus (+)** icon to add a new member to the selected list.
  - Set the range that you want to filter on by moving the **Min** and **Max** sliders in the histogram.
4. Click outside of the filter to close the filter panel.

## Apply Top Bottom N Filters

Use the Top Bottom N filter to filter a measure or attribute and display its highest or lowest values.

1. To apply the Top Bottom N filter to the canvas and all visualizations in the workbook:
  - a. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
  - b. In the Data panel of the visualization, select the attribute or measure that you want to filter on and drag and drop it to the filter bar.
  - c. In the filter bar, click the filter, then click **Top Bottom N**. You can only convert a range filter to Top Bottom N filter.
2. To apply the Top Bottom N filter to a specific visualization in the workbook:
  - a. In the canvas, select the visualization that you want to filter.
  - b. In the Data Panel, locate the attribute or measure that you want to filter on and drag and drop it to the Filter drop target in the Grammar Panel.
  - c. In the filter bar, click the filter, then click **Top Bottom N**.
3. To apply the Top Bottom N filter to an on-canvas filter:
  - a. With the canvas selected, go to the Data Panel and click **Visualizations**, then click the **List Box** filter.
  - b. In the Data Panel, locate the attribute or measure that you want to filter on, and drag and drop it to the List Box visualization that you just created.
4. To configure a Top Bottom N filter, click the filter, then:
  - To change between top to bottom, click **Method** value and click Top or Bottom.
  - To specify the number of rows that are displayed, click the **Count** field and enter the number of rows.
  - To change which attribute or measure column to limit by, click the **By** field and select an attribute or measure or custom calculation included on the canvas. Or click **Plus (+)** to locate and select the attribute or measure or metric that you want to limit by
5. Click outside of the filter to close the filter panel.

## Apply List Filters

You apply list filters to text, non-aggregatable numbers, and dates, and you can choose which members to include or exclude from the filter.

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, select a filter in the filter bar or select an on-canvas filter, then click **List**.
3. Locate the member you want to include and click it to add it to the Selections list. Alternatively, use the **Search** field and the **Search Options Menu** to find a member you want to add to the filter. Use the wildcards \* and ? for searching.
4. Optional: Perform the following actions related to the Selections list:
  - Click a member to remove it from the list.
  - Click the eye icon next to a member to filter it out, but not remove it from the list.
  - Click **Menu** at the top, and select **Exclude Selections** to exclude members from the list.

- Click **Null** to include members with null values in the list.
  - Click **Add** to add all members to the list.
  - Click **Clear** to remove all members from the list.
5. Click outside of the filter to close the filter panel.

## Apply Date Range Filters

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

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, select a filter in the filter bar or on-canvas filter, and click **Date Range**.
3. Click the drop-down list, and select the type of date range you want to apply (for example, Range, Start at, End at, Equal).
4. Use the date pickers to configure the range.
5. Click outside of the filter to close the filter panel.

## Apply Relative Time Filters

Use the relative time filter on a Date or Date/Time column to display data for a specified time period based upon the current date and time.

You can specify a relative time period as either an explicit number of past or future time units (for example 2 years), or you can specify a previous period. For example, Year To Date which includes data from 1-January this year to the current date, and Month To Date which includes data from the beginning of the month to the current date.

You can apply a Relative Time filter only to date columns that already exist in the data source, and not to derived columns such as Year, or Quarter. The Relative Time filter type supports Date (with no time of day portion) and DateTime (that is, TIMESTAMP with both date and time of day) column types.

The current date and time used in queries is the Oracle Analytics server host's date and time in the server's timezone (not the browser host's time or timezone).

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, click the filter in the filter bar or canvas, then click **Relative Time**.
3. Select a **Type** that defines the range that you want to filter.
  - **Last** - You specify a **Period** to apply to the selected **Time Level** (Years, Quarters, Months, Weeks, Days, and includes Hours, Minutes, and Seconds if

the column time is `TIMESTAMP`) relative to today's date, to display records for the date values for that period.

Last filters that are based on a `DateTime` column and which have a grain of Day or longer (for example, Year, Quarter, Month, Week, Day), retrieve data from the same time of day on the starting day. For example, if the server date/time is currently Thursday 3:15pm, a Last 2 Days filter on a `DateTime` column retrieves data with timestamps between Tuesday 3:15pm and Thursday 3:15pm in the server's timezone. Filter queries that are based on a `DATE` column type (which by definition have no time of day associated) only depend on the server host's date, not the time of day.

- **Next** - You specify a future **Period** number to apply to the selected **Time Level** (Years, Quarters, Months, Weeks, Days, also Hours, Minutes, and Seconds if the column time is `TIMESTAMP`) relative to today's date, to display records for the date values for that period.
  - **To Date** - You specify a past **Time Level** (Year, Quarter, Month, Week, Day, also Hour, and Minute if the column time is `TIMESTAMP`) relative to today's date, that you want to apply to the date values in the visualization.  
A To Date filter retrieves data from the beginning of the chosen period, for example, Month to Date retrieves data from midnight of the first day of this month up until the current date and time (that is, Today or Now).
4. Click outside of the filter to close the filter panel.

## Filter Data Using an Expression Filter

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

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

You create expressions using the Expression Filter panel. You can drag and drop data elements to the Expression Filter panel and then choose functions to apply. Expressions are validated for you before you apply them.

If your workbook doesn't have a visualization, create one. See [Begin to Build a Workbook and Create Visualizations](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, go to the filter bar and click **Add Filter** and then select **Add Expression Filter**.
3. In the Expression Filter panel, compose an expression in the **Expression** field. For example, enter "Sample Sales"."Base Facts"."Revenue" < "Sample Sales"."Base Facts"."Target Revenue" to focus on items that didn't achieve their target revenue.
4. In the **Label** field, give the expression a name.
5. Optional: Enter a description.  
The description displays in the tooltip when you hover over a calculation.
6. Click **Validate** to check if the syntax is correct.
7. When the expression filter is valid, then click **Apply**. The expression applies to the visualizations on the canvas.

## Use Role-Based Filters

This topic describes what you need to know to apply role-based filters to workbooks and visualizations. Filters based on application roles, known as role-based filters, enable business analysts and users to access just the data they need.

### Topics:

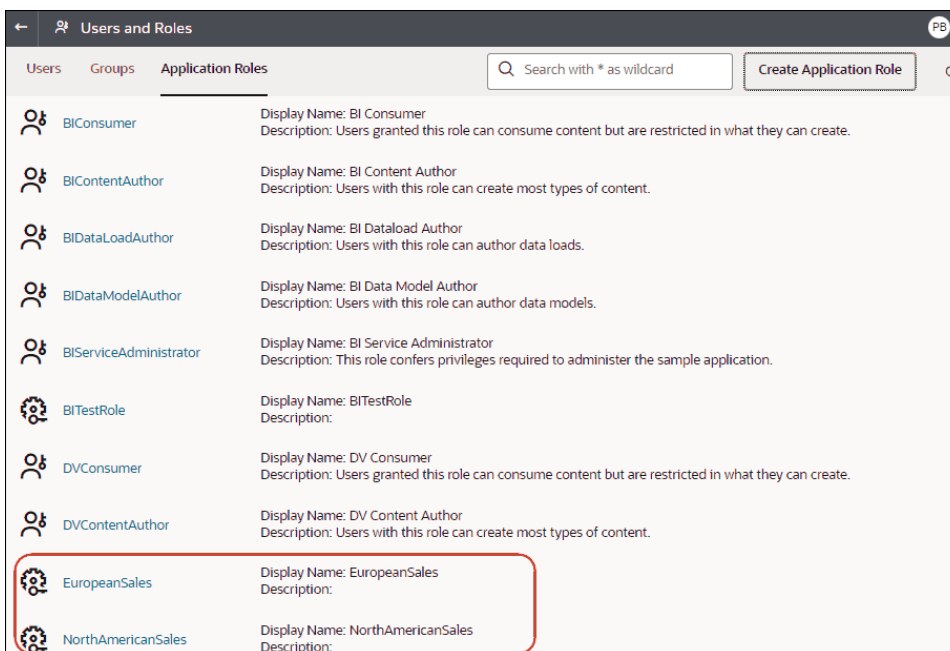
- [About Role-Based Filters](#)
- [Filter a Dataset Based on Application Role](#)
- [Example One - Apply a Simple Role-Based Filter in a Workbook](#)
- [Example Two - Apply Multiple Role-Based Filters in a Workbook](#)

## About Role-Based Filters

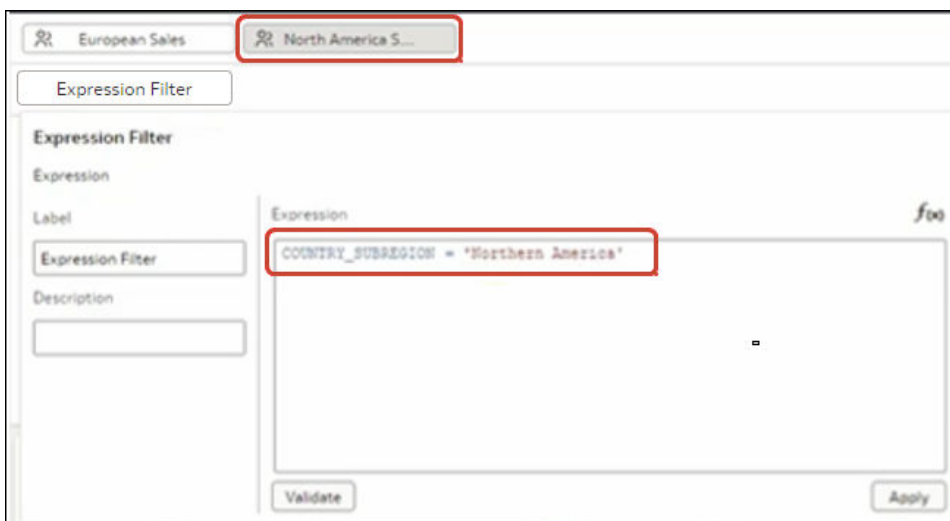
Filters based on application roles, known as role-based filters, enable Oracle Analytics business analysts and users to access just the data they need. For example, suppose you want some users to see North American sales data when they open a shared global sales workbook. To accomplish this, you create a custom application role called North American Analyst and then use it to filter the workbook data.

### Role-based filters overview

- Dataset owners apply filters based on Oracle Analytics application roles that allow users to see data that's applicable to their application roles.
- You apply role-based filters to datasets.
- You can apply multiple role-based filters to a dataset at the same time.
- When you add role-based filters in the Dataset editor, the preview data shown isn't filtered, but the dataset is filtered when workbook consumers access the dataset.
- You can use existing application roles or create your own application roles. For example, to filter a global sales dataset for analysts in Europe and North America you might create application roles *EuropeanSales* and *NorthAmericaSales*.

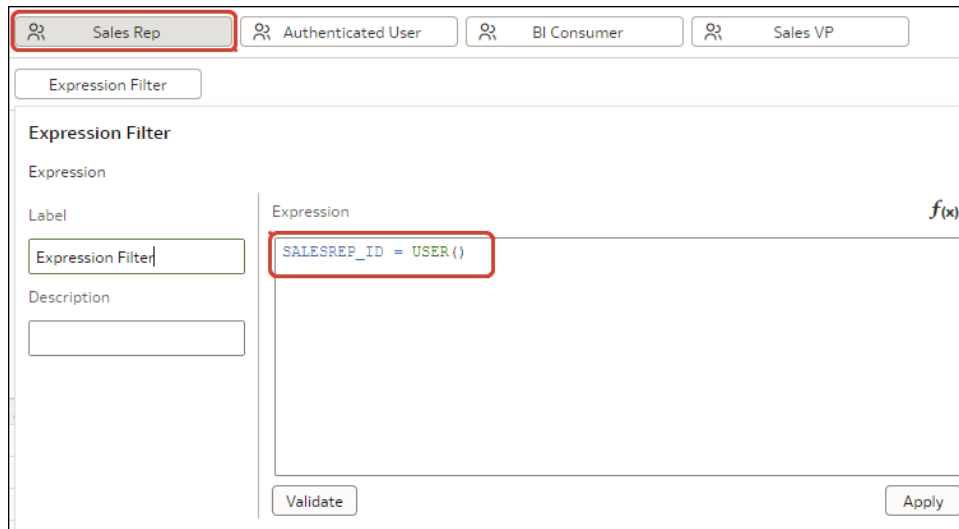


- You use expressions to specify role-based filters. For example, on a *North America Sales* application role you might filter on the `COUNTRY_SUBREGION` column of a `COUNTRIES` table using the expression `COUNTRY_SUBREGION = "Northern America"`.

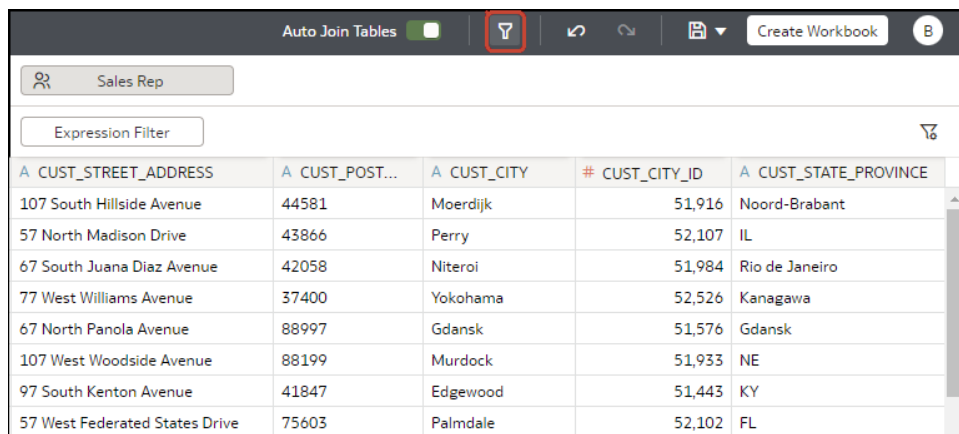


- Filter expressions can reference Oracle Analytics system variables. For example, on a *Sales Rep* application role you might filter on the `SALESREP_ID` column using the expression `SALESREP_ID = USER()`, where `USER()` is a system variable that provides the ID of the logged-in user.





- In the Dataset editor, you display the role-based filter panel using the **Hide or display the role-based filter bar** option on the toolbar.



### Tips on Using Role-based Filters

- To filter a dataset for all users and roles, add a role-based filter to the *Authenticated User* role. For example, if you want users to only access data for the EMEA region, add the filter expression `REGION = "EMEA"` to the *Authenticated User* role.

The screenshot shows the 'Expression Filter' dialog box in Oracle Analytics. At the top, there is a tab labeled 'Authenticated User' with a close button (X) and a plus sign (+). Below the tab, there is a section titled 'Expression Filter' with a sub-section 'Expression'. The 'Label' field contains 'Expression Filter'. The 'Expression' field contains 'REGION = "EMEA"', which is highlighted with a red box. The 'Description' field is empty. At the bottom, there are 'Validate' and 'Apply' buttons.

- When you place a role-based filter on a dataset, any user who doesn't have the role(s) specified won't be able to see any data, including the dataset owner. If a dataset owner needs to see the data, add the dataset owner to one of the specified roles. In addition, if users with a super role such as an Admin or the OrgVP need to see all data, create a dummy filter. For example, if you would like the OrgVP to see all data in a region, create an additional filter for the application role of OrgVP and create a filter with the expression `1=1`. When a user with OrgVP logs in and creates a workbook, they will be able to see all of the data.

## Filter a Dataset Based on Application Role

You use filters based on application roles to enable business analysts and users to access just the data they need. For example, you might want North American business users to only see North American data when they open a shared workbook.

When you've applied role-based filters to a dataset, add it to a workbook and share the workbook with other business analysts and users. When other users log in to Oracle Analytics and open the workbook, they'll only see data that you've shared with them using role-based filters.

1. From the Home page, select a dataset, click the **Actions menu**, and then select **Open**.
2. In the dataset editor, click **Join Diagram**.
3. Click the **Hide or display the role-based filter bar** option on the toolbar.

A CUST_STREET_ADDRESS	A CUST_POST...	A CUST_CITY	# CUST_CITY_ID	A CUST_STATE_PROVINCE
107 South Hillside Avenue	44581	Moerdijk	51,916	Noord-Brabant
57 North Madison Drive	43866	Perry	52,107	IL
67 South Juana Diaz Avenue	42058	Niteroi	51,984	Rio de Janeiro
77 West Williams Avenue	37400	Yokohama	52,526	Kanagawa
67 North Panola Avenue	88997	Gdansk	51,576	Gdansk
107 West Woodside Avenue	88199	Murdock	51,933	NE
97 South Kenton Avenue	41847	Edgewood	51,443	KY
57 West Federated States Drive	75603	Palmdale	52,102	FL

4. Hover over the role-based filter bar, and click **Add Role** (+) to display a list of application roles.

Search

- Authenticated User
- AuthorRole1
- AuthorRole2
- BI Consumer
- BI Content Author
- BI Dataload Author
- BI Data Model Author
- BI Service Administrator

CUSTOMER INFORMATION

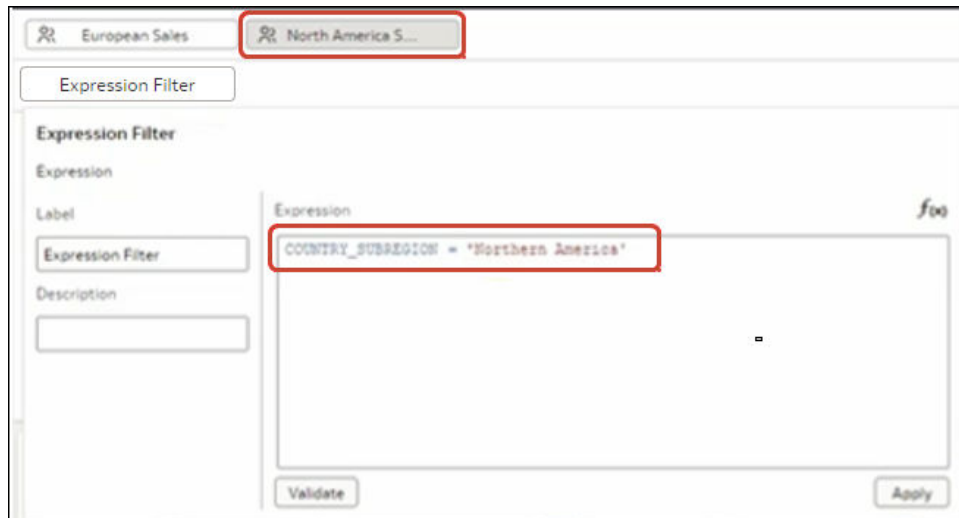
CUST\_STREET\_ADDRESS: This column contains 100% unique values.

CUST\_CITY\_ID: 57128, Asten

CUST\_STATE\_PROVINCE: CA, Nordrhein-Westfalen, Baden-Wuerttemberg, FL, Bayern, KY, Noord-Brabant, England - Greater Lon..., Noord-Holland, England - Norfolk

5. In the drop down list, select the application role that you'd like to use to filter the dataset.
6. Right-click the application role and select **Create Filter** to display the Expression Filter editor.
7. Optional: If required, use the **Label** field to change the filter name to something more meaningful.
8. In the **Expression** box, enter the logical expression that filters the data. using single quotes around data values.

For example, if your dataset has a column COUNTRY\_SUBREGION that identifies geographical region, you might enter `COUNTRY_SUBREGION = 'Northern America'`.



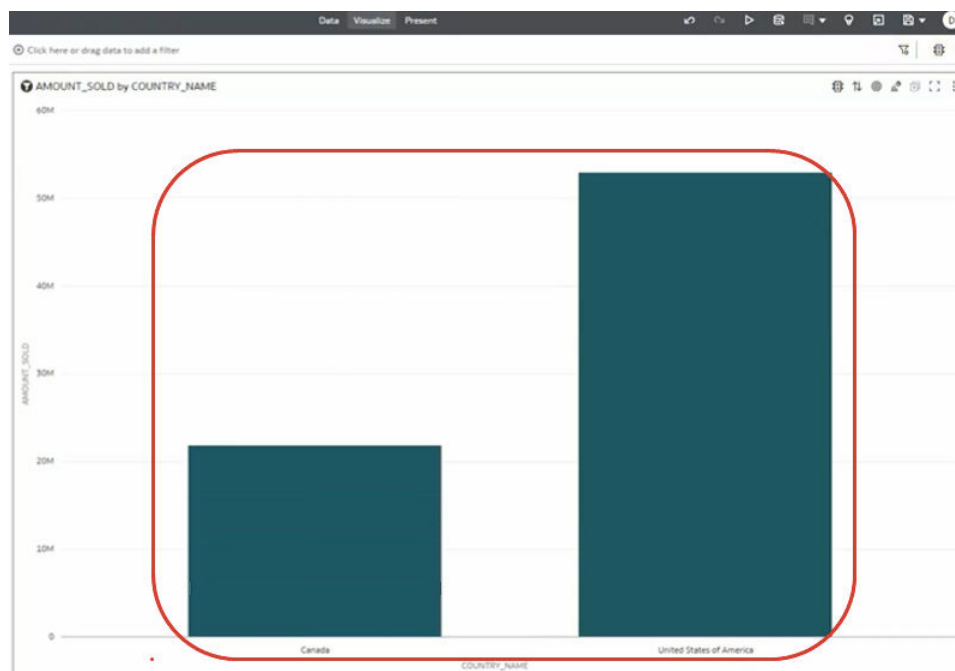
9. Click **Validate**, then click **Apply**.

## Example One - Apply a Simple Role-Based Filter in a Workbook

This example shows how to filter a dataset so that North American sales representatives can access only North American sales data when they open a shared global sales workbook.

### Example report

When North American sales representatives log into Oracle Analytics and open the shared global sales workbook, they only want to see sales data for North America. In this example, sales representative *dvauthoruser* can see sales for North American countries Canada and United States of America.



### Example data

The example dataset contains sales data, with the geographical location stored in the `COUNTRY_SUBREGION` column in the `COUNTRIES` table.

COUNTRY_ID	COUNTRY_ISO...	COUNTRY_NAME	COUNTRY_SUBREGION	COUNTRY_SJ...	COUNTRY_R...	COUNTRY_R...	COUNTRY_TOTAL	COUNTRY_TOT...
52771	CH	China	Asia	52,793	Asia	52,802	World total	52,806
52781	IN	India	Asia	52,793	Asia	52,802	World total	52,806
52782	JP	Japan	Asia	52,793	Asia	52,802	World total	52,806
52783	MY	Malaysia	Asia	52,793	Asia	52,802	World total	52,806
52769	SG	Singapore	Asia	52,793	Asia	52,802	World total	52,806
52791	ZA	South Africa	Africa	52,792	Africa	52,800	World total	52,806
52774	AU	Australia	Australia	52,794	Oceania	52,805	World total	52,806
52785	NZ	New Zealand	Australia	52,794	Oceania	52,805	World total	52,806
52787	SA	Saudi Arabia	Middle East	52,796	Middle East	52,804	World total	52,806
52786	PL	Poland	Eastern Europe	52,795	Europe	52,803	World total	52,806
52776	DE	Germany	Western Europe	52,799	Europe	52,803	World total	52,806
52777	DK	Denmark	Western Europe	52,799	Europe	52,803	World total	52,806
52778	ES	Spain	Western Europe	52,799	Europe	52,803	World total	52,806
52779	FR	France	Western Europe	52,799	Europe	52,803	World total	52,806

### Example users and application roles

- User `dvauthoruser` is assigned the application role `North America Sales`.

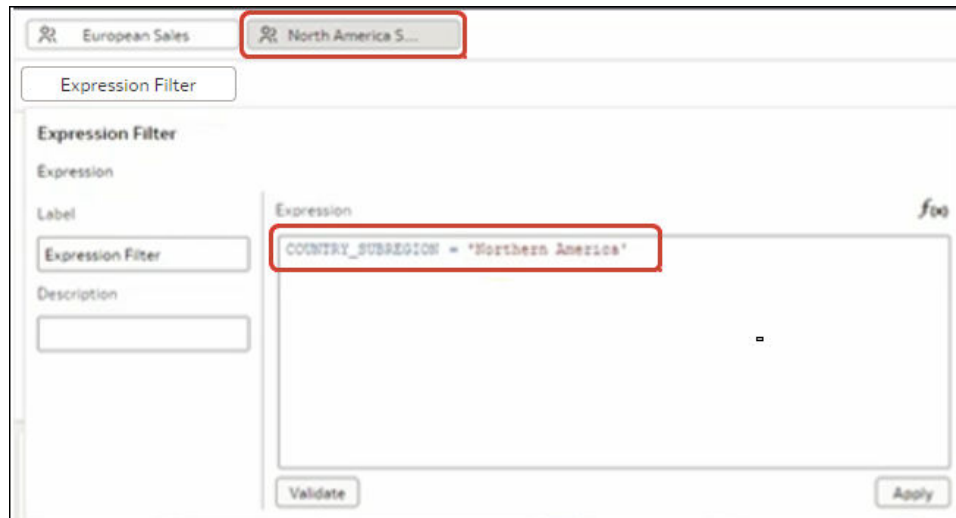
### Example dataset access configuration

In the Inspect dialog for the dataset, under Access, then Roles, authenticated users are given Read-Only access.

Name	Full Control	Read-Write	Read-Only
Authenticated User	○	○	●

### Example role-based filter

In the dataset editor, the workbook author applies a role-based filter to the `North America Sales` application role with the expression `COUNTRY_SUBREGION = "Northern America"`.



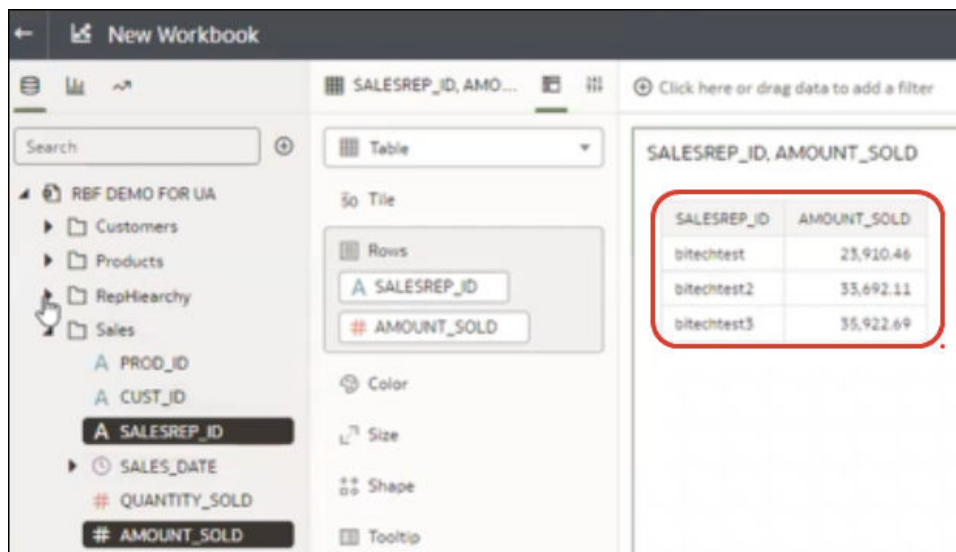
## Example Two - Apply Multiple Role-Based Filters in a Workbook

This example shows how sales vice presidents and sales representatives use the same shared workbook to analyze sales data. Vice presidents can see the sales data for every sales representative in their team. Sales representatives can only see their own sales data.

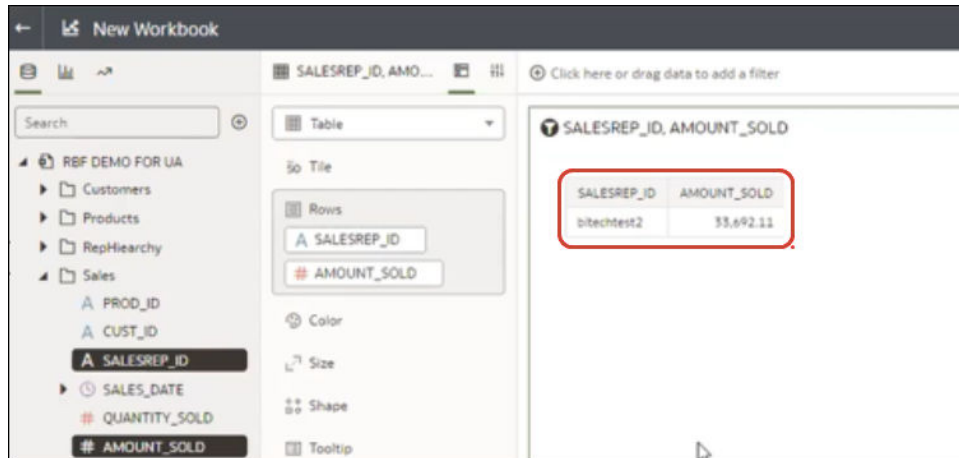
### Example report

Sales vice presidents or sales representatives can open the same shared workbook and see data appropriate to their application role and user ID.

- When a sales vice president logs into Oracle Analytics and opens the shared sales workbook, they see the sales data for each sales representative in their team. In this example, sales vice president *dvauthoruser* can see a sales summary for sales representatives in their team (*bitechtest*, *bitechtest2*, and *bitechtest3*).



- When a sales representative logs into Oracle Analytics and opens the shared sales workbook, they only see their own sales data. In this example, sales representative *bitechtest2* can see his or her sales \$33,692.11.

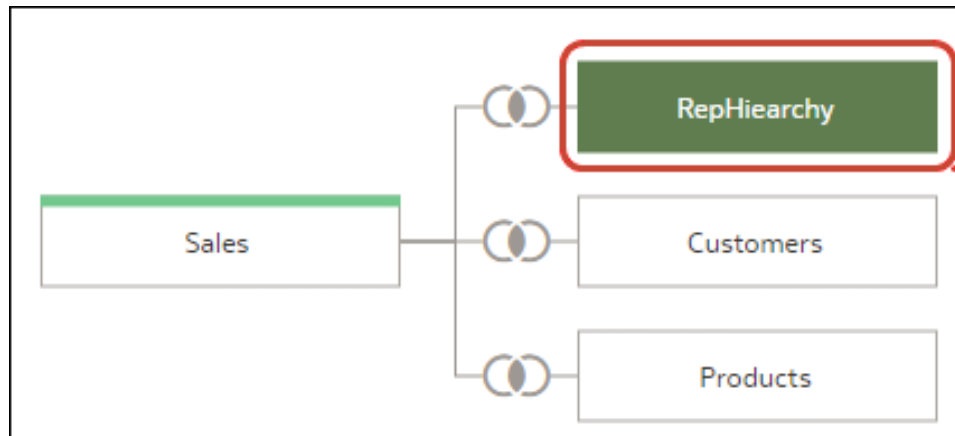


### Example data

The example dataset contains sales data, with the sales representative ID in the SALESREP\_ID column.

A PROD_ID	A CUST_ID	A SALESREP_ID	SALES_DATE	# QUANTITY_...	# AMOUNT_SOLD
139	2945	bitechtest2	08/26/2019	1	17.7700000000000
34	1025	bitechtest	06/19/2018	1	44.7900000000000
118	2365	bitechtest4	09/30/2019	1	8.1300000000000
47	3059	bitechtest2	01/27/2019	1	30.0800000000000
48	4678	bitechtest5	03/28/2022	1	12.0000000000000
134	3829	bitechtest7	08/09/2020	1	23.6000000000000
46	680	bitechtest5	06/10/2021	1	24.6100000000000
38	33742	bitechtest4	11/23/2019	1	27.7800000000000
139	1619	bitechtest6	07/07/2020	1	22.2500000000000
45	3633	bitechtest2	07/03/2020	1	48.1000000000000
16	2985	bitechtest3	07/07/2021	1	303.330000000000
28	4047	bitechtest3	07/17/2018	1	214.740000000000
31	5576	bitechtest2	12/16/2020	1	8.3200000000000
130	8205	bitechtest2	08/30/2018	1	94.4900000000000
140	43443	bitechtest5	03/31/2020	1	37.7900000000000
132	4435	bitechtest	10/02/2021	1	27.5900000000000
132	12005	bitechtest6	05/21/2021	1	23.7300000000000
123	9084	bitechtest3	12/26/2019	1	50.7900000000000
26	11445	bitechtest3	12/21/2021	1	154.650000000000
126	3927	bitechtest	04/08/2020	1	29.5200000000000
24	4960	bitechtest7	06/29/2021	1	64.3000000000000

The sales vice president to sales representative hierarchy is implemented using a RepHierarchy table.



The RepHierarchy table relates sales vice presidents to sales representatives in their team:

A VP_ID	A SALESREP_ID
dvauthoruser	bitechtest
dvauthoruser	bitechtest2
dvauthoruser	bitechtest3
dvauthoruser2	bitechtest4
dvauthoruser2	bitechtest5
dvauthoruser2	bitechtest6
⋮	
dvauthoruser2	bitechtest7

#### Example users and application roles

- Users *dvauthoruser* and *dvauthoruser2* are assigned the application role *Sales VP*.
- Users *bitechtest* to *bitechtest7* are assigned the application role *Sales Rep*.

#### Example dataset access configuration

In the Inspect dialog for the dataset, under Access, then Roles, authenticated users are given Read-Only access.

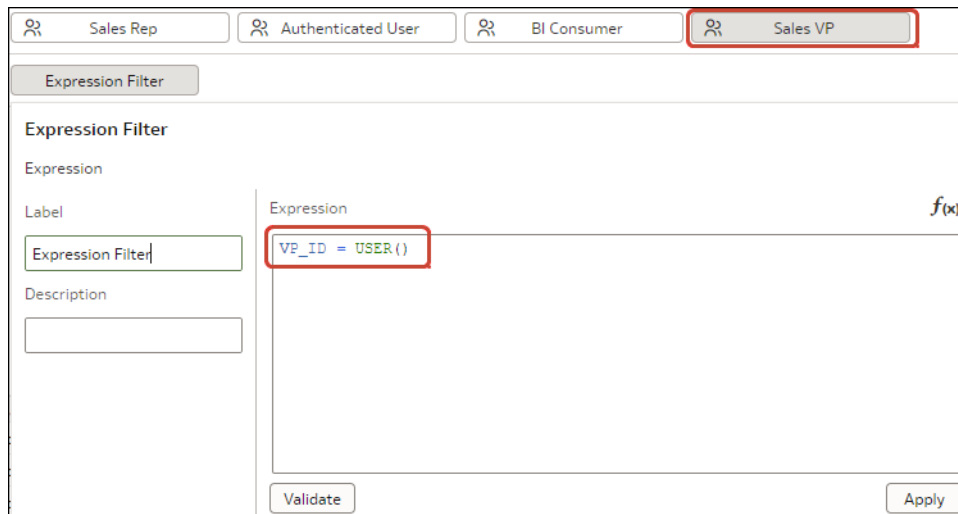




### Example role-based filters

The workbook author applies two role-based filters to the dataset used by the workbook, one for sales vice presidents and one for sales representatives.

- The workbook author applies a role-based filter to the sales vice president 'Sales VP' application role with the expression `SALESVP_ID = USER()`. The argument `USER()` is a system variable in Oracle Analytics that provides the ID of the logged-in user.



- The workbook author also applies a role-based filter to the 'Sales Rep' application role with the expression `SALESREP_ID = USER()`.

The screenshot shows the 'Expression Filter' dialog box in Oracle BI Express. At the top, there is a navigation bar with four roles: 'Sales Rep', 'Authenticated User', 'BI Consumer', and 'Sales VP'. The 'Sales Rep' role is selected and highlighted with a red box. Below the navigation bar is a button labeled 'Expression Filter'. The main area is titled 'Expression Filter' and contains the following fields:

- Expression:** A large text area containing the expression `SALESREP_ID = USER()`, which is highlighted with a red box.
- Label:** A text input field containing the text 'Expression Filter'.
- Description:** An empty text input field.

At the bottom of the dialog, there are two buttons: 'Validate' and 'Apply'.

# 9

## Create and Use Parameters

This topic describes how to create parameters to store and manage values that you can use in various parts of a workbook.

### Topics:

- [What Are Parameters?](#)
- [About System Parameters](#)
- [About Parameter Properties](#)
- [About Modifying and Deleting Parameters](#)
- [Create a Parameter](#)
- [Syntax for Referencing Parameters](#)
- [Bind Parameters to Filters](#)
- [Use Parameters in Workbooks](#)

## What Are Parameters?

A parameter functions as a user-defined variable that holds and manages a current value or values that you want to use in multiple places in a workbook. Use parameters to dynamically manipulate the workbook's data.

You can use parameters:

- In workbooks and visualizations as column selectors
- In workbook titles and visualization labels
- In expression filters
- In workbook, dashboard, and visualization filters.
- In calculations
- In Logical SQL expressions
- In a visualization's properties
- In data actions

When you create a parameter, you can specify a value that Oracle Analytics uses to initialize the parameter's current value. You can specify a list of available and initial values for a parameter by manually entering the values or using a Logical SQL query.

A parameter's scope is only within the workbook where you define it. You can't share parameters with other workbooks.

## About System Parameters

Each workbook contains system parameters that you can use when you want a workbook to contain data based on the user's system information such as current date or time.

System parameters are independent of the workbook's dataset or subject area, and are designed to cover the most common parameters use cases so that you don't have to create these parameters for each workbook.

In the workbook's Parameters tab, you can hover over a system parameter to view its definition. You can't add, modify, or delete a workbook's system parameters.

The system parameters are:

- Current Date
- Current Time
- Current DateTime
- Display Name
- User Name

## About Parameter Properties

How and where you want to use a parameter in the workbook determines the properties that you set for it. For example, you might set different properties for a parameter that you want to use as a filter control versus a parameter that you want to use in an expression.

These are the properties that you can set when you create or modify a parameter:

### Data Type

Specifies the kind of data the parameter contains and the values or range of values that the parameter accepts. The data type is also used to validate that the parameter is compatible and any expressions are generated correctly for the location where you use the parameter.

### Allow Multi Select

Determines if the parameter can accept a single initial value or multiple initial values.

After you enable multiple values, you use the **Initial Value** field to specify more than one initial values or write a SQL expression to provide initial values. When your parameter includes multiple initial values and you use the parameter as a filter control, the user can choose one or more initial values.

### Alias

Provides an override display value for the data element or key value passed by the parameter.

Many datasets use unfriendly names for the data elements. Use an alias to help users understand what the data element is. For example, instead of LST\_OR\_DT, you can create an alias "Last Order Date" to make the data element name user-friendly.

Use aliases to provide more familiar, user-friendly names for users to choose from filter controls. For example, for a data value of 1, you can provide an alias of East Sales Region, and for a data value of 2, you can provide an alias of West Sales Region.

For data actions, use aliases in a parameter to pass a key value and display value. Then when the target workbook applies the incoming parameter values, it also applies the incoming display values for each incoming key value.

### Format Numbers

Determines if the parameter's numeric values contain the thousands and decimal formats. This option is available for Integer and Double data types.

When **Format Numbers** is toggled to on, parameter values use number formatting determined by the browser's language setting, for example, 12,500 or 12.500.

When **Format Numbers** is toggled to off, parameter values contains no number formatting, for example, 12500.

### Available Values

Specifies the list of values that the parameter can hold. A parameter's available values are any, value, column, a Logical SQL query, and a range of values.

- Select **Any** to allow users to enter any value supported by the data type.
- Select **Value** to provide one or more values that the user can choose from. If **Allow Multiple Values** is enabled, then users can choose more than one value.
- Select **Column** to choose a column from which to fetch a list of values. When you select this option, the column selection field displays a tree of all of the workbook's datasets or subject area columns and any calculations in the workbook's My Calculations folder.
- Select **Logical SQL Query** to enter a Logical SQL expression to return one or more available values. You can reference other parameters within the Logical SQL expression. After you enter a Logical SQL expression, you can click the **Validate** icon to validate the expression.
- Select **Range** to provide start and end values to limit the value a user can choose from.

### Enforce Validation

When you create or modify a parameter, this option checks the parameter's initial value or values against the list of available values.

At runtime, this option validates that the specified parameter value or values is included in the list of available values.

At design time, if in the **Available Values** field you select **Value**, enabling the **Enforce Validation** option provides the available values list in the **Initial Value** field.

### Initial Value

The initial value is the parameter's default value that is applied and displayed when the user opens the workbook.

- Select **Value** and leave the value field blank when you don't want to apply a default initial parameter value. If you don't specify an initial value, then all values are used.
- Select **Value** and specify a value that you want to apply as the default initial parameter value. Note the following:

- If you selected **Allow Multi Select**, you can specify more than one initial value.
- If you selected **Enforce Validation**, you can select from the values specified in the **Available Values** field.
- Select **First Available Value** to apply and display the first value in the parameter's value list as the default initial value. If you're working with an attribute column that contains letters, then the first value is determined by the list returned by the Logical SQL expression. The returned list is always in alphabetical order.
- Select **Logical SQL Query** to enter a Logical SQL statement to dynamically fetch a list of values from the data source. You can reference other parameters within the Logical SQL expression. After you enter a Logical SQL expression, you can click the **Validate** icon to validate the expression.

## About Modifying and Deleting Parameters

Before you modify or delete a parameter, check the workbook to make sure that you know where and how the parameter is used.

For example, check to see if the parameter that you want to modify or delete is referenced in an expression or logical SQL query.

Understanding where and how the parameter is used before you modify or delete it prevents broken visualizations, queries, and calculations.

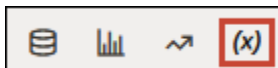
You can modify or delete only the parameters that you create in a workbook. You can't modify or delete a workbook's system parameters, for example Current Date or Current Time.

## Create a Parameter

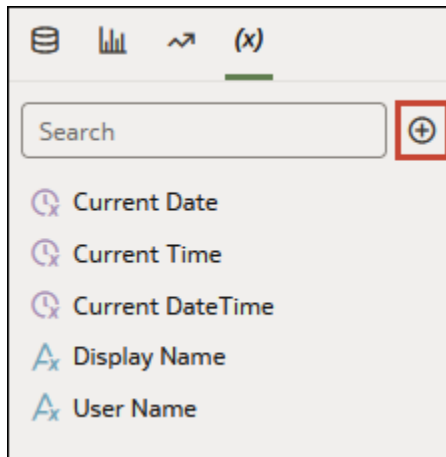
Create a parameter to hold and manage a current value or values that you want to use in multiple places in a workbook.

For information about how to choose the parameter's properties, see [About Parameter Properties](#).

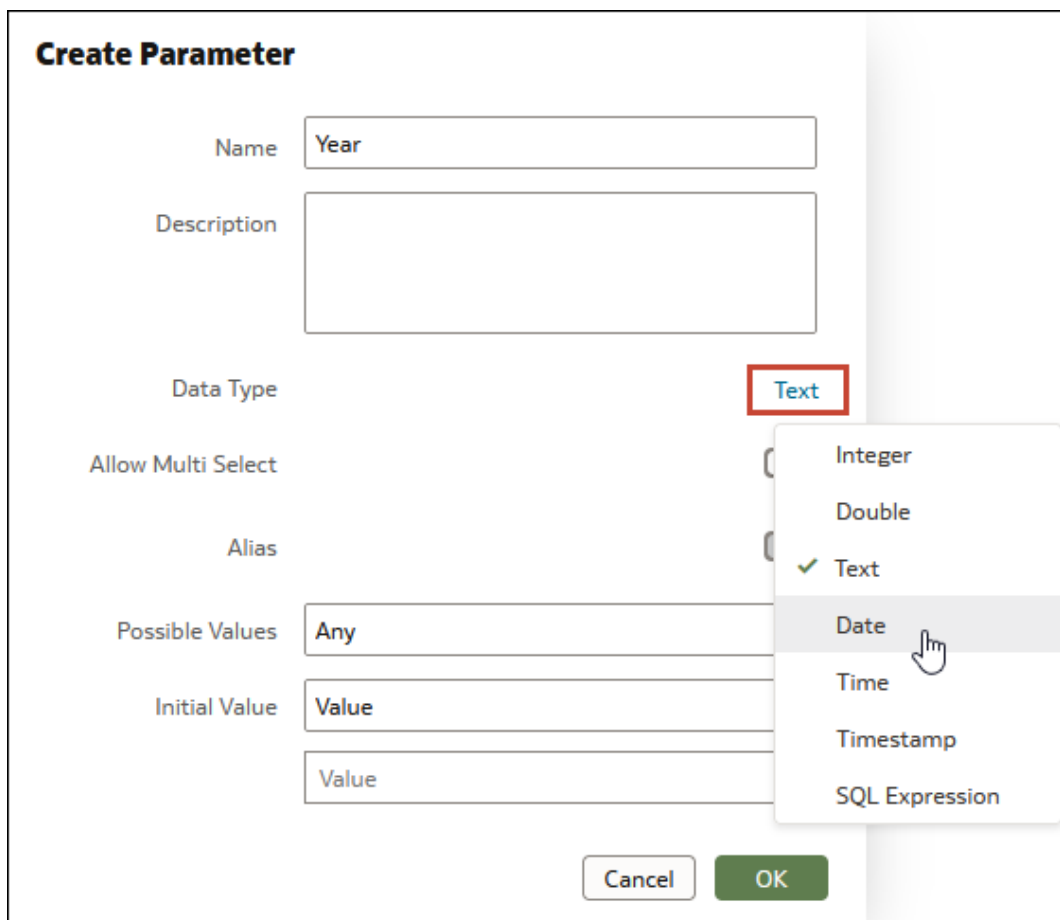
1. On the Home page, select the workbook to add a parameter to, click **Actions**, and then select **Open**.
2. In the **Data Panel** click **Parameters**.



3. In the Parameters Pane, click **Add**.



4. In the **Name** field, enter a unique name.
5. Click **Data Type** and choose the type of data you want the parameter to accept.



6. In the **Available Values** field select how you want specify the parameter's value.
7. In the **Initial Value** field, choose how you want the parameter's initial value to be determined. If you don't want to use an initial value, then select **Value** and leave the value blank.

8. Click **OK**.
9. Click **Save**.

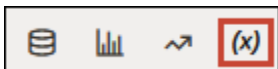
## Create a Parameter that Uses a Logical SQL Query for a Double Column

If your workbook contains a double column, you can create a parameter and provide a Logical SQL to select the display column and the descriptor ID column.

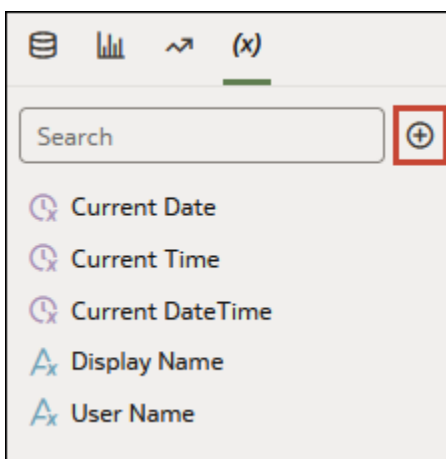
Double columns are available only in datasets created from local subject areas. In a double column, one column represents the data descriptor value and is displayed to the end user. The second column represents an identifier of the data descriptor and isn't displayed to the end user.

If you want to use a parameter in a double column type filter, you can create a parameter from and bind it to a filter from the filter's properties. See [Create and Bind a Parameter to a Double Column Type Filter](#).

1. On the Home page, select the workbook to add a parameter to, click **Actions**, and then select **Open**.
2. In the **Data Panel** click **Parameters**.



3. In the Parameters Pane, click **Add**.



4. In the **Name** field, enter a unique name.
5. In the **Available Values** field, select **Logical SQL Query**.
6. In the text box, write the Logical SQL, making sure to include the display column and the descriptor ID column. For example,

```
SELECT "A - Sample Sales"."Double Column Products"."P10 Product (Dble Column)", DESCRIPTOR_IDOF("A - Sample Sales"."Double Column Products"."P10 Product (Dble Column)") FROM "A - Sample Sales"
```



7. Go to the **Initial Value** field and confirm that either **Value** or **First Available Value** is selected.
8. Click **Save**.

## Syntax for Referencing Parameters

Use the syntax provided in this topic to reference parameters from a workbook visualization's properties, SQL expression, or calculations.

Use this syntax to reference a parameter:

```
@parameter("parameter name")('default value')
```

This table contains expression syntax examples:

Parameter Expression	Description
@parameter("Supplier")('Brembo')	References the Supplier parameter. The parameter value is 'Brembo' unless the Supplier parameter is passed into the workbook via data actions or URL parameters.
@parameter("StartDate")(DATE'2021-10-08')	References a parameter named StartDate with a default date of October 8, 2021.
@parameter("CurrentTime")(TIME'18:00:00')	References a parameter named CurrentTime with a default time of 18:00:00.
@parameter("CurrentDateTime") (TIMESTAMP'2023-02-28T18:00:00')	References a parameter named CurrentDateTime with a default date of February 28, 2023 and a default time of 18:00:00.
@parameter("NumOccurrences")(5)	References a parameter named NumOccurrences with a default of 5.
@parameter("SelectedColumn")("A - Sample Sales"."Offices"."D2 Department")	References a parameter named SelectedColumn, and defaults to "A - Sample Sales"."Offices"."D2 Department".
@parameter("Supplier", style="delimited", separator="/")('Brembo','Bosch')	References a parameter named Supplier, and the value defaults to "Brembo/Bosch" when used.
@parameter("Supplier", style="individual")('Brembo','Bosch')	References a parameter named Supplier, and is used by data actions to separate parameters: &myParam=Brembo&myParam=Bosch
@parameter("Supplier", type="alias")('Brembo','Bosch')	References a parameter named Supplier and uses any configured alias values, if they exist. Alias uses values if alias isn't configured.
@parameter("Supplier", type="value")('Brembo','Bosch')	References a parameter named Supplier and uses any configured values, regardless of whether an alias is configured.

# Bind Parameters to Filters

This topic describes how to create a parameter and bind it to a filter or choose an existing parameter to bind to a filter.

## Topics:

- [About Binding Parameters to Filters](#)
- [Create and Bind a Parameter to a Filter](#)
- [Create and Bind a Parameter to a List Box Dashboard Filter](#)
- [Create and Bind a Parameter to a Double Column Type Filter](#)
- [Bind an Existing Parameter to a Filter](#)

## About Binding Parameters to Filters

Bind a parameter to a filter when you want to pass a selected filter value from one canvas to another in a workbook, or you want to have more control over how filters behave and are exposed to the user.

Binding a parameter to a filter is one-way binding, meaning a parameter doesn't limit the list of available filter values that the user can choose from. A parameter's properties define the values that it can accept from the filter.

When bound to a filter, the parameter listens to the filter's selections and when the parameter accepts a filter value, it passes that value to wherever you use the parameter in the workbook.

Binding a parameter to a filter has many uses. For example, by default when you add the Dashboard Filters control to a canvas, it only applies filters to that canvas. You can use parameters bound to filters to pin the dashboard filters across multiple canvases in the workbook. When multiple canvases include a dashboard control with the same filters bound to the same parameters, any filter values selected by the user are applied to each canvas.

## Create and Bind a Parameter to a Filter

Click a filter's **Create Parameter** option to create a parameter and bind it to the filter with one click.

For more information about how to use parameter binding in a workbook's filters, see [About Binding Parameters to Filters](#).

When you create a parameter from a filter, the parameter definition's **Available Values** properties field is set to **Any** and the parameter accepts any filter value selected by the user. After you create a parameter from a filter, you can modify any of the parameter's properties. For example, you can add the values that you want the parameter to accept.

When you create a parameter from a filter, the parameter uses the filtered column's name, for example, if you bind a parameter to a City column filter, the binding creates a parameter named City.

1. On the Home page, select the workbook where you want to create a filter and add and bind a parameter to, click **Actions**, and then select **Open**.

2. Create or locate and click the filter where you want to create and bind the parameter.
3. Click (x) and then click **Create Parameter** to create and bind the parameter to the filter.
4. Optional: Go to the workbook's **Data Panel**, click **Parameters**, right-click the parameter you created from the filter, and select **Edit Parameter** to review and update the parameter's properties. Click **OK**.

## Create and Bind a Parameter to a List Box Dashboard Filter

Because the list box filter doesn't include the **Bind to Parameter** option, you need to use the **Create Parameter** filter property to create and bind a parameter to a list box dashboard filter.

For more information about how to use parameter binding, see [About Binding Parameters to Filters](#).

1. On the Home page, select a workbook, click **Actions**, select **Open**, and click **Edit**.
2. In the Data Panel, click the **Visualizations** tab, and drag and drop **Dashboard Filters** to the canvas.
3. In the Data Panel, click the **Data** tab, and drag and drop the column that you want to use to filter the canvas.
4. In the dashboard filter's Properties pane, click **Properties**, then click **Filter Controls**. Go to the **Filter Type** field and select **List Box**.
5. In the Properties pane, go to Parameter Binding and click **None**.
6. Select an existing parameter to bind to the filter, or click **Create Parameter** to use the selected filter values to create and bind the parameter to the list box filter.
7. Optional: To specify if the user is required to select a filter value, go to the Properties pane, click the **Selection Required** field, and select **On**.
8. Click **Save**.

## Create and Bind a Parameter to a Double Column Type Filter

Click a double column type filter's **Create Parameter** option to create a parameter and bind it to the filter with one click.

This tutorial provides a use case explaining how to bind a double column list filter to a parameter:

 [Tutorial](#)

For more information about how to use parameter binding in a workbook's filters, see [About Binding Parameters to Filters](#).

Double columns are available only in datasets created from local subject areas. In a double column, one column represents the data descriptor value and is displayed to the end user. The second column represents an identifier of the data descriptor and isn't displayed to the end user.

When you create a parameter for a double column, the **Alias** field in the parameter's property is turned on by default. An alias is required for a double column parameter, so you can't switch the **Alias** field to off.

When you create a parameter from a filter, the parameter uses the filtered column's name.

1. On the Home page, select the workbook where you want to create a double column type filter and add and bind a parameter to, click **Actions**, and then select **Open**.

2. Create or locate and click the double column type filter where you want to create and bind the parameter. The filter displays the double column's display values and not its ID values.
3. Click (x) and then click **Create Parameter** to create and bind the parameter to the filter.
4. Optional: Go to the workbook's **Data Panel**, click **Parameters**, right-click the parameter you created from the filter, and select **Edit Parameter** to reviews and update the parameter's properties.
5. Click **OK**.


## Bind an Existing Parameter to a Filter

Choose a system parameter or an existing workbook parameter to bind to a filter and pass a selected filter value to the parameter.

For more information about how to use parameter binding in a workbook's filters, see [About Binding Parameters to Filters](#).

You can also create a parameter from a filter with one click. See [Create and Bind a Parameter to a Filter](#).

When you click **Bind to Parameter**, Oracle Analytics lists the workbook's parameters that are compatible and available for you to bind to the filter.

Hover over a parameter's exclamation icon  for information about the parameter's compatibility with the filter. This information is just a warning and doesn't prevent you from binding the parameter to the filter.

The warning "The filter supports multiple values but the parameter doesn't," means that you can select multiple values in the filter but the parameter definition accepts only the first value specified in the filter value selection list. If you want to fix this issue, go to the filter's properties and change its **Multi Select filter** control to match the parameter's **Allow Multi Select** setting.

1. On the Home page, select the workbook with the filter that you want to bind a parameter to, click **Actions**, and then select **Open**.
2. Create or locate and click the filter that you want to bind the parameter to.
3. Click (x) and then click the parameter that you want to bind to the filter.
4. Click **OK**.

## Use Parameters in Workbooks

This topic describes how you can use parameters in a workbook, for example, in visualization labels and expressions.

### Topics:

- [Use a Parameter in the Filter Bar](#)
- [Use a Parameter as a Dashboard Filter Control](#)
- [Use a Parameter in a Visualization's Title](#)
- [Use a Parameter as a Visualization's Axis Label](#)

- [Use a Parameter in an Expression Filter](#)
- [Use a Parameter in a Workbook Calculation](#)
- [Use an Analytics Link Data Action to Pass Parameter Values](#)
- [Use a URL Navigation Data Action to Pass Parameter Values](#)
- [Bind a Parameter to a Reference Line or Band](#)

## Use a Parameter in the Filter Bar

Adding a parameter to the canvas' filter bar allows you to set the parameter value for the workbook. You can optionally hide the parameter filter control from users in Present mode.

This tutorial provides a use case explaining how to use a parameter in the filter bar:

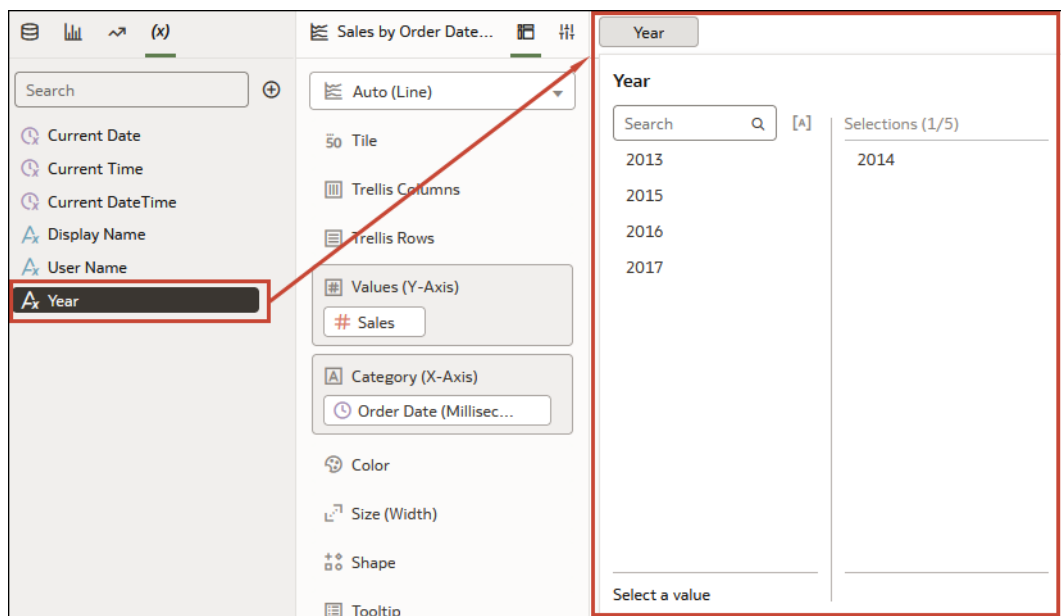
 [Tutorial](#)

### Note:

Adding a parameter as a filter control functions as a column selector. Adding a parameter as a filter control doesn't filter data.

Using a parameter in the filter bar doesn't provide the same features as a standard filter. For example, it doesn't provide the Top Bottom N, exclude, nulls, and limit values functionalities.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. In the **Data Panel** click **Parameters**.
3. Drag and drop a parameter to canvas' filters bar.



4. Click **Save** to save the workbook.

## Use a Parameter as a Dashboard Filter Control

When working on a workbook in Visualize or Present mode, you can use a parameter as a dashboard filter control to select and change the dimension and measure column values for a canvas' visualizations.

These tutorials provide use cases explaining how to use a parameter in the dashboard filter control:

 [Tutorial](#)

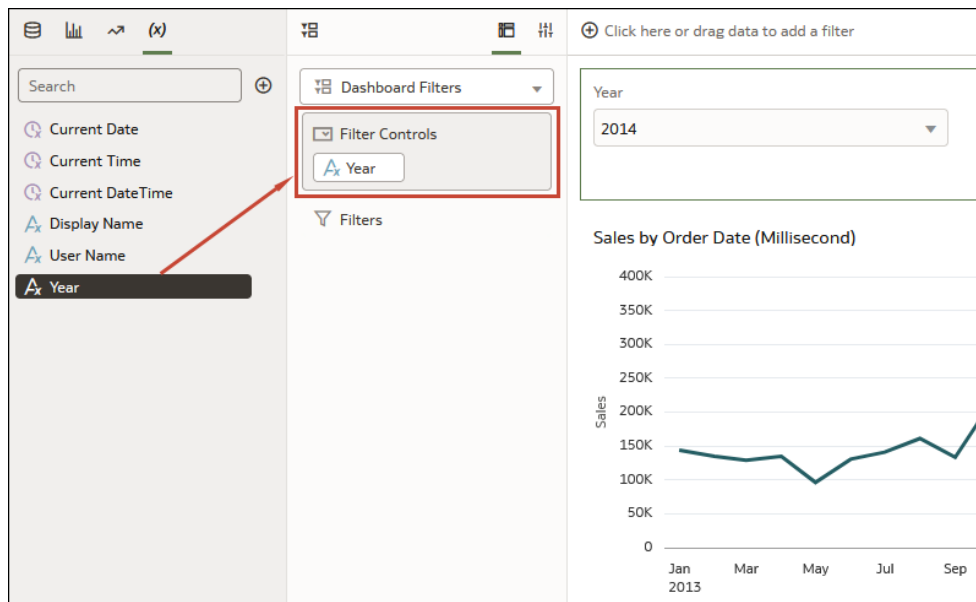
 [Tutorial](#)

### Note:

Adding a parameter as a filter control functions as a column selector. Adding a parameter as a filter control doesn't filter data.

Using a parameter as a dashboard filter control doesn't provide the same features as a standard filter. For example, it doesn't provide the Top Bottom N, exclude, nulls, and limit values functionalities.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. In the **Data Panel** click **Visualizations**.
3. Scroll to the Dashboard Controls section and drag and drop **Dashboard Filters** on the canvas.
4. In the **Data Panel** click **Parameters**.
5. Drag and drop a parameter to **Filter Controls** in the Dashboard Filter visualization's grammar panel.



6. Click **Save** to save the workbook.

## Use a Parameter in a Visualization's Title

Add a parameter to the visualization's title when you want to display the parameter's value in the context of the title.

For example, you can create a parameter called Year and add it to a dashboard filter on the canvas. Then you can reference the parameter in a visualization's title so that when the user chooses a year value, the title is updated to include the selected year.

The screenshot displays the Oracle BI interface. On the left, a search bar and a list of parameters are visible, with 'Year' selected. The main area shows a line chart titled 'Sales Order Date for 2016'. The Properties panel is open, showing the 'Title' field set to 'Sales Order Date for @parameter("Year")'. A filter 'Select a Year' is set to '2016'. The chart shows sales data from January to September.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. Click a visualization to select it, and then click **Properties** to display the Properties panel and click **General** to display the general properties.
3. Locate the **Title** field and click **Auto**. Select **Custom**.
4. Clear or modify the default title and use this syntax to include a parameter in the title:

```
@parameter("parameter name")
```

For example:

```
Sales by Order Date for @parameter("Year")
```

5. Click **Save** to save the workbook.

## Use a Parameter as a Visualization's Axis Label

A parameter value can be dynamically passed to a visualization's axis labels. The current value of the parameter is used as the axis label's name.

For example, you can create a parameter called Year and add it to a dashboard filter on the canvas. Then you can reference the parameter in a visualization's value axis so that when the user chooses a year value, the value axis title is updated to include the selected year.

The screenshot shows the Oracle BI interface. On the left, a filter for 'Year' is selected. The main panel displays the 'Sales by Order Date' visualization. The 'Labels Axis' section shows the title 'Sales for @parameter("Year")' highlighted with a red box. The 'Values Axis' section also has a red box around the title 'Sales for 2016'. The chart shows sales data for the years 2015 and 2016, with the 2016 data highlighted in red.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. On the canvas, select a visualization and click **Properties** to display the Properties panel and click **Axis** to display the axis properties.
3. Locate the axis label where you want to use the parameter. Go to the **Title** property, click **Auto**, and then click **Custom**.
4. Clear or modify the default title and use this syntax to include a parameter in the:

```
@parameter("<parameter name>")
```

For example:

```
@parameter("Year")
```

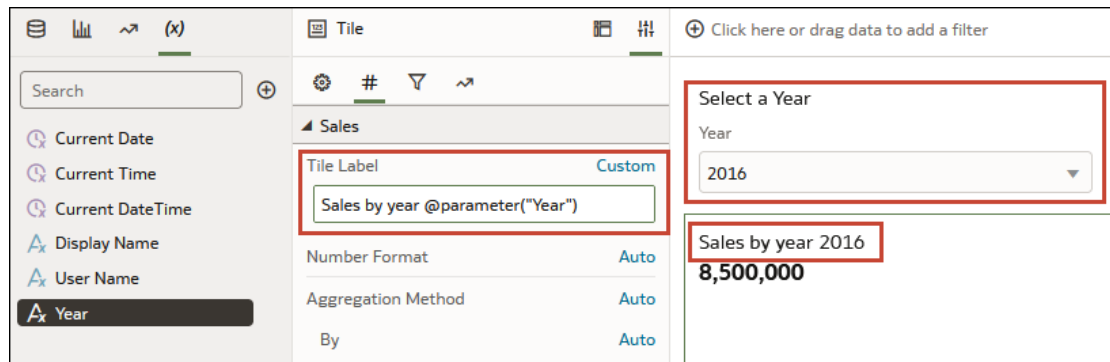
5. Click **Save** to save the workbook.



## Use a Parameter in a Tile Visualization's Measure Label

A parameter value can be dynamically passed to a tile visualization primary and secondary measure labels.

For example, suppose you want the workbook to include a dashboard filter measure selector, and when the user selects a measure value, the selected value is passed to the measure's label to give the tile visualization more context.



1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. Click a tile visualization to select it, click **Properties** and then click **Values** to display the Values panel.
3. Locate the measure's **Tile Label** field and click **Auto**. Select **Custom**.
4. Clear or modify the default title and use this syntax to include a parameter in the title:

```
@parameter("parameter name")
```

For example:

```
@parameter("Measure")
```

5. Click **Save** to save the workbook.

## Use a Parameter in an Expression Filter

You can include a parameter in an expression filter's SQL expression to create a complex visualization filter.

This tutorial provides a use case explaining how to use a parameter in an expression filter:

 [Tutorial](#)

See [Syntax for Referencing Parameters](#).

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. Click the visualization that you want to add the expression filter to and confirm that the visualization's **Grammar** panel is displayed.
3. In the Grammar panel, scroll to the **Filters** area, click **Drop Target Options**, and select **Create Expression Filter**.

4. In **Label**, enter a name for the expression filter.
5. In the **Expression** field, use this syntax to build the expression:

```
@parameter("parameter name")('default value')
```

For example:

```
rank(Sales)<=@parameter("Top N")(10)
```

6. Click **Validate**, and then click **Apply** to save the expression filter.

## Use a Parameter in a Workbook Calculation

Use a parameter to replace a constant in a calculation that you create in the workbook's My Calculations folder.

This tutorial provides a use case explaining how to use a parameter in a workbook calculation:

 [Tutorial](#)

See [Syntax for Referencing Parameters](#).

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. In the **Data Panel** click **Data**.
3. Locate the My Calculations folder, right-click it, and select **Create Calculation**.
4. In New Calculation, enter a name for the calculation.
5. In the calculation field, use this syntax to build the calculation:

```
@parameter("parameter name")('default value')
```

For example:

```
@parameter("Dimensions")('Order Priority')
```

6. Click **Validate** to validate the calculation, and then click **Save** to save the calculation.
7. Click **Save** to save the workbook.

## Use an Analytics Link Data Action to Pass Parameter Values

You can create a data action to pass the selected parameter values to a canvas in another workbook.

This tutorial provides a use case explaining how to use a parameter in an analytics link:

 [Tutorial](#)

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. Click **Menu** on the workbook toolbar and click **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.

4. Click the **Type** field and select **Analytics Link**.
5. Click the **Anchor To** field and select the columns from the current visualization to associate with this data action. Don't select measure columns or hidden columns. If you don't specify a value for the **Anchor To** field, then the data action applies to all data elements in the visualizations.
6. In the **Target** field, click the **This Workbook** field and select **Select from Catalog** and browse for and select the workbook that you want to use for the anchor.
7. Click the **Canvas Link** field and select the canvas that you want to use.
8. If you want to pass a filter value, then click the **Pass Values** field and select which values you want the data action to pass.
  - **All** - Dynamically determines the intersection of the cell that you click and passes all filter values for the selected data.
  - **Anchor Data** - Ensures that the data action is displayed at runtime, but only if the required columns specified in the **Anchor To** field are available in the view context.
  - **None** - Opens the page (URL or canvas) but no filter values are passed for the selected data.
  - **Custom** - Passes only user selected custom filter values for the selected data.
9. Click the **Pass Parameter Values** field and select which parameter values you want the data action to pass.
  - **All** - Dynamically determines the intersection of the cell that you click and passes all parameter values for the selected data.
  - **None** - Opens the page (URL or canvas) but no parameter values are passed for the selected data.
  - **Custom** - Passes only user selected custom parameter values for the selected data.
10. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error.
11. Click **OK** to save.

## Use a URL Navigation Data Action to Pass Parameter Values

You can create a data action that uses a URL to pass the selected parameter values from a workbook to another application.

For example, suppose your workbook contains a parameter that allows a user to select an employee ID value. You can create a URL navigation data action to pass the employee ID value to your HCM application.

1. On the Home page, select a workbook, click **Actions**, and then select **Open**.
2. Click **Menu** and select **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.
4. Click the **Type** field and select **URL Navigation**.

5. Click the **Anchor To** field and select the columns that you want the URL to apply to. If you don't specify a value for the **Anchor To** field, then the data action applies to all data elements in the visualizations.
6. Enter a URL and optionally include any URL options such as separator, style, or type.

For example, `http://www.example.com/search?q=@parameter("City",separator=",",type="value")('')`

7. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
8. Click **OK** to save.

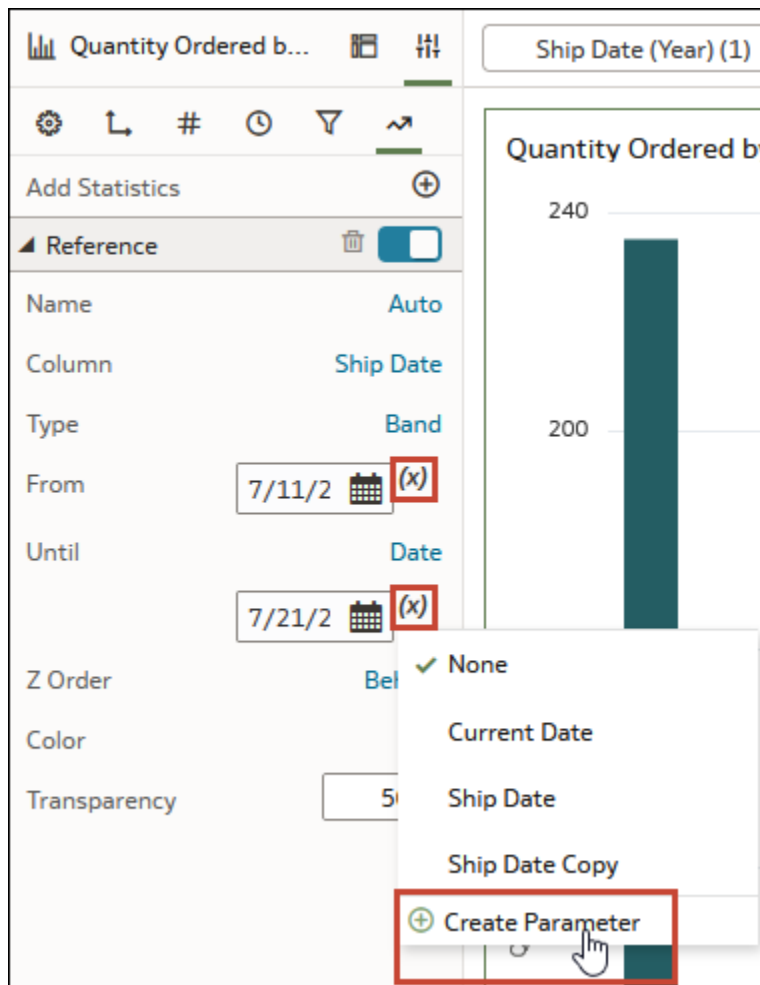
## Bind a Parameter to a Reference Line or Band

You can bind a parameter to a visualization's reference line or band's date value or date range when you want to use a parameter value to place the reference line or band on the visualization.

When you bind a parameter to a reference line or band, you can add the same parameter as a dashboard filter so that the user can enter a date value or range to control the placement of a visualization's reference line or band.

See [Add Reference Lines to Visualizations](#).

1. On the Home page, select the workbook with the visualization containing the reference line or band that you want to bind to a parameter, click **Actions**, and then select **Open**.
2. Click to select the visualization and in the Grammar Panel, click **Properties**, and click **Analytics**.
3. For a reference line, go to the **Value** field or for a reference band go to the **From** and **Until** field and click (x) **Bind to Parameter**.
4. Click **Create Parameter** to create and bind the parameter to the reference line or band.



The new parameter's name matches the column name.

5. Optional: Go to the workbook's **Data Panel**, click **Parameters**, right-click the parameter you created from the date value or range, and select **Edit Parameter** to review and update the parameter's properties.
6. Click **Save**.

# 10

## Apply Map Backgrounds and Map Layers to Enhance Visualizations

You can use geographical information to enhance the analysis of your data.

### Topics:

- [About Map Backgrounds](#)
- [Enhance Visualizations with Map Backgrounds](#)
- [Use Different Map Backgrounds in a Workbook](#)
- [Interpret Data Values with Color and Size in Map Visualizations](#)
- [Add Custom Map Layers](#)
- [Update Custom Map Layers](#)
- [Apply Multiple Data Layers to a Single Map Visualization](#)
- [Use an Image as a Map Background and Draw Map Layer Shapes on the Image](#)
- [Assign a Map Layer to a Data Column](#)
- [Auto Focus on Data for a Map Visualization](#)
- [Configure Zoom in Map Visualizations](#)
- [Review Location Matches for a Map Visualization](#)
- [Create Heatmap Layers on a Map Visualization](#)
- [Create Cluster Layers on a Map Visualization](#)
- [Represent Point Data with Custom Icons on a Map](#)
- [Select Points or Area on a Map](#)
- [Represent Line Data Using Size and Color on a Map](#)
- [Make Map Layers and Backgrounds Available to Users](#)
- [Use a Map Background as the Default](#)
- [Add Map Backgrounds](#)
- [Add Data Labels to a Map](#)

### About Map Backgrounds

You can enhance map visualizations in workbooks by adding and maintaining map backgrounds.

You can apply the ready-to-use map backgrounds to a workbook. You can also add backgrounds from the available list of Web Map Service (WMS) providers such as Google Maps and Baidu Maps, or you can add a map background by specifying appropriate Web Map Service or Tiled Web Map details. Background maps from these providers offer details

and language support (such as city or region name) that certain geographic regions (such as Asian countries) require.

You can modify backgrounds in the following ways:

- Modify the background parameters such as map type, format and API keys. The parameters are different for each WMS provider.
- Assign or change the default background in a workbook.
- Reverse the inherited default background settings in a workbook.

You can add a WMS provider and perform the following types of functions:

- Add the WMS map servers, and make them available as additional map background options.
- Select one or more map backgrounds available from the WMS provider.
- Assign an added WMS provider's map as the default map background.

## Enhance Visualizations with Map Backgrounds

You can use map backgrounds to enhance visualizations in a workbook.

 [LiveLabs Sprint](#)

 [Tutorial](#)

Based on the column values, a specific set of dimensions and metrics is displayed on the map visualization. You'll see either the default map background or an existing Oracle map background if no default is set.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Visualize**.
3. To select a column and render it in a map view, do one of the following:
  - Right-click a map-related column in the Data Element pane and click **Pick Visualization**, then select **Map**.
  - Drag and drop a map-related column from the Data Element pane to the blank canvas, or between visualizations on the canvas. On the visualization toolbar, click **Change Visualization Type** and select **Map**.
4. In the properties pane, click **Map** and specify the visualization properties.
5. If you want to use a different map background, click the **Background Map** value in the properties pane and select a background. For example, select Google Maps, and the visualization displays Google Maps as the map background.
  - If you want to see the list of available map backgrounds or change the backgrounds that you can use, do one of the following:
    - Click the **Background Map** value and select **Manage Map Backgrounds** to display the Map Background tab.
    - Open the Console page, click **Maps** and select the Backgrounds tab.
  - Select another map background such as Satellite, Road, Hybrid, or Terrain.
6. Click **Save**.

## Use Different Map Backgrounds in a Workbook

As an author you can use different map backgrounds in map visualizations.

Here is an example of how you might use a map background in a workbook.

1. On the Home page click **Create**, then click **Workbook**.
2. Select a dataset in the Add Dataset dialog.
3. Click **Add to Workbook**.  
The Workbook pane and list of Data Elements is displayed.
4. Select a map-related data element (for example, click **City**), and click **Pick Visualization**.
5. Select **Map** from the list of available visualizations.  
Either the default map background or an existing Oracle map background if no default is set is displayed.
6. In the visualization properties pane, select the **Map** tab.
7. Click the **Background Map** value and select a map from the drop-down list.  
For example, select Google Maps and Google Maps as the map background is displayed.
8. Optional: Click another value to change the type of map (such as Satellite, Road, Hybrid, or Terrain).
9. Optional: Click **Manage Map Backgrounds** from the **Background Map** options to display the Map Backgrounds pane.  
Use this option to maintain the map backgrounds that you want to use.

## Interpret Data Values with Color and Size in Map Visualizations

You can use the color and size of a shape such as a polygon or a bubble, to interpret values in a map visualization.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Select a column and render it in a map view, doing one of the following:
  - Right-click a map-related column in the Data Element pane and click **Pick Visualization**, then select **Map**.
  - Drag and drop a map-related column from the Data Element pane to the blank canvas, or between visualizations on the canvas. On the visualization toolbar, click **Change Visualization Type** and select **Map**.
3. Drag and drop columns to the following sections on the Visualization Grammar Pane.
  - Use **Color** to change the color for geometries displayed in the corresponding map layer (for example, polygon fill color, bubble color) based on the values.
  - Use **Size (Bubble)** to change color bubble size based on the measure column values. To change the size of the color bubble you've to drag and drop measure columns only. The size shows the aggregated measure for a specific geographic location in a map visualization.



- Use **Trellis Columns / Rows** to Compare multiple map visualizations based on the column values using filters.

In the map visualization, you can also use the following to interpret measure columns and attribute values:

- **Legend** - If a measure column or an attribute has multiple values, then the legend is displayed that shows values by size or color.
- **Tooltip** - If you hover the mouse pointer over a color bubble or data point, then the values are displayed in a tooltip.

## Add Custom Map Layers

You can add custom map layers to use in map visualizations.



You add a custom map layer using a geometric data file with the .json extension that conforms to GeoJSON schema <https://en.wikipedia.org/wiki/GeoJSON>. You then use the custom map layer to view geometric map data in a workbook. For example, you might add a Mexico\_States.json file to enable you to visualize geometric data in a map of Mexico States.

The maximum upload size for an individual GeoJSON file is 100 MB (compressed). The overall limit for GeoJSON files is 200 MB (compressed). Compressed GeoJSON files are smaller (up to half the original size) than uncompressed GeoJSON. Oracle Analytics compresses files that you upload by stripping out whitespace and truncating precision to 6 decimal points.

- Map layer files containing polygons with 12 or more decimal points might reduce in size by 50%.
- Map layer files that contain point geometries might reduce in size by 15-20%.

If preferred, you can compress your map layer files before you upload them to Oracle Analytics using tools such as [mapshaper.org](http://mapshaper.org).

When creating a custom map layer, you must select layer keys that correspond with data columns that you want to analyze in a map visualization. For example, if you want to analyze Mexican States data on a map visualization, you might start by adding a custom map layer for Mexican States, and select HASC code layer key from the Mexican\_States.json file. Here's an extract from the Mexican\_States.json file that shows some of the geometric data for the Baja California state.

```
},  
{  
  "type": "Feature",  
  "properties": {  
    "adm1_code": "MEX-2706",  
    "OBJECTID_1": 745,  
    "diss_me": 2706,  
    "adm1_cod_1": "MEX-2706",  
    "iso_3166_2": "MX-",  
    "wikipedia": "",  
    "iso_a2": "MX",  
    "adm0_sr": 6,  
    "name": "Baja California",  
    "name_alt": "",  
    "name_local": "",  
    "type": "Estado",  
    "type_en": "State",  
    "code_local": "",  
    "code_hasc": "MX.BN",  
    "note": ""  
  }  
}
```

If you wanted to use the `Mexican_States.json` file, the layer keys that you select must match columns that you want to analyze from the Mexican States Data tables. For example, if you know there's a data cell for the Mexican state Baja California then select the corresponding name field in the JSON file to display state names in the Map visualization. When you create a workbook and select column (such as State, and HASC), then Mexican states are displayed on the map. When you hover the mouse pointer over a state, the HASC code (such as MX BN) for each state is displayed on the map.

1. On the Home page, click **Navigator**, and then select **Console** to display the Console page.
2. Click **Maps** to display the Map Layers page.

You can enable and disable System Map Layers but you can't create or delete them.

3. To add a custom map layer, click **Add Custom Layer** or drag and drop a JSON file from File Explorer to the Custom Maps area.
4. Browse the Open dialog, and select a JSON file (for example, `Mexico_States.json`).

The JSON file must be a GeoJSON file that conforms to the standard specified in <https://en.wikipedia.org/wiki/GeoJSON> (the maximum file size allowed is 20MB).

Custom layers that use the Line String geometry type aren't fully supported. The Color and Size section on Visualization Grammar pane doesn't apply to line geometries.


5. Click **Open** to display the Map Layer dialog.
6. Enter a **Name** and an optional **Description**.
7. Select the layer keys that you want to use from the Layer Keys list.

The layer keys are a set of property attributes for each map feature, such as different codes for each state in Mexico. The layer keys originate from the JSON file. Where possible, select only the layer keys that correspond with your data.

8. Click **Add**. A success message is displayed when the process is complete and the layer is added.

## Update Custom Map Layers

You can maintain custom map layers.

1. On the Home page click **Navigator**, and then click **Console**.
2. Click **Maps**, click **Map Layers** and click **Custom Map Layers**.
3. To include or exclude a custom map layer from being available, click the tick symbol  for the layer. For example, if you want to exclude `us_states_hexagon_geo` from maps, click the tick to disable it and remove it from searches.
4. Click **Options** and select any of the following options:
  - a. Optional: To change settings for the custom map layer select **Inspect**.  
You can specify the Name, Description, Layer Keys, and choose an image or a map to use as the default background for this layer.
  - b. Optional: To upload a JSON file again select **Reload**.
  - c. Optional: To save the JSON file locally select **Download**.
  - d. Optional: To delete the custom map layer, select **Delete**.

## Switch to Use Another Map Layer

You can change which map layer you use in a map visualization.

1. On the Home page, select a workbook containing a map visualization, click the **Actions** menu, and then select **Open**.
2. Click **Data Layers** in the Properties pane.
3. Click the current **Map Layer** for example Mexican States. This displays a list of available map layers that you can choose from.
4. Click the map layer that you want to use to match your data points.

## Apply Multiple Data Layers to a Single Map Visualization

You can use the data layer feature to display multiple data series (different sets of dimensions and metrics) on a single map visualization. The data layers are overlaid on one another in a single map visualization.

1. On the Home page, select a workbook containing a map visualization, click the **Actions menu**, and then select **Open**.
2. Drag and drop measure or attribute columns containing map-related data from the Data Panel to the Category (Location) section on the Grammar Panel.
3. Click **Layer options** in the Category (Location) section of the Grammar pane and click **Add Layer** to add a new data layer (for example, Layer 2).

You can also set the layer order, hide the layer, and delete the layer.

4. Drag and drop a column to the Category (Location) section. Based on the column values the map visualization automatically updates with a different set of dimensions, and it overlays on the previous layer.

5. Optional: Click **Data Layers** in the Properties pane. Depending on the layer type, you can select:
  - **Name** - Change the layer name.
  - **Layer Type** - Change the layer type. For example, Polygon.
  - **Transparency** - Change the visibility of the layer.
  - **Outline** - Change the layer outline to **Custom** to select an **Outline Color** and set the **Outline Width**.
  - **Size** - Change the size of the layer in relation to the map.
  - **Tooltip** - Modify the data that appears on the tooltip when hovering over the layer on the map.
  - **Show Layer** - Display or hide the layer.
  - **Show Legend Title** - Display or hide the legend
  - **Data Labels Position** - Display and select a position for data labels on the map for selected data columns.
  - **Auto Zoom** - Automatically zoom to this layer's extent whenever the map visualization renders.
  - **Enable Selection** - Enable selection of data for this layer using the **Rectangle**, **Radial**, or **Polygon** selection toggles, or using left or right mouse click.
6. Click **Save**.

## Use an Image as a Map Background and Draw Map Layer Shapes on the Image

You can upload an image, prepare the image as a map background, draw map layer shapes onto the image, and associate data with the map background layer.

 [LiveLabs Sprint](#)

 [Video](#)

### Topics:

- [Upload an Image as a Map Background](#)
- [Draw Custom Map Layer Shapes on an Uploaded Image](#)
- [Associate a Dataset with Map Layer Shapes Drawn on an Uploaded Image](#)

## Upload an Image as a Map Background

You can upload an image as a map background and then draw layers on top of the uploaded image.

1. On the Home page, click **Navigator**, and then click **Console**.
2. On the Console page, click **Maps**.
3. In Maps, click the **Backgrounds** tab, and expand **Image Backgrounds**.
4. Click **Add Image**, select your image, and click **Open**.

5. Enter a name and description for the uploaded image, and click **Save**.

## Draw Custom Map Layer Shapes on an Uploaded Image

You can draw and edit custom map layer shapes on an uploaded image and associate the shapes with data in map visualizations.

1. On the Home page, click **Navigator**, and then click **Console**.
2. On the Console page, click **Maps**.
3. In Maps, click the **Backgrounds** tab, and expand **Image Backgrounds**.
4. In Image Backgrounds, select the image, click **Options**, and then select **Create Map Layer**.
5. Select **Polygon**, **Line**, or **Point**, and draw a shape onto the image.

Shape	Actions
<b>Polygon</b>	Click the image, drag and click to draw each edge of the polygon until the shape is complete, then click to finish.
<b>Circle</b>	Click the image, drag to increase the circle size until the circle reaches the required size, then click to finish.
<b>Line</b>	Click the image, then drag and click to draw each line edge until the line is complete.
<b>Point</b>	Click the image in the location where you want to draw a data point.

If you uploaded a motorcycle image, you could draw a shape outline over each visible part. For example, you might draw a polygon to represent an irregular shape like the fuel tank, or a line to represent a fork, or a circle to represent a tire, and so on.

Each new shape that you create is given a default name and is listed under Features.

6. Enter a name for each shape that corresponds to a key column value in the dataset.

For example, if you drew a petrol tank polygon shape and the key column PartID in the dataset has the value PT for petrol tank, then you must enter `PT` as the shape name.

You can also edit a shape name by clicking the corresponding object in the Features list.

7. Optional: If you want to reposition a shape, click the shape, then drag it to move it to a new position.
8. Optional: If you want to resize a shape, click and hold the shape, or edge, and drag it until it reaches the required size, then click again to finish.
9. Click **Save**.

## Associate a Dataset with Map Layer Shapes Drawn on an Uploaded Image

You can associate a dataset with the map background layer shapes that you drew on an uploaded image, and use it in a workbook.

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1. In the Home page, click **Create** to bring in a dataset file that you want to associate with your map background.  
  
For example, you might select `motorbike.xls` to create a motorcycle dataset with a PartID key column containing values that match the part names of the shapes that you drew.
2. In the key column of the dataset, click **Options**, select **Location Details**, choose the custom map layer, and click **OK** to assign the key column to the selected map layer.
3. Create a workbook.
4. Drag and drop the key column into the visualization. This automatically places the column into Category (Location).  
  
A map visualization is suggested based on the key column, and the associated map background is displayed.
5. Continue to add columns, and create visualizations as required.
6. Click **Save**.

## Assign a Map Layer to a Data Column

Assign a map layer to a data column to use it consistently in any workbook.

You can assign a map layer to a column that contains text or numeric attributes, for example, columns such as Airport Name, Latitude, and Longitude. When you select a data column with a map layer assignment for a visualization, Oracle Analytics automatically creates a map visualization.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Data** to go to the Data page.
3. In the **Data Diagram** select the dataset that contains the column that you want to prepare and click the dataset's **Edit** icon.  
  
If the dataset contains multiple tables, the Dataset editor is displayed and you'll see the Join Diagram with a tab for each table. Select the table that contains the column you want to prepare to open it in the Transform editor.
4. In the Transform editor, click **Options** for any numeric or text attribute column, and then click **Location Details**.
5. In Location Details, review the associated map layer, change the map layer if you want to, and then click **OK**.  
  
The property change is listed as a Change Property step in the Preparation Script pane.
6. Depending on your dataset, in the Preparation Script pane click **Apply Script**, or on the toolbar click **Save Dataset**.

The updated column displays the location icon indicating that the location preference has been set.

7. In the Properties panel for the updated column, click the **Location** icon to verify the map layer associated with the column.
8. Create a visualization with the data columns for which you have set the location details.

The visualization type is now automatically set as Map and the map layer is available for the specific columns. You no longer need to set the location details for each visualization.

## Auto Focus on Data for a Map Visualization

You can override the current visible area when you focus on new data in a map visualization.

The ability to auto focus on data enables you to view the visualization for the specific data that you displayed in a map. For example, if your map visualization displays sales by countries and you have first viewed sales for Australia, the map zooms to Australia. However, if you focus on sales for Italy, the map zooms to Italy.

1. On the Home page, select a workbook containing a map visualization, click the **Actions menu**, and then select **Open**.
2. In Visualization Properties, click **Map**, and then set **Auto Focus on Data** to **On**.

The default value of this property is **Off**.

## Configure Zoom in Map Visualizations

You can configure zoom to enable users to zoom in and out of a map visualization.

When Zoom Control is On, it displays the magnification control that enables you to zoom in or out of the map. When Zoom Interaction is On, it enables you to use the mouse wheel or a touch screen to zoom in or out of a selected map area. When Zoom Control and Zoom Interaction are On, you can zoom in or out of the map using the magnification control, mouse wheel, or a touch screen.

1. On the Home page, select a workbook containing a map visualization, click the **Actions menu**, and then select **Open**.
2. In Visualization Properties, click **Map**.
3. Click **Zoom Control** and **Zoom Interaction** to **On**.

## Review Location Matches for a Map Visualization

You can review mismatch issues between data and match results in map layers, such as when there are ambiguous or partial matches between words.

If ambiguous results are present, consider adding more columns to the map visualization to get the specific match. For example, your map might have layers for City, Country, and Continent. You can also exclude rows of data.

1. On the Home page, select a workbook containing a map visualization, click the **Actions menu**, and then select **Open**.

2. Click the **Visualization** tab.
3. Right-click the map visualization and select **Location Matches** from the menu to display the Location Matches dialog.
4. Select a tab representing a map layer in the current visualization to inspect how well your data matches the map layer.  
  
For example, select the **Country** tab to see how well your data matches with the Country map layer.
5. Optional: Click **Map Layer** to select a different layer or click **Manage Map Layers** to display the Console page.
6. Review and resolve data mismatches use the columns.  
  
Use **Match** to see what data items match with the map layer information. A match can be anything from No Match, Partial Match, to a 100% match. Matches are displayed initially sorted top down from the worst to the best matches.
  - No Match - Displays a red warning triangle indicator.
  - A Match with an issue - Displays a yellow warning triangle indicator. The warning doesn't indicate a poor match but an imperfect match for which you might want to review the use case.
  - A Perfect Match - Displays no warning triangle indicator.
  - If you are matching Latitude and Longitude, the match values are Valid or Invalid.The summary section above the table displays the number of locations and any issues.
7. Click the filter icon in the **Match** column title and select a filter option.
  - Use **All Data** to display all types of matches.
  - Use **Good Matches** to display only 100% perfect matches.
  - Use **All Issues** to display partial matches, multiple matches and no match.
  - Use **Partial Matches** to indicate the percentage difference between the strings being matched. For example: Part of a string is exactly right, such as Paulo versus Sao Paulo. Most of a word is exactly right, such as Caiyrol versus Cairo.
  - Use **Multiple Matches** to indicate how many matches exist for ambiguous cases. For example, you may see Barcelona, Spain matching with Barcelona Argentina. In this case you might want to revisit the data to add more detail to your GEO columns to ensure that you only match the correct columns.
8. Click in the **Exclude** column for each row of data that you want to exclude.
9. Click the **Exclude** menu:
  - Click **Select All** or **Deselect All**.
  - Click one of **Workbook Scope**, **Canvas Scope**, or **Visual Scope**.
10. Optional: Add in more columns to the Category (Location) edge on the visualization to make your match more specific. For example, add Country data to remove a mismatch like Barcelona, Spain versus Barcelona, Argentina.
11. Display the Location Matches dialog to check the summary for any remaining mismatches, and click **OK** when you are satisfied, or repeat previous steps as required.



## Create Heatmap Layers on a Map Visualization

You can use a heatmap as a data layer type on a map visualization to identify the density or high concentration of point values or metric values associated with the points. For example, you can use a heatmap to identify the high profit stores in a geographic region or country.

You can create two types of heatmap layers:

- **Density heatmap** - Uses only map-related column data (such as latitude and longitude columns). Density heatmap layers show the cumulative sum of a point, where each point carries a specific weight. A point has a radius of influence around it, such that other points that fall in the same area also contribute to the total cumulative result of a point.
  - **Metric heatmap** - Uses measure column data in the same layer. For example, if you add a measure column to the Color section on the Grammar Panel the heatmap is updated to show interpolated metric values.
1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
  2. Create an empty map visualization.
  3. Drag and drop attribute columns containing map-related data from the Data Panel to the Category (Geography) section on the Grammar Panel.
    - If you're creating a workbook with a map visualization, in the Data Panel, right-click an attribute column and click **Pick Visualization** then select **Map**.
  4. Go to the Data Layers tab of the properties pane.
    - Alternatively, click **Layer options** in the Category (Geography) section and click **Manage Layers**.
  5. To create a density heatmap, click **Layer Type** value and select **Heatmap**.
    - Alternatively, you can add a new map layer, change the layer type to **Heatmap** and then add attribute columns to the Category (Geography) section.
  6. To create a metric heatmap, drag and drop a metric column from the Data Panel to the Color section. The heatmap visualization changes from density to metric.
  7. In the Data Layers tab of the properties pane, specify the options for the heatmap layer such as Radius, Interpolation, Transparency, and Color.
    - The default interpolation method is automatically selected based on the aggregation rule of the metric column or value that you've selected for the layer.
    - You can select the radius value in pixels (px). The radius value is the extent of influence of a measure around a point value on a map.

The heatmap is automatically updated based on the options selected in the Data Layers tab.

## Create Cluster Layers on a Map Visualization

You can use a cluster layer as a type of data layer on a map visualization. In a cluster layer, points that are positioned near each other are grouped together into a common bubble.

The number of points clustered in the group is indicated in the bubble's label. If selected points are grouped with unselected points, the circle is dotted to indicate a partial selection. Individual points are displayed as pin icons to emphasize the distinction between grouped and ungrouped points. Points are grouped based on their proximity in pixels and on the map's zoom factor.

1. On the Home page, click the **Actions menu**, and then select **Open**.
2. Create an empty map visualization by dragging the Map visualization from the Data Panel to the canvas.
3. Drag and drop attribute columns containing map-related data from the Data Panel to the Category (Geography) section on the Grammar Panel.

If you're creating a workbook with a map visualization, in the Data Panel, right-click an attribute column and click **Pick Visualization** then select **Map**.

4. Click the Data Layers tab of the properties pane.

Alternatively, click **Layer options** in the Category (Geography) section and click **Manage Layers**.

5. To create a point cluster, click **Layer Type** value and select **Cluster**.

Alternatively, you can add a new map layer, change the layer type to **Cluster** and then add attribute columns to the Category (Geography) section.

The point cluster is automatically updated based on the zoom level.

## Represent Point Data with Custom Icons on a Map

You can use the Shapes edge to represent point data with custom icons in a map visualization.

You can associate a column with the Shape edge to display a custom shape for point data. For example, you can distinguish between cities by displaying them using custom shapes (for example, a square, a triangle, or a currency symbol). You can also change which custom shape you want to apply to one or more data points.

1. On the Home page, select a workbook containing a map visualization that contains point data, click the **Actions menu**, and then select **Open**.
2. Drag and drop an attribute column containing point data (for example, city) from the Data Panel to the Category (Geography) edge on the Grammar Panel.
3. Drag and drop a column from the Data Panel to the **Shapes** edge and optionally to the **Color** edge on the Grammar Panel.

The map visualization automatically updates based on your selection and overlays the previous layer.

4. Optional: You can change how you assign custom shapes to data points and to the map legend.
  - a. Highlight one or more data points on the map using one of the selection tools, or use Ctrl-click to select one or more data points.

- b. Right-click one of the multiple-selected data points, select **Custom Shapes** and then select **Series** or **Data Point**.
- c. Select a custom shape and click **Done**.

Custom shapes are applied as follows:

- **Series dialog** - custom data point shape not previously set  
Replaces highlighted data points and series items with the custom shape.
  - **Series dialog** - custom data point shape previously set  
Replaces only corresponding series items with the custom shape.
  - **Data Point dialog**  
Replaces only highlighted data points with the custom shape.
5. If you want to reassign the custom shape for a data point:
    - a. Right-click any data point, select **Shape**, and click **Custom Shapes**.
    - b. To change the custom shape assigned to a data point, click the shape corresponding to the data point that you want to change.
    - c. Select a new custom shape and click **Done**, then click **Done** again.
  6. If you want to reset all of the custom shapes currently applied to data points on a map visualization, right-click any data point, select **Shape**, and click **Reset Custom Shapes**.

This resets all of the shapes applied to data points on the map to the default setting.

## Select Points or Area on a Map

You can select multiple points on the map in a specific area that you define using the selection tools.

1. On the Home page, select a workbook containing a map visualization, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, select the map visualization.
3. On the visualization toolbar, do one of the following:
  - Click the **Rectangle Selection** tool and drag a rectangle on the map to select the points or area you want.
  - Click the **Radial Selection** tool and select a point on the map, then drag outward to create a circle. The unit shows the total distance covered on the map.
  - Click the **Polygon Selection** tool and drag a freehand border around the points or area you want to select on the map.

The selected points or area is highlighted on the map.

## Represent Line Data Using Size and Color on a Map

You can represent the weight of line data through thickness and color in a map visualization.

You can associate a measure with the Size edge to indicate the relative weight of a line. For example, to compare delays in airline routes, you can display flight routes

with varying line thickness, where a thicker line and a darker color correspond to a higher number of delays.

1. On the Home page, select a workbook with a map visualization that contains line data, click the **Actions menu**, and then select **Open**.
2. In the Visualize canvas, select the map visualization that displays the line data.
3. Drag and drop a column containing line data (for example airline routes) from the Data Panel to the Category (Geography) edge on the Grammar Panel.
4. Drag and drop a line measure column from the Data Panel to the **Size** edge and optionally to the **Color** edge on the Grammar Panel.

The map visualization automatically updates based on your selection and overlays the previous layer.

## Make Map Layers and Backgrounds Available to Users

For visualization workbooks, you can hide or display map layers and backgrounds for users.

1. On the Home page, click **Navigator** and then click **Console**.
2. Click **Maps** and then click **Backgrounds** or **Map Layers**.
3. Click the **Include** blue tick option to make the selected row item available or hidden from users.

You can hide or display map backgrounds, image backgrounds, custom map layers, and system map layers.

## Use a Map Background as the Default

For visualization workbooks, you can make a map background the default for users.

1. On the Home page, click **Navigator**, and then click **Console**.
2. Click **Maps**, click **Backgrounds** and then click **Map Backgrounds**.
3. Click the **Default** column field in the row of a map background to make it the default.

The map background is used by default in new visualizations.

## Add Map Backgrounds

You can add Google, Baidu, and other web map service backgrounds to use in visualizations.

### Topics:

- [Add Google Map Backgrounds](#)
- [Add Baidu Map Backgrounds](#)
- [Add Web Map Service \(WMS\) Backgrounds](#)
- [Add Tiled Web Map \(XYZ\) Backgrounds](#)
- [Web Map Background Troubleshooting Tips](#)

## Add Google Map Backgrounds

You can add Google map backgrounds to use in map visualizations.

1. On the Home page, click **Navigator**, and click **Console**.
2. In the Console, select **Maps**, click **Backgrounds**, and then click **Map Backgrounds**.
3. Click **Add Background** and select a **Google** from the list.
4. Enter a helpful description if needed.
5. Click **Account Type** to select your account.
6. Copy and paste your Google Maps API access key.

To use Google Maps tiles, you must obtain a Google Maps API access key from Google. Google prompts you to enter your Maps API access key and, when applicable, your Google “Client ID”. Usage of the tiles must meet the terms of service specified by Google in the Google Developers Site Terms of Service.

7. Click **Default Map Type** if applicable.
8. Click **Save** to include the map in the list of available map backgrounds.

## Add Baidu Map Backgrounds

You can add Baidu map backgrounds to use in map visualizations.

1. On the Home page, click **Navigator**, and click **Console**.
2. In the Console, select **Maps**, click **Backgrounds**, and then click **Map Backgrounds**.
3. Click **Add Background** and select **Baidu** from the list.
4. Enter a helpful description if needed.
5. Copy and paste your Baidu Maps API access key.

To use the Baidu Maps tiles, you must obtain a Baidu Maps API access key from Baidu. Baidu prompts you to enter your Maps API access key. Usage of the tiles must meet the terms of service specified by Baidu in their user agreement.

6. Click **I agree to trust this external host** if applicable.
7. Click **Save** to include the map in the list of available map backgrounds.

## Add Web Map Service (WMS) Backgrounds

You can add web map service backgrounds and use them in map visualizations.

Web map service backgrounds are hosted dynamically on a web server using the Web Map Service (WMS) protocol. You can use them to integrate maps containing information that you might not have in your enterprise, and easily present it spatially with your data.

1. On the Home page, click **Navigator**, and click **Console**.
2. In the Console, select **Maps**, click **Backgrounds**, and then click **Map Backgrounds**.

3. Click **Add Background** and select **Web Map Service** from the list.
4. Click the **General** tab and enter a name and description.
5. In **URL**, enter the full URL for the web map service.

Contact your web map service provider to find out the correct URL.

For example, [https://www.gebco.net/data\\_and\\_products/gebco\\_web\\_services/web\\_map\\_services/mapserv](https://www.gebco.net/data_and_products/gebco_web_services/web_map_services/mapserv).

**Version** automatically displays the web map service protocol version used by the WMS provider. The default value is 1.1.1 but you can select an alternative version from the drop-down list.

**Coordinate Reference System** automatically displays the reference system used by the host provider. The default value EPSG:3857 is the coordinate system used for projecting maps in 2 dimensions. Hover over the tooltip icon for details.

6. Click **I agree to trust this external host** to automatically add the host to your list of safe domains.
7. In **Layers**, enter the name of each background map layer that you want to use. Click the cross (x) icon to remove a layer.
8. Click **Format** if you need to change the image type.
9. Display the **Parameters** tab and click **Add Parameter**.

Parameters that you enter are included in the URL and tell the hosting server what to display in the map background (for example, image type, layer, geographic extent of the map, size of the returned image).

10. Enter parameters that you want to pass in the URL to the host server in `key:value` format.

Use this URL to find parameters that you can use for this web map service:

```
http://<url_of_the_map_server>?request=getCapabilities&service=wms
```

11. Click **Save** to add the background map layer to the list of available map backgrounds.  
You must refresh a page to see any changes.
12. Click **Preview** to display a preview of the map background.

The Preview tab only becomes available after the page is saved and refreshed . This is because the refresh enables recognition of the safe domains.

## Add Tiled Web Map (XYZ) Backgrounds

You can add tiled web map (XYZ) backgrounds and use them in map visualizations.

Tiled web map (XYZ) backgrounds are displayed in a browser by seamlessly joining dozens of individually requested image or vector data files over the Internet through a web server. You can use them to integrate maps containing information that you might not have in your enterprise, and easily present them spatially with your data.

You configure tile URL strings to specify vector tiles or raster tiled map images to load. The host evaluates each string and determines which tile to load.

Contact your tiled web map service provider to find out the correct URLs. Parameters in the URLs tell the hosting server what to display in the map background. For example, the map

name, version, and the number of tiles to use at the specified focus. Here are some examples of Mapbox tiled web map background URLs:

- `https://api.mapbox.com/styles/v1/mapbox/streets-v11/tiles/256/{z}/{x}/{y}`
- `https://api.mapbox.com/styles/v1/mapbox/satellite-v9/tiles/256/{z}/{x}/{y}`
- `https://api.mapbox.com/styles/v1/mapbox/light-v10/tiles/256/{z}/{x}/{y}`
- `https://api.mapbox.com/styles/v1/mapbox/dark-v10/tiles/256/{z}/{x}/{y}`
- `https://api.mapbox.com/styles/v1/mapbox/outdoors-v11/tiles/256/{z}/{x}/{y}`

1. On the Home page, click **Navigator**, and click **Console**.
2. In the Console, select **Maps**, click **Backgrounds**, and then click **Map Backgrounds**.
3. Click **Add Background** and select **Tiled Web Map** from the list.
4. Click the **General** tab and enter a name and description.
5. In **URL**, enter the full URL for the host tiled web map service.
6. Click the plus (+) icon to enter additional server URLs in the same domain, for load balancing.
7. Click **I agree to trust this external host** to automatically add the host to your list of safe domains.
8. Display the **Parameters** tab and click **Add Parameter**.

Parameters that you enter are included in the URL and tell the hosting server what to display in the map background (for example, image type, layer, geographic extent of the map, size of the returned image).

For example, you might enter `access_token` with a value of `exampleaccessTokenXyZ123456789nnnxxxZZz`.

Contact your provider for details.

9. Enter parameters that you want to pass in the URL to the host server in `key:value` format.
10. Click **Save** to add the specified tiled web maps to the list of available map backgrounds.  
You must refresh a page to see any changes.
11. Click **Preview** to display a preview of the map background.

The Preview tab only becomes available after the page is saved and refreshed. This is because the refresh enables recognition of the safe domains.

## Web Map Background Troubleshooting Tips

You might experience errors when you add a web map background. For example, a web map background image isn't displayed in the Preview tab or in a visualization.

Use these methods to find and diagnose web map background errors:

- Click **F12** to display the browser Developer Tools application and search for errors in the browser console tab. For example, search for `error` or `CORS`. Error messages are displayed in red text.
- If you see an error message similar to `Access to image at http://example.com has been blocked by CORS policy...`, contact the host provider to resolve the issue. Error messages that refer to the Cross Origin Resource Sharing (CORS) policy can only be resolved by the host provider.

## Add an Outline to Points and Shapes on a Map

You can add an outline to highlight the boundaries of points and shapes on a map visualization.

An outline highlights the boundaries of points and shapes so that users can quickly identify the visual information presented on a map. The Outline property is only available on maps that use the Point layer type; Heatmap and Cluster layer types don't have the Outline property.

1. Open the workbook containing the map visualization, click the **Actions menu**, and then select **Open**.
2. Click **Properties**. In Properties, click **Data Layers**.
3. In the Outline row, click **Auto** and select **Custom**.
4. Click the **Outline Color** field to select a color. In **Outline Width**, use the up arrow to increase the width and the down arrow to decrease the width.
5. Click **Save**.

## Add Data Labels to a Map

You can include data labels on a map visualization to describe individual data points.

Data labels in maps make the maps clear and informative. Data labels help to highlight specific data points or regions of interest, and users can quickly interpret the visual information presented in the maps.

1. Open the workbook containing the map visualization, click the **Actions menu**, and then select **Open**.
2. In the map visualization, use the rectangular selection tool and select the data element to use for the label, and then click **Menu**.
3. Click **Properties**, and then in Properties, click **Data Layers**.
4. Select and turn on **Data Labels**.
5. Configure the data labels.
  - **Data Labels Position** - Select a position for the label.
  - **Columns** - Select one or more columns to source the data labels. If you select more than one column, turn on the Multi Line property to show the second label in a new line.
  - **Allow Overlap** - Turn on to show all data labels regardless of the spacing and zoom level.
  - **Font** - Select the size and color of the data labels.



- **Halo** - Select **Auto** or **Custom** to add a halo effect to enhance the data label text.  
If you select **Custom** you can click **Halo Color** to choose a color for the halo.

# 11

## Use Data Actions

A Data Action link can pass context values as parameters to external URLs, filters to other workbooks or to visualizations embedded in external containers.

When a link navigates to a workbook, the data context is displayed in the form of canvas scope filters in the filter bar. The links data context may include attributes associated with the selections or cell from which the link was initiated.

### Topics:

- [Create Data Actions to Connect Visualization Canvases](#)
- [Create Data Actions to Connect to External URLs from Visualization Canvases](#)
- [Create HTTP Data Actions](#)
- [Use Data Actions to Connect to Oracle Analytics Publisher Reports](#)
- [Invoke Data Actions from Visualization Canvases](#)
- [How Data Actions Affect Filters](#)

## Create Data Actions to Connect Visualization Canvases

You can create data actions to navigate to a canvas in the current workbook or to a canvas in another workbook.



You can also use data actions to transfer context-related information (for example, an order number) where the link displays details about an order number in another visualization or workbook.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Menu** on the workbook toolbar and click **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.
  - You can use only letters and numbers in the navigation link's name.
  - You can add multiple navigation links.
4. Click the **Type** field and select **Analytics Link**.
5. Click the **Anchor To** field and select the columns from the current visualization to associate with this data action. Don't select measure columns or hidden columns. If you don't specify a value for the **Anchor To** field, then the data action applies to all data elements in the visualizations.
6. Click the **Workbook** field and select the workbook you want to use for the anchor:
  - **Use This Workbook** - Select if you want to link to a canvas in the active workbook. Columns that you select must be in the current visualization.

- **Select from Catalog** - Select to browse for and select the workbook that you want to use.
7. Click the **Canvas Link** field and select the canvas that you want to use.
  8. Click the **Pass Values** field and select which values you want the data action to pass.

For example, if in the **Anchor To** field, you specified order number column, then in the **Pass Values** field, select **Anchor Data** to pass the specified column values.

- **All** - Dynamically determines the intersection of the cell that you click and passes those values to the target.
  - **Anchor Data** - Ensures that the data action is displayed at runtime, but only if the required columns specified in the **Anchor To** field are available in the view context.
  - **None** - Opens the page (URL or canvas) but doesn't pass any data.
  - **Custom** - Enables you to specify a custom set of columns to pass.
9. Click **Supports Multiple Selection** to set the value.
    - **On** - The data action can be invoked when one or multiple data points are selected.
    - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
  10. Click **OK** to save.

## Create Data Actions to Connect to External URLs from Visualization Canvases

You can use data actions to navigate to an external URL from a canvas so that when you select a column such as the supplier ID, it displays a specific external website.

### LiveLabs Sprint

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Menu** and select **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.  
You can add multiple navigation links.
4. Click the **Type** field and select **URL Navigation**.
5. Click the **Anchor To** field and select the columns that you want the URL to apply to. If you don't specify a value for the **Anchor To** field, then the data action applies to all data elements in the visualizations.
6. Enter a URL address and optionally include notation and parameters.

For example, where `http://www.example.com?q=${keyValuesForColumn:"COLUMN"}` is displayed like `www.oracle.com?q=${keyValuesForColumn:"Sales"."Products"."Brand"}` The column names that you select here are replaced with values when you invoke the data action.

7. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
8. Click **OK** to save.
9. In the **Canvas**, click a cell, or use Ctrl-click to select multiple cells.
10. Right-click and select from the menu the navigation name that you created earlier.

Selecting the cells determines the values to pass to the parameters (that is, the URL tokens).

## About Creating HTTP API Data Actions

You can create HTTP API data actions to connect to a REST API from a workbook.

You configure an HTTP API data action to pass selected column values from a workbook to a REST API which returns a response. Note the following:

- There's no limit to the number of data actions you can create.
- A URL can contain tokens that pass contextual values to a data action, for example, data values, user name, workbook path, canvas name.

The following REST API URL example includes a **Category** column token value that displays the Google books API: `http://www.googleapis.com/books/v1/volumes?q=${valuesForColumn:"Category"}`. The value that you select from a cell in the **Category** column, for example, "Books", passes to the REST API which displays the requested page.

- If you use a POST method, or custom HTTP header that overrides the HTTP header, the following apply:
  - Enter each parameter as a name-value pair with the name and value separated by "=".
    - \* `paramName1=paramValue1`
    - \* `paramName2=${valuesForColumn:"Product"}`
  - A custom header works if the target of the HTTP request specifically allows the HTTP headers that you're using to be set on the request. If the headers aren't allowed, the browser blocks the request and displays an error message, for example a Cookie header, containing `Content-Type=application/json` will be blocked.

## Create HTTP Data Actions

You can use an HTTP API data action in a workbook so that when you select a column, it sends the value to a REST API which returns a response.

You must configure the domain that you're trying to connect to as a safe domain before you create an HTTP API data action. See Register Safe Domains.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click workbook **Menu** and then select **Data Actions**.
3. Click **Add Action** and enter a name for the new HTTP API data action. For example, enter `HTTP API Example`.
4. Click the **Type** field and select **HTTP API**.
5. Click the **Anchor To** field and select the columns that you want the HTTP API data action to apply to. Don't select measure columns or hidden columns. If you don't specify a value for the **Anchor To** field, then the data action applies to all data elements in the visualizations.
6. In the **HTTP Method** list select a method.
7. Enter the URL for the REST API that starts with `http` or `https` and optionally includes replacement tokens.
8. If you selected the POST method:
  - When you select the **Payload Type** value Form Data, enter each parameter on a separate line.
  - When you select the **Payload Type** value Raw Data, enter the raw data.
9. Enter a custom HTTP header if you want to add or override the HTTP header to suit the API that you're interfacing with.
10. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
11. Click **OK** to save.
12. Click a data point in the visualization.

For example, you might select "Books" from a token Category column to display a particular REST API.
13. Right-click and select **HTTP API Example** to display the result.

The selected data-points determine which values to pass to the URL tokens.

A success or failure message is displayed confirming the REST API has been successfully invoked using the selected value.

## Use Data Actions to Connect to Oracle Analytics Publisher Reports

A data action link can pass context values as URL parameters in Oracle Analytics Publisher reports.

When you click a link to open a Publisher report, the link might include attributes associated with the column selected in the visualization.

### Topics:

- [About Creating Data Actions to Connect to Oracle Analytics Publisher Reports](#)
- [Create Data Actions to Connect to Oracle Analytics Publisher Reports](#)
- [Create Custom Column Names in Data Actions to Pass in Oracle Analytics Publisher Report URLs](#)

## About Creating Data Actions to Connect to Oracle Analytics Publisher Reports

You can create a data action to link to an Oracle Analytics Publisher report.

You configure a data action to pass selected column values from a visualization to display in a Publisher report.

- You must store your Publisher report in a local folder.
- When the Publisher report uses the analysis as the data model, prompts in the underlying analysis must have **User Input** value set to **Choice List** to enable selected values to pass to prompts in the Publisher report.
- You can pass lists of values and list filters to display as prompts in your Publisher report. However, you can't pass number filters, date filters, or expression filters.

## Create Data Actions to Connect to Oracle Analytics Publisher Reports

You can create an analytics data action link to transfer selected data points from an Oracle Analytics workbook to an Oracle Analytics Publisher report.

The Oracle Analytics workbook, Publisher report, and analysis can be in different folders.

1. On the Home page, select a workbook that uses the data model used in the Publisher report, click the **Actions menu**, and then select **Open**.
2. Click **Menu** and select **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.
4. Click the **Type** field and select **Analytics Link**.
5. Enter a name for the data action in the **Name** field.
6. Click the **Target** field, select **Select from Catalog**, then browse to select the Publisher report that you want the data action to pass data to, and click **OK**.
7. Verify that **Parameter Mapping** is set to `Default`.

8. Verify the **Pass Values** field value is set to `All`.
9. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
10. Click **OK**.
11. Select data points in the visualization and choose the data action to test that the values are passed to the Publisher report.

## Create Custom Column Names in Data Actions to Pass in Oracle Analytics Publisher Report URLs

You can create a data action link that passes custom column names in the URL of an Oracle Analytics Publisher report.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Menu** and select **Data Actions**.
3. Click **Add Action** and enter a name for the new navigation link.
4. Click the **Type** field and select **Analytics Link**.
5. Enter a name for the data action in the **Name** field.
6. Click the **Target** field, select **Select from Catalog**, then browse to select the Publisher report that you want the data action to pass data to, and click **OK**.
7. Click **Parameter Mapping** and select **Set Custom Mapping** to specify custom column names to pass as URL parameters to the Publisher report.
8. Click **Add Row** and click **Select a Column** for each column that you want to pass to the Publisher report using a custom name.
9. Click **Enter Parameter** and enter a custom name for each column name that you want to replace.

The custom name passes to the Publisher report in the URL.

10. Verify the **Pass Values** field value is set to `All`.
11. Click **Supports Multiple Selection** to set the value.
  - **On** - The data action can be invoked when one or multiple data points are selected.
  - **Off** - The data action can only be invoked when a single data point is selected. This setting is particularly useful when the selection of multiple data points might result in an error (for example, with some third-party REST APIs).
12. Click **OK**.
13. Select data points in the visualization and choose the data action to verify that the custom column names are displayed in the URL of the Publisher report.

# Invoke Data Actions from Visualization Canvases

You can invoke data actions from a canvas to other canvases and URLs.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. On the canvas that contains a Data Action link leading to another canvas or URL, perform the following steps:
  - a. Right-click a data element, or select multiple elements (using Ctrl-click).
  - b. Select the data action that you want to invoke, from the context menu.
  - c. Complete the Workbook Properties dialog.

The name of the data actions that apply in the current view context are displayed in the context menu.

All the values defined in the **Anchor To** field must be available in the view context in order for a data action to be displayed in the context menu.

The following rules apply to matching data elements passed as values with data elements on the target canvas:

- If the same data element is matched in the target workbook's canvas, and if the target canvas doesn't have an existing canvas filter for the data element, a new canvas filter is added. If there is an existing canvas filter, it's replaced by the value from the source workbook's canvas. See [How Data Actions Affect Filters](#).
- If the expected dataset is unavailable but a different dataset is available, the match is made by using the column name and data type in the different dataset, and the filter is added to that.
- If there are multiple column matches by name and data type, then the filter is added to all those columns in the target workbook or canvas.

The data action navigates to the target cell or URL that is mapped and filters the data displayed based on the values specified in the Data Actions dialog.

The Pass Values context, set in the **Pass Values** field, consists of data elements used in the visualization from which the data action is invoked. The Pass Values context doesn't include data elements in the workbook, canvas, or visualization level filters.

## How Data Actions Affect Filters

Use the rules set out here to understand how data actions affect filters in target workbooks, canvases, and dashboards.

You configure a data action to pass selected column values from a workbook to another workbook filter, canvas filter, or dashboard filter. Data actions can change dashboard filters and workbook filters. You can't change dashboard and workbook filters if the filter bar is hidden.

Filter values from a data action apply by default at the workbook level or at the canvas level, but if a matching user-visible filter exists in the target workbook, then the data action filter values can override it. The filter values from a data action can't override visualization filters.

These are use case scenarios logic for data action filter values:



- Filter values from data actions change dashboard filter bar column selection values - This happens when the target workbook has a dashboard filter bar that uses the same columns, and has a matching filter type.
- Filter values from data actions change workbook or canvas filter values - This happens when changes to the dashboard filter aren't possible. The system then looks at the top level filter bar (workbook or canvas filters), and makes a change if there's a match to the incoming column selection, the filter bar is visible to the user, and the specific matching filter is visible and interactive (not read-only).
- Filter values from data actions create a canvas filter in the filter bar - This happens when the top level filter bar or a matching filter is hidden, or read-only. The default Limit By behavior is retained.

Use these rules to understand how data action filters interact with existing filters in target dashboards and workbooks:

- A data action can't add filters to a dashboard filter bar; it can only reuse existing filters on the dashboard filter bar.
- A data action can only reuse dashboard filters if a matching filter exists in the target workbook.
- A data action gives precedence to matching filters on the dashboard filter bar. This means that if there is a choice between a data action reusing a matching filter in a dashboard filter bar or a canvas filter bar, then the data action reuses the matching dashboard filter in preference to the matching canvas filter.
- A data action creates a canvas filter in the workbook filter bar if a compatible dashboard filter doesn't exist in the target workbook.
- A data action never creates a workbook filter in the target workbook. You need to bind the filter to a parameter to achieve this functionality.
- A data action can't change visualization filters because they aren't the target of data actions. This includes visualization filters selected on the dashboard filter bar. You need to bind these filters to parameters to change the values.
- A data action doesn't reuse an expression filter but instead creates a canvas expression filter.

# 12

## Create Custom Data Action Plug-ins

You can create custom data action plug-ins to use in Oracle Analytics.

Data action plug-ins extend Oracle Analytics and enable users to select data-points in visualizations and to invoke specific actions. Oracle Analytics provides a core set of data actions that cover many common use cases, but by writing your own data action plug-in, you can extend this functionality even further.

The tutorial uses an example to help you understand how to create a custom data action plug-in. [Tutorial](#)

You must have a basic understanding of the following to create custom data action plug-ins:

- JavaScript
- RequireJS
- JQuery
- KnockoutJS

### Topics:

- [About Data Action Plug-ins and the Data Actions Framework](#)
- [Choose the Best Data Action Class to Extend](#)
- [Generate Data Action Plug-ins from a Template](#)
- [Generated Folders and Files](#)
- [Extend a Data Action Base Class](#)
- [Choose Which Data Action Inherited Methods to Override](#)
- [Test, Package, and Install Your Data Action](#)
- [Use an Upgrade Handler for Knockout Model Changes](#)
- [Upgrade Data Action Plug-ins](#)
- [Data Action Plug-in File Reference](#)

## About Data Action Plug-ins and the Data Actions Framework

Data action plug-ins leverage the data actions framework to provide custom, data-driven actions that are tightly integrated into the Oracle Analytics user interface.

When a user invokes a data action, the Data Action Manager passes the request context (for example, qualified data reference, measure values, filters and metadata) to the data action plug-in which is responsible for handling the request. Oracle provides four types of data action plug-ins: `CanvasDataAction`, `URLNavigationDataAction`, `HTTPAPIDataAction` and `EventDataAction`. You can extend these data action plug-in types along with their abstract base classes to provide your own data actions.

**Topics:**

- [Data Action Categories](#)
- [Data Action Context](#)
- [Data Action Code Design](#)
- [Data Action Model Classes](#)
- [Data Action Service Classes](#)
- [Data Action Code Interactions](#)
- [Example Data Action plugin.xml File](#)
- [Data Action Plug-in Files and Folders](#)

## Data Action Categories

The data action categories include **Navigate to URL**, **HTTP API**, **Navigate to Canvas**, and **Event actions**:

- **Navigate to URL:** Opens the specified URL in a new browser tab.
- **HTTP API:** Uses the `GET/POST/PUT/DELETE/TRACE` commands to target an HTTP API and doesn't result in a new tab. Instead the HTTP status code is examined and a transient success or failure message is displayed.
- **Navigate to Canvas:** Enables the user to navigate from a source canvas to a target canvas in either the same or a different visualization. Any filters that are in effect in the source canvas are passed to the target canvas as external filters. When the target canvas opens, it attempts to apply the external filters to the visualization. The mechanism by which external filters are applied isn't described here.
- **Event Actions:** Publishes an event using the Oracle Analytics event router. Any JavaScript code (for example, a third-party plug-in) can subscribe to these events and handle their custom response accordingly. This provides the maximum flexibility because the plug-in developer can choose how the data action responds. For example, they can choose to display a user interface or pass data to multiple services at once.

Both the **Navigate to URL** and **HTTP API** data action category types can use a token syntax to inject data or metadata from the visualization into the `URL` and `POST` parameters.

### URL Token Replacement

HTTP data actions can replace tokens in URLs with values from the context passed to the data action. For example, qualified data reference values, filter values, username, workbook path, and canvas name.

Token	Notes	Replace With	Example	Result
\$ {valuesForColumn :COLUMN}	NA	Column display values from the qualified data reference.	\$ {valuesForColumn : "Sales"."Products". "Brand"}	BizTech, FunPod

Token	Notes	Replace With	Example	Result
<code>\$</code> <code>{valuesForColumn: COLUMN, separator: "/"}</code>	Any token that can potentially be replaced with multiple values supports the optional separator option. The separator defaults to a comma (,) but you can set it to any string. You can escape double quotes inside this string by using a backslash (\).	Column display values from the qualified data reference.	<code>\$</code> <code>{valuesForColumn: "Sales"."Products"."Brand"}</code>	<code>BizTech, FunPod</code>
<code>\$</code> <code>{valuesForColumn: COLUMN, separationStyle: individual}</code>	Any separationStyle defaults to delimited but you can set it to individual if the user needs to generate separate URL parameters for each value.	Column display values from the qualified data reference.	<code>&amp;myParam=\$</code> <code>{valuesForColumn: "Sales"."Products"."Brand"}</code>	<code>&amp;myParam=BizTech</code> <code>&amp;myParam=FunPod</code>
<code>\$</code> <code>{keyValuesForColumn: COLUMN}</code>	NA	Column key values from the qualified data reference.	<code>\$</code> <code>{keyValuesForColumn: COLUMN}</code>	<code>10001,10002</code>
<code>\${env:ENV_VAR}</code>	Supported environment variables are: <code>sProjectPath</code> , <code>sProjectName</code> , <code>sCanvasName</code> , <code>sUserID</code> , and <code>sUserName</code> .	An environment variable.	<code>\${env:'sUserID'}</code>	<code>myUserName</code>

## Data Action Context

You can define a context that is passed when the user invokes a data action.

You define how much of the context is passed to the data action when you create the data action.

### Qualified Data Reference

When the data action is invoked a qualified data reference is generated for each marked data point using an array of `LogicalFilterTree` objects. A `LogicalFilterTree` consists of multiple `LogicalFilterNode` objects arranged in a tree structure. This object includes:

- The attributes on the row or column edges of the data layout.
- The specific measure on the measure edge that addresses each marked cell.
- The specific measure value for each marked cell.
- Key values and display values.

## Environment Variables

In addition to the data and metadata describing each marked data point, certain data actions may need further context describing the environment from where the data action is invoked. Such environment variables include:

- Project Path
- Project Name
- Canvas Name
- User ID
- User Name

## Data Action Code Design

You create data actions using API classes.

- There are four concrete classes of data action that inherit from the `AbstractDataAction` class:
  - `CanvasDataAction`
  - `URLNavigationDataAction`
  - `HTTPAPIDataAction`
  - `EventDataAction`
- You can create new types of data actions using the data action plug-in API. See [Data Visualizer SDK Reference](#).
- The registry of data action types is managed by the `DataActionPluginHandler`.
- Code that creates, reads, edits, deletes, or invokes instances of data actions does so by publishing events.
- Events are handled by the `DataActionManager`.

## Data Action Model Classes

There are several different types of data action model classes.

### **AbstractDataAction**

This class is responsible for:

- Storing the Knockout Model (subclasses are free to extend this with their own properties).
- Defining the abstract methods that subclasses must implement:
  - `+ invoke(oActionContext: ActionContext, oDataActionContext: DataActionContext) <<abstract>>`  
Invokes the data action with the passed context - should only be called by the `DataActionManager`.
  - `+ getGadgetInfos(oReport): AbstractGadgetInfo[] <<abstract>>`  
Constructs and returns the `GadgetInfos` responsible for rendering the user interface fields for editing this type of data action.

- + validate() : DataActionError  
Validates the data action and returns null if valid or a `DataActionError` if it's invalid.
- Providing the default implementation for the following methods used to render generic parts of the data action user interface fields:
  - + getSettings():JSON  
Serializes the data action's Knockout Model to JSON ready to be included in the report (uses `komapping.toJS(_koModel)`).
  - + createNameGadgetInfo(oReport) : AbstractGadgetInfo  
Constructs and returns the `GadgetInfo` that can render the data action's **Name** field.
  - + createAnchorToGadgetInfo(oReport) : AbstractGadgetInfo  
Constructs and returns the `GadgetInfo` that can render the data action's **Anchor To** field.
  - + createPassValuesGadgetInfo(oReport) : AbstractGadgetInfo  
Constructs and returns the `GadgetInfo` that can render the data action's **Pass Values** field.

Subclasses may not need all of the `GadgetInfos` that the base class provides so they may not need to call all of these methods. By separating out the rendering of each field in this way, subclasses are free to pick and choose the gadgets they need. Some subclasses may even choose to provide a different implementation of these common data action gadgets.

### CanvasDataAction, URLNavigationDataAction, HTTPAPIDataAction, EventDataAction

These are the concrete classes for the basic types of data actions. These classes work by themselves to provide the generic user interface for these types of data action. They can also act as convenient base classes for custom data action plug-ins to extend.

- **CanvasDataAction:** Used to navigate to a canvas.
- **URLNavigationDataAction:** Used to open a web page in a new browser window.
- **HTTPAPIDataAction:** Used to make a `GET/POST/PUT/DELETE/TRACE` request to an HTTP API and handle the `HTTP Response` programmatically.
- **EventDataAction:** Used to publish JavaScript events through the Event Router.

Each class is responsible for:

- Implementing the abstract methods from the base class.
  - `invoke(oActionContext: ActionContext, oDataActionContext:DataActionContext)`  
This method should invoke the data action by combining the properties defined in the `KOModel` with the specified `DataActionContext` object.
  - `getGadgetInfos(oReport): AbstractGadgetInfo[]`  
This method should:
    - \* Create an array containing `AbstractGadgetInfos`.
    - \* Call individual `createXXXGadgetInfo()` methods pushing each `AbstractGadgetInfo` into the array.
    - \* Return the array.
- Providing the additional methods for creating the individual gadgets that are specific to the particular subclass of data action.

Subclasses of these concrete classes may not need to use all of the gadgets provided by their superclasses in their custom user interfaces. By separating out the construction of each gadget in this way, subclasses are free to pick and choose the gadgets they need.

### DataActionKOModel, ValuePassingMode

The `DataActionKOModel` class provides the base `KOModel` shared by the different subclasses of `AbstractDataAction`. See [DataActionKOModel Class](#).

## Data Action Service Classes

There are several different data action service classes.

### DataActionManager



All communication with `DataActionManager` uses `ClientEvents.DataActionManager` which implements event handlers for:

- Managing the set of data actions defined in the current workbook.
- Invoking a data action.
- Retrieving all the data actions defined in the current workbook.
- Retrieving all the data actions that are applicable to the current marked data points.

### DataActionContext, EnvironmentContext

When a data action is invoked, the `DataActionContext` class contains the context that's passed to the target.

- `getColumnValueMap()`  
Returns a map of attribute column values keyed by attribute column names. These define the qualified data reference for the data points that the data action is invoked from.
- `getLogicalFilterTrees()`  
Returns a `LogicalFilterTrees` object describing the qualified data references for the specific data points that the data action is invoked from (see the `InteractionService` for details).
- `getEnvironmentContext()`  
An instance of the `EnvironmentContext` class describing the source environment such as:
  - `getProjectPath()`
  - `getCanvasName()`

- `getUserID()`
- `getUserName()`
- `getReport()`  
Returns the report that the data action is invoked from.

### DataActionHandler

The `DataActionHandler` class registers the various data action plug-ins. Its API is broadly consistent with the other plug-in handlers (for example, `VisualizationHandler`).

The `DataActionHandler` class provides the following public methods:

- `getClassName(sPluginType:String) : String`  
Returns the fully qualified class name for the specified data action type.
- `getDisplayName(sPluginType:String) : String`  
Returns the translated display name for the specified data action type.
- `getOrder(sPluginType:String) : Number`  
Returns a number used to sort lists of the types of data action into the preferred order.

The `DataActionHandler` class provides the following static methods:

- `getDependencies(oPluginRegistry:Object) : Object.<String, Array>`  
Returns a dependency map covering all the registered data action types.
- `getHandler(oPluginRegistry:Object, sExtensionPointName:String, oConfig:Object) : DataActionPluginHandler`  
Constructs and returns a new instance of the `DataActionHandler` class.

### DataActionUpgradeHandler

The `DataActionUpgradeHandler` class is called by the `UpgradeService` when a report is opened.

The `DataActionHandler` class provides two main methods:

- `deferredNeedsUpgrade(sCurrentVersion, sUpgradeTopic, oDataActionJS, oActionContext) : Promise`  
Returns a `Promise` that resolves to a `Boolean` indicating whether the specified data action must be upgraded (`true`) or not (`false`). The method decides whether the data action must be upgraded by comparing the data action instance with the data action's constructor.
- `performUpgrade(sCurrentVersion, sUpgradeTopic, oDataActionJS, oActionContext, oUpgradeContext) : Promise`  
Carries out the upgrade on the specified data action and resolves the `Promise`. The upgrade itself is carried out by calling the `upgrade()` method on the data action (only the specific subclass of data action being upgraded is qualified to upgrade itself).
- `getOrder(sPluginType:String) : Number`  
Returns a number used to sort lists of the types of data action into the preferred order.



## Data Action Code Interactions

A data action interacts with Oracle Analytics code when it creates a user interface field, and when a user invokes a data action.

### Create the Field for a New Data Action Instance

This interaction starts when Oracle Analytics wants to render a data action user interface field. To do so, it:

1. Creates a `PanelGadgetInfo` that acts as the parent `GadgetInfo` for the `GadgetInfos` that the data action returns.
2. Calls `getGadgetInfos()` on the data action.
3. Adds the data action's `GadgetInfos` as children of the `PanelGadgetInfo` created in the first step.
4. Creates the `PanelGadgetView` that renders the `PanelGadgetInfo`.
5. Sets the `HTMLElement` that's the container of the `PanelGadgetView`.
6. Registers the `PanelGadgetView` as a child `HostedComponent` of a `HostedComponent` that's already attached to the `HostedComponent` tree.  
This renders the data action's gadgets inside the Panel gadget in the order they appear in the array returned by `getGadgetInfos()`.

### Invoke a Data Action

This interaction starts when the user invokes a data action through the Oracle Analytics user interface (for example, from the context menu on a data point in a visualization).

In response to the user interaction, the code:

1. Publishes an `INVOKE_DATA_ACTION` event containing the data action's ID, the `DataVisualization` that the data action is invoked from, and a `TransientVizContext` object.
2. The `DataActionManager` handles this event by:
  - a. Obtaining the data action instance from its ID.
  - b. Obtaining the `LogicalFilterTrees` for the marked data points in the specified `DataVisualization`.
  - c. Constructing a `DataActionContext` that contains all the information to pass to the data action's target.
  - d. Calling `invoke(oDataActionContext)` on the data action.

## Example Data Action plugin.xml File

This topic shows an example `plugin.xml` file for a `CanvasDataAction` data action.

### Example plugin.xml

```
<?xml version="1.0" encoding="UTF-8"?>  
<tns:obiplugin xmlns:tns="http://plugin.frameworks.tech.bi.oracle"
```

```

        xmlns:viz="http://plugin.frameworks.tech.bi.oracle/extension-
points/visualization"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        id="obitech-currencyconversion"
        name="Oracle BI Currency Conversion"
        version="0.1.0.@qualifier@"
        optimizable="true"
        optimized="false">

    <tns:resources>
        <tns:resource id="currencyconversion" path="scripts/
currencyconversion.js" type="script" optimizedGroup="base"/>
        <tns:resource-folder id="nls" path="resources/nls" optimizable="true">
            <tns:extensions>
                <tns:extension name="js" resource-type="script"/>
            </tns:extensions>
        </tns:resource-folder>
    </tns:resources>

    <tns:extensions>
        <tns:extension id="oracle.bi.tech.currencyconversiondataaction" point-
id="oracle.bi.tech.plugin.dataaction" version="1.0.0">
            <tns:configuration>
                {
                    "resourceBundle": "obitech-currencyconversion/nls/messages",
                    "properties":
                    {
                        "className": "obitech-currencyconversion/
currencyconversion.CurrencyConversionDataAction",
                        "displayName": { "key" : "CURRENCY_CONVERSION", "default" :
"Currency Conversion" },
                        "order": 100
                    }
                }
            </tns:configuration>
        </tns:extension>
    </tns:extensions>

</tns:obiplugin>

```

## Data Action Plug-in Files and Folders

The following files and folders are used to implement data action plug-ins.

bitech/client/plugins/src/

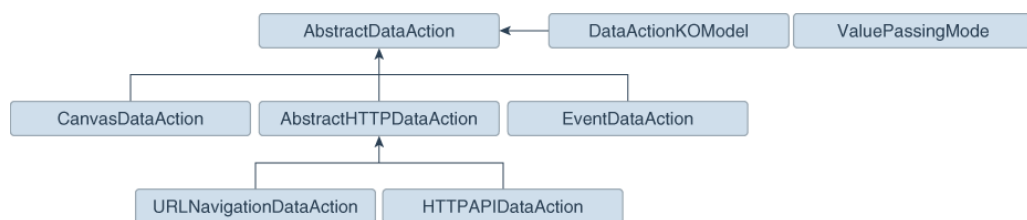
- report
  - obitech-report
    - \* scripts
    - \* dataaction

- \* dataaction.js
- \* dataactiongadgets.js
- \* dataactionpanel.js
- \* dataactionupgradehandler.js
- obitech-reportservice
  - scripts
    - \* dataaction
    - \* dataactionmanager.js
    - \* dataactionhandler.js

## Choose the Best Data Action Class to Extend

Before you start writing your custom data action plug-in, decide which of the existing data action classes you want to extend. Choose the data action class that provides functionality that most closely matches what you want your data action to do.

Each data action inherits from the `AbstractDataAction` class as shown in the class diagram. The class diagram shows the two abstract data action classes (`AbstractDataAction` and `AbstractHTTPDataAction`) and the four concrete data action classes (`CanvasDataAction`, `URLNavigationDataAction`, `HTTPAPIDataAction`, and `EventDataAction`) that you can extend. Each data action that you provide must extend one of these classes. Which class you extend depends on the behavior you want to implement when you invoke your data action. Most third-party data actions are likely to extend either `URLNavigationDataAction`, `HTTPAPIDataAction` or `EventDataAction`.



Regardless of which class you extend, when your data action is invoked, you're provided with metadata describing the full context of the data-point from which the data action is invoked. See [Data Action Context](#).

## AbstractDataAction Class

`AbstractDataAction` is the abstract base class from which all types of data action inherit. It's responsible for providing common functionality and default behavior that the subclasses can use.

### AbstractDataAction

All types of data action are subclasses of the `AbstractDataAction` base class. It provides the core set of functionality common to all data actions. Unless you're

creating a complex data action that carries out multiple types of action when invoked, or you need to do something not supported by the concrete classes, you shouldn't extend this class directly. If you need to create a complex data action then consider extending the concrete class that most closely provides the functionality you require.

### AbstractDataAction Syntax

```
+ AbstractDataAction(oKOModel)

+ getKOViewModel():DataActionKOModel

+ createFromJS(fDataActionConstructor, sClassName, oDataActionKOModelUS) :
AbstractDataAction

+ invoke(oActionContext, oDataActionContext)
+ getGadgetInfos(oReport) : AbstractGadgetInfo[]
+ validate() : DataActionError

+ getSettings() : Object
+ requiresActionContextToInvoke() : Boolean
+ isAllowedHere() : Boolean

# createNameGadgetInfo(oReport) : AbstractGadgetInfo
# createAnchorToGadgetInfo(oReport) : AbstractGadgetInfo
# createPassValuesGadgetInfo(oReport) : AbstractGadgetInfo
```

## DataActionKOModel Class

Each subclass of `AbstractDataAction` is likely to create its own subclass of `DataActionKOModel`. The `DataActionKOModel` base class provides the following properties:

### DataActionKOModel, ValuePassingMode

- `sID:String`  
The unique ID given to the data action instance.
- `sClass:String`  
The class name of this specific type of data action.
- `sName:String`  
The display name given to the data action instance.
- `sVersion`
- `sScopeID`
- `eValuePassingMode:ValuePassingMode`  
The mode used when passing context values. The mode can be one of the `ValuePassingMode` values (`ALL`, `ANCHOR_DATA`, `NONE`, `CUSTOM`).

- `aAnchorToColumns: ColumnKOViewModel[]`  
The columns that this data action is anchored to. This is optional. If not supplied, then the data action is available on all columns.
- `aContextColumns : ColumnKOViewModel[]`  
The columns that this data action includes in the context passed to the data action target when the data action is invoked. If not supplied, all marked columns are included in the context.

## CanvasDataAction Class

`CanvasDataAction` is a subclass of the `AbstractDataAction` base class. You can extend this concrete class to provide the functionality you require.

### CanvasDataAction

Use the `CanvasDataAction` class to navigate from a data point in a visualization to a different canvas. The canvas you're navigating to can be in the same workbook or a different one. All the active filters for the source visualization are passed to the target canvas along with new filters that describe the Qualified Data Reference of the data point itself. If your data action needs to navigate to a different canvas then this is the class your data action should extend.

```
+ CanvasDataAction(oKOModel)

+ create(s)ID_sName) : CanvasDataAction
+ upgrade(oOldDataActionJS) : Object

+ invoke(oActionContext: ActionContext,
oDataActionContext:DataActionContext)
+ getGadgetInfos(oReport) : AbstractGadgetInfo[]
+ validate() : DataActionError

# createProjectGadgetInfo(oReport) : AbstractGadgetInfo
# createCanvasGadgetInfo(oReport) : AbstractGadgetInfo
```

## EventDataAction Class

`EventDataAction` is a subclass of the `AbstractDataAction` base class. You can extend this concrete class to provide the functionality you require.

### EventDataAction

Use the `EventDataAction` class to publish a client-side event. You can then register one or more subscribers that listen for that event and perform their own actions. Use this type of data action in more complex use cases where you've a large amount of

code and can benefit from keeping your data action code loosely coupled to the code that performs the necessary actions when the data action is invoked.

```
+ EventDataAction(oKOModel)

+ create(sID_sName) : EventDataAction
+ upgrade(oOldDataActionJS) : Object

+ invoke(oActionContext: ActionContext, oDataActionContext:DataActionContext)
+ getGadgetInfos(oReport) : AbstractGadgetInfo[]
+ validate() : DataActionError

# createEventGadgetInfo(oReport) : AbstractGadgetInfo
```

## AbstractHTTPDataAction Class

`AbstractHTTPDataAction` is the abstract base class that the `URLNavigationDataAction` and `HTTPAPIDataAction` subclasses inherit common functionality and default behavior from.

### AbstractHTTPDataAction

The `AbstractHTTPDataAction` abstract base class is shared by both the `URLNavigationDataAction` and `HTTPAPIDataAction` classes. If your data action needs to open a web page in a new browser tab you must extend `URLNavigationDataAction`. If your data action needs to invoke an HTTP API then you should extend `HTTPAPIDataAction`. You may decide it's better to extend `AbstractHTTPDataAction` directly.

```
+ HTTPDataAction(oKOModel)

+ validate() : DataActionError

# createURLGadgetInfo(oReport) : AbstractGadgetInfo
```

## URLNavigationDataAction Class

`URLNavigationDataAction` is a subclass or the `AbstractHTTPDataAction` base class.

### URLNavigationDataAction

Use the `URLNavigationDataAction` class to open a specific URL in a new browser tab. You compose the URL using tokens that are replaced with values derived from data points that the user selects when they invoke the data action. The data point values are passed as part of the data action context to the external web page. For example, create a data action

invoked using a `CustomerID` column that opens a customer's web page in your Customer Relations Management application such as Oracle Sales Cloud.

```
+ URNavigationDataAction(oKOModel)

+ create(sID_sName) : URNavigationDataAction
+ upgrade(oOldDataActionJS) : Object

+ invoke(oActionContext: ActionContext,
oDataActionContext:DataActionContext)
+ getGadgetInfos(oReport) : AbstractGadgetInfo[]
```

## HTTPAPIDataAction Class

`HTTPAPIDataAction` is a subclass of the `AbstractHTTPDataAction` base class. You can extend this concrete class to provide the functionality you require.

### HTTPAPIDataAction

Use the `HTTPAPIDataAction` class to invoke HTTP APIs by creating an asynchronous `XMLHttpRequest` (XHR) and submitting it to the specified URL. The HTTP response code enables a message to be displayed briefly on the canvas. For example, you can customize the request to send JSON or XML payloads to a REST or SOAP server and you can customize the response handler to show a custom user interface.

For the `HTTPAPIDataAction` data action to work, you must add the URL of the HTTP API you want to access to your list of Safe Domains and grant it **Connect** access. See [Register Safe Domains](#).

```
+ HTTPAPIDataAction(oKOModel)

+ create(sID_sName) : HTTPAPIDataAction
+ upgrade(oOldDataActionJS) : Object

+ invoke(oActionContext: ActionContext,
oDataActionContext:DataActionContext)
+ getGadgetInfos(oReport) : AbstractGadgetInfo[]

# createHTTPMethodGadgetInfo(oReport) : AbstractGadgetInfo
# createPostParamGadgetInfo(oReport) : AbstractGadgetInfo
```

## Generate Data Action Plug-ins from a Template

You use a series of commands to generate a development environment and populate it with a HTTP API Data Action along with the necessary folders and files that you need to create a custom data action plug-in.

All plug-in files follow the same basic structure. You can manually create the files and folders or you can generate them from a template. The tools to do this are part of the Oracle Analytics Desktop software development kit (SDK) which is included with Oracle Analytics Desktop. See Oracle Analytics Desktop SDK Reference.

Use these commands to generate your development environment and populate it with a HTTP API data action.

1. At a command prompt, specify the root folder of your Oracle Analytics Desktop installation:

```
set DVDESKTOP_SDK_HOME=C:\Program Files\Oracle Analytics Desktop
```

2. Specify the location to store your custom plug-ins:

```
set PLUGIN_DEV_DIR=C:\temp\dv-custom-plugins
```

3. Add the SDK command line tools to your path using:

```
set PATH=%DVDESKTOP_SDK_HOME%\tools\bin;%PATH%
```

4. Create a folder for the directory used to store the custom plug-ins using:

```
mkdir %PLUGIN_DEV_DIR%
```

5. Change the directory to the folder for storing custom plug-ins:

```
cd %PLUGIN_DEV_DIR%
```

6. Create the environment variables:

```
bicreateenv
```

7. Create the template files needed to start developing a custom HTTP API data action, for example:

```
bicreateplugin -pluginxml dataaction -id company.mydataaction -subType  
httpapi
```

Use the `-subType` option to specify the data action type that you want to create from: `httpapi`, `urlNavigation`, `canvasNavigation`, `event`, or `advanced`. The `advanced` option extends from the `AbstractDataAction` base class.

## Generated Folders and Files

Your newly generated data action development environment contains these folders and files:

```
1  %PLUGIN_DEV_DIR%\src\customdataaction  
2  company-mydataaction\  
3  extensions\  
4  oracle.bi.tech.plugin.dataaction\  
5  company.mydataaction.json  
6  nls\  

```



```
7         root\  
8             messages.js  
9         messages.js  
10        mydataaction.js  
11        mydataactionstyles.css  
12        plugin.xml
```

- **Line 2:** The `company-mydataaction` folder is the ID that you specify.
- **Line 6:** The `nls` folder contains the files for externalizing strings that enable your plug-in to provide Native Language Support.
- **Line 7:** The strings in the files under the `nls\root` folder are the default strings used when translations for a requested language aren't available.
- **Line 8:** The `messages.js` file contains externalized strings for your plug-in that you can add.
- **Line 9:** The `messages.js` file must contain an entry that you add for each additional language that you want to provide localized strings for. You must add a corresponding folder under the `nls` folder for each locale that you want to add translations for. Each folder must contain the same set of files, with the same file names as those added under the `nls\root` folder.
- **Line 10:** The `mydataaction.js` file is the newly generated JavaScript module template that provides a starting point to develop your custom data action.
- **Line 11:** The `mydataactionstyles.css` file can contain any CSS styles that you want to add, and which your data action's user interface can use.
- **Line 12:** The `plugin.xml` file registers your plug-in and its files with Oracle Analytics.

## Extend a Data Action Base Class

Once you've chosen the subclass of data action that you want to extend and have generated the necessary folders and files, you're ready to start writing the code specific to your new data action.

You can find your newly generated data action code under `%PLUGIN_DEV_DIR%\src\dataaction`. See [Generated Folders and Files](#) for an explanation of the files and folder structure. The main file you must edit is the JavaScript file. For example, if your custom data action ID is `company.MyDataaction`, then the file you're looking for is `%PLUGIN_DEV_DIR%\src\dataaction\company-mydataaction\mydataaction.js`.

### Extending Your Data Action's Knockout Model

If your data action has additional properties that need to be stored, then you must add them as observable properties to the Knockout Model. If your data action is given the ID `company.MyDataaction`, then the Knockout Model is called `mydataaction.MyDataActionKOModel` which is located near the top of `mydataaction.js`. By default, this Knockout Model is configured to extend the Knockout Model used by your data action's superclass so you only need to add additional properties to the model.

For a data action that's extending the `HTTPAPIDataAction` base class, use code similar to the following:

```
1 - mydataaction.MydataactionKOModel = function (sClass, sID, sName,
sVersion, sScopeID, aAnchorToColumns, eValuePassingMode, sURL,
    eHTTPMethod, sPOSTParams)
2 - {
3 - mydataaction.MydataactionKOModel.baseConstructor.call(this, sClass, sID,
sName, sVersion, sScopeID, aAnchorToColumns, eValuePassingMode, sURL,
eHTTPMethod, sPOSTParams);
4 - };
5 - jsx.extend(mydataaction.MydataactionKOModel,
dataaction.HTTPAPIDataActionKOModel);
```

- **Line 1:** This is the constructor for your Knockout Model. It accepts the properties that the model needs to store.
- **Line 3:** This is the superclass's constructor, otherwise known as the `baseConstructor` to which you pass the values for all of the properties that are handled by one of the Knockout Model's superclasses.
- **Line 5:** This sets the superclass for this Knockout Model class.

Use code similar to the following to add a string and an array to set properties that are persisted by the data action.

```
1  mydataaction.MydataactionKOModel = function (sClass, sID, sName,
sVersion, sScopeID, aAnchorToColumns, eValuePassingMode, sURL, eHTTPMethod,
sPOSTParams)
2  {
3  mydataaction.MydataactionKOModel.baseConstructor.call(this, sClass, sID,
sName, sVersion, sScopeID, aAnchorToColumns, eValuePassingMode, sURL,
eHTTPMethod, sPOSTParams);
4
5
6  // Set Defaults
7  sMyString = sMyString || "My default string value";
8  aMyArray = aMyArray || [];
9
10
11 // Asserts
12 jsx.assertString(sMyString, "sMyString");
13 jsx.assertArray(aMyArray, "aMyArray");
14
15
16 // Add observable properties
17 this.sMyString = ko.observable(sMyString);
18 this.aMyArray = ko.observableArray(aMyArray);
19 };
20 jsx.extend(mydataaction.MydataactionKOModel,
dataaction.HTTPAPIDataActionKOModel);
```

## Choose Which Data Action Inherited Methods to Override

Each data action must implement various methods in order to function properly, so you only need to override those methods that implement behavior that you want to change.

If you're extending one of the concrete data actions classes, for example `HTTPAPIDataAction`, then most of the required methods are already implemented and you only need to override the methods that implement the behavior you want to change.

### Generic Methods

This section describes the various methods and what's expected of them.

All types of data action must implement the methods that are described here.

#### **create(sID, sName)**

The `create()` static method is called when you're creating a new data action and select a **Data Action Type** from the drop-down menu. This method is responsible for:

- Constructing the Knockout Model class that your data action uses. The Knockout Model class must have the ID and name that's passed to the `create()` method along with sensible defaults for all other properties. For example, for a currency conversion data action you might want to set the default currency to convert into Dollars. The Knockout Model is the correct place to provide your default values.
- Constructing an instance of your data action from the Knockout Model.
- Returning the instance of your data action.

#### **invoke(oActionContext, oDataActionContext)**

The `invoke()` method is called when the user invokes your data action from the context menu for a data point in a visualization. The method passes the `DataActionContext` argument which contains metadata describing the selected data points, visualization, filters, workbook, and session. See [Data Action Service Classes](#).

#### **validate()**

The `validate()` method is called on each data action when the user clicks **OK** in the Data Actions dialog. The `validate()` method returns a `null` to indicate that everything is valid or a `DataActionError` if something is invalid. If there's an error in one of the data actions in the dialog, the error prevents the dialog from closing and an error message is displayed to the user. This method validates the name of the data action using the `this.validateName()` method.

#### **getGadgetInfos(oReport)**

The `getGadgetInfos()` method is called to enable the user interface to display data action property fields. The method returns an array of `GadgetInfos` in the order you want them to appear in the user interface. Gadgets are provided for all of the most common types of fields (for example, text, drop-down, password, multi-select, radio button, check box) but you can create custom gadgets if you want more complicated fields (for example, where multiple gadgets are grouped together, or where different gadget fields display depending on which option you select). It's a best practice to create a method that constructs each `GadgetInfo` you want in your array, as it makes it

easier for potential subclasses to pick and choose from the `GadgetInfo`s you've provided. If you follow this best practice there are already various methods implemented by the different data action base classes that can return a `GadgetInfo` for each of the fields that they use in their user interfaces. If you also need one of these `GadgetInfo`s then you call the corresponding `create***GadgetInfo()` method and push its return value into your array of gadgets.

### **isAllowedHere(oReport)**

The `isAllowedHere()` method is called when the user right-clicks on a data-point in a visualization and the user interface starts to generate the context menu. If a data action exists that's relevant to the selected data-points, then the method returns `true` and the data action appears in the context menu. If the method returns `false`, then the data action doesn't appear in the context menu. Consider accepting the default behavior inherited from the superclass.

### **upgrade(oOldDataActionJS)**

If you're creating your first data action then don't use the `upgrade(oOldDataActionJS)` method. Only use this method after you've created your first Knockout Model and are making significant changes to properties for a second version of your Knockout Model. For example, if the first version of your data action stores a URL in its Knockout Model, but you decide that the next version will store URL component parts in separate properties (for example, `protocol`, `hostname`, `port`, `path`, `queryString` and `bookmark`).

The second version of your Knockout Model code would request to open a data action that had been saved with the first version of your Knockout Model code which can cause problems. To resolve this issue, the system identifies that your current data action code version is newer than that of the data action being opened and it calls the `upgrade()` method on your new data action class and passes in the old data action Knockout Model (serialized to a JSON object). You can then use the old JSON object to populate your new Knockout Model and return an upgraded version of the JSON object. This ensures that old data action metadata continues to work as you improve your data action code.

### **HTTPAPIDataAction Methods**

If you're extending the `HTTPAPIDataAction` class, then it provides the following additional method that you may choose to override:

#### **getAJAXOptions(oDataContext)**

The `getAJAXOptions()` method is called by the data action's `invoke()` method. The `getAJAXOptions()` method creates the `AJAX Options` object that describes the HTTP request that you want your data action to make. The `getAJAXOptions()` method is passed the `oDataContext` object that contains the metadata describing the selected data-points, visualization, filters, workbook, and session. Set the `AJAX Options` as required by the HTTP API you're trying to integrate with and specify the functions you want to be called when the `HttpRequest` is successful or results in an error. See the JQuery website for an explanation of the `jQuery.ajax` object and its properties.

The following implementation is inherited from the `HTTPAPIDataAction` class. You need to rewrite the inherited method to specify requirements. For example, forming the HTTP request, and the code that handles the HTTP response. This implementation is useful as it

shows the parameters passed to the `getAJAXOptions()` function, the object that it's expected to return, and gives a clear example of how to structure the code inside the method.

```
1 /**
2  * This method returns an object containing the AJAX settings used
3  * when the data action is invoked.
4  * Subclasses may wish to override this method to provide their own
5  * behavior.
6  * @param {module:obitech-reportservices/
7  * dataactionmanager.DataActionContext} oDataActionContext The context
8  * metadata describing where the data action was invoked from.
9  * @returns {?object} A JQuery AJAX settings object (see http://
10 api.jquery.com/jquery.ajax/ for details) - returns null if there is a
11 problem.
12 */
13 dataaction.HTTPAPIDataAction.prototype.getAJAXOptions = function
14 (oDataActionContext)
15 {
16     jsx.assertInstanceOfModule(oDataActionContext,
17     "oDataActionContext", "obitech-reportservices/dataactionmanager",
18     "DataActionContext");
19
20     var oAJAXOptions = null;
21     var oKOVViewModel = this.getKOVViewModel();
22     var sURL = oKOVViewModel.sURL();
23     if (sURL)
24     {
25         // Parse the URL
26         var sResultURL = this._parseURL(sURL, oDataActionContext);
27         if (sResultURL)
28         {
29             // Parse the POST parameters (if required)
30             var eHTTPMethod = oKOVViewModel.eHTTPMethod()[0];
31             var sData = null;
32             if (eHTTPMethod ===
33             dataaction.HTTPDataActionKOModel.HTTPMethod.POST)
34             {
35                 var sPOSTParams = oKOVViewModel.sPOSTParams();
36                 sData =
37                 sPOSTParams.replace(dataaction.AbstractHTTPDataAction.RegularExpression
38                 s.LINE_END, "&");
39                 sData = this._parseURL(sData, oDataActionContext, false);
40             }
41             oAJAXOptions = {
42                 type: eHTTPMethod,
43                 url: sResultURL,
44                 async: true,
45                 cache: false,
46                 success: function (/*oData, s textStatus, oJQXHR*/)
47                 {
48
49                     oDataActionContext.getReport().displaySuccessMessage(messages.HTTP_API_
50                     DATA_ACTION_INVOCATION_SUCCESSFUL.format(oKOVViewModel.sName()));
51                 },
52             },
53         }
54     }
55 }
```

```
38         error: function (oJQXHR/*, sTextStatus, sError*/)
39         {
40
oDataContext.getReport().displayErrorMessage(messages.HTTP_API_DATA_ACTION_INVOCATION_FAILED.format(oKOVModel.sName(), oJQXHR.statusText, oJQXHR.status));
41     }
42     };
43     if (sData)
44     {
45         oAJAXOptions.data = sData;
46     }
47     }
48 }
49 return oAJAXOptions;
50 };
```

## Test, Package, and Install Your Data Action

You use Oracle Analytics Desktop to test your data action from its source location before you install it.

1. If Oracle Analytics Desktop is currently running, close it.
2. If you're working behind a proxy, set the proxy settings in `%PLUGIN_DEV_DIR%\gradle.properties`. For information about accessing the web through HTTP proxy, see [Gradle User Manual](#).
3. Run Oracle Analytics Desktop in SDK mode by using the command prompt you started in [Choose Which Data Action Inherited Methods to Override](#) and enter the following commands:

```
cd %PLUGIN_DEV_DIR%
.\gradlew run
```

Oracle Analytics Desktop starts in SDK mode. Your data action plug-in appears in the [Console | Extensions](#) page.

Create a workbook and test your data action. If you find any issues, you can debug your code using your browser's built-in developer tools.

4. If you created an HTTP API data action:
  - a. Go to the [Console](#) and display the [Safe Domains](#) page.
  - b. Add each domain that you want to access.  
  
For example, if you need access to the `apilayer.com` APIs, add `apilayer.net` to the list of safe domains.
  - c. Click the **Connect** column checkbox for the selected domain.
  - d. Reload the [Safe Domains](#) page in your browser for the changes to take effect.
5. If you want to prepare your data action plug-in to distribute to other people or to install in Oracle Analytics:
  - Package all of the files into a single ZIP file containing the `%PLUGIN_DEV_DIR%\src\customdataaction` folder and its contents.

- Name the zip using the same ID you gave to your data action plug-in when you created it.
6. Install your data action plug-in. See [Manage Custom Plug-ins](#).

## Use an Upgrade Handler for Knockout Model Changes

For some Knockout Model changes you need to upgrade your data action plug-in using an upgrade handler.

When you're making improvements to your data action plug-in without making changes to the Knockout Model you normally edit your JavaScript or CSS files, create a new ZIP file, and replace the existing data action plug-in with the new ZIP file. However, if you've made changes to your data action's Knockout Model then you might need to change the data action `VERSION` property and provide an upgrade handler.

Decide whether you need to use an upgrade handler:

### Upgrade Handler Required

- If you rename a property in your Knockout Model.
- If you combine multiple properties into a single property in your Knockout Model.
- If you split a single property into multiple properties in your Knockout Model.
- If you add a new property to the Knockout Model and the correct default value for it depends on other values in the Knockout Model.

### Upgrade Handler Not Required

- If you add a new property to the Knockout Model and can provide a default value that's correct for all existing usages of your data action.
- If you remove a property from the Knockout Model because it's no longer used by your data action code.

## Upgrade Data Action Plug-ins

Upgrade your data action plug-ins to improve the data action code or upgrade the metadata to enable existing data actions to work with new data action code.

Use an upgrade handler to upgrade a data action plug-in.

1. Increase the version number of your data action.

For example, if your data action is called `company.MyDataAction`, then search `mydataaction.js` for the `mydataaction.MyDataAction.VERSION` property. If it's currently set to `1.0.0` then change it to `1.0.1`.

2. Add a static `upgrade(oOldDataActionJS)` method to your data action's class.

If the `VERSION` property differs from the `sVersion` value stored in the data action metadata then the Data Action Manager calls the static `upgrade()` method on your data action's class.

3. Implement your `upgrade()` method by calling the `upgrade()` method on the superclass and capture its response.

4. Continue to implement your `upgrade()` method by making further edits to the partially upgraded data action JSON returned by the superclass, until the object matches the correct set of properties required by your latest Knockout Model.
5. To finish call `var oUpgradedDataAction = dataaction.AbstractDataAction.createFromJS(fDataActionClass, sFullyQualifiedDataActionClassName, oUpgradedDataActionJS)`.

This command constructs a new instance of your data action from the upgraded data action JSON and returns `oUpgradedDataAction.getSettings()`.

## Data Action Plug-in File Reference

Each data action plug-in requires a `plugin.xml` file and each `plugin.xml` file can contain any number of data actions.

### Topics:

- [Data Action plugin.xml File Example](#)
- [Data Action plugin.xml File Properties Section - tns:obiplugin](#)
- [Data Action plugin.xml File Resources Section - tns:resources](#)
- [Data Action plugin.xml File Extensions Section - tns:extension](#)

## Data Action plugin.xml File Example

The `plugin.xml` file has three main sections, `tns:obiplugin`, `tns:resources`, and `tns:extension`.

### Example plugin.xml

This example shows a typical `plugin.xml` file for one data action.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <tns:obiplugin xmlns:tns="http://plugin.frameworks.tech.bi.oracle"
3             id="obitech-currencyconversion"
4             name="Oracle BI Currency Conversion"
5             version="0.1.0.@qualifier@"
6             optimizable="true"
7             optimized="false">
8
9
10 <tns:resources>
11   <tns:resource id="currencyconversion" path="scripts/
currencyconversion.js" type="script" optimizedGroup="base"/>
12   <tns:resource-folder id="nls" path="resources/nls"
optimizable="true">
13     <tns:extensions>
14       <tns:extension name="js" resource-type="script"/>
15     </tns:extensions>
16   </tns:resource-folder>
17 </tns:resources>
18
19
```



```
20 <tns:extensions>
21   <tns:extension
22     id="oracle.bi.tech.currencyconversiondataaction" point-
23     id="oracle.bi.tech.plugin.dataaction" version="1.0.0">
24     <tns:configuration>
25       {
26         "host": { "module": "obitech-currencyconversion/
27         currencyconversion" },
28         "resourceBundle": "obitech-currencyconversion/nls/
29         messages",
30         "properties":
31         {
32           "className": "obitech-currencyconversion/
33           currencyconversion.CurrencyConversionDataAction",
34           "displayName": { "key" : "CURRENCY_CONVERSION",
35           "default" : "Currency Conversion" },
36           "order": 100
37         }
38       }
39     </tns:configuration>
40   </tns:extension>
41 </tns:extensions>
42 </tns:obiplugin>
```

## Data Action plugin.xml File Properties Section - tns:obiplugin

The `tns:obiplugin` section defines properties common to all types of plug-ins.

### Plug-in Properties

The `tns:obiplugin` section defines properties common to all types of plug-ins.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <tns:obiplugin xmlns:tns="http://plugin.frameworks.tech.bi.oracle"
3   id="obitech-currencyconversion"
4   name="Oracle BI Currency Conversion"
5   version="0.1.0.@qualifier@"
6   optimizable="true"
7   optimized="false">
```

- **Line 1:** The XML declaration.
- **Line 2:** The opening tag for the plug-in's root XML element and the declaration for the `tns` namespace that's used throughout `plugin.xml` files.
- **Line 3:** The plug-in's unique ID.
- **Line 4:** The plug-in's default display name (used when a localized version isn't available).
- **Line 5:** The plug-in's version number.
- **Line 6:** A boolean indicating whether or not the JS/CSS can be optimized (compressed).

- **Line 7:** A boolean indicating whether or not the JS/CSS has been optimized (compressed).

## Data Action plugin.xml File Resources Section - tns:resources

The `tns:resources` section registers all of the files that contribute to your plug-in.

### Resources

```
1 <tns:resources>
2   <tns:resource id="currencyconversion" path="scripts/
currencyconversion.js" type="script" optimizedGroup="base"/>
3   <tns:resource-folder id="nls" path="resources/nls" optimizable="true">
4     <tns:extensions>
5       <tns:extension name="js" resource-type="script"/>
6     </tns:extensions>
7   </tns:resource-folder>
8 </tns:resources>
```

You need to register each JavaScript, CSS, Image, and Translation Resource File here. The section is contained within the `<tns:resources>` element and contains any number of the following elements:

- `<tns:resource>`  
These elements are used to register a single file (for example, a JavaScript or CSS file).
- `<tns:resource-folder>`  
These elements are used to register all the files under a specified folder at the same time. For example, an image folder or the folder containing the resource files for Native Language Support.

More information on how to register each type of file is provided in the following sections.

### JavaScript Files

Each JavaScript file in your plug-in must be registered with a line similar to the one shown below.

```
<tns:resource id="currencyconversion" path="scripts/currencyconversion.js"
type="script" optimizedGroup="base"/>
```

Where:

- **id** is the ID given to the file.  
Set the ID to match the JavaScript filename without the .js extension.
- **path** is the relative path to the JavaScript file from the plugin.xml file. JavaScript files should be stored under your plug-in's `scripts` directory.  
Use all lowercase for your JavaScript files with no special characters (for example, underscore, hyphen).
- **type** is the type of file being registered. It must be set to `script` for JavaScript files.
- **optimizedGroup** groups multiple JavaScript files into a single compressed file. Third-party plug-ins must leave this set to `base`.

## CSS Files

Each CSS file in your plug-in must be registered with a line similar to the one shown below.

```
<tns:resource id="currencyconversionstyles" path="resources/  
currencyconversion.css" type="css"/>
```

Where:

- **id** is the ID given to the file.  
Set the ID to match the CSS filename without the .css extension.
- **path** is the relative path to the CSS file from the plugin.xml file. CSS files should be stored under your plug-in's `resources` directory.  
Use all lowercase for your CSS files with no special characters (for example, underscore, hyphen).
- **type** is the type of file being registered. It should always be set to `css` for CSS files.

## Image Folders

If your plug-in has images that you need to refer to from within your JavaScript code, then put them in a `resources/images` directory within your plug-in's directory structure and add a `<tns:resource-folder>` element to your `plugin.xml` as follows:

```
<tns:resource-folder id="images" path="resources/images"  
optimizable="false"/>
```

If your images are only referenced by your CSS files, then you don't need to add this `<tns:resource-folder>` element to your `plugin.xml` file. In this case, you must still add them to the `resources/images` directory so that you can then refer to them using a relative path from your CSS file.

## Native Language Support Resource Folders

Oracle Analytics implements Native Language Support. This requires developers to externalize the strings they display in their user interface into separate JSON resource files. You can then provide different localized versions of those files in a prescribed directory structure and Oracle Analytics automatically uses the correct file for the user's chosen language. You can provide as many translated versions of the resource files as needed. A Native Language Support resource folder points Oracle Analytics to the root of the prescribed Native Language Support directory structure used by your plug-in. All plug-ins that use Native Language Support resource files must have a `<tns:resource-folder>` entry that looks exactly like the example below.

```
1 <tns:resource-folder id="nls" path="resources/nls"  
optimizable="true">  
2   <tns:extensions>  
3     <tns:extension name="js" resource-type="script"/>  
4   </tns:extensions>  
5 </tns:resource-folder>
```

See [Generated Folders and Files](#) for details about the contents of the files and the prescribed directory structure that you should follow.

## Data Action plugin.xml File Extensions Section - tns:extension

For each data action you want your plug-in to provide, you must register a data action extension using a `<tns:extension>` element similar to this:

```
<tns:extension id="oracle.bi.tech.currencyconversiondataaction" point-  
id="oracle.bi.tech.plugin.dataaction" version="1.0.0">  
  <tns:configuration>  
    {  
      "host": { "module": "obitech-currencyconversion/currencyconversion" },  
      "resourceBundle": "obitech-currencyconversion/nls/messages",  
      "properties":  
        {  
          "className": "obitech-currencyconversion/  
currencyconversion.CurrencyConversionDataAction",  
          "displayName": { "key" : "CURRENCY_CONVERSION", "default" :  
"Currency Conversion" },  
          "order": 100  
        }  
      }  
    }  
  </tns:configuration>  
</tns:extension>
```

Where:

- **id** is the unique ID you give to your data action.
- **point-id** is the type of extension you want to register. For data action extensions, this must be set to `oracle.bi.tech.plugin.dataaction`.
- **version** is the extension API version that your extension definition uses (leave this set to **1.0.0**).

The `<tns:configuration>` element contains a JSON string that defines:

- **host.module** - This is the fully qualified name of the module containing your data action. This fully qualified module name is formulated as `%PluginID%/ %ModuleName%`, where:
  - `%PluginID%` must be replaced with the plug-in ID you specified in the `id` attribute of the `<tns:obiplugin>` element.
  - `%ModuleName%` must be replaced with the resource ID you specified in the `id` attribute of the `<tns:resource>` element for the JavaScript file containing your data action.
- **resourceBundle** - This is the Native Language Support path to the resource file that contains this data action's localized resources. If your resource files are named `messages.js` and stored correctly in the prescribed `nls` directory structure, then set this property to `%PluginID%/nls/messages` (where `%PluginID%` must be replaced with the plug-in ID you specified in the `id` attribute of the `<tns:obiplugin>` element at the top of the `plugin.xml` file).
- **properties.className** - This is the fully qualified class name given to the data action you're registering. This fully qualified class name is formulated as `%PluginID%/ %ModuleName%. %ClassName%`, where:

- %PluginID% must be replaced with the plug-in ID you specified in the `id` attribute of the `<tns:obiplugin>` element.
- %ModuleName% must be replaced with the resource ID you specified in the `id` attribute of the `<tns:resource>` element for the JavaScript file containing your data action.
- %ClassName% must be replaced with the name you gave to the data action class in your JavaScript file.
- **properties.displayName** - This property contains an object and two further properties:
  - **key** is the Native Language Support message key that can be used to lookup the data action's localized display name from within the specified `resourceBundle`.
  - **default** is the default display name to use if for some reason the localized version of the display name can't be found.
- **properties.order** - This property enables you to provide a hint that's used to determine the position that this data action should appear when shown in a list of data actions. Data actions with lower numbers in their order property appear before data actions with higher numbers. When there's a tie, the data actions are displayed in the order they're loaded by the system.

# 13

## Use Other Functions to Visualize Data

This topic describes other functions that you can use to visualize your data.

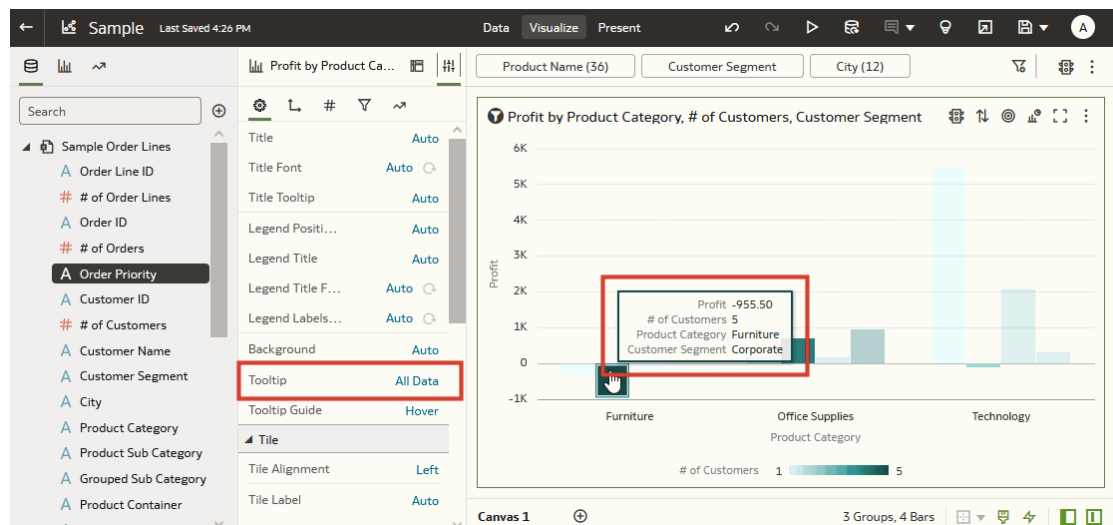
### Topics:

- [Identify Content with Tooltips](#)
- [Manage Custom Plug-ins](#)
- [Compose Expressions](#)
- [Use the Search Bar to Visualize Data from the Home Page](#)
- [Save Your Changes Automatically](#)
- [Sort the Items in a Page](#)

## Identify Content with Tooltips

Use tooltips to make your visualizations more interactive without cluttering them with too much information.

In the visualization designer page, use the Tooltip pane to display measures and labels when users click on a measure or hover over a visualization.



## Manage Custom Plug-ins

You can upload, download, search for, and delete custom plug-ins. Plug-ins are custom visualization types or custom data actions that you create externally and then import into your system.



For example, you can upload a custom plug-in that provides a visualization type that you can use in workbooks.

1. On the Home page, click the **Navigator**, and then click **Console**.
2. Click **Extensions**.

You use this page to upload, search for, delete, or download a custom plug-in.

3. To upload a custom plug-in, click **Extension** and perform one of the following actions.
  - Browse to the required plug-in file in your file system, and click **Open** to select the plug-in.
  - Drag the required plug-in file to the **Upload Custom Plugin** object.

If the uploaded custom plug-in file name is the same as an existing custom plug-in, then the uploaded file replaces the existing one and is displayed in visualizations.
4. Perform any of the following tasks.
  - If the plug-in provides a visualization type, you can select that type from the list of available types when you create or switch the type of a visualization.
  - To search for a custom plug-in, enter your search criteria in the **Search** field and click **Return** to display search results.
  - To delete a custom plug-in, click **Options** on the custom plug-in and select **Delete**, and click **Yes** to delete the custom plug-in.  
If you delete a custom visualization type that's used in a workbook, then that workbook displays an error message in place of the visualization. Either click **Delete** to remove the visualization, or upload the same custom plug-in so that the visualization renders correctly.
  - To download a custom plug-in, click **Options** on the custom plug-in and select **Download**.

## Compose Expressions

You can use the Expression window to compose expressions to use in expression filters or in calculations. Expressions that you create for expression filters must be Boolean (that is, they must evaluate to true or false).

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, appears only in the filter bar and can't be added as a data element to a visualization. You can create an expression filter from a calculation, but you can't create a calculation from an expression filter. See [Create Calculated Data Elements](#) and [Build Expression Filters](#).

You can compose an expression in various ways:

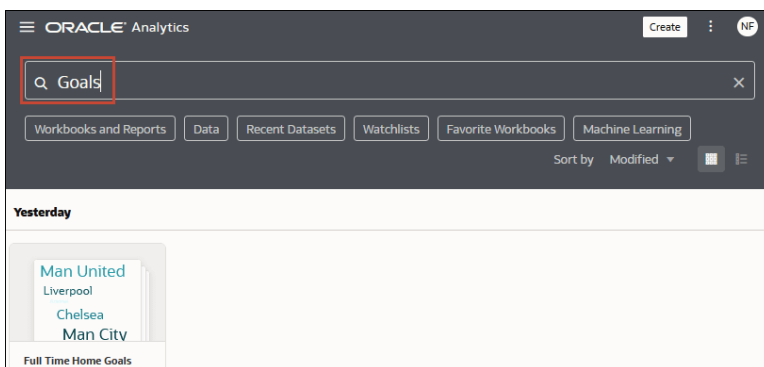
- Directly enter text and functions in the Expression window.
- Add data elements from the Data Elements pane (drag and drop, or double-click).
- Add functions from the function panel (drag and drop, or double-click).

See [Expression Editor Reference](#).

## Use the Search Bar to Visualize Data from the Home Page

Use the search bar on the Home page to find your data and quickly visualize it. You can then perform appropriate actions on the results.

1. On the Home page, click the search bar.
2. Enter a search term (for example, "Goals"), then press SHIFT + ENTER or select a specific result displayed in the drop-down list. You'll see your results displayed.



3. To further explore any of the results, click the **Actions** menu, and choose one of the options.

## Find Data, Workbooks, and Visualizations

This topic describes how you can search for items such as objects, workbooks, and columns.

 [LiveLabs Sprint](#)

### Topics:

- [How Is Data Indexed?](#)
- [Search for Content](#)
- [Search Options](#)
- [Search Tips](#)

## How Is Data Indexed?

When you search or visualize data from the Home page, your results are determined by what information has been indexed.

The system runs a process to index your saved objects, workbook content, and dataset column information. The indexing process also updates the index file to reflect any objects,



workbooks, or datasets that you deleted from your system so that these items are no longer displayed in your search results.

For all datasets, 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, CSV, and TXT dataset columns with 1,000 or fewer distinct rows. Note that no database column data is indexed and therefore that data isn't available in your search results.

## Search for Content

Use the search bar on the Home page to find items such as datasets, workbooks, and machine learning scripts.

1. On the Home page, locate the search bar.
2. Enter your search criteria. Note the following options:
  - Click in the search bar for a drop down list of all content types, such as workbook, report, and dataset. Click a content type to add it to the search bar. Or below the search bar, click one of the search tags to add it to the search bar.
  - Build or modify a search tag by adding or removing other items.
  - Specify the full or partial name of what you're looking for. The search is case-insensitive.
  - To clear your search terms, in the search bar click X or select search tags and delete.
3. In the search results, click an object to display it.

## Search Options

You can enter advanced search commands in the search bar to tailor your search results for exact matches, multi-term matches, and field-level matches.

You can combine multiple search terms with commands to narrow or widen your search. For example, `name: (revenue AND Analysis)`. Search commands and search terms are case-insensitive.

Search Command	Description	Example
AND	Enter AND between search terms to only display content which contains all the search terms. All forms of AND, such as, and, &&, or entering two search terms together, will return the same results.	Revenue AND Forecast Revenue and Forecast Revenue && Forecast Revenue Forecast
OR	Enter OR between search terms to display content that contains any of the search terms.	Revenue OR Profit Revenue or Profit Revenue    Profit
NOT	After entering a search term, enter NOT followed by more search terms to exclude any content from the results which match the search terms entered after the NOT command.	Revenue NOT Product Revenue not Product

Search Command	Description	Example
?	Enter the question mark (?) character in a search term as a wildcard to signify a single unknown character. This ensures that the search results include content with words matching the known characters from the search term. For example, searching for st?r would include results containing star and stir.	st?r
*	Enter the asterisk (*) character at the end of a partial search term or root word as a wildcard to find all content that contains the partial search term as well as content that contain variations of the root word. For example, searching for employ* would include results for employee, employment, or employer.	Employ*
name:	Enter name: followed by a search term to search for content where the search term is part of the Name field.	name:Revenue Analysis
description:	Enter description: followed by a search term to search for content where the search term is contained in the Description field of the content.	description:template desc:template
owner:	Enter owner: followed by a search term to search for content where the search term is contained in the Owner field of the content.	owner:Admin
columns:	Enter columns: followed by a search term to search for objects that reference columns matching the search term.	columns:product
text:	Enter text: at the beginning of a search followed by a search term to search for content where the search term is contained in any of the content's fields.	text:Revenue
""	Enclose a search term with double quotation marks to search for content that includes phrases or stop words which match the search term.	"Balance Letter" "Research by analysis"

## Search Tips

Use these tips to help you find your content.

- **Searching in Non-English Locales** - When you enter criteria in the search field, what displays in the drop-down list of suggestions can differ depending upon your locale setting. For example, if you're using an English locale and enter *sales*, then the drop-down list of suggestions contains items named *sale* and *sales*. However, if you're using a non-English locale such as Korean and type *sales*, then the drop-down list of suggestions contains only items that are named *sales* and items such as *sale* aren't included in the drop-down list of suggestions.
- **Searching for New Objects and Data** - If you create or save a workbook or create a dataset and then immediately try to search for it, then it's likely that your search results won't contain matches. If this happens, refresh your browser. If you still can't find the new

object or data, then wait a few minutes for the indexing process to run, and retry your search. Users can access only the data they've been given permission to access.

## Save Your Changes Automatically

You can use the auto save option to save your updates to a visualization workbook in real-time automatically.

If you've already saved your workbook in a specific location, the Save Workbook dialog isn't displayed after you click **Auto Save**.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. From the Save menu, select **Auto Save**.
3. In the Save Workbook dialog, enter the **Name** and optional **Description** to identify your workbook.
4. Select the folder where you want to save your workbook.
5. Click **Save**. Any workbook updates are saved in real-time.

Suppose that two users are updating the same workbook and **Auto Save** is enabled. The **Auto Save** option is automatically disabled when different types of updates are made to the workbook. A message is displayed that states that another user has updated the workbook.

## Sort the Items in a Page

You can quickly reorganize items in the Catalog, Data, and Machine Learning pages by sorting the items based on their attributes.

As you add more data or workbooks, sorting items helps you to control the order in which they're listed. For example, you can reorganize datasets on the Data page based on their modification dates and times.

1. On the Home page, click **Navigator**, and then click **Console**.
2. Click either **Catalog**, **Data**, or **Machine Learning** depending on which items you want to sort.
3. Click the **Sort By** menu on the page toolbar and select a sort option such as **Modified** or **Reverse Order**.
4. Click the **List View** icon to switch to list view. In the table, click a column header to sort the items in that column in ascending or descending order.

The selected sort and column options are saved as user preferences.

# 14

## Build a Presentation Flow

This chapter explains how to use Present to create a presentation flow from the workbook's canvases. The presentation flow determines the workbook for the end users.

### Topics:

- [What Is a Presentation Flow?](#)
- [What Are Auto and Manual Modes in Present?](#)
- [Switch Between Auto and Manual Modes in Present](#)
- [Open the Presentation Flow](#)
- [Specify the Canvases Layout in Present](#)
- [Set the Workbook Properties in Present](#)
- [Set Canvas Properties in Present](#)
- [Preview a Presentation Flow](#)

## What Is a Presentation Flow?

A presentation flow is the design that determines the workbook the end user interacts with. It's based on the design-time workbook, but you can modify it to hide design-side complexity and provide the workbook experience that your end users need to interact with their data.

By default Oracle Analytics creates a presentation flow based on the workbook that you design in Visualize. The first time you access the workbook in Present, it displays the default presentation flow, which is identical to the workbook you designed in Visualize. For example, the presentation flow contains all of the workbook's canvases, visualizations, filters, and so on.

If you preview the workbook from Visualize and are happy with the design and functionality, then you don't have to do anything else. But if you want to fine tune the end user workbook, you can use Present to modify the presentation flow to better suit your end user. Present provides flexibility for you as the author to find the right interactivity and provide the best workbook experience for your end user.

You can use Present to make workbook modifications such as:

- Hide unfinished canvases.
- Hide visualizations.
- Provide more options on a visualizations toolbar or menu.
- Hide the workbook's filter bar.
- Change the order of the canvases.

Remember that if you want to change a canvas' content, for example add a new visualization, then you use Visualize. Any changes you make in Visualize are included in the presentation

flow in Present. But when you use Present to polish the end user experience, any changes you make aren't applied to the workbook's design in Visualize.

## What Are Auto and Manual Modes in Present?

Auto and manual mode determine the types of changes that you can make while designing the presentation flow.

See [What Is a Presentation Flow?](#)

The first time that you open a workbook's presentation flow in Present, by default the presentation flow's properties and settings match those of the workbook design in Visualize. Auto mode is enabled the first time you open a workbook's presentation flow.

In auto mode, you can choose to hide a canvas and change many presentation flow properties at the workbook or canvas level, for example show or hide the workbook's header bar, keep a canvas' filter selections, and so on. It's important to remember that these changes aren't applied to the workbook or canvas in Visualize.

Switching to manual mode provides these additional options:

- Rename a canvas.
- Duplicate a canvas.
- Delete a canvas.
- Change the position of a canvas
- Choose to display a new canvas added in Visualize.
- Hide a visualization on a canvas.

Switching from manual mode to auto mode resets any of the manual changes listed above that you made to the presentation flow to match the workbook settings in Visualize. Switching from manual mode to auto mode preserves all other workbook or canvas-level properties that you set.

Switching from auto mode to manual mode allows you to make the additional changes listed above. Any of these changes that you make differ from the workbook settings in Visualize.

## Switch Between Auto and Manual Modes in Present

The auto or manual mode that you set in Present determines what type of changes you can make to the presentation flow's canvases and visualizations.




This tutorial provides a use case explaining how create a presentation flow in auto mode:

 [Tutorial](#)

This tutorial provides a use case explaining how create a presentation flow in manual mode:

 [Tutorial](#)

See [What Are Auto and Manual Modes in Present?](#)

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present** and go to the bottom of the Present page and locate the mode button .
3. Depending on which mode you're using, do one of the following:
  - Click **Manual Mode Active**  to switch from manual mode to auto mode.
  - Click **Auto Mode Active**  to switch from auto mode to manual mode.
4. Click **Save**.

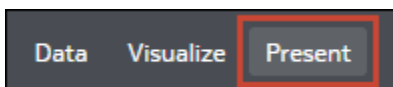
## Open the Presentation Flow

Open the workbook's presentation flow to fine-tune how the workbook and its canvases look and function for the end user.

The changes you make to the presentation flow are saved in Present and displayed in the end user workbook. Changes aren't saved to the workbook design in Visualize. For example, if in Present you customize the workbook's name and hide the filters bar, those changes aren't transferred to the workbook in Visualize.

See [Set the Workbook Properties in Present](#) and [Set Canvas Properties in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.



## Specify the Canvases Layout in Present

The presentation flow workbook inherits the layout you specified in Visualize. You can use Present to specify how the canvases are displayed in the presentation flow and the end user workbook.

### Topics:

- [Rearrange the Canvases in Present](#)
- [Duplicate a Canvas in Present](#)
- [Remove a Duplicate Canvas in Present](#)
- [Hide a Canvas in Present](#)
- [Display a Hidden Canvas in Present](#)
- [About Moving or Hiding Visualizations on a Canvas in Present](#)
- [Change a Visualization's Placement on a Canvas in Present](#)
- [Reset a Canvas in Present](#)

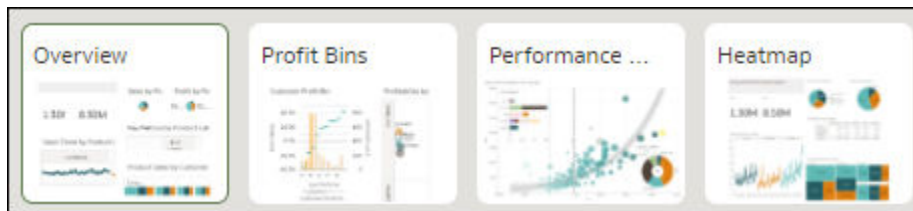
## Rearrange the Canvases in Present

When working on the presentation flow in manual mode, you can change the order of the workbook's canvases.

Any changes that you make to the canvas order in Present are saved to the presentation flow and not to the workbook design in Visualize.

See [Switch Between Auto and Manual Modes in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.



4. In the Canvases panel, drag and drop a canvas to a new position in the canvas display order.
5. Optional: Drag and drop more canvases to rearrange them in the canvas display order.
6. Click **Save**.

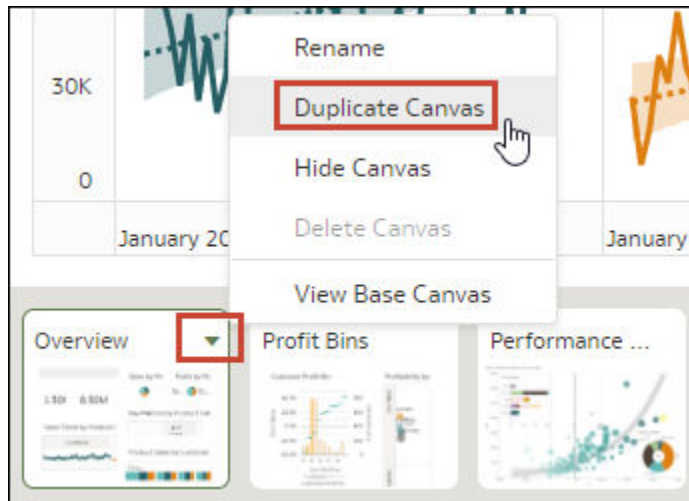
## Duplicate a Canvas in Present

When working on the presentation flow in manual mode, you can add the same canvas multiple times to the presentation flow. You might add a canvas multiple times when you want users to see different filter values on each version of a duplicated canvas.

Any canvases that you duplicate in Present are saved to the presentation flow and not to the workbook design in Visualize.

See [Switch Between Auto and Manual Modes in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.
4. In the Canvases panel, hover over a canvas, click the down arrow, and select **Duplicate Canvas**.



5. Click the duplicate canvas and modify it.
6. Click **Save**.

## Remove a Duplicate Canvas in Present

When working on the presentation flow in manual mode, you can delete any duplicate canvases from the presentation flow.

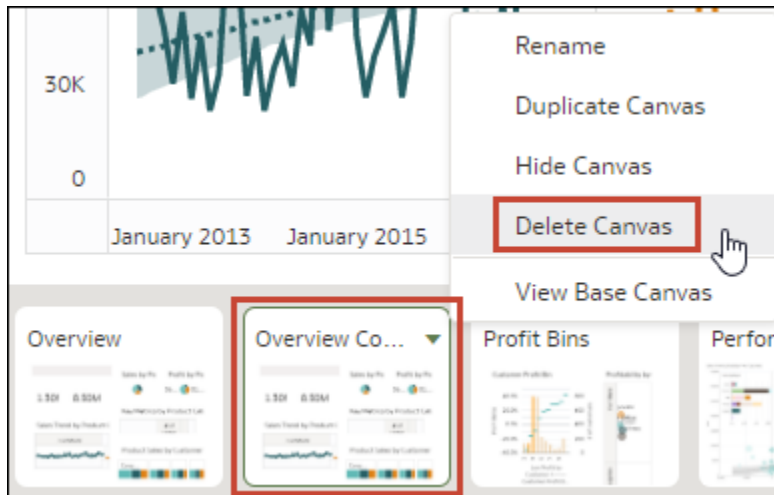
The Delete Canvas option is only available for canvases that you duplicated. You can hide but not delete any other canvases in Present.

Any changes that you make to the canvas display in the presentation flow are saved to Present and not to the workbook design in Visualize.

See [Switch Between Auto and Manual Modes in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.
4. In the Canvases panel, hover over a canvas, click the down arrow icon, and select **Delete Canvas**.





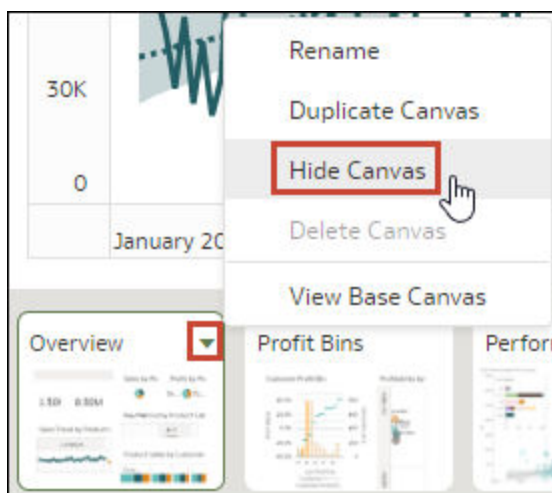
5. Click **Save**.

## Hide a Canvas in Present

When working on the presentation flow in either manual or auto mode, you can hide a canvas that you don't want end users to see in the workbook.

Any changes that you make to the canvas display in Present are saved to the presentation flow and not to the workbook design in Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.
4. In the Canvases panel, hover over a canvas, and select **Hide Canvas** to hide the canvas.



5. Click **Save**.

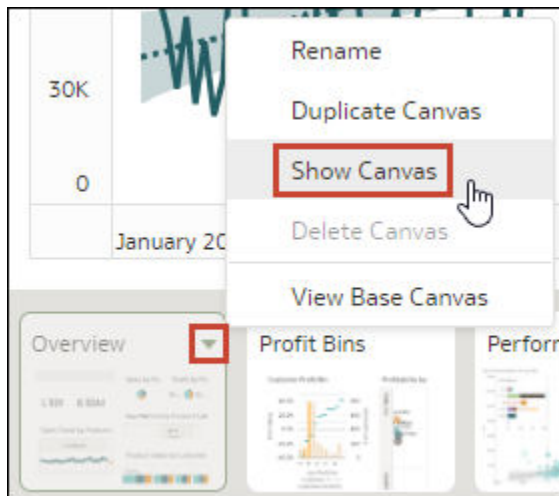
## Display a Hidden Canvas in Present

When working on the presentation flow in either manual or auto mode, you can display any hidden canvases.

If you're working in Present in manual mode, any canvases added in Visualize are displayed as hidden in the presentation flow. You can choose to keep the canvases hidden or you can display them in Present.

Any changes that you make to the canvas display in the presentation flow are saved to Present and not to the workbook design in Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.
4. In the Canvases panel, hover over a canvas, click the down arrow icon, and select **Show Canvas** to reveal the canvas.



5. Click **Save**.

## About Moving or Hiding Visualizations on a Canvas in Present

When working on the presentation flow in manual mode, the base canvas' **Layout** property in Visualize determines if the canvas includes white spaces or overlaps when you adjust the canvas' layout in Present.

See [About Canvas Layout Properties](#) and [Update Canvas Properties](#).

When the base canvas' **Layout** property is set to **Auto Fit** in Visualize, then in Present the canvas layout automatically adjusts to accommodate any visualizations that you move or hide. When you preview the canvas or select **Reset Adjustments** to remove the canvas' layout changes, no white spaces and overlaps are displayed.

When the base canvas' **Layout** property is set to **Freeform** in Visualize, then the canvas layout doesn't automatically adjust to accommodate any visualizations that you move or hide in Present. When you preview the canvas or select **Reset Adjustments** to remove the canvas' layout changes, white spaces and overlaps are displayed.

If your canvas is set to **Freeform** and in Present you move or hide visualizations, or reset the canvas, be sure to rearrange the visualizations to prevent any white spaces or overlaps. See [Show or Hide Canvas Visualizations in Present](#) and [Reset a Canvas in Present](#).

## Change a Visualization's Placement on a Canvas in Present

You can drag and drop visualizations to new positions on the canvas.

The canvas' **Layout** property in Visualize determines if your canvas contains white spaces and overlaps when you reposition visualizations. See [About Moving or Hiding Visualizations on a Canvas in Present](#).

Any changes that you make to the canvas display in Present are saved to the presentation flow and not to the workbook design in Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas with the visualizations that you want to reposition.
4. In the canvas, drag and drop the visualizations to reposition them.
5. Click **Save**.

## Reset a Canvas in Present

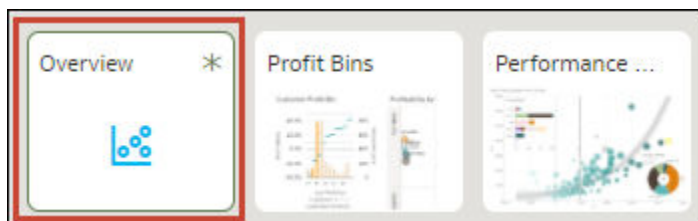
When working in manual mode, you can use the **Reset Adjustments** canvas option to synch the canvas in Present with its base canvas in Visualize.

You can reset any canvas that displays an asterisk. The asterisk indicates that the canvas' layout is out of synch with its base canvas in Visualize.

The canvas' **Layout** property in Visualize determines if your canvas contains white spaces and overlaps when you reset the canvas. See [About Moving or Hiding Visualizations on a Canvas in Present](#).

See [Switch Between Auto and Manual Modes in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Go to the bottom of the Present page and locate the Canvases panel.
4. In the Canvases panel, hover over a canvas displaying an asterisk, click the down arrow icon, and select **Reset Adjustments** to reset the canvas.



5. Click **Save**.

## Set the Workbook Properties in Present

The workbook inherits the properties that you set in Visualize. You can use Present to specify how you want the workbook to display to the end user and how the end user navigates and interacts with the workbook.

### Topics:

- [Specify Workbook Canvas Navigation in Present](#)
- [Show or Hide the Workbook Header Bar in Present](#)
- [Modify the Workbook Header Title in Present](#)
- [Modify the Workbook Header Color in Present](#)
- [Add an Image to the Workbook Header in Present](#)
- [Show or Hide the Zoom Control in Present](#)
- [Specify Workbook Zoom Control Options in Present](#)
- [Show or Hide the Workbook Toolbar in Present](#)
- [Select Workbook Toolbar Options in Present](#)
- [Show or Hide the Workbook Filter Bar in Present](#)
- [Specify Workbook Filter Options in Present](#)
- [Show or Hide Workbook Filters in Present](#)
- [Specify the Workbook Visualization Actions in Present](#)
- [Change the Workbook Canvases Visualization Alignment in Present](#)
- [Turn On or Off All Workbook and Canvas Actions in Present](#)
- [Specify Personalization Options in Present](#)

## Specify Workbook Canvas Navigation in Present

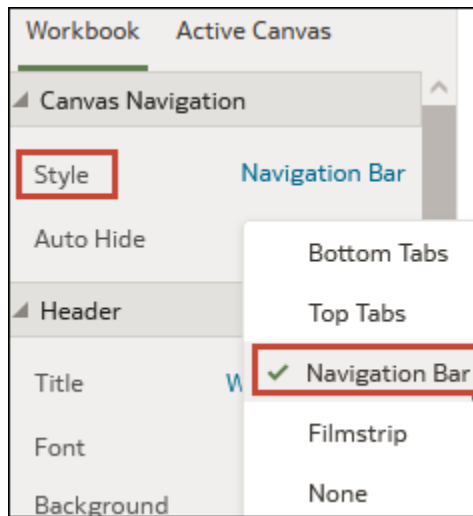
When you design a presentation flow, you can choose between navigation options to best fit how you want the end user to move between the workbook's canvases.

You can choose to always display the workbook's canvas navigation bar, or to display it only when the user hovers over the bottom of the workbook. You can also choose a navigation control corresponding to how you want to represent the canvases on the workbook's navigation bar.

The navigation control options are:

- **Bottom Tabs** - Displays each canvas as a tab including the canvas' title at the bottom of the workbook. The user clicks the tabs to navigate between canvases.
- **Top Tabs** - Displays each canvas as a tab including the canvas' title at the top of the workbook. The user clicks the tabs to navigate between canvases.
- **Navigation Bar** - Displays each canvas as a circle at the bottom of the workbook. The user clicks the circles to navigate between canvases.
- **Filmstrip** - Displays each canvas as a thumbnail at the bottom of the workbook. The user clicks the thumbnails to navigate between canvases.

- **None** - Removes the navigation control from the workbook.
1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
  2. Click **Present**.
  3. In the Present page, click the **Workbook** tab.
  4. In the Canvas Navigation section, click the **Style** field and select how you want the user to move between workbook canvases.



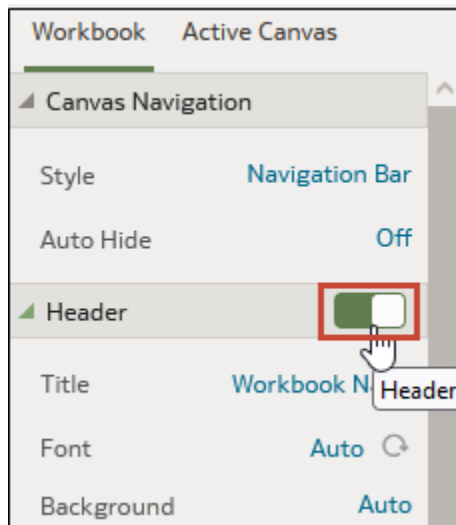
5. Optional: Click the **Auto Hide** field and select **On** if you want to display the navigation panel when the user mouses over the bottom of the workbook.
6. Click **Save**.

## Show or Hide the Workbook Header Bar in Present

When you design a presentation flow, the workbook's header bar is set to display by default. You can choose to show or hide the header bar.

The header bar displays the workbook title that you specify. For example, canvas name, workbook name, or a custom name.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Header section, click **Header** to toggle it to **Off** to hide the header bar, or click it to toggle it to **On** to show the header bar.



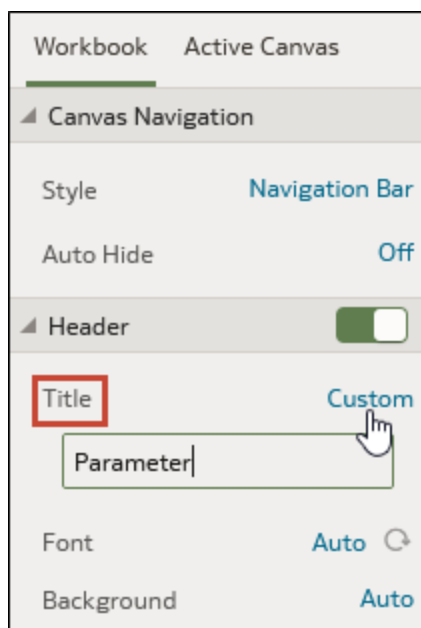
5. Click **Save**.

## Modify the Workbook Header Title in Present

When you design a presentation flow, you can specify which name you want to display as the workbook's header and how you want to format the header text.

You can also add an image to the workbook header. See [Add an Image to the Workbook Header in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Header section, click the **Title** field and select the name you want to use as a title, or select **Custom** and enter a title.

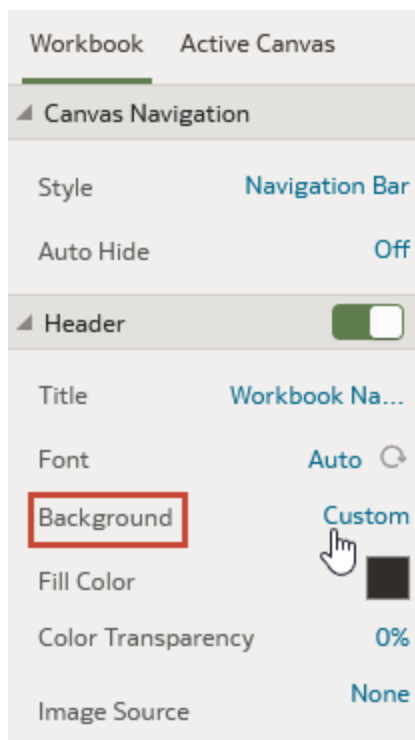


5. Optional: Click the **Font** field and specify the font style, font size, and any formatting that you want to use in the title, for example, bold or italic.
6. Click **Save**.

## Modify the Workbook Header Color in Present

When you design a presentation flow, you can customize the workbook header background's color and transparency.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Header section, click the **Background** field and select **Custom**.




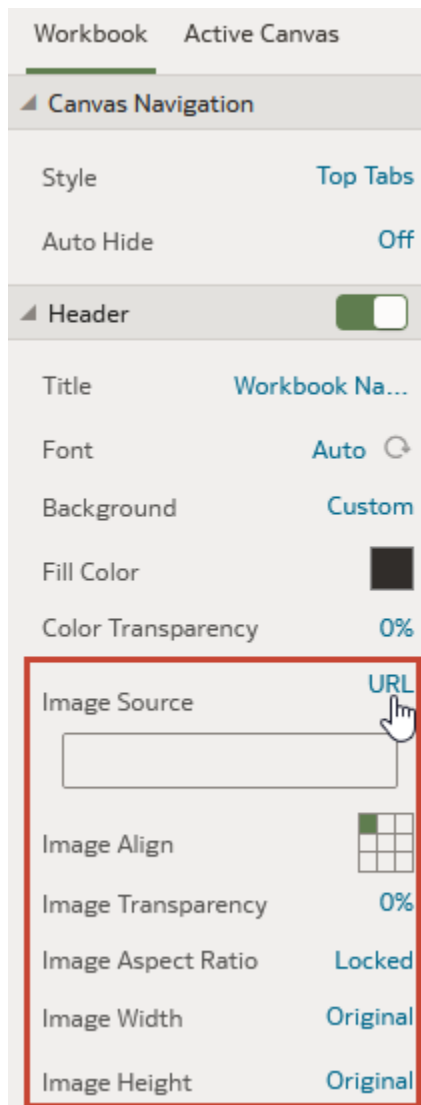
5. In the Header section, use the **Fill Color** and **Color Transparency** fields to specify how you want the header's background to display.
6. Click **Save**.

## Add an Image to the Workbook Header in Present

When you design a presentation flow, you can add an image from a file or URL to the workbook header and specify how you want the image to display.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.

2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Header section, click the **Background** field and then select **Custom**.
5. In the Header section, click the **Image Source** field and choose where to get the image from.
  - If you select **URL**, then paste the image source's URL into the text field.
  - If you select **File**, then click the file upload icon  and browse for and select the file you want to use.
6. In the Header section, specify the image's display properties, for example image width and height.



7. Click **Save**.



## Show or Hide the Zoom Control in Present

When you design a presentation flow, the workbook's header bar zoom control is set to hide by default. You can choose to show or hide the zoom control for all canvases.

When the zoom control is set to show, the zoom control is displayed in the workbook's header bar for canvases with their **Width** and **Height** properties set to **Fixed**.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Zoom section, click **Zoom** to toggle it to **On** to show the zoom control in the header bar, or click it to toggle it to **Off** to hide the zoom control in the header bar.
5. Click **Save**.

## Specify Workbook Zoom Control Options in Present

When you design a presentation flow, you can choose the default zoom setting used when the user opens a canvas.

The Zoom/Layout controls button allows consumers to zoom in and out of the whole active canvas to best fit their screen. Although you set the control for the workbook, the zoom control is displayed only for canvases with their **Width** and **Height** properties set to **Fixed**.

The zoom control properties that you set on the **Workbook** tab are carried over to the Active Canvas' zoom properties. You can override the **Workbook** tab's zoom properties on any individual canvas.

The Zoom section's toggle must be set to **On** before you can update the **Scale** property.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Zoom section, click **Scale** and select the zoom size used to display the canvas when a user opens it.
5. In the Zoom section, click **Control** to set it to **Off** to hide the zoom control in the workbook's header bar for all canvases, or click it to set it to **On** to show the zoom control in the workbook's header bar for all canvases.

Set this option to **Off** when your workbook contains many canvases and you want to use the Active Canvas option to display the zoom control on only a few canvases.

6. Click **Save**.

## Show or Hide the Workbook Toolbar in Present

When you design a presentation flow, the workbook's toolbar displays by default. You can choose to show or hide the workbook's toolbar for users.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present, click the **Workbook** tab.
4. In the Toolbar section, click **Toolbar** to toggle it to **Off** to hide the toolbar, or click it to toggle it to **On** to show the toolbar.
5. Click **Save**.

## Select Workbook Toolbar Options in Present

You can specify which of the workbook's toolbar options you want to display to the user.

You can select the Toolbar properties that you want to display to users in Present. Toolbar properties include undo and redo changes, refresh the workbook's data, show notes, and export.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Toolbar section, deselect the toolbar options that you want to hide, or select the toolbar options that you want to display.
5. Click **Save**.

## Show or Hide the Workbook Filter Bar in Present

When you design a presentation flow, you can show or hide the workbook's filter bar.

Showing the filter bar allows users to view, set, and modify the workbook's filter values. You can set filter values and then hide the filter bar so that the workbook includes specific data. Hiding the filter bar prevent users from changing the filter values.

The filter bar properties that you set on the **Workbook** tab are carried over to the Active Canvas' Filter Actions properties. You can override the **Workbook** tab's filter bar properties on any individual canvas.

All Filter Actions options are grayed out when the **Full Interactivity** option is set to **Off**. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present, click the **Workbook** tab.
4. In the Filter Bar section, click **Filter Bar** to toggle it to **Off** to hide the filter bar, or click it to toggle it to **On** to show the filter bar.
5. Click **Save**.

## Specify Workbook Filter Options in Present

When you design a presentation flow, you can specify which workbook filter options you want to provided to the user, for example, add filters or change filter values.

The options you set on the **Workbook** tab are carried over to the Active Canvas' Filter Actions properties. You can override the **Workbook** tab's filter bar properties on any individual canvas.

All Filter Actions options are grayed out when the **Full Interactivity** option is set to **Off**. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Filter Bar section, deselect the filter actions options that you want to hide, or select the filter action options that you want to display.
5. Click **Save**.

## Show or Hide Workbook Filters in Present

When you design a presentation flow, you can hide or show any individual workbook filters.

When working with filters in the presentation flow, any filters that you hide or show are saved in Present and aren't saved in Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Workbook Filters section, deselect the filter actions options that you want to hide, or select the filter action options that you want to display.
5. Click **Save**.

## Specify the Workbook Visualization Actions in Present

When you design a presentation flow, you can choose which visualization actions to make available to users in a workbook. For example, you can specify that the workbook provides visualization toolbar items like sort, maximize, or add to watchlist, and visualization menu items like drill, export to file, email or print, or copy data.

The visualization properties that you set on the **Workbook** tab are carried over to the Active Canvas' Visualization Actions properties. You can override the **Workbook** tab's visualization properties on any individual canvas. See [Select Canvas Visualization Toolbar Options in Present](#) .

All Visualization Actions options are grayed out when the **Full Interactivity** option is set to **Off**. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Visualization Actions section, deselect the actions that you don't want users to perform, or select the actions that you want users to perform.
5. Click **Save**.

## Change the Workbook Canvases Visualization Alignment in Present

When you design a presentation flow, you can control where the visualizations are displayed on the workbook's canvases. This allows you to choose the best placement of the visualizations based on the end user's screen size and resolution.

For example, if the workbook's canvases each contain one visualization, then you can choose **Center** to add white space around the visualizations to center them on the canvases.

The alignment options are:

- **Top Left** - Adds white space to the right of the visualizations on the canvas, but not to the top and left of the canvas. This is the default.
- **Top Center** - Adds white space to the left and right of the visualizations on the canvas, but not to the top of the canvas.
- **Center** - Adds white space to the top, left, and right of the visualizations on the canvas.

You can also change the positions of the visualizations on a canvas. See [Change a Visualization's Placement on a Canvas in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Presentation Layout section, go to the **Letterbox Alignment** field and choose an alignment.
5. Click **Save**.

## Turn On or Off All Workbook and Canvas Actions in Present

When you design a presentation flow, all filter bar and visualization actions are on by default. You can turn off and on actions individually, or use the **Full Interactivity** option to turn all actions for the workbook's canvases with one click.

Examples of filter actions are add filters, remove filters, and change filter value selections. Examples of visualization actions are drill, export, and sort by.

To turn off all filter and visualization actions that the user can perform on all canvases, set **Full Interactivity** field to **Off**.

Setting the **Full Interactivity** field to **On** allows you to set individual filter and visualization actions to specify how you want the user to interact with the workbook and canvases.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.

4. In the Interactivity section, go to the **Full Interactivity** field.
  - Select **Off** to disable all filter and visualization actions on all canvases.
  - Select **On** to enable all filter and visualization actions on all canvases.
5. Click **Save**.

## Specify Personalization Options in Present

When you design a presentation flow, you can specify if the filter values the end user selects are automatically reapplied when the user reopens the workbook.

The personalization options are:

- **Filter** - Select to reapply dashboard filter selections, visualization filters selections, and any visualizations with **Use as Filter** enabled when a user reopens the workbook.
- **Parameter** - Select to reapply dashboard filter selections and visualizations filter selections that use parameters as their filter controls when a user reopens the workbook. See [Use a Parameter as a Dashboard Filter Control](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. In the Present page, click the **Workbook** tab.
4. In the Personalization section, deselect the user's filter selections you don't want applied or select the user's filter selections you want applied when the user reopens a workbook.

Your administrator can disable workbook personalization for the entire organization through system settings. In this case, you can't set personalization options for your workbook. See .

5. Click **Save**.

## Set Canvas Properties in Present

In the presentation flow, each canvas inherits the workbook properties that you set in the **Workbook** tab in Present. You can change any canvas' inherited properties.

**Topics:**

- [Specify Canvas Filter Actions in Present](#)
- [Show or Hide Canvas Filters in Present](#)
- [Select Canvas Visualization Toolbar Options in Present](#)
- [Specify Canvas Visualization Menu Options in Present](#)
- [Show or Hide Canvas Visualizations in Present](#)
- [Specify Canvas Zoom Control Options in Present](#)
- [Show or Hide Canvas Notes in Present](#)

## Specify Canvas Filter Actions in Present

When you design a presentation flow, each canvas inherits the filter actions you set on the **Workbook** tab. You can use the **Active Canvas** tab to customize an individual canvas' filter actions, for example, add filters or change filter values.

Showing the filter bar allows users to view, set, and modify the canvas' filter values. You can set filter values and then hide the filter bar so that the canvas includes specific data. Hiding the filter bar prevent users from changing the filter values.

Any filter settings that you change or filter values that you add or remove in Present are saved to the presentation flow's canvas and not to the canvas in Visualize.

All Filter Actions options are grayed out when the **Full Interactivity** option is set to **Off** on the **Workbook** tab. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas that you want to update filters for.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Filter Bar section and in the Filter Actions area, deselect the filter bar options that you want to hide, or select the options that you want to display.
6. Optional: Click **Custom** and then click **Auto** to reset all visualization actions to the default settings you specified in the **Workbook** tab.
7. Click **Save**.

## Show or Hide Canvas Filters in Present

When you design a presentation flow, you can hide or show any individual canvas filters.

Any filters that you hide or show in Present are saved to the presentation flow's canvas and not to the canvas in Visualize.

All Canvas Filters options are grayed out when the **Full Interactivity** option is set to **Off** on the **Workbook** tab. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas that you want to update filters for.
4. In the Present page, click the **Active Canvas** tab.
5. In the Canvas Filters area, deselect the filters that you want to hide on the canvas, or select the filters that you want to display.
6. Click **Save**.

## Select Canvas Visualization Toolbar Options in Present

When you design a presentation flow, each canvas inherits the visualization toolbar options you set on the **Workbook** tab. You can use the **Active Canvas** tab to override the

visualization toolbar options that are set for the workbook, for example Map Actions or Add to Watchlist.

Any visualization settings that you change in Present are saved to the presentation flow's canvas and not to the canvas in Visualize.

All Visualization Actions options are grayed out when the **Full Interactivity** option is set to **Off** on the **Workbook** tab. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas that you want to update filters for.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Visualization Toolbar section, click to hide the actions in that you don't want users to perform from the visualization's toolbar, or click to add the actions that you want users to perform from the visualization's toolbar.
6. Optional: Click **Custom** and then click **Auto** to reset all visualization actions to the default settings you specified in the **Workbook** tab.
7. Click **Save**.

## Specify Canvas Visualization Menu Options in Present

When you design a presentation flow, each canvas inherits the visualization menu options you set on the **Workbook** tab. You can use the **Active Canvas** tab to specify which visualization menu options you want to provide to the user, for example, drill or export.

Any visualization settings that you change in Present are saved to the presentation flow's canvas and not to the canvas in Visualize.

All Visualization Actions options are grayed out when the **Full Interactivity** option is set to **Off** on the **Workbook** tab. See [Turn On or Off All Workbook and Canvas Actions in Present](#).

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas that you want to change user actions for.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Visualization Menu section, click to hide the actions that you don't want users to perform from the visualization's menu, or click to add the actions that you want users to perform from the visualization's menu.
6. Optional: Click **Custom** and then click **Auto** to reset all visualization actions to the default settings you specified in the **Workbook** tab.
7. Click **Save**.

## Show or Hide Canvas Visualizations in Present

When working in manual mode, you can hide or display individual visualizations on a canvas.

The canvas' **Layout** property in Visualize determines if your canvas contains white spaces and overlaps when you hide or show visualizations. See [About Moving or Hiding Visualizations on a Canvas in Present](#).

See [Switch Between Auto and Manual Modes in Present](#).

When you show or hide visualizations in Present, the changes are saved to the presentation flow's canvas and not to Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas where you want to show or hide visualizations.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Visualizations section and deselect the visualizations that you want to hide, or select the visualizations that you want to display on the canvas.
6. Click **Save**.

## Specify Canvas Zoom Control Options in Present

When you design a presentation flow, each canvas inherits the zoom control options you set on the **Workbook** tab. You can use the **Active Canvas** tab to customize an individual canvas' zoom control options.

The Zoom/Layout controls button allows consumers to zoom in and out of the whole active canvas to best fit their screen. The zoom control is displayed only for canvases with their **Width** and **Height** properties set to **Fixed**.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas that you want to update the zoom control for.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Zoom section, click **Scale**, and select the zoom size used to display the canvas when a user opens it.
6. In the Zoom section, click **Control** to set it to **Off** to hide the zoom control in the workbook header bar for the canvas, or click it to set it to **On** to show the zoom control in the workbook header bar for the canvas.
7. Optional: Click **Custom** and then click **Auto** to reset the default settings you specified in the **Workbook** tab.
8. Click **Save**.



## Show or Hide Canvas Notes in Present

When you design a presentation flow, by default all canvas notes are displayed. You can use the **Active Canvas** tab to specify which canvas notes to hide or show.



If you choose to leave some or all notes displayed for a canvas, then when you preview the workbook, you can click the **Hide Notes** workbook header button to turn off or on all notes that aren't hidden. Or when users view the workbook, they can click the **Hide Notes** header button to turn off or on all notes that aren't hidden. See [Show or Hide a Visualization's Notes](#).

Any notes that you hide or show in Present are saved to the presentation flow's canvas and not to the canvas in Visualize.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. If the presentation flow contains more than one canvas, then go to the bottom of the Present page and click the canvas where you want to show or hide notes.
4. In the Present page, click the **Active Canvas** tab.
5. Scroll to the Notes section and deselect the notes that you want to hide, or select the notes that you want to display on the canvas.
6. Click **Save**.

## Preview a Presentation Flow

As an author using the Present page to design the presentation flow, you can use the preview mode to test how a user views and interacts with the workbook you're designing. Switching to preview mode removes the presentation flow's workbook and canvas options and the canvas panel.

1. On the Home page, select a workbook, click the **Actions menu**, and then select **Open**.
2. Click **Present**.
3. Click **Preview**  to view the workbook as it displays to the user.
4. Click **Edit**  to exit the workbook's preview mode and return to the presentation flow in the **Present** page.

# Use Oracle Analytics Predictive Models and Oracle Machine Learning Models

In Oracle Analytics you can consume predictive models or machine learning models that reside in Oracle Database or , Oracle Autonomous Data Warehouse. Apply predictive models to your data to build machine learning Machine Learning (ML) and Artificial Intelligence (AI) into your applications without requiring ML or AI expertise.

## Topics:

- [Create and Use Oracle Analytics Predictive Models](#)
- [Use Oracle Machine Learning Models in Oracle Analytics](#)
- [Apply a Predictive or Registered Oracle Machine Learning Model to a Dataset](#)

## Create and Use Oracle Analytics Predictive Models

Oracle Analytics predictive models use several embedded Oracle Machine Learning algorithms to mine your datasets, predict a target value, or identify classes of records. Use the data flow editor to create, train, and apply predictive models to your data.

## Topics:

- [What Are Oracle Analytics Predictive Models?](#)
- [How Do I Choose a Predictive Model Algorithm?](#)
- [Train a Predictive Model Using AutoML in Oracle Autonomous Data Warehouse](#)
- [Create and Train a Predictive Model](#)
- [Inspect a Predictive Model](#)
- [Add a Predictive Model to a Workbook](#)
- [Evaluate Machine Learning Models Using Lift and Gain Charts](#)

## What Are Oracle Analytics Predictive Models?

An Oracle Analytics predictive model applies a specific algorithm to a dataset to predict values, predict classes, or to identify groups in the data.

You can also use Oracle machine learning models to predict data.

Oracle Analytics includes algorithms to help you train predictive models for various purposes. Examples of algorithms are classification and regression trees (CART), logistic regression, and k-means.

You use the data flow editor to first train a model on a training dataset. After the predictive model has been trained, you apply it to the datasets that you want to predict.

You can make a trained model available to other users who can apply it against their data to predict values. In some cases, certain users train models, and other users apply the models.

 **Note:**

If you're not sure what to look for in your data, you can start by using Explain, which uses machine learning to identify trends and patterns. Then you can use the data flow editor to create and train predictive models to drill into the trends and patterns that Explain found.

You use the data flow editor to train a model:

- First, you create a data flow and add the dataset that you want to use to train the model. This training dataset contains the data that you want to predict (for example, a value like sales or age, or a variable like credit risk bucket).
- If needed, you can use the data flow editor to edit the dataset by adding columns, selecting columns, joining, and so on.
- After you've confirmed that the data is what you want to train the model on, you add a training step to the data flow and choose a classification (binary or multi), regression, or cluster algorithm to train a model. Then name the resulting model, save the data flow, and run it to train and create the model.
- Examine the properties in the machine learning objects to determine the quality of the model. If needed, you can iterate the training process until the model reaches the quality you want.

Use the finished model to score unknown, or unlabeled, data to generate a dataset within a data flow or to add a prediction visualization to a workbook.

### Example

Suppose you want to create and train a multi-classification model to predict which patients have a high risk of developing heart disease.

1. Supply a training dataset containing attributes on individual patients like age, gender, and if they've ever experienced chest pain, and metrics like blood pressure, fasting blood sugar, cholesterol, and maximum heart rate. The training dataset also contains a column named "Likelihood" that is assigned one of the following values: absent, less likely, likely, highly likely, or present.
2. Choose the CART (Decision Tree) algorithm because it ignores redundant columns that don't add value for prediction, and identifies and uses only the columns that are helpful to predict the target. When you add the algorithm to the data flow, you choose the Likelihood column to train the model. The algorithm uses machine learning to choose the driver columns that it needs to perform and output predictions and related datasets.
3. Inspect the results and fine tune the training model, and then apply the model to a larger dataset to predict which patients have a high probability of having or developing heart disease.

## How Do I Choose a Predictive Model Algorithm?

Oracle Analytics provides algorithms for any of your machine learning modeling needs: numeric prediction, multi-classifier, binary classifier, and clustering.

Oracle's machine learning functionality is for advanced data analysts who have an idea of what they're looking for in their data, are familiar with the practice of predictive analytics, and understand the differences between algorithms.

 **Note:**

If you're using data sourced from Oracle Autonomous Data Warehouse, you can use the AutoML capability to quickly and easily train a predictive model for you, without requiring machine learning skills. See *Train a Predictive Model Using AutoML in Autonomous Data Warehouse*.

Normally users want to create multiple prediction models, compare them, and choose the one that's most likely to give results that satisfy their criteria and requirements. These criteria can vary. For example, sometimes users choose models that have better overall accuracy, sometimes users choose models that have the least type I (false positive) and type II (false negative) errors, and sometimes users choose models that return results faster and with an acceptable level of accuracy even if the results aren't ideal.

Oracle Analytics contains multiple machine learning algorithms for each kind of prediction or classification. With these algorithms, users can create more than one model, or use different fine-tuned parameters, or use different input training datasets and then choose the best model. The user can choose the best model by comparing and weighing models against their own criteria. To determine the best model, users can apply the model and visualize results of the calculations to determine accuracy, or they can open and explore the related datasets that Oracle Analytics used the model to output.

Consult this table to learn about the provided algorithms:

Name	Type	Category	Function	Description
CART	Classification Regression	Binary Classifier Multi-Classifier Numerical	-	Uses decision trees to predict both discrete and continuous values. Use with large datasets.

Name	Type	Category	Function	Description
Elastic Net Linear Regression	Regression	Numerical	ElasticNet	Advanced regression model. Provides additional information (regularization), performs variable selection, and performs linear combinations. Penalties of Lasso and Ridge regression methods. Use with a large number of attributes to avoid collinearity (where multiple attributes are perfectly correlated) and overfitting.
Hierarchical	Clustering	Clustering	AgglomerativeClustering	Builds a hierarchy of clustering using either bottom-up (each observation is its own cluster and then merged) or top down (all observations start as one cluster) and distance metrics. Use when the dataset isn't large and the number of clusters isn't known beforehand.
K-Means	Clustering	Clustering	k-means	Iteratively partitions records into k clusters where each observation belongs to the cluster with the nearest mean. Use for clustering metric columns and with a set expectation of number of clusters needed. Works well with large datasets. Result are different with each run.

Name	Type	Category	Function	Description
Linear Regression	Regression	Numerical	Ordinary Least Squares Ridge Lasso	Linear approach for a modeling relationship between target variable and other attributes in the dataset. Use to predict numeric values when the attributes aren't perfectly correlated.
Logistic Regression	Regression	Binary Classifier	LogisticRegressionC V	Use to predict the value of a categorically dependent variable. The dependent variable is a binary variable that contains data coded to 1 or 0.
Naive Bayes	Classification	Binary Classifier Multi-Classifer	GaussianNB	Probabilistic classification based on Bayes' theorem that assumes no dependence between features. Use when there are a high number of input dimensions.
Neural Network	Classification	Binary Classifier Multi-Classifer	MLPClassifier	Iterative classification algorithm that learns by comparing its classification result with the actual value and returns it to the network to modify the algorithm for further iterations. Use for text analysis.
Random Forest	Classification	Binary Classifier Multi-Classifer Numerical	-	An ensemble learning method that constructs multiple decision trees and outputs the value that collectively represents all the decision trees. Use to predict numeric and categorical variables.

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Name	Type	Category	Function	Description
SVM	Classification	Binary Classifier Multi-Classifer	LinearSVC, SVC	Classifies records by mapping them in space and constructing hyperplanes that can be used for classification. New records (scoring data) are mapped into the space and are predicted to belong to a category, which is based on the side of the hyperplane where they fall.

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## Train a Predictive Model Using AutoML in Oracle Autonomous Data Warehouse

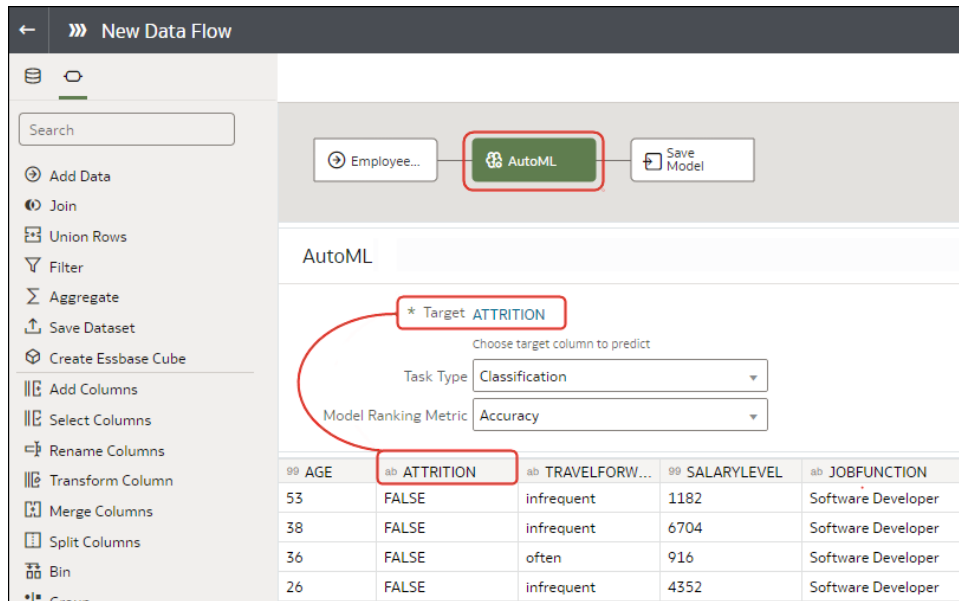
When you use data from Oracle Autonomous Data Warehouse, you can use its AutoML capability to recommend and train a predictive model. AutoML analyzes your data, calculates the best algorithm to use, and registers a prediction model in Oracle Analytics so that you can make predictions on your data.

Using AutoML means that Oracle Autonomous Data Warehouse does all of the hard work for you, so that you can deploy a prediction model without machine learning or artificial intelligence skills. The generated prediction model is saved in the Models area of the Machine Learning page. To predict data based on the new model, create a data flow and use the **Apply Model** step.

Before you start:

- Create a dataset based on the data in Oracle Autonomous Data Warehouse that you want to make predictions about. For example, you might have data about employee attrition, including a field named `ATTRITION` indicating 'Yes' or 'No' for attrition.
  - Make sure that the database user specified in the Oracle Analytics connection to Oracle Autonomous Data Warehouse has the role `OML_Developer` and isn't an 'admin' super-user. Otherwise, the data flow fails when you try to save or run it.
1. On the Home page, click **Create**, and then click **Data Flow**.
  2. In Add Dataset, select the dataset based on Oracle Autonomous Data Warehouse containing the data to analyze.
  3. Click **Add a step**, then click **AutoML**.
  4. For the **Target**, click **Select a column**, and select the data column containing the value you're trying to predict.

For example, to predict employee attrition, you might select a field named `ATTRITION` indicating 'TRUE' or 'FALSE' for whether employees have left an organization or not.



5. Accept the suggested **Task Type** and **Model Ranking Metric** that Oracle Analytics recommends, or select a different algorithm.
6. Click **Save Model**, and specify the name of the generated prediction model.
7. Click **Save** and specify a name for the data flow.
8. Click **Run** to analyze the data and generate a predictive model.
9. From the Home page, click **Navigate**, then click **Machine Learning**, then right-click the generated model and select **Inspect**.

You can locate the model that Oracle Analytics generates on the **Machine Learning** page on the **Models** tab. Inspect the model to assess its quality. See [Assess a Predictive Model's Quality](#).

## Create and Train a Predictive Model

Based on the problem that needs to be solved, an advanced data analyst chooses an appropriate algorithm to train a predictive model and then evaluates the model's results.

 [LiveLabs Sprint](#)

Arriving at an accurate model is an iterative process and an advanced data analyst can try different models, compare their results, and fine tune parameters based on trial and error. A data analyst can use the finalized, accurate predictive model to predict trends in other datasets, or add the model to workbooks.

### Note:

If you're using data sourced from Oracle Autonomous Data Warehouse, you can use the AutoML capability to quickly and easily train a predictive model for you, without requiring machine learning skills. See *Train a Predictive Model Using AutoML in Autonomous Data Warehouse*.



Oracle Analytics provides algorithms for numeric prediction, multi-classification, binary-classification and clustering.

The algorithms aren't available until you install Oracle machine learning into your local Oracle Analytics Desktop directory. See [How do I install Machine Learning for Desktop?](#)

1. On the Home page, click **Create**, and then select **Data Flow**.
2. Select the dataset that you want to use to train the model. Click **Add**.
3. In the data flow editor, click **Add a step (+)**.

After adding a dataset, you can either use all columns in the dataset to build the model or select only the relevant columns. Choosing the relevant columns requires an understanding of the dataset. Ignore columns that you know won't influence the outcome behavior or that contain redundant information. You can choose only relevant columns by adding the **Select Columns** step. If you're not sure about the relevant columns, then use all columns.

4. Select one of the train model steps (for example, **Train Numeric Prediction**, or **Train Clustering**).
5. Select an algorithm and click **OK**.
6. If you're working with a supervised model like prediction or classification, then click **Target** and select the column that you're trying to predict. For example, if you're creating a model to predict a person's income, then select the Income column.  
  
If you're working with an unsupervised model like clustering, then no target column is required.
7. Change the default settings for your model to fine tune and improve the accuracy of the predicted outcome. The model you're working with determines these settings.
8. Click the **Save Model** step and provide a name and description.
9. Click **Save**, enter a name and description of the data flow, and click **OK** to save the data flow.
10. Click **Run Data Flow** to create the predictive model based on the input dataset and model settings that you provided.

## Inspect a Predictive Model

After you create the predictive model and run the data flow, you can review information about the model to determine its accuracy. Use this information to iteratively adjust the model settings to improve its accuracy and predict better results.

### Topics:

- [View a Predictive Model's Details](#)
- [Assess a Predictive Model's Quality](#)
- [What Are a Predictive Model's Related Datasets?](#)
- [Find a Predictive Model's Related Datasets](#)

## View a Predictive Model's Details

A predictive model's detail information helps you understand the model and determine if it's suitable for predicting your data. Model details include its model class, algorithm, input columns, and output columns

1. On the Home page, click **Navigator**, and then click **Machine Learning**.
2. Click the **Models** tab.
3. Click the menu icon for a training model and select **Inspect**.
4. Click the **Details** to view the model's information.

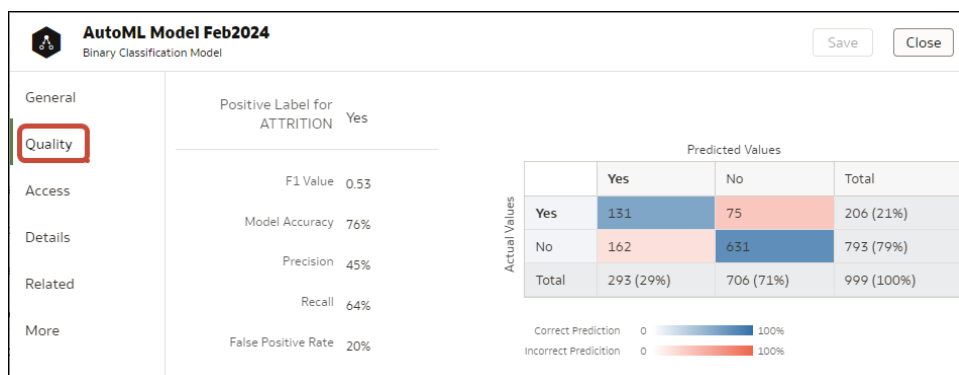
## Assess a Predictive Model's Quality

View information that helps you understand the quality of a predictive model. For example, you can review accuracy metrics like model accuracy, precision, recall, F1 value, and false positive rate.

Oracle Analytics provides similar metrics irrespective of the algorithm used to create the model, thereby making comparison between different models easy. During the model creation process, the input dataset is split into two parts to train and test the model based on the Train Partition Percent parameter. The model uses the test portion of the dataset to test the accuracy of the model that is built.

Based on your findings in the **Quality** tab, you may need to adjust the model parameters and retrain it.

1. On the Home page, click **Navigator**, and then click **Machine Learning**.
2. Click the **Models** tab.
3. Click the menu icon for a training model and select **Inspect**.
4. Click the **Quality** tab to review the model's quality metrics and assess the model. For example, review the **Model Accuracy** score.



**Tip:** Click **More** to review details of the views generated for the model.

## What Are a Predictive Model's Related Datasets?

When you run the data flow to create the Oracle Analytics predictive model's training model, Oracle Analytics creates a set of related datasets. You can open and create workbooks on these datasets to learn about the accuracy of the model.

### LiveLabs Sprint

Depending on the algorithm you chose for your model, related datasets contain details about the model such as prediction rules, accuracy metrics, confusion matrix, and key drivers for prediction. You can use this information to fine tune the model to get better results, and you can use related datasets to compare models and decide which model is more accurate.

For example, you can open a Drivers dataset to discover which columns have a strong positive or negative influence on the model. By examining those columns, you find that some columns aren't treated as model variables because they aren't realistic inputs or that they're too granular for the forecast. You use the data flow editor to open the model and based on the information you discovered, you remove the irrelevant or too-granular columns, and regenerate the model. You check the Quality and Results tab and verify if the model accuracy is improved. You continue this process until you're satisfied with the model's accuracy and it's ready to score a new dataset.

Different algorithms generate similar related datasets. Individual parameters and column names may change in the dataset depending on the type of algorithm, but the functionality of the dataset stays the same. For example, the column names in a statistics dataset may change from Linear Regression to Logistic Regression, but the statistics dataset contains accuracy metrics of the model.

These are the related datasets:

### **CARTree**

This dataset is a tabular representation of CART (Decision Tree), computed to predict the target column values. It contains columns that represent the conditions and the conditions' criteria in the decision tree, a prediction for each group, and prediction confidence. The Inbuilt Tree Diagram visualization can be used to visualize this decision tree.

The CARTree dataset is outputted when you select these model and algorithm combinations.

<b>Model</b>	<b>Algorithm</b>
Numeric	CART for Numeric Prediction
Binary Classification	CART (Decision Tree)
Multi Classification	CART (Decision Tree)

### **Classification Report**

This dataset is a tabular representation of the accuracy metrics for each distinct value of the target column. For example, if the target column can have the two distinct values Yes and No, this dataset shows accuracy metrics like F1, Precision, Recall, and Support (the number of rows in the training dataset with this value) for every distinct value of the target column.

The Classification dataset is outputted when you select these model and algorithm combinations.

Model	Algorithms
Binary Classification	Naive Bayes Neural Network Support Vector Machine
Multi Classification	Naive Bayes Neural Network Support Vector Machine

### Confusion Matrix

This dataset, which is also called an error matrix, is a pivot table layout. Each row represents an instance of a predicted class, and each column represents an instance in an actual class. This table reports the number of false positives, false negatives, true positives, and true negatives, which are used to compute precision, recall, and F1 accuracy metrics.

The Confusion Matrix dataset is outputted when you select these model and algorithm combinations.

Model	Algorithms
Binary Classification	Logistics Regression CART (Decision Tree) Naive Bayes Neural Network Random Forest Support Vector Machine
Multi Classification	CART (Decision Tree) Naive Bayes Neural Network Random Forest Support Vector Machine

### Drivers

This dataset provides information about the columns that determine the target column values. Linear regressions are used to identify these columns. Each column is assigned coefficient and correlation values. The coefficient value describes the column's weight-age used to determine the target column's value. The correlation value indicates the relationship direction between the target column and dependent column. For example, if the target column's value increases or decreases based on the dependent column.

The Drivers dataset is outputted when you select these model and algorithm combinations.

Model	Algorithms
Numeric	Linear Regression Elastic Net Linear Regression

Model	Algorithms
Binary Classification	Logistics Regression Support Vector Machine
Multi Classification	Support Vector Machine

### Hitmap

This dataset contains information about the decision tree's leaf nodes. Each row in the table represents a leaf node and contains information describing what that leaf node represents, such as segment size, confidence, and expected number of rows. For example, expected number of correct predictions = Segment Size \* Confidence.

The Hitmap dataset is outputted when you select these model and algorithm combinations.

Model	Algorithm
Numeric	CART for Numeric Prediction

### Residuals

This dataset provides information on the quality of the residual predictions. A residual is the difference between the measured value and the predicted value of a regression model. This dataset contains an aggregated sum value of absolute difference between the actual and predicted values for all columns in the dataset.

The Residuals dataset is outputted when you select these model and algorithm combinations.

Model	Algorithms
Numerics	Linear Regression Elastic Net Linear Regression CART for Numeric Prediction
Binary Classification	CART (Decision Tree)
Multi Classificatin	CART (Decision Tree)

### Statistics

This dataset's metrics depend upon the algorithm used to generate it. Note this list of metrics based on algorithm:

- Linear Regression, CART for Numeric Prediction, Elastic Net Linear Regression - These algorithms contain R-Square, R-Square Adjusted, Mean Absolute Error(MAE), Mean Squared Error(MSE), Relative Absolute Error(RAE), Related Squared Error(RSE), Root Mean Squared Error(RMSE).
- CART(Classification And Regression Trees), Naive Bayes Classification, Neural Network, Support Vector Machine(SVM), Random Forest, Logistic Regression - These algorithms contain Accuracy, Total F1.

This dataset is outputted when you select these model and algorithm combinations.

Model	Algorithm
Numeric	Linear Regression Elastic Net Linear Regression CART for Numeric Prediction
Binary Classification	Logistics Regression CART (Decision Tree) Naive Bayes Neural Network Random Forest Support Vector Machine
Multi Classification	Naive Bayes Neural Network Random Forest Support Vector Machine

### Summary

This dataset contains information such as Target name and Model name.

The Summary dataset is outputted when you select these model and algorithm combinations.

Model	Algorithms
Binary Classification	Naive Bayes Neural Network Support Vector Machine
Multi Classification	Naive Bayes Neural Network Support Vector Machine

## Find a Predictive Model's Related Datasets

Related datasets are generated when you train a predictive model.

Depending on the algorithm, related datasets contain details about the model like: prediction rules, accuracy metrics, confusion matrix, key drivers for prediction, and so on. These parameters help you understand the rules the model used to determine the predictions and classifications.

1. On the Home page, click **Navigator**, and then click **Machine Learning**.
2. Click the **Models** tab.
3. Click the menu icon for a training model and select **Inspect**.
4. Click the **Related** tab to access the model's related datasets.
5. Double-click a related dataset to view it or to use it in a workbook.

## Add a Predictive Model to a Workbook

When you create a scenario in a workbook, you apply a predictive model to the workbook's dataset to reveal the trends and patterns that the model was designed to find.



### Note:

You can't apply an Oracle machine learning model to a workbook's data.

After you add the model to the workbook and map the model's inputs to the dataset's columns, the Data Panel contains the model's objects, which you can drag and drop onto the canvas. Machine learning generates the model's values based on the visualization's corresponding data columns.

1. On the Home page, click **Create**, and then click **Workbook**.
2. Select the dataset that you want to use to create the workbook and click **Add to Workbook**.
3. In the Data pane, click **Add**, and select **Create Scenario**.
4. In the Create Scenario - Select Model dialog, select a model and click **OK**.

You can only apply a predictive model. You can't apply an Oracle machine learning model.

If each model input can't be matched to a data element, then the Map Your Data to the Model dialog is displayed.

5. If the Map Your Data to the Model dialog is displayed, then in the **Dataset** field, select the dataset to use with the model.
6. Match the model input and data elements as needed. Click **Done**.  
The scenario is displayed as a dataset in the Data Elements pane.
7. Drag and drop elements from the dataset and the model onto the Visualize canvas.
8. To adjust the scenario, right-click the scenario in the Data Elements pane and select **Edit Scenario**.
9. Change the dataset and update the model input and data elements mapping as needed.
10. Click **Save** to save the workbook.

## Evaluate Machine Learning Models Using Lift and Gain Charts

Lift and gain charts enable you to compare different machine learning models to determine the most accurate model.

### Topics:

- [Overview to Using Lift and Gain Charts](#)
- [Generate Predictive Data for Lift and Gain Charts](#)

- [Evaluate a Machine Learning Model Using a Lift and Gain Chart](#)

## Overview to Using Lift and Gain Charts

Lift and gain charts enable you to evaluate predictive machine learning models by charting modeling statistics in a visualization in Oracle Analytics.

When you use a data flow to apply a classification model to a dataset, Oracle Analytics enables you to compute lift and gain values. You can then visualize this data in a chart to help you assess the accuracy of predictive models and determine the best one to use.



### Prerequisites

- Oracle Database or Oracle Autonomous Data Warehouse
- A classification model that includes prediction probability (for example, a multi-classifier model created using the Naive Bayes training script).  
You access existing predictive models in the Machine Learning area in Oracle Analytics.

### Statistics Generated For Lift and Gain Analysis

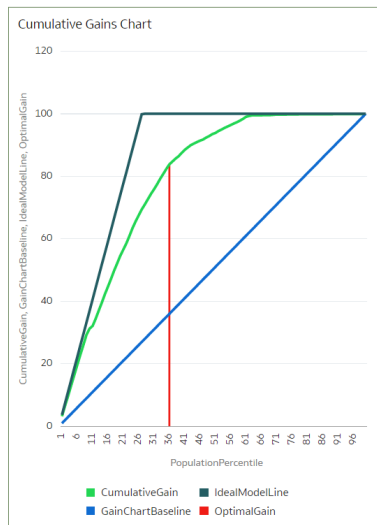
When you apply a predictive classification model to a dataset and generate lift and gain statistics, you produce a dataset named `<Data flow name>_LIFT` with these columns:

- PopulationPercentile - The dataset population split into 100 equal groups.
- CumulativeGain - The ratio of the cumulative number of positive targets up to that percentile, to the total number of positive targets. The closer the cumulative gains line is to the top-left corner of the chart, the greater the gain; the higher the proportion of the responders that are reached for the lower proportion of customers contacted.
- GainChartBaseline - The overall response rate : the line represents the percentage of positive records we expect to get if we selected records randomly. For example, in a marketing campaign, if we contact X% of the customers randomly, we will receive X% of the total positive response.
- LiftChartBaseline - Value of 1 and used as a baseline for lift comparison.
- LiftValue - The cumulative lift for a percentile. Lift is the ratio of the cumulative positive records density for the selected data, to the positive density over all the test data.



- **IdealModelLine** - The ratio of the cumulative number of positive targets to the total number of positive targets.
- **OptimalGain** - This indicates the optimum number of customers to contact. The cumulative gain curve will flatten beyond this point.

You can then visualize the `<Data flow name>_LIFT` dataset in an Oracle Analytics chart. For example, to analyze gains, you might plot PopulationPercentile on the x-axis, and CumulativeGain, GainChartBaseline, IdealModelLine, and OptimalGain on the y-axis.



## Generate Predictive Data for Lift and Gain Charts

When you use a data flow to apply a classification model to a dataset, Oracle Analytics enables you to compute statistics that you can visualize in lift and gain charts.

Before you start, create a classification model that includes prediction probability (for example, a multi-classifier model created using the Naive Bayes training script). Oracle Analytics displays available models on the Models tab on the Machine Learning page (from the Home page, click **Machine Learning**).

1. On the Home page, click **Create**, then click **Data Flow**.
2. Select a data source, then click **Add**.
3. Click **Add a Step**, and select **Apply Model**.
4. At Select Model, select a classification model that includes prediction probability, then click **OK**.
5. In Apply Model, in the **Parameters** section:
  - In **Compute lift and gain**, select **Yes**.
  - In **Target column to compute lift**, select the column name of the value being predicted. For example, if your model predicts whether customers will sign up for a membership using a column named SIGNUP, select SIGNUP.
  - In **Positive class to compute**, specify the case-sensitive data value representing the positive class (or the preferred outcome) in the prediction. For example, if your model predicts whether customers will sign-up for a

membership using a column named SIGNUP with values YES or NO, specify YES.

6. Add a **Save Data** node to your data flow.
7. Execute this data flow.

The data flow produces a dataset named `<Data flow name>_LIFT` that contains lift and gain statistics, which you can evaluate.

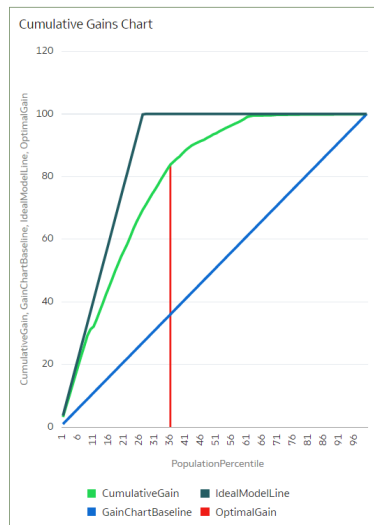
## Evaluate a Machine Learning Model Using a Lift and Gain Chart

Use a chart to analyze statistics generated by machine learning classification models to determine the best model to use.

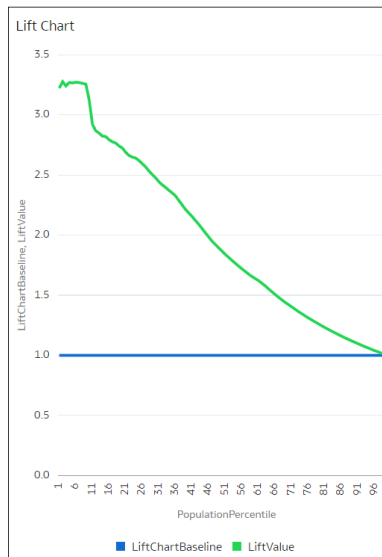
Before you start, apply a predictive model to your data and generate lift and gain statistics in a dataset.

1. On the Home page, click **Create**, then click **Workbook**.
2. In **Add Dataset**, select the `<Data flow name>_LIFT` dataset that you generated in the previous task, then click **Add to Workbook**.
3. In the **Visualize** panel, select the statistics to analyze, then right-click and select **Pick Visualization**, and choose **Line Chart**.

For example, to analyze gains, you might place **PopulationPercentile** on the x-axis, and place **CumulativeGain**, **GainChartBaseline**, **IdealModelLine**, and **OptimalGain** on the y-axis.



To analyze lift, you might place **PopulationPercentile** on the x-axis, and place **LiftChartBaseline**, and **LiftValue** on the y-axis.



## Use Oracle Machine Learning Models in Oracle Analytics

You can register and use Oracle machine learning models from Oracle Database or Oracle Autonomous Data Warehouse to score data in Oracle Analytics. Use the data flow editor to apply the machine learning models to your data.

Oracle Analytics enables you to build machine-learning into your applications without data scientist expertise.

### Topics:

- [How Can I Use Oracle Machine Learning Models in Oracle Analytics?](#)
- [Register Oracle Machine Learning Models in Oracle Analytics](#)
- [Inspect Registered Oracle Machine Learning Models](#)
- [Visualize a Registered Oracle Machine Learning Model's View](#)

## How Can I Use Oracle Machine Learning Models in Oracle Analytics?

Oracle Analytics allows you to register and use Oracle machine learning models from Oracle Database or Oracle Autonomous Data Warehouse.

Using Oracle machine learning models with Oracle Analytics greatly increases the level of predictive analytics that you can perform on datasets because the data and the model reside in the database, the data scoring is performed in the database, and the resulting dataset is stored in the database. This allows you to use the Oracle machine learning execution engine to score large datasets.

You can register and use Oracle machine learning models from these database data sources:

- Oracle Autonomous Data Warehouse
- Oracle Database

In Oracle Analytics you can register any of the database's Oracle machine learning models in the mining classes Classification, Regression, Clustering, Anomaly, or

Feature Extraction that were created using the Oracle Machine Learning for SQL API (OML 4SQL). Your database permissions determine the Oracle machine learning models that are available for you to register and use.

You can also create predictive models in Oracle Analytics.

## Register Oracle Machine Learning Models in Oracle Analytics

The Oracle machine learning models must be registered in Oracle Analytics before you can use them to predict data. You can register and use models that reside in your Oracle Database or Oracle Autonomous Data Warehouse data sources.

1. On the Home page, click **Page Menu**, then **Register Model/Function**, then **Machine Learning Models**.

2. In the Register an ML Model dialog, select a connection.

In the Select a Model to Register dialog, you see the database's Oracle machine learning models in the mining classes Classification, Regression, Clustering, Anomaly, or Feature Extraction that were created using the Oracle Machine Learning for SQL API (OML 4SQL).

If needed, click **Create Connection** to create a connection to the Oracle Database or Oracle Autonomous Data Warehouse data source containing the Oracle machine learning model that you want to use.

3. In the Select a Model to Register dialog, click the model that you want to register and review the model's information. For example, the model class and algorithm used to build the model, the target the model predicts, the columns the model is trained on, model predictions, and parameters.
4. Click **Register**.
5. From the Home page, click **Navigator**, and then click **Machine Learning** to confirm that the model was imported successfully.

## Inspect Registered Oracle Machine Learning Models

You can access and review information about the Oracle machine learning models that you registered in Oracle Analytics.

### Topics:

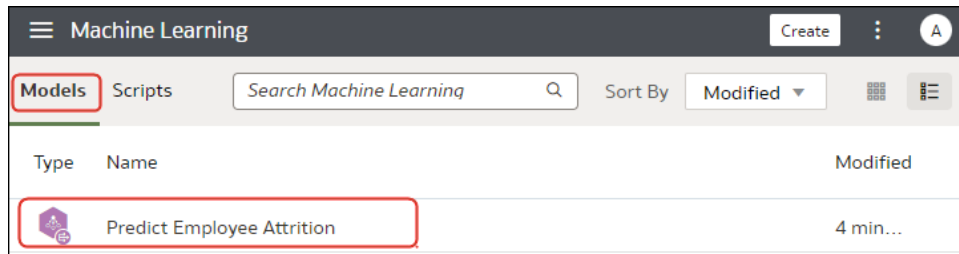
- [View a Registered Model's Details](#)
- [What Are a Registered Model's Views?](#)
- [View a Registered Model's Views List](#)

## View a Registered Model's Details

View an Oracle machine learning model's detail information to help you understand the model and determine if it's suitable for predicting your data. Model details include model class, algorithm, input columns, output columns, and parameters.

When you register a model, its detail information is included. This information is obtained from Oracle Database or Oracle Autonomous Data Warehouse.

1. On the Home page, click **Navigator**, and then click **Machine Learning**.
2. Click the **Models** tab.



3. Hover over the model you want to view, click its **Actions** menu



, and then select **Inspect**.

4. Click **Details** to view the model's information.

## What Are a Registered Model's Views?

When an Oracle machine learning model is created, views containing specific information about the model are generated and stored in the database. Use Oracle Analytics to access a list of a model's views, and then build datasets that you can use to visualize the information contained in the views.

Views contain information about the registered model such as model statistics, target value distribution, and algorithm settings. The number and kind of views created are determined by the model's algorithm. So a model built from the Naive Bayes algorithm has one set of views and a model built from the Decision Tree algorithm has a different set of views. For example, some of the views generated for a Decision Tree model are:

- **Scoring Cost Matrix** - Describes the scoring matrix for classification models. The view contains `actual_target_value`, `predicted_target_value`, and `cost`.
- **Global Name-Value Pairs** - Describes global statistics related to the model like number of rows used in the model build and convergence status.
- **Decision Tree Statistics** - Describes the statistics associated with individual nodes in the decision tree. The statistics include a target histogram for the data in the node. For every node in the tree, this view has information about `predicted_target_value`, `actual_target_value`, and `node support`.

Each view's name is unique, for example `DM$VCDT_TEST`. The format used to generate view names is `DM$VAlphabet_Model Name` where:

- `DM$V` - Represents a prefix for views generated from a registered model.
- `Alphabet` - Represents a value that indicates the type of output model. For example, `C` indicates that the view type is Scoring Cost Matrix, and `G` indicated that the view type is Global Name-Value Pair.
- `Model Name` - Holds the name of the registered Oracle machine learning model and its view. For example, `DT_TEST`.

For more information about views, see the documentation for your Oracle database version.

Oracle Analytics provides a list of any registered model's views. However, you can only access and visualize views for Oracle Database 12c Release 2 or later. If you're working with an early version of Oracle Database, then you can't use Oracle Analytics to access and visualize views.

## View a Registered Model's Views List

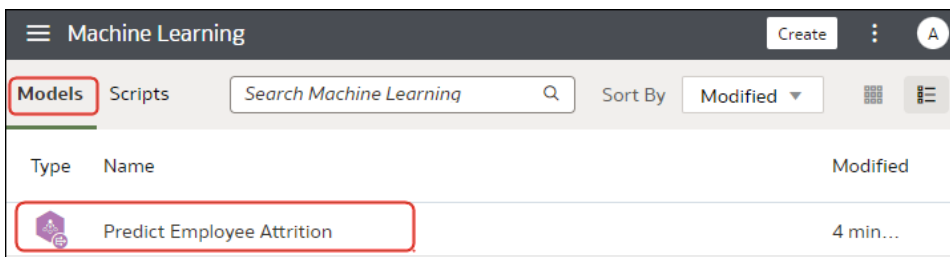
A registered model's views are stored in the database, but you can use Oracle Analytics to display a list of the model's views.


Views contain information such as a model's size, settings, and the attributes used in the model. This information can help you better understand and utilize the model.

### Note:

You can access and visualize views for Oracle Database 12c Release 2 or later. If you're working with an earlier version of Oracle Database, then these views don't exist in the database and you can't use Oracle Analytics to access and visualize them.

1. On the Home page, click **Navigator**, and then click **Machine Learning**.
2. Click the **Models** tab.



3. Hover over the model you want to view, click its **Actions** menu  , and then select **Inspect**.
4. Click the **Related** tab to view a list of the model's views.

## Visualize a Registered Oracle Machine Learning Model's View

Visualize any of a registered model's views to discover information that helps you better understand and utilize the model.



### Note:

You can access and visualize views for Oracle Database 12c Release 2 or later. If you're working with an earlier version of Oracle Database, then these views don't exist in the database and you can't use Oracle Analytics to access and visualize them.

When creating the dataset, you need to know the model's view name and the database schema name. Use the following task to find these names, create the dataset, and visualize the view's information.

1. On the Home Page, click **Navigator**, and then click **Machine Learning**.
2. Locate the registered machine learning model and click its **Actions menu**. Click **Inspect**.
3. Click **Details** and confirm that the **Model Info** section is expanded. Go to the **DB Model Owner** field and record the database schema name.
4. Click **Related** and locate and record the name of the view. Click **Close**.
5. On the Home page, click **Create** and click **Dataset**.
6. Select the connection that contains the machine learning model and its views.
7. In the Dataset editor, browse for and click the database schema name that you located on the **Details** tab.
8. Select the view that you located on the **Related** tab, and double-click columns to add them to the dataset. Click **Add**.
9. Click **Create Workbook** to build visualizations.

## Apply a Predictive or Registered Oracle Machine Learning Model to a Dataset

Use the data flow editor to score a predictive model on any dataset, or score a registered Oracle machine learning model on a dataset in its corresponding database.

Apply predictive models to your data to build machine learning Machine Learning (ML) and Artificial Intelligence (AI) into your applications without requiring ML or AI expertise.

Running the model outputs a new dataset with columns containing predicted values that you can use for analysis and visualization.

When you run a predictive model, the data is moved into and processed by Oracle Analytics. When you run a registered Oracle machine learning model, data isn't moved from the database into Oracle Analytics. Instead the model resides, is processed, and the output dataset is stored in the database.

Use this information to understand the data flow editor and **Apply Model** step options:

- The registered models are displayed and available for review and analyses. Unregistered models aren't displayed.
  - The available output columns are specific to the model type. For example, for numeric prediction, output columns include PredictedValue and PredictedConfidence, and for clustering, output columns include the clusterId.
  - The available parameters are specific to the model type. For example, if you use a clustering model for scoring, maximum null values is a parameter that you can provide for the scoring process. This parameter is used in the missing value imputation.
  - The model and the mapped input data types must match when you're working with an Oracle machine learning model. See View a Registered Model's Details.
1. On the Home page, click **Create**, and then click **Data Flow**.
  2. Select the dataset that you want to apply the model to. Click **Add**.
  3. In the Data Flow editor, click **Add a step (+)**.
  4. From the Data Flow Steps pane, double-click **Apply Model**, and then select the model to use.
  5. In Apply Model, go to the Inputs section, and then select a column as the input.
  6. In Apply Model, go to the Outputs section, and then select the columns that you want created with the dataset, and update the **Column Name** fields as needed.
  7. In the data flow editor, click **Add a step (+)** and select **Save Data**.
  8. Enter a name. In the **Save data to** field, specify the location for saving the output data.  
If you're working with an Oracle machine learning model, then the dataset's connection information defaults to the input dataset's connection.
  9. Set data preferences as needed in the **Treat As** and **Default Aggregation** fields.  
When you save data, the apply model appends the model's output columns that you selected to the input dataset.
  10. Click **Save**, enter a name and description for the data flow, and click **OK** to save the data flow.
  11. Click **Run Data Flow** to create the dataset.



# 16

## Import, Export, and Share

This topic describes how to import, export, and share your workbooks, visualizations, and stories with other users.

### Topics:

- [Import a Workbook File](#)
- [Export a Workbook or Folder as a File](#)
- [Share a Workbook URL with a Specific Canvas Selected](#)
- [Export a Visualization From the Visualize or Present Page](#)
- [Export Formatted Data from a Visualization to Excel](#)
- [Export a Visualization's Data to a CSV File](#)
- [Email Workbooks and Folders](#)
- [Email a File of a Visualization, Canvas, or Dashboard](#)
- [Print a Visualization, Canvas, or Dashboard](#)

## Import a Workbook File

You can import a workbook file (.dva file) that was exported from Analytics Cloud or Oracle Analytics Desktop. You can also import workbooks that were exported from Oracle Fusion Cloud Applications Suite.

Oracle Analytics might prompt for a password to access the workbook's data.

The import includes everything that you need to use the workbook such as associated datasets, connection string, connection credentials, and stored data.



### Note:

You can import a workbook file exported from the same version (or earlier version) as your Oracle Analytics environment. For example, if you exported a workbook from an Oracle Analytics environment that includes the May 2022 update, then you can import it into other Oracle Analytics environments that include the May 2022 update or a later update (such as July 2022).

However, you might experience unexpected results if you import a workbook that was exported from a more recent update of Oracle Analytics. For example, if you export a workbook from an Oracle Analytics environment that includes the September 2022 update, then Oracle doesn't recommend that you import this workbook into an Oracle Analytics environment that includes an earlier update, such as June 2022.

1. On the Home page, click the **Page Menu** icon and then select **Import Workbook/Flow**.

2. In the Import Workbook/Flow dialog, click **Select File** or drag a workbook file onto the dialog, and then click **Import**.

Following a successful import, check that your imported connections are valid by opening and saving them. See Edit a Data Source Connection.

## Export a Workbook or Folder as a File

You can export a workbook or folder as an archive file (.DVA) for backup purposes or to provide to another user for import into their instance of Analytics Cloud or Oracle Analytics Desktop.

Exporting is a way to share workbooks and files with other users or move workbooks and files between Analytics Cloud and Oracle Analytics Desktop. The .DVA file is for export and import, and you can't open it with an application other than Analytics Cloud or Oracle Analytics Desktop.

The .DVA file includes items that you specify such as the associated datasets, connection strings, connection credentials, and stored data.

1. On the Home page, click **Navigator**, and then click **Catalog**.
2. In the Catalog page, highlight the workbook or folder that you want to share and click **Actions menu**, then select **Export** to open the Export dialog.
3. Click **File**.
4. For **Name**, keep the default name or enter a new name for the export file (.DVA file).
5. Enable the **Include Data** option to include the data when sharing a workbook or folder.
6. Enable the **Include Connection Credentials** option so that users can open the workbook without having to sign in. Use the following guidelines to set this field:
  - **Excel, CSV, or TXT data sources** - These data sources don't use a data connection, therefore you can clear the **Include Connection Credentials** option.
  - **Database data sources** - If you enable the **Include Connection Credentials** option, the users must provide a valid user name and password to load data into the imported workbook.
  - - make sure that you also select the **Always use these credentials** option in the **Authentication** field on the Create Connection dialog.

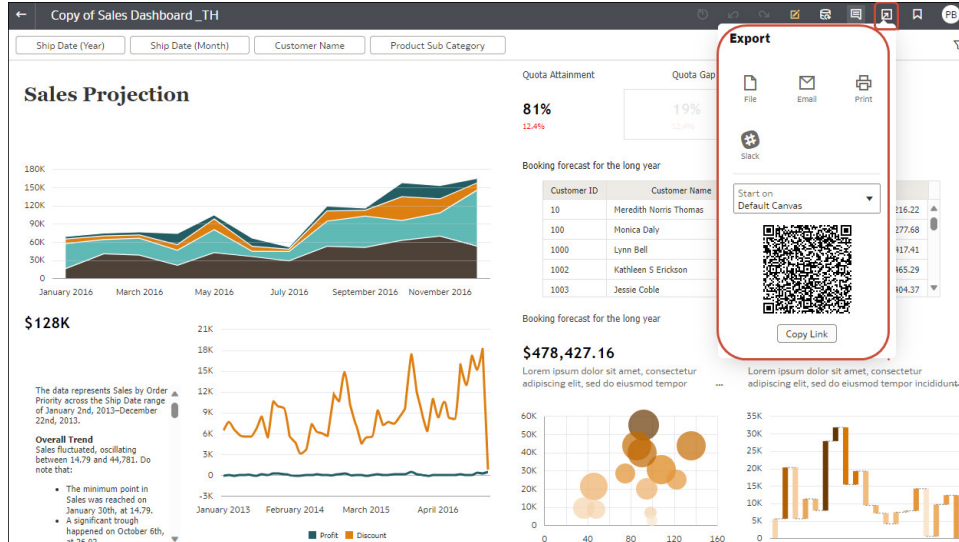
If you clear the **Include Connection Credentials** option or specify the **Require users to enter their own credentials** option in the **Authentication** field, then users must provide a valid user name and password to load data into the imported workbook.
7. If you enable **Include Data** or **Include Connection Credentials**, enter and confirm a password that the user must provide to import the workbook or folder and decrypt its connection credentials and data.
8. Click **Save** to export to a .DVA file.
9. Click **OK** to specify that you want to save the .DVA file rather open it in your browser.
10. Browse to a folder where you want to save the .DVA file.

11. Click **Save** to save the .DVA file to the folder that you specified.

## Share a Workbook URL with a Specific Canvas Selected

You can create a URL that displays a specific workbook canvas and then share the URL so that other users can display the workbook canvas without having to use the user interface to navigate to the specific workbook canvas.

1. On the Home page, select a workbook containing the canvas that you want to share, click the **Actions menu**, and then select **Open**
2. On the Visualize or Present canvas, click the **Export** icon in the workbook toolbar.



3. From the **Start On** list, select a canvas.
  - Use **Default Canvas** to select the canvas that the workbook opens to based on how the workbook was saved.
  - Use **Selected Canvas** to select the canvas that you're currently viewing.
4. Click **Copy Link** and share the URL with other users.
5. Optional: Share the QR code to scan and open the workbook URL on a mobile device.

## Export a Visualization From the Visualize or Present Page

You can export a visualization in a variety of formats: DVA (a visualization workbook file), Powerpoint (PPTX), Adobe Acrobat (PDF), PNG, or CSV (data only).

1. On the Home page, select a workbook containing the visualization that you want to export, click the **Actions menu**, and then select **Open**.
2. Go to the Visualize or Present canvas and click the visualization that you want to export.
3. In the visualization's toolbar, click **Menu**, and **Export**, and then click **File**.
4. In the **Format** field, select the output format you want and specify the output options:
  - For **Powerpoint (pptx)**, **Acrobat (pdf)**, and **Image (png)** — Specify the file name, paper size, and orientation.

When you share any of these visual formats, the visualization is re-rendered based on the size and orientation you select. So if you're sharing a table, then your output

file might not contain all of the table's rows and columns displayed in your visualization.

- For **Data (csv)** — Specify the output file name. This option only includes the data used in the workbook. The outputted file uses the data delimiter for your computer's locale. For example, if your locale is set to Brazil, then the delimiter for numeric decimals is a comma instead of a period, which is used when your locale is set to United States.
  - For **Package (dva)** — Specify whether to include workbook data and connection credentials. To enable users to open the workbook DVA file without having to enter a password, click **Include Connection Credentials** and specify the password.
5. In the **Include** field, select **Active Visual**.
  6. Click **Save**.

## Export Formatted Data from a Visualization to Excel

You can export formatted data from table and pivot table visualizations to the Microsoft Excel (XLSX) format.

Filters applied to data in your workbook are also applied to data in the exported file. You can export a visualization with 25,000 rows or fewer.

1. On the Home page, select a workbook containing the table or pivot table visualization you want to export, click the **Actions menu**, and then select **Open**.
2. In the visualization canvas, right-click the table or pivot table visualization that you want to export data for.
3. Select **Export**, and then select **File**.
4. In the File dialog, go to the **Format** field and select **Excel**.
5. In the **Include** field, select **Active Visual**.
6. Click **Save**.
7. Select a location in your local file system to save the Excel file.
8. Click **Save**.

## Export a Visualization's Data to a CSV File

You can export the data from a visualization to a CSV file. This allows you to open the file and work with the data in an application such as Excel.

1. Open the workbook that contains the visualization that you want to export data for.
2. In the Visualize or Present canvas, click the visualization that you want to export data for to select it.
3. Go to the workbook toolbar, and then click **Export**.
4. In the File dialog, go to the **Format** field and select Data (csv).
5. Click **Save**.

The exported file uses the data delimiter for your computer's locale. For example, if your locale is set to Brazil, then the delimiter for numeric decimals is a comma.

## Email Workbooks and Folders

You can email the .DVA file of a workbook or folder to other users.

Selecting the option to email a workbook or folder initiates an export process that produces a .DVA file. The .DVA file includes everything needed to use the workbook or folder (such as associated datasets, the connection string and credentials, and stored data)

1. On the Home page, click **Navigator**, and then click **Catalog**.
2. On the Catalog page select the workbook or folder that you want to share and click **Actions menu**, then select **Export** to open the Export dialog.
3. Click **Email** to open the Email dialog.
4. Enable the **Include Data** option if you're sharing a workbook or folder that uses an Excel data source and you want to include the data with the export.
5. Enable the **Connection Credentials** option if retrieving the data requires connection credentials. Then enter and confirm the password.

If your workbook or folder includes data from Oracle Applications or a database and you've selected the **Include Data** option, then enter a password to send to the database for authentication when the user opens the application to access the data. Disable the **Include Data** option if you want users to enter the password when they open the application to access the data.

6. Click **Email**.

Your email client opens a new partially composed email with the .DVA file attached.

## Email a File of a Visualization, Canvas, or Dashboard

You can email visualizations, canvases, or dashboards in formats like Powerpoint (PPTX), Acrobat (PDF), Image (PNG), CSV (data only), or Package (the whole workbook including connection credentials).

1. On the Home page, select a workbook containing the visualization, canvas, or dashboard to export, click the **Actions menu**, and then select **Open**.
2. On the Visualize or Present canvas, click the **Export** icon on the workbook toolbar, then click **Email**.
3. Use the **Format** option to select the output format you want, and specify output options:
  - For **Powerpoint (pptx)**, **Acrobat (pdf)**, and **Image (png)** - Specify the file name, paper size, and orientation.  
When you email any of these visual formats, the visualization or pages are re-rendered based on the size and orientation you select. So if you're emailing a table, then your output file might not contain all of the table's rows and columns included in your visualization, canvas, or dashboard.
  - For **Data (csv)** - Specify the output file name. This option only includes the data used in the workbook. The outputted file uses the data delimiter for your computer's locale. For example, if your locale is set to Brazil, then the delimiter for numeric decimals is a comma instead of a period, which is used when your locale is set to United States.
  - For **Package (dva)** - Specify whether to include workbook data, connection credentials,). To enable users to open the workbook DVA file without having to enter a password, click **Include Connection Credentials** and specify the password.

4. Click **Email**.

Your email client opens a new partially composed email with the .DVA file attached.

## Print a Visualization, Canvas, or Dashboard

You can print your workbook's visualizations, canvases, or dashboards.

When you print, the visualization or pages are re-rendered based on the size and orientation you selected. So if you're printing a table, then your printed copy might not contain all of the table's rows and columns included in your visualization, canvas, or dashboard.

1. On the Home page, select a workbook containing the visualization, canvas, or dashboard to print, click the **Actions menu**, and then select **Open**.
2. On the Visualize or Present canvas, click **Menu**, and **Export**, and then click **Print**.
3. Specify a name, and select an option from the include list.
  - **Name** - You can update the name if needed.
  - **Include** - You can select to print the Active Visual, Active Canvas, or All Canvases. You can also click **Include Filters** (if there are filters), and **Include Title** to include them in the printed output.
  - **Size** - You can use the **Custom** setting (the default size) to print using the height and width displayed on your screen, and optionally select **Scale Proportionally**, or you can select a different size option (for example, US Letter, A4).
  - **Orientation** - You can select whether to print in Landscape or Portrait format.
4. Optional: If filters are in the visualization, workbook, or dashboard, and you want to include them, click **Include Filters**.
5. Optional: If you want to include the title, click **Include Title**.
6. Optional: From the **Size** list, select the paper to use. When using **Custom**, specify the width and height in inches (in), pixels (px), or millimeters (mm).
7. Optional: Select the print format orientation.
8. Click **Print**.

# A

## Frequently Asked Questions

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

### Topics:

- [Oracle Analytics Desktop Installation FAQs](#)
- [Oracle Analytics Desktop Workbook and Data Source FAQs](#)
- [Oracle Analytics Desktop Printing and Exporting FAQs](#)

## Oracle Analytics Desktop Installation FAQs

This topic answers common installation questions.

### How do I install Machine Learning and Advanced Analytics?

Machine learning and advanced analytics are optional components that aren't included in the Oracle Analytics Desktop installation. You must install machine learning to use Diagnostics Analytics (Explain), Machine Learning Studio, or advanced analytics.

See [Install Machine Learning and Advanced Analytics on Windows](#) and [Install Machine Learning and Advanced Analytics on Mac](#).

### Why can't I install Oracle Analytics Desktop?

To perform the installation, you must have administrator privileges. If you try to install without administrator privileges, the following error message is displayed: `Error in creating registry key. Permission denied.`

To check to see if you've the required administrator privileges, go to Windows Control Panel and check your user accounts. If you don't have administrator privileges, then see your administrator to help you set up the required privileges.

### Why can't I successfully upgrade?

If you have issues upgrading, then delete the existing installation and try to the installation again.

### How will I know when to upgrade?

You'll see a message when an update is available. The message will guide you to Oracle Technology Network where you can download the latest installer. See [Oracle Analytics Desktop Installation Download](#).

## Oracle Analytics Desktop Workbook and Data Source FAQs

This topic answers common questions about workbooks and data sources.

### What data sources are supported?

You can use data only from specific types and versions of sources. See [Supported Data Sources](#).

### What if I'm using an unsupported version of Teradata?

If you're using an unsupported version of Teradata, then you must update the `extdriver.paths` configuration file before you can successfully build a connection to Teradata. This configuration file is located here: `C:\<your directory>\AppData\Local\OracleAnalyticsDesktop\extdrvier.paths`. For example, `C:\Users\jsmith\AppData\Local\OracleAnalyticsDesktop\extdriver.paths`.

When updating the `extdriver.paths` configuration file, remove the default Teradata version number and replace it with the Teradata version number that you're using. Make sure that you include `\bin` in the path. For example if you're using Teradata 14.10, change `C:\Program Files\Teradata\Client\15.10\bin` to `C:\Program Files\Teradata\Client\14.10\bin`.

## Oracle Analytics Desktop Printing and Exporting FAQs

This topic answers common questions about printing and exporting.

### Why don't I see images in workbooks or from background maps when I print pages or when I export images in formats such as PDF, PPT, and PNG?

You or a visualization builder might have added an image to a workbook or background map by referencing that image with a URL. For the image to print or be exported in various formats, the external website hosting that image must have the `Access-Control-Allow-Origin` header from the host server, to ensure proper security. If a map background includes an image reference that's taken from an external website that doesn't have this header, you won't see the image.

For more information about this header, see [https://www.w3.org/wiki/CORS\\_Enabled](https://www.w3.org/wiki/CORS_Enabled).



# B

## Troubleshoot Visualization Issues

This topic describes common problems that you might encounter when working with visualizations and explains how to solve them.

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

When you're trying to import a workbook, you might receive the following error message:

"There is already a workbook, data source or connection with the same name as something you're trying to import. Do you want to continue the import and replace the existing content?"

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

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

### **When I try to build a connection to Teradata, I get an error and the connection is not saved**

When you're trying to create a connection to Teradata, you might receive the following error message:

"Failed to save the connection. Cannot create a connection since there are some errors. Please fix them and try again."

This error message is displayed because the version of Teradata that you're using is different from the version supported by Oracle Analytics Desktop. To resolve this issue, update the `extdriver.paths` configuration file. This configuration file is located here: `C:\<your directory>\AppData\Local\OracleAnalyticsDesktop\extdriver.paths`. For example, `C:\Users\jsmith\AppData\Local\OracleAnalyticsDesktop\extdriver.paths`.

To update the `extdriver.paths` configuration file, remove the default Teradata version number and replace it with the Teradata version number that you're using. Make sure that you include `\bin` in the path. For example if you're using Teradata 14.10, then change `C:\Program Files\Teradata\Client\15.10\bin` to `C:\Program Files\Teradata\Client\14.10\bin`. See [What if I'm using a Teradata version different than the one supported by Oracle Analytics Desktop?](#)

### **I have issues when I try to refresh data for file-based data sources**

Keep in mind the following requirements when you refresh data for Microsoft Excel, CSV, or TXT data sources:

- To refresh an Excel file, ensure that the newer spreadsheet file contains a sheet with the same name as the original file you uploaded. If a sheet is missing, then you must fix the file to match the sheets in the original uploaded file.
- If the Excel, CSV, or TXT file that you reload is missing some columns, then you'll get an error stating that your data reload has failed. If this happens, then you must fix the file to match the columns in the original uploaded file.
- If the Excel, CSV, or TXT file you used to create the data source was moved or deleted, then the connection path is crossed out in the Data Source dialog. You can reconnect the data source to its original source file, or connect it to a replacement file, by right-clicking the data source in the Display pane and in the Options menu select **Reload Data**. You can then browse for and select the file to load.
- If you reloaded an Excel, CSV, or TXT file with new columns, then the new columns are marked as hidden and don't display in the Data Panel for existing workbooks using the dataset. To unhide these columns, click the **Hidden** option.

Your Excel spreadsheets must have a specific structure. See [About Files for Datasets](#).

### I can't refresh data from a MongoDB data source

The first time you connect to MongoDB, the MongoDB driver creates a cache file. If the MongoDB schema was renamed and you try to reload a MongoDB data source or use the data source in a workbook, then you might get an error or Oracle Analytics doesn't respond.

To correct this error, you need to clear the MongoDB cache. To clear the cache, delete the contents of the following directory: `C:\<your directory>\AppData\Local\Progress\DataDirect\MongoDB_Schema`. For example,  
`C:\Users\jsmith\AppData\Local\Progress\DataDirect\MongoDB_Schema`

### Where can I find files to help me diagnose a technical issue?

You can generate a diagnostic dump file to help resolve a specific issue. This file contains the following information:

- Update information
- Installer logs
- Application component logs containing status information for Oracle Business Intelligence Presentation Server, Oracle Business Intelligence Server, and other critical components
- Jetty logs
- Data Security Standard (DSS) logs
- Webcat metadata plugin logs
- Derby logs
- Server Administration Workbench (SAW) Server logs
- Oracle Business Intelligence Presentation Server logs
- Oracle Business Intelligence Server logs

1. Open the command prompt and change the directory to the Oracle Analytics Desktop installation directory (for example, C:\Program Files\Oracle Analytics Desktop).
2. Type `diagnostic_dump.cmd` and then provide a name for the .zip output file (for example, `output.zip`).
3. Press Enter to execute the command.  
You can find the diagnostic output .zip file in your installation directory.

**I need to find more information about a specific issue**

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

You can find the forum here: [Oracle Community Forum](#).

# C

## Accessibility Features and Tips

This topic describes accessibility features and information for Oracle Analytics Desktop.

### Topics:

- [Start Oracle Analytics Desktop with Accessibility Features Enabled](#)
- [Keyboard Shortcuts for Visualizations](#)
- [Keyboard Shortcuts for Data Flow](#)

## Start Oracle Analytics Desktop with Accessibility Features Enabled

You can enable features that improve navigation and make the interface accessible.

To enable the accessibility features, you must start Oracle Analytics Desktop from the command line. Open a command window and enter the following:

On Windows:

```
dvdesktop.exe - sdk
```

On Mac:

```
open /Applications/dvdesktop.app --args -sdk
```

When you run the command, Oracle Analytics Desktop opens in a web browser.

## Keyboard Shortcuts for Visualizations

You can use keyboard shortcuts to navigate and to perform actions in visualizations.

Use these keyboard shortcuts for working in the Visualize canvas.

Task	Keyboard Shortcut
Display the context menu. From the context menu, you can access the Export File option, and add columns to a workbook.	Shift+F10
Print content.	Ctrl+P (Windows) Command+Shift+P (Mac)
Reverse the last undo.	Ctrl+Y
Save a newly created workbook with a specific name.	Ctrl+Shift+S
Save a workbook with the changes.	Ctrl+S
Undo the last change.	Ctrl+Z

Use these keyboard shortcuts for working in tables and pivot tables in the Visualize canvas.

**Information for screen reader users:** Table and pivot table visualizations are interactive data grids. These data visualizations are not static table views, and therefore screen readers won't recognize these visualizations as table objects.

Task	Keyboard Shortcut
Display context menu.	SHIFT+F10
Move accessibility focus to the cell to the left.	Left Arrow
Move accessibility focus to the cell to the right.	Right Arrow
Move focus to first row.	HOME
Move focus to last row.	END
Move focus to the column header.	CTRL+Up Arrow
Move focus to the next row.	Down Arrow
Move focus to the previous row. If at the first data row then move to the column header.	Up Arrow
Move the focus in a table. The first Shift+Tab into the Table moves focus to the first column header. The second Shift+Tab moves focus to the previous focusable element outside of the Table data visualization.	SHIFT+TAB
Move the focus in a table or pivot table. The first Tab into the Table or Pivot Table moves focus to the first column header. The second Tab moves focus to the next focusable element outside of the Table data visualization.	TAB
Select and move focus to the next row or data cell.	SHIFT+Down Arrow
Select and move focus to the previous row.	SHIFT+Up Arrow

Use these keyboard shortcuts while working on a visualization in the Visualize canvas.

Task	Keyboard Shortcut
Copy a visualization to paste it to another canvas in the workbook or to a canvas in another workbook.	Ctrl+C
Delete a visualization.	Delete key
Duplicate a visualization.	Ctrl+D
Paste the visualization into a canvas in the workbook or into a canvas in another workbook.	Ctrl+V

Use these keyboard shortcuts while working with a filter in the filter panel on the filter bar.

Task	Keyboard Shortcut
Add the search string to the selection list.	Ctrl+Enter

Use these keyboard shortcuts when you want to open, create, or edit artifacts such as datasets, workbooks, data flows, and sequences in a new tab or window.

Task	Keyboard Shortcut
Open an artifact in a new browser tab.	Ctrl+Click the artifact
Open an artifact in a new browser window.	Shift+Click the artifact

Use these keyboard shortcuts for working in the Grammar Panel.

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<b>Task</b>	<b>Keyboard Shortcut</b>
Copy	Ctrl/Cmd+C
Cut	Ctrl/Cmd+X
Navigate backwards	Shift+tab
Navigate forwards	Tab
Paste	Ctrl/Cmd+V

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## Keyboard Shortcuts for Data Flow

Use these keyboard shortcuts to perform actions in the data flow editor.

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<b>Task</b>	<b>Keyboard Shortcut</b>
Undo the last change.	Ctrl + Z / Command + Z
Reverse the last undo.	Ctrl + Y / Command + Y

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# D

## Data Sources and Data Types Reference

Find out about supported data sources, databases, and data types.

### Topics

- [Supported Data Sources](#)
- [About the Oracle Applications Connector](#)
- [Certification - Supported Data Types](#)

## Supported Data Sources

With Oracle Analytics Desktop, you can connect to many different data sources. Data sources are sorted alphabetically by Oracle databases first, then other databases.

Data Source/ Connection Type	Version	Oracle Analytics Desktop for Windows	Oracle Analytics Desktop for Mac	More Information
Oracle Applications	Use the Oracle Applications connection type to connect to Oracle Fusion Cloud Applications Suite and on-premises Oracle BI Enterprise Edition deployments.	Yes	Yes	Connector supports several Oracle SaaS Applications. See <a href="#">About the Oracle Applications Connector</a> . See also <a href="#">Connect to an Application in Oracle Fusion Cloud Applications Suite</a> .

Data Source/ Connection Type	Version	Oracle Analytics Desktop for Windows	Oracle Analytics Desktop for Mac	More Information
Oracle Autonomous Data Warehouse	-	Yes	Yes	<p>Connection to public IP address only. You can connect to multiple Oracle Autonomous Data Warehouse data sources. Upload a wallet for each connection.</p> <p>Supports saving output from data flows.</p> <p>See <a href="#">Connect to Oracle Autonomous Data Warehouse</a> .</p> <p>As an alternative, you can also connect to Oracle Autonomous Data Warehouse using Delta Sharing. Use the <b>Delta Share</b> connection type. See <a href="#">Connect to a Database Using Delta Sharing</a>.</p>
Oracle Database	11.2.0.4+ 12.1+ 12.2+ 18+ 19+	Yes	Yes	<p>Use the Oracle Database connection type to connect to Oracle Database Classic Cloud Service.</p> <p>You can connect to multiple database services. Upload a wallet for each connection.</p> <p>Supports saving output from data flows.</p> <p>Ensure that the appropriate security access rules are in place to allow a network connection to the database service on the database listening port.</p> <p>See <a href="#">Connect to an Oracle Database</a>.</p>
Oracle Essbase	11.1.2.4.0+ 21c	Yes	Yes	<p>See <a href="#">Create a Connection to Oracle Essbase</a>.</p> <p>You can't use Oracle Essbase datasets in Data Flows.</p> <p>You can't blend datasets that use Oracle Essbase data sources.</p>
Oracle Netsuite	Netsuite Release 2019.2 (JDBC Driver 8.10.85.0)	Yes	Yes	-
Oracle Fusion Cloud B2C Service	1.2	Yes	No	-
Oracle Talent Acquisition	-	Yes	Yes	-
Action Ingres	5.0+	Yes	No	-
Action Matrix	5.0+	Yes	No	-
Action Vector	5.0+	Yes	No	-




Data Source/ Connection Type	Version	Oracle Analytics Desktop for Windows	Oracle Analytics Desktop for Mac	More Information
Amazon Aurora	-	Yes	No	-
Amazon EMR	Amazon EMR 4.7.2 running Amazon Hadoop 2.7.2 and Hive 1.0.0 Amazon EMR (MapR) - Amazon Machine Image (AMI) 3.3.2 running MapR Hadoop M3 and Hive 0.13.1	Yes	No	Complex data types not supported.
Amazon Redshift	1.0.1036 +	Yes	No	-
Apache Drill	1.7+	Yes	No	-
Apache Hive	2.3.0+ 3.0+	Yes	No	Supports Kerberos. Supports saving output from data flows.
Cassandra	3.10	Yes	No	-
Centrica	TBD	Yes	Yes	-
CSV File	-	Yes	Yes	-
DB2	10.1+ 10.5+	Yes	No	-
DataBricks	-	Yes	No	Use the <b>Delta Share</b> connection type. See <a href="#">Connect to a Database Using Delta Sharing</a> .
Delta Share	-	Yes	No	See <a href="#">Connect to a Database Using Delta Sharing</a> .
DropBox	-	Yes	No	-
Elastic Search	5.6.4+	Yes	-	-
Google Analytics	V4	Yes	No	-
Google Universal Analytics (Legacy)	Universal Analytics	Yes	No	-
Google Cloud	-	Yes	No	-
Google Drive	-	Yes	No	-
GreenPlum	4.3.8+	Yes	No	-
HortonWorks Hive	1.2+	Yes	No	Supports Kerberos. Supports saving output from data flows.

Data Source/ Connection Type	Version	Oracle Analytics Desktop for Windows	Oracle Analytics Desktop for Mac	More Information
HP Vertica	7+	Yes	No	-
IBM BigInsights Hive	1.2+	Yes	No	Supports Kerberos.
Impala	2.7+	Yes	No	-
Informix	12.1+	Yes	No	-
JDBC	Generic JDBC driver support	Yes	No	See <a href="#">Connect to Data Using JDBC</a> .
MapR Hive	1.2+	-	-	Supports Kerberos. Supports saving output from data flows.
Microsoft Access	2013 2016	Yes	No	-
Microsoft Azure SQL Database	-	Yes*	TBD	* Use the <b>SQL Server</b> connection type on the Create Connection page.
Microsoft Azure Synapse Analytics	-	Yes	Yes	-
Microsoft Excel	-	Yes	Yes	Only XLSX files (and XLS with unpivoted data).
MonetDB	5+	Yes	No	-
MongoDB	3.2.5	Yes	No	-
MySQL	5.6+ 5.7+	Yes	No	Connections to MySQL Community Edition aren't supported.
MySQL Heatwave	8.0.31+Not e: (Cloud offering – current latest cloud version supported)	Yes	Yes	-
Netezza	7	Yes	No	-
OData	4.0+	Yes	No	-
ODBC	Generic ODBC driver support	-	-	-
Pivotal HD Hive	-	Yes	No	Supports Kerberos.
PostgreSQL	9.0+	Yes	No	-
Presto	-	Yes	No	-
Salesforce	-	Yes	No	-
Snowflake Data Warehouse	Current version	Yes	Yes	See <a href="#">Connect to Snowflake Data Warehouse</a> .
Spark	1.6+	Yes	No	Supports saving output from data flows.

Data Source/ Connection Type	Version	Oracle Analytics Desktop for Windows	Oracle Analytics Desktop for Mac	More Information
SQL Server	2014 2016	Yes	No	-
Sybase ASE	15.7+	Yes	No	-
Sybase IQ	16+	Yes	No	-
Teradata	14 15 16 16.10	Yes	No	-
Teradata Aster	6.10+	Yes	No	-

## About the Oracle Applications Connector

The "Oracle Applications" connection type (  ) enables you to use Oracle Analytics to visualize data from applications in Oracle Fusion Cloud Applications Suite. For example, Oracle Fusion Cloud Financials. You can also use the "Oracle Applications" connection type to connect to your on-premises Oracle BI Enterprise Edition deployments (if patched to an appropriate level) or connect to another Oracle Analytics service.

You can connect to these applications in Fusion Applications Suite:

- Oracle Fusion Cloud Financials
- Oracle Fusion Cloud Human Capital Management
- Oracle Fusion Cloud Loyalty
- Oracle Fusion Cloud Procurement
- Oracle Fusion Cloud Project
- Oracle Fusion Cloud Supply Chain Planning
- Oracle Sales Automation

### Note:

When you connect to applications in Fusion Applications Suite, you access the data from an Oracle Transactional Business Intelligence report. These reports are subject to caching in Oracle Transactional Business Intelligence, and the data available in Oracle Analytics is based on the cached data. You can't control the cache behavior in Oracle Transactional Business Intelligence from Oracle Analytics.

# Certification - Supported Data Types

Here're the supported data types for Oracle Analytics.

**Topics:**

- [Supported Base Data Types](#)
- [Supported Data Types by Database](#)

## Supported Base Data Types

When reading from a data source, Oracle Analytics attempts to map incoming data types to the supported data types.

For example, a database column that contains only date values is formatted as a DATE, a spreadsheet column that contains a mix of numerical and string values is formatted as a VARCHAR, and a data column that contains numerical data with fractional values uses DOUBLE or FLOAT.

In some cases Oracle Analytics can't convert a source data type. To work around this data type issue, you can manually convert a data column to a supported type by entering SQL commands. In other cases, Oracle Analytics can't represent binary and complex data types such as BLOB, JSON, and XML.

Note that some data types aren't supported. You'll see an error message if the data source contains unsupported data types.

Oracle Analytics supports the following base data types:

- **Number Types** — SMALLINT, SMALLUNIT, TINYINT, TINYUINT, UINT, BIT, FLOAT, INT, NUMERIC, DOUBLE
- **Date Types** — DATE, DATETIME, TIMESTAMP, TIME
- **String Types** — LONGVARCHAR, CHAR, VARCHAR

## Supported Data Types by Database

Oracle Analytics supports the following data types.

Database Type	Supported Data Types
Oracle	BINARY DOUBLE, BINARY FLOAT CHAR, NCHAR CLOB, NCLOB DATE FLOAT NUMBER, NUMBER (p,s), NVARCHAR2, VARCHAR2 ROWID TIMESTAMP, TIMESTAMP WITH LOCAL TIMEZONE, TIMESTAMP WITH TIMEZONE

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**Database Type**    **Supported Data Types**

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DB2    BIGINT  
 CHAR, CLOB  
 DATE, DECFLOAT, DECIMAL, DOUBLE  
 FLOAT  
 INTEGER  
 LONGVAR  
 NUMERIC  
 REAL  
 SMALLINT  
 TIME, TIMESTAMP  
 VARCHAR

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SQL Server    BIGINT, BIT  
 CHAR  
 DATE, DATETIME, DATETIME2, DATETIMEOFFSET, DECIMAL  
 FLOAT  
 INT  
 MONEY  
 NCHAR, NTEXT, NUMERIC, NVARCHAR, NVARCHAR(MAX)  
 REAL  
 SMALLDATETIME, SMALLINT, SMALLMONEY  
 TEXT, TIME, TINYINT  
 VARCHAR, VARCHAR(MAX)  
 XML

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MySQL    BIGINT, BIGINT UNSIGNED  
 CHAR  
 DATE, DATETIME, DECIMAL, DECIMAL UNSIGNED, DOUBLE, DOUBLE UNSIGNED  
 FLOAT, FLOAT UNSIGNED  
 INTEGER, INTEGER UNSIGNED  
 LONGTEXT  
 MEDIUMINT, MEDIUMINT UNSIGNED, MEDIUMTEXT  
 SMALLINT, SMALLINT UNSIGNED  
 TEXT, TIME, TIMESTAMP, TINYINT, TINYINT UNSIGNED, TINYTEXT  
 VARCHAR  
 YEAR

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Apache Spark    BIGINT, BOOLEAN  
 DATE, DECIMAL, DOUBLE  
 FLOAT  
 INT  
 SMALLINT, STRING  
 TIMESTAMP, TINYINT  
 VARCHAR

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<b>Database Type</b>	<b>Supported Data Types</b>
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Teradata	BIGINT, BYTE, BYTEINT CHAR, CLOB DATE, DECIMAL, DOUBLE FLOAT INTEGER NUMERIC REAL SMALLINT TIME, TIMESTAMP VARCHAR
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# E

## Data Preparation Reference

This topic describes the set and types of recommendation and options you can use to perform data transform changes to a dataset.

### Topics:

- [Transform Reference](#)
- [Column Menu Options for Quick Data Transformations](#)

## Transform Reference

Find out about the data transform options that you can access in the transform editor by right-clicking on a dataset column. For example, to categorize racing lap times in a dataset column, you might right-click the 'Lap Time' column and select **Bin**.

Option	Description
<b>Bin</b>	Creates your own custom groups for number ranges. For example, you can create bins for an Age column with age ranges binned into Pre-Teen, Young Adult, Adult, or Senior based on custom requirements.
<b>Convert to Date</b>	Changes the data type of the column to date and deletes any values that aren't dates from the column.
<b>Convert to Number</b>	Changes the data type of the column to number, which deletes any values that aren't numbers from the column.
<b>Convert to Text</b>	Changes the data type of a column to text.
<b>Create</b>	Creates a column based on a function.
<b>Duplicate</b>	Creates a column with identical content of the selected column.
<b>Edit</b>	Edits the column. For example, you can change the name, select another column, or update functions.
<b>Group, Conditional Group</b>	Select <b>Group</b> to create your own custom groups. For example, you can group States together with custom regions, and you can categorize dollar amounts into groups indicating small, medium, and large.
<b>Hide</b>	Hides the column in the Data Panel and in the visualizations. If you want to see the hidden columns, click <b>Hidden columns</b> (ghost icon) on the page footer. You can then unhide individual columns or unhide all the hidden columns at the same time.
<b>Log</b>	Calculates the natural logarithm of an expression.
<b>Lowercase</b>	Updates the contents of a column with the values all in lowercase letters.
<b>Power</b>	Raises the values of a column to the power that you specify. The default power is 2.
<b>Rename</b>	Allows you to change the name of any column.
<b>Replace</b>	Changes specific text in the selected column to any value that you specify. For example, you can change all instances of <i>Mister</i> to <i>Mr.</i> in the column.
<b>Sentence Case</b>	Updates the contents of a column to make the first letter of the first word of a sentence uppercase.

Option	Description
<b>Split</b>	Splits a specific column value into parts. For example, you can split a column called, Name, into first and last name.
<b>Square Root</b>	Creates a column populated with the square root of the value in the column selected.
<b>Uppercase</b>	Updates the contents of a column with the values in all uppercase letters.

## Column Menu Options for Quick Data Transformations

In the transform editor, column options enable you to quickly transform your data. For example, to categorize racing lap times in a dataset column, you might right-click the 'Lap Time' column and select **Bin**.

Options	Description
<b>Bin</b>	Create your custom groups for number ranges.
<b>Convert to Number</b>	Change the data type of the column to number and delete any values that aren't numbers.
<b>Convert to Text</b>	Change the data type of a column to text.
<b>Delete</b>	Select and remove a column from the dataset.
<b>Duplicate</b>	Create a column with data that's identical to the selected column.
<b>Group</b>	Create a custom group to combine related values. For example, you can group states with custom regions and categorize dollar amounts into groups showing small, medium, and large.
<b>Lowercase</b>	Convert all the text in the column to lowercase.
<b>Merge Columns</b>	Combine two or more columns to display as one.
<b>Rename</b>	Change the column name.
<b>Sentence Case</b>	Convert the first letter of the first word to uppercase on each row in a column.
<b>Transform</b>	Modify the column data by using an expression.
<b>Trim</b>	Remove leading and trailing spaces from text data. Oracle Analytics doesn't show leading or trailing spaces in the data preview, but if the original data source contained leading or trailing spaces, this can affect queries.
<b>Uppercase</b>	Convert all the text in the column to uppercase.



# F

## Expression Editor Reference

This section describes the expression elements that you can use in the Expression Editor.

### Topics:

- [SQL Operators](#)
- [Conditional Expressions](#)
- [Functions](#)
- [Constants](#)
- [Types](#)

## SQL Operators

You use SQL operators to specify comparisons and arithmetic operations between expressions.

You can use various types of SQL operators.

Operator	Example	Description	Syntax
BETWEEN	"COSTS"."UNIT_COST" BETWEEN 100.0 AND 5000.0	Determines if a value is between two non-inclusive bounds. BETWEEN can be preceded with NOT to negate the condition.	BETWEEN [LowerBound] AND [UpperBound]
IN	"COSTS"."UNIT_COST" IN(200, 600, 'A')	Determines if a value is present in a set of values.	IN ([Comma Separated List])
IS NULL	"PRODUCTS"."PRODUCT_NAME" IS NULL	Determines if a value is null.	IS NULL
LIKE	"PRODUCTS"."PRODUCT_NAME" LIKE 'prod%'	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 (_).	LIKE
+	(FEDERAL_REVENUE + LOCAL_REVENUE) - TOTAL_EXPENDITURE	Plus sign for addition.	+

Operator	Example	Description	Syntax
-	(FEDERAL_REVENUE + LOCAL_REVENUE) - TOTAL_EXPENDITURE	Minus sign for subtraction.	-
* or X	SUPPORT_SERVICE_S_EXPENDITURE * 1.5	Multiply sign for multiplication.	* X
/	CAPITAL_OUTLAY_EXPENDITURE / 1.05	Divide by sign for division.	/
%		Percentage	%
	STATE    CAST(YEAR AS CHAR(4))	Character string concatenation.	
(	(FEDERAL_REVENUE + LOCAL_REVENUE) - TOTAL_EXPENDITURE	Open parenthesis.	(
)	(FEDERAL_REVENUE + LOCAL_REVENUE) - TOTAL_EXPENDITURE	Close parenthesis.	)
>	YEAR > 2000 and YEAR < 2016 and YEAR <> 2013	Greater than sign, indicating values higher than the comparison.	>
<	YEAR > 2000 and YEAR < 2016 and YEAR <> 2013	Less than sign, indicating values lower than the comparison.	<
=		Equal sign, indicating the same value.	=
>=		Greater than or equal to sign, indicating values the same or higher than the comparison.	>=
<=		Less than or equal to sign, indicating values the same or lower than the comparison.	<=
<>	YEAR > 2000 and YEAR < 2016 and YEAR <> 2013	Not equal to, indicating values higher or lower, but different.	<>
,	STATE in ('ALABAMA', 'CALIFORNIA')	Comma, used to separate elements in a list.	,

# Functions

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

## Topics:

- [Aggregate Functions](#)
- [Analytics Functions](#)
- [Conversion Functions](#)
- [Date and Time Functions](#)
- [Date Extraction Functions](#)
- [Display Functions](#)
- [Evaluate Functions](#)
- [Mathematical Functions](#)
- [Running Aggregate Functions](#)
- [String Functions](#)
- [System Functions](#)
- [Time Series Functions](#)

## Aggregate Functions

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

The following list describes the aggregation rules that are available for columns and measure columns. The list also includes functions that you can use when creating calculated items for analyses.

- **Default** — Applies the default aggregation rule as in the semantic model or by the original author of the analysis. Not available for calculated items in analyses.
- **Server Determined** — Applies the aggregation rule that's determined by the Oracle Analytics (such as the rule that is defined in the semantic model). The aggregation is performed within Oracle Analytics for simple rules such as Sum, Min, and Max. Not available for measure columns in the Layout pane or for calculated items in analyses.
- **Sum** — Calculates the sum obtained by adding up all values in the result set. Use this for items that have numeric values.
- **Min** — Calculates the minimum value (lowest numeric value) of the rows in the result set. Use this for items that have numeric values.
- **Max** — Calculates the maximum value (highest numeric value) of the rows in the result set. Use this for items that have numeric values.
- **Average** — Calculates the average (mean) value of an item in the result set. Use this for items that have numeric values. Averages on tables and pivot tables are rounded to the nearest whole number.
- **First** — In the result set, selects the first occurrence of the item for measures. For calculated items, selects the first member according to the display in the Selected list. Not available in the Edit Column Formula dialog box.

- **Last** — In the result set, selects the last occurrence of the item. For calculated items, selects the last member according to the display in the Selected list. Not available in the Edit Column Formula dialog box.
- **Count** — Calculates the number of rows in the result set that have a non-null value for the item. The item is typically a column name, in which case the number of rows with non-null values for that column are returned.
- **Count Distinct** — Adds distinct processing to the Count function, which means that each distinct occurrence of the item is counted only once.
- **None** — Applies no aggregation. Not available for calculated items in analyses.
- **Report-Based Total (when applicable)** — If not selected, specifies that the Oracle Analytics should calculate the total based on the entire result set, before applying any filters to the measures. Not available in the Edit Column Formula dialog box or for calculated items in analyses. Only available for attribute columns.

Function	Example	Description	Syntax
AGGREGATE AT	AGGREGATE (sales AT year)	<p>Aggregates columns based on the level or levels in the data model hierarchy you specify.</p> <ul style="list-style-type: none"> <li>• <i>measure</i> is the name of a measure column.</li> <li>• <i>level</i> is the level at which you want to aggregate.</li> </ul> <p>You can optionally specify more than one level. You can't specify a level from a dimension that contains levels that are being used as the measure level for the measure you specified in the first argument. For example, you can't write the function as AGGREGATE (yearly_sales AT month) if <i>month</i> is from the same time dimension used as the measure level for <i>yearly_sales</i>.</p>	AGGREGATE (measure AT level [, level1, levelN])
AGGREGATE BY	AGGREGATE (sales BY month, region)	<p>Aggregates a measure based on one or more dimension columns.</p> <ul style="list-style-type: none"> <li>• <i>measure</i> is the name of a measure column to aggregate.</li> <li>• <i>column</i> is the dimension column at which you want to aggregate.</li> </ul> <p>You can aggregate measures based more than one column.</p>	AGGREGATE (measure BY column [, column1, columnN])
AVG	Avg (Sales)	Calculates the average (mean) of a numeric set of values.	AVG (expr)
AVGDISTINCT		Calculates the average (mean) of all distinct values of an expression.	AVG (DISTINCT expr)

Function	Example	Description	Syntax
BIN	<pre>BIN(revenue BY productid, year WHERE productid &gt; 2 INTO 4 BINS RETURNING RANGE_LOW)</pre>	Classifies a given numeric expression into a specified number of equal width buckets. The function can return either the bin number or one of the two end points of the bin interval. <i>numeric_expr</i> is the measure or numeric attribute to bin. BY <i>grain_expr1</i> ,..., <i>grain_exprN</i> is a list of expressions that define the grain at which the <i>numeric_expr</i> is calculated. BY is required for measure expressions and is optional for attribute expressions. WHERE a filter to apply to the <i>numeric_expr</i> before the numeric values are assigned to bins INTO <i>number_of_bins</i> BINS is the number of bins to return BETWEEN <i>min_value</i> AND <i>max_value</i> is the min and max values used for the end points of the outermost bins RETURNING NUMBER indicates that the return value should be the bin number (1, 2, 3, 4, etc.). This is the default. RETURNING RANGE_LOW indicates the lower value of the bin interval RETURNING RANGE_HIGH indicates the higher value of the bin interval	<pre>BIN(numeric_expr [BY grain_expr1, ..., grain_exprN] [WHERE condition] INTO number_of_bins BINS [BETWEEN min_value AND max_value] [RETURNING {NUMBER   RANGE_LOW   RANGE_HIGH}])</pre>
BottomN		Ranks the lowest n values of the expression argument from 1 to n, 1 corresponding to the lowest numerical value.  <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer. Represents the bottom number of rankings displayed in the result set, 1 being the lowest rank.	<pre>BottomN(expr, integer)</pre>
COUNT	<pre>COUNT(Products)</pre>	Determines the number of items with a non-null value.	<pre>COUNT(expr)</pre>
COUNTDISTINCT		Adds distinct processing to the COUNT function.  <i>expr</i> is any expression.	<pre>COUNT(DISTINCT expr)</pre>
COUNT*	<pre>SELECT COUNT(*) FROM Facts</pre>	Counts the number of rows.	<pre>COUNT(*)</pre>
First	<pre>First(Sales)</pre>	Selects the first non-null returned value of the expression argument. The <i>First</i> function operates at the most detailed level specified in your explicitly defined dimension.	<pre>First([NumericExpression])</pre>
Last	<pre>Last(Sales)</pre>	Selects the last non-null returned value of the expression.	<pre>Last([NumericExpression])</pre>
MAVG		Calculates a moving average (mean) for the last n rows of data in the result set, inclusive of the current row.  <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer. Represents the average of the last n rows of data.	<pre>MAVG(expr, integer)</pre>

Function	Example	Description	Syntax
MAX	MAX (Revenue)	Calculates the maximum value (highest numeric value) of the rows satisfying the numeric expression argument.	MAX (expr)
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.	MEDIAN (expr)
MIN	MIN (Revenue)	Calculates the minimum value (lowest numeric value) of the rows satisfying the numeric expression argument.	MIN (expr)
NTILE		Determines the rank of a value in terms of a user-specified range. It returns integers to represent any range of ranks. NTILE with numTiles=100 returns what is commonly called the "percentile" (with numbers ranging from 1 to 100, with 100 representing the high end of the sort).  <i>expr</i> is any expression that evaluates to a numerical value. numTiles is a positive, nonnull integer that represents the number of tiles.	NTILE (expr, numTiles)
PERCENTILE		Calculates a percentile rank for each value satisfying the numeric expression argument. The percentile rank ranges are between 0 (0th percentile) to 1 (100th percentile).  <i>expr</i> is any expression that evaluates to a numerical value.	PERCENTILE (expr)
RANK	RANK (chronological_key, null, year_key_columns)	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're assigned the same rank (for example, 1, 1, 1, 4, 5, 5, 7...).  <i>expr</i> is any expression that evaluates to a numerical value.	RANK (expr)
STDDEV	STDDEV (Sales) STDDEV (DISTINCT Sales)	Returns the standard deviation for a set of values. The return type is always a double.	STDDEV (expr)
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.	STDDEV_POP ([NumericExpression])
SUM	SUM (Revenue)	Calculates the sum obtained by adding up all values satisfying the numeric expression argument.	SUM (expr)

Function	Example	Description	Syntax
SUMDISTINCT		Calculates the sum obtained by adding all of the distinct values satisfying the numeric expression argument. <i>expr</i> is any expression that evaluates to a numerical value.	SUM(DISTINCT <i>expr</i> )
TOPN		Ranks the highest n values of the expression argument from 1 to n, 1 corresponding to the highest numerical value. <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer. Represents the top number of rankings displayed in the result set, 1 being the highest rank.	TOPN( <i>expr</i> , <i>integer</i> )

## Analytics Functions

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

Function	Example	Description	Syntax
TRENDLINE	TRENDLINE( <i>revenue</i> , ( <i>calendar_year</i> , <i>calendar_quarter</i> , <i>calendar_month</i> ) BY ( <i>product</i> ), 'LINEAR', 'VALUE')	Oracle recommends that you apply a Trendline using the <b>Add Statistics</b> property when viewing a visualization. See Adjust Visualization Properties.  Fits a linear, polynomial, or exponential model, and returns the fitted values or model. The <i>numeric_expr</i> represents the Y value for the trend and the <i>series</i> (time columns) represent the X value.	TRENDLINE( <i>numeric_expr</i> , ([ <i>series</i> ]) BY ([ <i>partitionBy</i> ]), <i>model_type</i> , <i>result_type</i> )
CLUSTER	CLUSTER(( <i>product</i> , <i>company</i> ), ( <i>billed_quantity</i> , <i>revenue</i> ), ' <i>clusterName</i> ', 'algorithm=k- means;numClusters=%1;maxI ter=%2;useRandomSeed=FALS E;enablePartitioning=TRUE ' , 5, 10)	Collects a set of records into groups based on one or more input expressions using K-Means or Hierarchical Clustering.	CLUSTER(( <i>dimension_expr1</i> , ... <i>dimension_exprN</i> ), ( <i>expr1</i> , ... <i>exprN</i> ), <i>output_column_name</i> , <i>options</i> , [ <i>runtime_binded_options</i> ])
OUTLIER	OUTLIER(( <i>product</i> , <i>company</i> ), ( <i>billed_quantity</i> , <i>revenue</i> ), ' <i>isOutlier</i> ', 'algorithm=kmeans')	Classifies a record as Outlier based on one or more input expressions using K-Means or Hierarchical Clustering or Multi-Variate Outlier detection Algorithms.	OUTLIER(( <i>dimension_expr1</i> , ... <i>dimension_exprN</i> ), ( <i>expr1</i> , ... <i>exprN</i> ), <i>output_column_name</i> , <i>options</i> , [ <i>runtime_binded_options</i> ])

Function	Example	Description	Syntax
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.	REGR(y_axis_measure_expr, (x_axis_expr), (category_expr1, ..., category_exprN), output_column_name, options, [runtime_binded_options])
EVALUATE_SCRIPT	EVALUATE_SCRIPT('fileremo ://obiee.Outliers.xml', 'isOutlier', 'algorithm=kmeans;id=%1;arg1=%2;arg2=%3;useRandomSeed=False;', customer_number, expected_revenue, customer_age)	Executes a Python script as specified in the <i>script_file_path</i> , passing in one or more columns or literal expressions as input. The output of the function is determined by the <i>output_column_name</i> .	EVALUATE_SCRIPT(script_file_path, output_column_name, options, [runtime_binded_options])

## Conversion Functions

Conversion functions convert a value from one form to another.

Function	Example	Description	Syntax
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 <i>customer_name</i> (a data type of CHAR or VARCHAR) or <i>birthdate</i> (a datetime literal).	CAST(expr AS type)
IFNULL	IFNULL(Sales, 0)	Tests if an expression evaluates to a null value, and if it does, assigns the specified value to the expression.	IFNULL(expr, value)
INDEXCOL	SELECT INDEXCOL(VALUEOF (NQ_SESSION.GEOGRAPHY _LEVEL), Country, State, City), Revenue FROM Sales	Uses external information to return the appropriate column for the signed-in user to see.	INDEXCOL([integer literal], [expr1] [, [expr2], ?-])
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're equal, then the function returns NULL. If they're not equal, then the function returns the first expression. You can't specify the literal NULL for the first expression.	NULLIF([expression], [expression])



Function	Example	Description	Syntax
To_DateTime	SELECT To_DateTime ('2009-03-03 01:00', 'yyyy-mm-dd hh:mi:ss') FROM sales	Converts string literals of <i>DateTime</i> format to a <i>DateTime</i> data type.	To_DateTime ([expression], [literal])
VALUEOF	SalesSubjectArea.Customer.Region = VALUEOF("Region Security"."REGION")	References the value of a semantic model variable in a filter.  Use <i>expr</i> variables as arguments of the VALUEOF function. Refer to static semantic model variables by name.	VALUEOF (expr)

## Date and Time Functions

Date and time functions manipulate data based on `DATE` and `DATETIME`.

Function	Example	Description	Syntax
CURRENT_Date	CURRENT_DATE	Returns the current date.  The date is determined by the system in which the Oracle BI is running.	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  If no argument is specified, the function returns the default precision.	CURRENT_TIME (expr)
CURRENT_TIMESTAMP	CURRENT_TIMESTAMP (3)	Returns the current date/timestamp to the specified number of digits of precision.	CURRENT_TIMESTAMP (expr)
DAYNAME	DAYNAME (Order_Date)	Returns the name of the day of the week for a specified date expression.	DAYNAME (expr)
DAYOFMONTH	DAYOFMONTH (Order_Date)	Returns the number corresponding to the day of the month for a specified date expression.	DAYOFMONTH (expr)
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.	DAYOFWEEK (expr)
DAYOFYEAR	DAYOFYEAR (Order_Date)	Returns the number (between 1 and 366) corresponding to the day of the year for a specified date expression.	DAYOFYEAR (expr)
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.	DAY_OF_QUARTER (expr)
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.	HOUR (expr)

Function	Example	Description	Syntax
MINUTE	MINUTE(Order_Time)	Returns a number (between 0 and 59) corresponding to the minute for a specified time expression.	MINUTE(expr)
MONTH	MONTH(Order_Time)	Returns the number (between 1 and 12) corresponding to the month for a specified date expression.	MONTH(expr)
MONTHNAME	MONTHNAME(Order_Time)	Returns the name of the month for a specified date expression.	MONTHNAME(expr)
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.	MONTH_OF_QUARTER(expr)
NOW	NOW()	Returns the current timestamp. The NOW function is equivalent to the CURRENT_TIMESTAMP function.	NOW()
QUARTER_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.	QUARTER_OF_YEAR(expr)
SECOND	SECOND(Order_Time)	Returns the number (between 0 and 59) corresponding to the seconds for a specified time expression.	SECOND(expr)
TIMESTAMPADD	TIMESTAMPADD(SQL_TSI_MONTH, 12, Time."Order Date")	Adds a specified number of intervals to a timestamp, and returns a single timestamp. Interval options are: SQL_TSI_SECOND, SQL_TSI_MINUTE, SQL_TSI_HOUR, SQL_TSI_DAY, SQL_TSI_WEEK, SQL_TSI_MONTH, SQL_TSI_QUARTER, SQL_TSI_YEAR	TIMESTAMPADD(interval, expr, timestamp)
TIMESTAMPDIFF	TIMESTAMPDIFF(SQL_TSI_MONTH, Time."Order Date", CURRENT_DATE)	Returns the total number of specified intervals between two timestamps. Use the same intervals as TIMESTAMPADD.	TIMESTAMPDIFF(interval, expr, timestamp2)
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_QUARTER(expr)
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.	WEEK_OF_YEAR(expr)
YEAR	YEAR(Order_Date)	Returns the year for the specified date expression.	YEAR(expr)

## Date Extraction Functions

These functions calculate or round-down timestamp values to the nearest specified time period, such as hour, day, week, month, and quarter.

You can use the calculated timestamps to aggregate data using a different grain. For example, you might apply the `EXTRACTDAY()` function to sales order dates to calculate a timestamp for midnight on the day that orders occur, so that you can aggregate the data by day.

Function	Example	Description	Syntax
Extract Day	<pre>EXTRACTDAY("Order Date")</pre> <ul style="list-style-type: none"> <li>2/22/1967 3:02:01 AM returns 2/22/1967 12:00:00 AM.</li> <li>9/2/2022 10:38:21 AM returns 9/2/2022 12:00:00 AM.</li> </ul>	Returns a timestamp for midnight (12 AM) on the day in which the input value occurs. For example, if the input timestamp is for 3:02:01 AM on February 22nd, the function returns the timestamp for 12:00:00 AM on February 22nd.	<code>EXTRACTDAY(expr)</code>
Extract Hour	<pre>EXTRACTHOUR("Order Date")</pre> <ul style="list-style-type: none"> <li>2/22/1967 3:02:01 AM returns 2/22/1967 3:00:00 AM.</li> <li>6/17/1999 11:18:30 PM returns 6/17/1999 11:00:00 PM.</li> </ul>	Returns a timestamp for the start of the hour in which the input value occurs. For example, if the input timestamp is for 11:18:30 PM, the function returns the timestamp for 11:00:00 PM.	<code>EXTRACTHOUR (expr)</code>
Extract Hour of Day	<pre>EXTRACTHOUROFDAY("Order Date")</pre> <ul style="list-style-type: none"> <li>2014/09/24 10:58:00 returns 2000/01/01 10:00:00.</li> <li>2014/08/13 11:10:00 returns 2000/01/01 11:00:00</li> </ul>	Returns a timestamp where the hour equals the hour of the input value with default values for year, month, day, minutes, and seconds.	<code>EXTRACTHOUROFDAY (expr )</code>
Extract Millisecond	<pre>EXTRACTMILLISECOND("Order Date")</pre> <ul style="list-style-type: none"> <li>1997/01/07 15:32:02.150 returns 1997/01/07 15:32:02.150.</li> <li>1997/01/07 18:42:01.265 returns 1997/01/07 18:42:01.265.</li> </ul>	Returns a timestamp containing milliseconds for the input value. For example, if the input timestamp is for 15:32:02.150, the function returns the timestamp for 15:32:02.150.	<code>EXTRACTMILLISECOND (expr)</code>
Extract Minute	<pre>EXTRACTMINUTE("Order Date")</pre> <ul style="list-style-type: none"> <li>6/17/1999 11:18:00 PM returns 6/17/1999 11:18:00 PM.</li> <li>9/2/2022 10:38:21 AM returns 9/2/2022 10:38:00 AM.</li> </ul>	Returns a timestamp for the start of the minute in which the input value occurs. For example, if the input timestamp is for 11:38:21 AM, the function returns the timestamp for 11:38:00 AM.	<code>EXTRACTMINUTE (expr)</code>
Extract Month	<pre>EXTRACTMONTH("Order Date")</pre> <ul style="list-style-type: none"> <li>2/22/1967 3:02:01 AM returns 2/1/1967 12:00:00 AM.</li> <li>6/17/1999 11:18:00 PM returns 6/1/1999 12:00:00 AM.</li> </ul>	Returns a timestamp for the first day in the month in which the input value occurs. For example, if the input timestamp is for February 22nd, the function returns the timestamp for February 1st.	<code>EXTRACTMONTH (expr)</code>

Function	Example	Description	Syntax
Extract Quarter	<p>EXTRACTQUARTER("Order Date")</p> <ul style="list-style-type: none"> <li>2/22/1967 3:02:01 AM returns 1/1/1967 12:00:00 AM, the first day of the first fiscal quarter.</li> <li>6/17/1999 11:18:00 PM returns 4/1/1999 12:00:00 AM, the first day of the second fiscal quarter.</li> <li>9/2/2022 10:38:21 AM returns 7/1/2022 12:00:00 AM, the first day of the third fiscal quarter.</li> </ul> <p><b>Tip:</b> Use QUARTER (expr) to calculate just the ordinal quarter from the returned timestamp.</p>	Returns a timestamp for the first day in the quarter in which the input value occurs. For example, if the input timestamp occurs in the third fiscal quarter, the function returns the timestamp for July 1st.	EXTRACTQUARTER (expr)
Extract Second	<p>EXTRACTSECOND("Order Date")</p> <ul style="list-style-type: none"> <li>1997/01/07 15:32:02.150 returns 1997/01/07 15:32:02.</li> <li>1997/01/07 20:44:18.163 returns 1997/01/07 20:44:18.</li> </ul>	Returns a timestamp for the input value. For example, if the input timestamp is for 15:32:02.150, the function returns the timestamp for 15:32:02.	EXTRACTSECOND (expr)
Extract Week	<p>EXTRACTWEEK("Order Date")</p> <ul style="list-style-type: none"> <li>2014/09/24 10:58:00 returns 2014/09/21.</li> <li>2014/08/13 11:10:00 returns 2014/08/10.</li> </ul>	Returns the date of the first day of the week (Sunday) in which the input value occurs. For example, if the input timestamp is for Wednesday, September 24th, the function returns the timestamp for Sunday, September 21st.	EXTRACTWEEK (expr)
Extract Year	<p>EXTRACTYEAR("Order Date")</p> <ul style="list-style-type: none"> <li>1967/02/22 03:02:01 returns 1967/01/01 00:00:00.</li> <li>1999/06/17 23:18:00 returns 1999/01/01 00:00:00.</li> </ul>	Returns a timestamp for January 1st for the year in which the input value occurs. For example, if the input timestamp occurs in 1967, the function returns the timestamp for January 1st, 1967.	EXTRACTYEAR (expr)

## Display Functions

Display functions operate on the result set of a query.

Function	Example	Description	Syntax
BottomN	BottomN(Sales, 10)	Returns the <i>n</i> lowest values of expression, ranked from lowest to highest.	BottomN ([NumericExpression], [integer])

Function	Example	Description	Syntax
<b>FILTER</b>	<code>FILTER(Sales USING Product = 'widget')</code>	Computes the expression using the given preaggregate filter.	<code>FILTER(measure USING filter_expr)</code>
<b>MAVG</b>	<code>MAVG(Sales, 10)</code>	Calculates a moving average (mean) for the last <i>n</i> rows of data in the result set, inclusive of the current row.	<code>MAVG([NumericExpressi on], [integer])</code>
<b>MSUM</b>	<code>SELECT Month, Revenue, MSUM(Revenue, 3) as 3_MO_SUM FROM Sales</code>	Calculates a moving sum for the last <i>n</i> rows of data, inclusive of the current row.  The sum for the first row is equal to the numeric expression for the first row. The sum for the second row is calculated by taking the sum of the first two rows of data, and so on. When the <i>n</i> th row is reached, the sum is calculated based on the last <i>n</i> rows of data.	<code>MSUM([NumericExpressi on], [integer])</code>
<b>NTILE</b>	<code>NTILE(Sales, 100)</code>	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.	<code>NTILE([NumericExpress sion], [integer])</code>
<b>PERCENTILE</b>	<code>PERCENTILE(Sales )</code>	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.	<code>PERCENTILE([NumericEx pression])</code>
<b>RANK</b>	<code>RANK(Sales)</code>	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're assigned the same rank (for example, 1, 1, 1, 4, 5, 5, 7...).	<code>RANK([NumericExpressi on])</code>
<b>RCOUNT</b>	<code>SELECT month, profit, RCOUNT(profit) FROM sales WHERE profit &gt; 200</code>	Takes a set of records as input and counts the number of records encountered so far.	<code>RCOUNT([NumericExpress sion])</code>
<b>RMAX</b>	<code>SELECT month, profit, RMAX(profit) FROM sales</code>	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.	<code>RMAX([NumericExpressi on])</code>
<b>RMIN</b>	<code>SELECT month, profit, RMIN(profit) FROM sales</code>	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.	<code>RMIN([NumericExpressi on])</code>
<b>RSUM</b>	<code>SELECT month, revenue, RSUM(revenue) as RUNNING_SUM FROM sales</code>	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.	<code>RSUM([NumericExpressi on])</code>

Function	Example	Description	Syntax
TOPN	TOPN(Sales, 10)	Returns the <i>n</i> highest values of expression, ranked from highest to lowest.	TOPN ([NumericExpression], [integer])

## Evaluate Functions

Evaluate functions are database functions that can be used to pass through expressions to get advanced calculations.

Embedded database functions can require one or more columns. These columns are referenced by %1 ... %N within the function. The actual columns must be listed after the function.

Function	Example	Description	Syntax
EVALUATE	SELECT EVALUATE('instr(%1, %2)', address, 'Foster City') FROM employees	Passes the specified database function with optional referenced columns as parameters to the database for evaluation.	EVALUATE([string expression], [comma separated expressions])
EVALUATE_AGGR	EVALUATE_AGGR('R EGR_SLOPE(%1, sales.quantity, market.marketkey )	Passes the specified database function with optional referenced columns as parameters to the database for evaluation. This function is intended for aggregate functions with a GROUP BY clause.	EVALUATE_AGGR('db_agg_function(%1...%N)' [AS datatype] [, column1, columnN])

## Mathematical Functions

The mathematical functions described in this section perform mathematical operations.

Function	Example	Description	Syntax
ABS	ABS(Profit)	Calculates the absolute value of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	ABS( <i>expr</i> )
ACOS	ACOS(1)	Calculates the arc cosine of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	ACOS( <i>expr</i> )
ASIN	ASIN(1)	Calculates the arc sine of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	ASIN( <i>expr</i> )
ATAN	ATAN(1)	Calculates the arc tangent of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	ATAN( <i>expr</i> )

Function	Example	Description	Syntax
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.	ATAN2(expr1, expr2)
CEILING	CEILING(Profit)	Rounds a non-integer numeric expression to the next highest integer. If the numeric expression evaluates to an integer, the CEILING function returns that integer.	CEILING(expr)
COS	COS(1)	Calculates the cosine of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	COS(expr)
COT	COT(1)	Calculates the cotangent of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	COT(expr)
DEGREES	DEGREES(1)	Converts an expression from radians to degrees. <i>expr</i> is any expression that evaluates to a numerical value.	DEGREES(expr)
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.	EXP(expr)
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.	ExtractBit([Source Number], [Digits])
FLOOR	FLOOR(Profit)	Rounds a non-integer numeric expression to the next lowest integer. If the numeric expression evaluates to an integer, the FLOOR function returns that integer.	FLOOR(expr)
LOG	LOG(1)	Calculates the natural logarithm of an expression. <i>expr</i> is any expression that evaluates to a numerical value.	LOG(expr)
LOG10	LOG10(1)	Calculates the base 10 logarithm of an expression. <i>expr</i> is any expression that evaluates to a numerical value.	LOG10(expr)
MOD	MOD(10, 3)	Divides the first numeric expression by the second numeric expression and returns the remainder portion of the quotient.	MOD(expr1, expr2)
PI	PI()	Returns the constant value of pi.	PI()
POWER	POWER(Profit, 2)	Takes the first numeric expression and raises it to the power specified in the second numeric expression.	POWER(expr1, expr2)
RADIANS	RADIANS(30)	Converts an expression from degrees to radians. <i>expr</i> is any expression that evaluates to a numerical value.	RADIANS(expr)

Function	Example	Description	Syntax
RAND	RAND ()	Returns a pseudo-random number between 0 and 1.	RAND ()
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.	RAND (expr)
ROUND	ROUND (2.166000, 2)	Rounds a numeric expression to <i>n</i> digits of precision. <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer that represents the number of digits of precision.	ROUND (expr, integer)
SIGN	SIGN (Profit)	Returns the following: <ul style="list-style-type: none"> <li>• 1 if the numeric expression evaluates to a positive number</li> <li>• -1 if the numeric expression evaluates to a negative number</li> <li>• 0 if the numeric expression evaluates to zero</li> </ul>	SIGN (expr)
SIN	SIN (1)	Calculates the sine of a numeric expression.	SIN (expr)
SQRT	SQRT (7)	Calculates the square root of the numeric expression argument. The numeric expression must evaluate to a nonnegative number.	SQRT (expr)
TAN	TAN (1)	Calculates the tangent of a numeric expression. <i>expr</i> is any expression that evaluates to a numerical value.	TAN (expr)
TRUNCATE	TRUNCATE (45.1234 5, 2)	Truncates a decimal number to return a specified number of places from the decimal point. <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer that represents the number of characters to the right of the decimal place to return.	TRUNCATE (expr, integer)

## Running Aggregate Functions

Running aggregate functions perform operations on multiple values to create summary results.

Function	Example	Description	Syntax
MAVG		Calculates a moving average (mean) for the last <i>n</i> rows of data in the result set, inclusive of the current row. <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer. Represents the average of the last <i>n</i> rows of data.	MAVG (expr, integer)



Function	Example	Description	Syntax
MSUM	select month, revenue, MSUM(revenue, 3) as 3_MO_SUM from sales_subject_ar ea	Calculates a moving sum for the last n rows of data, inclusive of the current row. <i>expr</i> is any expression that evaluates to a numerical value. <i>integer</i> is any positive integer. Represents the sum of the last n rows of data.	MSUM( <i>expr</i> , <i>integer</i> )
RSUM	SELECT month, revenue, RSUM(revenue) as RUNNING_SUM from sales_subject_ar ea	Calculates a running sum based on records encountered so far. <i>expr</i> is any expression that evaluates to a numerical value.	RSUM( <i>expr</i> )
RCOUNT	select month, profit, RCOUNT(profit) from sales_subject_ar ea where profit > 200	Takes a set of records as input and counts the number of records encountered so far. <i>expr</i> is an expression of any datatype.	RCOUNT( <i>expr</i> )
RMAX	SELECT month, profit,RMAX(prof it) from sales_subject_ar ea	Takes a set of records as input and shows the maximum value based on records encountered so far. <i>expr</i> is an expression of any datatype.	RMAX( <i>expr</i> )
RMIN	select month, profit,RMIN(prof it) from sales_subject_ar ea	Takes a set of records as input and shows the minimum value based on records encountered so far. <i>expr</i> is an expression of any datatype.	RMIN( <i>expr</i> )

## String Functions

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

Function	Example	Description	Syntax
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. <i>expr</i> is any expression that evaluates to a character string.	ASCII( <i>expr</i> )
BIT_LENGTH	BIT_LENGTH('abcd ef')	Returns the length, in bits, of a specified string. Each Unicode character is 2 bytes in length (equal to 16 bits). <i>expr</i> is any expression that evaluates to a character string.	BIT_LENGTH( <i>expr</i> )

Function	Example	Description	Syntax
CHAR	CHAR(35)	Converts a numeric value between 0 and 255 to the character value corresponding to the ASCII code.  <i>expr</i> is any expression that evaluates to a numerical value between 0 and 255.	CHAR( <i>expr</i> )
CHAR_LENGTH	CHAR_LENGTH(Customer_Name)	Returns the length, in number of characters, of a specified string. Leading and trailing blanks aren't counted in the length of the string.  <i>expr</i> is any expression that evaluates to a character string.	CHAR_LENGTH( <i>expr</i> )
CONCAT	SELECT DISTINCT CONCAT('abc', 'def') FROM employee	Concatenates two character strings.  <i>exprs</i> are expressions that evaluate to character strings, separated by commas.  You must use raw data, not formatted data, with CONCAT.	CONCAT( <i>expr1</i> , <i>expr2</i> )
INSERT	SELECT INSERT('123456', 2, 3, 'abcd') FROM table	Inserts a specified character string into a specified location in another character string.  <i>expr1</i> is any expression that evaluates to a character string. Identifies the target character string.  <i>integer1</i> is any positive integer that represents the number of characters from the beginning of the target string where the second string is to be inserted.  <i>integer2</i> is any positive integer that represents the number of characters in the target string to be replaced by the second string.  <i>expr2</i> is any expression that evaluates to a character string. Identifies the character string to be inserted into the target string.	INSERT( <i>expr1</i> , <i>integer1</i> , <i>integer2</i> , <i>expr2</i> )
LEFT	SELECT LEFT('123456', 3) FROM table	Returns a specified number of characters from the left of a string.  <i>expr</i> is any expression that evaluates to a character string  <i>integer</i> is any positive integer that represents the number of characters from the left of the string to return.	LEFT( <i>expr</i> , <i>integer</i> )
LENGTH	LENGTH(Customer_Name)	Returns the length, in number of characters, of a specified string. The length is returned excluding any trailing blank characters.  <i>expr</i> is any expression that evaluates to a character string.	LENGTH( <i>expr</i> )

Function	Example	Description	Syntax
LOCATE	LOCATE('d' 'abcdef')	Returns the numeric position of a character string in another character string. If the character string isn't found in the string being searched, the function returns a value of 0.  <i>expr1</i> is any expression that evaluates to a character string. Identifies the string for which to search.  <i>expr2</i> is any expression that evaluates to a character string.  Identifies the string to be searched.	LOCATE( <i>expr1</i> , <i>expr2</i> )
LOCATEN	LOCATEN('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.  <i>expr1</i> is any expression that evaluates to a character string. Identifies the string for which to search.  <i>expr2</i> is any expression that evaluates to a character string. Identifies the string to be searched.  <i>integer</i> is any positive (nonzero) integer that represents the starting position to begin to look for the character string.	LOCATEN( <i>expr1</i> , <i>expr2</i> , <i>integer</i> )
LOWER	LOWER(Customer_N ame)	Converts a character string to lowercase.  <i>expr</i> is any expression that evaluates to a character string.	LOWER( <i>expr</i> )
OCTET_LENGTH	OCTET_LENGTH('ab cdef')	Returns the number of bytes of a specified string.  <i>expr</i> is any expression that evaluates to a character string.	OCTET_LENGTH( <i>expr</i> )
POSITION	POSITION('d', 'abcdef')	Returns the numeric position of <i>strExpr1</i> in a character expression. If <i>strExpr1</i> isn't found, the function returns 0.  <i>expr1</i> is any expression that evaluates to a character string. Identifies the string to search for in the target string. For example, "d".  <i>expr2</i> is any expression that evaluates to a character string. Identifies the target string to be searched. For example, "abcdef".	POSITION( <i>expr1</i> , <i>expr2</i> )
REPEAT	REPEAT('abc', 4)	Repeats a specified expression <i>n</i> times.  <i>expr</i> is any expression that evaluates to a character string  <i>integer</i> is any positive integer that represents the number of times to repeat the character string.	REPEAT( <i>expr</i> , <i>integer</i> )

Function	Example	Description	Syntax
REPLACE	REPLACE('abcd1234', '123', 'zz')	Replaces one or more characters from a specified character expression with one or more other characters.  <i>expr1</i> is any expression that evaluates to a character string. This is the string in which characters are to be replaced.  <i>expr2</i> is any expression that evaluates to a character string. This second string identifies the characters from the first string that are to be replaced.  <i>expr3</i> is any expression that evaluates to a character string. This third string specifies the characters to substitute into the first string.	REPLACE( <i>expr1</i> , <i>expr2</i> , <i>expr3</i> )
RIGHT	SELECT RIGHT('123456', 3) FROM table	Returns a specified number of characters from the right of a string.  <i>expr</i> is any expression that evaluates to a character string.  <i>integer</i> is any positive integer that represents the number of characters from the right of the string to return.	RIGHT( <i>expr</i> , <i>integer</i> )
SPACE	SPACE(2)	Inserts blank spaces.  <i>integer</i> is any positive integer that indicates the number of spaces to insert.	SPACE( <i>expr</i> )
SUBSTRING	SUBSTRING('abcde f' FROM 2)	Creates a new string starting from a fixed number of characters into the original string.  <i>expr</i> is any expression that evaluates to a character string.  <i>startPos</i> is any positive integer that represents the number of characters from the start of the left side of the string where the result is to begin.	SUBSTRING([SourceString] FROM [StartPostition])
SUBSTRINGN	SUBSTRING('abcde f' FROM 2 FOR 3)	Like SUBSTRING, creates a new string starting from a fixed number of characters into the original string.  <i>SUBSTRINGN</i> includes an integer argument that enables you to specify the length of the new string, in number of characters.  <i>expr</i> is any expression that evaluates to a character string.  <i>startPos</i> is any positive integer that represents the number of characters from the start of the left side of the string where the result is to begin.	SUBSTRING( <i>expr</i> FROM <i>startPos</i> FOR <i>length</i> )

Function	Example	Description	Syntax
TrimBoth	Trim(BOTH '_' FROM '_abcdef_')	Strips specified leading and trailing characters from a character string. <i>char</i> is any single character. If you omit this specification (and the required single quotes), a blank character is used as the default. <i>expr</i> is any expression that evaluates to a character string.	TRIM(BOTH <i>char</i> FROM <i>expr</i> )
TRIMLEADING	TRIM(LEADING '_' FROM '_abcdef')	Strips specified leading characters from a character string. <i>char</i> is any single character. If you omit this specification (and the required single quotes), a blank character is used as the default. <i>expr</i> is any expression that evaluates to a character string.	TRIM(LEADING <i>char</i> FROM <i>expr</i> )
TRIMTRAILING	TRIM(TRAILING '_' FROM 'abcdef_')	Strips specified trailing characters from a character string. <i>char</i> is any single character. If you omit this specification (and the required single quotes), a blank character is used as the default. <i>expr</i> is any expression that evaluates to a character string.	TRIM(TRAILING <i>char</i> FROM <i>expr</i> )
UPPER	UPPER(Customer_Name)	Converts a character string to uppercase. <i>expr</i> is any expression that evaluates to a character string.	UPPER( <i>expr</i> )

## System Functions

The `USER` system function returns values relating to the session. For example, the user name you signed in with.

Function	Example	Description	Syntax
DATABASE		Returns the name of the subject area to which you're logged on.	DATABASE ()
USER		Returns the user name for the semantic model to which you're logged on.	USER ()

## Time Series Functions

Time series functions enable you to aggregate and forecast data based on time dimensions. For example, you might use the `AGO` function to calculate revenue from one year ago.

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.

You can also apply these functions to subject area data using the defined time-level hierarchies in the subject area. See *Create Calculated Data Elements in a Workbook*.

- You can apply these functions in the My Calculations area in the workbook designer. See *Create Calculated Data Elements in a Workbook*.
- You can also apply these functions to subject area data using the defined time-level hierarchies in the subject area.

Function	Example	Description	Syntax
AGO	SELECT Year_ID, AGO(sales, year, 1)	Calculates the aggregated value of a measure in a specified time period in the past. For example, to calculate monthly revenue one year ago, use AGO(Revenue, Year, 1, SHIP_MONTH). To calculate quarterly revenues in the last quarter, use AGO(Revenue, Quarter, 1).	AGO(MEASURE, TIME_LEVEL, OFFSET)  Where: <ul style="list-style-type: none"> <li>• MEASURE represents the measure to calculate, for example, revenue.</li> <li>• TIME_LEVEL represents the time interval, which must be Year, Quarter, Month, Week, or Day.</li> <li>• OFFSET represents the number of time intervals to calculate back to, for example, 1 for one year.</li> </ul>
PERIODROLLING	SELECT Month_ID, PERIODROLLING (monthly_sales, -1, 1)	Computes the aggregate of a measure over the period starting <i>x</i> units of time and ending <i>y</i> 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.	PERIODROLLING(measure, x [, y])  Where: <ul style="list-style-type: none"> <li>• <i>measure</i> represents the name of a measure column.</li> <li>• <i>x</i> is an integer that represents the offset from the current time.</li> <li>• <i>y</i> is an integer that represents the number of time units over which the function computes.</li> <li>• <i>hierarchy</i> is an optional argument that represents the name of a hierarchy in a time dimension such as <i>yr</i>, <i>mon</i>, <i>day</i>, that you want to use to compute the time window.</li> </ul>
TODATE	SELECT Year_ID, Month_ID, TODATE (sales, year)	Calculates the aggregated value of a measure from the start of a time period to the latest time period, for example, year to date calculations.  For example, to calculate Year to Date Sales, use TODATE(sales, year).	TODATE(MEASURE, TIME_LEVEL)  Where: <ul style="list-style-type: none"> <li>• MEASURE represents an expression that references at least one measure column, for example, sales.</li> <li>• TIME_LEVEL represents the time interval, which must be Year, Quarter, Month, Week, or Day.</li> </ul>

## FORECAST Function

Creates a time-series model of the specified measure over the series using Exponential Smoothing (ETS) or Seasonal ARIMA or ARIMA. This function outputs a forecast for a set of periods as specified by the *numPeriods* argument.

**Syntax** FORECAST(*measure*, ([*series*]), *output\_column\_name*, *options*, [*runtime\_binded\_options*]))

Where:

- *measure* represents the measure to forecast, for example, revenue data.
- *series* represents the time grain used to build the forecast model. The series is a list of one or more time dimension columns. If you omit series, then the time grain is determined from the query.
- *output\_column\_name* represents the valid column names of *forecast*, *low*, *high*, and *predictionInterval*.
- *options* represents a string list of name/value pairs separated by a semi-colon (;). The value can include %1 ... %N specified in *runtime\_binded\_options*.
- *runtime\_binded\_options* represents a comma separated list of columns and options. Values for these columns and options are evaluated and resolved during individual query execution time.

**FORECAST Function Options** The following table list available options to use with the FORECAST function.

Option Name	Values	Description
numPeriods	Integer	The number of periods to forecast.
predictionInterval	0 to 100, where higher values specify higher confidence	The confidence level for the prediction.
modelType	ETS (Exponential Smoothing) SeasonalArima ARIMA	The model to use for forecasting.
useBoxCox	TRUE FALSE	If <i>TRUE</i> , then use Box-Cox transformation.
lambdaValue	Not applicable	The Box-Cox transformation parameter. Ignore if NULL or when <i>useBoxCox</i> is <i>FALSE</i> . Otherwise the data is transformed before the model is estimated.
trendDamp	TRUE FALSE	This is specific to the Exponential Smoothing model. If <i>TRUE</i> , then use damped trend. If <i>FALSE</i> or NULL, then use non-damped trend.
errorType	Not applicable	This is specific to the Exponential Smoothing model.

Option Name	Values	Description
trendType	N (none) A (additive) M (multiplicative) Z (automatically selected)	This is specific to the Exponential Smoothing model
seasonType	N (none) A (additive) M (multiplicative) Z (automatically selected)	This is specific to the Exponential Smoothing model
modelParamIC	ic_auto ic_aicc ic_bic ic_auto (this is the default)	The information criterion (IC) used in the model selection.

### Revenue Forecast by Day Example

This example selects revenue forecast by day.

```
FORECAST("A - Sample Sales"."Base Facts"."1- Revenue" Target,
("A - Sample Sales"."Time"."T00 Calendar Date"), 'forecast',
'numPeriods=30;predictionInterval=70;') ForecastedRevenue
```

### Revenue Forecast by Year and Quarter Example

This example selects revenue forecast by year and quarter.

```
FORECAST("A - Sample Sales"."Base Facts"."1- Revenue",
("A - Sample Sales"."Time"."T01 Year" timeYear, "A - Sample Sales"."Time"."T02
Quarter" TimeQuarter), 'forecast', 'numPeriods=30;predictionInterval=70;')
ForecastedRevenue
```

## Constants

You can use constants to include specific fixed dates and times in workbooks and reports.

Constant	Example	Description	Syntax
DATE	DATE '2026-04-09'	Creates a specific date in a calculation or expression.	DATE 'yyyy-mm-dd'
TIME	TIME '12:00:00'	Creates a specific time in a calculation or expression.	TIME 'hh:mi:ss'
TIMESTAMP	TIMESTAMP '2026-04-09 12:00:00'	Creates a specific time-stamp in a calculation or expression.	TIMESTAMP 'yyyy-mm-dd hh:mi:ss'



## 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.

## 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.

Follow these rules:

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

Expression	Example	Description	Syntax
CASE (If)	<pre> CASE   WHEN score-par &lt; 0 THEN     'Under Par'   WHEN score-par = 0 THEN     'Par'   WHEN score-par = 1 THEN     'Bogey'   WHEN score-par = 2 THEN     'Double Bogey'   ELSE 'Triple Bogey or   Worse' END </pre>	<p>Evaluates each <code>WHEN</code> condition and if satisfied, assigns the value in the corresponding <code>THEN</code> expression.</p> <p>If none of the <code>WHEN</code> conditions are satisfied, it assigns the default value specified in the <code>ELSE</code> expression. If no <code>ELSE</code> expression is specified, the system automatically adds an <code>ELSE NULL</code>.</p> <p><b>Note:</b> See <i>Best Practices for using CASE statements in Analyses and Visualizations</i>.</p>	<pre> CASE WHEN   request_condition1   THEN expr1 ELSE   expr2 END </pre>

Expression	Example	Description	Syntax
CASE (Switch)	<pre> CASE Score-par WHEN -5 THEN 'Birdie on Par 6' WHEN -4 THEN 'Must be Tiger' WHEN -3 THEN 'Three under par' WHEN -2 THEN 'Two under par' WHEN -1 THEN 'Birdie' WHEN 0 THEN 'Par' WHEN 1 THEN 'Bogey' WHEN 2 THEN 'Double Bogey' ELSE 'Triple Bogey or Worse' END </pre>	<p>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.</p> <p>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.</p> <p>If the first expression matches an expression in multiple WHEN clauses, only the expression following the first match is assigned.</p> <p><b>Note</b> See <i>Best Practices for using CASE statements in Analyses and Visualizations</i>.</p>	<pre> CASE expr1 WHEN expr2 THEN expr3 ELSE expr4 END </pre>
IfCase > ELSE	-	-	ELSE [expr]
IfCase > IFNULL	-	-	IFNULL([expr], [value])
IfCase > NULLIF	-	-	NULLIF([expr], [expr])
IfCase > WHEN	-	-	WHEN [Condition] THEN [expr]
IfCase > CASE	-	-	CASE WHEN [Condition] THEN [expr] END
SwitchCase > ELSE	-	-	ELSE [expr]
SwitchCase > >IFNULL	-	-	IFNULL([expr], [value])
SwitchCase > NULLIF	-	-	NULLIF([expr], [expr])
SwitchCase > WHEN	-	-	WHEN [Condition] THEN [expr]

## Best Practices For Using CASE statements in Analyses and Visualizations

When using CASE statements in reports and workbooks, consider the report columns and the order of aggregation because these affect how expressions and sub-totals are calculated.

- In general, when using CASE expressions, make sure that any columns used in the expression are included in the report.
- If the order of aggregation is important, then change the report aggregation rule from Default to Sum.
- If a condition has to be evaluated before the aggregation is computed (for example, if the column filtered isn't displayed in the report), then use the FILTER function.

### Example

This example use data for Brand, Product Type, and Revenue.

<b>Brand</b>	<b>Product_Type</b>	<b>Revenue</b>
<u>BizTech</u>	Accessories	2698715.06
<u>BizTech</u>	Audio	7415868.56
<u>BizTech</u>	Cell Phones	5917902.82
<u>BizTech</u>	Smart Phones	4967513.56
<u>FunPod</u>	Camera	7735104.57
<u>FunPod</u>	Fixed	4530169.23
<u>FunPod</u>	Portable	5234726.2
HomeView	Install	487556.74
HomeView	LCD	5324361.46
HomeView	Maintenance	518288.16
HomeView	Plasma	5169793.64

To apply a condition to set Camera revenue to 0, create the following conditional expression:

```
CASE WHEN Product_Type = 'Camera' THEN 0 ELSE Revenue END.
```

When Product\_Type is excluded from the report, data isn't available to evaluate the expression because it contains Product\_Type, and the results are:

P4 Brand	Revenue Excluding Camera (CASE)
BizTech	21,000,000.00
FunPod	0.00
HomeView	11,500,000.00

By adding PRODUCT\_TYPE to the report and setting report aggregation to SUM, the result aggregates after the base level values are calculated:

P4 Brand	P2 Product Type	Revenue Excluding Camera (CASE)
BizTech	Accessories	2,698,715.06
	Audio	7,415,868.56
	Cell Phones	5,917,902.82
	Smart Phones	4,967,513.56
<b>BizTech Total</b>		<b>21,000,000.00</b>
FunPod	Camera	0.00
	Fixed	4,530,169.23
	Portable	5,234,726.20
<b>FunPod Total</b>		<b>9,764,895.43</b>
HomeView	Install	487,556.74
	LCD	5,324,361.46
	Maintenance	518,288.16
	Plasma	5,169,793.64
<b>HomeView Total</b>		<b>11,500,000.00</b>

An alternative to using CASE is to use a filter expression: FILTER(Revenue using Product\_Type != 'Camera'). The expression is calculated independently of report columns, and aggregations are applied after calculation:

P4 Brand	Revenue Excluding Cameras (FILTER)
BizTech	21,000,000.00
FunPod	9,764,895.43
HomeView	11,500,000.00

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## Oracle Analytics Desktop SDK Reference

This topic describes the software development kit (SDK) that you can use to develop and deploy visualization plug-ins to your Oracle Analytics Desktop installation.

### Topics:

- [Oracle Analytics Desktop SDK](#)
- [Create the Visualization Plug-in Development Environment](#)
- [Create a Skeleton Visualization Plug-in](#)
- [Create a Skeleton Skin or Unclassified Plug-in](#)
- [Develop a Visualization Plug-in](#)
- [Run in SDK Mode and Test the Plug-in](#)
- [Validate the Visualization Plug-in](#)
- [Build, Package, and Deploy the Visualization Plug-in](#)
- [Delete Plug-ins from the Development Environment](#)

## Oracle Analytics Desktop SDK

The SDK provides a development environment where you can create and develop custom visualization plug-ins and deploy them to your Oracle Analytics Desktop installation.

### Topics:

- [Scripts](#)
- [Other Resources](#)

## Scripts

Your installation includes the scripts that you use to create a development environment and create skeleton visualization plug-ins.

The scripts are located in this directory: `<your_installation_directory>\Oracle Analytics Desktop\tools\bin`.

For example, `C:\Program Files\Oracle Analytics Desktop\tools\bin`  
Note the following script names and descriptions:

- **bicreateenv** - 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.

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

## Other Resources

You can use resources other than scripts to develop your custom visualization plug-ins.

Note the following available resources:

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

The `circlePack` sample is located in

```
<your_development_directory>\src\sampleviz\sample-circlepack
```

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

- **Other visualization plug-in samples** - You can download plug-in examples from the Oracle Analytics Library.
- **Tutorial** - The tutorial contains information and instructions to help you understand how to create a robust visualization plug-in. This tutorial provides step-by-step instructions for modifying the `circlePack` sample included in your plug-in development environment.

 [Tutorial](#)

- **JS API documentation** - This documentation contains JavaScript reference information that you need to develop a visualization plug-in. See Oracle Analytics Desktop SDK JavaScript Reference.

## Create the Visualization Plug-in Development Environment

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

1. Using the command prompt, create an empty development directory. For example, `C:\OracleAnalyticsDev`.
2. Set the `PATH` environment variable. For example,

```
set ANALYTICSDESKTOP_SDK_HOME="C:\Program Files\Oracle Analytics
Desktop"
set PLUGIN_DEV_DIR=C:\OracleAnalyticsDev
REM add tools\bin to path:
set PATH=%ANALYTICSDESKTOP_SDK_HOME%\tools\bin;%PATH%
```

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

```
cd C:\OracleAnalyticsDev
bcreateenv
```

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

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

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

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

## Create 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 Oracle Analytics Desktop environment.

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

```
bicreateplugin viz -<subType> -<id> -<name>
```

- <subType> is the type of visualization that you want to create. Your choices are:
  - **basic** - Use this option to create a visualization that doesn't use any data from Oracle Analytics Desktop or use any data model mapping. This is like the Image and Text visualization types delivered with Oracle Analytics Desktop. For example, you can use this visualization type to show an image or some text that's coded into the plug-in or from a configuration. You can use this type of visualization to improve formatting.
  - **dataviz** - This type renders data from data sources registered with Oracle Analytics Desktop 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 Analytics Desktop into the cells of a trellis visualization. It also responds to marking events from other visualizations on the same canvas and publish interaction events to affect other visualizations on the same canvas.
- <id> is your domain and the name that you want to give the visualization directory and components in your development environment. For example, com-company.basicviz.
- <name> is the name of the visualization plug-in that you test, deploy, and use in workbooks.

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

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

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

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

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

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

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

## Create a Skeleton Skin or Unclassified Plug-in

The `bicreateplugin -unclassified` command creates an empty plug-in with `plugin.xml`, localization bundles. The `bicreateplugin -skin` command creates a skeleton skin plug-in.

- 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>
```

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

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

```
C:\OracleDevDir>bicreateplugin skin -id com.company.newskin
```

## Develop 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 determines how Oracle Analytics Desktop renders and passes user interactions to the server.

- 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. See Oracle Analytics Desktop SDK JavaScript Reference.

## Run in SDK Mode and Test the Plug-in

You can run Oracle Analytics Desktop in SDK mode from your browser when you're developing your visualization plug-in or when you want to test your visualization plug-in.



1. Execute the `gradlew run` command. For example, `C:\OracleDevDir>gradlew run`  
After you run the command, note the following results:
  - Oracle Analytics Desktop 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 Oracle Analytics Desktop.
  - A system tray is displayed in the operating system's toolbar and includes three links: Launch Browser, which you use to launch or relaunch your default browser to display Oracle Analytics Desktop; Copy URL to Clipboard, which you can use to copy the URL and paste it into a different browser; and Shutdown, which you use to shut down the development browser.
2. Test your visualization by dragging and dropping it to a workbook'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.

## Validate the Visualization Plug-in

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

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

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

This step validates whether the JSON configuration files are properly formatted and contain appropriate visualization configuration. If the validation discovers any errors, then the system displays error messages.

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

## Build, Package, and Deploy the Visualization Plug-in

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

The build and package process runs for all of the visualizations in your development directory, and each plug-in is contained in its own zip file. There's no way to build and package specific visualizations. If you want to exclude visualizations from the build and package process, then you've to move the visualizations that you want to exclude out of your development directory, or delete them from the directory before you perform the build. See [Delete Plug-ins from the Development Environment](#).

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

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

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

2. Copy the zip files to your installation directory. For example, `%localappdata%\OracleAnalyticsDesktop\plugins`.

## Delete Plug-ins from the Development Environment

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

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

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

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

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

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

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

```
cd C:\<your_development_directory>
bideleteplugin skin -id <name_of_your_domain>.<name_of_skin_plugin>
```