
Amazon QuickSight

User Guide



Amazon QuickSight: User Guide

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What Is Amazon QuickSight?

Amazon QuickSight is a business analytics service you can use to build visualizations, perform ad hoc analysis, and get business insights from your data. It can automatically discover AWS data sources and also works with your data sources. Amazon QuickSight enables organizations to scale to hundreds of thousands of users, and delivers responsive performance by using a robust in-memory engine (SPICE).

Using Amazon QuickSight, you can do the following:

- **Get started quickly** – Sign in, choose a data source, and create your first visualization in minutes
- **Access data from multiple sources** – Upload files, connect to AWS data sources, or use your own external data sources
- **Take advantage of dynamic visualizations** – Smart visualizations are dynamically created based on the fields that you select
- **Get answers fast** – Generate fast, interactive visualizations on large data sets
- **Tell a story with your data** – Create data dashboards and point-in-time visuals, share insights and collaborate with others

Amazon QuickSight offers Standard and Enterprise editions. For more information about Amazon QuickSight editions and pricing, see [Different Editions of Amazon QuickSight \(p. 543\)](#) and [Amazon QuickSight](#).

You can create Amazon QuickSight data sets by using your own data sources or other data sources that are shared with you. Then you can create [Data Analyses \(p. 2\)](#), visualize the data, and share it through data dashboards. To get a first look at how it works, you can explore Amazon QuickSight using the sample data sets we provide. These can be downloaded from the following links, in case you don't already have them:

- [Business overview \(revenue data\)](#)
- [People overview—human resources \(HR\) data](#)
- [Sales pipeline](#)
- [Web and social media analytics \(marketing data\)](#)

There are also a variety of data sets available free online that you can use with Amazon QuickSight, for example:

- [AWS public datasets](#)
- [Eighteen places to find data sets for data science projects](#)
- [Search for BI sample data](#)
- [Search for sample data for visualization](#)
- [Search for Free Sample Databases](#)

These data sets come in a variety of formats. Some may require you to import them into a database engine before you can access their data.

To learn more about the major components and processes of Amazon QuickSight and the typical workflow for creating data visualizations, see the following sections.

Topics

- [Data Sources and Data Preparation \(p. 2\)](#)

- [Data Analyses \(p. 2\)](#)
- [Dashboards \(p. 3\)](#)
- [Typical Amazon QuickSight Workflow \(p. 3\)](#)
- [Next Steps \(p. 4\)](#)
- [Compliance \(p. 4\)](#)

Data Sources and Data Preparation

You can use a variety of sources for data analysis, including files, AWS services, and on-premises databases. To learn more about what data sources work with Amazon QuickSight, see [Supported Data Sources \(p. 59\)](#).

To get ready to create analyses, you create *data sets* based on your data sources. A data set identifies the specific fields and rows that you want to use. In addition to raw data, a data set stores any changes you make, so it's ready the next time you want to analyze the data. For example, you can rename fields, change data types, and add calculated fields.

You can create multiple analyses using the same data set. You can also use multiple data sets in a single analysis.

To learn more about creating data sets, see [Creating Data Sets \(p. 76\)](#).

Data Preparation

Data preparation is the process of transforming raw data for use in an analysis. This includes making changes like the following:

- Filtering out data so you can focus on what's important to you
- Renaming fields to make them easier to read
- Changing data types so they are more useful
- Adding calculated fields to enhance analysis
- Creating SQL queries to refine data

To learn more about data preparation, see [Preparing Data \(p. 125\)](#).

SPICE

SPICE is Amazon QuickSight's *Super-fast, Parallel, In-memory Calculation Engine*. SPICE is engineered to rapidly perform advanced calculations and serve data. The storage and processing capacity available in SPICE speeds up the analytical queries that you run against your imported data. By using SPICE, you save time because you don't need to retrieve the data every time you change an analysis or update a visual.

To learn more about using SPICE, see [Managing SPICE Capacity \(p. 583\)](#).

Data Analyses

A data *analysis* is the basic workspace for creating and interacting with *visuals*, which are graphical representations of your data. Each analysis contains a collection of visuals that you assemble and arrange for your purposes, such as a sales analysis, cost analysis, or tracking key performance indicators. Each analysis can contain *stories*, which you can use to save a sequential slide show of different iterations of

the analysis. This is useful if you want to show changes over time or provide visual comparisons of your data.

To learn more about Amazon QuickSight analyses, see [Working with Analyses \(p. 187\)](#).

Visuals

A *visual*, also known as a data visualization, is a graphical representation of a data set using a type of diagram, chart, graph, or table. All visuals begin in AutoGraph mode, which automatically selects a visualization based on the fields you select. You can also take control and choose your own visuals. Amazon QuickSight supports a variety of visuals including combo charts, heat and tree maps, pivot tables, and more. Or you can enhance your visualizations by applying filters, changing colors, or by arranging several in the workspace, just to name a few options.

To learn more about Amazon QuickSight visuals, see [Working with Amazon QuickSight Visuals \(p. 253\)](#).

Sheets

A *sheet* is a set of visuals that are all based on the same data source and are all viewed together. When you create an analysis, you place visuals in the workspace. After you publish the analysis as a dashboard, the workspace becomes a sheet. You can imagine this a sheet from a newspaper, except that it is filled with data visualizations.

Stories

A *story* is a set of one or more *scenes* (captured visuals) that you can play like a slideshow. You can use these to step through different iterations of an analysis. A scene is a representation of an analysis at a given point in time, or with specific settings. It shows the visuals that are on the analysis at that time, but the data in those visuals continues to update. It is not a static snapshot. You *capture* a scene for use in a story.

To learn more about Amazon QuickSight stories, see [Working with Stories \(p. 247\)](#).

Dashboards

A *dashboard* is a read-only snapshot of an analysis that you can share with other Amazon QuickSight users for reporting purposes. When you create and publish a dashboard, you specify which users have access to it. They can view and filter the dashboard visuals without changing the underlying data.

To learn more about Amazon QuickSight dashboards, see [Working with Dashboards \(p. 422\)](#).

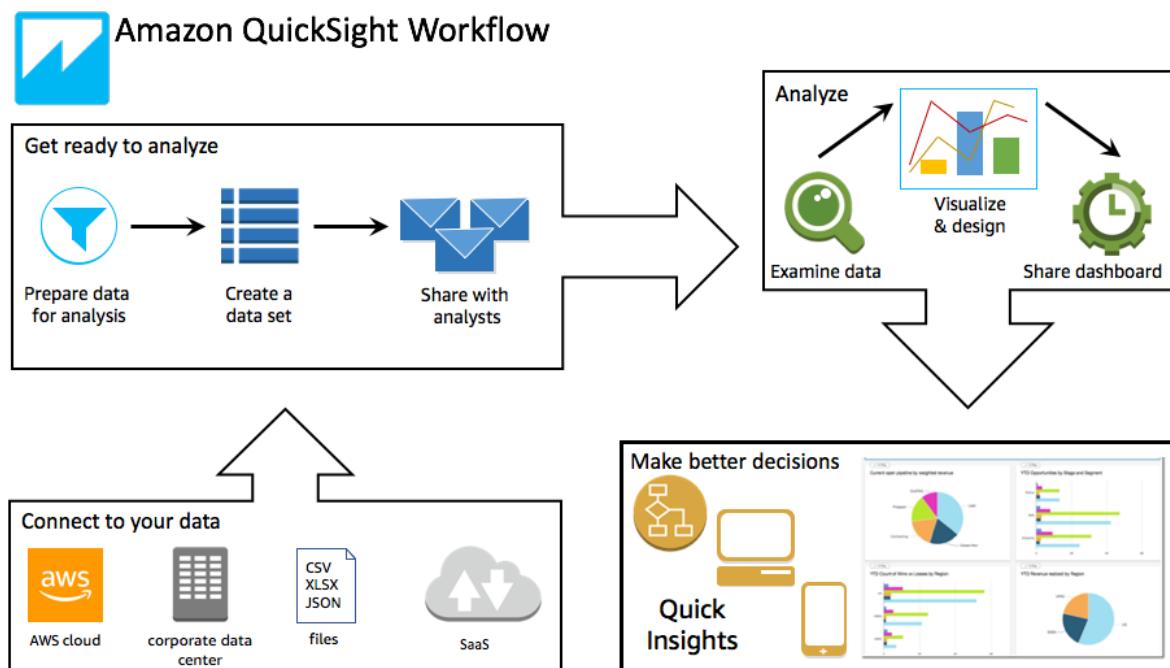
Typical Amazon QuickSight Workflow

The first time you create an analysis, the typical workflow looks like this:

1. Add or upload a data source, and use it to create a new data set.
2. (Optional) Prepare the data – get it ready for reports by standardizing field names, or adding calculations, for example.
3. Visualize (create) a new analysis from the data set.
4. Choose some fields to create the first visual in the analysis. You can use AutoGraph to dynamically create a visual based on the number and type of fields you choose. Alternatively, you can choose the visual type you want to use.

5. (Optional) Make changes to the visual if you want to (for example, by adding a filter or changing the visual type).
6. (Optional) Add more visuals to the analysis. You can resize and arrange them in the workspace.
7. (Optional) Capture the analysis into a story to create a narrative about some aspect of the data analysis.
8. (Optional) Publish the analysis as a dashboard to share insights with other users.

After you connect to your data and create a data set, you can create an analysis of it and share it in a dashboard, as shown in the following illustration:



Next Steps

If you are new to Amazon QuickSight, see [Signing Up for Amazon QuickSight \(p. 548\)](#) to learn more about subscribing.

If you are an administrator, see [Administration \(p. 543\)](#).

Compliance

This is a HIPAA Eligible Service. For more information about AWS, U.S. Health Insurance Portability and Accountability Act of 1996 (HIPAA), and using AWS services to process, store, and transmit protected health information (PHI), see [HIPAA Overview](#).

For information about this service and ISO 27001, a security management standard that specifies security management best practices, see [ISO 27001 Overview](#).

Content delivered to Amazon S3 buckets might contain customer content. For more information about removing sensitive data, see [How Do I Empty an S3 Bucket?](#) or [How Do I Delete an S3 Bucket?](#).

What's New in Amazon QuickSight

Find out what's new in Amazon QuickSight.

- Attend the Amazon QuickSight monthly customer webinar live with the Amazon QuickSight product team! The topics include demos and tutorials on all of the new features that we launch. [Register for the webinar](#)
- To learn more about ML Insights in Amazon QuickSight, you can watch this video.

New languages added

Amazon QuickSight is now available in 10 languages: English, German, Spanish, French, Portuguese, Italian, Japanese Korean, Simplified Chinese, and Traditional Chinese. For more information, see [Choosing a Language in Amazon QuickSight](#).

April 2019

Percentile aggregation

Amazon QuickSight supports aggregating by percentile. The `percentile` function helps you understand the distribution of your data. For more information, see [percentile](#).

April 2019

Custom number of data points

You can now format your visuals to display a custom number of data points or groups before showing the "other" category. This feature is available for bar charts, combo charts, line charts, pie charts, heat maps, and tree maps. For more information, see [Customizing the Number of Data Points to Display](#).

April 2019

ML-powered Anomaly Detection

Amazon QuickSight uses proven Amazon technology to continuously run anomaly detection powered by machine learning on millions of metrics and billions of data points. This anomaly detection enables you to get deep insights that are often buried in the aggregates, not visible in plain sight, and not scalable with manual analysis. With anomaly detection powered by machine learning (ML), there's no need for manual analysis, custom development, or ML domain expertise. For more information, see [ML-Powered Anomaly Detection](#).

March 2019

ML-powered Forecasting

With forecasting and what-if scenarios powered by machine learning, nontechnical users can now easily forecast their key business metrics. No ML expertise or Microsoft Excel data modeling is required. The built-in ML algorithm in Amazon QuickSight is designed to handle complex real-world scenarios. Amazon QuickSight uses ML to provide more reliable forecasts than traditional means. For more information, see [ML-powered Forecasts and What-Ifs](#).

March 2019

Auto-narratives

Automatic narratives provide key insights in everyday language, embedded contextually in your dashboard, saving hours on manual analysis. With automatic narratives, Amazon QuickSight interprets the charts and tables in your dashboard and provides a number of suggested insights in natural language. Depending on the shape and form of your data, you might get suggestions such as what the day-over-day changes look like, what was the highest sales date, what the growth rate is at, and what the forecast looks like for the next seven days. As the author of the dashboard, you can customize the computations and business language for your needs. You can use automatic narratives to effectively tell the story of your data in plain language.

For more information, see [Auto-narrative Insights](#).

March 2019

Custom window functions

Using custom window functions, you can calculate any aggregation for a defined window at the point you choose. You can define the window offsets you need. For more information, see [Table Calculations](#).

March 2019

RLS support for email reports

You can now create email reports with data tailored to each of your users and groups, for data sets that use row-level security. Amazon QuickSight generates a custom email snapshot for each user or group based on the data permissions that are defined in the dashboard. Row-level security (RLS) for email reports works for both scheduled and ad hoc (one-time) emails. For more information, see [Sending Reports](#).

March 2019

High cardinality filters

Amazon QuickSight now supports unbounded cardinality. That means you can have more than 10,000 values in your control or filter. For more information, see [Parameter Controls](#).

March 2019

New table calculations

You can now create calculated fields with percentileOver, runningAvg, runningCount, runningMax, and runningMin. For more information, see [Calculated Field Function and Operator Reference](#).

February 2019

Conditional aggregations

You can now create calculated fields to perform sumIf, countIf, minIf, maxIf, avgIf, and distinct_countIf. For more information, see [Calculated Fields](#).

January 2019

Join editor enhancements

We enhanced the join editor to increase usability and functionality. You can now add tables from one or more schemas on the same data source, or add the same table twice.

For more information, see [Joining Tables \(p. 136\)](#).

January 2019

Pivot table enhancements

Pivot tables now support infinite scrolling through millions of rows. You can add up to 20 fields for columns, and 20 fields for rows. Plus, you can add subtotals and totals to rows and columns. For more information, see [Pivot Tables](#).

January 2019

Join editor enhancements, cross schema data sources, and self joins

We enhanced the join editor to increase usability and functionality. You can now add tables from one or more schemas on the same data source, or add the same table twice. For more information, see [Joining Tables](#).

January 2019

New API for embedding Amazon QuickSight dashboards

You can embed dashboards and manage users or groups by using the Amazon QuickSight SDKs. For more information, see [Embedding and Other SDKs](#).

November 2018

New API operations for user and group management

Manage users or groups by using the Amazon QuickSight SDKs or by using the AWS CLI. For more information, see [List of Actions by Function](#).

November 2018

RLS group support and cascading controls

You can use groups with row-level security (RLS), and you can add cascading controls for parameters. For more information, see [Row Level Security](#).

November 2018

Top and bottom filters

Use a top and bottom filter to show the top or bottom n for the field you choose, based on values in another field. For example, you could choose to show the top five sales people based on revenue. For more information, see [Adding a Text Filter](#).

November 2018

Support for parseJSON data type in source tables

Use JSON native data types with `parseJson`. For more information, see [parseJson](#).

October 2018

Date functions and URL parameters

Use date functions to find out what quarter a date is in:

- [addDateTime \(p. 440\)](#)
- [extract \(p. 446\)](#)
- [truncDate \(p. 470\)](#)

You can also add parameters to URLs. For more information, see [Using Parameters in a URL \(p. 243\)](#).

September 2018

SPICE sorting

You can sort strings in SPICE data sets. For more information on these features, see [Sorting Visual Data in Amazon QuickSight \(p. 298\)](#)

August 2018

Scheduled email reports

You can schedule emailed reports, and add data labels to your visuals.

For more information on these features, see the following:

- [Sending Reports by Email \(p. 427\)](#)
- [Subscribing to Reports \(p. 431\)](#)
- [Customizing Data Labels on Visuals \(p. 271\)](#)

August 2018

Table calculations and time data granularity

You can create table calculations, using aggregated measures to discover how dimensions influence measures or each other. Also, you can visualize time data at granularities as low as one minute.

For more information on these features, see the following:

- [Table Calculations \(p. 438\)](#)
- [Changing Date Field Granularity \(p. 290\)](#)

August 2018

Customize labels, format counts, replace data sets, and new smaller visuals

You can replace data sets, customize labels, and format dimensions that are aggregated with count and count distinct. Also, new visuals start out smaller in size.

For more information on these features, see the following:

- [Replacing Data Sets \(p. 193\)](#)
- [Customizing Visual Labels \(p. 269\)](#)
- [Customizing a Field Format \(p. 197\)](#)
- [Working with Amazon QuickSight Visuals \(p. 253\)](#)

June 2018

New reader role and usage-based pricing, plus ability to upgrade subscriptions, and a new region

You can upgrade your Amazon QuickSight subscription from Standard edition to Enterprise edition. In Enterprise edition, Amazon QuickSight supports usage-based pricing for users in the reader role, sharing dashboards with all users in the reader role, and hourly refresh of data sets. Also, Amazon QuickSight is available in Asia Pacific (Tokyo).

For more information on these features, see the following:

- [Upgrading Your Amazon QuickSight Subscription from Standard Edition to Enterprise Edition \(p. 563\)](#)
- [Self-Provisioning an Amazon QuickSight Read-Only User \(p. 562\)](#)
- [Inviting Users to Access Amazon QuickSight \(p. 568\)](#)
- [Sharing Dashboards \(p. 424\)](#)
- [AWS Regions and IP Address Ranges \(p. 546\)](#)

May 2018

New reader role and usage-based pricing, upgrade subscriptions, private connections with VPC, and more

Amazon QuickSight supports private connections to data in a VPC with a private subnet in Enterprise edition.

In both editions, Amazon QuickSight supports parameters with on-sheet controls, dashboard co-ownership, custom URL actions, and 25-GB SPICE data sets.

For more information on these features, see the following:

- [Working with Amazon VPC \(p. 614\)](#)
- [Refreshing a Data Set on a Schedule \(p. 111\)](#)
- [Parameters in Amazon QuickSight \(p. 231\)](#)
- [Using Data Dashboards in Amazon QuickSight \(p. 10\) \(newly updated for read-only users\)](#)
- [Adding Custom URL Actions to Visuals in Amazon QuickSight \(p. 339\)](#)
- [Data Source Limits \(p. 62\)](#)

May 2018

Using Data Dashboards in Amazon QuickSight

Topics

- [Viewing Dashboard Data \(p. 10\)](#)
- [Filtering Dashboard Data \(p. 10\)](#)
- [Sorting Dashboard Data \(p. 10\)](#)
- [Exporting Data from a Dashboard \(p. 11\)](#)
- [Using the Visuals on Your Dashboard \(p. 11\)](#)
- [Subscribing to Your Dashboard \(p. 11\)](#)

Viewing Dashboard Data

In Amazon QuickSight, you can view data dashboards in email or interact with them on a webpage or your mobile device. If you are an Amazon QuickSight reader, you don't need a monthly subscription. To learn how to get the most out of reading your dashboards, use the following section.

Each dashboard is like a sheet from a newspaper that is filled with data visualizations. You can focus on any graph or chart. You can filter, and sort, and update chart colors. Dashboard that have controls embedded at the top give you easier access and control over what you see in some or all of the visuals on that sheet.

Any changes that you make to a dashboard are only temporary. They don't change the data, and they don't affect other users. If you want to save your settings and you have authoring access, use **Save as** to create your own private copy of the dashboard. If you want to share your changes with other users, you can work with the dashboard owner to update the dashboard on the server. This way, everyone can see the same version of data in the same way.

Filtering Dashboard Data

You can filter data in a visual in three ways:

- If your dashboard has filtering controls at the top of the screen, you can use them to filter all the visuals at once.
- You can use the filter icon at the top of each visual to filter visuals one at a time.
- You can create your own filters by using the filter pane on the left side of the page.

Sorting Dashboard Data

You can sort data in a visual in three ways:

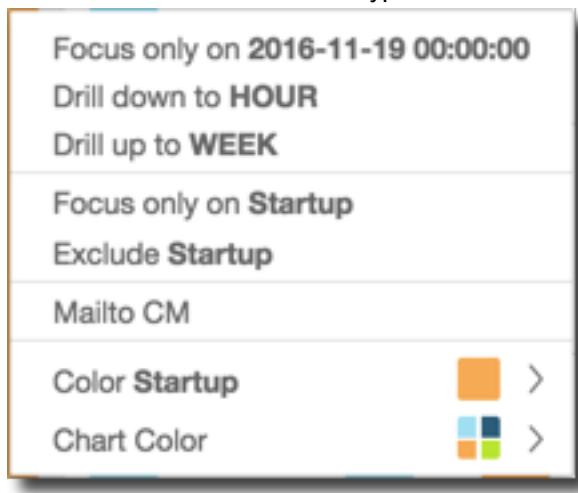
- You can hover over the label for the field you want to sort by, and choose the sort icon.
- You can choose the filter icon at the top right of the visual you want to sort.
- You can click or tap on the field and choose **Sort** from the context menu.

Exporting Data from a Dashboard

To export data from an analysis or dashboard to a comma-separated value (CSV) file, use the v-shaped menu at the top right of a visual. Data exports only for the visual you choose.

Using the Visuals on Your Dashboard

When you choose a data point on a visual, several actions are available. You can click or tap on a data point, for example on a bar in a bar chart, on a point where the line bends on a line chart, and so on. The available actions vary slightly based on what type of visual it is. The following screenshot shows a list of actions available on most chart types.



These actions are as follows:

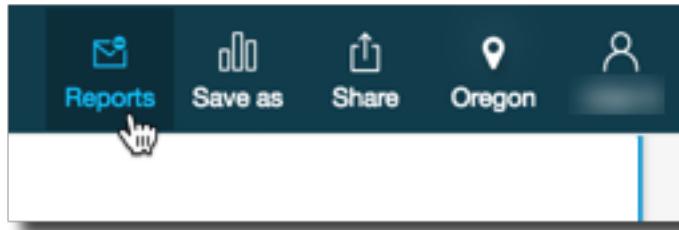
- Focus on or exclude
 - You can focus on or exclude specific data in a field in that visual, for example regions, metrics, or dates.
- Drill up or drill down
 - If your dashboard contains data on which you can drill down or up, you can drill up to a higher level or drill down to explore deeper details.
- Custom URL actions
 - If your dashboard contains URL actions, you can activate them by choosing a data point on a visual. For example, you might be able to email someone directly from the visual, or open another URL and send it data points (values) from this one.
- Change chart colors or specific field colors
 - You can change all the chart colors to a specific color. Alternatively, you can choose a specific field value to change its color, if that field is part of the color well (usually in the legend).

Subscribing to Your Dashboard

You can subscribe to a dashboard in report form, and receive it in an email. You can also adjust your report settings.

Use the following procedure to change your subscription and report settings for a specific dashboard.

1. First, open a dashboard that is shared with you.
2. Choose the **Reports** icon at top right.

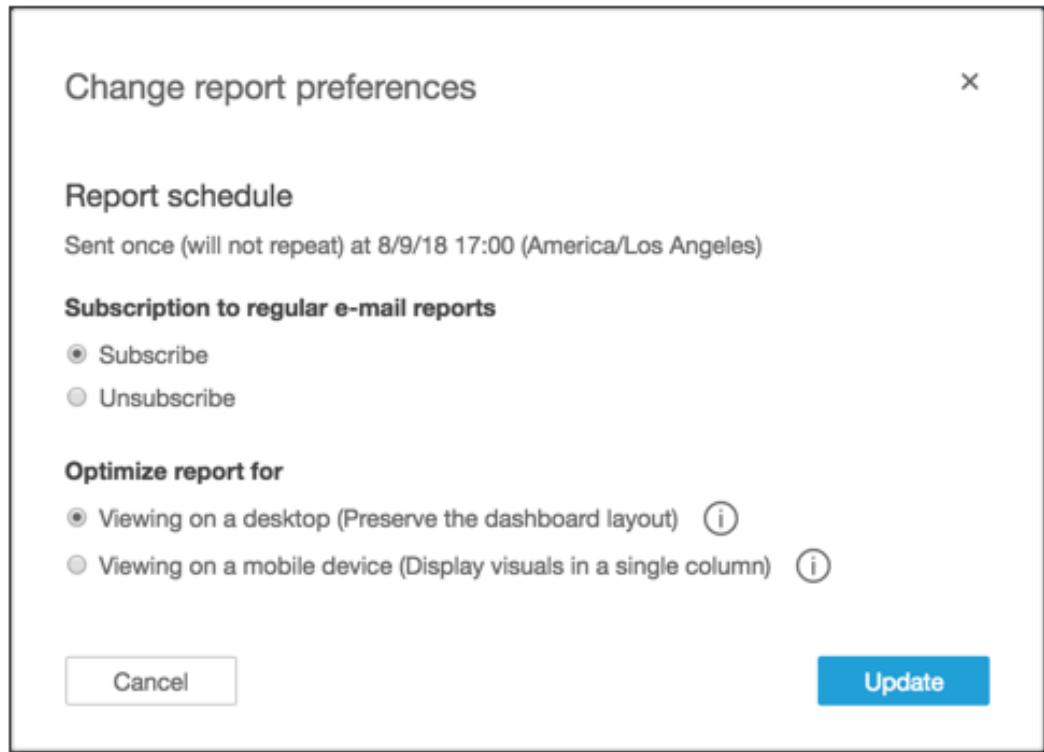


3. The **Change report preferences** screen appears. This screen shows the current report schedule, in addition to the subscription and optimization options.

For **Subscription**, choose **Subscribe** to start receiving reports, or **Unsubscribe** to stop receiving reports.

Under **Optimize**, choose the device you prefer to view the report on.

- If you usually use a mobile device or you prefer to view reports in a portrait format, choose **Viewing on a mobile device**. When you receive the report, the visuals display in a single vertical column.
- If you usually use a desktop or you prefer to view reports in a landscape format, choose **Viewing on a desktop**. When you receive the report, the visuals display in the same layout shown in your dashboard on your desktop.



4. Choose **Update** to confirm your choices, or choose **Cancel** to discard your changes.

Amazon QuickSight Quick Start Guide

Welcome to the *Amazon QuickSight Quick Start Guide*, designed for business analysts. Using Amazon QuickSight, you can import or connect to your data, analyze your data, and share your data visualizations in a dashboard. You can let Amazon QuickSight choose the format of your visual by leaving the AutoGraph on, or you can choose from a wide variety of charts, graphs, tables to create a customized visual data analysis. You can then group these together to form stories and dashboards. Then you can share them with your team.

How Does Amazon QuickSight Work?

You begin by choosing a dataset. You can groom your dataset by adding new data elements, creating calculations, or filtering out data. When you're satisfied that the dataset works for you, you can start analyzing it through graphics.

First, you can create a visual representation of your data. If you don't know what kind of chart you should use, Amazon QuickSight can help you by choosing a visual type for you. To see this in action, choose some fields. As you choose more fields, Amazon QuickSight's AutoGraph changes the type of visual it displays. It adapts to what you choose.

You can continue to add more visuals to the same analysis, based on different views of the same underlying data. To fit more visuals on a page, you can resize and rearrange them. Scroll down to find more space on the page.

By creating a series of visuals, you create a story. This visual narrative tells you what is happening in the subject you're investigating. You can save multiple stories, using filters to show how the data changes over time. Any of these visual data analyses can be shared with other people, who can then further analyze the data.

You can use Amazon QuickSight to publish data dashboards. These are read-only snapshots that you can share for reporting. If you choose, you can also allow other people to create a new analysis and dashboard based on the one you shared with them.

The first Amazon QuickSight user on your AWS account is free, and receives 1 GB [SPICE \(p. 2\)](#) capacity. To learn more about free trials and pricing for multiple users, see [Amazon QuickSight](#). For more information about the Standard and Enterprise editions, see [Different Editions of Amazon QuickSight \(p. 543\)](#)

Ready to Get Started?

Depending on your experience with Amazon QuickSight or tools like it, you can begin by looking at one of the following sections:

- [Guided Tour \(demos\)](#)

- [Getting Started with Data Analysis in Amazon QuickSight \(p. 16\)](#)

Amazon QuickSight Demos, Walkthroughs, and Articles

In the following section, you can find demos, walkthroughs, and articles that cover aspects of working with Amazon QuickSight.

If you want to see additional or different material added here, let us know. To do this, choose **Feedback** at the bottom of the screen.

Demo Videos

Following, you can find a list of videos that demonstrate the use of Amazon QuickSight, most shorter than 15 minutes long:

- [Data Visualization with Amazon QuickSight \(AWS re:Invent 2017 - DEM74\)](#), December 2017
- [Sharing Your Analysis and Insights Using Amazon QuickSight](#), May 2017
- [Customizing Your Visuals in Amazon QuickSight](#), May 2017
- [Using SQL to Import Data into Amazon QuickSight](#), May 2017
- [Accessing Amazon Redshift Data from Amazon QuickSight](#), May 2017
- [Demos from the Amazon QuickSight official website](#), various dates

Walkthroughs, Deep Dives, and Articles

Following, you can find a list of walkthrough and deep-dive videos demonstrating use of Amazon QuickSight, most longer than 30 minutes:

- [Deep Dive on Amazon QuickSight—January 2017 AWS Online Tech Talks](#), January 2017
- [Building Visualizations and Dashboards with Amazon QuickSight \(AWS re:Invent 2017 - ABD206\)](#), December 2017
- [Serverless Analytics—Amazon Redshift Spectrum, AWS Glue, and Amazon QuickSight](#), October 2017
- [Visualizing Amazon S3 Storage Management with Amazon QuickSight—2017 AWS Online Tech Talks](#), August 2017
- [Deploying Business Analytics at Enterprise Scale with Amazon QuickSight \(AWS re:Invent 2017 - ABD311\)](#), December 2017
- [Analyzing AWS Billing Data Using Amazon QuickSight](#), May 2017
- [Tackle Your Dark Data Challenge with AWS Glue \(and Visualize It in Amazon QuickSight\)—2017 AWS Online Tech Talks](#), September 2017
- [Serverless Big Data Analytics—Amazon Athena & Amazon QuickSight—2017 AWS Online Tech Talks](#), May 2017
- [Data Visualization with Amazon QuickSight \(AWS re:Invent 2017 - DEM74\)](#), December 2017

Following is a list of blog posts and quick start articles, most of which discuss how to accomplish a specific complex task using Amazon QuickSight:

- [List of all the official Amazon QuickSight blog posts](#)

- [Build a social media dashboard using machine learning and BI services, January 2018](#)
- [Visualize AWS CloudTrail Logs Using AWS Glue and Amazon QuickSight, November 2017](#)
- [Query and Visualize AWS Cost and Usage Data Using Amazon Athena and Amazon QuickSight, September 2017](#)
- [Quick Start: Build a Data Lake Foundation on the AWS Cloud with AWS Services, September 2017](#)
- [Analyzing Salesforce Data with Amazon QuickSight, August 2017](#)
- [Harmonize, Query, and Visualize Data from Various Providers using AWS Glue, Amazon Athena, and Amazon QuickSight, August 2017](#)
- [Analysis of Top-N DynamoDB Objects Using Amazon Athena and Amazon QuickSight, June 2017](#)
- [Visualize Amazon S3 Analytics Data with Amazon QuickSight, June 2017](#)
- [Build a Visualization and Monitoring Dashboard for IoT Data with Amazon Kinesis Data Analytics and Amazon QuickSight, May 2017](#)
- [Visualize Big Data with Amazon QuickSight, Presto, and Apache Spark on Amazon EMR, May 2017](#)
- [Analyzing VPC Flow Logs with Amazon Kinesis Data Firehose, Amazon Athena, and Amazon QuickSight, March 2017](#)
- [Harmonize, Search, and Analyze Loosely Coupled Datasets on AWS, February 2017](#)
- [Converging Data Silos to Amazon Redshift Using AWS DMS \(and Visualize in Amazon QuickSight\), January 2017](#)

Getting Started with Data Analysis in Amazon QuickSight

Use the topics in this section to create your first analysis. You can use sample data to create either a simple or a more advanced analysis, or you can connect to your own data to create an analysis.

Topics

- [Setting Up Amazon QuickSight \(p. 16\)](#)
- [Signing In to Amazon QuickSight \(p. 19\)](#)
- [Quick Start: Create an Analysis with a Single Visual Using Sample Data \(p. 20\)](#)
- [Tutorial: Create A Multivisual Analysis and a Dashboard Using Sample Data \(p. 23\)](#)
- [Create an Analysis Using Your Own Local Text File Data \(p. 45\)](#)
- [Create an Analysis Using Your Own Amazon S3 Data \(p. 46\)](#)
- [Create an Analysis Using Your Own Database Data \(p. 47\)](#)

Setting Up Amazon QuickSight

The following section explains how to get setup to use Amazon QuickSight. If you can already sign in to Amazon QuickSight, you should skip this section, and proceed to [Signing In to Amazon QuickSight \(p. 19\)](#).

To get signed up for Amazon QuickSight, choose one of the following.

Topics

- [Setup a Free Standalone User Account in Amazon QuickSight \(p. 17\)](#)

- [Sign Up for AWS and a Free Amazon QuickSight Account as an Educator or Student \(p. 18\)](#)
- [Set up Amazon QuickSight for an existing AWS user \(p. 18\)](#)

Setup a Free Standalone User Account in Amazon QuickSight

This section covers the fastest way to setup a free Amazon QuickSight account.

If you have only one user (author or admin), you can use Amazon QuickSight for free. If your team wants to try out Amazon QuickSight, you can sign up for a 60 day free trial for up to 4 additional users (author or admin). After the trial is over, you can reduce the number of users to 1 only, and then the Amazon QuickSight account remains free.

If you want to conduct a trial with a larger number than five users, you can still sign up this way. However, you are billed for users over five during the first sixty days, and users over 1 thereafter.

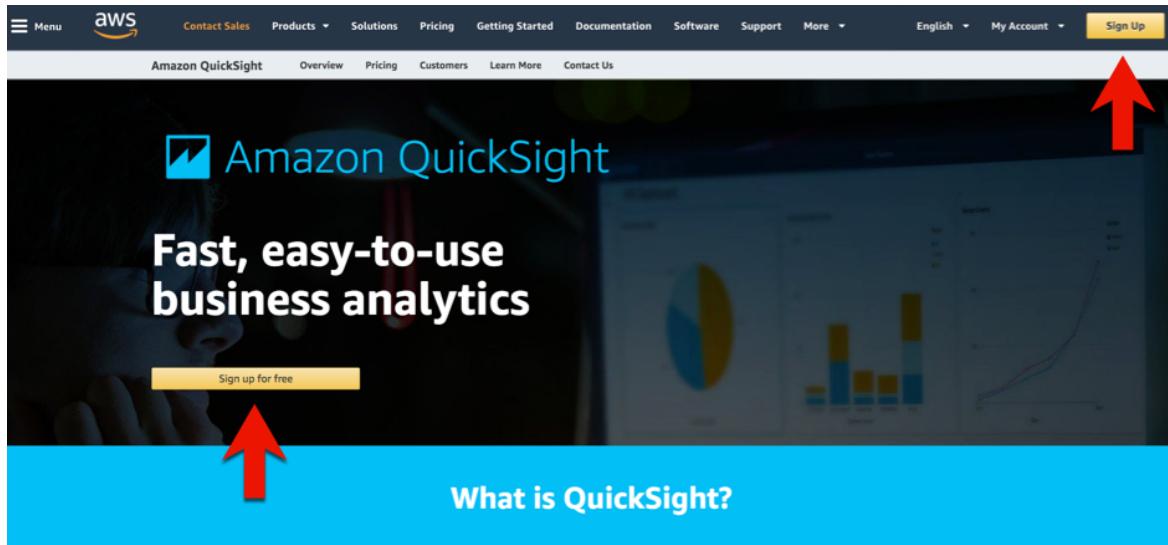
Note

You can only create users in the reader role in Enterprise edition. They aren't as part of the free trial.

If one of the following applies, visit the corresponding site for more information:

- Do you already have an AWS account? See [Set up Amazon QuickSight for an existing AWS user \(p. 18\)](#).
- Are you a student or educator, new to AWS? See [Sign Up for AWS and a Free Amazon QuickSight Account as an Educator or Student \(p. 18\)](#).

The following automated sign up guides you through the steps to open your account. To begin, choose **Sign Up** at the top right of the [Amazon QuickSight website](#).



The process works like this:

- First, you create a free AWS account. This step takes about ten minutes. It asks for your name, email, address, and phone number. You need to have a phone and a credit card to complete the process.
- Next, you create a free Amazon QuickSight account. In this step, you can choose either Standard or Enterprise edition. You also set up an Amazon QuickSight account name.
- After that, you open Amazon QuickSight and get some sample data to explore.

If you signed up for Amazon QuickSight using this method, you are ready to explore what you can do with Amazon QuickSight. See [Getting Started with Data Analysis in Amazon QuickSight \(p. 16\)](#)

Sign Up for AWS and a Free Amazon QuickSight Account as an Educator or Student

If you are an educator or a student, you can sign up using [AWS Educate](#) instead. You can use an AWS Educate Starter Account, if your institution doesn't have an AWS Account.

Set up Amazon QuickSight for an existing AWS user

This section covers how to setup a free Amazon QuickSight account, when you already have an existing AWS account. Amazon QuickSight offers a 60 day free trial for 4 users. If you maintain 1 user only, the Amazon QuickSight account remains free.

If one of the following applies, visit the corresponding site for more information:

- If you don't already have an AWS account, see [Setup a Free Standalone User Account in Amazon QuickSight \(p. 17\)](#).
- If you're a student or educator, new to AWS, see [Sign Up for AWS and a Free Amazon QuickSight Account as an Educator or Student \(p. 18\)](#) instead.

The following process helps an individual user to start up a free Amazon QuickSight Standard account. If you want to use Enterprise edition, or if you are an administrator trying to configure Amazon QuickSight for your company, see [Subscribe to Amazon QuickSight \(p. 548\)](#) instead.

Before you begin, you must be able connect to an existing AWS account. If your company already has an AWS account, contact your AWS account administrator for assistance.

To subscribe to Amazon QuickSight

1. Sign in to your AWS account and open Amazon QuickSight from the AWS Management Console. It is located under Analytics, and you can find it by searching for "QuickSight".
2. Your AWS account number is displayed for verification purposes. Choose **Sign up for QuickSight**.
3. Choose **Standard**. To confirm, choose **Continue**. A screen titled **Create your QuickSight account** appears.
4. Make choices for the following items:
 - Type in a unique name for your Amazon QuickSight subscription account. Your account name can only contain characters (A–Z and a–z), digits (0–9), and hyphens (-).
 - Type in a your email address to receive Amazon QuickSight service and usage notifications.
 - (Optional) Choose the AWS region you want to utilize for your default [SPICE \(p. 2\)](#) capacity. This is where your account's free SPICE capacity is allocated after signing up. Note that you aren't able to change the default capacity region later, but you can always purchase additional SPICE capacity in different regions as needed. See [AWS Regions and IP Address Ranges \(p. 546\)](#) for information on regions.
 - (Optional) Choose whether to allow autodiscovery of your AWS resources. You can change these options later in **Manage Account**. For more information, see [Allowing Autodiscovery of AWS Resources \(p. 591\)](#).
5. Review the choices you made, then choose **Finish**.

After you successfully complete signup, you are ready to explore what you can do with Amazon QuickSight.

Request Access to Amazon QuickSight

If your organization is already using Amazon QuickSight, you should talk to an Amazon QuickSight administrator or an AWS administrator to find out how to get access.

Signing In to Amazon QuickSight

You can sign in on the Amazon QuickSight page, <https://quicksight.aws.amazon.com/>. Follow the screen prompts to sign in. For your convenience, the procedure is outlined here. It varies slightly depending on the type of account you have.

1. For **Account name**, type the Amazon QuickSight account name. This is the name that was created for this Amazon QuickSight subscription. You should take note of it in case you need it later.
2. If you are prompted for your email address, type it in.
3. If the username is blank, type the user name you want to use to sign in. Choose one of the following:

- For organizational users – the user name provided by your administrator.

Your account can be based on IAM credentials, a Single Sign-On (SSO) service, or your email address. If you received an invitation email from another Amazon QuickSight user, it indicates what type of credentials to use.

- For individual users – the user name you created for yourself.

This is usually the IAM credentials you created.

User names that contain a semicolon (;) aren't supported.

4. Type the associated password in **Password**. If you aren't sure, ask the administrator. If you create a new password, there is a **Confirm password** field. Type your password again.

Passwords are case-sensitive, must be between 8 and 64 characters in length, and must contain at least one character from three of the following categories:

- Lowercase letters (a–z)
- Uppercase letters (A–Z)
- Numbers (0–9)
- Nonalphanumeric characters (~!@#\$%^&*_+=`|\{}{}\;";<>,.?/)

5. Choose **Sign in**. In some cases, this button is labeled **Create account and sign in**.
6. (Only for users invited by email.) You are prompted to type the account name provided in your email invitation. If you mistype it, you get an authentication error. To change the account name, choose the account name next to the **Account name**, and type in the correct one.

Signing In to Amazon QuickSight Using an Identity Provider

If your organization uses an identity provider, you must first sign in through the identity provider before you use Amazon QuickSight.

An identity provider supports single sign-on (SSO) access. This means you don't need to provide sign-in information to Amazon QuickSight. When you access Amazon QuickSight, you shouldn't see a sign-in screen.

If you do see a sign-in screen in this case, no credentials will work. Before you can use Amazon QuickSight, you must sign in through your identity provider.

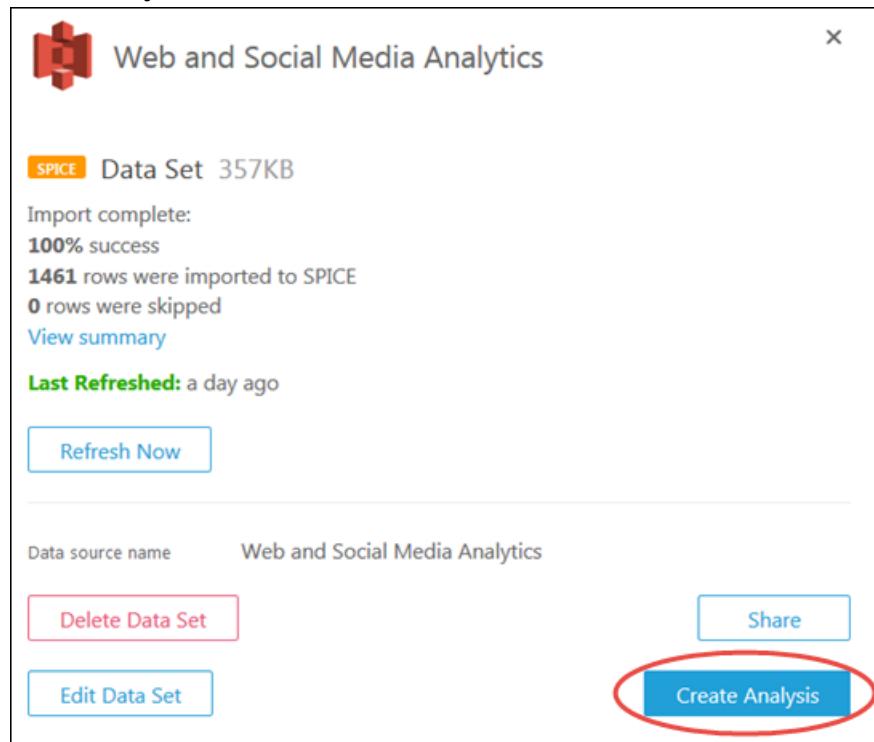
Quick Start: Create an Analysis with a Single Visual Using Sample Data

Use the following procedure to use the Web and Social Media Analytics sample data set to create an analysis containing a line chart visual. This visual shows the count by month of people that have added themselves to the mailing list.

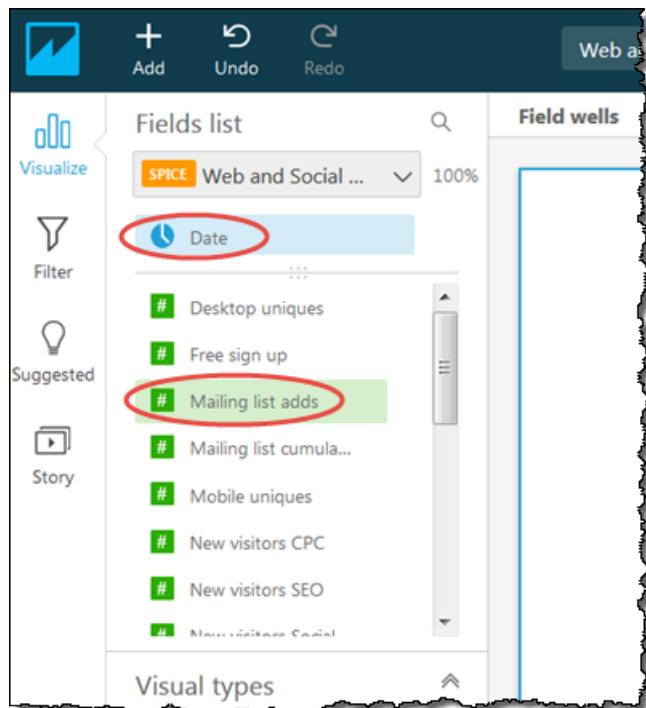
1. On the Amazon QuickSight start page, choose **New analysis**. If you don't have the sample data, you can download it from http://quicksightsampleddata.s3.amazonaws.com/MarketingData_QuickSightSample.csv.

To upload the sample data, use the following steps:

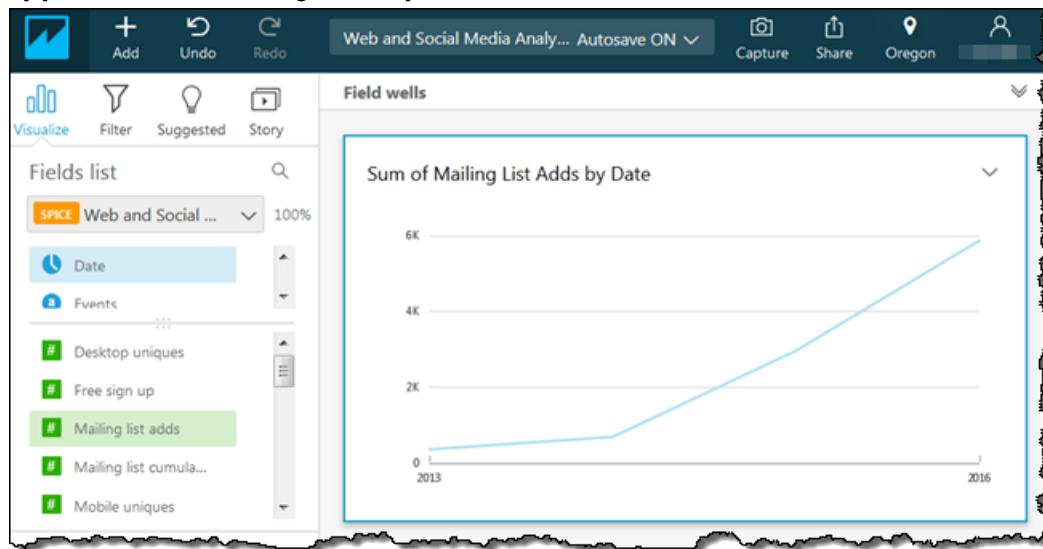
- a. Choose **New data set** from the **New analysis** screen. (Or, choose **Manage data** to locate the **New data set** screen.)
 - b. Choose **Upload a file**.
 - c. Choose the sample file, `MarketingData_QuickSightSample.csv`, from your drive.
 - d. Confirm file upload settings by choosing **Next** on the **Confirm file upload settings** screen.
 - e. Choose **Visualize** on the **Data source details** screen.
 - f. Skip the next step. Choosing **Visualize** brings you to the same screen as the process in Step 2.
2. On the **Your data sets** page, choose the **Web and Social Media Analytics** data set, and then choose **Create Analysis**.



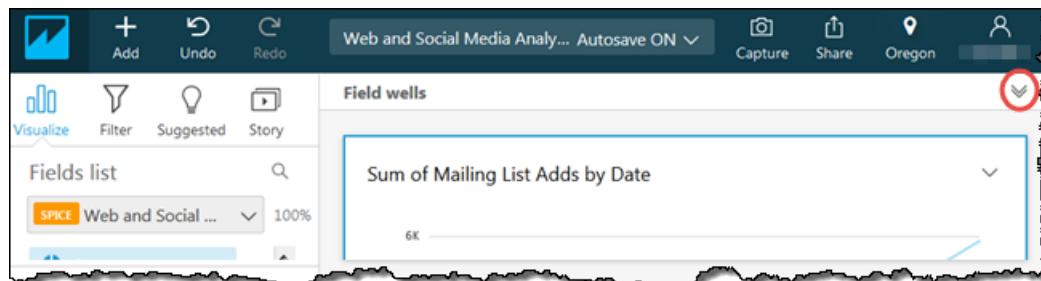
3. In the **Fields list** pane, choose **Date**, and then choose **Mailing list adds**.



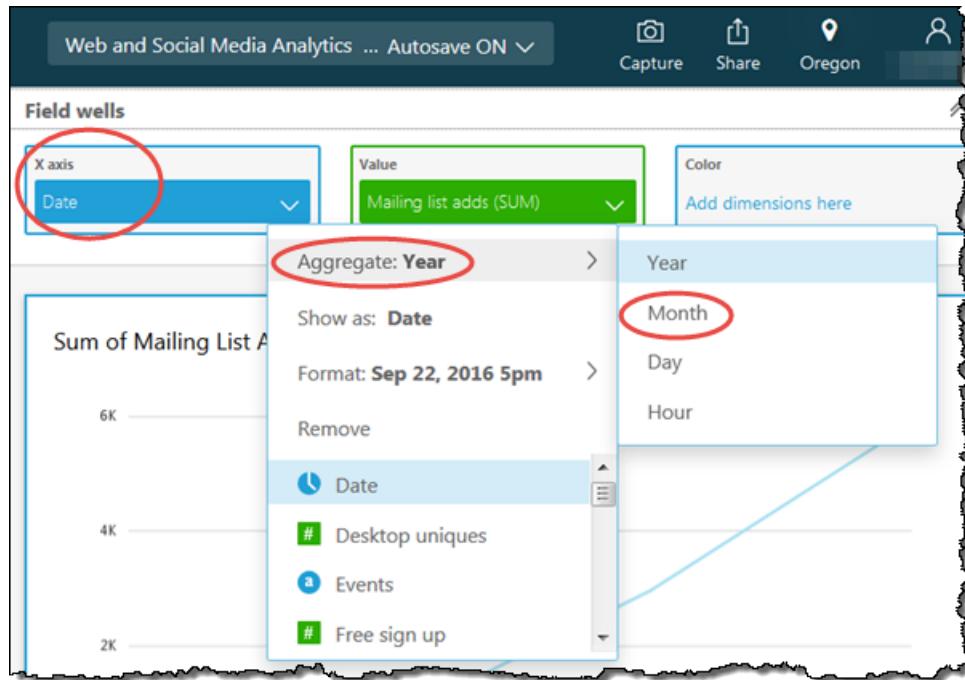
Amazon QuickSight uses AutoGraph to create the visual, selecting the visual type that it determines is most compatible with those fields. In this case, it selects a line chart that shows mailing list adds by year, which is the date granularity default.



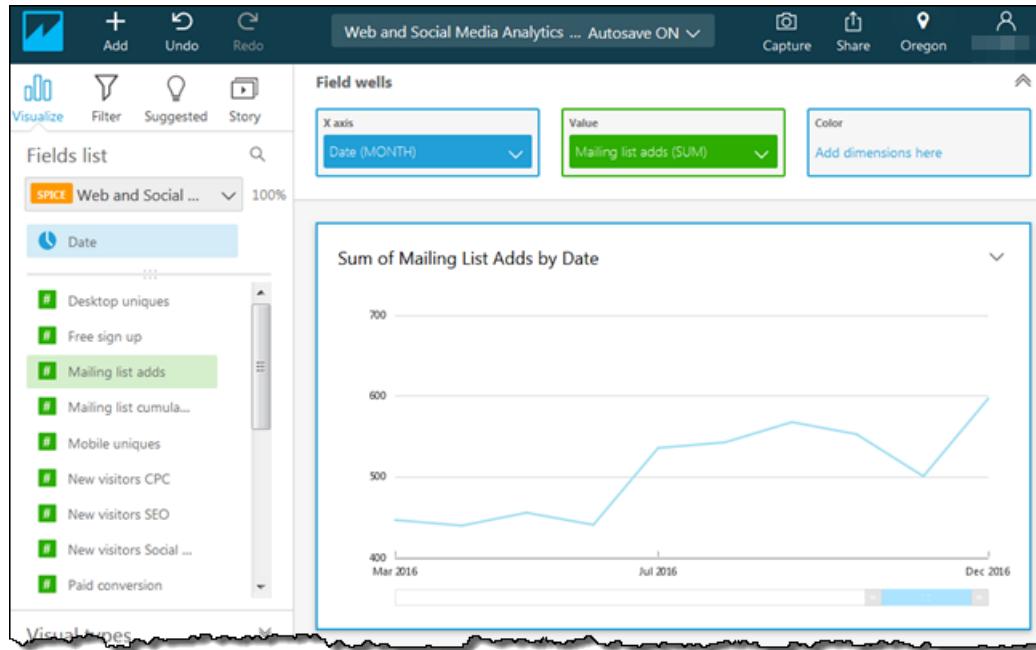
4. Expand the **Field wells** pane by choosing the expand icon.



5. Choose the **X axis** field well, choose **Aggregate**, and then choose **Month**.



The line chart updates to show mailing list adds by month, rather than by the default of by year.



Tutorial: Create A Multivisual Analysis and a Dashboard Using Sample Data

Use the procedures in the following sections to complete these tasks:

- Create and prepare a Marketing data set using the Web and Social Media Analytics sample data.
- Create a Marketing analysis and add several visuals to it.
- Modify the visuals in the analysis, including the following:
 - Adding another measure to an existing visual
 - Changing chart colors
 - Changing date granularity
 - Changing the size and layout of the visuals
 - Applying a filter
- Publish a dashboard based on the analysis.

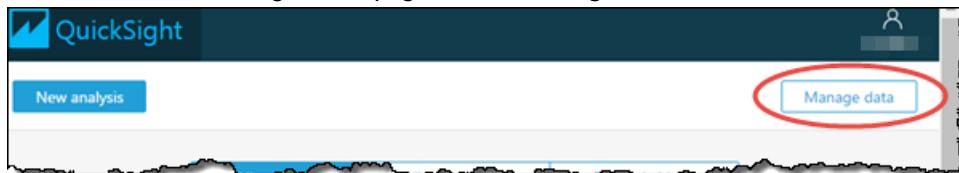
Topics

- [Tutorial: Create a Prepared Data Set \(p. 23\)](#)
- [Tutorial: Create an Analysis \(p. 28\)](#)
- [Tutorial: Modify Visuals \(p. 32\)](#)
- [Tutorial: Create a Dashboard \(p. 44\)](#)

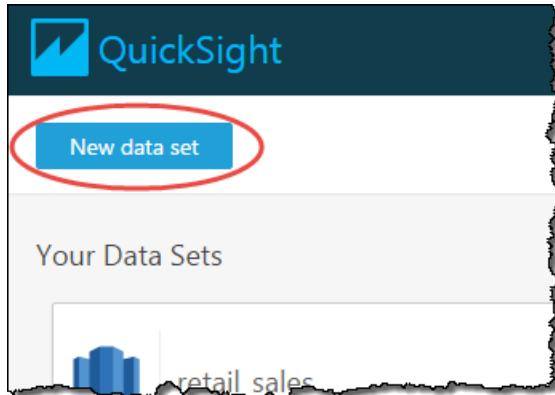
Tutorial: Create a Prepared Data Set

Use the following procedure to prepare the Marketing data set and create an analysis. If you don't see the Web and Social Media Analytics sample data already in Amazon QuickSight, you can download it from http://quicksightsampleddata.s3.amazonaws.com/MarketingData_QuickSightSample.csv.

1. On the Amazon QuickSight start page, choose **Manage data**.



2. On the Your data sets page, choose **New data set**.



3. In the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page, choose the **Web and Social Media Analytics** Amazon S3 data source and then choose **Edit/Preview data**.

Amazon QuickSight opens the data preparation page.

4. Name the data set.

Highlight **Group 1** in the data set name box, and type **Marketing Sample**.



5. Change the field selection to remove some fields we won't be working with.

In the **Fields** pane, unselect the **Twitter followers cumulative** and **Mailing list cumulative** fields.

Data source
SPICE

Tables Group 1

Fields 17 fields selected

- # Mailing list adds
- # Twitter followers cumulative
- # Mailing list cumulative
- # Return visitors

Upload Settings CSV

| Date | # |
|----------------|------|
| 2013-01-01T... | 2194 |
| 2013-01-02T... | 1653 |
| 2013-01-03T... | 2213 |
| 2013-01-04T... | 2223 |
| 2013-01-05T... | 1674 |
| 2013-01-06T... | 1681 |
| 2013-01-07T... | 2522 |

6. Rename a field.

In the data preview pane, scroll to the **Website Pageviews** field and choose the edit icon.

| Twitt... | Mailing list ... | Maili... | Web... |
|----------|------------------|----------|--------|
| # | # | # | # |
| 0 | 1872 | 25313 | 8438 |
| 2 | 1874 | 25424 | 8475 |

Highlight the field name, type **Website page views**, and then choose **Apply**.

Rename column header

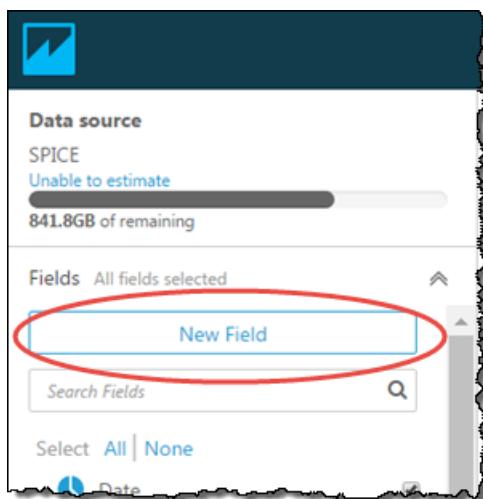
Website page views

Cancel

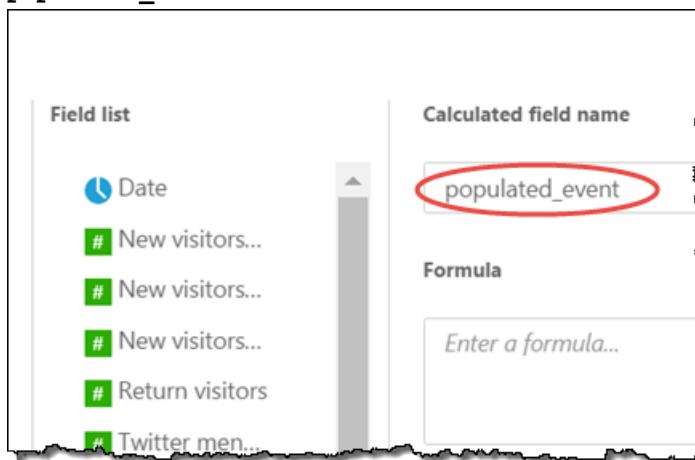
Apply

7. Add a calculated field that substitutes a text string for any 0-length string value in the **Events** field.

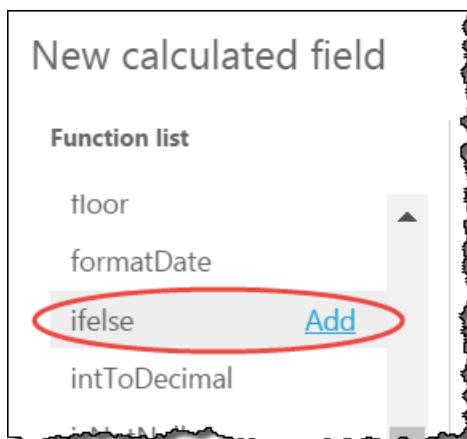
- a. On the data preparation page, expand the **Fields** pane, and then choose **New Field**.



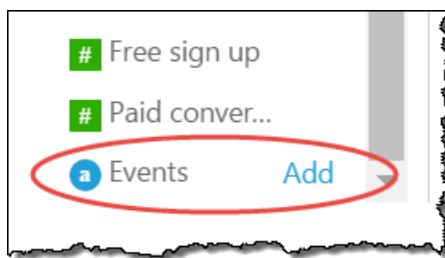
- b. In the **New calculated field** pane, highlight the value in **Calculated field name**, and then type populated_event.



- c. Choose the **ifelse** function from the **Function list** and then choose **Add**. This adds the function to the calculated field formula.



- d. Scroll down in the **Field list**, choose the **Events** field, and then choose **Add**. This adds the field to the calculated field formula.



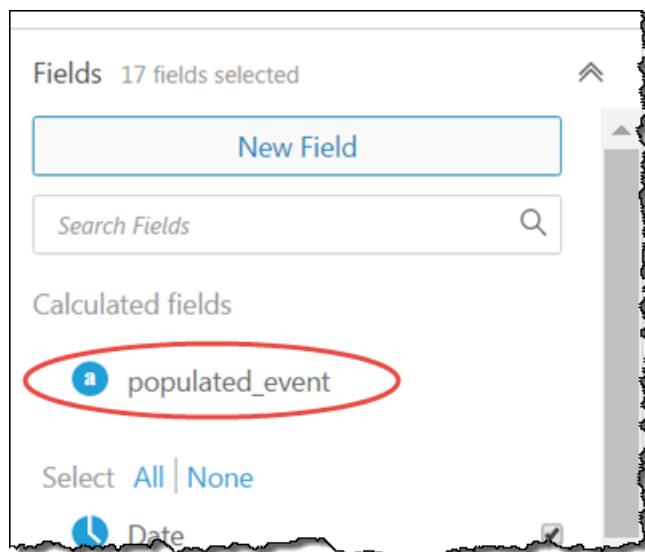
- e. In **Formula**, type the additional functions and parameters required, highlighted following:

The dialog box has 'Calculated field name' set to 'populated_event' and the 'Formula' field containing the code: `ifelse(strlen({Events})=0, 'Unknown', {Events})`. A blue 'Create' button is at the bottom.

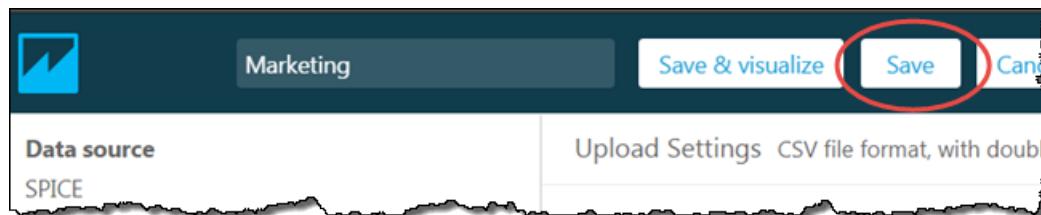
- f. Choose **Create**.

The dialog box has 'Calculated field name' set to 'populated_event' and the 'Formula' field containing the code: `ifelse(strlen({Events})=0, 'Unknown', {Events})`. The 'Create' button is circled with a red oval.

The new calculated field is created, and appears in the **Calculated fields** section at the top of the **Fields** pane.



8. Choose **Save**.



Next Steps

Create an analysis by using the procedure in [Tutorial: Create an Analysis \(p. 28\)](#).

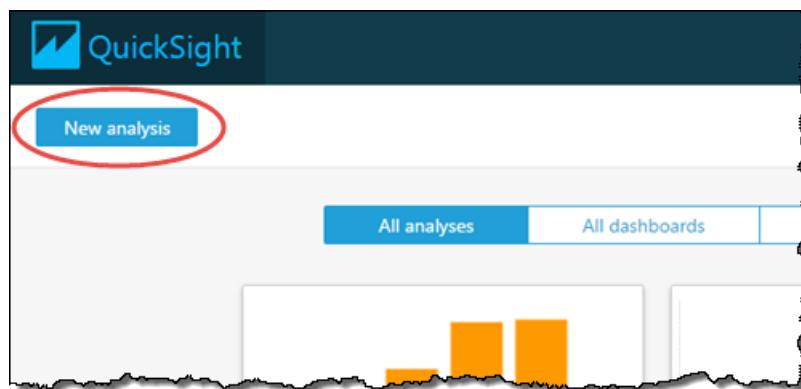
Tutorial: Create an Analysis

Create an analysis, add a visual using AutoGraph, and add another visual by choosing a specific visual type. This procedure builds on the data set you create and prepare using the steps in [Tutorial: Create a Prepared Data Set \(p. 23\)](#).

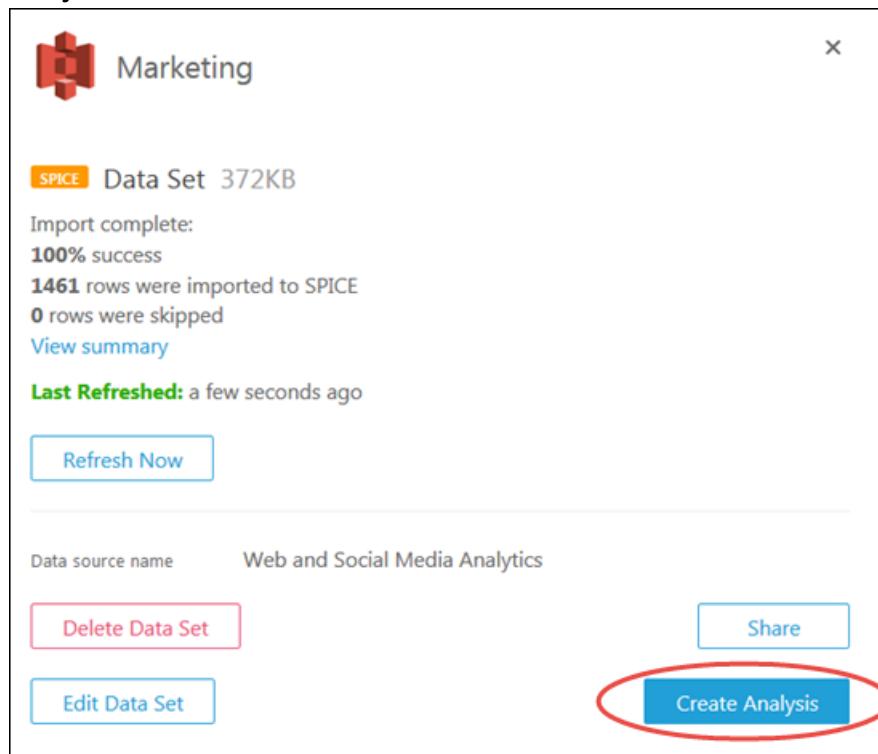
Create the Analysis

Create the analysis.

1. On the Amazon QuickSight start page, choose **New analysis**.



2. On the Your data sets page, choose the **Marketing Sample** data set and then choose **Create Analysis**.

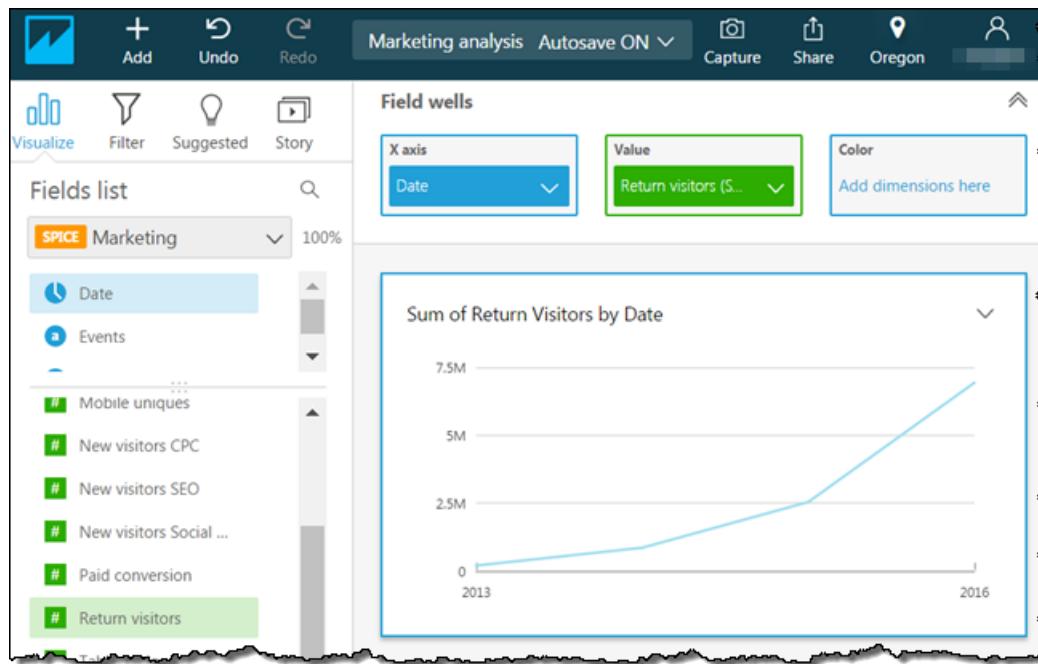


Create a Visual By Using AutoGraph

Create a visual by using AutoGraph, which is selected by default.

On the analysis page, choose **Date** and **Return visitors** in the **Fields list** pane.

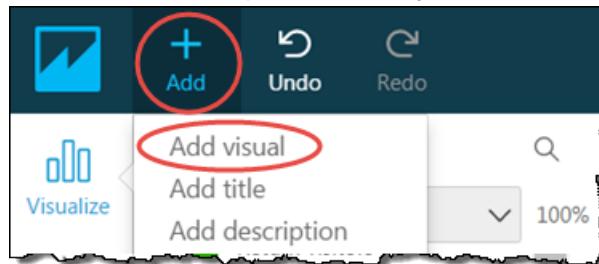
Amazon QuickSight creates a line chart using this data.



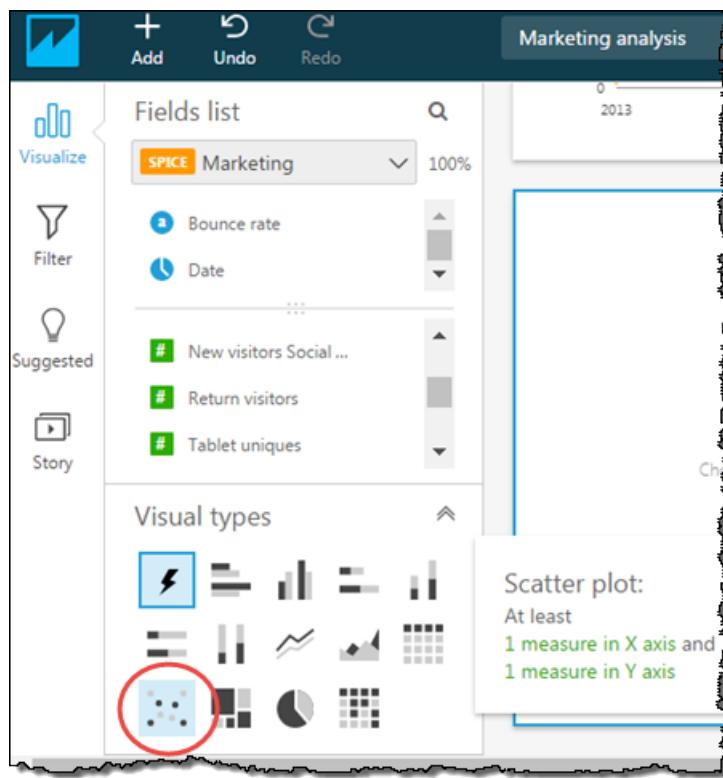
Create a Scatter Plot Visual

Create a visual by choosing a visual type and dragging fields to the field wells.

1. On the analysis page, choose **Add** and then **Add visual** on the application bar. A new, blank visual is created, and AutoGraph is selected by default.

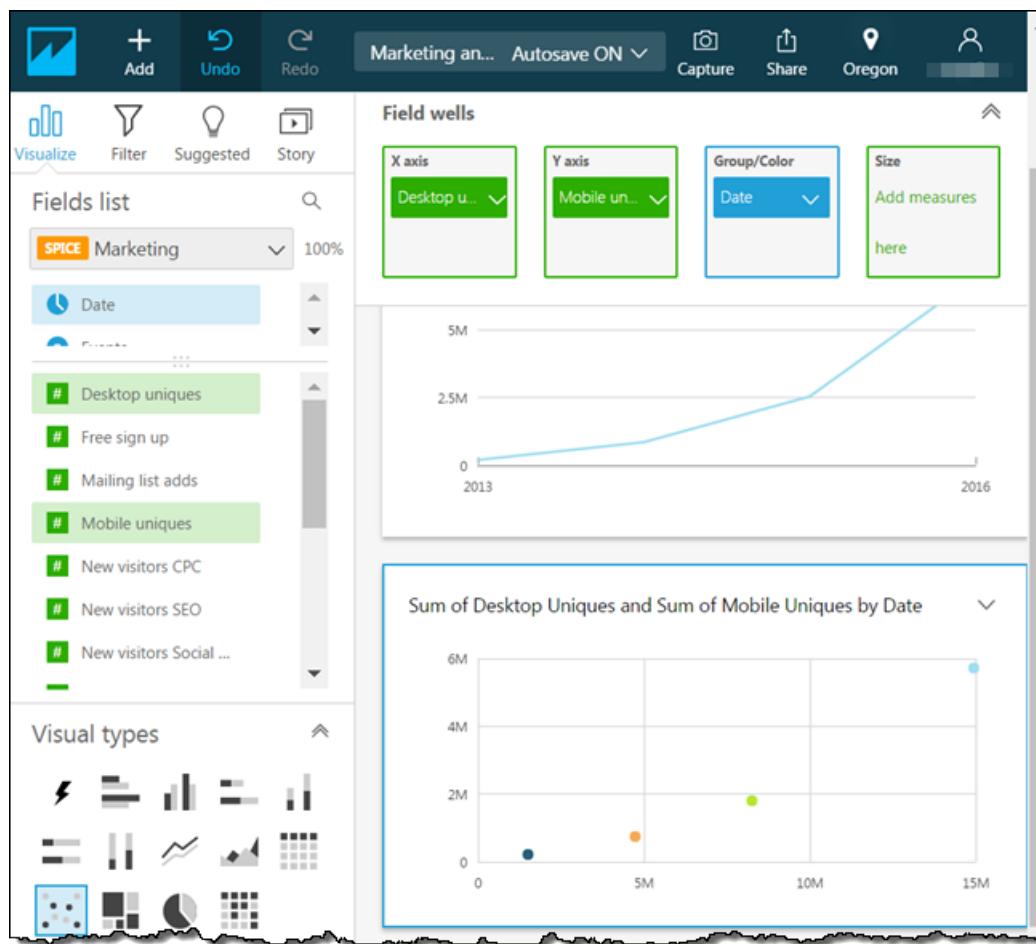


2. In the **Visual types** pane, choose the scatter plot icon.



3. Choose fields in the **Fields list** pane to add to the **Field wells** pane.
 - Choose **Desktop Uniques** to populate the **X axis** field well.
 - Choose **Mobile Uniques** to populate the **Y axis** field well.
 - Choose **Date** to populate the **Group/Color** field well.

A scatter plot is created using these fields.



Next Steps

Modify the visuals in the analysis by using the procedure in [Tutorial: Modify Visuals \(p. 32\)](#).

Tutorial: Modify Visuals

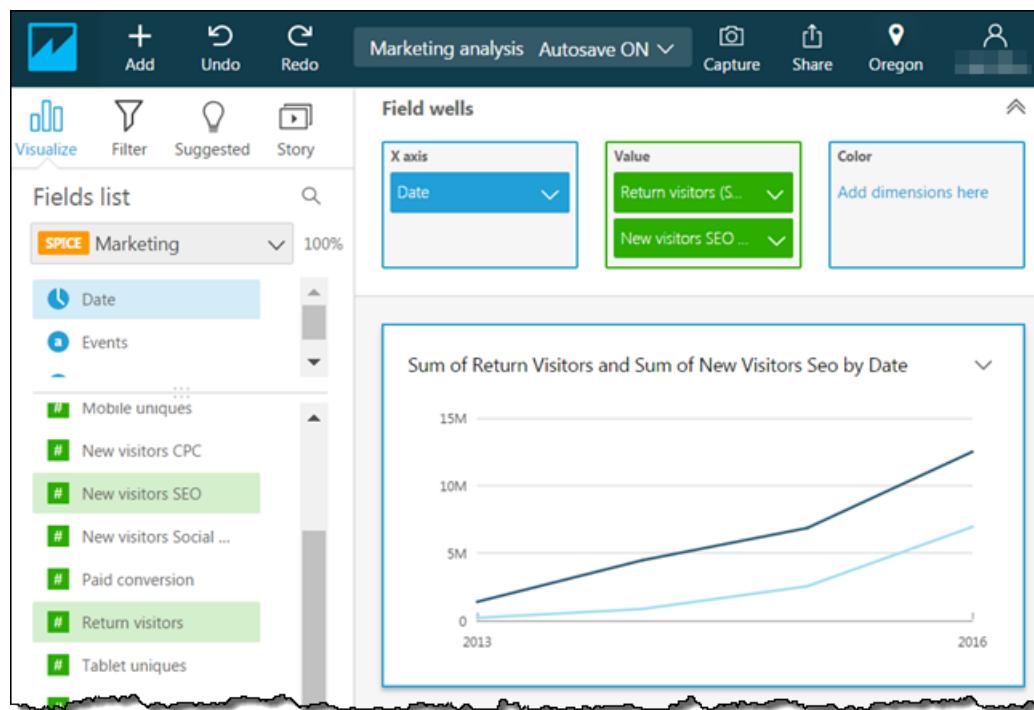
Use the following procedures to modify the visuals created using the procedures in [Tutorial: Create an Analysis \(p. 28\)](#).

Modify the Line Chart Visual

Modify the line chart visual by making it show an additional measure by date, and also by changing the chart color.

1. In the analysis, select the line chart visual.
2. Add another measure to the visual.

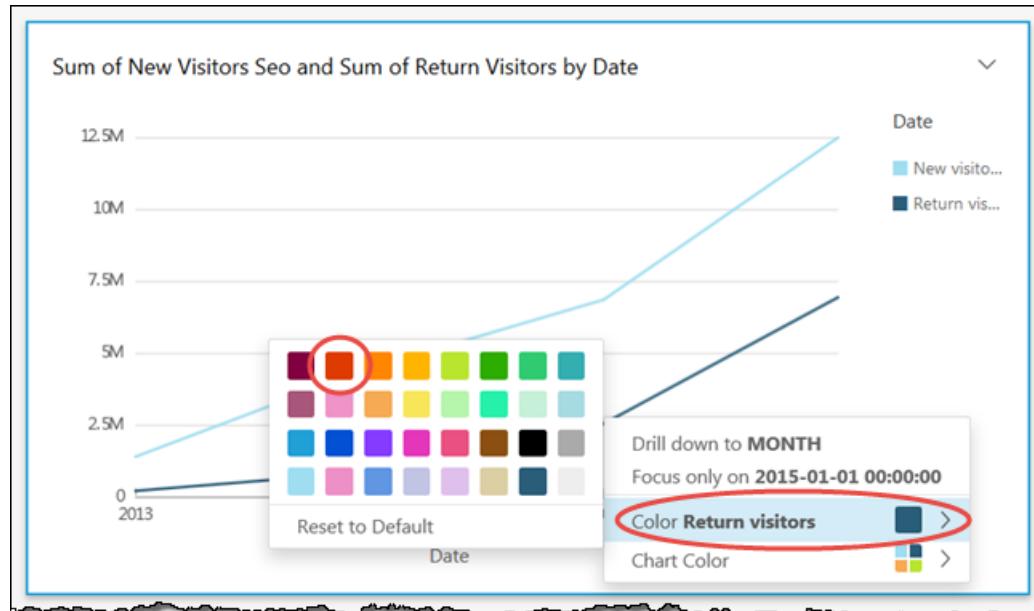
Select the **New visitors SEO** field in the **Fields list** pane. This measure is added to the **Value** field well, and the line chart updates with a line to represent it. Note that the visual title updates as well.

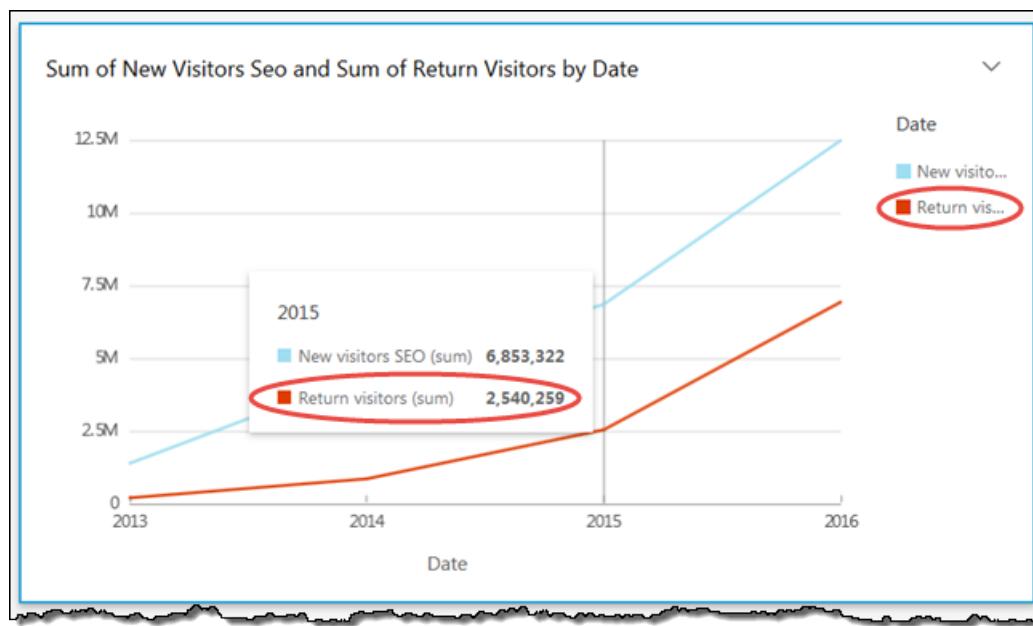


3. Change the color of the line used to represent the **Return visitors** measure.

Choose the line on the chart that represents **Return visitors**. To do this, choose the end of the line, not the middle of the line.

Choose **Color Return visitors**, and then choose the red icon from the color selector.

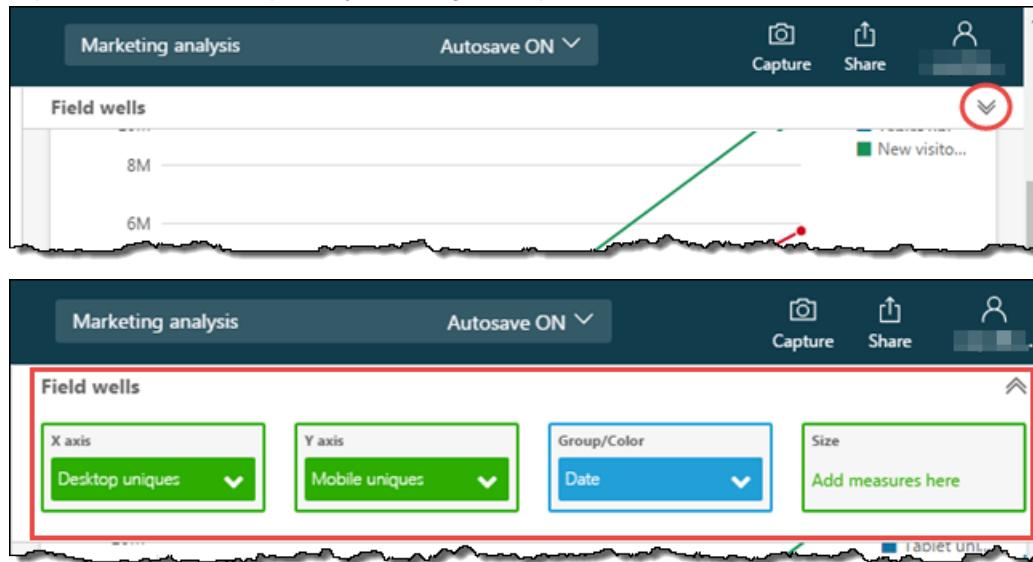




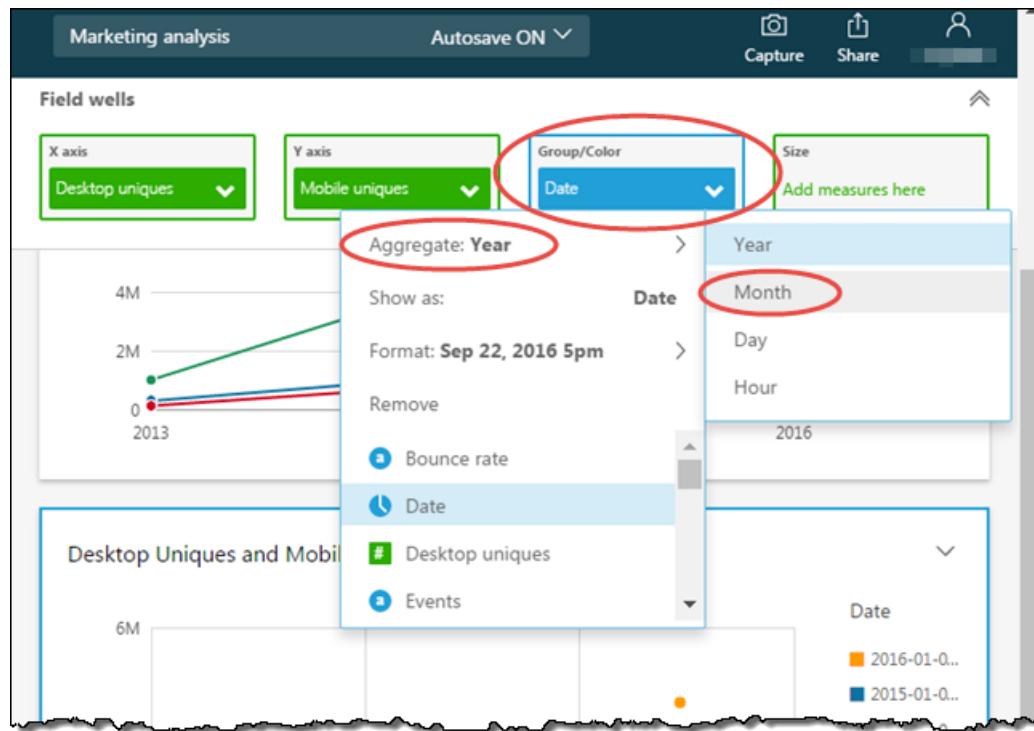
Modify the Scatter Plot Visual

Modify the scatter plot visual by changing the data granularity.

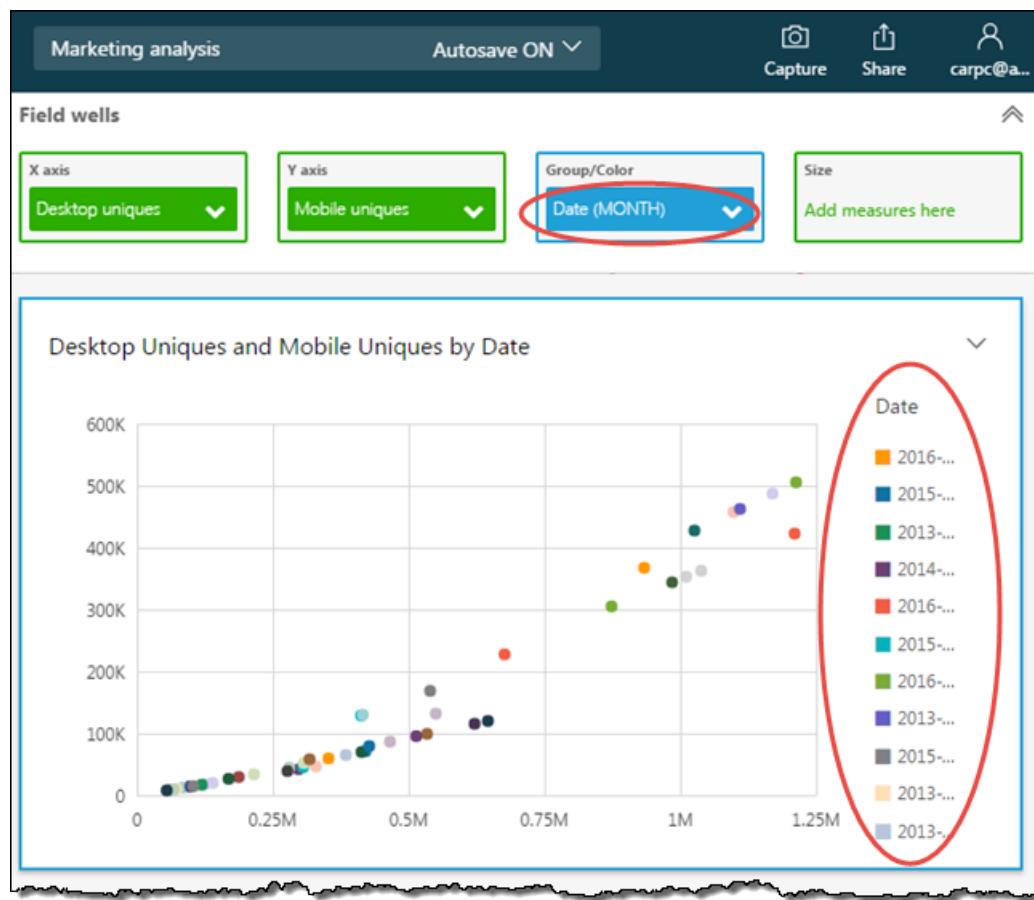
1. In the analysis, select the scatter plot visual.
2. Expand the **Field wells** pane by choosing the expand icon.



3. Choose the **Group/Color** field well, choose **Aggregate**, and then choose **Month**.



The scatter plot updates to show the measures by month, rather than by the default of by year.



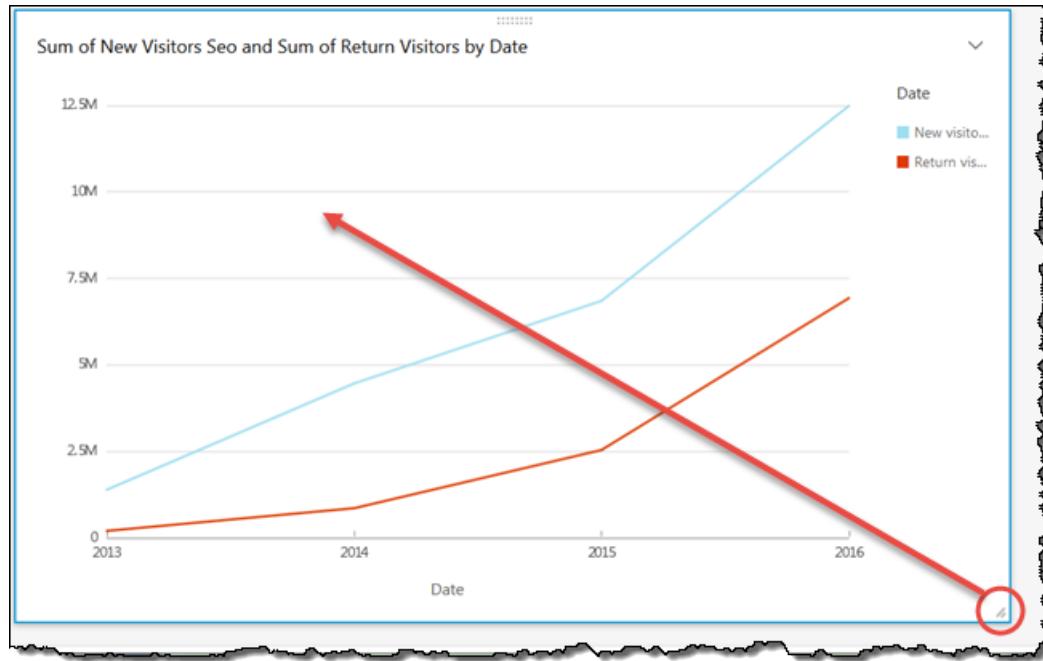
Modify Both Visuals by Changing Visual Layout and Adding a Filter

Modify both visuals by changing visual size and location, and by adding a filter and applying it to both of them.

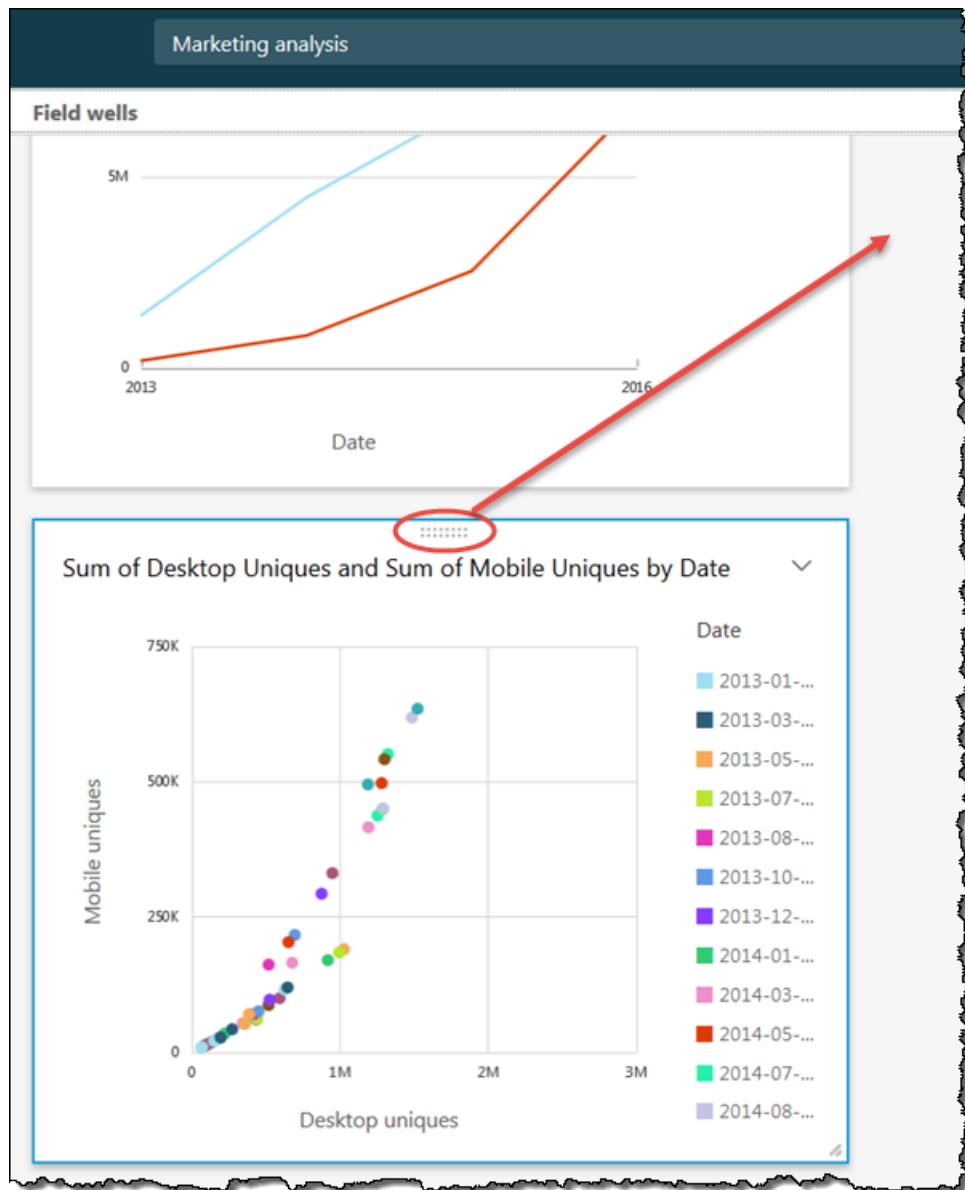
Change the Visual Layout

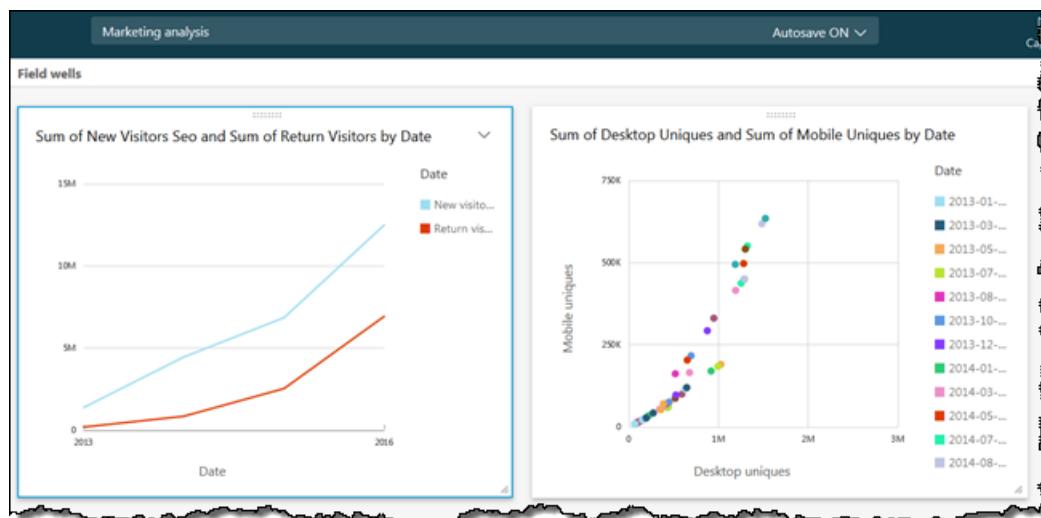
Modify both visuals by changing visual size and location.

1. In the analysis, select the line chart visual.
2. Choose the resize handle in the lower right corner of the visual and drag up and to the left, until the visual is half its former size both horizontally and vertically.



3. Repeat this procedure on the scatter plot visual.
4. Choose the move handle on the scatter plot visual, and drag it up to the right of the line chart visual so that they are side-by-side.

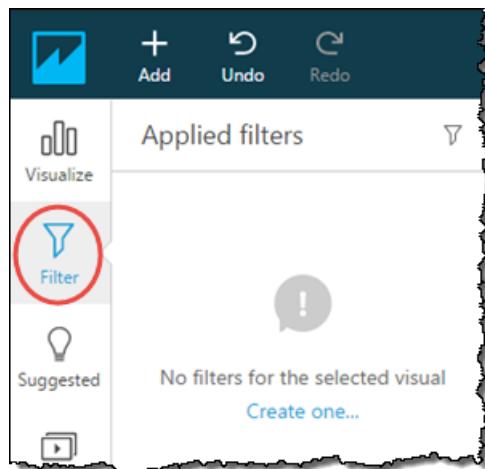




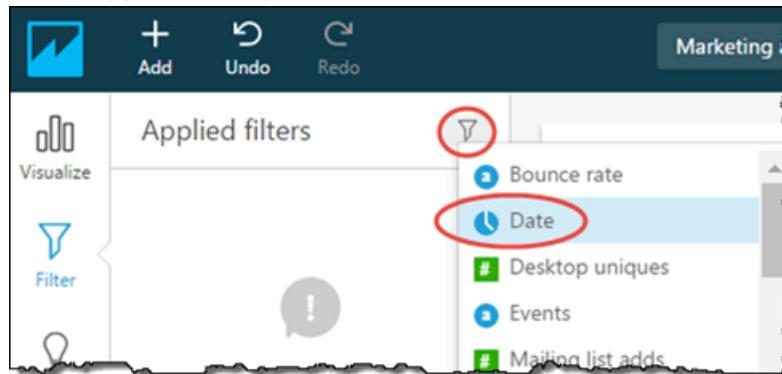
Modify Both Visuals by Adding a Filter

Modify both visuals by adding a filter and applying it to both of them.

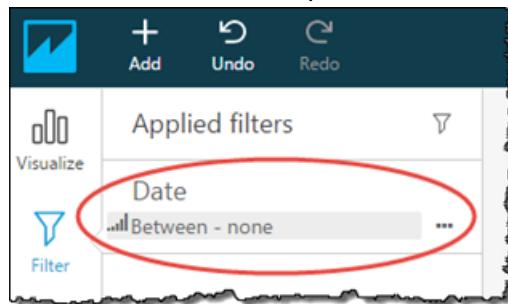
1. In the analysis, choose the scatter plot visual.
2. Choose **Filter** in the tool bar.



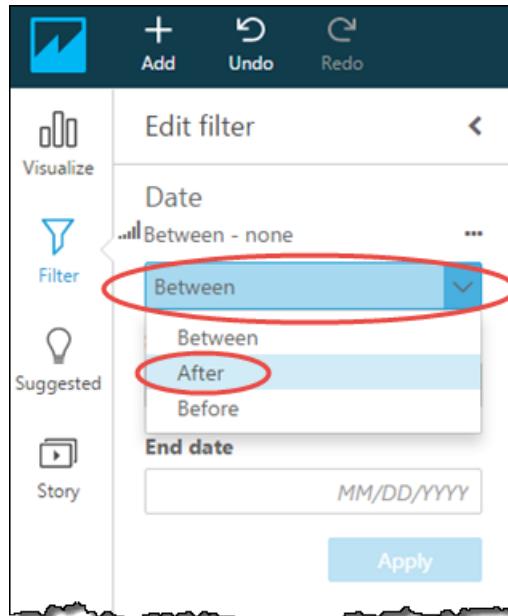
3. On the **Applied filters** pane, choose the new filter icon, and then choose the **Date** field to filter on.



4. Choose the new filter to expand it.

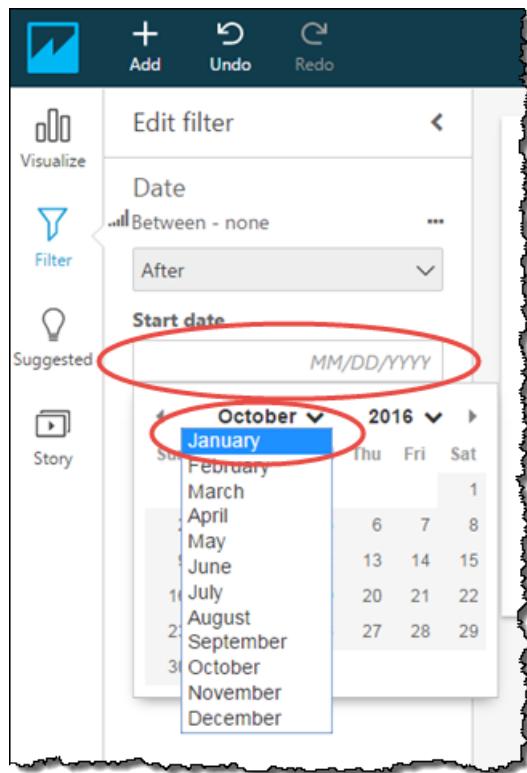


5. Choose the **After** comparison type.

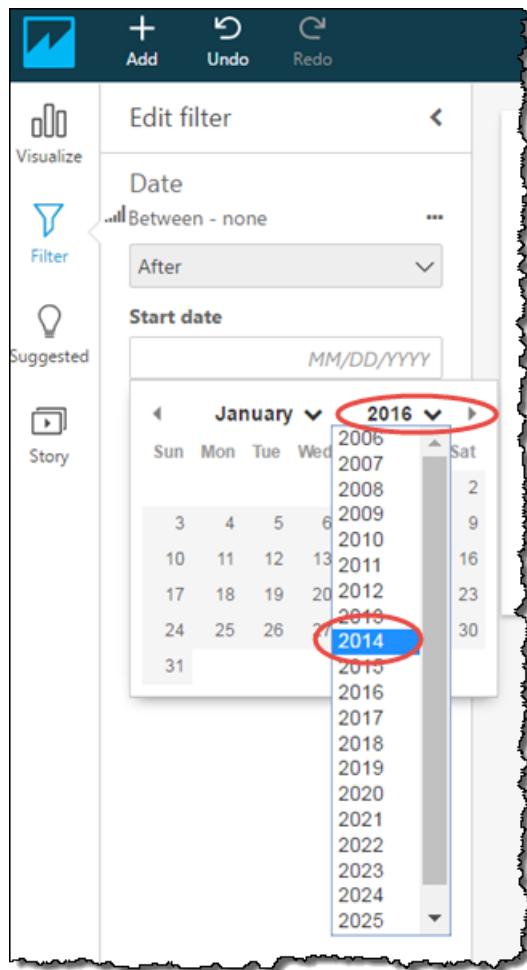


6. Enter a start date value of 1/1/2014.

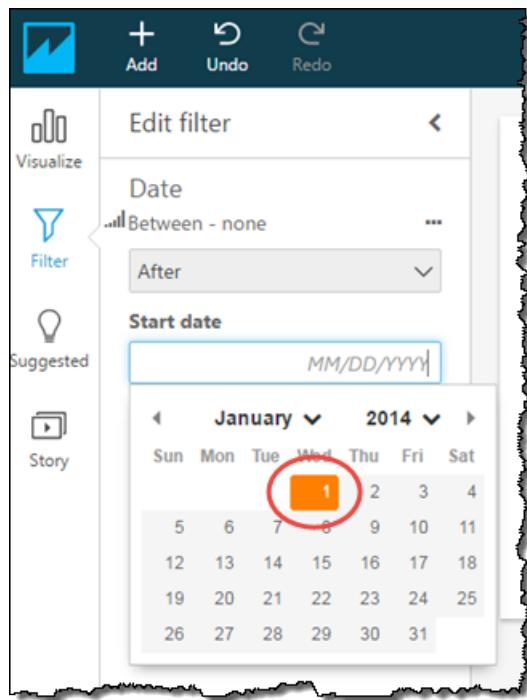
Choose **Start Date**, choose the month expander, and then choose **January**.



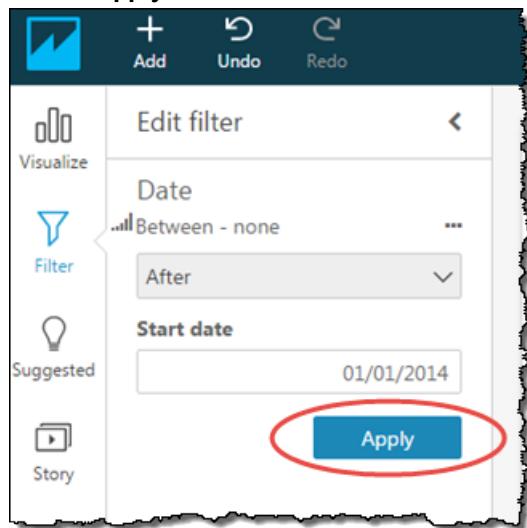
Choose the year expander and then choose **2014**.



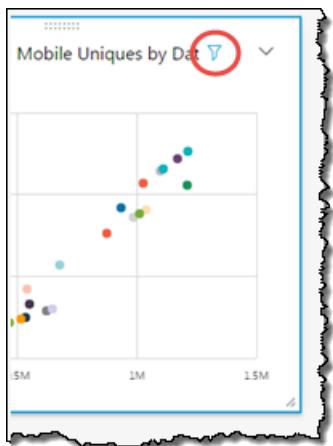
Choose the calendar and then choose 1.



7. Choose **Apply**.

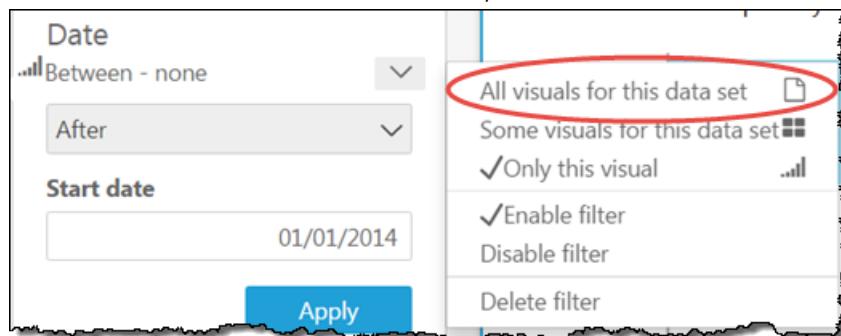


The filter is applied to the currently selected visual, which is the scatter plot visual. This is indicated with a filter icon next to the visual title.



8. Apply the filter to the line chart visual as well.

Choose the selector next to the filter name, and then choose **All visuals for this data set**.



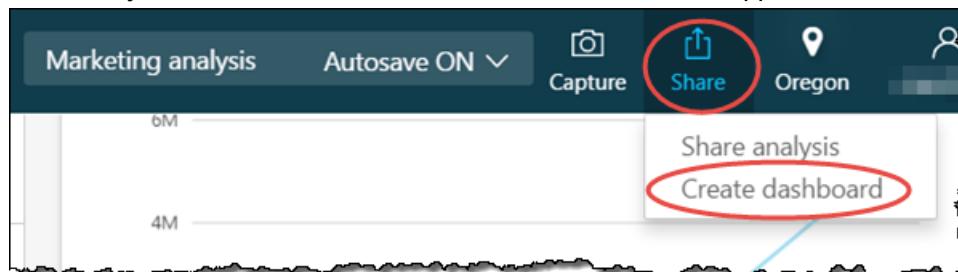
Next Steps

Create a dashboard from the analysis by using the procedure in [Tutorial: Create a Dashboard \(p. 44\)](#).

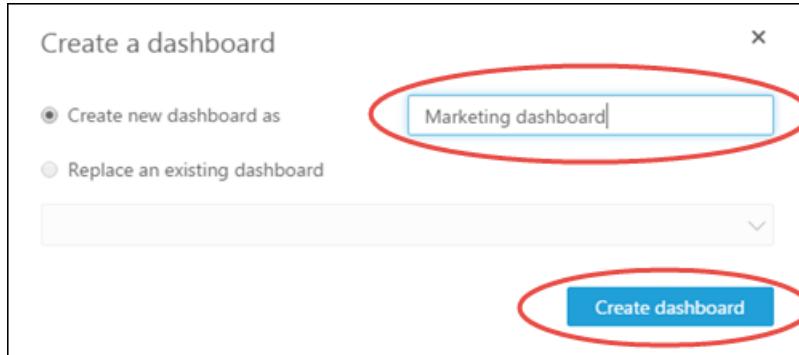
Tutorial: Create a Dashboard

Use the following procedure to create a dashboard from the analysis created using the procedure in [Tutorial: Create an Analysis \(p. 28\)](#).

1. In the analysis, choose **Share** and then **Create dashboard** on the application bar.



2. Choose **Create new dashboard as**, type the name **Marketing Dashboard**, and then choose **Create dashboard**.



3. On the **Share dashboard** dialog, choose **Cancel** (you can share the dashboard later by using the sharing option on the dashboard page). The dashboard is created.

Create an Analysis Using Your Own Local Text File Data

To create your first analysis using your own local text file data, follow these steps:

Topics

- [Step 1: Create a File Data Set and an Analysis \(p. 45\)](#)
- [Step 2: Create a Visual \(p. 45\)](#)

Step 1: Create a File Data Set and an Analysis

Complete the following procedure to create a data set and an analysis:

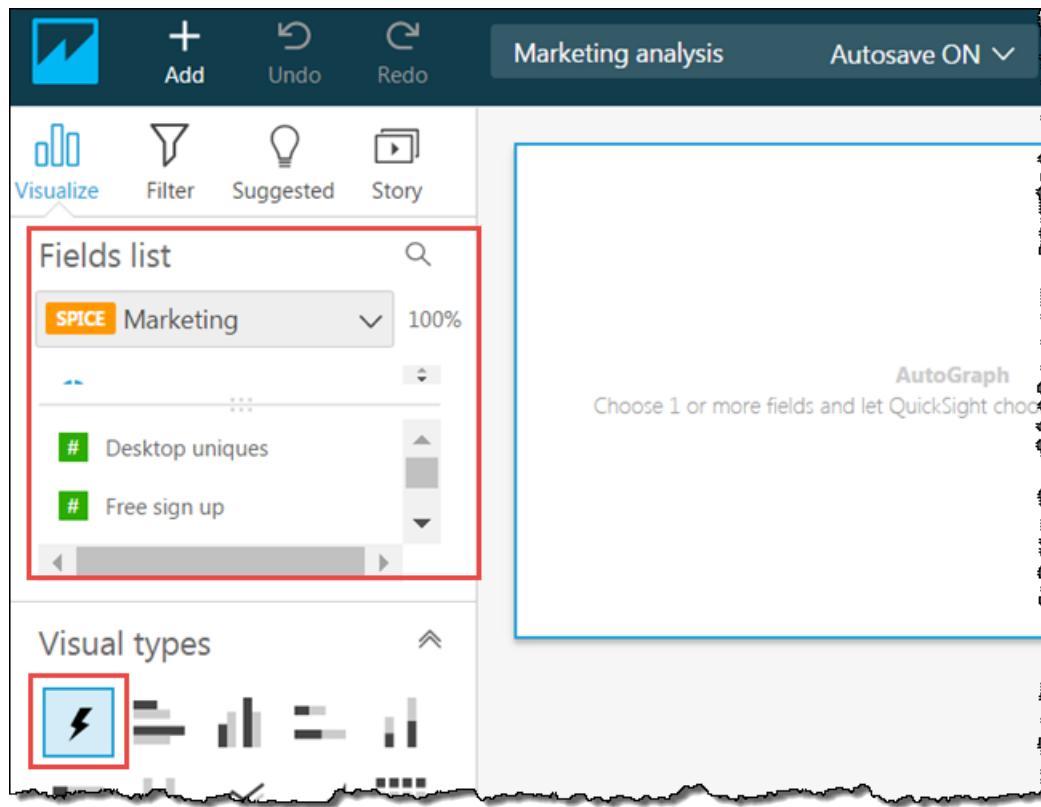
1. Check [Data Source Limits \(p. 62\)](#) to make sure your target file doesn't exceed data source limits.
2. On the Amazon QuickSight start page, choose **Manage data**.
3. On the **Your Data Sets** page, choose **New data set**.
4. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose **Upload a file**.
5. In the **Open** dialog box, browse to a text file, select it, and then choose **Open**.
A file must be 1 GB or less to be uploaded to Amazon QuickSight.
6. Choose **Next**.
7. Choose **Visualize**.

Step 2: Create a Visual

Next, create a visual.

In the **Fields list** pane of the analysis page, choose the fields you want to use.

Amazon QuickSight creates the visual, using AutoGraph to determine the most appropriate visual type for the fields you selected. For more information about AutoGraph, see [Using AutoGraph \(p. 346\)](#). For more information about modifying the visual, see [Working with Amazon QuickSight Visuals \(p. 253\)](#).



Create an Analysis Using Your Own Amazon S3 Data

To create your first analysis using your own Amazon S3 data, follow these steps:

Topics

- [Step 1: Create an Amazon S3 Data Set and an Analysis \(p. 46\)](#)
- [Step 2: Create a Visual \(p. 47\)](#)

Step 1: Create an Amazon S3 Data Set and an Analysis

Complete the following procedure to create a data set and an analysis:

1. Create a manifest file to identify the S3 files you want to import, using one of the formats specified in [Supported Formats for Amazon S3 Manifest Files \(p. 82\)](#).
2. Check [Data Source Limits \(p. 62\)](#) to make sure your target file set doesn't exceed data source limits.
3. Either save the manifest file to a local directory or upload it into Amazon S3.
4. On the Amazon QuickSight start page, choose **Manage data**.
5. On the **Your Data Sets** page, choose **New data set**.
6. In the **FROM NEW DATA SOURCES** section of the **Create a Data set** page, choose the Amazon S3 icon.
7. For **Data source name**, type a name for the data source.
8. For **Upload a manifest file**, do one of the following options:

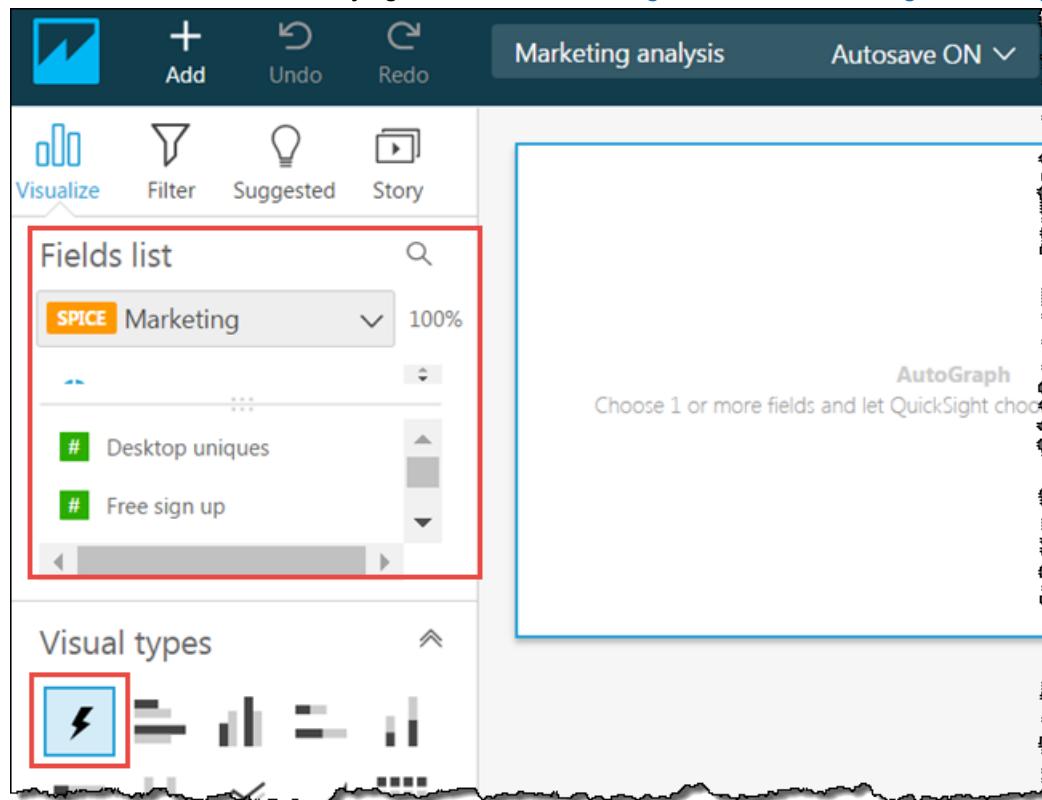
- Choose **URL** and type or paste in a URL for the manifest file. You can find this in the Amazon S3 console by right-clicking on the manifest file, choosing **Properties**, and looking at the **Link** field.
 - Choose **Upload** and then choose **Upload a JSON manifest file**. In **Open**, browse to a file, select it, and then choose **Open**.
9. Choose **Connect**.
 10. Choose **Visualize**.

Step 2: Create a Visual

Next, create a visual.

In the **Fields list** pane of the analysis page, choose the fields you want to use.

Amazon QuickSight creates the visual, using AutoGraph to determine the most appropriate visual type for the fields you selected. For more information about AutoGraph, see [Using AutoGraph \(p. 346\)](#). For more information about modifying the visual, see [Working with Amazon QuickSight Visuals \(p. 253\)](#).



Create an Analysis Using Your Own Database Data

To create your first analysis using your own database data, follow these steps:

Topics

- [Connect to a Database Data Source \(p. 48\)](#)
- [Step 2: Create a Database Data Set and an Analysis \(p. 49\)](#)
- [Step 3: Create a Visual \(p. 51\)](#)

Connect to a Database Data Source

Choose the situation that applies to you and follow the steps in the procedure to connect to your data source.

Your Amazon QuickSight Account

- [Your Amazon QuickSight Account Has Autodiscovered AWS Data Sources \(p. 48\)](#)
- [Your Amazon QuickSight Account Does Not Have Autodiscovered AWS Data Sources \(p. 48\)](#)

Your Amazon QuickSight Account Has Autodiscovered AWS Data Sources

If your Amazon QuickSight account has any autodiscovered AWS data sources, icons for those data sources appear on your start page. If you have credentials for one of these AWS data sources, use the following procedure. Otherwise, use the procedure in [Your Amazon QuickSight Account Does Not Have Autodiscovered AWS Data Sources \(p. 48\)](#).

1. Check [Data Source Limits \(p. 62\)](#) to make sure your target table or query doesn't exceed data source limits.
 2. Confirm that the database credentials you plan to use have appropriate permissions as described in [Required Permissions for Database Credentials \(p. 92\)](#).
 3. Make sure you have configured the cluster or instance for Amazon QuickSight access by following the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).
 4. On the Amazon QuickSight start page, choose **Manage data**.
 5. On the **Your Data Sets** page, choose **New data set**.
 6. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose either the **RDS** or the **Redshift Auto-discovered** icon, depending on the AWS service you want to connect to.
 7. Enter the connection information for the data source, as follows:
 - For **Data source name**, type a name for the data source.
 - For **Instance ID**, choose the name of the instance or cluster you want to connect to.
 - **Database name** shows the default database for the **Instance ID** cluster or instance. If you want to use a different database on that cluster or instance, type its name.
 - For **Username**, type the user name of an account that has permissions to access the target database, and also to read (perform a `SELECT` statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
 8. (Optional) Choose **Validate connection** to verify your connection information is correct.
 9. Choose **Create data source**.
- Note**
Amazon QuickSight automatically secures connections to Amazon RDS instances and Amazon Redshift clusters by using Secure Sockets Layer (SSL). You don't need to do anything to enable this.
10. Go to [Step 2: Create a Database Data Set and an Analysis \(p. 49\)](#).

Your Amazon QuickSight Account Does Not Have Autodiscovered AWS Data Sources

If you don't have any autodiscovered AWS data sources, use the following procedure:

1. Check [Data Source Limits \(p. 62\)](#) to make sure your target table or query doesn't exceed data source limits.

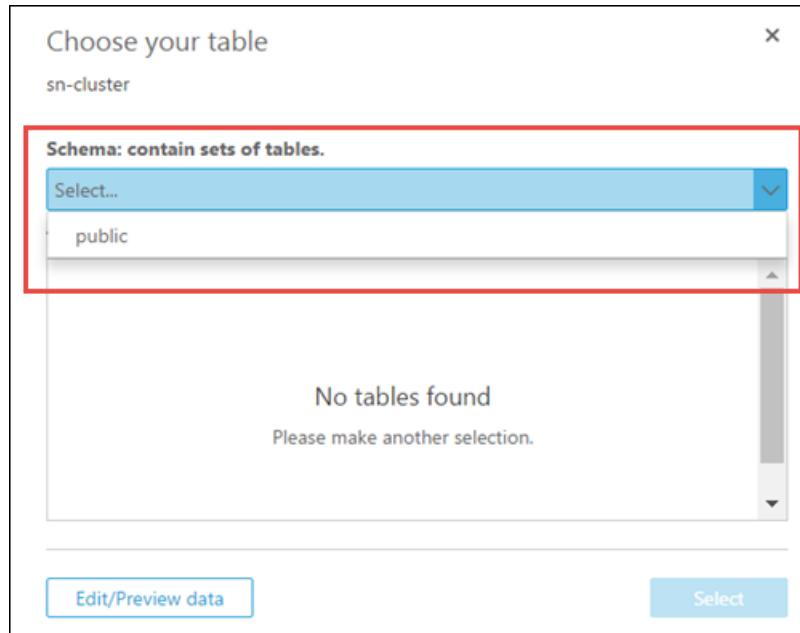
2. Confirm that the database credentials you plan to use have appropriate permissions as described in [Required Permissions for Database Credentials \(p. 92\)](#).
3. Make sure you have configured the cluster or instance for Amazon QuickSight access by following the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).
4. On the Amazon QuickSight start page, choose **Manage data**.
5. On the **Your Data Sets** page, choose **New data set**.
6. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the **Redshift** **Manual connect** icon if you want to connect to an Amazon Redshift cluster in another region or associated with a different AWS account, or choose the appropriate database management system icon to connect to an instance of Amazon Aurora, MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL.
7. Enter the connection information for the data source, as follows:
 - For **Data source name**, type a name for the data source.
 - For **Database server**, type or paste one of the following values:
 - For an Amazon Redshift cluster or Amazon RDS instance, type the endpoint of the cluster or instance without the port number. For example, if the endpoint value is **clusternode.1234abcd.us-west-2.redshift.amazonaws.com:1234**, then type **clusternode.1234abcd.us-west-2.redshift.amazonaws.com**. You can get the endpoint value from the **Endpoint** field on the cluster or instance detail page in the AWS console.
 - For an Amazon EC2 instance of MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL, type the public DNS. You can get the public DNS value from the **Public DNS** field on the instance detail pane in the EC2 console.
 - For a non–Amazon EC2 instance of MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL, type the host name or public IP address of the database server.
 - For **Port**, type the port that the cluster or instance uses for connections.
 - For **Database name**, type the name of the database that you want to use.
 - For **Username**, type the user name of an account that has permissions to access the target database and also to read (perform a **SELECT** statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
8. (Optional) If you are connecting to anything other than an Amazon Redshift cluster and you **don't** want a secured connection, uncheck **Enable SSL**. *We strongly recommend leaving this checked*, as an unsecured connection can be open to tampering. For more information on how the target instance uses Secure Sockets Layer (SSL) to secure connections, refer to the documentation for that database management system.

Amazon QuickSight automatically secures connections to Amazon Redshift clusters by using SSL. You don't need to do anything to enable this.
9. (Optional) Choose **Validate connection** to verify your connection information is correct.
10. Choose **Create data source**.
11. Go to [Step 2: Create a Database Data Set and an Analysis \(p. 49\)](#).

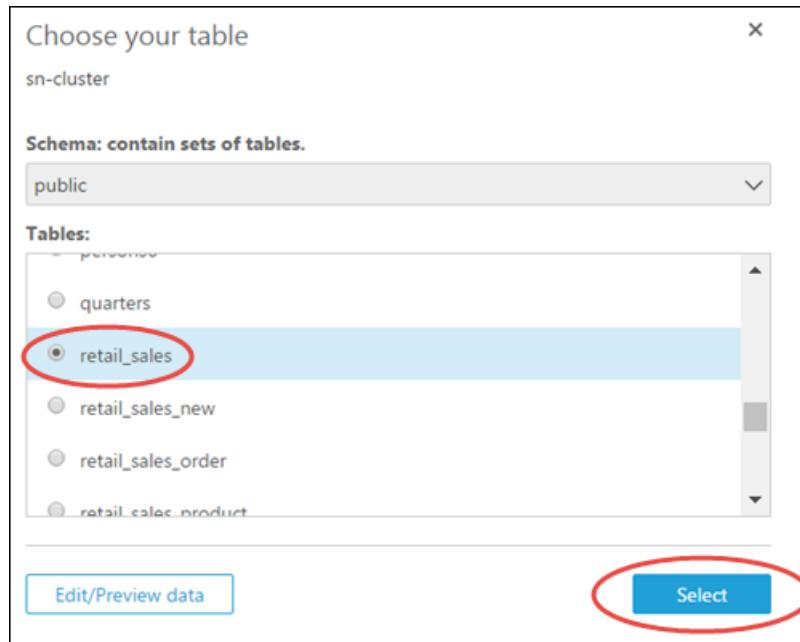
Step 2: Create a Database Data Set and an Analysis

Complete the following procedure to create a data set and an analysis:

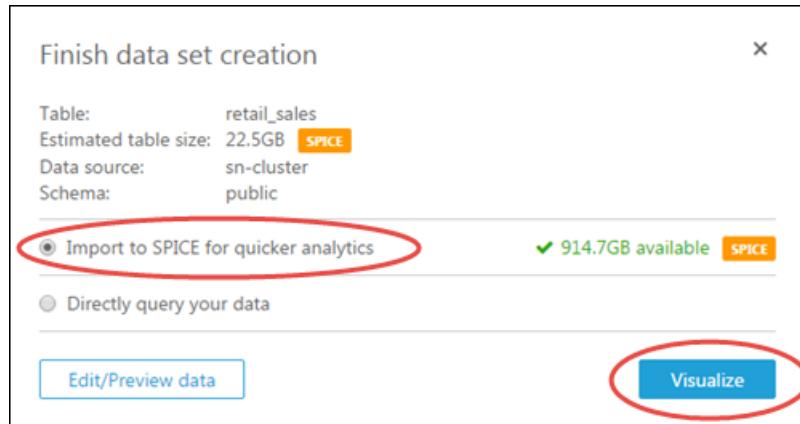
1. For **Schema: contain sets of tables**, choose **Select** and then choose a schema. Note that in some cases where there is only a single schema in the database, that schema will be automatically chosen and the schema selection option won't be displayed.



2. Choose a table and then choose **Select**.



3. Choose the **Import to SPICE for quicker analytics** radio button and then create an analysis by choosing **Visualize**.



Step 3: Create a Visual

Next, create a visual.

In the **Fields list** pane of the analysis page, choose the fields you want to use.

Amazon QuickSight creates the visual, using AutoGraph to determine the most appropriate visual type for the fields you selected. For more information about AutoGraph, see [Using AutoGraph \(p. 346\)](#). For more information about modifying the visual, see [Working with Amazon QuickSight Visuals \(p. 253\)](#).

Marketing analysis Autosave ON

Visualize Filter Suggested Story

Fields list Marketing 100%

SPICE Marketing

Desktop uniques

Free sign up

Visual types

AutoGraph
Choose 1 or more fields and let QuickSight choose

Navigating the User Interface

In the following topic, you can find a brief introduction to using the Amazon QuickSight user interface.

Topics

- [Using the Amazon QuickSight Landing Page \(p. 52\)](#)
- [Using the Amazon QuickSight Start Page \(p. 54\)](#)
- [Choosing a Language in Amazon QuickSight \(p. 57\)](#)

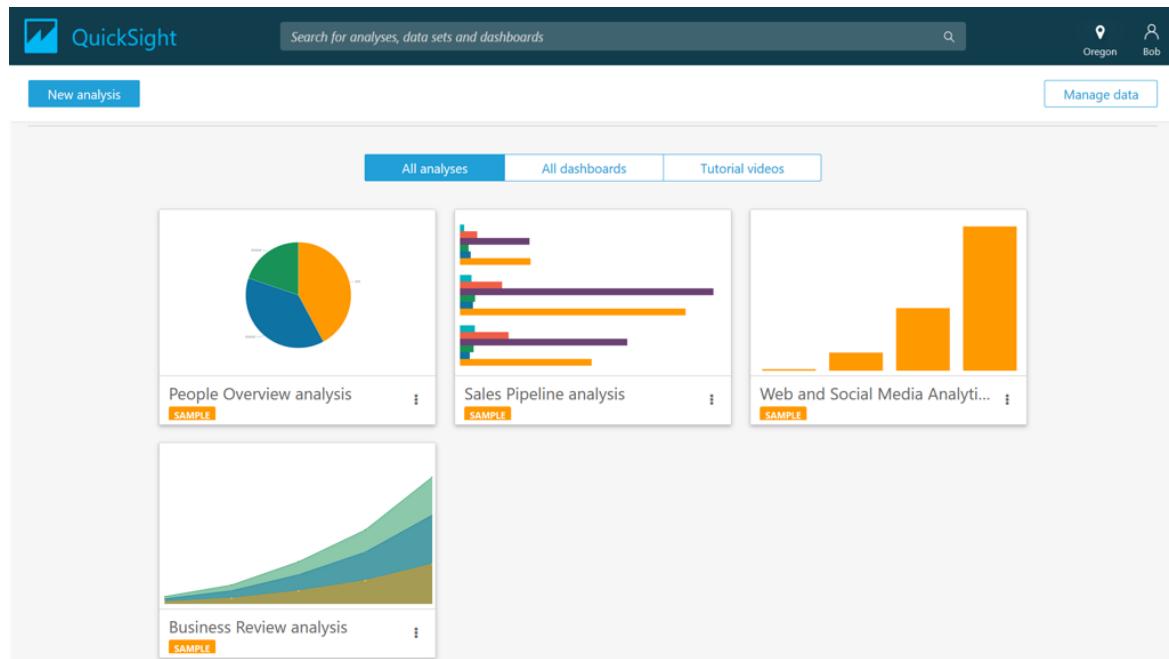
Using the Amazon QuickSight Landing Page

After you sign in to Amazon QuickSight, you see the Amazon QuickSight start page. The start page provides tabs for your analyses, your dashboards, and our tutorial videos. It also provides a menu bar at the top, with options for the following:

- Searching Amazon QuickSight
- Choosing the AWS Region that you want to work in
- Accessing your user profile (community, language selection, and help)
- Creating a new analysis
- Managing data

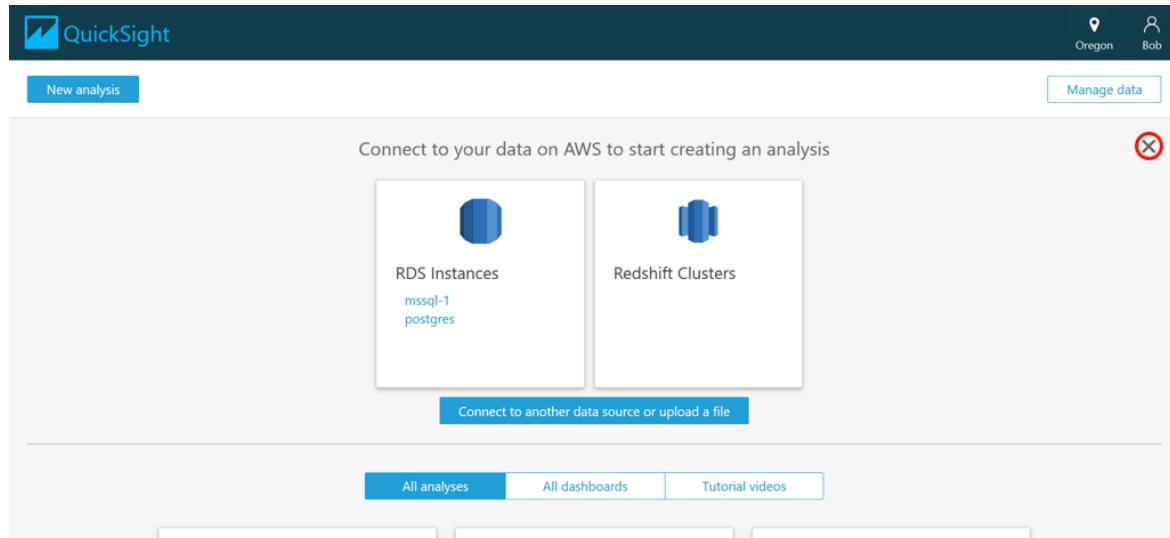
Note

Consult your administrator before changing your AWS Region. Your default AWS Region is configured by your Amazon QuickSight administrator. Changing the AWS Region changes where your work is stored.

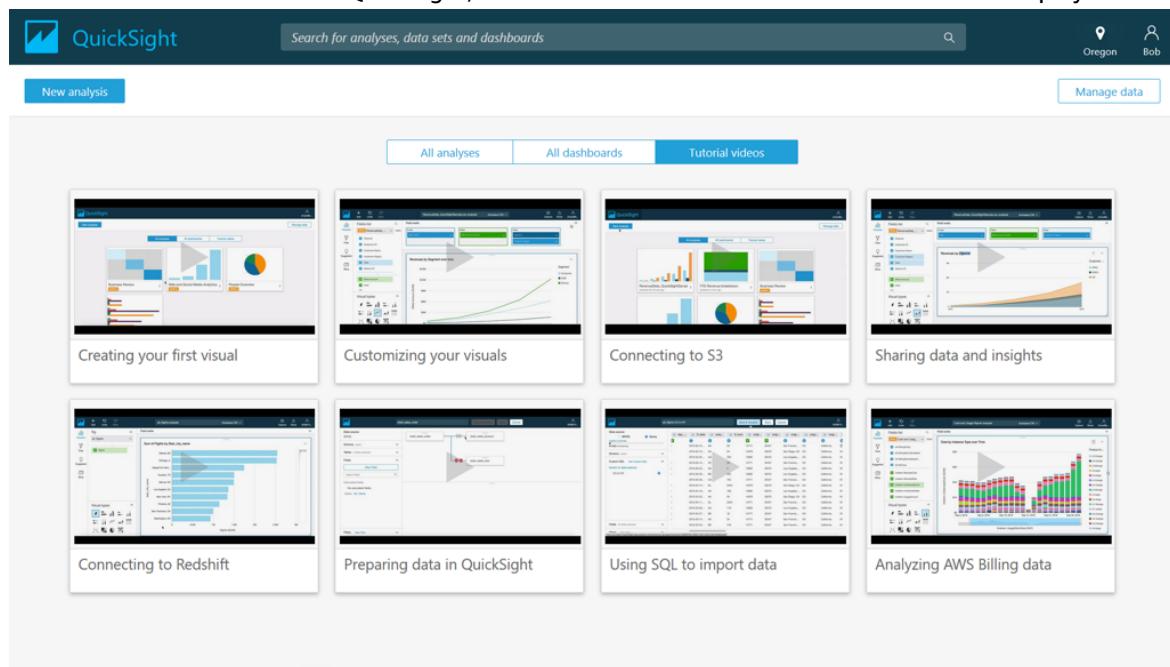


Amazon QuickSight User Guide Using the Amazon QuickSight Landing Page

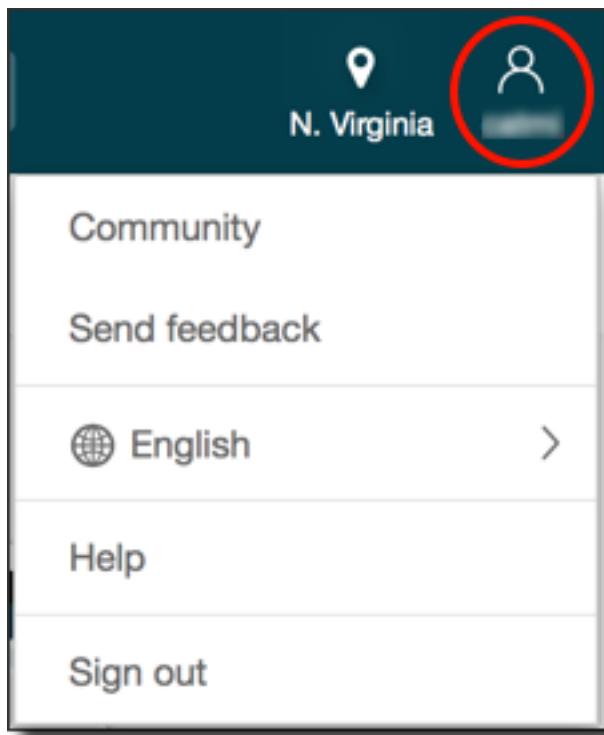
If you have autodiscovered data sources, your start screen looks like the following screenshot. Optionally, you can dismiss this data source information by choosing the X icon near the top right.



To view videos about Amazon QuickSight, choose the **Tutorial videos** tab. Choose a video to play it.



To access the user profile menu, choose your user icon at the upper right of any page in Amazon QuickSight. Use this menu to manage Amazon QuickSight features, visit the community, send product feedback, choose a language, get help from the documentation, or sign out of Amazon QuickSight.



The following options are available from the user profile menu:

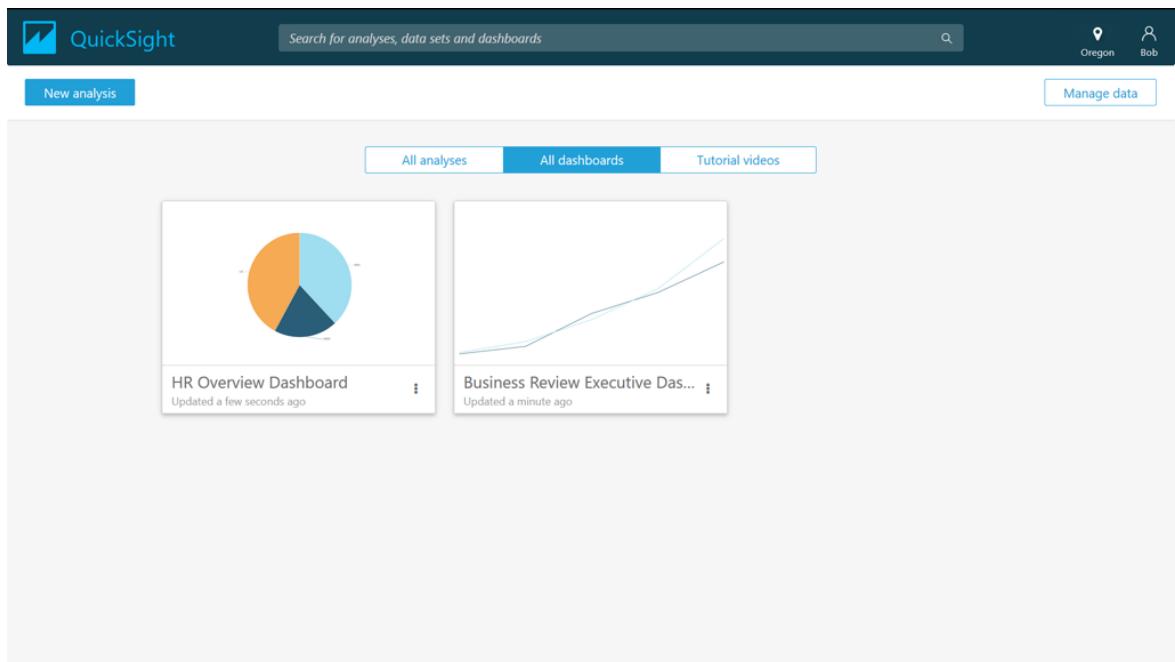
- **Manage QuickSight** – If you have appropriate permissions, you can access administrative functions such as managing users, subscriptions, [SPICE \(p. 2\)](#) capacity, and account settings.
- **Community** – Choose this option to visit the Amazon QuickSight online community.
- **Send feedback** – This is your direct connection to the product team. Use this simple form to report problems, request features, or tell us how you are using Amazon QuickSight.
- **Language setting** – Choose the language you want to use in the Amazon QuickSight user interface.
- **Help** – This will open the official AWS documentation, which you can view online, in Kindle, or as a PDF.
- **Sign out** – Choose this option to sign out of Amazon QuickSight and your AWS session.

Using the Amazon QuickSight Start Page

To see available dashboards, choose the **All dashboards** tab. Choose any dashboard to open it.

Amazon QuickSight User Guide

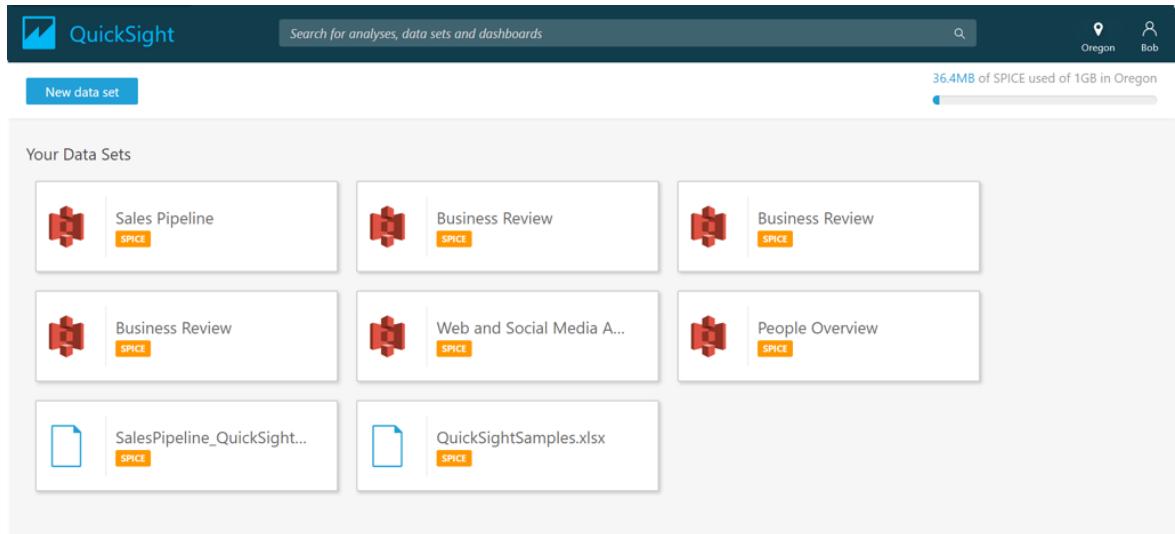
Using the Amazon QuickSight Start Page



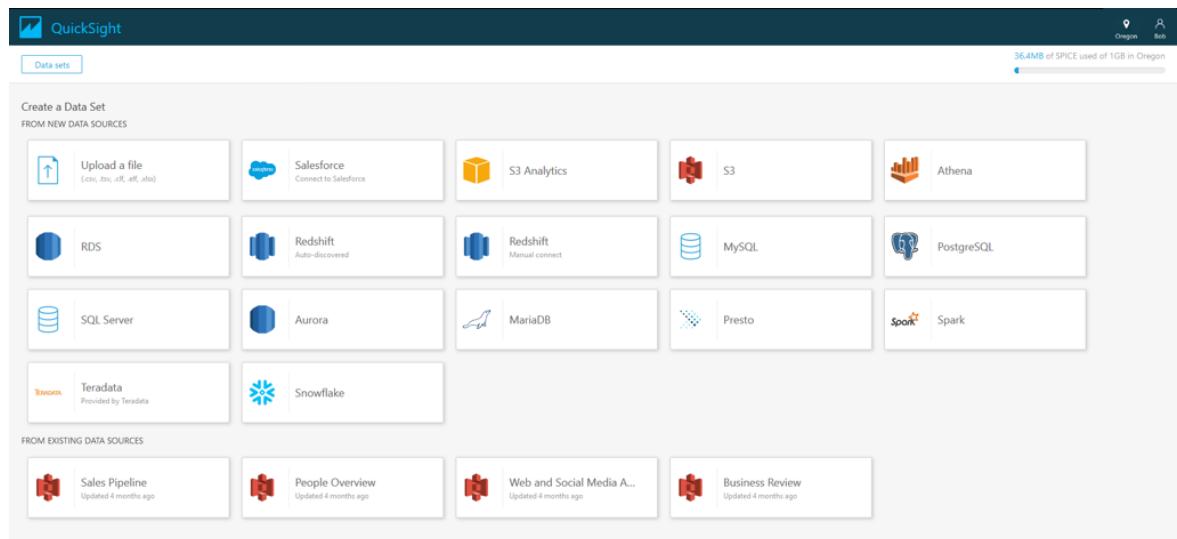
To see available analyses, choose the **All analyses** tab. This is the default tab when Amazon QuickSight opens. Choose any analysis to open it.

To create a new analysis, choose **New analysis**, near the top left. This takes you to **Your Data Sets**. Choose one to start analyzing it.

To see current data sets, or to create a new data set, choose **Manage data**, near the top right. This takes you to **Your Data Sets**, which displays the data sets that you have access to. (If they don't all fit on one page, you can navigate between pages.) From here, you can choose a data set to analyze.



To create a new data set from **Your Data Sets**, choose **New data set**. From here, you can upload a file, or you can create a new data set based on a data source (a connection to external data). Icons for new data sources are at the top of the screen under **From new data sources**. Icons for existing data sources are displayed below them, under **From existing data sources**.



Searching Amazon QuickSight

From the search bar, you can search for analyses and dashboards. To use the search tool, choose the search box at the top of the page. Then enter the name, or part of the name, of the data set, analyses, or dashboard you want to find. The search is not case-sensitive.

After you locate the item that you're looking for, you can open it directly from the search results. You can modify a data set, create an analysis from a data set, or access an analysis or dashboard. Choose an item from the search results to open it.

| Name | Type | Last modified |
|-----------------------------------|----------------|---------------|
| sales_metrics_092016.csv analysis | Analysis | 2 days ago |
| sales_metrics_092016.csv | Data set SPICE | 2 days ago |
| ABCO Sales Dashboard | Dashboard | 7 days ago |
| ABCO Sales Analysis | Analysis | 7 days ago |
| sales_metrics_092016.csv | Data set SPICE | 15 days ago |
| Sales Metrics analysis | Analysis | 23 days ago |
| Sales Trend | Analysis | 23 days ago |
| Sales Metrics analysis | Analysis | 23 days ago |
| Sales Metrics analysis | Analysis | 23 days ago |
| Sales pipeline | Analysis | 23 days ago |

Choosing a Language in Amazon QuickSight

You can choose the language that you want to use in the Amazon QuickSight user interface. This option is set separately for each individual user. The first time a user signs in, Amazon QuickSight detects and selects a suitable language. This choice is based on the user's browser preferences and interactions with localized AWS websites.

Amazon QuickSight supports the following languages:

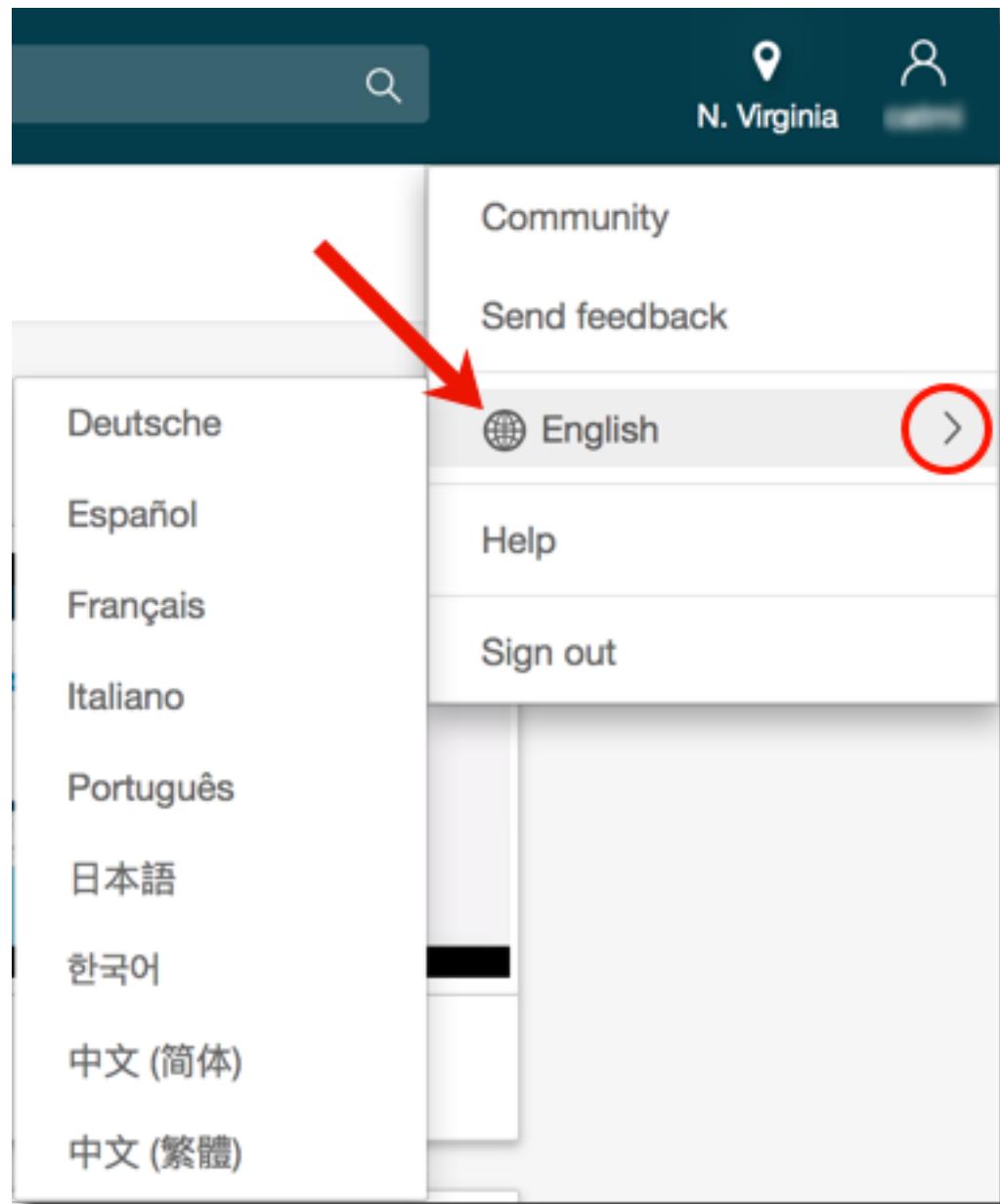
- English (en-US)
- German (de-DE)
- Spanish (es-ES)
- French (fr-FR)
- Italian (it-IT)
- Portuguese (pt-BR)
- Japanese (ja-JP)
- Korean (ko-KR)
- Simplified Chinese (zh-CN)
- Traditional Chinese (zh-TW)

Choosing a language translates only user interface elements. It doesn't translate the following:

- Amazon QuickSight reserved keywords
- User input
- Data
- Date or number formats
- ML Insights, suggested insights, or computations in narratives (including text)

Use the following procedure to change the language in the Amazon QuickSight interface.

1. Choose your user profile icon at top right.
2. To open the language options menu, choose the > symbol near the current language.



3. Choose the language that you want to use.

Working with Data in Amazon QuickSight

You can base your Amazon QuickSight analyses on a variety of data sources, including AWS data stores, Salesforce, files in common formats, and popular database engines. You connect to these data sources and create data sets, which identify the specific data from that data source that you want to work with. Data sets also store any data preparation you have done on that data, so that you can reuse that prepared data in multiple analyses. For more information on preparing data, see [Preparing Data \(p. 125\)](#).

You can view your available data sets on the **Your Data Sets** page, which you reach by choosing **Manage data** on the Amazon QuickSight start page. You can view available data sources and create a new data set on the **Create a Data Set** page, which you reach by choosing **New data set** on the **Your Data Sets** page.

Topics

- [Working with Data Sources in Amazon QuickSight \(p. 59\)](#)
- [Working with Data Sets \(p. 75\)](#)

Working with Data Sources in Amazon QuickSight

Use a data source to access an external data store. Amazon S3 data sources save the manifest file information, while Salesforce and database data sources save connection information like credentials, so you can easily create multiple data sets from that data store without having to re-enter information. Connection information isn't saved for text or Microsoft Excel files.

Topics

- [Supported Data Sources \(p. 59\)](#)
- [Data Source Limits \(p. 62\)](#)
- [Creating a Data Source \(p. 66\)](#)
- [Editing a Data Source \(p. 73\)](#)
- [Deleting a Data Source \(p. 75\)](#)

Supported Data Sources

Amazon QuickSight supports a variety of data sources that you can use to provide data for analyses. The following data sources are supported:

Relational Data Sources

You can use any of the following relational data stores as data sources for Amazon QuickSight:

- Amazon Athena
- Amazon Aurora
- Amazon Redshift
- Amazon Redshift Spectrum
- Amazon S3

- Amazon S3 Analytics
- Apache Spark 2.0 or later
- MariaDB 10.0 or later
- Microsoft SQL Server 2012 or later
- MySQL 5.1 or later
- PostgreSQL 9.3.1 or later
- Presto 0.167 or later
- Snowflake
- Teradata 14.0 or later

Note

You can access additional data sources not listed here by linking or importing them through supported data sources.

You can retrieve data from tables and materialized views in PostgreSQL instances, and from tables in all other database instances.

Amazon Redshift clusters, Amazon Athena databases, and Amazon Relational Database Service (RDS) instances must be in AWS. Other database instances must be in one of the following environments to be accessible from Amazon QuickSight:

- Amazon EC2
- On your local network
- In a data center or some other internet-accessible environment

File Data Sources

You can use files in Amazon S3 or on your local network as data sources for Amazon QuickSight. Amazon QuickSight supports files in the following formats:

- *CSV/TSV* – Delimited text files
- *ELF/CLF* – Extended and common log format files
- *JSON* – Flat or semi-structured data files
- *XLSX* – Microsoft Excel files

Files in Amazon S3 that have been compressed with zip, or gzip (www.gzip.org), can be imported as-is. If you used another compression program for files in Amazon S3, or if the files are on your local network, you need to unzip them before importing them.

JSON Data Sources

Amazon QuickSight natively supports JSON flat files and JSON semi structure data files.

You can either upload a JSON file or connect to your Amazon S3 bucket that contains JSON data. Amazon QuickSight automatically performs schema and type inference on JSON files and embedded JSON objects. Then it flattens the JSON, so you can analyze and visualize application-generated data.

Basic support for JSON flat file data includes the following:

- Inferring the schema
- Determining data types
- Flattening the data

- Parsing JSON (JSON embedded objects) from flat files

Support for JSON file structures (.json) includes the following:

- JSON records with structures
- JSON records with root elements as arrays

You can also use the `parseJson` function to extract values from JSON objects in a text file. For example, if your CSV file has a JSON object embedded in one of the fields, you can extract a value from a specified key value pair (KVP). For more information on how to do this, see [parseJson \(p. 461\)](#).

The following JSON features aren't supported:

- Reading JSON with a structure containing a list of records
- List attributes and list objects within a JSON record are skipped during import
- Customizing upload or configuration settings
- `parseJSON` functions for SQL and analyses
- Error messaging for invalid JSON
- Extracting a JSON object from a JSON structure
- Reading delimited JSON records

You can use the `parseJson` function to parse flat files during data preparation. This function extracts elements from valid JSON structures and lists.

The following JSON values are supported:

- JSON object
- String (double quoted)
- Number (integer and float)
- Boolean
- NULL

Software as a Service (SaaS) Data Sources

The following list shows which SaaS data sources are currently supported by Amazon QuickSight. The ones that aren't labeled "direct connection" use OAuth to connect instead. For sources using OAuth, the connector takes you to the SaaS site to authorize the connection before letting you create the data source.

Note

For this to work, the SaaS data source must be accessible to Amazon QuickSight over the network.

- Adobe Analytics
- GitHub
- JIRA (direct connection)
- Salesforce

You can use reports or objects in the following editions of Salesforce as data sources for Amazon QuickSight. Joined reports aren't supported as Amazon QuickSight data sources.

- Enterprise Edition
- Unlimited Edition

- Developer Edition
- ServiceNow (direct connection)
- Twitter

Data Source Limits

Data sources that you use with Amazon QuickSight must conform to the following limits.

Topics

- [File Limits \(p. 62\)](#)
- [Table and Query Limits \(p. 62\)](#)
- [Field Limits \(p. 62\)](#)
- [Supported Data Types \(p. 62\)](#)
- [Unsupported Data Values \(p. 64\)](#)
- [Handling Date Time Zones \(p. 65\)](#)
- [Supported Date Formats \(p. 65\)](#)

File Limits

The total size of the files specified in the manifest file can't exceed 25 GB when imported into SPICE. This limit isn't based on the actual size of the files. Instead, the limit is based on the space that the files occupy after they are imported into SPICE. The SPICE capacity is calculated using the formula described in [Capacity Planning for SPICE \(p. 583\)](#).

The total number of files specified in the manifest file can't exceed 1,000.

Files can have up to 1,000 columns. Each column name can have up to 127 characters. Data in any field of a data set you import into SPICE must be 511 characters or less.

Table and Query Limits

Any table or query result set you want to import into [SPICE \(p. 2\)](#) must use 25 GB or less of space in SPICE. The size limit is calculated based on the capacity the data occupies after imported into SPICE. The SPICE capacity is calculated using the formula described in [Capacity Planning for SPICE \(p. 583\)](#).

If you want to retrieve data from a larger table, you can use one of several methods to reduce the size of the data. You can deselect columns, or apply filters. In a SQL query, you can also use predicates, such as WHERE, HAVING.

Tables can have up to 1,000 columns. Each column name can have up to 127 characters.

Field Limits

Data in any field of a data set you import into SPICE must be 511 characters or less. Each field name can have up to 127 characters.

Supported Data Types

Amazon QuickSight currently supports the following primitive data types:

- Date – Dates must be in one of the [Supported Date Formats \(p. 65\)](#).
- Decimal – The decimal data type supports up to four decimal places to the right of the decimal point. Values that have a higher scale than this are truncated to the fourth decimal place when displayed in

data preparation or analyses and when imported into SPICE. For example, 13.00049 is truncated to 13.0004.

During data preparation, calculated fields that use decimal data with more than four decimal places use the full value to perform the calculation. If the result is again decimal data that uses more than four decimal places, the result is then truncated as described preceding. For more information, see [Handling Decimal Values in Calculated Fields \(p. 156\)](#).

- Integer
- String

Make sure that any table or file that you use as a data source contains only fields that can be implicitly converted to these data types. Amazon QuickSight skips any data rows that can't be converted.

The following table lists the source data types that are supported. Boolean data types are converted to integers in Amazon QuickSight.

| Database Engine or Source | Numeric Data Types | String Data Types | Datetime Data Types | Boolean Data Types |
|--|--|---|---|---|
| Amazon Athena, Presto | <ul style="list-style-type: none"> • bigint • decimal • double • integer • real • smallint • tinyint | <ul style="list-style-type: none"> • char • varchar | <ul style="list-style-type: none"> • date • timestamp | <ul style="list-style-type: none"> • boolean |
| Amazon Aurora, MariaDB, and MySQL | <ul style="list-style-type: none"> • bigint • decimal • double • int • integer • mediumint • numeric • smallint • tinyint | <ul style="list-style-type: none"> • char • enum • set • text • varchar | <ul style="list-style-type: none"> • date • datetime • timestamp • year | |
| PostgreSQL | <ul style="list-style-type: none"> • bigint • decimal • double • integer • numeric • precision • real • smallint | <ul style="list-style-type: none"> • char • character • text • varchar • varying character | <ul style="list-style-type: none"> • date • timestamp | <ul style="list-style-type: none"> • boolean |
| Apache Spark | <ul style="list-style-type: none"> • bigint • decimal • double • integer | <ul style="list-style-type: none"> • varchar | <ul style="list-style-type: none"> • date • timestamp | <ul style="list-style-type: none"> • boolean |

| Database Engine or Source | Numeric Data Types | String Data Types | Datetime Data Types | Boolean Data Types |
|-----------------------------|---|--|--|---|
| | <ul style="list-style-type: none"> real smallint tinyint | | | |
| Snowflake | <ul style="list-style-type: none"> bigrnt bytint decimal double doubleprecision float float4 float8 int integer number numeric real smallint tinyint | <ul style="list-style-type: none"> char character string text varchar | <ul style="list-style-type: none"> date datetime time timestamp timestamp_* | <ul style="list-style-type: none"> boolean |
| Microsoft SQL Server | <ul style="list-style-type: none"> bigrnt bit decimal int money numeric real smallint smallmoney tinyint | <ul style="list-style-type: none"> char nchar nvarchar text varchar | <ul style="list-style-type: none"> date datetime datetime2 datetimeoffset smalldatetime | <ul style="list-style-type: none"> bit |

Unsupported Data Values

If a field contains values that don't conform with the data type that Amazon QuickSight assigns to the field, the rows containing those values are skipped. For example, take the following source data.

| Sales ID | Sales Date | Sales Amount |
|----------|------------|--------------|
| <hr/> | | |
| 001 | 10/14/2015 | 12.43 |
| 002 | 5/3/2012 | 25.00 |
| 003 | Unknown | 18.17 |
| 004 | 3/8/2009 | 86.02 |

Amazon QuickSight interprets Sales Date as a date field and drops the row containing a nondate value, so only the following rows are imported.

| Sales ID | Sales Date | Sales Amount |
|----------|------------|--------------|
| 001 | 10/14/2015 | 12.43 |

| | | |
|-----|------------|-------|
| 001 | 10/14/2015 | 12.43 |
| 002 | 5/3/2012 | 25.00 |
| 004 | 3/8/2009 | 86.02 |

Also, if a database field contains values that can't be interpreted by the JDBC driver for the source database engine, the uninterpretable values are replaced by null so that the rows can be imported. The only known occurrence of this issue is with MySQL date, datetime, and timestamp fields that have all-zero values, for example **0000-00-00 00:00:00**. For example, take the following source data.

| Sales ID | Sales Date | Sales Amount |
|----------|---------------------|--------------|
| 001 | 2004-10-12 09:14:27 | 12.43 |
| 002 | 2012-04-07 12:59:03 | 25.00 |
| 003 | 0000-00-00 00:00:00 | 18.17 |
| 004 | 2015-09-30 01:41:19 | 86.02 |

In this case, the following data is imported.

| Sales ID | Sales Date | Sales Amount |
|----------|---------------------|--------------|
| 001 | 2004-10-12 09:14:27 | 12.43 |
| 002 | 2012-04-07 12:59:03 | 25.00 |
| 003 | (null) | 18.17 |
| 004 | 2015-09-30 01:41:19 | 86.02 |

Handling Date Time Zones

Amazon QuickSight uses UTC time for querying, filtering, and displaying date data.

When date data doesn't specify a time zone, Amazon QuickSight assumes UTC values. When date data does specify a time zone, Amazon QuickSight converts it to display in UTC time. For example, a date field with a time zone offset like **2015-11-01T03:00:00-08:00** is converted to UTC and displayed in Amazon QuickSight as **2015-11-01T15:30:00**.

Supported Date Formats

Data in date fields must be in one of the following supported formats, depending on the data source type.

For file uploads, Amazon S3 sources, Athena and Salesforce, Amazon QuickSight supports the use of date and time formats (both 24 hr and am/pm) described in the Joda API documentation. See [Class DateTimeFormat](#) for a complete list of Joda date formats.

For relational database sources, including Amazon Redshift, Amazon RDS, PostgreSQL, MySQL, Aurora, MariaDB, and Microsoft SQL Server, Amazon QuickSight supports the following date and time formats (24 hr only):

Amazon QuickSight supports dates in the range from Jan 1, 1400 00:00:00 UTC to Feb 26, 2364 23:59:59 UTC for SPICE data sets.

1. dd/MM/yyyy HH:mm:ss, for example 31/12/2016 15:30:00.
2. dd/MM/yyyy, for example 31/12/2016.
3. dd/MMM/yyyy HH:mm:ss, for example 31/DEC/2016 15:30:00.
4. dd/MMM/yyyy, for example 31/DEC/2016.

5. dd-MMM-yyyy HH:mm:ss, for example 31-DEC-2016 15:30:00.
6. dd-MMM-yyyy, for example 31-DEC-2016.
7. dd-MM-yyyy HH:mm:ss, for example 31-12-2016 15:30:00.
8. dd-MM-yyyy, for example 31-12-2016.
9. MM/dd/yyyy HH:mm:ss, for example 12/31/2016 15:30:00.
- 10MM/dd/yyyy, for example 12/31/2016.
- 11MM-dd-yyyy HH:mm:ss, for example 12-31-2016 15:30:00.
- 12MM-dd-yyyy, for example 12-31-2016.
- 13MMM/dd/yyyy HH:mm:ss, for example DEC/31/2016 15:30:00.
- 14MMM/dd/yyyy, for example DEC/31/2016.
- 15MMM-dd-yyyy HH:mm:ss, for example DEC-31-2016 15:30:00.
- 16MMM-dd-yyyy, for example DEC-31-2016.
- 17yyyy/MM/dd HH:mm:ss, for example 2016/12/31 15:30:00.
- 18yyyy/MM/dd, for example 2016/12/31.
- 19yyyy/MMM/dd HH:mm:ss, for example 2016/DEC/31 15:30:00.
- 20yyyy/MMM/dd, for example 2016/DEC/31.
- 21yyyy-MM-dd HH:mm:ss, for example 2016-12-31 15:30:00.
- 22yyyy-MM-dd, for example 2016-12-31.
- 23yyyy-MMM-dd HH:mm:ss, for example 2016-DEC-31 15:30:00.
- 24yyyy-MMM-dd, for example 2016-DEC-31.
- 25yyyyMMdd'T'HHmmss, for example 20161231T153000.
- 26yyyy-MM-dd'T'HH:mm:ss, for example 2016-12-31T15:30:00.

Note

When you create a calculated column formula using a date format that contains apostrophes, make sure to escape them. For example, `formatDate({myDateField}, "yyyyMMdd'T'HHmmss")` or `formatDate({myDateField}, 'yyyyMMdd\'T\'HHmmss')`.

Creating a Data Source

An associated data source is automatically created when you create an Amazon Athena, Amazon S3, Salesforce, or database data set. No data source is created when you create a data set by uploading a file.

- For information about creating an Amazon S3 data set, see [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).
- For information about creating an Amazon Athena data set, see [Creating a Data Set Using Amazon Athena Data \(p. 86\)](#).
- For information about creating a Salesforce data set, see [Creating a Data Set from Salesforce \(p. 89\)](#).
- For information about creating a data set from a database, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).

When you create a Presto or Apache Spark data set, you must configure Presto or Apache Spark for Amazon QuickSight, as described following.

Topics

- [Creating a Data Source and Data Set from SaaS Sources \(p. 67\)](#)
- [Creating a Data Source Using Presto \(p. 72\)](#)
- [Creating a Data Source Using Apache Spark \(p. 72\)](#)

Creating a Data Source and Data Set from SaaS Sources

To analyze and report on data from software as a service (SaaS) applications, you can use SaaS connectors to access your data directly from Amazon QuickSight. The SaaS connectors simplify accessing 3rd party application sources using OAuth, without any need to export the data to an intermediate data store.

You can use either cloud-based or server-based instances of the SaaS. To connect to an SaaS that is running on your corporate network, you need to make sure that the DNS name of your SaaS is accessible to Amazon QuickSight over the network. If Amazon QuickSight can't access the SaaS, it generates an unknown host error.

Here are examples of some ways you can use SaaS data:

- Engineering teams who use JIRA to track issues and bugs can report on developer efficiency and bug burndown.
- Marketing organizations can integrate Amazon QuickSight with Adobe Analytics to build consolidated dashboards to visualize their online and web marketing data.
- Teams using social media can access Twitter data to analyze and understand their customers' sentiment.

Use the following procedure to create a data source and data set by connecting to sources available through Software-as-a-Service (SaaS). In this procedure, we use a connection to GitHub as an example. Other SaaS data sources follow the same process, although the screens – especially the SaaS screens – might look different.

1. On the Amazon QuickSight start page, choose **Manage data**.
2. On the **Your Data Sets** page, choose **New data set**.
3. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the icon that represents the SaaS you want to use. For example, you might choose Adobe Analytics or GitHub.

For sources using OAuth, the connector takes you to the SaaS site to authorize the connection before letting you create the data source. A screen similar to one of the following appears:

The screenshot shows a modal dialog box titled "New [redacted] data source". At the top right is a close button (X). Below the title, there is a label "Data source name" followed by a text input field containing the placeholder text "Enter a name for the data source". At the bottom left is a "Validate connection" button, and at the bottom right is a blue "Create data source" button.

Or:

New [REDACTED] data source X

Data source name

Query

Maximum Rows

Or, if the SaaS data source doesn't use OAuth, this screen appears:

New Jira data source X

Data source name

Site Base Url

Username

Password

✓ Validated

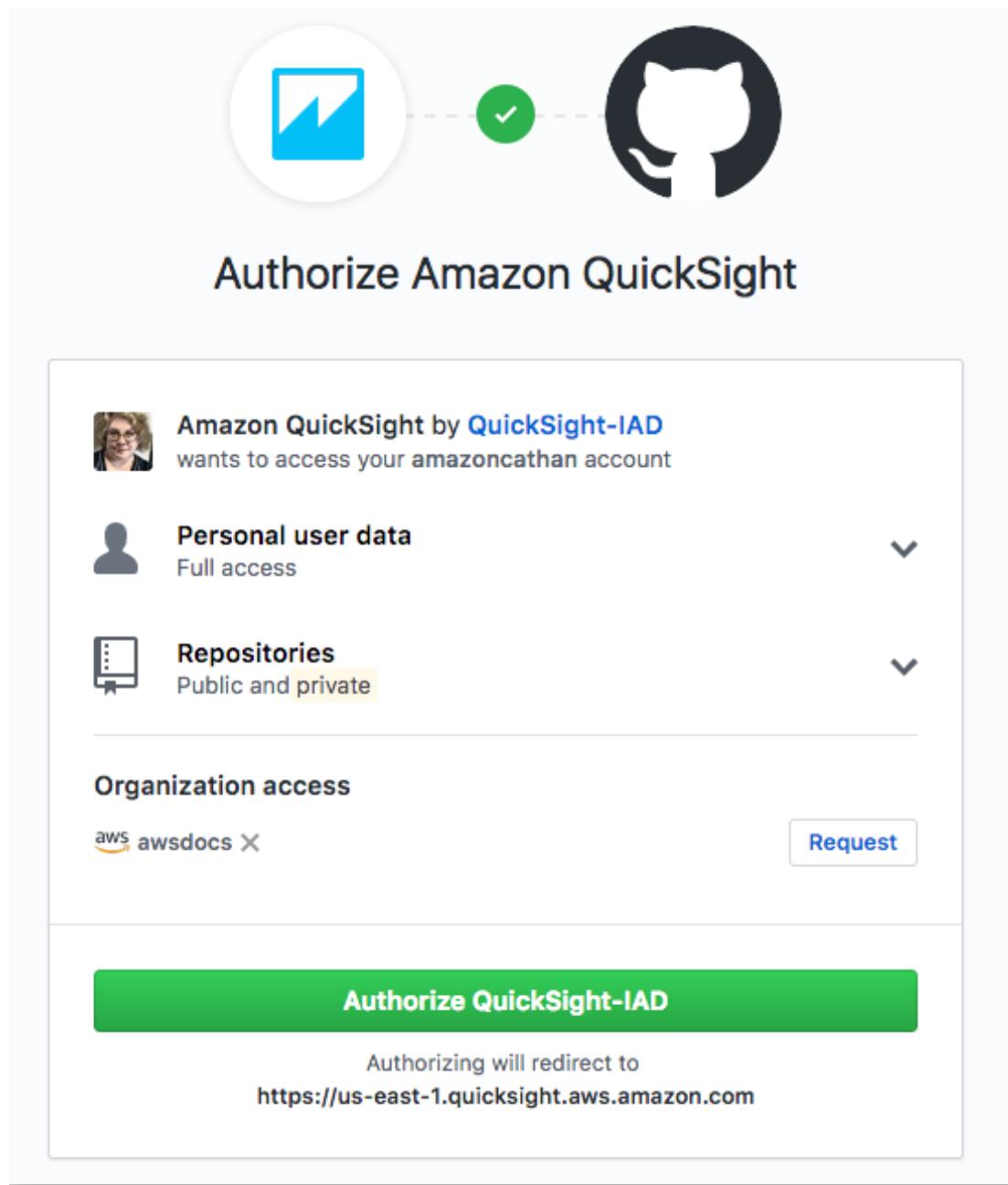
4. Choose a name for the data source, and type it in. If there are more screen prompts, type in the appropriate information. Then choose **Create data source**.
5. If you are prompted to do so, enter your credentials on the SaaS login page.

- When prompted, authorize the connection between your SaaS data source and Amazon QuickSight.

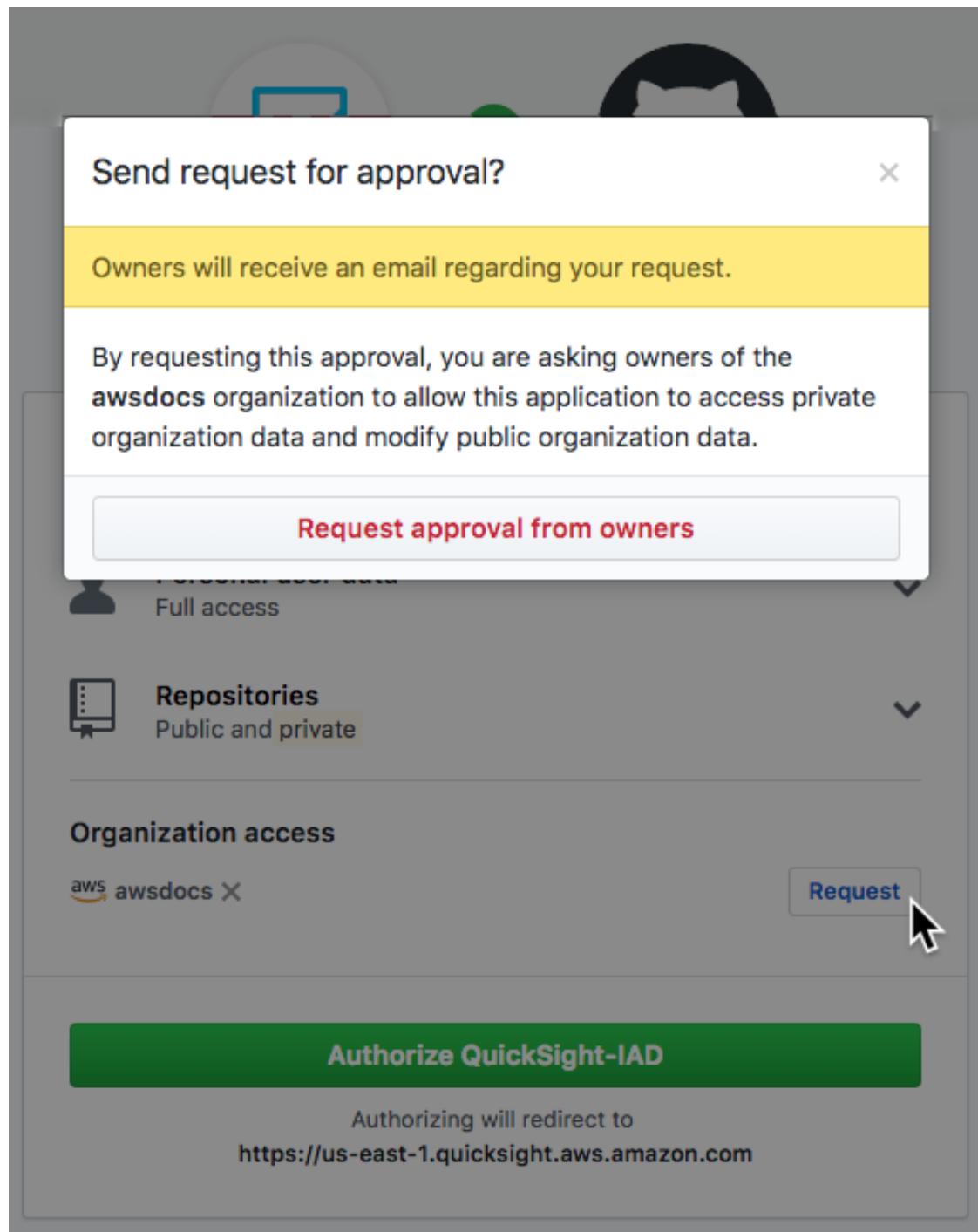
The following example shows the authorization for Amazon QuickSight to access the GitHub account for the Amazon QuickSight documentation.

Note

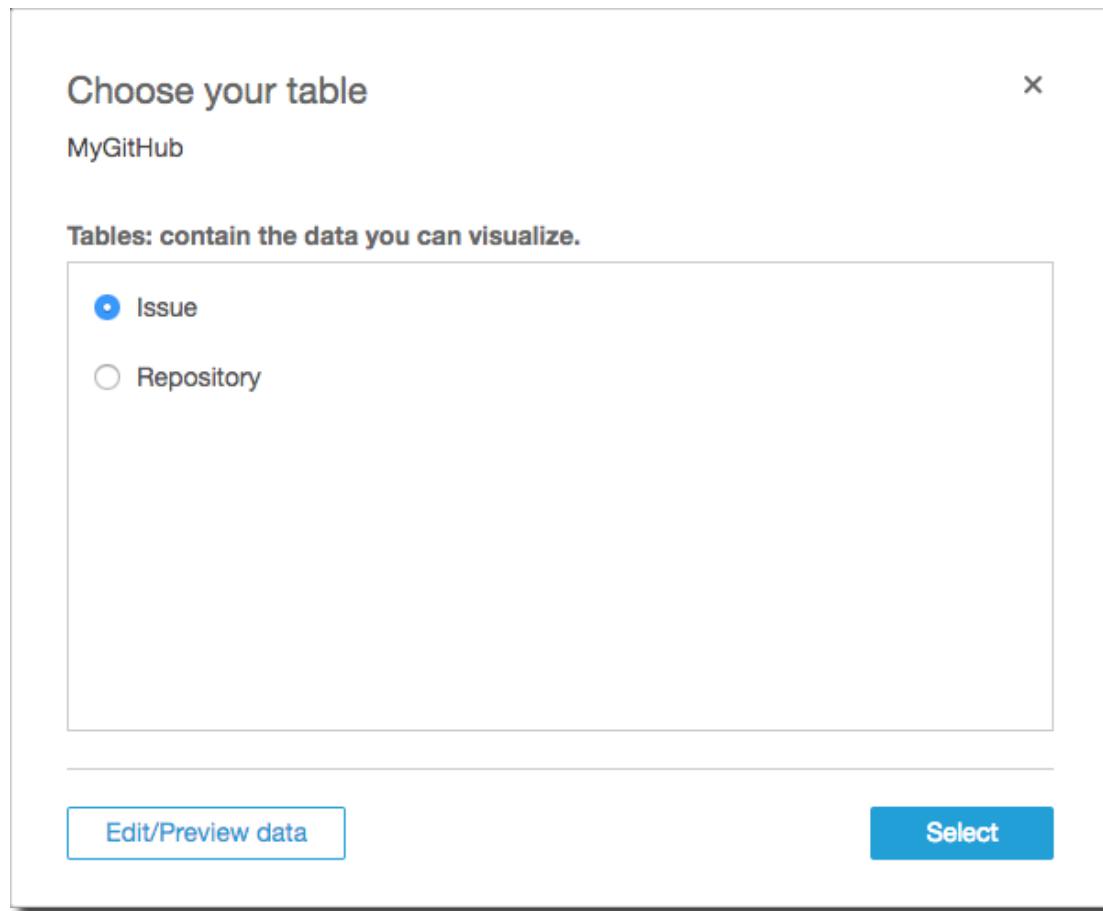
Amazon QuickSight documentation is now available on GitHub. If you'd like to make changes to this user guide, you can use GitHub to edit it directly.



(Optional) If your SaaS account is part of an organizational account, you might be asked to request organization access as part of authorizing Amazon QuickSight. If you want to do this, follow the prompts on your SaaS screen, then choose to authorize Amazon QuickSight.



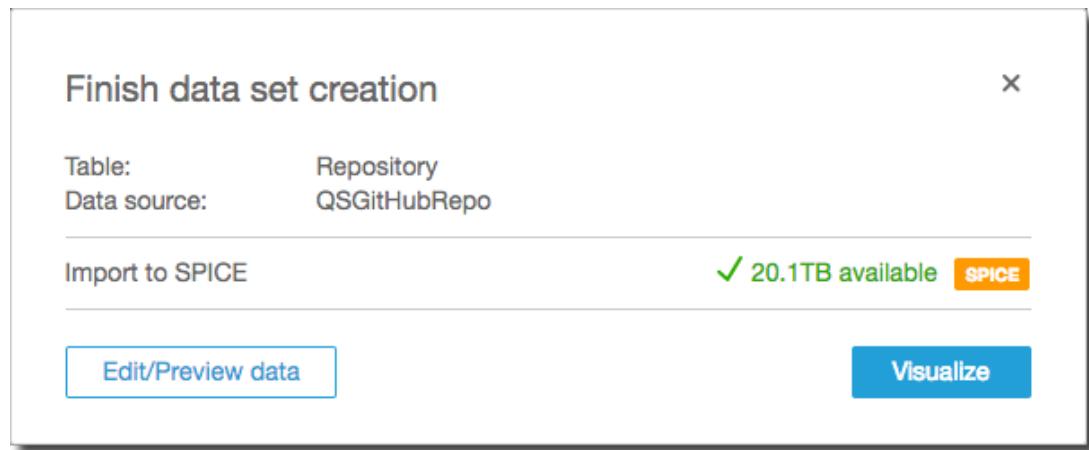
7. After authorization is complete, choose a table or object to connect to. Then choose **Select**.



8. On the following screen, choose one of these options:
 - To save the data source and data set, choose **Edit/Preview data**. Then choose **Save** from the top menu bar.
 - To create a data set and an analysis using the data as-is, choose **Visualize**. This option automatically saves the data source and the data set.

You can also choose **Edit/Preview data** to prepare the data before creating an analysis. This opens the data preparation screen. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).

- **Note**
If you don't have enough [SPICE \(p. 2\)](#) capacity, choose **Edit/Preview data**. In the data preparation screen, you can remove fields from the data set to decrease its size or apply a filter that reduces the number of rows returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



Note

The following constraints apply:

- The SaaS must support REST API operations for Amazon QuickSight to connect to it.
- If you are connecting to Jira, the URL must be a public address.
- If you are connecting to Twitter, which supports extracting seven days of data at a time, be aware that currently Amazon QuickSight retrieves only seven days before today.

Creating a Data Source Using Presto

You can connect to a variety of databases using Amazon QuickSight as a [Presto](#) client. Presto processes the analytic queries on backend databases. Then it returns results to the Amazon QuickSight client.

The results of analytic queries run through the Presto query engine can be turned into Amazon QuickSight data sets. You can either directly query your data through Presto, or you can import the results of your query into [SPICE \(p. 2\)](#).

Before you use Amazon QuickSight as a Presto client to run queries, you must configure Presto for Amazon QuickSight.

Amazon QuickSight requires your Presto server to be secured and authenticated using Lightweight Directory Access Protocol (LDAP), which is available to Presto version 0.167 or later. If Presto is configured to allow unauthenticated access, Amazon QuickSight refuses the connection to the server. To use Amazon QuickSight as a Presto client, you must configure LDAP authentication to work with Presto.

Presto's documentation contains information on how to set this up. To start, you'll need to configure it to enable front-end LDAP authentication over HTTPS. For general information on Presto, see the [Presto documentation](#). For information specifically on Presto and LDAP, see [Presto LDAP documentation](#).

To make sure that you have configured your server for Amazon QuickSight access, follow the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).

Creating a Data Source Using Apache Spark

You can connect directly to Apache Spark using Amazon QuickSight, or you can connect to Spark through Spark SQL. Using the results of queries, or direct links to tables or views, you create data sources in Amazon QuickSight. You can either directly query your data through Spark, or you can import the results of your query into [SPICE \(p. 2\)](#).

Before you use Amazon QuickSight with Spark products, you must configure Spark for Amazon QuickSight.

Amazon QuickSight requires your Spark server to be secured and authenticated using LDAP, which is available to Spark version 2.0 or later. If Spark is configured to allow unauthenticated access, Amazon QuickSight refuses the connection to the server. To use Amazon QuickSight as a Spark client, you must configure LDAP authentication to work with Spark.

The Spark documentation contains information on how to set this up. To start, you need to configure it to enable front-end LDAP authentication over HTTPS. For general information on Spark, see [the Apache Spark website](#). For information specifically on Spark and security, see [Spark security documentation](#).

To make sure that you have configured your server for Amazon QuickSight access, follow the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).

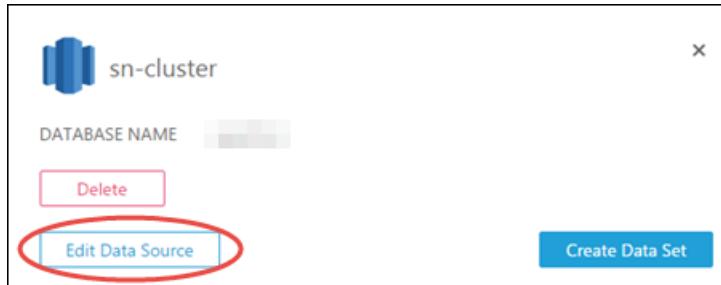
Editing a Data Source

You can edit an existing database data source to update the connection information, such as the server name or the user credentials. You can also edit an existing Amazon Athena data source to update the data source name. You can't edit Amazon S3 or Salesforce data sources.

Editing a Database Data Source

Use the following procedure to edit a database data source.

1. In the **FROM EXISTING DATA SOURCES** section of the [Create a Data Set](#) page, choose a database data source.
2. Choose **Edit Data Source**.



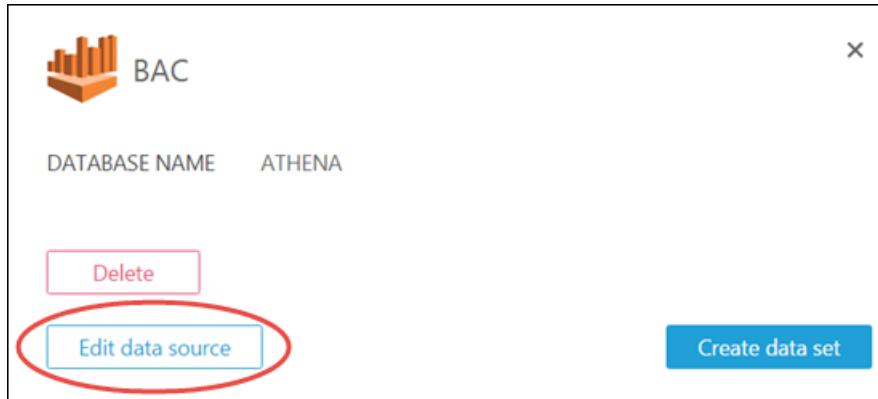
3. Modify the data source information.
 - If you are editing an autodiscovered database data source, you can modify any of the following settings:
 - For **Data source name**, type a name for the data source.
 - For **Instance ID**, choose the name of the instance or cluster you want to connect to from the list provided.
 - **Database name** shows the default database for the **Instance ID** cluster or instance. If you want to use a different database on that cluster or instance, type its name.
 - For **UserName**, type the user name of an account that has permissions to access the target database and also to read (perform a `SELECT` statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
 - If you are editing an external database data source, you can modify any of the following settings:
 - For **Data source name**, type a name for the data source.
 - For **Database server**, type or paste one of the following values:

- For an Amazon Redshift cluster, type the endpoint of the cluster without the port number. For example, if the endpoint value is **clustername.1234abcd.us-west-2.redshift.amazonaws.com:1234**, then type **clustername.1234abcd.us-west-2.redshift.amazonaws.com**. You can get the endpoint value from the **Endpoint** field on the cluster detail page in the Amazon Redshift console.
 - For an Amazon EC2 instance of PostgreSQL, MySQL, or SQL Server, type the public DNS. You can get the public DNS value from the **Public DNS** field on the instance detail pane in the EC2 console.
 - For a non-Amazon EC2 instance of PostgreSQL, MySQL, or SQL Server, type the hostname or public IP address of the database server.
 - For **Port**, type the port that the cluster or instance uses for connections.
 - For **Database name**, type the name of the database that you want to use.
 - For **UserName**, type the user name of an account that has permissions to access the target database and also to read (perform a `SELECT` statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
4. Choose **Validate connection**.
 5. If the connection validates, choose **Update data source**. If not, correct the connection information and try validating again.
 6. If you want to create a new data set using the updated data source, proceed with the instructions at [Creating a Data Set from a Database \(p. 96\)](#). Otherwise, close the **Choose your table** dialog.

Editing an Athena Data Source

Use the following procedure to edit an Athena data source.

1. In the **FROM EXISTING DATA SOURCES** section of the [Create a Data Set](#) page, choose an Athena data source.
2. Choose **Edit Data Source**.



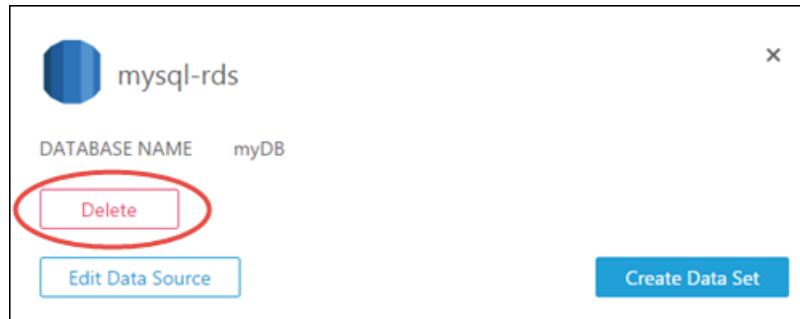
3. For **Data source name**, type a new name.
4. Choose **Update data source**.
5. If you want to create a new data set using the updated data source, proceed with the instructions at [Creating a Data Set Using Amazon Athena Data \(p. 86\)](#). Otherwise, close the **Choose your table** dialog.

Deleting a Data Source

You can delete a data source if it is no longer necessary. Deleting a query-based database data source makes any associated data sets unusable. Deleting an Amazon S3, Salesforce, or SPICE-based database data source doesn't affect your ability to use any associated data sets, because the data is stored in [SPICE \(p. 2\)](#). However, you can no longer refresh those data sets.

Use the following procedure to delete a data source.

1. In the **FROM EXISTING DATA SOURCES** section of the [Create a Data Set](#) page, choose the data source you want to delete.
2. Choose **Delete**.



3. Choose **Yes**.

Working with Data Sets

A data set identifies the specific data in a data source that you want to use. For example, the data source might be a table if you are connecting to a database data source, or a file if you are connecting to an Amazon S3 data source. A data set also stores any data preparation you have performed on that data, such as renaming a field or changing its data type. Storing this preparation means that you don't have to reprepare the data each time you want to create an analysis based on it.

Topics

- [Importing Data into SPICE \(p. 75\)](#)
- [Creating Data Sets \(p. 76\)](#)
- [Editing a Data Set \(p. 106\)](#)
- [Duplicating a Data Set \(p. 107\)](#)
- [Refreshing Data \(p. 107\)](#)
- [Changing a Data Set \(p. 112\)](#)
- [Sharing Data Sets \(p. 113\)](#)
- [Restricting Access to a Data Set by Using Row-Level Security \(p. 118\)](#)
- [Deleting a Data Set \(p. 123\)](#)

Importing Data into SPICE

SPICE is Amazon QuickSight's in-memory optimized calculation engine, designed specifically for fast, ad hoc data visualization. SPICE stores your data in a system architected for high availability, where it is saved until you choose to delete it. You can improve the performance of database data sets by importing the data into SPICE instead of using a direct query to the database. All data sets that aren't based on database data sources must use SPICE.

Each Amazon QuickSight account receives 10 GB of SPICE capacity per paid user, which is allocated when the user signs into Amazon QuickSight for the first time. Each Amazon QuickSight account also receives one free user with 1 GB of SPICE capacity. SPICE capacity is pooled across users for the Amazon QuickSight account. For example, if you have four users (three paid and one free), you have 31 GB of SPICE capacity available, which can be utilized by any of the users in the account. All of your default SPICE capacity is allocated to your home AWS Region, and the other regions have no SPICE capacity unless you choose to purchase some.

To free up SPICE capacity, delete any unused data sets that you have imported into SPICE. For more information about deleting a data set, see [Deleting a Data Set \(p. 123\)](#).

You can purchase additional SPICE capacity if you want to, and you can also release purchased SPICE capacity that you aren't using. For information about purchasing or releasing SPICE capacity, as well as monitoring SPICE usage, see [Managing SPICE Capacity \(p. 583\)](#).

Creating Data Sets

To create a data set, choose **New data set** on the **Your Data Sets** page. You can then create a data set based on an existing data source, or connect to a new data source and base the data set on that.

Topics

- [Creating Data Sets Using New Data Sources \(p. 76\)](#)
- [Creating a Data Set Using an Existing Data Source \(p. 101\)](#)

Creating Data Sets Using New Data Sources

To create a data set from a new data source, you must provide connection information to the data source.

- For local text or Excel files, you can simply identify the file location and upload the file.
- For Amazon S3, you must provide a manifest identifying the files or buckets that you want to use, and also the import settings for the target files.
- For Amazon Athena, all Athena databases associated with your AWS account are returned. No additional credentials are required.
- For Salesforce, you must provide credentials to connect with.
- For Amazon Redshift, Amazon RDS, Amazon EC2, or other database data sources, you must provide information about the server and database that host the data, as well as valid credentials for that instance.

Topics

- [Creating a Data Set Using a Local Text File \(p. 76\)](#)
- [Creating a Data Set Using a Microsoft Excel File \(p. 77\)](#)
- [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#)
- [Creating a Data Set Using Amazon Athena Data \(p. 86\)](#)
- [Creating a Data Set from Salesforce \(p. 89\)](#)
- [Creating Data Sets from New Database Data Sources \(p. 92\)](#)

Creating a Data Set Using a Local Text File

To create a data set using a local text file data source, identify the location of the file, and then upload it. The file data will be automatically imported into **SPICE (p. 2)** as part of creating a data set.

Use the following procedure to create a data set based on a local text file.

1. Check [Data Source Limits \(p. 62\)](#) to make sure that your target file doesn't exceed data source limits.

Supported file types include .csv, .tsv, .json, .clf, or .elf files.
2. On the Amazon QuickSight start page, choose **Manage data**.
3. On the **Your Data Sets** page, choose **New data set**.
4. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose **Upload a file**.
5. In the **Open** dialog box, browse to a file, select it, and then choose **Open**.

A file must be 1 GB or less to be uploaded to Amazon QuickSight.
6. To prepare the data before creating the data set, choose **Edit/Preview data**, otherwise choose **Visualize** to create an analysis using the data as-is. If you choose the former, you can specify a data set name as part of preparing the data. If you choose the latter, a data set with the same name as the source file is created. To learn more about data preparation, see [Preparing Data \(p. 125\)](#).

Creating a Data Set Using a Microsoft Excel File

To create a data set using a Microsoft Excel file data source, upload an .xlsx file from a local or networked drive. The data will be imported into [SPICE \(p. 2\)](#).

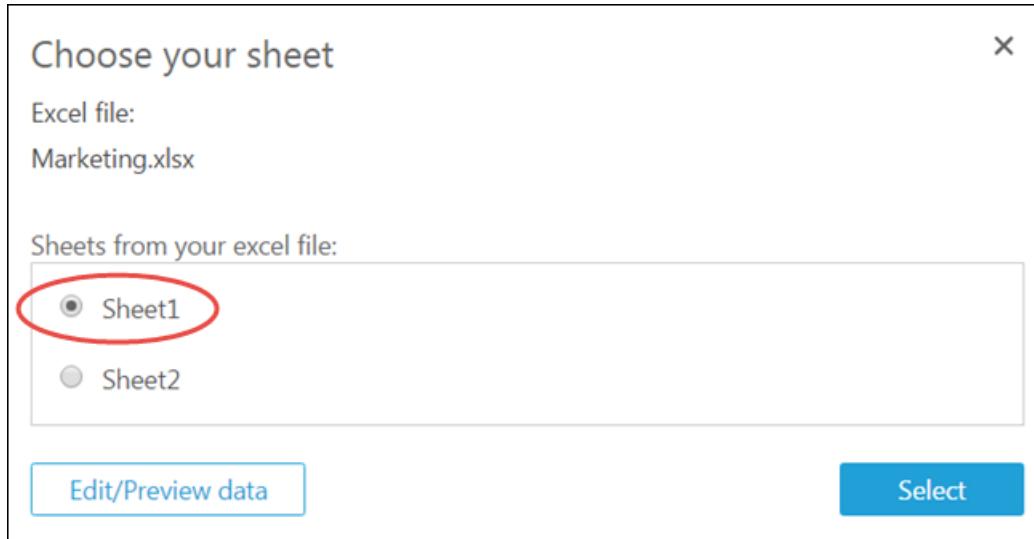
For more information about creating new Amazon S3 data sets using Amazon S3 data sources, see [Creating a Data Set Using an Existing Amazon S3 Data Source \(p. 101\)](#) or [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).

Use the following procedure to create a data set based on an Excel file.

1. Check [Data Source Limits \(p. 62\)](#) to make sure that your target file doesn't exceed data source limits.
2. On the Amazon QuickSight start page, choose **Manage data**.
3. On the **Your Data Sets** page, choose **New data set**.
4. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose **Upload a file**.
5. In the **Open** dialog box, choose a file, and then choose **Open**.

A file must be 1 GB or less to be uploaded to Amazon QuickSight.

6. If the Excel file contains multiple sheets, choose the sheet to import. You can change this later by preparing the data.



7. **Note**

On the following screens, you have multiple chances to prepare the data. Each of these takes you to the **Prepare Data** screen. This screen is the same one where you can access after the data import is complete. It allows you to change the upload settings even after the upload is complete.

Choose **Select** to confirm your settings. Or, you can choose **Edit/Preview data** to prepare the data immediately.

8. A preview of the data appears on the next screen. You can't make changes directly to the data preview. If the data headings and content don't look correct, you can choose **Edit settings and prepare data** to correct the file upload settings.

Otherwise, choose **Next**.

| Title | URL | Time spent | Bounce rate | Single pag... |
|------------------|-----------------|------------|-------------|---------------|
| DB Instance C... | docs.aws.ama... | 3.67 | 0.4806 | 1463 |
| test | test | 5.0 | 14.0 | 1234 |
| test2 | test2 | 3.1 | 68.02 | 2345 |

9. On the **Data Source Details** screen, you can choose **Edit/Preview data**. You can specify a data set name in the **Prepare Data** screen.

If you don't need to prepare the data, you can choose to create an analysis using the data as-is. Choose **Visualize**. Doing this names the data set the same as the source file, and takes you to the **Analysis** screen. To learn more about data preparation and excel upload settings, see [Preparing Data \(p. 125\)](#).

Table: Sheet 0
Estimated table size: 13.6KB **SPICE**
Data source: Book1.xlsx

Import to SPICE ✓ 170.1GB available **SPICE**

Creating a Data Set Using Amazon S3 Files

To create a data set using one or more text files (.csv, .tsv, .clf, or .elf) from Amazon S3, create a manifest that Amazon QuickSight can use to identify the files that you want to use, and also the upload settings needed to import them. When you create a data set using Amazon S3, the file data is automatically imported into [SPICE \(p. 2\)](#).

You must grant Amazon QuickSight access to any Amazon S3 buckets that you want to read files from. For information about granting Amazon QuickSight access to AWS resources, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

Use the following procedure to create an Amazon S3 data set.

1. Check [Data Source Limits \(p. 62\)](#) to make sure that your target file set doesn't exceed data source limits.
2. Create a manifest file to identify the text files you want to import, using one of the formats specified in [Supported Formats for Amazon S3 Manifest Files \(p. 82\)](#).
3. You can save the manifest file to a local directory, or upload it into Amazon S3.
4. On the Amazon QuickSight start page, choose **Manage data**.
5. On the **Your Data Sets** page, choose **New data set**.
6. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the Amazon S3 icon.
7. For **Data source name**, type a description of the data source. This name should be something that helps you distinguish this data source from others.
8. For **Upload a manifest file**, do one of the following:
 - To use a local manifest file, choose **Upload**, and then choose **Upload a JSON manifest file**. For **Open**, choose a file, and then choose **Open**.
 - To use a manifest file from Amazon S3, choose **URL**, and type the URL for the manifest file. To find the URL of a pre-existing manifest file in the Amazon S3 console, navigate to the appropriate file and choose it. A properties panel displays, including the link URL. You can copy the URL and paste it into Amazon QuickSight.
9. Choose **Connect**.
10. To make sure that the connection is complete, choose **Edit/Preview data**. Otherwise, choose **Visualize** to create an analysis using the data as-is. If you choose **Edit/Preview data**, you can specify a data set name as part of preparing the data. Otherwise, the data set name matches the name of the manifest file.

To learn more about data preparation, see [Preparing Data \(p. 125\)](#).

Data Sets Based on Multiple Amazon S3 Files

You can use one of several methods to merge or combine files from Amazon S3 inside Amazon QuickSight:

- **Combine files by using a manifest** – In this case, the files must have the same number of fields (columns). The data types must match between fields in the same position in the file. For example, the first field must have the same data type in each file. The same goes for the second field, and the third field, and so on. Amazon QuickSight takes field names from the first file.

The files must be listed explicitly in the manifest. However, they don't have to be inside the same S3 bucket.

In addition, the files must follow the rules described in [Supported Formats for Amazon S3 Manifest Files \(p. 82\)](#).

For more details about combining files using a manifest, see [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).

- **Merge files without using a manifest** – To merge multiple files into one without having to list them individually in the manifest, you can use Athena. With this method, you can simply query your text files, like they are in a table in a database. For more information, see the post [Analyzing Data in Amazon S3 Using Athena](#) in the Big Data blog.
- **Use a script to append files before importing** – You can use a script designed to combine your files before uploading.

Data Sets Using S3 Files in Another AWS Account

Use this section to learn how to set up security so you can use Amazon QuickSight to access Amazon S3 files in another AWS account.

For you to access files in another account, the owner of the other account must first set Amazon S3 to grant you permissions to read the file. Then, in Amazon QuickSight, you must set up access to the buckets that were shared with you. After both of these steps are finished, you can use a manifest to create a data set.

Note

To access files that are shared with the public, you don't need to set up any special security. However, you still need a manifest file.

Topics

- [Setting Up Amazon S3 to Allow Access from a Different Amazon QuickSight Account \(p. 80\)](#)
- [Setting Up Amazon QuickSight to Access Amazon S3 Files in Another AWS Account \(p. 81\)](#)

Setting Up Amazon S3 to Allow Access from a Different Amazon QuickSight Account

Use this section to learn how to set permissions in Amazon S3 files so they can be accessed by Amazon QuickSight in another AWS account.

For information on accessing another account's Amazon S3 files from your Amazon QuickSight account, see [Setting Up Amazon QuickSight to Access Amazon S3 Files in Another AWS Account \(p. 81\)](#). For more information about S3 permissions, see [Managing Access Permissions to Your Amazon S3 Resources](#) and [How Do I Set Permissions on an Object?](#)

You can use the following procedure to set this access from the S3 console. Alternatively, you can grant permissions by using the AWS CLI or by writing a script. If you have a lot of files to share, you can instead create an S3 bucket policy on the s3:GetObject action. To use a bucket policy, add it to the bucket permissions, not to the file permissions. For information on bucket policies, see [Bucket Policy Examples](#) in the [Amazon S3 Developer Guide](#).

1. Get the email address of the AWS account email you want to share with. Alternatively, you can get and use the canonical user ID. For more information on canonical user IDs, see [AWS Account Identifiers](#) in the [AWS General Reference](#).
2. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
3. Locate the Amazon S3 bucket that you want to share with Amazon QuickSight. Choose **Permissions**.
4. Choose **Add Account**, and then type in an email address, or paste in a canonical user ID, for the AWS account that you want to share with. This email address should be the primary one associated with the AWS account.
5. Choose **Yes** for both **Read bucket permissions** and **List objects**.

Choose **Save** to confirm.

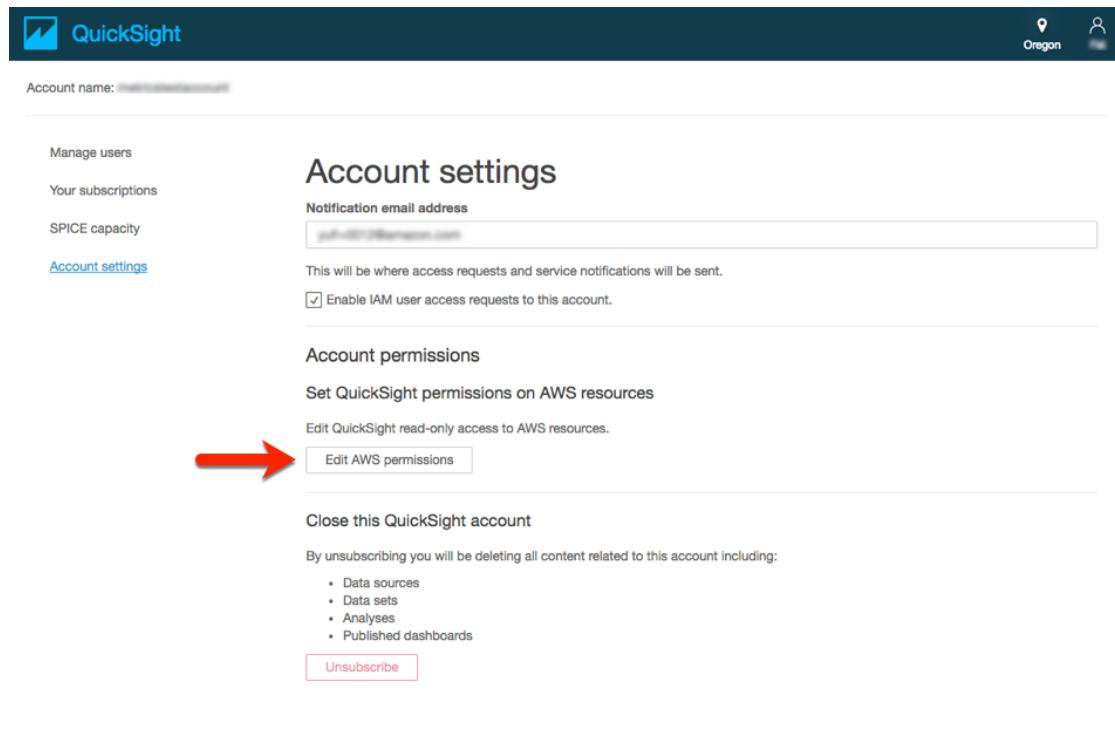
6. Locate the file you want to share, and open the file's permission settings.
7. Type in an email address or canonical user ID for the AWS account you want to share with. This email address should be the primary one associated with the AWS account.
8. Enable **Read object** permissions for each file that Amazon QuickSight needs access to.
9. Notify the Amazon QuickSight user that the files are now available for use.

Setting Up Amazon QuickSight to Access Amazon S3 Files in Another AWS Account

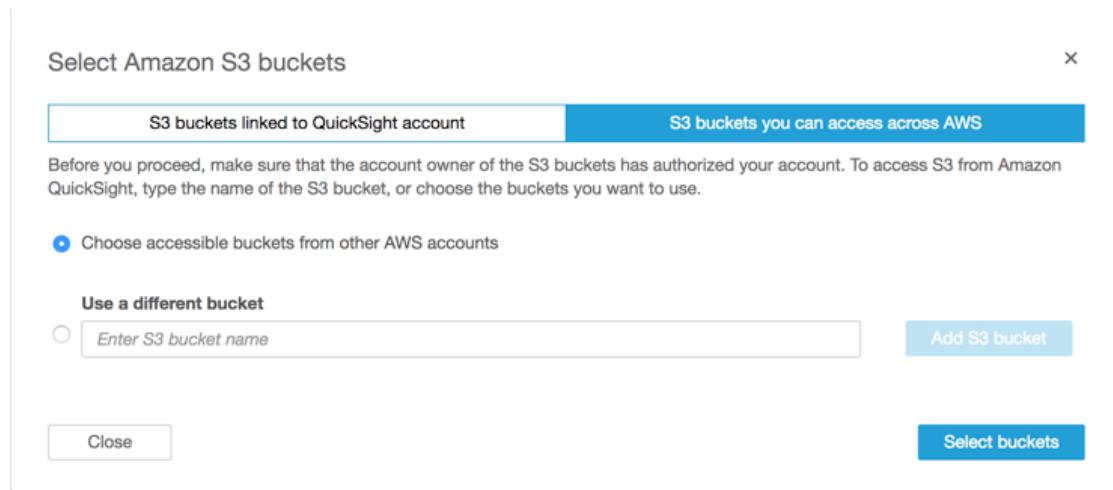
Use this section to learn how to set up Amazon QuickSight so you can access Amazon S3 files in another AWS account. For information on allowing someone else to access your Amazon S3 files from their Amazon QuickSight account, see [Setting Up Amazon S3 to Allow Access from a Different Amazon QuickSight Account \(p. 80\)](#).

Use the following procedure to access another account's Amazon S3 files from Amazon QuickSight. Before you can use this procedure, the users in the other AWS account must share the files in their Amazon S3 bucket with you.

1. Verify that the user or users in the other AWS account gave your account read and write permission to the S3 bucket in question.
2. Choose your profile icon, and then choose **Manage QuickSight**.
3. Choose **Edit AWS Permissions**.



4. Choose **Choose S3 buckets**.
5. On the **Select Amazon S3 buckets** screen, choose the **S3 buckets you can access across AWS** tab.



The default tab is named **S3 buckets linked to QuickSight account**. It shows all the buckets your Amazon QuickSight account has access to.

6. If you want to add all the buckets you have permission to use, choose **Choose accessible buckets from other AWS accounts**. Otherwise, type the name of the Amazon S3 bucket that you want to add. It must exactly match the unique name of the Amazon S3 bucket.

If you don't have the appropriate permissions, you see the error message "We can't connect to this S3 bucket. Make sure that any S3 buckets you specify are associated with the AWS account used to create this QuickSight account." This error message appears if you don't have either account permissions or Amazon QuickSight permissions.

Note

To use Amazon Athena, Amazon QuickSight needs to access the Amazon S3 buckets that Athena uses. You can add them here one by one, or use the **Choose accessible buckets from other AWS accounts** option.

7. Choose **Select buckets** to confirm your selection.
8. Create a new data set based on Amazon S3, and upload your manifest file. For more information about Amazon S3 data sets, see [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).

Supported Formats for Amazon S3 Manifest Files

You use JSON manifest files to specify files in Amazon S3 to import into Amazon QuickSight. These JSON manifest files can use either the Amazon QuickSight format described following or the Amazon Redshift format described in [Using a Manifest to Specify Data Files](#). You don't have to use Amazon Redshift to use the Amazon Redshift manifest file format.

If you use an Amazon QuickSight manifest file, it must have a .json extension, for example my_manifest.json. If you use an Amazon Redshift manifest file, it can have any extension.

If you use an Amazon Redshift manifest file, Amazon QuickSight processes the optional `mandatory` flag similarly to Amazon Redshift, terminating the import process and returning an error if the associated file is not found.

Files you select for import must be delimited-text (for example, .csv or .tsv), log (.clf), or extended log (.elf) format, or JSON (.json). All files identified in one manifest file must use the same file format. Plus, they must have the same number and type of columns. Amazon QuickSight supports UTF-8 file encoding, but not UTF-8 (with BOM). If you are importing JSON files, then for `globalUploadSettings` you need to specify `format`, but not `delimiter`, `textqualifier`, and `containsHeader`.

Any files you specify must be in Amazon S3 buckets that you have granted Amazon QuickSight access to. For information about granting Amazon QuickSight access to AWS resources, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

Manifest File Format for Amazon QuickSight

Amazon QuickSight manifest files use the following JSON format.

```
{
    "fileLocations": [
        {
            "URIs": [
                "uri1",
                "uri2",
                "uri3"
            ]
        },
        {
            "URIprefixes": [
                "prefix1",
                "prefix2",
                "prefix3"
            ]
        }
    ],
    "globalUploadSettings": {
        "format": "CSV",
        "delimiter": ",",
        "textqualifier": "'",
        "containsHeader": "true"
    }
}
```

Use the fields in the `fileLocations` element to specify the files to import, and the fields in the `globalUploadSettings` element to specify import settings for those files, such as field delimiters.

The manifest file elements are described following.

- **fileLocations** — Use this element to specify the files to import. You can use either or both of the `URIs` and `URIprefixes` arrays to do this. You must specify at least one value in one or the other of them.
- **URIs** — Use this array to list URIs for specific files to import.

Amazon QuickSight can access Amazon S3 files that are in any AWS Region. However, you must use a URI format that identifies the AWS Region of the Amazon S3 bucket if it is different from that used by your Amazon QuickSight account.

URIs in the following formats are supported:

| URI Format | Example | Comments |
|---|--|----------|
| <code>https://s3.amazonaws.com/<bucket name>/<file name></code> | <code>https://s3.amazonaws.com/data_bucket/data.csv</code> | |
| <code>s3://<bucket name>/<file name></code> | <code>s3://data_bucket/data.csv</code> | |
| <code>https://<bucket name>.s3.amazonaws.com/<file name></code> | <code>https://data_bucket.s3.amazonaws.com/data.csv</code> | |

| URI Format | Example | Comments |
|---|--|---|
| <code>https://s3-<region name>.amazonaws.com/<bucket name>/<file name></code> | <code>https://s3-us-east-1.amazonaws.com/data_bucket/data.csv</code> | This URI type identifies the AWS Region for the Amazon S3 bucket. |
| <code>https://<bucket name>.s3-<region name>.amazonaws.com/<file name></code> | <code>https://data_bucket.s3-us-east-1.amazonaws.com/data.csv</code> | This URI type identifies the AWS Region for the Amazon S3 bucket. |

- **URIPrefixes** — Use this array to list URI prefixes for S3 buckets and folders. All files in a specified bucket or folder are imported. Amazon QuickSight recursively retrieves files from child folders.

Amazon QuickSight can access Amazon S3 buckets or folders that are in any AWS Region. However, you must use a URI prefix format that identifies the AWS Region of the Amazon S3 bucket if it is different from that used by your Amazon QuickSight account.

URI prefixes in the following formats are supported:

| URIPrefix Format | Example | Comments |
|--|--|---|
| <code>https://s3.amazonaws.com/<bucket name>/</code> | <code>https://s3.amazonaws.com/data_bucket/</code> | |
| <code>https://s3.amazonaws.com/<bucket name>/<folder name1>/(<folder name2>/etc.)</code> | <code>https://s3.amazonaws.com/data_bucket/folder1/</code> | |
| <code>s3://<bucket name></code> | <code>s3://data_bucket/</code> | |
| <code>s3://<bucket name>/<folder name1>/(<folder name2>/etc.)</code> | <code>s3://data_bucket/folder1/</code> | |
| <code>https://<bucket name>.s3.amazonaws.com</code> | <code>https://data_bucket.s3.amazonaws.com</code> | |
| <code>https://s3-<region name>.amazonaws.com/<bucket name>/</code> | <code>https://s3-us-east-1.amazonaws.com/data_bucket/</code> | This URIPrefix type identifies the AWS Region for the Amazon S3 bucket. |
| <code>https://s3-<region name>.amazonaws.com/<bucket name>/<folder name1>/(<folder name2>/etc.)</code> | <code>https://s3-us-east-1.amazonaws.com/data_bucket/folder1/</code> | This URIPrefix type identifies the AWS Region for the Amazon S3 bucket. |
| <code>https://<bucket name>.s3-<region name>.amazonaws.com</code> | <code>https://data_bucket.s3-us-east-1.amazonaws.com</code> | This URIPrefix type identifies the AWS Region for the Amazon S3 bucket. |

- **globalUploadSettings** — (Optional) Use this element to specify import settings for the Amazon S3 files, such as field delimiters. If this element is not specified, Amazon QuickSight uses the default values for the fields in this section.

Important

For log (.clf) and extended log (.elf) files, only the **format** field in this section is applicable, so you can skip the other fields. If you choose to include them, their values are ignored.

- **format** — (Optional) Specify the format of the files to be imported. Valid formats are **CSV**, **TSV**, **CLF**, **ELF**, and **JSON**. The default value is **CSV**.
- **delimiter** — (Optional) Specify the file field delimiter. This must map to the file type specified in the **format** field. Valid formats are commas (,) for .csv files and tabs (\t) for .tsv files. The default value is comma (,).
- **textqualifier** — (Optional) Specify the file text qualifier. Valid formats are single quote ('), double quotes (""). The leading backslash is a required escape character for a double quote in JSON. The default value is double quotes (""). If your text doesn't need a text qualifier, don't include this property.
- **containsHeader** — (Optional) Specify whether the file has a header row. Valid formats are **true** or **false**. The default value is **true**.

Manifest File Examples for Amazon QuickSight

The following are some examples of completed Amazon QuickSight manifest files.

The following example shows a manifest file that identifies two specific .csv files for import. These files use double quotes for text qualifiers. The **format**, **delimiter**, and **containsHeader** fields are skipped because the default values are acceptable.

```
{  
    "fileLocations": [  
        {  
            "URIs": [  
                "https://data_bucket.s3.amazonaws.com/data.csv",  
                "https://data_bucket.s3.amazonaws.com/data2.csv"  
            ]  
        },  
        "globalUploadSettings": {  
            "textqualifier": "\""  
        }  
    ]  
}
```

The following example shows a manifest file that identifies one specific .tsv file for import, and also a bucket in another AWS Region that contains additional .tsv files for import. The **textqualifier** and **containsHeader** fields are skipped because the default values are acceptable.

```
{  
    "fileLocations": [  
        {  
            "URIs": [  
                "https://s3.amazonaws.com/data_bucket/data.tsv"  
            ]  
        },  
        {  
            "URIPrefixes": [  
                "https://s3-us-east-1.amazonaws.com/data_bucket/"  
            ]  
        }  
    ],  
    "globalUploadSettings": {  
        "textqualifier": "\""  
    }  
}
```

```
        "format": "TSV",
        "delimiter": "\t"
    }
}
```

The following example identifies two buckets that contain .clf files for import. One is in the same AWS Region as the Amazon QuickSight account, and one in a different AWS Region. The `delimiter`, `textQualifier`, and `containsHeader` fields are skipped because they are not applicable to log files.

```
{
    "fileLocations": [
        {
            "URIPrefixes": [
                "https://data_bucket.s3-us-east-1.amazonaws.com",
                "s3://other_data_bucket/"
            ]
        }
    ],
    "globalUploadSettings": {
        "format": "CLF"
    }
}
```

The following example uses the Amazon Redshift format to identify a .csv file for import.

```
{
    "entries": [
        {
            "url": "https://s3-us-west-2.amazonaws.com/myalias-test/
Consumer_Complaints3.csv",
            "mandatory": true
        }
    ]
}
```

The following example uses the Amazon Redshift format to identify two JSON files for import.

```
{
    "fileLocations": [
        {
            "URIs": [
                "https://data_bucket.s3.amazonaws.com/data.json",
                "https://data_bucket.s3.amazonaws.com/data2.json"
            ]
        }
    ],
    "globalUploadSettings": {
        "format": "JSON"
    }
}
```

Creating a Data Set Using Amazon Athena Data

You can connect to Amazon Athena data sources and use Athena data to create Amazon QuickSight data sets.

Before you try to read files from Amazon S3 buckets, make sure that you grant Amazon QuickSight access to them. For more information, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

To create an Athena data set

1. Check [Data Source Limits \(p. 62\)](#) to make sure that your target table or query doesn't exceed data source limits.
2. On the Amazon QuickSight start page, choose **Manage data**.
3. On the **Your Data Sets** page, choose **New data set**.
4. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the **Athena** icon.
5. For **Data source name**, type a name for the data source.
6. Choose **Validate connection** to validate the connection. If validation fails, make sure Amazon QuickSight has permission to access Athena resources. Then, try validating again. For more information on setting Amazon QuickSight permissions to AWS resources, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).
7. Choose **Create data source**.

Note

Amazon QuickSight automatically secures connections to Athena instances by using Secure Sockets Layer (SSL). You don't need to do anything to enable this.

8. For **Database: contain sets of tables**, choose **Select**, and then choose your Athena database.

Choose your table X

transport

Database: contain sets of tables.

Select... ▼

Choose **Prepare data** to create a SQL query or perform other data preparation, otherwise choose **Select table**.

[Edit/Preview data](#)

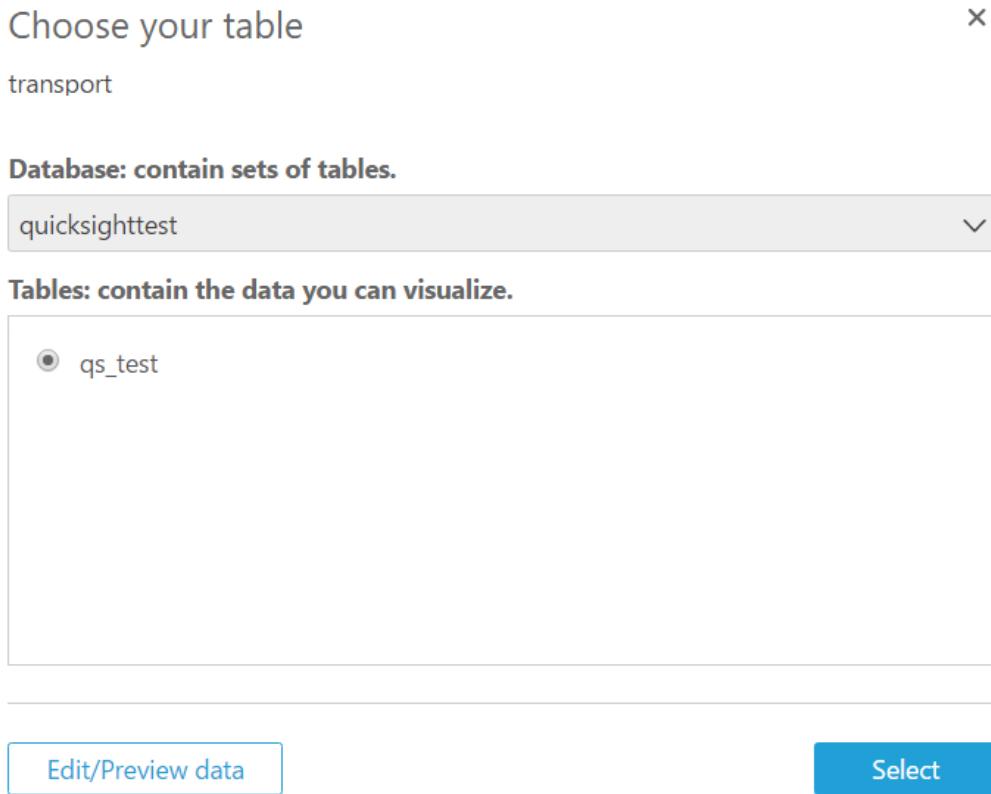
[Select](#)

Note

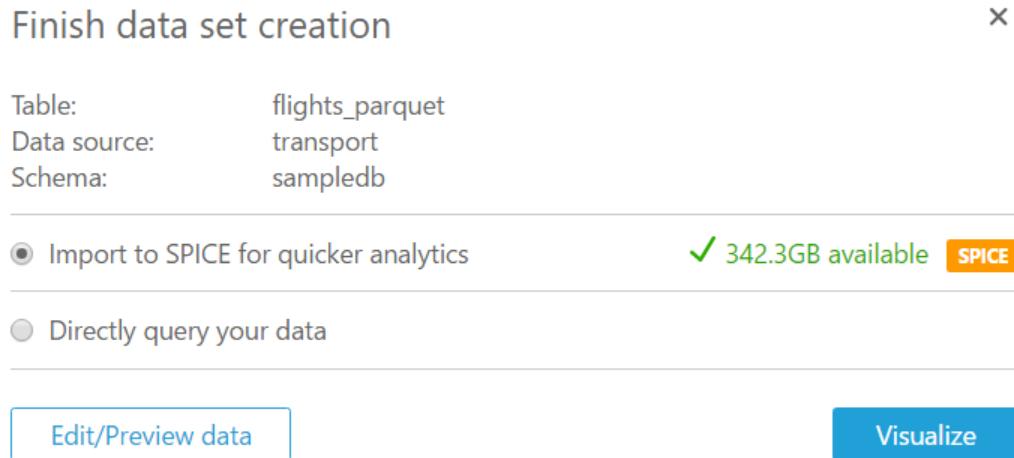
If you want to create a custom SQL query, choose **Edit/Preview data** to edit a query. If you do this without selecting a table, an error appears in the data preview area. You can safely ignore this. The error is saying that there is no data to display until your query is created.

9. Choose one of the following options:

- To prepare the data before creating an analysis, choose **Edit/Preview data** to begin data preparation. Choose to prepare data at this point if you are planning on writing a SQL query, rather than selecting data from a single table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
- Otherwise, choose a table, and then choose **Select** to confirm.



10. If you did not choose to prepare the data in the previous step, you will see the following screen.



To load your data into [SPICE \(p. 2\)](#), choose **Import to SPICE**. The green indicator shows whether or not you have space available.

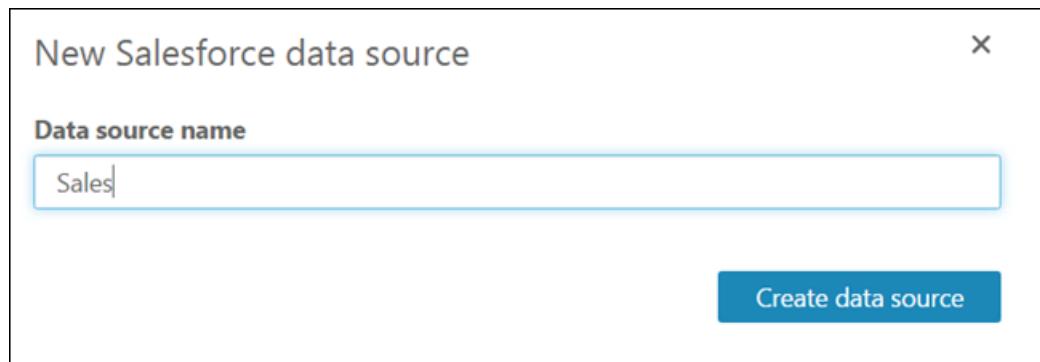
Alternatively, you can choose to query your data without using SPICE. To do this, choose **Directly query your data**.

- After choosing how to query your data, choose one of the following options:
 - To prepare the data before creating an analysis, choose **Edit/Preview data** to begin data preparation for the selected table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
 - To create a data set and analyze the data using the table as-is, choose **Visualize**.

Creating a Data Set from Salesforce

Use the following procedure to create a data set by connecting to Salesforce and selecting a report or object to provide data.

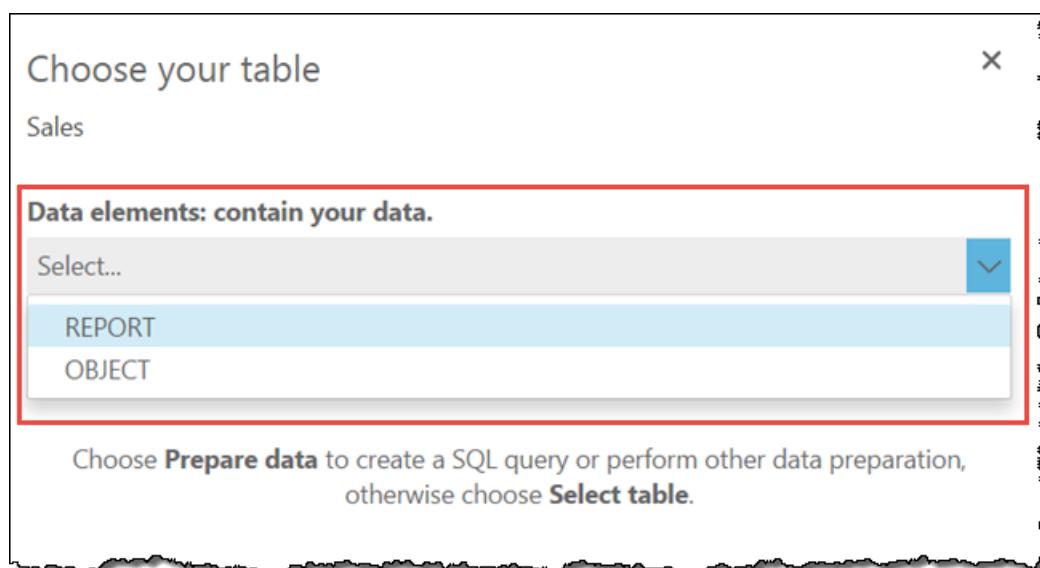
- Check [Data Source Limits \(p. 62\)](#) to make sure that your target report or object doesn't exceed data source limits.
- On the Amazon QuickSight start page, choose **Manage data**.
- On the **Your Data Sets** page, choose **New data set**.
- In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the **Salesforce** icon.
- Type a name for the data source and then choose **Create data source**.



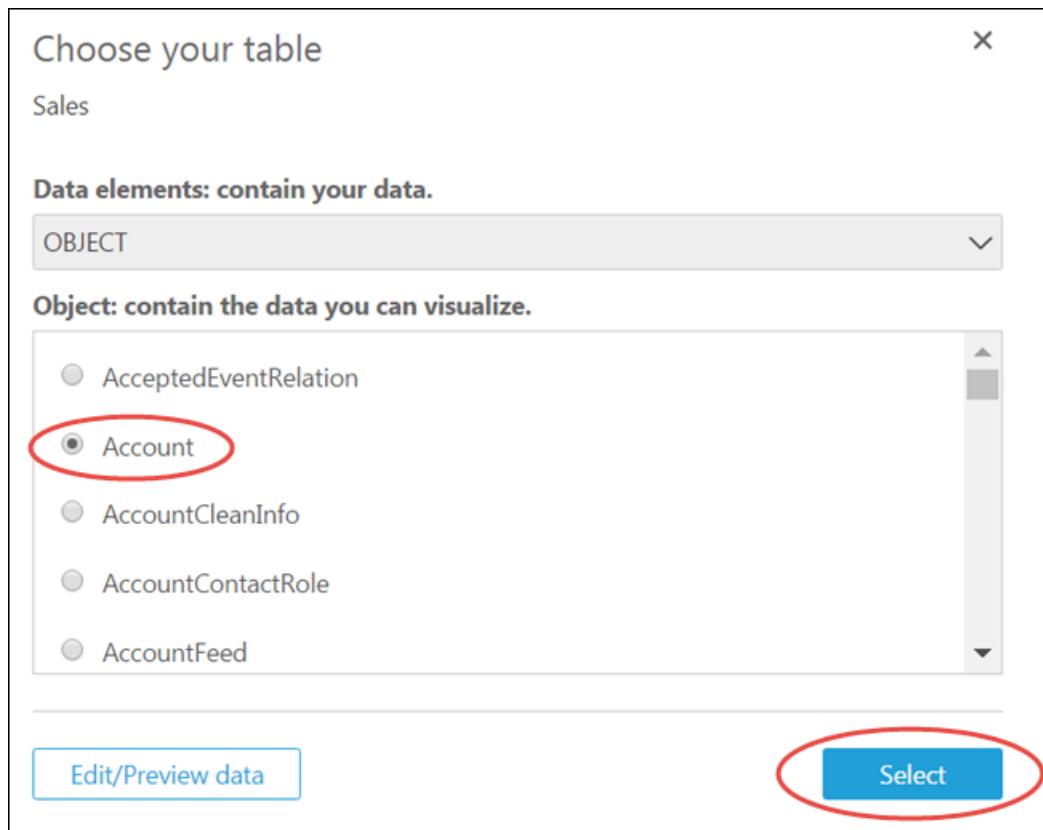
6. On the Salesforce login page, enter your Salesforce credentials.
7. For **Data elements: contain your data**, choose **Select** and then choose either **REPORT** or **OBJECT**.

Note

Joined reports aren't supported as Amazon QuickSight data sources.



8. Choose one of the following options:
 - To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
 - Otherwise, choose a report or object and then choose **Select**.

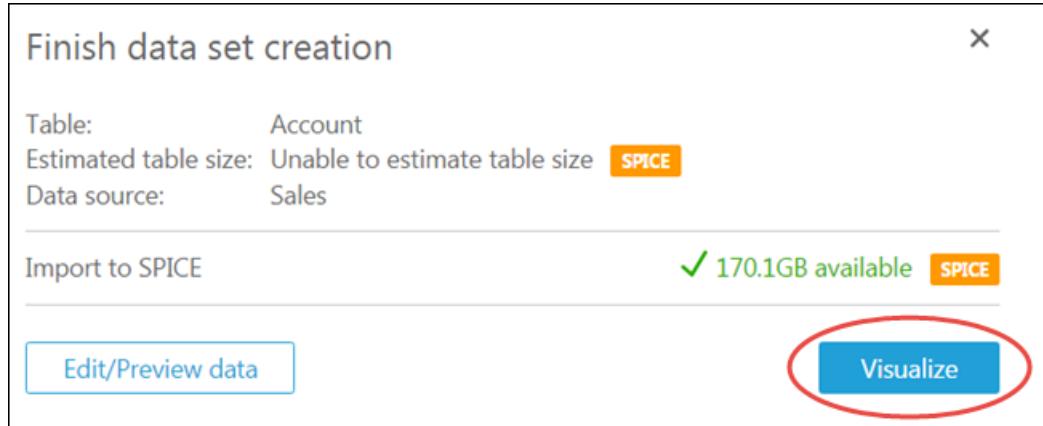


9. Choose one of the following options:

- To create a data set and an analysis using the data as-is, choose **Visualize**.

Note

If you don't have enough [SPICE \(p. 2\)](#) capacity, choose **Edit/Preview data**. In data preparation, you can remove fields from the data set to decrease its size or apply a filter that reduces the number of rows returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



- To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation for the selected report or object. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).

Creating Data Sets from New Database Data Sources

You can use a variety of database data sources to provide data to Amazon QuickSight. This includes Amazon RDS instances and Amazon Redshift clusters. It also includes MariaDB, Microsoft SQL Server, MySQL, and PostgreSQL instances in your organization, Amazon EC2, or similar environments.

When creating a new database data set, you can select one table, join several tables, or create a SQL query to retrieve the data that you want. You can also change whether the data set uses a direct query or instead stores data in [SPICE \(p. 2\)](#).

When you create a data set based on an AWS service like Amazon RDS, Amazon Redshift, or Amazon EC2, data transfer charges might apply when consuming data from that source. Those charges might also vary depending on whether that AWS resource is in the home AWS Region that you chose for your Amazon QuickSight account. For details on pricing, see the pricing page for the service in question.

Topics

- [Required Permissions for Database Credentials \(p. 92\)](#)
- [Network and Database Configuration Requirements \(p. 93\)](#)
- [Creating a Data Set from a Database \(p. 96\)](#)

Required Permissions for Database Credentials

To connect to a database, you must provide a user name and password. The user account identified by these credentials must have `SELECT` permissions on some system tables in order to allow Amazon QuickSight to do things like discover table schemas and estimate table size.

The following table identifies the tables that the user account must have `SELECT` permissions on, depending on the type of database you are connecting to. These requirements apply for all database instances you connect to, regardless of their environment—that is, whether they are on-premises, in Amazon RDS, in Amazon EC2, or elsewhere.

| Instance Type | Tables |
|-----------------------------|---|
| Amazon Aurora | <ul style="list-style-type: none">• INFORMATION_SCHEMA.STATISTICS• INFORMATION_SCHEMA.TABLES |
| Amazon Redshift | <ul style="list-style-type: none">• pg_stats• pg_class• pg_namespace |
| MariaDB | <ul style="list-style-type: none">• INFORMATION_SCHEMA.STATISTICS• INFORMATION_SCHEMA.TABLES |
| Microsoft SQL Server | <ul style="list-style-type: none">• DBCC SHOW_STATISTICS• sp_statistics |
| MySQL | <ul style="list-style-type: none">• INFORMATION_SCHEMA.STATISTICS• INFORMATION_SCHEMA.TABLES |
| PostgreSQL | <ul style="list-style-type: none">• pg_stats• pg_class• pg_namespace |

Note

If you are using MySQL or PostgreSQL, verify that you are connecting from an allowed host or IP address. For more detail, see [Database Configuration Requirements for Self-Administered Instances \(p. 95\)](#).

Network and Database Configuration Requirements

To serve as data sources, databases need to be configured so that Amazon QuickSight can access them. Use the following sections to make sure that your database is configured appropriately.

Important

Because a database instance on Amazon EC2 is administered by you rather than AWS, it must meet both the [Network Configuration Requirements \(p. 93\)](#) as well as the [Database Configuration Requirements for Self-Administered Instances \(p. 95\)](#).

Network Configuration Requirements

To be usable from Amazon QuickSight, a database server must be accessible from the internet. It must also allow inbound traffic from Amazon QuickSight servers.

If the database is on AWS and in the same AWS Region as your Amazon QuickSight account, you can auto-discover the instance to make connecting to it easier. To do this, you must grant Amazon QuickSight permissions to access it. For more information, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

Network Configuration for an AWS Instance in a Default VPC

In some cases, your database might be on an AWS cluster or instance that you created in a default VPC and so is publicly accessible (that is, you didn't choose to make private). In such cases, your database is already appropriately configured to be accessible from the internet. However, you still need to enable access from Amazon QuickSight servers to your AWS cluster or instance. For further details on how to do this, choose the appropriate topic following:

- [Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances \(p. 592\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters \(p. 596\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon EC2 Instances \(p. 603\)](#)

Network Configuration for an AWS Instance in a Non-Default VPC

If you are configuring an AWS instance in a non-default VPC, make sure that the instance is publicly accessible and that the VPC has the following:

- An internet gateway.
- A public subnet.
- A route in the route table between the internet gateway and the AWS instance.
- Network access control lists (ACLs) in your VPC that allow traffic between the cluster or instance and Amazon QuickSight servers. These ACLs must do the following:
 - Allow inbound traffic from the appropriate Amazon QuickSight IP address range and all ports to the IP address and port that the database is listening on.
 - Allow outbound traffic from the database's IP address and port to the appropriate Amazon QuickSight IP address range and all ports.

For more information about Amazon QuickSight IP address ranges, see [IP Address Ranges for Amazon QuickSight \(p. 95\)](#) following.

For more information about configuring VPC ACLs, see [Network ACLs](#).

- Security group rules that allow traffic between the cluster or instance and Amazon QuickSight servers. For further details on how to create appropriate security group rules, see [Authorizing Connections from Amazon QuickSight to AWS Data Stores \(p. 591\)](#).

For more information about configuring a VPC in the Amazon VPC service, see [Networking in Your VPC](#).

[Network Configuration for an AWS Instance in a Private VPC](#)

If your database is on an AWS cluster or instance that you created in a private VPC, you can use it with Amazon QuickSight. For more information, see [Working with Amazon VPC \(p. 614\)](#).

For more information on Amazon Virtual Private Cloud, see [Amazon VPC](#) and [Amazon VPC Documentation](#).

[Network Configuration for an AWS Instance That is Not in a VPC](#)

If you are configuring an AWS instance that is not in a VPC, make sure that the instance is publicly accessible. Also, make sure that there is a security group rule that allows traffic between the cluster or instance and Amazon QuickSight servers. For further details on how to do this, choose the appropriate topic following:

- [Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances \(p. 592\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters \(p. 596\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon EC2 Instances \(p. 603\)](#)

[Network Configuration for a Non-AWS Database Instance](#)

If you want to use SSL to secure your connections to your database (*recommended*), make sure that you have a certificate signed by a recognized certificate authority (CA). Amazon QuickSight doesn't accept certificates that are self-signed or issued from a non-public CA. For more information, see [Amazon QuickSight SSL and CA Certificates \(p. 94\)](#).

If your database is on a non-AWS server, you must change that server's firewall configuration to accept traffic from the appropriate Amazon QuickSight IP address range. For more information about Amazon QuickSight IP address ranges, see [IP Address Ranges for Amazon QuickSight \(p. 95\)](#). Refer to your operating system documentation for any other steps you need to take to enable internet connectivity.

[Amazon QuickSight SSL and CA Certificates](#)

Following is a list of accepted public Certificate Authorities. If you are using a non-AWS database instance, your certificate must be on this list, or it won't work.

- AAA Certificate Services
- AddTrust Class 1 CA Root
- AddTrust External CA Root
- AddTrust Qualified CA Root
- AffirmTrust Commercial
- AffirmTrust Networking
- AffirmTrust Premium
- AffirmTrust Premium ECC
- America Online Root Certification Authority 1
- America Online Root Certification Authority 2
- QuoVadis Root CA 2
- QuoVadis Root CA 3
- QuoVadis Root Certification Authority
- SecureTrust CA
- Sonera Class1 CA
- Sonera Class2 CA
- Starfield Root Certificate Authority - G2
- Starfield Services Root Certificate Authority - G2
- SwissSign Gold CA - G2
- SwissSign Platinum CA - G2

- Baltimore CyberTrust Code Signing Root
- Baltimore CyberTrust Root
- Buypass Class 2 Root CA
- Buypass Class 3 Root CA
- Certum CA
- Certum Trusted Network CA
- Chambers of Commerce Root
- Chambers of Commerce Root - 2008
- Class 2 Primary CA
- Class 3P Primary CA
- Deutsche Telekom Root CA 2
- DigiCert Assured ID Root CA
- DigiCert Global Root CA
- DigiCert High Assurance EV Root CA
- Entrust.net Certification Authority (2048)
- Entrust Root Certification Authority
- Entrust Root Certification Authority - G2
- Equifax Secure eBusiness CA-1
- Equifax Secure Global eBusiness CA-1
- GeoTrust Global CA
- GeoTrust Primary Certification Authority
- GeoTrust Primary Certification Authority - G2
- GeoTrust Primary Certification Authority - G3
- GeoTrust Universal CA
- Global Chambersign Root - 2008
- GlobalSign
- GlobalSign Root CA
- Go Daddy Root Certificate Authority - G2
- GTE CyberTrust Global Root
- KEYNECTIS ROOT CA
- SwissSign Silver CA - G2
- TC TrustCenter Class 2 CA II
- TC TrustCenter Class 4 CA II
- TC TrustCenter Universal CA I
- Thawte Personal Freemail CA
- Thawte Premium Server CA
- thawte Primary Root CA
- thawte Primary Root CA - G2
- thawte Primary Root CA - G3
- Thawte Server CA
- Thawte Timestamping CA
- T-TeleSec GlobalRoot Class 2
- T-TeleSec GlobalRoot Class 3
- UTN - DATACorp SGC
- UTN-USERFirst-Client Authentication and Email
- UTN-USERFirst-Hardware
- UTN-USERFirst-Object
- Valicert
- VeriSign Class 1 Public Primary Certification Authority - G3
- VeriSign Class 2 Public Primary Certification Authority - G3
- VeriSign Class 3 Public Primary Certification Authority - G3
- VeriSign Class 3 Public Primary Certification Authority - G4
- VeriSign Class 3 Public Primary Certification Authority - G5
- VeriSign Universal Root Certification Authority
- XRamp Global Certification Authority

IP Address Ranges for Amazon QuickSight

For more information on the IP address ranges for Amazon QuickSight in supported regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).

Database Configuration Requirements for Self-Administered Instances

For a database to be accessible to Amazon QuickSight, it must meet the following criteria:

- It must be accessible from the internet. To enable internet connectivity, see your database management system documentation.

- It must be configured to accept connections and authenticate access using the user credentials that you provide as part of creating the data set.
- If you are connecting to MySQL or PostgreSQL, the database engine must be accessible from your host or IP range. This optional security limitation is specified in MySQL or PostgreSQL connection settings. If this limitation is in place, any attempt to connect from a nonspecified host or IP address is rejected, even if you have the correct user name and password.
- In MySQL, the server accepts the connection only if the user and host are verified in the user table. For more information, see [Access Control, Stage 1: Connection Verification](#) in the MySQL documentation.
- In PostgreSQL, you must control client authentication by using the `pg_hba.conf` file in the database cluster's data directory, although this file might be named and located differently on your system. For more information, see [Client Authentication](#) in the PostgreSQL documentation.

Creating a Data Set from a Database

The following procedures walk you through connecting to database data sources and creating data sets. Use [Creating a Data Set from an Autodiscovered Amazon Redshift Cluster or Amazon RDS Instance \(p. 96\)](#) to create data sets from AWS data sources that your Amazon QuickSight account autodiscovered, or use [Creating a Data Set Using a Database That's Not Autodiscovered \(p. 98\)](#) to create data sets from any other database data sources.

Creating a Data Set from an Autodiscovered Amazon Redshift Cluster or Amazon RDS Instance

Use the following procedure to create a connection to an autodiscovered AWS data source.

1. Check [Data Source Limits \(p. 62\)](#) to make sure that your target table or query doesn't exceed data source limits.
2. Confirm that the database credentials you plan to use have appropriate permissions as described in [Required Permissions for Database Credentials \(p. 92\)](#).
3. Make sure that you have configured the cluster or instance for Amazon QuickSight access by following the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).
4. On the Amazon QuickSight start page, choose **Manage data**.
5. On the **Your Data Sets** page, choose **New data set**.
6. In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose either the **RDS** or the **Redshift Auto-discovered** icon, depending on the AWS service you want to connect to.
7. Enter the connection information for the data source, as follows:
 - For **Data source name**, type a name for the data source.
 - For **Instance ID**, choose the name of the instance or cluster you want to connect to.
 - **Database name** shows the default database for the **Instance ID** cluster or instance. If you want to use a different database on that cluster or instance, type its name.
 - For **UserName**, type the user name of an account that has permissions to access the target database and also to read (perform a `SELECT` statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
8. Choose **Validate connection** to verify your connection information is correct.
9. If the connection validates, choose **Create data source**. If not, correct the connection information and try validating again.

Note

Amazon QuickSight automatically secures connections to Amazon RDS instances and Amazon Redshift clusters by using Secure Sockets Layer (SSL). You don't need to do anything to enable this.

10. Choose one of the following:

- **Custom SQL**

On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.

- **Choose tables**

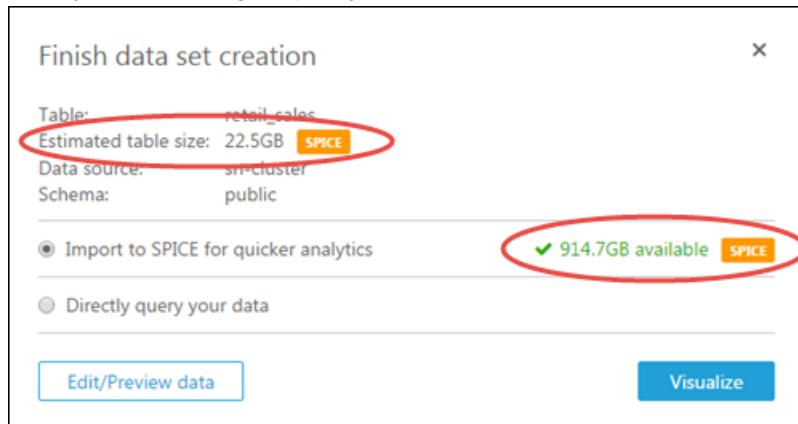
If you prefer to connect to specific tables, for **Schema: contain sets of tables**, choose **Select** and then choose a schema. In some cases where there is only a single schema in the database, that schema is automatically chosen, and the schema selection option isn't displayed.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

Otherwise, after choosing a table, choose **Select**.

11. Choose one of the following options:

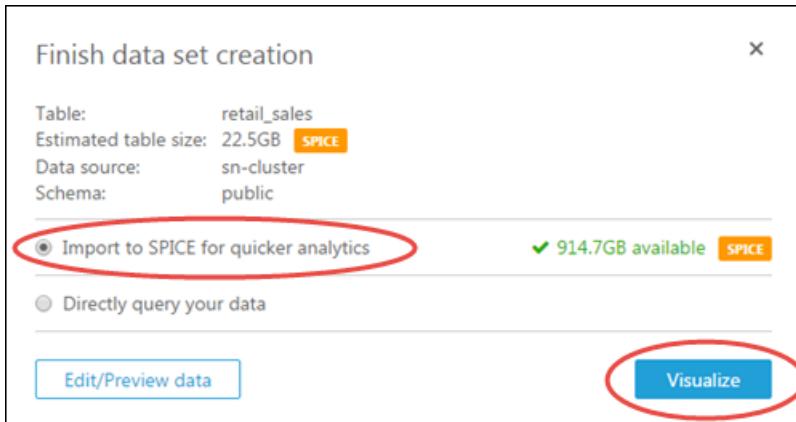
- To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation for the selected table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
- To create a data set and analysis using the table data as-is, and to import the data set data into SPICE for improved performance (recommended), check the table size and the SPICE indicator to see if you have enough capacity.



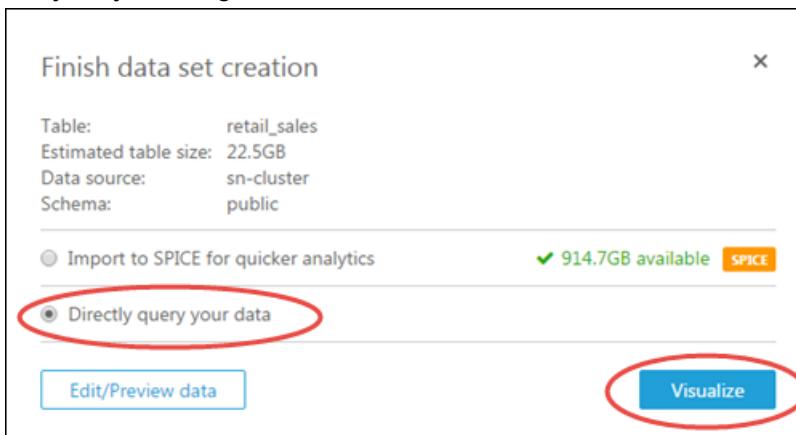
If you have enough SPICE capacity, choose **Import to SPICE for quicker analytics**, and then create an analysis by choosing **Visualize**.

Note

If you want to use SPICE and you don't have enough space, choose **Edit/Preview data**. In data preparation, you can remove fields from the data set to decrease its size, apply a filter, or write a SQL query that reduces the number of rows or columns returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



- To create a data set and an analysis using the table data as-is, and to have the data queried directly from the database, choose the **Directly query your data** option, and then create an analysis by choosing **Visualize**.



Creating a Data Set Using a Database That's Not Autodiscovered

Use the following procedure to create a connection to any database other than an autodiscovered Amazon Redshift cluster or Amazon RDS instance. Such databases include Amazon Redshift clusters and Amazon RDS instances that are in a different AWS Region or are associated with a different AWS account. They also include MariaDB, Microsoft SQL Server, MySQL, and PostgreSQL instances that are on-premises, in Amazon EC2, or in some other accessible environment.

- Check [Data Source Limits \(p. 62\)](#) to make sure that your target table or query doesn't exceed data source limits.
- Confirm that the database credentials that you plan to use have appropriate permissions as described in [Required Permissions for Database Credentials \(p. 92\)](#).
- Make sure that you have configured the cluster or instance for Amazon QuickSight access by following the instructions in [Network and Database Configuration Requirements \(p. 93\)](#).
- On the Amazon QuickSight start page, choose **Manage data**.
- On the **Your Data Sets** page, choose **New data set**.
- In the **FROM NEW DATA SOURCES** section of the **Create a Data Set** page, choose the **Redshift Manual connect** icon if you want to connect to an Amazon Redshift cluster in another AWS Region or associated with a different AWS account. Or, choose the appropriate database management system icon to connect to an instance of Amazon Aurora, MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL.

7. Enter the connection information for the data source, as follows:
 - For **Data source name**, type a name for the data source.
 - For **Database server**, type or paste one of the following values:
 - For an Amazon Redshift cluster or Amazon RDS instance, type the endpoint of the cluster or instance without the port number. For example, if the endpoint value is **clustername.1234abcd.us-west-2.redshift.amazonaws.com:1234**, then type **clustername.1234abcd.us-west-2.redshift.amazonaws.com**. You can get the endpoint value from the **Endpoint** field on the cluster or instance detail page in the AWS console.
 - For an Amazon EC2 instance of MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL, type the public DNS. You can get the public DNS value from the **Public DNS** field on the instance detail pane in the Amazon EC2 console.
 - For a non-Amazon EC2 instance of MariaDB, Microsoft SQL Server, MySQL, or PostgreSQL, type the hostname or public IP address of the database server. If you are using Secure Sockets Layer (SSL) for a secured connection (recommended), you likely need to provide the hostname to match the information required by the SSL certificate. For a list of accepted certificates see [Amazon QuickSight SSL and CA Certificates \(p. 94\)](#).
 - For **Port**, type the port that the cluster or instance uses for connections.
 - For **Database name**, type the name of the database that you want to use.
 - For **UserName**, type the user name of an account that has permissions to access the target database and also to read (perform a **SELECT** statement on) any tables in that database that you want to use.
 - For **Password**, type the password associated with the user account you entered.
8. (Optional) If you are connecting to anything other than an Amazon Redshift cluster and you *don't* want a secured connection, make sure that **Enable SSL** is clear. *We strongly recommend leaving this checked*, as an unsecured connection can be open to tampering.

For more information on how the target instance uses SSL to secure connections, see the documentation for the target database management system. Amazon QuickSight doesn't accept self-signed SSL certificates as valid. For a list of accepted certificates, see [Amazon QuickSight SSL and CA Certificates \(p. 94\)](#).

Amazon QuickSight automatically secures connections to Amazon Redshift clusters by using SSL. You don't need to do anything to enable this.

Some databases, such as Presto and Apache Spark, must meet additional requirements before Amazon QuickSight can connect. For more information, see [Creating a Data Source Using Presto \(p. 72\)](#), or [Creating a Data Source Using Apache Spark \(p. 72\)](#).

9. (Optional) Choose **Validate connection** to verify your connection information is correct.
10. If the connection validates, choose **Create data source**. If not, correct the connection information and try validating again.
11. Choose one of the following:
 - **Custom SQL**

On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.
 - **Choose tables**

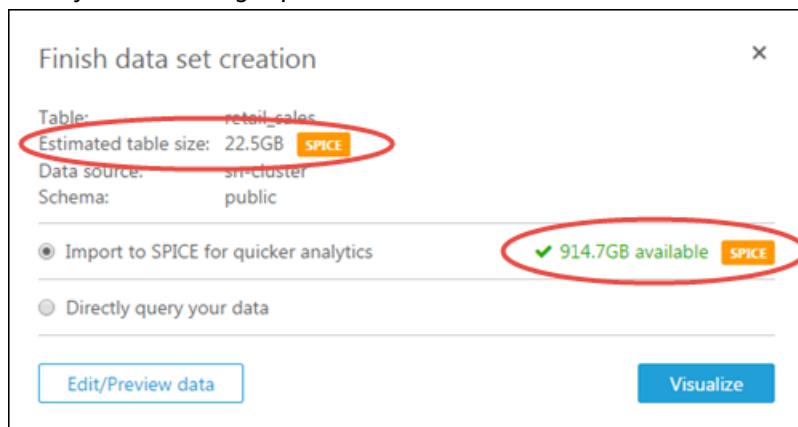
If you prefer to connect to specific tables, for **Schema: contain sets of tables**, choose **Select** and then choose a schema. In some cases where there is only a single schema in the database, that schema is automatically chosen, and the schema selection option isn't displayed.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

Otherwise, after choosing a table, choose **Select**.

12. Choose one of the following options:

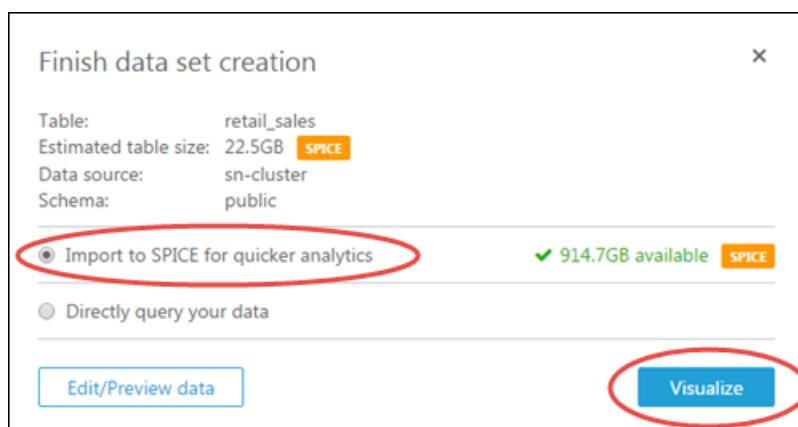
- To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation for the selected table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
- To create a data set and an analysis using the table data as-is, and to import the data set data into SPICE for improved performance (recommended), check the table size and the SPICE indicator to see if you have enough space.



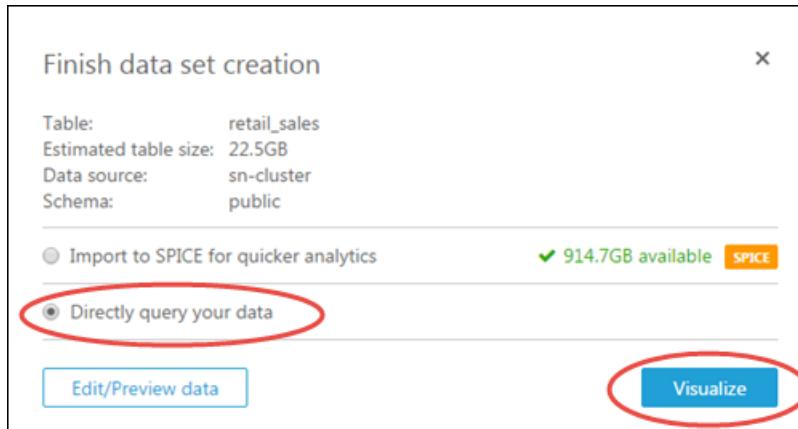
If you have enough SPICE capacity, choose **Import to SPICE for quicker analytics**, and then create an analysis by choosing **Visualize**.

Note

If you want to use SPICE and you don't have enough space, choose **Edit/Preview data**. In data preparation, you can remove fields from the data set to decrease its size, apply a filter, or write a SQL query that reduces the number of rows or columns returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



- To create a data set and an analysis using the table data as-is, and to have the data queried directly from the database, choose the **Directly query your data** option, and then create an analysis by choosing **Visualize**.



Creating a Data Set Using an Existing Data Source

After you make an initial connection to a Salesforce, AWS data store, or other database data source, Amazon QuickSight saves the connection information and adds the data source to the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page. You can use these existing data sources to create new data sets without re-specifying connection information.

Creating a Data Set Using an Existing Amazon S3 Data Source

Use the following procedure to create a data set using an existing Amazon S3 data source.

- On the Amazon QuickSight start page, choose **Manage data**.
- On the **Your Data Sets** page, choose **New data set**.
- In the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page, choose the Amazon S3 data source to use.
- To prepare the data before creating the data set, choose **Edit/Preview data**, to create an analysis using the data as-is, choose **Visualize**.

Creating a Data Set Using an Existing Amazon Athena Data Source

If you want to create a data set using an existing Amazon Athena data source, use the following procedure.

To create a data set using an existing Amazon Athena data source

- On the Amazon QuickSight start page, choose **Manage data**.
- On the **Your Data Sets** page, choose **New data set**.
- In the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page, choose the Athena data source to use.
- Choose **Create data set**.
- Choose one of the following:
 - Custom SQL**

On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and

then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.

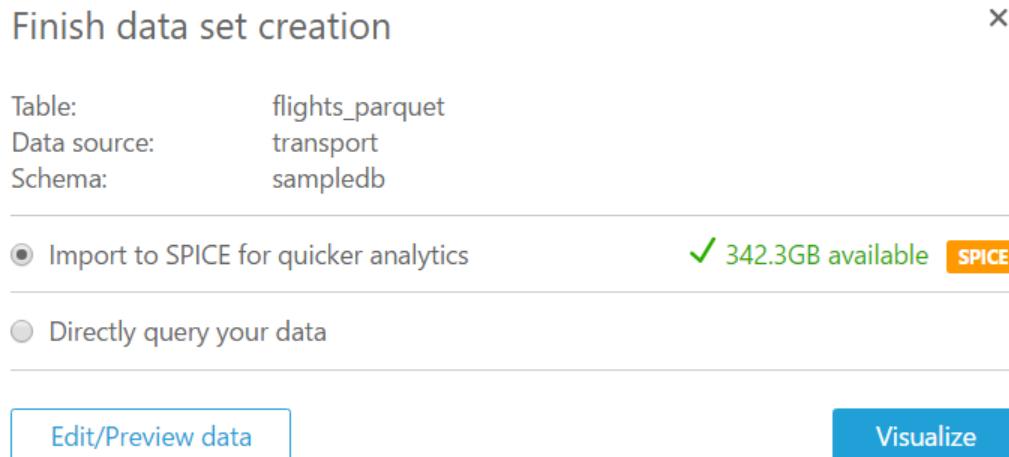
- **Choose tables**

If you prefer to connect to specific tables, for **Schema: contain sets of tables**, choose **Select** and then choose a schema. In some cases where there is only a single schema in the database, that schema is automatically chosen, and the schema selection option isn't displayed.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

Otherwise, after choosing a table, choose **Select**.

6. If you didn't choose to prepare the data in the previous step, the following screen appears.



To load your data into **SPICE** (p. 2), choose **Import to SPICE**. The green indicator shows whether or not you have space available.

Alternatively, you can choose to query your data without using SPICE. To do this, choose **Directly query your data**.

7. After choosing how to query your data, choose one of the following options:

- To prepare the data before creating an analysis, choose **Edit/Preview data** to begin data preparation for the selected table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
- To create a data set and analyze the data using the table as-is, choose **Visualize**.

Create a Data Set Using an Existing Salesforce Data Source

Use the following procedure to create a data set using an existing Salesforce data source.

1. On the Amazon QuickSight start page, choose **Manage data**.
2. On the **Your Data Sets** page, choose **New data set**.
3. In the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page, choose the Salesforce data source to use.

4. Choose **Create Data Set**.
5. Choose one of the following:
 - **Custom SQL**

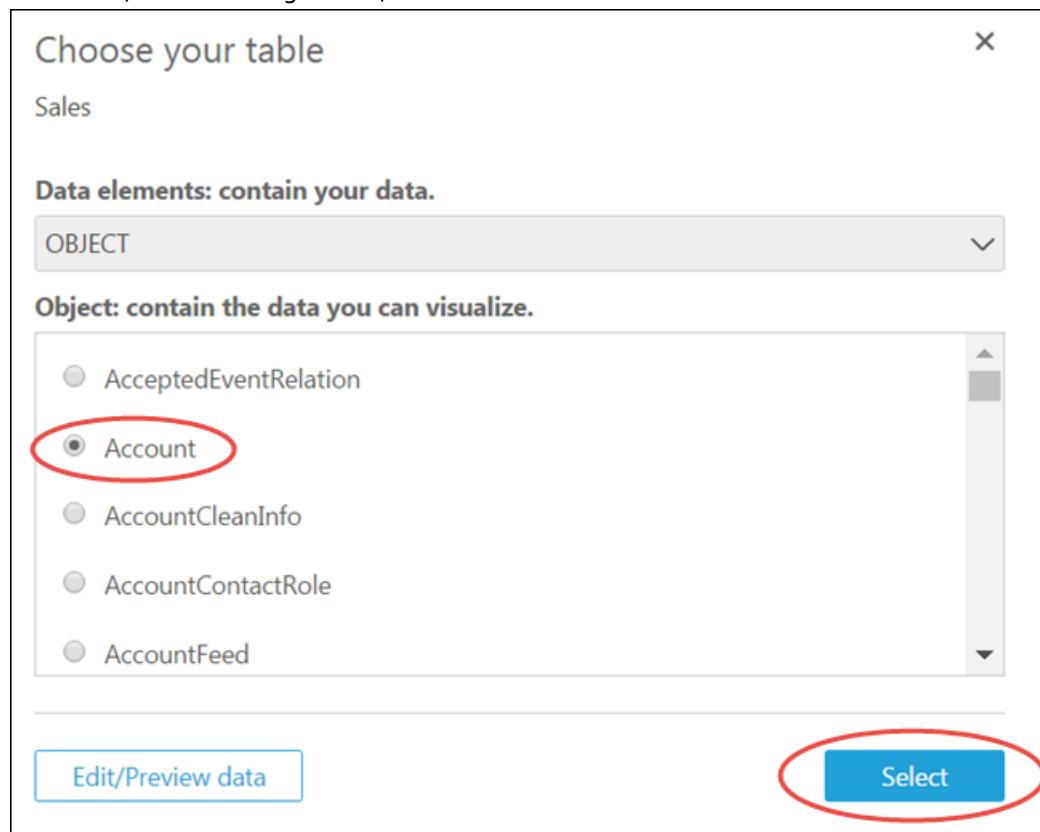
On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.

- **Choose tables**

If you prefer to connect to specific tables, for **Data elements: contain your data**, choose **Select** and then choose either **REPORT** or **OBJECT**.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

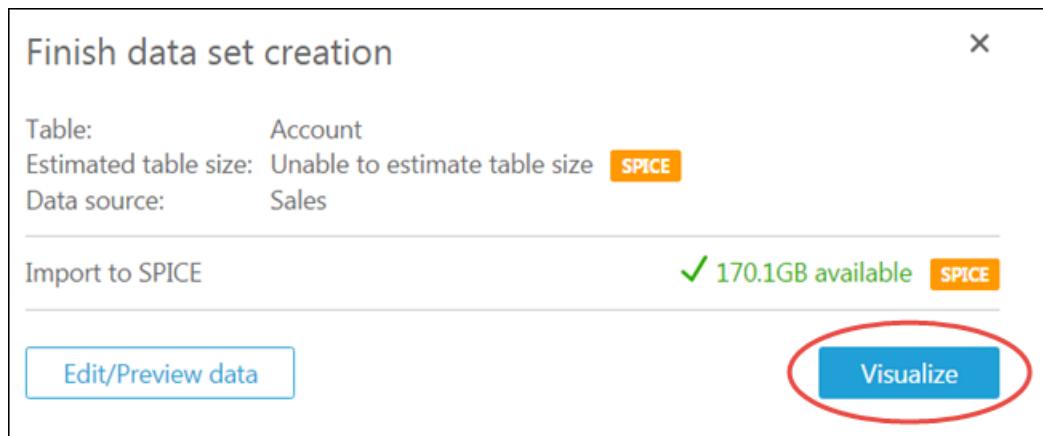
Otherwise, after choosing a table, choose **Select**.



6. On the next screen, choose one of the following options:
 - To create a data set and an analysis using the data as-is, choose **Visualize**.

Note

If you don't have enough **SPICE** (p. 2) capacity, choose **Edit/Preview data**. In data preparation, you can remove fields from the data set to decrease its size or apply a filter that reduces the number of rows returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



- To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation for the selected report or object. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).

Creating a Data Set Using an Existing Database Data Source

Use the following procedure to create a data set using an existing database data source.

1. On the Amazon QuickSight start page, choose **Manage data**.
2. On the **Your Data Sets** page, choose **New data set**.
3. In the **FROM EXISTING DATA SOURCES** section of the **Create a Data Set** page, choose the database data source to use, and then choose **Create Data Set**.
4. Choose one of the following:
 - **Custom SQL**

On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.

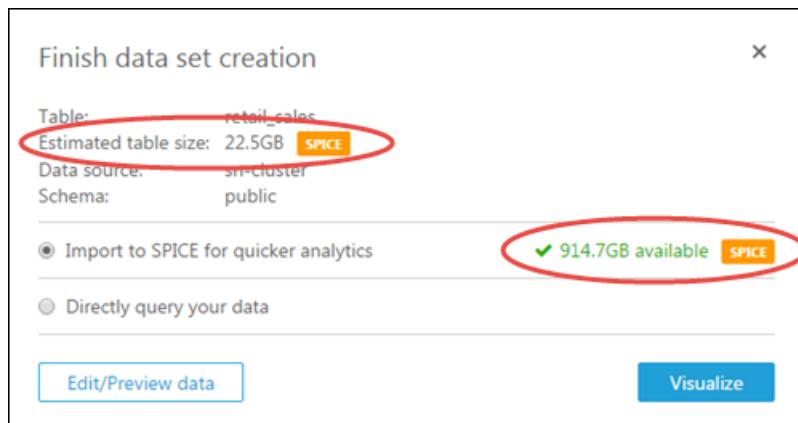
• **Choose tables**

If you prefer to connect to specific tables, for **Schema: contain sets of tables**, choose **Select** and then choose a schema. In some cases where there is only a single schema in the database, that schema is automatically chosen, and the schema selection option isn't displayed.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

Otherwise, after choosing a table, choose **Select**.

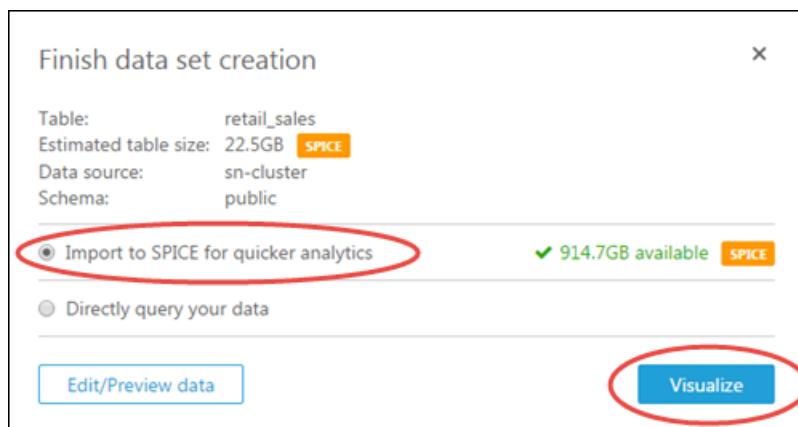
5. Choose one of the following options:
 - To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation for the selected table. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).
 - To create a data set and an analysis using the table data as-is, and to import the data set data into **SPICE (p. 2)** for improved performance (recommended), check the SPICE indicator to see if you have enough space.



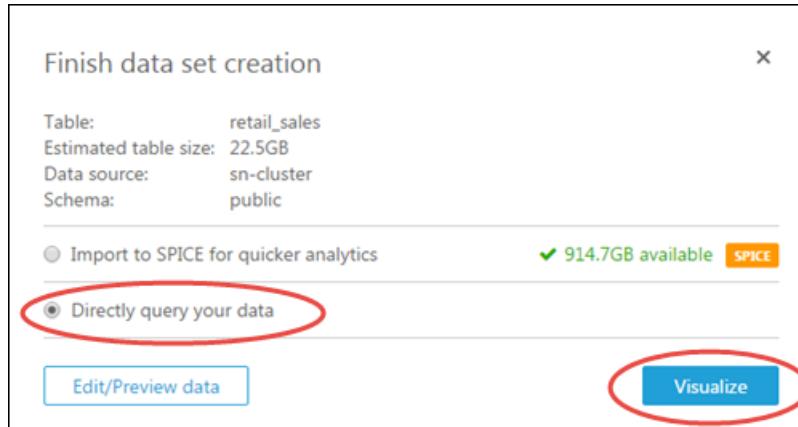
If you have enough SPICE capacity, choose **Import to SPICE for quicker analytics**, and then create an analysis by choosing **Visualize**.

Note

If you want to use SPICE and you don't have enough space, choose **Edit/Preview data**. In data preparation, you can remove fields from the data set to decrease its size, apply a filter, or write a SQL query that reduces the number of rows or columns returned. For more information about data preparation, see [Preparing Data Sets \(p. 125\)](#).



- To create a data set and an analysis using the table data as-is, and to have the data queried directly from the database, choose the **Directly query your data** option, and then create an analysis by choosing **Visualize**.



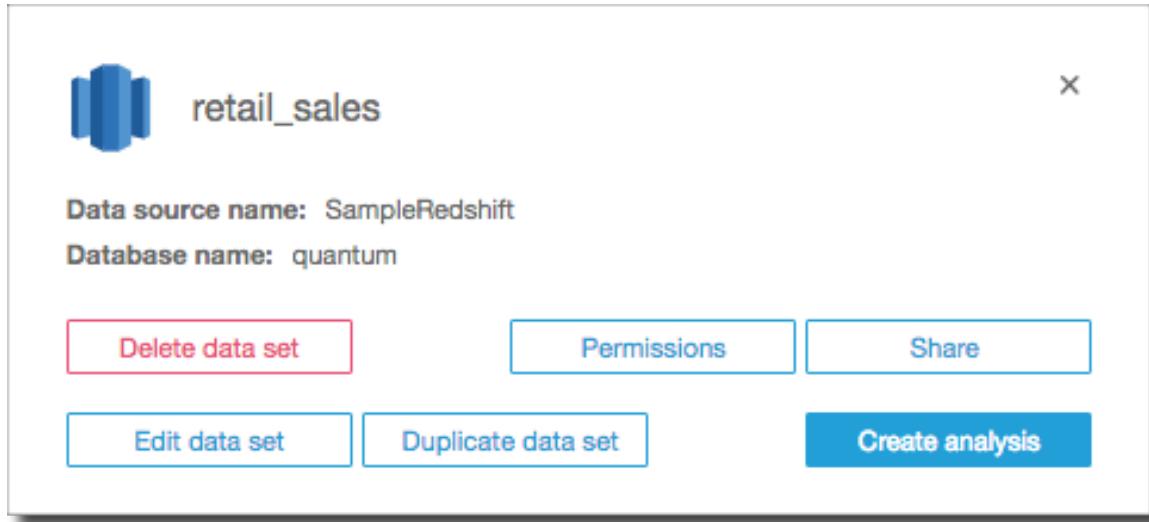
Editing a Data Set

You can edit an existing data set to perform data preparation. For more information about Amazon QuickSight data preparation functionality, see [Preparing Data \(p. 125\)](#).

You can open a data set for editing from the **Your Data Sets** page, or from the analysis page. Editing a data set from either location modifies the data set for all analyses that use it.

Editing a Data Set from the Your Data Sets Page

To edit a data set from the **Your Data Sets** page, choose the data set, and then choose **Edit Data Set**. The data set opens in the data preparation page.

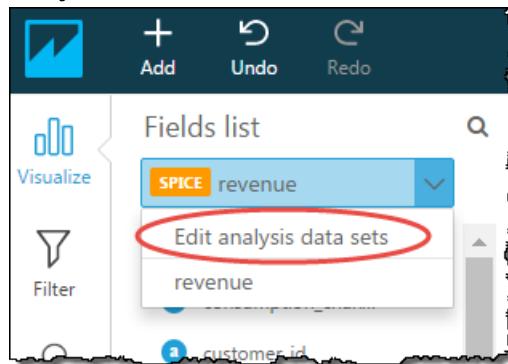


If you want to create a copy of the data set, choose **Duplicate data set**, and type a name for the copy.

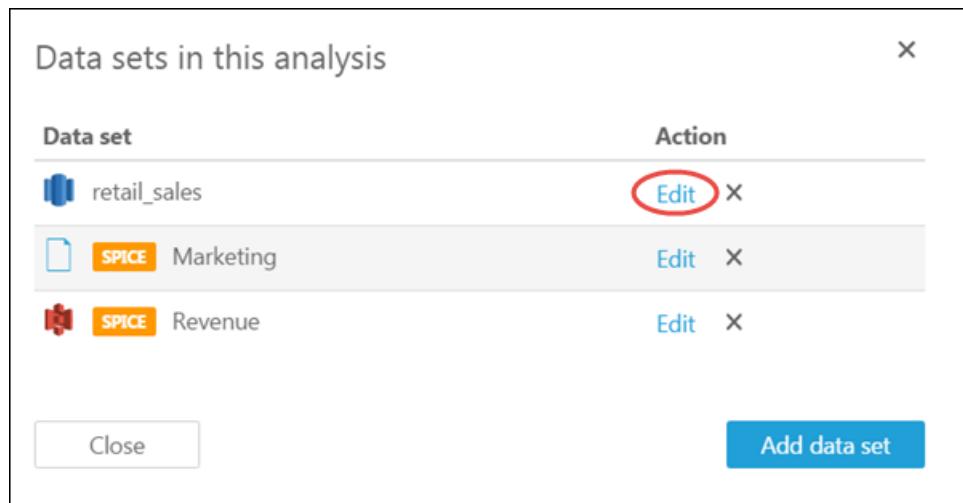
Editing a Data Set from the Analysis Page

Use the following procedure to edit a data set from the analysis page.

1. On the analysis page, choose the data set list at the top of the **Fields list** pane and then choose **Edit analysis data sets**.



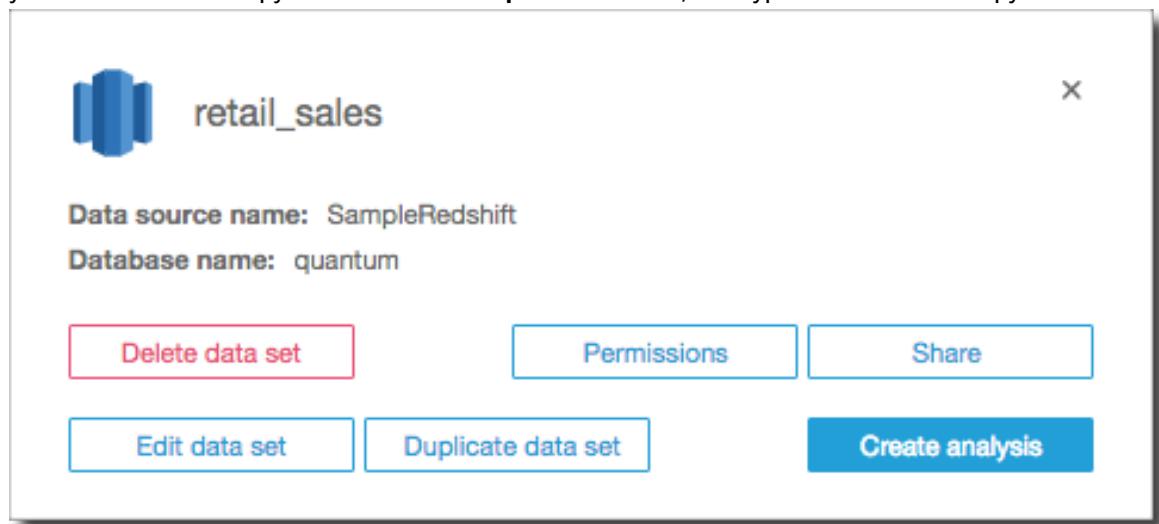
2. In **Data sets in this analysis**, choose the data set you want to edit, and then choose **Edit**. The data set opens in the data preparation page.



Duplicating a Data Set

You can duplicate an existing data set to save a copy of it with a new name. The new data set is a completely separate copy.

If you want to create a copy of the data set, open the **Your Data Sets** page and choose the data set that you want to make a copy of. Then choose **Duplicate data set**, and type a name for the copy.



Refreshing Data

You can refresh your [SPICE \(p. 2\)](#) data sets at any time. Refreshing imports the data into SPICE again, so the data includes any changes since the last import.

You can refresh SPICE data by taking any of the following approaches:

- You can use the options on the **Your Data Sets** page.
- You can refresh a data set during data preparation.
- You can schedule refreshes of the data.

In the following sections, you can find an explanation of each approach.

Topics

- Refreshing a Data Set from the Your Data Sets Page (p. 108)
- Refreshing a Data Set During Data Preparation (p. 109)
- Refreshing a Data Set on a Schedule (p. 111)

For data that is not stored in SPICE, you can do the following:

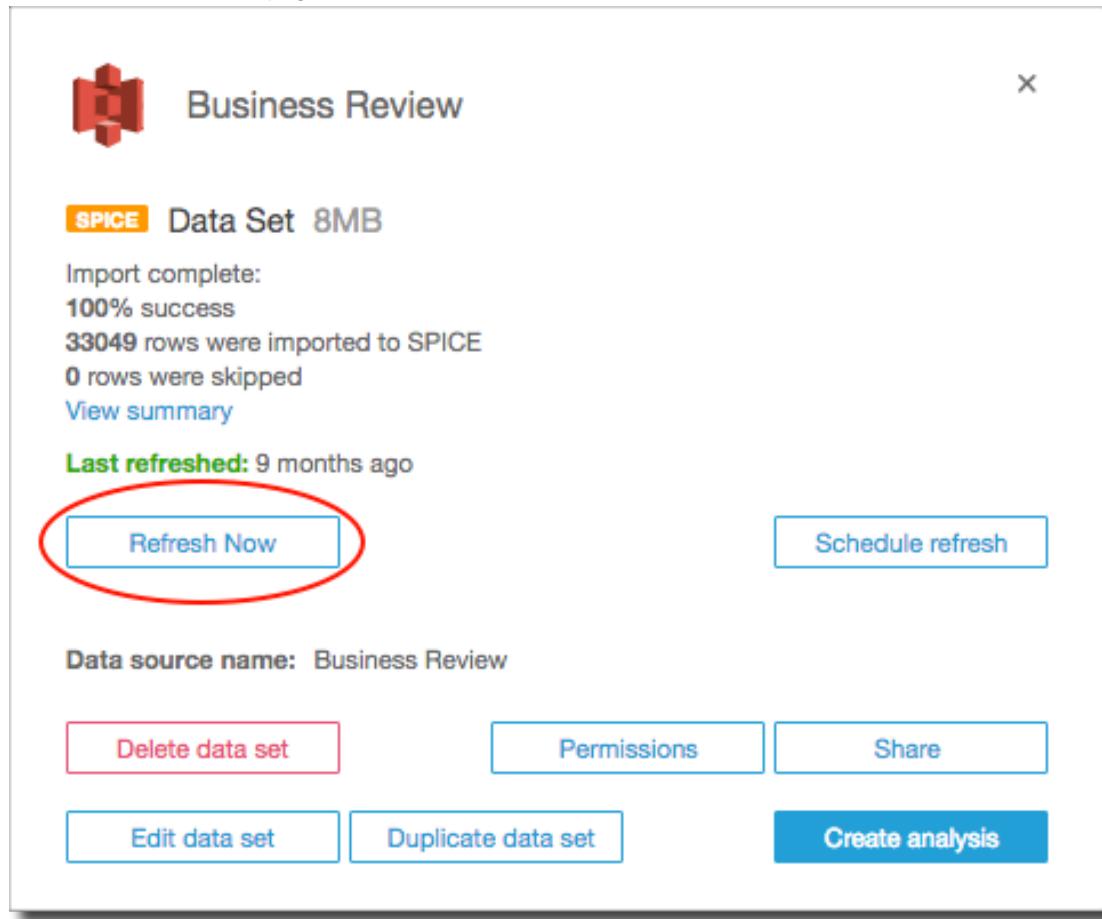
- To refresh file-based data, you must delete and recreate the data set.
- To refresh data from a database, reopen your data set or the visualization you created.

Refreshing a Data Set from the Your Data Sets Page

Use the following procedure to refresh a SPICE (p. 2) data set based on an Amazon S3 or database data source on the **Your Data Sets** page.

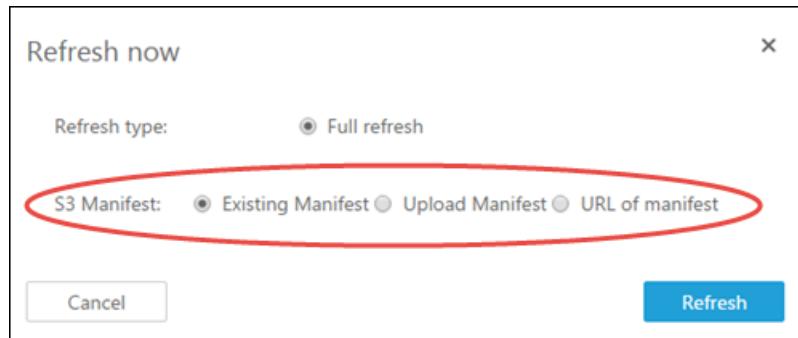
To refresh SPICE data from the Your Data Sets page

1. On the **Your Data Sets** page, choose the data set, and then choose **Refresh Now**.



2. Leave the refresh type as **Full refresh**.
3. If you are refreshing an Amazon S3 data set, choose one of the following options for **S3 Manifest**:

- To use the same manifest file you last provided to Amazon QuickSight, choose **Existing Manifest**. If you have changed the manifest file at the file location or URL that you last provided, the data returned reflects those changes.
- To specify a new manifest file by uploading it from your local network, choose **Upload Manifest**, and then choose **Upload manifest file**. For **Open**, choose a file, and then choose **Open**.
- To specify a new manifest file by providing a URL, type the URL of the manifest in **Input manifest URL**. You can find the manifest file URL in the Amazon S3 console by opening the context (right-click) menu for the manifest file, choosing **Properties**, and looking at the **Link** box.



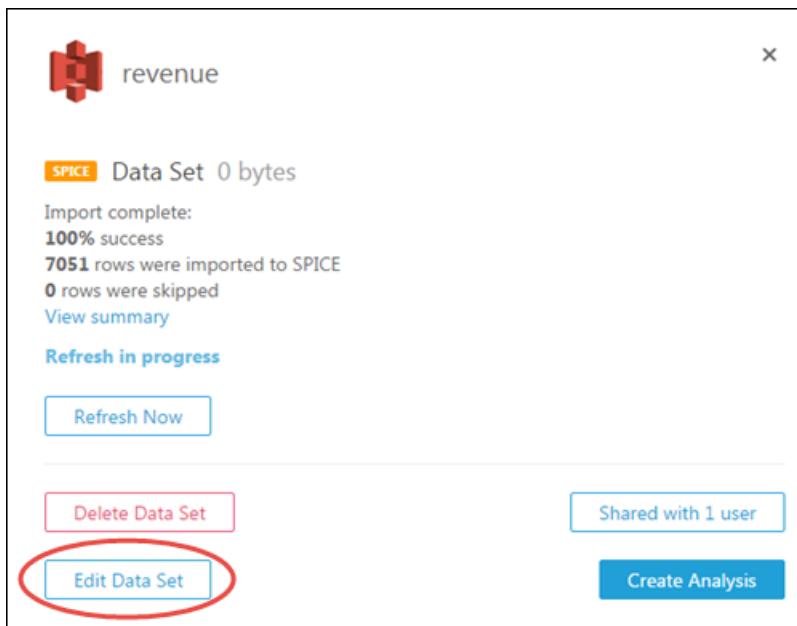
4. Choose **Refresh**.
5. If you are refreshing an Amazon S3 data set, choose **OK**, then **OK** again.
If you are refreshing a database data set, choose **OK**.

Refreshing a Data Set During Data Preparation

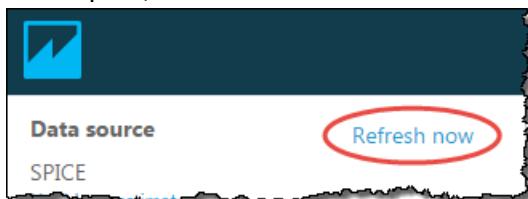
Use the following procedure to refresh a [SPICE \(p. 2\)](#) data set based on an Amazon S3 or database data source during data preparation.

To refresh SPICE data during data preparation

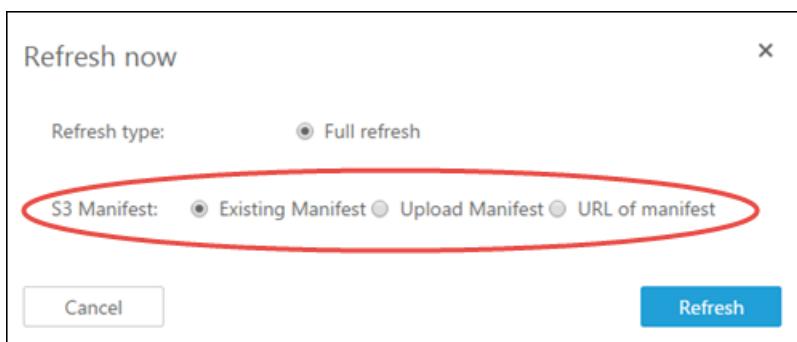
1. On the **Your Data Sets** page, choose the data set, and then choose **Edit Data Set**.



2. On the pane, choose **Refresh now**.



3. Leave the refresh type as **Full refresh**.
4. If you are refreshing an Amazon S3 data set, choose one of the following options for **S3 Manifest**:
 - To use the same manifest file you last provided to Amazon QuickSight, choose **Existing Manifest**. If you have changed the manifest file at the file location or URL that you last provided, the data returned reflects those changes.
 - To specify a new manifest file by uploading it from your local network, choose **Upload Manifest**, and then choose **Upload manifest file**. For **Open**, choose a file, and then choose **Open**.
 - To specify a new manifest file by providing a URL, type the URL of the manifest in **Input manifest URL**. You can find the manifest file URL in the Amazon S3 console by opening the context (right-click) menu for the manifest file, choosing **Properties**, and looking at the **Link** box.



5. Choose **Refresh**.

6. If you are refreshing an Amazon S3 data set, choose **OK**, then **OK** again.

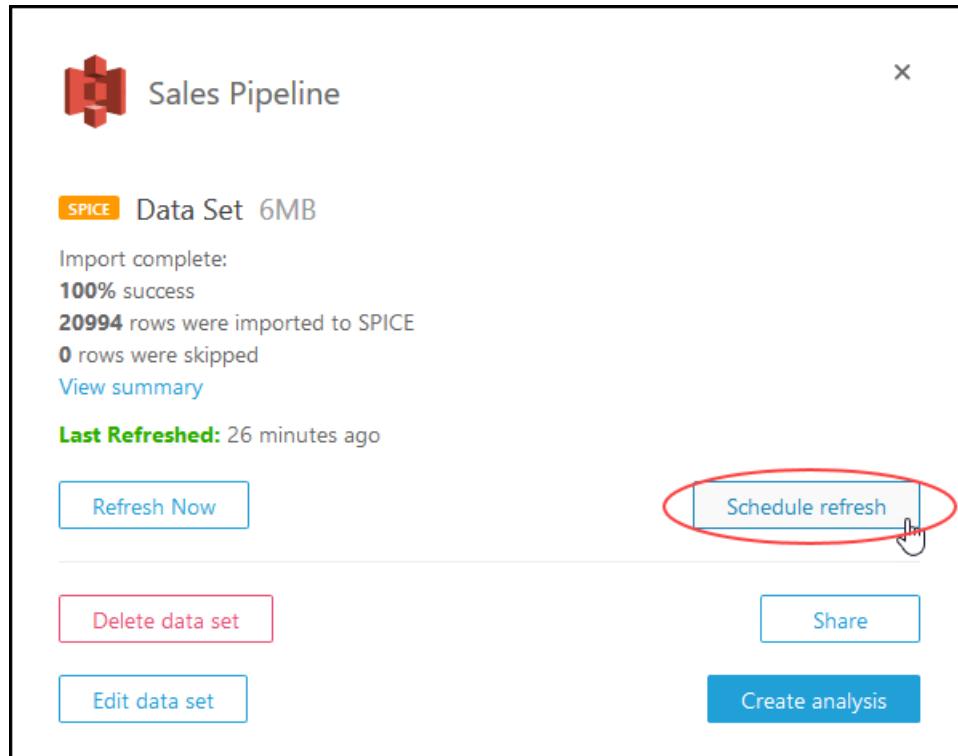
If you are refreshing a database data set, choose **OK**.

Refreshing a Data Set on a Schedule

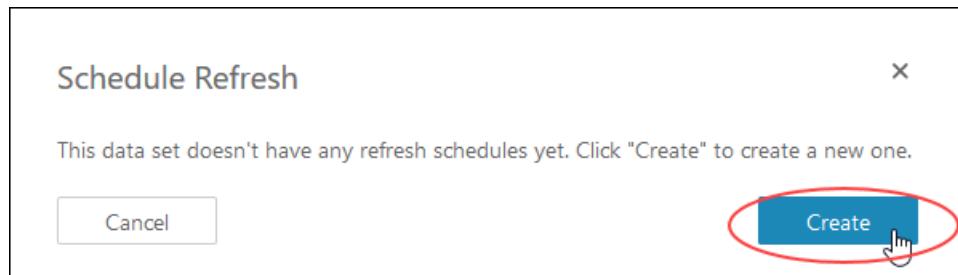
Use the following procedure to schedule refreshing the data. If your data set is based on a direct query and not stored in [SPICE \(p. 2\)](#), you can refresh your data by opening the data set or refreshing the page in an analysis or dashboard.

To refresh [SPICE \(p. 2\)](#) data on a schedule

1. On the [Your Data Sets](#) page, choose the data set, and then choose **Schedule refresh**.



2. For **Schedule Refresh**, choose **Create**.

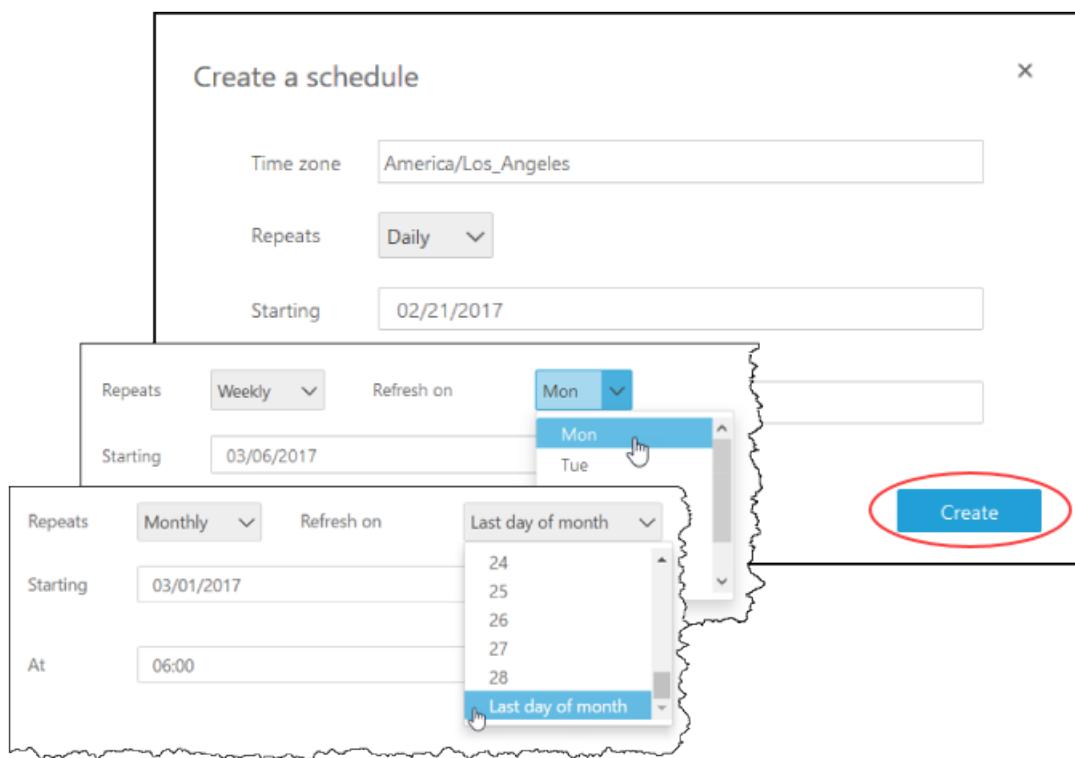


3. On the **Create a Schedule** screen, choose settings for your schedule.
 - a. **Time zone:** Choose the time zone that applies to the data refresh.
 - b. **For Repeats:** Choose one of the following:
 - For Standard or Enterprise editions, you can choose **Daily**, **Weekly**, or **Monthly**.

- **Daily:** Repeats every day
- **Weekly:** Repeats on the same day of each week
- **Monthly:** Repeats on the same day number of each month. To refresh data on the 29th, 30th or 31st day of the month, choose **Last day of month** from the list.
- For Enterprise edition only, you can choose **Hourly**. This setting refreshes your data set every hour, beginning at the time you choose. So, if you select 1:05 as the starting time, the data refreshes at five minutes after the hour, every hour.

If you decide to use an hourly refresh, you can't also use additional refresh schedules. To create an hourly schedule you must remove any other existing schedules for that data set; and you must remove any existing hourly schedule before you can create a daily, weekly, or monthly schedule.

- c. **Starting:** Choose a date for the refresh to start.
- d. **At:** Specify the time that the refresh should start. Use HH:MM and 24-hour format, for example 13:30.



4. Choose **Create**.

You can create five schedules for each data set. When you have created five, the **Create** button is disabled.

Changing a Data Set

In two situations, changes to a data set might cause concern. One is if you deliberately edit the data set. The other is if your data source has changed so much that it affects the analyses based on it.

Important

Analyses that are in production usage should be protected so they continue to function correctly.

We recommend the following when you're dealing with data changes:

- Document your data sources and data sets, and the visuals that rely upon them. Documentation should include screenshots, fields used, placement in field wells, filters, sorts, calculations, colors, formatting, and so on. Record everything that you need to recreate the visual.
- When you edit a data set, try not to make changes that might break existing visuals. For example, don't remove columns that are being used in a visual. If you must remove a column, create a calculated column in its place. The replacement column should have the same name and data type as the original.
- If your data source or data set changes in your source database, adapt your visual to accommodate the change, as described previously. Or you can try to adapt the source database. For example, you might create a view of the source table (document). Then if the table changes, you can adjust the view to include or exclude columns (attributes), change data types, fill null values, and so on. Or, in another circumstance, if your data set is based on a slow SQL query, you might create a table to hold the results of the query.

If you can't sufficiently adapt the source of the data, recreate the visuals based on your documentation of the analysis.

- If you no longer have access to a data source, your analyses based on that source are empty. The visuals you created still exist, but they can't display until they have some data to show. This result can happen if permissions are changed by your administrator.
- If you remove the data set a visual is based on, you might need to recreate it from your documentation. You can edit the visual and select a new data set to use with it. If you need to consistently use a new file to replace an older one, store your data in a location that is consistently available. For example, you might store your .csv file in S3 and create an S3 data set to use for your visuals. For more information on access files stored in S3, see [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).

Alternatively, you can import the data into a table, and base your visual on a query. This way, the data structures don't change, even if the data contained in them changes.

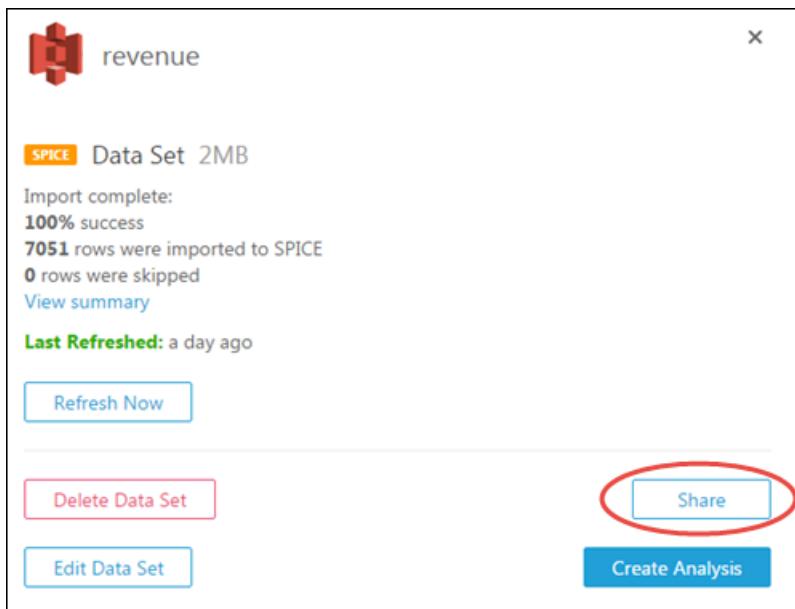
Sharing Data Sets

You can give other Amazon QuickSight users and groups access to a data set by sharing it with them. Then they can create analyses from it. If you make them co-owners, they can also refresh, edit, delete, or reshare the data set.

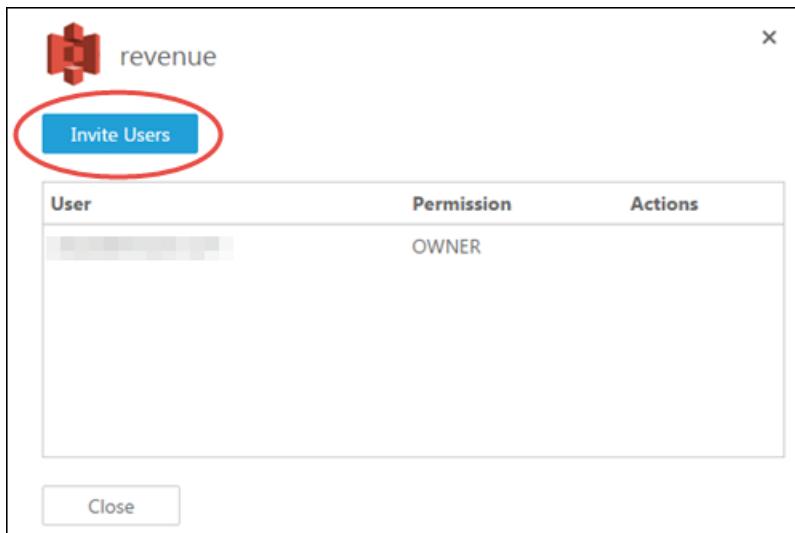
Sharing a Data Set

Use the following procedure to share a data set.

1. On the **Your Data Sets** page, choose the data set, and then choose **Share** (if this data set hasn't been shared with anyone) or **Shared with <X> users** (if the data set has been shared with others).

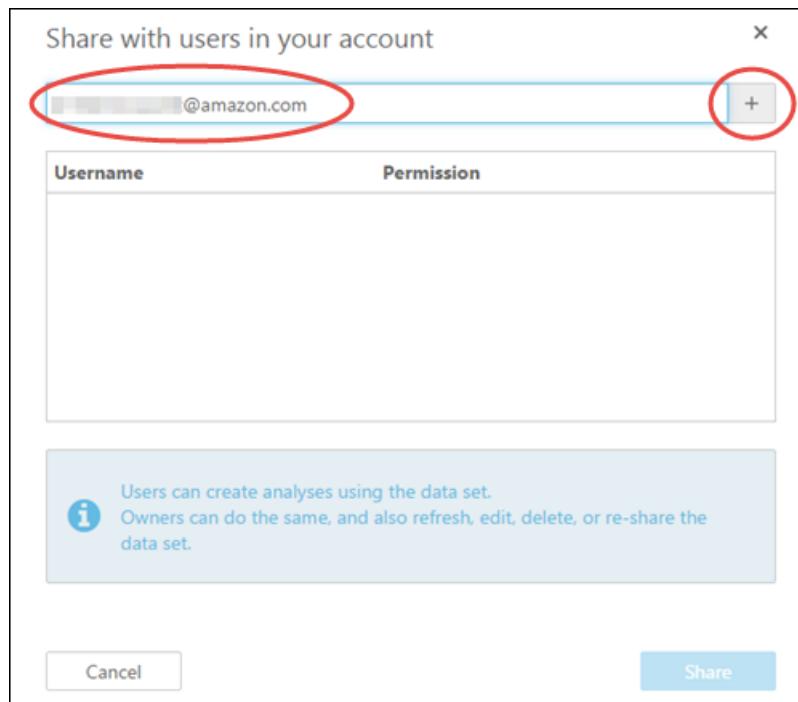


2. Choose **Invite Users**.



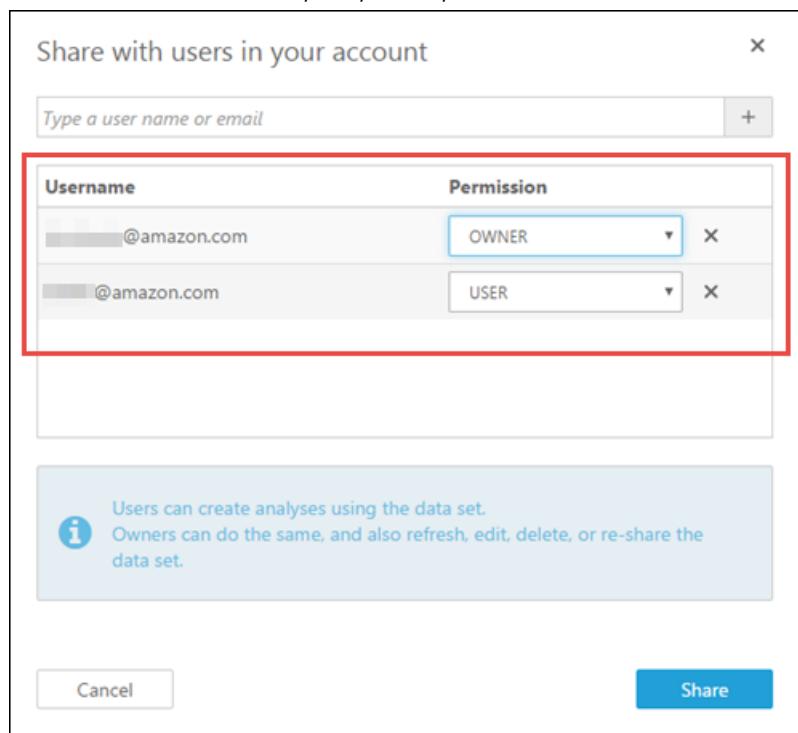
3. Type in user or group you want to share this data set with. Then choose the add icon. You can only invite users who belong to the same Amazon QuickSight account.

Repeat this step until you have entered information for everyone you want to share the data set with.



4. For **Permission**, choose the role for each user or group, to give them permissions on the data set.

Choose **User** to allow the user to create analyses from the data set. Choose **Owner** to allow the user to do that and also refresh, edit, delete, and re-share the data set.



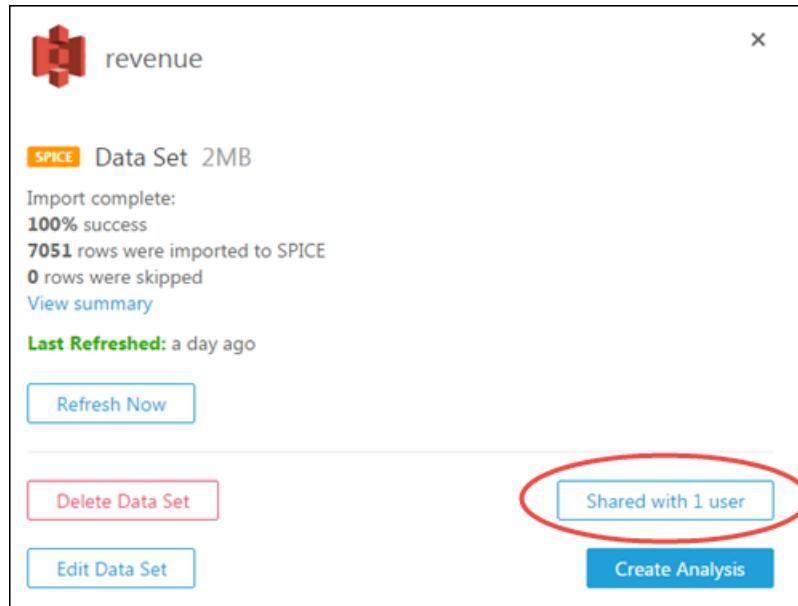
5. Choose **Share**.

Users receive emails with a link to the data set. Groups don't receive invitation emails.

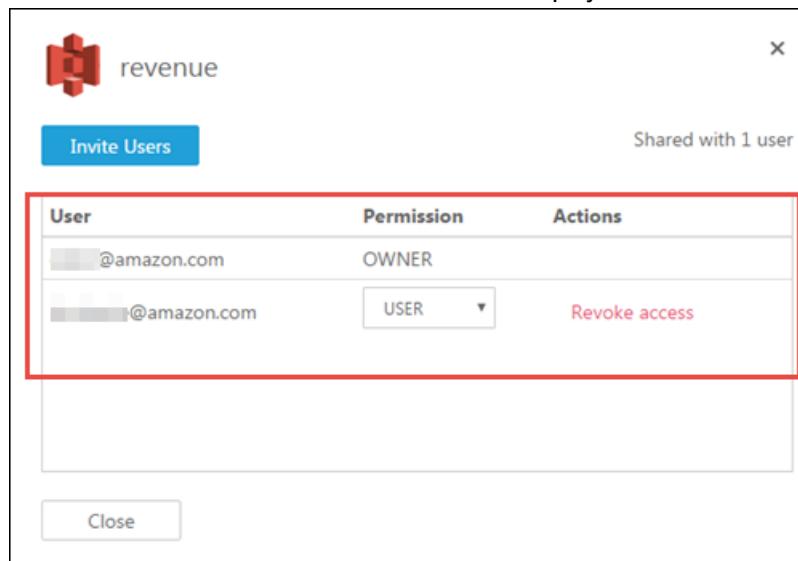
Viewing and Editing the Permissions of Users That a Data Set Is Shared With

If you have Owner permissions on a data set, you can use the following procedure to view, edit, or change user access to it.

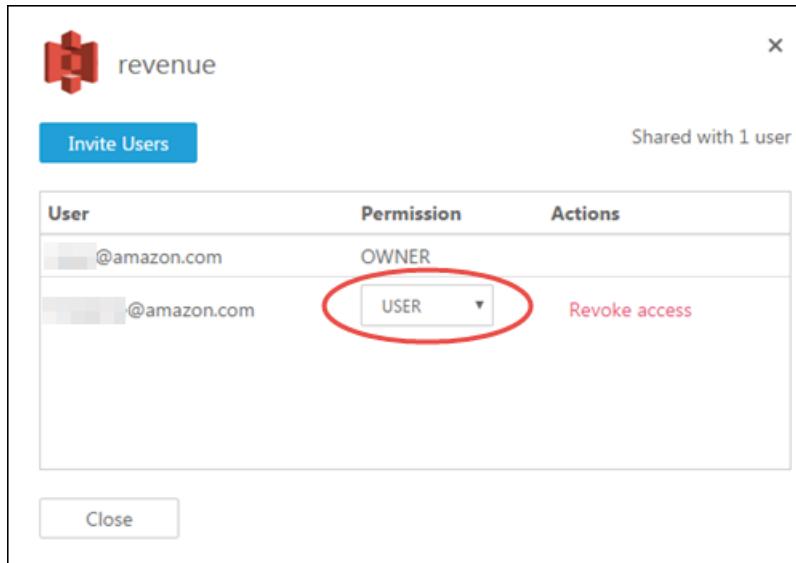
1. On the **Your Data Sets** page, choose the data set, and then choose **Share** (if this data set hasn't been shared with anyone) or **Shared with <X> users** (if the data set has been shared with others).



A list of all users with access to the data set is displayed.



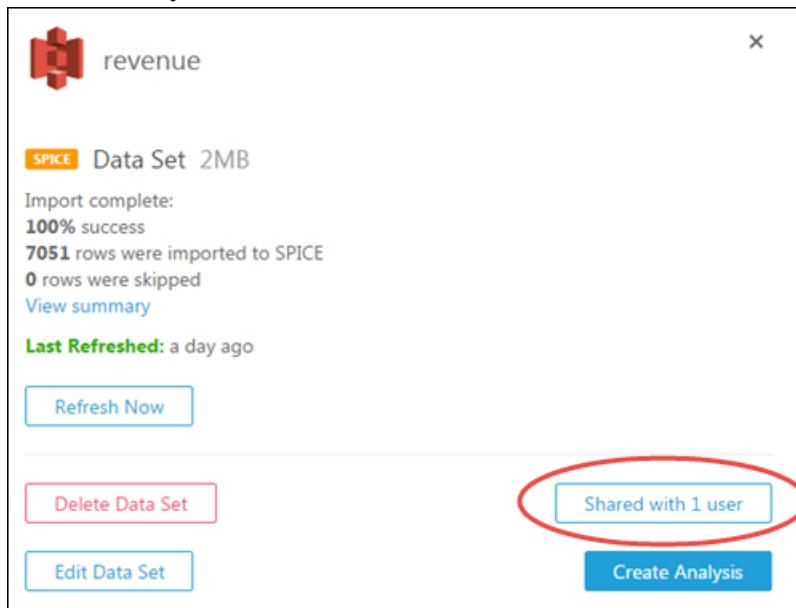
2. (Optional) To change roles, choose the field in the **Permission** column next to the user or group. Then choose either **User** or **Owner**.



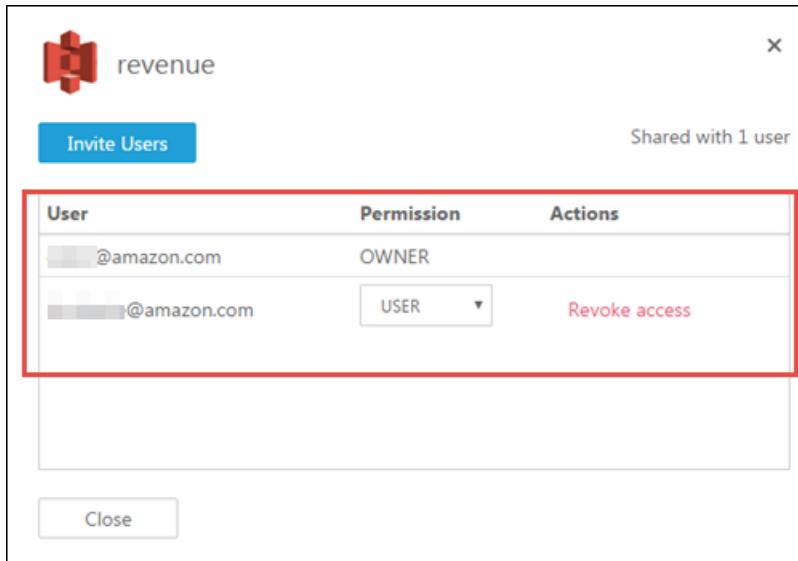
Revoking Access to a Data Set

If you have Owner permissions on a data set, you can use the following procedure to revoke user access to a data set.

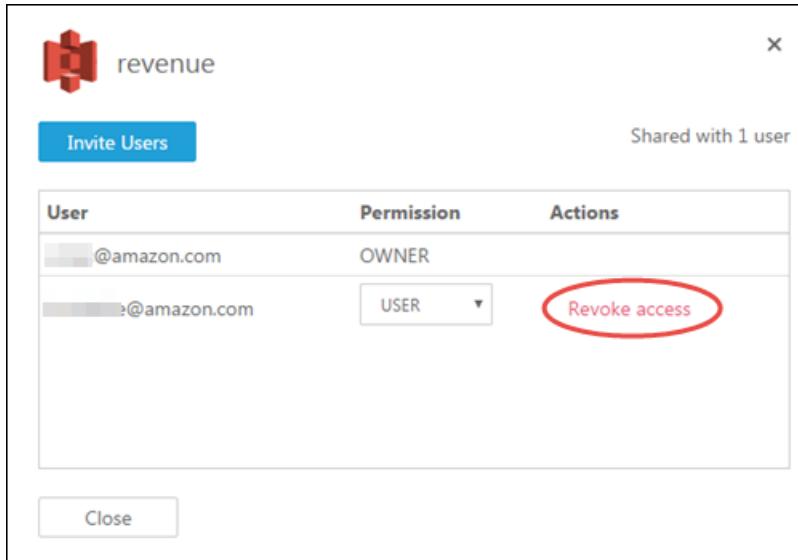
1. On the **Your Data Sets** page, choose the data set, and then choose **Share** (if this data set hasn't been shared with anyone) or **Shared with <X> users** (if the data set has been shared with others).



A list of all users with access to the data set is displayed.



2. In the **Actions** column for the user, choose **Revoke access**.



Restricting Access to a Data Set by Using Row-Level Security

In the Enterprise edition of Amazon QuickSight, you can restrict access to a data set by configuring row-level security on it. You can do this before or after you have shared the data set. Only the people you shared with can see any of the data. By adding row-level security, you can further control their access.

To do this, you create a query or file that has one column named `UserName`, `GroupName`, or both. You can also think of this as *adding a rule* for that user or group. Then you can add one column to the query or file for each field that you want to grant or restrict access to. For each user or group name that you add, you add the values for each field. You can use `NULL` (no value) to mean all values. To see examples of data set rules, see [Creating Data Set Rules for Row-Level Security \(p. 119\)](#).

To apply the data set rules, you add the rules as a permissions data set to your data set. Then you choose to explicitly allow or deny access based on the data set rules. Allowing access is the default. Keep in mind these points when you allow and deny access:

- The permissions data set can't contain duplicate values. Duplicates are ignored when evaluating how to apply the rules.
- If you use the rules to *grant access*, each user or group specified can see only the rows that *match* the field values in the data set rules.
- If you add a rule for a user or group and leave all the other columns with no value (NULL), you grant them access to all the data.
- If you don't add a rule for a user or group, that user or group can't see any of the data.
- If you use the rules to *deny access*, each user or group specified can see only the rows that *don't match* the field values in the data set rules.
- If you add a rule for a user or group and leave all the other columns with no value (NULL), you deny the user or group access to all the data.
- If you don't add a rule for a user or group, they are denied nothing—in other words, they can see all the data.

Amazon QuickSight treats spaces as literal values. If you have a space in a field that you are restricting, the data set rule applies to those rows. Amazon QuickSight treats both NULLs and blanks (empty strings "") as "no value". A NULL is an empty field value.

Depending on what data source your data set is coming from, you can configure a direct query to access a table of permissions. Terms with spaces inside them don't need to be delimited with quotes. If you use a direct query, you can easily change the query in the original data source.

Alternatively, you can upload data set rules from a text file or spreadsheet. If you are using a comma-separated value (CSV) file, don't include any spaces on the given line. Terms with spaces inside them need to be delimited with quotes. If you use data set rules that are file-based, apply any changes by overwriting the existing rules in the data set's permissions settings.

Data sets that are restricted are marked with the word **RESTRICTED** in the **Your Data Sets** screen.

Row-level security only works for fields containing textual data (string, char, varchar, and so on). It doesn't currently work for dates or numeric fields.

Creating Data Set Rules for Row-Level Security

Use the following procedure to create a permissions files or query to use as data set rules.

1. Create a file or a query that contains the data set rules (permissions).

It doesn't matter what order the fields are in. However, all the fields are case-sensitive. They must exactly match the field names and values.

The structure should look similar to the following.

| UserName | Region | Segment |
|-------------------|--------|--------------------------|
| AlejandroRosalez | EMEA | Enterprise, SMB, Startup |
| MarthaRivera | US | Enterprise |
| NikhilJayashankar | US | SMB, Startup |

| UserName | Region | Segment |
|-----------------------|--------|---------------------|
| PauloSantos | US | Startup |
| SaanviSarkar | APAC | Enterprise, SMB |
| sales-tps@example.com | | |
| ZhangWei | APAC | Enterprise, Startup |

Alternatively, if you prefer to use a .csv file, the structure should look similar to the following.

```
UserName,Region,Segment
AlejandroRosalez,EMEA,"Enterprise,SMB,Startup"
MarthaRivera,US,Enterprise
NikhilJayashankars,US,SMB
PauloSantos,US,Startup
SaanviSarkar,APAC,"SMB,Startup"
sales-tps@example.com,"",""
ZhangWei,APAC,"Enterprise,Startup"
```

Following is a SQL example.

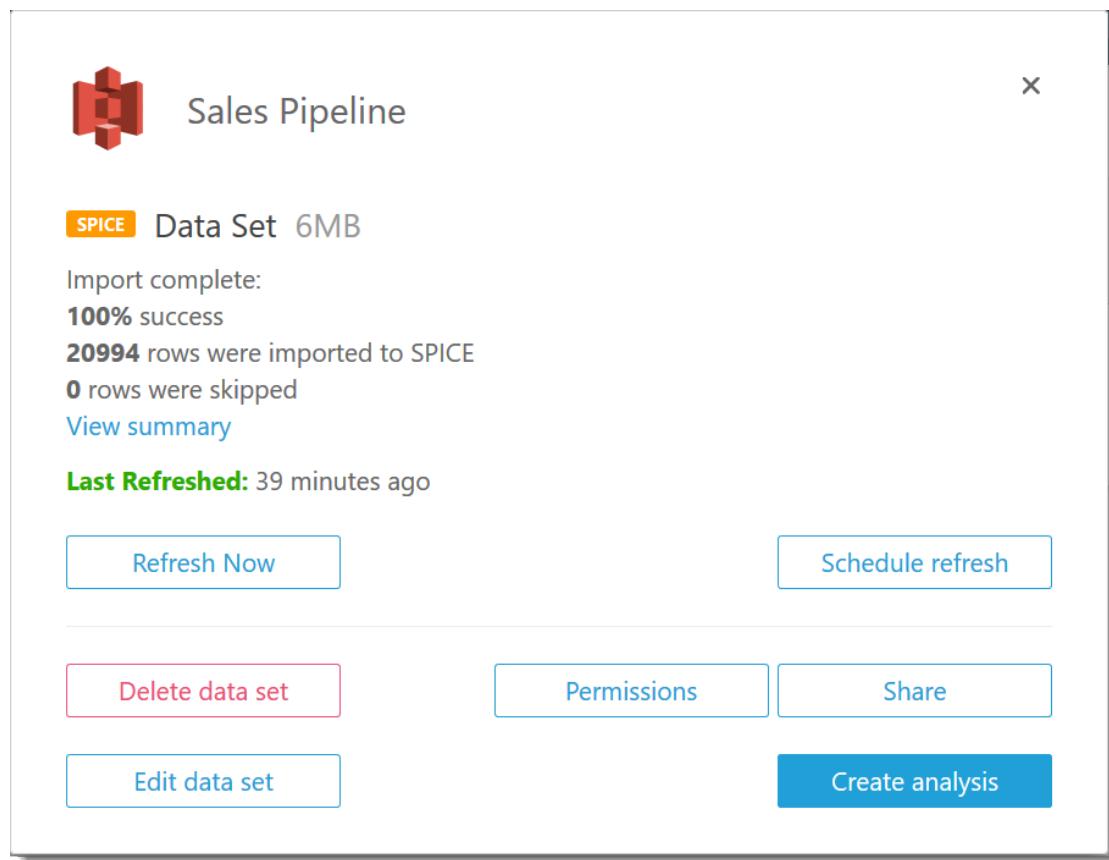
```
select User as UserName, Region, Segment
from tps-permissions
```

2. Create a data set for the data set rules. To make sure you can easily find it, give it a meaningful name, for example "Permissions-Sales-Pipeline".

Creating Row-Level Security

Use the following procedure to apply row-level permissions by using a file or query that contains data set rules.

1. Confirm that you have added your rules as a new data set. If you added them, but don't see them under the list of data sets, refresh the screen.
2. On the **Your Data Sets** page, choose the data set, and then choose **Permissions**.



3. From the list of data sets, choose your permissions data set.

The screenshot shows the 'Selected data set rules' dialog box for the 'Sales Pipeline' data set. At the top, there is a red cube icon and the text 'Sales Pipeline'. Below that, it says 'Selected data set rules' and 'None'. A list of data sets follows, with the first item, 'Permissions-Sales-Pipeline', selected (indicated by a filled circle). The other items are represented by an empty circle and a red cube icon:

- Permissions-Sales-Pipeline
- Business Review
- QuickSightSamples-Revenue
- Web and Social Media Analytics
- People Overview
- SalesPipeline_QuickSightSample
- QuickSightSamples.xlsx

Below the list, the text 'Permissions Policy:' is followed by two radio button options:

- Grant access to data set
- Deny access to data set

At the bottom of the dialog box are three buttons: 'Back' (disabled), 'Remove data set' (disabled), and 'Apply data set' (highlighted in blue).

If your permissions data set doesn't appear on this screen, return to your data sets, and refresh the page.

4. Choose the permissions policy. There are two choices:

- To use the data set rules to allow access to the data, choose **Grant access to data set**.
- To use the data set rules to prevent access to the data, choose **Deny access to data set**.

Each data set has only one active permissions data set. If you try to add a second permissions data set, it overwrites the existing one.

Important

Some restrictions apply to NULL and empty string values when working with row-level security.

If your data set has NULL values or empty strings ("") in the restricted fields, these rows are ignored when the restrictions are applied.

Inside the permissions data set, NULL values and empty strings are treated the same. For more information, see the following table.

| Rules for UserName, Region, Segment | Result If You Grant Access | Result If You Deny Access |
|--|--|--|
| AlejandroRosalez,EMEA,"Enterprise,SMB, Startup 'EMEA Enterprise, SMB, and Startup | Sees all EMEA Enterprise, SMB, and Startup | Doesn't see EMEA Enterprise, SMB, or Startup |
| sales-tps@example.com,"","","" | Sees all rows | Sees no rows |
| User has no entry | Sees no rows | Sees all rows |

Anyone you shared your dashboard with can see all the data in it, unless the data set is restricted by data set rules.

There are two ways to create a super user. If you use your permissions data set to grant access, list all possible values for each field for that user. Alternatively, if you use your permissions data set to deny access, leave the values blank for all restricted fields for that user. In either case, a user configured this way can see all values.

5. To save your changes, choose **Apply data set**. Then, on the **Confirm: saving data set rules** screen, choose **Apply data set**. Changes in permissions apply immediately to existing users.
6. (Optional) To remove permissions, first remove the data set rules from the data set.

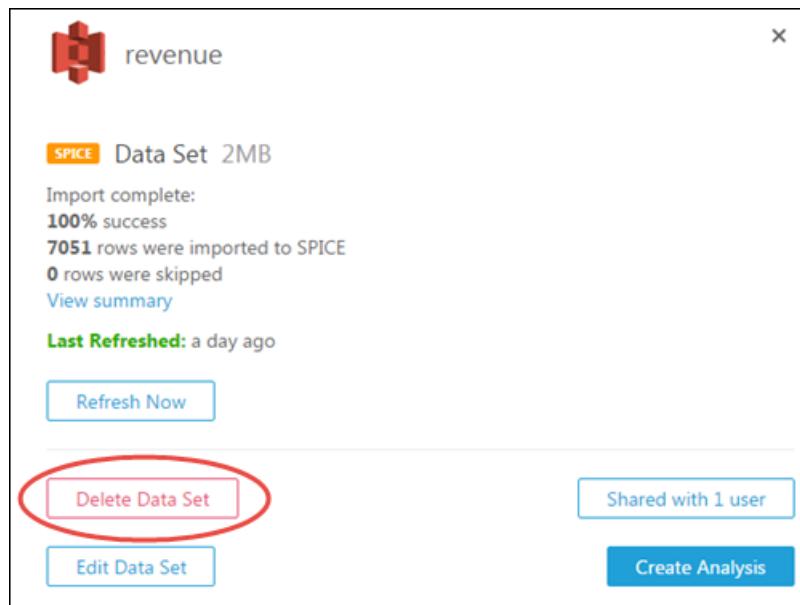
Make certain the data set rules are removed. Then, choose the permissions data set and choose **Remove data set**.

To overwrite permissions, choose a new permissions data set and apply it. You can reuse the same data set name, but you need to apply the new permissions in the **Permissions** screen to make these permissions active. SQL queries dynamically update, so these can be managed outside of Amazon QuickSight. In this case, permissions refresh when the direct query cache is automatically refreshed.

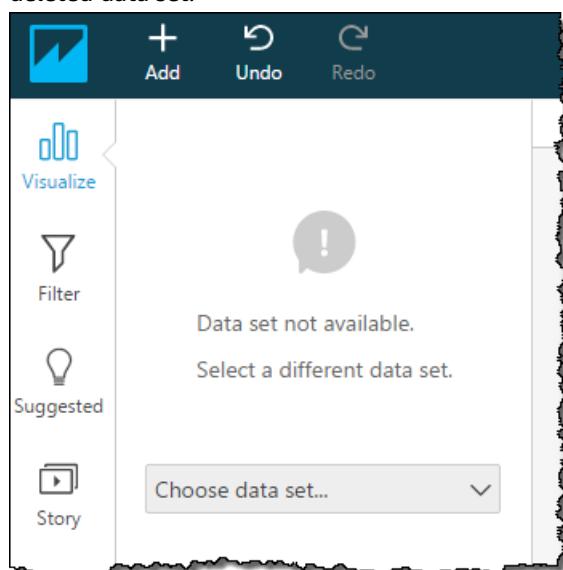
If you delete a file-based permissions data set before you remove it from the target data set, restricted users can't access the data set. While the data set is in this state, it remains marked as **RESTRICTED**. However, when you view **Permissions** for that data set, you can see that it has no selected data set rules. To fix this, you can specify new data set rules. Creating a data set with the same name is not enough to fix this. You must choose the new permissions data set in the **Permissions** screen. This restriction doesn't apply to direct SQL queries.

Deleting a Data Set

You can delete a data set from the **Your Data Sets** page. Choose the data set, and then choose **Delete Data Set**.



You receive a warning if you have any analyses that use the data set you have chosen for deletion. Continuing with the data set deletion does not delete the dependent analyses. The next time you open any of those analyses, you are prompted to select a new data set for any visuals that were based on the deleted data set.



Preparing Data

Data sets store any data preparation you have done on that data, so that you can reuse that prepared data in multiple analyses. Data preparation provides options such as adding calculated fields, applying filters, and changing field names or data types. If you are basing the data source on a SQL database, you can also use data preparation to join tables. Alternatively, you can enter a SQL query if you want to work with data from more than a single table.

If you want to transform the data from a data source before using it in Amazon QuickSight, you can prepare it to suit your needs and then save this preparation as part of the data set.

You can prepare a data set when you create it, or by editing it later. For more information about creating a new data set and preparing it, see [Creating Data Sets \(p. 76\)](#). For more information about opening an existing data set for data preparation, see [Editing a Data Set \(p. 106\)](#).

Use the following topics to learn more about data preparation.

Topics

- [Preparing Data Sets \(p. 125\)](#)
- [Choosing File Upload Settings \(p. 135\)](#)
- [Joining Tables \(p. 136\)](#)
- [Using a SQL Query \(p. 144\)](#)
- [Selecting Fields \(p. 148\)](#)
- [Changing a Field Name \(p. 152\)](#)
- [Changing a Field Data Type \(p. 153\)](#)
- [Using Unsupported or Custom Dates \(p. 154\)](#)
- [Working with Calculated Fields \(p. 155\)](#)
- [Adding a Filter \(p. 161\)](#)
- [Adding Geospatial Data \(p. 177\)](#)

Preparing Data Sets

You can prepare data in any data set to make it more suitable for analysis, for example changing a field name or adding a calculated field. For database data sets, you can also determine the data used by specifying a SQL query or joining two or more tables.

Use the following topics to learn how to prepare data sets.

Topics

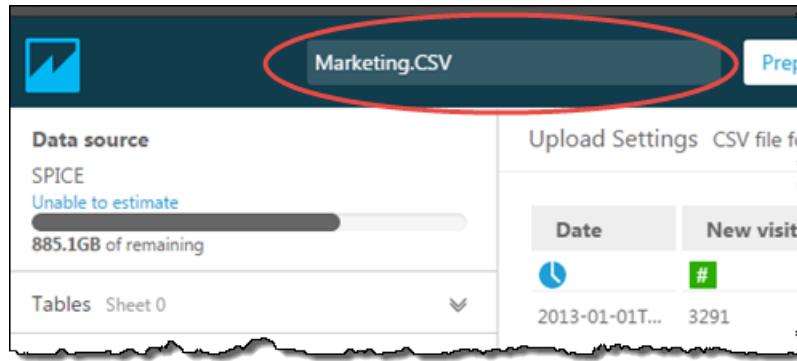
- [Preparing a Data Set Based on File Data \(p. 125\)](#)
- [Preparing a Data Set Based on Salesforce Data \(p. 129\)](#)
- [Preparing a Data Set Based on Database Data \(p. 132\)](#)

Preparing a Data Set Based on File Data

Use the following procedure to prepare a data set based on text or Microsoft Excel files from either your local network or Amazon S3.

1. Open a file data set for data preparation by choosing one of the following options:
 - Create a new local file data set, and then choose **Edit/Preview data**. For more information about creating a new data set from a local text file, see [Creating a Data Set Using a Local Text File \(p. 76\)](#). For more information about creating a new data set from a Microsoft Excel file, see [Creating a Data Set Using a Microsoft Excel File \(p. 77\)](#).
 - Create a new Amazon S3 data set, and then choose **Edit/Preview data**. For more information about creating a new Amazon S3 data set using a new Amazon S3 data source, see [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#). For more information about creating a new Amazon S3 data set using an existing Amazon S3 data source, see [Creating a Data Set Using an Existing Amazon S3 Data Source \(p. 101\)](#).
 - Open an existing Amazon S3, text file, or Microsoft Excel data set for editing, from either the analysis page or the **Your Data Sets** page. For more information about opening an existing data set for data preparation, see [Editing a Data Set \(p. 106\)](#).
2. (Optional) On the data preparation page, type a new name into the data set name box on the application bar.

This name defaults to the file name for local files. For example, it defaults to **Group 1** for Amazon S3 files.



3. Review the file upload settings and correct them if necessary. For more information about file upload settings, see [Choosing File Upload Settings \(p. 135\)](#).

Important

If you want to change upload settings, make this change before you make any other changes to the data set. New upload settings cause Amazon QuickSight to reimport the file. This process overwrites all of your other changes.

4. Prepare the data by doing one or more of the following:
 - [Selecting Fields \(p. 148\)](#)
 - [Changing a Field Name \(p. 152\)](#)
 - [Changing a Field Data Type \(p. 153\)](#)
 - [Adding a Calculated Field During Data Preparation \(p. 156\)](#)
 - [Adding a Filter \(p. 161\)](#)
5. Check the **SPICE (p. 2)** indicator to see if you have enough capacity to import the data set. File data sets automatically load into SPICE. The import happens when you choose either **Save & visualize** or **Save**.

If you don't have access to enough SPICE capacity, you can make the data set smaller by using one of the following options:

- Apply a filter to limit the number of rows.
- Select fields to remove from the data set.

Note

The SPICE indicator doesn't update to how much space you save by removing fields or filtering the data. It continues to reflect the SPICE usage from the last import.

6. Choose **Save** to save your work, or **Cancel** to cancel it.

You might also see **Save & visualize**. This option appears based on the screen that you started from. If this option isn't there, you can create a new visualization by starting from the data set screen.

Preparing a Data Set Based on a Microsoft Excel File

Use the following procedure to prepare a Microsoft Excel data set.

1. Open a text file data set for preparation by choosing one of the following options:
 - Create a new Microsoft Excel data set, and then choose **Edit/Preview data**. For more information about creating a new Excel data set, see [Creating a Data Set Using a Microsoft Excel File \(p. 77\)](#).
 - Open an existing Excel data set for editing. You can do this from the analysis page or the **Your Data Sets** page. For more information about opening an existing data set for data preparation, see [Editing a Data Set \(p. 106\)](#).
2. (Optional) On the data preparation page, type a name into the data set name box in the application bar. If you don't rename the data set, its name defaults to the Excel file name.

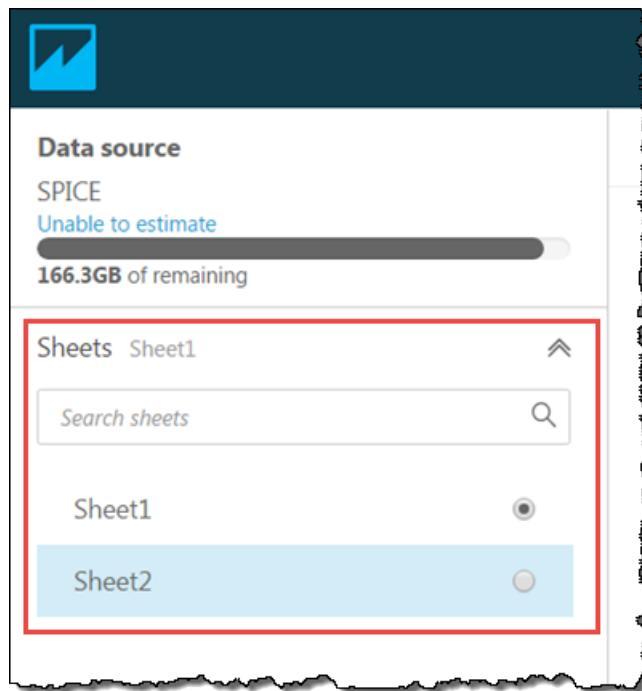


3. Review the file upload settings and correct them if necessary. For more information about file upload settings, see [Choosing File Upload Settings \(p. 135\)](#).

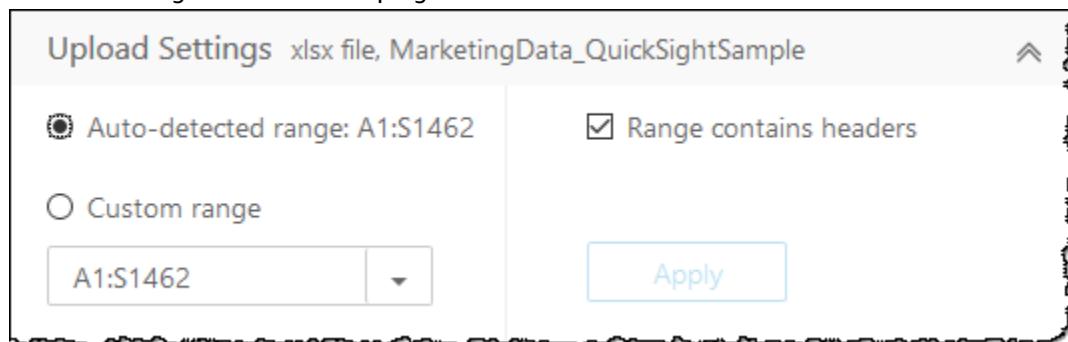
Important

If it's necessary to change upload settings, make this change before you make any other changes to the data set. Changing upload settings causes Amazon QuickSight to reimport the file. This process overwrites any changes you have made so far.

4. (Optional) Change the sheet selection.



5. (Optional) Change the range selection. To do this, open **Upload Settings** from the on-data set menu beneath the login name at the top right.



6. Prepare the data by doing one or more of the following:
 - [Selecting Fields \(p. 148\)](#)
 - [Changing a Field Name \(p. 152\)](#)
 - [Changing a Field Data Type \(p. 153\)](#)
 - [Adding a Calculated Field During Data Preparation \(p. 156\)](#)
 - [Adding a Filter \(p. 161\)](#)
7. Check the [SPICE \(p. 2\)](#) indicator to see if you have enough space to import the data set. Amazon QuickSight must import Excel data sets into SPICE. This import happens when you choose either **Save & visualize** or **Save**.

If you don't have enough SPICE capacity, you can choose to make the data set smaller using one of the following methods:

- Apply a filter to limit the number of rows.
- Select fields to remove from the data set.
- Define a smaller range of data to import.

Note

The SPICE indicator doesn't update to reflect your changes until after you load them. It shows the SPICE usage from the last import.

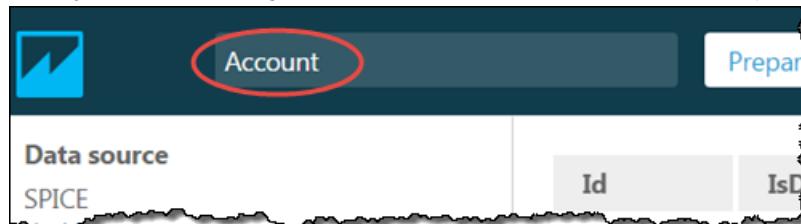
8. Choose **Save** to save your work, or **Cancel** to cancel it.

You might also see **Save & visualize**. This option appears based on the screen that you started from. If this option isn't there, you can create a new visualization by starting from the data set screen.

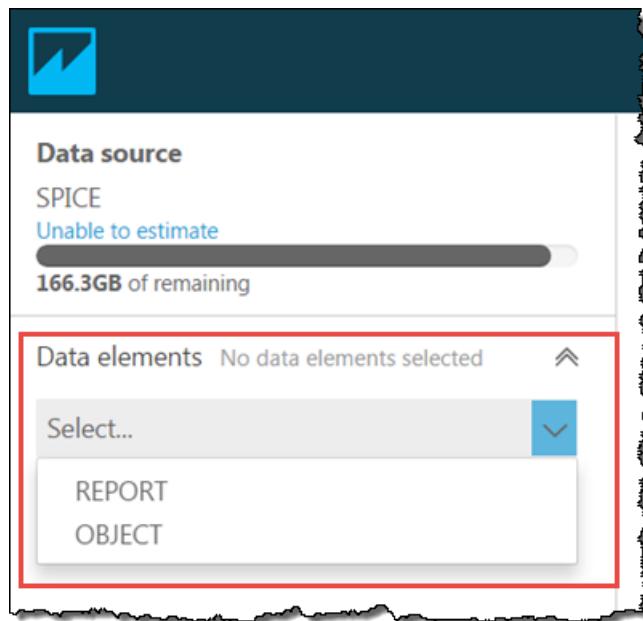
Preparing a Data Set Based on Salesforce Data

Use the following procedure to prepare a Salesforce data set.

1. Open a Salesforce data set for preparation by choosing one of the following options:
 - Create a new Salesforce data set and choose **Edit/Preview data**. For more information about creating a new Salesforce data set using a new Salesforce data source, see [Creating a Data Set from Salesforce \(p. 89\)](#). For more information about creating a new Salesforce data set using an existing Salesforce data source, see [Create a Data Set Using an Existing Salesforce Data Source \(p. 102\)](#).
 - Open an existing Salesforce data set for editing from either the analysis page or the **Your Data Sets** page. For more information about opening an existing data set for data preparation, see [Editing a Data Set \(p. 106\)](#).
2. (Optional) On the data preparation page, type a name into the data set name box in the application bar if you want to change the data set name (this defaults to the report or object name).

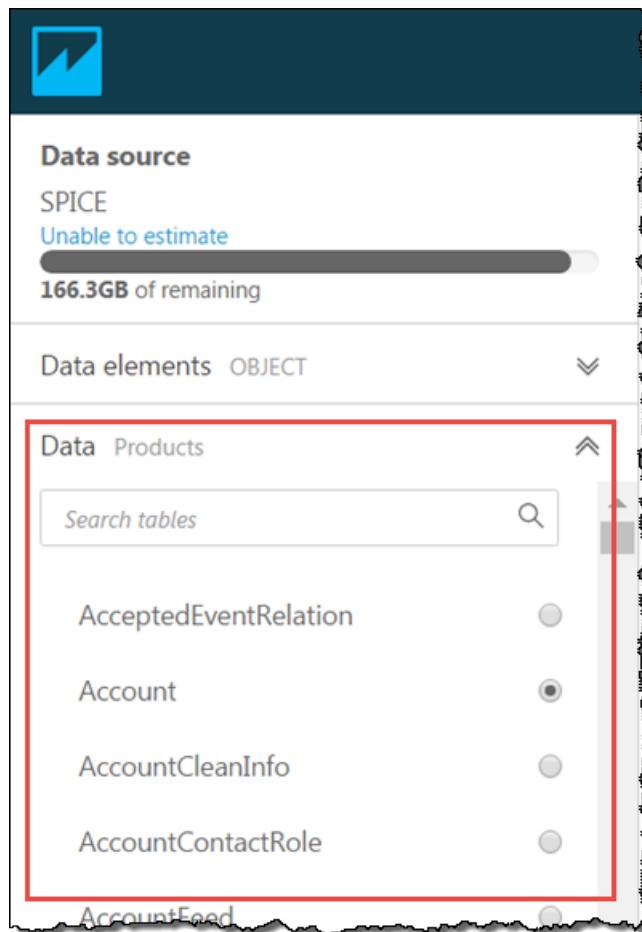


3. (Optional) Change the data element selection to see either reports or objects.



4. (Optional) Change the data selection to choose a different report or object.

If you have a long list in the **Data** pane, you can search to locate a specific item by typing a search term into the **Search tables** box. Any item whose name contains the search term is shown. Search is case-insensitive and wildcards are not supported. Choose the cancel icon (X) to the right of the search box to return to viewing all items.



5. Prepare the data by doing one or more of the following:
 - [Selecting Fields \(p. 148\)](#)
 - [Changing a Field Name \(p. 152\)](#)
 - [Changing a Field Data Type \(p. 153\)](#)
 - [Adding a Calculated Field During Data Preparation \(p. 156\)](#)
 - [Adding a Filter \(p. 161\)](#)
6. Check the **SPICE** (p. 2) indicator to see if you have enough space to import the data set. Importing data into SPICE is required for Salesforce data sets. Importing occurs when you choose either **Save & visualize** or **Save**.

If you don't have enough SPICE capacity, you can remove fields from the data set or apply a filter to decrease its size. For more information about adding and removing fields from a data set, see [Selecting Fields \(p. 148\)](#).

Note

The SPICE indicator doesn't update to reflect the potential savings of removing fields or filtering the data. It continues to reflect the size of the data set as retrieved from the data source.

7. Choose **Save** to save your work, or **Cancel** to cancel it.

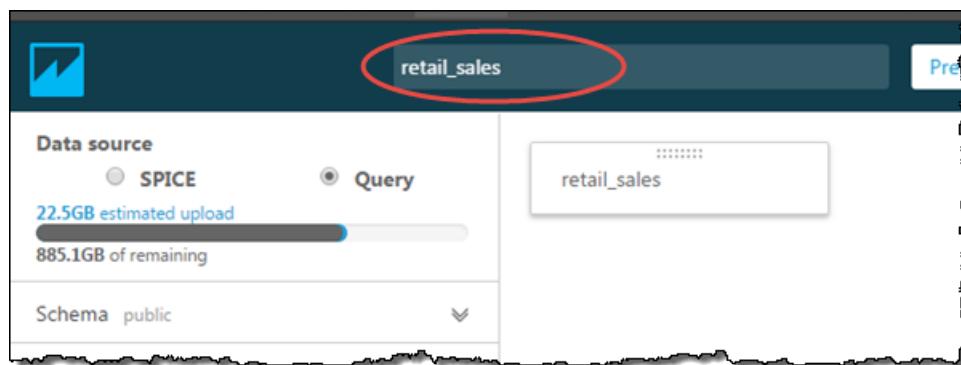
You might also see **Save & visualize**. This option appears based on the screen you started from. If this option isn't there, you can create a new visualization by starting from the data set screen.

Preparing a Data Set Based on Database Data

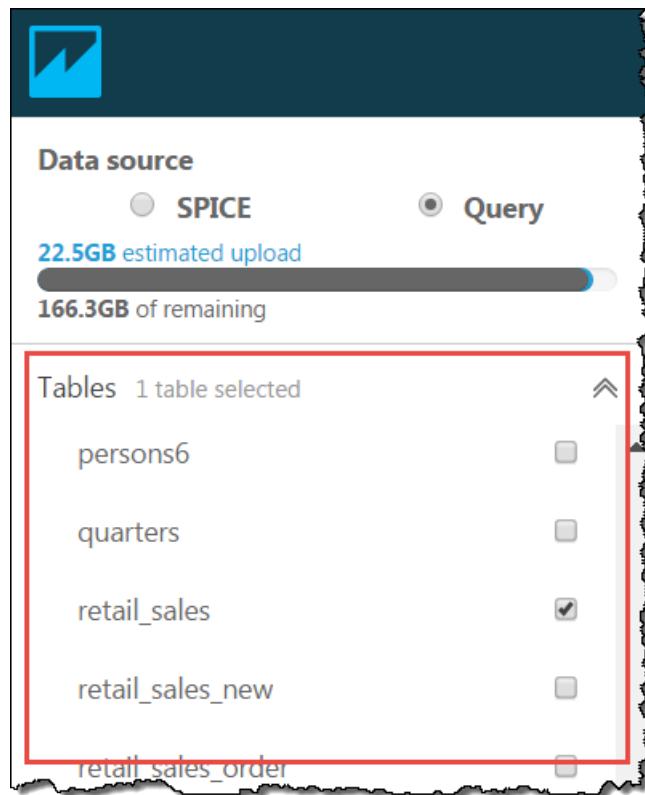
Use the following procedure to prepare a data set based on a query to a database. The data for this data set can be from an AWS database data source like Amazon Athena, Amazon RDS, or Amazon Redshift, or from an external database instance. You can choose whether to import a copy of your data into [SPICE \(p. 2\)](#), or to query the data directly.

1. Open a database data set for preparation by choosing one of the following options:
 - Create a new database data set and choose **Edit/Preview data**. For more information about creating a new data set using a new database data source, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#). For more information about creating a new data set using an existing database data source, see [Creating a Data Set Using an Existing Database Data Source \(p. 104\)](#).
 - Open an existing database data set for editing from either the analysis page or the **Your Data Sets** page. For more information about opening an existing data set for data preparation, see [Editing a Data Set \(p. 106\)](#).
2. (Optional) On the data preparation page, type a name into the data set name box on the application bar.

This name defaults to the table name if you selected one before data preparation. Otherwise, it's **Untitled data source**.

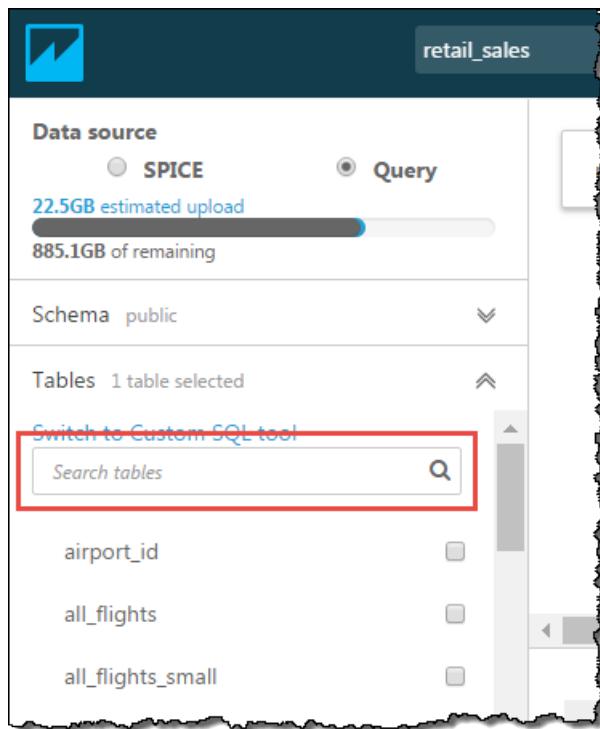


3. Decide how your data is selected by choosing one of the following:
 - To use a single table to provide data, choose a table or change the table selection.



If you have a long table list in the **Tables** pane, you can search for a specific table by typing a search term for **Search tables**.

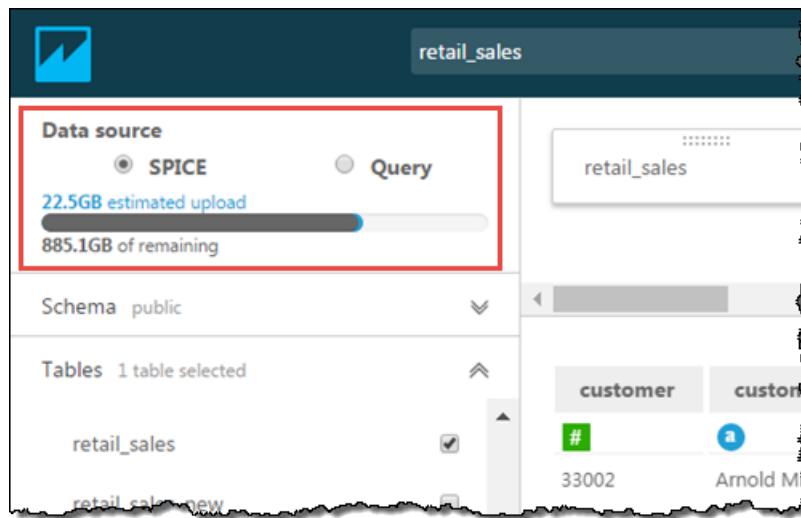
Any table whose name contains the search term is shown. Search is case-insensitive and wildcards are not supported. Choose the cancel icon (X) to the right of the search box to return to viewing all tables.



- To use two or more joined tables to provide data, choose two tables and join them using the join pane. You must import data into [SPICE \(p. 2\)](#) if you choose to use joined tables. For more information about joining tables using the Amazon QuickSight interface, see [Joining Tables \(p. 136\)](#).
- To use a custom SQL query to provide data in a new data set, choose **Switch to Custom SQL tool** on the **Tables** pane. For more information, see [Using a SQL Query \(p. 144\)](#).

To change the SQL query in an existing data set, choose **Edit SQL** on the **Fields** pane to open the SQL pane and edit the query.

4. Prepare the data by doing one or more of the following:
 - [Selecting Fields \(p. 148\)](#)
 - [Changing a Field Name \(p. 152\)](#)
 - [Changing a Field Data Type \(p. 153\)](#)
 - [Adding a Calculated Field During Data Preparation \(p. 156\)](#)
 - [Adding a Filter \(p. 161\)](#)
5. If you aren't joining tables, choose whether to query the database directly or to import the data into SPICE by selecting either the **Query** or **SPICE** radio button. We recommend using SPICE for enhanced performance.



If you want to use SPICE, check the SPICE indicator to see if you have enough space to import the data set. Importing occurs when you choose either **Save & visualize** or **Save**.

If you don't have enough space, you can remove fields from the data set or apply a filter to decrease its size.

Note

The SPICE indicator doesn't update to reflect the potential savings of removing fields or filtering the data. It continues to reflect the size of the data set as retrieved from the data source.

6. Choose **Save** to save your work, or **Cancel** to cancel it.

You might also see an option to **Save & visualize**. This option appears based on the screen you started from. If this option isn't there, you can create a new visualization by starting from the data set screen.

Choosing File Upload Settings

If you are using a file data source, you should confirm the upload settings that Amazon QuickSight uses to import the file into [SPICE \(p. 2\)](#), and correct them if necessary.

Important

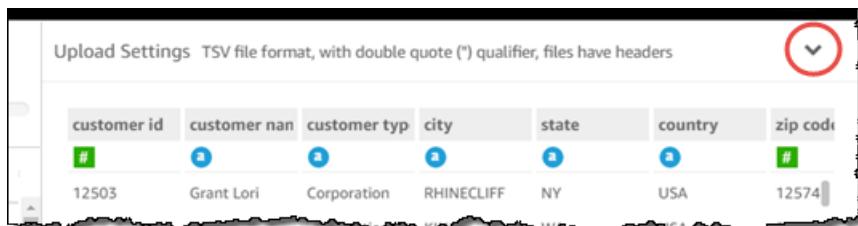
If it's necessary to change upload settings, make these changes before you make any other changes to the data set. Changing upload settings causes Amazon QuickSight to reimport the file. This process overwrites any changes you have made so far.

Changing Text File Upload Settings

Text file upload settings include the file header indicator, file format, text delimiter, text qualifier, and start row. If you are working with an Amazon S3 data source, the upload settings you select are applied to all files you choose to use in this data set.

Use the following procedure to change text file upload settings.

1. On the data preparation page, open the **Upload Settings** pane by choosing the expand icon.



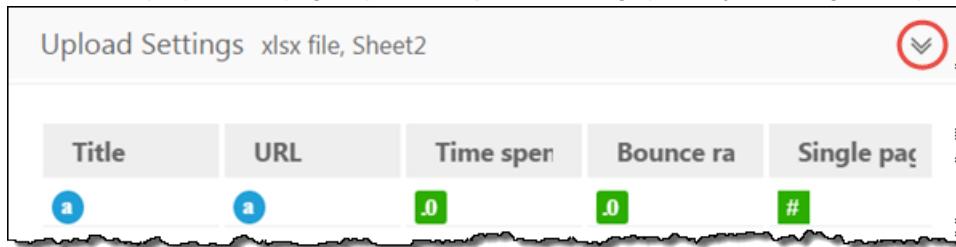
2. In **File format**, choose the file format type.
3. If you chose the **custom separated (CUSTOM)** format, specify the separating character in **Delimiter**.
4. If the file doesn't contain a header row, deselect the **Files include headers** check box.
5. If you want to start from a row other than the first row, specify the row number in **Start from row**. If the **Files include headers** check box is selected, the new starting row is treated as the header row. If the **Files include headers** check box is not selected, the new starting row is treated as the first data row.
6. In **Text qualifier**, choose the text qualifier, either single quotes ('') or double quotes ("").

Changing Microsoft Excel File Upload Settings

Microsoft Excel file upload settings include the range header indicator and whole sheet selector.

Use the following procedure to change Microsoft Excel file upload settings.

1. On the data preparation page, open the **Upload Settings** pane by choosing the expand icon.



2. Leave **Upload whole sheet** selected.
3. If the file doesn't contain a header row, deselect the **Range contains headers** check box.

Joining Tables

You can use the join interface in Amazon QuickSight to join tables from one or more schemas in the same data source. On the join interface, you can specify the join type and the fields to use to join the tables. The fields used in the join must be from the data source. You can't join on calculated fields that you created in Amazon QuickSight.

If you need to refine the SQL statement that you used to create the data set, use a custom SQL query instead. For more information about using a SQL query to create a data set, see [Using a SQL Query \(p. 144\)](#).

To join tables from different data sources, create the join before importing to Amazon QuickSight.

Important

If you choose a table and make changes to the fields, these changes are discarded when you add tables by using the join interface. Examples of changes might include changing a field name or adding a calculated field.

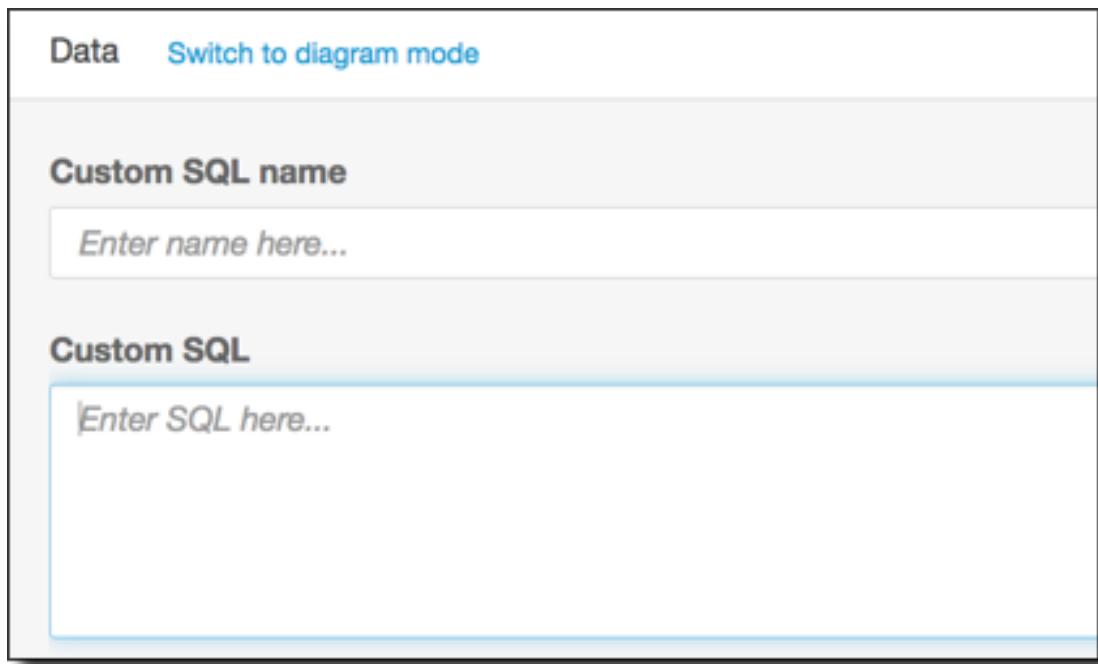
Creating a Join

Use the following procedure to join tables to use in a data set. Before you begin, import or connect to your data.

1. On the data preparation page, choose **Add data** near the top of the page.

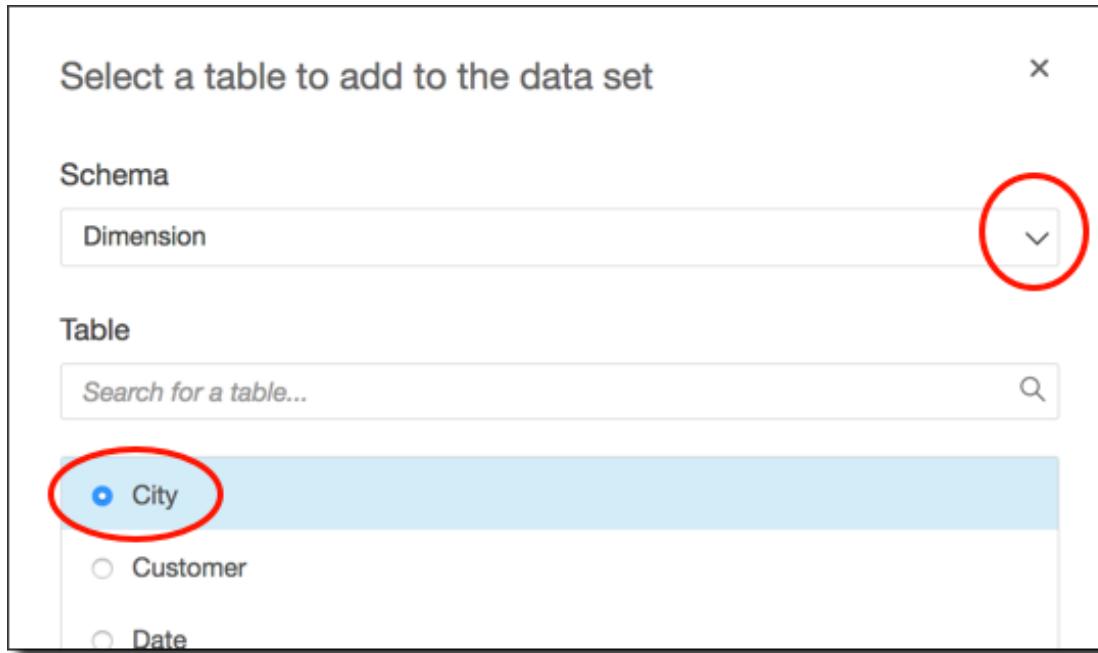
The screenshot shows the 'Data source' section with 'Query' selected. A red arrow points to the 'Add data' button, which is highlighted with a red oval. Below it is the 'Switch to custom SQL mode' link. To the right, there's a preview area for a 'Sale' data source, showing a table structure with columns like Sale Key, City Key, Customer Key, and various numerical values. The left sidebar shows fields like Sale Key, City Key, and Customer Key selected.

(Optional) If you're connected to a SQL-based data source, you can write a custom query by choosing **Switch to custom SQL mode**. Choosing this opens the following screen, where you can paste or type in a query. However, switching between modes erases your work in the other view. If you switch to custom SQL mode, choose **Switch to diagram mode** to switch back. The option to switch between SQL mode and diagram mode are available only when you are creating a new data set. If you want to switch modes for an existing data set, create a new one instead.



The following steps use the diagram mode.

After you choose **Add data**, the following screen appears.

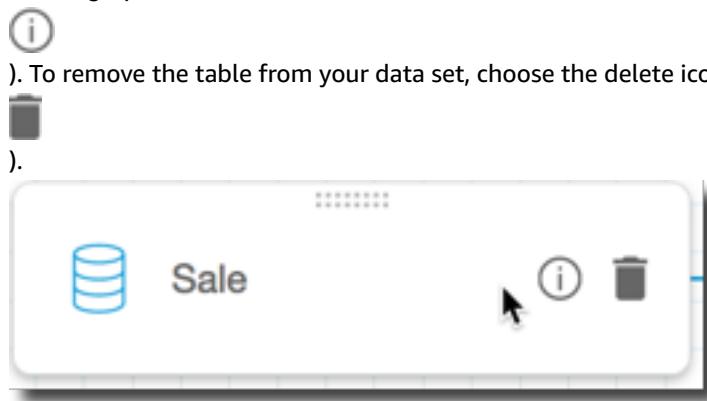


2. Choose the schema and the table that you want to add.

If you don't immediately see your table in the list, you can search for it by entering text in the search box. Doing this searches the schema that you selected for the partial table name.

3. Choose a table from the list by choosing the name of the table or the radio button next to it. Then choose **Select**. To exit without making changes, choose **Cancel**.

After you add a table, you can interact with it by hovering over it. Some icons appear on the graphic. To see information about the table, choose the information icon (). To remove the table from your data set, choose the delete icon ().

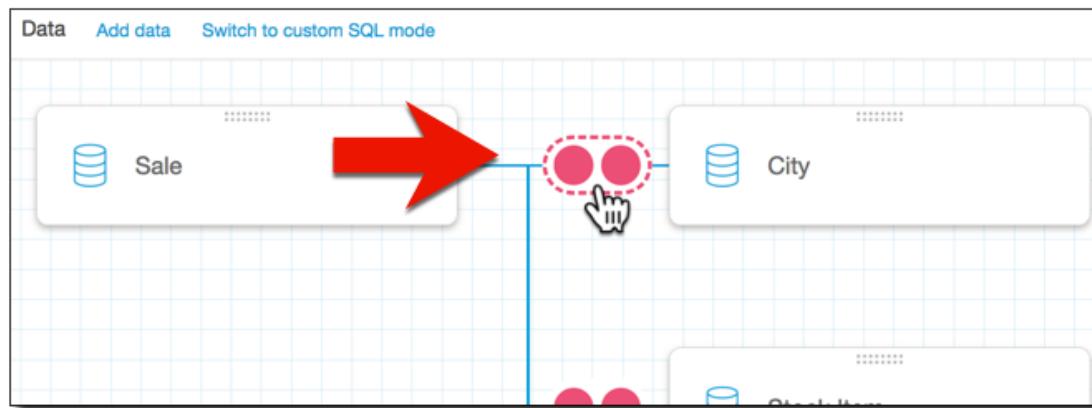


You can drag and drop tables to rearrange them.

You can add a table multiple times, to create self joins. To help you tell two instances of the same table apart, it displays a counter after the name. An example is **Product**, **Product (2)**, and **Product (3)**. Field names in the **Fields** or **Filters** sections include a label so you can see which instance of the table a particular field is from.

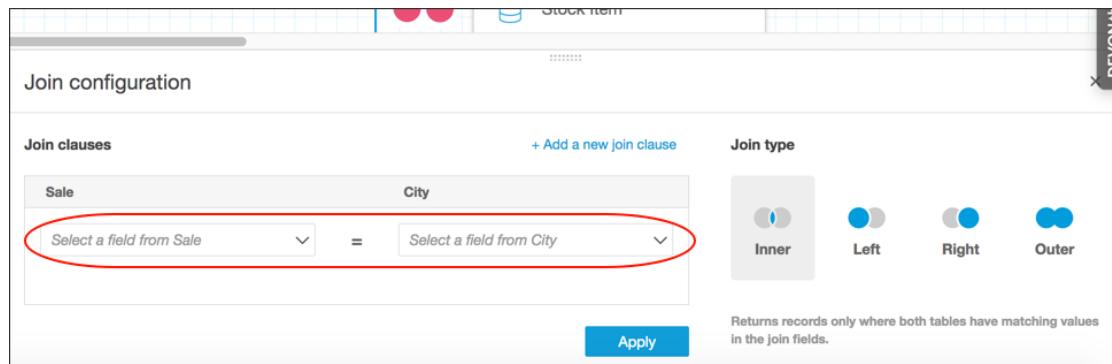
After you have added all of the necessary tables, you need to join them. You can see which joins aren't yet configured, because they display double red dots rather than a join symbol.

4. Create a join by choosing the double dots () to open the **Join Configuration** pane.



5. Choose the columns to join the tables on.

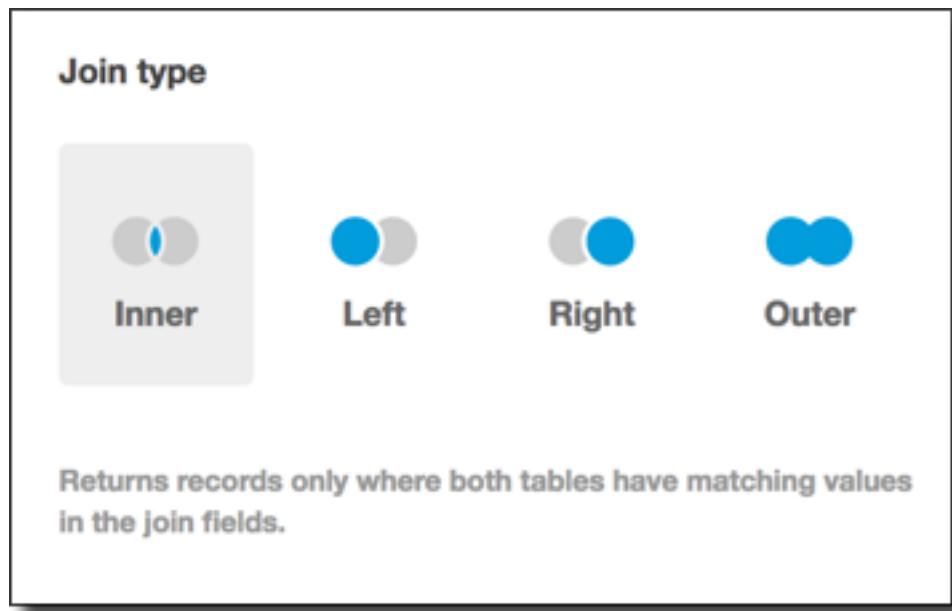
At the bottom of the screen, you can see options to set a field in one table equal to a field in another table.



- a. In the **Join clauses** section, choose the join column for each table.

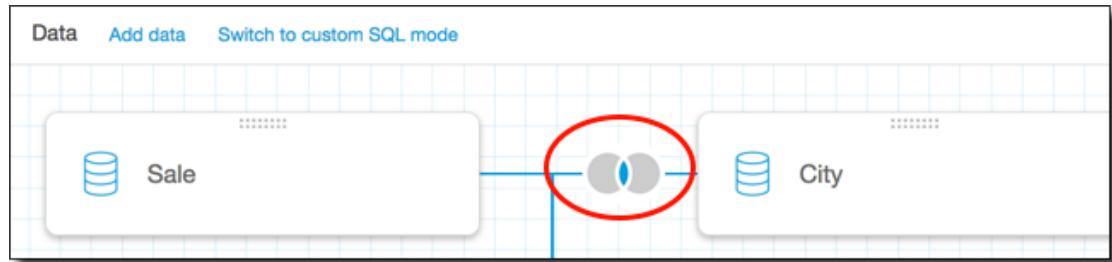
- b. (Optional) If the tables you selected join on multiple columns, choose **Add a new join clause**. Doing this adds another row to the join clauses, so you can specify the next set of columns to join. Repeat this process until you have identified all of the join columns for the tables.

6. In the **Join configuration** pane, under **Join type**, choose the kind of join to apply. You can choose each join type to learn more about it. For more information on joins, see [Join Types \(p. 142\)](#).



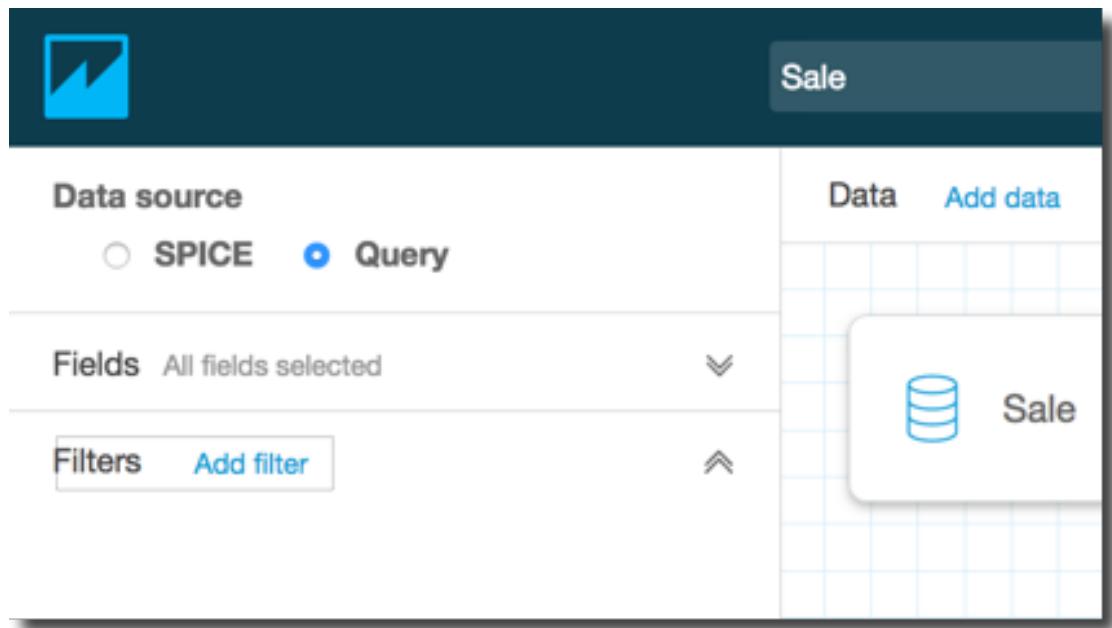
7. Choose **Apply** to confirm your choices. To cancel without making changes, choose the **X** at top right to close the Join configuration panel.

The join icon updates to indicate that the join type and columns have been selected.



8. (Optional) Choose one or more options at the far left to help you configure your data set:

- For **Data source**, you can choose **SPICE** to store your data set in **SPICE (p. 2)**, or choose **Query** to pull live data.
 - If you choose **SPICE**, the data is ingested into SPICE, and visuals that use the data set run queries in SPICE, instead of against the database.
 - If you choose **Query**, the data is not ingested into SPICE, and visuals that use the data set run queries against the database, instead of in SPICE.
- In the **Fields** section, you can choose fields you want to include or exclude.
- In the **Filters** section, you can add or edit filters.



Join Types

Amazon QuickSight supports the following join types:

- Inner joins
- Left and right outer joins
- Full outer joins

Let's take a closer look at what these join types do with your data. For our example data, we're using the following tables named `widget` and `safety_rating`.

```
SELECT * FROM safety-rating
rating_id safety_rating
1      A+
2      A
3      A-
4      B+
5      B

SELECT * FROM WIDGET
widget_id    widget safety_rating_id
1      WidgetA  3
2      WidgetB  1
3      WidgetC  1
4      WidgetD  2
5      WidgetE
6      WidgetF  5
7      WidgetG
```

Inner Joins

Use an inner join (



) when you want to see only the data where there is a match between two tables. For example, suppose that you perform an inner join on the **safety-rating** and **widget** tables.

In the following result set, widgets without safety ratings are removed, and safety ratings without associated widgets are removed. Only the rows that match perfectly are included.

```
SELECT * FROM safety-rating
INNER JOIN widget
ON safety_rating.rating_id = widget.safety_rating_id

rating_id    safety_rating    widget_id    widget      safety_rating_id
3            A-              1           WidgetA     3
1            A+              2           WidgetB     1
1            A+              3           WidgetC     1
2            A               4           WidgetD     2
5            B               6           WidgetF     5
```

Left and Right Outer Joins

These are also known as left or right outer joins. Use a left (



) or right (



) outer join when you want to see all the data from one table, and only the matching rows from the other table.

In a graphical interface, you can see which table is on the right or the left. In a SQL statement, the first table is considered to be on the left. Therefore, choosing a left outer join as opposed to a right outer join depends only on how the tables are laid out in your query tool.

For example, suppose that you perform a left outer join (



) on **safety-rating** (the left table) and **widgets** (the right table). In this case, all **safety-rating** rows are returned, and only matching **widget** rows are returned. You can see blanks in the result set where there is no matching data.

```
SELECT * FROM safety-rating
LEFT OUTER JOIN widget
ON safety_rating.rating_id = widget.safety_rating_id

rating_id    safety_rating    widget_id    widget      safety_rating_id
1            A+              2           WidgetB     1
1            A+              3           WidgetC     1
2            A               4           WidgetD     2
3            A-              1           WidgetA     3
4            B+              null        null       null
5            B               6           WidgetF     5
```

If you instead use a right outer join (

), call the tables in the same order so `safety-rating` is on the left and `widget` is on the right. In this case, only matching `safety-rating` rows are returned, and all `widget` rows are returned. You can see blanks in the result set where there is no matching data.

```
SELECT * FROM safety-rating
RIGHT OUTER JOIN widget
ON safety_rating.rating_id = widget.safety_rating_id

rating_id      safety_rating      widget_id      widget      safety_rating_id
3              A-                  1 WidgetA      3
1              A+                  2 WidgetB      1
1              A+                  3 WidgetC      1
2              A                  4 WidgetD      2
                           5 WidgetE
5              B                  6 WidgetF      5
                           7 WidgetG
```

Full Outer Joins

These are sometimes called just outer joins, but this term can refer to either a left outer, right outer, or full outer join. To define the meaning, we use the complete name: full outer join.

Use a full outer join (

) to see data that matches, plus data from both tables that doesn't match. This type of join includes all rows from both tables. For example, if you perform a full outer join on the `safety-rating` and `widget` tables, all rows are returned. The rows are aligned where they matched, and all extra data is included on separate rows. You can see blanks in the result set where there is no matching data.

```
SELECT * FROM safety-rating
FULL OUTER JOIN widget
ON safety_rating.rating_id = widget.safety_rating_id

rating_id      safety_rating      widget_id      widget      safety_rating_id
1              A+                  2 WidgetB      1
1              A+                  3 WidgetC      1
2              A                  4 WidgetD      2
3              A-                  1 WidgetA      3
4              B+                  6 WidgetF      5
5              B                  7 WidgetG
```

Using a SQL Query

When creating a new data set based on a direct query to a database, you can choose an existing SQL query or create a new SQL query. You can use either an existing or new query to refine the data retrieved from a database, or to combine data from multiple tables. Using a SQL query, you can specify SQL statements in addition to any join criteria to refine the data set. If you want to join tables only by specifying the join type and the fields to use to join the tables, you can use the join interface instead. For more information about using the join interface, see [Joining Tables \(p. 136\)](#).

You can specify a SQL query only for data sets based on SQL database data sources.

Important

If you chose a table and made any changes to the fields (for example, changing a field name or adding a calculated field), these changes are discarded when you switch from the table selector to the Custom SQL tool.

Creating a Custom SQL Query

Use the following procedure to create a custom SQL query for a data set.

1. Create a new data set that points to a database source. For more information about creating a data set from a database, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).
2. Choose one of the following:
 - **Custom SQL**

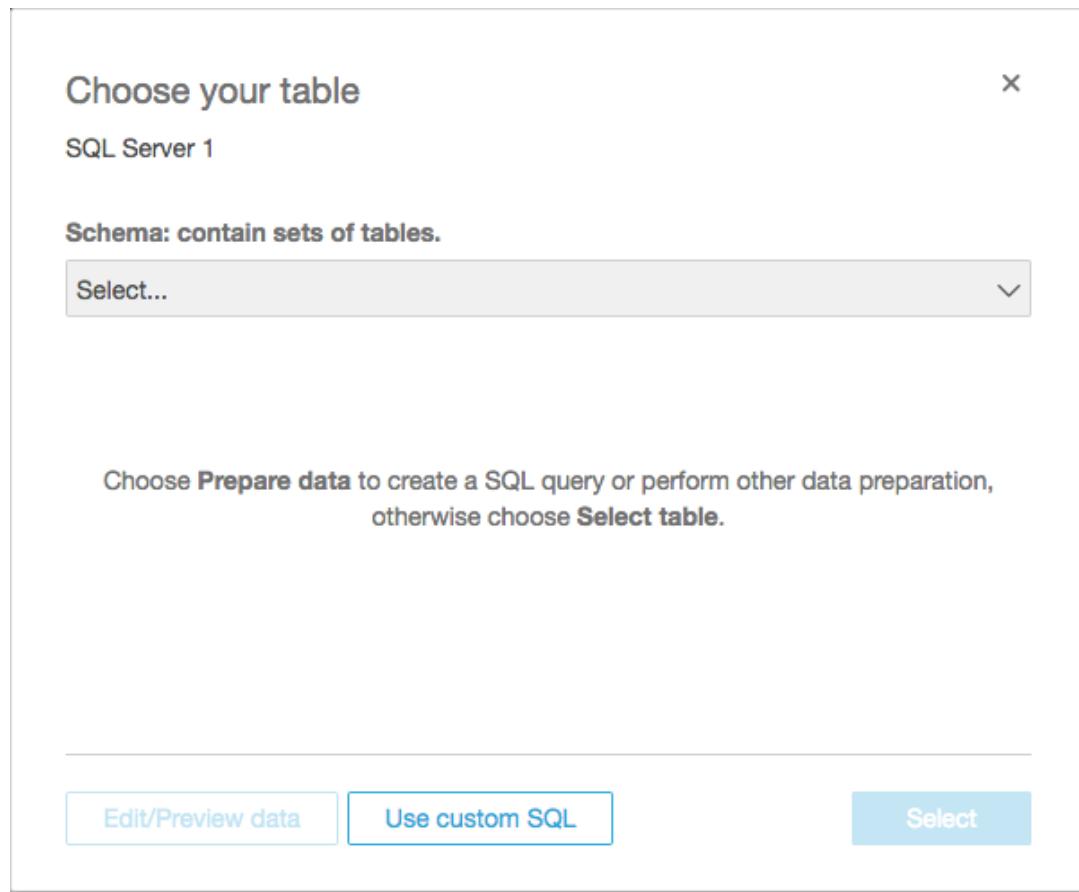
On the next screen, you can choose to write a query with the **Use custom SQL** option. Doing this opens a screen named **Enter custom SQL query**, where you can type a name for your query, and then enter the SQL. For best results, compose the query in a SQL editor, and then paste it into this window. After you name and enter the query, you can choose **Edit/Preview data** or **Confirm query**. Choose **Edit/Preview data** to immediately go to data preparation. Choose **Confirm query** to validate the SQL and make sure that there are no errors.

- **Choose tables**

If you prefer to connect to specific tables, for **Schema: contain sets of tables**, choose **Select** and then choose a schema.

To prepare the data before creating an analysis, choose **Edit/Preview data** to open data preparation. Use this option if you want to join to more tables.

Otherwise, after choosing a table, choose **Select**.



After you choose **Use SQL**, the **Tables** pane is renamed to **Custom SQL**. You can choose this new pane to switch back to using tables.

Note

You can explore the fields in your tables by using the **Tables** pane. After you select a table, its structure displays in the viewer. This view can be useful if you are unfamiliar with the field names, and want to write SQL.

In some cases, Amazon QuickSight can't change a table data source into a query. In this case, the screen doesn't display the option to switch to a custom SQL query. To use a query instead, create a new data set that is based on the query you want to use.

If your newly created data set doesn't appear on **Your Data Sets** screen, refresh your page. Likewise, if you choose your new data set and its dialog box has no options except **Create analysis**, close this dialog box and reopen it.

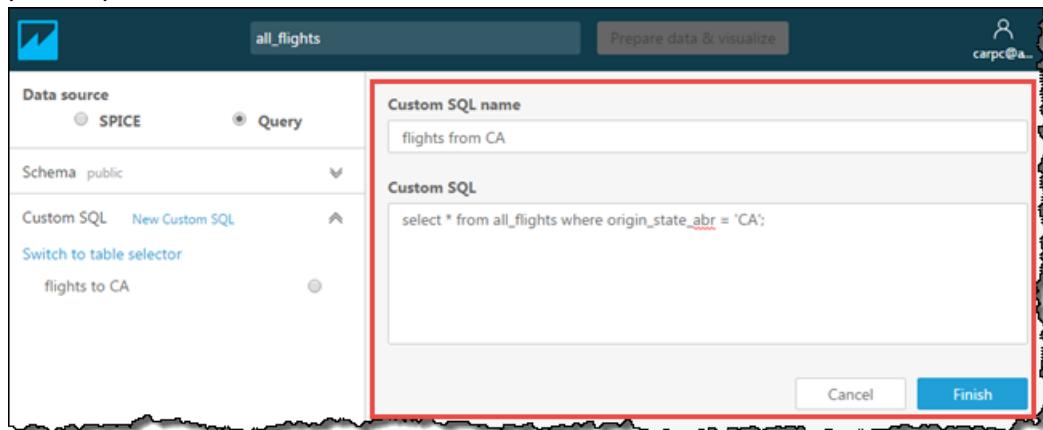
3. Enter information for a new SQL query:

- In the **Custom SQL** pane, choose **Use SQL**.
- For **Custom SQL name**, type a query name.
- For **Custom SQL**, type or paste in a SQL query. The query must conform to the SQL syntax of the target database engine in terms of capitalization, command termination, and other requirements.

Note

The **Custom SQL** box has no query editing functionality. It's easier to create the query that you want in your SQL editor of choice and then paste it in.

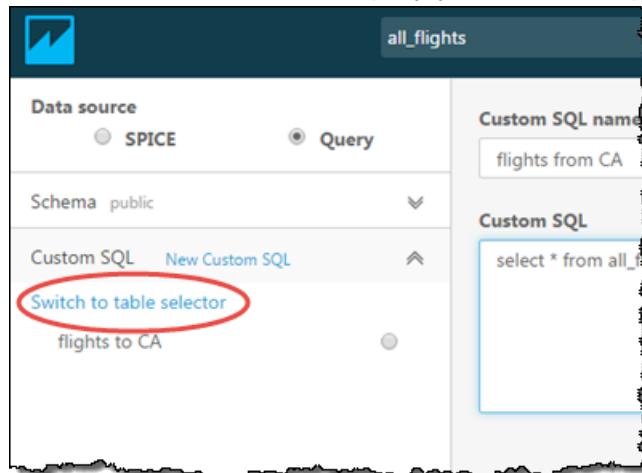
- Choose **Finish**. The query is processed and a sample of the query results displays in the data preview pane.



After you have selected or created a SQL query, the **SPICE** (p. 2) indicator updates to reflect the size of the data set returned by the query.

Switching Back to Using a Table

To stop using a SQL query and use regular table data instead, choose **Switch to table selector** in the **Custom SQL** pane, and then choose a table. You can only do this with new data sets. Once you have saved the data set to use a SQL query, you can edit the query, but you can't switch to using a table.



Modifying Existing Queries

To update an existing data set based on a SQL query, open the **Fields** pane, and choose **Edit SQL** to open the SQL pane and edit the query.

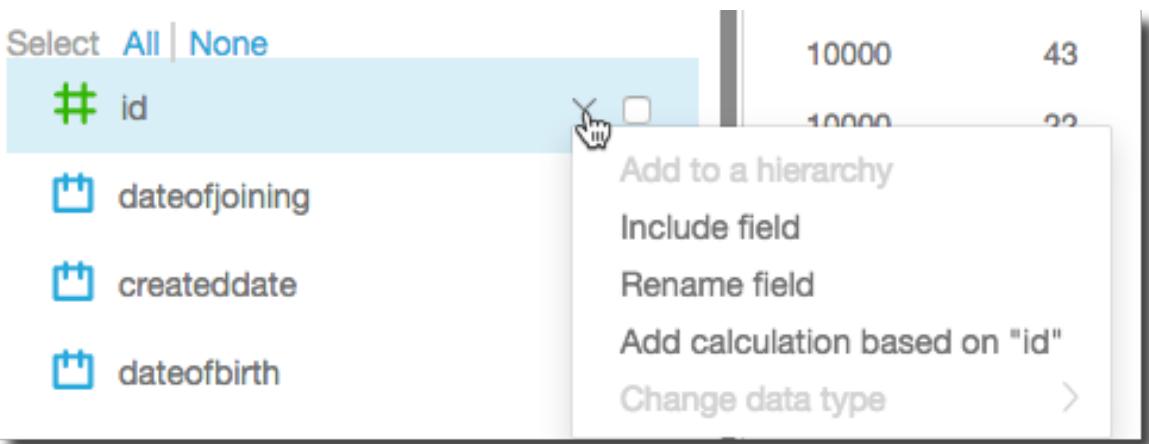
The screenshot shows the 'Data source' configuration screen in Amazon QuickSight. On the left, under 'Data source', 'Query' is selected. Below it, 'Tables' is listed as 'No table selected' and 'Fields' is listed as 'All fields selected'. There are buttons for 'New field' and 'Edit SQL'. A search bar labeled 'Search fields' is also present. On the right, there is a section for 'Custom SQL' with a 'Custom SQL name' of 'Onetable' and a preview of the SQL query 'select * from o'. A large red arrow points to the 'Edit SQL' button.

Selecting Fields

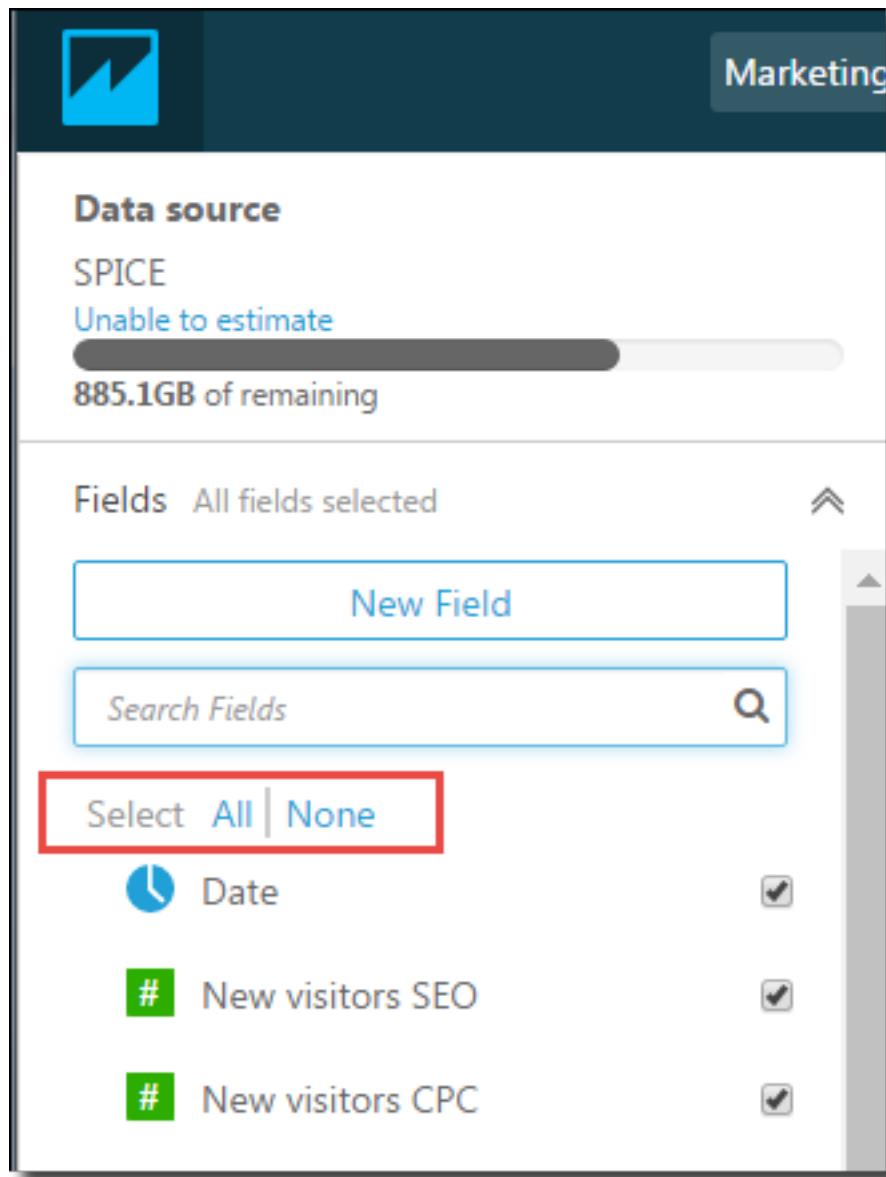
When you prepare data, only the fields you select on the data preparation page are available for subsequent use in a visual. By default, all of the fields in the table or file you are preparing are selected. You can toggle a field by either selecting or deselecting its check box in the **Fields** pane.

The screenshot shows the 'Data source' configuration screen. At the top, there is a blue header bar with a logo and the word 'Custom'. Below it, the 'Data source' section is visible, with 'Query' selected over 'SPICE'. A progress bar indicates '191GB of remaining' space. The 'Fields' section shows '17 fields selected'. It includes buttons for 'New field' and 'Edit SQL', and a search bar labeled 'Search fields'. A red circle highlights a dropdown menu next to a field named '# id'. The menu contains options like 'Select All', 'None', 'Exclude field', and 'Include field'. Below the menu, there are additional actions: 'Rename field', 'Add calculation', and 'Change data type'.

You can also toggle a field by hovering over the field menu, which appears next to each field on hover. Then choose either **Exclude field** or **Include field**. The same menu contains additional actions, such as **Rename field**, **Add calculation**, and **Change data type**.



You can select or deselect all fields at once by choosing either **All** or **None** at the top of the **Fields** pane.

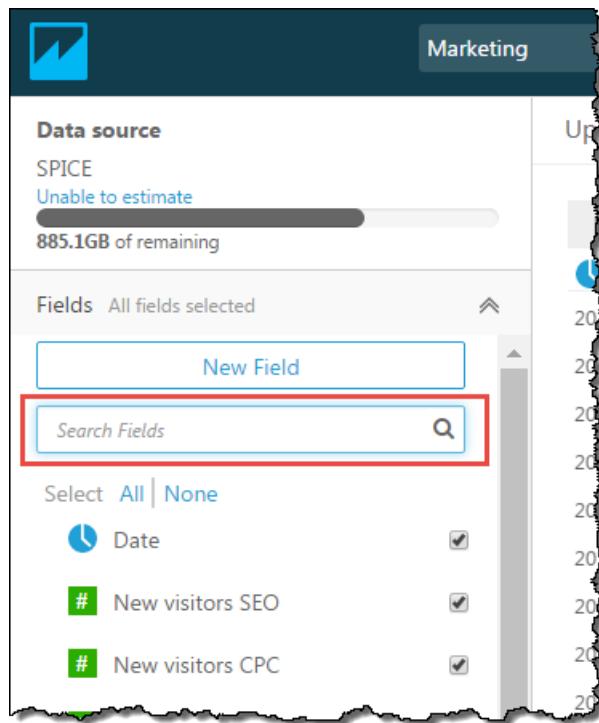


If you edit a data set and exclude a field that is used in a visual, that visual breaks. You can fix it the next time you open that analysis.

Searching for Fields

If you have a long field list in the **Fields** pane, you can search to locate a specific field by typing a search term for **Search fields**. Any field whose name contains the search term is shown.

Search is case-insensitive and wildcards are not supported. Choose the cancel icon (X) to the right of the search box to return to viewing all fields.



Changing a Field Name

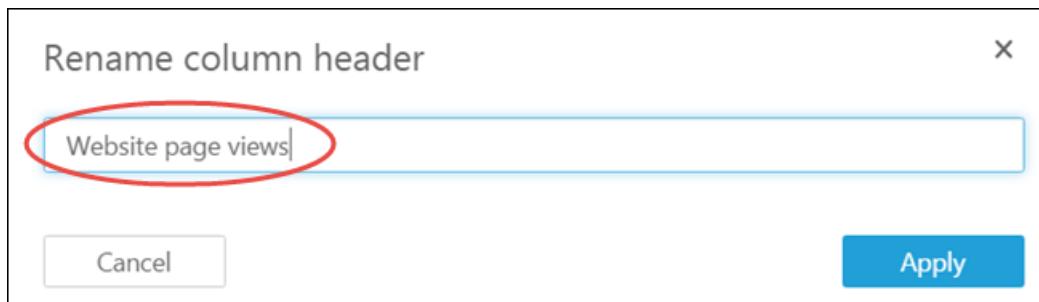
You can change any field name from what is provided by the data source. If you change the name of a field used in a calculated field, make sure also to change it in the calculated field function. Otherwise, the function fails.

Use the following procedure to change a field name.

1. In the data preview pane, choose the edit icon on the field that you want to change.

| Marketing | | | |
|---|------------------|----------|--------|
| Upload Settings CSV file format, with double quote ("") qualifier, start from row 1 | | | |
| Twitt... | Mailing list ... | Maili... | Web... |
| # | # | # | # |
| 0 | 1872 | 25313 | 8438 |
| 2 | 1874 | 25424 | 8475 |

2. Highlight the field name and type a new name.



3. Choose **Apply**.



Changing a Field Data Type

When Amazon QuickSight retrieves data, it assigns each field a data type based on the data in the field. The possible data types are as follows:

- Date — The date data type is used for date data in a supported format. For information about the date formats Amazon QuickSight supports, see [Data Source Limits \(p. 62\)](#).
- Decimal — The decimal data type is used for numeric data that requires one or more decimal places of precision, for example 18.23. The decimal data type supports values with up to four decimal places to the right of the decimal point. Values that have a higher scale than this are truncated to the fourth decimal place when displayed in data preparation or analyses and when imported into [SPICE \(p. 2\)](#). For example, 13.00049 is truncated to 13.0004.
- Int — The int data type is used for numeric data that only contains integers, for example 39.
- String — The string data type is used for nondate alphanumeric data.

During data preparation, you can change the data type of any field from the data source but not that of any calculated field you create. Amazon QuickSight converts the field data according to the data type you choose. Rows that contain data that is incompatible with that data type are skipped. For example, suppose that you convert the following field from String to Int.

| |
|--------|
| 10020 |
| 36803 |
| 14267a |
| 98457 |
| 78216b |

All records containing alphabetic characters in that field are skipped, as shown following.

| |
|-------|
| 10020 |
| 36803 |

98457

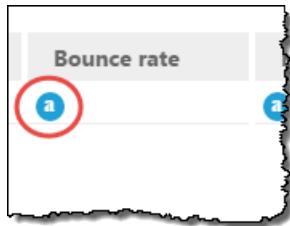
If you have a database data set with fields whose data types aren't supported by Amazon QuickSight, use a SQL query during data preparation. Then use `CAST` or `CONVERT` commands (depending on what is supported by the source database) to change the field data types. For more information about adding a SQL query during data preparation, see [Using a SQL Query \(p. 144\)](#). For more information about how different source data types are interpreted by Amazon QuickSight, see [Supported Data Types \(p. 62\)](#).

If you have numeric fields that act as dimensions rather than metrics, for example ZIP codes and most ID numbers, it's helpful to give them a string data type during data preparation. Doing this lets Amazon QuickSight understand that they are not useful for performing mathematical calculations and can only be aggregated with the `Count` function. For more information about how Amazon QuickSight uses dimensions and measures, see [Setting a Field as a Dimension or Measure \(p. 196\)](#).

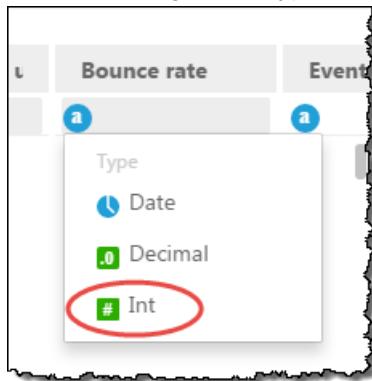
In [SPICE \(p. 2\)](#), numbers converted from numeric into an integer are truncated by default. If you want to round your numbers instead, you can create a calculated field using the [round \(p. 464\)](#) function. To see whether numbers are rounded or truncated before they are ingested into SPICE, check your database engine.

To change a field data type

1. In the data preview pane, choose the data type icon under the field you want to change.



2. Choose the target data type. Only data types other than the one currently in use are listed.



Using Unsupported or Custom Dates

Amazon QuickSight natively supports a limited number of date formats. However, you can't always control the format of the data provided to you. When your data contains a date in an unsupported format, you can tell Amazon QuickSight how to interpret it.

You can do this by editing the data set, and changing the format of the column from text or numeric to date. A screen appears after you make this change, so you can enter the format. For example, if you are using a relational data source, you can specify `MM-dd-yyyy` for a text field containing '09-19-2017', so it is interpreted as `2017-09-19T00:00:00.000Z`. If you are using a nonrelational data source, you can do the same thing starting with a numeric field or a text field.

Amazon QuickSight only supports text to date for relational (SQL) sources.

For more information on supported date formats, see [Supported Date Formats \(p. 65\)](#).

Use this procedure to help Amazon QuickSight understand dates in different formats.

1. For a data set containing unsupported date formats, edit the data as follows. For the column containing your datetime data, change the data type from text to date. Do this by choosing the colorful data type icon beneath the column name in the data preview.

| Date | Text ... | Cust... | Cust... | Cust... | Cust... | Servi... | Reve... | Billed... | Cost | Cons... | Distin... |
|-----------------|----------|----------------|---------|---------|---------|----------|---------|-----------|---------|---------|-----------|
| 2012-01-01T0... | Hxf... | SMB10 | APAC | SMB | HR | 42.07 | 63.82 | 51.07 | API | FALSE | |
| 2012-01-01T0... | Date | Hxf... | SMB10 | APAC | SMB | Billing | 28.47 | 39.14 | 26.22 | Mobile | FALSE |
| 2012-01-01T0... | Decimal | InS... | SMB64 | APAC | SMB | HR | 74.84 | 98.57 | 62.09 | Web | TRUE |
| 2012-01-01T0... | Int | InS... | SMB64 | APAC | SMB | Billing | 74.59 | 111.1 | 74.44 | Mobile | FALSE |
| 2012-01-01T0... | 010112 | A28Dzr5dnS... | SMB64 | APAC | SMB | Billing | 10.91 | 13.18 | 11.21 | API | FALSE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | HR | 50.26 | 71.02 | 45.46 | Mobile | TRUE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | Billing | 12.4 | 16.21 | 10.86 | Mobile | FALSE |
| 2012-01-01T0... | 010112 | A28Dzr5dnS... | SMB64 | APAC | SMB | Billing | 87.84 | 151.4 | 102.98 | Web | FALSE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | Billing | 34.9 | 59.26 | 40.3 | Web | FALSE |
| 2012-01-01T0... | 010112 | DXKeg08qHxf... | SMB10 | APAC | SMB | Billing | 9.31 | 12.73 | 10.82 | API | FALSE |
| 2012-01-01T0... | 010112 | DXKeg08qHxf... | SMB10 | APAC | SMB | HR | 121.38 | 185.33 | 116.75 | Web | TRUE |
| 2012-01-01T0... | 010112 | DXKeg08qHxf... | SMB10 | APAC | SMB | HR | 74.72 | 116.23 | 74.39 | Mobile | FALSE |
| 2012-01-01T0... | 010112 | A28Dzr5dnS... | SMB64 | APAC | SMB | HR | 45.61 | 56.18 | 44.94 | API | FALSE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | Billing | 5.75 | 8.15 | 6.93 | API | FALSE |
| 2012-01-01T0... | 010112 | A28Dzr5dnS... | SMB64 | APAC | SMB | HR | 89.07 | 126.65 | 81.06 | Mobile | FALSE |
| 2012-01-01T0... | 010112 | DXKeg08qHxf... | SMB10 | APAC | SMB | Billing | 72.21 | 124.93 | 84.95 | Web | FALSE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | HR | 67.13 | 113.75 | 71.66 | Web | FALSE |
| 2012-01-01T0... | 010112 | mbaJbeH8pd... | SMB55 | APAC | SMB | HR | 14.42 | 15.91 | 12.73 | API | FALSE |
| 2012-01-01T0... | 010112 | PG3rSXz6Ry... | Sta4 | APAC | Startup | Billing | 2807.42 | 3617.18 | 2459.73 | Web | TRUE |
| 2012-01-01T0... | 010112 | PG3rSXz6Ry... | Sta4 | APAC | Startup | Billing | 2453.58 | 3118.96 | 2089.72 | Mobile | FALSE |
| 2012-01-01T0... | 010112 | PG3rSXz6Ry... | Sta4 | APAC | Startup | HR | 1932.29 | 2783.01 | 1753.3 | Web | FALSE |
| 2012-01-01T0... | 010112 | PG3rSXz6Ry... | Sta4 | APAC | Startup | HR | 1042.19 | 824.76 | 659.8 | API | FALSE |
| 2012-01-01T0... | 010112 | PG3rSXz6Ry... | Sta4 | APAC | Startup | HR | 2000.01 | 2340.11 | 1497.67 | Mobile | FALSE |

Note

Integer dates that aren't Unix epoch datetimes don't work as is. For example, these formats are not supported as integers: `MMddyy`, `MMddyyyy`, `ddMMyy`, `ddMMyyyy`, and `yyMMdd`. The workaround is to first change them to text format. Make sure all your rows contain six digits (not five). Then change the text data type to datetime.

For more information on Unix epoch datetimes, see [epochDate \(p. 445\)](#).

When you change the data type to date, the **Edit date format** screen appears.

2. Type your date format, indicating which parts are month, date, year, or time. Formats are case-sensitive.
3. Choose **Validate** to make sure Amazon QuickSight can now interpret your datetime data with the format you specified. Rows that don't validate are skipped and omitted from the data set.
4. When you are satisfied with the results, choose **Update**. Otherwise, choose **Close**.

Working with Calculated Fields

Create calculated fields to use operators or functions to analyze or transform field data. For details about supported functions and operators, see [Calculated Field Function and Operator Reference for Amazon QuickSight \(p. 433\)](#).

You can use multiple functions and operators in a calculated field. For example, you might use the `formatDate` function to extract the year from a date field, and then the `ifelse` function to segment records based on the year.

```
ifelse(formatDate(order_date, 'yyyy') > '2000', 'this
century', 'last century')
```

You can create a calculated field based on one or more data set fields or existing calculated fields. For example, you can use the `ifelse` function to create a `quarter` field extrapolated from a month value.

```
ifelse(month <= 3, 1, month > 3 AND month <= 6, 2,
month > 6 AND month <= 9, 3, 4)
```

You can then use that calculated `quarter` field and a sales amount field to identify high-spending customers for the first quarter.

```
ifelse(quarter = 1 AND sales_amount >= 10000, 'review
account', 'n/a')
```

You can add calculated fields to a data set during data preparation or from the analysis page. When you add a calculated field to a data set during data preparation, it's available to all analyses that use that data set. When you add a calculated field to a data set in an analysis, it's available only in that analysis. For information about adding calculated fields during data preparation, see [Adding a Calculated Field During Data Preparation \(p. 156\)](#). For information about adding calculated fields in an analysis, see [Adding a Calculated Field to an Analysis \(p. 219\)](#).

Handling Decimal Values in Calculated Fields

The decimal data type supports up to four decimal places to the right of the decimal point. During data preparation, calculated fields that use decimal data with more than four decimal places use the full value to perform the calculation. If the result is again decimal data that uses more than four decimal places, the result is then truncated when the data set is imported into [SPICE \(p. 2\)](#) or displayed in an analysis.

As an example, take decimal field `FieldA` with a value of 0.00006, which is displayed in the user interface as 0.0. The full value 0.00006 is still used in all calculations. The following are some examples of how you can use this value in calculations:

- `FieldA > 0 = true`. The calculated field value displayed in the analysis or imported into SPICE is `true`.
- `ceil(FieldA) = 1`. The calculated field value displayed in the analysis or imported into SPICE is `1`.
- `FieldA + 0.00009 = 0.00015`. The calculated field value displayed in the analysis or imported into SPICE is `0.0001`.
- `FieldA * 1.5 = 0.00009`. The calculated field value displayed in the analysis or imported into SPICE is `0.0`.

Adding a Calculated Field During Data Preparation

Create calculated fields to use functions and operators to analyze or transform field data. For details about supported functions and operators, see [Calculated Field Function and Operator Reference for Amazon QuickSight \(p. 433\)](#). For more information about using calculated fields, see [Working with Calculated Fields \(p. 155\)](#).

You can add calculated fields to a data set during data preparation or from the analysis page. When you add a calculated field to a data set during data preparation, it's available to all analyses that use that data set. When you add a calculated field to a data set in an analysis, it's available only in that analysis.

Use this topic to learn about adding calculated fields during data preparation. For information about adding calculated fields in an analysis, see [Adding a Calculated Field to an Analysis \(p. 219\)](#).

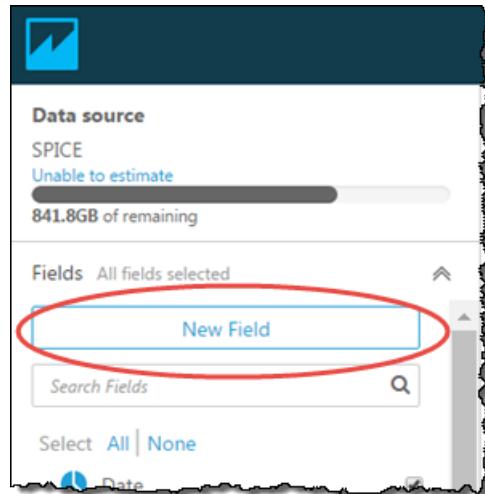
Adding a Calculated Field

Use the following procedure to add a calculated field.

1. Do one of the following:

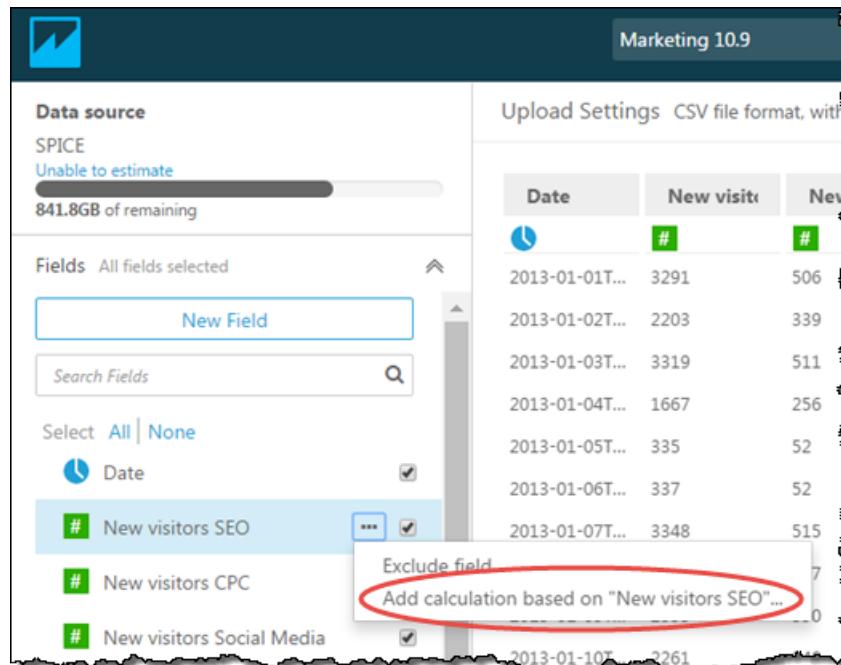
- Create a calculated field without having the formula populated by a field.

On the data preparation page, expand the **Fields** pane, and then choose **New Field**.

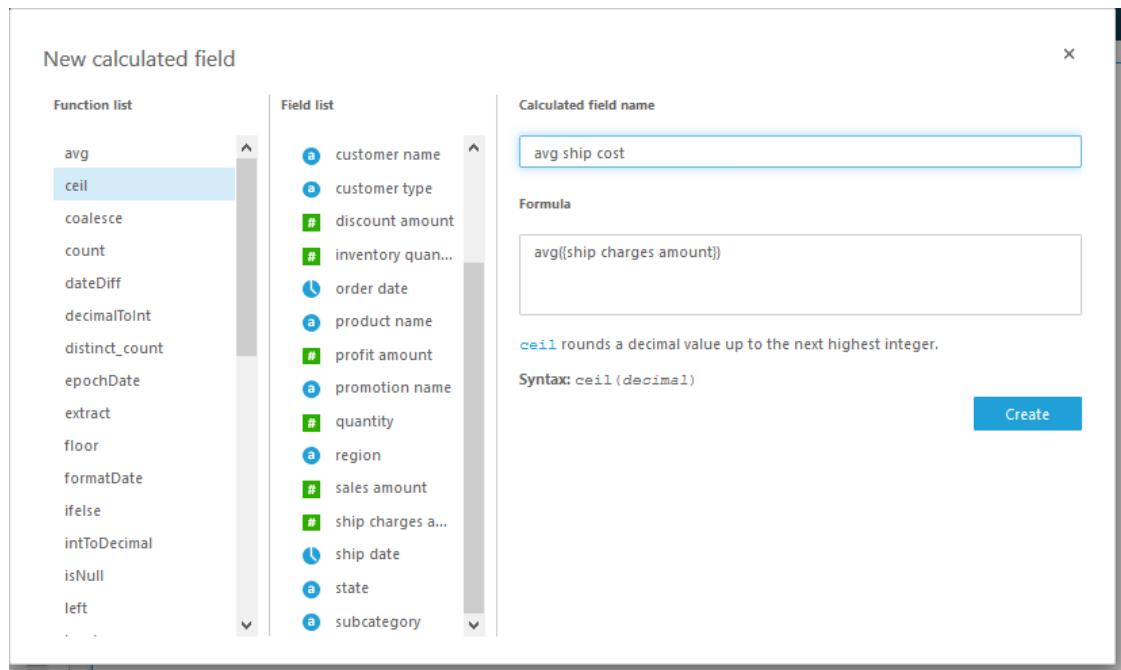


- Create a calculated field and have the formula populated with a specified field.

On the data preparation page, expand the **Fields** pane. Hover over the field that you want to use as the basis for the calculated field, choose the ellipsis at its right, and then choose **Add calculation based on <field name>**.

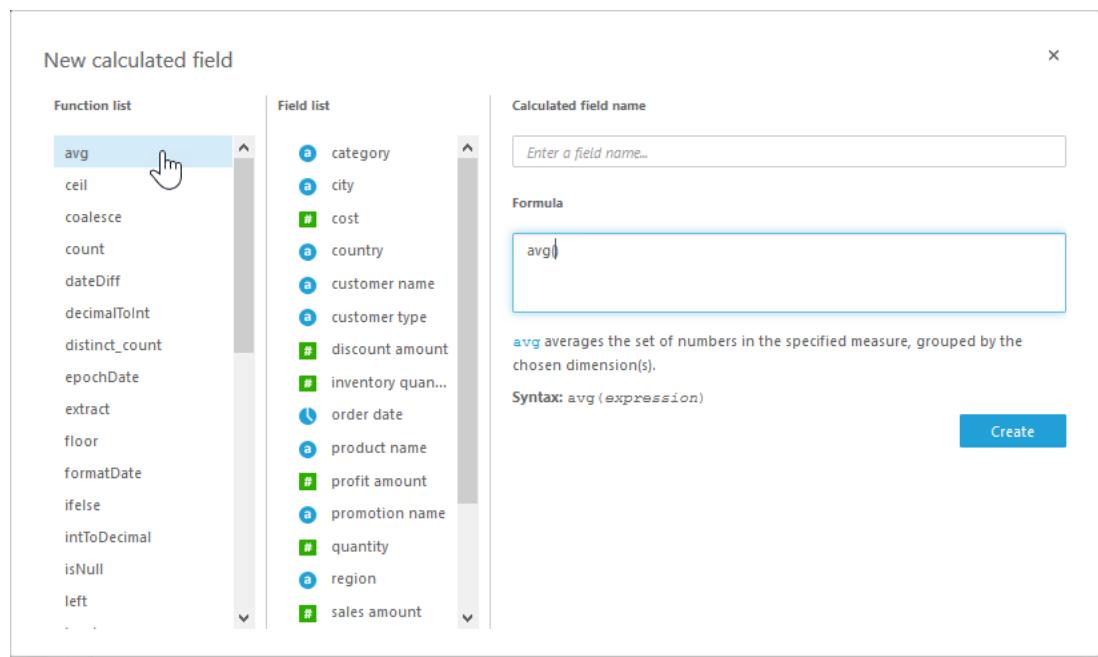


2. In the **Calculated field** pane, highlight the value in **Calculated field name**, and then type a name for the calculated field.



3. Add a function to the calculated field formula by doing one of the following:

- If you created the calculated field by choosing **New Field**, choose a function from **Function list** and then choose **Add**.

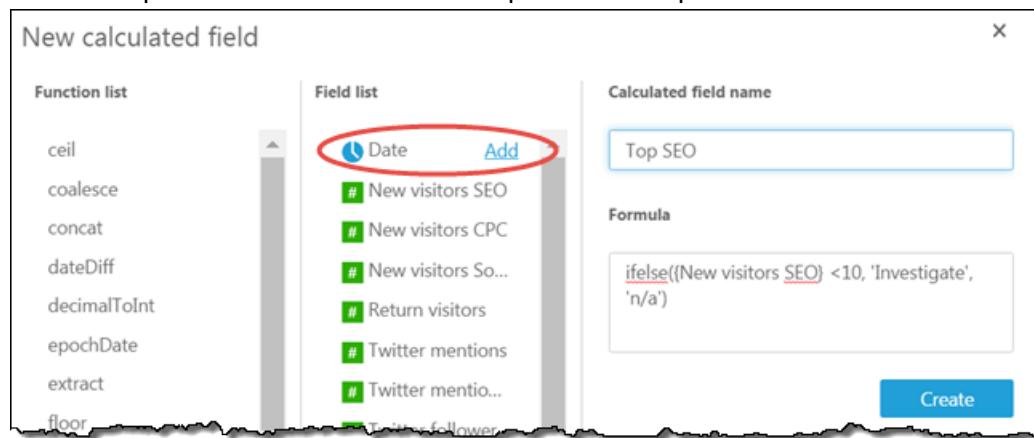


- If you created the calculated field by choosing a specific field to use, place your cursor in front of the field name in **Formula**. Then type the name of the function that you want to use and an open parenthesis, then place your cursor after the field name and type a close parenthesis.



4. In **Formula**, type any parameters needed by the function (help for the function displays below **Formula**). As needed, choose fields from **Field list** and then choose **Add** to add them to the formula. You can also choose additional functions from the **Function list** to complete the formula.

If you use a field name that has a space or a nonalphanumeric character other than an underscore, enclose the field name in curly braces when referencing it, for example `{customer id}`. Curly braces are optional if the field name has no space or a nonalphanumeric character.

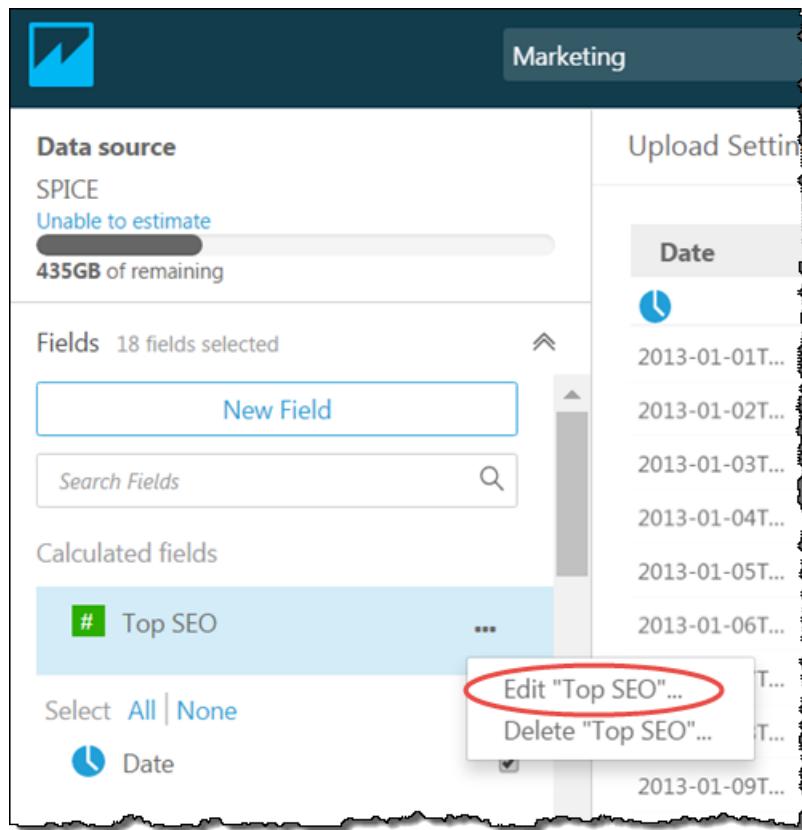


5. Choose **Create**.

The new calculated field is created, and appears in the **Calculated fields** section at the top of the **Fields** pane.

Editing a Calculated Field

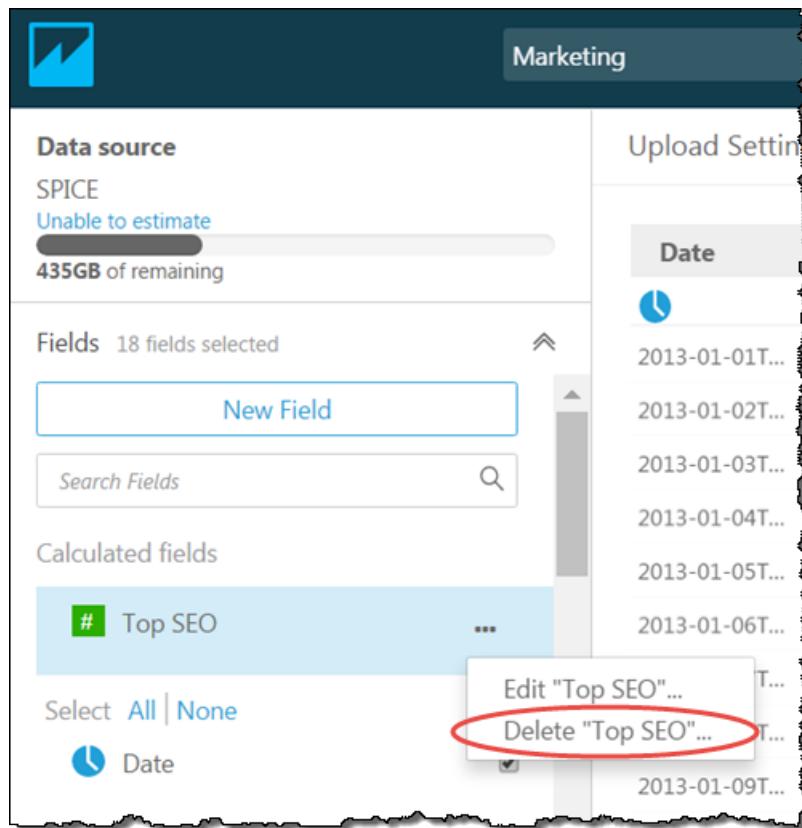
To edit a calculated field, locate the field you want to edit in the **Calculated fields** section of the **Fields** pane, hover over it, choose the ellipsis that appears to the right of it, and then choose **Edit <field name>**.



Deleting a Calculated Field

To delete a calculated field, locate the field you want to delete in the **Calculated fields** section of the **Fields** pane, hover over it, choose the ellipsis that appears to the right of it, and then choose **Delete <field name>**.

As with regular fields, if you delete a calculated field that is used in a visual, that visual breaks. You then need fix it the next time you open the relevant analysis.



Adding a Filter

You can use filters to refine the data in a data set. Each filter applies only to a single field. You can apply filters to both regular and calculated fields.

If you create multiple filters, all top-level filters apply together using AND. If you group filters by adding them inside a top-level filter, the filters in the group apply using OR.

Amazon QuickSight applies all of the enabled filters to the field. For example, if there is one filter of state = WA and another filter of sales >= 500, then the data set only contains records that meet both of those criteria. If you disable one of these, only one filter applies.

Take care that multiple filters applied to the same field aren't mutually exclusive.

Note

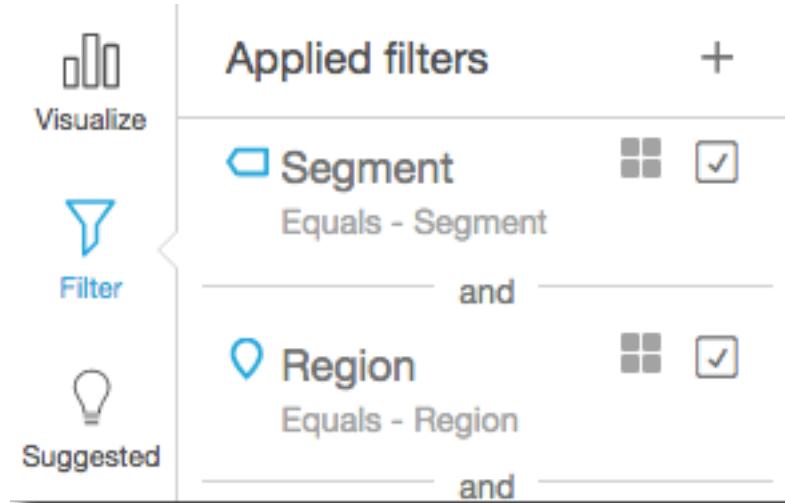
The data preview shows you the results of your combined filters only as they apply to the first 1000 rows. If all of the first 1000 rows are filtered out, then no rows show in the preview. This effect occurs even when rows after the first 1000 aren't filtered out.

Topics

- [Viewing Filters \(p. 162\)](#)
- [Adding a Filter \(p. 163\)](#)
- [Editing a Filter \(p. 174\)](#)
- [Deleting a Filter \(p. 176\)](#)

Viewing Filters

To see the filters for a data set, start on the data preparation page. Choose the **Filters** pane on the left side of the screen. It's located beneath the **Fields** pane.



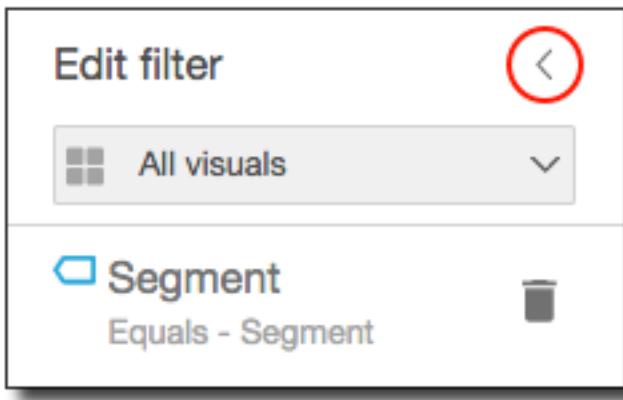
If a single field has multiple filters, they are grouped together. They display in order of create date, with the oldest filter on top.



Viewing Filter Details

Choose the filter to open the **Edit Filter** view and see filter details.

Choose the **Edit filter** selector to close that view and return to the **Filters** view.



Adding a Filter

You can apply filters to both regular and calculated fields, which include text (string data type), numeric (int or decimal data types), and date fields. Depending on the data type of the field you choose, you are offered different filtering options as described in the following topics.

Topics

- [Adding a Text Filter \(p. 163\)](#)
- [Adding a Numeric Filter \(p. 167\)](#)
- [Adding a Date Filter \(p. 169\)](#)

Adding a Text Filter

You have two options for creating text field filters. You can specify multiple field values to include or exclude using the **Custom filter list** filter type, or specify a single value that the field value must equal or not equal using the **Custom filter** filter type.

Adding a Text Filter by Specifying Multiple Field Values

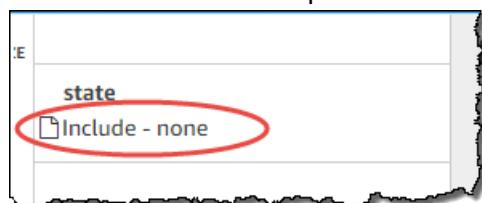
With the **Custom filter list** filter type, you specify one or more field values to filter on, and whether you want to include or exclude records that contain those values. The specified value and actual field value must match exactly for the filter to be applied to a given record.

Use the following procedure to create a text field filter by specifying multiple field values.

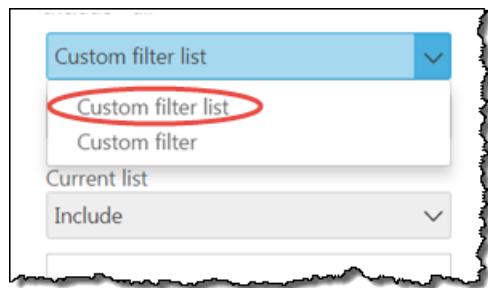
1. On the data preparation page, expand the **Filters** pane.
2. Choose **New filter**, and then choose a text field to filter on.

Doing this creates a new filter with no criteria.

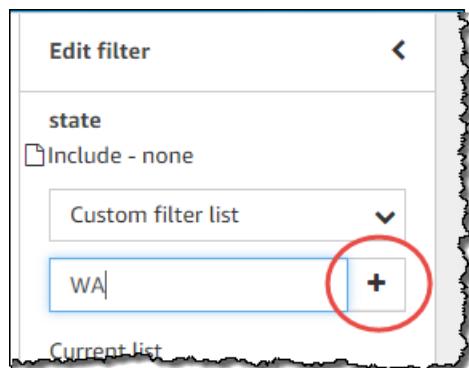
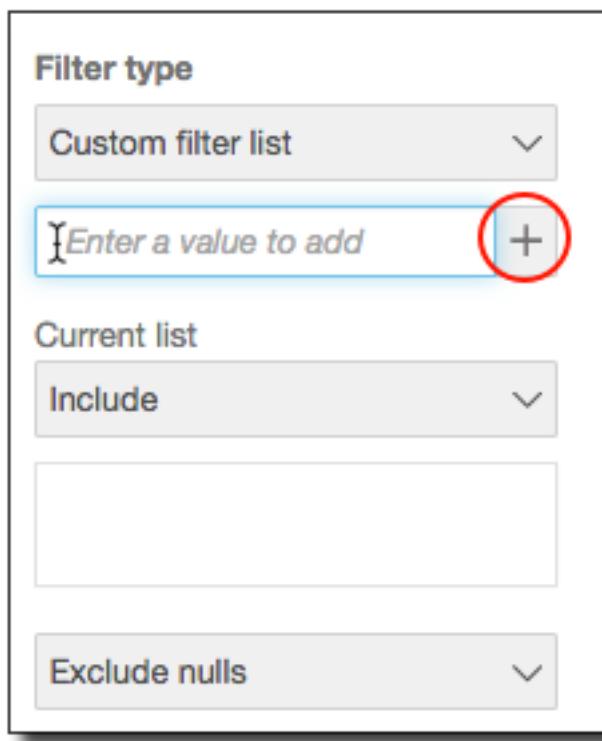
3. Choose the new filter to expand it.



4. Change the filter type to **Custom filter list**.



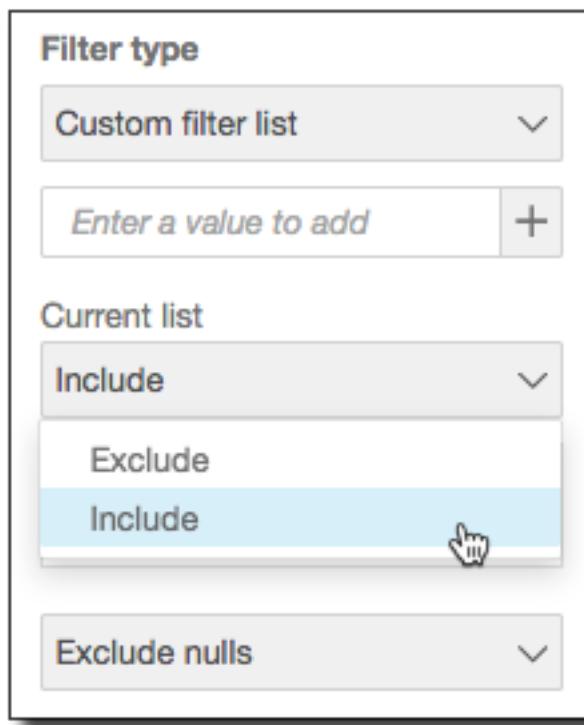
5. Type a field value in **Enter a value to add**, and then choose the add icon.



To remove a field value from the criteria, choose its delete icon.



6. (Optional) Repeat Step 5 until you have added all of the field values that you want to filter on.
7. Choose whether to include or exclude records that contain the field values you selected.



8. Choose **Apply**.

Adding a Text Filter by Specifying a Single Field Value

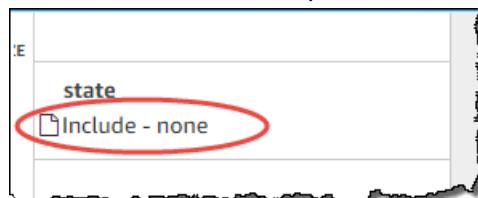
With the **Custom filter** filter type, you specify a single value that the field value must equal or not equal. If you choose an equal comparison, the specified value and actual field value must match exactly in order for the filter to be applied to a given record.

Use the following procedure to create a text field filter by specifying one field value.

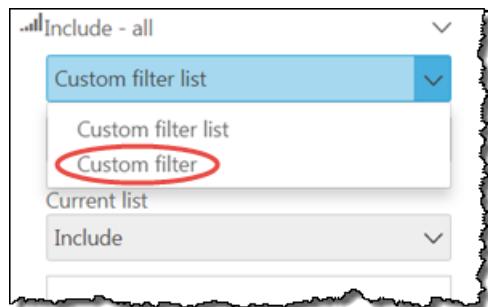
1. On the data preparation page, expand the **Filters** pane.
2. Choose **New filter**, and then choose a text field to filter on.

Doing this creates a new filter with no criteria.

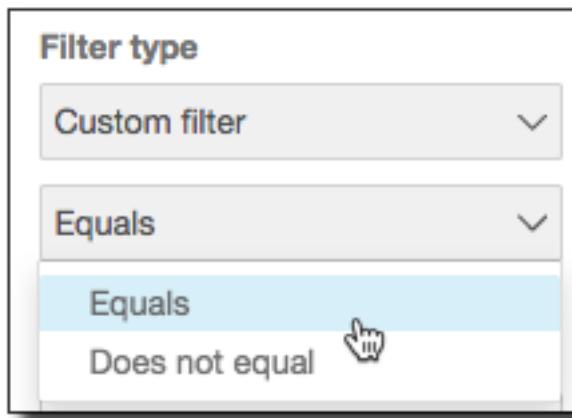
3. Choose the new filter to expand it.



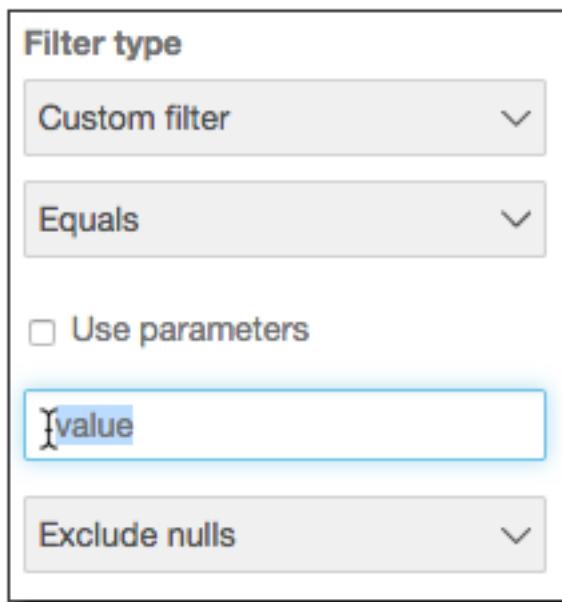
4. Change the filter type to **Custom filter**.



5. Choose a comparison type.



6. Type a field value in the **value** box.



7. Choose **Apply**.

Adding a Numeric Filter

Fields with decimal or int data types are considered numeric fields. You create filters on numeric fields by specifying a comparison type, for example **Greater than** or **Between**, and a comparison value or values as appropriate to the comparison type. Comparison values must be positive integers and should not contain commas.

You can use the following comparison types in numeric filters:

- Equals
- Does not equal
- Greater than
- Greater than or equal to
- Less than
- Less than or equal to
- Between

Creating a Numeric Filter

Use the following procedure to create a numeric field filter.

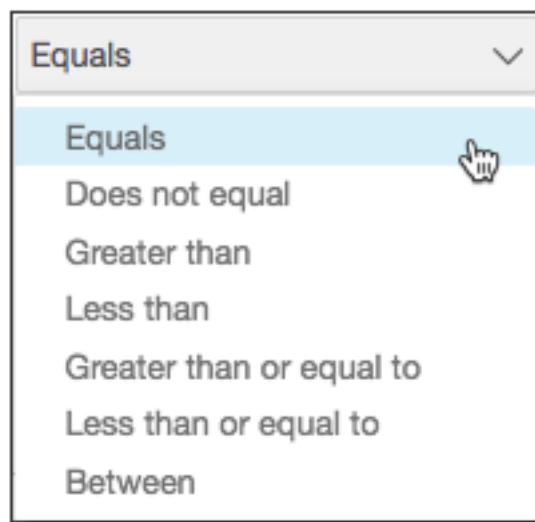
1. On the data preparation page, expand the **Filters** pane.
2. Choose **New filter**, and then choose a numeric field to filter on.

Doing this creates a new filter with no criteria.

3. Choose the new filter to expand it.



4. Choose a comparison type.



5. If you have chosen a comparison type other than **Between** or **Not between**, type a comparison value.

No aggregation

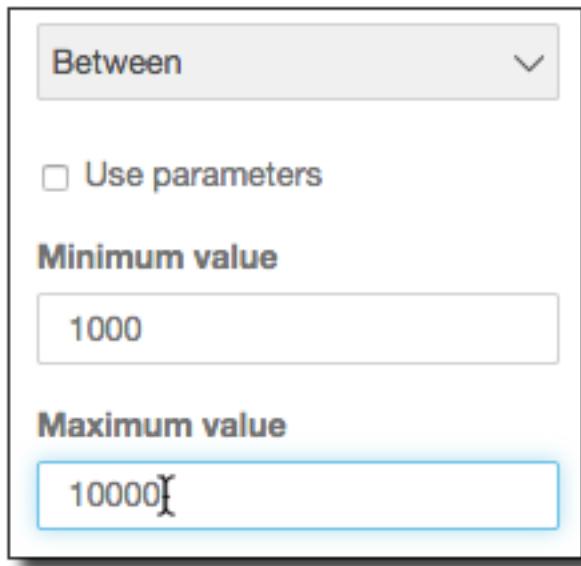
Equals

Use parameters

1000

Include nulls

If you have chosen a comparison type of **Between** or **Not between**, type the beginning of the value range in **Minimum value** and the end of the value range in **Maximum value**.



6. Choose **Apply**.

Adding a Date Filter

You create filters on date fields by selecting the filter conditions and date values that you want to use. There are two filter types for dates:

- **Range** – A series of dates based on a time range and comparison type. You can filter records based on whether the date field value is before or after a specified date, or within a date range. You enter date values in the format MM/DD/YYYY. You can use the following comparison types:
 - **Between** – Between a start date and an end date
 - **After** – After a specified date
 - **Before** – Before a specified date
- **Relative** – A series of date/time elements based on the current date. You can filter records based on the current date and your selected unit of measure (UOM). Date filter UOMs include years, quarters, months, weeks, days, hours, and minutes. You can use the following comparison types:
 - **Previous** – The previous UOM—for example, the previous year.
 - **This** – This UOM, which includes all dates and times that fall within the select UOM, even if they occur in the future.
 - **to date or up to now** – UOM to date, or UOM up to now. The displayed phrase adapts to the UOM you choose. However, in all cases this option filters out data that is not between the beginning of the current UOM and the current moment.
 - **Last n** – The last specified number of the given UOM, which includes all of this UOM and all of the last $n - 1$ UOM. For example, let's say today is May 10, 2017. You choose to use *years* as your UOM, and set Last *n* years to 3. The filtered data includes data for all of 2017, plus all of 2016, and all of 2015. If you have any data for the future dates of the current year (2017 in this example), these records are included in your data set.

Comparisons are applied inclusive to the date specified. For example, if you apply the filter <date> **Before 1/1/16**, the records returned include all rows with date values through 1/1/16 23:59:59.

Note

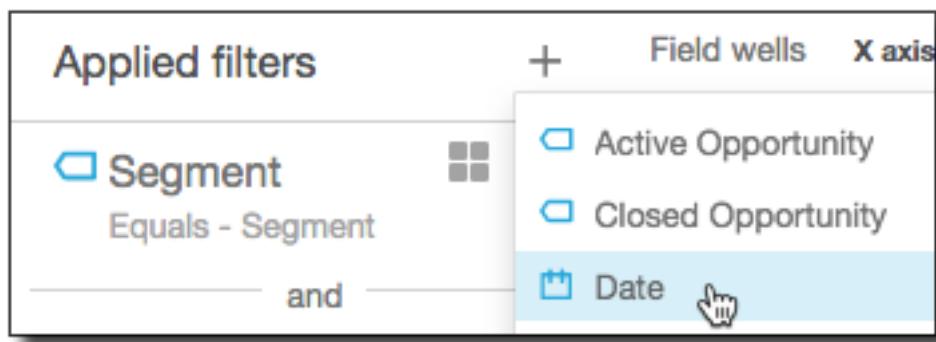
If a column or attribute has no time zone information, then the client query engine sets the default interpretation of that datetime data. For example, suppose that a column contains a timestamp, rather than a timestamptz, and you are in a different time zone than the data's origin. In this case, the engine can render the timestamp differently than you expect. Amazon QuickSight and SPICE (p. 2) both use Universal Coordinated Time (UTC) times.

Creating a Date Filter

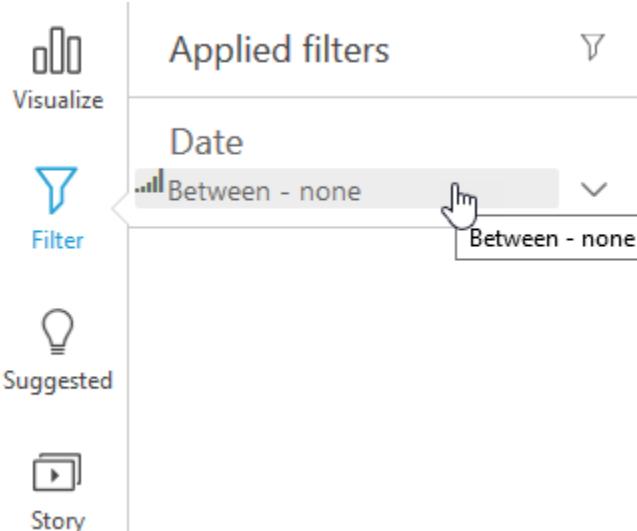
Use the following procedure to create a filter for a date field.

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose **Create one**, and then choose a date field to filter on.

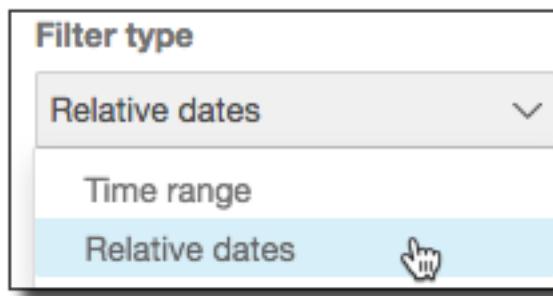
Doing this creates a new filter with no criteria.



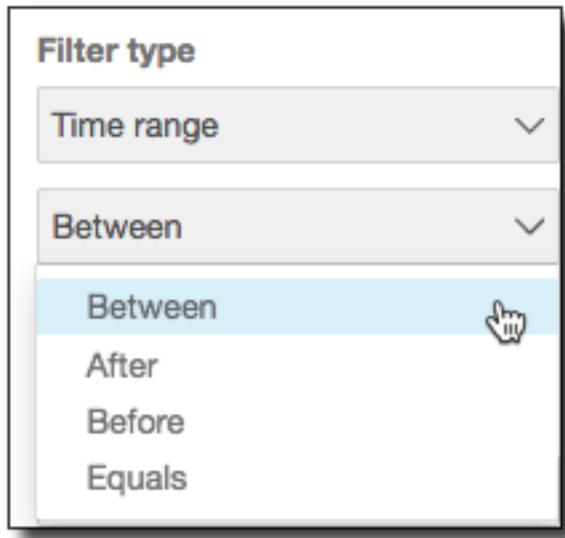
3. If the filter does not expand to show options, choose the new filter to expand it.



4. Choose a filter type.

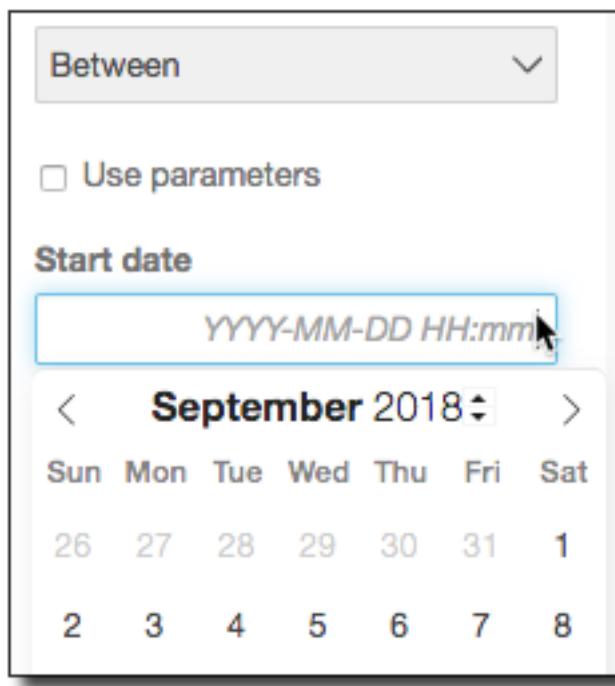


5. Do the following to create a date filter on a time range:
 - a. To create a date filter on a time range, choose a comparison type.

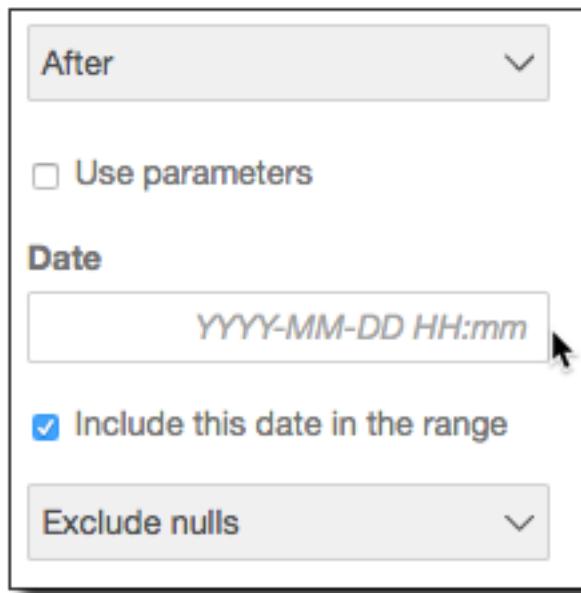


- b. Type date values.

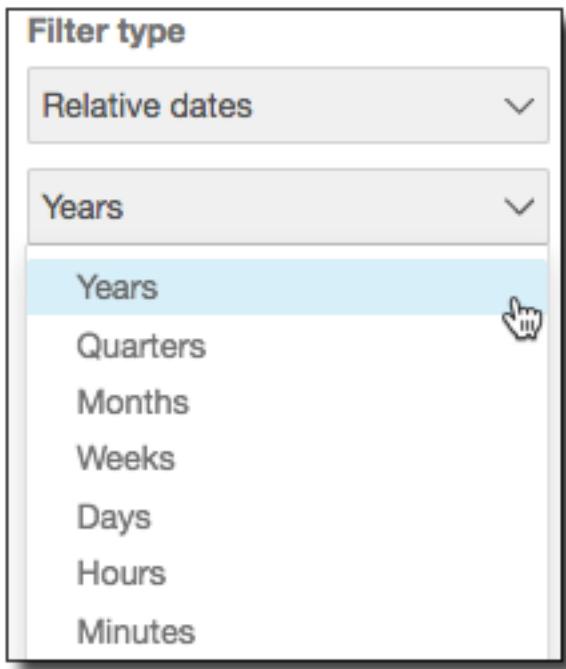
If you choose a **Between** comparison, type a start and end date, or select the **Start date** or **End date** field to bring up the date picker control and select dates.



If you choose a **Before** or **After** comparison, type a date, or choose the date field to bring up the date picker control and select a date instead.

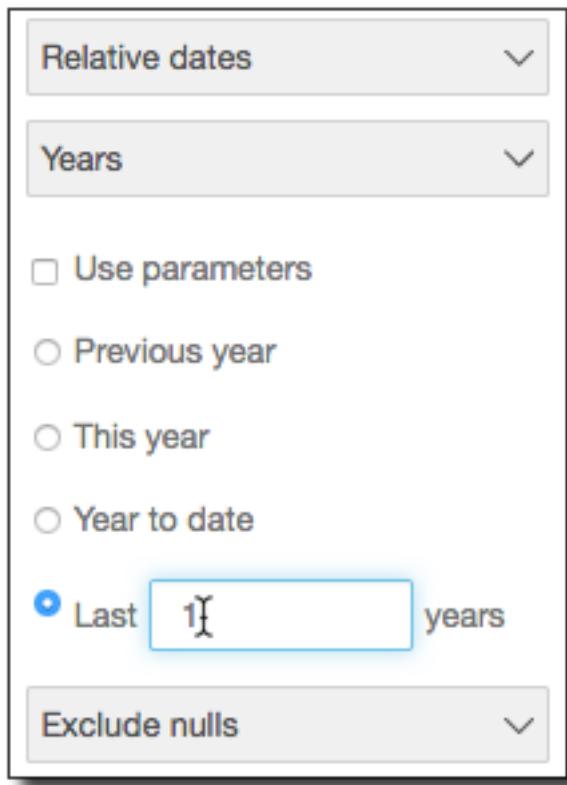


6. Do the following to create a date filter on relative dates:
 - a. Choose a unit of measure (UOM).



- b. Choose one option. If you choose **Last n UOM**, specify a number for your range—for example, last 3 years, or last 2 hours.

For more information about date filter options, see [Adding a Date Filter \(p. 169\)](#).



7. Choose **Apply**.

Editing a Filter

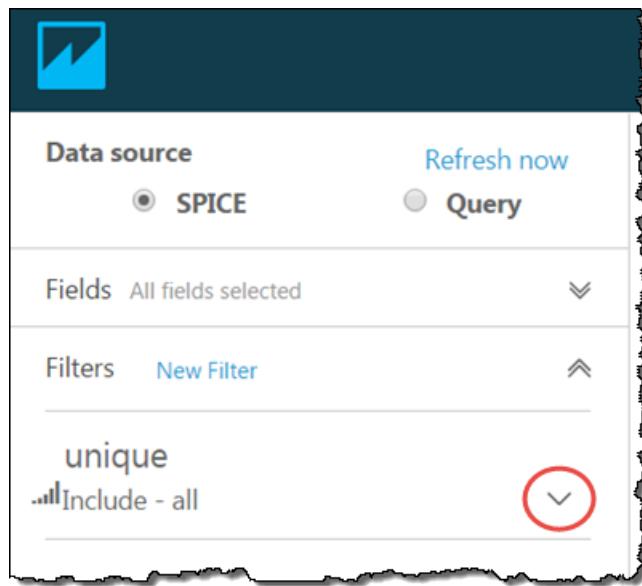
You can edit a filter by changing the filter criteria or enabling or disabling the filter.

You can't change the field a filter applies to. To apply a filter to a different field, create a new filter instead.

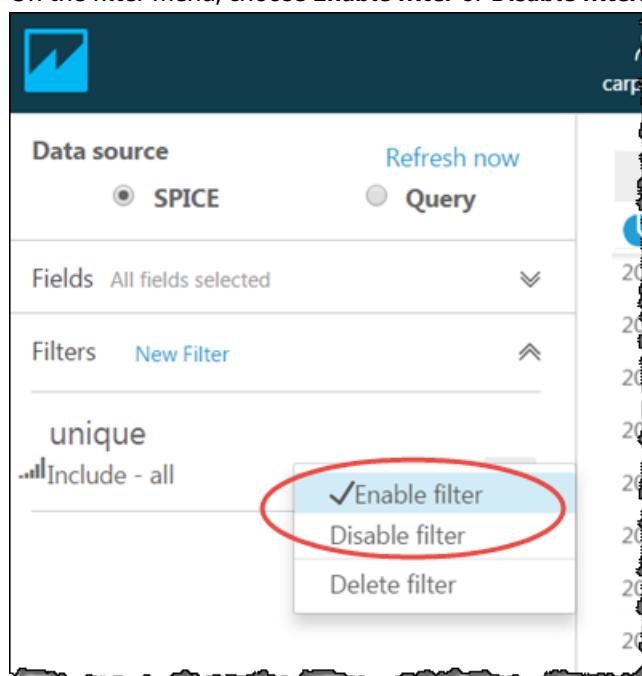
Enabling or Disabling a Filter

You can use the filter menu to enable or disable a filter. When you create a filter, it's enabled by default.

1. On the data preparation page, expand the **Filters** pane.
2. Choose the filter you want to enable or disable, and then choose the selector to the right of the filter name.



3. On the filter menu, choose **Enable filter** or **Disable filter**.



Changing Filter Criteria

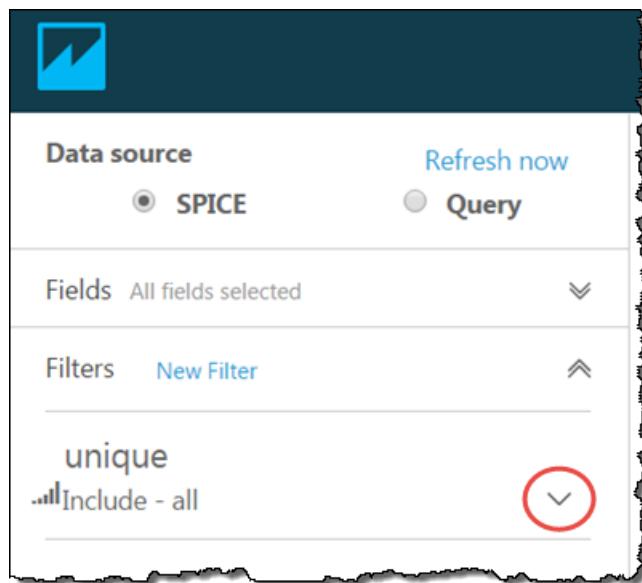
Use the following procedure to modify a filter.

1. On the data preparation page, expand the **Filters** pane.
2. Choose the filter you want to modify to see the filter details.
3. Change the comparison type or values.
4. Choose **Apply**.

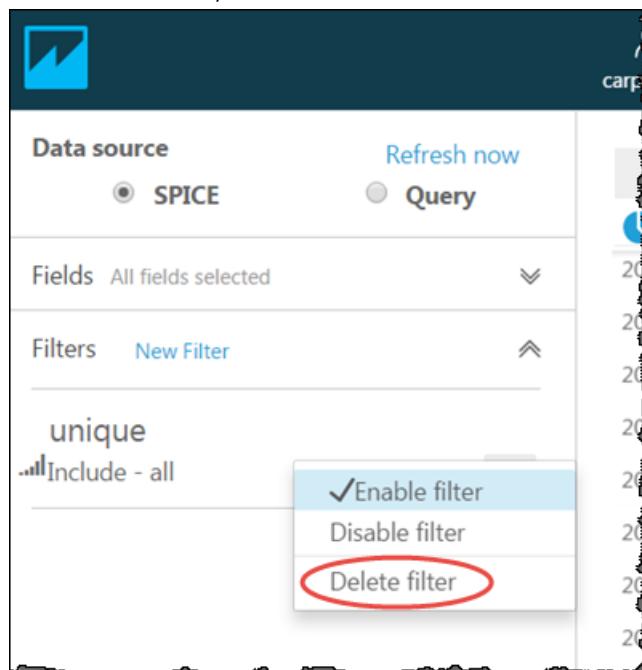
Deleting a Filter

Use the following procedures to delete a filter.

1. On the data preparation page, expand the **Filters** pane.
2. Choose the filter you want to enable or disable, and then choose the selector to the right of the filter name.



3. On the filter menu, choose **Delete filter**.



Adding Geospatial Data

You can flag geographic fields in your data, so that Amazon QuickSight can display them on a map. Amazon QuickSight can chart latitude and longitude coordinates. It also recognizes geographic components such as country, state, county, city, and zip code. You can also create geographic hierarchies that can disambiguate similar entities, for example the same city name in two states.

Note

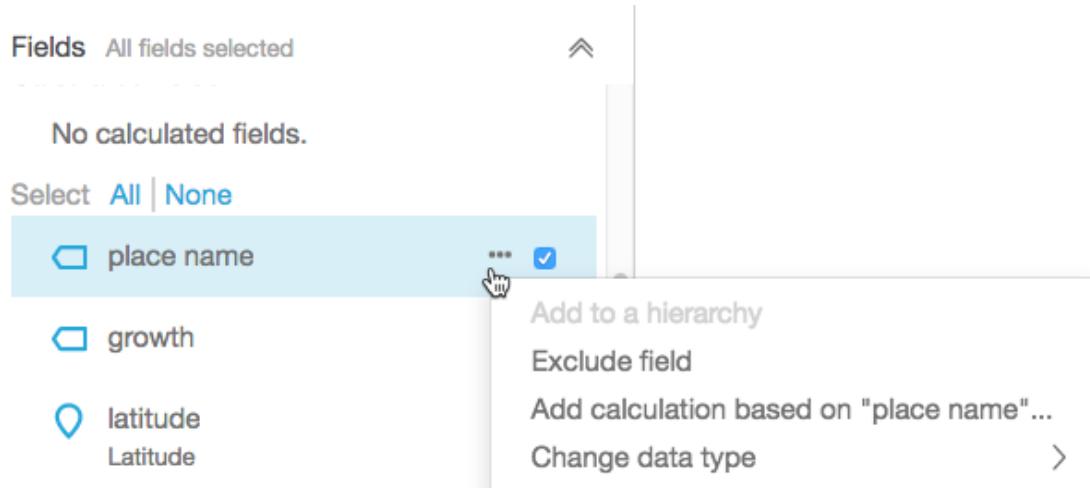
For now, automatic geocoding works only for US locations. You can add latitude and longitude coordinates to your data to make geospatial charts.

Geospatial charts in Amazon QuickSight aren't currently supported in some geographies, including India and China. We are working on adding support for more regions.

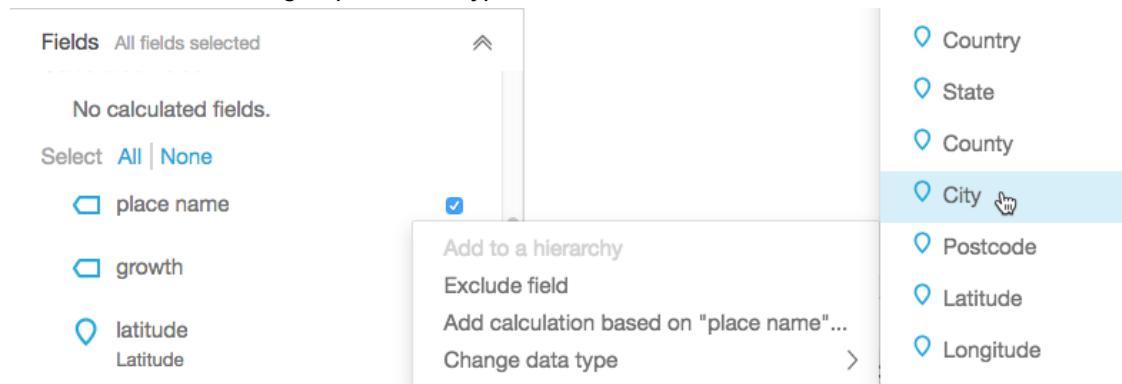
Use the following procedures to add geospatial data types and hierarchies to your data set.

1. On the data preparation page, label the geographic components with the correct data type.

There are several ways to do this. One is to choose the field under **Fields** and use the ellipses icon (...) to open the context menu.



Then choose the correct geospatial data type.



You can also change the data type in the work area with the data sample. To do this, choose the data type listed under the field name. Then choose the data type you want to assign.

2. Verify that all geospatial fields necessary for mapping are labeled as geospatial data types. You can check this by looking for the place marker icon. This icon appears under the field names across the top of the page, and also in the **Fields** pane on the left.



Also check the name of the data type, for example latitude or country.

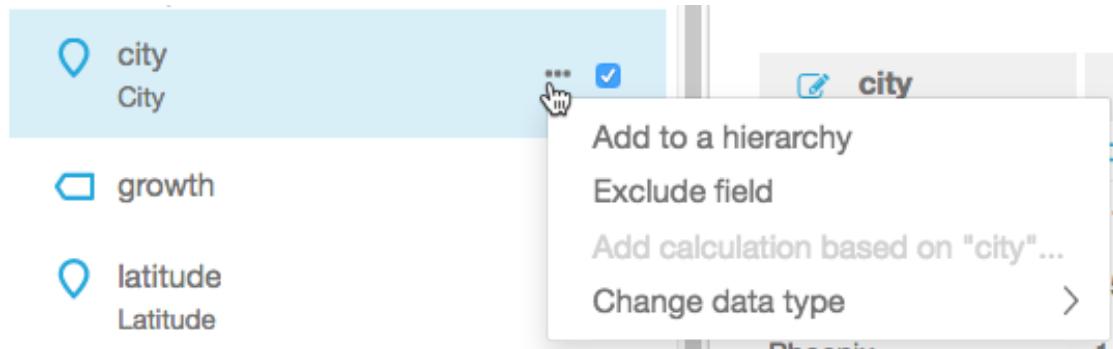
3. (Optional) You can set up a hierarchy or grouping for geographical components (state, city), or for latitude and longitude coordinates. For coordinates, you must add both latitude and longitude to the geospatial field wells.

Note

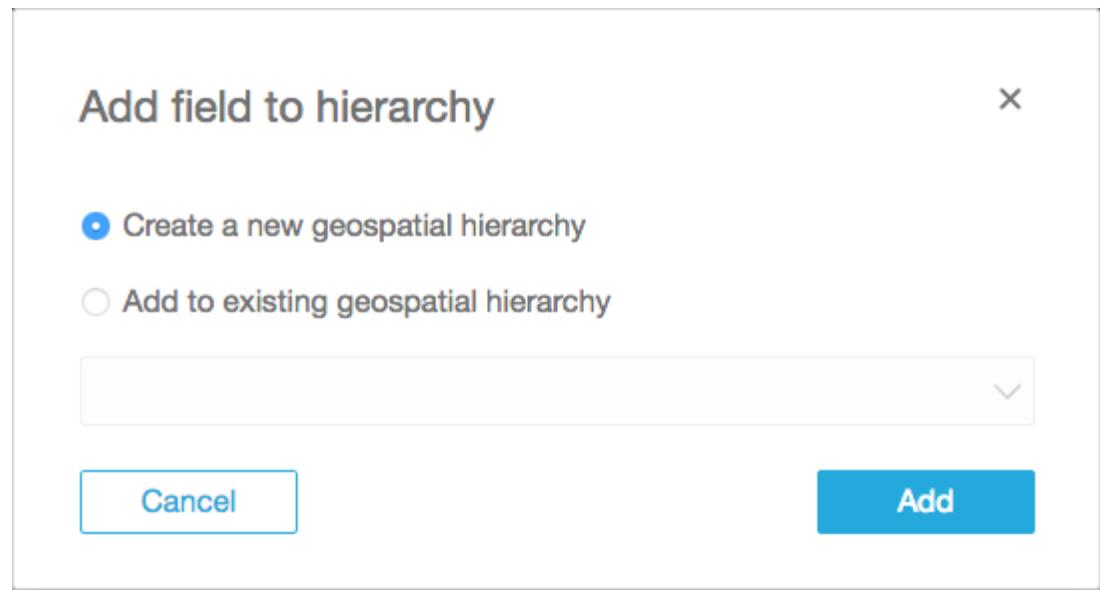
Currently drill-down is not working in map charts. We are working to add this.

To create a hierarchy or grouping, first choose one of these fields in the **Fields** pane. Each field can only belong to one hierarchy. It doesn't matter which one you choose first, or what order you add the fields in.

Choose the ellipsis icon (...) next to the field name. Then choose **Add to a hierarchy**.



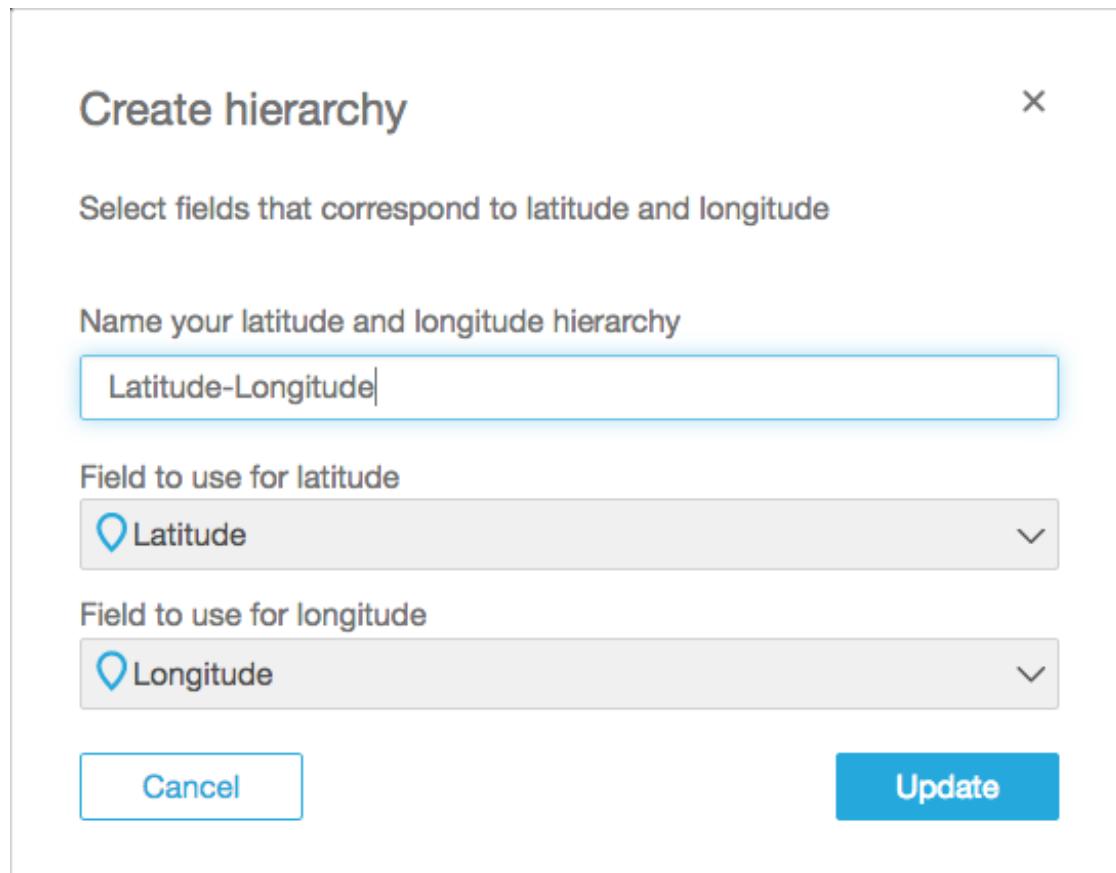
4. On the **Add field to hierarchy** screen, choose one of the following:
 - Choose **Create a new geospatial hierarchy** to create a new grouping.
 - Choose **Add to existing geospatial hierarchy** to add a field to a grouping that already exists. The existing hierarchies displayed include only those of matching geospatial types.



Choose **Add** to confirm your choice.

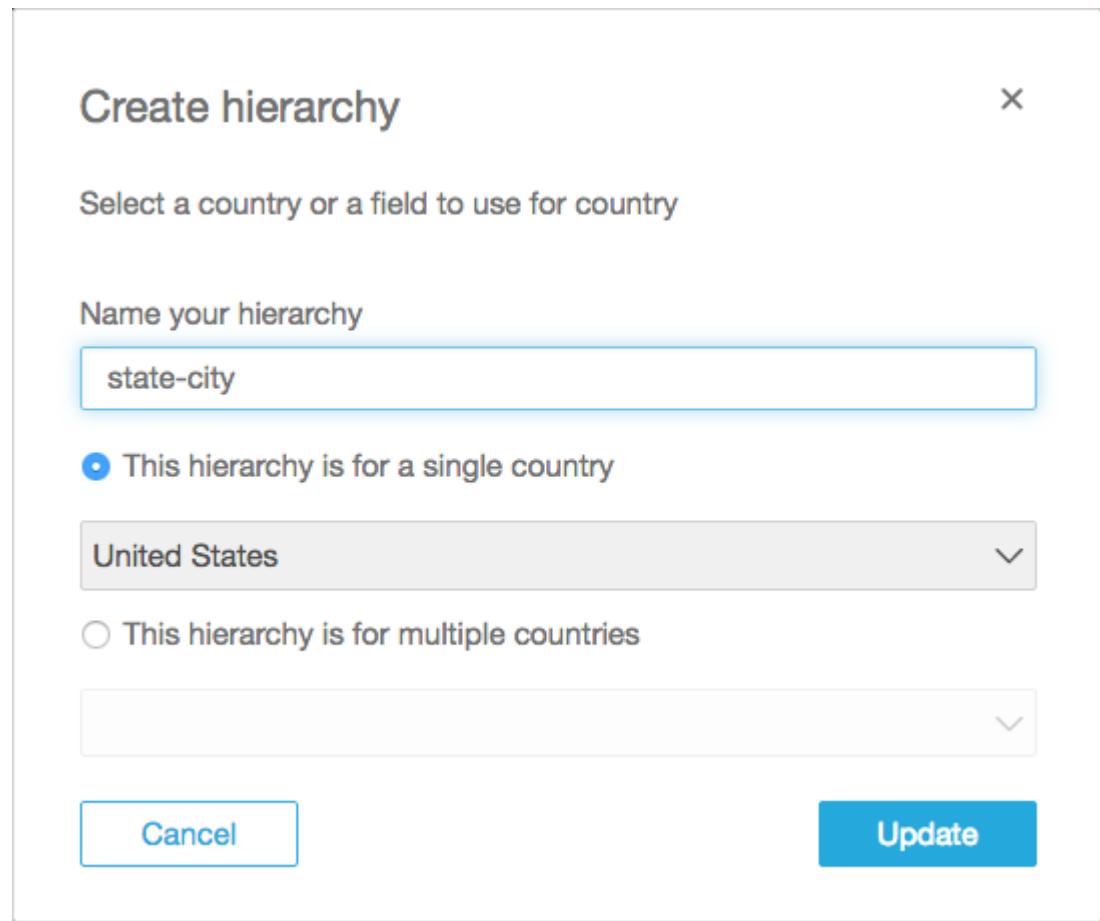
5. On the **Create hierarchy** screen, name your hierarchy.

If you are creating a latitude and longitude grouping, the **Create hierarchy** screen appears as follows. Depending on whether you chose latitude or longitude in the previous steps, either latitude or longitude displays on this screen. Make sure your latitude field shows under **Field to use for latitude**. Also make sure your longitude shows under **Field to use for longitude**.



For geographical components, the **Create hierarchy** screen has two choices:

- Choose **This hierarchy is for a single country** if your data only contains one country. Choose the specific country from the list. Your data doesn't need to contain every level of the hierarchy. You can add fields to the hierarchy in any order.
- Choose **This hierarchy is for multiple countries** if your data contains more than one country. Choose the field that contains the country names. Currently, Amazon QuickSight only supports US geographical areas. Thus, at this time, you can't create a hierarchy containing other geographical types.



For either hierarchy type, choose **Update** to continue.

6. Continue by adding as many fields to the hierarchy as you need to.

Your geospatial groupings appear in the **Fields** pane.

Fields All fields selected

Select All | None

state-city

United States

📍 state
State

📍 city
City

Changing a Geospatial Grouping

You can change a geospatial hierarchy or grouping that exists in a data set.

Use the following procedure to edit or disband a geospatial hierarchy.

1. Open the data set. In the **Fields** pane, choose the hierarchy name.

Fields All fields selected

Select All | None

Sales

📍 country
Country

📍 state



Edit hierarchy
Disband hierarchy

2. Choose the ellipsis icon (...), then choose one of the following options.

Choose **Disband hierarchy** to remove the hierarchy from the data set. You can't undo this operation. However, you can recreate your hierarchy or grouping by starting again at step 1. Disbanding the hierarchy doesn't remove any fields from the data set.

Choose **Edit hierarchy** to make changes to the hierarchy. Doing this reopens the creation screens, so you can make different choices in rebuilding your hierarchy.

Geospatial Troubleshooting

Use this section to discover QuickSight's requirements for correctly processing geospatial data. If QuickSight doesn't recognize your geospatial data as geospatial, use this section to help troubleshoot the issue. Make sure that your data follows the guidelines listed, so that it works in geospatial visuals.

Note

Geospatial charts in Amazon QuickSight currently aren't supported in some geographies, including India and China. We are working on adding support for more regions.

If your geography follows all the guidelines listed here, and still generates errors, contact the Amazon QuickSight team from within the Amazon QuickSight console.

Topics

- [Geocoding Issues \(p. 183\)](#)
- [Issues with Latitude and Longitude \(p. 184\)](#)

Geocoding Issues

Amazon QuickSight geocodes place names into latitude and longitude coordinates. It uses these coordinates to display place names on the map. Amazon QuickSight skips any places that it can't geocode.

For this process to work properly, your data must include at least the country. Also, there can't be duplicate place names inside of a parent place name.

A few issues prevent place names from showing up on a map chart. These issues include unsupported, ambiguous, or invalid locations, as described following.

Topics

- [Issues with Unsupported Areas \(p. 183\)](#)
- [Issues with Ambiguous Locations \(p. 183\)](#)
- [Issues with Invalid Geospatial Data \(p. 184\)](#)
- [Issues with the Default Country in Geocoding \(p. 184\)](#)

Issues with Unsupported Areas

Important

At this time, Amazon QuickSight only supports geographical place names in data related to the US.

To map locations in countries other than the US, include latitude and longitude coordinates in your data. Use these coordinates in the geospatial field well to make locations show on a map chart.

Issues with Ambiguous Locations

Geospatial data can't contain ambiguous locations. For example, suppose that the data contains a city named **Springfield**, but the next level in the hierarchy is country. Because multiple states have a city named **Springfield**, it isn't possible to geocode the location to a specific point on a map.

To avoid this problem, you can add enough geographical data to indicate what location should show on a map chart. For example, you can add a state level into your data and its hierarchy. Or, you might add latitude and longitude.

Issues with Invalid Geospatial Data

Invalid geospatial data occurs when a place name (a city, for example) is listed under an incorrect parent (a state, for example). This issue might be a simple misspelling, or data entry error.

Note

Amazon QuickSight doesn't support regions (for example, West Coast or South) as geospatial data. However, you can use a region as a filter in a visual.

Issues with the Default Country in Geocoding

Make sure that you are using the correct default country.

The default for each hierarchy is based on the country or country field that you choose when you create the hierarchy.

To change this default, you can return to the **Create hierarchy** screen. Then edit or create a hierarchy, and choose a different country.

If you don't create a hierarchy, your default country is based on your region. For details, see the following table.

| Region | Default Country |
|------------------------------|-----------------|
| US West (Oregon) Region | US |
| US East (Ohio) Region | |
| US East (N. Virginia) Region | |
| Asia Pacific (Singapore) | Singapore |
| Asia Pacific (Sydney) | Australia |
| EU (Ireland) Region | Ireland |

Issues with Latitude and Longitude

Amazon QuickSight uses latitude and longitude coordinates in the background to find place names on a map. However, you can also use coordinates to create a map without using place names. This approach also works with unsupported place names.

Latitude and longitude values must be numeric. For example, the map point indicated by **28.5383355 -81.3792365** is compatible with Amazon QuickSight. But **28° 32' 18.0096'' N 81° 22' 45.2424'' W** is not.

Topics

- [Valid Ranges for Latitude and Longitude Coordinates \(p. 184\)](#)
- [Using Coordinates in Degrees, Minutes, and Seconds \(DMS\) Format \(p. 185\)](#)

Valid Ranges for Latitude and Longitude Coordinates

Amazon QuickSight supports latitude and longitude coordinates within specific ranges.

| Coordinate | Valid Range |
|------------|--------------------|
| Latitude | Between -90 and 90 |

| Coordinate | Valid Range |
|------------|---------------------|
| Longitude | Between -180 to 180 |

Amazon QuickSight skips any data outside these ranges. Out-of-range points can't be mapped on a map chart.

Using Coordinates in Degrees, Minutes, and Seconds (DMS) Format

You can use a calculated field with a formula to create a numeric latitude and longitude out of character strings. Use this section to find different ways that you can create calculated fields in Amazon QuickSight, to parse GPS latitude and longitude into numeric latitude and longitude.

The following sample converts latitude and longitude to numeric format from separate fields. For example, suppose that you parse **51° 30' 26.4636'' N 0° 7' 39.9288'' W** using space as a delimiter. In this case, you can use something like the following sample to convert the resulting fields to numeric latitude and longitude.

In this example, the seconds are followed by two single quotation marks. If your data has a double quotation mark instead, then you can use `strlen(LatSec)-1` instead of `strlen(LatSec)-2`.

```

/*Latitude*/
    ifelse(
        LatDir = "N",
        parseInt(split(LatDeg, "°", 1)) +
            (parseDecimal(split(LatMin, "'", 1) ) /60) +
            (parseDecimal((substring(LatSec, 1, strlen(LatSec)-2) ) ) /3600),
        (parseInt(split(LatDeg, "°", 1)) +
            (parseDecimal(split(LatMin, "'", 1) ) /60) +
            (parseDecimal((substring(LatSec, 1, strlen(LatSec)-2) ) ) /3600)) * -1
    )

/*Longitude*/
    ifelse(
        LongDir = "E",
        parseInt(split(LongDeg, "°", 1)) +
            (parseDecimal(split(LongMin, "'", 1) ) /60) +
            (parseDecimal((substring(LongSec, 1, strlen(LongSec)-2) ) ) /3600),
        (parseInt(split(LongDeg, "°", 1)) +
            (parseDecimal(split(LongMin, "'", 1) ) /60) +
            (parseDecimal((substring(LongSec, 1, strlen(LongSec)-2) ) ) /3600)) * -1
    )

```

If your data doesn't include the symbols for degree, minute and second, the formula looks like the following.

```

/*Latitude*/
    ifelse(
        LatDir = "N",
        (LatDeg + (LatMin / 60) + (LatSec / 3600)),
        (LatDeg + (LatMin / 60) + (LatSec / 3600)) * -1
    )

/*Longitude*/
    ifelse(
        LongDir = "E",
        (LongDeg + (LongMin / 60) + (LongSec / 3600)),
        (LongDeg + (LongMin / 60) + (LongSec / 3600)) * -1
    )

```

The following sample converts **53° 21' N 06° 15' W** to numeric format. However, without the seconds, this location doesn't map as accurately.

```
/*Latitude*/
ifelse(
    right(Latitude, 1) = "N",
    (parseInt(split(Latitude, '°', 1)) +
     parseDecimal(substring(Latitude, (locate(Latitude, '°', 3)+1), 2) ) / 60) ,
    (parseInt(split(Latitude, '°', 1)) +
     parseDecimal(substring(Latitude, (locate(Latitude, '°', 3)+1), 2) ) / 60) * -1
)

/*Longitude*/
ifelse(
    right(Longitude, 1) = "E",
    (parseInt(split(Longitude, '°', 1)) +
     parseDecimal(substring(Longitude, (locate(Longitude, '°', 3)+1), 2) ) / 60) ,
    (parseInt(split(Longitude, '°', 1)) +
     parseDecimal(substring(Longitude, (locate(Longitude, '°', 3)+1), 2) ) / 60) * -1
)
```

The formats of GPS latitude and longitude can vary, so customize your formulas to match your data. For more information, see the following links:

- [Degrees Minutes Seconds to Decimal Degrees](#) on LatLong.net
- [Converting Degrees/Minutes/Seconds to Decimals using SQL](#) on Stack Overflow
- [Geographic Coordinate Conversion](#) on Wikipedia

Working with Analyses

You use an analysis to create and interact with visuals and stories. You can think of an analysis as a container for a set of related visuals and stories, for example ones that are all applicable to a given business goal or key performance indicator. You can use multiple data sets in an analysis, although any given visual can only use one of those data sets.

After you create an analysis and an initial visual, you can expand the analysis by adding data sets and visuals, and also by creating stories to add narrative to the analysis data.

Amazon QuickSight supports up to 20 data sets in a single analysis, and up to 20 visuals in a single analysis.

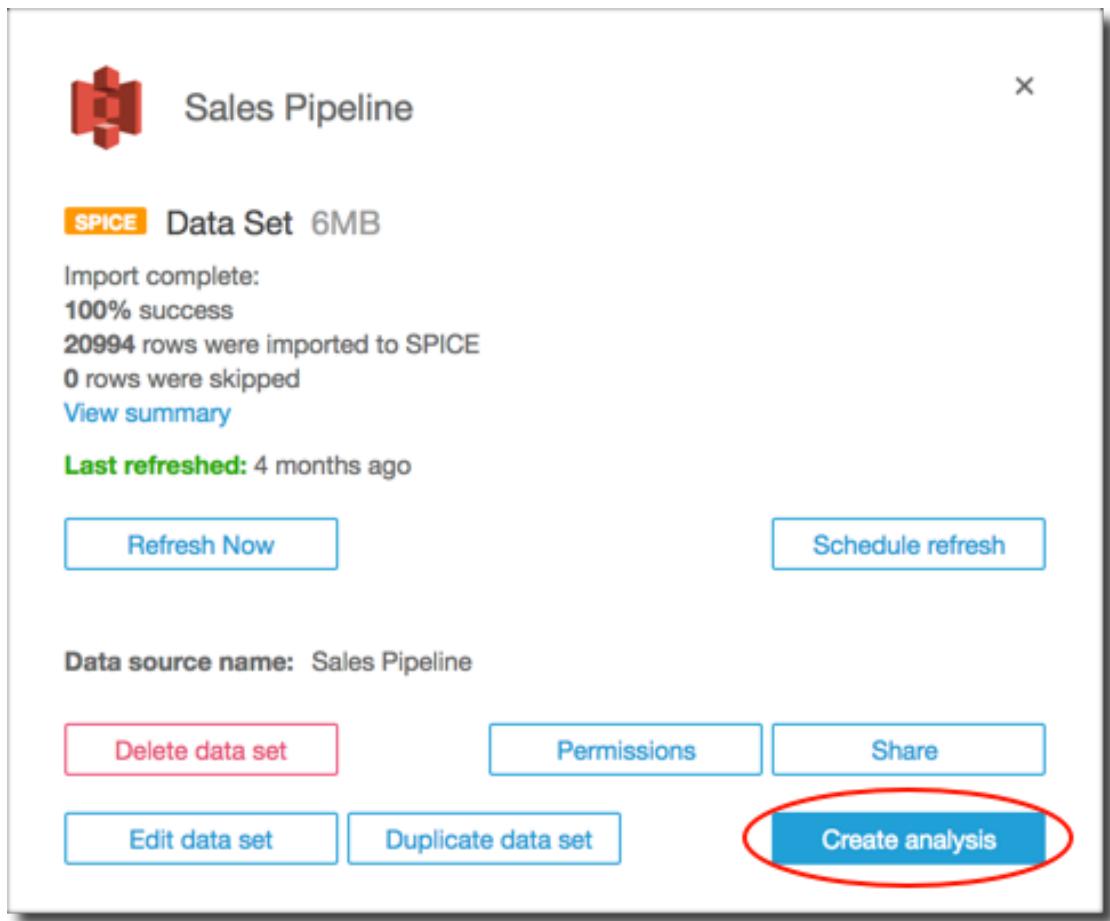
Topics

- [Creating an Analysis \(p. 187\)](#)
- [Saving Changes to an Analysis \(p. 188\)](#)
- [Renaming an Analysis \(p. 189\)](#)
- [Adding a Title and Description to an Analysis \(p. 189\)](#)
- [Viewing Analysis Details \(p. 190\)](#)
- [Deleting an Analysis \(p. 191\)](#)
- [Export Data from an Analysis to a CSV File \(p. 191\)](#)
- [Adding a Data Set to an Analysis \(p. 192\)](#)
- [Modifying Data Set Fields in an Analysis \(p. 196\)](#)
- [Adding a Calculated Field to an Analysis \(p. 219\)](#)
- [Parameters in Amazon QuickSight \(p. 231\)](#)
- [SPICE Data in an Analysis \(p. 244\)](#)
- [Sharing Analyses \(p. 245\)](#)
- [Working with Stories \(p. 247\)](#)

Creating an Analysis

Use the following procedure to create a new analysis.

1. On the **All analyses** tab of the Amazon QuickSight start page, choose **New analysis**. You are taken to the **Your Data Sets** page.
2. Choose a data set and then choose **Create analysis**.



If you don't have any data sets, create a new one by choosing **New data set**. You can create an analysis as the last step in creating a new data set. For more information about creating a data set, see [Creating Data Sets \(p. 76\)](#).

3. Create a visual. For more information about creating visuals, see [Creating an Amazon QuickSight Visual \(p. 253\)](#).

After you are done creating the analysis, you can iterate on it by modifying the visual, adding additional visuals, adding scenes to the default story, or adding additional stories.

Saving Changes to an Analysis

When working on an analysis, you can set Autosave either on (the default) or off. When Autosave is on, your changes are automatically saved every minute or so. When Autosave is off, your changes are not automatically saved, which allows you to make changes and pursue different lines of inquiry without permanently altering the analysis. If you decide that you want to save your results after all, re-enable Autosave. Your changes up to that point are then saved.

In either Autosave mode, you can undo or redo any change you make by choosing **Undo** or **Redo** on the application bar.

Changing the Autosave Mode

To change the Autosave mode for an analysis, choose the Autosave indicator next to the analysis name and then choose **Autosave ON** or **Autosave OFF**.



When Autosave Can't Save Changes

Suppose that one of the following things occurs:

- Autosave is on and another user makes a conflicting change to the analysis.
- Autosave is on and there is a service failure, such that your most recent changes can't be saved.
- Autosave is off, you turn it on, and one of the backlogged changes now being saved to the server conflicts with another user's changes.

In this case, Amazon QuickSight gives you the option to do one of two things. You can either let Amazon QuickSight turn Autosave off and continue working in unsaved mode, or reload the analysis from the server and then redo your most recent changes.

If your client authentication expires while you are editing an analysis, you are directed to sign in again. On successful sign-in, you are directed back to the analysis where you can continue working normally.

If your permissions on the analysis are revoked while you are editing it, you can't make any further changes.

Renaming an Analysis

Use the following procedure to rename an analysis.

1. Open the analysis you want to rename.
2. In the **Analysis name** field in the application bar, select the current name and then type a new name.

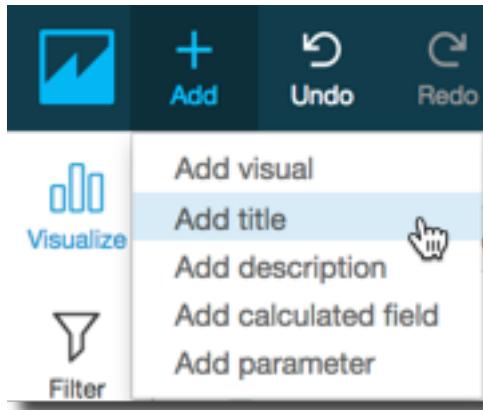
Adding a Title and Description to an Analysis

In addition to the analysis name, you can add a title and description to an analysis. A useful title and description provides context about the information in the analysis.

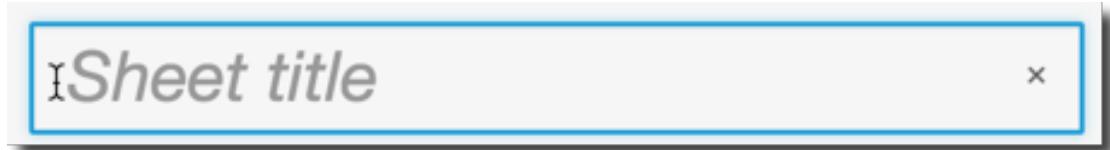
Add a Title and Description

Use the following procedure to add a title and description to an analysis. Titles and descriptions can contain up to 1024 characters.

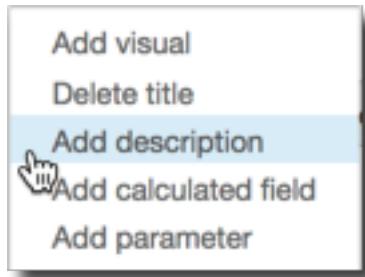
1. On the analysis page, choose **Add** in the application bar and then choose **Add title**.



2. Type a title in the **Sheet title** box and press **Enter**. To remove a title, choose **Add** in the application bar and then choose **Remove title**. Alternatively, to remove the title, you can select the title and then choose the x-shaped delete icon.



3. Choose **Add** in the application bar and then choose **Add description**.



4. Type a description in the **Description** box and press **Enter**. To remove a description, choose **Add** in the application bar and then choose **Remove description**. Alternatively, to remove the description, you can select the description and then choose the x-shaped delete icon.



Viewing Analysis Details

To view an analysis, locate the analysis on the **All analyses** tab of the Amazon QuickSight start page. Then choose the analysis.



Deleting an Analysis

You can delete an analysis by using the **All analyses** tab of the Amazon QuickSight start page. Deleting an analysis doesn't affect any dashboards that are based on that analysis.

To remove an analysis, choose the details icon (:) on the analysis, and choose **Delete**. Confirm your choice by choosing **Delete** again.



Export Data from an Analysis to a CSV File

To export data from an analysis or dashboard to a comma-separated values (CSV) file, follow the procedure in [Exporting Data from an Amazon QuickSight Visual to a CSV File \(p. 256\)](#).

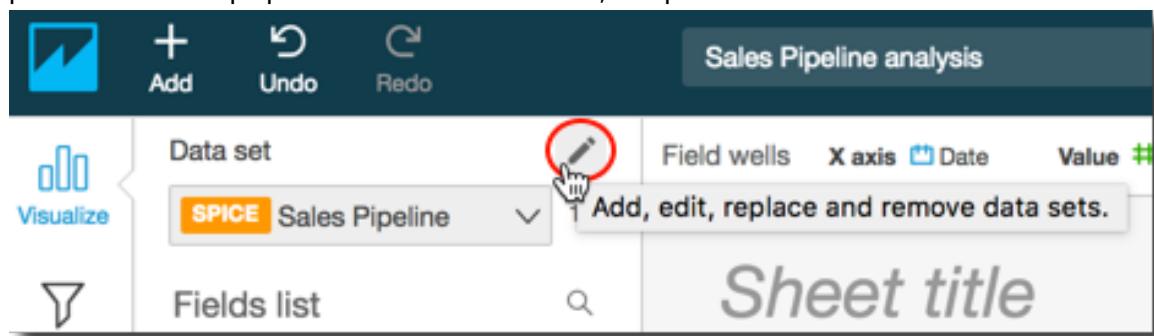
Adding a Data Set to an Analysis

Topics

- [Add or Edit a Data Set \(p. 192\)](#)
- [Replacing Data Sets \(p. 193\)](#)
- [Remove a Data Set From an Analysis \(p. 195\)](#)

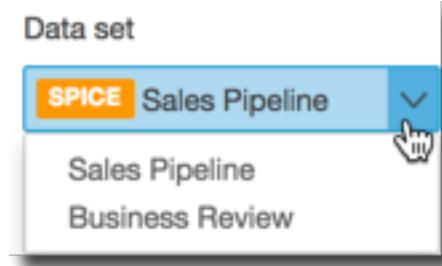
After you have created an analysis, you can add more data sets to the analysis. Then, you can use them to create more visuals.

From within the analysis, you can open any data set for editing, for example to add or remove fields, or perform other data preparation. You can also remove, or replace data sets.



The currently selected data set displays at the top of the **Fields list** pane. This is the data set that is used by the currently selected visual. Each visual can use only one data set. Choosing a different visual changes the selected data set to the one used by that visual.

To change the selected data set manually, choose the data set list at the top of the **Fields list** pane and then choose a different data set. This deselects the currently selected visual if it doesn't use this data set; either choose a visual that uses the selected data set, or choose **Add** on the application bar and then **Add Visual** to create a new visual using the selected data set.



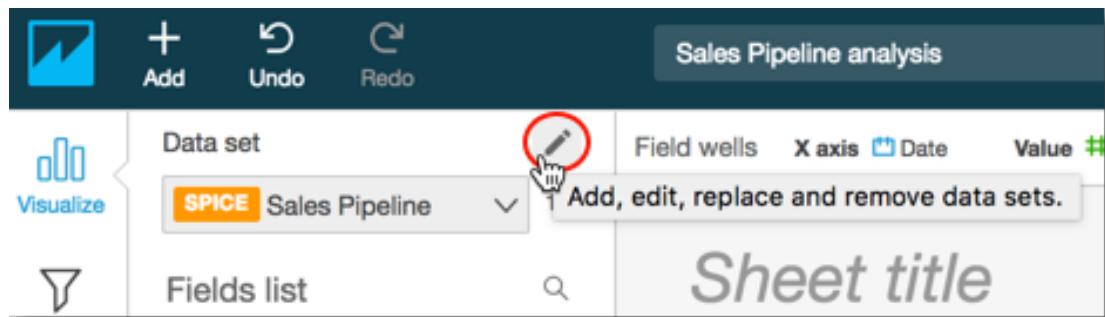
If you choose **Suggested** on the tool bar to see suggested visuals, you'll see visuals based on the currently selected data set.

Only filters for the currently selected data set are shown in the **Filter** pane, and you can only create filters on the currently selected data set.

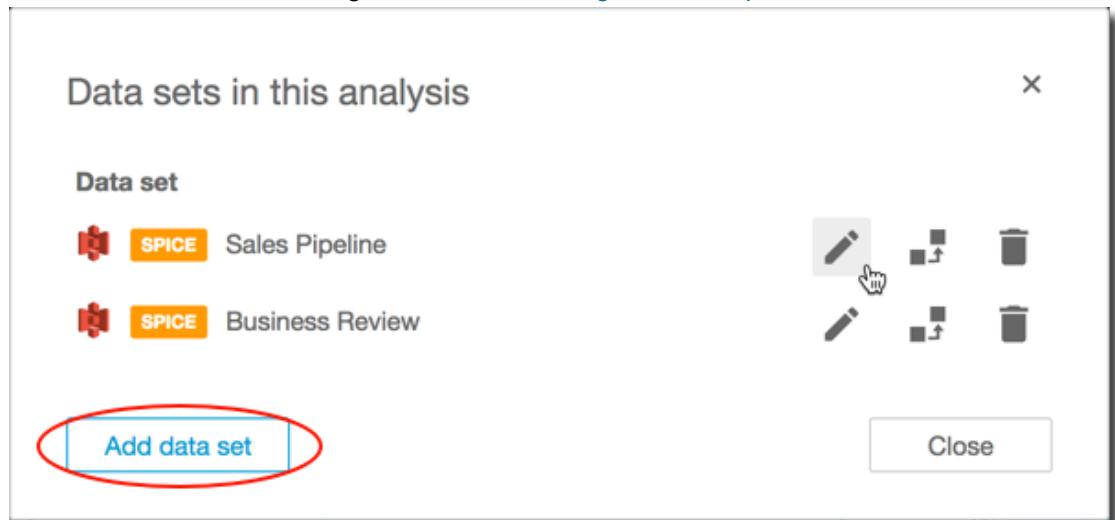
Add or Edit a Data Set

Use the following procedure to add a data set to an analysis or edit a data set used by an analysis.

1. On the analysis page, choose the pencil-shaped edit icon at the top of the **Fields list** pane.



2. Choose **Add data set** to add a data set. Or, choose the pencil-shaped edit icon to edit a data set. For more information about editing a data set, see [Editing a Data Set \(p. 106\)](#).



3. A list of your data sets appears. Choose a data set and then choose **Select**. To cancel, choose **Cancel**.

Replacing Data Sets

In an analysis, you can add, edit, replace, or remove data sets. Use this section to learn how to replace your data set.

When you replace a data set, the new data set should have similar columns, if you expect the visual to work the way you designed it. Replacing the data set also clears the undo and redo history for the analysis. This means you can't use the undo and redo buttons on the application bar to navigate your changes. So, when you decide to change the data set, your analysis design should be somewhat stable—not in the middle of an editing phase.

Use the following procedure to replace a data set.

1. Inside your analysis, choose the pencil icon near the data set from the top left of the screen.
2. Choose the **Replace this data set with another** icon in the screen that opens.
3. From the list of available data sets that appears, choose one, and then choose **Select**.
4. **Note**
Replacing a data set clears the undo and redo history for this analysis.

Review your choice, and confirm it by choosing **Replace**.

The data set is replaced with the new one. The field list and visuals are updated with the new data set.

At this point, you can choose to add a new data set, edit the new data set, or replace it with a different one. Choose **Close** to exit.

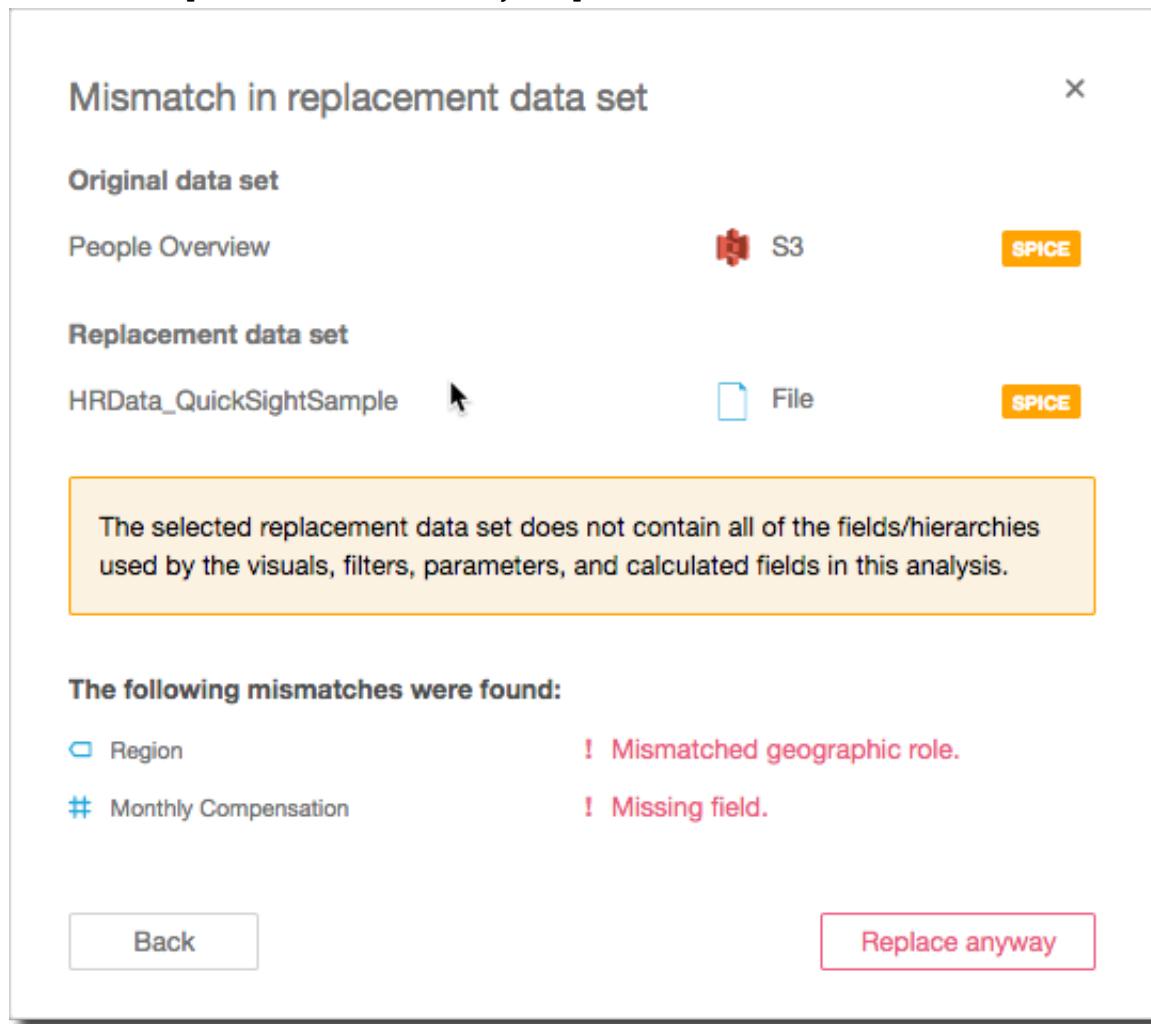
If Your New Data Set Doesn't Match

If the selected replacement data set doesn't contain all of the fields and hierarchies used by the visuals, filters, parameters, and calculated fields in your analysis, you receive a warning from Amazon QuickSight. It shows a list of mismatched columns.

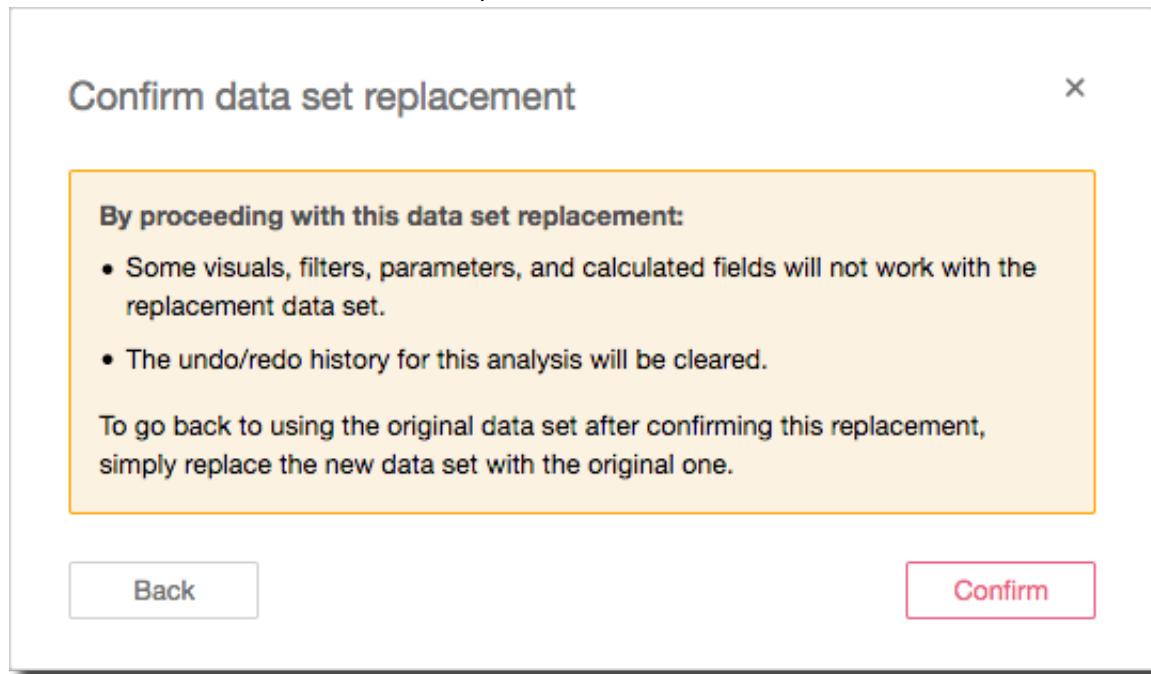
If this happens, you can choose **Replace anyway**, which breaks some or all of your visuals, or choose **Back** to cancel. By choosing **Back**, you get the opportunity to note the mismatches and investigate.

The following screenshot shows a mismatch. The **Region** field in the data set is a geographic type, when the analysis expects it to be a text field. Additionally, the new data set is missing the **Monthly Compensation** field, because the field containing this data has a different name in the data set.

In this case, you can choose **Back** and edit the data set to change **Region** to a string. You can then rename the **Compensation** field to **Monthly Compensation**.



Alternatively, if we choose **Replace anyway**, a confirmation notice appears. It warns you that some things in the analysis—visuals, filters, parameters, calculated fields, or some combination of these—don't work with the new data set. Choose **Confirm** to proceed, or choose **Back** to cancel.

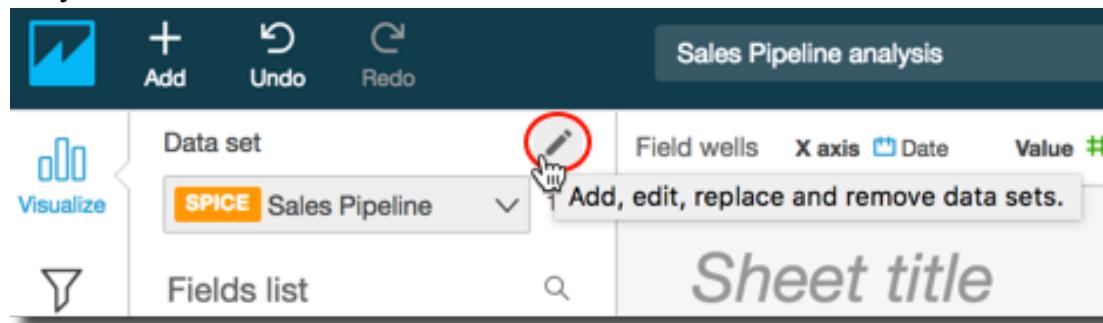


If you change your mind after replacing the data set, you can still recover. Let's say you replace the data set despite the mismatches, and then find that it is too difficult to change your analysis to match the new data set. You can undo any changes you made to your analysis, and replace the new data set with the original one, or with a data set that more closely matches the requirements of the analysis.

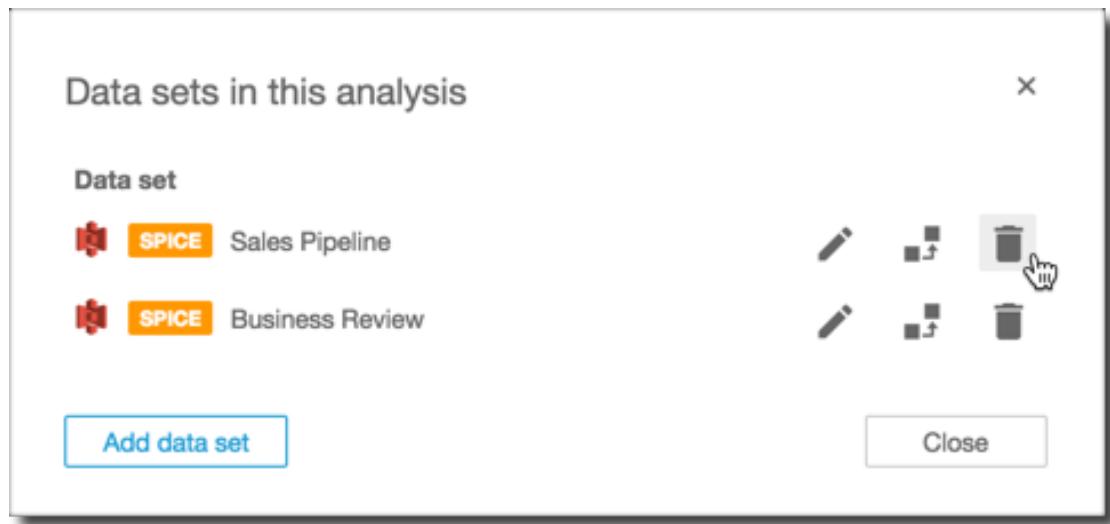
Remove a Data Set From an Analysis

Use the following procedure to delete a data set from an analysis.

1. On the analysis page, choose the data set list at the top of the **Fields list** pane and then choose **Edit analysis data sets**.



2. In the **Data sets in this analysis** dialog box, choose the data set you want to delete, and then choose the delete icon. Note that you can't delete a data set if it's the only one in the analysis.



3. Choose **Close** to close the dialog box.

Modifying Data Set Fields in an Analysis

You can modify the dimension or measure setting of a field by using the **Field list** pane. You can also change numeric field data types, and numeric or date field formats, by using the **Field list** pane, visual field wells, or on-visual editors. When you change a field data type or format, it applies to all visuals in the analysis that use that data set.

Topics

- [Setting a Field as a Dimension or Measure \(p. 196\)](#)
- [Changing a Field Data Type \(p. 197\)](#)
- [Customizing a Field Format \(p. 197\)](#)

Setting a Field as a Dimension or Measure

In the **Field list** pane, dimension fields have blue icons and measure fields have green icons. Dimensions are text or date fields that may be items, like products, or attributes that are related to measures and can be used to partition them, like sales date for sales figures. Measures are numeric values that you use for measurement, comparison, and aggregation. If Amazon QuickSight interpreted a field as a measure and you would rather use it as a dimension (or the other way around), you can change the setting for that field.

Changing a field's measure or dimension setting changes it for all visuals in the analysis that use that data set, but does not change it in the data set itself.

Change a Field's Dimension or Measure Setting

1. In the **Field list** pane, hover over the field you want to change.
2. Choose the selector icon to the right of the field name, and then choose **Convert to dimension** or **Convert to measure** as appropriate.

Changing a Field Data Type

You can use the **Field list** pane, visual field wells, or on-visual editors to change numeric field data types within the context of an analysis. Numeric fields default to displaying as numbers, but you can choose to have them display as currency or as a percentage instead. You can't change the data types for string or date fields.

Changing a field's data type in an analysis changes it for all visuals in the analysis that use that data set, but does not change it in the data set itself.

Note

If you are working in a pivot table visual, applying a table calculation changes the data type of the cell values if the data type doesn't make sense with the applied calculation. For example, if you apply the **Rank** function to a numeric field that you modified to use a currency data type, the cell values display as numbers rather than currency. Similarly, if you apply the **Percent difference** function instead, the cell values display as percentages rather than currency.

Change a Numeric Field's Data Type

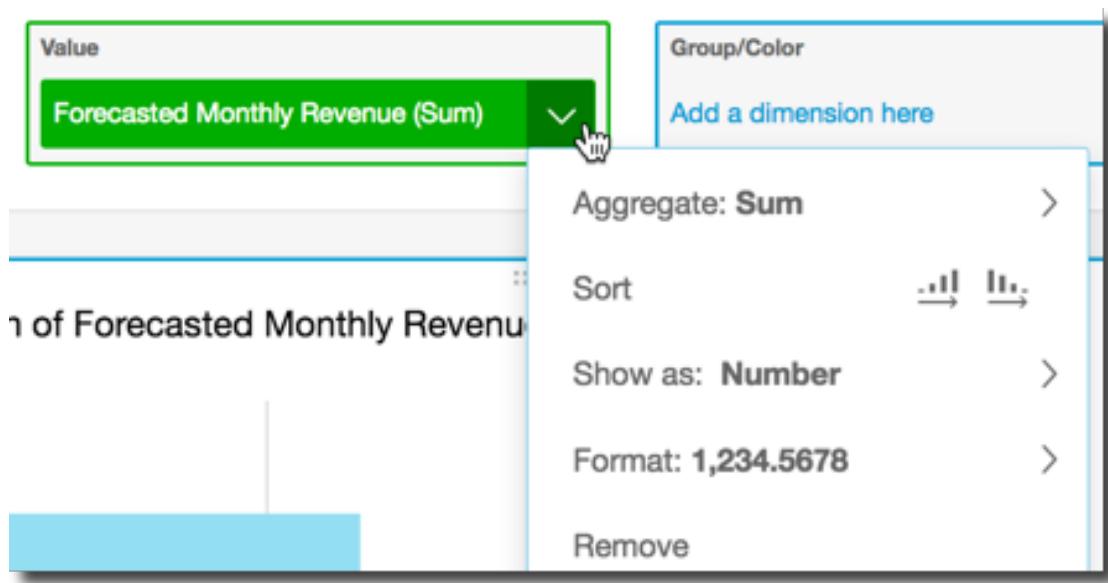
Use the following procedure to change a field's data type.

1. Choose one of the following options:
 - In the **Field list** pane, hover over the numeric field you want to change and then choose the selector icon to the right of the field name.
 - On any visual that contains an on-visual editor associated with the numeric field you want to change, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the numeric field you want to change.
2. Choose **Show as** and then choose **Number**, **Currency**, or **Percent**.

Customizing a Field Format

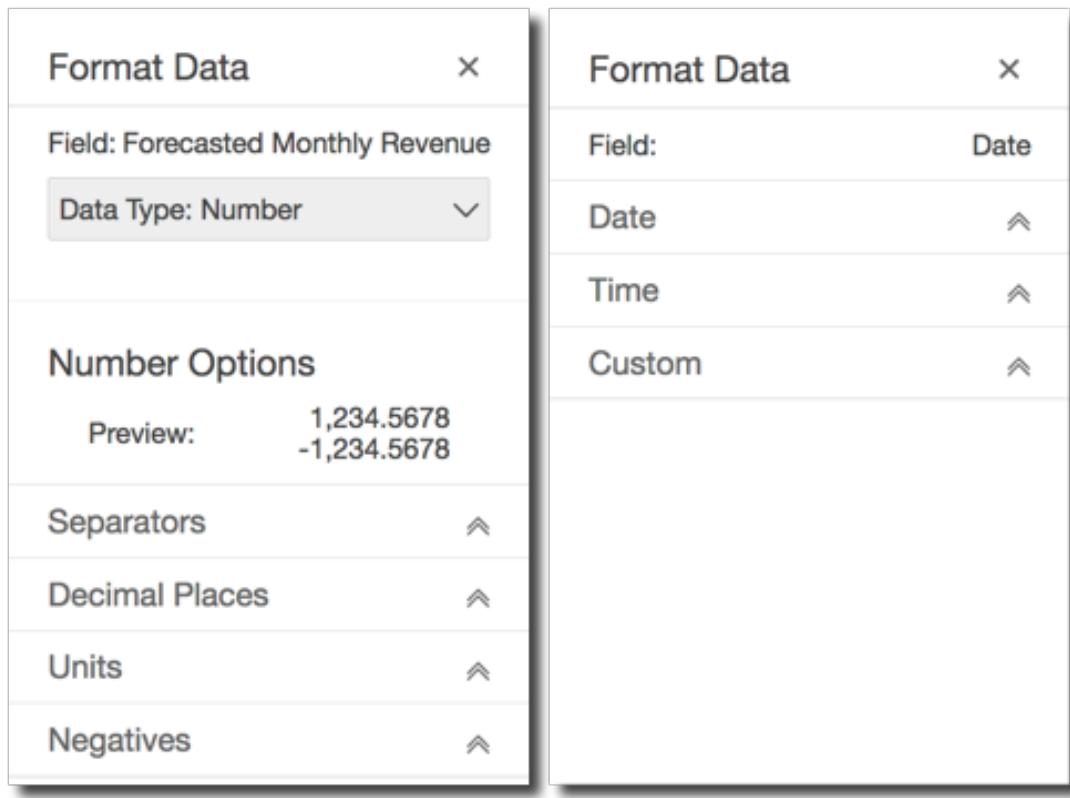
Use the following procedure to customizing the appearance of fields in an analysis.

1. In an analysis, choose a field to format, either by choosing it either in the field well or in the **Fields list** of the **Visualize** pane.



2. Choose **Show as** to change how the field shows in the analysis, and choose from the options on the context menu. The list of available options varies based on the field's data type. If you choose a non-numeric field from the fields list, you can change the *count format*, which is the formatting used when the field is counted.
3. Choose **Format** to change the format of the field, and choose from the options on the context menu. If you don't see an option that you want to use, choose **More formatting options** from the context menu.

The **Format Data** pane opens, presenting options for the type of numeric or date field you chose. The following screenshots show the **Format Data** pane.



The options for **Show as** from the context menu now appear in the drop-down list at the top of the **Format Data** pane. The rest of the options are specific to the data type and how you choose to show the field.

For date and time data, the default format pattern is YYYY-MM-DDTHH:mm:ssZZ, for example 2016-09-22T17:00:00-07:00.

For numbers, you can choose from the following units to display after the number:

- No unit suffix. This is the default.
- Thousands (K)
- Millions (M)
- Billions (B)
- Trillions (T)
- A custom unit prefix or suffix

For currency, you can choose from the following symbols:

- Dollars (\$)
- Euros (€)
- Pounds (£)
- Yen (¥)

Changing a Field Format

You can change the format of a field within the context of an analysis. The formatting options available for fields vary based on the field's data type.

Use menu options in the **Field list** pane or the visual field wells to make simple format changes, or use the **Format Data** pane to make more extensive formatting changes.

Topics

- [Format a Date Field \(p. 200\)](#)
- [Format a Number Field \(p. 204\)](#)
- [Format a Currency Field \(p. 209\)](#)
- [Format a Percent Field \(p. 215\)](#)
- [Return a Field's Format to Default Settings \(p. 219\)](#)

Format a Date Field

When you format a date field, you can choose a list of common formatting options. Alternatively, you can open the **Format Data** pane choose from a list of common formats, or specify custom formatting for the date and time values.

Changing a field format changes it for all visuals in the analysis that use that data set, but does not change it in the data set itself.

Format a Date Field Using List Options

If you want to format a date field by choosing from a list of common options, you can access such a list from the **Field list** pane, a visual on-visual editor, or a visual field well.

Use the following procedure to change a date field's format by choosing a list option.

1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the date field you want to format.
 - On any visual that contains an on-visual editor associated with the date field you want to format, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the date field you want to change.
2. Choose **Format**, and then choose the format you want. The following quick formatting options are offered for date fields:
 - Show the month, day, year, and time.
 - Show the month, day, and year.
 - Show the month and year.
 - Show the year.

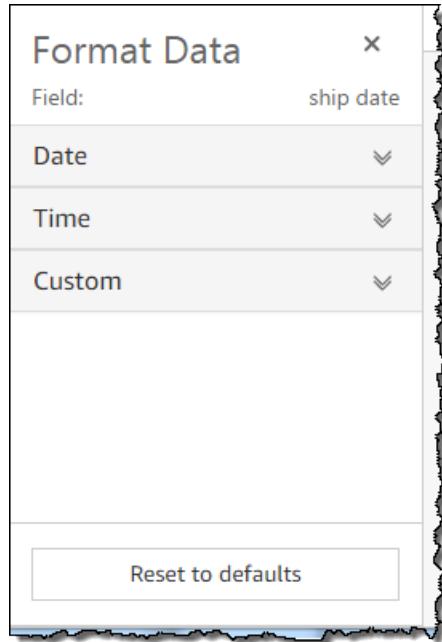
Format a Date Field Manually

Manually formatting the field allows you to choose from a more extensive list of date and time formats to use, or alternatively to specify custom formats for the date and time values.

Use the following procedure to manually change a date field's format.

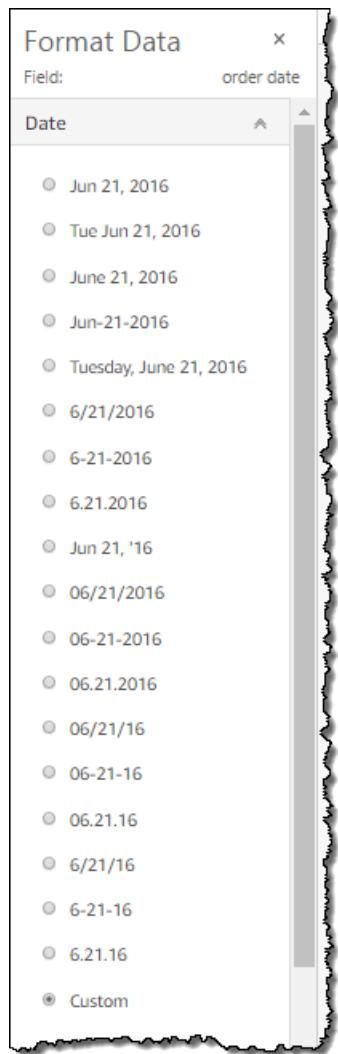
1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the date field you want to format.
 - On any visual that contains an on-visual editor associated with the date field you want to format, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the date field you want to change.
2. Choose **Format** and then choose **More Formatting Options....**

The **Format Data** pane opens.



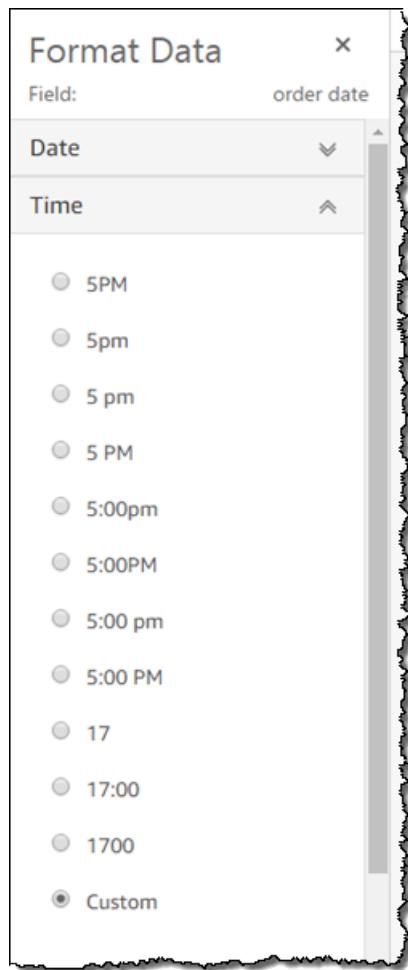
3. Expand the **Date** section. Choose an existing date format, or choose **Custom** and specify a format pattern in the **Custom** section lower down in the **Format Data** pane. If you choose **Custom** for the **Date** section, you must also choose **Custom** for the following **Time** section, and the pattern you specify in the **Custom** section must include any date and time formatting that you want.

The default selection is **Custom**, with a default format pattern of yyyy-MM-ddTHH:mm:ssZZ, for example 2016-09-22T17:00:00-07:00.



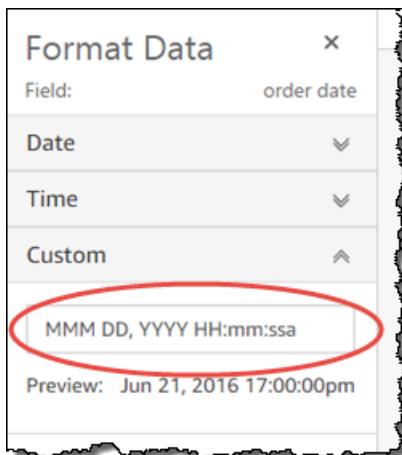
4. Expand the **Time** section. Choose an existing time format, or choose **Custom** and specify a format pattern in the **Custom** section lower down in the **Format Data** pane. If you choose **Custom** for the **Time** section, you must also choose **Custom** for the preceding **Date** section, and the pattern you specify in the **Custom** section must include any date and time formatting that you want.

The default selection is **Custom**, with a default format pattern of yyyy-MM-ddTHH:mm:ssZZ, for example 2016-09-22T17:00:00-07:00.

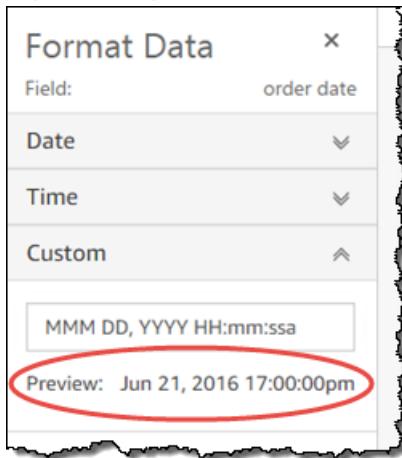


5. If you chose **Custom** in the **Date** and **Time** sections, expand the **Custom** section and specify the format pattern that you want, using the format pattern syntax specified in [Class DateTimeFormat](#) in the Joda project documentation.

If you chose something other than **Custom** in the **Date** and **Time** sections, **Custom** is populated with the format pattern that reflects your selections. For example, if you chose Jun 21, 2016 in the **Date** section and 17:00:00pm in the **Time** section, the **Custom** section shows the format pattern MMM dd, yyyy HH:mm:ssa.



6. (Optional) Expand the **Custom** section and use **Preview** to verify your specified format.



Format a Number Field

When you format a number field, you can either choose the decimal place and thousand separator format from a list of common options or you can open the **Format Data** pane and manually format the field. Manually formatting the field allows you to choose what separators to use, the number of decimal places to show, what units to use, and how to display negative numbers.

Changing a field format changes it for all visuals in the analysis, but does not change it in the underlying data set.

Format a Number Field Using List Options

If you want to format a number field by choosing from a list of common options, you can access such a list from the **Field list** pane, an on-visual editor, or a visual field well.

Use the following procedure to change a number field's format by choosing a list option.

1. Choose one of the following options:

- In the **Field list** pane, choose the selector icon to the right of the number field you want to format.
- On any visual that contains an on-visual editor associated with the number field you want to format, choose that on-visual editor.

- Expand the **Field wells** pane, then choose the field well associated with the number field you want to change.
2. Choose **Format**, and then choose the format you want. The following quick formatting options are offered for number fields:
- Use commas to separate groups of thousands and use a decimal point to show the fractional part of the number, for example 1,234.56.
 - Use a decimal point to show the fractional part of the number, for example 1234.56.
 - Show the number as an integer and use commas to separate groups of thousands, for example 1,234.
 - Show the number as an integer, for example 1234.

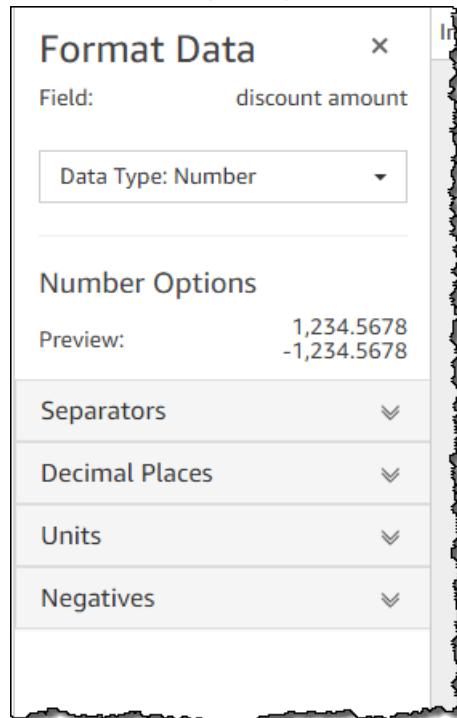
Format a Number Field Manually

Manually formatting the field allows you to choose what separators to use, the number of decimal places to show, what units to use, and how to display negative numbers.

Use the following procedure to manually change a number field's format.

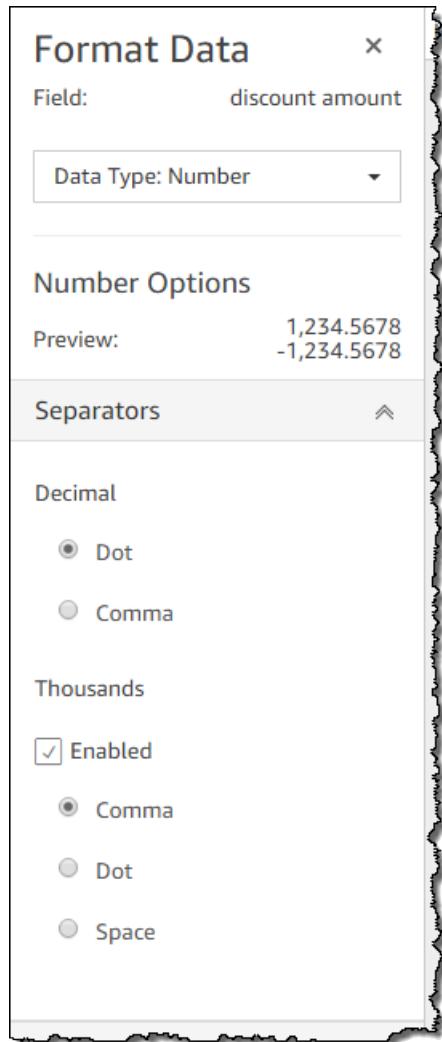
1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the number field you want to format.
 - On any visual that contains an on-visual editor associated with the number field you want to format, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the number field you want to change.
2. Choose **Format** and then choose **More Formatting Options....**

The **Format Data** pane opens.



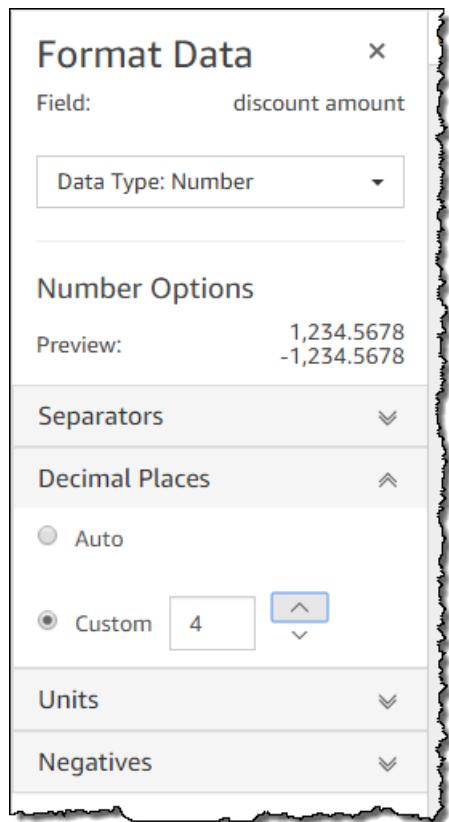
3. Expand the **Separators** section and choose from the following options:

- Under **Decimal**, choose a dot or a comma for the decimal separator. A dot is the default. If you choose a comma instead, you must use a dot or a space as the thousands separator.
- Under **Thousands**, select or deselect **Enabled** to indicate whether you want to use a thousands separator. **Enabled** is selected by default.
- If you are using a thousands separator, choose whether to use a comma, dot, or space for the separator. A comma is the default. If you choose a dot instead, you must use a comma as the decimal separator.



4. Expand the **Decimal Places** section and choose from the following options:

- Choose **Auto** to have Amazon QuickSight automatically determine the appropriate number of decimal places, or choose **Custom** to specify a number of decimal places. **Auto** is the default.
- If you chose **Custom**, enter the number of decimal places to use. Field values are rounded to the decimal places specified. For example, if you specify two decimal places, the value 6.728 is rounded to 6.73.

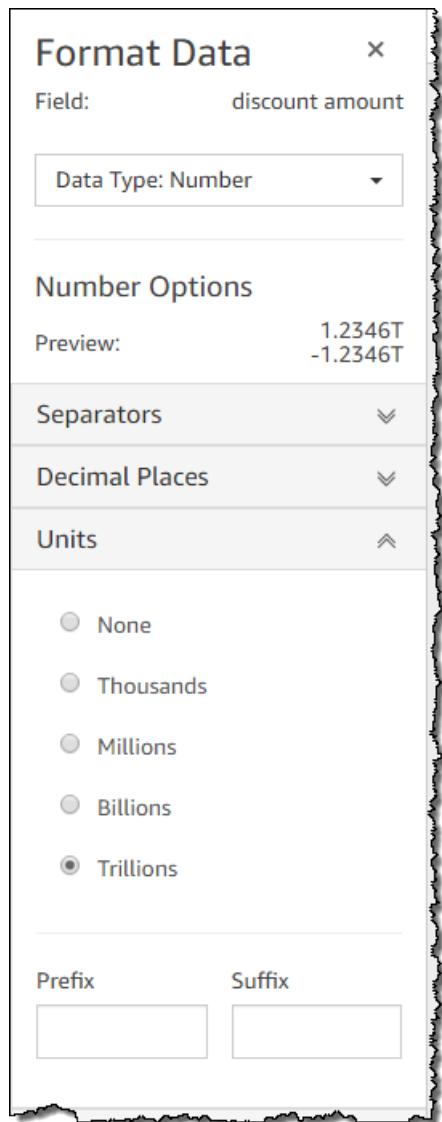


5. Expand the **Units** section and choose from the following options:

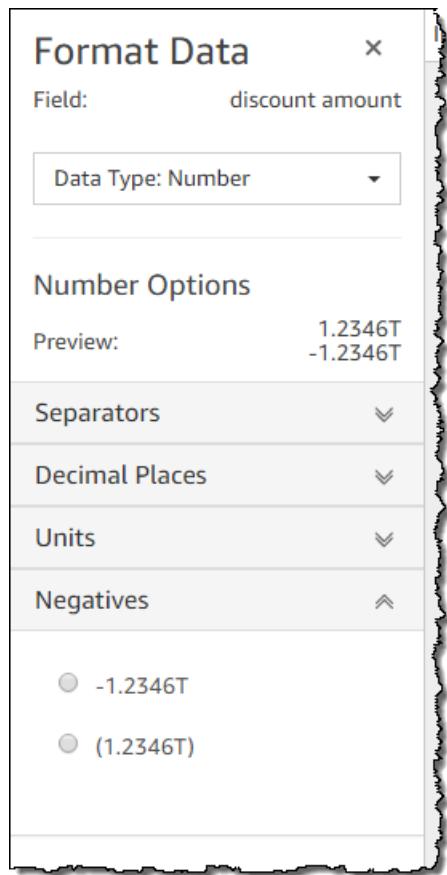
- Choose the unit to use. Choosing a unit adds the appropriate suffix to the number value. For example, if you choose **Thousands**, a field value of 1234 displays as 1.234K.

The unit options are as follows:

- No unit suffix. This is the default.
- Thousands (K)
- Millions (M)
- Billions (B)
- Trillions (T)
- If you want to use a custom prefix or suffix, specify it in the **Prefix** or **Suffix** box. You can specify both, and you can also specify a custom prefix in addition to the suffix added by selecting a unit.



6. Expand the **Negatives** section and choose whether to display a negative value by using a minus sign or by enclosing it in parentheses. Using a minus sign is the default.



Format a Currency Field

When you format a currency field, you can either choose the currency symbol from a list of common options, or open the **Format Data** pane and manually format the field. Manually formatting the field allows you to choose what symbol to use, what separators to use, the number of decimal places to show, what units to use, and how to display negative numbers.

Changing a field format changes it for all visuals in the analysis, but does not change it in the underlying data set.

Format a Currency Field Using List Options

If you want to choose the symbol for a currency field from a list of common options, you can access such a list from the **Field list** pane, an on-visual editor, or a visual field well.

Use the following procedure to select a currency field's symbol by choosing a list option.

1. Choose one of the following options:

- In the **Field list** pane, choose the selector icon to the right of the currency field you want to format.
- On any visual that contains an on-visual editor associated with the currency field you want to format, choose that on-visual editor.
- Expand the **Field wells** pane, then choose the field well associated with the currency field you want to change.

2. Choose **Symbol**, and then choose the symbol you want. The following symbols are offered for currency fields:
 - Display in dollars (\$).
 - Display in pounds (£).
 - Display in euros (€).
 - Display in yen (¥).

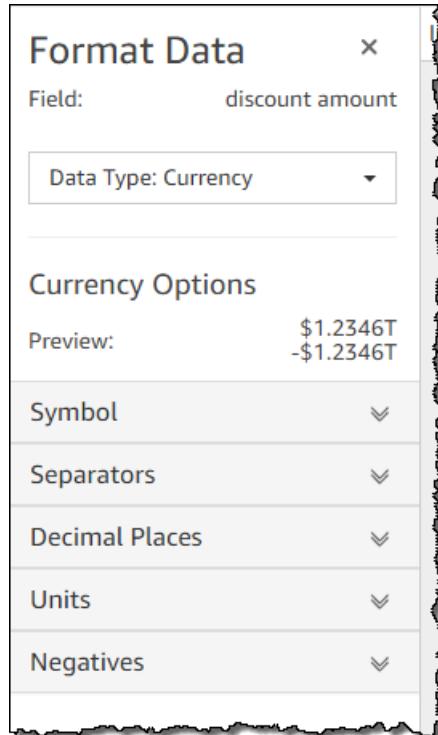
Format a Currency Field Manually

Manually formatting the field allows you to choose what symbol to use, what separators to use, the number of decimal places to show, what units to use, and how to display negative numbers.

Use the following procedure to manually change a currency field's format.

1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the currency field you want to format.
 - On any visual that contains an on-visual editor associated with the currency field you want to format, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the currency field you want to change.
2. Choose **Format** and then choose **More Formatting options....**

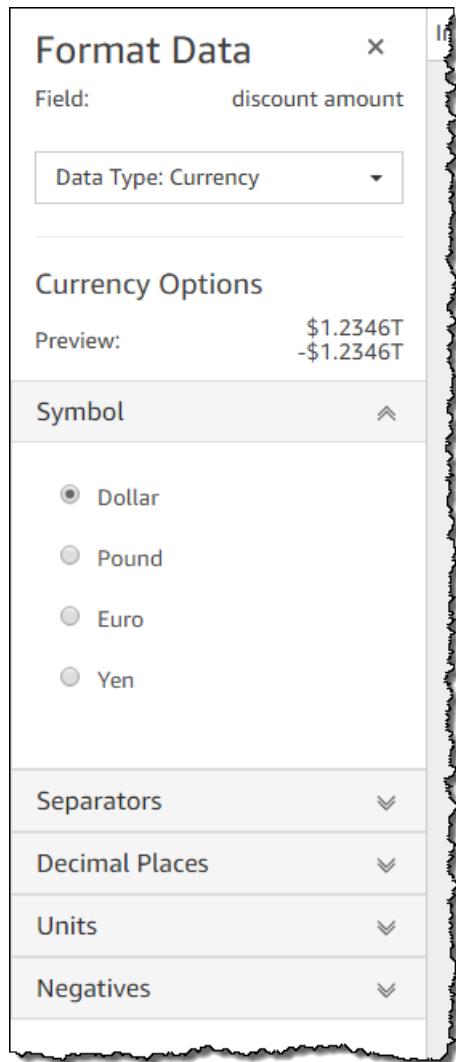
The **Format Data** pane opens.



3. Expand the **Symbol** section and choose from the following options:

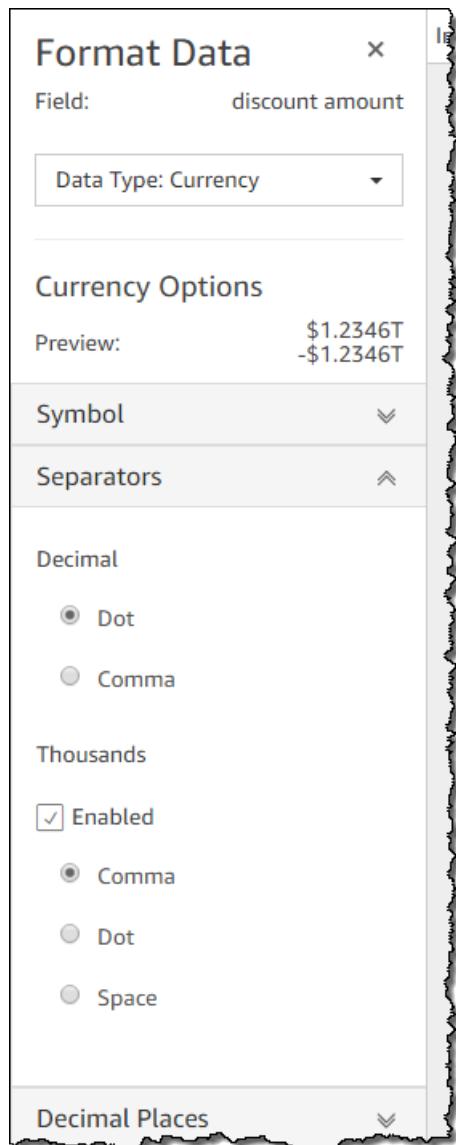
- Display in dollars (\$). This is the default.
- Display in pounds (£).

- Display in euros (€).
- Display in yen (¥).

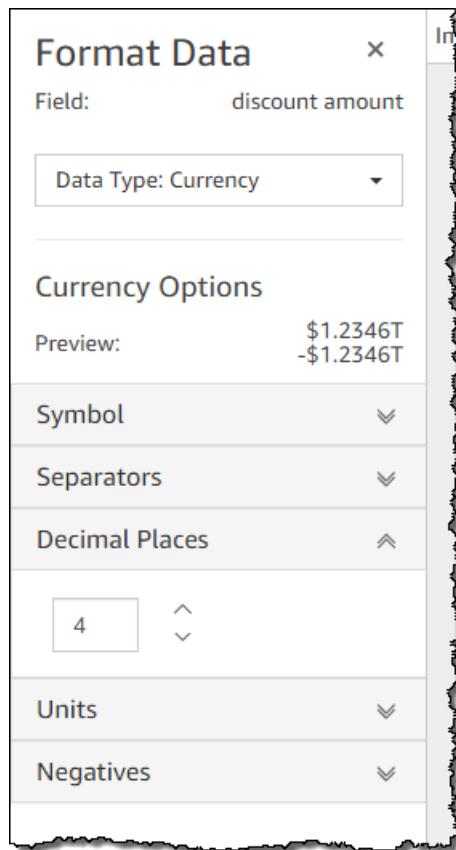


4. Expand the **Separators** section and choose from the following options:

- Under **Decimal**, choose a dot or a comma for the decimal separator. A dot is the default. If you choose a comma instead, you must use a dot or a space as the thousands separator.
- Under **Thousands**, select or deselect **Enabled** to indicate whether you want to use a thousands separator. **Enabled** is selected by default.
- If you are using a thousands separator, choose whether to use a comma, dot, or space for the separator. A comma is the default. If you choose a dot instead, you must use a comma as the decimal separator.



5. Expand the **Decimal Places** section and choose the number of decimal places to use. The default is 2. Field values are rounded to the decimal places specified. For example, if you specify two decimal places, the value 6.728 is rounded to 6.73.

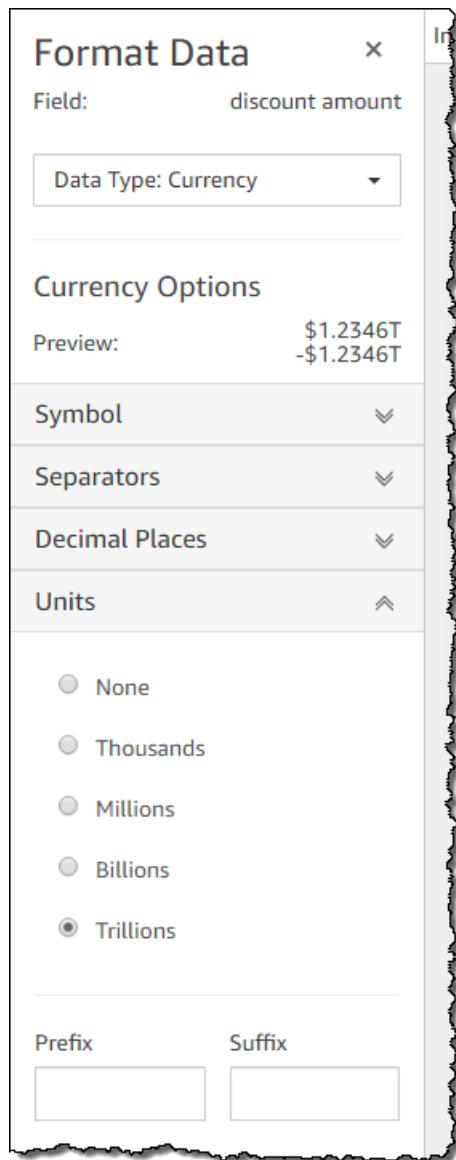


6. Expand the **Units** section and choose from the following options:

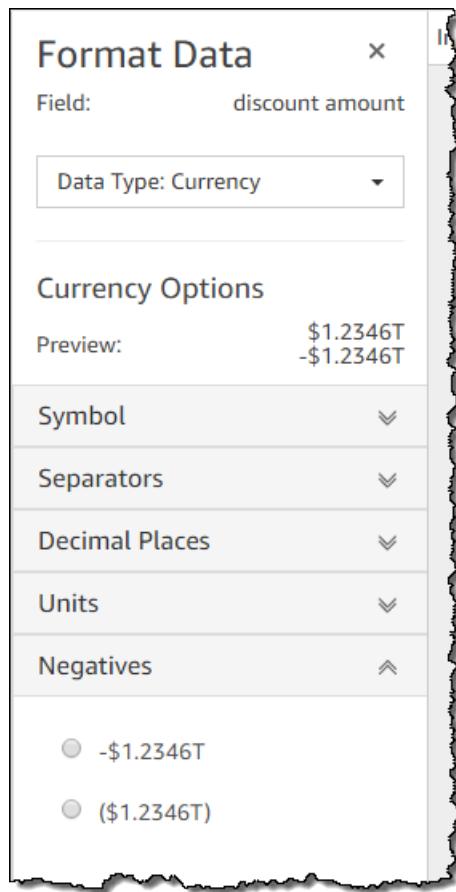
- Choose the unit to use. Choosing a unit adds the appropriate suffix to the number value. For example, if you choose **Thousands**, a field value of 1234 displays as 1.234K.

The unit options are as follows:

- No unit suffix. This is the default.
- Thousands (K)
- Millions (M)
- Billions (B)
- Trillions (T)
- If you want to use a custom prefix or suffix, specify it in the **Prefix** or **Suffix** box. Using a custom suffix is a good way to specify a currency suffix outside of those already offered by Amazon QuickSight. You can specify both, and you can also specify a custom prefix in addition to the suffix added by selecting a unit.



7. Expand the **Negatives** section and choose whether to display a negative value by using a minus sign or by enclosing it in parentheses. Using a minus sign is the default.



Format a Percent Field

When you format a percent field, you can either choose the number of decimal places from a list of common options, or open the **Format Data** pane and manually format the field. Manually formatting the field allows you to choose what separators to use, the number of decimal places to show, and how to display negative numbers.

Changing a field format changes it for all visuals in the analysis, but does not change it in the underlying data set.

Format a Percent Field Using List Options

If you want to choose the number of decimal places for a percent field from a list of common options, you can access such a list from the **Field list** pane, an on-visual editor, or a visual field well.

Use the following procedure to change a percent field's number of decimal places by choosing a list option.

1. Choose one of the following options:

- In the **Field list** pane, choose the selector icon to the right of the percent field you want to format.
- On any visual that contains an on-visual editor associated with the percent field you want to format, choose that on-visual editor.
- Expand the **Field wells** pane, then choose the field well associated with the percent field you want to change.

2. Choose **Decimals**, and then choose the number of decimal places you want. The following quick formats are offered for percent fields:
 - Display the value with two decimal places.
 - Display the value with one decimal place.
 - Display the value with no decimal places.

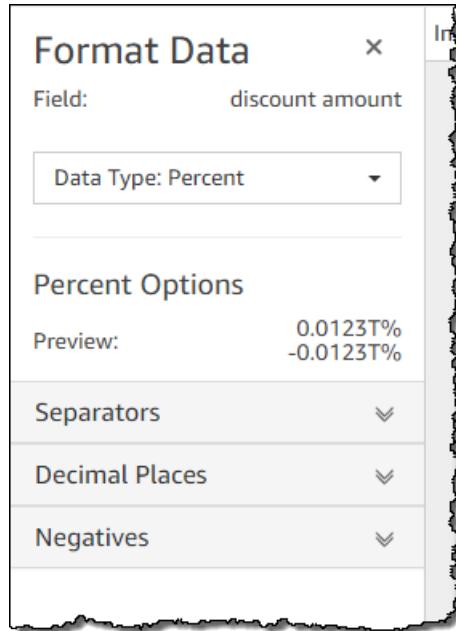
Format a Percent Field Manually

Manually formatting the field allows you to choose what separators to use, the number of decimal places to show, and how to display negative numbers.

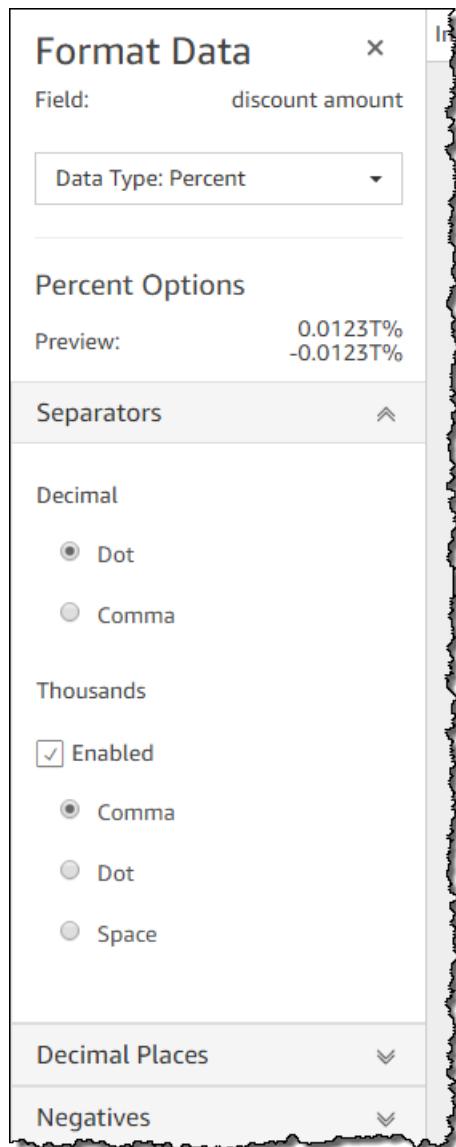
Use the following procedure to manually change a percent field's format.

1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the percent field you want to format.
 - On any visual that contains an on-visual editor associated with the percent field you want to format, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the percent field you want to change.
2. Choose **Format** and then choose **More Formatting options....**

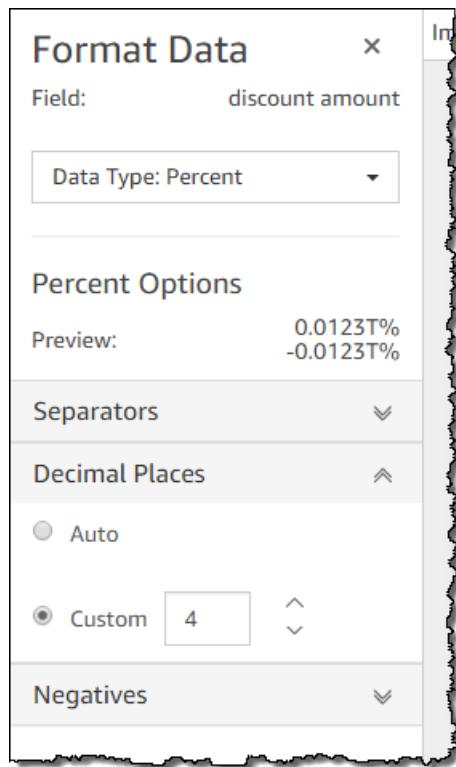
The **Format Data** pane opens.



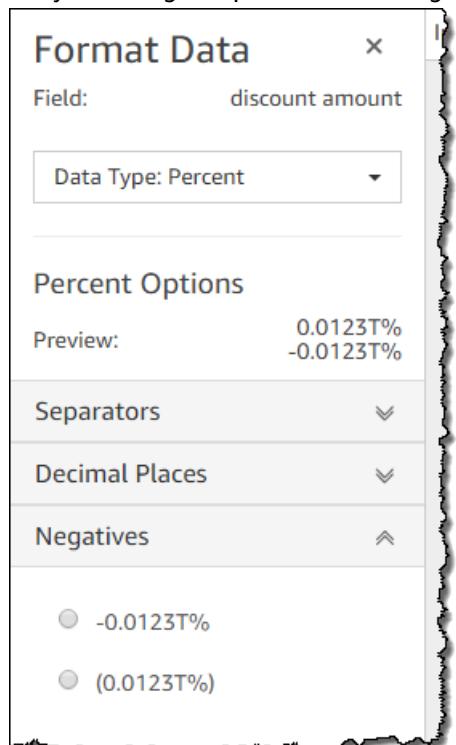
3. Expand the **Separators** section and choose from the following options:
 - Under **Decimal**, choose a dot or a comma for the decimal separator. A dot is the default. If you choose a comma instead, you must use a dot or a space as the thousands separator.
 - Under **Thousands**, select or deselect **Enabled** to indicate whether you want to use a thousands separator. **Enabled** is selected by default.
 - If you are using a thousands separator, choose whether to use a comma, dot, or space for the separator. A comma is the default. If you choose a dot instead, you must use a comma as the decimal separator.



4. Expand the **Decimal Places** section and choose from the following options:
 - Choose **Auto** to have Amazon QuickSight automatically determine the appropriate number of decimal places, or choose **Custom** to specify a number of decimal places. **Auto** is the default.
 - If you chose **Custom**, enter the number of decimal places to use. Field values are rounded to the decimal places specified. For example, if you specify two decimal places, the value 6.728 is rounded to 6.73.



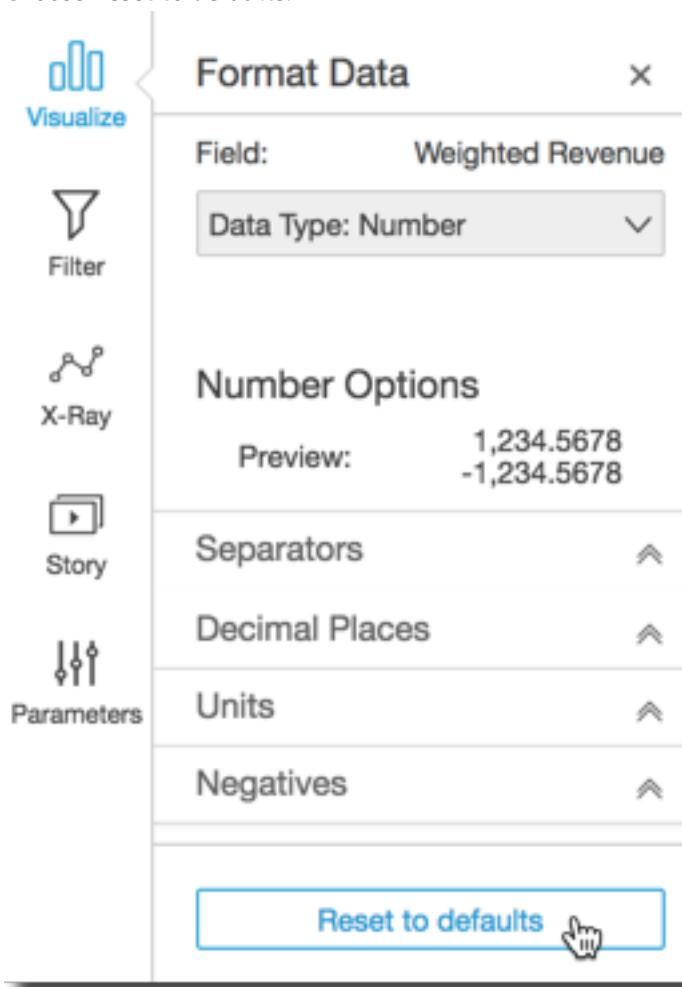
5. Expand the **Negatives** section and choose whether to display a negative value by using a minus sign or by enclosing it in parentheses. Using a minus sign is the default.



Return a Field's Format to Default Settings

Use the following procedure to return a field's format to the default settings.

1. Choose one of the following options:
 - In the **Field list** pane, choose the selector icon to the right of the field you want to reset.
 - On any visual that contains an on-visual editor associated with the field you want to reset, choose that on-visual editor.
 - Expand the **Field wells** pane, then choose the field well associated with the field you want to change.
2. Choose **Format** and then choose **More Formatting options....**
The **Format Data** pane opens.
3. Choose **Reset to defaults**.



Adding a Calculated Field to an Analysis

You create calculated fields to use functions and operators to analyze or transform field data. You can add calculated fields to a data set or to an analysis. You can create a calculated field and add a formula (expression) with aggregate functions only in an analysis.

When you add a calculated field to a data set during data preparation, it's available to all analyses that use that data set. Data sets support only single-row operations. When you add a calculated field to an analysis, it's available only in that analysis. Analyses support both single-row operations and aggregate operations.

Single-row operations are those that supply a (potentially) different result for every row. Aggregate operations supply results that are always the same for entire sets of rows. For example, if you use a simple string function with no conditions, it changes every row. If you use an aggregate function, it applies to all the rows in a group. If you ask for the total sales amount for the US, the same number applies to the entire set. If you ask for data on a particular state, the total sales amount changes to reflect your new grouping. It still provides one result for the entire set.

By creating the aggregated calculated field within the analysis, you can then drill down into the data. The value of that aggregated field is recalculated appropriately for each level. This type of aggregation isn't possible during data set preparation.

For example, let's say that you want to figure out the percentage of profit for each country, region, and state. You can add a calculated field to your analysis, $(\text{sum}(\text{salesAmount} - \text{cost})) / \text{sum}(\text{salesAmount})$. This field is then calculated for each country, region, and state, at the time your analyst drills down into the geography.

To see which functions are available in [SPICE \(p. 2\)](#), see [Functions by Category \(p. 436\)](#).

Note

The date functions `extract` and `truncDate` don't support SS (second) in SPICE.

For information on calculated fields in data sets, see [Working with Calculated Fields \(p. 155\)](#).

Topics

- [Using Aggregate Functions in Calculated Fields \(p. 220\)](#)
- [Adding a Calculated Field \(p. 226\)](#)
- [Parameters in a Calculated Field in an Analysis \(p. 228\)](#)
- [Editing a Calculated Field \(p. 229\)](#)
- [Deleting a Calculated Field \(p. 230\)](#)

Using Aggregate Functions in Calculated Fields

You can use the following aggregate functions on calculated fields during analysis and visualization:

- [Average \(avg \(p. 221\)\)](#) – Averages the set of numbers in the specified measure, grouped by the chosen dimension or dimensions.
- [Count \(count \(p. 222\)\)](#) – Calculates the number of values in a dimension or measure, grouped by the chosen dimension or dimensions.
- [Distinct Count \(distinct_count \(p. 222\)\)](#) – Calculates the number of distinct values in a dimension or measure, grouped by the chosen dimension or dimensions.
- [Maximum \(max \(p. 222\)\)](#) – Returns the maximum value of the specified measure, grouped by the chosen dimension or dimensions.
- [Minimum \(min \(p. 223\)\)](#) – Returns the minimum value of the specified measure, grouped by the chosen dimension or dimensions.
- [Sum \(sum \(p. 223\)\)](#) – Adds the set of numbers in the specified measure, grouped by the chosen dimension or dimensions.
- For each aggregation, there is also a conditional aggregation. These perform the same type of aggregation, based on a condition. Conditional aggregations include [avgIf \(p. 224\)](#), [countIf \(p. 224\)](#), [distinct_countIf \(p. 224\)](#), [maxIf \(p. 225\)](#), [minIf \(p. 225\)](#), and [sumIf \(p. 226\)](#).

When a calculated field formula contains an aggregation, it becomes a custom aggregation. To make sure your data is accurately displayed, Amazon QuickSight applies the following rules:

- Custom aggregations can't contain nested aggregate functions. For example, this formula won't work: `sum(avg(x)/avg(y))`. However, nesting nonaggregated functions inside or outside aggregate functions do work. For example, `ceil(avg(x))` works. So does `avg(ceil(x))`.
- Custom aggregations can't contain both aggregated and nonaggregated fields, in any combination. For example, this formula won't work: `Sum(sales)+quantity`
- Filter groups can't contain both aggregated and nonaggregated fields.
- Custom aggregations can't be converted to a dimension. They also can't be dropped into the field well as a dimension.
- In a pivot table, custom aggregations can't be added to table calculations.
- Scatter plots with custom aggregations need at least one dimension under **Group/Color** in the field wells.

For details about supported functions and operators, see [Calculated Field Function and Operator Reference for Amazon QuickSight \(p. 433\)](#).

Topics

- [avg \(p. 221\)](#)
- [count \(p. 222\)](#)
- [distinct_count \(p. 222\)](#)
- [max \(p. 222\)](#)
- [min \(p. 223\)](#)
- [percentile \(p. 223\)](#)
- [sum \(p. 223\)](#)
- [avgIf \(p. 224\)](#)
- [countIf \(p. 224\)](#)
- [distinct_countIf \(p. 224\)](#)
- [maxIf \(p. 225\)](#)
- [minIf \(p. 225\)](#)
- [sumIf \(p. 226\)](#)

avg

The `avg` function averages the set of numbers in the specified measure, grouped by the chosen dimension or dimensions. For example, `avg(salesAmount)` returns the average for that measure grouped by the (optional) chosen dimension.

Syntax

```
avg(decimal)
```

Arguments

decimal

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

count

The `count` function calculates the number of values in a dimension or measure, grouped by the chosen dimension or dimensions. For example, `count(product_type)` returns the total number of product types grouped by the (optional) chosen dimension, including any duplicates. The `count(sales)` function returns the total number of sales completed grouped by the (optional) chosen dimension, for example salesperson.

Syntax

```
count(dimension or measure)
```

Arguments

dimension or measure

The argument must be a measure or a dimension. Null values are omitted from the results. Literal values don't work. The argument must be a field.

distinct_count

The `distinct_count` function calculates the number of distinct values in a dimension or measure, grouped by the chosen dimension or dimensions. For example, `distinct_count(product_type)` returns the total number of unique product types grouped by the (optional) chosen dimension, without any duplicates. The `distinct_count(ship_date)` function returns the total number of dates when products were shipped grouped by the (optional) chosen dimension, for example region.

Syntax

```
distinct_count(dimension or measure)
```

Arguments

dimension or measure

The argument must be a measure or a dimension. Null values are omitted from the results. Literal values don't work. The argument must be a field.

max

The `max` function returns the maximum value of the specified measure, grouped by the chosen dimension or dimensions. For example, `max(sales_goal)` returns the maximum sales goals grouped by the (optional) chosen dimension.

Syntax

```
max(measure)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work. The argument must be a field.

min

The `min` function returns the minimum value of the specified measure, grouped by the chosen dimension or dimensions. For example, `min(return_rate)` returns the minimum rate of returns grouped by the (optional) chosen dimension.

Syntax

```
min(measure)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

percentile

The `percentile` aggregation computes the *n*th percentile of the specified measure, grouped by the chosen dimension or dimensions. This function helps you understand the distribution of your data.

Syntax

```
percentile(measure, percentile)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

percentile

The percentile value can be any double literal between 0 and 100. A percentile value of 50 computes the median value of the measure.

sum

The `sum` function adds the set of numbers in the specified measure, grouped by the chosen dimension or dimensions. For example, `sum(profit_amount)` returns the total profit amount grouped by the (optional) chosen dimension.

Syntax

```
sum(measure)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

avgIf

Based on a conditional statement, the `avgIf` function averages the set of numbers in the specified measure, grouped by the chosen dimension or dimensions. For example, `avgIf(ProdRev, CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` returns the average for that measure grouped by the (optional) chosen dimension, provided the condition evaluates to true.

Syntax

```
avgIf(dimension or measure, condition)
```

Arguments

decimal

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

condition

One or more conditions in a single statement.

countIf

Based on a conditional statement, the `countIf` function calculates the number of values in a dimension or measure, grouped by the chosen dimension or dimensions. For example, `countIf(ProdRev, CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` returns the total number of product types grouped by the (optional) chosen dimension, including any duplicates. The `countIf(sales)` function returns the total number of sales completed grouped by the (optional) chosen dimension, for example salesperson, provided the condition evaluates to true.

Syntax

```
countIf(dimension or measure, condition)
```

Arguments

dimension or measure

The argument must be a measure or a dimension. Null values are omitted from the results. Literal values don't work. The argument must be a field.

condition

One or more conditions in a single statement.

distinct_countIf

Based on a conditional statement, the `distinct_countIf` function calculates the number of distinct values in a dimension or measure, grouped by the chosen dimension or dimensions. For example, `distinct_countIf(product_type)` returns the total number of unique product types grouped by the (optional) chosen dimension, without any duplicates. The

`distinct_countIf(ProdRev,CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` function returns the total number of dates when products were shipped grouped by the (optional) chosen dimension, for example region, provided the condition evaluates to true.

Syntax

```
distinct_countIf(dimension or measure, condition)
```

Arguments

dimension or measure

The argument must be a measure or a dimension. Null values are omitted from the results. Literal values don't work. The argument must be a field.

condition

One or more conditions in a single statement.

maxIf

Based on a conditional statement, the `maxIf` function returns the maximum value of the specified measure, grouped by the chosen dimension or dimensions. For example, `maxIf(ProdRev,CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` returns the maximum sales goals grouped by the (optional) chosen dimension, provided the condition evaluates to true.

Syntax

```
maxIf(measure, condition)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work. The argument must be a field.

condition

One or more conditions in a single statement.

minIf

Based on a conditional statement, the `minIf` function returns the minimum value of the specified measure, grouped by the chosen dimension or dimensions. For example, `minIf(ProdRev,CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` returns the minimum rate of returns grouped by the (optional) chosen dimension, provided the condition evaluates to true.

Syntax

```
minIf(measure, condition)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

condition

One or more conditions in a single statement.

sumIf

Based on a conditional statement, the `sumIf` function adds the set of numbers in the specified measure, grouped by the chosen dimension or dimensions. For example, `sumIf(ProdRev, CalendarDay >= ${BasePeriodStartDate} AND CalendarDay <= ${BasePeriodEndDate} AND SourcingType <> 'Indirect')` returns the total profit amount grouped by the (optional) chosen dimension, provided the condition evaluates to true.

Syntax

```
sumIf(measure, conditions)
```

Arguments

measure

The argument must be a measure. Null values are omitted from the results. Literal values don't work.
The argument must be a field.

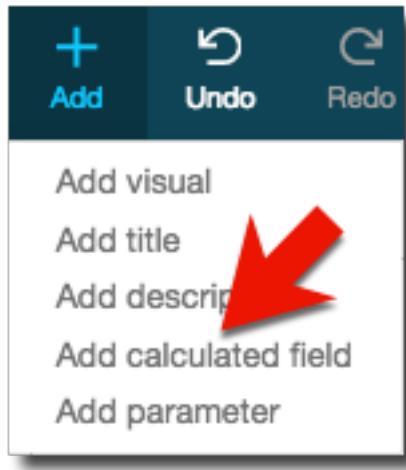
condition

One or more conditions in a single statement.

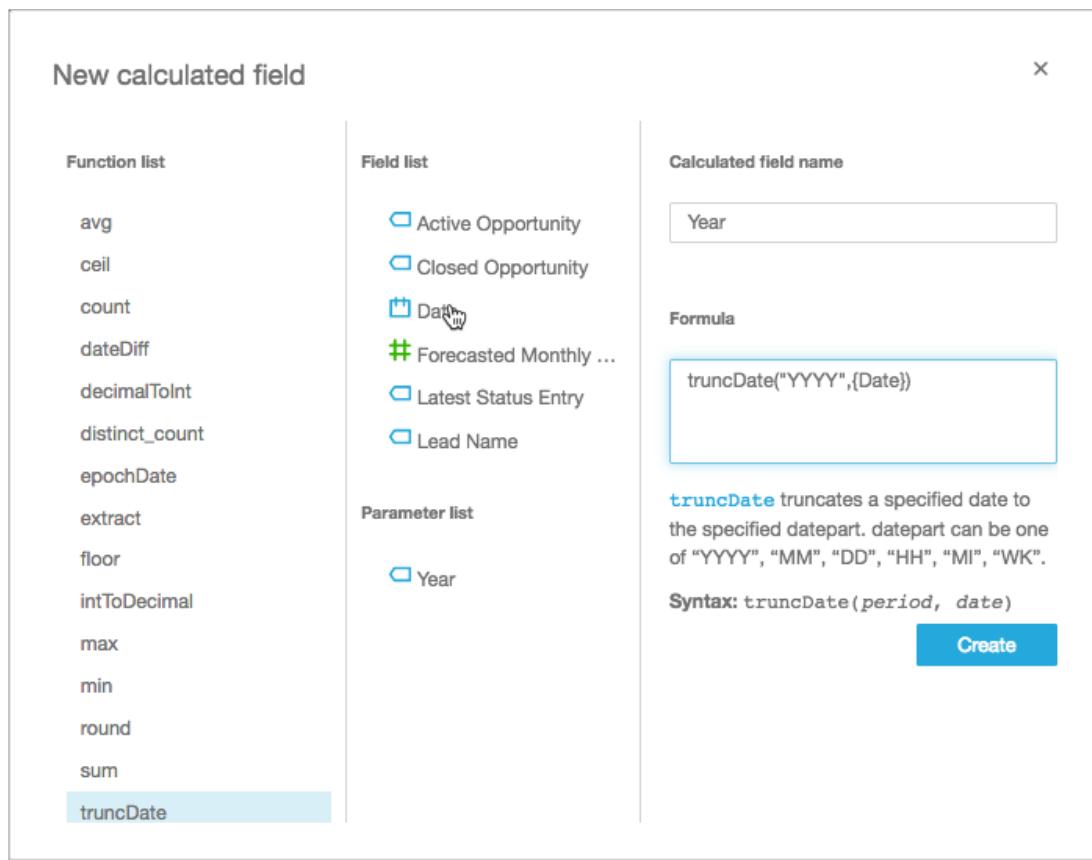
Adding a Calculated Field

Use the following procedure to add a calculated field.

1. Choose **Add** on the application bar, and then choose **Add calculated field**.



2. For **Calculated field name**, where it says **Enter a field name**, type a name for the calculated field. This name will be the field label displayed in the analysis, so it should match the existing style of field names.
3. Choose a function from **Function list**, and choose the fields that you want to use from the **Field list**. Each field is entered into the formula where your cursor is. You can add user-defined parameters from **Parameter list** in the same way.



4. In **Formula**, type any formula parameters needed by the function. Choose any additional fields or parameters to complete your formula.

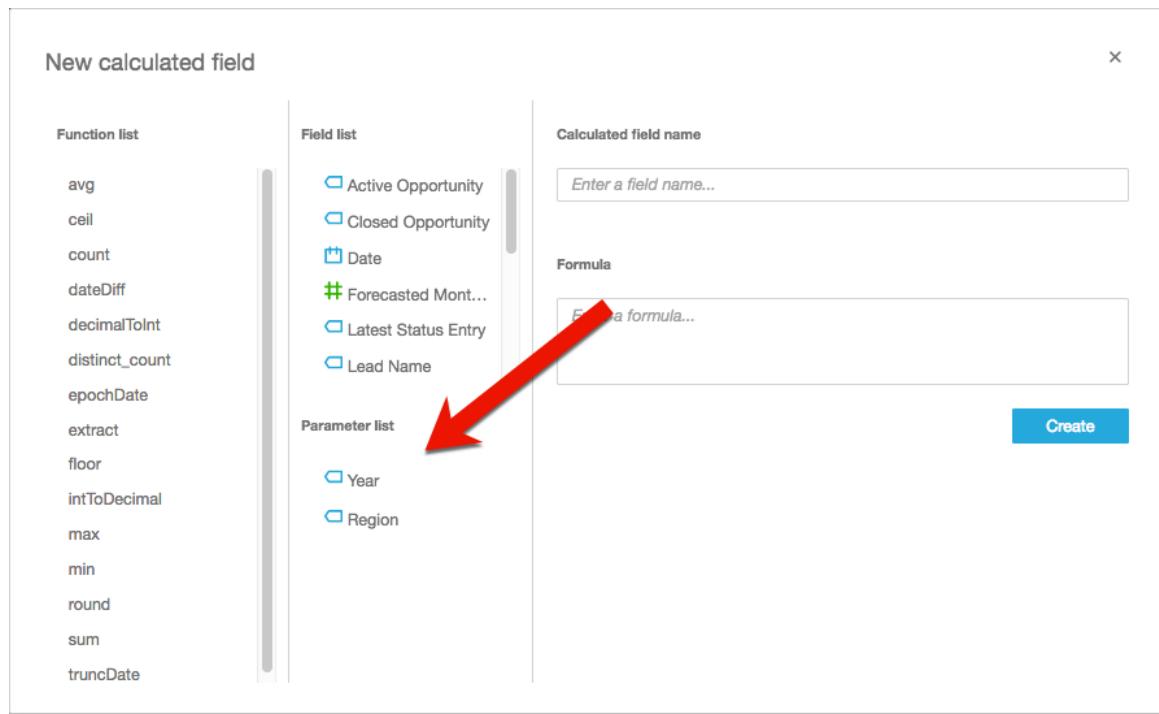
If you use a field that has a space or a nonalphanumeric character other than an underscore in the name, you must enclose the field name in curly braces when referencing it, for example `{ship charges amount}`. Curly braces are optional if the field name has no space and no nonalphanumeric character.

5. Choose **Create**.

If there are no errors in the formula or name, the new calculated field is created. It appears in the **Fields list** pane.

Parameters in a Calculated Field in an Analysis

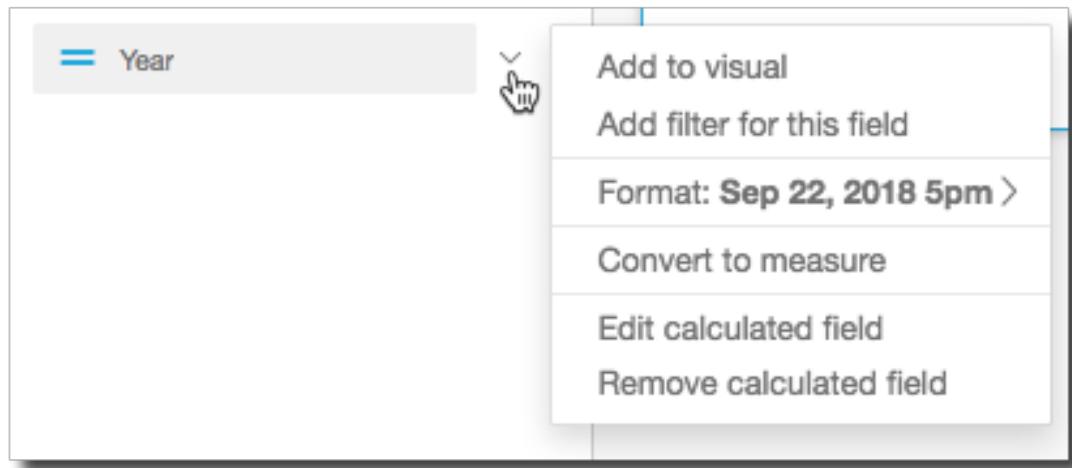
You can reference parameters in calculated fields that are in an analysis. When you create a calculation, you can choose existing parameters from the list of parameters under **Parameter list**. Alternatively, you can type in the parameter name, preceded with a \$ and enclosed in curly braces {}, for example `${parameterName}` .



Editing a Calculated Field

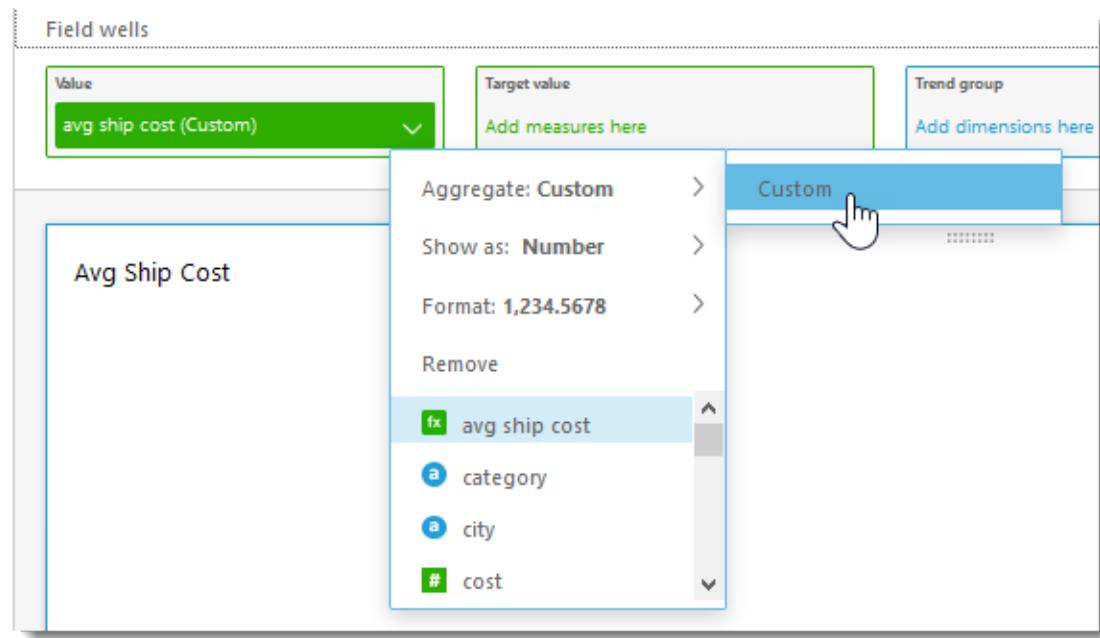
Use the following procedure to edit a calculated field.

1. In the **Field list** pane, hover over the calculated field you want to change.
2. Choose the selector icon to the right of the field name, and then choose **Edit calculated field**.



3. If the field is a custom aggregation, you can edit it in the field well.

Hover over the field in the field well and choose the selector icon to the right of the field name. Choose **Aggregate: custom**, and then choose **Custom**.

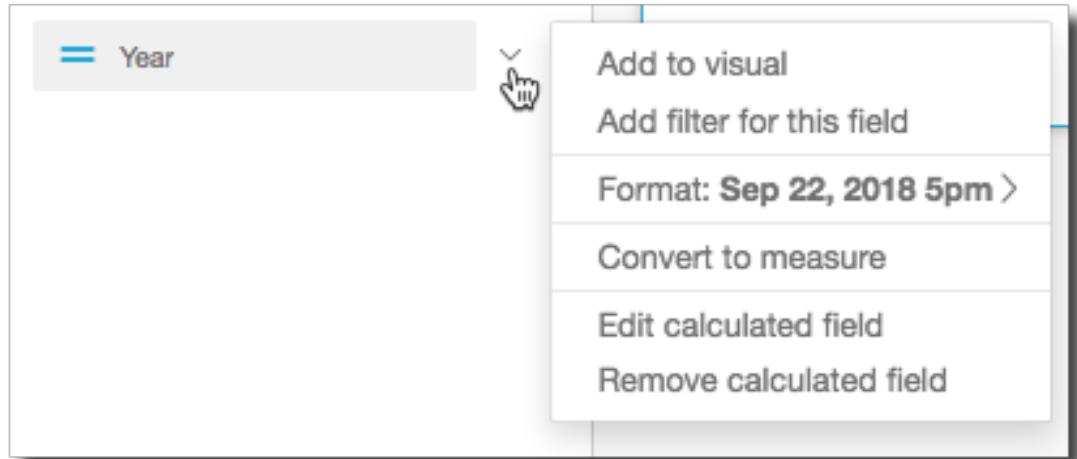


Then choose **Edit formula**.

Deleting a Calculated Field

Use the following procedure to delete a calculated field.

1. In the **Field list** pane, hover over the calculated field you want to delete.
2. Choose the selector icon to the right of the field name, and then choose **Remove calculated field**.



Parameters in Amazon QuickSight

Parameters are named variables that can transfer a value for use by an action or an object. They let you create an easier way for a dashboard user to interact with dashboard features in a less technical way. Parameters can also connect one dashboard to another, allowing a dashboard user to drill down into data that's in a different analysis.

For example, a dashboard user can use a list to choose a value. That value sets a parameter that in turn sets a filter, calculation, or URL action to the chosen value. Then the visuals in the dashboard react to the user's choices.

To make the parameters accessible to the dashboard viewer, you add a parameter control. You can set up cascading controls, so that a selection in one control filters the options that display in another control. A control can appear as a list of options, a slider, or a text entry area. If you don't create a control, you can still pass a value to your parameter in the dashboard URL.

For parameters to work, whether or not they have a related control, they need to be connected to something in your analysis. You can reference them in the following:

- Calculated fields (except for multivalue parameters)
- Filters
- Dashboard and analysis URLs
- URL actions

Some ways that you can use parameters are the following:

- Using a calculation, you can transform data that is shown in an analysis.
- If you add a control with a filter to an analysis you are publishing, the dashboard users can filter the data without creating their own filters.
- Using controls and URL actions, you can let dashboard users set values for the URL actions.

Topics

- [Setting Up Parameters in Amazon QuickSight \(p. 231\)](#)
- [Connecting to Parameters in Amazon QuickSight \(p. 237\)](#)

Setting Up Parameters in Amazon QuickSight

Topics

- [Creating or Editing Parameters in Amazon QuickSight \(p. 231\)](#)
- [Using a Control with a Parameter in Amazon QuickSight \(p. 233\)](#)
- [Creating Parameter Defaults in Amazon QuickSight \(p. 235\)](#)

Creating or Editing Parameters in Amazon QuickSight

Use the following procedure to create or edit a basic parameter.

1. Choose an analysis to work with, and decide which field you want to parameterize.
2. Choose the **Parameters** pane from the left side of the screen.

3. Add a new parameter by choosing the add icon (+) near the top of the pane.

Edit an existing parameter by first choosing the v-shaped icon near the parameter name and then choosing **Edit parameter**.

4. The following screen appears.

The screenshot shows the 'Create new parameter' dialog box. At the top, it says 'Create new parameter' and has a close button ('X'). Below that, a sub-instruction reads: 'Use parameters to dynamically control values in your fields, filters and sheet'. The main configuration area starts with a 'Name' section containing a text input field labeled 'Parameter name'. Next is a 'Data type (Not alterable after creation)' section with a dropdown menu set to 'String'. Under 'Values', there are two radio buttons: 'Single value' (selected) and 'Multiple values'. A 'Static default value' section follows, with an input field for 'Enter value' and a blue button 'Set a dynamic default'. At the bottom, there are 'Cancel' and 'Create' buttons.

A parameter consists of the following parts, which you enter on this screen:

Name

Enter an alphanumeric value for the parameter **Name**. This name is used as a reference in the consumers of the parameters (for example, calculated field, filter, custom URL action, and so on). For ease of use, you can choose a name that reflects the data type and purpose of the parameter.

Data type

Choose a value for **Data type**. This data type can't be altered after you create the parameter. If you want to use the parameter for a text box or drop-down list, choose **String**.

Values

Choose one of the following:

- **Single value** – for parameters that can contain only one value.
- **Multiple values** – for parameters that can contain one or more values. Multivalue parameters can't be datetime data types. They also don't support dynamic default values.

To switch an existing parameter between single and multiple values, delete and recreate the parameter.

Static default value

Choose a static default value for the parameter. This static value is used during the first page load, if a dynamic default value or URL parameter isn't provided.

Dynamic default value

Choose **Set a dynamic default** to create a default that is user-specific. A *dynamic default* is a per-user default value for the first page load of the dashboard. Using a dynamic default, you can create a personalized view for each user.

Calculated fields can't be used as dynamic defaults.

Dynamic defaults don't prevent a user from selecting a different value. If you want to also secure the data, you can add row-level locking. For more information, see [Restricting Access to a Data Set by Using Row-Level Security \(p. 118\)](#).

This option only appears if you choose a single value parameter. Multivalue parameters can't have dynamic defaults.

Note

If you choose a multivalue parameter, the screen changes to remove the default options. Instead, you see a box with the text **Enter values you want to use for this control**. You can enter multiple values in this box, each on a single line. These values are used as the default selected values in the parameter control. The values here are unioned with what you choose to enter for the parameter control. For more information on parameter controls, see [Parameter Controls \(p. 233\)](#).

5. Choose **Create** or **Update** to complete creating or updating the parameter.

After you create a parameter, you can use it in a variety of ways. You can create a control (such as a button) so that you can choose a value for your parameter. For more information, see the following sections.

Using a Control with a Parameter in Amazon QuickSight

In dashboards, parameter controls appear at the top of the data sheet, which contains a set of visuals. Providing a control allows users to choose a value to use in a predefined filter or URL action. Dashboard users can use controls to apply filtering across all visuals data sets on a dashboard, without having to create the filters themselves.

Use the following procedure to create or edit a control for an existing parameter. You need to have an existing parameter to create or edit a control for it.

1. Choose an existing parameter's context menu, the **v** icon near the parameter name, and choose **Add control**.
2. Enter a name to give the new control a label. This label displays at the top of the workspace, and later at the top of the sheet that a dashboard displays on.
3. Choose a style for the control from the following:

- **Text box**

A text box lets a user type in their own value. A text box works with numbers and text (strings).

- **Drop-down (single-select or multiselect)**

A *single select* drop-down lets a user select one value from a list. A *multiselect* drop-down lets a user select multiple values. Both type of lists work with numbers and text (strings).

Multiselect lists used by a control can work with the following:

- Custom URL actions
- Dashboard or analysis URLs
- Custom filters (these must either equal or not equal the values provided; no other comparisons are supported)

- **Slider**

A slider lets a user select a numeric value by sliding the control from one end of the bar to another. A slider works with numbers.

- **Date-picker**

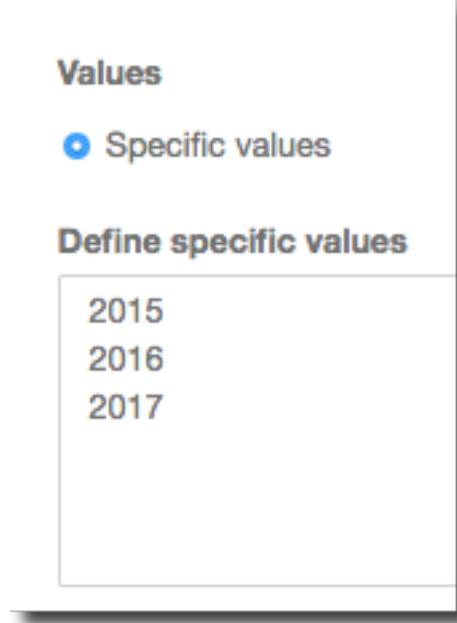
A date-picker lets a user select a date from a calendar control.

The **Style** option displays only the style types that are appropriate for the parameter's data type and single or multivalue setting. If the style that you want to use isn't in the list, you can recreate your parameter with the appropriate settings and try again.

4. (Optional) If you choose a drop-down control, the screen expands so you can choose the values to display. You can either specify a list of values, or use a field in a data set. Choose one of the following:

- **Specific values**

To create a list of specific values, type in one per line, with no separating spaces or commas, as shown in the following screenshot.



In the control, the values display in the order you typed them, not alphabetically.

- **Link to a data set field**

To link to a field, choose the data set that contains your field, then choose the field from the list. It can't be a calculated field.

The values display alphabetically in the control, unless there are more than 10,000 distinct values. Then the control displays a search box instead. Each time you search for the value you want to use, it initiates a new query. If the results contain more than 10,000 values, you can scroll through the values with pagination.

If you change the default values in the parameter, choose **Reset** on the control to show the new values.

The values that you choose here are unioned with the static default values in the parameter settings.

5. (Optional) You can limit the values displayed in the controls, so they only show values that are valid for what is selected in other controls. This is called a cascading control.

To create one, choose **Show relevant values only**. Choose one or more controls that can change what displays in this control.

6. When you finish choosing options for your control, choose **Add**.

The finished control appears at the top of the workspace. The context menu, shaped like a v, offers four options:

- **Reset** restores the user's selection to its default state.
- **Refresh list** applies only to drop-downs that are linked to a field in a data set. Choosing **Refresh list** queries the data to check for changes. Data used in the control is cached.
- **Edit** reopens the control creation screen so that you can change your settings.
- **Delete** removes the control. You can recreate it by choosing the parameter context menu.

In the workspace, you can also resize and rearrange your controls. The dashboard users see them as you do, except without being able to edit or delete them.

Creating Parameter Defaults in Amazon QuickSight

Use this section to learn more about the types of parameter defaults that are available, and how to set up each of them. If you set up a dynamic default, the parameter's control automatically uses that user's preselected default. In the absence of a dynamic default, the parameter's control uses the static default.

Use the following procedure to create or edit a static (unchanging) default value for a parameter.

1. Choose the context menu (v) by the parameter you want to edit, or create a new parameter by following the steps in [Creating or Editing Parameters in Amazon QuickSight \(p. 231\)](#).
2. To set a static default, enter a value for **Static default value**. Otherwise, leave this blank. The value you set for a static default can't be changed by the dashboard user.

To create or edit an optional dynamic default value for a parameter, use the following procedure. The data set for dynamic defaults can use a database query or an uploaded file. You can't use dynamic defaults with multivalued parameters—those that use a multiselect drop-down control.

1. Create a database table or SQL query similar to the following. To maintain this table or query more easily, the names of other fields (columns) should closely match those in the data set that you are analyzing. It doesn't matter what order the fields are in. It also doesn't matter if there are fields in this data set that aren't in the current analysis.

`UserID` must be unique in the data set.

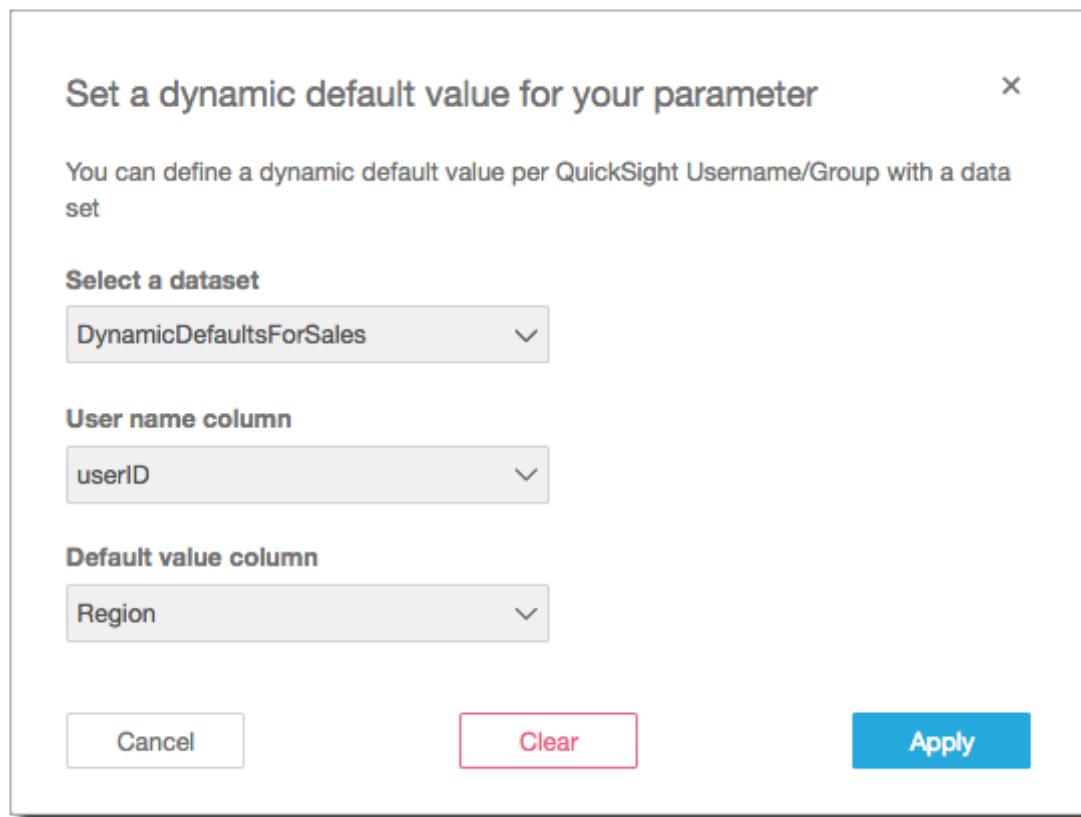
| UserID | Region | Segment |
|----------------------|--------------|------------|
| anacarolinasilva | NorthEast | SMB |
| liujie | SouthEast | SMB |
| WestRegionSalesExecs | West | Enterprise |
| saanvisarkar | NorthCentral | SMB |
| zhangwei | SouthCentral | SMB |

After you finish this procedure, you can use these fields to choose the default settings for each user, based on a filter you create. To learn more about using filters with parameters, see [Using Filters with Parameters in Amazon QuickSight \(p. 239\)](#).

We recommend that you put all dynamic default definitions in a single table.

2. Create a data set based on this data, and add it to your analysis.
3. Open the **Parameters** pane, choose a parameter's context (v) menu, and choose **Edit parameter**.
4. Choose **Set a dynamic default**.
5. Choose the data set that you put your user ID and dynamic default values in. Then choose the **UserID** column for the **User name column**. Next, choose the relevant value field for the **Default value column**, for example **Region** or **Segment**.

For example, in the following screenshot, the user chooses the data set they created for this (**DynamicDefaultsForSales**), then chooses the user name column (**userID**). Then the user chooses the column that contains the default values (**Region**) to use for each user in **DynamicDefaultsForSales**.



6. Choose **Apply** to save your changes. Each user's dynamic default value is used in the parameter controls, the first time the user opens the page. You can have more columns in your data set to choose dynamic defaults for additional columns.

Amazon QuickSight uses the static default value for users who don't exist in the data set, don't have a default assigned to them, or don't have unique defaults. Each user must have only a single set of defaults. If you don't want to use dynamic defaults, you can choose to set a static default.

If there is no static default either, then the user can still choose values from the controls. Also, having a dynamic default set doesn't stop users from choosing a different value from the control.

Connecting to Parameters in Amazon QuickSight

Use this section after you have a parameter set up, to connect it and make it work.

After you create a parameter, you can create consumers of the parameters. *Parameter consumers* are components that consume the value of a parameter, such as filters, controls, calculated fields, or URL actions.

You can choose your next step from the shortcuts on this screen.

Parameter Added

Connect your parameter:

Create a filter, using the combination of parameters, new control, and a filter.

 Filter

Create a new control for a filter or a calculated field.

 Control

Use a parameter in a calculated field.

 Calculated field

Create a URL action with parameters.

 Custom actions

[Close](#)

You can navigate to each of these options in another way, as follows:

- To create a filter, choose **Filter** to the left of the screen. In short, you create a **Custom Filter** and enable **Use parameters**. The list shows only eligible parameters.
- To add a new control for the parameter, choose **Parameters** on the left. In short, choose your parameter, and then **Add control**.
- To use a parameter in a calculated field, either edit an existing calculated field, or add a new one by choosing **Add** at the top left. The parameter list appears below the field list.

Note

You can't use multivalue parameters with calculated fields.

- To create a URL action, choose the v-shaped menu on a visual, and then choose **URL Actions**.

For more information on each of these topics, see the following sections.

Topics

- [Using Filters with Parameters in Amazon QuickSight \(p. 239\)](#)
- [Using Calculated Fields with Parameters in Amazon QuickSight \(p. 241\)](#)
- [Using Custom URL Actions with Parameters in Amazon QuickSight \(p. 242\)](#)

- [Using Parameters in a URL \(p. 243\)](#)

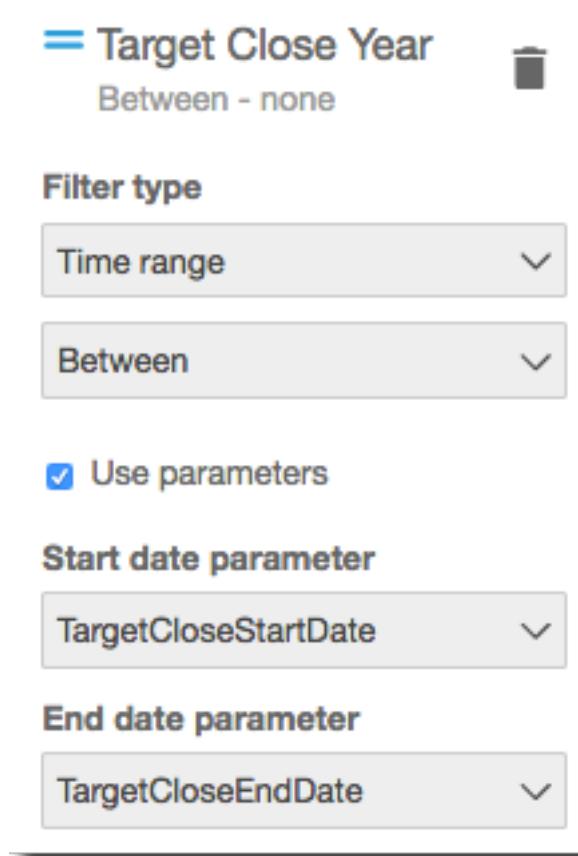
Using Filters with Parameters in Amazon QuickSight

Use this section to filter the data in an analysis or dashboard by a single-value parameter value. To use a multivalued parameter—one with a multiselect drop-down control—create a custom filter that is equal (or not equal) to the values.

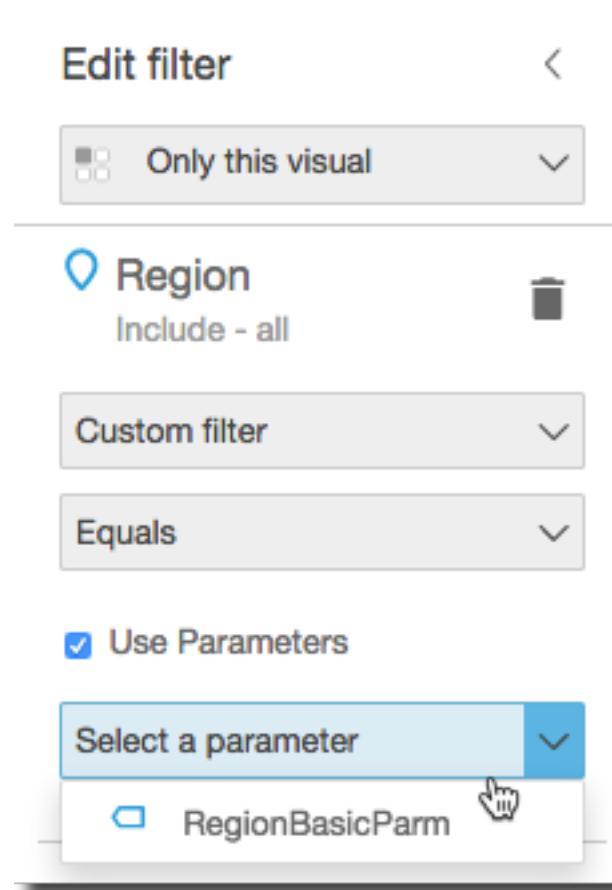
Before using a filter with a parameter, you should already know how to work with filters.

1. Verify that your analysis has a parameter already created. Choose **Edit** from either the parameter or the control's menu to find out what settings are in use.
2. Choose the **Filter** pane from the left of the screen. If there is already a filter for the field that you want to use, choose it to open its settings. Otherwise, create a filter for the field that you want to filter by parameter.
3. Choose **Use Parameters**.
4. Choose your parameters from the list or lists below **Use parameters**. For text (string) fields, first choose **Custom Filter**, and then enable **Use Parameters**.

For date fields, choose the **Start date** and **End date** parameters, as shown in the following screenshot.



For fields with other data types, choose **Select a parameter** and then choose your parameter from the list.



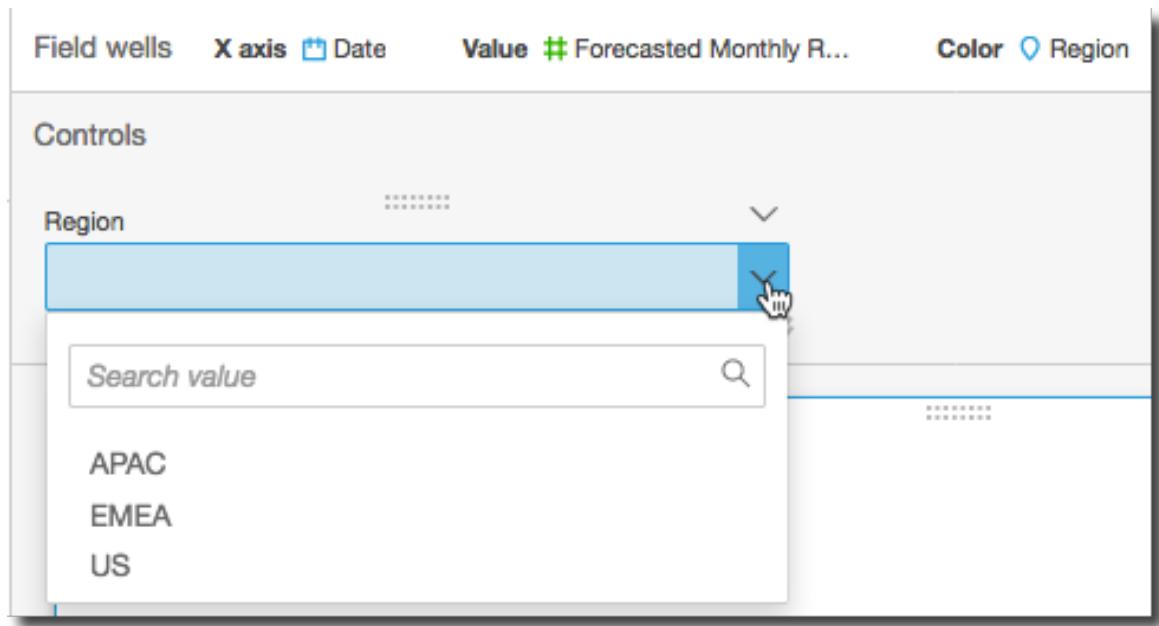
Note

Parameters that can hold multiple values must use equal or not equal as the comparison type.

5. Choose **Apply** to save your changes.

Test your new filter by choosing the control near the top of the analysis. In this example, we use a basic parameter that has no defaults, and a dynamic control that is linked to the **Region** field in the sample data set named **Sales Pipeline**. The control queries the data, returning all values.

Two context menus appear in the following screenshot. The menu that is highlighted in the screenshot manages the parameter. The menu that is not highlighted manages the control settings. Using the control's menu, you can reset the control by choosing **Reset**, or refresh your data by choosing **Refresh list**.

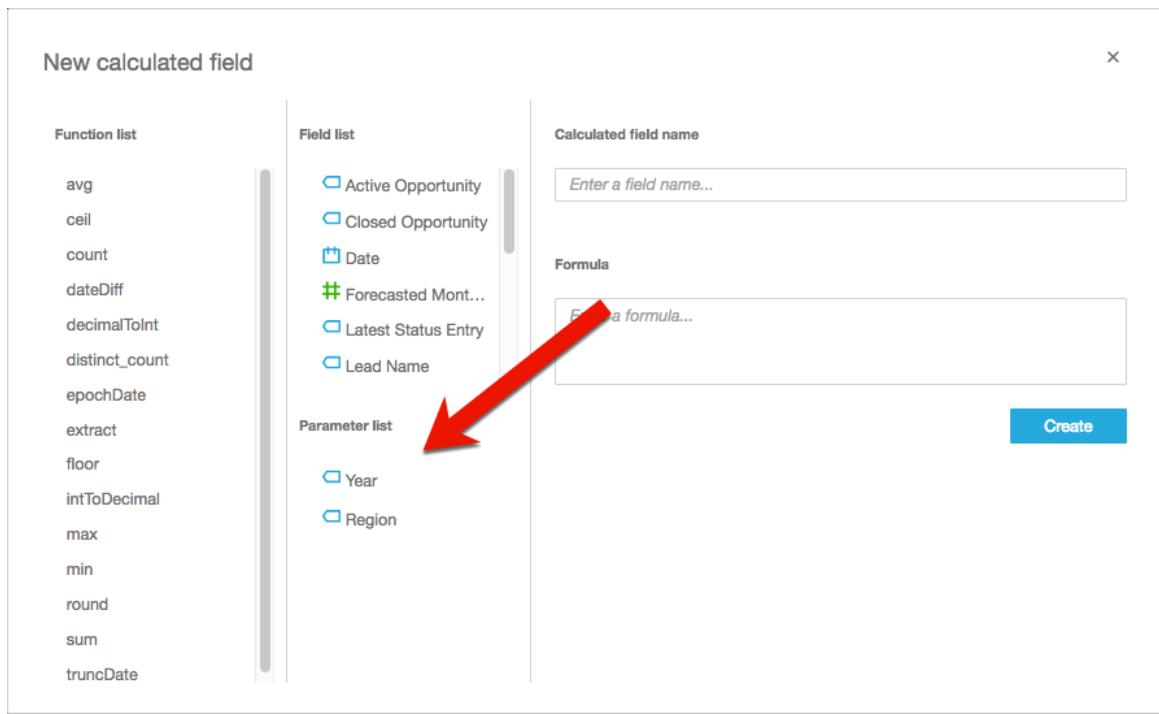


If you delete or recreate a parameter that you are using in a filter, you can update the filter with the new parameter. To do this, open the filter, choose the new parameter that you want to use, and then choose **Apply**.

If you rename a parameter, you don't need to update the filter or any other consumers.

Using Calculated Fields with Parameters in Amazon QuickSight

You can pass the value of a parameter to a calculated field in an analysis. When you create a calculation, you can choose existing parameters from the list of parameters under **Parameter list**. You can't create a calculated field that contains a multivalued parameter—those with a multiselect drop-down control.



For the formula, you can use any of the available functions. You can pass the viewer's selection from the parameter control, to the `ifElse()` function, and then return a metric accordingly, as shown in the following example:

```
ifelse(
    ${KPIMetric} = 'Sales', sum({Weighted Revenue}),
    ${KPIMetric} = 'Forecast', sum({Forecasted Monthly Revenue}),
    ${KPIMetric} = '# Active', distinct_count(ActiveItem),
    Null
)
```

The preceding example creates a metric (a decimal) that you can use in a field well. Then, when a user chooses a value from the parameter control, the visual updates to reflect their selection.

Using Custom URL Actions with Parameters in Amazon QuickSight

A *URL action* lets you launch any URL from a data point in a visual, to open another webpage. You can also pass or send parameters dynamically. To make this work, you set up a parameter, and then add a custom URL action to the visual. The parameters on both the sending and the receiving end should match in name and data type. All parameters are compatible with custom URL actions.

If you just want to use a parameter in a link, without creating a URL action, see [Using Parameters in a URL \(p. 243\)](#).

To use a parameter in a custom URL action, select it from the list. Parameters are prefixed with a \$ and enclosed in angle brackets <> >, for example: <\$parameterName>.

For details on creating a URL action, see [Adding Custom URL Actions to Visuals in Amazon QuickSight \(p. 339\)](#).

Using Parameters in a URL

You can use a parameter name and value in a URL in Amazon QuickSight to set a default value for that parameter in a dashboard or analysis.

The following example shows the URL of a dashboard that sets a parameter for another dashboard.

```
https://us-east-2.quicksight.aws.amazon.com/sn/dashboards/abc123-abc1-abc2-abc3-  
abcdefef1234#p.myParameter=12345
```

In the previous example, the first part is the link to the target dashboard: `https://us-east-2.quicksight.aws.amazon.com/sn/dashboards/abc123-abc1-abc2-abc3-abcdefef1234`. The hash sign (#) follows the first part to introduce the *fragments*, which contain the values that you want to set.

The values in the fragments aren't received or logged by AWS servers. This functionality keeps your data values more secure.

The fragment after # follows these rules:

- Parameters are prefixed with `p.`. The names are the parameter name, not the control name. You can view the parameter name by opening the analysis, and choosing **Parameter** on the left sidebar.
- The value is set using equals (=). The following rules apply:
 - Literal values don't use quotation marks.
 - Spaces inside values are automatically encoded by the browser, so you don't need to use escape characters when manually creating a URL.
 - To return all values, set the parameter equal to "[ALL]".
 - In custom URL actions, target parameter names begin with `$`, for example: `<<$passThroughParameter>>`
 - In custom URL actions, parameter values display with angle brackets `<< >>`, for example `<<dashboardParameter1>>`. The dashboard user sees the lookup value, not the variable.
- For a custom URL action, multivalue parameters only need one instance of the same parameter in the fragment, for example: `p.city=<<$city>>`
- For a direct URL, multiple values for a single parameter have two instances of the same parameter in the fragment. For an example, see following.
- Ampersands (&) separate multiple parameters. For an example, see following.

The server converts the date to UTC and sends it to the backend as a string without a time zone. To use Universal Coordinated Time (UTC) dates, exclude the time zone. Following are some examples of date formats that work:

- 2017-05-29T00%3A00%3A00
- 2018-04-04 14:51 -08:00
- Wed Apr 04 2018 22:51 GMT+0000

```
https://us-east-2.quicksight.aws.amazon.com/sn/dashboards/abc123-  
abc1-abc2-abc3-abcdefef1234#p.shipdate=2018-09-30 08:01&p.city=New  
York&p.city=Seattle&p.teamMember=12&p.percentageRank=2.3
```

In the browser, this code becomes the following.

```
https://us-east-2.quicksight.aws.amazon.com/sn/dashboards/abc123-  
abc1-abc2-abc3-abcdefef1234#p.shipdate=2018-09-30%2008:01&p.city>New  
%20York&p.city=Seattle&p.teamMember=12&p.percentageRank=2.3
```

The previous example sets four parameters:

- `shipDate` is a date parameter: Sept 30, 2018.
- `city` is a multivalued string parameter: New York, and Seattle
- `teamMember` is an integer parameter: 12.
- `percentageRank` is a decimal parameter: 2.3.

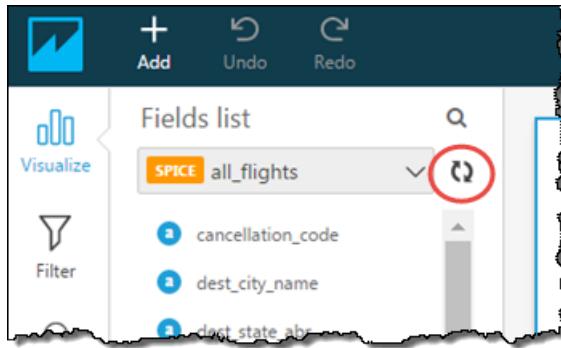
The following example shows how to set values for a parameter that accepts multiple values.

```
https://us-east-2.quicksight.aws.amazon.com/sn/dashboards/abc123-abc1-abc2-abc3-  
abcdefef1234#p.MultiParam=WA&p.MultiParam=OR&p.MultiParam=CA
```

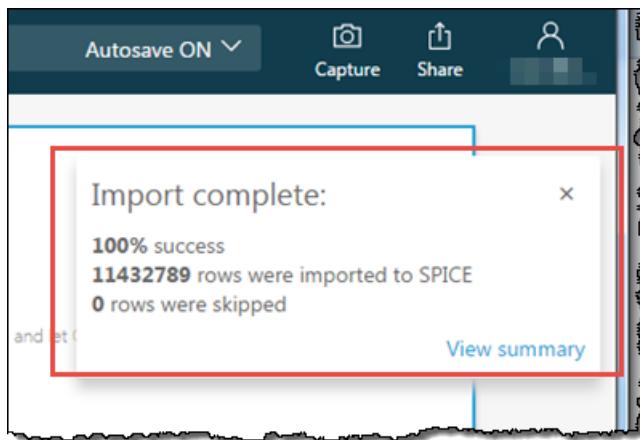
To pass values from one dashboard (or analysis) to another dashboard based on the user's data point selection, use [custom URL actions \(p. 339\)](#). If you choose, you can also generate these URLs manually, and use them to share a specific view of the data.

SPICE Data in an Analysis

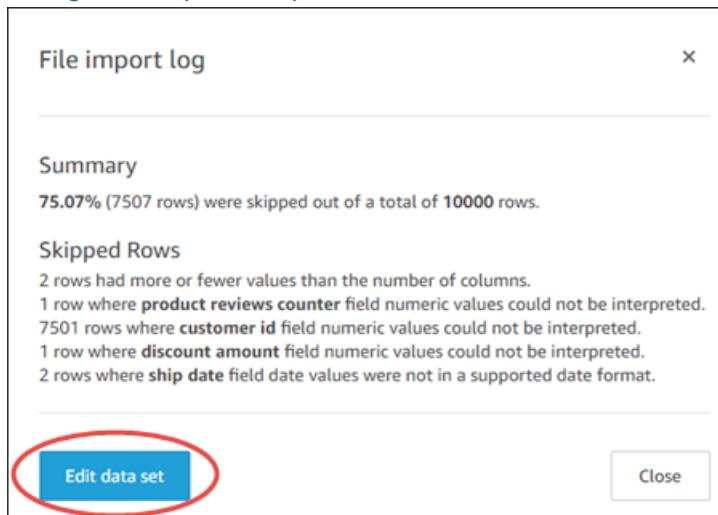
When you use [SPICE \(p. 2\)](#) data to create an analysis, a data import indicator appears next to the data set list at the top of the **Fields list** pane. When you first open the analysis and the data set is importing, this icon appears as a spinner.



Once the SPICE import completes, the indicator displays the percentage of rows that were successfully imported. A message also appears at the top of the visualization pane to provide counts of the rows imported and skipped.



If any rows were skipped, you can choose **View summary** in this message bar to see details about why those rows failed to import. To edit the data set and resolve the issues that led to skipped rows, choose **Edit data set**. For more information about common causes for skipped rows, see [My Rows Were Skipped During Data Preparation \(p. 533\)](#).



If an import fails altogether, the data import indicator appears as an exclamation point icon, and an **Import failed** message displays.

Sharing Analyses

You can share an analysis with one or more other users by emailing them a link, making it easy to collaborate and disseminate findings. You can only share an analysis with other users in your Amazon QuickSight account.

Once you share an analysis, you can review the other users that have access to it, and also revoke access from any user.

Topics

- [Share an Analysis \(p. 246\)](#)
- [View the Users an Analysis is Shared With \(p. 247\)](#)

- [Revoke Access to an Analysis \(p. 247\)](#)

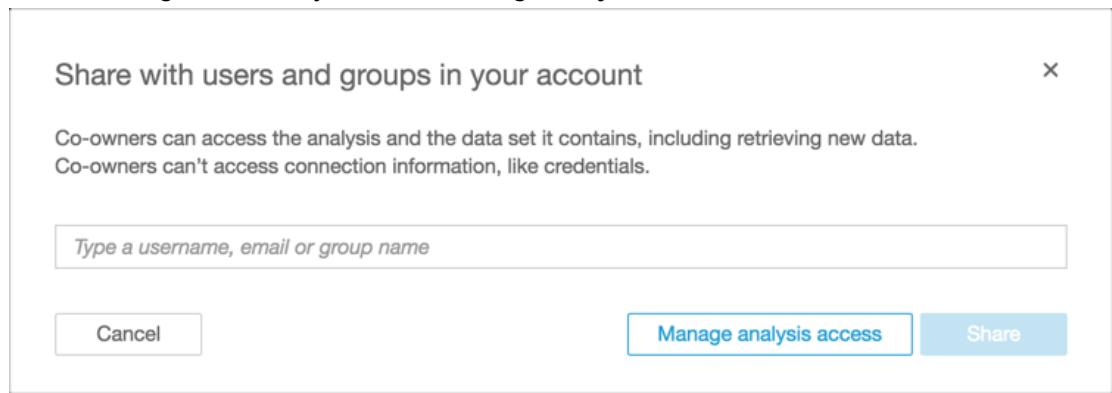
Share an Analysis

Use the following procedure to share an analysis.

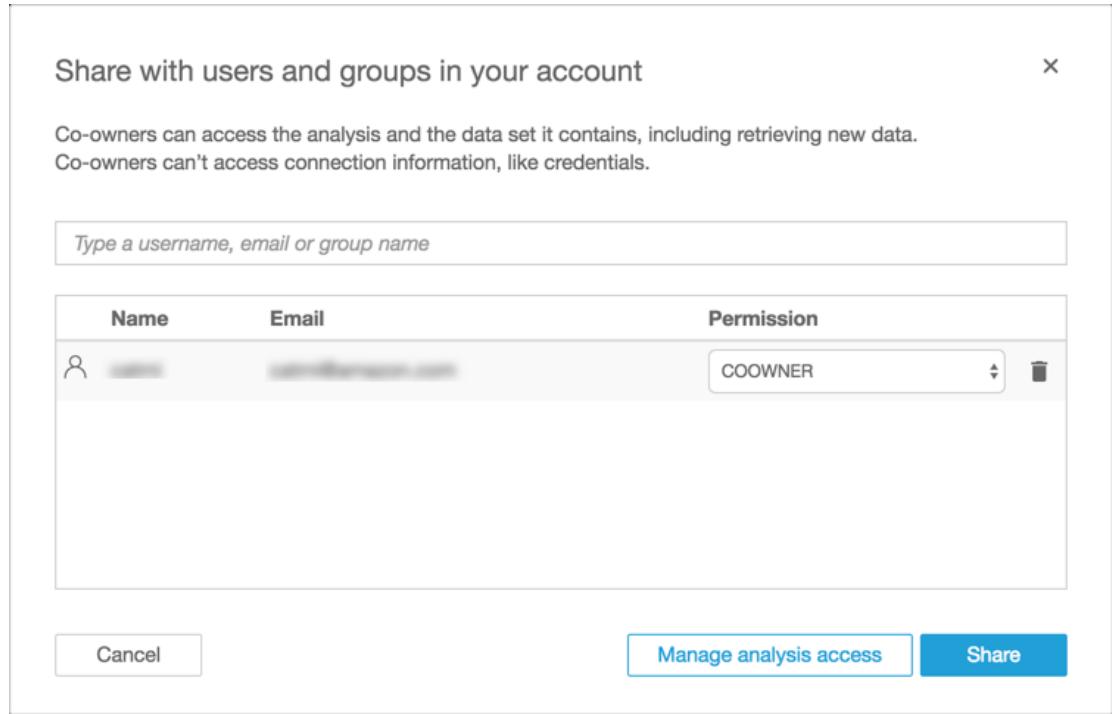
1. On the analysis page, choose **Share** on the application bar and then choose **Share analysis**.
2. You can only share analyses with users or groups who are in your Amazon QuickSight account.

To add a user or group to share with, in the **Type a user name or email** box, type the first user or group you want to share this analysis with. Then choose **Share**. Repeat this step until you have entered information for everyone you want to share the analysis with.

To edit sharing for this analysis, choose **Manage analysis access**.



3. On this screen you can edit permissions, and add more users or groups. For **Permission**, choose the role to assign to each user or group. The role determines the permission level to grant to that user or group.



4. Choose **Share**.

The users you have shared the analysis with receive emails with a link to the analysis. Groups don't receive invitation emails.

View the Users an Analysis is Shared With

If you have shared an analysis, you can use the following procedure to see which users or groups have access to it.

1. On the analysis page, choose **Share** on the application bar and then choose **Share analysis**.
2. Choose **Manage analysis access**.
3. Review who this analysis has been shared with. You can search to locate a specific user account by typing a search term. The search will return any user, group, or email address that contains the search term. Searching is case-sensitive and wildcards are not supported. Delete the search term to view all users and groups.

Revoke Access to an Analysis

Use the following procedure to revoke access to an analysis.

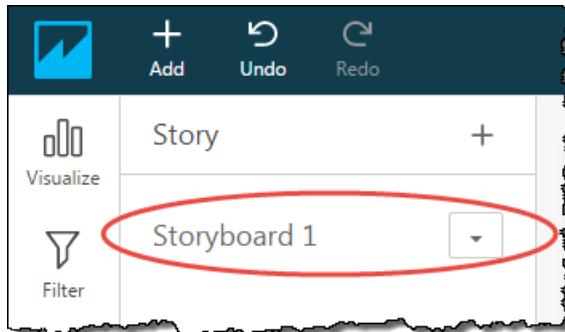
1. On the analysis page, choose **Share** on the application bar and then choose **Share analysis**.
2. Choose **Manage analysis access**.
3. Locate the user or group whose access you want to revoke. Then choose the trashcan icon next to the user or group.
4. Choose **Confirm**.

Working with Stories

You can use a story to preserve multiple iterations of an analysis and then play them sequentially to provide a narrative about the analysis data. For example, you might want to see several versions of the analysis, all with the same charts but with different filters applied.

A captured iteration of an analysis is called a scene. A scene preserves the visuals that are in the analysis at the time you create it, including such things as filtering and sort order. The data in the visuals is not captured as part of the scene. When you play the story, visuals will reflect the current data in the data set.

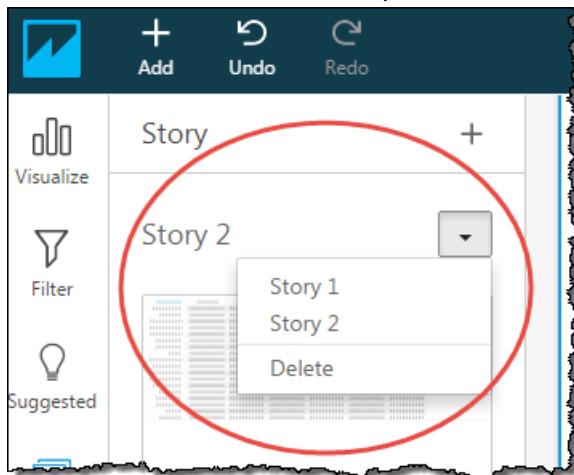
Every analysis comes with a default story called **Storyboard 1**. When working in an analysis, you can add scenes to **Storyboard 1** by choosing **Capture** on the application bar. You can rename **Storyboard 1** by using the procedure in [Rename a Story or Scene \(p. 249\)](#).



You can create additional stories as needed. If you have added other stories to the analysis, choosing **Capture** adds a scene to whichever story is currently selected.

View a Story

You can view the currently selected story for an analysis by choosing **Story** on the tool bar. To see or select other stories, choose the expand icon next to the currently selected story.



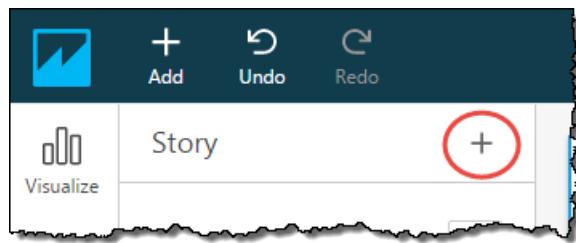
Create a Story

Use the following procedure to create a new story.

1. On the analysis page, choose **Story** on the tool bar.



2. Choose the add icon (+) at the top of the **Story** pane.



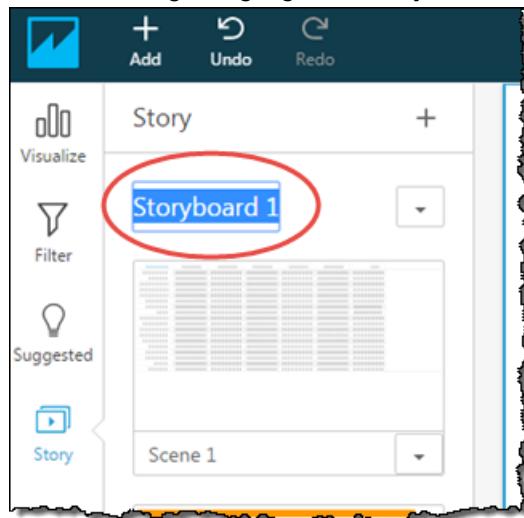
3. Type a story name and then choose **OK**. The new story is set as the current selected story.

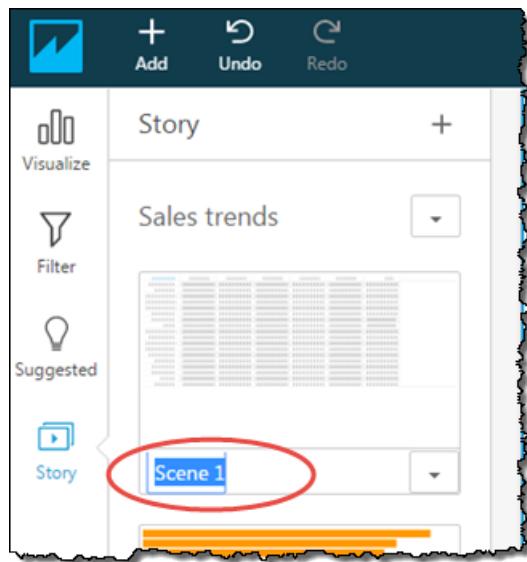
Choose **Visualize** on the tool bar to return to viewing visuals again. Whenever you want to capture the current state of the analysis as a scene in the story, choose **Capture** on the application bar.

Rename a Story or Scene

You can rename stories, and also scenes within stories. Use the following procedure to rename a story or a scene.

1. On the analysis page, choose **Story** on the tool bar.
2. Select and drag to highlight the story or scene name you want to change.



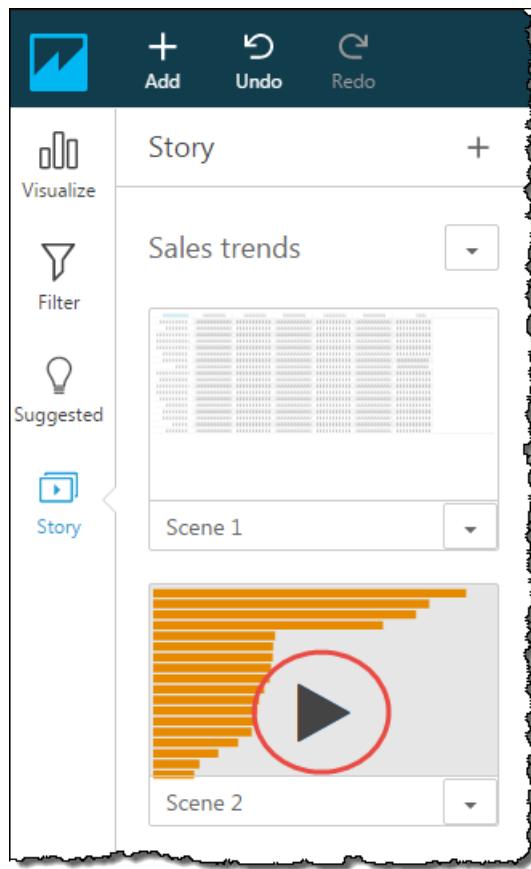


3. Type a new name and then press **Enter**.

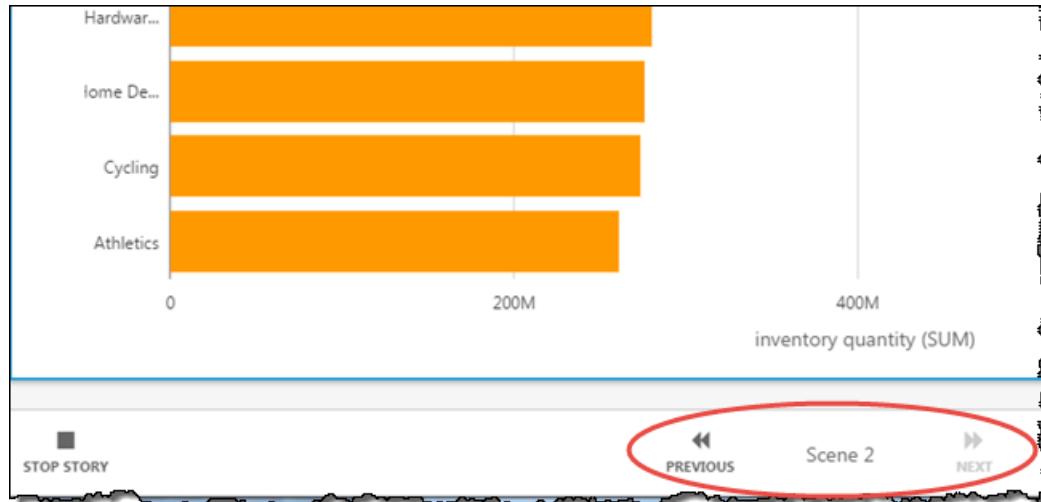
Play a Story

Use the following procedure to play a story.

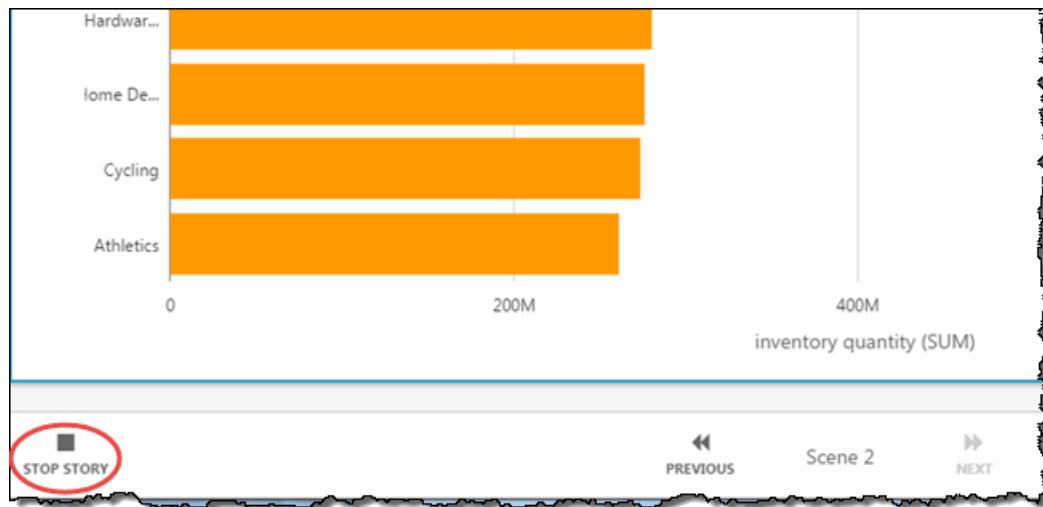
1. On the analysis page, choose **Story** on the tool bar.
2. Choose the play icon on the scene you want to start playing from. The story plays, opening on the scene you selected.



3. Choose **PREVIOUS** or **NEXT** to step through the scenes in the story.

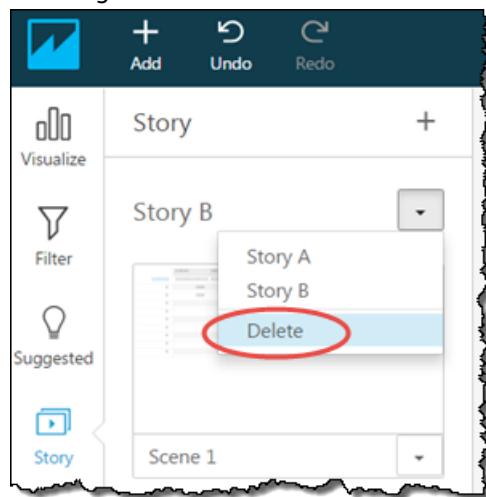


4. To stop playing the story, choose **STOP STORY**.



Delete a Story

You can delete the currently selected story by choosing the expand icon next to the story and then choosing **Delete**.



Working with Amazon QuickSight Visuals

A visual is a graphical representation of your data. You can create a wide variety of visuals in an analysis, using different data sets and visual types.

After you have created a visual, you can modify it in a range of ways to customize it to your needs. Possible customizations include changing what fields map to visual elements, changing the visual type, sorting visual data, or applying a filter.

Amazon QuickSight supports up to 20 data sets in a single analysis, and up to 20 visuals in a single analysis.

Use the following sections to learn how to create and modify visuals.

Topics

- [Creating an Amazon QuickSight Visual \(p. 253\)](#)
- [Renaming an Amazon QuickSight Visual \(p. 255\)](#)
- [Deleting an Amazon QuickSight Visual \(p. 256\)](#)
- [Exporting Data from an Amazon QuickSight Visual to a CSV File \(p. 256\)](#)
- [Changing Visual Layout in Amazon QuickSight \(p. 257\)](#)
- [Viewing Visual Data in Amazon QuickSight \(p. 261\)](#)
- [Formatting a Visual in Amazon QuickSight \(p. 265\)](#)
- [Changing the Fields Used by a Visual in Amazon QuickSight \(p. 278\)](#)
- [Changing Visual Colors in Amazon QuickSight \(p. 292\)](#)
- [Sorting Visual Data in Amazon QuickSight \(p. 298\)](#)
- [Filtering Visual Data in Amazon QuickSight \(p. 301\)](#)
- [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#)
- [Adding Custom URL Actions to Visuals in Amazon QuickSight \(p. 339\)](#)
- [Working with Visual Types in Amazon QuickSight \(p. 342\)](#)

Creating an Amazon QuickSight Visual

You can create a visual in several ways. You can select the fields that you want and use AutoGraph to let Amazon QuickSight determine the most appropriate visual type. Alternatively, you can choose a specific visual type and choose fields to populate it. Alternatively, if you aren't sure what questions your data can answer for you, you can choose **Suggested** on the tool bar and choose a visual that Amazon QuickSight suggests for you. Suggested visuals are ones that we think are of interest, based on a preliminary examination of your data. For more information about AutoGraph, see [Using AutoGraph \(p. 346\)](#).

You can add more visuals to the workspace by choosing **Add**, then **Add visual**. Visuals created after June-21-2018 are smaller in size, fitting two on each row. You can resize the visuals and drag them to rearrange them.

To create a useful visual, it helps to know what question you are trying to answer as specifically as possible, and to use the smallest data set that can answer that question. Doing so helps you create simpler visuals that are easier to analyze.

Fields as Dimensions and Measures

In the **Fields list** pane, dimension fields have blue icons and measure fields have green icons. Dimensions are text or date fields that can be items, like products, or attributes that are related to measures and can be used to partition them, like sales date for sales figures. Measures are numeric values that you use for measurement, comparison, and aggregation. You typically use a combination of dimension and measure fields to produce a visual, for example sales totals (a measure) by sales date (a dimension). For more information about the types of fields expected by the different visual types, see the specific visual type topics in the [Working with Visual Types in Amazon QuickSight \(p. 342\)](#) section. For more information about changing a field's measure or dimension setting, see [Setting a Field as a Dimension or Measure \(p. 196\)](#).

Field Limitations

You can only use one date field per visual. This limitation applies to all visual types.

You can't use the same field for more than one dimension field well or drop target on a visual. For more information about how expected field type is indicated by field wells and drop targets, see [Using Visual Field Controls \(p. 278\)](#).

Searching for Fields

If you have a long field list in the **Fields list** pane, you can search to locate a specific field. To do so, choose the search icon at the top of the **Fields list** pane and then enter a search term into the search box. Any field whose name contains the search term is shown. Search is case-insensitive and wildcards aren't supported. Choose the cancel icon (X) to the right of the search box to return to viewing all fields.

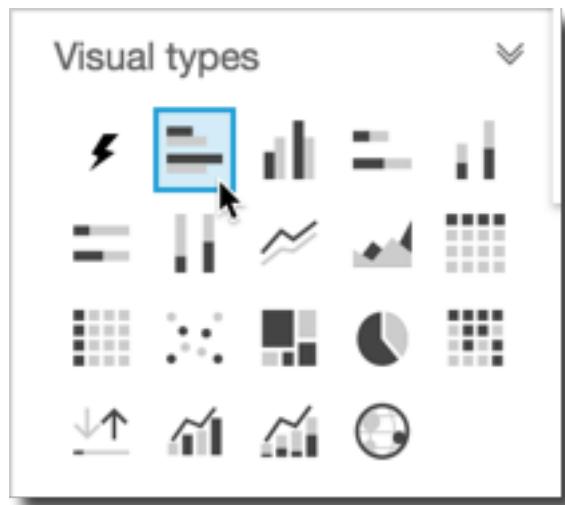
Creating a Visual

Use the following procedure to create a new visual.

1. On the Amazon QuickSight start page, choose the analysis that you want to add a visual to.
2. On the analysis page, choose the data set that you want to use from the data set list at the top of the **Fields list** pane. For more information, see [Adding a Data Set to an Analysis \(p. 192\)](#).
3. Choose **Add** on the application bar, and then choose **Add visual**.

A new, blank visual is created and receives focus.

4. Use one of the following options:
 - Choose the fields to use from the **Fields list** pane at left. If the **Fields list** isn't visible, choose **Visualize** to display it. Amazon QuickSight creates the visual, using the visual type it determines is most compatible with the data you selected.
 - Create a visual by choosing a visual type and then choosing fields to populate it.
 1. Choose the icon of a visual type from the **Visual types** pane.



The field wells display the fields that are visualized.

A screenshot of the Amazon QuickSight analysis page. At the top, there's a toolbar with 'Visualize', 'Data set' (set to 'SPICE Sales Pipeline'), and other settings. Below the toolbar, the 'Field wells' section is visible, containing three boxes: 'Y axis' (set to 'Opportunity Stage'), 'Value' (set to 'Weighted Revenue (Sum)'), and 'Group/Color' (with a placeholder 'Add a dimension here').

Click anywhere on the field wells to open them.

A screenshot of the Amazon QuickSight analysis page showing the expanded 'Field wells' section. The three boxes are now interactive input fields: 'Y axis' (dropdown menu showing 'Opportunity Stage'), 'Value' (dropdown menu showing 'Weighted Revenue (Sum)'), and 'Group/Color' (button with placeholder 'Add a dimension here').

- From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the color of the target field well. If you choose to use a dimension field to populate a **Value** field well, the **Count** aggregate function is automatically applied to it to create a numeric value.

Amazon QuickSight creates the visual using the visual type you selected.

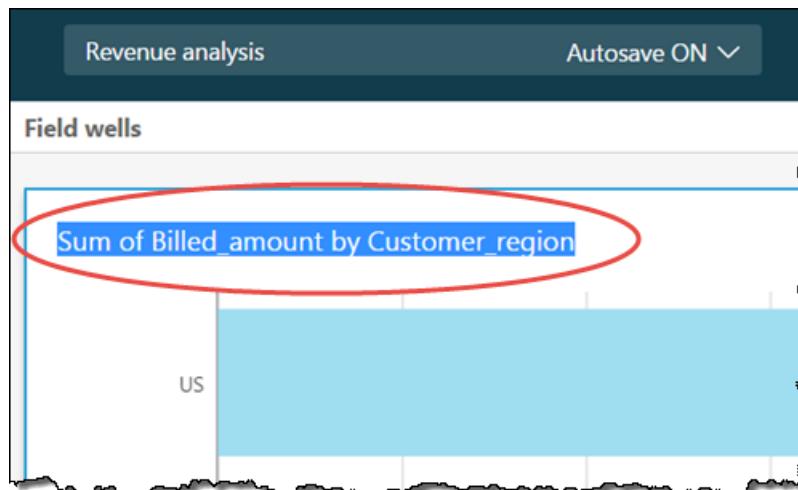
- Create a visual using a suggestion.

On the tool bar, choose **Suggested**, then choose a suggested visual.

Renaming an Amazon QuickSight Visual

Use the following procedure to rename a visual.

- On the analysis page, choose the visual that you want to rename.
- Select the visual name at the top left of the visual and enter a new name.



3. Press **Enter** or click outside of the visual name field to save the new name.

Deleting an Amazon QuickSight Visual

Use the following procedure to delete a visual.

1. On the analysis page, choose the visual that you want to delete.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Delete**.



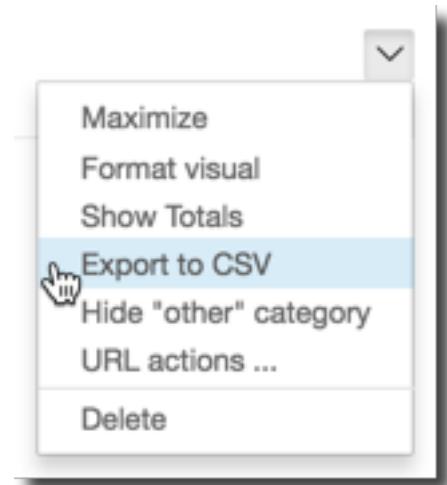
Exporting Data from an Amazon QuickSight Visual to a CSV File

Use the following procedure to export data from a visual to a file with the comma-separated value (CSV) format.

For table charts, Amazon QuickSight supports exporting up to 1 million rows or 500 MB of data, whichever limit is reached first. For all other visuals (including pivot tables), the limits that apply to exporting are the same limits that apply to the visual type.

The export contains only the fields and the filtered data that are currently displayed in the visual.

1. Choose or create an analysis or dashboard that contains one or more visuals.
2. Choose the visual that you want to export.
3. Choose the on-visual menu, at the upper right of the visual. Then choose **Export to CSV**.



4. Depending on your browser settings, one of the following happens:
 - The file automatically goes to your default **Download** location.
 - A dialog box appears so you can choose a file name and location.
 - A dialog box appears so you can choose to open the file with the default software or to save the file. If you choose to save, you can choose a file name and location.

You can provide a name for the downloaded file. By default, the CSV file name is the name of your visual. To make the file name unique, it has a sequential timestamp (a Unix epoch data type) or a date in the format yyyy-MM-dd_THH_mm_ss.SSSZ.

5. To export data from additional visuals in the same analysis or dashboard, repeat this process for each visual.

Tip

If you have difficulty getting the download to start, try a different browser.

Changing Visual Layout in Amazon QuickSight

When you create an analysis, you see a workspace that contains one full-sized visual. You can add more visuals to the workspace by choosing **Add**, then **Add visual**. Visuals created after May 2018 are smaller in size, fitting two on each row. You can resize the visuals and drag them to rearrange them.

If you change a visual to make it considerably smaller, the on-visual editors are hidden so that the chart elements have more room to display. Bar chart visuals can also display fewer data points. To see a resized visual in full pane mode so that on-visual editors and all data points are displayed, use the **Maximize** option on the on-visual menu. Choose **Minimize** to return the visual to its original size when you are done.

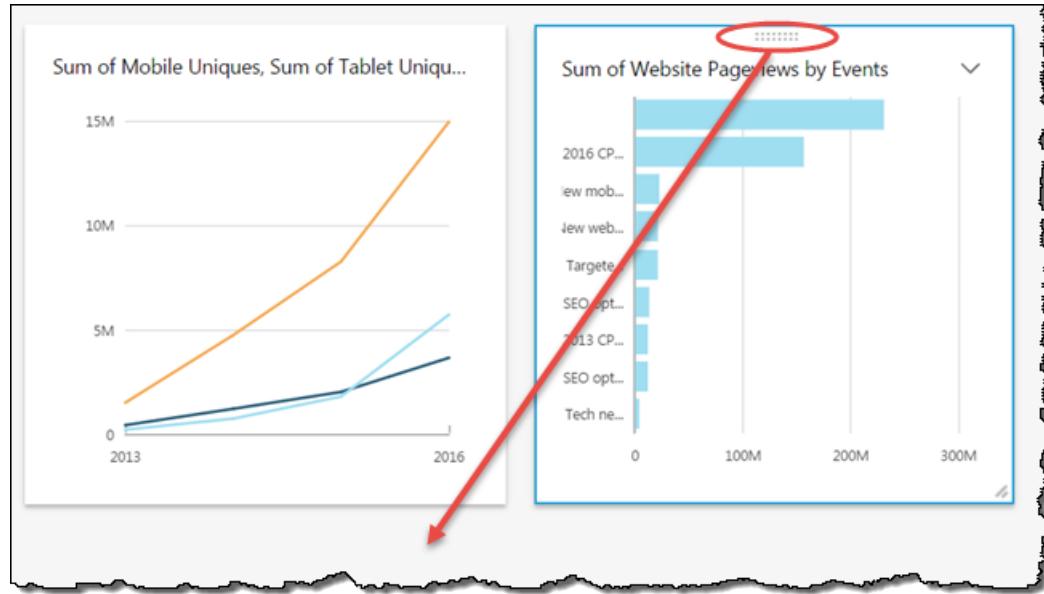
In some cases, you might resize a visual that uses a legend so that it is taller than it is wide. In such cases, the legend displays on the bottom of the chart if it had been displaying on the right-hand side.

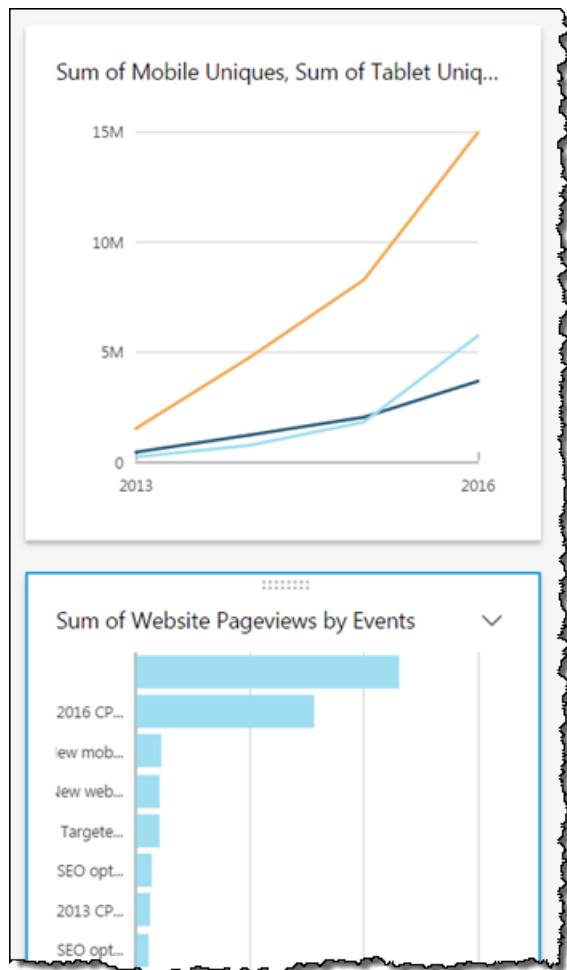
If you reduce the size of the browser window, Amazon QuickSight resizes and if necessary reorders visuals for optimal display. For example, smaller visuals that were side by side might be displayed sequentially. The original layout is restored when the size of the browser window is increased again.

Note:

Changing Visual Location

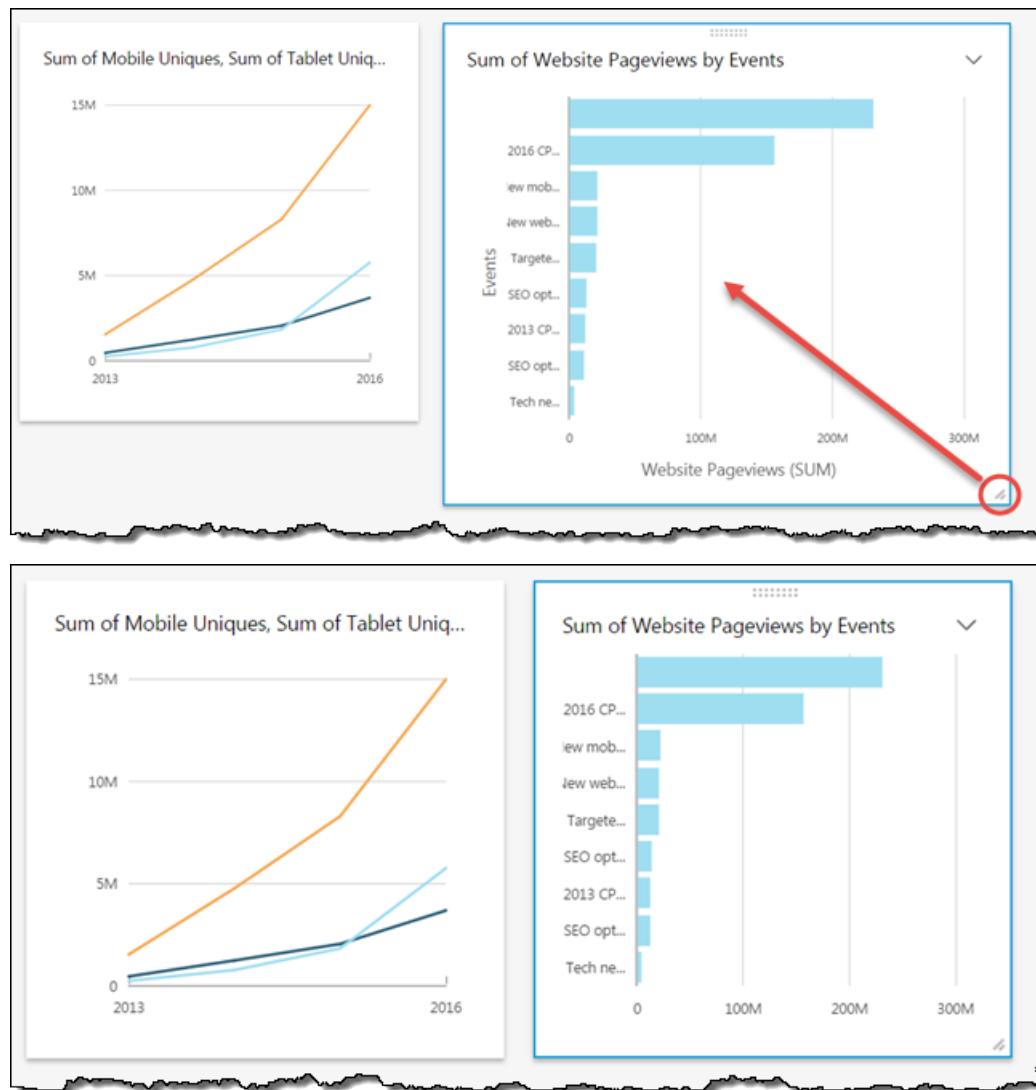
On the analysis page, choose the move handle on the visual that you want to relocate. Drag the visual to where you want it.





Changing Visual Size

To change visual size, on the analysis page choose the resize handle on the visual that you want to resize. Drag to change the visual's dimensions.



Editing a Resized Visual

Use the following procedure to open a resized visual in full pane mode for editing.

1. On the analysis page, choose the visual that you want to edit.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Maximize**.



The visual opens in full pane mode, displaying the on-visual editors if they were hidden.

3. Edit the visual. When you are done, choose the on-visual menu at the upper-right corner of the visual, and then choose **Minimize**.

Viewing Visual Data in Amazon QuickSight

Amazon QuickSight offers a variety of ways to see the details of the data being displayed in a visual. The axes or rows and columns of the visual (depending on the visual type) have labels, and hovering over any graphical element in a visual displays the data associated with that element. Some visual types use visual cues to emphasize the element you are hovering over and make it easier to differentiate, for example by changing the color of the element, or highlighting it.

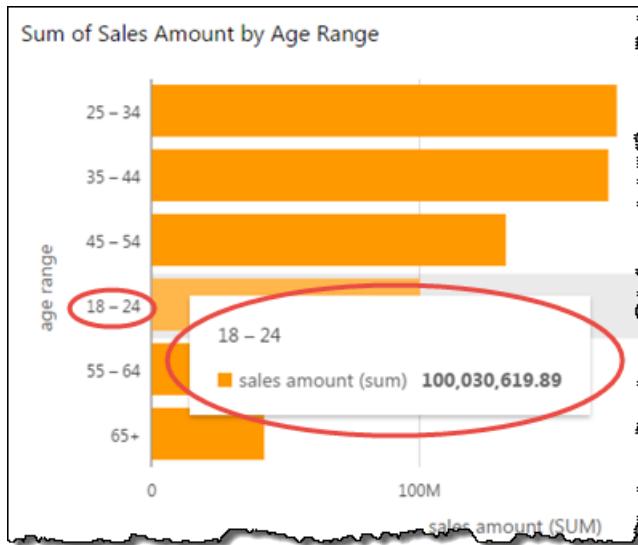
Use the following sections to learn more about viewing data in visuals.

Topics

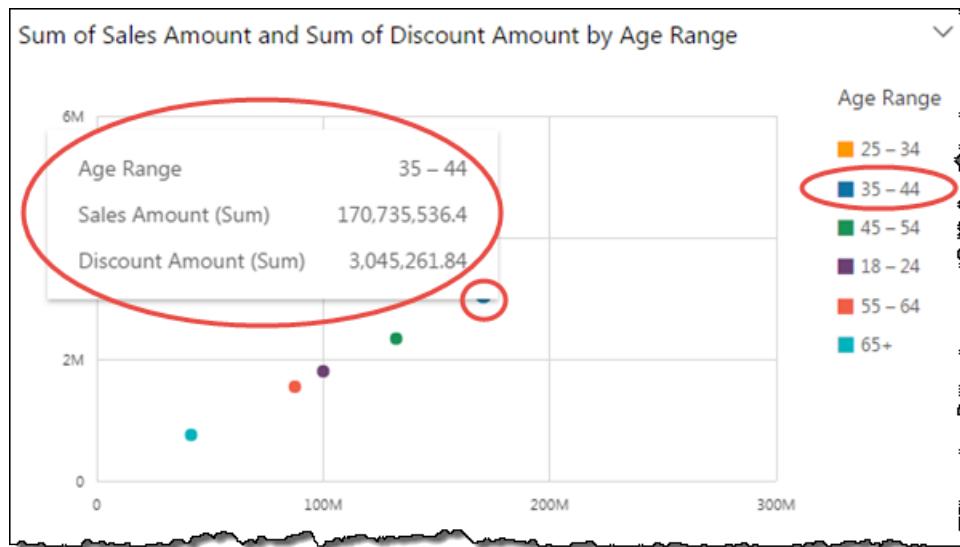
- [Viewing Visual Details \(p. 261\)](#)
- [Scrolling Through Visual Data \(p. 262\)](#)
- [Focusing on Visual Elements \(p. 263\)](#)
- [Excluding Visual Elements \(p. 264\)](#)

Viewing Visual Details

When viewing a visual, you can hover your cursor over any graphical element to get details on that element. For example, a bar on a bar chart:

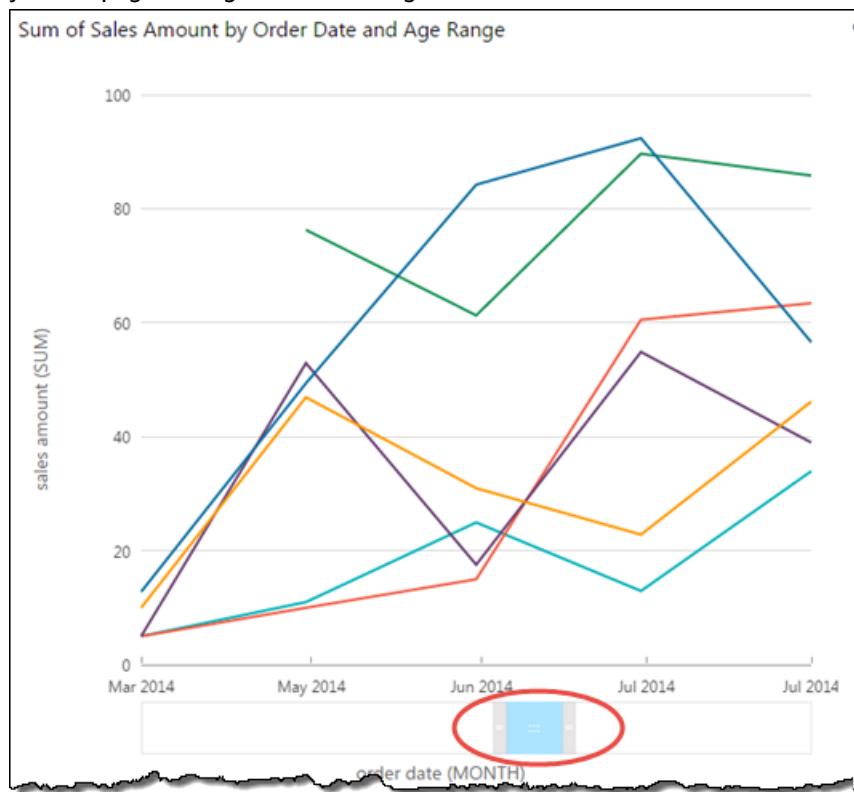


Or a bubble on a scatter plot:

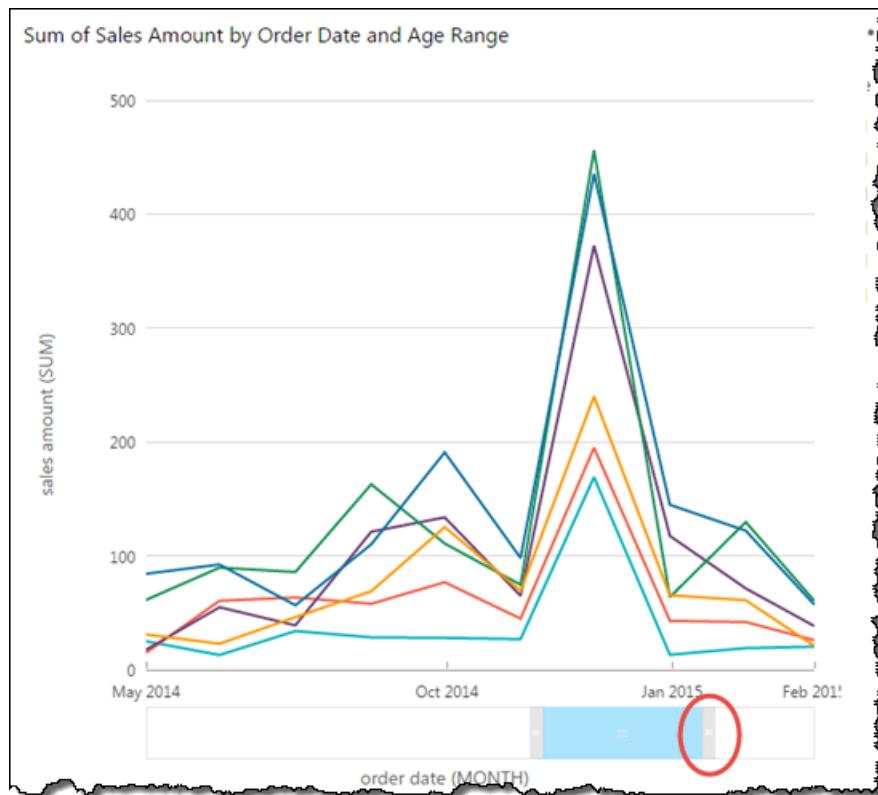


Scrolling Through Visual Data

For bar charts, line charts, and pivot tables, creating a visual on a large data set can result in more visual elements than can be fit into the page length or width. In these cases, scroll bars are provided so that you can page through the data. Drag the scroll bar slider to view different areas of the chart.



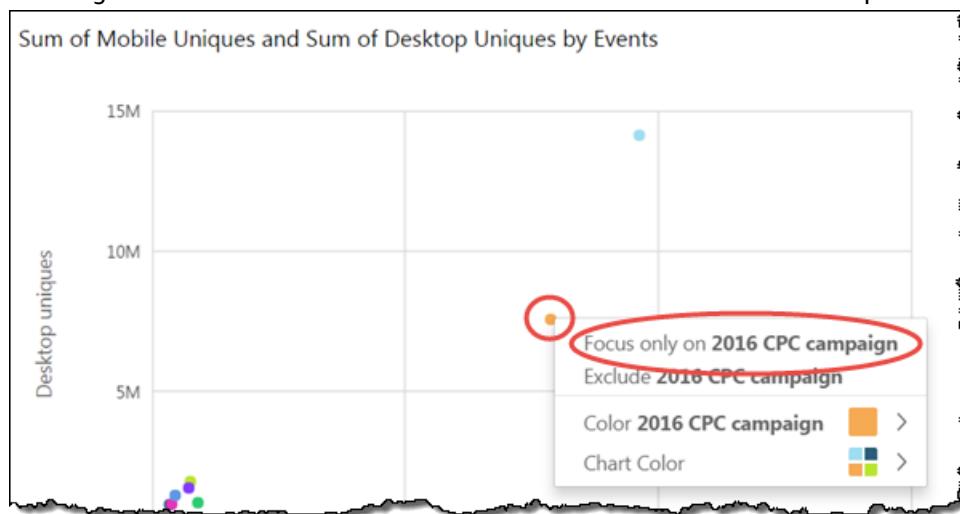
On bar charts and line charts, you can also adjust the length of the slider to reflect a greater or lesser proportion of the chart. To do this, choose one of the gray handles on either end of the slider and drag it to adjust the slider size.

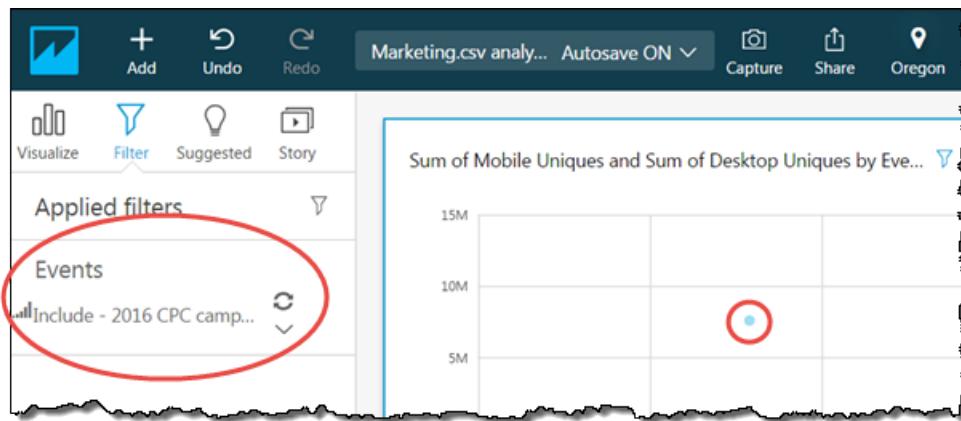


Focusing on Visual Elements

When viewing visuals, you can choose an element on the visual, and then choose to focus on the element. Elements to focus on can include, for example, a bar or bubble, or a row or column header in the case of a pivot table.

Focusing on the element creates a filter that removes all other elements except for the one you selected:





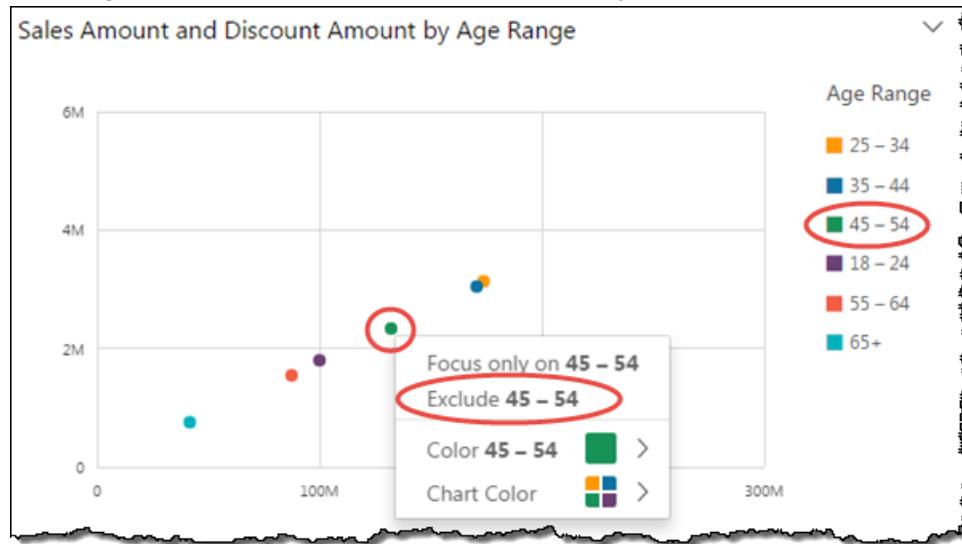
To see the other elements again, either choose **Undo** on the application bar, or disable or delete the filter.

For more information about filters, see [Filtering Visual Data in Amazon QuickSight \(p. 301\)](#).

Excluding Visual Elements

When viewing visuals, you can choose an element (like a bar or bubble, or a row or column header in the case of a pivot table), and then choose to exclude the element. The exception is that you can't exclude elements that are mapped to date fields. You can exclude multiple elements on a single chart.

Excluding the element creates a filter that removes only that element from the visual:





To see the excluded element again, either choose **Undo** on the application bar, or disable or delete the filter.

For more information about filters, see [Filtering Visual Data in Amazon QuickSight \(p. 301\)](#).

Formatting a Visual in Amazon QuickSight

Use visual formatting to choose display options for your data visualization.

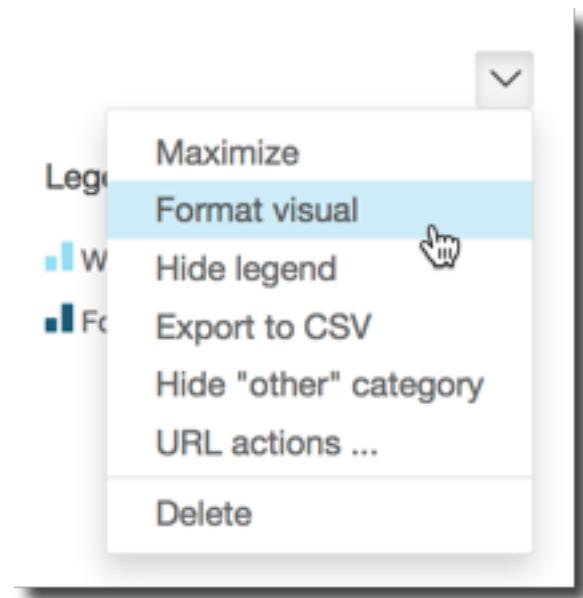
Topics

- [Customizing a Visual Title \(p. 265\)](#)
- [Customizing the Visual Legend \(p. 266\)](#)
- [Customizing Visual Labels \(p. 269\)](#)
- [Customizing Data Labels on Visuals \(p. 271\)](#)
- [Displaying Totals and Subtotals \(p. 272\)](#)
- [Customizing Style for Pivot Tables \(p. 273\)](#)
- [Changing the Visual Scale with the Axis Range \(p. 274\)](#)
- [Customizing a Visual \(p. 277\)](#)

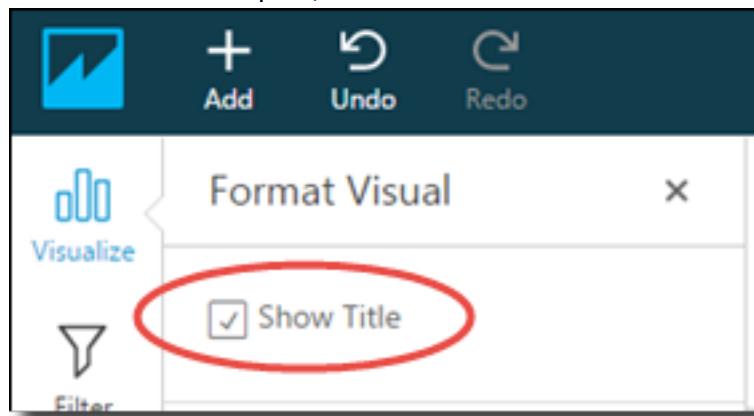
Customizing a Visual Title

Use the following procedure to hide or display the title for a visual. The visual title displays by default.

1. On the analysis page, choose the visual that you want to format. You can change the title by putting your cursor in the title and editing it directly. To revert to the default name, delete your entry.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



3. On the **Format Visual** pane, enable or disable **Show title**.



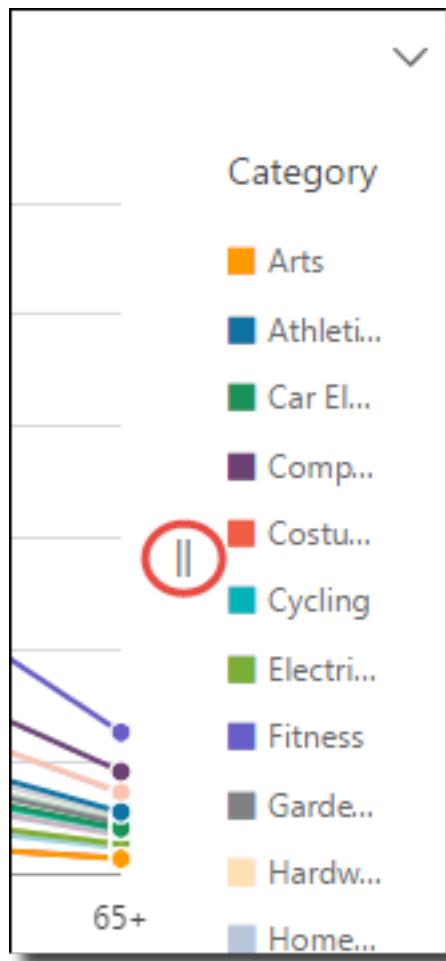
4. Close the **Format Visual** pane by choosing the X icon in the upper-right corner of the pane.

Customizing the Visual Legend

The *visual legend* helps you identify what a visual element represents by mapping its value to a color. For example, on a line chart, line color might represent store location.

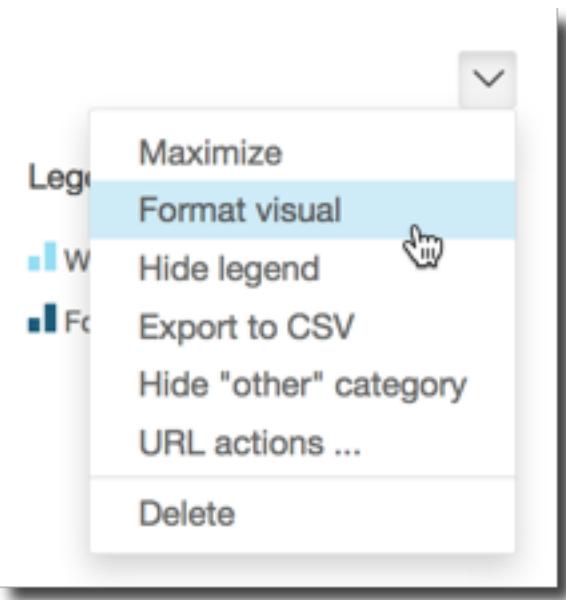
To hide or display the legend, you can use the visual menu. You can also use the **Format Visual** pane, which provides more options. The visual legend displays to the right of the visual by default.

When you move your cursor over the legend, a handle appears that you can use to adjust the width of the legend pane by dragging it wider or narrower.

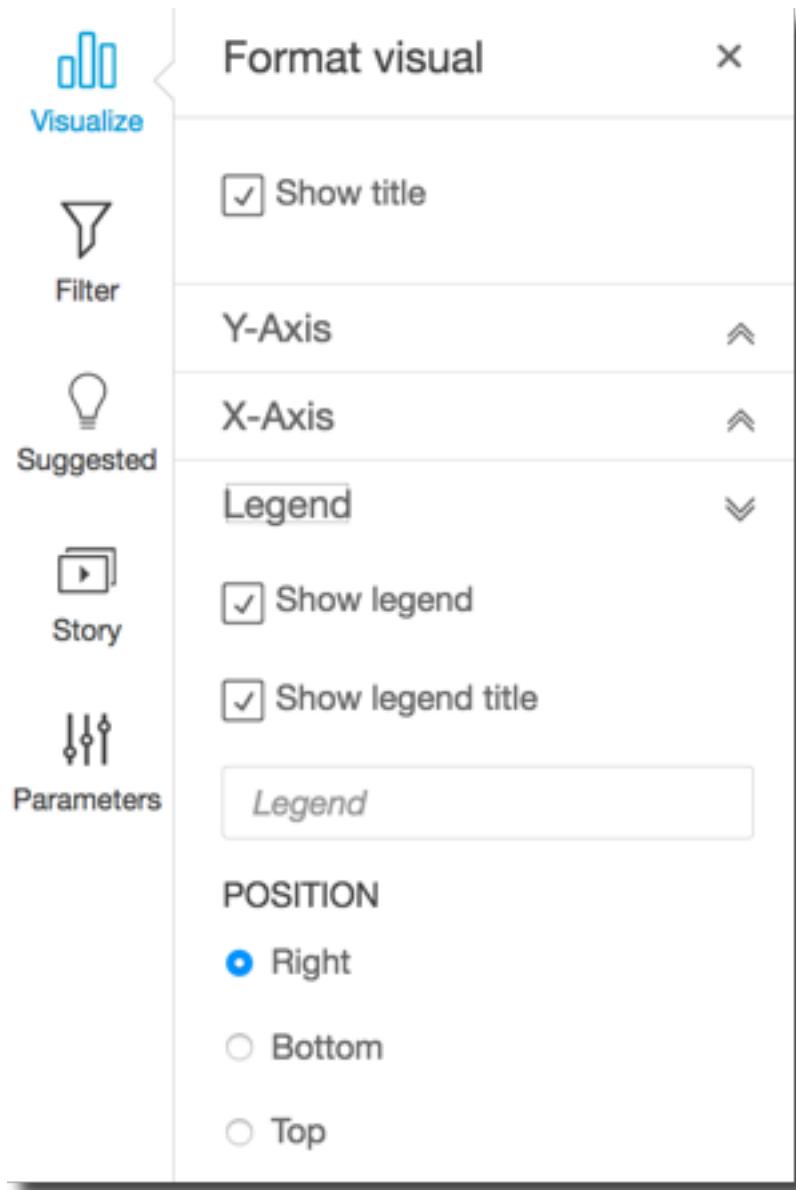


Use the following procedure to hide or display the visual title. The visual title displays by default.

1. On the analysis page, choose the visual that you want to format.
2. Choose the on-visual menu at the upper-right corner of the visual, and choose **Display legend** or **Hide legend**.
3. Choose **Format visual** to see formatting options.



4. On the **Format Visual** pane, expand the **Legend** section.
5. Enable or disable **Show legend** and **Show legend title**.

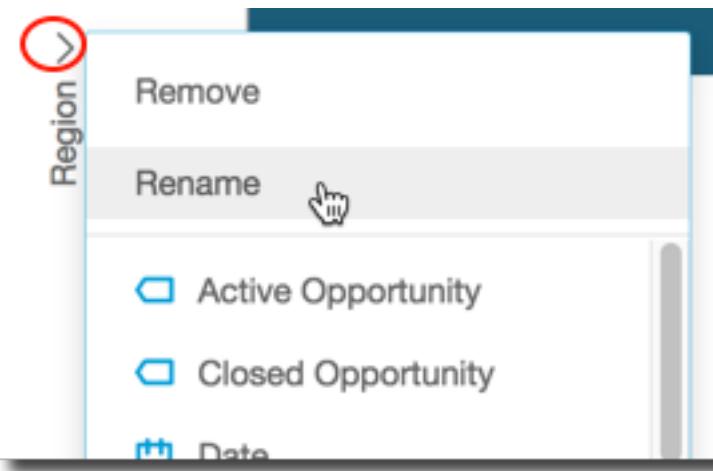


6. To customize the title of the legend, enter a new title for **Legend**. To revert to the default name, delete your entry.
7. For **POSITION**, choose **Right**, **Bottom**, or **Top** to determine where on the visual the legend displays.
8. Close the **Format Visual** pane by choosing the **X** icon in the upper-right corner of the pane.

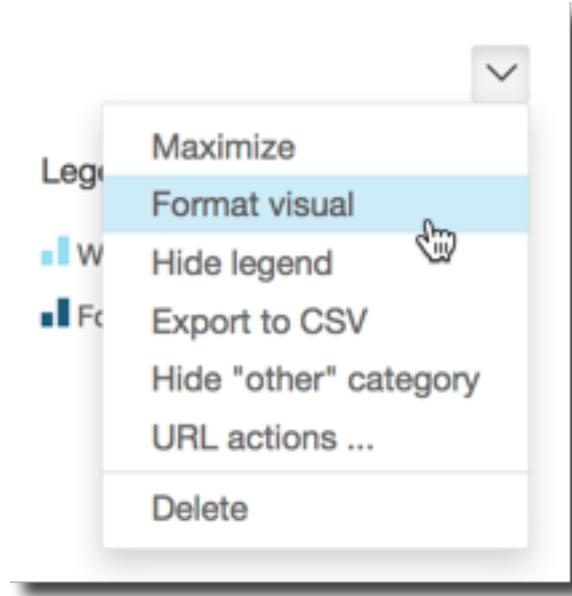
Customizing Visual Labels

Use the following procedure to customize, display, or hide the labels for a visual.

1. On the analysis page, choose the visual that you want to format. You can change the labels by choosing the label directly on the visual, and choosing **Rename**. To revert to the default name, delete your entry.



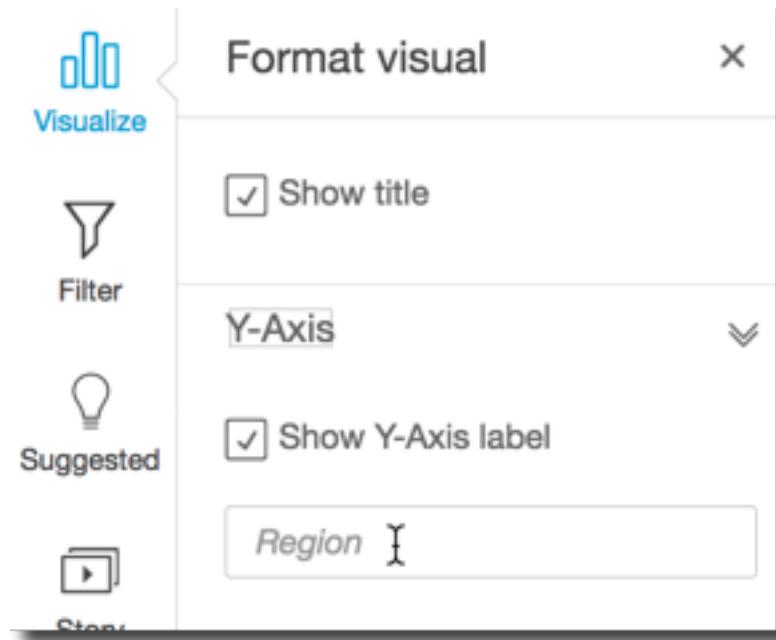
2. To see more options, choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



For pivot tables, you can relabel row names, column names, and value names. Additionally, under **Styling**, you can choose to hide columns labels or metric labels (for single metrics only).

You can add the same value to the same visual multiple times. You can do so to show the same value with different aggregations or table calculations applied. By default, the fields all display the same label. You can edit the names by using the **Format Visual** panel, which you open by choosing the V-shaped icon at top right.

3. On the **Format Visual** pane, enable or disable **Show label**. This option takes its name from the name of the axis, for example **Show X-Axis label**.



4. Close the **Format Visual** pane by choosing the X icon in the upper-right corner of the pane.

Customizing Data Labels on Visuals

To customize data labels on a visual, you can use the **Format Visual** pane to show data labels, and then use the settings to configure them. Data label customization is supported on bar, line, combo, scatter, and pie charts.

You can customize the following options:

- Position, which determines where the label appears in relation to the data point (for bar, combo, and line charts):
 - For vertical bar charts, you can customize to set position:
 - Above bars
 - Inside of bars
 - Bottom of bars
 - Top of bars
 - For horizontal bar charts, you can customize to set position:
 - Right of bars
 - Inside of bars
 - For line charts, you can customize to set position:
 - Above lines
 - Left or right of points on lines
 - Below lines
 - For scatter charts, you can customize to set position:
 - Above points
 - Left or right of points
 - Below points
- Font size and color (for bar, combo, line, scatter, and pie charts)

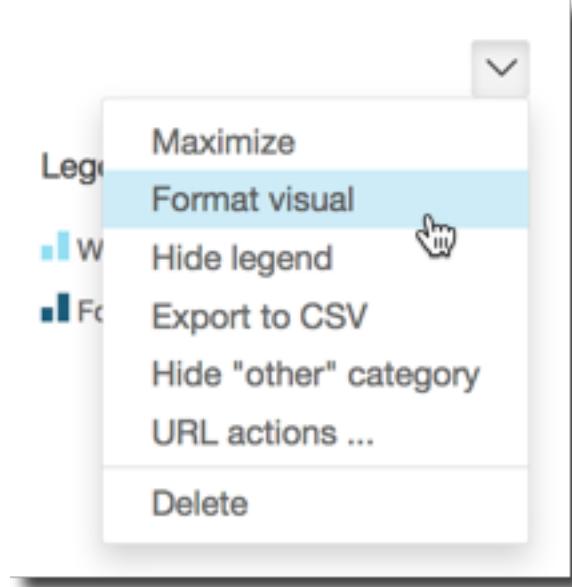
- Label pattern, which determines how data is labeled (for bar, combo, line, and scatter charts):
 - For bar, combo, line, and scatter charts, you can label:
 - All
 - By group/color
 - For lines, the following additional label options are available:
 - Line ends
 - Minimum or maximum value only
 - Minimum and maximum values
- Group selection (for bars and lines, when the label pattern is "by group/color")
- Allow labels to overlap (for bars and lines), for use with fewer data points

Note

If you add more than one measure to an axis, the data label displays the formatting for the first measure only.

Use the following procedure to configure data labels.

1. On the analysis page, choose the visual that you want to format.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



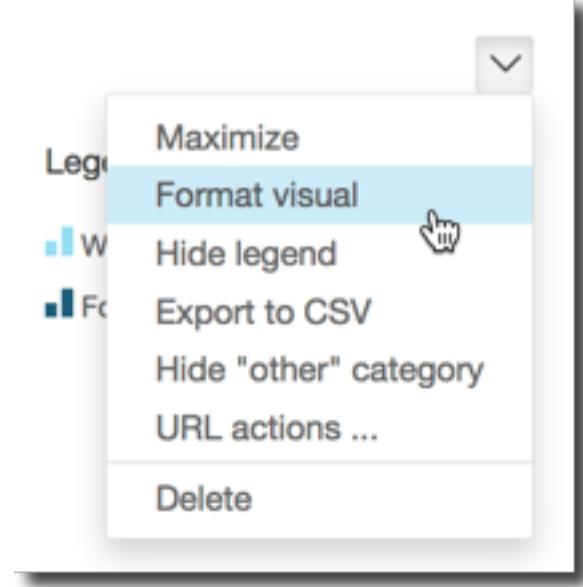
3. On the **Format Visual** pane, choose **Data Labels**.
 4. Enable **Show data labels** to show and customize labels. Disable this option to hide data labels.
 5. Choose the settings that you want to use. The settings offered are slightly different for each chart type. To see all available options, see the list before this procedure.
- You can immediately view the effect of each change on the visual.
6. Close the **Format Visual** pane by choosing the X icon in the upper-right corner of the pane.

Displaying Totals and Subtotals

On tables and pivot tables, you can configure the display of totals or subtotals. Tables can display totals at the top or the bottom of the visual. Pivot tables can display totals and subtotals on rows and columns.

Use the following procedure to display or hide totals and subtotals for a visual.

1. On the analysis page, choose the visual that you want to format.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



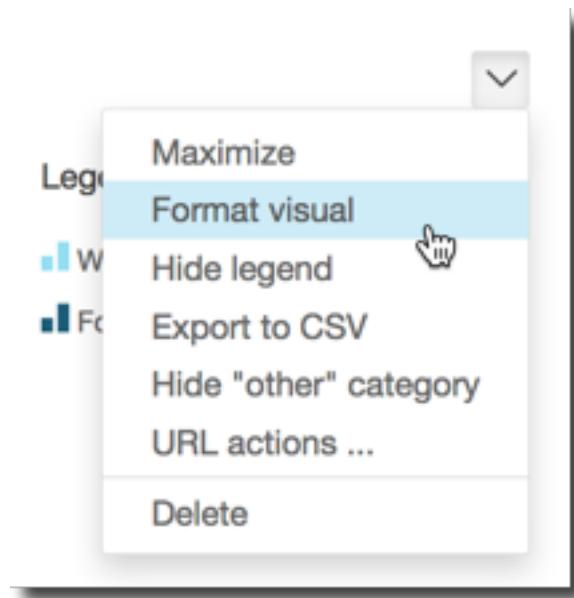
3. If you are using a table, show totals by enabling **Show totals**. By default, totals are displayed at the bottom of the table. To display totals at the top, choose **Top**.
4. If you are using a pivot table, choose one or more of the following:
 - To display totals, choose **Total**.
To show totals on each row, enable **Show totals on row**.
To show totals on each column, enable **Show totals on column**.
 - To display subtotals, choose **Subtotal**.
To show subtotals on each row, enable **Show subtotals on row**.
To show subtotals on each column, enable **Show subtotals on column**.

Customizing Style for Pivot Tables

You can choose from several options for styling pivot tables, including fitting the table to your current view and hiding column field names. You can also choose to hide the metric label when you use a single metric, to avoid seeing the same metric label repeated on the pivot table.

Use the following procedure to customize the styling for a visual.

1. On the analysis page, choose the visual that you want to format.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



3. Choose **Styling**.
4. To prevent displaying a single metric label repeatedly, enable **Hide single metric**.
5. To hide labels for fields in the **Columns** field well, enable **Hide column field names**.
6. To expand the table to fill your current view, choose **Fit table to view**. You can't undo this action.

To shrink the table to fit your current view, you can adjust the width of each column. To do this, grab the right edge of the column, near the column title. Drag the edge in either direction.

| Startup | SMB |
|---------------|---------------|
| Billed Amount | Billed Amount |
| 102,832.76 | 17,500.14 |
| 357,995.33 | 44,803.39 |
| 393,575.11 | 36,607.5 |
| 242,010.98 | 40,337.72 |

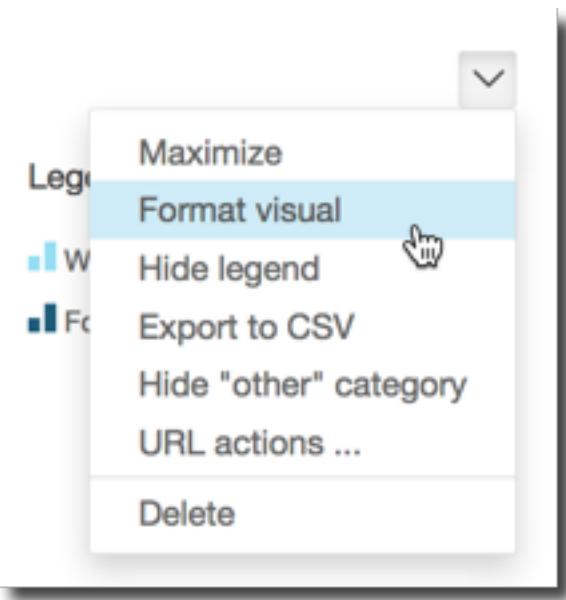
Changing the Visual Scale with the Axis Range

To change the scale of the values shown on the visual, you can use the **Format Visual** pane to set the range for one or both axes of the visual. This option is available for the value axis on bar charts, combo charts, line charts, and scatter plots.

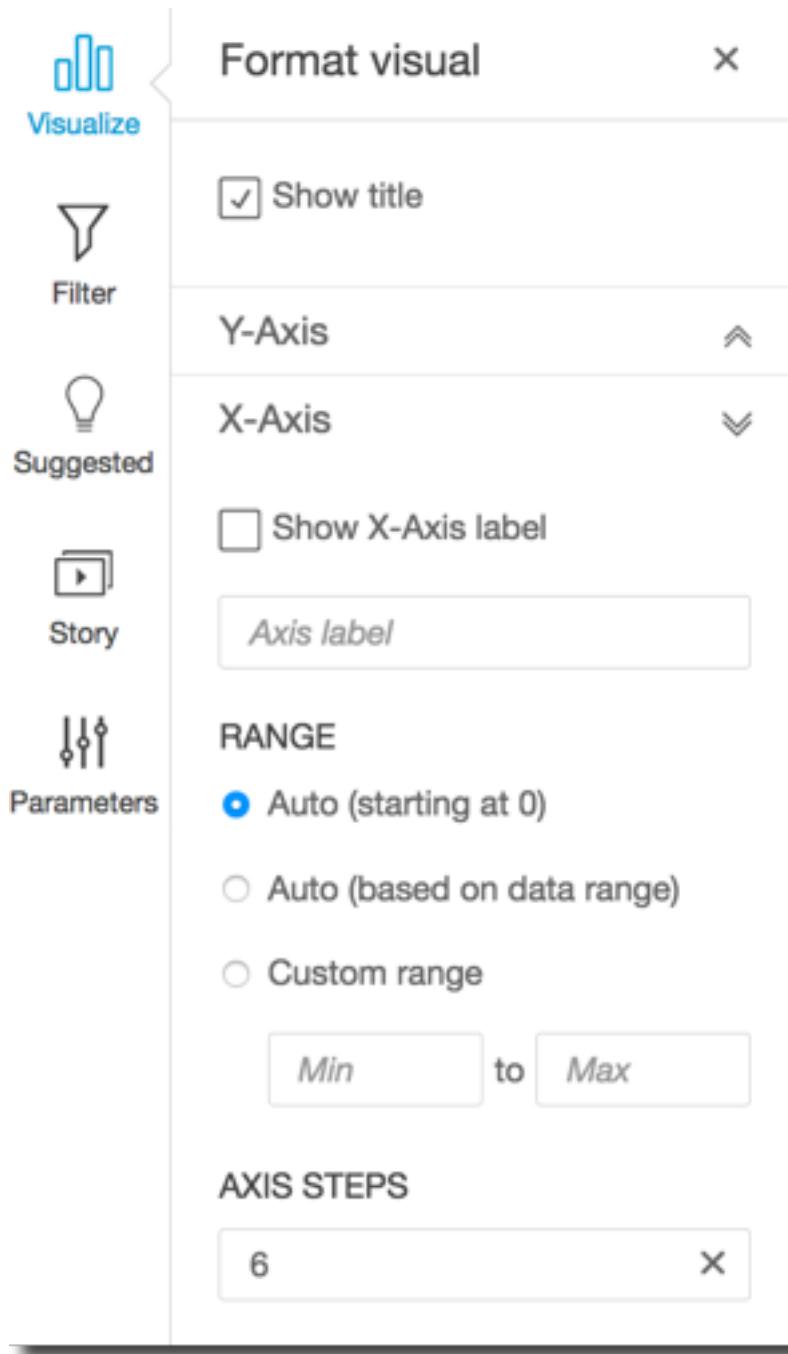
By default, the axis range starts at 0 and ends with the highest value for the measure being displayed. For the group-by axis, you can use the data zoom tool on the visual to dynamically adjust the scale.

Use the following procedure to set the axis range for a visual.

1. On the analysis page, choose the visual that you want to format.
2. Choose the on-visual menu at the upper-right corner of the visual, and then choose **Format visual**.



3. On the **Format Visual** pane, choose **X-Axis** or **Y-axis**, depending on what type of visual you are customizing. This is the **X-Axis** section for horizontal bar charts, the **Y-Axis** section for vertical bar charts and line charts, and both axes are available for scatter plots. On combo charts, use **Bars** and **Lines** instead.
4. Enter a new name in the box to rename the axis. To revert to the default name, delete your entry.



5. Set the range for the axis by choosing one of the following options:

- Choose **Auto (starting at 0)** to have the range start at 0 and end around the highest value for the measure being displayed.
- Choose **Auto (based on data range)** to have the range start at the lowest value for the measure being displayed and end around the highest value for the measure being displayed.
- Choose **Custom range** to have the range start and end at values that you specify.

If you choose **Custom range**, enter the start and end values in the fields in that section. Typically, you use integers for the range values. For stacked 100 percent bar charts, use a decimal value to

indicate the percentage that you want. For example, if you want the range to be 0–30 percent instead of 0–100 percent, enter 0 for the start value and .3 for the end value.

6. To customize the number of values to show on the axis, enter in an integer between 1 and 50.
7. Close the **Format Visual** pane by choosing the X icon in the upper-right corner of the pane.

Customizing a Visual

Use the following list to see which visuals support what type of formatting.

- Bar charts (both horizontal and vertical) support the following formatting:
 - Customize, display, or hide title, field labels, and data labels
 - Customize, display, or hide legend (exception: simple charts without clustering or multiple measures don't show a legend)
 - Specify axis range and steps on the x-axis for horizontal bar charts, and on the y-axis for vertical bar charts
 - Choose how many data points to display on the x-axis for vertical bar charts, and on the y-axis for horizontal bar charts
 - Show or hide the "other" category
- Combo charts support the following formatting:
 - Customize, display, or hide title, field labels, and data labels
 - Customize, display, or hide legend (exception: simple charts without clustering, stacking, or multiple measures don't show a legend)
 - Specify axis range on bars and lines
 - Choose how many data points to display on the x-axis
 - Show or hide the "other" category
- Geospatial charts (maps) support the following formatting:
 - Customize, display, or hide title and legend
- Heat maps support the following formatting:
 - Customize, display, or hide title, legend, and labels
 - Choose how many rows and columns to display
 - Show or hide the "other" category
- Key performance indicators (KPIs) support the following formatting:
 - Customize, display, or hide title
 - Display or hide trend arrows and progress bar
 - Customize comparison method as auto, difference, percent (%), or difference as percent (%)
 - Customize primary value displayed to be comparison or actual
- Line charts support the following formatting:
 - Customize, display, or hide title, field labels, and data labels
 - Customize, display, or hide legend (exception: simple charts don't show a legend)
 - Specify axis range and steps (on y-axis)
 - Choose how many data points to display on the x-axis
 - Show or hide the "other" category, except when the x-axis is a date
- Pie charts support the following formatting:
 - Customize, display, or hide title, data labels, and legend
 - Customize, display, or hide the labels for group/color and value fields
 - Choose how many slices to display from the **Group/Color** field
 - Show or hide the "other" category

- Pivot tables support the following formatting:
 - Customize, display, or hide title
 - Customize, display, or hide the labels for column, row, and value fields
 - Display or hide totals and subtotals on rows or columns
 - Choose additional styling options: fit table to view, hide column field names, hide duplicate label when using single metric
- Scatter plots support the following formatting:
 - Customize, display, or hide title, legend, field labels, and data labels
 - Specify axis range (on x-axis and y-axis)
- Tabular reports support the following formatting:
 - Customize, display, or hide title and legend
 - Customize, display, or hide the column names for group-by and value fields
 - Display or hide totals at the top or bottom of the table
- Tree maps support the following formatting:
 - Customize, display, or hide title and legend
 - Customize, display, or hide the labels for group-by, size, and color fields
 - Choose how many squares to display from the **Group by** field
 - Show or hide the “other” category

Changing the Fields Used by a Visual in Amazon QuickSight

You can add or modify fields for a visual by using the **Fields list** pane, the field wells, or the on-visual editors or drop targets on the visual.

The field wells, on-visual editors, and drop targets available for a specific visual depends on the visual type selected. Refer to the appropriate visual type topic in the [Working with Visual Types in Amazon QuickSight \(p. 342\)](#) section for details.

Important

You can also change the data type and format of numeric fields by using field wells and on-visual editors. If you change a field in this way, it changes it for all visuals in the analysis, not just for the selected visual. For more information about changing numeric field data types and formats, see [Modifying Data Set Fields in an Analysis \(p. 196\)](#).

Use the following topics to learn more about adding, removing, and modifying fields on a visual.

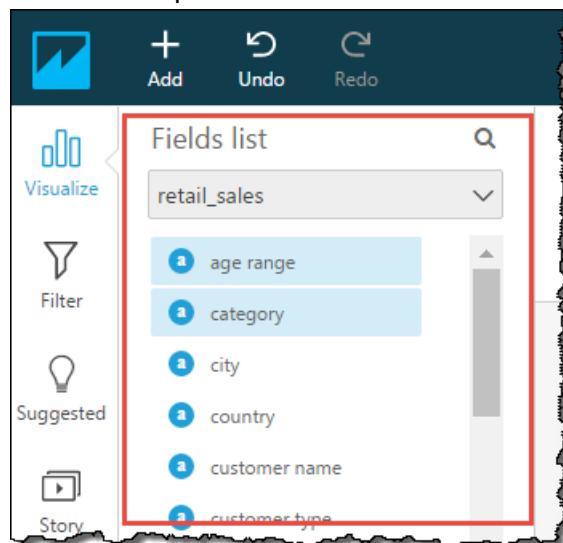
Topics

- [Using Visual Field Controls \(p. 278\)](#)
- [Adding or Removing a Field \(p. 283\)](#)
- [Changing the Field Associated with a Visual Element \(p. 285\)](#)
- [Changing Field Aggregation \(p. 288\)](#)
- [Changing Date Field Granularity \(p. 290\)](#)

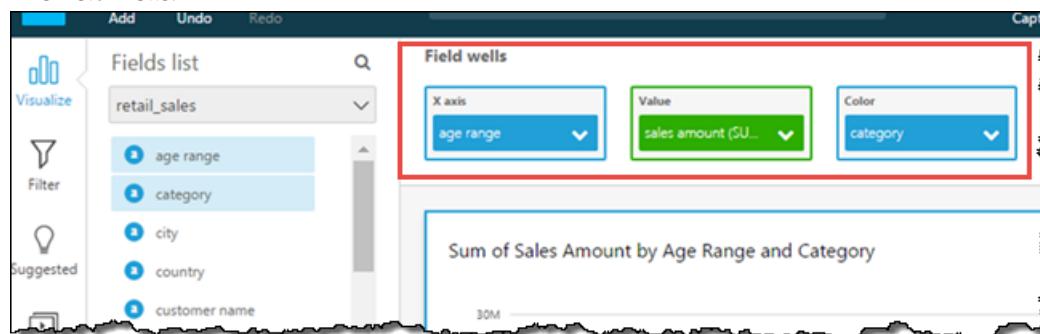
Using Visual Field Controls

You can edit the fields used by a visual by using the following user interface (UI) controls:

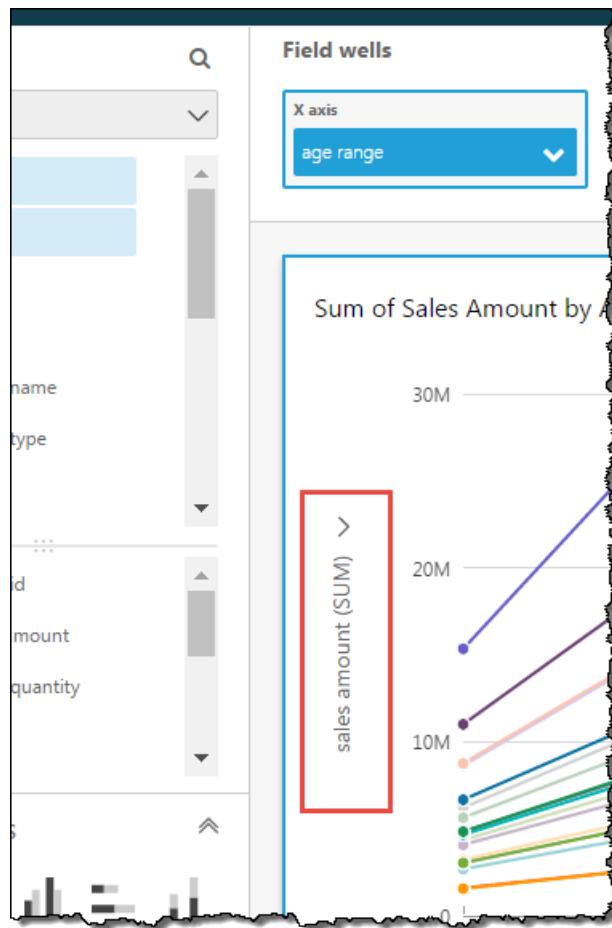
- The **Fields list** pane.



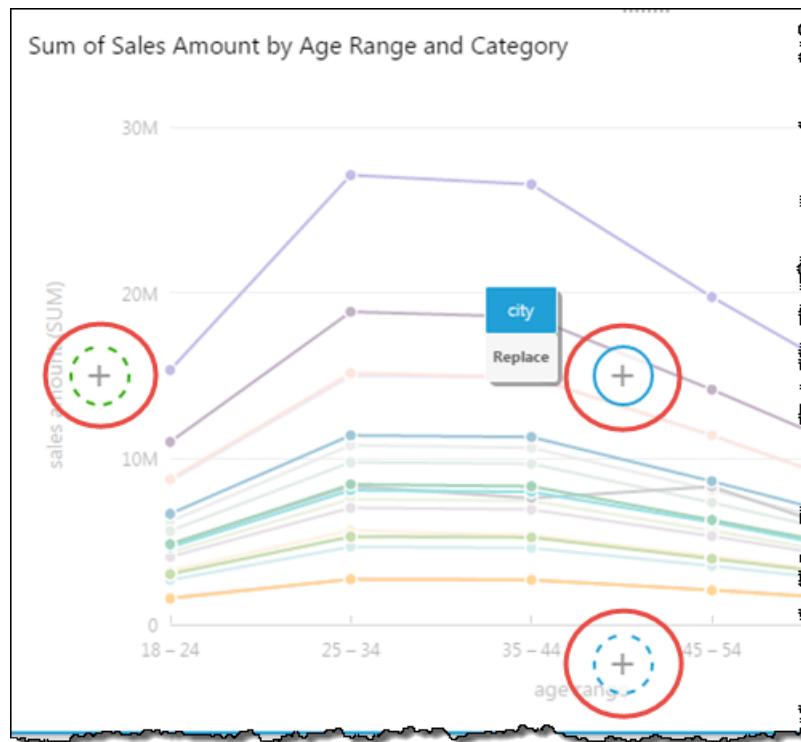
- The field wells.



- The on-visual editors.



- The drop targets on the visual.



You can use these controls as follows:

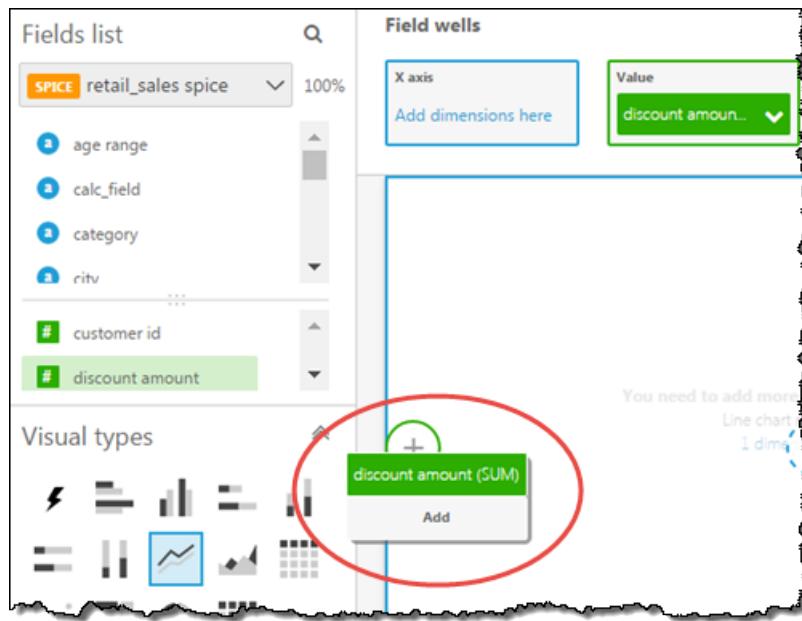
- You can create a visual and assign fields to different elements on it by selecting fields in the **Fields list** pane, or dragging fields to field wells or drop targets.
- You can change the field associated with a visual element by dragging a field to a drop target or field well, or selecting a different field in a field well or on-visual editor.
- You can change field aggregation or date granularity by using the field wells or the on-visual editors.

The field wells, on-visual editors, and drop targets available on a specific visual depends on the visual type selected.

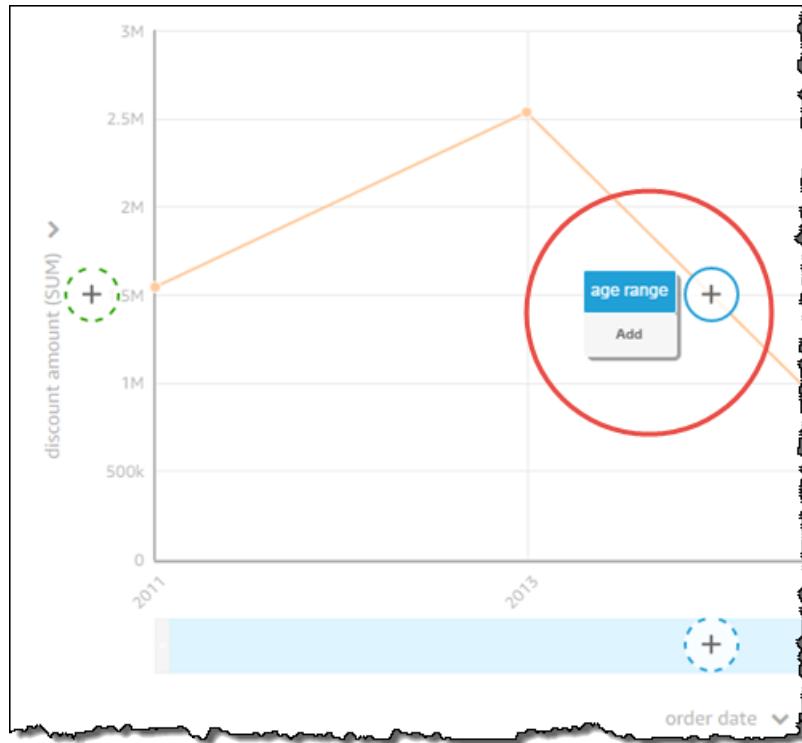
Dragging Fields to Drop Targets or Field Wells

When you drag a field to either a drop target or field well, Amazon QuickSight provides you with information about whether the target element expects a measure or a dimension. Amazon QuickSight also provides you with information about whether that element is available for field assignment.

For example, when you drag a measure to the value drop target on a new single-measure line chart, you see the drop target color-coded green. That green color coding indicates that the drop target expects a measure. The drag label indicates that the target is available to add a field.



When you drag a dimension to the X axis or color drop target on a new line chart, you see a label color-coded blue. That blue color coding indicates that the drop target expects a dimension. The drag label indicates that the target is available to add a field.



You can also drag a measure or dimension to a drop target on a line chart where the element is already associated with a field. In this case, the drag label indicates that you are replacing the field currently associated with the drop target.



Adding or Removing a Field

You can add a field to a visual by choosing it on the **Fields list** pane, dragging it to a drop target on the visual, or dragging it to a field well. There is a 1:1 correspondence of drop targets to field wells for each visual type, so you can use whichever method you prefer.

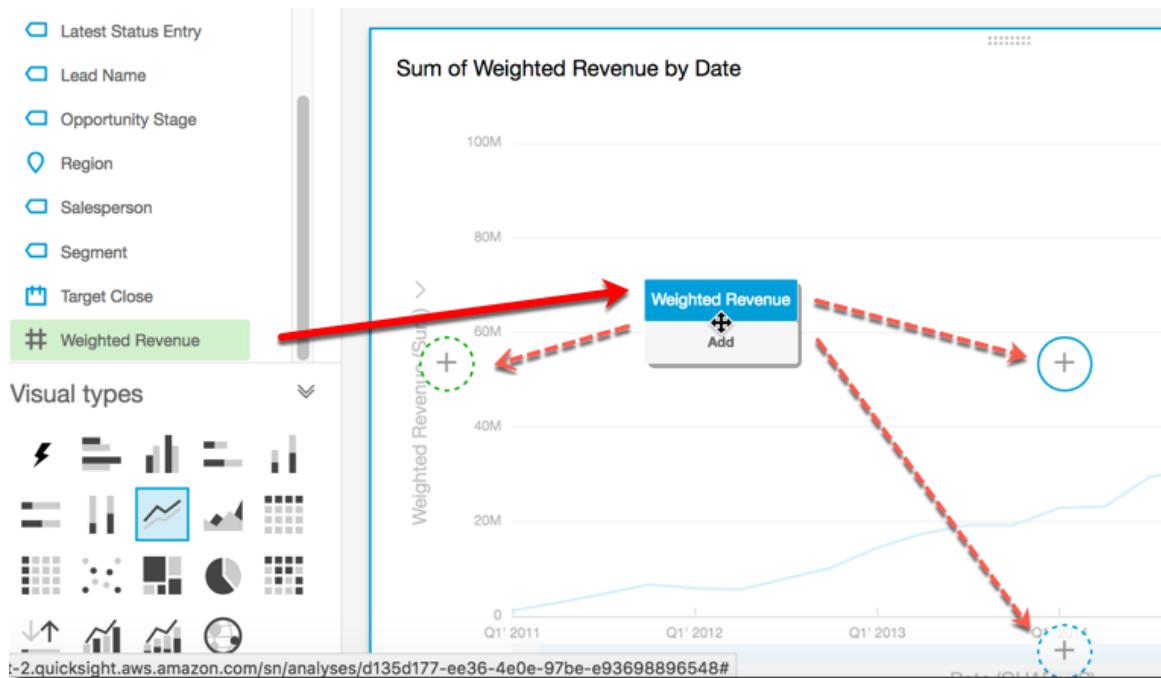
To remove a field from a visual, deselect it in the **Fields list** pane, or choose an on-visual editor or field well that uses that field, and then choose **Remove** from the pop-up menu.

Adding a Field by Selecting It in the Fields List Pane

You can also let Amazon QuickSight map the field to the most appropriate visual element. To do so, simply choose the field in the **Fields list** pane. Amazon QuickSight adds the field to the visual by populating the first empty field well that corresponds with that field type (either measure or dimension). If all of the visual elements are already populated, Amazon QuickSight determines the most appropriate field well and replaces the field in it with the field selected.

Adding a Field by Using a Drop Target

To add a field to a visual by using a drop target, first choose a field in the **Fields list** pane. Then drag the field to your chosen drop target on the visual, making sure the drop indicator shows that the field is being added.



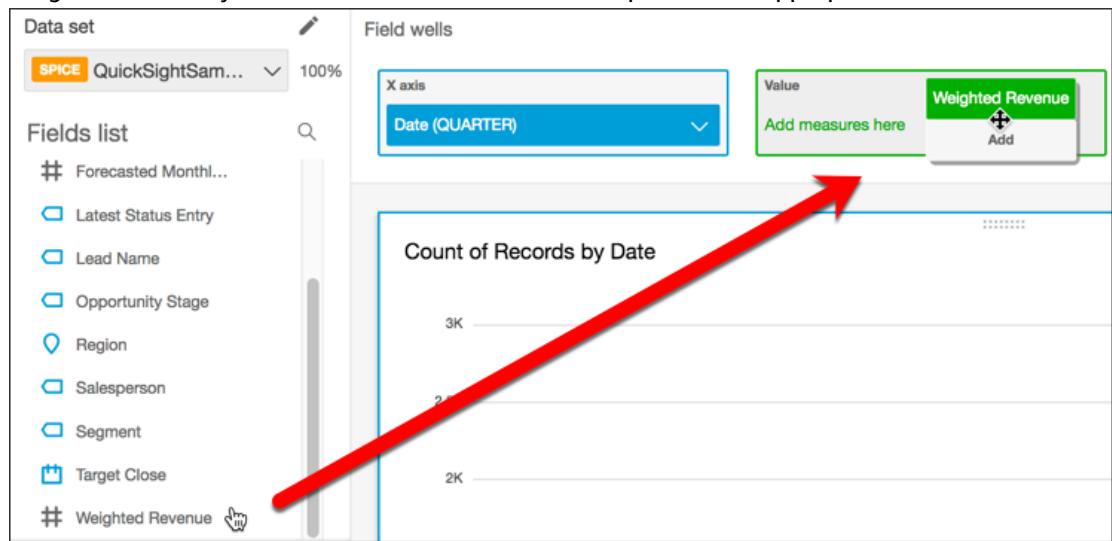
Adding a Field by Using a Field Well

To add a field to a visual by using a field well, choose a field in the **Fields list** pane. Then drag the field to the target field well, making sure that the drop indicator shows that the field is being added.

1. Expand the **Field wells** pane by choosing the expand icon.



2. Drag the field that you want to add from the **Fields list** pane to the appropriate field well.



Note

You can add the same value to the same visual multiple times. You can do so to show the same value with different aggregations or table calculations applied. By default, the fields all display the same label. You can edit the names by using the **Format Visual** panel, which you open by choosing the V-shaped icon at top right.

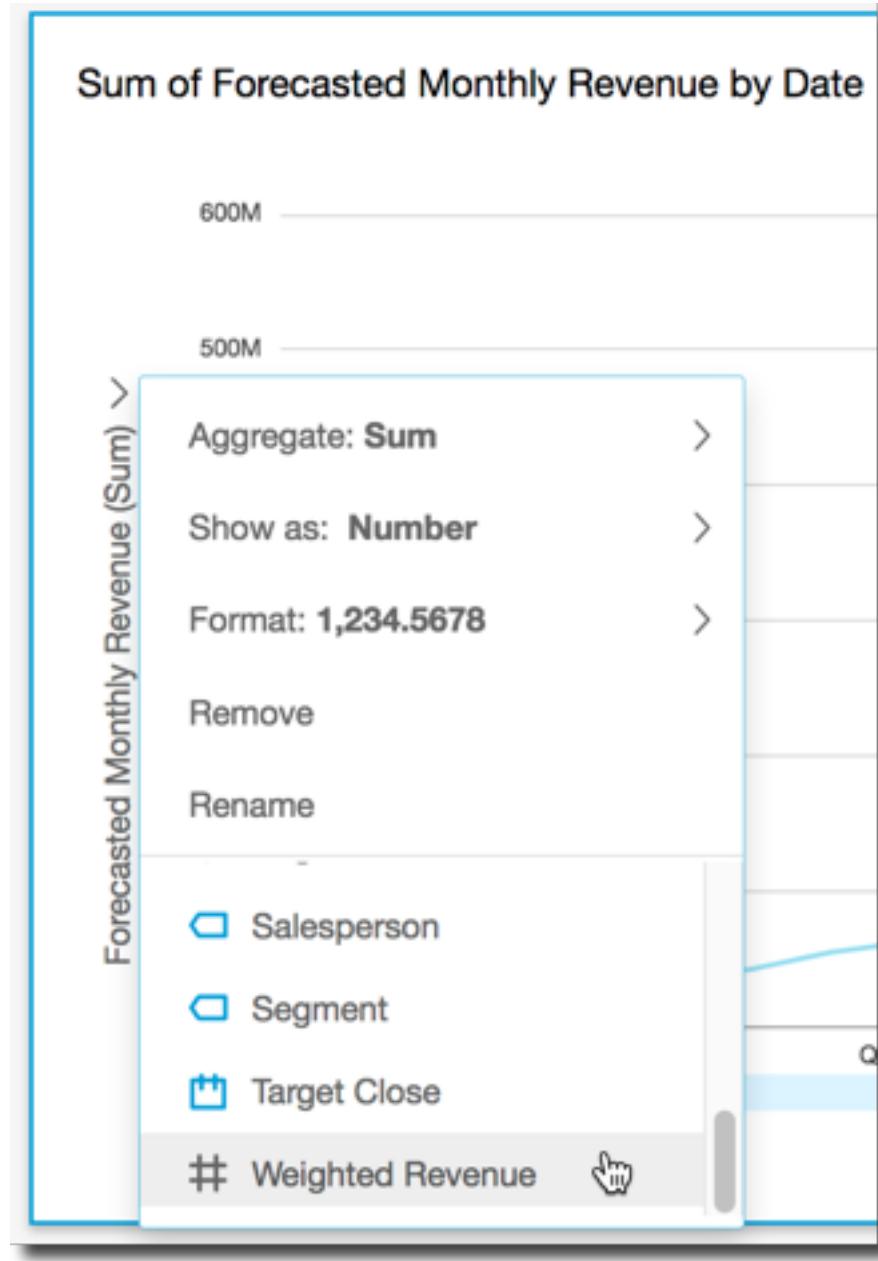
Changing the Field Associated with a Visual Element

You can change the field assigned to an element in a visual by using the field wells, drop targets, or the on-visual editors on the visual. For pivot tables, you must use field wells or drop targets as this visual type does not provide on-visual editors.

Change a Field Mapping by Using an On-Visual Editor

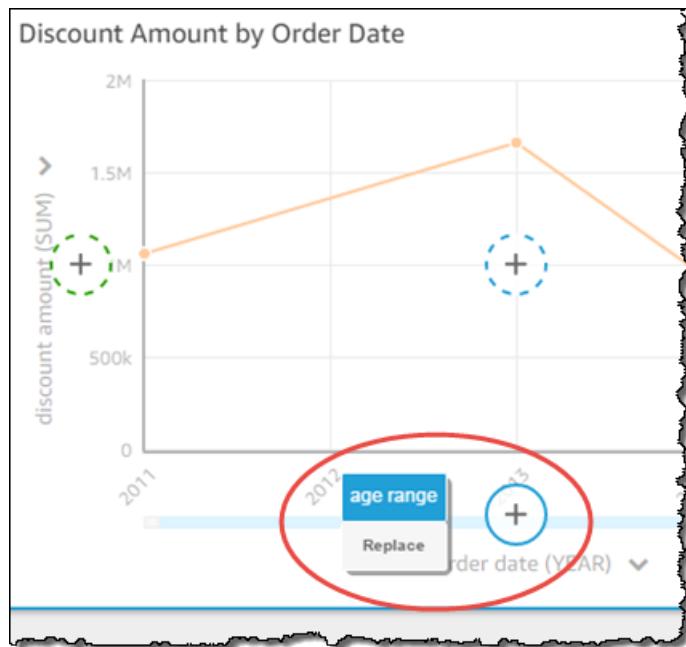
Use the following procedure to modify the mapping of a field to a visual element.

1. On the visual, choose the on-visual editor for the visual element for which you want to change the field.
2. On the on-visual editor menu, choose the field that you want to associate with that visual element.



Changing a Field Mapping by Using a Drop Target

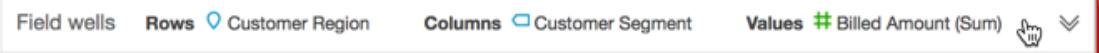
To modify the mapping of a field to a visual element by using a drop target, choose a field in the **Fields list** pane. Then drag the field to a drop target on the visual, making sure that the drop indicator shows that the field is being replaced.



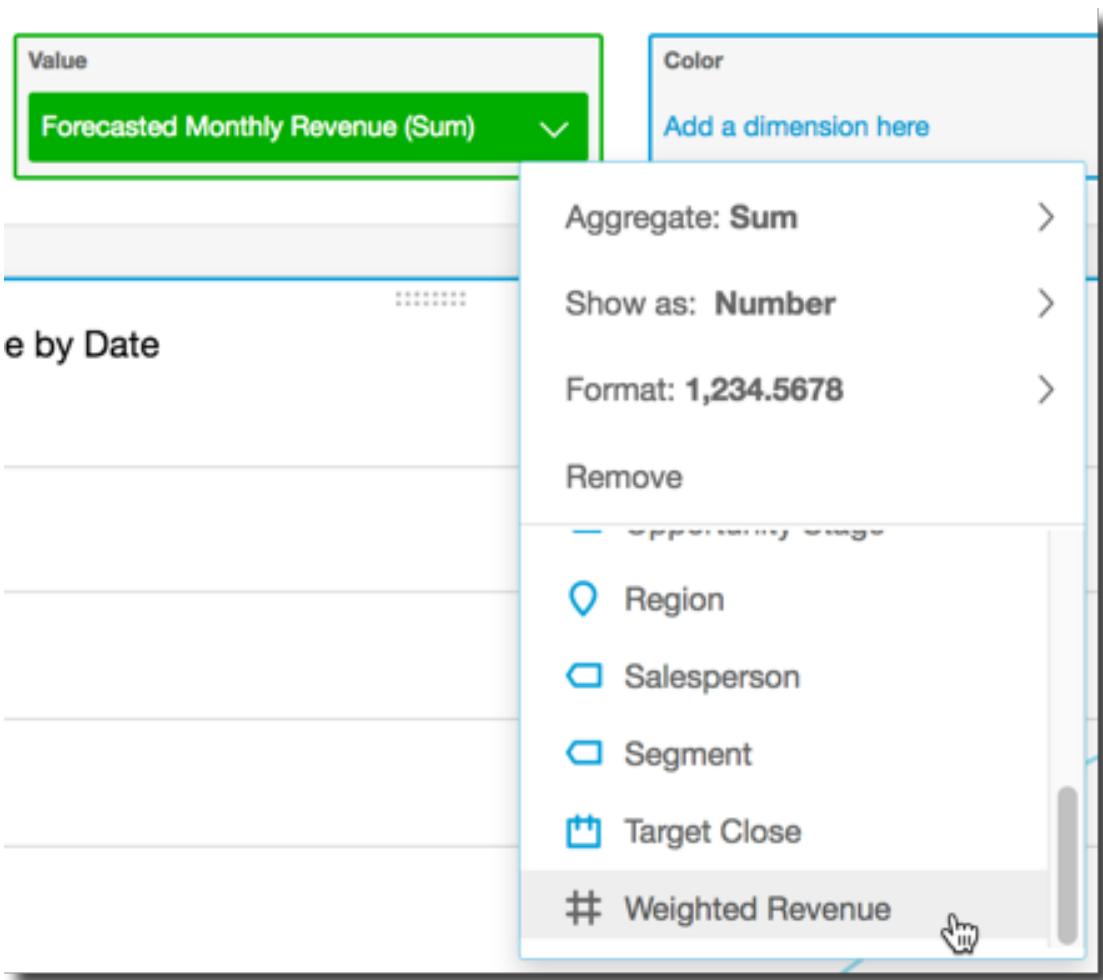
Changing a Field Mapping by Using a Field Well

Use the following procedure to modify the mapping of a field to a visual element.

1. Expand the **Field wells** pane by choosing the expand icon.



2. Choose the field well that represents the element that you want to remap, and then choose a new field from the menu that displays.



Changing Field Aggregation

You can apply functions to fields to display aggregate information, like the sum of the sales for a given product. You can apply an aggregate function by using the options in either an on-visual editor or a field well. The following aggregate functions are available in Amazon QuickSight:

- Average – Calculates the average value for the selected field.
- Count – Provides a count of the number of records containing the selected measure for a given dimension. An example is a count of Order ID by State.
- Distinct Count – Provides a count of how many different values are in the selected measure, for the selected dimension or dimensions. An example is a count of Product by Region. A simple count can show how many products are sold for each region. A distinct count can show how many different products are sold for each region. You might have sold 2000 items, but only two different types of items.
- Max – Calculates the maximum value for the selected field.
- Min – Calculates the minimum value for the selected field.
- Sum – Totals all of the values for the selected field.

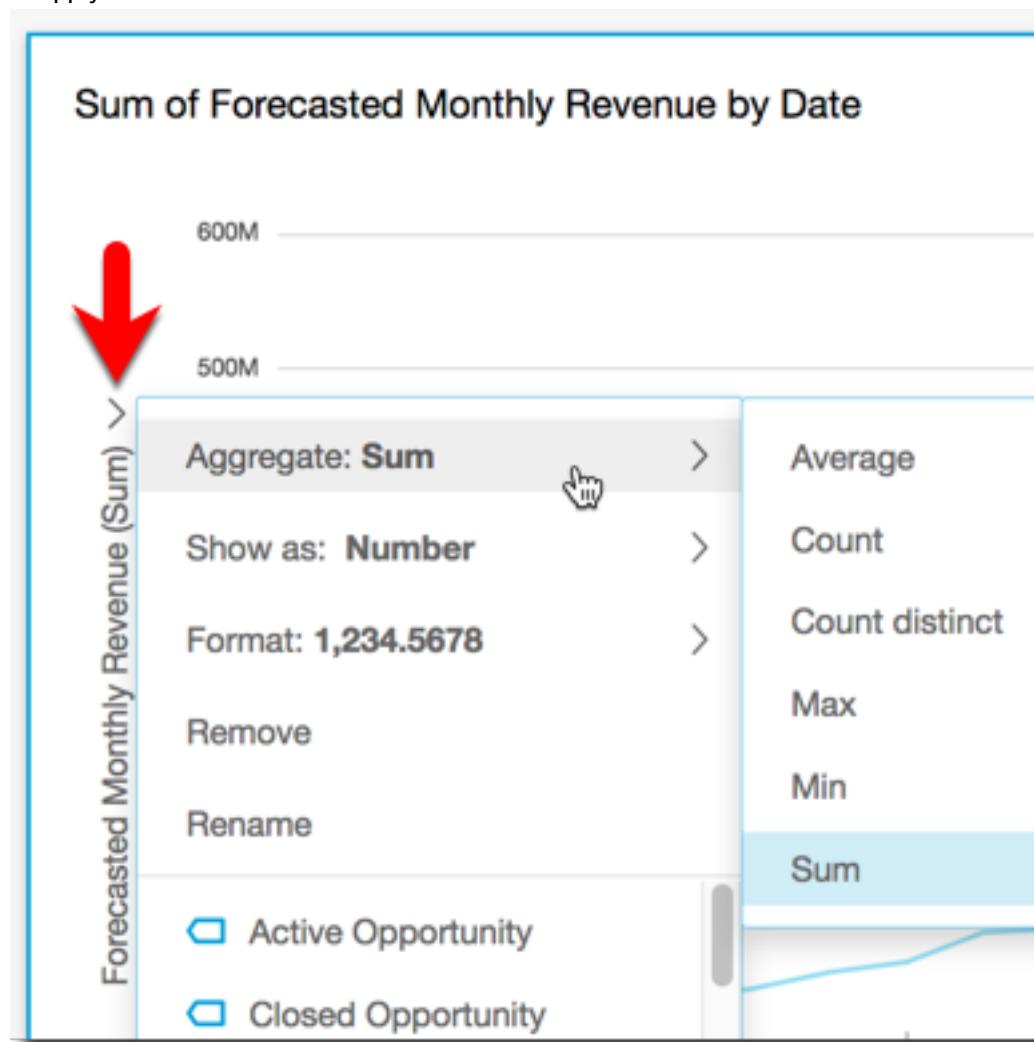
All aggregate functions can be applied to numeric fields. *Count* is automatically applied to a dimension if you choose to use it in a field well that expects a measure. If you have used a dimension in that way, you can also change the aggregate function applied to it. You can't apply aggregate functions to fields in dimension field wells.

The visual elements that support aggregated fields varies by visual type.

Changing or Adding Aggregation on a Field by Using an On-Visual Editor

Use the following procedure to change or add aggregation on a field.

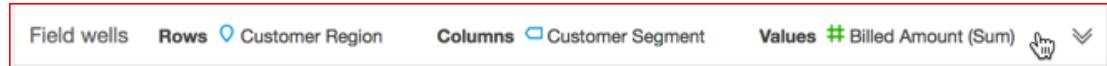
1. On the visual, choose the on-visual editor for the field that you want to apply aggregation to.
2. On the on-visual editor menu, choose **Aggregate**, then choose the aggregate function that you want to apply.



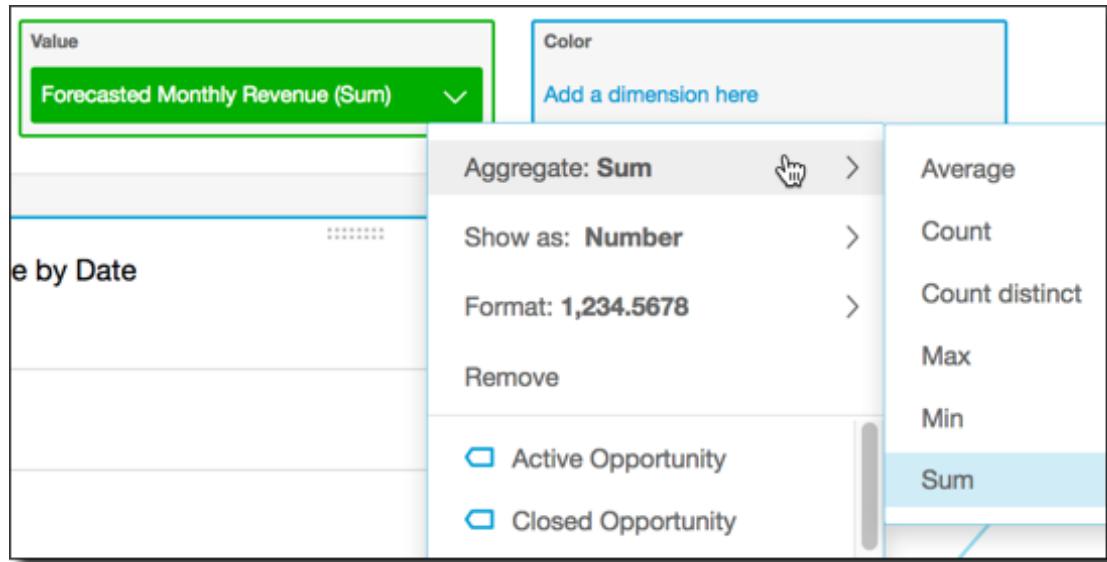
Changing or Adding Aggregation to a Field by Using a Field Well

Use the following procedure to add aggregation to a field for a pivot table visual.

1. Expand the **Field wells** pane by choosing the expand icon.



2. Choose the field well containing the field that you want to apply an aggregate function to.
3. On the field well menu, choose **Aggregate**, then choose the aggregate function that you want to apply.



Changing Date Field Granularity

You can change the granularity for a date field on a visual to determine the intervals for which item values are shown. You can set the date field granularity to one of the following values:

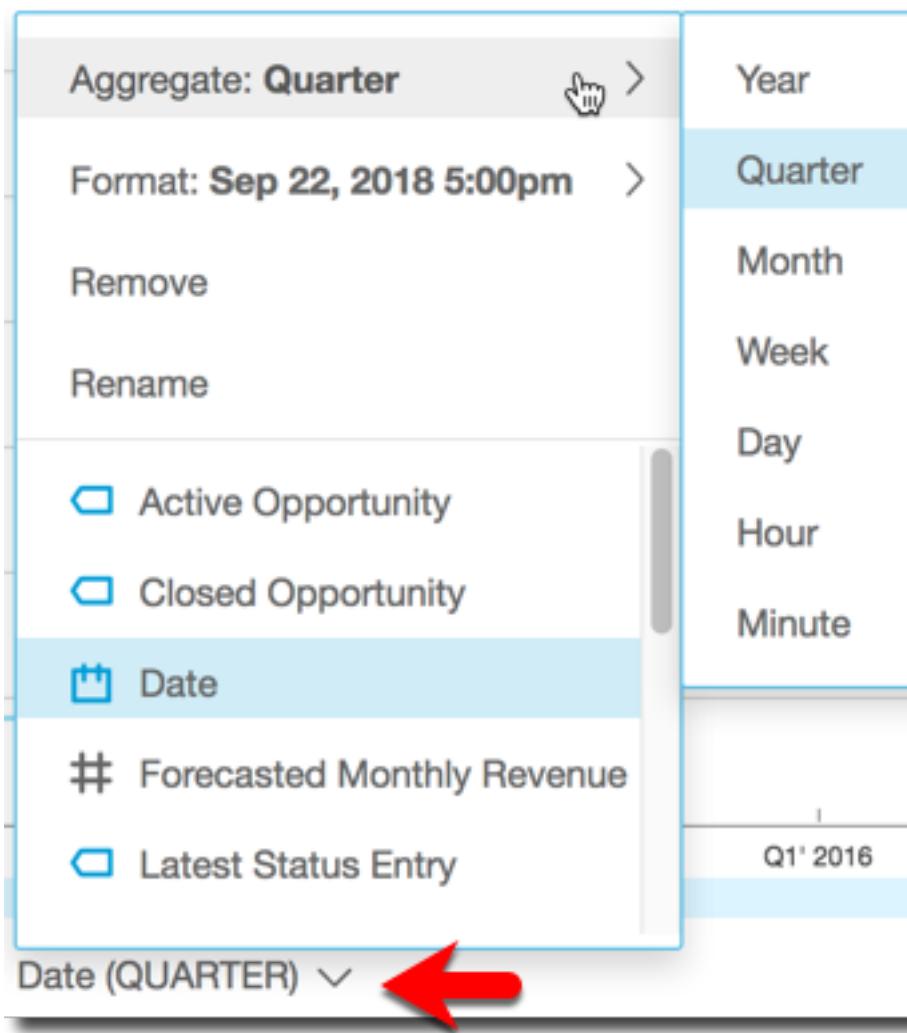
- Year (this is the default).
- Quarter
- Month
- Week
- Day
- Hour
- Minute

Hour and minute are only available if the field contains time data.

Changing Date Field Granularity by Using an On-Visual Editor

Use the following procedure to change date field granularity by using an on-visual editor.

1. On the visual, choose the field well for the date field whose granularity you want to change.
2. On the field well menu, choose **Aggregate**, then choose the time interval that you want to apply, as shown following:



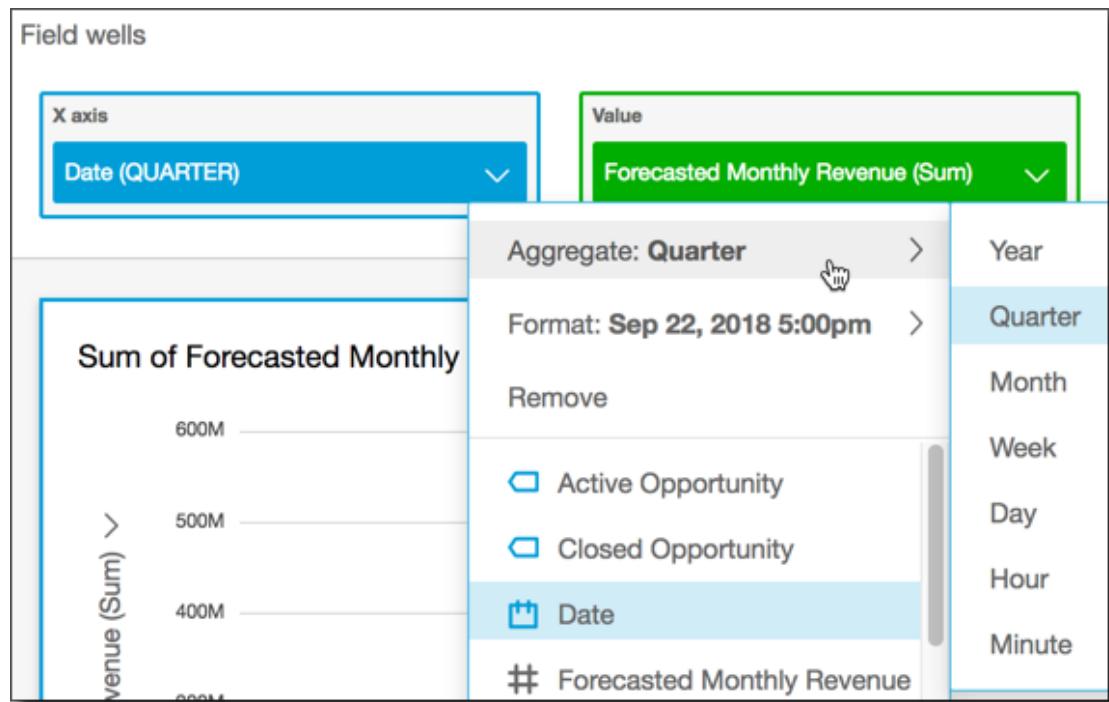
Changing Date Field Granularity by Using a Field Well

Use the following procedure to change date field granularity by using a field well.

1. Expand the **Field wells** pane by choosing the expand icon.

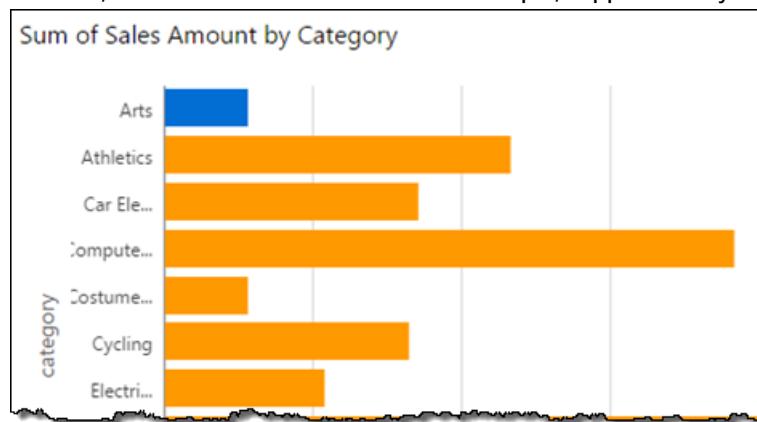


2. Choose the field well containing the date field, and then choose **Aggregate**. Choose the date granularity that you want to use.

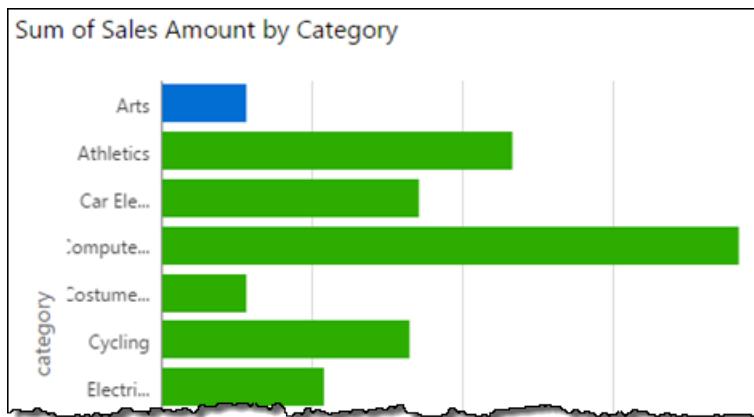


Changing Visual Colors in Amazon QuickSight

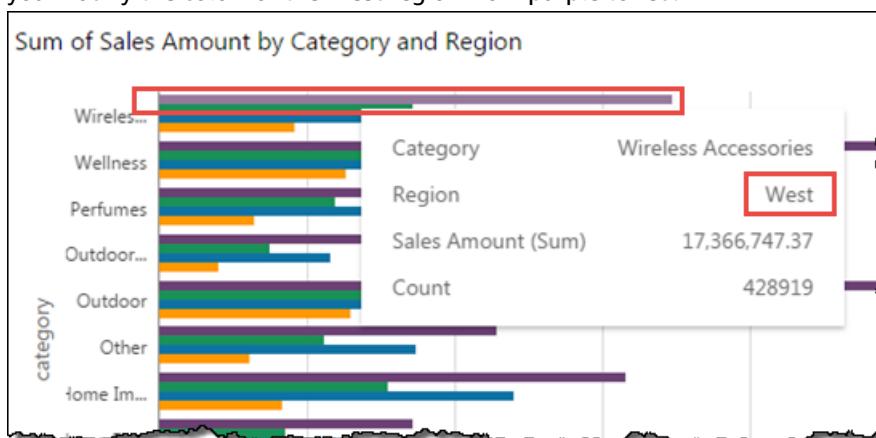
You can change the color of one, some, or all elements on visuals that use scatter plot, pie chart, or any of the bar chart or line chart visual types. You can change the chart color used by all elements on the chart, and also change the color of individual elements. When you set the color for an individual element, it overrides the chart color. For example, suppose that you set the color for the **Arts** bar to blue.



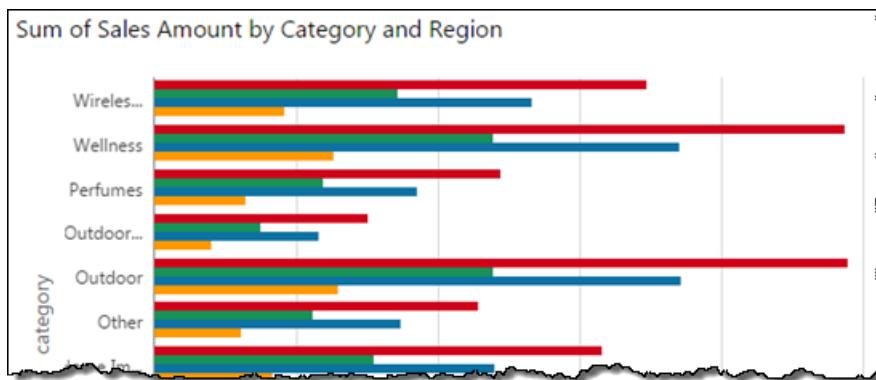
Then you change the chart color to green. The **Arts** bar remains blue.



When you change the color of an element that is grouped, for example a bar in a clustered bar chart, the color for that element is changed in all of the groups. For example, if you have the following visual and you modify the color for the **West** region from purple to red:



It is modified in all of the clusters:



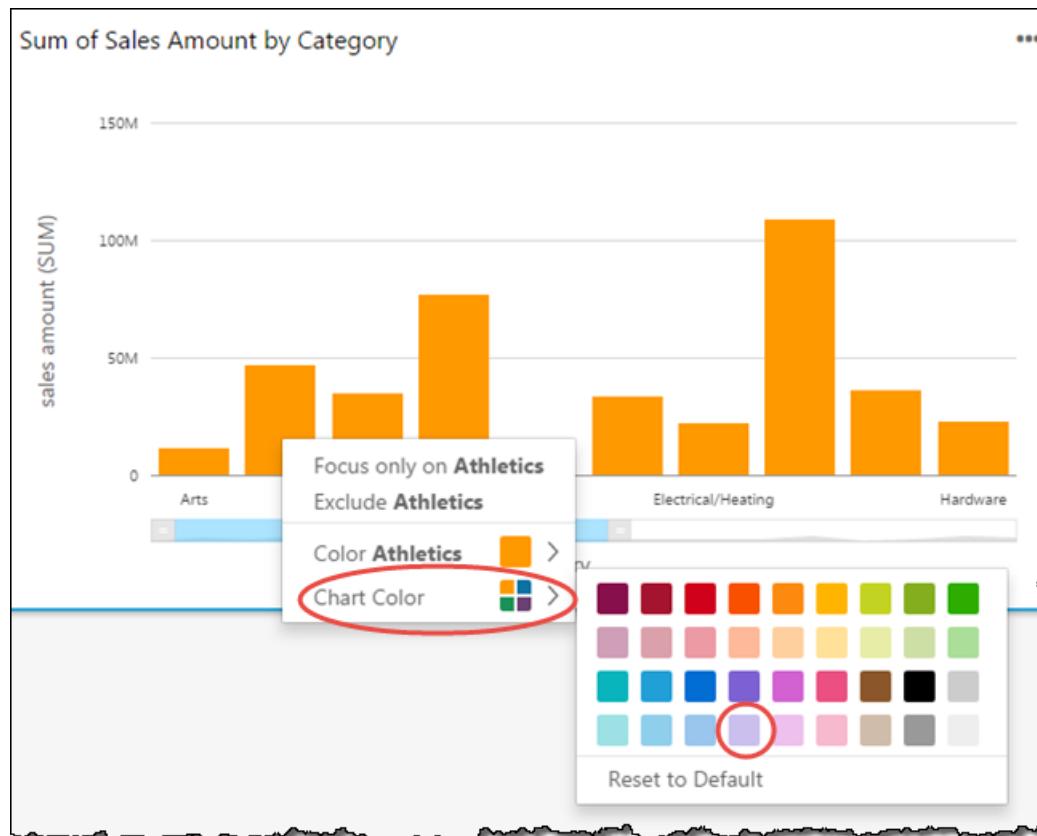
Setting New Colors for a Visual

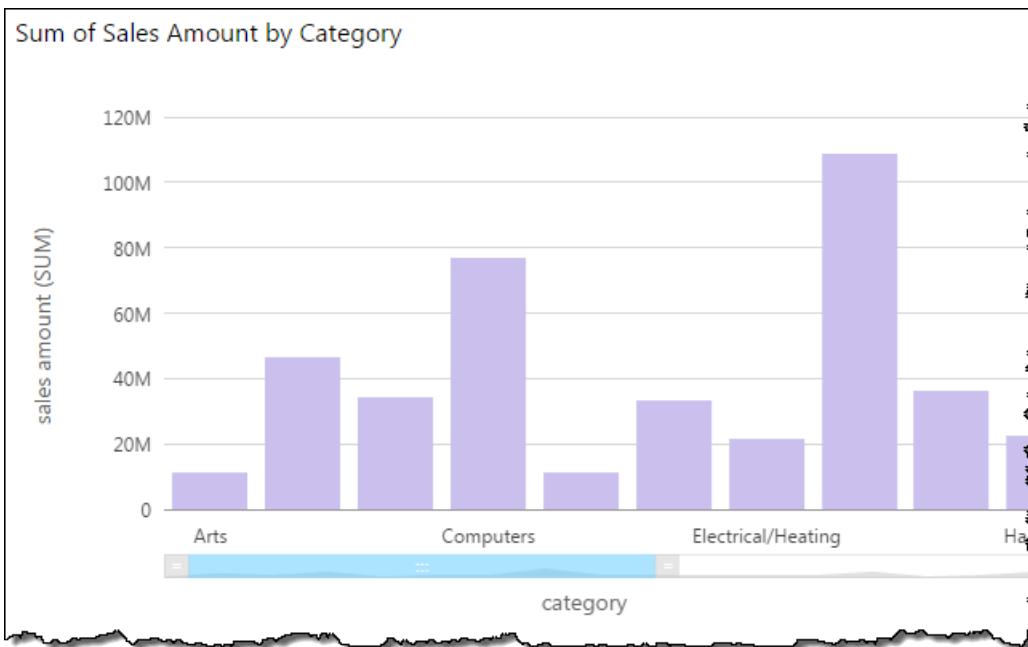
Use the following procedure to change the colors for a visual.

1. On the analysis page, choose the visual that you want to modify.
2. To change the chart color, choose any element on the visual, and then choose **Chart Color**.

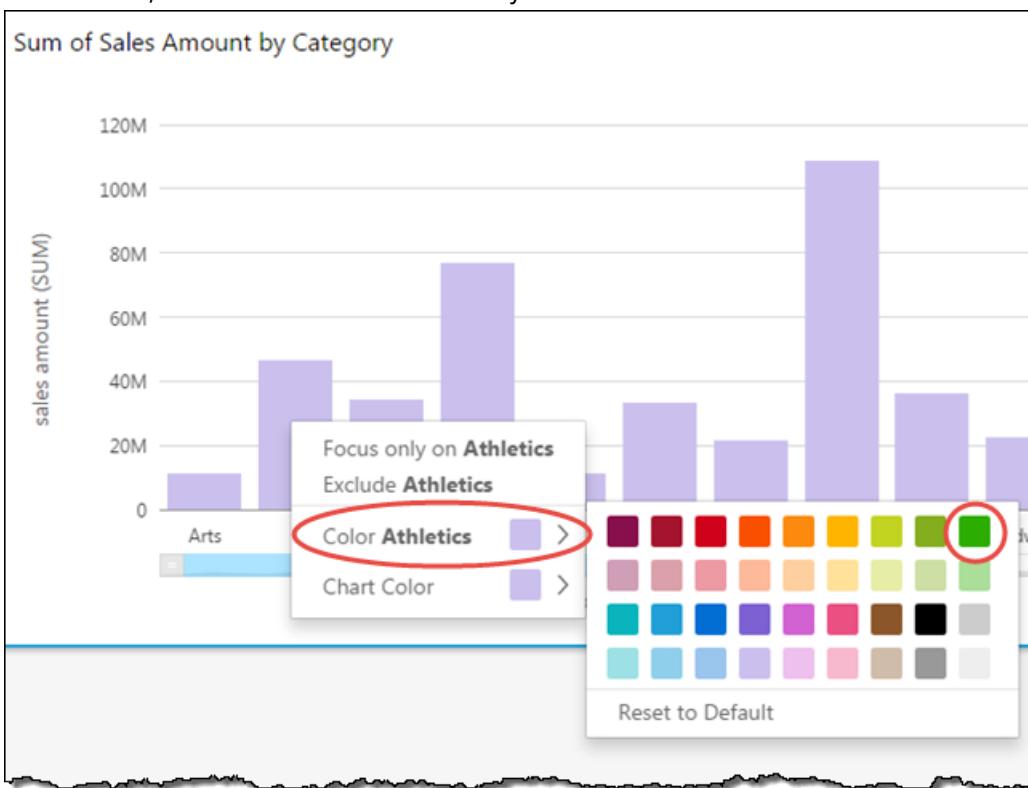
To select elements, do the following:

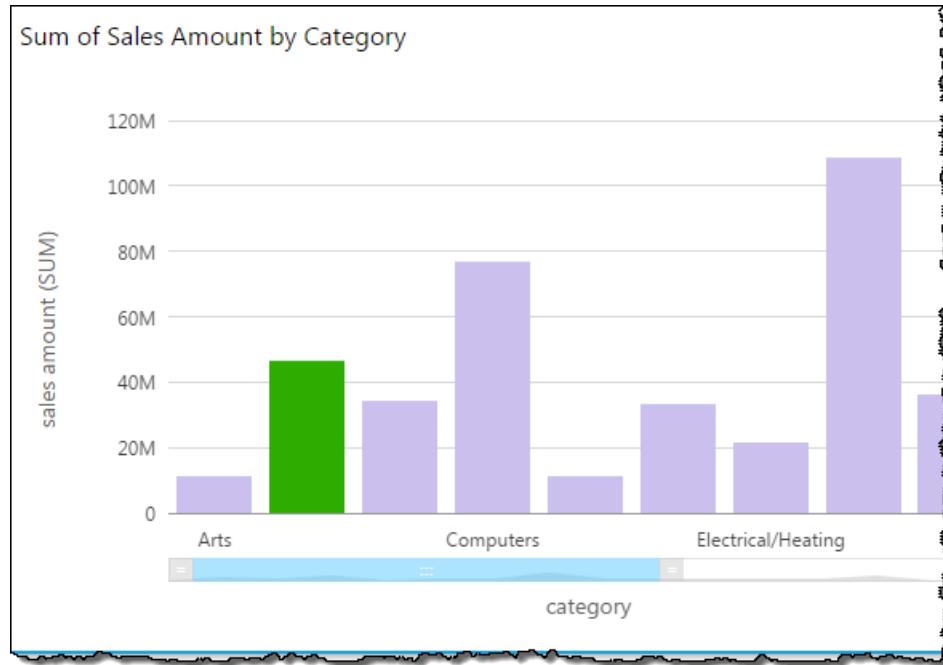
- On a bar chart, choose any bar.
 - On a line chart, choose the end of a line.
 - On a scatter plot, choose an element. The field must be in the **Group/Color** section of **Field wells**.
3. Choose the color that you want. All elements on the visual are changed to use this color, except for any that have previously had their color individually set. In that case, the element color overrides the chart color.



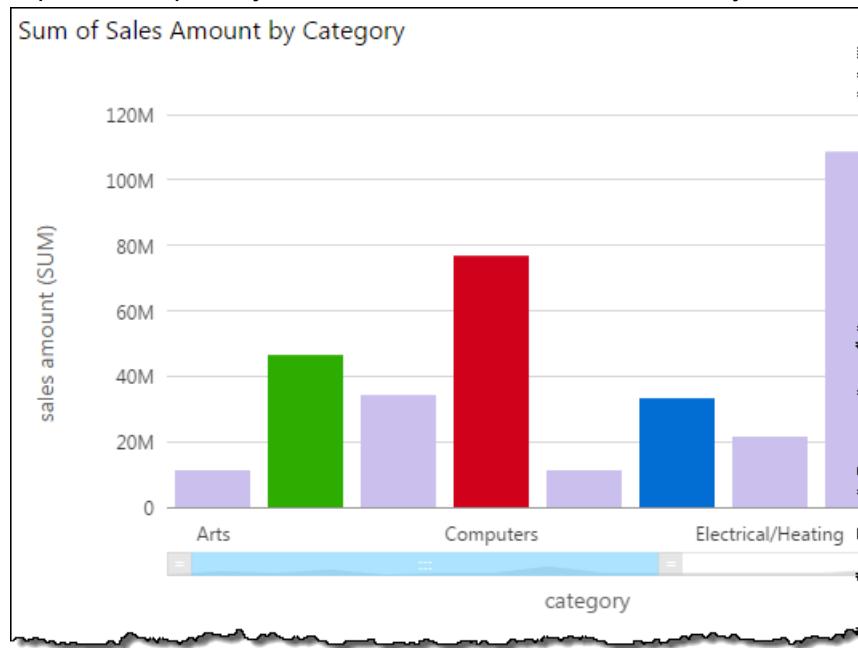


4. To change the color for a single element on the visual, choose that element, choose **Color <fieldname>**, and then choose the color that you want.





Repeat this step until you have set the color on all elements that you want to modify.

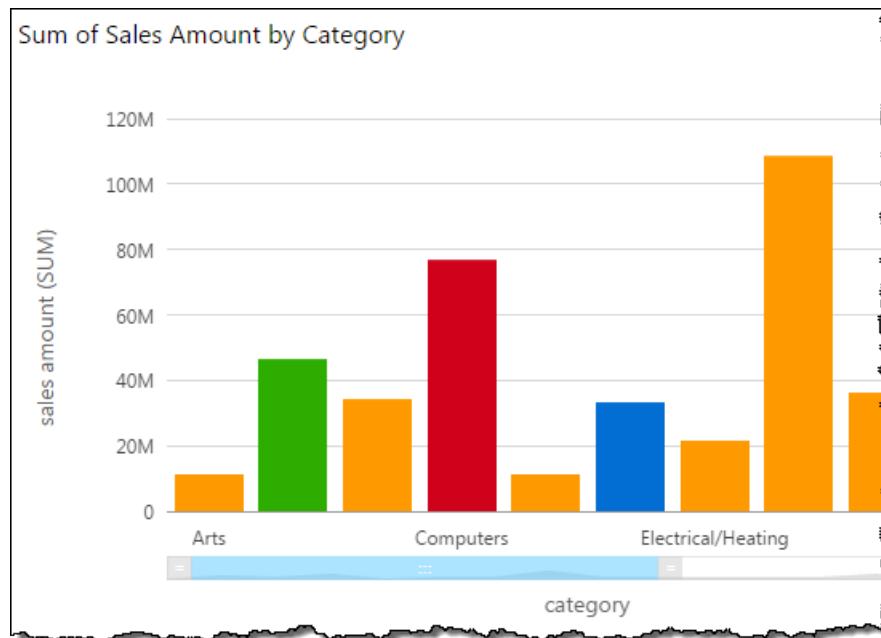
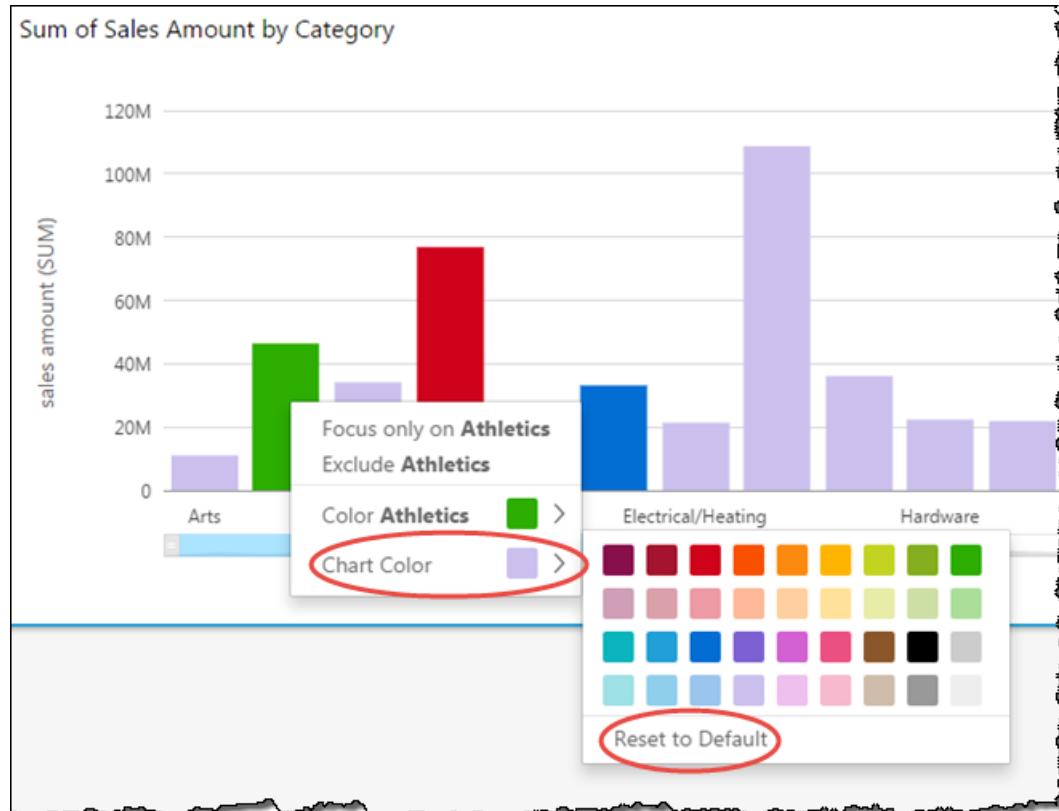


Setting Visual Colors Back to Defaults

Use the following procedure to return to using the default colors on a visual.

1. On the analysis page, choose the visual that you want to modify.
2. To change the chart color back to the default color for that visual type, choose any element on the visual, choose **Chart Color**, and then choose **Reset to Default**. All elements on the visual are

changed to the default color for the visual type, except for any that have previously had their color individually set. In that case, the element color setting overrides the chart color setting.



- To change the color for a single element back to the default, choose that element, choose **Color <fieldname>**, and then choose **Reset to Default**. The default color for individual elements is the chart color if you have specified one, or the default color for the visual type otherwise.



Sorting Visual Data in Amazon QuickSight

Most visual types offer the ability to change data sort order. Whether sorting is supported and what visual element you can sort by depends on the visual type.

Note

For SPICE data sets, sorting by text fields (those with a string data type) is supported for fields that contain no more than 256,000 unique values. When this limit is exceeded, a notification appears at the upper right of the visual.

Use the following table to identify the field wells or on-visual editors that support sorting for each visual type.

| Visual Type | Field Well or On-Visual Editor |
|-----------------------------|---|
| Bar charts (all Horizontal) | Y axis and Value |
| Bar charts (all Vertical) | X axis and Value |
| Combo charts (all) | X axis, Bars, and Lines |
| Geospatial charts | Sorting not supported |
| Heat map | Columns and Values |
| KPIs | Sorting not supported |
| Line charts (all) | X axis and Value for numeric measures only |
| Pie chart | Value and Group/Color |
| Pivot table | Column |
| Scatter plot | Sorting not supported |
| Tabular Reports | Group by and Value |
| Tree map | Size, Group by, and Color |

For more information on sorting pivot table data, see [Sorting Pivot Tables \(p. 369\)](#).

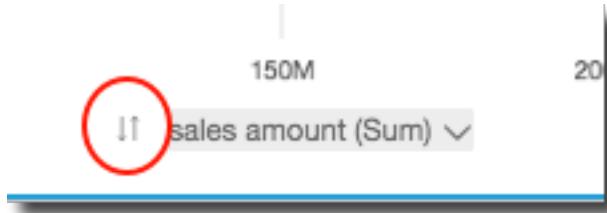
Sorting a Visual

For most visual types, you can use either a field well or an on-visual editor to choose the sort order. Pivot tables behave differently; you specify the sort order by using the column sort icon on the visual. For more information about sorting pivot tables, see [Sorting Pivot Tables \(p. 369\)](#).

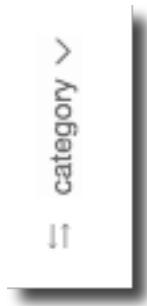
Use the procedures below to sort any non-pivot table visual type by using either a field well or an on-visual editor.

Quick Sorting on a Visual Axis

To quickly sort dimensions and measures on bar, stacked, combo charts, hover over the field name on either axis, and choose the sort icon that appears.

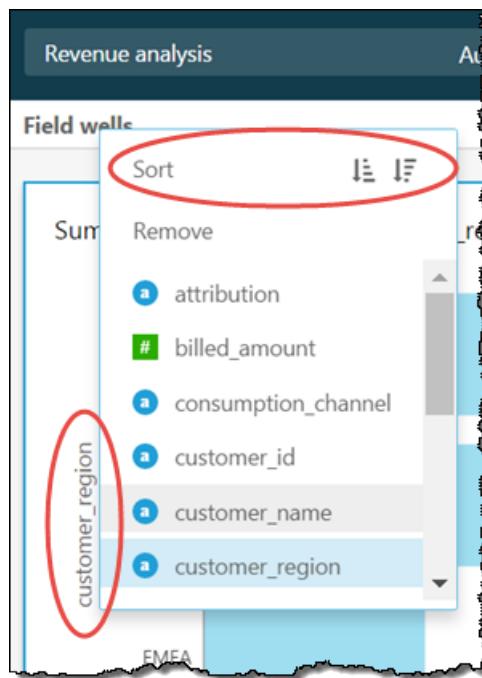


This shortcut to sorting is available for any data type in direct queries. In SPICE, it is available only for datetime, numeric, and decimal data types.



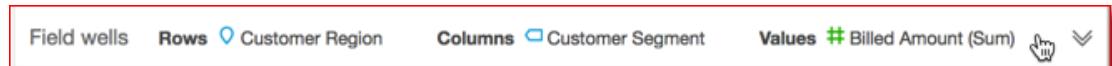
Sorting by Using an On-Visual Editor

1. On the visual, choose an on-visual editor that supports sorting.
2. On the on-visual editor menu, choose **Sort**, and then choose the ascending or descending sort order icon.

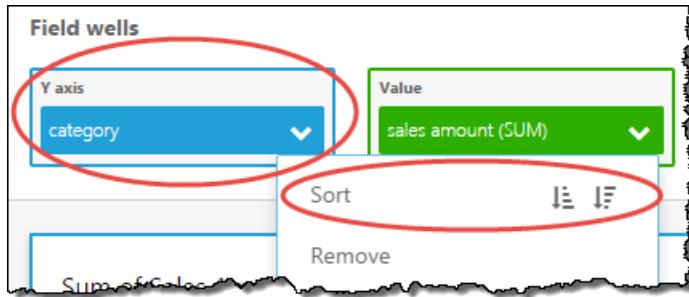


Sorting by Using a Field Well

1. Expand the **Field wells** pane by choosing the expand icon.



2. Choose a field well that supports sorting.
3. On the field well menu, choose **Sort**, and then choose the ascending or descending sort order icon.



Filtering Visual Data in Amazon QuickSight

You can use filters to refine the data displayed in a visual. Filters are applied to the data before any aggregate functions that you specify.

A filter is associated with a single data set in an analysis. It can be scoped to one, several, or all visuals in the analysis that use that data set. By default, a filter applies only to the visual that was selected when the filter was created. You can change the scope of a filter after you create it.

Each filter applies only to a single field. You can apply filters to both regular and calculated fields.

If you create multiple filters, all top-level filters apply together using AND. If you group filters by adding them inside a top-level filter, the filters in the group apply using OR.

Amazon QuickSight applies all of the enabled filters to the field. For example, if there is one filter of state = WA and another filter of sales >= 500, then the data set only contains records that meet both of those criteria. If you disable one of these, only one filter applies.

Take care that multiple filters applied to the same field aren't mutually exclusive.

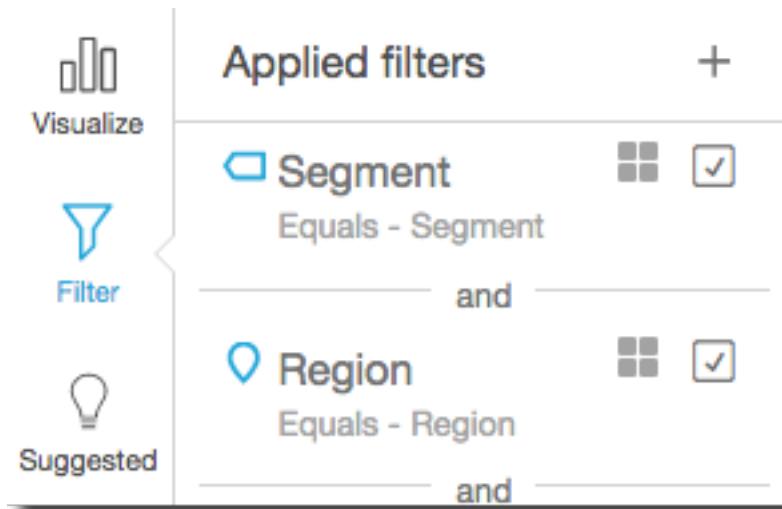
Amazon QuickSight uses filters to focus on or exclude a visual element representing a particular value. For more information about focusing on a visual element, see [Focusing on Visual Elements \(p. 263\)](#). For more information about excluding a visual element, see [Excluding Visual Elements \(p. 264\)](#).

Topics

- [Viewing Filters \(p. 301\)](#)
- [Adding a Filter \(p. 304\)](#)
- [Editing a Filter \(p. 328\)](#)
- [Deleting a Filter \(p. 330\)](#)
- [Parameterize a Filter \(p. 331\)](#)

Viewing Filters

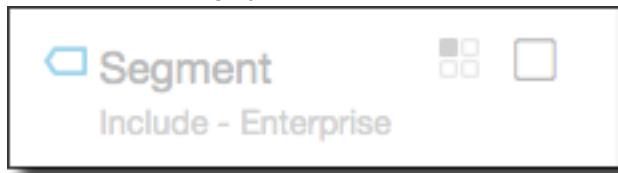
To see the filters for a visual, choose **Filter** on the tool bar. The filters that apply to the selected visual display. They appear in the **Applied filters** pane in order of creation, with the oldest filter on top.



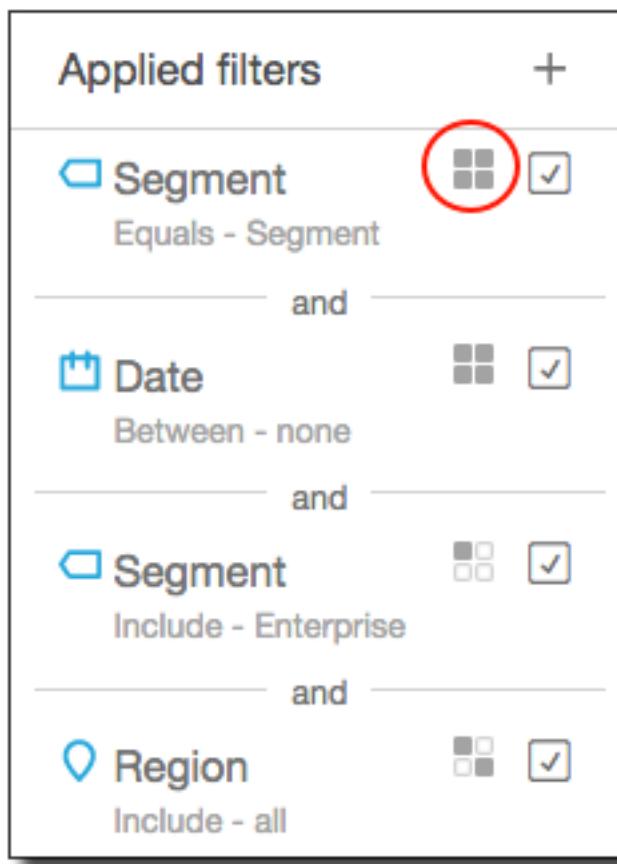
Understanding Filter Icons

Filters in the **Applied filters** pane display icons to indicate how they are scoped, and whether or not they are enabled.

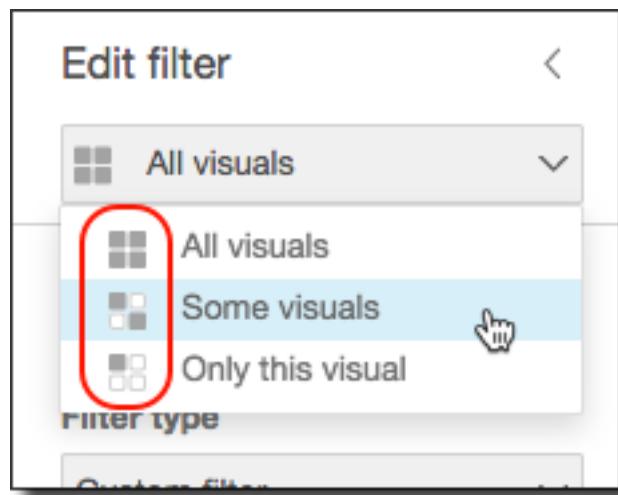
A disabled filter is grayed out, and its check box is disabled.



One of several scope icons displays to the right of the filter name to indicate the scope set on that filter. The scope icon resembled four boxes in a square. If all boxes are filled, the filter applies to all visuals on the analysis sheet. If only one box is filled, the filter applies to the selected visual only. If some boxes are filled, the filter applies to some of the visuals on the sheet, including the one currently selected.



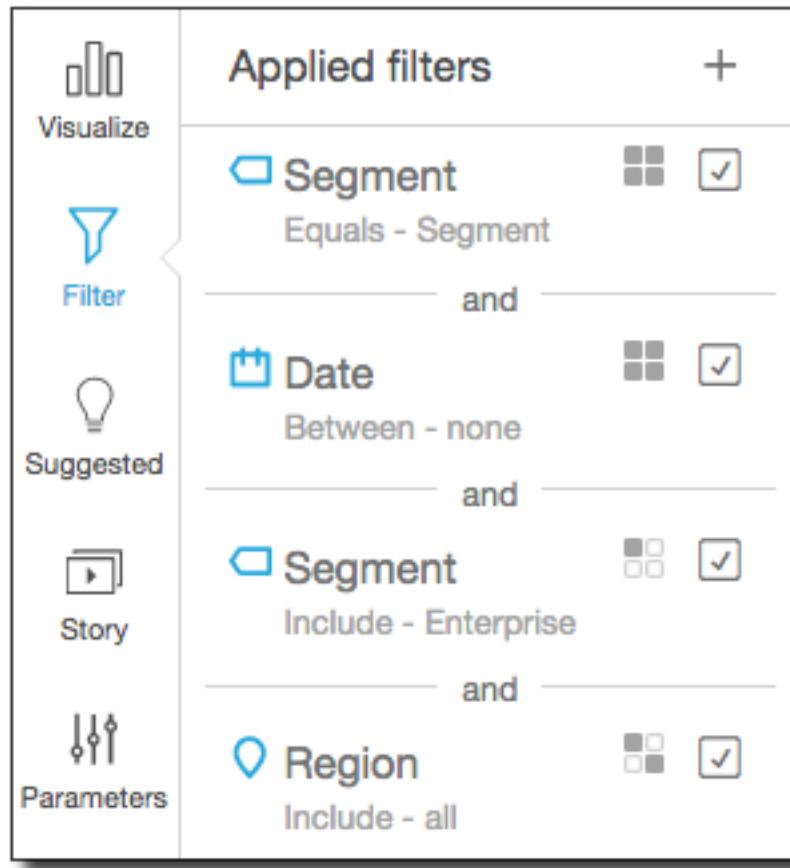
These scope icons match those displayed on the filter menu when you are choosing the scope for the filter.



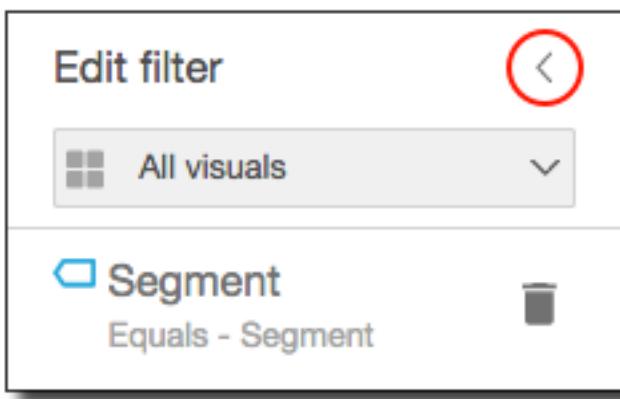
Viewing Filter Details

To see filter details, choose **Filter** on the left. The filter view retains your last selection. So when you open **Filter**, you see either the **Applied filters** or the **Edit filter** view.

In the **Applied filters** view, you can choose any filter to view its details. The filters in this list can change depending on the scope of the filter, and which visual you currently have selected.



You can close the **Edit filter** view by choosing the selector on the right. Doing this resets the **Filter** view.

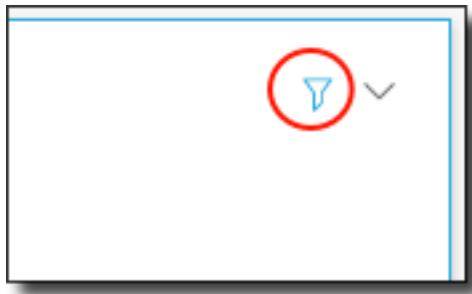


Adding a Filter

You can create a filter on any field from the data set associated with the currently selected visual. If you want to create a filter for a different data set, choose a visual that uses that data set. When you create

a filter, it applies by default to just the currently selected visual. You can apply the filter to additional visual that use that data set after you create it.

After you apply a filter to a visual, a filter icon appears on the top right of the visual, next to the v-shaped on-visual menu. This icon shows you at a glance that the data is filtered.



Depending on the data type of the field you choose, you see different filtering options, as described in the following topics.

Topics

- [Adding a Text Filter \(p. 305\)](#)
- [Adding a Numeric Filter \(p. 315\)](#)
- [Adding a Date Filter \(p. 319\)](#)
- [Adding a Compound Filter with And/Or Operators \(p. 327\)](#)

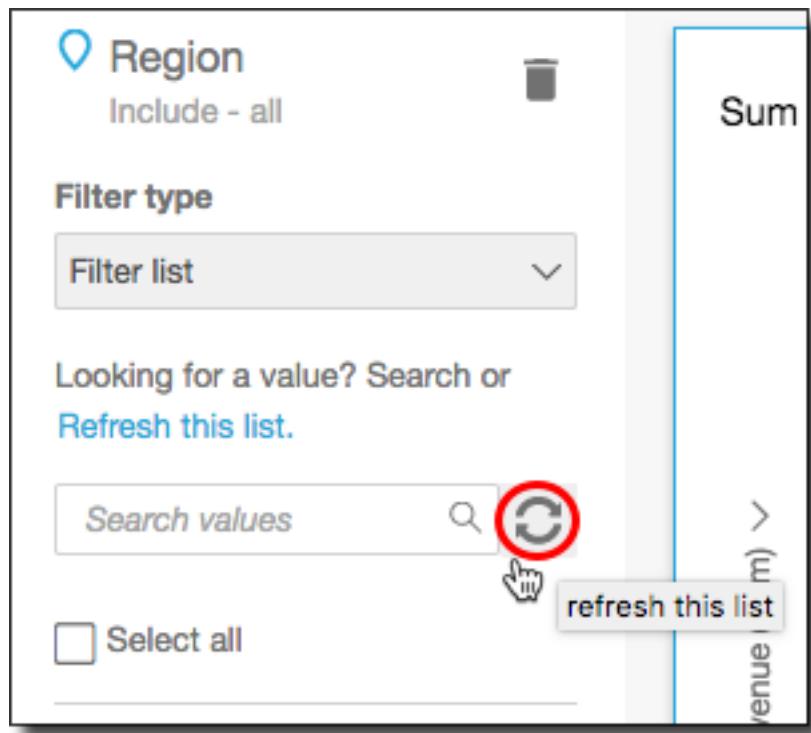
Adding a Text Filter

You can filter text fields by either choosing field values from a list or by specifying field values.

Use the **Filter list** filter type to filter by choosing field values. To narrow down the values displayed, type a search term into the box above the checklist and choose **Search**. Search terms are case-insensitive and wildcards aren't supported. Any field value that contains the search term is returned. For example, searching on **I** returns **al**, **AL**, **la**, and **LA**.

To return to viewing the full set of field values rather than just those that match the search term, choose **Search** again.

For filter lists, you can refresh the list of field values by choosing the refresh icon.



The values display alphabetically in the control, unless there are more than 10,000 distinct values. Then the control displays a search box instead. Each time you search for the value you want to use, it initiates a new query. If the results contain more than 10,000 values, you can scroll through the values with pagination.

You can also use the **Custom filter list** filter type to specify one or more field values to filter on. A custom filter also lets you choose whether you want to include or exclude records that contain those values. You can also choose whether to exclude or include nulls, or show only rows with nulls in this field. The specified value and actual field value must match exactly for the filter to be applied to a given record.

With the **Custom filter** filter type, you specify a single value that the field value must equal or not equal. If you choose an equal comparison, the specified value and actual field value must match exactly in order for the filter to be applied to a given record. Custom filters also allow you the option to attach a parameter. To use a preexisting parameter, enable the **Use parameters** setting. For more information about parameters, see [Parameterize a Filter \(p. 331\)](#).

Use a **Top and bottom filter** filter type to show the top or bottom n value for the field you choose, based on values in another field. For example, you can choose to show the top 5 sales people based on revenue. You can use an integer parameter as the n value to dynamically control the number of results to show.

You can find details on how to create each type of text field filter in the following sections.

Topics

- [Using a Filter List to Select Field Values \(p. 307\)](#)
- [Using a Custom Filter List to Specify Multiple Values with Additional Options \(p. 308\)](#)
- [Using a Custom Filter to Specify a Single Value or Parameter \(p. 311\)](#)
- [Using a Top and Bottom Text Filter \(p. 314\)](#)

Using a Filter List to Select Field Values

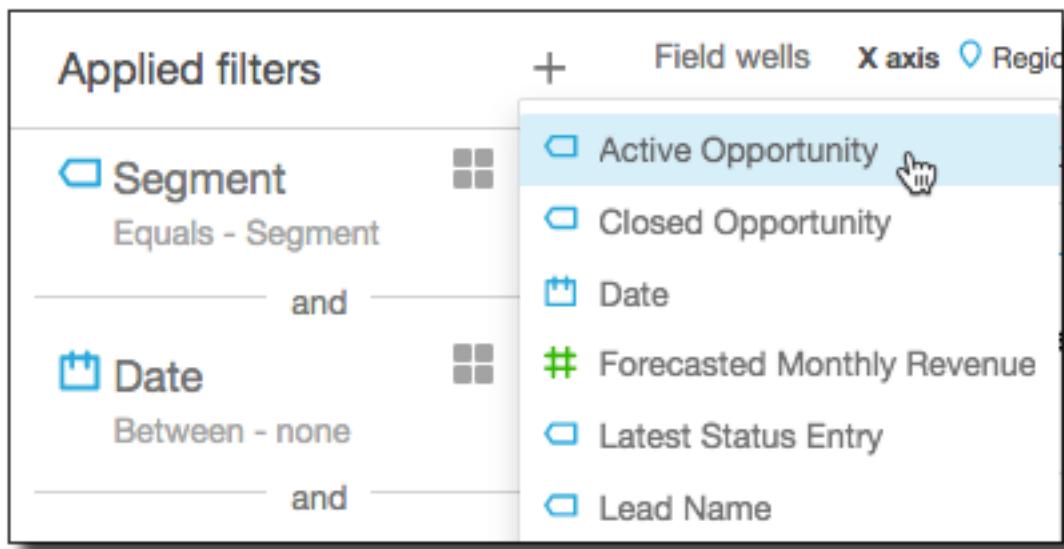
Use the following procedure to create a text field filter by selecting field values.

Important

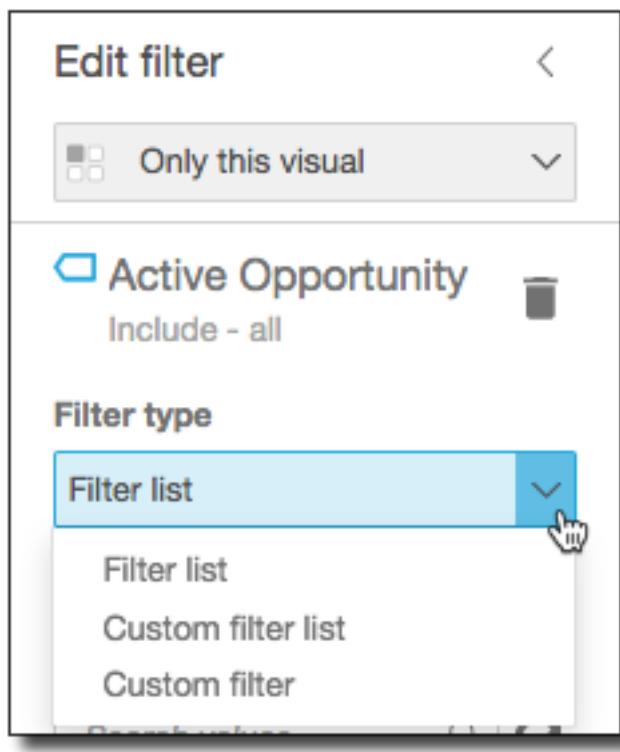
You can only filter by choosing field values in cases where Amazon QuickSight can quickly retrieve the full set of values. In cases where you are working with very large record sets and this is not possible, filter by specifying field values instead. For more information about filtering with specified field values, see [Using a Custom Filter List to Specify Multiple Values with Additional Options \(p. 308\)](#) and [Using a Custom Filter to Specify a Single Value or Parameter \(p. 311\)](#).

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the add filter icon (+), and then choose a text field to filter on.

Doing this creates a new filter with no criteria.



3. The filter is added to the list of filters. Choose the new filter to expand it.
4. Choose **Filter list** for the filter type.



5. Choose the field values that you want to filter on.

To narrow the values displayed, type a search term into the box above the checklist and choose **Search**. Search terms are case-insensitive and wildcards aren't supported. Any field value that contains the search term is returned. For example, searching on **I** returns **al**, **AL**, **la**, and **LA**.

Choose **X** in the search box to clear the search term.

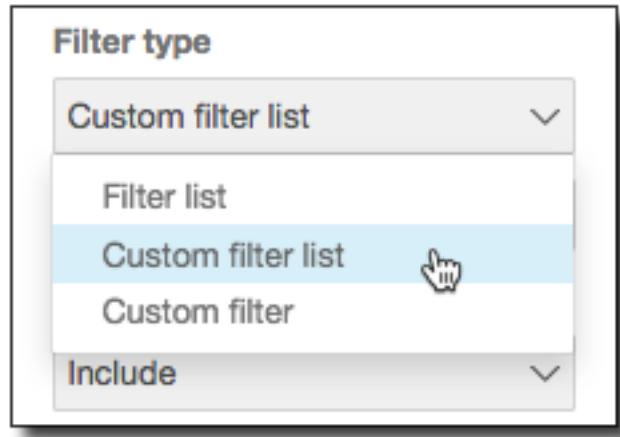
The values display alphabetically in the control, unless there are more than 10,000 distinct values. Then the control displays a search box instead. Each time you search for the value you want to use, it initiates a new query. If the results contain more than 10,000 values, you can scroll through the values with pagination.

Using a Custom Filter List to Specify Multiple Values with Additional Options

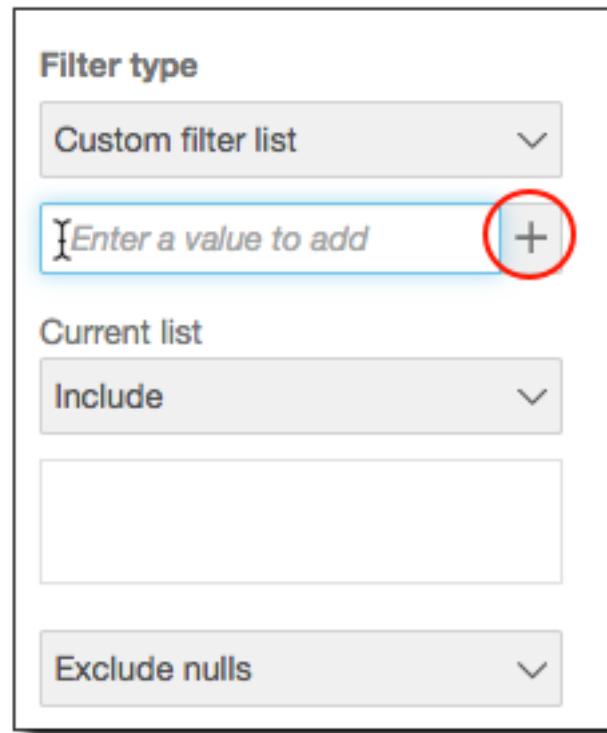
You can use the **Custom filter list** filter type to specify one or more field values to filter on, and choose whether you want to include or exclude records that contain those values. You can also choose whether to exclude or include nulls, or show only rows with nulls in this field.

Use the following procedure to create a text field filter by specifying exact field values. The specified value and actual field value must match exactly for the filter to be applied to a given record.

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the new filter icon, and then choose a text field to filter on.
3. Choose the new filter to expand it.
4. Choose **Custom filter list** for the filter type.



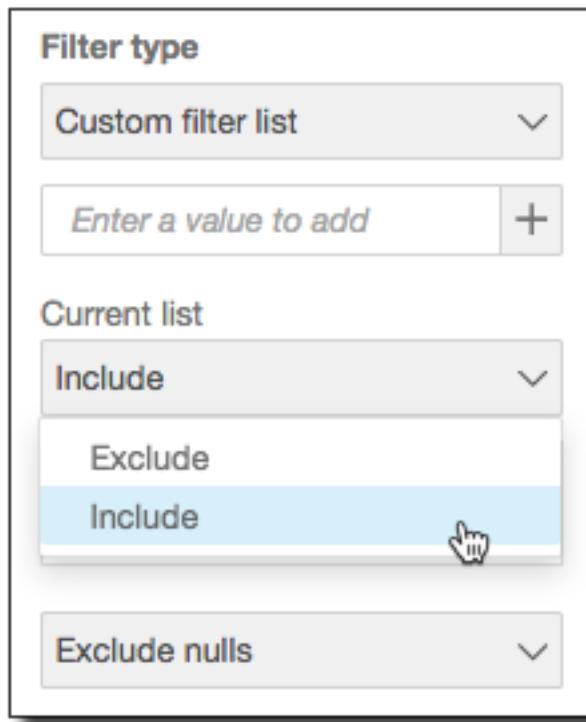
5. Enter a field value in **Enter a value to add**, and then choose the add icon.



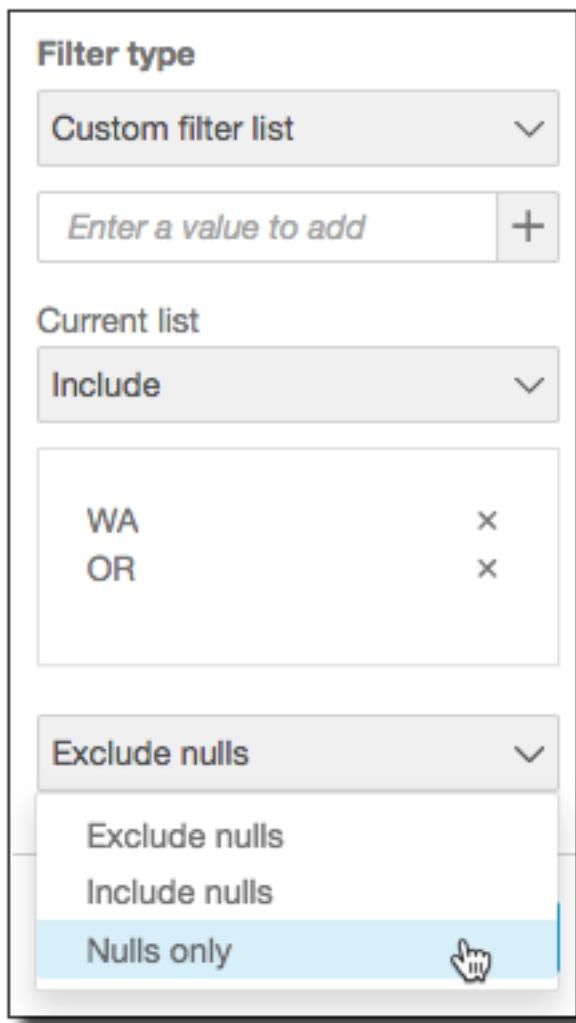
To remove a field value from the criteria, choose its delete icon.



6. (Optional) Repeat Step 5 until you have all of the field values that you want to filter on.
7. Choose whether to include or exclude records that contain the field values you selected.



8. Choose how to handle null values in the filtered field. You can choose to include or exclude the values you listed. Alternatively, you can choose to show nulls only.



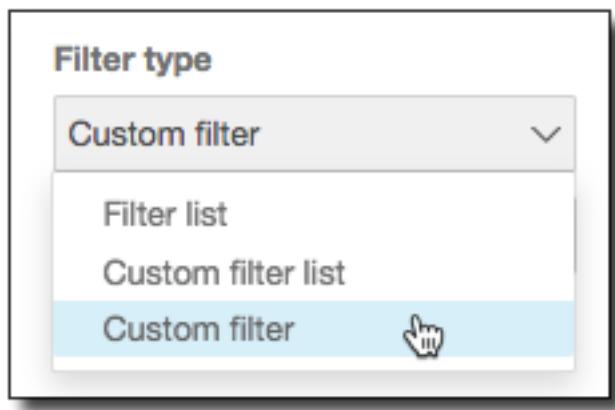
9. Choose **Apply**.

Using a Custom Filter to Specify a Single Value or Parameter

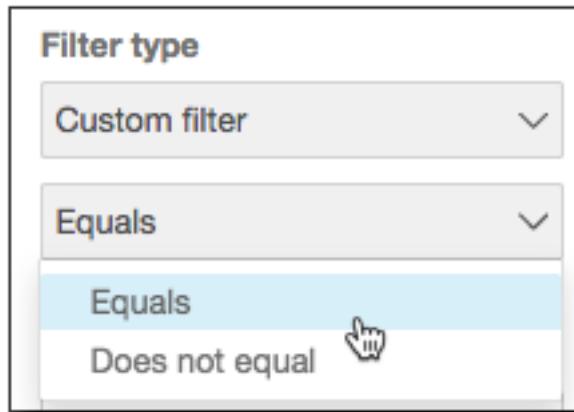
With the **Custom filter** filter type, you specify a single value that the field value must equal or not equal. If you choose an equal comparison, the specified value and actual field value must match exactly for the filter to be applied to a given record. You can also choose how to handle null values in the filtered field. You can choose to include or exclude nulls, or show only rows containing nulls. Alternatively, you can use a parameter with a custom filter.

Use the following procedure to create a text field filter by specifying one field value or parameter.

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the new filter icon, and then choose a text field to filter on.
3. Choose the new filter to expand it.
4. Choose **Custom filter** for the filter type.

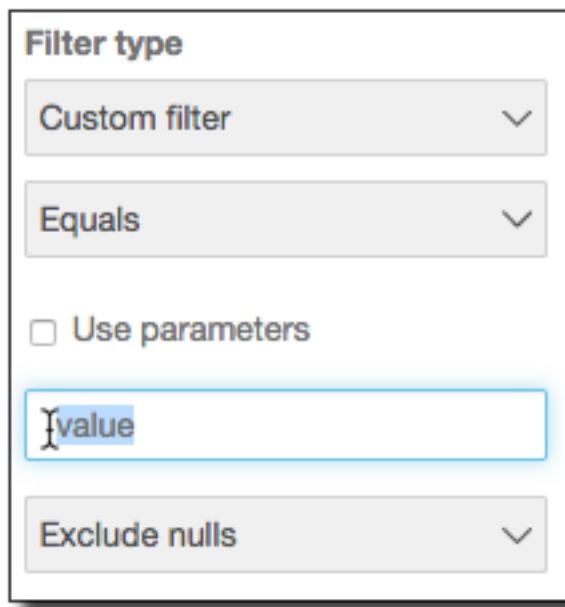


5. Choose a comparison type.

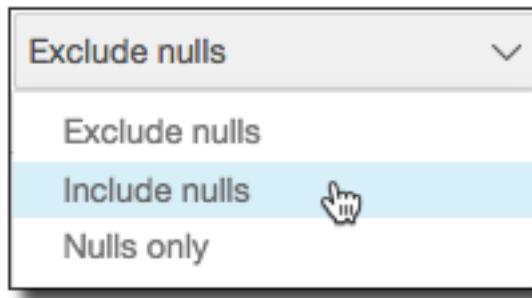


6. Choose one of the following.

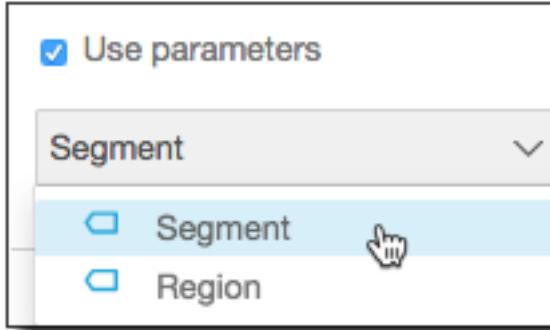
- To use a literal value, type a field value in the **value** field.



Then choose how to handle null values in the filtered field. You can choose to include or exclude the values you listed. Alternatively, you can choose to show nulls only.



- To use an existing parameter, enable **Use parameters**, then choose your parameter from the list.



You must create your parameters first for them to appear in this list. Usually, you create a parameter, add a control for it, and then add a filter for it. For more information, see [Parameters](#)

in Amazon QuickSight (p. 231). The values display alphabetically in the control, unless there are more than 10,000 distinct values. Then the control displays a search box instead. Each time you search for the value you want to use, it initiates a new query. If the results contain more than 10,000 values, you can scroll through the values with pagination.

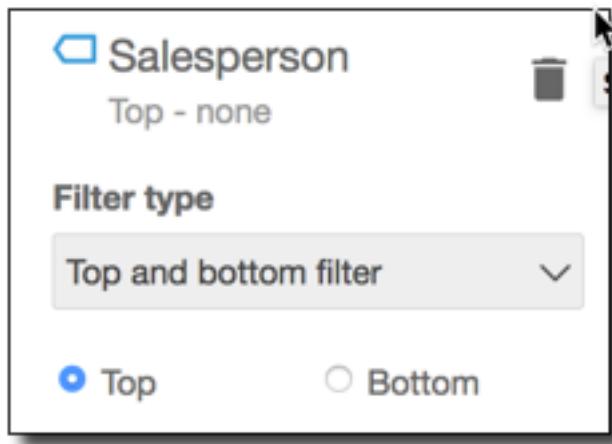
7. Choose **Apply**.

Using a Top and Bottom Text Filter

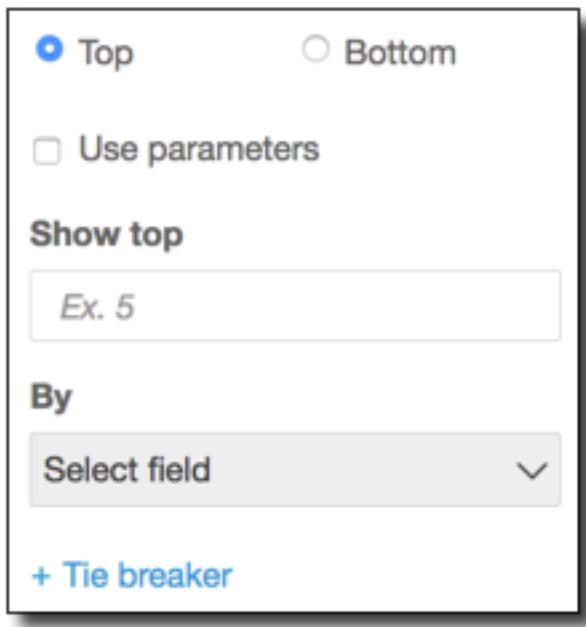
You can use a **Top and bottom filter** to show the top or bottom n value of one field ranked by the values in another field. For example, you might show the top 5 sales people based on revenue. You can also use a parameter to allow dashboard users to dynamically choose how many top or bottom ranking values to show.

Use the following procedure to create a top and bottom text filter.

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the new filter icon, and then choose a text field to filter on.
3. Choose the new filter to expand it.
4. Choose **Top and bottom** for the filter type.



5. Choose **Top** or **Bottom**.
6. For **Show top** (or **Show bottom**), do one of the following:
 - Enter the number of top or bottom items to show.



- To use a parameter for the number of top or bottom items to show, enable **Use parameters**. Then choose an existing integer parameter.

For example, let's say you want to show the top 3 salespersons by default, but you want the dashboard viewer to be able to choose whether to show between 1 and 10 top salespersons. In this case, take the following actions:

- Create an integer parameter with a default value.
 - To link the number of displayed items to a parameter control, create a control for the integer parameter. Then you make the control a slider with a step size of 1, a minimum value of 1, and a maximum value of 10.
 - To make the control work, link it to a filter by creating a top and bottom filter on **Salesperson** by **Weighted Revenue**, enable **Use parameters**, and choose your integer parameter.
7. For **By**, choose a field to base the ranking on. If you want to show the top 5 sales people per revenue, choose the revenue field. You can also set the aggregate that you want to perform on the field.
 8. (Optional) Add one or more aggregations as tie breakers, in case there are more than 5 results returned for the top 5 sales people per revenue. This situation can happen if multiple salespeople have the same revenue amount.

To create a tie breaker, choose **+Tie breaker**, and then choose another field. To remove a tie breaker, use the delete icon.

9. Choose **Apply**.

Adding a Numeric Filter

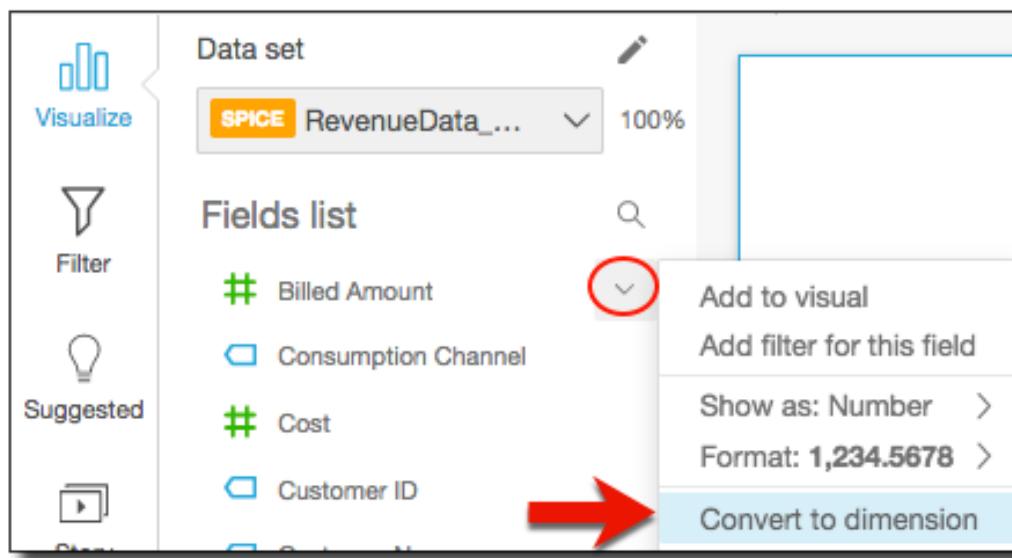
Fields with decimal or int data types are considered numeric fields. You create filters on numeric fields by specifying a comparison type, for example **Greater than** or **Between**, and a comparison value or values as appropriate to the comparison type. Comparison values must be positive integers and should not contain commas.

You can use the following comparison types in numeric filters:

- Equals
- Does not equal
- Greater than
- Less than
- Greater than or equal to
- Less than or equal to
- Between

Note

To use a top and bottom filter for numeric data, first change the field from a measure to a dimension. Doing this converts the data to text. Then you can use a text filter. For more information, see [Adding a Text Filter \(p. 305\)](#).



For data sets based on database queries, you can also optionally apply an aggregate function to the comparison value or values, for example **Sum** or **Average**.

You can use the following aggregate functions in numeric filters:

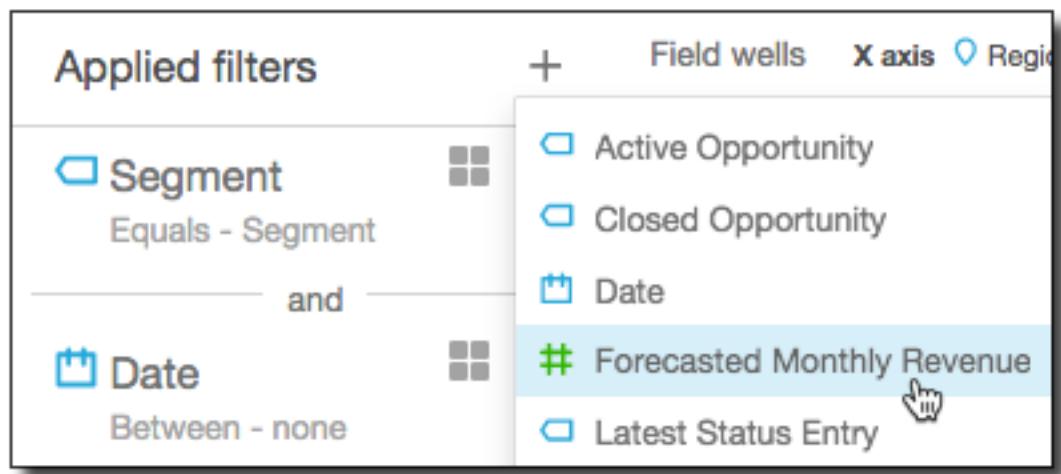
- Average
- Count
- Max
- Min
- Sum

Creating a Numeric Filter

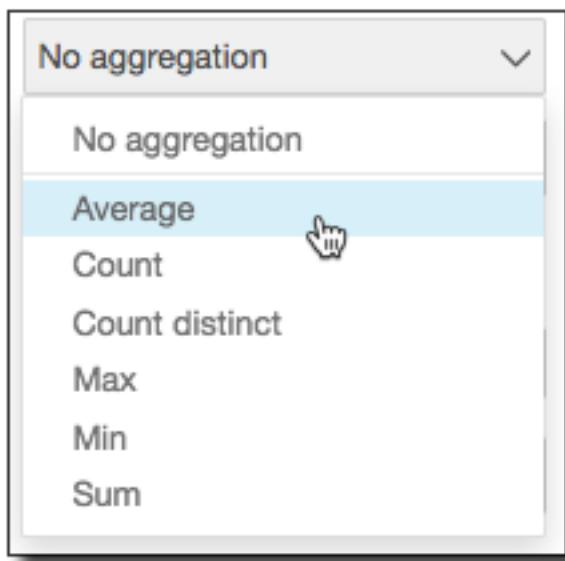
Use the following procedure to create a numeric field filter.

1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the new filter icon, and then choose a numeric field to filter on.

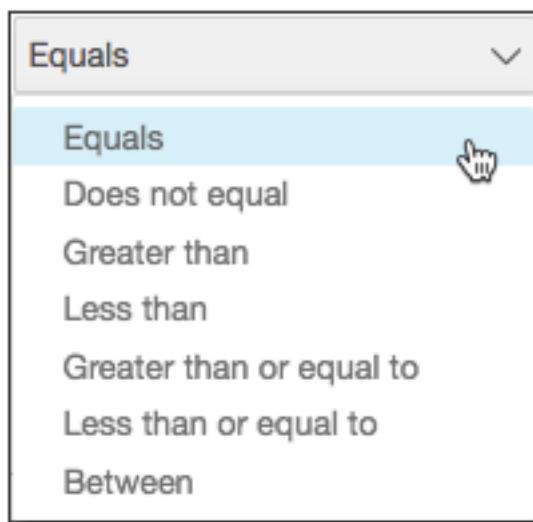
This creates a new filter with no criteria.



3. Choose the new filter to expand it.
4. If you want to aggregate, choose the aggregation type.



5. Choose a comparison type.



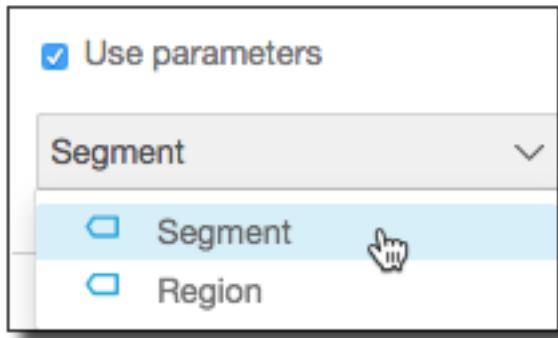
6. Choose one of the following:

- To use literal values, enter the comparison value or values. If you chose a comparison type other than **Between**, enter one comparison value. If you chose a comparison type of **Between**, enter the beginning of the value range in **Minimum value** and the end of the value range in **Maximum value**.

A screenshot of a filter configuration interface. It includes the following fields:

- 'No aggregation' dropdown
- 'Equals' dropdown (selected)
- 'Use parameters' checkbox (unchecked)
- A text input field containing the value '1000', which is circled in red.
- 'Include nulls' dropdown

- To use an existing parameter, enable **Use parameters**, then choose your parameter from the list.



You must create your parameters first before they can appear in this list. Usually, you create a parameter, add a control for it, and then add a filter for it. For more information, see [Parameters in Amazon QuickSight \(p. 231\)](#). The values display alphabetically in the control, unless there are more than 10,000 distinct values. Then the control displays a search box instead. Each time you search for the value you want to use, it initiates a new query. If the results contain more than 10,000 values, you can scroll through the values with pagination.

7. Choose **Apply**.

Adding a Date Filter

You create filters on date fields by selecting the filter conditions and date values that you want to use. There are two filter types for dates:

- **Range** – A series of dates based on a time range and comparison type. You can filter records based on whether the date field value is before or after a specified date, or within a date range. You enter date values in the format MM/DD/YYYY. You can use the following comparison types:
 - **Between** – Between a start date and an end date
 - **After** – After a specified date
 - **Before** – Before a specified date
 - **Equals** – On a specified date
- **Relative** – A series of date/time elements based on the current date. You can filter records based on the current date and your selected unit of measure (UOM). Date filter units include years, quarters, months, weeks, days, hours, and minutes. You can use the following comparison types:
 - **Previous** – The previous UOM—for example, the previous year.
 - **This** – This UOM, which includes all dates and times that fall within the select UOM, even if they occur in the future.
 - **To date or up to now** – UOM to date, or UOM up to now. The displayed phrase adapts to the UOM you choose. However, in all cases this option filters out data that is not between the beginning of the current UOM and the current moment.
 - **Last n** – The last specified number of the given UOM, which includes all of this UOM and all of the last $n - 1$ UOM. For example, let's say today is May 10, 2017. You choose to use *years* as your UOM, and set Last *n* years to 3. The filtered data includes data for all of 2017, plus all of 2016, and all of 2015. If you have any data for the future dates of the current year (2017 in this example), these records are included in your data set.
 - **Top and bottom** – A number of date entries ranked by another field. You can show the top or bottom *n* for the type of date or time UOM you choose, based on values in another field. For example, you can choose to show the top 5 sales days based on revenue.

Comparisons are applied inclusive to the date specified. For example, if you apply the filter <date> Before 1/1/16, the records returned include all rows with date values through 1/1/16 23:59:59.

You can also choose to include or exclude nulls, or exclusively show rows that contain nulls in this field. If you pass in a null date parameter (one without a default value), it doesn't filter the data until you provide a value.

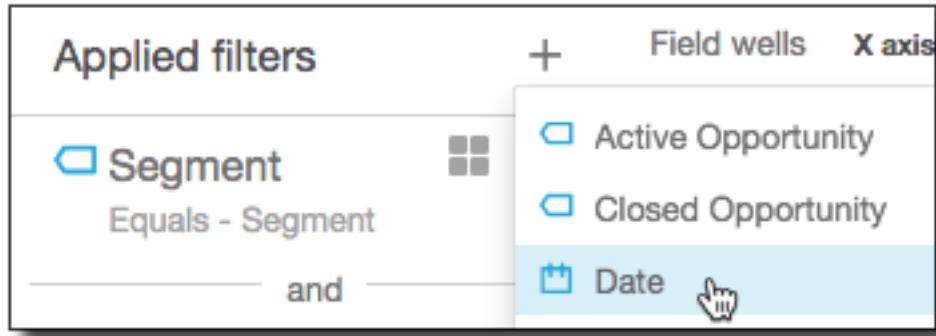
Note

If a column or attribute has no time zone information, then the client query engine sets the default interpretation of that datetime data. For example, suppose that a column contains a timestamp, rather than a timestamptz, and you are in a different time zone than the data's origin. In this case, the engine can render the timestamp differently than you expect. Amazon QuickSight and SPICE (p. 2) both use Universal Coordinated Time (UTC) times.

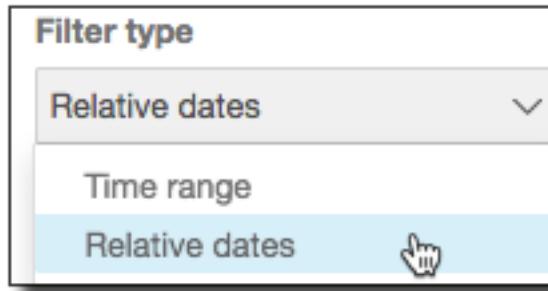
Creating a Date Filter

Use the following procedure to create a filter for a date field.

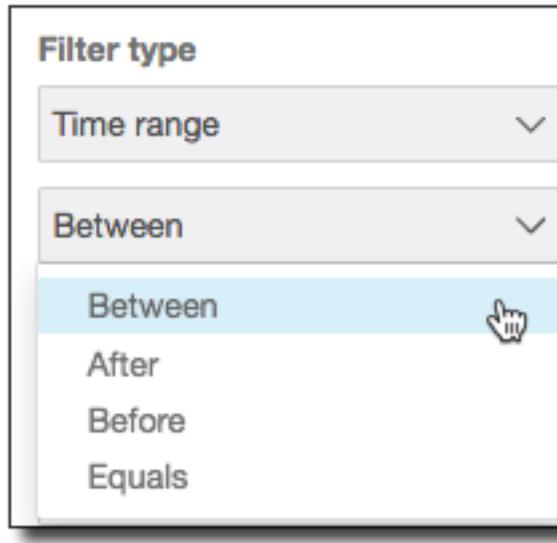
1. Choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose **Create one**, and then choose a date field to filter on.



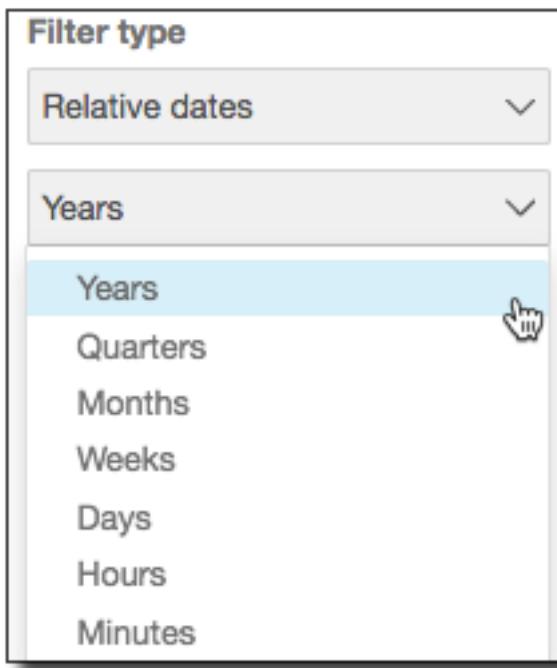
3. Choose the new filter to expand it.
4. Choose a filter type.



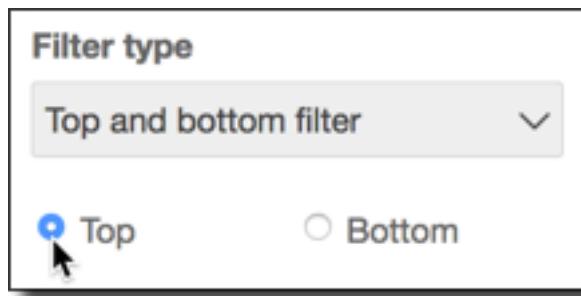
5. Choose one of the following:
 - If you are creating a time range filter, choose a comparison type.



- If you are creating a relative date filter, choose a unit of measure (UOM).



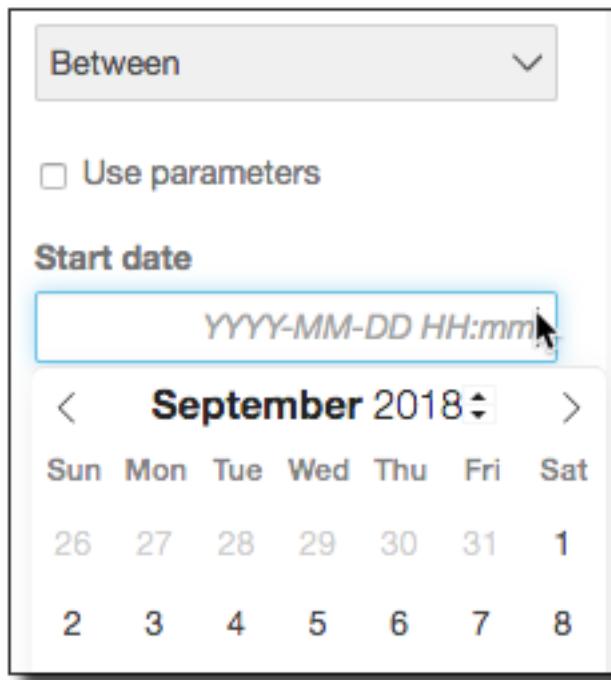
- If you are creating a top and bottom filter, choose Top or Bottom.



6. Choose one of the following:

- **Time Range:** If you are filtering on a time range, enter date values.

To use **Between** as a comparison, enter a start and end date, or choose the **Start date** or **End date** field to bring up the date picker control and choose dates.



You can choose if you want to include either or both the start and end dates in the range.

Start date

2018-09-01 00:00

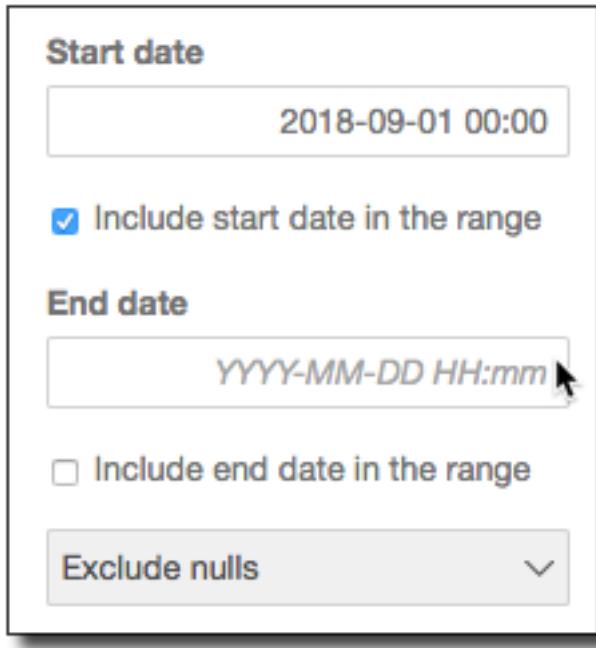
Include start date in the range

End date

YYYY-MM-DD HH:mm 

Include end date in the range

Exclude nulls 



To use **Before**, **After**, or **Equals** comparisons, enter a date or choose the date field to bring up the date picker control and choose a date instead.

After 

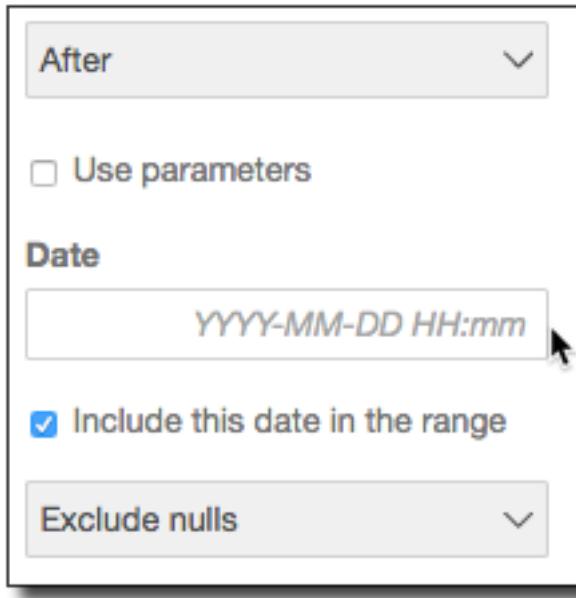
Use parameters

Date

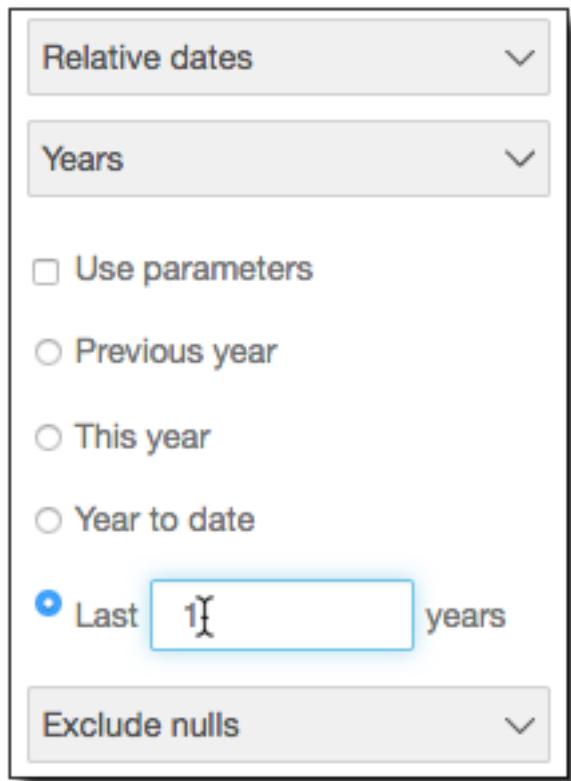
YYYY-MM-DD HH:mm 

Include this date in the range

Exclude nulls 

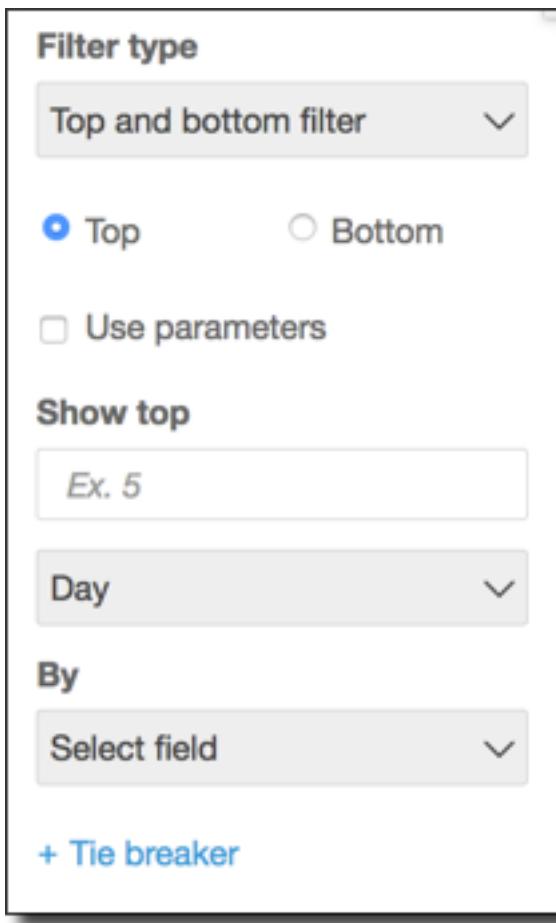


- **Relative Dates:** If you are filtering on relative dates, choose a unit of measure (UOM). If you choose **Last n UOM**, specify a number for your range—for example, last 3 years, or last 2 hours.



- **Top and bottom:** If you are filtering for top or bottom:

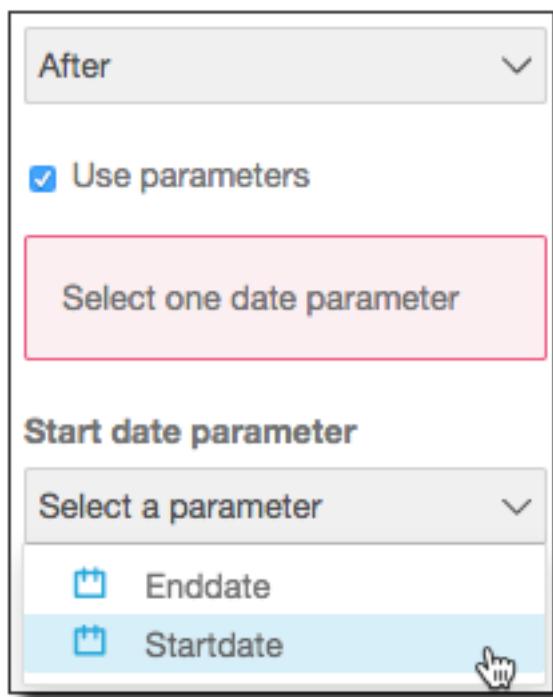
For **Show top** (or **Show bottom**), enter the number of top or bottom items you want to show, and choose a unit of time.



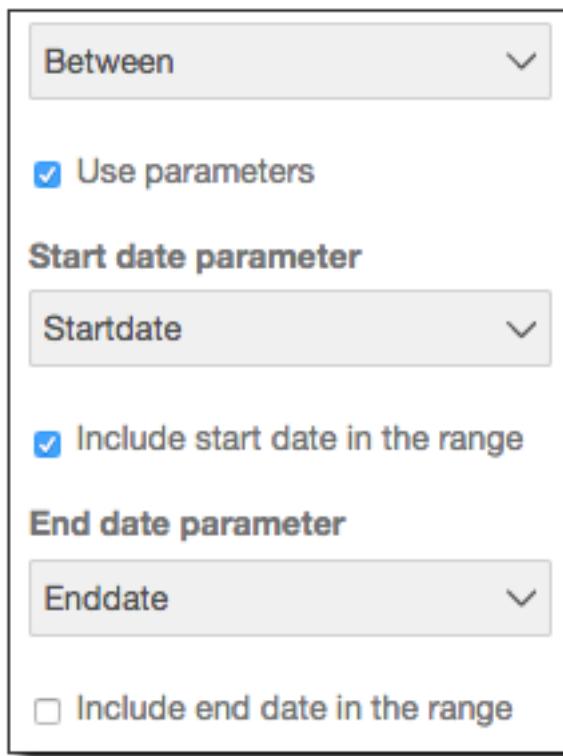
For **By**, choose a field to base the ranking on.

Optionally, you can add another field as a tie breaker, if the field for **By** has duplicates. Choose **+Tie breaker**, and choose another field. To remove a tie breaker, use the delete icon.

7. (Optional) If you are filtering by using an existing parameter, instead of specific dates, enable **Use parameters**, then choose your parameter or parameters from the list. To use **Before**, **After**, or **Equals** comparisons, choose one date parameter. You have the option to include this date in the range.



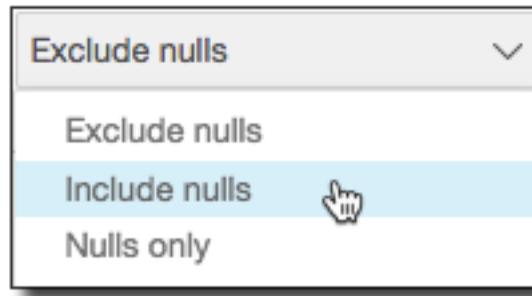
To use **Between**, enter both the start date and end date parameters separately. You can include the start date, the end date, or both in the range.



To use a parameter for **Top and bottom**, choose an integer parameter for the number of top or bottom items to show.

You must create your parameters first, before you can use them in a filter. Usually, you create a parameter, add a control for it, and then add a filter for it. For more information, see [Parameters in Amazon QuickSight \(p. 231\)](#).

8. (Optional) If you are not using parameters, at the bottom of the filter view, choose how to handle null values in the filtered field. You can choose to include or exclude the values you listed. Alternatively, you can choose to show nulls only. The options for how to handle nulls don't appear for top and bottom filters.



9. Choose **Apply**.

Adding a Compound Filter with And/Or Operators

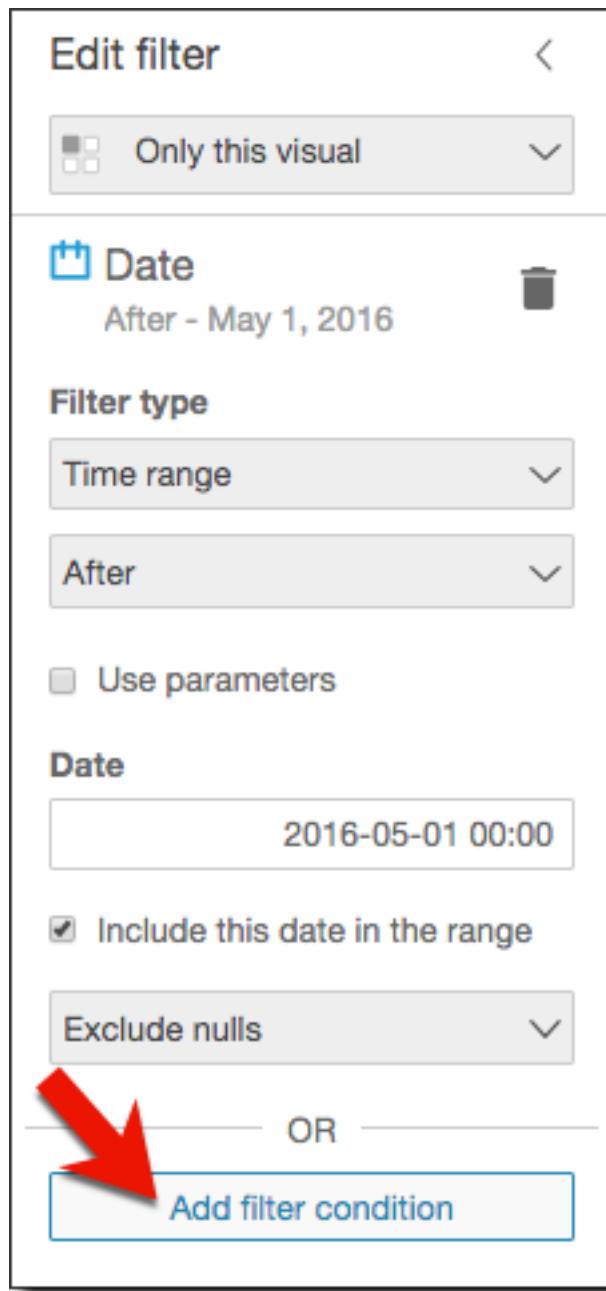
When you add multiple filters to a visual, Amazon QuickSight uses the AND operator to combine them.

To add multiple filters using the OR operator, you must create a filter group. This lets you combine multiple conditions in a single filter with the OR operator. You can think of this as grouping filters in parentheses. Filter grouping is available for all types of filters.

When you filter on multiple measures (green fields marked with #), you can apply the filter conditions to an aggregate of that field. Filters in a group can contain either aggregated or non-aggregated fields, but not both.

To create a filter group, follow these steps.

1. Edit or create a filter.
2. Scroll to the bottom of the filter, where there is a dividing line labeled **OR**. Choose **Add filter condition**.



3. A new blank filter appears below the first one. Choose the next field and the conditions to filter on.
4. (Optional) You can add additional filter conditions to the filter group.
5. (Optional) To remove a filter from the filter group, choose trashcan icon near the field name.
6. When you are finished, choose **Apply**.

Editing a Filter

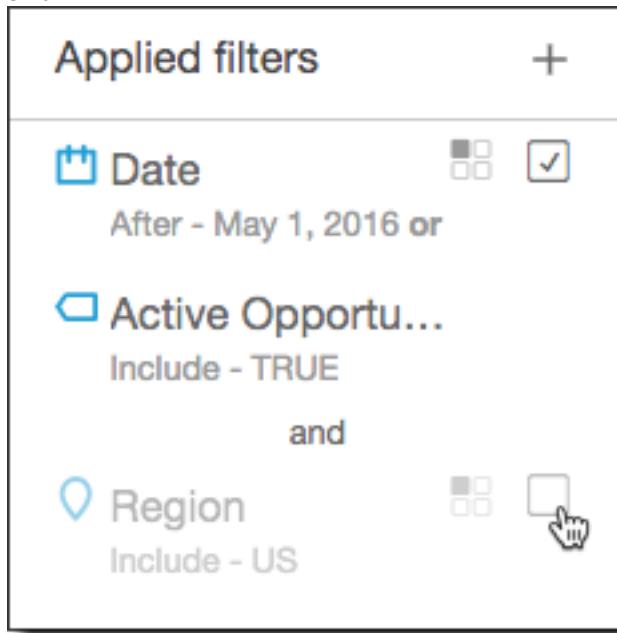
You can edit a filter by enabling or disabling the filter or changing the filter criteria. You can also edit a filter by changing the filter scope to include or exclude other visuals in the analysis that use the same data set.

You can't change the field a filter applies to. To apply a filter to a different field, create a new filter instead.

Enabling or Disabling a Filter

You can use the filter menu to enable or disable a filter. When you create a filter, it is enabled by default.

1. On the analysis page, choose **Filter** on the tool bar.
2. On the **Applied filters** pane, use the check box to enable or disable the filter. A disabled filter is grayed out.



Changing Filter Criteria

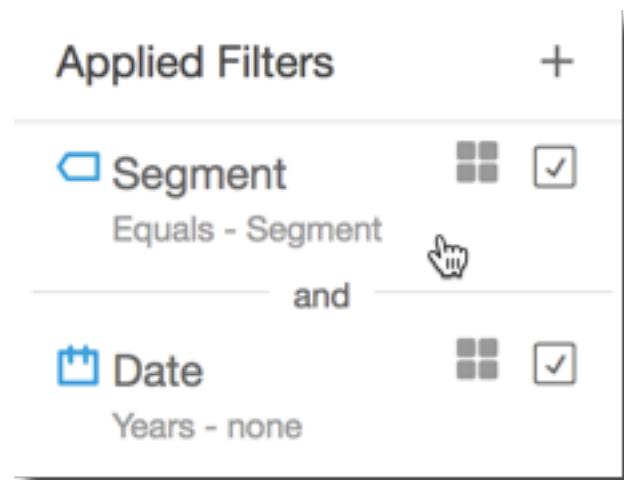
Use the following procedure to modify a filter.

1. On the analysis page, choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the filter that you want to modify. Doing this displays the filter details.
3. Change the settings that you want to modify.
4. Choose **Apply**.

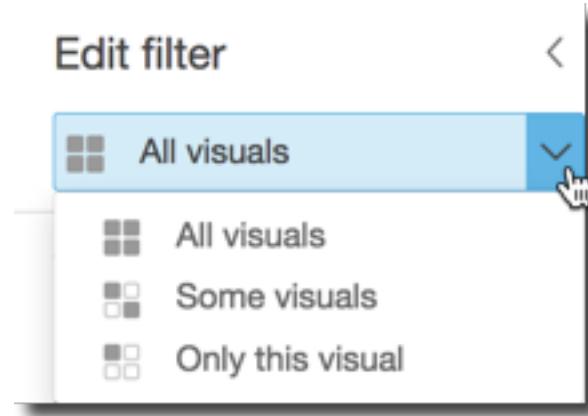
Changing Filter Scope

You can use the filter menu to set the scope of a filter to one, several, or all visuals in the analysis that use the data set that filter is based on. By default, a filter applies only to the visual that was selected when the filter was created.

1. On the analysis page, choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the selector to the right of the filter name.



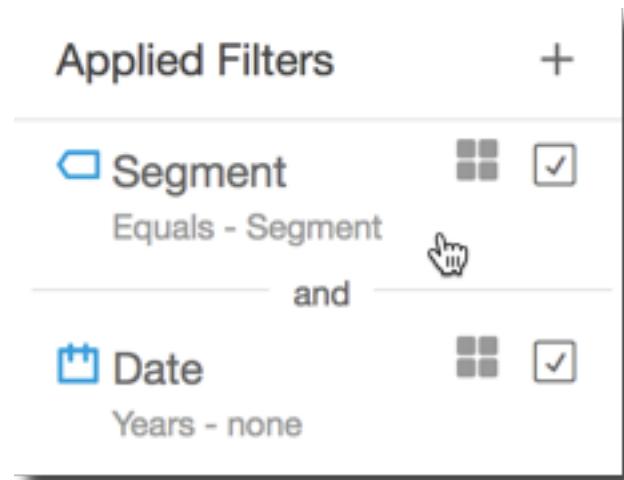
3. On the filter menu, choose **All visuals**, **Some visuals** or **Only this visual**.



Deleting a Filter

Use the following procedures to delete a filter.

1. On the analysis page, choose **Filter** on the tool bar.
2. On the **Applied filters** pane, choose the filter that you want to delete.



3. Choose one of the following:
 - To delete a filter, choose **Delete filter**.
 - To delete all filters from a filter group, choose **Delete all**.
 - To delete one filter from a filter group, scroll to the filter that you want to delete. Then choose the delete icon near the appropriate field name. Doing this removes a single filter condition.

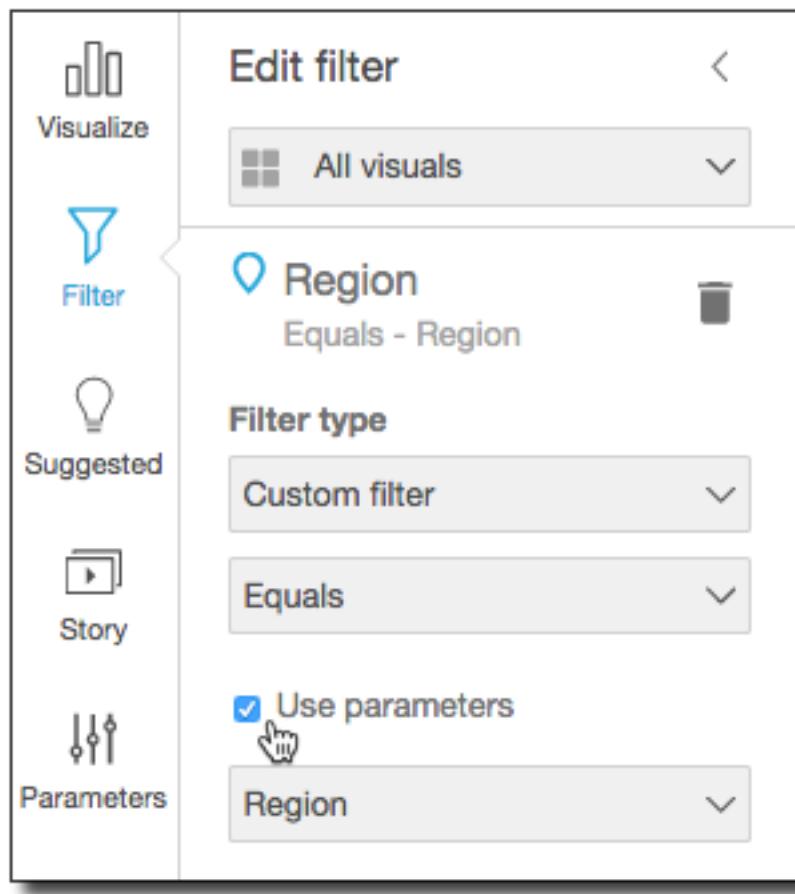
Parameterize a Filter

To use an existing parameter in a filter on your analysis, you select **Use parameters**, and choose the parameter or parameters that you want to use. If you are filtering a text field (string), you need to choose a filter for **Custom filter**.

Before you can add a parameter to a filter, the parameter must exist already. If you want to filter on date parameters, create one each for start and end dates. If you want to filter on relative dates, create an integer parameter first. If you need to create a parameter, use the **Parameters** pane at left. For more information, see [Parameters in Amazon QuickSight \(p. 231\)](#).

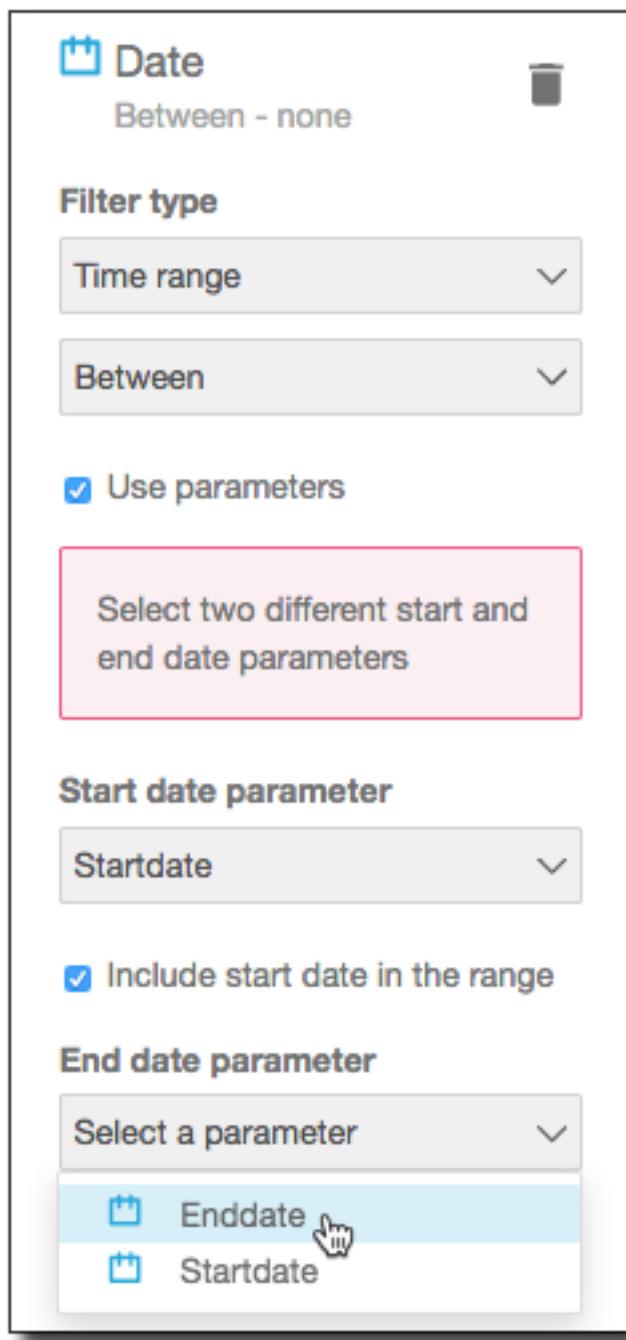
Use the following procedure to use a parameter with a new or existing filter.

1. Choose the visual that you want to work with, and then choose the **Filter** pane on the left side of the screen.
2. Choose the filter that you want work with, so that you see the options that belong to that filter.



3. Choose one of the following:

- For a text field (string), choose **Custom filter**. The **Use parameters** option appears after you choose **Custom filter**.
- For a time range, choose **Time range** and **Use parameters**. If you want to filter for data between two dates, use the lists to choose your start and end date parameters. Alternatively, you can choose to filter for a date that is before, after, or equal to a single date parameter.
- For relative dates, choose **Relative dates** and **Use parameters**. Then use the list to choose your integer parameter.



4. Choose **Apply** to save your changes.

Adding Drill-Downs to Visual Data in Amazon QuickSight

All visual types except pivot tables offer the ability to create a hierarchy of fields for a visual element. The hierarchy lets you drill down to see data at different levels of the hierarchy. For example, you could associate the country, state, and city fields with the X axis on a bar chart. Then, you could drill down or up to see data at each of those levels. As you drill down each level, the data displayed is refined by the value in the field you drill down on. For example, if you drill down on the state of California, you see data on all of the cities in California.

The field wells you can use to create drill-downs varies by visual type. Refer to the topic on each visual type to learn more about its drill-down support.

Drill-down functionality is added automatically for dates when you associate a date field with the drill-down field well of a visual. In this case, you can always drill up and down through the levels of date granularity. Drill-down functionality is also added automatically for geospatial groupings, after you define these in the data set.

Use the following table to identify the field wells/on-visual editors that support drill-down for each visual type.

| Visual type | Field well or on-visual editor |
|-----------------------------|------------------------------------|
| Bar charts (all Horizontal) | Y axis and Group/Color |
| Bar charts (all Vertical) | X axis and Group/Color |
| Combo charts (all) | X axis and Group/Color |
| Geospatial charts | Geospatial and Color |
| Heat map | Rows and Columns |
| KPIs | Trend Group |
| Line charts (all) | X axis and Color |
| Pie chart | Group/Color |
| Pivot table | Drill-down not supported |
| Scatter plot | Group/Color |
| Tabular Reports | Drill-down not supported |
| Tree map | Group by |

Adding a Drill-Down

Use the following procedure to add drill-down levels to a visual.

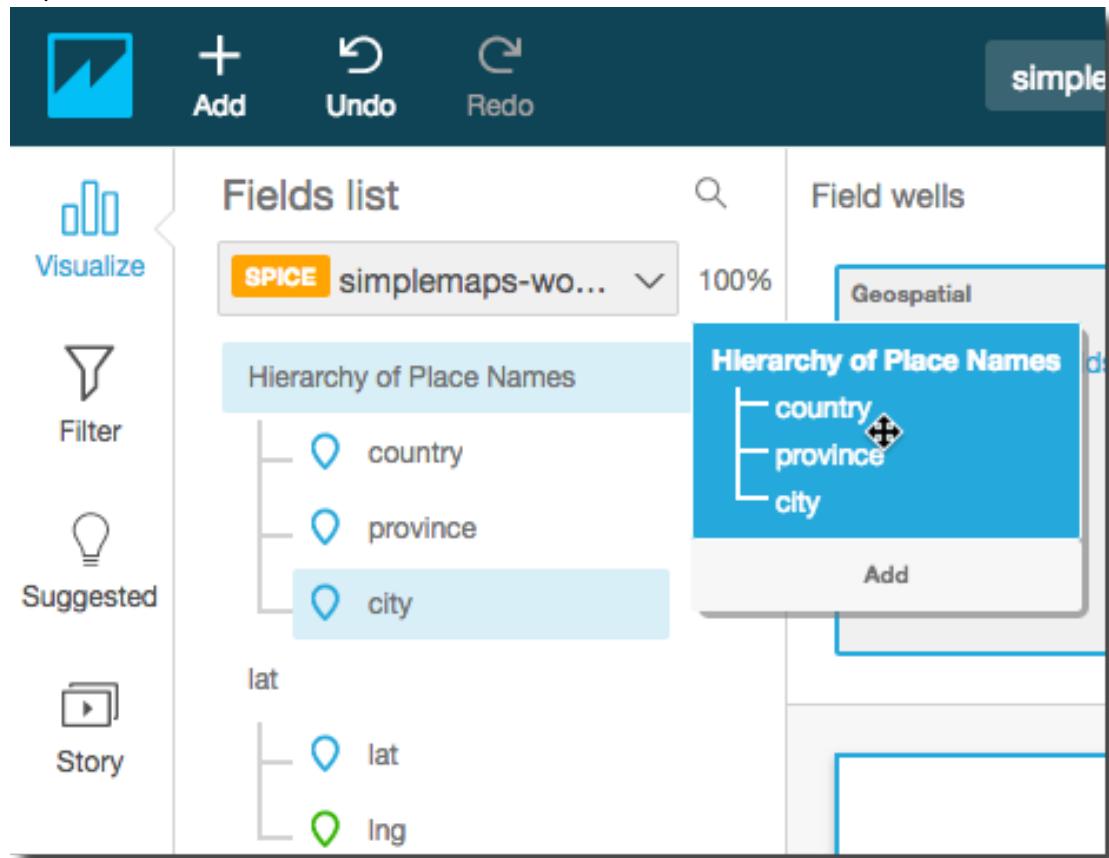
1. On the analysis page, choose the visual that you want to add drill-downs to.

Note

You can't add drill-downs to pivot tables.

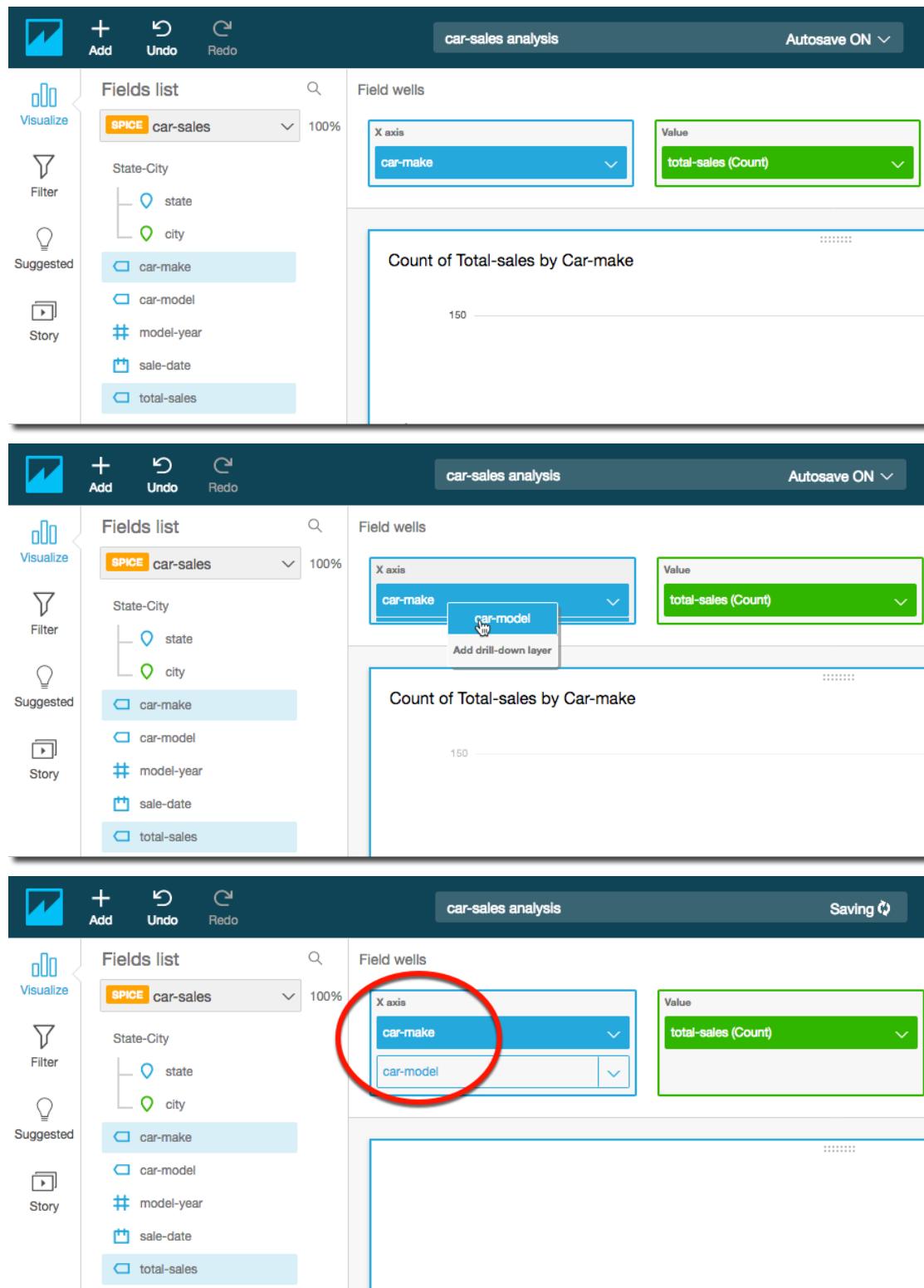
2. Expand the **Field wells** pane.

3. If your data set has a defined hierarchy, for example for geospatial or coordinate data, you can drag the entire hierarchy into the field well as one. In this case, you don't need to follow the remaining steps.

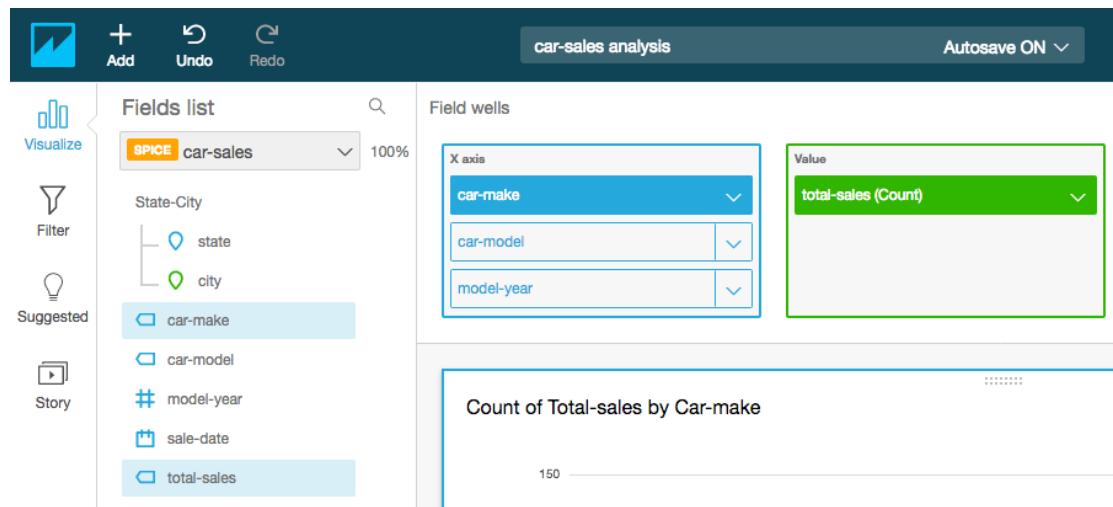


If you don't have a predefined hierarchy, you can create one in your analysis, as described in the remaining steps.

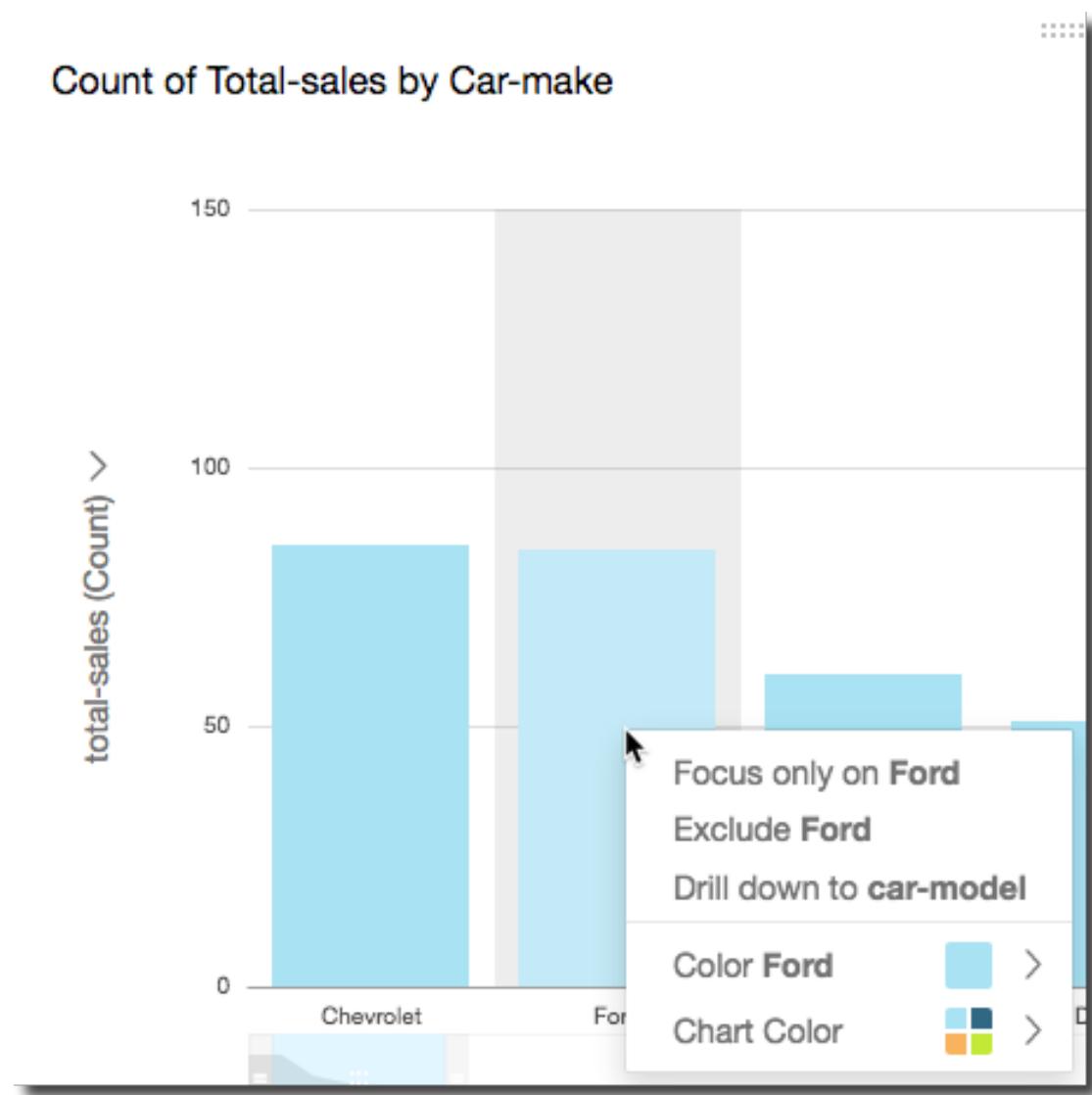
4. Drag a field that you want to use in the drill-down hierarchy to an appropriate field well, depending on the visual type. Make sure that the label for the dragged field says **Add drill-down layer**. Position the dragged field above or below the existing field based on where you want it to be in the hierarchy you're creating.



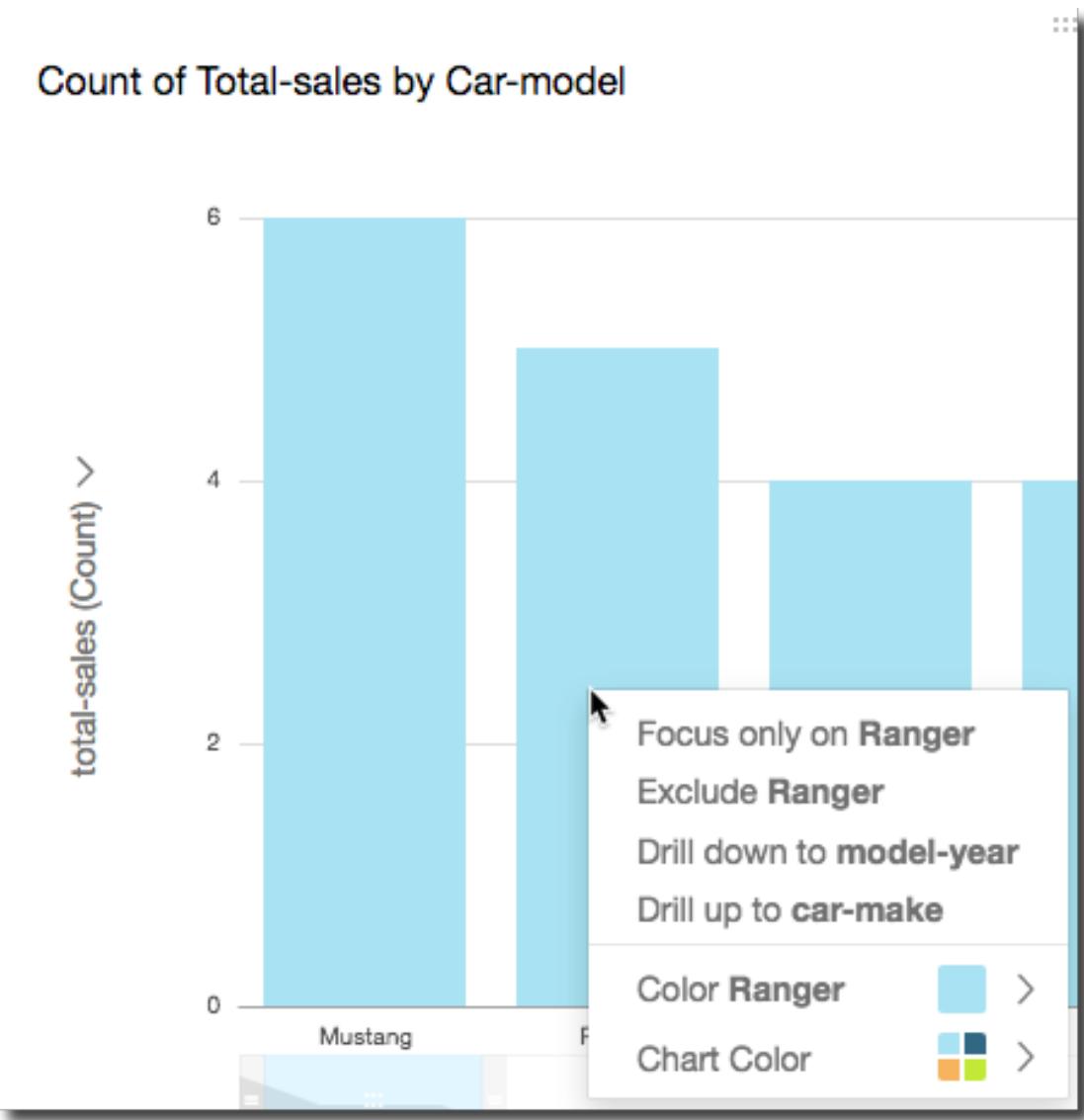
5. Continue until you have added all of the levels of hierarchy that you want. To remove a field from the hierarchy, choose the field, and then choose **Remove**.



6. To drill down or up to see data at a different level of the hierarchy, choose an element on the visual (like a line or bar), and then choose **Drill down to <lower level>** or **Drill up to <higher level>**. In this example, from the car-make level you can drill down to car-model to see data at that level. If you drill down to car-model from the **Ford** car-make, you see only car-models in that car-make.



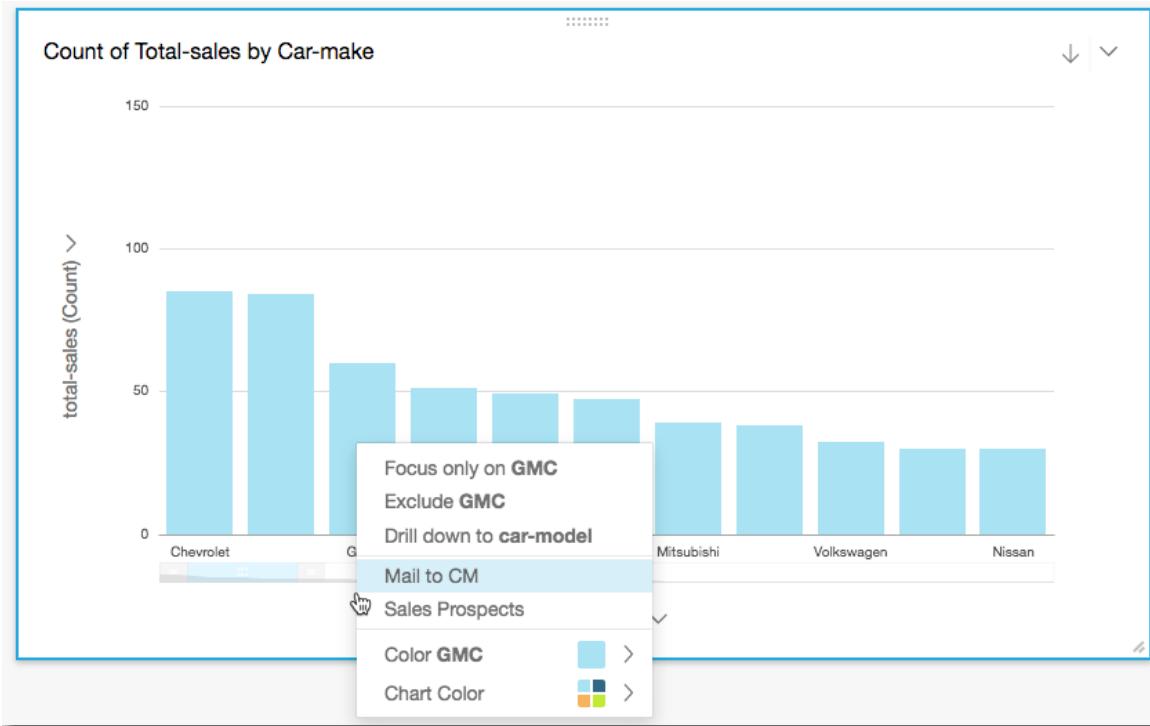
After you drill down to the car-model level, you can then drill down further to see make-year data, or go back up to car-make. If you drill down to make-year from the bar representing **Ranger**, you see only years for that model of car.



Adding Custom URL Actions to Visuals in Amazon QuickSight

You can use URL schemes to perform an action, based on a URL, from within your dashboard. In some cases, you might want to create a link to another URL from your visual, or you might want to create an email directly from a visual. Users viewing the dashboard can use a URL action to send data points to other URLs (dashboards, analyses, and websites) by using the data point context menu.

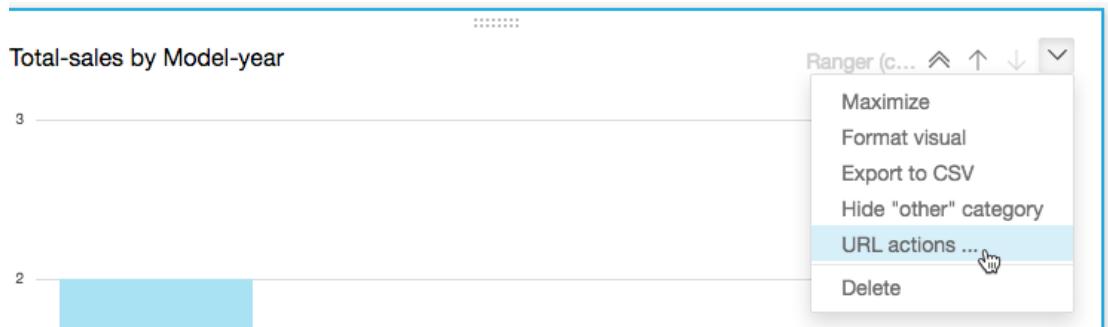
To use an existing URL action, choose a data point on a visual. When you hover over the data point, a notification appears regarding that data point. To get the URL action menu, choose the data point to bring up the context menu. You can find URL actions listed in the middle of the context menu, just above **Color** options.



You can create URL actions on any visual type. URL actions can be deep links into another application, but only if each can be accessed by a valid URL in the URL scheme `https`, `http`, or `mailto`. You can create a maximum of 100 URL actions per visual.

Create or edit a URL action by using the following procedure.

1. Open a visual. Choose the v-shaped at the top right of the visual to display the on-visual menu. Choose **URL actions**.

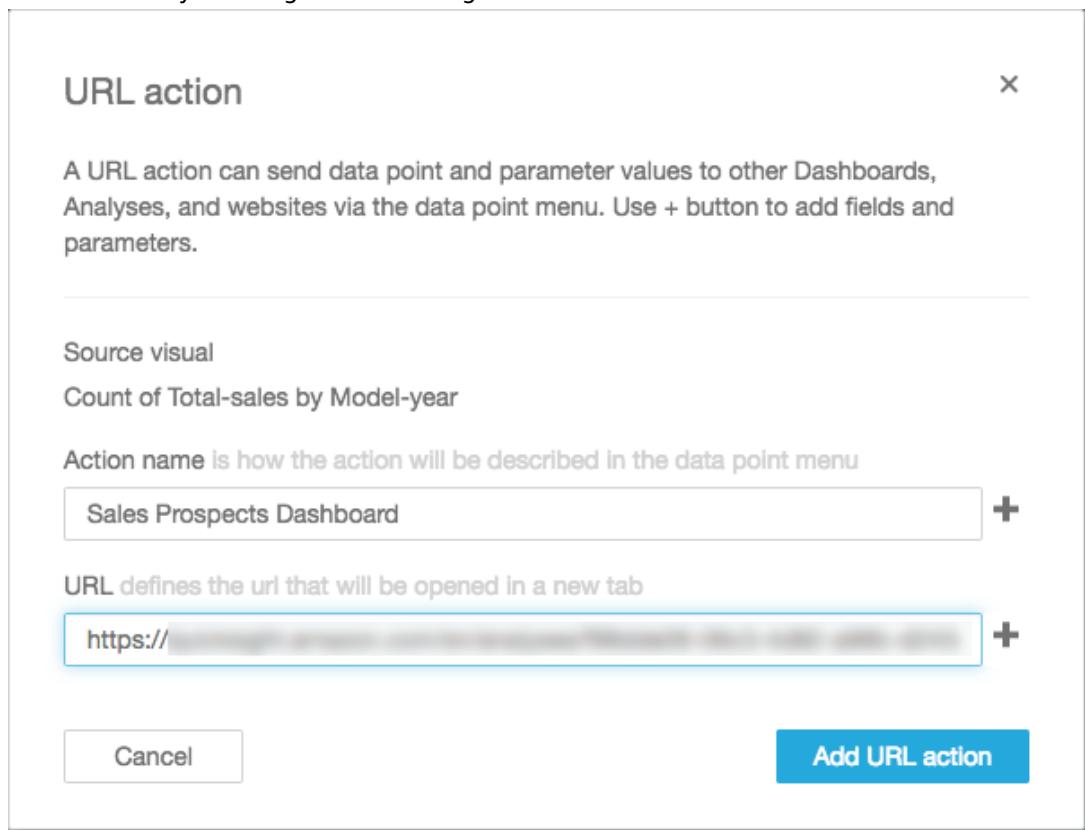


If this is the first action for this visual, the **URL action** screen opens. If one or more actions already exist, the **URL actions for this visual** screen appears, which lists all existing actions.

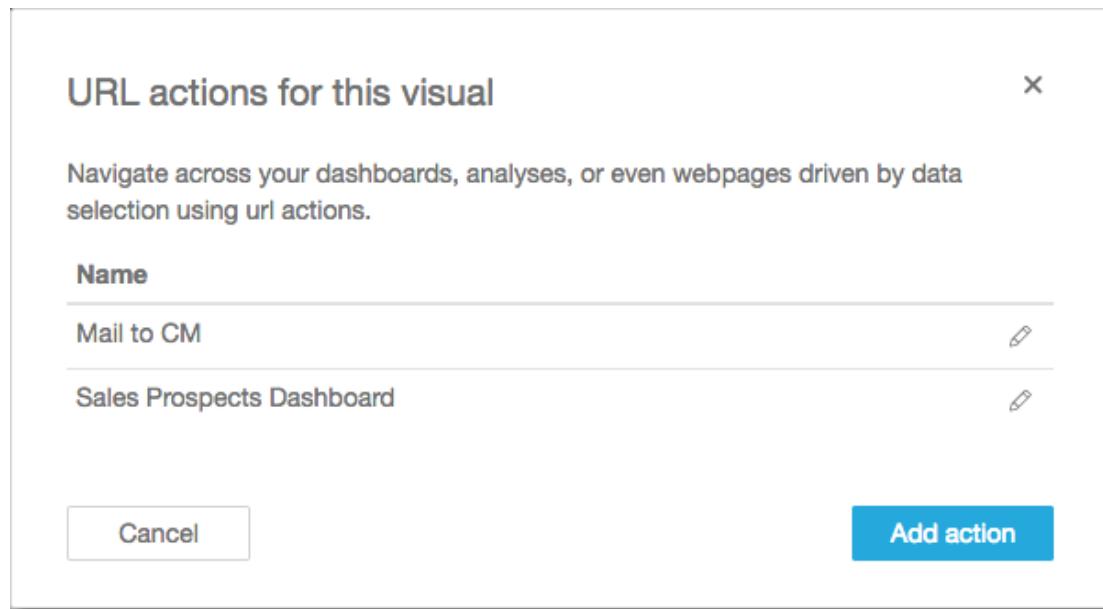
2. Do the following to name and define a URL for your URL action:

- For **Action name**, type a custom name for your URL action. This name appears in the context menu when you choose a data point in the visual.
 - Define the URL that you want to open as part of the URL action. The URL must be part of one of the following schemes:
 - https://
 - http://

- mailto:
- You can also parameterize the URL to include dynamic values. The parameters on both the sending and the receiving end should match in name and data type. To use a parameter in a custom URL action, use the name of the parameter prefixed with a \$ and enclosed in angle brackets <>, for example <\$parameterName>. Select a value or a parameter from the current visual by choosing the + on the right.



3. Choose **Add URL action** to save your changes.
4. Edit the action name and URL by choosing the pencil icon near the name of the URL action. Or, add a new URL action by choosing **Add URL action**.



5. After you finish making changes, you can close the screen by choosing either **X** or **Cancel**.

For more information on using parameters, see [Parameters in Amazon QuickSight \(p. 231\)](#).

Working with Visual Types in Amazon QuickSight

Amazon QuickSight offers a range of visual types that you can use to display your data. Use the topics in this section to learn more about the capabilities of each visual type.

Topics

- [Measures and Dimensions in Visuals \(p. 343\)](#)
- [Display Limits in Visuals \(p. 343\)](#)
- [Using AutoGraph \(p. 346\)](#)
- [Using Bar Charts \(p. 346\)](#)
- [Using Combo Charts \(p. 351\)](#)
- [Using Geospatial Charts \(Maps\) \(p. 354\)](#)
- [Using Heat Maps \(p. 356\)](#)
- [Using KPIs \(p. 358\)](#)
- [Using Line Charts \(p. 359\)](#)
- [Using Pie Charts \(p. 363\)](#)
- [Using Pivot Tables \(p. 364\)](#)
- [Using Scatter Plots \(p. 391\)](#)
- [Using Tabular Reports \(p. 392\)](#)
- [Using Tree Maps \(p. 394\)](#)

Measures and Dimensions in Visuals

When we describe how to use the different visual types, we use the term *measure* to refer to numeric values that you use for measurement, comparison, and aggregation in visuals. A measure can be either a numeric field, like product cost, or a numeric aggregate on a field of any data type, like count of transaction IDs.

We use the term *dimension* to refer to text or date fields that can be items, like products, or attributes that are related to measures and can be used to partition them. Examples are sales date for sales figures or product manufacturer for customer satisfaction numbers. Amazon QuickSight automatically identifies a field as a measure or a dimension based on its data type.

Numeric fields can act as dimensions, for example ZIP codes and most ID numbers. It's helpful to give such fields a string data type during data preparation. This way, Amazon QuickSight understands that they are to be treated as dimensions and are not useful for performing mathematical calculations.

You can change whether a field is displayed as a dimension or measure on an analysis-by-analysis basis instead. For more information, see [Fields as Dimensions and Measures \(p. 254\)](#).

Display Limits in Visuals

All visual types limit the number of data points they display, so that the visual elements (like lines, bars, or bubbles) are still easy to view and analyze. The visual selects the first n number of rows for display up to the limit for that visual type. The selection is either according to sort order, if one has been applied, or in default order otherwise.

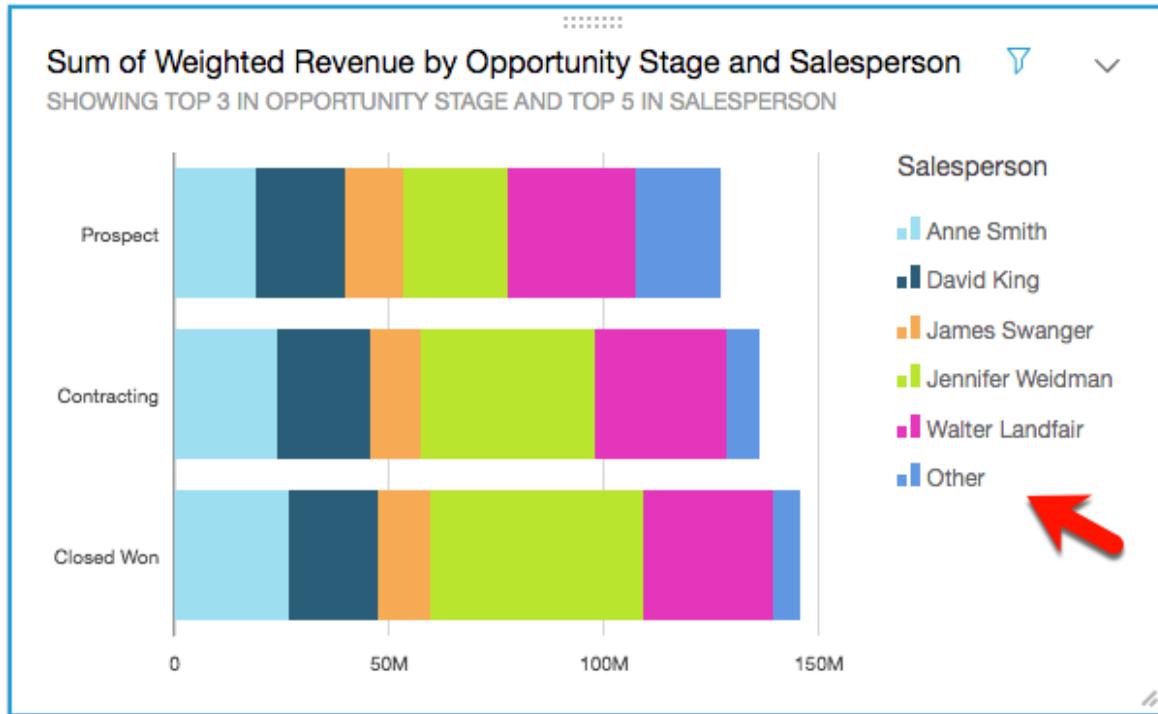
The number of data points supported varies by visual type. To learn more about display limits for a particular visual type, see the topic for that type.

The visual title identifies the number of data points displayed if you have reached the display limit for that visual type. If you have a large data set and want to avoid running into the visual display limit, use one or more filters to reduce the amount of data displayed. For more information about using filters with visuals, see [Filtering Visual Data in Amazon QuickSight \(p. 301\)](#).

Amazon QuickSight supports up to 20 data sets in a single analysis, and up to 20 visuals in a single analysis.

You can also choose to limit how many data points you want to display in your visual, before they are added to the **other** category. This category contains the aggregated data for all the data beyond the cutoff limit for the visual type you are using—either the one you impose, or the one based on display limits. You can use the on-visual menu to choose whether to display the **other** category. The **other** category doesn't show on scatter plots, heat maps, maps, tables (tabular reports), or KPIs. It also doesn't show on line charts when the X axis is a date. Drilling down into the **other** category is not supported.

The following image shows the **other** category on a bar chart.



The following image shows the **other** category on a pivot table.

Sum of Weighted Revenue by Salesperson and Opportunity...

| Salesperson | Opportunity Stage | Weighted Revenue |
|-------------|-------------------|------------------|
| Anne Smith | Closed Won | 26,768,347 |
| | Contracting | 24,283,888 |
| | Prospect | 18,952,686 |
| David King | Closed Won | 20,797,243 |
| | Contracting | 21,273,660 |
| Other | | 297,131,502 |

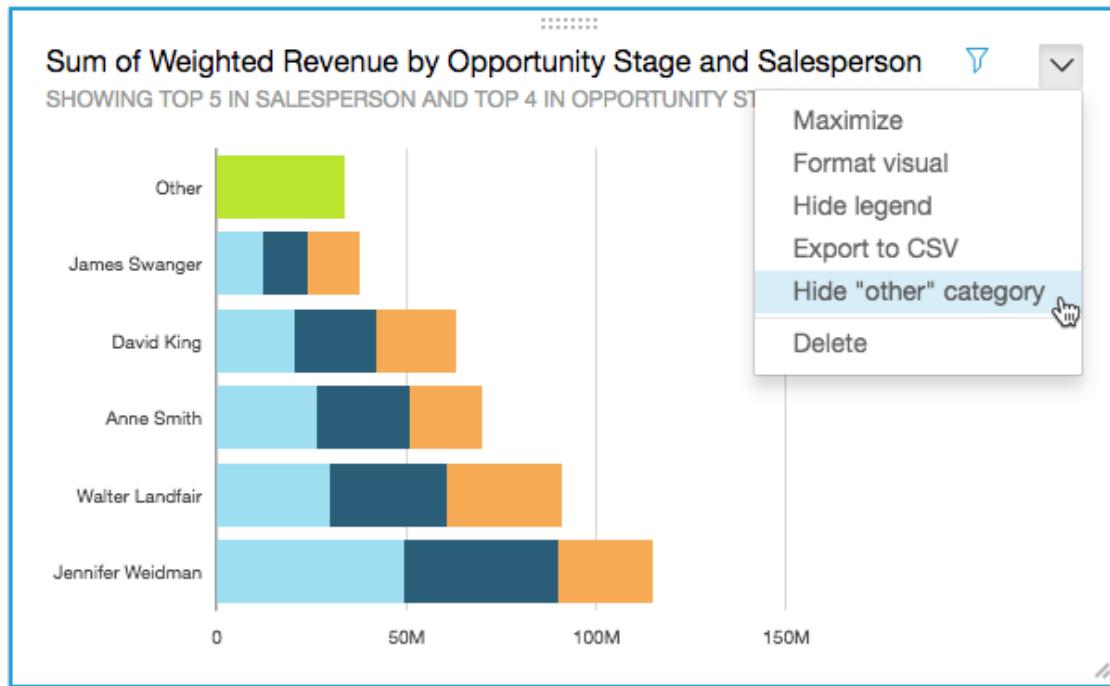
A red arrow points to the 'Other' row in the pivot table.

Hiding or Displaying the other Category

Use the following procedure to hide or display the **other** category.

1. On the analysis page, choose the visual that you want to modify.

- Choose the on-visual menu at the upper-right corner of the visual, and then choose **Hide "other" category** or **Show "other" category**, as appropriate.



Customizing the Number of Data Points to Display

You can choose the number of data points to display on the main axis of some visuals. After this number is displayed in the chart, any additional data points are included in the "other" category. For example, if you choose to include 10 data points out of 200, 10 display in the chart and 190 become part of the "other" category.

To find this setting, choose the v-shaped on-visual menu, then choose **Format visual**. You can use the following table to determine which field well contains the data point setting and what number of data points the visual type displays by default.

| Visual Type | Where to Find the Data Point Setting |
|-----------------------|--|
| Bar chart, horizontal | Y-axis – Number of data points displayed |
| Bar chart, vertical | X-axis – Number of data points displayed |
| Combo chart | X-axis – Number of data points displayed |
| Heat map | Rows – Number of rows displayed Columns – Number of columns displayed |
| Line chart | X-axis – Number of data points displayed |
| Pie chart | Group/Color – Number of slices displayed |
| Tree map | Group by – Number of squares displayed |

Topics

- [Using AutoGraph \(p. 346\)](#)
- [Using Bar Charts \(p. 346\)](#)
- [Using Combo Charts \(p. 351\)](#)
- [Using Geospatial Charts \(Maps\) \(p. 354\)](#)
- [Using Heat Maps \(p. 356\)](#)
- [Using KPIs \(p. 358\)](#)
- [Using Line Charts \(p. 359\)](#)
- [Using Pie Charts \(p. 363\)](#)
- [Using Pivot Tables \(p. 364\)](#)
- [Using Scatter Plots \(p. 391\)](#)
- [Using Tabular Reports \(p. 392\)](#)
- [Using Tree Maps \(p. 394\)](#)

Using AutoGraph

AutoGraph isn't a visual type itself, but instead lets you tell Amazon QuickSight to choose the visual type for you. When you create a visual by choosing AutoGraph and then selecting fields, Amazon QuickSight uses the most appropriate visual type for the number and data types of the fields you select.

The icon for AutoGraph is as follows:



Creating a Visual Using AutoGraph

Use the following procedure to create a visual using AutoGraph.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the AutoGraph icon.
4. On the **Fields list** pane, choose the fields that you want to use.

Using Bar Charts

Amazon QuickSight supports the following types of bar charts, with either horizontal or vertical orientation:

- Single-measure
- Multi-measure
- Clustered
- Stacked
- Stacked 100 percent

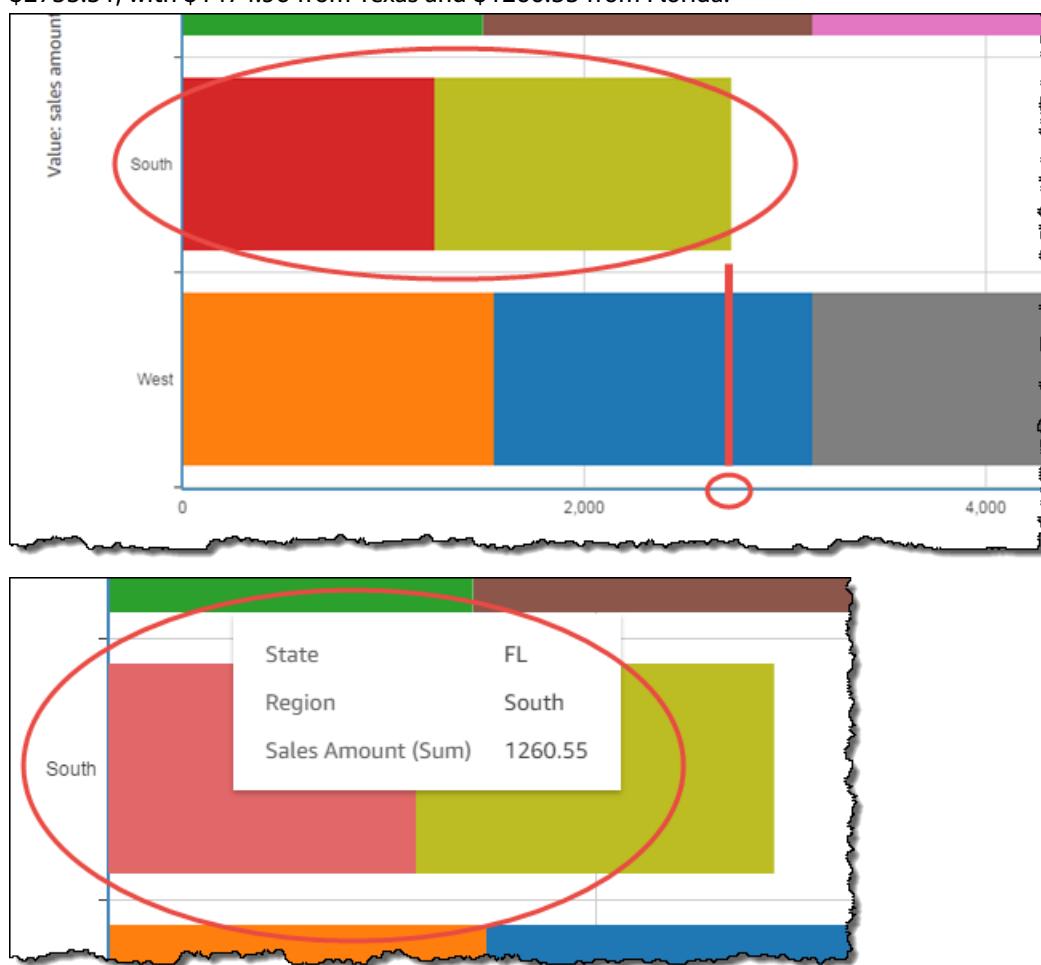
You use these as follows:

- Use the horizontal or vertical bar chart visual types to create single-measure, multi-measure, or clustered bar charts.

- Use a single-measure bar chart to show values for a single measure for a dimension.
- Use a multi-measure bar chart to show values for two or more measures for a dimension.
- Use a clustered bar chart to show values for a single measure for a dimension that is then grouped by another dimension, for example sales total by state, grouped by region.
- Use any of the stacked bar chart visual types to create stacked bar charts. A *stacked bar chart* is similar to a clustered bar chart in that it displays a measure for two dimensions. However, instead of clustering bars for each child dimension by the parent dimension, it displays one bar per parent dimension. It uses color blocks within the bars to show the relative values of each item in the child dimension.

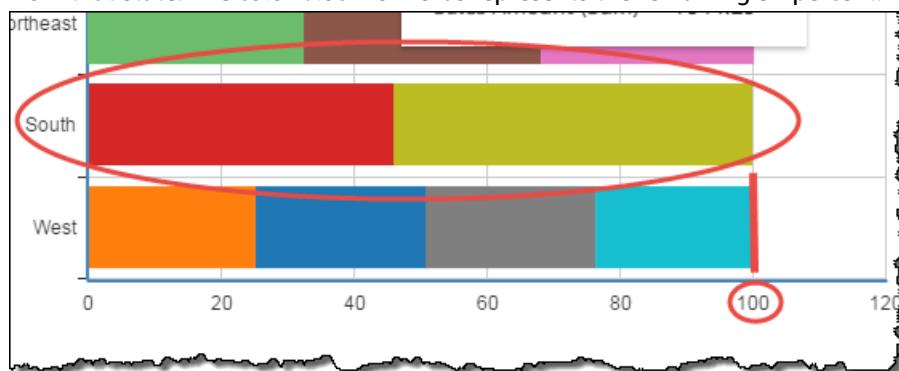
Amazon QuickSight offers both regular stacked bar charts and stacked 100 percent bar charts. A regular stacked bar chart differs from a stacked 100 percent bar chart in that the color blocks reflect the value of each item in the child dimension relative to the total for the measure. In contrast, a stacked 100 percent bar chart shows them by their percentage.

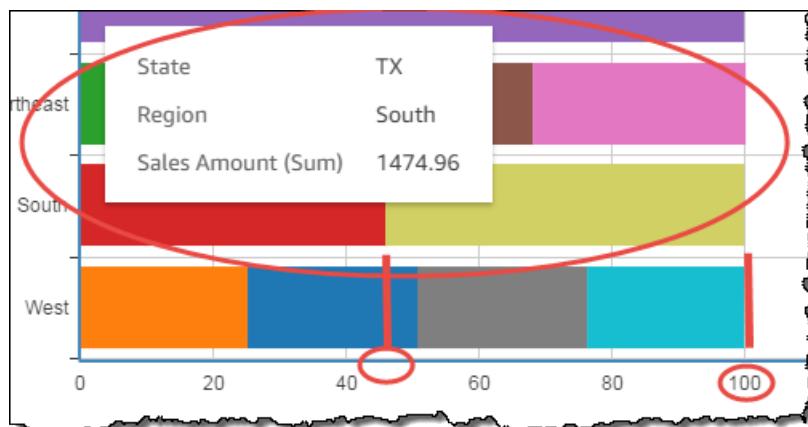
For example, the following stacked bar chart shows that total sales in the southern region were \$2735.51, with \$1474.96 from Texas and \$1260.55 from Florida.





The following stacked 100 percent bar chart shows this same data by percentage, which is 100 percent for the southern region. The color block for Florida represents the approximately 46 percent of revenue from that state. The color block for Texas represents the remaining 54 percent.





You can use the bar chart visual type to create a single-measure, multi-measure, or clustered bar chart. A single-measure bar chart shows one measure for one dimension, for example average delay time by flight number. A multi-measure bar chart shows two or more measures for one dimension, for example sales total and profit total by automobile model. A clustered bar chart shows values for a dimension grouped by a related dimension, for example sales totals by automobile model, grouped by car maker.

To create a bar chart, use a dimension for the X or Y axis and a measure for the value. The dimension is typically a text field that is related to the measure in some way and can be used to segment it to see more detailed information. You can also use a date field in this way, but in that case we recommend using a line chart because it's better suited to showing changes in a measure over time. Each bar in the chart represents a measure value for an item in the dimension you chose.

Bar charts show up to 2500 data points on the axis for visuals that don't use group/color. For visuals that do use group/color, they show up to 50 data points on the axis and up to 50 data points for group/color. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

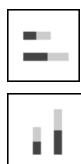
The icons for bar charts are as follows:



Other Bar Charts

Use a *stacked bar chart* to show values for hierarchical data, for example sales total by car model, stacked by car maker. A stacked bar chart uses a scale based on the maximum value for the selected measure.

The icon for stacked bar charts are as follows:



Use a *100 percent bar chart* to show values for hierarchical data, where you want to emphasize the percentage in relation to a total of 100. A stacked 100 percent bar chart uses a scale of 100 percent.

Bar Chart Features

Use the following table to understand the features supported by bar charts.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|--|--|
| Changing the legend display | Yes, with exceptions | Multi-measure and clustered bar charts display a legend, while single-measure horizontal bar charts don't. | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Yes | | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | Yes | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude any bar on the chart, except when you are using a date field as the dimension for the axis. In that case, you can only focus on a bar, not exclude it. | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | Yes | You can sort on the fields you choose for the axis and the values. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the field or fields you choose for the value, and can't apply aggregation to the fields you choose for the axis or group/color. | Changing Field Aggregation (p. 288) |
| Adding drill-downs | Yes | You can add drill-down levels to the axis, and Group/Color field wells. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Creating a Bar Chart

Use the following procedure to create a bar chart.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the bar chart icon for the type of bar chart you want to create.
4. From the **Fields list** pane, choose the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.
 - To create a single-measure bar chart, use one measure in the **Value** field well.

- To create a multi-measure bar chart, use two or more measures in the **Value** field well. Leave the **Group/Color** field well empty.
 - To create a clustered bar chart, choose another dimension for the **Group/Color** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **X or Y axis** or **Group/Color** field wells. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Using Combo Charts

Amazon QuickSight supports the following types of combo charts:

- Clustered bar combo chart
- Stacked bar combo chart

These are also known as line and column charts.

Use the combo chart visual types to create a single visualization that shows two different types of data. These two types are individually best suited to a line chart and a bar chart. The difference between these two types can work well for comparing two sets of data, for example trends and categorical data.

On the clustered bar combo chart, bars display for each child dimension, grouped by the parent dimension. On the stacked bar combo chart, one bar displays per parent dimension. Inside each bar, colors show the relative values of each item in the child dimension. Both types of combo chart require only one dimension on the **X axis**, but are usually more effective when also displaying at least one measure under **Lines**.



The combo chart is like using two different types of visualization at the same time. You should make sure the data in the bars (or columns) directly relates to the data in the line or lines. This relationship is not technically enforced by the tool, so it's essential that you determine this relationship yourself. Without some relation between the lines and bars, the visual loses meaning.

You can use the combo chart visual type to create a single-measure or single-line chart. A single-measure combo chart shows one measure for one dimension.

To create a multi-measure chart, you can choose to add multiple lines, or multiple bars. A multi-measure bar chart shows two or more measures for one dimension. You can group the bars in clusters, or stack them.

For the bars, use a dimension for the axis and a measure for the value. The dimension is typically a text field that is related to the measure in some way and can be used to segment it to see more detailed information. Each bar in the chart represents a measure value for an item in the dimension you chose.

Bars and lines show up to 2500 data points on the axis for visuals that don't use group/color. For visuals that do use group/color, bars show up to 50 data points on the axis and up to 50 data points for group/color, while lines show 200 data points on the axis and up to 25 data points for group/color. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

A clustered bar chart shows values for a dimension grouped by a parent dimension. A stacked bar combo chart shows values for a dimension stacked by parent dimension. Combo charts use a scale based on the maximum value for the selected measure.

The icons for combo charts are as follows.



Combo Chart Features

Use the following table to understand the features supported by combo charts.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|--|--|
| Changing the legend display | Yes, with exceptions | Multi-measure combo charts display a legend, and single-measure combo charts don't. | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Yes | You can set the range for the axis. | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | Yes | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude any bar on the chart, except when you are using a date field | Focusing on Visual Elements (p. 263) |

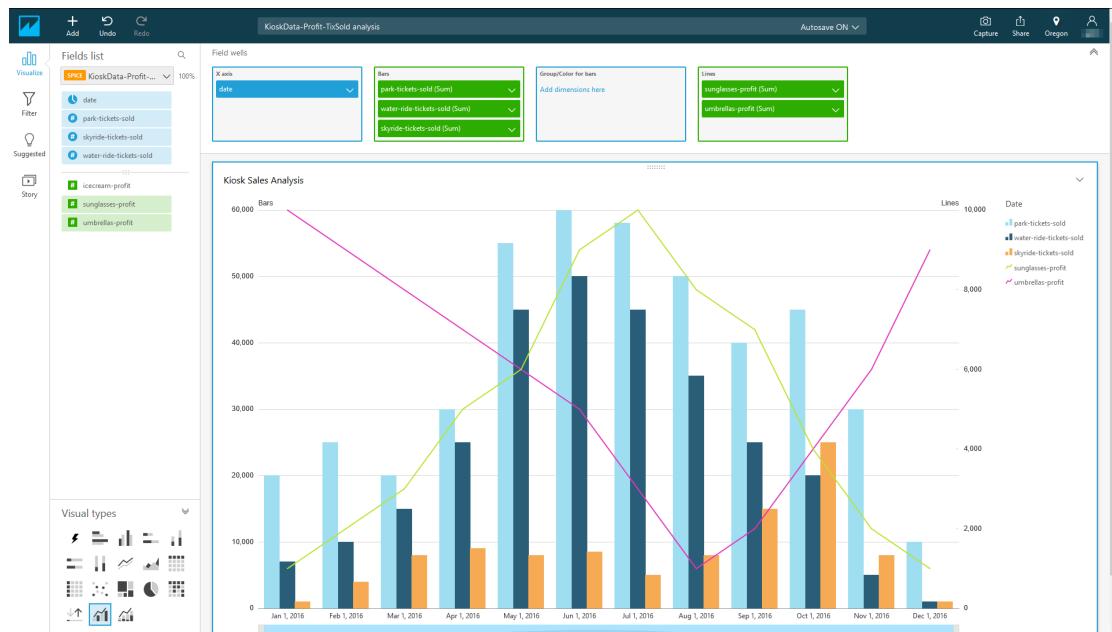
| Feature | Supported? | Comments | For More Information |
|--------------------|------------|---|---|
| | | as the dimension for the axis. In that case, you can only focus on a bar, not exclude it. | Excluding Visual Elements (p. 264) |
| Sorting | Yes | You can sort on the fields you choose for the axis and the values. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the field or fields you choose for the value. You can't apply aggregation to the fields you choose for the axis or group/color. | Changing Field Aggregation (p. 288) |
| Adding drill-downs | Yes | You can add drill-down levels to the axis and Group/Color field wells. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Creating a Combo Chart

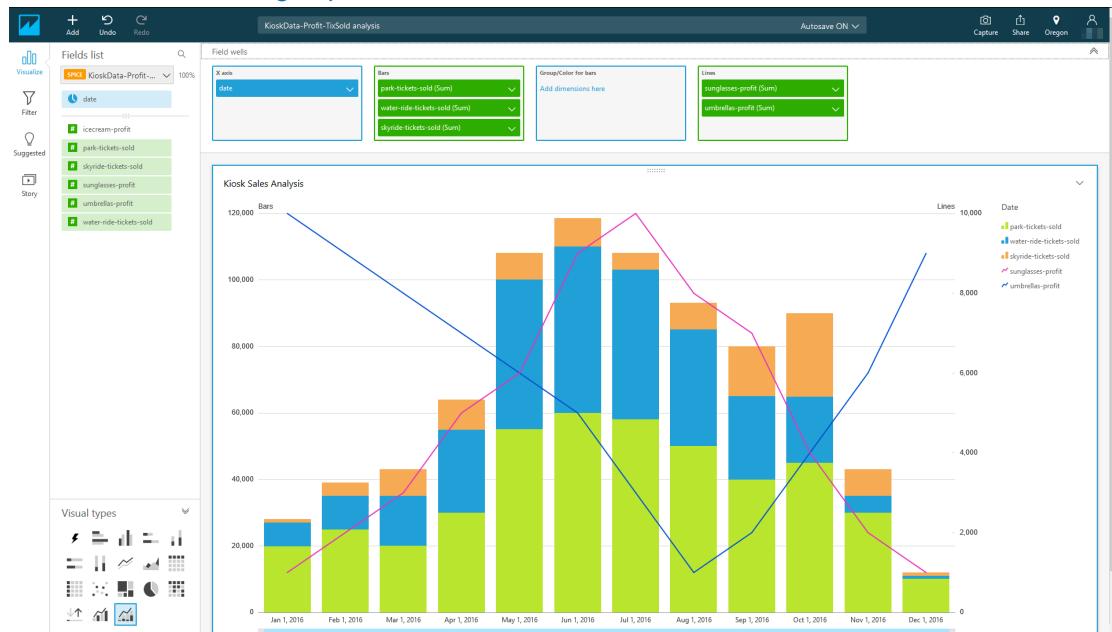
Use the following procedure to create a combo chart.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose one of the combo chart icons.
4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value. You can create combo charts as follows:
 - Choose a dimension for the **X axis**.
 - To create a single-measure combo chart, choose one measure for either **Bars** or **Lines**.
 - To create a multi-measure combo chart, choose two or more measures for the **Bars** or **Lines** field well.
 - Optionally, add a dimension to the **Group/Color** field well. If you have a field in **Group/Color**, you can't have more than one field under **Bars**.

Amazon QuickSight User Guide Using Geospatial Charts (Maps)



5. (Optional) Add drill-down layers by dragging one or more additional fields to the **X axis** or **Group/Color** field wells. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).



Using Geospatial Charts (Maps)

Use geospatial charts to show differences in data values across a geographical map. The map allows you to zoom in and out. As you zoom in closer, you can see more geographical features. The map retains the chosen zoom level and size.

Each circle represents a geographical location on the map chart. This can be latitude and longitude, or geographical components such as state or city. The size of the circles represents the magnitude of the field in the **Size** well, in relation to other values in the same field. The color of the circles represents the values in the **Color** well. The field in the **Color** well displays in the legend, if you choose to display one.

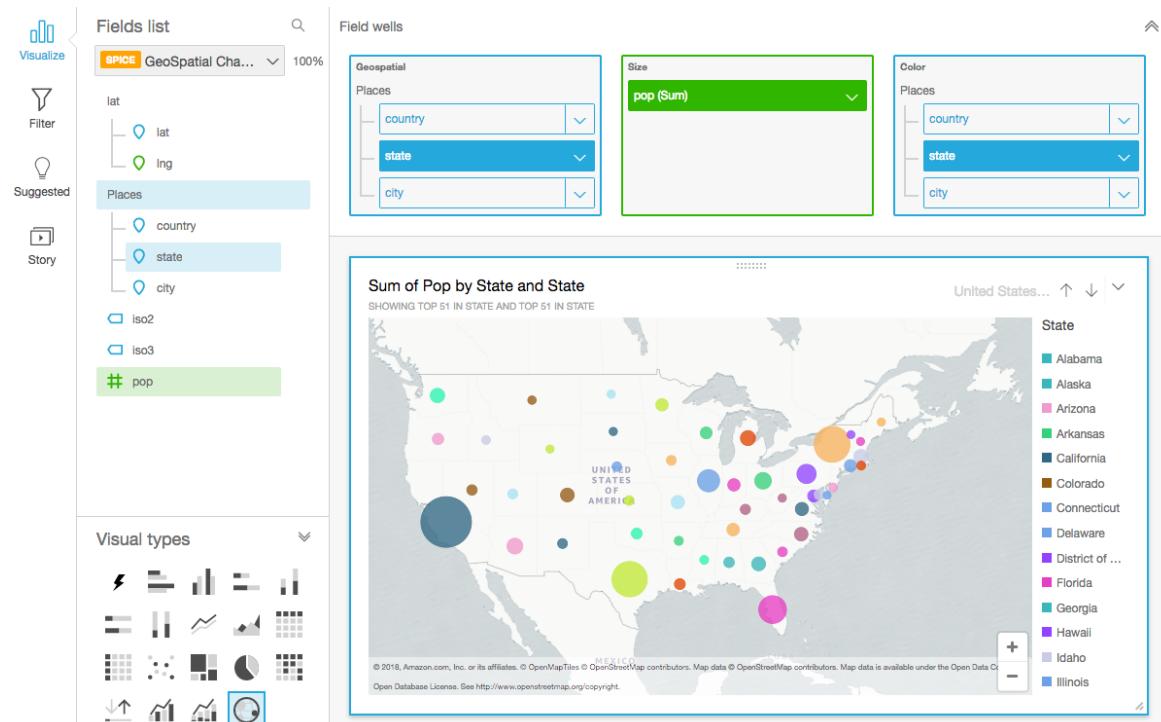
Here is a sample of a map chart. The latitude, longitude, country, state, and city are identified by a place marker icon, showing that they are a geospatial data type. State and city are inside of a hierarchy named Geo. Data types must be correctly configured in the data set before geospatial mapping can work. Predefined hierarchies, called *geospatial groupings*, are optional. They allow Amazon QuickSight to resolve locations on the map, in case of any ambiguities. If the data types are correct, the mapping can work for supported geographies without geospatial groupings.

For more information about setting up geospatial data types and hierarchies, see [Adding Geospatial Data \(p. 177\)](#).

Important

Geospatial charts in Amazon QuickSight currently aren't supported in some geographies, including India and China. We are working on adding support for more regions.

For now, automatic geocoding works only for US locations. However, you can add latitude and longitude coordinates to your data to make geospatial charts. For help with geospatial issues, see [Geospatial Troubleshooting \(p. 183\)](#).



Use the following table to understand the features supported by geospatial maps.

| Feature | Supported? | Comments | For More Information |
|----------------------------|------------|---|--|
| Legend display | Yes | Displays contents of the field in the Color well | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |

| Feature | Supported? | Comments | For More Information |
|----------------------------|------------|--|---|
| Changing the visual colors | Partial | You can change the color of the circles on the map, but not for individual values. | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Adding drill-downs | Yes | You can add drill-down levels to the Geospatial and Color field wells. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Using Heat Maps

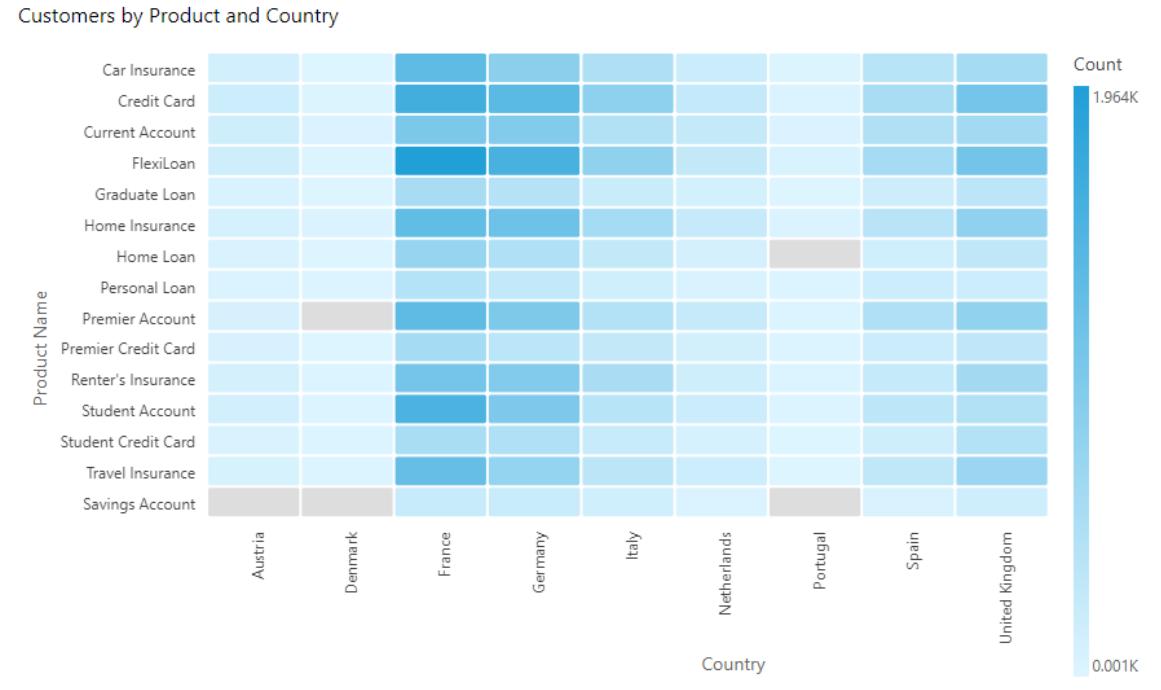
Use heat maps to show a measure for the intersection of two dimensions, with color-coding to easily differentiate where values fall in the range. Heat maps can also be used to show the count of values for the intersection of the two dimensions.

Each rectangle on a heat map represents the value for the specified measure for the intersection of the selected dimensions. Rectangle color represents where the value falls in the range for the measure, with darker colors indicating higher values and lighter colors indicating lower ones.

Heat maps and pivot tables display data in a similar tabular fashion. Use a heat map if you want to identify trends and outliers, because the use of color makes these easier to spot. Use a pivot table if you want to further analyze data on the visual, for example by changing column sort order or applying aggregate functions across rows or columns.

To create a heat map, choose at least two fields of any data type. Amazon QuickSight populates the rectangle values with the count of the X axis value for the intersecting Y axis value. Typically, you choose a measure and two dimensions.

For example, the following heat map shows which products are most used by the customers in these countries, measured by a simple count.



Heat maps show up to 50 data points for rows and up to 50 data points for columns. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

The icon for a heat map is as follows:



Heat Map Features

Use the following table to understand the features supported by heat maps.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|---|--|
| Changing the legend display | Yes | | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Not applicable | | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | No | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude a rectangle in a heat map, except when you are using a date field as the rows dimension. In that case, you can only focus on a rectangle, not exclude it. | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | Yes | You can sort by the fields you choose for the columns and the values. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the fields you choose for the value, and can't apply aggregation to the fields you choose for the rows or columns. | Changing Field Aggregation (p. 288) |
| Adding drill-downs | Yes | You can add drill-down levels to the Rows and Columns field wells. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Create a Heat Map

Use the following procedure to create a heat map.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the heat map icon.

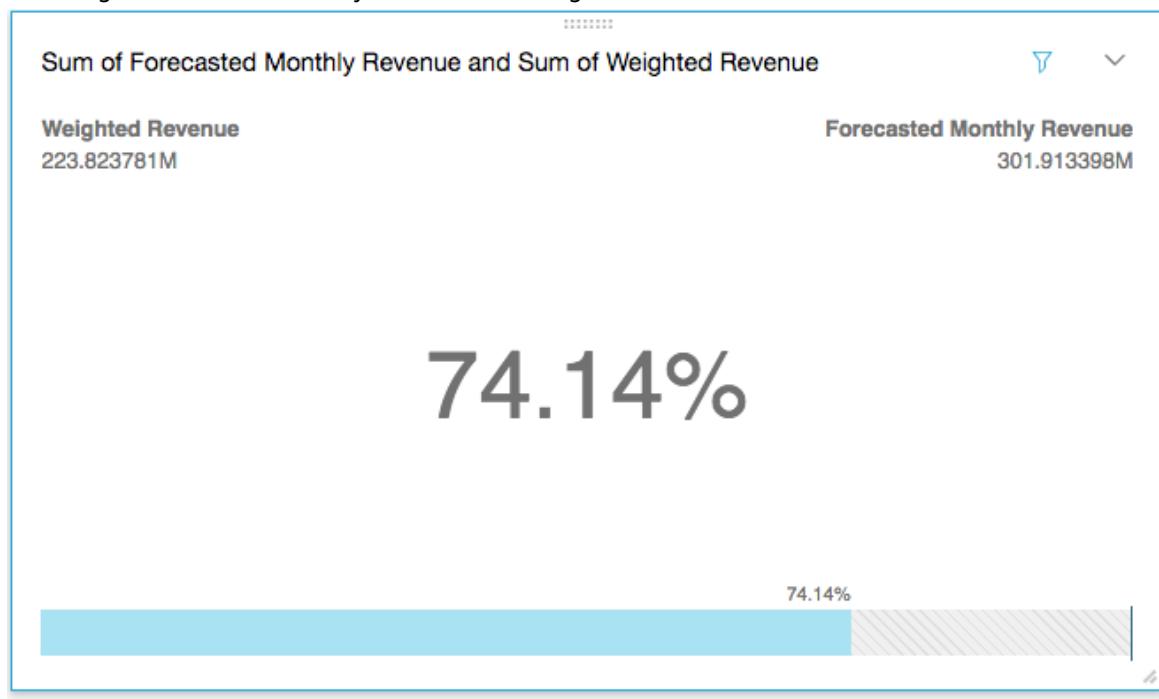
4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.

To create a heat map, drag a dimension to the **Rows** field well, a dimension to the **Columns** field well, and a measure to the **Values** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **Rows** or **Columns** field wells. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Using KPIs

Use a KPI to visualize a comparison between a key value and its target value.

A KPI displays a value comparison, the two values being compared, and a progress bar. For example, the following KPI shows how closely revenue is meeting its forecast.



The icon for a KPI is as follows:



KPI Features

Use the following table to understand the features supported by the KPI visual type in Amazon QuickSight.

| Feature | Supported? | Comments | For More Information |
|--------------------------------------|------------|--|---|
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Removing the title | Yes | You can choose not to display a title. | |
| Changing comparison method | Yes | By default, Amazon QuickSight automatically chooses a method. The settings are auto, difference, percent, and difference as percent. | |
| Changing the primary value displayed | Yes | You can choose comparison (default) or actual. | |
| Display or remove the progress bar | Yes | You can format the visual to either display (default) or not display a progress bar. | |

Creating a KPI

Use the following procedure to create a KPI.

1. Create a new analysis for your data set.
2. In the **Visual types** pane, choose the KPI icon.
3. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. You must use measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.

To create a KPI, drag a measure to the **Value** field well. To compare that value to a target value, drag a different measure to the **Target value** field well.

4. (Optional) Choose formatting options by selecting the on-visual menu at the upper-right corner of the visual, then choosing **Format visual**.

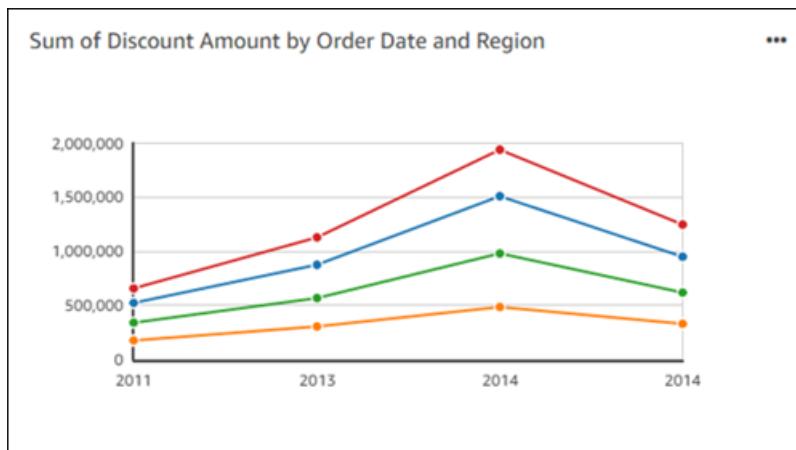
Using Line Charts

Use line charts to compare changes in measure values over period of time, for the following scenarios:

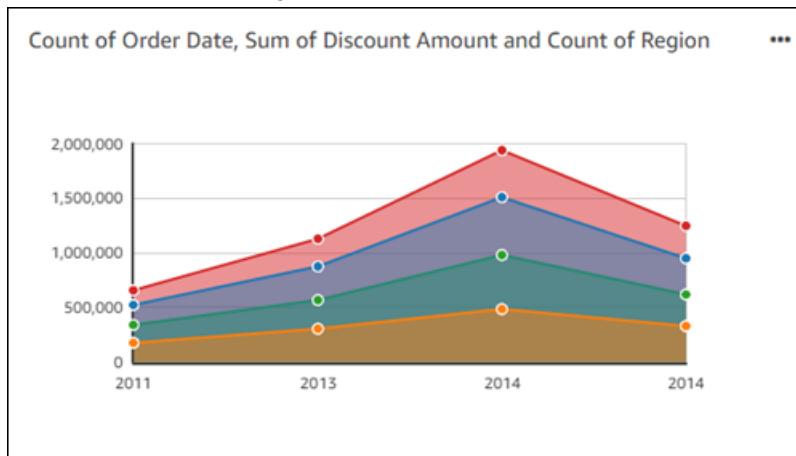
- One measure over a period of time, for example gross sales by month.
- Multiple measures over a period of time, for example gross sales and net sales by month.
- One measure for a dimension over a period of time, for example number of flight delays per day by airline.

Line charts show the individual values of a set of measures or dimensions against the range displayed by the Y axis. Area line charts differ from regular line charts in that each value is represented by a colored area of the chart instead of just a line, to make it easier to evaluate item values relative to each other.

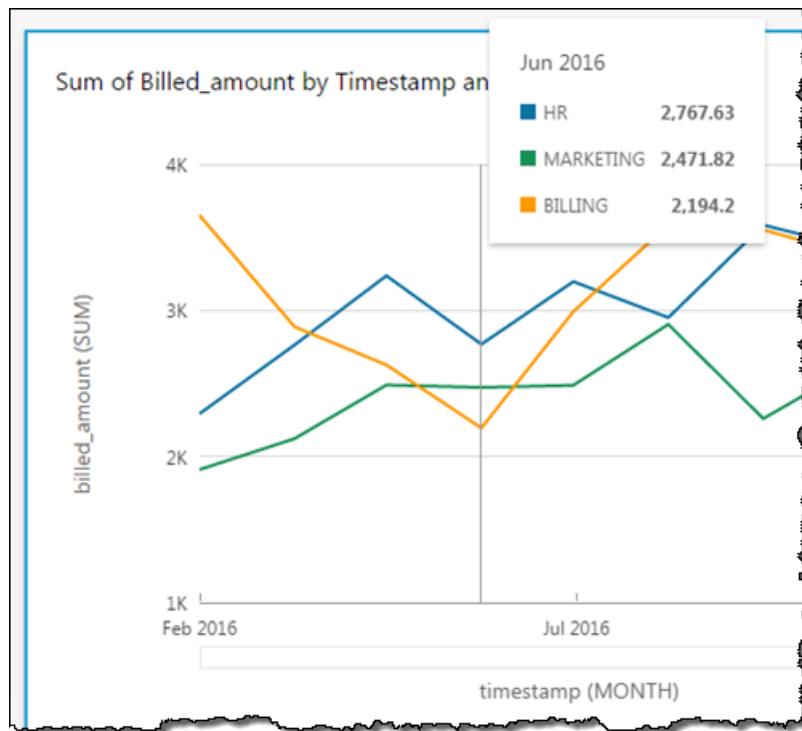
For example, discount amount by year by region looks like the following in a line chart.



It looks like the following in an area line chart.



Each line on the chart represents a measure value across a period of time. When you have a chart with multiple lines, hover over any line to see a pop-up legend that shows the values for each line for that point in time.



Use line charts to compare changes in values for one or more measures or dimensions over a period of time.

In regular line charts each value is represented by a line, and in area line charts each value is represented by a colored area of the chart.

Line charts show up to 2500 data points on the X axis when no color field is selected. When color is populated, line charts show up to 200 data points on the X axis and up to 25 data points for color. For more information about how data that falls outside the display limit for this visual type, see [Display Limits in Visuals \(p. 343\)](#).

The icons for line charts are as follows:



Line Chart Features

Use the following table to understand the features supported by line charts.

| Feature | Supported? | Comments | For More Information |
|-----------------------------|------------|----------|--|
| Changing the legend display | Yes | | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|---|--|
| Changing the axis range | Yes | You can set the range for the Y axis. | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | Yes | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | <p>You can focus on or exclude any line on the chart, except in the following cases:</p> <ul style="list-style-type: none"> • You create a multi-dimension line chart and use a date field as the dimension for the line color. • You create a measure or multi-measure line chart and use a date field as the dimension for the X axis. <p>In these cases, you can only focus on a line, not exclude it.</p> | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | Yes, with exceptions | You can sort data for numeric measures in the X axis and Value field wells. Other data is automatically sorted in ascending order. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the field you choose for the value, and can't apply aggregation to the fields you choose for the X axis and color. | Changing Field Aggregation (p. 288) |
| Adding drill-downs | Yes | You can add drill-down levels to the X axis and Color field wells. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Creating a Line Chart

Use the following procedure to create a line chart.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose one of the line chart icons.
4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.
 - To create a single-measure line chart, drag a dimension to the **X axis** field well and one measure to the **Value** field well.

- To create a multi-measure line chart, drag a dimension to the **X axis** field well and two or more measures to the **Value** field well. Leave the **Color** field well empty.
 - To create a multi-dimension line chart, drag a dimension to the **X axis** field well, one measure to the **Value** field well, and one dimension to the **Color** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **X axis** or **Color** field wells. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Using Pie Charts

Use pie charts to compare values for items in a dimension.

Each wedge in a pie chart represents one item in the dimension. Wedge size represents the proportion of the value for the selected measure that the item represents compared to the whole for the dimension. Pie charts are best when precision isn't important and there are few items in the dimension.

Pie charts show up to 20 data points for group/color. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

The icon for a pie chart is as follows:



Pie Chart Features

Use the following table to understand the features supported by pie charts.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|---|--|
| Changing the legend display | Yes | | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Not applicable | | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | Yes | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude a wedge in a pie chart, except when you are using a date field as a dimension. In that case, you can only focus on a wedge, not exclude it. | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | Yes | You can sort on the field you choose for the value or the group/color. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the field you choose for the value, and can't apply | Changing Field Aggregation (p. 288) |

| Feature | Supported? | Comments | For More Information |
|--------------------|------------|---|---|
| | | aggregation to the field you choose for group/color. | |
| Adding drill-downs | Yes | You can add drill-down levels to the Group/Color field well. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Create a Pie Chart

Use the following procedure to create a pie chart.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the pie chart icon.
4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.
To create a pie chart, drag a measure to the **Value** field well and a dimension to the **Group/Color** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **Group/Color** field well. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Using Pivot Tables

Use pivot tables to show measure values for the intersection of two dimensions.

Heat maps and pivot tables display data in a similar tabular fashion. Use a heat map if you want to identify trends and outliers, because the use of color makes these easier to spot. Use a pivot table if you want to analyze data on the visual.

To create a pivot table, choose at least one field of any data type, and choose the pivot table icon. Amazon QuickSight creates the table and populates the cell values with the count of the column value for the intersecting row value. Typically, you choose a measure and two dimensions measurable by that measure.

Pivot tables support infinite scroll down and right. You can add up to 20 fields as rows and 20 fields as columns.

Using a pivot table, you can do the following:

- Specify multiple measures to populate the cell values of the table, so that you can see a range of data
- Cluster pivot table columns and rows to show values for subcategories grouped by related dimension
- Change row sort order
- Apply statistical functions
- Add totals and subtotals to rows and columns
- Use infinite scroll
- Transpose fields used by rows and columns

To easily transpose the fields used by the rows and columns of the pivot table, choose the orientation icon



)

near the top right of the visual. To see options for showing and hiding totals and subtotals, formatting the visual, or exporting data to a CSV file, choose the V-shaped icon at top right.

As with all visual types, you can add and remove fields. You can also change the field associated with a visual element, change field aggregation, and change date field granularity. In addition, you can focus on or exclude rows or columns. For more information about how to make these changes to a pivot table, see [Changing the Fields Used by a Visual in Amazon QuickSight \(p. 278\)](#).

For information on formatting pivot tables, see [Formatting a Visual in Amazon QuickSight \(p. 265\)](#).

The icon for a pivot table is as follows.



Topics

- [Pivot Table Features \(p. 365\)](#)
- [Creating a Pivot Table \(p. 366\)](#)
- [Orienting Pivot Table Values \(p. 367\)](#)
- [Expanding and Collapsing Pivot Table Clusters \(p. 369\)](#)
- [Sorting Pivot Tables \(p. 369\)](#)
- [Using Table Calculations in Pivot Tables \(p. 370\)](#)
- [Pivot Table Limitations \(p. 390\)](#)
- [Pivot Table Best Practices \(p. 390\)](#)

Pivot Table Features

Pivot tables don't display a legend.

Use the following table to understand the features supported by pivot tables.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|--|--|
| Changing the legend display | No | | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Not applicable | | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | No | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude any column or row, except when you are using a date field as one of the dimensions. In | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |

| Feature | Supported? | Comments | For More Information |
|---|------------|--|--|
| | | that case, you can only focus on the column or row that uses the date dimension, not exclude it. | |
| Sorting | Yes | You can sort by the field you choose for the columns. | Sorting Visual Data in Amazon QuickSight (p. 298) Sorting Pivot Tables (p. 369) |
| Field aggregation | Yes | <p>You must apply aggregation to the field or fields you choose for the value. You can't apply aggregation to the fields that you choose for the rows or columns.</p> <p>If you choose to create a multi-measure pivot table, you can apply different types of aggregation to the different measures. For example, you can show the sum of the sales amount and the maximum discount amount.</p> | Changing Field Aggregation (p. 288) |
| Adding drill-downs | No | | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |
| Showing and hiding totals and subtotals | Yes | <p>You can show or hide totals and subtotals for rows and columns.</p> <p>Metrics automatically roll up to show subtotals when you collapse a row or column. If you use a table calculation, use aggregates to display roll-ups.</p> | |
| Exporting or copying data | Yes | <p>You can export all of the data to a CSV file.</p> <p>You can select and copy the content of the cells.</p> | Exporting Data from an Amazon QuickSight Visual to a CSV File (p. 256) |

Creating a Pivot Table

Use the following procedure to create a pivot table.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the pivot table icon.
4. From the **Fields list** pane, choose the fields that you want to include. Amazon QuickSight automatically places these into the field wells.

To change the placement of a field, drag it to the appropriate field wells. Typically, you use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.

- To create a single-measure pivot table, drag a dimension to the **Rows** field well, a dimension to the **Columns** field well, and a measure to the **Values** field well.
- To create a multi-measure pivot table, drag a dimension to the **Rows** field well, a dimension to the **Columns** field well, and two or more measures to the **Values** field well.
- To create a clustered pivot table, drag one or more dimensions to the **Rows** field well, one or more dimensions to the **Columns** field well, and a measure to the **Values** field well.

You can also select multiple fields for all of the pivot table field wells if you want to. Doing this combines the multi-measure and clustered pivot table approaches.

Note

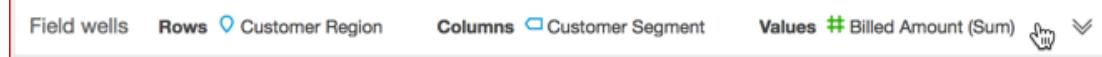
To view roll-ups for calculated fields, make sure that you are using aggregates. For example, a calculated field with `field-1 / field-2` doesn't display a summary when rolled up. However, `sum(field-1) / sum(field-2)` does display a roll-up summary.

Orienting Pivot Table Values

You can choose to display a pivot table in a columnar or row-based format. Columnar is the default. When you change to a row-based format, a column with the value name is added to the right of the row header column.

Use the following procedure to change a pivot table format.

1. On the analysis page, choose the pivot table visual that you want to edit.
2. Expand the **Field wells** pane by choosing the field wells at the top of the visual.



3. On the **Values** field well, choose one of the following options:
 - Choose **Column** for a columnar format.

Field wells

| | |
|------|---------------------|
| Rows | Customer Region |
| | Consumption Channel |

| | |
|---------|------------------|
| Columns | Customer Segment |
| | Service Line |

| | |
|---------------------|--------------------------------------|
| Values | <input checked="" type="radio"/> Row |
| | <input type="radio"/> Column |
| Billed Amount (Sum) | |

Revenue by Service Line, Customer Region, Customer Segment, and Consumption Channel

Customer Segment > Service Line

| | | Enterprise | | SMB | |
|-----------------|------------------|------------|--------------|--------------|------------|
| Customer Region | Consumption C... | Marketing | HR | Billing | Marketing |
| APAC | API | 104,350.34 | 132,225.58 | 127,772.08 | 17,566.44 |
| | Mobile | 191,448.63 | 247,966.85 | 238,773.51 | 40,337.72 |
| | Web | 282,733.31 | 370,020.33 | 340,658.32 | 57,737.54 |
| EMEA | API | 253,154.34 | 353,785.82 | 427,324.86 | 35,788.24 |
| | Mobile | 445,424.8 | 663,531.12 | 787,623.59 | 83,356.67 |
| | Web | 659,433.53 | 951,639.98 | 1,136,865.12 | 118,399.79 |
| US | API | 213,715.84 | 440,195.3 | 383,297.6 | 61,647.74 |
| | Mobile | 497,424.85 | 1,029,193.5 | 899,185.99 | 150,126.31 |
| | Web | 714,712.03 | 1,466,952.72 | 1,284,108.35 | 210,907.85 |

- Choose **Row** for a row format.

Field wells

| | |
|------|---------------------|
| Rows | Customer Region |
| | Consumption Channel |

| | |
|---------|------------------|
| Columns | Customer Segment |
| | Service Line |

| | |
|---------------------|--------------------------------------|
| Values | <input checked="" type="radio"/> Row |
| | <input type="radio"/> Column |
| Billed Amount (Sum) | |

Revenue by Service Line, Customer Region, Customer Segment, and Consumption Channel

Customer Segment > Service Line

| | | Enterprise | | SMB | |
|-----------------|------------------|---------------|------------|--------------|--------------|
| Customer Region | Consumption C... | Billed Amount | | Marketing | |
| APAC | API | Billed Amount | Marketing | HR | Billing |
| | Mobile | Billed Amount | 104,350.34 | 132,225.58 | 127,772.08 |
| | Web | Billed Amount | 191,448.63 | 247,966.85 | 238,773.51 |
| EMEA | API | Billed Amount | 253,154.34 | 353,785.82 | 427,324.86 |
| | Mobile | Billed Amount | 445,424.8 | 663,531.12 | 787,623.59 |
| | Web | Billed Amount | 659,433.53 | 951,639.98 | 1,136,865.12 |
| US | API | Billed Amount | 213,715.84 | 440,195.3 | 383,297.6 |
| | Mobile | Billed Amount | 497,424.85 | 1,029,193.5 | 899,185.99 |
| | Web | Billed Amount | 714,712.03 | 1,466,952.72 | 1,284,108.35 |

Note

If you use only one metric, you can eliminate the repeated header by formatting the visual and styling it with the **Hide single metric** option. For more information, see [Customizing Style for Pivot Tables \(p. 273\)](#).

Expanding and Collapsing Pivot Table Clusters

If you are using grouped columns or rows in a pivot table, you can expand or collapse a group to show or hide its data in the visual.

Use the following procedure to expand or collapse a pivot table group.

1. On the analysis page, choose the pivot table visual that you want to edit.
2. Choose one of the following:
 - To collapse a group, choose the collapse icon near the name of the field.
 - To expand a group, choose the expand icon near the name of the field. The collapse icon shows a minus sign. The expand icon shows a plus sign.

In the following screenshot, Customer Region and the Enterprise segment are expanded, and SMB and Startup are collapsed. When a group is collapsed, its data is summarized in the row or column.

Revenue by Service Line, Customer Region, Customer Segment, and Consumption Channel

| Customer Segment > Service Line | | | | | | |
|---------------------------------|------------------|---------------|------------|--------------|--------------|------------|
| Customer Region | Consumption C... | Billed Amount | Enterprise | | SMB | Startup |
| | | | Marketing | HR | Billing | |
| APAC | API | Billed Amount | 104,350.34 | 132,225.58 | 127,772.08 | 98,977.33 |
| | Mobile | Billed Amount | 191,448.63 | 247,966.85 | 238,773.51 | 231,934.61 |
| | Web | Billed Amount | 282,733.31 | 370,020.33 | 340,658.32 | 329,184.75 |
| EMEA | API | Billed Amount | 253,154.34 | 353,785.82 | 427,324.86 | 199,635.93 |
| | Mobile | Billed Amount | 445,424.8 | 663,531.12 | 787,623.59 | 474,354.34 |
| | Web | Billed Amount | 659,433.53 | 951,639.98 | 1,136,865.12 | 667,843.43 |
| US | API | Billed Amount | 213,715.84 | 440,195.3 | 383,297.6 | 271,066.46 |
| | Mobile | Billed Amount | 497,424.85 | 1,029,193.5 | 899,185.99 | 656,111.84 |
| | Web | Billed Amount | 714,712.03 | 1,466,952.72 | 1,284,108.35 | 928,394.53 |

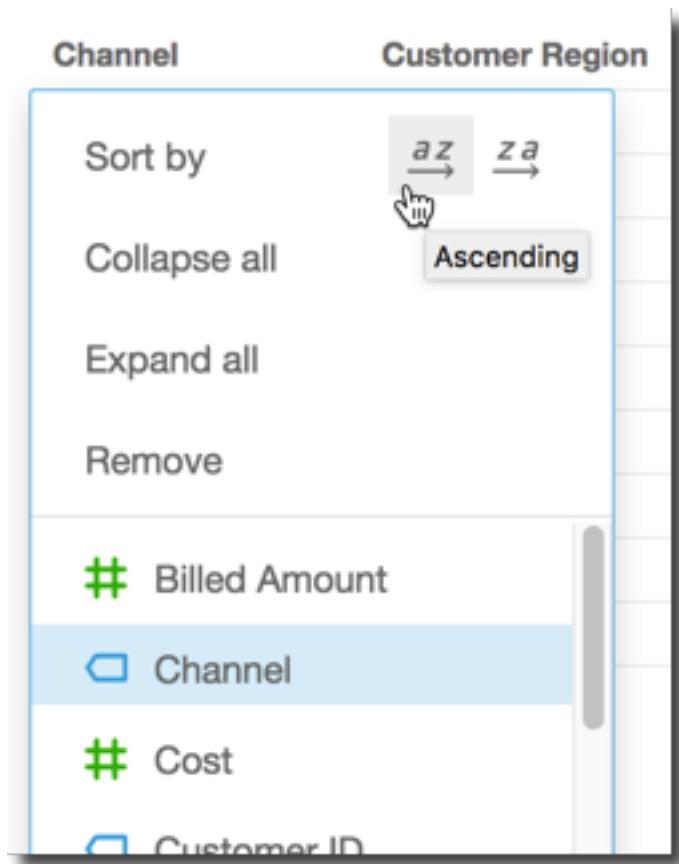
Sorting Pivot Tables

In a pivot table, you can change the sort order on any column to sort all rows in the table according to the values in that column. You can only sort by one column at a time. Sorting on a metric based on a table calculation is supported only if the table calculation used is one of the following:

- Percent of Total (p. 376)
- Percentile (p. 378)
- Rank (p. 377)

On the visual, or in the field wells, choose the name of the column that you want to sort by. From the context menu, choose AZ for ascending or ZA for descending sort order.

The context menu in the screenshot also offers options to collapse all or expand all for this field, to remove it, or to replace it with another field.



You can sort by a value by choosing the value to get the context menu, which offers sort ascending and descending options. Doing this also works on subtotals.

| Startup | | | |
|---------------|---------------|-----------------|---------------|
| Mobile | API | Subtotal | |
| Billed Amount | Billed Amount | Billed Amount | Billed Amount |
| \$3,119 | \$1,380 | Sort ascending | |
| \$2,397 | \$1,229 | Sort descending | |
| \$3,061 | \$1,436 | \$4,454 | |
| \$3,154 | \$933 | \$4,086 | |

Using Table Calculations in Pivot Tables

You can use table calculations to apply statistical functions to pivot table cells that contain measures (numeric values). Use the following sections to understand which functions you can use in calculations, and how to apply or remove them.

The data type of the cell value automatically changes to work for your calculation. For example, say that you apply the **Rank** function to a currency data type. The values display as integers rather than currency,

because rank isn't measured as currency. Similarly, if you apply the **Percent difference** function instead, the cell values display as percentages.

Topics

- [Adding and Removing Pivot Table Calculations \(p. 371\)](#)
- [Functions for Pivot Table Calculations \(p. 373\)](#)
- [Ways to Apply Pivot Table Calculations \(p. 379\)](#)

Adding and Removing Pivot Table Calculations

Use the following procedures to add, modify, and remove table calculation on a pivot table.

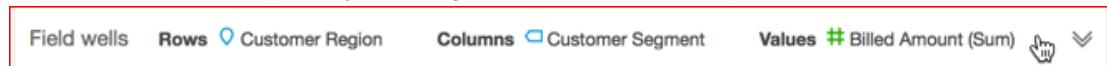
Topics

- [Adding a Pivot Table Calculation \(p. 371\)](#)
- [Changing How a Calculation Is Applied \(p. 371\)](#)
- [Removing a Calculation \(p. 372\)](#)

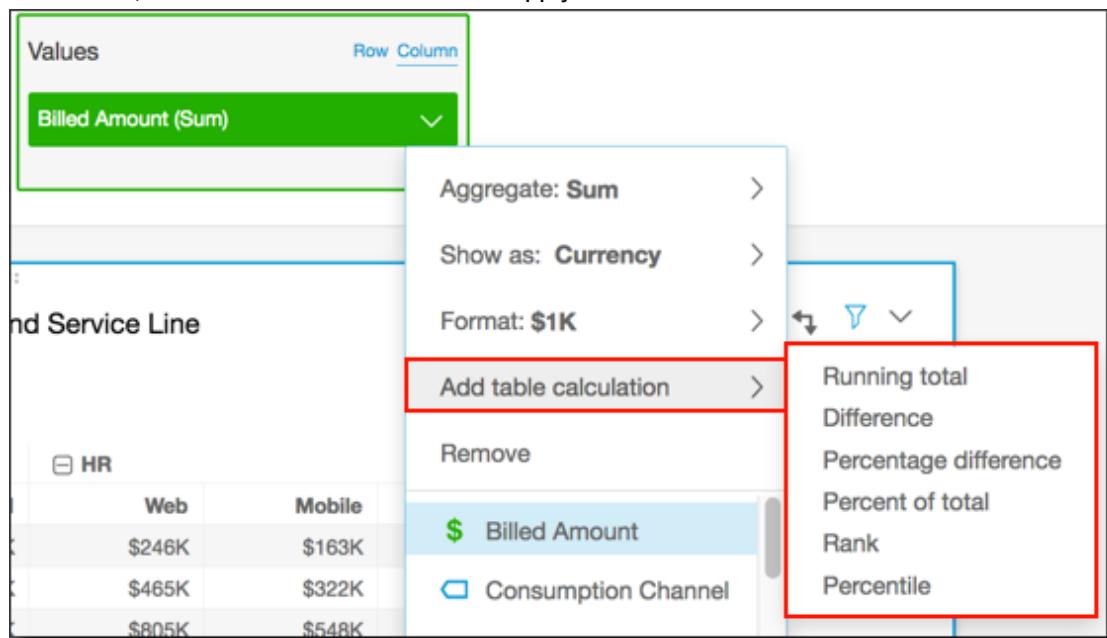
Adding a Pivot Table Calculation

Use the following procedure to add a table calculation to a pivot table.

1. Expand the **Field wells** pane by choosing the field wells at the top of the visual.



2. Choose the field in the **Values** well that you want to apply a table calculation to, choose **Add table calculation**, and then choose the function to apply.



Changing How a Calculation Is Applied

Use the following procedure to change the way a table calculation is applied to a pivot table.

1. Expand the **Field wells** pane by choosing field wells at the top of the visual.



2. Choose the field in the **Values** well that has the table calculation that you want to change, choose **Calculate as**, and then choose the way that you want the calculation applied.

The screenshot shows a context menu for the 'Billed Amount (Sum)' field in the 'Values' well. The menu items include 'Aggregate: Sum', 'Show as: Currency', 'Format: \$1K', 'Add table calculation', 'Calculate as' (which is highlighted with a red box), 'Remove calculation', and 'Remove'. To the right of the 'Calculate as' item is a sub-menu titled 'Table across' which lists 'Table down', 'Table across down', 'Table down across', 'Group across', 'Group down', 'Group across down', and 'Group down across'. A red box highlights the 'Table across' sub-menu.

| Web | Mobile |
|----------|----------|
| \$762K | \$925K |
| \$1,419K | \$1,742K |
| \$2,456K | \$3,005K |
| \$1,111K | \$1,360K |
| \$1,788K | \$2,188K |
| \$2,907K | \$3,558K |

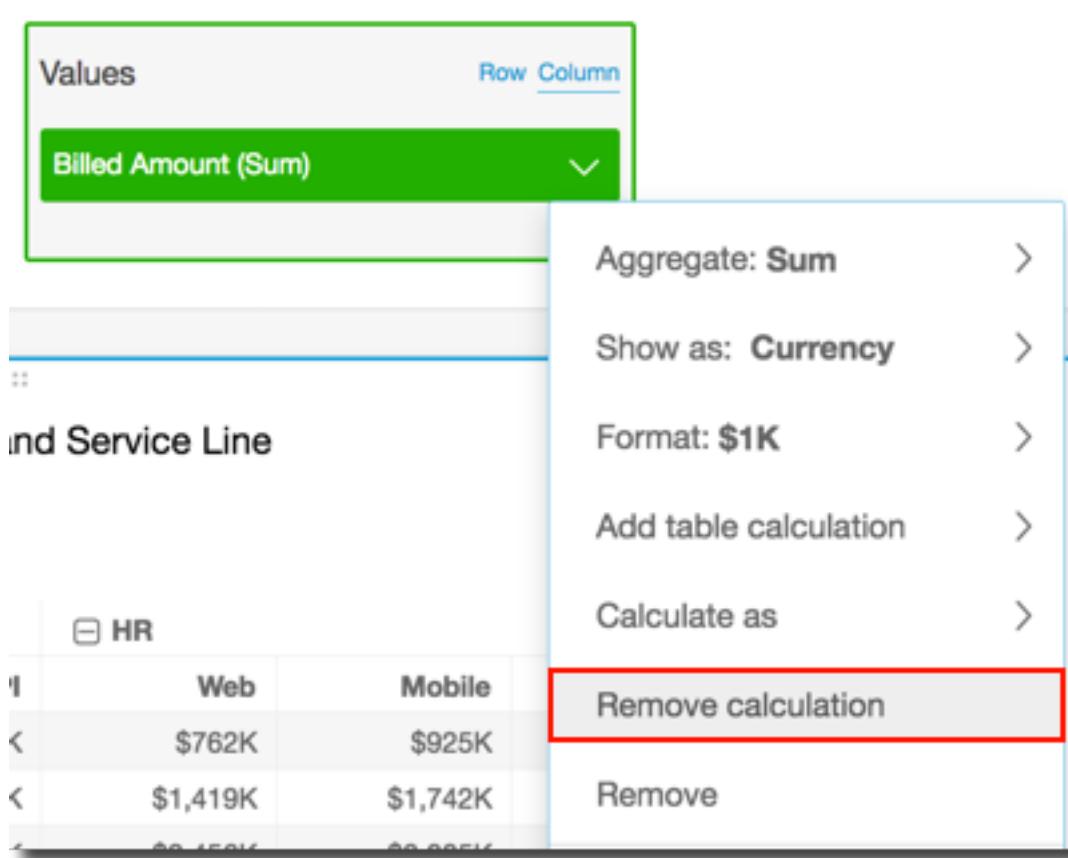
Removing a Calculation

Use the following procedure to remove a table calculation from a pivot table.

1. Expand the **Field wells** pane by choosing the field wells at the top of the visual.



2. Choose the field in the **Values** well that you want to remove the table calculation from, and then choose **Remove calculation**.



Functions for Pivot Table Calculations

You can use the following functions in pivot table calculations.

Topics

- [Running Total \(p. 373\)](#)
- [Difference \(p. 374\)](#)
- [Percentage Difference \(p. 375\)](#)
- [Percent of Total \(p. 376\)](#)
- [Rank \(p. 377\)](#)
- [Percentile \(p. 378\)](#)

Running Total

The **Running total** function calculates the sum of a given cell value and the values of all cells prior to it. This sum is calculated as $\text{Cell1}=\text{Cell1}$, $\text{Cell2}=\text{Cell1}+\text{Cell2}$, $\text{Cell3}=\text{Cell1}+\text{Cell2}+\text{Cell3}$, and so on. For example, suppose that you have the following data.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|--------|----------|----------|--------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | HR | | Mobile | API |
| | | Web | Mobile | API | Web | | |
| APAC | 2014 | \$257K | \$178K | \$82K | \$246K | \$163K | \$74K |
| | 2015 | \$471K | \$335K | \$149K | \$465K | \$322K | \$146K |
| | 2016 | \$819K | \$572K | \$260K | \$805K | \$548K | \$253K |
| EMEA | 2014 | \$376K | \$259K | \$122K | \$353K | \$249K | \$114K |
| | 2015 | \$589K | \$414K | \$209K | \$576K | \$401K | \$198K |
| | 2016 | \$968K | \$671K | \$336K | \$932K | \$651K | \$316K |
| US | 2014 | \$709K | \$496K | \$213K | \$729K | \$501K | \$217K |
| | 2015 | \$1,253K | \$872K | \$375K | \$1,267K | \$903K | \$375K |
| | 2016 | \$2,181K | \$1,538K | \$645K | \$2,192K | \$1,554K | \$654K |

Applying the **Running total** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|----------|----------|----------|----------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | HR | | Mobile | API |
| | | Web | Mobile | API | Web | | |
| APAC | 2014 | \$257K | \$435K | \$516K | \$762K | \$925K | \$999K |
| | 2015 | \$471K | \$806K | \$954K | \$1,419K | \$1,742K | \$1,888K |
| | 2016 | \$819K | \$1,391K | \$1,651K | \$2,456K | \$3,005K | \$3,258K |
| EMEA | 2014 | \$376K | \$635K | \$757K | \$1,111K | \$1,360K | \$1,473K |
| | 2015 | \$589K | \$1,003K | \$1,212K | \$1,788K | \$2,188K | \$2,386K |
| | 2016 | \$968K | \$1,639K | \$1,975K | \$2,907K | \$3,558K | \$3,873K |
| US | 2014 | \$709K | \$1,205K | \$1,417K | \$2,146K | \$2,647K | \$2,864K |
| | 2015 | \$1,253K | \$2,126K | \$2,500K | \$3,767K | \$4,670K | \$5,044K |
| | 2016 | \$2,181K | \$3,720K | \$4,365K | \$6,557K | \$8,111K | \$8,765K |

Difference

The **Difference** function calculates the difference between a cell value and value of the cell prior to it. This difference is calculated as $\text{Cell1} = \text{Cell1} - \text{null}$, $\text{Cell2} = \text{Cell2} - \text{Cell1}$, $\text{Cell3} = \text{Cell3} - \text{Cell2}$, and so on. Because $\text{Cell1} - \text{null} = \text{null}$, the Cell1 value is always empty. For example, suppose that you have the following data.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|--------|----------|----------|--------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | HR | | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | \$257K | \$178K | \$82K | \$246K | \$163K | \$74K |
| | 2015 | \$471K | \$335K | \$149K | \$465K | \$322K | \$146K |
| | 2016 | \$819K | \$572K | \$260K | \$805K | \$548K | \$253K |
| EMEA | 2014 | \$376K | \$259K | \$122K | \$353K | \$249K | \$114K |
| | 2015 | \$589K | \$414K | \$209K | \$576K | \$401K | \$198K |
| | 2016 | \$968K | \$671K | \$336K | \$932K | \$651K | \$316K |
| US | 2014 | \$709K | \$496K | \$213K | \$729K | \$501K | \$217K |
| | 2015 | \$1,253K | \$872K | \$375K | \$1,267K | \$903K | \$375K |
| | 2016 | \$2,181K | \$1,538K | \$645K | \$2,192K | \$1,554K | \$654K |

Applying the **Difference** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | | |
|--|------|------------------------------------|--------|---------|---------|----------|---------|---------|
| | | Service Line > Consumption Channel | | | | | | |
| Customer Region | Date | Billing | | HR | | | | |
| | | Web | Mobile | API | Web | Mobile | API | |
| APAC | 2014 | | | -\$78K | -\$96K | \$164K | -\$83K | -\$90K |
| | 2015 | | | -\$136K | -\$186K | \$317K | -\$143K | -\$176K |
| | 2016 | | | -\$247K | -\$312K | \$545K | -\$257K | -\$295K |
| EMEA | 2014 | | | -\$117K | -\$137K | \$231K | -\$104K | -\$135K |
| | 2015 | | | -\$176K | -\$204K | \$366K | -\$175K | -\$203K |
| | 2016 | | | -\$297K | -\$335K | \$595K | -\$281K | -\$335K |
| US | 2014 | | | -\$213K | -\$284K | \$517K | -\$228K | -\$284K |
| | 2015 | | | -\$381K | -\$498K | \$892K | -\$364K | -\$528K |
| | 2016 | | | -\$643K | -\$893K | \$1,547K | -\$638K | -\$900K |

Percentage Difference

The **Percentage Difference** function calculates the percent difference between a cell value and the value of the cell prior to it, divided by the value of the cell prior to it. This value is calculated as $\text{Cell1} = (\text{Cell1}-\text{null})/\text{null}$, $\text{Cell2} = (\text{Cell2}-\text{Cell1})/\text{Cell1}$, $\text{Cell3} = (\text{Cell3}/\text{Cell2})/\text{Cell2}$, and so on. Because $(\text{Cell1}-\text{null})/\text{null} = \text{null}$, the Cell1 value is always empty. For example, take the following rows.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|--------|----------|----------|--------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | | HR | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | \$257K | \$178K | \$82K | \$246K | \$163K | \$74K |
| | 2015 | \$471K | \$335K | \$149K | \$465K | \$322K | \$146K |
| | 2016 | \$819K | \$572K | \$260K | \$805K | \$548K | \$253K |
| EMEA | 2014 | \$376K | \$259K | \$122K | \$353K | \$249K | \$114K |
| | 2015 | \$589K | \$414K | \$209K | \$576K | \$401K | \$198K |
| | 2016 | \$968K | \$671K | \$336K | \$932K | \$651K | \$316K |
| US | 2014 | \$709K | \$496K | \$213K | \$729K | \$501K | \$217K |
| | 2015 | \$1,253K | \$872K | \$375K | \$1,267K | \$903K | \$375K |
| | 2016 | \$2,181K | \$1,538K | \$645K | \$2,192K | \$1,554K | \$654K |

Applying the **Percentage Difference** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|---------|---------|---------|---------|---------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | | HR | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | | -30.56% | -54.15% | 200.96% | -33.64% | -54.88% |
| | 2015 | | -28.91% | -55.61% | 213.06% | -30.67% | -54.71% |
| | 2016 | | -30.17% | -54.52% | 209.77% | -31.94% | -53.80% |
| EMEA | 2014 | | -31.03% | -52.93% | 189.54% | -29.52% | -54.34% |
| | 2015 | | -29.79% | -49.37% | 174.91% | -30.38% | -50.64% |
| | 2016 | | -30.68% | -49.86% | 177.00% | -30.16% | -51.51% |
| US | 2014 | | -29.99% | -57.15% | 243.08% | -31.27% | -56.68% |
| | 2015 | | -30.37% | -57.04% | 237.94% | -28.71% | -58.50% |
| | 2016 | | -29.48% | -58.06% | 239.84% | -29.10% | -57.92% |

Percent of Total

The **Percent of Total** function calculates the percentage the given cell represents of the sum of all of the cells included in the calculation. This percentage is calculated as $\text{Cell1} = \text{Cell1} / (\text{sum of all cells})$, $\text{Cell2} = \text{Cell2} / (\text{sum of all cells})$, and so on. For example, suppose that you have the following data.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|--------|----------|----------|--------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | | HR | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | \$257K | \$178K | \$82K | \$246K | \$163K | \$74K |
| | 2015 | \$471K | \$335K | \$149K | \$465K | \$322K | \$146K |
| | 2016 | \$819K | \$572K | \$260K | \$805K | \$548K | \$253K |
| EMEA | 2014 | \$376K | \$259K | \$122K | \$353K | \$249K | \$114K |
| | 2015 | \$589K | \$414K | \$209K | \$576K | \$401K | \$198K |
| | 2016 | \$968K | \$671K | \$336K | \$932K | \$651K | \$316K |
| US | 2014 | \$709K | \$496K | \$213K | \$729K | \$501K | \$217K |
| | 2015 | \$1,253K | \$872K | \$375K | \$1,267K | \$903K | \$375K |
| | 2016 | \$2,181K | \$1,538K | \$645K | \$2,192K | \$1,554K | \$654K |

Applying the **Percent of Total** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|--------|-------|--------|--------|-------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | | HR | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | 21.47% | 14.90% | 6.83% | 20.56% | 13.64% | 6.15% |
| | 2015 | 20.54% | 14.60% | 6.48% | 20.29% | 14.08% | 6.37% |
| | 2016 | 20.40% | 14.24% | 6.47% | 20.06% | 13.65% | 6.30% |
| EMEA | 2014 | 20.00% | 13.79% | 6.49% | 18.79% | 13.24% | 6.04% |
| | 2015 | 19.07% | 13.39% | 6.77% | 18.63% | 12.97% | 6.40% |
| | 2016 | 19.31% | 13.38% | 6.71% | 18.59% | 12.98% | 6.29% |
| US | 2014 | 19.61% | 13.72% | 5.88% | 20.17% | 13.86% | 6.00% |
| | 2015 | 19.38% | 13.49% | 5.79% | 19.59% | 13.96% | 5.79% |
| | 2016 | 19.38% | 13.66% | 5.73% | 19.48% | 13.81% | 5.81% |

Rank

The **Rank** function calculates the rank of the cell value compared to the values of the other cells included in the calculation. Rank always shows the highest value equal to 1 and lowest value equal to the count of cells included in the calculation. If there are two or more cells with equal values, they receive the same rank but are considered to take up their own spots in the ranking. Thus, the next highest value is pushed down in rank by the number of cells at the rank above it, minus one. For example, if you rank the values 5,3,3,4,3,2, their ranks are 1,3,3,2,3,6.

For example, suppose that you have the following data.

Sum of Billed Amount by Customer Region and Service Line

| Service Line | | | |
|-----------------|-----------|----------|----------|
| Customer Region | Marketing | HR | Billing |
| APAC | \$1,357K | \$3,023K | \$3,122K |
| EMEA | \$2,247K | \$3,788K | \$3,944K |
| US | \$4,657K | \$8,392K | \$8,282K |

Applying the **Rank** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

Sum of Billed Amount by Customer Region and Service Line

| Service Line | | | |
|-----------------|-----------|----|---------|
| Customer Region | Marketing | HR | Billing |
| APAC | 3 | 2 | 1 |
| EMEA | 3 | 2 | 1 |
| US | 3 | 1 | 2 |

Percentile

The **Percentile** function calculates the percent of the values of the cells included in the calculation that are at or below the value for the given cell.

This percent is calculated as follows.

```
percentile rank(x) = 100 * B / N
```

Where:

B = number of scores below x
N = number of scores

For example, suppose that you have the following data.

| Sum of Billed Amount by Date, Customer Region, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|----------|--------|----------|----------|--------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | HR | | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | \$257K | \$178K | \$82K | \$246K | \$163K | \$74K |
| | 2015 | \$471K | \$335K | \$149K | \$465K | \$322K | \$146K |
| | 2016 | \$819K | \$572K | \$260K | \$805K | \$548K | \$253K |
| EMEA | 2014 | \$376K | \$259K | \$122K | \$353K | \$249K | \$114K |
| | 2015 | \$589K | \$414K | \$209K | \$576K | \$401K | \$198K |
| | 2016 | \$968K | \$671K | \$336K | \$932K | \$651K | \$316K |
| US | 2014 | \$709K | \$496K | \$213K | \$729K | \$501K | \$217K |
| | 2015 | \$1,253K | \$872K | \$375K | \$1,267K | \$903K | \$375K |
| | 2016 | \$2,181K | \$1,538K | \$645K | \$2,192K | \$1,554K | \$654K |

Applying the **Percentile** function across the table rows, using **Table across** for **Calculate as**, gives you the following results.

| Sum of Billed Amount by Customer Region, Date, Consumption Channel, and Service Line | | | | | | | |
|--|------|------------------------------------|--------|-------|-------|--------|-------|
| | | Service Line > Consumption Channel | | | | | |
| Customer Region | Date | Billing | | HR | | | |
| | | Web | Mobile | API | Web | Mobile | API |
| APAC | 2014 | 88.89 | 66.67 | 33.33 | 77.78 | 55.56 | 22.22 |
| | 2015 | 88.89 | 66.67 | 33.33 | 77.78 | 55.56 | 22.22 |
| | 2016 | 88.89 | 66.67 | 33.33 | 77.78 | 55.56 | 11.11 |
| EMEA | 2014 | 88.89 | 66.67 | 22.22 | 77.78 | 55.56 | 11.11 |
| | 2015 | 88.89 | 66.67 | 22.22 | 77.78 | 55.56 | 11.11 |
| | 2016 | 88.89 | 66.67 | 22.22 | 77.78 | 55.56 | 11.11 |
| US | 2014 | 77.78 | 55.56 | 11.11 | 88.89 | 66.67 | 22.22 |
| | 2015 | 77.78 | 55.56 | 22.22 | 88.89 | 66.67 | 11.11 |
| | 2016 | 77.78 | 55.56 | 11.11 | 88.89 | 66.67 | 22.22 |

Ways to Apply Pivot Table Calculations

You can apply table calculations in the ways described following. Table calculations are applied to only one field at a time. Thus, if you have a pivot table with multiple values, calculations are only applied to the cells representing the field that you applied the calculation to.

Topics

- [Table Across \(p. 380\)](#)
- [Table Down \(p. 380\)](#)
- [Table Across Down \(p. 381\)](#)
- [Table Down Across \(p. 383\)](#)
- [Group Across \(p. 384\)](#)
- [Group Down \(p. 386\)](#)
- [Group Across Down \(p. 387\)](#)
- [Group Down Across \(p. 388\)](#)

Table Across

Using **Table across** applies the calculation across the rows of the pivot table, regardless of any grouping. This application is the default. For example, take the following pivot table.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

Applying the **Running total** function using **Table across** gives you the following results, with row totals in the last column.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|-----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$1,009K | \$1,195K | |
| | 2015 | \$1,137K | \$1,932K | \$2,293K | |
| | 2016 | \$1,997K | \$3,376K | \$4,014K | |
| EMEA | 2014 | \$932K | \$1,578K | \$1,880K | |
| | 2015 | \$1,511K | \$2,557K | \$3,088K | |
| | 2016 | \$2,461K | \$4,163K | \$5,011K | |
| US | 2014 | \$1,816K | \$3,074K | \$3,613K | |
| | 2015 | \$3,230K | \$5,502K | \$6,465K | |
| | 2016 | \$5,613K | \$9,584K | \$11,253K | |

Table Down

Using **Table down** applies the calculation down the columns of the pivot table, regardless of any grouping. For example, take the following pivot table.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

Applying the **Running total** function using **Table down** gives you the following results, with column totals in the last row.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|-----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,735K | \$1,205K | \$547K | |
| | 2016 | \$3,733K | \$2,584K | \$1,185K | |
| EMEA | 2014 | \$4,665K | \$3,230K | \$1,487K | |
| | 2015 | \$6,176K | \$4,276K | \$2,017K | |
| | 2016 | \$8,637K | \$5,978K | \$2,865K | |
| US | 2014 | \$10,454K | \$7,235K | \$3,404K | |
| | 2015 | \$13,684K | \$9,507K | \$4,367K | |
| | 2016 | \$19,297K | \$13,478K | \$6,036K | |

Table Across Down

Using **Table across down** applies the calculation across the rows of the pivot table, and then takes the results and reapplies the calculation down the columns of the pivot table. For example, take the following pivot table.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

Applying the **Running total** function using **Table across down** gives you the following results. In this case, totals are summed both down and across, with the grand total in the lower-right cell.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|-----------|-----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$1,009K | \$1,195K | |
| | 2015 | \$2,332K | \$3,127K | \$3,488K | |
| | 2016 | \$5,485K | \$6,864K | \$7,501K | |
| EMEA | 2014 | \$8,433K | \$9,079K | \$9,381K | |
| | 2015 | \$10,893K | \$11,939K | \$12,469K | |
| | 2016 | \$14,931K | \$16,633K | \$17,480K | |
| US | 2014 | \$19,297K | \$20,554K | \$21,093K | |
| | 2015 | \$24,323K | \$26,595K | \$27,558K | |
| | 2016 | \$33,171K | \$37,142K | \$38,811K | |

In this case, suppose that you apply the **Rank** function using **Table across down**. Doing so means that the initial ranks are determined across the table rows and then those ranks are in turn ranked down the columns. This approach gives you the following results.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|--------|-----|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| □ APAC | 2014 | 21 | 24 | 27 | |
| | 2015 | 13 | 18 | 25 | |
| | 2016 | 6 | 11 | 20 | |
| □ EMEA | 2014 | 16 | 19 | 26 | |
| | 2015 | 10 | 14 | 23 | |
| | 2016 | 4 | 8 | 17 | |
| □ US | 2014 | 7 | 12 | 22 | |
| | 2015 | 3 | 5 | 15 | |
| | 2016 | 1 | 2 | 9 | |

Table Down Across

Using **Table down across** applies the calculation down the columns of the pivot table. It then takes the results and reapplies the calculation across the rows of the pivot table. For example, take the following pivot table.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| □ APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| □ EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| □ US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

You can apply the **Running total** function using **Table down across** to get the following results. In this case, totals are summed both down and across, with the grand total in the bottom right cell.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | |
|--|------|-----------|-----------|-----------|
| Consumption Channel | | | | |
| Customer Region | Date | Web | Mobile | API |
| APAC | 2014 | \$599K | \$1,009K | \$1,195K |
| | 2015 | \$2,332K | \$3,127K | \$3,488K |
| | 2016 | \$5,485K | \$6,864K | \$7,501K |
| EMEA | 2014 | \$8,433K | \$9,079K | \$9,381K |
| | 2015 | \$10,893K | \$11,939K | \$12,469K |
| | 2016 | \$14,931K | \$16,633K | \$17,480K |
| US | 2014 | \$19,297K | \$20,554K | \$21,093K |
| | 2015 | \$24,323K | \$26,595K | \$27,558K |
| | 2016 | \$33,171K | \$37,142K | \$38,811K |

You can apply the **Rank** function using **Table down across** to get the following results. In this case, the initial ranks are determined down the table columns. Then those ranks are in turn ranked across the rows.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | |
|--|------|-----|--------|-----|
| Consumption Channel | | | | |
| Customer Region | Date | Web | Mobile | API |
| APAC | 2014 | 21 | 24 | 27 |
| | 2015 | 13 | 18 | 25 |
| | 2016 | 6 | 11 | 20 |
| EMEA | 2014 | 16 | 19 | 26 |
| | 2015 | 10 | 14 | 23 |
| | 2016 | 4 | 8 | 17 |
| US | 2014 | 7 | 12 | 22 |
| | 2015 | 3 | 5 | 15 |
| | 2016 | 1 | 2 | 9 |

Group Across

Using **Group across** applies the calculation across the rows of the pivot table within group boundaries, as determined by the second level of grouping applied to the columns. For example, if you group by field-2 and then by field-1, grouping is applied at the field-2 level. If you group by field-3, field-2, and field-1, grouping is again applied at the field-2 level. When there is no grouping, **Group across** returns the same results as **Table across**.

For example, take the following pivot table where columns are grouped by Service Line and then by Consumption Channel.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| □ APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| □ EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| □ US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

You can apply the **Running total** function using **Group across** to get the following results. In this case, the function is applied across the rows, bounded by the columns for each service category group. The Mobile columns display the total for both Consumption Channel values for the given Service Line, for the Customer Region and Date (year) represented by the given row. For example, the highlighted cell represents the total for the APAC region for 2012, for all Consumption Channel values in the Service Line named Billing.

| Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel | | | | | |
|--|------|------------------------------------|--------|-------------|--------|
| | | Service Line > Consumption Channel | | | |
| Customer Region | Date | □ Billing | | □ Marketing | |
| | | API | Mobile | API | Mobile |
| □ APAC | 2012 | \$23K | \$74K | | |
| | 2013 | \$45K | \$153K | \$3K | \$11K |
| | 2014 | \$82K | \$260K | \$31K | \$100K |
| □ EMEA | 2012 | \$22K | \$78K | | |
| | 2013 | \$50K | \$172K | \$4K | \$15K |
| | 2014 | \$122K | \$381K | \$66K | \$204K |
| □ US | 2012 | \$43K | \$140K | | |
| | 2013 | \$114K | \$382K | \$14K | \$48K |
| | 2014 | \$213K | \$709K | \$110K | \$370K |

Group Down

Using **Group down** applies the calculation down the columns of the pivot table within group boundaries, as determined by the second level of grouping applied to the rows. For example, if you group by field-2 and then by field-1, grouping is applied at the field-2 level. If you group by field-3, field-2, and field-1, grouping is again applied at the field-2 level. When there is no grouping, **Group down** returns the same results as **Table down**.

For example, take the following pivot table where rows are grouped by `Customer Region` and then by `Date (year)`.

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

You can apply the **Running total** function using **Group down** to get the following results. In this case, the function is applied down the columns, bounded by the rows for each `Customer Region` group. The 2014 rows display the total for all years for the given `Customer Region`, for the `Service Line` and `Consumption Channel` represented by the given column. For example, the highlighted cell represents the total for the APAC region, for the Billing service for the Mobile channel, for all the Date values (years) that display in the report.

Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel

| | | Service Line > Consumption Channel | | | |
|-----------------|------|------------------------------------|--------|-----------|--------|
| Customer Region | Date | Billing | | Marketing | |
| | | API | Mobile | API | Mobile |
| □ APAC | 2012 | \$23K | \$51K | | |
| | 2013 | \$68K | \$159K | \$3K | \$8K |
| | 2014 | \$149K | \$337K | \$34K | \$77K |
| □ EMEA | 2012 | \$22K | \$56K | | |
| | 2013 | \$72K | \$178K | \$4K | \$11K |
| | 2014 | \$194K | \$438K | \$70K | \$148K |
| □ US | 2012 | \$43K | \$97K | | |
| | 2013 | \$157K | \$365K | \$14K | \$34K |
| | 2014 | \$370K | \$861K | \$124K | \$294K |

Group Across Down

Using **Group across down** applies the calculation across the rows within group boundaries, as determined by the second level of grouping applied to the columns. Then the function takes the results and reapplyes the calculation down the columns of the pivot table. It does so within group boundaries as determined by the second level of grouping applied to the rows.

For example, if you group a row or column by field-2 and then by field-1, grouping is applied at the field-2 level. If you group by field-3, field-2, and field-1, grouping is again applied at the field-2 level. When there is no grouping, **Group across down** returns the same results as **Table across down**.

For example, take the following pivot table where columns are grouped by **Service Line** and then by **Consumption Channel**. Rows are grouped by **Customer Region** and then by **Date (year)**.

| | | Consumption Channel | | | |
|-----------------|------|---------------------|----------|----------|--|
| Customer Region | Date | Web | Mobile | API | |
| | | \$599K | \$410K | \$186K | |
| □ APAC | 2014 | | | | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| □ EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| □ US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

You can apply the **Running total** function using **Group across down** to get the following results. In this case, totals are summed both down and across within the group boundaries. Here, these boundaries are Service Line for the columns and Customer Region for the rows. The grand total appears in the lower-right cell for the group.

Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel

Service Line > Consumption Channel

| Customer Region | Date | Billing | | Marketing | |
|-----------------|------|---------|----------|-----------|--------|
| | | API | Mobile | API | Mobile |
| APAC | 2012 | \$23K | \$201K | | |
| | 2013 | \$68K | \$309K | \$3K | \$42K |
| | 2014 | \$149K | \$487K | \$34K | \$111K |
| EMEA | 2012 | \$22K | \$250K | | |
| | 2013 | \$72K | \$372K | \$4K | \$81K |
| | 2014 | \$194K | \$632K | \$70K | \$219K |
| US | 2012 | \$43K | \$466K | | |
| | 2013 | \$157K | \$734K | \$14K | \$157K |
| | 2014 | \$370K | \$1,231K | \$124K | \$418K |

You can apply the **Rank** function using **Group across down** to get the following results. In this case, the function is first applied across the rows bounded by each Service Line group. The function is then applied again to the results of that first calculation, this time applied down the columns bounded by each Customer Region group.

Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel

Service Line > Consumption Channel

| Customer Region | Date | Billing | | Marketing | |
|-----------------|------|---------|--------|-----------|--------|
| | | API | Mobile | API | Mobile |
| APAC | 2012 | 6 | 4 | | |
| | 2013 | 5 | 2 | 4 | 3 |
| | 2014 | 3 | 1 | 2 | 1 |
| EMEA | 2012 | 6 | 4 | | |
| | 2013 | 5 | 2 | 4 | 3 |
| | 2014 | 3 | 1 | 2 | 1 |
| US | 2012 | 6 | 5 | | |
| | 2013 | 4 | 2 | 4 | 3 |
| | 2014 | 3 | 1 | 2 | 1 |

Group Down Across

Using **Group down across** applies a calculation down the columns within group boundaries, as determined by the second level of grouping applied to the rows. Then Amazon QuickSight takes the results and reapplies the calculation across the rows of the pivot table. Again, it reapplies the calculation within group boundaries as determined by the second level of grouping applied to the columns.

For example, if you group a row or column by field-2 and then by field-1, grouping is applied at the field-2 level. If you group by field-3, field-2, and field-1, grouping is again applied at the field-2 level. When there is no grouping, **Group down across** returns the same results as **Table down across**.

For example, take the following pivot table. Columns are grouped by **Service Line** and then by **Consumption Channel**. Rows are grouped by **Customer Region** and then by **Date** (year).

| Sum of Billed Amount by Customer Region, Date, and Consumption Channel | | | | | |
|--|------|---------------------|----------|----------|--|
| | | Consumption Channel | | | |
| Customer Region | Date | Web | Mobile | API | |
| □ APAC | 2014 | \$599K | \$410K | \$186K | |
| | 2015 | \$1,137K | \$795K | \$361K | |
| | 2016 | \$1,997K | \$1,379K | \$638K | |
| □ EMEA | 2014 | \$932K | \$646K | \$302K | |
| | 2015 | \$1,511K | \$1,046K | \$531K | |
| | 2016 | \$2,461K | \$1,702K | \$848K | |
| □ US | 2014 | \$1,816K | \$1,257K | \$539K | |
| | 2015 | \$3,230K | \$2,272K | \$963K | |
| | 2016 | \$5,613K | \$3,971K | \$1,669K | |

You can apply the **Running total** function using **Group down across** to get the following results. In this case, totals are summed both down and across within the group boundaries. In this case, these are **Service Category** for the columns and **Customer Region** for the rows. The grand total is in the lower-right cell for the group.

| Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel | | | | | |
|--|------|------------------------------------|----------|-------------|--------|
| | | Service Line > Consumption Channel | | | |
| Customer Region | Date | □ Billing | | □ Marketing | |
| | | API | Mobile | API | Mobile |
| □ APAC | 2012 | \$23K | \$201K | | |
| | 2013 | \$68K | \$309K | \$3K | \$42K |
| | 2014 | \$149K | \$487K | \$34K | \$111K |
| □ EMEA | 2012 | \$22K | \$250K | | |
| | 2013 | \$72K | \$372K | \$4K | \$81K |
| | 2014 | \$194K | \$632K | \$70K | \$219K |
| □ US | 2012 | \$43K | \$466K | | |
| | 2013 | \$157K | \$734K | \$14K | \$157K |
| | 2014 | \$370K | \$1,231K | \$124K | \$418K |

You can apply the **Rank** function using **Group down across** to get the following results. In this case, the function is first applied down the columns bounded by each *Customer Region* group. The function is then applied again to the results of that first calculation, this time applied across the rows bounded by each *Service Line* group.

| Sum of Billed Amount by Customer Region, Date, Service Line, and Consumption Channel | | | | | | |
|--|------|------------------------------------|--------|-----------|--------|--|
| | | Service Line > Consumption Channel | | | | |
| Customer Region | Date | Billing | | Marketing | | |
| | | API | Mobile | API | Mobile | |
| APAC | 2012 | 6 | 4 | | | |
| | 2013 | 5 | 2 | 4 | 3 | |
| | 2014 | 3 | 1 | 2 | 1 | |
| EMEA | 2012 | 6 | 4 | | | |
| | 2013 | 5 | 2 | 4 | 3 | |
| | 2014 | 3 | 1 | 2 | 1 | |
| US | 2012 | 6 | 5 | | | |
| | 2013 | 4 | 2 | 4 | 3 | |
| | 2014 | 3 | 1 | 2 | 1 | |

Pivot Table Limitations

The following limitations apply to pivot tables:

- You can create pivot table calculations only on nonaggregated values. For example, if you create a calculated field that is a sum of a measure, you can't also add a pivot table calculation to it.
- If you are sorting by a custom metric, you can't add a table calculation until you remove the custom metric sort.
- If you are using a table calculation and then add a custom metric, you can't sort by the custom metric.
- Totals and subtotals are blank for table calculations on metrics aggregated by distinct count.

Pivot Table Best Practices

It's best to deploy a minimal set of rows, columns, metrics, and table calculations, rather than offering all possible combinations in one pivot table. If you include too many, you risk overwhelming the viewer and you can also run into the computational limitations of the underlying database.

To reduce the level of complexity and reduce the potential for errors, you can take the following actions:

- Apply filters to reduce the data included in for the visual.
- Use fewer fields in the **Row** and **Column** field wells.
- Use as few fields as possible in the **Values** field well.
- Create additional pivot tables so that each displays fewer metrics.

In some cases, there's a business need to examine many metrics in relation to each other. In these cases, it can be better to use multiple visuals on the same dashboard, each showing a single metric. You can reduce the size of the visuals on the dashboard, and colocate them to form a grouping. If a decision

the viewer makes based on one visual creates the need for a different view, you can deploy custom URL actions to launch another dashboard according to the choices made by the user.

It's best to think of visuals as building blocks. Rather than using one visual for multiple purposes, use each visual to facilitate one aspect of a larger business decision. The viewer should have enough data to make a well-informed decision, without being overwhelmed by the inclusion of all possibilities.

Using Scatter Plots

Use scatter plots to visualize two or three measures for a dimension.

Each bubble on the scatter plot represents one item in the dimension. The X and Y axes represent two different measures that apply to the dimension. A bubble appears on the chart at the point where the values for the two measures for an item in the dimension intersect. Optionally, you can also use bubble size to represent an additional measure.

Scatter plots show up to 50 data points for the intersection of the X and Y axis values for visuals that don't use group/color. For visuals that do use group/color, scatter plots show up to 2500 data points. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

The icon for a scatter plot is as follows:



Scatter Plot Features

Use the following table to understand the features supported by scatter plots.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|--|--|
| Changing the legend display | Yes, with exceptions | Scatter plots display a legend if you have the Group/Color field well populated. | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Yes | You can set the range for both the X and Y axes. | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | Yes | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude a bubble in a scatter plot, except when you are using a date field as a dimension. In that case, you can only focus on a bubble, not exclude it. | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | No | | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the fields you choose for the X axis, Y axis, and size, and can't | Changing Field Aggregation (p. 288) |

| Feature | Supported? | Comments | For More Information |
|--------------------|------------|---|---|
| | | apply aggregation to the field you choose for the group/color. | |
| Adding drill-downs | Yes | You can add drill-down levels to the Group/Color field well. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Creating a Scatter Plot

Use the following procedure to create a scatter plot.

1. On the analysis page, choose **Visualize** on the tool bar.
 2. Choose **Add** on the application bar, and then choose **Add visual**.
 3. On the **Visual types** pane, choose the scatter plot icon.
 4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.
- To create a scatter plot, drag a measure to the **X axis** field well, a measure to the **Y axis** field well, and a dimension to the **Group/Color** field well. To represent another measure with bubble size, drag that measure to the **Size** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **Group/Color** field well. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Using Tabular Reports

Use tabular reports to see a customized table view of your data.

To create a table visual, choose at least one field of any data type. You can add as many columns as you need. Plus, you can add calculated columns.

The icon for a table is as follows.



Tabular Report Features

Tabular reports don't display a legend. You can hide or display the title on a tabular report. You can also hide or display totals, and choose to show totals at the top or the bottom of the table.

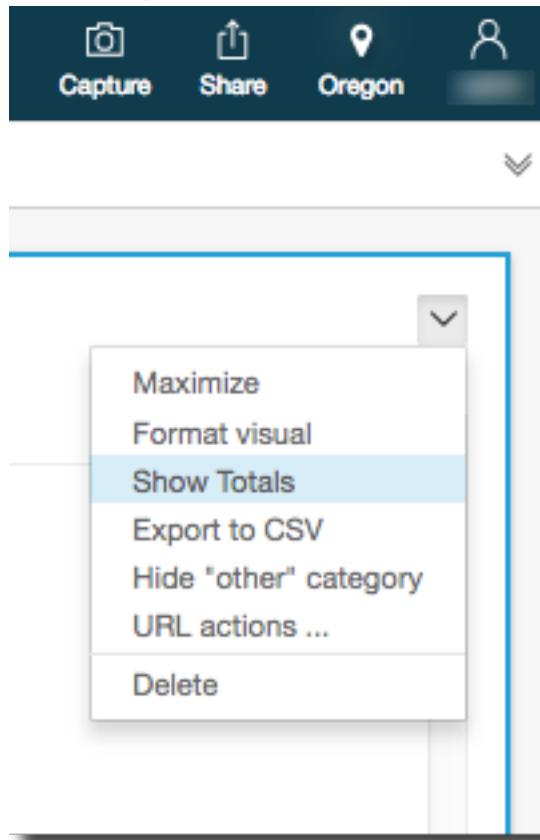
Use the following table to understand the features supported by tabular reports.

| Feature | Supported? | For More Information |
|-----------------------------|------------|--|
| Changing the legend display | No | Customizing the Visual Legend (p. 266) |

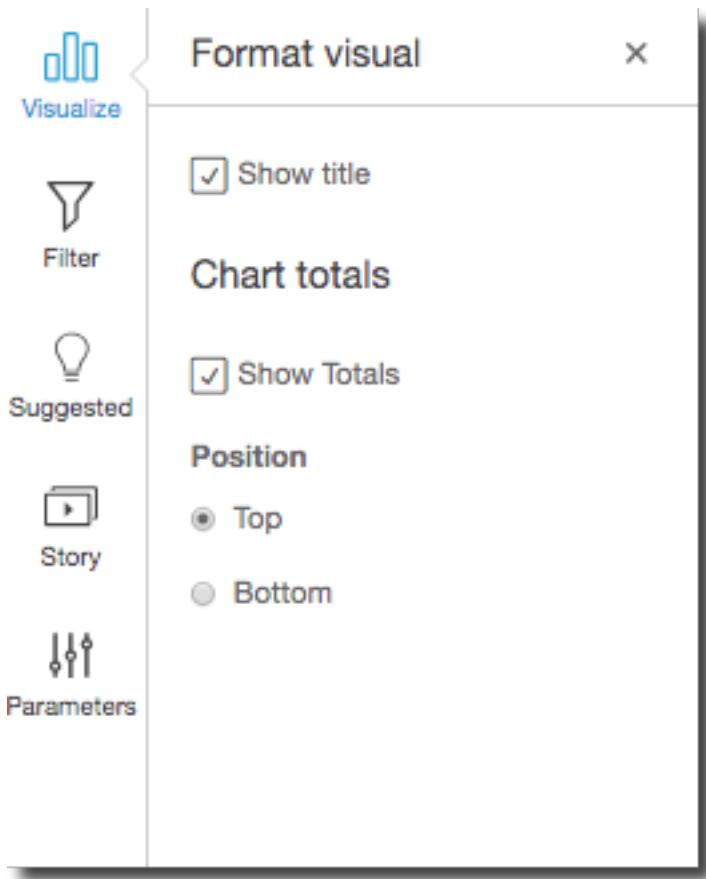
| Feature | Supported? | For More Information |
|------------------------------------|------------|---|
| Changing the title display | Yes | Customizing a Visual Title (p. 265) |
| Sorting | Yes | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Calculated fields and aggregations | Yes | Changing Field Aggregation (p. 288) |
| Adding drill-downs | No | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |
| Show/hide total | Yes | Use Totals on a Tabular Report (p. 393) |

Use Totals on a Tabular Report

You can show or hide totals on a tabular report. Use the on-visual menu on the top right of the visual to access the option to **Show Totals** or **Hide Totals**.



You can show totals at the top or the bottom of the visual. Use the on-visual menu to access the option for **Format visual**. If you enable **Show Totals**, you will see the options for **Top** and **Bottom** locations.



Tabular reports can display up to 200 columns.

Creating a Tabular Report

Use the following procedure to create a tabular report (a table visual).

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.
3. On the **Visual types** pane, choose the table icon.
4. From the **Fields list** pane, choose the fields that you want to use. If you want to add a calculated field, choose **Add** on the application bar, and then choose **Add calculated field**.

To create a non-aggregated view of the data, add fields only to the **Value** field well. This shows data without any aggregations.

To create an aggregated view of the data, choose the fields that you want to aggregate by, and then add them to the **Group by** field well.

Using Tree Maps

Use tree maps to visualize one or two measures for a dimension.

Each rectangle on the tree map represents one item in the dimension. Rectangle size represents the proportion of the value for the selected measure that the item represents compared to the whole for the

dimension. You can optionally use rectangle color to represent another measure for the item. Rectangle color represents where the value for the item falls in the range for the measure, with darker colors indicating higher values and lighter colors indicating lower ones.

Tree maps show up to 100 data points for the group by field. For more information about how we handle data that falls outside display limits, see [Display Limits in Visuals \(p. 343\)](#).

The icon for a tree map is as follows:



Tree Map Features

Use the following table to understand the features supported by tree maps.

| Feature | Supported? | Comments | For More Information |
|-----------------------------------|----------------------|--|--|
| Changing the legend display | Yes | | Customizing the Visual Legend (p. 266) |
| Changing the title display | Yes | | Customizing a Visual Title (p. 265) |
| Changing the axis range | Not applicable | | Changing the Visual Scale with the Axis Range (p. 274) |
| Changing the visual colors | No | | Changing Visual Colors in Amazon QuickSight (p. 292) |
| Focusing on or excluding elements | Yes, with exceptions | You can focus on or exclude a rectangle from a tree map, except when you are using a date field as the dimension. In that case, you can only focus on a rectangle, not exclude it. | Focusing on Visual Elements (p. 263) Excluding Visual Elements (p. 264) |
| Sorting | Yes | You can sort on the fields you choose for size, color, or to group by. | Sorting Visual Data in Amazon QuickSight (p. 298) |
| Field aggregation | Yes | You must apply aggregation to the fields you choose for size and color, and can't apply aggregation to the field you choose to group by. | Changing Field Aggregation (p. 288) |
| Adding drill-downs | Yes | You can add drill-down levels to the Group by field well. | Adding Drill-Downs to Visual Data in Amazon QuickSight (p. 334) |

Create a Tree Map

Use the following procedure to create a tree map.

1. On the analysis page, choose **Visualize** on the tool bar.
2. Choose **Add** on the application bar, and then choose **Add visual**.

3. On the **Visual types** pane, choose the tree map icon.
4. From the **Fields list** pane, drag the fields that you want to use to the appropriate field wells. Typically, you want to use dimension or measure fields as indicated by the target field well. If you choose to use a dimension field as a measure, the **Count** aggregate function is automatically applied to it to create a numeric value.

To create a tree map, drag a measure to the **Size** field well and a dimension to the **Group by** field well. Optionally, drag another measure to the **Color** field well.
5. (Optional) Add drill-down layers by dragging one or more additional fields to the **Group by** field well. For more information about adding drill-downs, see [Adding Drill-Downs to Visual Data in Amazon QuickSight \(p. 334\)](#).

Working with ML Insights

Amazon QuickSight uses machine learning to help you uncover hidden insights and trends in your data, identify key drivers, and forecast business metrics. You can also consume these insights in natural language narratives embedded in dashboards.

Using machine learning (ML) and natural language capabilities, Amazon QuickSight Enterprise Edition takes you beyond descriptive and diagnostic analysis, and launches you into forecasting and decision-making. You can understand your data at a glance, share your findings, and discover the best decisions to achieve your goals. You can do this without developing teams and technology to create the necessary machine learning models and algorithms.

You likely have already built visualizations that answer questions about what happened, when, where, and provide drill down for investigation and identification of patterns. With ML insights, you can avoid spending hours manually analyzing and investigating. You can select from a list of customized context-sensitive narratives, called *auto-narratives*, and add them to your analysis. In addition to choosing auto-narratives, you can choose to view forecasts, anomalies, and factors contributing to these. You can also add auto-narratives that explain the key takeaways in plain language, providing a single data-driven truth for your company.

As time passes and data flows through the system, Amazon QuickSight continually learns so it can deliver ever more pertinent insights. Instead of deciding what the data means, you can decide what to do with the information it provides.

With a shared foundation based on machine learning, all of your analysts and stakeholders can see trends, anomalies, forecasts, and custom narratives built on millions of metrics. They can see root causes, consider forecasts, evaluate risks, and make well-informed, justifiable decisions.

You can create a dashboard like this with no manual analysis, no custom development skills, and no understanding of machine learning modeling or algorithms. All this capability is built into Amazon QuickSight Enterprise Edition.

Note

Machine learning capabilities are used as needed throughout the product. Features that actively use machine learning are labeled as such.

With insights, Amazon QuickSight introduces three major features:

- **ML-powered anomaly detection** – Amazon QuickSight uses Amazon's proven machine learning technology to continuously analyze all your data to detect anomalies. You can identify the top contributors to any significant change in your business metrics, such as higher-than-expected sales or a dip in your website traffic. Amazon QuickSight uses the Random Cut Forest algorithm on millions of metrics and billions of data points. Doing this enables you to get deep insights that are often buried in the aggregates, inaccessible through manual analysis.
- **ML-powered forecasting** – Amazon QuickSight enables nontechnical users to confidently forecast their key business metrics. The built-in ML Random Cut Forest algorithm automatically handles complex real-world scenarios such as detecting seasonality and trends, excluding outliers, and imputing missing values. You can interact with the data with point-and-click simplicity.
- **Auto-narratives** – By using automatic narratives in Amazon QuickSight, you can build rich dashboards with embedded narratives to tell the story of your data in plain language. Doing this can save hours of sifting through charts and tables to extract the key insights for reporting. It also creates a shared understanding of the data within your organization so you make decisions faster. You can use the suggested auto-narrative, or you can customize the computations and language to meet your unique requirements. Amazon QuickSight is like providing a personal data analyst to all of your users.

Topics

- [Understanding the ML Algorithm Used by Amazon QuickSight \(p. 398\)](#)
- [Data Set Requirements for Using ML Insights with Amazon QuickSight \(p. 400\)](#)
- [Working with Insights in Amazon QuickSight \(p. 401\)](#)
- [Creating Auto-narratives with Amazon QuickSight \(p. 405\)](#)
- [Detecting Anomalies with Amazon QuickSight \(p. 415\)](#)
- [Forecasting and Creating What-If Scenarios with Amazon QuickSight \(p. 419\)](#)

Understanding the ML Algorithm Used by Amazon QuickSight

Amazon QuickSight uses a built-in version of the Random Cut Forest (RCF) algorithm. RCF is an unsupervised algorithm for detecting spikes in time series data, breaks in periodicity or seasonality, and data point exceptions.

Note

You don't need any technical experience in machine learning to use the ML-powered features in &QS;. This section dives into the technical aspects of the algorithm, and isn't required reading to use the features. We're providing this content for those who want the technical details about how it works.

A human can easily distinguish a data point that stands out from the rest of the data. RCF does the same thing by building a "forest" of decision trees, and then monitoring how new data points change the forest. As Amazon QuickSight samples the data, RCF assigns each data point an anomaly score. It gives higher scores to data points that look anomalous. What qualifies as an anomaly depends on the application. Amazon QuickSight identifies a data point as anomalous when its score is significantly different from the recent points.

The idea is to create a forest where each decision tree grows out of a partition of the data sampled for training the algorithm. Each tree builds a specific type of binary space partitioning tree on the samples. In Amazon QuickSight, the anomaly score assigned to a data point by the tree is, in approximation, inversely proportional to the resulting depth of the point in the tree. The random cut forest assigns an anomaly score by computing the average score from each constituent tree and scaling the result with respect to the sample size. The RCF algorithm is based on the one described in the whitepaper [Robust Random Cut Forest Based Anomaly Detection On Streams](#).

Topics

- [What Is RCF? \(p. 398\)](#)
- [Streaming and Connections to Anomaly Detection and Forecasting \(p. 399\)](#)
- [What's the Difference Between Anomaly Detection and Forecasting? \(p. 399\)](#)
- [How RCF Is Applied to Detect Anomalies \(p. 399\)](#)
- [How RCF Is Applied to Generate Forecasts \(p. 399\)](#)
- [References for Working with Machine Learning and RCF \(p. 400\)](#)

What Is RCF?

The algorithm called *random forest* (RF) is a widely used and successful technique in machine learning. It builds a collection of models, where a model corresponds to a decision tree—thus the name forest. However, random forests can't be easily updated in an incremental manner, so for incremental updating there was a need to create a new algorithm.

A *random cut forest* (RCF) is a special type of random forest, where the variables in tree construction are designed to allow incremental updates. Random cut forests can work as a synopsis or sketch of a dynamic data stream (or a time-indexed sequence of numbers). Questions about the stream can be answered from that synopsis.

Streaming and Connections to Anomaly Detection and Forecasting

A *streaming algorithm* is an online algorithm with a small memory footprint. An online algorithm makes its decision about the input point indexed by time t before it sees the $(t+1)$ -st point. The small memory allows nimble algorithms that can produce answers with low latency and allow a user to interact with the data.

Respecting the ordering imposed by time, as in an *online* algorithm, is necessary in anomaly detection and forecasting. If we already know what will happen the day after tomorrow, then predicting what happens tomorrow isn't a forecast—it's just interpolating an unknown missing value. Similarly, a new product introduced today can be an anomaly, but it doesn't necessarily remain an anomaly at the end of the next quarter.

What's the Difference Between Anomaly Detection and Forecasting?

Anomaly detection answers questions like "What happened that doesn't usually happen?" Forecasting answers the question "If everything continues to happen as expected, what happens in the future?" The math that allows forecasting also enables us to ask "If a few things change, what happens then?"

Both anomaly detection and forecasting begin by examining the current known data points. Amazon QuickSight anomaly detection begins with what is known so it can establish what is outside the known set, and identify those data points as anomalous. Amazon QuickSight forecasting excludes the anomalous data points, and sticks with the known pattern. Forecasting focuses on the established pattern of data distribution. In contrast, anomaly detection focuses on the data points that deviate from what is expected. Each method approaches decision-making from a different direction.

How RCF Is Applied to Detect Anomalies

An *anomaly* is a data point that draws your attention away from normal points—think of an image of a red flower in a field of yellow flowers. This "displacement of attention" is encoded in the (expected) position of a tree (that is, a model in RCF) that would be occupied by the input point. This is expressed as a score. The votes or scores of the different models are aggregated because each of the models by itself is a weak predictor.

The whitepaper [Random Cut Forest Based Anomaly Detection On Streams](#) provides multiple examples of this state-of-the-art online anomaly detection (time-series anomaly detection). RCFs are used on contiguous segments or "shingles" of data, where the data in the immediate segment acts as a context for the most recent one. Previous versions of RCF-based anomaly-detection algorithms score an entire shingle. The algorithm in Amazon QuickSight also provides an approximate location of the anomaly in the current extended context. This approximate location can be useful in the scenario where there is delay in detecting the anomaly. Delays occur because any algorithm needs to characterize "previously seen deviations" to "anomalous deviations," which can unfold over some time.

How RCF Is Applied to Generate Forecasts

To forecast the next value in a stationary time sequence, the RCF algorithm answers the question "What would be the most likely completion, after we have a candidate value?" It uses a single tree in RCF to

perform a search for the best candidate. The candidates across different trees are aggregated, because each tree by itself a weak predictor. The aggregation also allows the generation of quantile errors. This process is repeated t times to predict the t -th value in the future.

The algorithm in Amazon QuickSight is called *BIFOICAL*. It uses two RCFs to create a CALibrated BI-FOrest architecture. The first RCF is used to filter out anomalies and provide a weak forecast, which is corrected by the second. Overall, this approach provides significantly more robust forecasts in comparison to other widely available algorithms such as ETS.

The number of parameters in the Amazon QuickSight forecasting algorithm is significantly fewer than for other widely available algorithms. This allows it to be useful out of the box, without human adjustment for a larger number of time series data points. As more data accumulates in a particular time series, the forecasts in Amazon QuickSight can adjust to data drifts and changes of pattern. For time series that show trends, trend detection is performed first to make the series stationary. The forecast of that stationary sequence is projected back with the trend.

Because the algorithm relies on an efficient online algorithm (RCF), it can support interactive "what-if" queries. In these, some of the forecasts can be altered and treated as hypotheticals to provide conditional forecasts. This is the origin of the ability to explore "what-if" scenarios during analysis.

References for Working with Machine Learning and RCF

To learn more about machine learning and this algorithm, we suggest the following resources:

- The article [Robust Random Cut Forest \(RRCF\): A No Math Explanation](#) provides a lucid explanation without the mathematical equations.
- The book [The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition \(Springer Series in Statistics\)](#) provides a thorough foundation on machine learning.
- [Random Cut Forest Based Anomaly Detection On Streams](#), a scholarly whitepaper with examples of both anomaly detection and forecasting.

A different approach to RCF appears in other AWS services. For more information, see the following:

- *Amazon Kinesis Data Analytics SQL Reference*: [RANDOM_CUT_FOREST](#) and [RANDOM_CUT_FOREST_WITH_EXPLANATION](#)
- *Amazon SageMaker Developer Guide*: [Random Cut Forest \(RCF\) Algorithm](#). This approach is also explained in [The Random Cut Forest Algorithm](#), a chapter in *Machine Learning for Business* (October 2018).

Data Set Requirements for Using ML Insights with Amazon QuickSight

To begin using the machine learning capabilities of Amazon QuickSight, you need to connect to or import your data. You can use an existing Amazon QuickSight data set or create a new one. You can directly query your SQL-compatible source, or ingest the data into SPICE.

The data must have the following properties:

- At least one metric (for example, sales, orders, shipped units, sign ups, and so on).
- At least one category dimension (for example, product category, channel, segment, industry, and so on). Categories with NULL values are ignored.

- Features like anomaly detection and forecasting work best with more data. Make sure that your data set has enough historical data for optimal results. For example, if the grain of your data is daily, you need at least 38 days of data. If the grain is monthly, you need at least 43 months of data. Following are the requirements for each time grain:
 - Years: 32 data points
 - Quarters: 35 data points
 - Months: 43 data points
 - Weeks: 35 data points
 - Days: 38 data points
 - Hours: 39 data points
 - Minutes: 46 data points
- If you want to analyze anomalies or forecasts, you also need at least one date dimension.

If you don't have a data set to get started, you can download this sample data set: [ML Insights Sample Dataset VI](#). After you have a data set ready, create a new analysis from the data set.

Working with Insights in Amazon QuickSight

In Amazon QuickSight, you can add ready-to-use analytical computations to your analysis in the form of widgets. You can work with insights in two ways:

- Suggested insights

Amazon QuickSight creates a list of suggested insights based on its interpretation of the data you put into your visuals. The list changes based on context. In other words, you can see different suggestions depending on what fields you add to your visual and what type of visual you choose. For example, if you have a time-series visualization, your insights might include period-over-period changes, anomalies, and forecasts. As you add more visualizations to your analysis, you generate more suggested insights.

- Custom insights

Custom insights enable you to create your own computation, using your own words to give context to the fields that appear in the widget. When you create a custom insight, you add it to the analysis, and then choose what type of calculation you want to use. Then, you can add text and formatting to make it look how you want. You can also add more fields, calculations, and parameters.

You can add any combination of suggested and custom insights to your analysis, to create the decision-making environment that best serves your purposes.

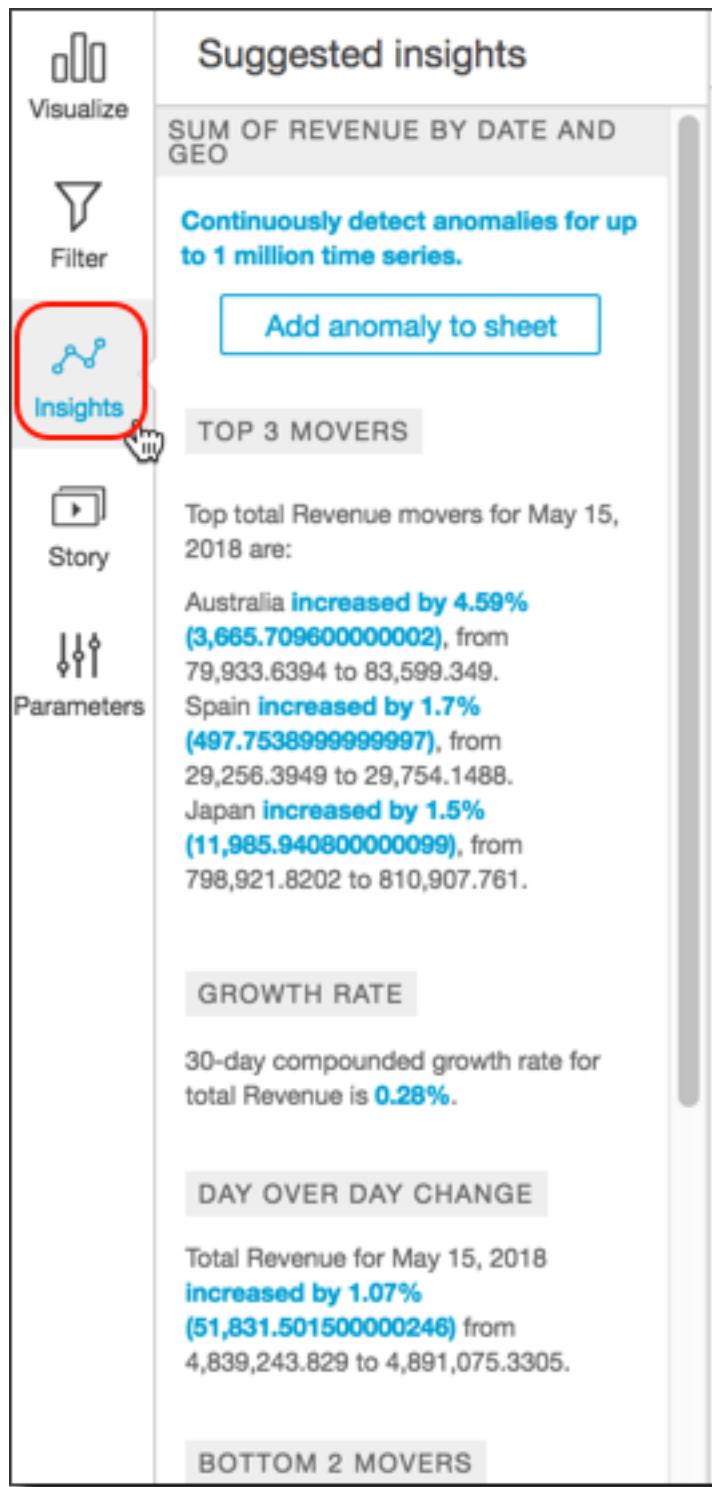
Topics

- [Adding Suggested Insights \(p. 401\)](#)
- [Adding Custom Insights to Your Analysis \(p. 404\)](#)

Adding Suggested Insights

Use the following procedure to add suggested insights to your analysis.

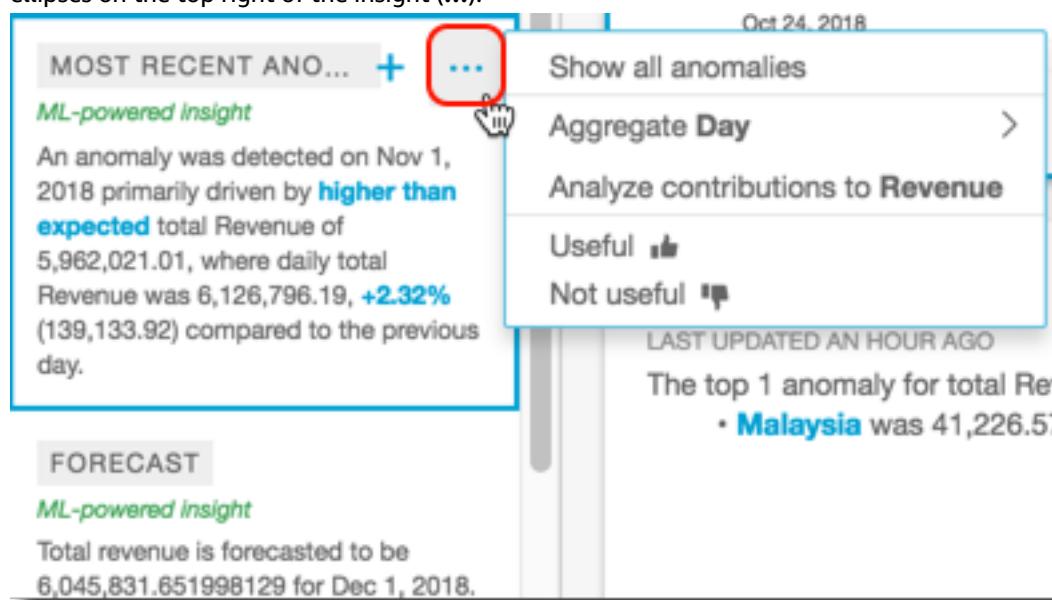
1. Begin with an analysis that has a few fields added to a visual.
2. On the left, choose **Insights**. The **Insights** panel opens and displays a list of ready-to-use suggested insights.



Each visual also displays a small box on its top border to display how many insights are available for that visual. You can choose this box to open the **Insights** panel, and it opens to whatever view you most recently had open.

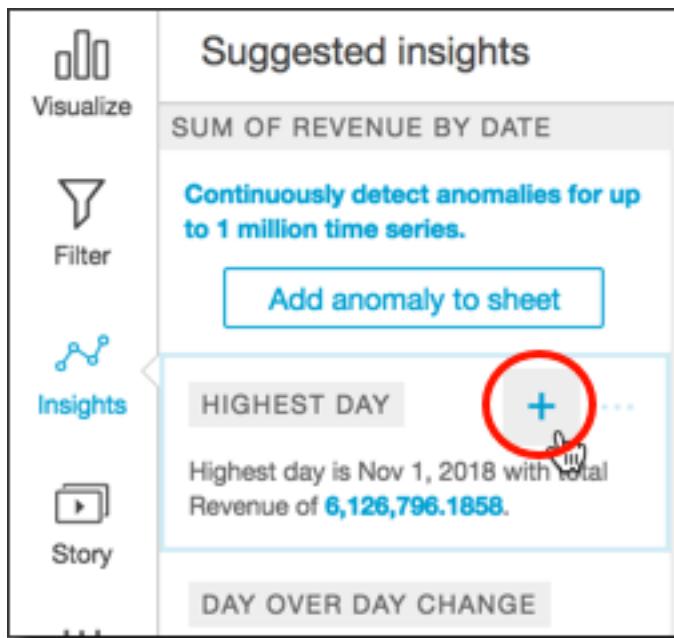
You can scroll down to preview more insights. This list is generated each time you change your visual. If you make changes, check **Insights** to see what is new.

3. (Optional) Open the context menu with more options for one of the insights. To do this, choose the ellipses on the top right of the insight (...).



The options are different for each type of insight. The options that you can interact with include the following:

- **Change the time series aggregation** – to year, quarter, month, week, day, hour, or minute.
 - **Analyze contributions to metrics** – choose contributors and a time frame to analyze.
 - **Show all anomalies** – to browse anomalies in this time frame.
 - **Edit forecast** – to choose forecast length, prediction interval, and seasonality.
 - **Focus on or Exclude** – to zoom in or zoom out on your dimensional data.
 - **Show details** – to view more information about a recent anomaly.
 - Provide feedback on the usefulness of the insight in your analysis.
4. Add a suggested insight to your analysis by choosing the plus sign (+) near the insight title.



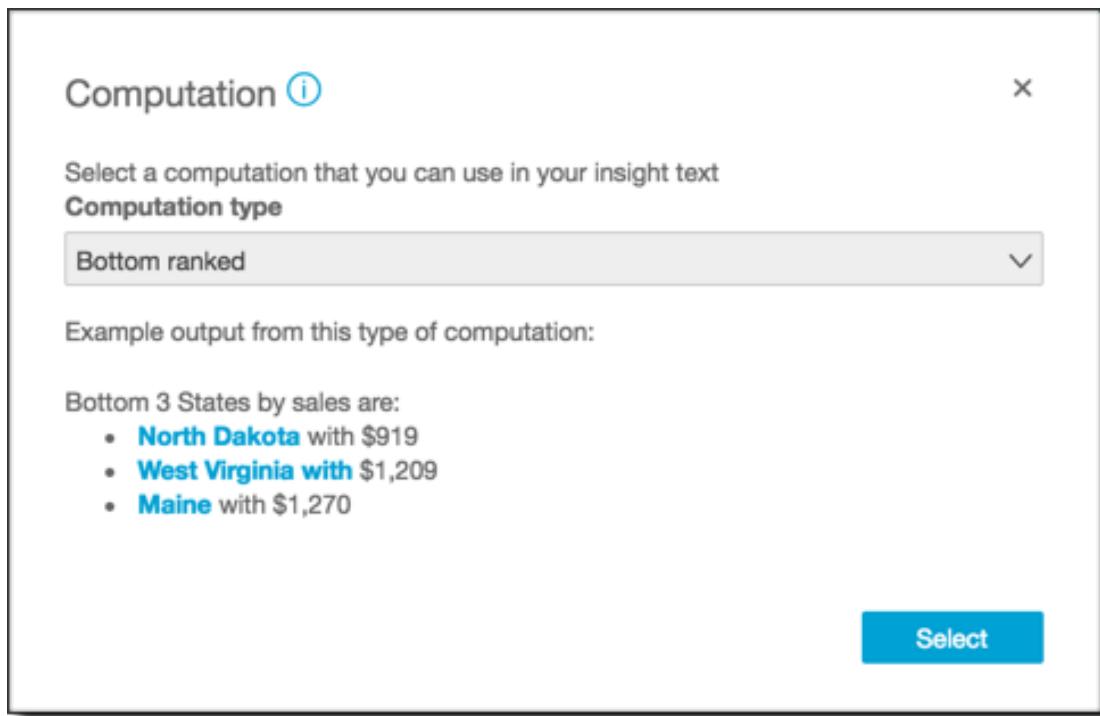
5. (Optional) After you add an insight to your analysis, customize the narrative that you want it to display. To do this, choose the v-shaped on-visual menu, then choose **Customize narrative**. For more information, see [Creating Auto-narratives with Amazon QuickSight \(p. 405\)](#).
If your insight is for anomalies, you can also change the settings for the anomaly detection. To do this, choose **Configure anomaly**. For more information, see [Using ML-Powered Anomaly Detection \(p. 416\)](#).
6. (Optional) To remove the insight from your analysis, choose the v-shaped on-visual menu at the top right of the visual. Then choose **Delete**.

Adding Custom Insights to Your Analysis

If you don't want to use any of the suggested insights, you can create your own custom insight. Use the following procedure to create a custom computational insight.

1. Start with an existing analysis. On the top menu bar, choose **Add+**. Then choose **Add Insight**.

A container for the new insight is added to the analysis. The following screen appears.



2. Do one of the following:
 - Choose the computation that you want to use from the list. As you choose each item, an example of that insight's output displays. When you find the one you want to use, choose **Select**.
 - Alternatively, you can exit this screen and customize the insight manually. An unconfigured insight has a **Customize insight** button. Choose the button to open the **Configure narrative** screen. For more information on using the expression editor, see [Creating Auto-narratives with Amazon QuickSight \(p. 405\)](#).

Because you are initiating the creation of the insight, it is not based on an existing visual. When the insight is added to the analysis, it displays a note showing what kind of data it needs to complete your request. For example, it might ask for **1 dimension in Time**. In this case, you add a dimension to the **Time** field well.

3. After you have the correct data, follow any remaining screen prompts to finish creating the custom insight.
4. (Optional) To remove the insight from your analysis, choose the v-shaped on-visual menu at the top right of the visual. Then choose **Delete**.

Creating Auto-narratives with Amazon QuickSight

An *auto-narrative* is a natural-language summary widget that displays descriptive text instead of charts. You can embed these widgets throughout your analysis to highlight key insights and callouts. You don't have to sift through the visual, drilling down, comparing values, and rechecking ideas to extract a conclusion. You also don't have to try to understand what the data means, or discuss different interpretations with your colleagues. Instead, you can extrapolate the conclusion from the data, and display it in the analysis, stated plainly. A single interpretation can be shared by everyone.

Amazon QuickSight automatically interprets the charts and tables in your dashboard and provides a number of suggested insights in natural language. The suggested insights that you can choose from are

ready-made and come with words, calculations, and functions. But you can change them if you want to. You can also design your own. As the author of the dashboard, you have complete flexibility to customize the computations and language for your needs. You can use narratives to effectively tell the story of your data in plain language.

Note

Narratives are separate from machine learning. They only use ML if you add forecast or anomaly computations to them.

Topics

- [Using Auto-narratives \(p. 406\)](#)
- [Auto-narrative Computations \(p. 409\)](#)

Using Auto-narratives

The following walkthrough shows an example of how to customize a narrative. For this example, we use a period over period computation type.

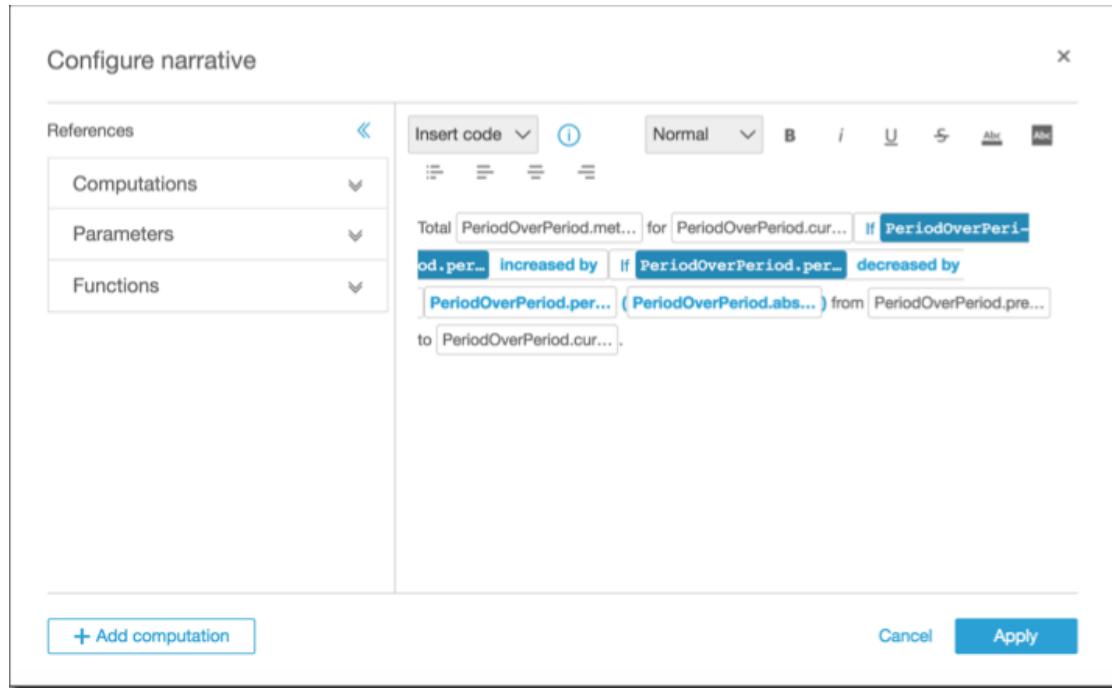
1. Begin with an existing analysis. Add a **period over period** insight to it. The easiest way to do this is to choose the + icon, then **Add insight**, then choose a type of insight from the list. You can choose from the following templates, which are defined by example here. For more information on computational insights, see [Auto-narrative Computations \(p. 409\)](#).
 - **Bottom ranked** – for example, the bottom three states by sales revenue.
 - **Bottom movers** – for example, the bottom three products sold, by sales revenue.
 - **Forecast (ML-powered insight)** – for example, "Total sales are forecasted to be \$58,613 for Jan 2016."
 - **Growth rate** – for example, "The 3-month compounded growth rate for sales is 22.23%."
 - **Maximum** – for example, "Highest month is Nov 2014 with sales of \$112,326."
 - **Metric comparison** – for example, "Total sales for Dec 2014 is \$90,474, 10% higher than target of \$81,426."
 - **Minimum** – for example, "Lowest month is Feb 2011 with sales of \$4,810."
 - **Anomaly detection (ML-powered insight)** – for example, the top three anomalies for total sales on Jan 3, 2019.
 - **Period over period** – for example, "Total sales for Nov 2014 increased by 44.39% (\$34,532) from \$77,793 to \$112,326."
 - **Period to date** – for example, "Year-to-date sales for Nov 30, 2014 increased by 25.87% (\$132,236) from \$511,236 to \$643,472."
 - **Top ranked** – for example, top three states by sales revenue.
 - **Top movers** – for example, top products by sales revenue for November 2014.
 - **Total aggregation** – for example, "Total revenue is \$2,297,200."
 - **Unique values** – for example, "There are 793 unique values in Customer_IDs."

Choose one, and then choose **Select** to create the widget. To create an empty narrative, close this screen without choosing a template. To follow this example, choose **Period over period**.

If you had a visual selected when you added the insight, the field wells have preconfigured fields the date, metric, and category. These come from the visualization that you chose when you created the insight. You can customize the fields as needed.

You can only customize a narrative for a new or existing insight (text-based) widget. You can't add one to an existing visual (chart based), because it's a different type of widget.

2. Edit the narrative in the expressions editor by choosing the v-shaped on-visual menu, then choosing **Customize narrative**. The following screen appears.



Standard text formatting tools are located at the top of the screen. You can insert expressions and conditional statements like **IF** and **FOR** statements. You can add text and computations in the work area on the right.

In this context, **Computations** are predefined calculations (period-over-period, period-to-date, growth rate, max, min, top movers, and so on) that you can reference in your template to describe your data. Currently, Amazon QuickSight supports 13 different types of computations that you can add to your insight. In this example, **PeriodOverPeriod** is added by default because we chose the **Period Over Period** template from the suggested insights panel.

3. Choose **Add computation** at bottom left to add a new computation, and then choose one from the list. For the purposes of this walkthrough, choose **Growth rate**, and then choose **Next**.
4. Configure the computation by choosing the number of periods that you want to compute over. The default is 4, and that works for our example. Optionally, you can change the name of the computation at the top of the screen. However, for our purposes, leave the name unchanged.

Note

The computation names that you create are unique within the insight. You can reference multiple computations of the same type in your narrative template. For example, suppose that you have two metrics, sales revenue and units sold. You can create growth rate computations for each metric, so long as they have different names.

However, anomaly computations aren't compatible with any other computation type in the same widget. Anomaly detection must exist in an insight by itself. To use other computations in the same analysis, put them into insights separate from anomalies.

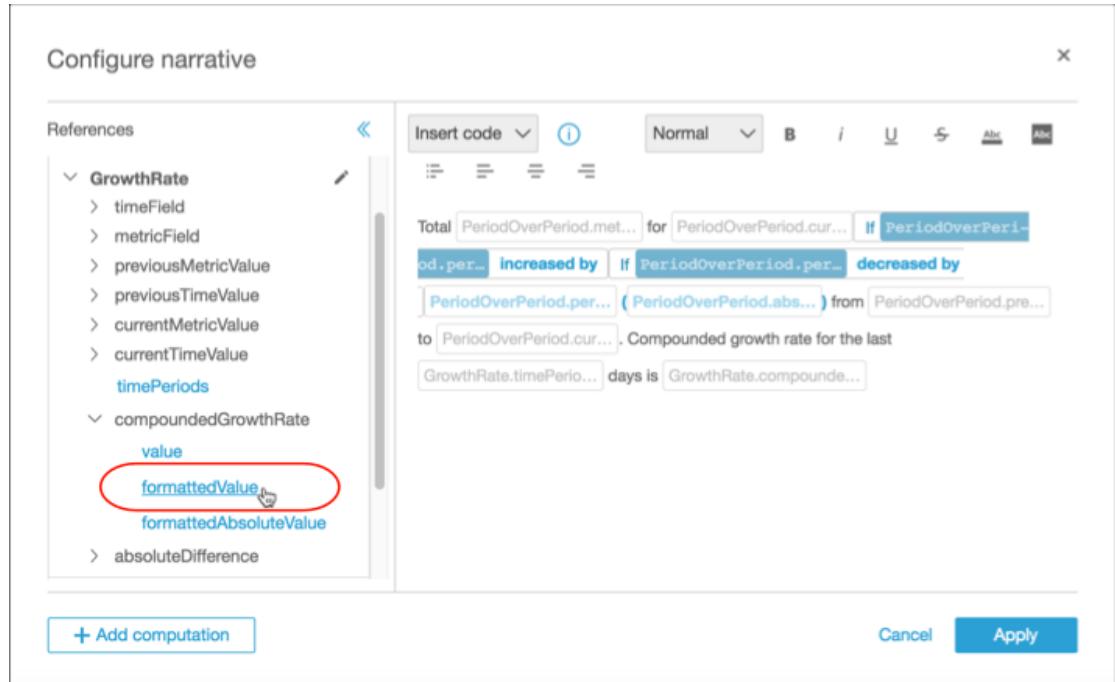
To proceed, choose **Add**.

5. Expand **Computations** on the left. The computations that are part of the narrative display in the list. In this case, it's **PeriodOverPeriod** and **GrowthRate**.
6. In the workspace, add the following text after the final period: **Compounded growth rate for the last**

- Add the computation. Leave your cursor after the word **last**. On the left, under **GrowthRate**, choose the expression named **timePeriods** (click only once to add it).

Doing this inserts the expression **GrowthRate.timePeriods**, which is the number of periods you set in the configuration for **GrowthRate**.

- Complete the sentence with **days is** and add the expression **GrowthRate.compoundedGrowthRate.formattedValue**. Choose the expression from the list, rather than typing it in. However, you can edit the contents of the expression after you add it.



Note

The **formattedValue** expression returns a string that is formatted based on the formatting applied for the metric on the field. To perform metric math, use **value** instead, which returns the raw value as an integer or decimal.

- Add a conditional statement and formatting. Place your cursor at the end of the template, after the **formattedValue** expression. On the top, choose **Insert code**, and then choose **Inline IF** from the list. An expression block opens.
- With the expression block open, choose **GrowthRate > compoundedGrowthRate > value** from the expression list on the left. Enter **>0** at the end of the expression. Choose **Save**. Don't move your cursor yet.

A prompt appears for the conditional content; enter **better than expected!** Then select the text you just entered, and use the formatting toolbar at the top to turn it green and bold.

- Add another expression block for the case when the growth rate wasn't that great by repeating the previous step. But this time, make it **<0** and enter the text **worse than expected**. Make it red instead of green.
- Choose **Apply**. The customized narrative that we just created should look similar to the following.

Total Revenue for Nov 17, 2018 **decreased by 2.15%**
(-131,031.3472000066) from 6,100,697.1616 to
5,969,665.8144. Compounded growth rate for the last 4 days is
-0.26% worse than expected.

The expression editor provides you with a sophisticated tool to customize your narratives. You can also reference the parameters you create for your analysis or dashboard, and use a set of built-in functions for further customization.

Tip

To create an empty narrative, add an insight using the + icon and then **Add insights**. But instead of choosing a template, simply close the screen.

The best way to get started with customizing narratives is to use the existing templates to learn the syntax.

Auto-narrative Computations

Use this section to help you understand what functions are available to you when you are customizing an auto-narrative. You only need to customize a narrative if you want to change or build on the default computation.

After you create an auto-narrative, the expression editor opens. You can also activate the expression editor by choosing the on-visual menu, and then **Customize Narrative**. To add a computation while using the expression editor, choose + **Add computation**.

You can use the following code expresion to build your auto-narrative. These are available from the list that's labelled **Insert code**. Code statements can display inline (in a sentence) or as a block (in a list).

- Expression – create your own code expression
- IF – An IF statement that includes an expression after evaluating a condition.
- FOR – A FOR statement that loops through values.

You can use the following computations to build your auto-narrative. You can use the expression editor without editing any syntax, but you can also customize it if you want to. To interact with the syntax, open the computational widget in the auto-narrative expression editor.

Topics

- [Bottom Movers Computation \(p. 410\)](#)
- [Bottom Ranked Computation \(p. 410\)](#)
- [Growth Rate Computation \(p. 411\)](#)
- [Maximum Computation \(p. 411\)](#)
- [Metric Comparison Computation \(p. 412\)](#)
- [Minimum Computation \(p. 412\)](#)
- [ML-powered Anomaly Detection \(p. 412\)](#)
- [ML-powered Forecasting \(p. 413\)](#)
- [Period over Date Computation \(p. 413\)](#)

- [Period over Period Computation \(p. 414\)](#)
- [Top Movers Computation \(p. 414\)](#)
- [Top Ranked Computation \(p. 414\)](#)
- [Total Aggregation Computation \(p. 415\)](#)
- [Unique Values Computation \(p. 415\)](#)

Bottom Movers Computation

The bottom movers computation counts the requested number of categories by date that rank in the bottom of the auto-narrative's data set. For example, you can create a computation to find the bottom three products sold, by sales revenue.

Parameters

name

The unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Category

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Number of movers

The number of ranked results you want to display.

Order by

The order you want to use: percent difference or absolute difference.

Bottom Ranked Computation

The bottom ranked computation calculates the requested number of categories by value that rank in the bottom of the auto-narrative's data set. For example, you can create a computation to find the bottom three states by sales revenue.

Parameters

name

The unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Category

The dimension you want to rank.

Value

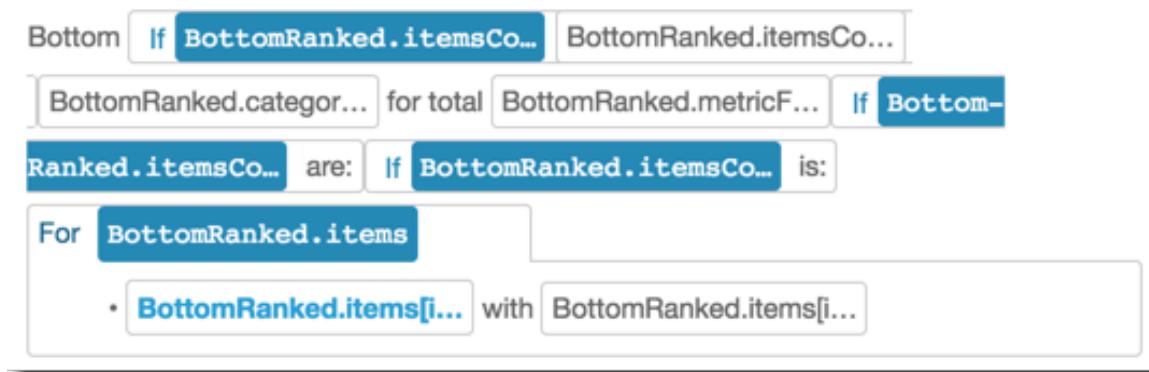
The aggregated measure that the computation is based on.

Number of results

The number of ranked results you want to display.

Example

The following screenshot shows the default configuration for the bottom ranked computation.



Growth Rate Computation

The growth rate computation compares values over time periods. For example, you can create a computation to find the 3-month compounded growth rate for sales, expressed as a percentage.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Number of periods

The number of time periods in the future that you want to use to compute the growth rate.

Maximum Computation

The maximum computation finds the maximum dimension by value. For example, you can create a computation to find the month with the highest revenue.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Metric Comparison Computation

The metric comparison computation compares values in different measures. For example, you can create a computation to compare two values, such as actual sales compared to sales goals.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Target value

The field that you want to compare to the value.

Minimum Computation

The minimum computation finds the minimum dimension by value. For example, you can create a computation to find the month with the lowest revenue.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

ML-powered Anomaly Detection

The ML-powered anomaly detection computation searches your data for anomalies. For example, you can detect the top three anomalies for total sales on Jan 3, 2019.

For more information about configuring anomaly detection, see [Detecting Anomalies with Amazon QuickSight \(p. 415\)](#).

Note

You can't add ML-powered anomaly detection to another computation, and you can't add another computation to an anomaly detection.

ML-powered Forecasting

The ML-powered forecast computation forecasts future metrics based on patterns of previous metrics by seasonality. For example, you can create a computation to forecast total revenue for the next six months.

For more information about working with forecasts, see [Forecasting and Creating What-If Scenarios with Amazon QuickSight \(p. 419\)](#).

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Periods forward

The number of time periods in the future that you want to forecast. Ranges from 1 to 1000.

Periods backward

The number of time periods in the past that you want to base your forecast on. Ranges from 0 to 1000.

Seasonality

The number of seasons included in the calendar year. The default setting, **automatic** detects this for you. Ranges from 1 to 180.

Period over Date Computation

The period over period computation finds compares values from two different time ranges. For example, you can create a computation to find out how much year-to-date sales increased or decreased since the previous time period.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Time granularity

The date granularity that you want to use for the computation, for example year to date.

Period over Period Computation

The period over period computation finds compares values from two different time periods. For example, you can create a computation to find out how much sales increased or decreased since the previous time period.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Date

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Top Movers Computation

The top movers computation counts the requested number of categories by date that rank in the top of the auto-narrative's data set. For example, you can create a computation to find the top products by sales revenue for a time period.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Category

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Number of results

The number of top ranking items you want to find.

Top Ranked Computation

The top ranked computation finds the top ranking dimensions by value. For example, you can create a computation to find the top three states by sales revenue.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Category

The dimension you want to rank.

Value

The aggregated measure that the computation is based on.

Number of results

The number of top ranking items you want to find.

Total Aggregation Computation

The total aggregation computation creates a grand total of the value. For example, you can create a computation to find the total revenue.

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Value

The aggregated measure that the computation is based on.

Unique Values Computation

The unique values computation counts the unique values in a category field. For example, you can create a computation to count the number of unique values in a dimension, such as how many customers you have

Parameters

name

A unique descriptive name that you assign or change. A name is assigned if you don't create your own. You can edit this later.

Category

The dimension you want to rank.

Detecting Anomalies with Amazon QuickSight

Amazon QuickSight uses proven Amazon technology to continuously run ML-powered anomaly detection across millions of metrics to discover hidden trends and outliers in your data. This anomaly detection enables you to get deep insights that are often buried in the aggregates and not scalable with manual analysis. With ML-powered anomaly detection, there's no need for manual analysis, custom development, or ML domain expertise.

Important

Anomaly detection is a compute-intense task. Before you start using it, you can get an idea of costs by analyzing the amount of data you want to use. We offer a tiered pricing model that is based on the number of metrics you process per month. To learn more about usage-based pricing, see [Amazon QuickSight Pricing](#).

Topics

- [Using ML-Powered Anomaly Detection \(p. 416\)](#)
- [Exploring Anomalies \(p. 417\)](#)
- [Viewing Top Contributors \(p. 419\)](#)

Using ML-Powered Anomaly Detection

Use the following procedure to start detecting anomalies in your analysis.

If you already have anomaly detection in your analysis, skip ahead to the following section to learn how to explore the anomalies detected by Amazon QuickSight.

1. Begin with an existing analysis. Choose one of the following:

- On the left, choose **Insights**. Then choose **Add anomaly to sheet**.

This creates a widget entitled **Anomaly detection**. Follow the screen prompts to add fields.

- On the top menu, choose **Add**, then **Add insight**. From the list, choose **Anomaly detection** and **Select**.

This creates a widget entitled **Insight**. Follow the screen prompts to add fields.

Note

In the field wells, **Categories** represent the dimensional values that Amazon QuickSight splits the metric by. For example, let's say you are analyzing anomalies on revenue across all product categories and product SKUs. There are 10 product categories, each with 10 product SKUs. Amazon QuickSight splits the metric by the 100 unique combinations and runs anomaly detection on each for the split metric.

You can add up to five category fields to an anomaly detection job. Table calculations don't work with anomaly detection.

2. Choose the widget that you added to your analysis. Then choose the **Get started** button on the widget.

A scrollable screen appears with configuration settings for anomaly detection.

3. On the scrollable screen, configure one or more of the following:

- **Name** – provide a descriptive name for your anomaly detection.
- **Fields for analysis** – view the contents of the field wells. To edit these, choose **Cancel** to exit this screen, and then add your new fields.
- **Analyze all combinations of these categories** – by default, if you have selected three categories, Amazon QuickSight runs anomaly detection on the following combinations hierarchically: A, AB, ABC. If you choose this option, Amazon QuickSight analyzes all combinations: A, AB, ABC, BC, AC. If your data isn't hierarchical, make sure to enable this option.
- **Number of anomalies to show** – set how many anomalies you want to display on the narrative widget. You can still explore all the anomalies, no matter how few you choose to show in the analysis.
- **Schedule** – set the time interval at which anomaly detection recalculates. The schedule runs only for published dashboards. In the analysis, you can run it manually in the analysis as needed.
 - **Occurrence** – set how often you want the recalculation to run: every hour, every day, every week, or every month.
 - **Start schedule on** – set the date and time to start running this schedule.
 - **Timezone** – set the time zone that the schedule runs in.

- **Contribution analysis** – (optional) analyze the top contributors when an anomaly is detected. For example, Amazon QuickSight can show you the top customers that contributed to a spike in sales in the USA for home improvement products. If you have additional dimensions in your data—dimensions you aren't already using in the anomaly detection—you can add them here for contribution analysis.
 - **Dimensions** – view a list of dimensions to choose contributors from. You can choose up to four dimensions.
4. Choose **OK** to confirm your choices. Choose **Cancel** to exit without saving. Choose **Delete computation** to remove it.
- To reopen the configuration screen, choose the v-shaped on-visual menu, then choose **Configure anomaly**.
5. Run the anomaly and see your anomaly narrative by choosing **Run now**.
- The amount of time it takes to complete anomaly detection varies depending on how many unique data points you are analyzing. The process can take a few minutes for a minimum number of points, or it can take many hours. While it's running in the background, you can do other work in your analysis. However, you shouldn't change the anomaly detection configuration or narrative, or explore the anomalies during run time.
6. (Optional) Remove the anomaly detection by choosing the v-shaped on-visual menu, then choosing **Configure anomaly**. Then choose **Delete computation** at the bottom of the screen. To confirm deletion, choose **Delete**. Otherwise, choose **Cancel**.

Exploring Anomalies

After your anomaly detection is finished running, you can interactively explore the anomalies in your analysis.

Before you begin, look at your anomaly widget. It displays one of the following:

- A completed run displays the narrative in the widget, with only the v-shaped on-visual menu icon at top right.
- An alert icon with an exclamation point (!) displays next to the on-visual menu icon. Refresh the page to clear this. Alternatively, you can choose the icon and then choose **Update** to dismiss it.
- The **Run now** button displays. Refresh the page to clear this.

Important

You can't explore the anomalies while anomaly detection is running. However, you can do other work in your analysis, or even close the analysis, while it runs.

When you are ready to begin, open the anomaly exploration screen, choose the v-shaped on-visual menu, then choose **Explore anomalies**. Amazon QuickSight displays anomalies that were detected during the most recent run of anomaly detection.

The main section of the screen is composed of the following components:

- **Status** – under the **Anomalies** heading, the status section displays information on the last run. It tells you how many metrics were processed and how long ago. You can choose the link to learn more about the details, for example how many metrics were ignored.
- **Anomalies** – the center of the screen displays the anomalies for the most recent data point in the time series. One or more graphs display with a chart showing variations in a metric over time. To use this graph, you select a point along the time line. The currently selected point in time is highlighted in the graph, and has a context menu offering you the option to analyze contributions to the current metric.

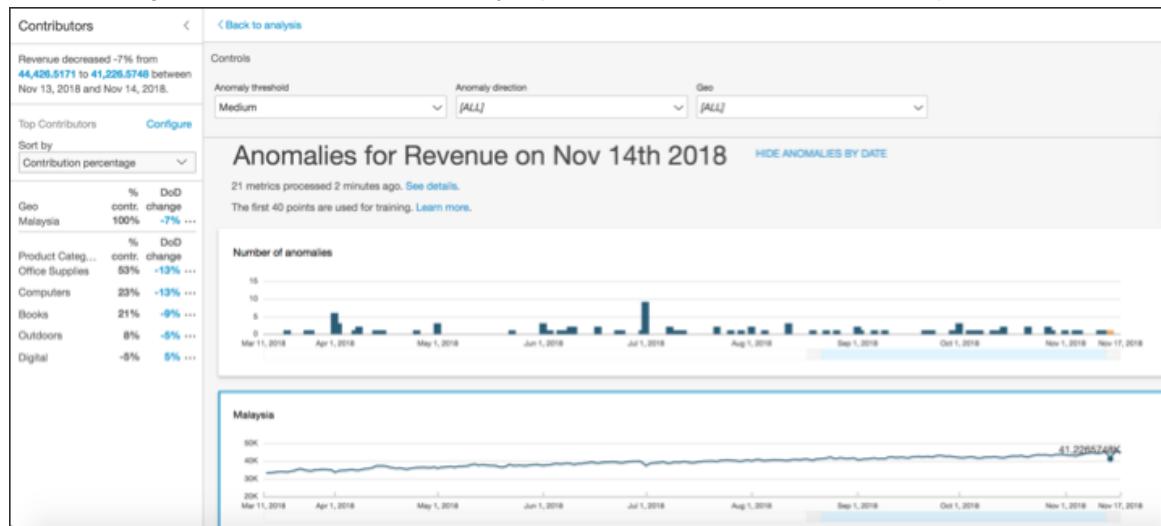
You can also drag the cursor over the time line without choosing a specific point, to display the metric value for that point in time.

- **Anomalies by Date** – if you choose **SHOW ANOMALIES BY DATE**, another graph displays to show you how many significant anomalies there were for each time point. You can see details in this chart on each bar's context menu.
- **Timeline adjustment** – each graph has a timeline adjustor tool below the dates, which you can use to compress, expand, or choose a period of time to view.
- **Controls** – the current settings display at the top of the workspace. You can expand this by using the double arrow icon on the far right. The following settings are available for anomaly exploration:
 - **Anomaly threshold** – sets how sensitive your detector is to detected anomalies. You should expect to see more anomalies with the setting set to **Low**, and less anomalies when the setting is set to **High**. This sensitivity is determined based on standard deviations of the anomaly score generated by the RCF algorithm.
 - **Anomaly direction** – sets display to show anomalies that are either higher or lower than expected.
 - **Categories** – one or more category settings appear at right, based on the fields in the category field well. Using these settings, you can limit the data that displays in the screen.

The left side of the screen displays contributors. It has the following components:

- **Narrative** – at top left, a narrative displays to describe any change in the metrics.
- **Top contributors configuration** – choose **Configure** to change the contributors and the date range to use in this section.
- **Sort by** – sets the sort applied to the results that display below. You can choose from the following:
 - **Absolute difference**
 - **Contribution percentage (default)**
 - **Deviation from expected**
 - **Percentage difference**
- **Top contributor results** – displays the results of the top contributor analysis for the point in time selected on the timeline at right.

The following screenshot shows the anomaly exploration screen with all sections expanded.



Tip

If the left side of the screen doesn't display the **Contributors** section, go back to the analysis and choose **Explore anomalies** again.

Viewing Top Contributors

Contribution analysis locates the contributing factors to an anomaly. The report displays only the significant contributors—not all of them. For example, Amazon QuickSight can show you the top customers that contributed to a spike in sale in the USA for health products. If you have dimensions in your data that you aren't using in the anomaly detection, you can add up to four of them for contribution analysis.

Use the following procedure to add contribution analysis for up to four category dimensions.

Before you begin, you need to open an analysis that has an existing anomaly detection. If your analysis isn't using anomaly detection, see the previous section, [Detecting Anomalies with Amazon QuickSight \(p. 415\)](#).

1. Open the anomaly configuration screen by choosing the v-shaped on-visual menu, then choosing **Configure anomaly**.
2. Scroll to the bottom of the screen. Under **Contribution analysis**, choose up to four dimensions to run an analysis on.
3. To confirm your choices, choose **OK**. Otherwise, choose **Cancel**.

Forecasting and Creating What-If Scenarios with Amazon QuickSight

Using ML-powered forecasting, you can forecast your key business metrics with point-and-click simplicity. No machine learning expertise is required. The built-in ML algorithm in Amazon QuickSight is designed to handle complex real-world scenarios. Amazon QuickSight uses machine learning to help provide more reliable forecasts than available by traditional means.

For example, suppose that you are a business manager. Suppose that you want to forecast sales to see if you are going to meet your goal by the end of the year. Or, suppose that you expect a large deal to come through in two weeks and you want to know how it's going to affect your overall forecast.

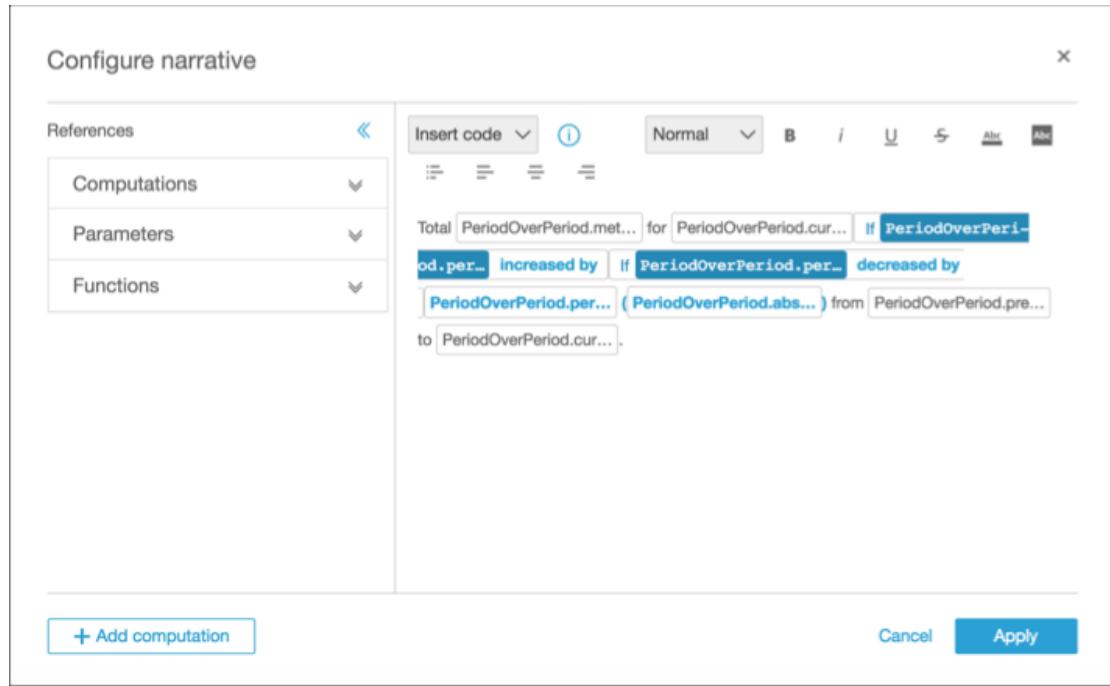
You can forecast your business revenue with multiple levels of seasonality (for example, sales with both weekly and quarterly trends). Amazon QuickSight automatically excludes anomalies in the data (for example, a spike in sales due to price drop or promotion) from influencing the forecast. You also don't have to clean and reprep the data with missing values because Amazon QuickSight automatically handles that. In addition, with ML-powered forecasting, you can perform interactive what-if analyses to determine the growth trajectory you need to meet business goals.

Using Forecasts and What-If Scenarios

You can add a forecasting widget to your existing analysis, and publish it as a dashboard. To analyze what-if scenarios, use an analysis, not a dashboard. With ML-powered forecasting, Amazon QuickSight enables you to forecast complex, real-world scenarios such as data with multiple seasonality. It automatically excludes outliers that it identifies and imputes missing values.

Use the following procedure to add a graphical forecast to your analysis, and explore what-if scenarios.

1. Create a visual that uses a single date field and a revenue field. Choose the v-shaped on-visual menu, then choose **Add forecast**. Amazon QuickSight automatically analyzes the historical data using ML, and displays a graphical forecast for the next 14 periods.



Although this procedure is for graphical forecasting, you can also add a forecast as a narrative in an insight widget. To learn more, see [Creating Auto-narratives with Amazon QuickSight \(p. 405\)](#).

2. On the **Forecast properties** panel that opens at left, customize one or more of the following settings:
 - **Forecast length** – set **Periods forward** to forecast, and **Periods backward** to look for patterns to base the forecast on.
 - **Prediction interval** – set the estimated range for the forecast. Doing this changes how wide the band of possibility is around the predicted line.
 - **Seasonality** – set the number of time periods involved in the predictable seasonal pattern of data. The range is 1–180, and the default setting is **Automatic**.

To save your changes, choose **Apply**.

3. Analyze what-if scenarios by choosing a forecasted data point (in the orange band) on the chart, and then choosing **What-if analysis** from the context menu. The **What-if analysis** panel opens on the left. Set the following options:
 - **Scenario** – set a target for a date, or set a target for a time range.
 - **Dates** – if you are setting a target for a specific date, enter that date here. If you are using a time range, set the start and end dates.
 - **Target** – set a target value for the metric.

Amazon QuickSight adjusts the forecast to meet the target.

4. Keep your changes by choosing **Apply**. To discard them, close the **What-if analysis** panel.

If you keep your changes, you see the new forecast adjusted for the target, alongside the original forecast without the what-if.

The what-if analysis is represented on the visual as a dot on the metric line. You can hover over the data points on the forecasting line to see the details.

Here are a few other things you can do:

- To interact with or remove a what-if analysis, choose the dot on the metric line.
- To create additional what-if scenarios, close the what-if analysis before choosing a new point on the line.
- To export the forecasting data to a CSV file, choose the v-shaped on-visual menu, then choose **Export to CSV**.

Note

What-if analyses can exist inside an analysis only, not inside a dashboard.

Working with Dashboards

A *dashboard* is a read-only snapshot of an analysis that you can share with other Amazon QuickSight users for reporting purposes. A dashboard preserves the configuration of the analysis at the time you publish it, including such things as filtering, parameters, controls, and sort order. The data used for the analysis isn't captured as part of the dashboard. When you view the dashboard, it reflects the current data in the data sets used by the analysis.

When you share a dashboard, you specify which users have access to it. Users who are dashboard viewers can view and filter the dashboard data. Any selections to filters, controls, or sorting that users apply while viewing the dashboard exist only while the user is viewing the dashboard, and aren't saved once it's closed. Users who are dashboard owners can edit and share the dashboard, and optionally can edit and share the analysis. If you want them to also edit and share the data set, you can set that up in the analysis.

A shared dashboard can also be embedded in a website or app, if you are using Enterprise edition. For more information about embedded dashboards, see [Embedding Amazon QuickSight Dashboards \(p. 510\)](#).

Use the following sections to learn how to publish, share, and view dashboards.

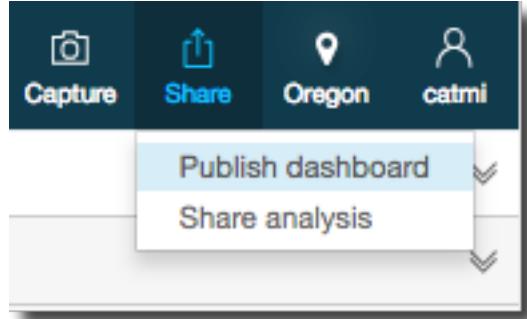
Topics

- [Publishing a Dashboard \(p. 422\)](#)
- [Copying a Dashboard \(p. 423\)](#)
- [Deleting a Dashboard \(p. 424\)](#)
- [Sharing Dashboards \(p. 424\)](#)
- [Sending Reports by Email \(p. 427\)](#)
- [Subscribing to Reports \(p. 431\)](#)

Publishing a Dashboard

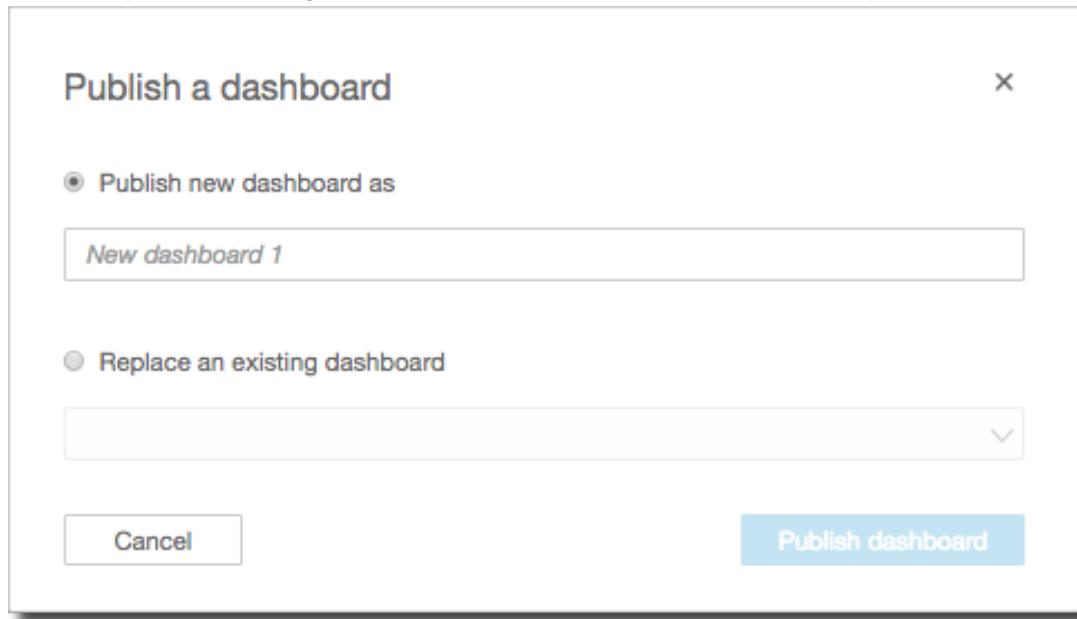
Use the following procedure to publish and optionally share a dashboard.

1. On the analysis page, choose **Share** on the application bar, and then choose **Publish dashboard**.



2. Do one of the following:

- Choose **Publish new dashboard as**, and then type a dashboard name.
- Choose **Replace an existing dashboard**, and then choose the dashboard to replace.



3. Choose **Publish dashboard**.
4. Do one of the following:
 - To publish a dashboard without sharing, choose **x** at the upper right of the **Share dashboard with users** screen. You can always share the dashboard later by choosing **Share** from the application bar.
 - To share the dashboard, follow the procedure in [Sharing Dashboards \(p. 424\)](#).

After you complete these steps, you complete creating and sharing the dashboard. The new dashboard users now receive email with a link to the dashboard. Groups don't receive invitation emails.

Copying a Dashboard

To create a new analysis or dashboard from an existing dashboard, choose **Save As** from the top menu. Doing so creates a new analysis. To create a new dashboard, share the new analysis as a dashboard. You must have co-owner access to the dashboard, or have **Save as** privileges on it.

After you save the original dashboard as a new analysis, you can collaborate on it by sharing the new analysis with other users. You can use this workflow to preserve a production version of the dashboard, while also developing or testing a new version of it.

Use the following procedure to copy a dashboard to a new one.

1. Open the dashboard you want to duplicate.
2. Choose **Save As**, and then type a name for the new analysis. When you save an existing dashboard using the **Save As** option, it creates an analysis based on the dashboard.
3. (Optional) Make changes to the new analysis.

At this point, you can share the analysis with other users so you can collaborate on changes. All users who have access can make changes to the new analysis.

4. (Optional) To create a new dashboard with your changes to the new analysis, choose **Share**, and then **Publish Dashboard**.
5. (Optional) To save the new dashboard without sharing it, close the **Share dashboard with users** screen. Alternatively, you can enter users to share with. You can always share later by choosing **Share** from the application bar.

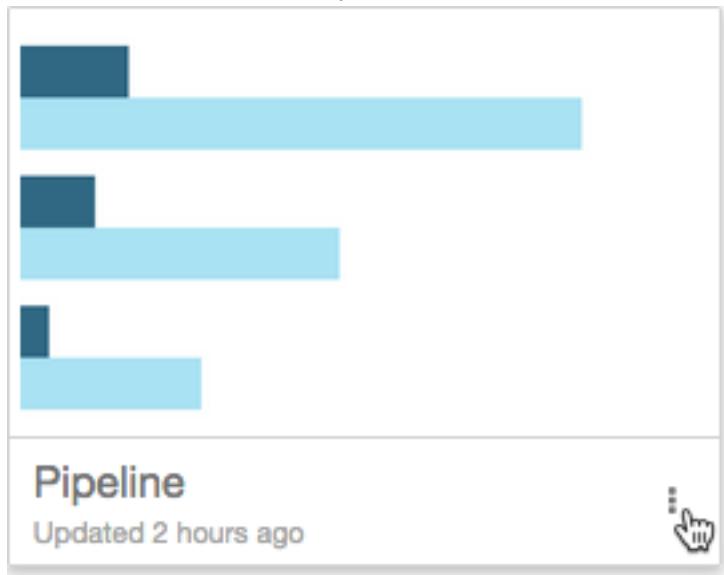
For more information, see the following:

- [Sharing Dashboards \(p. 424\)](#)
- [Sharing Analyses \(p. 245\)](#)

Deleting a Dashboard

You can only delete dashboards that you own or co-own. Use the following procedure to delete a dashboard.

1. On the **All dashboards** tab of the Amazon QuickSight start page, choose the details icon (vertical dots :) on the dashboard that you want to delete.



2. Choose **Delete**. Then choose **Delete** again to confirm that you want to delete it.

Sharing Dashboards

After you publish a dashboard, you can share it with other users or groups, and choose the level of access to grant them. You can also choose to share with all users in your Amazon QuickSight subscription.

After you share a dashboard, you can review the other users or groups that have access to it. You can also revoke access to the dashboard, or remove yourself from it.

You can also embed interactive dashboards in websites and apps. For more information, see [Embedding Amazon QuickSight Dashboards \(p. 510\)](#).

Topics

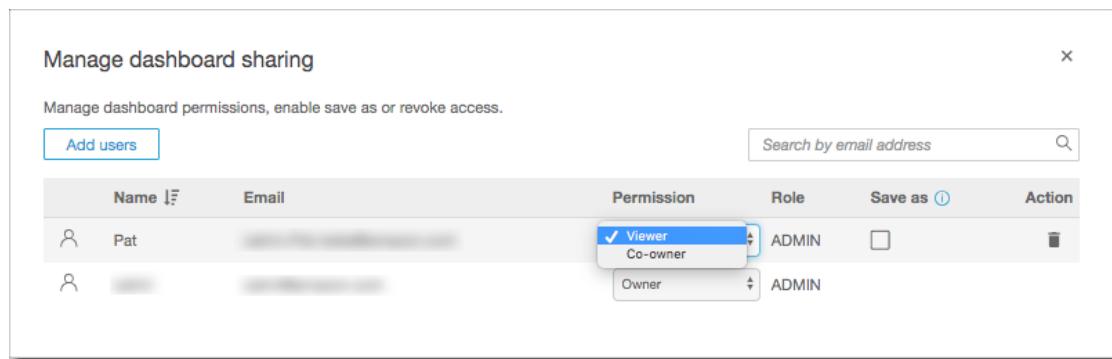
- [Viewing the Users Sharing the Dashboard \(p. 425\)](#)
- [Sharing an Existing Dashboard \(p. 425\)](#)
- [Revoking Access to a Dashboard \(p. 427\)](#)

Viewing the Users Sharing the Dashboard

Use the following procedure to see which users or groups have access to the dashboard.

1. Open the dashboard and choose **Share** from the application bar. Then choose **Manage dashboard access**.
2. Review the users and groups, and their roles and settings.

You can search to locate a specific user or group by typing in their name, or any part of their name. Searching is case-sensitive, and wildcards are not supported. Delete the search term to return view all user accounts.



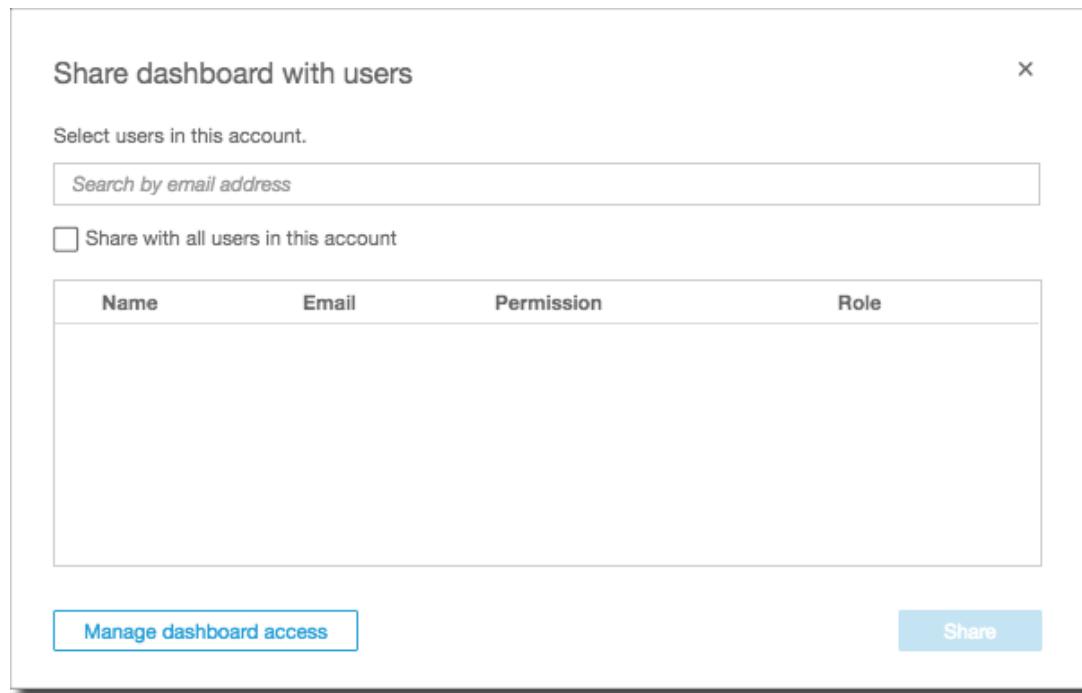
Sharing an Existing Dashboard

Use the following procedure to share a dashboard. You can use the same procedure to reshare a dashboard to send a new notification email. However, confirmation emails are not sent to groups.

1. On the dashboard page, choose **Share** on the application bar.
2. Do one of the following:
 - Before adding any users, you can check what permissions already exist by choosing **Manage dashboard access**. Then choose **Add users** to return to this screen.
 - You have the option to share with all the users in your QS subscription. To do this, select the option **Share with all users in this account**. When you manage dashboard access through the **Managed dashboard sharing** screen, you see that the option **Share with all users in this account** is enabled. The individual users aren't listed in this screen.
 - To share with an individual user or group, type the user or group into the search box. Then choose the user or group from the list that appears. Only active users and groups appear in the list.

Important

Users who have access to the dashboard can also see the data used in the analysis.



To add more users, type in another user or group. You can remove users or groups by choosing the delete icon near the user that you want to remove.

3. After you have entered everyone that you want to share with, choose **Share** to confirm your choices. In the next screen, you can see the user name, email, permission level, user role, and privileges. You can also remove a user by using the delete icon.
4. Choose permissions for each user. Users in the reader role don't have any options for permissions or **Save as** privileges.

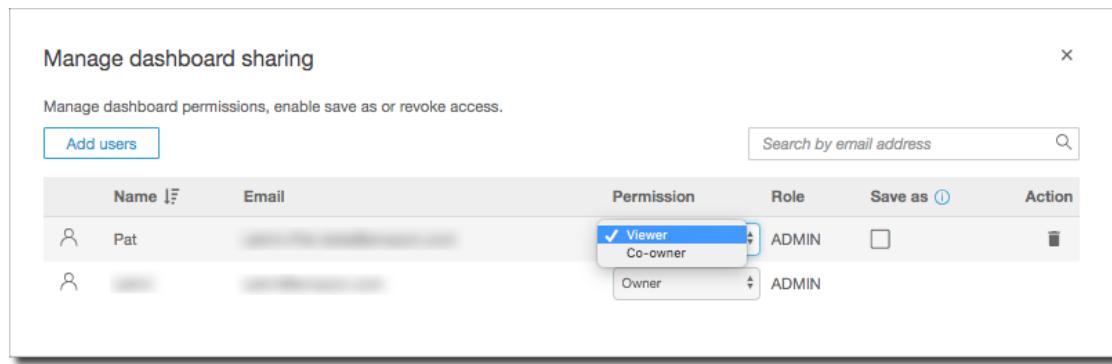
- **Viewer**

Viewers can view, filter, and sort the dashboard data. They can also use any controls or custom URL actions that are on the dashboard. Any changes they make to the dashboard exist only while they are viewing it, and aren't saved once they close the dashboard.

- **Co-owner**

Co-owners can edit and share the dashboard. You have the option to provide them with the same permissions to the analysis. If you want them to also edit and share the data set, you can set that up inside the analysis.

Choose whether to enable a user's privilege to **Save as** to create a new dashboard from a copy of this one. This privilege grants read-only access to the data sets, so the user or group can create new analyses from it.



Revoking Access to a Dashboard

Use the following procedure to revoke user access to a dashboard.

1. On the dashboard page, choose **Share** on the application bar.
2. Choose **Manage dashboard sharing**.
3. Locate the user you want to remove. Under **Action**, choose the delete icon for that user.

Sending Reports by Email

In Enterprise edition, you can send a dashboard in report form either once or on a schedule (daily, weekly, or monthly). You can email the reports to users or groups who share your Amazon QuickSight subscription. To receive email reports, the users or group members must meet the following conditions:

- They are part of your Amazon QuickSight subscription.
- You already shared the dashboard with them.
- They have completed sign-up process to activate their subscription as Amazon QuickSight readers, authors, or admins.

QuickSight generates a custom email snapshot for each user or group based on their data permission that is defined in the dashboard. RLS for email reports works for both scheduled and ad-hoc emails.

Subscribers who are readers see an option for **Reports** on the dashboard when an email report is available for that dashboard. They can use the **Reports** option to subscribe to or unsubscribe from the emails. They can also change their preferred report layout. For more information, see [Subscribing to Reports \(p. 431\)](#).

Note

Email reports use only the static default value for parameters. Any dynamic default values for parameter controls are ignored.

Geospatial (map) charts aren't supported for email reports.

How Billing Works for Email Reports

Authors and admins can receive any number of email reports at no extra charge.

For readers (users in the reader role), it costs one session per report, up to the monthly maximum. After receiving an email report, the reader gets a session credit to access the interactive dashboard at no additional cost during the same month. Reader session credits don't carry over to the next billing month.

For a reader, charges for email reports and interactive sessions both accrue up to the monthly maximum charge. For readers who hit the monthly max charge, there are no further charges, and they can receive as many additional email reports as they need.

Emailing Reports from a Dashboard

You can set up or alter emailed reports by choosing **Share** and **Email report** from your dashboard screen. The settings include the following:

- Schedule for sending the report (once only, daily, weekly, or monthly)
- Report title
- Email subject line
- Email body text
- Option to view optimized for mobile
- Recipients

You can automatically send the report to selected recipients or to all users who have access to the dashboard. Readers can also choose to subscribe from the dashboard.

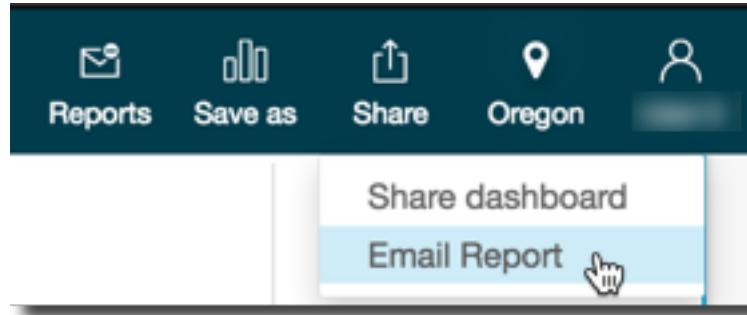
Before you save your report settings, you can choose **View dataset** list to see which data sets are used in the report. You can also choose to send a sample of the report by choosing **Send test report**.

Use the following procedure to email reports from a dashboard in Enterprise edition. The same procedure applies to both creating new and editing existing reports.

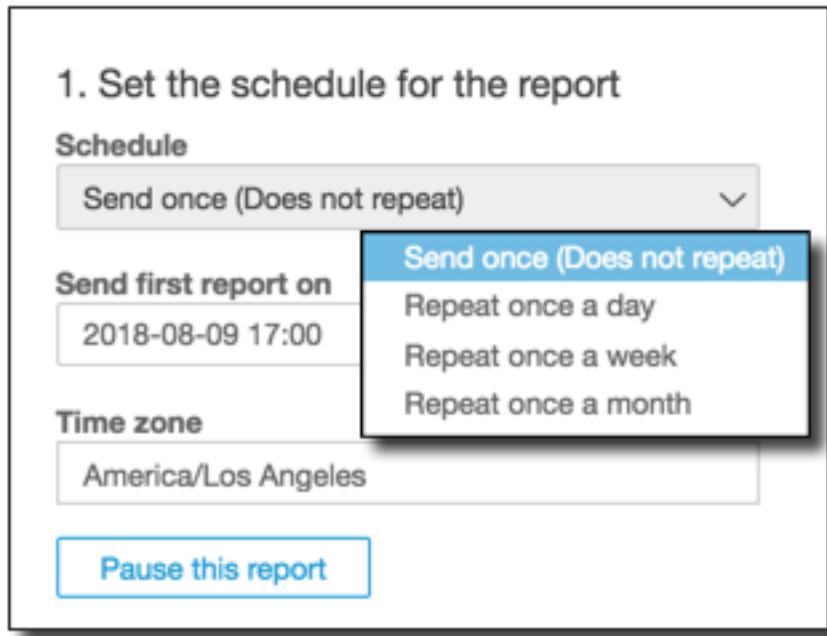
1. Make sure that you are using Amazon QuickSight Enterprise edition and that you have shared the dashboard with the users or group members you want to schedule email reports for.

To enable, edit, or delete emailed reports, you must be a co-owner of the dashboard.

2. Open the dashboard that you want to send out. Then choose **Email report** from the **Share** icon on the application bar at the top of the screen.



3. Choose **Schedule** to set the schedule for the report, and then choose the frequency for the report:
 - **Send once (Does not repeat)** – sends the report only once at the date and time that you choose.
 - **Repeat once a day** – reports daily at the same time.
 - **Repeat once a week** – reports each week on the same day at the same time.
 - **Repeat once a month** – repeats on the same day of the month at the same time.



For **Send first report on**, choose the date and time that you want the first report to be sent. If you choose to repeat the report, the schedule recurs at the same time and day based on the interval you select. For example, suppose that you choose to send your first report August 1 at 9 a.m., and you choose that the report repeat once a month. In this case, the second report is sent September 1 at 9 a.m. If you choose once a week, the day of the week August 1 falls on is the day the report repeats, at the same time the first one sends.

For **Time Zone**, choose the time zone that applies to this schedule.

If you are editing an existing report, the **Pause this report** button appears. Using this option, you can pause the current schedule without deleting it. If the report has already been paused, the **Resume this report** button appears instead, so you can continue with the existing schedule. The schedule is paused or resumed after you save your changes by choosing to update the report (at the bottom of the screen).

4. Customize the email title, subject line, and body text.

For **Report title**, enter a title for the report. By default, this is the same as the dashboard title.

Optionally, you can enter a customized subject line in **E-mail subject line**, and the text for your email in **E-mail body text**.

5. For **Optimize report for**, choose one of the following options:

- **Viewing on a desktop** – send your report as it appears in your dashboard.
- **Viewing on a mobile device** – stack visuals into a single column.

2. Customize email text and report preference

Report title

New Dashboard 1

(Optional) E-mail subject line

My test email report

(Optional) E-mail body text

This is my optional email body text

Optimize report for

- Viewing on a desktop (Preserve the dashboard layout) (i)
- Viewing on a mobile device (Display visuals in a single column) (i)

6. Choose recipients for your report:

- Enable the option for **Send email report to all users with access to dashboard** to send your report to people that you shared the dashboard with. When you add new users to the dashboard, they automatically start receiving the email reports also.
- Choose recipients from the provided list to specify and maintain a list of people you want to email reports to. You can use the search box to locate people by email or group name.

People who have access to the dashboard can choose to subscribe or unsubscribe themselves from the emailed version of the dashboard. For more information on subscribing, see [Subscribing to Reports \(p. 431\)](#).

3. Select recipients

Recipients

Reports can be sent automatically to selected recipients. Other readers can subscribe themselves via the dashboard. [Learn more](#)

Send email report to all users with access to dashboard

| | Username | Type | Email | Status | Action |
|-------------------------------------|------------|-------|-------|------------|---|
| <input checked="" type="checkbox"/> | [REDACTED] | Owner | | Subscribed | <input type="button" value="Send test report"/> |

7. (Optional) To view a list of the data sets used by this report, choose **View dataset list** at the bottom of the screen.
8. If you are creating a new report, choose **Save report** to confirm your choices. A "Report scheduled" message briefly appears at upper right.

If you are editing a report, choose one of the following options:

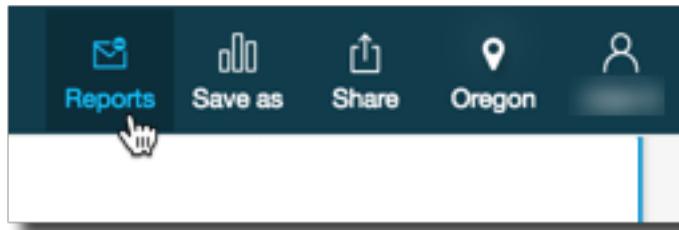
- To save changes and close the screen, choose **Update report**.
- To save changes and immediately send out a report, choose **Update & send a report now**. If you choose to send the report now, it's sent out immediately, even when your schedule's start date is in the future.

Subscribing to Reports

In Enterprise edition, you can subscribe to a dashboard in report form. You can also adjust your report settings.

Use the following procedure to change your subscription and report settings for a specific dashboard.

1. First, open a dashboard that is shared with you, or a dashboard that you own or co-own.
2. Choose the **Reports** icon at top right.

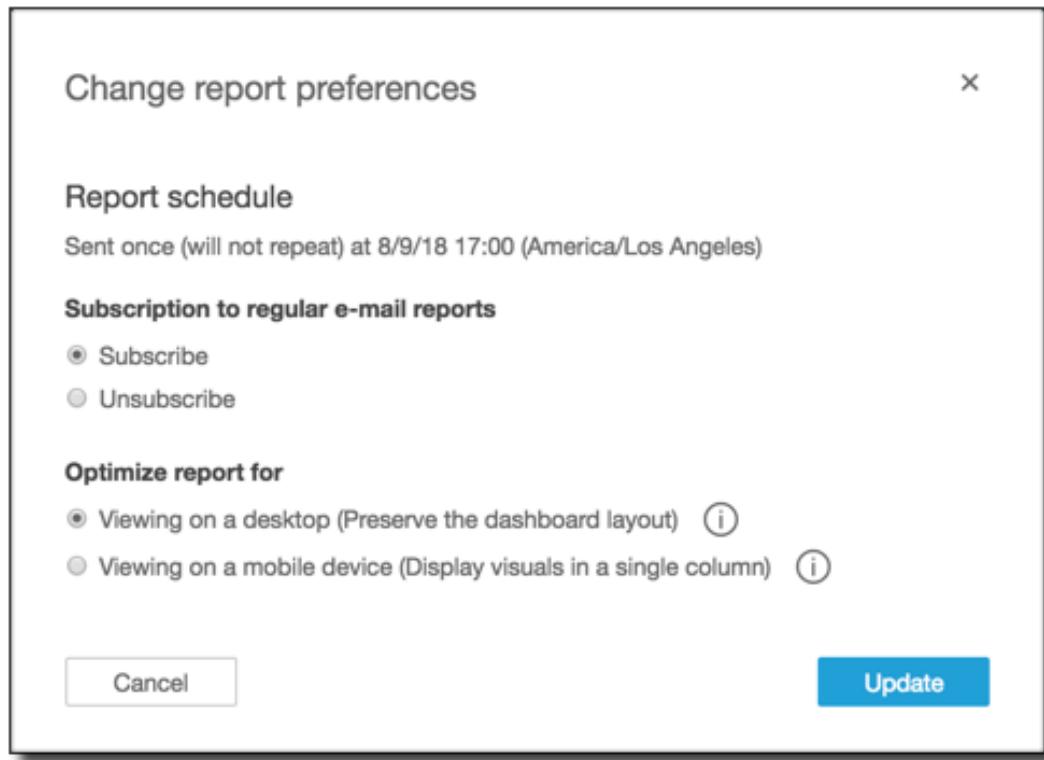


3. The **Change report preferences** screen appears. This screen shows the current report schedule, in addition to the subscription and optimization options.

For **Subscription**, choose **Subscribe** to start receiving reports, or **Unsubscribe** to stop receiving reports.

Under **Optimize**, choose the device you prefer to view the report on.

- If you usually use a mobile device or you prefer to view reports in a portrait format, choose **Viewing on a mobile device**. When you receive the report, the visuals display in a single vertical column.
- If you usually use a desktop or you prefer to view reports in a landscape format, choose **Viewing on a desktop**. When you receive the report, the visuals display in the same layout shown in your dashboard on your desktop.



4. Choose **Update** to confirm your choices, or choose **Cancel** to discard your changes.

Calculated Field Function and Operator Reference for Amazon QuickSight

You can use the following functions and operators to create calculated fields.

For information on aggregating calculated fields, see [Using Aggregate Functions in Calculated Fields \(p. 220\)](#). You can only aggregate calculated fields in an analysis, not in a data set.

Topics

- [Arithmetic and Comparison Operators \(p. 433\)](#)
- [Functions by Category \(p. 436\)](#)
- [Function Index \(p. 439\)](#)
- [Table Calculation Functions Index \(p. 471\)](#)

Arithmetic and Comparison Operators

You can use the following arithmetic and comparison operators in calculated fields:

- Addition (+)
- Subtraction (-)
- Multiplication (*)
- Division (/)
- Power (^)
- Equal (=)
- Not equal (<>)
- Greater than (>)
- Greater than or equal to (>=)
- Less than (<)
- Less than or equal to (<=)
- AND
- OR
- NOT

Equal (=) and not equal (<>) comparisons are case-sensitive. For example, if the condition is `state = 'WA'` and the value in the field is `wa`, those values are not considered to be equivalent.

Amazon QuickSight uses the standard order of operations: parentheses, exponents, multiplication, division, addition, subtraction.

To make lengthy calculations easier to read, you can use parenthesis to clarify groupings and precedence in calculations.

In the following statement, you don't need parentheses. The multiplication statement is processed first, and then the result is added to five, returning a value of 26. However, parentheses make the statement easier to read and thus maintain.

```
5 + (7 * 3)
```

Because parenthesis are first in the order of operations, you can change the order in which other operators are applied. For example, in the following statement the addition statement is processed first, and then the result is multiplied by three, returning a value of 36.

```
(5 + 7) * 3
```

Example: Arithmetic Operators

The following example uses multiple arithmetic operators to determine a sales total after discount.

```
(Quantity * Amount) - Discount)
```

Example: (=) Equal

Using `=` performs a case-sensitive comparison of values. Rows where the comparison is TRUE are included in the result set.

In the following example, rows where the `Region` field is `south` are included in the results. If the `Region` is `south`, these rows are excluded.

```
Region = 'South'
```

In the following example, the comparison evaluates to FALSE.

```
Region = 'south'
```

The following example shows a comparison that converts `Region` to all uppercase (`SOUTH`), and compares it to `SOUTH`. This returns rows where the region is `south`, `South`, or `SOUTH`.

```
toUpper(Region) = 'SOUTH'
```

Example: (<>)

The not equal symbol `<>` means *less than or greater than*.

So, if we say `x<>1`, then we are saying *if x is less than 1 OR if x is greater than 1*. Both `<` and `>` are evaluated together. In other words, *if x is any value except 1*. Or, *x is not equal to 1*.

Note

Use `<>`, not `!=`.

The following example compares `Status Code` to a numeric value. This returns rows where the `Status Code` is not equal to `1`.

```
statusCode <> 1
```

The following example compares multiple statusCode values. In this case, active records have activeFlag = 1. This example returns rows where one of the following applies:

- For active records, show rows where the status isn't 1 or 2
- For inactive records, show rows where the status is 99 or -1

```
( activeFlag = 1 AND (statusCode <> 1 AND statusCode <> 2) )
OR
( activeFlag = 0 AND (statusCode= 99 OR statusCode= -1) )
```

Example: (^)

The power symbol ^ means *to the power of*.

The following example is a simple expression of 2 to the power of 4 or ($2 * 2 * 2 * 2$). This returns a value of 16.

```
2^4
```

Example: AND, OR, and NOT

The following example uses AND, OR, and NOT to compare multiple expressions using conditional operators to tag top customers NOT in Washington or Oregon with a special promotion, who made more than 10 orders. If no values are returned, the value 'n/a' is used.

```
ifelse(( (NOT (State = 'WA' OR State = 'OR')) AND Orders > 10), 'Special Promotion XYZ',
'n/a')
```

Example: Creating Comparison Lists Like "in" or "not in"

This example uses operators to create a comparison to find values that exist, or don't exist, in a specified list of values.

The following example compares promoCode a specified list of values. This example returns rows where the promoCode is in the list (1, 2, 3).

```
promoCode      = 1
OR promoCode   = 2
OR promoCode   = 3
```

The following example compares promoCode a specified list of values. This example returns rows where the promoCode is NOT in the list (1, 2, 3).

```
NOT(promoCode = 1
OR promoCode = 2
OR promoCode = 3
)
```

Another way to express this is to provide a list where the promoCode is not equal to any items in the list.

```
promoCode      <> 1
```

```
AND promoCode <> 2  
AND promoCode <> 3
```

Example: Creating a "between" Comparison

This example uses comparison operators to create a comparison showing values that exist between one value and another.

The following example examines `OrderDate` and returns rows where the `OrderDate` is between the first day and last day of 2016. In this case, we want the first and last day included, so we use "or equal to" on the comparison operators.

```
OrderDate >= "1/1/2016" AND OrderDate <= "12/31/2016"
```

Functions by Category

In this section, you can find a list of the functions available in Amazon QuickSight sorted by category.

Topics

- [Aggregate Functions \(p. 436\)](#)
- [Conditional Functions \(p. 437\)](#)
- [Date Functions \(p. 437\)](#)
- [Numeric Functions \(p. 437\)](#)
- [String Functions \(p. 437\)](#)
- [Table Calculations \(p. 438\)](#)

Aggregate Functions

The aggregate functions for calculated fields in Amazon QuickSight include the following. These are only available during analysis and visualization. Each of these functions returns values grouped by the chosen dimension or dimensions.

- [avg \(p. 221\)](#) averages the set of numbers in the specified measure, grouped by the chosen dimension or dimensions.
- [count \(p. 222\)](#) calculates the number of values in a dimension or measure, grouped by the chosen dimension or dimensions.
- [distinct_count \(p. 222\)](#) calculates the number of distinct values in a dimension or measure, grouped by the chosen dimension or dimensions.
- [max \(p. 222\)](#) returns the maximum value of the specified measure, grouped by the chosen dimension or dimensions.
- [min \(p. 223\)](#) returns the minimum value of the specified measure, grouped by the chosen dimension or dimensions.
- [percentile \(p. 223\)](#) computes the *n*th percentile of the specified measure, grouped by the chosen dimension or dimensions.
- [sum \(p. 223\)](#) adds the set of numbers in the specified measure, grouped by the chosen dimension or dimensions.
- For each aggregation, there is also a conditional aggregation. These perform the same type of aggregation, based on a condition. Conditional aggregations include [avgIf \(p. 224\)](#), [countIf \(p. 224\)](#), [distinct_countIf \(p. 224\)](#), [maxIf \(p. 225\)](#), [minIf \(p. 225\)](#), and [sumIf \(p. 226\)](#).

Conditional Functions

The conditional functions for calculated fields in Amazon QuickSight include the following:

- [coalesce \(p. 442\)](#) returns the value of the first argument that is not null.
- [ifelse \(p. 449\)](#) evaluates a set of *if, then* expression pairings, and returns the value of the *then* argument for the first *if* argument that evaluates to true.
- [isNotNull \(p. 450\)](#) evaluates an expression to see if it is not null.
- [isNull \(p. 451\)](#) evaluates an expression to see if it is null. If the expression is null, `isNull` returns true, and otherwise it returns false.
- [nullif \(p. 454\)](#) compares two expressions. If they are equal, the function returns null. If they are not equal, the function returns the first expression.

Date Functions

The date functions for calculated fields in Amazon QuickSight include the following:

- [addDateTime \(p. 440\)](#) adds or subtracts a unit of time to the date or time provided.
- [dateDiff \(p. 444\)](#) returns the difference in days between two date fields. (SPICE enabled)
- [epochDate \(p. 445\)](#) converts an epoch date into a standard date. (SPICE enabled)
- [extract \(p. 446\)](#) returns a specified portion of a date value. (SPICE enabled)
- [formatDate \(p. 448\)](#) formats a date using a pattern you specify.
- [now \(p. 454\)](#) returns the current date and time, using either settings for a database, or UTC for file and Salesforce.
- [truncDate \(p. 470\)](#) returns a date value that represents a specified portion of a date. (SPICE enabled)

Numeric Functions

The numeric functions for calculated fields in Amazon QuickSight include the following:

- [ceil \(p. 441\)](#) rounds a decimal value to the next highest integer. (SPICE enabled)
- [decimalToInt \(p. 444\)](#) converts a decimal value to an integer. (SPICE enabled)
- [floor \(p. 447\)](#) decrements a decimal value to the next lowest integer. (SPICE enabled)
- [int.ToDecimal \(p. 450\)](#) converts an integer value to a decimal. (SPICE enabled)
- [round \(p. 464\)](#) rounds a decimal value to the closest integer or, if scale is specified, to the closest decimal place. (SPICE enabled)

String Functions

The string (text) functions for calculated fields in Amazon QuickSight include the following:

- [concat \(p. 443\)](#) concatenates two or more strings.
- [left \(p. 452\)](#) returns the specified number of leftmost characters from a string.
- [locate \(p. 452\)](#) locates a substring within another string, and returns the number of characters before the substring.
- [ltrim \(p. 453\)](#) removes preceding white space from a string.
- [parseDate \(p. 455\)](#) parses a string to determine if it contains a date value, and returns the date if found.

- [parseDecimal \(p. 459\)](#) parses a string to determine if it contains a decimal value.
- [parseInt \(p. 460\)](#) parses a string to determine if it contains an integer value.
- [parseJson \(p. 461\)](#) parses values from a native JSON or from a JSON object in a text field.
- [replace \(p. 462\)](#) replaces part of a string with a new string.
- [right \(p. 463\)](#) returns the specified number of rightmost characters from a string.
- [rtrim \(p. 465\)](#) removes following white space from a string.
- [split \(p. 465\)](#) splits a string into an array of substrings, based on a delimiter that you choose, and returns the item specified by the position.
- [strlen \(p. 466\)](#) returns the number of characters in a string.
- [substring \(p. 467\)](#) returns the specified number of characters in a string, starting at the specified location.
- [toLowerCase \(p. 467\)](#) formats a string in all lowercase.
- [toString \(p. 468\)](#) formats the input expression as a string.
- [toUpperCase \(p. 469\)](#) formats a string in all uppercase.
- [trim \(p. 469\)](#) removes both preceding and following white space from a string.

Table Calculations

Table calculations form a group of functions that provide context in an analysis. They provide support for enriched aggregated analysis. By using these calculations, you can address common business scenarios such as calculating percentage of total, running sum, difference, common baseline, and rank.

When you are analyzing data in a specific visual, you can apply table calculations to the current set of data to discover how dimensions influence measures or each other. Visualized data is your result set based on your current data set, with all the filters, field selections, and customizations applied. To see exactly what this result set is, you can export your visual to comma-separated value (CSV) format. A table calculation function performs operations on the data to reveal relationships between fields.

The table calculations available in Amazon QuickSight for both [SPICE \(p. 2\)](#) and direct query data include the following:

Lookup-based functions:

- [difference \(p. 472\)](#) calculates the difference between a measure based on one set of partitions and sorts, and a measure based on another.
- [lag \(p. 474\)](#) calculates the lag (previous) value for a measure.
- [lead \(p. 475\)](#) calculates the lead (following) value for a measure.
- [percentDifference \(p. 477\)](#) calculates the percentage difference between the current value and a comparison value.

Over functions:

- [avgOver \(p. 479\)](#) calculates the average of a measure over one or more dimensions.
- [countOver \(p. 480\)](#) calculates the count of a measure over one or more dimensions.
- [maxOver \(p. 483\)](#) calculates the maximum of a measure over one or more dimensions.
- [minOver \(p. 485\)](#) calculates the minimum of a measure over one or more dimensions.
- [percentOfTotal \(p. 487\)](#) calculates the percentage a measure contributes to the total.
- [sumOver \(p. 489\)](#) calculates the sum of a measure over one or more dimensions.

Ranking functions:

- [rank \(p. 490\)](#) calculates the rank of a measure or a dimension.
- [denseRank \(p. 492\)](#) calculates the rank of a measure or a dimension, ignoring duplicates.
- [percentileRank \(p. 493\)](#) calculates the rank of a measure or a dimension, based on percentile.

Running functions:

- [runningAvg \(p. 495\)](#) calculates a running average for a measure.
- [runningCount \(p. 496\)](#) calculates a running count for a measure.
- [runningMax \(p. 497\)](#) calculates a running maximum for a measure.
- [runningMin \(p. 498\)](#) calculates a running minimum for a measure.
- [runningSum \(p. 499\)](#) calculates a running sum for a measure.

Custom Window functions:

- [windowAvg \(p. 500\)](#) calculates the average of the aggregated measure in a custom window that is partitioned and sorted by specified attributes.
- [windowCount \(p. 502\)](#) calculates the count of the aggregated measure in a custom window that is partitioned and sorted by specified attributes.
- [windowMax \(p. 503\)](#) calculates the maximum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes.
- [windowMin \(p. 505\)](#) calculates the minimum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes.
- [windowSum \(p. 507\)](#) calculates the sum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes.

Function Index

In this section, you can find a list of functions available in Amazon QuickSight. Some functions are available in [SPICE \(p. 2\)](#), while you are in the analysis screen.

To view a list of functions sorted by category, with brief definitions, see [Functions by Category \(p. 436\)](#).

Topics

- [addDateTime \(p. 440\)](#)
- [ceil \(p. 441\)](#)
- [coalesce \(p. 442\)](#)
- [concat \(p. 443\)](#)
- [decimalToInt \(p. 444\)](#)
- [dateDiff \(p. 444\)](#)
- [epochDate \(p. 445\)](#)
- [extract \(p. 446\)](#)
- [floor \(p. 447\)](#)
- [formatDate \(p. 448\)](#)
- [ifelse \(p. 449\)](#)
- [intToDecimal \(p. 450\)](#)
- [isNotNull \(p. 450\)](#)
- [isNull \(p. 451\)](#)

- [left \(p. 452\)](#)
- [locate \(p. 452\)](#)
- [ltrim \(p. 453\)](#)
- [now \(p. 454\)](#)
- [nullif \(p. 454\)](#)
- [parseDate \(p. 455\)](#)
- [parseDecimal \(p. 459\)](#)
- [parseInt \(p. 460\)](#)
- [parseJson \(p. 461\)](#)
- [replace \(p. 462\)](#)
- [right \(p. 463\)](#)
- [round \(p. 464\)](#)
- [rtrim \(p. 465\)](#)
- [split \(p. 465\)](#)
- [strlen \(p. 466\)](#)
- [substring \(p. 467\)](#)
- [toLowerCase \(p. 467\)](#)
- [toString \(p. 468\)](#)
- [toUpperCase \(p. 469\)](#)
- [trim \(p. 469\)](#)
- [truncDate \(p. 470\)](#)

addDateTime

`addDateTime` adds or subtracts a unit of time from a datetime value. For example, `addDateTime(2, 'YYYY', parseDate('02-JUL-2018', 'dd-MMM-yyyy'))` returns 02-JUL-2020. You can use this function to perform date math on your date and time data.

`addDateTime` is not supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
addDateTime(amount, period, datetime)
```

Arguments

amount

A positive or negative integer value that represents the amount of time that you want to add or subtract from the provided datetime field.

period

A positive or negative value that represents the amount of time that you want to add or subtract from the provided datetime field. Valid periods are as follows:

- YYYY: This returns the year portion of the date.
- Q: This returns the quarter that the date belongs to (1–4).
- MM: This returns the month portion of the date.

- DD: This returns the day portion of the date.
- WK: This returns the week portion of the date. The week starts on Sunday in Amazon QuickSight.
- HH: This returns the hour portion of the date.
- MI: This returns the minute portion of the date.
- SS: This returns the second portion of the date. (SS is not supported when added inside SPICE-based analyses.)

datetime

The date or time that you want to perform date math on.

Return Type

Datetime

Example

Let's say you have a field called `purchase_date` that has the following values.

```
2018 May 13 13:24
2017 Jan 31 23:06
2016 Dec 28 06:45
```

Using the following calculations, `addDateTime` modifies the values as shown following.

```
addDateTime(-2, 'YYYY', purchaseDate)

2016 May 13 13:24
2015 Jan 31 23:06
2014 Dec 28 06:45

addDateTime(4, 'DD', purchaseDate)

2018 May 17 13:24
2017 Feb 4 23:06
2017 Jan 1 06:45

addDateTime(20, 'MI', purchaseDate)

2018 May 13 13:44
2017 Jan 31 23:26
2016 Dec 28 07:05
```

ceil

`ceil` rounds a decimal value to the next highest integer. For example, `ceil(29.02)` returns 30.

`ceil` is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
ceil(decimal)
```

Arguments

decimal

A field that uses the decimal data type, a literal value like **17.62**, or a call to another function that outputs a decimal.

Return Type

Integer

Example

The following example rounds a decimal field to the next highest integer.

```
ceil(salesAmount)
```

The following are the given field values.

```
20.13  
892.03  
57.54
```

For these field values, the following values are returned.

```
21  
893  
58
```

coalesce

coalesce returns the value of the first argument that is not null. When a non-null value is found, the remaining arguments in the list are not evaluated. If all arguments are null, the result is null. 0-length strings are valid values and are not considered equivalent to null.

Syntax

```
coalesce(expression1, expression2 [, expression3, ...])
```

Arguments

coalesce takes two or more expressions as arguments. All of the expressions must have the same data type or be able to be implicitly cast to the same data type.

expression

The expression can be numeric, datetime, or string. It can be a field name, a literal value, or another function.

Return Type

coalesce returns a value of the same data type as the input arguments.

Example

The following example retrieves a customer's billing address if it exists, her street address if there is no billing address, or returns "No address listed" if neither address is available.

```
coalesce(billingAddress, streetAddress, 'No address listed')
```

concat

concat concatenates two or more strings.

Syntax

```
concat(expression1, expression2 [, expression3 ...])
```

Arguments

concat takes two or more string expressions as arguments.

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

Return Type

String

Examples

The following example concatenates three string fields and adds appropriate spacing.

```
concat(salutation, ' ', firstName, ' ', lastName)
```

The following are the given field values.

| salutation | firstName | lastName |
|------------|--------------|-------------|
| Ms. | Li | Juan |
| Dr. | Ana Carolina | Silva |
| Mr. | Nikhil | Jayashankar |

For these field values, the following values are returned.

```
Ms. Li Juan
Dr. Ana Carolina Silva
Mr. Nikhil Jayashankar
```

The following example concatenates two string literals.

```
concat('Hello', 'world')
```

The following value is returned.

```
Helloworld
```

decimalToInt

decimalToInt converts a decimal value to the integer data type by stripping off the decimal point and any numbers after it. decimalToInt does not round up. For example, decimalToInt(29.99) returns 29.

decimalToInt is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
decimalToInt(decimal)
```

Arguments

decimal

A field that uses the decimal data type, a literal value like **17.62**, or a call to another function that outputs a decimal.

Return Type

Integer

Example

The following example converts a decimal field to an integer.

```
decimalToInt(salesAmount)
```

The following are the given field values.

```
20.13  
892.03  
57.54
```

For these field values, the following values are returned.

```
20  
892  
58
```

dateDiff

dateDiff returns the difference in days between two date fields.

dateDiff is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
dateDiff(date1, date2)
```

Arguments

dateDiff takes two dates as arguments.

date

A date field or a call to another function that outputs a date.

Return Type

Integer

Example

The following example returns the difference between two dates.

```
dateDiff(orderDate, shipDate)
```

The following are the given field values.

| orderDate | shipDate |
|-----------|----------|
| ===== | ===== |
| 01/01/14 | 01/05/14 |
| 09/13/16 | 09/20/16 |

For these field values, the following values are returned.

| |
|---|
| 4 |
| 7 |

epochDate

epochDate converts an epoch date into a standard date in the format yyyy-MM-ddTkk:mm:ss.SSSZ, using the format pattern syntax specified in [Class DateTimeFormat](#) in the Joda project documentation. An example is 2015-10-15T19:11:51.003Z.

epochDate is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
epochDate(epochdate)
```

Arguments

epochdate

An epoch date, which is an integer representation of a date as the number of seconds since 00:00:00 UTC on January 1, 1970.

epochdate must be an integer. It can be the name of a field that uses the integer data type, a literal integer value, or a call to another function that outputs an integer. If the integer value is longer than 10 digits, the digits after the tenth place are discarded.

Return Type

Date

Example

The following example converts an epoch date to a standard date.

```
epochDate(3100768000)
```

The following value is returned.

```
2068-04-04T12:26:40.000Z
```

extract

extract returns a specified portion of a date value. Requesting a time-related portion of a date that doesn't contain time information returns 0.

extract is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
extract(period, date)
```

Arguments

period

The period that you want extracted from the date value. Valid periods are as follows:

- YYYY: This returns the year portion of the date.
- Q: This returns the quarter that the date belongs to (1–4).
- MM: This returns the month portion of the date.
- DD: This returns the day portion of the date.
- WD: This returns the day of the week as an integer, with Sunday as 1.
- HH: This returns the hour portion of the date.
- MI: This returns the minute portion of the date.
- SS: This returns the second portion of the date. This argument is not supported when added inside SPICE-based analyses.

date

A date field or a call to another function that outputs a date.

Return Type

Integer

Example

The following example extracts the day from a date value.

```
extract('DD', orderDate)
```

The following are the given field values.

```
orderDate
=====
01/01/14
09/13/16
```

For these field values, the following values are returned.

```
01
13
```

floor

`floor` decrements a decimal value to the next lowest integer. For example, `floor(29.08)` returns 29.

`floor` is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
floor(decimal)
```

Arguments

decimal

A field that uses the decimal data type, a literal value like **17.62**, or a call to another function that outputs a decimal.

Return Type

Integer

Example

The following example decrements a decimal field to the next lowest integer.

```
floor(salesAmount)
```

The following are the given field values.

```
20.13
892.03
57.54
```

For these field values, the following values are returned.

```
20
892
57
```

formatDate

formatDate formats a date using a pattern you specify.

Syntax

```
formatDate(date, ['format'], ['timezone'])
```

Arguments

date

A date field or a call to another function that outputs a date.

format

(Optional) A string containing the format pattern to apply. This argument accepts the format patterns specified in [Supported Date Formats \(p. 65\)](#).

If you don't specify a format, this string defaults to yyyy-MM-ddTkk:mm:ss:SSS.

time_zone

(Optional) A string representing an [IANA](#) time zone.

If you don't specify a time zone, UTC is used.

Return Type

String

Example

The following example formats a UTC date and displays using a specific time zone.

```
formatDate(orderDate, 'dd MMM yyyy', 'America/Los_Angeles')
```

The following are the given field values.

```
order date
=====
2012-12-14T00:00:00.000Z
2013-12-29T00:00:00.000Z
2012-11-15T00:00:00.000Z
```

For these field values, the following values are returned.

```
13 Dec 2012
28 Dec 2013
```

14 Nov 2012

ifelse

`ifelse` evaluates a set of *if, then* expression pairings, and returns the value of the *then* argument for the first *if* argument that evaluates to true. The remaining arguments in the list are not evaluated. If none of the *if* arguments evaluate to true, then the value of the *else* argument is returned.

Syntax

```
ifelse(if, then [, if, then ...], else)
```

Arguments

`ifelse` takes one or more *if, then* expression pairings, plus one expression for the *else* argument.

if

The expression to be evaluated as true or not. It can be a field name like `address1`, a literal value like '`Unknown`', or another function like `toString(salesAmount)`.

If you use multiple AND and OR operators in the *if* argument, enclose statements in parentheses to identify processing order. For example, the following *if* argument returns records with a month of 1, 2, or 5 and a year of 2000.

```
ifelse((month = 5 OR month < 3) AND year = 2000, 'yes', 'no')
```

The next *if* argument uses the same operators, but returns records with a month of 5 and any year, or with a month of 1 or 2 and a year of 2000.

```
ifelse(month = 5 OR (month < 3 AND year = 2000), 'yes', 'no')
```

then

The expression to return if its *if* argument is evaluated as true. It can be a field name like `address1`, a literal value like '`Unknown`', or a call to another function. The expression must have the same data type as the other *then* arguments and the *else* argument.

else

The expression to return if none of the *if* arguments evaluate as true. It can be a field name like `address1`, a literal value like '`Unknown`', or another function like `toString(salesAmount)`. The expression must have the same data type as all of the *then* arguments.

Return Type

`ifelse` returns a value of the same data type as the input arguments.

Example

The following example assigns a group to a sales record based on the sales total.

```
ifelse(salesTotal > 0 AND salesTotal < 500, 'Group 1', salesTotal >= 500 AND salesTotal < 1000, 'Group 2', 'Group 3')
```

intToDecimal

`intToDecimal` converts an integer value to the decimal data type.

`intToDecimal` is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
intToDecimal(integer)
```

Arguments

int

A field that uses the integer data type, a literal value like **14**, or a call to another function that outputs an integer.

Return Type

Decimal

Example

The following example converts an integer field to a decimal.

```
intToDecimal(price)
```

The following are the given field values.

```
20  
892  
57
```

For these field values, the following values are returned.

```
20.0  
892.0  
58.0
```

You can apply formatting inside an analysis, for example to format `price` as currency.

isNotNull

`isNotNull` evaluates an expression to see if it is not null. If the expression is not null, `isNotNull` returns true, and otherwise it returns false.

Syntax

```
isNotNull(expression)
```

Arguments

expression

The expression to be evaluated as null or not. It can be a field name like `address1` or a call to another function that outputs a string.

Return Type

Boolean

Example

The following example evaluates the `sales_amount` field for null values.

```
isNotNull(salesAmount)
```

The following are the given field values.

```
20.13  
(null)  
57.54
```

For these field values, the following values are returned.

```
true  
false  
true
```

isNull

`isNull` evaluates an expression to see if it is null. If the expression is null, `isNull` returns true, and otherwise it returns false.

Syntax

```
isNull(expression)
```

Arguments

expression

The expression to be evaluated as null or not. It can be a field name like `address1` or a call to another function that outputs a string.

Return Type

Boolean

Example

The following example evaluates the `sales_amount` field for null values.

```
isNull(salesAmount)
```

The following are the given field values.

```
20.13  
(null)  
57.54
```

For these field values, the following values are returned.

```
false  
true  
false
```

left

`left` returns the leftmost characters from a string, including spaces. You specify the number of characters to be returned.

Syntax

```
left(expression, limit)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

limit

The number of characters to be returned from *expression*, starting from the first character in the string.

Return Type

String

Example

The following example returns the first 3 characters from a string.

```
left('Seattle Store #14', 3)
```

The following value is returned.

```
Sea
```

locate

`locate` locates a substring that you specify within another string, and returns the number of characters until the first character in the substring. The function returns 0 if it doesn't find the substring.

Syntax

```
locate(expression, substring, start)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

substring

The set of characters in *expression* that you want to locate. The substring can occur one or more times in *expression*.

start

(Optional) If *substring* occurs more than once, use *start* to identify where in the string the function should start looking for the substring. For example, suppose that you want to find the second example of a substring and you think it typically occurs after the first 10 characters. You specify a *start* value of 10.

Return Type

Integer

Examples

The following example returns information about where the first occurrence of the substring 'and' appears in a string.

```
locate('1 and 2 and 3 and 4', 'and')
```

The following value is returned.

```
3
```

The following example returns information about where the first occurrence of the substring 'and' appears in a string after the fourth character.

```
locate('1 and 2 and 3 and 4', 'and', 4)
```

The following value is returned.

```
9
```

ltrim

`ltrim` removes preceding white space from a string.

Syntax

```
ltrim(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

Return Type

String

Example

The following example removes the preceding spaces from a string.

```
ltrim('    Seattle Store #14')
```

The following value is returned.

```
Seattle Store #14
```

now

For database data sets that directly query the database, now returns the current date and time using the settings and format specified by the database server. For file imports and Salesforce data sets, now returns the UTC date and time, in the format yyyy-MM-ddTk:mm:ss:SSSZ (for example, 2015-10-15T19:11:51:003Z).

You can only add now to a calculated field during data preparation, not to an analysis.

Syntax

```
now()
```

Return Type

Date

nullif

nullif compares two expressions. If they are equal, the function returns null. If they are not equal, the function returns the first expression.

Syntax

```
nullif(expression1, expression2)
```

Arguments

nullif takes two expressions as arguments.

expression

The expression can be numeric, datetime, or string. It can be a field name, a literal value, or another function.

Return Type

String

Example

The following example returns nulls if the reason for a shipment delay is unknown.

```
nullIf(delayReason, 'unknown')
```

The following are the given field values.

```
delayReason
=====
unknown
back ordered
weather delay
```

For these field values, the following values are returned.

```
(null)
back ordered
weather delay
```

parseDate

parseDate parses a string to determine if it contains a date value, and returns a standard date in the format yyyy-MM-ddTkk:mm:ss.SSSZ (using the format pattern syntax specified in [Class DateTimeFormat](#) in the Joda project documentation), for example 2015-10-15T19:11:51.003Z. This function returns all rows that contain a date in a valid format and skips any rows that don't, including rows that contain null values.

Amazon QuickSight supports dates in the range from Jan 1, 1900 00:00:00 UTC to Dec 31, 2037 23:59:59 UTC. See also [Supported Date Formats \(p. 65\)](#).

Note

parseDate is not supported for use with [SPICE \(p. 2\)](#) data sets.

Syntax

```
parseDate(expression, [ 'format' ], [ 'time_zone' ])
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '1/1/2016', or a call to another function that outputs a string.

format

(Optional) A string containing the format pattern that *date_string* must match. For example, if you are using a field with data like **01/03/2016**, you specify the format 'MM/dd/yyyy'. If you don't specify a format, it defaults to yyyy-MM-dd. Rows whose data doesn't conform to *format* are skipped.

Different date formats are supported based on the type of data set used. Use the following table to see details of supported date formats.

| Date Source Type | Supported Date Formats |
|---|--|
| File, Amazon Athena, and Salesforce data sets | All date format patterns specified in Supported Date Formats (p. 65) . |
| Direct query of Amazon Aurora, MariaDB, and MySQL databases | <ul style="list-style-type: none"> • MM/dd/yyyy • dd/MM/yyyy • yyyy/MM/dd • MMM/dd/yyyy • dd/MMM/yyyy • yyyy/MMM/dd • MM/dd/yyyy HH:mm:ss • dd/MM/yyyy HH:mm:ss • yyyy/MM/dd HH:mm:ss • MMM/dd/yyyy HH:mm:ss • dd/MMM/yyyy HH:mm:ss • yyyy/MMM/dd HH:mm:ss • MM-dd-yyyy • dd-MM-yyyy • yyyy-MM-dd • MMM-dd-yyyy • dd-MMM-yyyy • yyyy-MMM-dd • MM-dd-yyyy HH:mm:ss • dd-MM-yyyy HH:mm:ss • yyyy-MM-dd HH:mm:ss • MMM-dd-yyyy HH:mm:ss • dd-MMM-yyyy HH:mm:ss • yyyy-MMM-dd HH:mm:ss |
| Direct query of Snowflake | <ul style="list-style-type: none"> • dd/MM/yyyy • dd/MM/yyyy HH:mm:ss • dd-MM-yyyy • dd-MM-yyyy HH:mm:ss • MM/dd/yyyy • MM/dd/yyyy HH:mm:ss • MM-dd-yyyy • MM-dd-yyyy HH:mm:ss • yyyy/MM/dd • yyyy/MM/dd HH:mm:ss |

| Date Source Type | Supported Date Formats |
|--|---|
| | <ul style="list-style-type: none">• yyyy-MM-dd• yyyy-MM-dd HH:mm:ss |
| Direct query of Microsoft SQL Server databases | <ul style="list-style-type: none">• dd-MM-yyyy• MM/dd/yyyy• dd/MM/yyyy• yyyy/MM/dd• MMM/dd/yyyy• dd/MMM/yyyy• yyyy/MMM/dd• dd/MM/yyyy HH:mm:ss• yyyy/MM/dd HH:mm:ss• MMM/dd/yyyy HH:mm:ss• dd/MMM/yyyy HH:mm:ss• yyyy/MMM/dd HH:mm:ss• MM-dd-yyyy• yyyy-MM-dd• MMM-dd-yyyy• yyyy-MMM-dd• MM-dd-yyyy HH:mm:ss• dd-MM-yyyy HH:mm:ss• yyyy-MM-dd HH:mm:ss• MMM-dd-yyyy HH:mm:ss• dd-MMM-yyyy HH:mm:ss• yyyy-MMM-dd HH:mm:ss |

| Date Source Type | Supported Date Formats |
|---|--|
| Direct query of Amazon Redshift or PostgreSQL databases | <ul style="list-style-type: none"> • MM/dd/yyyy • dd/MM/yyyy • yyyy/MM/dd • MMM/dd/yyyy • dd/MMM/yyyy • yyyy/MMM/dd • MM/dd/yyyy HH:mm:ss • dd/MM/yyyy HH:mm:ss • yyyy/MM/dd HH:mm:ss • MMM/dd/yyyy HH:mm:ss • dd/MMM/yyyy HH:mm:ss • yyyy/MMM/dd HH:mm:ss • MM-dd-yyyy • dd-MM-yyyy • yyyy-MM-dd • MMM-dd-yyyy • dd-MMM-yyyy • yyyy-MMM-dd • MM-dd-yyyy HH:mm:ss • dd-MM-yyyy HH:mm:ss • yyyy-MM-dd HH:mm:ss • MMM-dd-yyyy HH:mm:ss • dd-MMM-yyyy HH:mm:ss • yyyy-MMM-dd HH:mm:ss |
| SPICE (p. 2) database data sets (any DBMS) | Not supported |

time_zone

(Optional) A string representing an IANA time zone.

If you don't specify a time zone, UTC is used.

Return Type

Date

Example

The following example evaluates `prodDate` to determine if it contains date values.

```
parseDate(prodDate, 'MM/dd/yyyy')
```

The following are the given field values.

```
prodDate
```

```
-----  
01-01-1999  
12/31/2006  
1/18/1982  
7/4/2010
```

For these field values, the following rows are returned.

```
12-31-2006T00:00:00.000Z  
01-18-1982T00:00:00.000Z  
07-04-2010T00:00:00.000Z
```

parseDecimal

`parseDecimal` parses a string to determine if it contains a decimal value. This function returns all rows that contain a decimal, integer, or null value, and skips any rows that don't. If the row contains an integer value, it is returned as a decimal. For example, a value of '2' is returned as '2.0'.

Syntax

```
parseDecimal(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**9.62**', or a call to another function that outputs a string.

Return Type

Decimal

Example

The following example evaluates `fee` to determine if it contains decimal values.

```
parseDecimal(fee)
```

The following are the given field values.

```
fee  
-----  
2  
2a  
12.13  
3b  
3.9  
(null)  
198.353398
```

For these field values, the following rows are returned.

```
2.0
12.13
3.9
(null)
198.353398
```

parseInt

`parseInt` parses a string to determine if it contains an integer value. This function returns all rows that contain a decimal, integer, or null value, and skips any rows that don't. If the row contains a decimal value, it is returned as the nearest integer, rounded down. For example, a value of '2.99' is returned as '2'.

Syntax

```
parseInt(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '`3`', or a call to another function that outputs a string.

Return Type

Integer

Example

The following example evaluates `feeType` to determine if it contains integer values.

```
parseInt(feeType)
```

The following are the given field values.

```
feeType
-----
2
2.1
2a
3
3b
(null)
5
```

For these field values, the following rows are returned.

```
2
2
3
(null)
5
```

parseJson

Use `parseJson` to extract values from a JSON object.

In [SPICE \(p. 2\)](#), you can use `parseJson` when you are preparing a data set, but not in calculated fields during analysis.

For direct query, you can use `parseJson` both during data preparation and analysis. The `parseJson` function applies to either strings or to JSON native data types, depending on the dialect, as shown in the following table.

| Dialect | Type |
|----------------------|---|
| PostgreSQL | JSON |
| Amazon Redshift | String |
| Microsoft SQL Server | String |
| MySQL | JSON |
| Teradata | JSON |
| Presto | String |
| Snowflake | Semistructured data type object and array |
| Hive | String |

Syntax

```
parseJson(fieldName, path)
```

Arguments

fieldName

The field containing the JSON object that you want to parse.

path

The path to the data element you want to parse from the JSON object. Valid path syntax includes:

- \$ – Root object
- . – Child operator
- [] – Subscript operator for array

Return Type

String

Example

The following example evaluates incoming JSON to retrieve a value for item quantity. By using this during data preparation, you can create a table out of the JSON.

```
parseJson({jsonField}, ".$.items.qty")
```

The following shows the JSON.

```
{
  "customer": "John Doe",
  "items": {
    "product": "Beer",
    "qty": 6
  },
  "list1": [
    "val1",
    "val2"
  ],
  "list2": [
    {
      "list2key1": "list1value1"
    }
  ]
}
```

For this example, the following value is returned.

```
6
```

Example

The following example evaluates `JSONObject1` to extract the first key value pair (KVP), labelled "State", and assign the value to the calculated field that you are creating.

```
parseJson(JSONObject1, ".$.state")
```

The following are the given field values.

```
JSONObject1
-----
{"State": "New York", "Product": "Produce", "Date Sold": "1/16/2018", "Sales Amount": "$3423.39"}
 {"State": "North Carolina", "Product": "Bakery Products", "Date Sold": "2/1/2018", "Sales Amount": "$3226.42"}
 {"State": "Utah", "Product": "Water", "Date Sold": "4/24/2018", "Sales Amount": "$7001.52"}
```

For these field values, the following rows are returned.

```
New York
North Carolina
Utah
```

replace

`replace` replaces part of a string with another string that you specify.

Syntax

```
replace(expression, substring, replacement)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

substring

The set of characters in *expression* that you want to replace. The substring can occur one or more times in *expression*.

replacement

The string you want to have substituted for *substring*.

Return Type

String

Example

The following example replaces the substring 'and' with 'or'.

```
replace('1 and 2 and 3', 'and', 'or')
```

The following string is returned.

```
1 or 2 or 3
```

right

right returns the rightmost characters from a string, including spaces. You specify the number of characters to be returned.

Syntax

```
right(expression, limit)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

limit

The number of characters to be returned from *expression*, starting from the last character in the string.

Return Type

String

Example

The following example returns the last five characters from a string.

```
right('Seattle Store#14', 12)
```

The following value is returned.

```
tle Store#14
```

round

`round` rounds a decimal value to the closest integer if no scale is specified, or to the closest decimal place if scale is specified.

`round` is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
round(decimal, scale)
```

Arguments

decimal

A field that uses the decimal data type, a literal value like **17.62**, or a call to another function that outputs a decimal.

scale

The number of decimal places to use for the return values.

Return Type

Decimal

Example

The following example rounds a decimal field to the closest second decimal place.

```
round(salesAmount, 2)
```

The following are the given field values.

```
20.1307  
892.0388  
57.5447
```

For these field values, the following values are returned.

```
20.13  
892.04
```

58.54

rtrim

`rtrim` removes following white space from a string.

Syntax

```
rtrim(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

Return Type

String

Example

The following example removes the following spaces from a string.

```
rtrim('Seattle Store #14    ')
```

For these field values, the following values are returned.

```
Seattle Store #14
```

split

`split` splits a string into an array of substrings, based on a delimiter that you choose, and returns the item specified by the position.

Syntax

```
split(expression, delimiter , position)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street;1402 35th Ave;1818 Elm Ct;11 Janes Lane**', or a call to another function that outputs a string.

delimiter

The character that delimits where the string is broken into substrings. For example, `split('one|two|three', '|', 2)` becomes the following.

```
one
two
three
```

If you choose `position = 2`, `split` returns 'two'.
position

(Required) The position of the item to return from the array. The position of the first item in the array is 1.

Return Type

String array

Example

The following example splits a string into an array, using the semicolon character (;) as the delimiter, and returns the third element of the array.

```
split('123 Test St;1402 35th Ave;1818 Elm Ct;11 Janes Lane', ';', 3)
```

The following item is returned.

```
1818 Elm Ct
```

This function skips items containing null values or empty strings.

strlen

`strlen` returns the number of characters in a string, including spaces.

Syntax

```
strlen(expression)
```

Arguments

expression

An expression can be the name of a field that uses the string data type like `address1`, a literal value like '`Unknown`', or another function like `substring(field_name, 0, 5)`.

Return Type

Integer

Example

The following example returns the length of the specified string.

```
strlen('1421 Main Street')
```

The following value is returned.

16

substring

substring returns the characters in a string, starting at the location specified by the *start* argument and proceeding for the number of characters specified by the *length* arguments.

Syntax

```
substring(expression, start, length)
```

Arguments

expression

An expression can be the name of a field that uses the string data type like **address1**, a literal value like '**Unknown**', or another function like `substring(field_name,0,5)`.

start

The character location to start from. *start* is inclusive, so the character at the starting position is the first character in the returned value.

length

The number of additional characters to include after *start*. *length* is inclusive of *start*, so the last character returned is *length* - 1 after the starting character.

Return Type

String

Example

The following example returns the thirteenth through nineteenth characters in a string.

```
substring('Fantasy and Science Fiction',13,7)
```

The following value is returned.

Science

toLowerCase

`toLowerCase` formats a string in all lowercase. `toLowerCase` skips rows containing null values.

Syntax

```
toLowerCase(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like **'12 Main Street'**, or a call to another function that outputs a string.

Return Type

String

Example

The following example converts a string value into lowercase.

```
toLowerCase('Seattle Store #14')
```

The following value is returned.

```
seattle store #14
```

toString

`toString` formats the input expression as a string. `toString` skips rows containing null values.

Syntax

```
toString(expression)
```

Arguments

expression

An expression can be a field of any data type, a literal value like **14.62**, or a call to another function that returns any data type.

Return Type

String

Example

The following example returns the values from `payDate` (which uses the date data type) as strings.

```
toString(payDate)
```

The following are the given field values.

```
payDate
-----
1992-11-14T00:00:00.000Z
2012-10-12T00:00:00.000Z
```

```
1973-04-08T00:00:00.000Z
```

For these field values, the following rows are returned.

```
1992-11-14T00:00:00.000Z  
2012-10-12T00:00:00.000Z  
1973-04-08T00:00:00.000Z
```

toUpper

`toUpper` formats a string in all uppercase. `toUpper` skips rows containing null values.

Syntax

```
toUpper(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

Return Type

String

Example

The following example converts a string value into uppercase.

```
toUpper('Seattle Store #14')
```

The following value is returned.

```
SEATTLE STORE #14
```

trim

`trim` removes both preceding and following white space from a string.

Syntax

```
trim(expression)
```

Arguments

expression

The expression must be a string. It can be the name of a field that uses the string data type, a literal value like '**12 Main Street**', or a call to another function that outputs a string.

Return Type

String

Example

The following example removes the following spaces from a string.

```
trim('  Seattle Store #14  ')
```

For these field values, the following values are returned.

```
Seattle Store #14
```

truncDate

`truncDate` returns a date value that represents a specified portion of a date. For example, requesting the year portion of the value 2012-09-02T00:00:00.000Z returns 2012-01-01T00:00:00.000Z. Specifying a time-related period for a date that doesn't contain time information returns the initial date value unchanged.

`truncDate` is supported for use with analyses based on [SPICE \(p. 2\)](#) data sets.

Syntax

```
truncDate('period', date)
```

Arguments

period

The period of the date that you want returned. Valid periods are as follows:

- YYYY: This returns the year portion of the date.
- Q: This returns the date of the first day of the quarter that the date belongs to.
- MM: This returns the month portion of the date.
- DD: This returns the day portion of the date.
- WK: This returns the week portion of the date. The week starts on Sunday in Amazon QuickSight.
- HH: This returns the hour portion of the date.
- MI: This returns the minute portion of the date.
- SS: This returns the second portion of the date. (Not supported when added inside SPICE-based analyses.)

date

A date field or a call to another function that outputs a date.

Return Type

Date

Example

The following example returns a date representing the month of the order date.

```
truncDate('MM', orderDate)
```

The following are the given field values.

```
orderDate
=====
2012-12-14T00:00:00.000Z
2013-12-29T00:00:00.000Z
2012-11-15T00:00:00.000Z
```

For these field values, the following values are returned.

```
2012-12-01T00:00:00.000Z
2013-12-01T00:00:00.000Z
2012-11-01T00:00:00.000Z
```

Table Calculation Functions Index

When you are analyzing data in a specific visual, you can apply table calculations to the current set of data to discover how dimensions influence measures or each other. *Visualized data* is your result set based on your current data set, with all the filters, field selections, and customizations applied. To see exactly what this result set is, you can export your visual to comma-separated value (CSV) format. A *table calculation function* performs operations on the data to reveal relationships between fields.

In this section, you can find a list of the functions available in table calculations that you can perform on visualized data in Amazon QuickSight.

To view a list of functions sorted by category, with brief definitions, see [Functions by Category \(p. 436\)](#).

Lookup-based functions:

- [difference \(p. 472\)](#)
- [lag \(p. 474\)](#)
- [lead \(p. 475\)](#)
- [percentDifference \(p. 477\)](#)

Over functions:

- [avgOver \(p. 479\)](#)
- [countOver \(p. 480\)](#)
- [maxOver \(p. 483\)](#)
- [minOver \(p. 485\)](#)
- [percentileOver \(p. 486\)](#)
- [percentOfTotal \(p. 487\)](#)
- [sumOver \(p. 489\)](#)

Ranking functions:

- [rank \(p. 490\)](#)
- [denseRank \(p. 492\)](#)
- [percentileRank \(p. 493\)](#)

Running functions:

- [runningAvg \(p. 495\)](#)
- [runningCount \(p. 496\)](#)
- [runningMax \(p. 497\)](#)
- [runningMin \(p. 498\)](#)
- [runningSum \(p. 499\)](#)

Custom window functions:

- [windowAvg \(p. 500\)](#)
- [windowCount \(p. 502\)](#)
- [windowMax \(p. 503\)](#)
- [windowMin \(p. 505\)](#)
- [windowSum \(p. 507\)](#)

difference

`difference` calculates the difference between a measure based on one set of partitions and sorts, and a measure based on another.

`difference` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
difference
(
    measure
    ,[ sortorder_field ASC_or_DESC, ... ]
    ,lookup_index,
    ,[ partition field, ... ]
)
```

Arguments

measure

An aggregated measure that you want to see the difference for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

lookup index

The lookup index can be positive or negative, indicating a following row in the sort (positive) or a previous row in the sort (negative). The lookup index can be 1–2,147,483,647. For the engines MySQL, MariaDB and Aurora with MySQL compatibility, the lookup index is limited to just 1.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the difference between sum({Billed Amount}), sorted by Customer Region ascending, compared to the next row, and partitioned by Service Line.

```
difference(
    sum( {Billed Amount} ),
    [{Customer Region} ASC],
    1,
    [{Service Line}]
)
```

The following example calculates the difference between Billed Amount compared to the next line, partitioned by ([{Customer Region}]). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
difference(
    sum( {Billed Amount} ),
    [{Customer Region} ASC],
    1
)
```

The red highlights show how each amount is added (a + b = c) to show the difference between amounts a and c.

Field wells

Group by
Customer Region

Value
difference (Custom)
Billed Amount (Sum)

Sum of Billed Amount and Difference by Customer Region

| Customer Region | difference | Billed Amount |
|-----------------|--------------|---------------|
| APAC | a 8,390,654 | |
| EMEA | +b 2,647,510 | =c 11,038,164 |
| US | 12,509,001 | 23,547,165 |

lag

lag calculates the lag (previous) value for a measure based on specified partitions and sorts.

lag is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
lag
(
    measure
    , [ sortorder_field ASC_or_DESC, ... ]
    , lookup_index,
    , [ partition_field, ... ]
)
```

Arguments

measure

The measure that you want to get the lag for. This can include an aggregate, for example `sum({Sales Amt})`.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

lookup index

The lookup index can be positive or negative, indicating a following row in the sort (positive) or a previous row in the sort (negative). The lookup index can be 1–2,147,483,647. For the engines MySQL, MariaDB, and Amazon Aurora with MySQL compatibility, the lookup index is limited to just 1.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the previous `sum(sales)`, partitioned by the state of origin, in the ascending sort order on `cancellation_code`.

```
lag
(
    sum(Sales),
    [cancellation_code ASC],
    1,
```

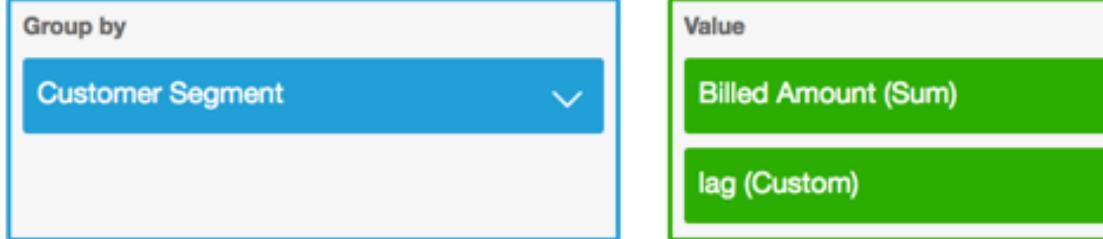
```
) [origin_state_nm]
```

The following example uses a calculated field with lag to display the amount for the previous row next to the amount for the current row, sorted by Customer Segment. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
lag(  
    sum({Billed Amount}),  
    [{Customer Segment} ASC],  
    1  
)
```

The following screenshot shows the results of the example.

Field wells



| Sum of Billed Amount and Lag by Customer Segment | | |
|--|---------------|------------|
| Customer Segment | Billed Amount | lag |
| Enterprise | 14,643,518 | |
| SMB | 3,857,503 | 14,643,518 |
| Startup | 24,474,962 | 3,857,503 |

lead

lead calculates the lead (following) value for a measure based on specified partitions and sorts.

lead is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
lead  
(
```

```
measure
,[ sortorder_field ASC_or_DESC, ... ]
,lookup_index,
,[ partition_field, ... ]
)
```

Arguments

measure

The measure that you want to get the lead for. This can include an aggregate, for example `sum({Sales Amt})`.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

lookup index

The lookup index can be positive or negative, indicating a following row in the sort (positive) or a previous row in the sort (negative). The lookup index can be 1–2,147,483,647. For the engines MySQL, MariaDB, and Amazon Aurora with MySQL compatibility, the lookup index is limited to just 1.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the next `sum(sales)`, partitioned by the state of origin, in the ascending sort order on `cancellation_code`.

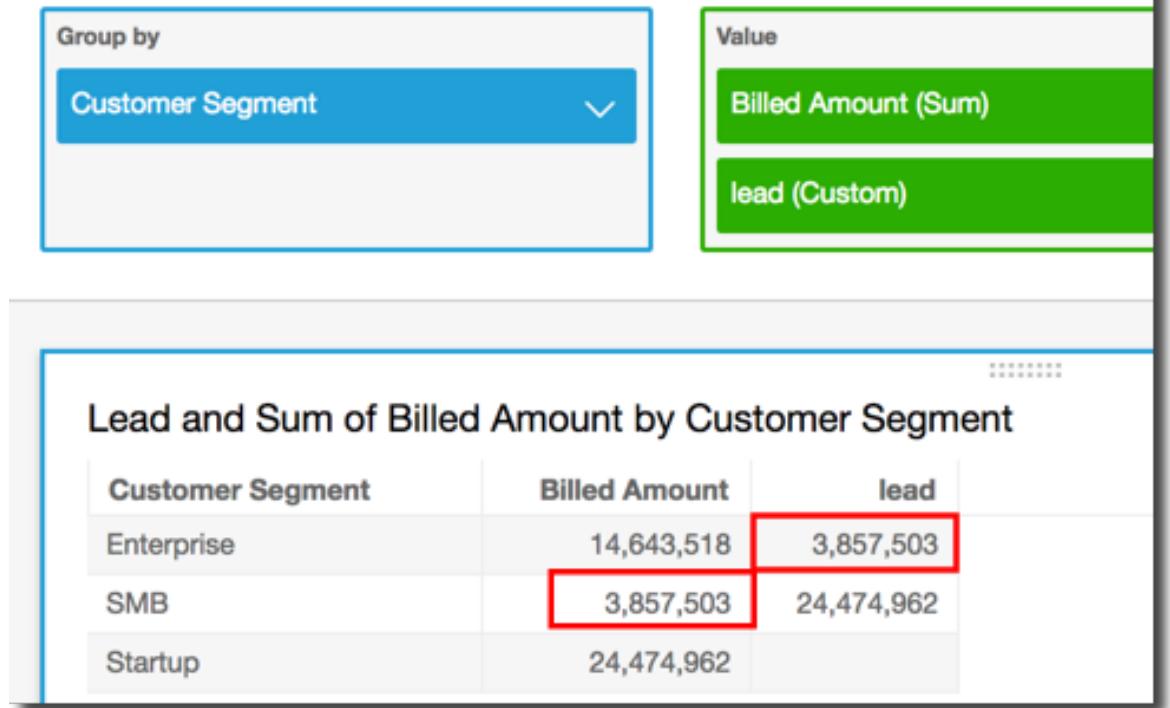
```
lead
(
    sum(sales),
    [cancellation_code ASC],
    1,
    [origin_state_nm]
)
```

The following example uses a calculated field with `lead` to display the amount for the next row beside the amount for the current row, sorted by `Customer Segment`. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
lead(
    sum({Billed Amount}),
    [{Customer Segment} ASC],
    1
)
```

The following screenshot shows the results of the example.

Field wells



percentDifference

`percentDifference` calculates the percentage difference between the current value and a comparison value, based on partitions, sorts, and lookup index.

`percentDifference` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
percentDifference
(
  measure
  ,[ sortorder_field ASC_or_DESC, ... ]
  ,lookup_index
  ,[ partition_field, ... ]
)
```

Arguments

measure

An aggregated measure that you want to see the percent difference for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

lookup index

The lookup index can be positive or negative, indicating a following row in the sort (positive) or a previous row in the sort (negative). The lookup index can be 1–2,147,483,647. For the engines MySQL, MariaDB and Aurora with MySQL compatibility, the lookup index is limited to just 1.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the percentage of difference between the `sum(Sales)` for the current and the previous State, sorted by Sales.

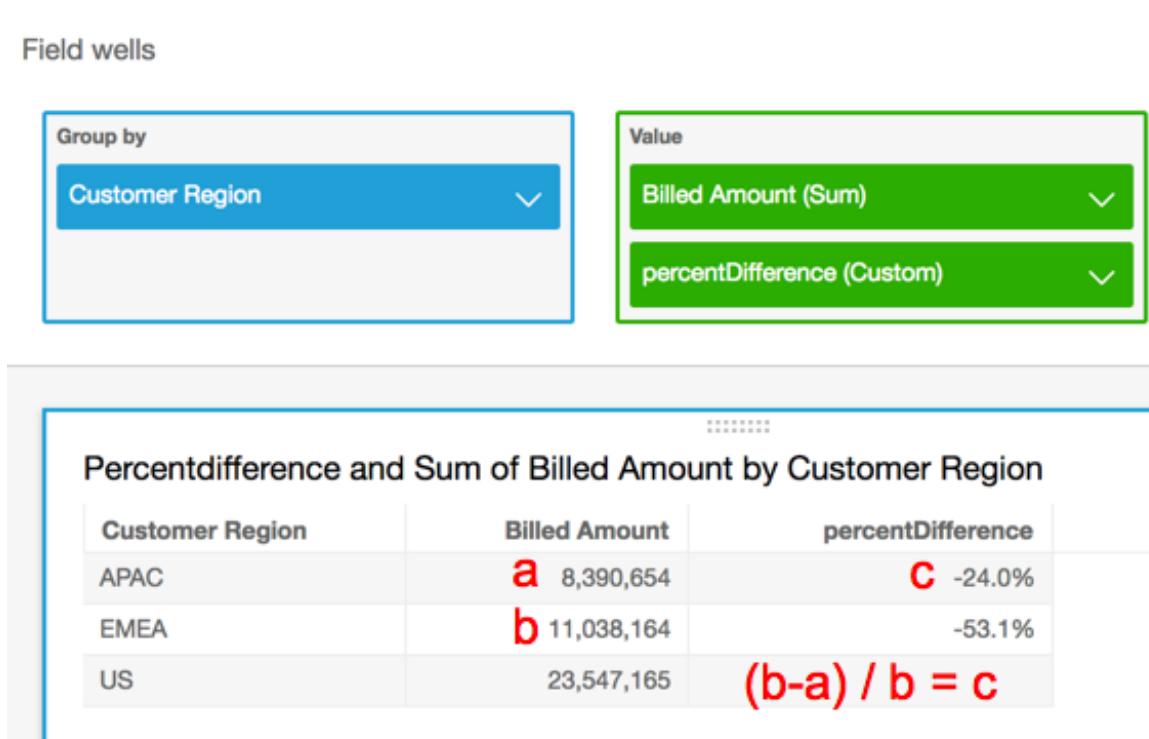
```
percentDifference
(
  sum(amount),
  [sum(amount) ASC],
  -1,
  [State]
)
```

The following example calculates the percent that a specific `Billed Amount` is of another `Billed Amount`, sorted by ([`{Customer Region}` ASC]). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
percentDifference(
  sum( {Billed Amount} ),
  [{Customer Region} ASC],
  1
)
```

The following screenshot shows the results of the example. The red letters show that the total `Billed Amount` for the `Customer Region APAC` is 24 percent less than the amount for the `EMEA` region.

Field wells



avgOver

`avgOver` calculates the average of a measure partitioned by a list of dimensions.

`avgOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
avgOver
(
    measure
    ,[ partition_field, ... ]
)
```

The following example shows the average Billed Amount over Customer Region. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
avgOver(
    sum({Billed Amount}),
    [{Customer Region}]
)
```

The following screenshot shows the results of the example. With the addition of Service Line, the total amount billed for each is displayed, and the average of these three values displays in the calculated field.

Field wells

The screenshot shows two side-by-side boxes representing field wells. The left box, titled 'Group by', contains 'Customer Region' and 'Service Line'. The right box, titled 'Value', contains 'Billed Amount (Sum)' and 'avgOver (Custom)'. Both boxes have a downward arrow icon at the bottom right.

| Sum of Billed Amount and Avgover by Customer Region and Service Line | | | | |
|--|--------------|---------------|-----------|---|
| Customer Region | Service Line | Billed Amount | avgOver | |
| APAC | Billing | 3,569,780 | 2,796,885 | = |
| APAC | HR | 3,441,106 | 2,796,885 | |
| APAC | Marketing | 1,379,768 | 2,796,885 | |
| EMEA | Billing | 4,446,586 | 3,679,388 | |
| EMEA | HR | 4,316,700 | 3,679,388 | |
| EMEA | Marketing | 2,274,878 | 3,679,388 | |

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales_Amt})`.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example gets the average `sum(Sales)` partitioned over `City` and `State`.

```
avgOver
(
    sum(Sales),
    [City, State]
)
```

countOver

`countOver` calculates the count of a dimension or measure partitioned by a list of dimensions.

`countOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
countOver(  
    measure  
    , [ partition_field, ... ]  
)
```

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales Amt})`.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example gets the count of Sales partitioned over City and State.

```
countOver  
(  
    Sales,  
    [City, State]  
)
```

The following example gets the count of {County} partitioned over City and State.

```
countOver  
(  
    {County},  
    [City, State]  
)
```

The following example shows the count of `Billed Amount` over `Customer Region`. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
countOver(  
    sum({Billed Amount}),  
    [{Customer Region}]  
)
```

The following screenshot shows the results of the example. Because there are no other fields involved, the count is one for each region.

Field wells

Group by

Customer Region

Value

countOver (Custom)

Countover by Customer Region

| Customer Region | countOver |
|-----------------|-----------|
| APAC | 1 |
| EMEA | 1 |
| US | 1 |

If you add additional fields, the count changes. In the following screenshot, we add `Customer Segment` and `Service Line`. Each of those fields contains three unique values. With 3 segments, 3 service lines, and 3 regions, the calculated field shows 9.

Field wells

Group by

Customer Segment

Service Line

Customer Region

Value

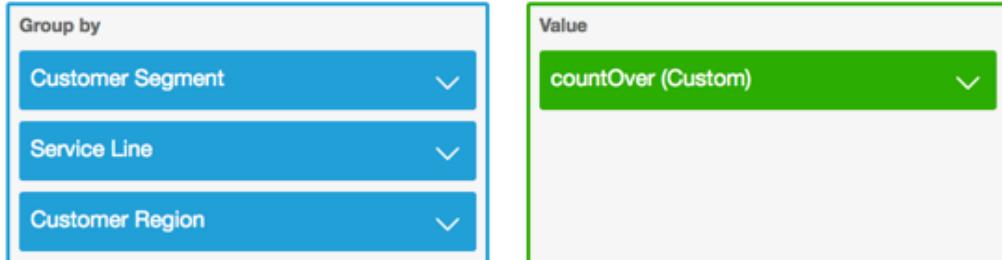
countOver (Custom)

Countover by Customer Segment, Service Line, and Customer Region

| Customer Segment | Service Line | Customer Region | countOver |
|------------------|--------------|-----------------|-----------|
| Enterprise | Billing | APAC | 9 |
| Enterprise | Billing | EMEA | 9 |
| Enterprise | Billing | US | 9 |
| Enterprise | HR | APAC | 9 |

If you add the two additional fields to the partitioning fields in the calculated field, `countOver(sum({Billed Amount}), [{Customer Region}, {Customer Segment}, {Service Line}])`, then the count is again 1 for each row.

Field wells



| Countover by Customer Region, Service Line, and Customer Segment | | | |
|--|--------------|-----------------|-----------|
| Customer Segment | Service Line | Customer Region | countOver |
| Enterprise | Billing | APAC | 1 |
| Enterprise | Billing | EMEA | 1 |
| Enterprise | Billing | US | 1 |
| Enterprise | HR | APAC | 1 |
| Enterprise | HR | EMEA | 1 |
| Enterprise | HR | US | 1 |

maxOver

`maxOver` calculates the maximum of a measure or date partitioned by a list of dimensions.

`maxOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
maxOver
(
    measure
    , [ partition_field, ... ]
)
```

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales Amt})`.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the maximum sum(Sales), partitioned by City and State.

```
maxOver
(
    sum(Sales),
    [City, State]
)
```

The following example shows the maximum Billed Amount over Customer Region. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
maxOver(
    sum({Billed Amount}),
    [{Customer Region}]
)
```

The following screenshot shows the results of the example. With the addition of Service Line, the total amount billed for each is displayed, and the maximum of these three values displays in the calculated field.

Field wells

The screenshot shows two side-by-side panels. The left panel, titled 'Group by', contains two dropdown menus: 'Customer Region' and 'Service Line'. The right panel, titled 'Value', also contains two dropdown menus: 'Billed Amount (Sum)' and 'maxOver (Custom)'. Both panels have a downward arrow icon indicating they are dropdown menus.

The screenshot shows a data table with the following columns: Customer Region, Service Line, Billed Amount, and maxOver. The rows show data for APAC, EMEA, and Marketing. The 'Billed Amount' column for APAC has three entries: 3,569,780, 3,441,106, and 1,379,768. The 'maxOver' column shows the maximum value for each row, which is 3,569,780 for all rows except the last one where it is 4,446,586. A red box highlights the 'Billed Amount' cell for the first APAC row, and another red box highlights the 'maxOver' cell for the same row, with an equals sign between them.

| Sum of Billed Amount and Maxover by Customer Region and Service Line | | | |
|--|--------------|---------------|-------------|
| Customer Region | Service Line | Billed Amount | maxOver |
| APAC | Billing | 3,569,780 | 3,569,780 |
| APAC | HR | 3,441,106 | = 3,569,780 |
| APAC | Marketing | 1,379,768 | 3,569,780 |
| EMEA | Billing | 4,446,586 | 4,446,586 |
| EMEA | HR | 4,316,700 | 4,446,586 |
| EMEA | Marketing | 2,274,878 | 4,446,586 |

minOver

`minOver` calculates the minimum of a measure or date partitioned by a list of dimensions.

`minOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
minOver
(
    measure
    ,[ partition_field, ... ]
)
```

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales Amt})`.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the min `sum(Sales)`, partitioned by `City` and `State`.

```
minOver
(
    sum(Sales),
    [City, State]
)
```

The following example shows the minimum `Billed Amount` over `Customer Region`. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
minOver(
    sum({Billed Amount}),
    [{Customer Region}]
)
```

The followins screenshot shows the results of the example. With the addition of `Service Line`, the total amount billed for each is displayed, and the minimum of these three values displays in the calculated field.

Field wells

The screenshot shows two side-by-side field wells. The left well, titled 'Group by', contains 'Customer Region' and 'Service Line'. The right well, titled 'Value', contains 'Billed Amount (Sum)' and 'minOver (Custom)'. Both sections have dropdown arrows at the bottom right.

| Sum of Billed Amount and Minover by Customer Region and Service Line | | | |
|--|--------------|---------------|-------------|
| Customer Region | Service Line | Billed Amount | minOver |
| APAC | Billing | 3,569,780 | 1,379,768 |
| APAC | HR | 3,441,106 | = 1,379,768 |
| APAC | Marketing | 1,379,768 | 1,379,768 |
| EMEA | Billing | 4,446,586 | 2,274,878 |
| EMEA | HR | 4,316,700 | 2,274,878 |
| EMEA | Marketing | 2,274,878 | 2,274,878 |

percentileOver

`percentileOver` calculates the *n*th percentile of a measure partitioned by a list of dimensions.

`percentileOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
percentileOver(
    measure
    ,percentile-n
    ,[ partition_field, ...]
)
```

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales Amt})`.

percentile-n

The percentile that you want to calculate for this measure. This decimal value can be 0–100.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the median (the 50th percentile) of Sales partitioned by City and State.

```
percentileOver
(
  Sales,
  50,
  [City, State]
)
```

The following example calculates the 98th percentile of sum({Billed Amount}) partitioned by Customer Region. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
percentileOver
(
  sum({Billed Amount}),
  98,
  [{Customer Region}]
)
```

The following screenshot shows the how these two examples looks on a chart.

| Sum of Billed Amount, PercOver50, and PercOver98 by Customer Region | | | |
|---|---------------|------------|-------------|
| Customer Region | Billed Amount | percOver50 | percOver98 |
| APAC | \$598,114 | \$850,406 | \$1,648,034 |
| EMEA | \$850,406 | \$850,406 | \$1,648,034 |
| US | \$1,648,034 | \$850,406 | \$1,648,034 |

percentOfTotal

percentOfTotal calculates the percentage a measure contributes to the total, based on the dimensions specified.

percentOfTotal is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
percentOfTotal
```

```
(  
    measure  
    , [ partition_field, ... ]  
)
```

Arguments

measure

An aggregated measure that you want to see the percent of total for. (Currently, the distinct count aggregation is not supported for `percentOfTotal`.)

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example creates a calculation for the percent of total Sales contributed by each State.

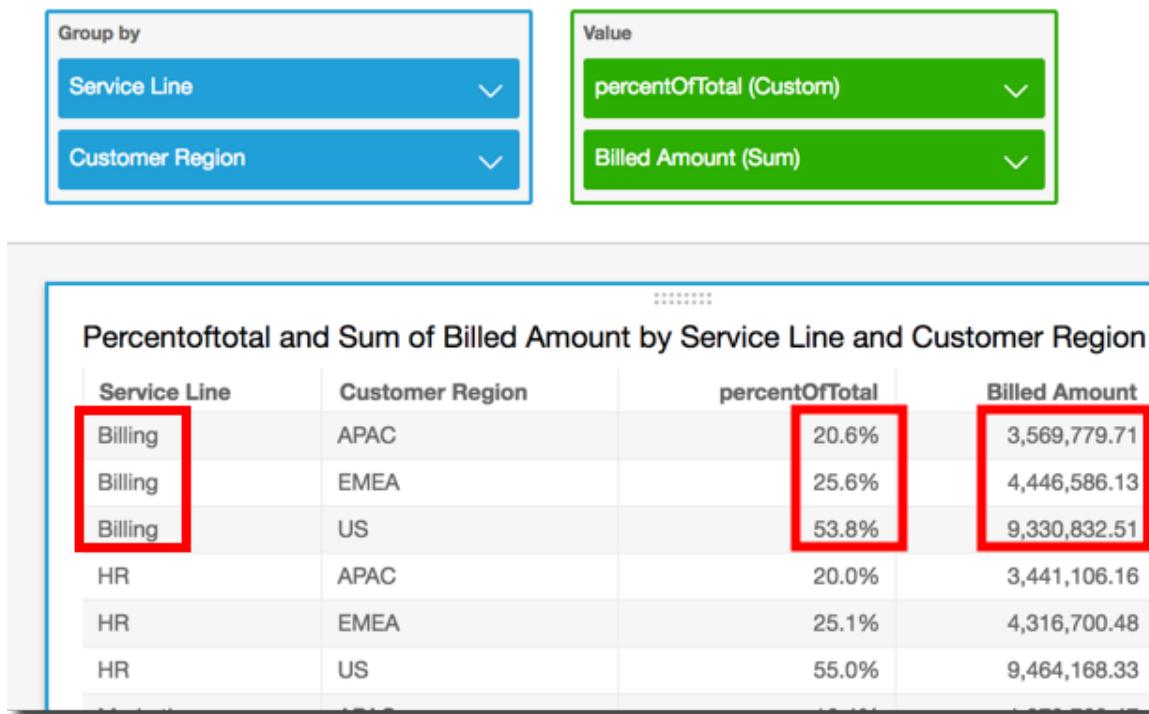
```
percentOfTotal  
(  
    sum(Sales),  
    [State]  
)
```

The following example calculates the percent that a specific `Billed Amount` is when compared to the total `Billed Amount`, partitioned by ([{Service Line} ASC]). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
percentOfTotal(  
    sum( {Billed Amount} ),  
    [{Service Line}]  
)
```

The following screenshot shows the results of the example. The red highlights show that the partition field with the value "Billing" has three entries, one for each region. The total billed amount for this service line is divided into three percentages, which total 100 percent. Percentages are rounded and might not always add up to exactly 100 percent.

Field wells



sumOver

`sumOver` calculates the sum of a measure partitioned by a list of dimensions.

`sumOver` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
sumOver
(
    measure
    , [ partition_field, ... ]
)
```

Arguments

measure

The aggregated measure that you want to get the sum for, for example `sum({Sales_Amt})`.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the sum of `sum(Sales)`, partitioned by `City` and `State`.

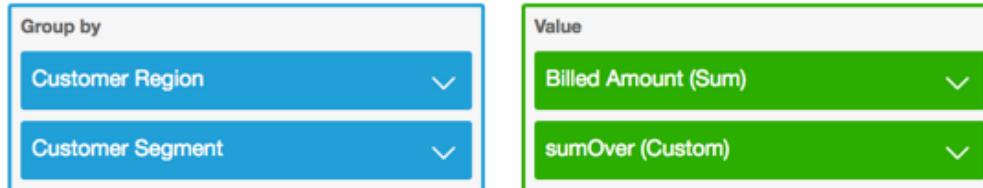
```
sumOver
(
    sum(Sales),
    [City, State]
)
```

The following example sums `Billed Amount` over `Customer Region`. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
sumOver(
    sum({Billed Amount}),
    [{Customer Region}]
)
```

The following screenshot shows the results of the example. With the addition of `Customer Segment`, the total amount billed for each is summed for the `Customer Region`, and displays in the calculated field.

Field wells



| Sum of Billed Amount and Sumover by Customer Region and Customer Segment | | | | |
|--|------------------|---------------|-----------|------------|
| Customer Region | Customer Segment | Billed Amount | sumOver | |
| APAC | Enterprise | 2,035,949 | 8,390,654 | |
| APAC | SMB | 660,097 | = | 8,390,654 |
| APAC | Startup | 5,694,609 | | 8,390,654 |
| EMEA | Enterprise | 5,678,783 | | 11,038,164 |
| EMEA | SMB | 1,341,834 | | 11,038,164 |
| EMEA | Startup | 4,017,547 | | 11,038,164 |

rank

`rank` calculates the rank of a measure or a dimension in comparison to the specified partitions. It counts each item, even duplicates, once and assigns a rank "with holes" to make up for duplicate values.

`rank` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
rank
(
  [ sort_order_field ASC_or_DESC, ... ]
  , [ partition_field, ... ]
)
```

Arguments

sort order field

One or more aggregated measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example ranks `max(Sales)`, based on a descending sort order, by `State` and `City`, within the `State` of `WA`. Any cities with the same `max(Sales)` are assigned the same rank, but the next rank includes the count of all previously existing ranks. For example, if three cities share the same ranking, the fourth city is ranked as fourth.

```
rank
(
  [max(Sales) DESC],
  [State, City]
)
```

The following example ranks `max(Sales)`, based on an ascending sort order, by `State`. Any states with the same `max(Sales)` are assigned the same rank, but the next rank includes the count of all previously existing ranks. For example, if three states share the same ranking, the fourth state is ranked as fourth.

```
rank
(
  [max(Sales) ASC],
  [State]
)
```

The following example ranks `Customer Region` by total `Billed Amount`. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
rank(
  [sum({Billed Amount}) DESC]
)
```

The following screenshot shows the results of the example, along with the total Billed Amount so you can see how each region ranks.

Field wells

The screenshot shows the configuration of two field wells and the resulting analysis output:

- Group by:** Customer Region
- Value:** rank (Custom) and Billed Amount (Sum)

Analysis Output:

Rank and Sum of Billed Amount by Customer Region

| Customer Region | rank | Billed Amount |
|-----------------|------|---------------|
| APAC | 3 | 8,390,654 |
| EMEA | 2 | 11,038,164 |
| US | 1 | 23,547,165 |

denseRank

denseRank calculates the rank of a measure or a dimension in comparison to the specified partitions. It counts each item only once, ignoring duplicates, and assigns a rank "without holes" so that duplicate values share the same rank.

denseRank is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
denseRank
(
    [ sort_order_field ASC_or_DESC, ... ]
    , [ partition_field, ... ]
)
```

Arguments

sort order field

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example densely ranks max(Sales), based on a descending sort order, by State and City. Any cities with the same max(Sales) are assigned the same rank, and the next city is ranked consecutively after them. For example, if three cities share the same ranking, the fourth city is ranked as second.

```
denseRank
(
    [max(Sales) DESC],
    [State, City]
)
```

The following example densely ranks max(Sales), based on a descending sort order, by State. Any states with the same max(Sales) are assigned the same rank, and the next is ranked consecutively after them. For example, if three states share the same ranking, the fourth state is ranked as second.

```
denseRank
(
    [max(Sales) DESC],
    [State]
)
```

percentileRank

percentileRank calculates the percentile rank of a measure or a dimension in comparison to the specified partitions. The percentile rank value(x) indicates that the current item is above x% of values in the specified partition. The percentile rank value ranges from 0 (inclusive) to 100 (exclusive).

percentileRank is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
percentileRank
(
    [ sort_order_field ASC_or_DESC, ... ]
    ,[ {partition_field}, ... ]
)
```

Arguments

sort order field

One or more aggregated measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example does a percentile ranking of `max(Sales)` in descending order, by `State`.

```
percentileRank
(
    [max(Sales) DESC],
    [State]
)
```

The following example does a percentile ranking of `Customer Region` by total `Billed Amount`. This example uses the [revenue sample data file](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
percentileRank(
    [sum({Billed Amount}) DESC],
    [{Customer Region}]
)
```

The following screenshot shows the results of the example, along with the total `Billed Amount` so you can see how each region compares.

The screenshot shows the 'Field wells' section of the Amazon QuickSight interface. It includes two main sections: 'Group by' and 'Value'. The 'Group by' section has a dropdown menu set to 'Customer Region'. The 'Value' section has two dropdown menus: 'Billed Amount (Sum)' and 'Percentile (Custom)'. Below this, a table visualization titled 'Sum of Billed Amount and Percentile by Customer Region' is displayed, showing data for three regions: APAC, EMEA, and US.

| Customer Region | Billed Amount | Percentile |
|-----------------|---------------|------------|
| APAC | 8,390,654.34 | 66.6666 |
| EMEA | 11,038,164.3 | 33.3333 |
| US | 23,547,164.89 | 0 |

runningAvg

runningAvg calculates a running average for a measure based on the specified dimensions and sort orders.

runningAvg is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
runningAvg
(
    measure
    ,[ sortorder_field ASC_or_DESC, ... ]
    ,[ partition_field, ... ]
)
```

Arguments

measure

An aggregated measure that you want to see the running average for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates a running average of sum(Sales), sorted by Sales, partitioned by City and State.

```
runningAvg
(
    sum(Sales),
    [Sales ASC],
    [City, State]
)
```

The following example calculates a running average of Billed Amount, sorted by month ([truncDate("MM", Date) ASC]). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
runningAvg
(
    sum({Billed Amount}),
    [truncDate("MM", Date) ASC]
```

)

runningCount

runningCount calculates a running count for a measure or dimension, based on the specified dimensions and sort orders.

runningCount is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
runningCount
(
  measure_or_dimension
  ,sortorder_field ASC_or_DESC, ...
  ,partition_field, ...
)
```

Arguments

measure or dimension

An aggregated measure or dimension that you want to see the running count for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates a running count of `sum(Sales)`, sorted by `Sales`, partitioned by `City` and `State`.

```
runningCount
(
  sum(Sales),
  [Sales ASC],
  [City, State]
)
```

The following example calculates a running count of `Billed Amount`, sorted by month (`[truncDate("MM", Date) ASC]`). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
runningCount
```

```
(  
    sum({Billed Amount}),  
    [truncDate("MM", Date) ASC]  
)
```

runningMax

`runningMax` calculates a running maximum for a measure based on the specified dimensions and sort orders.

`runningMax` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
runningMax  
(  
    measure  
    ,[ sortorder_field ASC_or_DESC, ... ]  
    ,[ partition_field, ... ]  
)
```

Arguments

measure

An aggregated measure that you want to see the running maximum for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates a running maximum of `sum(Sales)`, sorted by `Sales`, partitioned by `City` and `State`.

```
runningMax  
(  
    sum(Sales),  
    [Sales ASC],  
    [City, State]  
)
```

The following example calculates a running maximum of `Billed Amount`, sorted by month [`truncDate("MM", Date) ASC`]. This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
runningMax
(
  sum({Billed Amount}),
  [truncDate("MM", Date) ASC]
)
```

runningMin

`runningMin` calculates a running minimum for a measure based on the specified dimensions and sort orders.

`runningMin` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
runningMin
(
  measure
  ,[ sortorder_field ASC_or_DESC, ... ]
  ,[ partition_field, ... ]
)
```

Arguments

measure

An aggregated measure that you want to see the running minimum for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates a running minimum of `sum(Sales)`, sorted by `Sales`, partitioned by `City` and `State`.

```
runningMin
(
  sum(Sales),
  [Sales ASC],
  [City, State]
)
```

The following example calculates a running minimum of `Billed Amount`, sorted by month (`[truncDate("MM", Date) ASC]`). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
runningMin
(
  sum({Billed Amount}),
  [truncDate("MM", Date) ASC]
)
```

runningSum

`runningSum` calculates a running sum for a measure based on the specified dimensions and sort orders.

`runningSum` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
runningSum
(
  measure
  ,[ sortorder_field ASC_or_DESC, ... ]
  ,[ partition_field, ... ]
)
```

Arguments

measure

An aggregated measure that you want to see the running sum for.

sort order field

One or more measures and dimensions that you want to sort the data by, separated by commas. You can specify either ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates a running sum of `sum(Sales)`, sorted by `Sales`, partitioned by `City` and `State`.

```
runningSum
(
  sum(Sales),
  [Sales ASC],
  [City, State]
)
```

The following example calculates a running sum of `Billed Amount`, sorted by month (`[truncDate("MM", Date) ASC]`). This example uses the [revenue sample dataset](#), located in an Amazon S3 bucket. The fields in the table calculation are in the field wells of the visual.

```
runningSum
(
  sum({Billed Amount}),
  [truncDate("MM", Date) ASC]
)
```

The following screenshot shows the results of the example. The red labels show how each amount is added ($a + b = c$) to the next amount, resulting in a new total.

| Date | Billed Amount | runningSum |
|----------|---------------|---------------|
| Jan 2012 | 54,675.45 | a 54,675.45 |
| Feb 2012 | +b 57,127.93 | =c 111,803.38 |
| Mar 2012 | 66,303.97 | 178,107.35 |
| Apr 2012 | 66,694.23 | 244,801.58 |
| May 2012 | 75,906.62 | a 320,708.2 |
| Jun 2012 | +b 83,531.67 | =c 404,239.87 |

windowAvg

`windowAvg` calculates the average of the aggregated measure in a custom window that is partitioned and sorted by specified attributes. Usually, you use custom window functions on a time series, where your visual shows a metric and a date field. For example, you can use `windowAvg` to calculate a moving average, which is often used to smooth out the noise in a line chart.

`windowAvg` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. Window functions aren't supported for MySQL versions earlier than 8 and MariaDB versions earlier than 10.2.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
windowAvg
(
  measure
  , sort_order_field ASC/DESC, ...
  , start_index
  , end_index
  , [partition_field, ... ]
)
```

Arguments

measure

The aggregated metric that you want to get the average for, for example `sum({Revenue})`.

sort attribute

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

start index

The start index is a positive integer, indicating n rows above the current row. The start index counts the available data points above the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

end index

The end index is a positive integer, indicating n rows below the current row. The end index counts the available data points below the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

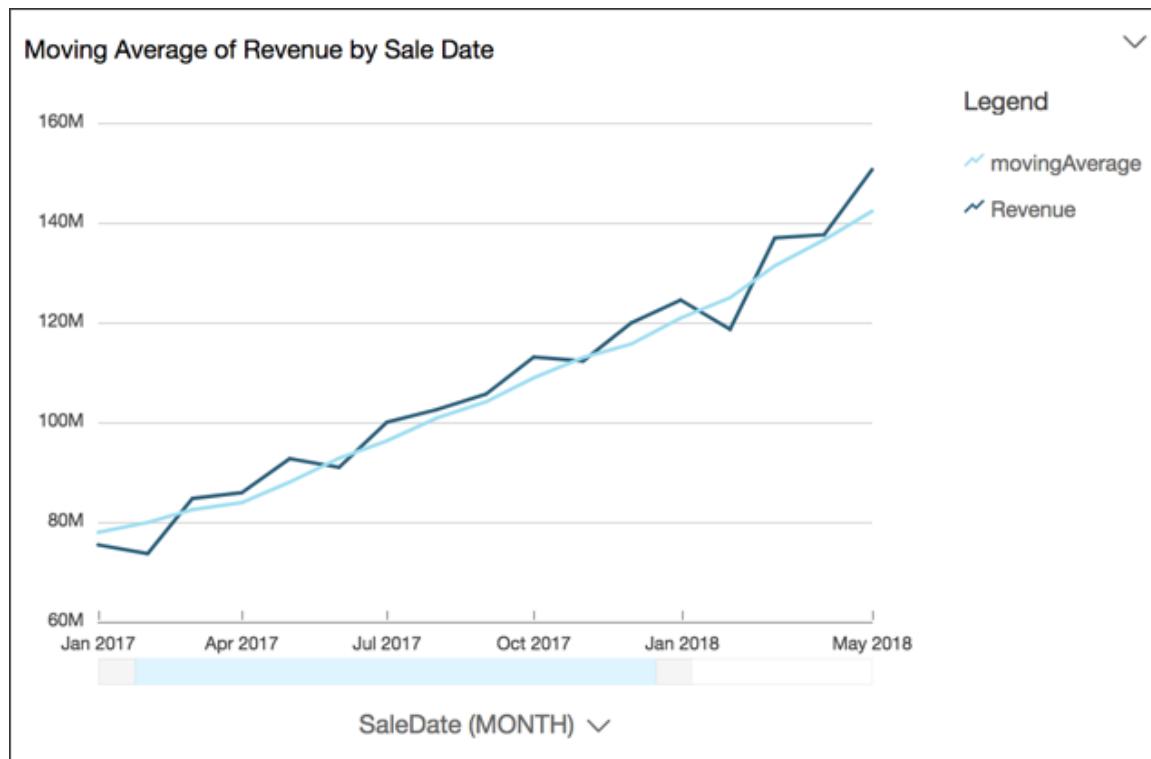
Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the moving average of `sum(Revenue)`, partitioned by `SaleDate`. The calculation includes three rows above and two row below of the current row.

```
windowAvg
(
    sum(Revenue),
    [SaleDate ASC],
    3,
    2
)
```

The following screenshot shows the results of this moving average example. The `sum(Revenue)` field is added to the chart to show the difference between the revenue and the moving average of revenue.



windowCount

windowCount calculates the count of the aggregated measure or dimension in a custom window that is partitioned and sorted by specified attributes. Usually, you use custom window functions on a time series, where your visual shows a metric and a date field.

windowCount is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. Window functions aren't supported for MySQL versions earlier than 8 and MariaDB versions earlier than 10.2.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
windowCount
(
    measure_or_dimension
    , [sort_order_field ASC/DESC, ...]
    , start_index
    , end_index
    , [partition_field, ... ]
)
```

Arguments

measure or dimension

The aggregated metric that you want to get the average for, for example `sum({Revenue})`.

sort attribute

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

start index

The start index is a positive integer, indicating n rows above the current row. The start index counts the available data points above the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

end index

The end index is a positive integer, indicating n rows below the current row. The end index counts the available data points below the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the moving count of sum(Revenue), partitioned by SaleDate. The calculation includes three rows above and two row below of the current row.

```
windowCount
(
    sum(Revenue),
    [SaleDate ASC],
    3,
    2
)
```

windowMax

windowMax calculates the maximum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes. Usually, you use custom window functions on a time series, where your visual shows a metric and a date field. You can use windowMax to help you identify the maximum of the metric over a period time.

windowMax is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. Window functions aren't supported for MySQL versions earlier than 8 and MariaDB versions earlier than 10.2.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
windowMax
```

```
(  
    measure  
        , [sort_order_field ASC/DESC, ...]  
        , start_index  
        , end_index  
    , [partition_field, ... ]  
)
```

Arguments

measure

The aggregated metric that you want to get the average for, for example `sum({Revenue})`.

sort attribute

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

start index

The start index is a positive integer, indicating *n* rows above the current row. The start index counts the available data points above the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

end index

The end index is a positive integer, indicating *n* rows below the current row. The end index counts the available data points below the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

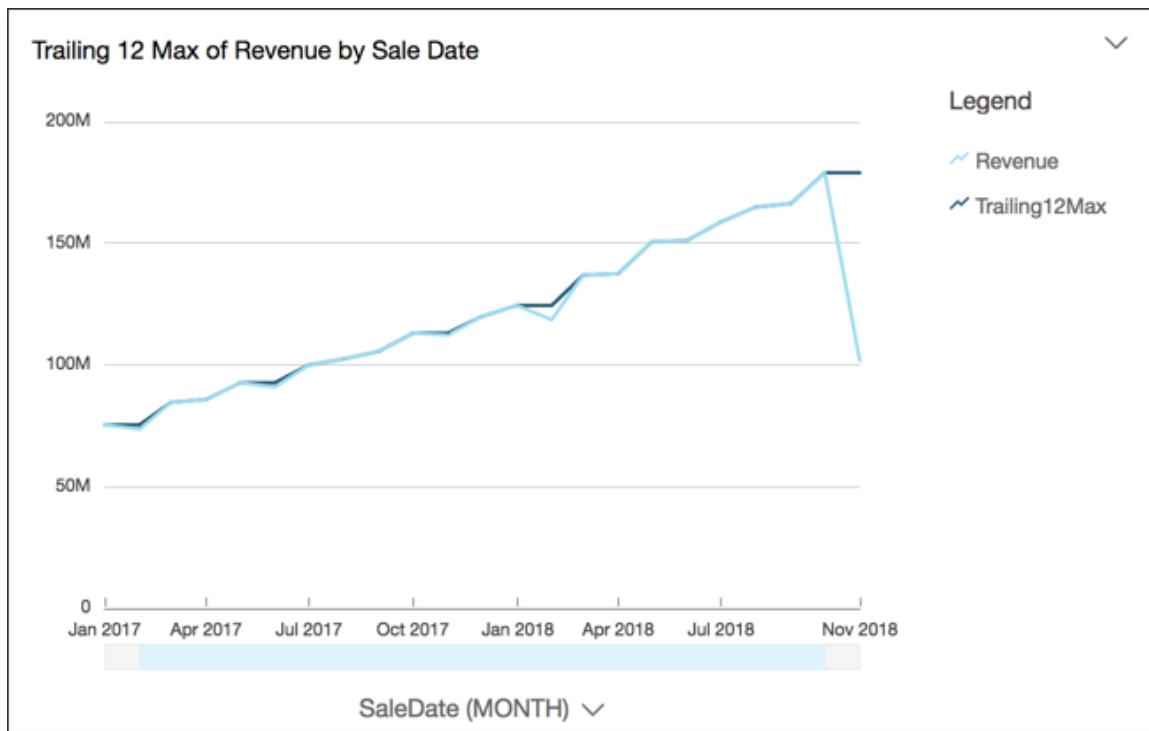
Each field in the list is enclosed in {} (curly braces), if it is more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the trailing twelve month maximum of `sum(Revenue)`, partitioned by `SaleDate`. The calculation includes 12 rows above and 0 row below of the current row.

```
windowMax  
(  
    sum(Revenue),  
    [SaleDate ASC],  
    12,  
    0  
)
```

The following screenshot shows the results of this trailing twelve month example. The `sum(Revenue)` field is added to the chart to show the difference between the revenue and the trailing twelve month maximum revenue.



windowMin

windowMin calculates the minimum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes. Usually, you use custom window functions on a time series, where your visual shows a metric and a date field. You can use windowMin to help you identify the minimum of the metric over a period time.

windowMin is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. Window functions aren't supported for MySQL versions earlier than 8 and MariaDB versions earlier than 10.2.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
windowMin
(
    measure
        , [sort_order_field ASC/DESC, ...]
        , start_index
        , end_index
    , [partition_field, ... ]
)
```

Arguments

measure

The aggregated metric that you want to get the average for, for example `sum({Revenue})`.

sort attribute

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

start index

The start index is a positive integer, indicating n rows above the current row. The start index counts the available data points above the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

end index

The end index is a positive integer, indicating n rows below the current row. The end index counts the available data points below the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

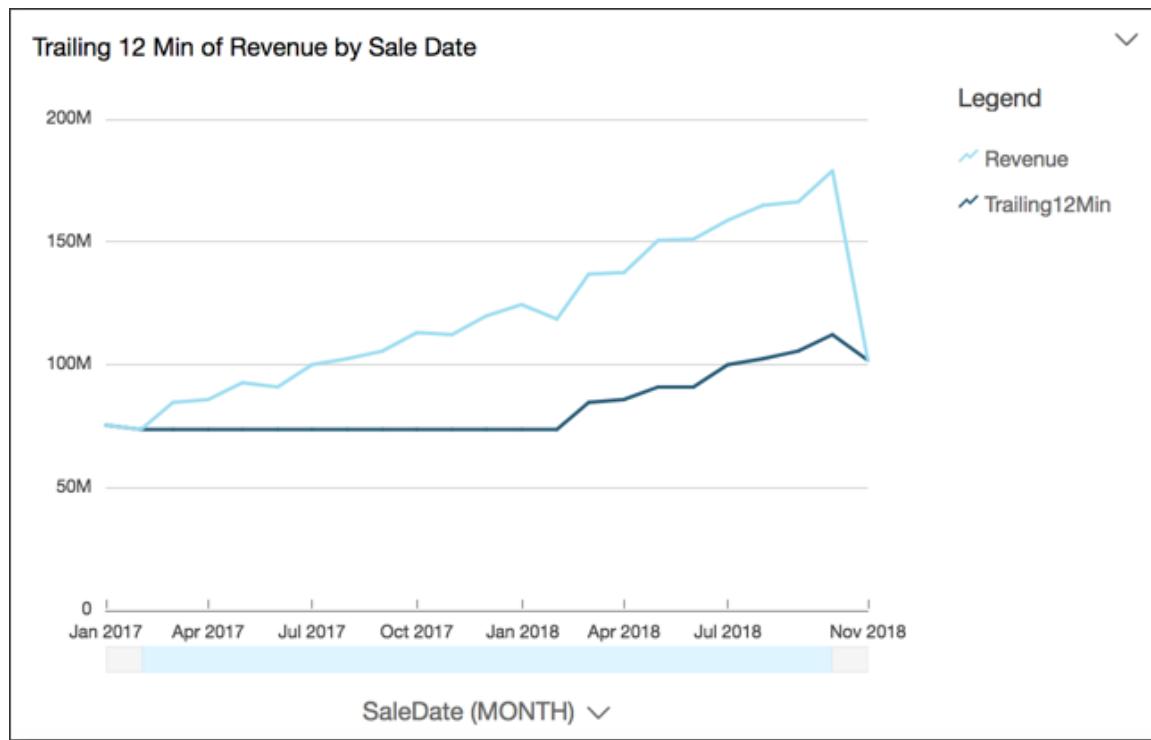
Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

Example

The following example calculates the trailing twelve month minimum of sum(Revenue), partitioned by SaleDate. The calculation includes 12 rows above and 0 row below of the current row.

```
windowMin
(
    sum(Revenue),
    [SaleDate ASC],
    12,
    0
)
```

The following screenshot shows the results of this trailing twelve month example. The sum(Revenue) field is added to the chart to show the difference between the revenue and the trailing twelve month minimum revenue.



windowSum

windowSum calculates the sum of the aggregated measure in a custom window that is partitioned and sorted by specified attributes. Usually, you use custom window functions on a time series, where your visual shows a metric and a date field.

windowSum is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. Window functions aren't supported for MySQL versions earlier than 8 and MariaDB versions earlier than 10.2.

Syntax

The brackets are required. To see which arguments are optional, see the following descriptions.

```
windowSum
(
    measure
        , [sort_order_field ASC/DESC, ...]
        , start_index
        , end_index
    , [partition_field, ... ]
)
```

Arguments

measure

The aggregated metric that you want to get the sum for, for example `sum({Revenue})`.

`windowAvg` is supported for use with analyses based on [SPICE \(p. 2\)](#) and direct query data sets. For the engines MySQL, MariaDB, and Amazon Aurora with MySQL compatibility, the lookup index

is limited to just 1. Window functions aren't supported for MySQL versions below 8 and MariaDB versions earlier than 10.2.

sort attribute

One or more aggregated fields, either measures or dimensions or both, that you want to sort the data by, separated by commas. You can either specify ascending (**ASC**) or descending (**DESC**) sort order.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

start index

The start index is a positive integer, indicating n rows above the current row. The start index counts the available data points above the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

end index

The end index is a positive integer, indicating n rows below the current row. The end index counts the available data points below the current row, rather than counting actual time periods. If your data is sparse (missing months or years, for example), adjust the indexes accordingly.

partition field

(Optional) One or more dimensions that you want to partition by, separated by commas.

Each field in the list is enclosed in {} (curly braces), if it's more than one word. The entire list is enclosed in [] (square brackets).

Example

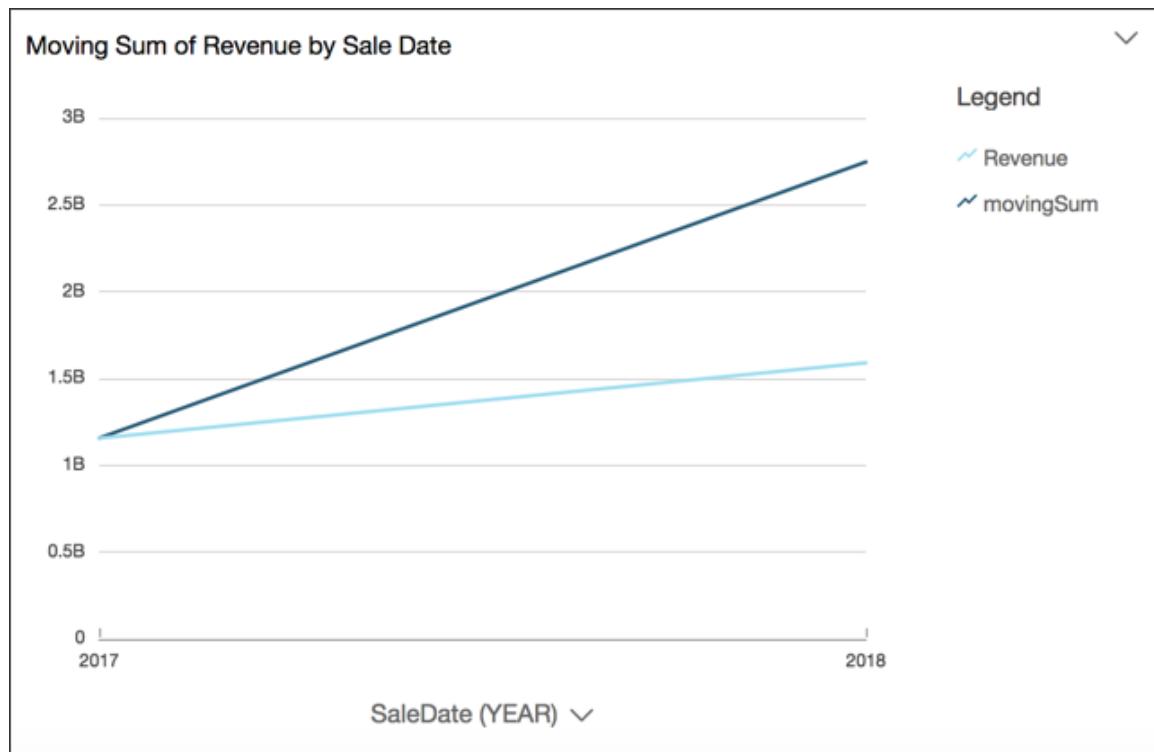
The following example calculates the moving sum of `sum(Revenue)`, sorted by `SaleDate`. The calculation includes two rows above and one row ahead of the current row.

```
windowSum
(
    sum(Revenue),
    [SaleDate ASC],
    2,
        1
)
```

The following example show a trailing 12-month sum.

```
windowSum(sum(Revenue),[SaleDate ASC],12,0)
```

The following screenshot shows the results of this trailing 12-month sum example. The `sum(Revenue)` field is added to the chart to show the difference between the revenue and the trailing 12-month sum of revenue.



Embedding and Other SDKs

We provide API operations for Amazon QuickSight, and also software development kits (SDKs) for AWS that enable you to access Amazon QuickSight from your preferred programming language. Currently, you can manage users and groups. In Enterprise edition, you can also embed dashboards in your webpage or app.

To monitor the calls made to the Amazon QuickSight API for your account, including calls made by the AWS Management Console, command line tools, and other services, use AWS CloudTrail. For more information, see the [AWS CloudTrail User Guide](#).

Required Knowledge

If you plan to access Amazon QuickSight through an API, you should be familiar with the following:

- JSON
- Web services
- HTTP requests
- One or more programming languages, such as JavaScript, Java, Python, or C#.

Available API Operations for Amazon QuickSight

The Amazon QuickSight API operations provide the following:

- User and group management
- Dashboard embedding

AWS provides libraries, sample code, tutorials, and other resources for software developers who prefer to build applications using language-specific API operations instead of submitting a request over HTTPS. These libraries provide basic functions that automatically take care of tasks such as cryptographically signing your requests, retrying requests, and handling error responses, so that it's easier for you to get started.

For more information about downloading the AWS SDKs, see [AWS SDKs and Tools](#).

Topics

- [Embedding Amazon QuickSight Dashboards \(p. 510\)](#)
- [Using Amazon QuickSight with the AWS SDKs \(p. 520\)](#)

Embedding Amazon QuickSight Dashboards

Using Amazon QuickSight Enterprise edition, you can embed dashboards into apps or websites. By using embedded dashboards, you can focus on your core product experience by offloading scalable, responsive analytics code to Amazon QuickSight. With embedded dashboards, there are no servers to manage, no upfront costs, no annual commitments, and no charges for unused embedded dashboards.

The following sections describe how to plan and implement embedded dashboards.

Topics

- [Creating Embedded Dashboards with the Amazon QuickSight SDK \(p. 511\)](#)
- [Functionality of Embedded Amazon QuickSight Dashboards \(p. 517\)](#)
- [Pricing and Licensing for Embedded Dashboards with Amazon QuickSight \(p. 518\)](#)
- [Security and User Provisioning for Embedded Dashboards in Amazon QuickSight \(p. 519\)](#)
- [Limitations for Embedded Dashboards in Amazon QuickSight \(p. 519\)](#)
- [Scenarios for Embedding Dashboards with Amazon QuickSight \(p. 519\)](#)

Creating Embedded Dashboards with the Amazon QuickSight SDK

This section helps you understand the process for creating embedded dashboards and using the `GetDashboardEmbedURL` API to get an embedded URL and authorization code. In general, embedding a dashboard in your web page or app involves the following steps.

Before you can embed content, you need a subscription to Amazon QuickSight Enterprise edition in the AWS account you plan to use to embed dashboards. If your app also resides in AWS, the app doesn't need to reside on the same AWS account as the Amazon QuickSight subscription. However, the app needs the ability to assume the AWS Identity and Access Management (IAM) role for the API calls.

Set up your data sources and create the visualizations you want to share, then publish them into one or more dashboards that you can embed into your app.

1. Add the domain of the web app where you want to embed the dashboard to the list of domains that are approved for embedding.

An Amazon QuickSight admin can view or edit the list of approved domains. For more information, see [Adding Domains for Embedded Dashboard Users \(p. 562\)](#).

2. Set up permissions for users:

- Verify that you have an AWS Identity and Access Management (IAM) role that specifically allows access to the dashboard's Amazon Resource Name (ARN). An AWS administrator can create an IAM role with the correct policy attached. For more information, see [IAM Policy Actions for Embedding Dashboards with Amazon QuickSight \(p. 611\)](#).
- Verify that your users get authenticated through IAM, SAML, or WebIdentity. Authentication methods are configured by an AWS administrator, and then added to Amazon QuickSight by an Amazon QuickSight admin.
- Verify that the author of the analysis published the dashboard and shared it with the users or groups who want to use it.

3. Use one of the [AWS SDKs](#) to create a URL to embed in your webpage on the server.
4. Integrate the [Amazon QuickSight JavaScript SDK](#) into your app. You can then embed the dashboard and integrate it with your webpage.

You can go directly to the examples in the sections listed below, if you want to jump in immediately.

Topics

- [HTML Example of Embedding a Dashboard with Amazon QuickSight \(p. 514\)](#)
- [Java Example of Embedding a Dashboard with Amazon QuickSight \(p. 515\)](#)
- [JavaScript \(Node.js\) Example of Embedding a Dashboard with Amazon QuickSight \(p. 516\)](#)
- [Python3 Example of Embedding a Dashboard with Amazon QuickSight \(p. 517\)](#)
- [.NET/C# Example of Embedding a Dashboard with Amazon QuickSight \(p. 517\)](#)

The remainder of this section provides further details on using the API operation. For more information, see [Amazon QuickSight API Reference](#).

`GetDashboardEmbedURL` takes the following parameters:

- `awsAccountId` — AWS account ID that contains the dashboard you are embedding
- `dashboardId` — The ID for the dashboard, also added to IAM policy
- `identityType` — Authentication type (Currently, only `IAM` is supported.)
- `sessionLifeTimeInMinutes` — How many minutes the session is valid
- `undoRedoDisabled` — Remove the undo/redo button on embedded dashboard
- `resetDisabled` — Remove the reset button on embedded dashboard

You need the following SDK files:

- <http://s3-us-west-2.amazonaws.com/quicksight-ams-sdk-files/AWSQuickSightJavaClient-1.11.x.jar>
- <http://s3-us-west-2.amazonaws.com/quicksight-ams-sdk-files/botocore-1.12.35.tar.gz>
- <http://s3-us-west-2.amazonaws.com/quicksight-ams-sdk-files/nuget.zip>

The following example shows the AWS CLI commands and the order to run them. You can use the API operations for these in your own code. There are several examples in this section.

```
CLI Basic Example

/* Assume the role with permissions enabled for actions: quickSight:RegisterUser and
quicksight:GetDashboardEmbedURL */
/* You can use assume-role, assume-role-with-web-identity, or assume-role-with-saml */
aws sts assume-role
--role-arn "arn:aws:iam::111122223333:role/embedding_quicksight_dashboard_role"
--role-session-name embedding_session_identifier

/* If the user does not exist in QuickSight, register the user */
aws quicksight register-user
--aws-account-id 111122223333
--namespace default
--identity-type IAM
--iam-arn "arn:aws:iam::111122223333:role/embedding_quicksight_dashboard_role"
--user-role READER
--session-name "embedding_session_identifier"
--email user123@example.com
--region us-east-1

/* Get the URL for the embedded dashboard, to be used in a server-side call*/
aws quicksight get-dashboard-embed-url
--aws-account-id 111122223333
--dashboard-id 1a1ac2b2-3fc3-4b44-5e5d-c6db6778df89
--identity-type IAM
```

The embedding session identifier can be the user's email or user name. If you use the following command to set the IAM role, the role session ID of the user visiting your site is made up of the role name from the `role-arn` and the `role-session-name`, for example: `embedding_quicksight_dashboard_role/john.doe@example.com`

```
aws sts assume-role --role-arn "arn:aws:iam::293424211206:role/
embedding_quicksight_dashboard_role" --role-
session-name john.doe@example.com
```

The `assume-role` API returns three output parameters: access key, secret key, and session token. Set these three parameters in the CLI, as follows. If you are using a Windows machine, use `set` instead of `export`.

```
export AWS_ACCESS_KEY_ID      = access_key_from_assume_role
export AWS_SECRET_ACCESS_KEY = secret_key_from_assume_role
export AWS_SESSION_TOKEN     = session_token_from_assume_role
```

The following shows an example response from `get-dashboard-embed-url`.

```
{
  "Status": "200",
  "EmbedUrl": "https://spaceneedle-alpha.amazon.com/embed/620bef10822743fab329fb3751187d2d&hellip;long_URL_including_auth_code",
  "RequestId": "7bee030e-f191-45c4-97fe-d9faf0e03713"
}
```

Use the following procedure to assume the role, register the user, and get your embedded dashboard URL.

1. Set up permissions for dashboard users. They should do the following:

- Be authenticated through IAM, SAML, or WebIdentity.
- Assume a role that gives them access to the dashboard through Amazon QuickSight.
- Be one of the users the dashboard is shared with.

Each user who views the dashboard embedded in your application must have permission to access the dashboard. You can provision users ahead of time manually or by using API operations, or provision them just-in-time as they access your application. You can permission users individually, or use the groups API to create and manage user groups for sharing.

Each user who accesses a dashboard must assume a role that gives them Amazon QuickSight access and permissions to the dashboard. To achieve this, create a role in your AWS account that has an associated policy that provides reader permissions to any user who assumes it. Add `quicksight:RegisterReader` permissions to ensure that the reader can only access Amazon QuickSight in a read-only fashion, and not have access to any other data or creation capability. You also need to provide the role with permissions to retrieve dashboards by using `quicksight:GetDashboardEmbedUrl`.

To assume the role, choose one of the following AWS Security Token Service (AWS STS) API operations:

- `AssumeRole` — Use this when you are using an IAM identity to assume the role.
- `AssumeRoleWithWebIdentity` — Use this when you are using a web identity provider to authenticate your user.
- `AssumeRoleWithSaml` — Use this when you are using SAML to authenticate your users.

At the time of assuming the role, also ensure that you are passing a unique session ID for each user (for example, email address). The combination of the role name and the session (`rolename/rolesessionname`) is treated as the unique user name in Amazon QuickSight. An example is `EmbeddedQuickSightReader/username@example.com` or `QuickSightEmbed/OSviewer`. By doing this, you can ensure appropriate permissions per user. It also prevents any throttling of user access. Throttling is a security feature that prevents the same user from accessing Amazon QuickSight from multiple locations.

If you get an `ExpiredToken` error when calling the `AssumeRole` operation, this is because the previous `SESSION_TOKEN` is still in the environment variables. Clear this by setting the following variables:

- `AWS_ACCESS_KEY_ID`
- `AWS_SECRET_ACCESS_KEY`
- `AWS_SESSION_TOKEN`

If you didn't previously provision the user in Amazon QuickSight, call the `RegisterUser` API to federate the user into the role. You can then add the user to the correct user group by using the group management API operations to make the dashboard available to the user.

For more information are available regarding trust policies for OpenId Connect or SAML authentication, see the following sections of the *IAM User Guide*:

- [Creating a Role for Web Identity or OpenID Connect Federation \(Console\)](#)
 - [Creating a Role for SAML 2.0 Federation \(Console\)](#)
2. An Amazon QuickSight admin must add the domain of the web app you want to embed the dashboard into the list of domains that are approved for embedding. There is an option to add subdomains as part of a domain. You can add up to 100 domains to the allowlist. For more information, see [Adding Domains for Embedded Dashboard Users \(p. 562\)](#).
 3. Call the `GetDashboardEmbedUrl` API to get the URL that you can embed in your dashboard. This URL is valid for 5 minutes, and the resulting session is valid for 10 hours. The API provides the URL with an `auth_code` that enables a single-signon session.

Use the Amazon QuickSight embedding SDK (JavaScript) to embed the dashboard. This allows you to control parameters within the dashboard and receive callbacks in terms of page load completion and errors. Currently, we support server-side calls only.

Embed this dashboard in your webpage by using the Amazon QuickSight JavaScript SDK or by adding this URL into an iframe. If you set a fixed height and width number (in pixels) Amazon QuickSight uses those and doesn't change your visual as your window resizes. If you set a relative percent height and width, Amazon QuickSight will provide a responsive layout that is modified as your window size changes.

Topics

- [HTML Example of Embedding a Dashboard with Amazon QuickSight \(p. 514\)](#)
- [Java Example of Embedding a Dashboard with Amazon QuickSight \(p. 515\)](#)
- [JavaScript \(Node.js\) Example of Embedding a Dashboard with Amazon QuickSight \(p. 516\)](#)
- [Python3 Example of Embedding a Dashboard with Amazon QuickSight \(p. 517\)](#)
- [.NET/C# Example of Embedding a Dashboard with Amazon QuickSight \(p. 517\)](#)

HTML Example of Embedding a Dashboard with Amazon QuickSight

The following example shows the html you can use to display an embedded dashboard.

```
<!DOCTYPE html>
<html>

<head>
  <title>Basic Embed</title>
```

```
<script type="text/javascript" src="https://unpkg.com/amazon-quicksight-embedding-sdk@1.0.1/dist/quicksight-embedding-js-sdk.min.js"></script>
<script type="text/javascript">
    function embedDashboard() {
        var containerDiv = document.getElementById("dashboardContainer");
        var params = {
            url: "https://us-east-1.quicksight.aws.amazon.com/sn/dashboards/1a1ac2b2-3fc3-4b44-5e5d-c6db6778df89",
            container: containerDiv,
            parameters: {
                country: 'United States'
            },
            height: "700px",
            width: "1000px"
        };
        var dashboard = QuickSightEmbedding.embedDashboard(params);
        dashboard.on('error', function() {});
        dashboard.on('load', function() {});
        dashboard.setParameters({country: 'Canada'});
    }
</script>

</head>

<body onload="embedDashboard()">
    <div id="dashboardContainer"></div>
</body>

</html>
```

Java Example of Embedding a Dashboard with Amazon QuickSight

The following example shows the Java code you can use to get the URL to display an embedded dashboard.

Example

```
final String dashboardId = "1c1fe111-e2d2-3b30-44ef-a0e11111cde";
final String awsAccountId = "111122223333";
final GetDashboardEmbedUrlResult dashboardEmbedUrlResult =
    client.getDashboardEmbedUrl(new GetDashboardEmbedUrlRequest()
        .withDashboardId(dashboardId)
        .withAwsAccountId(awsAccountId)
        .withIdentityType(IdentityType.IAM)
        .withResetDisabled(true)
        .withSessionLifetimeInMinutes(1001)
        .withUndoRedoDisabled(false)
    );
```

The following example shows a sample response.

Example

```
//The URL returned is over 900 characters. For this example, we've shortened the string for readability and added ellipsis to indicate that it's incomplete.
https://spaceneedle-alpha.amazon.com/embed/d11facd655b645878350470a1895d9fc...
System.out.println(dashboardEmbedUrlResult.getEmbedUrl());
```

The following example shows the Java code you can use to create the client:

Example

```
private static AmazonQuickSight getClient() {  
  
    final AWSCredentialsProvider credsProvider = new AWSCredentialsProvider() {  
        @Override  
        public AWSCredentials getCredentials() {  
            // provide actual IAM access key and secret key here  
            return new BasicAWSCredentials("access-key", "secret-key");  
        }  
  
        @Override  
        public void refresh() {}  
    };  
  
    return AmazonQuickSightClientBuilder  
        .standard()  
        .withRegion(Regions.US_EAST_1.getName())  
        .withCredentials(credsProvider)  
        .build();  
}
```

JavaScript (Node.js) Example of Embedding a Dashboard with Amazon QuickSight

The following example shows the JavaScript (Node.js) you can use to get the URL to display an embedded dashboard.

Example

```
const AWS = require('aws-sdk');  
const https = require('https');  
  
var quicksight = new AWS.Service({  
    apiConfig: require('./quicksight-2018-04-01.min.json'),  
    region: 'us-east-1',  
});  
  
quicksight.getDashboardEmbedUrl({  
    'AwsAccountId': '111122223333',  
    'DashboardId': '1c1fe111-e2d2-3b30-44ef-a0e11111cde',  
    'IdentityType': 'IAM',  
    'ResetDisabled': true,  
    'SessionLifetimeInMinutes': 100,  
    'UndoRedoDisabled': false  
}, function(err, data) {  
    console.log('Errors: ');  
    console.log(err);  
    console.log('Response: ');  
    console.log(data);  
});
```

Example

```
//The URL returned is over 900 characters. For this example, we've shortened the string for  
readability and added ellipsis to indicate that it's incomplete.  
{ Status: 200,
```

```
EmbedUrl: 'https://spaceneedle-alpha.amazon.com/embed/620bef10822743fab329fb3751187d2d...  
RequestId: '7bee030e-f191-45c4-97fe-d9faf0e03713' }
```

Python3 Example of Embedding a Dashboard with Amazon QuickSight

The following example shows the Python3 code you can use to get the URL to display an embedded dashboard.

Example

```
import botocore.session
session = botocore.session.get_session()
client = session.create_client("quicksight", region_name='us-east-1')
client.get_dashboard_embed_url(AwsAccountId="111122223333", DashboardId="1c1fe111-e2d2-3b30-44ef-a0e11111cde", IdentityType="IAM", SessionLifetimeInMinutes=100, ResetDisabled=True, UndoRedoDisabled=True)
```

.NET/C# Example of Embedding a Dashboard with Amazon QuickSight

The following example shows the .NET/C# code you can use to get the URL to display an embedded dashboard.

Example

```
var client = new AmazonQuickSightClient(
    AccessKey,
    SecretAccessKey,
    sessionToken,
    Amazon.RegionEndpoint.USEast1);
try
{
    Console.WriteLine(
        client.GetDashboardEmbedUrlAsync(new GetDashboardEmbedUrlRequest
        {
            AwsAccountId = "111122223333",
            DashboardId = "1c1fe111-e2d2-3b30-44ef-a0e11111cde",
            IdentityType = IdentityType.IAM,
            ResetDisabled = true,
            SessionLifetimeInMinutes = 100,
            UndoRedoDisabled = false
        }).Result.EmbedUrl
    );
} catch (Exception ex) {
    Console.WriteLine(ex.Message);
}
```

Functionality of Embedded Amazon QuickSight Dashboards

Embedded dashboards provide the same level of interactivity as Amazon QuickSight. Embedded dashboards support the following interactions available in Amazon QuickSight dashboards today:

- Drill-down: implicit (time hierarchies) and explicit (defined by the user)

- Custom actions (link to a new tab)
- On-screen filters
- Download to CSV
- Sorting on visuals
- Email report opt-in
- Reset dashboard to defaults option
- Undo/redo actions on the dashboard

All features available to a reader on the web dashboard experience are available to an embedded user. Authors of dashboards can determine whether to enable features such as advanced filtering (left filter panel, filter restatement icon and focus/exclude options) and download to CSV option.

Embedded dashboards support features that provide a customized view of data with features, such as row-level security and dynamic default values for filters. You can customize dashboards using the regular Amazon QuickSight dashboard customization options. From the JavaScript SDK, Amazon QuickSight also supports the following:

- Create an iframe of the preferred size to contain the Amazon QuickSight dashboard
- Dynamically authenticate the user
- Enable or disable email report subscription options
- Enable or disable undo/redo options on embedding chrome

To allow you to customize the dashboard with your app's theme, Amazon QuickSight hides the top navigation bar. When you publish a dashboard, you can also choose to hide the advanced filtering options and the on-sheet filter controls. That way you can instead use controls that are embedded in your app. You can also pass in fragments via the dashboard URL to further customize the view of the data.

Pricing and Licensing for Embedded Dashboards with Amazon QuickSight

This section covers pricing and licensing information for using embedded dashboards with Amazon QuickSight Enterprise edition.

Pricing for Embedded Dashboards with Amazon QuickSight

Embedded dashboards are billed in a way that is similar to billing for readers. Each viewer gets a 30-minute session charged at \$0.30, with a max charge of \$5 per user per month. Session authentication in Amazon QuickSight expires after 10 hours. Currently, if the hosting app needs sessions longer than 10 hours, users see a time-out page.

Licensing for Embedded Dashboards with Amazon QuickSight

All embedded iframes feature a “Powered by Amazon QuickSight” label, along with required legal notices. Loading animations feature an Amazon QuickSight logo.

Each individual user who accesses an embedded dashboard is licensed separately, and must be a user of Amazon QuickSight. Similar to dashboards within Amazon QuickSight, embedded dashboards need to be shared with a group that the user is a member of. Alternatively, embedded dashboards can be shared explicitly with each user.

Routing more than one user through a single Amazon QuickSight user is not yet supported. Doing this triggers throttling at the user level, so that the same user identity can't access Amazon QuickSight from

multiple browsers. If you need to use multiple iframes on the same page, contact the Amazon QuickSight team.

Security and User Provisioning for Embedded Dashboards in Amazon QuickSight

You can control access to dashboards through user groups, which can be programmatically managed using the group API operations. Plus you can use features such as row-level security to control granular access to data.

Embedded dashboards provide secure access and seamless integration with websites or apps by using transparent authentication via IAM roles, SAML, or OpenID Connect. Each individual viewer of an embedded dashboard requires a valid Amazon QuickSight session token. You can provision viewers of embedded dashboards as users of Amazon QuickSight by one of the following methods:

- On the fly, by using Amazon QuickSight's just-in-time user provisioning capabilities
- In advance, by using available user management API operations

To enable a seamless authentication experience for users on the embedded page, you can validate the user by providing them an AWS role. Alternatively, you can authenticate them using SAML/Open ID connect when displaying the iframe on the webpage or app. The JS SDK validates the users with their AWS credentials and on successful completion, provides access to the embedded Amazon QuickSight dashboard.

To ensure that the dashboards are embedded only in authorized apps, an Amazon QuickSight admin must add each domain you want to use in the Amazon QuickSight settings. For more information, see [Adding Domains for Embedded Dashboard Users \(p. 562\)](#).

CloudTrail auditing logs can provide you with information regarding the number of dashboards embedded, access rates, and domains where they are embedded.

Limitations for Embedded Dashboards in Amazon QuickSight

This section provides information regarding limitations and other things you should be aware of when using embedded dashboards.

- Authentication by AD connector is not currently supported. We encourage users of Active Directory to use reader roles to provide data analysis capabilities.
- Users who are signed in to AWS console can encounter an error when opening an embedded dashboard in Amazon QuickSight with a different user account.
- Currently, users of the hosting app have access to the AWS console with limited permissions.
- You can't access the full Amazon QuickSight app from the embedded dashboard. Instead, access Amazon QuickSight separately using the authentication method you normally use to access the dashboard.
- If the underlying dashboard is deleted, users see an Amazon QuickSight error page.

Scenarios for Embedding Dashboards with Amazon QuickSight

This section outlines some business scenarios and how Amazon QuickSight applies to them.

Scenario 1

You can embed dashboards in an app. You can use Amazon QuickSight to build interactive dashboards that are seamlessly embedded in your SaaS app. Your users log in to the app and securely view customized and easy-to-use dashboards. You don't have to provision servers, manage infrastructure, or develop your own code to create charts.

Scenario 2

You can embed dashboards in a website where users log in. Using Amazon QuickSight, you can share interactive data dashboards with all your authenticated intranet users without needing to purchase software for every user or server infrastructure. Amazon QuickSight runs in the cloud, scales to thousands of users, and offers pay-per-session pricing to bring large scale solutions within reach. The code required to implement embedded dashboards is minimal, and fast to implement.

Scenario 3

You currently can't embed dashboards in a website where users are anonymous. If a single user accesses the same dashboard from multiple locations, their usage is automatically throttled. This means that the first user sees the dashboard, and then the request times out for subsequent users. This results in an inconsistent user experience until each connection times out. Embedding dashboards in an anonymous website is not currently supported.

Scenario 4

You can't currently embed dashboards with no connectivity as a static report. Using embedded dashboards for display only is not supported. However, if you have this requirement, you could potentially use a screenshot of your visual in your display. But users can't interact with it, and you have to refresh it using a different mechanism.

Using Amazon QuickSight with the AWS SDKs

Using Amazon QuickSight, you can manage some aspects of your deployment by using the AWS SDKs. You can use one of the AWS SDKs to access an API that's tailored to the programming language or platform that you're using. For more information, see [AWS SDKs](#).

The first release of API operations for Amazon QuickSight introduces embedding and user and group management capabilities. You can use the `get-dashboard-embed-url` API operation to obtain an authenticated dashboard URL that can be embedded in application domains that are on the allow list for Amazon QuickSight dashboard embedding. You can use the user API operations to programmatically expand and manage your Amazon QuickSight deployments. You can use the group API operations for easier permissions management for resources within Amazon QuickSight.

Amazon QuickSight supports SDKs for the following:

- User and group provisioning and management
- Embedded dashboards and provisioning of their users (Enterprise edition only)

For more information, see [Amazon QuickSight API Reference](#).

Topics

- [Permissions for Using Amazon QuickSight from the AWS SDKs \(p. 521\)](#)
- [Amazon QuickSight and the AWS CLI \(p. 521\)](#)
- [Amazon QuickSight Java SDK \(p. 522\)](#)

- [Amazon QuickSight JavaScript \(Node.js\) SDK \(p. 523\)](#)
- [Amazon QuickSight Python3 SDK \(p. 524\)](#)
- [Amazon QuickSight .NET/C# SDK \(p. 525\)](#)
- [Terminology \(p. 526\)](#)

Permissions for Using Amazon QuickSight from the AWS SDKs

Before you can call the Amazon QuickSight operations, you need the `quicksight:operation-name` permission in a policy attached to your IAM identity. For example, to call `list-users`, you need the permission `quicksight>ListUsers`. The same pattern applies to all operations.

If you're not sure what the necessary permission is, you can attempt to make the call and the client tells you what the missing permission is. You can use asterisk (*) in the Resource field of your permission policy in lieu of explicit resources, but it is highly recommended that you restrict each permission as much as possible. You can restrict user access by specifying or excluding resources in the policy, using their Amazon QuickSight Amazon Resource Name (ARN) identifier.

For more information, see the following:

- [Setting Your IAM Policy \(p. 609\)](#)
- [Actions, Resources, and Condition Keys](#)
- [IAM JSON Policy Elements](#)

To retrieve the ARN of a user or a group, use the `Describe` operation on the relevant resource. You can also add conditions in IAM to further restrict access to an API in some scenarios. For instance, when adding `User1` to `Group1`, the main resource is `Group1`, so you can allow or deny access to certain groups, but you can also add a condition by using the IAM Amazon QuickSight key `quicksight:UserName` to allow or prevent certain users from being added to that group.

Following is an example policy. It means that the caller with this policy attached, is able to invoke the `CreateGroupMembership` operation on any group, provided that the user name they are adding to the group is not `user1`.

```
{  
    "Effect": "Allow",  
    "Action": "quicksight>CreateGroupMembership",  
    "Resource": "arn:aws:quicksight:us-east-1:aws-account-id:group/default/*",  
    "Condition": {  
        "StringNotEquals": {  
            "quicksight:UserName": "user1"  
        }  
    }  
}
```

Amazon QuickSight and the AWS CLI

The following procedure explains how to interact with Amazon QuickSight API operations through the AWS CLI. The following instructions have been tested in Bash but should be identical or similar in other command-line environments.

1. Install AWS SDK in your environment. Instructions on how to do that are located here: [AWS Command line Interface](#).

2. Set up your AWS CLI identity and region using the following command and follow-up instructions. Use the credentials for an IAM identity or role that has the proper permissions.

```
aws configure
```

3. Look at the Amazon QuickSight SDK help by issuing the following command:

```
aws quicksight help
```

4. To get detailed instructions on how to use an API, enter its name followed by help, like so:

```
aws quicksight list-users help
```

5. Now you can call an Amazon QuickSight API operation. This example returns a list of Amazon QuickSight users in your account.

```
aws quicksight list-users --aws-account-id aws-account-id --namespace default --region us-east-1
```

Amazon QuickSight Java SDK

Use the following procedure to set up a Java app that interacts with Amazon QuickSight.

1. To get started, create a Java project in your IDE.
2. Import the Amazon QuickSight SDK into your new project, for example:
`AWSQuickSightJavaClient-1.11.x.jar`
3. Once your IDE indexes the Amazon QuickSight SDK, you should be able to add an import line as follows:

```
import com.amazonaws.services.quicksight.AmazonQuickSight;
```

If your IDE doesn't recognize this as valid, verify that you imported the SDK.

4. Like other AWS SDKs, Amazon QuickSight SDK requires external dependencies to perform many of its functions. You need to download and import those into the same project. The following dependencies are required:
 - `aws-java-sdk-1.11.402.jar` (AWS Java SDK and credentials setup) — See [Set up the AWS SDK for Java](#)
 - `commons-logging-1.2.jar` — See https://commons.apache.org/proper/commons-logging/download_logging.cgi
 - `jackson-annotations-2.9.6.jar`, `jackson-core-2.9.6.jar`, and `jackson-databind-2.9.6.jar` — See <http://repo1.maven.org/maven2/com/fasterxml/jackson/core/>
 - `httpclient-4.5.6.jar`, `httpcore-4.4.10.jar` — See <https://hc.apache.org/downloads.cgi>
 - `joda-time-2.1.jar` — See <https://mvnrepository.com/artifact/joda-time/joda-time/2.1>
5. Now, you are ready to create an Amazon QuickSight client. You can use a default public endpoint that the client can communicate with or you can reference the endpoint explicitly. There are multiple ways to provide your AWS credentials. In the following example, we provide a direct, simple approach. The following client method is used to make all the API calls that follow:

```
private static AmazonQuickSight getClient() {  
  
    final AWSCredentialsProvider credsProvider = new AWSCredentialsProvider() {  
        @Override
```

```
public AWSCredentials getCredentials() {
    // provide actual IAM access key and secret key here
    return new BasicAWSCredentials("access-key", "secret-key");
}

@Override
public void refresh() {}

return AmazonQuickSightClientBuilder
    .standard()
    .withRegion(Regions.US_EAST_1.getName())
    .withCredentials(credsProvider)
    .build();
}
```

- Now, we can use the above client to list all the users in our Amazon QuickSight account.

Note

You have to provide the AWS account ID that you used to subscribe to Amazon QuickSight. This must match the AWS account ID of the caller's identity. Cross-account calls aren't supported at this time. Furthermore, the required parameter `namespace` should always be set to `default`.

```
getClient().listUsers(new ListUsersRequest()
    .withAwsAccountId("relevant_AWS_account_ID")
    .withNamespace("default")
    .getUserList().forEach(user -> {
        System.out.println(user.getArn());
});
```

- To see a list of all possible API operations and the request objects they use, you can **CTRL-click** on the client object in your IDE in order to view the Amazon QuickSight interface. Alternatively, find it within the `com.amazonaws.services.quicksight` package in the Amazon QuickSight JavaClient JAR file.

Amazon QuickSight JavaScript (Node.js) SDK

Use the following procedure to interact with Amazon QuickSight using Node.js.

- Set up your node environment using the following commands:

- `npm install aws-sdk`
- `npm install aws4`
- `npm install request`
- `npm install url`

- For information on configuring the Node.js with AWS SDK and setting your credentials, see the [AWS SDK for JavaScript Developer Guide for SDK v2](#).
- Use the following code sample to test your setup. HTTPS is required. The sample displays a full listing of Amazon QuickSight operations along with their URL request parameters, followed by a list of Amazon QuickSight users in your account.

```
const AWS = require('aws-sdk');
const https = require('https');

var quicksight = new AWS.Service({
    apiConfig: require('./quicksight-2018-04-01.min.json'),
    region: 'us-east-1',
});
```

```
console.log(quicksight.config.apiConfig.operations);

quicksight.listUsers({
    // Enter your actual AWS account ID
    'AwsAccountId': 'relevant_AWS_account_ID',
    'Namespace': 'default',
}, function(err, data) {
    console.log('---');
    console.log('Errors: ');
    console.log(err);
    console.log('---');
    console.log('Response: ');
    console.log(data);
});
```

Amazon QuickSight Python3 SDK

Use the following procedure to create a custom built botocore package to interact with Amazon QuickSight.

1. Create a credentials file in the AWS directory for your environment. In a Linux/Mac-based environment, that file is called `~/.aws/credentials` and looks like this:

```
[default]
aws_access_key_id = Your_IAM_access_key
aws_secret_access_key = Your_IAM_secret_key
```

2. Unzip the folder `botocore-1.12.10`. Change directory into `botocore-1.12.10` and enter the Python3 interpreter environment.
3. Responses come back as a dictionary object. They each have a `ResponseMetadata` entry that contains request IDs and response status. Other entries are based on what type of operation you run.
4. The following example is a sample app that first creates, deletes, and lists groups. Then, it lists users in a Quicksight account:

```
import botocore.session
default_namespace = 'default'
account_id = 'relevant_AWS_Account'

session = botocore.session.get_session()
client = session.create_client("quicksight", region_name='us-east-1')

print('Creating three groups: ')
client.create_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup1')
client.create_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup2')
client.create_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup3')

print('Retrieving the groups and listing them: ')
response = client.list_groups(AwsAccountId = account_id, Namespace=default_namespace)
for group in response['GroupList']:
    print(group)

print('Deleting our groups: ')
client.delete_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup1')
client.delete_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup2')
```

```
client.delete_group(AwsAccountId = account_id, Namespace=default_namespace,
    GroupName='MyGroup3')

response = client.list_users(AwsAccountId = account_id, Namespace=default_namespace)
for user in response['UserList']:
    print(user)
```

Amazon QuickSight .NET/C# SDK

Use the following procedure to interact with Amazon QuickSight using C#.NET. This example is constructed on Microsoft Visual for Mac; the instructions can vary slightly based on your IDE and platform. However, they should be similar.

1. Unzip the `nuget.zip` file into a folder called `nuget`.
2. Create a new **Console app** project in Visual Studio.
3. Under your solution, locate app **Dependencies**, then open the context (right-click menu) and choose **Add Packages**.
4. In the sources list, choose **Configure Sources**.
5. Choose **Add**, and name the source `QuickSightSDK`. Browse to the `nuget` folder and choose **Add Source**.
6. Choose **OK**. Then, with `QuickSightSDK` selected, select all three Amazon QuickSight packages:
 - `AWSSDK.QuickSight`
 - `AWSSDK.Extensions.NETCore.Setup`
 - `AWSSDK.Extensions.CognitoAuthentication`
7. Click **Add Package**.
8. Copy and paste the following sample app into your console app editor.

```
using System;
using Amazon.QuickSight.Model;
using Amazon.QuickSight;

namespace DotNetQuickSightSDKTest
{
    class Program
    {
        private static readonly string AccessKey = "insert_your_access_key";
        private static readonly string SecretAccessKey = "insert_your_secret_key";
        private static readonly string AccountID = "AWS_account_ID";
        private static readonly string Namespace = "default"; // leave this as default

        static void Main(string[] args)
        {
            var client = new AmazonQuickSightClient(
                AccessKey,
                SecretAccessKey,
                Amazon.RegionEndpoint.USEast1);

            var listUsersRequest = new ListUsersRequest
            {
                AwsAccountId = AccountID,
                Namespace = Namespace
            };

            client.ListUsersAsync(listUsersRequest).Result.UserList.ForEach(
                user => Console.WriteLine(user.ArN)
            );
        }
    }
}
```

```
var listGroupsRequest = new ListGroupsRequest
{
    AwsAccountId = AccountID,
    Namespace = Namespace
};

client.ListGroupsAsync(listGroupsRequest).Result.GroupList.ForEach(
    group => Console.WriteLine(group.Arn)
);
}
```

Terminology

Caller identity: – The identity of the AWS Identity and Access Management (IAM) user making an API request. The identity of the caller is determined by Amazon QuickSight using the signature attached to the request. Through the use of our provided SDK clients, no manual steps are necessary to generate the signature or attach it to the requests. However, you can do it manually if you want to.

Invoker identity: – In addition to the caller identity, but not as a replacement for it, you can assume a caller's identity through the Assume Role functionality when making calls to Amazon QuickSight. We approve callers through their invoker's identity. This is done to avoid having to explicitly add multiple accounts belonging to the same Amazon QuickSight subscription.

QuickSight user: – This is an Amazon QuickSight user identity acted upon by your API call. This user is not identical to the caller identity but might be the one that maps to him/her within Amazon QuickSight.

QuickSight ARN: – Amazon Resource Name. Amazon QuickSight resources —in this context users and groups— are identified using their name or ARN. For example, these are the ARNs for a group named `MyGroup1`, a user named `User1`, and a dashboard with the ID `1a1ac2b2-3fc3-4b44-5e5d-c6db6778df89`:

```
arn:aws:quicksight:us-east-1:111122223333:group/default/MyGroup1
arn:aws:quicksight:us-east-1:111122223333:user/default/User1
arn:aws:quicksight:us-west-2:111122223333:dashboard/1a1ac2b2-3fc3-4b44-5e5d-c6db6778df89
```

Depending on the scenario, you might need to provide an entity's name, ID, or ARN. You can retrieve the ARN if you have the name, using some of the operations described in the following sections.

Troubleshooting Amazon QuickSight

Use this information to help you diagnose and fix common issues that you can encounter when using Amazon QuickSight.

Note

Need more help? You can visit the Amazon QuickSight [User Community](#) or the [AWS forums](#). See also the [Amazon QuickSight Resource Library](#).

Topics

- [I Can't Connect to My Data Source \(p. 527\)](#)
- [My Rows Were Skipped During Data Preparation \(p. 533\)](#)
- [My SPICE Data Doesn't Sort Alphabetically \(p. 534\)](#)
- [I Can't Add a Visual to My Analysis \(p. 534\)](#)
- [I Get a Feedback Bar Across My Printed Docs \(p. 534\)](#)
- [How Do I Delete My Amazon QuickSight Account? \(p. 534\)](#)
- [My Map Charts Don't Show Locations \(p. 534\)](#)
- [Amazon QuickSight Isn't Working in My Browser \(p. 535\)](#)
- [Troubleshooting Issues When Using Athena with Amazon QuickSight \(p. 535\)](#)
- [My Pivot Table Stops Working \(p. 542\)](#)
- [My email sign-in stopped working \(p. 542\)](#)

I Can't Connect to My Data Source

Use this section to help you troubleshoot connections to data sources. Before you continue, verify that the database is currently available. Also, verify that you have the correct connection information and valid credentials.

Topics

- [I Need to Validate the Connection to My Data Source, or Change Data Source Settings \(p. 527\)](#)
- [I Can't Connect to Amazon Athena \(p. 528\)](#)
- [I Can't Connect Although My Data Source Connection Options Look Right \(SSL\) \(p. 529\)](#)
- [I Can't Connect to MySQL \(Issues with SSL and Authorization\) \(p. 531\)](#)
- [I Can't Connect to Amazon S3 \(p. 532\)](#)
- [I Can't Connect to RDS \(p. 533\)](#)

I Need to Validate the Connection to My Data Source, or Change Data Source Settings

If you need to update your data source, or you got a connection error and need to check your settings, follow these steps and validate your connection to the data source.

1. From the QuickSight home screen, choose **Manage data**.

2. Choose **New data set**.
3. Scroll to **FROM EXISTING DATA SOURCES**.
4. Choose the data source you want to test or change.
5. If the option is offered, choose **Edit/Preview data**.
6. Choose **Validate connection**.
7. Make any changes you want to make, then choose **Update data source**.

I Can't Connect to Amazon Athena

You get an insufficient permissions error when you run a query and the permissions aren't configured. To verify that you can connect Amazon QuickSight to Amazon Athena, check these settings:

- AWS resource permissions inside of Amazon QuickSight
- IAM (IAM) policies
- Amazon S3 location
- Query results location
- AWS KMS key policy (for encrypted data sets only)

Use the following procedure to make sure that you authorized Amazon QuickSight to use Athena. Permissions to AWS resources apply to all Amazon QuickSight users.

To authorize Amazon QuickSight to access Athena

1. In the AWS Region list at top right, choose the US East (N. Virginia) Region. You use this AWS Region temporarily while you edit your account permissions.
2. Open Amazon QuickSight, choose your profile name at top right, and then choose **Manage QuickSight**.
3. Choose **Account Settings**, on the left.
4. On the **Account Settings** page, choose **Edit AWS permissions**. If **Athena** is not enabled (selected), select it now.
5. Verify that you enabled access to the Amazon S3 buckets for your Athena query:
 - a. On the **Edit QuickSight read-only access to AWS resources** page, find Amazon S3.
 - If Amazon S3 is not enabled (selected), select it now.
 - b. Choose **Choose S3 buckets** to choose individual buckets.
 - c. Choose the buckets that you want to access from your Athena query, and then choose **Select buckets** to confirm.
6. On the **Edit QuickSight read-only access to AWS resources** page, choose **Apply**.
7. If you changed your AWS Region during the first step of this process, change it back to the AWS Region that you want to use.

Your AWS Identity and Access Management (IAM) policies must grant permissions to specific actions. Your IAM user or role must be able to read and write both the input and the output of the S3 buckets that Athena uses for your query.

To verify that your IAM policies have permission to use S3 buckets for your query

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.

2. Locate the IAM user or role you are using. Choose the user or role name to see the associated policies.
3. Verify that the policy has the correct permissions. Choose a policy you want to verify, then choose **Edit policy**. Use the visual editor, which opens by default. If you have the JSON editor open instead, choose the **Visual editor** tab.
4. Choose the S3 entry in the list to see its contents. The policy needs to grant permissions to list, read, and write. If S3 is not in the list, or it doesn't have the correct permissions, you can add them here.

The IAM user needs access to read and write to the results location in S3. By default, Athena stores query results in `aws-athena-query-results-<ACCOUNTID>-<REGION>`. However, you might be using a different S3 bucket. Also, if the data set is encrypted, the IAM user needs to be a key user in the specified KMS key's policy.

Important

Do not put the endpoint in the S3 URL.

This format is correct: `s3://bucket/path`

This format generates an "Access Denied" error: `s3://us-east-1.amazonaws.com/bucket/path`

To set permissions to your Athena query results location

1. Open the Athena console at <https://console.aws.amazon.com/athena/>.
2. Choose **Settings** and get the value in **Query result location**. If **Encrypt query results** is enabled (selected), check whether it uses SSE-KMS or CSE-KMS, and note the key.
3. Make sure that your IAM user has access to the correct bucket by opening the S3 console at <https://console.aws.amazon.com/s3/>. Alternatively, if you are managing access with an access control list (ACL), check the ACLs.
4. If your data set is encrypted (**Encrypt query results** is enabled), make sure that the IAM user or role is added as a key user in that AWS KMS key's policy. You can access KMS settings in IAM.

To grant access to the S3 bucket used by Athena

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. Choose the S3 bucket used by Athena in the **Query result location**.
3. On the **Permissions** tab, verify the permissions.

I Can't Connect Although My Data Source Connection Options Look Right (SSL)

Problems connecting can occur when Secure Sockets Layer (SSL) is incorrectly configured. The symptoms can include the following:

- You can connect to your database in other ways or from other locations but not in this case.
- You can connect to a similar database but not this one.

Rule out the following circumstances:

- Permissions issues
- Availability issues
- An expired or invalid certificate

- A self-signed certificate
- Certificate chain in the wrong order
- Ports not enabled
- Firewall blocking an IP address
- A VPC or security group not configured correctly.

To help find issues with SSL, you can use an online SSL checker, or a tool like OpenSSL.

The following steps walk through troubleshooting a connection where SSL is suspect. The administrator in this example has already installed OpenSSL.

Example

1. The user finds an issue connecting to the database. The user verifies that he can connect a different database in another AWS Region. He checks other versions of the same database and he can connect easily.
2. The administrator reviews the issue and decides to verify that the certificates are working correctly. She searches online for an article on using OpenSSL to troubleshoot or debug SSL connections.
3. Using OpenSSL, the administrator verifies the SSL configuration in the terminal.

```
echo quit
openssl s_client -connect <host>:port
```

The result shows that the certificate is not working:

```
...
...
...
CONNECTED(00000003)
012345678901234:error:140770FC:SSL routines:SSL23_GET_SERVER_HELLO:unknown
protocol:s23_clnt.c:782:
---
no peer certificate available
---
No client certificate CA names sent
---
SSL handshake has read 7 bytes and written 278 bytes
---
New, (NONE), Cipher is (NONE)
Secure Renegotiation IS NOT supported
SSL-Session:
    Protocol : TLSv1.2
    Cipher   : 0000
    Session-ID:
    Session-ID-ctx:
    Master-Key:
    Key-Ag  : None
    PSK identity: None
    PSK identity hint: None
    Start Time: 1497569068
    Timeout   : 300 (sec)
    Verify return code: 0 (ok)
---
```

4. The administrator corrects the problem by installing the SSL certificate on the user's database server.

For more detail on the solution in this example, see [Using SSL to Encrypt a Connection to a DB Instance](#) in the *Amazon RDS User Guide*.

I Can't Connect to MySQL (Issues with SSL and Authorization)

To check on some common connection issues in MySQL, use the following steps. This procedure helps you find out if you have enabled SSL and granted usage rights.

1. Check /etc/my.cnf to make sure SSL is enabled for MySQL.
2. In MySQL, run the following command.

```
show status like 'Ssl%';
```

If SSL is working, you see results like the following.

| Variable_name | Value |
|--------------------------------|----------------------|
| Ssl_accept_renegotiates | 0 |
| Ssl_accepts | 1 |
| Ssl_callback_cache_hits | 0 |
| Ssl_cipher | |
| Ssl_cipher_list | |
| Ssl_client_connects | 0 |
| Ssl_connect_renegotiates | 0 |
| Ssl_ctx_verify_depth | 18446744073709551615 |
| Ssl_ctx_verify_mode | 5 |
| Ssl_default_timeout | 0 |
| Ssl_finished_accepts | 0 |
| Ssl_finished_connects | 0 |
| Ssl_session_cache_hits | 0 |
| Ssl_session_cache_misses | 0 |
| Ssl_session_cache_mode | SERVER |
| Ssl_session_cache_overflows | 0 |
| Ssl_session_cache_size | 128 |
| Ssl_session_cache_timeouts | 0 |
| Ssl_sessions_reused | 0 |
| Ssl_used_session_cache_entries | 0 |
| Ssl_verify_depth | 0 |
| Ssl_verify_mode | |
| Ssl_version | |

If SSL is disabled, you see results like the following.

| Variable_name | Value |
|-------------------------|-------|
| Ssl_accept_renegotiates | 0 |
| Ssl_accepts | 0 |
| Ssl_callback_cache_hits | 0 |
| Ssl_cipher | |
| Ssl_cipher_list | |

```

| Ssl_client_connects      | 0   |
| Ssl_connect_renegotiates | 0   |
| Ssl_ctx_verify_depth     | 0   |
| Ssl_ctx_verify_mode      | 0   |
| Ssl_default_timeout      | 0   |
| Ssl_finished_accepts    | 0   |
| Ssl_finished_connects   | 0   |
| Ssl_session_cache_hits   | 0   |
| Ssl_session_cache_misses | 0   |
| Ssl_session_cache_mode   | NONE |
| Ssl_session_cache_overflows | 0   |
| Ssl_session_cache_size   | 0   |
| Ssl_session_cache_timeouts | 0   |
| Ssl_sessions_reused     | 0   |
| Ssl_used_session_cache_entries | 0   |
| Ssl_verify_depth         | 0   |
| Ssl_verify_mode           | 0   |
| Ssl_version               |
+-----+

```

3. Make sure that you have installed a supported SSL certificate on the database server.
4. Grant usage for the specific user to connect using SSL.

```
GRANT USAGE ON *.* TO 'encrypted_user'@'%' REQUIRE SSL;
```

For more detail on the solution in this example, see the following:

- [SSL Support for MySQL DB Instances](#) in the *Amazon RDS User Guide*.
- [Using SSL to Encrypt a Connection to a DB Instance](#) in the *Amazon RDS User Guide*.
- [MySQL documentation](#)

I Can't Connect to Amazon S3

To successfully connect to Amazon S3, you must configure authentication and create a valid manifest file inside the bucket you are trying to access. You also need to make sure that the file described by the manifest is available.

To verify authentication, make sure that you authorized Amazon QuickSight to access the S3 account. It's not enough that you, the user, are authorized. Amazon QuickSight must be authorized separately.

To authorize Amazon QuickSight to access your Amazon S3 bucket

1. In the AWS Region list at top right, choose the US East (N. Virginia) Region. You use this AWS Region temporarily while you edit your account permissions.
2. Inside of Amazon QuickSight, choose your profile name (top right). Choose **Manage QuickSight**, and then choose **Account Settings**, on the left.
3. On the **Account Settings** page, choose **Edit AWS permissions**.
4. If **Amazon S3** is selected, see how many buckets are authorized.
5. To select individual buckets, choose **Choose S3 buckets**. Select the buckets you want to access from Amazon QuickSight. Then choose **Select buckets**.
6. Choose **Apply**.
7. If you changed your AWS Region during the first step of this process, change it back to the AWS Region you want to use.

We strongly recommend that you make sure that your manifest file is valid. If Amazon QuickSight can't parse your file, it gives you an error similar to "We can't parse the manifest file as a valid JSON" or "We can't connect to the S3 bucket."

To verify your manifest file

1. Open your manifest file. You can do this directly from the Amazon S3 console at <https://console.aws.amazon.com/s3/>. Navigate to your manifest file and choose **Open**.
2. Make sure that the URI or URLs provided inside the manifest file indicate the file or files that you want connect to.
3. Make sure that your manifest file is formed correctly, if you use a link to the manifest file rather than uploading the file. The link shouldn't have any additional phrases after the word .json. You can get the correct link to an S3 file by viewing its **Link** value in the details on the S3 console.
4. Make sure that the content of the manifest file is valid by using a JSON validator, like the one at <https://jsonlint.com>.
5. Verify permissions on your bucket or file. In the <https://console.aws.amazon.com/s3/>, navigate to your Amazon S3 bucket, choose the **Permissions** tab, and add the appropriate permissions. Make sure that the permissions are at the right level, either on the bucket or on the file or files.
6. If you are using the s3:// protocol, rather than https://, make sure that you reference your bucket directly. For example, use [s3://mybucket myfile.csv](https://s3.amazonaws.com/mybucket/myfile.csv) instead of [s3://s3-us-west-2.amazonaws.com/mybucket myfile.csv](https://s3-us-west-2.amazonaws.com/mybucket/myfile.csv). Doubly specifying Amazon S3, by using s3:// and also s3-us-west-2.amazonaws.com, causes an error.

For more information on manifest files and connecting to Amazon S3, see [Supported Formats for Amazon S3 Manifest Files \(p. 82\)](#).

In addition, verify that your Amazon S3 data set was created according to the steps in [Creating a Data Set Using Amazon S3 Files \(p. 79\)](#).

If you use Athena to connect to Amazon S3, see [I Can't Connect to Amazon Athena \(p. 528\)](#).

I Can't Connect to RDS

For details on troubleshooting connections to Amazon RDS, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).

You can also refer to the Amazon RDS documentation on troubleshooting connections, [Cannot Connect to Amazon RDS DB Instance](#).

My Rows Were Skipped During Data Preparation

When you prepare data, Amazon QuickSight previews a portion of your data for you to work with. If it can't interpret a row for any reason, it skips this row. Then it displays a message to say how many rows are skipped.

Here is a list of things to check:

- Inconsistency between the field data type and the field data, for example text data in a field with a numeric data type.
- Having a file that contains a header but having the **Contains header** upload setting deselected.
- Having the data source data violate one or more [Data Source Limits \(p. 62\)](#).
- Field data that is incompatible with or excluded by the function used in a calculated field. For example, if you have a calculated field that uses [parseDate \(p. 455\)](#), rows with data that doesn't evaluate to a valid date are skipped.

My SPICE Data Doesn't Sort Alphabetically

SPICE (p. 2) doesn't yet support sorting text. To work around this issue, use a direct query instead of SPICE. If you are using text files, you need to import them through another data source.

I Can't Add a Visual to My Analysis

If you are editing an analysis for a selected data source, and the connection to the data source terminates unexpectedly, this error state can prevent further changes to the analysis. In this case, you can't add more visuals to the analysis.

To fix this issue, do the following:

- Verify that you still have access to the data source.
- Add exceptions to your ad blocker for *.aws.amazon.com, amazonaws.com, and https://mobileanalytics.*.amazonaws.com.
- If you are using a proxy server, verify that *.quicksight.aws.amazon.com is added to the list of approved domains (allowlist).

I Get a Feedback Bar Across My Printed Docs

The browser sometimes prints the document feedback bar across the page, blocking some printed content.

To avoid this problem, use the twirl-down icon on the bottom left of the screen to minimize the feedback bar. Then print your document.

We always welcome your feedback on our documentation!



How Do I Delete My Amazon QuickSight Account?

If you need to delete your Amazon QuickSight account, even when you can't access Amazon QuickSight to unsubscribe, sign in to AWS and use the following link to open the [unsubscribe screen](#): <https://us-east-1.quicksight.aws.amazon.com/sn/console/unsubscribe>. This approach works no matter what AWS Regions you use. It deletes all data, analyses, Amazon QuickSight users, and Amazon QuickSight administrators. If you have further difficulty, contact support.

My Map Charts Don't Show Locations

For automatic mapping, called geocoding, to work on map charts, your data must be prepared following specific rules. For help with geospatial issues, see [Geospatial Troubleshooting \(p. 183\)](#). For help with preparing data for geospatial charts, see [Adding Geospatial Data \(p. 177\)](#).

Amazon QuickSight Isn't Working in My Browser

If you can't view Amazon QuickSight correctly in your Chrome browser, follow these steps to fix the problem:

1. Open Chrome and navigate to `chrome://flags/#touch-events`.
2. If the option is set to **Automatic**, change it to **Disabled**
3. Close and reopen Chrome.

Troubleshooting Issues When Using Athena with Amazon QuickSight

This section covers troubleshooting various issues you might encounter when using Athena with Amazon QuickSight. This list came from support calls frequently made by Amazon QuickSight customers.

Topics

- [Insufficient Permissions When Using Athena with Amazon QuickSight \(p. 535\)](#)
- [Table Not Found When Using Athena with Amazon QuickSight \(p. 536\)](#)
- [Column Not Found When Using Athena with Amazon QuickSight \(p. 536\)](#)
- [Staging Bucket No Longer Exists When Using Athena with Amazon QuickSight \(p. 536\)](#)
- [Query Timeout When Using Athena with Amazon QuickSight \(p. 537\)](#)
- [Invalid Data When Using Athena with Amazon QuickSight \(p. 537\)](#)
- [Table Incompatible When Using AWS Glue with Athena in Amazon QuickSight \(p. 537\)](#)

Insufficient Permissions When Using Athena with Amazon QuickSight

If you receive an "insufficient permissions" error, try these steps to resolve your problem:

1. Make sure that you granted Amazon QuickSight read-only access to the S3 buckets used by Athena.
 - a. To do this, choose **Manage QuickSight** from your profile icon in the top right of the screen.
 - b. Next, choose **Account Settings** and then **Edit AWS permissions**.
 - c. On the **Edit QuickSight read-only-access to AWS resources** screen, choose **Choose S3 buckets**. Verify that the appropriate S3 buckets are listed and that their check boxes are selected.
 - d. If your bucket isn't listed under **S3 buckets linked to QuickSight account**, choose the **S3 buckets you can access across AWS** tab. To add your bucket, type in your bucket's name and choose **Add S3 bucket**.
2. If your data file is encrypted with an AWS KMS key, grant permissions to the Amazon QuickSight IAM role to decrypt the key. The easiest way to do this is to use the AWS CLI.

You can run the `create-grant` command in AWS CLI to do this.

```
aws kms create-grant --key-id <KMS key ARN> --grantee-principal <Your Amazon QuickSight Role ARN> --operations Decrypt
```

The Amazon Resource Name (ARN) for the Amazon QuickSight role has the format `arn:aws:iam::<account id>:role/service-role/aws-quicksight-service-role-v<version number>` and can be accessed from the IAM console. To find your KMS key ARN, use the S3 console. Go to the bucket that contains your data file and choose the **Overview** tab. The key is located near **KMS key ID**.

Table Not Found When Using Athena with Amazon QuickSight

If you receive a "table not found" error, this can happen if the tables in an analysis are missing from the Athena data source.

In the Athena console, check for your table under the corresponding schema. You can recreate the table in Athena and then create a new data set in Amazon QuickSight on that table. To investigate how the table was lost in the first place, you can use the Athena console to check the query history. This helps you locate the queries that dropped the table.

If this error happened when you were editing a custom SQL query in preview, verify the name of the table in the query, and check for any other syntax errors. Amazon QuickSight can't infer the schema from the query. The schema must be specified in the query.

For example, the following statement works.

```
select from my_schema.my_table
```

The following statement fails because it's missing the schema.

```
select from my_table
```

Column Not Found When Using Athena with Amazon QuickSight

If you receive a "column not found" error, this can happen if the columns in an analysis are missing from the Athena data source.

In Amazon QuickSight, open your analysis. In the **Visualize** tab, choose **Choose data set...**, then **Edit analysis data sets**.

In the **Data sets in this analysis** screen, choose **Edit** near your data set to refresh the data set. Amazon QuickSight caches the schema for 2 minutes. So it can take 2 minutes before the latest changes display.

To investigate how the column was lost in the first place, you can go to Athena console and check the query history to find queries that edited the table.

If this error happened when you were editing a custom SQL query in preview, verify the name of the column in the query, and check for any other syntax errors. For example, check that the column name isn't enclosed in single quotes, which are reserved for strings.

Staging Bucket No Longer Exists When Using Athena with Amazon QuickSight

Use this section to help solve this error: "**The staging bucket for this query result no longer exists in the underlying data source.**"

When you create a data set using Athena, Amazon QuickSight creates an S3 bucket. By default, this bucket has a name similar to "aws-athena-query-results->region<->account-id<". If you remove this bucket, then your next Athena query might fail with an error saying the staging bucket no longer exists.

To fix this error, create a new bucket with the same name in the correct AWS Region.

Query Timeout When Using Athena with Amazon QuickSight

If your query times out, you can try these options to resolve your problem.

If the failure was generated while working on an analysis, remember that Amazon QuickSight's timeout for generating any visual is 2 minutes. If you're using a custom SQL query, you can simplify your query to optimize execution time.

If you are in direct query mode (not using SPICE), you can try importing your data to SPICE. However, if your query exceeds the Athena 30-minute timeout, you might get another timeout while importing data into SPICE. For the most current information on Athena limits, see [Amazon Athena Limits](#).

Invalid Data When Using Athena with Amazon QuickSight

An "Invalid Data" error can occur when you use any operator or function in a calculated field. Verify that the data in the table is consistent with the format you supplied to the function.

For example, if you are using the function `parseDate(expression, ['format'], ['time_zone'])` as `parseDate(date_column, 'MM/dd/yyyy')`, all values in `date_column` must conform to 'MM/dd/yyyy' format ('05/12/2016'). Any value that isn't in this format ('2016/12/05') can cause an error.

Table Incompatible When Using AWS Glue with Athena in Amazon QuickSight

If you are getting errors when using AWS Glue tables in Athena with Amazon QuickSight, it might be because you're missing some metadata. Follow these steps to find out if your tables don't have the `TableType` attribute that Amazon QuickSight needs for the Athena connector to work. Usually, the metadata for these tables wasn't migrated to the AWS Glue Data Catalog. For more information, see [Upgrading to the AWS Glue Data Catalog Step-by-Step](#) in the [AWS Glue Developer Guide](#).

If you don't want to migrate to the AWS Glue data catalog at this time, you have two options. You can recreate each AWS Glue table through the AWS Glue Management Console. Alternatively, you can use the AWS CLI scripts listed in the following procedure to identify and update tables with missing `TableType` attributes.

If you prefer to use the CLI to do this, use the following procedure to help you design your scripts.

1. Use the CLI to learn which AWS Glue tables have no `TableType` attributes.

```
aws glue get-tables --database-name <your_database_name>;
```

For example, you can run the following command in the CLI.

```
aws glue get-table --database-name "test_database" --name "table_missing_table_type"
```

Following is a sample of what the output looks like. You can see that the table "table_missing_table_type" doesn't have the TableType attribute declared.

```
{
    "TableList": [
        {
            "Retention": 0,
            "UpdateTime": 1522368588.0,
            "PartitionKeys": [
                {
                    "Name": "year",
                    "Type": "string"
                },
                {
                    "Name": "month",
                    "Type": "string"
                },
                {
                    "Name": "day",
                    "Type": "string"
                }
            ],
            "LastAccessTime": 1513804142.0,
            "Owner": "owner",
            "Name": "table_missing_table_type",
            "Parameters": {
                "delimiter": ",",
                "compressionType": "none",
                "skip.header.line.count": "1",
                "sizeKey": "75",
                "averageRecordSize": "7",
                "classification": "csv",
                "objectCount": "1",
                "typeOfData": "file",
                "CrawlerSchemaDeserializerVersion": "1.0",
                "CrawlerSchemaSerializerVersion": "1.0",
                "UPDATED_BY_CRAWLER": "crawl_date_table",
                "recordCount": "9",
                "columnsOrdered": "true"
            },
            "StorageDescriptor": {
                "OutputFormat":
                    "org.apache.hadoop.hive.ql.io.HiveIgnoreKeyTextOutputFormat",
                    "SortColumns": [],
                    "StoredAsSubDirectories": false,
                    "Columns": [
                        {
                            "Name": "col1",
                            "Type": "string"
                        },
                        {
                            "Name": "col2",
                            "Type": "bigint"
                        }
                    ],
                    "Location": "s3://myAthenatest/test_dataset/",
                    "NumberOfBuckets": -1,
                    "Parameters": {
                        "delimiter": ",",
                        "compressionType": "none",
                        "skip.header.line.count": "1",
                        "columnsOrdered": "true",
                        "sizeKey": "75",
                        "averageRecordSize": "7",

```

```

        "classification": "csv",
        "objectCount": "1",
        "typeOfData": "file",
        "CrawlerSchemaDeserializerVersion": "1.0",
        "CrawlerSchemaSerializerVersion": "1.0",
        "UPDATED_BY_CRAWLER": "crawl_date_table",
        "recordCount": "9"
    },
    "Compressed": false,
    "BucketColumns": [],
    "InputFormat": "org.apache.hadoop.mapred.TextInputFormat",
    "SerdeInfo": {
        "Parameters": {
            "field.delim": ","
        },
        "SerializationLibrary":
        "org.apache.hadoop.hive.serde2.lazy.LazySimpleSerDe"
    }
}
]
}
}

```

2. Edit the table definition in your editor to add "TableType": "EXTERNAL_TABLE" to the table definition, as shown in the following example.

```

{
    "Table": {
        "Retention": 0,
        "TableType": "EXTERNAL_TABLE",
        "PartitionKeys": [
            {
                "Name": "year",
                "Type": "string"
            },
            {
                "Name": "month",
                "Type": "string"
            },
            {
                "Name": "day",
                "Type": "string"
            }
        ],
        "UpdateTime": 1522368588.0,
        "Name": "table_missing_table_type",
        "StorageDescriptor": {
            "BucketColumns": [],
            "SortColumns": [],
            "StoredAsSubDirectories": false,
            "OutputFormat": "org.apache.hadoop.hive.io.HiveIgnoreKeyTextOutputFormat",
            "SerdeInfo": {
                "SerializationLibrary":
                "org.apache.hadoop.hive.serde2.lazy.LazySimpleSerDe",
                "Parameters": {
                    "field.delim": ","
                }
            },
            "Parameters": {
                "classification": "csv",
                "CrawlerSchemaSerializerVersion": "1.0",
                "UPDATED_BY_CRAWLER": "crawl_date_table",
                "columnsOrdered": "true",
                "averageRecordSize": "7",
                "objectCount": "1",
                "typeOfData": "file"
            }
        }
    }
}

```

```

        "sizeKey": "75",
        "delimiter": ",",
        "compressionType": "none",
        "recordCount": "9",
        "CrawlerSchemaDeserializerVersion": "1.0",
        "typeOfData": "file",
        "skip.header.line.count": "1"
    },
    "Columns": [
        {
            "Name": "col1",
            "Type": "string"
        },
        {
            "Name": "col2",
            "Type": "bigint"
        }
    ],
    "Compressed": false,
    "InputFormat": "org.apache.hadoop.mapred.TextInputFormat",
    "NumberOfBuckets": -1,
    "Location": "s3://myAthenatest/test_date_part/"
},
"Owner": "owner",
"Parameters": {
    "classification": "csv",
    "CrawlerSchemaSerializerVersion": "1.0",
    "UPDATED_BY_CRAWLER": "crawl_date_table",
    "columnsOrdered": "true",
    "averageRecordSize": "7",
    "objectCount": "1",
    "sizeKey": "75",
    "delimiter": ",",
    "compressionType": "none",
    "recordCount": "9",
    "CrawlerSchemaDeserializerVersion": "1.0",
    "typeOfData": "file",
    "skip.header.line.count": "1"
},
"LastAccessTime": 1513804142.0
}
}
}

```

3. You can adapt the following script to update the table input, so that it includes the `TableType` attribute.

```
aws glue update-table --database-name <your_database_name> --table-input
<updated_table_input>
```

The following shows an example.

```

aws glue update-table --database-name test_database --table-input '
{
    "Retention": 0,
    "TableType": "EXTERNAL_TABLE",
    "PartitionKeys": [
        {
            "Name": "year",
            "Type": "string"
        },
        {
            "Name": "month",
            "Type": "string"
        }
    ]
}

```

```

        },
        {
            "Name": "day",
            "Type": "string"
        }
    ],
    "Name": "table_missing_table_type",
    "StorageDescriptor": {
        "BucketColumns": [],
        "SortColumns": [],
        "StoredAsSubDirectories": false,
        "OutputFormat":
            "org.apache.hadoop.hive.ql.io.HiveIgnoreKeyTextOutputFormat",
        "SerdeInfo": {
            "SerializationLibrary":
                "Parameters": {
                    "field.delim": ","
                }
            },
            "Parameters": {
                "classification": "csv",
                "CrawlerSchemaSerializerVersion": "1.0",
                "UPDATED_BY_CRAWLER": "crawl_date_table",
                "columnsOrdered": "true",
                "averageRecordSize": "7",
                "objectCount": "1",
                "sizeKey": "75",
                "delimiter": ",",
                "compressionType": "none",
                "recordCount": "9",
                "CrawlerSchemaDeserializerVersion": "1.0",
                "typeOfData": "file",
                "skip.header.line.count": "1"
            },
            "Columns": [
                {
                    "Name": "col1",
                    "Type": "string"
                },
                {
                    "Name": "col2",
                    "Type": "bigint"
                }
            ],
            "Compressed": false,
            "InputFormat": "org.apache.hadoop.mapred.TextInputFormat",
            "NumberOfBuckets": -1,
            "Location": "s3://myAthenatest/test_date_part/"
        },
        "Owner": "owner",
        "Parameters": {
            "classification": "csv",
            "CrawlerSchemaSerializerVersion": "1.0",
            "UPDATED_BY_CRAWLER": "crawl_date_table",
            "columnsOrdered": "true",
            "averageRecordSize": "7",
            "objectCount": "1",
            "sizeKey": "75",
            "delimiter": ",",
            "compressionType": "none",
            "recordCount": "9",
            "CrawlerSchemaDeserializerVersion": "1.0",
            "typeOfData": "file",
            "skip.header.line.count": "1"
        },
    }
}

```

```
        "LastAccessTime": 1513804142.0  
    }'
```

My Pivot Table Stops Working

If your pivot table exceeds the computational limitations of the underlying database, this is usually caused by the combination of items in the field wells: rows, columns, metrics, and table calculations. You can reduce the level of complexity and reduce the potential for errors by simplifying your pivot table. For more information see [Pivot Table Best Practices \(p. 390\)](#).

My email sign-in stopped working

Currently, emails are case-sensitive. If yours isn't working, ask your administrator to check it for a mix of upper and lowercase letters. Use your email as it was entered.

Administration

Use the following section to learn about Amazon QuickSight administrative tasks. This section contains information about controlling access, managing accounts, and choosing AWS Regions.

Topics

- [Different Editions of Amazon QuickSight \(p. 543\)](#)
- [AWS Regions and IP Address Ranges \(p. 546\)](#)
- [Supported Browsers \(p. 547\)](#)
- [Signing Up for Amazon QuickSight \(p. 548\)](#)
- [Access and Authentication in Amazon QuickSight \(p. 553\)](#)
- [Managing User Access Inside Amazon QuickSight \(p. 567\)](#)
- [Managing Amazon QuickSight Usage \(p. 573\)](#)
- [Working with AWS Services \(p. 590\)](#)

Different Editions of Amazon QuickSight

Amazon QuickSight offers Standard and Enterprise editions. To learn more about the differences in availability, user management, permissions, and security between the two versions, see the following topic.

Both editions offer a full set of features for creating and sharing data visualizations. Enterprise edition additionally offers encryption at rest and Microsoft Active Directory (Microsoft Active Directory) integration. In Enterprise edition, you select a Microsoft Active Directory directory in AWS Directory Service. You use that active directory to identify and manage your Amazon QuickSight users and administrators.

For more information about the features offered by the Amazon QuickSight editions and about pricing, see the [Amazon QuickSight website](#).

Comparing Editions

To help you decide which edition is for you, take a look at the following table to compare features between editions.

| Features | Standard Edition | Enterprise Edition |
|------------------------------|------------------|--------------------|
| Free Authors | 1 | 1 |
| Free Trial Authors (60 Days) | 4 | 4 |
| Included SPICE Capacity | 10 GB/User | 10 GB/User |
| Readers | N/A | \$0.30/session |
| Additional SPICE Capacity | \$0.25/GB/mo. | \$0.38/GB/mo. |

| Features | Standard Edition | Enterprise Edition |
|---|------------------|--------------------|
| Connect to spreadsheets, databases, data lakes, and business apps | # | # |
| Easily analyze data with AutoGraph | # | # |
| Fast, scalable visualizations | # | # |
| Publish dashboards for interactive data access | # | # |
| Single-Sign-On with SAML or OpenID Connect | # | # |
| Web and mobile access | # | # |
| Drill-down to detail and customize filters | # | # |
| Enable audit logs with AWS CloudTrail | # | # |
| Reader Role | | # |
| Securely Access data in Private VPCs and On-Prem | | # |
| Row Level Security | | # |
| Hourly refresh of SPICE data | | # |
| Secure data encryption at rest | | # |
| Connect to Active Directory | | # |
| Use Active Directory groups | | # |

Availability of Editions

All editions are available in any AWS Region that is currently supported by Amazon QuickSight.

The capacity region in which you start your Amazon QuickSight subscription is where your account's default [SPICE \(p. 2\)](#) capacity is allocated. However, you can purchase additional SPICE capacity and access your AWS resources in any other supported AWS Region.

You can start a new Amazon QuickSight subscription using Standard edition, choosing any default capacity region. You can then upgrade it to Enterprise edition at any time, and connect to it using Role Based Federation (SSO) or email invitations.

If you require Active Directory integration, begin by creating a new Enterprise edition subscription. Choose the US East (N. Virginia) Region as your default capacity region.

Note

If you are using Microsoft Active Directory onsite at your data center or outside your default AWS Region, you can use AD Connector to integrate with Amazon QuickSight Enterprise edition. Currently, Amazon QuickSight only supports AD Connectors located in the US East (N. Virginia) Region.

To manage Enterprise account settings, you must temporarily change your region for your session to US East (N. Virginia) Region. You can change it back when you have finished editing your account settings. These settings include changing your subscription's notification email, enabling IAM access requests, editing access to AWS resources, and unsubscribing from Amazon QuickSight.

User Management Between Edititons

User management is different between the Amazon QuickSight Standard and Enterprise editions. However, both editions support identity federation, or Federated Single Sign-On (SSO), through Security Assertion Markup Language 2.0 (SAML 2.0).

User Management for Standard Edition

In Standard edition, you can invite an AWS Identity and Access Management (IAM) user and allow that user to use their credentials to access Amazon QuickSight. Alternatively, you can invite any person with an email address to create an Amazon QuickSight-only user account. When you create a user account, Amazon QuickSight sends email to that user inviting them to activate their account.

When you create a user account, you also choose to assign it either an administrative or a user role. This role assignment determines the user's permissions in Amazon QuickSight. You perform all management of users by adding, changing, and deleting user accounts in Amazon QuickSight.

For more information about managing Standard edition user accounts, see [Managing User Access Inside Amazon QuickSight \(p. 567\)](#).

User Management for Enterprise Edition

In Enterprise edition, you can select one or more Microsoft Active Directory active directory groups in AWS Directory Service for administrative access. All users in these groups are authorized to sign in to Amazon QuickSight as administrators. You can also select one or more Microsoft Active Directory active directory groups in AWS Directory Service for user access. All users in these groups are authorized to sign in to Amazon QuickSight as users.

Important

Amazon QuickSight administrators and users added in this way aren't automatically notified of their access to Amazon QuickSight. You must email users with the sign-in URL, the account name, and their credentials.

You can only add or remove Enterprise edition user accounts by adding or removing a person from a Microsoft Active Directory group that you associated with Amazon QuickSight. When you add a user account, the permissions it gets rely on whether the Microsoft Active Directory group is an administrative group or a user group in Amazon QuickSight.

You can also bulk add or remove user accounts by integrating Microsoft Active Directory groups with, or removing Microsoft Active Directory groups from, Amazon QuickSight.

Deactivating a user by removing the user from a Microsoft Active Directory group, or by removing their Microsoft Active Directory group from integration with Amazon QuickSight, doesn't delete the associated Amazon QuickSight user account for that person.

For more information about managing Enterprise edition user accounts, see [Access and Authentication in Amazon QuickSight \(p. 553\)](#).

Permissions for the Different Editions

In Standard edition, all Amazon QuickSight administrators can manage subscriptions and SPICE capacity. They can also add, modify, and delete user accounts.

Additional AWS permissions are required to manage Amazon QuickSight permissions to AWS resources and to unsubscribe from Amazon QuickSight. These tasks can only be performed by an IAM user who also has administrative permissions in Amazon QuickSight, or by the IAM user or AWS account that created the Amazon QuickSight account.

To manage access to AWS resources from Amazon QuickSight, you must be logged in as one of the following:

- Any IAM user who is an Amazon QuickSight administrator
- The IAM user or AWS root account that created the Amazon QuickSight account

In Enterprise edition, you must add AD users or groups to an IAM role that has QuickSight permissions, rather than adding IAM users individually. All Microsoft Active Directory users that are Amazon QuickSight administrators can manage subscriptions and SPICE capacity.

Additional AWS permissions are required to manage Microsoft Active Directory groups, manage access to AWS resources, or unsubscribe from Amazon QuickSight. Administrators are prompted for AWS or IAM credentials to perform these tasks.

For more information about the permissions needed for specific tasks, see [Setting Your IAM Policy \(p. 609\)](#).

Secure Transmission and Storage Between Editions

In both editions of Amazon QuickSight, all transfers of data (for example, from the data source to SPICE, or from SPICE to the user interface) are encrypted. Database connections are secured using Secure Sockets Layer (SSL), and all other transfers are secured using Transport Layer Security (TLS).

In Enterprise edition, data at rest in SPICE is also encrypted using block-level encryption with AWS-managed keys.

AWS Regions and IP Address Ranges

AWS cloud computing resources are housed in highly available data center facilities in different areas of the world (for example, North America, Europe, or Asia). Each data center is part of an AWS Region. Each AWS Region contains two or more data centers, which are called Availability Zones (AZs). For more information about AWS Regions and AZs, see [Global Infrastructure](#).

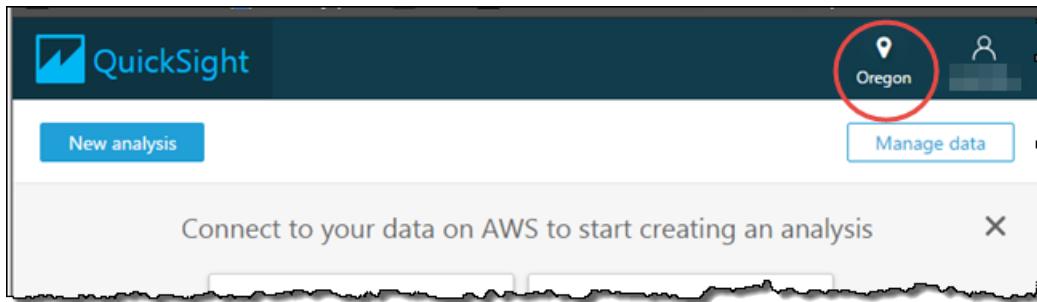
Amazon QuickSight is currently supported in the following AWS Regions and IP address ranges.

| AWS Region | IP Address Range |
|-----------------------------------|-------------------|
| US East (Ohio) (us-east-2) | 52.15.247.160/27 |
| US East (N. Virginia) (us-east-1) | 52.23.63.224/27 |
| US West (Oregon) (us-west-2) | 54.70.204.128/27 |
| EU (Ireland) (eu-west-1) | 52.210.255.224/27 |
| Asia Pacific (Singapore) | 13.229.254.0/27 |
| Asia Pacific (Sydney) | 54.153.249.96/27 |

| AWS Region | IP Address Range |
|----------------------|------------------|
| Asia Pacific (Tokyo) | 13.113.244.32/27 |

When you sign up for Amazon QuickSight, you select a home AWS Region. This is the AWS Region where you want Amazon QuickSight to allocate the initial SPICE capacity associated with any user accounts you create. Typically, this will be the AWS Region closest to your physical location, and the same AWS Region where you have the majority of your other AWS resources (like Amazon RDS instances). For more information about how SPICE capacity is allocated, see [Managing SPICE Capacity \(p. 583\)](#).

When you sign in to Amazon QuickSight using the default URL of aws.amazon.com/quicksight, the US East (N. Virginia) (us-east-1) region is selected by default. If you sign in using a URL that specifies a supported AWS Region, for example us-west-2.quicksight.aws.amazon.com, the AWS Region specified in the URL is selected. You can change to other supported AWS Regions by using the region selector on the right side of the application bar.



You can autodiscover your Amazon RDS instances and Amazon Redshift clusters that run in any of the AWS Regions that Amazon QuickSight supports. If you enable autodiscovery, the autodiscovered resources displayed reflect whatever AWS Region you currently have selected. You can still use AWS resources in other AWS Regions by manually creating connections to them. For more information about enabling autodiscovery of AWS data stores, see [Authorizing Connections from Amazon QuickSight to AWS Data Stores \(p. 591\)](#).

It is important to remember that each AWS Region is completely independent. Any Amazon QuickSight resources you create, like data sets and analyses, exist only in the AWS Region in which you create them, and can't be moved to other AWS Regions.

Supported Browsers

Before you start working with Amazon QuickSight, use the following table to verify that your browser is supported for Amazon QuickSight access.

| Browser | Version | Check Your Version |
|---------------|---------------------|---|
| Apple Safari | 7 or later | Open Safari. On the menu, choose Safari , and then choose About Safari . The version number is shown in the dialog box that displays. |
| Google Chrome | Last three versions | Open Chrome and type chrome://version in your address bar. The version is in the |

| Browser | Version | Check Your Version |
|------------------------------------|---------------------|---|
| | | Google Chrome field at the top of the results. |
| Microsoft Edge | Latest version | Not applicable. |
| Microsoft Internet Explorer | 11 or later | Open Internet Explorer, choose the Tools icon, and then choose About Internet Explorer . |
| Mozilla Firefox | Last three versions | Open Firefox. On the menu, choose the Help icon, and then choose About Firefox . The version number is listed underneath the Firefox name. |

Signing Up for Amazon QuickSight

If you are new to AWS, see [Setting Up Amazon QuickSight \(p. 16\)](#) to create an Amazon QuickSight account.

If you have an existing AWS account, see [Subscribe to Amazon QuickSight \(p. 548\)](#) to create an Amazon QuickSight account.

If your organization has an existing Amazon QuickSight account and you want to request access to it, follow the procedure in [Request Access to an Existing Amazon QuickSight Account \(p. 549\)](#).

Note

To avoid confusion with *AWS users* and *AWS administrators*, we refer to all Amazon QuickSight users as *Amazon QuickSight users* or *Amazon QuickSight administrators*.

For information on supported browsers, see [Supported Browsers \(p. 547\)](#).

Topics

- [Subscribe to Amazon QuickSight \(p. 548\)](#)
- [Request Access to an Existing Amazon QuickSight Account \(p. 549\)](#)

Subscribe to Amazon QuickSight

Use this topic to subscribe to Amazon QuickSight using an existing AWS account. If you don't have an AWS account, see [Setting Up Amazon QuickSight \(p. 16\)](#) for streamlined sign-up.

You can have only one Amazon QuickSight account per AWS account. The Amazon QuickSight account contains all the users who use Amazon QuickSight. Users can sign in directly, through an IAM user or role, or through Single Sign-On. For details on using IAM, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#). For details on using Single Sign-On, see [Enabling Single Sign-On Access to Amazon QuickSight Using SAML 2.0 \(p. 557\)](#).

Before you begin, you must be able to connect to an existing AWS account. If your company already has an AWS account, contact your AWS account administrator for assistance.

To subscribe to Amazon QuickSight

1. Sign in to your AWS account and open Amazon QuickSight from the AWS Management Console. It is located under Analytics, and you can find it by searching for "QuickSight".

2. Your AWS account number is displayed for verification purposes. Choose **Sign up for QuickSight**.
3. Choose **Standard or Enterprise**. To confirm, choose **Continue**. A screen titled **Create your QuickSight account** appears.
4. If you choose Standard, skip this step and proceed to the next one.

If you choose Enterprise, you first choose the method you want to connect with. Choose one of the following.

- **Use Role Based Federation (SSO)**
- **Use Active Directory**

5. For both Standard and Enterprise editions, make choices for the following items:

- Type in a unique account name for Amazon QuickSight. Your account name can only contain characters (A–Z and a–z), digits (0–9), and hyphens (–). If you use AD, and it has a default alias, this alias is used for the account name.
- Type in a notification email address for the Amazon QuickSight account owner or group. This email receives service and usage notifications.
- (Optional) Choose the AWS region you want to utilize for your default **SPICE** (p. 2) capacity. This is where your account's free SPICE capacity is allocated after signing up. Note that you aren't able to change the default capacity region later, but you can always purchase additional SPICE capacity in different regions as needed. See [AWS Regions and IP Address Ranges \(p. 546\)](#) for information on regions.
- (Optional) Choose whether to allow autodiscovery of your AWS resources. You can change these options later in **Manage Account**. For more information, see [Allowing Autodiscovery of AWS Resources \(p. 591\)](#).

6. Review the choices you made, then choose **Finish**.
7. (Optional) To open Amazon QuickSight, choose **Go to Amazon QuickSight**.

If you are using Enterprise edition, you can manage user groups, by choosing **Manage access to QuickSight**. Otherwise, close the browser and notify your users how to connect.

For Enterprise edition, there are a few more steps to complete: configuring users and groups to access Amazon QuickSight.

After you sign up for Amazon QuickSight, users can start to sign in, connect to data, and create analyses.

To set up data sources for your users, see [Working with Data Sources in Amazon QuickSight \(p. 59\)](#).

To enable self-provisioning for Amazon QuickSight by setting an IAM policy on a role with permissions for `CreateUser` or `CreateAdmin`, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

To start creating analyses, see [Getting Started with Data Analysis in Amazon QuickSight \(p. 16\)](#).

For more information about managing users in Amazon QuickSight Standard edition, see [Managing User Accounts in Amazon QuickSight Standard Edition \(p. 568\)](#).

For more information about managing users in Amazon QuickSight Enterprise edition, see [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 553\)](#).

Request Access to an Existing Amazon QuickSight Account

If your organization has already signed up for Amazon QuickSight, you can ask your Amazon QuickSight administrator to add you as a user.

For Standard edition accounts, your Amazon QuickSight administrator can give you access through your IAM credentials, through Single Sign-On (SSO), or through your email address. For more information for Standard edition users, see [Getting Access as a New Amazon QuickSight Standard Edition User \(p. 550\)](#).

For more information for Enterprise edition users, see [Getting Access as a New Amazon QuickSight Enterprise Edition User \(p. 551\)](#).

After you sign in for the first time, you can connect to data and creating analyses. For more information about creating your first analysis, see [Getting Started with Data Analysis in Amazon QuickSight \(p. 16\)](#).

Topics

- [Getting Access as a New Amazon QuickSight Standard Edition User \(p. 550\)](#)
- [Getting Access as a New Amazon QuickSight Enterprise Edition User \(p. 551\)](#)

Getting Access as a New Amazon QuickSight Standard Edition User

Your Amazon QuickSight administrator uses either your IAM credentials, your Single Sign-On (SSO) service, or your email address to create your Amazon QuickSight user account. Then Amazon QuickSight sends you an email inviting you to activate it. The invitation email you receive indicates what type of credentials you should use.

Note

If your company uses a Single Sign-On (SSO) service with Amazon QuickSight, your administrator must provide instructions on how to sign in. For more information on how this is set up, see [Enabling Single Sign-On Access to Amazon QuickSight Using SAML 2.0 \(p. 557\)](#).

[Signing In as a New User Using Credentials Based on Your Email Address](#)

Use the following procedure to sign in as a new user who has an Amazon QuickSight–only account based on an email address.

To sign in as a new user who has an account based on an email address

1. In your invitation email, choose the link in the body of the email to open the Amazon QuickSight sign-up page.
2. Complete your user account by typing a password.

Passwords are case-sensitive, must be between 8 and 64 characters in length, and must contain at least one character from three of the following four categories:

- Lowercase letters (a–z)
 - Uppercase letters (A–Z)
 - Numbers (0–9)
 - Nonalphanumeric characters (~!@#\$%^&*_+=`|\(){}[];:"<>,.?/)
3. Choose **Create account and sign in**.
 4. Choose **Continue**. Doing this takes you to the Amazon QuickSight start page.

[Signing In as a New User Using Your IAM Credentials](#)

Use the following procedure to sign in to Amazon QuickSight as a new user who has IAM credentials.

To sign in as a new user with IAM credentials

1. When you receive the invitation email, go to the Amazon QuickSight sign in page, <https://quicksight.aws.amazon.com/>.

2. For **Account name**, type the account name in your invitation email, and then choose **Continue**.
3. Type your IAM user name in **Email address or username**.
4. Type your IAM password in **Password**.
5. Choose **Sign in**.

Self-Provisioning an Amazon QuickSight user

Use the following procedure to sign in to Amazon QuickSight as a new user who has access to Amazon QuickSight, but has not yet created a login. For this process to work, the AWS administrator must have granted permissions, using an AWS user or group policy in IAM. For more information, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

To sign in as a new user with access but no login

1. When you are invited to do so, go to the Amazon QuickSight sign in page, <https://quicksight.aws.amazon.com/>.
2. For **Account name**, type the Amazon QuickSight account name (not the AWS account number). Your administrator or manager might provide this name. Then choose **Continue**.
3. Type your new Amazon QuickSight user name in **Email address or username**.
4. Type your new Amazon QuickSight password in **Password**.
5. Choose **Sign in**.

Self-Provisioning an Amazon QuickSight administrator

Use the following procedure to set or create the administrator for Amazon QuickSight. This procedure does not require using an alias for your account or your directory.

To make a user the Amazon QuickSight administrator

1. Create the AWS user
 - Use IAM to create the user you want to be the administrator of Amazon QuickSight. Or, identify an existing user in IAM for the administrator role. If you prefer, you can put the user inside a new group, for manageability.
 - Grant the user (or group) sufficient permissions, as described in [Setting Your IAM Policy \(p. 609\)](#).
 - For more information on working with IAM, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).
2. Log in to your AWS console with the target user's credentials.
3. Go to <http://quicksight.aws.amazon.com/sn/console/get-user-email>.
4. Type in your email, and choose **Continue**
5. On success, the target IAM user is now an Amazon QuickSight administrator.

Getting Access as a New Amazon QuickSight Enterprise Edition User

Before you begin, your Amazon QuickSight administrator must add your network user account to an active directory group associated with Amazon QuickSight. Then, the administrator must provide you with the information that you need to activate your Amazon QuickSight user account, including the Amazon QuickSight account name.

Use the following procedure to sign in to Amazon QuickSight as a new Enterprise edition user.

To sign in as a new Enterprise edition user

1. Choose **Standard** or **Enterprise**. To confirm, choose **Continue**. A screen titled **Create your QuickSight account** appears.
2. (Optional) If you choose **Standard**, skip this step and proceed to the next one.

If you choose **Enterprise**, you can choose the method you want to use to connect. You can choose one of the following.

- **Use Role Based Federation (SSO)**
- **Use Active Directory**

Note

If you want to use IAM to manage your users, choose **Use Role Based Federation (SSO)**.

If you choose **Active Directory**, you will have the chance to add groups and users at this point. However, you can do this later.

3. For all editions, make choices for the following items.
 - Type in a unique account name for QuickSight. Your account name can only contain characters (A–Z and a–z), digits (0–9), and hyphens (-). If you use AD and it has a default alias, the alias becomes the account name.
 - Type in a notification email address for the QuickSight account owner or group. This email receives service and usage notifications
 - (Optional) Choose a capacity region for [SPICE \(p. 2\)](#). New Enterprise accounts must start in US East (N. Virginia). Users can change their region any time. See [AWS Regions and IP Address Ranges \(p. 546\)](#) for information on regions.
 - (Optional) Choose whether to allow autodiscovery of your AWS resources. You can change these options later in **Manage Account**. For more information, see [Allowing Autodiscovery of AWS Resources \(p. 591\)](#).
4. Before you choose **Finish**, make sure you chose the correct edition (Standard or Enterprise). Currently, to change editions you must either to unsubscribe and create a new Amazon QuickSight account or contact the product team for migration assistance.

Verify the choices you made, then choose **Finish**.

5. (Optional) If you are using Standard edition, skip this step. For Enterprise edition, to open Amazon QuickSight choose **Go to Amazon QuickSight**. To manage Microsoft Active Directory user groups, choose **Manage access to QuickSight**.

Otherwise, close the browser and notify your users how to connect.

After you sign up for Amazon QuickSight, users can log in, connect to data, and create analyses. You can send them a link to [Amazon QuickSight Quick Start Guide \(p. 14\)](#) to provide them with information to get started.

To enable self-provisioning for Amazon QuickSight by setting an IAM policy on a role with permissions for `CreateUser` or `CreateAdmin`, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

To set up data sources for your users, see [Working with Data Sources in Amazon QuickSight \(p. 59\)](#).

For more information about managing users for Amazon QuickSight administrators, see [Managing User Access Inside Amazon QuickSight \(p. 567\)](#).

Access and Authentication in Amazon QuickSight

Use the following topics to manage access and authentication to Amazon QuickSight. This topic is for AWS administrators.

Topics

- [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 553\)](#)
- [Adding Domains for Embedded Dashboard Users \(p. 562\)](#)
- [Upgrading Your Amazon QuickSight Subscription from Standard Edition to Enterprise Edition \(p. 563\)](#)
- [Canceling Your Amazon QuickSight Subscription and Closing the Account \(p. 565\)](#)

Managing User Accounts in Amazon QuickSight Enterprise Edition

AWS administrators can use this topic to learn more about managing user accounts in Amazon QuickSight Enterprise edition. For information about managing user accounts in Amazon QuickSight Standard edition, see [Managing User Accounts in Amazon QuickSight Standard Edition \(p. 568\)](#).

In Enterprise edition, you can manage users through any of the following:

- Active Directory. You can add and remove Microsoft Active Directory directory groups to create and deactivate user accounts. You can access the directory groups directly or by using the AD Connector.
- Federated logins.
- Inviting users by email.

To do this, you must have both administrative privileges in Amazon QuickSight and also appropriate AWS permissions. For more information on the necessary AWS permissions, see [Setting Your IAM Policy \(p. 609\)](#). If you are using directory groups, you need to be a network administrator.

Each Amazon QuickSight Enterprise edition account can have an unlimited number of user accounts. User names that contain a semicolon (;) aren't supported.

Use the following procedures to add, view, and deactivate Amazon QuickSight Enterprise edition user accounts.

Important

You can't remap Amazon QuickSight users or groups from one identity store to another. For example, if you are migrating from an on-premises Active Directory to AWS Directory Service, or the other way around, you have to unsubscribe and resubscribe to Amazon QuickSight. This functionality applies because even if the user's aliases remain the same, the underlying identity data changes. To make the transition easier, request in advance that your users document all their Amazon QuickSight assets and settings before the migration.

Adding User Accounts

Whether you are using federated logins or inviting users by email or using Active Directory, an Amazon QuickSight administrator can directly add users to Amazon QuickSight. If you are using Microsoft Active Directory, you can also manage users through groups. You can create multiple user accounts at once by choosing one or more Active Directory groups to integrate with Amazon QuickSight. All users in the selected groups are authorized to sign in to Amazon QuickSight. You can also add user accounts individually by adding those users to Active Directory groups that are already integrated with Amazon QuickSight.

To see what groups are integrated with your Amazon QuickSight account, use the procedure in [Viewing User Account Details \(p. 554\)](#). For more information about adding a user to a Microsoft Active Directory directory group, see [Add Users and Groups \(Simple AD and Microsoft Active Directory\)](#). Or you can read more about how to [connect to a directory using AD Connector](#).

Users who are invited by email are notified how to sign in. Other users aren't automatically notified of their access to Amazon QuickSight. You or your assigned Amazon QuickSight administrator must provide users with your Amazon QuickSight account name, the sign-in URL (<https://quicksight.aws.amazon.com/>), and instructions to sign in.

Note

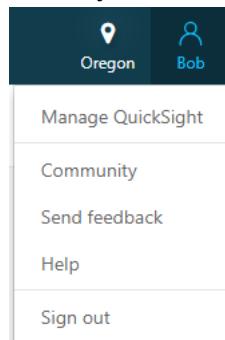
Although you can manage users through Active Directory groups or as AWS Identity and Access Management (IAM) users, you don't have to do it this way. You can instead choose to invite Amazon QuickSight-only users by email. Choose the **Manage Users** feature of the **Manage QuickSight** page, and enter an email address to invite someone to join your Amazon QuickSight account. Each user gets an email containing a link to Amazon QuickSight. Using the invitation link, the user can then set up a user name and password in Amazon QuickSight. Users can also request access through self-provisioning. For more information on requesting access, see [Provisioning Users for Amazon QuickSight \(p. 561\)](#).

Amazon QuickSight subscriptions based on Active Directory can only have users provisioned in Active Directory.

Viewing User Account Details

Use the following procedure to view the users or groups that are integrated with Amazon QuickSight.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



2. Choose **Manage Users**. On this screen, you can see which users were active this month. You can also see deleted users.
3. (Optional) If you are using Microsoft Active Directory and you have the correct administrative permissions, you can view the directory groups integrated with Amazon QuickSight.
Choose **Manage groups**.
4. (Optional) If you are managing groups, then enter your AWS or IAM credentials on the AWS sign-in page that appears.

Deactivating Active Directory User Accounts

Deactivating a group or user account removes that group or user's access to Amazon QuickSight resources, like analyses or data sets. However, it doesn't delete resources they own and it doesn't release their [SPICE \(p. 2\)](#) capacity. After deactivating a user, you can delete the user from your Amazon QuickSight account. When you delete a user, Amazon QuickSight gives you the option to either delete the user's resources or transfer their resources to another user.

To deactivate a user account individually, remove that user from all Microsoft Active Directory directory groups that are integrated with Amazon QuickSight. To view the groups integrated with your Amazon QuickSight account, use the procedure in [Viewing User Account Details \(p. 554\)](#).

If you later need to reactivate a user account, put the user into a group with access to Amazon QuickSight. This restores their access to Amazon QuickSight and to any existing resources that are still associated with that user account.

Note

You can't upgrade or downgrade a user by transferring them between groups. For more information, see [Updating Enterprise User Accounts \(p. 556\)](#).

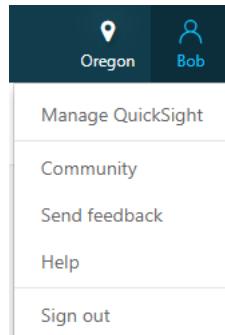
You can activate or deactivate multiple user accounts at once by adding or removing one or more Microsoft Active Directory directory groups from integration with Amazon QuickSight.

Important

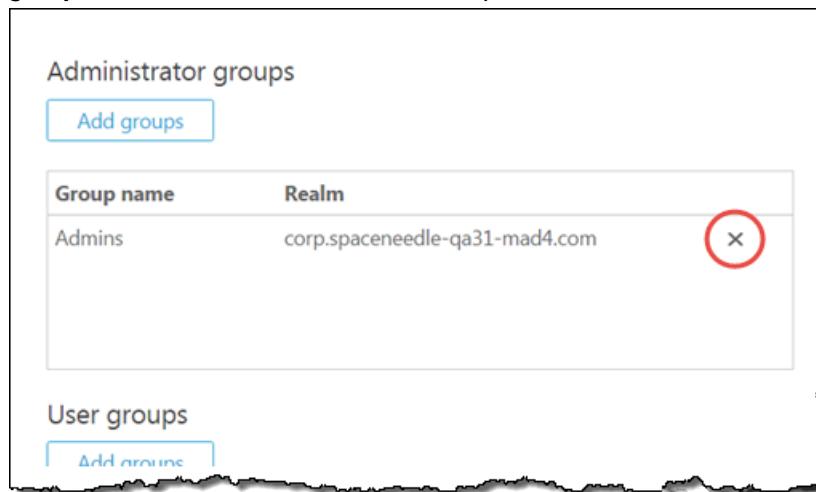
Removing all groups and users doesn't remove any resources and doesn't cancel your subscription to Amazon QuickSight.

Use the following procedure to remove a Microsoft Active Directory directory group from Amazon QuickSight.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.

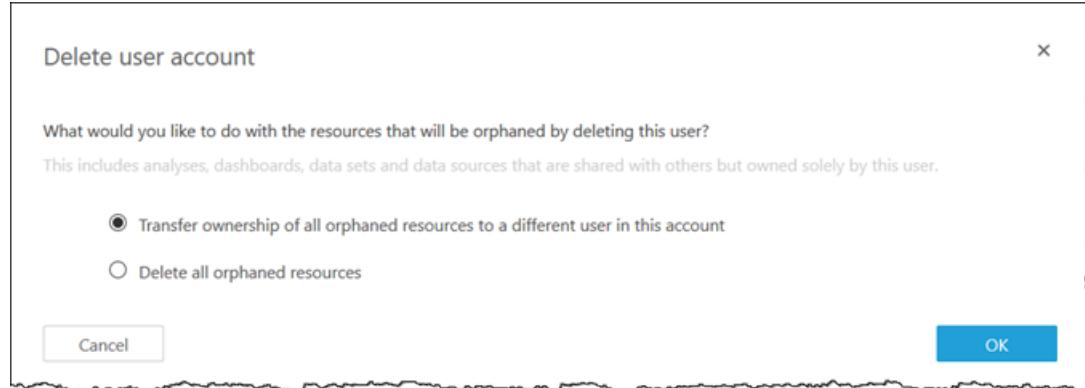


2. Choose **Manage Users**.
3. Choose **Manage groups**.
4. On the AWS sign-in page, enter your AWS or IAM credentials.
5. Locate the group that you want to remove under either the **Administrator groups** or the **User groups** section, and then choose the x-shaped delete icon.



6. In the **Manage users** screen, You can view each deactivated user in the **Deleted user** section. This is located beneath the **Active users this month** section.

To transfer the user's resources, click on the **Action "x"** button beside that user's name. You are prompted to decide what to do with resources owned solely by that user.



Choose one of the following:

- Transfer ownership of all orphaned resources to a different user in this account.
- Delete all orphaned resources. (This frees the user's [SPICE \(p. 2\)](#) capacity.)

Warning

You can't undo this action.



Whichever action you choose applies to all resources owned solely by that user. If you transfer the user's resources, Amazon QuickSight reassigned them to the user you choose. It doesn't make unnecessary duplicates of those resources.

Updating Enterprise User Accounts

You can upgrade or downgrade between author and admin users in the **Manage users** tab of the **Manage QuickSight** screen. If you are using directory groups, you can instead move a user into the appropriate group. To do this, you need both administrative privileges in Amazon QuickSight and also appropriate AWS permissions. Some limitations apply on upgrading or downgrading user access in this automated way.

To downgrade authors to the readers, you delete the users and then recreate them as readers. After you choose to remove a user, you are prompted to transfer or delete their assets. If you are using directory

groups, also move that user into the appropriate group. Just moving them into another group doesn't change their access the way it does for transfers between admin and author.

You can change a user's name by first creating a new user and then deleting the original user. By using this approach, you can transfer their assets directly back to them. If you are using a directory service, you can temporarily transfer their assets to a different user. Then, make your changes in Active Directory. The next time the user signs in to Amazon QuickSight, they are asked to create a new account. After they create the new account, the user possessing their assets can transfer all assets back to them.

When you make changes to users or groups in Amazon QuickSight, it can take up to five (5) minutes for the change to take effect, for example:

- deleting a user
- changing a user from an admin to an author
- adding or removing group members

The five minute time period allows changes to propagate throughout the system.

Deleting Enterprise User Accounts

Deleting a user account works the same way in both the Standard and Enterprise editions of Amazon QuickSight. User accounts can be deleted by an Amazon QuickSight administrator. To delete a user account, use the procedure in [Deleting a User Account \(p. 571\)](#).

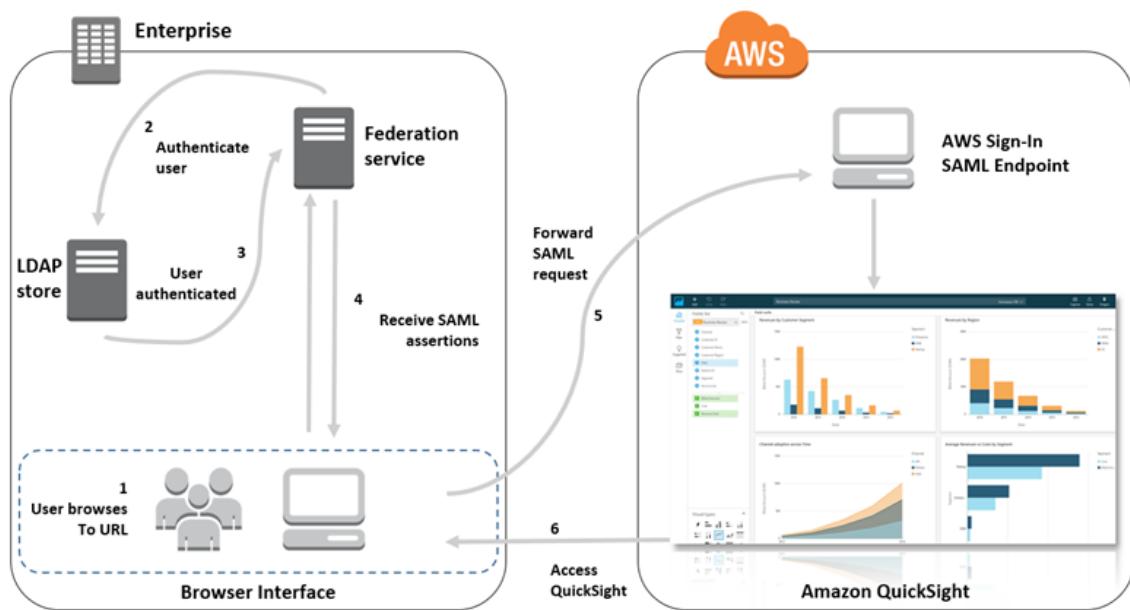
Enabling Single Sign-On Access to Amazon QuickSight Using SAML 2.0

Amazon QuickSight supports identity federation through Security Assertion Markup Language 2.0 (SAML 2.0) in both Standard and Enterprise editions. You can use an identity provider that supports SAML 2.0 to provide a simple on-boarding flow for your Amazon QuickSight users. Such identity providers include Microsoft Active Directory Federation Services, Ping One Federation Server, and Okta.

With identity federation, your users get one-click access to their Amazon QuickSight applications using their existing identity credentials. You also have the security benefit of identity authentication by your identity provider. You can control which users have access to Amazon QuickSight using your existing identity provider.

Example Authentication Workflow

In the following diagram, you can see a typical authentication flow between Amazon QuickSight and a third-party identity provider. In this example, the administrator has set up a sign-in page to access Amazon QuickSight, called `applications.exampleco.com`. The web page uses a federation service that complies with SAML 2.0 to trigger a sign-on request. The administrator has also set up a user to allow access to Amazon QuickSight.



In this authentication flow, the following happens:

1. The user browses to `https://applications.exampleco.com`. The sign-on page requests authentication for the user.
2. The federation service requests authentication from the organization's identity store.
3. The identity store authenticates the user and returns the authentication response to the federation service.
4. When authentication is successful, the federation service posts the SAML assertion to the user's browser.
5. The user's browser posts the SAML assertion to the AWS Sign-In SAML endpoint (`https://signin.aws.amazon.com/saml`). AWS Sign-In receives the SAML request, processes the request, authenticates the user, and forwards the authentication token to the Amazon QuickSight service.
6. Using the authentication token from AWS, Amazon QuickSight authorizes the user and presents applications to the browser.

From the user's perspective, the process happens transparently. The user starts at your organization's internal portal and lands at an Amazon QuickSight application portal, without ever having to supply any AWS credentials.

Setting Up SAML

You can use an AWS Identity and Access Management (IAM) role and a relay state URL to configure an identity provider (IdP) that is compliant with SAML 2.0. The role grants users permissions to access Amazon QuickSight. The relay state is the portal that the user is forwarded to, after successful authentication by AWS.

Topics

- [Prerequisites \(p. 559\)](#)
- [Step 1: Create a SAML Provider in AWS \(p. 559\)](#)
- [Step 2: Configure Permissions in AWS for Your Federated Users \(p. 559\)](#)

- [Step 3: Configure the SAML IdP \(p. 560\)](#)
- [Step 4: Create Assertions for the SAML Authentication Response \(p. 561\)](#)
- [Step 5: Configure the Relay State of Your Federation \(p. 561\)](#)

Prerequisites

Before configuring your SAML 2.0 connection, do the following:

- Configure your IdP to establish a trust relationship with AWS:
 - Inside your organization's network, configure your identity store, such as Windows Active Directory, to work with a SAML-based IdP. SAML-based IdPs include Microsoft Windows Active Directory Federation Services, Shibboleth, and so on.
 - Using your IdP, generate a metadata document that describes your organization as an identity provider.
 - Set up SAML 2.0 authentication, using the same steps as for the AWS Management Console. When this process is complete, you can configure your relay state to match the relay state of Amazon QuickSight (See [Step 5: Configure the Relay State of Your Federation \(p. 561\)](#)).
- Create an Amazon QuickSight account and note the name to use when you configure your IAM policy and IdP. For more information on creating an Amazon QuickSight account, see [Signing Up for Amazon QuickSight \(p. 548\)](#).

After you create the setup to federate to the AWS Management Console as outlined in the tutorial, you can edit the relay state provided in the tutorial. You do so with the relay state of Amazon QuickSight, described in step 5 following. For more information about integrating with your IdP or using SSO in AWS, see [Integrating Third-Party SAML Solution Providers with AWS](#) in the *IAM User Guide*.

Step 1: Create a SAML Provider in AWS

Your SAML identity provider defines your organization's IdP to AWS. It does so by using the metadata document you previously generated using your IdP.

To create a SAML provider in AWS

1. Sign in to the AWS Management Console and open the IAM console at <https://console.aws.amazon.com/iam/>.
2. Create a new SAML provider, which is an entity in IAM that holds information about your organization's identity provider. For more information, see [Creating SAML Identity Providers](#) in the *IAM User Guide*.
3. As part of this process, upload the metadata document produced by the IdP software in your organization noted in the previous section.

Step 2: Configure Permissions in AWS for Your Federated Users

Next, create an IAM role that establishes a trust relationship between IAM and your organization's IdP. This role identifies your IdP as a principal (trusted entity) for the purposes of federation. The role also defines which users authenticated by your organization's IdP are allowed to access Amazon QuickSight. For more information about creating a role for a SAML IdP, review [Creating a Role for SAML 2.0 Federation](#) in the *IAM User Guide*.

After you have created the role, you can limit the role to have permissions only to Amazon QuickSight by attaching an inline policy to the role. The following sample policy document provides access to Amazon QuickSight. This policy allows the user access to Amazon QuickSight and allows them to create both author accounts and reader accounts.

Note

In the following example, replace <YOUR_AWS_ACCOUNT_ID> with your 12-digit AWS account ID (with no hyphens '-').

```
{  
    "Statement": [  
        {  
            "Action": [  
                "quicksight:CreateUser"  
            ],  
            "Effect": "Allow",  
            "Resource": [  
                "arn:aws:quicksight::<YOUR_AWS_ACCOUNT_ID>:user/${aws:userid}"  
            ]  
        }  
    ],  
    "Version": "2012-10-17"  
}
```

If you want to provide access to Amazon QuickSight and also the ability to create Amazon QuickSight admins, authors (standard users), and readers, you can use the following policy example.

```
{  
    "Statement": [  
        {  
            "Action": [  
                "quicksight>CreateAdmin"  
            ],  
            "Effect": "Allow",  
            "Resource": [  
                "arn:aws:quicksight::<YOUR_AWS_ACCOUNT_ID>:user/${aws:userid}"  
            ]  
        }  
    ],  
    "Version": "2012-10-17"  
}
```

You can view account details in the AWS Management Console.

Once you have set up SAML and the IAM policy or policies, you don't need to invite users manually. The first time that users open Amazon QuickSight, they are provisioned automatically, using the highest level permissions in the policy. For example, if they have permissions to both `quicksight:CreateUser` and `quicksight:CreateReader`, they are provisioned as authors. If they also have permissions to `quicksight:CreateAdmin`, they are provisioned as admins. Each permission level includes the ability to create the same level user and below. For example, an author can add other authors or readers.

Users who are invited manually are created in the role assigned by the person who invited them. They don't need to have policies that grant them permissions.

Step 3: Configure the SAML IdP

After you create the IAM role, update your SAML IdP about AWS as a service provider. To do so, install the `saml-metadata.xml` file found at <https://signin.aws.amazon.com/static/saml-metadata.xml>.

To update the IdP metadata, see the instructions provided by your IdP. Some providers give you the option to type the URL, after which the IdP gets and installs the file for you. Others require you to download the file from the URL and then provide it as a local file.

For more information, see your IdP documentation.

Step 4: Create Assertions for the SAML Authentication Response

Next, configure the information that the IdP passes as SAML attributes to AWS as part of the authentication response. For more information, see [Configuring SAML Assertions for the Authentication Response](#) in the *IAM User Guide*.

Step 5: Configure the Relay State of Your Federation

Finally, you can configure the relay state of your federation to point to the Amazon QuickSight relay state URL. After successful authentication by AWS, the user is directed to Amazon QuickSight, defined as the relay state in the SAML authentication response.

The relay state URL for Amazon QuickSight is:

`https://quicksight.aws.amazon.com`

Provisioning Users for Amazon QuickSight

Self-Provisioning an Amazon QuickSight Administrator

Amazon QuickSight administrators are users who can also manage Amazon QuickSight features such as account settings and user accounts. They can also purchase additional Amazon QuickSight user subscriptions, purchase [SPICE \(p. 2\)](#) capacity, and cancel the subscription to Amazon QuickSight for your AWS account.

You can use an AWS user or group policy to give users the ability to add themselves as administrators of Amazon QuickSight. Their accounts become active and billable the first time that they open Amazon QuickSight. To set up self-provisioning, you need to give them permission to use the `quicksight:CreateAdmin` action. For more information about using AWS Identity and Access Management (IAM), see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

Alternatively, you can use the following procedure to use the console to set or create the administrator for Amazon QuickSight.

To make a user the Amazon QuickSight administrator

1. Create the AWS user:
 - Use IAM to create the user that you want to be the administrator of Amazon QuickSight. Alternatively, identify an existing user in IAM for the administrator role. You can also put the user inside a new group, for manageability.
 - Grant the user (or group) sufficient permissions, as described in [Setting Your IAM Policy \(p. 609\)](#).

For more information on working with IAM, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

2. Sign in to your AWS Management Console with the target user's credentials.
3. Go to <http://quicksight.aws.amazon.com/sn/console/get-user-email>, type in the target user's email address, and choose **Continue**.

On success, the target IAM user is now an administrator in Amazon QuickSight.

Self-Provisioning an Amazon QuickSight Author

Amazon QuickSight authors can create data sources, data sets, analyses, and dashboards. They can share analyses and dashboards with other Amazon QuickSight users in your Amazon QuickSight account.

However, they don't have access to the **Manage QuickSight** menu. They can't change account settings, manage user accounts, purchase additional Amazon QuickSight user subscriptions or [SPICE \(p. 2\)](#) capacity, or cancel the subscription to Amazon QuickSight for your AWS account.

You can use an AWS user or group policy to give users the ability to create an Amazon QuickSight author account for themselves. Their accounts become active and billable the first time they open Amazon QuickSight. To set up self-provisioning, you need to give them permission to use the `quicksight:CreateUser` action. For more information about using IAM, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

Self-Provisioning an Amazon QuickSight Read-Only User

Amazon QuickSight read-only users or *readers* can view and manipulate dashboards that are shared with them, but they can't make any changes or save a dashboard for further analysis. Amazon QuickSight readers can't create data sources, data sets, analyses, or visuals. They can't do any administrative tasks. Choose this role for people who are consumers of the dashboards but don't author their own analysis, for example, executives.

If you are using Microsoft Active Directory with Amazon QuickSight, you can manage read-only permissions by using a group. Otherwise, you can bulk-invite users to use Amazon QuickSight. You can also use an AWS user or group policy to give people the ability to create an Amazon QuickSight reader account for themselves.

Reader accounts become active and billable the first time they open Amazon QuickSight. If you decide to upgrade or downgrade a user, billing for that user is pro-rated for the month. To set up self-provisioning, you need to give them permission to use the `quicksight:CreateReader` action. For more information about using IAM, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

Using Multi-Factor Authentication (MFA) with Amazon QuickSight

You can use multi-factor authentication (MFA) with Amazon QuickSight by using your [AWS Directory Service](#) for Microsoft Active Directory, also known as AWS Microsoft Active Directory or AWS Managed Microsoft Active Directory.

For more information on how to set this up, see [How to Enable Multi-Factor Authentication for AWS Services by Using AWS Microsoft Active Directory and On-Premises Credentials](#)

For more information on multi-factor authentication, see [Multi-Factor Authentication](#) in the AWS Directory Service Administration Guide.

Adding Domains for Embedded Dashboard Users

In Amazon QuickSight Enterprise edition, you can embed dashboards in an app or webpage. The domain that is going to host embedded dashboards must be on the *allowlist*, the list of approved domains for your Amazon QuickSight subscription. This requirement protects your data by keeping unapproved domains from hosting embedded dashboards.

You can only embed dashboards after you perform the following steps:

- Approve the hosting domains and subdomains for embedding.
- Publish the dashboard.
- Share the dashboard with users or groups so they can see the embedded version of it.

Use the following procedure to view or edit the list of approved domains.

1. Choose the profile icon at top right.
2. Choose **Manage QuickSight**. You must be an Amazon QuickSight admin to access this screen.
3. Choose **Domains and Embedding** on the left. The domains that you can embed a dashboard in are listed at the bottom of the page.
4. (Optional) You can add a new domain here by entering it in the **Domain** box. You can also choose **Include subdomains** to allow embedded dashboards on all subdomains. Choose **Add** to add the domain.

You can edit or delete existing domain by choosing the icons next to each domain in the list at the bottom of the page.

Make sure that you use a valid https URL. The following list shows examples of URLs that are valid for embedded dashboards:

- <https://example-1.com>
- <https://www.アマゾンドメイン.jp>
- <https://www.亚马逊域名.cn:1234>
- <https://111.222.33.44:1234>
- <https://111.222.33.44>

The following list shows examples of URLs that are *not* valid for embedded dashboards:

- <http://example>
- https://example.com.*.example-1.co.uk
- <https://co.uk>
- <https://111.222.33.44.55:1234>
- <https://111.222.33.44.55>

For more information about embedded dashboards, see [Embedding Amazon QuickSight Dashboards \(p. 510\)](#).

Upgrading Your Amazon QuickSight Subscription from Standard Edition to Enterprise Edition

You can upgrade from Amazon QuickSight Standard edition to Amazon QuickSight Enterprise edition. In Enterprise edition, Amazon QuickSight supports the following additional features:

- Active directory integration
- Encryption for data at REST
- Pay-per-session pricing for users in the reader role
- Row-level security
- Hourly refresh of datasets
- Private connections to data in a VPC with a private subnet

To see a full comparison of Standard edition with Enterprise edition, see [Amazon QuickSight Editions](#).

When you upgrade your account, your admins and authors are billed at the Amazon QuickSight Enterprise edition rates. For up-to-date information on rates, see [Pricing](#). To enjoy pay-per-session pricing, you can add additional users as readers. Before you reprovision existing users as readers, transfer or delete their resources, and then delete the users from your subscription.

Users who are in the reader role can view and manipulate shared dashboards, and receive emailed updates. However, readers can't add or change data sources, data sets, analyses, visuals, or administrative settings. Billing for readers is significantly lower in cost than regular user pricing. It's based on 30-minute sessions, and it's capped at a maximum amount per month for each reader. Billing for upgrades is pro-rated for the month of the upgrade. Upgrades to users are also pro-rated. If you have an annual subscription to Standard edition, it's converted to Enterprise edition and stays in place for the remaining term.

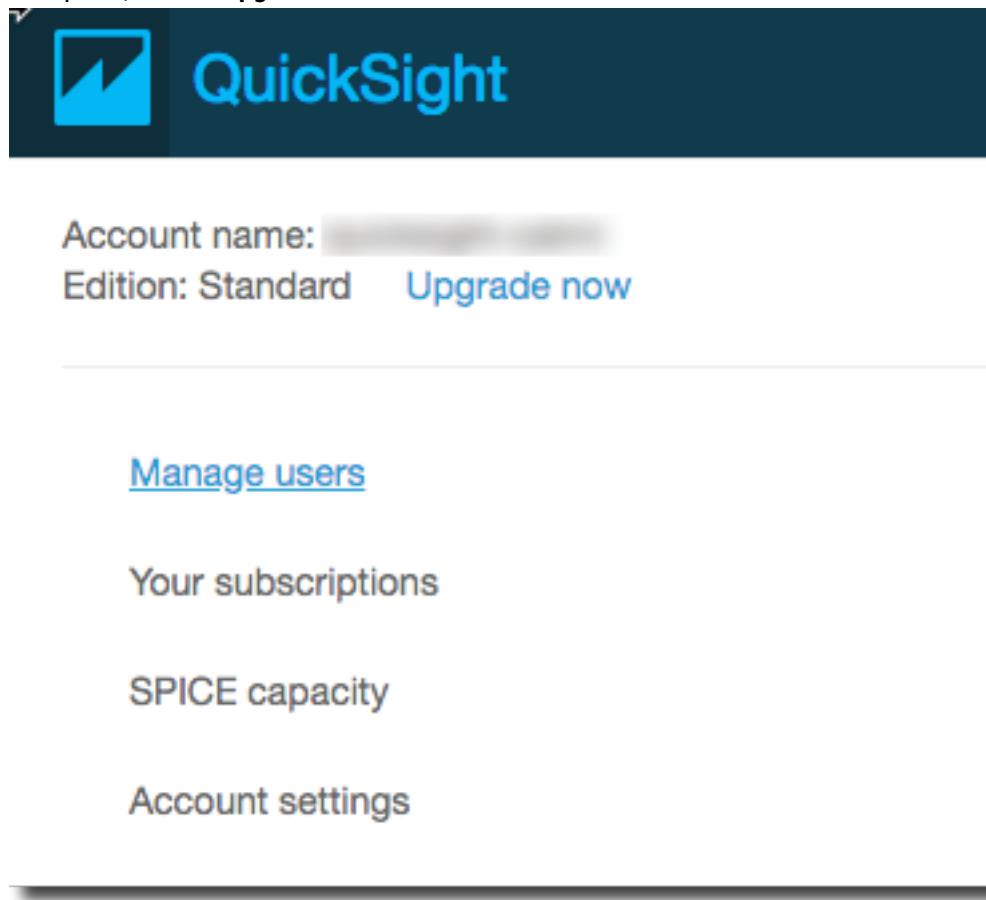
Warning

Downgrading from Enterprise edition to Standard edition isn't currently possible due to the enhanced feature set available in Enterprise edition. To perform this downgrade, unsubscribe from Amazon QuickSight, and then start a new subscription. It isn't possible to transfer users or assets between subscriptions.

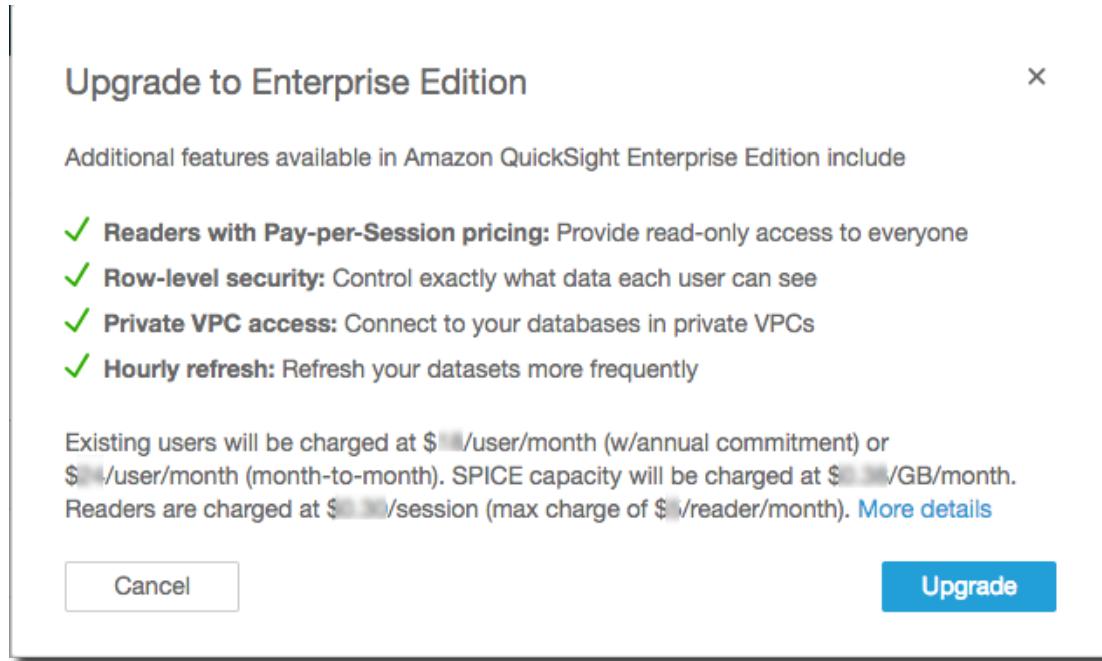
Upgrading to Enterprise edition to use Active Directory connectivity isn't supported due to differences in the user identity mechanisms between Amazon QuickSight password-based users and existing Active Directory users. However, you can upgrade to Enterprise, and still use password-based users. If you want to upgrade, and change how users sign in, you can unsubscribe and start a new subscription.

Use the following procedure to upgrade to Enterprise edition. To perform the upgrade, you need administrative access to Amazon QuickSight, with security permissions to subscribe. The person performing the upgrade is usually an AWS administrator who is also an Amazon QuickSight administrator.

1. Open the administrative settings page by clicking on your profile icon at top right.
2. At top left, choose **Upgrade now**.



The following screen appears. For the latest prices, see <https://aws.amazon.com/quicksight/>.



3. Be sure that you want to upgrade.

Important

You can't undo this action.

Choose **Upgrade** to upgrade. The upgrade is instantaneous.

Billing for the upgrade to your subscription is pro-rated for the month of upgrade. Upgrades to Amazon QuickSight users are also pro-rated.

4. When you upgrade to Enterprise edition, your admin and author users retain their roles. You can downgrade users to readers. First make sure to transfer any assets they own that you want to keep. Then, delete them and add them back to your subscription as readers. If you are using Active Directory, delete the authors, move them to the new reader group, then recreate them as readers in Amazon QuickSight.

Canceling Your Amazon QuickSight Subscription and Closing the Account

If you want to close your Amazon QuickSight account, you can unsubscribe from the service. To unsubscribe, you must be signed in using the IAM account or AWS root account that was used to create your Amazon QuickSight account.

Use the following procedure to unsubscribe from Amazon QuickSight.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.
2. Choose **Account settings**.
3. Choose **Unsubscribe**.
4. (For Amazon QuickSight Enterprise edition accounts only) On the AWS sign-in page, enter your AWS or IAM credentials.

5. **Note**

This step applies only to early adopters of Amazon QuickSight. Amazon QuickSight accounts created after the preview period don't see these options.

(Optional) If you prefer to use the AWS Management Console to manually delete the Simple AD directory or VPC that Amazon QuickSight used for user management, deselect to uncheck **Delete Simple AD directory** or **Delete VPC**.

However, we strongly recommend leaving these selected (checked) so that these resources are automatically removed.

Unsubscribe from QuickSight

QuickSight account name 

By unsubscribing you will be deleting all content related to this account including:

- Data sources
- Data sets
- Analyses
- Published dashboards

Delete your Directory and VPC?

- Delete Simple AD directory**
Delete the directory used to manage QuickSight users
- Delete VPC**
Delete the VPC used by the QuickSight directory

[Cancel](#)

[Unsubscribe](#)

6. Choose **Unsubscribe**.

Unsubscribe from QuickSight

QuickSight account name



By unsubscribing you will be deleting all content related to this account including:

- Data sources
 - Data sets
 - Analyses
 - Published dashboards
-

[Cancel](#)

[Unsubscribe](#)

Note

If you need to delete your Amazon QuickSight account, even when you can't access Amazon QuickSight to unsubscribe, sign in to AWS and use the following link to open [the unsubscribe screen](#): <https://us-east-1.quicksight.aws.amazon.com/sn/console/unsubscribe>. This approach works no matter what AWS Regions you use. It deletes all data, analyses, Amazon QuickSight users, and Amazon QuickSight administrators. If you have difficulties, contact AWS Support.

Unsubscribing deletes all users, data, and assets (for example, data sets, data sources, queries, dashboards, analyses, settings, and so on). You can't undo this action. However, after your account is unsubscribed, you can create a new Amazon QuickSight account using any edition and user authorization method.

Closing your Amazon QuickSight account, also called unsubscribing, doesn't close your AWS account. If you also want to close the associated AWS account, see [Closing an AWS Account](#).

Managing User Access Inside Amazon QuickSight

Amazon QuickSight administrators can use the following topics to manage user access to Amazon QuickSight and Amazon QuickSight access to AWS resources.

Topics

- [Managing User Accounts in Amazon QuickSight Standard Edition \(p. 568\)](#)
- [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 568\)](#)
- [Inviting Users to Access Amazon QuickSight \(p. 568\)](#)
- [Viewing Amazon QuickSight User Account Details \(p. 571\)](#)
- [Deleting a User Account \(p. 571\)](#)

Managing User Accounts in Amazon QuickSight Standard Edition

Use this topic to learn more about managing user accounts in Amazon QuickSight Standard edition. For information on users in Enterprise edition, see [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 553\)](#).

If you have administrative privileges in Amazon QuickSight, you can create and delete user accounts. You can create user accounts based on AWS Identity and Access Management (IAM) credentials, or you can create Amazon QuickSight–only user accounts using the email address of the user.

You can't create Amazon QuickSight user accounts using AWS credentials that aren't IAM credentials. Federated logins work through IAM roles. User names that contain a semicolon (;) aren't supported.

Each Amazon QuickSight Standard edition account can have up to 100 user accounts, including the AWS root account or IAM account that created the Amazon QuickSight account. If you need an exception to this limit, follow the instructions in [AWS Service Limits](#) in the *AWS General Reference* to submit a limit increase request.

Note

Currently, emails are case-sensitive.

Managing User Accounts in Amazon QuickSight Enterprise Edition

Use this topic to learn more about managing user accounts in Amazon QuickSight Enterprise edition. For information about users in Standard edition, see [Managing User Accounts in Amazon QuickSight Standard Edition \(p. 568\)](#).

In Enterprise edition, you can manage users through any one of the following:

- Active Directory users and groups
- Federated logins
- Inviting users by email

In Active Directory, individual users are created or deactivated when a network administrator adds or removes them from the directory group. If you are downgrading users to the reader role, you can delete and recreate them in Amazon QuickSight. Deactivating groups or users removes their access to Amazon QuickSight resources. However, it doesn't delete the user's subscription or any resources they own. Note that removing all groups from Amazon QuickSight doesn't remove any resources and doesn't unsubscribe you from Amazon QuickSight.

For instructions on managing user access in Enterprise edition, see [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 553\)](#).

Inviting Users to Access Amazon QuickSight

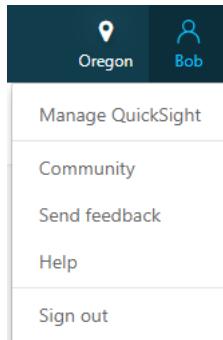
In Standard edition, and in Enterprise edition using SSO, you can invite any person with a valid email address to use Amazon QuickSight. When they sign up, a new Amazon QuickSight–only user account is created for them. You can also invite IAM users in your AWS account to use Amazon QuickSight. In this case, they can use their IAM credentials to sign in to Amazon QuickSight. Any IAM user you invite must have a password associated with their IAM credentials, and you must also have an email address for them.

User accounts are created in two steps. First, you invite a user to join Amazon QuickSight. Doing this creates an inactive user account in Amazon QuickSight, and sends an invitation email to the user. When the user accepts the invitation and signs in for the first time, the user creates a password to activate the user account.

For information about signing in for the first time, see [Signing In to Amazon QuickSight \(p. 19\)](#).

Use the following procedure to invite a user to access Amazon QuickSight.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



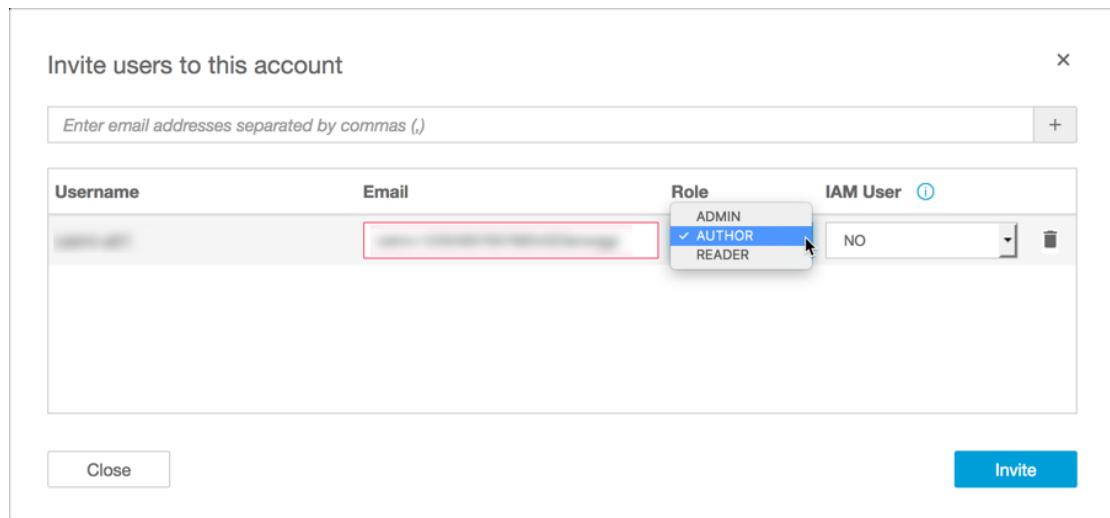
2. Choose **Manage Users**. In this screen, you can manage users who already exist in your account.

A screenshot of the 'Manage Users' screen in Amazon QuickSight. The top navigation bar shows the account name 'qsdocs' and edition 'Standard' with an 'Upgrade now' button. On the left, there are links for 'Manage users', 'Your subscriptions', 'SPICE capacity', and 'Account settings'. The main area has a heading 'Manage Users' with a 'Invite users' button. There is a search bar 'Search for a user' and a dropdown for 'Show all roles'. A table lists users with columns for 'Username', 'Email', 'Role', 'Status', and 'Action'. One user is listed: 'Username' (redacted), 'Email' (redacted), 'Role' (ADMIN), 'Status' (ACTIVE), and 'Action' (button).

3. Choose **Invite users**.

4. In the **Invite users to this account** screen, enter a new user name for a person to whom you want to grant access to Amazon QuickSight. If the user is an IAM user, enter their IAM user name. Then press **+**. A user's IAM user name can be the same as their email address.

Repeat this step until you have entered everyone you want to invite. Then proceed to the next step to enter details.



5. For **Email**, type an email address for the user account. If your company uses single sign-on (SSO), the user's email domain must match yours.

Note

Currently, emails are case-sensitive.

6. For **Role**, choose the role to assign to each person you are inviting. A *role* determines the permission level to grant to that user account.

- Choose **ADMIN** if you want the user to be able to both use Amazon QuickSight for authoring and for performing administrative tasks like managing users or purchasing [SPICE \(p. 2\)](#) capacity.

There are some differences in what administrative tasks IAM admin users and that Amazon QuickSight admin users can perform, because some administrative tasks require permissions in AWS, which Amazon QuickSight-only users lack.

- Admin users can manage users, [SPICE \(p. 2\)](#) capacity, and subscriptions.
- Admin users who are also IAM admin users can also manage users, SPICE capacity, and subscriptions. In addition, they can manage Amazon QuickSight permissions to AWS resources, upgrade to Enterprise edition, and unsubscribe from Amazon QuickSight.

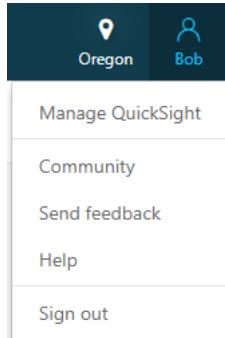
If you want to create an admin user with IAM admin access, check with your AWS administrator and make sure that the IAM user has the all necessary statements in their IAM permissions policy to work with Amazon QuickSight resources. For more information about what statements are required, see [Setting Your IAM Policy \(p. 609\)](#).

- Choose **AUTHOR** if you want the user to author analyses and dashboards in Amazon QuickSight but not perform any administrative tasks.
 - In Enterprise edition, you can choose **READER** if you want the user to be able to interact with shared dashboards, but not author analyses and dashboards, or perform any administrative tasks.
7. For **IAM User**, verify that it says **Yes** for accounts that are associated with IAM users, and **No** for those that are Amazon QuickSight-only.
 8. (Optional) To delete a user, choose the delete icon at the end of the relevant row.
 9. Choose **Invite**.

Resend an Invitation to a User

The sign-up URL in the invitation email expires after 24 hours. Use the following procedure if you need to resend an invitation to someone.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.

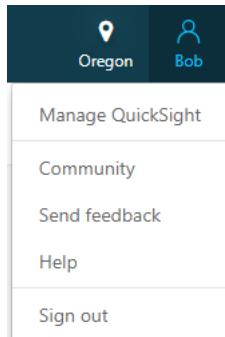


2. Choose **Manage Users**.
3. Find the entry for the person you want to re-invite, and choose **Resend invitation** for that user.
4. Choose **Confirm**.

Viewing Amazon QuickSight User Account Details

You can view Amazon QuickSight user accounts on the **Manage Users** page. Use the following procedure to view a user account.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



2. Choose **Manage Users**.
3. Type a search term for **Search for a user** to search for a specific user account. Any user name or email address that starts with the search term is shown. Search is case-insensitive and wildcards aren't supported. To clear the search results and view all user accounts, delete the search term.
4. Review the user name, email, assigned role, and status. The status field shows either **ACTIVE** or **INACTIVE** to indicate whether or not the user has responded to the invitation email and activated an account.

Deleting a User Account

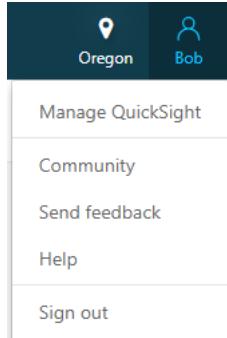
User accounts can be deleted by either an AWS administrator or an Amazon QuickSight administrator. Deleting a user account works the same in both the Standard and Enterprise editions of Amazon QuickSight.

Deleting a user account removes or transfers their resources. In Enterprise edition, the network administrator can temporarily deactivate a user account by removing it from the network group that has access to Amazon QuickSight. If a user is deleted, but not deactivated, that user can still access

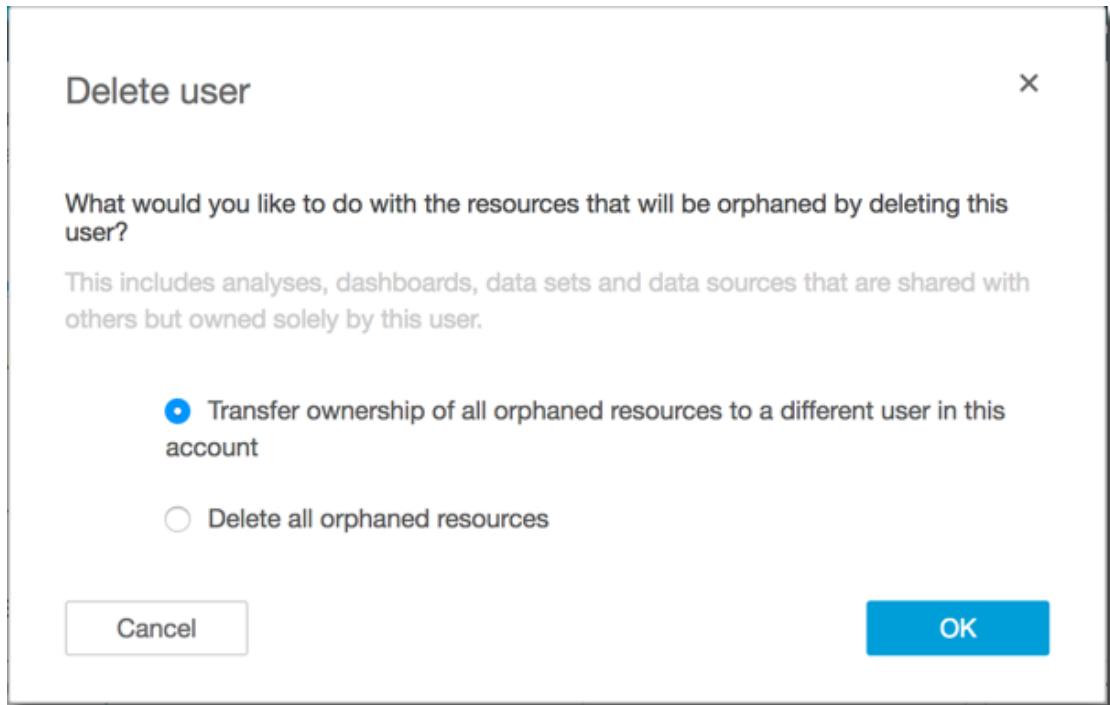
Amazon QuickSight as a new user. For more information about deactivating an Enterprise user account, see [Deactivating Active Directory User Accounts \(p. 554\)](#).

Use the following procedure to delete a user account.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.

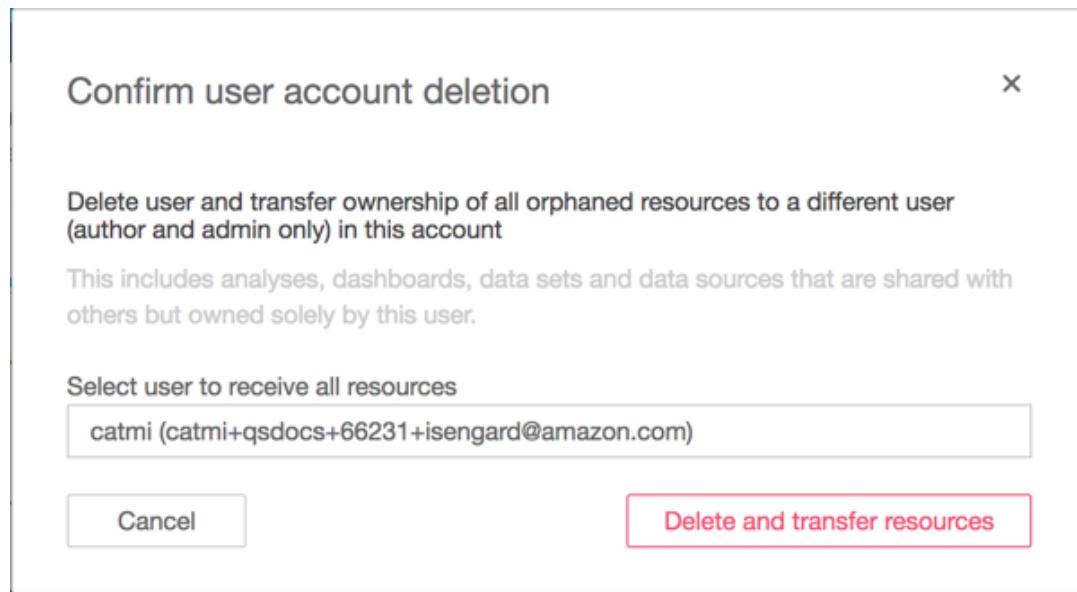


2. Choose **Manage Users**.
3. Locate the user account you want to delete and then choose the delete icon at the end of that row.
4. Choose to either delete or transfer any resources owned by the user and then choose **OK**.

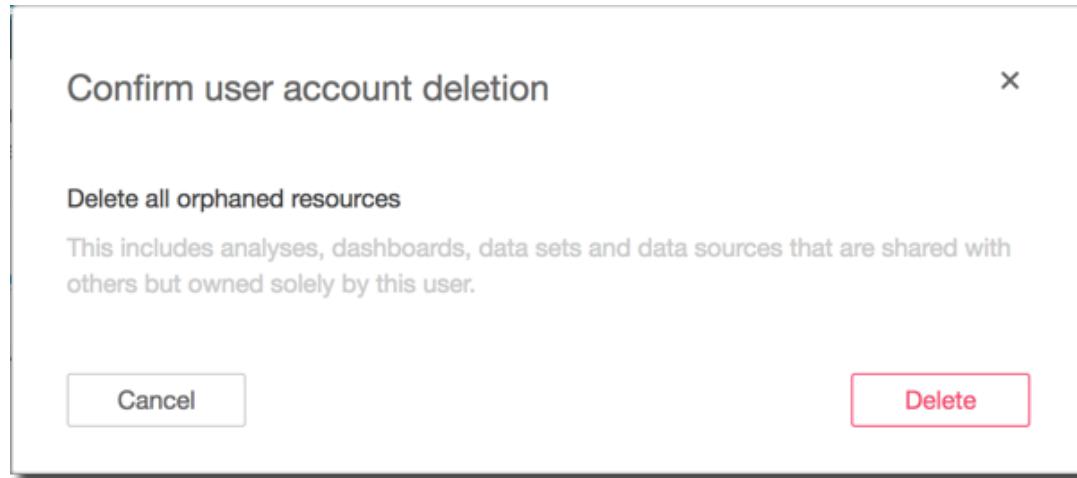


5. Do one of the following:

- If you chose to transfer user resources, type the user name of the account to transfer them to and then choose **Delete and transfer resources**.



- If you chose to delete user resources, choose **Delete**. You can't undo this action.



Managing Amazon QuickSight Usage

If your Amazon QuickSight user account has administrative privileges, you can manage user account subscriptions and [SPICE \(p. 2\)](#) capacity.

Use the following topics to manage subscriptions and SPICE capacity.

Topics

- [Managing Subscriptions \(p. 574\)](#)
- [Managing SPICE Capacity \(p. 583\)](#)

Managing Subscriptions

You can purchase standard user subscriptions to get discounted pricing on Amazon QuickSight. When you create an Amazon QuickSight account, you automatically get one free user account. When you invite additional users to Amazon QuickSight, you are charged for those user accounts on a month-by-month basis. If you have Enterprise edition, you have the option to take advantage of pay-per-session pricing for reader accounts. These are users who only view data dashboards, and don't need author or admin access. When you purchase a subscription, you pay for a user account on an annual rather than monthly basis, and receive a discounted price in return for the extended time commitment. For more information about pricing, see [Amazon QuickSight](#).

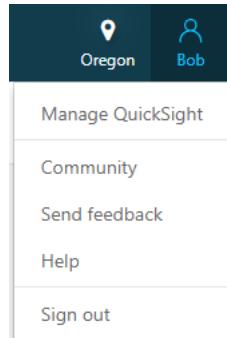
When you purchase a set of standard user subscriptions, you choose the number of user accounts you want to cover. You also choose when the subscriptions should start (any time from the month following the current month, to one year in the future) and whether the subscriptions autorenew. All subscriptions that you purchase together must use the same values for these settings.

You can edit an existing set of user subscriptions to change whether it autorenews. If the set is not yet active, you can also change the number of subscriptions it covers, or delete it entirely.

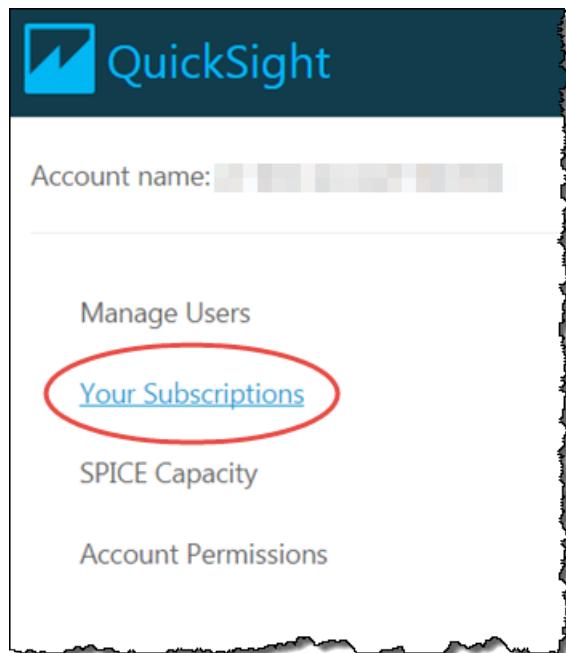
View Current Subscriptions

Use the following procedure to view your current user subscriptions.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



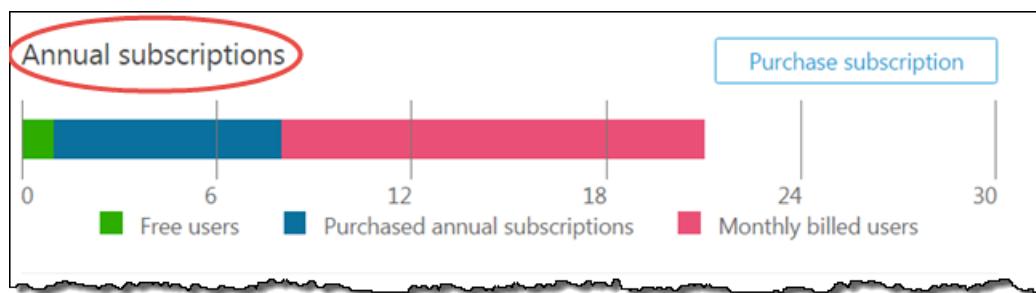
2. Choose **Your Subscriptions**.



3. Use the subscription meter to see how many user accounts you have and how they are billed. The types of user accounts shown are as follows:
 - Free users: This is the free user you receive as a standard part of your Amazon QuickSight account.
 - Purchased annual subscriptions: These are users covered by purchased subscriptions rather than billed month-to-month.
 - Monthly billed users: These are users that are billed month-to-month.

In the following example, the account has 21 users total:

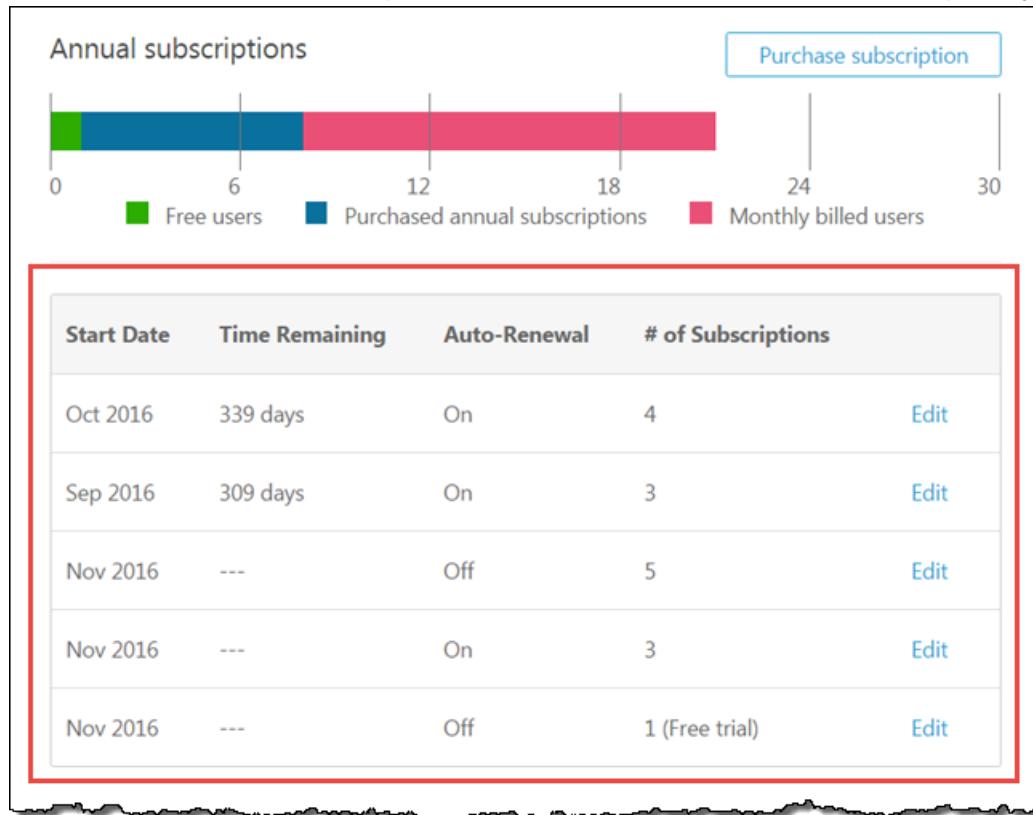
- 1 free user.
- 7 users with annual subscriptions. Only currently active subscriptions are shown here.
- 13 month-to-month users.



Hover over any section of the meter to get details on that user segment.



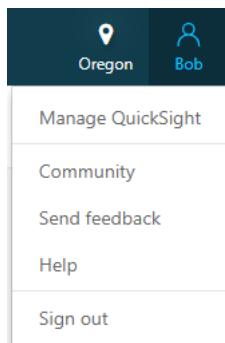
4. Use the information in the subscriptions table to see what current and future subscriptions you have.



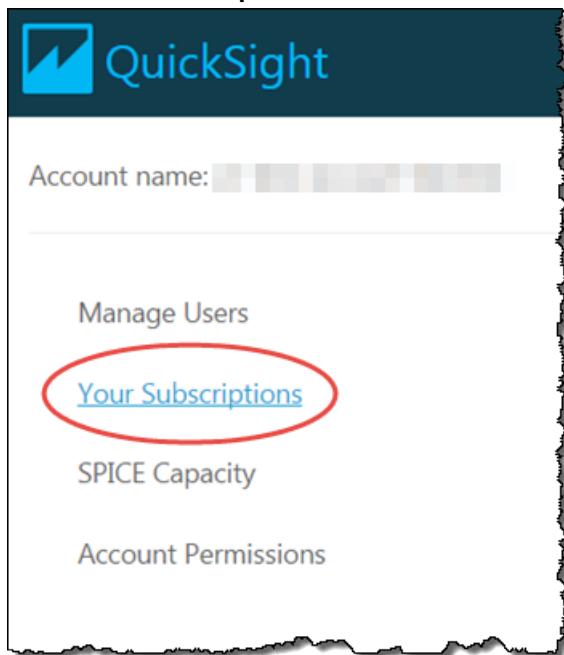
Purchase Subscriptions

Use the following procedure to purchase subscriptions.

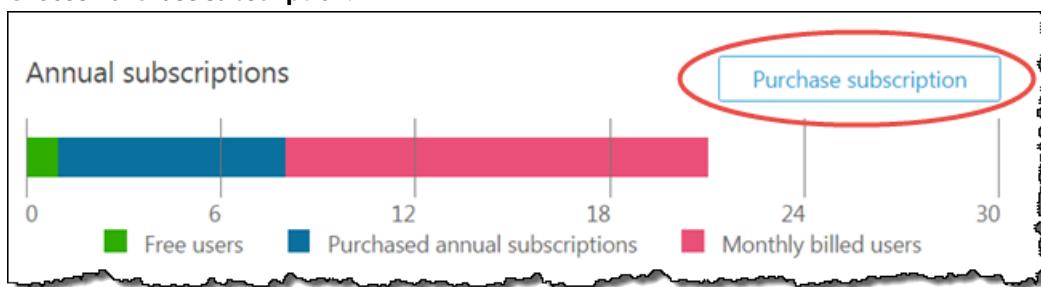
1. Choose your user name on the application bar and then choose **Manage QuickSight**.



2. Choose Your Subscriptions.



3. Choose Purchase subscription.



4. Choose or enter the number of subscriptions you want.

Purchase annual commitment

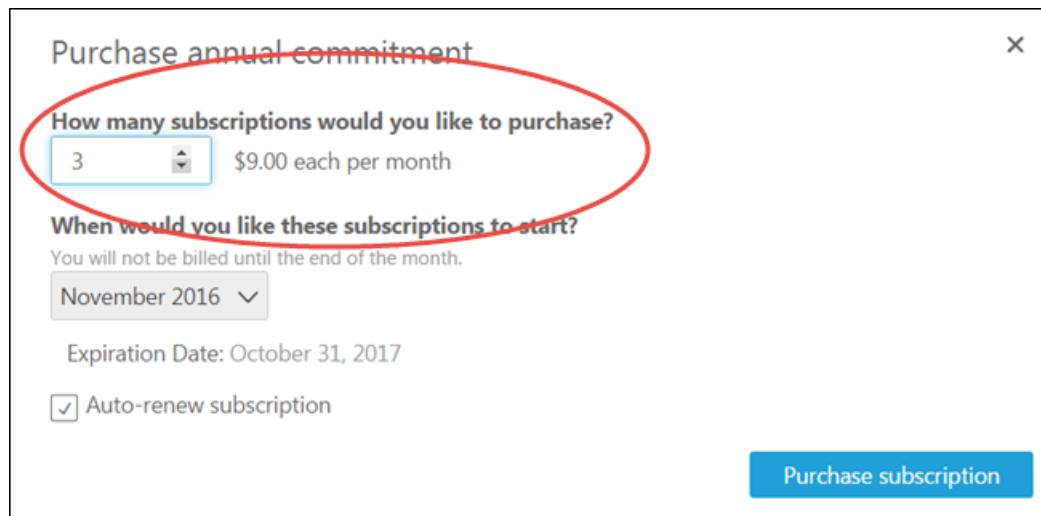
How many subscriptions would you like to purchase?
3 \$9.00 each per month

When would you like these subscriptions to start?
You will not be billed until the end of the month.
November 2016 ▾

Expiration Date: October 31, 2017

Auto-renew subscription

Purchase subscription



5. Choose the month and year when the subscriptions will start.

Purchase annual commitment

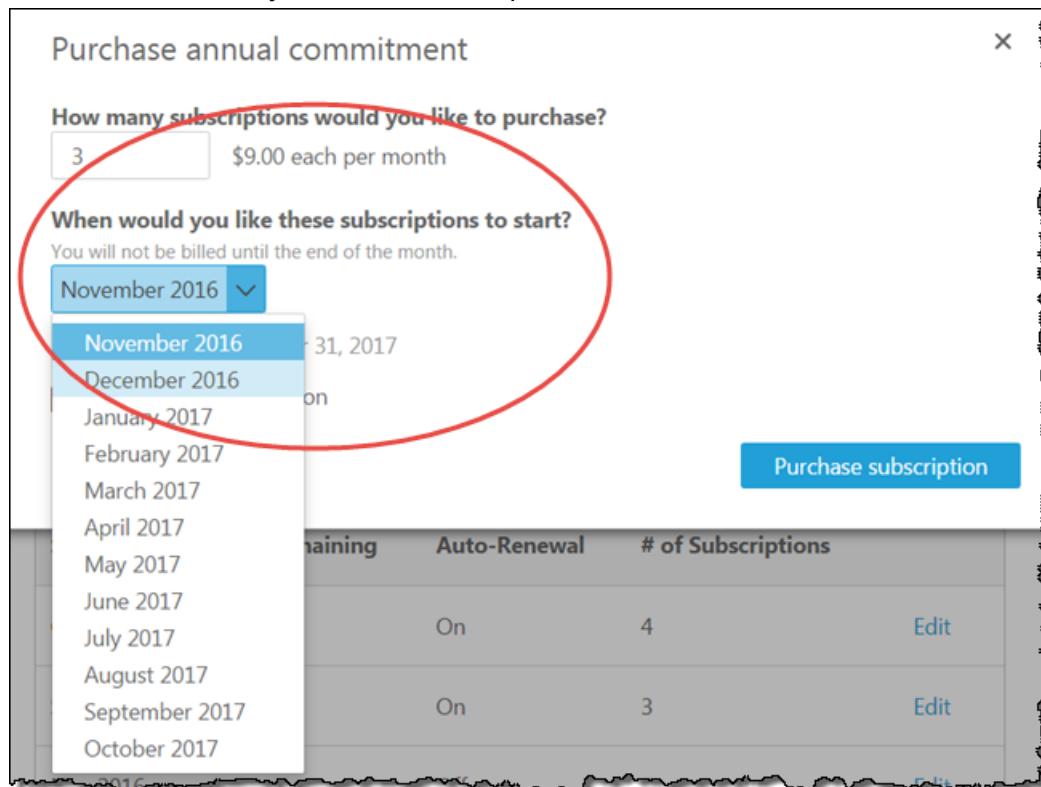
How many subscriptions would you like to purchase?
3 \$9.00 each per month

When would you like these subscriptions to start?
You will not be billed until the end of the month.
November 2016 ▾

Expiration Date: November 31, 2017

Auto-renew subscription

| Subscription Name | Auto-Renewal | # of Subscriptions | Action |
|-------------------|--------------|--------------------|--------|
| Subscription 1 | On | 4 | Edit |
| Subscription 2 | On | 3 | Edit |



6. Choose whether the subscriptions autorenew.

Purchase annual commitment X

How many subscriptions would you like to purchase?
 \$9.00 each per month

When would you like these subscriptions to start?
You will not be billed until the end of the month.
 ▾

Expiration Date: November 30, 2017

Auto-renew subscription

Purchase subscription

7. Choose **Purchase subscription**.

Purchase annual commitment X

How many subscriptions would you like to purchase?
 \$9.00 each per month

When would you like these subscriptions to start?
You will not be billed until the end of the month.
 ▾

Expiration Date: November 30, 2017

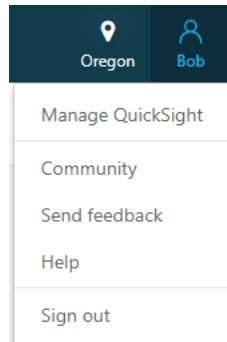
Auto-renew subscription

Purchase subscription

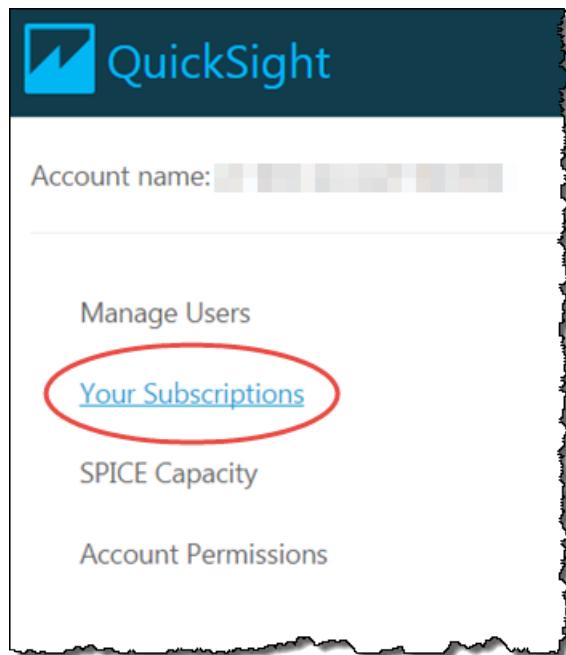
Edit Subscriptions

Use the following procedure to edit subscriptions.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



2. Choose **Your Subscriptions**.



3. Next to the set of subscriptions you want to change, choose **Edit**.

| Start Date | Time Remaining | Auto-Renewal | # of Subscriptions | |
|------------|----------------|--------------|--------------------|----------------------|
| Dec 2016 | --- | On | 3 | Edit |
| Oct 2016 | 339 days | On | 4 | Edit |

4. (Optional) If the subscriptions haven't started yet, change the number of subscriptions you want.

Edit annual commitment

Order ID:
16967e70-7a05-411b-b3bb-80f79b5965d6

How many subscriptions would you like to purchase?
 \$9.00 each per month

Start Date:
December 1, 2016

Expiration Date:
November 30, 2017

Auto-renew subscription

[Delete Subscription](#) [Save changes](#)

5. Choose whether the subscriptions autorenew.

Edit annual commitment ×

Order ID:
16967e70-7a05-411b-b3bb-80f79b5965d6

How many subscriptions would you like to purchase?
 \$9.00 each per month

Start Date:
December 1, 2016
Expiration Date:
November 30, 2017

Auto-renew subscription

Delete Subscription Save changes

6. Choose **Save changes**.

Edit annual commitment ×

Order ID:
16967e70-7a05-411b-b3bb-80f79b5965d6

How many subscriptions would you like to purchase?
 \$9.00 each per month

Start Date:
December 1, 2016
Expiration Date:
November 30, 2017

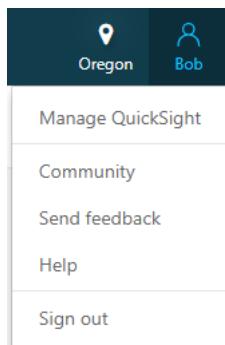
Auto-renew subscription

Delete Subscription Save changes

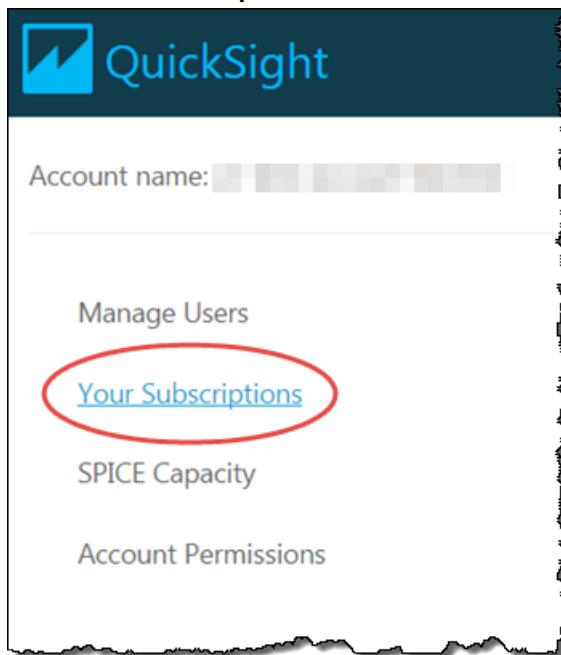
Delete Subscriptions

Use the following procedure to delete subscriptions. You can only delete subscriptions that haven't started yet.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.



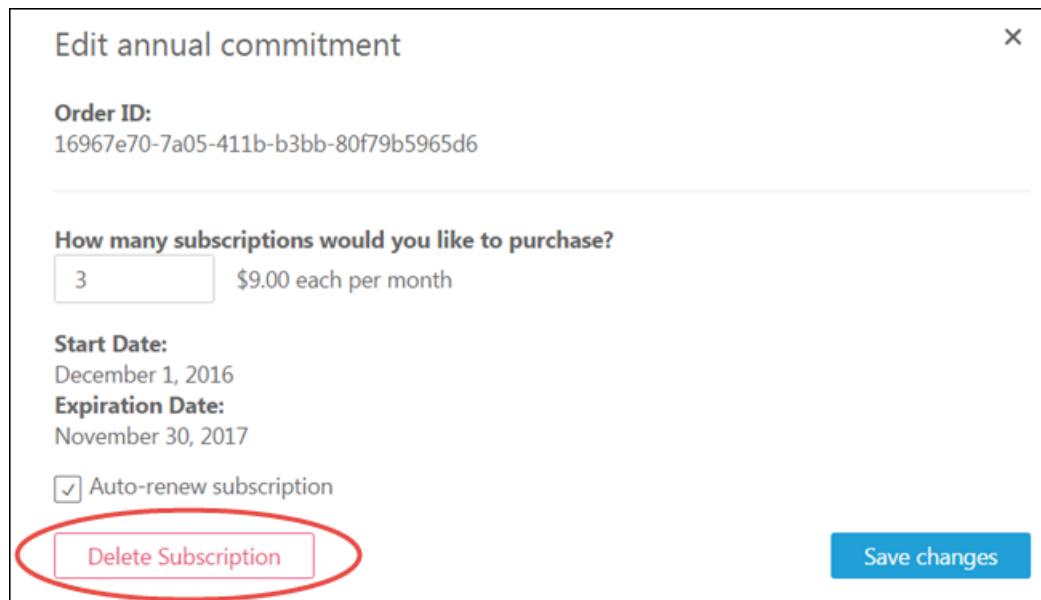
2. Choose **Your Subscriptions**.



3. Next to the set of subscriptions you want to delete, choose **Edit**.

| Start Date | Time Remaining | Auto-Renewal | # of Subscriptions | |
|------------|----------------|--------------|--------------------|----------------------|
| Dec 2016 | --- | On | 3 | Edit |
| Oct 2016 | 339 days | On | 4 | Edit |

4. Choose **Delete Subscription**.



Managing SPICE Capacity

You can use the admin page to see how much [SPICE \(p. 2\)](#) capacity you have overall, and how much of that you are using. SPICE capacity is allocated by AWS Region, so the information displayed is for the currently selected AWS Region.

SPICE stores your data until you choose to delete it. You can improve performance by importing the data into SPICE instead of using a direct query to the database. All nondatabase data sets must use SPICE.

SPICE capacity is pooled across users for the Amazon QuickSight account. All of your default SPICE capacity is allocated to your home AWS Region. The other AWS Regions have no SPICE capacity unless you choose to purchase some.

To free up SPICE capacity, delete unused data sets from SPICE. For more information about deleting a data set, see [Deleting a Data Set \(p. 123\)](#).

You can purchase additional SPICE capacity if you want to, up to a limit of 1 TB total capacity per QuickSight account. If you need an exception to this limit, follow the instructions at [AWS Service Limits](#) to submit a limit increase request. You can also release purchased SPICE capacity that you aren't using. Purchasing or releasing SPICE capacity only affects the capacity for the currently selected AWS Region. For information about additional SPICE pricing, see [Amazon QuickSight](#).

Capacity Planning for SPICE

The amount of SPICE capacity a data set uses isn't the same as the size of its source file or table. The logical size computation occurs after all the data type transformations and calculated columns you define during data preparation. These fields are materialized in SPICE in a way that enhances query performance. Any changes you make in an analysis have no effect on the logical size of the data in SPICE. Only changes that are saved in the data set apply to SPICE capacity.

In capacity planning for SPICE, consider what data types will be defined in the data set. For example, the file you want to import may contain all strings (text). But in order for these to be used in a meaningful way in an analysis, you prepare the data by changing the data types to their proper form. For example, fields containing prices are changed from strings to decimals, and fields containing dates are changed

from strings to dates. If you create a calculation to make the conversion, you can remove the original field from the data set and substitute the formatted calculated field. In that case, you don't need to include the size of the original field in your capacity planning. Only included fields are stored in SPICE.

Note

Geospatial data types use metadata to interpret the physical data type. Latitude and longitude are numeric. All other geospatial categories are strings.

To calculate how much SPICE capacity your data set needs, multiply the number of rows by the number of bytes SPICE uses per row. Currently, SPICE needs 8 bytes per field for decimal, int, and date fields. For each string field (text), SPICE needs 8 bytes plus the UTF-8 encoded character length. The formula looks like this:

```
Total logical row size in bytes =  
    (Number of Numeric Fields * 8 bytes per field)  
    + (Number of Date Fields * 8 bytes per field)  
    + (Number of Text Fields * (8 bytes + UTF-8 encoded character length per field) )  
  
Total bytes of data = Number of rows * Total logical row size in bytes  
  
GB of SPICE Capacity Needed = Total bytes of data / 1,073,741,824
```

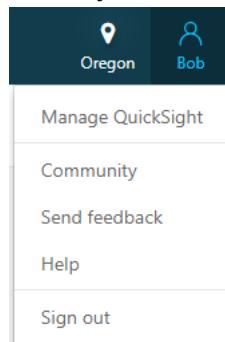
For example, let's say you have a table with 5,000,000 rows that you want to import into SPICE. It has 30 numeric fields, 20 date fields, and 10 string fields of 100 bytes each. Your formula looks like this:

```
Total logical row size in bytes =  
1480 bytes =  
    (30 * 8)  
    + (20 * 8)  
    + (10 * (8 + 100) )  
  
Total bytes of data =  
5,000,000 rows * 1480 bytes =  
7,400,000,000 bytes  
  
GB of SPICE Capacity Needed = 7,400,000,000 / 1,073,741,824 = 7 GB
```

View SPICE Capacity and Usage

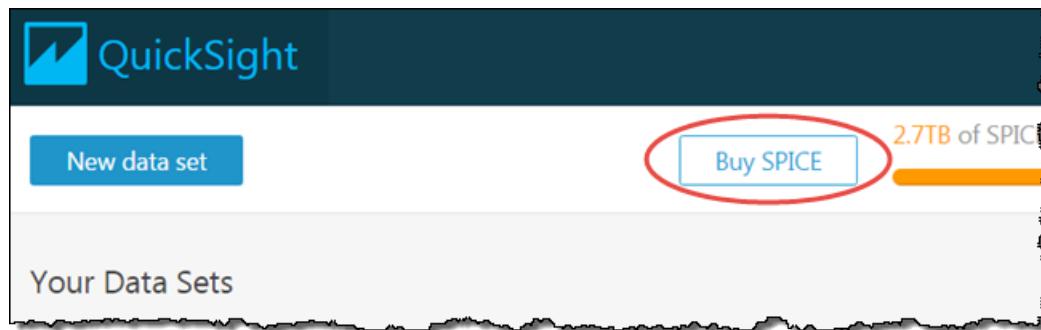
Use the following procedure to review your SPICE capacity and usage.

1. Choose your user name on the application bar, and then choose **Manage QuickSight**.

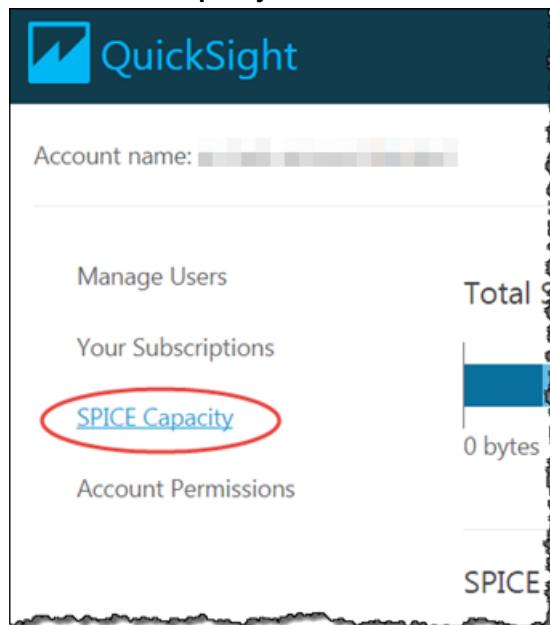


Note

If you are low on SPICE capacity, you can also choose the **Buy SPICE** alert that appears on the **Your Data Sets** and **Create a Data Set** pages.

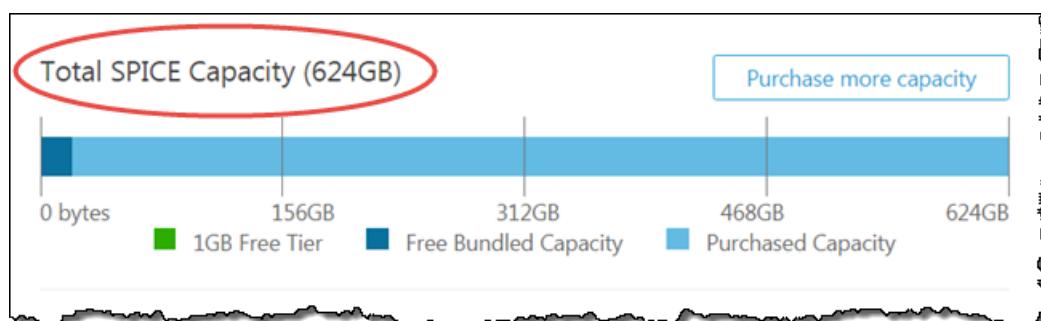


2. Choose **SPICE Capacity**.

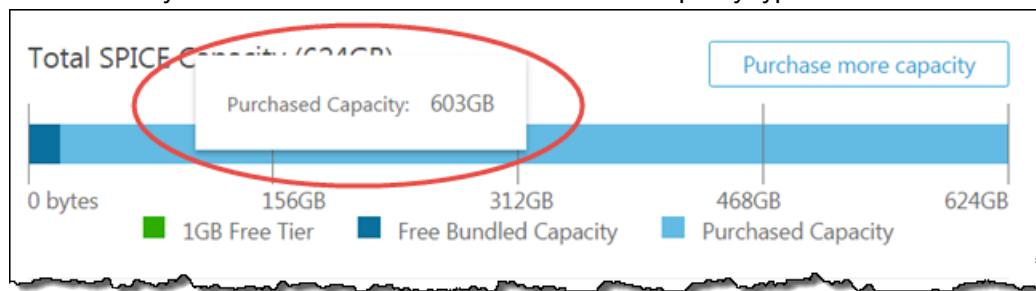


3. Use the **Total SPICE Capacity** meter to see your SPICE capacity, broken out by type. Capacity types are as follows:

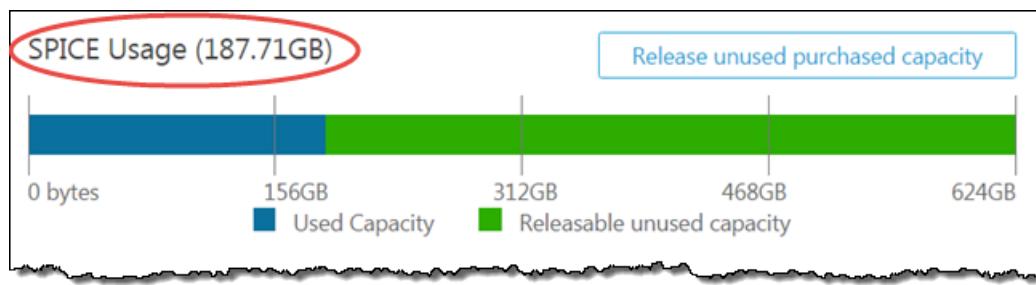
- Free tier: This is the 1 GB of capacity associated with the free user that you get with every Amazon QuickSight account.
- Free bundled: This is the total default capacity associated with your paid users. You get 10 GB of default SPICE capacity per paid user.
- Purchased: This is the additional SPICE capacity you have purchased.



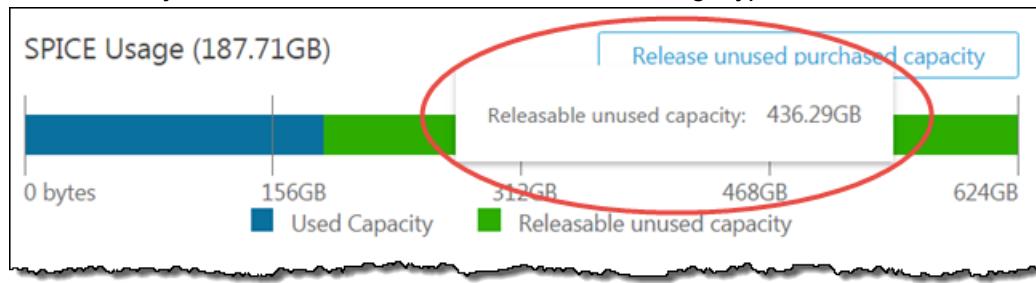
Hover over any section of the meter to see details on that capacity type.



4. Use the **SPICE Usage** meter to see your SPICE usage, broken out by type. Usage types are as follows:
 - Used capacity: This is used portion of the default SPICE capacity you get per user.
 - Unused capacity: This is unused portion of the default SPICE capacity you get per user.
 - Releasable unused capacity: This is purchased capacity that isn't in use, and so can be released to reduce costs.



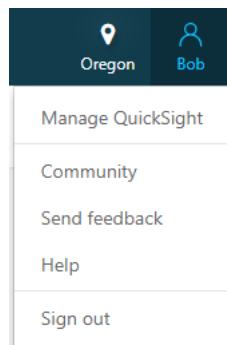
Hover over any section of the meter to see details on that usage type.



Purchase SPICE Capacity

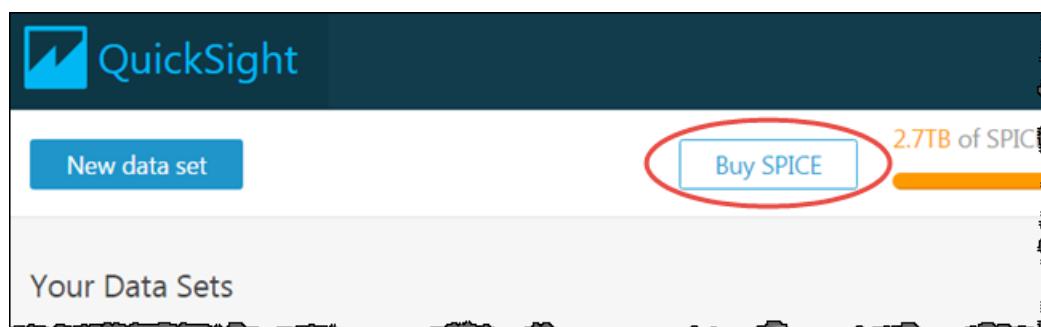
Use the following procedure to purchase additional **SPICE** (p. 2) capacity.

1. Choose your user name on the application bar and then choose **Manage QuickSight**.

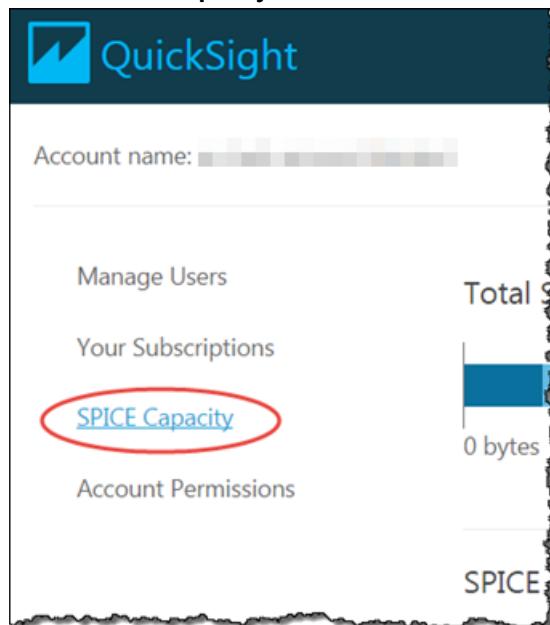


Note

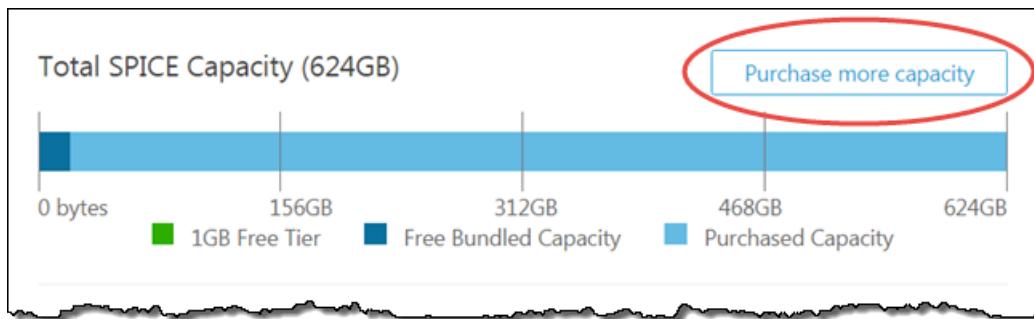
If you are low on SPICE capacity, you can also choose the **Buy SPICE** alert that appears on the **Your Data Sets** and **Create a Data Set** pages.



2. Choose **SPICE Capacity**.



3. Choose **Purchase more capacity**.



4. For **How much SPICE capacity do you need?**, type the number of gigabytes (GBs) you want to purchase.

Purchase SPICE capacity

How much SPICE capacity do you need?
10 GB

Cancel Purchase SPICE capacity

5. Choose **Purchase SPICE capacity**.

Purchase SPICE capacity

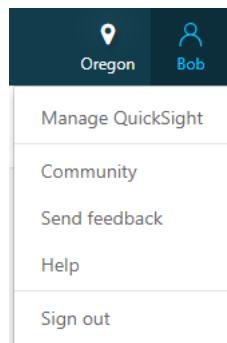
How much SPICE capacity do you need?
10 GB

Cancel Purchase SPICE capacity

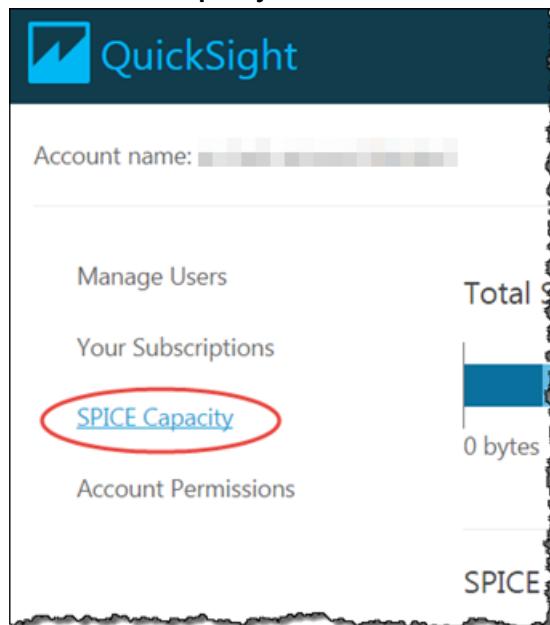
Release SPICE Capacity

Use the following procedure to release unused purchased [SPICE \(p. 2\)](#) capacity.

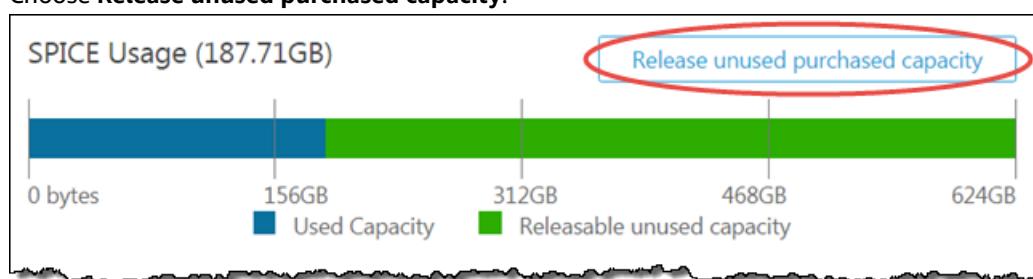
1. Before you begin, delete data sets that are using the SPICE capacity you want to release. To learn more about deleting data sets, see [Deleting a Data Set \(p. 123\)](#).
2. Choose your user name on the application bar and then choose **Manage QuickSight**.



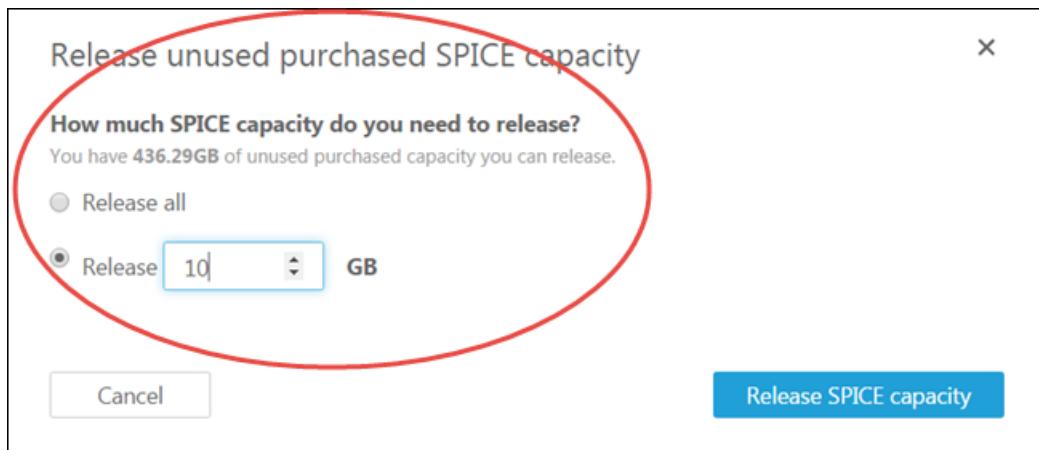
3. Choose **SPICE Capacity**.



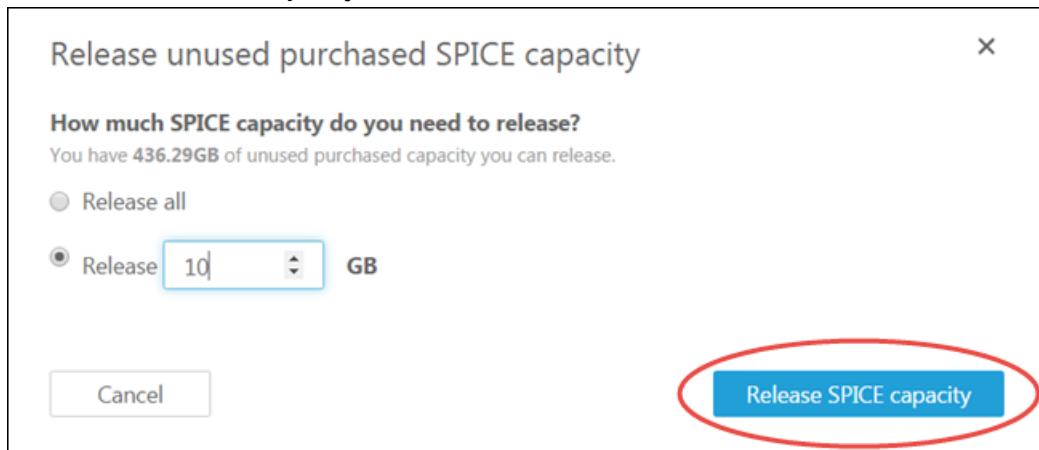
4. Choose **Release unused purchased capacity**.



5. For **How much SPICE capacity do you need to release?**, choose **Release all** if you want to release all unused purchased capacity, or choose **Release <amount> GB** and type the number of gigabytes (GBs) that you want to release.



6. Choose **Release SPICE capacity**.



Working with AWS Services

Use this section to help you set up Amazon QuickSight to work with other AWS services, such as AWS Identity and Access Management (IAM) and AWS CloudTrail.

Topics

- [Working with AWS Data Sources \(p. 590\)](#)
- [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#)
- [Working with Amazon VPC \(p. 614\)](#)
- [Logging Operations with AWS CloudTrail \(p. 622\)](#)

Working with AWS Data Sources

Use this section to help you configure autodiscovery, manage permissions, and authorize connections.

Topics

- [Allowing Autodiscovery of AWS Resources \(p. 591\)](#)
- [Authorizing Connections from Amazon QuickSight to AWS Data Stores \(p. 591\)](#)

- [Exploring Your AWS Data in Amazon QuickSight \(p. 605\)](#)
- [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#)

Allowing Autodiscovery of AWS Resources

Configuring AWS Resources

Use the following sections to help you configure your AWS resources to work with Amazon QuickSight.

Configuring Your AWS Data Sources for Amazon QuickSight Access

You can have Amazon QuickSight autodiscover Amazon RDS DB instances or Amazon Redshift clusters that are associated with your AWS account. These resources must be located in the same AWS Region as your Amazon QuickSight account.

If you choose to enable autodiscovery, choose one of the following options to make the AWS resource accessible:

- For Amazon RDS DB instances that you created in a default VPC and didn't choose to make private, or that aren't in a VPC (are EC2-Classic instances), see [Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances \(p. 592\)](#). In this topic, you can find information on creating a security group to allow connections from Amazon QuickSight servers.
- For Amazon Redshift clusters that you created in a default VPC and didn't choose to make private, or that aren't in a VPC (are EC2-Classic instances), see [Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters \(p. 596\)](#). In this topic, you can find information on creating a security group to allow connections from Amazon QuickSight servers.
- For an Amazon RDS DB instance or Amazon Redshift cluster that is in a nondefault VPC, see [Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances \(p. 592\)](#) or [Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters \(p. 596\)](#). In these topics, you can find information on creating a security group to allow connections from Amazon QuickSight servers, and then verifying that the VPC meets the requirements described in [Network Configuration for an AWS Instance in a Non-Default VPC \(p. 93\)](#).
- The Amazon RDS instance must be available for access to the public IP of the Amazon QuickSight region.

Enabling autodiscovery is the easiest way to make this data available in Amazon QuickSight. You can still manually create data connections whether or not you enable autodiscovery.

Confirming the Availability of AWS Identity and Access Management (IAM) Roles

If you choose to enable autodiscovery of AWS resources for your Amazon QuickSight account, Amazon QuickSight creates an AWS Identity and Access Management (IAM) role in your AWS account. This IAM role that grants your account permission to identify and retrieve data from your AWS data sources.

Because AWS limits you to 250 IAM roles, be sure that you have at least one free role for Amazon QuickSight to use if you want Amazon QuickSight to autodiscover your AWS resources.

Authorizing Connections from Amazon QuickSight to AWS Data Stores

For Amazon QuickSight to access your AWS resources, you must create security groups for them that authorize connections from the IP address ranges used by Amazon QuickSight servers. You must have AWS credentials that permit you to access these AWS resources to modify their security groups.

Use the procedures in the following sections to enable Amazon QuickSight connections.

Topics

- [Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances \(p. 592\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters \(p. 596\)](#)
- [Authorizing Connections from Amazon QuickSight to Amazon EC2 Instances \(p. 603\)](#)

Authorizing Connections from Amazon QuickSight to Amazon RDS DB Instances

For Amazon QuickSight to connect to an Amazon RDS DB instance, you must create a new security group for that DB instance. This security group contains an inbound rule authorizing access from the appropriate IP address range for the Amazon QuickSight servers in that region. To learn more about authorizing Amazon QuickSight connections, see [Manually Enabling Access to an Amazon RDS Instance in a VPC \(p. 592\)](#) or [Manually Enabling Access to an Amazon RDS Instance That Is Not in a VPC \(p. 595\)](#).

To create and assign a security group for an Amazon RDS DB instance, you must have AWS credentials that permit access to that DB instance.

Enabling connection from Amazon QuickSight servers to your instance is just one of several prerequisites for creating a data set based on an AWS database data source. For more information about what is required, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).

Manually Enabling Access to an Amazon RDS Instance in a VPC

Use the following procedure to enable Amazon QuickSight access to an Amazon RDS DB instance in a VPC.

To enable Amazon QuickSight access to an Amazon RDS DB instance in a VPC

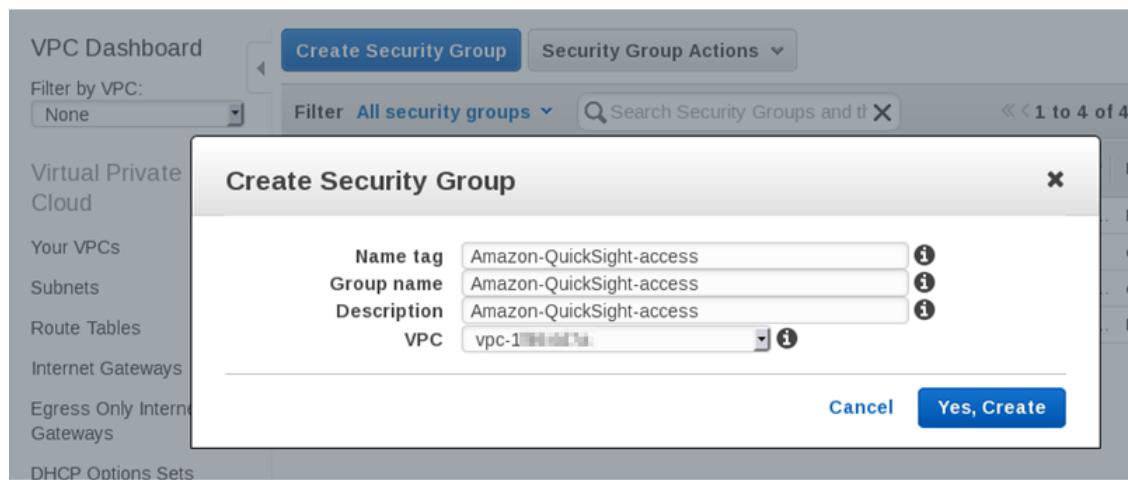
1. Sign in to the AWS Management Console and open the Amazon RDS console at <https://console.aws.amazon.com/rds/>.
2. On the **Instances** page, select the instance to which you want to grant access, and then choose the details page icon, as shown following.

The screenshot shows the Amazon RDS console for MySQL. At the top, there are buttons for "Launch DB Instance", "Show Monitoring", and "Instance Actions". Below this is a search bar with "Filter: All Instances" and a search field. The main area displays a table with columns: Engine, DB Instance, Status, and CPU. One instance is listed: MySQL, mytestinstance, backing-up, 1.50%. Below the table, the "Endpoint" is shown as a blue link. The "Configuration Details" section is expanded, showing:

| Configuration Details | Value |
|-----------------------|---|
| ARN | arn:aws:rds:eu-west-1: [REDACTED]:db:mytestinstanc |
| VPC | vpc-1[REDACTED] |
| Port | 3306 |
| Certificate Authority | rds-ca-2015 (Mar 5, 2020) |

Red arrows point to the ARN, VPC, and Port fields.

3. Locate **Port** in the **Cluster Database Properties** section. Note the **Port** value.
4. Locate **VPC** in the **Security and Network** section, and note the **VPC** value. Choose the **VPC** value to open the VPC console.
5. On the Amazon VPC Management Console, choose **Security Groups** in the navigation pane.
6. Choose **Create Security Group**.
7. On the **Create Security Group** page, enter the security group information as follows:
 - For **Name tag** and **Group name**, type **Amazon-QuickSight-access**.
 - For **Description**, type **Amazon-QuickSight-access**.
 - For **VPC**, choose the VPC for your instance. This VPC is the one with the VPC ID that you noted.



8. Choose **Yes, Create**.
9. Your new security group should be displayed on the screen. Choose the security group, and then choose **Inbound Rules** from the tab list.

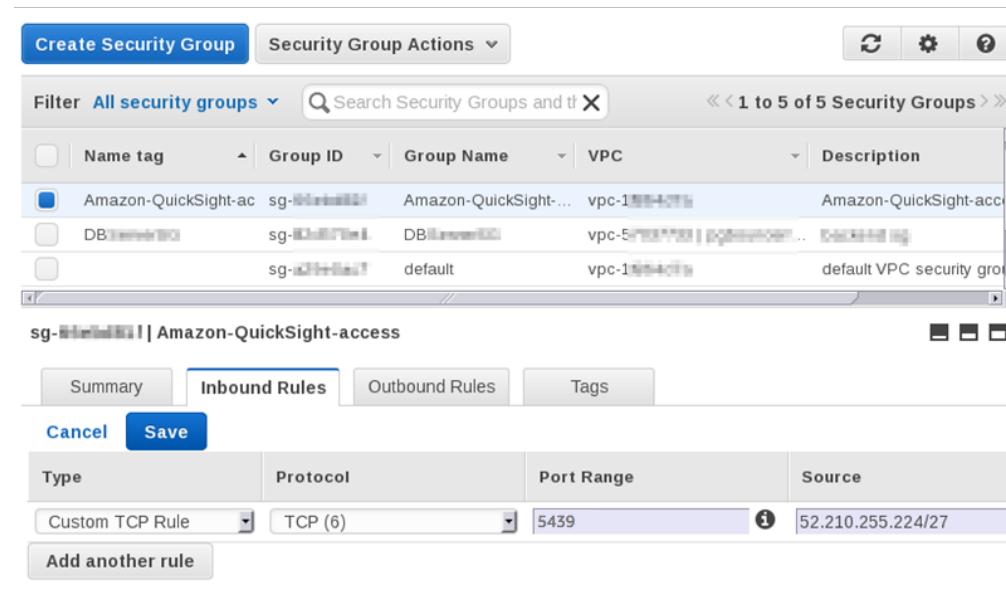
Choose **Edit** to create a new rule. Use the following values:

- For **Type**, choose **Custom TCP Rule**.
- For **Protocol**, choose **TCP (6)**.
- For **Port Range**, type the port number of the Amazon RDS cluster to which you are providing access. This port number is the one that you noted in an earlier step.
- For **Source**, type the CIDR address block for the region where you'll be using QuickSight. For example, here is the CIDR address block for EU (Ireland): 52.210.255.224/27. For more information on the IP address ranges for Amazon QuickSight in supported regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).

Note

If you have activated Amazon QuickSight in multiple regions, you can create inbound rules for each Amazon QuickSight endpoint CIDR. Doing this allows Amazon QuickSight to have access to the Amazon RDS DB instance from any region defined in the inbound rules.

An Amazon QuickSight user or administrator who uses Amazon QuickSight in multiple regions is treated as a single user. In other words, even if you are using Amazon QuickSight in every region, both your Amazon QuickSight account and your users are global.



10. Choose **Save** to save your new inbound rule.
11. Return to the **Instances** page of the Amazon RDS console.

Choose the instance that you want to enable access to.

Choose **Instance Actions**, and then choose **Modify**.

12. In the **Network & Security** section, the currently assigned security group or groups are already chosen for **Security Group**. Press CTRL and choose **Amazon-QuickSight-access** in addition to the other selected groups.
13. Choose **Continue**, and then choose **Modify DB Instance**.

[Manually Enabling Access to an Amazon RDS Instance That Is Not in a VPC](#)

Use the following procedure to access an Amazon RDS DB instance that is not in a VPC.

To access an Amazon RDS DB instance that is not in a VPC

1. Sign in to the Amazon RDS console.
2. Choose **Security Groups** in the navigation pane.
3. Choose **Create DB Security Group**.
4. Type **Amazon-QuickSight-access** for the **Name** and **Description** values, and then choose **Create**.
5. The new security group is selected by default.

Select the details icon next to the security group, as shown following.

| Create DB Security Group | | | | Delete |
|--|--------------------------|-------------------|--------------------------|--------|
| Filter: <input type="text"/> Search DB Security Groups... X | | | | |
| | Name | Status | Description | |
| <input checked="" type="checkbox"/> | amazon-quicksight-access | no-authorizations | Amazon-QuickSight-access | |

6. For **Connection Type**, choose **CIDR/IP**.
7. For **CIDR/IP to Authorize**, type the appropriate CIDR address block. For more information on the IP address ranges for Amazon QuickSight in supported regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).

| | | | | | |
|--|---------|---------------------------------|--|----------------|-----------|
| Connection Type | CIDR/IP | CIDR/IP of your current machine | [REDACTED] | i | Authorize |
| CIDR/IP to Authorize* <input type="text" value="52.23.63.224/27"/> | | | | | |

8. Choose **Authorize**.
9. Return to the **Instances** page of the Amazon RDS Management Console, choose the instance that you want to enable access to, choose **Instance Actions**, and then choose **Modify**.
10. In the **Network & Security** section, the currently assigned security group or groups already is chosen for **Security Group**. Press CTRL and choose **Amazon-QuickSight-access** in addition to the other selected groups.
11. Choose **Continue**, and then choose **Modify DB Instance**.

Authorizing Connections from Amazon QuickSight to Amazon Redshift Clusters

For Amazon QuickSight to connect to an Amazon Redshift instance, you must create a new security group for that instance. This security group contains an inbound rule authorizing access from the appropriate IP address range for the Amazon QuickSight servers in that region. To learn more about authorizing Amazon QuickSight connections, see [Manually Enabling Access to an Amazon Redshift Cluster in a VPC \(p. 596\)](#) or [Manually Enabling Access to an Amazon Redshift Cluster That Is Not in a VPC \(p. 601\)](#).

To create and assign a security group for an Amazon Redshift cluster, you must have AWS credentials that permit access to that cluster.

Enabling connection from Amazon QuickSight servers to your cluster is just one of several prerequisites for creating a data set based on an AWS database data source. For more information about what is required, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).

Manually Enabling Access to an Amazon Redshift Cluster in a VPC

Use the following procedure to enable Amazon QuickSight access to an Amazon Redshift cluster in a VPC.

To enable Amazon QuickSight access to an Amazon Redshift cluster in a VPC

1. Sign in to the AWS Management Console and open the Amazon Redshift console at <https://console.aws.amazon.com/redshift/>.
2. Choose the details page icon next to the cluster you want to make available, as shown following.

The screenshot shows the Amazon Redshift Clusters page. On the left, there's a sidebar with options like Redshift dashboard, Clusters (which is selected and highlighted in orange), Snapshots, Security, Parameter groups, Workload management, Reserved nodes, Events, and Connect client. The main area is titled 'Clusters' and contains a table with two rows. The columns are labeled 'Cluster', 'Cluster Status', and 'DB Health'. The first cluster has a status of 'available' and 'healthy'. The second cluster also has a status of 'available' and 'healthy'. A red arrow points to the details icon (a magnifying glass) next to the second cluster. At the top of the page, there are navigation links for Services, Resource Groups, QuickSight, S3, and a search bar.

| Cluster | Cluster Status | DB Health |
|--------------------------------|----------------|-----------|
| Cluster 1 (available, healthy) | available | healthy |
| Cluster 2 (available, healthy) | available | healthy |

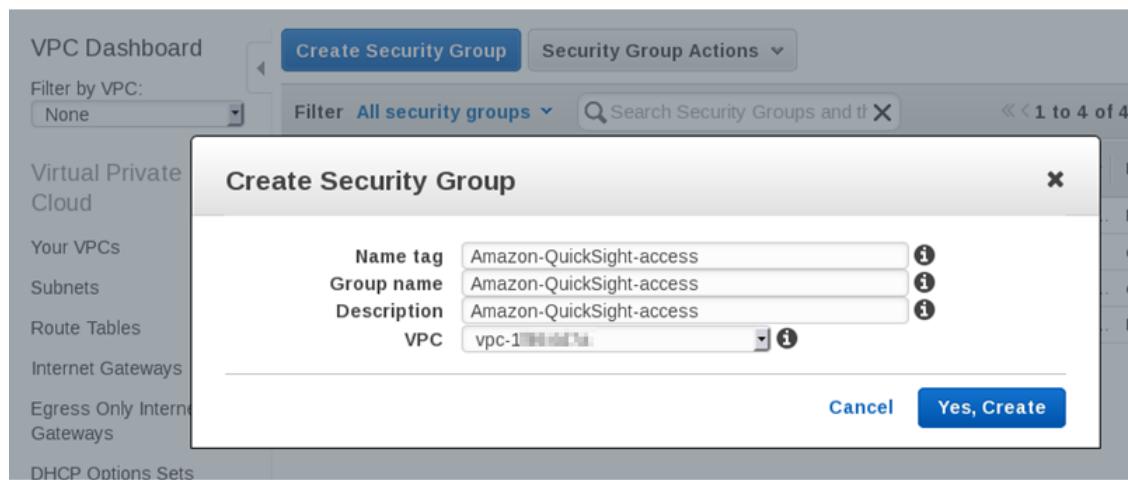
3. Locate **Port** in the **Cluster Database Properties** section. Note the **Port** value.
4. Locate **VPC ID** in the **Cluster Properties** section, note the **VPC ID** value. Choose **View VPCs** to open the Amazon VPC Management Console.

The screenshot shows the Redshift dashboard with the 'Clusters' tab selected. In the 'Cluster Properties' section, the VPC ID (vpc-5...) and its associated 'View VPCs' link are highlighted with a red circle and arrow. In the 'Cluster Database Properties' section, the 'Port' field is highlighted with a red circle and arrow.

| Cluster Properties | | Cluster Status |
|-------------------------|------------------------------------|--------------------|
| Cluster Name | redshift | Clus |
| Cluster Type | Single Node | Data |
| Node Type | dc1.large | In Mainten |
| Nodes | 1 | Parameter Group Ap |
| Zone | eu-west-1b | Pending Modif |
| Created Time | November 4, 2016 at 8:11:17 PM UTC | |
| Cluster Version | 1.0.1333 | |
| VPC ID | vpc-5... (View VPCs) | |
| Cluster Subnet Group | redshift | |
| VPC security groups | DB... (sg-82...0ml) (active) | |
| Cluster Parameter Group | default:redshift-1.0 (in-sync) | |
| Enhanced VPC Routing | No | |

| Cluster Database Properties | | Backup, Audit Loggi |
|-----------------------------|------|---------------------|
| Port | 5439 | Automated Snapsho |
| Publicly Accessible | Yes | Cross-Region S |

5. On the Amazon VPC Management Console, choose **Security Groups** in the navigation pane.
6. Choose **Create Security Group**.
7. On the **Create Security Group** page, enter the security group information as follows:
 - For **Name tag** and **Group name**, type **Amazon-QuickSight-access**.
 - For **Description**, type **Amazon-QuickSight-access**.
 - For **VPC**, choose the VPC for your instance. This is the VPC with the VPC ID that you noted.



8. Choose **Yes, Create**.
9. Your new security group should be displayed on the screen. Choose the security group. Then, choose **Inbound Rules** from the tab list.

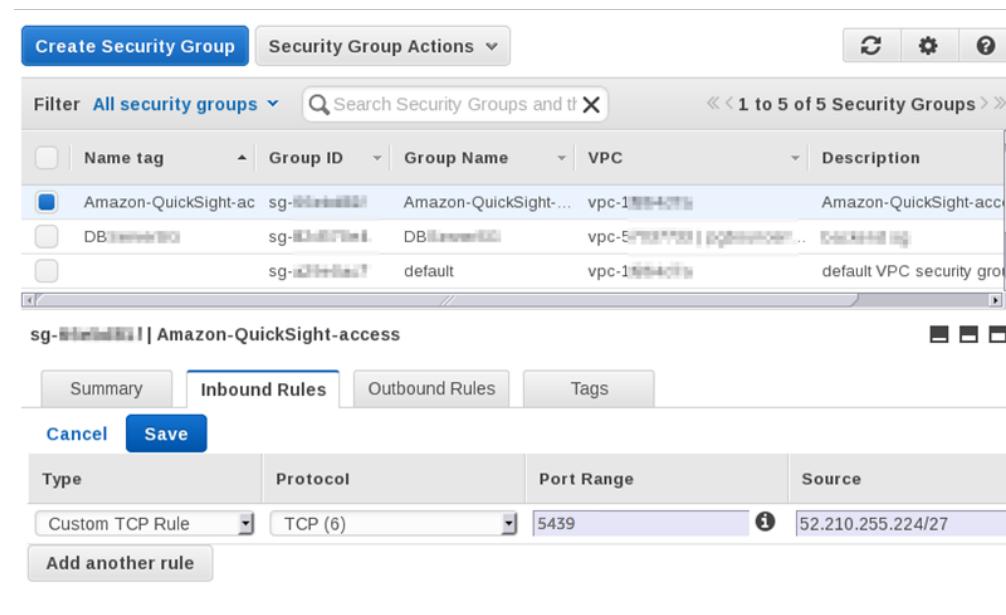
Choose **Edit** to create a new rule. Use the following values:

- For **Type**, choose **Custom TCP Rule**.
- For **Protocol**, choose **TCP (6)**.
- For **Port Range**, enter the port number of the Amazon Redshift cluster to which you are providing access. This is the port number you noted in an earlier step.
- For **Source**, type the CIDR address block for the region where you'll be using QuickSight. For example, here is the CIDR address block for EU (Ireland): 52.210.255.224/27. For more information on the IP address ranges for Amazon QuickSight in supported regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).

Note

If you have activated Amazon QuickSight in multiple regions, you can create inbound rules for each Amazon QuickSight endpoint CIDR. Doing this allows Amazon QuickSight to have access to the Amazon RDS DB instance from any region defined in the inbound rules.

An Amazon QuickSight user or administrator who uses Amazon QuickSight in multiple regions is treated as a single user. In other words, even if you are using Amazon QuickSight in every region, both your Amazon QuickSight account and your users are global.



10. Choose **Save** to save your new inbound rule.
11. Return to the **Clusters** page of the Amazon Redshift Management Console, and then open the details page for the cluster that you want to enable access to.

Choose **Cluster**, and then choose **Modify**.

| | |
|-----------------|------------------------------------|
| Cluster Name | redshift-1 |
| Cluster Type | Single Node |
| Node Type | dc1.large |
| Nodes | 1 |
| Zone | eu-west-1b |
| Created Time | November 4, 2016 at 8:11:17 PM UTC |
| Cluster Version | 1.0.1333 |
| VPC ID | vpc-5 [REDACTED] (View VPCs) |

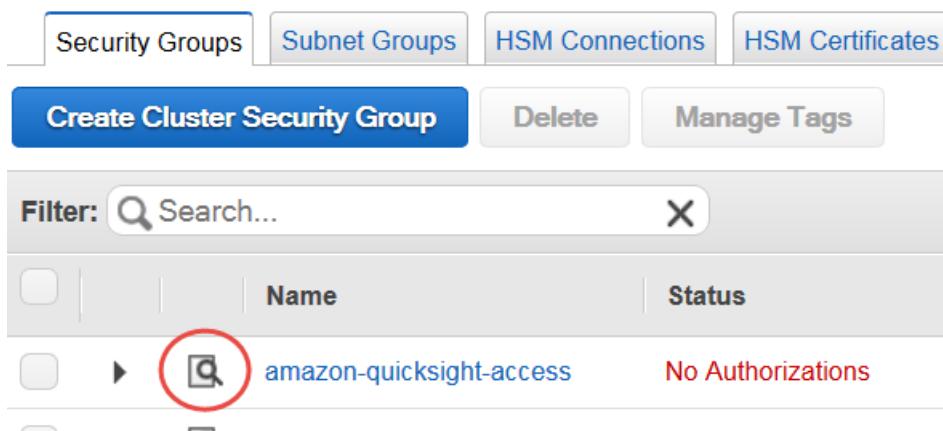
12. The currently assigned security groups are already chosen for **VPC Security Groups**. Press CTRL and choose **Amazon-QuickSight-access** in addition to the other selected groups.
13. Choose **Modify**.

Manually Enabling Access to an Amazon Redshift Cluster That Is Not in a VPC

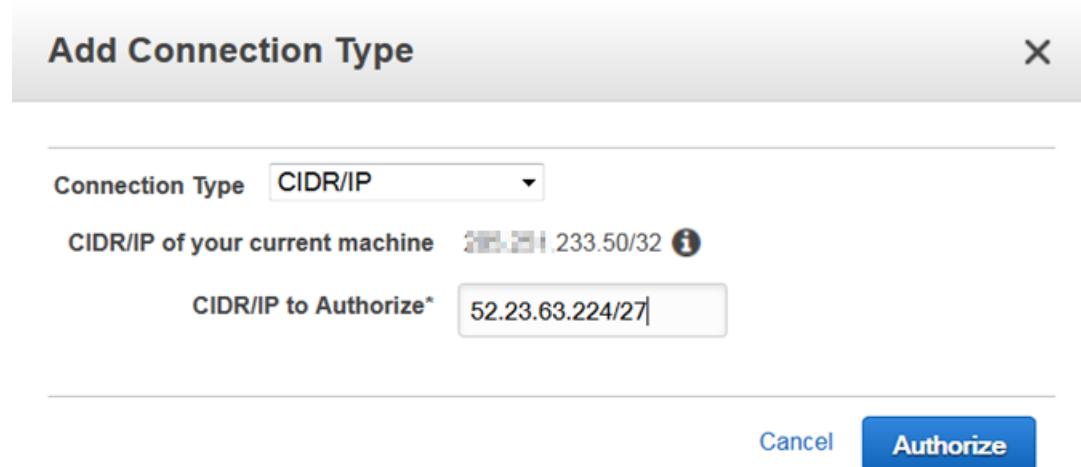
Use the following procedure to access an Amazon Redshift cluster that is not in a VPC.

To access an Amazon Redshift cluster that is not in a VPC

1. Sign in to the AWS Management Console and open the Amazon Redshift console at <https://console.aws.amazon.com/redshift/>.
2. Choose **Security** in the navigation pane.
3. Choose **Create Cluster Security Group**.
4. Type **Amazon-QuickSight-access** for the **Cluster Security Group Name** and **Description** values, and then choose **Create**.
5. Select the details icon next to the security group, as shown following.



6. Choose **Add Connection Type**.
7. Enter the connection information.
 - For **Connection Type**, choose **CIDR/IP**.
 - For **CIDR/IP to Authorize**, type the appropriate CIDR address block. The supported IP address ranges for Amazon QuickSight regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).



8. Choose **Authorize**.
9. Return to the **Clusters** page of the Amazon Redshift console, open the details page for the cluster that you want to enable access to, choose **Cluster**, and then choose **Modify**.
10. The currently assigned security groups are already chosen for **Cluster Security Group**. Press CTRL and choose **Amazon-QuickSight-access** in addition to the other selected groups.
11. Choose **Modify**.

Enabling Access to Amazon Redshift Spectrum

Using Amazon Redshift Spectrum, you can connect Amazon QuickSight to an external catalog with Amazon Redshift. For example, you can access the Athena catalog and query unstructured data on your Amazon S3 data lake using an Amazon Redshift cluster instead of the Athena query engine.

You can also combine data sets that include data stored in Amazon Redshift and in S3. Then you can access them using the SQL syntax in Amazon Redshift.

After you've registered your data catalog (for Athena) or external schema (for a [Hive metastore](#)), you can use Amazon QuickSight to select the external schema and the Amazon Redshift Spectrum tables. This process works just as for any other Amazon Redshift tables in your cluster. You don't need to load or transform your data.

For more information on using Amazon Redshift Spectrum, see [Using Amazon Redshift Spectrum to Query External Data](#) in the *Amazon Redshift Database Developer Guide*.

To connect using Redshift Spectrum, you need to do the following:

- Create or identify an IAM role associated with the Amazon Redshift cluster.
- Add the IAM policies `AmazonS3ReadOnlyAccess` and `AmazonAthenaFullAccess` to the IAM role.
- Register an external schema or data catalog for the tables that you plan to use.

Redshift Spectrum lets you separate storage from compute, so you can scale them separately. You only pay for the queries that you run.

To connect to Redshift Spectrum tables, you don't need to grant Amazon QuickSight access to Amazon S3 or Athena. Amazon QuickSight only needs access to the Amazon Redshift cluster. For full details on

configuring Redshift Spectrum, see [Getting Started with Amazon Redshift Spectrum](#) in the *Amazon Redshift Database Developer Guide*.

Authorizing Connections from Amazon QuickSight to Amazon EC2 Instances

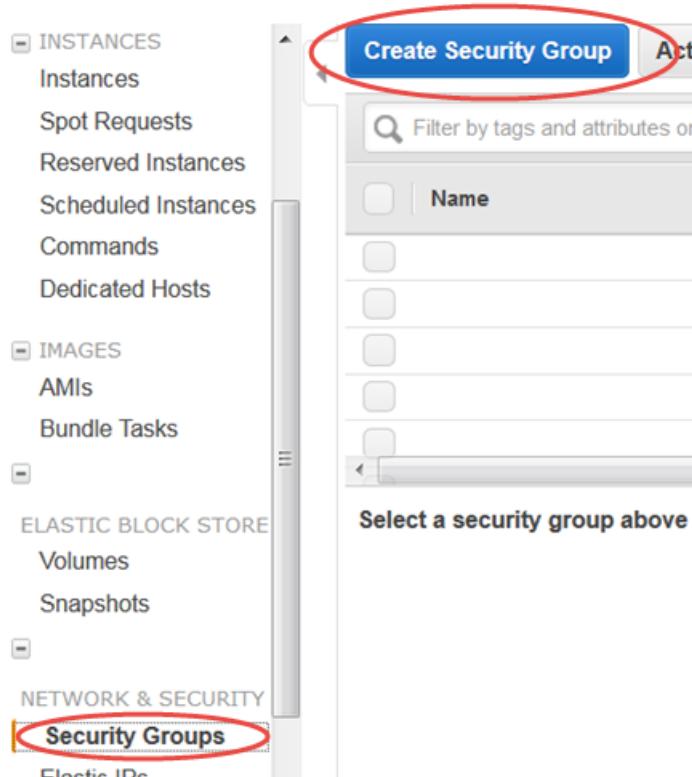
For Amazon QuickSight to connect to an Amazon EC2 instance, you must create a new security group for that instance. This security group contains an inbound rule authorizing access from the appropriate IP address range for the Amazon QuickSight servers in that region.

To modify the security groups for these Amazon EC2 instances, you must have AWS credentials that permit you to access to the instances.

Enabling connection from Amazon QuickSight servers to your instance is just one of several prerequisites for creating a data set based on an AWS database data source. For more information about what is required, see [Creating Data Sets from New Database Data Sources \(p. 92\)](#).

To enable Amazon QuickSight access to an Amazon EC2 instance

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. If your EC2 instance is in a VPC, select the instance to view the instance details pane. Locate its VPC ID and make note of it for later use.
3. Choose **Security Groups** in the **NETWORK & SECURITY** section of the navigation pane on the left. Then choose **Create Security Group**, as shown following.



4. Enter the security group information as follows:
 - For **Security group name**, type **Amazon-QuickSight-access**.

- For **Description**, type **Amazon-QuickSight-access**.
 - For **VPC**, choose the VPC ID that you noted in step 2 if your Amazon EC2 instance is in a VPC. Otherwise, choose **No VPC**.
5. Choose **Add Rule** on the **Inbound** tab.
 6. Create a new rule with the following values:
 - For **Type**, choose **Custom TCP Rule**.
 - For **Protocol**, choose **TCP**.
 - (Optional) For **Port Range**, enter the port number used by the instance on this Amazon EC2 instance to which you are providing access.
 - For **Source**, type the CIDR address block for the region where you'll be using QuickSight. For example, here is the CIDR address block for EU (Ireland): `52.210.255.224/27`. For more information on the IP address ranges for Amazon QuickSight in supported regions, see [AWS Regions and IP Address Ranges \(p. 546\)](#).

Note

If you have activated Amazon QuickSight in multiple regions, you can create inbound rules for each Amazon QuickSight endpoint CIDR. Doing this allows Amazon QuickSight to have access to the Amazon RDS DB instance from any region defined in the inbound rules.

An Amazon QuickSight user or administrator who uses Amazon QuickSight in multiple regions is treated as a single user. In other words, even if you are using Amazon QuickSight in every region, both your Amazon QuickSight account and your users are global.

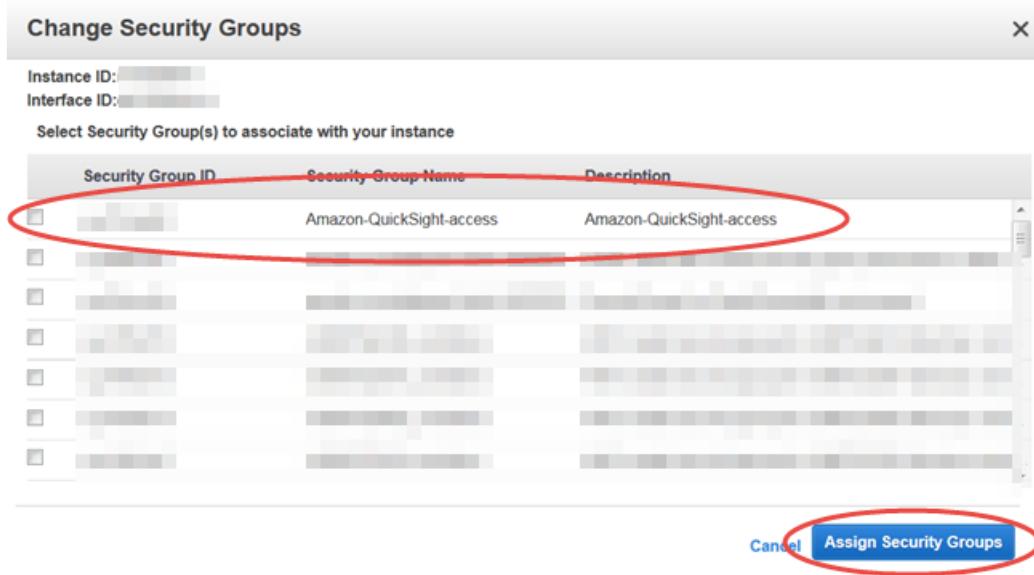
The screenshot shows the 'Create Security Group' dialog box. The 'Inbound' tab is selected. A single rule is defined:

| Type | Protocol | Port Range | Source |
|-----------------|----------|------------|---------------------------|
| Custom TCP Rule | TCP | 1433 | Custom IP 52.23.63.224/27 |

At the bottom right of the dialog are 'Cancel' and 'Create' buttons.

7. Choose **Create**.
8. Choose **Instances** in the **INSTANCES** section of the navigation pane, and then choose the instance that you want to enable access to.
9. Choose **Actions**, then **Networking**, and then **Change Security Groups**.
10. In **Change Security Groups**, select the **Amazon-QuickSight-access** security group.

Then choose **Assign Security Groups**, as shown following.



Exploring Your AWS Data in Amazon QuickSight

Use this section to learn how to explore AWS data in Amazon QuickSight using the AWS Management Console. Using the **Explore in QuickSight** shortcut, you can access a customizable dashboard template showing your data. Just as with any Amazon QuickSight dashboard, this dashboard can be refreshed on a schedule, published, and shared with other users in your organization.

Topics

- [Exploring Amazon S3 Analytics Data \(p. 605\)](#)

Exploring Amazon S3 Analytics Data

Amazon QuickSight contains a dashboard designed to provide insight into your Amazon S3 analytics data. To use this feature, you must first enable S3 analytics storage class analysis for your S3 buckets. For more on enabling storage class analysis in S3, see [Amazon S3 Analytics – Storage Class Analysis](#) in the [Amazon S3 Developer Guide](#).

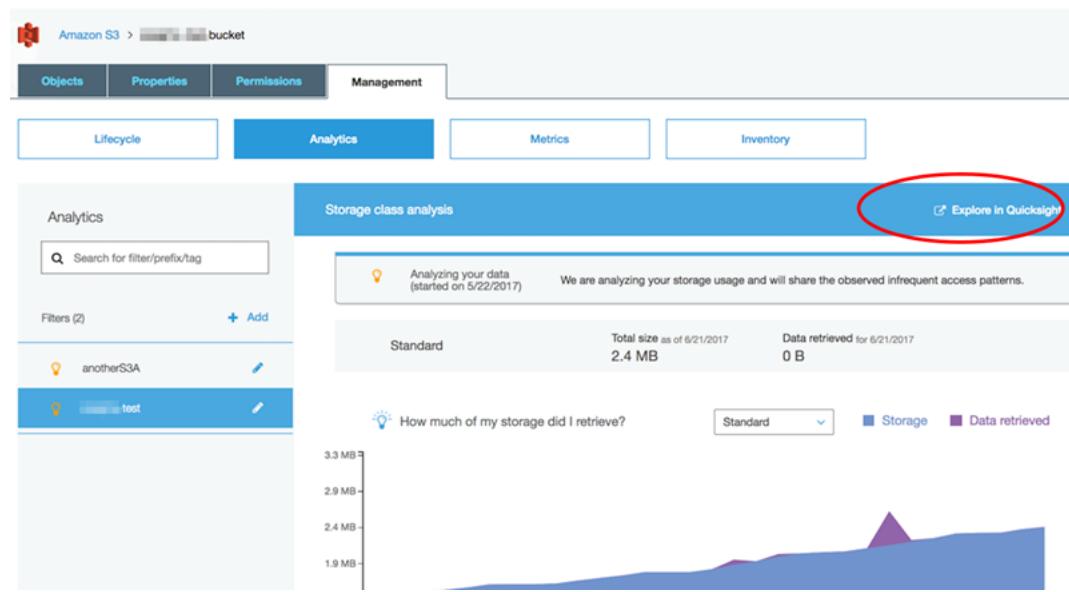
After you have enabled storage class analysis, you can use Amazon QuickSight to explore your S3 analytics data.

To explore S3 analytics data in Amazon QuickSight

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. Choose a bucket to explore. The bucket must have storage class analysis enabled, with at least one filter.
3. Choose the **Management** tab.
4. Then Choose **Analytics**.
5. Choose **Explore in QuickSight**.

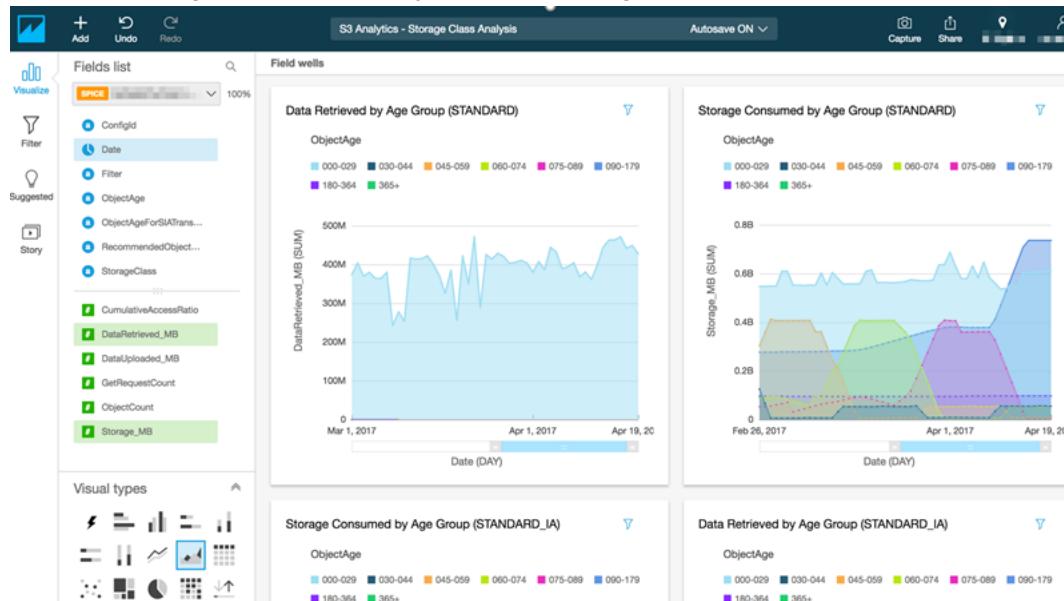
Note

If you don't have an Amazon QuickSight account, you're prompted to create one before you can use the dashboard.



When you choose the option to explore in Amazon QuickSight, your S3 analytics data is automatically loaded into the dashboard template. The dashboard contains multiple visualizations to help you to understand the storage access pattern of your bucket.

Use the template as is, or customize it to suit your needs. For example, one visual on the default template helps you identify infrequently accessed data. It compares the amount of data retrieved to the amount of storage consumed, for objects of different ages.



You can also add your own visualizations to the dashboard. For example, you can break down the data access patterns, using filters for storage class analysis that you already have defined in S3 analytics.

To learn more about using S3 analytics and storage class analysis, see [Amazon S3 Analytics – Storage Class Analysis](#) in the [Amazon S3 Developer Guide](#).

Managing Amazon QuickSight Permissions to AWS Resources

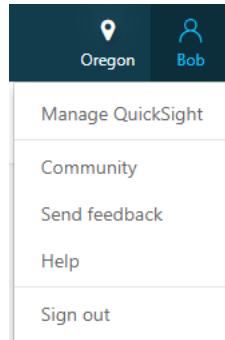
As part of signing up for Amazon QuickSight, you set Amazon QuickSight permissions to your AWS resources. You can edit those permissions to change the level of access that Amazon QuickSight has to these resources. To edit these permissions, you must be signed in using the IAM account or AWS root account used to create your Amazon QuickSight account. Alternatively, you can be signed in as an IAM user with administrative privileges and the permissions described in the **Set Amazon QuickSight permissions to AWS resources** row of the table shown in [Setting Your IAM Policy \(p. 609\)](#).

Important

You should only edit Amazon QuickSight permissions to your AWS resources from within Amazon QuickSight. If you edit these permissions directly using the IAM Management Console, you can't edit them from Amazon QuickSight.

To edit Amazon QuickSight permissions to your AWS resources

1. Choose your user name on the application bar, and then choose **Manage QuickSight**.



2. Choose **Account settings**.
3. Under **Account permissions**, choose **Edit AWS Permissions**.
4. (For Amazon QuickSight Enterprise edition accounts only) On the AWS sign-in page, enter your AWS or IAM credentials.
5. On the **Edit QuickSight read-only access to AWS resources** page, select **Enable autodiscovery of your data and users in your AWS Redshift, RDS, and IAM services**. Doing this allows Amazon QuickSight to autodiscover any of these types of resources associated with your AWS account. Alternatively, expand this section and choose the individual options for the resources that you want to use with Amazon QuickSight.
6. If you have one or more Amazon S3 buckets, select the **Amazon S3 (all buckets)** check box to edit Amazon QuickSight access to them. For **Choose Amazon S3 buckets**, choose the buckets you want to make available to Amazon QuickSight, and then choose **Select buckets**.
7. If you have Amazon Athena databases, choose **Athena** to allow Amazon QuickSight to access them.
8. Choose **Apply**.

Note

The **QuickSightAthena** managed policy contains the necessary permissions for Amazon QuickSight to interact with Athena. However, it doesn't have permissions for input buckets. Managed policies can't be changed. So, even if you are using this policy you still need to enable access to the S3 buckets.

If you have difficulties accessing Athena, see [Troubleshooting Issues When Using Athena with Amazon QuickSight \(p. 535\)](#).

Working with AWS Identity and Access Management (IAM) Users, Roles, and Policies

Amazon QuickSight is fully integrated with AWS Identity and Access Management (IAM). Use this section to find how to configure IAM identities and policies for use with Amazon QuickSight:

- For information on creating IAM users, groups, and roles, see [IAM Identities](#).
- For information on creating policies in IAM, see [Creating a New Policy](#).
- To start work directly with IAM, sign in to the AWS Management Console and open the IAM console at <https://console.aws.amazon.com/iam/>.

Topics

- [Working with IAM Actions and Permissions for Amazon QuickSight Users \(p. 608\)](#)
- [Setting Your IAM Policy \(p. 609\)](#)

Working with IAM Actions and Permissions for Amazon QuickSight Users

Amazon QuickSight provides a number of AWS Identity and Access Management (IAM) actions that you can use for creating or removing an Amazon QuickSight account. All Amazon QuickSight actions are prefixed with `quicksight:`, such as `quicksight:Subscribe`. For information about using Amazon QuickSight actions in an IAM policy, see [Setting Your IAM Policy \(p. 609\)](#).

The following list shows the supported Amazon QuickSight actions:

- **"`quicksight:CreateAdmin`"**

`CreateAdmin` enables the user to provision Amazon QuickSight administrators, authors, and readers.

- **"`quicksight:CreateUser`"**

`CreateUser` enables the user to provision Amazon QuickSight authors and readers.

- **"`quicksight:CreateReader`"**

`CreateReader` enables the user to provision Amazon QuickSight readers.

- **"`quicksight:GetGroupMapping`"**

`GetGroupMapping` is used only in Amazon QuickSight Enterprise edition accounts. It enables the user to use Amazon QuickSight to identify and display the Microsoft Active Directory (Microsoft Active Directory) directory groups that are mapped to roles in Amazon QuickSight.

- **"`quicksight:GetDashboardEmbedUrl`"**

`GetDashboardEmbedUrl` allows a dashboard to be invoked as an embedded entity.

- **"`quicksight:SearchDirectoryGroups`"**

`SearchDirectoryGroups` is used only in Amazon QuickSight Enterprise edition accounts. It enables the user to use Amazon QuickSight to display your Microsoft Active Directory directory groups so that you can choose which ones to map to roles in Amazon QuickSight.

- **"`quicksight:SetGroupMapping`"**

`SetGroupMapping` is used only in Amazon QuickSight Enterprise edition accounts. It enables the user to use Amazon QuickSight to map the Microsoft Active Directory directory groups that you select to roles in Amazon QuickSight.

- **"quicksight:Subscribe"**

Subscribe enables the user to subscribe to Amazon QuickSight. Enabling this action also allows the user to upgrade the subscription to Enterprise edition.

- **"quicksight:Unsubscribe"**

Unsubscribe enables the user to unsubscribe from Amazon QuickSight, which permanently deletes all users and their resources from Amazon QuickSight.

Setting Your IAM Policy

You can use AWS root credentials or IAM user credentials to create an Amazon QuickSight account. AWS root and administrator credentials already have all of the required permissions for managing Amazon QuickSight access to AWS resources.

However, we recommend that you protect your root credentials, and instead use IAM user credentials. To do this, you can create a policy and attach it to the IAM user and roles that you plan to use for Amazon QuickSight. The policy must include the appropriate statements for the Amazon QuickSight administrative tasks you need to perform, as described in the following sections.

Important

Be aware of the following when working with Amazon QuickSight and IAM policies:

- Avoid directly modifying a policy that was created by Amazon QuickSight. When you modify it yourself, Amazon QuickSight can't edit it. This inability can cause an issue with the policy. To fix this issue, delete the previously modified policy.
- If you get an error on permissions when you try to create an Amazon QuickSight account, see [IAM Policy Actions for Creating Users in Amazon QuickSight \(p. 610\)](#).
- In some cases, you might have an Amazon QuickSight account that you can't access even from the root account (for example, if you accidentally deleted its directory service). In this case, you can delete your old Amazon QuickSight account, then recreate it. For more information, see [Canceling Your Amazon QuickSight Subscription and Closing the Account \(p. 565\)](#).

IAM Policy Actions for Signing Up for Amazon QuickSight

To allow a user to sign up and set permissions to AWS resources for Amazon QuickSight, allow the following actions in an IAM policy. For more information, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

The permissions for signing up don't allow you to fully use Amazon QuickSight. However, a user with the AWS root and administrator credentials can subscribe to Amazon QuickSight with no additional actions needed.

| Standard Edition | Enterprise Edition |
|--|---|
| <ul style="list-style-type: none">• ds:AuthorizeApplication• ds:CheckAlias• ds>CreateAlias• ds>CreateIdentityPoolDirectory• ds>DeleteDirectory• ds:DescribeDirectories• ds:DescribeTrusts• ds:UnauthorizeApplication | <p>Allow all of the actions required for Standard edition, plus the following:</p> <ul style="list-style-type: none">• quicksight:GetGroupMapping• quicksight:SearchDirectoryGroups• quicksight:SetGroupMapping |

| Standard Edition | Enterprise Edition |
|--|--------------------|
| <ul style="list-style-type: none"> • <code>iam:CreatePolicy</code> • <code>iam:CreateRole</code> • <code>iam>ListAccountAliases</code> • <code>quicksight>CreateUser</code> • <code>quicksight>CreateAdmin</code> • <code>quicksight:Subscribe</code> | |

IAM Policy Actions for Creating Users in Amazon QuickSight

To allow a user to create users and administrators in Amazon QuickSight, allow the following actions in an IAM policy. For more information, see [Working with AWS Identity and Access Management \(IAM\) Users, Roles, and Policies \(p. 608\)](#).

| Standard Edition | Enterprise Edition |
|--|---|
| <ul style="list-style-type: none"> • <code>quicksight/CreateUser</code> • <code>quicksight>CreateAdmin</code> | <ul style="list-style-type: none"> • <code>quicksight/CreateUser</code> • <code>quicksight>CreateAdmin</code> • <code>quicksight>CreateReader</code> |

IAM Policy Actions for Setting AWS Resource Permissions in Amazon QuickSight

To allow a user to set permissions to use AWS resources inside Amazon QuickSight, allow the following actions in an IAM policy. For more information, see [Managing Amazon QuickSight Permissions to AWS Resources \(p. 607\)](#).

| Standard Edition | Enterprise Edition |
|---|--|
| <ul style="list-style-type: none"> • <code>iam:AttachRolePolicy</code> • <code>iam:CreatePolicy</code> • <code>iam:CreatePolicyVersion</code> • <code>iam:CreateRole</code> • <code>iam>DeletePolicyVersion</code> • <code>iam>DeleteRole</code> • <code>iam:DetachRolePolicy</code> • <code>iam:GetPolicy</code> • <code>iam:GetPolicyVersion</code> • <code>iam:GetRole</code> • <code>iam>ListAttachedRolePolicies</code> • <code>iam>ListEntitiesForPolicy</code> • <code>iam>ListPolicyVersions</code> • <code>iam>ListRoles</code> • <code>s3>ListAllMyBuckets</code> | Allow the same actions as required for Standard edition. |

IAM Policy Actions for Managing Directory Group Associations to Microsoft Active Directory or AD Connector from Amazon QuickSight

For Enterprise edition only, to allow a user to manage directory group associations to Microsoft Active Directory or AD Connector from Amazon QuickSight, allow the following actions in an IAM policy. For more information, see [Managing User Accounts in Amazon QuickSight Enterprise Edition \(p. 553\)](#).

| Standard Edition | Enterprise Edition |
|---|---|
| <ul style="list-style-type: none"> • N/A | <ul style="list-style-type: none"> • ds:DescribeTrusts • quicksight:GetGroupMapping • quicksight:SearchDirectoryGroups • quicksight:SetGroupMapping |

IAM Policy Actions for Unsubscribing from Amazon QuickSight

To allow a user to unsubscribe from Amazon QuickSight, allow the following actions in an IAM policy. Unsubscribing removes all users and data, and you can't undo this operation. For more information, see [Canceling Your Amazon QuickSight Subscription and Closing the Account \(p. 565\)](#).

To prevent Amazon QuickSight administrators from unsubscribing from Amazon QuickSight and deleting all users and data, you can deny all users the quicksight:Unsubscribe action. Then, if users try to unsubscribe, they get a message to contact their AWS administrator.

| Standard Edition | Enterprise Edition |
|--|--|
| <ul style="list-style-type: none"> • ds>DeleteDirectory • ds:UnauthorizeApplication • quicksight:Unsubscribe | <ul style="list-style-type: none"> • ds>DeleteDirectory • ds:UnauthorizeApplication • quicksight:Unsubscribe |

IAM Policy Actions for Embedding Dashboards with Amazon QuickSight

To allow a user to invoke an embedded dashboard from Amazon QuickSight, allow the following actions in an IAM policy. In the policy, you need to supply the dashboard IDs for the dashboards that can be embedded. For an example, see [IAM Policy Examples for Amazon QuickSight Dashboard Embedding \(p. 611\)](#).

| Standard Edition | Enterprise Edition |
|------------------|--|
| | <ul style="list-style-type: none"> • quicksight:RegisterUser • quicksight:GetDashboardEmbedUrl |

IAM Policy Examples for Amazon QuickSight Dashboard Embedding

The following example shows an IAM policy that enables dashboard sharing for specific dashboards.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": "quicksight:RegisterUser",
            "Resource": "arn:aws:quicksight:us-east-1:123456789012:dashboards/5678901234567890"
        }
    ]
}
```

```

        "Resource": "*",
        "Effect": "Allow"
    },
    {
        "Action": "quicksight:GetDashboardEmbedUrl",
        "Resource": "arn:aws:quicksight:us-
west-2:111122223333:dashboard/1a1ac2b2-3fc3-4b44-5e5d-c6db6778df89",
        "Effect": "Allow"
    }
]
}

```

IAM Policy Examples for Amazon QuickSight

Following, you can find several IAM policy examples for Amazon QuickSight.

The following example shows an IAM policy that enables Active Directory group management for an Amazon QuickSight Enterprise edition account.

```
{
    "Statement": [
        {
            "Action": [
                "ds:DescribeTrusts",
                "quicksight:GetGroupMapping",
                "quicksight:SearchDirectoryGroups",
                "quicksight:SetGroupMapping"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ],
    "Version": "2012-10-17"
}
```

The following example shows a policy that enables creating Amazon QuickSight users only. For `quicksight:CreateReader`, `quicksight:CreateUser`, and `quicksight:CreateAdmin`, you can limit the permissions to `"Resource": "arn:aws:quicksight:<YOUR_AWS_ACCOUNTID>:user/$aws:userid"`. For all other permissions described in this guide, use `"Resource": "*"`. The resource represents the scope of the permissions.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "quicksight>CreateUser"
            ],
            "Effect": "Allow",
            "Resource": "arn:aws:quicksight:<YOUR_AWS_ACCOUNTID>:user/$aws:userid"
        }
    ]
}
```

The following example for Amazon QuickSight Enterprise edition shows a policy that enables subscribing, creating users, managing Active Directory, and setting permissions to AWS resources. This example explicitly denies permission to unsubscribe from Amazon QuickSight.

```
{
    "Version": "2012-10-17",
```

```

"Statement": [
    {
        "Effect": "Allow",
        "Action": [
            "ds:AuthorizeApplication",
            "ds:UnauthorizeApplication",
            "ds:CheckAlias",
            "ds>CreateAlias",
            "ds:DescribeDirectories",
            "ds:DescribeTrusts",
            "ds>DeleteDirectory",
            "ds>CreateIdentityPoolDirectory",
            "iam:CreatePolicy",
            "iam:CreateRole",
            "iam>ListAccountAliases",
            "quicksight>CreateAdmin",
            "quicksight:Subscribe",
            "quicksight:GetGroupMapping",
            "quicksight:SearchDirectoryGroups",
            "quicksight:SetGroupMapping"
        ],
        "Resource": "*"
    },
    {
        "Effect": "Allow",
        "Action": [
            "iam:AttachRolePolicy",
            "iam:DetachRolePolicy",
            "iam>ListAttachedRolePolicies",
            "iam:CreatePolicy",
            "iam:GetPolicy",
            "iam>CreatePolicyVersion",
            "iam>DeletePolicyVersion",
            "iam:GetPolicyVersion",
            "iam>ListPolicyVersions",
            "iam:CreateRole",
            "iam>DeleteRole",
            "iam:GetRole",
            "iam>ListRoles",
            "iam>ListEntitiesForPolicy",
            "s3>ListAllMyBuckets"
        ],
        "Resource": "*"
    },
    {
        "Effect": "Deny",
        "Action": "quicksight:Unsubscribe",
        "Resource": "*"
    }
]
}

```

The following example for Amazon QuickSight Standard Edition shows a policy that enables subscribing, creating authors and readers, and setting permissions to AWS resources. This example explicitly denies permission to unsubscribe from Amazon QuickSight.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "ds:AuthorizeApplication",
                "ds:UnauthorizeApplication",

```

```
        "ds:CheckAlias",
        "ds>CreateAlias",
        "ds:DescribeDirectories",
        "ds:DescribeTrusts",
        "ds>DeleteDirectory",
        "ds>CreateIdentityPoolDirectory",
        "iam>CreatePolicy",
        "iam>CreateRole",
        "iam>ListAccountAliases",
        "quicksight>CreateUser",
        "quicksight:Subscribe"
    ],
    "Resource": "*"
},
{
    "Effect": "Allow",
    "Action": [
        "iam:AttachRolePolicy",
        "iam:DetachRolePolicy",
        "iam>ListAttachedRolePolicies",
        "iam>CreatePolicy",
        "iam:GetPolicy",
        "iam>CreatePolicyVersion",
        "iam>DeletePolicyVersion",
        "iam:GetPolicyVersion",
        "iam>ListPolicyVersions",
        "iam>CreateRole",
        "iam>DeleteRole",
        "iam:GetRole",
        "iam>ListRoles",
        "iam>ListEntitiesForPolicy",
        "s3>ListAllMyBuckets"
    ],
    "Resource": "*"
},
{
    "Effect": "Deny",
    "Action": [
        "quicksight:Unsubscribe",
    ],
    "Resource": "*"
}
]
```

For information about Amazon QuickSight actions like `quicksight:GetGroupMapping`, see [Working with IAM Actions and Permissions for Amazon QuickSight Users \(p. 608\)](#).

Working with Amazon VPC

Amazon QuickSight is fully integrated with the Amazon Virtual Private Cloud (Amazon VPC) service. Use this section to find how to configure Amazon QuickSight to access data in your VPC.

In Amazon QuickSight Enterprise edition, you can create connections to your VPCs from your AWS account's Amazon QuickSight subscription. Each connection creates an elastic network interface in your VPC for Amazon QuickSight to send traffic to instances in your VPC. When creating a data set, Amazon QuickSight accesses a VPC connection using only private IP addresses to connect to an instance that is not reachable from the public internet. You can access VPCs that are located in the same AWS Region where you are using Amazon QuickSight to create analyses.

Create a Private Connection to Amazon VPC Using Amazon QuickSight

Use the following procedure to create a connection to a VPC. Before you begin, you should understand your deployment of Amazon VPC in the AWS Region you are using: its subnets, and security groups, in relation to the destinations (databases) you want to reach from Amazon QuickSight.

1. In Amazon QuickSight, choose your profile icon at the top right of the screen, then choose **Manage QuickSight**. From the menu at left, choose **Manage VPC connections**.

The **Account Settings** page appears. Any existing private connections to VPCs display on this page.

The screenshot shows the 'Account Settings' page in Amazon QuickSight. At the top, it displays the account name 'amazoncathan' and edition 'Enterprise'. On the left, there's a sidebar with links for 'Manage users', 'Your subscriptions', 'SPICE capacity', and 'Account settings'. Below the sidebar, a button labeled 'Manage VPC connections' is highlighted with a blue border. To the right, a section titled 'Manage VPC connections' is shown with the sub-instruction: 'Review all VPC connections for Quicksight. Add a new VPC connection and remove the old one to update a VPC connection.' A table lists existing VPC connections, which currently show 'No VPC connections'. At the bottom of the table is a blue 'Add VPC connection' button.

2. Choose **Add VPC connection** to add a new VPC connection.

On this page, you can also delete a VPC connection by using the delete icon. You can change a VPC connection on this page by creating a new VPC connection and deleting the old one.

3. For **VPC connection name**, type a unique descriptive name. This name doesn't need to be an actual VPC ID or name.
4. Type the subnet ID for **Subnet ID**, and type the group ID for **Security group ID**. Make sure that the subnet and the security group are in the same VPC. Also, make sure you are accessing a VPC that is in the same AWS Region where you are creating Amazon QuickSight analyses. You can't use Amazon QuickSight in one AWS Region to connect to a subnet and security group that are in a different AWS Region. More detailed requirements are provided in the following steps, and in [How Amazon QuickSight Connects to Your VPC \(p. 620\)](#).

Adding VPC Connection

You can connect Quicksight to your data secured by Virtual Private Cloud (VPCs). Enter the IDs for the VPC connection below. Use the links below to locate them in the AWS console.

- VPC ID [AWS VPC console](#)
- Subnet ID [AWS VPC subnet console](#)
- Security group [AWS Security group console](#)

VPC connection name

Enter a name

Subnet ID

Example: subnet-12345678

Security group ID

Example: sg-12345678

VPC connection details cannot be changed later.

Create

If you need to locate information about the subnet and security group, do the following:

- a. On the Amazon VPC console, find the **VPC ID** that you want to use.

The screenshot shows the Amazon VPC Dashboard. On the left, there's a sidebar with various options like Your VPCs, Subnets, Route Tables, etc. The 'Your VPCs' option is selected. On the right, there's a main panel with a 'Create VPC' button and an 'Actions' dropdown. Below that is a search bar with placeholder text 'Search VPCs and their properties'. A table lists two VPCs:

| | Name | VPC ID | State |
|--------------------------|-----------|---------|-----------|
| <input type="checkbox"/> | vpc-d5c | vpc-d5c | available |
| <input type="checkbox"/> | vpc-test1 | vpc-5e9 | available |

A message 'Select a VPC above' is displayed below the table.

- b. On the Amazon VPC subnet console page, see which subnets are in that VPC by locating the VPC ID. Choose a subnet, and copy its **Subnet ID** value. The subnet you choose is the one where you plan to create an elastic network interface. It must be possible to route from this subnet to any destinations you want to reach. For more information, see [VPCs and Subnets](#).

| | Name | Subnet ID | State | VPC |
|--------------------------|------------|-----------|---------|-----|
| <input type="checkbox"/> | subnet-a03 | available | vpc-d5c | |
| <input type="checkbox"/> | subnet-39c | available | vpc-d5c | |
| <input type="checkbox"/> | subnet-821 | available | vpc-d5c | |
| <input type="checkbox"/> | subnet-ed6 | available | vpc-d5c | |
| <input type="checkbox"/> | subnet-ce9 | available | vpc-d5c | |
| <input type="checkbox"/> | subnet-a20 | available | vpc-d5c | |

Select a subnet above

- c. On the **Adding VPC connection** screen, enter the **Subnet ID** value that you copied in the previous step for **Subnet ID**.
- d. On the Amazon VPC security group console page, see which security groups are in that VPC by locating the VPC ID. Choose a group, and copy its **Group ID** value.

Create a new security group for use only with the elastic network interface created by Amazon QuickSight. The group must allow inbound traffic on all ports from the security groups of the destinations you want to reach.

The group must also allow outbound traffic to the database on the port that the database is listening on.

Additionally, you must update your database's security group to allow inbound traffic from your new security group.

For more information, see [Security Group Rules for Amazon QuickSight's Elastic Network Interface \(p. 621\)](#).

Note

The database server's security group must allow inbound traffic from the security group you choose.

The screenshot shows the VPC Dashboard with the 'Security Groups' tab selected. On the left, a sidebar lists various VPC components: Virtual Private Cloud, Your VPCs, Subnets, Route Tables, Internet Gateways, Egress Only Internet Gateways, DHCP Options Sets, Elastic IPs, Endpoints, Endpoint Services, NAT Gateways, and Peering Connections. Below these, under the 'Security' heading, are Network ACLs and Security Groups, with Security Groups highlighted by an orange border. The main pane displays a table of security groups with columns for Name tag, Group ID, Group Name, and VPC. The table contains four entries: sg-05b, sg-0d9, sg-314, and sg-f574, all associated with the VPC 'vpc-d5c'. A message at the bottom of the main pane says 'Select a security group above'.

| Name tag | Group ID | Group Name | VPC |
|----------|----------|------------|---------|
| | sg-05b | | vpc-d5c |
| | sg-0d9 | | vpc-5e9 |
| | sg-314 | | vpc-d5c |
| | sg-f574 | | vpc-d5c |

- e. On the **Adding VPC connection** screen, enter the **Group ID** value that you copied in the previous step for **Security group ID**.

5.

Important

You can't change the settings for a VPC connection.

Review your choices, then choose **Create**.

Adding VPC Connection

You can connect Quicksight to your data secured by Virtual Private Cloud (VPCs). Enter the IDs for the VPC connection below. Use the links below to locate them in the AWS console.

- VPC ID [AWS VPC console](#)
- Subnet ID [AWS VPC subnet console](#)
- Security group [AWS Security group console](#)

VPC connection name

vpc-d5c

Subnet ID

subnet-a03

Security group ID

sg-05b

VPC connection details cannot be changed later.

Note

Creating a VPC connection requires permission for the `quicksight:CreateVPCConnection` and `ec2:CreateNetworkInterface` actions.

For best practices when using Amazon VPC, see the following:

- [AWS Single VPC Design](#) on the AWS website
- [Recommended Network ACL Rules for Your VPC](#) in the *Amazon VPC User Guide*
- [VPC Scenarios and Examples](#) in the *Amazon VPC User Guide*

What Is Amazon VPC?

Amazon Virtual Private Cloud (Amazon VPC) enables you to define a virtual network in your own logically isolated area within the AWS cloud, known as a *virtual private cloud (VPC)*. You can launch your AWS resources, such as instances, into your VPC. Your VPC closely resembles a traditional network that you might operate in your own data center, with the benefits of using AWS's scalable infrastructure. You can configure your VPC; you can select its IP address range, create subnets, and configure route tables, network gateways, and security settings. You can connect instances in your VPC to the internet. You can connect your VPC to your own corporate data center, making the AWS cloud an extension of your data center. To protect the resources in each subnet, you can use multiple layers of security, including security groups and network access control lists. For more information, see the [Amazon VPC User Guide](#).

How Amazon QuickSight Connects to Your VPC

When you create a VPC connection from Amazon QuickSight to your VPC, Amazon QuickSight creates an elastic network interface in the subnet that you choose. It must be possible to route from this subnet to any destinations you want to reach.

Network traffic from Amazon QuickSight then originates from this network interface when Amazon QuickSight connects to a database or other instance within your VPC using a VPC connection. Because

this network interface exists inside your VPC, traffic originating from it can reach destinations within your VPC using their private IP addresses.

Controlling the Resources That Amazon QuickSight Can Reach in Your VPC

Network traffic sent from Amazon QuickSight to an instance within your VPC through a VPC connection is subject to all of the standard security controls, just as other traffic in your VPC is. Route tables, network ACLs, and security groups all apply to network traffic from Amazon QuickSight in the same way they apply to traffic between other instances in your VPC.

Configuring Security Group Rules for Use with Amazon QuickSight

For Amazon QuickSight to successfully connect to an instance in your VPC, you must configure your security group rules to allow traffic between the Amazon QuickSight network interface and your instance.

Security Group Rules for the Instance in Your VPC

The security group attached to your data source's instance must allow inbound traffic from Amazon QuickSight on the port that Amazon QuickSight is connecting to.

You can do this by adding a rule to your security group that allows traffic from the security group ID that is associated with the Amazon QuickSight (recommended). Alternatively, you can use a rule that allows traffic from the private IP address assigned to Amazon QuickSight.

For more information, see [Security Groups for Your VPC and VPCs and Subnets](#).

Security Group Rules for Amazon QuickSight's Elastic Network Interface

When using a VPC Connection, traffic comes from the elastic network interface that we create in your VPC. Each elastic network interface gets its own private IP address that's chosen from the subnet you configure. The private IP address is unique for each AWS account, unlike the public IP range.

The security group attached to the Amazon QuickSight elastic network interface should have outbound rules allowing traffic to all of the data source instances in your VPC that you want Amazon QuickSight to connect to. If you don't want to restrict which instances Amazon QuickSight can connect to, you can configure your security group with an outbound rule to allow traffic to 0.0.0.0/0 on all ports. If you want to restrict Amazon QuickSight to connect only to certain instances, you can specify the security group ID (recommended) or private IP address of the instances you want to allow. You specify these, along with the appropriate port numbers for your instances, in your outbound security group rule.

The security group attached to the Amazon QuickSight elastic network interface behaves differently than most security groups. Security groups are usually stateful, meaning that when an outbound connection is established the return traffic from the destination host is automatically allowed. However, the security group attached to the Amazon QuickSight network interface isn't stateful. This means that your return traffic from the destination host isn't automatically allowed. In this case, adding an egress rule to the network interface security group doesn't work. Therefore, you must add inbound rules to your security group to explicitly authorize it.

Because the destination port number of any inbound return packets is set to a randomly allocated port number, the inbound rule in your security group must allow traffic on all ports (0–65535). If you don't want to restrict which instances Amazon QuickSight can connect to, then you can configure this security group with an inbound rule to allow traffic on 0.0.0.0/0 on all ports. If you want to restrict Amazon QuickSight to connect only to certain instances, you can specify the security group ID (recommended). Alternatively, you can specify the private IP address of the instances you want to allow in your inbound security group rule. In this case, your inbound security group rule still needs to allow traffic on all ports.

Limitations on Data Sources Using a VPC Connection

The following data source types can use a VPC connection:

- Amazon Redshift
- Amazon RDS
- Amazon Aurora
- PostgreSQL
- MySQL
- MariaDB
- Microsoft SQL Server

The instance you are connecting to must either reside within your VPC or be reachable by using an AWS Direct Connect gateway, NAT gateway or VPN gateway. Amazon QuickSight can't send traffic through a VPC connection to instances that are only reachable by a VPC peering connection.

Amazon QuickSight can't connect to a network load balancer by using a VPC connection.

Other Requirements for Data Sources Using a VPC Connection

The DNS name of the database or instance you are connecting to through a VPC connection must be resolvable from outside of your VPC. Also, the connection must return the private IP address of your instance. Databases hosted by Amazon Redshift, Amazon RDS, and Aurora automatically meet this requirement.

Logging Operations with AWS CloudTrail

Amazon QuickSight is integrated with AWS CloudTrail. This service provides a record of actions taken by a user, role, or an AWS service in Amazon QuickSight. The calls captured include calls from the Amazon QuickSight console. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Amazon QuickSight. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to Amazon QuickSight, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

Topics

- [Amazon QuickSight Information in CloudTrail \(p. 622\)](#)
- [Tracking Non-API Events by Using CloudTrail Logs \(p. 623\)](#)
- [Example: Amazon QuickSight Log File Entries \(p. 625\)](#)

Amazon QuickSight Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When supported event activity occurs in Amazon QuickSight, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see [Viewing Events with CloudTrail Event History](#).

For an ongoing record of events in your AWS account, including events for Amazon QuickSight, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create

a trail in the console, the trail applies to all AWS Regions. The trail logs events from all Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- [Overview for Creating a Trail](#)
- [CloudTrail Supported Services and Integrations](#)
- [Configuring Amazon SNS Notifications for CloudTrail](#)
- [Receiving CloudTrail Log Files from Multiple Regions](#) and [Receiving CloudTrail Log Files from Multiple Accounts](#)

Amazon QuickSight supports logging the following actions as events in CloudTrail log files:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials
- Whether the request was made with temporary security credentials for an IAM role or federated user
- Whether the request was made by another AWS service

For more information on user identity, see the [CloudTrail userIdentity Element](#).

By default, each Amazon QuickSight log entry contains the following information:

- **userIdentity** – User identity
- **eventTime** – Event time
- **eventId** – Event Id
- **readOnly** – Read only
- **awsRegion** – AWS Region
- **eventSource (quicksight)** – Source of the event (Amazon QuickSight)
- **eventType (AwsServiceEvent)** – Event type (AWS service event)
- **recipientAccountId (customer AWS account)** – Recipient account ID (Customer AWS account)

Note

CloudTrail displays users as unknown if they were provisioned by Amazon QuickSight. This display is because these users aren't a known IAM identity type.

Tracking Non-API Events by Using CloudTrail Logs

Following is a list of the non-API events you can track.

User Management

- **CreateAccount** – Create Account
- **BatchCreateUser** – Create User
- **BatchResendUserInvite** – Invite User
- **UpdateGroups** – Update Groups

This event works with Enterprise edition only.

- **UpdateSpiceCapacity** – Update SPICE Capacity
- **DeleteUser** – Delete User
- **Unsubscribe** – Unsubscribe User

Subscription

- **CreateSubscription** – Create Subscription
- **UpdateSubscription** – Update Subscription
- **DeleteSubscription** – Delete Subscription

Dashboard

- **GetDashboard** – Get Dashboard
- **CreateDashboard** – Create Dashboard
- **UpdateDashboard** – Update Dashboard
- **UpdateDashboardAccess** – Update Dashboard Access
- **DeleteDashboard** – Delete Dashboard

Analysis

- **GetAnalysis** – Get Analysis
- **CreateAnalysis** – Create Analysis
- **UpdateAnalysisAccess** – Update Analysis Access
- **UpdateAnalysis** – Update Analysis
 - **RenameAnalysis** – Rename Analysis
 - **CreateVisual** – Create Visual
 - **RenameVisual** – Rename Visual
 - **DeleteVisual** – Delete Visual
 - **DeleteAnalysis** – Delete Analysis

Data Source

- **CreateDataSource** – Create Data Source
 - **FlatFile** – Flat file
 - **External** – External
 - **S3** – S3
 - **ImportS3ManifestFile** – S3 Manifest File
 - **Presto** – Presto
 - **RDS** – RDS
 - **Redshift** – Redshift (manual)
- **UpdateDataSource** – Update Data Source
- **DeleteDataSource** – Delete Data Source

Data Set

- **CreateDataSet** – Create Data Set
 - **CustomSQL** – Custom SQL
 - **SQLTable** – SQL Table
 - **File** – CSV or XLSX
- **UpdateDataSet** – Update SQL Join Dataset
- **UpdateDatasetAccess** – Update Dataset Access

- **DeleteDataSet** – Delete Dataset

Example: Amazon QuickSight Log File Entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the BatchCreateUser action.

```
{  
    "eventVersion": "1.05",  
    "userIdentity":  
    {  
        "type": "Root",  
        "principalId": "123456789012",  
        "arn": "arn:aws:iam::123456789012:root",  
        "accountId": "123456789012",  
        "userName": "test-username"  
    },  
    "eventTime": "2017-04-19T03:16:13Z",  
    "eventSource": "quicksight.amazonaws.com",  
    "eventName": "BatchCreateUser",  
    "awsRegion": "us-west-2",  
    "requestParameters": null,  
    "responseElements": null,  
    "eventID": "e7d2382e-70a0-3fb7-9d41-a7a913422240",  
    "readOnly": false,  
    "eventType": "AwsServiceEvent",  
    "recipientAccountId": "123456789012",  
    "serviceEventDetails":  
    {  
        "eventRequestDetails":  
        {  
            "users":  
            {  
                "test-user-11":  
                {  
                    "role": "USER"  
                },  
                "test-user-22":  
                {  
                    "role": "ADMIN"  
                }  
            },  
            "eventResponseDetails":  
            {  
                "validUsers": [  
                ],  
                "invalidUsers": [  
                    "test-user-11",  
                    "test-user-22"  
                ]  
            }  
        }  
    }  
}
```

AWS Glossary

For the latest AWS terminology, see the [AWS Glossary](#) in the *AWS General Reference*.

Document History

The following table describes the important changes to the *Amazon QuickSight User Guide*. If you want to be notified about updates, you can subscribe to the RSS feed using the icon in the menu bar. If you are also interested in updates for all AWS products, see [What's New with AWS](#).

Note

In a Kindle publication, you can find the last change date above the table of contents. However, on the Kindle website, the original publication date is unchanged.

The following table describes important changes in each release of the *Amazon QuickSight User Guide* after March 4, 2019. For notification about updates to this documentation, you can subscribe to an RSS feed.

| update-history-change | update-history-description | update-history-date |
|--|--|---------------------|
| New languages added (p. 627) | Amazon QuickSight is now available in 10 languages: English, German, Spanish, French, Portuguese, Italian, Japanese Korean, Simplified Chinese, and Traditional Chinese. For more information, see Choosing a Language in Amazon QuickSight . | April 8, 2019 |
| New aggregation function (p. 627) | Amazon QuickSight supports aggregating by percentile. This function helps you understand the distribution of your data. For more information, see percentile . | April 8, 2019 |
| Customize how many data points to display (p. 627) | You can now format your visuals to display a custom number of data points or groups before showing the "other" category. This feature is available for bar charts, combo charts, line charts, pie charts, heat maps, and tree maps. For more information, see Customizing a Visual . | April 8, 2019 |
| ML-powered forecasting (p. 627) | With forecasting powered by machine learning and what-if analyses in Amazon QuickSight, nontechnical users can now easily forecast their key business metrics. No ML expertise or Microsoft Excel data modeling is required. The built-in ML algorithm in Amazon QuickSight is designed to handle complex real-world scenarios. Amazon | March 14, 2019 |

| | | |
|---|--|----------------|
| | <p>Quicksight uses ML to provide more reliable forecasts than traditional means. For more information, see Forecasts and What-Ifs.</p> | |
| ML-powered anomaly detection (p. 627) | <p>Amazon Quicksight uses proven Amazon technology to continuously run ML-powered anomaly detection on millions of metrics and billions of data points. This anomaly detection enables you to get deep insights that are often buried in the aggregates, not visible in plain sight, and not scalable with manual analysis. With ML-powered anomaly detection, there's no need for manual analysis, custom development, or ML domain expertise. For more information, see Anomaly Detection.</p> | March 14, 2019 |
| Automatic narratives (p. 627) | <p>Automatic narratives provide key insights in everyday language, embedded contextually in your dashboard, saving hours on manual analysis. With automatic narratives, Amazon Quicksight interprets the charts and tables in your dashboard and provides a number of suggested insights in natural language. Depending on the shape and form of your data, you might get suggestions such as what the day-over-day changes look like, what was the highest sales date, what the growth rate is at and what the forecast looks like for the next seven days. As the author of the dashboard, you can customize the computations and business language for your needs. You can use automatic narratives to effectively tell the story of your data in plain language. For more information, see Narrative Insights.</p> | March 14, 2019 |

Previous Updates

The following table describes the important changes in each release of the *Amazon QuickSight User Guide* before March 4, 2019.

| Change | Description | Date Changed |
|--------------|---|------------------|
| New features | <p>Using custom window functions, you can calculate any aggregation for a defined window at the point of selection. You can define the window interval before and after any point in time. You can also do calculations for that window using the <code>sum</code>, <code>average</code>, <code>minimum</code>, <code>maximum</code>, and <code>count</code> functions. Doing this enables a moving window aggregation as you progress through your data points. For more information, see Table Calculation Functions Index (p. 471).</p> <p>Send email reports with data tailored to each of your users and groups. You can now create email reports for data sets that use row-level security. QuickSight generates a custom email snapshot for each user or group based on their data permission that is defined in the dashboard. RLS for email reports works for both scheduled and ad hoc emails. For more information, see Sending Reports by Email (p. 427).</p> <p>Amazon QuickSight now supports unbounded cardinality. That means you can have more than 10,000 values in your control or filter. For more information, see Using a Control with a Parameter in Amazon QuickSight (p. 233).</p> <p>You can create a datetime parameter that has no static default value. Filters on these parameters become active after you choose a value. For more information, see Adding a Date Filter (p. 319).</p> | March 4, 2019 |
| New features | <p>There are new table calculations available:</p> <ul style="list-style-type: none"> • percentileOver (p. 486) • runningAvg (p. 495) • runningCount (p. 496) • runningMax (p. 497) • runningMin (p. 498) | February 7, 2019 |
| New features | <p>Amazon QuickSight supports emailing reports that use row-level security, using controls with unbounded cardinality, and creating datetime parameters with no default values. For more information, see:</p> <ul style="list-style-type: none"> • Sending Reports by Email (p. 427) • Using a Control with a Parameter in Amazon QuickSight (p. 233) • Adding a Date Filter (p. 319) | January 22, 2019 |
| New features | <p>We added conditional aggregations, including <code>sumIf</code>, <code>countIf</code>, <code>minIf</code>, <code>maxIf</code>, <code>avgIf</code>, and <code>distinct_countIf</code>.</p> <p>Pivot tables now support infinite scrolling through millions of rows. You can add up to 20 fields for columns, and 20 fields for rows. Plus, you can add subtotals and totals to rows and columns.</p> | January 10, 2019 |

| Change | Description | Date Changed |
|------------------|---|--------------------|
| | <p>For more information, see the following:</p> <ul style="list-style-type: none"> • Using Aggregate Functions in Calculated Fields (p. 220) • Using Pivot Tables (p. 364) | |
| New feature | <p>We enhanced the join editor to increase usability and functionality. You can now add tables from one or more schemas on the same data source, or add the same table twice.</p> <p>For more information, see Joining Tables (p. 136).</p> | January 3, 2019 |
| New SDK | <p>You can embed dashboards and manage users or groups by using the Amazon QuickSight SDKs. For more information, see Embedding and Other SDKs (p. 510).</p> | November 27, 2018 |
| New features | <p>You can use groups with row-level security (RLS), and you can add cascading controls for parameters. For more information, see:</p> <ul style="list-style-type: none"> • Restricting Access to a Data Set by Using Row-Level Security (p. 118) • Using a Control with a Parameter in Amazon QuickSight (p. 233) | November 20, 2018 |
| Function renamed | <p>We renamed the percentile function to make it more intuitive. Its new name is <code>percentileRank</code>. For more information, see percentileRank (p. 493).</p> | November 12, 2018 |
| New features | <p>Use a top and bottom filter to show the top or bottom n for the field you choose, based on values in another field. For example, you could choose to show the top five sales people based on revenue. For more information, see Adding a Text Filter (p. 305).</p> <p>Use a cascading controls to limit the values displayed in the controls, so they only show values that are relevant to what is selected in other controls. For more information, see Setting Up Parameters in Amazon QuickSight (p. 231).</p> | November 1, 2018 |
| New feature | <p>Use JSON native data types with <code>parseJson</code>. For more information see, parseJson (p. 461).</p> | October 30, 2018 |
| New features | <p>Use date functions to find out what quarter a date is in:</p> <ul style="list-style-type: none"> • addDateTime (p. 440) • extract (p. 446) • truncDate (p. 470) <p>Add parameters to URLs. For more information see, Using Parameters in a URL (p. 243).</p> | September 10, 2018 |
| New features | <p>You can sort strings in SPICE data sets. For more information on these features, see Sorting Visual Data in Amazon QuickSight (p. 298)</p> | August 20, 2018 |

| Change | Description | Date Changed |
|--------------|---|-----------------|
| New features | <p>You can schedule emailed reports, and add data labels to your visuals.</p> <p>For more information on these features, see the following sections:</p> <ul style="list-style-type: none"> • Sending Reports by Email (p. 427) • Subscribing to Reports (p. 431) • Customizing Data Labels on Visuals (p. 271) | August 15, 2018 |
| New features | <p>You can create table calculations, using aggregated measures to discover how dimensions influence measures or each other. Also, you can visualize time data at granularities as low as one minute.</p> <p>For more information on these features, see the following sections:</p> <ul style="list-style-type: none"> • Table Calculations (p. 438) • Changing Date Field Granularity (p. 290) | August 8, 2018 |
| New features | <p>You can replace data sets, customize labels, and format dimensions that are aggregated with count and count distinct. Also, new visuals start out smaller in size.</p> <p>For more information on these features, see the following sections:</p> <ul style="list-style-type: none"> • Replacing Data Sets (p. 193) • Customizing Visual Labels (p. 269) • Customizing a Field Format (p. 197) • Working with Amazon QuickSight Visuals (p. 253) | June 21, 2018 |

| Change | Description | Date Changed |
|-----------------------------------|--|--------------|
| New features and a new AWS Region | <p>You can upgrade your Amazon QuickSight subscription from Standard edition to Enterprise edition. In Enterprise edition, Amazon QuickSight supports usage-based pricing for users in the reader role, sharing dashboards with all users in the reader role, and hourly refresh of data sets. Amazon QuickSight supports also supports private connections to data in a VPC with a private subnet in Enterprise edition.</p> <p>In both editions, Amazon QuickSight supports parameters with on-sheet controls, dashboard co-ownership, custom URL actions, and 25-GB SPICE data sets.</p> <p>Also, Amazon QuickSight is available in Asia Pacific (Tokyo).</p> <p>For more information on these features, see the following sections:</p> <ul style="list-style-type: none"> • Upgrading Your Amazon QuickSight Subscription from Standard Edition to Enterprise Edition (p. 563) • Self-Provisioning an Amazon QuickSight Read-Only User (p. 562) • Inviting Users to Access Amazon QuickSight (p. 568) • Sharing Dashboards (p. 424) • Working with Amazon VPC (p. 614) • Refreshing a Data Set on a Schedule (p. 111) • Parameters in Amazon QuickSight (p. 231) • Using Data Dashboards in Amazon QuickSight (p. 10) (newly updated for read-only users) • Adding Custom URL Actions to Visuals in Amazon QuickSight (p. 339) • Data Source Limits (p. 62) • AWS Regions and IP Address Ranges (p. 546) | May 30, 2018 |
| New feature | <p>Amazon QuickSight supports quick sorting from axis labels, duplicating data sets, and showing or hiding totals on tabular reports. Also, you can add custom SQL to a data set earlier in the creation workflow. For more information on these features, see the following sections:</p> <ul style="list-style-type: none"> • Quick Sorting on a Visual Axis (p. 299) • Duplicating a Data Set (p. 107) • Use Totals on a Tabular Report (p. 393) • Creating a Custom SQL Query (p. 145) | May 25, 2018 |

| Change | Description | Date Changed |
|------------------|--|--------------------|
| New features | <p>You can use Amazon QuickSight to connect to Software as a Service (SaaS) providers. For more information, see Software as a Service (SaaS) Data Sources (p. 61).</p> <p>You can import JSON files to Amazon QuickSight. For more information, see JSON Data Sources (p. 60). You can also parse JSON fields in a CSV file. For more information, see parseJson (p. 461).</p> | April 9, 2018 |
| New feature | You can use Amazon QuickSight with Amazon S3 files that are in a different AWS account. For more information, see Data Sets Using S3 Files in Another AWS Account (p. 80) . | November 20, 2017 |
| New visual types | You can create visuals using maps. You can also view tabular data in a visual. For more information on preparing geospatial data for use in a visual, see Adding Geospatial Data (p. 177) . For more information on creating a geospatial visual, see Using Geospatial Charts (Maps) (p. 354) . For more information on using tabular reports, see Using Tabular Reports (p. 392) . | November 20, 2017 |
| New features | Amazon QuickSight can support 1000 columns in a data set. For more information, see Data Source Limits (p. 62) . Calculated fields are supported in SPICE data sets. For more information, see Adding a Calculated Field to an Analysis (p. 219) . Also, high cardinality values, which often display as a long tail on a visual, are placed into a category called other . For more information, see Working with Visual Types in Amazon QuickSight (p. 342) . | November 20, 2017 |
| New feature | In Enterprise edition, you can restrict access to a data set by adding row-level security. To learn more, see Restricting Access to a Data Set by Using Row-Level Security (p. 118) . | October 20, 2017 |
| New visual type | You can create visuals using combo charts. To learn more about combo charts, see Using Combo Charts (p. 351) . | October 20, 2017 |
| New features | Amazon QuickSight supports creating custom aggregations for calculated fields in analyses, custom date formats, and copies of dashboards. For more information on aggregating calculated fields, see Using Aggregate Functions in Calculated Fields (p. 220) . For more information on using unsupported dates by creating a custom date format, see Using Unsupported or Custom Dates (p. 154) . For more information on duplicating dashboards, see Copying a Dashboard (p. 423) . | September 25, 2017 |
| New feature | You can combine multiple filters using the And/Or operators. To learn more about filter groups, see Adding a Compound Filter with And/Or Operators (p. 327) . | August 31, 2017 |
| New data source | Amazon QuickSight supports Amazon S3 Analytics. | August 31, 2017 |

| Change | Description | Date Changed |
|---------------|---|---------------------|
| New Features | Amazon QuickSight supports importing ZIP files from Amazon S3. There is also a new search feature, to simplify finding analyses, data sets, and dashboards. For more information on the search feature, see Navigating the User Interface (p. 52) . | August 31, 2017 |
| New regions | Amazon QuickSight is now available in Asia Pacific (Singapore) and Asia Pacific (Sydney). | August 8, 2017 |
| New feature | Amazon QuickSight supports Snowflake cloud data warehouse. | July 31, 2017 |
| New feature | Amazon QuickSight added a new aggregation: Count Distinct. To learn more, see Changing Field Aggregation (p. 288) . | July 19, 2017 |
| New feature | Amazon QuickSight supports exploring Amazon S3 analytics data from an Amazon QuickSight dashboard that you reach from the AWS Management Console. To learn more, see Exploring Your AWS Data in Amazon QuickSight (p. 605) . | July 5, 2017 |
| New feature | Amazon QuickSight supports Federated Single Sign-On (SSO) in Enterprise Edition. To learn more, see Enabling Single Sign-On Access to Amazon QuickSight Using SAML 2.0 (p. 557) . | May 25, 2017 |
| New feature | Amazon QuickSight supports Amazon Redshift Spectrum. To learn more, see Enabling Access to Amazon Redshift Spectrum (p. 602) . | May 25, 2017 |
| New feature | Amazon QuickSight supports Federated Single Sign-On (SSO) in Standard Edition. To learn more, see Enabling Single Sign-On Access to Amazon QuickSight Using SAML 2.0 (p. 557) . | May 25, 2017 |
| New feature | Amazon QuickSight supports just-in-time (JIT) user provisioning through the following policy actions: <code>quicksight:CreateUser</code> and <code>quicksight:CreateAdmin</code> . To learn more, see Setting Your IAM Policy (p. 609) . | May 25, 2017 |
| New feature | Amazon QuickSight supports direct connections to Teradata 14.0 and later. | May 25, 2017 |
| New feature | Amazon QuickSight added relative date filters for data sets and visuals. To learn more, see Adding a Date Filter (p. 169) . | May 25, 2017 |
| New feature | Amazon QuickSight supports connecting to Apache Spark and Presto. To learn more, see Creating a Data Source Using Apache Spark (p. 72) and Creating a Data Source Using Presto (p. 72) . | May 3, 2017 |
| New feature | Amazon QuickSight supports operational logging with AWS CloudTrail. To learn more, see Logging Operations with AWS CloudTrail (p. 622) . | April 28, 2017 |

| Change | Description | Date Changed |
|---------------|--|---------------------|
| New feature | Amazon QuickSight is available in US East (Ohio). To learn more about regions, see AWS Regions and IP Address Ranges (p. 546) . | April 11, 2017 |
| New feature | <ul style="list-style-type: none"> You can use the AD Connector with Amazon QuickSight. To learn more about managing Enterprise users, see Access and Authentication in Amazon QuickSight (p. 553). You can add Key Performance Indicators (KPIs) to your visualizations. To learn more, see Using KPIs (p. 358). And you can import .xlsx files with headers and footers, comments, formatting, filter header, sort, frozen panel/header, hidden columns, groups, and formulas / references. You can also limit your import to a specific range. To learn more about importing ranges, see Choosing File Upload Settings (p. 135). | April 6, 2017 |
| New feature | You can now export to a comma-separated value (CSV) format file using Amazon QuickSight. To learn more, see Exporting Data from an Amazon QuickSight Visual to a CSV File (p. 256) . | March 21, 2017 |
| New feature | You can now schedule data refreshes for SPICE data sets. To learn more, see Refreshing Data (p. 107) . | February 14, 2017 |
| New feature | You can now connect to Amazon Athena databases and use them as data sources in Amazon QuickSight. To learn more, see Creating a Data Set Using Amazon Athena Data (p. 86) . | December 22, 2016 |
| New edition | Amazon QuickSight now offers an Enterprise edition as well as a Standard edition. Both editions offer a full set of features for creating and sharing data visualizations, and Enterprise edition additionally offers encryption at rest and Active Directory integration. When you choose to use Enterprise edition, you select a Microsoft Active Directory directory in AWS Directory Service and use that active directory to identify and manage your Amazon QuickSight users and administrators. To learn more, see Different Editions of Amazon QuickSight (p. 543) . | December 15, 2016 |
| New guide | This is the first release of <i>Amazon QuickSight User Guide</i> . | November 15, 2016 |

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