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# User Guide

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# Introduction to the User Guide

This ThoughtSpot User Guide contains information on navigating and searching data with ThoughtSpot. It will assist you with starting new searches, managing your pinboards, and troubleshooting.

ThoughtSpot enables you to view and analyze your data through a search-based user interface. You can create your searches on the fly by typing them into a search bar, like you do when using an internet search engine. ThoughtSpot makes it easy to see your data, get your questions answered, create interactive graphs, and customize pinboards. You do not need to understand how the data is stored, attend days of training, or know SQL to do these things. Collaboration and security features make it easy for to protect sensitive data and share information safely with others.

ThoughtSpot gives administrators the ability to modify data properties to meet business needs, for example by providing search synonyms for common terms, boosting the importance of a column in search results, or formatting how the data appears. So if you are not getting the answers you expect when using ThoughtSpot, check with your ThoughtSpot administrator to see if some settings may need to be changed.

- [Finding your way around \(page 6\)](#)  
ThoughtSpot is organized into several sections to make navigation easy. You can reach them by using the menu bar.
- [About the user profile \(page 12\)](#)  
The user icon lets you view your profile or sign out of ThoughtSpot.
- [Understanding privileges \(page 14\)](#)  
The things you can do in ThoughtSpot are determined by the privileges you have. These are set at the group level.
- [About stickers \(page 16\)](#)  
You can create stickers to make it easier for people to find data sources and pinboards.

# Finding your way around

**Summary:** ThoughtSpot is organized into several sections to make navigation easy. You can reach them by using the menu bar.

These are the different sections in ThoughtSpot:

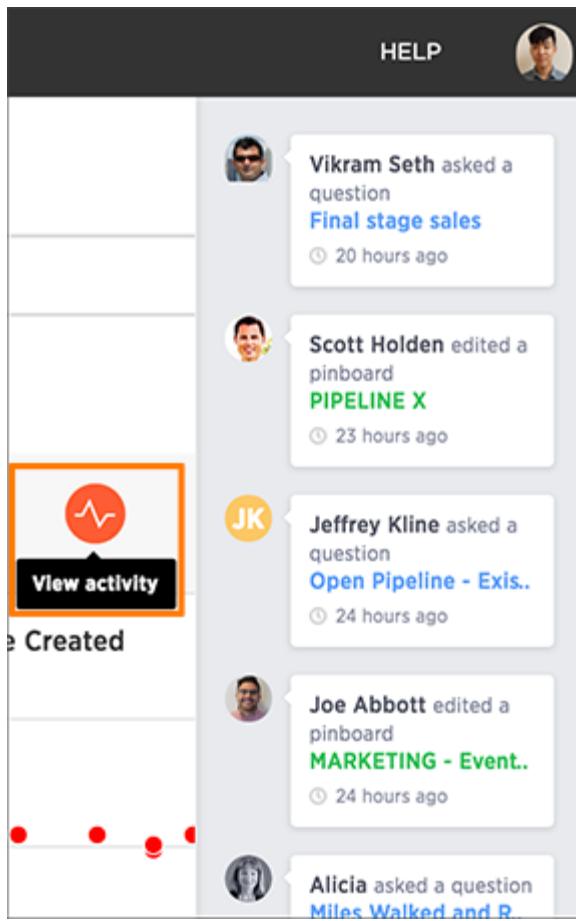


## Home

Click the logo to go to the home page. The home page contains:

- Search bar - Click in the search bar to start a new search. This is the same thing as clicking **Search** in the top navigation bar.
- Last viewed pinboard - The home page shows the last pinboard you looked at. The dropdown box on the top left of the pinboard lets you choose a different pinboard without having to leave the home page.
- Activity - The activity button shows recent actions performed by other people.

To view the activity panel, click on the **activity** icon on the right side of the home page.



You can even click on one of the object names to jump to its location.

## Search

Search is where you will spend most of your time. It allows you to search and explore your data. Choose your data sources and type in the search bar at the top. As you type your search, results will appear in the main part of the screen as either a table or a chart.

To learn more about this section, visit [About search \(page 0\)](#).

## Answers

Answers are the result of a single search. You can save an answer you want to work more on later, or just keep it for your personal use. Answers are for you alone, until you share them with others.

## Pinboards

Pinboards are collections of related search results. You can create your own pinboard or add to an existing one. Once a pinboard has been saved, it can be shared with others or viewed as a slideshow. The Pinboards page shows a list of saved pinboards. Click on one to view, edit, or share it.

To learn more about pinboards, visit [About pinboards \(page 144\)](#).

## Data

DATA contains a list of data sources (tables and worksheets). These are usually loaded and managed by your administrator. However, you may be able to import a spreadsheet (Excel or CSV) here, if you have the correct privileges.

To learn more about this section, visit [Working with data \(page 173\)](#).

## Admin

Admin only appears if you have administrator privileges. This section is covered in the ThoughtSpot Administrator Guide.

## Help

Help is a support resource for ThoughtSpot. It contains short videos, a keyword reference, links to documentation, and other useful materials. You can also find the support contact information and software version number here.

## User

The user icon allows you to either view your preferences or log out. You can also change your icon here.

To learn more about this section, visit [About the user profile \(page 12\)](#).

## Related information

[Set your ThoughtSpot locale \(page 11\)](#)

# Log in or out of ThoughtSpot

To set up and explore your data, access the ThoughtSpot application from a standard Web browser using a username and password. Before accessing ThoughtSpot, you need:

- The Web address (IP address or server name) for ThoughtSpot.
- A network connection.
- A Web browser.
- A username and password for ThoughtSpot.

## Supported Web browsers

The following browsers are verified to work well with the ThoughtSpot application:

Browser	Version	Operating System
Google Chrome	20 and above	Windows 7 or greater, Linux, MacOS
Mozilla Firefox	14 and above	Windows 7 or greater, Linux, MacOS
Internet Explorer	11	Windows 7 or greater

## Log in

To log in to ThoughtSpot from a browser:

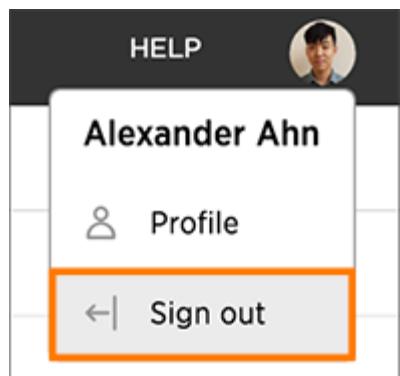
1. Open the browser and type in the Web address for ThoughtSpot: `http://<hostname_or_IP>`
2. Enter your username and password and click **Enter Now**.



## Log out

Once you're done with your search session, you can optionally log out of ThoughtSpot. To log out of ThoughtSpot from a browser:

1. Click your user icon at the top right hand corner of the screen.
2. Click **Sign out**.



# Set your display language (locale)

The language the ThoughtSpot UX is displayed is based off of your browser locale. You can change the UX displayed language on all browsers that ThoughtSpot supports.

In addition to American English, ThoughtSpot supports German and Japanese language display. So if you set Japanese as your default language in your browser settings, then the interface will update to reflect that after you refresh your page.

Keywords, operators, and error messages are included in the translated material. Formulas, however, are *\*not translated*. Also, all metadata remains as user inputted.

To set your ThoughtSpot locale:

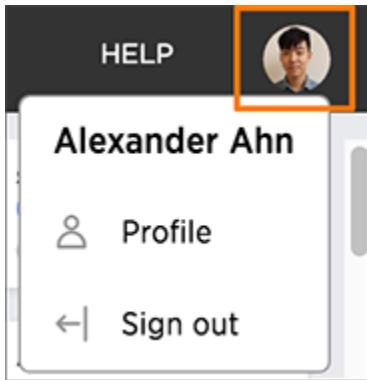
1. Go to the settings page of your browser.
2. Change your default language to one that is supported by ThoughtSpot.
3. Save your settings.
4. Refresh your ThoughtSpot browser page.

Your ThoughtSpot interface should reflect your new chosen language.

# About your user profile

**Summary:** The user icon lets you view your profile or sign out of ThoughtSpot.

To view the user actions, click on your user icon on the top right corner of the page.



Click **Profile** to go to your profile preference page, where you can change your icon, email, and locale preferences. The locale preferences control the language and data formats by geographic locations.

## Update my preferences

A screenshot of the "Update my preferences" page. On the left, there is a section for "Preferred Locale" with a dropdown menu currently set to "en-US". A list of other locale options is visible in the dropdown: en-CA, en-GB, en-US (which is highlighted), de-DE, and ja. Below this, there is a checkbox labeled "Email me sharing notifications" which is checked. On the right, there is another section for "Update my SpotIQ preferences" with a checkbox labeled "Email me analysis notification on success" which is also checked.

For example, if you are using ThoughtSpot in the US, the number formatting should look like this: xxx,xxx.xx. And in Europe, it should look like this: xxx.xxx,xx.

You can change your picture by clicking **Upload Picture**. The system accepts PNG or JPEG files that are under 4MB.

Update my picture



**Upload Picture**

Upload a .png or .jpg file (less than 4MB). It should be in a square format (e.g. 100x100).

You can change your email notifications preferences by checking or unchecking **Email me sharing notifications** and clicking **Update Preferences**.

Update my preferences

Email me sharing notifications  
**Update Preferences**

Clicking **Sign out** logs you out of ThoughtSpot, and takes you back to the sign in page.

# Understanding privileges

**Summary:** The things you can do in ThoughtSpot are determined by the privileges you have. These are set at the group level.

If you are trying to do something in ThoughtSpot, and cannot access the screens to accomplish it, you may not have the correct privileges. In this case, you should contact your administrator and explain what you want to accomplish. Your administrator may be able to grant you additional privileges.

**Note:** Permissions to see and edit tables, worksheets, and pinboards are not affected by privileges. They are given when these items are shared with you.

Here are the privileges that the administrator sets, and the capabilities they enable:

Privilege	Description
Has administration privileges	Can manage Users and Groups and has view and edit access to all data. Users with this privilege can also download a saved answer.
Can upload user data	Can upload their own data from the application's DATA page using Actions > Upload data.
Can download data	Can download data from search results and pinboards.
Can share with all users	Can see the names of and share with users outside of the groups the user belongs to.
Can manage data	Can create a worksheet. Can also create an aggregated worksheet from the results of a search by selecting Save as worksheet. Can also use ThoughtSpot Data Connect, if it is enabled on your cluster.
Can schedule pinboards	Can create pinboard schedules and edit their own scheduled jobs.
Has Spot IQ privilege	User can use SpotIQ's auto analyze function.
Can Administer RLS	Users in groups with this privilege (directly or indirectly) can bypass row-level security (RLS) rules. This privilege can only be assigned by a user who already Has administration privilege. Your installation configuration may enable or disable this feature. By default it is enabled.

The following table shows the intersection of user privilege and ability:

The following table shows the intersection of user privilege and ability:

	Create/Edit WS	Create Agg WS	Modify Col. Props. <sup>1</sup>	Upload Data	Download Data	Share within Group	Share with All	RLS rules	CrUD Relationships	Read Relationships	See Hidden Cols	Join with Upload Data	Schema Viewer	Use Data Connect	Use Scheduler	Use Auto-Analyze
Admin	Y	Y	Y	Y	Y	Y	Y	Y <sup>2</sup>	Y	Y	Y	Y	Y	Y	Y	Y
Can Upload Data	N	N	N	Y	N	Y	N	Y <sup>3</sup>	Y <sup>4</sup>	N	N	N	N	N	N	N
Can Download Data	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N
Data Management	Y	Y	Y	Y	N	Y	N	Y <sup>4</sup>	Y <sup>4</sup>	Y <sup>5</sup>	Y	N	Y	N	N	N
Can Auto-Analyze	N	N	N	N	N	N	N	N	Y <sup>4</sup>	N	N	N	N	N	N	Y
Can Schedule	N	N	N	N	N	N	N	N	Y <sup>4</sup>	N	N	N	N	N	N	N
Can Share with All	N	N	N	N	Y	Y	N	N	Y <sup>4</sup>	N	N	N	Y	N	N	N
None	N	N	N	N	Y	N	N	N	Y <sup>4</sup>	N	N	N	N	N	N	N

Table notes:

1. Applies to non-owners only.
2. Any tables.
3. Author of at least one table in relationship.
4. Only when read permission for columns used in the relationship.
5. With edit permission.

# Use stickers to organize

**Summary:** Stickers enable you to create categories for classification of objects, including pinboards, answers, data sources, and worksheets.

You can create stickers to make it easier for people to find data sources and pinboards. Stickers are global in scope. This means that everyone can see the stickers and use them to tag objects. They can also filter lists of objects by sticker. Stickers are often used to designate subject areas, such as sales, HR, and finance, but you can use them any way you like.

Keep in mind these permissions when working with stickers:

- Only administrators can create stickers.
- Anyone can apply a sticker.
- Anyone can filter by a sticker.

## Create a sticker

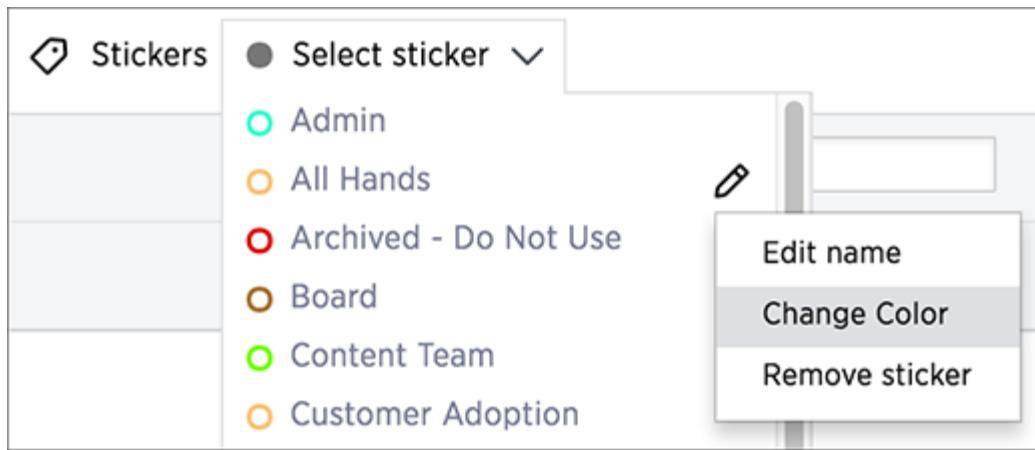
Only administrator users can create stickers. Anyone can apply the stickers you create, or use them as filters when selecting from a list of sources or pinboards.

To create a sticker:

1. Navigate to the **Manage Data** or **Pinboards** screen using the icons in the top navigation bar.
2. Choose **Select sticker**, scroll to the bottom of the list, and click **+ Add**.

The screenshot shows a list of existing stickers on the left and a 'Select sticker' dropdown menu on the right. The dropdown menu contains a list of 20 stickers, each with a color-coded circle and a name. At the bottom of the dropdown is a blue button labeled '+ Add'. The list includes: Admin (teal), All Hands (orange), Archived - Do Not Use (red), Board (brown), Content Team (green), Customer Adoption (light orange), Customer Service (purple), Customer Usage (yellow-orange), Demo (orange-red), Engineering (blue), IMS (yellow), Marketing (pink), Olympics (light orange), PM (yellow-green), and QA Testing (dark red).

3. Type the name for the new sticker.
4. You can change the name or color of a sticker by clicking the edit icon next to its name.

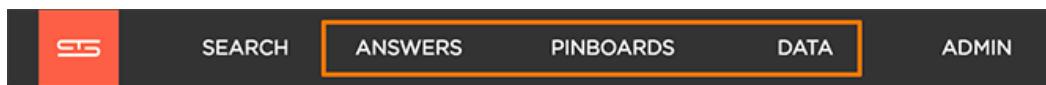


## Apply a sticker

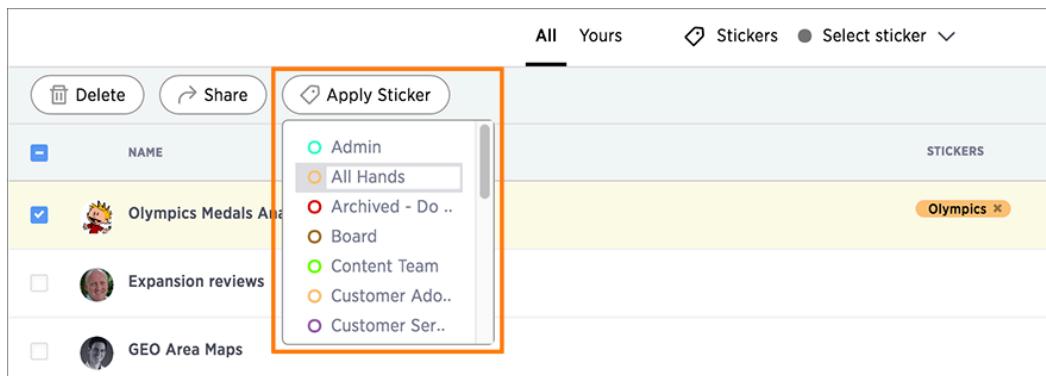
Only administrators create stickers, but anyone with edit privileges can tag an object with a sticker.

To tag an object with a sticker:

1. From the top menu, choose Answers, Pinboards, or Data.



2. Find the item(s) you want to tag in the list, and check the box next to its name.
3. Click the apply sticker icon and choose one from the list. You can apply as many stickers as you like to an object.



## Filter by stickers

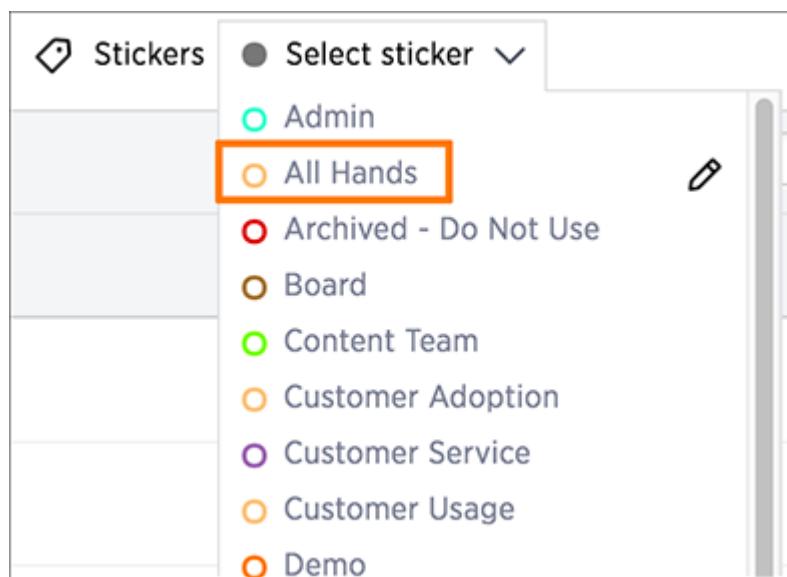
Whenever you are selecting objects from a list, you can filter by sticker to find what you're looking for. Anyone can use stickers to filter lists of pinboards or data sources. You can also filter by sticker when selecting data sources.

To filter by sticker:

1. From the top menu, choose Answers, Pinboards, or Data.



2. Click on Select sticker, and select a sticker to filter by. Click on its name.



# What is a ThoughtSpot Search?

**Summary:** You use search answer questions about your data without having to consult a data analyst.

Using ThoughtSpot's relational search is simple, so anyone can use it. In the search bar, type what you are interested in exploring, for example `revenue midwest sales rep`. ThoughtSpot will return an answer based on your searched terms.

As you get better with ThoughtSpot's search, you will be able to get more out of your data by performing more complex searches. There are a few basic things you should understand before starting a new ThoughtSpot search.

## How do I search data?

You've probably seen one of these before:



Click in the box and start typing some letters. As soon as you begin typing, search suggestions appear. Type slowly and use the suggestions to find what you're looking for.

Whenever you finish typing a word, you'll see an answer in the form of a chart or a table.

You should know that search in ThoughtSpot is more like an Amazon search than a conversation. For example. Instead of:

`Find me all books by Lewis Carroll with the title Alice in Wonderland`

You'd type:

`carroll alice`

Or consider Google. You wouldn't type in:

`Find me the largest city by population`

You'd type:

`largest city by population`

or simply:

`largest city population`

That's how search works in ThoughtSpot. You can use some helping words like "by" and "for" but they can also be left out, and the search will return the same answer.

## What kinds of things can I type?

Search is based on the tables that exist in your data. Tables are made of rows and columns, like spreadsheets. So you can search by typing in any of these words:

- The column name: like revenue, product name, or store
- Any of the values in the columns: like 20000, kitten chow, or richmond
- One of the special [keywords \(page 224\)](#) ThoughtSpot understands: like yesterday, >, or contains

## What does a search result in?

Searches return a set of results in the form of a table or a chart. ThoughtSpot likes to call this set of results in response to a search an *answer*. An answer is the result of a single search. You can save an answer you want to work more on later, or just keep it for your personal use. The ANSWERS tab is where you can view and then the your saved search results. Answers are for you alone, but you can share them with others.

## Related information

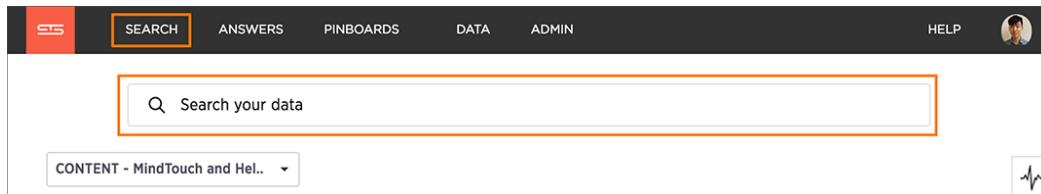
- [Choose a data source \(page 23\)](#)
- [Search bar features \(page 24\)](#)
- [Search suggestions \(page 26\)](#)
- [Search results and column types \(page 28\)](#)

# Start a new search

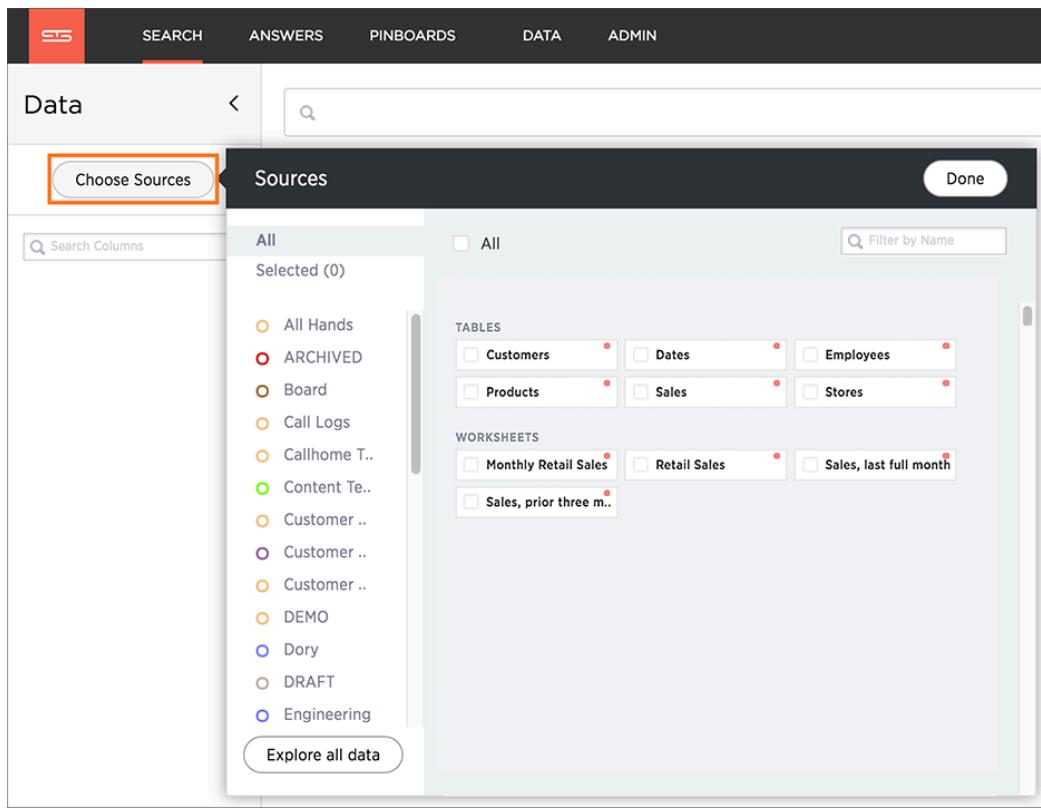
**Summary:** Starting a new ThoughtSpot search is simple, like starting a new Google search.

To start a new search:

1. Click **Search** on the top navigation bar. You can also click **Search your data** at the top of the home page.



2. Choose your sources by clicking **Choose Sources**.



To see details of all of the data, click **Explore all data**.

- a. Filter through all available sources by using the search bar or stickers.
  - b. Select your sources.
  - c. Click **Done**.
3. Add columns to the search bar, or double click columns in the Data column in the left panel.

The columns listed in the left panel are grouped together by data sources for discoverability and

ease of access. You can also add multiple columns at once by clicking each column to select it, and then click **+ Add Columns**.

The screenshot shows the ThoughtSpot search interface. At the top, there's a navigation bar with tabs: SEARCH (which is active), ANSWERS, PINBOARDS, DATA, and ADMIN. To the right of the tabs is a user profile icon. Below the navigation bar, the main area has a title "Data" and a back arrow. On the left, there's a sidebar titled "Choose Sources" with a "Search Columns" input field. Under "Search Columns", there's a tree view of data sources:

- fruit\_for\_help
  - Date
  - Fruit
  - Location
  - Price per fruit (\$)
  - Quantity sold
  - Total sale
  - Vendor
- fruit\_sales

At the bottom of the sidebar is a button labeled "+ Add Columns". To the right of the sidebar, there's a search bar with a magnifying glass icon. In the center-right area, there's a watermark-like logo "SG" and the text "Search your data".

Your search is given an automatic title based on your search columns, and is displayed as either a table or chart, depending on how it is best represented. You can [change the view \(page 55\)](#) to fit your needs.

# Choose a data source

**Summary:** Before you start a new search, make sure you have chosen the right data sources.

To begin a new search, you must first select your data sources by clicking on the Choose Sources button. You will see a list of data sources that have been shared with you. The data sources are usually created by your administrator, though you can also [upload your own data \(page 175\)](#).

The screenshot shows the ThoughtSpot interface with a dark-themed header bar. The header includes the ThoughtSpot logo, SEARCH, ANSWERS, PINBOARDS, DATA, and ADMIN buttons. Below the header, the word "Data" is displayed next to a back arrow and a search icon. A modal window titled "Sources" is open, with a "Choose Sources" button highlighted by a red box. The modal contains a sidebar with a "Search Columns" input field and a list of data sources under "All". The main area shows tables and worksheets with checkboxes. A "Done" button is visible in the top right corner of the modal.

TABLES
<input type="checkbox"/> Customers
<input type="checkbox"/> Dates
<input type="checkbox"/> Employees
<input type="checkbox"/> Products
<input type="checkbox"/> Sales
<input type="checkbox"/> Stores

WORKSHEETS
<input type="checkbox"/> Monthly Retail Sales
<input type="checkbox"/> Retail Sales
<input type="checkbox"/> Sales, last full month
<input type="checkbox"/> Sales, prior three m...

Searches happen in the context of the selected data sources. ThoughtSpot will also make suggestions from other data sources for you, if what you're typing can't be found in the selected data source.

# Search bar features

**Summary:** The search bar is designed to make it easy for you to identify your search terms.

A lot of work has gone into making ThoughtSpot's search bar intuitive and easy to use. However, it still helps to know some details of how the search bar works.

## Boxed search phrases

The search bar shows boxes around each search phrase, so you can easily see where it begins and ends. Your search phrases still appear as text when you are typing, but whenever you click out of the search bar, they are boxed. Search phrases have blue boxes, and [filters \(page 42\)](#) have white boxes.



## Removing search phrases

When you click on a search phrase, it is highlighted, so you can easily replace it with one of the suggestions. When you hover over on a boxed phrase, you'll see an **x**, which you can click to remove it. When you delete a phrase, your search will automatically update.

If you find yourself looking at a table or chart, but it doesn't seem to contain all the data you expect, try looking in the search bar for white boxes (filters). If you remove all the filters, you will again see all the available data for that search.

## Spell check

The search bar includes spell check. If you spell or type a term incorrectly, your suggestions will include the correct spelling of the term or keyword.

The spell check in the search bar also performs a metaphone check for similar sounding words on text data values.

## Dictionary synonyms

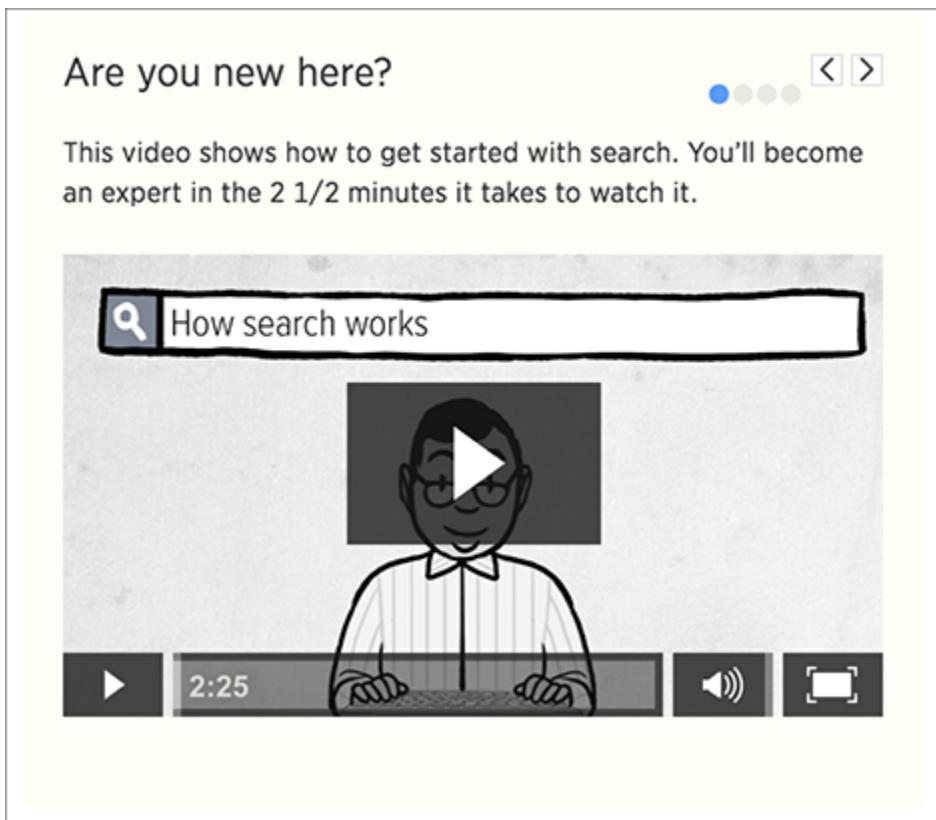
A dictionary of common word synonyms is bundled with ThoughtSpot. The dictionary contains synonyms

for common terms that occur in data. For example, if you type in “gross”, and that word is not found, ThoughtSpot will consider it a synonym for “revenue”. We use the WordNet library of terms, which takes word proximity into account, and weights words by similarity to the target term.

This frees you from having to know the exact term or column name used in a data source. You can still find the answer in many cases, if you type a word with the same meaning as a different word that occurs in the data.

## Search help

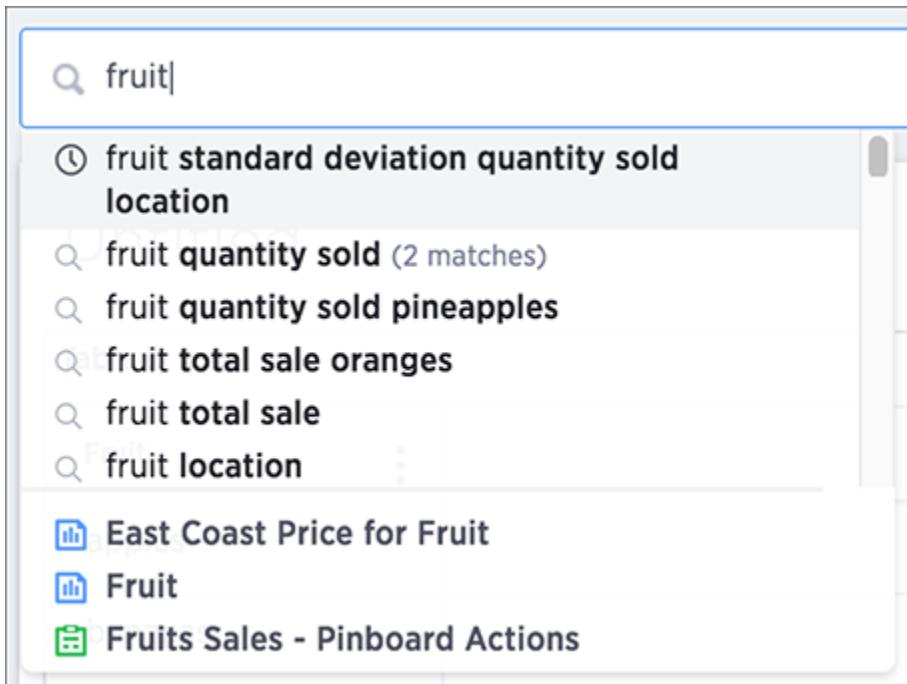
If you type an unrecognized search term, you will be offered tips on searching. The search help appears when you type a term that isn't understood by ThoughtSpot and then press the Enter key.



# Search suggestions

Summary: How ThoughtSpot learns from your searches and helps you.

Search suggestions include complete recent searches that are similar to the search you are constructing. You can also search for saved objects, such as pinboards.



## Usage-based ranking (UBR)

Search suggestions are relevant to the data and personalized to your search behavior. ThoughtSpot learns over time what columns are most important to you and to your company as a whole. Then, it uses this knowledge to rank the search terms it offers. The term for this is usage-based ranking (UBR).

ThoughtSpot keeps usage statistics on frequency of search terms in its local cache. If you frequently use type terms related to finance or to a particular product, ThoughtSpot provides you with related suggestions more frequently. Using this information, frequently used terms and phrases are offered in search suggestions more often than those that are not commonly used.

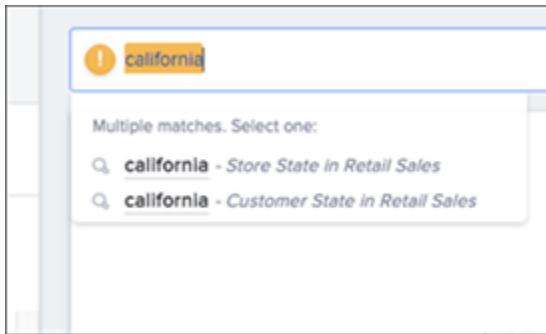
UBR based on search patterns makes ThoughtSpot more valuable over time. Search suggestions become more helpful the more searches you complete.

## Recent searches

As you type in the search bar, you are given search suggestions that include recent searches. This makes it easier to learn what you can do with ThoughtSpot. In addition to displaying your own recent searches, the search bar also learns from searches made by other people. This should provide you with interesting searches that you may not have been aware of. You'll see recent searches in a separate section of search suggestions, as recent searches appear higher in suggestions than other terms.

## Auto-disambiguation in search

When there are more than one possible meaning for a search term, you can provide disambiguation by selecting from a list of choices. Now, your choice is sticky. That means you won't have to select it again, in the scope of the current search.



## Out of scope columns

Search suggestions are not limited in scope to the columns that you select as the data sources. Suggestions can include columns that are out of scope, too. If you choose one of these suggestions, the columns will be added to the data sources scope for you.

## Object searches

Search suggestions also include relevant pinboards that have already been created. This means that if a pinboard that is similar to the search you're trying to do already exists, it will appear in search suggestions.

# Search results and column types

**Summary:** Searches in ThoughtSpot use columns that are defined as either attributes or measures.

ThoughtSpot identifies search columns (`sales`, `customer_name`, `total_sale`) as either attributes or measures. The columns you choose impact your search results. That's because several chart types expect that your search contains a certain number of attributes and a certain number of measures.

## Attributes

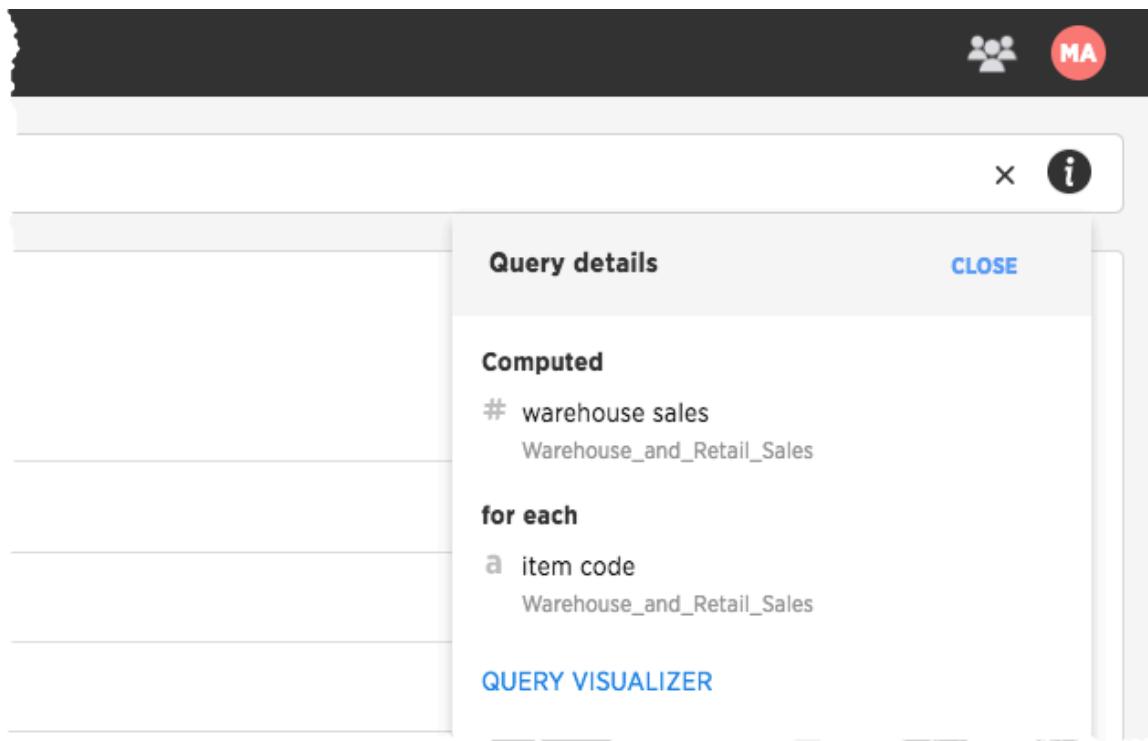
Attribute are primarily text or date values. Attributes make up the x-axis of your chart most of time. Some examples of attributes in terms of a person include name, eye color, occupation, social security number, address, employee ID, and phone number.

## Measures

Measures are numeric values you can do math on, with meaningful results. You will most likely find your measures on the y-axis of your chart. Some examples of measures in terms of a person are age, height, and weight.

## Query details

After, or while completing a search, you can see how ThoughtSpot displayed the answer. Click the **exclamation mark** on the right hand side of the search bar to open the **Query details** dialogue box.



This dialog shows measures ThoughtSpot computed, for each combination of attributes. Choose **QUERY VISUALIZER** to see search filters and how the tables were linked and used.

# Last data refresh time

**Summary:** You can see the last time at which data was refreshed without having to visit the \*\*DATA\*\* page.

Hover over the data when choosing a data source to see the last time it was updated. You will also see when it was created and by whom.

The screenshot shows the 'Sources' interface. On the left, there's a sidebar with categories like 'All', 'Selected (0)', 'ARCHIVED', etc. The main area lists 'IMPORTED DATA' sources: 'How\_search\_works...', 'MindTouch\_most\_po...', and 'MindTouch\_searches...'. A tooltip is displayed over the third item, containing the following information:

- NAME: Udemy\_user\_course
- AUTHOR: Alicia
- CREATED: 9 months ago
- UPDATED: 1 month ago
- DATABASE: FalconUserDataDataBase
- SCHEMA: FalconUserDataSchema

You can also hover over a column in the DATA column to see when it was last refreshed. This popup will also show sample values from that column.

The screenshot shows the 'Data' interface. On the left, there's a sidebar with 'Choose Sources' and a search bar. The main area shows a table with columns like 'Last searched' and 'Search query'. A tooltip is displayed over the 'Last searched' column for the 'Search query' row, containing the following information:

- NAME: Search query
- SOURCE: last searched
- MINDTOUCH\_SEARCHES\_LAST\_90\_DAYS
- UPDATED: a month ago
- 06/22/FY 2017 09 AM
- SAMPLE VALUES
- filters pinboard 2017 09 AM
- filter pinboard
- filters 06/22/FY 2017 09 AM

And lastly, you can hover over a column or column name in an answer to see last updated information.

Most Recently Searched

Search query (Select) ▾

Most Recently Searched table

Last searched	Search query
HOURLY	source: Search query (MindTouch_searches_last_90_days) UPDATED: a month ago
06/22/FY 2017 07 AM	date serach
06/22/FY 2017 07 AM	

# Results that are tables

**Summary:** Tables display your answer in a format similar to an Excel spreadsheet.

Your search results are not limited by the number of attributes or columns in order to be presented as a table. You can have a table with just one attribute or measure. When you choose to display your answer as a table, ThoughtSpot will create the columns for you and any relevant headlines.

Sometimes when you view a table, the results will be aggregated (combined). For example, if you only type “revenue”, you’ll see the total sum of all the revenue the table contains as one combined number. If you include the keyword “monthly”, the results will be aggregated by month. You can rearrange the column order of your table among other search actions.

Every table gives you the option to rearrange the column order and change the column widths.

## Rearrange column order

You can rearrange the column order of your table after adding all of your search terms.

To rearrange the column order:

1. While viewing your answer as a table, click the column header you would like to move.
2. Drag it across to its new position.

## Resize column widths

You can resize the column widths of your table after adding all of your search terms.

Any adjustments you make to the column widths of your table are saved when you pin the table to a pinboard.

To resize the column widths:

1. While viewing your answer as a table, hover over a column border in the column header row.
2. Click and drag the border to create your preferred column width.

## Sort columns

You can sort a table by column values by clicking on the column title. If you hold down the SHIFT key you can click on multiple heads and sort on them in turn.

**Tip:** This same functionality is available on tables you see elsewhere in ThoughtSpot. For example, a table in the DATA page is also sortable in this manner.

## About headlines (summary information)

Headlines display summary information of a table result. Headlines contain summary information for each column of a table. They appear at the bottom of the table in individual boxes.

Top Clicked Search Result for Frequent Searches				
Search query (Select) ▾	Hits: > 2 ▾			Actions ▾
Search query	Last searched DAILY	Top clicked result	Hits ▾ TOTAL	
filters pinboard	06/22/FY 2017	about pinboard filtersin 02_administration,	14	
filter pinboard	06/22/FY 2017	pinboard filtersin 01_the_basics/3.3	11	
filters	06/22/FY 2017	--	11	
stickers	06/07/FY 2017	create stickersin 02_administration/admini	10	
formula	06/13/FY 2017	formula referencein 02_administration/adr	9	
additive	06/07/FY 2017	change the additive setting for a column	8	
pivot	06/20/FY 2017	--	6	
filter	06/10/FY 2017	filter by a stickerin 02_administration/adm	5	
macos	05/04/FY 2017	--	5	
aggregation	06/07/FY 2017	change the aggregation setting for a colun	4	
load	06/20/FY 2017	--	4	
change data type	06/05/FY 2017	change the data type of a columnin 02_ad	4	

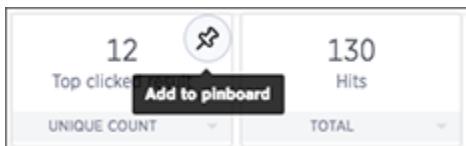
(Showing rows 1 - 15 of 23)

23 Search query UNIQUE COUNT	04/19/FY 2017 - 06/22/FY 2017 Daily (Last searched)	12 Top clicked result UNIQUE COUNT	130 Hits TOTAL
------------------------------------	--	--	----------------------

ThoughtSpot automatically creates up to 20 headlines for each table. Your ThoughtSpot configuration can be changed to accommodate more if needed.

You can modify how you'd like the value to be displayed by clicking the dropdown on a headline and selecting a different type of aggregation. The usual available aggregations are total, average, standard deviation, variance, minimum, and maximum. There are also unique count and total count values available for the appropriate columns.

To add a headline to a pinboard, hover over it and click the Add to pinboard icon.



# Overview of keyword searches

**Summary:** Use keywords when asking a question to narrow and further define your search.

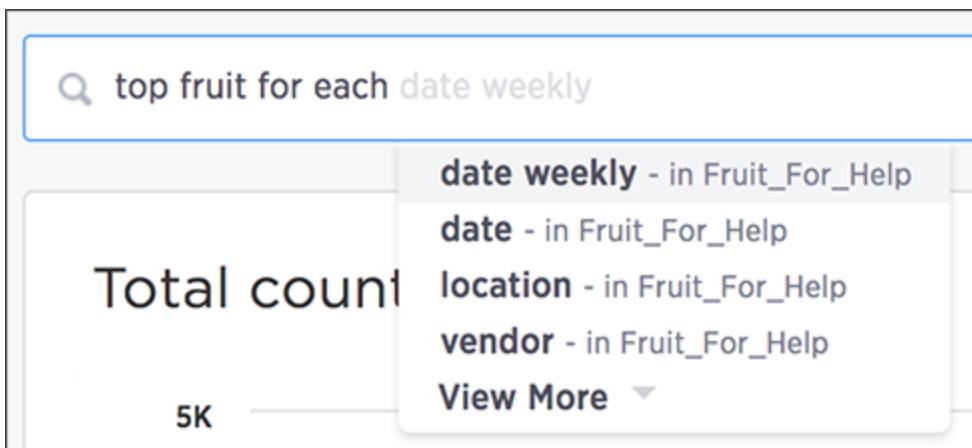
In addition to column names, values, and filters, the search bar also accepts keywords. You can access a list of keywords and other reference materials in the [references \(page 224\)](#) section or in the help center. Open the help center by clicking **Help** on the top navigation bar.

The screenshot shows the ThoughtSpot help center interface. At the top left is the ThoughtSpot logo (a red circle with 'TS'). To its right is the word 'KEYWORDS'. To the right of 'KEYWORDS' is a search bar containing the placeholder text 'What are you looking for?'. Below these elements is a sidebar with a white background and rounded corners, containing a list of keyword categories: 'Basic keywords', 'Date keywords', 'Time keywords', 'Text keywords', 'Number keywords', and 'Filter keywords'. To the right of the sidebar, the main content area has a light gray background. It displays examples of keyword usage under the heading 'Basic keywords'. It shows two columns: 'top' and 'bottom'. Under 'top', there is an example: 'top sales rep by count sales for average revenue > 10000'. Under 'bottom', there are three examples: 'revenue average', 'revenue by state', and 'customer by revenue for each sales rep'. At the bottom of the main content area, there are two more examples: 'bottom' and 'top n'. The 'bottom' example is 'bottom' and the 'top n' example is 'top 10 sales rep revenue'.

Within the help center, you'll find videos and documentation that pertain to the current version of ThoughtSpot. Here is where you can also find a list of keywords. You can expand each section to see which keywords are available and examples on how to use them.

## Example: Simplify search with the top keyword

The **top** keyword can be a powerful addition to your search when you remember to use it. By using one keyword, you can greatly simplify your searches. The **top** keyword is one such keyword. Its syntax looks like **top n** for each **x**.



Some common search examples it can simplify are finding the:

- top two performing sales rep
- top revenue average revenue by state
- top two students ranked by source for each class

## Types of keywords

Keywords serve a variety of predefined purposes, and are divided into different groups. The groups are as follows:

- Basic keywords

You can use keywords such as `top` and `bottom` to, for example, only see results for the best or worst performing sales rep.

- Date keywords

Date keywords give you the freedom to narrow your search by days, weeks, months, quarters, or years. There are also a number of date related keywords such as `after`, `before`, and `year-over-year`. Use the new date keywords to describe dates in the future. This is useful for exploring things that are scheduled for a future date, such as shipments due to go out in the next week.

- Time keywords

Time keywords are the most useful when trying to figure out how many visitors you've received within the last `n minutes` or `hours`.

- Text keywords

You can use text keywords to find similar words or phrases that contains a certain word. For example, product name contains `green`.

- Number keywords

These keywords allows you to define your search by sum, average, count, max, min, and other accumulations.

- Filter keywords

Filter keywords work in the same way as filters on table columns or chart axes.

- Location keywords

The keywords `near` and `farther than` allow you to search with spatial filters on your geo type

columns with latitude/longitude data. This lets you focus your search based on distance and locations. You can specify a specific radius using miles, kilometers, or meters.

## Related information

- [Keyword reference \(page 224\)](#)
- [Search using growth over time \(page 37\)](#)
- [Geographical proximity keywords “near” and “farther than” \(page 40\)](#)

# Search using growth over time

Summary: You can show growth over time by using the growth of keyword in your search.

The **growth of** keyword compares the data from different date periods, and returns a percentage of growth. To search using growth over time:

1. Type growth of into the search bar, and choose a measure you're interested in seeing the growth of.

A screenshot of a search interface. At the top, there is a search bar with the text "growth of quantity by date". Below the search bar, a list of suggestions is displayed, each preceded by a magnifying glass icon:

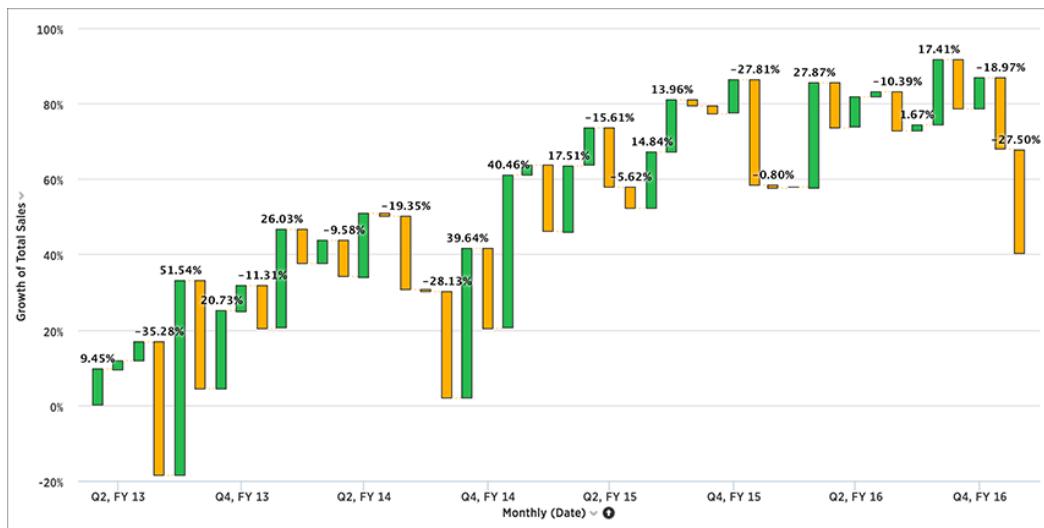
- growth of quantity by date
- growth of quantity sales by date
- growth of sales sales per qty by date
- growth of sales per qty by date

Below the suggestions, there is a section with three items, each preceded by a green folder icon:

- Copy of MARKETING - Website
- MARKETING - Website
- TS: Dogfood search query analysis

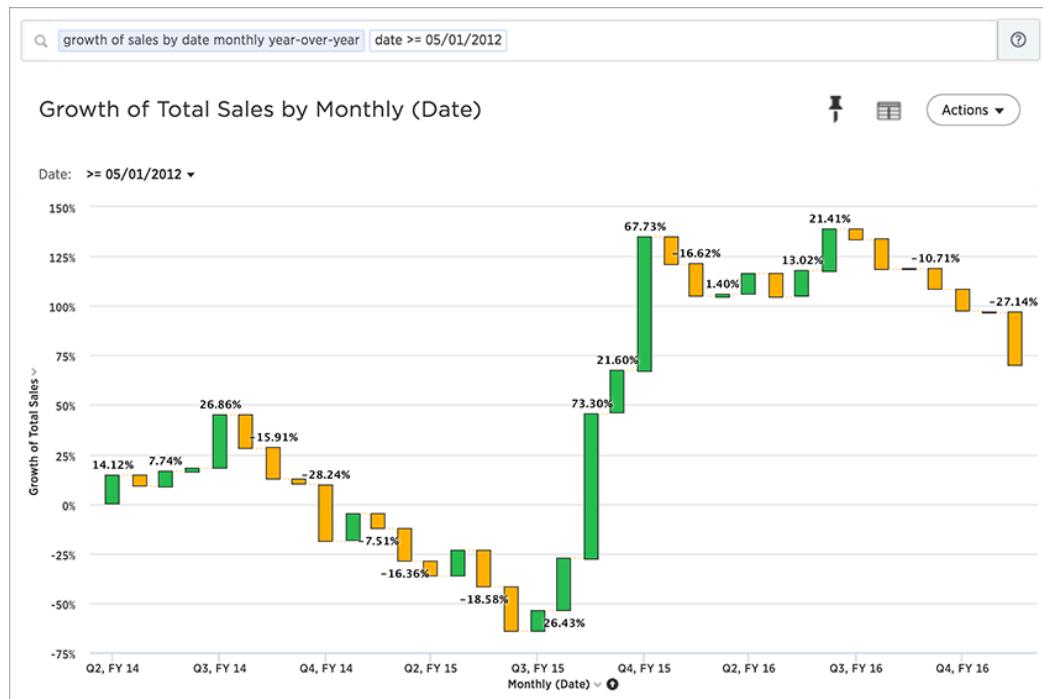
You will see a list of suggestions to choose from based on your sources. You can also type a different column name containing numeric data to compare.

2. Then, type by, followed by a date column name.
3. Switch to the Chart view for a visual representation of your search.



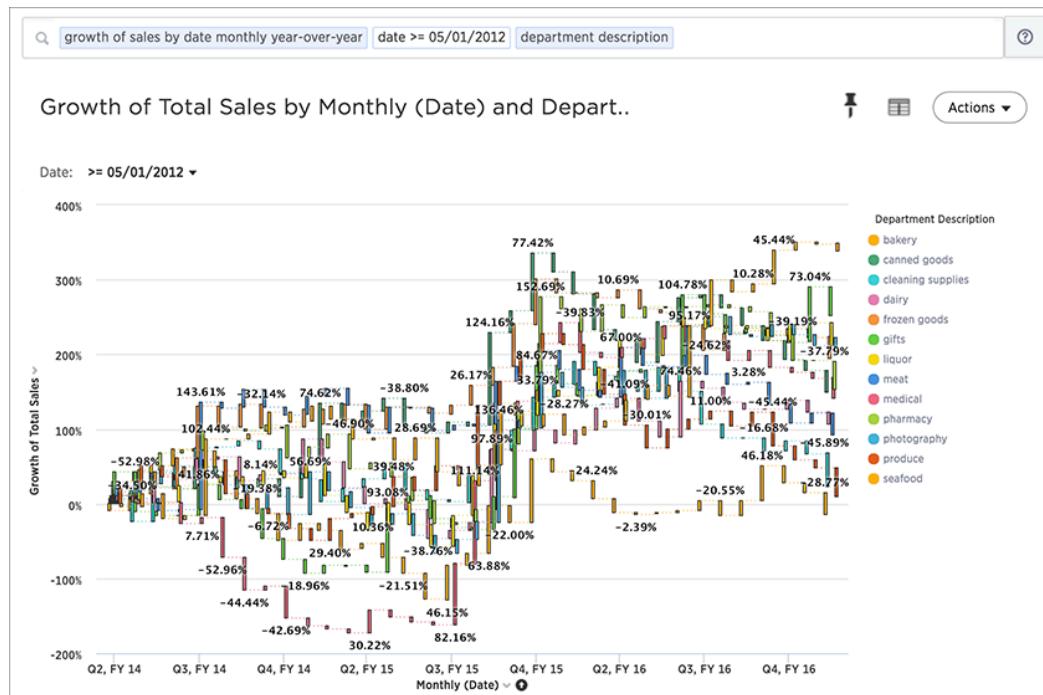
The growth is calculated as a positive or negative percentage, for each period relative to the last period in the series. The line chart is a good way to display your data, but the waterfall chart is especially effective to show growth.

4. You can also do year-over-year analysis, which compares each time period to the corresponding time period in the prior year. This type of growth analysis is more common in retail and other seasonal businesses. To do this, type monthly year-over-year after your growth of phrase in the search bar.



This compares data between the same month from different years. For example, it will allow you to compare sales from June of this year to the sales from June of last year. Note that for the first year, values are labeled as “{Blank}” in the Data View since there are no previous data to compare them to.

5. Add an attribute to your search see the breakdown of how each grouping of the attribute contributed to the overall growth of your measure. Click **Configure Chart** and add your attribute to the **Legend** field.

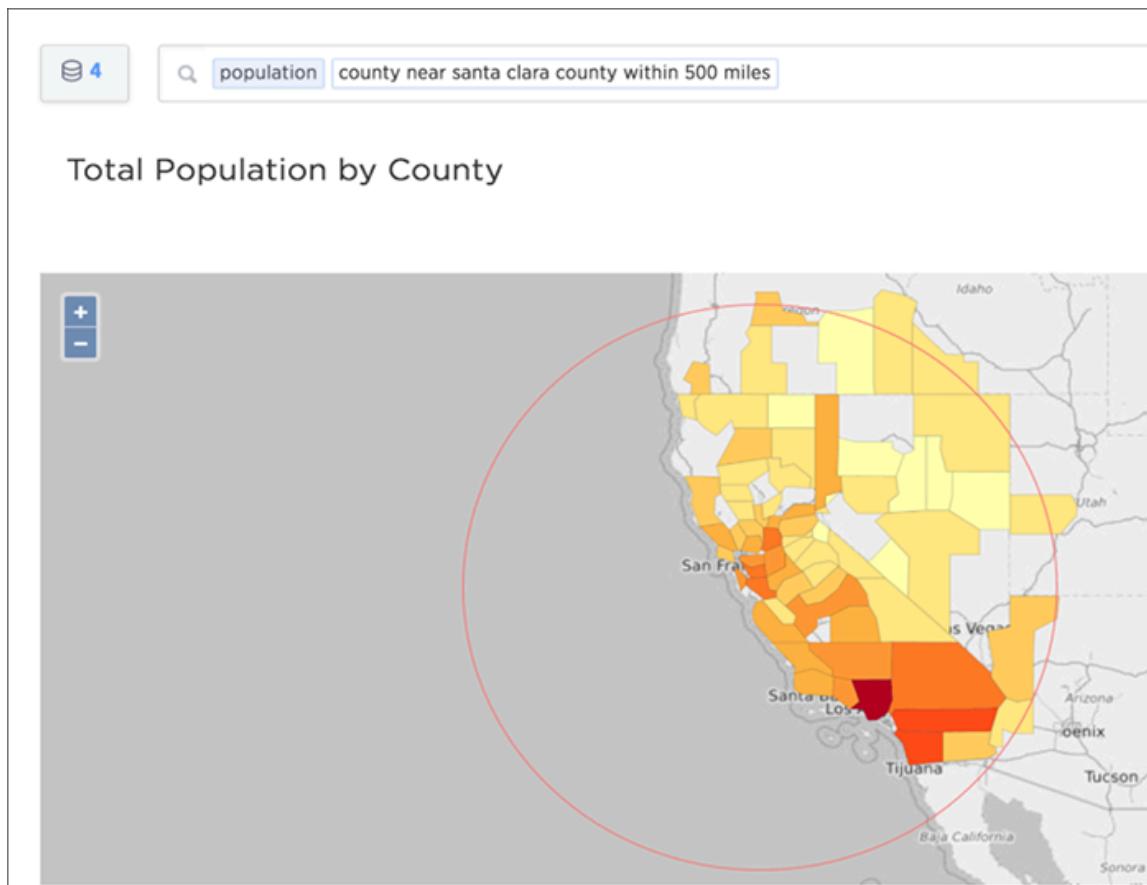


It looks like Q4, FY 15 was a much more productive period for a number of categories compared to a year ago.

# Proximity searches "near" and "farther than"

**Summary:** If your table contains Latitude and Longitude data, you can use proximity searches that find entities related to each other by location.

Proximity keywords allow you to search and then show on map (via search) all instances of a measure near an attribute's associated lat/long coordinates within x miles/km/meters. Using proximity keywords causes ThoughtSpot to display a circle that represents your set distance on the geo charts when you filter on a GeoType column.



The proximity keywords are.

- `near`
- `near...within n miles|km|meters`
- `farther than n miles|km|meters from`

The distance is calculated as a straight-line distance (not road distance) radius using miles, kilometers, or meters from the central point. If not specified, the default is 10 km.

These keywords are limited to 33 latitude/longitude pairs. They work on duplicate counties. Finally, you can filter on them. Some examples of valid searches are:

```
landings latitude longitude city near tokyo
```

```
landings latitude longitude city near tokyo within 50 miles
```

You can bracket your search only with actual values found in the data. So "longitude between -125.000000 and -115.316670 worked for me, but not longitude between -125 and -115.

## Proximity search configuration requirements

All your data must be in the same set. The worksheet or one of the tables must contain a column of type longitude and a column of type latitude. The latitude and longitude data have to be on the same base tables for the feature to work. You can't, for instance, have a dimension table with all your cities and their associated geo coordinates and join to it from your fact table and expect proximity search to work.

Also, your administrators must have configured these columns using the appropriate GeoType.

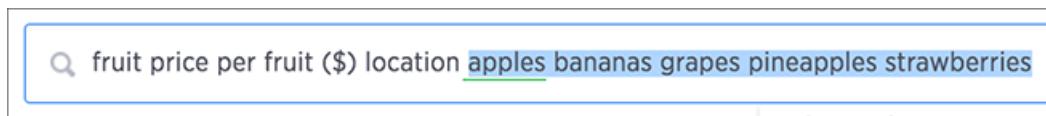
# Understand filters

**Summary:** Filters narrow down the search result to only include the data you want to see.

When you add a value to your search, it becomes a filter. To add a filter from the search bar:

1. Click in the search bar and type the values you want to include in the search.

Typing a value in the search bar acts as a filter.



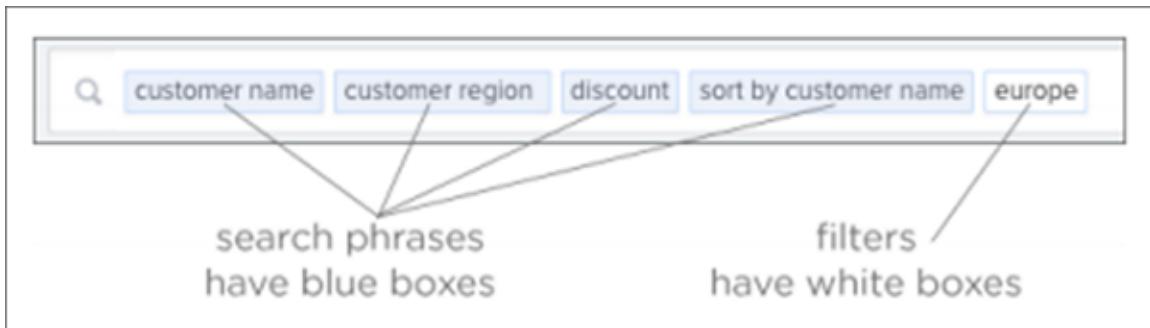
You can also use filter keywords like yesterday, after, next month, 2016 to filter your search. To see more filter keywords, refer to the [keyword reference \(page 224\)](#).

2. Click outside of the search bar or push enter to apply your filter.

Simple filters can be applied to an answer, while pinboard filters can be applied to all visualizations of a pinboard. You can find out more about [pinboard filters in the pinboards section \(page 156\)](#).

## Where filters appear in ThoughtSpot

As you have seen with search, filters appear in white boxes in the search bar.



In an answer or a pinboard, filters appear just below the title. For pinboards, your filters apply to all worksheet-based visualizations in the pinboard.

A screenshot of an answer titled "Olympics Medals Analysis". Below the title is a filter dropdown labeled "Medal: gold ▾" with a red "X" button to its right. The background of the answer has a light gray gradient.

If you ever find that your search or pinboard does not appear to contain all the data you want to see, check for any existing filters and remove them by clicking the X to see all the data.

**Note:** Filtering on NULL and empty values is a special case. You can find out more about how these values are represented and how to filter for them in [About filtering on null, blank, or empty values \(page 52\)](#).

## Simple filters

Simple filters can be applied to searches in a few different ways. You can use the search bar or the **Change Configuration** menu to add a filter to a search. You can apply simple filters to your search, whether it shows a table or a chart. Your filters remain part of the search even when you change the visualization type.

When adding a filter from the **Change Configuration** menu, numeric columns and text columns provide you with a checkbox selector for values. If the column contains a date, you'll see a calendar selector when applying a filter. This is also where you'll go to apply bulk filters.

## Bulk filters

If you have a large worksheet or table with thousands or millions of rows, you may want to create bulk filters. You can paste in a list of filter values, without having to click the box next to each value in the filter selector.

Bulk filters can be very useful when you have a very large worksheet or table. You can use them to filter a large list of values easily. For example, this is useful if you want to only search on a list of products that your manager sent to you in an email. You can cut and paste those values into the bulk filter box to quickly generate a report or chart that includes only those items of interest.

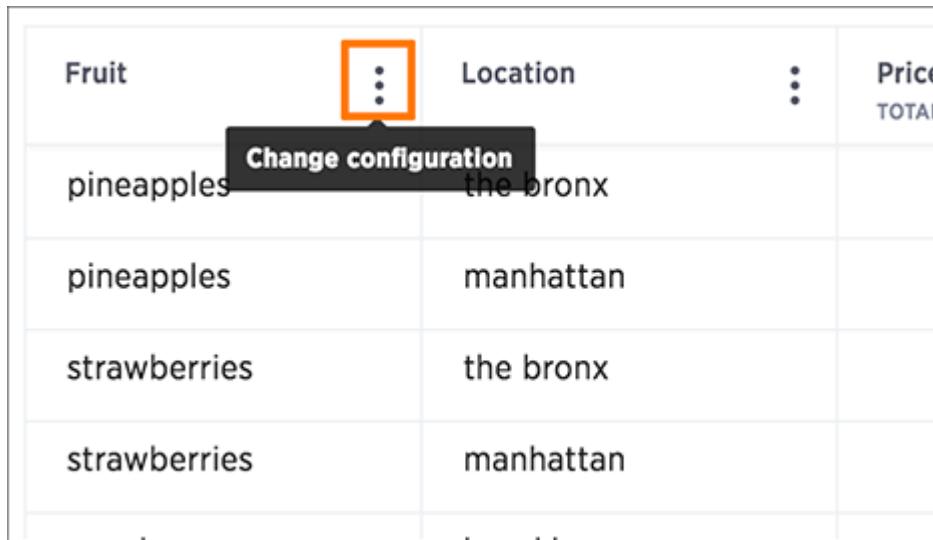
You can [create a bulk filter \(page 48\)](#) by pasting a list of values, separated by commas, semicolons, new lines, or tabs, into the bulk filter box. This allows you to easily search a large list of filters repeatedly.

# Add a filter to a table

Summary: You can add a simple filter from a column header while viewing your answer as a table.

To add a filter from column headers:

1. While viewing your answer as a table, click **Change configuration** on the column header you want to filter.

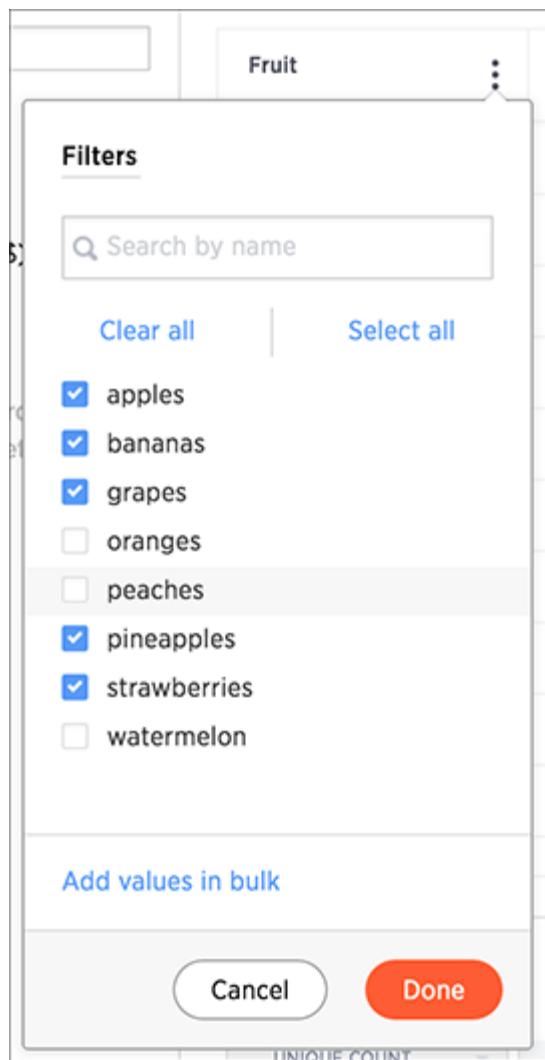


The screenshot shows a table with four rows of data. The columns are labeled 'Fruit', 'Location', and 'Price TOTAL'. The first row contains 'pineapples' in the 'Fruit' column and 'the bronx' in the 'Location' column. A black rectangular box highlights the 'Change configuration' button above the 'Location' column header. The second row contains 'pineapples' in the 'Fruit' column and 'manhattan' in the 'Location' column. The third row contains 'strawberries' in the 'Fruit' column and 'the bronx' in the 'Location' column. The fourth row contains 'strawberries' in the 'Fruit' column and 'manhattan' in the 'Location' column. The 'Price TOTAL' column is empty.

Fruit	Location	Price TOTAL
pineapples	the bronx	
pineapples	manhattan	
strawberries	the bronx	
strawberries	manhattan	

2. Select **Filters**.
3. Select the values to include in your answer.
4. Click **Done**.

If there are too many values, you can use the filter search bar to find the ones you want.



# Add a filter to a chart

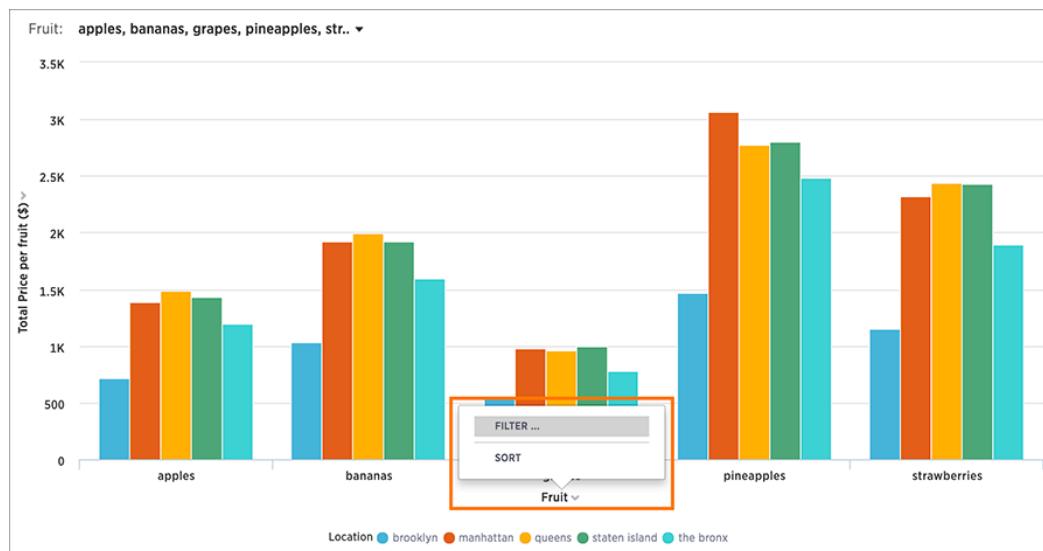
**Summary:** You can add a simple filter from a chart axis while viewing your answer as a chart.

You can filter a chart in two ways:

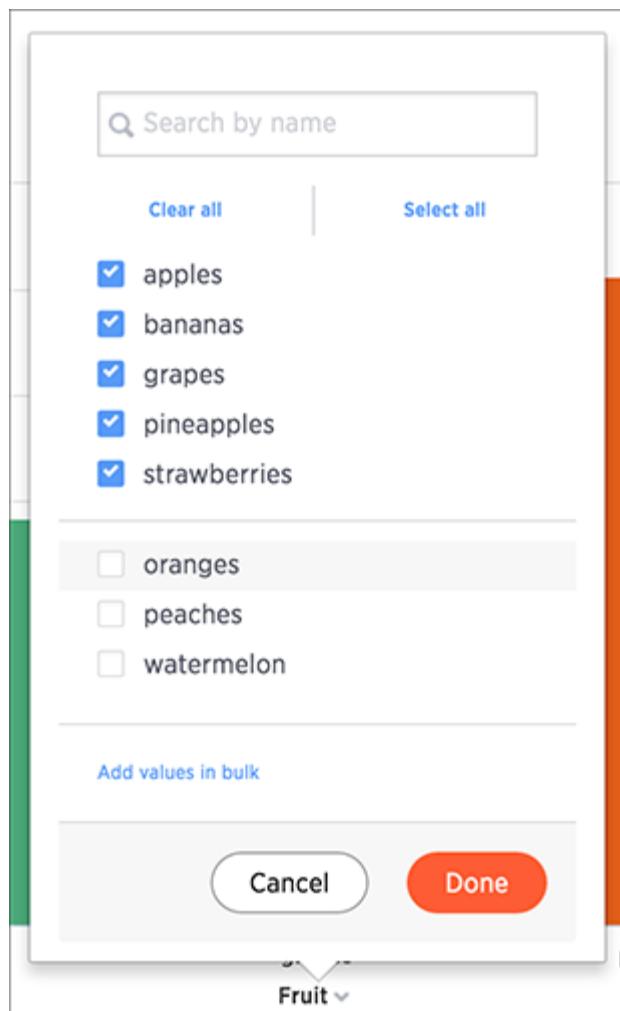
1. Click on the legend labels to toggle the values on or off.
2. Follow the steps shown here to filter on the axis values.

To add a filter from the chart axes:

1. While viewing your answer as a chart, click the chart axis you want to filter on, and select **Filter**.



2. Select the values you would like to include in your answer. Then click **Done**.



# Create a bulk filter

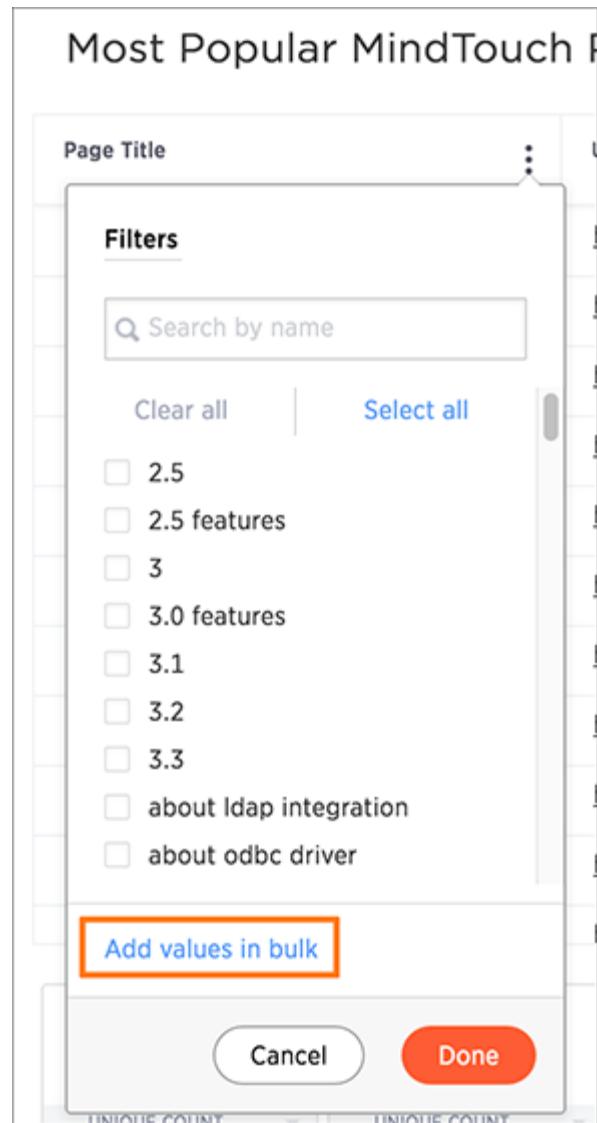
You can create a bulk filter by pasting a list of values, separated by commas, semicolons, new lines, or tabs, into the bulk filter box. This allows you to easily search a large list of filters repeatedly.

In this example, we will cut and paste values to create a bulk filter. You could also do this by pasting in a list of text values from an email or cells from an Excel or Google Sheets spreadsheet.

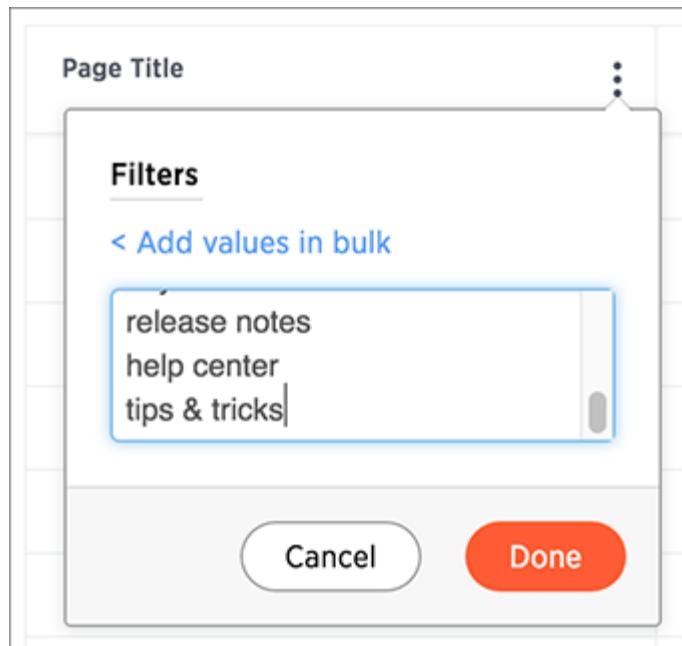
1. When viewing a table, select multiple cells by clicking and dragging.
2. Right click and choose Copy to Clipboard.

Most Popular MindTouch Pages November 2015			
Page Title	URL	Views <small>TOTAL</small>	
welcome to the help center	<a href="https://help.thoughtspot.com/help_center">https://help.thoughtspot.com/help_center</a>	2,422	
installation and setup	<a href="https://help.thoughtspot.com/02_administrators/installation_and_setup">https://help.thoughtspot.com/02_administrators/installation_and_setup</a>	2,000	
administration	<a href="https://help.thoughtspot.com/02_administrators">https://help.thoughtspot.com/02_administrators</a>	1,151	
the basics	<span style="background-color: black; color: white; padding: 2px 5px;">Copy to clipboard</span> <a href="https://help.thoughtspot.com/01_the_basics">https://help.thoughtspot.com/01_the_basics</a>	879	
knowledge base	<a href="https://help.thoughtspot.com/03_knowledge_base">https://help.thoughtspot.com/03_knowledge_base</a>	743	
keywords	<a href="https://help.thoughtspot.com/help_center/keywords">https://help.thoughtspot.com/help_center/keywords</a>	727	
release notes	<a href="https://help.thoughtspot.com/03_knowledge_base/release_notes">https://help.thoughtspot.com/03_knowledge_base/release_notes</a>	677	
help center	<a href="https://help.thoughtspot.com/help_center">https://help.thoughtspot.com/help_center</a>	630	
tips & tricks	<a href="https://help.thoughtspot.com/help_center/tips_tricks">https://help.thoughtspot.com/help_center/tips_tricks</a>	620	
administrator guide 2.2	<a href="https://help.thoughtspot.com/02_administrators/administrator_guide_2.2">https://help.thoughtspot.com/02_administrators/administrator_guide_2.2</a>	581	

3. Click the Filters icon in the column header.
4. Click Add values in bulk:



5. Paste the values into the bulk filter box.

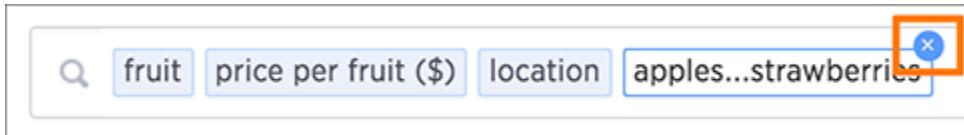


6. Click Done.

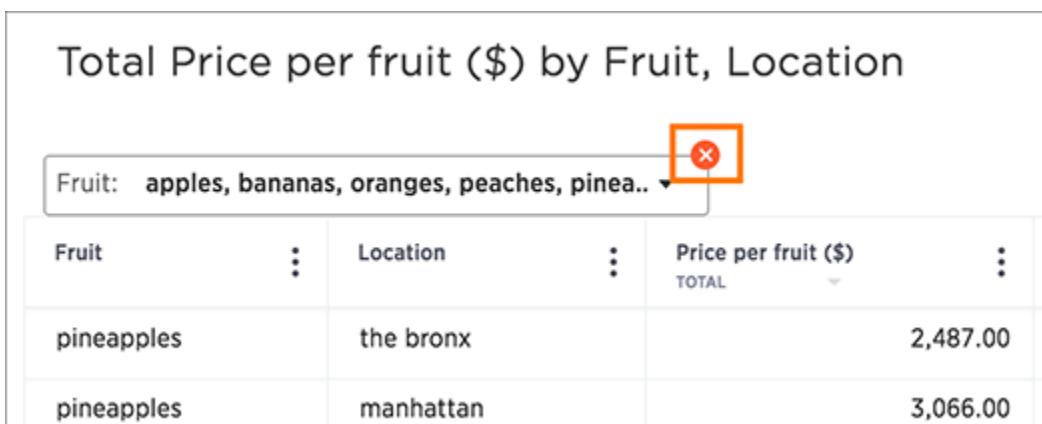
## Delete a filter

Summary: You can delete a filter from an answer to return to the original unfiltered search result.

There are multiple ways to delete a filter. To delete a filter you can click the x on the filter term in the search bar.



You can also click the x on the filter bar above the answer.



# Filter on null, blank, or empty values

**Summary:** Filtering on NULL and empty values is a special case.

Filtering on null, blank, or empty values can be tricky if your data contains both of these. You can use this method to see what's really going on with these types of values, and to get the filtering behavior you want.

## How NULL and blank values are displayed

When you view a table or chart, you may see values that appear as {blank}. These can actually be one of two types of values:

- NULL values, which are essentially missing values.
- blank or empty values, like an empty string of text or a string containing only whitespace (spaces, tabs).

Both of these types of values are represented as {blank}, but if you filter on {blank}, the filter will apply to only the NULL values. That is, only the NULL values will be included in your result. It can be hard to tell what's going on if you have a data source that contains both NULL and blank/empty values.

## To show NULL and blank values differently

If you need to differentiate between NULL and blank values, you can [Add a formula \(page 11\)](#) to make them appear differently in charts and tables. In this example, we'll use <text\_column> to refer to the text column which contains both NULL and blank values:

```
if ( strlen ( <text_column> ) = 0 ) then if ( isnull ( <text_column> ) ) then 'null'  
else 'empty' else <text_column>
```

This formula will show "null" where the value contained in the column is actually NULL. When the value is blank or empty, it will show up as "empty".

## To allow filtering on both NULL and blank values

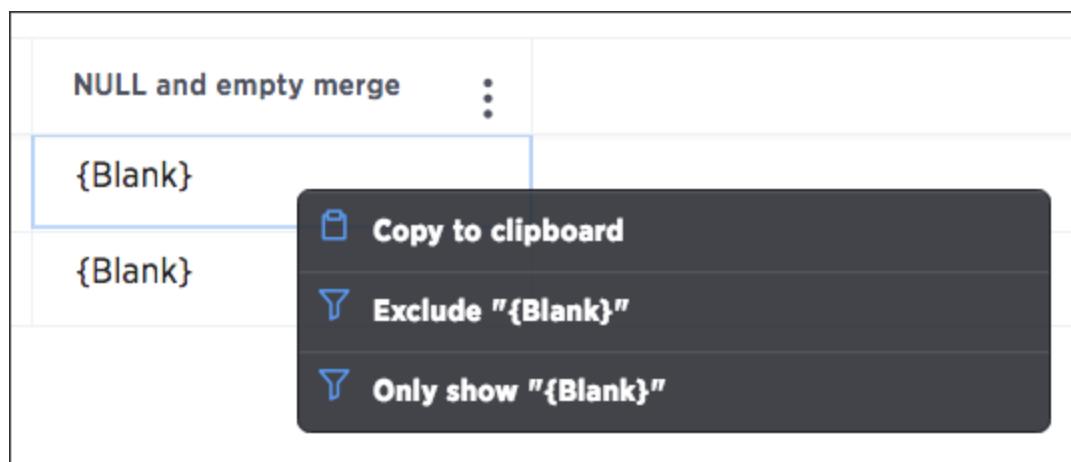
If you want to keep the same display format for NULL and blank values, but be able to filter on both using "{blank}", your [formula \(page 11\)](#) will be slightly different. You can use a formula like:

```
if ( strlen ( <text_column> ) = 0 ) then null else <text_column>
```

Use the filter you created instead of the original text column in your search to get the result you desire.

## Filtering on your formula

After creating the above formula that fits what you want to do, you can filter on the formula column you created in the search bar by typing the value {blank}, which will act as a filter. Or you can filter by left clicking on a{blank} value in your search result table, then right clicking and selecting Show only "{Blank}".



# Other search actions

There are other search actions you can perform by interacting directly with your answer. These actions can be performed in an ad hoc way, or you can pin your answer to a pinboard to save your configurations.

- [Change view options \(page 55\)](#)  
You can change the view of your answer so it appears as a table or a chart. Sorting your search allows you to order your answer, making it easier to read. You can change the date bucketing on tables and charts for columns with date values.
- [Show underlying data \(page 57\)](#)  
Viewing the underlying data of your answer gives you an un-aggregated view of the underlying data.
- [Drill down \(page 59\)](#)  
Drilling down allows you to see more information about the columns used within your search.
- [Exclude and include row values \(page 0\)](#)  
You can include or exclude row values from your answer.
- [Apply conditional formatting \(page 0\)](#)  
You can apply conditional formatting to tables or charts to highlight values in the data. This makes values above, below, or within a particular threshold stand out.
- [Copy an answer \(page 65\)](#)  
You can make a copy of an answer if you would like to make edits without changing the original answer.
- [Download your search \(page 67\)](#)  
You can download your search as either a table or chart.
- [Replay search \(page 69\)](#)  
You can instantly generate a step-by-step replay showing the creation of a table or chart.

# Change result display options

**Summary:** You can change how your search results (answers) appear.

Your search answer (results) have various display options. You can change the visualization used to display your results, their sort order, and how they are grouped or grouped.

## Change the view

You can change the view of your answer so it appears as a table or a chart. To change the view of your answer:

1. View your answer.
2. Click Change Visualization.
3. Select either table or a chart type.



## Sort your search

Sorting your search allows you to order your answer, making it easier to read. To sort your search:

- If you are in the data (table) view, click the column header you would like to sort on.

By default, sorting applies in descending order. You can click on a column header to sort again to sort in ascending order.

**Tip:** Hold shift and click another column to add a secondary sort. You can even add tertiary sorting and so on by continuing to use this trick.

- If you are in the chart view, click the axis label of your chart and select Sort.

## Change the date bucketing

The default date bucketing takes the entire search result into account. For example, if your search includes last month, dates are bucketed daily instead of monthly. You can change the date bucketing on tables and charts for columns with date values. To change the date bucketing:

1. Click the date bucket dropdown on the column header of your table or on the axis label of your chart.

Last searched		⋮
DAILY		
NO_BUCKET	7	
HOURLY		
DAILY	7	
WEEKLY	7	
MONTHLY		
QUARTERLY	7	
YEARLY	7	

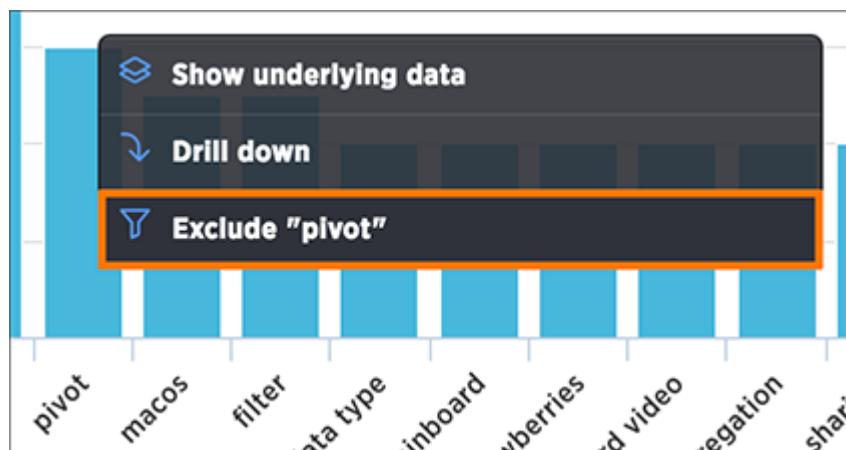
2. Select a different date bucket.

## Exclude and include row values

You can include or exclude row values from your answer.

To exclude or include row values:

1. Right click on the visualization or table cell of interest
2. Select Exclude “value” or Include “value” if available.



# Show underlying data

**Summary:** Viewing the underlying data of your answer gives you an un-aggregated view of the underlying data.

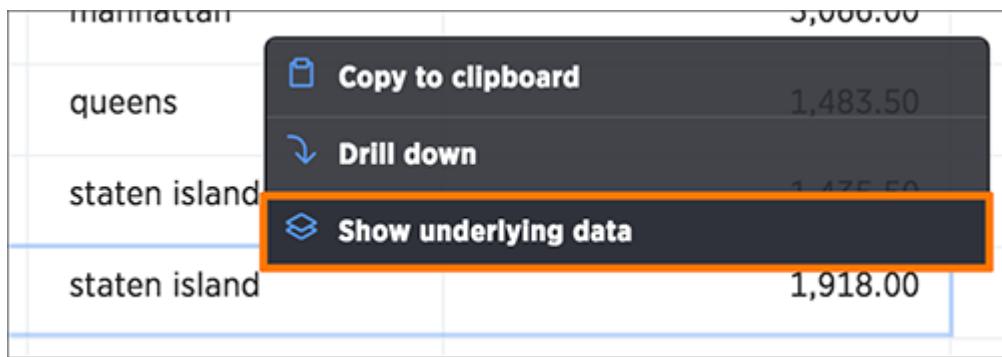
You can see the most granular details of a given result set, i.e. it shows the un-aggregated view. This feature lets you understand what an answer consists of. For example, if you search for “customer region revenue”, the answer shows the aggregate revenue value for each customer region. You can then click on any row and then on **Show underlying data**, to see each value that “revenue” constitutes of, for any given region.

Only the first 1,000 rows are shown when viewing the underlying data. You can even download the results shown when you choose **Show underlying data** from a chart. The download file limit is 100,000 rows.

**Note:** Viewing underlying data does not work for answers that are derived from chasm trap searches.

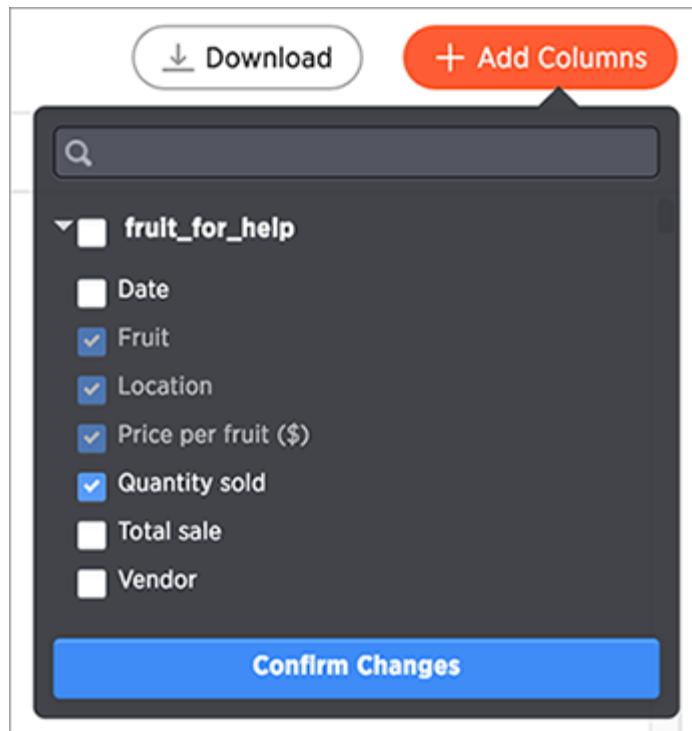
To show underlying data:

1. Right click on the visualization or table cell of interest
2. Select **Show underlying data**.



A new window opens that displays a summary and the underlying data.

3. Optionally, choose to + Add Column to the date\_to\_xmlschema and click Confirm Changes.



4. Click Download to download a CSV file of the data.

A screenshot of the ThoughtSpot interface titled "Showing underlying data". At the top, it displays a "Summary" section with "Fruit: bananas", "Location: staten island", and "Total Price per fruit (\$): 1,918.00". Below this is a table titled "Underlying Data" with three columns: "Location", "Fruit", and "Price per fruit (\$)". The table contains four rows, all of which show "staten island" in the Location column, "bananas" in the Fruit column, and "2.00" in the Price per fruit (\$) column.

Location	Fruit	Price per fruit (\$)
staten island	bananas	2.00

Download + Add Columns

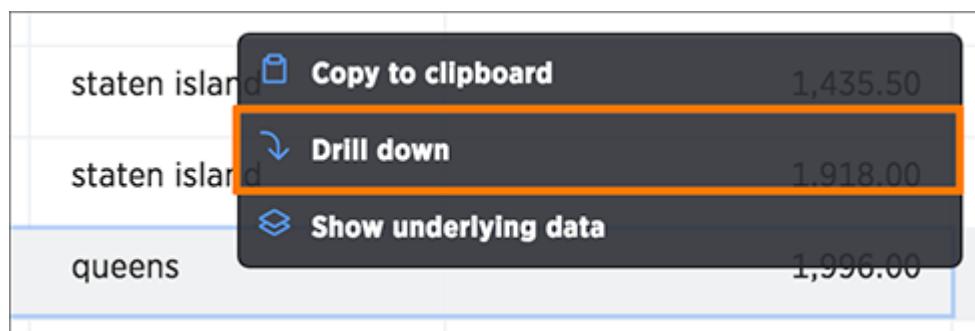
# See the search behind a result

Summary: You can use your answer to learn more about the data used in your search.

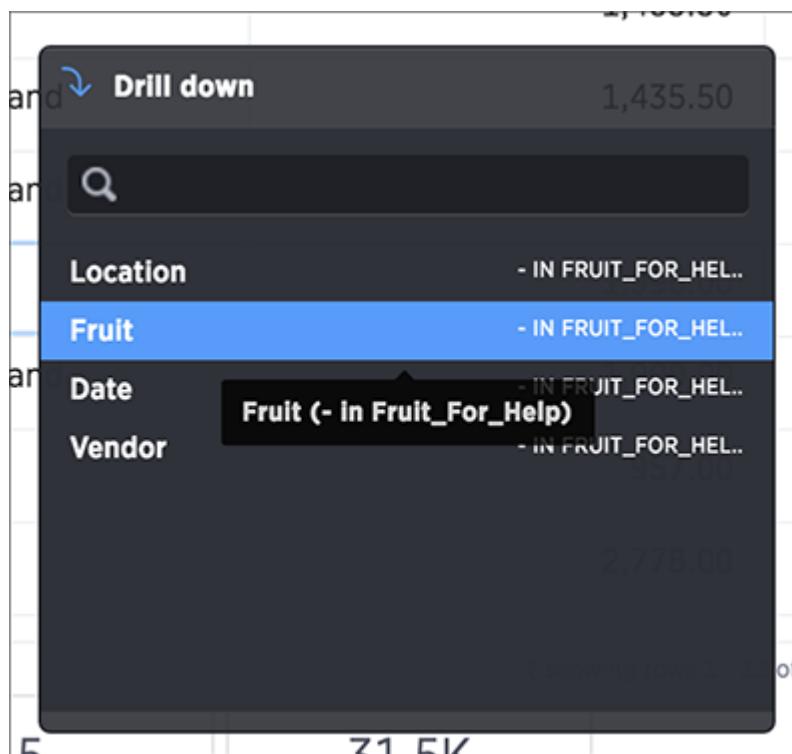
Drilling down allows you to see more information about the columns used within your search. If you own the pinboard you can drill down to the data beneath. Users you share the pinboard with can also drill down provided they *also* have access to the data on which the board was based.

To drill down:

1. Right click on the visualization or table cell of interest, and select Drill down.



2. Click on any of the listed data to recreate the search with that data included.



# Apply conditional formatting

**Summary:** Use conditional formatting to make portions of your results stand out

You can apply conditional formatting to tables or charts to highlight values in the data. This makes values above, below, or within a particular threshold stand out.

## Understand conditional formatting

Many companies create pinboards with key metrics they want to track in daily or weekly staff meetings. Using conditional formatting, they can see at a glance how they are performing relative to these metrics.

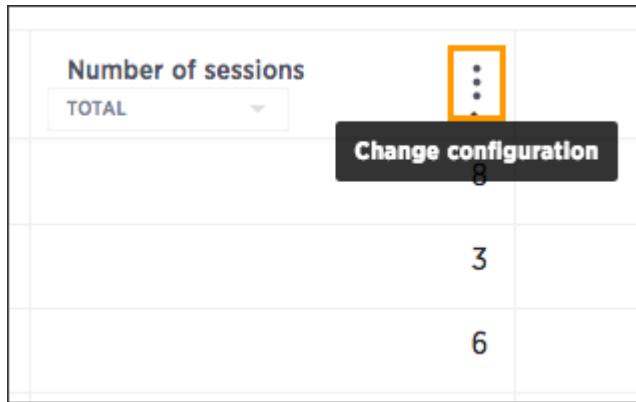
You can add visual cues for KPIs (Key Performance Indicators) or threshold metrics to charts and tables, to easily show where you are falling short or exceeding targets. These visual cues are called conditional formatting, which applies color formatting to your search result. For tables, you can add conditional formatting to set the background color of cells in a table based on the values they contain. For charts, you can add conditional formatting to show the threshold(s) you defined, and the data that falls within them will be shown using the same color.

## Apply conditional formatting to a table

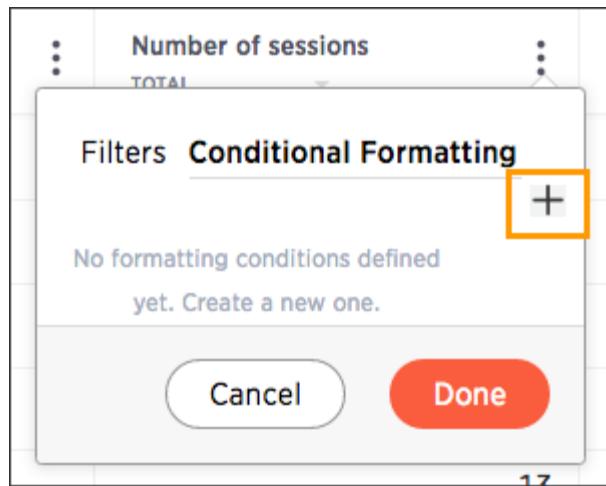
You can use conditional formatting to show table cells with a background color determined by the value they contain.

To apply conditional formatting to a table:

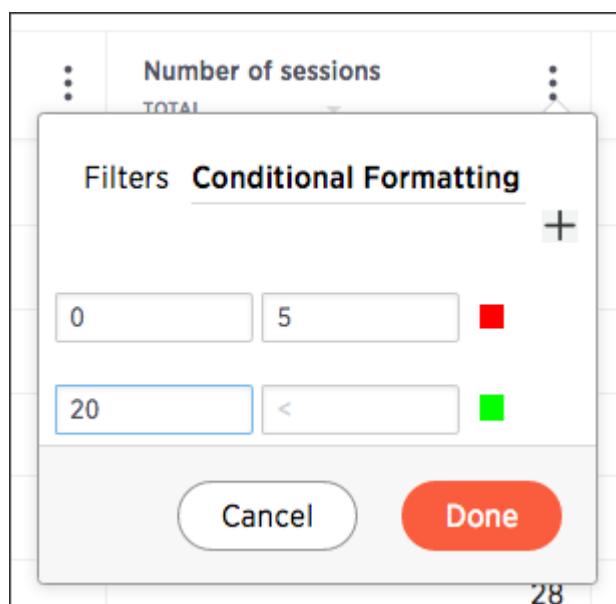
1. In the column header of your table for the column you want to apply formatting to, click the three dot Change Configuration icon.



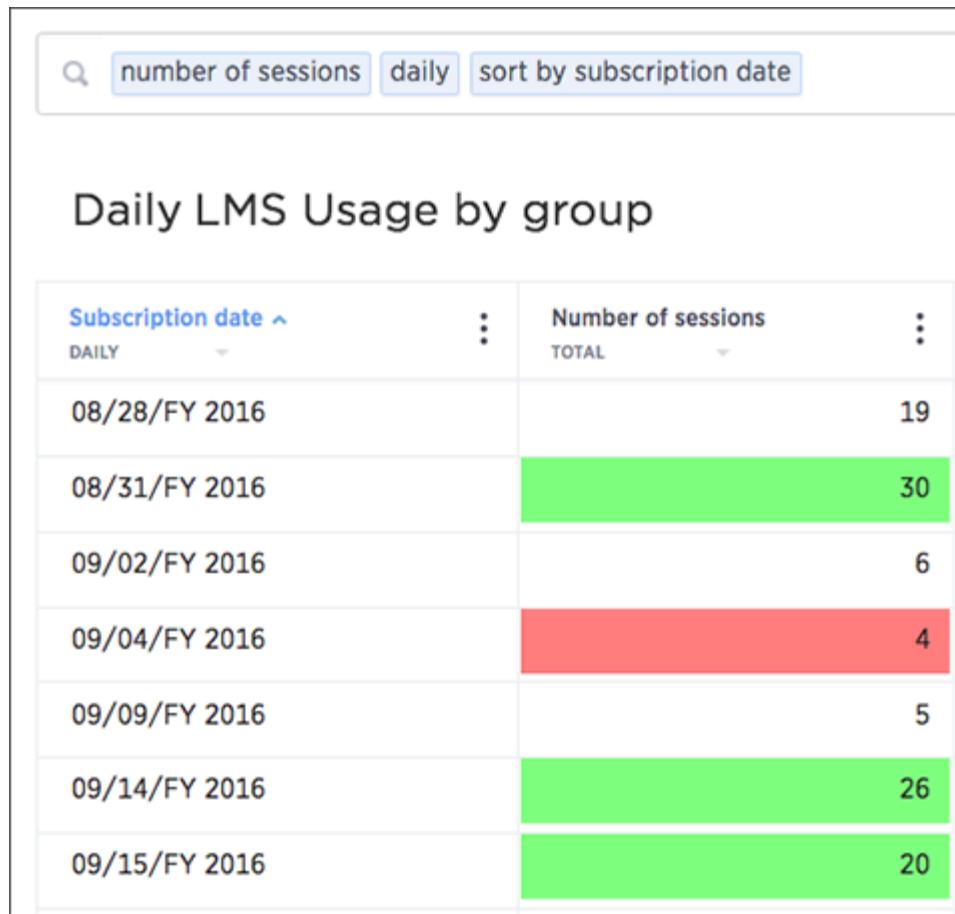
2. Select Conditional Formatting.
3. Click the + icon in the Conditional Formatting menu.



4. Define the sets of values and the color to use for each set.



5. Click Done after defining all of your conditional formatting sets.



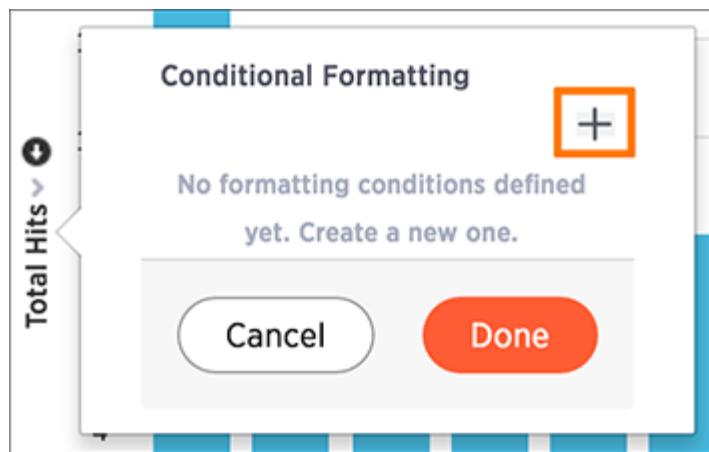
6. Note that if you change to a chart type, you will need to apply conditional formatting again. Conditional formatting is tied to the specific visualization.

## Apply conditional formatting to a chart

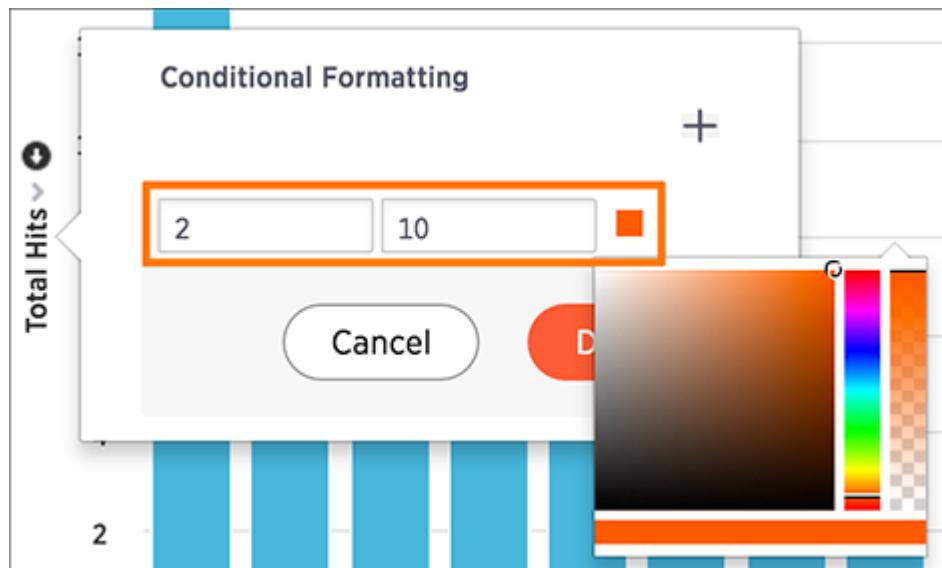
You can use conditional formatting to show charts with a target value or range drawn as a line in the chart, and the legend colors determined by where values fall relative to the target.

To apply conditional formatting to a chart:

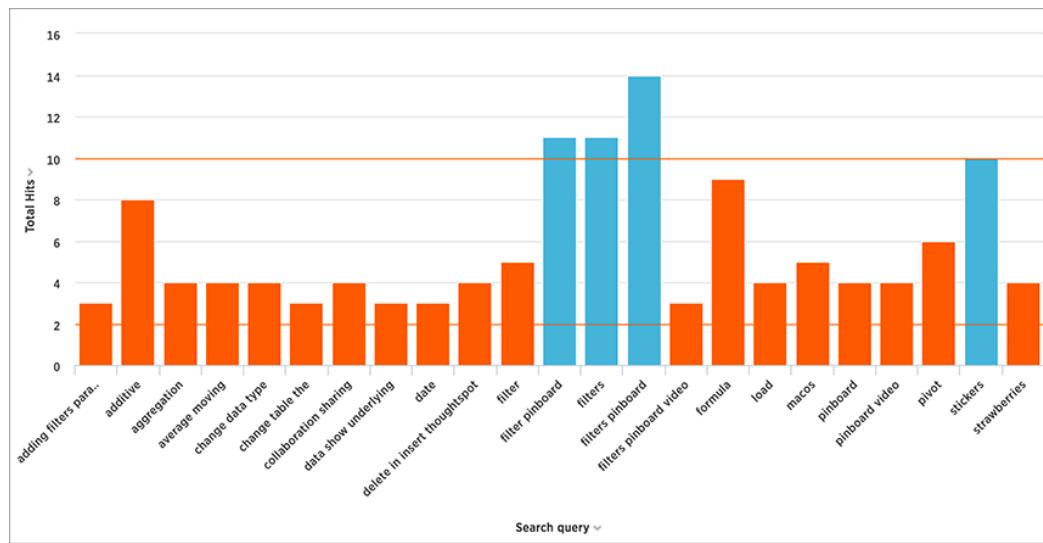
1. Click the axis label of your chart. Select Conditional Formatting.
2. Click the + icon in the Conditional Formatting menu.



3. Define the ranges of values and the color to use for each range you want to track. To add another range, click the + icon and repeat.



4. Click Done after defining all of your conditional formatting ranges.



5. Note that if you change the chart type, you will need to apply conditional formatting again. It is tied to the specific visualization.

# Copy an answer

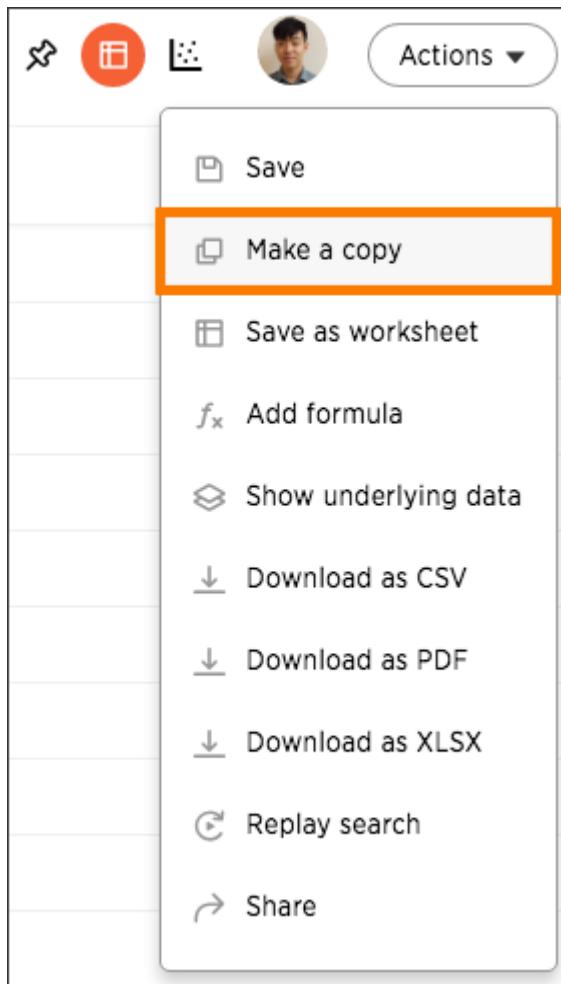
**Summary:** Making a copy of an answer allows you to make your own edits without overwriting the original.

You can make a copy of an answer if you would like to make edits without changing the original answer. When copying, you can type in a different name for your copy.

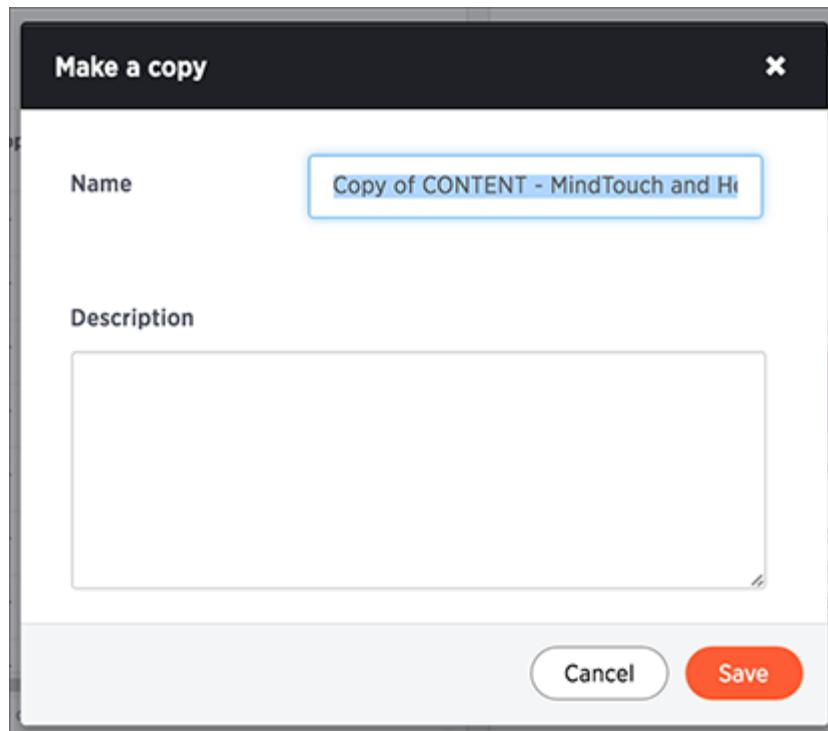
1. Click on **Answers**, on the top navigation bar.



2. On the answer list page, click the answer you would like to copy.
3. Click **Actions** and select **Make a copy**.



4. Give your answer a new name and description. Then click **Save**.

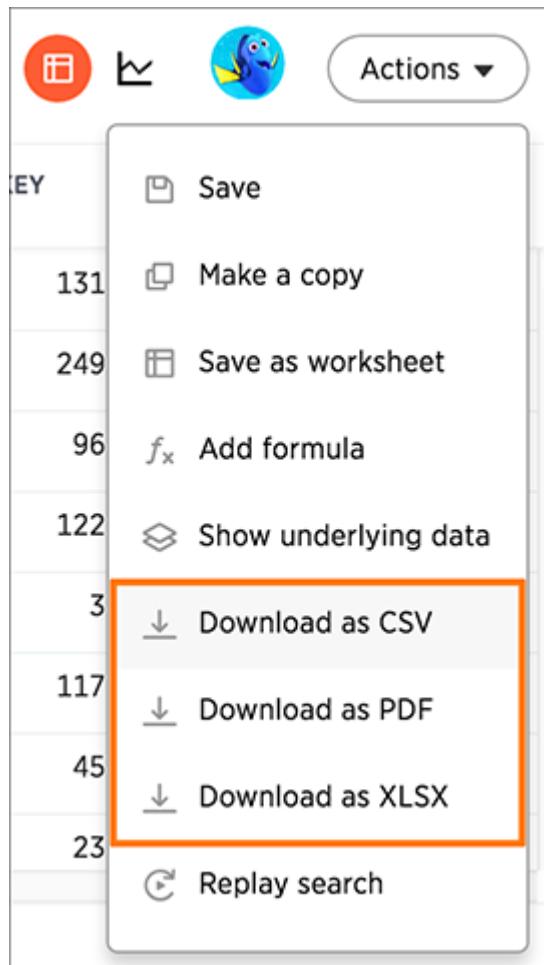


# Download your search

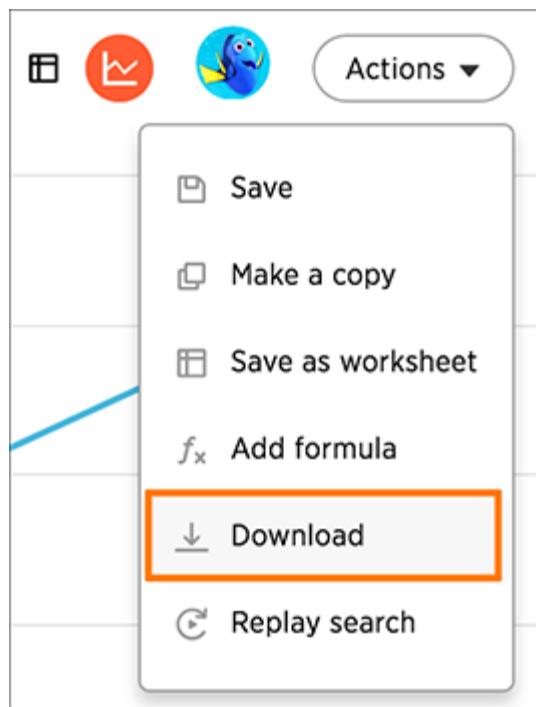
Summary: You can download your search as either a table or chart.

You have the option to download your table as a CSV (comma separated values), PDF, or XLSX (Excel) file. When you download a chart, it will be a PNG file. To download your search:

- Click Actions. For a table, choose between Download as CSV, Download as PDF, or Download as XLSX.



- For a chart, select Download.

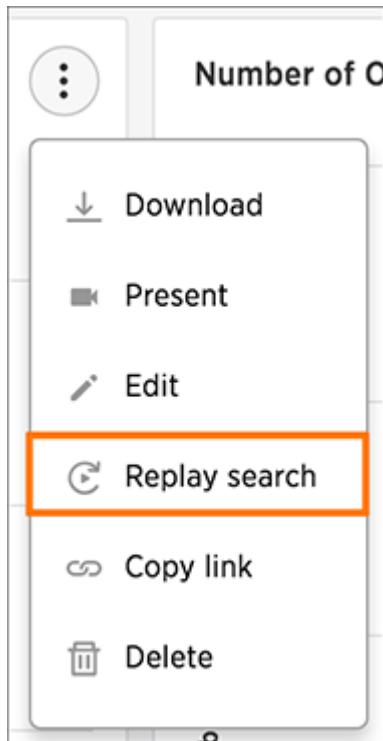


# Replay search

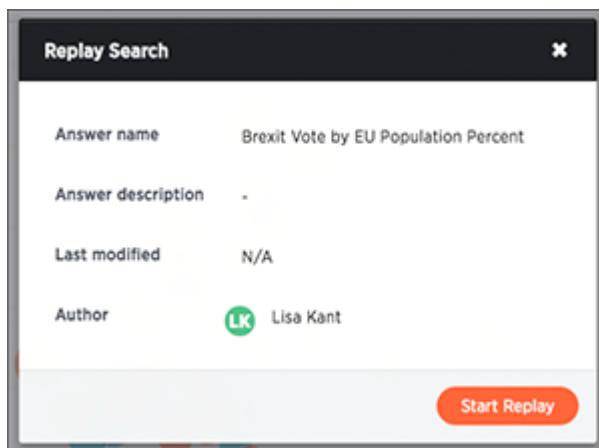
**Summary:** You can instantly generate a step-by-step replay showing the creation of a table or chart.

The replay feature shows how to create the chart or table you are viewing. Use it to teach yourself, or take a screencam of it and create your own ThoughtSpot training for your team.

1. When viewing a chart or table, click Actions and select Replay search.



2. Then, select Start Replay to view the video.



The replay will start automatically. You can pause and resume it by clicking on it.

# Understand charts

**Summary:** Charts display your search answer in a visual way.

Your search needs at least [one attribute and one measure \(page 28\)](#) to be presented as a chart. When you choose to display your answer as a chart, ThoughtSpot will assign it the best fit chart type.

**Note:** Colors are maintained across searches within a session. For example, when doing a search on revenue by state, each state will keep its color assigned to it even if you change the search or chart type.

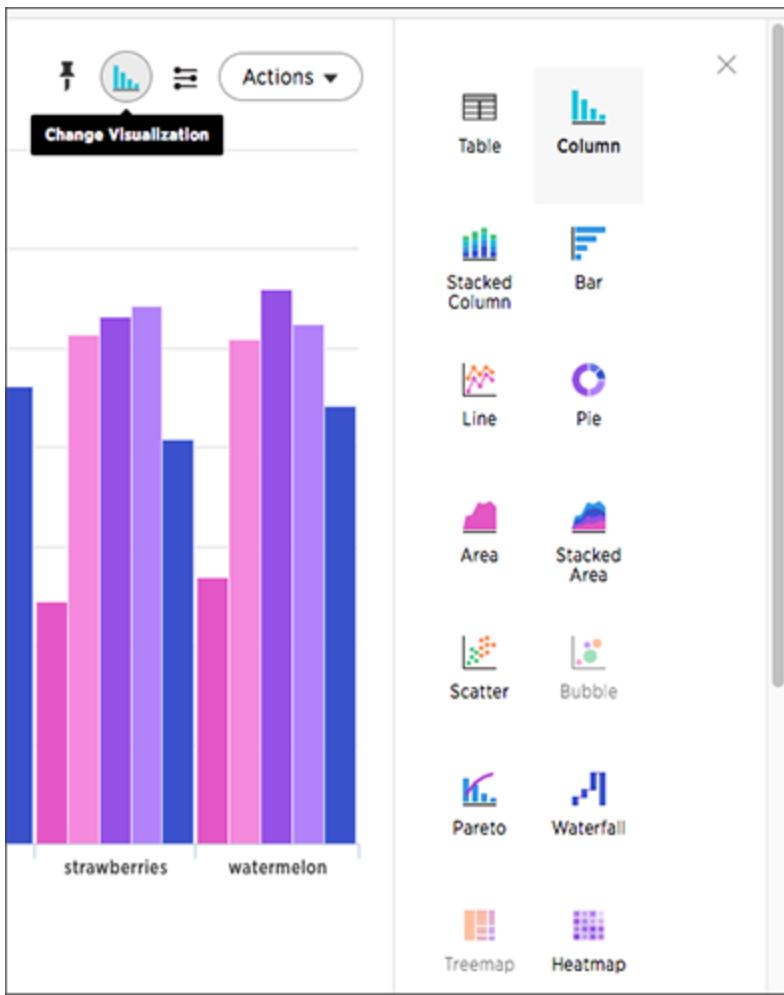
You can choose from a large number of chart types in ThoughtSpot. Each chart type provides you with a different visualization for your answer.

You can also [adjust the axes, labels, and view of the chart \(page 99\)](#).

## About chart types

You can choose from a large number of chart types in ThoughtSpot. Each chart type provides you with a different visualization for your answer.

You can change the chart type of your answer by clicking **Change Visualization**.



Note: Some chart types may be unavailable for you to select depending on the columns of your search. For example, if your search does not contain at least one geographical column then you will not be able to select any of the geo chart types. Unavailable chart types are grayed out. Hovering over one will tell you what columns are needed before you can choose it.

- [Column charts \(page 73\)](#)

The column chart is one of ThoughtSpot's simplest, yet most versatile chart type. More often than not, the column chart will be chosen as your default chart type.

- [Bar charts \(page 75\)](#)

The bar chart is very similar to the column chart. The only difference is that it is oriented the other way.

- [Line charts \(page 76\)](#)

Like the column chart, the line chart is one of ThoughtSpot's simplest, yet most versatile chart type. More often than not the line chart will be chosen as your default chart type.

- [Pie charts \(page 77\)](#)

The pie chart is a classic chart type that displays your search in a circle. The pie chart ThoughtSpot shows is in the shape of a doughnut.

- [Area charts \(page 79\)](#)

The area chart is based on the line chart, but has filled in regions.

- [Scatter charts \(page 81\)](#)

The scatter chart is useful for finding correlations or outliers in your data.

- [Bubble charts \(page 82\)](#)

The bubble chart displays three dimensions of data with each containing a set of values.

- [Pareto charts \(page 84\)](#)

The pareto chart is a type of chart that contains both columns and a special type of line chart.

- [Waterfall charts \(page 85\)](#)

The waterfall chart is used to show how an initial value is affected by a series of intermediate positive or negative values.

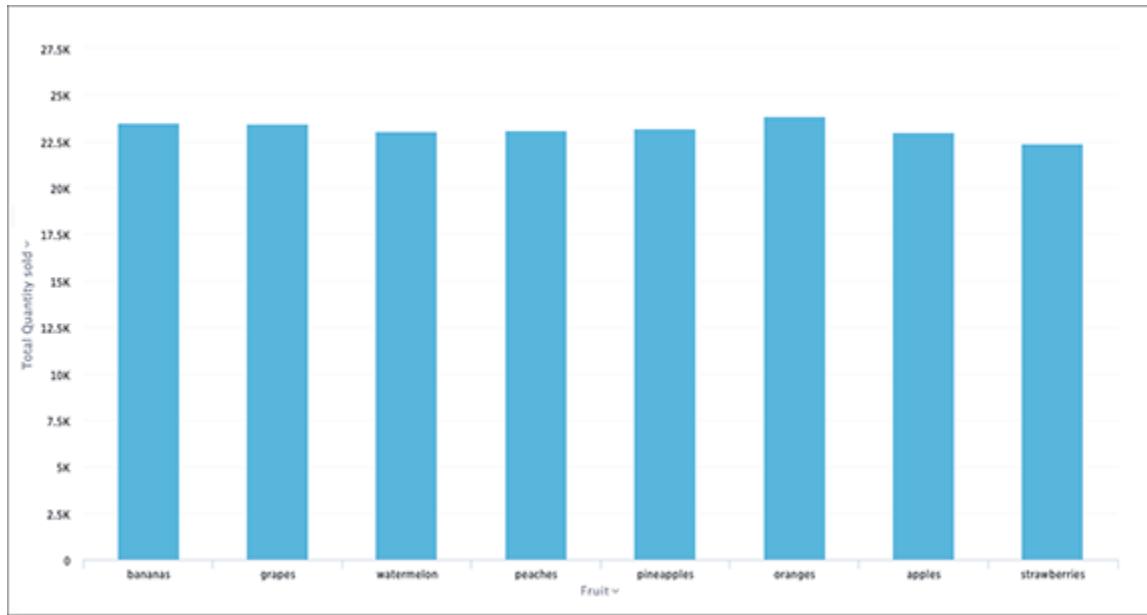
- [Treemap charts \(page 86\)](#)  
The treemap chart displays hierarchical data as a set of nested rectangles.
- [Heatmap charts \(page 94\)](#)  
The heatmap chart displays individual data values in a matrix following a color scale.
- [Line column charts \(page 88\)](#)  
The line column chart combines the column and line charts.
- [Funnel charts \(page 91\)](#)  
The funnel chart shows a process with progressively decreasing proportions amounting to 100 percent in total.
- [About geo charts \(page 92\)](#)  
There are three geo charts that let you visualize geographical data in ThoughtSpot.
- [About pivot tables \(page 96\)](#)  
Pivot tables in ThoughtSpot use the well known drag-and-drop interface. Creating a pivot table enables exploring alternate visualization of data in a wide table. The basic idea is that some data is easier to consume when laid out horizontally, while others, vertically.

# Column charts

Summary: A column chart is the most versatile chart type

The column chart is one of ThoughtSpot's simplest, yet most versatile chart type. More often than not, the column chart will be chosen as your default chart type.

Column charts are vertical bar charts that display your data using rectangular bars. The length of the bar is proportional to the data value.



Your search needs at least one attribute and one measure to be represented as a column chart.

## Stacked column charts

The stacked column chart is similar to the column chart, but with one major difference. It includes a legend, which divides each column into additional sections by color.

Stacked column charts are typically used when you want to compare aggregated data and the data that it includes together. This chart type benefits when you add the **Additional chart options** option. Turning it on will show the sum of the stacks at the top of each stack.

It is important to note that stacked column charts plot the y-axis as a percentage by default. You can choose to toggle **Show Y-Axis as %** on or off in the Configuration Options. This feature is also available for stacked area charts.

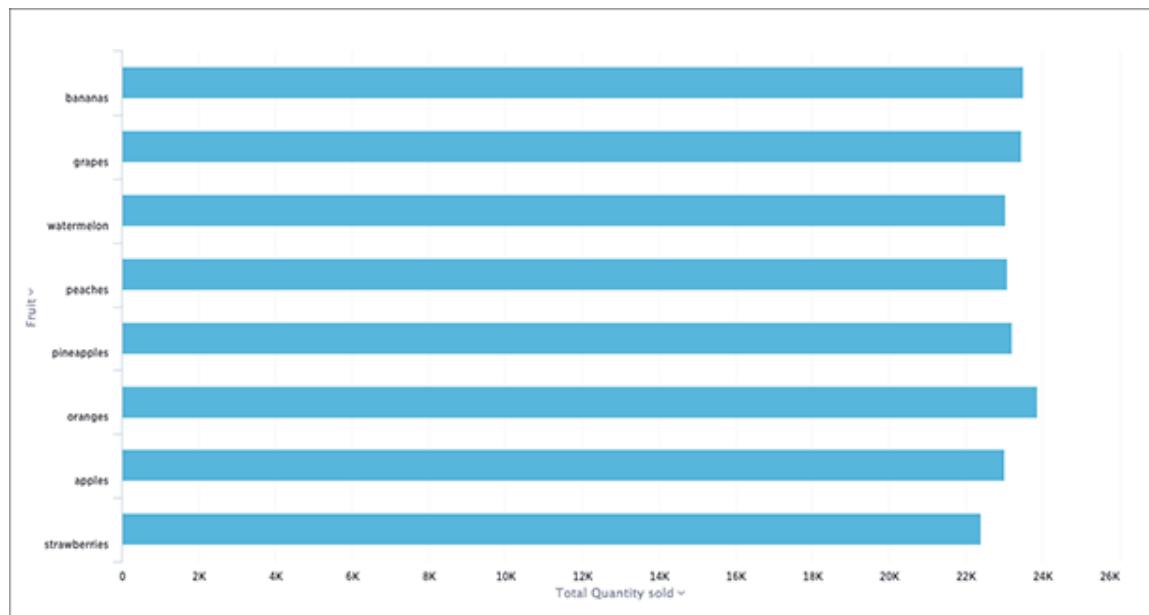


Your search needs at least two attributes and one measure to be represented as a stacked column chart.

# Bar charts

The bar chart is very similar to the column chart. The only difference is that it is oriented the other way.

Bar charts display your data using horizontal rectangular bars. The length of the bar is proportional to the data value.



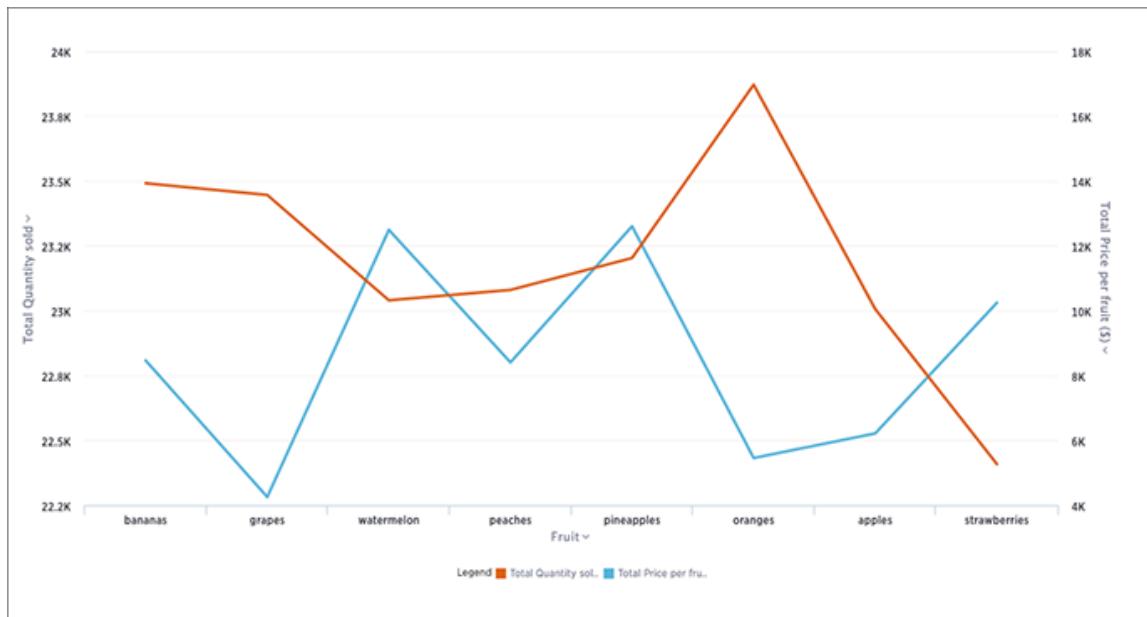
Your search needs at least one attribute and one measure to be represented as a bar chart.

# Line charts

Summary: Line charts are good at showing trends over intervals of time.

Like the column chart, the line chart is one of ThoughtSpot's simplest, yet most versatile chart type. More often than not the line chart will be chosen as your default chart type.

Line charts displays your data as a series of data points connected by straight line segments. The measurement points are ordered by the x-axis value.



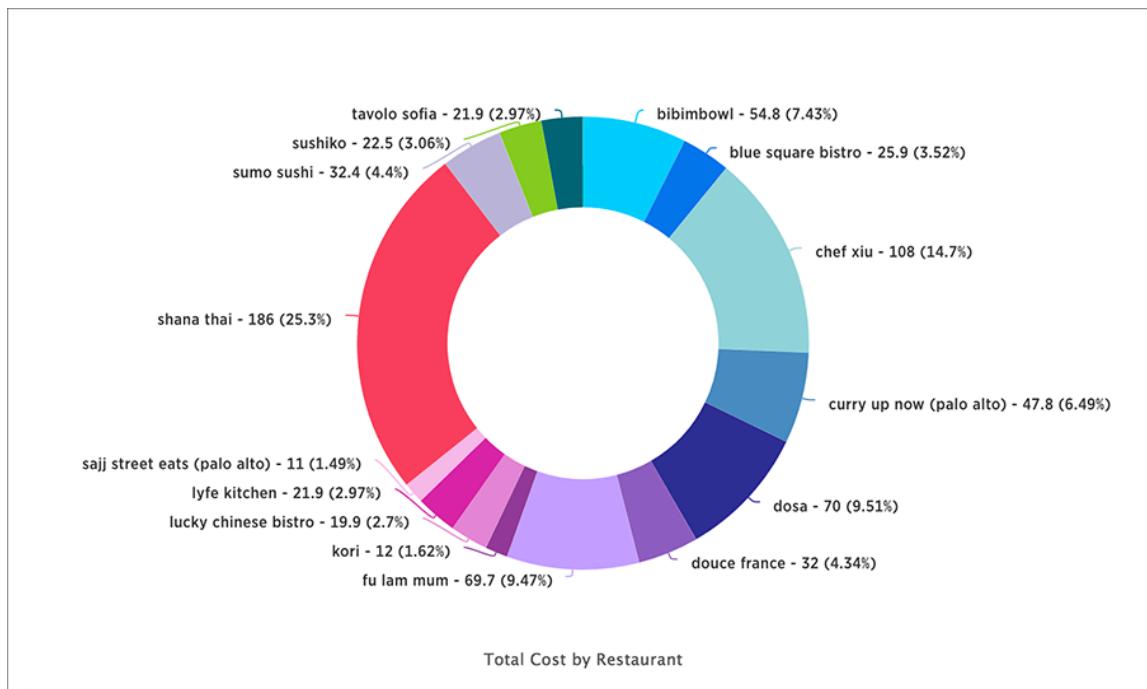
Your search needs at least one attribute and one measure to be represented as a line chart.

# Pie charts

The pie chart is a classic chart type that displays your search in a circle. The pie chart ThoughtSpot shows is in the shape of a doughnut.

## How pie charts divide data

Pie charts divide your data into sectors that each represent a proportion of a whole circle. You can display the exact values of each slice, in addition to the percentage values by toggling on **Additional chart options** found under **Change chart configuration**.

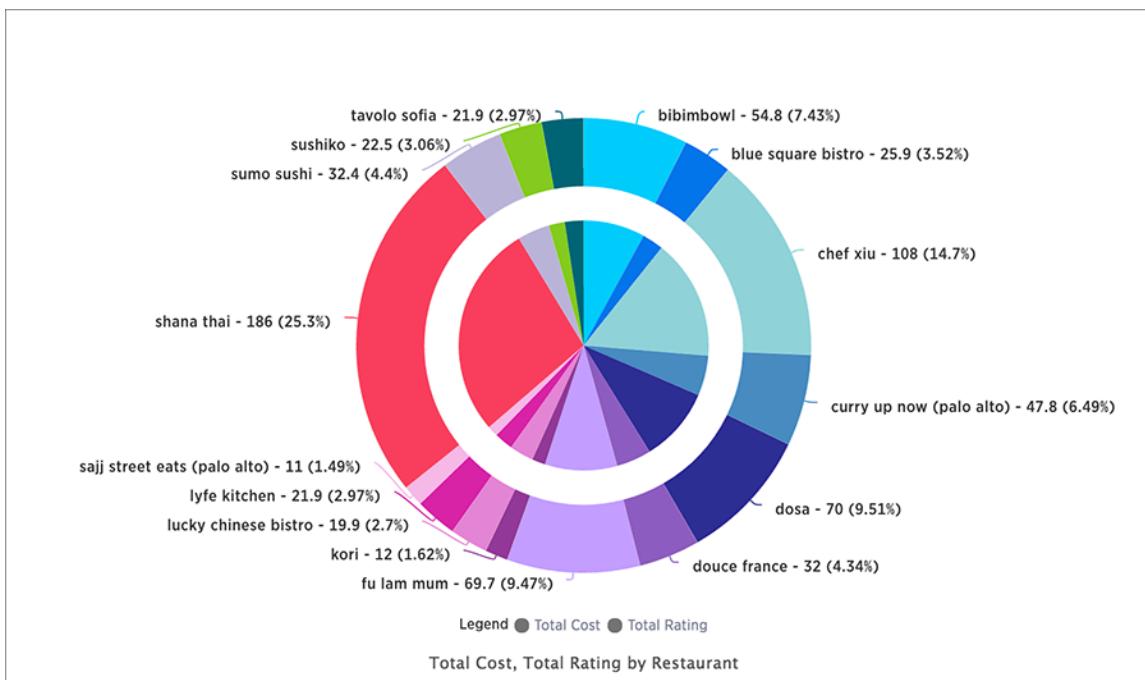


Your search needs at least one attribute and one measure to be represented as a pie chart. Also, there must be fewer than 50 values in the attribute column.

## Pie in pie charts

The pie in pie chart can be created from a regular pie chart in order to compare more than one component of an attribute. Pie in pie charts show two concentric pie charts comparing different measures.

To see a pie in pie chart, assign two different measures to the y-axis under **Configure Chart**.

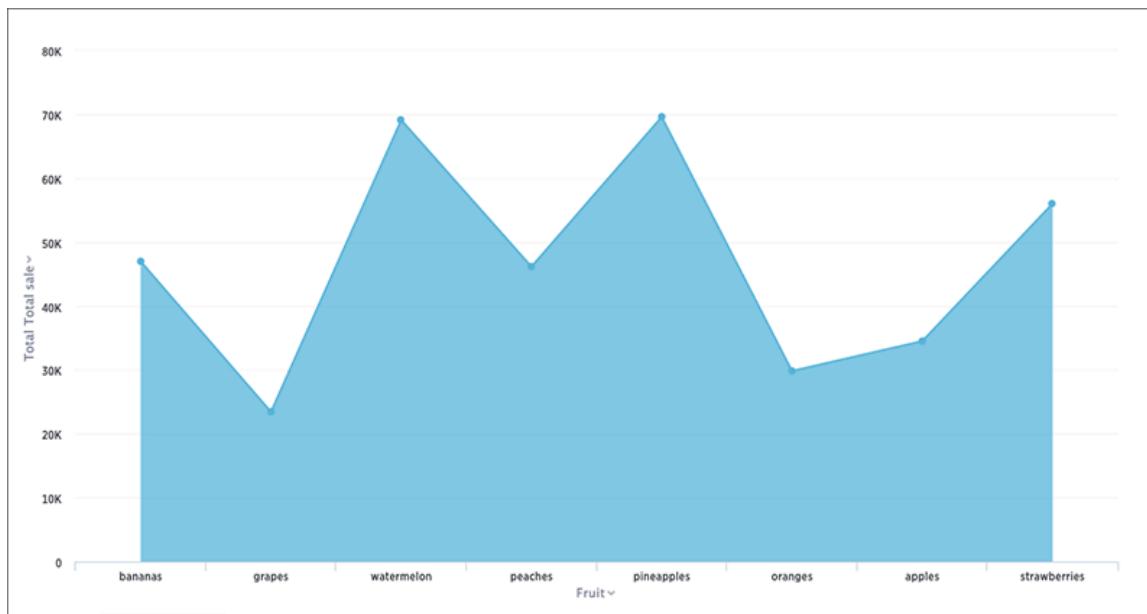


# Area Charts

The area chart is based on the line chart, but has filled in regions.

## Understand area charts

Area charts display quantitative data graphically. The area between the x-axis and the line are colored in to help you compare different portions of the chart.



Your search needs at least one attribute and one measure to be represented as an area chart.

## Stacked area charts

The stacked area chart is an area chart with an attribute in the legend, which divides the area into layers.

Stacked area charts show the relative contribution to the accumulated total of a measure over time.

Stacked area charts plot the y-axis as a percentage by default. You can choose to toggle Show Y-Axis as % on or off in the Configuration Options to create your own mountain-style charts.

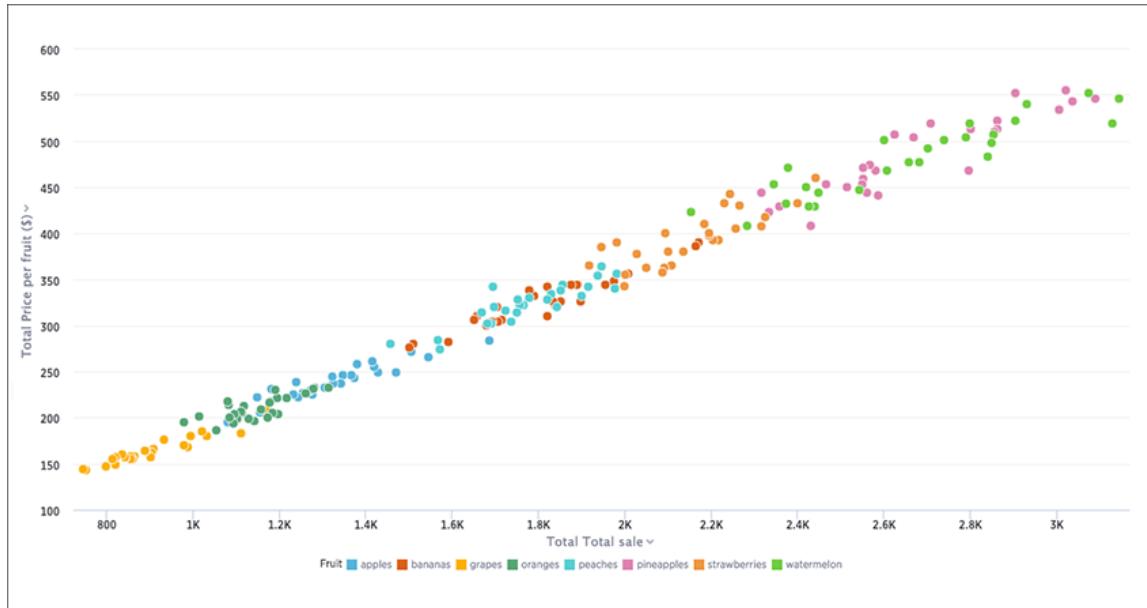


Your search needs at least two attributes and one measure to be represented as a stacked area chart.

# Scatter charts

**Summary:** The scatter chart is useful for finding correlations or outliers in your data.

Scatter charts display your data as a collection of points, which can either be evenly or unevenly distributed. Each point is plotted based on its own axes values. This helps you determine if there is a relationship between your searched columns.

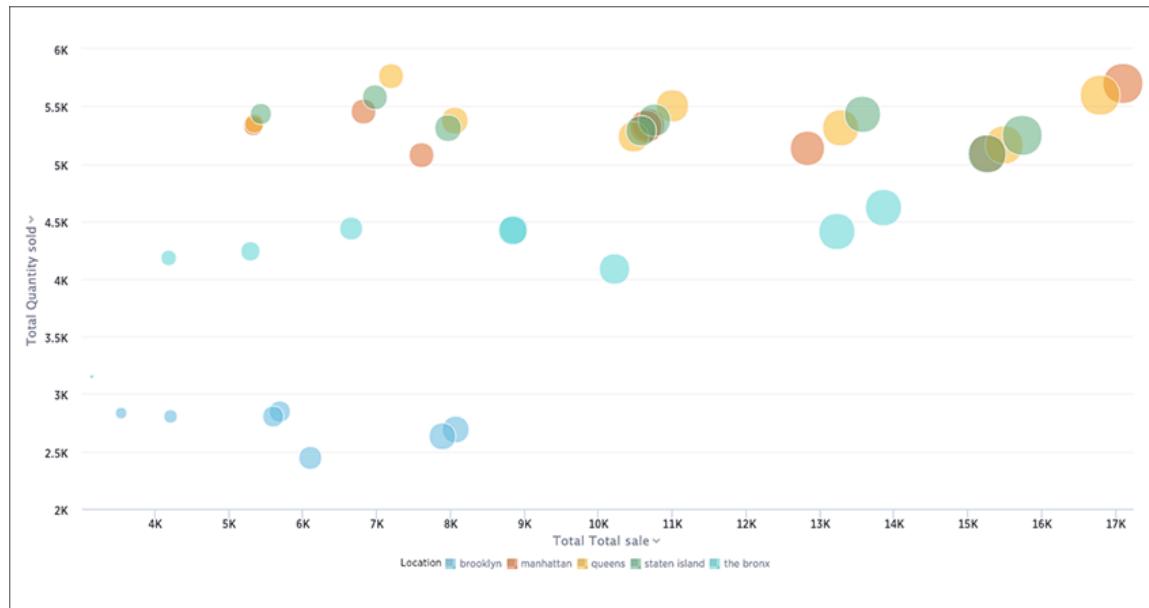


Your search needs at least one attribute and one measure to be represented as a scatter chart.

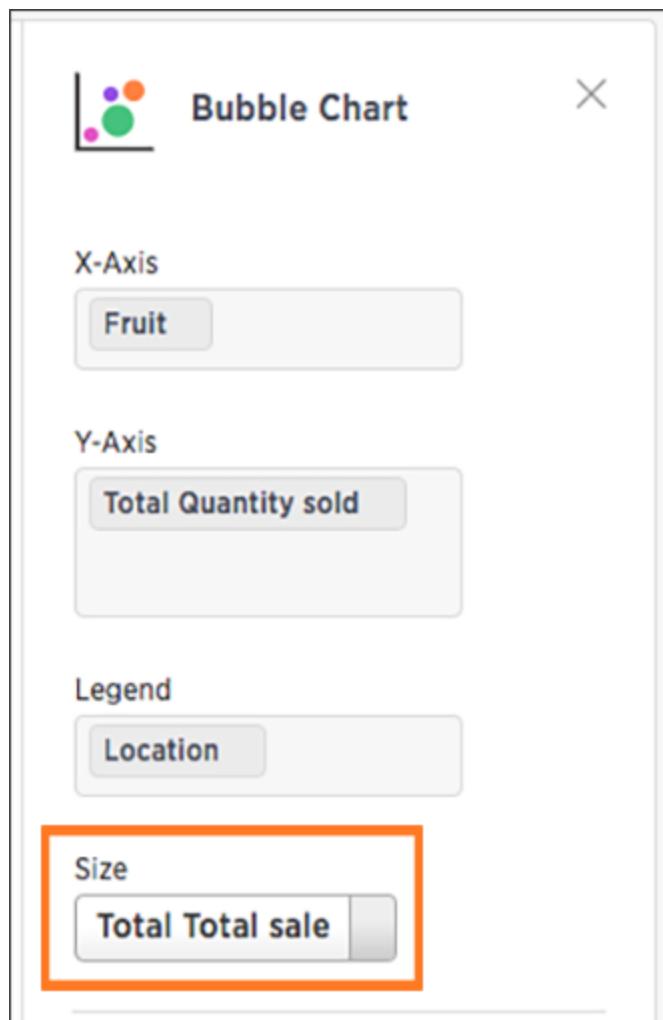
# Bubble charts

Summary: The bubble chart displays three dimensions of data with each containing a set of values.

The bubble chart is a variation of the scatter chart, with the data points replaced with bubbles. These bubbles add a third data dimension to your answer.



The size of each bubble depends on the measure you choose under **Edit chart configuration**.

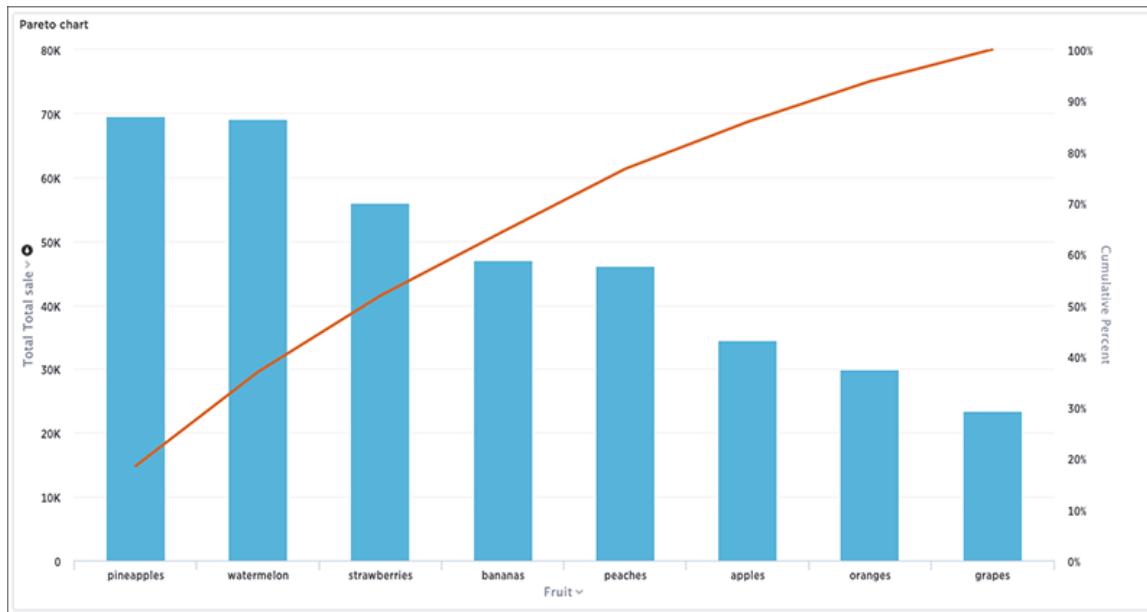


Your search needs at least one attribute and two measures to be represented as a bubble chart.

# Pareto charts

Summary: The pareto chart is a type of chart that contains both columns and a special type of line chart.

The individual values of a pareto chart are represented in descending order by columns, and the cumulative percent total is represented by the line. The y-axis on the left is paired with the columns, while the y-axis on the right is paired with the line. By the end of the line, the cumulative percent total reaches 100 percent.

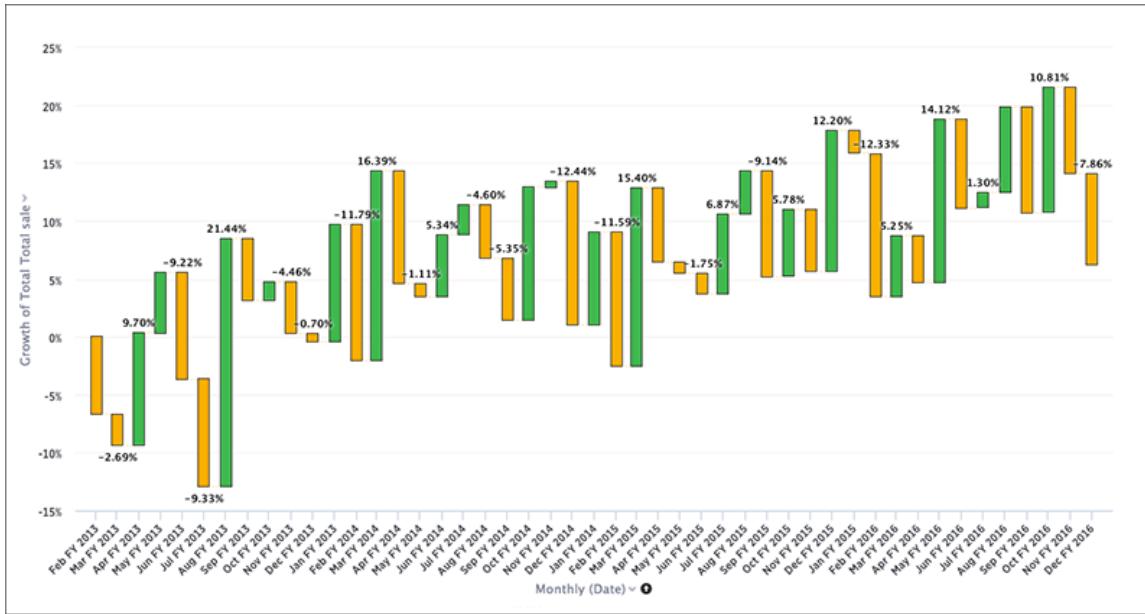


Your search needs at least one attribute and one measure to be represented as a pareto chart.

# Waterfall charts

**Summary:** The waterfall chart is used to show how an initial value is affected by a series of intermediate positive or negative values.

Waterfall charts are good for visualizing positive and negative growth, and therefore work well with the growth over time keyword. The columns are color-coded to distinguish between positive and negative values.

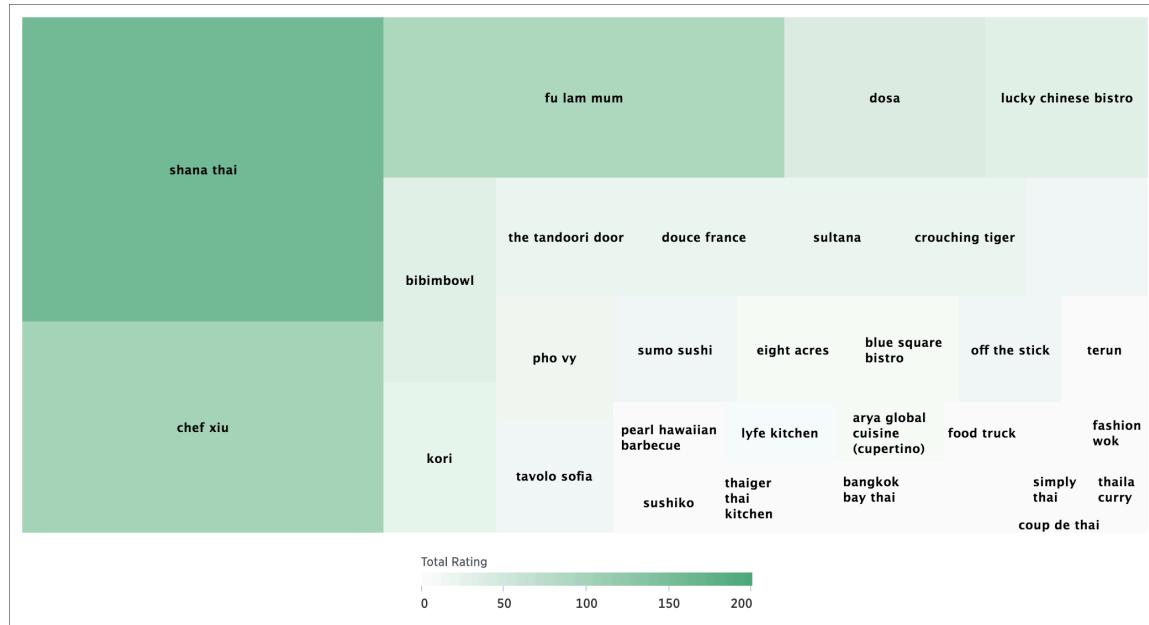


Your search needs at least one attribute and one measure to be represented as a waterfall chart.

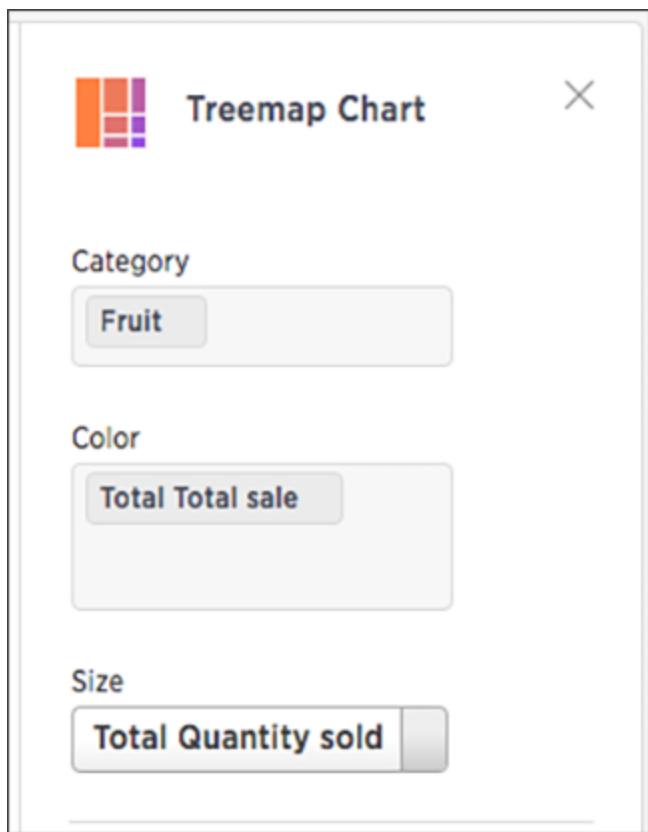
# Treemap charts

**Summary:** The treemap chart displays hierarchical data as a set of nested rectangles.

Treemap charts use color and rectangle size to represent two measure values. Each rectangle, or branch, is a value of the attribute. Some branches can contain smaller rectangles, or sub-branches. This setup makes it possible to display a large number of items in an efficient way.



You can rearrange the columns of your search into category, color, and size under Edit chart configuration.



Your search needs at least one attribute and two measures to be represented as a treemap chart.

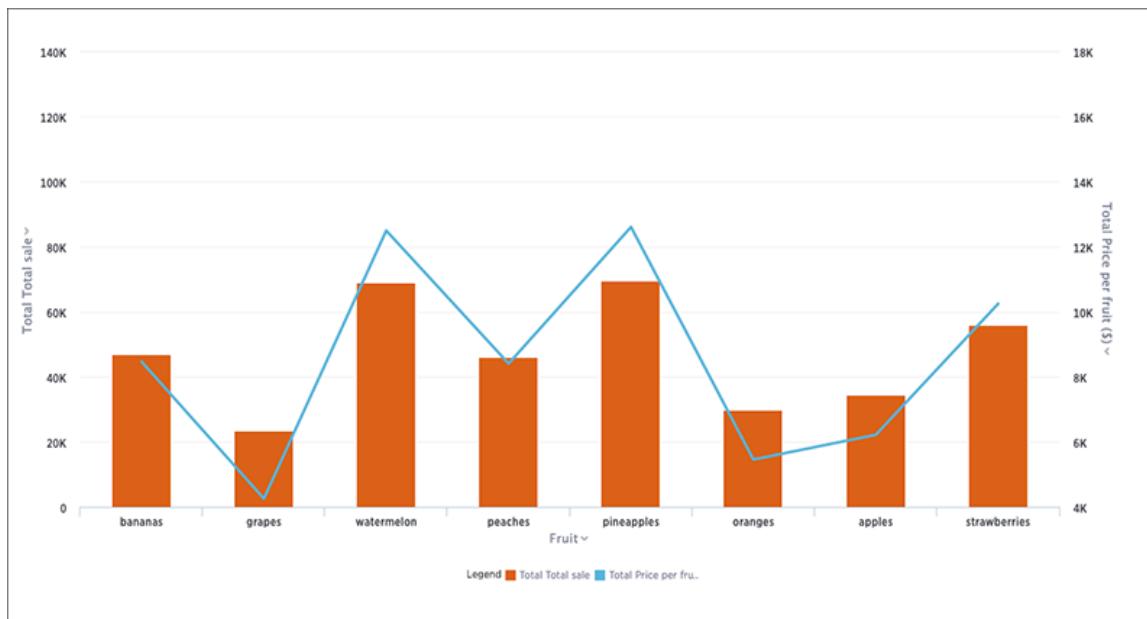
# Line column charts

**Summary:** The line stacked column chart combines stacked column and line charts.

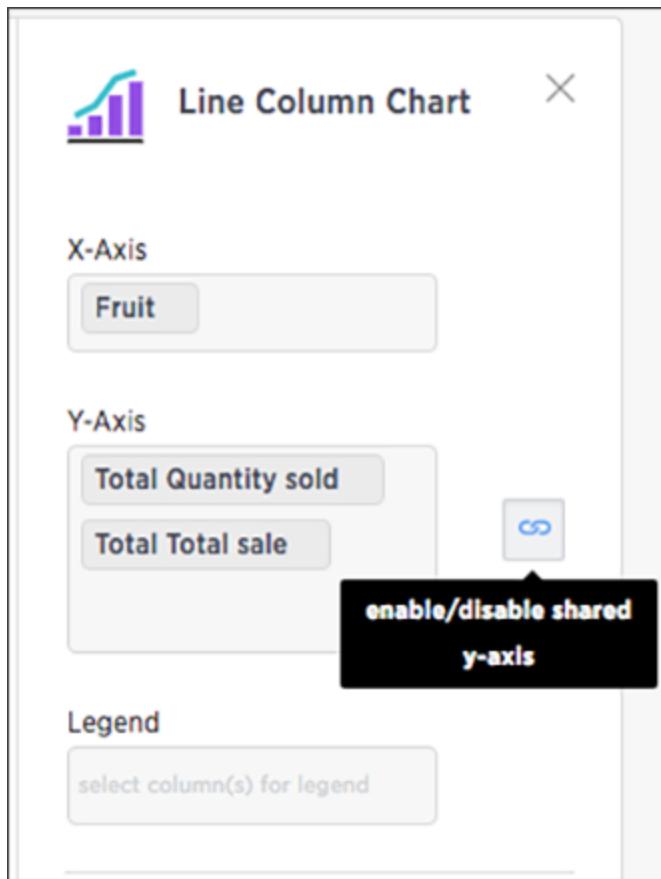
The line column chart combines the column and line charts. Your search needs at least one attribute and two measures to be represented as a line column chart.

## Understand line column charts

Line column charts display one measure as a column chart and the other as a line chart. Each of these measures has its own y-axis.

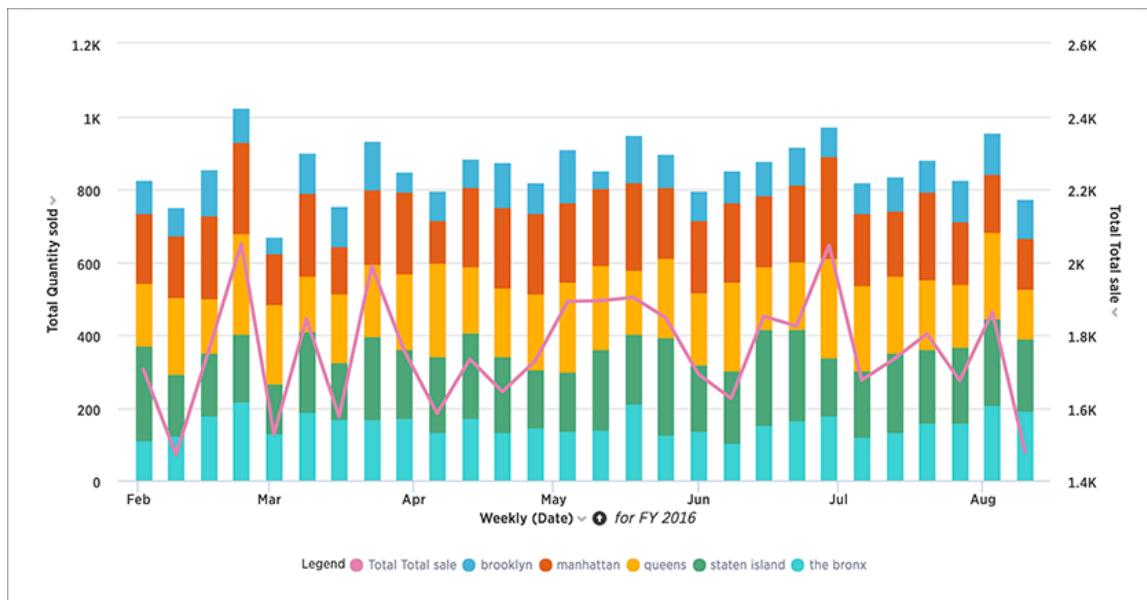


You can choose to enable shared y-axis by clicking the link icon found under **Edit chart configuration**.

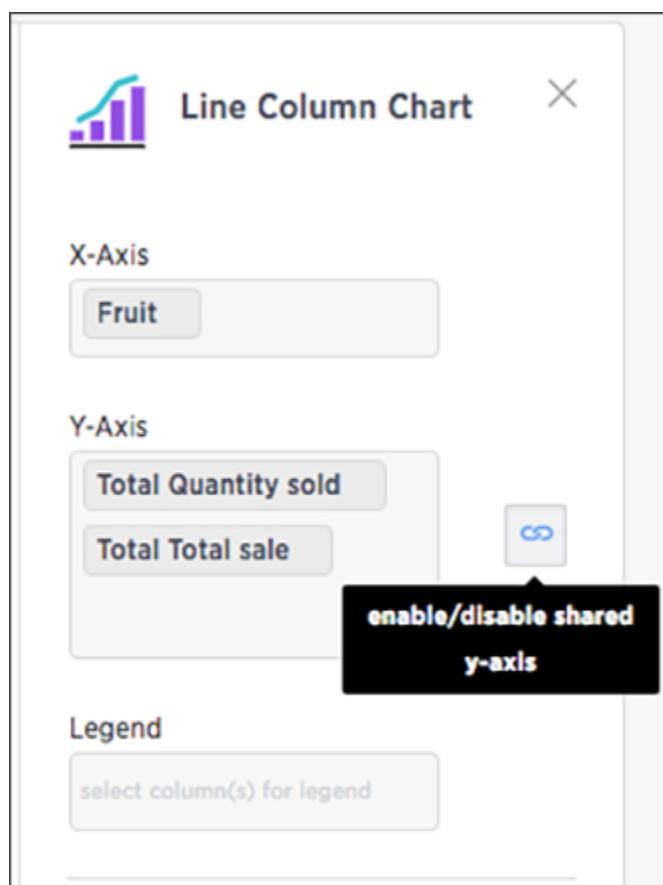


## Line stacked column charts

This chart is similar to the line column chart, except that it divides its columns with an attribute in the legend. There are two y-axes, one for each measure.



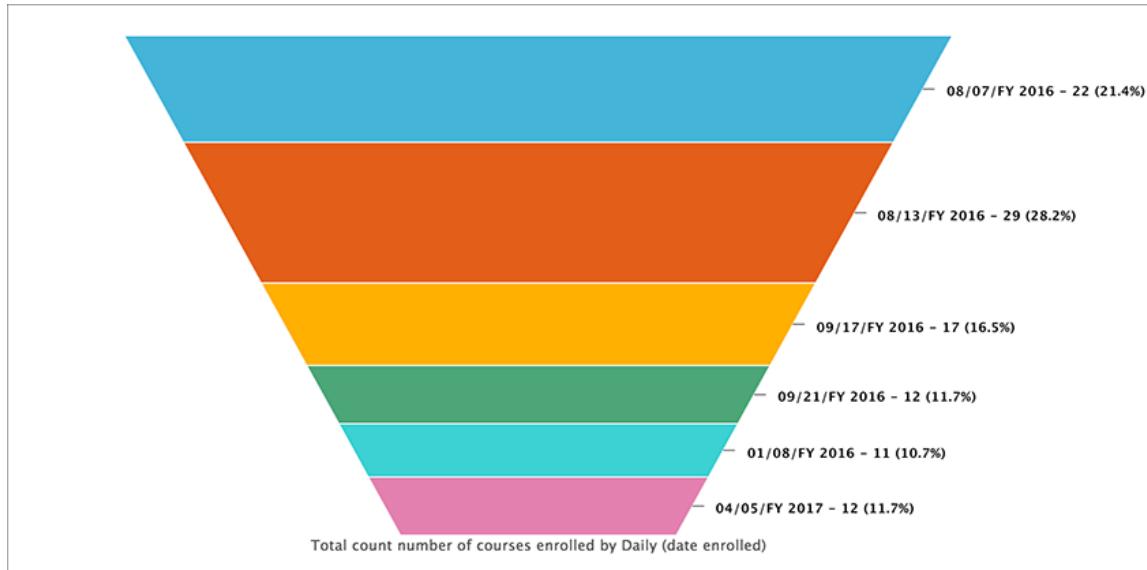
You can choose to enable shared y-axis by clicking the link icon found under Edit chart configuration.



# Funnel charts

**Summary:** The funnel chart shows a process with progressively decreasing proportions amounting to 100 percent in total.

A funnel chart is similar to a stacked percent column chart, and is often used to represent stages in a sales process. You can visualize the progression of data as it passes from one phase to another. Data in each of these phases is represented as different proportions.



Your search needs at least one attribute and one measure to be represented as a column chart. The attribute must contain 50 or fewer values.

# Geo charts

**Summary:** There are three geo charts that let you visualize geographical data in ThoughtSpot.

Geo charts show data on a map by location. They are geo area, geo bubble, and geo heatmap charts. And these geo charts can display six types of geographical data, which are:

- Country
- State
- County
- Zipcode
- Point (latitude/longitude)
- Other sub-nation regions (for international countries)

In addition to the United States, ThoughtSpot also supports maps for the United Kingdom, Germany, Sweden, South Africa, and France.

## Geo data that can be displayed

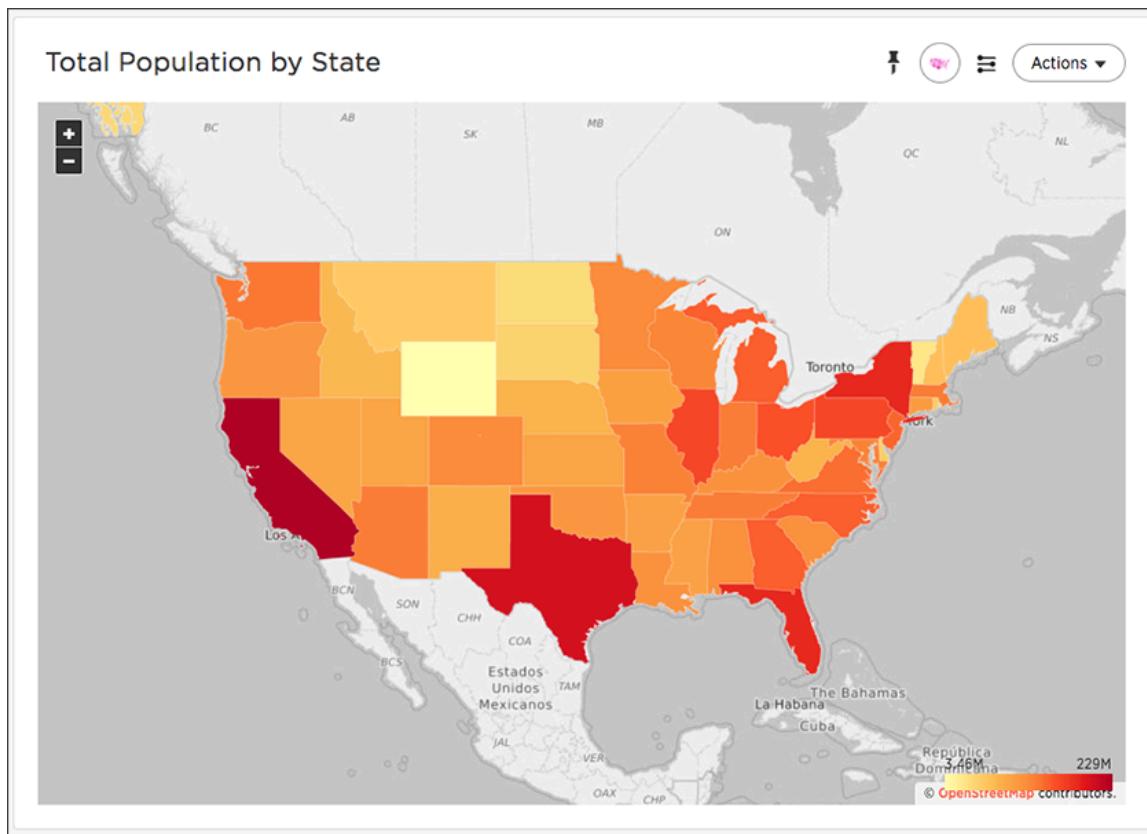
Here is a table that shows which GeoType data can be displayed using which geo chart type.

GeoType	Geo chart type	Notes
Country	Geo area (default), geo bubble, geo heatmap	Can also be regions.
County	Geo area (default), geo bubble, geo heatmap	Only for counties in the United States.
Point	Geo bubble (default), geo heatmap	Must use both latitude and longitude columns.
State	Geo area (default), geo bubble, geo heatmap	Only for states in the United States.
Zipcode	Geo bubble (default), geo heatmap	Zip codes and zip codes +4 in the United States.
Other sub-nation regions	Geo area (default), geo bubble, geo heatmap	The display will depend on the type of administrative region chosen.

For data to be displayed using geo charts, your administrator must configure it as geographical data. If you are expecting to be able to get a map visualization, but it isn't available, contact your administrator so they can make the configuration.

## Area charts

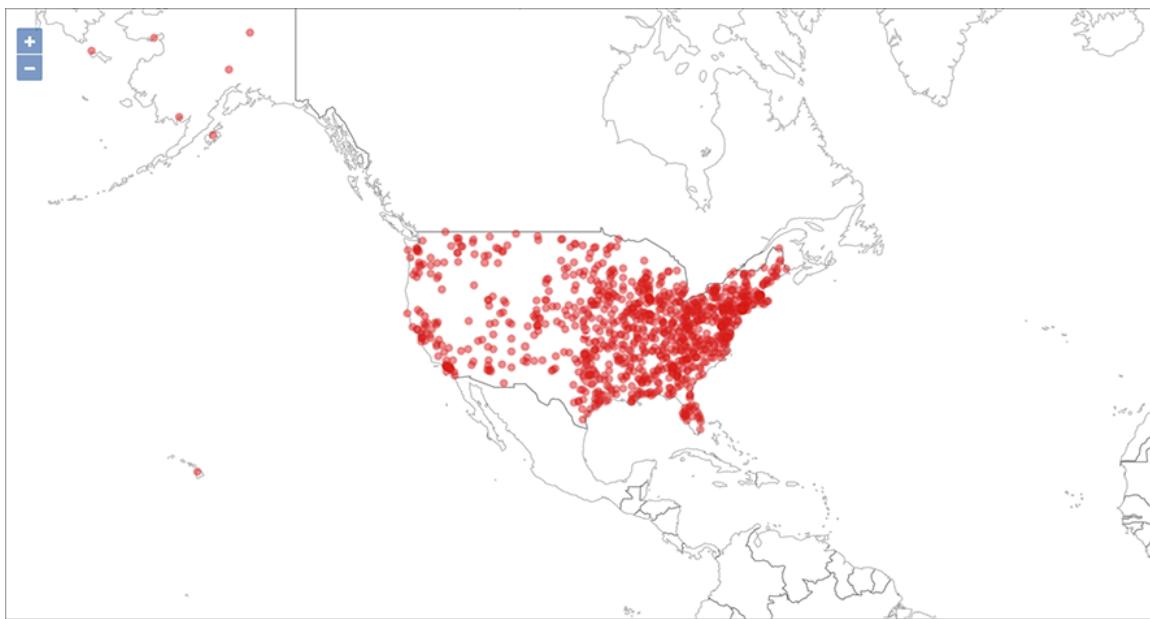
Geo area charts highlight the regions of interest. Point data (longitude/latitude) doesn't work on geo area charts. Also, only geo area charts display boundaries for counties.



Your search needs one geographical column of granularity to be represented as a geo area chart.

## Geo bubble charts

Geo bubble charts, like bubble charts, display the value of the measure by the size of the bubble. Zip code data makes the most sense for geo bubble charts.



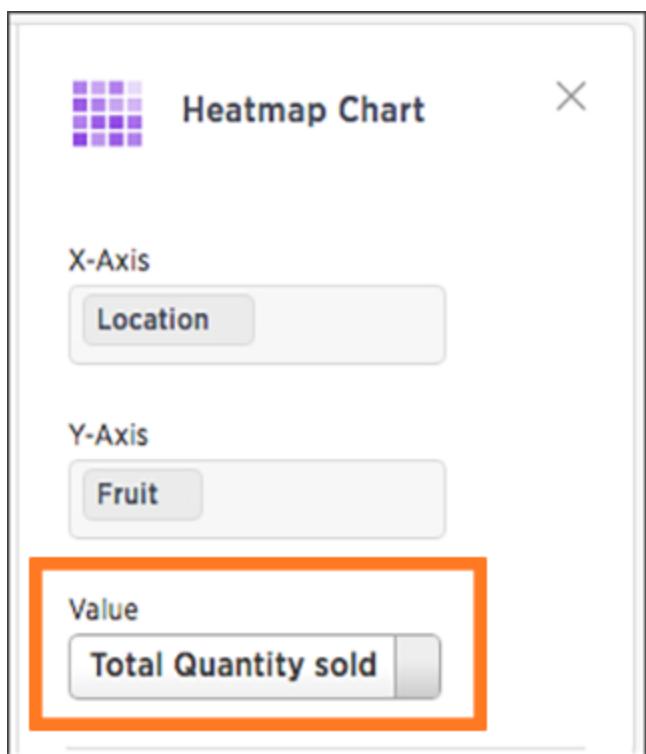
Your search needs one geographical column or a pair of latitude and longitude columns to be represented as a geo bubble chart.

## Heatmap charts

Heatmap charts are similar to treemap charts in that they both use a similar system of color-coding to represent data values. However, the heatmap does not use size to measure data, and instead requires an additional attribute.



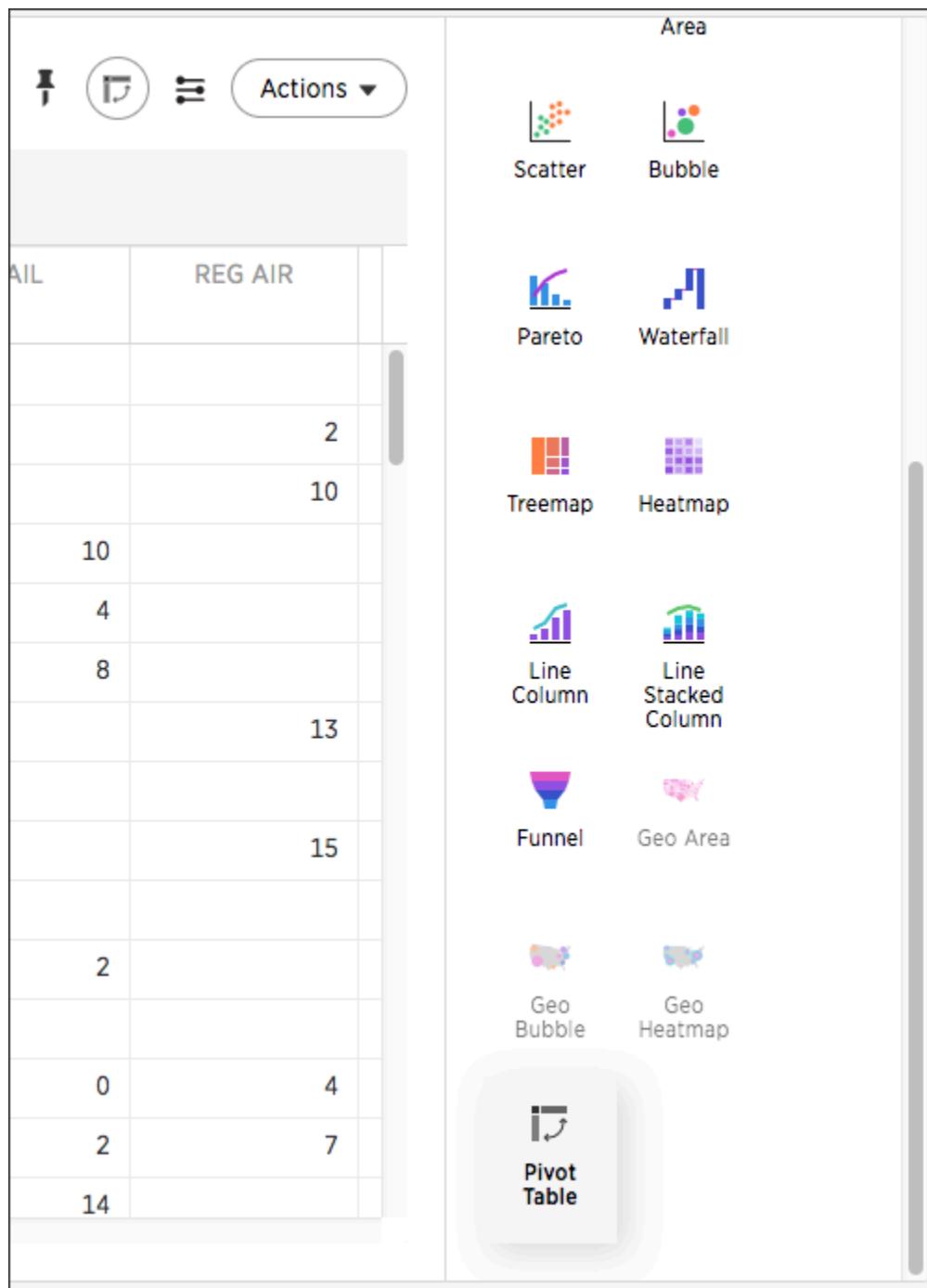
The value of each cell depends on the measure you choose under Edit char configuration.



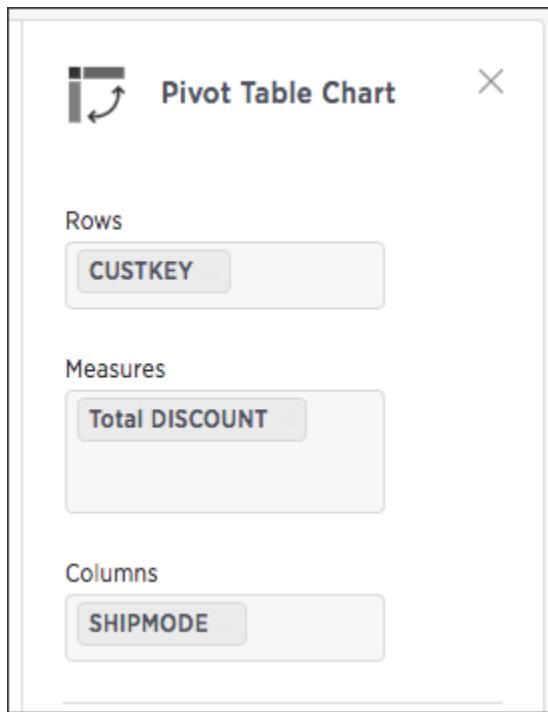
# Pivot table

Summary: A pivot table is a chart type.

Creating a pivot table enables exploring alternate visualization of data in a wide table. The basic idea is that some data is easier to consume when laid out horizontally, while others, vertically. Pivot tables are a chart type typat use a drag-and-drop interface.



Choose Pivot Table under Select Chart Type to view your search as a pivot table. Add rows, measures, and columns to the search bar and restructure your table by moving these values under **Configure Chart** or by dragging and dropping them.



Some additional details about pivot tables include:

- Pivot tables show the grand totals for columns and rows.
- You can toggle on the Heatmap mode found under Configuration Options to add color coordination to your data.

Total DISCOUNT	SHIPMODE	MAIL	RAIL	REG AIR	SHIP	TRUCK	Grand Total
6043		3			16	12	34
6145		2				7	18
6247							11
6269			9	16			39
6281				13		2	16
6296		6			9	6	27
6322					4	5	18
6343			17	8	7		40
6364		9	13	9	6	0	46
6460					14		28
6466		9			0		20
6487				19		8	39
6538		16		7		11	46
{Other}		3.19K	3.4K	3.42K	3.21K	3.27K	22.7K
Grand Total		3.5K	3.7K	3.73K	3.49K	3.6K	25.3K

- Click a column or row to expand it. Additionally, you can expand or collapse all by right clicking the arrow on the top left of a cell.



- When you pin a pivot table to a pinboard, it will retain your expansion settings.

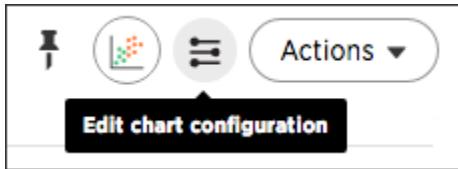
The pivot table chart type has these limitations:

- Only the first 10,000 data values will be used. If you would like to increase this limit, please contact ThoughtSpot Support.
- Pivot table is not available if the dataset contains more than 100,000 rows.
- Columns with cardinality beyond 100 are grouped into {Other}.
- Show underlying data menu is unavailable.
- Conditional formatting is not functional.

# Change a chart

**Summary:** You can adjust the axes, labels, and view of the chart.

Every chart gives you the option to move columns between the x- and y-axes, hide or Additional chart options, and zoom.



The configure chart option (the top icon which looks like a small bar chart) gives you the ability to edit the chart axes and legends. Click on the icon to view the chart axes, add a legend, lock axes, and more.

- [Reorder labels on the axis or legend \(page 100\)](#)  
When there are multiple columns on the x- or y-axis or legend of a chart, you can reorder them by using the Configure Chart icon.
- [Set the y-axis range \(page 101\)](#)  
You can manually set the y-axis range by using the Edit chart configuration icon.
- [Hide and show values \(page 102\)](#)  
You can hide and show values on the chart using the legend.
- [Change chart colors \(page 104\)](#)  
You can easily change the legend colors in a chart.
- [Additional chart options \(page 107\)](#)  
You can configure charts to show the y-axis data values.
- [Zoom into a chart \(page 108\)](#)  
You can zoom into your chart by selecting an area with your mouse.

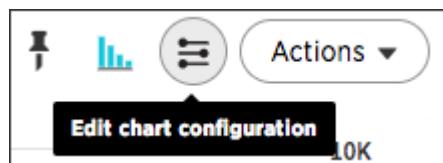
# Reorder labels on the axis or legend

When there are multiple columns on the x- or y-axis or legend of a chart, you can reorder them by using the **Configure Chart** icon.

The order in which columns appear on the axis or legend is based on the sequence they are added. The first field is used as the primary sorting field for the chart. Adding another field adds it after the first one on the axis label or legend. If you want to change the order, you can remove the fields and re-add them in the reverse order.

This example shows you how to reorder the x-axis columns.

1. While viewing your answer as a chart, click **Edit chart configuration** near the top right.



2. In the X-Axis box, delete the values. Then re-add them in the new preferred order.



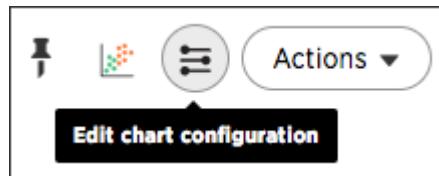
3. Click **Done**.

Your chart reorganizes itself to reflect the new label order.

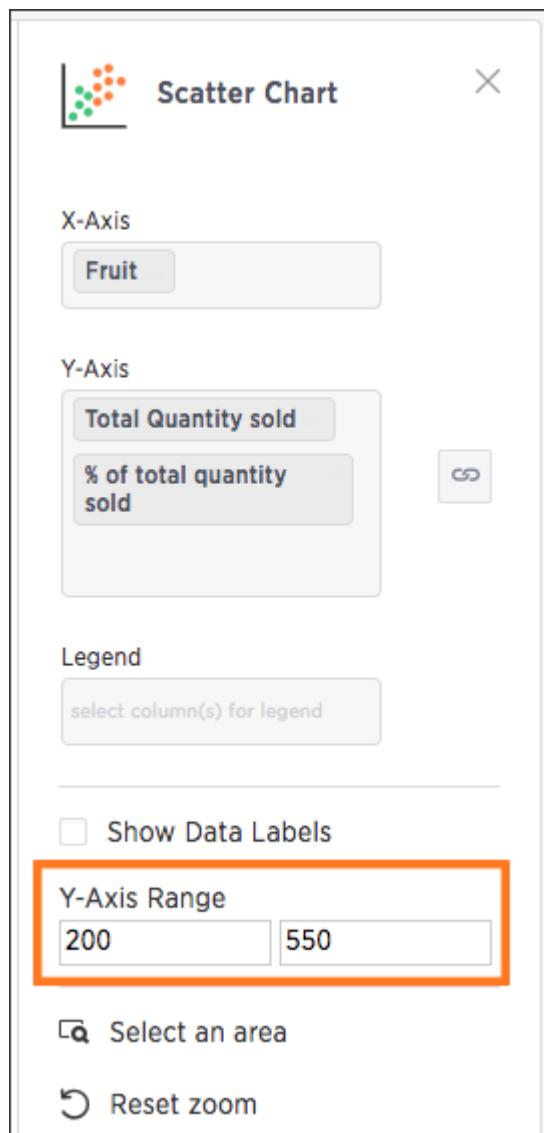
# Set the y-axis range

You can manually set the y-axis range by using the Edit chart configuration icon. The chart configuration panel includes the option to manually set the y-axis range. To set the y-axis range:

1. While viewing your answer as a chart, click **Edit chart configuration** near the top right.



2. Under Y-Axis Range enter your preferred start and end values.



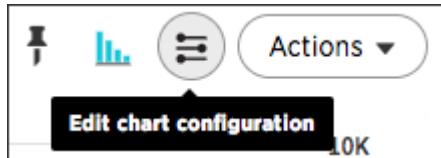
Your chart will reorganize itself to reflect the new y-axis range.

# Hide and show values

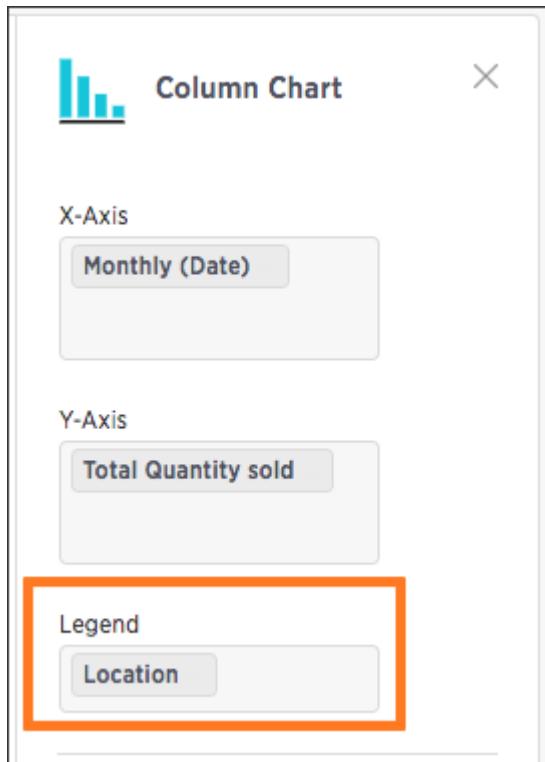
**Summary:** You can hide and show values on the chart using the legend.

Clicking on a legend item will hide it from the chart. You can click it again to show it. To hide and show values:

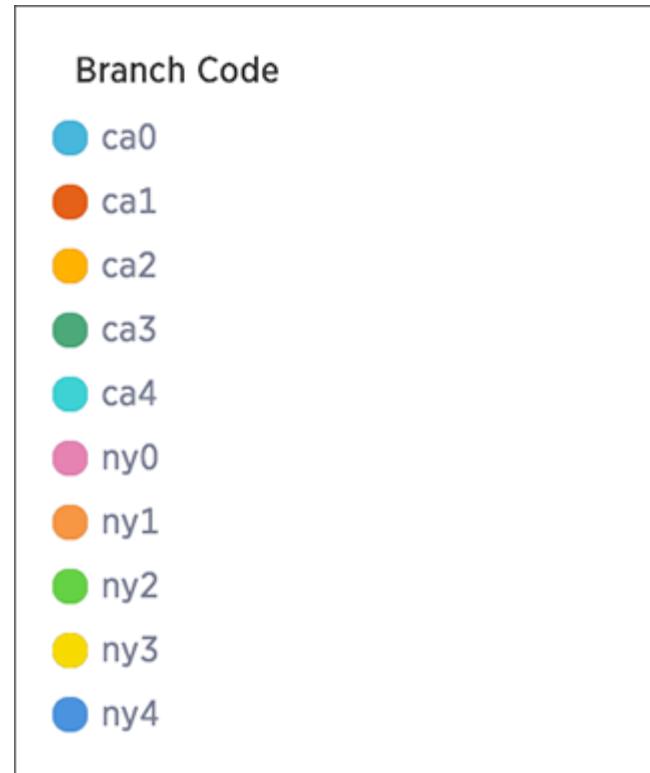
1. While viewing your answer as a chart, click **Edit chart configuration** on the right.



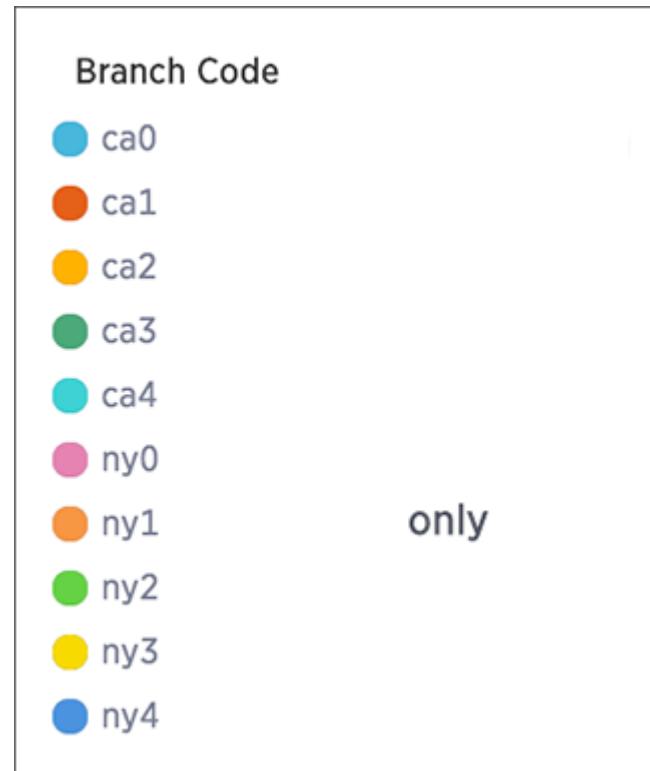
2. Make sure you have a column in the **Legend** field.



3. On the chart, click the legend value you would like to hide. Click the hidden legend value again to show it.



You can also click **only** next to a legend value to only show that value on the chart.



# Change chart colors

**Summary:** You can easily change the legend colors in a chart.

To change the colors used in a chart, you can use the color picker from the chart. The color you set is used in:

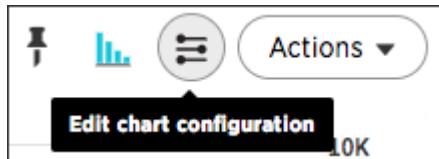
- legends on charts
- tables for conditional formatting
- tags and editing the colors

To change the chart colors, you need at least one column in the chart's legend.

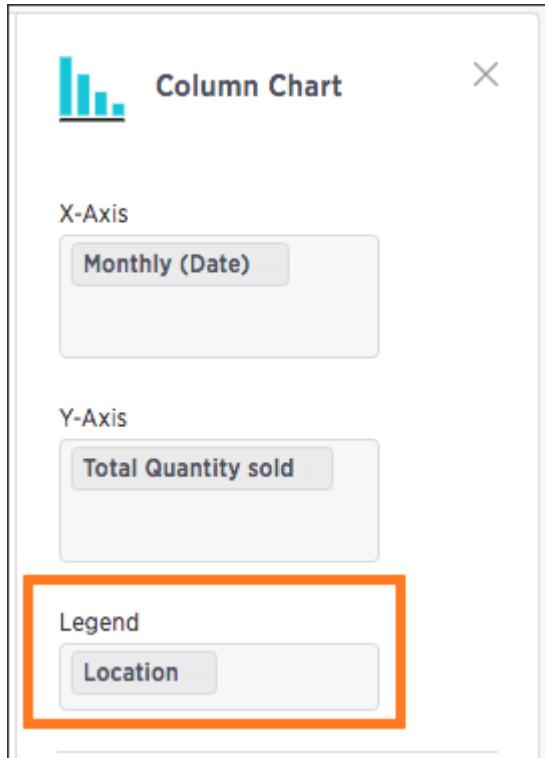
Colors are maintained across searches within a session. For example, when doing a search on revenue by state, each state will keep its color assigned to it even if you change the search or chart type.

## Add a column to the legend

1. While viewing your answer as a chart, click **Edit chart configuration** on the right.

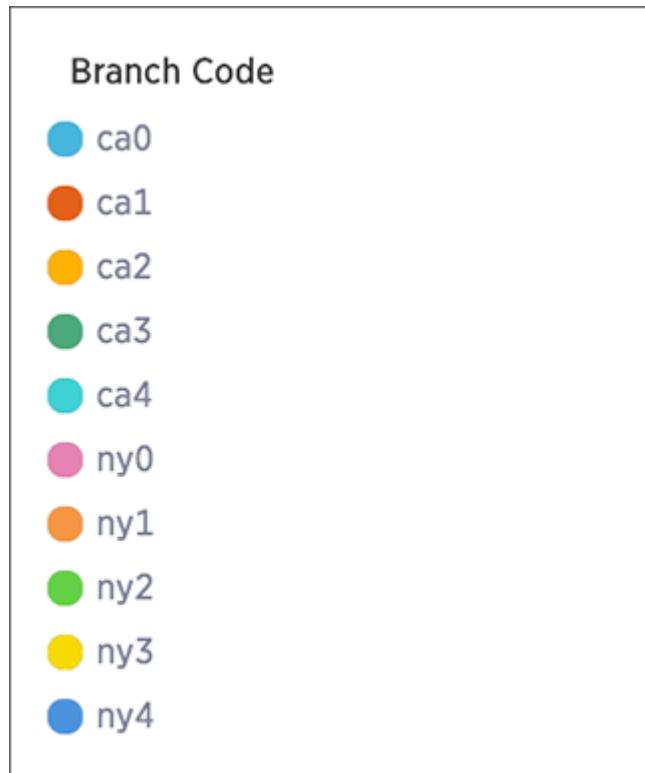


2. Make sure you have a column in the **Legend** field.



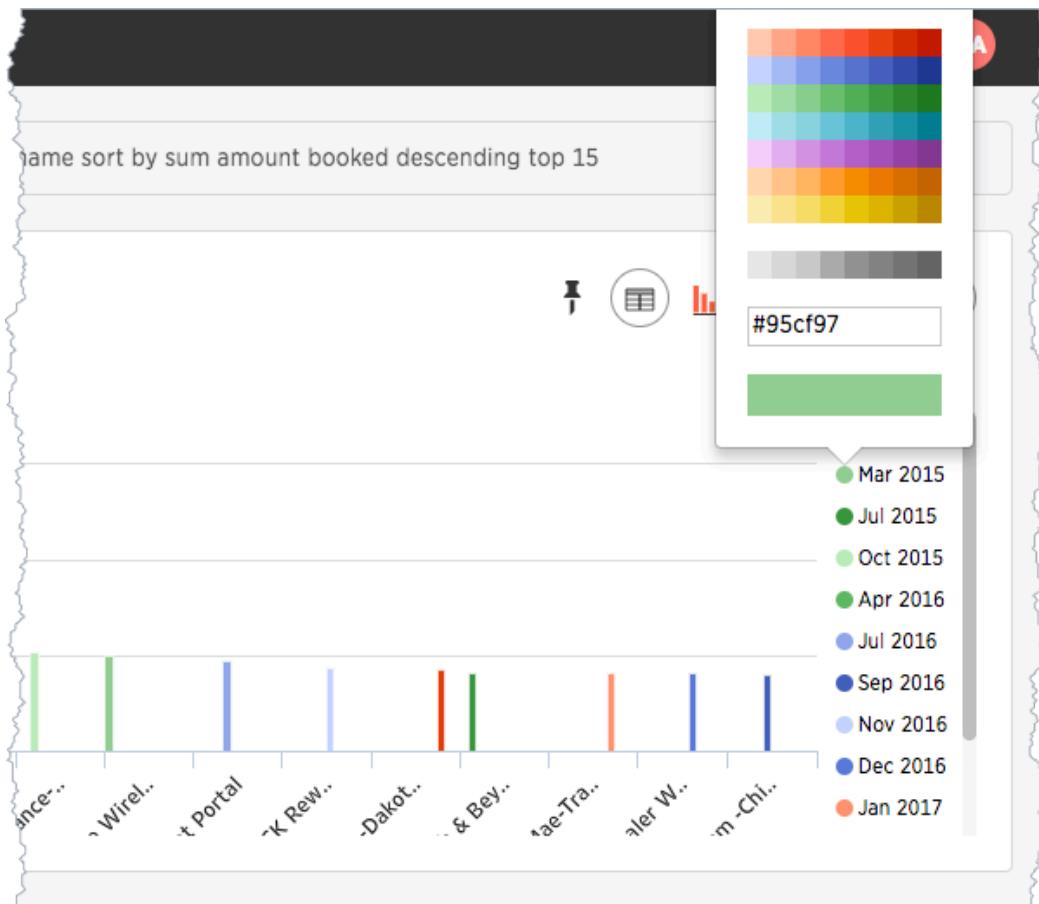
## Set a color through the legend

1. On the chart, click the color icon of the legend value you would like to change the color of.



2. Use the color picker to choose a new color to represent that legend value.

You can also enter a HEX value directly.



3. Click outside of the picker to dismiss the picker.
4. Actions > Save your changes.

# Additional chart options

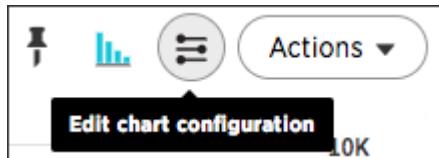
**Summary:** You can configure charts to show the y-axis data values.

Some charts have additional options under Configuration Options that are covered in each chart type topic.

## Show data labels

To show data labels:

1. While viewing your answer as a chart, click **Edit chart configuration**.

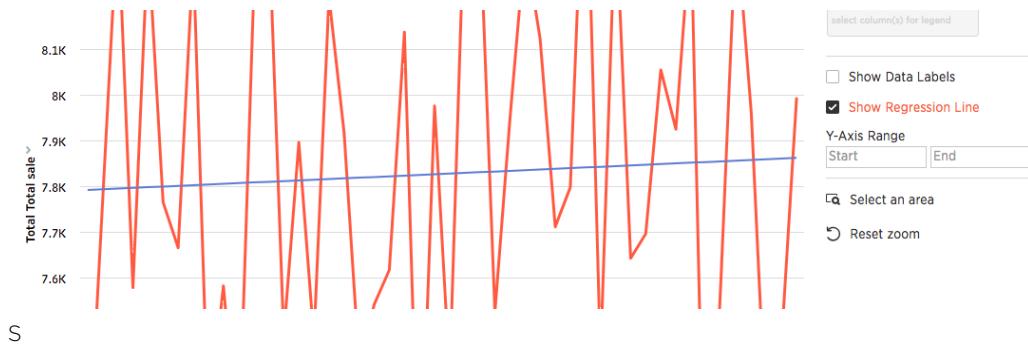


2. Select **Show Data Labels**.



## Add regression line

1. While viewing your answer as a chart, click **Edit chart configuration**.
2. Select **Show regression line**.



# Zoom into a chart

You can zoom into your chart by selecting an area with your mouse. To zoom into a chart:

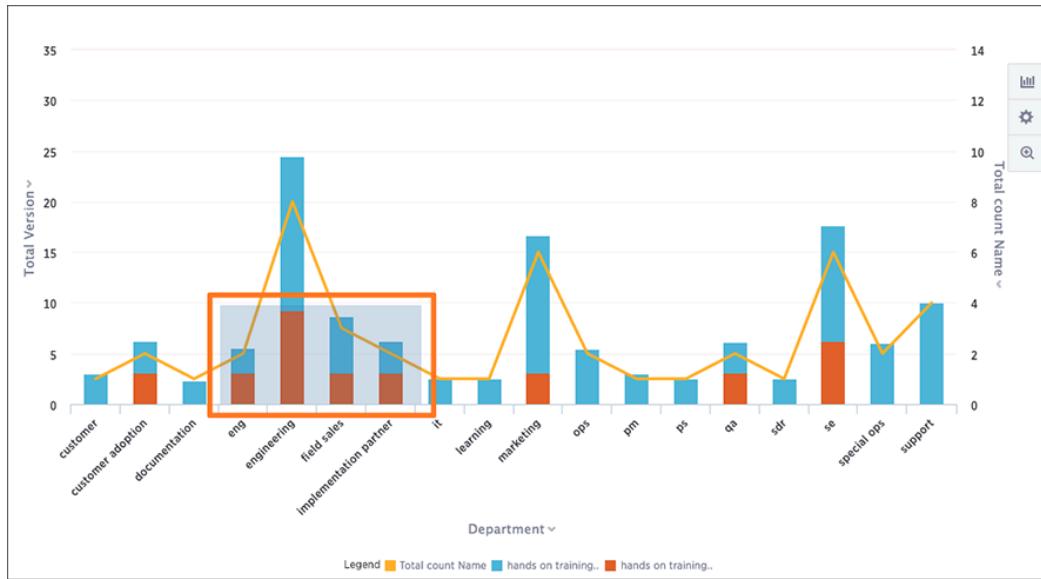
1. While viewing your answer as a chart, click **Edit chart configuration** on the right.



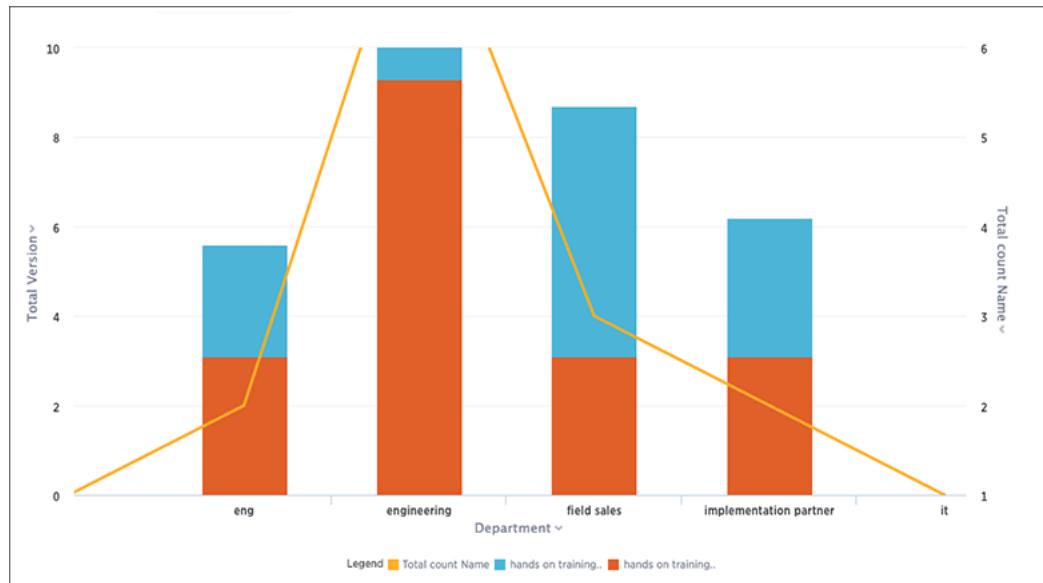
2. Click **Select an area**.



3. Select an area on your chart to zoom into by clicking and dragging your mouse.



Your chart will be reconfigured to only show the selected area.



4. If you would like to return to the original chart view, click **Reset zoom** under Zoom options.



# Understand formulas in searches

**Summary:** To provide richer insights, you can add a formula to your search.

The Formula Builder includes many types of operators, such as logical (if, then, else), math, date, and text string functions.

You can create a formula from directly within a search. If you have the privilege that allows you to create or edit worksheets, you can also create a formula within a worksheet. Formulas in worksheets act as derived columns, so that anyone who uses the worksheet as a data source will see the formula as just another column.

Adding a formula within a search works much the same way as adding a formula to a worksheet. However, you will be able to edit the formula directly from within the answer. If you add the answer to a pinboard and share it with the Edit privilege, other people can see the formula results, too. In order to make edits to the formula, they also need to have the Edit privilege on the underlying data.

- [Add a formula to a search \(page 111\)](#)

You can add a formula directly within a search. Some common reasons for using a formula in a search are to perform mathematical functions, check for and replace null values, or add if...then...else logic.

- [View or edit a formula in a search \(page 114\)](#)

You can always go back and view or edit a formula that has been added to a search. Do this by clicking the edit icon next to its name in the Columns listing.

- [About aggregate formulas \(page 116\)](#)

When working with formulas, it is useful to understand the difference between regular (or row-wise) formulas and aggregation formulas.

- [About conversion formulas \(page 128\)](#)

Some formulas require the input to be of a particular data type. If you find that you want to pass a value to the function, but it is of the wrong data type, you can convert it using a conversion formula.

- [About date formulas \(page 129\)](#)

Date formulas allow you to apply date related functions to your formulas.

- [About percent \(simple number\) calculations \(page 132\)](#)

You can use simple number functions to perform useful percent calculations.

- [About conditional formulas \(operators\) \(page 133\)](#)

Conditional formulas, or operators, allow you to apply if/then/else conditions in your formulas.

- [About nested formulas \(page 135\)](#)

Nested formulas, or formula on formula, allow you to reference a formula within another formula.

- [About formula support for chasm trap schemas \(page 136\)](#)

You can create a formula that involves aggregated measures coming from multiple fact tables of a chasm trap.

# Add a formula to a search

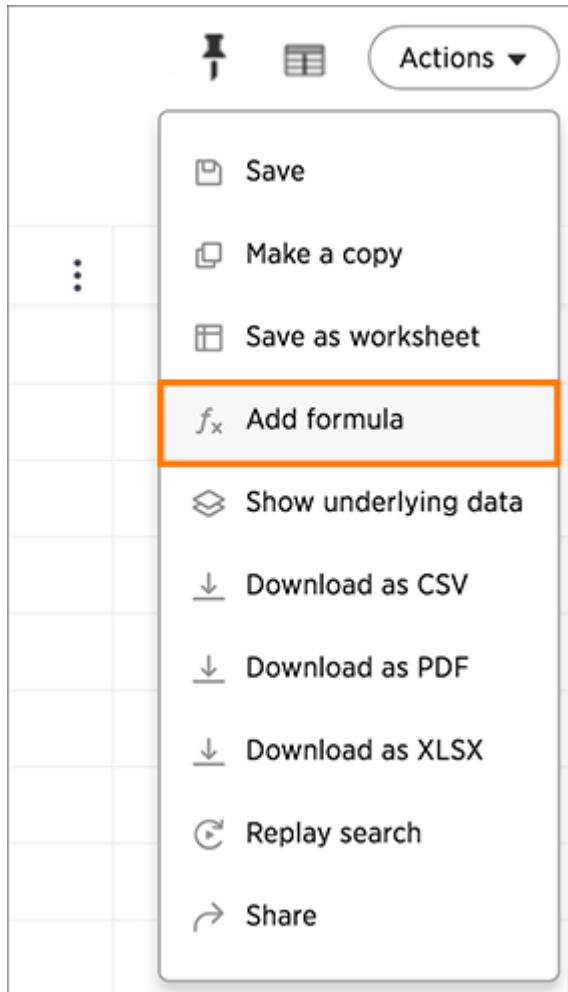
You can add a formula directly within a search. Some common reasons for using a formula in a search are to perform mathematical functions, check for and replace null values, or add conditional logic.

To create a formula in a search:

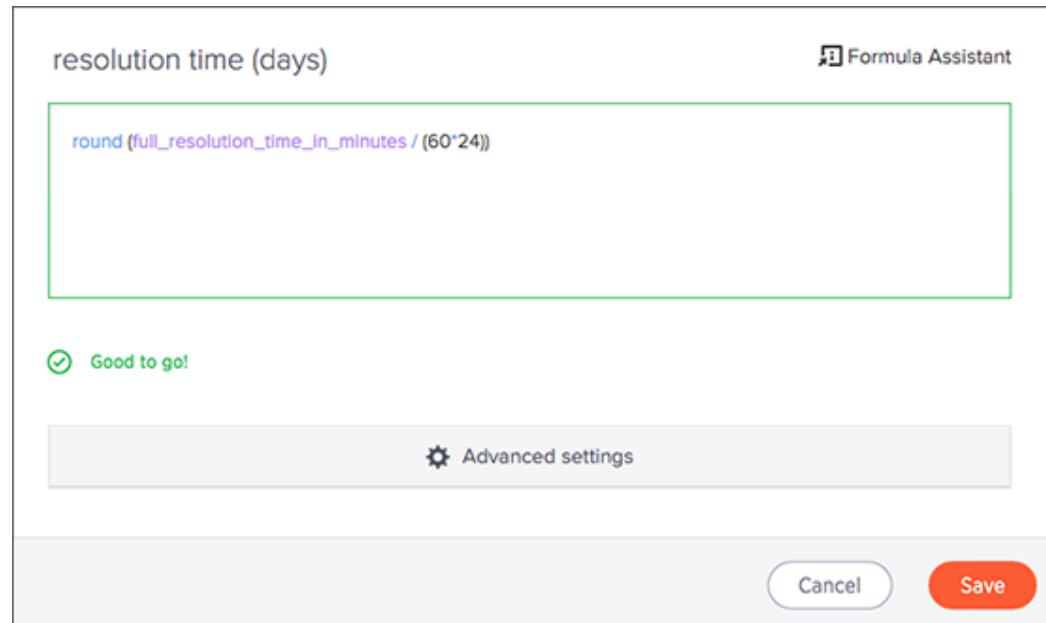
1. Start a new search, or choose an existing answer from a pinboard to edit.
2. If the answer shows a chart, switch to Data View.



3. In the upper right hand side of the table, click Actions and select Add formula.

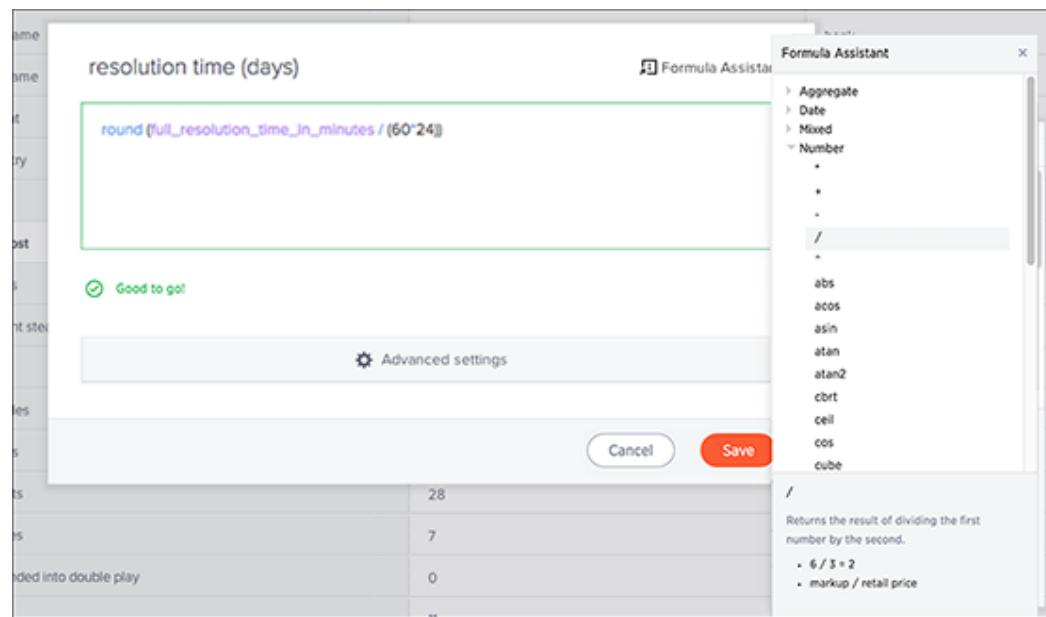


4. Type your formula in the Formula Builder.



**Note:** Formulas elements are color coded by type and can include the formula operators and functions (blue), the names of columns (purple), and/or constants (black).

5. You can see a list of formula operators with examples by clicking on Formula Assistant.



6. If you want to change what your formula returns, use the Advanced settings. Depending on your formula, you may be able to change:

- Data type
- ATTRIBUTE or MEASURE
- Aggregation type

resolution time (days)

round(full\_resolution\_time\_in\_minutes / (60\*24))

Good to go!

Advanced settings

Data type	Measure or attribute	?	Aggregation
Numeric	MEASURE		TOTAL
			AVG
			MAX
			MIN
			STD DEVIATION
			TOTAL
			TOTAL COUNT
			UNIQUE COUNT
			VARIANCE

false

8

<=120min

<=120min

Save

7. Name the formula by clicking on its title and typing the new name. Click Save.

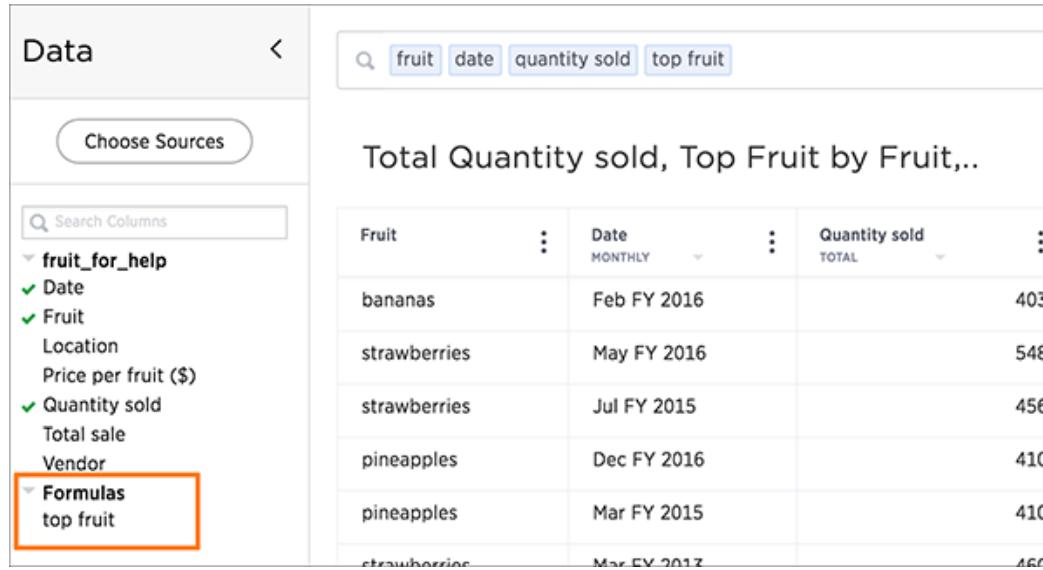
## Related information

[Formula reference \(page 270\)](#)

# View or edit a formula in a search

You can always go back and view or edit a formula that was added to a search. Do this by clicking the edit icon next to its name in the **Columns** listing. Anyone who has edit privileges on an answer can also edit any formulas it contains. To view or edit an existing formula in an answer:

1. Navigate to the pinboard that contains the answer with the formula, and open it.
2. Scroll down to the bottom of the **Columns** listing. You will see a data source called **Formulas**.
3. Expand **Formulas**, and you'll see a list of all the formulas in this answer.



The screenshot shows the ThoughtSpot Data interface. On the left, there's a sidebar with a 'Data' title and a 'Choose Sources' button. Below it is a search bar labeled 'Search Columns'. A list of columns is shown under 'fruit\_for\_help', including Date, Fruit, Location, Price per fruit (\$), Quantity sold, Total sale, and Vendor. The 'Formulas' section is expanded, showing 'top fruit' with an edit icon (pencil) highlighted with an orange box. On the right, a table titled 'Total Quantity sold, Top Fruit by Fruit,..' is displayed. The table has columns for Fruit, Date (set to MONTHLY), and Quantity sold (set to TOTAL). The data includes rows for bananas, strawberries, pineapples, and strawberries again, with various dates from Feb FY 2016 to Mar FY 2017 and quantities ranging from 403 to 548.

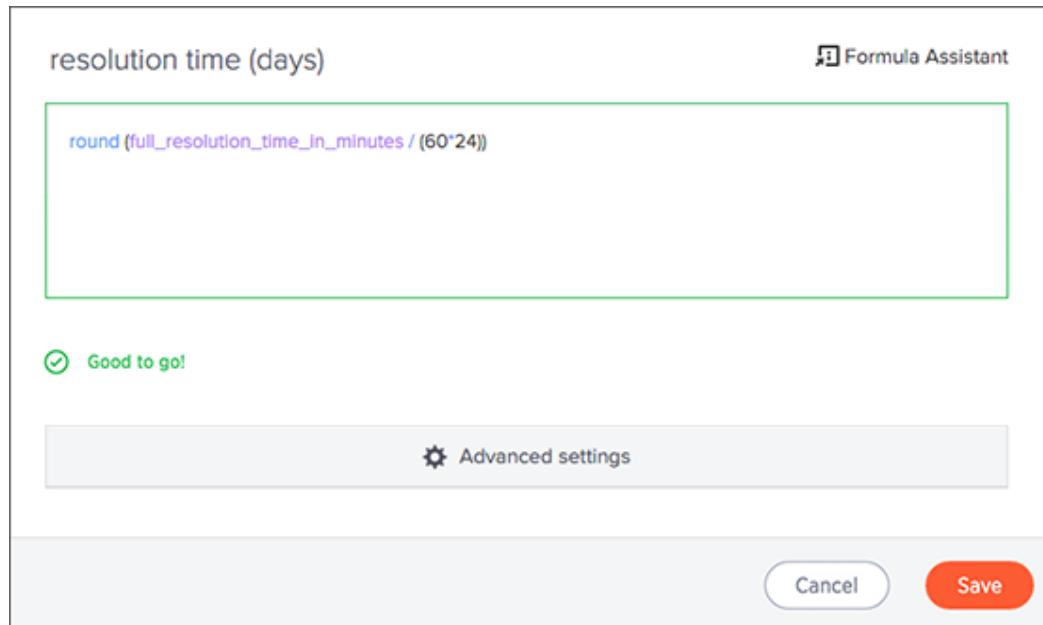
Fruit	Date	Quantity sold
bananas	Feb FY 2016	403
strawberries	May FY 2016	548
strawberries	Jul FY 2015	456
pineapples	Dec FY 2016	410
pineapples	Mar FY 2015	410
strawberries	Mar FY 2017	460

4. Click the edit icon next to the formula name.



The screenshot shows the ThoughtSpot Formula Builder interface. It displays a list of formulas under the heading 'Formulas'. The first formula, 'Resolution Time', is selected and has an edit icon (pencil) highlighted with an orange box. Below it is another formula, 'Qa Acceptance Atte...', which is currently inactive (indicated by a red X).

5. Type your formula in the Formula Builder.



**Note:** Formulas elements are color coded by type and can include the formula operators and functions (blue), the names of columns (purple), and/or constants (black).

6. Click **Save** to save the formula with your changes.

# Overview of aggregate formulas

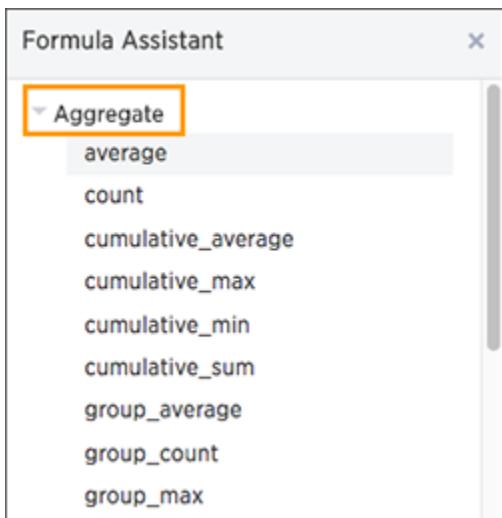
When working with formulas, it is useful to understand the difference between regular (or row-wise) formulas and aggregation formulas.

## Regular and aggregation formulas

Formulas can be broken down into two types:

Formula	Aggregation formula
Acts on individual rows and returns one result per row.	Combines rows together and returns a single result for a group of rows.
Examples: add, subtract, multiply, divide, contains, if...then...else	Examples: Average, cumulative sum, moving average, standard deviation

You can tell which formulas are aggregation formulas by looking at the **Formula Assistant**. Aggregation formulas have their own section.



## Advanced aggregation formulas

Some more advanced aggregation formulas are widely used in business intelligence, since they provide better insight into data. Some of the more advanced aggregation formulas are:

- [Grouping formulas \(page 123\)](#) apply a specific aggregate to a value, and group the results by an attribute in the data.
- [Cumulative formulas \(page 119\)](#) measure from the start of your data to the current point. They're often applied on time-based data.
- [Moving formulas \(page 124\)](#) measure within a window (usually time-based) that you define.

Data from any rows that are not included in the search result will not be incorporated, and you cannot

create a filter on aggregated data.

## Using division with aggregation in a search

Whenever your search result combines rows, your formula will get aggregated automatically. For example, if your search contains words like "region", "monthly", or "department", the results will be grouped (aggregated) by that category. The administrator can change the default aggregation that gets applied through a configuration, and you can also change it using the dropdown list in the column header of the search result.

For example, this search would typically return a sum of total sales by department:

```
sum sales department
```

This search would return an average of sales by month:

```
average sales monthly
```

When you're using division in your formula, and the search is aggregated like this, you may have to change the order of operations to get the result you expect. This is best understood by using a real world example.

Suppose you want to calculate the gross margin by department for a grocery store. The formula for gross margin is:

```
profit / sales
```

But if you use that as your formula, you won't get the expected calculation. Why? It's because the formula will be evaluated in this order: For each row, divide profit by sales and then total up all the results. As you can see, the results do not look like gross margin values, which should be between 0 and 1.

Gross margin by department		
Department Description	Gross Margin without Sum ()	
photography	2,012.54	
bakery	1,890.42	
cleaning supplies	1,493.94	
frozen goods	2,453.36	
meat	1,152.35	
dairy	800.57	
gifts	1,736.05	

Instead, you'd need to use a formula that uses the order of operations you want:

```
sum (profit) / sum (sales)
```

Now the result is as expected, because the formula totals the profits for all rows, and then divides that by the total of sales for all rows, returning an average gross margin:

Gross margin by department		
Department Description ::	Gross Margin without Sum () :: TOTAL	Gross Margin with Sum () ::
photography	2,012.54	0.56
bakery	1,890.42	0.54
cleaning supplies	1,493.94	0.40
frozen goods	2,453.36	0.69
meat	1,152.35	0.31
dairy	800.57	0.21
gifts	1,736.05	0.55

# About cumulative formulas

**Summary:** Cumulative formulas are aggregate formulas.

Cumulative formulas that allow you to calculate the average, max, min, or sum of your data over time. Although we usually talk about cumulative formulas over time, you can use them over any other sequential data. Each of the cumulative formulas accepts a measure and one or more optional grouping by an attribute (like region or department):

```
formula (measure, [attribute, attribute, ...])
```

Only the measure value is required. If you supply both a measure and attributes, the formula returns the aggregate of the measure accumulated by the attribute(s) in the order specified. You should experiment with only a measure and then with an attribute to see which output best meets your use case.

The cumulative formulas are:

Function	Description
cumulative_average	Takes a measure and one or more attributes. Returns the average of the measure, accumulated by the attribute(s) in the order specified. For example: <code>cumulative_average (revenue, order date, state)</code>
cumulative_max	Takes a measure and one or more attributes. Returns the maximum of the measure, accumulated by the attribute(s) in the order specified. For example: <code>cumulative_max (revenue, state)</code>
cumulative_min	Takes a measure and one or more attributes. Returns the minimum of the measure, accumulated by the attribute(s) in the order specified. For example: <code>cumulative_min (revenue, campaign)</code>
cumulative_sum	Takes a measure and one or more attributes. Returns the sum of the measure, accumulated by the attribute(s) in the order specified. For example: <code>cumulative_sum (revenue, order date)</code>

# Calculate the cumulative sum

**Summary:** Use the cumulative function in a search to measure from the start of your data to the current point.

This example demonstrates using the cumulative\_sum formula, also known as a running total. To use the cumulative function in a search:

1. Start a new search.

REGION	COMMITDATE QUARTERLY	REVENUE TOTAL
africa	Q1 FY 1993	38,235,729
africa	Q2 FY 1993	67,504,844
africa	Q3 FY 1993	116,890,921
africa	Q4 FY 1993	180,153,392
africa	Q1 FY 1994	166,139,486
africa	Q2 FY 1994	189,965,026
africa	Q3 FY 1994	138,520,689
africa	Q4 FY 1994	147,903,759

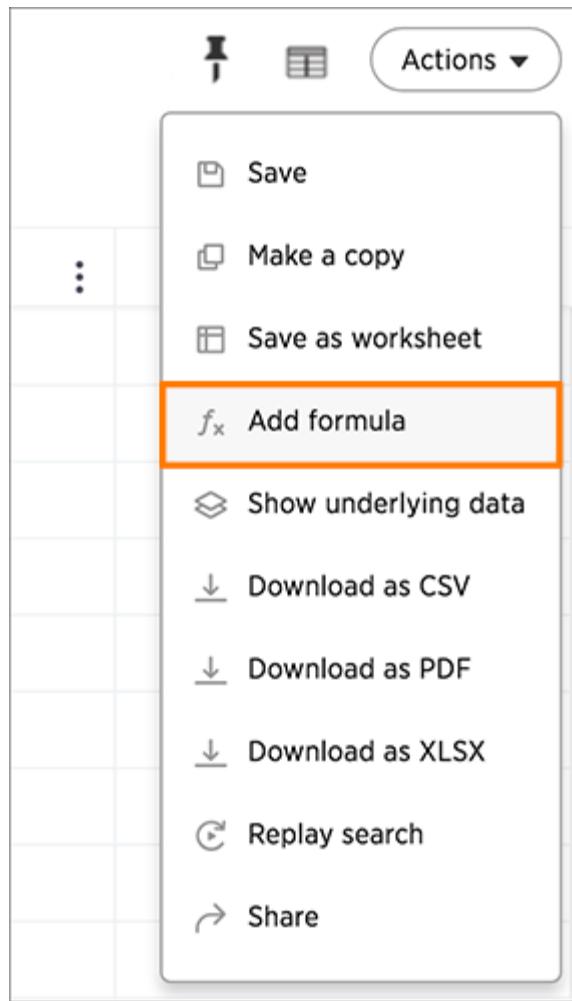
( showing rows 1 - 14 of 135 )

18.1B REVENUE  
TOTAL

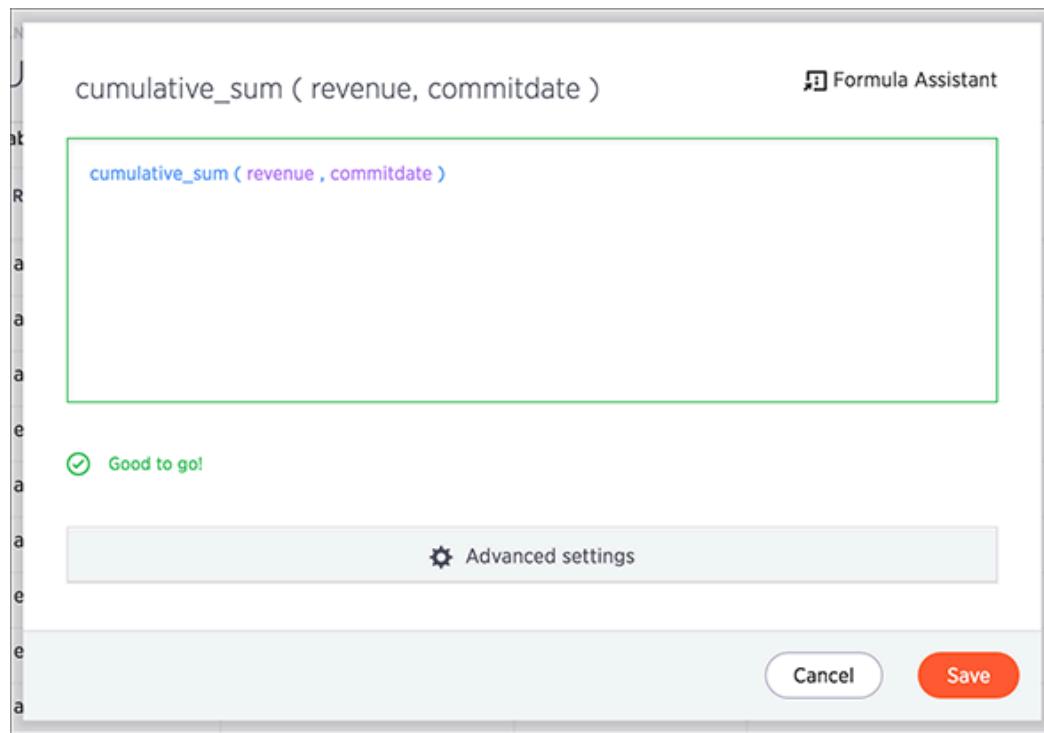
5 REGION  
UNIQUE COUNT

Q1 FY 1993 - Q3 FY 1999  
Quarterly (COMMITDATE)

2. In the upper right hand side of the table, click **Actions** and select **Add formula**.



3. Enter the cumulative\_sum formula, providing a measure and one or more attributes. The example will return the sum of revenue, accumulated by the commit date.



4. Name the formula by clicking on its title and typing the new name. Click Save.
5. The formula will appear in the search bar and in the table as its own column.

The screenshot shows the ThoughtSpot Table view titled 'Untitled'. The table has four columns: 'REGION', 'COMMITDATE (MONTHLY)', 'REVENUE (TOTAL)', and 'cumulative\_sum (revenue, commitdate)'. The data rows show various regional and monthly commitdate values with their corresponding revenue and cumulative sums. At the bottom of the table, there is a summary section with four boxes: '18.1B REVENUE' (TOTAL), '5 REGION' (UNIQUE COUNT), 'Feb FY 1993 - Oct FY 1999' (Monthly (COMMITDATE)), and '7.1M cumulative\_sum (revenue, commitdate)' (MIN).

REGION	COMMITDATE (MONTHLY)	REVENUE (TOTAL)	cumulative_sum (revenue, commitdate)
africa	Nov FY 1993	86,601,468	309,232,962
africa	Nov FY 1994	28,881,900	926,291,987
africa	Jan FY 1998	16,773,589	3,079,460,707
america	Apr FY 1993	41,296,350	85,157,963
america	Sep FY 1995	12,512,017	1,481,630,414
america	Oct FY 1996	69,654,810	1,939,222,892
america	Nov FY 1996	45,631,320	1,984,854,212

( showing rows 1 - 9 of 401 )

18.1B REVENUE TOTAL	5 REGION UNIQUE COUNT	Feb FY 1993 - Oct FY 1999 Monthly (COMMITDATE)	7.1M cumulative_sum (revenue, commitdate) MIN
---------------------------	-----------------------------	---	---

A headline box displaying the cumulative sum within the entire table will appear at the bottom. You can click on it to toggle between different aggregations.

# About grouping formulas

What if you want to aggregate a value by a specific attribute (for example, show revenue by product)? This is known as a grouped aggregation, but some people call it a pinned measure or level-based measure. You can do this for any aggregation using the grouping formulas.

Each of the grouping formulas accepts a measure and one or more optional attributes:

```
formula (measure, [attribute, attribute, ...])
```

Only the measure value is required. If you supply both a measure and an attribute, the formula returns the aggregate of the measure grouped by the attribute(s). You should experiment with only a measure and then with an attribute to see which output best meets your use case.

The grouping formulas are the following:

Function	Description	Examples
group_average	Takes a measure and one or more attributes. Returns the average of the measure grouped by the attribute(s).	- group_average (revenue, customer region)
group_count	Takes a measure and one or more attributes. Returns the count of the measure grouped by the attribute(s).	group_count (revenue, customer region)
group_max	Takes a measure and one or more attributes. Returns the maximum of the measure grouped by the attribute(s).	group_max (revenue, customer region)
group_min	Takes a measure and one or more attributes. Returns the minimum of the measure grouped by the attribute(s).	group_min (revenue, customer region)
group_stddev	Takes a measure and one or more attributes. Returns the standard deviation of the measure grouped by the attribute(s).	group_stddev (revenue, customer region)
group_sum	Takes a measure and one or more attributes. Returns the sum of the measure grouped by the attribute(s).	group_sum (revenue, customer region)
group_unique_count	Takes a column name and one or more attributes. Returns the number of unique values in a column, grouped by the attribute(s).	group_unique_count ( product, supplier)
group_variance	Takes a measure and one or more attributes. Returns the variance of the measure grouped by the attribute(s).	group_variance (revenue, customer region)

# About moving formulas

**Summary:** Moving formulas are aggregate formulas that allow you to calculate the average, max, min, or sum of your data over a predetermined interval, or window, with an adjustable range.

Moving formulas can be used to smooth out any irregularities in your data to easily recognize trends. The larger the interval you set, the more the peaks and valleys are smoothed out. While the smaller the interval, the closer the moving averages are to the actual data points.

Each of the moving formula accepts a measure, two integers to define the window, and one or more optional attributes.

```
formula (measure, integer, integer, [attribute, attribute, ...])
```

Only the measure and integer values are required. If you supply both required and optional values, the formula returns the aggregate of the measure over the given window. You should experiment with only a measure and integers leaving out the attribute and then adding it back in. This will help you decide which output best meets your use case.

The moving formulas are the following:

- `moving_average`, for example `moving_average (revenue, 2, 1, customer region)`  
Takes a measure, two integers to define the window to aggregate over, and one or more attributes. Returns the average of the measure over the given window. The attributes are the ordering columns used to compute the moving average. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, 1,1 will have a window size of 3. To see periods in the past, use a negative number for the second endpoint, as in the example `moving_average(sales, 1, -1, date)`.
- `moving_max`, for example `moving_max (complaints, 1, 2, store name)`  
Takes a measure, two integers to define the window to aggregate over, and one or more attributes. Returns the maximum of the measure over the given window. The attributes are the ordering columns used to compute the moving maximum. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, 1,1 will have a window size of 3. To see periods in the past, use a negative number for the second endpoint, as in the example `moving_max(sales, 1, -1, date)`.
- `moving_min`, for example `moving_min (defects, 3, 1, product)`  
Takes a measure, two integers to define the window to aggregate over, and one or more attributes. Returns the minimum of the measure over the given window. The attributes are the ordering columns used to compute the moving minimum. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, 1,1 will have a window size of 3. To see periods in the past, use a negative number for the second endpoint, as in the example `moving_min(sales, 1, -1, date)`.
- `moving_sum`, for example `moving_sum (revenue, 1, 1, order date)`  
Takes a measure, two integers to define the window to aggregate over, and one or more attributes. Returns the sum of the measure over the given window. The attributes are the ordering columns used to compute the moving sum. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, 1,1 will have a window size of 3. To see periods in the past, use a negative number for the second endpoint, as in the example `moving_sum(sales, 1, -1, date)`.

# Calculate the moving average

**Summary:** You can use the moving formulas to compute a measure within a moving window of your data, usually defined by time.

This example demonstrates using the `moving_average` formula. To use the moving function in a search:

1. Start a new search.

REGION	COMMITDATE QUARTERLY	REVENUE TOTAL
africa	Q1 FY 1993	38,235,729
africa	Q2 FY 1993	67,504,844
africa	Q3 FY 1993	116,890,921
africa	Q4 FY 1993	180,153,392
africa	Q1 FY 1994	166,139,486
africa	Q2 FY 1994	189,965,026
africa	Q3 FY 1994	138,520,689
africa	Q4 FY 1994	147,903,759

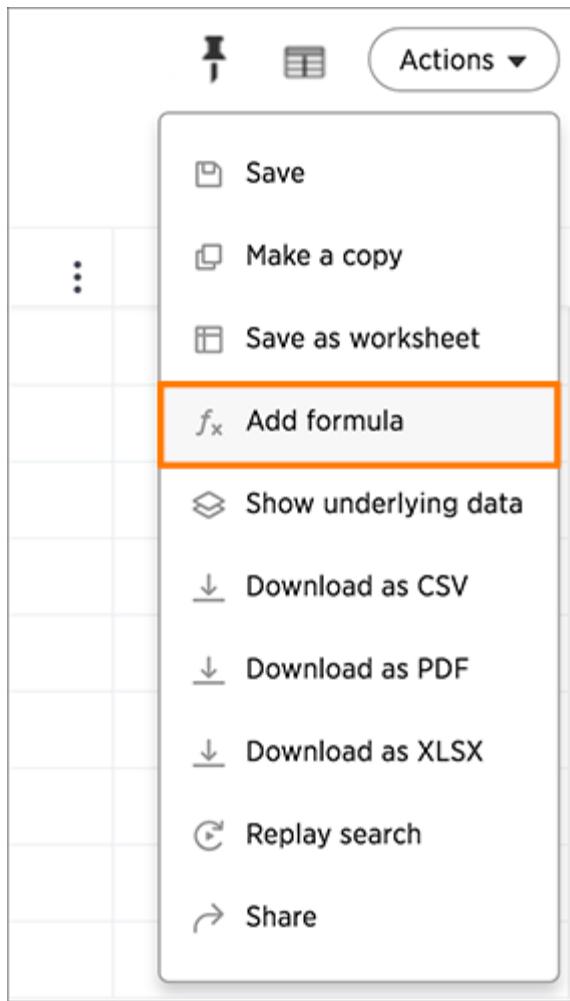
Showing rows 1 - 14 of 135

18.1B REVENUE  
TOTAL

5 REGION  
UNIQUE COUNT

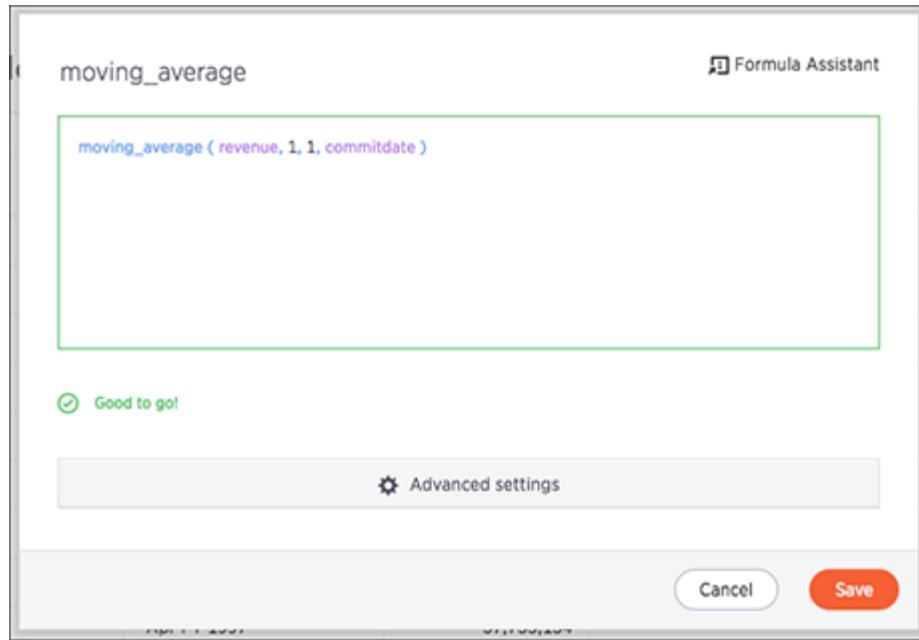
Q1 FY 1993 - Q3 FY 1999  
Quarterly (COMMITDATE)

2. In the upper right hand side of the table, click Actions and select Add formula.



3. Enter the moving\_average formula, providing a measure, a window, and one or more attributes.

The example will return the average of revenue, within the commit date window size of 3. The window includes the previous, current, and next rows. The attributes are the ordering columns used to compute the moving average. The window is (current - Num1..Current + Num2) with both end points being included in the window. For example, "1,1" will have a window size of 3. To see periods in the past, use a negative number for the second endpoint, as in the example "moving\_average(sales, 1, -1, date)".



4. Name the formula by clicking on its title and typing the new name. Click Save.

The formula will appear in the search bar and in the table as its own column.

REGION	COMMITDATE MONTHLY	REVENUE TOTAL	moving_average (revenue, 1, 1, commitdate)
africa	Nov FY 1993	86,601,468	67,580,044.33
africa	Nov FY 1994	28,881,900	44,018,897.67
africa	Jan FY 1998	16,773,589	20,810,803.00
america	Apr FY 1993	41,296,350	50,056,679.00
america	Sep FY 1995	12,512,017	27,881,766.00
america	Oct FY 1996	69,654,810	54,408,279.67
america	Nov FY 1996	45,631,320	52,882,097.00
america	Apr FY 1997	21,160,168	25,207,722.67

( showing rows 1 - 7 of 401.)

A box displaying the moving average within the entire table will appear at the bottom.

5. Click on the box to toggle between aggregation types.

# About conversion formulas

Some formulas require the input to be of a particular data type. If you find that you want to pass a value to the function, but it is of the wrong data type, you can convert it using a conversion formula.

The following are the default conversion formulas:

- `to_bool`
- `to_integer`
- `to_string`
- `to_float`

Information on the usage for these formulas is in the [Formula reference \(page 270\)](#).

Booleans are interpreted in the following ways:

Data Type	Description
<code>to_bool(integer)</code>	Boolean true maps to integer 1 and boolean false to integer 0.
<code>to_bool(string)</code>	Boolean true maps to string “true” and boolean false to string “false”.
<code>to_double(boolean)</code>	0 maps to boolean false, everything else to boolean true.
<code>to_integer(boolean)</code>	0 maps to boolean false, everything else to boolean true.
<code>to_string(boolean)</code>	The string “true” maps to boolean true, everything else to boolean false.

# About date formulas

Date formulas are useful when you want to compare data collected between two date periods. Date formulas allow you to apply date related functions to your formulas. The date functions include:

Function	Description	Examples
add_days	Returns the result of adding the specified number of days to the given date.	<ul style="list-style-type: none"> <li>• add_days (01/30/2015, 5) = 02/04/2015</li> <li>• add_days (invoiced, 30)</li> </ul>
date	Returns the date portion of a given date.	<ul style="list-style-type: none"> <li>• date (home visit)</li> </ul>
day	Returns the number (1-31) of the day for the given date.	<ul style="list-style-type: none"> <li>• day (01/15/2014) = 15</li> <li>• day (date ordered)</li> </ul>
day_number_of_week	Returns the number (1-7) of the day in a week for the given date with 1 being Monday and 7 being Sunday.	<ul style="list-style-type: none"> <li>• day_number_of_week (01/30/2015) = 6</li> <li>• day_number_of_week (shipped)</li> </ul>
day_number_of_year	Returns the number (1-366) of the day in a year for the given date.	<ul style="list-style-type: none"> <li>• day_number_of_year (01/30/2015) = 30</li> <li>• day_number_of_year (invoiced)</li> </ul>
day_of_week	Returns the day of the week for the given date.	<ul style="list-style-type: none"> <li>• day_of_week (01/30/2015) = Friday</li> <li>• day_of_week (serviced)</li> </ul>
diff_days	Subtracts the second date from the first date and returns the result in number of days, rounded down if not exact.	<ul style="list-style-type: none"> <li>• diff_days (01/15/2014, 01/17/2014) = -2</li> <li>• diff_days (purchased, shipped)</li> </ul>

Function	Description	Examples
diff_time	Subtracts the second date from the first date and returns the result in number of seconds.	<ul style="list-style-type: none"> <li>• diff_time (01/01/2014, 01/01/2014) = -86,400</li> <li>• diff_time (clicked, submitted)</li> </ul>
hour_of_day	Returns the hour of the day for the given date.	<ul style="list-style-type: none"> <li>• hour_of_day (received)</li> </ul>
is_weekend	Returns true if the given date falls on a Saturday or Sunday.	<ul style="list-style-type: none"> <li>• is_weekend (01/31/2015) = true</li> <li>• is_weekend (emailed)</li> </ul>
month	Returns the month from the given date.	<ul style="list-style-type: none"> <li>• month (01/15/2014) = January</li> <li>• month (date ordered)</li> </ul>
month_number	Returns the number (1-12) of the month for the given date.	<ul style="list-style-type: none"> <li>• month_number (09/20/2014) = 9</li> <li>• month_number (purchased)</li> </ul>
now	Returns the current timestamp.	<ul style="list-style-type: none"> <li>• now ()</li> </ul>
start_of_month	Returns the date for the first day of the month for the given date.	<ul style="list-style-type: none"> <li>• start_of_month (01/31/2015) = Jan FY 2015</li> <li>• start_of_month (shipped)</li> </ul>
start_of_quarter	Returns the date for the first day of the quarter for the given date.	<ul style="list-style-type: none"> <li>• start_of_quarter (09/18/2015) = Q3 FY 2015</li> <li>• start_of_quarter (sold)</li> </ul>
start_of_week	Returns the date for the first day of the week for the given date.	<ul style="list-style-type: none"> <li>• start_of_week (06/01/2015) = 05/30/</li> </ul>

Function	Description	Examples
		<pre>2015 Week • start_of_week (emailed)</pre>
start_of_year	Returns the date for the first day of the year for the given date.	<ul style="list-style-type: none"> <li>• start_of_year ( 02/15/2015 ) = FY 2015</li> <li>• start_of_year (joined)</li> </ul>
time	Returns the time portion of a given date.	<ul style="list-style-type: none"> <li>• time (3/1/2002 10:32) = 10:32</li> <li>• time (call began)</li> </ul>
year	Returns the year from the given date.	<ul style="list-style-type: none"> <li>• year (01/15/2014) = 2014</li> <li>• year (date ordered)</li> </ul>

## Calculate date formulas

Calculating date formulas is useful when you want to compare data from different date periods. Here are some examples of using date formulas:

### Example 1

The following example shows you how to create formulas that you can use to compare data from this week to last week.

- The formula for this week is: `week ( today () ) - week (date)`
- The formula for last week is: `diff_days ( week ( today ) , week ( date ) )`

### Example 2

The following example shows you how to calculate the percent increase from the last date period to this period in terms of revenue.

1. Create the formula: `this week revenue = sum ( if ( this week ) then revenue else 0 )`
2. Then create the formula: `last week revenue = sum ( if (last week) then revenue else 0 )`
3. Use [nested formulas \(page 135\)](#) to calculate the percent increase by creating a parent formula:  
`percent increase = ( ( last week revenue - this week revenue) / last week revenue ) \* 100`

# Percent (simple number) calculations

You can use simple number functions to perform useful percent calculations.

Simple number functions include addition, subtraction, multiplication, and division.

Function	Description	Examples
*	Returns the result of multiplying both numbers.	<ul style="list-style-type: none"> <li><code>3 * 2 = 6</code></li> <li><code>price * taxrate</code></li> </ul>
+	Returns the result of adding both numbers.	<ul style="list-style-type: none"> <li><code>1 + 2 = 3</code></li> <li><code>price + shipping</code></li> </ul>
-	Returns the result of subtracting the second number from the first.	<ul style="list-style-type: none"> <li><code>3 - 2 = 1</code></li> <li><code>revenue - tax</code></li> </ul>
/	Returns the result of dividing the first number by the second.	<ul style="list-style-type: none"> <li><code>6 / 3 = 2</code></li> <li><code>markup / retail price</code></li> </ul>

## Calculate percentages

Calculating percentages is useful when you want to see, for example, the percentage revenue generated from each channel (online, stores, partner, etc.).

The following example shows you how to figure out the percentage revenue generated from each channel (online, stores, partners, etc.).

1. Create the following formula in the Formula Builder: `percent revenue = ( sum ( revenue ) / group sum ( revenue ) ) \* 100`
2. Now you can search by each channel, using the percent revenue formula that you just created.

# About conditional formulas (operators)

Conditional formulas, or operators, allow you to apply if/then/else conditions in your formulas. You can leverage operators in your conditional formulas to have them return true, false, or a predetermined value. The operators include:

Operator	Description	Examples
and	Returns true when both conditions are true, otherwise returns false.	<ul style="list-style-type: none"> <li>(1 = 1) and (3 &gt; 2) = true</li> <li>lastname = 'smith' and state ='texas'</li> </ul>
if...then...else	Conditional operator.	<ul style="list-style-type: none"> <li>if (3 &gt; 2) then 'bigger' else 'not bigger'</li> <li>if (cost &gt; 500) then 'flag' else 'approve'</li> </ul>
ifnull	Returns the first value if it is not null, otherwise returns the second.	ifnull (cost, 'unknown')
isnull	Returns true if the value is null.	isnull (phone)
not	Returns true if the condition is false, otherwise returns false.	not (3 > 2) = false not (state = 'texas')
or	Returns true when either condition is true, otherwise returns false.	<ul style="list-style-type: none"> <li>(1 = 5) or (3 &gt; 2) = true</li> <li>state = 'california' or state ='oregon'</li> </ul>

## Calculate the conditional sum

Calculating the conditional sum is useful when you want to see, for example, the total revenue for a product by region.

Conditional sum formulas follow this syntax: if (some condition) then (measure) else 0. You can use this syntax to limit your search in cases when you don't want to add a column filter. For example: if (product = shoes) then revenue else 0

The following example shows you how to figure out the number of customers who bought both products, in this case an ipad and galaxy tablet. You can then find out the revenue generated by both products.

1. Create the following formula in the Formula Builder:

```
ipadcount = sum ( if ( product = 'ipad' ) then 1 else 0 ) > 0
```

This formula will provide you with the number of ipads that were bought.

2. You can then create another formula that looks like this:

```
galaxycount = sum ( if ( product = 'galaxy' then 1 else 0 ) > 0
```

And this formula will provide you with the number of galaxys that were bought.

3. Using [nested formulas \(page 135\)](#), you can combine these two formulas.

For example: `f1 = ipadcount + galaxycount`

4. Now, you can search using the f1 formula to find out the revenue generated by both products.

# Nested formulas

Nested formulas, or formula on formula, allow you to reference a formula within another formula. This graphic illustrates how you would define a formula and then reference it from another:



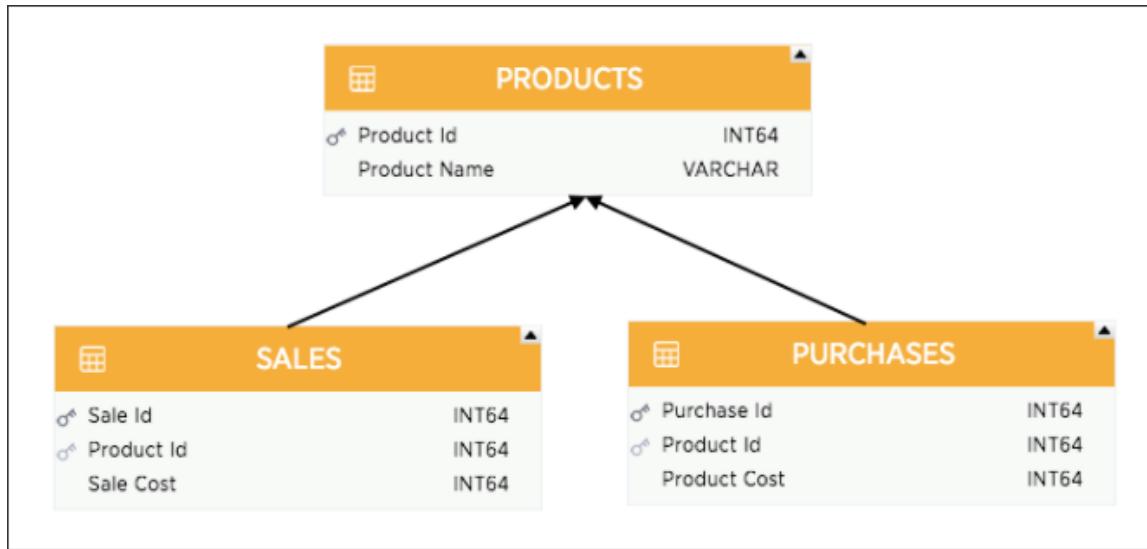
These formulas become columns, and are even suggested within the Formula Builder. There is no limit to the nesting depth you can create.

ThoughtSpot doesn't allow users to create invalid formulas, such as cyclic (loops) or inconsistent aggregation formulas. To support this, formulas have dependency awareness. For example, you cannot delete a formula that is nested in another. Also, formula dependency awareness ensures that you do not break any dependent formulas while editing a formula with dependent formulas. For example, common cases of invalidating occur when users try to change a data type.

Nesting enables encapsulation and decomposition of formula logic. Meaning, you may have a staff member create some small useful formulas that others can use. This also minimizes duplication of formulas.

# Formula support for chasm trap schemas

You can create a formula that involves aggregated measures coming from multiple fact tables of a chasm trap.



Just as you would create any other formula, you can create a formula that spans across a chasm trap. The Formula Builder will provide column suggestions for formulas that span across chasm traps.

# Refine a search with a worksheet

**Summary:** If you want to search on top of another search, try saving your search as a worksheet. Then, you can use the saved worksheet as a data source for a new search.

Worksheets can be created from tables or from searching. You can also create a worksheet from a search. This is an advanced form of searching. A worksheet created from a search is called an *aggregated worksheet*. Aggregated worksheets are effectively the same as any worksheet.

When you do a search on a data source, ThoughtSpot is only able to aggregate one column by one other column. Because of this, you may come across searches you can't do in one pass, because they are essentially nested queries. But you can create the equivalent of nested queries using an aggregated worksheet, which is essentially an answer that you save as a worksheet.

You can use search saved as a worksheet just like any other data source. You can even link it to other sources by defining a relationship. When you save an answer as a worksheet, and then use it as a source in a new search, it is similar to doing a nested query in SQL, only much easier to create.

To create a worksheet from a search, you must belong to a group that has the privilege **Has administration privileges** or **Can Manage Data**. If you are not able to create aggregated worksheets, contact your administrator and request the **Can Manage Data** privilege.

## Aggregated worksheet workflow

Suppose you have created a search on the sales fact table that shows the top ten Sales Reps by revenue for the first quarter. Then you want to do some further investigations on that set of data, like ranking them by how much they discounted a specific product using data from the orders fact table. Unless you save your first answer as a worksheet, certain explorations like this won't be possible. If you want to do this, here are the steps at a high level:

1. Create the first search, and [save it as an aggregated worksheet \(page 139\)](#).
2. Link your worksheet to any other data sources you'll need.
3. Create a new search that includes your aggregated worksheet and the other sources you linked with it.
4. You may want to create a new worksheet that includes these data sources.

This will make it easy for people to search using the same group of aggregated worksheet and tables that you created.

## Best practices for using aggregated worksheets

Only users with administrative privileges are able to create aggregated worksheets and link them. Users that create aggregated worksheets should keep in mind best practices for creating a worksheet and the boundaries around the final worksheet size.

You can't link an aggregated worksheet with a sharded table. If you do this and try to search on it, you will get an error.

To be able to join an aggregated worksheet with a base table, your installation must be configured to allow the behavior. The aggregated worksheet cannot have more than 5 tables involved. Moreover, the number of rows in the final aggregated worksheet cannot be greater than 1000.

The order of the objects being linked (joined) matters, this is because joins are directional. The table/aggregated worksheet with the foreign key needs to occur in the first (left) position. The table with the

primary key should be in the second (right) position.

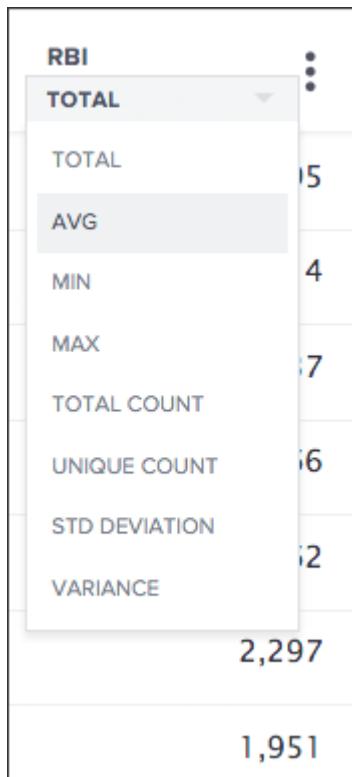
For the best performance, the final aggregated worksheet should have 50 or fewer columns and no more than 10 million rows. Exceeding these boundaries can make your worksheet creation slow or error prone.

You can use an ETL (extract, transform, load) process to circumvent these limitations.

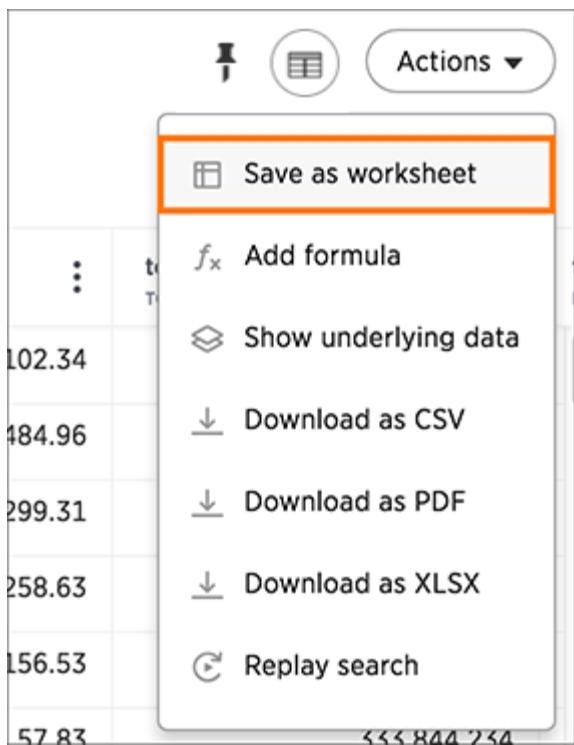
# Save a search as a worksheet

This procedure walks you through creating a worksheet from a search. To create a worksheet from a search (i.e. an aggregated worksheet):

1. Start a new search, or edit an existing visualization from a pinboard.  
Any filters or aggregations created during this search will be reflected in the worksheet.
2. If you want to use a different aggregation than the default one for any column, set it from the column header.



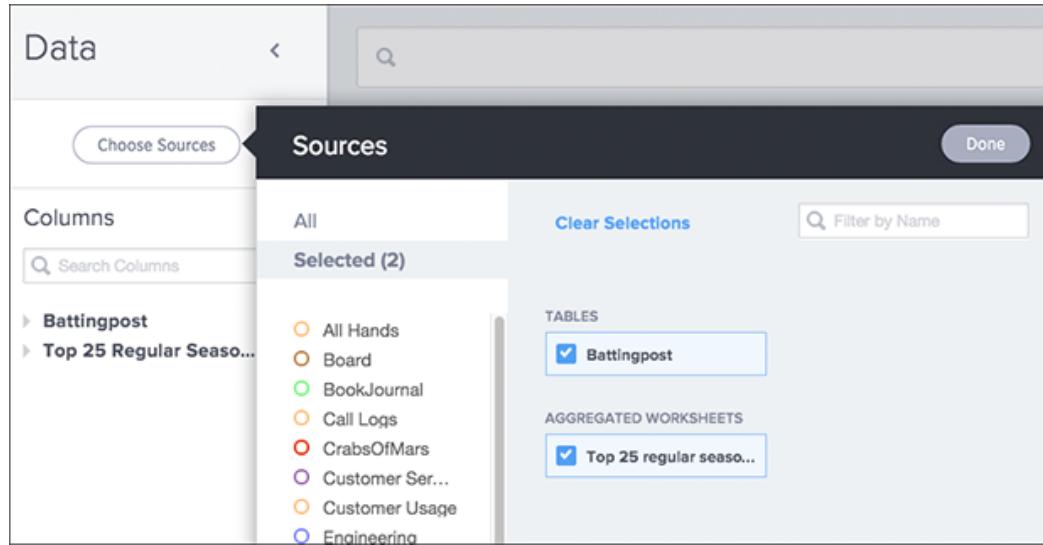
3. Save the answer as a [Worksheet](#).



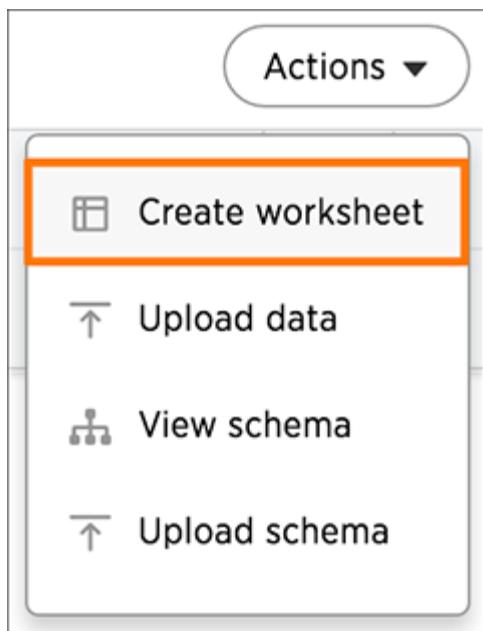
# Search from an aggregated worksheet

After creating a worksheet from a search (also called an aggregated worksheet) and linking it to related data, you're ready to create your new search. To do a search on the aggregated worksheet, along with any data sources you linked:

1. Click the search icon, and select Data Source. Choose your linked sources.



2. Do a search using columns from the linked sources, including any aggregations you created.
3. Test the result, to make sure it's what you expect. If your search shows no data found or doesn't look right to you, it is possible that one of the links between your sources was made on the incorrect column. Check the relationships you created and try linking using a different column, to see if that gives the expected search results.
4. Once you have the expected answer, you can create a worksheet to make it easier for you and other people to use. To do this, click the DATA icon.
5. Click the Actions icon from the upper right side of the screen
6. Select Create worksheet.



7. Choose both views using **Choose Sources**.
8. You may need to rename some columns appropriately for searching.
9. Share the worksheet with the appropriate users and groups.

# Worksheet example scenarios

Here are three common examples of when you would need to use aggregated worksheets.

## Example 1

The first example involves creating an aggregated worksheet with a default filter. Say you want to create a worksheet that only shows data for a particular US state. In your search, enter `customer state = texas`. Then click **Actions**, and select **Save as worksheet**. Give your worksheet a name, then click **Save** to create your worksheet.

Now you have a worksheet that only contains data that pertains to Texas. You can share this worksheet with others to search across. Another popular example of this concept includes creating a worksheet with only active employee data.

## Example 2

The second example involves joining two aggregated worksheets. Say you want to plot the revenue of the top five states over time. Search for `revenue`, `store state`, and `top 5`. Save this answer as an aggregated worksheet called `Top 5 states`. Then start another search with the tokens `revenue`, `store state`, and `date`. Save this answer as an aggregated worksheet called `Total monthly purchases`.

Now you want to join these two worksheets. Navigate to the **DATA** tab and make a relationship between the two worksheets, involving `store state`.

To start a new search, select your two aggregated worksheets as data sources, selecting the appropriate columns: `store state` from `Top 5 States`, and `date` and `total sales` from `Total monthly Purchases`. You will only see data for the top five revenue states.

## Example 3

The third example involves creating a search to find customers who bought product A, but did not buy product B. This example can also be done using [conditional formulas \(page 133\)](#).

First, you would have to perform searches for total sales by customer for both A and B, and create aggregated worksheets for both. Then join these two aggregated worksheets back in an outer join looking for conditions where the A and B join values are null.

This approach can become clunky, but depending on the requirement, can also be easily implemented.

# Basic pinboard usage

**Summary:** Create a new pinboard to group and manage related search results. Pinboards are the ThoughtSpot term for a dashboard.

Pinboards act like live dashboards, and are collections of your related charts, tables, and headline.

## What are pinboards

You can pin charts and tables to any pinboard which you created, and those that have been shared with you with the Edit privilege. When you create a pinboard, you can share it with other people with either the View or Edit privilege. Pinboards are interactive, allowing you to perform actions like filtering, excluding values, and drilldown on the visualizations.

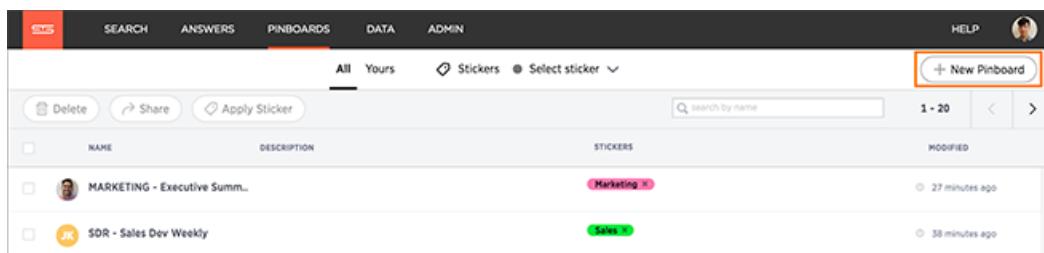
## Create a pinboard

To create a pinboard:

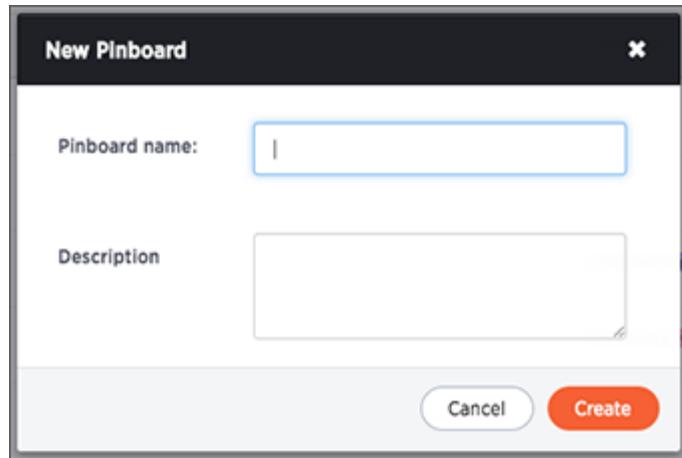
1. Click on Pinboards, on the top navigation bar.



2. Click + New Pinboard on the pinboards list page.



3. In the New Pinboard dialog box, give your pinboard a name and description. Then click Create.



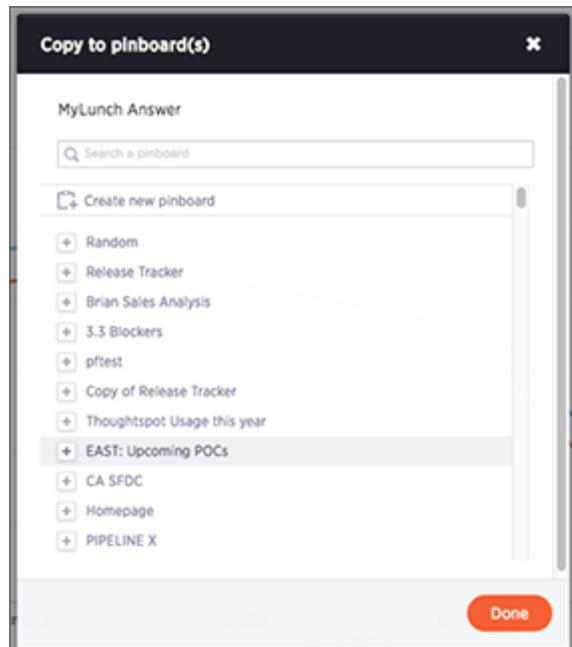
## Add an answer to a pinboard

Instead of saving an answer you can add it to a pinboard by pinning it. To add an answer to a pinboard:

1. While viewing your answer of interest, click the Pin icon on the top right of the answer.



2. In the Copy to pinboard(s) dialog box, click the + icons next to the pinboards you would like to add your answer to.

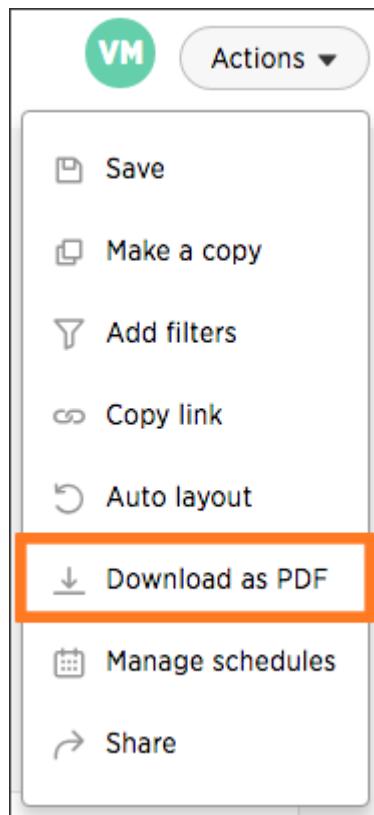


Tip: You can also select Create new pinboard at the top of the list to create a new pinboard, then add your answer to it.

## Download a pinboard

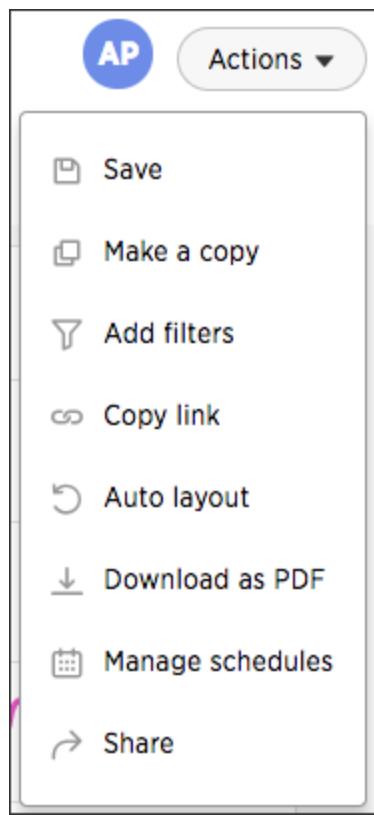
You can download a pinboard as a PDF file, without having to download each visualization separately. Downloading a pinboard works just as it would when downloading an answer. To download a pinboard:

1. Click Actions, and select Download as PDF.

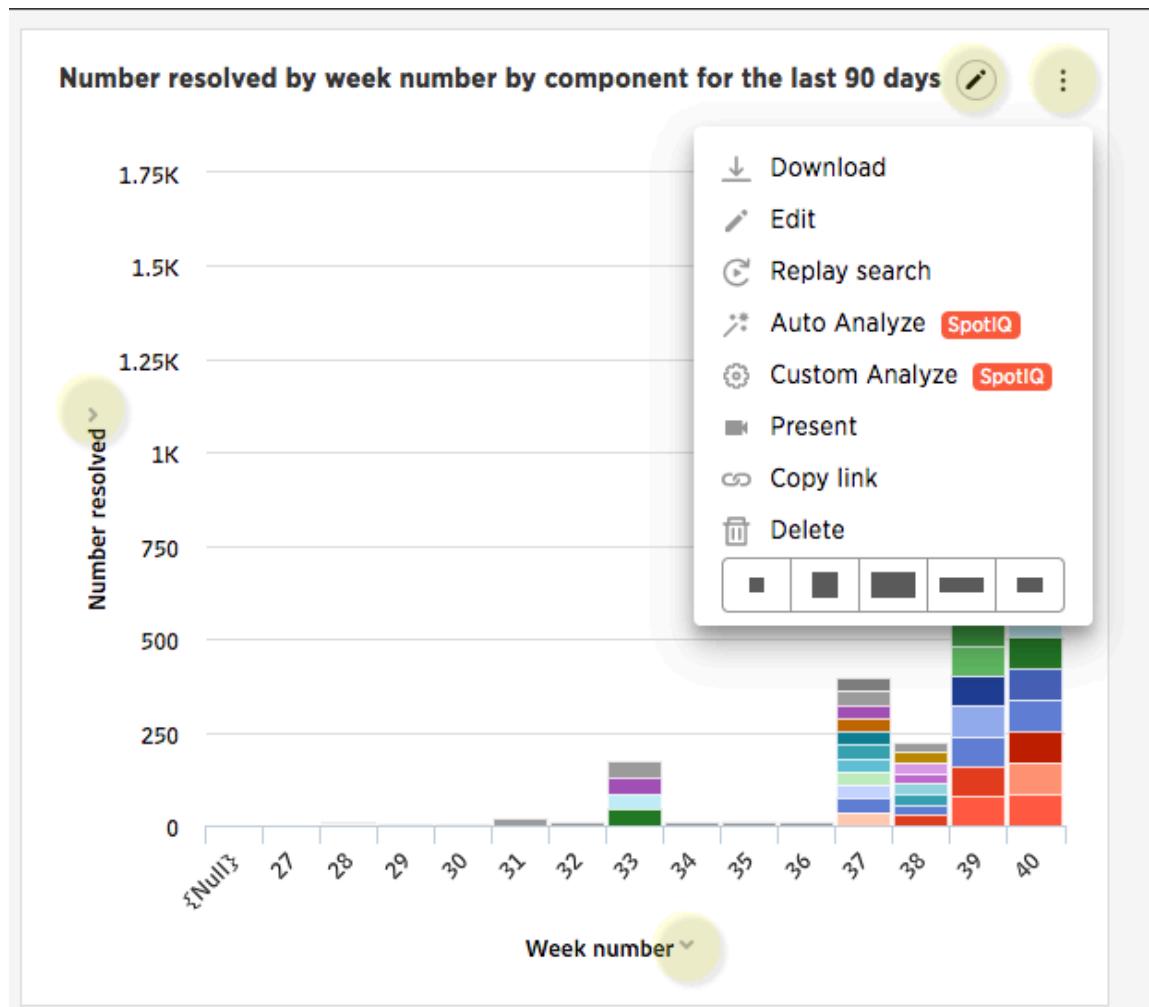


## Other pinboard actions

Other pinboard actions include actions you normally perform on your search as well as actions that you can only perform on a pinboard. Most of these actions are found under the Actions button.



Other actions are available on a pinboard display itself. Some actions are static others appear only when you over over specific locations of the pinboard. This diagram displays active action areas on a pinboard.



# Edit the layout of a pinboard

**Summary:** Editing the layout of a pinboard lets you snap visualizations into place, choose between set visualization sizes, and reset your layout.

Visualizations within a pinboard are easy to move around and snap into place on a relative flow layout. Your pinboard layout is also responsive to your browser resolution. This helps keep the layout of your pinboard neat and organized.

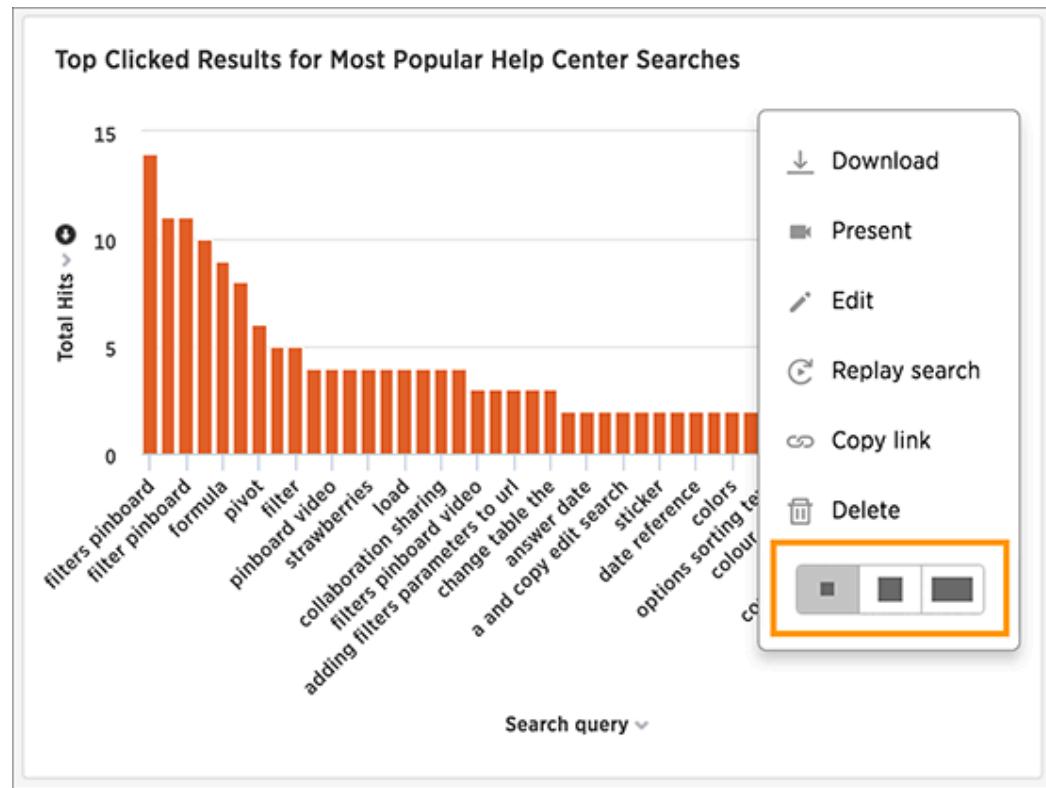
## Reorder the visualization

In addition, the size picker at the bottom of a visualization dropdown lets you toggle between predetermined sizes for each visualization. Charts and graphs can be toggled between a small, medium, and full width size, while headlines can be only one size (small). One row of the pinboard can hold a predetermined number of visualizations of each size.

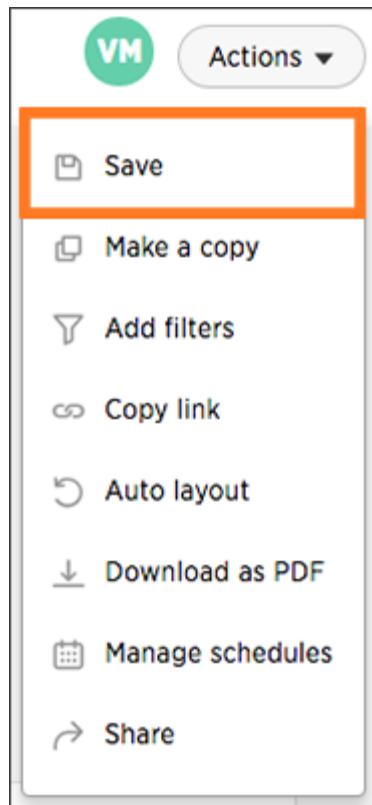
1. Click on **Pinboards**, on the top navigation bar.



2. On the pinboard list page, click the pinboard you would like to edit.
3. Resize your visualizations by choosing between the predetermined sizes under the visualization dropdown menu.



4. Drag and drop your visualizations on the layout grid to reorder your pinboard.
5. If you are unhappy with your layout or you would like ThoughtSpot to configure your layout for you, go ahead and [reset your layout \(page 168\)](#).
6. Save your pinboard by clicking Actions and Save.



## Change the orientation of a chart or table

You can change the size of a chart or table on a pinboard. To do this:

1. Navigate to the chart or table.
2. Select the menu.

The system displays the dropdown menu.

The image shows a chart titled "Total Count by Yearly (Created)" with a dropdown menu open on the right. The chart displays the following data:

Created	Total count	Issue Key
YEARLY		
FY 2017	5,907	
FY 2018	3,845	
FY 2014	2,801	

(showing rows 1-4 of 6)

The dropdown menu on the right includes:

- Download as CSV
- Download as XLSX
- Download as PDF
- Edit
- Replay search
- Auto Analyze
- Custom Analyze
- Present
- Copy link
- Delete

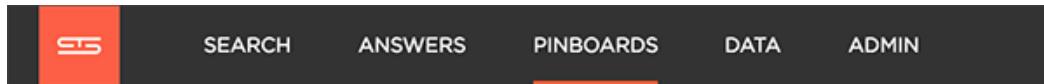
The last item shows the possible orientation

3. Select a new orientation.
4. Choose Actions > Save.

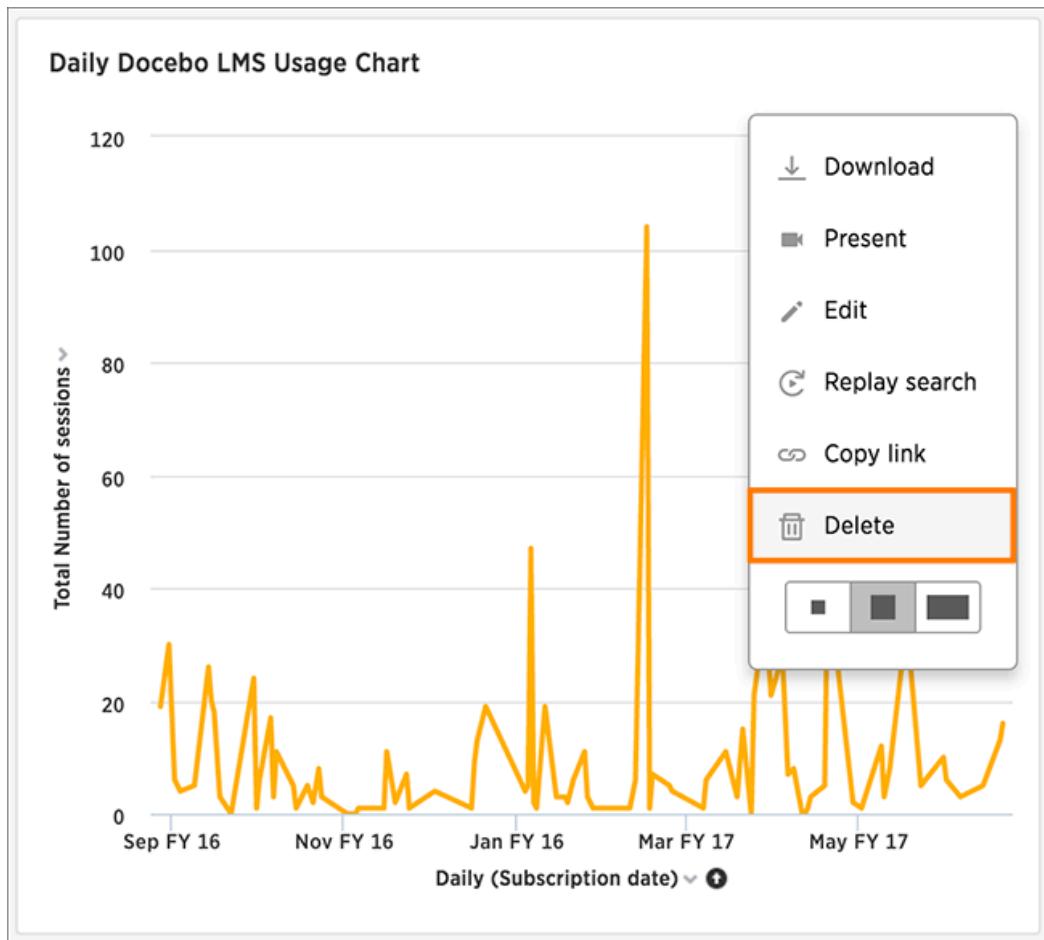
## Remove a visualization from your pinboard.

To delete a visualization:

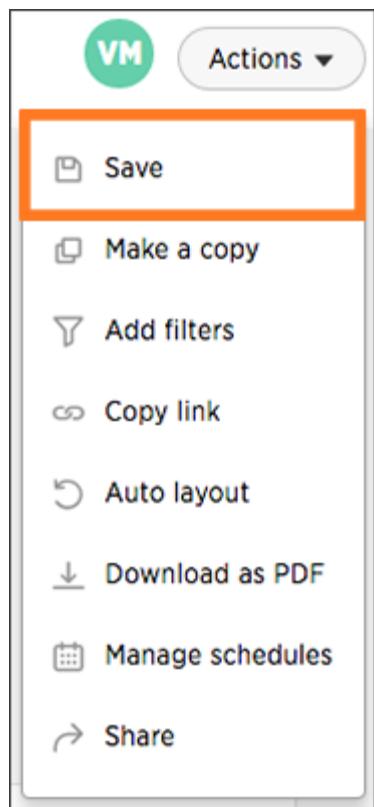
1. Click on Pinboards, on the top navigation bar.



2. On the pinboard list page, click the pinboard you would like to edit.
3. Click Delete under the dropdown menu of the visualization you would like to delete.

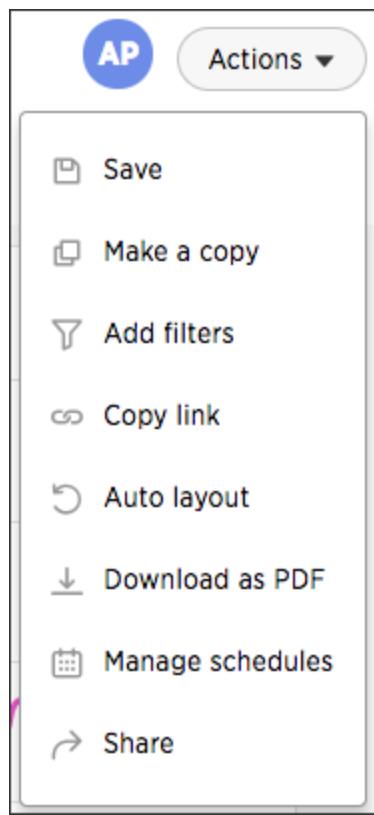


4. Save your pinboard by clicking Actions and Save.

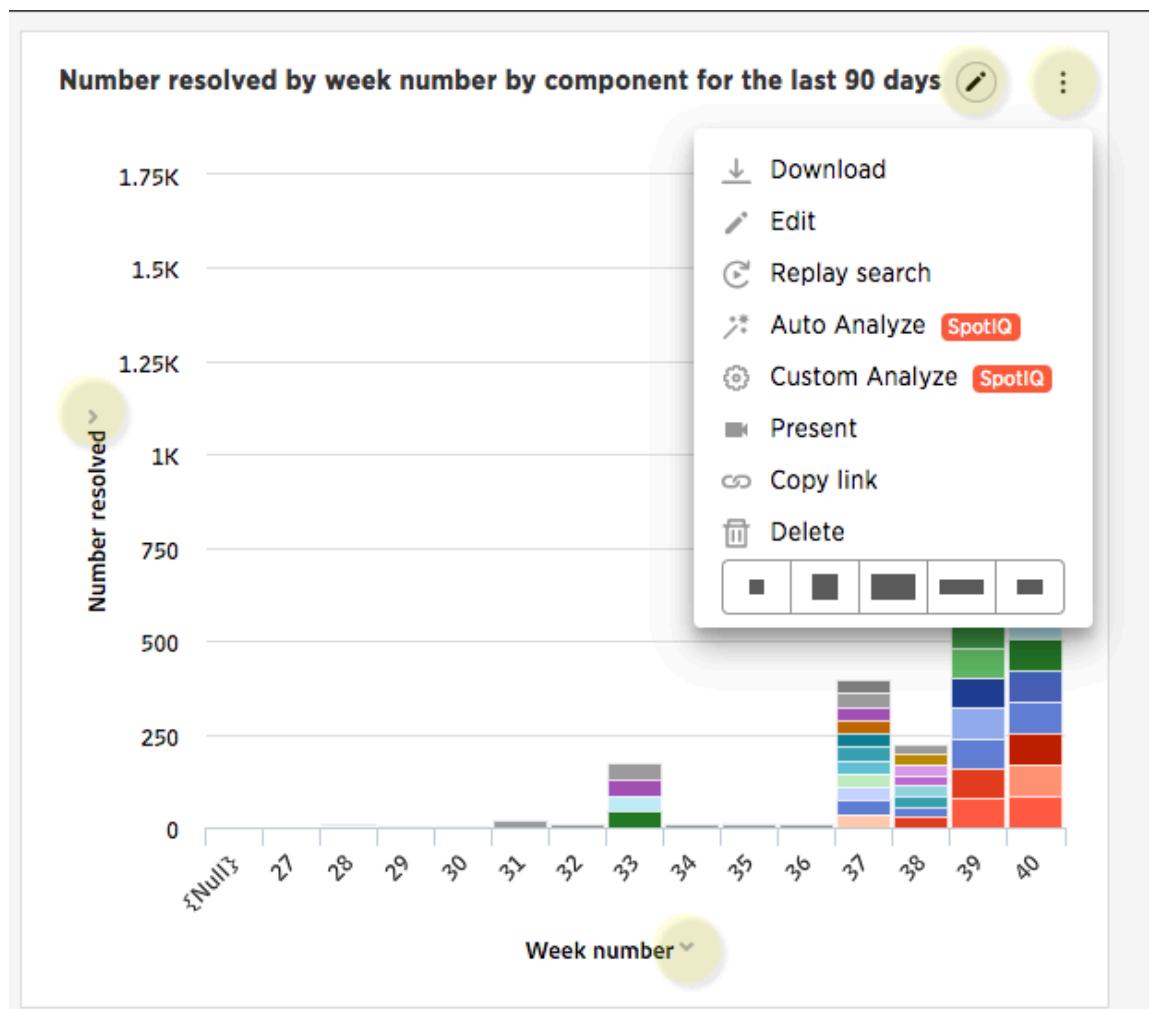


## Other pinboard edits

Other pinboard actions include actions you normally perform on your search as well as actions that you can only perform on a pinboard. Most of these actions are found under the **Actions** button.



Other actions are available on a pinboard display itself. Some actions are static others appear only when you over over specific locations of the pinboard. This diagram displays active action areas on a pinboard.



# Pinboard filters

Filters, including bulk filters, can be applied to pinboards just as with tables and charts. These kinds of filters apply to an entire pinboard, making it easy to see only the data that you are interested in across the tables and charts within a pinboard.

## When to use a pinboard filter

Pinboard filters can be very useful when you want to apply the same filters to more than one related visualization. You can narrow the focus of your pinboard for specific purposes or audiences.

When you apply a filter, the pinboard is not automatically saved with your filter applied. This is to encourage ad hoc filtering. Therefore, people with read-only access can create pinboard filters. You must have edit access to the pinboard, and view access (or higher) to the underlying data source in order save a pinboard filter.

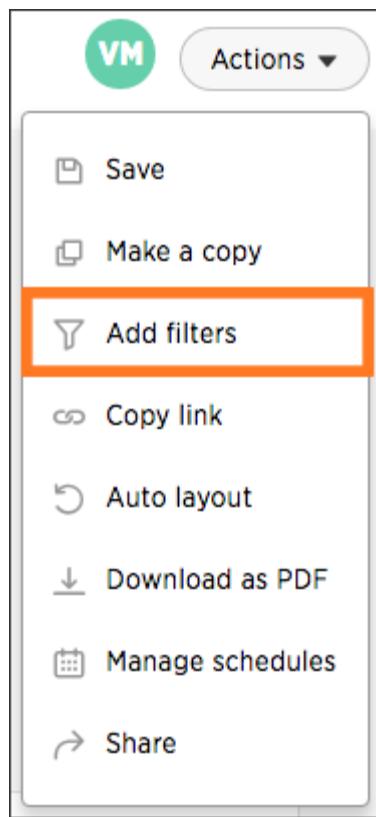
Note that pinboard filters only apply to the tables and charts that are based on worksheets. If a pinboard also includes tables and charts that were created from underlying tables or on user uploaded data, the filters don't apply to them.

## Create a pinboard filter

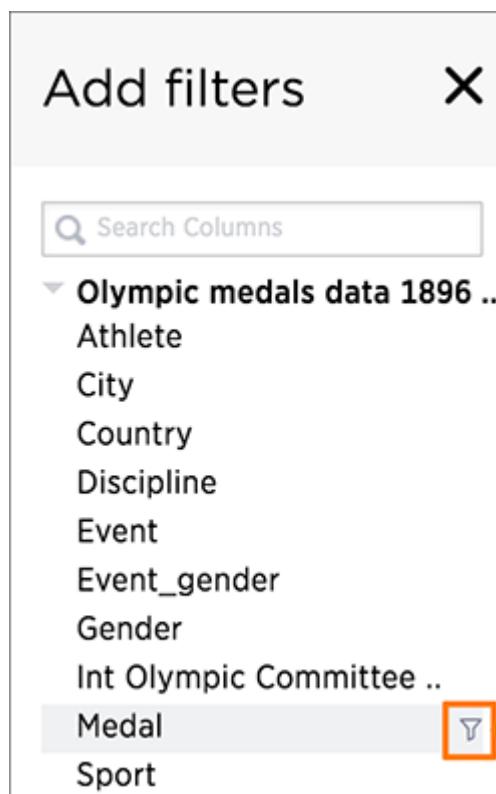
You can create a filter in the pinboard view for any pinboard. This allows you to easily manipulate the visualizations and view the modified presentation in one place.

Here is an example that shows you how to add a single filter to a pinboard. To create a pinboard filter:

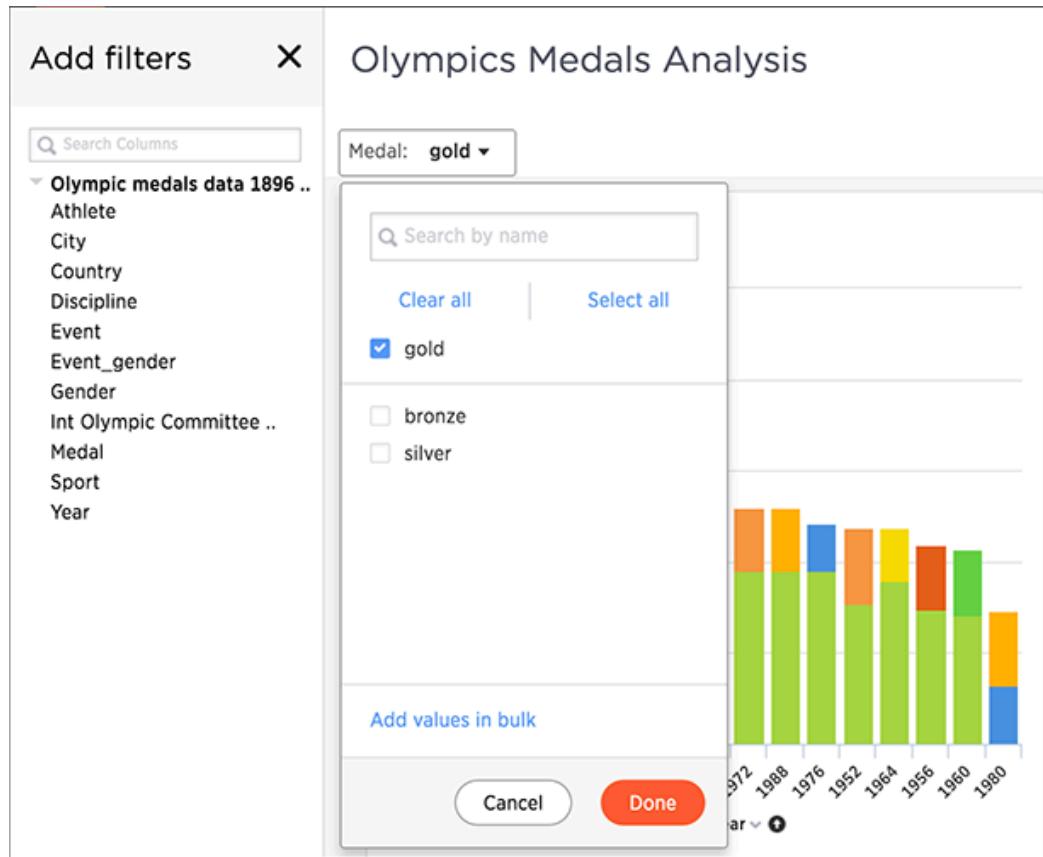
1. Click the Actions button, and click Add filters.



2. In the populated columns menu, click the Add filter icon next to the columns you would like to use as filters.



3. Choose the values you are interested in by typing them in, selecting the appropriate checkboxes, or using Add values in bulk.
4. Click Done.



Your applied filter will sit at the top of the pinboard, where you can either edit or delete it.



When you apply a filter, the pinboard is not automatically saved with your filter applied to every object in the pinboard that was created from a worksheet. Pinboard filters do not apply to tables and charts built directly on top of base tables.

# Schedule a pinboard job

**Summary:** You can schedule a pinboard job for any pinboard by using the Add a schedule prompt page.

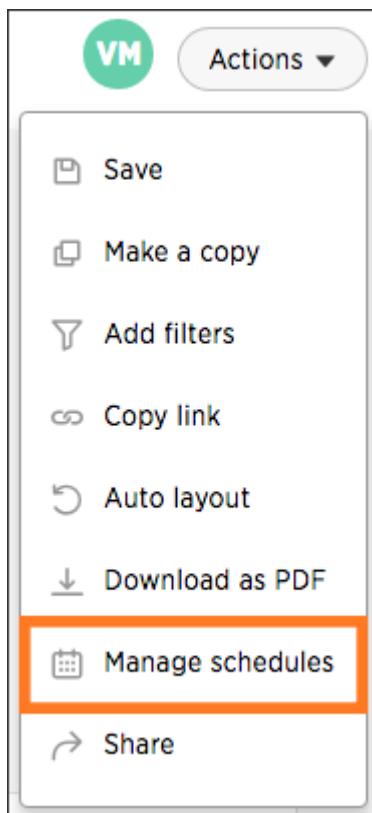
You can add multiple schedules with different configurations for a single pinboard. However, each job is limited to one pinboard schedule. To add a schedule, you must have administrator or can schedule pinboard privilege, and at least edit-only and view-only access to the pinboard.

To schedule a pinboard:

1. Log in to ThoughtSpot from a browser.
2. Click on Pinboards, on the top navigation bar.



3. Select the pinboard you would like to create a schedule for.
4. Click Actions and select Manage schedules to view all of the schedules set for the pinboard.



5. Click + Schedule to add a new schedule.

PINBOARD SCHEDULES				
	NAME	DESCRIPTION	STATUS	RECIPIENT
<input type="checkbox"/>	test	test	▷ Scheduled	1 Recipient
<input type="checkbox"/>	max jobs test	max jobs	▷ Scheduled	1 Recipient
<input type="checkbox"/>	header	header	▷ Scheduled	1 Recipient

The system displays the Add a schedule for PINBOARD page. On this page you configure both the schedule

- Set the values for your schedule.

### Add a schedule for rdata

**Schedule**

Repeats

Server time zone UTC

Name

Description

Type  CSV  PDF

Gating condition

**Recipients**

Users or groups

Emails:

Field	Description
Repeats	You can rebuild a pinboard every $n$ minutes, hourly, daily, weekly, or monthly. For some of these, you can also choose specific times of the day or days of the week. Make sure to note the Server time zone which is the timezone which will be used.
Name	Provide a short name for this schedule, Monthly Report Source is an example of a good name.
Description	Enter a description to remind yourself and to inform others. For example, if this is an important schedule for a meeting or a report, you should mention that.
Type	CSV files provide all data for tables, with one attachment per table. Use CSV files to perform further analysis offline. PDF files show all visualizations in the pinboard. Each chart takes up a whole page in the file, while only the first 100 rows of a table are included. Use PDF files to skim the data.

**Gating condition** Write a statement that returns a boolean value. For example, `sum(revenue) > 100` is a valid condition but `is_weekend(commit_date)` is not. You can use any valid formula in your statement. At the scheduled time, ThoughtSpot checks the gating condition, and, if the condition returns true, processes the pinboard. For a list of valid formulas, see the [Formula Reference \(page 270\)](#).

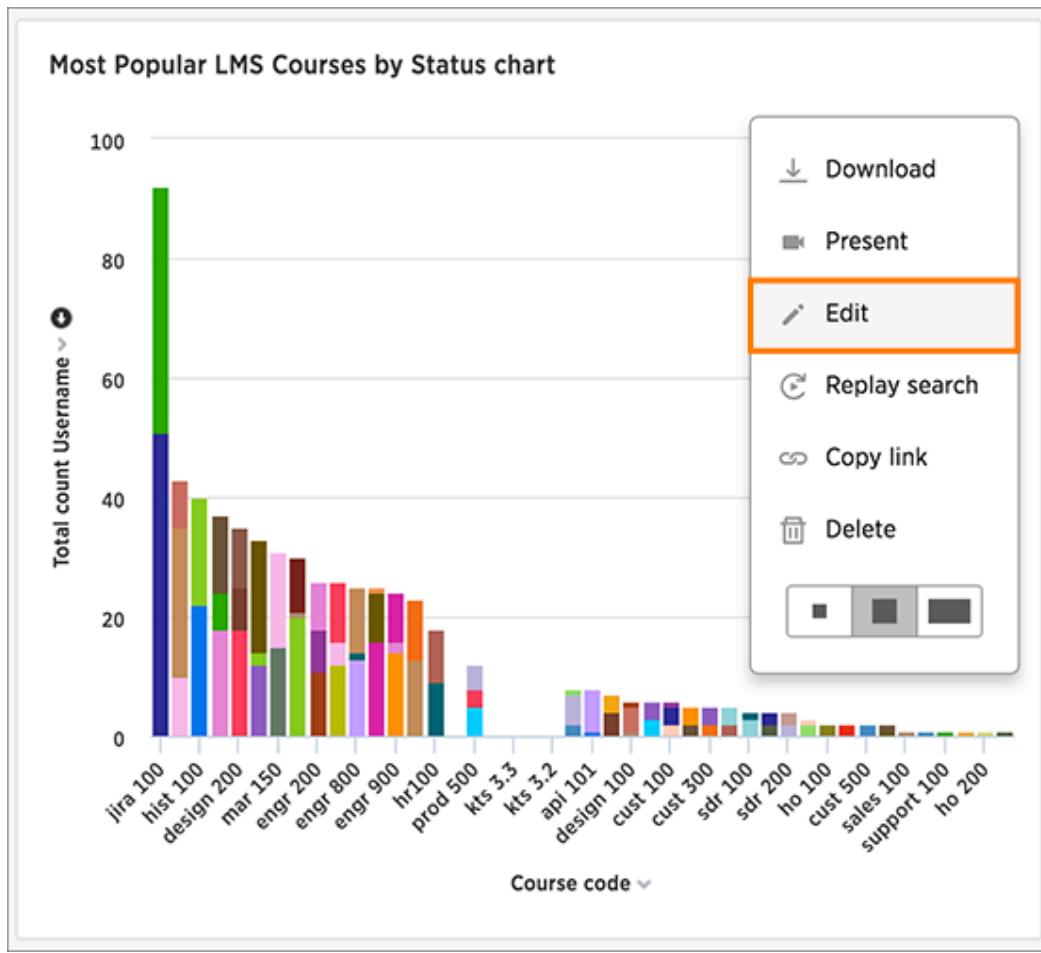
**Recipients** You are limited to 1000 recipients per job. You can add **Users or groups** to enter ThoughtSpot users or groups. Use **Emails** to add recipients that are not ThoughtSpot users. Any users your Thoughtspot admin must have set your whitelist domains. Contact ThoughtSpot Support to set your whitelist domains.

7. Click **Schedule** to save your schedule configuration.

# Search actions within a pinboard

You can perform many of the same search actions on individual visualizations within a pinboard as you can within a search. You can interact directly with a visualization of a pinboard to perform ad hoc searches or edit it. These search actions include the following:

- Editing a search - You can edit the original search and reconfigure the answer. In the dropdown of a visualization, click Edit.



You will be taken to an edit mode, where you can [view and change sources \(page 23\)](#), [search different columns \(page 24\)](#), [change the view \(page 55\)](#), [save the answer as a worksheet \(page 137\)](#), [add a formula \(page 110\)](#), and [change the chart \(page 99\)](#).

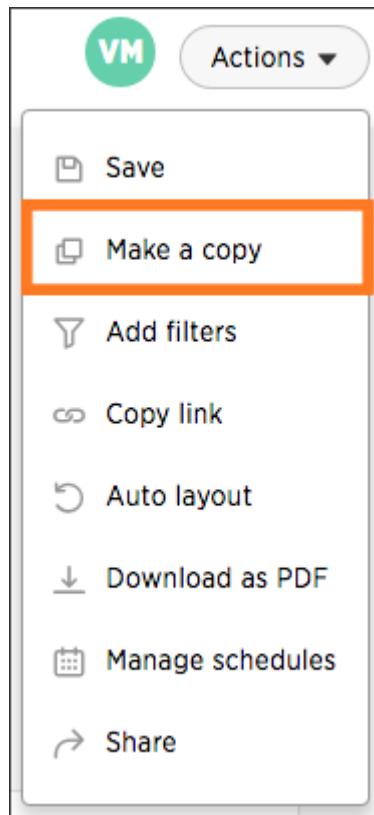
# Copy a pinboard

You can make a copy of a pinboard if you would like to make edits without changing the original pinboard. Making a copy of a pinboard allows you to make your own edits without overwriting the original. When saving a copy, you can type in a new name.

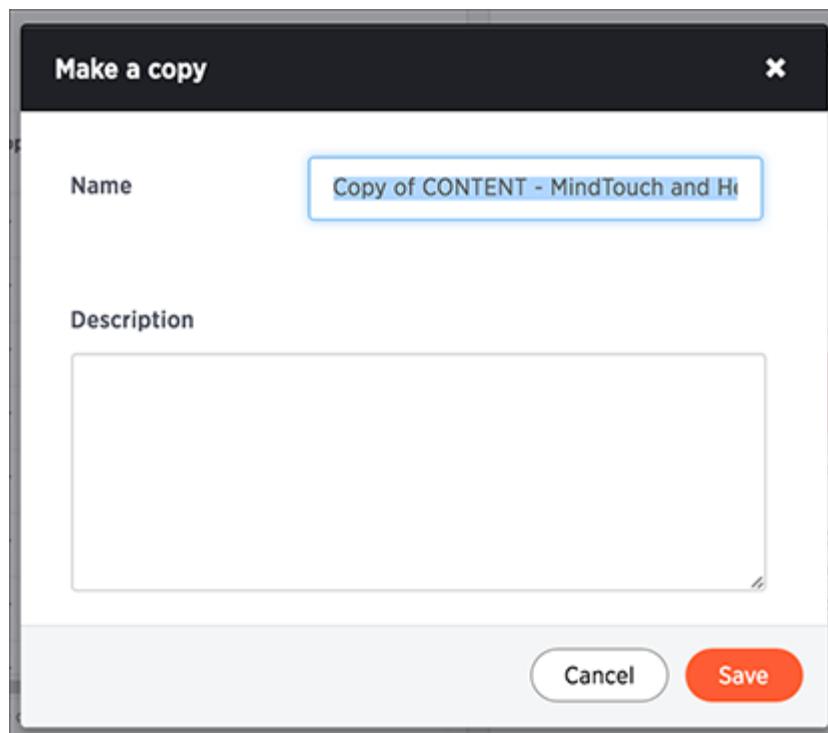
1. Click on Pinboards, on the top navigation bar.



2. On the pinboard list page, click the pinboard you would like to copy.
3. Click Actions and select Make a copy.



4. Give your pinboard a new name and description. Then click Save.



# Copy a pinboard or visualization link

**Summary:** In pinboards, there is a copy link option that lets you copy the link to access the pinboard and visualizations directly.

You can copy and paste the copied link to include in a presentation or spreadsheet, or email or Slack it to other people in your company. Note that when clicking the link, the person must be authenticated to ThoughtSpot to see the visualization (e.g. by logging in or LDAP).

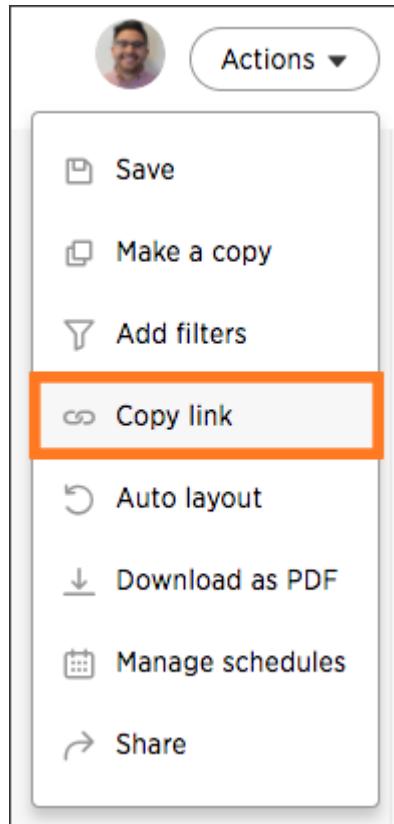
You can also use this link for embedding the chart or table in another Web page, Web portal, or application when using the ThoughtSpot JavaScript API with Embedding or the REST API. For details, read the ThoughtSpot Application Integration Guide.

To copy the link for a pinboard:

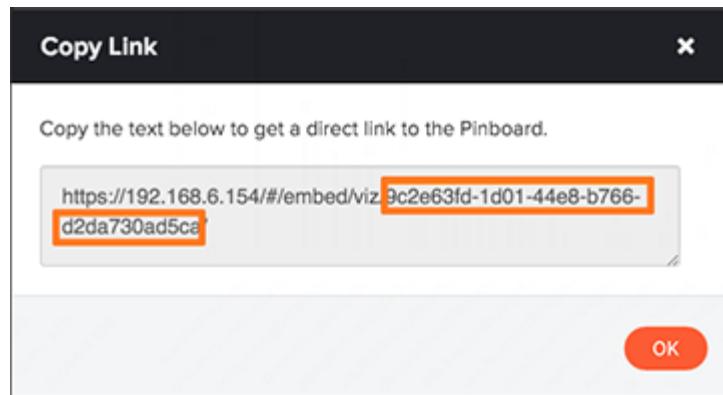
1. Click on Pinboards, on the top navigation bar.



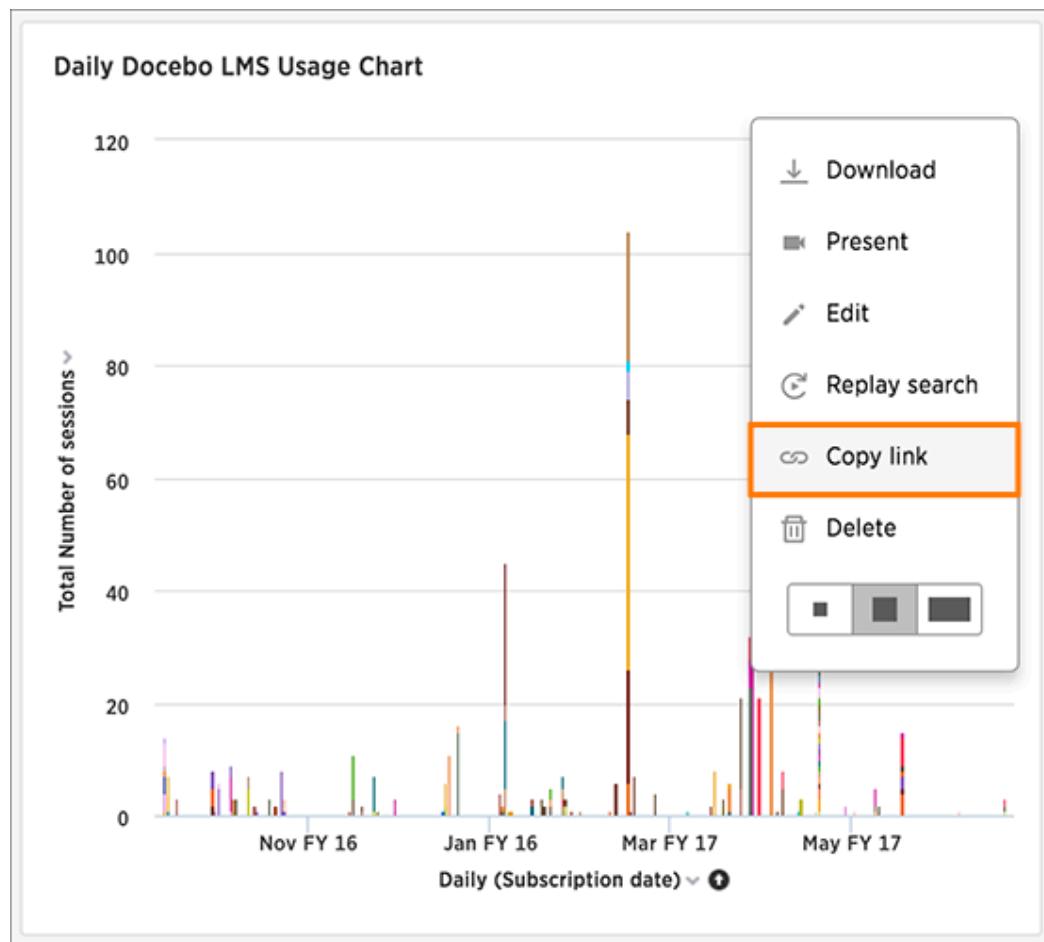
2. On the pinboard list page, click the pinboard you would like to get a link for.
3. Click Actions and select Copy link.



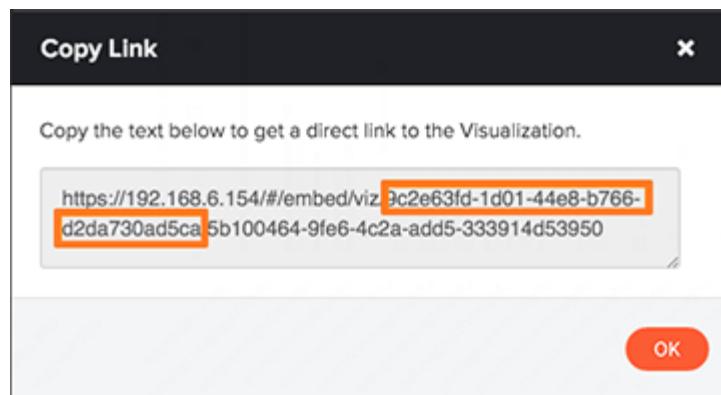
4. Copy the pinboard link. The highlighted portion is the pinboard ID.



5. To copy an individual visualization link, click **Copy link** under the dropdown menu of the visualization you would like to get a link for.



6. Copy the visualization link. The highlighted portion is the visualization ID.



# Reset a pinboard or visualization

You can undo your edits to a pinboard or visualization by resetting it

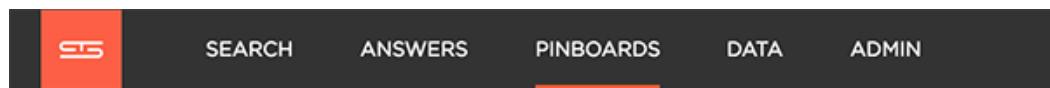
## Reset the layout of a pinboard

Reset the layout of a pinboard to undo your changes or have ThoughtSpot create a layout for you.

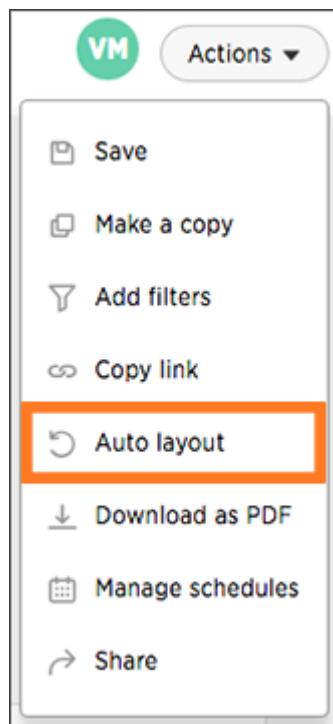
You can reset the layout of your pinboard if you would like to undo your edits or have ThoughtSpot optimize your layout space for you. This action will keep the sizes of your visualizations, but not the order.

To reset the layout of a pinboard:

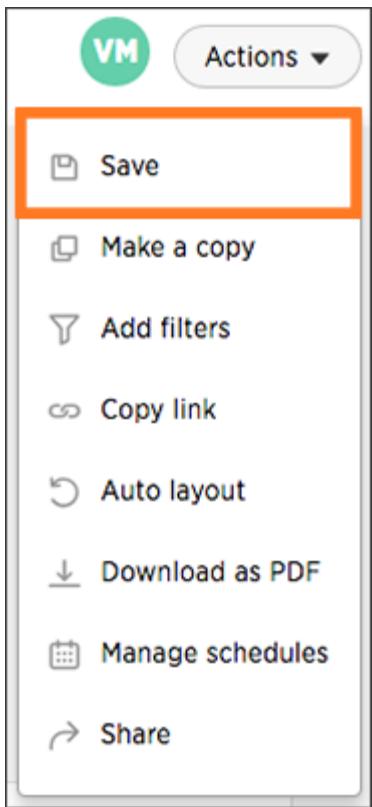
1. Click on Pinboards, on the top navigation bar.



2. On the pinboard list page, click the pinboard you would like to edit.
3. Click Actions and select Auto layout.



4. Save your pinboard by clicking Actions and Save.

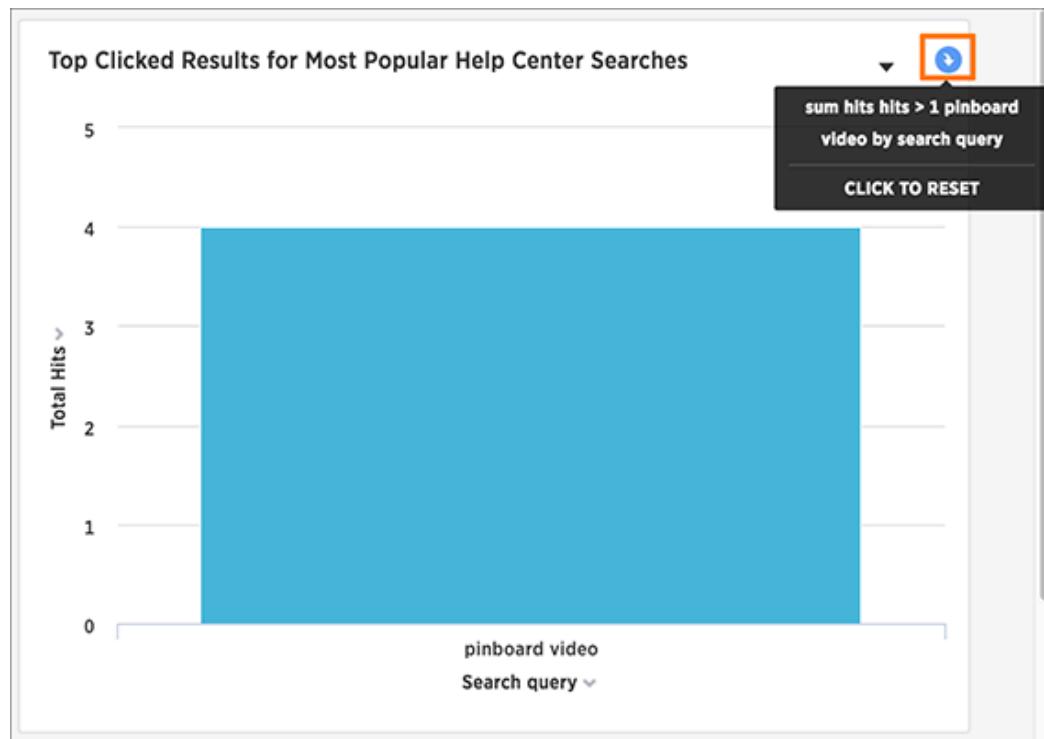


## Reset a visualization

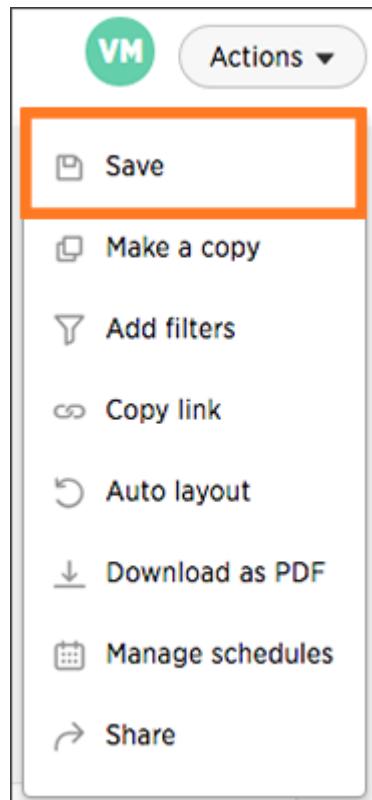
After performing ad hoc actions or edits to a visualization of your pinboard, you can reset the visualization to its original form.

To reset a visualization:

1. On an altered visualization, click the reset icon.



2. Save your pinboard by clicking Actions and Save.



# Start a slideshow

**Summary:** Displaying your pinboard as a slideshow is a good way to present its contents to others.

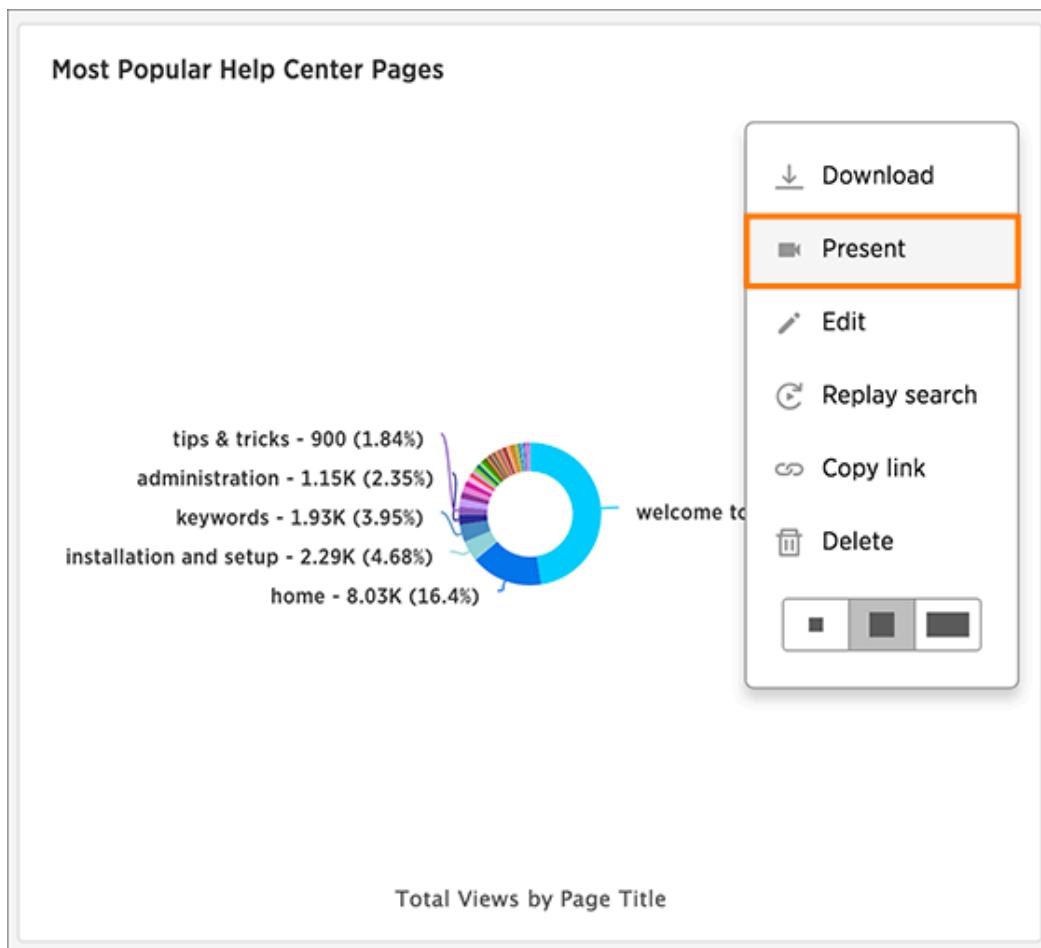
Presenting your pinboard displays your visualizations in order from left to right and top to bottom.

To start a slideshow:

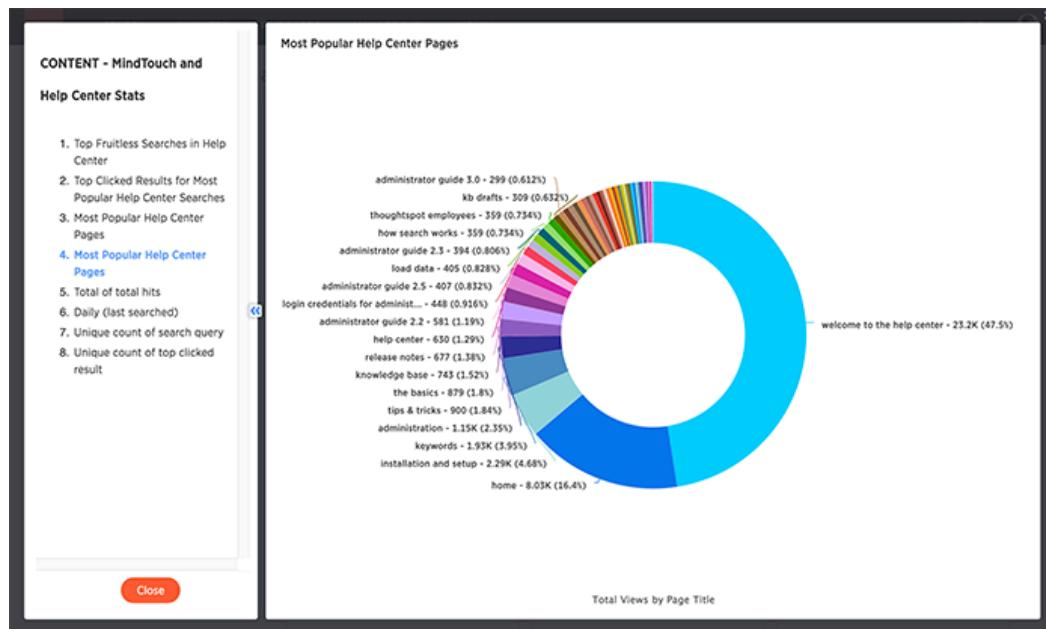
1. Click on Pinboards, on the top navigation bar.



2. On the pinboard list page, click the pinboard you would like to present.
3. Click Present under the dropdown menu of the visualization you would like to start the slideshow with.



4. Use the left and right arrow keys to navigate between your pinboard's visualizations.



5. Click the x at the top right of the screen or push the Esc key to exit the slideshow view.

# Understand data sources

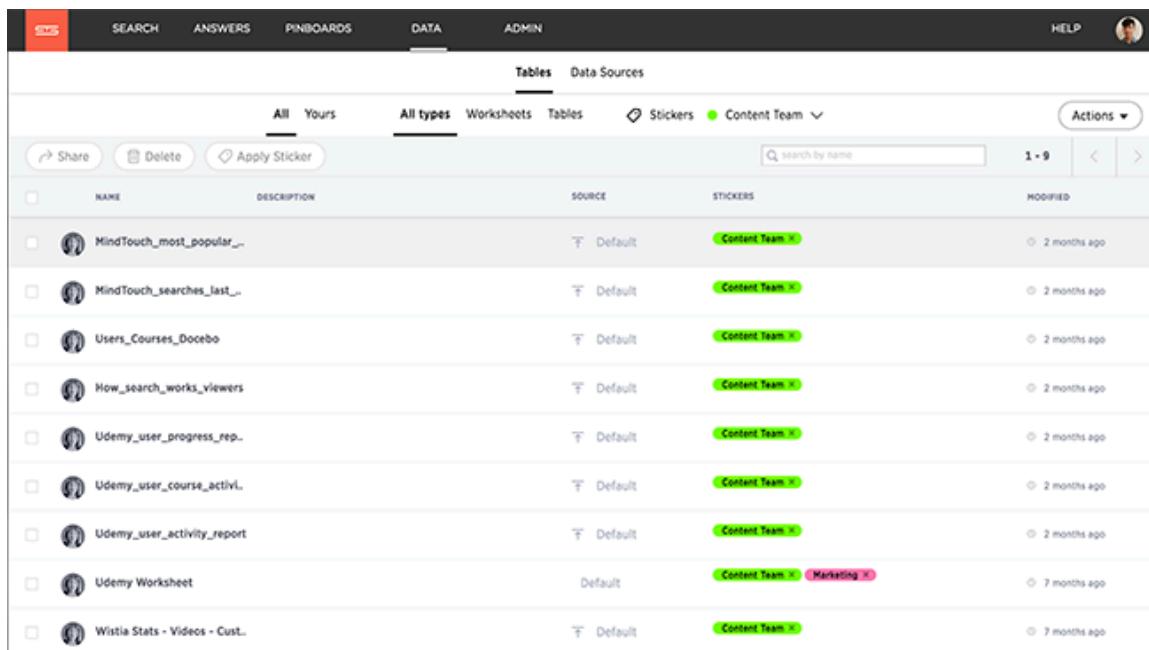
**Summary:** Use the DATA tab to manage data sources.

The DATA tab lists all of the tables and data sources available to you. There are three types of data sources that you may see in the data list. They are tables, worksheets, and user uploaded data. You will most likely only see worksheets and user uploaded sources. These are the most commonly used data sources for searching.

Name	Icon	Definition	Created By
Table	 Default	Raw tables loaded by an Administrator.	Administrators
Worksheet		Collection of related tables, optimized for searching. (Like a view).	Anyone
User Imported	 Imported	Table uploaded by a user through the Web browser.	Anyone

Clicking on the name of a table or data source shows you detailed information about it. You won't be able to change these settings or edit the table unless it was shared with you with the Edit privilege. To see how to edit a data source, refer to the *ThoughtSpot Administrator Guide*.

Use the filters at the top of the page to find the data you are interested in. From the DATA tab, you can also delete or apply stickers to tables and data sources in bulk by selecting them and clicking the appropriate action button.



The screenshot shows the ThoughtSpot interface with the 'DATA' tab selected. At the top, there are filters for 'All', 'Yours', 'All types', 'Worksheets', 'Tables', 'Stickers' (set to 'Content Team'), and a search bar. Below the filters is a table with columns: NAME, DESCRIPTION, SOURCE, STICKERS, and MODIFIED. The table lists several entries, each with a checkbox, a profile icon, and a table name. Most entries have 'Default' as the source and 'Content Team' as the sticker. One entry, 'Udemy Worksheet', has both 'Content Team' and 'Marketing' stickers. The last two entries have '7 months ago' as the modified date.

NAME	DESCRIPTION	SOURCE	STICKERS	MODIFIED
MindTouch_most_popular...		Default	Content Team	2 months ago
MindTouch_searches_last...		Default	Content Team	2 months ago
Users_Courses_Docebo		Default	Content Team	2 months ago
How_search_works_viewers		Default	Content Team	2 months ago
Udemy_user_progress_rep...		Default	Content Team	2 months ago
Udemy_user_course_activi...		Default	Content Team	2 months ago
Udemy_user_activity_report		Default	Content Team	2 months ago
Udemy Worksheet		Default	Content Team, Marketing	7 months ago
Wistia Stats - Videos - Cust...		Default	Content Team	7 months ago

## Related information

- [View your data profile \(page 179\)](#)  
Basic column data profile information is available under Profile on the Data page.
- [About sharing \(page 211\)](#)  
Whenever you are working in ThoughtSpot, you are in your own private environment until you share your work with others. This applies to searches, pinboards, and any data you upload.

# Create and load a CSV file

**Summary:** The simplest way to load data is to upload a CSV or Excel file from the ThoughtSpot Web interface.

Loading data through the Web browser is recommended for smaller tables (under 50MB) with simple relationships between them. This method is recommended for small, one time data loads. Using this method, the data schema is created for you automatically.

Any user who belongs to a group that has the privilege **Has administration privileges** or **Can upload user data** can upload their own data from the browser.

Your data should be in a CSV (comma separated values) before you load it. A CSV file is a text file made up of data fields separated by a delimiter and optionally enclosed with an enclosing character. If your data contains multiple tables, you'll have a separate CSV for each table.

## Create a CSV file

The first step in loading data is to obtain or create one or more CSV files that contain the data to be loaded into ThoughtSpot. CSV is a common format for transferring data between databases. ThoughtSpot requires this format.

Most applications such as Microsoft Excel or Google Sheets can output CSV formatted files. If your source is an Excel spreadsheet or Google Sheet:

1. Save, export, or download the file in CSV format. The exact procedure you use will depend on the source application.
2. Review the file's format before uploading it to ThoughtSpot.

Your source data may be in another database. If this is the case, your company's ETL (extract, transform, load) process will typically generate CSV files. If your source is another database:

3. Connect to the source database.
4. Extract each table you wish to import into ThoughtSpot as a CSV file.

The column delimiter should be a , (comma), | (pipe), or tab.

Large organizations typically have a data administrator or department that builds ETL processes. If the data you want is in another system, speak with your ThoughtSpot administrator about getting CSV files extracted from this system.

## Formatting the CSV

A CSV file contains a delimiter that marks the separation between fields in the data. The delimiter is usually comma, but it can be any character. The file also contains fields optionally enclosed with double quotes. Use these guidelines when creating the CSV file:

- If the CSV contains column headers, they must match the column names in the database exactly.
- Often a | (pipe) or tab is used as the delimiter, because it may be less likely to occur within the data values.
- When a field contains a double quote, it must be escaped with the character specified in the escape character argument in tsload.
- When a field contains the delimiter, the field must be enclosed in double quotes.

ThoughtSpot supports a wide range of [date and timestamp formats \(page 259\)](#) in the CSV file. Blank

values in user uploaded CSV files are interpreted as NULL values. These include the values (case insensitive):

- NULL
- \N
- NA
- N/A
- [space]

If you are appending data to an existing schema or table, columns in the CSV file must be in the same order as defined in the target table.

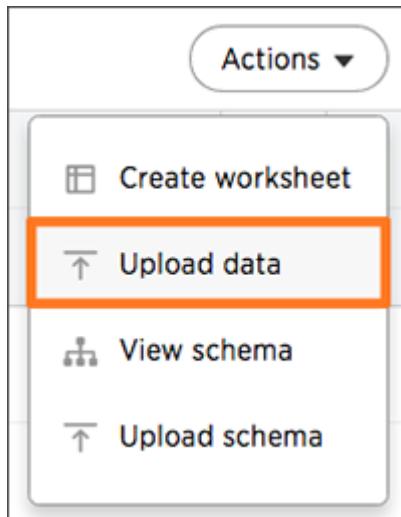
## Load the CSV File

Any user who belongs to a group that has the privilege **Has administration privileges** or **Can upload user data** can upload their own data from the browser. To load the CSV or Excel file into ThoughtSpot:

1. Log into ThoughtSpot from a browser.
2. Click on DATA, on the top navigation bar.



3. Click the Actions button in the upper right corner, and select Upload Data.



4. Upload the CSV or Excel file by doing one of these options:
  - a. Click on **Browse your files** and select the file.
  - b. Drag and drop the file into the drop area.
5. Answer the question **Are the column names already defined in the file header?**
6. Answer the question **Are the fields separated by?** Click **Next**.
7. Click on the column header names to change them to more useful names, if you'd like. Click **Next**.
8. Review the automatically generated data types for each column, and make any changes you want. There are four data types: Text, Integer, Decimal, and Date.
9. Click **Import**.

When an upload is complete, the system reports the results and offers you some further actions.

The screenshot shows the ThoughtSpot interface for uploading data. At the top, there's a navigation bar with links for Search, Answers, Pinboards, SpotIQ, Data, and a user icon. Below the navigation bar, the title "Upload your data" is displayed. A progress bar at the top indicates three steps: 1. Upload your file (highlighted in dark grey), 2. Set column names, and 3. Set column types. Step 1 has a large arrow pointing right. Step 2 and 3 are in light grey boxes. Below the progress bar is a dashed rectangular area where a CSV file can be uploaded. A file named "Warehouse\_and\_Retail\_Sales.csv" is shown being dropped into this area. A curved arrow points from the file name to the dashed area. At the bottom of the upload area, there are two questions: "Are the column names already defined in the file header?" with radio buttons for Yes and No, and "Are the fields separated by?" with radio buttons for Comma(,), Semicolon(;), Pipe(|), Space, and Tab. To the right of these questions are "Cancel" and "Next >" buttons.

- Click **Link to Existing Data** if you want to link the data you uploaded to the data in another table or worksheet.
- Click **Search** if you want to begin a new search.
- Click **Auto analyze** if you want to use the SpotIQ feature to find insights in your new data.

# Append data through the UI

**Summary:** Use append to add more data to an existing data source.

If you have permissions to upload data and permissions to a data source, you can add to that source by uploading more data with CSV file. You can append data to your existing system tables through the ThoughtSpot application, even if the tables were initially loaded using Data Connect or tsload. The CSV file must have the same structure as the table it is being loaded into, including number and type of columns, in the same order as the target table.

To append data into ThoughtSpot:

1. Log in to ThoughtSpot from a browser.
2. Click on **Data**, on the top navigation bar.



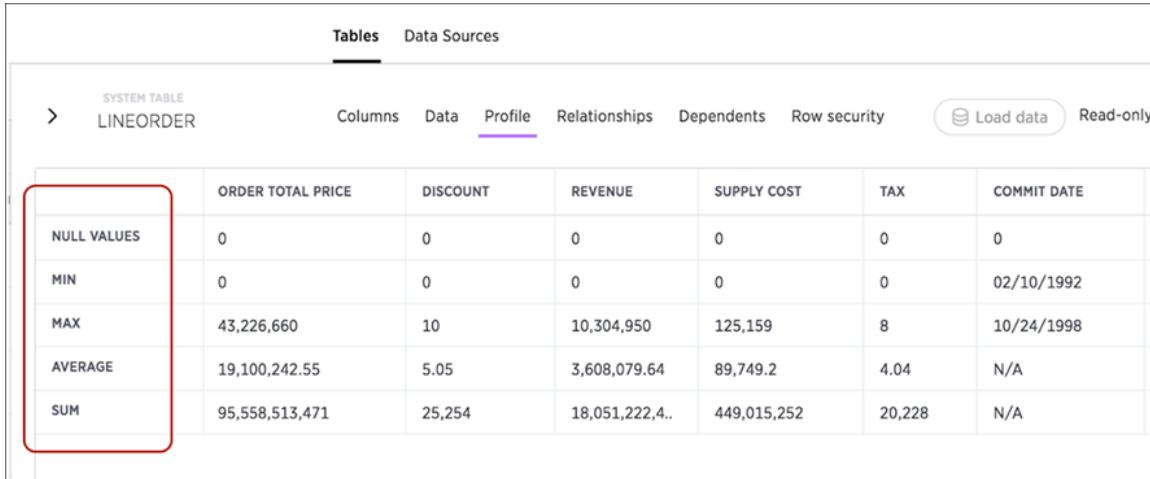
3. Click the on the table you would like to append data to.
4. Click the Load data button.

A screenshot of the ThoughtSpot table configuration interface. At the top, there's a breadcrumb trail showing 'IMPORTED > stackedexample'. Below this are tabs for 'Columns', 'Data', 'Relationships', 'Dependents', and 'Row security'. On the far right are two buttons: 'Load data' (which is highlighted with a red box) and 'Save'. The main area shows a table with three rows and seven columns. The columns are: COLUMN NAME, DESCRIPTION, DATA TYPE, COLUMN TYPE, ADDITIVE, AGGREGATION, and HIDDEN. The first row has 'Company' as the column name, 'Click to edit' as the description, 'VARCHAR' as the data type, 'ATTRIBUTE' as the column type, 'NO' as additive, 'NONE' as aggregation, and 'NO' as hidden. The second row has 'Number of emplo..' as the column name, 'Click to edit' as the description, 'INT64' as the data type, 'MEASURE' as the column type, 'YES' as additive, 'SUM' as aggregation, and 'NO' as hidden. The third row has 'Department' as the column name, 'Click to edit' as the description, 'VARCHAR' as the data type, 'ATTRIBUTE' as the column type, 'NO' as additive, 'NONE' as aggregation, and 'NO' as hidden.

5. Upload the CSV or Excel file by doing one of these options:
  - Click on **Browse your files** and select the file.
  - Drag and drop the file into the drop area.
6. Answer the question **Are the column names already defined in the file header?**
7. Answer the question **Do you want to append to the existing data or overwrite it?**
8. Answer the question **Are the fields separated by?** Click **Next**.
9. Click on the column header names to change them to more useful names, if you'd like. Click **Next**.
10. Review the automatically generated data types for each column, and make any changes you want. There are four data types: **Text**, **Integer**, **Decimal**, and **Date**.
11. Click **Import**.
12. Click **Link to Existing Data** if you want to link the data you uploaded to the data in another table or worksheet. Or click **Search** if you want to begin a new search.

# View a data profile

After you upload a CSV file, it is available as a table in ThoughtSpot. The **Profile** tab appears after you have selected a specific table from DATA.



	ORDER TOTAL PRICE	DISCOUNT	REVENUE	SUPPLY COST	TAX	COMMIT DATE
NULL VALUES	0	0	0	0	0	0
MIN	0	0	0	0	0	02/10/1992
MAX	43,226,660	10	10,304,950	125,159	8	10/24/1998
AVERAGE	19,100,242.55	5.05	3,608,079.64	89,749.2	4.04	N/A
SUM	95,558,513,471	25,254	18,051,222,4..	449,015,252	20,228	N/A

The data profile includes null values, min, max, average, and sum information for each table column. This **Profile** view should help you get a better sense of what's there before searching on the data.

# What is SpotIQ?

SpotIQ is a ThoughtSpot feature that helps you find insights into your data. Insights are trends, correlations, explanations of increases, explanations of decreases, and outliers (values unique from what is typical in your data).

Using SpotIQ, you can find interesting answers in your data that you might not have found on your own. SpotIQ also learns from your responses to your insights. Meaning, how you interact with SpotIQ results helps to build better results.

## Who can use SpotIQ?

The SpotIQ feature is made for users who are not data magicians; however, data magicians can use it to do power data magic. This means SpotIQ is for everyone.

If you can see the SpotIQ on your ThoughtSpot dashboard, you have access to SpotIQ:



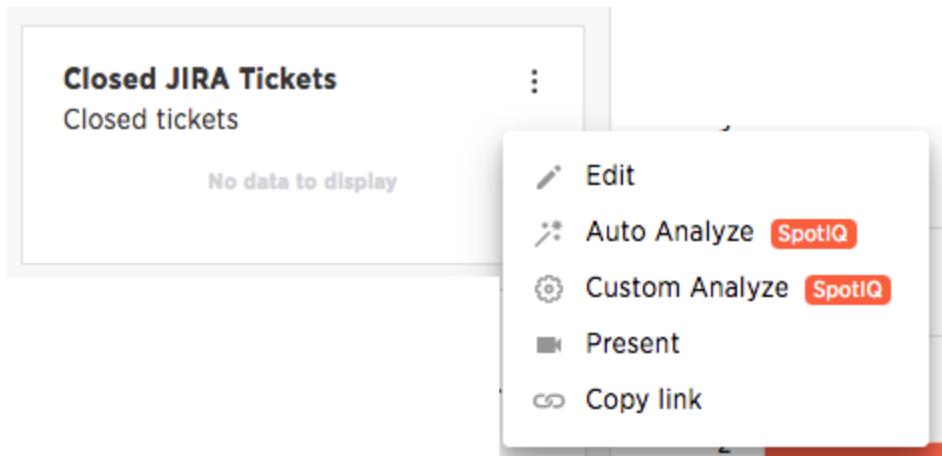
If you can't see this option, ask your ThoughtSpot Administrator to give you the **Has Spot IQ** privileges.

## Where to find SpotIQ actions

The SpotIQ page shows you all the analysis results in the system you have access to, these results are called SpotIQ *insights*. You can create your own results from several different locations in your system:

- search results such as query, saved answer, or visualization.
- tables or worksheets
- data uploads
- SpotIQ insights

The menu items that use SpotIQ have a lozenge that indicates this:



## How do you use SpotIQ?

The best way to learn how to use SpotIQ is to try it for yourself. The [SpotIQ 101 tutorial \(page 182\)](#) walks you through a simple example.

# SpotIQ 101: Load and analyze data

This 101 walks you through a few simple, SpotIQ workflows. When you have completed the walk through you will be able to use the core features of SpotIQ in your ThoughtSpot installation.

If you want a detailed overview of what SpotIQ does before you try it out, first [read the introduction to SpotIQ \(page 180\)](#).

## Prerequisites

Before you begin, make sure you can login into ThoughtSpot application. To complete this tutorial, you need the ability to Log in into ThoughtSpot Ability to upload a CSV file. You also need the ability to use the SpotIQ application. These features require that your user account must have the following privileges:

- Can upload user data
- Has Spot IQ privilege

Your ThoughtSpot administrator can give you these privileges. If you can see the SpotIQ option on your ThoughtSpot dashboard, you have access to SpotIQ:



## Get the sample data and some insights

You can use SpotIQ with any of the data in your system.

This tutorial uses a dataset containing a list of sales and movement data by item and department.

1. Download the [FoodDollarDataReal \(page 0\)](#) CSV file.
2. Save or move the file to a place on your local drive..

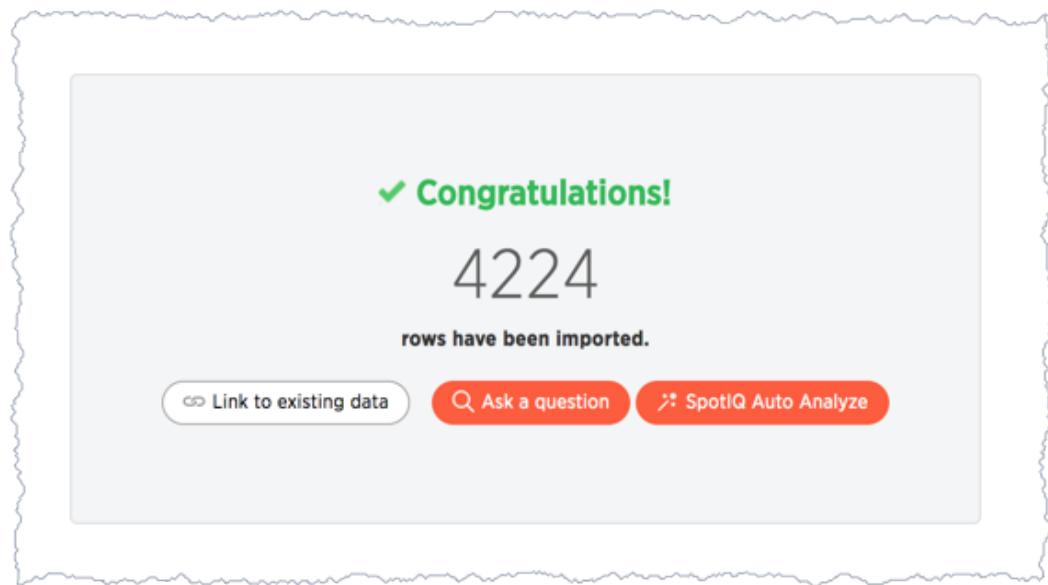
## Upload the data

1. If you haven't, log into the ThoughtSpot application.
2. Click the DATA tab and choose Actions > Upload Data.
3. Browse to the sample data file you downloaded or drag the file into the upload area.
4. Choose YES for the Are the column names already defined in the file header setting.
5. Choose Comma for the Are the files separated by? setting.

The screenshot shows the first step of the data upload process. A large dashed box is provided for file upload, with a green arrow pointing from a 'FoodDollarDataReal.csv' file icon towards it. Below the box, two questions are asked: 'Are the column names already defined in the file header?' (with 'Yes' selected) and 'Are the fields separated by?' (with 'Comma(,)'). At the bottom right are 'Cancel' and 'Next >' buttons.

6. Click Next for the Set column names page.
7. Set the ITEM CODE column to TEXT on the Set column types page.
8. Click Upload.

The system presents you with a few choices.



9. Choose SpotIQ Auto Analyze to build SpotIQ insights.

Building insights can take time. How long depends on the data you are analyzing. The ThoughtSpot application displays an informational message. The message disappears after a moment.



## Work with the INSIGHTS list

Each time SpotIQ does an analysis, it generates a set of results. ThoughtSpots keeps the results until the user that requested the analysis (or an admin), deletes them. You can run SpotIQ on the same object multiple times. Each analysis generates new results.

1. To check for the results of your analysis, select the SpotIQ page.

The SpotIQ page allows you to see all results with data you have permission for. So the results lists shows All results or just Yours.

2. Select Yours.

NAME	DESCRIPTION	STICKERS	MODIFIED
FoodDollarDataReal	Table analysis, done at 17 October 2017 13:41		13 minutes ago
NominalData	Table analysis, done at 17 October 2017 13:26		28 minutes ago
Warehouse_and_Retail_Sales	Table analysis, done at 16 October 2017 18:29		3 hours ago

3. Look for results from your FoodDollarDataReal data.

SpotIQ labels each result with a NAME, DESCRIPTION, STICKERS, and MODIFIED. The NAME comes from the object that was analyzed which is referenced again in the DESCRIPTION. The combination of NAME, DESCRIPTION, and MODIFIED is unique.

4. Take a minute and review the DESCRIPTION and MODIFIED time.

Not every SpotIQ analysis creates results. You can see information about each analysis as well as the results.

5. Select the analyzes link at the top of the page.

Check the STATUS and also how long the RESULT took to generate. Since you got results, you can see that the analysis succeeded.

6. Select the Analysis for FoodDollarDataReal and choose Delete.

The information disappears from the analyzes list.

7. Choose Results.

You should still see your Warehouse\_and\_Retail\_Sales run. Deleting information about an analysis run does not delete the actual results. You must delete each individually.

## Where to go next

At this point, you've created a set of insights using SpotIQ, in the next section you [Review insights \(page 186\)](#) you created.

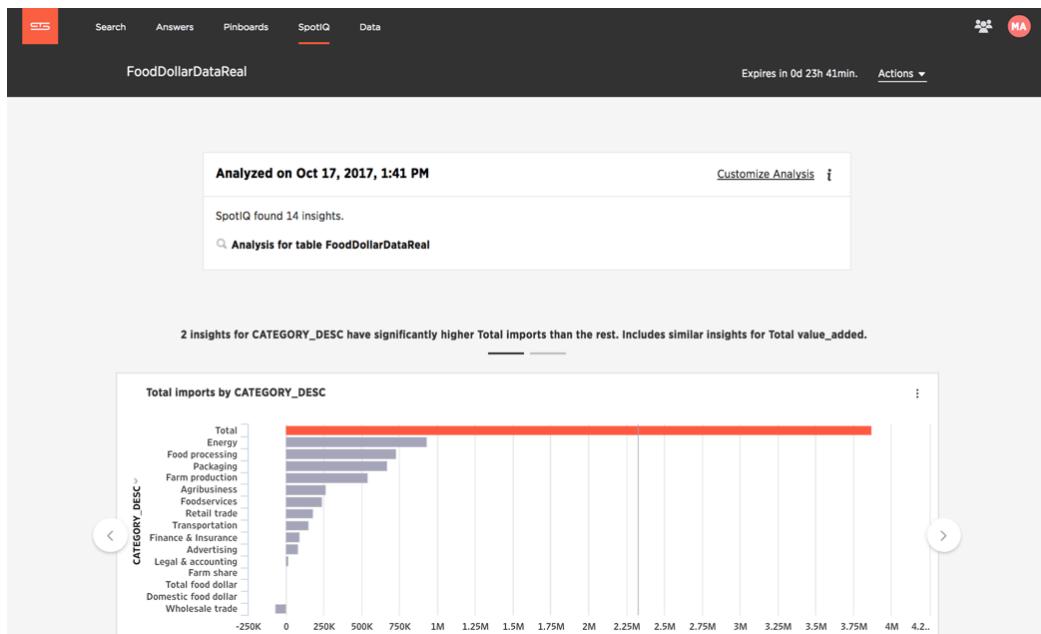
# 101: Do more with SpotIQ

At this point, you have done [the first set of SpotIQ tutorial tasks \(page 0\)](#), you've uploaded some data and run your first SpotIQ analysis. You should be able to look at the INSIGHT list and see when your analysis ran. This is important knowledge because data changes, you'll want to run multiple analyzes on the same data.

In this section, you look at the results and see what insights SpotIQ discovered. You'll learn about the basic types of analysis SpotIQ runs on data.

## View results of an analysis

1. If you haven't, log into the ThoughtSpot application.
2. Select the INSIGHTS > Results page.
3. Look for results from your FoodDollarDataReal analysis and click on the NAME. The application opens the SpotIQ insights.



The first panel provides information about the analysis.

4. Click on the small *i* to see a summary of the SpotIQ analysis.

Analyzed on Oct 17, 2017, 1:41 PM

Customize Analysis i

**Analysis details** [CLOSE](#)

SpotIQ performed 20 drills and discovered 14 insights.

**Showing 1 out of 1 insights.**

```
# table_num      a year
FoodDollarDataReal    FoodDollarDataReal
```

**No insights discovered.**

```
# table_num      a units
FoodDollarDataReal    FoodDollarDataReal
```

**No insights discovered.**

```
# table_num      a table_name
FoodDollarDataReal    FoodDollarDataReal
```

**No insights discovered.**

**Imports by CATEGORY\_DESC**

Total  
Energy  
Food processing  
Packaging  
Manufacturing  
Agribusiness  
Food services

The screenshot shows the ThoughtSpot interface with an analysis details panel open. The panel title is "Analyzed on Oct 17, 2017, 1:41 PM" and "Customize Analysis". It displays the message "SpotIQ found 14 insights." and a specific insight for the table "FoodDollarDataReal". The insight states: "2 insights for CATEGORY\_DESC have significantly higher Total imports than the rest". Below this, there is a bar chart titled "Imports by CATEGORY\_DESC" showing imports for various categories. The categories listed on the left are Total, Energy, Food processing, Packaging, Manufacturing, Agribusiness, and Food services. The bars represent the total imports for each category. A red arrow points to the expiration date "Expires in 0d 23h 41min." in the bottom right corner of the panel.

You can tell that SpotIQ ran through 20 combinations and discovered 14 insights. The first looked for an insight in a combination of the `table_num` and `year` columns in the `FoodDollarDataReal` data and discovered one insight. The next two column combination `table_num` and `units` did not reveal any insights.

5. Close the details panel and look at the corresponding insight SpotIQ produced.

You can see that SpotIQ found three sets of insights:

- 2 insights for `CATEGORY_DESC` have significantly higher Total imports than the rest. Includes similar insights for `Total value_added`.
- Insights from Cross Correlation Analysis.
- Insights from Trend Analysis.

There is a reason there are three sets. You'll learn the answer to that later.

## Time and your insight data

You'll notice that when you first look at an insight there is an expiration date in the upper right corner:

Expires in 0d 23h 41min. [Actions ▾](#)

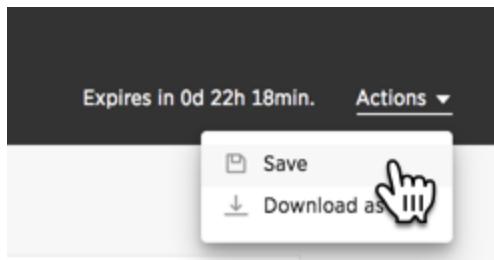
A red arrow points to the expiration date "Expires in 0d 23h 41min." in the bottom right corner of the insight card.

If the expiration time elapses, ThoughtSpot automatically removes the reports.

Insights also take space in the ThoughtSpot installation. A lot of people creating insights can add up to a lot of data lying around. Just as water rising in a bath tub can overflow or just cause a problem you have to wade through, too much data can create a lot of old reports to sift through.

Another reason to expire an insight is time. Typically, business data is changing every day if not more frequently. Any particular set of insights are valid for data during a specific period of time. This doesn't mean old insights can't provide information you can use, just that you are unlikely to get the same insight twice.

If a set of insights look good, you can **Save** them and they are not removed when they expire. Do this now, click **Actions > Save** from the menu:



Now your insights won't expire as you work with them!

## Data outliers

SpotIQ attempts to look for three central insights. The first insight it looks for are data outliers. An outlier is a value that is "far away" or that differs from the other data.

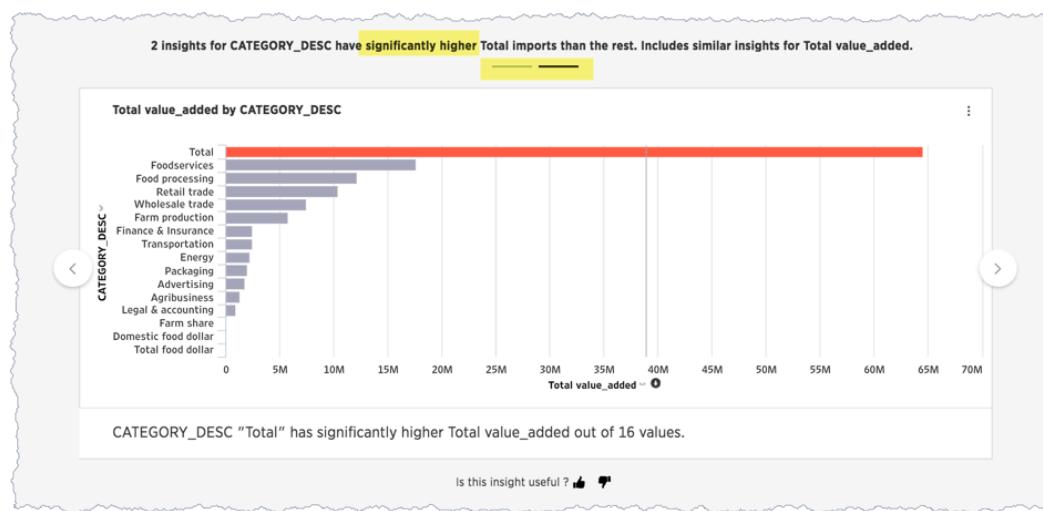
Outliers can result from measurement or recording errors or they could contain valuable information. For example, one store might sell significantly more towels in one week out of the year because there was a flood that week.

1. Scroll to the first carousel of data that SpotIQ created for you.

A carousel groups a set of visualizations on a page. You can use the arrows attached to a carousel to "page" through its contents.

2. Count the number of items in the carousel.

You should see that SpotIQ found two outliers.



In this case, SpotIQ is indicating that the **Total Imports** value is significantly higher than the other values in your set.

Two facts about this outlier shouldn't surprise you. The first fact is that a total exceeds all the other items in the data. That just makes sense so this isn't a true outlier.

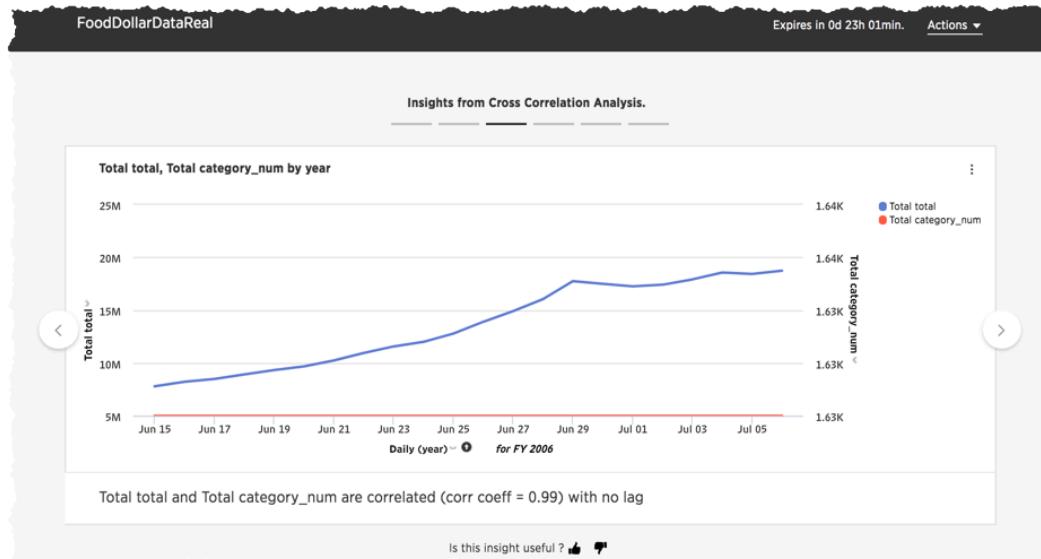
The second fact is that SpotIQ insights are not always interesting. In this case the data included totals in the row data which caused nonsense outliers. You can use SpotIQ to fix this issue and go further. More about this later in the tutorial.

# Looking for relationships (cross-correlation analysis)

The second category of insights SpotIQ attempts to find is cross-correlations. Cross-correlation looks for and measures relationships between two quantitative, continuous information sets – in our case two fields (columns) in our dataset. Usually, you'll see a cross-correlation in your insights if your data includes time or date data.

The result of a correlation analysis shows how strong and in what direction a relationship between two data sets moves. The range is -1 to 1, the closer the cross-correlation value is to 1, the more closely the information fields (data elements) are correlated.

1. Scroll down your insight page, till you find the correlation results:
2. Page through the correlation category to the third insight:



You can see that the overall total and the total category number values correlate very strongly. The correlation also looks for a *lag* value.

*In the business world the dependence of a variable Y (the dependent variable) on another variable X (the explanatory variable) is rarely instantaneous. Often, Y responds to X after a certain lapse of time. Such a lapse of time is called a lag. [Good Data Help](#).*

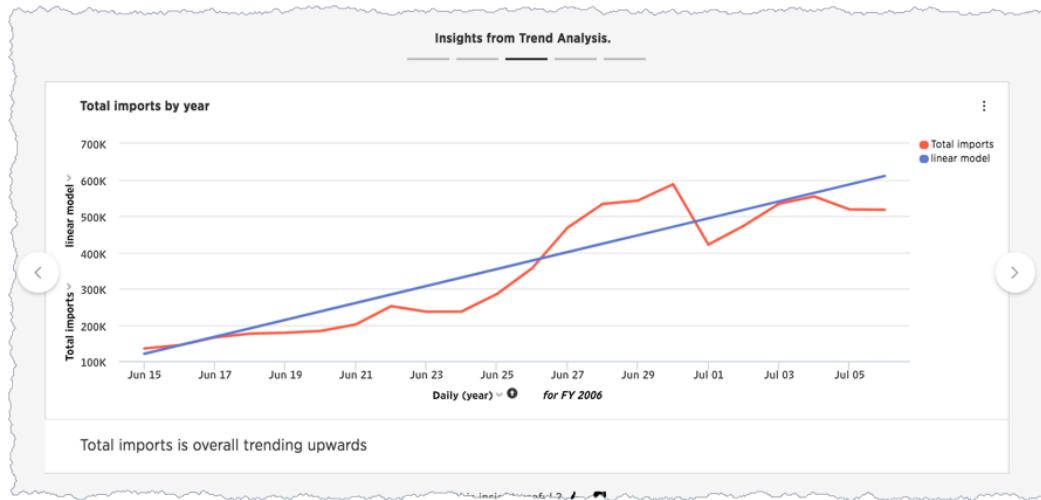
## Trends over time

The third set of insights SpotIQ looks for is a trendline. A trendline is a straight or curved line that indicates the general pattern or direction of a time series data (information in sequence over time). As you may have guessed, trendlines rely on your data having a date or time column.

You can use a trendline to determine the general direction of a trend in your data. Are sales climbing or are customers declining over time?

1. Scroll down to the Insights from Trend Analysis section.

2. Look for the Total imports by year result.



At this point, you may have noticed that SpotIQ grouped each type of insights. Outliers, correlations, and this last one, trendlines. This grouping makes it easier to locate and review similar types of insights.

## Where to go next

In this section, you explored some of the functionality of the **SpotIQ** page. You learned that SpotIQ combines columns in your data to look for three categories of insights:

- outliers
- cross-correlations
- trendlines

In [the next section \(page 191\)](#), you'll learn how to schedule SpotIQ to deliver insights on a regular basis.

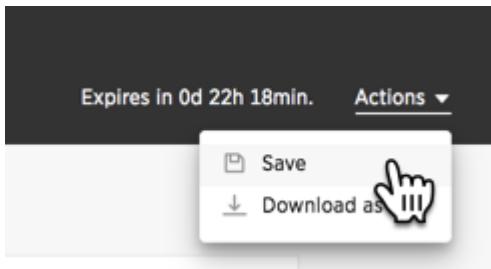
# SpotIQ 101: Review insights

You've finished the [second part of the tutorial \(page 186\)](#). In this, the third and final part, you'll learn how you can modify a SpotIQ analysis to extend or customize the analysis. You'll edit an insight to customize the chart it uses or modify the Search syntax behind it.

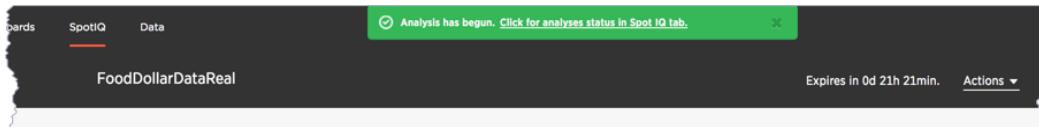
## Customize an analysis

In the second part of the tutorial, you reviewed the first output from SpotIQ. The outlier insights weren't really that useful. Let's try to dig deeper into that.

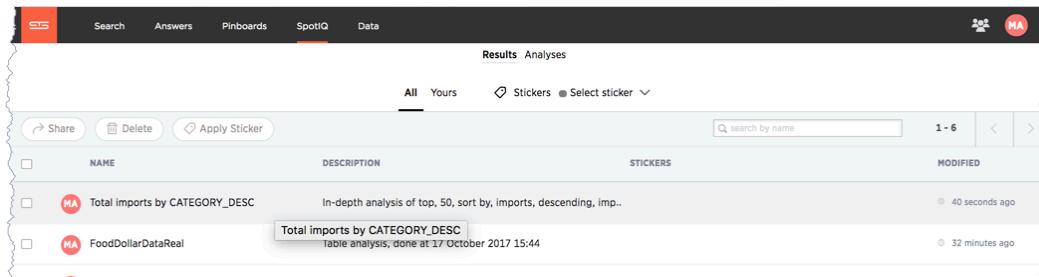
1. Scroll down to the outlier section.
2. Select the first insight.
3. Choose the menu and select Auto Analyze.



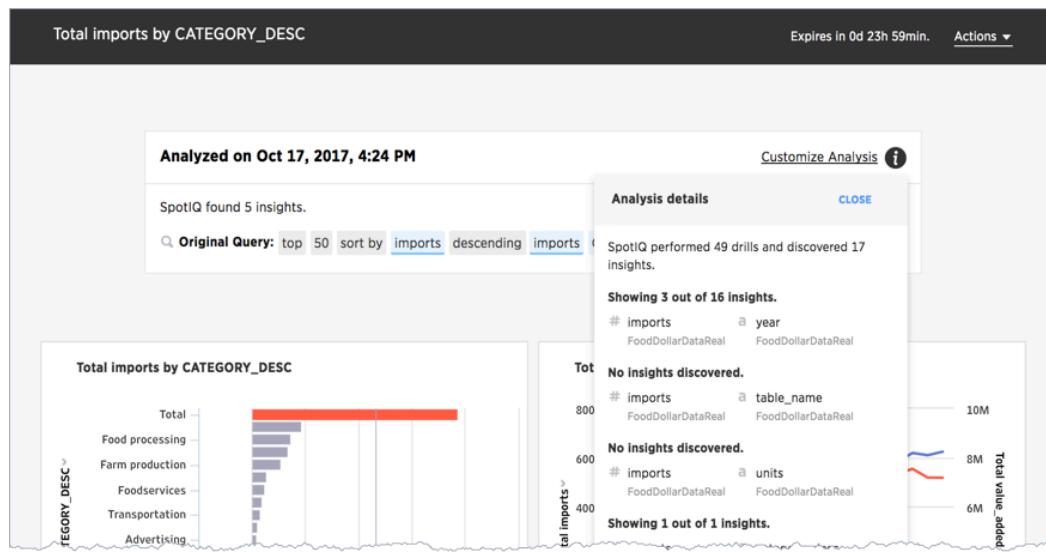
The system responds by starting a new insight run based on the single chart. Each time you request a change to the analysis settings, it starts another run.



4. Return to the SpotIQ page and select your new analysis.



5. Open the analysis and review the analysis details.



If you recall, the first run against this data SpotIQ ran through 20 combinations and discovered 14 insights. In this second run against one table, SpotIQ ran 49 combinations and developed 17 insights. Only 4 insights were discovered.

Running SpotIQ again does not necessarily result in fewer runs or even, as in this case a reduced number of insights. It changes the analysis though, by selecting the single insight from your first run, you gave SpotIQ information it could use to focus the next run.

Continue with the customization.

6. Choose Customize Analysis.

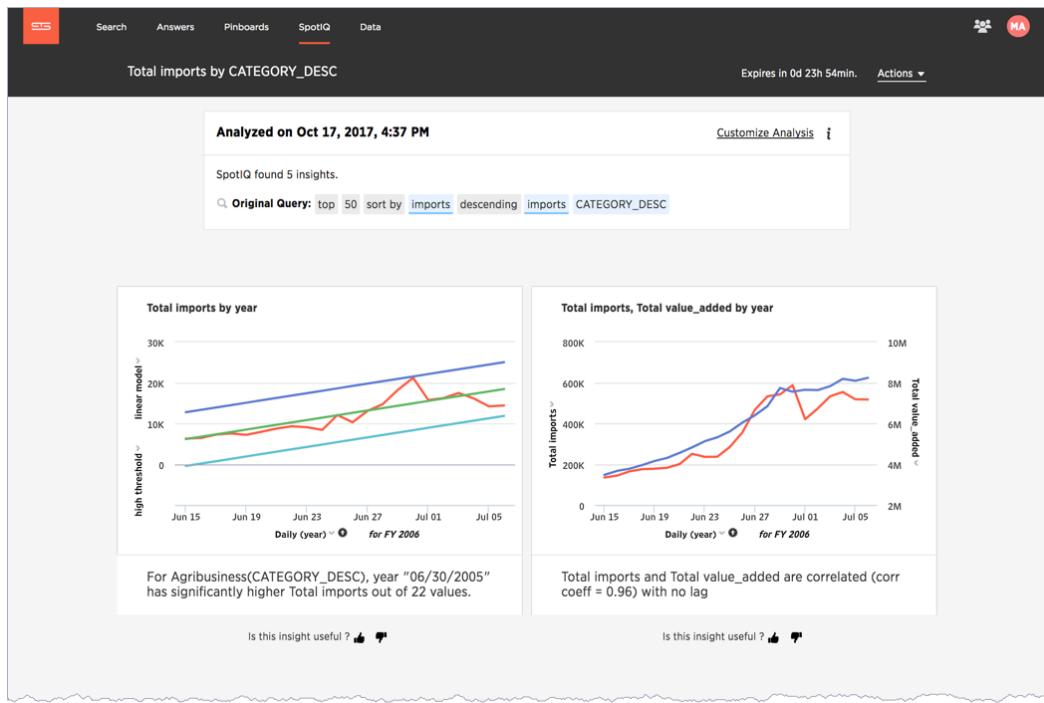
The Customize Analysis dialog appears.

7. Select the Customize algorithms tab.
8. Uncheck the Outlier Detection using Z-Score option.
9. Click Trigger Analysis.

SpotIQ starts a new analysis.

10. Open the new analysis from the SpotIQ page.

You'll find that the new analysis has the same name as the last one you ran. The new results include an outlier and a cross-correlation. You'll discover with these new charts a definite outlier 6/30/2005.



## Modify an insight search and visualization

The lines used in the cross-correlation are somewhat ambiguous. A different visualization may help in this case. You can also modify the charts you see in your results. Try this now.

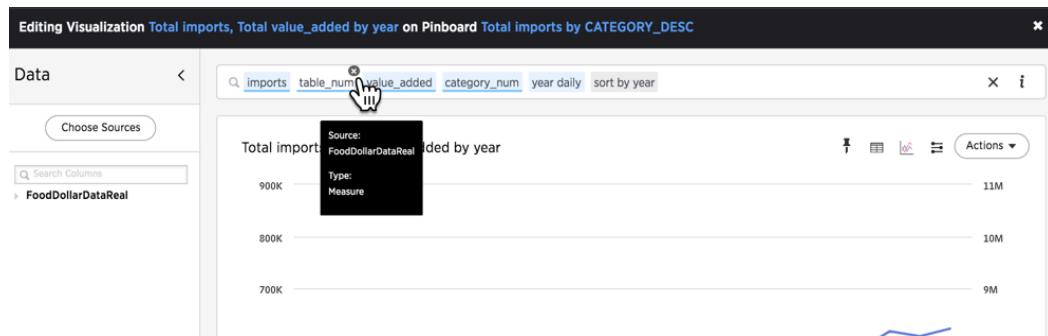
1. Select the menu on the Total imports, Total value\_added by year chart.
2. Click on the chart menu and choose Edit.



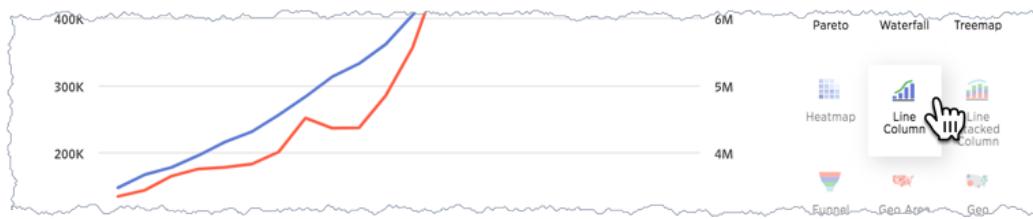
The Edit Visualization appears. The layout is familiar to any user that has run a ThoughtSpot search or worked with a result. This dialog reveals the **Search syntax** used to generate the insight. You can use this dialog to do all the things you would normally do with a search.

3. Edit the search bar and remove `table_num` from the search.

The `table_num` isn't strictly necessary in the data.



4. Select the chart icon and choose Line Column to change the visualization.



5. Choose Actions > Update.
6. Close the dialog by pressing the X.

The chart with your changes now appears in the SpotIQ list. The outlier stands out very clearly now in both charts.



## Present your insights

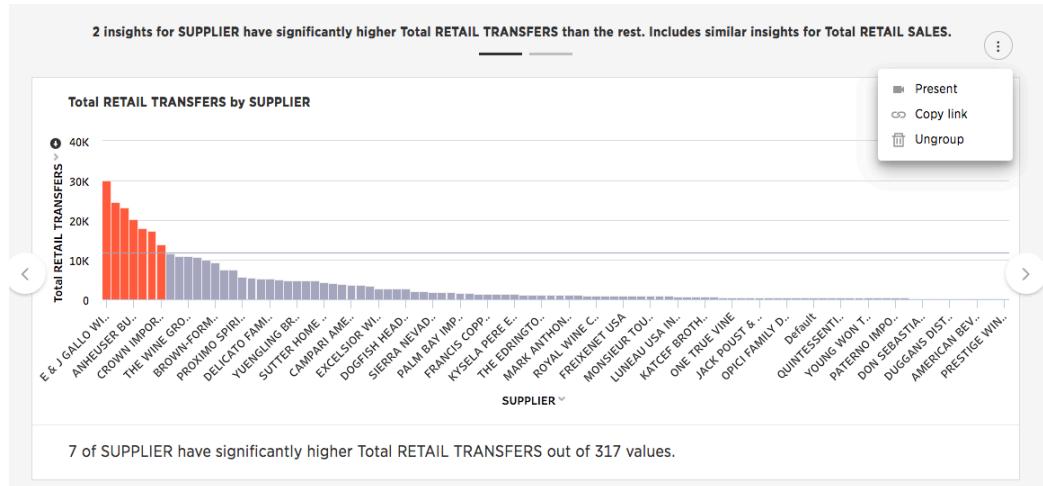
You can present SpotIQ insights in several ways. You can present an individual result or all of them at once. You can package all the insights in a PDF. This is useful for passing a packet of results. Because any insight is an insight into data at a specific point in time, you should always consider saving the insight as a PDF.

1. Locate the Actions menu on the corner of the SpotIQ page.
2. Choose Actions > Download as PDF from the menu.

The system downloads a file containing all the insights. Keep in mind this file can be very large if there are a lot of insights found in your data.

You can use the Present action to view visualizations that appear in a carousel. These can be presented as a group. Present is the best way to do this, so do the following:

1. Scroll down to your first carousel with your new charts.
2. Roll over the right corner of the menu to reveal the menu.



- Choose Present from the menu.

Each individual chart has a Download, Present, or Copy link action you can also take.

## Schedule a recurring analysis

If you find an analysis configuration that is useful. You can run that configuration periodically. This is a good thing to do of course as, in a business, data changes all the time.

- Go to the SpotIQ page.
- Choose the Analysis tab.

NAME	STATUS	MODIFIED	RESULT
<input checked="" type="checkbox"/> MA Analysis for Total imports by CATEGORY_DESC...	✓ Done	32 minutes ago	Last run succeeded in 10.00 seconds. <a href="#">View Results</a>
<input type="checkbox"/> MA Analysis for Total imports by CATEGORY_DESC...	✓ Done	45 minutes ago	Last run succeeded in 5.00 seconds. <a href="#">View Results</a>
<input type="checkbox"/> MA Analysis for table FoodDollarDataReal	✓ Done	45 minutes ago	Last run succeeded in 10.00 seconds. <a href="#">View Results</a>

- Click on the latest Total imports by CATEGORY\_DESC analysis.

The Customize Analysis dialog appears.

The screenshot shows the ThoughtSpot interface with a dark header bar containing the logo, 'Search', 'Answers', 'Pinboards', 'SpotIQ', and 'Data'. Below the header is a modal window titled 'Customize Analysis' with a sub-header 'Job Runs Job Schedule Customize'. The main content area displays a table with one row of data:

STARTED AT	ENDED AT	STATUS	RESULT
33 minutes ago	33 minutes ago	Success	<a href="#">View Results</a>

A search bar at the top right of the modal contains the placeholder 'search by name'.

4. Choose the Job Schedule option.
5. Fill out the schedule to run the job Monthly.

The screenshot shows the 'Customize Analysis' dialog with the 'Job Schedule' tab selected. The configuration form includes fields for 'Repeats' (set to 'Monthly'), 'Run the task on' (set to '1 of every month'), and 'at' (set to '00 : 00'). At the bottom are 'Cancel' and 'Schedule' buttons, with 'Schedule' being highlighted.

Every month SpotIQ will update your analysis with new data.

Keep in mind that SpotIQ jobs take resources in your system. So, you really don't want to leave casual jobs running in the system. Go ahead and delete this latest job. Now that you know how to schedule a job, it isn't needed anymore.

1. Check the job you just scheduled.
2. Click Delete to remove it.

## Congratulations!

Congratulations, at this point you've learned the basics of SpotIQ with ThoughtSpot. Throughout the application, you'll find the SpotIQ icon on search answers, pinboards, visualizations, and data. Wherever you see this option, you can end up on the SpotIQ page, refining your analysis and discovering new insights into your business.

# Best SpotIQ Practices

The SpotIQ feature works without you having to do anything but pushing a button. However, like any other feature, there things you can do to optimize the feature. This page contains some best practices you can use to make SpotIQ more effective when you use it.

## When to invoke SpotIQ

If you followed the tutorial, you know that right after uploading data is a good time to run **Auto Analyze**. SpotIQ can very quickly help you find insights in your data.

Start from a **Search**. Enter a single measure in the bar; one you want to explore of course! Then, choose **Actions > Auto Analyze** on the results. Choosing the single measure focuses SpotIQ.

Use **Custom Analyze** to focus or tweak the SpotIQ results. While you are tempted to keep all the columns, eliminating some can also result in a better analysis.

## Do your data modeling

You can increase the SpotIQ's effectiveness by ensuring you are practicing good data modeling. This is true if you are user uploading the occasional data file or a data management professional. Modeling data requires that you can:

1. Click on the **DATA** icon, to get to the data management listing.
2. Click on a data source you own or can edit. This brings up the **Columns** screen, where you'll make your modeling settings.
3. Modify one or more column settings.
4. Save your changes.

If you worked through the SpotIQ tutorial, you can try experiment on the **FoodDollarDataReal** data you uploaded.

Make sure you set the [INDEX PRIORITY \(page 0\)](#) for columns in your data source. Use a value between 8-10 for important columns to improve their search ranking. Use 1-3 for low priority columns. INDEX PRIORITY impacts user-based ranking which helps SpotIQ focus its analysis.

SpotIQ uses measures for correlations. For trendlines and outliers, if SpotIQ has a measure, it then drills by attributes in turn.

**ATTRIBUTE** = text or dates that you can't sum  
**MEASURE** = values you can do math on, with a meaningful result

**Attributes**

- \* Fruit
- \* Grocery
- \* Macintosh

**Measures**

- \* Price
- \* Age
- \* Weight

**What about?**  
A style number or product ID.



You should also set AGGREGATION on your columns. SpotIQ applies the default aggregations from your data when it pulls measures for analysis.

## Situations to avoid

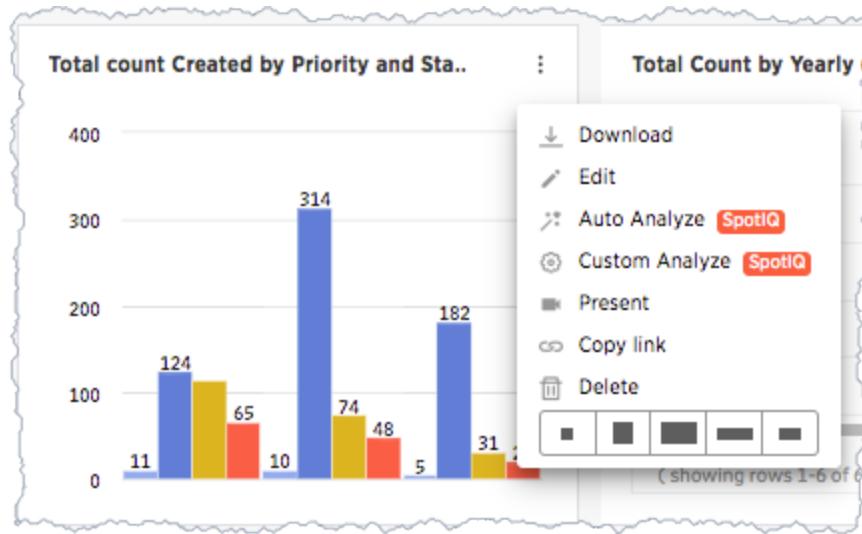
Like any AI, some situations SpotIQ is not yet equipped to handle. You should know what these are so you can avoid them. If your data contains a measure that uses a MOVING\_\* or GROUP\_\* formula, SpotIQ may return results that simply aren't meaningful. When doing a correlation analysis, SpotIQ may not find meaningful data if you have a measure with anything other than SUM.

# Custom SpotIQ analysis

Everywhere in ThoughtSpot where you can Auto Analyze with ThoughtSpot, you can also configure a customized SpotIQ analysis. The customized analysis can be a one-time customization or can apply to all future analysis of that particular data source.

## Finding customization controls

Every menu or location where you can Auto Analyze with ThoughtSpot, you can also choose Custom Analyze. It looks like this:



Regardless of where you are in the ThoughtSpot UI, the SpotIQ Customize Analysis dialog has the same layout. The columns, of course, are specific to the data you launched the dialog from.

---

This dialog has three tabs, Included columns, Excluded columns , and Customize Algorithms. The Customize Algorithms is by far the most advanced panel.

## Customize Analysis

Included columns Excluded columns Customize algorithms

### Select Algorithms

Outlier Detection using Z-Scores  
 Outlier Detection using Linear Regression  
 Trend Analysis  
 Cross-Correlation Analysis

### Refine Parameters

Minimum rows required for analysis

Multiplier for Outlier Detection

Maximum P-Value

Minimum Correlation Coefficient

Maximum Correlation Lag

Restrict analysis to current resultset only  
 Exclude null values from current analysis

Insight Count Settings

**Trigger Analysis**

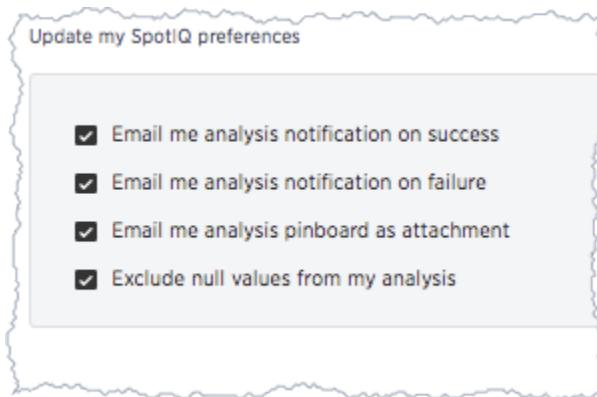
The SpotIQ insights page has an option for this dialog and also an option to customize a single analysis.

The screenshot shows the ThoughtSpot interface with the following elements:

- Customize Analysis Dialog:** A modal window titled "Customize Analysis" is open. It contains a list of columns under "Included columns for SpotIQ analysis" and a list of columns under "Excluded columns". A blue arrow points from the "Customize Analysis" button in the main interface to this dialog.
- Analysis View:** In the background, there's a bar chart titled "Total imports by CATEGORY\_DESC". The Y-axis is labeled "CATEGORY\_DESC" and includes categories like Food processing, Packaging, Farm production, Agribusiness, Foodservices, Retail trade, Transportation, Finance & Insurance, Advertising, Legal & accounting, Farm share, Total food dollar, Domestic food dollar, and Wholesale trade. The X-axis shows values in thousands of dollars, ranging from -250K to 1M. A blue arrow points from the "Trigger Analysis" button in the main interface to this view.
- Improve Analysis Dialog:** A green modal window titled "Improve Analysis" is open. It states: "In Total imports by CATEGORY\_DESC, CATEGORY\_DESC "Total" has significantly higher Total imports out of 16 values." It contains two checkboxes: "Exclude @ CATEGORY\_DESC - FOODOLLARDATAREAL" and "Exclude # imports - FOODOLLARDATAREAL". A note below says: "Note: Click Customize Analysis to exclude one or more columns *permanently* from your future analysis." A blue arrow points from the "Run Again" button in this dialog back to the main interface.

The Improve Analysis dialog always excludes a value from all future analysis.

Finally, you can also set some analysis options from your user Profile.



You'll notice only one of these options is actually related to analysis. The others relate to how you receive notifications about SpotIQ operations.

## Eliminate null values

Null values should be eliminated from your analysis.

From next analysis

From future analyses

In the Search bar, add a filter `column!= Null` to the search bar. Or choose **Exclude null values from current analysis**, using the **Customize algorithms** panel.

Set **Exclude null values from my analysis** on your user **Profile** to exclude them from any future SpotIQ analyses you do.

## Exclude uninteresting column(s) in insight

You should always exclude columns you are not interested from your analysis.

### From next analysis

Exclude a column using **Improve Analysis** on a visualization. Or set the value through the **Excluded columns** tab of the **Customize Analysis** panel.

### From future analyses

Choose **Also exclude from all my future analysis** on the **Excluded columns** tab of the **Customize Analysis** panel. Alternatively, exclude using the **Improve Analysis** dialog on an insight that uses the column you want to exclude.

## Include an interesting column

You can always includes columns that interest you in your analysis.

### From next analysis

Choose **Customize Analysis** and select to **Include** columns that you want to appear.

### From future analyses

Ensure **\*\*Index Priority\*\*** is between 8-10 on the column through data modeling.

## Remove known date outliers

Your data may contain known outliers. For example, you are in the middle of a quarter and only want to analyze the previous quarter. Anything from the present quarter could contain an outlier.

### From next analysis

In the Search bar, add a filter `date< last time period` to the search bar.

### From future analyses

Not applicable.

## Too few insights

Your SpotIQ analysis may not provide you as many insights as you think it should.

### From next analysis

### From future analyses

Choose **Customize Analysis** and **Customize algorithms**. Decrease the Multiplier for Outlier Detection to a value closer to zero.

Not applica-  
ble.

# Advanced R Customizations

Admins and users with the **Has SpotIQ privilege** can run an R script using the **Custom Analysis** feature of SpotIQ. This means you can run an R script from any point in ThoughtSpot where you find the **Custom Analysis** menu option.

The R language is an open source programming language used for statistical computing. As such, knowledgeable users can use R to perform sophisticated analysis in a ThoughtSpot environment.

This section explains the feature and how to use it. It is not meant as an R primer. To learn more about R and how to use it, visit the (R Project for Statistical Computing)[<https://www.r-project.org/>].

## Understand R script requirements in ThoughtSpot

ThoughtSpot provides R running as a service within a ThoughtSpot cluster. Permissions are restricted. This means the R script does not have permission to system commands.

The ThoughtSpot cluster has pre-installed the basic R packages. If your script requires a specific package, you may request your Thoughtspot cluster admin to install the package on your behalf.

ThoughtSpot internally transforms and binds an R script prior to sending it to the cluster's R service. The system expects each script have a well-defined structure which is the following:

```
####R SCRIPT#####
<Fill script body>
####COLUMN BINDINGS (ONE PER LINE) #####
<Fill column bindings here>
```

The scripts contains the column bindings with the answer results appearing as parameters in the R script. ThoughtSpot expects for each `.paramn` in R your script must provide a corresponding binding. The following pseudo code illustrates an R script in a form suitable for ThoughtSpot:

```
####R SCRIPT#####
df <- data.frame(.param0,.param1, ...);
...
write.csv(..., file=#output_csv#, ...);
```

Notice that `.param0` refers to first column in column binding and `.param1` refers to the second. Should you need a third binding, you would use `.param2` and so forth.

The output of the script is either PNG or CSV. This example script uses `#output_csv#` to emit data in a CSV (tabular) format. Use `#output_png#` to emit data in PNG format.

Presently, error reporting is limited for R scripts in SpotIQ. You should validate your R script independent of your ThoughtSpot environment. Once you are sure they are free of syntax or other errors, then try the script in ThoughtSpot.

## Try a Custom Analysis with R

The following illustrates how to run an R analysis on data that has a sales column and a zip code column.

1. Log into ThoughtSpot and go to the Search bar.

2. Use Choose Sources to locate a source with sales and zip code data. This example uses **Phone Sales** data.
3. Enter `sales zip code` in the search bar.

If your source contains the proper data, you should see something similar to the following:

The screenshot shows the ThoughtSpot Data interface. At the top, there's a navigation bar with tabs for Search, Answers, Pinboards, SpotIQ, Data, and Admin. Below the navigation bar, a search bar contains the query "sales zip code". To the right of the search bar are icons for a user profile and a help icon. On the left, a sidebar titled "Data" has a "Choose Sources" button and a "Search Columns" dropdown menu. The menu is expanded and shows a section for "Phone Sales" with options like "% Gross Margin", "Age Group", and "City". The main area displays a table titled "Total Sales by Zip Code". The table has two columns: "Zip Code" and "Sales TOTAL". It shows two rows of data: one for zip code 91706 with sales of 267,380.23, and another for zip code 70601 with sales of 789,295.87.

4. Choose Actions > Custom Analyze.

The screenshot shows the ThoughtSpot interface with a modal dialog box overlaid. The dialog is titled "Actions" and lists several options: Save, Save as worksheet, Add formula, Show underlying data, Download as CSV, Download as PDF, Download as XLSX, Auto Analyze (SpotIQ), Custom Analyze (SpotIQ) (which is highlighted with a red border and a hand cursor icon), and Share.

ThoughtSpot opens the *Customize Analysis* dialog.

5. Choose the **Customize algorithms** tab.
6. In the **Select Algorithms** section, click the **Custom R Script** box.

Selecting this option unsets all the other options on this tab and displays the **Refine Parameters** field.

**Customize Analysis**

Included columns Excluded columns **Customize algorithms**

**Select Algorithms**

- Outlier Detection using Z-Scores
- Outlier Detection using Linear Regression
- Trend Analysis
- Cross-Correlation Analysis
- Custom R Script
- K-Means Clustering (2-Dimensional)

**Refine Parameters**

```
####R SCRIPT#####
####COLUMN BINDINGS (ONE PER LINE)####
```

Insight Count Settings

**Trigger Analysis**

- Enter this sample script in the field.

```
####R SCRIPT#####
library(ggplot2)
set.seed(20)
df <- data.frame(.param0, .param1)
cluster <- kmeans(df[1:2], 3, nstart = 20)
cluster$cluster <- as.factor(cluster$cluster)
png(file=#output_png#,width=400,height=350,res=72)
print(ggplot(df, aes(.param0, .param1, color = cluster$cluster)) +
geom_point())
####COLUMN BINDINGS (ONE PER LINE)#####
Sales
Zip Code
```

This script binds .param0 to Sales and .param1 to the Zip Code column. You can see from the script that the output should be PNG (#output\_png#).

- Check your work.

**Select Algorithms**

- Outlier Detection using Z-Scores
- Outlier Detection using Linear Regression
- Trend Analysis
- Cross-Correlation Analysis
- Custom R Script
- K-Means Clustering (2-Dimensional)

**Refine Parameters**

```
####R SCRIPT#####
library(ggplot2)
set.seed(20)
df <- data.frame(.param0, .param1)
cluster <- kmeans(df[1:2], 3, nstart = 20)
cluster$cluster <- as.factor(cluster$cluster)
png(file=#output_png#,width=400,height=350,res=72)
print(ggplot(df, aes(.param0, .param1, color = cluster$cluster)) + geom_point())
#####COLUMN BINDINGS (ONE PER LINE)#####
Sales
Zip Code
```

**Insight Count Settings**

**Trigger Analysis**

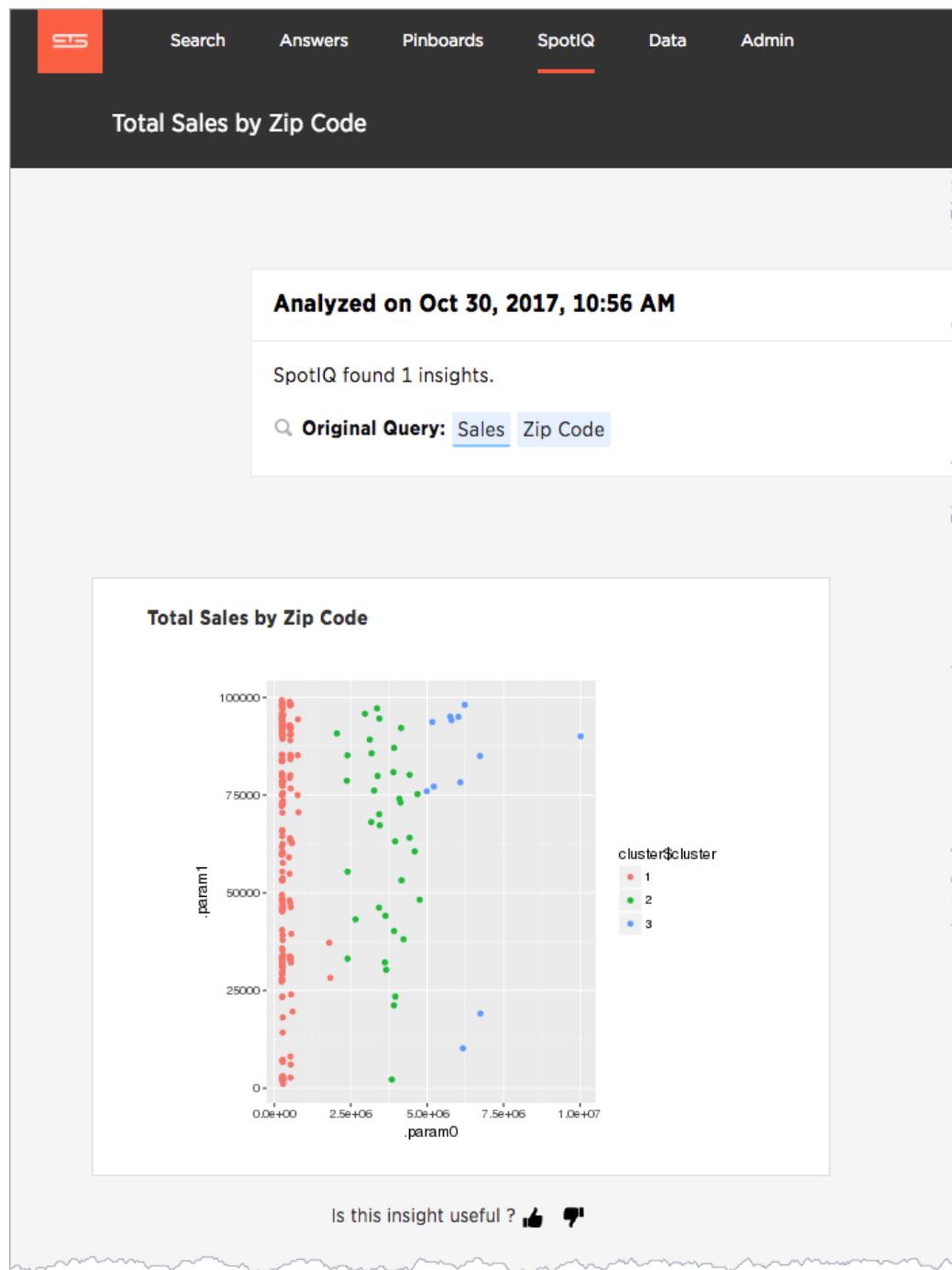
- Click Trigger Analysis.

SpotIQ runs your analysis in the background.

- Go to the SpotIQ page and click on the results of your newly triggered analysis.

NAME	DESCRIPTION	STICKERS	MODIFIED
Total Sales by Zip Code	Custom R analysis of Sales, Zip Code don..	A	2 minutes ago

You should see the results in PNG format similar to the following:



You can run another R script directly on this result to get CSV results. Try this on your own. Here is the script to give you CSV output:

```
####R SCRIPT#####
set.seed(20);
df <- data.frame(.param0,.param1);
cluster <- kmeans(df[1:2], 3, nstart = 20);
df$Cluster <- as.factor(cluster$cluster);
colnames(df) [1] <- 'Sales';
colnames(df) [2] <- 'Zip Code';
write.csv(df, file="#output_csv#, row.names=FALSE);
####COLUMN BINDINGS (ONE PER LINE) ####
```

Sales  
Zip Code

# Overview of sharing

Whenever you are working in ThoughtSpot, you are in your own private environment until you share your work with others. Sharing applies to searches, pinboards, and any data you upload.

## What you can share

This is a list of objects a regular, non-administrator user can share. Administrators have more granular control over data security.

You can share with groups and with individual people. You can share several different types of objects:

Object type	Description	Default security model
Uploaded data	Data that was uploaded using a Web browser.	Only the user who uploaded the data (and any user with administrator privileges) has access to it by default. They can share a table (or selected columns) with other people or groups. See <a href="#">Share uploaded data (page 216)</a>
Pinboards	A pinboard of saved search results.	Anyone who can view a pinboard can share it. See <a href="#">share a pinboard (page 212)</a>
Answers	The result of a single search.	Anyone who can view an answer can share it. See <a href="#">share answers (page 214)</a>

## Who can share and to whom

You do not have to be an administrator or the owner, to share saved answers or pinboards. Any user can share them, based on the access levels the user has.

If you upload a spreadsheet, you can share **Can View** or **Can Edit** privileges with other people, who can further share them with others. This last point is important. Like sharing a secret, sharing an object or your data can quickly spread in this way to people you do not intend it to. So, if your data or work is sensitive to your business be thoughtful in how you share it.

Finally, you can revoke access to an object (table, worksheet, or pinboard) that you have previously shared. Unsharing an object is very similar to sharing it.

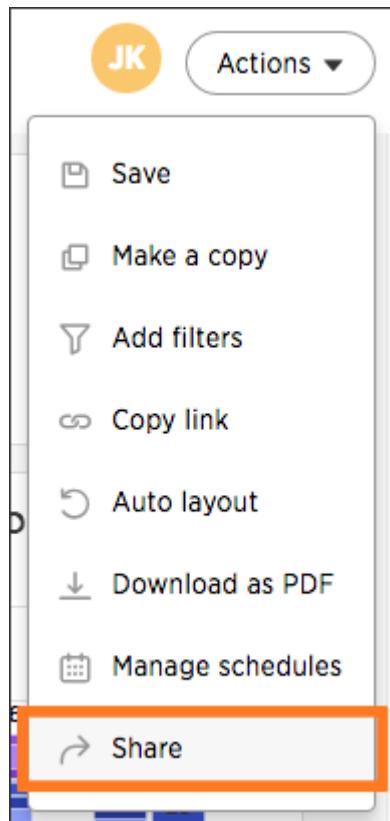
# Share a pinboard

**Summary:** Whenever you view a pinboard you have the option of sharing it with others.

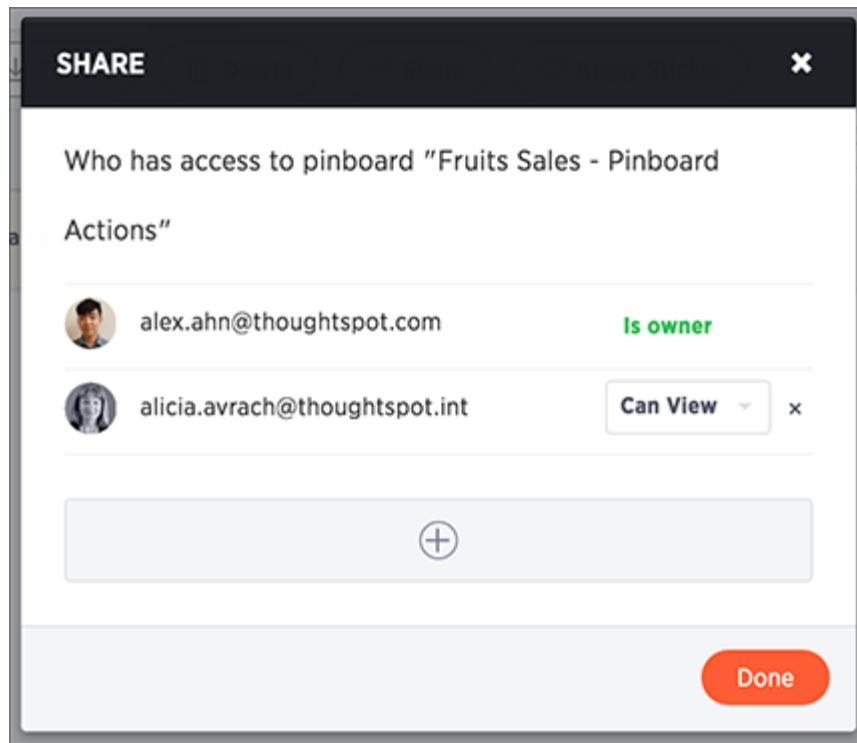
When you share a pinboard what you are really sharing is a live link to the pinboard, when you click **Share with....** So whenever someone else views it, they will see the most recently saved version with the most recent data. You do not have to be an administrator or the owner to share saved pinboards. Any user can share them, based on the access levels the user has.

To share a pinboard:

1. Configure the pinboard to look as you'll want it to appear when shared.
2. Click the **Share** icon.



3. Click + Add users or groups and select users or groups that you want to share with.



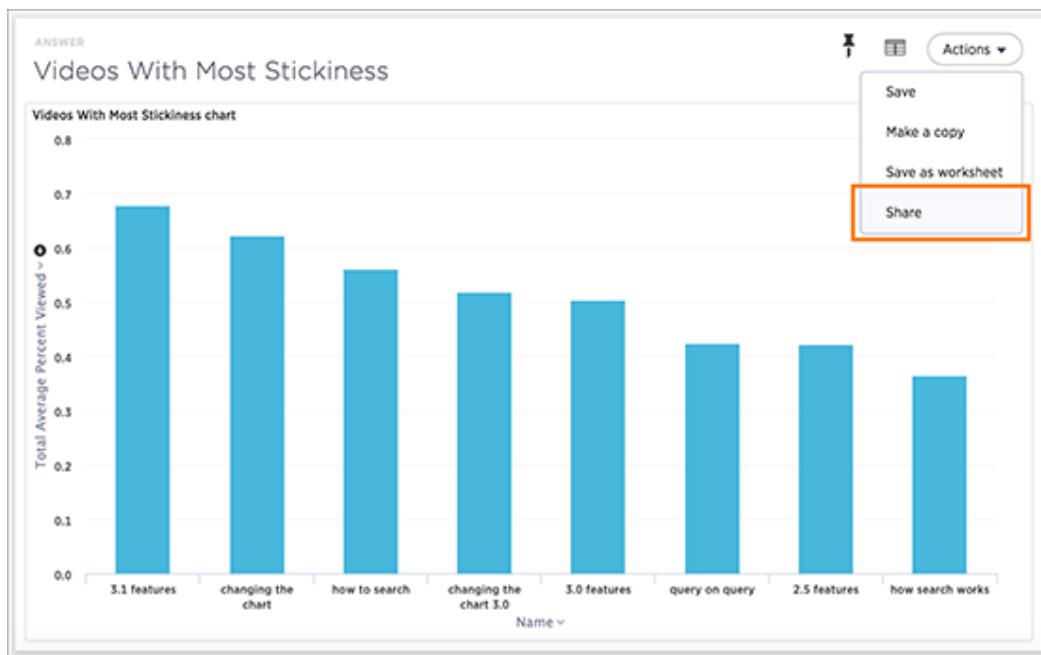
4. Configure the level of access by selecting from the dropdown list. You will only see options available, based on your own access level. For example, if you have only View access, you cannot share as Edit. You can select:
  - Can View to provide read-only access. If the person doesn't have access to the underlying data, they can only view a shared pinboard. If they change anything on the pinboard, their changes are not saved. In order to persist the changes, the user would need to make a copy of the modified pinboard.
  - Can Edit to allow modification. Enables renaming or deleting the shared pinboard. If a person with edit privileges modifies a shared pinboard, their changes will be saved to it.
5. Click Add and Save.
6. Click Add Permissions.

# Share answers

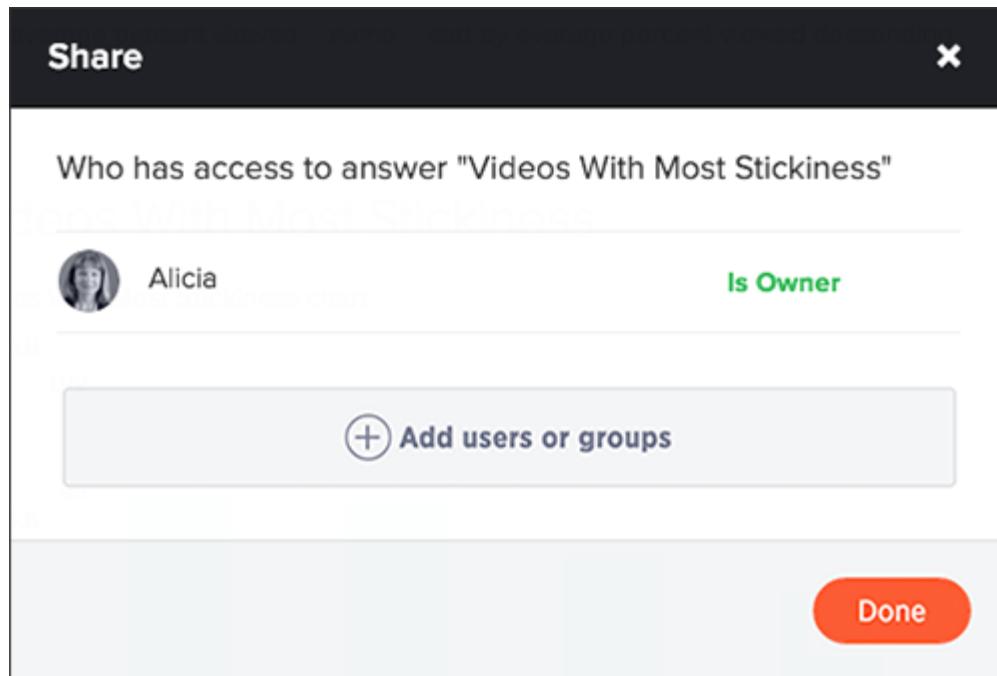
**Summary:** You do not have to be an administrator or the owner to share saved answers. Any user can share them, based on the access levels the user has.

Whenever you view an answer, you have the option of sharing it with others. It will be shared in its current state, so if you have modified the answer by interacting with the table or chart, the modified version is what will be shared.

1. Configure the answer to look as you'll want it to appear when shared.
2. Save the answer by clicking **Actions** and **Save**.
3. Click **Actions** and then **Share**.



4. Click **+ Add users or groups** and select users or groups that you want to share with.



5. Configure the level of access by selecting from the dropdown list. You can select:
  - Can View to provide read-only access. If the user doesn't have access to the underlying worksheet, they can only view the shared answer.
  - Can Edit to allow modification. Enables renaming or deleting the shared answer. If a user with edit privileges modifies a shared answer, their changes will be saved to it.
6. Click Add and Save.
7. Click Done.

# Share uploaded data

If you upload a spreadsheet, you can share Can View or Can Edit privileges with other people, who can further share them with others.

Data that you uploaded from a Web browser is only visible to you and to the administrator. You can share the entire uploaded table, or only some of its columns.

Share uploaded data by following these steps:

1. Click on DATA, on the top navigation bar.



2. Click on the name of the uploaded data you want to share.
3. Click the Share icon.

A screenshot of the ThoughtSpot 'Tables' view. The top navigation bar shows 'Tables' is selected. Below the bar, there are filters for 'All', 'Yours', 'All types', 'Worksheets', 'Tables', and 'Stickers'. A 'Share' button is highlighted with a red box. The main area lists tables with columns for NAME, DESCRIPTION, and SOURCE. Three tables are listed: 'Fish1 WS' (owner MM), 'Fish Worksheet' (owner MA), and 'fish\_seas\_oceans' (owner AS, checked).

NAME	DESCRIPTION	SOURCE
Fish1 WS		
Fish Worksheet		
fish_seas_oceans		Default

4. Select Entire Table or Specific Columns.

A screenshot of the 'SHARE' dialog box. On the left, there are two radio button options: 'Entire Table' (unchecked) and 'Specific Columns' (checked). Below this are four column names: Date\_Key, Date, Holiday\_Indicator, and Selling\_Season. On the right, it says 'Who has access to column "Selling\_Season"'. Underneath is a list showing 'AS' (owner) with a green 'Is owner' status. A plus sign button is available to add more users. At the bottom right is a 'Done' button.

SHARE

Entire Table

Specific Columns

Date\_Key

Date

Holiday\_Indicator

Selling\_Season

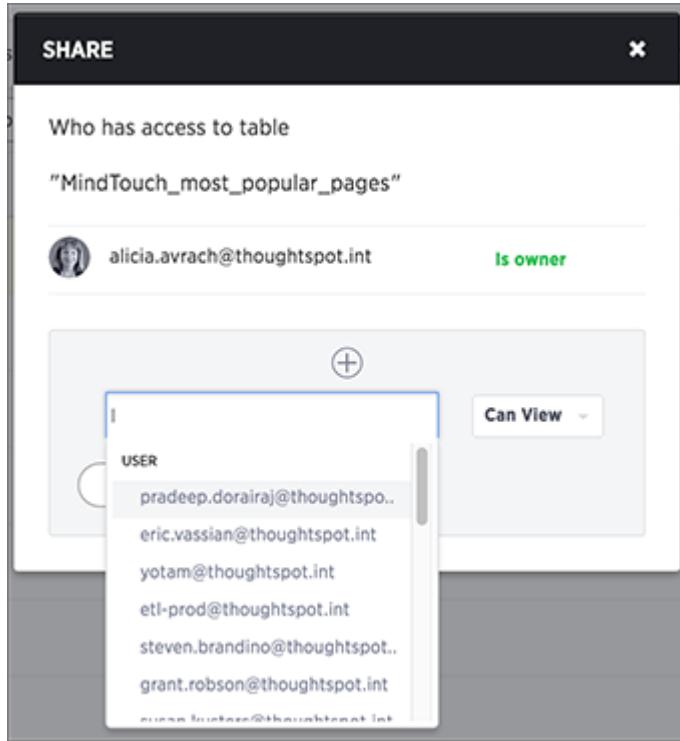
Who has access to column "Selling\_Season"

AS Is owner

+

Done

5. If you selected Specific Columns, select the column(s) to share.
6. Click + Add users or groups and select the users and groups that you want to share with.



7. Configure the level of access by selecting from the dropdown list. You can select:
  - Can View to provide read-only access. This enables viewing the table data and defining worksheets on the table.
  - Can Edit to allow modification. This enables renaming, modifying, or deleting the entire table and adding or removing its columns.
8. Click Add and Save.
9. Click Done.

# Revoke access (unshare)

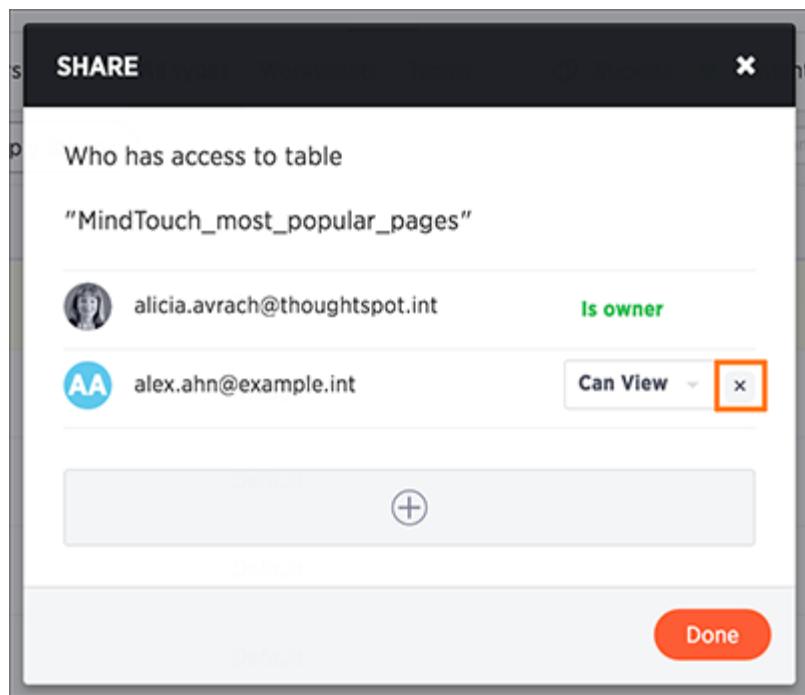
You may need to revoke access to an object (table, worksheet, or pinboard) that you have previously shared. Unsharing an object is very similar to sharing it.

To unshare one or more objects:

1. Go to the area where the object(s) you want to unshare is located. From the top menu bar:
  - If the object is a table or worksheet, click DATA.
  - If the object is a pinboard, click Pinboards.
  - If the object is an answer, click Answers.
2. Find the object(s) in the list, and check the corresponding box(es).
3. Click the Share icon.

The screenshot shows a user interface for managing worksheets. At the top, there are tabs for 'Tables' and 'Data Sources'. Below that, there are filters for 'All', 'Yours', 'All types', 'Worksheets' (which is currently selected), and 'Tables'. There are also buttons for 'Share', 'Delete', and 'Apply Sticker'. The main area lists worksheets with columns for 'NAME', 'DESCRIPTION', and 'SOURCE'. The 'CODEX - Answers..' worksheet has a checked checkbox next to it, indicating it is selected for sharing. The 'Share' button is highlighted with an orange box.

4. Click the X next to the users and groups that you want to remove from sharing.



5. Click Done.

# Get help

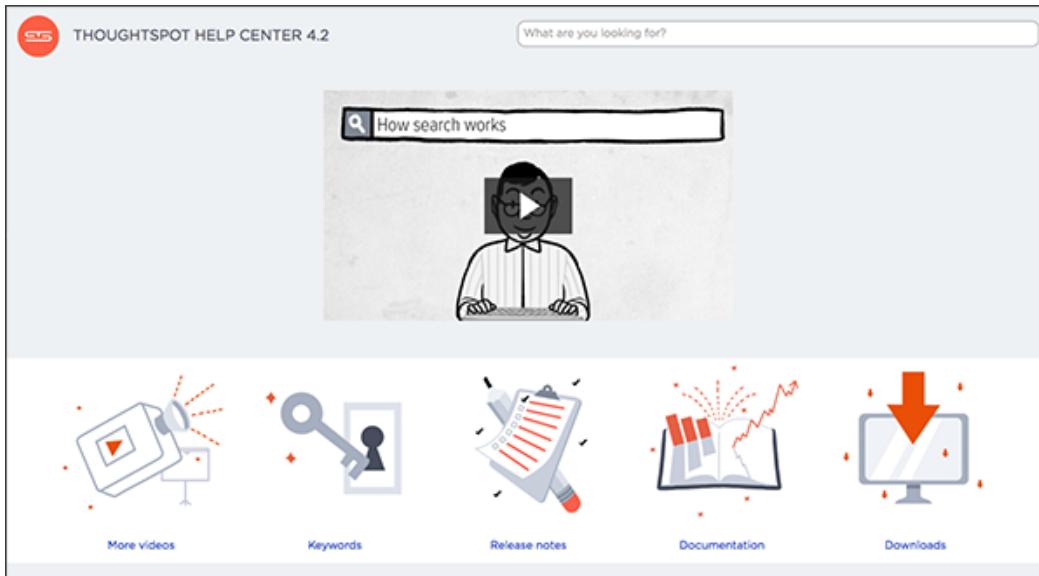
**Summary:** The Help Center provides links to different resources that were created to help you use ThoughtSpot.

The online Help Center serves as your first line of support for when you run into any questions while using ThoughtSpot.

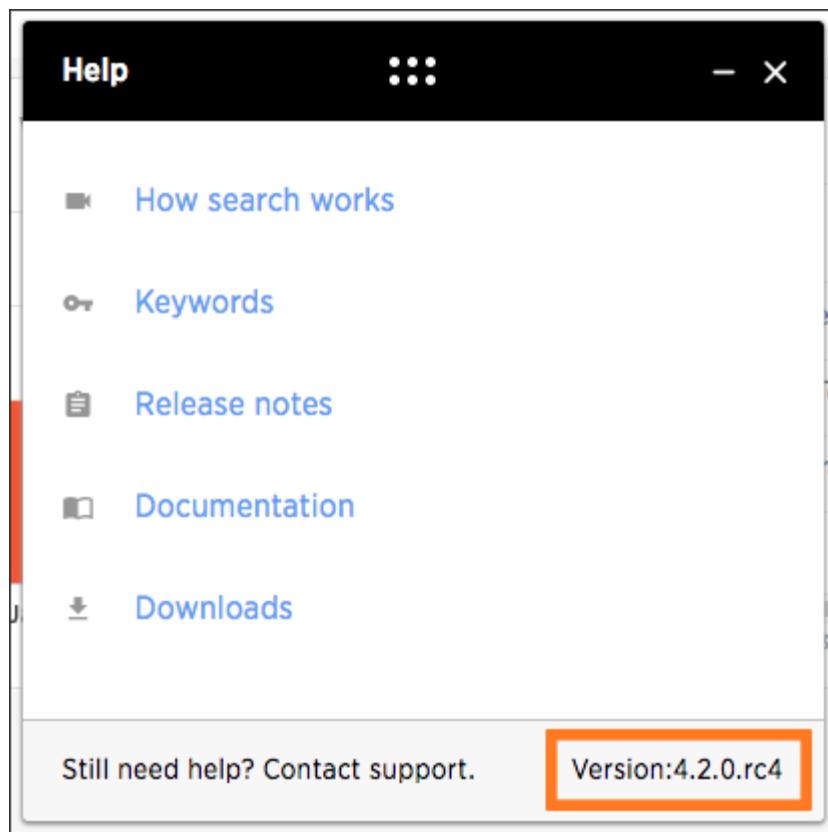
The Help Center can be accessed by clicking on **Help** on the top navigation bar. This opens a simple dialog box with links to How to search, Keywords, Release notes, Documentation, and Downloads. Click one of them to open a new tab containing your selected topic.

The Help Center provides the following resources:

- **A search bar** - You can use the search bar to search through all of ThoughtSpot's documentation and videos.
- **Short training videos** - Each of these videos cover a popular topic or feature, especially those that have just been released.

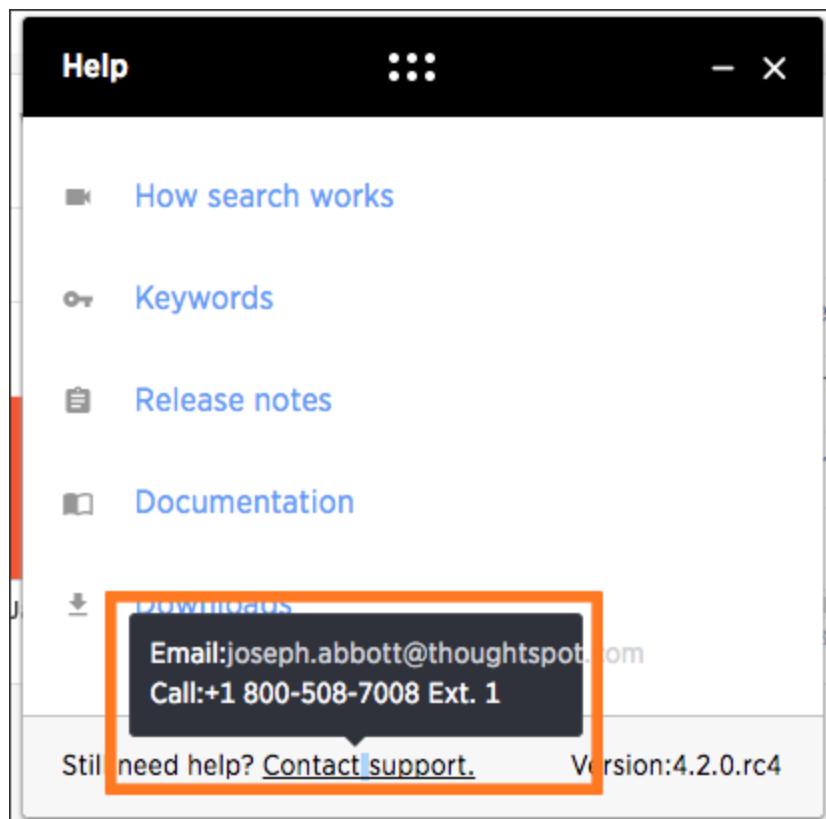


- **Keyword reference**- This reference contains all of the keywords that you can use to improve your search experience. The keywords are categorized into sections, and each of them are accompanied by an example.
- **Release Notes** - A new Release Notes is made available with every major, minor, and patch release. It contains information on new features and bug fixes.
- **Documentation** - The Documentation section includes links to various documentation guides and topics.
- **Downloads** - You can download ThoughtSpot clients and API files from here, including ODBC and JDBC drivers and the Data API.
- **Version information** The version number of the ThoughtSpot instance you are currently using can be found in the Help Center.



## Support contact information

If you still can't find what you're looking for, you can contact support.



# About this reference

This Reference section contains the commands and their syntax for all the command line tools in ThoughtSpot.

Included in this guide are:

- [Keyword reference \(page 224\)](#) lists the available keywords to use in your search. These are also listed in the Help Center, which is available from [Help](#) on the top navigation bar in ThoughtSpot.
- [tscli command reference \(page 244\)](#) lists the ThoughtSpot Command Line Interface commands.
- [Formula reference \(page 270\)](#) lists the available formula operators and functions. These are also listed in the Formula Assistant, which is available from the place in ThoughtSpot where you build formulas.
- [Date and time formats reference \(page 259\)](#) lists the accepted date, time, and timestamp formats that you can use when uploading data through the Web interface or using the ThoughtSpot Loader.
- [Row level security rules reference \(page 262\)](#) lists the operators for building row level security rules.
- [TQL reference \(page 234\)](#) lists the SQL commands that are supported in TQL.
- [ThoughtSpot Loader flag reference \(page 241\)](#) lists the options for loading data with tsload.

# Keyword reference

You can use keywords when asking a question to help define your search. This reference lists the various keywords. You can also see this list of keywords and examples from within the help center.

## General keywords

Keyword	Examples
top	<ul style="list-style-type: none"><li>• top sales rep by count sales for average revenue &gt;10000</li><li>• sales rep average revenue for each region top</li></ul>
bottom	<ul style="list-style-type: none"><li>• bottom revenue average revenue by state</li><li>• customer by revenue for each sales rep bottom</li></ul>
n	<ul style="list-style-type: none"><li>• top 10 sales rep revenue</li></ul>
n	<ul style="list-style-type: none"><li>• bottom 25 customer by revenue for each sales rep</li></ul>
sort by	<ul style="list-style-type: none"><li>• revenue by state sort by average revenue</li><li>• revenue by customer sort by region</li></ul>

# Date keywords

Keyword	Examples
after	<ul style="list-style-type: none"> <li>order date after 10/31/2014</li> </ul>
before	<ul style="list-style-type: none"> <li>order date before 03/01/2014</li> </ul>
between ... and ...	<ul style="list-style-type: none"> <li>order date between 01/30/2012 and 01/30/2014</li> </ul>
day of week	<ul style="list-style-type: none"> <li>revenue by day of week last 6 months</li> </ul>
week	<ul style="list-style-type: none"> <li>revenue by week last quarter</li> </ul>
month	<ul style="list-style-type: none"> <li>revenue by month last year</li> </ul>
daily	<ul style="list-style-type: none"> <li>shipments by region daily</li> </ul>
weekly	<ul style="list-style-type: none"> <li>revenue weekly</li> </ul>
monthly	<ul style="list-style-type: none"> <li>commission &gt; 10000 monthly</li> </ul>
quarterly	<ul style="list-style-type: none"> <li>sales quarterly for each product</li> </ul>
yearly	<ul style="list-style-type: none"> <li>shipments by product yearly</li> </ul>
day of week</var>	<ul style="list-style-type: none"> <li>count shipments Monday</li> </ul>

Keyword	Examples
month</var>	<ul style="list-style-type: none"> <li>commission January</li> </ul>
month year</var>	<ul style="list-style-type: none"> <li>commission by sales rep February 2014</li> </ul>
year</var>	<ul style="list-style-type: none"> <li>revenue by product 2014 product name contains snowboard</li> </ul>
yesterday	<ul style="list-style-type: none"> <li>sales yesterday for pro -ski200 by store</li> </ul>
week to date	<ul style="list-style-type: none"> <li>sales by order date week to date for pro-ski200</li> </ul>
month to date	<ul style="list-style-type: none"> <li>sales by product month to date sales &gt; 2400</li> </ul>
quarter to date	<ul style="list-style-type: none"> <li>sales by product quarter to date for top 10 products by sales</li> </ul>
year to date	<ul style="list-style-type: none"> <li>sales by product year to date</li> </ul>
last day	<ul style="list-style-type: none"> <li>customers last day by referrer</li> </ul>
last week	<ul style="list-style-type: none"> <li>customers last week by store</li> </ul>
last month	<ul style="list-style-type: none"> <li>customers last month by day</li> </ul>
last quarter	<ul style="list-style-type: none"> <li>customers last quarter sale &gt;300</li> </ul>

Keyword	Examples
last year	<ul style="list-style-type: none"> <li>top 10 customers last year by sale by store for region west</li> </ul>
n days	<ul style="list-style-type: none"> <li>visitors last 7 days</li> </ul>
n weeks	<ul style="list-style-type: none"> <li>visitors last 10 weeks by day</li> </ul>
n months	<ul style="list-style-type: none"> <li>visitors last 6 months for homepage visits &gt; 30 by month</li> </ul>
n quarters	<ul style="list-style-type: none"> <li>visitors last 2 quarters by month by campaign</li> </ul>
n years	<ul style="list-style-type: none"> <li>visitors last 5 years by revenue for sum revenue &gt;5000</li> </ul>
growth of ... by ...	<ul style="list-style-type: none"> <li>growth of sales by order date</li> </ul>
growth of ... by ... daily	<ul style="list-style-type: none"> <li>growth of sales by order date daily</li> </ul>
growth of ... by ... monthly	<ul style="list-style-type: none"> <li>growth of sales by date shipped monthly sales &gt; 24000</li> </ul>
growth of ... by ... weekly	<ul style="list-style-type: none"> <li>growth of sales by receipt date weekly for proski2000</li> </ul>
growth of ... by ... quarterly	<ul style="list-style-type: none"> <li>growth of sales by date shipped quarterly</li> </ul>

Keyword	Examples
growth of ... by ... yearly	<ul style="list-style-type: none"> <li>• growth of sales by date closed yearly</li> </ul>
daily year-over-year	<ul style="list-style-type: none"> <li>• growth of revenue by order date daily year-over-year</li> </ul>
weekly year-over-year	<ul style="list-style-type: none"> <li>• growth of revenue by date shipped weekly year-over-year</li> </ul>
monthly year-over-year	<ul style="list-style-type: none"> <li>• growth of revenue by receipt date monthly year-over-year</li> </ul>
quarterly year-over-year	<ul style="list-style-type: none"> <li>• growth of revenue by date shipped quarterly year-over-year</li> </ul>
<i>n</i> days ago	<ul style="list-style-type: none"> <li>• sales 2 days ago</li> </ul>
<i>n</i> weeks ago	<ul style="list-style-type: none"> <li>• sales 4 weeks ago by store</li> </ul>
<i>n</i> months ago	<ul style="list-style-type: none"> <li>• sales 2 months ago by region</li> </ul>
<i>n</i> quarters ago	<ul style="list-style-type: none"> <li>• sales 4 quarters ago by product name contains deluxe</li> </ul>
<i>n</i> years ago	<ul style="list-style-type: none"> <li>• sales 5 years ago by store for region west</li> </ul>

Keyword	Examples
today	<ul style="list-style-type: none"> <li>sales today by store</li> </ul>
next day	<ul style="list-style-type: none"> <li>shipments next day by order</li> </ul>
next week	<ul style="list-style-type: none"> <li>shipments next week by store</li> </ul>
next month	<ul style="list-style-type: none"> <li>appointments next month by day</li> </ul>
next quarter	<ul style="list-style-type: none"> <li>opportunities next quarter amount &gt; 30000</li> </ul>
next year	<ul style="list-style-type: none"> <li>opportunities next year by sales rep</li> </ul>
$n$ days	<ul style="list-style-type: none"> <li>shipments next 7 days</li> </ul>
$n$ weeks	<ul style="list-style-type: none"> <li>shipments next 10 weeks by day</li> </ul>
$n$ months	<ul style="list-style-type: none"> <li>openings next 6 months location</li> </ul>
$n$ quarters	<ul style="list-style-type: none"> <li>opportunities next 2 quarters by campaign</li> </ul>
$n$ years	<ul style="list-style-type: none"> <li>opportunities next 5 years by revenue</li> </ul>

## Time keywords

Keyword	Examples
detailed	<ul style="list-style-type: none"> <li>ship time detailed</li> </ul>

Keyword	Examples
last minute	<ul style="list-style-type: none"> <li>count homepage views last minute</li> </ul>
last hour	<ul style="list-style-type: none"> <li>count unique visits last hour</li> </ul>
<i>n</i> minutes	<ul style="list-style-type: none"> <li>count visitors last 30 minutes</li> </ul>
<i>n</i> hours	<ul style="list-style-type: none"> <li>count visitors last 12 hours</li> </ul>
hourly	<ul style="list-style-type: none"> <li>visitors by page name hourly</li> </ul>
<i>n</i> minutes ago	<ul style="list-style-type: none"> <li>sum inventory by product 10 minutes ago</li> </ul>
<i>n</i> hours ago	<ul style="list-style-type: none"> <li>sum inventory by product by store 2 hours ago</li> </ul>

## Text keywords

Keyword	Examples
begins with	<ul style="list-style-type: none"> <li>product name begins with 'pro'</li> </ul>
contains	<ul style="list-style-type: none"> <li>product name contains "alpine" description contains "snow shoe"</li> </ul>
ends with	<ul style="list-style-type: none"> <li>product name ends with 'deluxe'</li> </ul>

Keyword	Examples
not begins with	<ul style="list-style-type: none"> <li>product name not begins with "tom's"</li> </ul>
not contains	<ul style="list-style-type: none"> <li>product color not contains 'tan' product color not contains 'red'</li> </ul>
not ends with	<ul style="list-style-type: none"> <li>product name not ends with "trial"</li> </ul>
similar to	<ul style="list-style-type: none"> <li>course name similar to 'hand'</li> </ul>
not similar to	<ul style="list-style-type: none"> <li>course name not similar to 'hand'</li> </ul>

## Number keywords

Function	Examples
sum	<ul style="list-style-type: none"> <li>sum revenue</li> </ul>
average	<ul style="list-style-type: none"> <li>average revenue by store</li> </ul>
count	<ul style="list-style-type: none"> <li>count visitors by site</li> </ul>
max	<ul style="list-style-type: none"> <li>max sales by visitor by site</li> </ul>
min	<ul style="list-style-type: none"> <li>min revenue by store by campaign for cost &gt; 5000</li> </ul>
standard deviation	<ul style="list-style-type: none"> <li>standard deviation revenue by product by month for date after 10/31/2010</li> </ul>
unique count	<ul style="list-style-type: none"> <li>unique count visitor by product page last week</li> </ul>

Function	Examples
variance	<ul style="list-style-type: none"> <li>• variance sale amount by visitor by product for last year</li> </ul>

## Filter keywords

Function	Examples
between... and	<ul style="list-style-type: none"> <li>• revenue between 0 and 1000</li> </ul>
>	<ul style="list-style-type: none"> <li>• sum sale amount by visitor by product for last year sale amount &gt; 2000</li> </ul>
<	<ul style="list-style-type: none"> <li>• unique count visitor by product by store for sale amount &lt; 20</li> </ul>
>=	<ul style="list-style-type: none"> <li>• count calls by employee lastname &gt;= m</li> </ul>
<=	<ul style="list-style-type: none"> <li>• count shipments by city latitude &lt;= 0</li> </ul>
=	<ul style="list-style-type: none"> <li>• unique count visitor by store purchased products = 3 for last 5 days</li> </ul>
!=	<ul style="list-style-type: none"> <li>• sum sale amount region != canada region != mexico</li> </ul>

## Location keywords

Function	Examples
near	<ul style="list-style-type: none"><li>• revenue store name county near san francisco</li></ul>
near... within <i>n</i> miles km meters	<ul style="list-style-type: none"><li>• revenue store name county near alameda within 50 miles</li></ul>
farther than <i>n</i> miles km meters from	<ul style="list-style-type: none"><li>• average hours worked branch farther than 80 km from scarborough</li></ul>

Location keywords only work for searches where the data source includes latitude/longitude data.

# TQL reference

TQL is the ThoughtSpot language for entering SQL commands. This reference lists TQL commands you can use to do things like creating a schema or verifying a data load.

## TQL commands

You can use TQL either [through the ThoughtSpot application's web interface \(page 0\)](#) or the [command line interface \(page 234\)](#) in the Linux shell.

**Note:** Worksheets and pinboards in ThoughtSpot are dependent upon the data in the underlying tables. Use caution when modifying tables directly. If you change or remove a schema on which those objects rely, the objects could become invalid.

You can use TQL to view and modify schemas and data in tables. Remember to add a semicolon after each command. Commands are not case sensitive but are capitalized here for readability.

When referring to objects using fully qualified object names, the syntax is:

```
"database"."schema"."table"
```

As a best practice, you should enclose object names (database, schema, table, and column) in double quotes, and column values in single quotes.

## Basic commands

Syntax	Description	Examples
help	Displays command help.	TQL> help

## View schemas and data

Syntax	Description	Examples
SHOW DATABASES	Lists all available databases.	TQL> SHOW DATABASES;
USE <database>	Switches the context to the specified database. This is required if queries do not use fully qualified names (database.schema.table) for specifying tables.	TQL> USE "fruit_database";
SHOW SCHEMAS	Lists all schemas within the current database.	TQL> SHOW SCHEMAS;
SHOW TABLES	Lists all tables within the current database by schema.	TQL> SHOW TABLES;
SHOW TABLE <table>	Lists all the columns for a table.	TQL> SHOW TABLE "locations";

Syntax	Description	Examples
SCRIPT SERVER	Generates the TQL schema for all tables in all databases on the server.	TQL> SCRIPT SERVER;
SCRIPT DATABASE <database>	Generates the TQL schema for all tables in a database.	TQL> SCRIPT DATABASE "fruit_database";
SCRIPT TABLE <table>	Generates the TQL schema for a table.	TQL> SCRIPT TABLE "vendor";
<pre>SELECT   &lt;cols_or_expr&gt;   FROM &lt;table_list&gt;   [WHERE     &lt;predicates&gt;]   [GROUP BY &lt;expr&gt;]   [ORDER BY &lt;expr&gt;]</pre>	<p>Shows specified set of table data. If you do not specify the TOP number of rows to select, the top 50 rows will be returned by default. The number of rows to return can be set using the TQL command line flag:</p> <p>--query_results _apply_top_row_count</p> <p>You can use the following aggregation functions:</p> <ul style="list-style-type: none"> <li>• sum</li> <li>• count</li> <li>• count distinct</li> <li>• stddev</li> <li>• avg</li> <li>• variance</li> <li>• min</li> <li>• max</li> </ul> <p>You can use the following date functions:</p> <ul style="list-style-type: none"> <li>• absyear</li> <li>• absmonth</li> <li>• absday</li> <li>• absquarter</li> <li>• date</li> <li>• time</li> </ul>	<pre>TQL&gt; SELECT       TOP 10 "quantity"       FROM "sales_fact";</pre> <pre>TQL&gt; SELECT COUNT(*)       FROM "vendor";</pre> <pre>TQL&gt; SELECT "vendor",       SUM("quantity")       FROM "sales_fact"       GROUP BY "vendor";</pre> <pre>TQL&gt; SELECT "vendor",       SUM("amount")       FROM "vendor",       "sales_fact"       WHERE       "sales_fact"."vendorid"       = "vendor"."vendorid"       AND "amount" &gt; 100       GROUP BY "vendor"       ORDER BY "amount"       DESC;</pre> <pre>TQL&gt; SELECT "vendor",       SUM("quantity")       FROM "sales_fact"       GROUP BY "vendor"       LIMIT 10;</pre>

## Schema creation

Syntax	Description	Examples
CREATE DATABASE <database>	Creates a database.	TQL> CREATE DATABASE "fruit_database";
CREATE SCHEMA <schema>	Creates a schema within the current database.	TQL> CREATE SCHEMA "fruit_schema";
<pre>CREATE TABLE &lt;table&gt;   (&lt;column_definitions&gt;   [&lt;constraints&gt;])</pre>	<p>Creates a table with the specified column definitions and constraints.</p> <p>Use PARTITION BY HASH to shard a table across</p>	<pre>TQL&gt; CREATE TABLE "vendor"       ("vendorid" int,       "name" varchar(255));</pre>

Syntax	Description	Examples
[PARTITION BY HASH (<number>) [KEY ("<column>")]]	<p>all nodes. If no KEY is specified, the table will be randomly sharded.</p> <p>Note that you can specify relationship constraints (FOREIGN KEY or RELATIONSHIP) in the CREATE TABLE statement. But it is recommended to define these using ALTER TABLE statements at the end of your TQL script, after creating your tables. This works better in scripts, because it guarantees that tables are created before they are referenced in the constraint definitions.</p>	<pre>TQL&gt; CREATE TABLE "sales_fact" ("saleid" int, "locationid" int, "vendorid" int, "quantity" int, "sale_amount" double, "fruitid" int, CONSTRAINT PRIMARY KEY("saleid"))  PARTITION BY HASH(96) KEY ("saleid");</pre>

## Schema modification

Syntax	Description	Examples
DROP DATABASE <database>	Drops a database and all of its schemas and tables.	<pre>TQL&gt; DROP DATABASE "fruit_database";</pre>
DROP SCHEMA <schema>	Drops a schema within the current database, and drops all of the tables in the schema.	<pre>TQL&gt; DROP SCHEMA "fruit_schema";</pre>
DROP TABLE <table>	Drops a table.	<pre>TQL&gt; DROP TABLE "location";</pre>
ALTER TABLE <table> ADD   DROP   RENAME COLUMN <column>	<p>Alters a table to add, drop, or rename a column.</p> <p>When you add a column to an existing table, you must provide a default value to use for existing rows.</p>	<pre>TQL&gt; ALTER TABLE "cart" ADD COLUMN "nickname" varchar(255) DEFAULT 'no nickname';  TQL&gt; ALTER TABLE "cart" DROP COLUMN "nickname";  TQL&gt; ALTER TABLE "cart" RENAME COLUMN "nickname" TO "shortname";</pre>
TRUNCATE TABLE <table>	<p>Removes all data from a table, but preserves its metadata, including all GUIDs, relationships, etc. This can be used to force a new schema for a table without losing the metadata.</p> <p>However, this operation removes all existing data from the table and must be used with caution. You must reload the data following a TRUNCATE, or all dependent objects (worksheets and pinboards) in ThoughtSpot will become invalid.</p>	<pre>TQL&gt; TRUNCATE TABLE "location";</pre>

Syntax	Description	Examples
<pre>ALTER TABLE &lt;table&gt;   DROP CONSTRAINT   PRIMARY KEY;</pre>	<p>Drops the primary key from a table.</p> <p>Note that if you then add a new primary key, the same upsert behavior will be applied as with adding any primary key. This can result in data deletion, so make sure you understand how the upsert will affect your data ahead of time.</p>	<pre>TQL&gt; ALTER TABLE "sales"   DROP CONSTRAINT   PRIMARY KEY;  TQL&gt; ALTER TABLE "sales"   ADD CONSTRAINT   PRIMARY KEY   ("PO_number");</pre>
<pre>ALTER TABLE &lt;table&gt;   DROP [FOREIGN KEY     RELATIONSHIP]   &lt;name&gt;;</pre>	<p>Drops the named foreign key or relationship between two tables.</p>	<pre>TQL&gt; ALTER TABLE   "sales_fact"   DROP FOREIGN KEY   "FK_PO_number";  TQL&gt; ALTER TABLE   "fruit_dim"   DROP RELATIONSHIP   "REL_dates";</pre>
<pre>ALTER TABLE &lt;table&gt;   DROP [CONSTRAINT   FOREIGN KEY   [&lt;table_name&gt;]     RELATIONSHIP   [WITH   &lt;table_name&gt;];</pre>	<p>You must use this syntax when dropping relationships between tables created before ThoughtSpot version 3.2. This is because relationships could not be named in older versions.</p> <p>Drops the foreign key or relationship between two tables where you cannot reference it by relationship name. If the relationship was created without a name, use:</p> <ul style="list-style-type: none"> <li>• the name of the referenced table, for a foreign key.</li> <li>• the name of the related table, for a relationship.</li> </ul> <p>If you drop a foreign key without specifying the referenced table, all foreign keys from the table you are altering will be dropped.</p>	<pre>TQL&gt; ALTER TABLE   "shipments"   DROP CONSTRAINT   FOREIGN KEY "orders";  TQL&gt; ALTER TABLE   "wholesale_buys"   DROP RELATIONSHIP   WITH "retail_sales";  /* Drops all relationships that have wholesale_buys as a source.  */  TQL&gt; ALTER TABLE   "wholesale_buys"   DROP RELATIONSHIP;  /* Drops all foreign keys from wholesale_buys.  */  TQL&gt; ALTER TABLE   "wholesale_buys"   DROP CONSTRAINT   FOREIGN KEY;</pre>
<pre>ALTER TABLE &lt;table&gt;   [SET DIMENSION     SET FACT   [PARTITION BY HASH   [(&lt;shards&gt;)]   [KEY(&lt;column&gt;)]]]</pre>	<p>Changes the partitioning on a table by doing one of:</p> <ul style="list-style-type: none"> <li>• re-sharding a sharded table</li> <li>• changing a replicated table to a sharded table</li> <li>• changing a sharded table to a replicat-</li> </ul>	<pre>TQL&gt; ALTER TABLE   "sales_fact"   SET FACT   PARTITION BY HASH   (96)   KEY ("PO_number");  TQL&gt; ALTER TABLE</pre>

Syntax	Description	Examples
	<p>ed (unsharded) table</p> <p>By default, ThoughtSpot does not shard dimension tables.</p> <p>To change the partitioning on a table, or to change a dimension table to a sharded table, use <code>ALTER TABLE...SET FACT PARTITION BY HASH...;</code></p> <p>To make a sharded table into a dimension table (replicated on every node), use <code>ALTER TABLE...SET DIMENSION;</code> command.</p>	<pre>"fruit_dim" SET DIMENSION;</pre>
<code>ALTER TABLE &lt;table&gt;   MODIFY COLUMN &lt;column&gt;   &lt;new_data_type&gt;;</code>	Changes the data type of a column. This can have implications on sharding and primary key behavior. See <a href="#">About data type conversion (page Q)</a> .	<pre>TQL&gt; ALTER TABLE fact100       MODIFY COLUMN product_id int;</pre>

## Modify Schema

Syntax	Description	Examples
<code>INSERT INTO &lt;table&gt; VALUES ...</code>	Inserts values into a table. Only use this for testing. Do not use INSERT on a production system.	<pre>TQL&gt; INSERT INTO "vendor"       VALUES 'helen rose',       'jacob norse',       'eileen ruff',       'manny gates';</pre>
<code>UPDATE &lt;table&gt;   ...   SET ...   [WHERE ...]</code>	Updates rows in a table that match optionally provided predicates. Predicates have the form column = value connected by the AND keyword. Sets the column values to the specified values.	<pre>TQL&gt; UPDATE "location"       SET "borough" =       'staten island',       "city" = 'new york'       WHERE "borough" =       'staten isl'       AND city = 'NY';</pre>
<code>DELETE FROM &lt;table&gt; [WHERE...]</code>	Deletes rows from a table that match optionally provided predicates. Predicates have the form column = value connected by the AND keyword.	<pre>TQL&gt; DELETE FROM "vendor"       WHERE       "name" = 'Joey Smith'       AND       "vendorid" = '19463';</pre>

## Constraints and relationships

Constraints and relationships in ThoughtSpot are used to define the relationships between tables (i.e. how they can be joined). However, constraints are not enforced, as they would be in a transactional database. You can define the following constraints when creating a table with CREATE TABLE, or add them to an existing table using the ADD CONSTRAINT syntax:

Syntax	Description	Examples
PRIMARY KEY	<p>Designates a unique, non-null value as the primary key for a table. This can be one column or a combination of columns.</p> <p>If values are not unique, an upsert will be performed if a row includes a primary key that is already present in the data.</p>	<pre>CREATE TABLE "schools" (     "schoolID" varchar(15),     "schoolName" varchar(255),     "schoolCity" varchar(55),     "schoolState" varchar(55),     "schoolNick" varchar(55),     CONSTRAINT     PRIMARY KEY ("schoolID") ) ;</pre> <pre>TQL&gt; ALTER TABLE "cart" ADD CONSTRAINT PRIMARY KEY ("cart_id");</pre> <pre>TQL&gt; ALTER TABLE "cart" DROP CONSTRAINT PRIMARY KEY "cart_id";</pre>
FOREIGN KEY	<p>Defines a relationship where the value(s) in the table are used to join to a second table. Uses an equality operator. The foreign key must match the primary key of the table that is referenced in number, column type, and order of columns.</p> <p>When creating a foreign key, give it a name. You can reference the foreign key name later, if you want to remove it.</p>	<pre>TQL&gt; ALTER TABLE "batting" ADD CONSTRAINT "FK_player" FOREIGN KEY ("playerID") REFERENCES "players" ("playerID");</pre> <pre>TQL&gt; ALTER TABLE "batting" ADD CONSTRAINT "FK_lg_team" FOREIGN KEY ("lgID" ,"teamID") REFERENCES "teams" ("lgID" , "teamID");</pre> <pre>TQL&gt; ALTER TABLE "shipment" ADD CONSTRAINT "FK_PO_vendor" FOREIGN KEY ("po_number", "vendor") REFERENCES "orders" ("po_number", "vendor");</pre> <pre>TQL&gt; ALTER TABLE "shipment" DROP CONSTRAINT "FK_PO_vendor";</pre>
RELATIONSHIP	<p>Defines a relationship where the value(s) in the table can be used to join to a second table, using an equality condition (required) and one or more range conditions (optional). These conditions act like a WHERE clause when the two tables are joined. They are applied using AND logic, such that all conditions must be met for a row to be included.</p> <p>You may add multiple relationships between tables.</p> <p>When creating a relationship, give it a name. You can reference the relationship name later, if you want to remove it.</p>	<pre>TQL&gt; ALTER TABLE "wholesale_buys" ADD RELATIONSHIP "REL_fruit" WITH "retail_sales" AS "wholesale_buys"."fruit" = "retail_sales"."fruit" AND ("wholesale_buys"."date_order" &lt; "retail_sales"."date_sold" AND "retail_sales"."date_sold" &lt;</pre>

Syntax	Description	Examples
		<pre>"wholesale_buys"."expire_date");  TQL&gt; ALTER TABLE "wholesale_buys" DROP RELATIONSHIP "REL_fruit";</pre>

## Flags

The `--query_results_apply_top_row_count <number>` flag can be used with TQL to limit the number of result rows returned by a query. For example:

```
$ tq1 --query_results_apply_top_row_count 100
```

## Data types

ThoughtSpot supports a simplified list of data types:

Syntax	Description	Examples
Character	<ul style="list-style-type: none"> <li>• <code>VARCHAR(<i>n</i>)</code></li> </ul>	Specify the maximum number of characters, as in <code>VAR-CHAR(255)</code> . The size limit is 1GB for <code>VARCHAR</code> values.
Floating point	<ul style="list-style-type: none"> <li>• <code>DOUBLE</code></li> <li>• <code>FLOAT</code></li> </ul>	<code>DOUBLE</code> is recommended.
Boolean	<ul style="list-style-type: none"> <li>• <code>BOOL</code></li> </ul>	Can be <code>true</code> or <code>false</code> .
Integer	<ul style="list-style-type: none"> <li>• <code>INT</code></li> <li>• <code>BIGINT</code></li> </ul>	<p><code>INT</code> holds 32 bits.</p> <p><code>BIGINT</code> holds 64 bits.</p>
Date or time	<ul style="list-style-type: none"> <li>• <code>DATE</code></li> <li>• <code>DATETIME</code></li> <li>• <code>TIMESTAMP</code></li> <li>• <code>TIME</code></li> </ul>	<p><code>DATETIME</code>, <code>TIMESTAMP</code>, and <code>TIME</code> are stored at the granularity of seconds.</p> <p><code>TIMESTAMP</code> is identical to <code>DATETIME</code>, but is included for syntax compatibility.</p>

# ThoughtSpot loader flag reference

For recurring data loads and for scripting loads, use the ThoughtSpot Loader (tsload). This reference section lists all the flags that can be used to modify the behavior of tsload.

## General tsload flags

Flag	Description	Notes
--target_database <database>	Specifies the pre-existing target database into which tsload should load the data.	
--target_schema <schema>	Specifies the target schema. Default is "falcon_default_schema".	
--target_table <table>	Specifies the tables that you want to load into the database. The tables must exist in the database specified by --target_database.	
--empty_target	Specifies that any data in the target table is to be removed before the new data is loaded.	If supplied, any rows that exist in the table specified by --target_database and --target_table will be deleted before this data load. To perform an "upsert" on the existing data, omit this flag or specify --noempty_target.
--max_ignored_rows <number>	Specifies the maximum number of rows that can be ignored if they fail to load.	If the number of ignored rows exceeds this limit, the load will be aborted.
--bad_records_file <path_to_file>/<file_name>	Specifies the file to use for storing rows that failed to load.	Input rows that do not conform to the defined schema in ThoughtSpot will be ignored and inserted into this file.
--date_format <date_formatmask>	Specifies the format string for date values.	The default format is yearmonthday e.g. "Dec 30th, 2001" and is represented as 20011230. Use the date format specifications supported in the <a href="#">strftime library function</a> .
--date_time_format <date_formatmask> <time_formatmask>	Specifies the format string for datetime values.	The default is yearmonthday hour:minute:second e.g. Dec 30th, 2001 1:15:12 and is represented as 20011230 01:15:12. Use the datetime format specifications supported in the <a href="#">strftime library function</a> .
--time_format <time_formatmask>	Specifies the format string for time values.	The default is hour:minute:second. Use the time format specifications supported in the <a href="#">strftime library function</a> .
--v=[0 1 2 3]	Specifies the verbosity of log messages.	Provide a value for verbosity level. By default, verbosity is set to the minimum, which is 0. This value is similar to a volume control. At higher levels your log receives more messages and that log more frequently. This is used for

Flag	Description	Notes
		debugging. You should not change this value unless instructed by ThoughtSpot Support.
--skip_second_fraction	Skips fractional seconds when loading data.	If supplied, the upserts logic may be affected, especially if the date time being loaded is a primary key, and the data has millisecond granularity. Load the data twice, once as a string with a primary key, and again with second granularity date time. There is no support to store fractional seconds in the ThoughtSpot system.

## File loading tsload flags

The following flags are used when loading data from an input file:

Flag	Description	Notes
--source_file <path_to_file>/<file_name>	Specifies the location of the file to be loaded.	
--source_data_format [csv delimited]	Specifies the data file format.	Optional. The default is csv.
--field_separator "<delimiter>"	Specifies the field delimiter used in the input file.	
--trailing_field_separator	Specifies that the field separator appears after every field, including the last field per row.	Example row with trailing field separator: a,b,c,The default is false.
--null_value "<null_representation>"	Specifies how null values are represented in the input file.	These values will be converted to NULL upon loading.
--dateConvertedToEpoch [true false]	Specifies whether the "date" or "datetime" values in the input file are represented as epoch values.	
--booleanRepresentation [true_false   1_0   T_F   Y_N]	Specifies the format in which boolean values are represented in the input file.	The default is T_F. You can also use this flag to specify other values. For example, if your data used Y for true and NULL for false, you could specify:--booleanRepresentation Y_NULL
--has_header_row	Indicates that the input file contains a header row.	If supplied, the first row of the file is ignored. If not supplied, the first row of the file is loaded as data.
--escape_character "<character>"	Specifies the escape character used in the input file.	If no value is specified, the default is "(double quotes).
--enclosing_character "<character>"	Specifies the enclosing character used in the input file.	If the enclosing character is double quotes, you need to escape it, as in this example:

Flag	Description	Notes
--use_bit_boolean_values = [true   false]	Specifies how boolean values are represented in the input file.	--enclosing_character "\'"  If supplied, the input CSV file uses a bit for boolean values, i.e. the false value is represented as 0x0 and true as 0x1. If omitted or set to false, boolean values are assumed to be T_F, unless you specify something else using the flag --boolean_representation [true_false   1_0   T_F   Y_N].

# tscli command reference

The `tscli` command line interface is an administration interface for the ThoughtSpot instance. Use `tscli` to take snapshots (backups) of data, apply updates, stop and start the services, and view information about the system. This reference defines each subcommand and what you can accomplish with it.

## How to use the tscli command

The `tscli` command has the following syntax:

```
tscli [-h] [--helpfull] [--verbose] [--noautoconfig]
      [--autoconfig] [--yes] [--cluster <cluster>]
      [--zoo <zookeeper>] [--username username] [--identity_file identity_file]
      {alert,backup,backup-policy,callhome,cluster,command,dr-mirror,etl,event,
       feature,fileserver,firewall,hdfs,ldap,logs,map-tiles,monitoring,nas,node,
       os,saml,scheduled-pinboards,smtp,snapshot,snapshot-policy,spot,ssl,storage,
       support}
```

The `tscli` command has several subcommands such as `alert`, `backup`, and so forth. You issue a subcommand using the following format:

```
tscli [subcommand]
```

Subcommands have their own additional options and actions such as `tscli backup create` or `tscli backup delete` for example. To view help for a subcommand:

```
tscli [subcommand] -h
```

A subcommand itself may have several options.

## tscli subcommands

This section lists each subcommand and its syntax.

### alert subcommand

```
tscli alert [-h] {count,info,list,off,on,refresh,silence,status,unsilence}
```

Use this subcommand to do the following:

- `tscli alert info` Lists all alerts.
- `tscli alert list` Lists the generated alerts.
- `tscli alert off` Disables all alerts from the cluster.
- `tscli alert on` Enables alerts from the cluster.
- `tscli alert silence --name <alert_name>`

Silences the alert with `alert_name`. For example, `DISK_ERROR`. Silenced alerts are still recorded

in postgres, however emails are not sent out.

- `tscli alert status` Shows the status of cluster alerts.

- `tscli alert unsilence-name alert_name`

Unsilences the alert with \*`alert_name`\*. For example, `DISK_ERROR`.

## backup subcommand

```
tscli backup [-h] {create,delete,ls,restore}
```

Use this subcommand to do the following:

- `tscli backup create [-h] [--mode {full,light,dataless}] [--type {full,incremental}] [--base BASE] [--storage_type {local,nas}] [--remote] name out`

Pulls a snapshot and saves it as a backup where:

- `--mode {full,light,dataless}`

Mode of backups. To understand these different modes see [Understand backup modes \(page 0\)](#).

- `--type {full,incremental}` Type of backup.(Incremental incremental is not implemented yet) (default: full)

- `--base BASE`

Based snapshot name for incremental backup. (Not Implemented yet) (default: None)

- `--storage_type {local,nas}`

Storage type of output directory. (default: local)

- `--remote`

Take backup through orion master. (default: True)

- `tscli backup delete *name*` Deletes the named backup.
- `tscli backup ls` List all backups taken by the system.
- `tscli backup restore` Restore cluster using backup.

## backup-policy

```
tscli backup-policy [-h] {create,delete,disable,enable,ls,show,status,update}
```

Use this subcommand to do the following:

- `tscli backup-policy create` Prompts an editor for you to edit the parameters of the backup policy.
- `tscli backup-policy delete name` Deletes the backup policy with `name`.
- `tscli backup-policy disable name` Disables the policy `name`.
- `tscli backup-policy enable name` Enables the policy `name`.
- `tscli backup-policy ls` List backup policies.
- `tscli backup-policy show name` Show the policy `name`.
- `tscli backup-policy status name` Enables the policy `name`.
- `tscli backup-policy update *name*` Prompts an editor for you to edit the policy `name`.

## callhome

```
tscli callhome [-h] {disable,enable,generate-bundle}
```

Use this subcommand to do the following:

- `tscli callhome disable` Turns off the periodic call home feature.
- `tscli callhome enable --customer_name customer_name``

Enables the “call home” feature, which sends usage statistics to ThoughtSpot Support every six hours via the secure file server. Before using this command for the first time, you need to set up the file server connection using `tscli fileserver configure`.

The parameter `customer_name` takes the form `Shared/*`customer_name`*/stats`.

- `tscli callhome generate-bundle -d directory --since DAYS`
  - `--d D` Dest folder where tar file will be created. (default: None)
  - `--since DAYS`

Grab callhome data from this time window in the past. Should be a human readable duration string, e.g. 4h (4 hours), 30m (30 minutes), 1d (1 day). (default: None) Generates a tar file of the cluster metrics and writes it to the specified directory where `DAYS` is how far back you’d like to generate the tar file from in days. For example, 30. If this parameter is not specified, the command will collect stats from the last 15 days by default.

## cluster

```
tscli cluster [-h]
{abort-reinstall-os,check,create,get-config,load,reinstall-os,report,restore,resume-reinstall-os,resume-update,set-config,set-min-resource-spec,show-resource-spec,start,status,stop,update,update-hadoop}
```

Use this subcommand to do the following:

- `tscli cluster abort-reinstall-os` Abort in-progress reinstall.
- `tscli cluster check --includes {all,disk,zookeeper,hdfs,orion-cgroups,orion-oreo}` check the status nodes in the cluster.

You must specify a component to check.

- `tscli cluster create release`

Creates a new cluster from the release file specified by \*release\*. This command is used by ThoughtSpot Support when installing a new cluster, for example, `tscli cluster create 2.0.4.tar.gz`

- `tscli cluster get-config` Get current cluster network and time configuration. Prints JSON configuration to stdout. If for some reason the system cannot be connected to all interfaces, the command returns an error but continues to function.
- `tscli cluster load` Load state from given backup onto existing cluster
- `tscli cluster reinstall-os` Reinstall OS on all nodes of the cluster.
- `tscli cluster report` Generate cluster report.

- `tscli cluster restore --release release_tarball backupdir'`  
Restores a cluster using the backup in the specified directory *backupdir*. If you're restoring from a dataless backup, you must supply the release tarball for the corresponding software release.
- `tscli cluster resume-reinstall-os` Resume in-progress reinstall.
- `tscli cluster resume-update` Resume in-progress updates.
- `tscli cluster set-config` Set cluster network and time configuration. Takes JSON configuration from stdin.
- `tscli cluster set-min-resource-spec` Sets min resource configuration of the cluster
- `tscli cluster show-resource-spec` Prints default or min.
- `tscli cluster start` Start cluster.
- `tscli cluster status` Gives the status of the cluster, including release number, date last updated, number of nodes, pending tables time, and services status.
- `tscli cluster stop` Pauses the cluster (but does not stop storage services).
- `tscli cluster update` Update existing cluster.
- `tscli cluster update-hadoop` Updates Hadoop/Zookeeper on the cluster.

## command

```
tscli command [-h] {run}
```

Command to run a command on all nodes.

```
tscli command run [-h] [--nodes NODES] --dest_dir DEST_DIR [--copyfirst COPYFIRST] [--timeout TIMEOUT] command
```

- `--nodes NODES` Space separated IPs of nodes where you want to run the command. (default: all)
- `--dest_dir DEST_DIR` Directory to save the files containing output from each nodes. (default: None)
- `--copyfirst COPYFIRST` Copy the executable to required nodes first. (default: False)
- `--timeout TIMEOUT` Timeout waiting for the command to finish. (default: 60)

## dr-mirror

```
tscli dr-mirror [-h] {start,status,stop}
```

- `tscli dr-mirror start` Starts a mirror cluster which will continuously recover from a primary cluster.
- `tscli dr-mirror status` Checks whether the current cluster is running in mirror mode.
- `tscli dr-mirror stop` Stops mirroring on the local cluster.

## etl

```
tscli etl [-h] {change-password,disable-lw,download-agent,enable-lw,show-lw}
```

- `tscli etl change-password --admin_username admin_user --username Informatica_user'`

Changes the Informatica Cloud account password used by ThoughtSpot Data Connect.  
Required parameters are:

- `--admin_username admin_user` specifies the Administrator username for ThoughtSpot.
- `--username Informatica_user` specifies the username for the Informatica Cloud.

- `tscli etl disable-lw` Disables ThoughtSpot Data Connect.
  - `tscli etl download-agent` Downloads the ThoughtSpot Data Connect agent to the cluster.
  - `tscli etl enable-lw [-h] --username USERNAME --thoughtspot_url THOUGHTSPOT_URL --admin_username ADMIN_USERNAME [--groupname GROUPNAME] --org_id ORG_ID [--pin_to PIN_TO] [--proxy_host PROXY_HOST] [--proxy_port PROXY_PORT] [--proxy_username PROXY_USERNAME] [--max_wait MAX_WAIT]`
- You should contact ThoughtSpot Support for assistance in setting this up. Required parameters are:
- `--username USERNAME` Username for Informatica Cloud (default: None)
  - `--thoughtspot_url THOUGHTSPOT_URL` URL to reach thoughtspot. (default: None)
  - `--admin_username ADMIN_USERNAME` Admin username for ThoughtSpot (default: None)
  - `--groupname GROUPNAME`
  - `--org_id ORG_ID` specifies the Informatica id of the organization (company). For ThoughtSpot, this is 001ZFA. org\_id shouldn't include the prefix org. For example, if on Informatica cloud, the orgid is Org003XYZ, then use only
  - `--pin_to PIN_TO` specifies the IP address to pin to. If you specify an IP to pin to, that node becomes sticky to the Informatica agent, and will always be used. Defaults to the public IP address of the localhost where this command was run.
  - `--proxy_host PROXY_HOST` Proxy server host for network access (default: )
  - `--proxy_port PROXY_PORT` Proxy server port (default: )
  - `--proxy_username PROXY_USERNAME` Proxy server username (default: )
  - `--max_wait MAX_WAIT` Maximum time in seconds to wait for Data Connect agent to start (default: None)
- `tscli etl show-lw` Shows the status of ThoughtSpot Data Connect. It also returns the Informatica username and OrgId.

## event

```
tscli event [-h] {list}
```

This subcommand has the following actions:

```
tscli event list [-h] [--include INCLUDE] [--since SINCE] [--from FROM] [--to TO] [--limit LIMIT] [--detail] [--summary_contains SUMMARY_CONTAINS] [--detail_contains DETAIL_CONTAINS] [--attributes ATTRIBUTES]
```

- `--include INCLUDE` Options are all, config, notification. Default config. (default: config)
- `--since SINCE` Grab events from this time window in the past. Should be a human readable duration string, e.g. 4h (4 hours), 30m (30 minutes), 1d (1 day). (default: None)
- `--from FROM` Begin timestamp, must be of the form: yyyyymmdd-HH:MM (default: None)
- `--to TO` End timestamp, must be of the form: yyyyymmdd-HH:MM (default: None)
- `--limit LIMIT` Max number of events to fetch. (default: 0)
- `--detail` Print events in detail format. This is not tabular. Default is a tabular summary. (default: False)
- `--summary_contains SUMMARY_CONTAINS` Summary of the event will be checked for this string. Multiple strings to check for can be specified by separating them with | (event returned if it matchesALL). Put single quotes around the param value to prevent undesired glob expansion (default: None)
- `--detail_contains DETAIL_CONTAINS` Details of the event will be checked for this string. Multiple strings to check for can be specified by separating them with | (event returned if it matches ALL). Put single quotes around the param value to prevent undesired glob expansion (default: None)
- `--attributes ATTRIBUTES` Specify attributes to match as key=value. Multiple attributes to check for can be specified by separating them with | (event returned if it matches ALL). Put single quotes around the param value to prevent undesired glob expansion (default: None)

## feature

```
tscli feature [-h] {get-all-config}
```

This subcommand has the following actions:

**tscli feature get-all-config** Gets the configured features in a cluster. The command will return a list of features, such as custom branding, Data Connect, and call home, and tell you whether they are enabled or disabled.

## fileserver

```
tscli fileserver [-h] {configure,download-release,purge-config,show-config,upload}
```

This subcommand has the following actions:

- **tscli fileserver configure [-h] --user *USER* [--password *PASSWORD*]** Configures the secure file server username and password for file upload/download and the call home feature. You only need to issue this command once, to set up the connection to the secure file server. You only need to reissue this command if the password changes. The parameter *PASSWORD* is optional. If a password is not specified, you will be prompted to enter it.
- **tscli fileserver download-release [-h] [--user *USER*] [--password *PASSWORD*] *release*** Downloads the specified release file and its checksum. Specify the release by number, to the second decimal point (e.g. 3.1.0, 3.0.5, etc.). You may optionally specify the --user and --password to bypass the credentials that were specified when configuring the file server connection with **tscli fileserver configure**. Before using this command for the first time, you need to set up the file server connection using **tscli fileserver configure**.
- **tscli fileserver purge-config** Removes the file server configuration.
- **tscli fileserver show-config** Shows the file server configuration.
- **tscli fileserver upload [-h] [--user *USER*] [--password *PASSWORD*] --file\_name *FILE\_NAME\** -server\_dir\_path \**SERVER\_DIR\_PATH*\***

Uploads the file specified to the directory specified on the secure file server. You may optionally specify the --user and --password to bypass the credentials that were specified when configuring the file server connection with **tscli fileserver configure**. Before using this command for the first time, you need to set up the file server connection using **tscli fileserver configure**.

Accepts these flags

- **--user *USER*** Username of fileserver (default: None)
- **--password *PASSWORD*** Password of fileserver (default: None). This is required and the command prompts you for it if you do not supply it.
- **--file\_name *FILE\_NAME\**** Local file that needs to be uploaded (default: None)
- **--server\_dir\_path *SERVER\_DIR\_PATH*** Directory path on fileserver. (default: None) The *SERVER\_DIR\_PATH* parameter specifies the directory to which you want to upload the file. It is based on your customer name, and takes the form /Shared/\*customer\_name\*.

## firewall

```
tscli firewall [-h] {close-ports,disable,enable,open-ports,status}
```

- `tscli firewall close-ports`

Closes given ports through firewall on all nodes. Takes a list of ports to close, comma separated. Only closes ports which were previously opened using “open-ports”. Ignores ports which were not previously opened with “open-ports” or were already closed.

- `tscli firewall disable` Disable firewall.
- `tscli firewall enable` Enable firewall.
- `tscli firewall open-ports *ports*`

Opens given ports through firewall on all nodes. Takes a list of ports to open, comma separated. Ignores ports which are already open. Some essential ports are always kept open (e.g. ssh), they are not affected by this command or by `close-ports`.

- `tscli firewall status` Shows whether firewall is currently enabled or disabled.

## hdfs

```
tscli hdfs [-h] {leave-safemode}
```

This subcommand has the following actions:

`tscli hdfs leave-safemode` Command to get HDFS namenodes out of safemode.

## ldap

```
tscli ldap [-h] {add-cert,configure,purge-configuration}
```

This subcommand has the following actions:

- `tscli ldap add-cert name certificate`  
Adds an SSL certificate for LDAP. Use only if LDAP has been configured without SSL and you wish to add it. Use `*name*` to supply an alias for the certificate you are installing.
- `tscli ldap configure`  
Configures LDAP using an interactive script. You can see detailed instructions for setting up LDAP in [About LDAP integration \(page 0\)](#).
- `tscli ldap purge-configuration` Purges (removes) any existing LDAP configuration.

## logs

```
tscli logs [-h] {collect,runcmd}
```

This subcommand has the following actions:

- `tscli logs collect [-h] [--include INCLUDE] [--exclude EXCLUDE] [--since SINCE] [--from FROM] [--to TO] [--out OUT] [--maxsize MAXSIZE] [--sizeonly] [--nodes NODES]`

Extracts logs from the cluster. Does not include any logs that have been deleted due to log rotation.

These parameters have the following values:

- `--include INCLUDE`

Specifies a comma separated list of logs to include. Each entry is either a “selector” or a glob for matching files. Selectors must be among: all, orion, system, ts. Anything starting with / is assumed to be a glob pattern and interpreted via `find(1)`. Other entries are ignored. Put single quotes around the param value to prevent undesired glob expansion (default: all)

- `--exclude EXCLUDE`

Comma separated list of logs to exclude. Applies to the list selected by --include. Params are interpreted just like in --include (default: None)

- `--since SINCE`

Grab logs from this time window in the past. Should be a human readable duration string, e.g. 4h (4 hours), 30m (30 minutes), 1d (1 day). (default: None)

- `--from FROM` Timestamp where collection begins, must be of the form: yyyy-mm-dd-HH:MM (default: None)
- `--to TO` Timestamp where collection ends, must be of the form: yyyy-mm-dd-HH:MM (default: None)
- `--out OUT` Tarball path for dumping logs from each node (default: /tmp/logs.tar.gz)
- `--maxsize MAXSIZE` Only fetch logs if size is smaller than this value. Can be specified in megabytes/gigabytes, e.g. 100MB, 10GB. (default: None)
- `--sizeonly` Do not collect logs. Just report the size. (default: False)
- `--nodes NODES` Comma separated list of nodes from where to collect logs. Skip this to use all nodes. (default: None)

- `tscli logs runcmd [-h] --cmd CMD [--include INCLUDE] [--exclude EXCLUDE] [--since SINCE] [--from FROM] [--to TO] [--outfile OUTFILE] [--outdir OUTDIR] [--cmd_infmt CMD_INFMT] [--cmd_outfmt CMD_OUTFMT] [--nodes NODES]`

Runs a Unix command on logs in the cluster matching the given constraints. Results are reported as text dumped to standard out, the specified output file, or as tarballs dumped into the specified directory.

- `--cmd CMD`

Unix-Command to be run on the selected logs. Use single quotes to escape spaces etc. Language used to specify CMDSTR has following rules.

- A logfile and its corresponding result file can be referred by keywords SRCFILE & DSTFILE. eg. cp SRCFILE DSTFILE
- Without any reference to DSTFILE in CMDSTR, > DSTFILE will be appended to CMDSTR for output redirection. eg du -sch SRCFILE gets auto-transtalted to du -sch SRCFILE > DSTFILE
- Without any reference to SRCFILE, content of log is streamed to CMDSTR via pipe. eg. tail -n100 | grep ERROR gets auto-transtalted to cat SRCFILE | tail -n100 | grep ERROR > DSTFILE (default: None)

- `--include INCLUDE`

Comma separated list of logs to include,each entry is either a “selector” or a glob for matching files.Selectors must be among: all, orion, system, ts. Anything starting with / is assumed to be a glob pattern and interpreted via `find(1)`. Other entries are ignored. TIP: put single quotes around the param value to prevent undesired glob expansion (default: all)

- `--exclude EXCLUDE`

Comma separated list of logs to exclude. Applies to the list selected by --include. Params are interpreted just like in --include (default: None)

- `--since SINCE`

Grab logs from this time window in the past. Should be a human readable duration string, e.g. 4h (4 hours), 30m (30 minutes), 1d (1 day). (default: None)

- --from *FROM* Timestamp where collection begins, must be of the form: yyyy-mm-dd-HH:MM (default: None)
- --to *TO* Timestamp where collection ends, must be of the form: yyyy-mm-dd-HH:MM (default: None)
- --outfile *OUTFILE* File path for printing all the results. By default printed to stdout (default: None)
- --outdir *OUTDIR* Directory path for dumping results with original dir structure from each node. Used as an alternative to printing output to outfile/stdout (default: None)
- --cmd\_infmt *CMD\_INFMT* Specify if the inputfile should be compressed/uncompressed before running CMD. C=compressed, U=uncompressed. Don't use this flag if CMD works on both (default: None)
- --cmd\_outfmt *CMD\_OUTFMT* Specify if *OUTFILE* generated by CMD will be compressed/uncompressed. C=compressed, U=uncompressed. Don't use this flag if output file will be of same format as input file (default: None)
- --nodes *NODES* Comma separated list of nodes where to run command. Skip this to use all nodes. (default: None)

## map-tiles

```
tscli map-tiles [-h] {disable,enable}
```

This subcommand supports the following actions:

- tscli map-tiles enable [-h] [--online] [--offline] [--tar TAR] [--md5 MD5]
   
Enables ThoughtSpot's map tiles, which are used when constructing geomap charts. If you don't have interest access, you must download the map tiles tar and md5 files. Then you must append the following to the tscli command.
  - --online Download maptiles tar from internet. (default: True)
  - --offline Using maptiles tar from local disk. (default: False)
  - --tar *TAR* Specified tar file for map-tiles. (default: )
  - --md5 *MD5* Specified md5 file for map-tiles. (default: )
- tscli map-tiles disable Disable map-tiles functionality.

## monitoring

```
tscli monitoring [-h] {set-config,show-config}
```

This subcommand has the following actions:

- tscli monitoring set-config [-h] [--email EMAIL] [--clear\_email] [--heartbeat\_interval HEARTBEAT\_INTERVAL] [--heartbeat\_disable] [--report\_interval REPORT\_INTERVAL] [--report\_disable] Sets the monitoring configuration.
  - --email *EMAIL* Comma separated list (no spaces) of email addresses where the cluster will send monitoring information.
  - --clear\_email Disable emails by clearing email configuration. (default: False)
  - --heartbeat\_interval *HEARTBEAT\_INTERVAL* Heartbeat email generation interval in seconds. Should be greater than 0.
  - --heartbeat\_disable Disable heartbeat email generation. (default: False)

- `--report_interval REPORT_INTERVAL` Cluster report email generation interval in seconds. Should be greater than 0.
- `--report_disable` Disable cluster report email generation. (default: False)
- `tscli monitoring show-config` Shows the monitoring configuration.

## nas

```
tscli nas [-h] {ls,mount-cifs,mount-nfs,unmount}
```

This subcommand has the following actions:

- `tscli nas ls [-h]` List mounts managed by NAS mounter service.
- `tscli nas mount-cifs [-h] --server SERVER [--path_on_server PATH_ON_SERVER] --mount_point MOUNT_POINT --username USERNAME --password PASSWORD [--uid UID] [--gid GID] [--options OPTIONS]`

Mounts a CIFS device on all nodes.

- `--server SERVER` IP address or DNS name of CIFS service. For example, 10.20.30.40 (default: None)
- `--path_on_server PATH_ON_SERVER` Filesystem path on the CIFS server to mount (source). For example: /a (default: /)
- `--mount_point MOUNT_POINT`

Directory on all cluster nodes where the NFS filesystem should be mounted (target). This directory does not need to already exist. If this directory already exists, a new directory is not created and the existing directory is used for mounting. For example: /mnt/external (default: None)

- `--username USERNAME` Username to connect to the CIFS filesystem as (default: None)
- `--password PASSWORD` CIFS password for `--username` (default: None)

- `--uid UID`

`UID` that will own all files or directories on the mounted filesystem when the server does not provide ownership information. See `man mount.cifs` for more details. (default: 1001)

- `--gid GID`

`Gid` that will own all files or directories on the mounted filesystem when the server does not provide ownership information. See `man mount.cifs` for more details. (default: 1001)

- `--options OPTIONS` Other command-line options to forward to `mount.cifs` command (default: noexec)

- `tscli nas mount-nfs [-h] --server SERVER [--path_on_server PATH_ON_SERVER] --mount_point MOUNT_POINT [--options OPTIONS]`

Mounts a NFS device on all nodes. Parameters are:

- `--server SERVER` IP address or DNS name of NFS service. For example, 10.20.30.40 (default: None)
- `--path_on_server PATH_ON_SERVER` Filesystem path on the NFS server to mount (source). For example: /a/b/c/d (default: /)
- `--mount_point MOUNT_POINT`

Directory on all cluster nodes where the NFS filesystem should be mounted (target).

This directory does not need to already exist. If this directory already exists, a new directory is not created and the existing directory is used for mounting. For example: /mnt/external (default: None)

- --options OPTIONS Command-line options to forward to mount command (default: noexec).
- tscli nas unmount [-h] --dir *DIR*  
Unmounts all devices from the specified *DIR* (directory) location. This command returns an error if nothing is currently mounted on this directory via tscli nas mount (default: None)

## node

```
tscli node [-h] {check,ls,reinstall-os,status}
```

This subcommand has the following actions:

- tscli node check [-h] [--select {reinstall-preflight}] [--secondary SECONDARY]  
Run checks per node. Takes the following parameters:
  - --select {reinstall-preflight} Select the type of node check (default: reinstall-preflight)
  - --secondary SECONDARY Secondary drive for reinstall-preflight (default: sdd)
- tscli node ls [-h] [--type {all,healthy,not-healthy}] Filter by node state (default: all)
- tscli node reinstall-os [-h] [--secondary SECONDARY] [--cluster] Reinstall OS on a node. This takes the following parameters:
  - --secondary SECONDARY Secondary drive to be used to carry to reinstall (default: sdd)
  - --cluster Is the node part of a cluster (default: False)

## os

```
tscli os [-h] {find-package,list-packages}
```

This subcommand supports the following actions:

- tscli os find-package [-h] *name*

Lists all packages and versions included in the product image whose name contains *name*. Package names you can specify are:

- alert
- backup
- callhome
- cluster
- event
- fileserver
- firewall
- ldap
- logs
- monitoring
- node
- os
- release
- smtp
- snapshot

- ssl
  - storage
  - support
- tscli os list-packages [-h] Lists all packages and versions included in the product image.

## saml

```
tscli saml [-h] {configure,purge-configuration}
```

This subcommand has the following actions:

- tscli saml configure [-h] Configures SAML. To see a list of prerequisites refer to [Configure SAML \(page 0\)](#).
- tscli saml purge-configuration Purges any existing SAML configuration.

## scheduled-pinboards

```
tscli scheduled-pinboards [-h] {disable,enable}
```

This subcommand has the following actions:

- tscli scheduled-pinboards disable [-h] Disable scheduled pinboards for this cluster.
- tscli scheduled-pinboards enable [-h] Enables scheduled pinboards, which is disabled in prod clusters by default.

## smtp

```
tscli smtp [-h]  
{reset-canonical-mapping, set-canonical-mapping, set-mailfromname, set-mailname, set-relayhost, show-canonical-mapping, show-mailfromname, show-mailname, show-relayhost}
```

This subcommand takes supports the following actions:

- tscli smtp reset-canonical-mapping Deletes the current postmap mapping.
- tscli smtp set-canonical-mapping [-h] new\_key new\_value Sets a new Postmap mapping.
- tscli smtp set-mailfromname mailfromname Sets the name, an email address, from which email alerts are sent, for the cluster.
- tscli smtp set-mailname mailname Sets the mailname, a domain, where email alerts are sent, for the cluster.
- tscli smtp set-relayhost [-h] [--force FORCE] relayhost Sets the Relay Host for SMTP (email) sent from the cluster.
  - --force FORCE Set even if relay host is not accessible. (default: False)
- tscli smtp show-canonical-mapping Shows the current postmap mapping.
- tscli smtp show-mailfromname Shows the mailname, from which email alerts are sent, for the cluster.
- tscli smtp show-mailname Shows the mailname, where email alerts are sent, for the cluster.
- tscli smtp show-relayhost Shows the for SMTP (email) sent from the cluster. If there is no Relay Host configured, the command returns NOT FOUND.

## snapshot

```
tscli snapshot [-h] {backup,create,delete,ls,restore,update-ttl}
```

Learn more about snapshots and backups see the [Understand the backup strategies \(page 0\)](#) documentation. This subcommand supports the following actions:

- `tscli snapshot backup [-h] [--mode {full,light,dataless}] [--type {full,incremental}] [--base BASE] [--storage_type {local,nas}] [--remote] name out`

Pull snapshot out as a backup. This takes the following parameters:

- `--mode {full,light,dataless}` Mode of backups. (default: full)
- `name` Name of snapshot to pull out as a backup. To list all snapshots, run `tscli snapshot ls`.
- `out` Directory where backup will be written, must not already exist.
- `--type {full,incremental}` Type of backup.(Incremental backup is not implemented yet) (default: full)
- `--base BASE` Based snapshot name for incremental backup. (Not Implemented yet) (default: None)
- `--storage_type {local,nas}` Storage type of output directory. (default: local)
- `--remote` Take backup through Orion master. (default: True)

- `tscli snapshot create [-h] name reason ttl`

Creates a new snapshot with the `name` and `reason` provided. This command does not accept . (periods), but does accept – (dashes). The `ttl` parameter is the number of days after which this snapshot will be automatically deleted. A value of -1 disables automatic deletion.

- `tscli snapshot delete [-h] name` Deletes the named snapshot.
- `tscli snapshot ls [-h]` List available snapshots.
- `tscli snapshot restore [-h] [--allow_release_change] [--only_service_state] name` Restore cluster to an existing snapshot. This takes the following parameters:

- `--allow_release_change` Allow restoration to a snapshot at a different release. (default: False)
- `--only_service_state` Restore only service state. (default: False)

- `tscli snapshot update-ttl [-h] [--disable DISABLE] name ttl`

Updates manual snapshot garbage collection policy.

- `name` Specifies which snapshot to update.
- `ttl` Extends the manual snapshot `ttl` (time-to-live) value. Use a positive value to increase `ttl`. Use negative value to decrease it.
- `--disable DISABLE` Disable manual snapshot garbage collection. Setting this value to True will override any `ttl` value. (default: False)

## snapshot-policy

```
tscli snapshot-policy [-h] {disable,enable,show,update}
```

This subcommand supports the following actions:

- `tscli snapshot-policy disable [-h]` Disable snapshot policy.

- `tscli snapshot-policy enable -h` Enable specified snapshot policy.
- `tscli snapshot-policy show [-h]` Show snapshot policy.
- `tscli snapshot-policy update [-h] [--config CONFIG]` Update periodic snapshot config.  
This takes the following parameter:
  - `--config CONFIG` Text format of periodic backup policy config (default: None)

## spot

```
tscli spot [-h] {enable}
```

This subcommand supports the following actions:

```
tscli spot [-h] {enable} Enables Spot integration.
```

## ssl

```
tscli ssl [-h]  
{add-cert,clear-min-tls-version,off,on,rm-cert,set-min-tls-version,status,tls-status}
```

`status` Shows whether of SSL authentication is enabled or disabled for the ThoughtSpot application.  
`tls-status` Prints the status of TLS support

This subcommand supports the following actions:

- `tscli ssl add-cert [-h] key certificate` Adds an SSL certificate, key pair.
- `tscli ssl clear-min-tls-version [-h]` Clears any customizations for the minimum TLS version to support.
- `tscli ssl off`  
Disables SSL. Disabling SSL will stop users from seeing a security warning when accessing ThoughtSpot from a browser if there is no SSL certificate installed.
- `tscli ssl on [-h]` If SSL is enabled and there is no certificate, users will see a security warning when accessing ThoughtSpot from a browser.
- `tscli ssl rm-cert` Removes the existing SSL certificate, if any.
- `tscli ssl set-min-tls-version [-h] {1.0,1.1,1.2}` Sets the minimum supported TLS version. Sets the minimum SSL version to be supported by the ThoughtSpot application. Please ensure that client browsers are enabled for this version or newer.
- `tscli ssl status` Shows whether SSL authentication is enabled or disabled.
- `tscli ssl tls-status [-h]` Prints the status of TLS support.

## storage

```
tscli storage [-h] {gc}
```

This subcommand supports the following actions:

```
tscli storage gc [-h] [--log_age LOG_AGE] [--force] [--localhost_only]
```

Garbage collect unused storage. Before issuing this command, you must stop the cluster using `tscli cluster stop`. After garbage collection has completed, you can restart the cluster with `tscli cluster start`. The command frees space in these directories:

- `/tmp`

- /usr/local/scaligent/logs/
- /export/logs/orion
- /export/logs/oreo
- /export/logs/hadoop
- /export/logs/zookeeper
- cores

Accepts these optional flags:

- `--log_age LOG_AGE`

Delete logs older than these many hours. Use a non-zero value ideally. A zero value will cause all temporary files to be deleted, including say those which are just temporarily closed while they are being passed from one component to the next. (default: 4)

- `--force` Forces deletion of all logs and temporary files regardless of age. This must only be run on a stopped cluster. (default: False)
- `--localhost_only` If used, only the logs on the localhost will be removed. If not specified, the command acts on the entire cluster.

## support

```
tscli support [-h]
{restart-remote,rm-admin-email,rm-admin-phone,set-admin-email,set-admin-phone,set-remote,
show-admin-email,show-admin-phone,show-remote,start-remote,stop-remote}
```

This subcommand supports the following actions:

- `tscli support restart-remote` Restarts remote support.
- `tscli support rm-admin-email` Removes the email address for contacting the customer administrator. Replaces it with the default ThoughtSpot Support email address.
- `tscli support rm-admin-phone` Removes the phone number for contacting the customer administrator. Replaces it with the default ThoughtSpot Support phone number.
- `tscli support set-admin-email email` Sets the email address for contacting the customer administrator. If you would like to display a blank email address, issue the command `tscli support set-admin-email ''`.
- `tscli support set-admin-phone phone_number` Sets the phone number for contacting the customer administrator. Specify a phone number using any value (e.g. +1 800-508-7008 Ext. 1). If you would like to display a blank phone number, issue the command `tscli support set-admin-phone`.
- `tscli support set-remote [-h] [--addr ADDR] [--user USER]` Configures the cluster for remote support through SSH tunneling, where `ADDR` is the address of support, e.g. `tunnel.thoughtspot.com`, and `USER` is the support username.
- `tscli support show-admin-email` Shows the email address for customer administrator, if set.
- `tscli support show-admin-phone` Shows the phone number for customer administrator, if set.
- `tscli support show-remote` Shows the status and configuration of remote support.
- `tscli support start-remote` Starts remote support.
- `tscli support stop-remote` Stops remote support.

# Date and time formats reference

This is a references for the date and time contexts and formats you can use with ThoughtSpot. You define data formats in specific contexts and, depending on the context, your choices in data formatting differ. You must understand date and time when you load data in these contexts:

- using data upload from the browser
- through `tsload` command
- through data connect or another extract, transform, load (ETL) tool

Data loading formats do not change how data is displayed in tables and charts.

The context where you *can control* date and time formats is data modeling. Data modeling controls how data is displayed in search and their resulting answers.

## Data loading formats via `tsload`

When loading via the `tsload` command you must specify date and timestamp formats using the format specifications defined in the [strptime library function](#). Data is imported based on the timezone of the node from which `tsload` is run.

For date data types, the default format is `%Y%m%d` which translates to `yearmonthday`. For example, Dec 30th, 2001 is represented as `20011230`. For time and datetime data types, the default is `%Y%m%d %H:%M:%S` which translates to `yearmonthday hour:minute:second`, for example, Dec 30th, 2001 1:15:12 is represented as `20011230 01:15:12`.

## Data modeling formats for browser data upload

These date and time formats are supported in a CSV file when uploading via the browser. You cannot specify the date format; ThoughtSpot will pick the format that fits your data best:

- 1/30/2014
- 2014-01-30
- 2014-1-30
- 30-Jan-2014
- 2014-Jan-30
- 2014-01-30 10:32 AM
- 2014-01-30 14:52
- 2014-01-30 10:32:22
- 2014-01-30 10:32:22 AM
- 2014-01-30 10:32:22.0
- 2014-01-30 10:32:22.0 AM
- 2014-01-30 10:32:22.000
- 2014-01-30 10:32:22.000 AM
- 1/30/2014
- 30-Jan-14
- 01-Mar-02 (assumes 2002)
- 30/1/2014 10:32 AM
- 30/1/2014 14:52
- 30/1/2014 10:32:22
- 30/1/2014 10:32:22 AM
- 30/1/2014 10:32:22.0
- 30/1/2014 10:32:22.0 AM
- 30/1/2014 10:32:22.000
- 30/1/2014 10:32:22.000 AM
- 30-Jan-14 10:32 AM
- 30-Jan-14 14:52
- 30-Jan-14 10:32:22

- 30-Jan-14 10:32:22 AM
- 30-Jan-14 10:32:22.0
- 30-Jan-14 10:32:22.0 AM
- 30-Jan-14 10:32:22.000
- 30-Jan-14 10:32:22.000 AM
- Fri Jan 30 2014 3:26 PM
- Fri Jan 30 2014 13:46
- Fri Jan 30 2014 10:32:22
- Fri Jan 30 2014 10:32:22 AM
- Fri Jan 30 2014 10:32:22.0
- Fri Jan 30 2014 10:32:22.0 AM
- Fri Jan 30 2014 10:32:22.000
- Fri Jan 30 2014 10:32:22.000 AM
- 14:52
- 10:32 AM
- 10:32:22
- 10:32:22 AM
- 10:32:22.0
- 10:32:22.000
- 10:32:22.0 AM
- 10:32:22.000 AM

## Data loading formats via data connect or another ETL tool

Data that is loaded via ETL arrives through ODBC or JDBC connection. After you extract the data from the source and before you load it into ThoughtSpot, you must transform any date or timestamp into a valid format for ThoughtSpot. Once transformed, no explicit data masking is required. See the data integration guide for more details of loading data via ODBC and JDBC.

## Data modeling formats

A user with administrative rights can configure data modeling for data on one or all files. You can set number, date, and currency display formats. These formats define how these value types display in tables and charts. See the Admin Guide for more information about data modeling settings. The following format strings are available for use:

Format mask	Description
YYYY or yyyy	four digit year such as 2017
YY or yy	last two digits of year such as 17
M	month with no leading zero 1-12
MM	Two digit month 01-12
MMM	Three letter month such as Jan
D	Day of year without a leading zero 0-365
DD	Day of year with up to one leading zero 01-365
DDD	Day of year with up to two leading zeroes 001-365

Format mask	Description
d	Day of month with no leading zero 1-31
dd	Two digit day of month 01-31
HH	Two digit 24 hour representation of hour 00-23
hh	Two digit 12 hour representation of hour 01-12
H	24 hour representation of hour with no leading zero 0-23
h	12 hour representation of hour with no leading zero 1-12
mm	Minutes 00-59
m	Minutes with no leading zero 0-59
ss	Seconds 00-59
s	Seconds with no leading zero 0-59
a	AM/PM indicator

Valid delimiters include most non-alphabet characters. This includes but is not limited to:

- \ (forward slash)
- / (backward slash)
- | (pipe symbol)
- : (colon)
- - (dash)
- \_ (underscore)
- = (equal sign)

Examples of valid format masks you can produce for display are as follows:

- MM/dd/yyyy
- MMM
- DD/MM/yyyy
- MM/dd/yyyy HH:mm
- DD/MM/yyyy HH:mm

# Row level security rules reference

ThoughtSpot allows you to create row level security rules using expressions. If an expression evaluates to “true” for a particular row and group combination, that group will be able to see that row. This reference lists the various operators and functions you can use to create rules.

For information on how to use the row level security functions and operators, see [About Rule-Based Row Level Security \(page 0\)](#). There is a special variable called `ts_groups`, which you can use when creating row level security rules. It fetches a list of the groups that the currently logged in user belongs to. For each row, if the expression in the rule evaluates to ‘true’ for any one of these groups, that row will be shown to the user.

You can also see this list of operators and examples from within the Rule Builder by selecting Rule Assistant.

## Conversion functions

These functions can be used to convert data from one data type to another. Conversion to or from date data types is not supported.

Function	Description	Examples
<code>to_bool</code>	Returns the input as a boolean (true or false).	<code>to_bool (0) = false</code> <code>to_bool (married)</code>
<code>to_date</code>	Accepts a date represented as an integer or text string, and a second string parameter that can include strftime date formatting elements. Replaces all the valid strftime date formatting elements with their string counterparts and returns the result. Does not accept epoch formatted dates as input.	<code>to_date (date_sold, '%Y-%m-%d')</code>
<code>to_double</code>	Returns the input as a double.	<code>to_double ('3.14') = 3.14</code> <code>to_double (revenue * .01)</code>
<code>to_integer</code>	Returns the input as an integer.	<code>to_integer ('45') + 1 = 46</code> <code>to_integer (price + tax - cost)</code>
<code>to_string</code>	Returns the input as a text string.	<code>to_string (45 + 1) = '46'</code> <code>to_string (revenue - cost)</code>

## Date functions

Function	Description	Examples
<code>add_days</code>	Returns the result of adding the specified number of	<code>add_days (01/30/2015, 5) = 02/04/2015</code> <code>add_days (invoiced, 30)</code>

Function	Description	Examples
	days to the given date.	
date	Returns the date portion of a given date.	date (home visit)
day	Returns the number (1-31) of the day for the given date.	day (01/15/2014) = 15 day (date ordered)
day_number_of_week	Returns the number (1-7) of the day in a week for the given date with 1 being Monday and 7 being Sunday.	day_number_of_week (01/30/2015) = 6 day_number_of_week (shipped)
day_number_of_year	Returns the number (1-366) of the day in a year for the given date.	day_number_of_year (01/30/2015) = 30 day_number_of_year (invoiced)
day_of_week	Returns the day of the week for the given date.	day_of_week (01/30/2015) = Friday day_of_week (serviced)
diff_days	Subtracts the second date from the first date and returns the result in number of days, rounded down if not exact.	diff_days (01/15/2014, 01/17/2014) = -2 diff_days (purchased, shipped)
diff_time	Subtracts the second date from the first date and returns the result in number of seconds.	diff_time (01/01/2014, 01/01/2014) = -86,400 diff_time (clicked, submitted)
hour_of_day	Returns the hour of the day for the given date.	hour_of_day (received)
is_weekend	Returns true if the given date falls on a Saturday or Sunday.	is_weekend (01/31/2015) = true is_weekend (emailed)
month	Returns the month from the given date.	month (01/15/2014) = January month (date ordered)
month_number	Returns the number (1-12) of the month for the given date.	month_number (09/20/2014) = 9 month_number (purchased)
now	Returns the current timestamp.	now ()
start_of_month	Returns `MMM yyyy` for	start_of_month (01/31/2015) = Jan

Function	Description	Examples
	the first day of the month. Your installation configuration can override this setting so that it returns a different format such as `MM/dd/yyyy`. Speak with your ThoughtSpot administrator if you .	FY 2015 <code>start_of_month (shipped)</code>
<code>start_of_quarter</code>	Returns the date for the first day of the quarter for the given date.	<code>start_of_quarter ( 09/18/2015 ) = Q3 FY 2015</code> <code>start_of_quarter (sold)</code>
<code>start_of_week</code>	Returns the date for the first day of the week for the given date.	<code>start_of_week ( 06/01/2015 ) = 05/30/2015 Week</code> <code>start_of_week (emailed)</code>
<code>start_of_year</code>	Returns the date for the first day of the year for the given date.	<code>start_of_year ( 02/15/2015 ) = FY 2015</code> <code>start_of_year (joined)</code>
<code>time</code>	Returns the time portion of a given date.	<code>time (3/1/2002 10:32) = 10:32</code> <code>time (call began)</code>
<code>year</code>	Returns the year from the given date.	<code>year (01/15/2014) = 2014</code> <code>year (date ordered)</code>

## Mixed functions

These functions can be used with text and numeric data types.

Function	Description	Examples
<code>!=</code>	Returns true if the first value is not equal to the second value.	<code>3 != 2 = true</code> <code>revenue != 1000000</code>
<code>&lt;</code>	Returns true if the first value is less than the second value.	<code>3 &lt; 2 = false</code> <code>revenue &lt; 1000000</code>
<code>&lt;=</code>	Returns true if the first value is less than or equal to the second value.	<code>1 &lt;= 2 = true</code> <code>revenue &lt;= 1000000</code>
<code>=</code>	Returns true if the first value is equal to the second value.	<code>2 = 2 = true</code> <code>revenue = 1000000</code>
<code>&gt;</code>	Returns true if the first value is greater than the second value.	<code>3 &gt; 2 = true</code> <code>revenue &gt; 1000000</code>
<code>&gt;=</code>	Returns true if the first value is greater	<code>3 &gt;= 2 = true</code>

Function	Description	Examples
	than or equal to the second value.	<code>revenue &gt;= 1000000</code>
<code>greatest</code>	Returns the larger of the values.	<code>greatest (20, 10) = 20</code> <code>greatest (q1 revenue, q2 revenue)</code>
<code>least</code>	Returns the smaller of the values.	<code>least (20, 10) = 10</code> <code>least (q1 revenue, q2 revenue)</code>

## Number functions

Function	Description	Examples
<code>?</code>	Returns the result of multiplying both numbers.	<code>3 * 2 = 6</code> <code>price * taxrate</code>
<code>+</code>	Returns the result of adding both numbers.	<code>1 + 2 = 3</code> <code>price + shipping</code>
<code>-</code>	Returns the result of subtracting the second number from the first.	<code>3 - 2 = 1</code> <code>revenue - tax</code>
<code>/</code>	Returns the result of dividing the first number by the second.	<code>6 / 3 = 2</code> <code>markup / retail price</code>
<code>^</code>	Returns the first number raised to the power of the second.	<code>3 ^ 2 = 9</code> <code>width ^ 2</code>
<code>abs</code>	Returns the absolute value.	<code>abs (-10) = 10</code> <code>abs (profit)</code>
<code>acos</code>	Returns the inverse cosine in degrees.	<code>acos (0.5) = 60</code> <code>acos (cos-satellite-angle)</code>
<code>asin</code>	Returns the inverse sine (specified in degrees).	<code>asin (0.5) = 30</code> <code>asin (sin-satellite-angle)</code>
<code>atan</code>	Returns the inverse tangent in degrees.	<code>atan (1) = 45</code> <code>atan (tan-satellite-angle)</code>
<code>atan2</code>	Returns the inverse tangent in degrees.	<code>atan2 (10, 10) = 45</code> <code>atan2 (longitude, latitude)</code>
<code>cbrt</code>	Returns the cube root of a number.	<code>cbrt (27) = 3</code> <code>cbrt (volume)</code>
<code>ceil</code>	Returns the smallest following integer.	<code>ceil (5.9) = 6</code> <code>ceil (growth rate)</code>

Function	Description	Examples
<code>cos</code>	Returns the cosine of an angle (specified in degrees).	<code>cos (63) = 0.45</code> <code>cos (beam angle)</code>
<code>cube</code>	Returns the cube of a number.	<code>cube (3) = 27</code> <code>cube (length)</code>
<code>exp</code>	Returns Euler's number (~2.718) raised to a power.	<code>exp (2) = 7.38905609893</code> <code>exp (growth)</code>
<code>exp2</code>	Returns 2 raised to a power.	<code>exp2 (3) = 8</code> <code>exp2 (growth)</code>
<code>floor</code>	Returns the largest previous integer.	<code>floor (5.1) = 5</code> <code>floor (growth rate)</code>
<code>ln</code>	Returns the natural logarithm.	<code>ln (7.38905609893) = 2</code> <code>ln (distance)</code>
<code>log10</code>	Returns the logarithm with base 10.	<code>log10 (100) = 2</code> <code>log10 (volume)</code>
<code>log2</code>	Returns the logarithm with base 2 (binary logarithm).	<code>log2 (32) = 5</code> <code>log2 (volume)</code>
<code>mod</code>	Returns the remainder of first number divided by the second number.	<code>mod (8, 3) = 2</code> <code>mod (revenue, quantity)</code>
<code>pow</code>	Returns the first number raised to the power of the second number.	<code>pow (5, 2) = 25</code> <code>pow (width, 2)</code>
<code>random</code>	Returns a random number between 0 and 1.	<code>random () = .457718</code> <code>random ()</code>
<code>round</code>	Returns the first number rounded to the second number (the default is 1).	<code>round (35.65, 10) = 40</code> <code>round (battingavg, 100)</code>
<code>safe_divide</code>	Returns the result of dividing the first number by the second. If the second number is 0, returns 0 instead of NaN (not a number).	<code>safe_divide (12, 0) = 0</code> <code>safe_divide (total_cost, units)</code>
<code>sign</code>	Returns +1 if the number is greater than zero, -1 if less than zero, 0 if zero.	<code>sign (-250) = -1</code> <code>sign (growth rate)</code>
<code>sin</code>	Returns the sine of an angle (specified in degrees).	<code>sin (35) = 0.57</code> <code>sin (beam angle)</code>

Function	Description	Examples
spherical_distance	Returns the distance in km between two points on Earth.	spherical_distance (37.465191, -122.153617, 37.421962, -122.142174) = 4,961.96 spherical_distance (start_latitude, start_longitude, start_latitude, start_longitude)
sq	Returns the square of a numeric value.	sq (9) = 81 sq (width)
sqrt	Returns the square root.	sqrt (9) = 3 sqrt (area)
tan	Returns the tangent of an angle (specified in degrees).	tan (35) = 0.7 tan (beam angle)

## Operators

Operator	Description	Examples
and	Returns true when both conditions are true, otherwise returns false.	(1 = 1) and (3 > 2) = true lastname = 'smith' and state ='texas'
if...then...else	Conditional operator.	if (3 > 2) then 'bigger' else 'not bigger' if (cost > 500) then 'flag' else 'approve'
ifnull	Returns the first value if it is not null, otherwise returns the second.	ifnull (cost, 'unknown')
isnull	Returns true if the value is null.	isnull (phone)
not	Returns true if the condition is false, otherwise returns false.	not (3 > 2) = false not (state = 'texas')
or	Returns true when either condition is true, otherwise returns false.	(1 = 5) or (3 > 2) = true state = 'california' or state ='oregon'

# Text functions

Function	Description	Examples
concat	Returns the one or more values as a concatenated text string. Be sure to use single quotes instead of double quotes around each of the strings.	<pre>concat ('hay' , 'stack') = 'haystack' concat (last_name , first_name)</pre>
contains	Returns true if the first string contains the second string, otherwise returns false.	<pre>contains ('broomstick', 'room') = true contains (product, 'trial version')</pre>
edit_distance	Accepts two text strings. Returns the edit distance (minimum number of operations required to transform one string into the other) as an integer. Works with strings under 1023 characters.	<pre>edit_distance ('attorney', 'atty') = 4 edit_distance (color, 'red')</pre>
edit_distance_with_cap	Accepts two text strings and an integer to specify the upper limit cap for the edit distance (minimum number of operations required to transform one string into the other). If the edit distance is less than or equal to the specified cap, returns the edit distance. If it is higher than the cap, returns the cap plus 1. Works with strings under 1023 characters.	<pre>edit_distance_with_cap ('pokemon go', 'minecraft pixelmon', 3) = 4 edit_distance_with_cap (event, 'burning man', 3)</pre>
similar_to	Accepts a document text string and a search text string. Returns true if relevance score (0-100) of the search string with respect to the document is greater than or equal to 20. Relevance is based on edit distance, number of words in the query, and length of words in the query which are present in the document.	<pre>similar_to ('hello world', 'hello swirl') = true similar_to (current team, drafted by)</pre>
similarity	Accepts a document text string and a search text string. Returns the relevance score (0-100) of the search string with respect to the	<pre>similarity ('where is the burning man concert', 'burning man') = 46 similarity (tweet1, tweet2)</pre>

Function	Description	Examples
	document. Relevance is based on edit distance, number of words in the query, and length of words in the query which are present in the document. If the two strings are an exact match, returns 100.	
spells_like	Accepts two text strings. Returns true if they are spelled similarly and false if they are not. Works with strings under 1023 characters.	<code>spells_like ('thouhgtpot', 'thoughtspot') = true spells_like (studio, distributor)</code>
strlen	Returns the length of the text.	<code>strlen ('smith') = 5 strlen (lastname)</code>
strpos	Returns the numeric position (starting from 0) of the first occurrence of the second string in the first string, or -1 if not found.	<code>strpos ('haystack_with_needles', 'needle') = 14 strpos (complaint, 'lawyer')</code>
substr	Returns the portion of the given string, beginning at the location specified (starting from 0), and of the given length.	<code>substr ('persnickety', 3, 7) = snicket substr (lastname, 0, 5)</code>

## Variables

These variables can be used in your expressions.

Function	Description	Examples
ts_groups	Returns the list all the groups the current logged in user belongs to. For any row, if the expression evaluates to true for any of the groups, the user can see that row.	<code>ts_groups = east</code>

# Formula reference

ThoughtSpot allows you to create derived columns in worksheets using formulas. This reference lists the various operators and functions you can use to create formulas.

You can also see this list of operators and examples from within the Formula Builder by selecting **Formula Assistant**.

## Aggregate functions

These functions can be used to aggregate data.

Function	Description	Examples
average	Returns the average of all the values of a column.	average (revenue)
count	Returns the number of rows in the table containing the column.	count (product)
cumulative_average	Takes a measure and one or more attributes. Returns the average of the measure, accumulated by the attribute(s) in the order specified.	cumulative_average (revenue, order date, state)
cumulative_max	Takes a measure and one or more attributes. Returns the maximum of the measure, accumulated by the attribute(s) in the order specified.	cumulative_max (revenue, state)
cumulative_min	Takes a measure and one or more attributes. Returns the minimum of the measure, accumulated by the attribute(s) in the order specified.	cumulative_min (revenue, campaign)
cumulative_sum	Takes a measure and one or more attributes. Returns the sum of the measure, accumulated by the attribute(s) in the order specified.	cumulative_sum (revenue, order date)
group_average	Takes a measure and one or more attributes. Returns the average of the measure grouped by the attribute(s).	group_average (revenue, customer region, state)
group_count	Takes a measure and one or more attributes. Returns the count of the measure grouped by the attribute(s).	group_count (revenue, customer region)
group_max	Takes a measure and one or more attributes. Returns the maximum of the measure grouped by the attribute(s).	group_max (revenue, customer region)
group_min	Takes a measure and one or more attributes. Returns the minimum of the measure grouped by the attribute(s).	group_min (revenue, customer region)

Function	Description	Examples
group_stddev	Takes a measure and one or more attributes. Returns the standard deviation of the measure grouped by the attribute(s).	group_stddev (revenue, customer region)
group_sum	Takes a measure and one or more attributes. Returns the sum of the measure grouped by the attribute(s).	group_sum (revenue, customer region)
group_unique_count	Takes a measure and one or more attributes. Returns the unique count of the measure grouped by the attribute(s).	group_unique_count (product , supplier)
group_variance	Takes a measure and one or more attributes. Returns the variance of the measure grouped by the attribute(s).	group_variance (revenue, customer region)
max	Returns the maximum value of a column.	max (sales)
min	Returns the minimum value of a column.	min (revenue)
moving_average	Takes a measure, two integers to define the window to aggregate over, and one or more attributes. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, "1,1" will have a window size of 3. To define a window that begins before Current, specify a negative number for Num2. Returns the average of the measure over the given window. The attributes are the ordering columns used to compute the moving average.	moving_average (revenue, 2, 1, customer region)
moving_max	Takes a measure, two integers to define the window to aggregate over, and one or more attributes. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, "1,1" will have a window size of 3. To define a window that begins before Current, specify a negative number for Num2. Returns the maximum of the measure over the given window. The attributes are the ordering columns used to compute the moving maximum.	moving_max (complaints, 1, 2, store name)
moving_min	Takes a measure, two integers to define the window to aggregate over, and one or more attributes. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, "1,1" will have a window size of 3. To define a window that begins before Current, specify a negative number for Num2. Returns the minimum of the measure over the given window. The attributes are the ordering columns used to compute the moving minimum.	moving_min (defects, 3, 1, product)

Function	Description	Examples
moving_sum	Takes a measure, two integers to define the window to aggregate over, and one or more attributes. The window is (current - Num1...Current + Num2) with both end points being included in the window. For example, "1,1" will have a window size of 3. To define a window that begins before Current, specify a negative number for Num2. Returns the sum of the measure over the given window. The attributes are the ordering columns used to compute the moving sum.	moving_sum (revenue, 1, 1, order date)
stddev	Returns the standard deviation of all values of a column.	stddev (revenue)
sum	Returns the sum of all the values of a column.	sum (revenue)
unique count	Returns the number of unique values of a column.	unique count (customer)
variance	Returns the variance of all the values of a column.	variance (revenue)

## Conversion functions

These functions can be used to convert data from one data type to another. Conversion to or from date data types is not supported.

Function	Description	Examples
to_bool	Returns the input as a boolean (true or false).	to_bool (0) = false to_bool (married)
to_date	Accepts a date represented as an integer or text string, and a second string parameter that can include strftime date formatting elements. Replaces all the valid strftime date formatting elements with their string counterparts and returns the result. Does not accept epoch formatted dates as input.	to_date (date_sold, '%Y-%m-%d')
to_double	Returns the input as a double.	to_double ('3.14') = 3.14 to_double (revenue * .01)
to_integer	Returns the input as an integer.	to_integer ('45') + 1 = 46 to_integer (price + tax - cost)
to_string	Returns the input as a text string.	to_string (45 + 1) = '46' to_string (revenue - cost)

## Date functions

Function	Description	Examples
add_days	Returns the result of adding the specified number of days to the given date.	add_days (01/30/2015, 5) = 02/04/2015 add_days (invoiced, 30)
date	Returns the date portion of a given date.	date (home visit)
day	Returns the number (1-31) of the day for the given date.	day (01/15/2014) = 15 day (date ordered)
day_number_of_week	Returns the number (1-7) of the day in a week for the given date with 1 being Monday and 7 being Sunday.	day_number_of_week (01/30/2015) = 6 day_number_of_week (shipped)
day_number_of_year	Returns the number (1-366) of the day in a year for the given date.	day_number_of_year (01/30/2015) = 30 day_number_of_year (invoiced)
day_of_week	Returns the day of the week for the given date.	day_of_week (01/30/2015) = Friday day_of_week (serviced)
diff_days	Subtracts the second date from the first date and returns the result in number of days, rounded down if not exact.	diff_days (01/15/2014, 01/17/2014) = -2 diff_days (purchased, shipped)
diff_time	Subtracts the second date from the first date and returns the result in number of seconds.	diff_time (01/01/2014, 01/01/2014) = -86,400 diff_time (clicked, submitted)
hour_of_day	Returns the hour of the day for the given date.	hour_of_day (received)
is_weekend	Returns true if the given date falls on a Saturday or Sunday.	is_weekend (01/31/2015) = true is_weekend (emailed)
month	Returns the month from the given date.	month (01/15/2014) = January month (date ordered)

Function	Description	Examples
<code>month_number</code>	Returns the number (1-12) of the month for the given date.	<code>month_number (09/20/2014) = 9</code> <code>month_number (purchased)</code>
<code>now</code>	Returns the current time-stamp.	<code>now ()</code>
<code>start_of_month</code>	Returns `MMM yyyy` for the first day of the month. Your installation configuration can override this setting so that it returns a different format such as `MM/dd/yyyy`. Speak with your ThoughtSpot administrator if you .	<code>start_of_month ( 01/31/2015 ) = Jan FY 2015</code> <code>start_of_month (shipped)</code>
<code>start_of_quarter</code>	Returns the date for the first day of the quarter for the given date.	<code>start_of_quarter ( 09/18/2015 ) = Q3 FY 2015</code> <code>start_of_quarter (sold)</code>
<code>start_of_week</code>	Returns the date for the first day of the week for the given date.	<code>start_of_week ( 06/01/2015 ) = 05/30/2015 Week</code> <code>start_of_week (emailed)</code>
<code>start_of_year</code>	Returns the date for the first day of the year for the given date.	<code>start_of_year ( 02/15/2015 ) = FY 2015</code> <code>start_of_year (joined)</code>
<code>time</code>	Returns the time portion of a given date.	<code>time (3/1/2002 10:32) = 10:32</code> <code>time (call began)</code>
<code>year</code>	Returns the year from the given date.	<code>year (01/15/2014) = 2014</code> <code>year (date ordered)</code>

## Mixed functions

These functions can be used with text and numeric data types.

Function	Description	Examples
<code>!=</code>	Returns true if the first value is not equal to the second value.	<code>3 != 2 = true</code> <code>revenue != 1000000</code>
<code>&lt;</code>	Returns true if the first value is less than the second value.	<code>3 &lt; 2 = false</code> <code>revenue &lt; 1000000</code>
<code>&lt;=</code>	Returns true if the first value is less than or equal to the second value.	<code>1 &lt;= 2 = true</code> <code>revenue &lt;= 1000000</code>

Function	Description	Examples
=	Returns true if the first value is equal to the second value.	<code>2 = 2 = true</code> <code>revenue = 1000000</code>
>	Returns true if the first value is greater than the second value.	<code>3 &gt; 2 = true</code> <code>revenue &gt; 1000000</code>
>=	Returns true if the first value is greater than or equal to the second value.	<code>3 &gt;= 2 = true</code> <code>revenue &gt;= 1000000</code>
greatest	Returns the larger of the values.	<code>greatest (20, 10) = 20</code> <code>greatest (q1 revenue, q2 revenue)</code>
least	Returns the smaller of the values.	<code>least (20, 10) = 10</code> <code>least (q1 revenue, q2 revenue)</code>

## Number functions

Function	Description	Examples
?	Returns the result of multiplying both numbers.	<code>3 * 2 = 6</code> <code>price * taxrate</code>
+	Returns the result of adding both numbers.	<code>1 + 2 = 3</code> <code>price + shipping</code>
-	Returns the result of subtracting the second number from the first.	<code>3 - 2 = 1</code> <code>revenue - tax</code>
/	Returns the result of dividing the first number by the second.	<code>6 / 3 = 2</code> <code>markup / retail price</code>
^	Returns the first number raised to the power of the second.	<code>3 ^ 2 = 9</code> <code>width ^ 2</code>
abs	Returns the absolute value.	<code>abs (-10) = 10</code> <code>abs (profit)</code>
acos	Returns the inverse cosine in degrees.	<code>acos (0.5) = 60</code> <code>acos (cos-satellite-angle)</code>
asin	Returns the inverse sine (specified in degrees).	<code>asin (0.5) = 30</code> <code>asin (sin-satellite-angle)</code>
atan	Returns the inverse tangent in degrees.	<code>atan (1) = 45</code> <code>atan (tan-satellite-angle)</code>
atan2	Returns the inverse tangent in degrees.	<code>atan2 (10, 10) = 45</code> <code>atan2 (longitude, latitude)</code>

Function	Description	Examples
<code>cbrt</code>	Returns the cube root of a number.	<code>cbrt (27) = 3</code> <code>cbrt (volume)</code>
<code>ceil</code>	Returns the smallest following integer.	<code>ceil (5.9) = 6</code> <code>ceil (growth rate)</code>
<code>cos</code>	Returns the cosine of an angle (specified in degrees).	<code>cos (63) = 0.45</code> <code>cos (beam angle)</code>
<code>cube</code>	Returns the cube of a number.	<code>cube (3) = 27</code> <code>cube (length)</code>
<code>exp</code>	Returns Euler's number (~2.718) raised to a power.	<code>exp (2) = 7.38905609893</code> <code>exp (growth)</code>
<code>exp2</code>	Returns 2 raised to a power.	<code>exp2 (3) = 8</code> <code>exp2 (growth)</code>
<code>floor</code>	Returns the largest previous integer.	<code>floor (5.1) = 5</code> <code>floor (growth rate)</code>
<code>ln</code>	Returns the natural logarithm.	<code>ln (7.38905609893) = 2</code> <code>ln (distance)</code>
<code>log10</code>	Returns the logarithm with base 10.	<code>log10 (100) = 2</code> <code>log10 (volume)</code>
<code>log2</code>	Returns the logarithm with base 2 (binary logarithm).	<code>log2 (32) = 5</code> <code>log2 (volume)</code>
<code>mod</code>	Returns the remainder of first number divided by the second number.	<code>mod (8, 3) = 2</code> <code>mod (revenue, quantity)</code>
<code>pow</code>	Returns the first number raised to the power of the second number.	<code>pow (5, 2) = 25</code> <code>pow (width, 2)</code>
<code>random</code>	Returns a random number between 0 and 1.	<code>random () = .457718</code> <code>random ()</code>
<code>round</code>	Returns the first number rounded to the second number (the default is 1).	<code>round (35.65, 10) = 40</code> <code>round (battingavg, 100)</code>
<code>safe_divide</code>	Returns the result of dividing the first number by the second. If the second number is 0, returns 0 instead of NaN (not a number).	<code>safe_divide (12, 0) = 0</code> <code>safe_divide (total_cost, units)</code>
<code>sign</code>	Returns +1 if the number is greater than 0, -1 if less than 0, and 0 if equal to 0.	<code>sign (-250) = -1</code>

Function	Description	Examples
	than zero, -1 if less than zero, 0 if zero.	<code>sign (growth rate)</code>
<code>sin</code>	Returns the sine of an angle (specified in degrees).	<code>sin (35) = 0.57</code> <code>sin (beam angle)</code>
<code>spherical_distance</code>	Returns the distance in km between two points on Earth.	<code>spherical_distance (37.465191, -122.153617, 37.421962, -122.142174) = 4,961.96</code> <code>spherical_distance (start_latitude, start_longitude, start_latitude, start_longitude)</code>
<code>sq</code>	Returns the square of a numeric value.	<code>sq (9) = 81</code> <code>sq (width)</code>
<code>sqrt</code>	Returns the square root.	<code>sqrt (9) = 3</code> <code>sqrt (area)</code>
<code>tan</code>	Returns the tangent of an angle (specified in degrees).	<code>tan (35) = 0.7</code> <code>tan (beam angle)</code>

## Operators

Operator	Description	Examples
<code>and</code>	Returns true when both conditions are true, otherwise returns false.	<code>(1 = 1) and (3 &gt; 2) = true</code> <code>lastname = 'smith' and state = 'texas'</code>
<code>if...then...else</code>	Conditional operator.	<code>if (3 &gt; 2) then 'bigger' else 'not bigger'</code> <code>if (cost &gt; 500) then 'flag' else 'approve'</code>
<code>ifnull</code>	Returns the first value if it is not null, otherwise returns the second.	<code>ifnull (cost, 'unknown')</code>
<code>isnull</code>	Returns true if the value is null.	<code>isnull (phone)</code>
<code>not</code>	Returns true if the condition is false, otherwise returns false.	<code>not (3 &gt; 2) = false</code> <code>not (state = 'texas')</code>
<code>or</code>	Returns true when either condition is true, otherwise returns false.	<code>(1 = 5) or (3 &gt; 2) = true</code> <code>state = 'california' or state = 'oregon'</code>

# Text functions

Function	Description	Examples
concat	Returns the one or more values as a concatenated text string. Be sure to use single quotes instead of double quotes around each of the strings.	<pre>concat ('hay' , 'stack') = 'haystack' concat (last_name , first_name)</pre>
contains	Returns true if the first string contains the second string, otherwise returns false.	<pre>contains ('broomstick', 'room') = true contains (product, 'trial version')</pre>
edit_distance	Accepts two text strings. Returns the edit distance (minimum number of operations required to transform one string into the other) as an integer. Works with strings under 1023 characters.	<pre>edit_distance ('attorney', 'atty') = 4 edit_distance (color, 'red')</pre>
edit_distance_with_cap	Accepts two text strings and an integer to specify the upper limit cap for the edit distance (minimum number of operations required to transform one string into the other). If the edit distance is less than or equal to the specified cap, returns the edit distance. If it is higher than the cap, returns the cap plus 1. Works with strings under 1023 characters.	<pre>edit_distance_with_cap ('pokemon go', 'minecraft pixelmon', 3) = 4 edit_distance_with_cap (event, 'burning man', 3)</pre>
similar_to	Accepts a document text string and a search text string. Returns true if relevance score (0-100) of the search string with respect to the document is greater than or equal to 20. Relevance is based on edit distance, number of words in the query, and length of words in the query which are present in the document.	<pre>similar_to ('hello world', 'hello swirl') = true similar_to (current team, drafted by)</pre>
similarity	Accepts a document text string and a search text string. Returns the relevance score (0-100) of the search string with respect to the	<pre>similarity ('where is the burning man concert', 'burning man') = 46 similarity (tweet1, tweet2)</pre>

Function	Description	Examples
	document. Relevance is based on edit distance, number of words in the query, and length of words in the query which are present in the document. If the two strings are an exact match, returns 100.	
spells_like	Accepts two text strings. Returns true if they are spelled similarly and false if they are not. Works with strings under 1023 characters.	<code>spells_like ('thouhgtspot', 'thoughtspot') = true spells_like (studio, distributor)</code>
strlen	Returns the length of the text.	<code>strlen ('smith') = 5 strlen (lastname)</code>
strpos	Returns the numeric position (starting from 0) of the first occurrence of the second string in the first string, or -1 if not found.	<code>strpos ('haystack_with_needles', 'needle') = 14 strpos (complaint, 'lawyer')</code>
substr	Returns the portion of the given string, beginning at the location specified (starting from 0), and of the given length.	<code>substr ('persnickety', 3, 7) = snicket substr (lastname, 0, 5)</code>

# Error code reference

## Summary: List of error codes and messages.

This section lists error codes that can appear in ThoughtSpot, with summary information and actions to take. Error codes and messages are shown in ThoughtSpot when something goes wrong. These messages can appear in the application and in logs.

When you see an error code, you will also see a message with a brief summary of what has happened. If there is a remediation action you can take, it will be listed in this references. If there is no action listed, please contact ThoughtSpot Support.

Tip: Only the base code number is listed for each error. So keep this in mind when searching through these codes. For example, error code TS-00125 is simply listed as 125.

## Metadata Errors (100 - 499)

Code	Severity	Summary	Details	Action
TS-100	INFO	Success. {1} has been added to {2}. # {1} - name of visualization # {2} - {name/link to pinboard}	None	None
TS-101	ERROR	Failure adding {1} to {2}	Visualization could not be added to {2} # {1} - name of visualization # {2} - name/link to pinboard	None
TS-102	ERROR	Failure adding {1} to {2} due to corruption	{1} could not be added to {2} as the pinboard has one or more invalid visualizations	Please try again after removing the invalid visualization(s) from {2} # {1} - name of visualization # {2} - name/link to pinboard
TS-103	INFO	Success. Visualization has been deleted from {1}. 1 - name/link to pinboard	None	None
TS-104	ERROR	Failure deleting visual from {1}	Visualization could not be deleted from the pinboard. 1 - name/link to pinboard	None
TS-105	ERROR	Failure deleting visual from {1} due to corruption	Visualization could not be deleted from {1} as the pinboard has one or more	Please try again after removing the invalid visualization(s) from the pin-

Code	Severity	Summary	Details	Action
			invalid visualizations. 1 - name/link to pinboard	board
TS-106	INFO	Success. {1} created successfully. 1 - name/link to pin-board	None	None
TS-107	ERROR	Failure creating {1}. 1 - name/link to pin-board	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-108	INFO	Sticker created successfully.	None	None
TS-109	ERROR	Failure creating the sticker.	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-110	INFO	Sticker deleted successfully.	None	None
TS-111	ERROR	Failure deleting sticker.	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-112	INFO	Pinboards deleted successfully.	None	None
TS-113	ERROR	Failure deleting pin-boards	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-114	INFO	Answers deleted successfully.	None	None
TS-115	ERROR	Failure deleting answers	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-116	INFO	Tables deleted successfully.	None	None
TS-117	ERROR	Failure deleting tables	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None

Code	Severity	Summary	Details	Action
minEmail}.				
TS-118	INFO	Relationship created successfully.	None	None
TS-119	ERROR	Failure creating relationship	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-120	INFO	Relationship updated successfully.	None	None
TS-121	ERROR	Failure updating the relationship	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-122	INFO	Relationship deleted successfully.	None	None
TS-123	ERROR	Failure deleting the relationship	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-124	ERROR	Failure fetching details for table	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-125	ERROR	Failure fetching details for the tables	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-126	ERROR	Failure fetching details for datasource	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-127	ERROR	Failure fetching details for datasources	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-128	ERROR	Failure fetching details for metadata items	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None

Code	Severity	Summary	Details	Action
TS-129	ERROR	Failure opening the answer	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-130	ERROR	Failure opening the pinboard	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-131	ERROR	Failure opening the worksheet	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-132	INFO	Table saved successfully.	None	None
TS-133	ERROR	There was a problem saving the table	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-134	INFO	Visualization update successful	None	None
TS-135	ERROR	Visualization failed to update	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-136	INFO	{1} saved 1 - name of answer	None	None
TS-137	ERROR	{1} could not be saved 1 - name of answer	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-138	INFO	{1} saved 1 - name of pinboard / link	None	None
TS-139	ERROR	{1} could not be saved 1 - name of pinboard / link	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-140	INFO	{1} saved 1 - name of worksheet	None	None
TS-141	ERROR	{1} could not be	Uh oh. We're not sure	None

Code	Severity	Summary	Details	Action
		saved 1 - name of worksheet	what happened. Please email the trace file to {adminEmail}.	
TS-142	INFO	{1} saved 1 - name of answer	None	None
TS-143	ERROR	{1} could not be saved	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}. 1 - name of answer	None
TS-144	INFO	{1} saved 1 - name/link to pinboard	None	None
TS-145	ERROR	{1} could not be saved	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}. 1 - name of pinboard	None
TS-146	INFO	Worksheet saved	None	None
TS-147	ERROR	Worksheet could not be saved	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-148	INFO	Sticker updated	None	None
TS-149	ERROR	The sticker could not be updated	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-150	INFO	Successfully assigned sticker	None	None
TS-151	ERROR	The sticker could not be assigned	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-152	INFO	Successfully unassigned sticker	None	None
TS-153	ERROR	The sticker could not be unassigned	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None

Code	Severity	Summary	Details	Action
TS-154	ERROR	Failed to fetch metadata list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-155	ERROR	Failed to fetch table list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-156	ERROR	Failed to fetch relationship list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-157	ERROR	Failed to fetch answer list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-158	ERROR	Failed to fetch pin-board list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-159	ERROR	Failed to fetch worksheet list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-160	ERROR	Failed to fetch aggregated worksheet list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-161	ERROR	Failed to fetch imported data list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-162	ERROR	Failed to fetch system table list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-163	ERROR	Failed to DB view list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-164	ERROR	Failed to fetch data source list	Uh oh. We're not sure what happened. Please	None

Code	Severity	Summary	Details	Action
			email the trace file to {adminEmail}.	
TS-165	ERROR	Failed to fetch column list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-166	ERROR	Failed to label list	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-167	ERROR	Failed to fetch answer	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-168	ERROR	Failed to fetch worksheet	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-169	INFO	Aggregated worksheet {1} created 1 - name of aggregated worksheet	None	None
TS-170	ERROR	Failure creating Aggregated Worksheet.	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-171	INFO	{1} updated 1 - name of aggregated worksheet	None	None
TS-172	ERROR	{1} failed to update 1 - name of aggregated worksheet	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-173	ERROR	{1} failed to update 1 - name of the formula	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-174	ERROR	Comments cannot be fetched	Failed to save client state	None
TS-175	ERROR	Comment cannot	Uh oh. We're not sure	None

Code	Severity	Summary	Details	Action
		be created	what happened. Please email the trace file to {adminEmail}.	
TS-176	ERROR	Comment cannot be updated	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-177	ERROR	Comment cannot be deleted	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-178	INFO	Rule saved successfully	None	None
TS-179	ERROR	Rule could not be saved	We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-180	INFO	Rule deleted successfully	None	None
TS-181	ERROR	Rule could not be deleted	We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-182	INFO	Item deleted successfully.	None	None
TS-183	ERROR	Item could not be deleted.	We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-184	INFO	Related link created successfully.	None	None
TS-185	ERROR	Related link could not be created.	Uh oh. We're not sure what happened. Please click 'Report Problem' to email a report to your administrator, {adminEmail}.	None
TS-186	INFO	Related link updated successfully.	None	None
TS-187	ERROR	Related link could not be updated.	Uh oh. We're not sure what happened. Please click 'Report Problem' to email a report to your ad-	None

Code	Severity	Summary	Details	Action
ministrator, {adminEmail}.				
TS-188	INFO	Related link deleted successfully.	None	None
TS-189	ERROR	Related link could not be deleted.	Uh oh. We're not sure what happened. Please click 'Report Problem' to email a report to your administrator, {adminEmail}.	None
TS-190	INFO	Related link detail fetched successfully.	None	None
TS-191	ERROR	Related link detail could not be fetched.	Uh oh. We're not sure what happened. Please click 'Report Problem' to email a report to your administrator, {adminEmail}.	None

## Data Service Errors (500 - 699)

Code	Severity	Summary	Details	Action
TS-500	ERROR	Failed to fetch leaf level data	Failed to fetch leaf level data.	None
TS-501	ERROR	Failed to fetch excel data	Failed to fetch excel data.	None
TS-502	ERROR	Failed to fetch visualization data	Failed to fetch visuzliation data.	None
TS-503	ERROR	Failed to fetch visualizations data	Failed to fetch data for visualizations.	None
TS-504	ERROR	Failed to fetch chart data	Failed to fetch table data.	None
TS-505	ERROR	Failed to fetch table data	Failed to fetch table data.	None
TS-506	ERROR	Failed to fetch worksheet data	Failed to fetch worksheet data.	None
TS-507	ERROR	Failed to fetch filter data	Failed to fetch filter data.	None

Code	Severity	Summary	Details	Action
TS-508	ERROR	Failed to fetch headline data	Failed to fetch filter data.	None
TS-509	ERROR	Failed to fetch natural query	Failed to fetch natural query.	None
TS-510	INFO	File upload successful	None	None
TS-511	ERROR	Failed to upload file	Failed to upload	None
TS-512	ERROR	The pinboard data could not be exported to pdf.	Uh oh. We're not sure what happened. Please click 'Report Problem' to email a report to your administrator, {adminEmail}.	None

## Dependency Errors (700 - 799)

Code	Severity	Summary	Details	Action
TS-700	ERROR	Failure fetching table dependents	Failed to fetch dependents for the table.	None
TS-701	ERROR	Failure fetching column dependents	Failed to fetch dependents for the column.	None
TS-702	ERROR	Failure fetching incomplete items	Failed to fetch incomplete items.	None

## Admin Service Errors (800 - 899)

Code	Severity	Summary	Details	Action
TS-800	ERROR	Failure fetching MemCache stats	Failed to fetch MemCache stats.	None
TS-801	ERROR	Failure MemCache Clear	Failed to clear MemCache.	None
TS-802	ERROR	Failure searching from MemCache	Failed to search from MemCache.	None
TS-803	ERROR	Failure fetching Loggers	Failed to fetch Loggers.	None
TS-804	ERROR	Failure setting LogLevel	Failed to set Log Level.	None
TS-805	ERROR	Failure getting debug info	Failed to get debug info.	None

Code	Severity	Summary	Details	Action
TS-806	INFO	Memcache cleared successfully	None	None
TS-807	INFO	Log level set successfully	None	None
TS-808	ERROR	Failed to report problem	None	None
TS-809	INFO	Problem reported successfully	None	None

## Permissions Errors (900 - 999)

Code	Severity	Summary	Details	Action
TS-900	ERROR	Failure fetching table permissions	Failed to fetch table permissions.	None
TS-901	ERROR	Failure fetching answer permissions	Failed to fetch answer permissions.	None
TS-902	ERROR	Failure fetching pinboard permissions	Failed to fetch pinboard permissions.	None
TS-903	ERROR	Failure getting metadata permissions	Failed to get metadata permissions.	None

## Import Data Errors (1000 - 1099)

Code	Severity	Summary	Details	Action
TS-1000	ERROR	Data caching failed	Data caching failed.	None
TS-1001	ERROR	Read Columns failed.	Failed to read columns.	None
TS-1002	ERROR	Failed to read keys.	Failed to read keys.	None
TS-1003	ERROR	Failed to read relationships.	Failed to read relationships.	None
TS-1004	ERROR	Failed to load data.	Failed to load data.	None
TS-1005	ERROR	Failed to create table.	Failed to create table.	None
TS-1006	ERROR	Failed to fetch data rows.	Failed to fetch data rows.	None
TS-1007	ERROR	Failed to delete files.	Failed to fetch data rows.	None
TS-1008	ERROR	Failed to abort create table.	Failed to abort create table.	None

Code	Severity	Summary	Details	Action
TS-1009	ERROR	Failed to create schema.	Failed to create schema.	None
TS-1010	ERROR	Failed to fetch table models.	Failed to fetch table models.	None
TS-1011	ERROR	Failed to fetch sample values.	Failed to fetch sample values.	None

## Scheduled Jobs Errors (1100 - 1199)

Code	Severity	Summary	Details	Action
TS-1100	INFO	The list of jobs.	None	Please click 'Report Problem' to email a report to your administrator.
TS-1110	INFO	Successfully created job.	None	None
TS-1111	ERROR	The job could not be created.	None	Please click 'Report Problem' to email a report to your administrator.
TS-1112	INFO	Successfully updated job.	None	None
TS-1113	ERROR	The job could not be updated.	None	Please click 'Report Problem' to email a report to your administrator.
TS-1114	INFO	Successfully deleted jobs.	None	None
TS-1115	ERROR	The job could not be deleted.	None	Please click 'Report Problem' to email a report to your administrator.
TS-1116	INFO	The job was paused.	None	None
TS-1117	ERROR	The job could not be paused.	None	Please click 'Report Problem' to email a report to your administrator.
TS-1118	INFO	The job was resumed	None	None
TS-1119	ERROR	The job could not be resumed.	None	Please click 'Report Problem' to email a report to your administrator.

## User Admin Service Errors (1200 - 1399)

Code	Severity	Summary	Details	Action
TS-1200	ERROR	Failed to fetch users list	Failed to fetch users list	None
TS-1201	ERROR	Failed to fetch groups list	Failed to fetch groups list	None
TS-1202	ERROR	Failed to fetch users and groups list	Failed to fetch users and groups list	None
TS-1203	ERROR	Successfully created user	Successfully created user	None
TS-1204	ERROR	Failed to create user	Failed to create user	None
TS-1205	ERROR	Successfully created group	Successfully created group	None
TS-1206	ERROR	Failed to create group	Failed to create group	None
TS-1207	ERROR	Successfully updated user	Successfully updated user	None
TS-1208	ERROR	Failed to update user	Failed to update user	None
TS-1209	ERROR	Successfully updated users	Successfully updated users	None
TS-1210	ERROR	Failed to update users	Failed to update users	None
TS-1211	ERROR	Successfully updated group	Successfully updated group	None
TS-1212	ERROR	Failed to update group	Failed to update group	None
TS-1213	ERROR	Successfully updated password	Successfully updated password	None
TS-1214	ERROR	Failed to update password	Failed to update password	None
TS-1215	ERROR	Successfully deleted users	Successfully deleted users	None
TS-1216	ERROR	Failed to delete users	Failed to delete users	None
TS-1217	ERROR	Successfully deleted groups	Successfully deleted groups	None
TS-1218	ERROR	Failed to delete groups	Failed to delete groups	None
TS-1219	ERROR	Successfully assigned users to groups	Successfully assigned users to groups	None
TS-1220	ERROR	Failed to assign users to groups	Failed to assign users to groups	None

Code	Severity	Summary	Details	Action
TS-1221	ERROR	Failed to fetch profile pic	Failed to fetch profile pic	None
TS-1222	INFO	Successfully uploaded profile pic	None	None
TS-1223	ERROR	Failed to upload profile pic	Failed to upload profile pic	None
TS-1224	ERROR	Successfully assigned groups to group	Failed to assign user to group	None
TS-1228	ERROR	Successfully created role	Successfully created role	None
TS-1229	ERROR	Failed to create role	Failed to create role	None
TS-1230	ERROR	Successfully deleted role	Successfully deleted role	None
TS-1231	ERROR	Failed to delete role	Failed to delete role	None
TS-1232	ERROR	Successfully updated role	Successfully updated role	None
TS-1233	ERROR	Failed to update role	Failed to update role	None

## Session Service Errors (1400 - 1599)

Code	Severity	Summary	Details	Action
TS-1400	ERROR	Failed to fetch session info	Failed to fetch session info	None
TS-1401	ERROR	Failed to login	Uh oh. We're not sure what happened. Please email the trace file to {adminEmail}.	None
TS-1402	ERROR	Failed to logout	Failed to logout	None
TS-1403	ERROR	Failed to save client state	Failed to save client state	None
TS-1404	ERROR	Failed to fetch login config	Failed to fetch login config	None
TS-1405	ERROR	Failed to fetch slack config	Failed to fetch slack config	None
TS-1406	ERROR	Health check failed	Health check failed	None
TS-1407	ERROR	Failed to fetch health portal token	Failed to fetch health portal token	None
TS-1408	ERROR	The health portal release	Uh oh. We're not sure what happened.	None

Code	Severity	Summary	Details	Action
		name could not be retrieved	Please email the trace file to {adminEmail}.	

## Data Management Service Errors (1600 - 1799)

Code	Severity	Summary	Details	Action
TS-1600	ERROR	Failed to fetch data source types	Failed to fetch data source types	None
TS-1601	ERROR	Failed to fetch data source sample values	Failed to fetch data source sample values	None
TS-1602	ERROR	Failed to delete data source	Failed to delete data source	None
TS-1603	ERROR	Failed to execute DDL	Failed to execute DDL	None
TS-1604	ERROR	Failed to update schedule	Failed to update schedule	None
TS-1605	ERROR	Failed to reload tasks	Failed to reload tasks	None
TS-1606	ERROR	Failed to stop tasks	Failed to stop tasks	None
TS-1607	ERROR	Failed to get creation DDL	Failed to get creation DDL	None
TS-1608	ERROR	Failed to load from data source	Failed to load from data source	None
TS-1609	ERROR	Failed to create connection to data source	Failed to create connection to data source	None
TS-1610	ERROR	Failed to create data source	Failed to create data source	None
TS-1611	ERROR	Failed to connect to data source	Failed to connect to data source	None
TS-1612	ERROR	Failed to get data source connection field info	Failed to get data source connection field info	None
TS-1613	ERROR	Failed to get connection list for data source	Failed to get connection list for data source	None
TS-1614	ERROR	Failed to get connection attributes for data source	Failed to get connection attributes for data source	None
TS-1615	ERROR	Failed to get connections	Failed to get connections to data	None

Code	Severity	Summary	Details	Action
to data source		source		
TS-1616	ERROR	Failed to fetch data source config	Failed to fetch data source config	None
TS-1617	ERROR	Failed to parse sql.	Failed to parse sql.	None
TS-1618	ERROR	Failed to execute sql.	Failed to execute sql.	None
TS-1619	INFO	Successfully created connection to data source	None	None
TS-1620	INFO	Successfully updated data upload schedule	None	None
TS-1621	ERROR	Failed to execute sql.	Please check the failing command, executed {1} statements successfully.	None
TS-1622	ERROR	Lightweight data-cache disabled	Lightweight data-cache disabled	None
TS-1623	INFO	Selected tables were queued for loading.	Selected tables were queued for loading.	None
TS-1624	ERROR	DataType conversion error.	No mapping found for source datatype to ThoughtSpot datatype.	None
TS-1625	INFO	Successfully reload task started.	None	None
TS-1626	INFO	Successfully connected to data source.	None	None
TS-1627	INFO	Successfully created data source.	None	None
TS-1628	INFO	Successfully stopped the tasks.	None	None
TS-1629	INFO	Successfully deleted the connection.	None	None
TS-1630	ERROR	There was an error deleting this connection.	None	None
TS-1631	INFO	Successfully executed the DDL.	None	None

## Cluster Status Service Errors (1800 - 1899)

Code	Severity	Summary	Details	Action
TS-1800	WARNING	Failed to fetch cluster information from search service.	None	None
TS-1801	WARNING	Failed to fetch table detail information from search service.	None	None
TS-1802	WARNING	Failed to fetch cluster information from database service.	None	None
TS-1803	WARNING	Failed to fetch table detail information from database service.	None	None
TS-1804	WARNING	Failed to fetch cluster information from cluster management service.	None	None
TS-1805	WARNING	Failed to fetch detail information from cluster management service.	None	None
TS-1806	WARNING	Failed to fetch log from cluster management service.	None	None
TS-1807	WARNING	Failed to fetch snapshot list from cluster management service.	None	None
TS-1808	WARNING	Failed to fetch cluster information from alert management service.	None	None
TS-1809	WARNING	Failed to fetch cluster information from event service.	None	None
TS-1810	WARNING	Failed to fetch alerts information from alert management service.	None	None
TS-1811	WARNING	Failed to fetch events information from alert management service.	None	None
TS-1812	INFO	Thanks for your feedback!	None	None
TS-1813	WARNING	Sorry! Unable to submit the feedback at this moment!	None	None
TS-1814	INFO	Successfully exported objects. File can be found at {1}.	None	None

Code	Severity	Summary	Details	Action
TS-1815	ERROR	Sorry! Unable to export objects at this moment!	What happened? {1}.	None
TS-1816	INFO	Successfully imported objects	None	None
TS-1817	ERROR	Sorry! Unable to import objects at this moment!	What happened? {1}.	None
TS-1818	INFO	Successfully deleted data source object(s).	None	None

## Callosum API Errors (9000 - 9199)

Code	Severity	Summary	Details	Action
TS-9000	ERROR	The data you are trying to delete has some dependencies	Some objects depend on the data you are trying to delete	delete the dependencies before deleting this data.
TS-9001	ERROR	Uh oh. We're not sure what happened.	Please email the trace file to {adminEmail}.	None
TS-9002	ERROR	Could not authorize user	Try logging in again	None
TS-9003	ERROR	Uh oh. We're not sure what happened.	Please email the trace file to {adminEmail}.	None
TS-9004	WARNING	Still loading data, come back soon	None	None
TS-9005	ERROR	Uh oh. We're having trouble getting data for this request.	Please email the trace file to {adminEmail}.	None
TS-9006	ERROR	Uh oh. We're having trouble getting data for this request.	Please email the trace file to {adminEmail}.	None
TS-9007	ERROR	Uh oh. We're having trouble getting data for this request.	Please email the trace file to {adminEmail}.	None
TS-9008	ERROR	Something went	Uh oh. We're not sure what hap-	None

Code	Severity	Summary	Details	Action
		wrong with your search	pened. Please email the trace file to {adminEmail}.	
TS-9009	ERROR	The calculation engine has timed out. Please try again.	Please email the trace file to {adminEmail}.	None
TS-9010	ERROR	Cannot open Object	Object cannot be opened due to errors in some of its dependencies	None
TS-Blink Generated Errors (9500 - 9599)				
TS-9500	WARNING	Cannot connect to the calculation engine. Please try again soon.	None	None
TS-9501	WARNING	The calculation engine has timed out. Please try again.	None	None
TS-9502	WARNING	Cannot connect to the search engine. Please try again soon.	None	None
TS-9503	WARNING	The search engine has timed out. Please try again.	None	None
TS-9504	ERROR	Cannot open {1}	{1} cannot be opened due to errors in the following dependencies 1 - Type of the object Table/Answer/ Pinboard etc.	None
TS-9505	WARNING	We're still indexing this data, try again soon	None	None
TS-9506	ERROR	Object is not present in the system	{1} is not present in the system 1 - Type of the object Table/Answer/ Pinboard etc.	None
TS-9507	ERROR	ThoughtSpot is unreachable.	None	None

Code	Severity	Summary	Details	Action
Please try again soon				

## Common Errors (10000 - 10099)

Code	Severity	Summary	Details	Action
TS-10000	ERROR	A system error has occurred	Uh oh. We're not sure what happened. Please contact your administrator.	None
TS-10001	ERROR	Connection failed	The metadata store is not reachable.	Please contact your administrator
TS-10002	ERROR	The input is invalid	Input from the client to the server is invalid.	Please contact your administrator
TS-10003	ERROR	Unfortunately, you can't do that	You are not authorized to perform {1}. # {1} - action user is not authorized for	Please request access from your administrator
TS-10004	ERROR	The user could not be authorized	User {0} is not authorized to perform {1}. # {0} - name of the user # {1} - action user is not authorized for	Please request access from your administrator
TS-10005	ERROR	The base object is missing	An underlying object referenced by this object is missing in store.	Please contact your administrator
TS-10006	ERROR	The connection to Zookeeper has failed	Zookeeper is not reachable.	Please contact your administrator
TS-10007	ERROR	There's invalid parameter(s)	Invalid parameter values: {0}.	Please contact your administrator
TS-10008	ERROR	The user cannot be found	User {0} not found in store. # {0} - name of the user	Please contact your administrator
TS-10009	ERROR	Cannot add group	This group already belongs to the group you are trying to add it to.	None

## Falcon Errors (10600 - 10699)

Code	Severity	Summary	Details	Action
TS-10603	ERROR	Falcon query cancelled	None	None

## Data Errors (11000 - 11099)

Code	Severity	Summary	Details	Action
TS-11001	ERROR	Invalid row	None	None
TS-11002	ERROR	Invalid table/query resultset	None	None
TS-11003	ERROR	Invalid column identifier	None	None
TS-11004	ERROR	Invalid visualization identifier	None	None
TS-11005	ERROR	No data	Query execution resulted in no data.	None
TS-11006	ERROR	Query execution failed	Error in query execution to Falcon.	None
TS-11007	ERROR	Answer data generation failed	Error in Answer data generation for Sage input.	None
TS-11008	ERROR	Data export failed	None	None
TS-11009	ERROR	Data generation failed	Error in data generation in Callosum.	None

## Report Generation Errors (12000 - 13000)

Code	Severity	Summary	Details	Action
TS-12700	ERROR	Error while exporting data file.	None	None
TS-12701	ERROR	Invalid input.	The definition of the job is invalid.	None
TS-12702	ERROR	No author provided.	None	None
TS-12703	ERROR	No pinboard provided.	None	None

Code	Severity	Summary	Details	Action
TS-12704	ERROR	No recipients provided.	None	None
TS-12705	ERROR	This format is not supported.	None	None
TS-12706	ERROR	No job name provided.	None	None
TS-12707	ERROR	No job description provided.	None	None
TS-12708	ERROR	Pinboard data export error.	None	None
TS-12709	ERROR	Visualization data export error.	None	None
TS-12710	ERROR	User data unavailable.	None	None
TS-12711	ERROR	Configuration information unavailable.	None	None
TS-12712	ERROR	There are too many recipients.	The max number of recipients is 1000.	None
TS-12713	ERROR	Attachment size limit exceeded.	None	None
TS-12714	ERROR	Recipient domain is not whitelisted.	None	None

## More Metadata Errors (13000 - 13099)

Code	Severity	Summary	Details	Action
TS-13001	ERROR	Schema creation failed	Error creating database schema.	None
TS-13002	ERROR	Views creation failed	Error creating view.	None
TS-13003	ERROR	The object cannot be found in store	Object with Id: {0} of type: {1} not found. # {0} – identity of the object # {1} – type of object	None
TS-13004	ERROR	The object is in an invalid state	Object with Id: {0} of type: {1} in invalid state. # {0} – identity of the object # {1} – type of object	None
TS-13005	ERROR	Object already	Object with Id: {0} of	None

Code	Severity	Summary	Details	Action
		exists	type: {1} already exists. # {0} - identity of the object # {1} - type of object	
TS-13006	ERROR	Invalid object type	Invalid type: {0} provided. # {1} - type of object	None
TS-13007	ERROR	Invalid Sage question	Insufficient or invalid input from Sage: {0}. # {0} - the invalid input	None
TS-13008	ERROR	Invalid Sage question	Input from Sage - missing columns of type: {0}. # {0} - column type	None
TS-13009	ERROR	Invalid Sage question	Invalid input from Sage - invalid expression: {0}. # {0} - the invalid expression	None
TS-13010	ERROR	Sending logical metadata to Sage failed	Sending logical metadata to Sage failed due to: {0}. # {0} - reason for failure	None
TS-13011	ERROR	Answer generation failed	Answer generation failed due to: {0}. # {0} - reason for failure	None
TS-13012	ERROR	Worksheet generation failed	Worksheet generation failed due to: {0}. # {0} - reason for failure	None
TS-13013	ERROR	Service provider unavailable	Service provider unavailable: {0}. # {0} - provider details	None
TS-13015	ERROR	Physical model not loaded	None	None
TS-13016	ERROR	Invalid physical schema proto	Inconsistency in physical schema from Falcon: {0}. # {0} - error details	None
TS-13017	ERROR	Invalid duplicate columns	Duplicate columns: {0}. # {0} - List of duplicate column identities	None
TS-13018	ERROR	Cyclic relationship	Detected cycles: {0}. # {0} - cycle details	None

Code	Severity	Summary	Details	Action
TS-13019	WARNING	Older physical schema version received	Schema update for older version: {0} received and ignored. # {0} - received version number	None
TS-13020	ERROR	Invalid relationship	Attempted to create invalid relationship: {0}. # {0} - relationship details	None
TS-13022	ERROR	Invalid filter values: {values}	None	None
TS-13023	ERROR	Creating relationship failed.	None	None
TS-13024	ERROR	Deleting schema failed.	None	None
TS-13025	ERROR	Expression validation failed.	None	None
TS-13026	INFO	Load schedule successfully disabled.	None	None
TS-13027	ERROR	Load schedule could not be disabled.	None	None
TS-13028	ERROR	Objects fetched from the connection are invalid for editing datasource.	None	To proceed with editing the datasource, please edit the connection below to fetch valid source objects.
TS-13029	INFO	Successfully edited data source connection.	None	None
TS-13030	ERROR	Connection test failed.	None	Please verify connection attributes.

## Loading Errors (30000 - 30099)

Code	Severity	Summary	Details	Action
TS-30000	ERROR	Table is not ready (data loading in progress).	None	None

## Timely Errors (60000 - 64999)

Code	Severity	Summary	Details	Action
TS-60000	ERROR	Failed to initialize.	None	None