ThoughtSpot

ThoughtSpot Embrace

Release 7.0

March, 2021

Table of Contents

SAP HANA

Embrace overview

Summary: Using Embrace, you can perform live queries on external databases.

If your company stores source data externally in data warehouses, you can use ThoughtSpot Embrace to directly query that data and use ThoughtSpot's analysis and visualization features, without moving the data into ThoughtSpot.

Embrace supports the following external databases:

- Snowflake
- Amazon Redshift
- Google BigQuery
- Microsoft Azure Synapse
- Teradata
- SAP HANA **Beta**

To enable Embrace, contact ThoughtSpot support.

How it works

You create a connection to the external database, choosing the columns from each table that you want to explore in your live query. Primary key and foreign key relationships are imported along with the primary and foreign key tables. If there are any joins in the tables of your connection, they are also imported. After your connection is complete, it becomes a **linked** data source in ThoughtSpot that allows you to query the external database directly. It's easy to apply transformations and filter the data also.

Key benefits

- Set up and deploy ThoughtSpot faster by connecting directly to the external database.
- Eliminate the need to move data into ThoughtSpot for analysis.
- Centralize data management and governance in the external database.
- Save significant time and money by avoiding ETL pipelines.
- Connect to multiple external databases.

Recommended instance types

The following sections contain the supported and recommended instance types for ThoughtSpot Embrace deployments in AWS, Azure, and GCP. When setting up your cluster, use the information here to select an instance type, configure the number of instances required for the storage you need, and add data volumes to your cluster.

AWS

VMs with EBS-only persistent storage

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM EBS volume	Required boot volume capacity
Up to 1B rows	r5.4xlarge, r4.4xlarge	16/122, 16/128	2X 400 GB	200 GB for each node
Up to 4B rows	r5.8xlarge	32/244, 32/256	2X 400 GB	200 GB for each node
4B+ rows	r5.16xlarge	64/488, 64/512	2x 1 TB	200 GB for each node

VMs with EBS and S3 persistent storage

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM EBS volume	Required boot volume capacity
Up to 1B rows	r5.4xlarge, r4.4xlarge	16/122, 16/128	1x 500 GB	200 GB for each node
Up to 4B rows	r5.8xlarge	32/244, 32/256	1x 500 GB	200 GB for each node
4B+ rows	r5.16xlarge	64/488, 64/512	1x 500 GB	200 GB for each node

Azure

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM Premium SSD Managed Disk volume	Required root volume capacity
Up to 1B rows	E16s_v3	16/128	2X 400 GB	200 GB for each node
Up to 4B rows	E32s_v3	32/256	2X 400 GB	200 GB for each node
4B+ rows	E64s_v3	64/432	2x1 TB	200 GB for each node

GCP

VMs with Persistent Disk-only storage

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM Zonal Persistent SSD Disk volume	Required boot volume capacity
Up to 1B rows	n1-highmem-16	16/ 122	2X 400 GB	200 GB for each node
Up to 4B rows	n1-highmem-32	32/ 208	2X 400 GB	200 GB for each node
4B+ rows	n1-highmem-64	64/ 416	2x 1 TB	200 GB for each node

VMs with Persistent Disk and Google Cloud storage

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM Zonal Persistent SSD Disk volume	Required boot volume capacity
Up to 1B rows	n1-highmem-16	16/ 122	1X 500 GB	200 GB for each node

Per VM user data capacity	Instance type	CPU/ RAM	Recommended per-VM Zonal Persistent SSD Disk volume	Required boot volume capacity
Up to 4B rows	n1-highmem-32	32/ 208	1X 500 GB	200 GB for each node
4B+ rows	n1-highmem-64	64/ 416	1X 500 GB	200 GB for each node

Limitations

⚠ **Important:** Embrace does not support joins across connections.

Feature availability in Embrace

The following matrix compares the features that are available in our internal high-performance database, Falcon, and the ones available in Embrace:

Feature Name	Falcon	Embrace
Simple Search and Complex searches: Versus, Inline Subquerying, Growth	✓	✓
Search Suggestions for column names and values	✓	✓
Headlines that summarize tables	✓	✓
All chart types and configurations	✓	✓
Spot IQ: Analyze	✓	✓
Spot IQ: Instant insights, Did you know?, Pinboard insights	✓	✗
Monitor	✓	✗
Table and Column remapping through Scriptability	✗	✓
Custom calendar	✓	✗
Materialized view	✓	✗

Function availability in Embrace

The following matrix compares the specific function support across the different databases of Embrace. Functions not listed here have full support.

Function	Snowflake	Amazon Redshift	Google BigQuery	Azure Synapse	Teradata	SAP HANA
`SOUNDS_LIKE`	✗	✗	✗	✗	✗	✗
`STRING_ MATCH_SCORE`	✗	✗	✗	✗	✗	✗
`EDIT_DISTANCE_WITH_CAP`	✗	✗	✗	✗	✗	✗
`APPROX_SET_CARDINALITY`	✗	✗	✗	✗	✗	✗
`COUNT_NOT_NULL`	✗	✗	✗	✗	✗	✗
`SPELLS_LIKE`	✓	✗	✗	✗	✓	✗
`EDIT_DISTANCE`	✓	✗	✗	✗	✓	✗
`MEDIAN`	✓	✓	✗	✓	✓	✓
`PERCENTILE`	✓	✓	✗	✓	✓	✗

Data type availability in Embrace

The following matrix captures the specific data type support limitations across the different databases of Embrace. Data types not listed here have full support.

Data Type	Snowflake	Amazon Redshift	Google BigQuery	Azure Synapse	Teradata	SAP HANA
`BINARY`	✗	✓	✓	✗	✓	✓
`VARBINARY`	✗	✓	✓	✗	✓	✗
`GEOMETRY`	✓	✗	✓	✓	✓	✗
`BYTES`	✓	✓	✗	✓	✗	✓

Data Type	Snowflake	Amazon Redshift	Google BigQuery	Azure Synapse	Teradata	SAP HANA
`DATETIMEOFFSET`	✓	✓	✓	✗	✓	✓

Additional specific exceptions

The following list captures the specific limitations across the different databases of Embrace. Databases not listed here have full support.

General: all databases

Sample values

Embrace does not internationalize sample values in tables.

Google BigQuery

Join support

Google BigQuery does not support PK-FK joins. Therefore, when using Embrace, you must create joins explicitly in ThoughtSpot.

Partitioned tables

When running a query on a partitioned table with the **Require partition filter option** enabled, you must specify the `WHERE` clause. Without a `WHERE` clause specified, queries generate an error.
To ensure that the query on such tables honors the partition condition, you must create a worksheet filter in ThoughtSpot.

Azure Synapse

Azure Synapse supports up to 10 `IF THEN ELSE` statements in a single query.

Azure Synapse does not support foreign keys, so no PK-FK joins can be defined in Synapse.

Teradata

Teradata does not support the function: `AGGREGATE_DISTINCT`.

Teradata does not support the following data types: `JSON, INTERVAL, VARBYTE, BLOB, CLOB, PERIOD, XML, GEOSPATIAL`.

SAP HANA

SAP HANA does not support the following functions: `PERCENTILE, AGGREGATE_DISTINCT, SPELLS_LIKE, EDIT_DISTANCE`.

SAP HANA does not support the following data types: `BLOB, CLOB, NCLOB, TEXT, POINT`.

SAP HANA does not support calculation views with mandatory input parameters. If you need to use calculation views in ThoughtSpot, you must remove the mandatory parameter requirement.

Next steps

- **Add a Snowflake connection [See page 11]**

  Create the connection between ThoughtSpot and tables in a Snowflake database.
- **Add a Redshift connection [See page 55]**

  Create the connection between ThoughtSpot and tables in an Amazon RedShift database.
- **Add a BigQuery connection [See page 71]**

  Create the connection between ThoughtSpot and tables in a Google BigQuery database.
- **Add a Synapse connection [See page 89]**

  Create the connection between ThoughtSpot and tables in an Azure Synapse database.
- **Add a Teradata connection [See page 102]**

  Create the connection between ThoughtSpot and tables in a Teradata database.
- **Add an SAP HANA connection [See page 115]**

  Create the connection between ThoughtSpot and tables in an SAP HANA database.

Snowflake overview

Embrace enables you to connect to Snowflake databases, to use your data in ThoughtSpot.

- Add a connection [See page 11]
- Modify a connection [See page 15]
- Best practices [See page 22]
- Reference [See page 32]
- Partner Connect [See page 34]
- Tutorial [See page 37]

Add a Snowflake connection

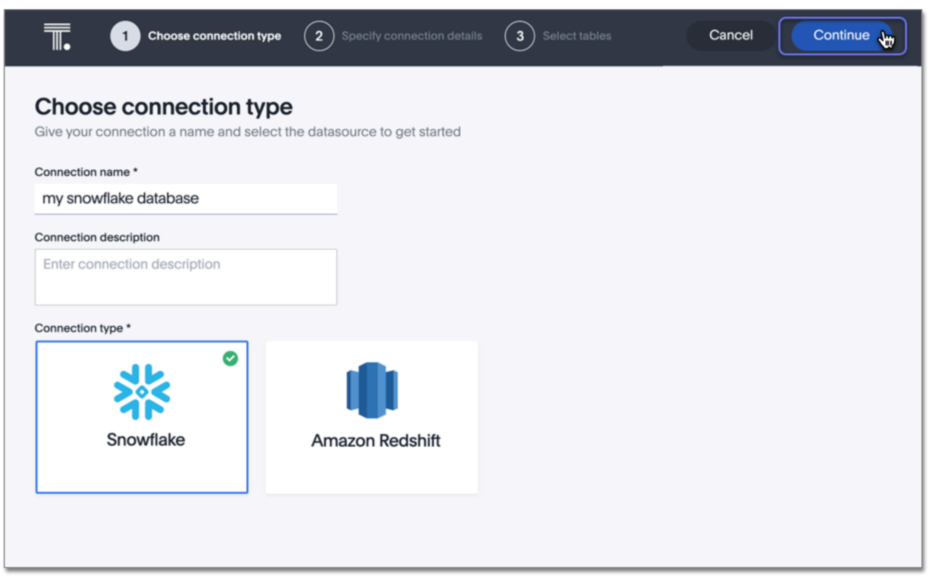
Once ThoughtSpot Embrace is enabled, you can add a connection to a Snowflake database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

To add a new connection to Snowflake:

1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab at the top of the page, and click **+ Add connection** at the upper-right-hand side of the page.

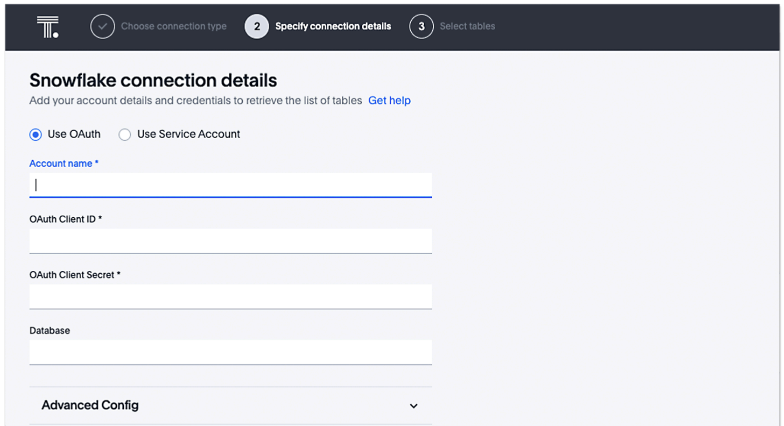
3. Create a name for your connection, a description (optional), then select the Snowflake connection type, and click **Continue**.



4. Enter the connection details for your Snowflake data source using either OAuth or service account authentication:

   For OAuth authentication, do the following:

   a. Enter Account name, OAuth Client ID, OAuth Client Secret, and (optional) Database.



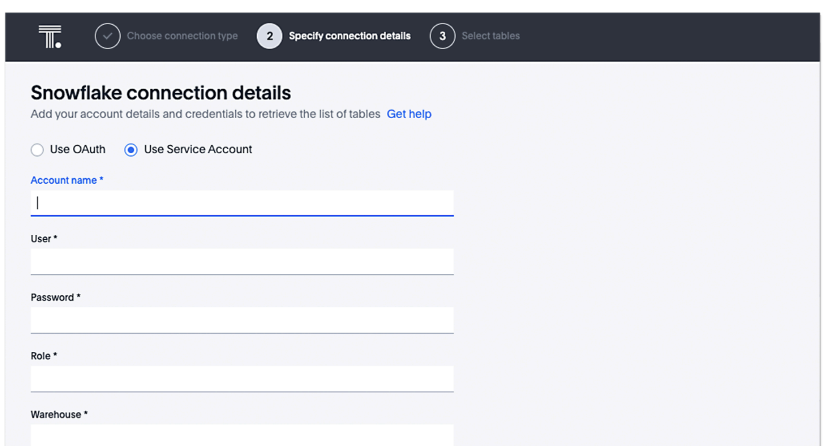
b. If you wish to provide the optional additional key-value pairs for your Snowflake connection, complete the procedure in step 5, and then click **Continue**. If not, click **Continue**.

c. When the Snowflake login screen appears, enter your Snowflake User Name and Password and click **Log In**, or use the Single-Sign-On option.

d. In the next Snowflake screen, allow ThoughtSpot to access your Snowflake account by clicking **Allow**, and then go to step 7 to select tables for your connection.

For service account authentication, do the following:

- Enter Account name, User, Password, Role, Warehouse, and (optional) Database.



Refer to the Snowflake connection reference [See page 0] for more information on each of the specific attributes you must enter for your connection.

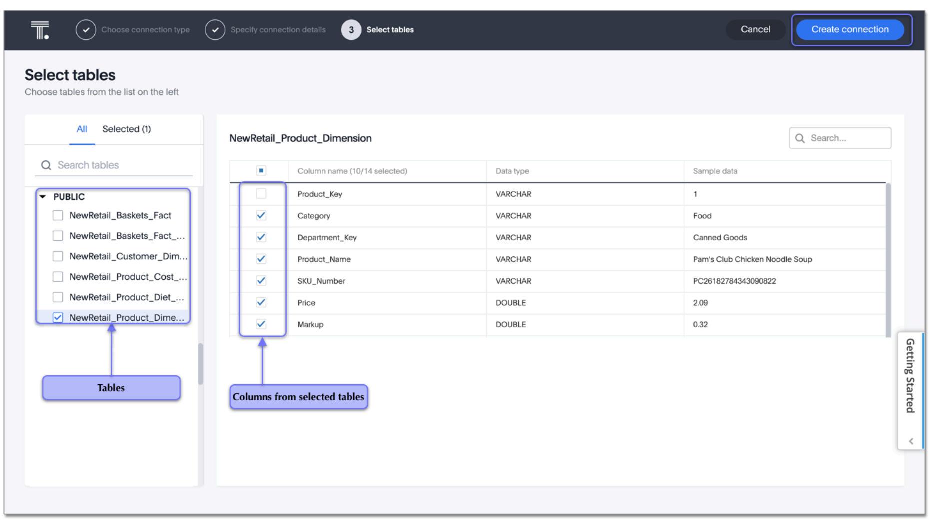
5. (Optional) Provide additional key-value pairs that are required to set up your connection to Snowflake, by doing the following:

    - Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
    - Enter your key and value information.
    - To add more keys and values, click the plus sign (+), and enter them.

    > **Note:** Any key-value pairs that you enter must be defined in your Snowflake data source. Key-value pairs are case-sensitive.

6. Click **Continue**.

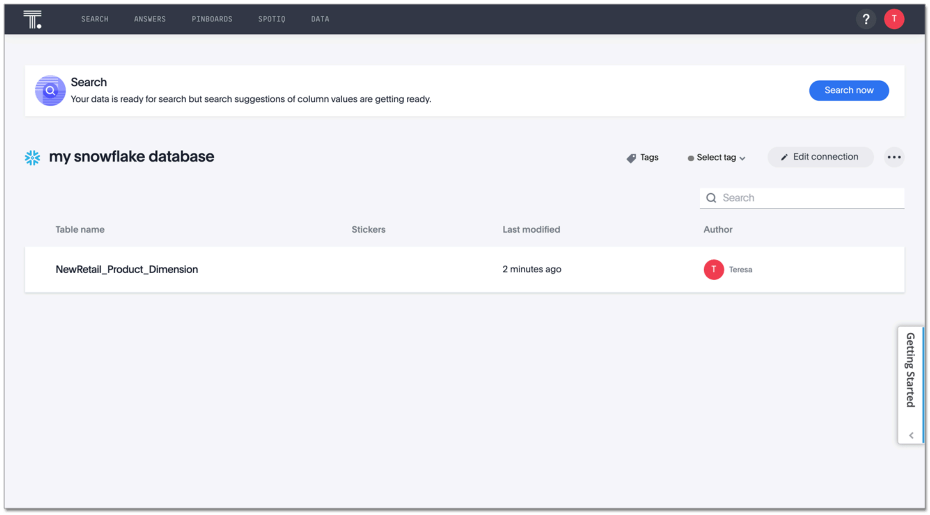
7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



A message appears indicating the number of tables and columns that will be added to your connection.

8. Click **Confirm**.

Once the connection is added, you can search your Snowflake database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify a Snowflake connection [See page 15]
- Snowflake connection reference [See page 32]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify a Snowflake connection

Summary: Learn how to modify a Snowflake connection and its tables.

You can modify an Embrace Snowflake connection in the following ways:

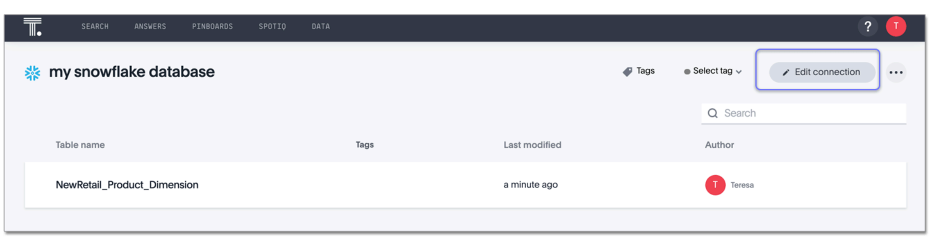
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing a Snowflake connection

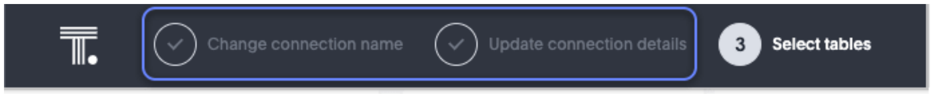
You can edit a Snowflake connection to add tables and columns.

To edit a Snowflake connection:

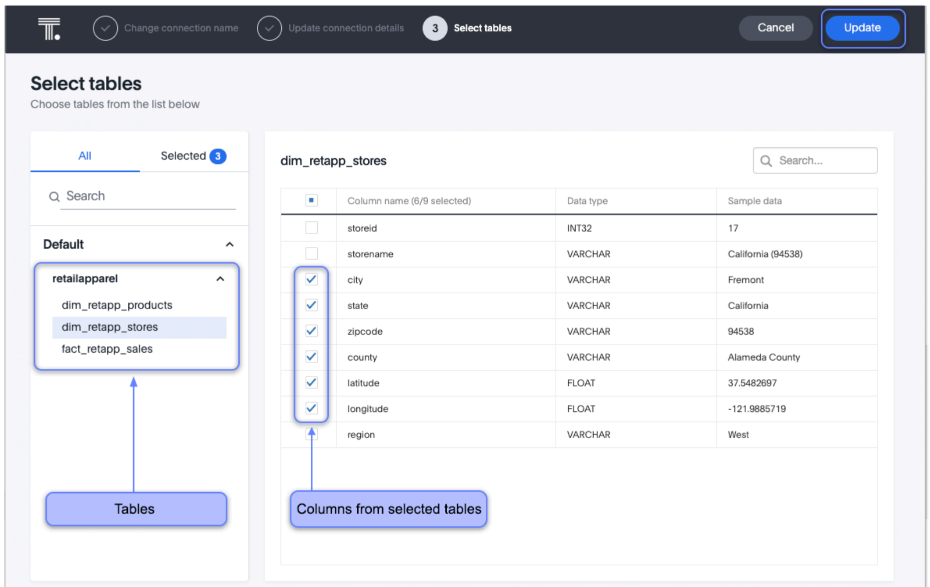
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.
4. Click **Edit connection** at the upper-right-hand side of the page.



By default, the Select tables page appears. You have the option, though, to change the connection name and update the connection details, by clicking the appropriate option at the top of the screen, making any changes needed and clicking **Continue** to go to the next page.



5. Expand the database table drop-down menu, and select the tables and columns you want to add.



6. Click **Update**, and then click **Confirm** to save the updated connection detail.

To remove a table from a connection, delete it from the connection details page. For more information, see Deleting a table [See page 19].

Remapping a Snowflake connection

Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

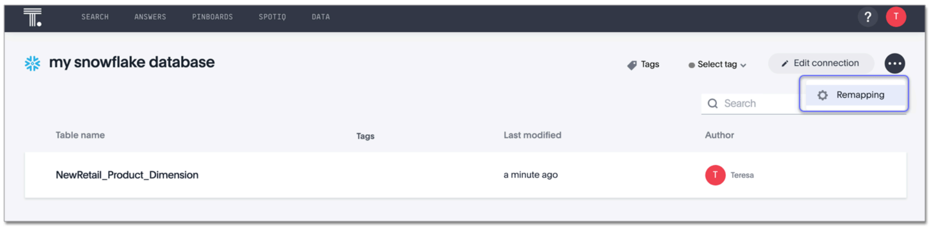
To remap a Snowflake connection:

1. Click **Data** in the top navigation bar.

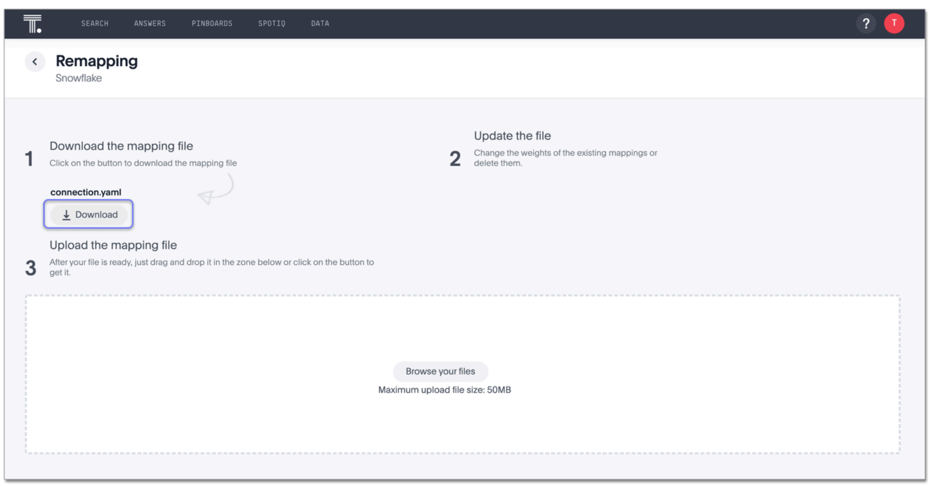
2. Click the **embrace** tab.

3. Click the name of the connection you want to remap.

4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



6. Edit the file, as required, and save it.

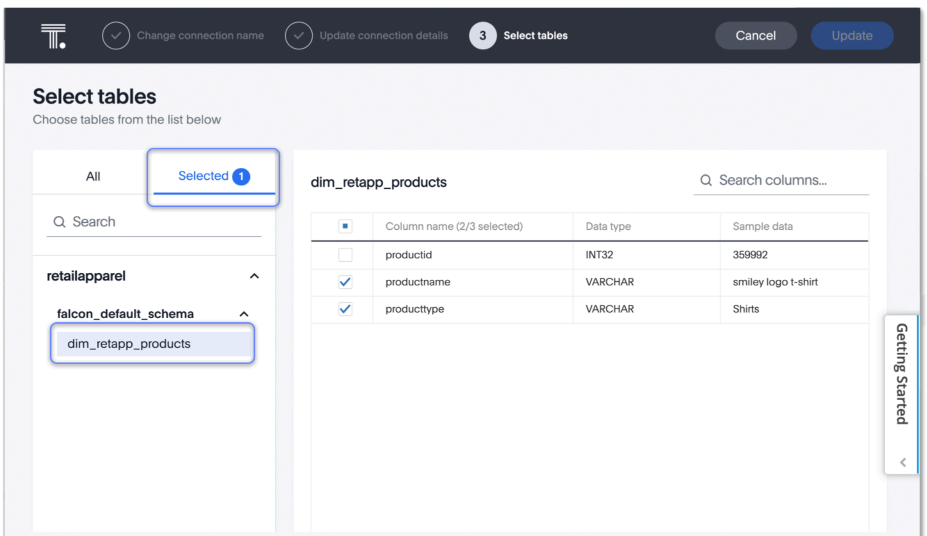
7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from a Snowflake connection

You can edit a Snowflake connection to remove a column.

To remove a column from a Snowflake connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection that contains the column you want to remove.
4. Click **Edit connection** at the upper-right-hand side of the page.
5. In the Select tables page, click the Selected tab.
6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.
8. Click **Update**.

   The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from a Snowflake connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

To delete a table from a Snowflake connection:

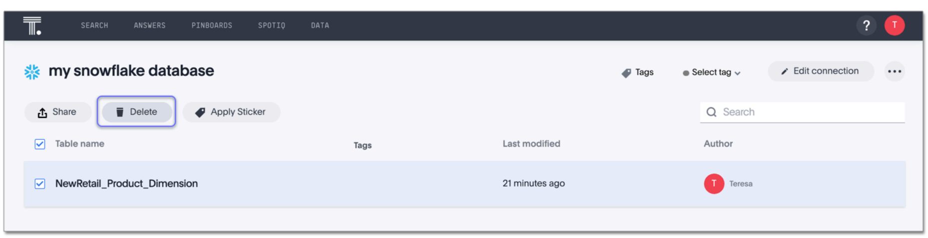
1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab.

3. Click the name of the connection that contains the table you want to delete.

4. Find the table you want to delete in the list, and check the box next to its name.

5. Click **Delete**, and then click **Delete** again to confirm.

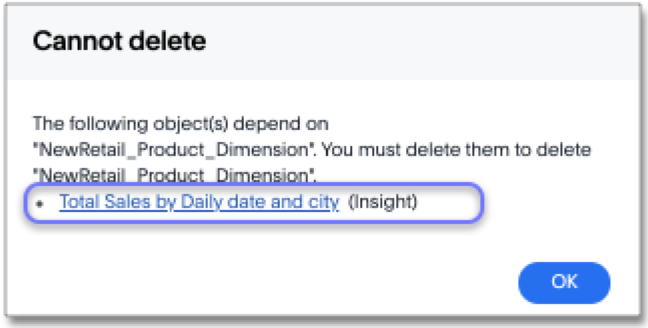


If you attempt to delete a table with dependent objects, the operation is blocked. A *Cannot delete* window appears, with a list of links to dependent objects. See Deleting a table with dependent objects [See page 19]

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

  When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

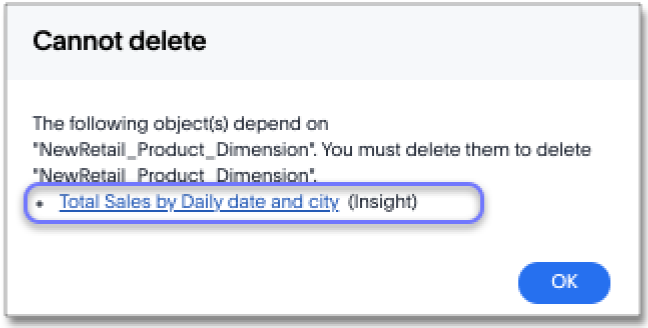
Deleting a Snowflake connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete a Snowflake connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

   If you attempt to delete a connection with dependent objects, the operation is blocked, and a “Cannot delete” warning appears with a list of dependent objects with links.



5. If the “Cannot delete” warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.

6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click again **Delete** to confirm.

Best practices for Embrace with Snowflake

Summary: You can connect to Snowflake using ThoughtSpot Embrace, and start searching your data. This article contains helpful pointers on data modeling.

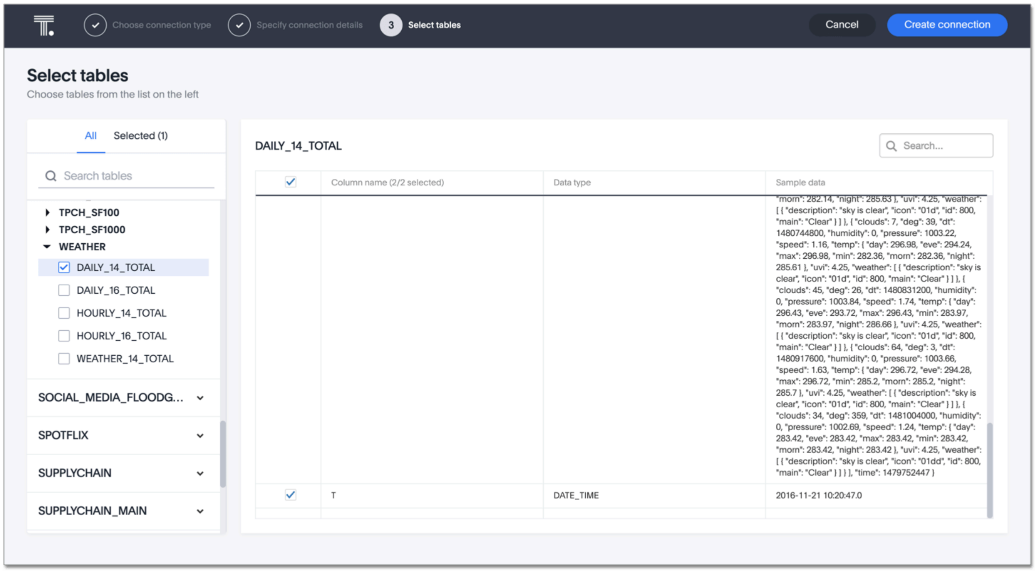
After connecting to Snowflake through ThoughtSpot Embrace, you may notice that some things don't work as you expect. This article lists best practices for improving the user experience by making small changes to the Snowflake schema in Snowflake, to optimize it for ThoughtSpot.

Change JSON to a relational schema in Snowflake

ThoughtSpot works with relational data, where data must be in the form of a table, with rows and columns. Relational data is commonly stored as comma separated values, in CSV format, or in tables in a database.

The Snowflake warehouse uses more flexible requirements for storing data, such as the `VARIANT` data type to store JSON. However, the user experience when searching directly on JSON data in ThoughtSpot is not as good as searching over relational data.

For example, if you connect to the Snowflake Free Trail sample WEATHER dataset, and search it in ThoughtSpot, the `DAILY_14_TOTAL` table features JSON data.



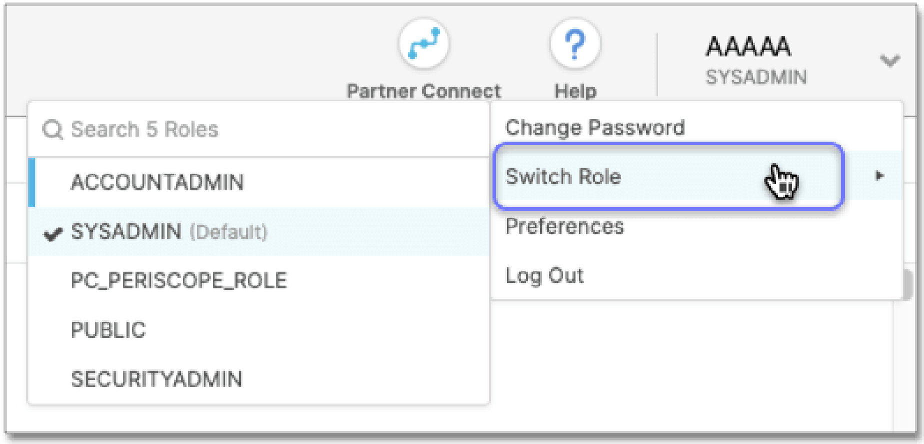
To make this data searchable in ThoughtSpot, you must first create a view in Snowflake, which effectively makes the JSON data into relational (table) data. You can then search this data in ThoughtSpot, and generate chart and table results from your searches. This process is called “schema on read”.

Create a view in snowflake

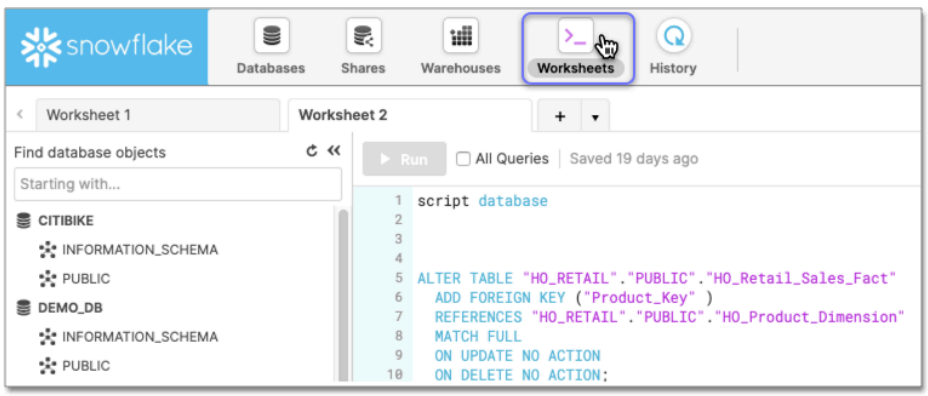
To create a view from a Snowflake table that contains JSON, follow these steps:

1. Log in to your Snowflake instance.

2. If necessary, change your role so you can issue `CREATE VIEW` DDL statement in the target schema. See [CREATE VIEW (https://docs.snowflake.net/manuals/sql-reference/sql/create-view.html)](https://docs.snowflake.net/manuals/sql-reference/sql/create-view.html) in Snowflake.



3. Click **Worksheets**.



4. Issue the `CREATE VIEW` statement.

   See CREATE VIEW Syntax (https://docs.snowflake.net/manuals/sql-reference/sql/create-view.html#syntax).

   The following example uses the sample `WEATHER` data from the **Snowflake Free Trial** sample data:

```
CREATE <strong>json_weather_data_view</strong> as
SELECT
  v:time::timestamp as observation_time,
  v:city.id::int as city_id,
  v:city.name::string as city_name,
  v:city.country::string as country,
  v:city.coord.lat::float as city_lat,
  v:city.coord.lon::float as city_lon,
  v:clouds.all::int as clouds,
  (v:main.temp::float)-273.15 as temp_avg,
  (v:main.temp_min::float)-273.15 as temp_min,
  (v:main.temp_max::float)-273.15 as temp_max,
  v:weather[0].main::string as weather,
  v:weather[0].description::string as weather_desc,
  v:weather[0].icon::string as weather_icon,
  v:wind.deg::float as wind_dir,
  v:wind.speed::float as wind_speed
FROM json_weather_data
WHERE city_id = 5128638;
```

5. Query the new view in Snowflake.

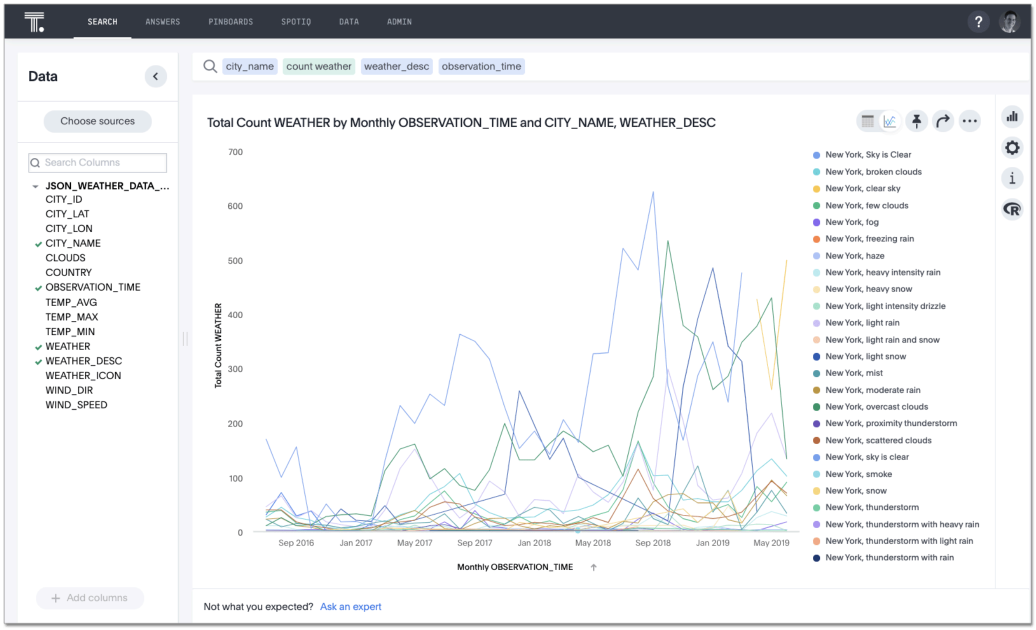
   The following example demonstrates how you can query the view `json_weather_data_view` created in the previous step:

```
SELECT * FROM json_weather_data_view
WHERE date_trunc('month',observation_time) = '2018-01-0
1'
LIMIT 20;
```

6. In ThoughtSpot Embrace, add a connection to Snowflake, specifically to the view you created.

   See Connect to Snowflake through Embrace [See page 30].

When you subsequently search in ThoughtSpot against the Snowflake view, you can easily create charts and graphs, as expected.



Add joins between tables

To search more than one table at the same time in ThoughtSpot, you must define joins between these tables by specifying the columns that contain matching data across two tables. These columns represent the 'primary key' and 'foreign key' of the join.

In Snowflake, you can query the schema to get a list of its existing foreign key constraints with referenced constraints.

To determine which foreign keys already exist in your Snowflake schema, issue the following `SELECT ... AS` statement:

```
select
  fk_tco.table_schema as foreign_schema,
  fk_tco.table_name as foreign_table,
  fk_tco.constraint_name as foreign_constraint,
  '>-' as rel,
  pk_tco.table_schema as referenced_schema,
  pk_tco.table_name as referenced_table,
  pk_tco.constraint_name as referenced_constraint
from
  information_schema.referential_constraints rco
join
  information_schema.table_constraints fk_tco
  on fk_tco.constraint_name = rco.constraint_name
  and fk_tco.constraint_schema = rco.constraint_schema
join
  information_schema.table_constraints pk_tco
  on pk_tco.constraint_name = rco.unique_constraint_name
  and pk_tco.constraint_schema = rco.unique_constraint_schema
order by
  fk_tco.table_schema,
  fk_tco.table_name;
```

The system returns the results of this query as a table that represents all foreign keys in the database, ordered by schema name and by name of the foreign table. The table has the following columns:

foreign_schema

The name of the foreign schema

foreign_table

The name of the foreign table

foreign_constraint

The name of the foreign key constraint

rel

The relationship symbol that indicates the direction of the join

referenced_schema

The name of the referenced schema

referenced_schema

The name of the referenced schema

referenced_schema

The name of the referenced schema

To search multi-table Snowflake data in ThoughtSpot, you must explicitly create joins.

There are two ways to do this:

1. ThoughtSpot recommends that you add the necessary foreign key constraints by creating a join in Snowflake. We demonstrate how you can do in Create joins in Snowflake [See page 28].

   For in-depth information from Snowflake, see CREATE or ALTER TABLE … CONSTRAINT (https://docs.snowflake.net/manuals/sql-reference/sql/create-table-constraint.html).

2. Alternatively, if you don't have the necessary permissions, you can create these relationships in ThoughtSpot.

   See Join a table or view to another data source [See page 0] and Constraints [See page 0].

Create joins in Snowflake

To add a foreign key constraint in Snowflake, you must issue the following `ALTER TABLE` statement:

```
ALTER TABLE <table_name> ADD { outoflineUniquePK | outoflineFK
}
```

outoflineUniquePK

The primary key in the relationship, with the following definition:

```
outoflineUniquePK ::=
  [ CONSTRAINT <constraint_name>> ]
  { UNIQUE | PRIMARY KEY } ( <col_name>> [ , <col_name> ,
... ] )
  [ [ NOT ] ENFORCED ]
  [ [ NOT ] DEFERRABLE ]
  [ INITIALLY { DEFERRED | IMMEDIATE } ]
  [ ENABLE | DISABLE ]
  [ VALIDATE | NOVALIDATE ]
  [ RELY | NORELY ]
```

outoflineFK

The foreign key in the relationship, with the following definition:

```
outoflineFK :=
    [ CONSTRAINT <constraint_name> ]
    FOREIGN KEY ( <col_namev [ , <col_name> , ... ] )
    REFERENCES <ref_table_name> [ ( <ref_col_name> [ , <re
f_col_name> , ... ] ) ]
    [ MATCH { FULL | SIMPLE | PARTIAL } ]
    [ ON [ UPDATE { CASCADE | SET NULL | SET DEFAULT | RESTR
ICT | NO ACTION } ]
         [ DELETE { CASCADE | SET NULL | SET DEFAULT | RESTR
ICT | NO ACTION } ] ]
    [ [ NOT ] ENFORCED ]
    [ [ NOT ] DEFERRABLE ]
    [ INITIALLY { DEFERRED | IMMEDIATE } ]
    [ ENABLE | DISABLE ]
    [ VALIDATE | NOVALIDATE ]
    [ RELY | NORELY ]
```

Example 1: adding a foreign key in Snowflake

For example, you can add a foreign key to Retail Sales schema in Snowflake by running the following `ALTER TABLE` statement. Also, contrast it with Example 2 [See page 29]:

```
ALTER TABLE "HO_RETAIL"."PUBLIC"."HO_Retail_Sales_Fact"
  ADD FOREIGN KEY ("Date_Key" )
  REFERENCES "HO_RETAIL"."PUBLIC"."HO_Date_Dimension"
  MATCH FULL
  ON UPDATE NO ACTION
  ON DELETE NO ACTION;
```

Example 2: adding a foreign key in ThoughtSpot

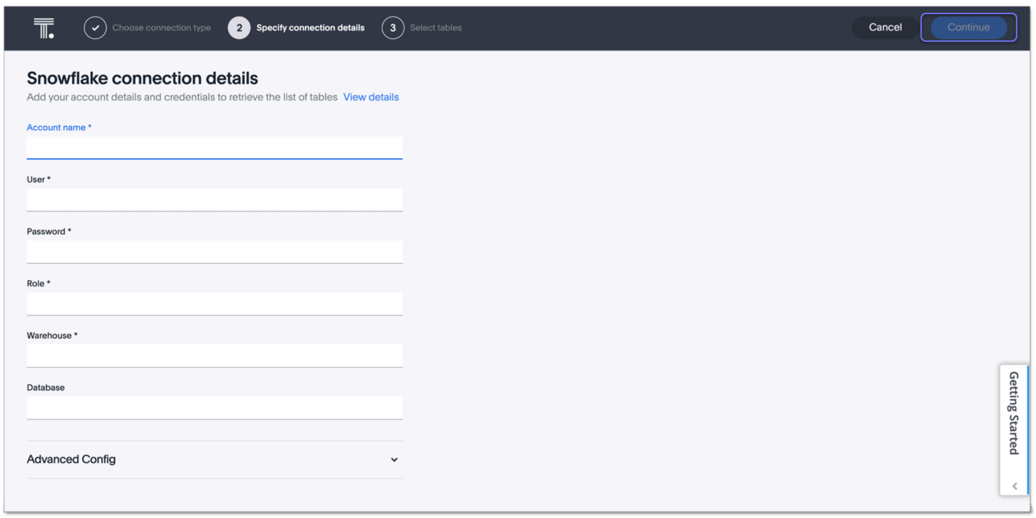
To add the foreign key in ThoughtSpot (an alternative to the process outlined in Example 1 [See page 29]), you can issue the following TQL `ALTER TABLE` statement:

```
TQL> ALTER TABLE "HO_Retail_Sales_Fact"
   ADD CONSTRAINT FOREIGN KEY ("Date_Key")
   REFERENCES "HO_Date_Dimension" ("Date_Key");
```

Connect to Snowflake through Embrace

Follow the general steps in Add a Snowflake connection [See page 11].

In the following screen, the **Account name** is the first part of the URL that you use to access Snowflake.



If you cannot find your **Full account name** in Snowflake, see the following examples for determining your account based on the account name, cloud platform, and region. Assume that the **account name** is `xy12345`.

Cloud platform	Region	Full account name
AWS	US East (N. Virginia)	xy12345.us-east-1
	US East (Ohio)	xy12345.us-east-2.aws
	US West (Oregon)	xy12345
	Canada (Central)	xy12345.ca-central-1.aws
	EU (Ireland)	xy12345.eu-west-1

	EU (Frankfurt)	xy12345.eu-central-1
	Asia Pacific (Singapore)	xy12345.ap-southeast-1
	Asia Pacific (Sydney)	xy12345.ap-sowtheast-2
GCP - *Preview*	us-central1 (Iowa)	xy12345.us-central1.gcp
Azure	East US 2	xy12345.east-us-2.azure
	US Gov Virginia	xy12345.us-gov-virginia.azure
	Canada Central	xy12345.canada-central.azure
	West Europe	xy12345.west-europe.azure
	Australia East	xy12345.australia-east.azure
	Southeast Asia	xy12345.southeast-asia.azure

Snowflake connection reference

Summary: Learn about the fields used to create a Snowflake connection with ThoughtSpot Embrace.

Here is a list of the fields of a Snowflake connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new Snowflake connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Account name

Enter the account name associated with your Snowflake connection. The account name is part of the URL that you use to access the Snowflake UI. It is the portion of the URL before `snowflakecomputing.com`.

Example: If your URL is `https://abcd.xyz.efg.snowflakecomputing.com`, your account name is `abcd.xyz.efg`.

User

Enter the Snowflake account username.

Password

Enter the Snowflake account password.

Role

Specify the privilege of the user.

Warehouse

Specify the warehouse associated with the connection.

Database

Specify the database associated with the account. *(Optional)*

OAuth

Enter the OAuth client ID associated with the Snowflake database.

OAuth client secret

Enter the OAuth client secret associated with the Snowflake database.

Passthrough functions for Snowflake

Passthrough functions allow you to send SQL expressions directly to Snowflake without being interpreted by ThoughtSpot. If you have custom database functions that ThoughtSpot doesn't support, you can use these new passthrough functions in the ThoughtSpot Formula Assistant to call your custom functions.

A passthrough function serves as a wrapper around the specific Snowflake SQL function. To use a specific Snowflake SQL function, match the data type that the function returns with the Embrace passthrough function that returns that data type.

For details on all supported passthrough functions, see Embrace passthrough functions [See page 0].

For details on Snowflake SQL functions, see Snowflake's SQL Function Reference (https://docs.snowflake.com/en/sql-reference-functions.html).

ThoughtSpot in Snowflake Partner Connect

Summary: With Snowflake Partner Connect you get a free trial of ThoughtSpot that allows you to try out ThoughtSpot Embrace to connect to Snowflake.

Snowflake Partner Connect allows you to quickly and easily try out ThoughtSpot connected to Snowflake, using ThoughtSpot Embrace.

ThoughtSpot in Snowflake Partner Connect benefits:

- 30-day trial
- Easy to sign up
- Up and running in 5 minutes
- Trial data already loaded into Snowflake
- No data modeling required
- Gain first-hand experience of the power of ThoughtSpot search-driven insights

Prerequisites

- A Snowflake account

  If you don't have an account, you can sign up for a free trial (https://trial.snowflake.com/).
- Add the **try.thoughtspot.com** IP address to your list of allowed domains in your Snowflake account: `35.164.213.211`
- Read the best practices for Embrace with Snowflake [See page 22].

Sign up for the ThoughtSpot free trial in Snowflake Partner Connect

To sign up for the free trial, do the following:

1. Log in to your Snowflake account.

2. Click **Partner Connect**.

3. Click **ThoughtSpot**. The *Connect to ThoughtSpot* window appears.

4. Click **Connect**. A ThoughtSpot account is created for you and an email titled *Activate Your ThoughtSpot Trial* is sent to the email address associated with your Snowflake account. This email contains activation instructions.

5. Click **Activate**. Your browser redirects to try.thoughtspot.com (https://try.thoughtspot.com/).

   If you choose **Activate Later**, you can open the email and click **Start Trial Now** to navigate to try.thoughtspot.com.

6. At try.thoughtspot.com, do the following:

   - For **Username**, enter the email address associated with your Snowflake account.
   - Enter your **Company Name**.
   - Create a **Password**.
   - Confirm the **Password**, by re-entering it.
   - Check the checkbox for **I agree to Terms and Conditions**.
   - Click **Sign in**.

   Once you sign in, the ThoughtSpot home page appears.

Using Embrace with Snowflake in the ThoughtSpot free trial

1. From the ThoughtSpot home page, a *Connect to Snowflake* guided tutorial appears at the bottom-right of the page. You can play the video, which shows you the entire workflow of using Embrace to connect to Snowflake.

2. Click **Next**, to be guided, step-by-step, through the process of connecting ThoughtSpot to Snowflake, selecting and searching a data source, changing a chart configuration, and more.

3. Once you finish the tutorials, you are ready to try out your own searches, chart configurations, pinboard filters, and more.

Related information

- ThoughtSpot Tutorials for Snowflake Partner Connect [See page 37]
- Embrace overview [See page 3]
- Add a Snowflake connection [See page 11]
- Modify a Snowflake connection [See page 15]

ThoughtSpot Tutorials for Snowflake Partner Connect

Summary: Explore these tutorials to learn how to model your data after connecting to your Snowflake database.

When you create a connection to Snowflake in ThoughtSpot, any data modeling or table joins are inherited automatically.

If there are no table joins in your Snowflake connection, you can easily create them in ThoughtSpot.

The following example shows how the table joins were created in the Sales table of the Retail Sales worksheet, available in your **try.thoughtspot.com** account created through Snowflake Partner Connect.

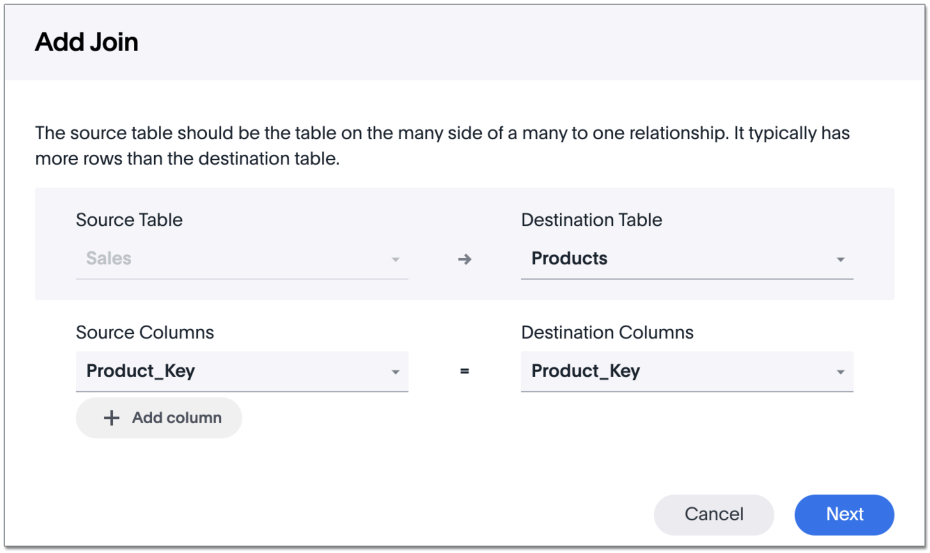
Creating table joins

The joins in the Sales table were created by doing the following:

1. Click **Data** in the top navigation bar.
2. Click the **Tables** tab at the top of the page.
3. Click the **Sales** table.

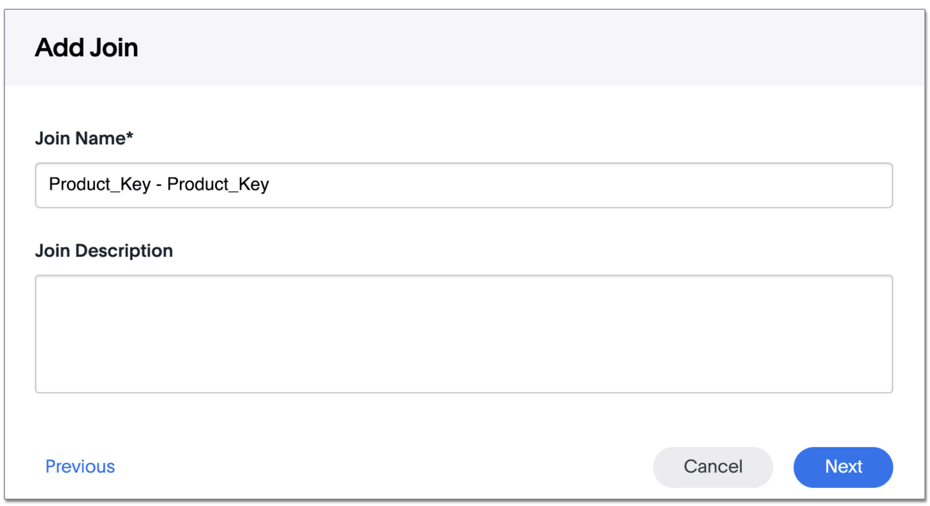
   The Columns view of the Sales table appears.
4. Click the **Joins** tab.
5. Click **+Add join**.

   The Add Join window appears.
6. In the Add Join window, use the drop-down menus to make the following selections:
   - For Destination Table, select **Products**.
   - For Source Columns, select **Product_Key**.
   - For Destination Columns, select **Product_Key**.



7. Click **Next**.

8. Enter the name *Product_Key - Product_Key*, a description for your join (optional), and click **Next**.

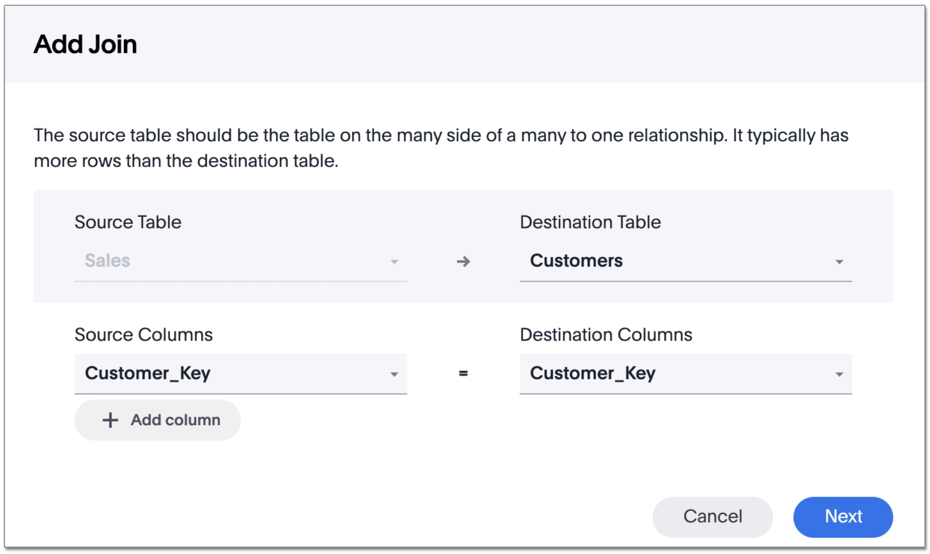


> **Note:** You can use any name you want. The names we've chosen for this tutorial match those in the actual schema for this dataset on try.thoughtspot.com.

The first join is created. Now you will add the other joins.

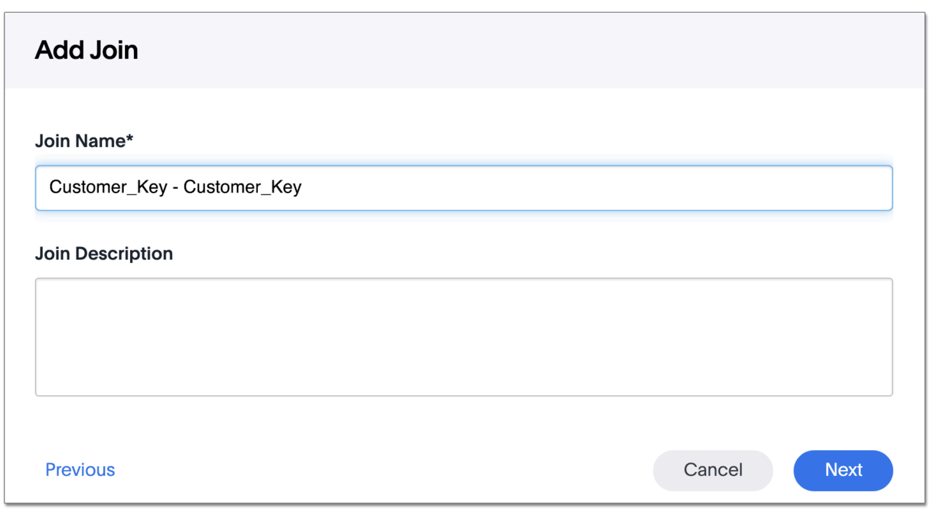
9. Click **+Add join**.

10. In the Add Join window, use the drop-down menus to make the following selections:
    - For Destination Table, select **Customers**.
    - For Source Columns, select **Customer_Key**.
    - For Destination Columns, select **Customer_Key**.



11. Click **Next**.

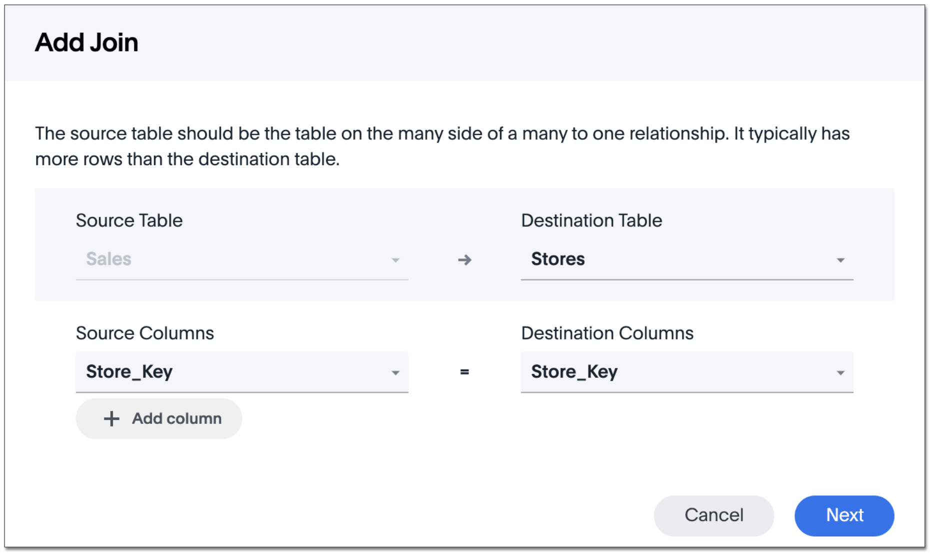
12. Enter the name *Customer_Key - Customer_Key*, a description for your join (optional), and click **Next**.



13. Click **+Add join**.

14. In the Add Join window, use the drop-down menus to make the following selections:

- For Destination Table, select **Stores**.
- For Source Columns, select **Store_Key**.
- For Destination Columns, select **Store_Key**.



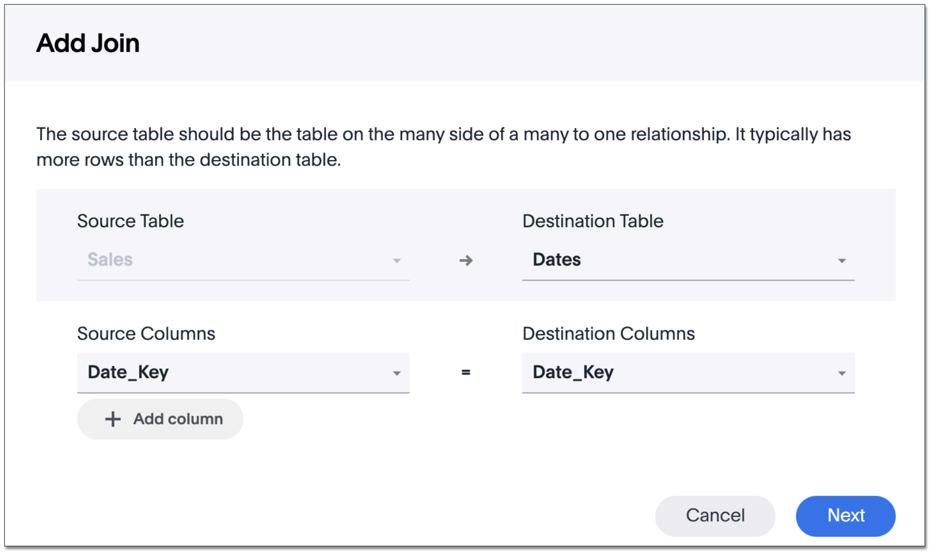
15. Click **Next**.

16. Enter the name *Store_Key-Store_Key*, a description for your join (optional), and click **Next**.

17. Click **+Add join**.

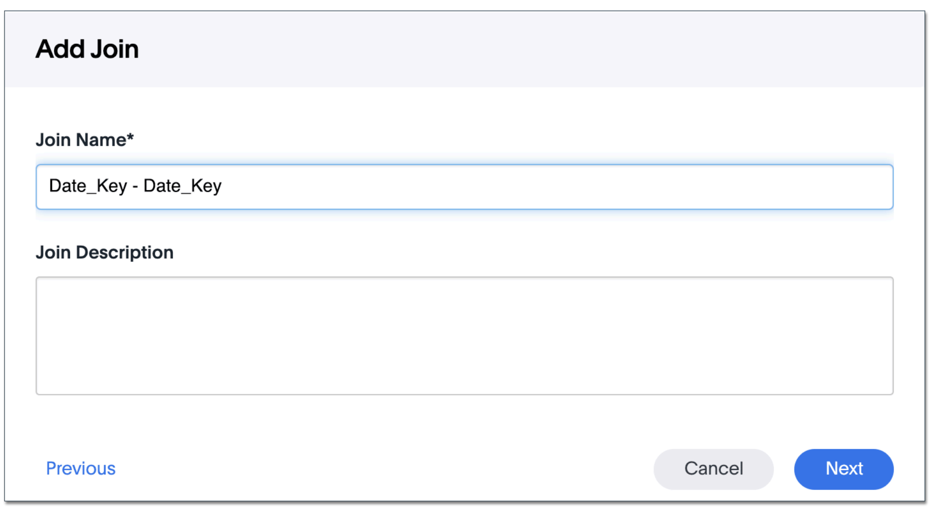
18. In the Add Join window, use the drop-down menus to make the following selections:
    - For Destination Table, select **Dates**.
    - For Source Columns, select **Date_Key**.

- For Destination Columns, select **Date_Key**.

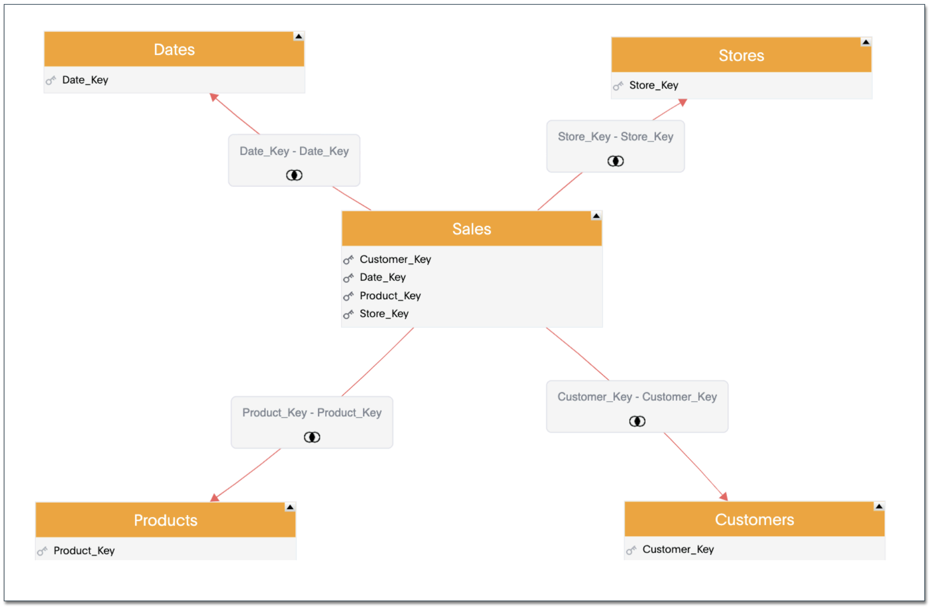


19. Click **Next**.

20. Enter the name *Date_Key - Date_Key*, a description for your join (optional), and click **Next**.



Now that all four table joins are created, the schema looks like this:

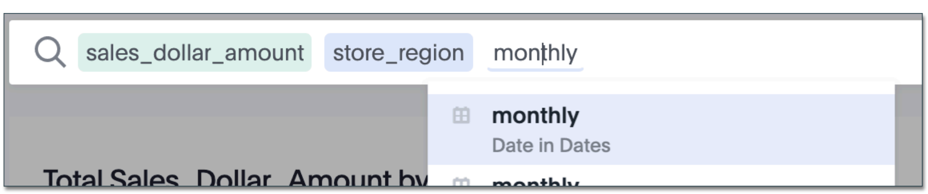


Searching joined tables

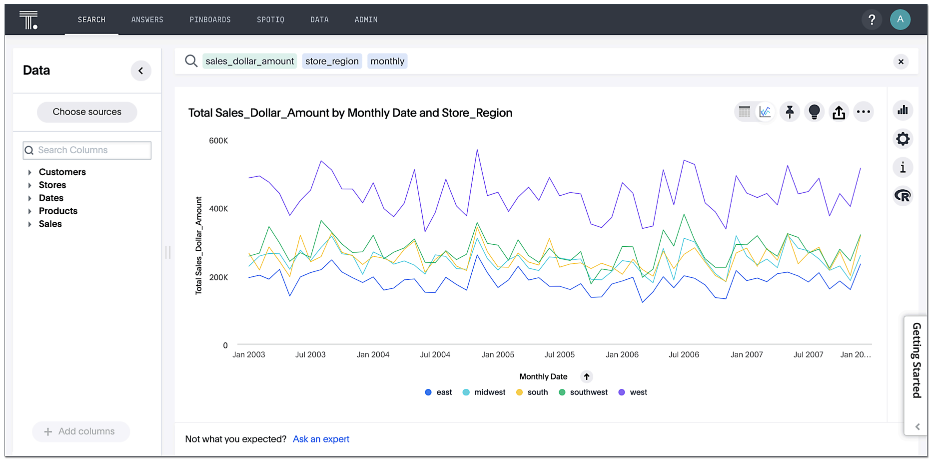
You can easily search the joined tables, without having to create a worksheet.

To search the joined tables, do the following:

1. Click **Search**.
2. Click the *Retail Sales* data source, and click **Choose sources**.
3. Select all the tables you just joined (Customers, Dates, Products, Sales, and Stores) and click **Close**.
4. In the search bar, enter **sales_dollar_amount**, **store_region**, and **monthly *Date in Dates***.



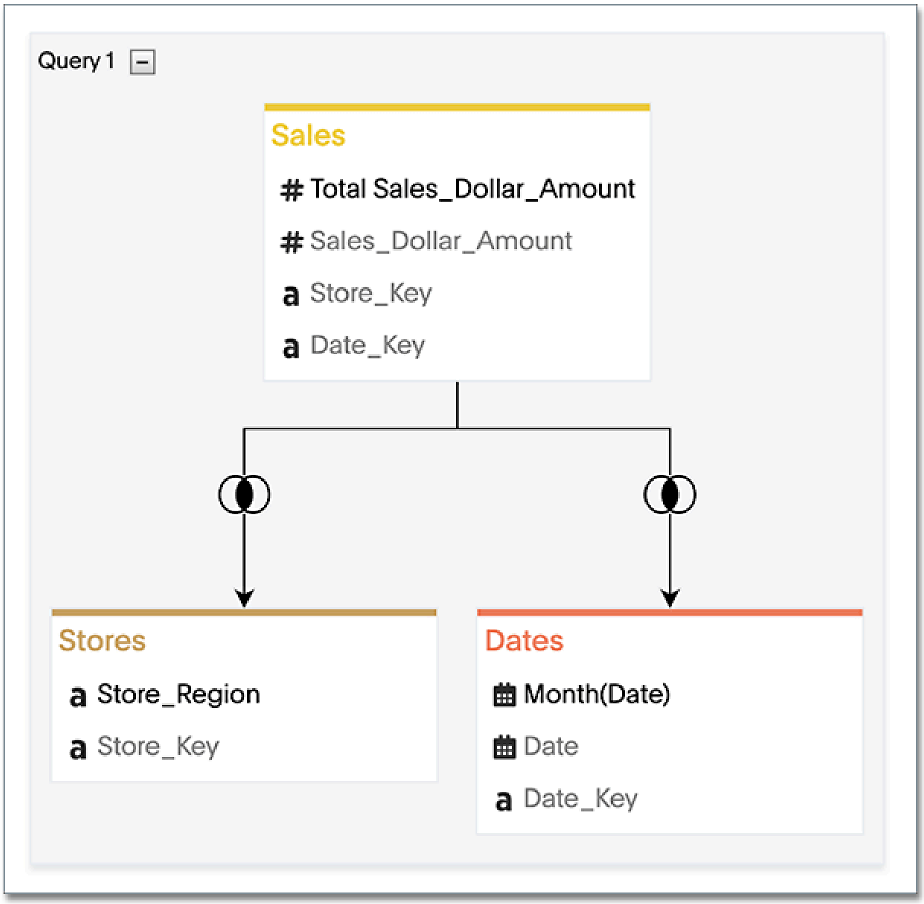
The search results look like this:



> **Note:** When Monthly is a native keyword, it will work on any timestamp. For the purposes of this example, we're using monthly as the date, from the Dates table.

5. To confirm that the search is honoring the table joins, click the Query details icon i, to the right of the chart.

6. To confirm the search is bridging three different tables to create a result, click **Query visualizer**.

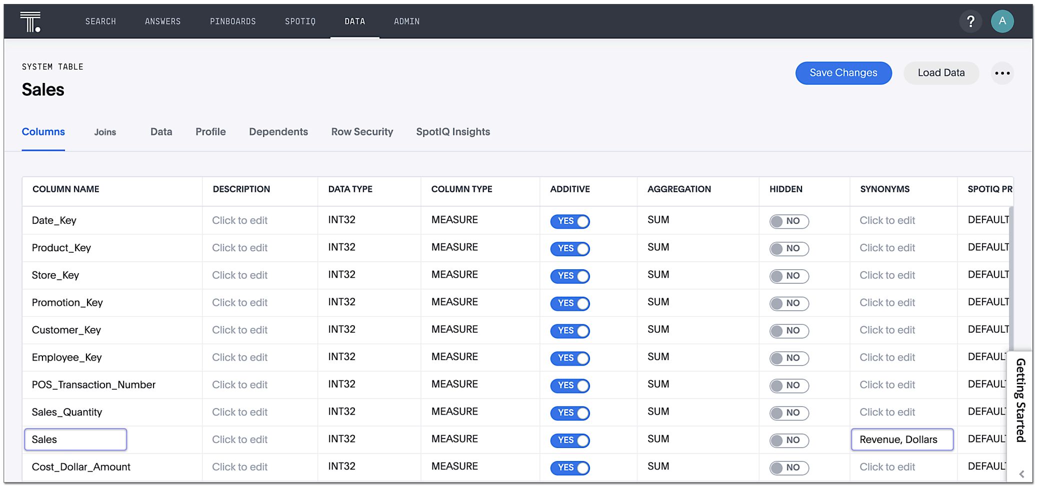


Best practices for data modeling

Here are some examples of how you can model your data to enhance searchability:

- Change column names
- Add synonyms for columns

In the following example, the *Sales_Dollar_Amount* column was renamed to Sales and the synonyms of *Revenue* and *Dollars* were added.



These are just a couple of examples of things you can do.

For more information about data modeling, see: Overview of data modeling settings [See page 0]

Creating a worksheet

A worksheet is a curated dataset built for ad-hoc analysis, that allows you to translate data from a database into the language of your business users.

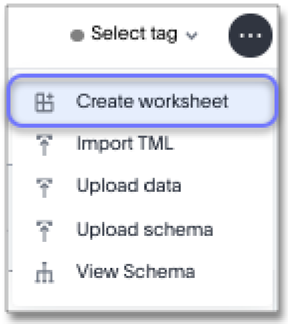
Examples of things you can do in a worksheet include:

- Removing columns that aren't needed
- Adding data labels and synonyms
- Adding calculations, such as margin

The worksheet based on the Sales table on **try.thoughtspot.com** was created by doing the following:

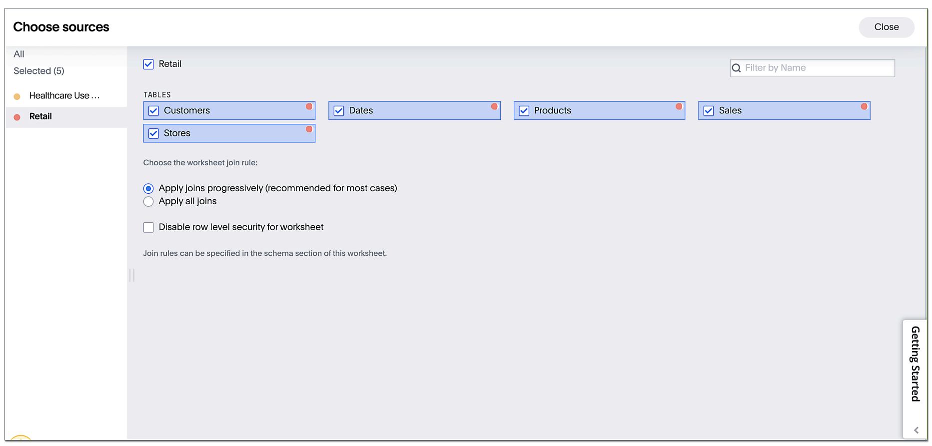
1. Click **Data**.

2. Click the more options icon , and select **Create worksheet**.



3. Click the **+** icon, next to Sources.

4. Check the box next to all five of the tables from the Retail dataset in your schema.



5. Make sure the default setting of **Apply joins progressively** is selected. This ensures that the search uses only the tables that are required.

6. Click **Close**.

7. In the Data view, click the name of the Customers table to reveal all of the columns in that table.

8. Double-click each column from the Customers table that you want to include in the worksheet.

   Include these columns:

   - Customer_Type

- Customer Name
- Customer_Gender
- Customer Region
- Customer State
- Customer City
- Customer Zip Code
- Customer County

9. Use the same process to select columns from the other tables to include in the worksheet.

   From the Dates table, include this column:

   - Date

   From the Products table, include these columns:

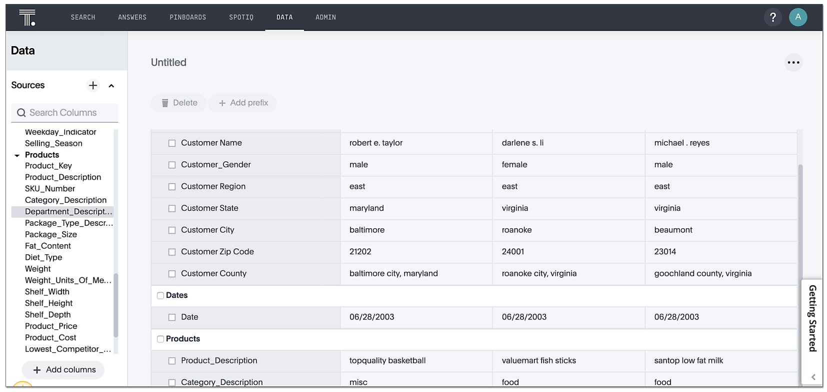
   - Product_Description
   - Category_Description
   - Department_Description

   From the Sales table, include these columns:

   - Sales_Dollar_Amount
   - Cost_Dollar_Amount
   - Gross_Profit_Dollar_Amount

   From the Stores table, include these columns:

   - Store_Name
   - Store_Region
   - Store_State
   - Store_City
   - Store_Zip_Code
   - Store_County



Note: As a best practice, you would not select a key from a table when creating a worksheet, because you would not want to search for the key.

10. Click the pencil icon next to the current name of your worksheet, enter the name **Retail Sales**, and click **Done**.

11. Click the more options icon , and select **Save**.

    Now, let's add a percent gross margin formula to the worksheet.

12. Click **Edit Worksheet**.

13. Next to Formulas, click the plus icon .

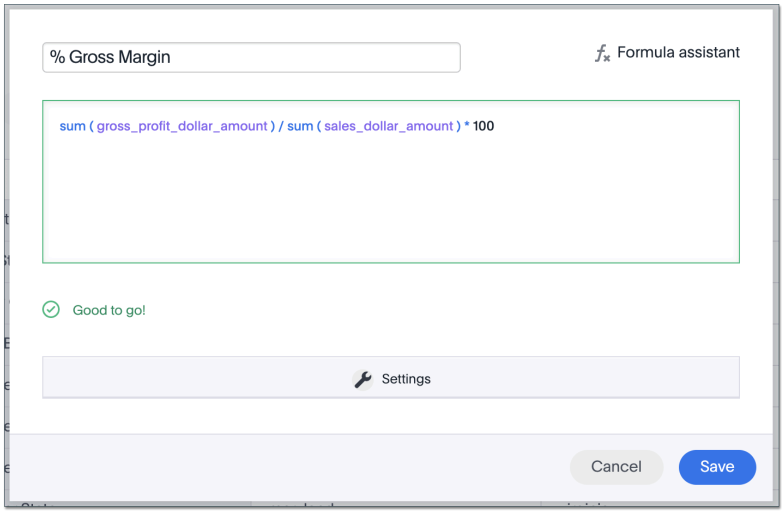
14. In the formula window, do the following:

    a. In the top field, enter the formula title: **% Gross Margin**.

    b. In the next field, enter this formula:

```
sum ( gross_profit_dollar_amount ) / sum ( sales_dollar_amount ) * 100
```

c. Click **Save**.



15. Save the worksheet with the formula added, by clicking the more options icon , and selecting **Save**.

16. Click **Data**, and click the Retail Sales worksheet.

17. In the Columns view, make sure that the % Gross Margin formula has the following settings:
    - For DATA TYPE: **DOUBLE**
    - For COLUMN TYPE: **MEASURE**
    - For AGGREGATION: **AVERAGE**

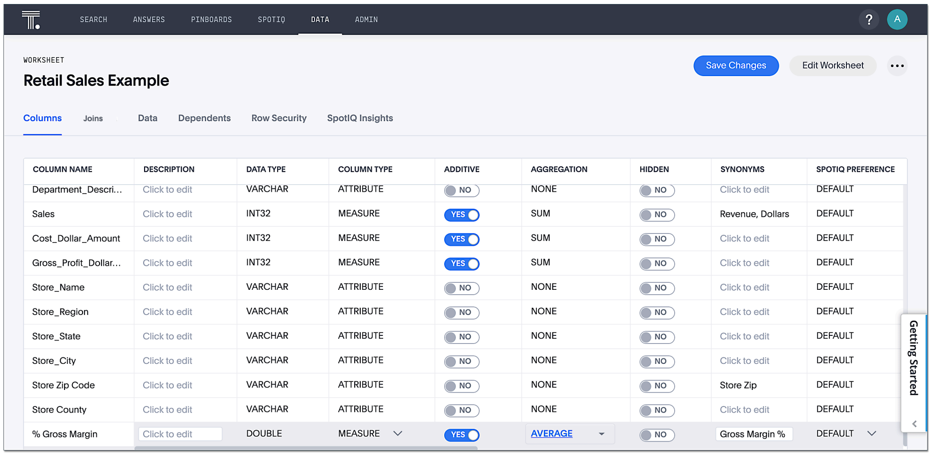
18. Save the worksheet with the updated formula settings, by clicking the more options icon , and selecting **Save**.

Best practices for worksheets

The best practices for data modeling also apply to worksheets.

The example here includes:

- Changed column names
- Synonyms for columns
- % Gross Margin formula



Adding a currency and geo map to a worksheet

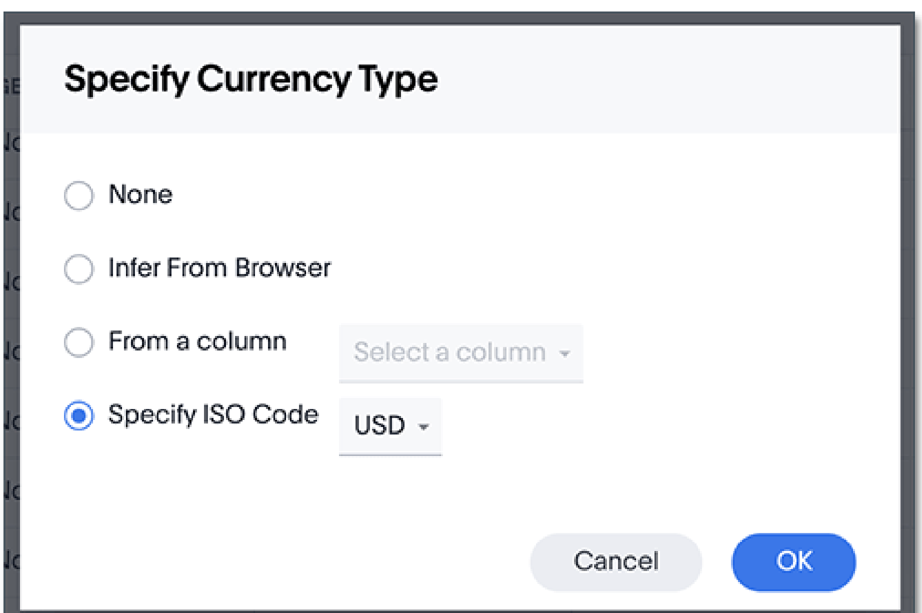
To further enhance the usability of a worksheet, you can add a specific currency type to monetary values, and a geographic map to regions in your data.

Using the Retail Sales worksheet example, here's how geo maps and currency could be added:

1. Click **Data**, and click the **Retail Sales** worksheet.

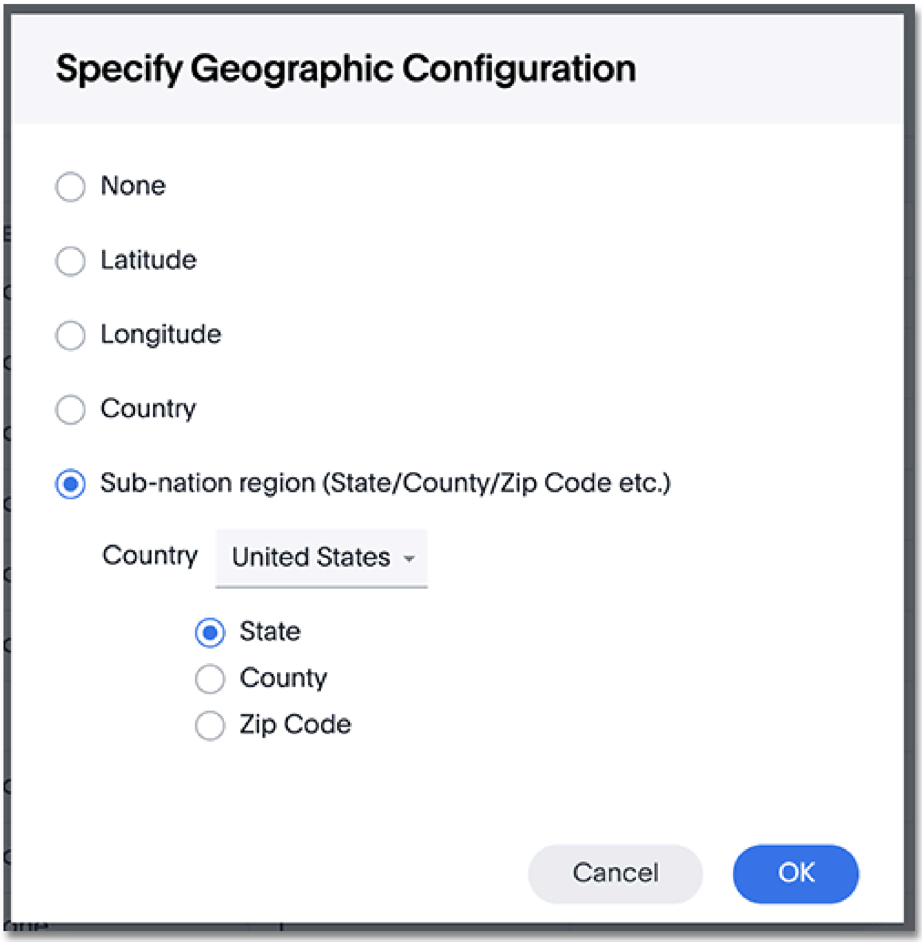
2. In the Columns view, find the Sales column and click **None** in the Currency Type column.

3. In the Specify Currency Type window, select **Specify ISO Code** and, then select **USD** from the drop-down menu.



4. In the Columns view, find the Store_State column, and click **None** in the Geo Config column.

5. In the Specify Geographic Configuration window, select **Specify Sub-nation region**, keep the default country of United States, and then select **State**.



6. Click **Save Changes**.

   Now that both currency and geographic types are set, you can see those changes reflected when you search the Retail Sales worksheet.

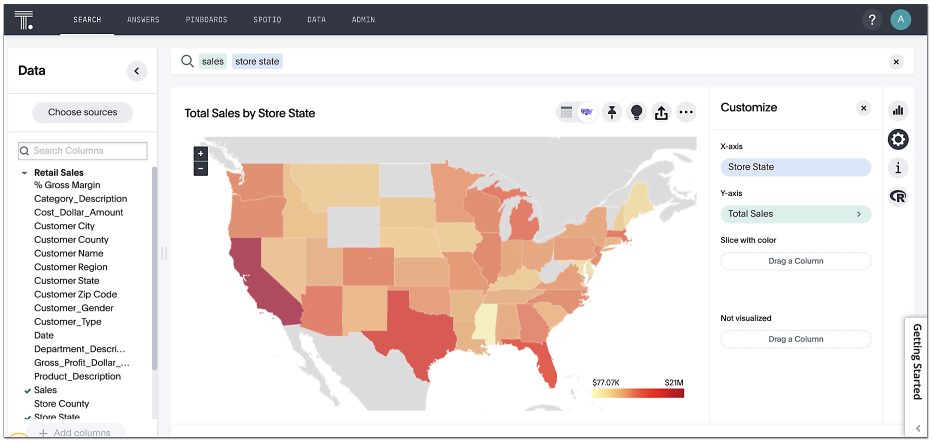
7. Click **Search**.

8. Click **Choose sources**.

9. Deselect any tables previously selected (if needed), select only the **Retail Sales** worksheet, and click **Close**.

10. In the search bar, enter: **sales store state** and press tab.

    The initial search results appear, but without labels for each state.



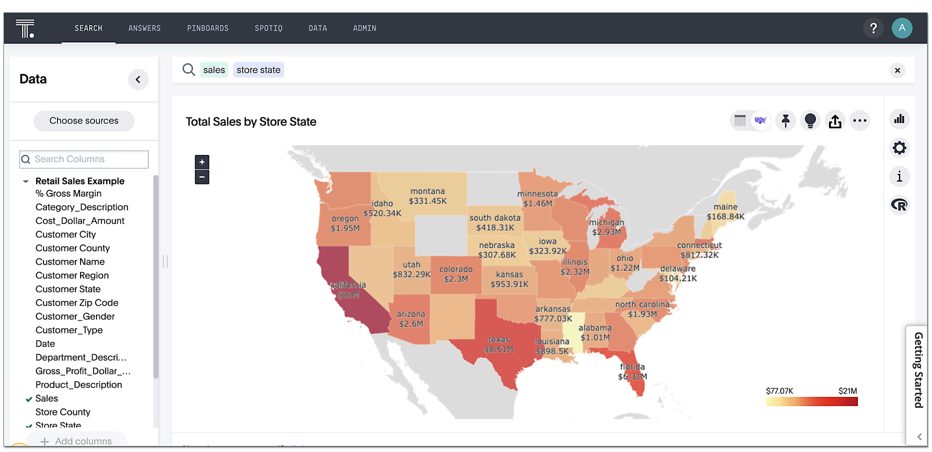
The final step is to add the labels.

11. Click the Edit chart configuration icon  .

12. In the Customize panel, click the **Total Sales** tile.

13. In the Edit column panel, select the **Data Labels** checkbox.

    Now in the search results, you can see labels with the state name and total sales in US dollars.



Related information

- ThoughtSpot in Snowflake Partner Connect [See page 34]
- Embrace overview [See page 3]
- Add a Snowflake connection [See page 11]
- Modify a Snowflake connection [See page 15]

Amazon Redshift overview

Embrace enables you to connect to Amazon Redshift databases, to use your data in ThoughtSpot.

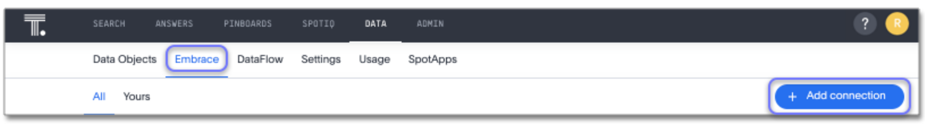
Add an Amazon Redshift connection

Once ThoughtSpot Embrace is enabled, you can add a connection to a Redshift database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

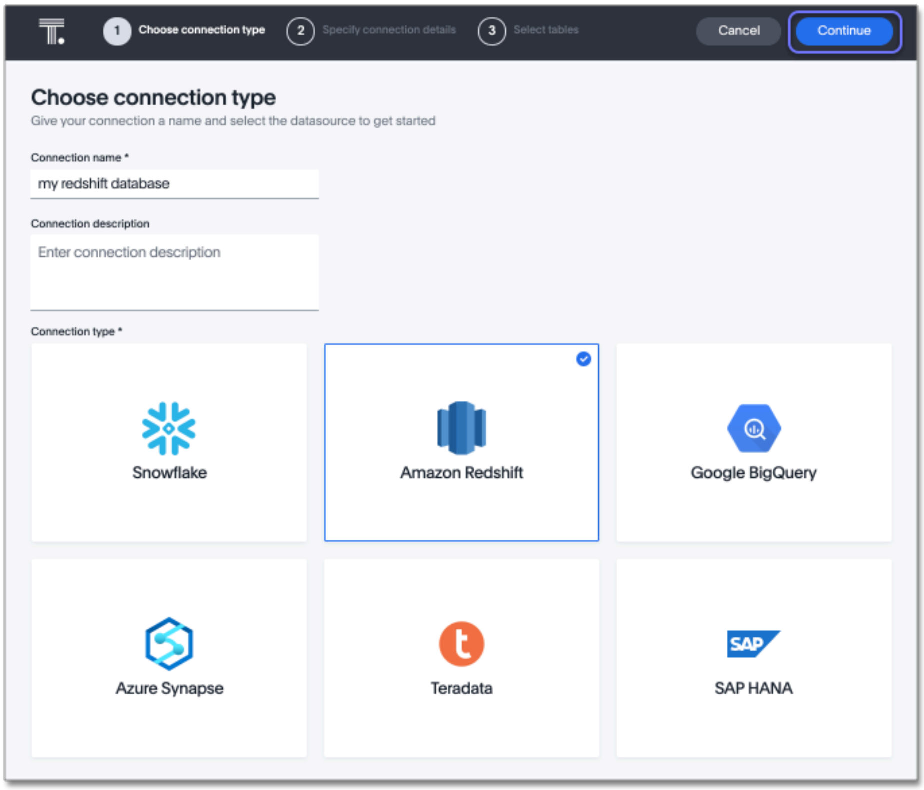
To add a new connection to Redshift:

1. Click **Data** in the top navigation bar.

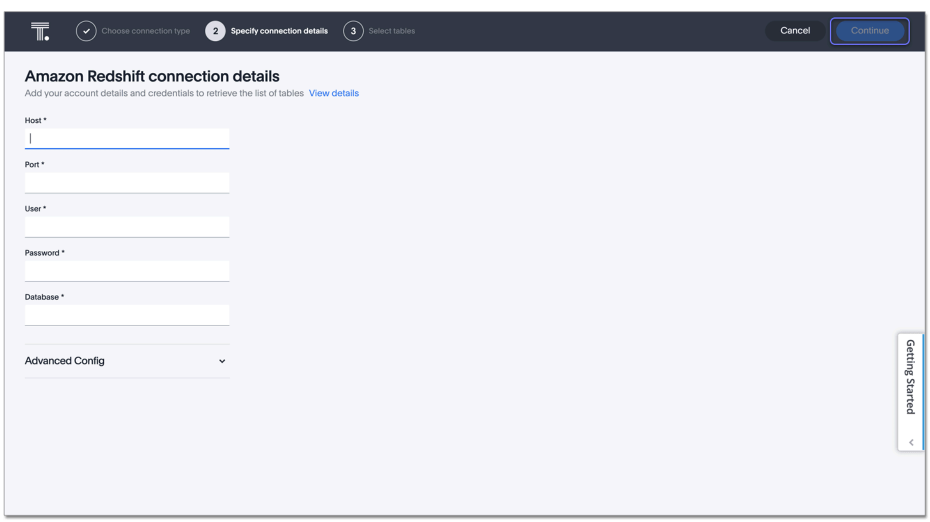
2. Click the **Embrace** tab at the top of the page, and click **+ Add connection** at the upper-right-hand side of the page.



3. Create a name for your connection, a description (optional), then select the Redshift connection type, and click **Continue**.



4. Enter the connection details for your Redshift data source.



Refer to the Redshift connection reference [See page 69] for more information on each of the specific attributes you must enter for your connection.

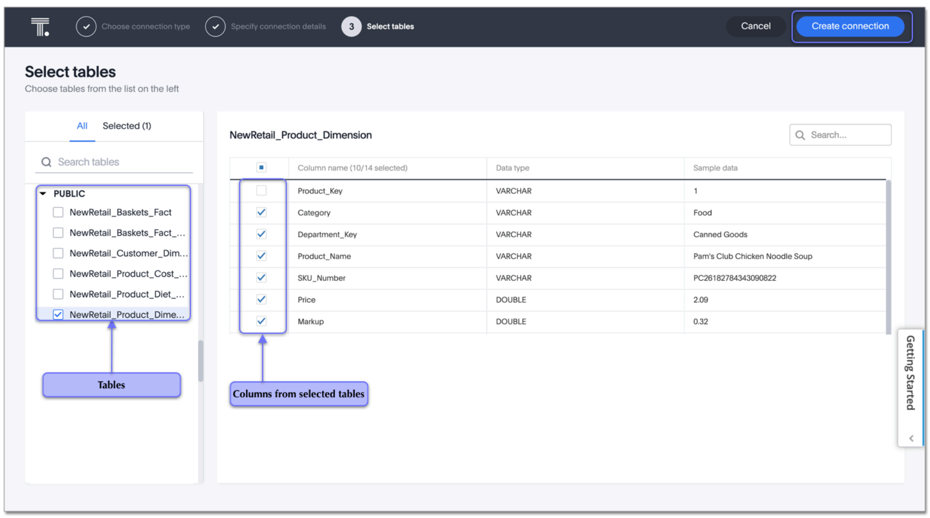
5. (Optional) Provide additional key-value pairs that you need to set up your connection to Redshift, by doing the following:

- Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
- Enter your key and value information.
- To add more keys and values, click the plus sign (+), and enter them.

> **Note:** Any key-value pairs that you enter must be defined in your Redshift data source. Key-value pairs are case-sensitive.

6. Click **Continue**.

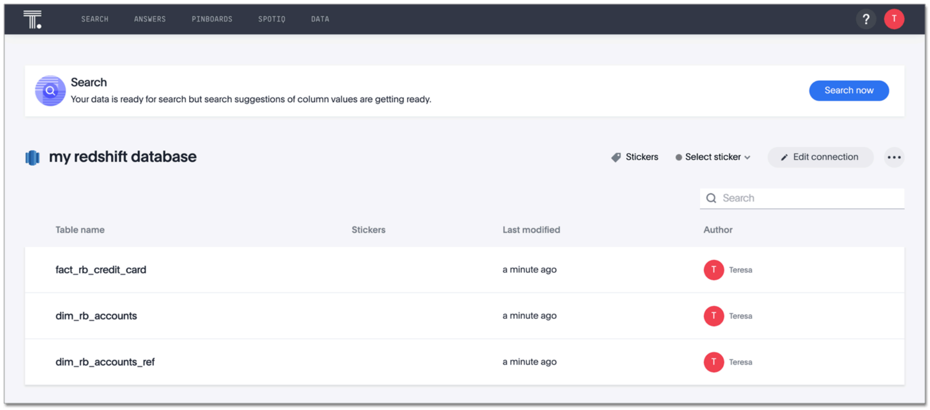
7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



A message appears indicating the number of tables and columns that will be added to your connection.

8. Click **Confirm**.

Once the connection is added, you can search your Redshift database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify a Redshift connection [See page 59]
- Redshift connection reference [See page 69]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify a Redshift connection

Summary: Learn how to modify a Redshift connection and its tables.

You can modify an Embrace Redshift connection in the following ways:

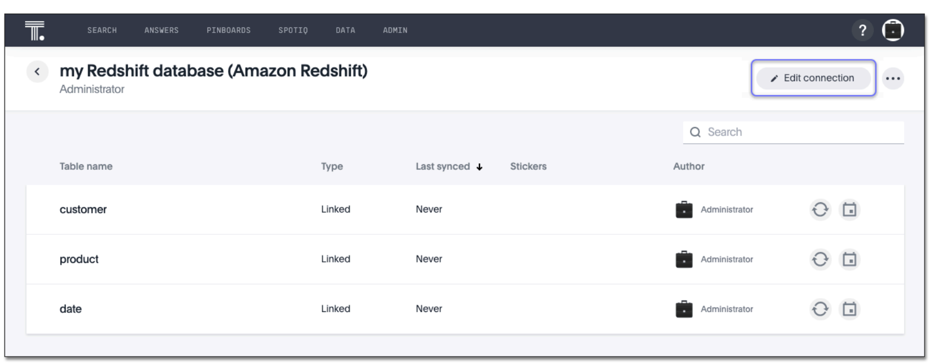
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing a Redshift connection

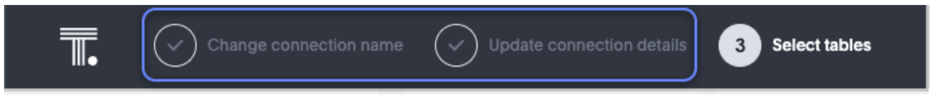
You can edit a Redshift connection to add tables and columns.

To edit a Redshift connection:

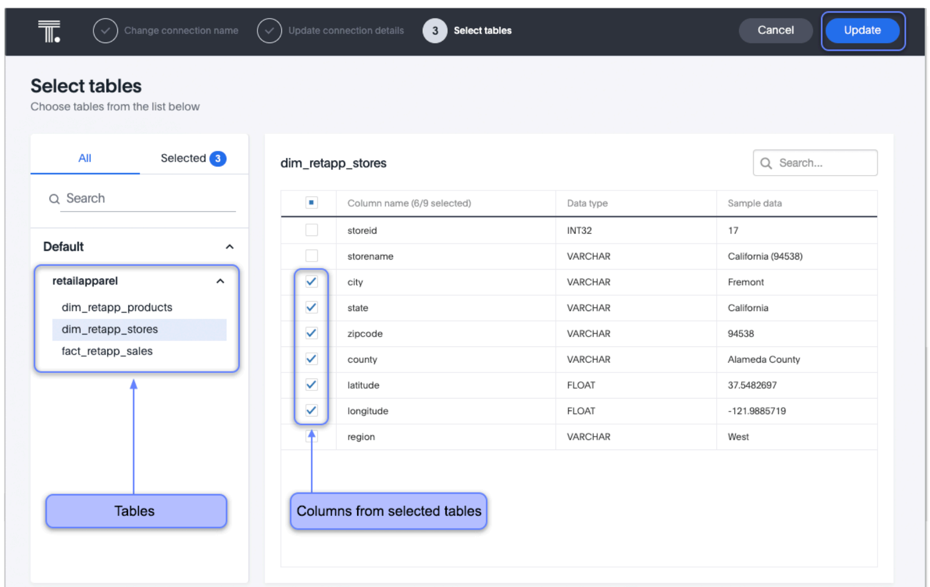
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.
4. Click **Edit connection** at the upper-right-hand side of the page.



By default, the Select tables page appears. You have the option, though, to change the connection name and update the connection details, by clicking the appropriate option at the top of the screen, making any changes needed and clicking **Continue** to go to the next page.



5. Expand the database table drop-down menu, and select the tables and columns you want to add.



6. Click **Update**, and then click **Confirm** to save the updated connection detail.

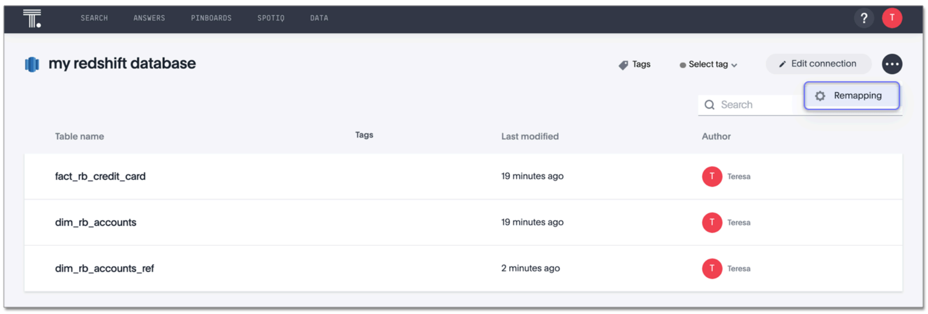
To remove a table from a connection, delete it from the connection details page. For more information, see Deleting a table [See page 63].

Remapping a Redshift connection

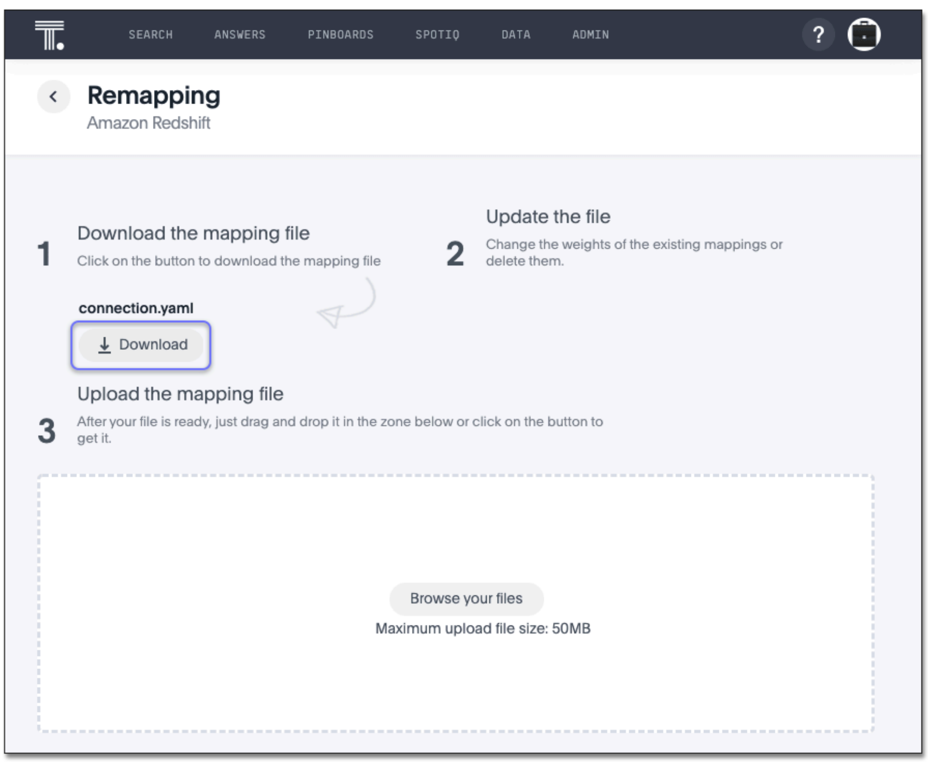
Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

To remap a Redshift connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to remap.
4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



6. Edit the file, as required, and save it.

7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from a Redshift connection

You can edit a Redshift connection to remove a column.

To remove a column from a Redshift connection:

1. Click **Data** in the top navigation bar.

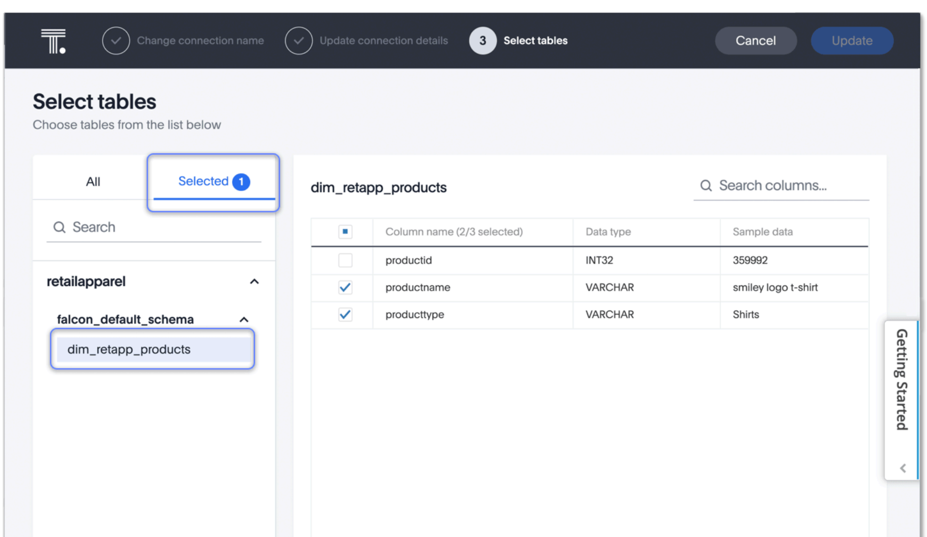
2. Click the **Embrace** tab.

3. Click the name of the connection that contains the column you want to remove.

4. Click **Edit connection** at the upper-right-hand side of the page.

5. In the Select tables page, click the Selected tab.

6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.

8. Click **Update**.

   The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from a Redshift connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

To delete a table from a Redshift connection:

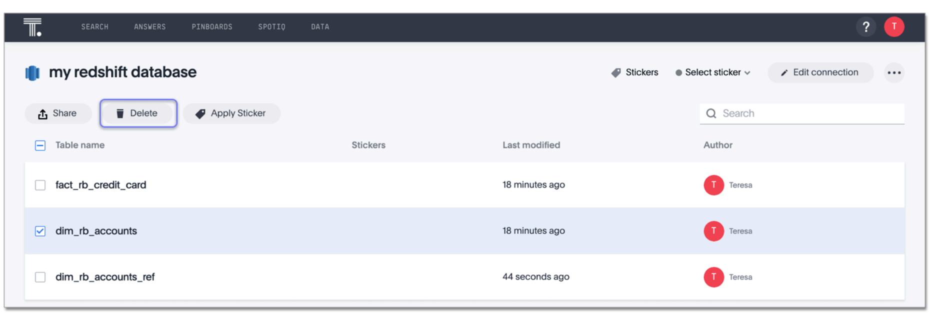
1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab.

3. Click the name of the connection that contains the table you want to delete.

4. Find the table you want to delete in the list, and check the box next to its name.

5. Click **Delete**, and then click **Delete** again to confirm.

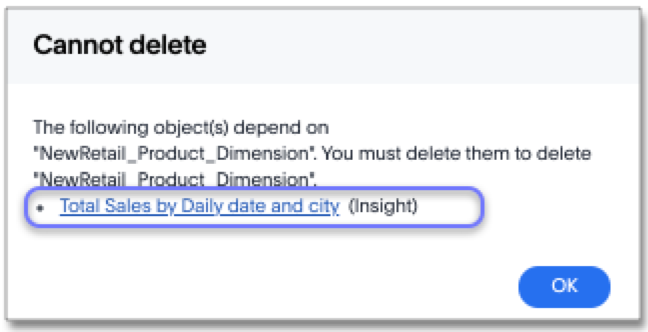


If you attempt to delete a table with dependent objects, the operation is blocked. A *Cannot delete* window appears, with a list of links to dependent objects. See Deleting a table with dependent objects [See page 64]

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

  When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

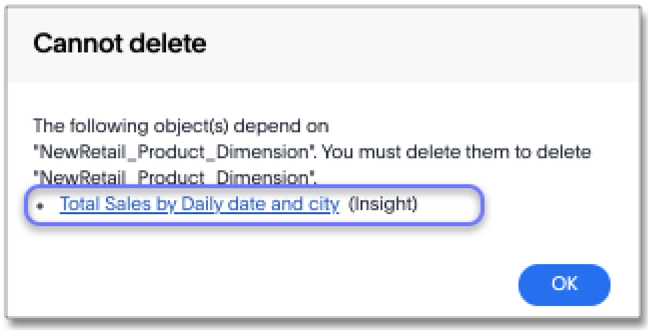
Deleting a Redshift connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete a Redshift connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

If you attempt to delete a connection with dependent objects, the operation is blocked, and a "Cannot delete" warning appears with a list of dependent objects with links.



5. If the "Cannot delete" warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.

6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click again **Delete** to confirm.

Best practices for Embrace with Redshift

Summary: You can connect to Redshift using ThoughtSpot Embrace, and start searching your data. This article contains helpful pointers on data modeling.

Configuring your ThoughtSpot server

We recommend configuring the following settings when creating Embrace connections:

- Turn on ‘Search on Enter’ to reduce the number of queries run against Redshift.
- Turn off ‘Auto Indexing’, and manually set the Index Type on columns that would be helpful when searching.

Contact ThoughtSpot support to do this configuration.

Optimizing query performance

User experience in ThoughtSpot Embrace is strongly impacted by the performance of queries in the underlying database. Redshift is a columnar MPP database built for analytic workloads, and proper tuning can have a significant impact on query performance.

You should always follow AWS best practices to optimize query performance. For details, see Tuning query performance (https://docs.aws.amazon.com/redshift/latest/dg/c-optimizing-query-performance.html) in Amazon’s Redshift documentation.

Workload management and monitoring

We recommend that you implement workload management (WLM) within Redshift to prioritize queries appropriately. For more information, refer to the following links in Amazon’s Redshift documentation:

- Implementation: Implementing workload management (https://docs.aws.amazon.com/redshift/latest/dg/cm-c-implementing-workload-management.html)
- Workload and performance data: System monitoring tables (https://docs.aws.amazon.com/

redshift/latest/dg/cm-c-wlm-query-monitoring-rules.html#cm-c-wlm-query-monitoring-metrics)

Concurrency scaling

ThoughtSpot may generate large numbers of concurrent queries. Redshift’s concurrency scaling feature can be enabled to provide consistent query performance during periods of high activity.

For details, see Working with concurrency scaling (https://docs.aws.amazon.com/redshift/latest/dg/concurrency-scaling.html) in Amazon’s Redshift documentation.

Data modeling

In Redshift, query performance can be improved significantly using Sort and Distribution keys on large tables. Selecting an optimized compression type can also have a big impact on query performance.

These and other important topics are covered in Amazon Redshift best practices for table design (https://docs.aws.amazon.com/redshift/latest/dg/c_designing-tables-best-practices.html) in Amazon’s Redshift documentation.

Materialized views

Redshift now supports materialized views, and it is recommended to create a materialized view and use it in place of any complex views or poor performing table joins.

For details, see Creating materialized views in Amazon Redshift (https://docs.aws.amazon.com/redshift/latest/dg/materialized-view-overview.html) in Amazon’s Redshift documentation.

Defining joins between tables

To search more than one table at the same time in ThoughtSpot, you must define joins between these tables by specifying the columns that contain matching data across two tables. These columns represent the ‘primary key’ and ‘foreign key’ of the join. You can define them in either Redshift or ThoughtSpot.

For details on the syntax for defining primary and foreign keys in Redshift, see ALTER TABLE (https://docs.aws.amazon.com/redshift/latest/dg/r_ALTER_TABLE.html) in Amazon's Redshift documentation.

For details on defining joins in ThoughtSpot, see Join a table or view to another data source [See page 0].

Redshift connection reference

Summary: Learn about the fields used to create a Redshift connection using ThoughtSpot Embrace.

Here is a list of the fields of a Redshift connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new Redshift connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Host

Enter the host name associated with the Redshift database.

Port

Enter the port number associated with the Redshift database.

User

Enter the Redshift account username.

Password

Enter the Redshift account password.

Database

Specify the database associated with the account.

Google BigQuery overview

Embrace enables you to connect to Google BigQuery databases, to use your data in ThoughtSpot.

- Add a connection [See page 71]
- Modify a connection [See page 75]
- Reference [See page 82]

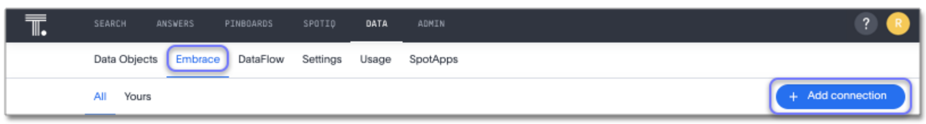
Add a Google BigQuery connection

Once ThoughtSpot Embrace is enabled, you can add a connection to a BigQuery database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

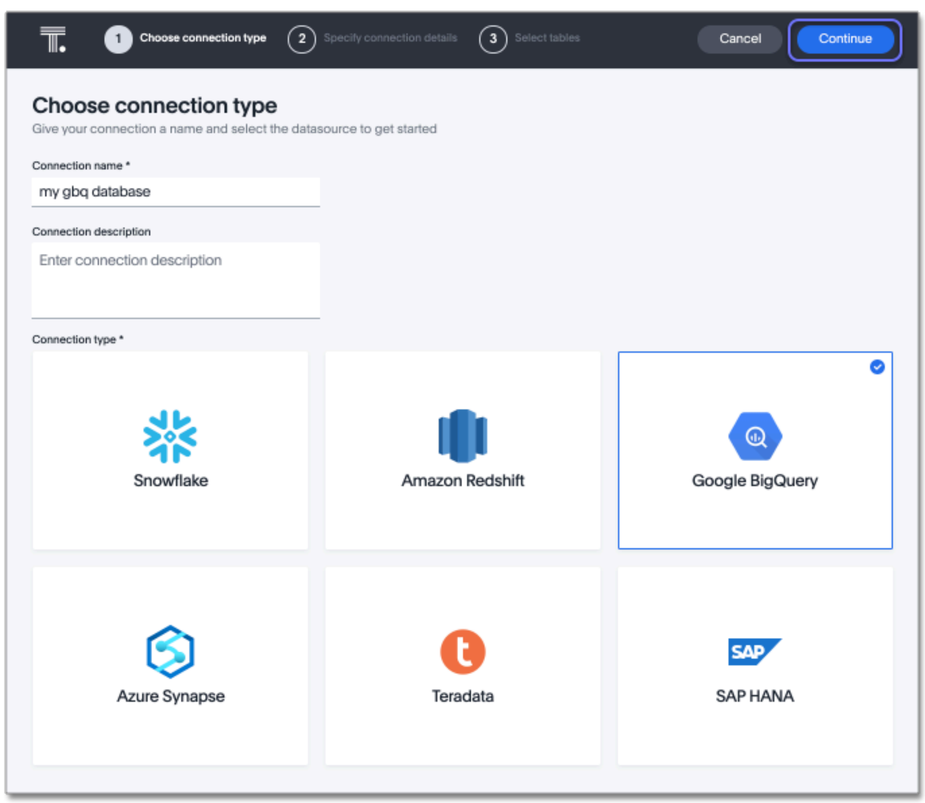
To add a new connection to BigQuery:

1. Click **Data** in the top navigation bar.

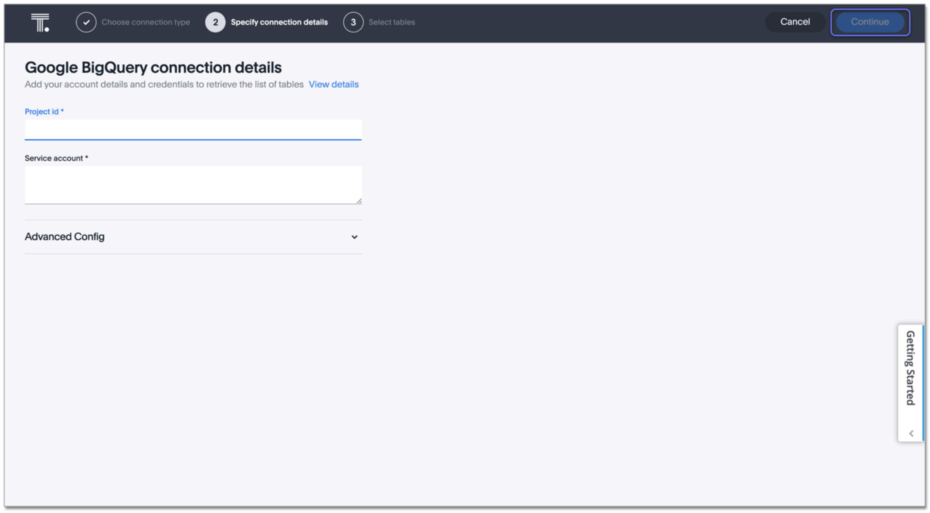
2. Click the **Embrace** tab at the top of the page, and click **+ Add connection** at the upper-right-hand side of the page.



3. Create a name for your connection, a description (optional), then select the BigQuery connection type, and click **Continue**.



4. Enter the connection details for your BigQuery data source.



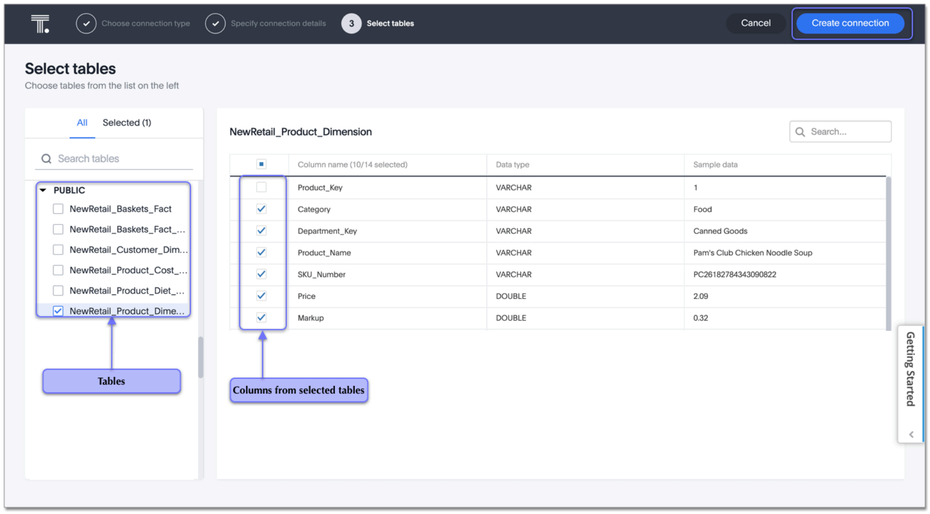
Refer to the BigQuery connection reference [See page 82] for more information on each of the specific attributes you must enter for your connection.

5. (Optional) Provide additional key-value pairs that you need to set up your connection to BigQuery, by doing the following:
    - Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
    - Enter your key and value information.
    - To add more keys and values, click the plus sign (+), and enter them.

> **Note:** Any key-value pairs that you enter must be defined in your BigQuery data source. Key-value pairs are case-sensitive.

6. Click **Continue**.

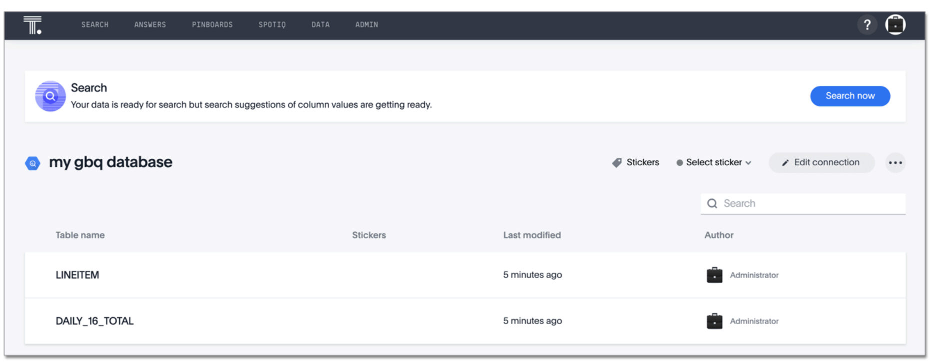
7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



A message appears indicating the number of tables and columns that will be added to your connection.

8. Click **Confirm**.

Once the connection is added, you can search your BiqQuery database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify a BigQuery connection [See page 75]
- BigQuery connection reference [See page 82]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify a BigQuery connection

Summary: Learn how to modify a BigQuery connection and its tables.

You can modify an Embrace BigQuery connection in the following ways:

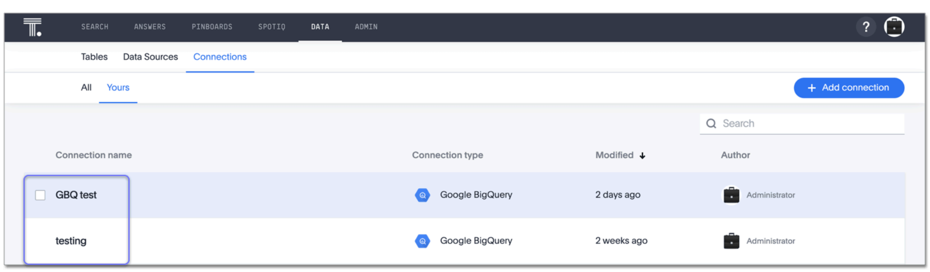
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing a BigQuery connection

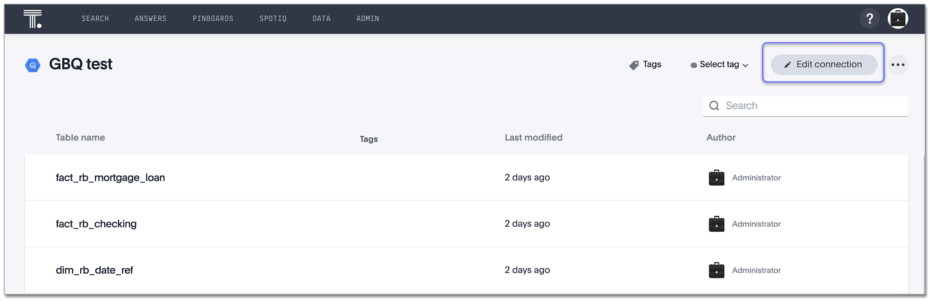
You can edit a BigQuery connection to add tables and columns.

To edit a BigQuery connection:

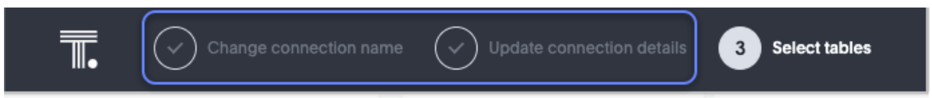
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.



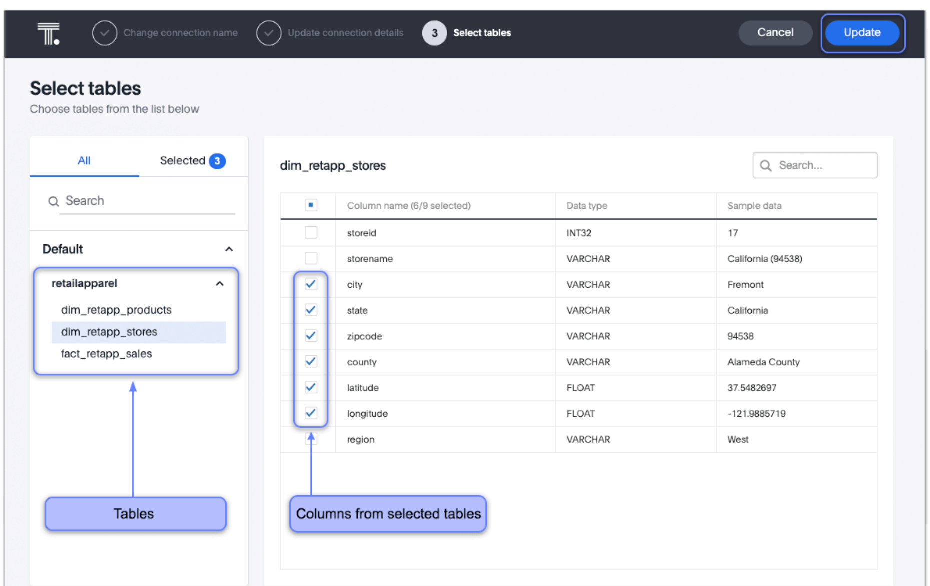
4. Click **Edit connection** at the upper-right-hand side of the page.



By default, the Select tables page appears. You have the option, though, to change the connection name and update the connection details, by clicking the appropriate option at the top of the screen, making any changes needed and clicking **Continue** to go to the next page.



5. Expand the database table drop-down menu, and select the tables and columns you want to add.



6. Click **Update**, and then click **Confirm** to save the updated connection detail.

To remove a table from a connection, delete it from the connection details page. For more information, see Deleting a table [See page 79].

Remapping a BigQuery connection

Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

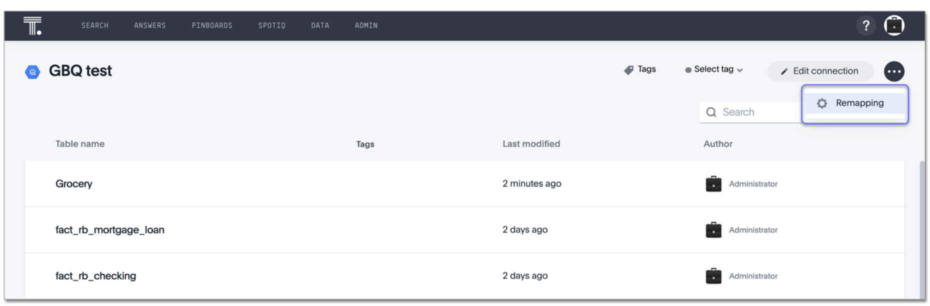
To remap a BigQuery connection:

1. Click **Data** in the top navigation bar.

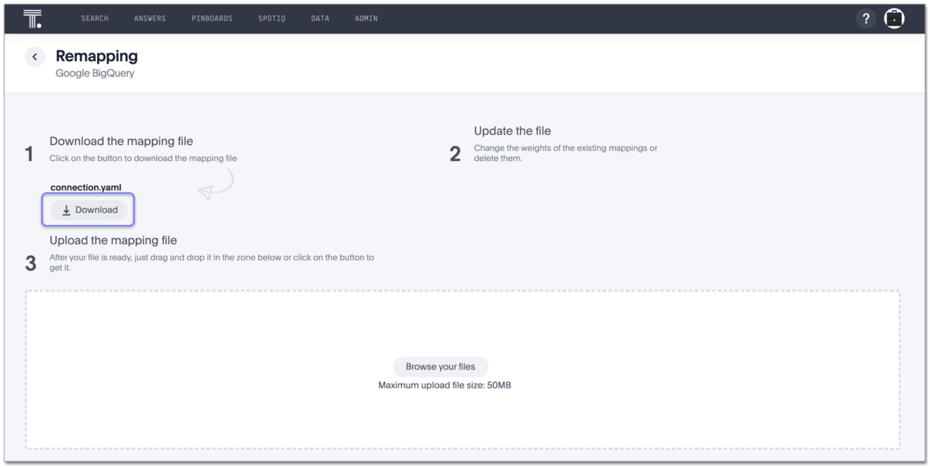
2. Click the **Embrace** tab.

3. Click the name of the connection you want to remap.

4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



6. Edit the file, as required, and save it.

7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from a BigQuery connection

You can edit a BigQuery connection to remove a column.

To remove a column from a BigQuery connection:

1. Click **Data** in the top navigation bar.

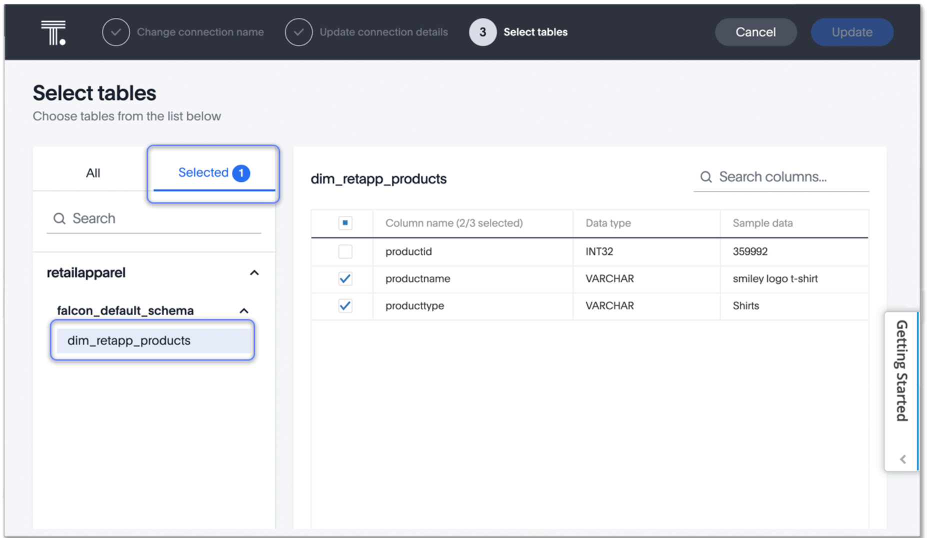
2. Click the **Embrace** tab.

3. Click the name of the connection that contains the column you want to remove.

4. Click **Edit connection** at the upper-right-hand side of the page.

5. In the Select tables page, click the Selected tab.

6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.

8. Click **Update**.

   The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from a BigQuery connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

To delete a table from a BigQuery connection:

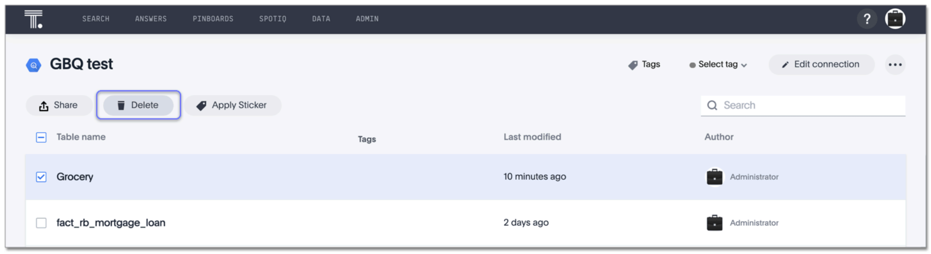
1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab.

3. Click the name of the connection that contains the table you want to delete.

4. Find the table you want to delete in the list, and check the box next to its name.

5. Click **Delete**, and then click **Delete** again to confirm.

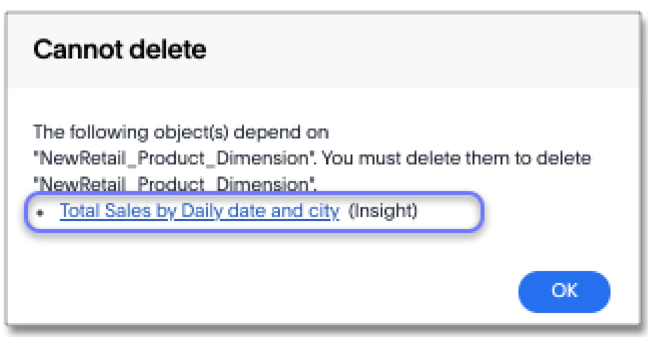


If you attempt to delete a table with dependent objects, the operation is blocked. A *Cannot delete* window appears, with a list of links to dependent objects. See Deleting a table with dependent objects [See page 80].

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

  When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

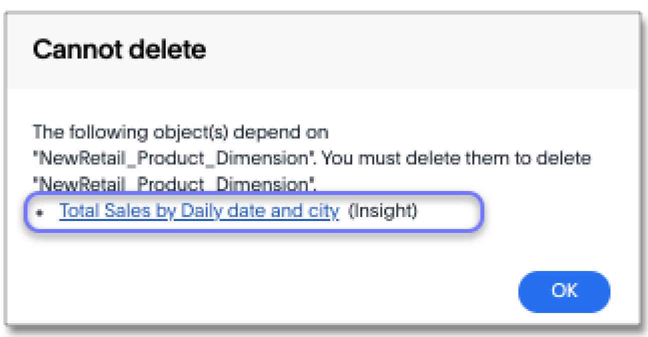
Deleting a BigQuery connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete a BigQuery connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

   If you attempt to delete a connection with dependent objects, the operation is blocked, and a “Cannot delete” warning appears with a list of dependent objects with links.

5. If the “Cannot delete” warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.
6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click **Delete** again to confirm.

BigQuery connection reference

Summary: Learn about the fields used to create a BigQuery connection using ThoughtSpot Embrace.

Here is a list of the fields of a BigQuery connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new BigQuery connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Project id

Enter the project ID associated with the BigQuery database.

Service account

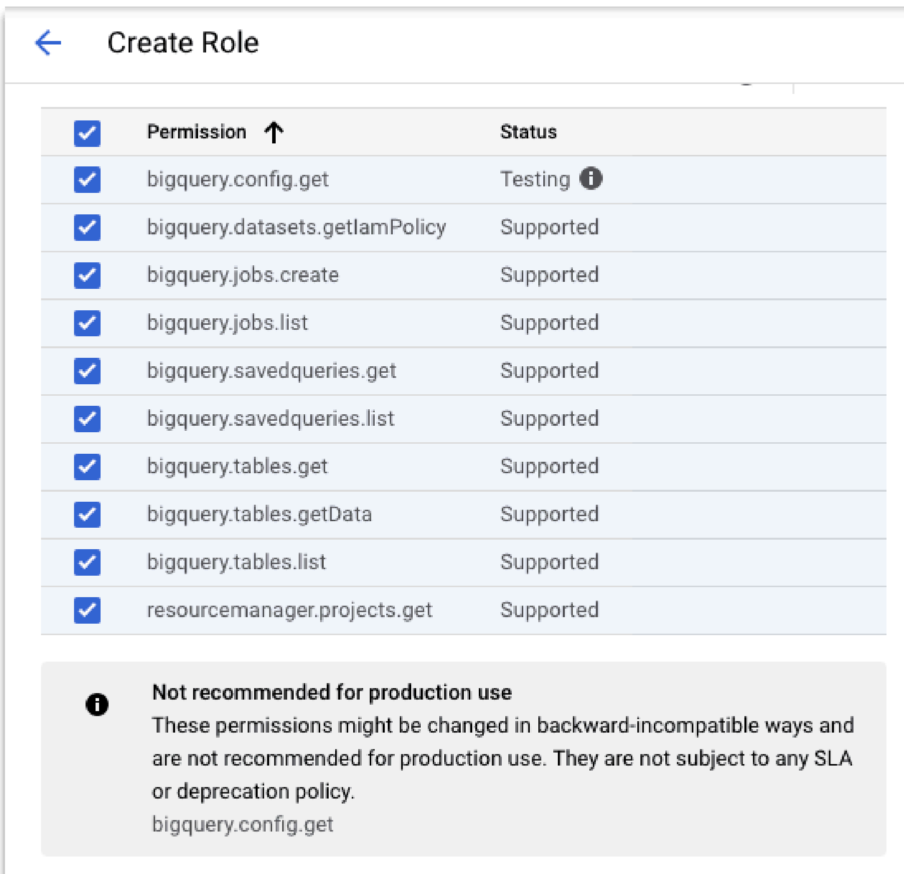
Enter the service account associated with the BigQuery database.

Create a custom role

In order to use ThoughtSpot Embrace to query your GBQ database, you must create a custom role with specific permissions and then assign it to your service account.

1. Navigate to console.cloud.google.com (https://console.cloud.google.com), sign in, and select your project.
2. Hover over **IAM & admin**.
3. Click **Roles**.
4. Click **+CREATE ROLE**.
5. On the Create Role page, do the following:
    - Enter a title (or keep the existing one).
    - (Optional) Enter a description.
    - Create an ID (or keep the existing one).
    - Select a Role launch stage.
    - Click **+ADD PERMISSIONS**.
6. In the Add permissions window, select the following permissions:

- bigquery.config.get
- bigquery.datasets.getIamPolicy
- bigquery.jobs.create
- bigquery.jobs.list
- bigquery.savedqueries.get
- bigquery.savedqueries.list
- bigquery.tables.get
- bigquery.tables.getData
- bigquery.tables.list
- resourcemanager.projects.get



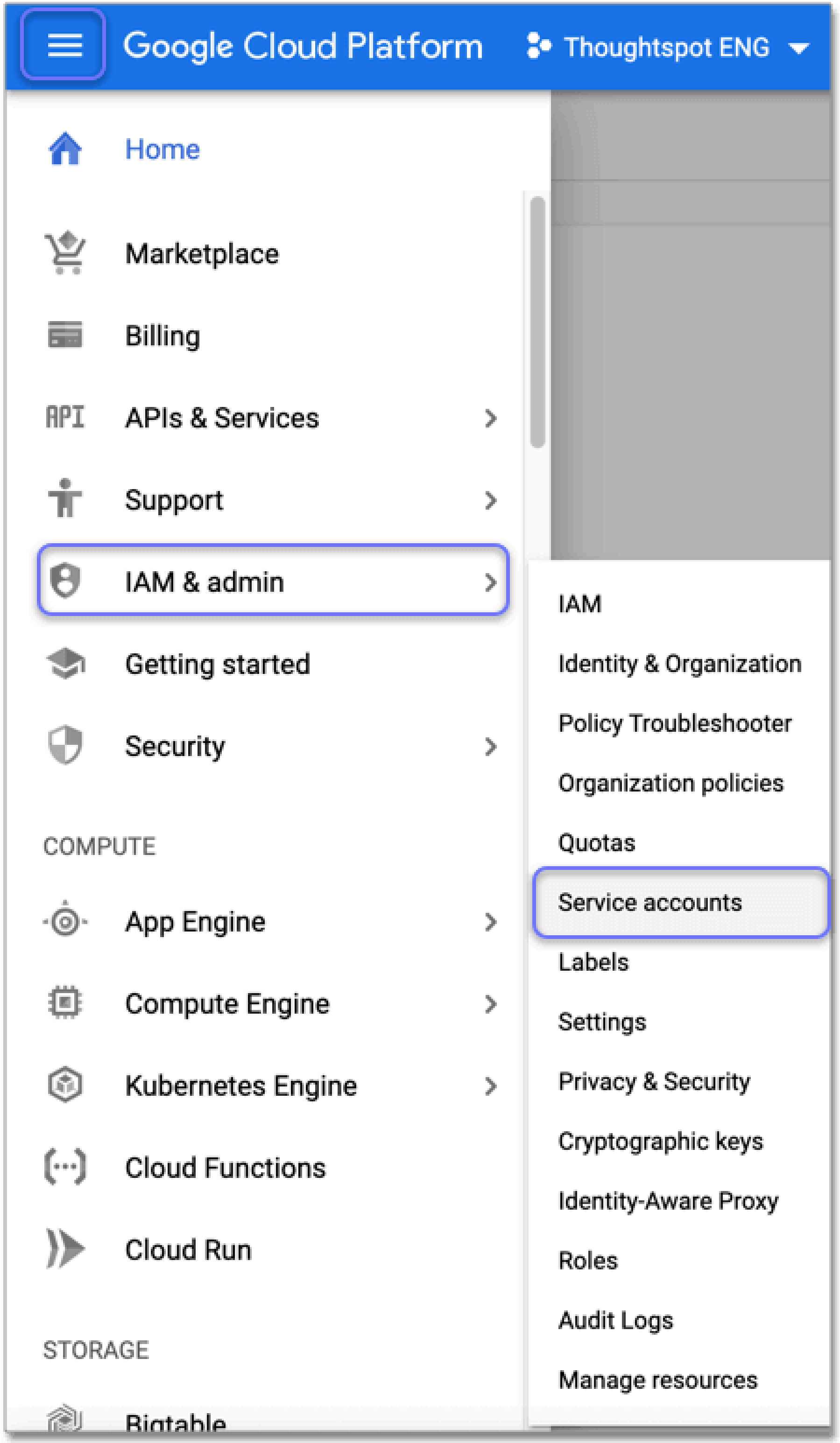
7. Click **ADD**.

8. Click **CREATE**.

Set up service account

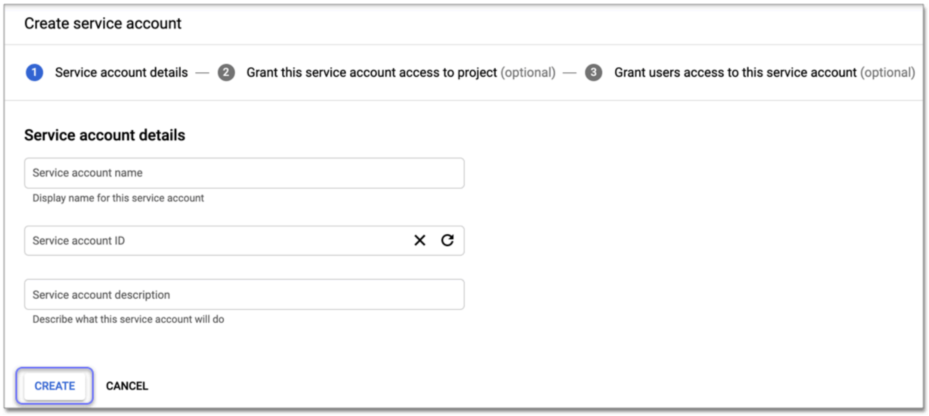
You may already have a service account for GBQ with the proper permissions in place. If not, follow these steps to create a service account.

1. Navigate to console.cloud.google.com (https://console.cloud.google.com), sign in, and select your project.
2. Click the navigation menu in the upper left, if it is not already open.
3. Hover over **IAM & Admin**.
4. Click **Service Accounts**.



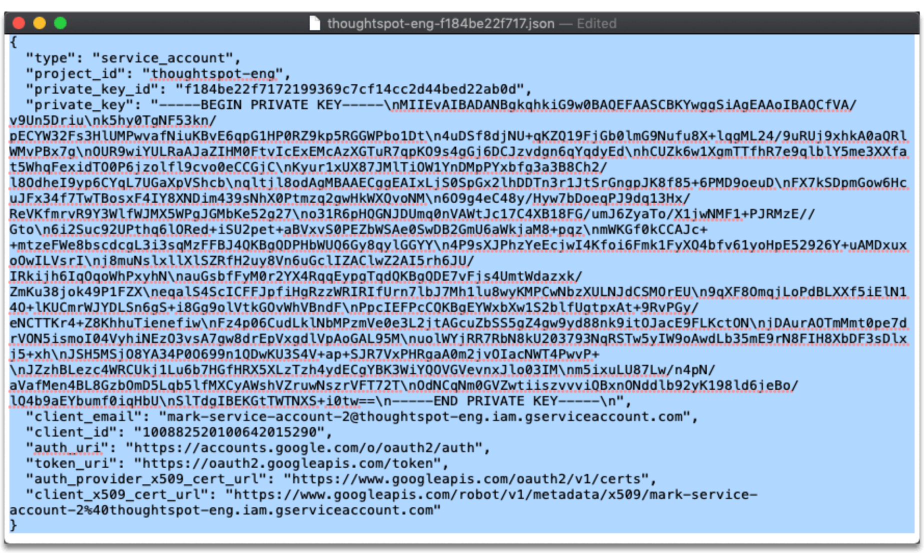
5. Click **+ CREATE SERVICE ACCOUNT** from the top menu.
6. Specify a name, and add an optional description.

7. Click **CREATE**.



8. On the Service account permissions page, click **Select a role**, choose **Custom**, and select the custom role you created in Create a custom role [See page 82].
9. Click **CONTINUE**.
10. On the Create service account page, click **+ CREATE KEY**.
11. For **Key type**, choose **JSON**.
12. Click **CREATE**. The key downloads to your computer.

    When the download is complete, the message: “Private key saved to your computer” appears.
13. Make note of the name of the filename, so you can find it on your computer, and then click **CLOSE**.
14. When you are ready to add a connection to BigQuery in ThoughtSpot, open the private key file in a text editor, and copy the entire contents of the file.



15. In the connection details page of your BigQuery connection in ThoughtSpot, paste this key

into the **Service account** field.

For details on how to add a connection to BigQuery in ThoughtSpot, see Add a BigQuery connection [See page 71].

Share dataset

To make your dataset available for your Google BigQuery connection in ThoughtSpot, you must share it with your service account in Google BigQuery in an owner role.

1. Navigate to console.cloud.google.com (https://console.cloud.google.com), sign in, and select your project.
2. Click the navigation menu in the upper left, if it is not already open.
3. Scroll down in the navigation menu into the BIG DATA section, and click **BigQuery**.

   Your project should be listed on the left side of the page under the search box.
4. Click your project to reveal its available datasets.
5. Click the dataset that you want to share.
6. Click **SHARE DATASET**.
7. Click **Owner** to reveal the complete list of project owners.
8. In the Add members box, enter the member email address of the service account you want to share the dataset with.
9. Click **Select a role**, select **Project > Owner**, and click **Add**.
10. Click **Done**.

Azure Synapse overview

Embrace enables you to connect to Azure Synapse databases, to use your data in ThoughtSpot.

- Add a connection [See page 89]
- Modify a connection [See page 93]
- Reference [See page 100]

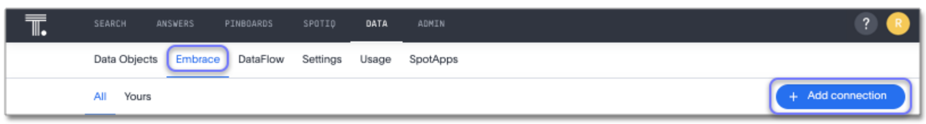
Add an Azure Synapse connection

Once ThoughtSpot Embrace is enabled, you can add a connection to a Synapse database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

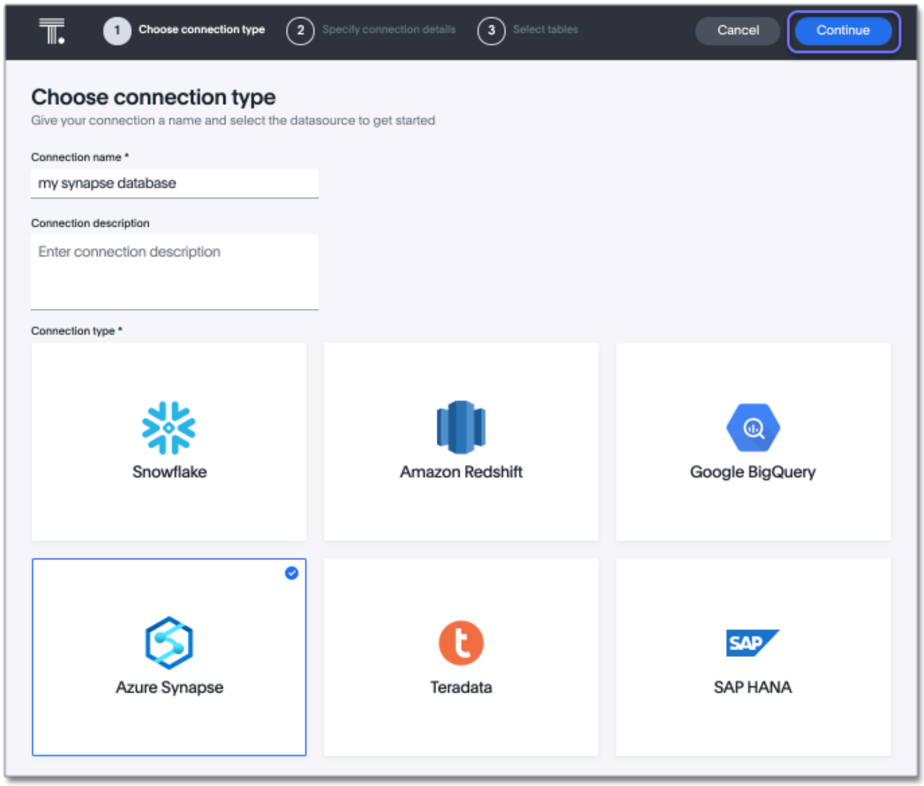
To add a new connection to Synapse:

1. Click **Data** in the top navigation bar.

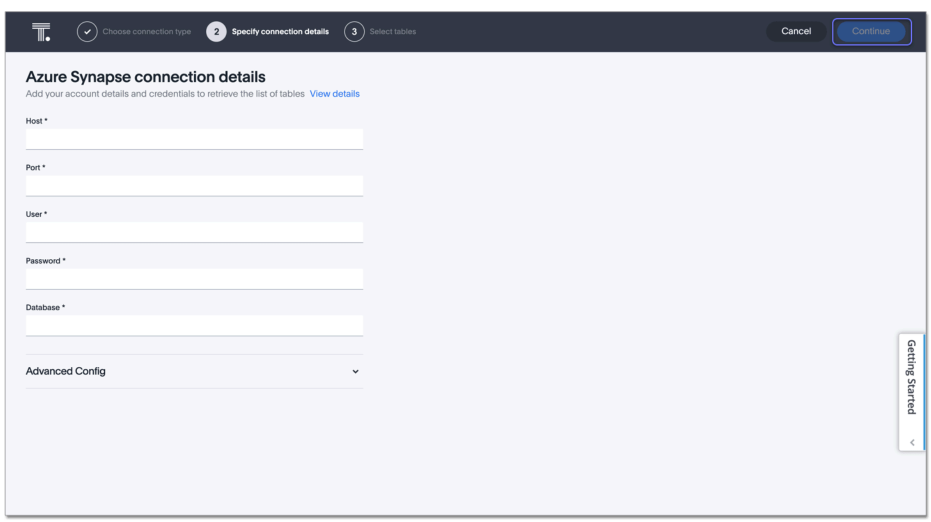
2. Click the **Embrace** tab at the top of the page, and click **+ Add connection** at the upper-right-hand side of the page.



3. Create a name for your connection, a description (optional), then select the Synapse connection type, and click **Continue**.



4. Enter the connection details for your Synapse data source.



Refer to the Synapse connection reference [See page 100] for more information on each of the specific attributes you must enter for your connection.

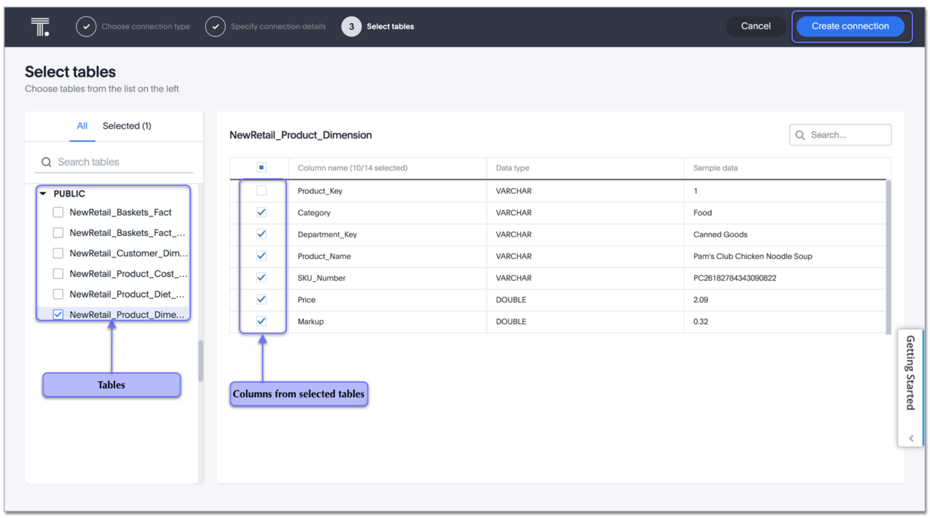
5. (Optional) Provide additional key-value pairs that you need to set up your connection to Synapse, by doing the following:

- Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
- Enter your key and value information.
- To add more keys and values, click the plus sign (+), and enter them.

> **Note:** Any key-value pairs that you enter must be defined in your Synapse data source. Key-value pairs are case-sensitive.

6. Click **Continue**.

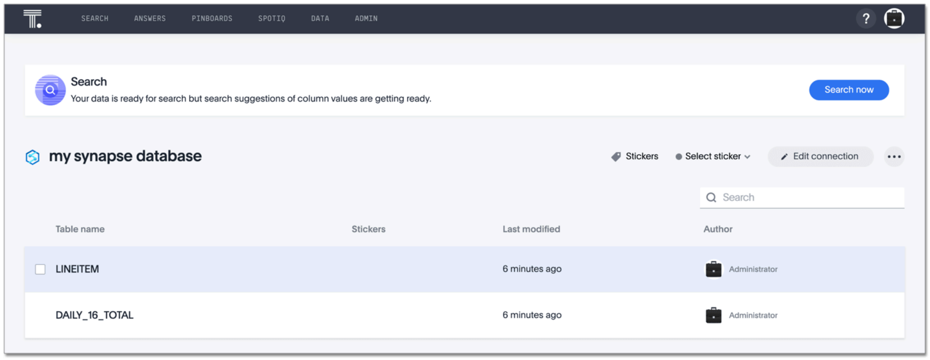
7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



A message appears indicating the number of tables and columns that will be added to your connection.

8. Click **Confirm**.

Once the connection is added, you can search your Synapse database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify a Synapse connection [See page 93]
- Synapse connection reference [See page 100]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify a Synapse connection

Summary: Learn how to modify a Synapse connection and its tables.

You can modify an Embrace Synapse connection in the following ways:

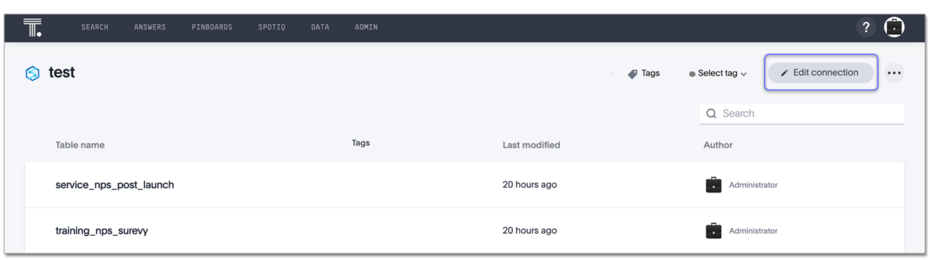
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing a Synapse connection

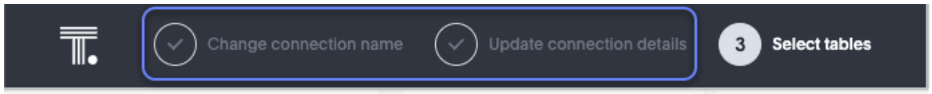
You can edit a Synapse connection to add tables and columns.

To edit a Synapse connection:

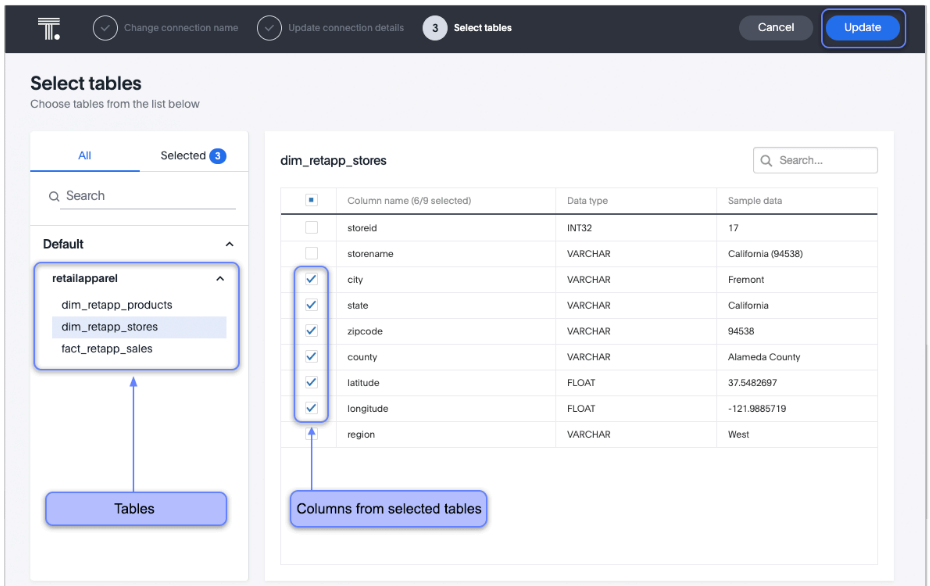
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.
4. Click **Edit connection** at the upper-right-hand side of the page.



By default, the Select tables page appears. You have the option, though, to change the connection name and update the connection details, by clicking the appropriate option at the top of the screen, making any changes needed and clicking **Continue** to go to the next page.



5. Expand the database table drop-down menu, and select the tables and columns you want to add.



6. Click **Update**, and then click **Confirm** to save the updated connection detail.

To remove a table from a connection, delete it from the connection details page. For more information, see Deleting a table [See page 97].

Remapping a Synapse connection

Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

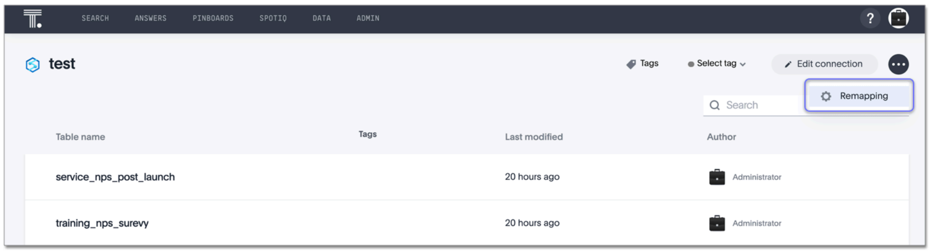
To remap a Synapse connection:

1. Click **Data** in the top navigation bar.

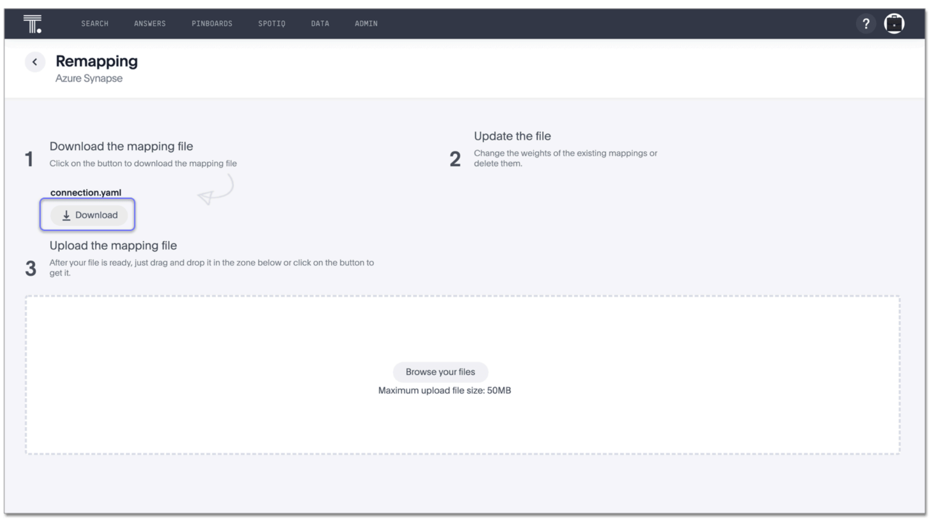
2. Click the **Embrace** tab.

3. Click the name of the connection you want to remap.

4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



6. Edit the file, as required, and save it.

7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from a Synapse connection

You can edit a Synapse connection to remove a column.

To remove a column from a Synapse connection:

1. Click **Data** in the top navigation bar.

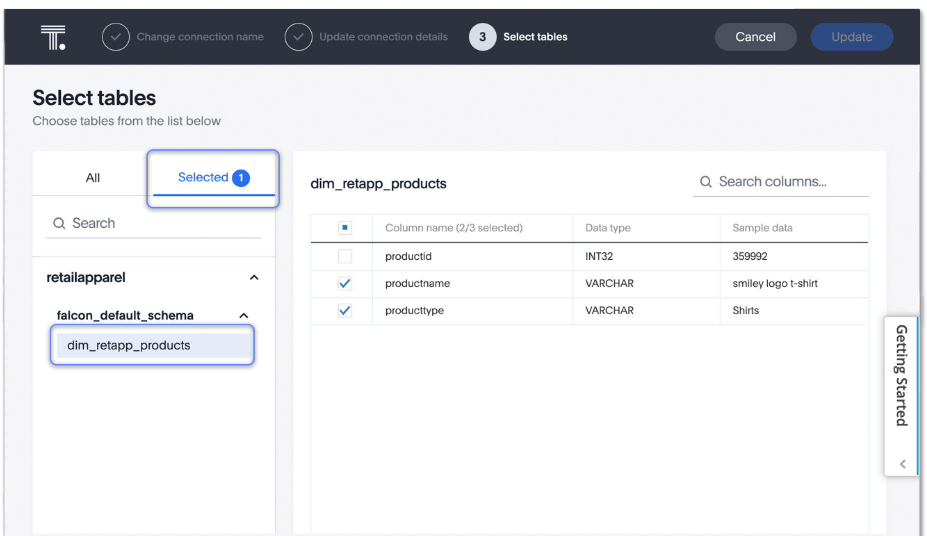
2. Click the **Embrace** tab.

3. Click the name of the connection that contains the column you want to remove.

4. Click **Edit connection** at the upper-right-hand side of the page.

5. In the Select tables page, click the Selected tab.

6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.

8. Click **Update**.

   The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from a Synapse connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

To delete a table from a Synapse connection:

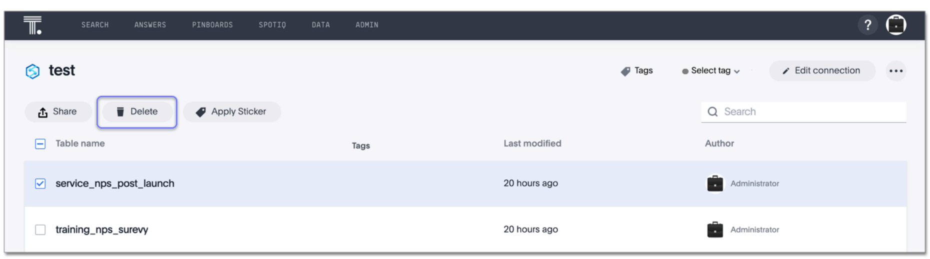
1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab.

3. Click the name of the connection that contains the table you want to delete.

4. Find the table you want to delete in the list, and check the box next to its name.

5. Click **Delete**, and then click **Delete** again to confirm.

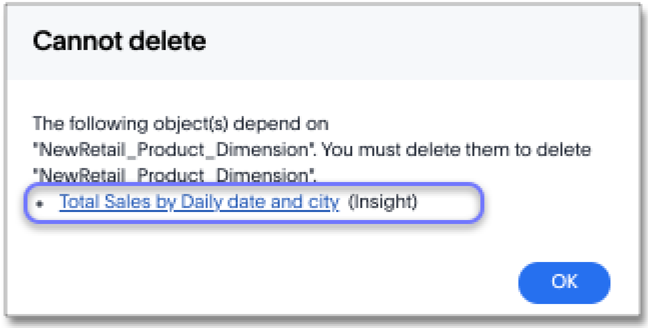


If you attempt to delete a table with dependent objects, the operation is blocked. A *Cannot delete* window appears, with a list of links to dependent objects. See Deleting a table with dependent objects [See page 97].

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

  When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

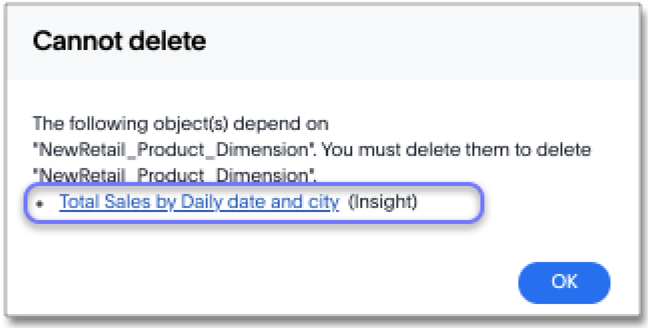
Deleting a Synapse connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete a Synapse connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

   If you attempt to delete a connection with dependent objects, the operation is blocked, and a “Cannot delete” warning appears with a list of dependent objects with links.



5. If the “Cannot delete” warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.

6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click again **Delete** to confirm.

Synapse connection reference

> **Summary:** Learn about the fields used to create a Synapse connection with ThoughtSpot Embrace.

Here is a list of the fields of a Synapse connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new Synapse connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Host

Enter the host name associated with the Synapse database.

Port

Enter the port number associated with the Synapse database.

User

Enter the Synapse account username.

Password

Enter the Synapse account password.

Database

Specify the database associated with the account.

Teradata overview

Embrace enables you to connect to Teradata databases, to use your data in ThoughtSpot.

- Add a connection [See page 102]
- Modify a connection [See page 106]
- Reference [See page 113]

Note: Teradata Vantage version 16.20 or later is required.

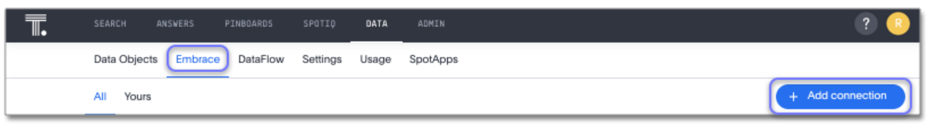
Add a Teradata connection

Once ThoughtSpot Embrace is enabled, you can add a connection to a Teradata database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

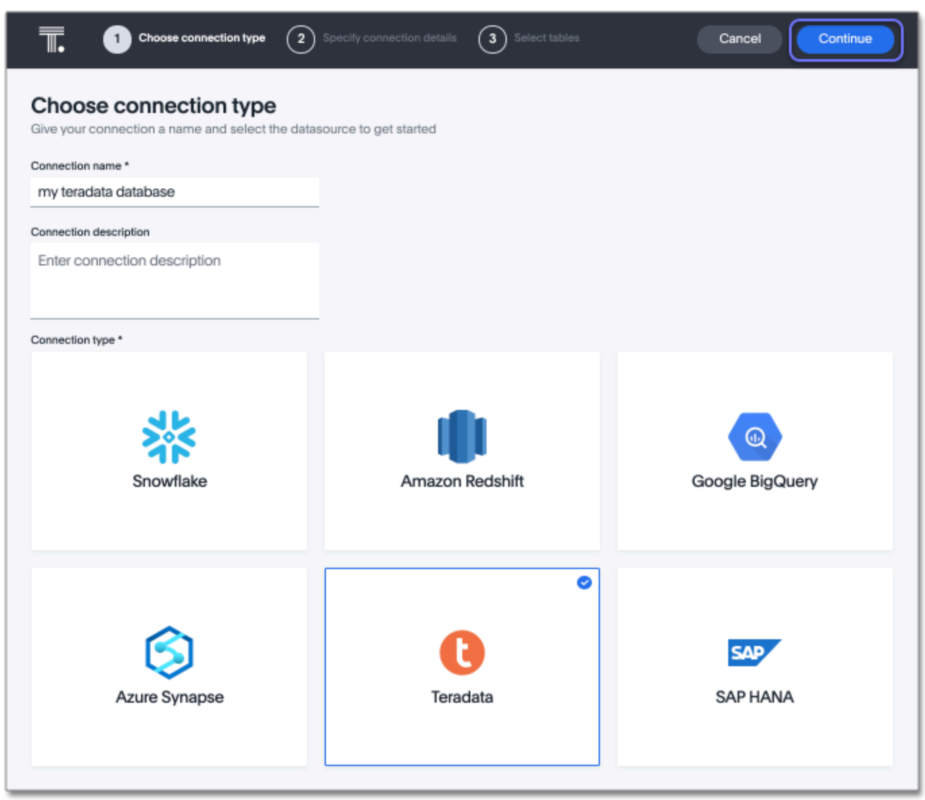
To add a new connection to Teradata:

1. Click **Data** in the top navigation bar.

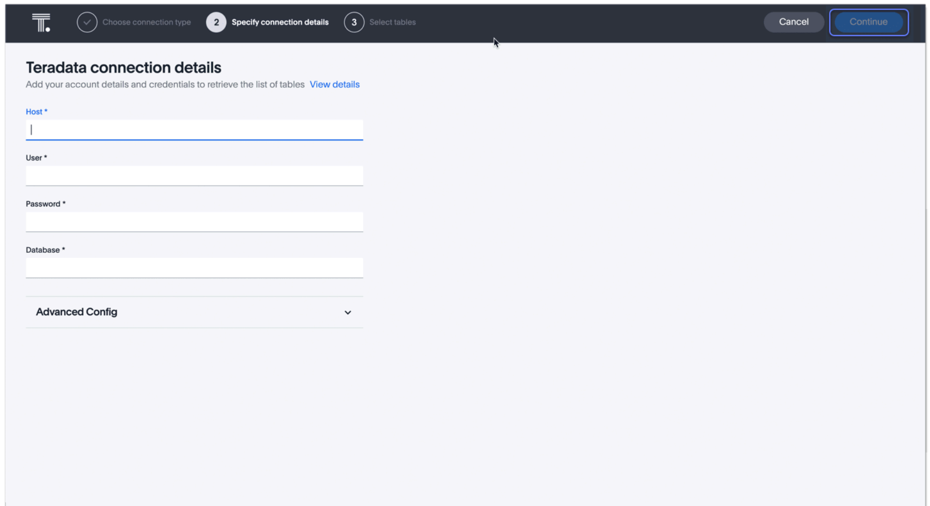
2. Click the **Embrace** tab at the top of the page, and click **+ Add connection** at the upper-right-hand side of the page.



3. Create a name for your connection, a description (optional), then select the Teradata connection type, and click **Continue**.



4. Enter the connection details for your Teradata data source.



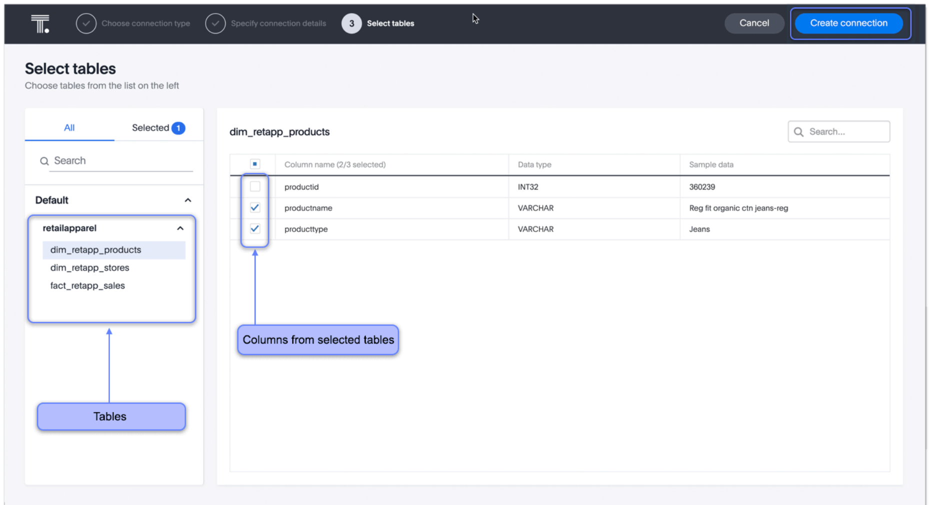
Refer to the Teradata connection reference [See page 113] for more information on each of the specific attributes you must enter for your connection.

5. (Optional) Provide additional key-value pairs that you need to set up your connection to Teradata, by doing the following:
    - Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
    - Enter your key and value information.
    - To add more keys and values, click the plus sign (+), and enter them.

> **Note:** Any key-value pairs that you enter must be defined in your Teradata data source. Key-value pairs are case-sensitive.

6. Click **Continue**.

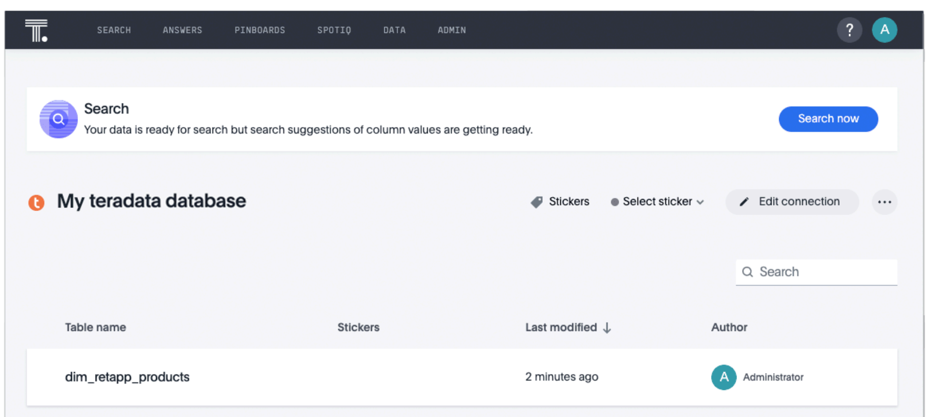
7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



A message appears indicating the number of tables and columns that will be added to your connection.

8. Click **Confirm**.

Once the connection is added, you can search your Teradata database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify a Teradata connection [See page 106]
- Teradata connection reference [See page 113]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify a Teradata connection

Summary: Learn how to modify a Teradata connection and its tables.

You can modify an Embrace Teradata connection in the following ways:

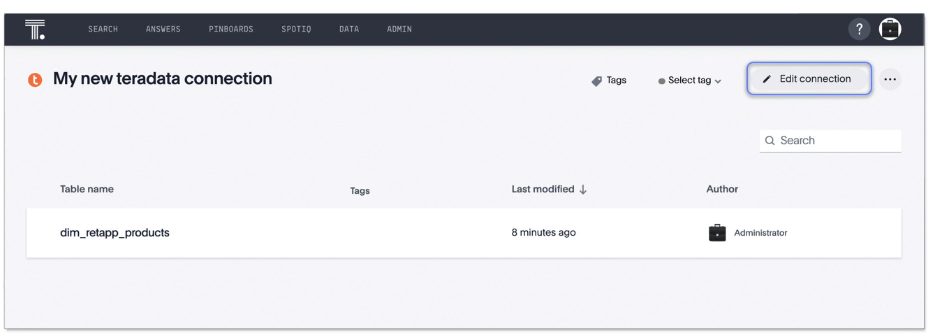
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing a Teradata connection

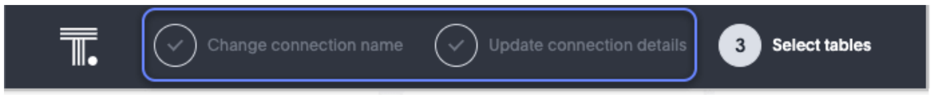
You can edit a Teradata connection to add tables and columns.

To edit a Teradata connection:

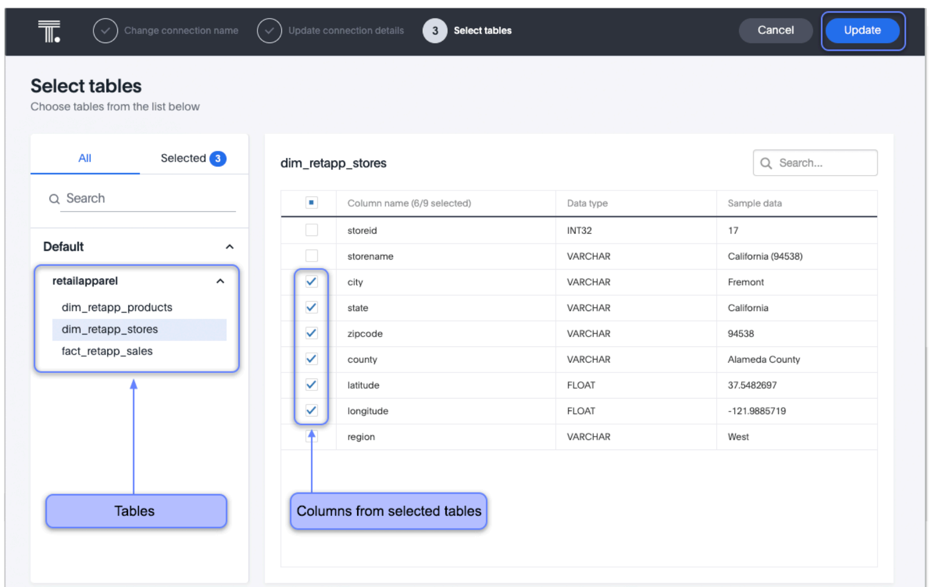
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.
4. Click **Edit connection** at the upper-right-hand side of the page.



By default, the Select tables page appears. You have the option, though, to change the connection name and update the connection details, by clicking the appropriate option at the top of the screen, making any changes needed and clicking **Continue** to go to the next page.



5. Expand the database table drop-down menu (if needed), and select the tables and columns you want to add.



6. Click **Update**, and then click **Confirm** to save the updated connection detail.

To remove a table from a connection, you must delete it from the connection details page. For more information, see Deleting a table [See page 0].

Remapping a Teradata connection

Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

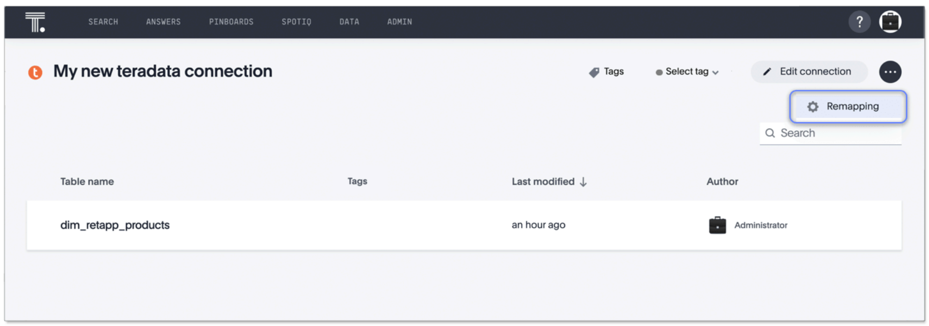
To remap a Teradata connection:

1. Click **Data** in the top navigation bar.

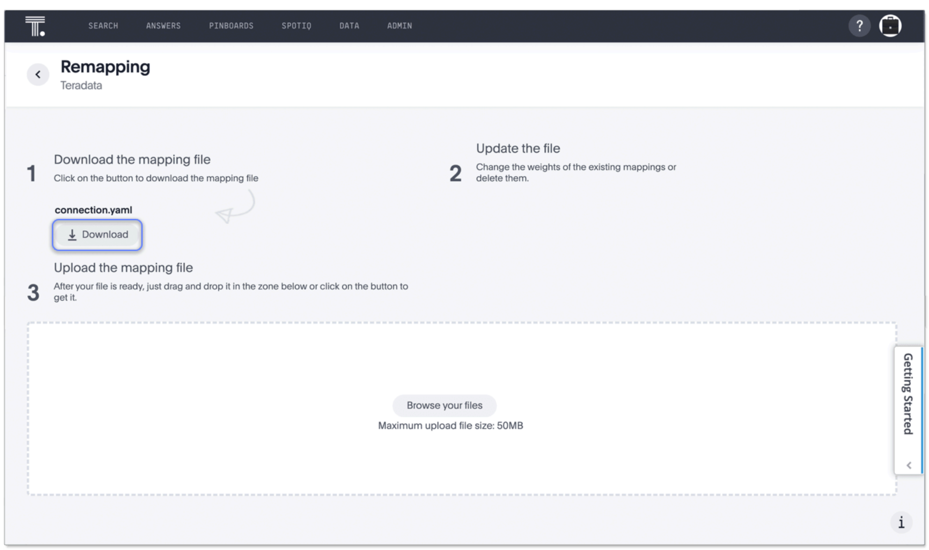
2. Click the **Embrace** tab.

3. Click the name of the connection you want to remap.

4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



6. Edit the file, as required, and save it.

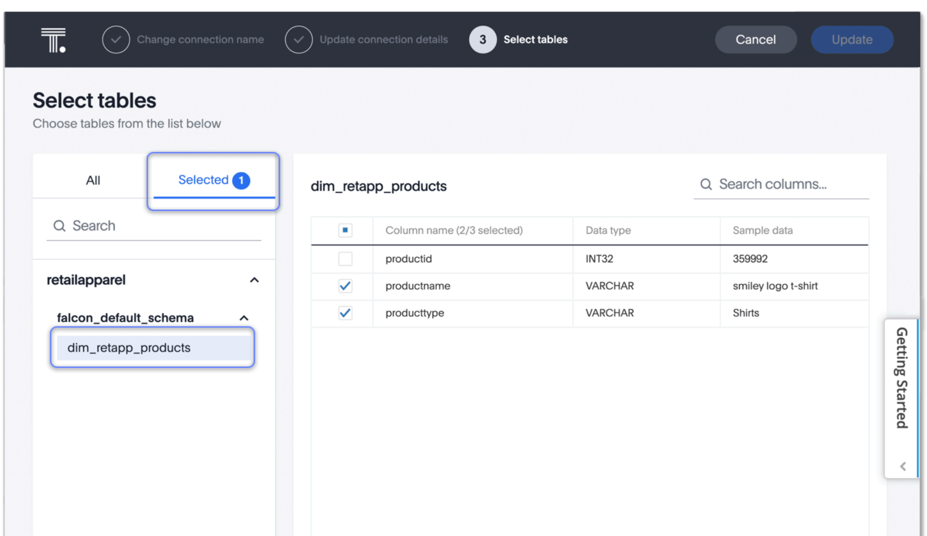
7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from a Teradata connection

You can edit a Teradata connection to remove a column.

To remove a column from Teradata connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection that contains the column you want to remove.
4. Click **Edit connection** at the upper-right-hand side of the page.
5. In the Select tables page, click the Selected tab.
6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.
8. Click **Update**.

The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from a Teradata connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

You can edit a Teradata connection to delete tables.

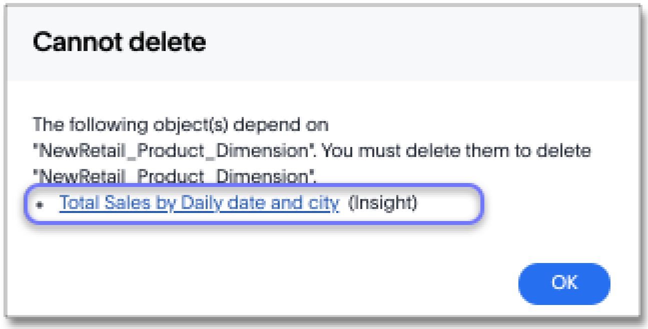
To delete a table from a Teradata connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection that contains the table you want to delete.
4. Find the table you want to delete in the list, and check the box next to its name.
5. Click **Delete**, and then click **Delete** again to confirm.

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

  When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

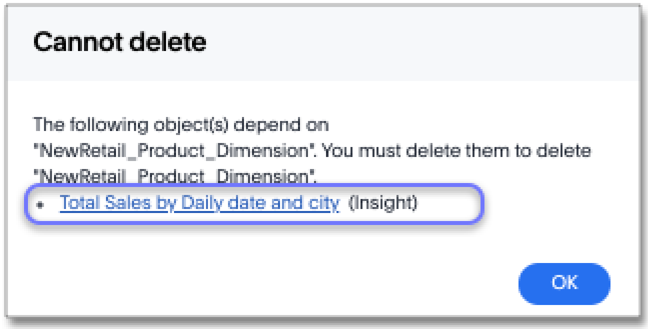
Deleting a Teradata connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete a Teradata connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

   If you attempt to delete a connection with dependent objects, the operation is blocked, and a “Cannot delete” warning appears with a list of dependent objects with links.



5. If the “Cannot delete” warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.

6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click **Delete** again to confirm.

Teradata connection reference

Summary: Learn about the fields used to create a Teradata connection using ThoughtSpot Embrace.

Here is a list of the fields of a Teradata connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new Teradata connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Host

Enter the host associated with the Teradata database.

User

Enter the user account associated with the Teradata database.

Password

Enter the password associated with the user account of the Teradata database.

Database

Enter the database name associated with the Teradata database. *(Optional)*

SAP HANA overview

Embrace enables you to connect to SAP HANA databases, to use your data in ThoughtSpot.

- Add a connection [See page 115]
- Modify a connection [See page 119]
- Reference [See page 126]

Note: SAP HANA version 2.0 or later is required.

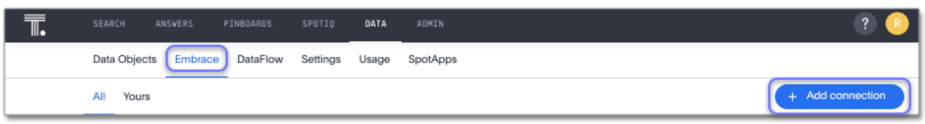
Add an SAP HANA connection

Once ThoughtSpot Embrace is enabled, you can add a connection to an SAP HANA database. This allows you to perform a live query of the external database to create answers and pinboards, without having to bring the data into ThoughtSpot.

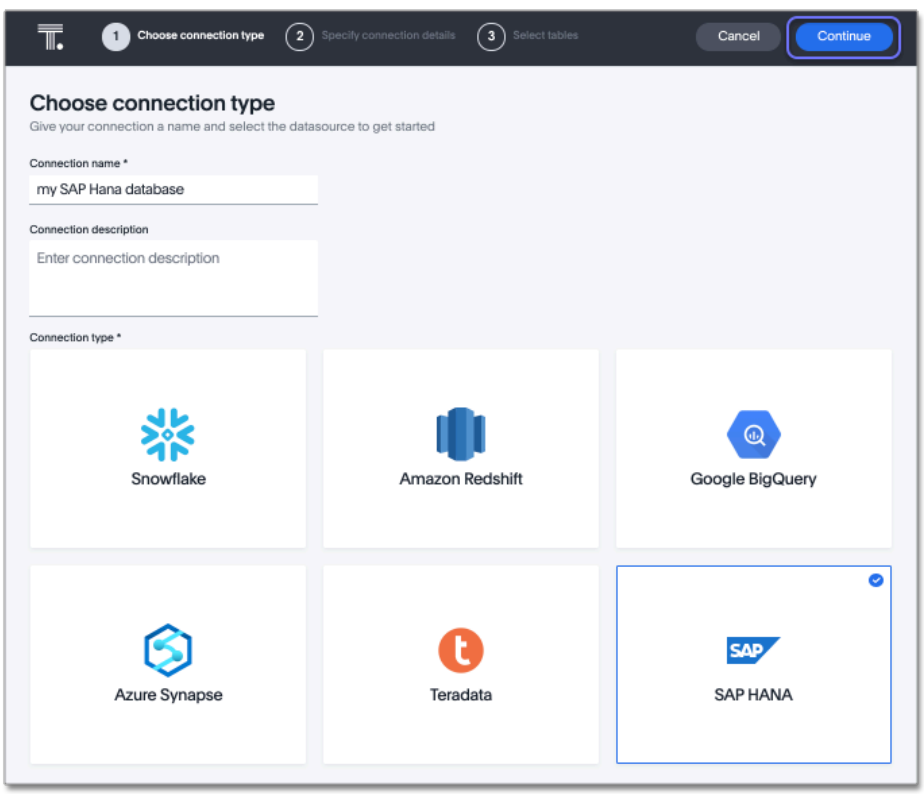
To add a new connection to SAP HANA:

1. Click **Data** in the top navigation bar.

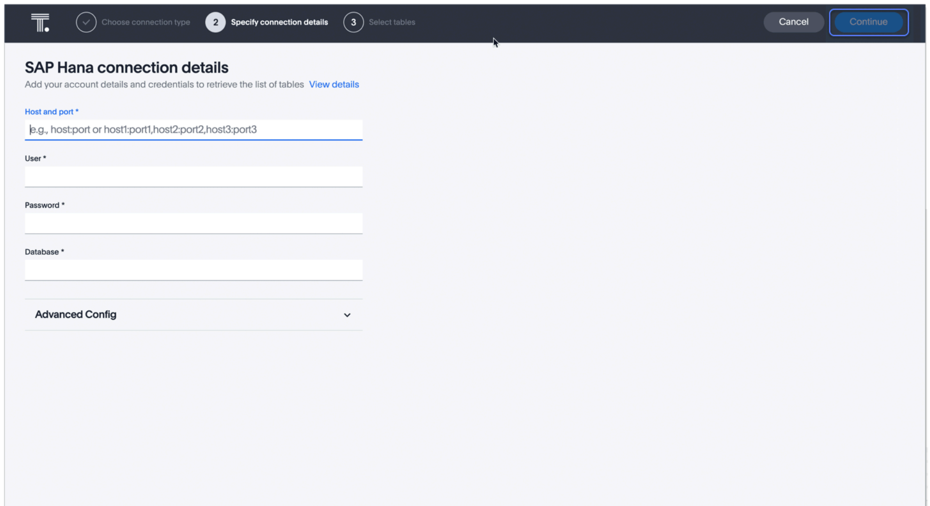
2. Click the **Embrace** tab, and click **+ Add connection** at the upper-right-hand side of the page.



3. Create a name for your connection, a description (optional), then select the SAP HANA connection type, and click **Continue**.



4. Enter the connection details for your SAP HANA data source.



Refer to the SAP HANA connection reference [See page 0] for more information on each of the specific attributes you must enter for your connection.

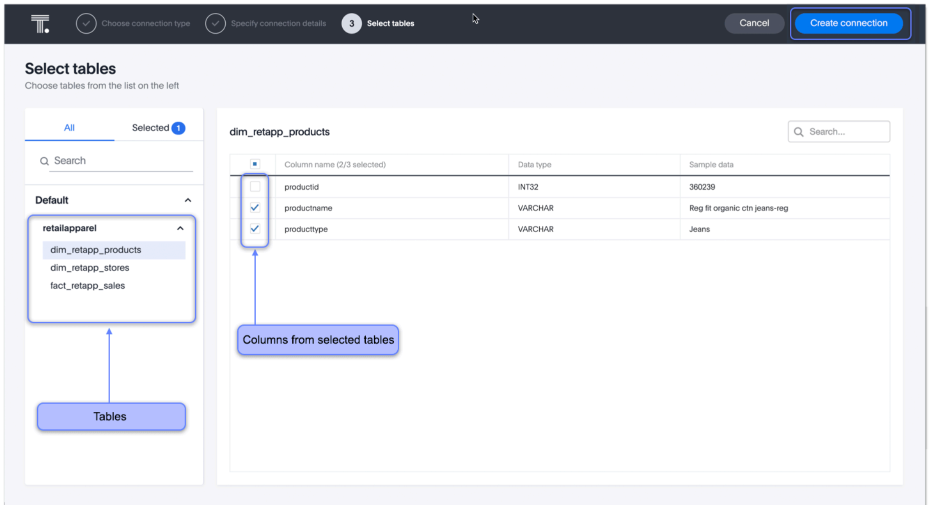
5. (Optional) Provide additional key-value pairs that you need to set up your connection to SAP HANA, by doing the following:
   - Click the **Advanced Config** menu to reveal the **Key** and **Value** fields.
   - Enter your key and value information.
   - To add more keys and values, click the plus sign (+), and enter them.

> **Note:** Any key-value pairs that you enter must be defined in your SAP HANA data source. Key-value pairs are case-sensitive.

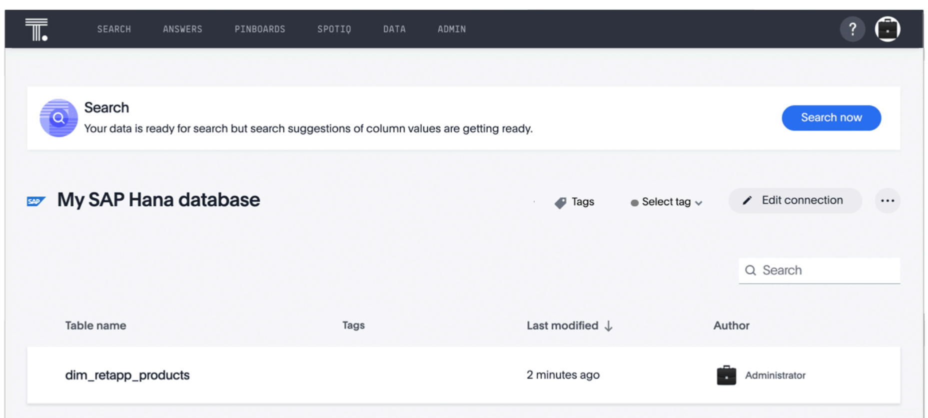
For more information about the advanced properties for SAP HANA, see: SAP HANA Client Interface Programming Reference (https://help.sap.com/viewer/0eec0d68141541d1b07893a39944924e/2.0.03/en-US/109397c2206a4ab2a5386d494f4cf75e.html), in the SAP's documentation.

6. Click **Continue**.

7. Select tables (on the left) and the columns from each table (on the right), and then click **Create connection**.



Once the connection is added, you can search your BiqQuery database right away by clicking **Search now**.



Your new connection appears on the **Data** > **Connections** page. You can click the name of your connection to view the tables and columns in your connection.

The connection you just created is a link to the external data source. If there are any joins in the selected tables of the external data source, those are imported into ThoughtSpot.

You can now perform a live query on the selected tables and columns of your connection. Because the selected tables and columns in your connection are linked, it may take a while to initially render the search results. This is because ThoughtSpot does not cache linked data. With linked data, ThoughtSpot queries the external database directly, which is slower than querying data that is stored in ThoughtSpot's database.

Related information

- Modify an SAP HANA connection [See page 0]
- SAP HANA connection reference [See page 0]
- Load and manage data [See page 0]
- Data and object security [See page 0]

Modify an SAP HANA connection

Summary: Learn how to modify an SAP HANA connection and its tables.

You can modify an Embrace SAP HANA connection in the following ways:

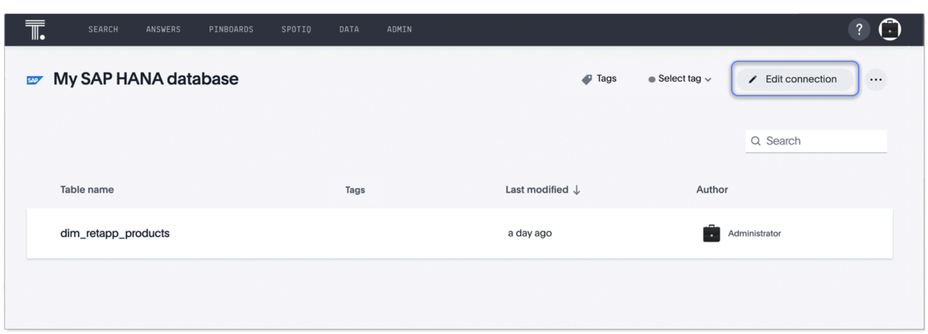
- Edit a connection: to add or remove tables and columns
- Remap a connection: to map a table or column to a different table or column
- Remove a column
- Delete a table
- Delete a connection

Editing an SAP HANA connection

You can edit an SAP HANA connection to add tables and columns.

To edit an SAP HANA connection:

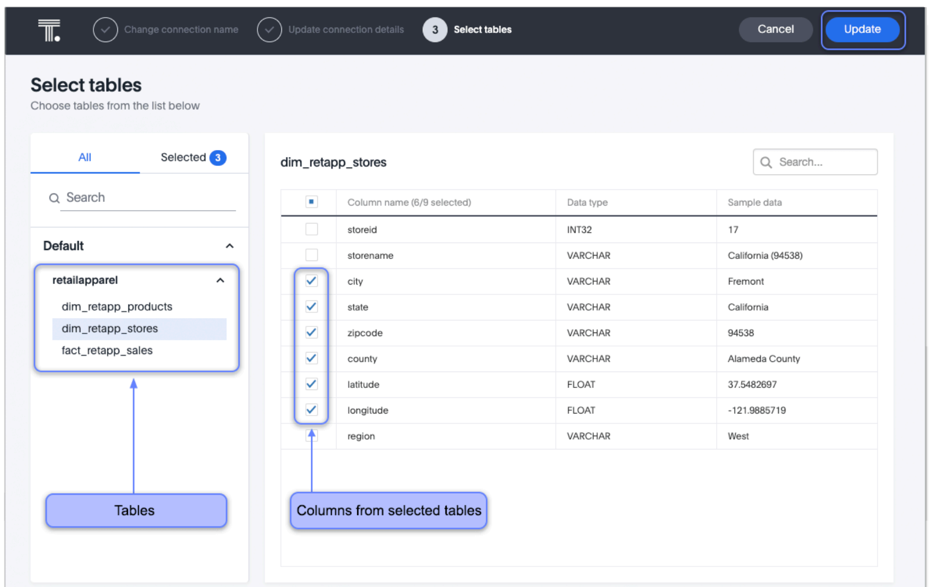
1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to edit.
4. Click **Edit connection** at the upper-right-hand side of the page.



5. On the Choose connection type page, change the connection name or description (if needed), and then click **Continue**.

6. On the SAP HANA connection details page, make any changes needed, and then click **Continue**.

7. Expand the database table drop-down menu, and select the tables and columns you want to add.



8. Click **Update**, and then click **Confirm** to save the updated connection detail.

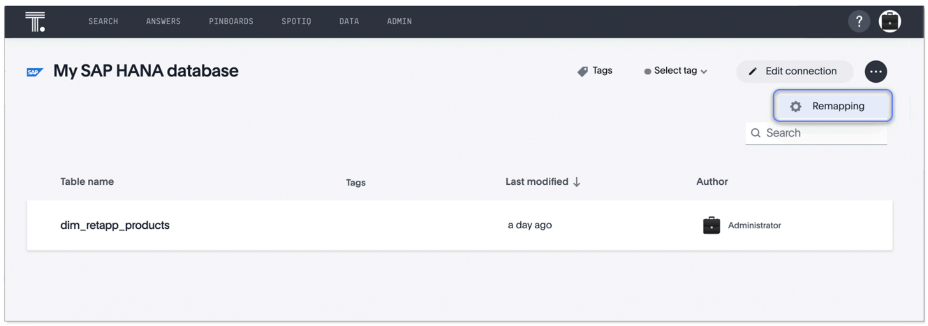
To remove a table from a connection, delete it from the connection details page. For more information, see Deleting a table [See page 0].

Remapping an SAP HANA connection

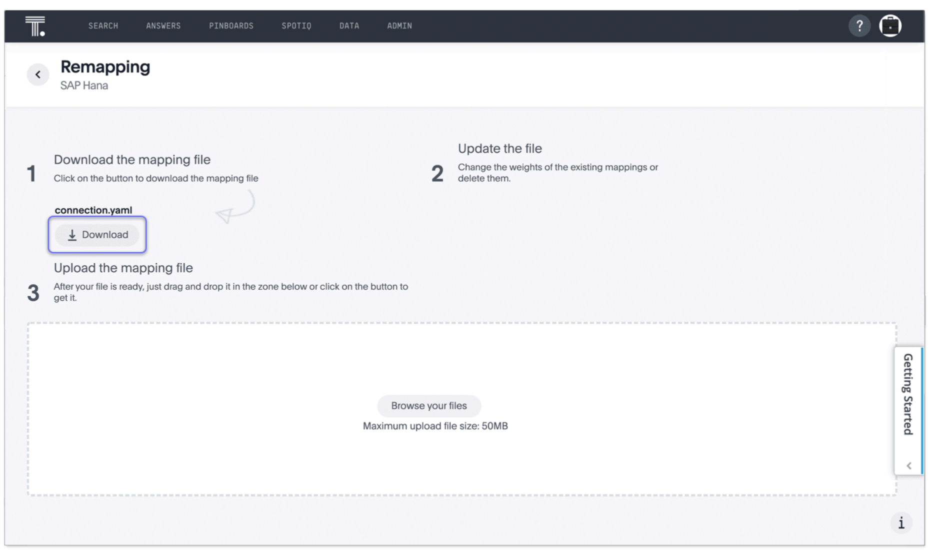
Modify the connection parameters by editing the source mapping `yaml` file that was created when you added the connection. For example, you can remap the existing table or column to a different table or column in an existing database connection. ThoughtSpot recommends that you check the dependencies before and after you remap a table or column in a connection to ensure they display as intended.

To remap an SAP HANA connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection you want to remap.
4. Click the More icon and select **Remapping** on the upper-right-hand side of the page.



5. Click **Download** to download the source mapping file.



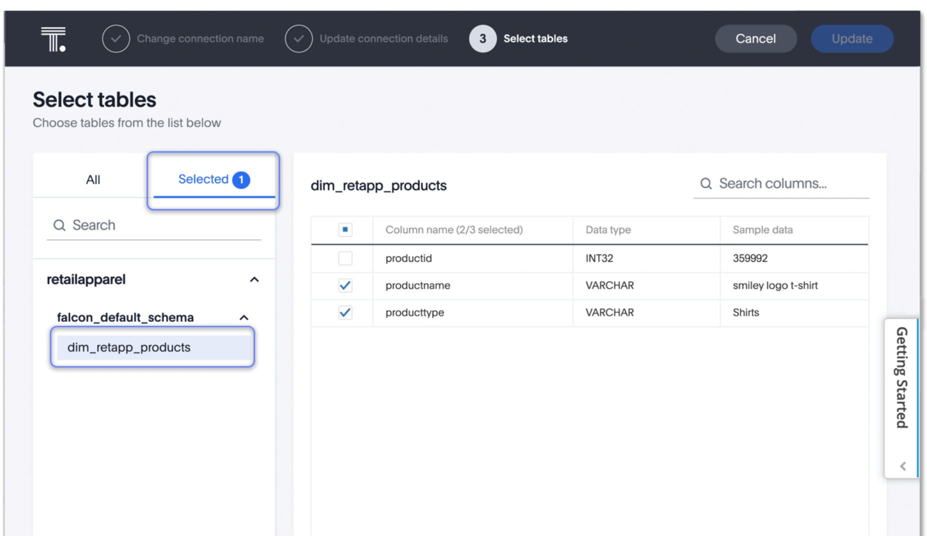
6. Edit the file, as required, and save it.
7. On the Remapping page, click **Browse your files**, and upload your edited mapping file to update the mapping of your connection.

Removing a column from an SAP HANA connection

You can edit an SAP HANA connection to remove a column.

To remove a column from an SAP HANA connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Click the name of the connection that contains the column you want to remove.
4. Click **Edit connection** at the upper-right-hand side of the page.
5. In the Select tables page, click the Selected tab.
6. Click the name of the table that contains the column you want to remove.



7. In the list of columns at the right, uncheck the column you want to remove.
8. Click **Update**.

The Update connection message appears, summarizing the changes that will be made to the connection.

9. Confirm your changes, by clicking **Confirm**.

Deleting a table from an SAP HANA connection

ThoughtSpot checks for dependencies whenever you try to remove a table in a connection. ThoughtSpot shows a list of dependent objects, and you can click them to delete them or remove the dependency. Then you can remove the table.

To delete a table from an SAP HANA connection:

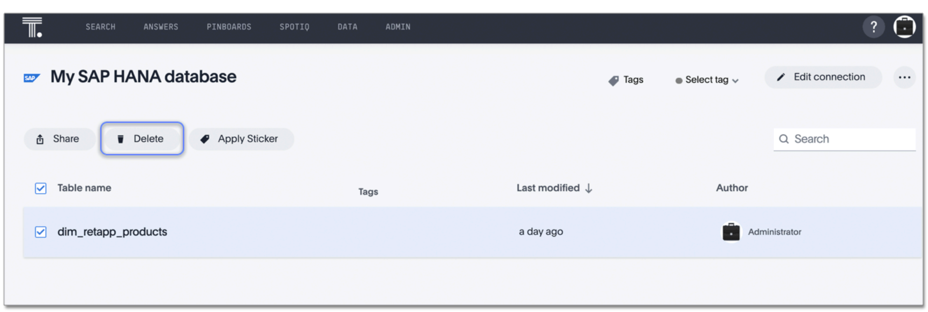
1. Click **Data** in the top navigation bar.

2. Click the **Embrace** tab.

3. Click the name of the connection that contains the table you want to delete.

4. Find the table you want to delete in the list, and check the box next to its name.

5. Click **Delete**, and then click **Delete** again to confirm.

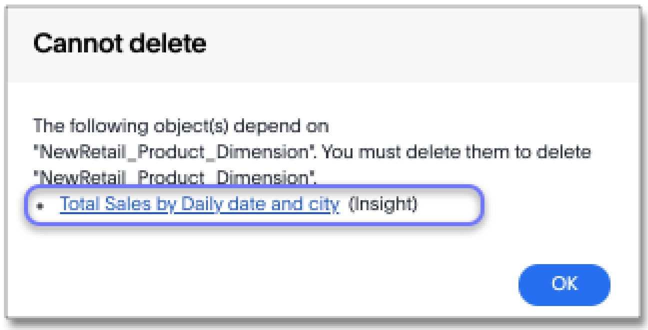


If you attempt to delete a table with dependent objects, the operation is blocked. A *Cannot delete* window appears, with a list of links to dependent objects. See Deleting a table with dependent objects [See page 0].

Deleting a table with dependent objects

- In the *Cannot delete* window, click the link for each object to modify or delete it.

When all dependencies are removed, you can delete the table.



You can also click the name of a table and then click the linked objects to see a list of dependent objects with links. The list shows the names of the dependent objects (worksheets, pinboards or answers), and the columns they use from that table. You can use this information to determine the impact of changing the structure of the data source or to see how widely used it is. Click a dependent object to modify or delete it.

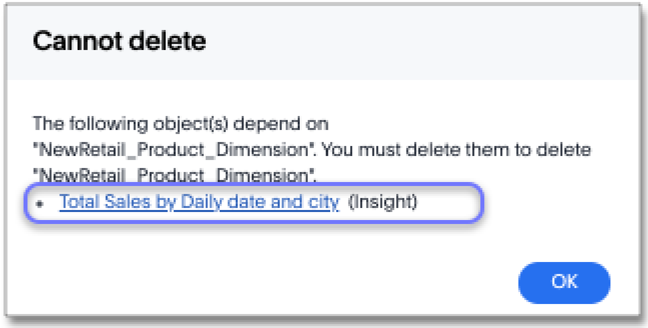
Deleting an SAP HANA connection

A connection can be used in multiple data sources or visualizations. Because of this, you must delete all of the sources and tasks that use that connection, before you can delete the connection.

To delete an SAP HANA connection:

1. Click **Data** in the top navigation bar.
2. Click the **Embrace** tab.
3. Check the box next to the connection you want to delete.
4. Click **Delete**, and then click **Delete** again to confirm.

   If you attempt to delete a connection with dependent objects, the operation is blocked, and a “Cannot delete” warning appears with a list of dependent objects with links.



5. If the “Cannot delete” warning appears, click the link for each object to delete it, and then click **Ok**. Otherwise, go to the next step.

6. When all its dependencies are removed, delete the connection by clicking **Delete**, and then click **Delete** again to confirm.

SAP HANA connection reference

Summary: Learn about the fields used to create an SAP HANA connection using ThoughtSpot Embrace.

Here is a list of the fields of an SAP HANA connection in ThoughtSpot Embrace. You need specific information to establish a seamless and secure connection. All fields are required, except where noted.

Connection name

Enter a new SAP HANA connection name.

Connection description

Provide a short description of the connection. *(Optional)*

Host and port

Enter the host followed by a colon and the port number of the SAP HANA database.

Example: If your host is `192.168.1.1`, and your port is `8080` you would enter `192.168.1.1:8080`.

User

Enter the user associated with the SAP HANA database.

Password

Enter the password associated with the user of the SAP HANA database.

Database

Enter the database associated with the SAP HANA database.