Cloudera Streaming Analytics 1.5.0

CSA Community Edition

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Contents

Community Edition Overview

The Community Edition of Cloudera Streaming Analytics (CSA) is a standalone deployment of Apache Flink and SQL Stream Builder (SSB). You can use the dockerized version of CSA to quickly setup Flink and SSB in your local environment, and try out the real-time streaming capabilities of Flink accompanied by the real-time querying features of SSB using SQL.

Architecture

The Community Edition of Cloudera Streaming Analytics consists of preconfigured Docker images for Zookeeper, Kafka and PostgreSQL to make getting started easier. The components can be reached using their dedicated ports. Storage for the Community Edition is handled by docker volumes, while PostgreSQL is integrated for database management and storing the Materialized Views.

PostgreSQL is used by SQL Stream Builder components internally. It is also used as the underlying database for the Materialized View Engine. The PostgreSQL database for the Materialized View tables (*EVENTADOR_SNAPPER* database) can be accessed by using the user *EVENTADOR_SNAPPER*. The default password for the database is *CLOUDERA*.

The containers use the following docker volumes to provide persistent local storage between restarts. If the volumes do not exist in your local environment, they are created when running the docker-compose up command.

ssb-volume

Persistent in the Flink TaskManager and JobManager containers. It is used for storing savepoints of the jobs. When using the Filesystem connector, it is also recommended to use a volume.

pg-volume

Used by the PostgreSQL database. It stores the internal tables required for SQL Stream Builder to work, as well as the created Materialized Views.

kf-volume

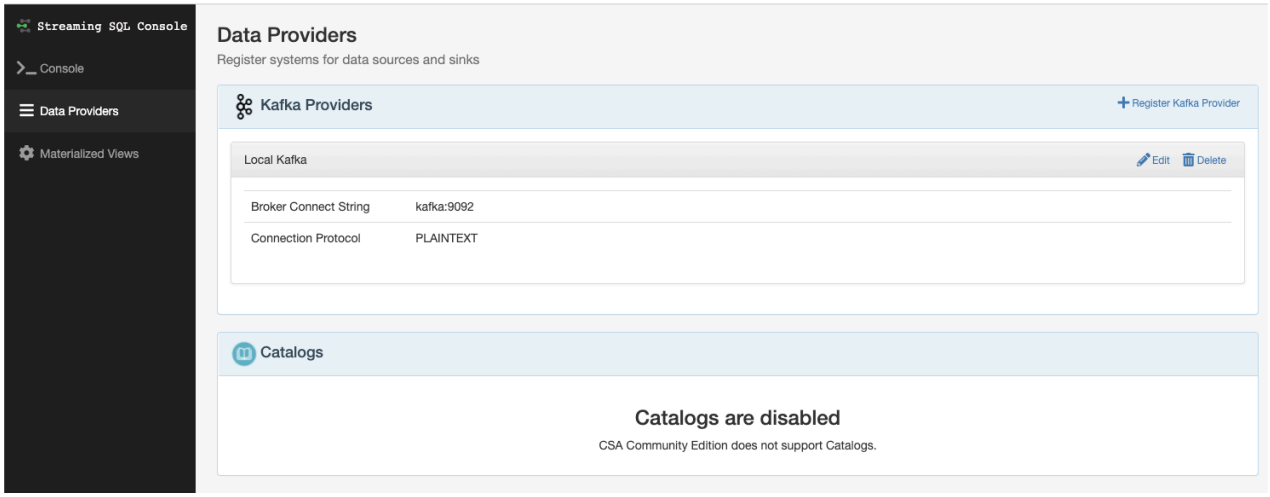
Used by the Kafka container to store the topics.

zk-volume

Used by Zookeeper.

It is possible to delete the docker volumes for a fresh start by shutting down all of the containers with docker-compo se down --volumes command, or individually removing them with docker volume rm <*VOLUME NAME*> command.

By default, the Kafka container is preconfigured in SQL Stream Builder as the **Local Kafka** data provider.



For local prototyping to the preconfigured Kafka, you can create and produce data to topics with the following commands:

```
docker-compose exec kafka /opt/kafka/bin/kafka-topics.sh --bootstrap-server
kafka:9092
          --create --topic myNewTopic
```

```
docker-compose exec -T kafka /opt/kafka/bin/kafka-console-producer.sh --boot
strap-server
          kafka:9092 --topic airplanes
```

Release Notes

Learn more about the supported component versions, known issues, fixed issues and limitations that apply to the Cloudera Streaming Analytics Community Edition.

Component version support

Apache Flink 1.13 is supported

Unsupported Features

- Kerberos authentication
- Catalog support

Limitations

The following limitations are applied to the Community Edition:

- Only 3 SQL jobs can be run simultaneously

- All jobs are submitted to the same standalone cluster.
- Storage option is only the docker volumes.
- Kafka and Filesystem to Docker volume are the only supported connectors.

Installing CSA Community Edition

You need to access the Downloads Page of Cloudera Streaming Analytics (CSA) to receive the Community Edition version of CSA. After receiving the docker file of CSA Community Edition, you need to create a composed version of the images and run CSA using Docker. The Streaming SQL Console is available using a local host address.

Before you begin

- For Mac/Windows users, make sure that you have Docker Desktop on your computer.
- Make sure that you have set the minimum memory and CPU for Docker. For more information, see the System Prerequisites section.

Procedure

1. Access the Downloads Page of CSA Community Editon to aquire the Community Edition artifact.
2. Create a folder to where you will download the Community Edition artifact.
3. Run the following command in command line after accessing the folder where you store the Community Edition artifact.

   ```
   docker-compose up
   ```

   Tip: When starting the containers, you can set the Flink TaskManager containers to 2 to have more resources when running SSB.

   ```
   docker-compose up -d --scale flink-taskmanager=2
   ```

   It can take time to start the Community Editon for the first time or when there are changes to the docker images.
4. Access the Streaming SQL Console after everything is up and running with the following local host address.

   ```
   http://localhost:8000
   ```

5. Sign in to the Streaming SQL Console.

   You have the option to create a new account or use the default username and password.

   - Default username: admin
   - Default password: admin

   After providing the username and password, click Login.

   As another option, you can also register a new account:

   a) Click Create account.
   b) Provide your Name, Username and Password.
   c) Click Register.
   d) Log in using the previously set Username and Password.

Results

You have installed the Community Edition of CSA on your local environment.

What to do next

SQL Stream Builder is ready to be used.

System Prerequisites

There are minimum system requirements that are need to be met when running the Community Edition of Cloudera Streaming Analytics (CSA).

Table 1: System prerequisites

Docker-compose version	1.6.0 or higher
Docker engine version	1.10.0 or higher
Memory	4 GB or more
CPU	4 cores or more
Required TCP ports	• Kafka: 9092 • PostgreSQL: 5432 • ZooKeeper: 2181 • Streaming SQL Console: 8000 • Streaming SQL Engine: 18121 • Materialized View Engine: 18131 • Flink Dashboard: 8081

Linux

The Community Edition should run on any Linux distribution that has a working docker and docker-compose installation. No configuration changes are typically required.

MacOS/Windows

MacOS and Windows users should use Docker Desktop to run SQL Stream Builder.

By default, Docker Desktop limits resources to containers. To run SQL Stream Builder, you need to select Docker -> Preferences , and increase the memory and CPU allocations.

Community Edition Quickstart Guide

You can use the Community Edition Quickstart Guide to learn and try the basic steps to use SQL Stream Builder through the Streaming SQL Console. The Quickstart Guide details the steps of how to create a table, run a query, create a view and add a Materialized View.

Creating a table

As a first step to use the Community Edition, learn how to create a table that generates random data using the included Faker connector after accessing the Streaming SQL Console.

When you access the Streaming SQL Console, you are redirected to the homepage of the SQL Stream Builder user interface. The homepage of Streaming SQL Console is the **Console page**. On the **Console page**, you can easily create and submit your SQL queries in the **SQL window**.

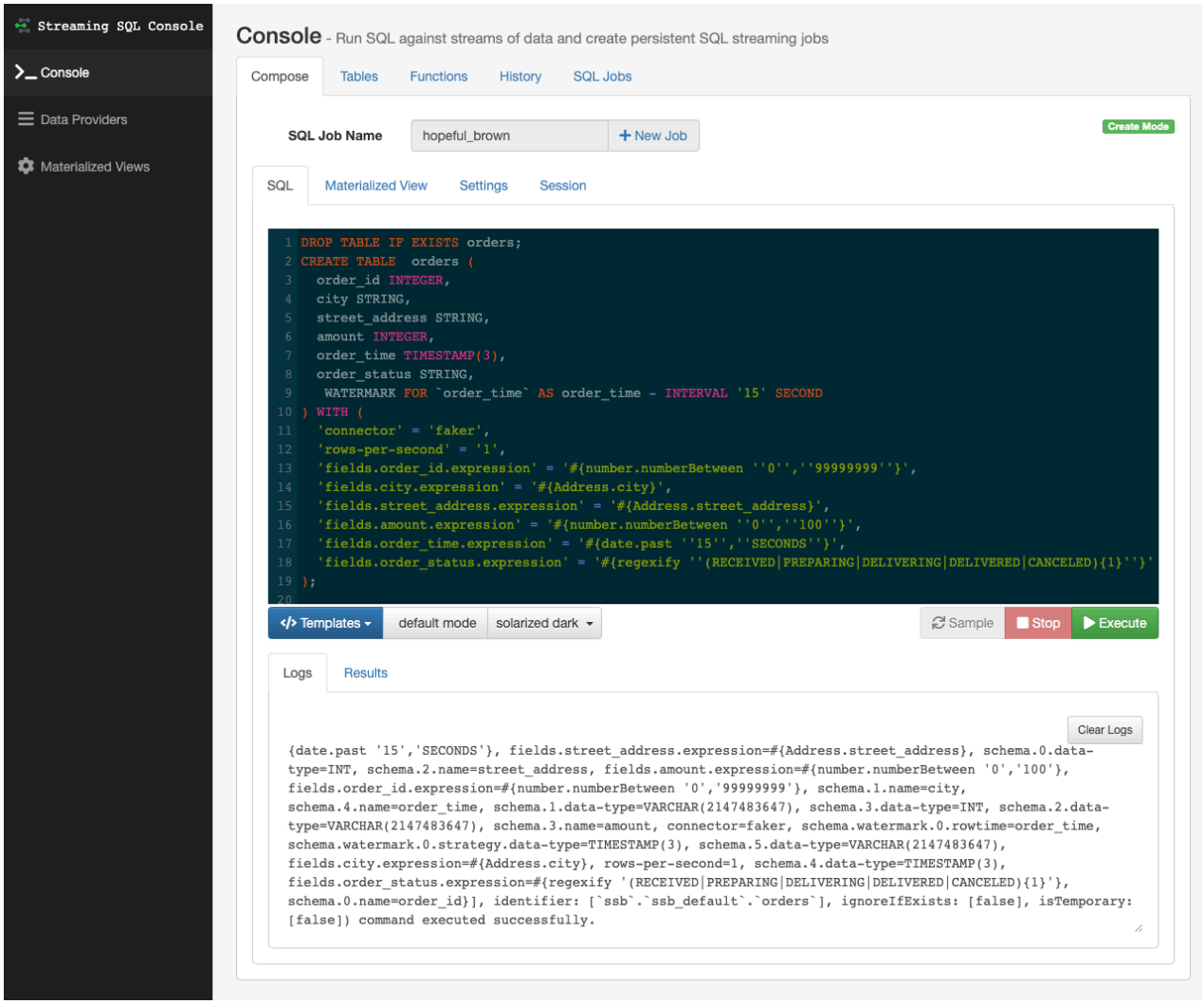
As a first step in executing a SQL query, you need to create a table. At this point, you can use the predefined templates under the **SQL window**.

Use the following CREATE TABLE statement, and paste it to the **SQL window**.

```
DROP TABLE IF EXISTS orders;
CREATE TABLE  orders (
  order_id INTEGER,
  city STRING,
  street_address STRING,
```

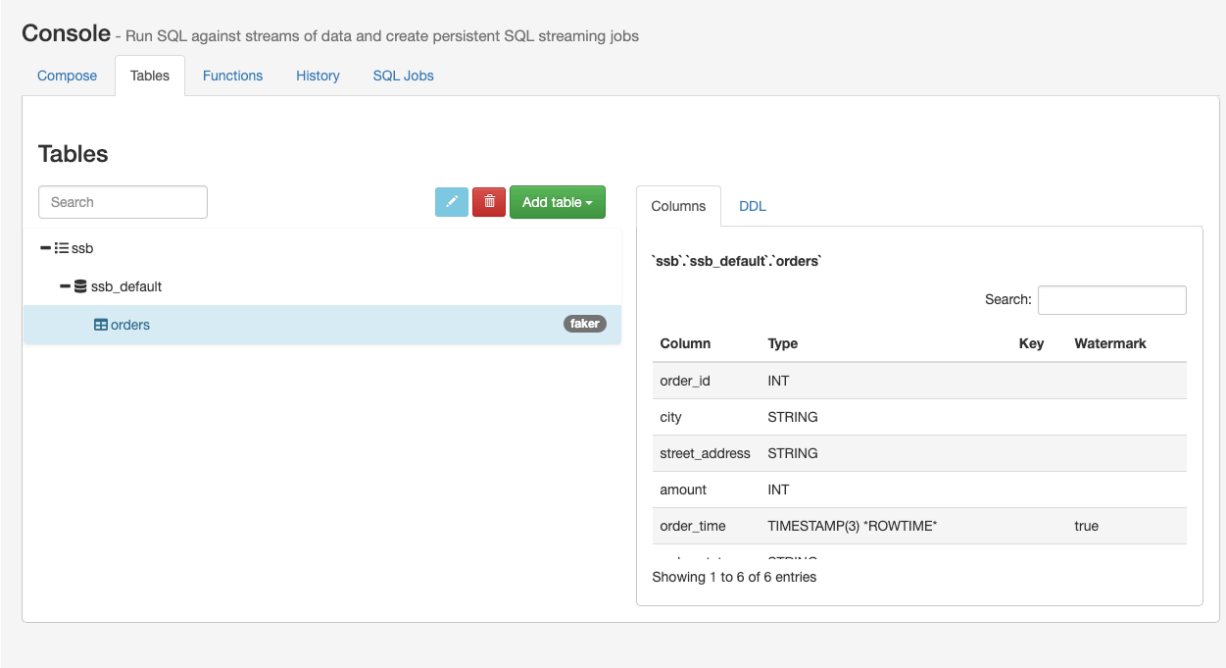
```
  amount INTEGER,
  order_time TIMESTAMP(3),
  order_status STRING,
   WATERMARK FOR `order_time` AS order_time - INTERVAL '15' SECOND
) WITH (
  'connector' = 'faker',
  'rows-per-second' = '1',
  'fields.order_id.expression' = '#{number.numberBetween ''0'',''99999999''}
',
  'fields.city.expression' = '#{Address.city}',
  'fields.street_address.expression' = '#{Address.street_address}',
  'fields.amount.expression' = '#{number.numberBetween ''0'',''100''}',
  'fields.order_time.expression' = '#{date.past ''15'',''SECONDS''}',
  'fields.order_status.expression' = '#{regexify ''(RECEIVED|PREPARING|DELI
VERING|DELIVERED|CANCELED){1}''}'
);
```

To create the table, you need to click on the Execute button under the **SQL window**.

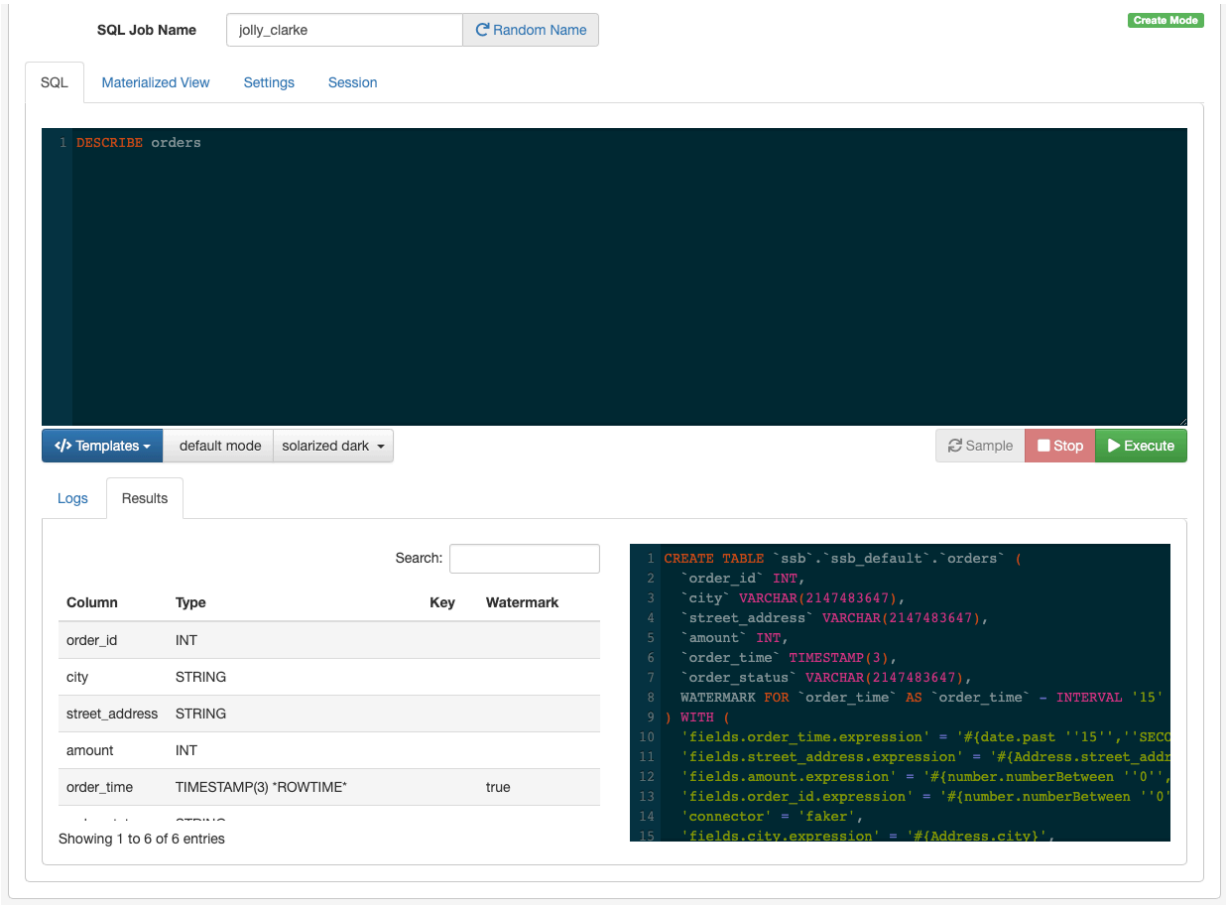


After executing the CREATE TABLE statement, there are two ways to view the created table:

- You can view the table under the Tables tab:



- You can use the DESCRIBE orders; statement:



Running a SELECT query

After creating a table, learn how to run a SELECT query that outputs the resulted data under the Result tab of Streaming SQL Console.

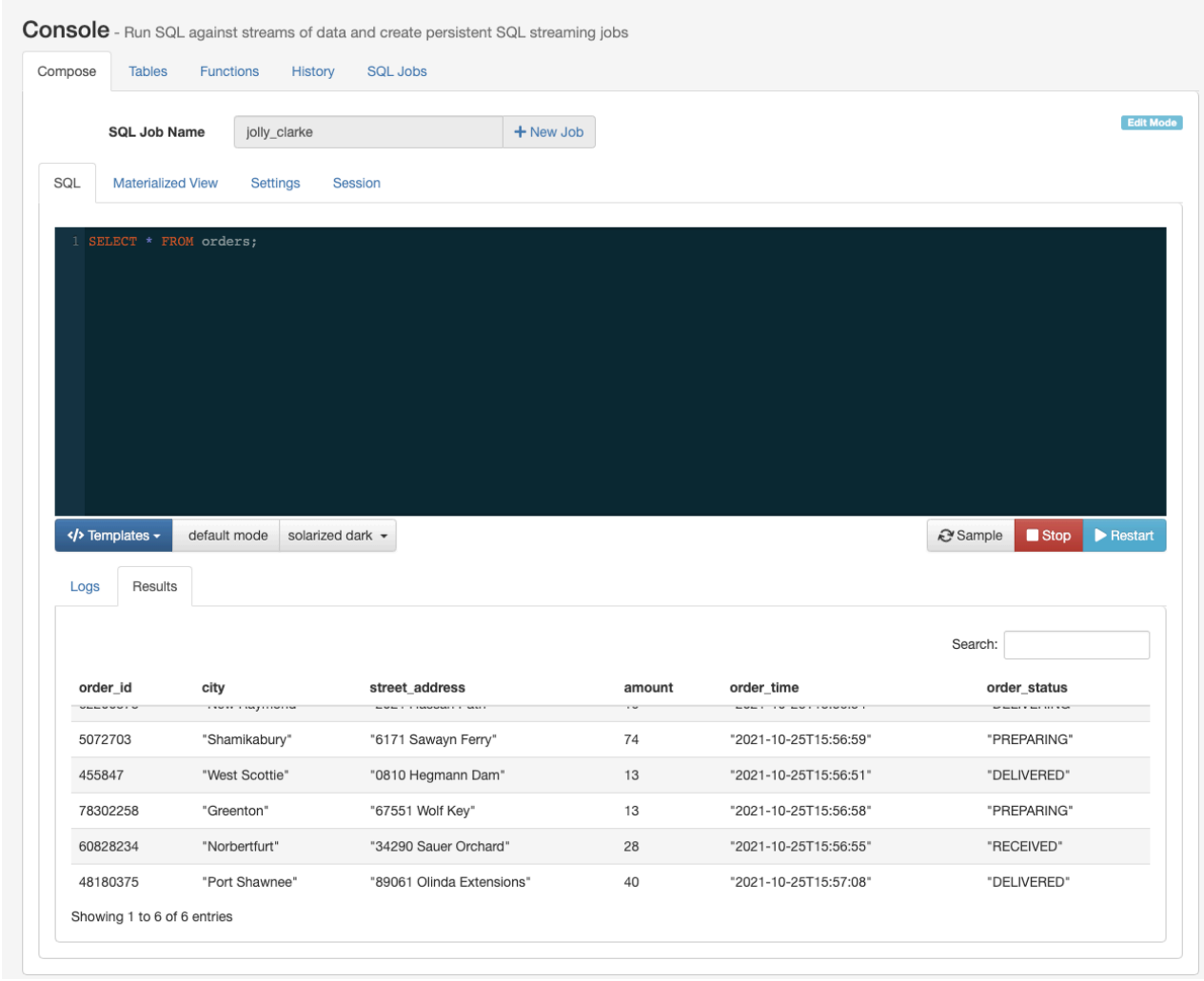
You have created your table using the Faker template that currently generates data. As a next step, you can run a SELECT query and ouput the results on the **Console page** under the **Results tab**.

Add the following SQL query to the **SQL window**:

```
SELECT * FROM orders;
```

To execute the query, you need to click on the Execute button under the **SQL window**.

After a short amount of time, the samples of the result continously show up under the **Results tab**.



When you execute a query, a Flink job is created in the background. You can see more detailes about the created Flink job by navigating to the SQL Jobs tab and accessing the Flink Dashboard for the running job. You can also reload the SQL job into the **SQL window** to edit the job, or stop the job from the **SQL Jobs** tab.

Creating and querying a view

Now that you have learned the basic steps of creating a table and querying data from a table, learn how to create a more complex query using views.

In the following example, you create a view using the columns from the created Faker table. In this derived computation that can be saved as a view, the orders are aggregate in half minute intervals based on their status.

Use the following CREATE VIEW statement, and paste it to the **SQL window**.

```
DROP VIEW IF EXISTS summaries;
CREATE VIEW summaries AS
SELECT window_start, window_end, order_status, COUNT(*) as order_count, SUM(
amount) as total_amount
FROM TABLE(
    TUMBLE(TABLE orders, DESCRIPTOR(order_time), INTERVAL '20' SECONDS))
GROUP BY window_start, window_end, order_status;
```

To create the view, you need to click on the Execute button under the **SQL window**.

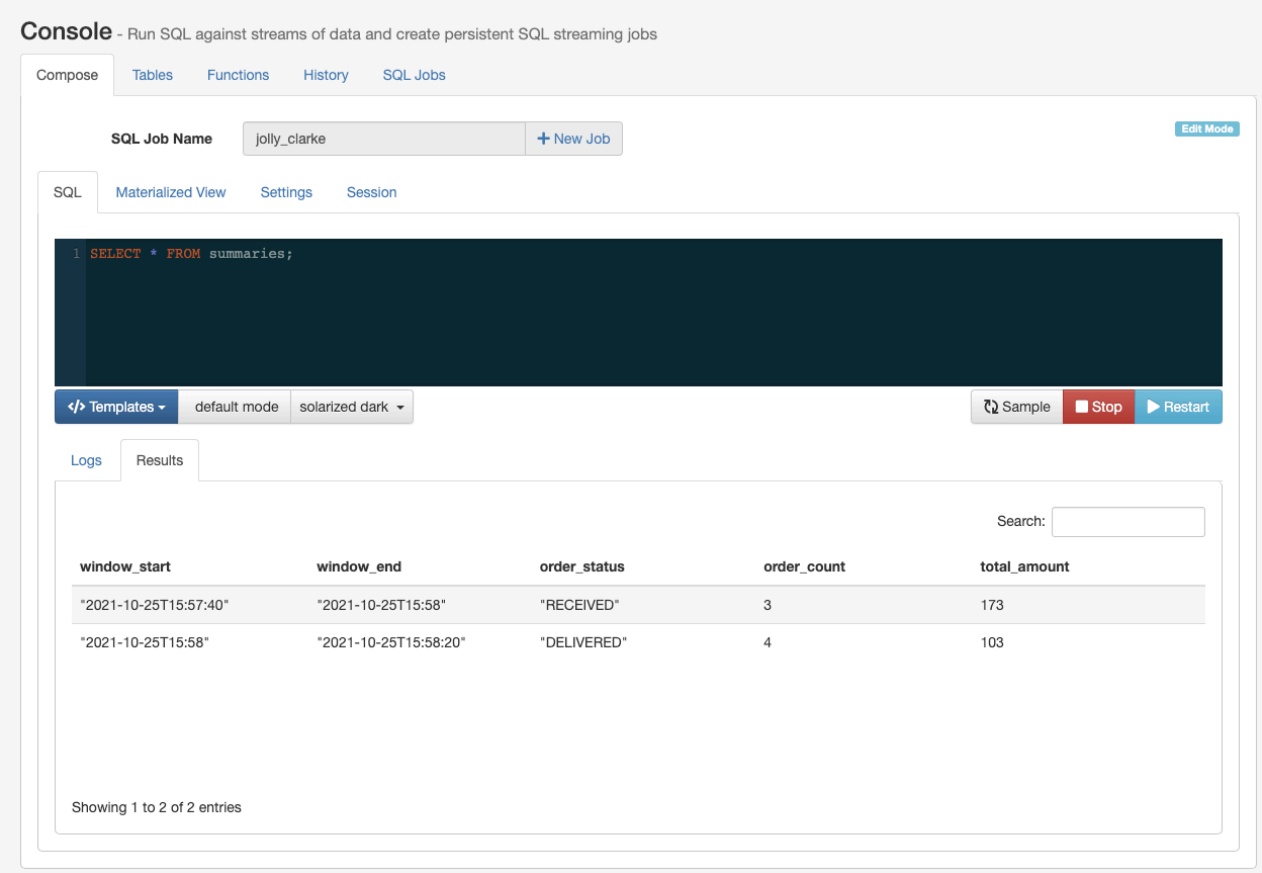
Before selecting data from this view, you can change the **Sample Behavior** to sample all messages on the **Settings** tabs. This way the sampled output is not limited to a given amount of messages.

Add the following SQL query to the **SQL window** to run the query:

```
SELECT * FROM summaries
```

To execute the query, you need to click on the Execute button under the **SQL window**.

After a short amount of time, the samples of the aggregated result continously show up under the Results tab.



Adding a sink using a template

Now that you know how to sample the queried results to the Result tab, learn how to create a sink using one of the predefined Templates to output the results of the executed SQL queries.

After some careful experimentation, you have executed the SELECT * FROM summaries query, stored it as a view and sampled the results to the Streaming SQL Console.

Now, the next step is to stream the aggregated records to an external system, such as Kafka. The Community Edition comes with a preconfigured Kafka container that can be selected from the predefined Templates.

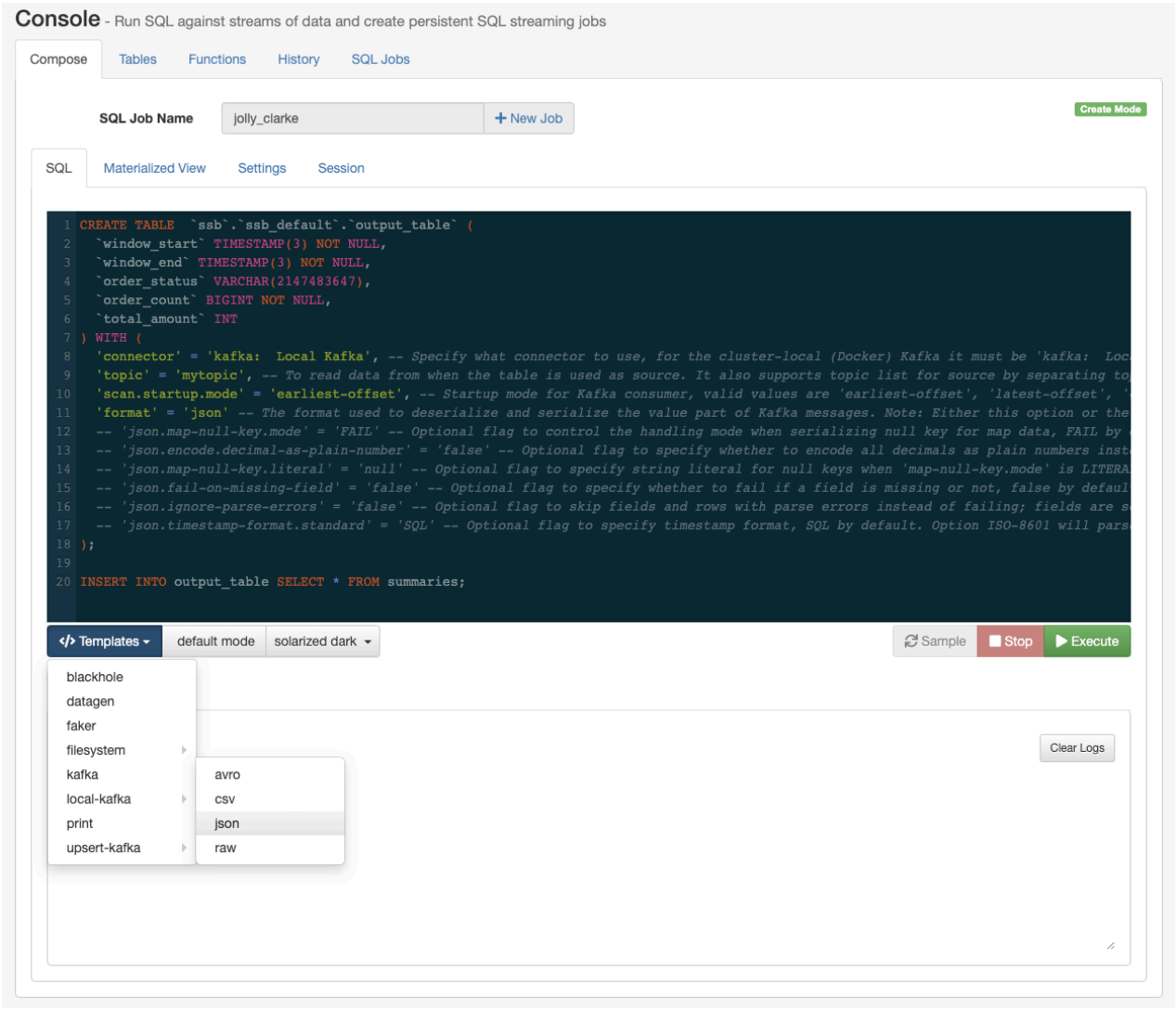
The created view has a complex schema. It would be tedious to describe it, and manually create a Kafka table with a matching schema. Luckily, SQL Stream Builder can do this task automatically.

As you can add more statements in one SQL window, you can create the Kafka table and add a SELECT query at the same time.

Add the following SQL query to the SQL window, but do not execute it:

```
INSERT INTO output_table SELECT * FROM summaries;
```

As the *OUTPUT_TABLE* does not exists yet, you need to import the CREATE TABLE statement to the SQL window by selecting Templates > local-kafka > json. SSB automatically inserts the appropriate CREATE TABLE DDL statement before the SELECT query. Before executing the queries, you must fill out the topic in the connector option.



Click on the Execute button to run the script, both statements will be executed.

Adding a Materialized View

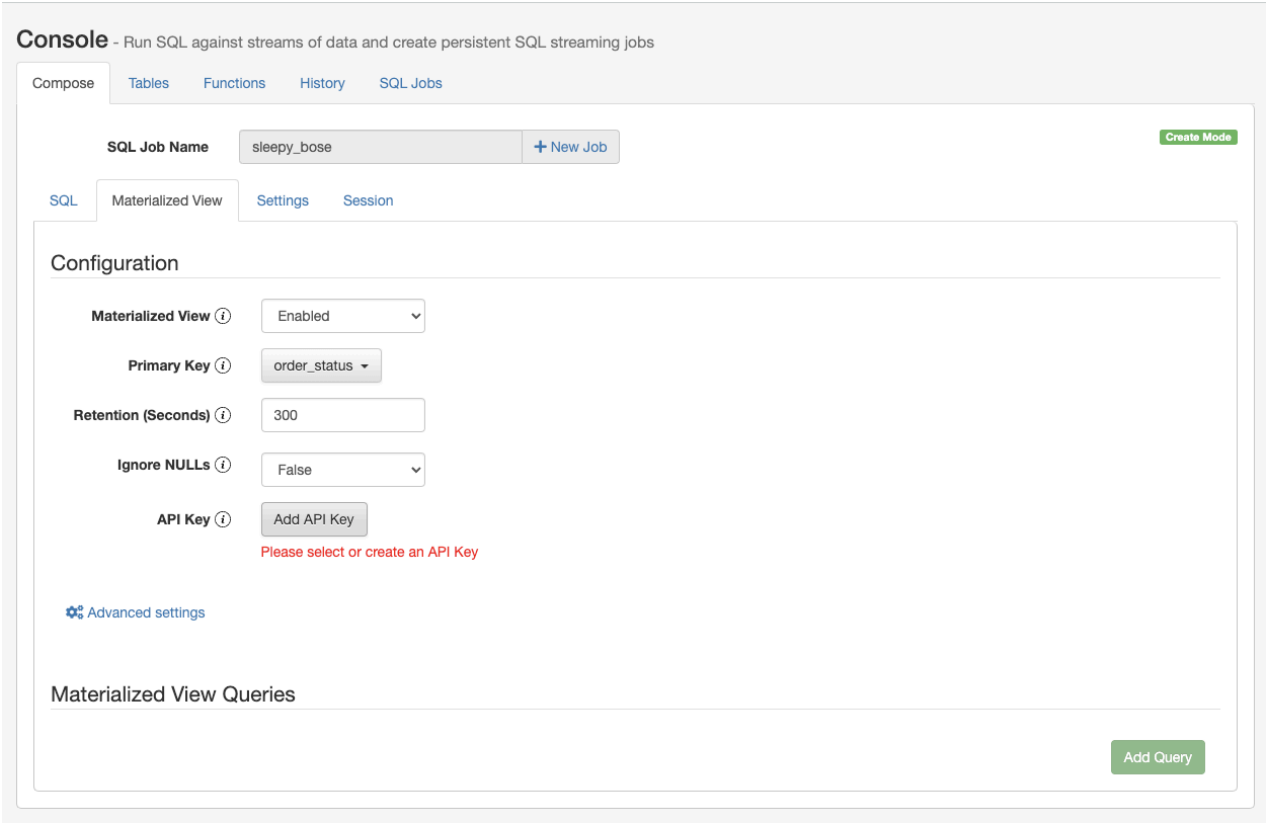
Materialized views let you create a persistent snapshot of the stream that can be queried through a REST endpoint. This can then be queried by external applications and tools. Now, that you know how to query simple and aggregated data, learn how to create Materialized Views.

In the following example, you will create a Materialized View that shows the latest order count and total amount for each order status. The key will be the status, and the other fields will be updated with the value from the latest 20 second interval.

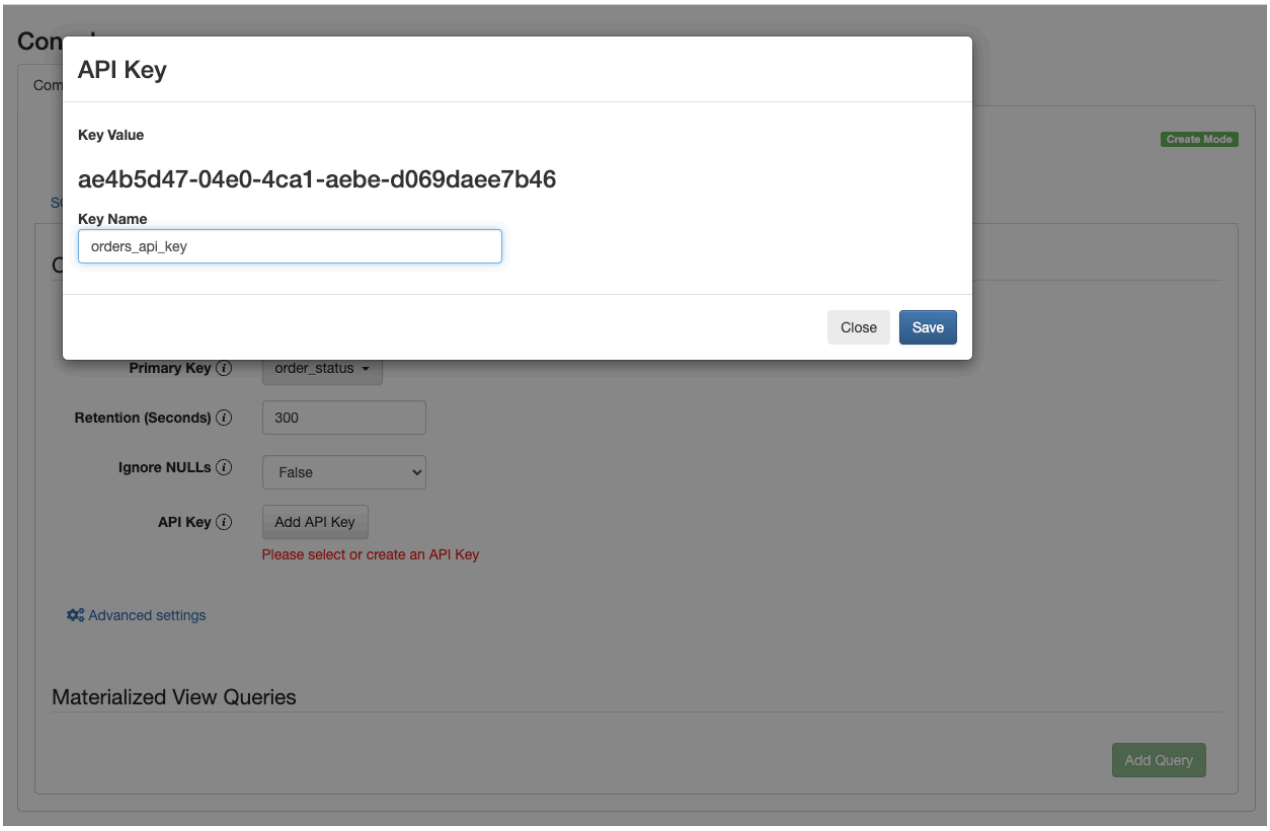
First, you need a New Job with a SELECT query. Add the following SQL query to the SQL window to run the query:

```
SELECT * FROM summaries
```

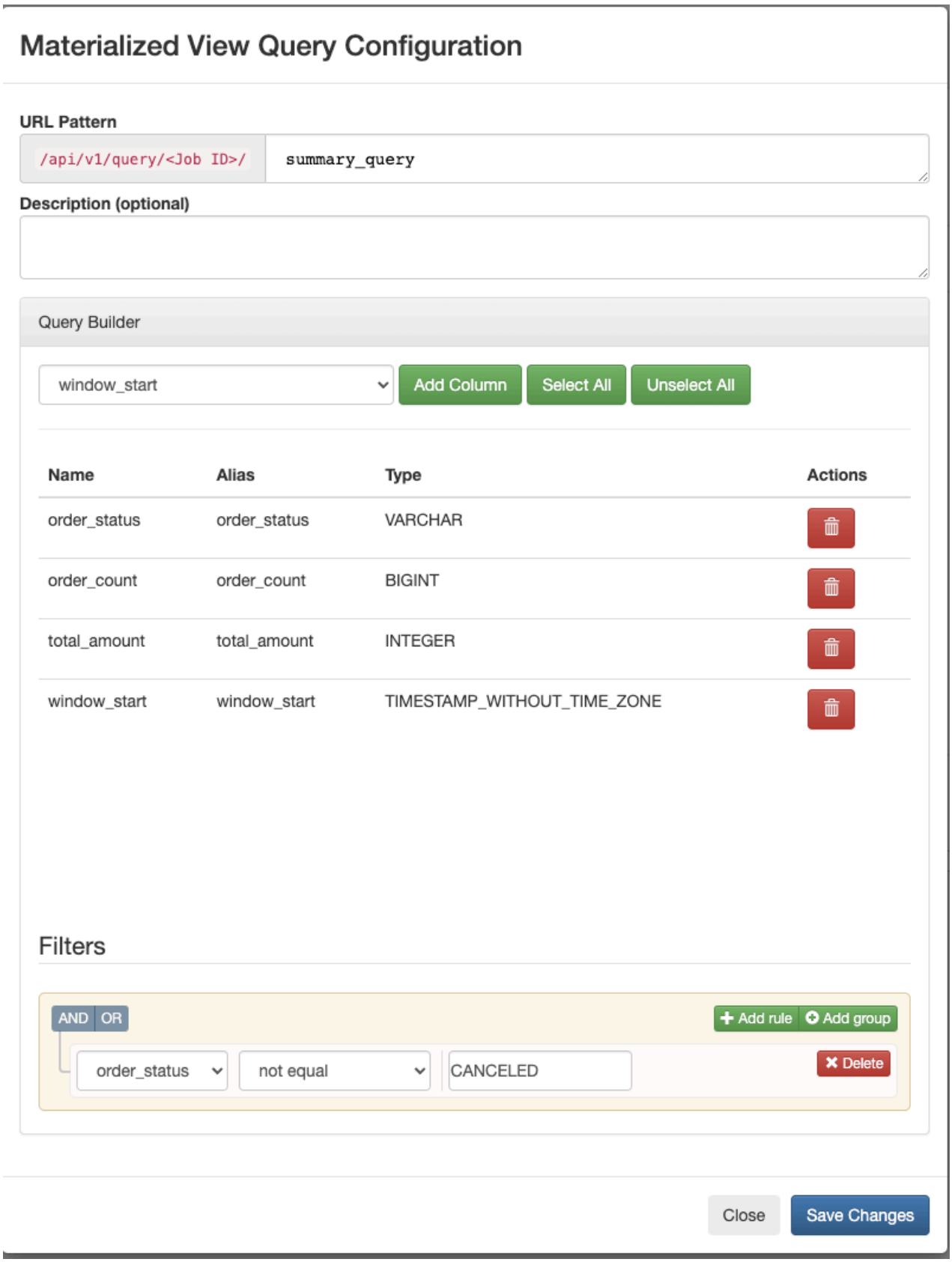
Before executing the query, you need to enable the Materialized View feature. On the Materialized View tab, set the Materialized View configuration to *ENABLED*, and select the *ORDER_STATUS* as the primary key.



You also must add an API key to the configuration that will be a part of the generated URL. Click on the Add API Key button, and provide any type of name to the API key.

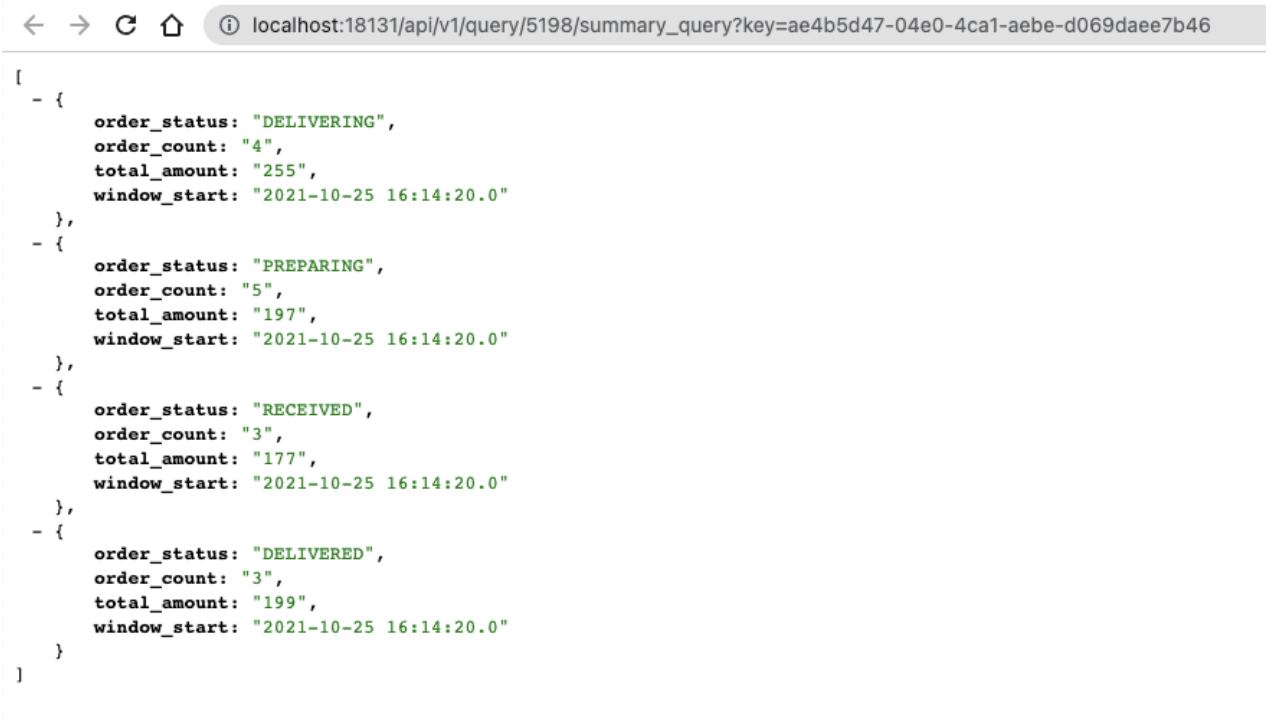


After configuring the Materialized View, you can add a query. On the Query Configuration page, specify the URL and select the fields that you want to include in the Materialized View. You can also add filters to further narrow down the result. In the following example, summary_query is the name of the URL, order_status, order_count, total_amount and window_start columns are selected as fields. A filer is also added to exclude the orders with a *CANCELED* status.



Click on the Save Changes button to add the query to the Materialized View. The URL pattern will appear under the Materialized View Queries.

When you click on the URL pattern, you are redirected to the localhost:18131 address. You will receive an error message that no data is generated, because the SELECT query is not executed yet. Go back to the SQL tab on the Streaming SQL Console, and click on the Execute button to start the SQL job. After a couple of seconds, the endpoint becomes active and the results show up on the localhost address.



Troubleshooting

When using the Community Edition and encounter an error, you can use the following examples to help you troubleshoot the issue.

'Port is already in use' error message

You need to verify that the required ports are available and not already in use.

Use one of the following commands to see which ports are in used:

- MacOS/Windows: netstat -an
- Linux: netstat -nlp or ss -nlp

exited 137 error message

If you see tmp-sqlio-1 exited with code 137 error message in the Streaming SQL Engine log, you need to the modify docker memory Resources settings.

Open Docker Desktop, go to the Settings > Resources , and set memory limit to 4 GB

If you are running a previous cluster and need to restart the Community Edition from scratch, you can run the following commands:

```
docker-compose down
docker rm -f $(docker ps -a -q)
docker volume rm $(docker volume ls -q)
docker-compose up -d
```