

# **CLOUDERA DATA PLATFORM**

## **DATA WAREHOUSE LAB –**

### **Experimental, you are welcome to try this lab or use the prior version**

**Step-by-step instructions:**

#### **Part 1 - Data Catalog [20 minutes]**

Overview: What is Cloudera Data Catalog?

Data Catalog is a service that enables you to understand, manage, secure, and govern data assets across the enterprise. Data Catalog helps you understand data across multiple clusters and across multiple CDP environments. You can search to locate relevant data of interest based on various parameters. Using Data Catalog, you can understand how data is interpreted for use, how it is created and modified, and how data access is secured and protected.

Purpose: Search for a dataset (table) in Data Catalog, called “flights”.

- Find what database(s) the table “flights” is located.
- Find out at least one year that the “flights” table was generated from.
- Find out how many columns the table “flights” contains.

1) Open CDP, using the “admin” user within the Test Drive link.

Your link should look something like (remember click the link in your email not the link below)

[http://login.trycdp.com/auth/realms/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx\\_admin@trycdp.com&p=X](http://login.trycdp.com/auth/realms/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx_admin@trycdp.com&p=X)

\*xx represents the trial user #

\*X represents the password

2) Click the “Data Catalog” within the CDP Home Screen



3) Type “flights” in the search box and press enter on your keyboard

The screenshot shows the Data Catalog / Search interface. At the top, it says "Data Catalog / Search". Below is a search bar with the text "flights". To the left of the search bar are "Launch Profilers" and "Action" buttons. The main area is titled "Entities" and lists several items: "actualelapsedtime (hive\_column)", "securitydelay (hive\_column)", "year (hive\_column)", "cancelled (hive\_column)", and "weatherdelay (hive\_column)". Below this is a "Suggestions" section with the word "flights".

4) Click “Hive Table” under Filters on the left

Launch Profilers

flights

Data Lakes

| Type       | Name    | Location              |
|------------|---------|-----------------------|
| Hive Table | flights | /airlines_new_orc     |
| Hive Table | flights | /airlines_new_parquet |

Filters

TYPE

Hive Table

HBase Table

+ Add New Value

\*Find what database(s) the table "flights" is located.

5) Click "flights" where the Location = /airlines\_new\_orc

Launch Profilers

flights

Data Lakes

| Type       | Name    | Location              |
|------------|---------|-----------------------|
| Hive Table | flights | /airlines_new_orc     |
| Hive Table | flights | /airlines_new_parquet |

Filters

TYPE

Hive Table

HBase Table

+ Add New Value

6) Zoom into the Lineage and scroll over one of the /cdp-lake/data, clicking the "i" for more information

#### Data Catalog - Asset Details

The screenshot shows the 'Asset Details' page for a 'flights' table. Key details include:

- Name:** flights
- Type:** HIVE TABLE
- Data Lake:** cdptrialuser31-dl
- Dataset:** 0
- Number of Columns:** 29
- Asset Properties:** Owner: csoo\_trialuser31, Qualified Name: airlines\_new\_src.flights@cm, Created On: Wed Jan 13 2021 01:10:57 GMT-0600 (Central Standard Time), Last Access Time: Wed Jan 13 2021 01:10:57 GMT-0600 (Central Standard Time)
- Table Type:** MANAGED\_TABLE
- Database:** airlines\_new\_src
- DB Catalog:** cm
- Parent:** airlines\_new\_src
- Managed Classifications:** 0
- Lineage:** A lineage diagram showing the flow of data from various sources (e.g., /cdp-lake/flights/year=1997) into the 'flights' table.
- Entity Detail:** A detailed view of the entity 'cdp-lake/data/airlines/airlines\_new\_src.db/flights/year=1997'. Fields include:
 

|                     |   |
|---------------------|---|
| Guid:               | b65a2094-f572-432e-9fa4-95d9ff7db650                            |
| Type Name:          | aws_s3_pseudo_dir   |
| Classifications(0): | -   |
| Owner:              | -NA-  |
| Qualified Name:     | cdp-lake/data/airlines/airlines_new_src.db/flights/year=1997@cm |
| Created On:         | -NA-  |
| Update Time:        | -NA-  |
| Created By:         | csoo_trialuser31  |
| Updated By:         | csoo_trialuser31  |

\*Find out at least one year that the “flights” table was generated from.

\*Find out how many columns the table “flights” contains.

## Part 2 - Create a Virtual Warehouse and Run Queries [45 minutes]

Overview: What is Cloudera Data Warehouse?

We will explore features of Cloudera Data Warehouse (CDW) by performing some data exploration and create dashboards to share our results to a wider audience

We will be taking a look at a generated data set from a mock airline company containing flights information from its fleet of aircraft.

A virtual warehouse represents virtual compute resources to access data that is stored in a database catalog. This lets you create or destroy compute resources, auto-scale, or separate resources across different workloads, all running on the same underlying data.

CDW let's you choose from a set of default resources based on your predicted workload as well as give you fine grained control over autoscaling and timeout features so you can fine tune your system to be most cost effective.

Purpose: Create a virtual warehouse and run queries, answering the questions below:

- What are the top 5 visited destinations by year from (1995-2008)?
- What are the top 10 routes (origin and dest) that have seen maximum diversions?
- Which three months have seen the most number of cancellation due to bad weather?

1) Open CDP, using the “admin” user within the Test Drive link.

Your link should look something like (remember click the link in your email not the link below)

[http://login.trycdp.com/auth/realm/trialxx/protocol/saml/clients/samlclient?tn=trialxx\\_admin@trycdp.com&p=X](http://login.trycdp.com/auth/realm/trialxx/protocol/saml/clients/samlclient?tn=trialxx_admin@trycdp.com&p=X)

\*xx represents the trial user #

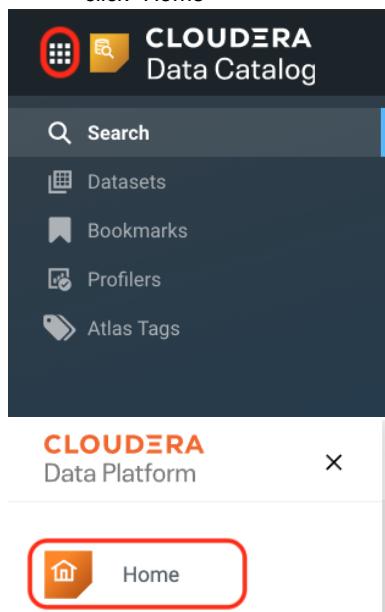
\*X represents the password

2) Click the “Data Warehouse” within the CDP Home Screen



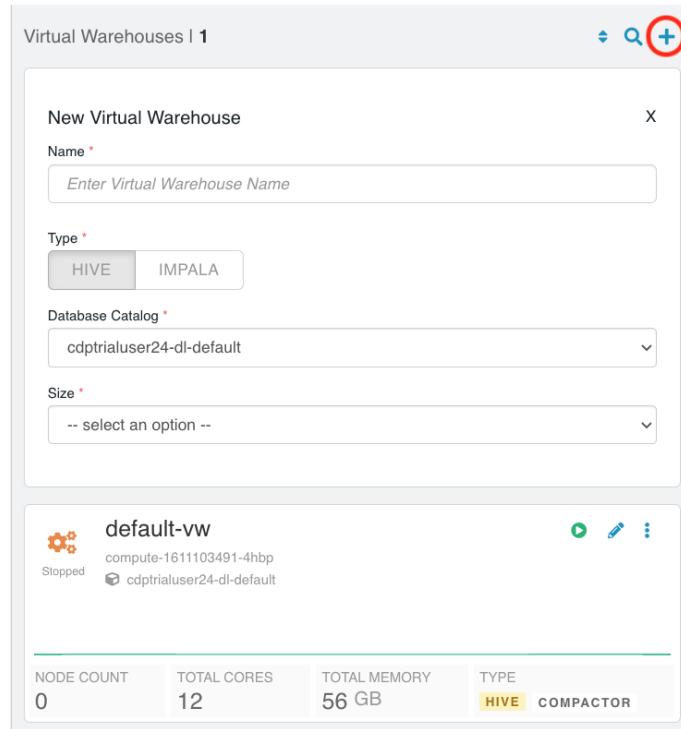
How do you get to the CDP Home Screen?

- From any experience such as "Data Catalog", click the 9 square at the top left and then click "Home"



**WE HAVE DONE THIS FOR YOU – DO NOT CREATE A NEW  
VIRUTAL WAREHOUSE – READ THROUGH THIS FOR  
BACKGROUND INFO...**

3) Click the “+” at the top right next to “Virtual Warehouses”



The screenshot shows a modal window titled "New Virtual Warehouse". At the top right is a red circle highlighting the "+" button. The form fields include:

- Name: Enter Virtual Warehouse Name
- Type: HIVE (selected)
- Database Catalog: cdptrialuser24-dl-default
- Size: -- select an option --

Below the form is a table showing the details of a created Virtual Warehouse:

| default-vw      | compute-1611103491-4hbp | cdptrialuser24-dl-default     |
|-----------------|-------------------------|-------------------------------|
| Stopped         |                         |                               |
| NODE COUNT<br>0 | TOTAL CORES<br>12       | TOTAL MEMORY<br>56 GB         |
|                 |                         | TYPE<br><b>HIVE</b> COMPACTOR |

4) Enter a name for your New Virtual Warehouse

Virtual Warehouses | 1

New Virtual Warehouse

Name \*

 testvirtualwarehouse1

Type \*

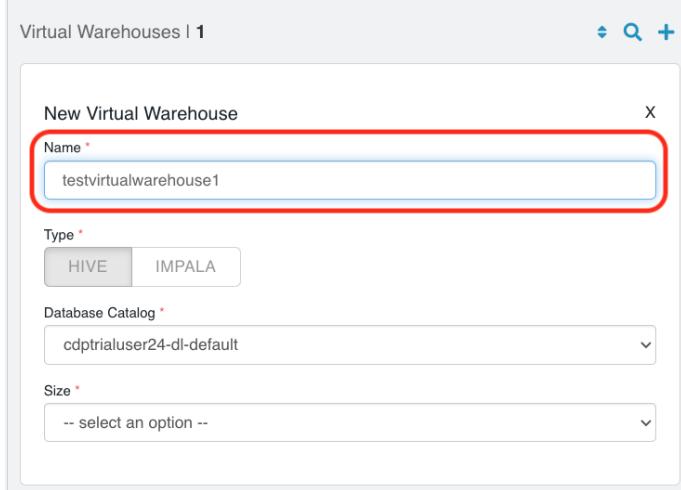
HIVE IMPALA

Database Catalog \*

cdptrialuser24-dl-default

Size \*

-- select an option --



5) Select the Size of "xsmall - 2 Executor Nodes"

\*How do I choose a size? Initial concurrent users

Virtual Warehouses | 1

New Virtual Warehouse

Name \*

 testvirtualwarehouse1

Type \*

HIVE IMPALA

Database Catalog \*

cdptrialuser24-dl-default

Size \*

-- select an option --

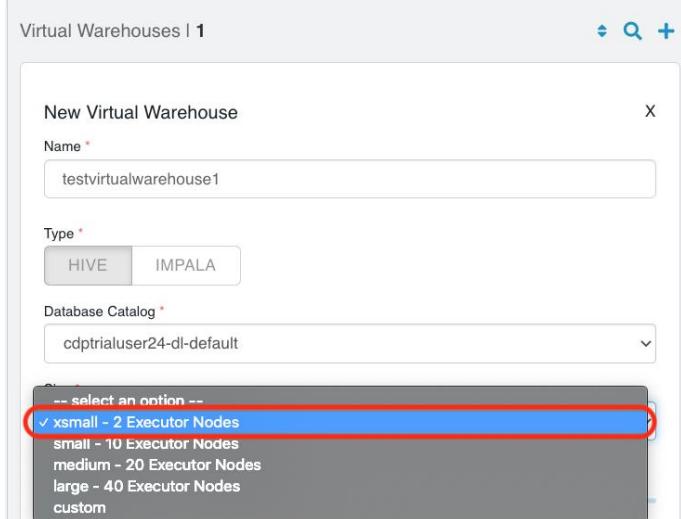
xsmall - 2 Executor Nodes

small - 10 Executor Nodes

medium - 20 Executor Nodes

large - 40 Executor Nodes

custom



6) Set the AutoSuspend Timeout (in seconds) between 4500 and 5500:

\*What is AutoSuspend Timeout? Automatically spin-down unused resources after timeout occurs.

Virtual Warehouses | 1

New Virtual Warehouse

Name \*

Type \*

HIVE IMPALA

Database Catalog \*

cdptrialuser24-dl-default

Size \*

xsmall - 2 Executor Nodes

AutoSuspend Timeout (in seconds): 5000

0 1000 2000 3000 4000 5000 6000 7000

7) Choose “Install Data Visualization” to be on

\*Allowing for Data Visualizations in Part 3

Virtual Warehouses | 2

New Virtual Warehouse

Name \*

Type \*

HIVE IMPALA

Database Catalog \*

cdptrialuser24-dl-default

Size \*

xsmall - 2 Executor Nodes

AutoSuspend Timeout (in seconds): 5000

Concurrency Autoscaling ⓘ

Nodes: Min:2, Max:6

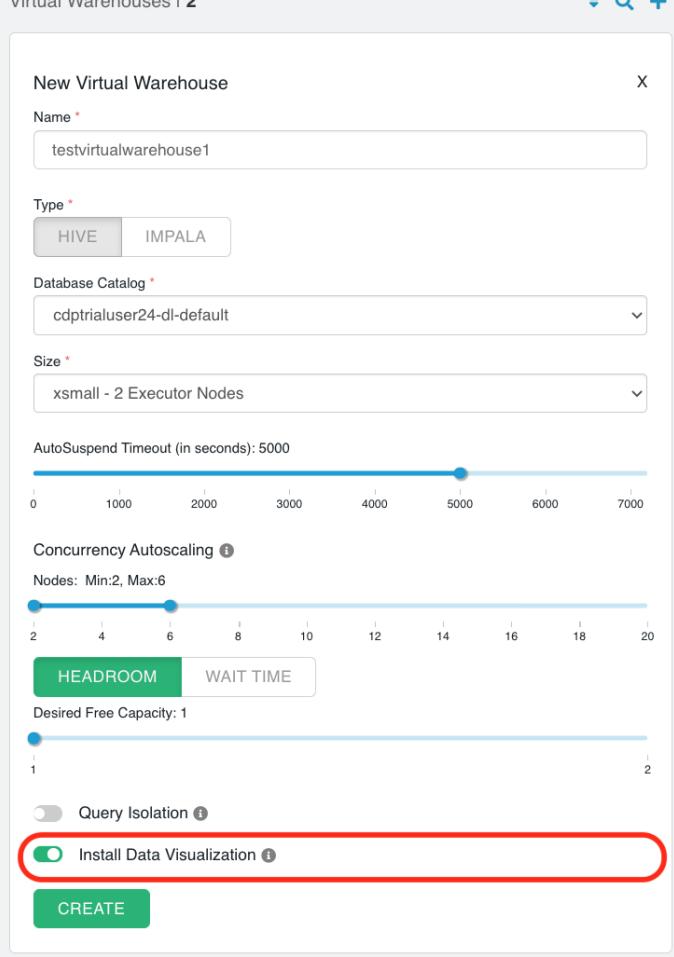
HEADROOM WAIT TIME

Desired Free Capacity: 1

Query Isolation ⓘ

Install Data Visualization ⓘ

**CREATE**



8) Click "Create" to create your Virtual Warehouse

\*Allow for approximately 5 minutes for your Virtual Warehouse to become available for use

**CREATE**

When available for use, "Starting" will change to "Running" as shown below

testvirtualwarehouse1  
compute-1611179792-vz49  
Starting cdptrialuser24-dl-default

checking if query-coordinator-0 statefulset is ready with at least 1 ready replica(s) (config-id: 7647c82f-8b37-4593-80e9-058f1f928b31 version: 7.2.8.0-24)

| NODE COUNT | TOTAL CORES | TOTAL MEMORY | TYPE                    |
|------------|-------------|--------------|-------------------------|
| 2          | 38          | 292 GB       | HIVE DATA VISUALIZATION |

testvirtualwarehouse1  
compute-1611179792-vz49  
Running cdptrialuser24-dl-default

NODE COUNT TOTAL CORES TOTAL MEMORY TYPE  
2 38 292 GB HIVE DATA VISUALIZATION

**OK, TIME FOR YOU TO JUMP BACK IN. THE DATA ANALYTICS STUDIO (DAS) IS DEPRICATED. IT IS REPLACED WITH HUE. THE INSTRUCTIONS BELOW SHOW YOU HUE WITH IMPALA. IF YOU WANT TO USE DAS AND HIVE THOSE INSTRUCTIONS ARE AFTER THE IMPALA LABS**

9) Notice there are two virtual warehouses built on the cdptrial data catalog. Only the "default" virtual warehouse is enabled for Data VIZ

Virtual Warehouses | 30

|  | martyimpala<br>Running impala-1629223690-zvrj<br>cdptrialuser10-datalake-default | HUE | Data VIZ |
|--|--|-----|----------|
|  | default<br>Running compute-1629217181-qsn5<br>cdptrialuser10-datalake-default    | DAS | Data VIZ |

10) Click on HUE to enter the “Hadoop User Experience”

The screenshot shows the Hue Virtual Warehouses interface. At the top, there's a search bar and a '+' button. Below it, there are three warehouse entries:

- martyimpala**: Running, impala-1629223690-zvrj, cdptrialuser10-datalake-default. It has 2 nodes, 48 cores, and 365 GB memory. Type: IMPALA.
- default**: Running, compute-1629217181-qsn5, cdptrialuser10-datalake-default. It has 2 nodes, 38 cores, and 292 GB memory. Type: HIVE, UNIFIED ANALYTICS, COMPACTOR.
- Another entry partially visible below the default one.

11) The landing page takes you to the “default” database. Click on the < to the left of the default database to select a different database

The screenshot shows the Hue Impala query editor. On the left, there's a sidebar with icons for Home, Databases, Tables, and Cloud. The 'Tables' icon is highlighted with a red box. The main area shows the 'Impala' database selected. A search bar at the top says 'Search data and saved documents...'. Below it, there's a table with columns for 'Tables' and '(0)'.

12) Click on the database “airlines\_new\_parquet” that we saw in Part 1 “Data Catalog.” Both Impala and Hive work with both Parquet and ORC files. As a rule of thumb if you’re mostly using Impala use Parquet format or Kudu. When working with Hive ORC is the preferred format.

The screenshot shows the Impala UI interface. On the left, there's a sidebar with icons for databases, tables, and files. The main area is titled 'Impala' and shows a list of databases: 'airlines\_new\_orc', 'airlines\_new\_parquet' (which is highlighted with a red box), 'default', and 'retail\_clickstream'. A search bar at the top right says 'Search'.

If you ever need to get back to this screen layout click on the “editor” shown here:

This screenshot shows the same Impala UI as above, but the 'Editor' tab is highlighted with a red box in the top navigation bar.

13) Enter the following query, answering the question “show me the top 5 visited destination by year from (1995-2008)” Click on the blue triangle to run the query.

```
SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
GROUP BY dest,year
ORDER BY Times_Visited DESC
LIMIT 5;
```

Why doesn't it run right away? You promised it was fast 😊

This screenshot shows the Impala UI with a query entered in the editor:

```
1 SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
2 GROUP BY dest,year
3 ORDER BY Times_Visited DESC
4 LIMIT 5;
```

A status message at the bottom of the screen says:

Latest admission queue reason : Waiting for executors to start. Only DDL queries and queries scheduled only on the coordinator (either NUM\_NODES set to 1 or when small query optimization is triggered) can currently run. za42ca87aec98945:13b33a1b00000000

Two yellow callout boxes point to the status message and the query editor area:

- The first box points to the status message with the text: "What is ‘waiting for query executors to start?’"
- The second box points to the editor area with the text: "This will be a blue triangle, click it to run"

martyimpala  
impala-1629223690-zvrj  
Stopped cdptrialuser10-datalake-default

|                 |                   |                        |              |
|-----------------|-------------------|------------------------|--------------|
| NODE COUNT<br>2 | TOTAL CORES<br>48 | TOTAL MEMORY<br>365 GB | TYPE<br>IDLE |
|-----------------|-------------------|------------------------|--------------|

Impala went to sleep to save money on cloud costs. You can see it wake back up to answer your query

You may get the query result without having to wait for Impala to “wake up.” You get to decide how long an idle time you want to wait before you scale down to zero, or if you have the budget you can have Impala always available.

14) Click “EXPLAIN” to see the explain plan prior to running the query

\*Not required to execute the query - this gives us a plan on exactly what the query is doing

Search data and saved documents...

Impala

Add a name... Add a description

Tables (4) +

airlines\_new\_parquet

Filter...  
airlines airports flights planes

Explain  
Get shareable link  
Format  
Clear

1| SELECT dest,year,COUNT(dest) as Times\_Visited;  
2| GROUP BY dest,year  
3| ORDER BY Times\_Visited DESC  
4| LIMIT 5;

Click on this down-arrow to expose the menu

Query History      Saved Queries      Results (5)      Explain

```

Max Per-Host Resource Reservation: Memory=508.00MB Threads=15
Per-Host Resource Estimates: Memory=2.43GB
Dedicated Coordinator Resource Estimate: Memory=104MB
WARNING: The following tables have potentially corrupt table statistics.
Drop and re-compute statistics to resolve this problem.
airlines_new_parquet.flights
WARNING: The following tables are missing relevant table and/or column statistics.
airlines_new_parquet.flights

PLAN-ROOT SINK
|
| 05:MERGING-EXCHANGE [UNPARTITIONED]
|   order by: count(dest) DESC
|   limit: 5
|
| 02:TOP-N [LIMIT=5]
|   order by: count(dest) DESC
|   row-size=24B cardinality=5

```

The “Explain Plan” shows you how the query will execute. It is asking you to update statistics for the tables in the query. This is a good idea for performance. We can discuss this in more detail.

15) After you run the query you will have a link to lots of information about the query. Click on the link shown below

Impala    Add a name...    Add a description...   

airlines\_new\_parquet ▾ ?

```

1|SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
2|GROUP BY dest,year
3|ORDER BY Times_Visited DESC
4|LIMIT 5;
5|

```

LOCAL SPARKASSIGN QUEUE (0/0) - RELAYING (0/0 EXECUTORS TO SPARK) WITH 0 QUERIES SINCE YESTERDAY

other NUM\_NODES set to 1 or when small query optimization is triggered) can currently run 2a42ca87aec98945:13b33a1b00000000

Query 2a42ca87aec98945:13b33a1b00000000: 0% Complete (0 out of 14)

Query 2a42ca87aec98945:13b33a1b00000000 100% Complete (14 out of 14)

Query 2a42ca87aec98945:13b33a1b00000000 100% Complete (14 out of 14)

Query History    Saved Queries    Results (5)    Explain

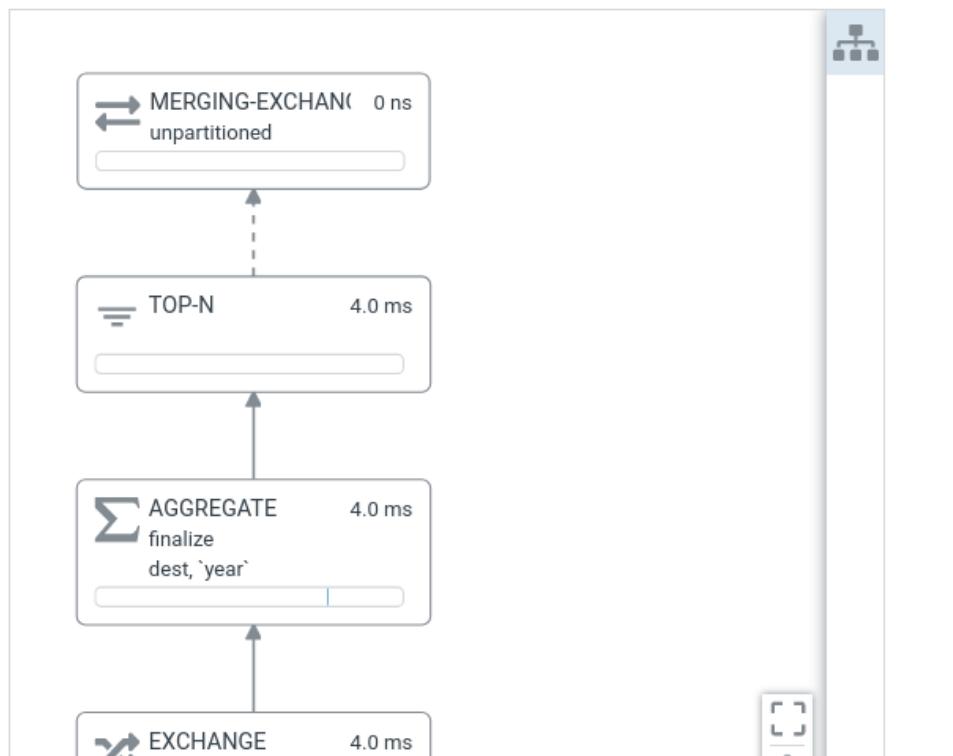
16) Explore the different tabs in the query pop-up. The Visual Plan shows how the query was executed. These get more interesting with multi table joins. The Summary show how much time was spent in each stage of the query, the memory used, and the rows produced. The Profile includes the summary and great detail of everything that happened on each node running the query.

Impala

SELECT dest,year,COUNT(dest) as Times\_Visited FROM flights G...

ID  
2a42ca87aec98945:13b33a1b00000000

Plan    Query    Text Plan    Summary    Profile    Memory    Backends    Instances



17) Add another query to the editor

```
SELECT origin,dest,COUNT(Diverted) as t FROM flights
WHERE Diverted = 1
GROUP BY origin,dest
ORDER BY t DESC
LIMIT 10;
```

18) Notice the highlighting on the left edge. HUE is parsing based on the semi-colon and the execution arrow will run whatever is highlighted in blue, or whatever has been highlighted by the cursor. This way you can have multiple queries in the same canvas.

```
2 GROUP BY dest,year
3 ORDER BY Times_Visited DESC
4 LIMIT 5;
5
6 SELECT origin,dest,COUNT(Diverted) as t FROM flights
7 WHERE Diverted = '1'| 
8 GROUP BY origin,dest
9 ORDER BY t DESC
10 LIMIT 10;
11
```

19) Click the blue arrow to execute the query, answering the question “What are the top 10 routes (origin and dest) that have seen maximum diversions?”

|   | origin | dest | t   |
|---|--------|------|-----|
| 1 | ORD    | LGA  | 845 |
| 2 | LGA    | DFW  | 749 |
| 3 | DFW    | LGA  | 653 |
| 4 | DAL    | HOU  | 615 |
| 5 | ATL    | LGA  | 567 |
| 6 | MDW    | STL  | 512 |
| 7 | ATL    | DFW  | 482 |
| 8 | ORD    | DFW  | 450 |

20) Hover over the disappearing next to the airports table to see more information about the table. We’re going to use the geo location of the airports to do a marker map in HUE.

The screenshot shows the Hue interface. On the left, there's a sidebar with icons for Clusters, Applications, and Help. Below that is a list of tables under 'airlines\_new\_parquet': airlines, airports, flights, and planes. In the center, a detailed view of the 'airports' table is shown. The table has 7 columns: iata, airport, city, state, country, lat, and lon. Each column includes a description and a sample value. At the bottom right of the table view, there are buttons for 'Table Browser' and 'DWF'.

You can also click on the table name to expand all the columns. On the far right of the browser is help tooling.

21) This is the “drag and drop” option, drag and drop the table name “airports over to line 12

The screenshot shows the Hue interface with the 'Impala' query editor open. The left sidebar lists tables: airlines, airports, flights, and planes. The top bar shows the table name 'airports'. The main area contains an auto-generated SQL query for selecting data from the 'airports' table. The query includes several SELECT statements and a GROUP BY clause. A progress bar at the bottom indicates the query is 100% complete.

When you drop the table name you'll get to choose what SQL you want auto generated. Take the “select” option and run the query with the blue-triangle

The screenshot shows the Hue interface with the 'Impala' query editor open. The left sidebar lists tables: airlines, airports, flights, and planes. The top bar shows the table name 'airports'. The main area contains an auto-generated SQL query for selecting data from the 'airports' table. The query includes several SELECT statements and a GROUP BY clause. A progress bar at the bottom indicates the query is 100% complete. The interface shows a 'Query History' section with previous queries and their results.

22) Let's now build a marker map of the airports with the most cancellations. This will correlate with the airports that have the most flights. Run the SQL shown below

```

SELECT origin, lat, lon, COUNT(Cancelled) as num_of_cancellations ,
concat(origin, " ", cast(count(cancelled) as string)) as airport_label
FROM flights, airports
WHERE origin = iata and cancelled = 1 AND cancellationcode = 'B'
GROUP BY origin, lat, lon order by num_of_cancellations desc limit 50;

```

23) After you run the SQL use the down arrow to choose the type of output formatting. You've been using the data grid, we're now going to choose the marker-map

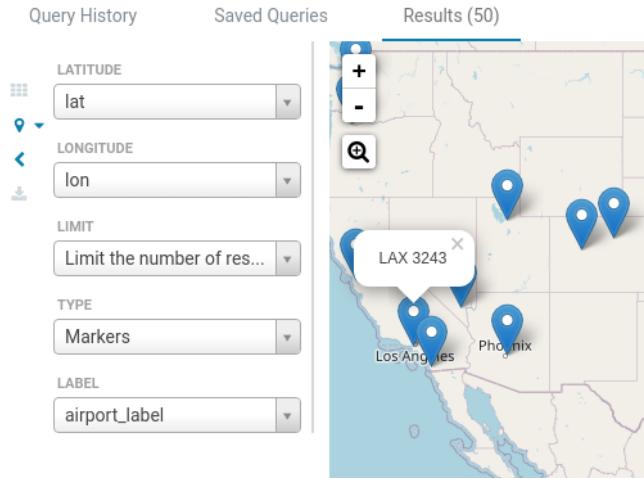
The screenshot shows a database query interface. At the top, there is a code editor window containing an SQL query. Below it is a results pane with two rows of status information: "Query 6c419d4a75c5fabe:772554f000000000 100% Complete (15 out of 15)" and "Query 6c419d4a75c5fabe:772554f000000000 100% Complete (15 out of 15)".

Below the results pane is a "Results (50)" tab. Underneath it, there is a table with five columns: "origin", "lat", "lon", "num\_of\_cancellations", and "airport\_label". The first row of the table has a red box around the "origin" column header.

To the left of the table, there is a dropdown menu with several options: "Bars", "Pie", "Scatter", "Marker Map" (which is highlighted with a red box), and "Gradient Map".

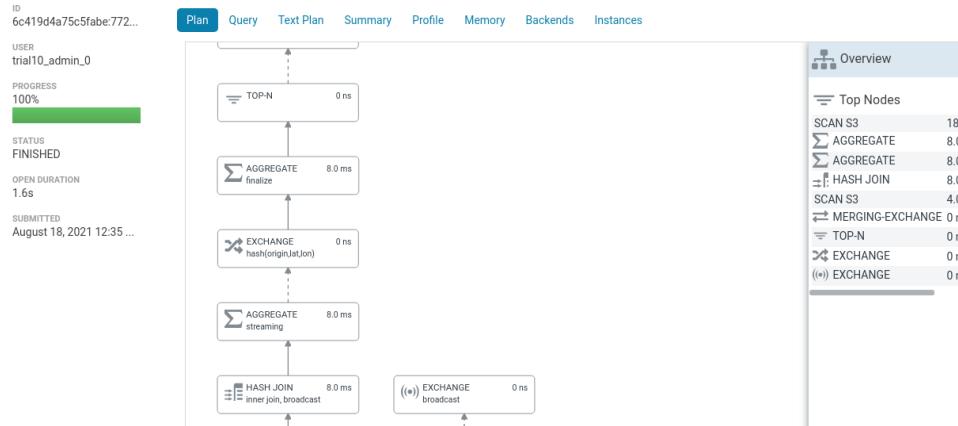
| origin      | lat          | lon          | num_of_cancellations | airport_label |
|-------------|--------------|--------------|----------------------|---------------|
| 1 ORD       | 41.979595    | -87.90446417 | 22123                | ORD 22123     |
| 32.89595056 | -97.0372     | 16519        |                      | DFW 16519     |
| 33.64044444 | -84.42694444 | 15350        |                      | ATL 15350     |
| 40.77724306 | -73.87260917 | 10688        |                      | LGA 10688     |
| 40.69249722 | -74.16866056 | 8979         |                      | EWR 8979      |
| 29.98047222 | -95.33972222 | 8885         |                      | IAH 8885      |
| 42.3643475  | -71.00517917 | 7978         |                      | BOS 7978      |
| 8 CVG       | 39.04614278  | -84.6621725  | 6980                 | CVG 6980      |

24) Configure the marker map per shown below. Clicking on one of the markers will pop up the value of the "airport\_label" column



25) Look at the query plan – notice we now have a join in the tree

```
SELECT origin, lat, lon, COUNT(Cancelled) as num_of_cance...
```

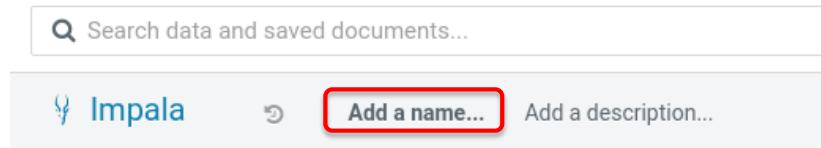


26) The summary shows details of all the stages in the join and their metrics

```
SELECT origin, lat, lon, COUNT(Cancelled) as num_of_cance...
```

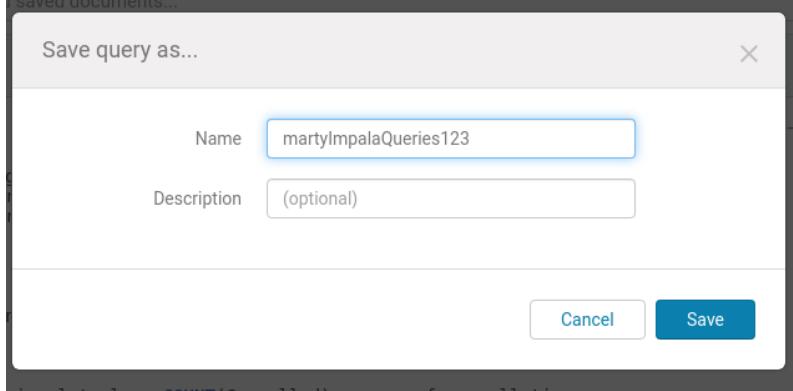
| ID  | 6c419d4a75c5fabe:772... | Plan  | Query     | Text Plan | Summary | Profile | Memory    | Backends  | Instances                     |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
|---|-------------------------|-------|-----------|-----------|---------|---------|-----------|-----------|-------------------------------|----------|--------|-------|----------|----------|-------|------|-------|----------|---------------|--------|----------|---|---|---------|---------|--|--|--|---------|---------|--|---------------------|---|---|---------|---------|----|----|-----------|----------|---------------|--|---------------------|---|----|---------|---------|--|--|--|---------|---|--|----------|---|----|---------|---------|-----|----|----------|---------|--|--|--------------|---|----|---------|---------|-----|-------|----------|-----------|----------|--|-------------|---|----|---------|---------|-------|-------|----------|----------|----------------------|--|---------------------|---|----|---------|---------|--|--|--|-----------|---|--|--------------|---|----|---------|---------|-------|-------|----------|-----------|-----------|--|--------------|---|----|-----------|---------|---------|-------|---------|---|-----------------------|--|------------------|---|---|---------|---------|--|--|--|----------|----------|--|-------------|---|---|---------|---------|-------|--------|-----------|-----------|-----------|--|---------------------|---|---|---------|---------|--|--|--|---------|---|--|------------|---|---|---------|---------|-------|--------|-----------|----------|-------------------------------|--|------------|---|----|----------|-----------|---------|-------|----------|----------|------------------------------|--|
| USER  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| trial10_admin_0   |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| PROGRESS  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 100%  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| STATUS  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| FINISHED  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| OPEN DURATION   |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 1.6s  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| SUBMITTED   |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| August 18, 2021 12:35 A...  |                         |       |           |           |         |         |           |           |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| <table border="1"><thead><tr><th>Operator</th><th>#Hosts</th><th>#Inst</th><th>Avg Time</th><th>Max Time</th><th>#Rows</th><th>Est.</th><th>#Rows</th><th>Peak Mem</th><th>Est. Peak Mem</th><th>Detail</th></tr></thead><tbody><tr><td>F03:ROOT</td><td>1</td><td>1</td><td>0.000ns</td><td>0.000ns</td><td></td><td></td><td></td><td>4.02 MB</td><td>4.00 MB</td><td></td></tr><tr><td>00:MERGING-EXCHANGE</td><td>1</td><td>1</td><td>0.000ns</td><td>0.000ns</td><td>50</td><td>50</td><td>234.00 KB</td><td>28.22 KB</td><td>UNPARTITIONED</td><td></td></tr><tr><td>F02:EXCHANGE SENDER</td><td>2</td><td>14</td><td>0.000ns</td><td>0.000ns</td><td></td><td></td><td></td><td>3.45 KB</td><td>0</td><td></td></tr><tr><td>04:TOP-N</td><td>2</td><td>14</td><td>0.000ns</td><td>0.000ns</td><td>318</td><td>50</td><td>12.00 KB</td><td>1.76 KB</td><td></td><td></td></tr><tr><td>07:AGGREGATE</td><td>2</td><td>14</td><td>3.999ms</td><td>8.000ms</td><td>318</td><td>4.37M</td><td>34.05 MB</td><td>128.00 MB</td><td>FINALIZE</td><td></td></tr><tr><td>06:EXCHANGE</td><td>2</td><td>14</td><td>0.000ns</td><td>0.000ns</td><td>1.69K</td><td>4.37M</td><td>56.00 KB</td><td>10.55 MB</td><td>HASH(origin,lat,lon)</td><td></td></tr><tr><td>F00:EXCHANGE SENDER</td><td>2</td><td>14</td><td>0.000ns</td><td>0.000ns</td><td></td><td></td><td></td><td>104.34 KB</td><td>0</td><td></td></tr><tr><td>03:AGGREGATE</td><td>2</td><td>14</td><td>1.714ms</td><td>8.000ms</td><td>1.69K</td><td>4.37M</td><td>42.01 MB</td><td>128.00 MB</td><td>STREAMING</td><td></td></tr><tr><td>02:HASH JOIN</td><td>2</td><td>14</td><td>857.148us</td><td>7.999ms</td><td>267.00K</td><td>4.37M</td><td>7.99 MB</td><td>0</td><td>INNER JOIN, BROADCAST</td><td></td></tr><tr><td> --F04:JOIN BUILD</td><td>2</td><td>2</td><td>3.999ms</td><td>4.000ms</td><td></td><td></td><td></td><td>23.27 MB</td><td>23.25 MB</td><td></td></tr><tr><td>  05:EXCHANGE</td><td>2</td><td>2</td><td>0.000ns</td><td>0.000ns</td><td>3.38K</td><td>10.96K</td><td>248.00 KB</td><td>331.71 KB</td><td>BROADCAST</td><td></td></tr><tr><td>  F01:EXCHANGE SENDER</td><td>1</td><td>1</td><td>0.000ns</td><td>0.000ns</td><td></td><td></td><td></td><td>8.81 KB</td><td>0</td><td></td></tr><tr><td>  01:SCAN S3</td><td>1</td><td>1</td><td>3.999ms</td><td>3.999ms</td><td>3.38K</td><td>10.96K</td><td>427.30 KB</td><td>16.00 MB</td><td>airlines_new_parquet.airports</td><td></td></tr><tr><td>00:SCAN S3</td><td>2</td><td>14</td><td>61.714ms</td><td>180.000ms</td><td>267.00K</td><td>4.37M</td><td>16.21 MB</td><td>88.00 MB</td><td>airlines_new_parquet.flights</td><td></td></tr></tbody></table> |                         |       |           |           |         |         |           |           |                               | Operator | #Hosts | #Inst | Avg Time | Max Time | #Rows | Est. | #Rows | Peak Mem | Est. Peak Mem | Detail | F03:ROOT | 1 | 1 | 0.000ns | 0.000ns |  |  |  | 4.02 MB | 4.00 MB |  | 00:MERGING-EXCHANGE | 1 | 1 | 0.000ns | 0.000ns | 50 | 50 | 234.00 KB | 28.22 KB | UNPARTITIONED |  | F02:EXCHANGE SENDER | 2 | 14 | 0.000ns | 0.000ns |  |  |  | 3.45 KB | 0 |  | 04:TOP-N | 2 | 14 | 0.000ns | 0.000ns | 318 | 50 | 12.00 KB | 1.76 KB |  |  | 07:AGGREGATE | 2 | 14 | 3.999ms | 8.000ms | 318 | 4.37M | 34.05 MB | 128.00 MB | FINALIZE |  | 06:EXCHANGE | 2 | 14 | 0.000ns | 0.000ns | 1.69K | 4.37M | 56.00 KB | 10.55 MB | HASH(origin,lat,lon) |  | F00:EXCHANGE SENDER | 2 | 14 | 0.000ns | 0.000ns |  |  |  | 104.34 KB | 0 |  | 03:AGGREGATE | 2 | 14 | 1.714ms | 8.000ms | 1.69K | 4.37M | 42.01 MB | 128.00 MB | STREAMING |  | 02:HASH JOIN | 2 | 14 | 857.148us | 7.999ms | 267.00K | 4.37M | 7.99 MB | 0 | INNER JOIN, BROADCAST |  | --F04:JOIN BUILD | 2 | 2 | 3.999ms | 4.000ms |  |  |  | 23.27 MB | 23.25 MB |  | 05:EXCHANGE | 2 | 2 | 0.000ns | 0.000ns | 3.38K | 10.96K | 248.00 KB | 331.71 KB | BROADCAST |  | F01:EXCHANGE SENDER | 1 | 1 | 0.000ns | 0.000ns |  |  |  | 8.81 KB | 0 |  | 01:SCAN S3 | 1 | 1 | 3.999ms | 3.999ms | 3.38K | 10.96K | 427.30 KB | 16.00 MB | airlines_new_parquet.airports |  | 00:SCAN S3 | 2 | 14 | 61.714ms | 180.000ms | 267.00K | 4.37M | 16.21 MB | 88.00 MB | airlines_new_parquet.flights |  |
| Operator  | #Hosts                  | #Inst | Avg Time  | Max Time  | #Rows   | Est.    | #Rows     | Peak Mem  | Est. Peak Mem                 | Detail   |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| F03:ROOT  | 1                       | 1     | 0.000ns   | 0.000ns   |         |         |           | 4.02 MB   | 4.00 MB                       |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 00:MERGING-EXCHANGE   | 1                       | 1     | 0.000ns   | 0.000ns   | 50      | 50      | 234.00 KB | 28.22 KB  | UNPARTITIONED                 |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| F02:EXCHANGE SENDER   | 2                       | 14    | 0.000ns   | 0.000ns   |         |         |           | 3.45 KB   | 0                             |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 04:TOP-N  | 2                       | 14    | 0.000ns   | 0.000ns   | 318     | 50      | 12.00 KB  | 1.76 KB   |                               |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 07:AGGREGATE  | 2                       | 14    | 3.999ms   | 8.000ms   | 318     | 4.37M   | 34.05 MB  | 128.00 MB | FINALIZE                      |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 06:EXCHANGE   | 2                       | 14    | 0.000ns   | 0.000ns   | 1.69K   | 4.37M   | 56.00 KB  | 10.55 MB  | HASH(origin,lat,lon)          |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| F00:EXCHANGE SENDER   | 2                       | 14    | 0.000ns   | 0.000ns   |         |         |           | 104.34 KB | 0                             |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 03:AGGREGATE  | 2                       | 14    | 1.714ms   | 8.000ms   | 1.69K   | 4.37M   | 42.01 MB  | 128.00 MB | STREAMING                     |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 02:HASH JOIN  | 2                       | 14    | 857.148us | 7.999ms   | 267.00K | 4.37M   | 7.99 MB   | 0         | INNER JOIN, BROADCAST         |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| --F04:JOIN BUILD  | 2                       | 2     | 3.999ms   | 4.000ms   |         |         |           | 23.27 MB  | 23.25 MB                      |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 05:EXCHANGE   | 2                       | 2     | 0.000ns   | 0.000ns   | 3.38K   | 10.96K  | 248.00 KB | 331.71 KB | BROADCAST                     |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| F01:EXCHANGE SENDER   | 1                       | 1     | 0.000ns   | 0.000ns   |         |         |           | 8.81 KB   | 0                             |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 01:SCAN S3  | 1                       | 1     | 3.999ms   | 3.999ms   | 3.38K   | 10.96K  | 427.30 KB | 16.00 MB  | airlines_new_parquet.airports |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |
| 00:SCAN S3  | 2                       | 14    | 61.714ms  | 180.000ms | 267.00K | 4.37M   | 16.21 MB  | 88.00 MB  | airlines_new_parquet.flights  |          |        |       |          |          |       |      |       |          |               |        |          |   |   |         |         |  |  |  |         |         |  |                     |   |   |         |         |    |    |           |          |               |  |                     |   |    |         |         |  |  |  |         |   |  |          |   |    |         |         |     |    |          |         |  |  |              |   |    |         |         |     |       |          |           |          |  |             |   |    |         |         |       |       |          |          |                      |  |                     |   |    |         |         |  |  |  |           |   |  |              |   |    |         |         |       |       |          |           |           |  |              |   |    |           |         |         |       |         |   |                       |  |                  |   |   |         |         |  |  |  |          |          |  |             |   |   |         |         |       |        |           |           |           |  |                     |   |   |         |         |  |  |  |         |   |  |            |   |   |         |         |       |        |           |          |                               |  |            |   |    |          |           |         |       |          |          |                              |  |

27) Time to save our work. Give your Impala session a name. Use something unique as this is a multi-user environment.



Then click "Save" and then "Save" in the popup





Your saved queries will show up under the "Saved Queries" heading.

A screenshot of the Data Visualization Lab interface. At the top, there's a code editor window showing a query. Below it is a results table with two rows of data. At the bottom, there's a navigation bar with tabs: 'Query History', 'Saved Queries' (which is highlighted with a red rectangle), and 'Results (50)'. A table below the tabs shows the saved query details.

| Name                  | Description | Owner           | Last Modified             |
|-----------------------|-------------|-----------------|---------------------------|
| martyImpalaQueries123 |             | trial10_admin_0 | 08/17/2021 1:55 PM -04:00 |

**SKIP TO THE DATA VISUALIZATION LAB. DAS INSTRUCTIONS BELOW. DAS IS DEPRECATED SO I URGE YOU TO JUMP TO THE DATA VISUALIZATION... so I don't really have strong feelings about this...**

9) Once your Virtual Warehouse is "Running", click the line in the top right and then click "Open DAS"

Virtual Warehouses | 3

|              | testvirtualwarehouse1                                | mschoeni-iso-1  |
|--------------|--|---|
| Running      | compute-1611179792-vz40<br>cdptrialuser24-dl-default | Stopped<br>compute-1611173596-db7v<br>cdptrialuser24-dl-default |
| NODE COUNT   | 2  | 38  |
| TOTAL CORES  | 38   | 292 GB  |
| TOTAL MEMORY | 292 GB   |   |
| TYPE         | HIVE   | DATA  |

Suspend  
Clone  
Edit  
Delete  
Upgrade  
Copy JDBC URL  
Download JDBC Jar  
**Open DAS**  
Open Data Visualization

- 10) Enter the login information from step #1 above using the user, then click “LOGIN”  
 \*Changing “trialxx\_admin” to the trial user you’re using and password defined by “X” in #1 above

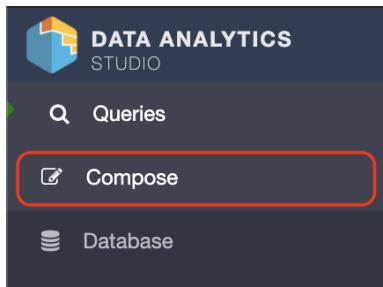
DATA ANALYTICS STUDIO

Username  
trialxx\_admin

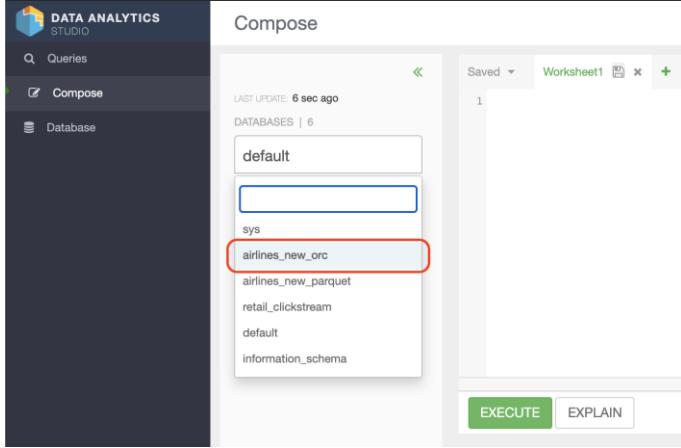
Password

**LOGIN**

- 11) Click on “Compose”, to write the queries below to answer questions on the table “flights”



- 12) Choose the database “airlines\_new\_orc” that we found in Part 1 “Data Catalog”



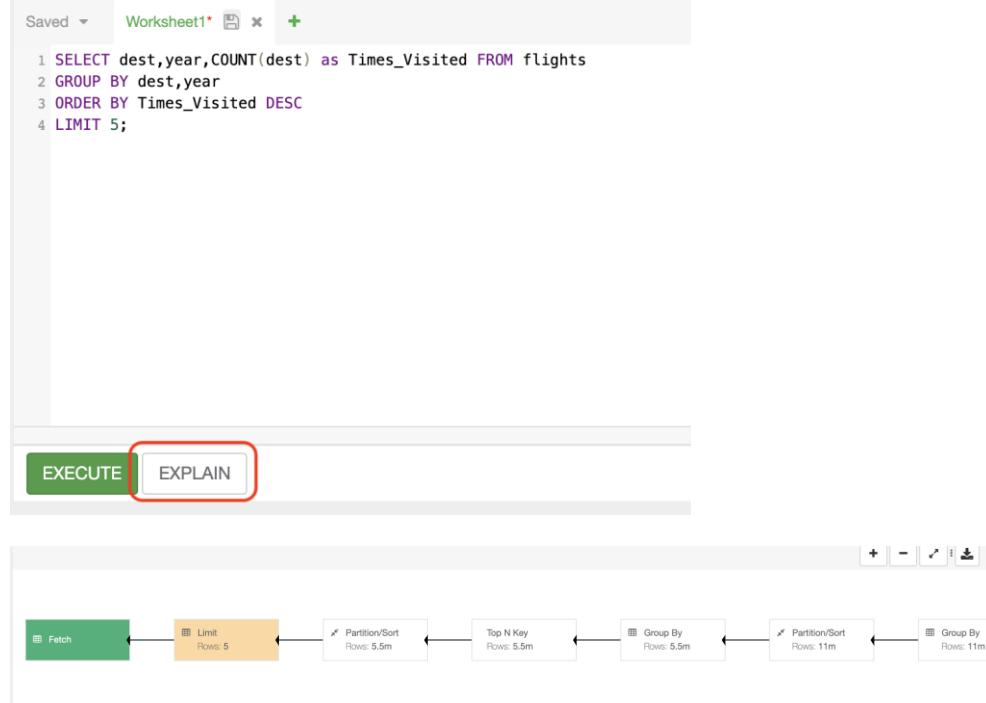
- 13) Enter the following query in Worksheet1, answering the question "show me the top 5 visited destination by year from (1995-2008)"

```
SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
GROUP BY dest,year
ORDER BY Times_Visited DESC
LIMIT 5;
```

```
Saved ▾ Worksheet1* + ×
1 SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
2 GROUP BY dest,year
3 ORDER BY Times_Visited DESC
4 LIMIT 5;

EXECUTE EXPLAIN
```

- 14) Click "EXPLAIN" to see the visual explain plan prior to running the query  
 \*Not required to execute the query - this gives us a plan on exactly what the query is doing



The screenshot shows a database interface with a query editor and a visual explain plan viewer.

**Query Editor:**

- Saved: Worksheet1\*
- Query code:

```

1 SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
2 GROUP BY dest,year
3 ORDER BY Times_Visited DESC
4 LIMIT 5;

```

**Control Buttons:**

- EXECUTE
- EXPLAIN (button is highlighted with a red box)

**Visual Explain Plan:**

```

graph LR
    Fetch[Fetch] --> Limit[Limit  
Rows: 5]
    Limit --> PS1[Partition/Sort  
Rows: 5.5m]
    PS1 --> TNK[Top N Key  
Rows: 5.5m]
    TNK --> GB1[Group By  
Rows: 5.5m]
    GB1 --> PS2[Partition/Sort  
Rows: 11m]
    PS2 --> GB2[Group By  
Rows: 11m]
  
```

The visual explain plan consists of seven nodes connected by arrows. The nodes are: Fetch, Limit (orange box), Partition/Sort (Rows: 5.5m), Top N Key (Rows: 5.5m), Group By (Rows: 5.5m), Partition/Sort (Rows: 11m), and Group By (Rows: 11m). The "Limit" node is highlighted with an orange box, and the "EXPLAIN" button is highlighted with a red box.

- 15) Click “EXECUTE” to execute the query, answering the question “show me the top 5 visited destination by year from (1995-2008)”

The screenshot shows a database worksheet titled "Worksheet1". At the top, there are buttons for "Saved", "Worksheet1\*", "File", "X", and a "+" button. Below the title, the query is displayed:

```
1 SELECT dest,year,COUNT(dest) as Times_Visited FROM flights  
2 GROUP BY dest,year  
3 ORDER BY Times_Visited DESC  
4 LIMIT 5;
```

At the bottom of the worksheet, there are two buttons: "EXECUTE" (which is highlighted with a red border) and "EXPLAIN".

- 16) Click the download button on the top right, to download the results as a CSV file

The screenshot shows a results table titled "Results". The table has three columns: DEST, YEAR, and TIMES\_VISITED. The data is as follows:

| DEST | YEAR | TIMES_VISITED |
|------|------|---------------|
| ATL  | 2005 | 428900        |
| ATL  | 2004 | 416989        |
| ATL  | 2008 | 416821        |
| ATL  | 2007 | 413805        |
| ATL  | 2006 | 404809        |

- 17) Going back to “Worksheet 1”, click the “+” to add another Worksheet for the next query

Saved ▾ Worksheet1\* +

```
1 SELECT dest,year,COUNT(dest) as Times_Visited FROM flights
2 GROUP BY dest,year
3 ORDER BY Times_Visited DESC
4 LIMIT 5;
5
```

EXECUTE EXPLAIN

18) In “Worksheet 2”, Choose the database “airlines\_new\_orc” then copy-and-paste the following query, answering the question “What are the top 10 routes (origin and dest) that have seen maximum diversions?”

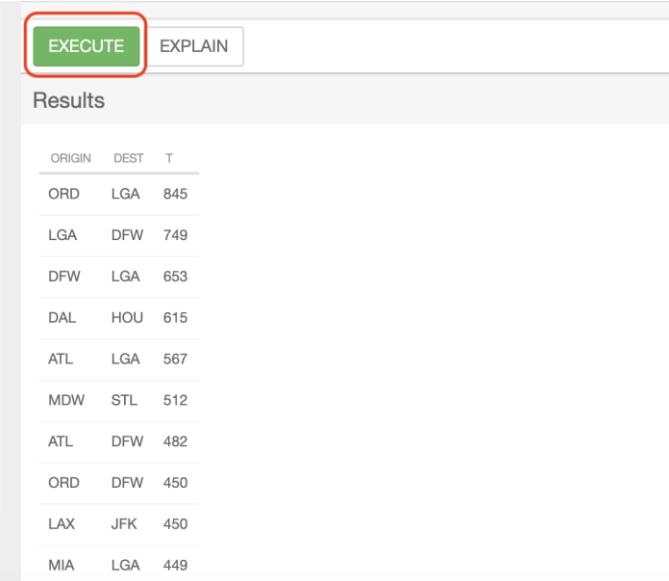
```
SELECT origin,dest,COUNT(Diverted) as t FROM flights
WHERE Diverted = 1
GROUP BY origin,dest
ORDER BY t DESC
LIMIT 10;
```

Saved ▾ Worksheet1\* Worksheet2\* +

```
1 SELECT origin,dest,COUNT(Diverted) as t FROM flights
2 WHERE Diverted = 1
3 GROUP BY origin,dest
4 ORDER BY t DESC
5 LIMIT 10;|
```

EXECUTE EXPLAIN

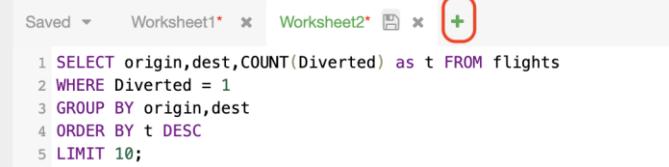
- 19) Click “EXECUTE” to execute the query, answering the question “What are the top 10 routes (origin and dest) that have seen maximum diversions?”



The screenshot shows a user interface for executing SQL queries. At the top, there are two buttons: "EXECUTE" (highlighted with a red box) and "EXPLAIN". Below them is a section labeled "Results" containing a table with three columns: ORIGIN, DEST, and T. The table lists 10 flight routes with their diversion counts.

| ORIGIN | DEST | T   |
|--------|------|-----|
| ORD    | LGA  | 845 |
| LGA    | DFW  | 749 |
| DFW    | LGA  | 653 |
| DAL    | HOU  | 615 |
| ATL    | LGA  | 567 |
| MDW    | STL  | 512 |
| ATL    | DFW  | 482 |
| ORD    | DFW  | 450 |
| LAX    | JFK  | 450 |
| MIA    | LGA  | 449 |

- 20) Going back to “Worksheet 2”, click the “+” to add another Worksheet for the final query



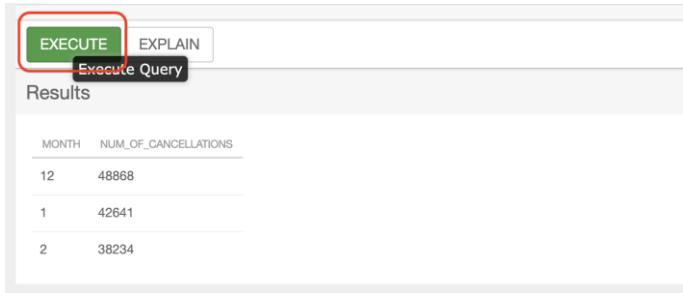
The screenshot shows a browser window with a tab bar at the top. The second tab from the left is labeled "Worksheet2\*" and has a red circle with a plus sign (+) to its right, indicating it can be selected to add a new worksheet. Below the tabs, there is a code editor containing a SQL query.

```
1 SELECT origin,dest,COUNT(Diverted) as t FROM flights
2 WHERE Diverted = 1
3 GROUP BY origin,dest
4 ORDER BY t DESC
5 LIMIT 10;
```

21) In "Worksheet 3", Choose the database "airlines\_new\_orc" then copy-and-paste the following query, answering the question "Which three months have seen the most number of cancellation due to bad weather?"

```
SELECT month,COUNT(Cancelled) as num_of_cancellations FROM flights
WHERE Cancelled = 1 AND CancellationCode = 'B'
GROUP BY month
ORDER BY num_of_cancellations DESC
LIMIT 3;
```

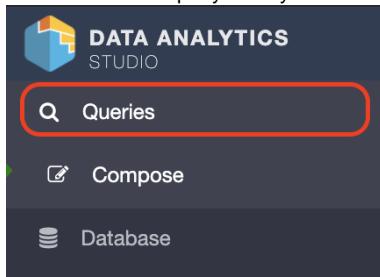
22) Click "EXECUTE" to execute the query, answering the question "Which three months have seen the most number of cancellation due to bad weather?"



| MONTH | NUM_OF_CANCELLATIONS |
|-------|----------------------|
| 12    | 48868                |
| 1     | 42641                |
| 2     | 38234                |

22) Click "EXECUTE" a second time - this will lead us to our last portion of Part 2

23) Click on "Queries" on the top left navigation bar  
\*We'll look at our query history



24) Click the "Compare" on the right of your last query run (query at the top)

| QUERIES (159)                              |         |       |               |                            |                |                |          |                 |         | COMPOSE QUERY |
|--|---------|-------|---------------|----------------------------|----------------|----------------|----------|-----------------|---------|---------------|
| QUERY                                      | STATUS  | QUEUE | USER          | TABLES READ                | TABLES WRITTEN | START TIME     | DURATION | DAG ID          | ACTIONS |               |
| ✓ SELECT month,COUNT(cancelled) as n...    | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 8 seconds ago  | 00:00:00 | Not Available   |         |               |
| ✓ SELECT month,COUNT(cancelled) as n...    | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 4 minutes ago  | 00:00:02 | dag_16112364... |         |               |
| ✓ SELECT origin,dest,COUNT(diverted) as... | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 8 minutes ago  | 00:00:03 | dag_16112364... |         |               |
| ✓ SELECT dest,year,COUNT(dest) as Time...  | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 20 minutes ago | 00:00:00 | Not Available   |         |               |
| ✓ SELECT dest,year,COUNT(dest) as Time...  | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 21 minutes ago | 00:00:00 | Not Available   |         |               |

25) Click the “Compare” on the right of the query (second to the top)

| QUERIES (159)                              |         |       |               |                            |                |                |          |                 |         | COMPOSE QUERY |
|--|---------|-------|---------------|----------------------------|----------------|----------------|----------|-----------------|---------|---------------|
| QUERY                                      | STATUS  | QUEUE | USER          | TABLES READ                | TABLES WRITTEN | START TIME     | DURATION | DAG ID          | ACTIONS |               |
| ✓ SELECT month,COUNT(cancelled) as n...    | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 4 minutes ago  | 00:00:00 | Not Available   |         |               |
| ✓ SELECT month,COUNT(cancelled) as n...    | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 8 minutes ago  | 00:00:02 | dag_16112364... |         |               |
| ✓ SELECT origin,dest,COUNT(diverted) as... | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 13 minutes ago | 00:00:03 | dag_16112364... |         |               |
| ✓ SELECT dest,year,COUNT(dest) as Time...  | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 24 minutes ago | 00:00:00 | Not Available   |         |               |
| ✓ SELECT dest,year,COUNT(dest) as Time...  | SUCCESS | None  | trial24_admin | flights (airlines_new_o... | Not Available  | 25 minutes ago | 00:00:00 | Not Available   |         |               |

26) Click on the “COMPARE” button to compare the two queries



27) Notice the run duration is different between the two, let's find out why

| Query Details - A  |               |         |                      |                      | Query Details - B  |               |         |                      |                      |
|--|---------------|---------|----------------------|----------------------|--|---------------|---------|----------------------|----------------------|
| QUERY ID   | USER          | STATUS  | START TIME           | END TIME             | QUERY ID   | USER          | STATUS  | START TIME           | END TIME             |
| hive_20210121153926_e3a56b9d-71f2-45dc-b23e-2c2e1146d61e | trial24_admin | SUCCESS | 21 Jan 2021 09:39:26 | 21 Jan 2021 09:39:26 | hive_20210121153513_37aefec1-0284-4897-bfbb-bf9bb5797252 | trial24_admin | SUCCESS | 21 Jan 2021 09:35:13 | 21 Jan 2021 09:35:15 |
| USER   | trial24_admin |         |                      |                      | USER   | trial24_admin |         |                      |                      |
| STATUS   | SUCCESS       |         |                      |                      | STATUS   | SUCCESS       |         |                      |                      |
| START TIME   |               |         |                      |                      | START TIME   |               |         |                      |                      |
| 21 Jan 2021 09:39:26                                     |               |         |                      |                      | 21 Jan 2021 09:35:13                                     |               |         |                      |                      |
| END TIME   |               |         |                      |                      | END TIME   |               |         |                      |                      |
| 21 Jan 2021 09:39:26                                     |               |         |                      |                      | 21 Jan 2021 09:35:15                                     |               |         |                      |                      |
| DURATION   | 118ms         |         |                      |                      | DURATION   | 2s 311ms      |         |                      |                      |

28) Click on “timeline” at the top



As shown, the faster query only did “compile and parse”, while the slower query did “compile, parse, build dag, submit dag, submit to running, run dag”. Why? Because if you run the same exact query twice, the results are cached (if the data didn't change). CDW knows if the data changed.



## WELCOME TO THE DATA VISUALIZATION LAB

### Part 3 - Data Visualization [25 minutes]

**Overview:** What is Data Visualization and how do we use it with our data?

**Purpose:** Create visualization using the flight information answering the question (visually with a density graph):

- What were the most number of flights from destination to origin between (1995-2008) - Route Density

- 1) Open CDP, using the “admin” user within the Test Drive link.

Your link should look something like (remember click the link in your email not the link below)

[http://login.trycdp.com/auth/realm/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx\\_admin@trycdp.com&p=X](http://login.trycdp.com/auth/realm/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx_admin@trycdp.com&p=X)

\*xx represents the trial user #

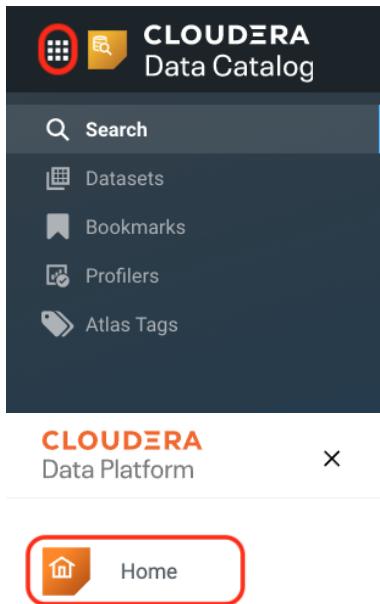
\*X represents the password

2) Click the “Data Warehouse” within the CDP Home Screen



How do you get to the CDP Home Screen?

- From any experience such as “Data Catalog”, click the 9 square at the top left and then click “Home”



NOTES FOR NEW LAB: You will autologin, and when you get to create new dataset use the impalacdw and corresponding setting shown here:

The screenshot shows the Cloudera Data Visualization interface. On the left, there's a sidebar with 'All Connections' (Default Hive VW, impalacdw, samples). The main area has tabs for HOME, VISUALS, and DATA. A search bar at the top right says 'find titles, viz types, datasets, authors'. A 'NEW DATASET' button is highlighted with a red box. The central part of the screen is titled 'New Dataset' and contains the following fields:

- Dataset title \*: 'impalaflights'
- Dataset Source: 'From Table'
- Select Database: 'airlines\_new\_parquet'
- Select Table: 'flights'

At the bottom right are 'CANCEL' and 'CREATE' buttons.

3) Click "Open Data Visualization" on your existing "Running" Virtual Warehouse

Virtual Warehouses

|            | testvirtualwarehouse1                                | mschoeni-iso-1  |
|------------|--|---|
| Running    | compute-1611179792-vz49<br>cdptrialuser24-dl-default | Stopped<br>compute-1611173596-dbtv<br>cdptrialuser24-dl-default |
| NODE COUNT | 2  | TOTAL CORES   |
|            | 38   | TOTAL MEMORY  |
|            | 292 GB   | TYPE  |
|            |  | HIVE DA   |
| NODE COUNT | TOTAL CORES  | TOTAL MEMORY  |

⋮ ⚡ 🔍 +

Suspend  
Clone  
Edit  
Delete  
Upgrade  
Copy JDBC URL  
Download JDBC Jar  
Open DAS  
Open Data Visualization

- 4) Enter the login information from step #1 above using the user, then click “LOGIN”  
 \*Changing “trialxx\_admin” to the trail user you’re using and password defined by “X” in #1 above

CLOUDERA  
Data Visualization

LOGIN

Username

Password

Invalid login

[Forgot your password?](#)

Remember me on this computer

**LOGIN**

- 5) Click “DATA” the top navigation bar

The screenshot shows the Cloudera Data Visualization interface. At the top, there is a navigation bar with links for HOME, VISUALS, and DATA. The DATA link is highlighted with a red circle. Below the navigation bar is a search bar with placeholder text "find titles, viz types, datasets, authors...". On the left side, there is a sidebar titled "All Connections" which lists "Default Hive VW" and "samples". In the main content area, there is a section titled "Datasets" with a count of 11. Below this, there is a table with columns "Title/Table", "Created", and "Last Modified".

6) Click “Default Hive VW” to add our dataset

This screenshot shows the same interface as the previous one, but the "Default Hive VW" connection in the sidebar is highlighted with a red circle. The main content area remains the same, showing the "Datasets" section and the table below it.

7) Click “NEW DATASET” to add our “flights” data

This screenshot shows the interface again, but the "NEW DATASET" button in the top right of the main content area is highlighted with a red circle. The sidebar and the rest of the interface remain consistent with the previous screenshots.

8) Enter a name for the Dataset title naming “airline\_new\_orc.flights”

\*Can be any name you choose

New Dataset

Create a dataset from data on this connection. You need to create a dataset before you can create dashboards or apps.

Dataset title \*

airlines\_new\_orc.flights

Dataset Source

From Table

Select Database

airlines\_new\_orc

Select Table

flights

CANCEL CREATE

9) Choose the database “airlines\_new\_orc”

New Dataset

Create a dataset from data on this connection. You need to create a dataset before you can create dashboards or apps.

Dataset title \*

airlines\_new\_orc.flights

Dataset Source

From Table

Select Database

airlines\_new\_orc

Select Table

flights

CANCEL CREATE

10) Choose the table “flights”

\*Need to import multiple databases and tables? You'd use Dataset Source = SQL

New Dataset

Create a dataset from data on this connection. You need to create a dataset before you can create dashboards or apps.

Dataset title \*

Dataset Source

From Table

Select Database

Select Table

flights

CANCEL CREATE

11) Click "CREATE"

New Dataset

Create a dataset from data on this connection. You need to create a dataset before you can create dashboards or apps.

Dataset title \*

Dataset Source

From Table

Select Database

Select Table

flights

CANCEL CREATE

12) Click "+" to create a New Dashboard

The screenshot shows the Power BI dataset overview page. At the top, there are buttons for 'NEW DATASET', 'ADD DATA', and a dropdown menu. Below this, there are sections for 'Datasets' and 'Connection Explorer'. A new dashboard titled 'airlines\_new\_orc.flights' is listed under 'Datasets', with a red circle highlighting the 'New Dashboard' button next to its name.

13) Choose “Treemap” under “VISUALS”

The screenshot shows the 'Dashboard Designer' interface. On the left, the 'VISUALS' pane is open, displaying various visualization icons. One icon, labeled 'Treemap', is highlighted with a red circle. The main workspace shows a 'DATA' view with a connection to 'airlines\_new\_orc.flights'. The 'Dimensions' section lists fields like 'flights', 'uniquecarrier', 'tailnum', 'origin', 'dest', 'cancellationcode', and 'diverted'. The 'Measures' section lists fields starting with '#'. The right side of the screen shows a sidebar with navigation links: 'DASH.', 'Visuals' (selected), 'Filters', 'Settings', 'Style', 'VISUAL', 'Build' (selected), 'Settings', and 'Style'.

14) Drag-and-drop both “dest” and origin” from Dimensions->Flights into Dimensions under Visuals

**Dashboard Designer**

**VISUALS**

Table

Dimensions

dest  
origin

Measures

drag fields to add here

Tooltips

drag fields to add here

Filters

drag fields to add here

Limit: 100

REFRESH VISUAL

**DATA**

airlines\_new\_orc.flights

Sample Mode: OFF

Search

Dimensions (6)

flights

A uniquecarrier  
A tailnum  
A origin  
A dest  
A cancellationcode  
A diverted

Measures (24)

flights

# Record Count  
# month  
# dayofmonth  
# dayofweek  
# deptime  
# crsdeptime  
# arrtime  
# crsarstime  
# flightnum

DASH.

Visuals

Filters

Settings

Style

BUILD

Visuals

Filters

Settings

Style

Favorites

AirDrop  
Recents  
Applications  
Desktop  
Documents  
Downloads

Locations

Network

Tags

Red  
Orange  
Yellow  
Green  
Blue

15) Drag-and-drop "Record Count" from Measures->Flights into Measures under Visuals

**Dashboard Designer**

**VISUALS**

Table

**DATA**

airlines\_new.orc.flights

Sample Mode: OFF

Search

**Dimensions** 6

- flights
- A uniquecarrier
- A tailnum
- A origin
- A dest
- A cancellationcode
- A diverted

**Measures** 24

- sum(1)
- # Record Count
- # month
- # dayofmonth
- # dayofweek
- # deptime
- # crsdeptime
- # arrtime
- # crsarrtime
- # flightnum
- # actualelapsedtime
- # crselapsedtime
- # airtime
- # arrdelay

Dest

Origin

Record Count

Measure

Tooltip

drag fields to add here

Filters

drag fields to add here

Limit: 100

REFRESH VISUAL

16) Click the right arrow next to Record Count and select "Descending" under Order and Top K

**Dashboard Designer**

**VISUALS**

- Treemap
- 1234
- Word
- Scatter
- Line
- Bar
- Stacked Bar
- Map
- Heatmap
- SQL

\* Dimensions

- dest
- origin

\* Measure

- # Record Count

Tooltips

X Trellis

Y Trellis

Filters

**FIELD PROPERTIES**

- Date/Time Functions
- Text Functions
- Analytic Functions
- Change Type
- Order and Top K

✓ Descending

Ascending

Top K: eg. 100

Bottom K: eg. 100

Top K/Bottom K applies to granular dimensions

[] Enter/Edit Expression

Display Format

Alias

Description

Duplicate

Save Expression

Remove

**DASH.**

- Visuals
- Filters
- Settings
- Style

**BUILD**

- Build
- Settings
- Style

**REFRESH VISUAL**

17) Click "REFRESH VISUAL"

\*Notice - you can have other Visuals chosen to be displayed with the Dimensions and Measure(s), then click REFRESH VISUALS

**Dashboard Designer**

**VISUALS**

- Treemap
- 1234
- WORD CLOUD
- PIVOT
- MAP
- ACTION
- SQL

**Dimensions**

- dest
- origin

**Measure**

- # Record Count

**Tooltips**

drag fields to add here

**X Trellis**

drag fields to add here

**Y Trellis**

drag fields to add here

**Filters**

drag fields to add here

**REFRESH VISUAL**

**DATA**

airlines\_new\_orc.flights

Sample Mode: OFF

Search

**Dimensions** 6

- flights
- uniquecarrier
- tailnum
- origin
- dest
- cancellationcode
- diverted

**Measures** 24

- flights
- # Record Count
- # month
- # dayofmonth
- # dayofweek
- # deptime
- # crsdeptime
- # arrtime
- # crsarrrtime
- # flightnum
- # actualelapsedtime
- # crselapsedtime
- # airtime
- # arrdelay

**DASH.**

Visuals

Filters

Settings

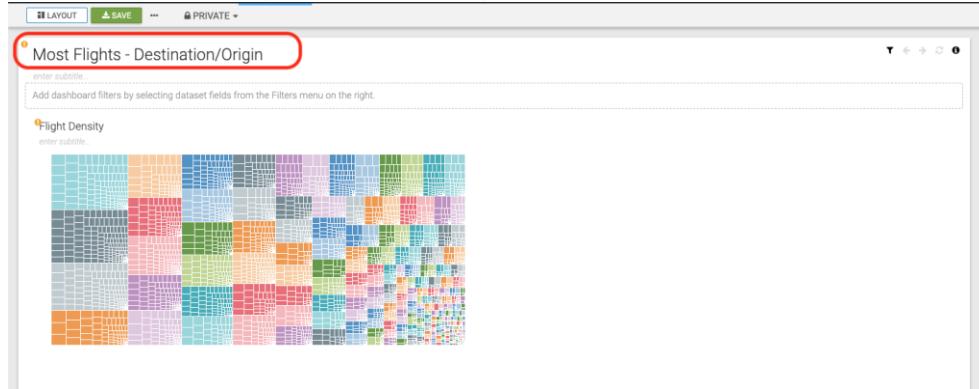
Style

**BUILD**

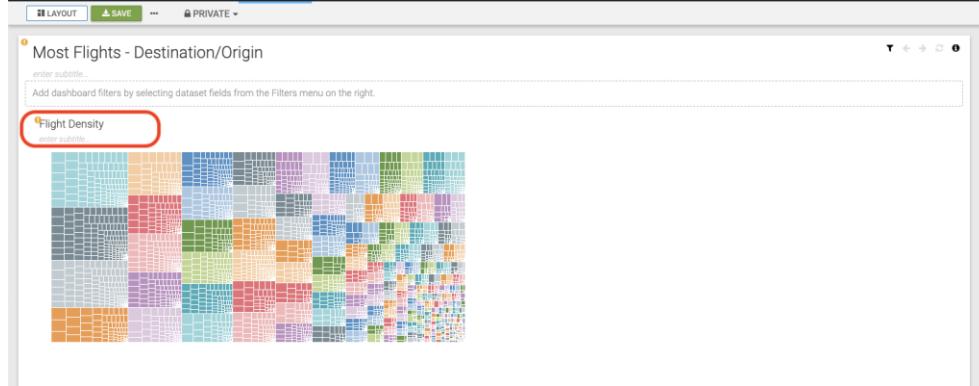
Settings

Style

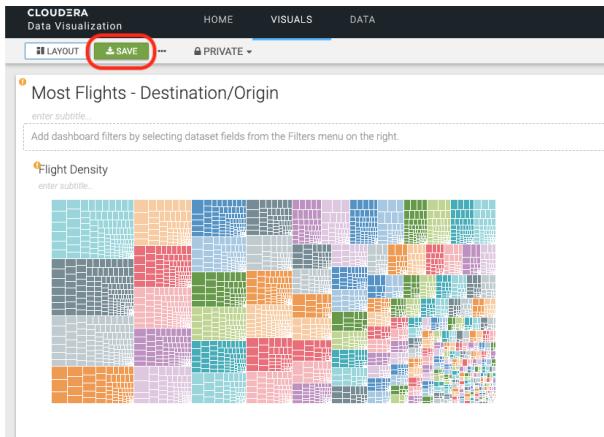
18) Enter a title “Most Flights - Destination/Origin”



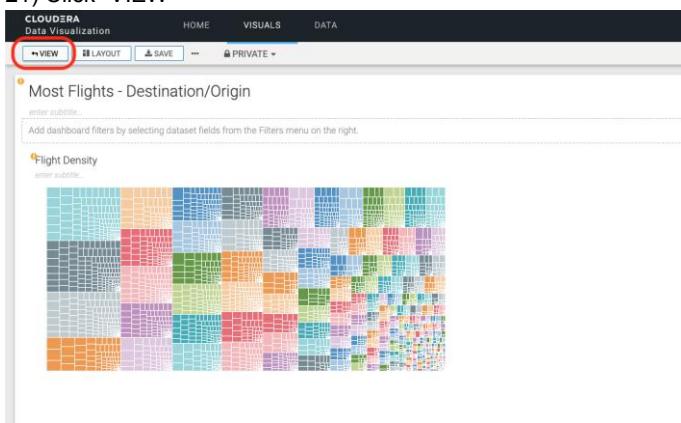
19) Enter “Flight Density” under the graph’s title



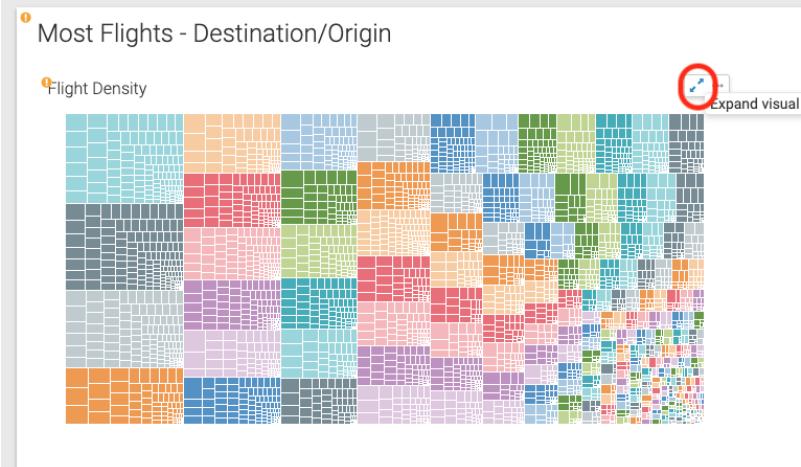
20) Click “SAVE”



21) Click "VIEW"



22) Scroll over the graph and click "Expand Visual"



Destinations are displayed



**OPTIONAL DATA IMPORT LAB USING DAS. YOU WILL DO THIS DATA IMPORT IN SPARK TOMORROW USING THE CLOUDERA MACHINE LEARNING.**

## **Part 4 - Import a File into a Table [15 minutes]**

Overview: How do we import data (csv file), creating a table?

- 1) Open CDP, using the “admin” user within the Test Drive link.

Your link should look something like (remember click the link in your email not the link below)

[http://login.trycdp.com/auth/realms/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx\\_admin@trycdp.com&p=X](http://login.trycdp.com/auth/realms/trycdp-trialxx/protocol/saml/clients/samlclient?tn=trialxx_admin@trycdp.com&p=X)

\*xx represents the trial user #

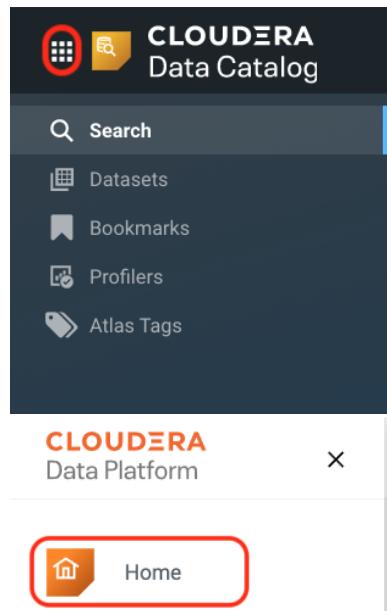
\*X represents the password

- 2) Click the “Data Warehouse” within the CDP Home Screen



How do you get to the CDP Home Screen?

- From any experience such as "Data Catalog", click the 9 square at the top left and then click "Home"



3) Click "Open DAS" on your existing "Running" Virtual Warehouse

\*The same steps you did in Part 2 to Open DAS

The screenshot shows the 'Virtual Warehouses' section of a user interface. There are three entries listed:

- testvirtualwarehouse1**: Running, compute-1611179792-vz49, cdptrialuser24-dl-default. It has 2 nodes, 38 cores, and 292 GB memory.
- mschoeni-iso-1**: Stopped, compute-1611173596-db7v, cdptrialuser24-dl-default. It has 0 nodes, 12 cores, and 56 GB memory.
- default-vw**: Stopped, compute-1611103491-4hbp.

A context menu is open over the first entry, listing options: Suspend, Clone, Edit, Delete, Upgrade, Copy JDBC URL, Download JDBC Jar, **Open DAS** (which is highlighted with a red box), Open Data Visualization, Set Compactor, Run AutoScaling Demo, and Collect Diagnostic Bundle.

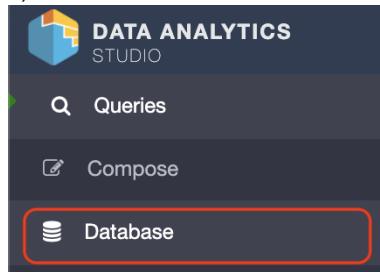
4) Enter the login information from step #1 above using the user, then click "LOGIN"

\*You'll likely already be authenticated from Part 2, you may not need to enter credentials

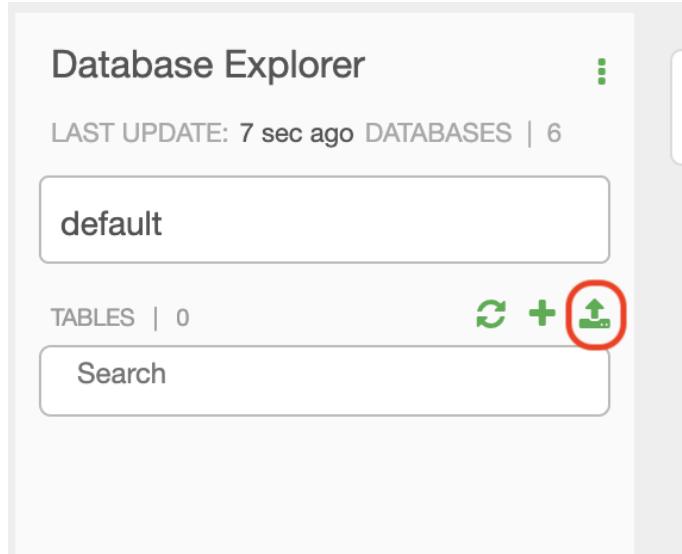
\*Changing "trialxx\_admin" to the trial user you're using and password defined by "X" in #1 above

The screenshot shows a login form for 'DATA ANALYTICS STUDIO'. It includes fields for 'Username' (containing 'trialxx\_admin') and 'Password' (empty). A large green 'LOGIN' button is at the bottom, which is circled in red.

5) Click on Database on the left navigation bar



6) Click on "Upload Table", using the "default" database

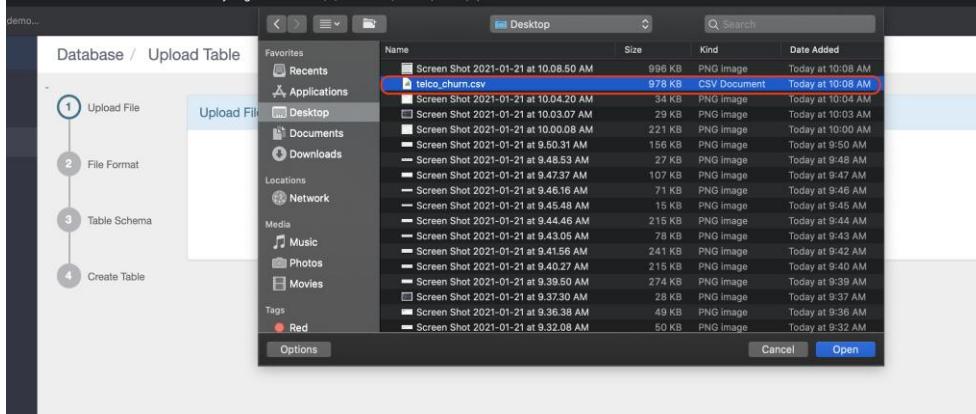


7) In a new browser window or tab, download the CSV file, saving to your desktop as "telco\_churn.csv"

[https://raw.githubusercontent.com/andy-hansen/cdp/master/cml/raw/WA\\_Fn-UseC\\_Telco-Customer-Churn-.csv](https://raw.githubusercontent.com/andy-hansen/cdp/master/cml/raw/WA_Fn-UseC_Telco-Customer-Churn-.csv)

| customerID | gender | SeniorCitizen | Partner | Dependents | tenure | PhoneService | MultipleLines | InternetService | OnlineSecurity | OnlineBackup     | onthlyCharges | TotalCharges     | Churn          |                  |  |  |
|------------|--------|---------------|---------|------------|--------|--------------|---------------|-----------------|----------------|------------------|---------------|------------------|----------------|------------------|--|--|
| 7590-VHVG  | Female | 0             | No      | No         | 10     | No           | phone service | DSL             | No             | Yes              | No            | No               | Month-to-month | Yes              | Electronic check,29.85,29.85,No            |  |
| 5575-GNVE  | Male   | 0             | No      | No         | 34     | Yes          | No            | DSL             | Yes            | No               | No            | No               | One year       | No               | Mailed check,56.95,1889.5,No               |  |
| 3668-QPYB  | Male   | 0             | No      | No         | 2      | Yes          | No            | DSL             | Yes            | No               | No            | No               | Month-to-month | Yes              | Mailed check,53.85,108.15,Yes              |  |
| 7795-CFOCW | Male   | 0             | No      | No         | 45     | No           | phone service | DSL             | Yes            | No               | Yes           | No               | One year       | No               | Bank transfer (automatic),42.3,1840.75,No  |  |
| 9237-HQITU | Female | 0             | No      | No         | 2      | Yes          | No            | Fiber optic     | No             | No               | No            | No               | Month-to-month | Yes              | Electronic check,70.7,151.65,Yes           |  |
| 9305-CDSKC | Female | 0             | No      | No         | 8      | Yes          | Yes           | Fiber optic     | No             | No               | No            | No               | Month-to-month | Yes              | Electronic check,99.65,820.5,Yes           |  |
| 1452-KIOWK | Male   | 0             | No      | Yes        | 22     | Yes          | Yes           | Fiber optic     | No             | Yes              | No            | Yes              | Month-to-month | Yes              | Credit card (automatic),89.1,1949.4,No     |  |
| 6713-OKOMC | Female | 0             | No      | 10         | No     | No           | phone service | DSL             | Yes            | No               | No            | No               | Month-to-month | No               | Mailed check,29.75,301.9,No                |  |
| 7892-POOKP | Female | 0             | Yes     | No         | 28     | Yes          | Yes           | Fiber optic     | No             | No               | Yes           | Yes              | Month-to-month | Yes              | Electronic check,104.8,3046.05,Yes         |  |
| 6388-TABGU | Male   | 0             | No      | Yes        | 62     | Yes          | No            | DSL             | Yes            | Yes              | No            | No               | One year       | No               | Bank transfer (automatic),56.15,3487.95,No |  |
| 9763-GRSKD | Male   | 0             | Yes     | No         | 13     | Yes          | No            | DSL             | Yes            | No               | No            | No               | Month-to-month | Yes              | Mailed check,49.95,587.45,No               |  |
| 7469-LXBCI | Male   | 0             | No      | No         | 16     | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,94.95,587.45,No         |
| 8091-TTVAX | Male   | 0             | Yes     | No         | 58     | Yes          | Yes           | Fiber optic     | No             | Yes              | No            | Yes              | One year       | No               | Credit card (automatic),100.35,5681.1,No   |  |
| 0280-XJGEX | Male   | 0             | No      | No         | 49     | Yes          | Yes           | Fiber optic     | No             | Yes              | Yes           | Yes              | Month-to-month | Yes              | Bank transfer (automatic),103.7,5036.3,    |  |
| 5129-JLPIS | Male   | 0             | No      | No         | 25     | Yes          | No            | Fiber optic     | Yes            | No               | Yes           | Yes              | Month-to-month | Yes              | Electronic check,105.5,2686.05,No          |  |
| 3655-SNQYZ | Female | 0             | Yes     | Yes        | 69     | Yes          | Yes           | Fiber optic     | No             | Yes              | Yes           | Yes              | Two year       | No               | Credit card (automatic),113.25,7895.15,No  |  |
| 8191-XWSZG | Female | 0             | No      | No         | 52     | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,81.91,7382.25,No        |
| 9959-WOFKT | Male   | 0             | No      | Yes        | 71     | Yes          | Yes           | Fiber optic     | No             | Yes              | Yes           | Yes              | Two year       | No               | Bank transfer (automatic),106.7,7382.25,No |  |
| 4190-MFLW  | Female | 0             | Yes     | Yes        | 10     | Yes          | No            | DSL             | No             | No               | Yes           | Yes              | Month-to-month | No               | Credit card (automatic),55.2,528.35,Yes    |  |
| 4183-MYFRB | Male   | 0             | No      | No         | 21     | Yes          | No            | Fiber optic     | No             | Yes              | Yes           | Yes              | Month-to-month | Yes              | Electronic check,90.05,1862.9,No           |  |
| 8779-QRDMV | Male   | 1             | No      | No         | 1      | Yes          | No            | phone service   | DSL            | Yes              | No            | No               | Yes            | Month-to-month   | Yes  | Electronic check,39.65,39.65,Yes         |
| 1680-VDCWW | Male   | 0             | Yes     | No         | 12     | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,1680.0,3505.1,No        |
| 1066-JKSGK | Male   | 0             | No      | No         | 1      | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,1066.0,3505.1,No        |
| 3638-WEABW | Female | 0             | No      | No         | 58     | Yes          | Yes           | DSL             | No             | Yes              | No            | No               | Two year       | Yes              | Credit card (automatic),59.9,3505.1,1,No   |  |
| 6322-HRPPA | Male   | 0             | Yes     | Yes        | 49     | Yes          | No            | DSL             | Yes            | Yes              | No            | No               | Month-to-month | No               | Credit card (automatic),59.6,2970.3,No     |  |
| 6865-JZNRK | Female | 0             | No      | No         | 30     | Yes          | No            | DSL             | Yes            | Yes              | No            | No               | Month-to-month | Yes              | Bank transfer (automatic),55.3,1530.6,No   |  |
| 6467-CHFWZ | Male   | 0             | Yes     | Yes        | 47     | Yes          | Yes           | Fiber optic     | No             | Yes              | No            | Yes              | Month-to-month | Yes              | Electronic check,99.35,4749.15,Yes         |  |
| 8665-UTDHZ | Male   | 0             | Yes     | Yes        | 1      | Yes          | No            | phone service   | DSL            | No               | Yes           | No               | Month-to-month | No               | Electronic check,30.2,30.2,Yes             |  |
| 5248-YGLIN | Male   | 0             | Yes     | No         | 72     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | Yes              | Two year       | Yes              | Credit card (automatic),90.25,6369.45,No   |  |
| 8773-HHUOZ | Female | 0             | No      | Yes        | 17     | Yes          | No            | DSL             | No             | Yes              | No            | No               | Month-to-month | Yes              | Mailed check,64.7,1093.1,Yes               |  |
| 3841-NFECX | Female | 1             | Yes     | No         | 71     | Yes          | Yes           | Fiber optic     | Yes            | Yes              | Yes           | Yes              | No             | Two year         | Yes  | Credit card (automatic),96.35,6766.95,No |
| 4929-XIHVW | Male   | 1             | Yes     | No         | 2      | Yes          | No            | Fiber optic     | No             | Yes              | No            | No               | Month-to-month | Yes              | Credit card (automatic),95.5,181.65,No     |  |
| 6827-IEAUQ | Female | 0             | Yes     | Yes        | 27     | Yes          | No            | DSL             | Yes            | Yes              | Yes           | No               | One year       | No               | Mailed check,66.15,1874.45,No              |  |
| 7310-EGVHZ | Male   | 0             | No      | No         | 1      | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,7310.0,1874.45,No       |
| 3413-BMNZE | Male   | 1             | No      | No         | 1      | Yes          | No            | DSL             | No             | No               | No            | No               | Month-to-month | No               | Bank transfer (automatic),45.25,45.25,No   |  |
| 6234-RAALF | Female | 0             | Yes     | Yes        | 72     | Yes          | Yes           | Fiber optic     | Yes            | Yes              | Yes           | Yes              | Two year       | No               | Bank transfer (automatic),99.9,7251.7,No   |  |
| 6047-YHPVI | Male   | 0             | No      | No         | 5      | Yes          | No            | Fiber optic     | No             | No               | No            | No               | Month-to-month | Yes              | Electronic check,69.7,316.9,Yes            |  |
| 6572-ADKRS | Female | 0             | No      | No         | 46     | Yes          | No            | Fiber optic     | No             | No               | Yes           | No               | Month-to-month | Yes              | Credit card (automatic),74.8,3548.3,No     |  |
| 5380-WJKRV | Male   | 0             | No      | No         | 34     | Yes          | Yes           | Fiber optic     | No             | Yes              | Yes           | Yes              | Month-to-month | Yes              | Electronic check,106.35,3549.25,Yes        |  |
| 8168-UQWVF | Female | 0             | No      | No         | 11     | Yes          | Yes           | Fiber optic     | No             | No               | Yes           | Yes              | Month-to-month | Yes              | Bank transfer (automatic),97.85,1105.4     |  |
| 8865-TNDMV | Male   | 0             | Yes     | Yes        | 10     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | One year       | No               | Mailed check,49.55,475.7,No                |  |
| 9489-DEDPV | Female | 0             | Yes     | Yes        | 70     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | Two year       | Yes              | Credit card (automatic),69.2,4872.35,No    |  |
| 9867-JCZSP | Female | 0             | Yes     | Yes        | 17     | Yes          | No            | No              | no             | internet service | No            | internet service | No             | internet service | No   | internet service,9867.0,4861.45,No       |
| 4671-VJLCI | Female | 0             | No      | No         | 63     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | Two year       | Yes              | Credit card (automatic),79.85,4861.45,No   |  |
| 4080-IIARD | Female | 0             | Yes     | No         | 13     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | Month-to-month | Yes              | Electronic check,76.2,981.45,No            |  |
| 3714-NTNPO | Female | 0             | No      | No         | 49     | Yes          | Yes           | Fiber optic     | No             | No               | No            | No               | Month-to-month | Yes              | Electronic check,84.5,3906.7,No            |  |
| 5948-UZLF  | Male   | 0             | No      | No         | 2      | Yes          | No            | DSL             | No             | Yes              | No            | No               | Month-to-month | No               | Mailed check,49.25,97.0,No                 |  |
| 7760-OYPDY | Female | 0             | No      | No         | 2      | Yes          | No            | Fiber optic     | No             | No               | No            | No               | Month-to-month | Yes              | Electronic check,80.65,144.15,Yes          |  |
| 7639-LIAVY | Male   | 0             | No      | No         | 52     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | Two year       | Yes              | Credit card (automatic),79.75,4217.8,No    |  |
| 2954-PIBKQ | Female | 0             | Yes     | Yes        | 69     | Yes          | Yes           | DSL             | Yes            | Yes              | Yes           | No               | Two year       | Yes              | Credit card (automatic),64.15,4254.1,No    |  |
| 8012-SOUDQ | Female | 1             | No      | No         | 43     | Yes          | Yes           | Fiber optic     | No             | Yes              | No            | No               | Month-to-month | Yes              | Electronic check,90.25,3838.75,No          |  |
| 9420-LOJKX | Female | 0             | No      | No         | 15     | Yes          | No            | Fiber optic     | Yes            | Yes              | No            | Yes              | Month-to-month | Yes              | Credit card (automatic),99.1,1426.4,Yes    |  |
| 6575-SUVOI | Female | 1             | Yes     | No         | 25     | Yes          | Yes           | DSL             | Yes            | No               | No            | Yes              | Month-to-month | Yes              | Credit card (automatic),69.5,1752.65,No    |  |
| 7495-OKKRY | Female | 1             | Yes     | No         | 8      | Yes          | Yes           | Fiber optic     | No             | Yes              | No            | No               | Month-to-month | Yes              | Credit card (automatic),80.65,633.3,Yes    |  |

8) Going back to the window from step 6 above, upload the file "telco\_churn.csv"



9) Click the “Is first row header?”, since the first row is a header

Select File Format

|  |                                  |                                      |
|--|----------------------------------|--------------------------------------|
| File type  | <input type="text" value="CSV"/> | <input type="button" value="Clear"/> |
| Field Delimiter  | <input type="text" value=","/>   | <input type="button" value="Clear"/> |
| Escape Character   | <input type="text" value="\\"/>  | <input type="button" value="Clear"/> |
| Quote Character  | <input type="text" value="\"/>   | <input type="button" value="Clear"/> |
| <input checked="" type="checkbox"/> Is first row header? |                                  |                                      |
| <input type="checkbox"/> Contains endlines?              |                                  |                                      |
| <input type="button" value="PREVIEW"/>                   |                                  |                                      |

10) Click “PREVIEW” prior to creating the table

**PREVIEW**

**Table Preview**

| CUSTOMERID | GENDER | SENIORCITIZEN | PARTNER | DEPENDENTS | TENURE | PHONESERVICE | MULTIPLELINES    | INTERNETSERVICE | ONLINESECURITY | ONLINEBACKUP | DEVICEPROTECTION | TECHSUPPORT | STREAMINGTV | STREAMINGMOVIES | CONTR       |
|------------|--------|---------------|---------|------------|--------|--------------|------------------|-----------------|----------------|--------------|------------------|-------------|-------------|-----------------|-------------|
| 7590-VHVEG | Female | 0             | Yes     | No         | 1      | No           | No phone service | DSL             | No             | Yes          | No               | No          | No          | No              | Month-month |
| 5575-GNVDE | Male   | 0             | No      | No         | 34     | Yes          | No               | DSL             | Yes            | No           | Yes              | No          | No          | No              | One year    |
| 3668-QPYBK | Male   | 0             | No      | No         | 2      | Yes          | No               | DSL             | Yes            | Yes          | No               | No          | No          | No              | Month-month |
| 7795-CFOCW | Male   | 0             | No      | No         | 45     | No           | No phone service | DSL             | Yes            | No           | Yes              | Yes         | No          | No              | One year    |
| 9237-      | Female | 0             | No      | No         | 2      | Yes          | No               | Fiber optic     | No             | No           | No               | No          | No          | No              | Month-      |

**BACK** **NEXT ➔** **CANCEL**

11) Click “NEXT”

**PREVIEW**

**Table Preview**

| CUSTOMERID | GENDER | SENIORCITIZEN | PARTNER | DEPENDENTS | TENURE | PHONESERVICE | MULTIPLELINES    | INTERNETSERVICE | ONLINESECURITY | ONLINEBACKUP | DEVICEPROTECTION | TECHSUPPORT | STREAMINGTV | STREAMINGMOVIES | CONTR       |
|------------|--------|---------------|---------|------------|--------|--------------|------------------|-----------------|----------------|--------------|------------------|-------------|-------------|-----------------|-------------|
| 7590-VHVEG | Female | 0             | Yes     | No         | 1      | No           | No phone service | DSL             | No             | Yes          | No               | No          | No          | No              | Month-month |
| 5575-GNVDE | Male   | 0             | No      | No         | 34     | Yes          | No               | DSL             | Yes            | No           | Yes              | No          | No          | No              | One year    |
| 3668-QPYBK | Male   | 0             | No      | No         | 2      | Yes          | No               | DSL             | Yes            | Yes          | No               | No          | No          | No              | Month-month |
| 7795-CFOCW | Male   | 0             | No      | No         | 45     | No           | No phone service | DSL             | Yes            | No           | Yes              | Yes         | No          | No              | One year    |
| 9237-      | Female | 0             | No      | No         | 2      | Yes          | No               | Fiber optic     | No             | No           | No               | No          | No          | No              | Month-      |

**BACK** **NEXT ➔** **CANCEL**

12) Enter ‘telco\_churn’ as the Table Name. Click “CREATE”

Database / Upload Table

Table Name: telco\_churn

| COLUMN NAME   | DATA TYPE | SIZE | ADVANCED  | ACTION                    |
|---------------|-----------|------|---|---------------------------|
| customerID    | STRING    |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| gender        | STRING    |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| SeniorCitizen | INT       |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| Partner       | STRING    |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| Dependents    | STRING    |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| tenure        | INT       |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |
| PhoneService  | STRING    |      | <input checked="" type="checkbox"/> Allow complex datatypes | <button>X DELETE</button> |

**CREATE**

13) Wait for about 2 minutes then Go-to “Compose” and within “Worksheet 1” run the following query on the new table

```
select * from telco_churn limit 10;
```

| customerID | gender | SeniorCitizen | Partner | Dependents | tenure | PhoneService | DSL              |
|------------|--------|---------------|---------|------------|--------|--------------|------------------|
| 7595-VHVG  | Female | 0             | Yes     | No         | 1      | No           | No phone service |
| 5575-GNYDE | Male   | 0             | No      | No         | 34     | Yes          | No               |
| 3868-QPYBK | Male   | 0             | No      | No         | 2      | Yes          | No               |

### Parking lot items

- Show Impala/Hue - for CDH customers
- [Add - Result Cache explanation](#)
- [Import CML github csv file](#)

- Comment [1]:** @rcicak@cloudera.com .. perhaps we should also show Hue/Impala to run queries on same dataset.
- Comment [2]:** I don't think we'll have time to do both.
- Comment [3]:** Done in Part 2 - executing a query twice. Part 4 imports the CSV file