Building Simple Data Stack

Project Brief

This project demonstrate how to implement a modern data stack, build data pipelines, machine learning and reporting capabilities using a variety of tools.

BRIAN GWAYI
Independent Data Lead & Engineer

First Things First !!!

Five Key Questions

I. Where is our data? Source
II. Where do we consolidate our data? Storage
III. How will we get it there? Ingestion
IV. How will we clean it up? Transformation
V. How will we analyze it? Reporting

BRIAN GWAYI
Independent Data Lead & Engineer

Data Stack Architecture Design

Where is our data?

PostgreSQL

MySQL

How will we get it there?

Airflow

+

Python

Where do we consolidate our data?

Amazon Redshift

Transformation

dbt

Raw

Model

Model

How do we analyze it?

tableau

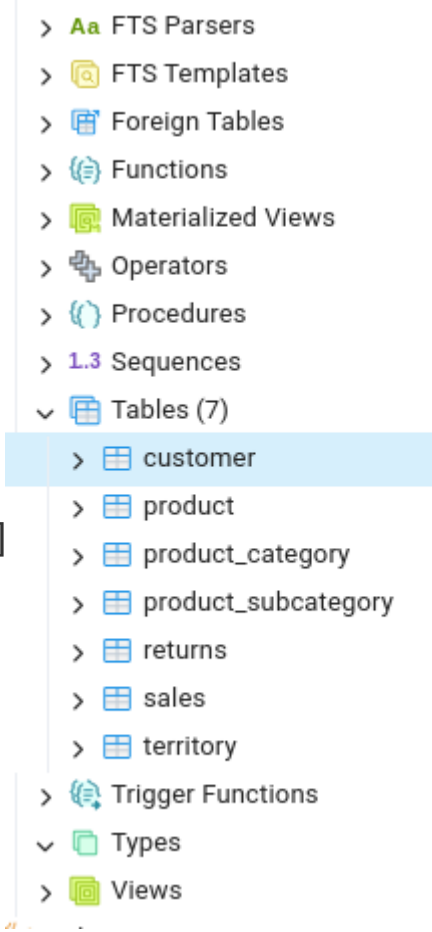
looker

Power BI

Where

is Our Data?

```
Source : PostgreSQL
Schema : Public
Database_Name: adw_db
Tables_Count : 7
Tables : [customer,
          product,
          product_category,
          returns,
          sales,
          territory,
          product_subcategory]
```



Data Output Messages Notifications

	orderdate date	stockdate date	ordernumber character varying (255)	productkey integer	customerkey integer
1	2022-01-01	2021-12-13	SO61285	529	23791
2	2022-01-01	2021-09-24	SO61285	214	23791
3	2022-01-01	2021-09-04	SO61285	540	23791
4	2022-01-01	2021-09-28	SO61301	529	16747
5	2022-01-01	2021-10-21	SO61301	377	16747
6	2022-01-01	2021-10-23	SO61301	540	16747
7	2022-01-01	2021-09-04	SO61269	215	11792
8	2022-01-01	2021-10-21	SO61269	229	11792
9	2022-01-01	2021-10-24	SO61286	528	11530
10	2022-01-01	2021-09-27	SO61286	536	11530
11	2022-01-01	2021-10-23	SO61298	530	18155
12	2022-01-01	2021-12-02	SO61298	214	18155
13	2022-01-01	2021-12-15	SO61298	223	18155
14	2022-01-01	2021-10-01	SO61310	538	13541
15	2022-01-01	2021-11-08	SO61310	584	13541

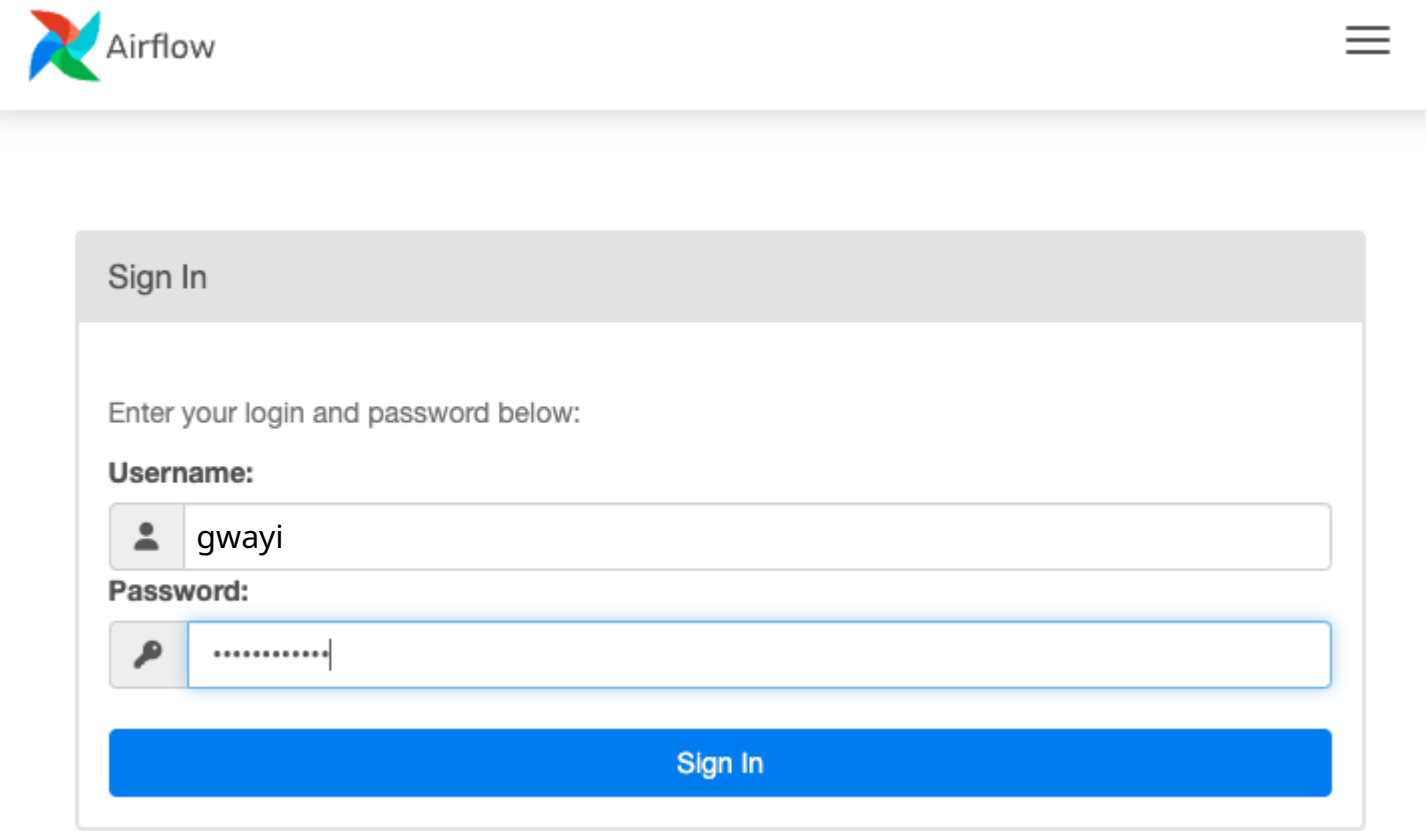
How do we ingest Our Data?

```
Ingestion : Programmatically
Orchestration : Apache Airflow
```

Apache Airflow Setup

```
Terminal

$ python3 -m venv airflow-env
$ source airflow-env/bin/activate
$ export AIRFLOW_HOME=~/airflow
$ pip install apache-airflow
$ airflow db init
$ airflow webserver -p 8080
$ airflow sheduler
```

Apache Airflow Webserver UI



How do we ingest Our Data?

```
# install dependencies

pip install google-cloud-bigquery
pip install --upgrade snowflake-connector-python

# importing libraries

from airflow.decorators import dag, task
from datetime import datetime, timedelta
from google.cloud import bigquery
import pandas as pd
import psycopg2
```

```
# define a DAG

args{
    ”owner”:”gwayi”,
    "retries": 1,
    "retry_delay":timedelta(minutes=5)
    }

@dag(
    default_arguments = args
    Schedule=timedelta(minutes=30),
    start_date=datetime(2024, 7, 29),
    catchup=False,
    tags=['DataOps Team']
    )
```

How do we ingest Our Data?

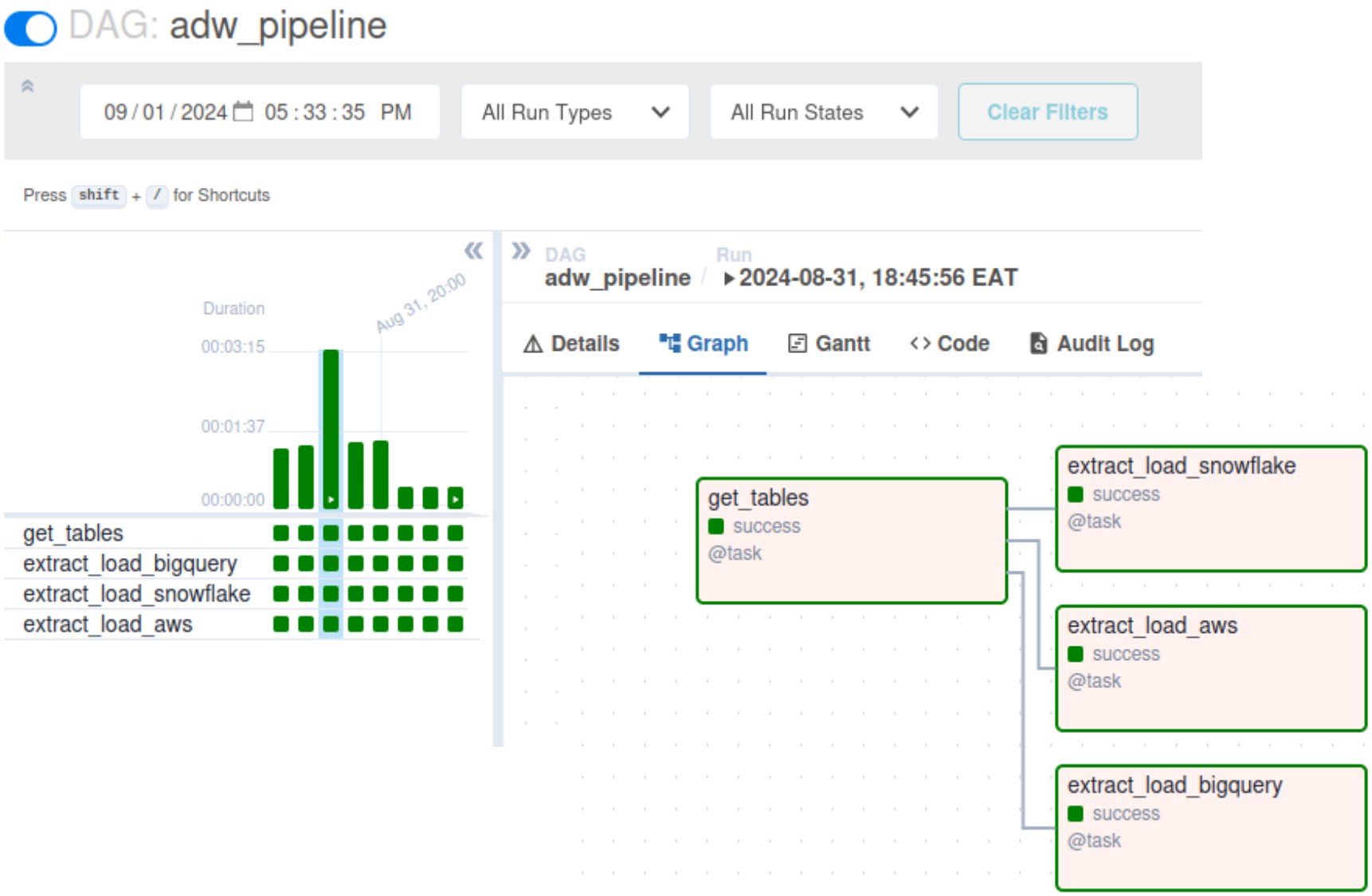
Task I (Get Tables)

```
@task()
def get_tables():
"""extract list of tables
in public schema"""

  try:
    cursor.execute(
         f"""SELECT table_name
         FROM information_schema.tables
         WHERE table_schema = 'public'"""
          )

  tbls = [x[0] for x in cursor.fetchall()]
```

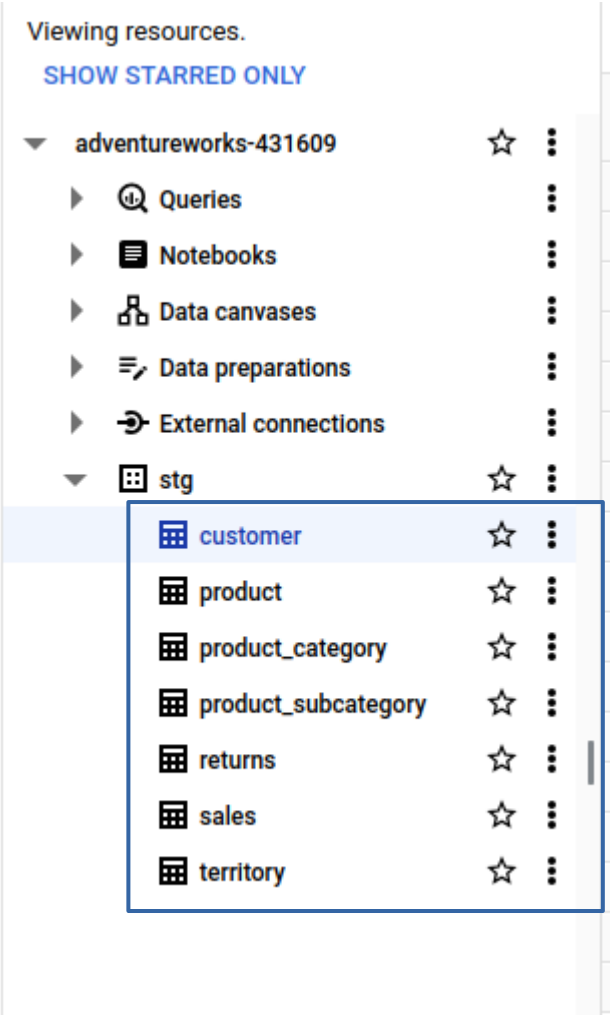
Task II (Extract_Load)

```
@task()
def extract|load_bigquery(tbls, conn):
"""loop through tbls then extract & load"""

     client = bigquery.Client()
     job_config = bigquery.LoadJobConfig(
     write_disposition="WRITE_TRUNCATE")

      for tbl in tbls:
      table_id = f"adventureworks-431609.stg.{tbl}"
      sql = f"SELECT * FROM {tbl} WHERE
      updated_at >= {ds}'"
      df = pd.read_sql(sql, conn)

      job = client.load_table_from_dataframe(
      df, table_id, job_config=job_config)
      job.result()

    get_tables = get_tables()
    extract_load = extract_load(get_tables)
```

Running Data pipeline – Apache Airflow



Google BigQuery



SCHEMA | DETAILS | PREVIEW | TABLE EXPLORER PREVIEW | INSIGHTS PREVIEW | LINEAGE

Row	customerid	firstname	lastname	fullname
1	1305	A.	Leonetti	A. Leonetti
2	1305	A.	Leonetti	A. Leonetti
3	829	Ed	Dudenhoefer	Ed Dudenhoefer
4	829	Ed	Dudenhoefer	Ed Dudenhoefer
5	1953	H.	Valentine	H. Valentine
6	1953	H.	Valentine	H. Valentine
7	539	Jo	Brown	Jo Brown
8	539	Jo	Brown	Jo Brown
9	1917	Abe	Tramel	Abe Tramel
10	1917	Abe	Tramel	Abe Tramel
11	323	Amy	Alberts	Amy Alberts
12	323	Amy	Alberts	Amy Alberts
13	735	Amy	Consentino	Amy Consentino
14	735	Amy	Consentino	Amy Consentino
15	1033	Ann	Hass	Ann Hass
16	1033	Ann	Hass	Ann Hass
17	437	Ann	Beebe	Ann Beebe

How do we transform Our Data?

```
Transformation : dbt
Orchestration : Apache Airflow
Models 3 : [production,
            machine learning,
            Reporting]
```

Set up dbt

```
pip install dbt-biquery
dbt –version
dbt init dbt_adw

Key Commands
dbt debug, dbt run, dbt run –full-refresh,
dbt seed, dbt test, dbt docs generate
```

Transformations

```
Join returns
   to territory
     territory
   to product
      Product
   to product_subcategory
      product_subcategory
   to productcategory
as returns_wide


Join sales
   to territory
     territory
   to product
      Product
   to product_subcategory
      product_subcategory
   to productcategory
as sales_wide
```

BigQuery

SELECT CONNECTOR

Make your BigQuery reports load even faster with BigQuery BI Engine. Learn More

BigQuery

By Google

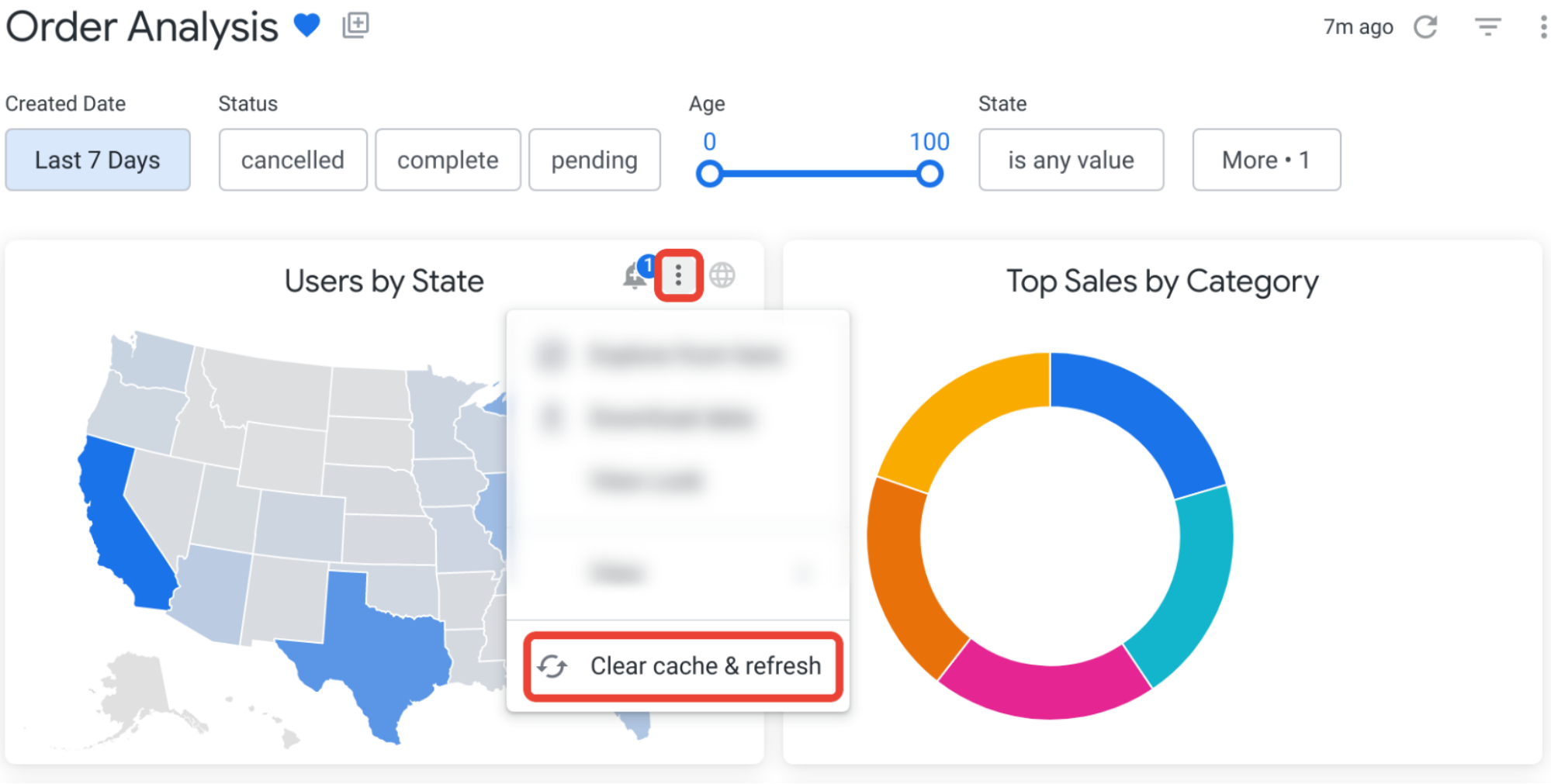
BigQuery is Google's fully managed, petabyte scale, low-cost analytics data warehouse. BigQuery charges for querying/processing of data. Those queries are charged to the credit card of the billing project.

LEARN MORE REPORT AN ISSUE

RECENT PROJECTS	Project	Dataset	Table
MY PROJECTS	Enter Project Id manually	Business_Reporting	returns_wide_table
SHARED PROJECTS	AdventureWorks	ML	sales_wide_table
CUSTOM QUERY	My Project 69537	Production	
PUBLIC DATASETS	My First Project	staging	
		stg	

How do we ingest Our Data?

Google Looker



Ultimate End Goal

Data + Insights + Action
= Actionable Insights

Data

What happened/ will happen?

Insight

Why did it happened/ will it happen?

Action

What do we do?