Cloud: MAANG Stock Price Analysis

Group-8:

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Problem Definition and Objective

In a rapidly evolving financial market, staying ahead of the trend analysis is essential for making informed investment decisions.

We also aim to explore the external factors that impact the stock price and the level of risk associated with their securities.

This project seeks to develop a data-driven solution to address the complexities of analyzing the historical stock prices of MAANG companies and identify the market conditions and external factors that could help make informed investment decisions.

End-Goal

The ultimate end goal of this project is to ensure we get valuable insights to empower and help investors, analysts and traders make informed decisions

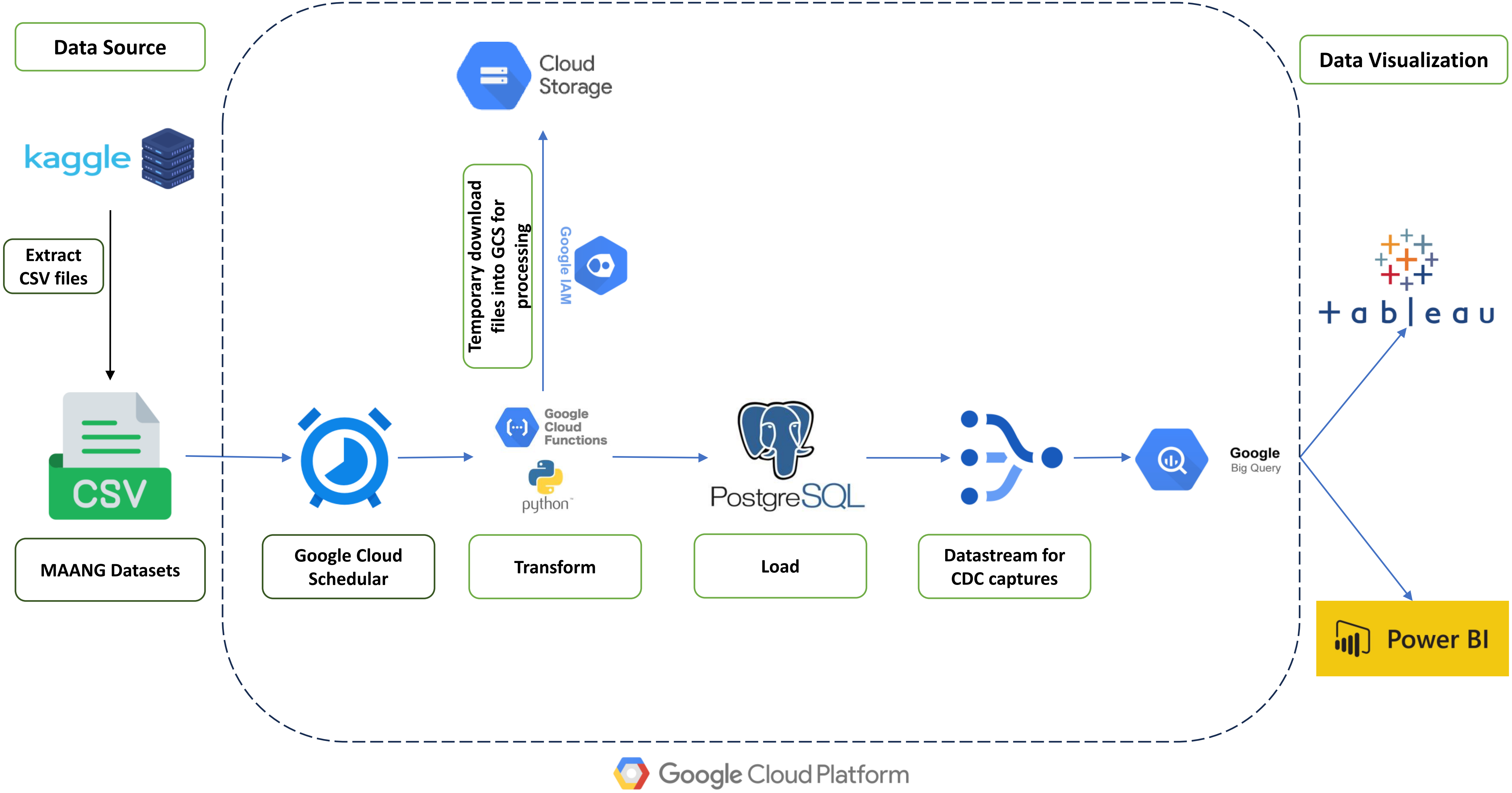
The project aims to predict the effectiveness of trading strategies by back tracing with historical data insights and provide actionable insights to make data-driven decisions about the trends, opportunities, and volatility

Furthermore, by developing an efficient cloud-based data engineering solution that can handle large volumes of data for real-time analysis.

Data Source

- This dataset includes the historical data of stock prices for MAANG companies. It contains the daily, weekly, and monthly stock prices for each company, and they are automatically updated daily
- This dataset has 15 datasets, and each file has around 7 columns. Here we have daily, monthly, and weekly data for each of the companies from the years 2000 -2023.
- http://www.kaggle.com/datasets/nikhil1e9/ne8lix-stock-price/

Data Pipeline Architecture



Data Source

Extract CSV files

MAANG Datasets

Google Cloud Schedular

Temporary download files into GCS for processing

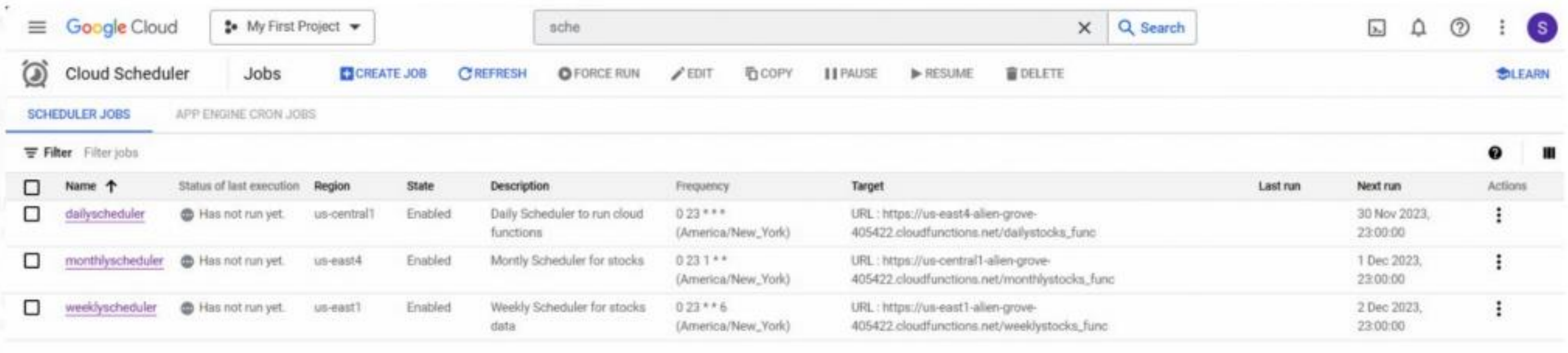
Transform

Load

Datastream for CDC captures

Data Visualization

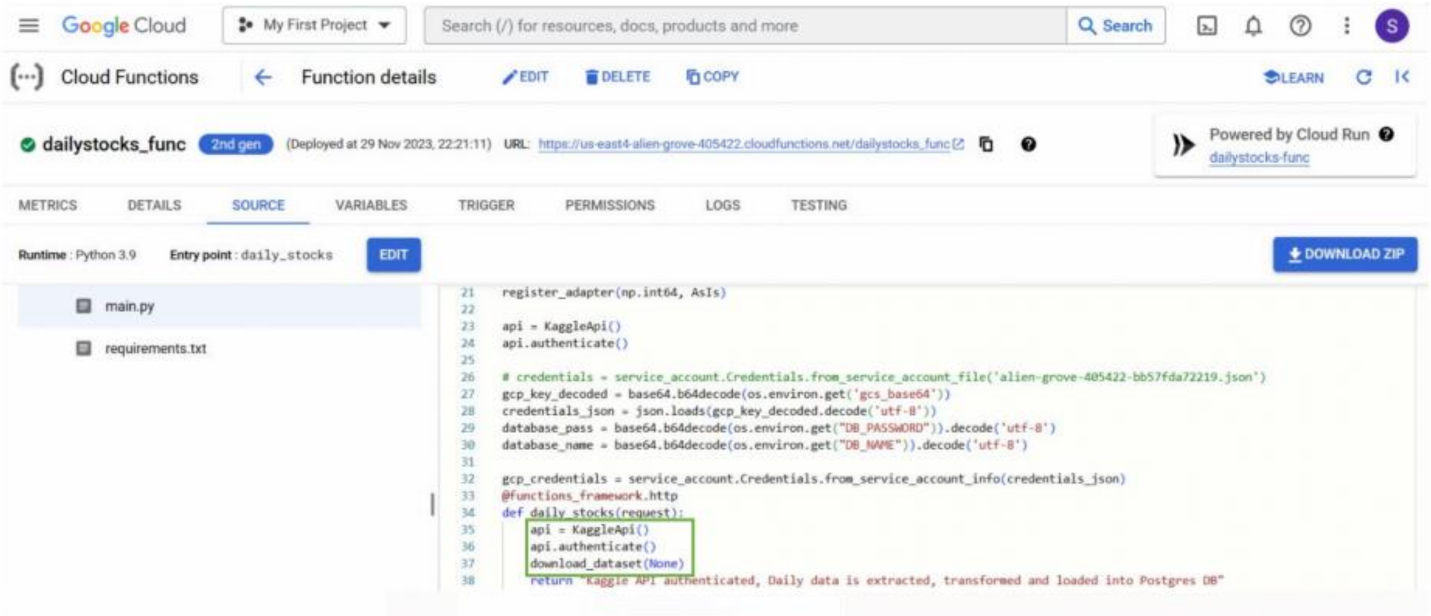
Data Ingestion – Cloud Schedular



□	Name ↑	Status of last execution	Region	State	Description	Frequency	Target	Last run	Next run	Actions
□	dailyscheduler	Has not run yet.	us-central1	Enabled	Daily Scheduler to run cloud functions	0 23 * * * (America/New_York)	URL : https://us-east4-alien-grove-405422.cloudfunctions.net/dailystocks_func		30 Nov 2023, 23:00:00	⋮
□	monthlyscheduler	Has not run yet.	us-east4	Enabled	Montly Scheduler for stocks	0 23 1 * * (America/New_York)	URL : https://us-central1-alien-grove-405422.cloudfunctions.net/monthlystocks_func		1 Dec 2023, 23:00:00	⋮
□	weeklyscheduler	Has not run yet.	us-east1	Enabled	Weekly Scheduler for stocks data	0 23 * * 6 (America/New_York)	URL : https://us-east1-alien-grove-405422.cloudfunctions.net/weeklystocks_func		2 Dec 2023, 23:00:00	⋮

- We have adopted py scripts for daily, weekly, and monthly to transform and insert the 15 files into cloud Postgres. Here, we used the Kaggle API instead of downloading the 15 files into the local or cloud bucket, as the data is very dynamic and changes daily.
- We are using a cloud scheduler to trigger the cloud functions.

Cloud Functions

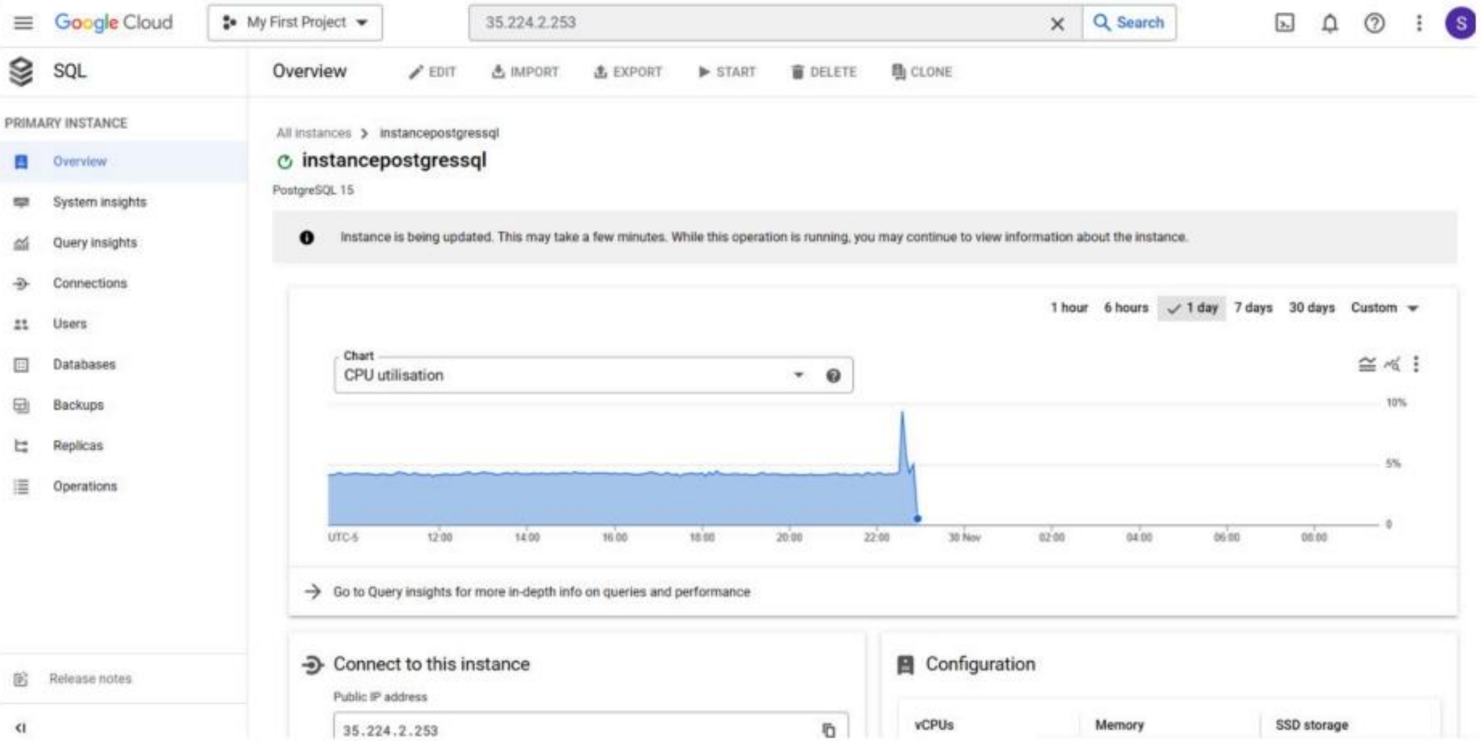


dailystocks_func 2nd gen (Deployed at 29 Nov 2023, 22:21:11) URL: https://us-east4-alien-grove-405422.cloudfunctions.net/dailystocks_func

Runtime : Python 3.9 Entry point : daily_stocks

```python
register_adapter(np.int64, AsIs)

api = KaggleApi()
api.authenticate()

# credentials = service_account.Credentials.from_service_account_file('alien-grove-405422-bb57fda72219.json')
gcp_key_decoded = base64.b64decode(os.environ.get('gcs_base64'))
credentials_json = json.loads(gcp_key_decoded.decode('utf-8'))
database_pass = base64.b64decode(os.environ.get("DB_PASSWORD")).decode('utf-8')
database_name = base64.b64decode(os.environ.get("DB_NAME")).decode('utf-8')

gcp_credentials = service_account.Credentials.from_service_account_info(credentials_json)
@functions_framework.http
def daily_stocks(request):
    api = KaggleApi()
    api.authenticate()
    download_dataset(None)
    return "Kaggle API authenticated, Daily data is extracted, transformed and loaded into Postgres DB"
```

Cloud SQL Postgres



35.224.2.253

instancepostgressql

PostgreSQL 15

Instance is being updated. This may take a few minutes. While this operation is running, you may continue to view information about the instance.

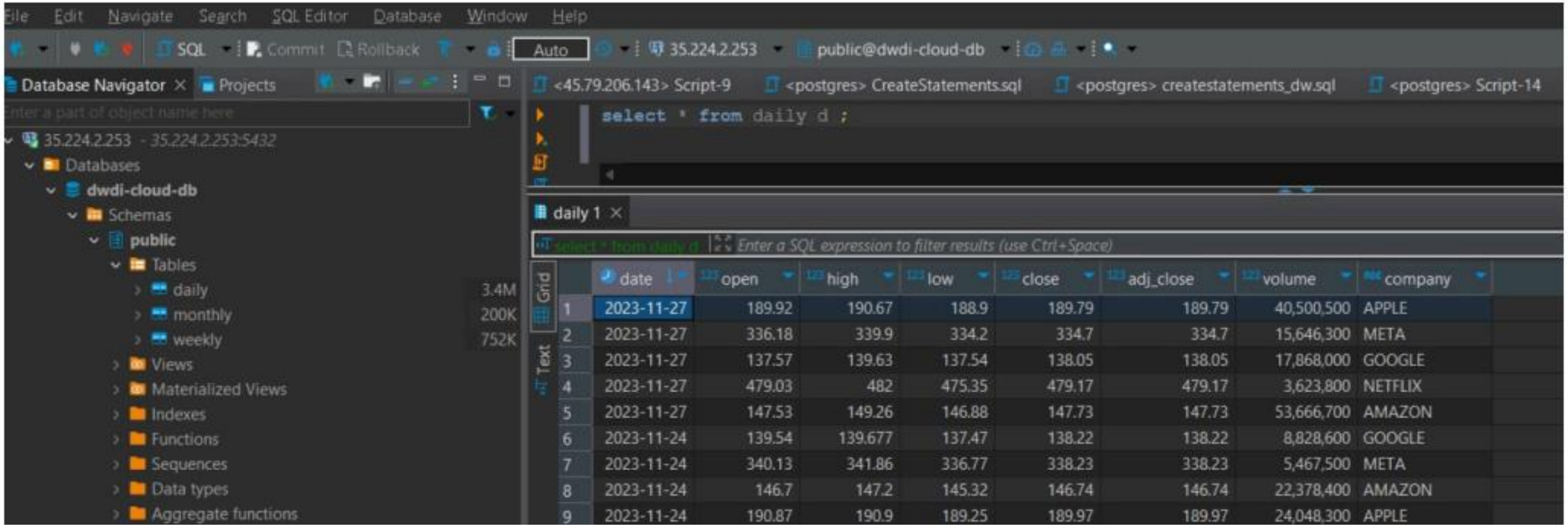
Chart: CPU utilisation

Go to Query insights for more in-depth info on queries and performance

Connect to this instance

Public IP address: 35.224.2.253

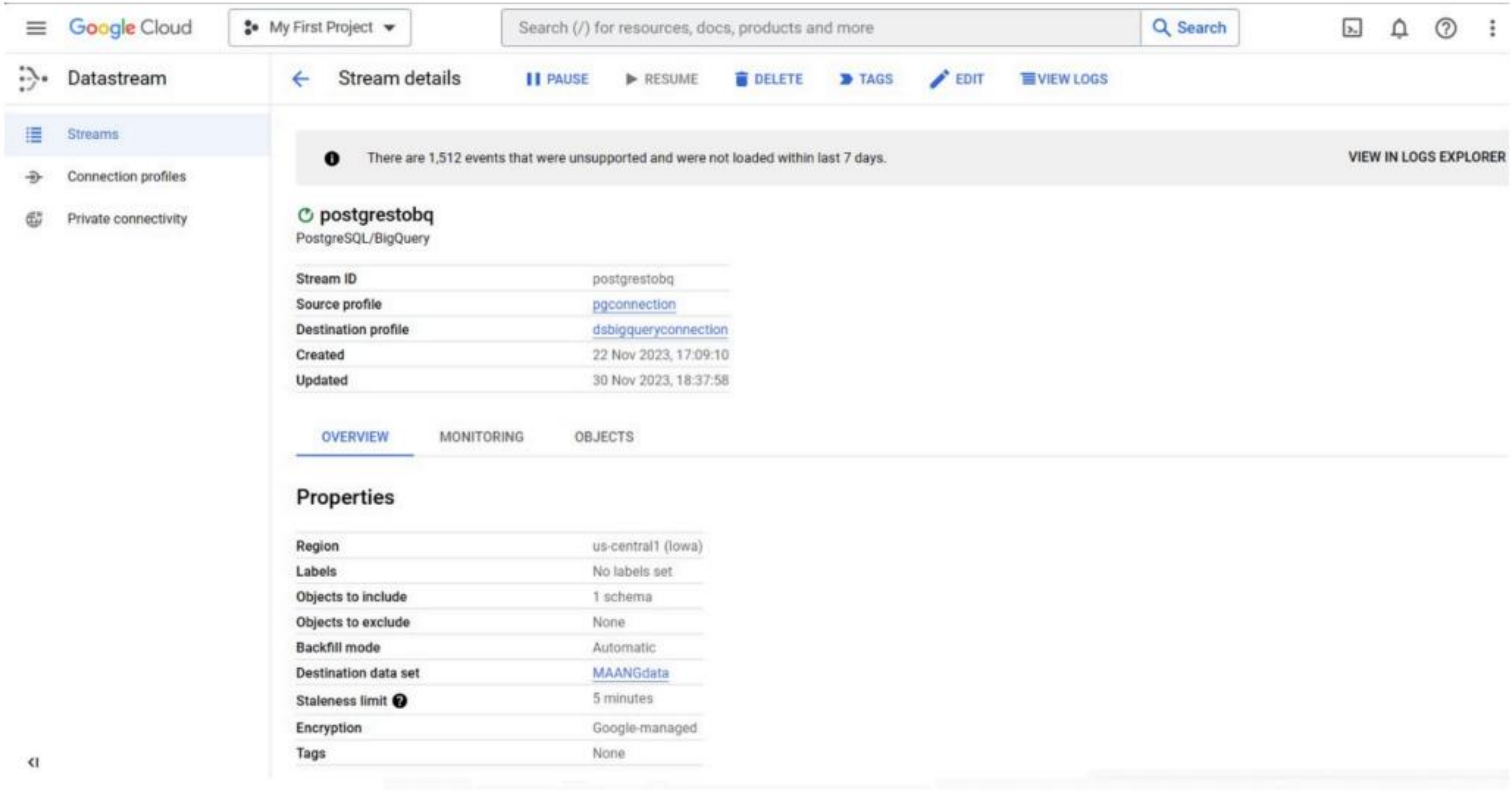
Configuration



```
select * from daily d ;
```

	date	open	high	low	close	adj_close	volume	company
1	2023-11-27	189.92	190.67	188.9	189.79	189.79	40,500,500	APPLE
2	2023-11-27	336.18	339.9	334.2	334.7	334.7	15,646,300	META
3	2023-11-27	137.57	139.63	137.54	138.05	138.05	17,868,000	GOOGLE
4	2023-11-27	479.03	482	475.35	479.17	479.17	3,623,800	NETFLIX
5	2023-11-27	147.53	149.26	146.88	147.73	147.73	53,666,700	AMAZON
6	2023-11-24	139.54	139.677	137.47	138.22	138.22	8,828,600	GOOGLE
7	2023-11-24	340.13	341.86	336.77	338.23	338.23	5,467,500	META
8	2023-11-24	146.7	147.2	145.32	146.74	146.74	22,378,400	AMAZON
9	2023-11-24	190.87	190.9	189.25	189.97	189.97	24,048,300	APPLE

Database Connection



There are 1,512 events that were unsupported and were not loaded within last 7 days.

postgrestobq

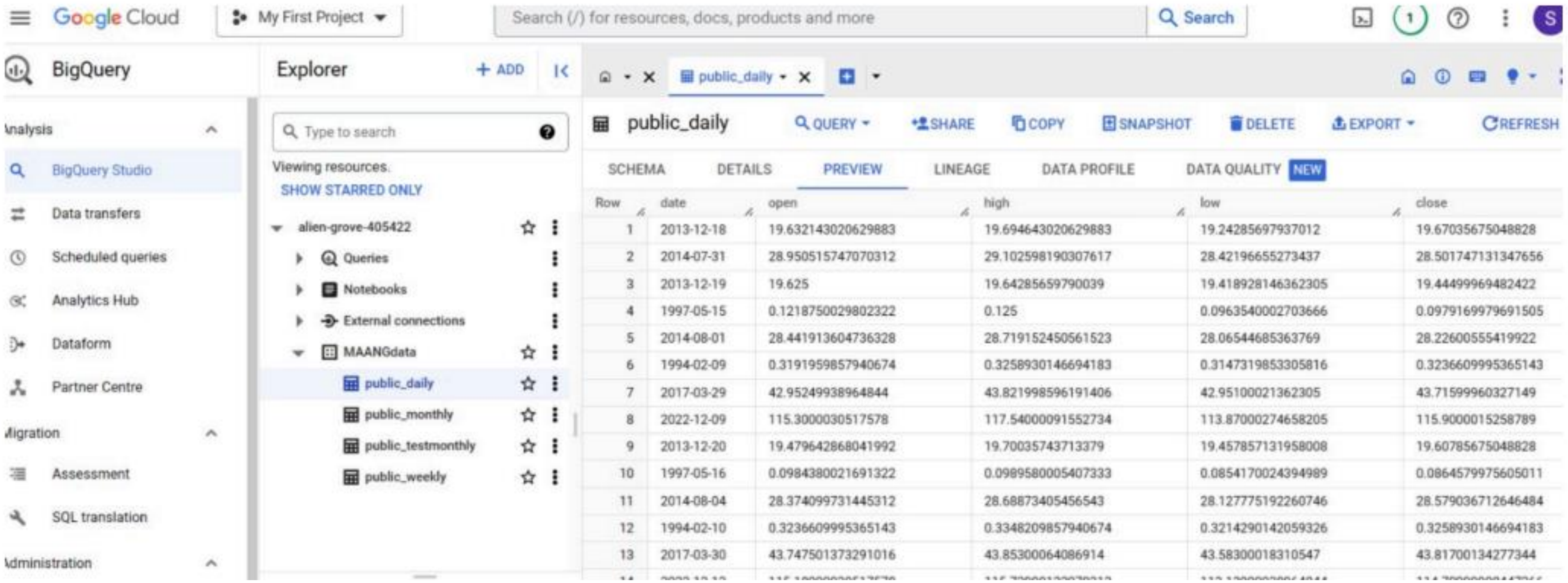
PostgreSQL/BigQuery

Stream ID	postgrestobq
Source profile	pgconnection
Destination profile	dsbigqueryconnection
Created	22 Nov 2023, 17:09:10
Updated	30 Nov 2023, 18:37:58

Properties

Region	us-central1 (Iowa)
Labels	No labels set
Objects to include	1 schema
Objects to exclude	None
Backfill mode	Automatic
Destination data set	MAANGdata
Staleness limit	5 minutes
Encryption	Google-managed
Tags	None

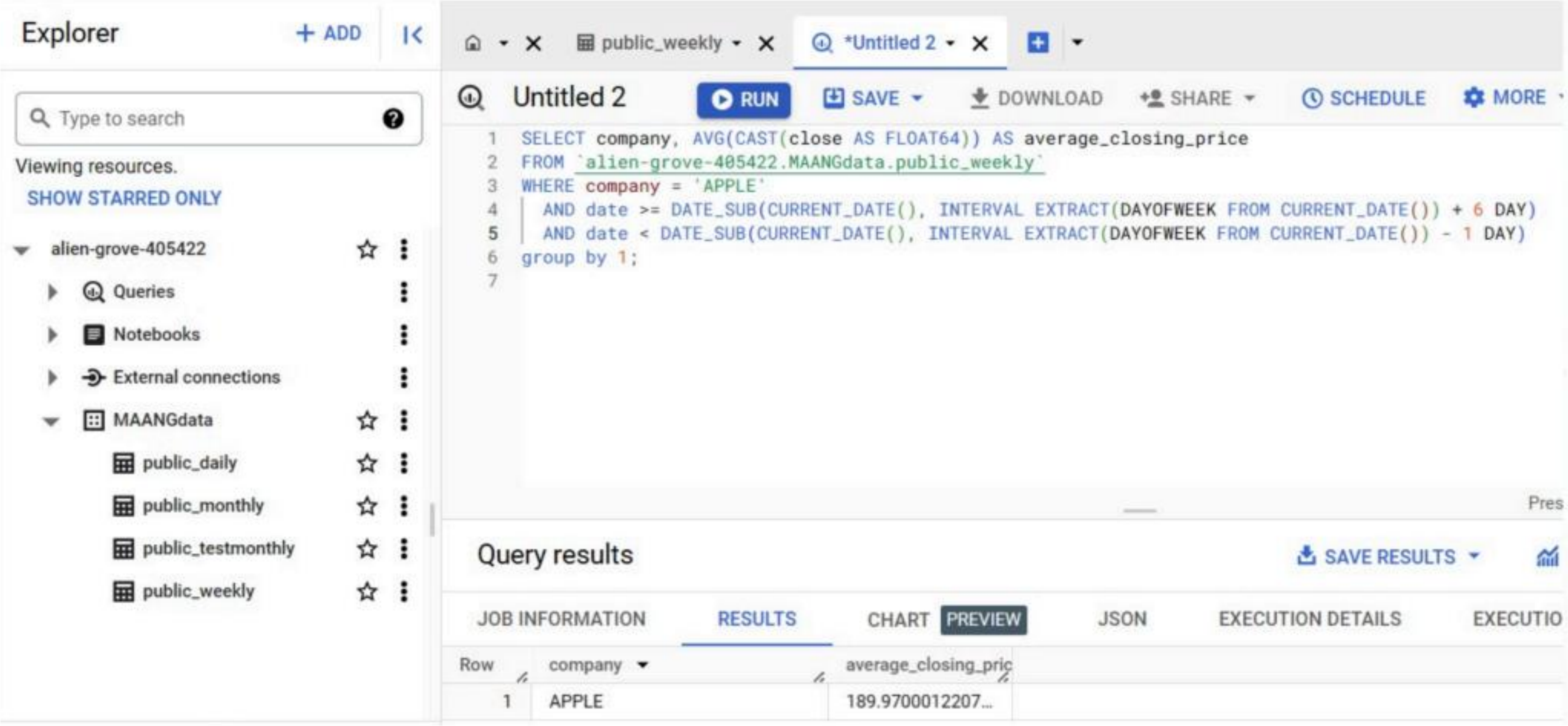
Data Ingestion From Cloud SQL to Bigquery using DataStream



Row	date	open	high	low	close
1	2013-12-18	19.632143020629883	19.694643020629883	19.24285697937012	19.67035675048828
2	2014-07-31	28.950515747070312	29.102598190307617	28.42196655273437	28.501747131347656
3	2013-12-19	19.625	19.64285659790039	19.418928146362305	19.44499969482422
4	1997-05-15	0.1218750029802322	0.125	0.0963540002703666	0.0979169979691505
5	2014-08-01	28.441913604736328	28.719152450561523	28.06544685363769	28.22600555419922
6	1994-02-09	0.3191959857940674	0.3258930146694183	0.3147319853305816	0.3236609995365143
7	2017-03-29	42.95249938964844	43.821998596191406	42.95100021362305	43.71599960327149
8	2022-12-09	115.3000030517578	117.54000091552734	113.87000274658205	115.9000015258789
9	2013-12-20	19.479642868041992	19.70035743713379	19.457857131958008	19.60785675048828
10	1997-05-16	0.0984380021691322	0.0989580005407333	0.0854170024394989	0.0864579975605011
11	2014-08-04	28.374099731445312	28.68873405456543	28.127775192260746	28.579036712646484
12	1994-02-10	0.3236609995365143	0.3348209857940674	0.3214290142059326	0.3258930146694183
13	2017-03-30	43.747501373291016	43.85300064086914	43.58300018310547	43.81700134277344

Bigquery Data Warehouse

1. Calculate the average closing price for last week for Apple:

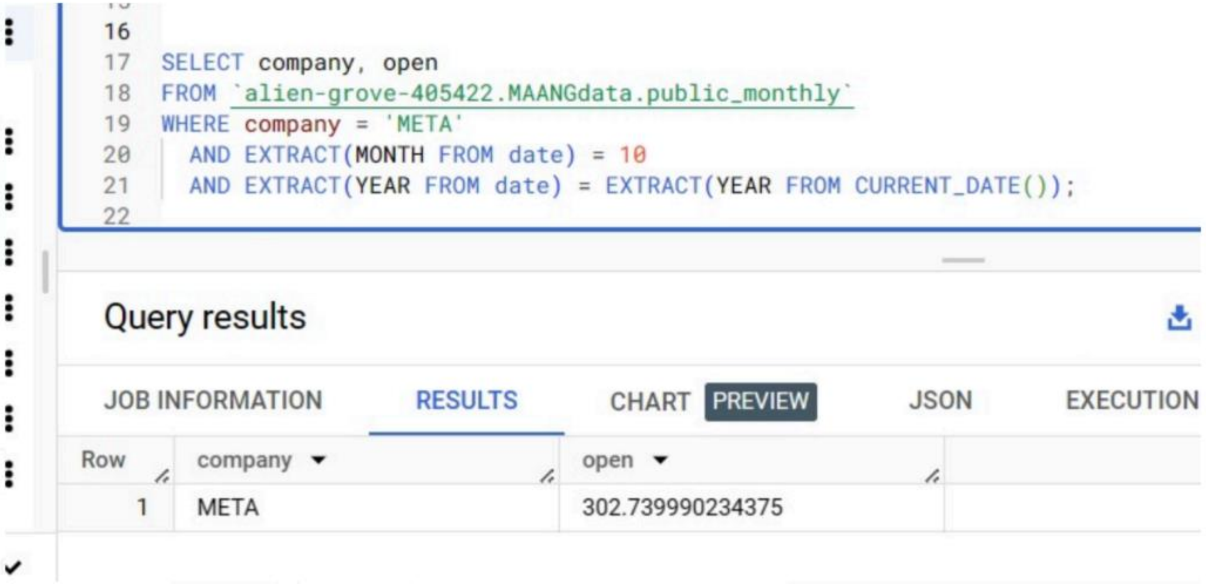


```sql
SELECT company, AVG(CAST(close AS FLOAT64)) AS average_closing_price
FROM `alien-grove-405422.MAANGdata.public_weekly`
WHERE company = 'APPLE'
  AND date >= DATE_SUB(CURRENT_DATE(), INTERVAL EXTRACT(DAYOFWEEK FROM CURRENT_DATE()) + 6 DAY)
  AND date < DATE_SUB(CURRENT_DATE(), INTERVAL EXTRACT(DAYOFWEEK FROM CURRENT_DATE()) - 1 DAY)
group by 1;
```

Row	company	average_closing_pric
1	APPLE	189.9700012207...

Analytical Queries

2. What is the opening stock price for Meta in the month of October?



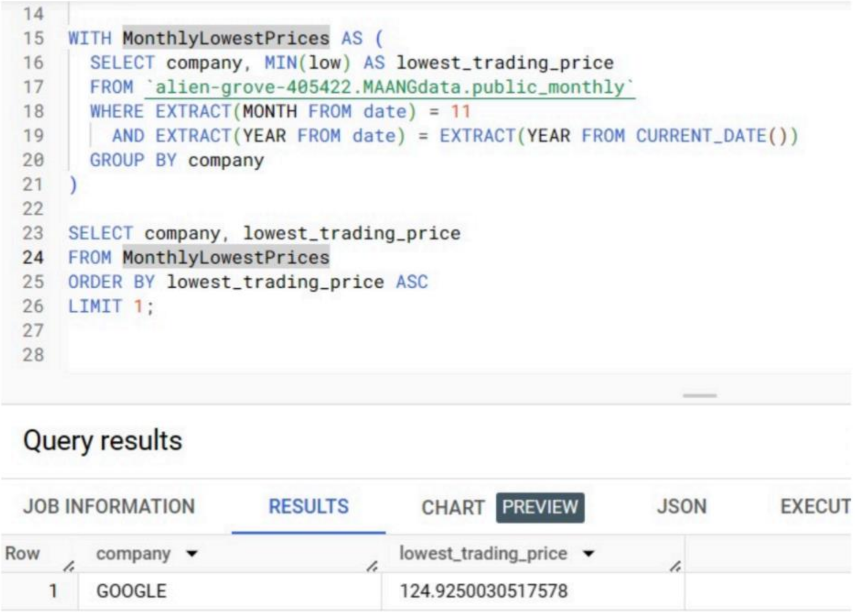
```sql
SELECT company, open
FROM `alien-grove-405422.MAANGdata.public_monthly`
WHERE company = 'META'
  AND EXTRACT(MONTH FROM date) = 10
  AND EXTRACT(YEAR FROM date) = EXTRACT(YEAR FROM CURRENT_DATE());
```

Row	company	open
1	META	302.739990234375

Cont.

Cont.

3. Which is the lowest trading price and company in the month of November?



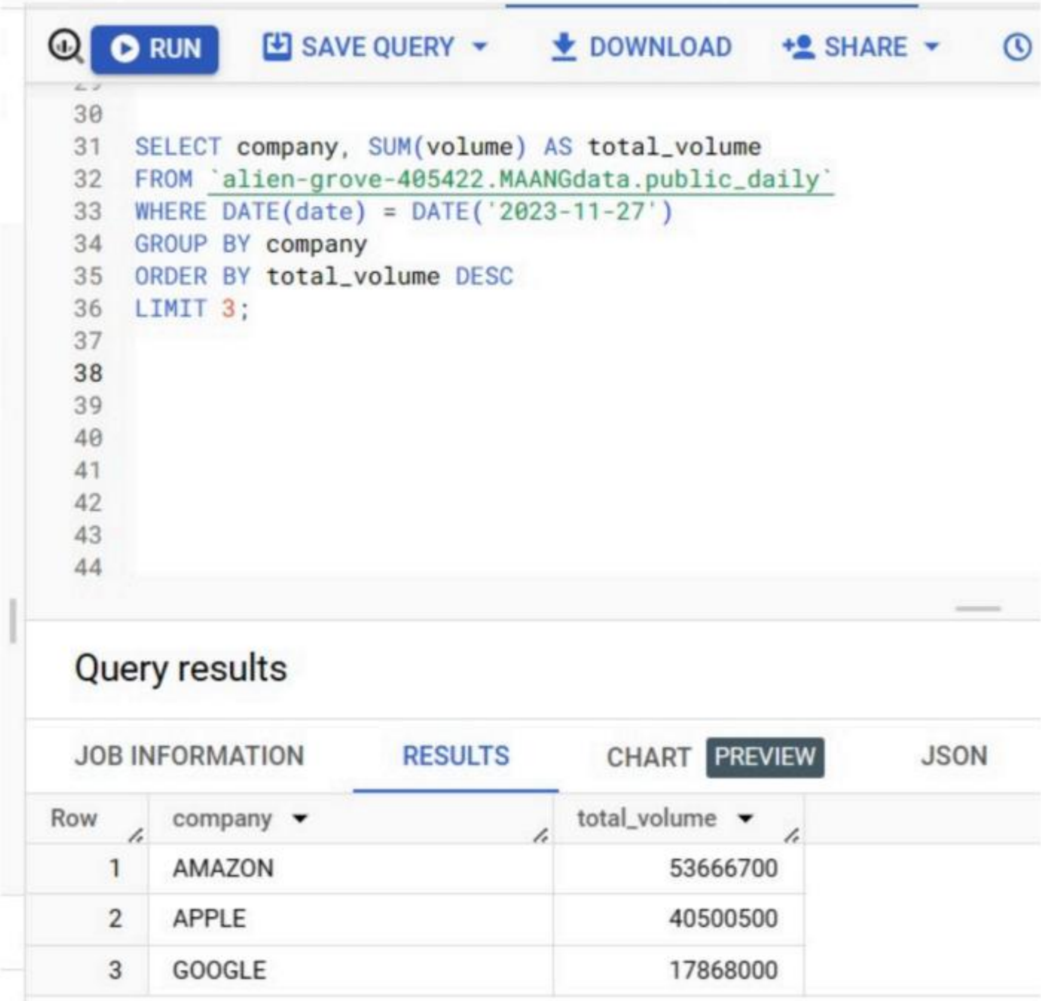
```sql
WITH MonthlyLowestPrices AS (
  SELECT company, MIN(low) AS lowest_trading_price
  FROM `alien-grove-405422.MAANGdata.public_monthly`
  WHERE EXTRACT(MONTH FROM date) = 11
    AND EXTRACT(YEAR FROM date) = EXTRACT(YEAR FROM CURRENT_DATE())
  GROUP BY company
)

SELECT company, lowest_trading_price
FROM MonthlyLowestPrices
ORDER BY lowest_trading_price ASC
LIMIT 1;
```

Query results

Row	company	lowest_trading_price
1	GOOGLE	124.9250030517578

Cont.

4. On the 27th of November, what were the top 3 stocks sold and by which company?

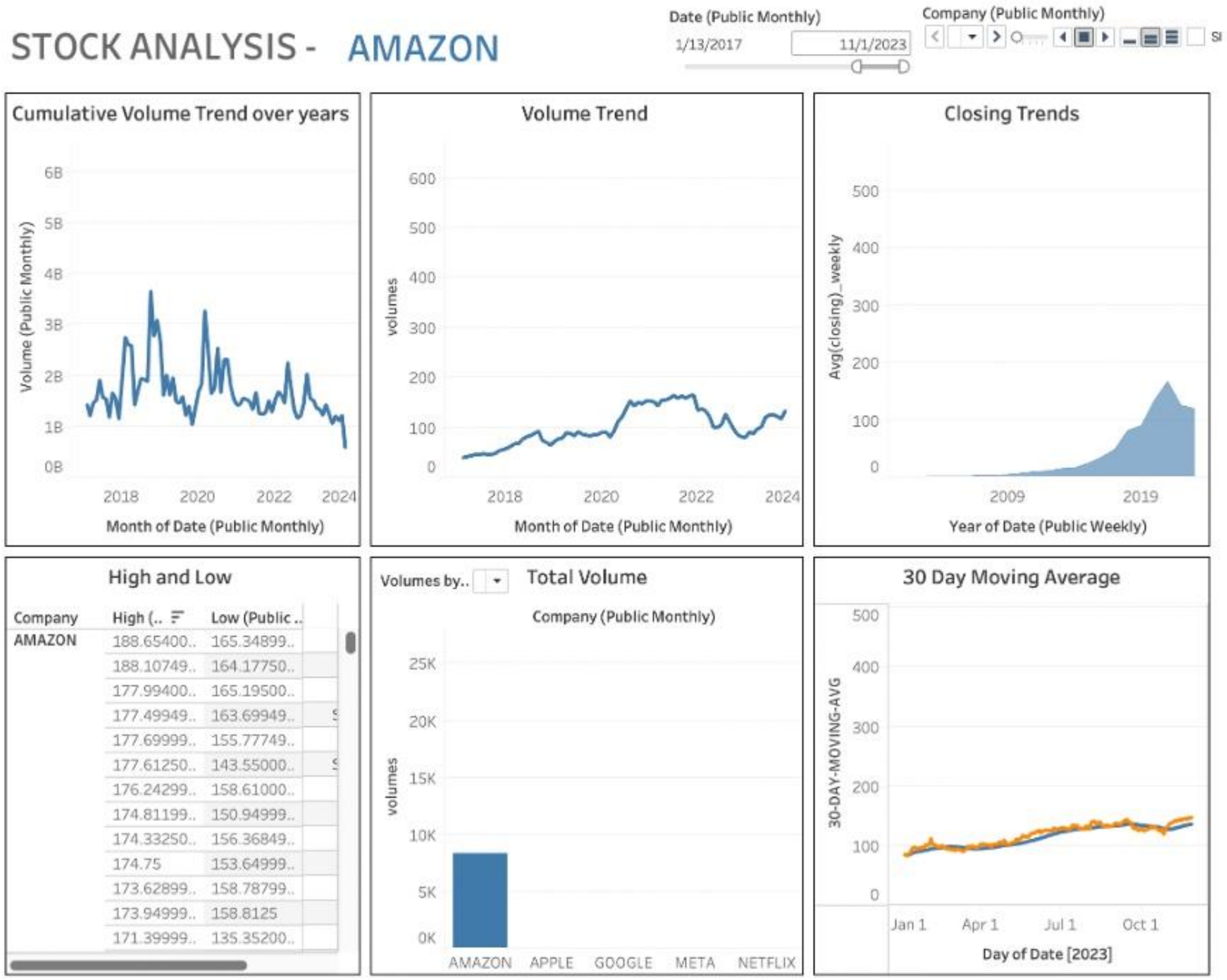


```sql
SELECT company, SUM(volume) AS total_volume
FROM `alien-grove-405422.MAANGdata.public_daily`
WHERE DATE(date) = DATE('2023-11-27')
GROUP BY company
ORDER BY total_volume DESC
LIMIT 3;
```

Query results

Row	company	total_volume
1	AMAZON	53666700
2	APPLE	40500500
3	GOOGLE	17868000

Tableau Dashboard



STOCK ANALYSIS - AMAZON

Date (Public Monthly): 1/13/2017 – 11/1/2023

Company (Public Monthly)

High and Low

Company	High (..	Low (Public ..
AMAZON	188.65400..	165.34899..
	188.10749..	164.17750..
	177.99400..	165.19500..
	177.49949..	163.69949..
	177.69999..	155.77749..
	177.61250..	143.55000..
	176.24299..	158.61000..
	174.81199..	150.94999..
	174.33250..	156.36849..
	174.75	153.64999..
	173.62899..	158.78799..
	173.94999..	158.8125
	171.39999..	135.35200..