Wizeline DEB Bootcamp

Capstone Project Presentation

Sidney Ochoki Isoe

Roles: Software Implementation Consultant | Business Analyst | Data Analyst

Experience: Working with data for over a decade

Hobbies: Music, video games, data

Contact: sidneyisoe

Session Goal

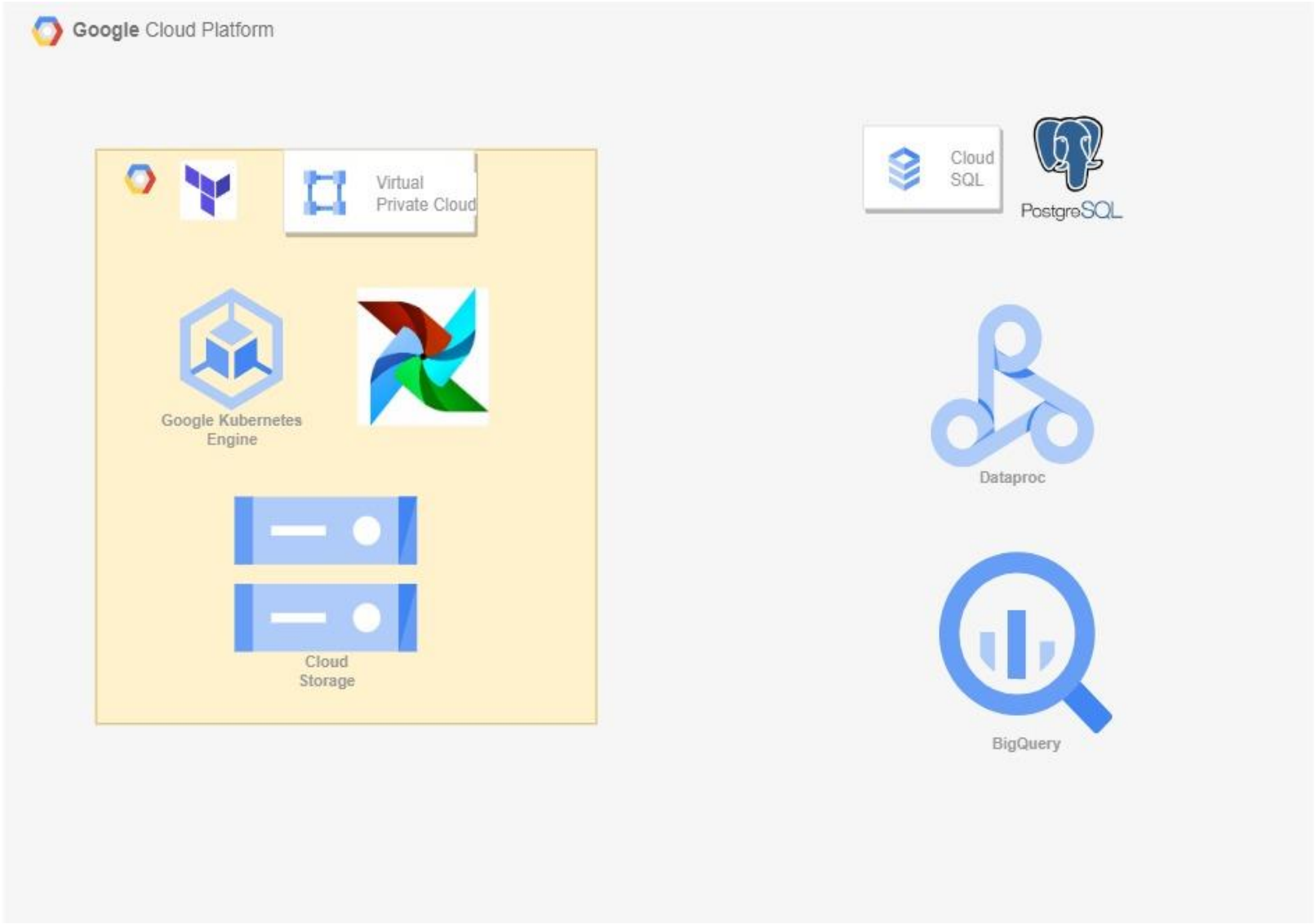
The goal is to explain my end-to-end solution used for the capstone project.

1. Introduction
2. Infrastructure
3. Data Pipelines
4. Challenges
5. Lessons Learned

1. Introduction

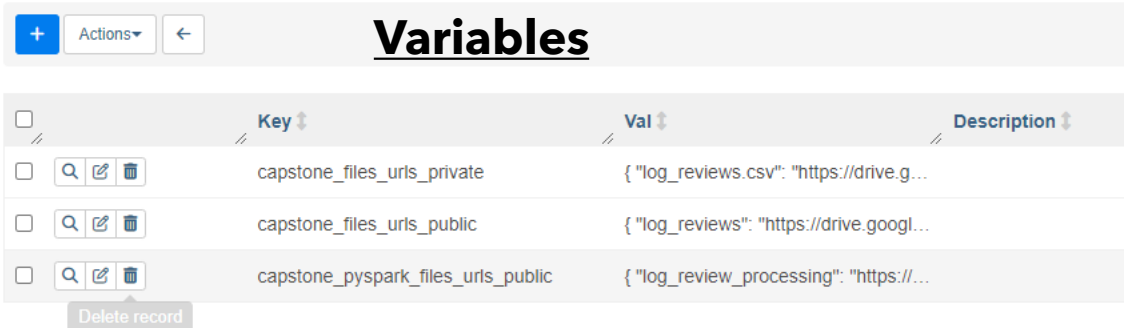
The objective of the capstone project was to use the technologies and techniques we acquired during the bootcamp to build an end-to-end solution for movie analytics data warehouse

2. Infrastructure

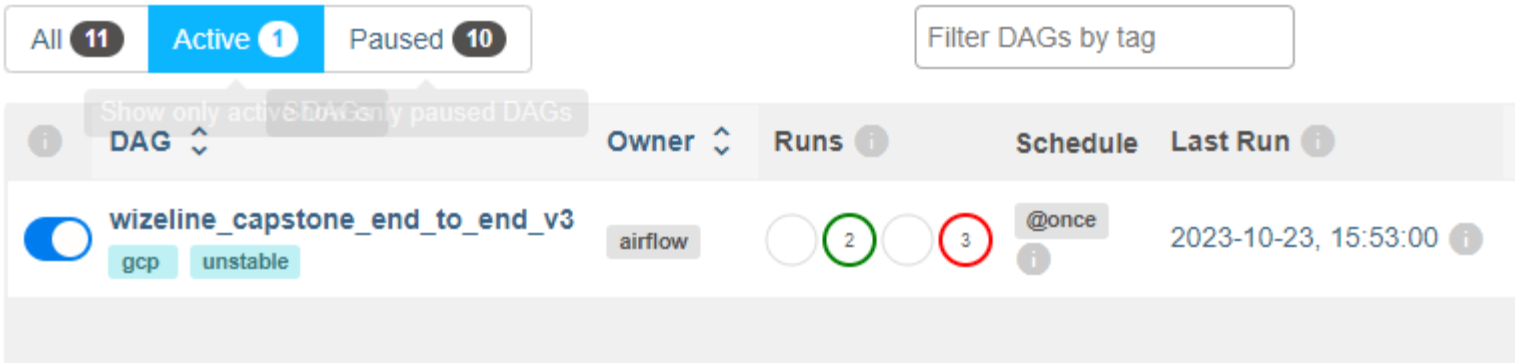


Pipeline

Variables



DAGs

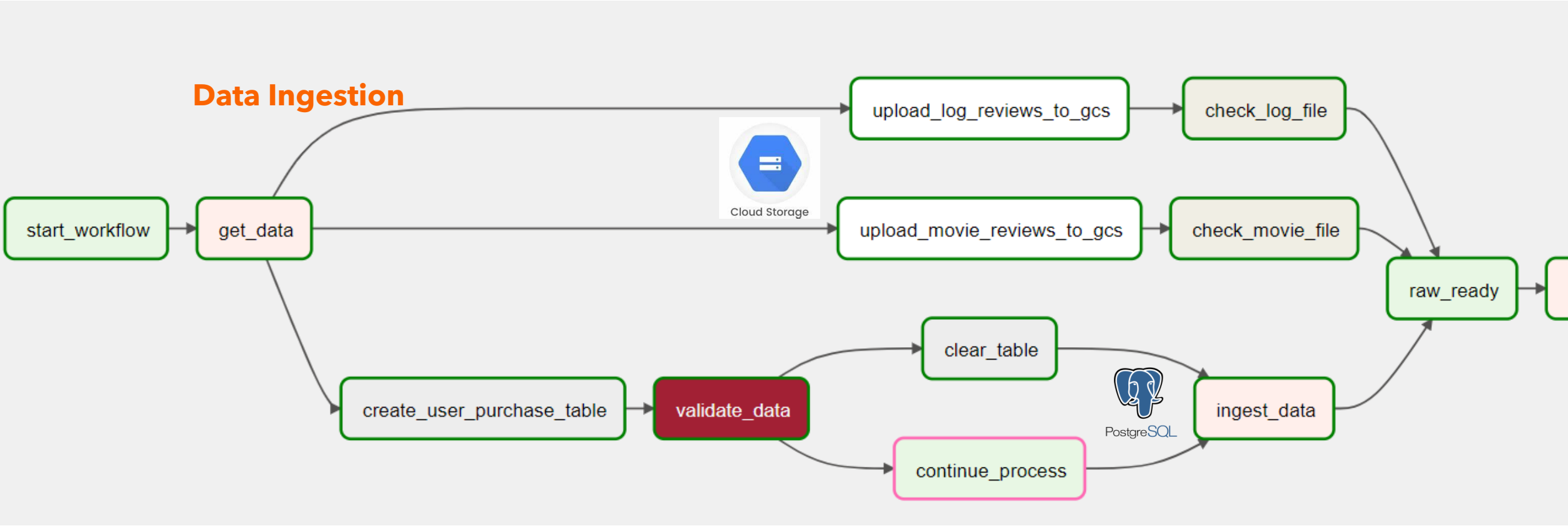


One end-to-end solution

Connections

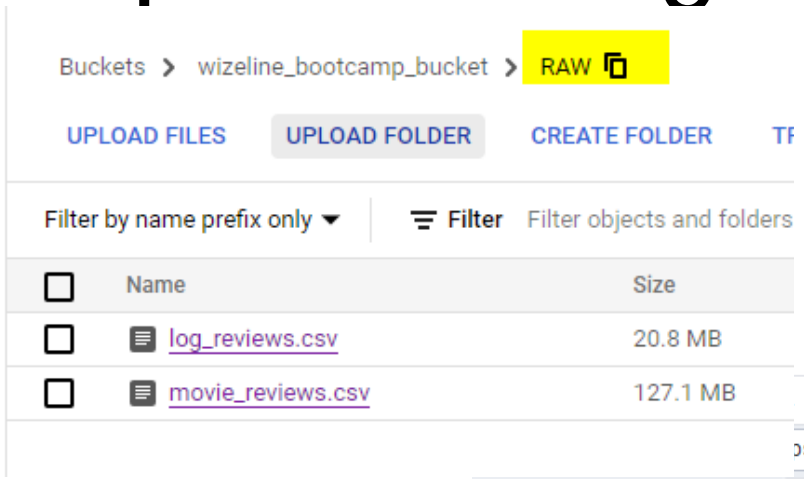
Conn Id	Conn Type	Description	Host	Port
capstone_postgres	postgres		34.41.179.52	5432
gcp_default	google_cloud_platform			

Pipeline – load data to RAW



- `user_purchase.csv` file into a PostgreSQL DB
- the last two CSV files (`movie_review.csv` and `log_reviews.csv`) into a cloud bucket

Pipelines – ingested data



Statistics | Dependencies | Dependents | Processes | public.user_purchase/capstone/sisoe@capstone

ostone/sisoe@capstone

100 rows

Query | Query History

Scratch Pad

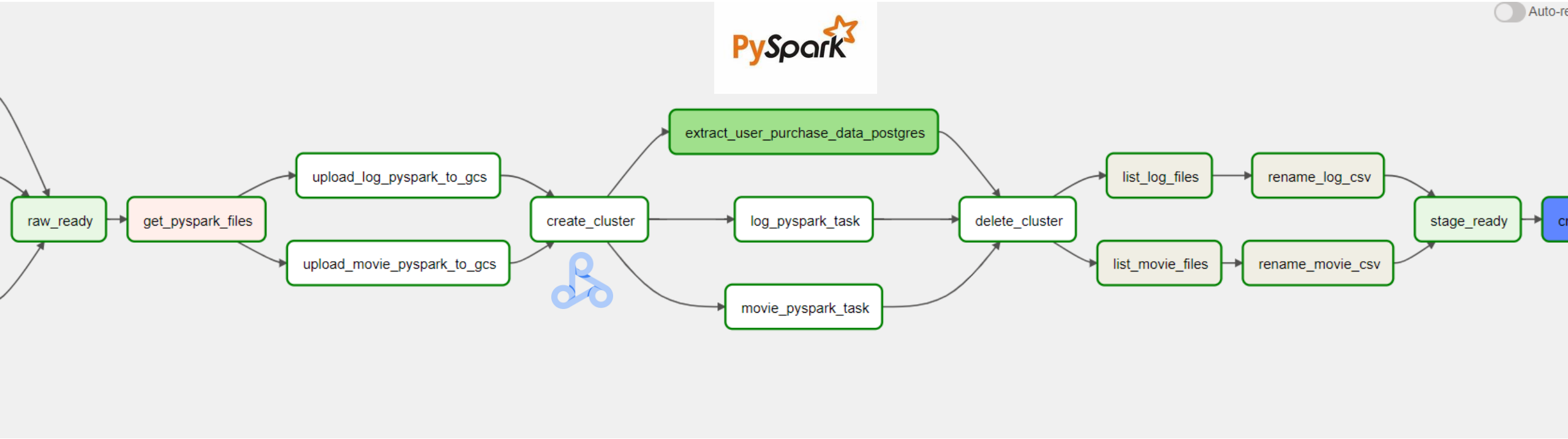
```
1  SELECT * FROM public.user_purchase
2  LIMIT 100
```

PostgreSQL

Data Output | Messages | Notifications

	invoice_number character varying (10)	stock_code character varying (20)	detail character varying (1000)	quantity integer	invoice_date timestamp without time zone	unit_price numeric (8,3)	customer_id integer	country character varying (20)
1	536365	85123A	WHITE HANGING HEART T-LIGHT HOLDER	6	2010-12-01 08:26:00	2.550	17850	United Kingdom
2	536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.390	17850	United Kingdom
3	536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.750	17850	United Kingdom
4	536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.390	17850	United Kingdom
5	536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.390	17850	United Kingdom
6	536365	22752	SET 7 BABUSHKA NESTING BOXES	2	2010-12-01 08:26:00	7.650	17850	United Kingdom
7	536365	21730	GLASS STAR FROSTED T-LIGHT HOLDER	6	2010-12-01 08:26:00	4.250	17850	United Kingdom
8	536366	22633	HAND WARMER UNION JACK	6	2010-12-01 08:28:00	1.850	17850	United Kingdom

Pipelines – RAW to STAGING



- **Transforming the data** by submitting a PySpark job into Dataproc
- Extracting the user_purchase data from PostGres
- Combining the part files from Spark into single csv files

Pipelines – RAW to STAGE

	Name	Size
☐	classified_movie_reviews.csv	1.3 MB
☐	classified_movie_reviews.csv/	–
☐	log_reviews_transformed.csv	6.9 MB
☐	log_reviews_transformed.csv/	–
☐	user_purchase.csv	45.4 MB

STAGE bucket

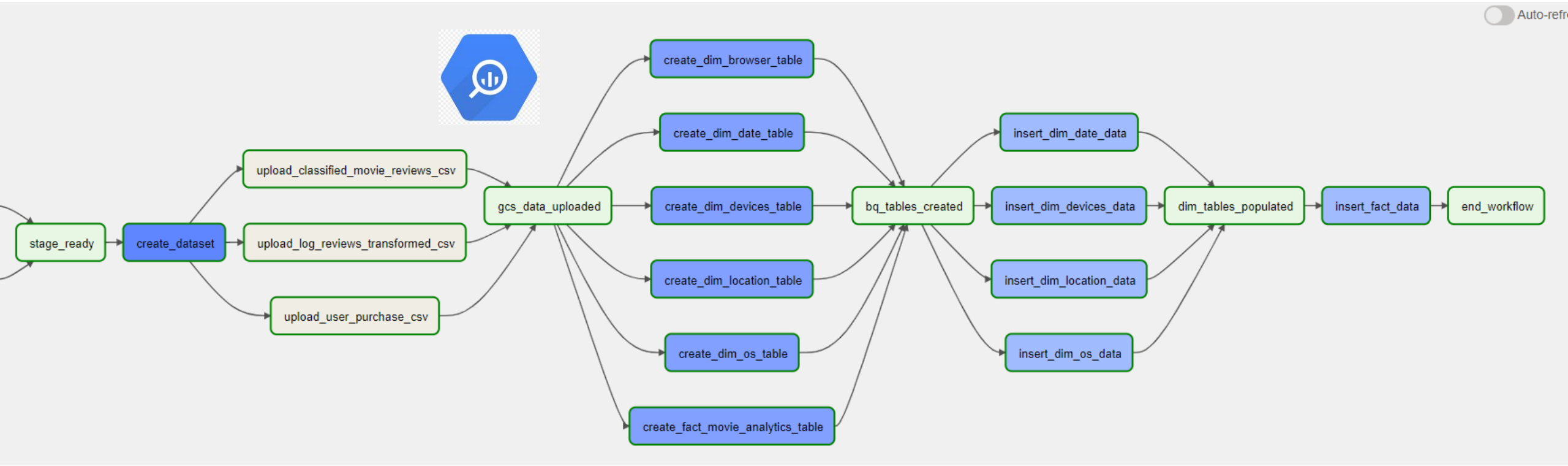
Review_logs.csv

	A	B	C	D	E	F	G
1	log_id	log_date	device	os	location	ip	phone_number
2	1	04-25-2021	Mobile	Apple iOS	Kansas	9.200.232.57	821-540-5777
3	2	03-13-2021	Tablet	Google Android	Oregon	9.200.232.57	819-102-1320
4	3	09-30-2021	Tablet	Apple iOS	Minnesota	9.200.232.57	989-156-0498
5	4	05-24-2021	Tablet	Apple MacOS	Arkansas	9.200.232.57	225-837-9935
6	5	02-01-2021	Tablet	Linux	New Hampshire	9.200.232.57	243-842-4562
7	6	07-23-2021	Tablet	Apple iOS	Pensylvania	9.200.232.57	694-501-4352
8	7	10-13-2021	Computer	Apple MacOS	New York	9.200.232.57	430-449-7136
9	8	09-18-2021	Computer	Microsoft Windows	California	9.200.232.57	633-661-7714
10	9	05-08-2021	Tablet	Apple MacOS	Washington	9.200.232.57	450-036-0504
11	10	03-04-2021	Tablet	Linux	Lousiana	9.200.232.57	738-536-6776
12	11	06-19-2021	Computer	Google Android	Minnesota	9.200.232.57	682-519-9021
13	12	03-23-2021	Mobile	Google Android	Arkansas	9.200.232.57	678-722-6084
14	13	04-08-2021	Mobile	Linux	Pensylvania	9.200.232.57	781-850-8167
15	14	06-29-2021	Mobile	Microsoft Windows	Lousiana	9.200.232.57	208-216-2106
16	15	10-20-2021	Computer	Linux	Idaho	9.200.232.57	693-854-2646
17	16	06-03-2021	Mobile	Linux	Montana	9.200.232.57	805-540-1405
18	17	05-27-2021	Tablet	Apple MacOS	Nebraska	9.200.232.57	896-134-1623
19	18	04-01-2021	Tablet	Apple MacOS	Alabama	9.200.232.57	850-716-4779
20	19	06-12-2021	Tablet	Google Android	Missouri	9.200.232.57	946-565-9757
21	20	05-09-2021	Computer	Google Android	Rhode Island	9.200.232.57	938-623-1577
22	21	05-30-2021	Computer	Microsoft Windows	California	9.200.232.57	544-505-5479
23	22	07-31-2021	Tablet	Apple MacOS	Mississippi	9.200.232.57	461-476-4022
24	23	03-21-2021	Tablet	Apple iOS	New Hampshire	9.200.232.57	756-517-6671
25	24	10-28-2021	Mobile	Microsoft Windows	Texas	9.200.232.57	560-069-9075
26	25	05-11-2021	Mobile	Google Android	West Virginia	9.200.232.57	480-164-5985

classified_movie_review.csv

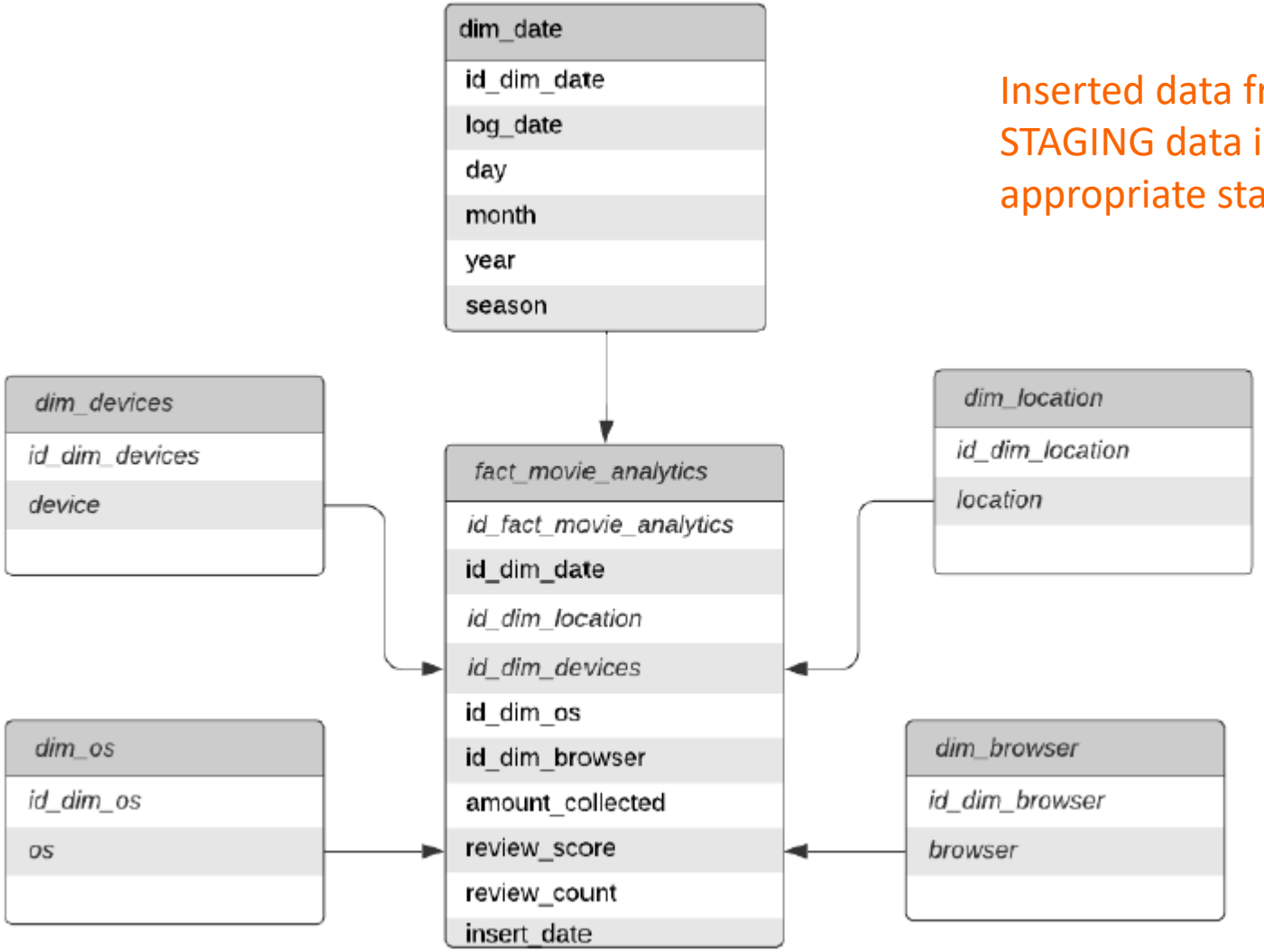
	A	B	C
1	user_id	positive_r	review_id
2	13756	0	1
3	15738	0	2
4	15727	0	3
5	17954	0	4
6	16579	1	5
7	14841	0	6
8	18085	0	7
9	16365	1	8
10	17912	0	9
11	15100	1	10
12	16781	0	11
13	16656	1	12
14	14390	1	13
15	17975	0	14
16	17616	0	15
17	14589	0	16
18	17629	0	17
19	13089	0	18

Pipelines – STAGING to Data Warehouse



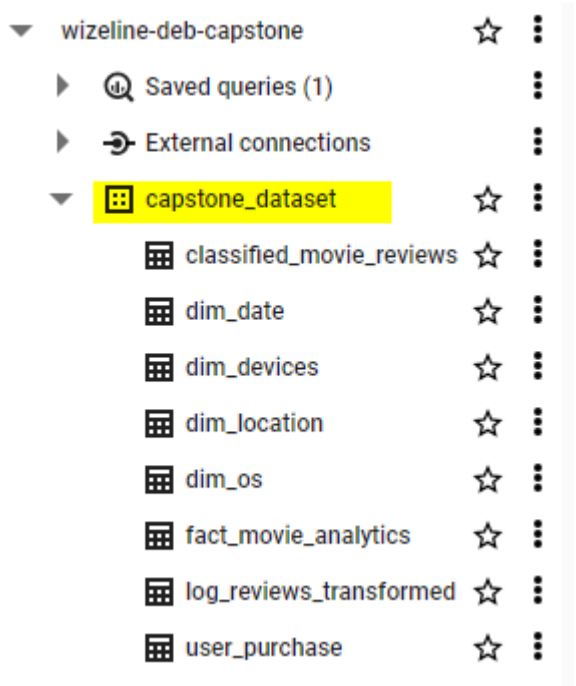
- Created a Data Warehouse structure for an external analytics team to be able to consume Data Warehouse data.
- Inserted data from the STAGING data into an appropriate star schema

Pipelines –Data Warehouse Schema



Inserted data from the STAGING data into an appropriate star schema

BigQuery (DW) - Analytics




```sql
SELECT COUNT(*) review_count FROM `wizeline-deb-capstone.capstone_dataset.log_reviews_transformed` AS lr
WHERE
  lr.location IN ('California', 'NY', 'Texas') AND
  lr.os LIKE '%Apple%' ;
```

Query results

JOB INFORMATION | RESULTS | CHART | PREVIEW | JSON | EXECUTION DETAILS | EXECUTION GRAPH

Row	review_count
1	1616

```sql
SELECT COUNT(*) review_count, lr.device  FROM `wizeline-deb-capstone.capstone_dataset.log_reviews_transformed` AS lr
WHERE
  lr.location IN ('California', 'NY', 'Texas') AND
  lr.os LIKE '%Apple%'
GROUP BY lr.device;
```

Query results

JOB INFORMATION | RESULTS | CHART | PREVIEW | JSON | EXECUTION DETAILS | EXECUTION GRAPH

Row	review_count	device
1	537	Mobile
2	558	Tablet
3	521	Computer

Challenges: TIME & INFRASTRUCTURE

- Building the infrastructure using terraform
- Understanding GCP
- Endless errors
- Inadequate Airflow documentation

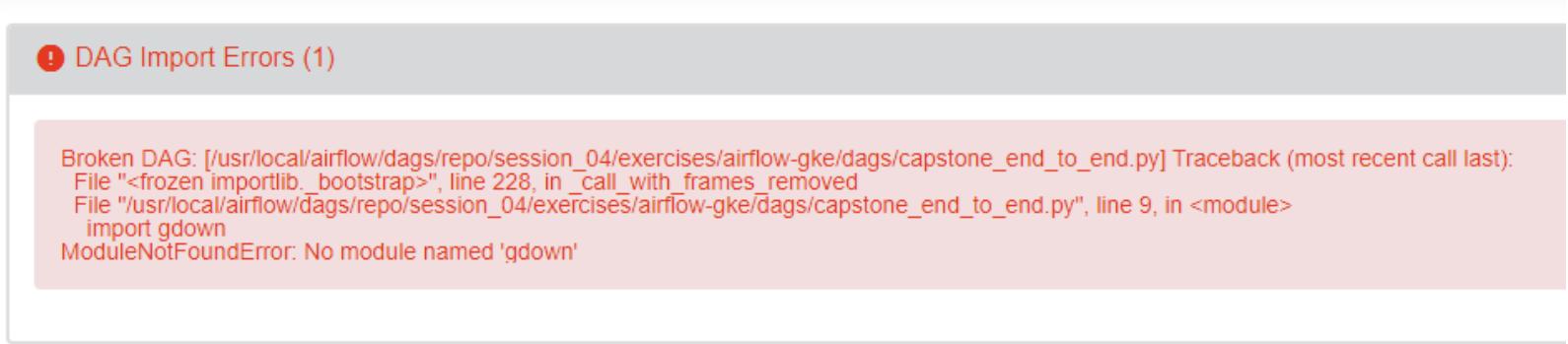
Challenges: Navigating GKE

airflow-values.yaml

```yaml
  ## if the git-sync sidecar container is enabled
  ##
  enabled: true
  ## the url of the git repo
  ##
  ## ____ EXAMPLE _________________
  ##  # https git repo
  ##  repo: "https://github.com/USERNAME/REPOSITORY.git"
  ##
  ## ____ EXAMPLE _________________
  ##  # ssh git repo
  ##  repo: "git@github.com:USERNAME/REPOSITORY.git"
  ##
  repo: "https://github.com/S-Ochoki/Wizeline-Google-Africa-DEB"
  ## the sub-path within your repo where dags are located
  ## - only dags under this path within your repo will be seen by airflow,
  ##  (note, the full repo will still be cloned)
  ##
  repoSubPath: "session_04/exercises/airflow-gke/dags"
  ## the git branch to check out
  ##
  branch: main
###################################
## DATABASE | PgBouncer
###################################
pgbouncer:
 ## if the pgbouncer Deployment is created
 ##
 enabled: false

airflow:
  extraPipPackages:
    - "gdown==4.7.1"
```

Challenges: DAG Errors



Challenges: Infrastructure knowledge

```
    File "/home/airflow/.local/lib/python3.9/site-packages/airflow/providers/google/common/hooks/base_google.py", line 475, in inner_wrapper
      return func(self, *args, **kwargs)
    File "/home/airflow/.local/lib/python3.9/site-packages/airflow/providers/google/cloud/hooks/dataproc.py", line 723, in wait_for_job
      raise AirflowException(f"Job failed:\n{job}")
airflow.exceptions.AirflowException: Job failed:
reference {
  project_id: "wizeline-deb-capstone"
  job_id: "2e3a0c51-e187-4256-a3db-ddf9ffe978cb"
}
placement {
  cluster_name: "wizeline-deb-dataproc"
  cluster_uuid: "7431a0ad-2443-40c5-a59d-46cf9f6ef31e"
}
pyspark_job {
  main_python_file_uri: "gs://wizeline_bootcamp_bucket/SPARK_JOB/movie_review_positive_sentiment.py"
}
status {
  state: ERROR
  details: "File not found: gs://wizeline_bootcamp_bucket/SPARK_JOB/movie_review_positive_sentiment.py"
  state_start_time {
    seconds: 1697067149
    nanos: 871776000
  }
}
status_history {
  state: PENDING
  state_start_time {
    seconds: 1697067024
    nanos: 227696000
  }
```

inaccurate file creation / storage

Lessons Learned

- Airflow
- IaC / Terraform
- Cloud vs On-premise
- Data storage options
- Data processing

Summary

It was a very good **experience**