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E-COMMERCE DATA PIPELINE & DATA INSIGHTS

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Agenda

1. Project Management Approach
2. Logical Data Pipeline Architecture
3. Platform Data Pipeline Architecture (2 Variations)
4. Data Warehouse Design
5. ELT Pipeline
6. Data Quality Testing
7. Data Analysis & Insights
8. Pipeline Orchestration

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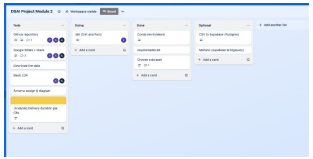
Trello



Project Management Strategy - Trello

- Trello was utilized for tracking project tasks and progress.
- Each team member has designated cards for their responsibilities.
- The board is organized into columns for 'To Do', 'In Progress', and 'Done'.
- Guide for daily meetings
- Able to give comments ensure clear communication and accountability

Benefits of Using Trello

- Visual organization enhances team collaboration and transparency.
- Easy to assign tasks and set deadlines within the platform.
- New ideas/links could be easily updated and read by team members
- Trello's mobile app allows team members to update tasks on the go.

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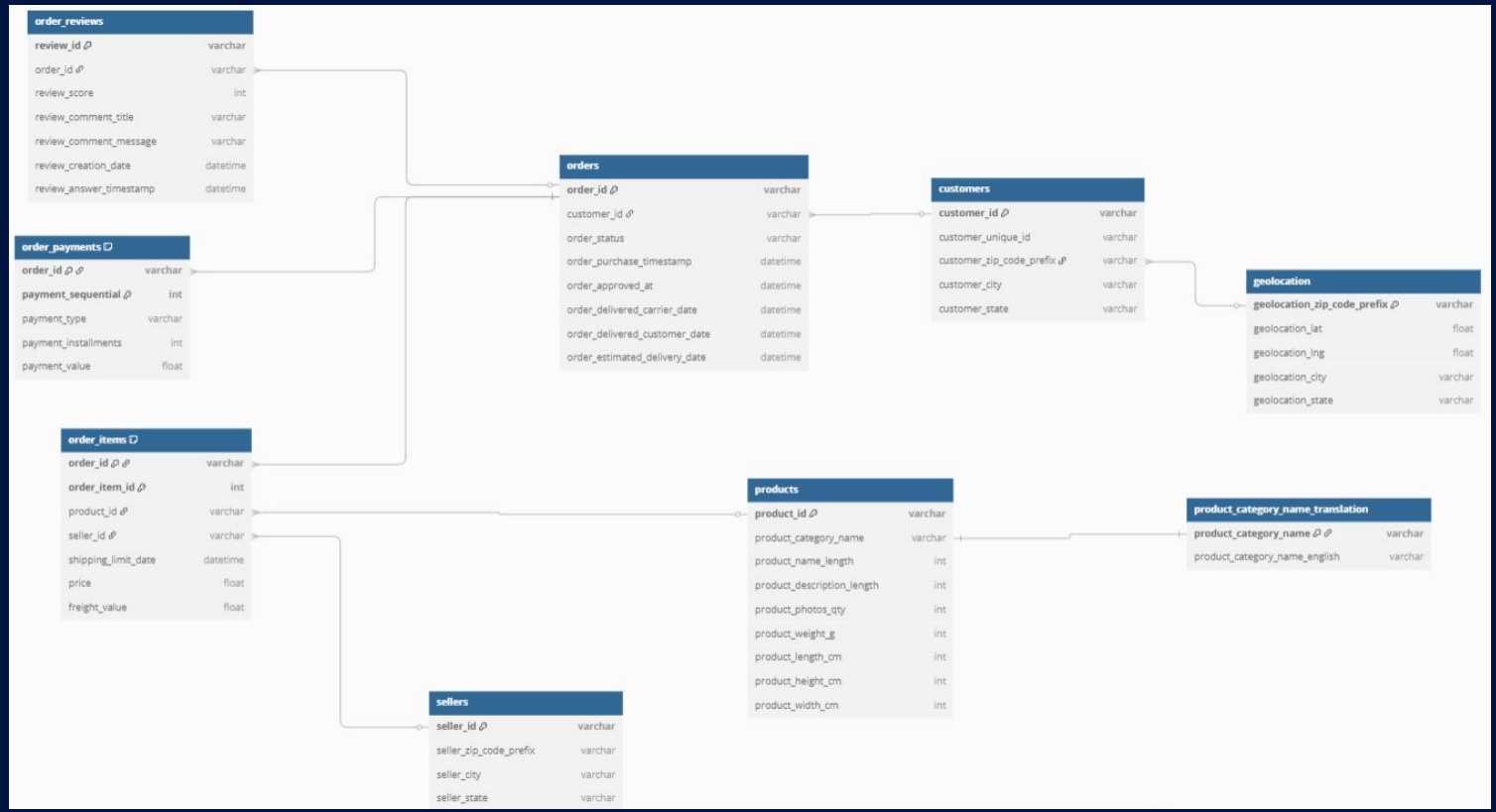
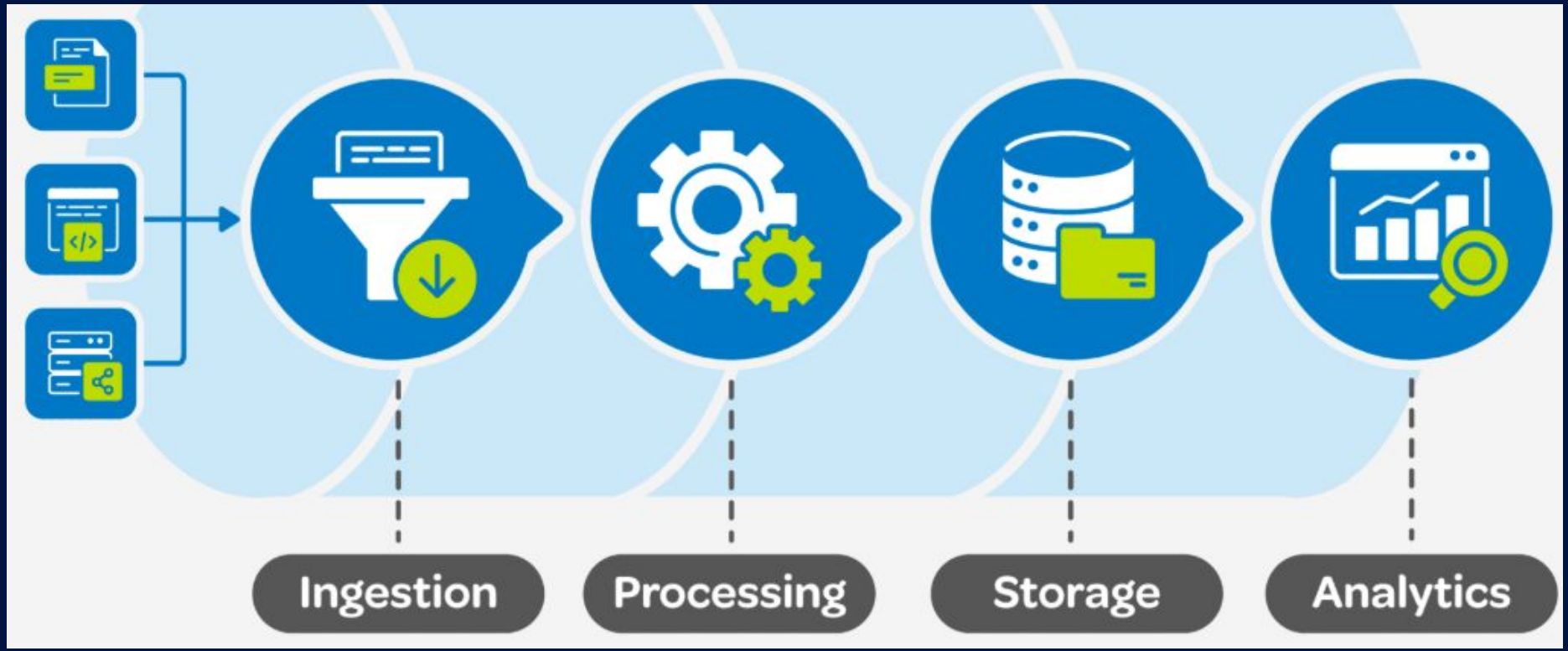
Source Data

Data set: Brazilian E-Commerce Public Dataset by Olist



Logical Data Pipeline Architecture



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Data Pipeline Architecture v 1.0

Data Source

Raw Data

Data Storage

BigQuery

Data Preparation

DBT

pandas_gbq

SQL

BI & Analytics

Python

Pandas

Plotly

Seaborn

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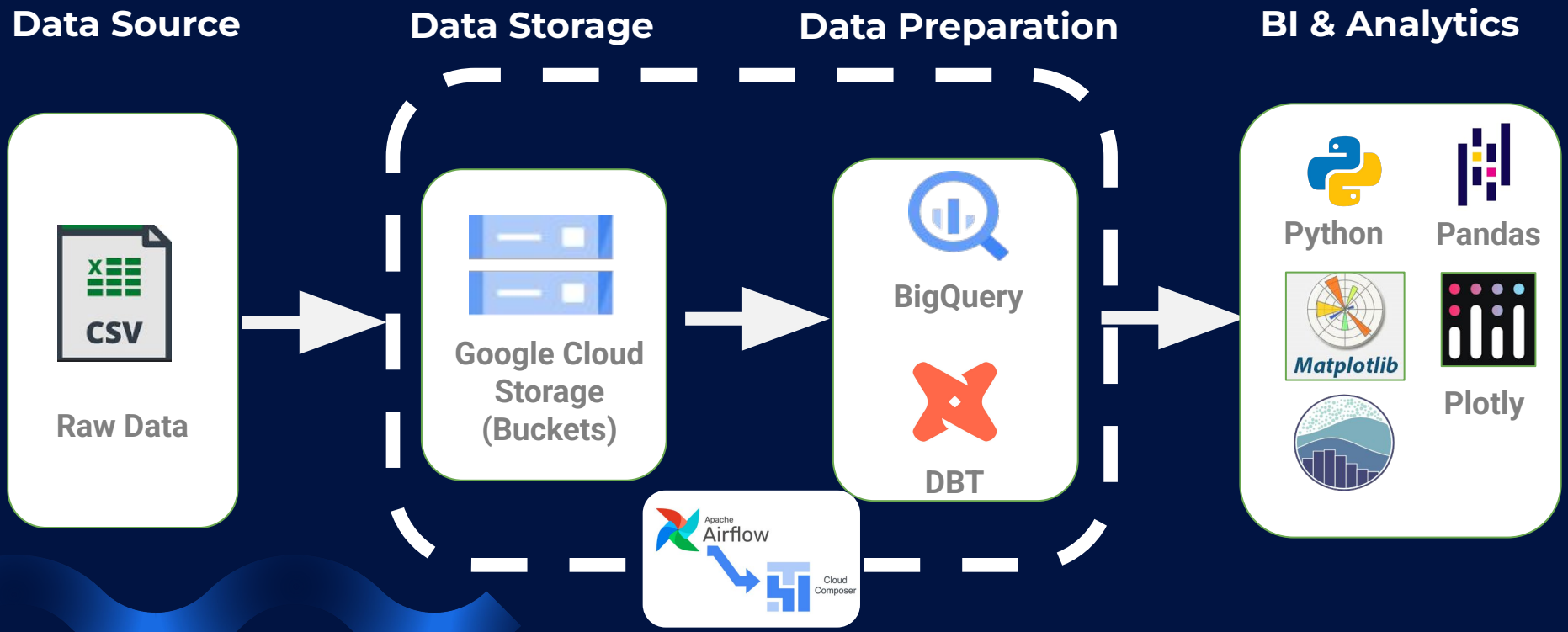
Data Pipeline Architecture v 2.0



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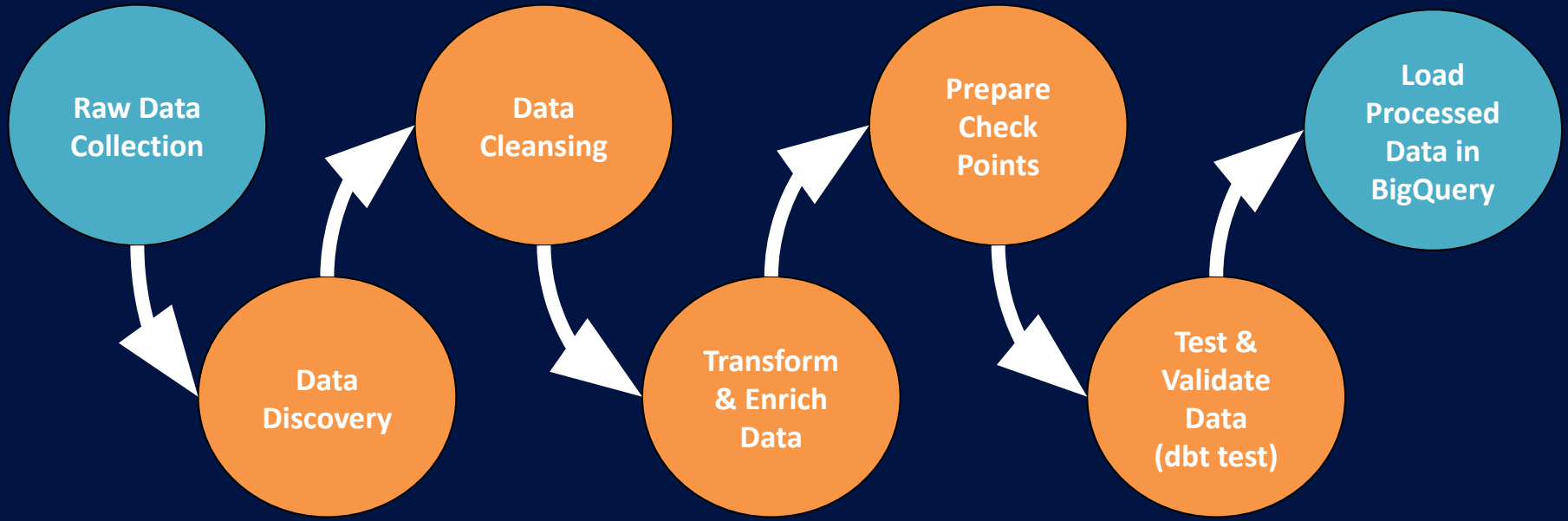
Data Preparation



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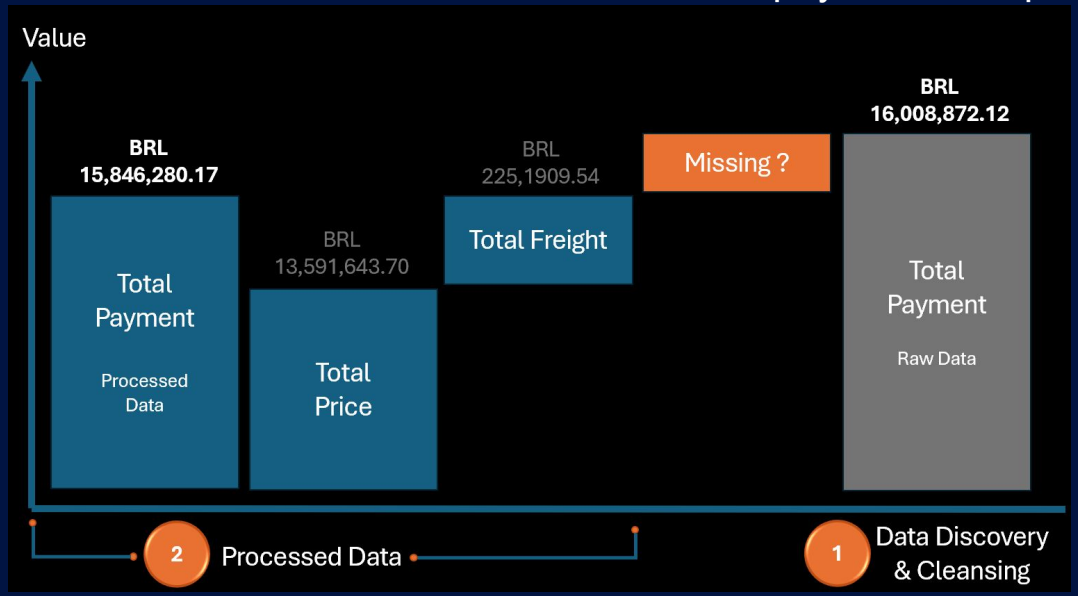
Data Exploration & Validation

Test Case:

Does the delivered order value match our payment receipts?



Test Case working files link

New Query : Checking **Missing Data**
Total : 833 payments transactions
776 distinct orders with BRL162,591.95

	order_status	order_status_count	price_sum
0	canceled	179	0.00
1	created	5	0.00
2	delivered	3	134.97
3	invoiced	2	0.00
4	shipped	1	0.00
5	unavailable	643	0.00

Check Point:
We accept ‘canceled’ status for dirty data.
But the rest of the transactions require to rectify and clean up up.

```yaml
models:
  - name: check_order_item_payment
    description: 'Model description'
    columns:
      - name: order_status
        description: Only 'canceled' status is acceptable here.
        tests:
          - dbt_utils.expression_is_true:
              expression: "{{ order_status }} = 'canceled'"
```

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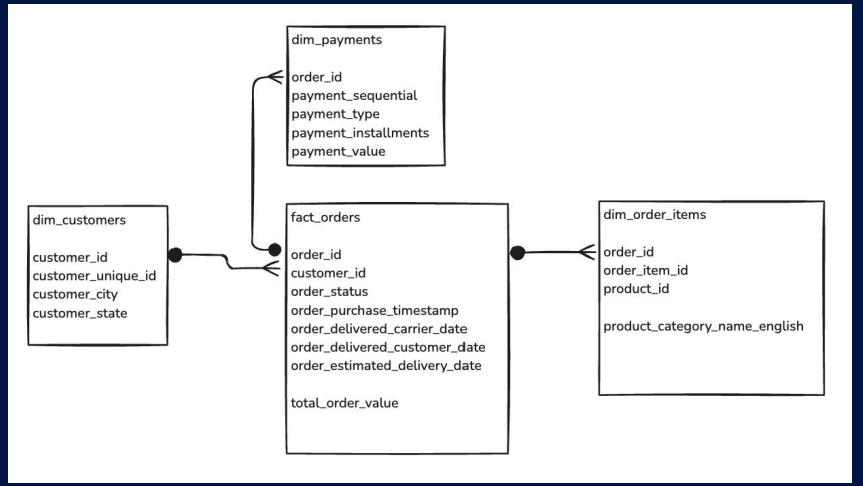
Data Warehouse Design (Star Schema)

Business Question: Providing Insights on Delivery Performance of Olist

1. Central Table — **fact_orders**
   a. Tracks every order placed, including key timestamps, delivery status, and total value.
      ➤ It's the heart of the schema where all delivery metrics are measured.
2. Customer Dimension — **dim_customers**
   a. Adds geographic context (city, state) to each order, enabling analysis of regional delivery trends and customer behavior.
3. Item Dimension — **dim_order_items**
   a. Breaks down orders into individual items with price, freight cost, and product category — crucial for understanding delivery cost drivers and product-based delays.
4. Payment Dimension — **dim_order_payments**
   a. Links payment methods and values to orders, allowing insights into how payment types affect delivery performance (e.g., delays with boleto payments).



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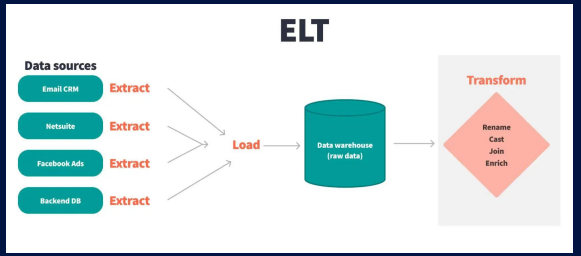
ELT Pipeline Features

1. **Transformation of Raw Data into a Star Schema Using dbt:**
   - Utilized dbt to structure the raw data into a star schema, enhancing query performance and simplifying data analysis.
   - Created SQL models to represent different dimensions and fact tables within the schema.

2. **Implementation of Data Cleaning and Validation Steps:**
   - Employed dbt's testing capabilities to ensure data quality by defining tests within the project, such as checking for uniqueness, non-null constraints, dbt_utilis functions

3. **Creation of Derived Columns:**
   - Developed additional metrics like **total_order_amount** within dbt models to enrich the dataset and provide deeper analytical insights.

4. **Exploratory Data Analysis Using Jupyter Notebooks:**
   - Utilized Jupyter Notebooks to perform exploratory data analysis on the transformed data, allowing for interactive examination and visualization of trends and patterns.



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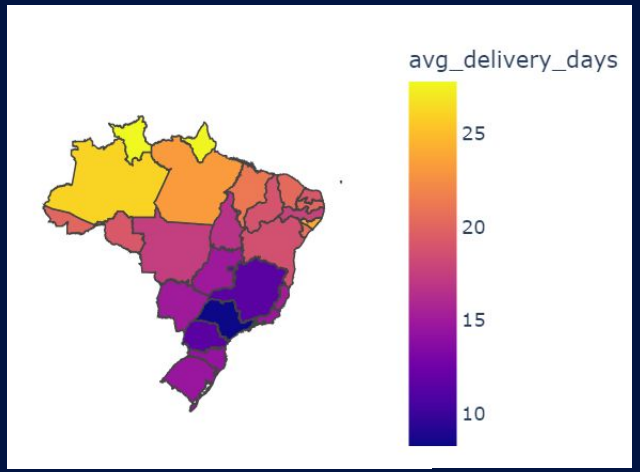
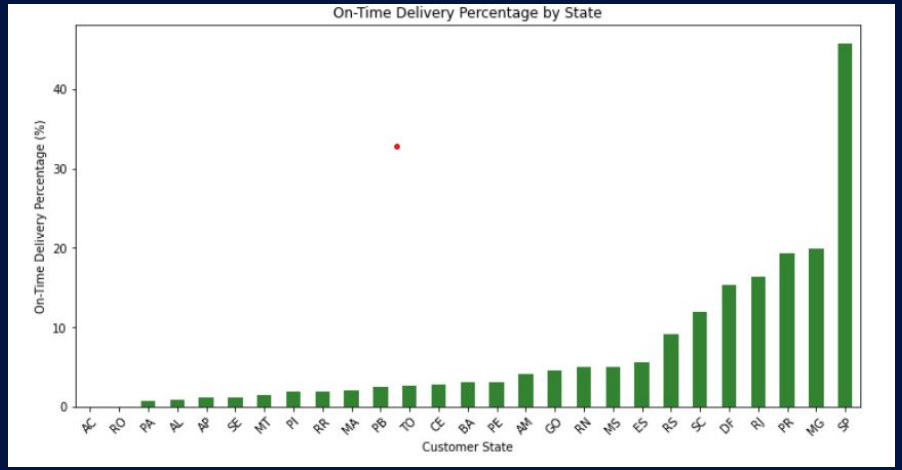
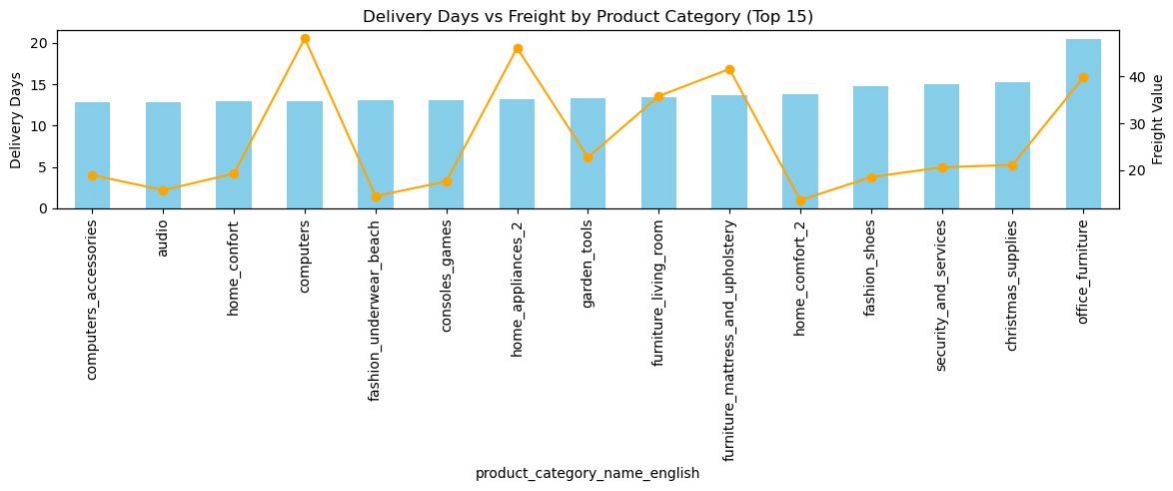
Data Analysis Insights

1) Northern States in Brazil had the highest average delivery dates





2) Bulkier Items show a stronger correlation to higher delivery times



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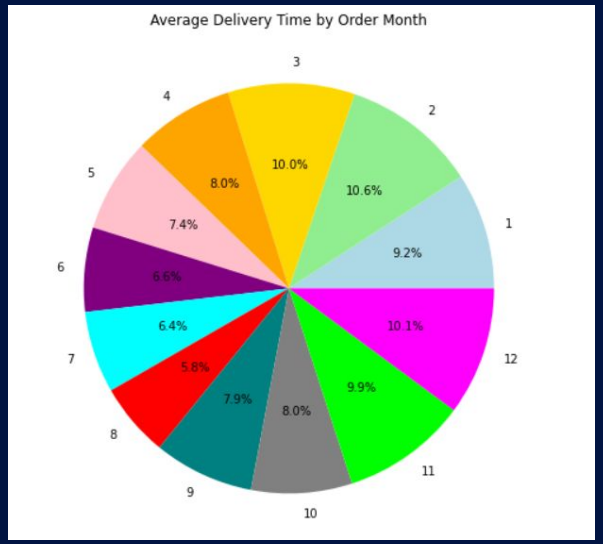
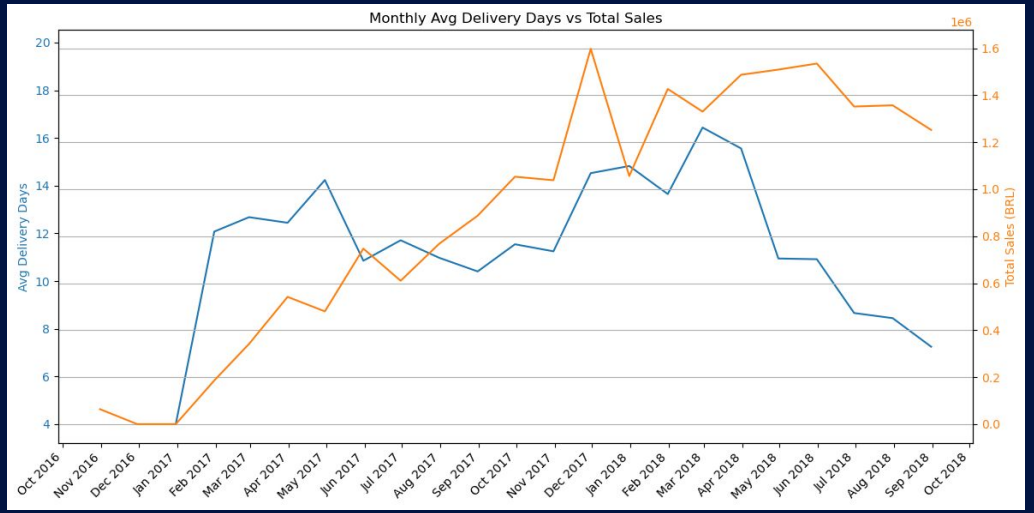
3) Delivery times peak in February, March, November, and December due to seasonal demand, holidays





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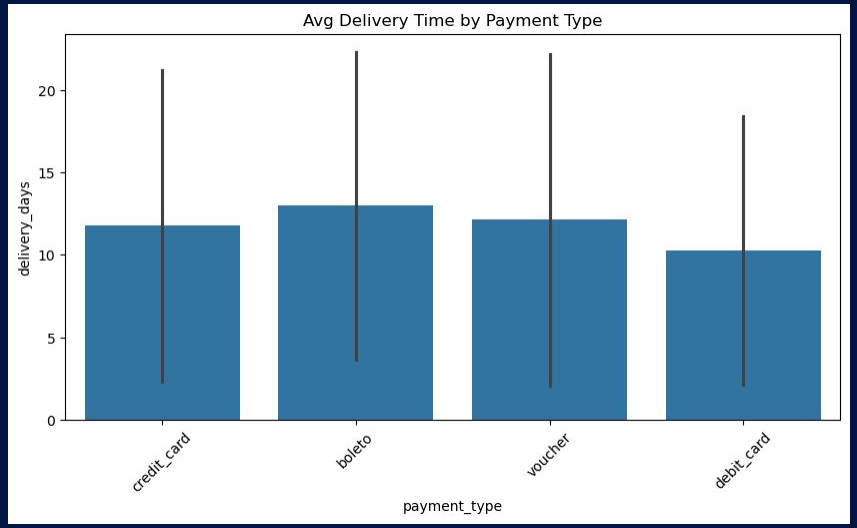
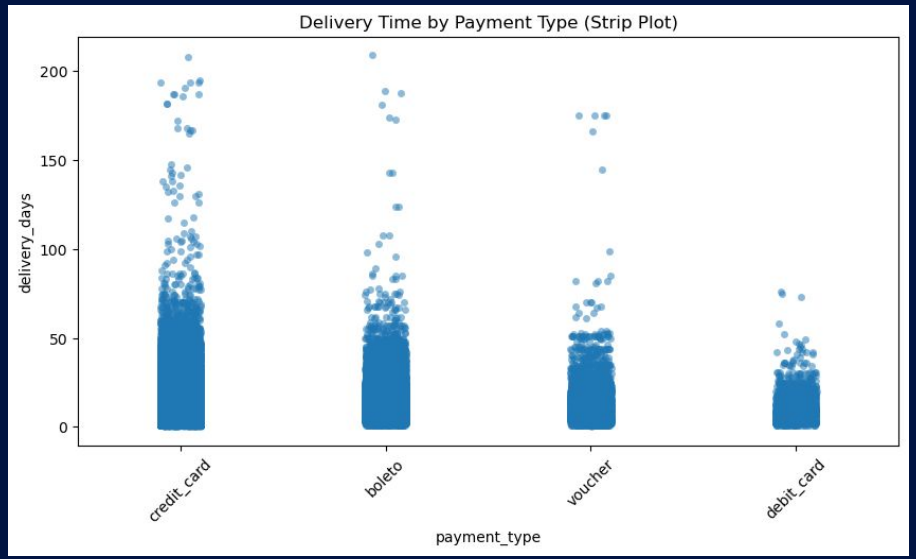
4) Boleto & Credit Card Transactions have higher delivery times





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Pipeline Orchestration - Google Cloud Composer

Managed service, using Apache Airflow.
Note: this orchestration pipeline is connected to a different dataset in BigQuery (composer_test) for the purpose of presentation.
The other parts of this Project uses the “brazil_e_commerce” dataset.

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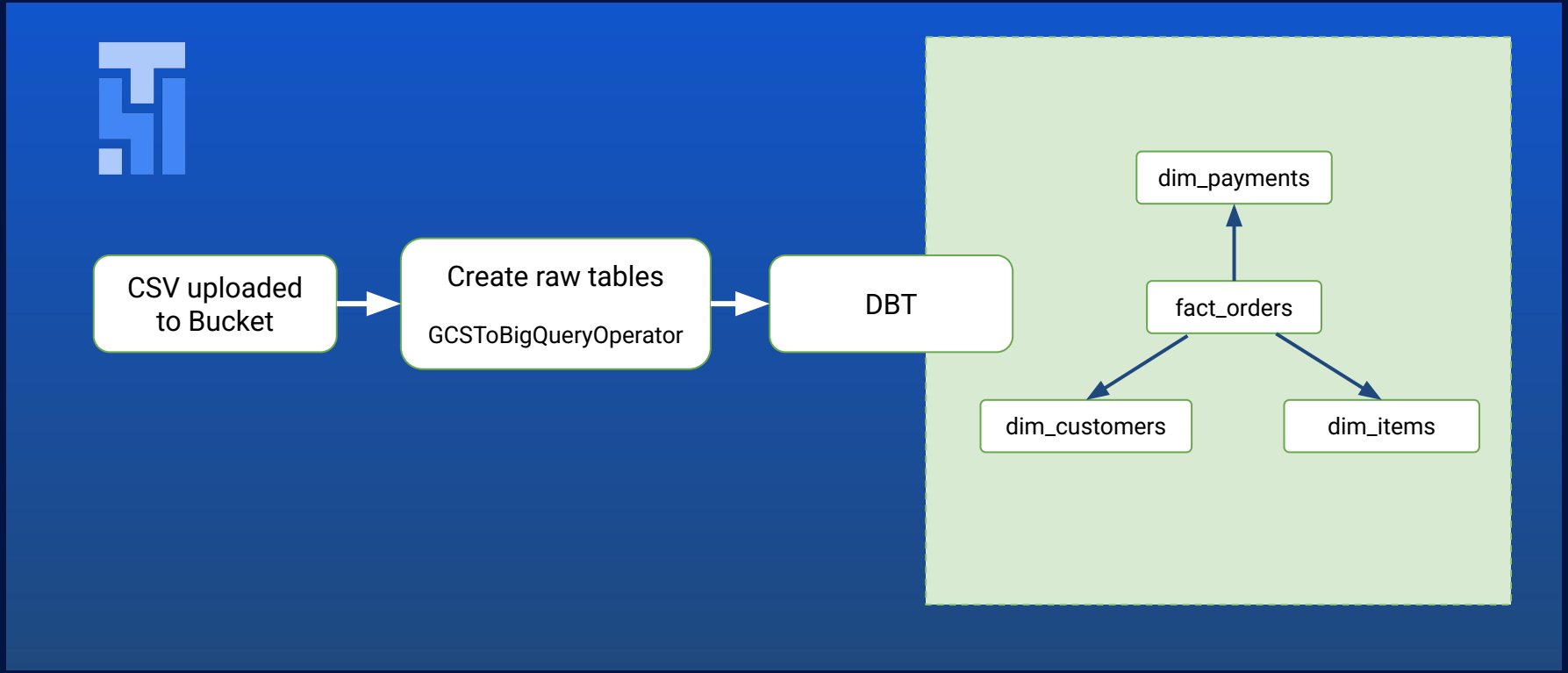
Data Pipeline in Google Cloud Composer



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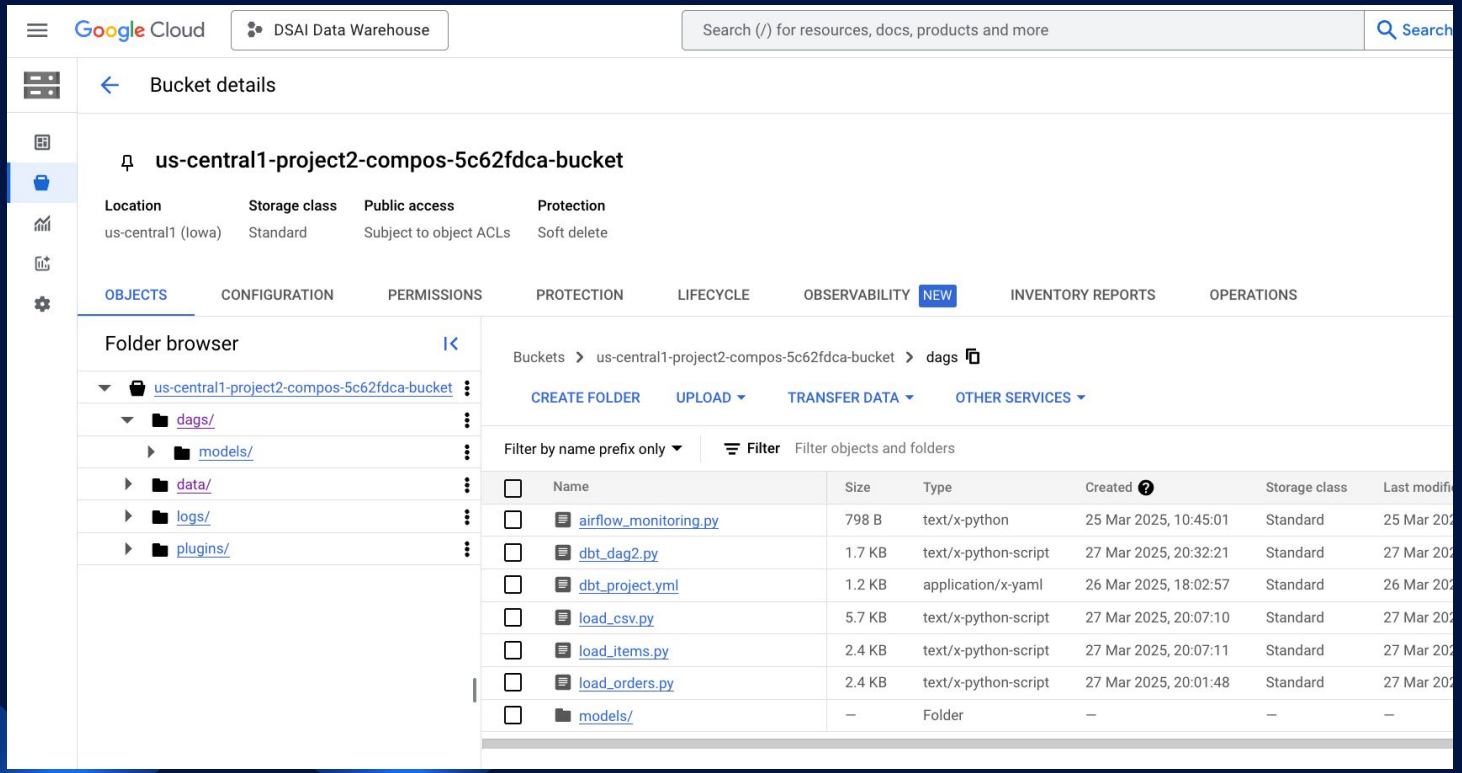
DAGs folder in Bucket



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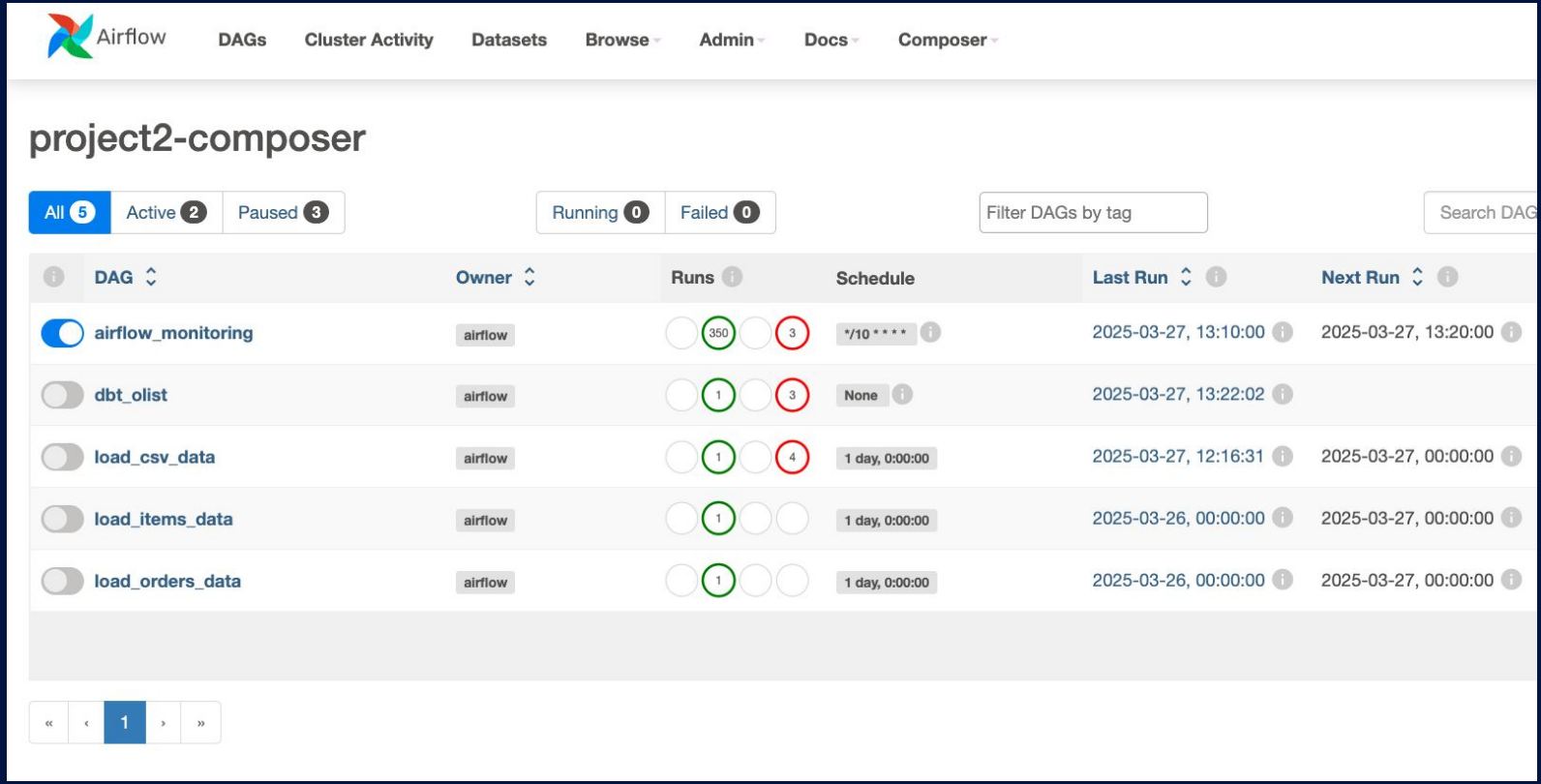
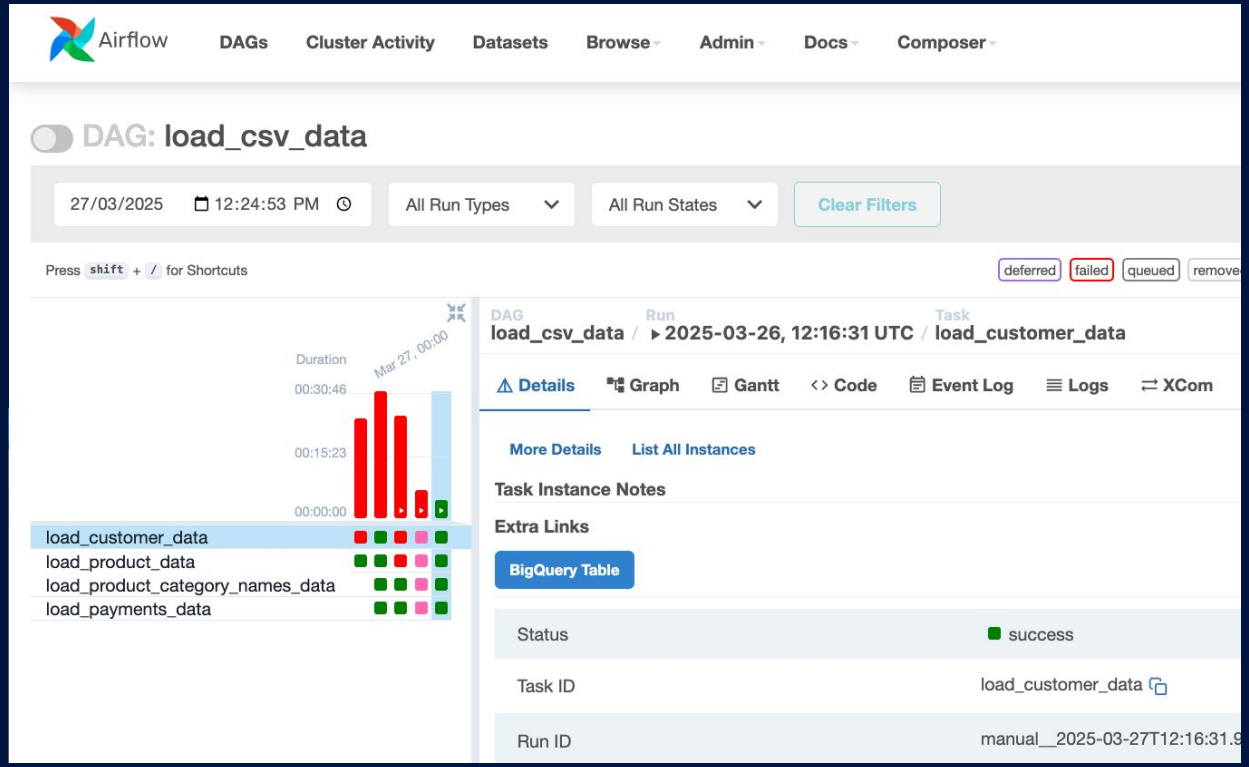
Airflow DAGs in Google Cloud Composer



load_csv_data DAG run logs



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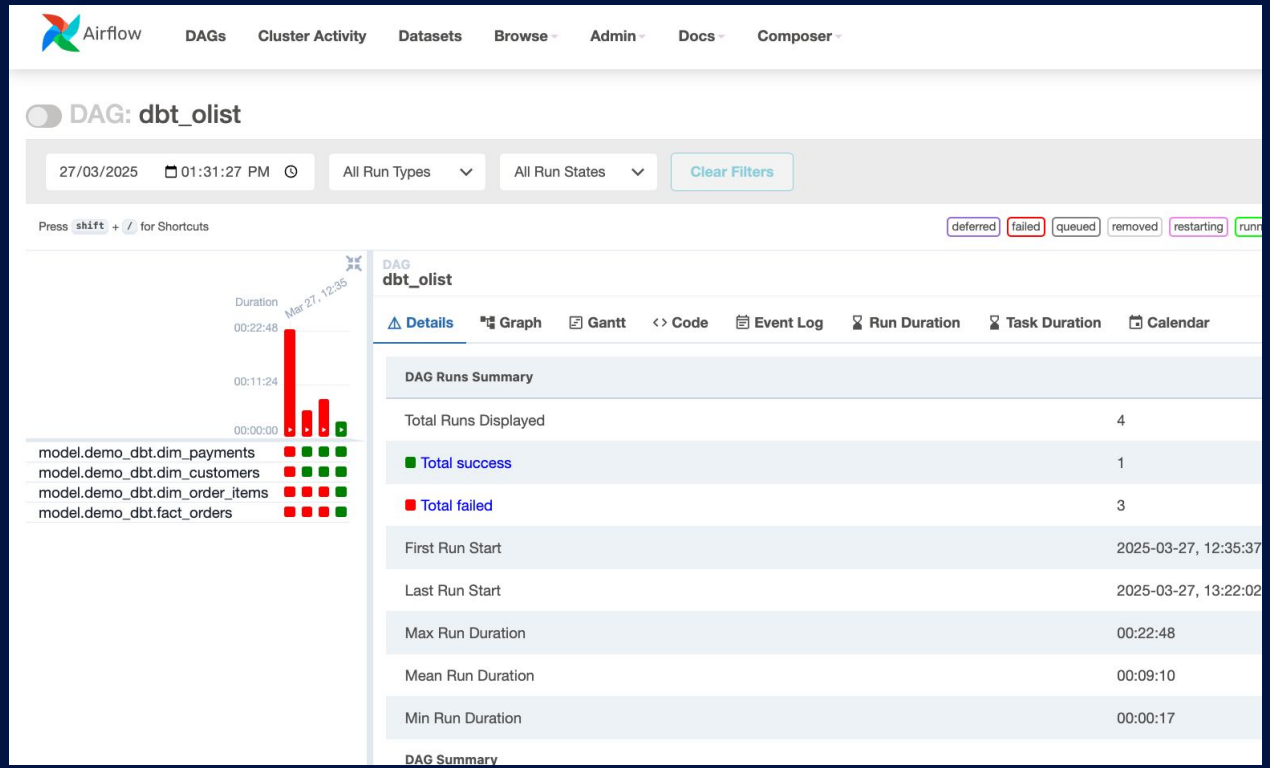
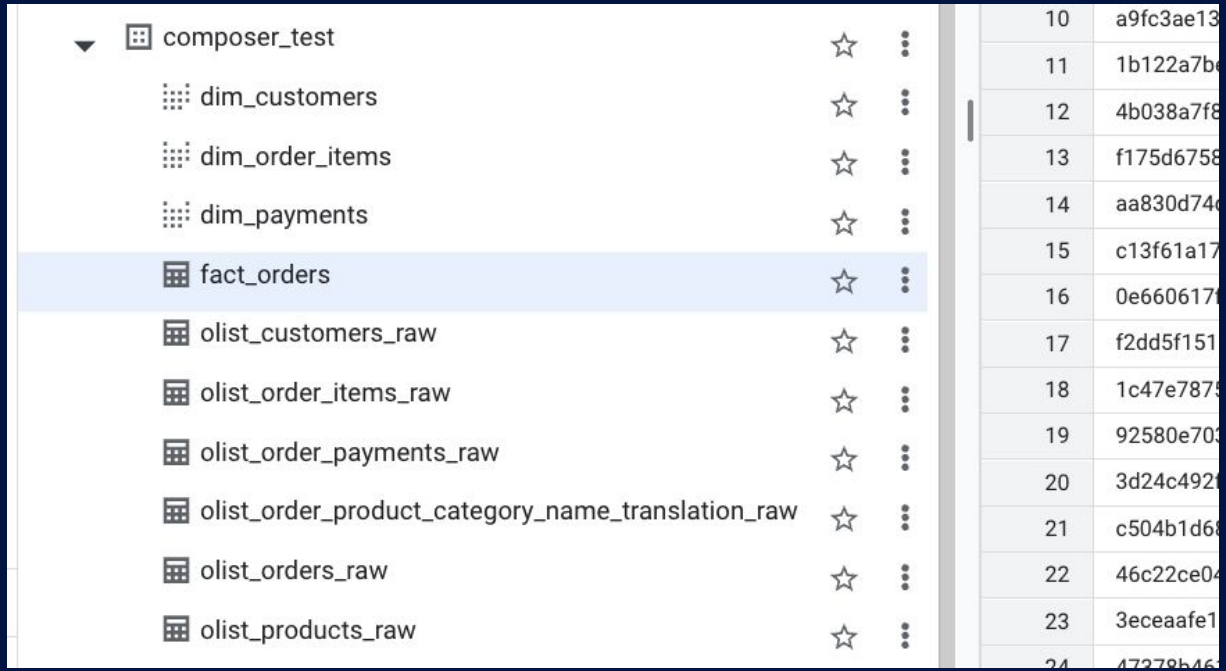
DBT running as DAG



Tables and Views in BigQuery



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THANK YOU

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