Data Analytics

BUSINESS ANALYSIS & CO:
A Data-Driven evaluation of Olist's performances

MOMBO Lionnel

December, 2025

Table of content

Table of Contents

Introduction

Business Use Case:

Brazil represents the largest e-commerce market in Latin America with a population of 213 million inhabitants. an ultra-connected population where the smartphone is largely ingrained in consumption habits. In this immense country with a unique geography and an economic disparity between the different segments of the population Brazil presents unique logistical and financial challenges. Olist (is a Brazilian e-commerce company founded on July 15 2015 in Curitiba) attempts to meet this challenge. his business model is a marketplace focused on providing technology solutions for e-commerce, primarily for small and medium-sized enterprises (SMEs) in Brazil. In this project, i try to identify some key indicators of the company.

Goal:

The goal of my project is to:

- Understand the company, his market and his model.
- Understand some key indicators that may drive his growth.
- Give suggestions in how to improve the performance of OLIST

High-level plan:

- Research about project topic
- Data collection
- Project scope
- Exploratory data analysis in Python (data wrangling, data cleaning)
- Visualization insights in Tableau
- Selection and creation of a database using MySQL
- Adding data to database and create Entity Relationship Diagram
- Data manipulation in SQL
- Data manipulation in Python
- Exposing data via API

Data and data sources

I have found a dataset on https://www.kaggle.com based on a popular Brazilian e-commerce: Olist Store. It's a public dataset of orders made at Olist.

The dataset has information of more than 100k orders from 2016 to 2018 made at multiple marketplaces in Brazil.

Its features allow viewing an order from multiple dimensions: from order status, price, payment type, payment, freight, customer location, product attributes.

This is real commercial data, it has been anonymized.

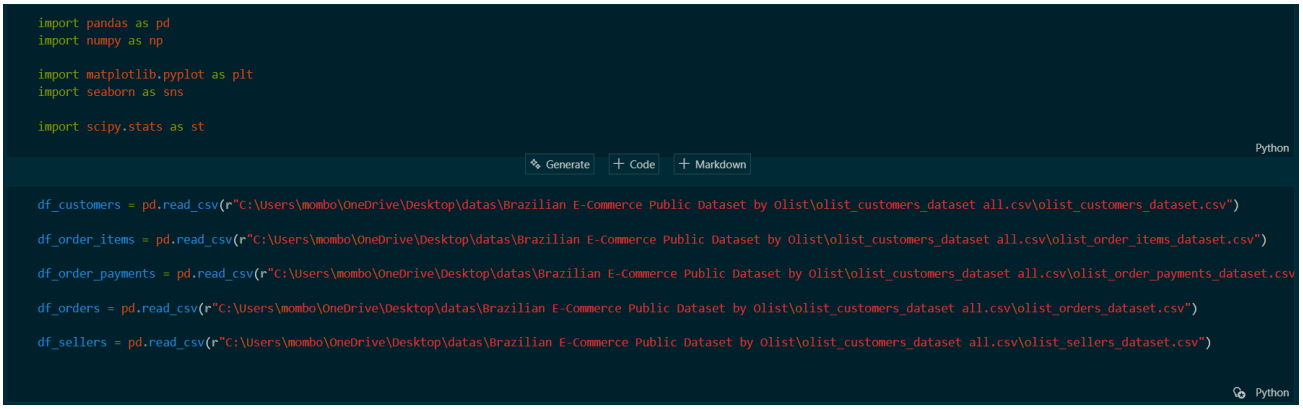
This dataset, i used for my project, called "Brazilian E-Commerce Public Dataset by Olist" from Kaggle, is composed of 5 sheets in csv format:

- Olist_customers _dataset
- Olist_order_items_dataset
- Olist_order_payments_dataset
- Olist_ orders _dataset
- Olist_sellers _dataset

Data cleaning and Exploratory data analysis

Data cleaning and Exploratory Data Analysis (EDA) was conducted on the 5 dataframes in Python.

The datasets has been integrated into Python using libraries like Pandas, Numpy …



```
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
import seaborn as sns

import scipy.stats as st
```

Python

Generate + Code + Markdown

```
df_customers = pd.read_csv(r"C:\Users\mombo\OneDrive\Desktop\datas\Brazilian E-Commerce Public Dataset by Olist\olist_customers_dataset all.csv\olist_customers_dataset.csv")

df_order_items = pd.read_csv(r"C:\Users\mombo\OneDrive\Desktop\datas\Brazilian E-Commerce Public Dataset by Olist\olist_customers_dataset all.csv\olist_order_items_dataset.csv")

df_order_payments = pd.read_csv(r"C:\Users\mombo\OneDrive\Desktop\datas\Brazilian E-Commerce Public Dataset by Olist\olist_customers_dataset all.csv\olist_order_payments_dataset.csv

df_orders = pd.read_csv(r"C:\Users\mombo\OneDrive\Desktop\datas\Brazilian E-Commerce Public Dataset by Olist\olist_customers_dataset all.csv\olist_orders_dataset.csv")

df_sellers = pd.read_csv(r"C:\Users\mombo\OneDrive\Desktop\datas\Brazilian E-Commerce Public Dataset by Olist\olist_customers_dataset all.csv\olist_sellers_dataset.csv")
```

Python

Each dataframe was checked:

 # df_customers
 # df_order_items
 # df_order_payments
 # df_orders
 # df_sellers

- Checking number of observations

```
df_customers.shape
```

✓ 0.0s

```
(99441, 5)
```

- Checking for informations

```
df_sellers.info()
```

✓ 0.0s

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3095 entries, 0 to 3094
Data columns (total 4 columns):
 #   Column                 Non-Null Count  Dtype 
---  ------                 --------------  ----- 
 0   seller_id              3095 non-null   object
 1   seller_zip_code_prefix  3095 non-null   int64 
 2   seller_city            3095 non-null   object
 3   seller_state           3095 non-null   object
dtypes: int64(1), object(3)
memory usage: 96.8+ KB
```

- Checking for composition of column

```
df_sellers["seller_state"].value_counts().head(2)
```

✓ 0.0s

```
seller_state
SP    1849
PR     349
Name: count, dtype: int64
```

```
df_sellers["seller_state"].nunique()
```

✓ 0.0s

```
23
```

- Handling null values

```
df_sellers.isna().sum()
```

✓ 0.0s

```
seller_id                0
seller_zip_code_prefix    0
seller_city              0
seller_state             0
dtype: int64
```

- Checking for duplicates

```
df_sellers.duplicated().sum(),
```
✓ 0.0s

```
(np.int64(0),)
```

- Complete statistical column summary

```
df_sellers.describe()
```
✓ 0.0s

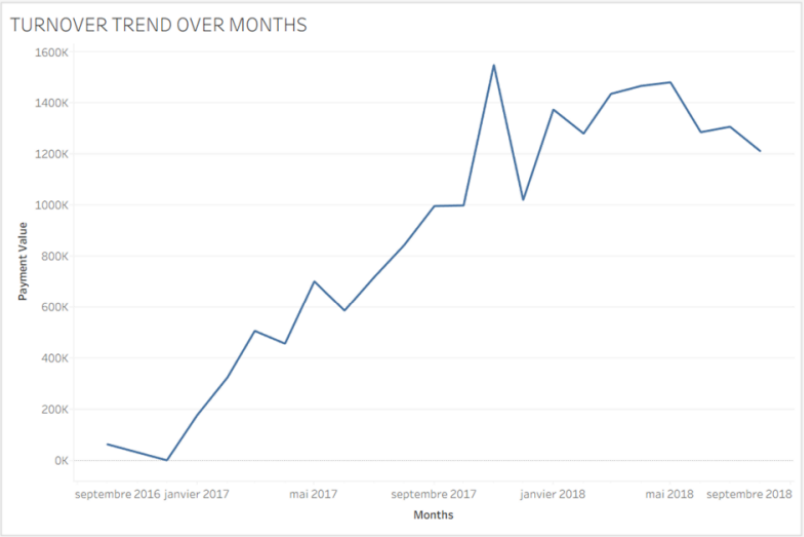
	seller_zip_code_prefix
count	3095.000000
mean	32291.059451
std	32713.453830
min	1001.000000
25%	7093.500000
50%	14940.000000
75%	64552.500000
max	99730.000000

- Convert the specified columns to datetime format

```
#specify date columns
date_columns = ['order_purchase_timestamp', 'order_approved_at','order_delivered_carrier_date',
                'order_delivered_customer_date', 'order_estimated_delivery_date','shipping_limit_date']

# Convert the specified columns to datetime format
for col in date_columns:
    df_all[col] = pd.to_datetime(df_all[col])
```
✓ 0.1s

Visualizations

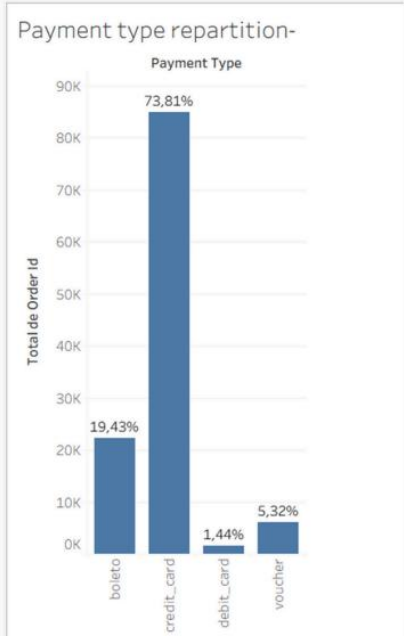
TURNOVER TREND OVER MONTHS



Years	Quaters	Turnover
2016	T4	62 611
2017	T1	1 005 928
	T2	1 742 629
	T3	2 554 846
	T4	3 567 225
2018	T1	4 089 537
	T2	4 232 672
	T3	2 517 948
	TOTAL	**19 773 395**

- Turnover was very low until January 2017. This period represents a very slow start-up phase.
- Accelerated Growth between May 2017 and January 2018
- Period of stabilization at a high level between January 2018 and September 2018

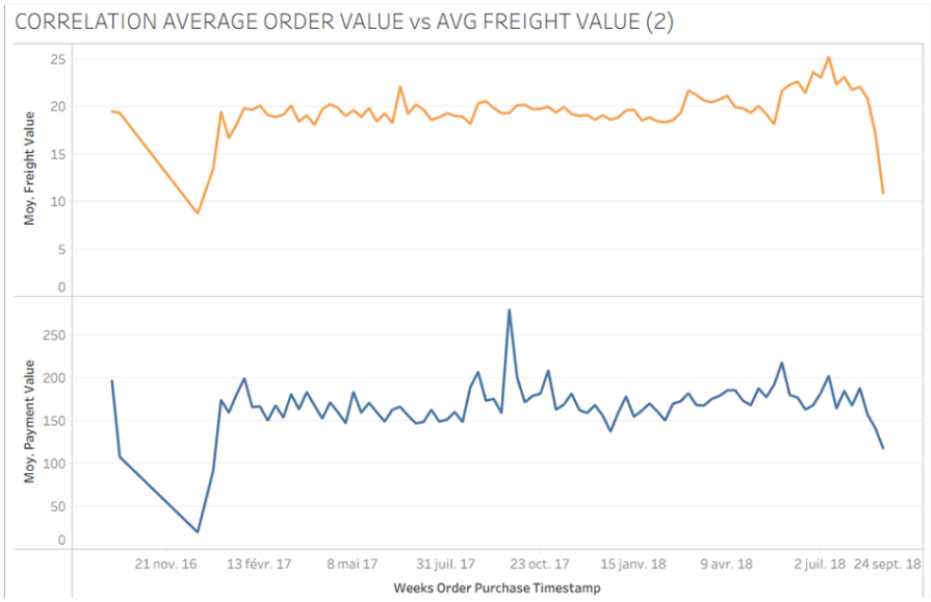
PAYMENT TYPE REPARTITION



Payment type repartition		
payment_type	Number of order	Pourcentage
Credit_card	84 895	73,81%
Boleto	22 347	19,43%
Voucher	6 123	5,32%
Debit_card	1 653	1,44%

- This suggests that the platform is heavily geared towards instant transactions.
- Boleto represents an important alternative for customers who do not have access to a credit card.

CORRELATION AVERAGE ORDER VALUE vs AVG FREIGHT VALUE



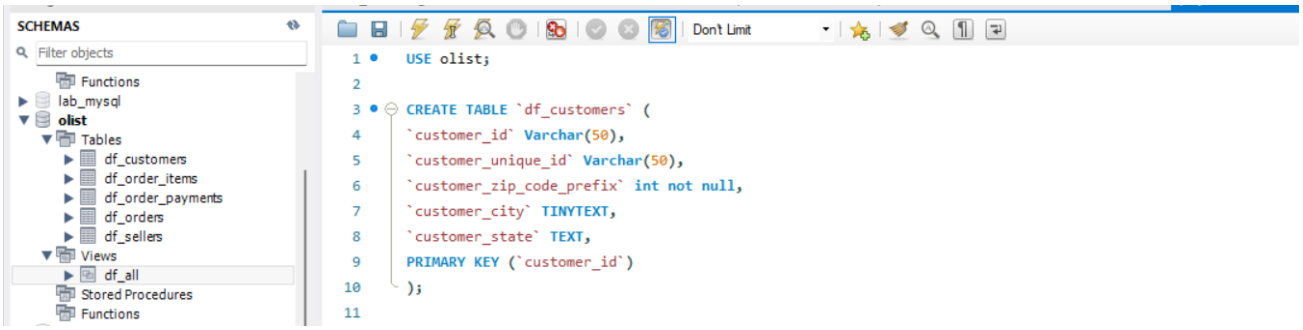
- AOV is a fundamental metric in e-commerce.It allows companies to increase their profitability and revenue without having to acquire new customers. It also allows companies to evaluate their marketing campaigns effectiveness.

$$AOV = \frac{TURNOVER}{NUMBER\ OF\ ORDERS}$$

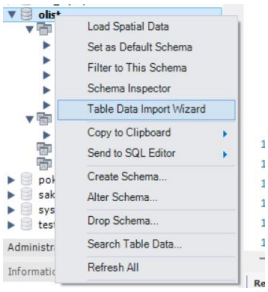
Database type selection

Once the data has been cleaned using Python, I sat up the database design phase, focusing on organization and normalization to ensure efficient data exploitation. I used MySql workbench.

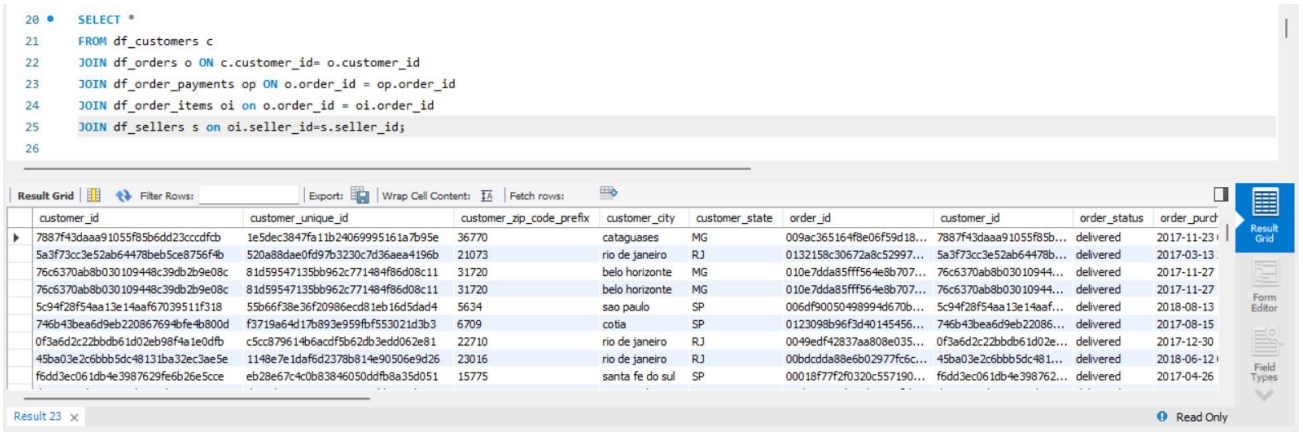
To integrate data into MySql workbench, I created the database Olist with 5 tables.



I imported data using the function Create table and the button Table Data Import Wizard.

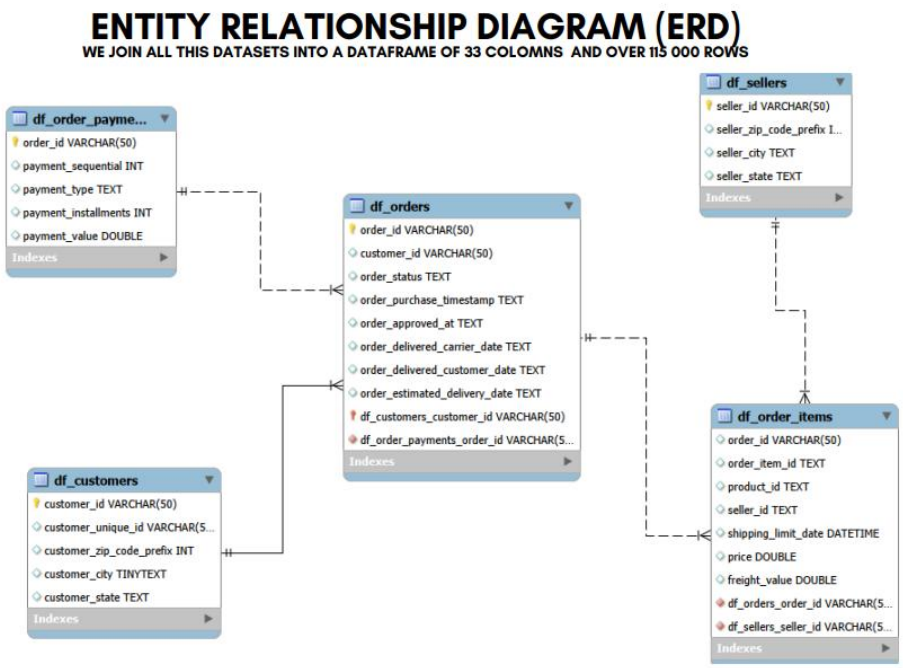


Aggregation tables were created, as well as the relationships between the tables, using queries:



Entities. ERD

The following image represents the Entities Relationship Diagram (ERD-MYSQL) of the Brazilian e-commerce company olist used in my project.



Database's Queries

In order to Understand some key factors that may drive his growth, I conducted certain queries.

- Creating view: Aggregating multiple columns from different table

```sql
CREATE VIEW df_all AS
SELECT
    o.order_id,
    o.order_purchase_timestamp,
    o.order_approved_at,
    o.order_delivered_customer_date,
    op.payment_type,
    op.payment_value,
    oi.product_id,
    oi.price,
    oi.freight_value,
    s.seller_id,
    s.seller_city
FROM df_customers c
JOIN df_orders o ON c.customer_id = o.customer_id
JOIN df_order_payments op ON o.order_id = op.order_id
JOIN df_order_items oi ON o.order_id = oi.order_id
JOIN df_sellers s ON oi.seller_id = s.seller_id;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

order_id	order_purchase_timestamp	order_approved_at	order_delivered_customer_date	payment_type	payment_value	product_id	price	freight_value
00d8d65b666158b633f96054d31af43b	2017-10-13 19:57:48	2017-10-17 04:24:35	2017-11-07 20:38:45	boleto	130.88	a0450529bd974ebeaf93b1731184396a	94.9	35.98
009ac365164f8e06f59d18a08045f6c4	2017-11-23 00:03:52	2017-11-23 00:11:24	2017-11-29 16:33:25	voucher	8.75	35557c68a22ecebcf066e25ca2ddc144	16.9	15.1
019bdbaef5b5121c9b1811976aa510a5	2018-05-08 11:08:03	2018-05-10 03:36:39	2018-05-18 20:30:44	boleto	108.64	eb6c2ecde53034fc9ec47741b3232c9d	35	19.32
019bdbaef5b5121c9b1811976aa510a5	2018-05-08 11:08:03	2018-05-10 03:36:39	2018-05-18 20:30:44	boleto	108.64	eb6c2ecde53034fc9ec47741b3232c9d	35	19.32
0132158c30672a8c52997a2492613ec2	2017-03-13 23:23:23	2017-03-13 23:23:23	2017-03-15 09:27:54	credit_card	413.31	e9eebb8e8ba0fadb9020f8ba1c003b48	399.9	13.41

- Calculate turnover by year

```sql
SELECT
    YEAR(order_purchase_timestamp) AS year,
    ROUND(SUM(payment_value),2) AS turnover
FROM
    df_all
GROUP BY
    YEAR(order_purchase_timestamp)
ORDER BY
    year;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

year	turnover
2016	62611.27
2017	8870627.51
2018	10840155.92

Result 6

- Calculate turnover by city (the 5 highest revenues per city)

```sql
SELECT
    seller_city,
    ROUND(SUM(payment_value), 2) AS turnover
FROM
    df_all
GROUP BY
    seller_city
ORDER BY
    turnover DESC
LIMIT 5;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

seller_city	turnover
sao paulo	4143574.49
ibitinga	1037016.06
curitiba	631504.72
itaquaquecetuba	571007.34
guarulhos	483201.68

- Calculate AVERAGE ORDER VALUE (AOV) by quarter

```sql
SELECT
    CONCAT(YEAR(order_purchase_timestamp), '-Q', QUARTER(order_purchase_timestamp)) AS QUARTER,
    FORMAT(SUM(payment_value) / COUNT(DISTINCT order_id), 2, 'fr_FR') AS AOV
FROM
    df_all
GROUP BY
    QUARTER
ORDER BY
    QUARTER;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

QUARTER	AOV
2016-Q4	231,04
2017-Q1	203,84
2017-Q2	193,99
2017-Q3	209,17
2017-Q4	206,45
2018-Q1	198,25
2018-Q2	215,48
2018-Q3	201,32

- Calculate average delivery time by year

```sql
SELECT
    YEAR(order_purchase_timestamp) AS year,
    ROUND(AVG(DATEDIFF(order_delivered_customer_date, order_approved_at)), 2) AS avg_delivery_time_days
FROM
    df_all
WHERE
    order_delivered_customer_date IS NOT NULL
GROUP BY
    year
ORDER BY
    year;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

year	avg_delivery_time_days
2016	19.25
2017	12.38
2018	11.47

API

In order to expose portion of data from the database I have created an API that allows users to retrieve specific data.

I used FLASK for creating this REST APIs. It's a good choice for transforming a Python script into a web service capable of receiving and sending data (often in JSON format).

- Installe Flask and Pymysql

```
pip install flask
pip install pymysql
```

Python

- Initialize Flask app

```
from flask import Flask, jsonify, request
import pymysql

# Initialize Flask app
app = Flask(__name__)
```

0.0s Python

- MySql database connector

```
#
def get_db_connection():
    try:
        connection = pymysql.connect(
            user='root',            # Replace with your username
            password='********',       # Replace with your password
            database='olist',
            cursorclass=pymysql.cursors.DictCursor
            )
        return connection
    except Exception as e:
        print(f"Error connecting to database: {e}")
        return None

print(get_db_connection().get_host_info)
```

55.3s Python

- Available Endpoints

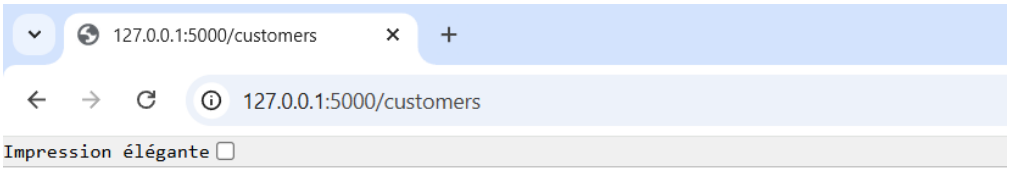
```
# Define API endpoint to get information on customers

@app.route("/customers", methods=["GET"])
def get_customers():
    connection = get_db_connection()
    if not connection:
        return jsonify({"error": "Failed to connect to database."}), 500

    with connection.cursor() as cursor:
        query = "SELECT customer_id, customer_city, customer_zip_code_prefix,customer_state  FROM olist.df_customers;"
        cursor.execute(query)
        customers = cursor.fetchall()

    connection.close()
    return jsonify(customers)
```

55.3s Python

```python
# Define API endpoint to get information on order items

@app.route("/order_items", methods=["GET"])
def get_items():
    connection = get_db_connection()
    if not connection:
        return jsonify({"error": "Failed to connect to database."}), 500

    with connection.cursor() as cursor:
        query = "SELECT order_id,product_id, seller_id, price, freight_value FROM olist.df_order_items;"
        cursor.execute(query)
        items = cursor.fetchall()

    connection.close()
    return jsonify(items)
```

55.3s Python

- Result of Flask requests's




```
[
  {
    "customer_city": "osasco",
    "customer_id": "00012a2ce6f8dcda20d059ce98491703",
    "customer_state": "SP",
    "customer_zip_code_prefix": 6273
  },
  {
    "customer_city": "itapecerica",
    "customer_id": "000161a058600d5901f007fab4c27140",
    "customer_state": "MG",
    "customer_zip_code_prefix": 35550
  },
  {
    "customer_city": "nova venecia",
    "customer_id": "0001fd6190edaaf884bcaf3d49edf079",
    "customer_state": "ES",
    "customer_zip_code_prefix": 29830
  },
  {
    "customer_city": "mendonca",
    "customer_id": "0002414f95344307404f0ace7a26f1d5",
    "customer_state": "MG",
    "customer_zip_code_prefix": 39664
  },
  {
    "customer_city": "sao paulo",
    "customer_id": "000379cdec625522490c315e70c7a9fb",
    "customer_state": "SP",
    "customer_zip_code_prefix": 4841
  },
  {
    "customer_city": "valinhos",
    "customer_id": "0004164d20a9e969af783496f3408652",
    "customer_state": "SP",
    "customer_zip_code_prefix": 13272
  },
  {
    "customer_city": "niteroi",
    "customer_id": "000419c5494106c306a97b5635748086",
    "customer_state": "RJ",
    "customer_zip_code_prefix": 24220
  },
```

Impression élégante ☐


```
[
  {
    "freight_value": 13.29,
    "order_id": "00010242fe8c5a6d1ba2dd792cb16214",
    "price": 58.9,
    "product_id": "4244733e06e7ecb4970a6e2683c13e61",
    "seller_id": "48436dade18ac8b2bce089ec2a041202"
  },
  {
    "freight_value": 19.93,
    "order_id": "00018f77f2f0320c557190d7a144bdd3",
    "price": 239.9,
    "product_id": "e5f2d52b802189ee658865ca93d83a8f",
    "seller_id": "dd7ddc04e1b6c2c614352b383efe2d36"
  },
  {
    "freight_value": 17.87,
    "order_id": "000229ec398224ef6ca0657da4fc703e",
    "price": 199.0,
    "product_id": "c777355d18b72b67abbeef9df44fd0fd",
    "seller_id": "5b51032eddd242adc84c38acab88f23d"
  },
  {
    "freight_value": 12.79,
    "order_id": "00024acbcdf0a6daa1e931b038114c75",
    "price": 12.99,
    "product_id": "7634da152a4610f1595efa32f14722fc",
    "seller_id": "9d7a1d34a5052409006425275ba1c2b4"
  },
  {
    "freight_value": 18.14,
    "order_id": "00042b26cf59d7ce69dfabb4e55b4fd9",
    "price": 199.9,
    "product_id": "ac6c3623068f30de03045865e4e10089",
    "seller_id": "df560393f3a51e74553ab94004ba5c87"
  },
  {
    "freight_value": 12.69,
    "order_id": "00048cc3ae777c65dbb7d2a0634bc1ea",
    "price": 21.9,
    "product_id": "ef92defde845ab8450f9d70c526ef70f",
    "seller_id": "6426d21aca402a131fc0a5d0960a3c90"
  },
```

GDPR

All datasets used in this project are exclusively public. The aggregated information ensures that no individual can be identified, maintaining strict data anonymity. As no personally identifiable information (PII) was utilized, the project strictly adheres to General Data Protection Regulation (GDPR) standards.

GITHUB:

https://github.com/mombolionnel-max/Project-_Olist_L.MOMBO.git

THANK YOU