DataOps 03: Trino + DBT + Spark — Everything Everywhere All at Once

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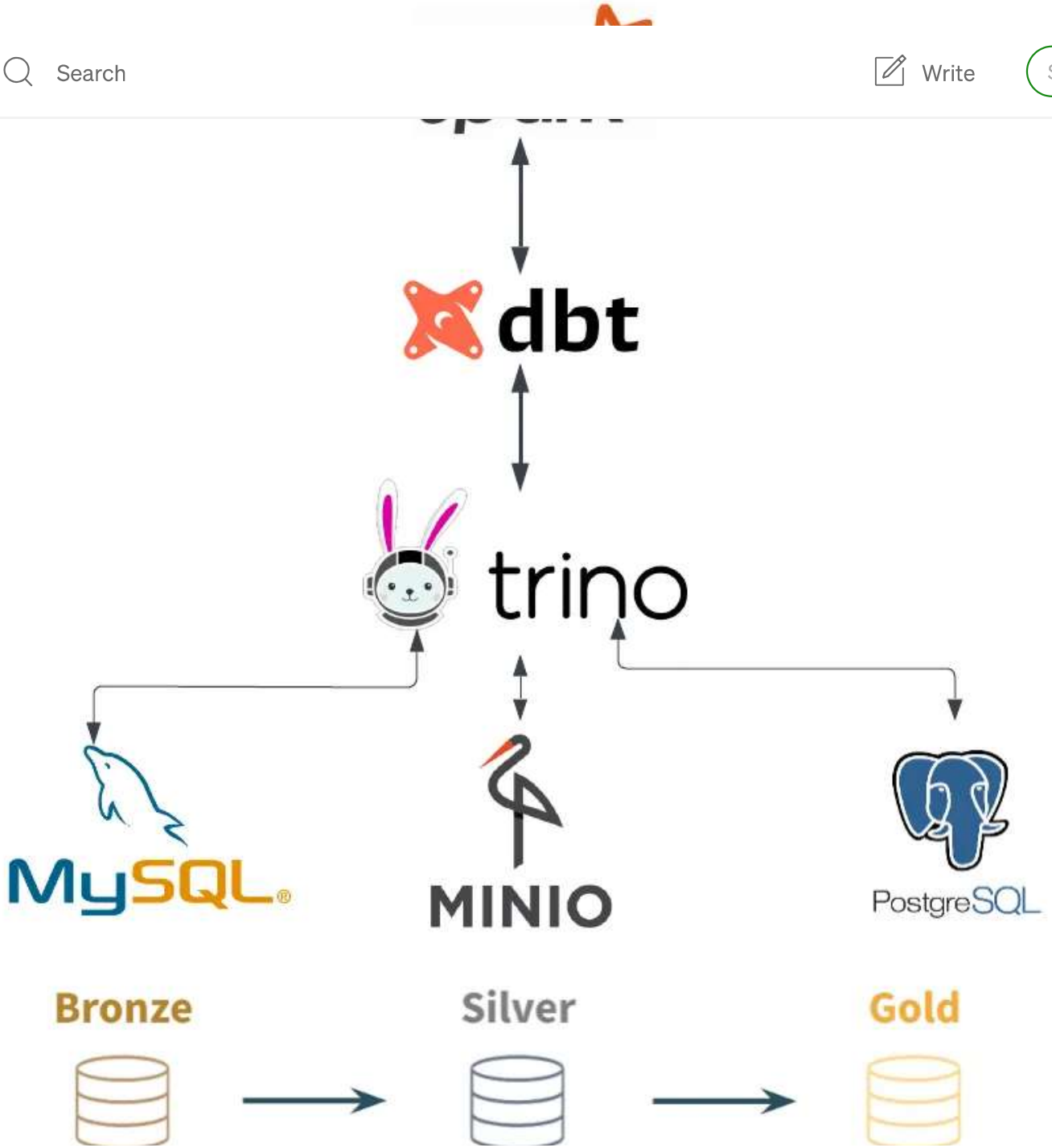


> *I choose a lazy person to do a hard job. Because a lazy person will find an easy way to do it.*
> *— Bill Gates*

The inherent human inclination is to conserve energy and embrace moments of rest, a characteristic deeply embedded in our biological programming. Drawing from my experience as a programmer, I have actively explored a diverse array of tools and technologies, including IDEs, frameworks, and no-code platforms, to streamline and reduce the effort required in programming tasks.

In my capacity as a data pipeline creator, I have leveraged tools like pandas to establish connections with various data sources, perform transformations, and load data into output destinations. Apache Spark has also been instrumental in handling similar tasks, significantly expediting the implementation of ETL processes. However, the emergence of a newer technology, known as DBT (Data Build Tool), has notably enhanced the efficiency of analytics engineers.

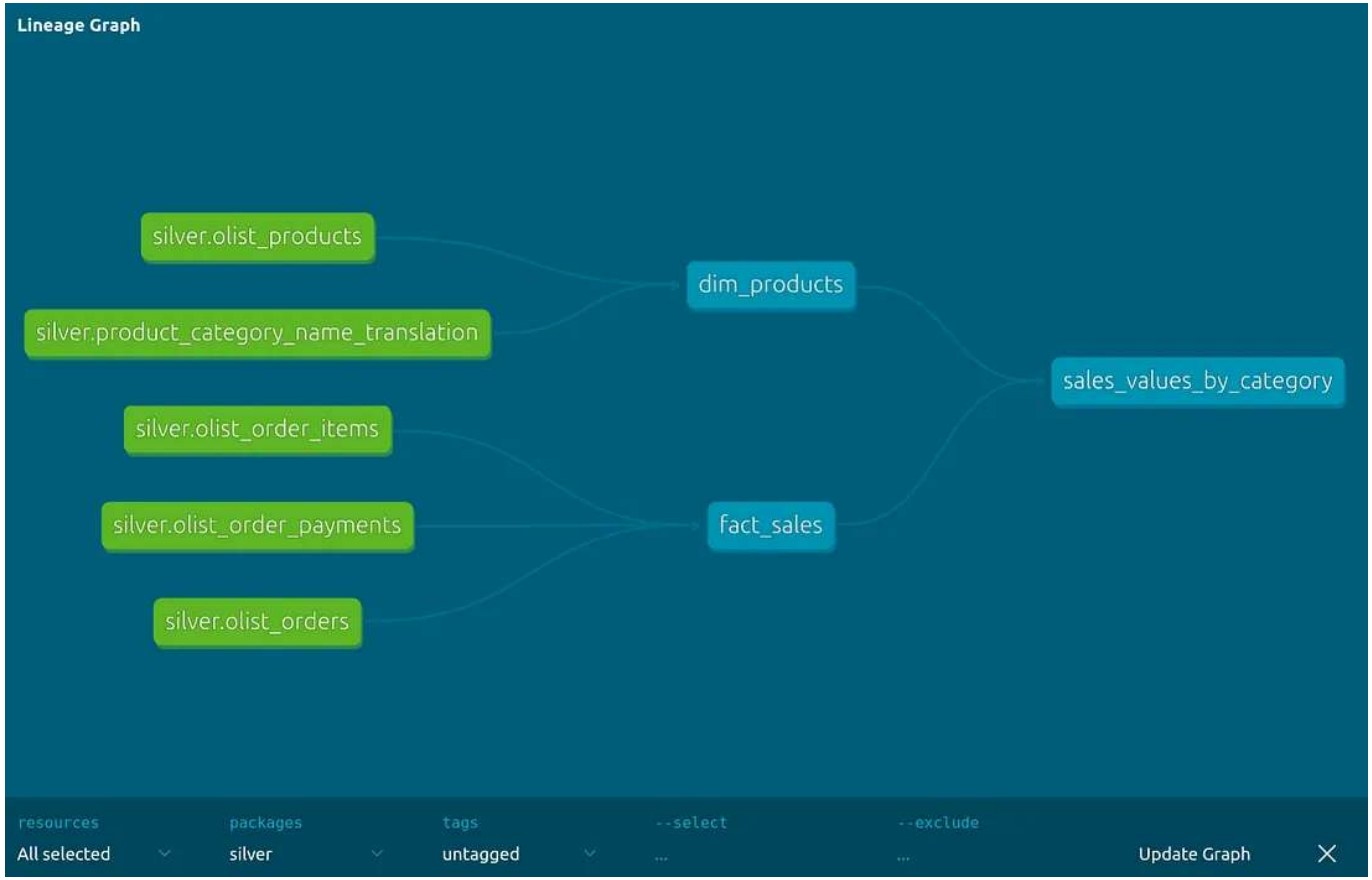
While I find myself intrigued by the capabilities of no-code platforms like Azure Data Factory, AWS Glue, Airbytes, and Apache Nifi, I sometimes encounter discomfort when it comes to customizing algorithms to align with specific business requirements. To address this challenge, I have discovered a combination of tools that can accelerate ETL workflows while ensuring data quality and adaptability.

After experimenting with various options, I found that using Trino, DBT, and Spark in combination was a perfect solution. Trino can **extract data from everything**, DBT can **load it everywhere**, and Spark can **transform it all at once**. In this article, I'll explain how to set up and utilize this powerful combination.

Github: https://github.com/ongxuanhong/de03-trino-dbt-spark-everything-everywhere-all-at-once

Data sources: Kaggle: Brazilian E-Commerce Public Dataset by Olist

Problems



DBT lineage graph

Let’s consider a basic analytics problem. Suppose we have a set of data related to product category transactions, and we want to determine the total amount of product sales over a given monthly period, as well as the corresponding values per bill for each product category during these periods. That means we will calculate table **sales_values_by_category** which has the following information

	monthly	category	total_sales	total_bills	values_per_bills
1	2018-08	toys	26,759.44	155	172.642
2	2018-08	telephony	67,187.07	244	275.357
3	2018-08	pet_shop	34,594.29	174	198.818
4	2018-07	toys	22,664.35	150	151.096
5	2018-07	telephony	34,930.6	207	168.747
6	2018-07	pet_shop	27,512.66	138	199.367
7	2018-06	toys	29,234.11	182	160.627
8	2018-06	telephony	31,561.17	205	153.957
9	2018-06	pet_shop	31,558.54	158	199.738
10	2018-05	toys	37,896.28	212	178.756
11	2018-05	telephony	24,947.46	239	104.383
12	2018-05	pet_shop	15,630.43	128	122.113
13	2018-04	toys	29,011.45	193	150.318
14	2018-04	telephony	30,350.14	249	121.888
15	2018-04	pet_shop	25,932.21	155	167.305
16	2018-03	toys	28,692.28	222	129.245
17	2018-03	telephony	32,412.52	322	100.66
18	2018-03	pet_shop	19,144.02	109	175.633
19	2018-02	toys	17,982.83	131	137.274
20	2018-02	telephony	26,698.79	333	80.177

Where:

olist_order_items_dataset

```
eller_id                         |shipping_limit_date|price         |freight_value|
---------------------------------|-------------------|--------------|-------------|
```

```
48436dade18ac8b2bce089ec2a04120|2017-09-19 09:45:35|58.9000015259 |13.2899999619|
d7ddc04e1b6c2c614352b383efe2d36|2017-05-03 11:05:13|239.8999938965|19.9300003052|
5b51032eddd242adc84c38acab88f23|2018-01-18 14:48:30|199           |17.8700008392|
0d7a1d34a5052409006425275ba1c2b|2018-08-15 10:10:18|12.9899997711 |12.7899999619|
f560393f3a51e74553ab94004ba5c87|2017-02-13 13:57:51|199.8999938965|18.1399993896|
5426d21aca402a131fc0a5d0960a3c9|2017-05-23 03:55:27|21.8999996185 |12.6899995804|
7040e82f899a04d1b434b795a43b461|2017-12-14 12:10:31|19.8999996185 |11.8500003815|
5996cddab893a4652a15592fb58ab8d|2018-07-10 12:30:45|810           |70.75        |
416b6a846a11724393025641d4edd5e|2018-03-26 18:31:29|145.9499969482|11.6499996185|
a143b05f0110f0dc71ad71b4466ce92|2018-07-06 14:10:56|53.9900016785 |11.3999996185|
```

olist_order_payments_dataset

```
|order_id                         |payment_sequential|payment_type|payment_instal
|---------------------------------|------------------|------------|--------------
|"00010242fe8c5a6d1ba2dd792cb1621|1                 |credit_card |2
|"00018f77f2f0320c557190d7a144bdd|1                 |credit_card |3
|"000229ec398224ef6ca0657da4fc703|1                 |credit_card |5
|"00024acbcdf0a6daa1e931b038114c7|1                 |credit_card |2
|"00042b26cf59d7ce69dfabb4e55b4fd|1                 |credit_card |3
|"00048cc3ae777c65dbb7d2a0634bc1e|1                 |boleto      |1
|"00054e8431b9d7675808bcb819fb4a3|1                 |credit_card |1
|"000576fe39319847cbb9d288c5617fa|1                 |credit_card |10
|"0005a1a1728c9d785b8e2b08b904576|1                 |credit_card |3
|"0005f50442cb953dcd1d21e1fb92349|1                 |credit_card |1
```

olist_orders_dataset

```
|order_id                         |customer_id                      |order_status|
|---------------------------------|---------------------------------|------------|
|"00010242fe8c5a6d1ba2dd792cb1621|"3ce436f183e68e07877b285a838db11|delivered   |
|"00018f77f2f0320c557190d7a144bdd|f6dd3ec061db4e3987629fe6b26e5cce|delivered   |
|"000229ec398224ef6ca0657da4fc703|"6489ae5e4333f3693df5ad4372dab6d|delivered   |
|"00024acbcdf0a6daa1e931b038114c7|d4eb9395c8c0431ee92fce09860c5a06|delivered   |
|"00042b26cf59d7ce69dfabb4e55b4fd|"58dbd0b2d70206bf40e62cd34e84d79|delivered   |
|"00048cc3ae777c65dbb7d2a0634bc1e|"816cbea969fe5b689b39cfc97a50674|delivered   |
|"00054e8431b9d7675808bcb819fb4a3|"32e2e6ab09e778d99bf2e0ecd489871|delivered   |
|"000576fe39319847cbb9d288c5617fa|"9ed5e522dd9dd85b4af4a077526d811|delivered   |
|"0005a1a1728c9d785b8e2b08b904576|"16150771dfd4776261284213b89c304|delivered   |
|"0005f50442cb953dcd1d21e1fb92349|"351d3cb2cee3c7fd0af6616c82df21d|delivered   |
```

olist_products_dataset

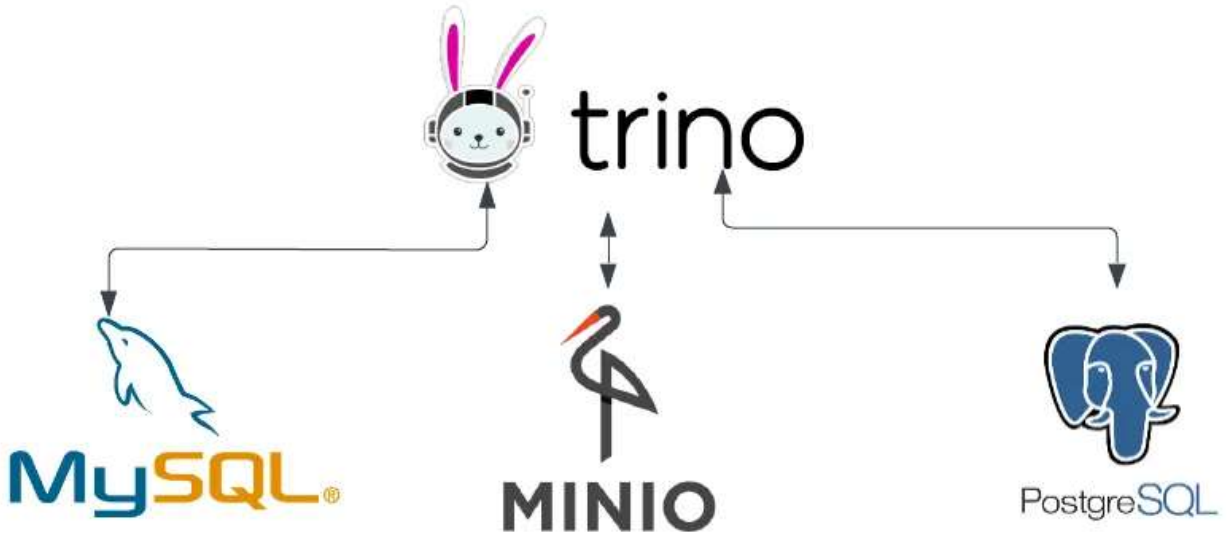
```
|product_id                       |product_category_name|product_name_lenght|prod
|---------------------------------|---------------------|-------------------|----
|"00066f42aeeb9f3007548bb9d3f33c3|perfumaria           |53                 |596
|"00088930e925c41fd95ebfe695fd265|automotivo           |56                 |752
|"0009406fd7479715e4bef61dd91f246|cama_mesa_banho      |50                 |266
|"000b8f95fcb9e0096488278317764d1|utilidades_domesticas|25                 |364
|"000d9be29b5207b54e86aa1b1ac5487|relogios_presentes   |48                 |613
|"0011c512eb256aa0dbbb544d8dffcf6|automotivo           |58                 |177
```

```
|"00126f27c813603687e6ce486d909d0|cool_stuff            |42                  |2,46
|"001795ec6f1b187d37335e1c4704762|consoles_games        |53                  |274
|"001b237c0e9bb435f2e54071129237e|cama_mesa_banho       |42                  |253
|"001b72dfd63e9833e8c02742adf472e|moveis_decoracao      |45                  |520
```

product_category_name_translation

```
|product_category_name    |product_category_name_english|
|-------------------------|-----------------------------|
|agro_industria_e_comercio|agro_industry_and_commerce   |
|alimentos                |food                         |
|alimentos_bebidas        |food_drink                   |
|artes                    |art                          |
|artes_e_artesanato       |arts_and_craftmanship        |
|artigos_de_festas        |party_supplies               |
|artigos_de_natal         |christmas_supplies           |
|audio                    |audio                        |
|automotivo               |auto                         |
|bebes                    |baby                         |
```

Trino — the EXTRACTOR of everything



Normally, when working with Pandas, in order to connect to a data source, you need to create DataLoader class for handling the connection. For example, to connect to MySQL you will define a function similar to the script below:

```
def get_db_connection(self):
    conn_info = (
        f"mysql+pymysql://{self.params['user']}:{self.params['password']}"
        + f"@{self.params['host']}:{self.params['port']}"
        + f"/{self.params['database']}"
    )
```

```
    print(f"Configs: {conn_info}")
    db_conn = create_engine(conn_info).connect()
    try:
        yield db_conn
    except Exception:
        raise
    finally:
        db_conn.close()
```

If you'd like to connect to PostgreSQL, you might create a function similar to this script

```
def get_db_connection(self):
    conn_info = (
        f"postgresql+psycopg2://{self.params['user']}:{self.params['password']}"
        + f"@{self.params['host']}:{self.params['port']}"
        + f"/{self.params['database']}"
    )
    print(f"Configs: {conn_info}")
    db_conn = create_engine(conn_info)
    return db_conn
```

Or MinIO, the connection would be like this

```
def get_db_connection(self):

    client = Minio(
        endpoint=self.params.get("endpoint_url"),
        access_key=self.params.get("aws_access_key_id"),
        secret_key=self.params.get("aws_secret_access_key"),
        secure=False,
    )

    try:
        yield client
    except Exception:
        raise
```

I'm wondering if there is a framework that can simplify the process of connecting to various data sources through a simple configuration rather than requiring manual coding. And Trino is a good candidate because it supports **federated queries** with the ability to access data from multiple systems using a single query, it becomes feasible to combine historical log data from an S3 object storage with customer data from a MySQL relational database.

A list of Trino connectors can be found here. In our demo, we will use the following connectors:

- Delta Lake

```
connector.name=delta-lake
hive.metastore.uri=thrift://hive-metastore:9083
hive.s3.endpoint=http://minio:9000
hive.s3.aws-access-key=minio
hive.s3.aws-secret-key=minio123
hive.s3.path-style-access=true
delta.enable-non-concurrent-writes=true
delta.unique-table-location=false
```

- MySQL

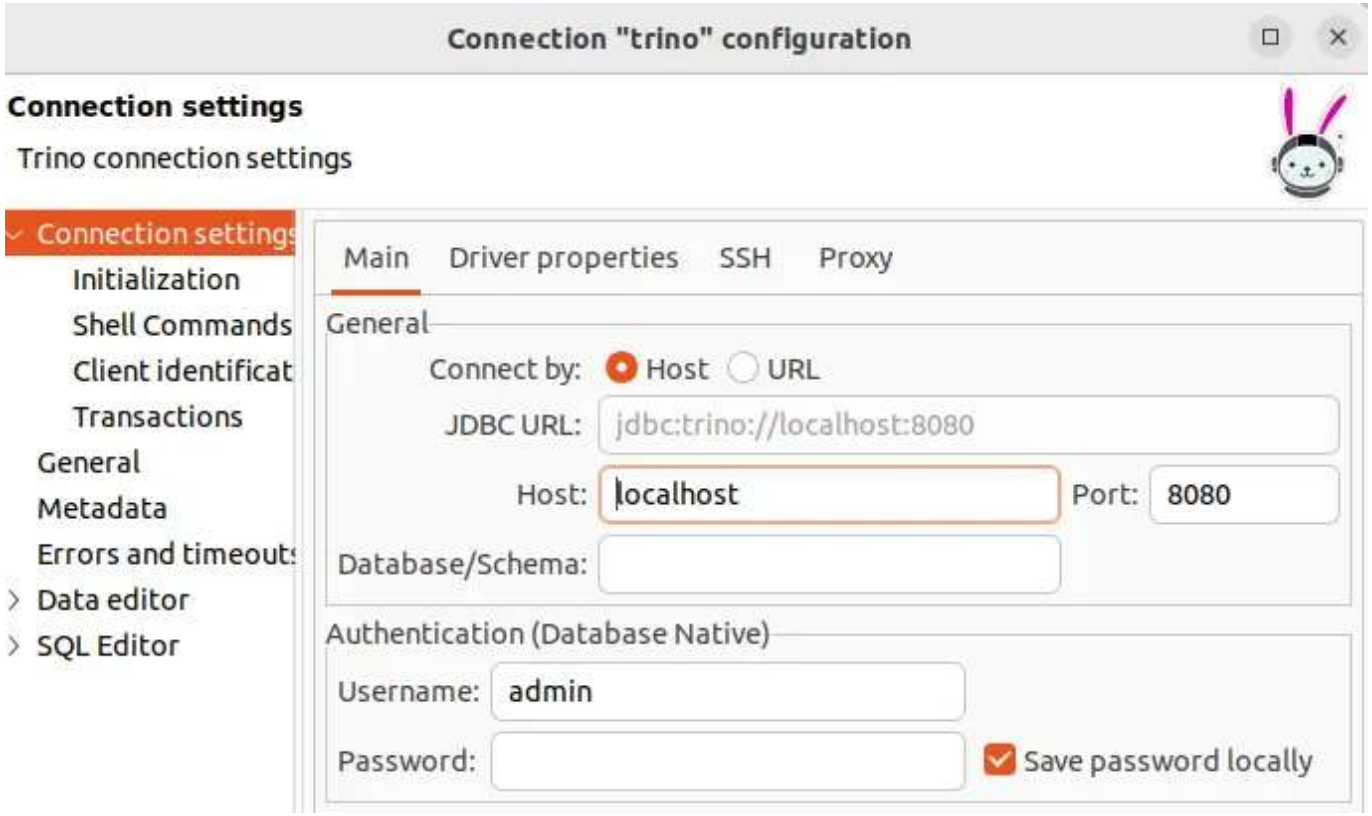
```
connector.name=mysql
connection-url=jdbc:mysql://de_mysql:3306?allowPublicKeyRetrieval=true&useSSL=fa
connection-user=root
connection-password=admin
```

- PostgreSQL

```
connector.name=postgresql
connection-url=jdbc:postgresql://de_psql:5432/ecom_analytics
connection-user=admin
connection-password=admin123
```

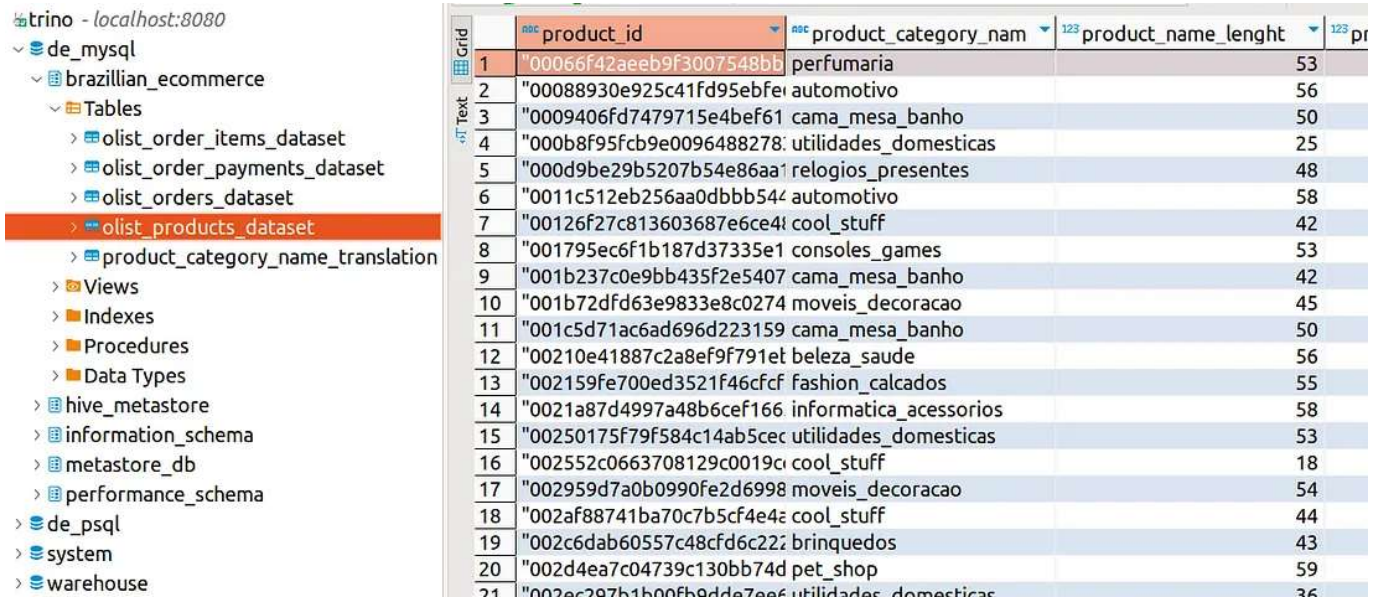
While I would usually provide instructions for setting up the services using the docker-compose.yml file, for this particular demonstration, I'd prefer to simply explain the concept instead.

There are tools that you can use to connect to Trino such as DBeaver or beeline CLI. For this demonstration, I'll be using DBeaver to establish the connection, as shown in the figure below.



Once you've established a successful connection, you should be able to view a list of available data sources as shown in the figure below.

To preview the data stored in MySQL databases, you can execute a query that will display the results in a similar manner to what is shown in the figure below.



DBT — the LOADER everywhere


dbt
trino
MySQL
MINIO
PostgreSQL
Bronze
Silver
Gold
Raw Ingestion and History
Filtered, Cleaned, Augmented
Business-level Aggregates

While most people view DBT as the transformation component in an ELT pipeline, I believe that DBT can also serve as a data loader, moving data between source and target **without touching any of the data definition language (DDL).**

You can find a list of available DBT adapters here. For the purposes of our demonstration, we will be utilizing the following adapters:

- Starburst & Trino
- Spark

By organizing your project into these files and folders, you can more easily manage your data and models, and ensure that your code is accurate and efficient.

```
ecom_analytics
├── bronze
│   ├── dbt_project.yml
│   ├── models
│   │   ├── olist_order_items.sql
│   │   ├── olist_order_payments.sql
│   │   ├── olist_orders.sql
│   │   └── olist_products.sql
```

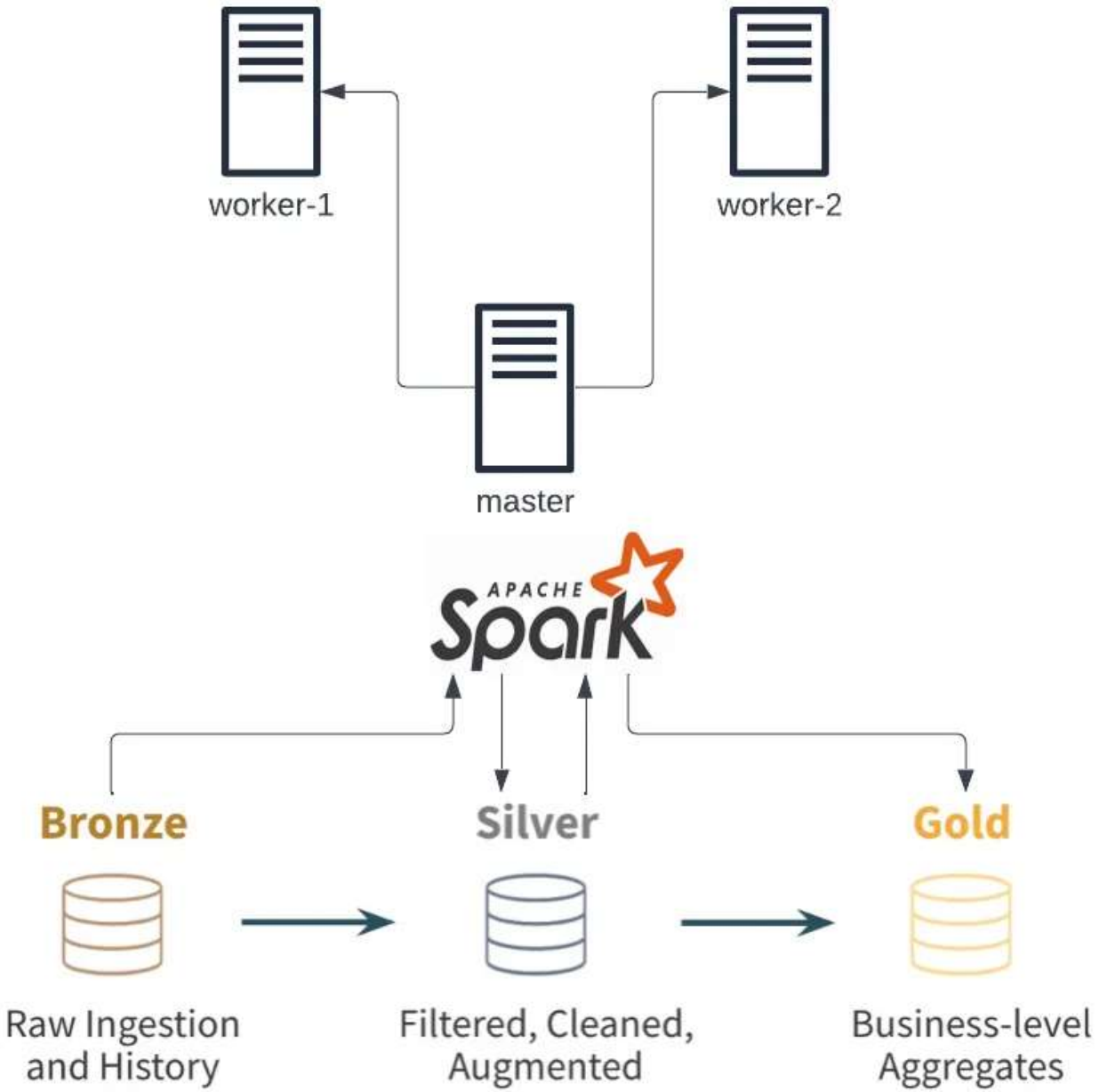
```
│   ├── seeds
│   │   └── product_category_name_translation.csv
├── gold
│   ├── dbt_project.yml
│   ├── models
│   │   └── sales_values_by_category.sql
├── Makefile
├── profiles.yml
└── silver
    ├── dbt_project.yml
    ├── models
    │   ├── gold
    │   │   └── sales_values_by_category.sql
    │   ├── orders_sources.yml
    │   └── silver
    │       ├── dim_products.sql
    │       └── fact_sales.sql
    ├── packages.yml
```

- `dbt_project.yml` : This is the project configuration file that defines the project name, version, and other important metadata.
- `profiles.yml` : This file contains the database connection information, such as the host, port, and credentials.
- `models/` : This folder contains the data models that you want to build, as well as the SQL code for creating those models.

- `seeds/` : This folder contains CSV files in your dbt project (typically in your seeds directory), that dbt can load into your data warehouse using the `dbt seed` command.

Please refer to DBT project named **ecom_analytics** for more details.

Spark — the TRANSFORMER all at once


worker-1
worker-2
master
APACHE
Spark
Bronze
Silver
Gold
Raw Ingestion and History
Filtered, Cleaned, Augmented
Business-level Aggregates

Bronze layer

We will extract the following tables from MySQL and load them to MinIO

- olist_order_items_dataset
- olist_order_payments_dataset
- olist_orders_dataset
- olist_products_dataset
- product_category_name_translation

To establish a connection to Trino for the purpose of extracting data from “**catalog:de_mysql**” and loading it into “**catalog:warehouse**”, you will need to prepare a **profiles.yml** file.

```
trino:
  target: dev
  outputs:
    dev:
      type: trino
      user: admin
      host: localhost
      port: 8080
      database: warehouse
```

```
      schema: bronze
      threads: 1
```

In order for DBT to know where to store the data, you will need to add these configurations to your **dbt_project.yml** file.

```
models:
  bronze:
    +materialized: incremental
    +incremental_strategy: delete+insert
    +file_format: delta
    +location_root: s3a://warehouse/bronze
```

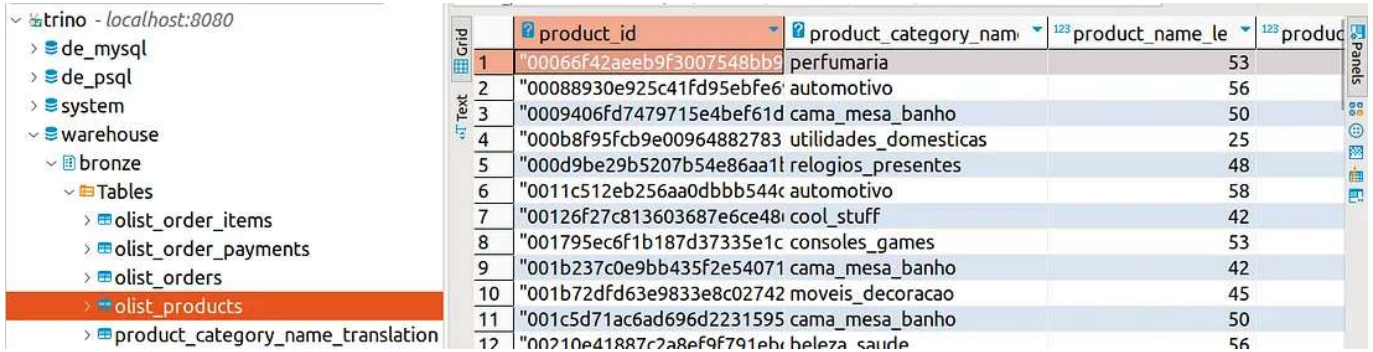
Go to `jdbc:trino://localhost:8080` to register **warehouse.bronze** schema.

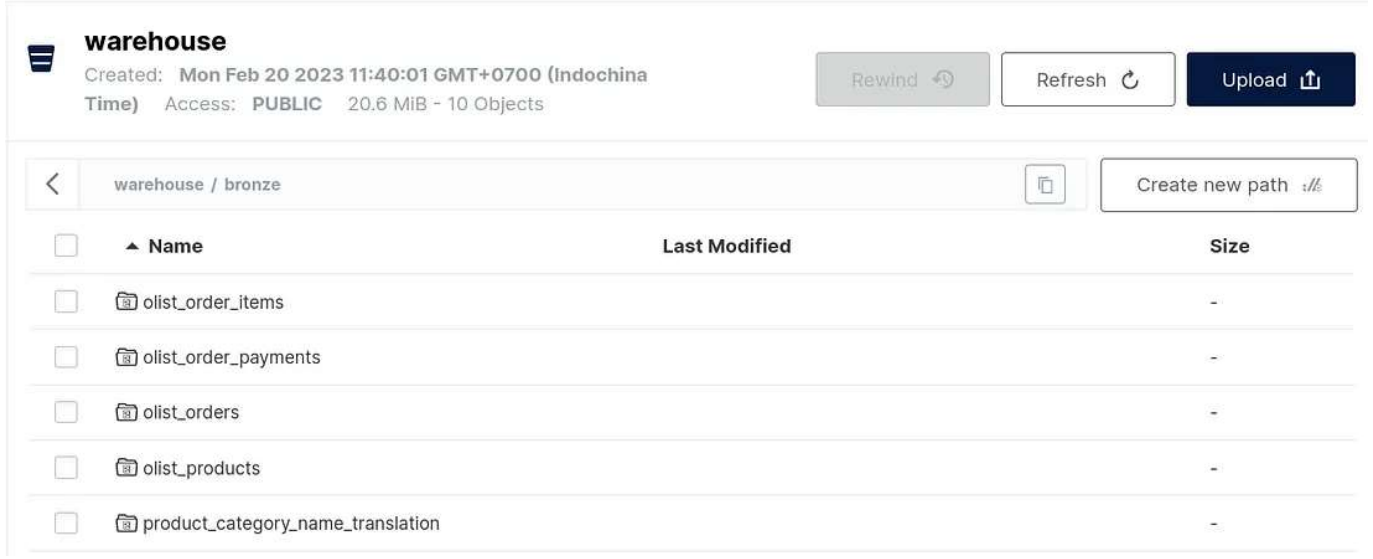
```
CREATE SCHEMA IF NOT EXISTS warehouse.bronze
WITH (location='s3a://warehouse/bronze');
```

Run this command to start the process

```
dbt run --project-dir ./bronze --profiles-dir ./ --full-refresh

08:00:17  Running with dbt=1.4.0
08:00:17  Found 4 models, 0 tests, 0 snapshots, 0 analyses, 310 macros, 0 operat
08:00:17
08:00:18  Concurrency: 1 threads (target='dev')
08:00:18
08:00:18  1 of 4 START sql incremental model bronze.olist_order_items ..........
08:00:21  1 of 4 OK created sql incremental model bronze.olist_order_items .....
08:00:21  2 of 4 START sql incremental model bronze.olist_order_payments .......
08:00:22  2 of 4 OK created sql incremental model bronze.olist_order_payments ..
08:00:22  3 of 4 START sql incremental model bronze.olist_orders ...............
08:00:23  3 of 4 OK created sql incremental model bronze.olist_orders ..........
08:00:23  4 of 4 START sql incremental model bronze.olist_products .............
08:00:23  4 of 4 OK created sql incremental model bronze.olist_products ........
08:00:23
08:00:23  Finished running 4 incremental models in 0 hours 0 minutes and 6.11 se
08:00:23
08:00:23  Completed successfully
08:00:23
08:00:23  Done. PASS=4 WARN=0 ERROR=0 SKIP=0 TOTAL=4
```

Double check **catalog:warehouse** and **minio:warehouse**





Silver layer

Go to `jdbc:trino://localhost:8080` to register **warehouse.silver** schema.

```
CREATE SCHEMA IF NOT EXISTS warehouse.silver
WITH (location='s3a://warehouse/silver');
```

Prepare the following packages in **packages.yml** files. These packages will help us define external tables and macros functions such as pivot commands.

```
packages:
  - package: dbt-labs/dbt_external_tables
    version: 0.8.2
  - package: dbt-labs/dbt_utils
    version: 0.9.2
```

If you are interested in understanding how dbt packages work behind the scenes, there are a few key concepts to consider.

First, a dbt package is essentially a collection of pre-built dbt models, macros, and other resources that can be used as a starting point for building out your own data pipelines. These packages can be sourced from a variety

of places, including the dbt Hub (a public repository of dbt packages) or custom-built packages created by other users.

When you install a dbt package, what you are really doing is downloading a set of YAML files that define the models, macros, and other resources that make up that package. These YAML files are then compiled into a SQL file that can be run against your database to create the relevant tables and views.

Overall, dbt packages provide a powerful way to accelerate your data pipeline development by leveraging pre-built models, macros, and other resources. By understanding how these packages work behind the scenes, you can gain a deeper appreciation for the capabilities of dbt and how it can be used to streamline your data analytics workflows.

Run this command to install dependencies

```
dbt deps --project-dir ./silver

08:14:14  Running with dbt=1.4.0
08:14:15  Installing dbt-labs/dbt_external_tables
08:14:15    Installed from version 0.8.2
08:14:15    Up to date!
08:14:15  Installing dbt-labs/dbt_utils
08:14:16    Installed from version 0.9.2
```

```
08:14:16    Updated version available: 1.0.0
08:14:16
08:14:16  Updates available for packages: ['dbt-labs/dbt_utils']
Update your versions in packages.yml, then run dbt deps
```

To connect to Apache Spark and transform data from the “**bronze**” layer of “**catalog:warehouse**” and load it back into the “**silver**” and “**gold**” layers, you will need to prepare a **profiles.yml** file.

```
spark:
  target: dev
  outputs:
    dev:
      type: spark
      method: thrift
      host: localhost
      port: 10000
      schema: silver
      connect_retries: 5
      connect_timeout: 60
      retry_all: true
```

Add these configurations to **dbt_project.yml** so that DBT has all the needed information to store the data in **catalog:warehouse.**

```
models:
  silver:
    +materialized: incremental
    +incremental_strategy: merge
    +file_format: delta
    +pre_hook:
      - SET spark.hadoop.fs.s3a.endpoint=http://minio:9000
      - SET spark.hadoop.fs.s3a.access.key=minio
      - SET spark.hadoop.fs.s3a.secret.key=minio123
      - SET spark.hadoop.fs.s3a.path.style.access=true
      - SET spark.hadoop.fs.s3a.connection.ssl.enabled=false
      - SET spark.hadoop.fs.s3a.impl=org.apache.hadoop.fs.s3a.S3AFileSystem
    silver:
      +location_root: s3a://warehouse/silver
    gold:
      +location_root: s3a://warehouse/gold
```

Prepare external table in **orders_sources.yml** file

```
version: 2

sources:
  - name: silver
    tables:
      - name: olist_products
        external:
          location: 's3a://warehouse/bronze/olist_products'
          using: delta
```

```
    columns:
      - name: product_id
        data_type: string
      - name: product_category_name
        data_type: string
      - name: product_name_lenght
        data_type: int
      - name: product_description_lenght
        data_type: int
      - name: product_photos_qty
        data_type: int
      - name: product_weight_g
        data_type: int
      - name: product_length_cm
        data_type: int
      - name: product_height_cm
        data_type: int
      - name: product_width_cm
        data_type: int
  - name: product_category_name_translation
    external:
      location: 's3a://warehouse/bronze/product_category_name_translation'
      using: delta
    columns:
      - name: product_category_name
        data_type: string
      - name: product_category_name_english
        data_type: string
  - name: olist_order_items
    external:
      location: 's3a://warehouse/bronze/olist_order_items'
      using: delta
    columns:
      - name: order_id
        data_type: string
      - name: order_item_id
```

```
        data_type: int
      - name: product_id
        data_type: string
      - name: seller_id
        data_type: string
      - name: shipping_limit_date
        data_type: string
      - name: price
        data_type: float
      - name: freight_value
        data_type: float
  - name: olist_order_payments
    external:
      location: 's3a://warehouse/bronze/olist_order_payments'
      using: delta
    columns:
      - name: order_id
        data_type: string
      - name: payment_sequential
        data_type: int
      - name: payment_type
        data_type: string
      - name: payment_installments
        data_type: int
      - name: payment_value
        data_type: float
  - name: olist_orders
    external:
      location: 's3a://warehouse/bronze/olist_orders'
      using: delta
    columns:
      - name: order_id
        data_type: string
      - name: customer_id
        data_type: string
      - name: order_status
```

```
      data_type: string
    - name: order_purchase_timestamp
      data_type: string
    - name: order_approved_at
      data_type: string
    - name: order_delivered_carrier_date
      data_type: string
    - name: order_delivered_customer_date
      data_type: string
    - name: order_estimated_delivery_date
      data_type: string
```

Run this command to register the external table

```
dbt run-operation --project-dir ./silver stage_external_sources

08:15:14  Running with dbt=1.4.0
08:15:15  1 of 5 START external source silver.olist_products
08:15:15  1 of 5 (1) refresh table silver.olist_products
08:15:15  1 of 5 (1) OK
08:15:15  2 of 5 START external source silver.product_category_name_translation
08:15:15  2 of 5 (1) refresh table silver.product_category_name_translation
08:15:15  2 of 5 (1) OK
08:15:15  3 of 5 START external source silver.olist_order_items
08:15:16  3 of 5 (1) refresh table silver.olist_order_items
08:15:16  3 of 5 (1) OK
08:15:16  4 of 5 START external source silver.olist_order_payments
08:15:16  4 of 5 (1) refresh table silver.olist_order_payments
08:15:16  4 of 5 (1) OK
```

```
08:15:16  5 of 5 START external source silver.olist_orders
08:15:16  5 of 5 (1) refresh table silver.olist_orders
08:15:17  5 of 5 (1) OK
```

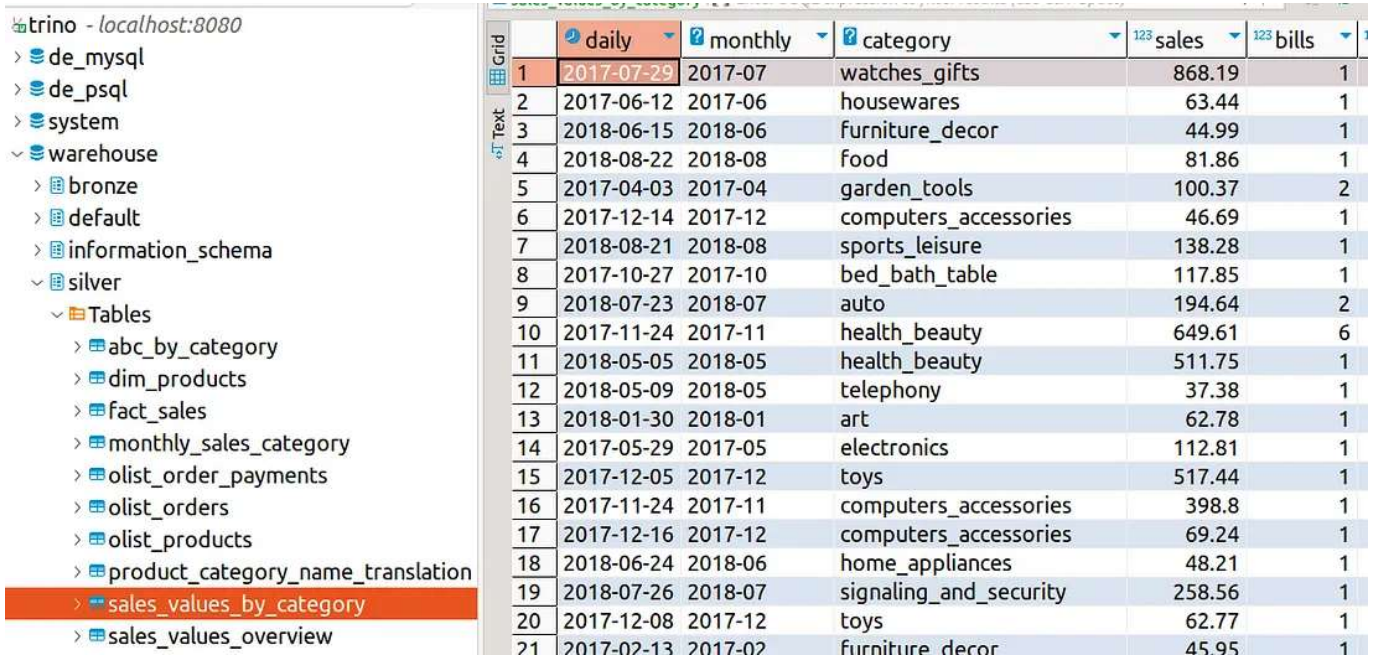
The command `docker logs spark-thrift-server` can be used to view the logs of the Spark Thrift Server container. This will show what the Spark Thrift Server is doing behind the scenes, including any error messages, warnings, or informational messages. The logs can be used to troubleshoot issues or gain insight into the behavior of the Spark Thrift Server. For example, this is how **dbt-labs/dbt_external_tables** execute.

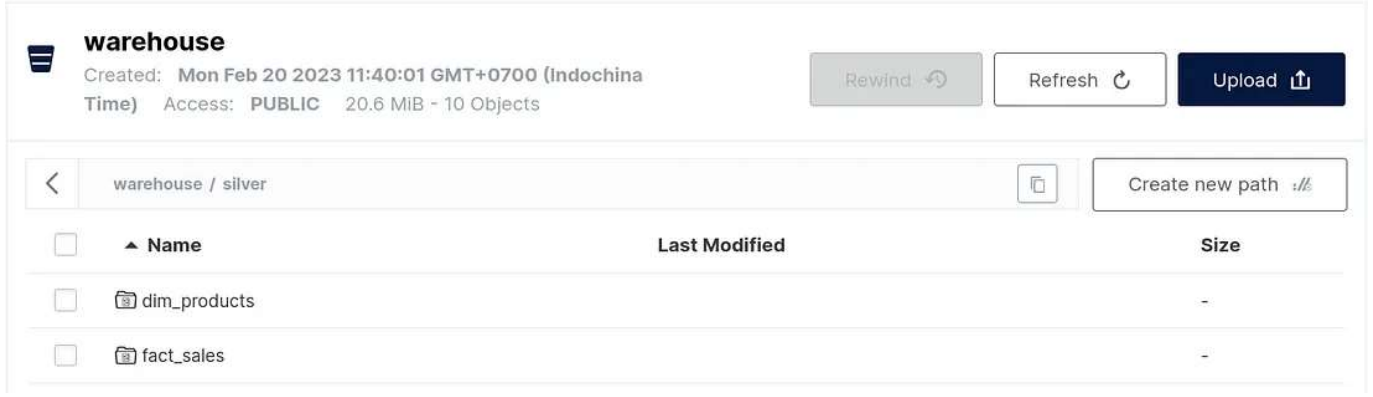
```
create table silver.olist_order_items (
    order_id string,
    order_item_id int,
    product_id string,
    seller_id string,
    shipping_limit_date string,
    price float,
    freight_value float
)  using delta
location 's3a://warehouse/bronze/olist_order_items'
```

Run this command to start the process

```
dbt run --project-dir ./silver --profiles-dir ./ --full-refresh

04:32:52  Running with dbt=1.4.0
04:32:52  Found 3 models, 0 tests, 0 snapshots, 0 analyses, 570 macros, 0 operat
04:32:52
04:32:52  Concurrency: 1 threads (target='dev')
04:32:52
04:32:52  1 of 3 START sql incremental model silver.dim_products ..............
04:32:59  1 of 3 OK created sql incremental model silver.dim_products .........
04:32:59  2 of 3 START sql incremental model silver.fact_sales .................
04:33:08  2 of 3 OK created sql incremental model silver.fact_sales ............
04:33:08  3 of 3 START sql incremental model silver.sales_values_by_category ...
04:33:13  3 of 3 OK created sql incremental model silver.sales_values_by_categor
04:33:13
04:33:13  Finished running 3 incremental models in 0 hours 0 minutes and 21.73 s
04:33:13
04:33:13  Completed successfully
04:33:13
04:33:13  Done. PASS=3 WARN=0 ERROR=0 SKIP=0 TOTAL=3
```

Double check **catalog:warehouse** and **minio:warehouse**





Gold layer

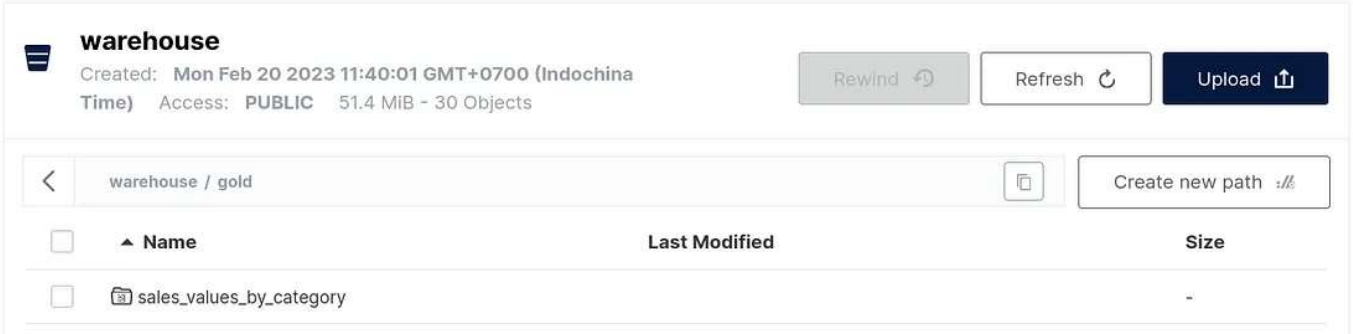
Great, it's good to know that you were able to load the gold data layer from **minio:warehouse** into PostgreSQL for analytics. By running this command,

you finish the pipeline

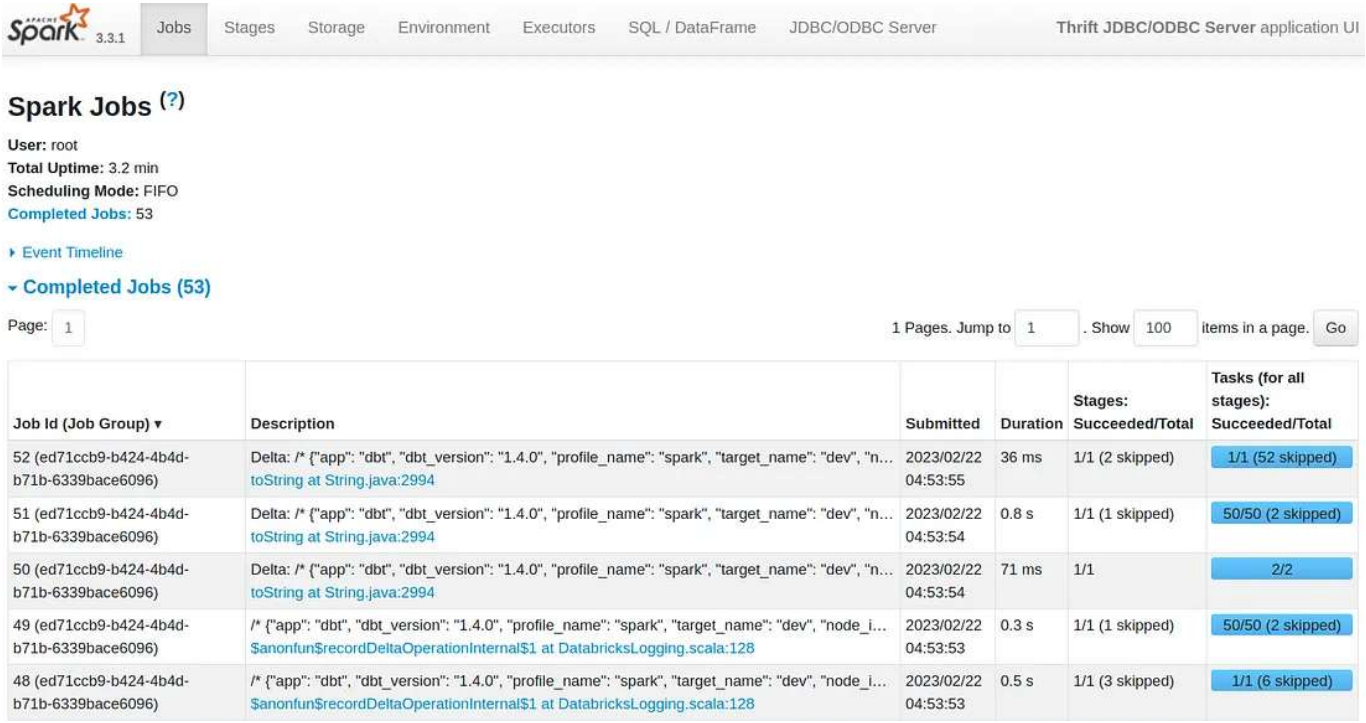
```
dbt run --project-dir ./gold --profiles-dir ./ --full-refresh

03:49:00  Running with dbt=1.4.0
03:49:00  Found 1 model, 0 tests, 0 snapshots, 0 analyses, 310 macros, 0 operati
03:49:00
03:49:01  Concurrency: 1 threads (target='dev')
03:49:01
03:49:01  1 of 1 START sql table model gold.sales_values_by_category ..........
03:49:01  1 of 1 OK created sql table model gold.sales_values_by_category .....
03:49:01
03:49:01  Finished running 1 table model in 0 hours 0 minutes and 0.82 seconds (
03:49:01
03:49:01  Completed successfully
03:49:01
03:49:01  Done. PASS=1 WARN=0 ERROR=0 SKIP=0 TOTAL=1
```

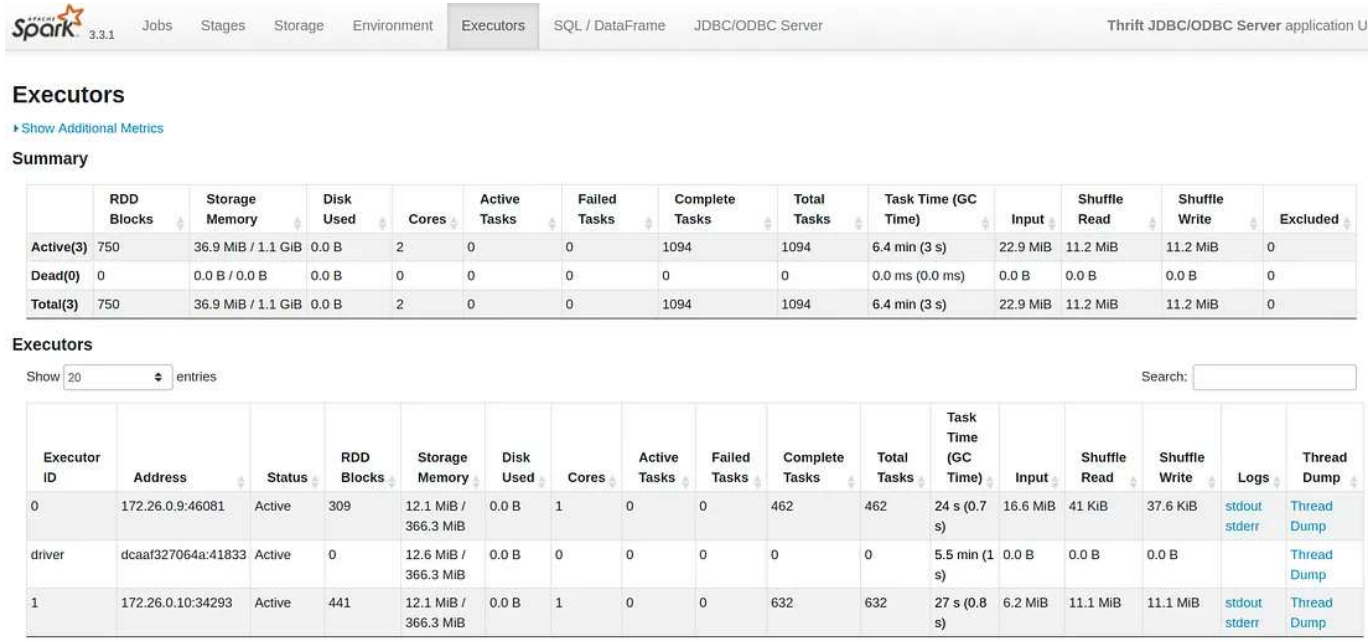
Double check **catalog:de_psql** and **minio:warehouse**

	daily	monthly	category	sales	bills	values_pe
1	2017-07-29	2017-07	watches_gifts	868.19	1	
2	2017-06-12	2017-06	housewares	63.44	1	
3	2018-06-15	2018-06	furniture_decor	44.99	1	
4	2018-08-22	2018-08	food	81.86	1	
5	2017-04-03	2017-04	garden_tools	100.37	2	
6	2017-12-14	2017-12	computers_accessories	46.69	1	
7	2018-08-21	2018-08	sports_leisure	138.28	1	
8	2018-06-27	2018-06	furniture_decor	233.84	1	



Upon inspecting the Spark jobs by navigating to `localhost:4040/jobs`, it becomes evident that DBT has effectively utilized the power of computing from our Spark mini-cluster.





	RDD Blocks	Storage Memory	Disk Used	Cores	Active Tasks	Failed Tasks	Complete Tasks	Total Tasks	Task Time (GC Time)	Input	Shuffle Read	Shuffle Write	Excluded
Active(3)	750	36.9 MiB / 1.1 GiB	0.0 B	2	0	0	1094	1094	6.4 min (3 s)	22.9 MiB	11.2 MiB	11.2 MiB	0
Dead(0)	0	0.0 B / 0.0 B	0.0 B	0	0	0	0	0	0.0 ms (0.0 ms)	0.0 B	0.0 B	0.0 B	0
Total(3)	750	36.9 MiB / 1.1 GiB	0.0 B	2	0	0	1094	1094	6.4 min (3 s)	22.9 MiB	11.2 MiB	11.2 MiB	0

Executor ID	Address	Status	RDD Blocks	Storage Memory	Disk Used	Cores	Active Tasks	Failed Tasks	Complete Tasks	Total Tasks	Task Time (GC Time)	Input	Shuffle Read	Shuffle Write	Logs	Thread Dump
0	172.26.0.9:46081	Active	309	12.1 MiB / 366.3 MiB	0.0 B	1	0	0	462	462	24 s (0.7 s)	16.6 MiB	41 KiB	37.6 KiB	stdout stderr	Thread Dump
driver	dcaaf327064a:41833	Active	0	12.6 MiB / 366.3 MiB	0.0 B	0	0	0	0	0	5.5 min (1 s)	0.0 B	0.0 B	0.0 B		Thread Dump
1	172.26.0.10:34293	Active	441	12.1 MiB / 366.3 MiB	0.0 B	1	0	0	632	632	27 s (0.8 s)	6.2 MiB	11.1 MiB	11.1 MiB	stdout stderr	Thread Dump

Conclusion

In summary, the synergy of Trino, DBT, and Spark presents a formidable solution for data extraction, transformation, and loading (ETL), with a particular focus on the ELT process. Collectively, these three components constitute an excellent choice for analytics engineers seeking a seamless and dependable approach to handle and analyze their data.

Trino simplifies data connectivity across diverse sources, while DBT's versatility shines in facilitating data loading and transfer between disparate systems. Spark, with its impressive ability to transform substantial datasets,

seamlessly integrates into this trio of tools. Together, they harmoniously complement each other, culminating in an efficient and adaptable data pipeline.

P/S: The title of the article “Everything, Everywhere, All at Once” is borrowed from a movie.

References

- Federated queries in data lakes with Redpanda and Trino
- Kaggle: Brazilian E-Commerce Public Dataset by Olist
- Iceberg + Spark + Trino + Dagster: modern, open-source data stack demo

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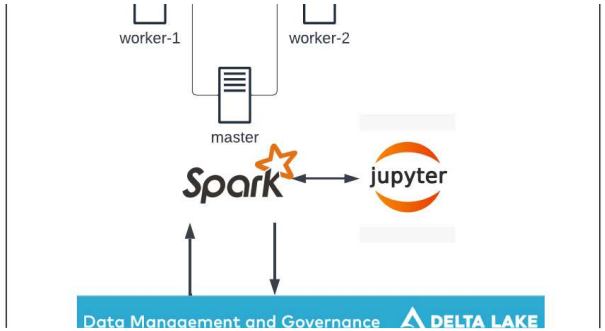

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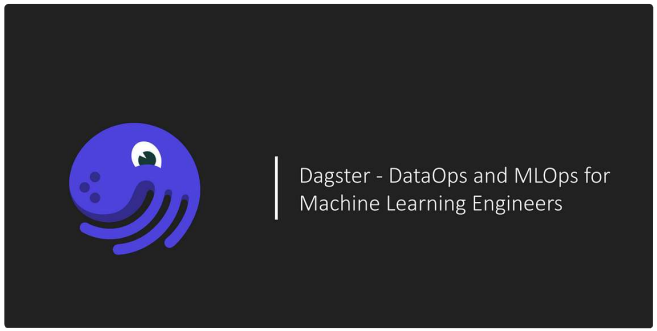

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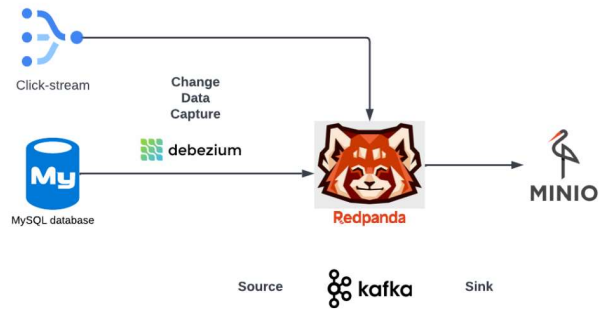

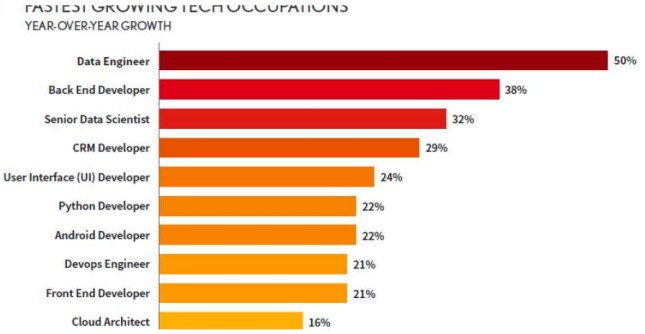

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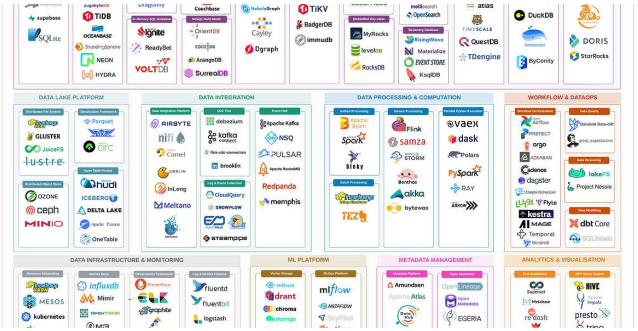

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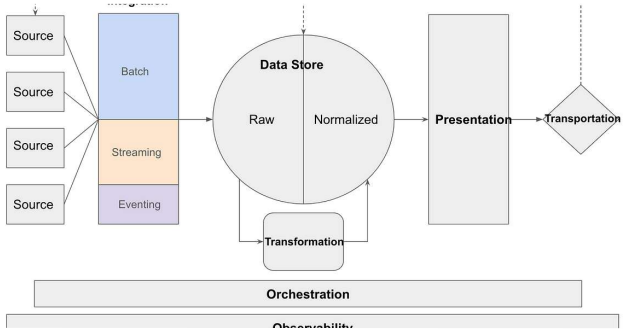

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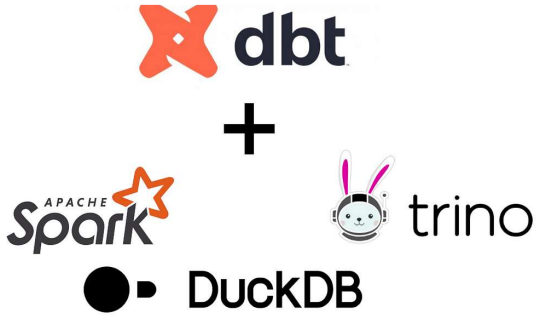

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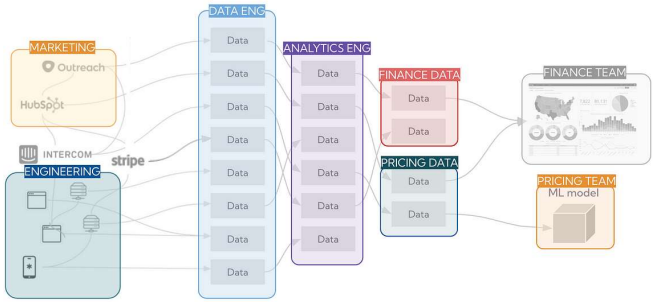

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