Building
Modern Data Stacks

Foundation First !!!

Four Key Questions

I. Where do we consolidate our data ? > Storage
II. How will we get it there ? > Ingestion
III. How will we clean it up? > Transformation
IV. How will we analyze it? > Reporting

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The
Big Choice

Data Stack

Popular Options

Storage > Snowflake, BigQuery, s3, Redshift
Ingestion > Airbyte, Airflow, Fivetran
Transformation > dbt
Reporting > Tableau, Power BI, Looker, Superset

N/B This is not an exhaustive list.

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Data Stack Architecture Design

Source

PostgreSQL

Ingestion

Airflow

+

Python

Storage
BigQuery

Amazon **Redshift**

Transformation
dbt

dbt

Raw

Model

Model

Model

Reporting

Looker

looker

End Goal

Put data to use

“Data is like garbage. You’d better know what you are going to do with it before you collect it.”

~ Mark Twain

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Content

02 Ingestion

Setting up Apache Airflow

- Documentation
- Deployment

Setting up ETL Directory

- db.credentials.py
  Est connection wit databases
- sql_queries.py
  Queries to extract & load data
- elt/etl.p
  Run all operations
- main.py
  Maintain Operation flow

02

Ingestion

Setting up Apache Airflow

- Documentation
- Deployment

Writing ELT Python Scripts

- .py Code - Extract & Load

Python

```python
# importing libraries

from airflow.decorators import dag, task
from datetime import datetime, timedelta
import requests
from google.cloud import bigquery
import pandas as pd
import psycopg2
from io import StringIO
```

02

Ingestion

Setting up Apache Airflow

– Airflow Documentation

- Production Deployment Documentation

Writing ELT Python Script

- .py Code - Extract & Load

Python

```python
# instantiating DAG

args{
    ”owner”:”gwayi”,
    "retries": 1,
    "retry_delay":timedelta(minutes=5)
    }
```

```python
@dag(
    default_arguments = args
    schedule=timedelta(minutes=30),
    start_date=datetime(2024, 7, 29),
    catchup=False,
    tags=['Team B']
    )
```

02 Writing ELT Python Script

- .py Code - Extract & Load

Python

```python
@task()
def gt_tbls(conn):

    sql = """SELECT table_name
    FROM information_schema.tables
    WHERE table_type = 'BASE TABLE'
    AND table_catalog = 'adventure_works'
    AND table_schema NOT IN
    ('pg_catalog','information_schema');"""

    cursor = conn.cursor()
    cursor.execute(sql)
    tbls=cursor.fetchall()

    conn.commit()
    conn.close()

    tbls = [x[0] for x in tbls]
    Return tbls
```

02

Writing ELT Python Script
- .py Code - Extract & Load

Python

```python
@task()
def xt_tbls(tbls):

        dataframe = {}
        for tbl in tbls:
              sql = f"SELECT * FROM {tbl} WHERE
              createdAt <= (convert(datetime2, {last_rundate}) OR
              modifiedAt <=(convert(datetime2, {last_rundate})"
              dataframe[tbl] = pd.read_sql(sql, conn)

        return dataframe
```

02

Writing ELT Python Script
- .py Code - Extract & Load

Python

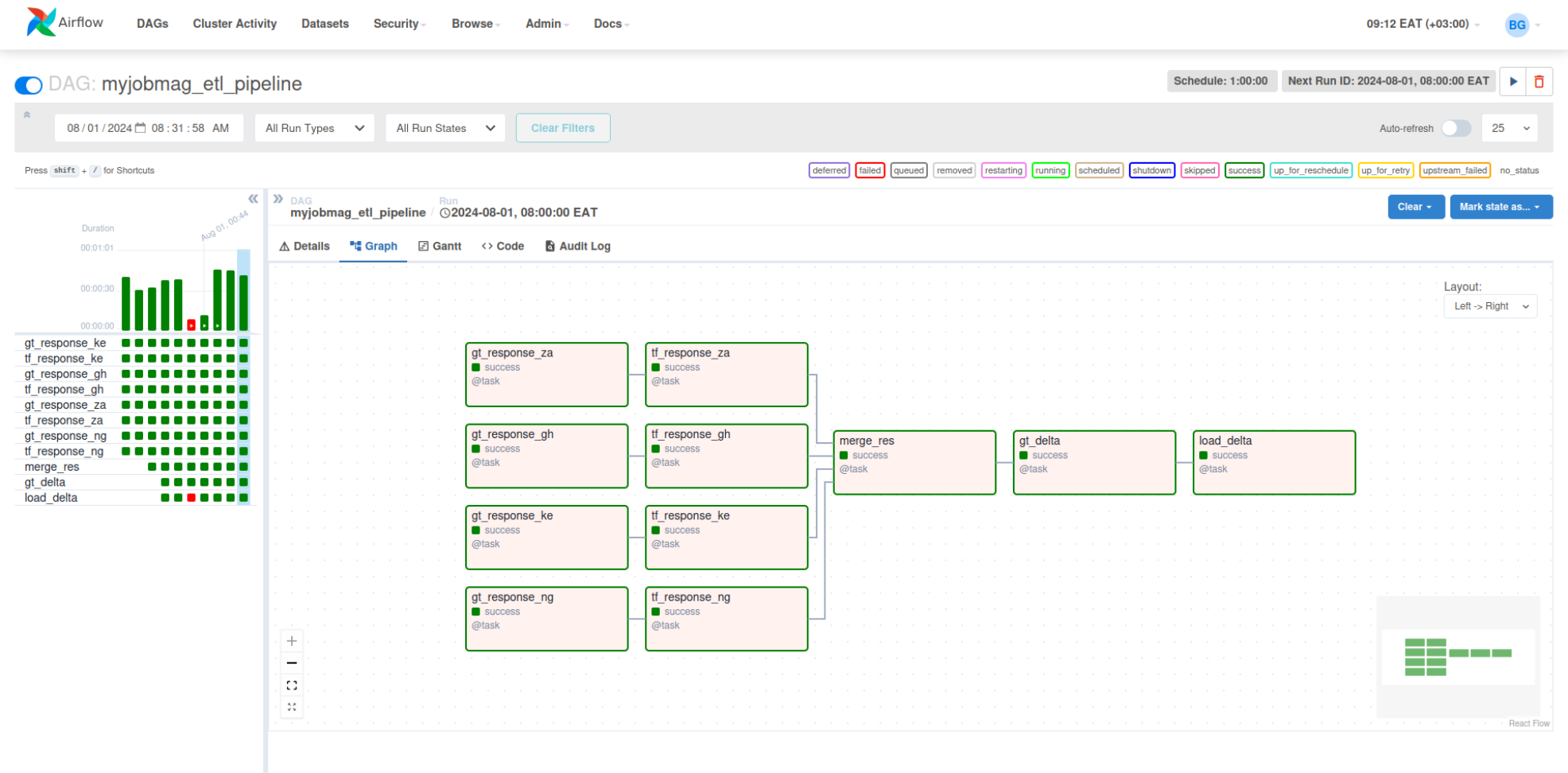
```python
@task()

def upsert_tbls(df):
        client = bigquery.Client()
        table_id = "adventureworks-431609.adw_dwh.customer"
        job = client.load_table_from_dataframe(df, table_id)
        job.result()
        print(f"uploading data to Google BigQuery is {job.state}")
upsert_tbla()
```

02

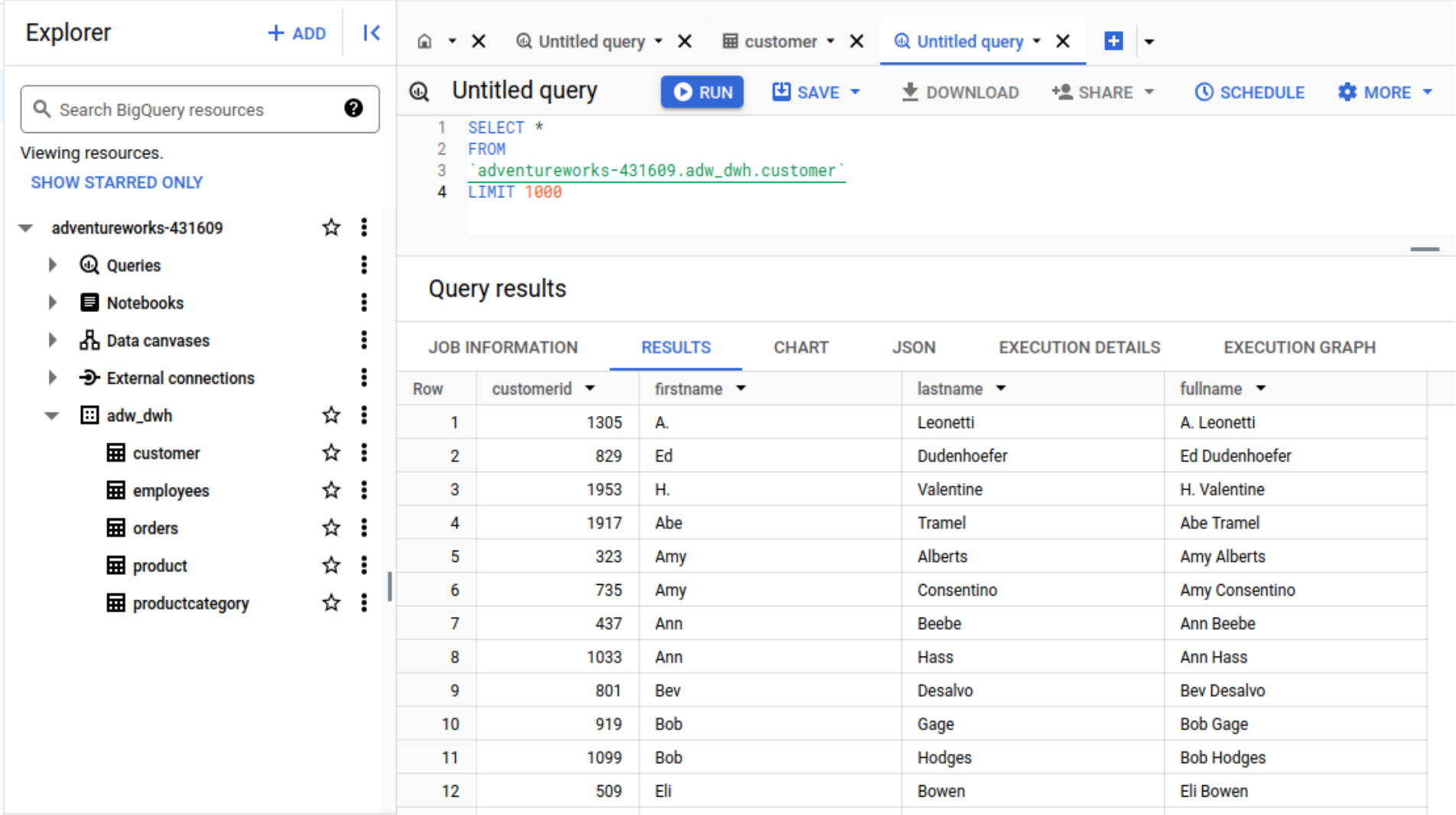
Ingestion

Orchestrating & Running Workflow – Apache Airflow



02 Ingestion

Data loaded in Google BigQuery



Row	customerid	firstname	lastname	fullname
1	1305	A.	Leonetti	A. Leonetti
2	829	Ed	Dudenhoefer	Ed Dudenhoefer
3	1953	H.	Valentine	H. Valentine
4	1917	Abe	Tramel	Abe Tramel
5	323	Amy	Alberts	Amy Alberts
6	735	Amy	Consentino	Amy Consentino
7	437	Ann	Beebe	Ann Beebe
8	1033	Ann	Hass	Ann Hass
9	801	Bev	Desalvo	Bev Desalvo
10	919	Bob	Gage	Bob Gage
11	1099	Bob	Hodges	Bob Hodges
12	509	Eli	Bowen	Eli Bowen

03

Transformation

Getting started with dbt

- Getting started documentation

Terminal

```
python -m venv adw_dbt # create virtual environment

cd adw_dbt # change into directory

source adw_dbt-env/bin/activate # activate environment

pip install dbt-core dbt-bigquery # install dbt + adapter

dbt –version # check version

dbt init <project_name> # initiate dbt project

dbt debug # debug setup

dbt run # run dbt models
dbt run --full-refres
```

03 Transformation

Building Data Models

Python

03 Transformation

Testing Models

Python