

USN NUMBER: 1RVU23CSE264

NAME: Meghana G

Ex No: 3	ETL Pipeline Implementation: Exporting Data from SQL Server to PostgreSQL
Date: 10/9/25	

Objective:

This lab experiment provides practical experience in building a basic ETL (Extract, Transform, Load) data pipeline using Python. It guides participants through the core stages of the pipeline from extracting raw data, transforming it into a usable format, and loading it into a target system. The activity also simulates the roles and responsibilities of key stakeholders, such as data engineers, data scientists, and business analysts, to demonstrate their collaborative contributions in the data pipeline.

Outcomes:

1. Identify and describe the stages of the data engineering lifecycle.
2. Explain the roles and responsibilities of different stakeholders at each stage.
3. Perform basic data engineering tasks within a simulated environment.
4. Collaborate across simulated stakeholder roles to design and implement a data-driven solution.

Lab Procedure

STEP 1: Install the following software :

1. SQL Server Express + SQL Server Management Studio (SSMS)

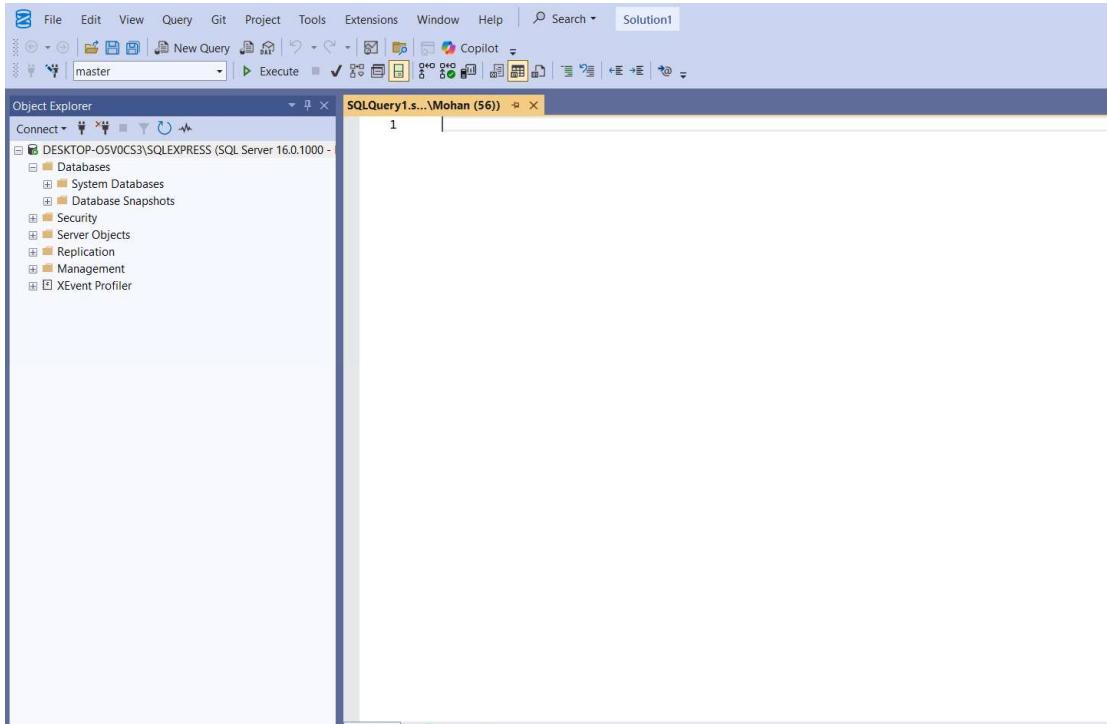
- Links: [SQL Server Downloads](#)
- Install SQL Server Express with default settings.
- Install SSMS to manage the database.

2. AdventureWorks Sample Database

- Use the link: AdventureWorks Installation
 - Make sure it's installed in your SQL Server.
- PostgreSQL

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3. Download & install: [PostgreSQL Downloads](#)

- Default password: **12345** (you can use **demopass** for your ETL role as in your code).
- Also install pgAdmin (optional but helps to visualize database).
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4. Python environment

- Make sure you have Python 3.9+,
Make sure you have Python 3.9+, **pandas**, **sqlalchemy**, and **psycopg2** installed.
- Install via pip

5. ODBC Driver for SQL Server

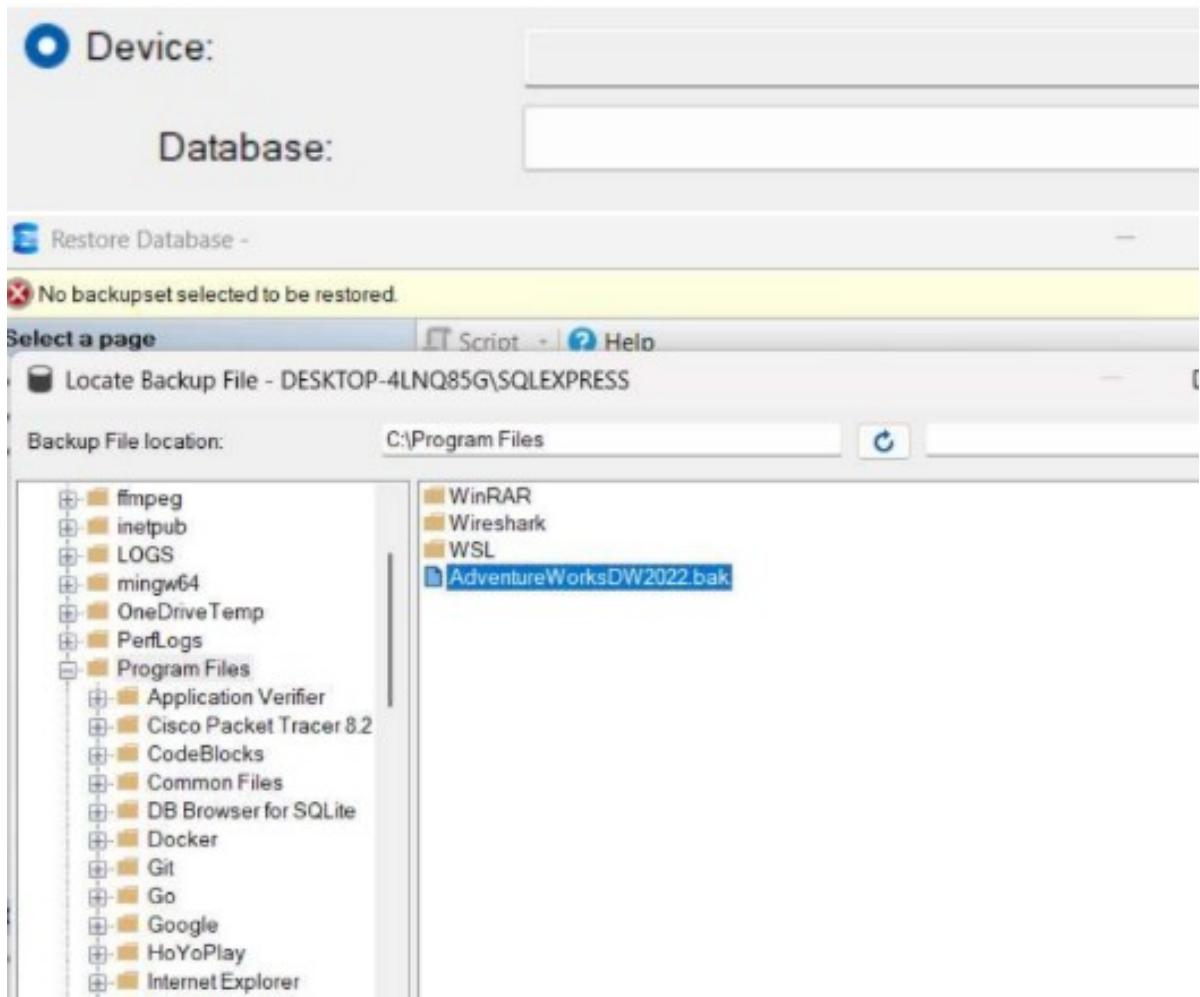
- Download [ODBC Driver 17](#)
[ODBC Driver 17](#)

Step 2: Open SSMS(Through Visual Studio):

1. Connect to the sql server that you downloaded(usually ends with \SQLEXPRESS)
2. After connecting, Databases->restore databases->device, click on the three dots and click on add, then select your adventureworks.bak file.

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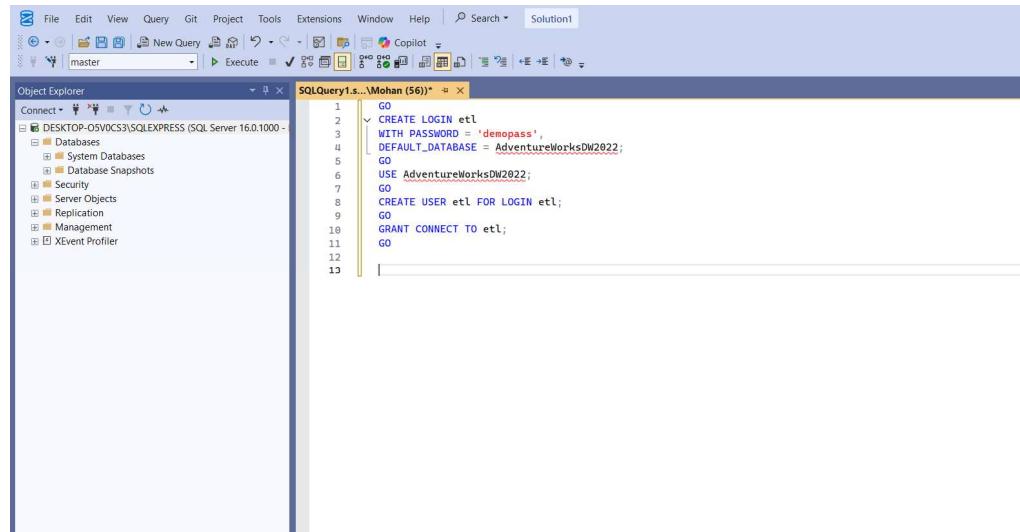


3. Now open ‘New Query’ and run the following code:

```
USE master;
GO
CREATE LOGIN etl
WITH PASSWORD = 'demopass',
DEFAULT_DATABASE = AdventureWorksDW2022;
GO
USE AdventureWorksDW2022;
GO
CREATE USER etl FOR LOGIN etl;
GO
GRANT CONNECT TO etl;
GO
```

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The screenshot shows the SSMS interface with the Object Explorer on the left and a query window on the right. The query window contains the following T-SQL script:

```
1 GO
2 CREATE LOGIN etl
3     WITH PASSWORD = 'demopass',
4         DEFAULT_DATABASE = AdventureWorksDW2022;
5 GO
6 USE AdventureWorksDW2022;
7 GO
8 CREATE USER etl FOR LOGIN etl;
9 GO
10 GRANT CONNECT TO etl;
11 GO
12
13
```

3. Open PGADMIN4:

1. Click on ‘Databases’->Create-> Database-> name it ‘adventureworks’->save 2.
- Open Query Tool and run the following code :

-- Creating the Role and Granting the privileges

CREATE ROLE etl WITH

LOGIN

PASSWORD 'demopass';

GRANT ALL PRIVILEGES ON DATABASE adventureworks TO etl;

-- Run this while connected to adventureworks

GRANT USAGE, CREATE ON SCHEMA public TO etl;

GRANT ALL PRIVILEGES ON ALL TABLES IN SCHEMA public TO etl;

GRANT ALL PRIVILEGES ON ALL SEQUENCES IN SCHEMA public TO etl;

ALTER DEFAULT PRIVILEGES IN SCHEMA public

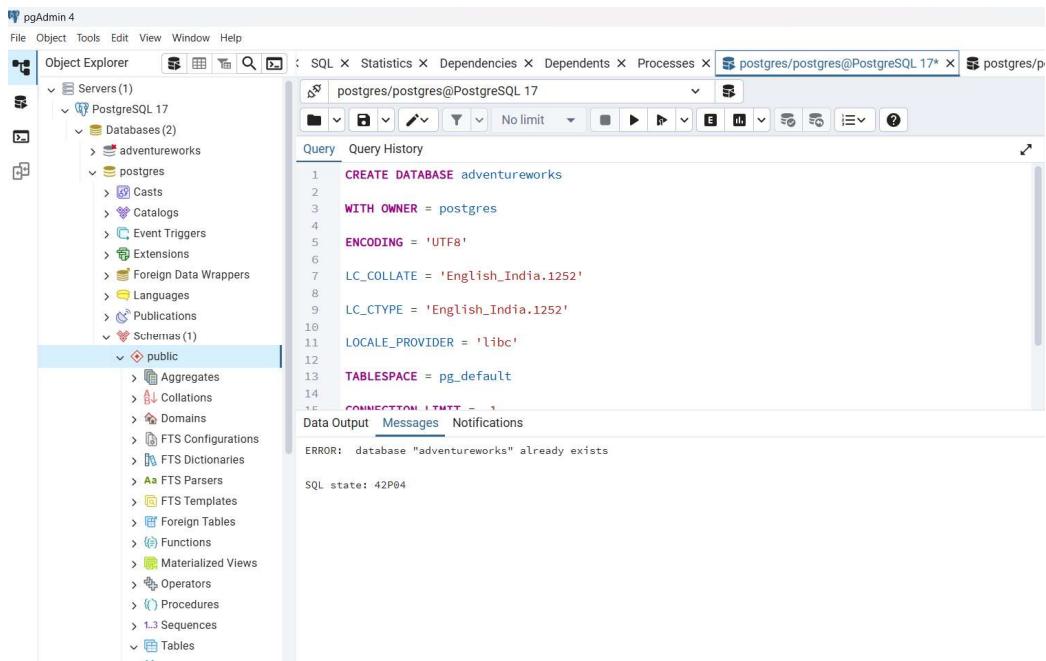
GRANT ALL PRIVILEGES ON TABLES TO etl;

ALTER DEFAULT PRIVILEGES IN SCHEMA public

GRANT ALL PRIVILEGES ON SEQUENCES TO etl;

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4. Open cmd:

1. Run the following code to install dependencies:

```
pip install psycopg2-binary pandas sqlalchemy pyodbc
```

5. Running Python Script:

In the python script, on line 10, 'server = r".\SQLEXPRESS" # your instance' , you need to replace it with your SQL server name. For eg: if you sql server name is DESKTOP 4LNQ85G\SQLEXPRESS then your line of code will be: server = r"DESKTOP 4LNQ85G\SQLEXPRESS". THIS IS THE SAME SERVER THAT YOU CONNECTED TO SSMS.

Now run the script and you should see the output in the terminal.

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6. OUTPUT

Open PgAdmin->Databases->adventureworks ->schemas->public->tables-> right click on any

one(stg_dimprodu
ct stg_dimproduct
category
stg_dimproductsubcategory
stg_dimsalesterritory
stg_factinternetsales) ->Vie

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pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer Dependencies Dependents Processes adventureworks/p... public.stg_DimProduct/adventureworks...

Languages Publications Schemas(1) public Aggregates Collations Domains FTS Configurations FTS Dictionaries FTS Parsers FTS Templates Foreign Tables Functions Materialized Views Operators Procedures Sequences Tables(5) stg_DimProduct

public.stg_DimProduct/adventureworks/postgres@PostgreSQL ...

Data Output Messages Notifications

Showing rows: 1 to 606 Page No:

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode
1	1	AR-5381		[null]	[null]
2	2	BA-8327		[null]	[null]
3	3	BE-2349		[null]	[null]
4	4	BE-2908		[null]	[null]
5	5	BL-2036		[null]	[null]
6	6	CA-5965		[null]	[null]
7	7	CA-6738		[null]	[null]
8	8	CA-7457		[null]	[null]
9	9	CB-2903		[null]	[null]
10	10	CN-6137		[null]	[null]
11	11	CR-7833		[null]	[null]
...

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer Dependencies Dependents Processes adventureworks/p... public.stg_DimProductCategory/adventureworks... public.stg_DimProductCategory/adventureworks...

Languages Publications Schemas(1) public Aggregates Collations Domains FTS Configurations FTS Dictionaries FTS Parsers FTS Templates Foreign Tables Functions Materialized Views Operators Procedures Sequences Tables(5) stg_DimProduct

public.stg_DimProductCategory/adventureworks/postgres@PostgreSQL ...

Data Output Messages Notifications

Showing rows: 1 to 4 Page No:

	ProductCategoryKey	ProductCategoryAlternateKey	EnglishProductCategoryName	SpanishProductCategoryName
1	1		1 Bikes	Bicicleta
2	2		2 Components	Componente
3	3		3 Clothing	Prenda
4	4		4 Accessories	Accesorio

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File Object Tools Edit View Window Help

Object Explorer

public.stg_DimProductSubcategory

public.stg_DimProductSubcategory/adventureworks/postgres...

Data Output Messages Notifications

Showing rows: 1 to 37 Page No: 1

	ProductSubCategoryKey bigint	ProductSubCategoryAlternateKey bigint	EnglishProductSubcategoryName text	SpanishProduct text
1		1	Mountain Bikes	Bicicleta de montaña
2		2	Road Bikes	Bicicleta de carretera
3		3	Touring Bikes	Bicicleta de paseo
4		4	Handlebars	Barra
5		5	Bottom Brackets	Eje de pedalier
6		6	Brakes	Frenos
7		7	Chains	Cadena
8		8	Cranksets	Bielas
9		9	Derailleurs	Desviador
10		10	Forks	Horquilla
11		11	Headsets	Dirección
12		12	Mountain Frames	Cuadro de montaña

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

public.stg_FactInternetSales

public.stg_FactInternetSales/adventureworks/postgres...

Data Output Messages Notifications

Showing rows: 1 to 1000 Page No: 1

	ProductKey bigint	OrderDateKey bigint	DueDateKey bigint	ShipDateKey bigint	CustomerKey bigint	PromotionKey bigint	CurrencyKey bigint
1	310	20101229	20110110	20110105	21768	1	1
2	346	20101229	20110110	20110105	28389	1	1
3	346	20101229	20110110	20110105	25863	1	1
4	336	20101229	20110110	20110105	14501	1	1
5	346	20101229	20110110	20110105	11003	1	1
6	311	20101230	20110111	20110106	27645	1	1
7	310	20101230	20110111	20110106	16624	1	1
8	351	20101230	20110111	20110106	11005	1	1
9	344	20101230	20110111	20110106	11011	1	1
10	312	20101231	20110112	20110107	27621	1	1
11	312	20101231	20110112	20110107	27616	1	1

Github link:

<https://github.com/meghana1653/Data-Engineering/blob/main/LAB-3.zip>