Mazenet Technologies

Data Engineering Training

PROJECT: BANKING DATA PLATFORM DEVELOPMENT

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Batch: DE-2025 Batch 1

Trainer: Aaryan Kumar

Date: 10-12-2025

SYNOPSIS

Day 1 — Architecture & Data Ingestion Layer

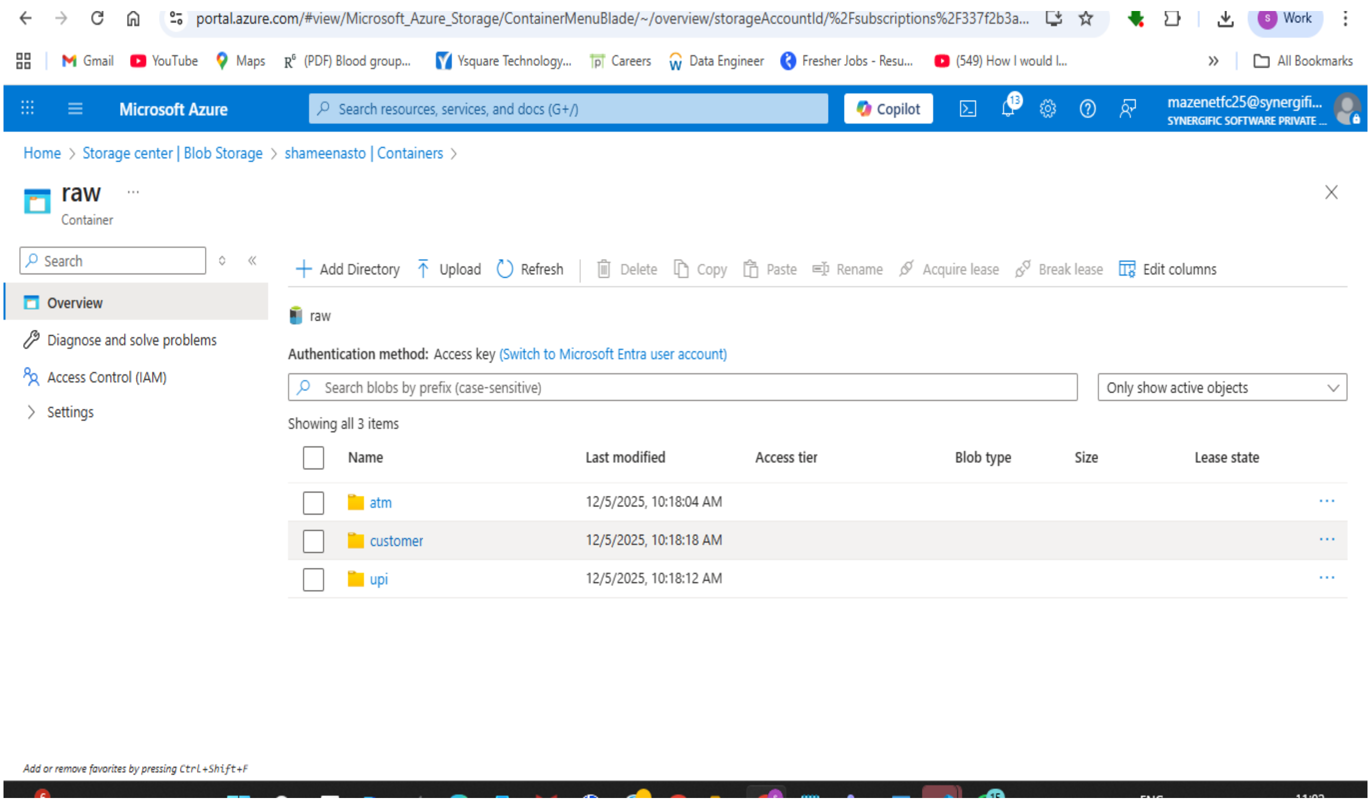
Goal: The goal of Day 1 was to design the architecture of the banking data platform and set up the initial data ingestion layer for both real-time and batch processing.

Services Used: - Azure Data Lake Storage Gen2 (ADLS) - Azure Event Grid - Azure Service Bus - Azure Functions.

Implementation:

1. I started by **creating ADLS Gen2 containers** for storing raw transaction data.

   And I created separate folders for raw/atm/ and raw/upi.



portal.azure.com/#view/Microsoft_Azure_Storage/ContainerMenuBlade/~/overview/storageAccountId/%2Fsubscriptions%2F337f2b3a...

Home > Storage center | Blob Storage > shameenasto | Containers >

raw
Container

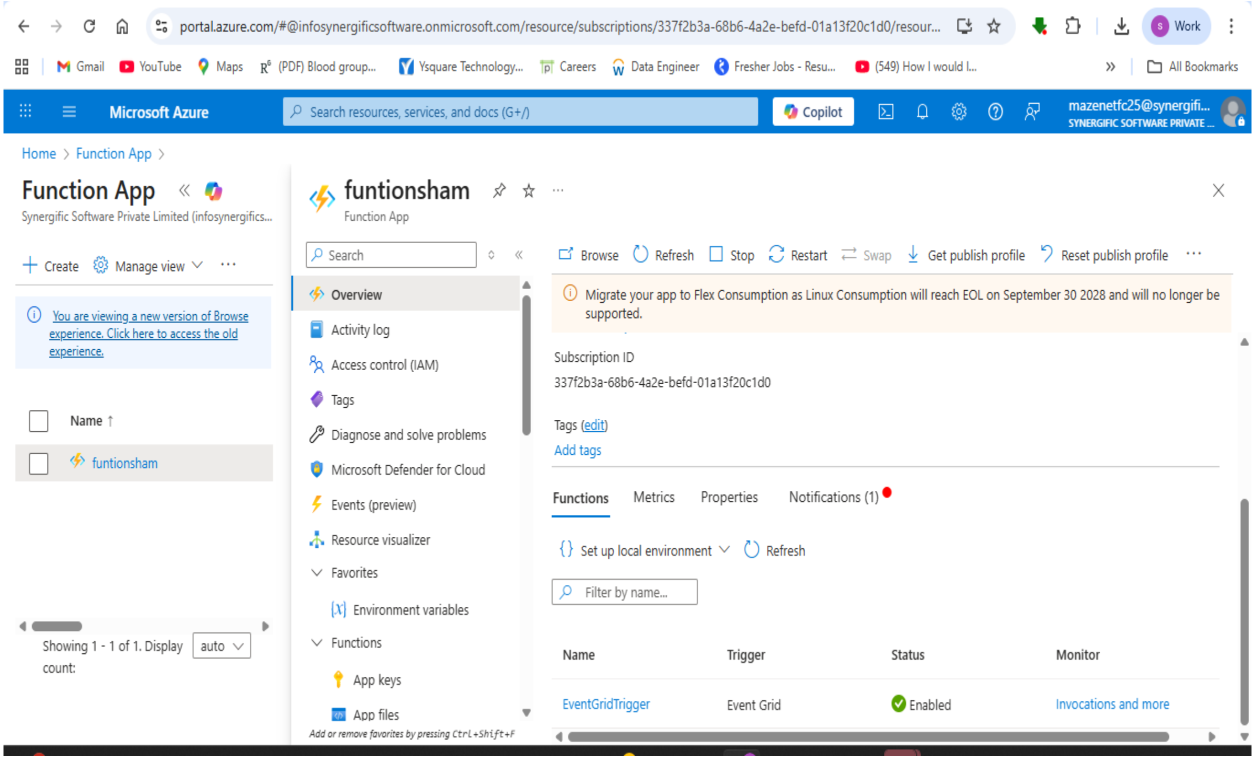
raw

Authentication method: Access key (Switch to Microsoft Entra user account)

Showing all 3 items

Name	Last modified	Access tier	Blob type	Size	Lease state
atm	12/5/2025, 10:18:04 AM				
customer	12/5/2025, 10:18:18 AM				
upi	12/5/2025, 10:18:12 AM				

2. I then **configured Event Grid** to trigger Azure Functions whenever a new file is uploaded to the raw containers.



You are viewing a new version of Browse experience. Click here to access the old experience.

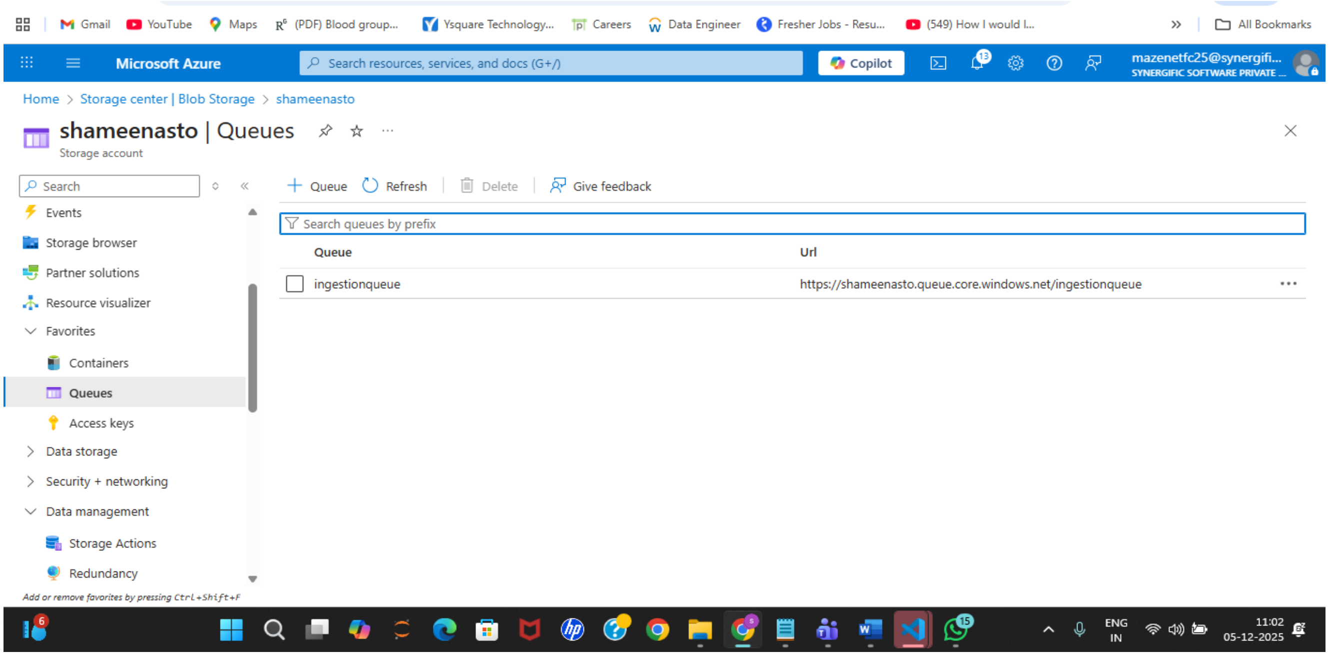
Migrate your app to Flex Consumption as Linux Consumption will reach EOL on September 30 2028 and will no longer be supported.

Subscription ID
337f2b3a-68b6-4a2e-befd-01a13f20c1d0

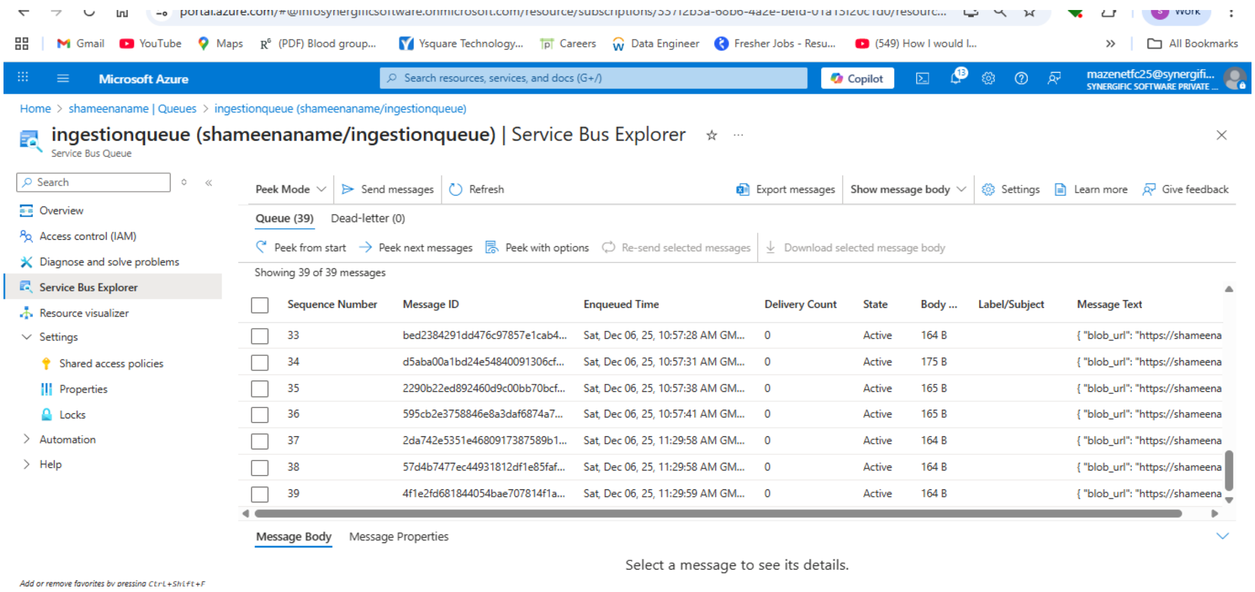
Tags (edit)
Add tags

Name	Trigger	Status	Monitor
EventGridTrigger	Event Grid	✓ Enabled	Invocations and more

3. Next, I **created a Service Bus queue** to orchestrate real-time transaction processing. This queue will receive messages from Event Grid triggers.



Queue	Url
ingestionqueue	https://shameenasto.queue.core.windows.net/ingestionqueue

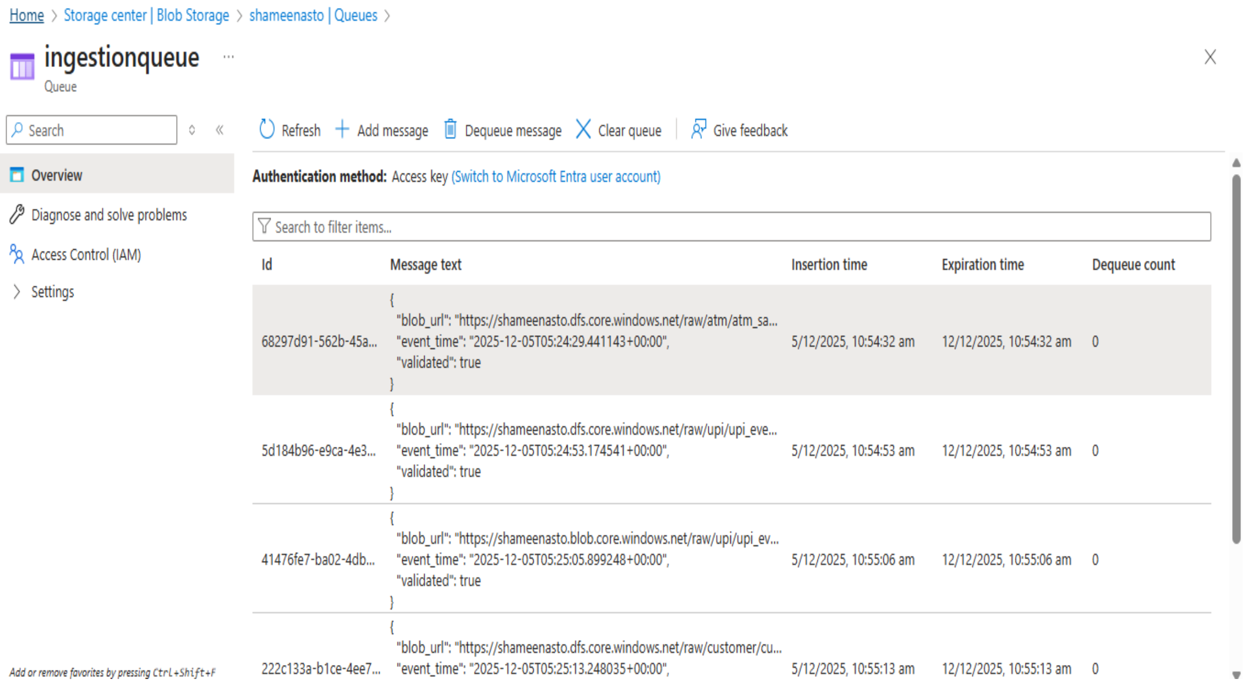


Showing 39 of 39 messages

□	Sequence Number	Message ID	Enqueued Time	Delivery Count	State	Body ...	Label/Subject	Message Text
□	33	bed2384291dd476c97857e1cab4...	Sat, Dec 06, 25, 10:57:28 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	34	d5aba00a1bd24e54840091306cf...	Sat, Dec 06, 25, 10:57:31 AM GM...	0	Active	175 B		{ "blob_url": "https://shameena
□	35	2290b22ed892460d9c00bb70bcf...	Sat, Dec 06, 25, 10:57:38 AM GM...	0	Active	165 B		{ "blob_url": "https://shameena
□	36	595cb2e3758846e8a3daf6874a7...	Sat, Dec 06, 25, 10:57:41 AM GM...	0	Active	165 B		{ "blob_url": "https://shameena
□	37	2da742e5351e4680917387589b1...	Sat, Dec 06, 25, 11:29:58 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	38	57d4b7477ec44931812df1e85faf...	Sat, Dec 06, 25, 11:29:58 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	39	4f1e2fd681844054bae707814f1a...	Sat, Dec 06, 25, 11:29:59 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena

Select a message to see its details.

I also tried in Storage Queue and got queue messages.


Home > Storage center | Blob Storage > shameenasto | Queues >
ingestionqueue
Queue
Search
Overview
Diagnose and solve problems
Access Control (IAM)
Settings
Add or remove favorites by pressing Ctrl+Shift+F
Refresh
Add message
Dequeue message
Clear queue
Give feedback
Search to filter items...

Authentication method: Access key (Switch to Microsoft Entra user account)

Id	Message text	Insertion time	Expiration time	Dequeue count

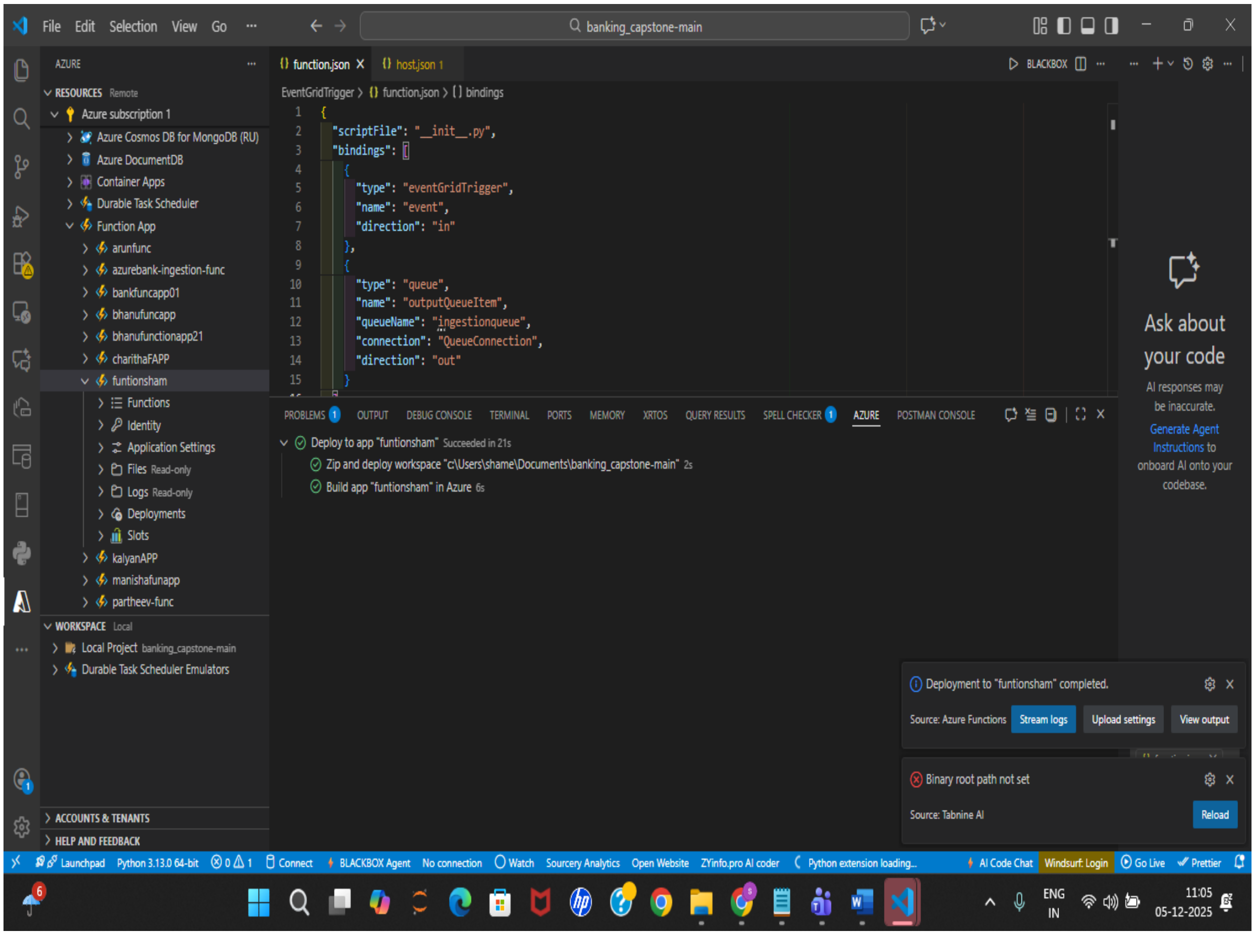
68297d91-562b-45a...	{
	"blob_url": "https://shameenasto.dfs.core.windows.net/raw/atm/atm_sa...
	"event_time": "2025-12-05T05:24:29.441143+00:00",
	"validated": true
	}
		5/12/2025, 10:54:32 am	12/12/2025, 10:54:32 am	0

5d184b96-e9ca-4e3...	{
	"blob_url": "https://shameenasto.dfs.core.windows.net/raw/upi/upi_eve...
	"event_time": "2025-12-05T05:24:53.174541+00:00",
	"validated": true
	}
		5/12/2025, 10:54:53 am	12/12/2025, 10:54:53 am	0

41476fe7-ba02-4db...	{
	"blob_url": "https://shameenasto.blob.core.windows.net/raw/upi/upi_ev...
	"event_time": "2025-12-05T05:25:05.899248+00:00",
	"validated": true
	}
		5/12/2025, 10:55:06 am	12/12/2025, 10:55:06 am	0

222c133a-b1ce-4ee7...	{ "blob_url": "https://shameenasto.dfs.core.windows.net/raw/customer/cu... "event_time": "2025-12-05T05:25:13.248035+00:00",	5/12/2025, 10:55:13 am	12/12/2025, 10:55:13 am	0

4. I **built the first Python Azure Function** with Event Grid trigger. This function validates file metadata and pushes ingestion requests to the Service Bus queue.



```
{
  "scriptFile": "__init__.py",
  "bindings": [
    {
      "type": "eventGridTrigger",
      "name": "event",
      "direction": "in"
    },
    {
      "type": "queue",
      "name": "outputQueueItem",
      "queueName": "ingestionqueue",
      "connection": "QueueConnection",
      "direction": "out"
    }
```

```
Deploy to app "funtionsham" Succeeded in 21s
    Zip and deploy workspace "c:\Users\shame\Documents\banking_capstone-main" 2s
    Build app "funtionsham" in Azure 6s
```

Deployment to "funtionsham" completed.

Source: Azure Functions Stream logs Upload settings View output

Binary root path not set

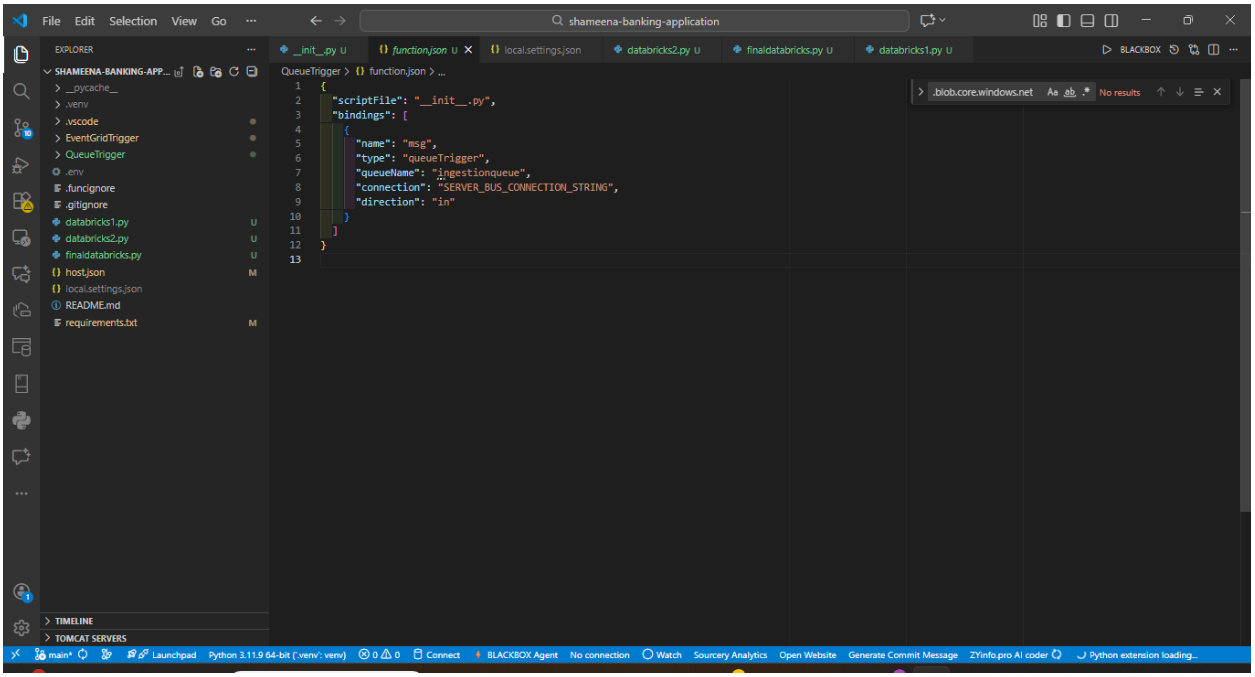
Source: Tabnine AI Reload

Day 2 — Transformation Layer & NoSQL Operational Store

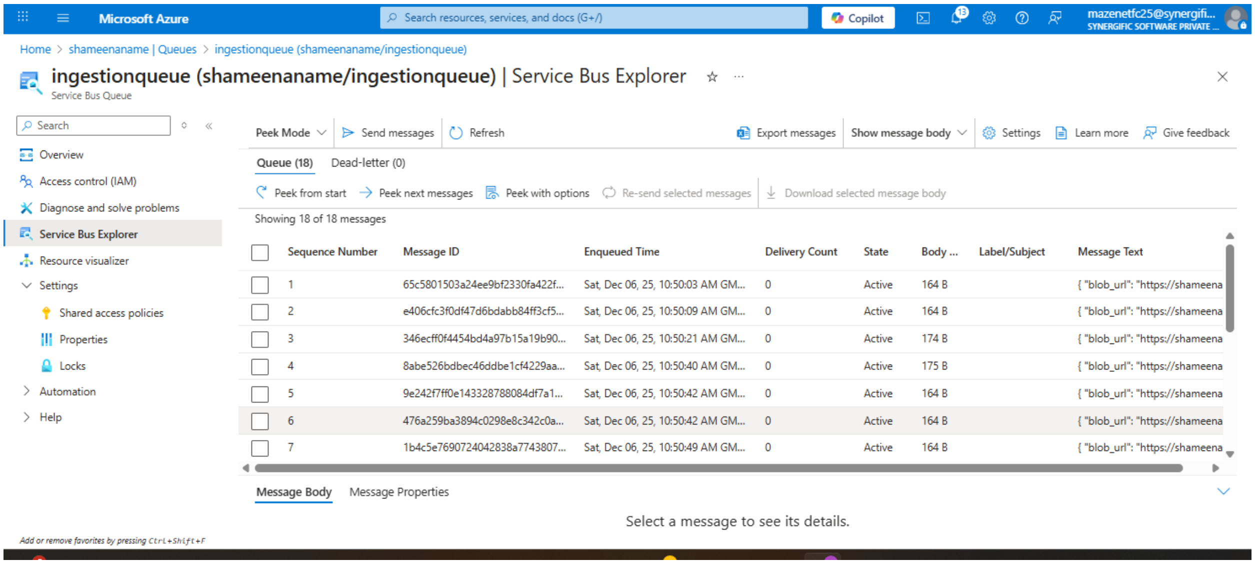
Goal: The goal of Day 2 was to process and transform incoming data using Python Azure Functions, and store operational data in Cosmos DB for low-latency lookups.

Services Used: - Azure Functions (Queue Triggered) - Azure Blob Storage / ADLS Gen2 - Azure Cosmos DB - Azure Databricks.

Implementation: 1. I **created Queue-triggered Azure Functions** to process messages from the Service Bus queue. These functions: - Load file content from Blob Storage. - Validate data schema and integrity. - Remove duplicate transactions based on unique IDs. - Classify transaction types (ATM, UPI, IMPS, NEFT). - Detect suspicious patterns like rapid multiple withdrawals.



```json
{
  "scriptFile": "__init__.py",
  "bindings": [
    {
      "name": "msg",
      "type": "queueTrigger",
      "queueName": "ingestionqueue",
      "connection": "SERVER_BUS_CONNECTION_STRING",
      "direction": "in"
    }
  ]
}
```


Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
mazenetfc25@synergifi...
SYNERGIFIC SOFTWARE PRIVATE ...
Home > shameenaname | Queues > ingestionqueue (shameenaname/ingestionqueue)

ingestionqueue (shameenaname/ingestionqueue) | Service Bus Explorer

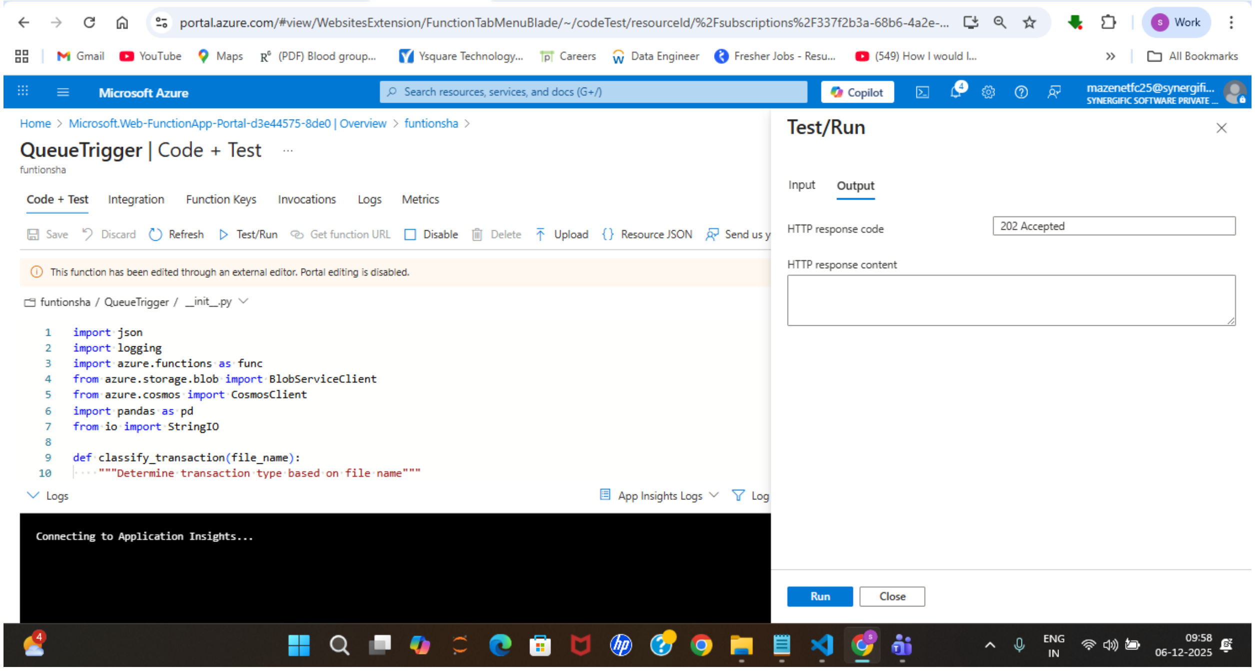
Service Bus Queue

Showing 18 of 18 messages

□	Sequence Number	Message ID	Enqueued Time	Delivery Count	State	Body ...	Label/Subject	Message Text
□	1	65c5801503a24ee9bf2330fa422f...	Sat, Dec 06, 25, 10:50:03 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	2	e406cfc3f0df47d6bdabb84ff3cf5...	Sat, Dec 06, 25, 10:50:09 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	3	346ecff0f4454bd4a97b15a19b90...	Sat, Dec 06, 25, 10:50:21 AM GM...	0	Active	174 B		{ "blob_url": "https://shameena
□	4	8abe526bdbec46ddbe1cf4229aa...	Sat, Dec 06, 25, 10:50:40 AM GM...	0	Active	175 B		{ "blob_url": "https://shameena
□	5	9e242f7ff0e143328788084df7a1...	Sat, Dec 06, 25, 10:50:42 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	6	476a259ba3894c0298e8c342c0a...	Sat, Dec 06, 25, 10:50:42 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena
□	7	1b4c5e7690724042838a7743807...	Sat, Dec 06, 25, 10:50:49 AM GM...	0	Active	164 B		{ "blob_url": "https://shameena

Select a message to see its details.

Add or remove favorites by pressing Ctrl+Shift+F


portal.azure.com/#view/WebsitesExtension/FunctionTabMenuBlade/~/codeTest/resourceId/%2Fsubscriptions%2F337f2b3a-68b6-4a2e-...
Work
Gmail
YouTube
Maps
(PDF) Blood group...
Ysquare Technology...
Careers
Data Engineer
Fresher Jobs - Resu...
(549) How I would l...
All Bookmarks
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
mazenetfc25@synergifi...
SYNERGIFIC SOFTWARE PRIVATE ...
Home > Microsoft.Web-FunctionApp-Portal-d3e44575-8de0 | Overview > funtionsha >

QueueTrigger | Code + Test

funtionsha

Code + Test
Integration
Function Keys
Invocations
Logs
Metrics
Save
Discard
Refresh
Test/Run
Get function URL
Disable
Delete
Upload
Resource JSON
Send us y

This function has been edited through an external editor. Portal editing is disabled.

funtionsha / QueueTrigger / __init__.py

```python
import json
import logging
import azure.functions as func
from azure.storage.blob import BlobServiceClient
from azure.cosmos import CosmosClient
import pandas as pd
from io import StringIO

def classify_transaction(file_name):
    """Determine transaction type based on file name"""
```

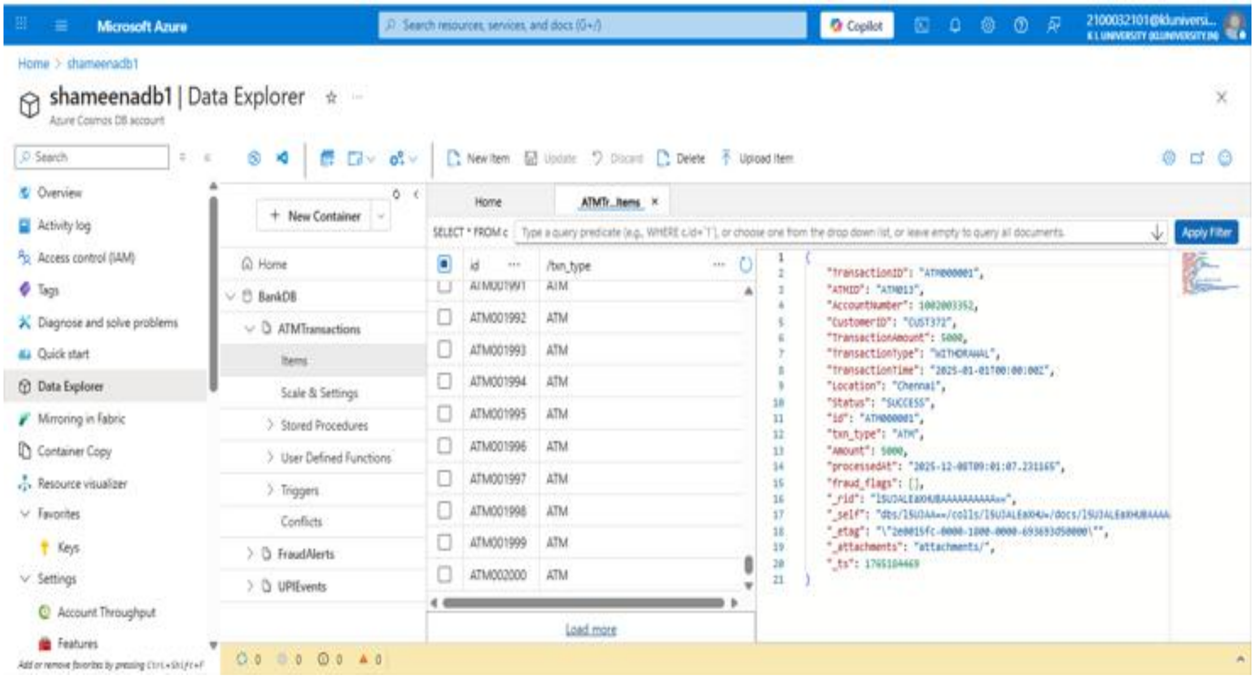
```
Connecting to Application Insights...
```

Test/Run

HTTP response code: 202 Accepted

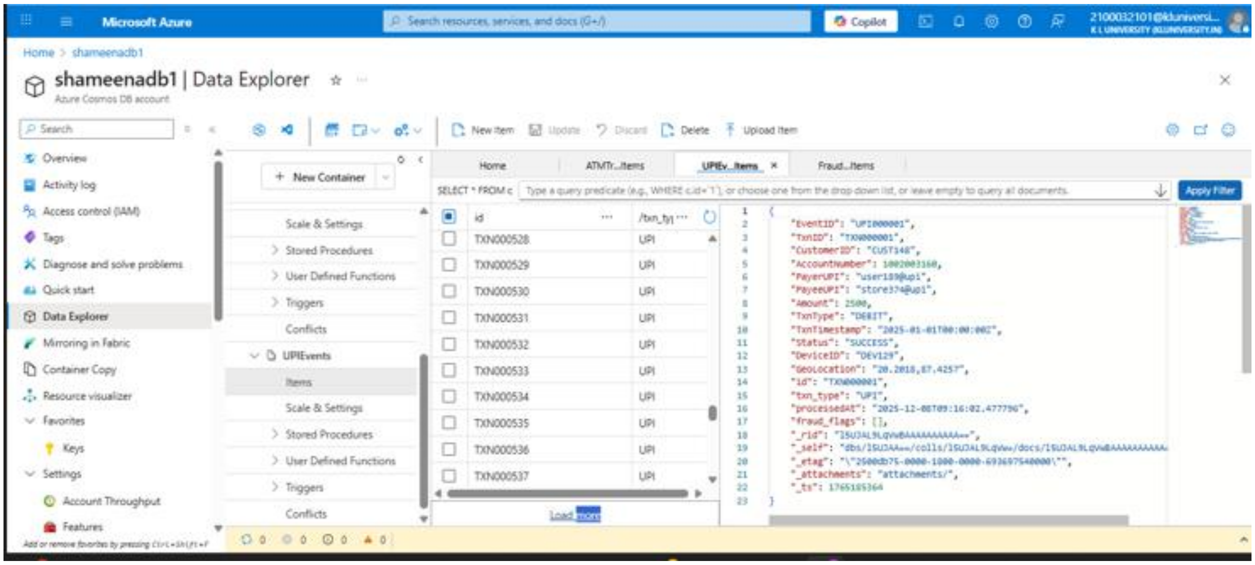
HTTP response content

2. I **set up Cosmos DB collections** to store operational data:
    - ATMTransactions for real-time ATM history (partitioned by /txn_type).
    - UPIEvents for UPI transactions (partitioned by /txn_type).
    - FraudAlerts for immediate fraud notifications (partitioned by /alertype).



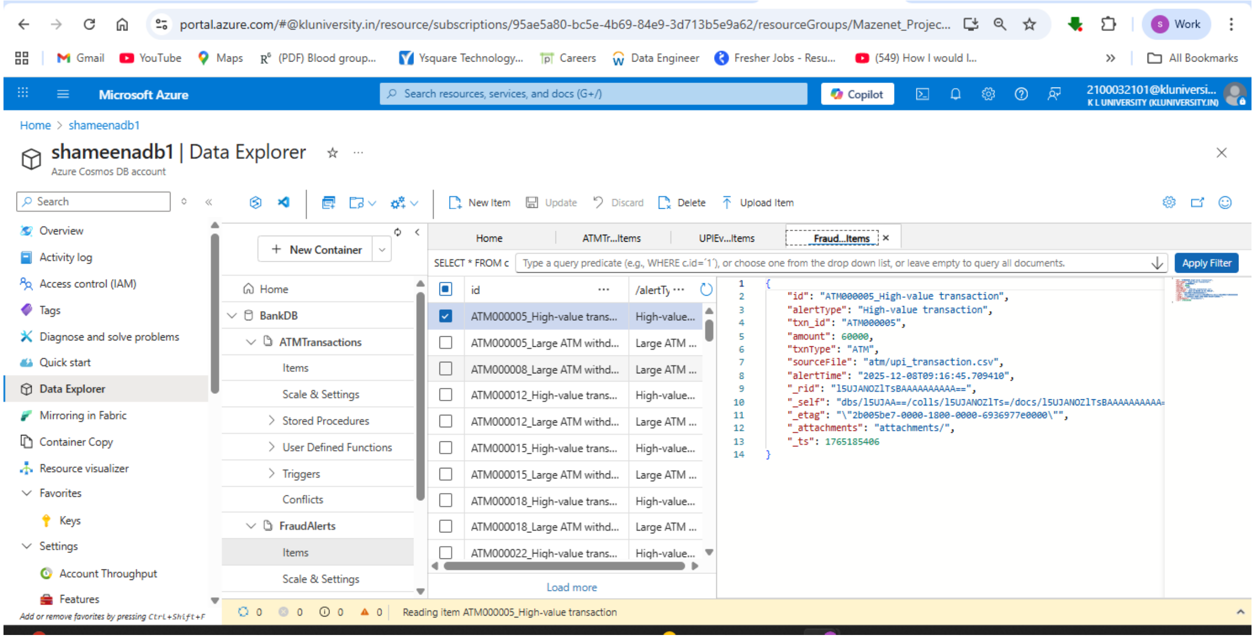
id	/txn_type
ATM001991	ATM
ATM001992	ATM
ATM001993	ATM
ATM001994	ATM
ATM001995	ATM
ATM001996	ATM
ATM001997	ATM
ATM001998	ATM
ATM001999	ATM
ATM002000	ATM

```
{
    "TransactionID": "ATM000001",
    "ATMID": "ATM013",
    "AccountNumber": 1002003352,
    "CustomerID": "CUST372",
    "TransactionAmount": 5000,
    "TransactionType": "WITHDRAWAL",
    "TransactionTime": "2025-01-01T00:00:00Z",
    "Location": "Chennai",
    "Status": "SUCCESS",
    "id": "ATM000001",
    "txn_type": "ATM",
    "Amount": 5000,
    "processedAt": "2025-12-08T09:01:07.231165",
    "fraud_flags": [],
    "_rid": "1SUJALEa0KUBAAAAAAAAAA==",
    "_self": "dbs/1SUJAA==/colls/1SUJALEa0KU=/docs/1SUJALEa0KUBAAAA
    "_etag": "\"2e0015fc-0000-1000-0000-693653d50000\"",
    "_attachments": "attachments/",
    "_ts": 1765184469
}
```



id	/txn_ty
TXN000528	UPI
TXN000529	UPI
TXN000530	UPI
TXN000531	UPI
TXN000532	UPI
TXN000533	UPI
TXN000534	UPI
TXN000535	UPI
TXN000536	UPI
TXN000537	UPI

```
{
    "EventID": "UPI000001",
    "TxnID": "TXN000001",
    "CustomerID": "CUST148",
    "AccountNumber": 1002003168,
    "PayerUPI": "user189@upi",
    "PayeeUPI": "store374@upi",
    "Amount": 2500,
    "TxnType": "DEBIT",
    "TxnTimestamp": "2025-01-01T00:00:00Z",
    "Status": "SUCCESS",
    "DeviceID": "DEV129",
    "GeoLocation": "20.2018,87.4257",
    "id": "TXN000001",
    "txn_type": "UPI",
    "processedAt": "2025-12-08T09:16:02.477796",
    "fraud_flags": [],
    "_rid": "1SUJAL9LqVwBAAAAAAAAAA==",
    "_self": "dbs/1SUJAA==/colls/1SUJAL9LqVw=/docs/1SUJAL9LqVwBAAAAAAAAA
    "_etag": "\"2500db75-0000-1000-0000-693697540000\"",
    "_attachments": "attachments/",
    "_ts": 1765185364
}
```

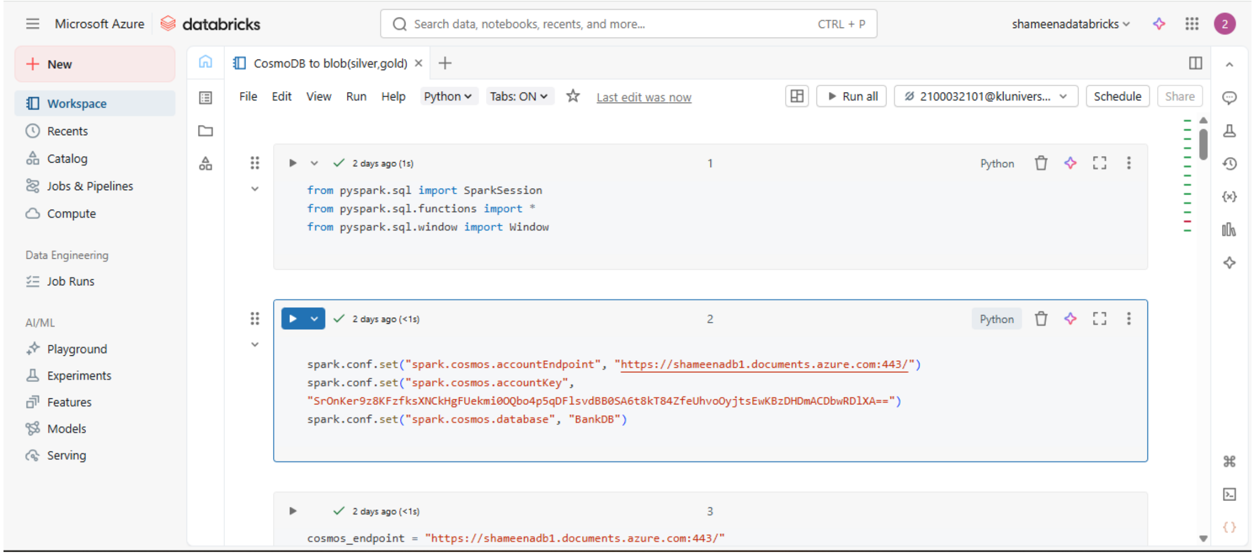


SELECT * FROM c Type a query predicate (e.g., WHERE c.id='1'), or choose one from the drop down list, or leave empty to query all documents.

id	/alertTy
ATM000005_High-value trans...	High-value...
ATM000005_Large ATM withd...	Large ATM ...
ATM000008_Large ATM withd...	Large ATM ...
ATM000012_High-value trans...	High-value...
ATM000012_Large ATM withd...	Large ATM ...
ATM000015_High-value trans...	High-value...
ATM000015_Large ATM withd...	Large ATM ...
ATM000018_High-value trans...	High-value...
ATM000018_Large ATM withd...	Large ATM ...
ATM000022_High-value trans...	High-value...

```
{
    "id": "ATM000005_High-value transaction",
    "alertType": "High-value transaction",
    "txn_id": "ATM000005",
    "amount": 60000,
    "txnType": "ATM",
    "sourceFile": "atm/upi_transaction.csv",
    "alertTime": "2025-12-08T09:16:45.709410",
    "_rid": "l5UJANOZlTsBAAAAAAAAAA==",
    "_self": "dbs/l5UJAA==/colls/l5UJANOZlTs=/docs/l5UJANOZlTsBAAAAAAAAAA=
    "_etag": "\"2b005be7-0000-1800-0000-6936977e0000\"",
    "_attachments": "attachments/",
    "_ts": 1765185406
}
```

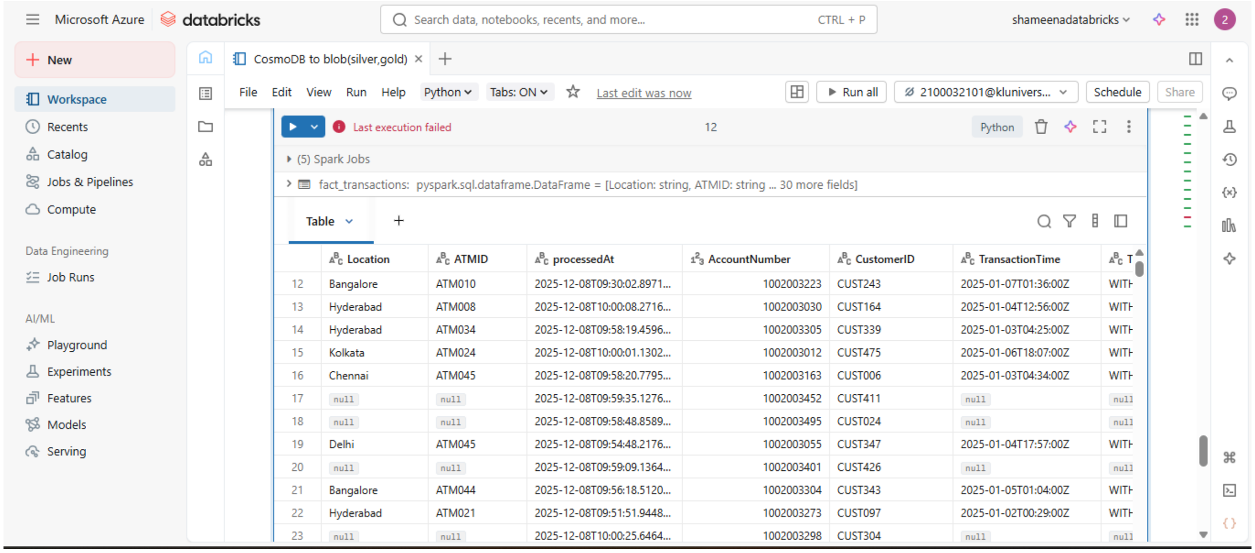
3. I then **executed a PySpark data clean pipeline** on Azure Databricks:
    - ○ Read raw data from Cosmos DB.
    - ○ Normalized columns (currency formats, timestamp formats).
    - ○ Merged ATM and UPI streams into a unified Fact_Transactions dataset.
    - ○ Stored processed data in Bronze, Silver, and Gold delta layers.



```
from pyspark.sql import SparkSession
from pyspark.sql.functions import *
from pyspark.sql.window import Window
```

```
spark.conf.set("spark.cosmos.accountEndpoint", "https://shameenadb1.documents.azure.com:443/")
spark.conf.set("spark.cosmos.accountKey",
"SrOnKer9z8KFzfksXNCkHgFUekmi0OQbo4p5qDFlsvdBB0SA6t8kT84ZfeUhvoOyjtsEwKBzDHDmACDbwRDlXA==")
spark.conf.set("spark.cosmos.database", "BankDB")
```

```
cosmos_endpoint = "https://shameenadb1.documents.azure.com:443/"
```



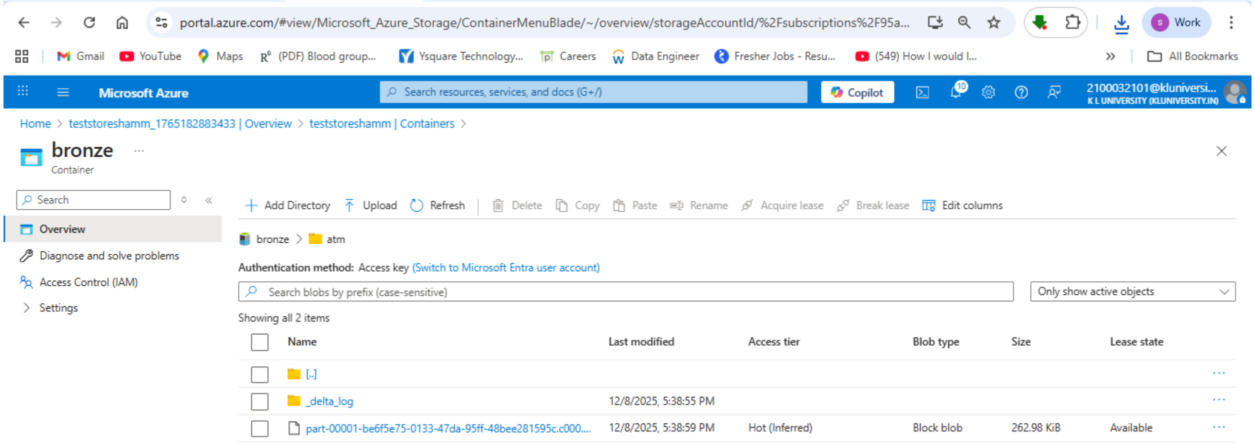
Last execution failed 12

(5) Spark Jobs

fact_transactions: pyspark.sql.dataframe.DataFrame = [Location: string, ATMID: string ... 30 more fields]

Table

	Location	ATMID	processedAt	AccountNumber	CustomerID	TransactionTime	T
12	Bangalore	ATM010	2025-12-08T09:30:02.8971...	1002003223	CUST243	2025-01-07T01:36:00Z	WITH
13	Hyderabad	ATM008	2025-12-08T10:00:08.2716...	1002003030	CUST164	2025-01-04T12:56:00Z	WITH
14	Hyderabad	ATM034	2025-12-08T09:58:19.4596...	1002003305	CUST339	2025-01-03T04:25:00Z	WITH
15	Kolkata	ATM024	2025-12-08T10:00:01.1302...	1002003012	CUST475	2025-01-06T18:07:00Z	WITH
16	Chennai	ATM045	2025-12-08T09:58:20.7795...	1002003163	CUST006	2025-01-03T04:34:00Z	WITH
17	null	null	2025-12-08T09:59:35.1276...	1002003452	CUST411	null	null
18	null	null	2025-12-08T09:58:48.8589...	1002003495	CUST024	null	null
19	Delhi	ATM045	2025-12-08T09:54:48.2176...	1002003055	CUST347	2025-01-04T17:57:00Z	WITH
20	null	null	2025-12-08T09:59:09.1364...	1002003401	CUST426	null	null
21	Bangalore	ATM044	2025-12-08T09:56:18.5120...	1002003304	CUST343	2025-01-05T01:04:00Z	WITH
22	Hyderabad	ATM021	2025-12-08T09:51:51.9448...	1002003273	CUST097	2025-01-02T00:29:00Z	WITH
23	null	null	2025-12-08T10:00:25.6464...	1002003298	CUST304	null	null



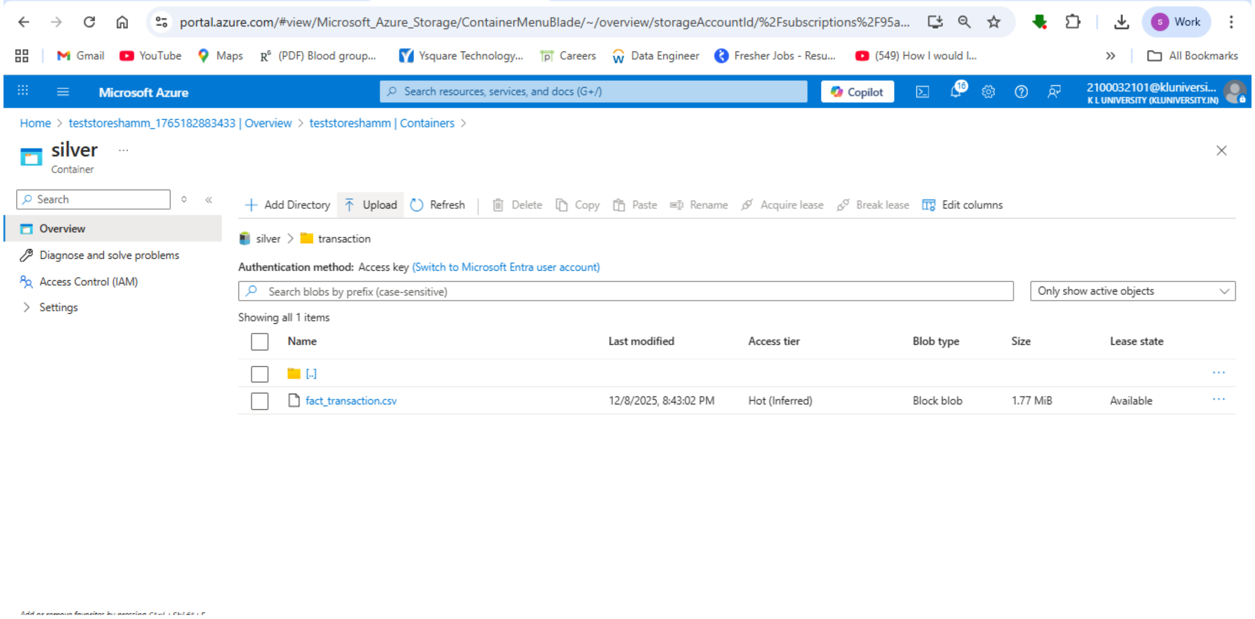
bronze > atm

Authentication method: Access key (Switch to Microsoft Entra user account)

Search blobs by prefix (case-sensitive)   Only show active objects

Showing all 2 items

Name	Last modified	Access tier	Blob type	Size	Lease state
[..]					
_delta_log	12/8/2025, 5:38:55 PM				
part-00001-be6f5e75-0133-47da-95ff-48bee281595c.c000....	12/8/2025, 5:38:59 PM	Hot (Inferred)	Block blob	262.98 KiB	Available



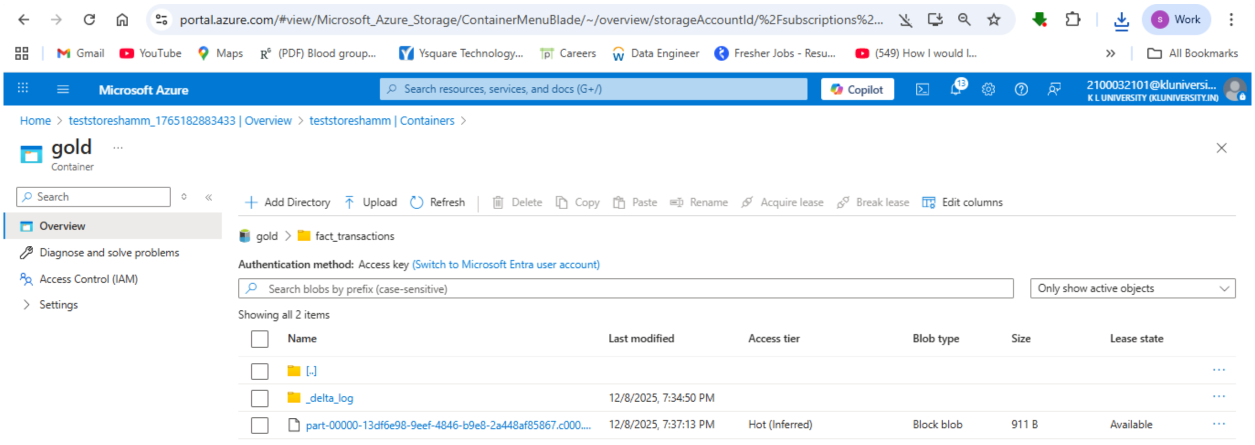
silver > transaction

Authentication method: Access key (Switch to Microsoft Entra user account)

Search blobs by prefix (case-sensitive) | Only show active objects

Showing all 1 items

□	Name	Last modified	Access tier	Blob type	Size	Lease state	
□	[..]						···
□	fact_transaction.csv	12/8/2025, 8:43:02 PM	Hot (Inferred)	Block blob	1.77 MiB	Available	···



gold > fact_transactions

Authentication method: Access key (Switch to Microsoft Entra user account)

Search blobs by prefix (case-sensitive) | Only show active objects

Showing all 2 items

□	Name	Last modified	Access tier	Blob type	Size	Lease state	
□	[..]						···
□	_delta_log	12/8/2025, 7:34:50 PM					···
□	part-00000-13df6e98-9eef-4846-b9e8-2a448af85867.c000....	12/8/2025, 7:37:13 PM	Hot (Inferred)	Block blob	911 B	Available	···

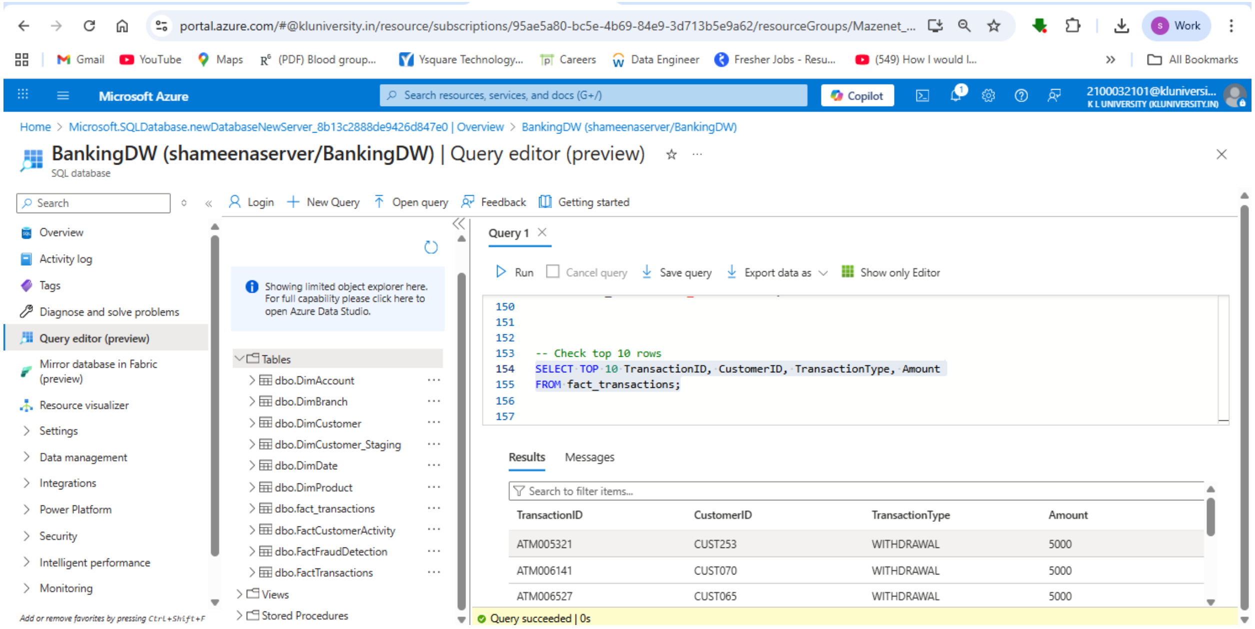
Day 3 — Data Warehouse Implementation

Goal: The goal of Day 3 was to build a dimensional data warehouse to support analytics and reporting, applying PySpark ETL to populate fact and dimension tables.

Services Used: - Azure SQL Database- Azure Databricks - Delta Lake (Bronze/Silver/Gold Layers)

Implementation:

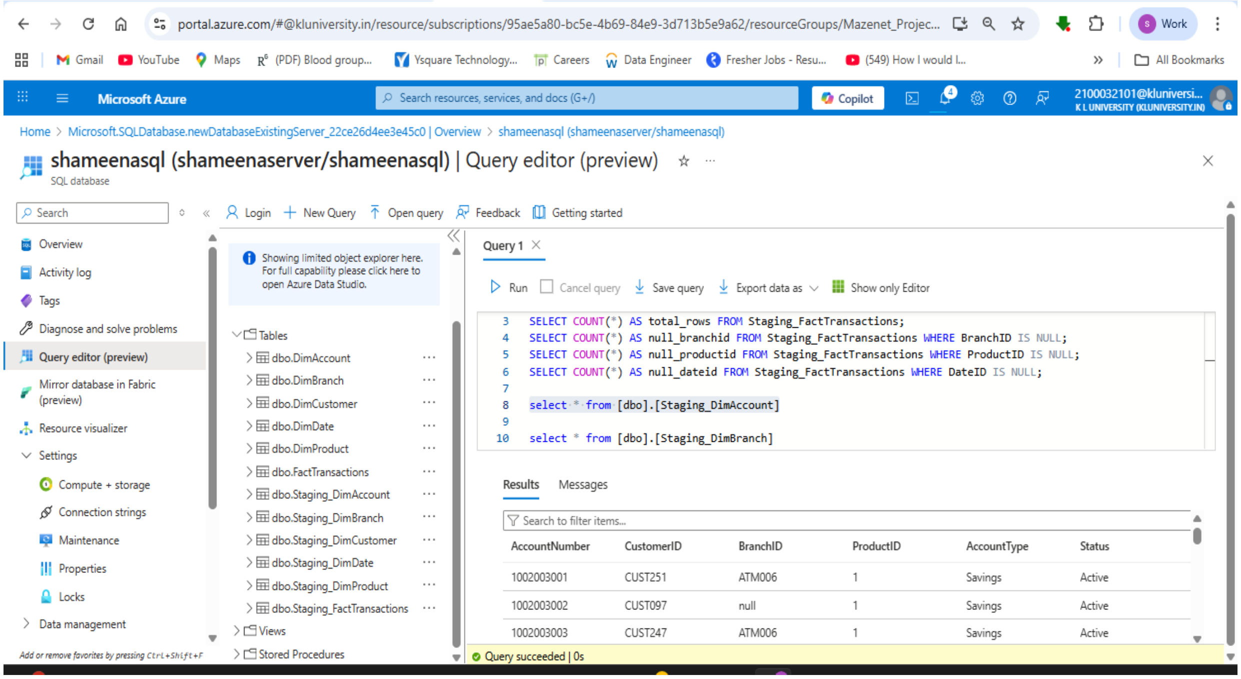
1. I **designed the Star Schema** for the banking data warehouse with the following tables: - Dimension Tables: DimCustomer (SCD Type 2), DimAccount, DimBranch, DimProduct, DimDate. - Fact Tables: FactTransactions, FactFraudDetection, FactCustomerActivity.



```
-- Check top 10 rows
SELECT TOP 10 TransactionID, CustomerID, TransactionType, Amount
FROM fact_transactions;
```

TransactionID	CustomerID	TransactionType	Amount
ATM005321	CUST253	WITHDRAWAL	5000
ATM006141	CUST070	WITHDRAWAL	5000
ATM006527	CUST065	WITHDRAWAL	5000

Query succeeded | 0s

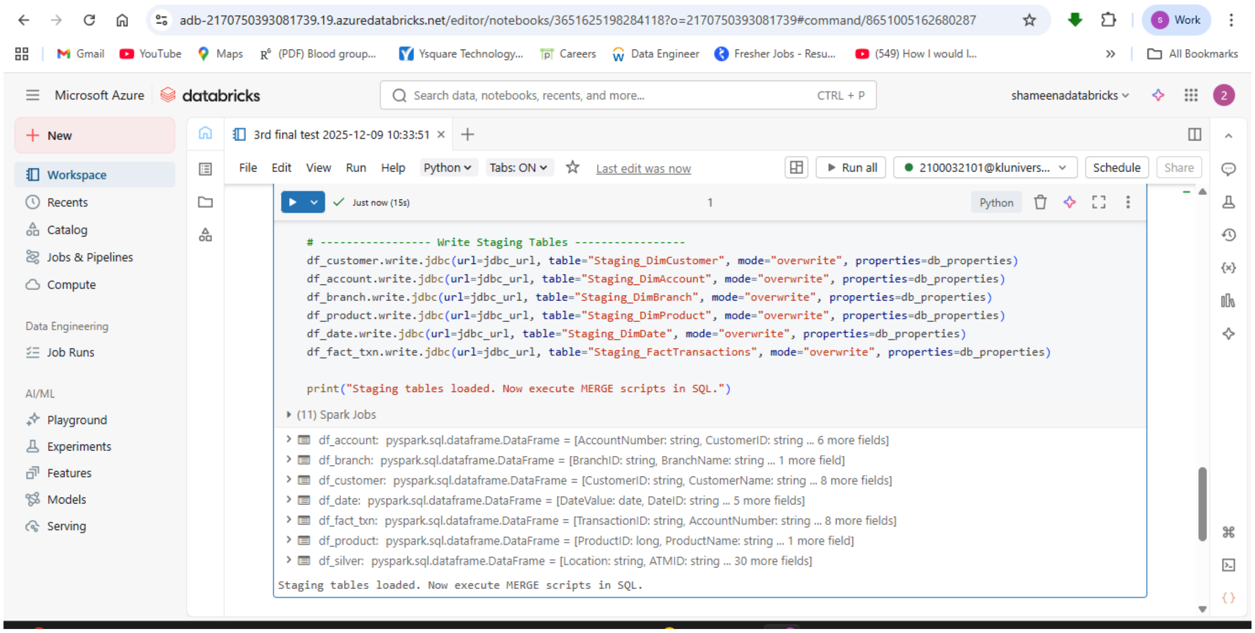

portal.azure.com/#@kluniversity.in/resource/subscriptions/95ae5a80-bc5e-4b69-84e9-3d713b5e9a62/resourceGroups/Mazenet_Projec...
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
Home > Microsoft.SQLDatabase.newDatabaseExistingServer_22ce26d4ee3e45c0 | Overview > shameenasql (shameenaserver/shameenasql)
shameenasql (shameenaserver/shameenasql) | Query editor (preview)
SQL database
Overview
Activity log
Tags
Diagnose and solve problems
Query editor (preview)
Mirror database in Fabric (preview)
Resource visualizer
Settings
Compute + storage
Connection strings
Maintenance
Properties
Locks
Data management
Login
New Query
Open query
Feedback
Getting started
Showing limited object explorer here. For full capability please click here to open Azure Data Studio.
Tables
dbo.DimAccount
dbo.DimBranch
dbo.DimCustomer
dbo.DimDate
dbo.DimProduct
dbo.FactTransactions
dbo.Staging_DimAccount
dbo.Staging_DimBranch
dbo.Staging_DimCustomer
dbo.Staging_DimDate
dbo.Staging_DimProduct
dbo.Staging_FactTransactions
Views
Stored Procedures
Query 1
Run
Cancel query
Save query
Export data as
Show only Editor
Results
Messages
Search to filter items...

```
SELECT COUNT(*) AS total_rows FROM Staging_FactTransactions;
SELECT COUNT(*) AS null_branchid FROM Staging_FactTransactions WHERE BranchID IS NULL;
SELECT COUNT(*) AS null_productid FROM Staging_FactTransactions WHERE ProductID IS NULL;
SELECT COUNT(*) AS null_dateid FROM Staging_FactTransactions WHERE DateID IS NULL;

select * from [dbo].[Staging_DimAccount]

select * from [dbo].[Staging_DimBranch]
```

AccountNumber	CustomerID	BranchID	ProductID	AccountType	Status
1002003001	CUST251	ATM006	1	Savings	Active
1002003002	CUST097	null	1	Savings	Active
1002003003	CUST247	ATM006	1	Savings	Active

Query succeeded | 0s

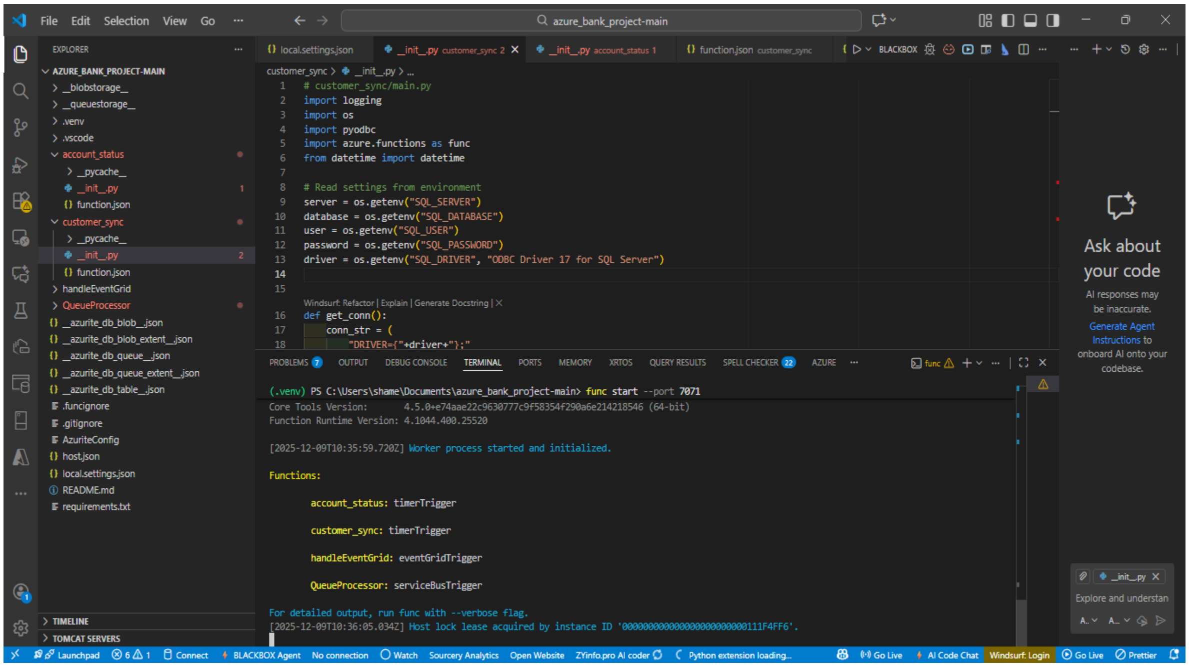
2. I **implemented PySpark ETL jobs** to populate the warehouse:
   - Load cleaned data from Silver layer.
   - Apply business logic for dimension and fact table population.
   - Perform MERGE/UPSERT for efficient dimension and fact updates.

- 

```python
# ---------------- Write Staging Tables ----------------
df_customer.write.jdbc(url=jdbc_url, table="Staging_DimCustomer", mode="overwrite", properties=db_properties)
df_account.write.jdbc(url=jdbc_url, table="Staging_DimAccount", mode="overwrite", properties=db_properties)
df_branch.write.jdbc(url=jdbc_url, table="Staging_DimBranch", mode="overwrite", properties=db_properties)
df_product.write.jdbc(url=jdbc_url, table="Staging_DimProduct", mode="overwrite", properties=db_properties)
df_date.write.jdbc(url=jdbc_url, table="Staging_DimDate", mode="overwrite", properties=db_properties)
df_fact_txn.write.jdbc(url=jdbc_url, table="Staging_FactTransactions", mode="overwrite", properties=db_properties)

print("Staging tables loaded. Now execute MERGE scripts in SQL.")
```

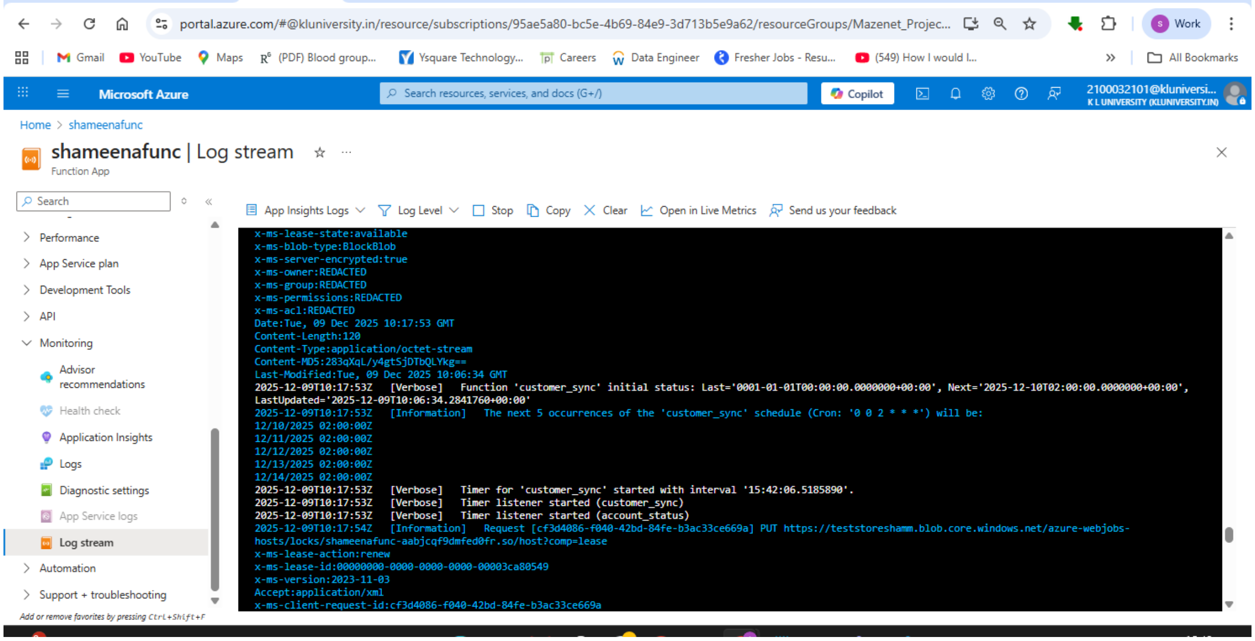
```
(11) Spark Jobs
df_account:  pyspark.sql.dataframe.DataFrame = [AccountNumber: string, CustomerID: string ... 6 more fields]
df_branch:  pyspark.sql.dataframe.DataFrame = [BranchID: string, BranchName: string ... 1 more field]
df_customer:  pyspark.sql.dataframe.DataFrame = [CustomerID: string, CustomerName: string ... 8 more fields]
df_date:  pyspark.sql.dataframe.DataFrame = [DateValue: date, DateID: string ... 5 more fields]
df_fact_txn:  pyspark.sql.dataframe.DataFrame = [TransactionID: string, AccountNumber: string ... 8 more fields]
df_product:  pyspark.sql.dataframe.DataFrame = [ProductID: long, ProductName: string ... 1 more field]
df_silver:  pyspark.sql.dataframe.DataFrame = [Location: string, ATMID: string ... 30 more fields]
Staging tables loaded. Now execute MERGE scripts in SQL.
```

3. I **scheduled data synchronization using Timer-triggered Azure Functions**:
    - Daily full synchronization of customer master data.
    - Daily updates of account status in DimAccount.

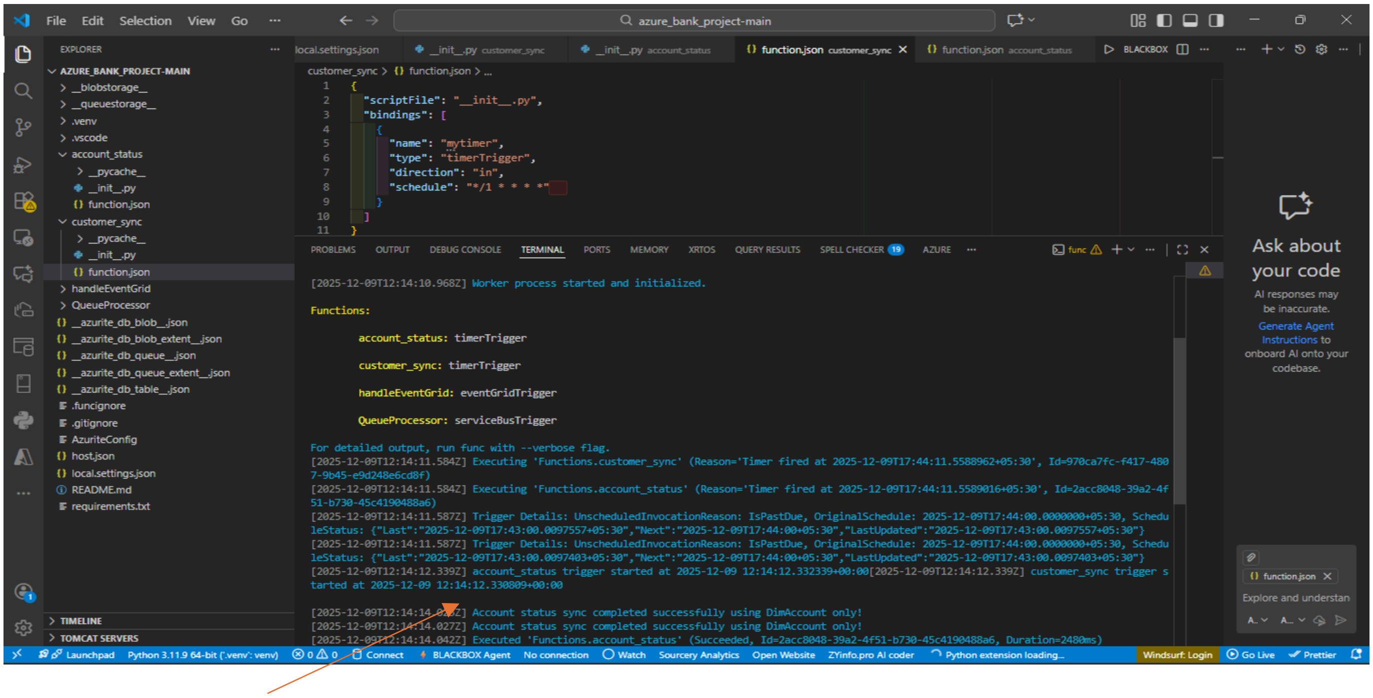


```python
# customer_sync/main.py
import logging
import os
import pyodbc
import azure.functions as func
from datetime import datetime

# Read settings from environment
server = os.getenv("SQL_SERVER")
database = os.getenv("SQL_DATABASE")
user = os.getenv("SQL_USER")
password = os.getenv("SQL_PASSWORD")
driver = os.getenv("SQL_DRIVER", "ODBC Driver 17 for SQL Server")


def get_conn():
    conn_str = (
        "DRIVER={"+driver+"};"
```

```
(.venv) PS C:\Users\shame\Documents\azure_bank_project-main> func start --port 7071
Core Tools Version:       4.5.0+e74aae22c9630777c9f58354f290a6e214218546 (64-bit)
Function Runtime Version: 4.1044.400.25520

[2025-12-09T10:35:59.720Z] Worker process started and initialized.

Functions:

        account_status: timerTrigger

        customer_sync: timerTrigger

        handleEventGrid: eventGridTrigger

        QueueProcessor: serviceBusTrigger

For detailed output, run func with --verbose flag.
[2025-12-09T10:36:05.034Z] Host lock lease acquired by instance ID '0000000000000000000000000111F4FF6'.
```



```
x-ms-lease-state:available
x-ms-blob-type:BlockBlob
x-ms-server-encrypted:true
x-ms-owner:REDACTED
x-ms-group:REDACTED
x-ms-permissions:REDACTED
x-ms-acl:REDACTED
Date:Tue, 09 Dec 2025 10:17:53 GMT
Content-Length:120
Content-Type:application/octet-stream
Content-MD5:283qXqL/y4gtSjDTbQLYkg==
Last-Modified:Tue, 09 Dec 2025 10:06:34 GMT
2025-12-09T10:17:53Z   [Verbose]   Function 'customer_sync' initial status: Last='0001-01-01T00:00:00.0000000+00:00', Next='2025-12-10T02:00:00.0000000+00:00',
LastUpdated='2025-12-09T10:06:34.2841760+00:00'
2025-12-09T10:17:53Z   [Information]   The next 5 occurrences of the 'customer_sync' schedule (Cron: '0 0 2 * * *') will be:
12/10/2025 02:00:00Z
12/11/2025 02:00:00Z
12/12/2025 02:00:00Z
12/13/2025 02:00:00Z
12/14/2025 02:00:00Z
2025-12-09T10:17:53Z   [Verbose]   Timer for 'customer_sync' started with interval '15:42:06.5185890'.
2025-12-09T10:17:53Z   [Verbose]   Timer listener started (customer_sync)
2025-12-09T10:17:53Z   [Verbose]   Timer listener started (account_status)
2025-12-09T10:17:54Z   [Information]   Request [cf3d4086-f040-42bd-84fe-b3ac33ce669a] PUT https://teststoreshamm.blob.core.windows.net/azure-webjobs-
hosts/locks/shameenafunc-aabjcqf9dmfed0fr.so/host?comp=lease
x-ms-lease-action:renew
x-ms-lease-id:00000000-0000-0000-0000-00003ca80549
x-ms-version:2023-11-03
Accept:application/xml
x-ms-client-request-id:cf3d4086-f040-42bd-84fe-b3ac33ce669a
```



```
{
  "scriptFile": "__init__.py",
  "bindings": [
    {
      "name": "mytimer",
      "type": "timerTrigger",
      "direction": "in",
      "schedule": "*/1 * * * *"
    }
  ]
}
```

```
[2025-12-09T12:14:10.968Z] Worker process started and initialized.

Functions:

        account_status: timerTrigger

        customer_sync: timerTrigger

        handleEventGrid: eventGridTrigger

        QueueProcessor: serviceBusTrigger

For detailed output, run func with --verbose flag.
[2025-12-09T12:14:11.584Z] Executing 'Functions.customer_sync' (Reason='Timer fired at 2025-12-09T17:44:11.5588962+05:30', Id=970ca7fc-f417-480
7-9b45-e9d248e6cd8f)
[2025-12-09T12:14:11.584Z] Executing 'Functions.account_status' (Reason='Timer fired at 2025-12-09T17:44:11.5589016+05:30', Id=2acc8048-39a2-4f
51-b730-45c4190488a6)
[2025-12-09T12:14:11.587Z] Trigger Details: UnscheduledInvocationReason: IsPastDue, OriginalSchedule: 2025-12-09T17:44:00.0000000+05:30, Schedu
leStatus: {"Last":"2025-12-09T17:43:00.0097557+05:30","Next":"2025-12-09T17:44:00+05:30","LastUpdated":"2025-12-09T17:43:00.0097557+05:30"}
[2025-12-09T12:14:11.587Z] Trigger Details: UnscheduledInvocationReason: IsPastDue, OriginalSchedule: 2025-12-09T17:44:00.0000000+05:30, Schedu
leStatus: {"Last":"2025-12-09T17:43:00.0097403+05:30","Next":"2025-12-09T17:44:00+05:30","LastUpdated":"2025-12-09T17:43:00.0097403+05:30"}
[2025-12-09T12:14:12.339Z] account_status trigger started at 2025-12-09 12:14:12.332339+00:00[2025-12-09T12:14:12.339Z] customer_sync trigger s
tarted at 2025-12-09 12:14:12.330809+00:00

[2025-12-09T12:14:14.023Z] Account status sync completed successfully using DimAccount only!
[2025-12-09T12:14:14.027Z] Account status sync completed successfully using DimAccount only!
[2025-12-09T12:14:14.042Z] Executed 'Functions.account_status' (Succeeded, Id=2acc8048-39a2-4f51-b730-45c4190488a6, Duration=2480ms)
```

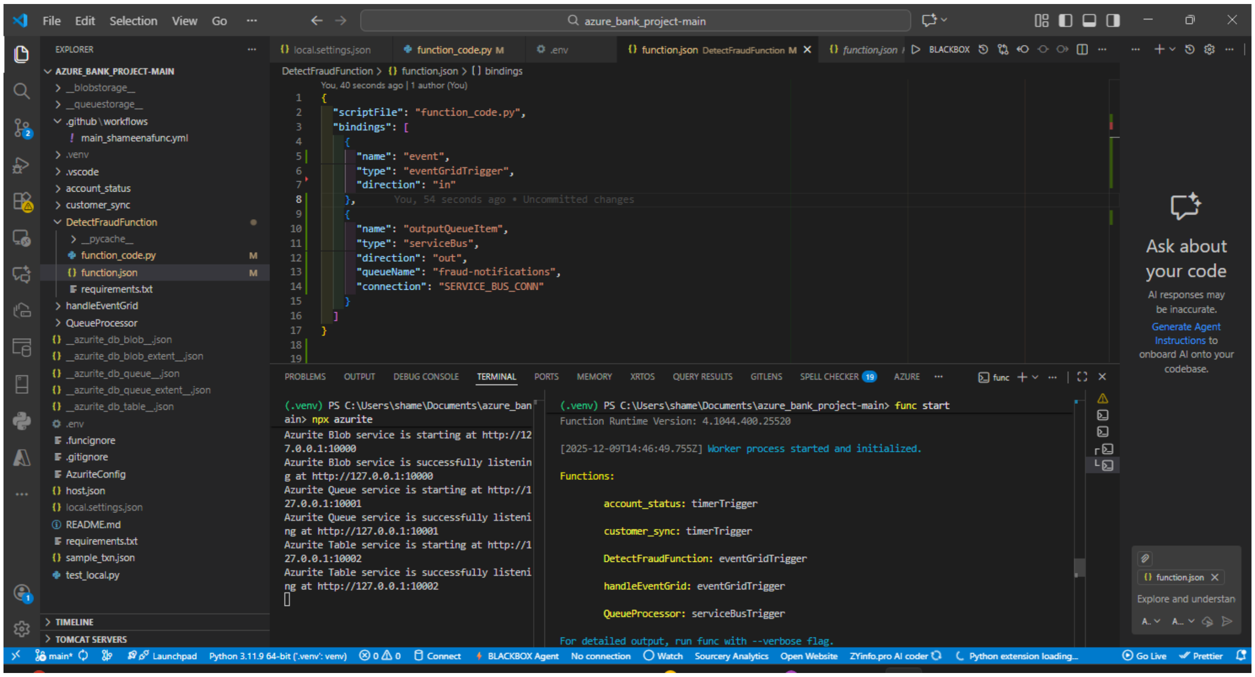
Day 4 — Real-Time Alerts, Security & CI/CD

Goal: The goal of Day 4 was to implement real-time fraud alerts, enforce enterprise-grade security, and automate deployment using CI/CD.

Services Used: - Azure Event Grid - Azure Functions (Event Grid Trigger) - Azure Service Bus - Cosmos DB Azure Firewall – and here I have created Deployment Center for GitHub Actions for CI/CD in Azure Function.

Implementation:

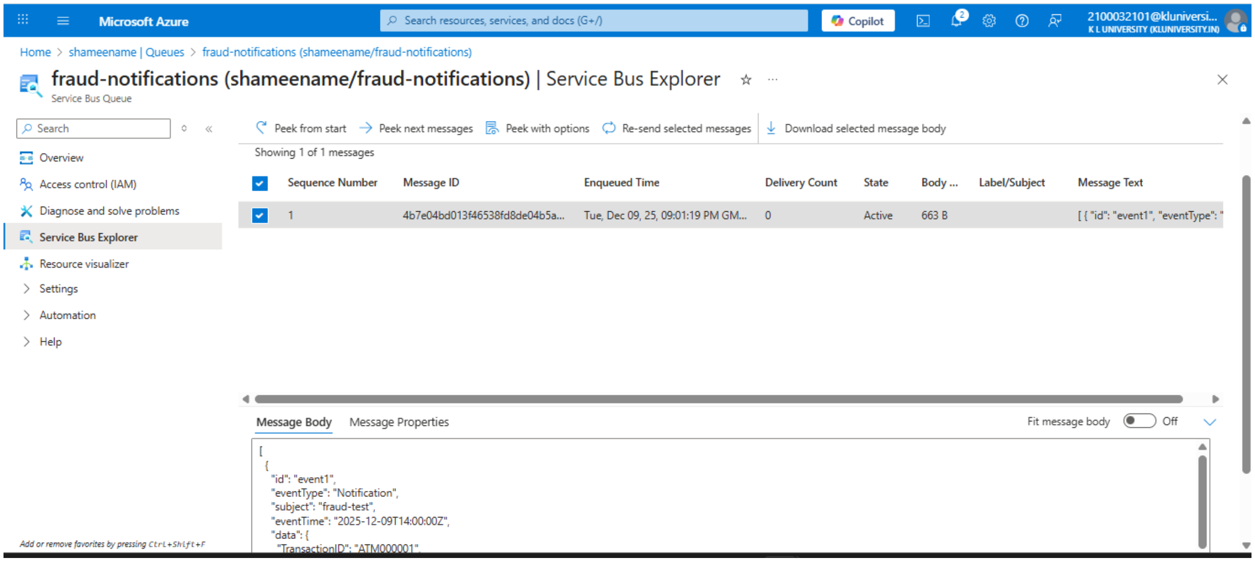
1. I **created Event Grid-triggered Functions** for real-time fraud detection: - Analyze high-value transactions (> ₹50,000) - Detects anomalies.



```json
{
  "scriptFile": "function_code.py",
  "bindings": [
    {
      "name": "event",
      "type": "eventGridTrigger",
      "direction": "in"
    },
    {
      "name": "outputQueueItem",
      "type": "serviceBus",
      "direction": "out",
      "queueName": "fraud-notifications",
      "connection": "SERVICE_BUS_CONN"
    }
  ]
}
```

```
(.venv) PS C:\Users\shame\Documents\azure_ban
ain> npx azurite
Azurite Blob service is starting at http://12
7.0.0.1:10000
Azurite Blob service is successfully listenin
g at http://127.0.0.1:10000
Azurite Queue service is starting at http://1
27.0.0.1:10001
Azurite Queue service is successfully listeni
ng at http://127.0.0.1:10001
Azurite Table service is starting at http://1
27.0.0.1:10002
Azurite Table service is successfully listeni
ng at http://127.0.0.1:10002
```

```
(.venv) PS C:\Users\shame\Documents\azure_bank_project-main> func start
Function Runtime Version: 4.1044.400.25520

[2025-12-09T14:46:49.755Z] Worker process started and initialized.

Functions:

        account_status: timerTrigger

        customer_sync: timerTrigger

        DetectFraudFunction: eventGridTrigger

        handleEventGrid: eventGridTrigger

        QueueProcessor: serviceBusTrigger

For detailed output, run func with --verbose flag.
```



Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
2100032101@kluniversi...
K L UNIVERSITY (KLUNIVERSITY.IN)
Home > shameename | Queues > fraud-notifications (shameename/fraud-notifications)
Service Bus Queue
Search
Overview
Access control (IAM)
Diagnose and solve problems
Service Bus Explorer
Resource visualizer
Settings
Automation
Help
Add or remove favorites by pressing Ctrl+Shift+F
Peek from start
Peek next messages
Peek with options
Re-send selected messages
Download selected message body
Message Body
Message Properties
Fit message body
Off

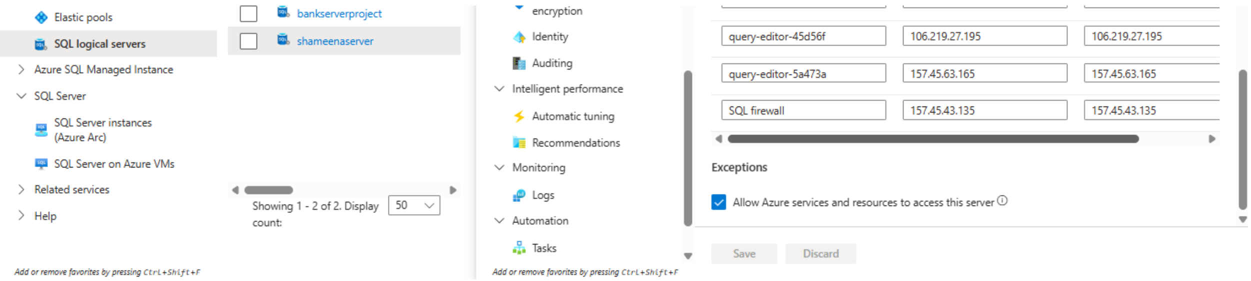
fraud-notifications (shameename/fraud-notifications) | Service Bus Explorer

Showing 1 of 1 messages

☑	Sequence Number	Message ID	Enqueued Time	Delivery Count	State	Body ...	Label/Subject	Message Text
☑	1	4b7e04bd013f46538fd8de04b5a...	Tue, Dec 09, 25, 09:01:19 PM GM...	0	Active	663 B		[{ "id": "event1", "eventType": "

```
[
 {
  "id": "event1",
  "eventType": "Notification",
  "subject": "fraud-test",
  "eventTime": "2025-12-09T14:00:00Z",
  "data": {
   "TransactionID": "ATM000001",
```

2. I **secured all data traffic using the firewall**

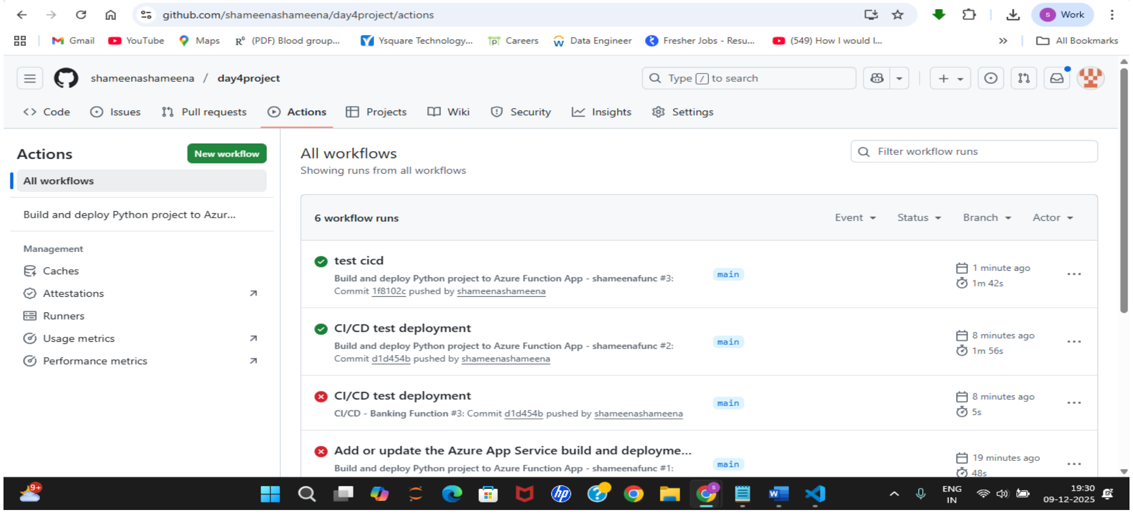


query-editor-45d56f	106.219.27.195	106.219.27.195
query-editor-5a473a	157.45.63.165	157.45.63.165
SQL firewall	157.45.43.135	157.45.43.135

Exceptions

☑ Allow Azure services and resources to access this server

3. I **implemented CI/CD pipelines** for automation:
   - Azure Functions: Automated build, test, and deployment by adding deployment center setup here I connected my git repo , user name, password.



All workflows

Showing runs from all workflows

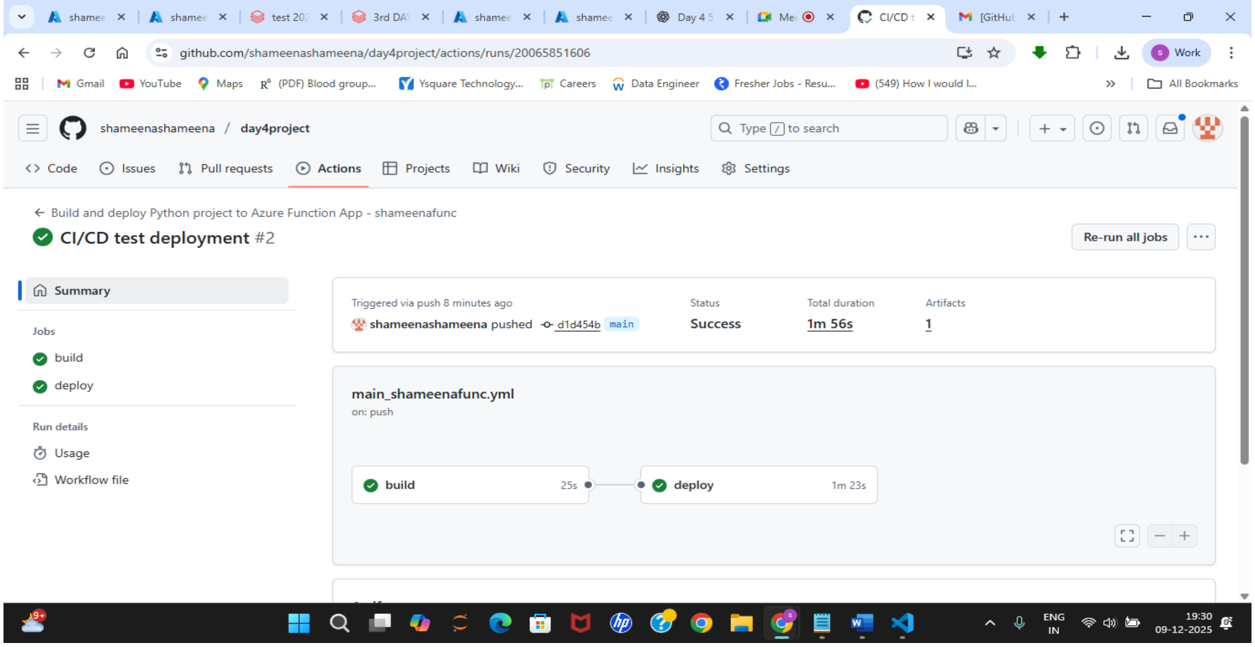
6 workflow runs

✓ test cicd
Build and deploy Python project to Azure Function App - shameenafunc #3: Commit 1f8102c pushed by shameenashameena
main
1 minute ago
1m 42s

✓ CI/CD test deployment
Build and deploy Python project to Azure Function App - shameenafunc #2: Commit d1d454b pushed by shameenashameena
main
8 minutes ago
1m 56s

✗ CI/CD test deployment
CI/CD - Banking Function #3: Commit d1d454b pushed by shameenashameena
main
8 minutes ago
5s

✗ Add or update the Azure App Service build and deployme...
Build and deploy Python project to Azure Function App - shameenafunc #1:
main
19 minutes ago
48s



← Build and deploy Python project to Azure Function App - shameenafunc

CI/CD test deployment #2

Jobs: ✓ build, ✓ deploy

Triggered via push 8 minutes ago

shameenashameena pushed d1d454b main

Status: Success

Total duration: 1m 56s

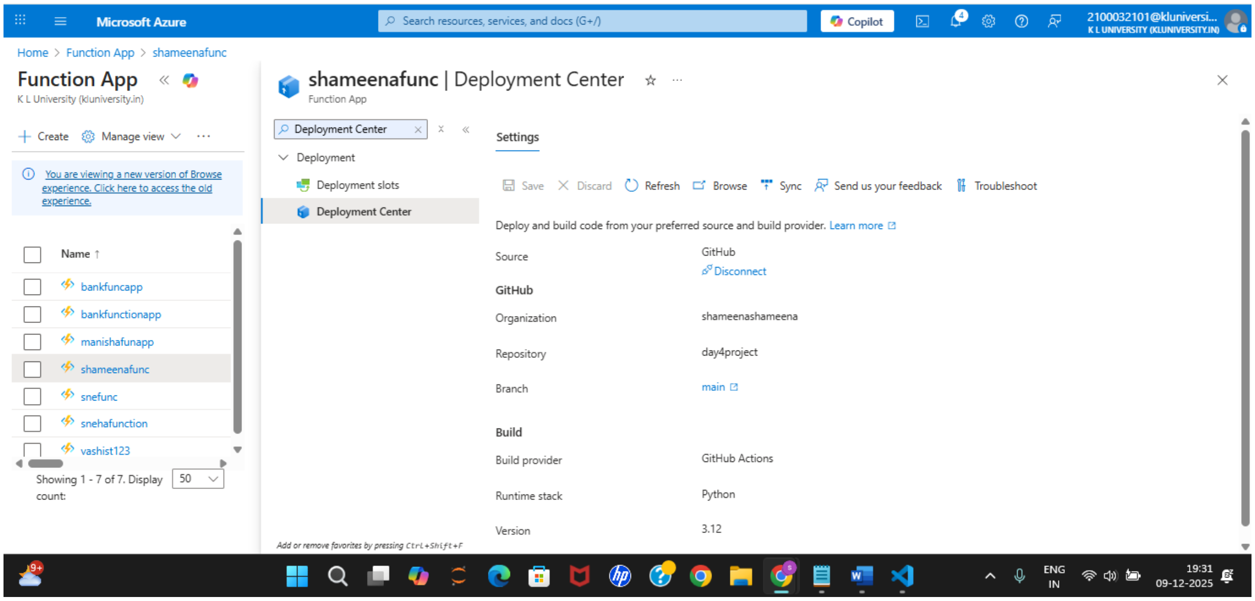
Artifacts: 1

main_shameenafunc.yml

on: push

✓ build 25s → ✓ deploy 1m 23s

19:30 09-12-2025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Copilot
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K L UNIVERSITY (KLUNIVERSITY.IN)
Home > Function App > shameenafunc
Function App
K L University (kluniversity.in)
Create
Manage view
You are viewing a new version of Browse experience. Click here to access the old experience.
Name ↑
Showing 1 - 7 of 7. Display count: 50
Deployment Center
Deployment
Deployment slots
Deployment Center
Settings
Save
Discard
Refresh
Browse
Sync
Send us your feedback
Troubleshoot
Add or remove favorites by pressing Ctrl+Shift+F

Name ↑
bankfuncapp
bankfunctionapp
manishafunapp
shameenafunc
snefunc
snehafunction
vashist123

shameenafunc | Deployment Center

Function App

Deploy and build code from your preferred source and build provider. Learn more

Source	GitHub Disconnect
GitHub	
Organization	shameenashameena
Repository	day4project
Branch	main
Build	
Build provider	GitHub Actions
Runtime stack	Python
Version	3.12

19:31 09-12-2025

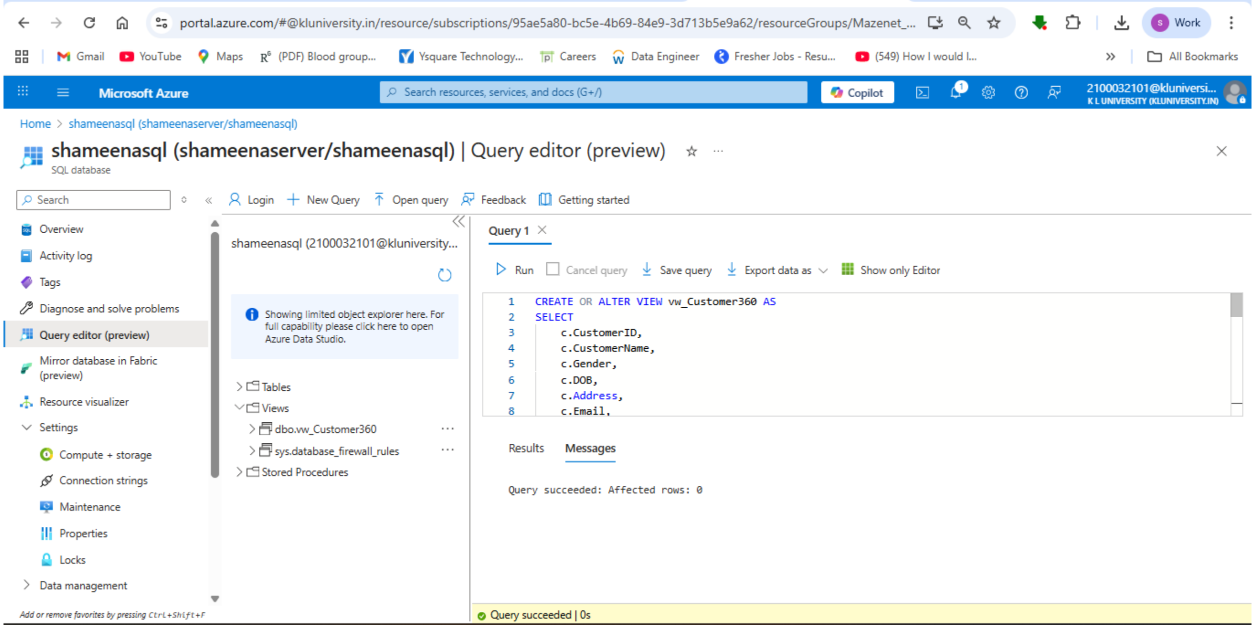
Day 5 — Reporting, Customer 360 & Final Demo

Goal: The goal of Day 5 was to consolidate all processed data into a Customer 360 view, create actionable Power BI dashboards, and demonstrate the complete pipeline.

Services Used: - Azure SQL Data Warehouse / Synapse - Cosmos DB - Power BI - Azure Functions / Event Grid / Service Bus

Implementation:

1. I **built the Customer 360 analytical view** by combining: - Transaction history from FactTransactions. - Customer demographics and KYC from DimCustomer.



portal.azure.com/#@kluniversity.in/resource/subscriptions/95ae5a80-bc5e-4b69-84e9-3d713b5e9a62/resourceGroups/Mazenet_...
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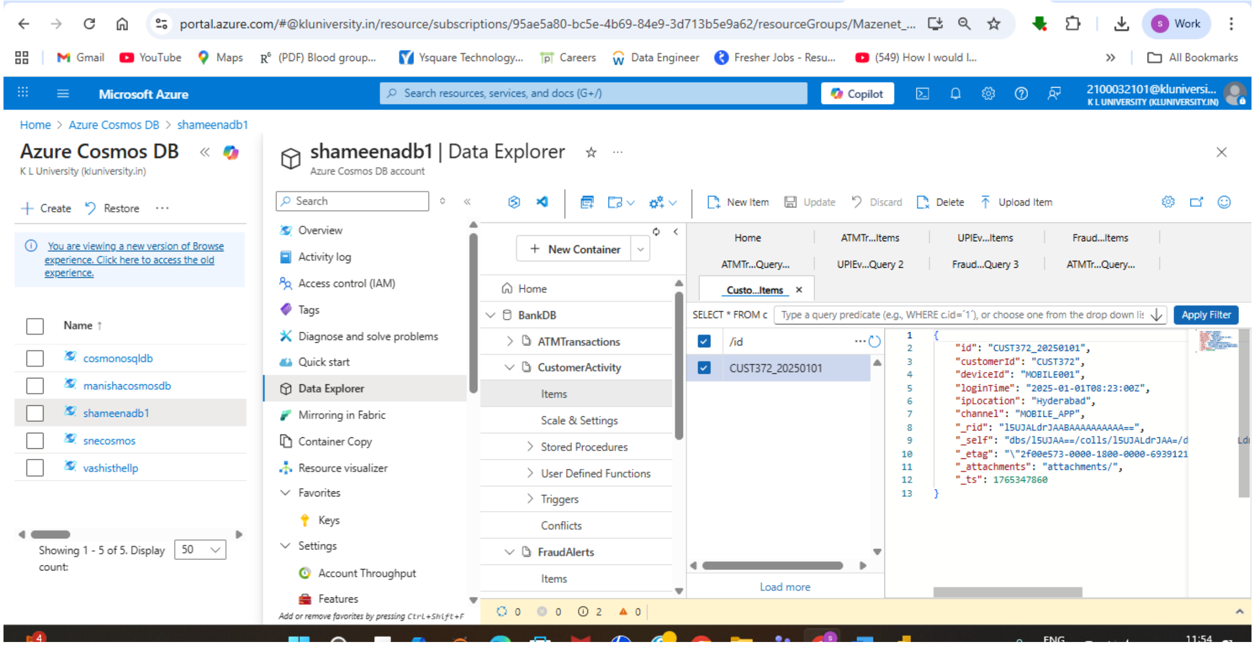
K L UNIVERSITY (KLUNIVERSITY.IN)
Home > shameenasql (shameenaserver/shameenasql)
shameenasql (shameenaserver/shameenasql) | Query editor (preview)
SQL database
Login
New Query
Open query
Feedback
Getting started
Overview
Activity log
Tags
Diagnose and solve problems
Query editor (preview)
Mirror database in Fabric (preview)
Resource visualizer
Settings
Compute + storage
Connection strings
Maintenance
Properties
Locks
Data management
shameenasql (2100032101@kluniversity...
Showing limited object explorer here. For full capability please click here to open Azure Data Studio.
Tables
Views
dbo.vw_Customer360
sys.database_firewall_rules
Stored Procedures
Query 1
Run
Cancel query
Save query
Export data as
Show only Editor
Results
Messages

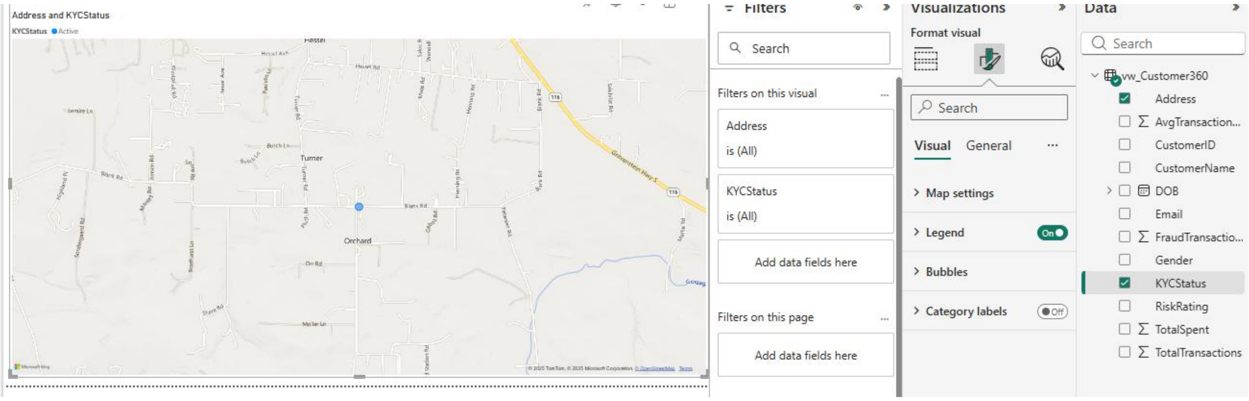
```
CREATE OR ALTER VIEW vw_Customer360 AS
SELECT
    c.CustomerID,
    c.CustomerName,
    c.Gender,
    c.DOB,
    c.Address,
    c.Email,
```

```
Query succeeded: Affected rows: 0
```

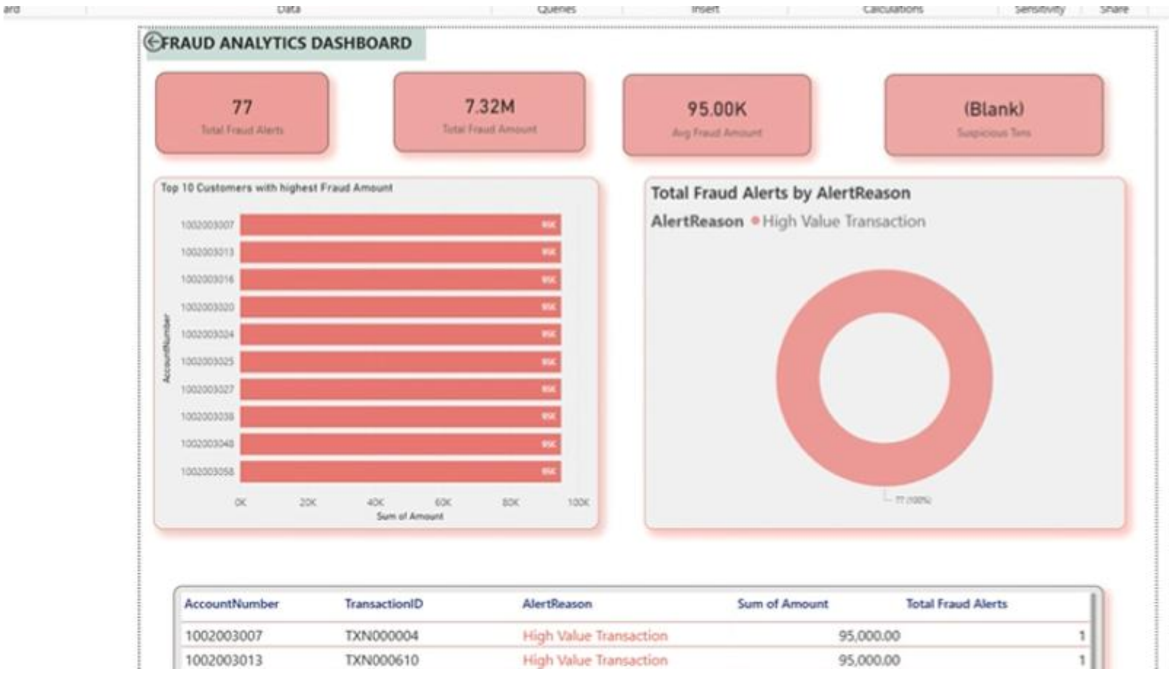
Query succeeded | 0s



```
{
    "id": "CUST372_20250101",
    "customerId": "CUST372",
    "deviceId": "MOBILE001",
    "loginTime": "2025-01-01T08:23:00Z",
    "ipLocation": "Hyderabad",
    "channel": "MOBILE_APP",
    "_rid": "l5UJALdrJAABAAAAAAAAAA==",
    "_self": "dbs/l5UJAA==/colls/l5UJALdrJAA=/d
    "_etag": "\"2f00e573-0000-1800-0000-6939121
    "_attachments": "attachments/",
    "_ts": 1765347860
}
```



2. I **created Power BI dashboards**:
   - Branch Performance Dashboard.
   - Daily Transaction Volume Dashboard.
   - ATM/UPI Channel Analysis.
   - Fraud Analytics Dashboard.



FRAUD ANALYTICS DASHBOARD

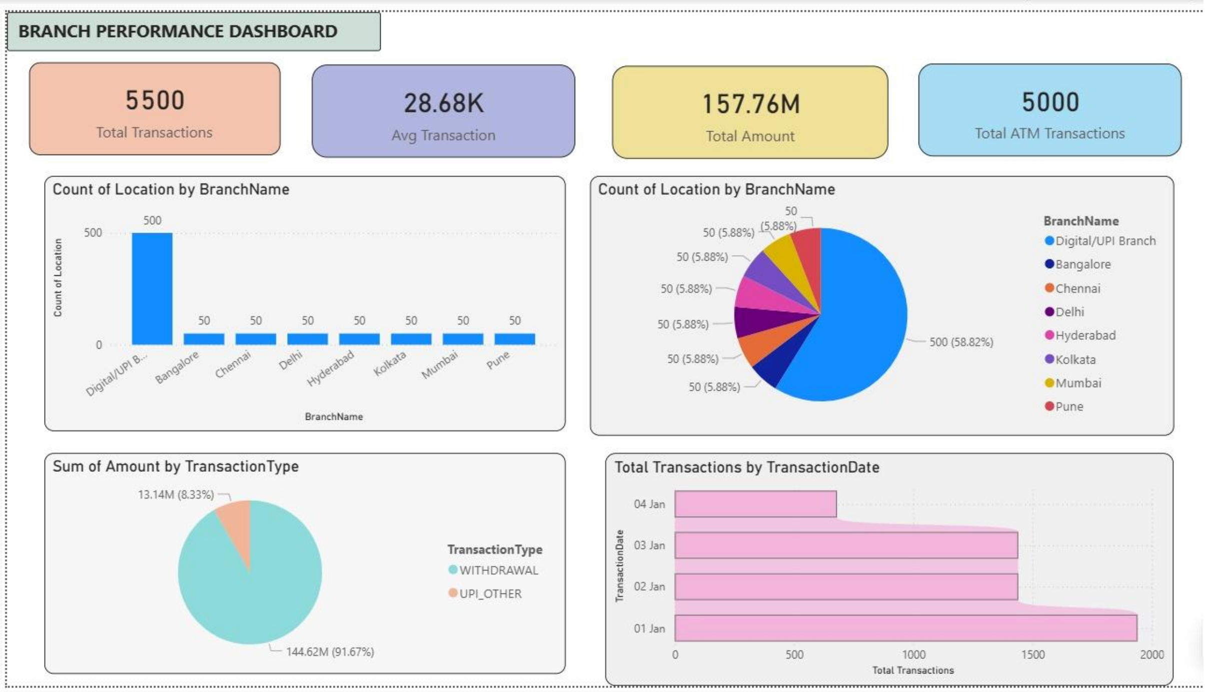
77 Total Fraud Alerts

7.32M Total Fraud Amount

95.00K Avg Fraud Amount

(Blank) Suspicious Txns

AccountNumber	TransactionID	AlertReason	Sum of Amount	Total Fraud Alerts
1002003007	TXN000004	High Value Transaction	95,000.00	1
1002003013	TXN000610	High Value Transaction	95,000.00	1



BRANCH PERFORMANCE DASHBOARD

5500
Total Transactions

28.68K
Avg Transaction

157.76M
Total Amount

5000
Total ATM Transactions

Count of Location by BranchName

Count of Location by BranchName

Sum of Amount by TransactionType

Total Transactions by TransactionDate