

# **NETWORK & SERVICE AUTOMATION USING GCP**

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# **TABLE OF CONTENTS:**

1. Company Introduction
2. Project Background
3. Scope & Utility of Project
4. Architecture of the Project
5. Technology Background
6. Some snapshots
7. Learnings: Professional & Technical
8. Key Highlights of Project



# 1. COMPANY INTRODUCTION

- Swedish base **MNC**, founded in 1876, headquarters - Stockholm.
- Operates in over **180 countries**, Employs **100,000+** people worldwide.

## **AREA OF EXPERTISE:**

**Networks:** Ericsson is a leader in designing, deploying, and managing advanced communication networks, including 5G and beyond.

**Digital Services:** The company offers a range of digital solutions to help businesses and governments accelerate their digital transformation.

**Managed Services:** Ericsson provides comprehensive managed services to optimize network performance and operational efficiency.

**Emerging Technologies:** Ericsson explores emerging technologies such as Internet of Things (IoT), artificial intelligence, and cloud computing.



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# 1. COMPANY INTRODUCTION

## CORE VALUES

### RESPECT



We must treat people with respect and value diversity. We must recognize the value of property and the environment.

### PROFESSIONALISM



We must act professionally and set high standards. We should take responsibility for the impact of our own actions and always give our best to the team.

### PERSEVERANCE



We should always put in the extra effort even when things seem hard, troublesome or even impossible.



## 2. PROJECT BACKGROUND

### OBJECTIVES:

- Develop Data Ingestion Automation – To reduce error, time, manual effort
- Make Lightweight Architecture of the existing one to cut the costs and company can offer service in budget for small customers. (**Note – This is an internal tool so discussion on this is limited**)
- Better utilization of available cloud resources i.e., computation power, storage etc

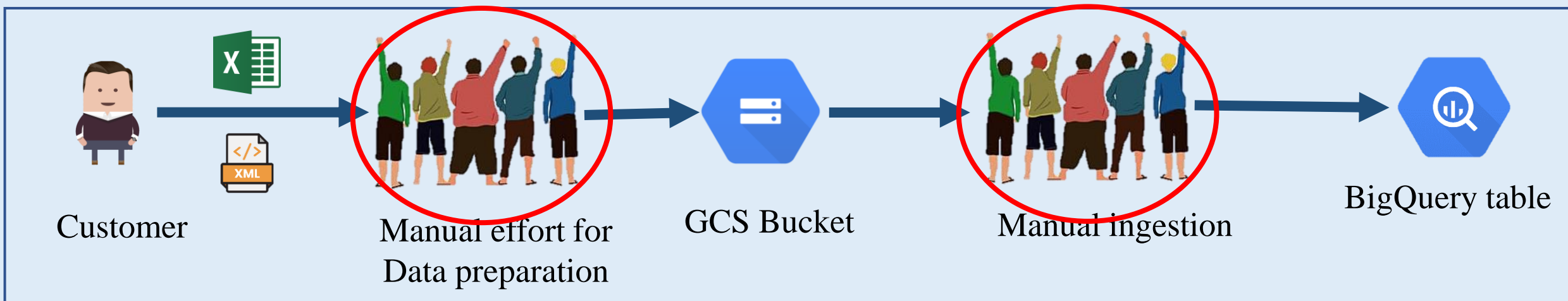
### NEED:

- Manual effort elimination for updation, deletion, insertion into table
- Cost reduction of cloud resources usage
- Better usage of GCP features

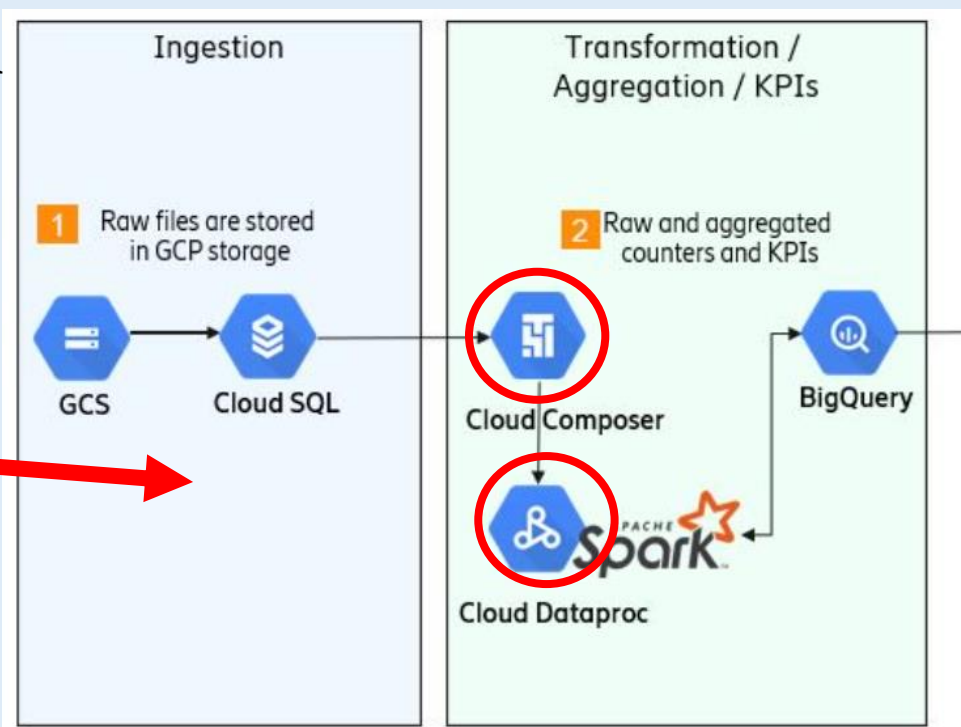


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## 2. PROJECT BACKGROUND



**Fig. 1) Old Data ingestion Automation**  
Need to eliminate manual efforts



**Fig. 2) Old Architecture of GCP:**  
Need to eliminate red circled component which is too costly.



### 3. SCOPE & UTILITY OF PROJECT

#### SCOPE:

- As today is the era of cloud technology so working on this project which is based on Google Cloud Platform give great exposure to corporate.
- Variety of automation is needed in industry and one learning inspire other learning exposure.
- This data ingestion automation enables businesses to efficiently handle large volumes of data from various sources

#### UTILITY:

- Cost & error reduction for ingestion system
- Faster updation in BigQuery table no manual updation, insertion or deletion
- By automation tasks such extraction, transformation & loading, Org. have improved efficiency, time saving, enhanced data quality and consistency.

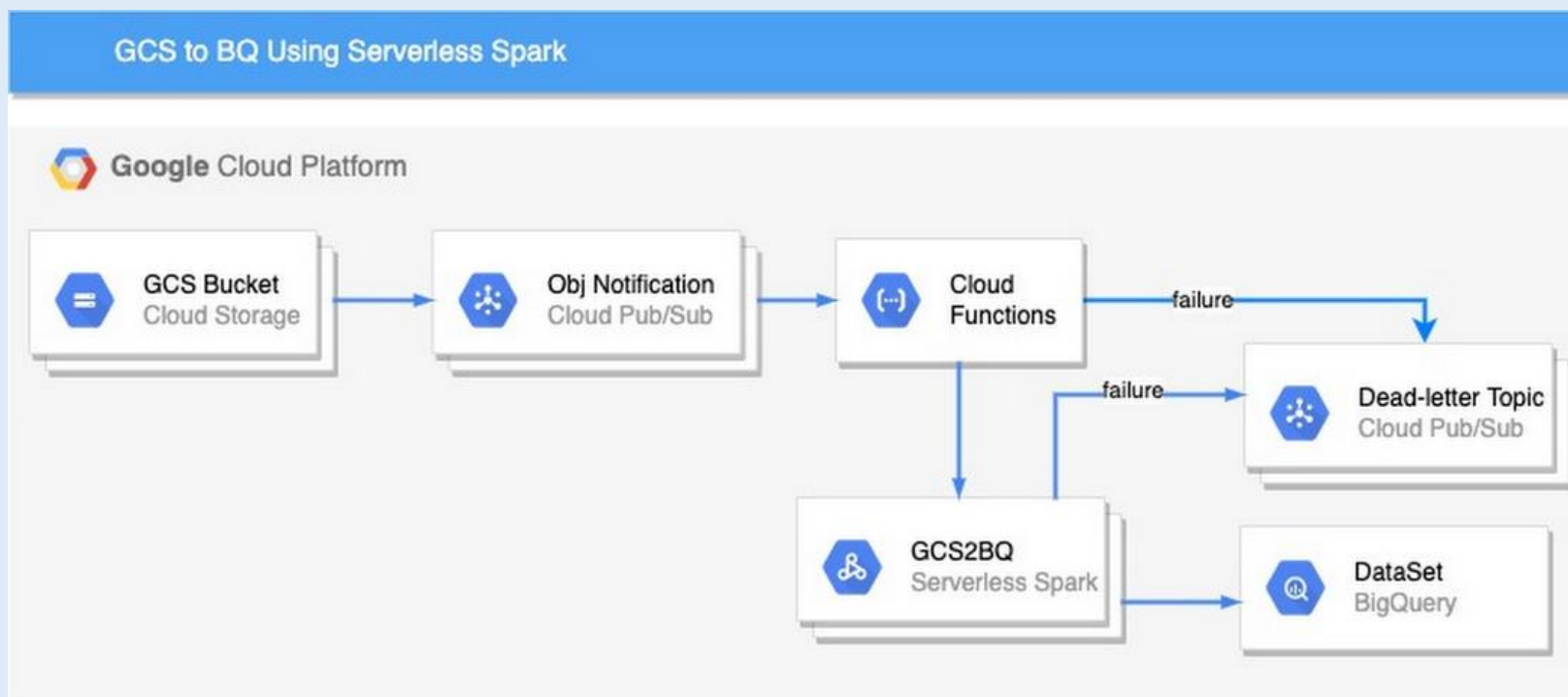
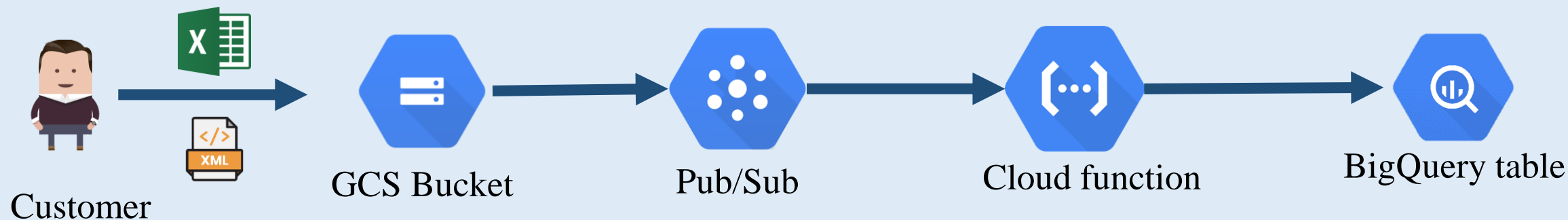




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# 4. ARCHITECTURE OF THE PROJECT

## 4.1 DATA INGESTION AUTOMATION

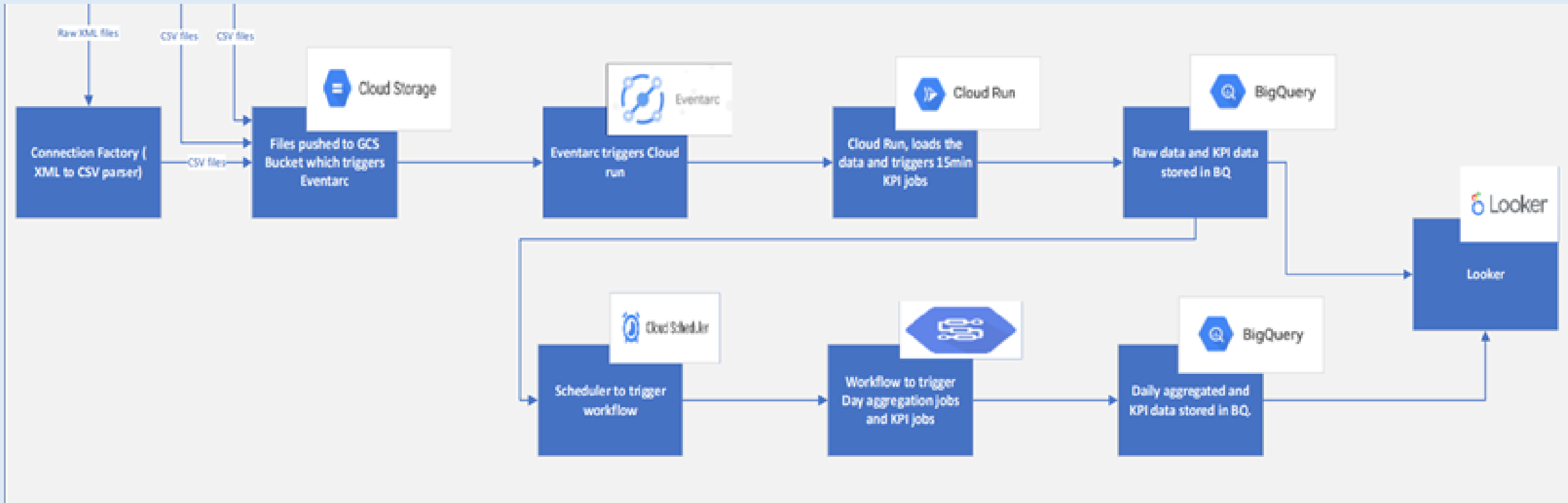






# 4. ARCHITECTURE OF THE PROJECT

## 4.2 NEW LIGHT WEIGHT ARCHITECTURE OF GCP



**Fig. - New light weight architecture of GCP**



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## 5. TECHNOLOGY BACKGROUND

### Development Need:

**Programming language** – Python 3.10

**Modules** – Pandas, JSON, Google cloud BigQuery, google cloud storage, Flask, Jinja2, Sqlite3

**Database** – GoogleSQL (Because it supports broadest domain)

**Tools:** Excel, VS code, Docker-Container

**GCP Components** – BigQuery, GCS Bucket, Cloud Function, Cloud Run etc.

And some Ericsson's internal tool



Fig. Python Logo



Google Cloud Platform



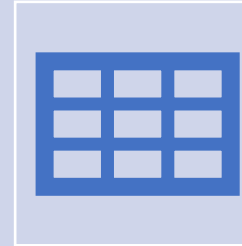
## 5. TECHNOLOGY BACKGROUND

GCP Component	Brief Description
BigQuery	Data warehouse/analytics
Pub/Sub	Global real time messaging
Composer	Managed workflow orchestration service
Dataproc	Managed Apache Hadoop
GCS Bucket	Globally unique container for storing and organizing data objects in Google Cloud Storage
Google Cloud Function	Event-driven serverless compute platform for building and connecting cloud services.
Eventarc	Fully managed event ingestion and delivery service for event-driven architectures.
Cloud Run	Fully managed serverless platform for deploying and running containerized applications.
Cloud scheduler	Fully managed cron job scheduler for automating recurring tasks in the cloud.

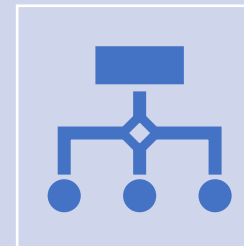


# 6. SOME SNAPSHOTS

SCHEMA						DETAILS	PREVIEW	LINEAGE
Filter Enter property name or value								
<input type="checkbox"/>	Field name	Type	Mode	Collation	Default			
<input type="checkbox"/>	<a href="#">data_type</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">vendor</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">technology</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">name</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">source_name</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">temporal_unit</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">regional_unit</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">identifier_column_names</a>	STRING	REPEATED					
<input type="checkbox"/>	<a href="#">timestamp_column_name</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">timestamp_column_pattern</a>	STRING	NULLABLE					
<input type="checkbox"/>	<a href="#">metadata_column_mappings</a>	RECORD	REPEATED					
EDIT SCHEMA						VIEW ROW ACCESS POLICIES		
PERSONAL HISTORY						PROJECT HISTORY		



In the above table we can see that all of our data is loaded with the correct schema that we require for mapping our data in the table. The schema can consist of different types of data such as string, records( arrays of struct) etc. as we have loaded into our JSON files by running the Python scripts.



These entries have to be entered with correct mode in schema such as nullable or repeated so that our BigQuery operation works correctly and data is entered.

# 6. SOME SNAPSHOTS



- ✓ In above table, we see that after we have deployed the Cloud Function using the trigger, we can use Metrics tab to study the performance of our function such as the memory utilized by our function, the execution time and so on. The same can be seen in Logs tab also. We can study these and further enhance our codes to improve the performance.



# 6. SOME SNAPSHOTS

SCHEMA	DETAILS	PREVIEW	LINEAGE
Table expiration	NEVER		
Data location	US		
Default collation			
Case insensitive	false		
Description			
Labels			
Storage info ?			
Number of rows	2		
Total logical bytes	9.12 KB		
Active logical bytes	9.12 KB		
Long term logical bytes	0 B		
Total physical bytes	29.45 KB		
Active physical bytes	29.45 KB		
Long term physical bytes	0 B		
Time travel physical bytes	29.45 KB		
PERSONAL HISTORY		PROJECT HISTORY	
		REFRESH ^	

In above table, we see that on the BigQuery tab in GCP, we can view the details of our table in terms of memory, rows etc.

We can view the entire table under the Preview tab.

# 6. SOME SNAPSHOTS

METRICS

DETAILS

SOURCE

VARIABLES

TRIGGER

PERMISSIONS

LOGS

TESTING

Runtime : Python 3.7

Entry point : main

DOWNLOAD ZIP

AggregationMapping.py

changes.txt

CommonInfo.py

DataConfiguration.txt

Enrichment.py

env.yml

identifierColumn.py

main.py

OperationBigquery.py

```

1 from google.cloud import bigquery as bq
2 from google.cloud.exceptions import NotFound
3 import json,time,base64
4
5 from RanCounters import counterGroup, upsertDataConfig
6 from OperationBigquery import OperationBigquery
7
8 from Schemas import aggregation_schema, dataconfig_schema
9
10 from AggregationMapping import insertTemp,deleteMain,upsertAggregation, getTableNames
11
12 from google.cloud import storage
13 import logging
14 import pandas as pd
15 import os
16
17
18
19 if os.environ.get('PROJECT_NAME') and os.environ.get('DATASET_NAME'):
20     projectName = os.environ['PROJECT_NAME']
21     datasetName = os.environ['DATASET_NAME']
22 else:
23     path = 'not_used/NgPMGCS_Mapping_Details1.xlsx'

```

- ✓ Above Figure shows us all of our codes and files that we have uploaded onto the function under the Source tab. These codes get executed in the function. We generally call different functions in the main.py code to run and it becomes more organised.





# 7. LEARNING: TECHNICAL & PROFESSIONAL

## TECHNICAL:

- Telecom fundamentals
- Debugging, testing and preparing documentation
- Preparing Dynamic SQL using BigQuery
- Familiarity of Cloud platform with Realtime project
- CI/CD with GCP and its component
- Coding Skill enhancement and gained better understanding

## PROFESSIONAL:

- Teamwork, Time management, Project Development, Professionalism
- Critical thinking, Logic building,
- Work in streamlined hierarchical manner for an MNC corporate setup.
- Code of business Ethics, Prevention of Sexual Harassment,



## 8. KEY HIGHLIGHTS OF PROJECTS

- ✓ E2E product development and deployment – Data ingestion Automation
- ✓ This Product reduces manual effort by 80%.
- ✓ With built-in connectors and event-driven architecture, organizations can seamlessly ingest data while ensuring data quality through validation and transformation.
- ✓ GCP's cost optimization features allow for efficient resource utilization, making data ingestion both reliable and cost-effective.
- ✓ Hands on experience in telecom sector as well as google cloud platform which is industry-oriented.



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- <https://console.cloud.google.com/functions>
- <https://www.pngwing.com/en/search?q=thank+you>