NETWORK & SERVICE AUTOMATION USING GCP

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Jan 25th , 2023 - July 25th , 2023

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GCP – Google Cloud Platform

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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.

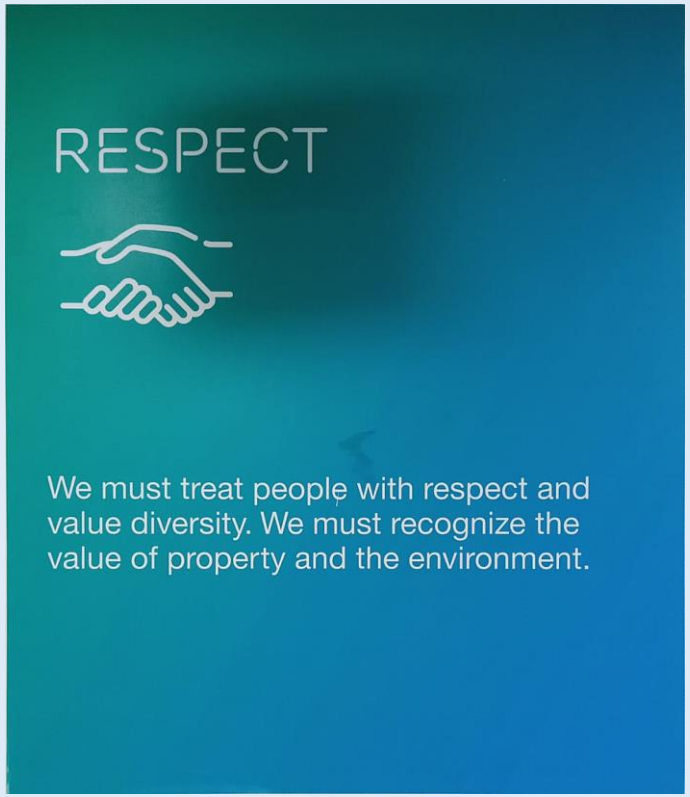
Managed Services: Ericsson provides comprehensive managed services to optimize network performance and operational efficiency.

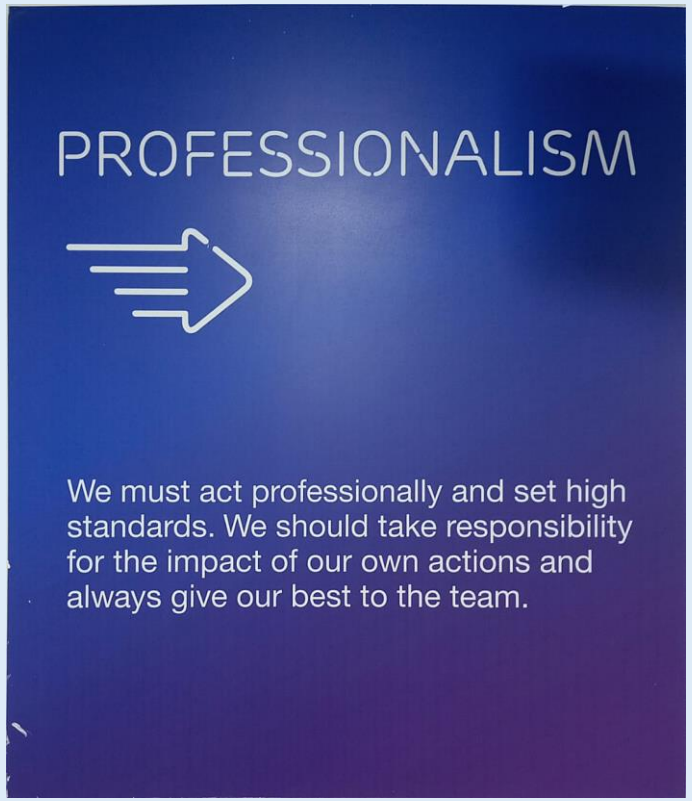
Emerging Technologies: Ericsson explores emerging technologies such as Internet of Things (IoT), artificial intelligence, and cloud computing.

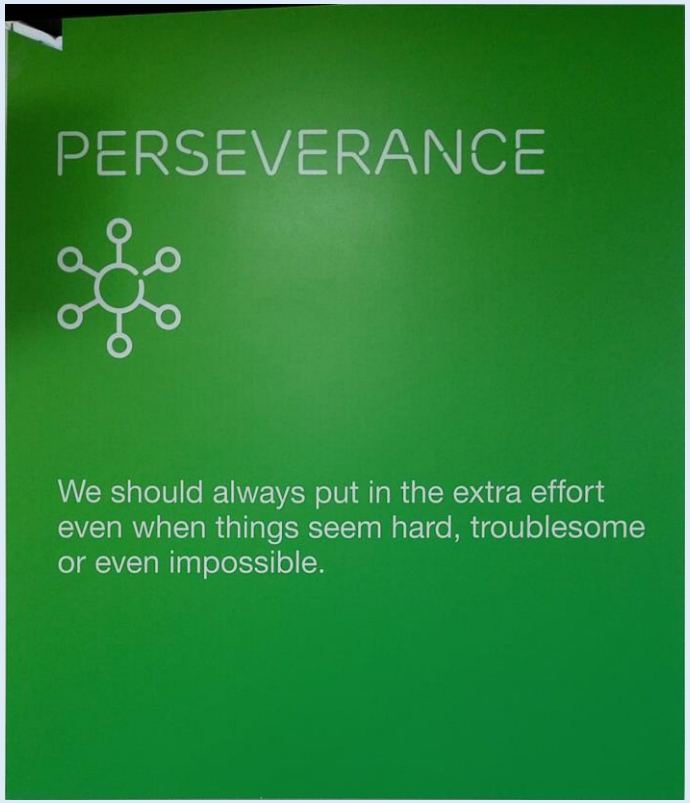
Ref - https://www.ericsson.com/en

1. COMPANY INTRODUCTION

CORE VALUES







Ref - https://www.ericsson.com/en/careers/working-here

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

Ref - https://www.pngwing.com/en/free-png-zkjkf

2. PROJECT BACKGROUND

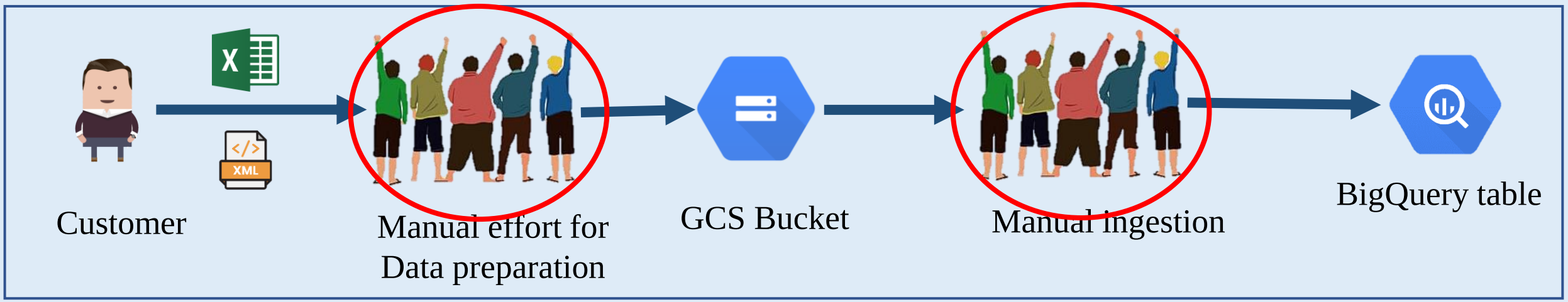


Fig. 1) Old Data ingestion Automation

Need to eliminate manual efforts

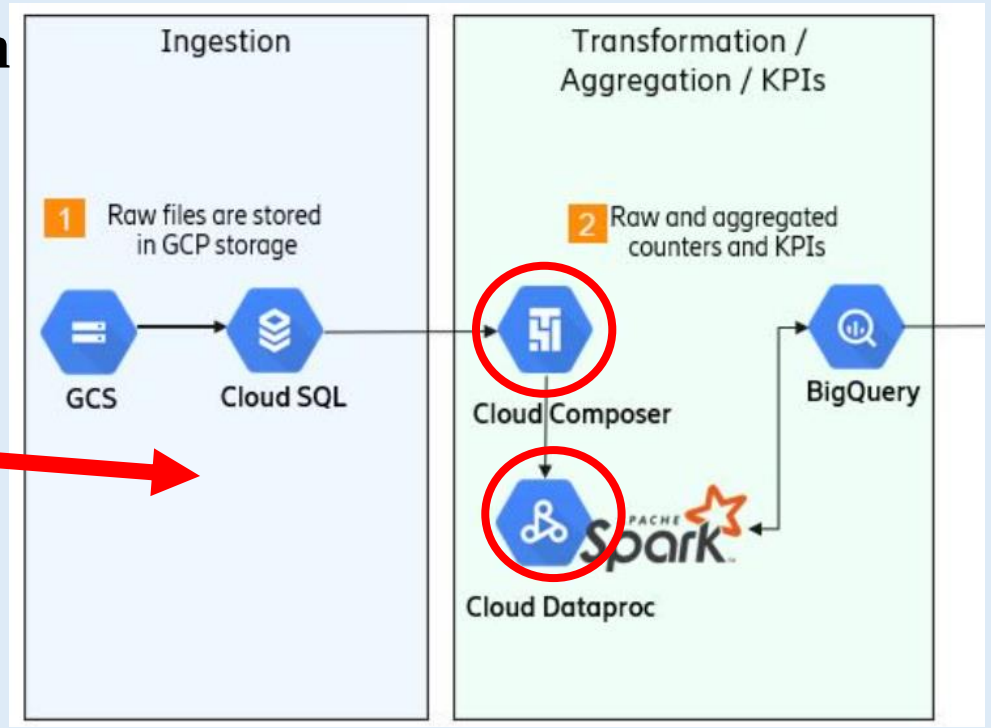


Fig. 2) Old Architecture of GCP:

Need to eliminate red circled component which is too costly.

3. SCOPE & UTILITY OF PROJECT

SCOPE:

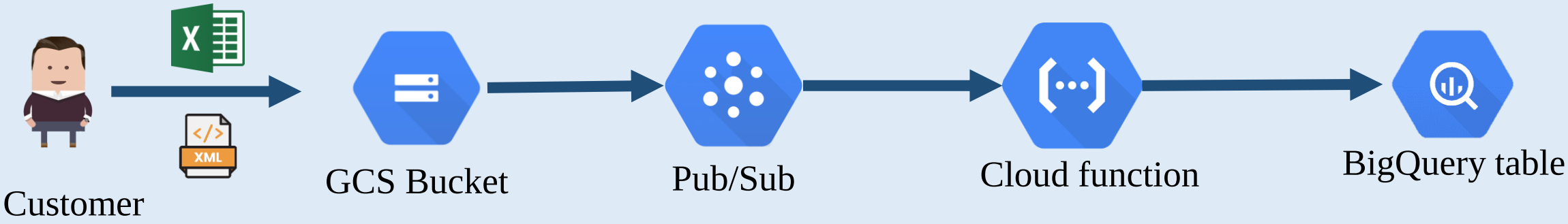
- As today is the era of cloud technology so working on this project which is based on Google Cloud Platform give great exposure to corporate.
- Variety of automation is needed in industry and one learning inspire other learning exposure.
- This data ingestion automation enables businesses to efficiently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

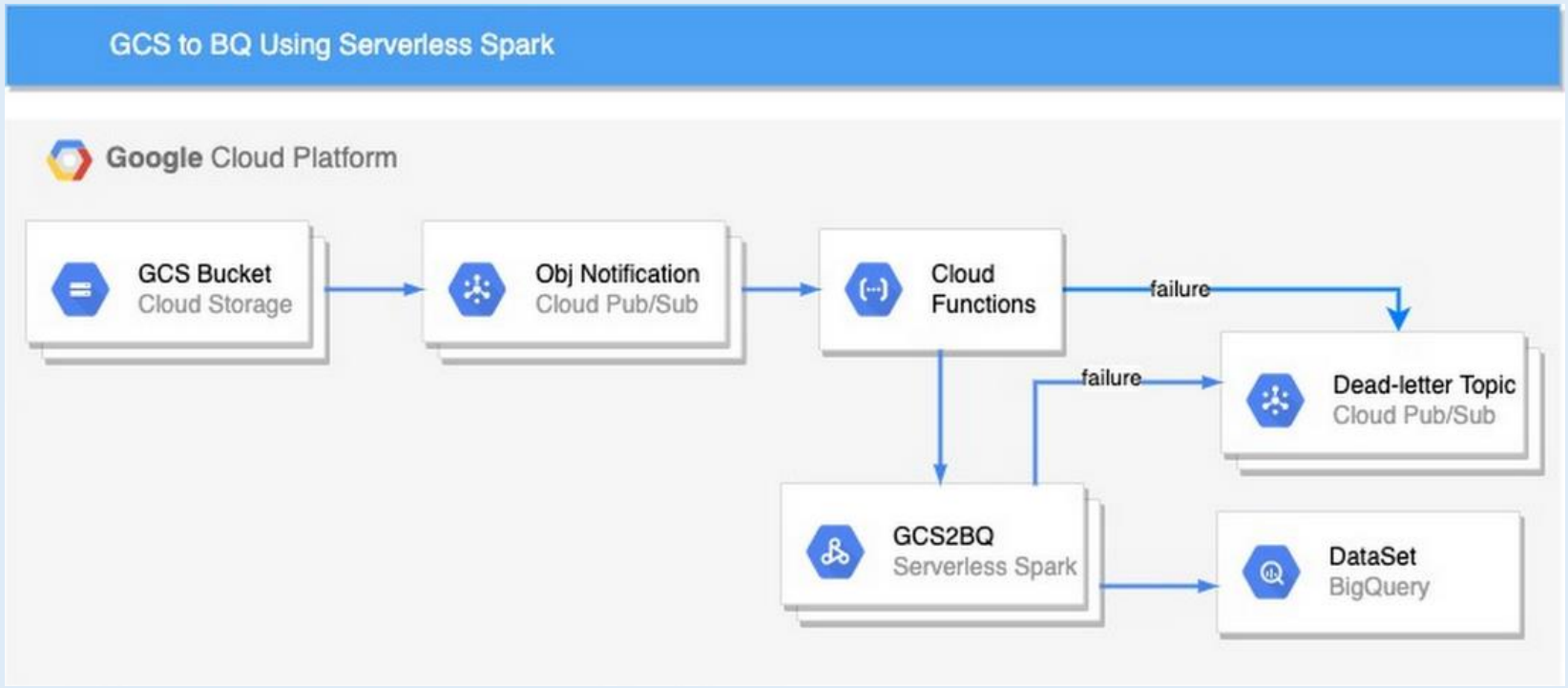
UTILITY:

- 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.

4. ARCHITECTURE OF THE PROJECT

4.1 DATA INGESTION AUTOMATION





4. ARCHITECTURE OF THE PROJECT

4.2 NEW LIGHT WEIGHT ARCHITECTURE OF GCP

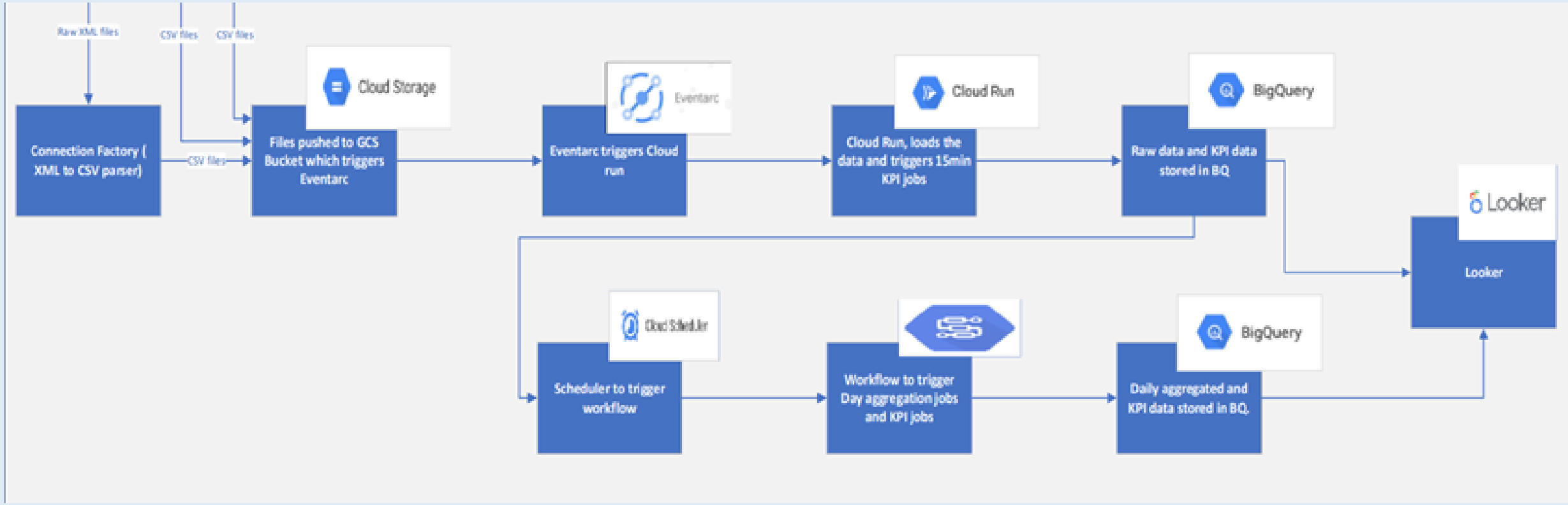


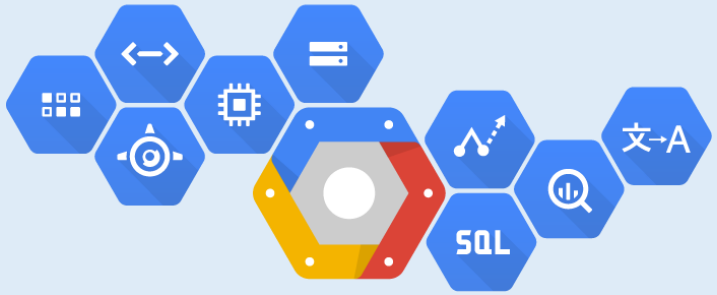
Fig. - New light weight architecture of GCP

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

Ref - https://commons.wikimedia.org/wiki/File:Python-logo-notext.svg, https://www.pinterest.com/pin/296393219209598164/

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.

Ref - https://console.cloud.google.com/

6. SOME SNAPSHOTS

SCHEMA | DETAILS | PREVIEW | LINEAGE

Filter Enter property name or value

Field name	Type	Mode	Collation	Defaul
data_typ	STRING	NULLABLE		
vendor	STRING	NULLABLE		
technology	STRING	NULLABLE		
name	STRING	NULLABLE		
source_name	STRING	NULLABLE		
temporal_unit	STRING	NULLABLE		
regional_unit	STRING	NULLABLE		
identifier_column_names	STRING	REPEATED		
timestamp_column_name	STRING	NULLABLE		
timestamp_column_pattern	STRING	NULLABLE		
metadata_column_mappings	RECORD	REPEATED		

Add to query in split tab

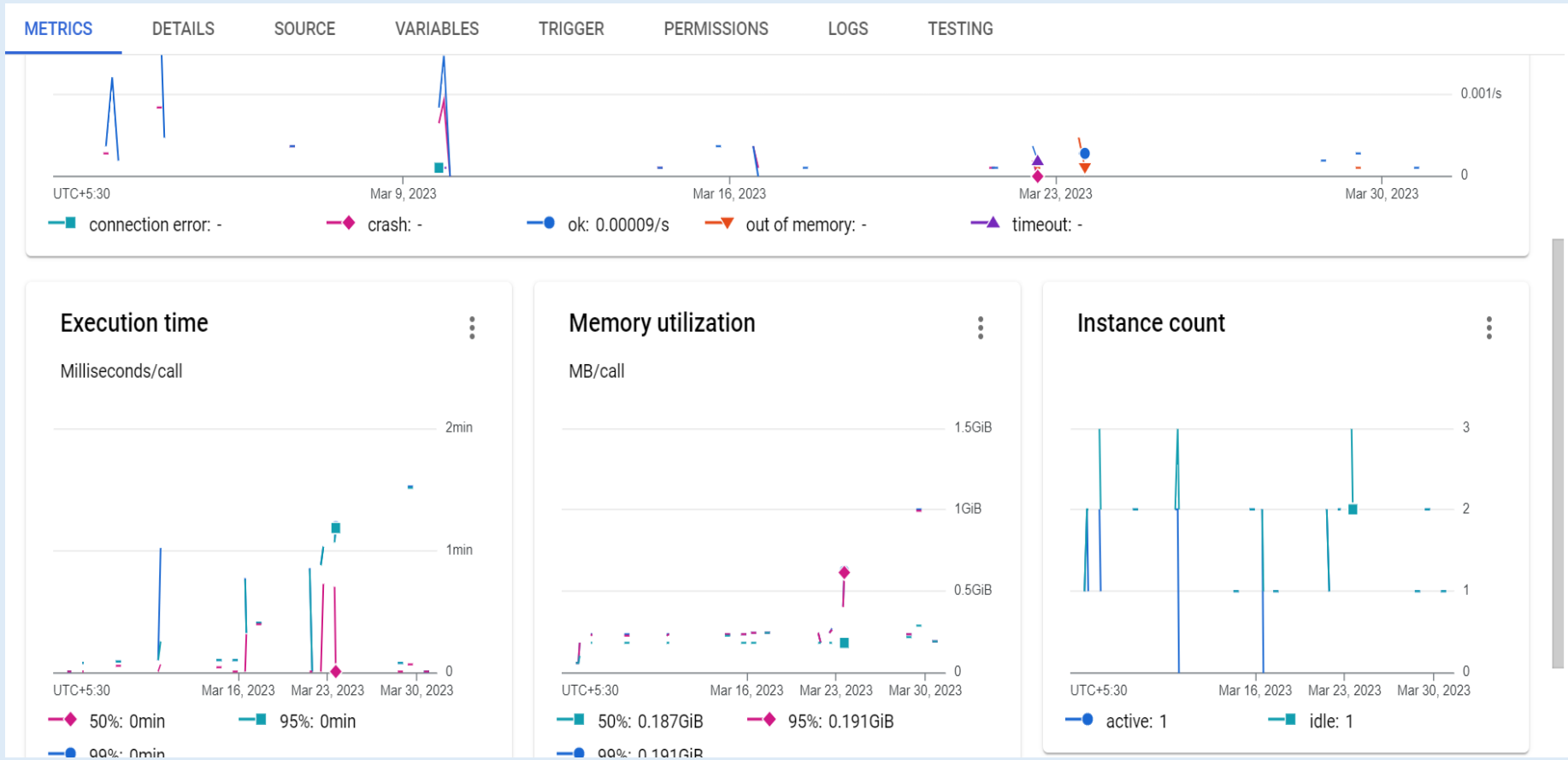
EDIT SCHEMA | VIEW ROW ACCESS POLICIES

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.

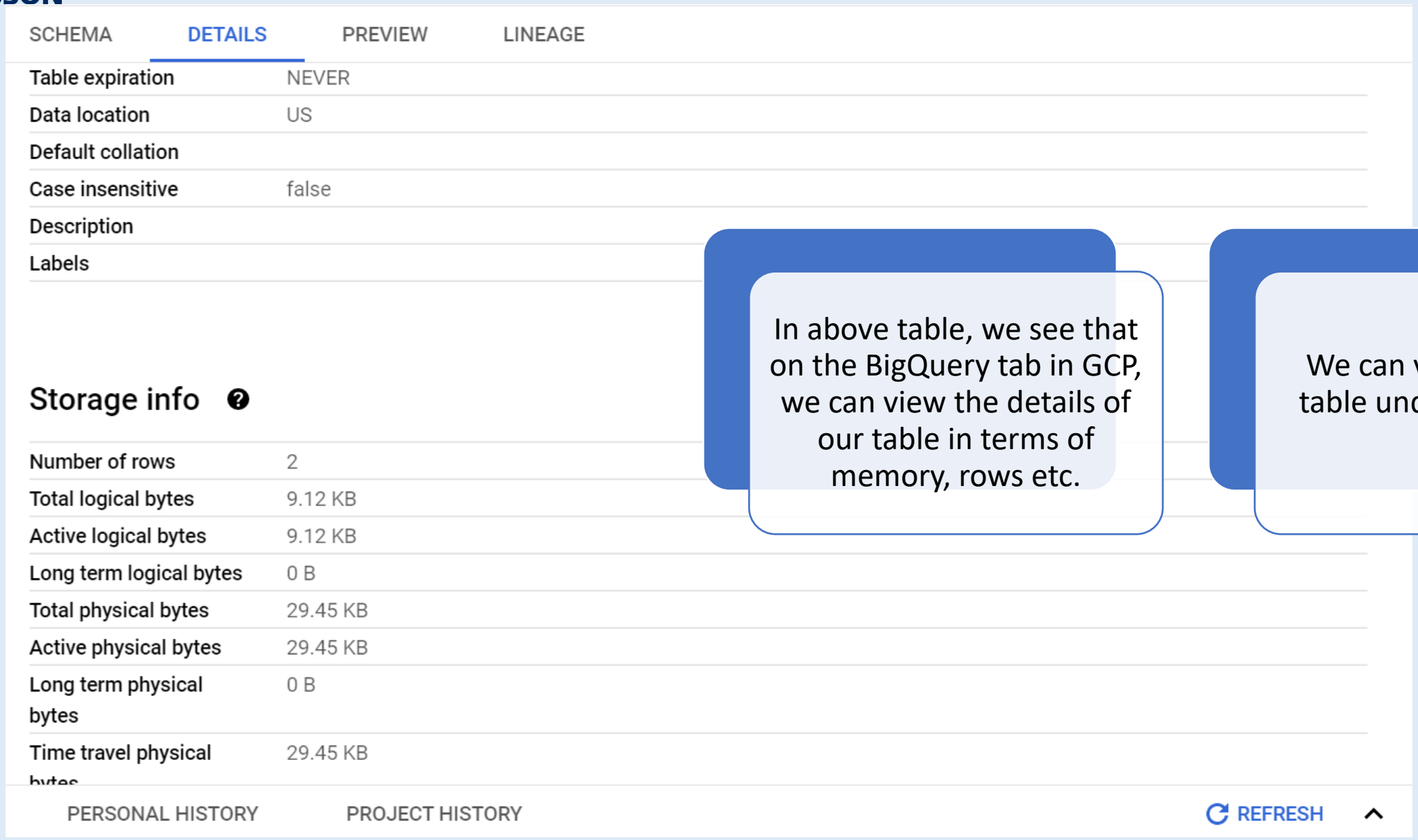
These entries have to be entered with correct mode in schema such as nullable or repeated so that our BigQuery operation works correctly and data is entered.

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.

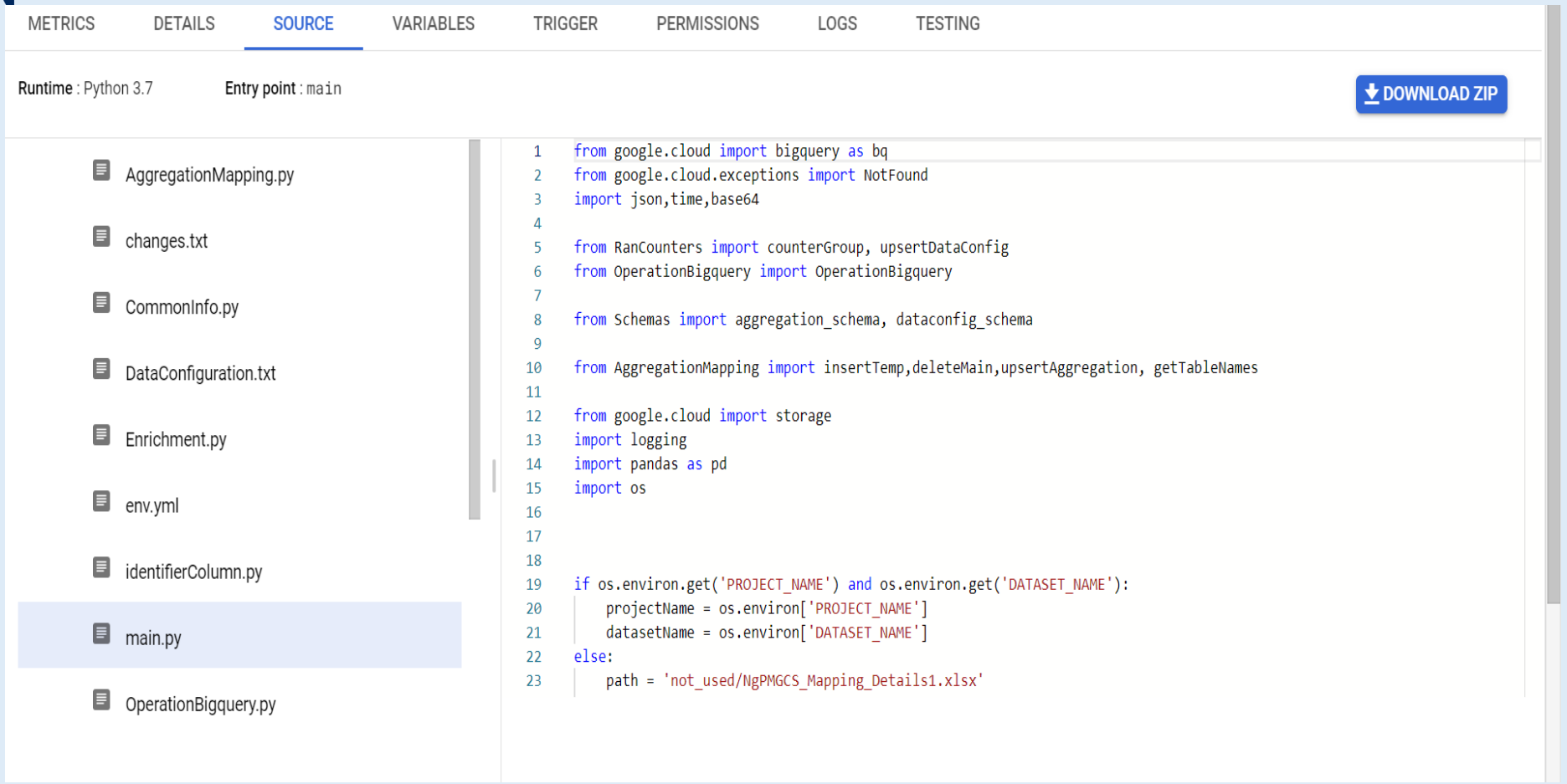
6. SOME SNAPSHOTS



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



✓ 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

ERICSSON

THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

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 it’s 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.

Ref - https://www.ericsson.com/en

9. FEEDBACK FOR PROJECT SEMESTER

- ✓ The college's organization of the project semester is exceptional, providing a structured and efficient platform for students to excel.
- ✓ The project semester organized by the college was a valuable learning experience, fostering collaboration and innovation among industry experts.
- ✓ Practical and hands-on approach to education, preparing us for real-world challenges.
- ✓ Faculty visit was nice, he asked about new learning and advised us for horizontal exploration then vertical exploration. I think that was best advise.

REFERENCES

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