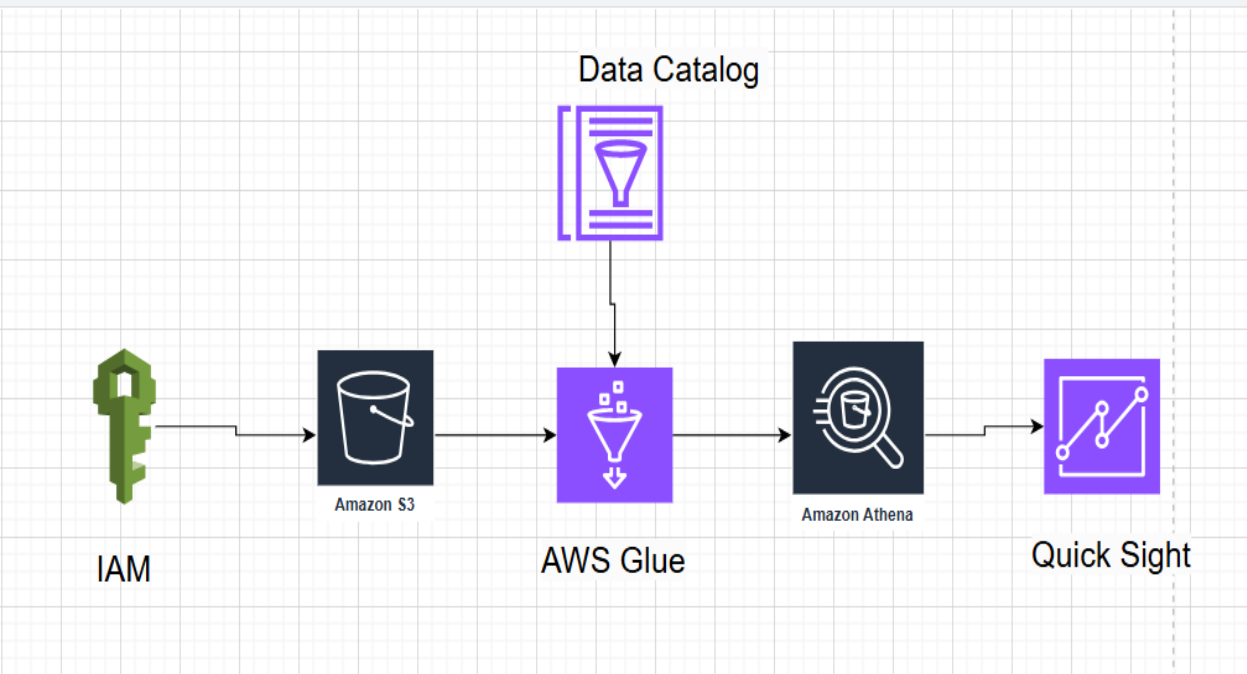
AWS Analytics: Project Documentation

Prepared by: Sagar Naduvinkeri - LinkedIn

Project Overview

The objective of this project was to demonstrate end-to-end proficiency in AWS Analytics services. This included securely storing data, automating schema discovery, querying datasets without a traditional database, and presenting insights through dynamic dashboards. By leveraging AWS S3, Glue, Athena, and QuickSight, I built a scalable, efficient, and cost-effective analytics pipeline — a typical workflow for modern cloud-based data analysis.



Step 1: Data Storage with IAM and Amazon S3

1.1 IAM Configuration

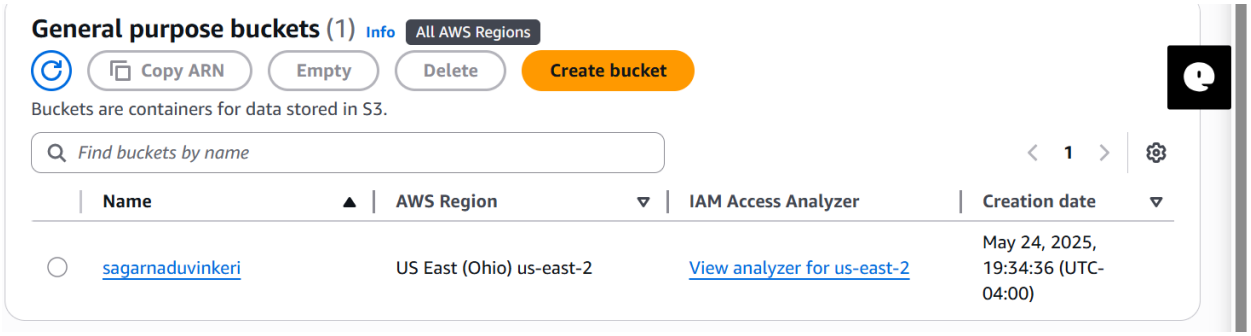
To maintain AWS best practices for security and access control, I began by creating a dedicated IAM user for this project. The user was granted limited permissions aligned with the principle of least privilege, including access to Amazon S3, Glue, Athena, and QuickSight. This approach allowed secure resource management and better auditability.

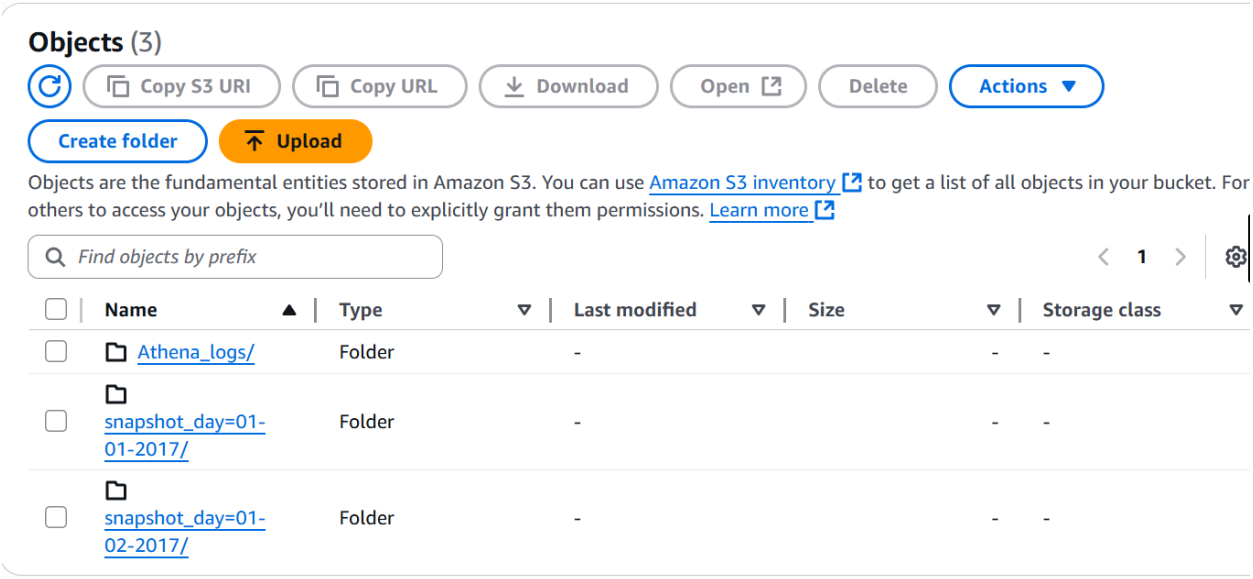
1.2 Amazon S3 Bucket Setup

I created an Amazon S3 bucket, which served as the primary data lake for this project. The raw dataset, an Excel file, was uploaded here. Notably, I uploaded the dataset in snapshot form, partitioned by upload timestamps. This snapshotting strategy offers the following advantages:

- Reduces the need to re-scan entire datasets repeatedly.
- Optimizes Athena query performance.
- Simplifies historical comparisons by maintaining versioned datasets.

Amazon S3 proved to be a highly durable, cost-effective, and scalable storage layer, perfect for data lake architecture.





Step 2: Automating Metadata Discovery with AWS Glue

2.1 AWS Glue Overview

AWS Glue is a fully managed **serverless data integration** service that simplifies ETL (Extract, Transform, Load) operations. It helps automate the discovery and cataloging of datasets without manual schema definitions, making it ideal for dynamic or semi-structured data environments.

2.2 Glue Crawler Configuration

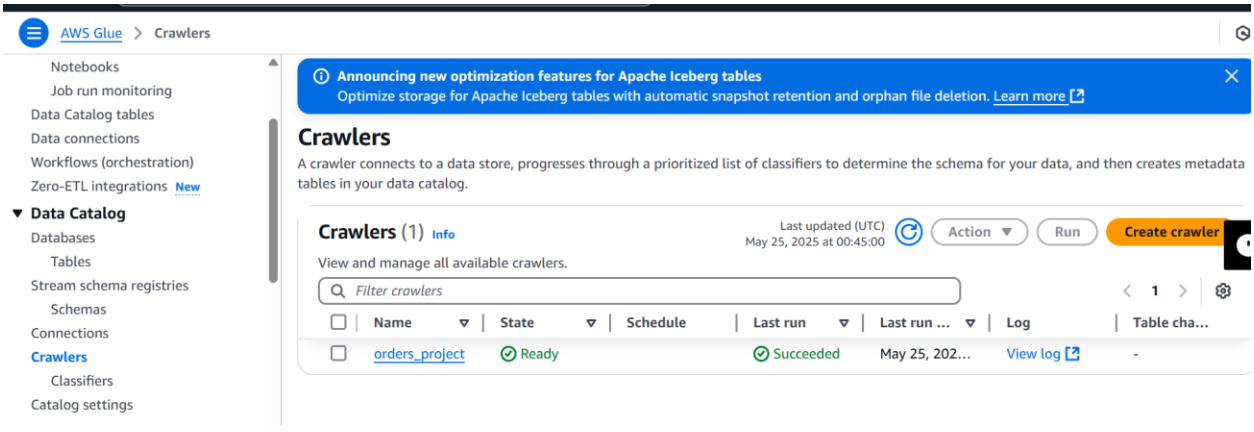
I configured an **AWS Glue Crawler** to scan the S3 bucket. The crawler automatically:

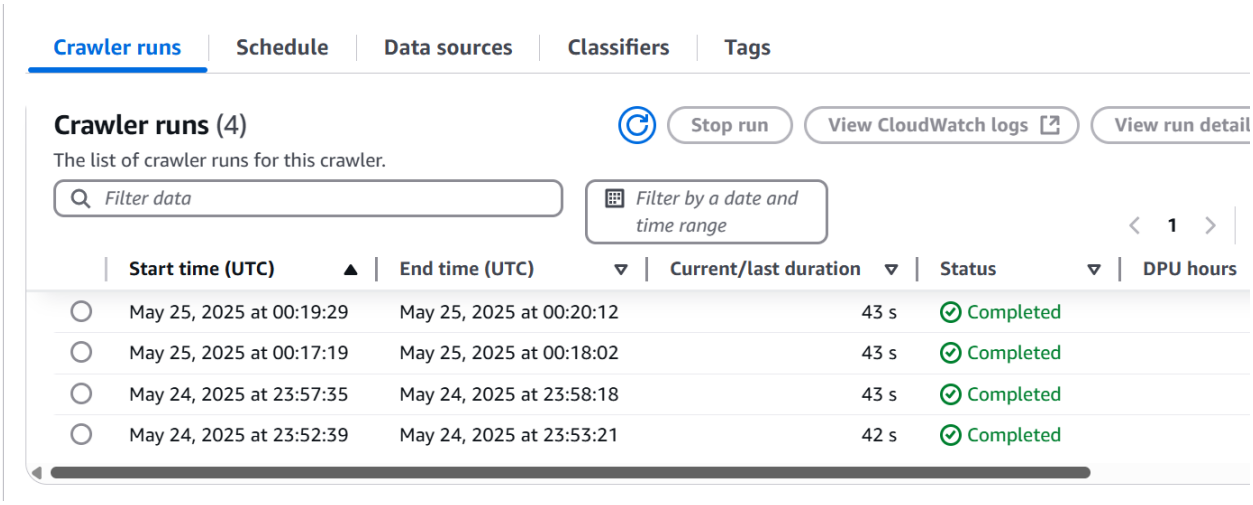
- Detected the uploaded Excel files.
- Inferred the schema from the content.
- Created tables in the AWS Glue **Data Catalog**.

The crawler scheduled runs enabled automatic updates to the schema when new snapshots are added, ensuring up-to-date metadata. Glue's ability to work with multiple data formats (e.g., CSV, Parquet, JSON, Excel) makes it extremely versatile for data analysts.

Benefits in This Scenario:

- Eliminates manual schema mapping.
- Keeps metadata updated as new data arrives.
- Lays the foundation for seamless querying via Athena.





Step 3: Serverless Querying with Amazon Athena

3.1 Athena Integration

With the tables created in the Glue Data Catalog, I used **Amazon Athena** to query the datasets directly from S3 — without moving the data. Athena supports SQL syntax, which made querying intuitive and powerful.

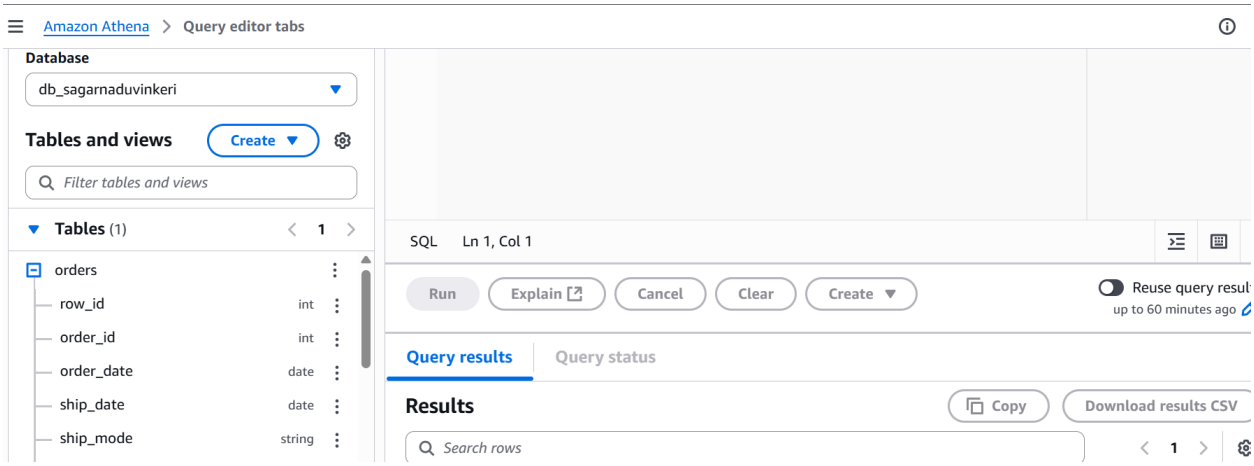
3.2 Use Cases Demonstrated:

- Filtering and aggregating sales data.
- Trend analysis using timestamped snapshots.
- Joins and transformations across multiple partitions (if needed).

Why Athena is Ideal:

- Serverless: No infrastructure provisioning required.
- Pay-per-query: Cost-effective since you only pay for scanned data.
- Speed: Combined with snapshot design and partitioning, queries were faster and efficient.

This step highlighted the power of AWS's **serverless data lake architecture**, reducing overhead and accelerating insights.



Step 4: Business Intelligence with Amazon QuickSight

4.1 QuickSight Setup

Finally, I visualized the processed data using **Amazon QuickSight** — AWS's native BI tool. I connected QuickSight directly to Athena, allowing real-time querying of the underlying S3 datasets.

4.2 Dashboard Creation

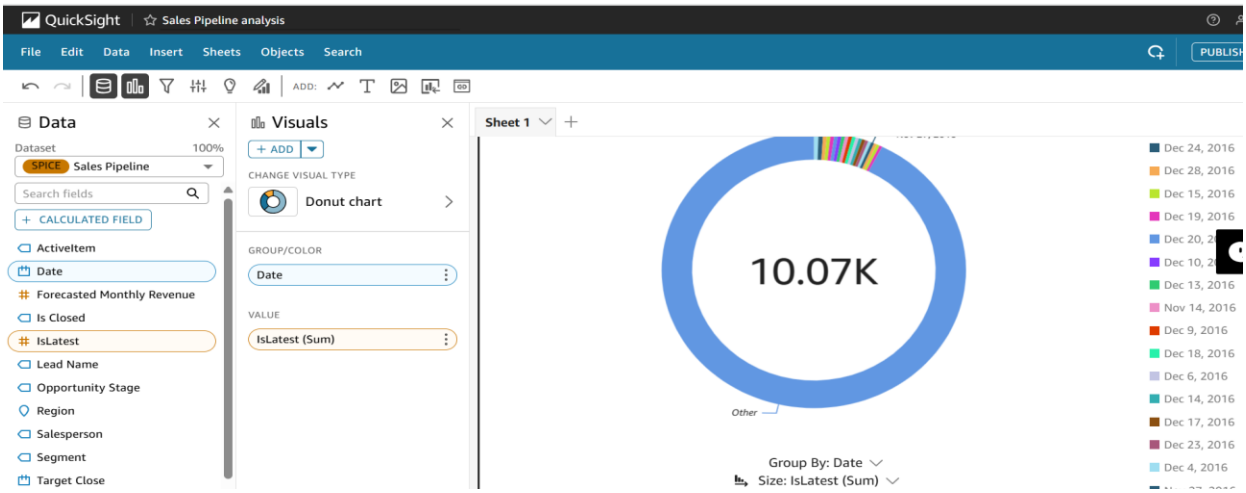
I created an interactive dashboard with:

- Time-series charts tracking trends.
- Pie charts to visualize categorical distributions.
- KPIs (Key Performance Indicators) to highlight metrics like totals, averages, and growth.

QuickSight allowed easy sharing of dashboards with stakeholders and decision-makers, making the project results both **actionable and visually impactful**.

Key Features Utilized:

- Direct integration with Athena.
- Drag-and-drop dashboard building.
- Scheduled refresh for live data monitoring.



Conclusion: This project effectively demonstrates the **power, simplicity, and integration** of AWS Analytics tools (IAM, S3, Glue, Crawler, Athena and Quickshight). Each component worked seamlessly to form an efficient **end-to-end data analytics pipeline**.