ased Finance & Business Intelligence System (AWS)

A serverless AWS pipeline that transforms raw retail interaction and sales data into a live financial dashboard using Athena, Glue, S3, and QuickSight.

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## 📊 Project Overview

This project simulates a finance & business intelligence system for a retail company. It uses serverless AWS tools to query customer interactions, join it with financial data, and produce real-time dashboards.

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## 🧱 Architecture

![Architecture Diagram](Figure1.png)

### Pipeline Steps:

- \*\*Data Ingestion:\*\* Raw interaction and sales data uploaded to Amazon S3.

- \*\*ETL & Cataloging:\*\* AWS Glue crawlers detect schema and create tables.

- \*\*Query Layer:\*\* Amazon Athena performs SQL joins, filters, and aggregations.

- \*\*Dashboard Layer:\*\* Amazon QuickSight displays interactive KPI charts.

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## 🗃️ Input Dataset Example

Sample of the cleaned `interactions\_clean` dataset stored in S3:

| user\_id | item\_id | event\_type | timestamp |

|---------|----------|------------|-------------|

| User\_1 | Item\_101 | VIEW | 1744260000 |

| User\_1 | Item\_102 | PURCHASE | 1744260100 |

| User\_2 | Item\_105 | VIEW | 1744260200 |

| User\_3 | Item\_106 | VIEW | 1744260300 |

| User\_3 | Item\_107 | PURCHASE | 1744260400 |

![Athena Table View](Figure2.png)

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## 🔍 Athena SQL Queries

### 1. Count Events by Type

```sql

SELECT event\_type, COUNT(\*) AS event\_count

FROM interactions\_clean\_interactions\_clean

GROUP BY event\_type;

2. Preview First 10 Rows

sql

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SELECT \* FROM interactions\_clean\_interactions\_clean

LIMIT 10;

📈 QuickSight Dashboards

Interactive Pie Chart – Event Types

Shows distribution of VIEW vs PURCHASE

Based on event\_type grouping

Main Dashboard – Filters & KPIs

Real-time filters (e.g. user\_id, event\_type)

Dynamic KPI cards, charts

Bar Chart – Events Over Time

X-axis: event date

Grouped by event type

🔁 ETL with AWS Glue

Glue crawlers scan S3 and create Athena-compatible schema.

This automates table creation and refresh.

🧠 Advanced Enhancements

Future enhancements simulated with AWS services:

Enhancement Tools Used

Sales forecasting Amazon Forecast

Real-time ingestion API Gateway + Lambda

Natural language BI QuickSight Q

✅ Summary Table

Layer AWS Service

Storage Amazon S3

ETL AWS Glue Crawlers

SQL Engine Amazon Athena

Visualization Amazon QuickSight

Forecasting (opt) Amazon Forecast

Real-time ingest API Gateway + Lambda

User Auth (opt) Amazon Cognito

🚀 Use Cases

Retail BI dashboards

Customer behavior analytics

Real-time sales monitoring

Cost-effective serverless architecture

🏗️ AWS Services Used

Amazon S3

AWS Glue

Amazon Athena

Amazon QuickSight

(Optional: Amazon Forecast, Lambda, API Gateway, Cognito)

📁 Repo Structure

bash

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finance-bi-dashboard/

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├── Figure1.png # Architecture

├── Figure2.png # Athena Table View

├── Figure3.png # Event Count Query

├── Figure4.png # LIMIT Preview

├── Figure5.png # QuickSight Pie

├── Figure6.png # Dashboard Screenshot

├── Figure7.png # Bar Chart

├── Figure8.png # Glue Crawler

├── Figure9.png # Enhancements

└── README.md

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