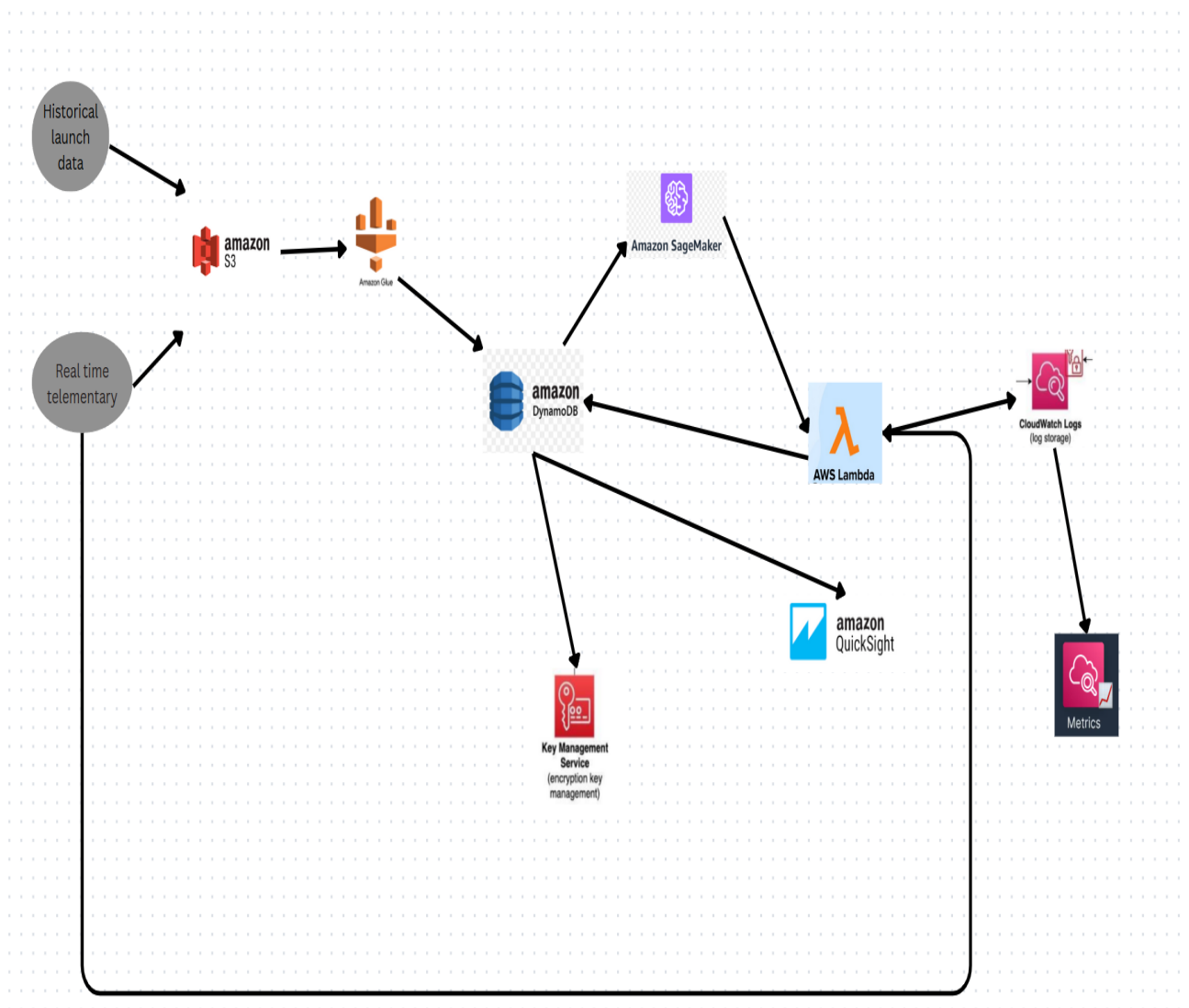


## Project Design Phase-I Solution Architecture

Date	19 September 2023
Team ID	PNT2022TMIDxxxxxx
Project Name	Project - Falcon
Maximum Marks	4 Marks

### Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:



## **Data Flow Arrows**

### **Data Ingestion Sources:**

1. **Historical Launch Data → Amazon S3**
  - Stores historical launch data, such as landing outcomes, weather conditions, and telemetry data.
2. **Real-Time Telemetry → Amazon S3**
  - Real-time telemetry data is stored in S3 for processing (optional if real-time prediction is implemented).

### **Data Processing Pipeline:**

3. **Amazon S3 → AWS Glue / Apache Spark**
  - Data stored in S3 flows to AWS Glue or Apache Spark for data processing and cleaning.
4. **AWS Glue / Apache Spark → Feature Store (DynamoDB or Redis)**
  - After data is processed and cleaned, it is sent to DynamoDB or Redis as structured features for model training and prediction.

### **Model Training Pipeline:**

5. **Feature Store (DynamoDB or Redis) → SageMaker / EC2 with TensorFlow or PyTorch**
  - The processed features from the feature store are sent to SageMaker or EC2 for model training.

### **Model Deployment and Inference:**

6. **Trained Model (SageMaker / EC2) → Amazon SageMaker Endpoint / Lambda Function**
  - The trained model is deployed to a SageMaker Endpoint or Lambda function to run predictions.
7. **Real-Time Telemetry → SageMaker Endpoint / Lambda Function**
  - Real-time telemetry data flows directly to the deployed model endpoint or Lambda function for inference.

### **Prediction Output Storage:**

8. **SageMaker Endpoint / Lambda Function → DynamoDB**
  - Prediction results and metadata (e.g., time, confidence level) are stored in DynamoDB.

### **Monitoring and Logging:**

9. **SageMaker Endpoint / Lambda Function → CloudWatch Logs**
  - Prediction requests, responses, and errors are logged in CloudWatch for monitoring.
10. **CloudWatch Logs → CloudWatch Metrics**
  - Logs feed into CloudWatch Metrics to track performance metrics (accuracy, recall) over time.

### **Notification and Visualization:**

#### **11. DynamoDB → SNS / Lambda**

- Based on prediction results in DynamoDB, SNS or Lambda triggers notifications to stakeholders.

#### **12. DynamoDB → QuickSight or Tableau**

- Historical landing data and predictions are visualized in QuickSight or Tableau for insights and performance monitoring.

### **Security and Encryption:**

#### **13. Amazon S3 / DynamoDB ↔ KMS (Key Management Service)**

- KMS manages encryption keys for securing data in S3 and DynamoDB.