

Telemetry Streamline

Real-Time Device Insights Platform

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Problem

Organizations managing distributed devices lack fast, reliable telemetry. Unstructured data creates delays, weak diagnostics, and higher operational cost.

Goal

Build a production-grade, serverless streaming ETL platform that ingests telemetry in real time, validates and enriches events, tracks lineage, detects anomalies, and supports rich analytics.

Solution

Devices submit structured telemetry into Kinesis. A Schema Validator Lambda enforces structure using a Schema Registry. Enrichment Lambdas attach metadata and lineage entries before routing events to DynamoDB for latest device state, OpenSearch for diagnostics, and S3 for the raw event lake. Anomaly detection triggers SNS alerts. Historical analytics run through Athena and Redshift. All resources deploy via Terraform with GitHub Actions CI/CD. CloudWatch + X-Ray provide observability.

Architecture

Kinesis → Validator Lambda → Enrichment + Lineage → Router → DynamoDB (state) / OpenSearch (search) / S3 (raw lake) → Athena/Redshift. Includes Schema Registry, Lineage Store, DLQ handling, IAM, monitoring, and CI/CD automation.

Outcomes

- Real-time ingestion at scale.
- Consistent schema enforcement and lineage tracking.
- Sub-second writes to DynamoDB for latest device state.
- Full-text search in OpenSearch.
- Automated anomaly detection and alerting.

- Historical SQL analytics in Athena/Redshift.
- Fully automated IaC deployments.

Tech Stack

AWS (Kinesis, Lambda, DynamoDB, S3, OpenSearch, Glue, Athena, Redshift, SNS, CloudWatch, X-Ray), Terraform, GitHub Actions, Python, SQL.