EPLEXITY

Global Oil and Gas

Global Oil and Gas Case Study

Project: Real Time Data Analysis

Company: Global Oil and Gas

Industry: Oil and Gas Energy

About:

Our client is a global oil and gas company focusing on the expansion and operation of crude oil reserves in many of the premium onshore locations in the US. They are dedicated to innovation in the production of oil and gas using smart, safe, and environmentally sustainable operations.

Challenge:

The company has undertaken a number of initiatives to provide better clarity into its operations for each rig and well. The most recent initiative is to provide real time well and rig data from the field in extremely high frequency intervals.

The current systems obtain remote field data over very slow modems or in large batch uploads. Each rig and well system has its own data format, data structure, and frequency for sending data. They have mandated that the new system deliver a more universal ingestion system, irrespective of the data source, and over a high-speed network.

Provide real time rig data in high frequency intervals.

Each rig had its own data format which caused disruption.

Needed a universal ingestion system over a high speed network.

Solution:

EPLEXITY designed an AWS cloud solution that focuses on the implementation of real time process control data streaming system. Each rig device complements its existing Supervisory Control and Data Acquisition (SCADA) system. SCADA is designed to work at a lower data frequency and in much large time batches (hours, days, weeks). The new AWS cloud system receives from 50 to 200 data elements every second from each rig. Rig data will be normalized across many different rig types, using transformation algorithms. The implementation is intended to be deployed to thousands of rigs that in the completion phase of operations (i.e. drilling).

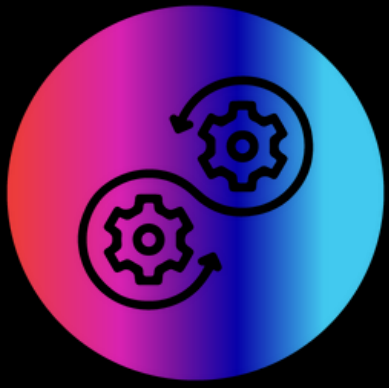
The new IOT device connects over MQTT using TLS and x509 certificate for device security. The data stream is transformed when it reaches AWS into a high-volume FIFO queuing system, leveraging AWS SQS, S3, Dynamo DB, and Lambda functions. The SQS topics leverage the stream the data, eliminate sample duplicates, and maintain perfect time sequence without the need of a database store. The data process system allows each data sample to travel through various high capacity transformations, analyses, and augmentations.

The overall design objective of the system is to apply all data transformations in real time, without the need for the batching of samples. External to the real time stream, sample data is used for Machine Learning algorithms leveraging AWS Sagemaker and Sagemaker Studio for the analysis and training. Simulators have been built to replay historical data for analysis and testing, which utilize AWS ECS, Lambda, and MQTT.

Once the real time data has been augmented and cleaned, AWS Glue Batch jobs, AWS Sagemaker Machine Learning algorithms, and deep analysis are applied to provide instant comparison of the data stream to benchmarks or inferences. Within seconds of the data being ingested into AWS Cloud, the system will be able to detect important or critical changes to any or all oil and gas operations. The end to end assessment completes within a few seconds, for every data sample, without any batching or delays in the stream.

A real time process control data streaming system was designed in AWS .

AWS SQS eliminated sample duplicates while maintaining a perfect time sequence.



Instant comparison of data through AWS Glue Batch Jobs, AWS Sagemaker ML algorithms & deep analysis.

Outcome:

Control signals are fed back to the field within seconds of a change. This enables management of remote field events, reducing operational risk and costs. EPLEXITY's AWS cloud solution is expected to generate significant annualized savings.

Analyzing data in real time allows our client to take immediate action on rigs and wells, from a remote distance. Detecting these changes and communicating those changes immediately to the field can improve employee and contractor safety and save millions on operational expenses. These next generation process control data systems will make a dramatic contribution to the client's goal of free cash flow for all their crude oil assets.

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