Building an End-to-End Industrial IoT (IIoT) Solution with AWS IoT

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Feb 24th, 2020
Agenda

- What are the Industrial data challenges?
- What is needed in an end-to-end Industrial data solution?
- A quick overview of AWS IoT Analytics services for IIoT solutions
- A step-by-step customer solution walkthrough
  - Common customer asks and core design considerations
  - Architecture
  - Demonstration
- Where do I go from here?
- Q/A
If you knew the state of every “Thing” and could reason on top of that data ... what problems would you solve?
How can I liberate my untapped industrial data?

...to cloud for unbounded Analytics to optimize my Operations
What are the **Industrial data challenges**?

**Problem statement**

- Industrial data has gravity but often **untapped**

- Industrial data is **undiscovered** into **proprietary on-premises historians**

- Industrial customers want to use **AI/ML**, but are usually early in their data journey

**AWS solution approach**

- Democratize access to the data for actionable operational insights

- Build a **consistent and open datastore** of myriad data streams using **flexible ingestion tools**

- Deploy tools today that **future proof** you as you move from **descriptive to preventive to predictive analytics**
What’s needed in an **industrial data solution**?

- **1.** Collect and store any data at any scale and at low costs
- **2.** One secure home for all data (no silos)
- **3.** Democratize access and right analytics tool for the job
- **4.** Connect to internal and external apps

Data from PLCs, Turbines, Compressors

Operational Insights
IIoT solutions are multidimensional and complex to implement
AWS IoT’s virtuous cycle of services

- AWS IoT Things Graph
- AWS IoT Events
- AWS IoT SiteWise
- AWS IoT Analytics
- AWS IoT Device Management
- AWS IoT Device Defender
- AWS IoT Core

Intelligence and outcomes

Control services

Device services

Analytics services

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AWS IoT SiteWise

Ingest equipment data into AWS in minutes

Structure data and specify performance metrics for your equipment and processes

Store data in a time-series optimized datastore

Create and share dashboards to visualize live and historical equipment data
AWS IoT Events is a managed service that continuously monitors data to detect stateful changes and trigger actions or workflows.

**Build**

Build logic flows to evaluate incoming telemetry data and detect equipment or process states by defining a detector model.

**Monitor**

Near real-time, data is processed through detectors from multiple sources to trigger outputs.

**Automate**

Intelligent notifications automate workflows to improve productivity and reduce costly noise.
Let’s dive deep into a real customer solution walkthrough
Customer asks & core design considerations

Scalable
Cost effective
Secure
Flexible access

Operational dashboard & alerts
Deep insights
Self-serve analytics & BI reporting

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Technical outcomes

1. Setup field to cloud connectivity
2. Collect, organize, process, and store
3. Monitor operational metrics in near real-time
4. Alerting
5. Build a central datastore for historical data
6. Business Intelligence (BI) Reporting
Core Architecture of a Customer solution

**Customer (On-premises)**
- Business Data Center
  - AWS IoT Greengrass & SiteWise Connector
  - Edge Gateway
- Firewall
- Station/Plant
  - HMI
  - OPC-DA
  - OPC-UA
  - KEPServerEX
- PLC

**AWS Cloud**
- Managers / Analysts / Operators
  - AWS IoT Greengrass & SiteWise Connector
  - SiteWise Monitor
  - AWS IoT SiteWise (Preview)
  - AWS IoT Core rules engine
  - AWS IoT Analytics
  - Amazon SNS
  - Data Scientists/Engineers
    - AWS IoT SiteWise (Preview)
    - Operational datastore, “hot” data
    - Amazon SageMaker
    - Machine Learning
  - Managers / Analysts
    - AWS CloudTrail
    - AWS KMS
    - AWS CloudTrail
    - AWS IAM

**Internet**
- AWS IoT Events
- Operators
  - Near real-time alerts & notifications
- Amazon Athena
  - (BI Reporting & self-serve analysis on historical data)
- Amazon QuickSight
  - Near real-time Operational Dashboard
- Amazon S3
  - Industrial data lake, “warm/cold” data
  - Amazon S3
  - Amazon S3
  - Amazon S3

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Demonstration
How about historical data & legacy apps?

- **Customer (On-premises)**
  - Business Data Center
    - AWS IoT Greengrass & SiteWise Collector
    - Edge Gateway
    - Firewall
  - Station
    - HMI
    - OPC-DA
    - OPC-UA
    - KEPServerEX
    - PLC
  - Historians
  - Enterprise Data (ERP, CRM, 3rd Party)
  - Legacy Applications

- **AWS Cloud**
  - SiteWise Monitor
  - Managers / Analysts / Operators (Near real-time Operational Dashboard)
  - AWS IoT Events
  - Amazon SNS (Near real-time alerts & notifications)
  - AWS IoT SiteWise (Preview)
    - Operational datastore, “hot” data
  - AWS IoT Core rules engine
  - AWS IoT Analytics
  - Amazon SageMaker
    - Data Scientists/Engineers (Machine Learning)
  - Amazon S3
    - Industrial Data Lake, “warm/cold” data
  - Amazon Athena
  - Amazon QuickSight
    - Managers / Analysts (BI Reporting & Self-serve Analysis on historical data)
  - AWS CloudTrail
  - AWS KMS
  - AWS CloudTrail
  - AWS IAM
  - Amazon API Gateway
  - AWS Snowball
  - AWS DMS
  - AWS Glue Crawler
  - AWS Glue Data Catalog

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Where do I go from here?

AWS IoT SiteWise (public preview)

AWS re:Invent 2019: What's new with AWS IoT analytics services? (IOT208)
https://www.youtube.com/watch?v=k-h62-L2bns

Getting started with AWS IoT SiteWise (a three-part step-by-step blog post)
Q/A
Thank you!

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