
AWS
re:Invent

EMB043

Introducing AWS IoT SiteWise Edge

Shyam Krishnamoorthy

General Manager
AWS IoT Device Software
AWS

Usman Anwer

Principal Product Manager
AWS IoT
AWS

AWS re:Invent

© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Agenda

The rise of industrial IoT

Overview of AWS IoT SiteWise

Introducing AWS IoT SiteWise Edge

AWS IoT SiteWise Edge deep dive

Customer example



© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Industrial IoT is transforming manufacturing

Industrial automation

Industrial IoT (IIoT)

Industry 4.0



Industrial IoT is transforming manufacturing

Improve quality





Predict equipment failures

Increase productivity





Ensure worker safety

The key to transformation

Start with industrial **data**

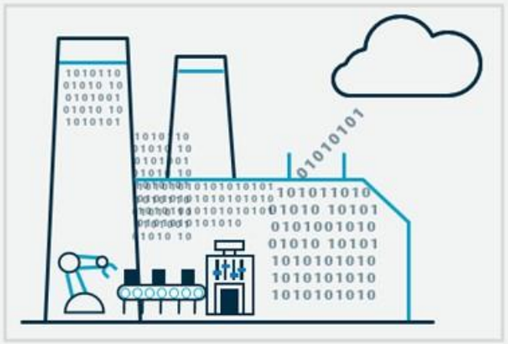
Label, organize, and enrich with context to get **information**

Analyze and infer to get **insights**

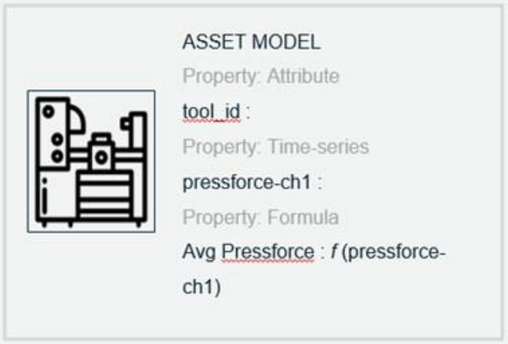
Insights lead to business **decisions**

AWS IoT SiteWise

AWS IoT SiteWise collects data from the plant floor with a local gateway, structures that data, and computes metrics to help you make data-driven decisions



Ingest equipment data into AWS in minutes



Structure data and specify performance metrics for your equipment and processes

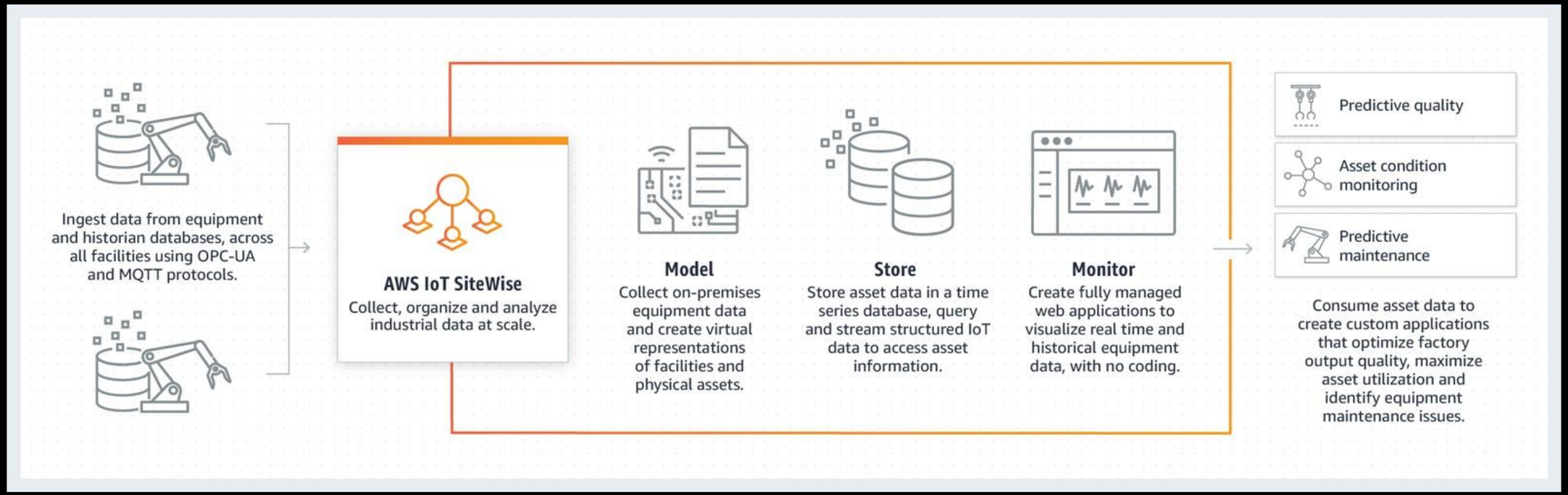


Store data in a time series optimized data store

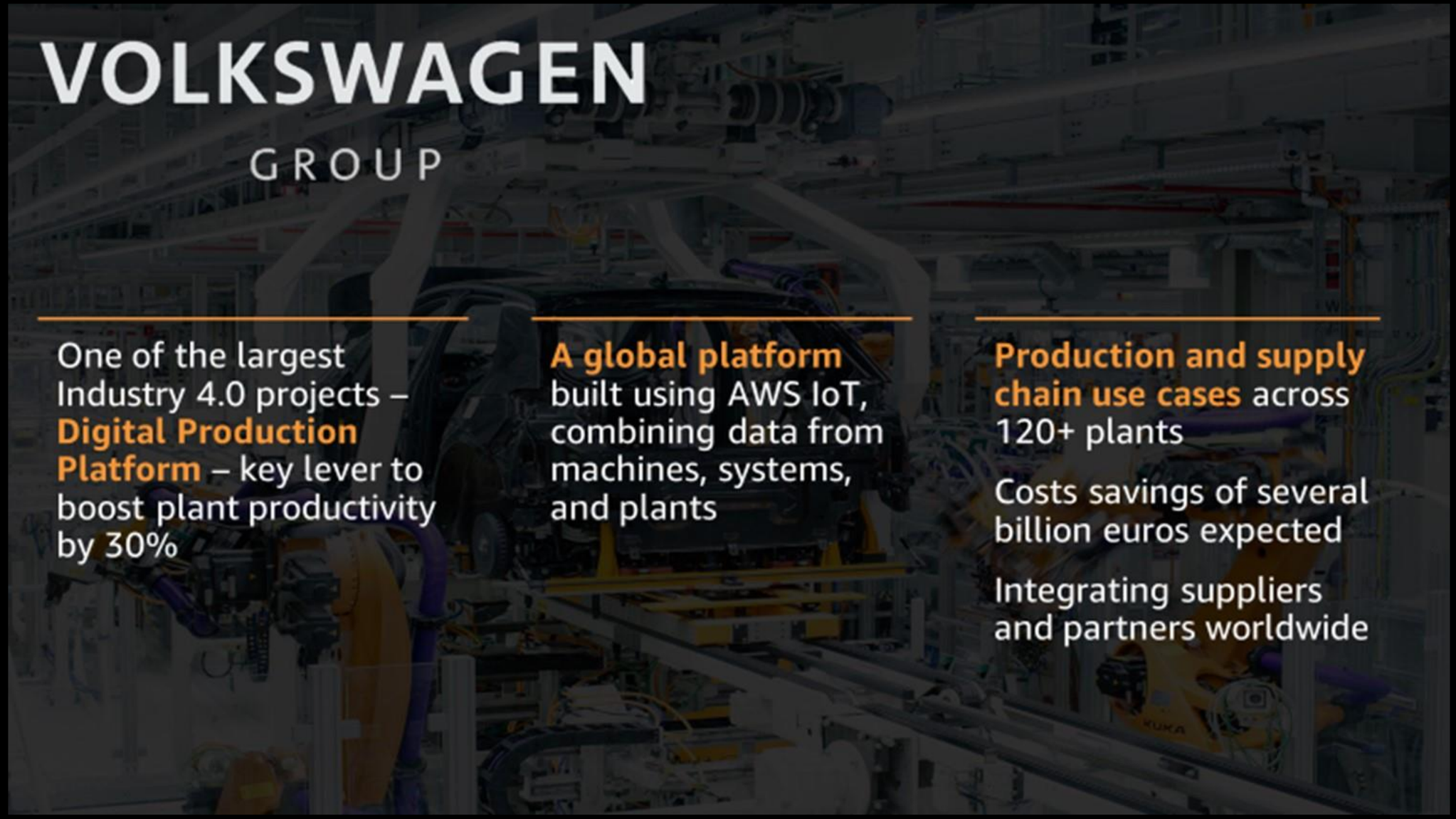


Create and share dashboards to visualize live and historical equipment data

AWS IoT SiteWise



AWS IoT SiteWise in action

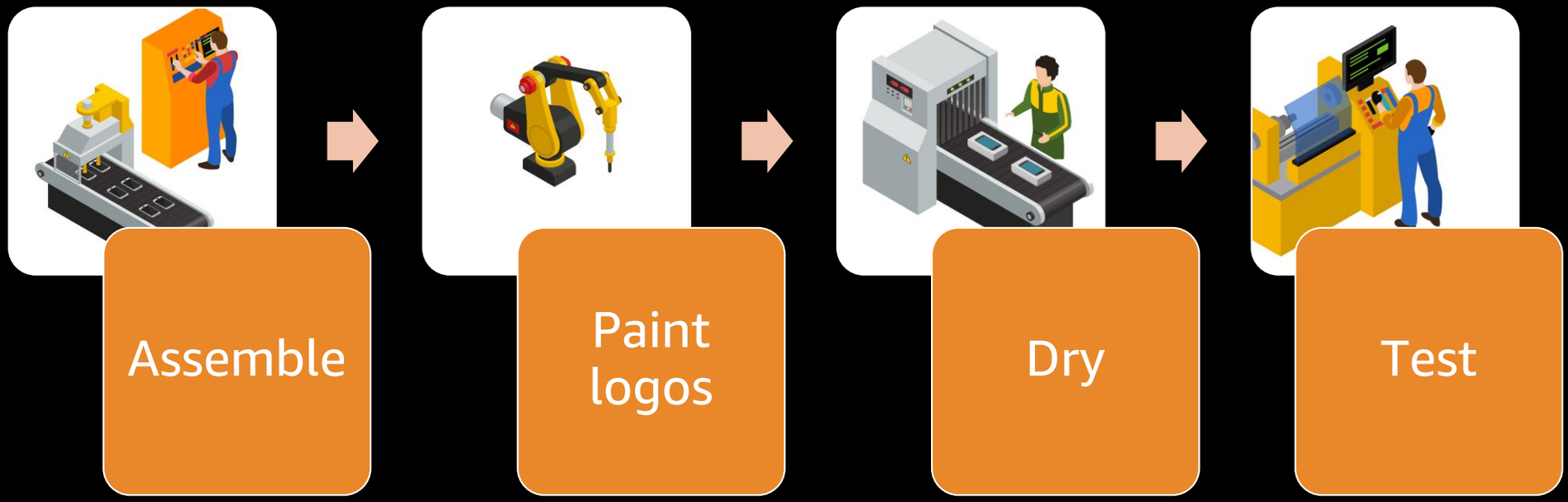


Let’s zoom in to a single factory
… and simplify …

A simple example: Building a toy airplane



A simple example: Building a toy airplane



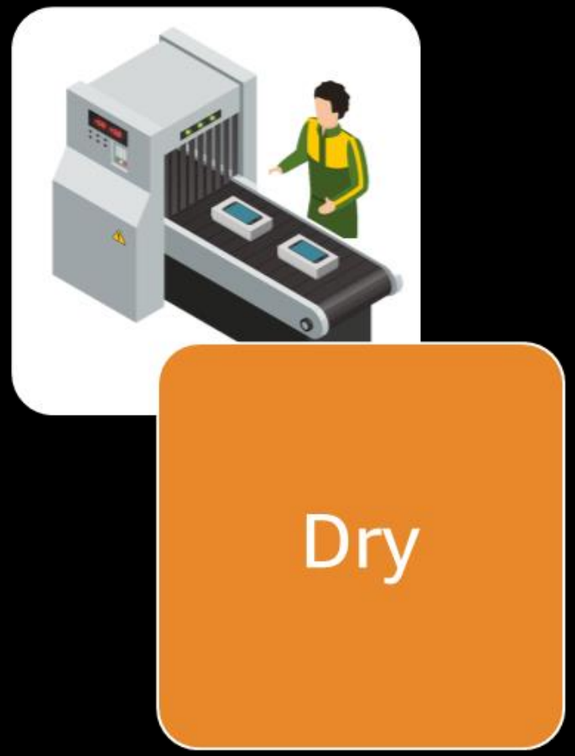
A simple example: Building a toy airplane

- Predictive maintenance for equipment
- Gather machine health data to predict failures and reduce downtime
- Q: Should I send all the equipment data to the cloud for training?



A simple example: Building a toy airplane

- Employee safety
- Proximity sensing, proactive equipment shutdown
- Q: What safety decisions do I need to continue making when cloud connectivity is unreliable?



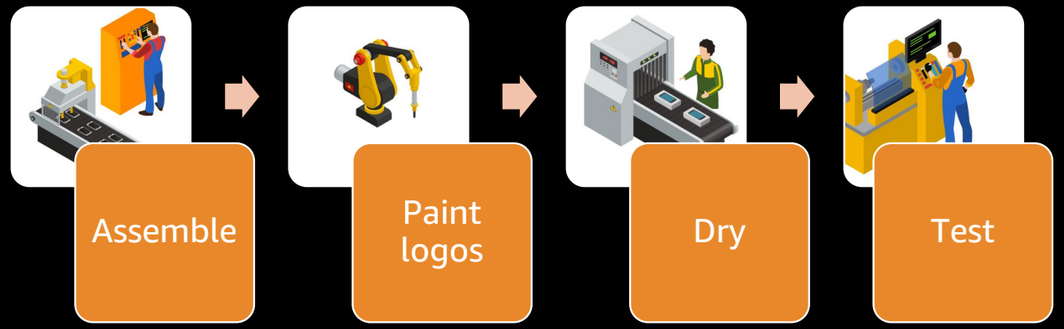
A simple example: Building a toy airplane

- Quality
- Identify defects during testing with heuristic or machine learning techniques
- Q: Should I run my machine learning logic locally or in the cloud?



A simple example: Building a toy airplane

- Productivity and OEE
- Monitor efficiency of each cell, as well as overall equipment effectiveness (OEE)
- Q: Where do I decide to adjust capacity or supplies for each cell to improve OEE?



Cooperative edge and cloud workloads

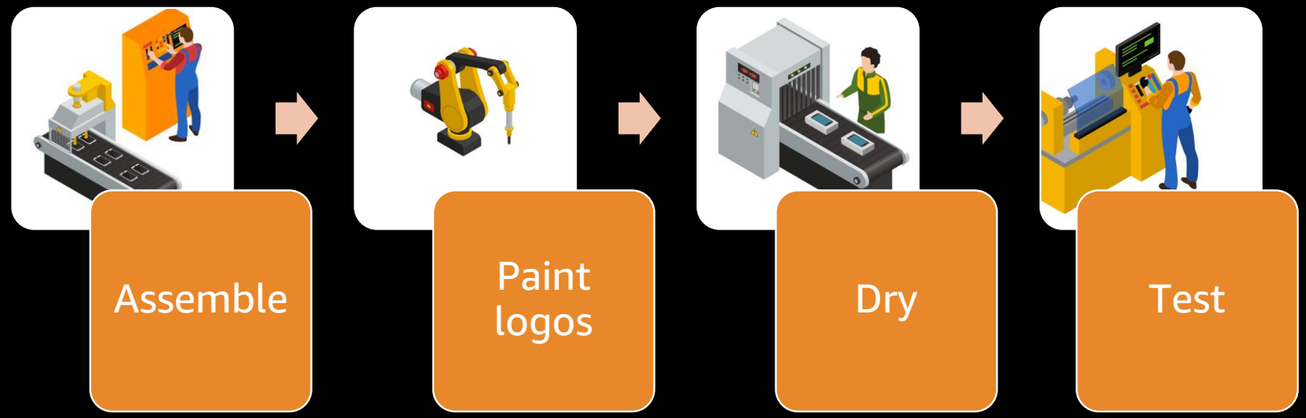
Local + cloud data processing	• Reduce costs by filtering and aggregating high-volume data locally • Send filtered data to the cloud for additional processing
Local + cloud monitoring	• Monitor factory-specific KPIs at the edge with real-time low-latency access to process engineers; alert staff about process issues as soon as they occur • Monitor cross-site efficiency in the cloud for business decision makers
Disconnected operations	• Make operationally critical decisions locally to be resilient to unreliable networks • Synchronize data with the cloud when connectivity returns

Cooperative edge and cloud workloads

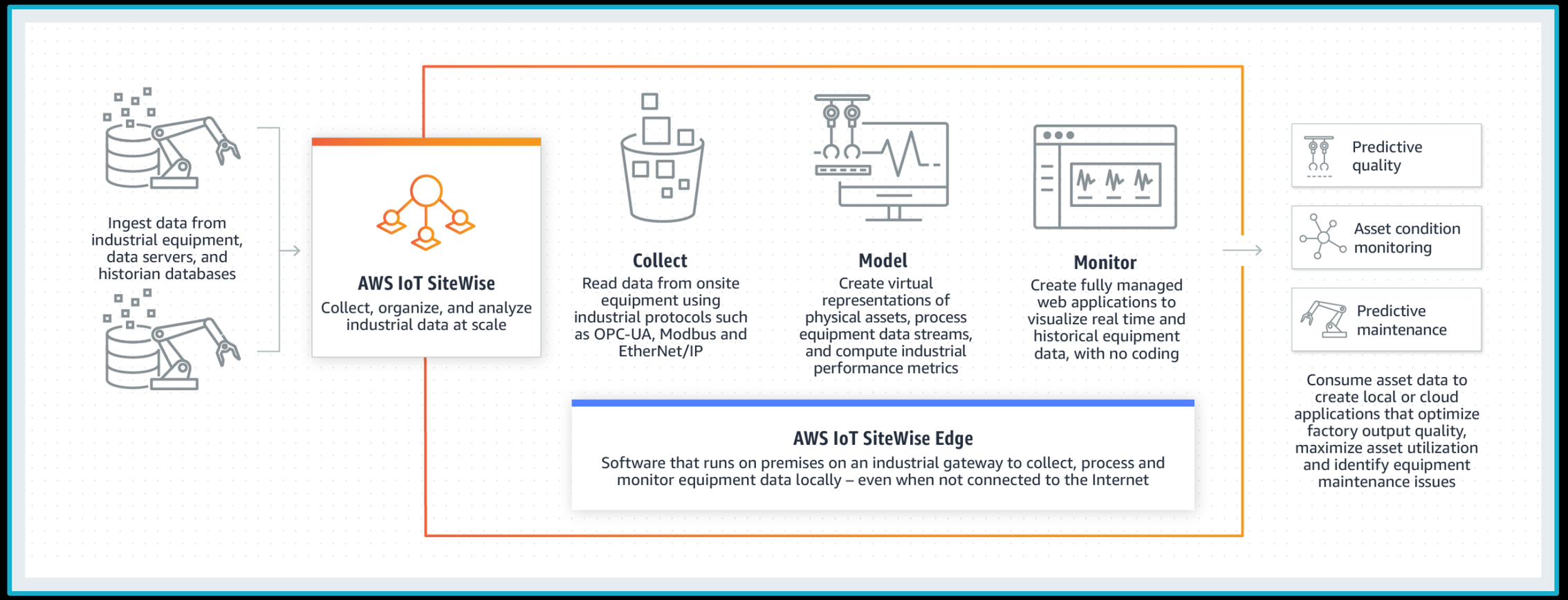
Local + cloud data processing

Local + cloud monitoring

Disconnected operations



Introducing AWS IoT SiteWise Edge



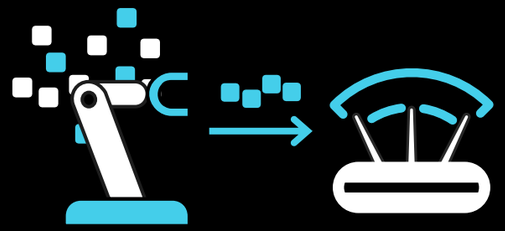
AWS IoT SiteWise Edge deep dive



AWS re:Invent

© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.

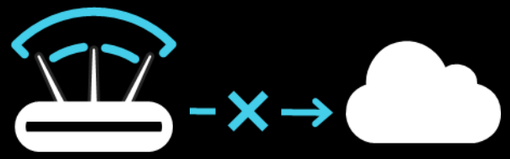
AWS IoT SiteWise Edge features



Collect and process industrial data



Monitor locally



Manage gateways locally

Gateway hardware platforms



Linux industrial computer



AWS Snow Family devices



AWS Outpost

Gateway hardware platforms



Linux industrial computer



AWS Snow Family devices



AWS Outpost

Prerequisite software: AWS IoT Greengrass Core

Minimum hardware requirement: 4-core processor, 16 GB RAM, >50 GB storage

AWS IoT SiteWise Edge features

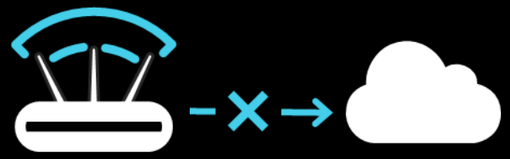


Collect and process industrial data

- Data collection pack



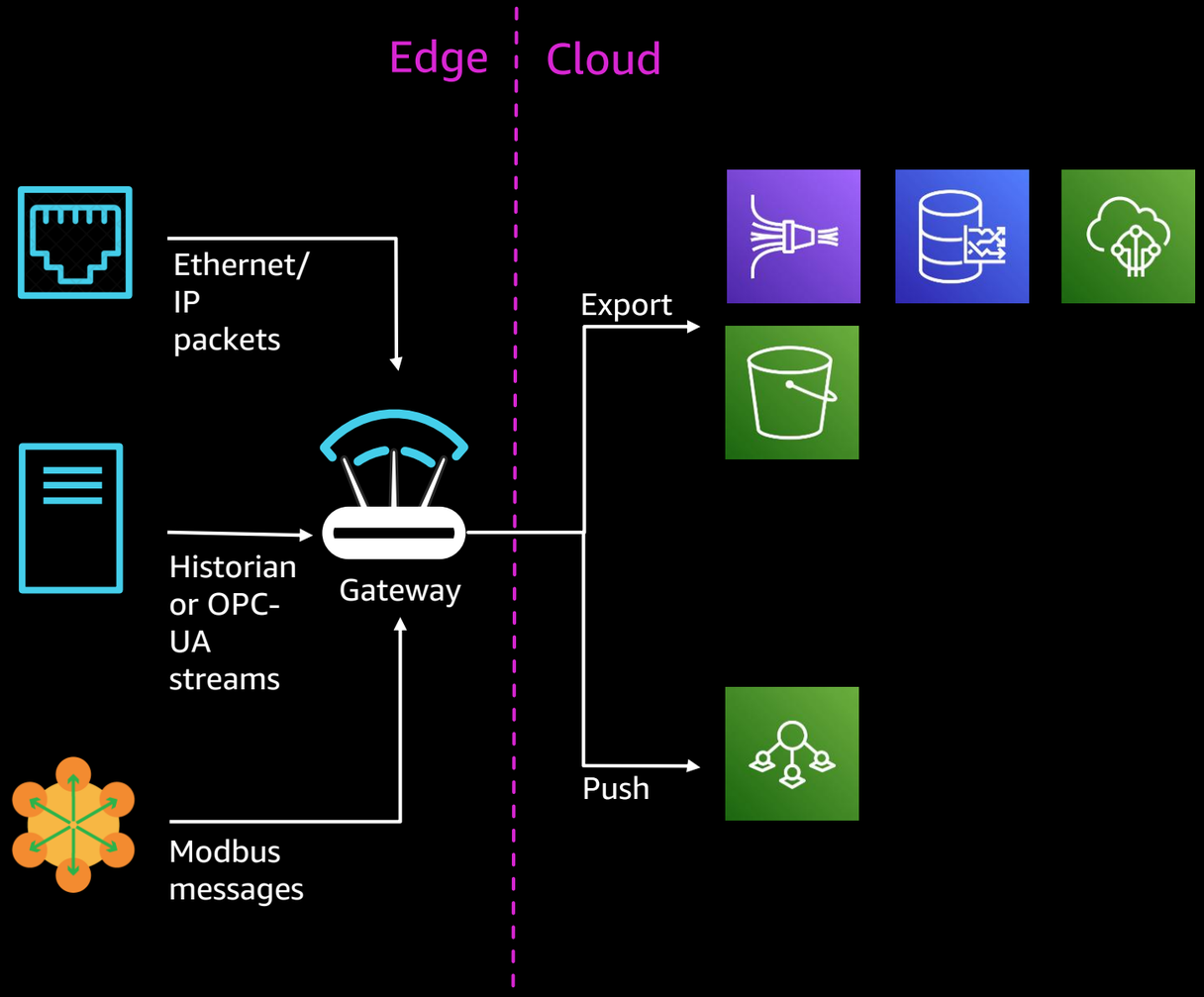
Monitor locally



Manage gateways locally

Data collection pack

- OPC-UA
- Modbus
- Ethernet/IP
- Push data to AWS IoT SiteWise cloud service
- Export data to other AWS destinations
- Store and forward



AWS IoT SiteWise Edge features

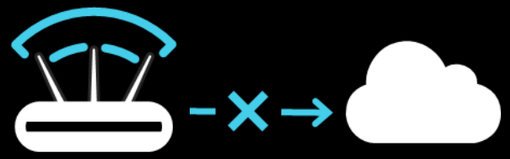


Collect and process data

- Data collection pack
- Data processing pack



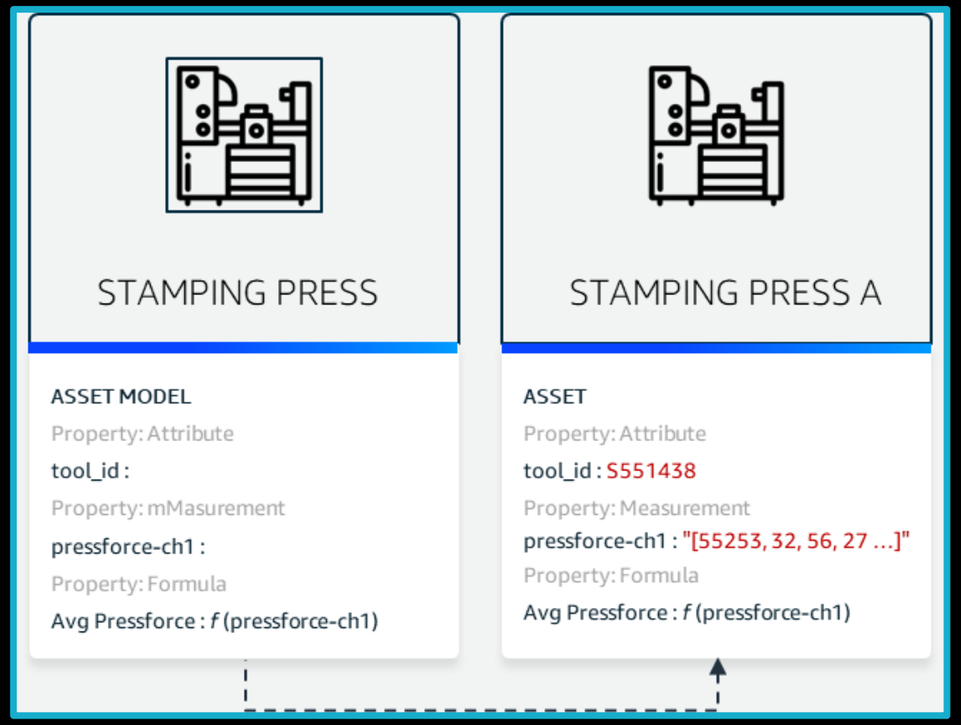
Monitor locally



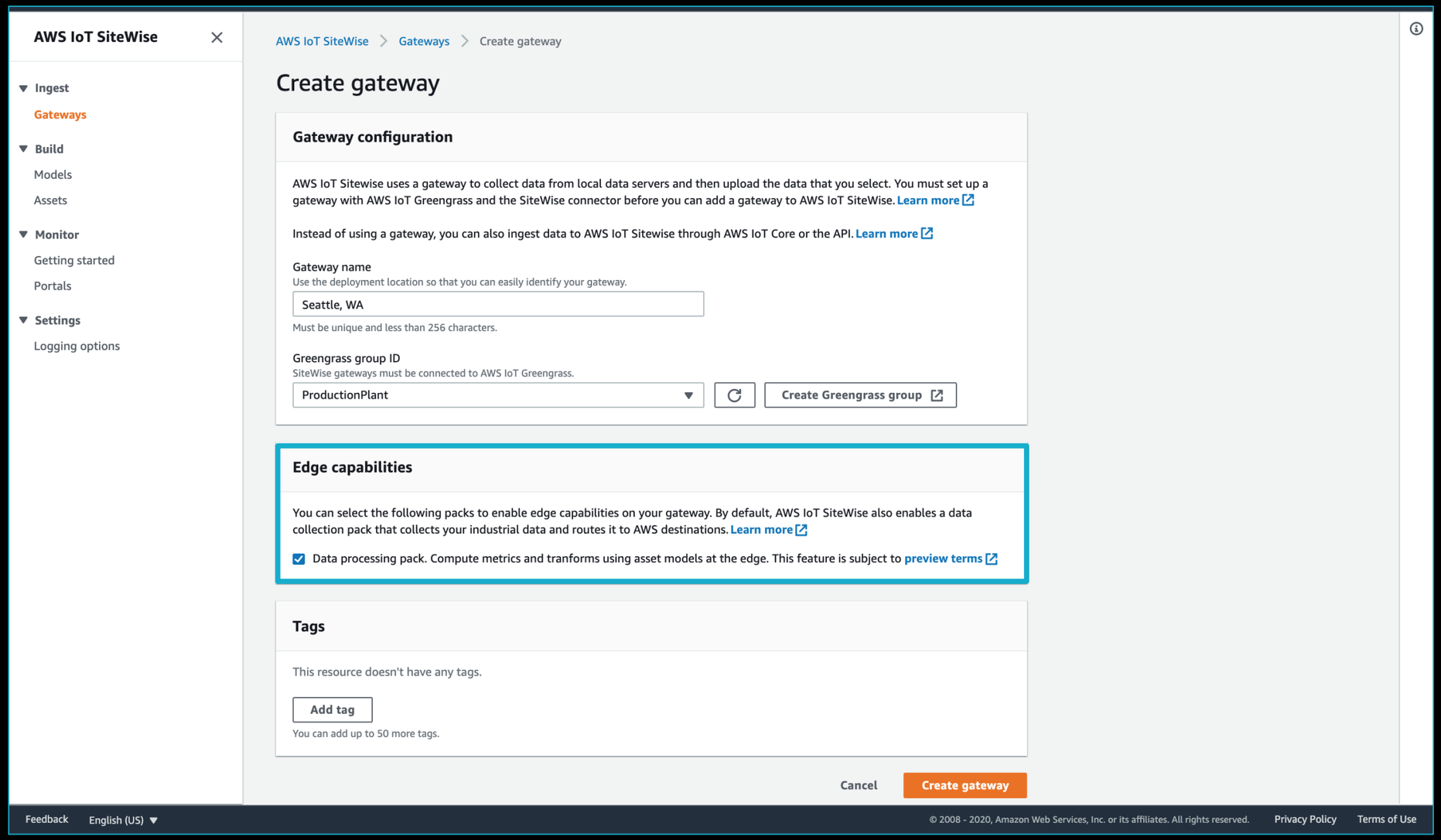
Manage gateways locally

Data processing pack

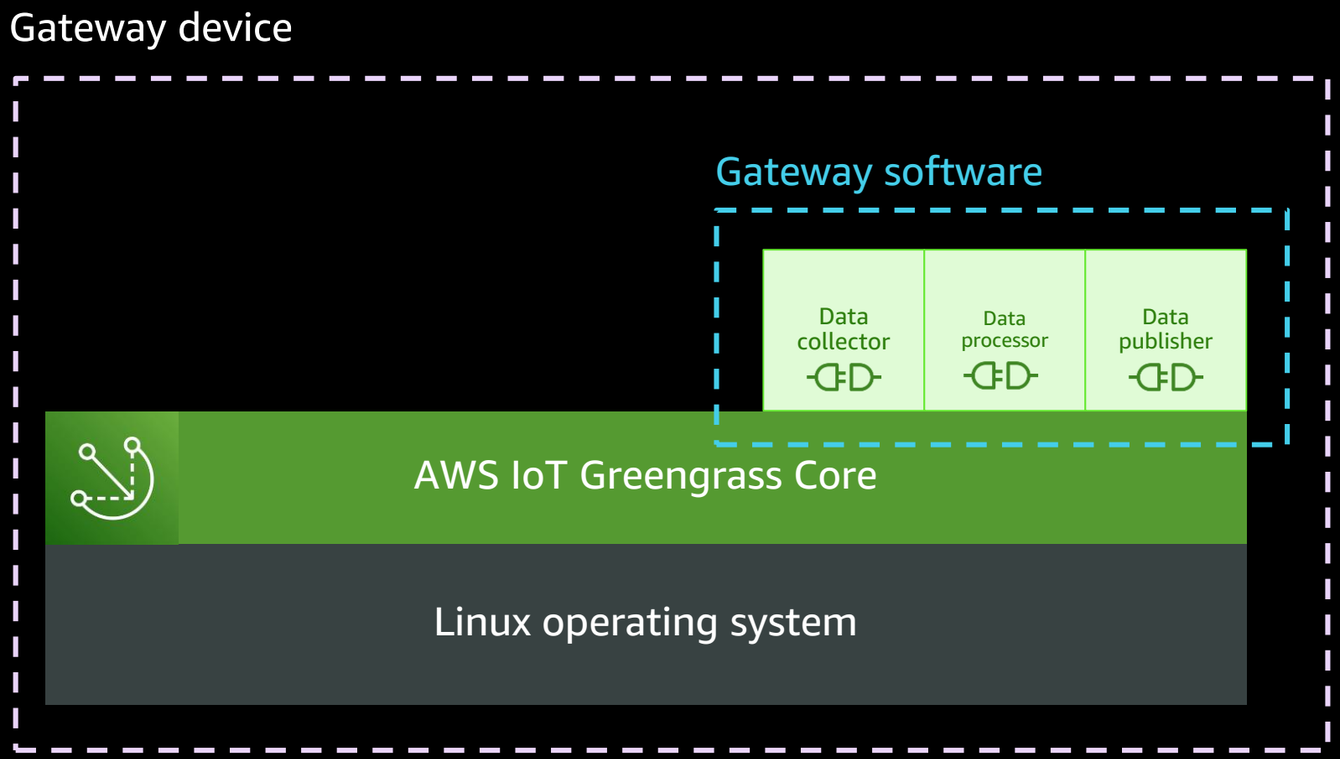
- Label and structure equipment data
- Pre-compute transforms (e.g., convert F to C)
- Downsample high-frequency data for cloud ingest (e.g., from 1 data point per second to 1 data point per minute)
- Guarantee uptime for local data applications (e.g., real-time quality monitoring)



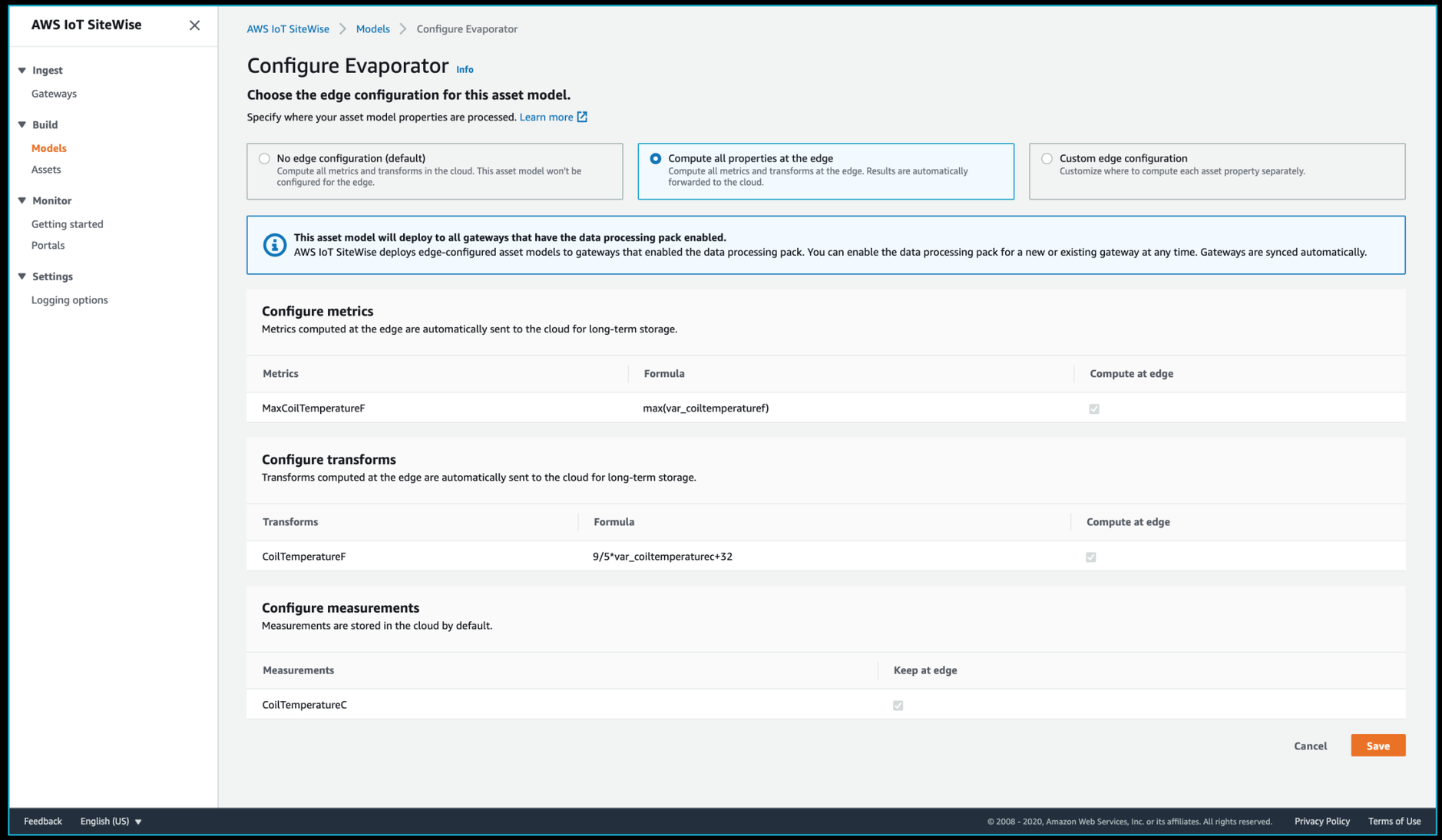
Data processing pack



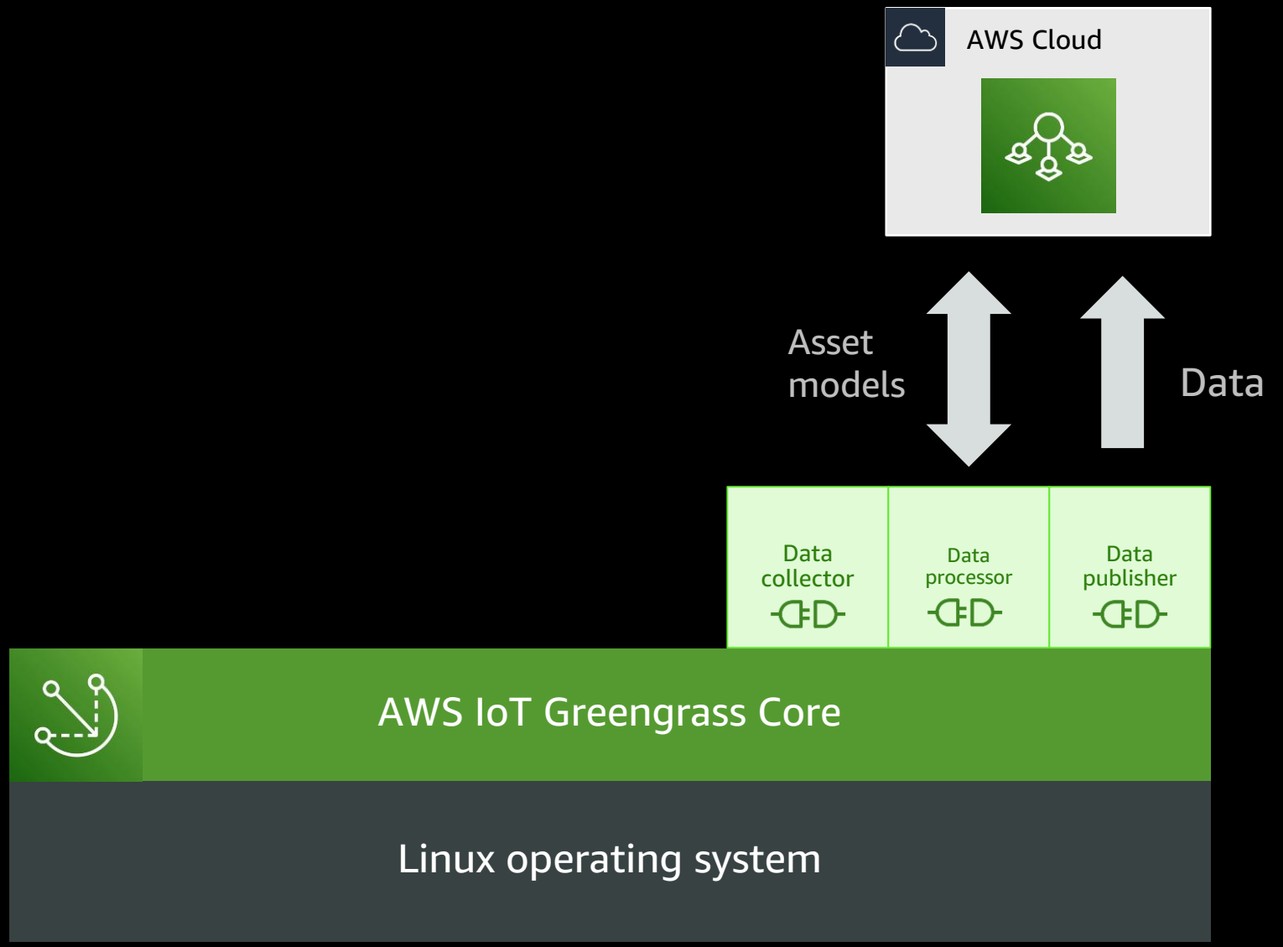
Pipeline formation



Configuring asset models for edge



Automated sync



Example: Weighing for quality



Example: Weighing for quality



Weighing scale

Load cell reading (mA)

Weight (g)
Load cell reading x Scaling factor

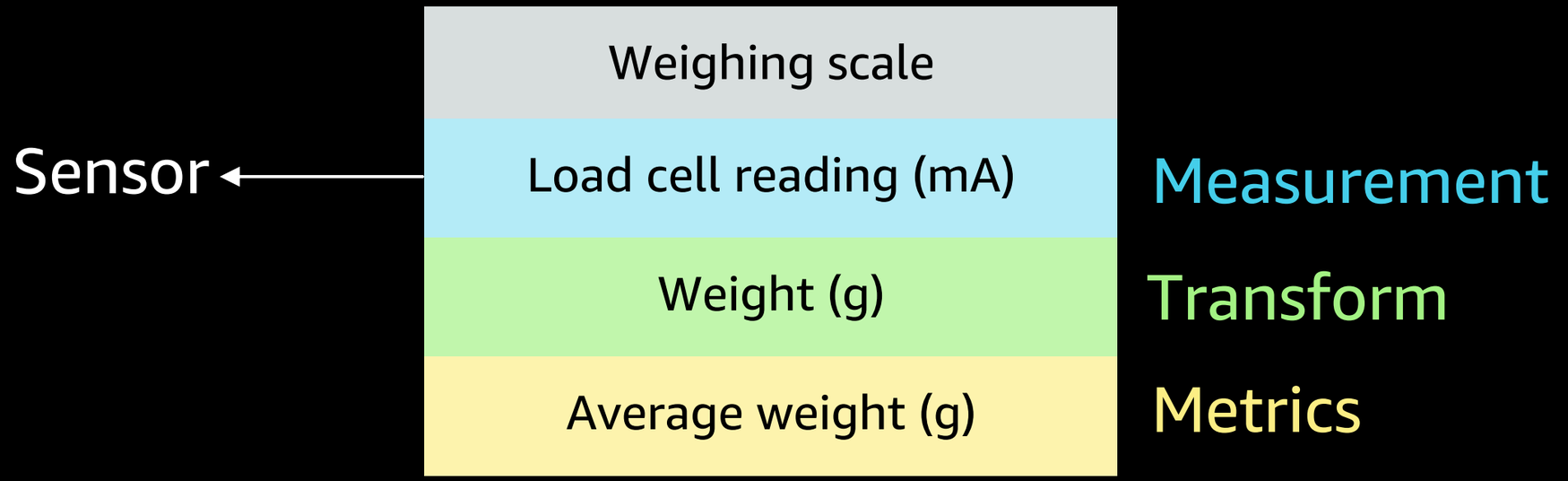
Average weight (g)

Measurement

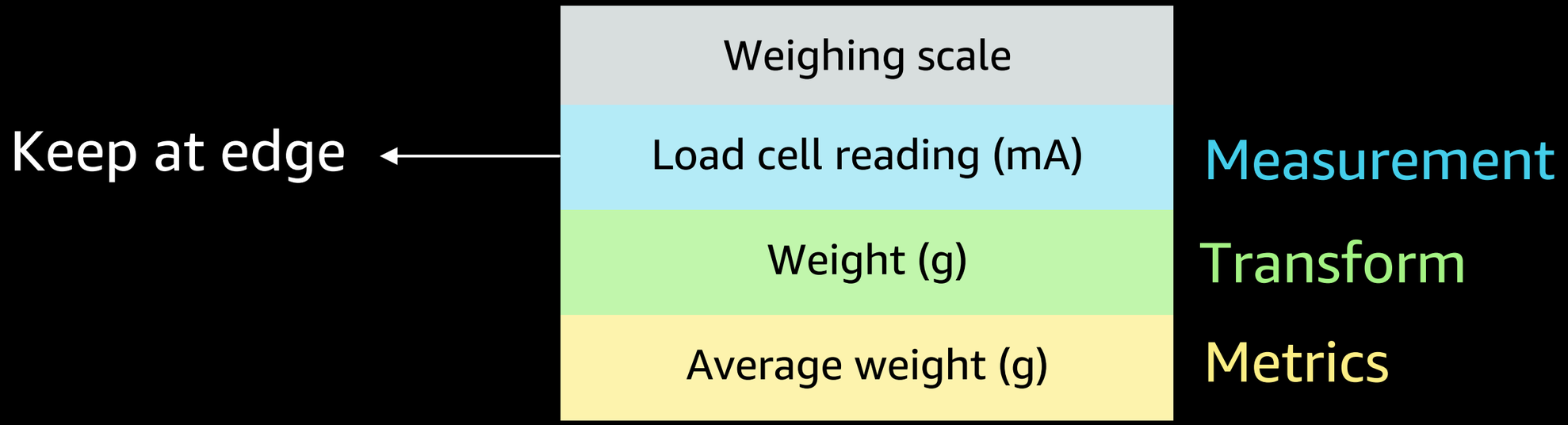
Transform

Metrics

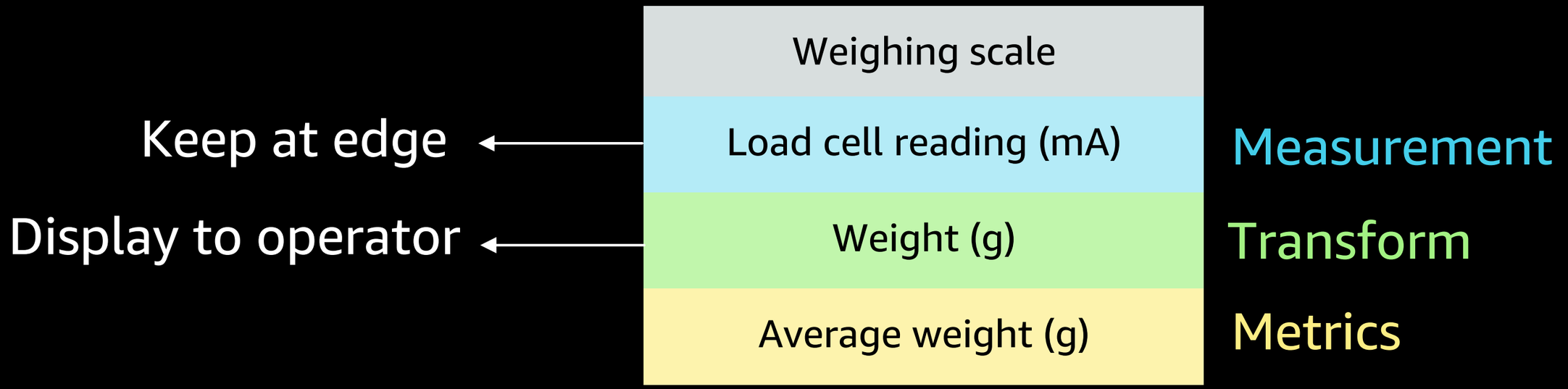
Example: Weighing for quality



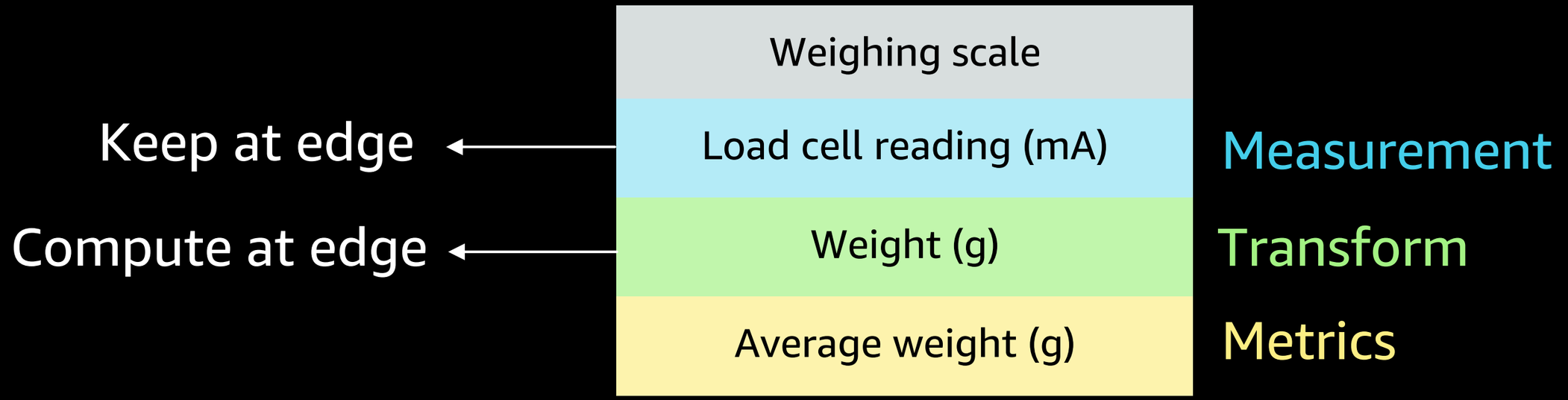
Example: Weighing for quality



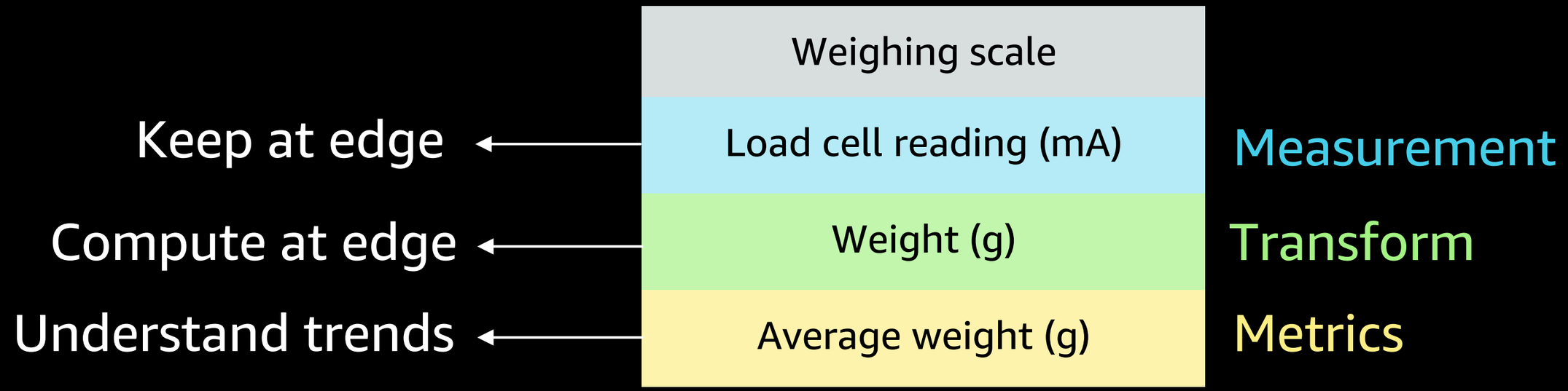
Example: Weighing for quality



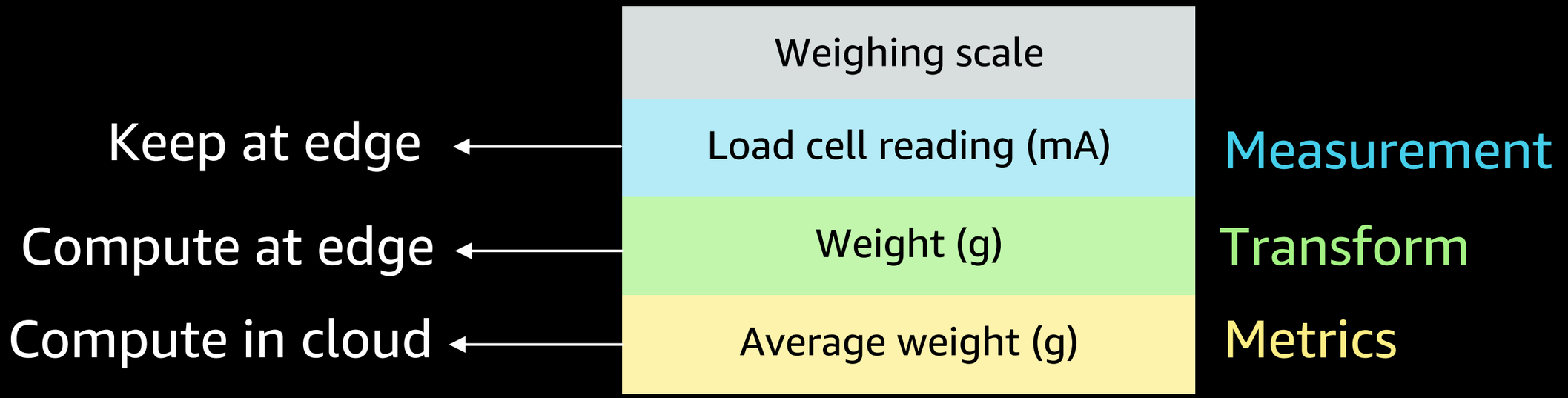
Example: Weighing for quality



Example: Weighing for quality

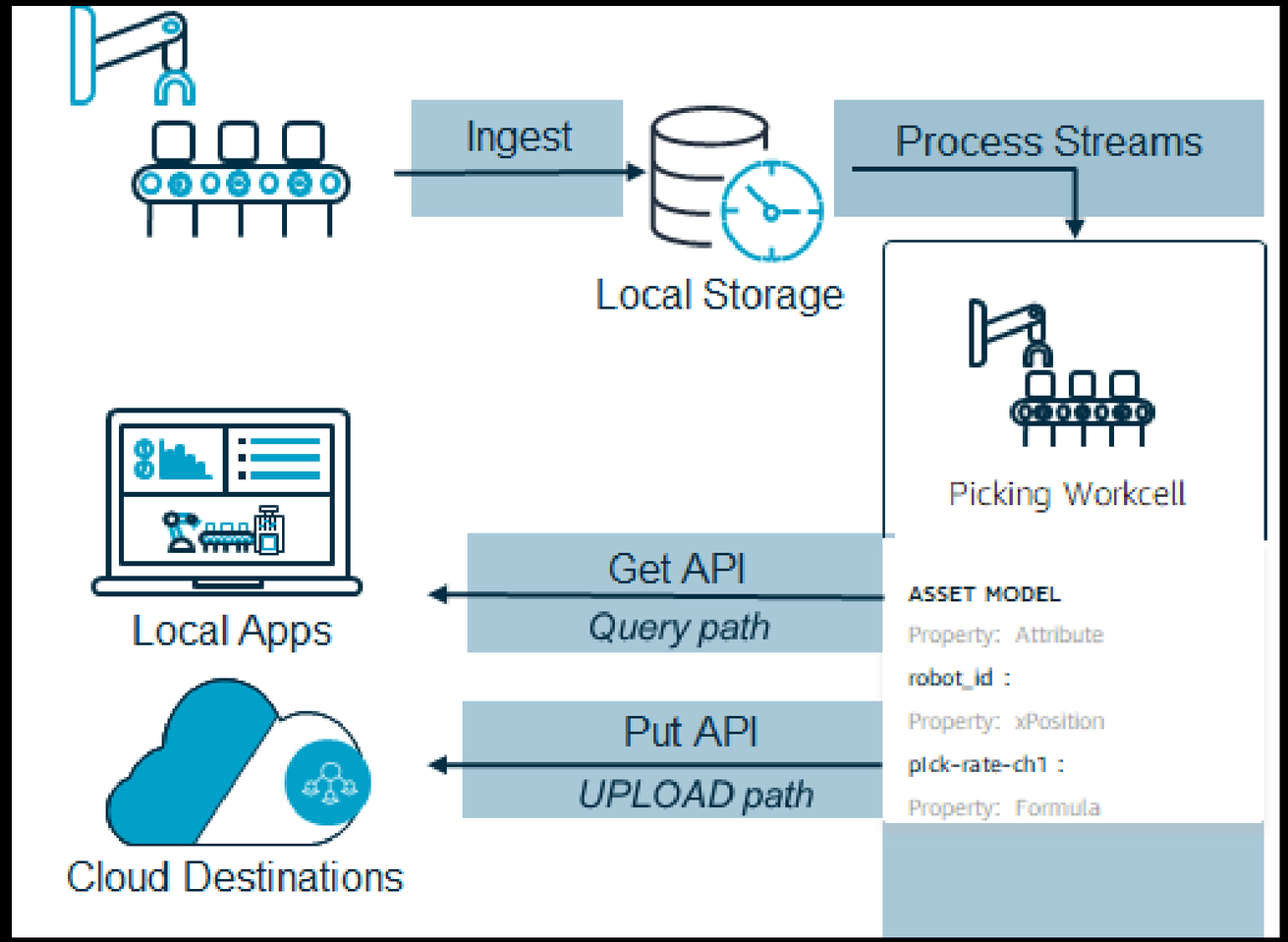


Example: Weighing for quality

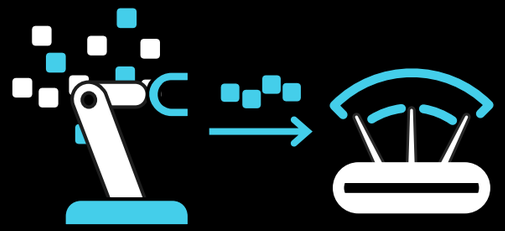


Edge stream processing

- Data streams normalized to a common format for optimal processing
- Data streams stored in a local time-series database
- Computations triggered on arrival
- AWS IoT Greengrass stream manager decouples services for performance
- AWS IoT Greengrass stream manager provided buffer for transmitting data to cloud without loss



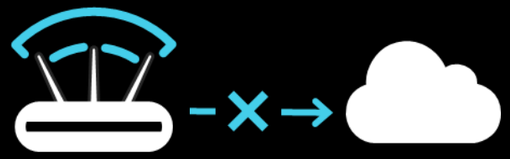
AWS IoT SiteWise Edge features



Collect and process data in gateway



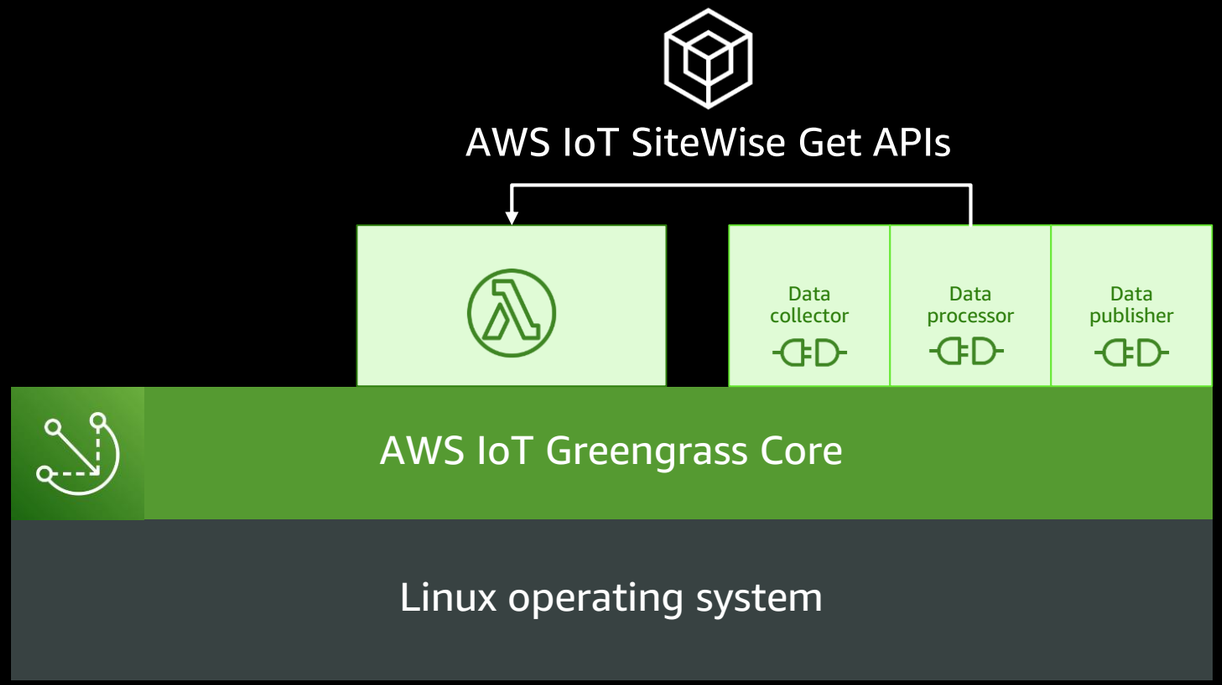
Monitor
- AWS IoT SiteWise Data Plane APIs
- AWS IoT SiteWise Monitor portals



Manage gateways locally

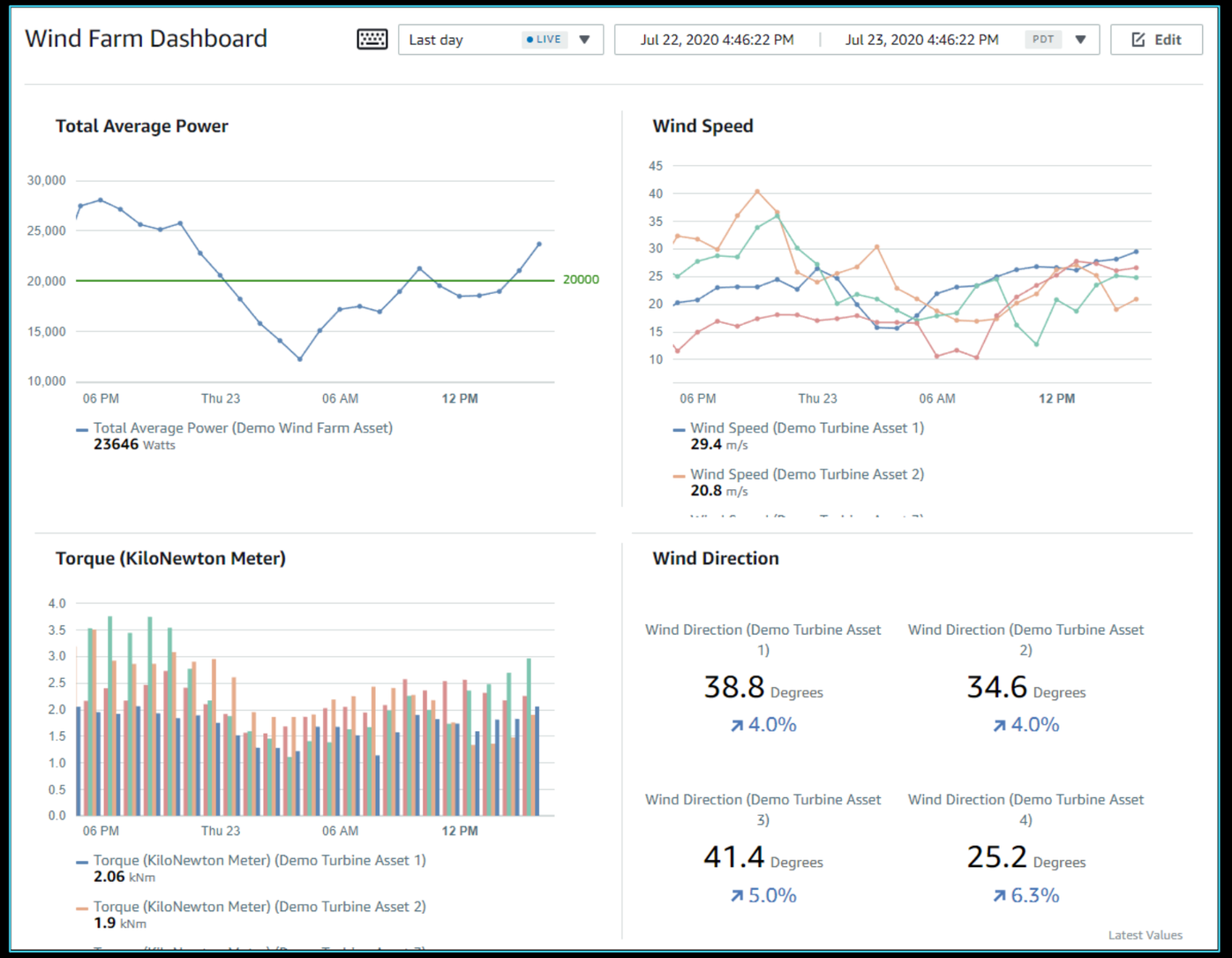
Option 1: Get data using AWS IoT SiteWise APIs

- Read-only AWS IoT SiteWise data plane APIs
  - GetAssets()
  - GetAssetProperty()
- APIs secured via SigV4 credentials

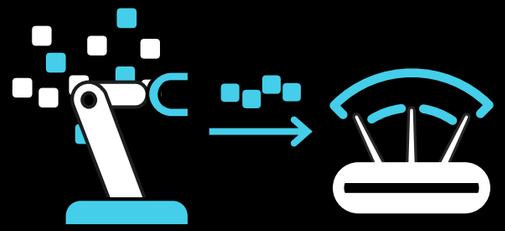


Option 2: Local AWS IoT SiteWise dashboards

- Create monitor dashboards for plant floor operators
- Dashboards can open a web browser over the local plant network; they are served through a server on the edge gateway
- Data access is secured through SigV4 password
- Dashboards are uninterrupted by intermittent internet connectivity



AWS IoT SiteWise Edge features



Collect and process data in gateway



Monitor locally

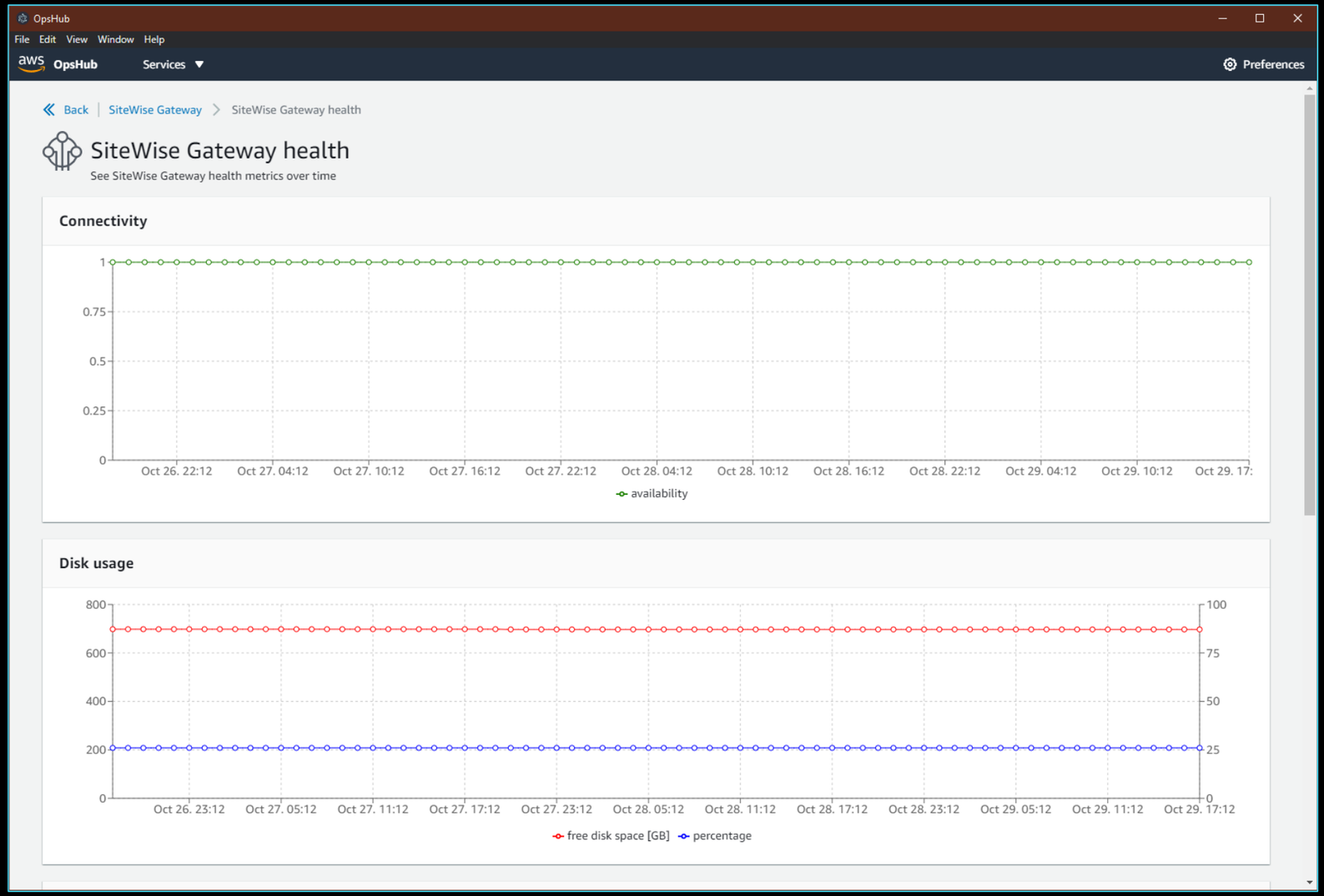


Manage gateways locally

OpsHub for AWS IoT SiteWise

Troubleshooting gateways on-premises

- Access edge resources (e.g., dashboards)
- View gateway device health metrics (e.g., connectivity, memory, CPU)
- View latest data ingested
- Restart software





Managing factory efficiency at scale

© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Rehrig Pacific Company
SINCE 1913



Product – Plastic products for waste management and supply chain

Process – Multiple discrete operations turn raw materials into finished good

Goal – Reduce build-up of inventory on-site arising from slowdown in process

Solution – Monitor workstation availability and quickly isolate root cause issues to prevent slowdowns

Constraint – Ensure solution is available regardless of connectivity to cloud

Rehrig Pacific Company
SINCE 1913



Local monitoring – Compute availability metrics for each station and visualize on a simple dashboard accessible across the factory

Root cause analysis – Isolate causes for issues indicated through metrics by inspecting equipment data

Asset management – Understand longer-term utilization trends for each asset across sites to plan forward

Recap and resources

- AWS IoT SiteWise Edge enables Industrial IoT on the factory floor
- Data processing at the edge for low-latency, critical workloads
- Use same asset models and APIs across cloud and edge
- Read our blog post at https://aws.amazon.com/blogs/iot/



© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Thank you!

Shyam Krishnamoorthy
General Manager
AWS IoT Device
Software
AWS

Usman Anwer
Principal Product
Manager AWS IoT
AWS

© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.



Please complete the session survey

AWS re:Invent

© 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.