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www.aka.ms/azure-meetups

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Windows Insider

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MVP Windows Plattform Development

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Azure IoT

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Technical Evangelist

Harnessing the IoT Revolution

What if I simply knew where my things were?

What if my things could tell me when they go someplace they shouldn't?

What if I could collect data which helps me improve my product?

It all starts with a great idea…

What if I knew when things were going to break before they did?

What insights could I find from comparing *all* of my things?

What if I could tell when it's the best time for my things to _____ ?

IoT technologies have reached an inflection point

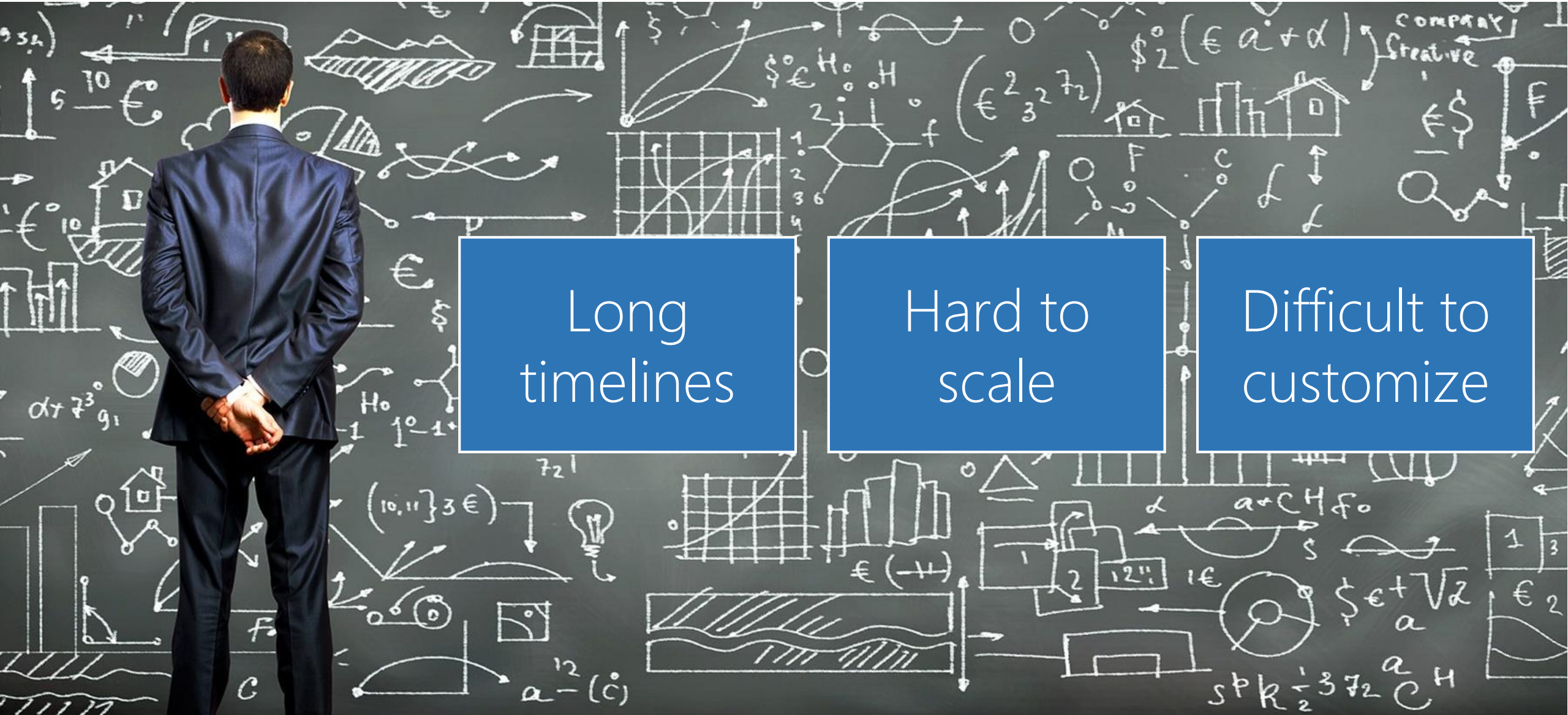
Hardware is cheap

Connectivity is pervasive

The state of the art is maturing

Analysis enables new businesses

However, IoT projects can be complex



Long timelines

Hard to scale

Difficult to customize

Key Learnings from Customers

- Azure is a scalable cost-effective platform for IoT solutions
- Organizations desire a default configuration of core services
- Architecture flexibility is required for:
  - Data ingress/egress options
  - Event processing and data flow customization
  - Analytics
  - Storage options
  - 3rd party integration

Reference Architecture Guiding Principles

Heterogeneity

Accommodates for a vast variety of scenarios, environments, devices, and processing patterns

Security

Considers security and privacy measures across all areas

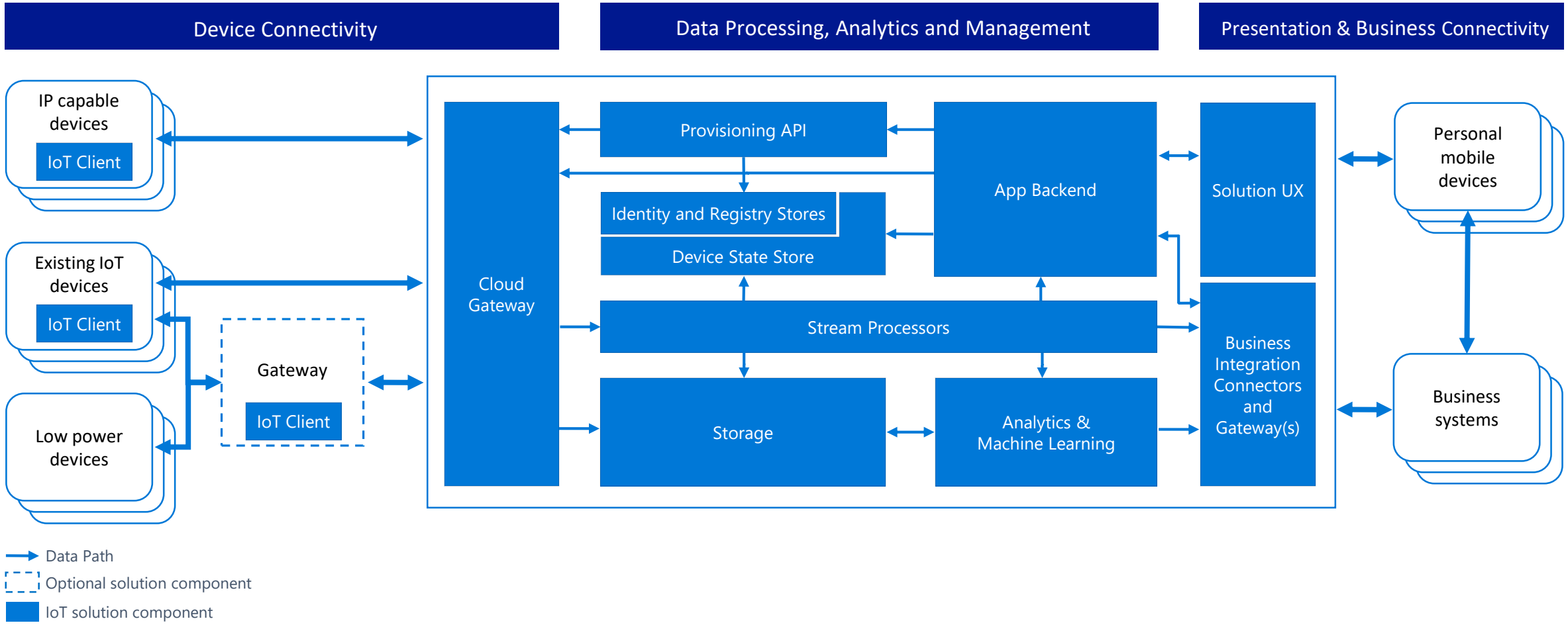
Hyper-scale deployments

Supports millions of connected devices

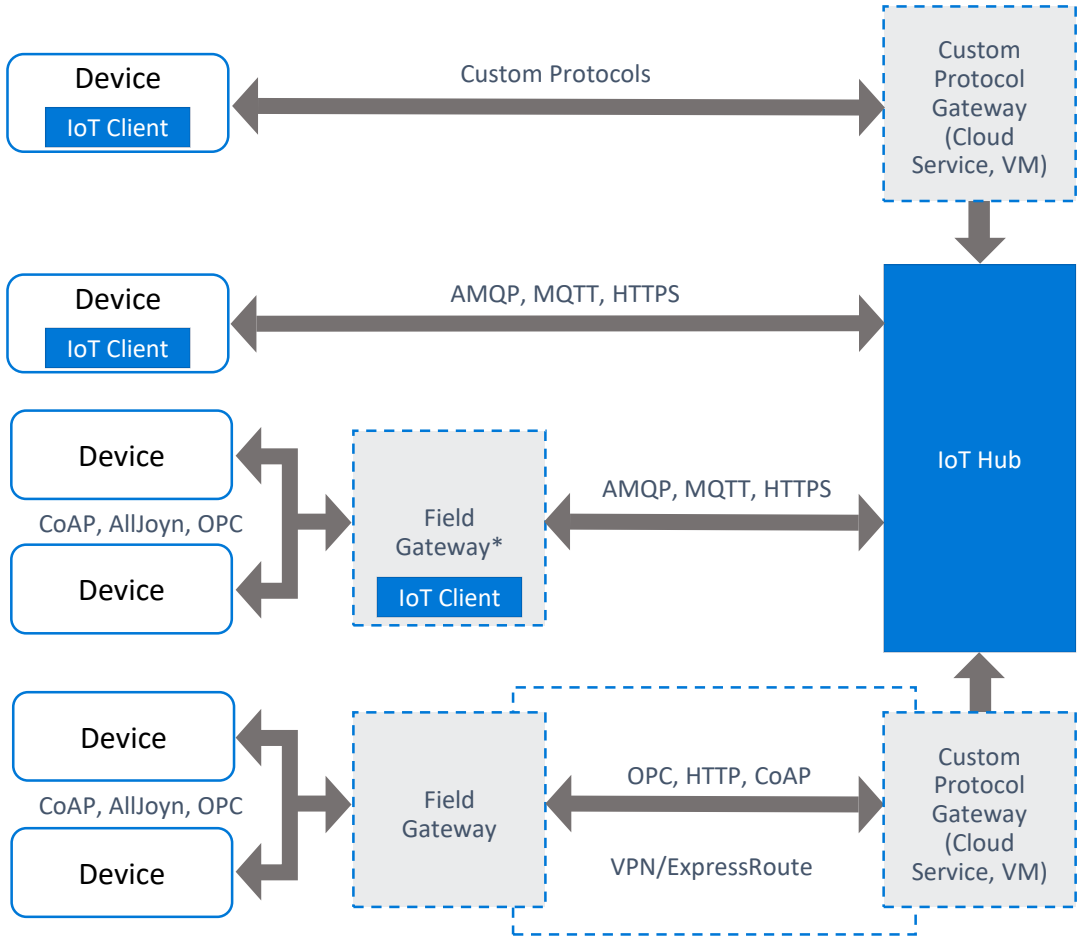
Flexibility

Allows for composability and extensibility to enable the usage of various first-party or third-party technologies

Azure IoT Reference Architecture



Device Connectivity



Data Path

Optional solution component

Azure IoT solution component

** Field Gateway is currently a concept that may represent Microsoft, 3rd party or custom capabilities at a hardware or software level*

Azure IoT SDKs

Device-facing

For devices and field gateway

Platforms

- RTOS (FreeRTOS)
- Linux
  (Ubuntu, Debian, Fedora, Raspbian, Angstrom)
- Windows 7/8/10 (.NET / PCL / WinRT)
- ARM mbed
- Android
- iOS

Languages

- C, Java, C#, Javascript, Python

Service-facing

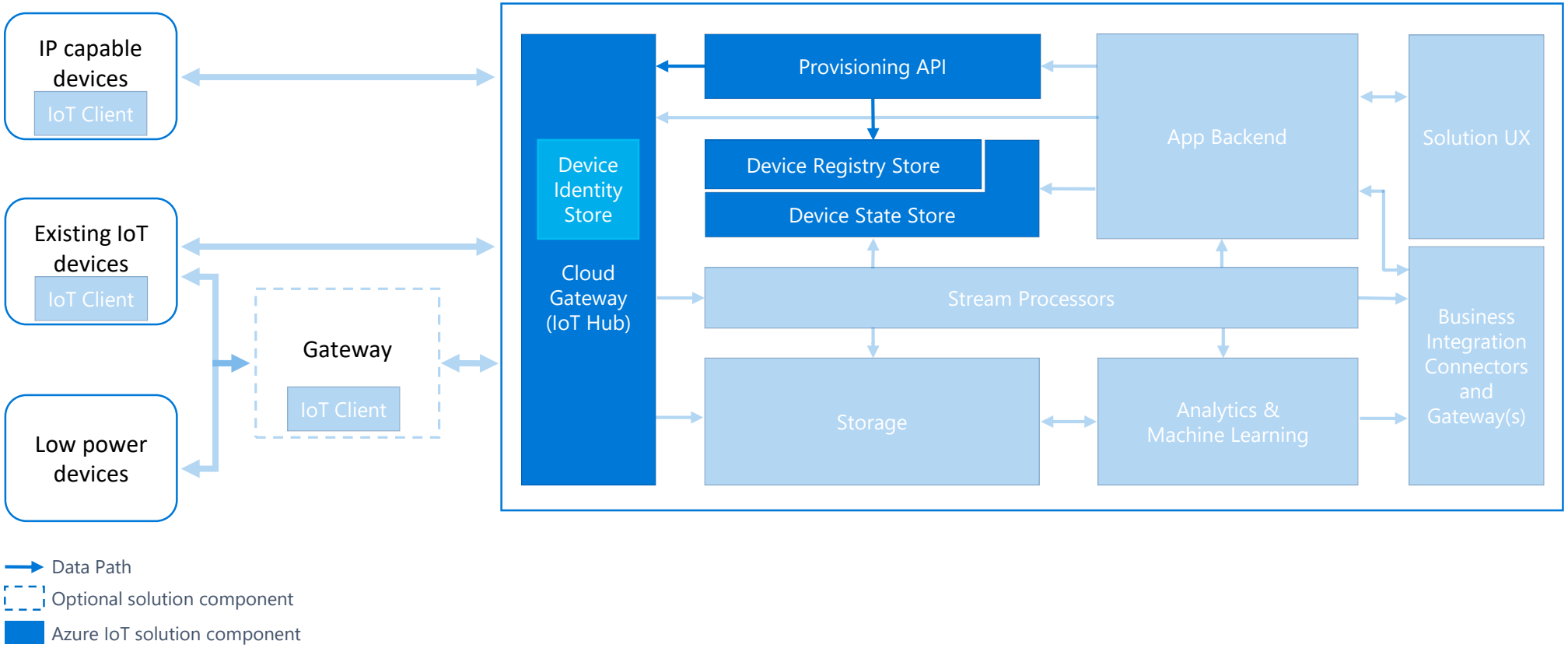
For back-ends and cloud gateway

Languages

- .NET C#
- Java
- Node

https://github.com/Azure/azure-iot-sdks
https://github.com/Azure/azure-iot-gateway-sdk

Device Stores



Device Identity, Registry and State Stores

Identity Store

Authority for all registered devices

Stores identity information and authentication secrets

Registry Store

Index database in addition to the identity store

Contains discovery and reference data related to devices

Can define a schema model or use a vertical industry standard schema for metadata

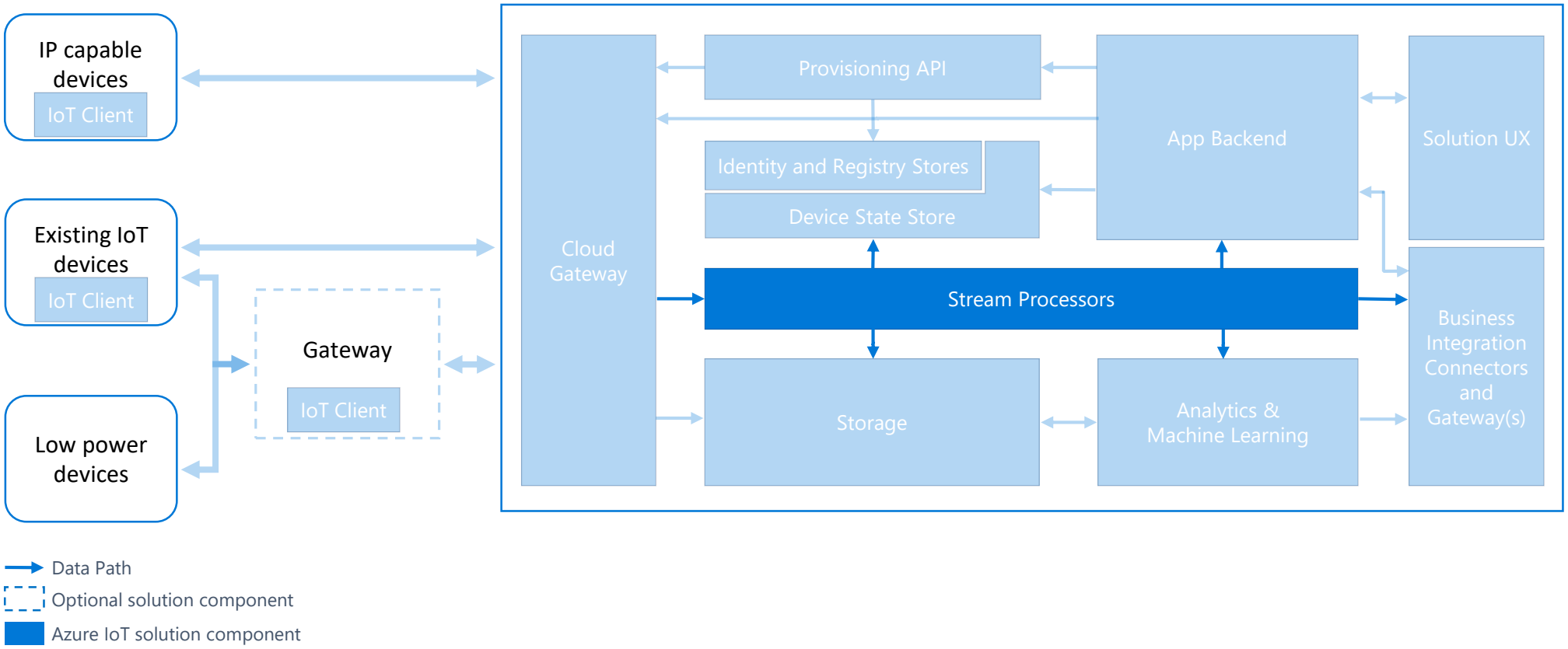
Can store structured metadata and links to externally stored operational data

Device State Store

Contains all operational data related to the devices:

- "Last known values" for each device
- Aggregated or computed values
- Stream of device data events

Stream Processors



Stream Processing: Data Flow

After ingress through the Cloud Gateway, the flow of data through the system is facilitated by data pumps and analytics tasks

Data flow can be driven by:

- Azure Stream Analytics
- Azure HDInsight Storm
- Spark
- Custom Event Processors

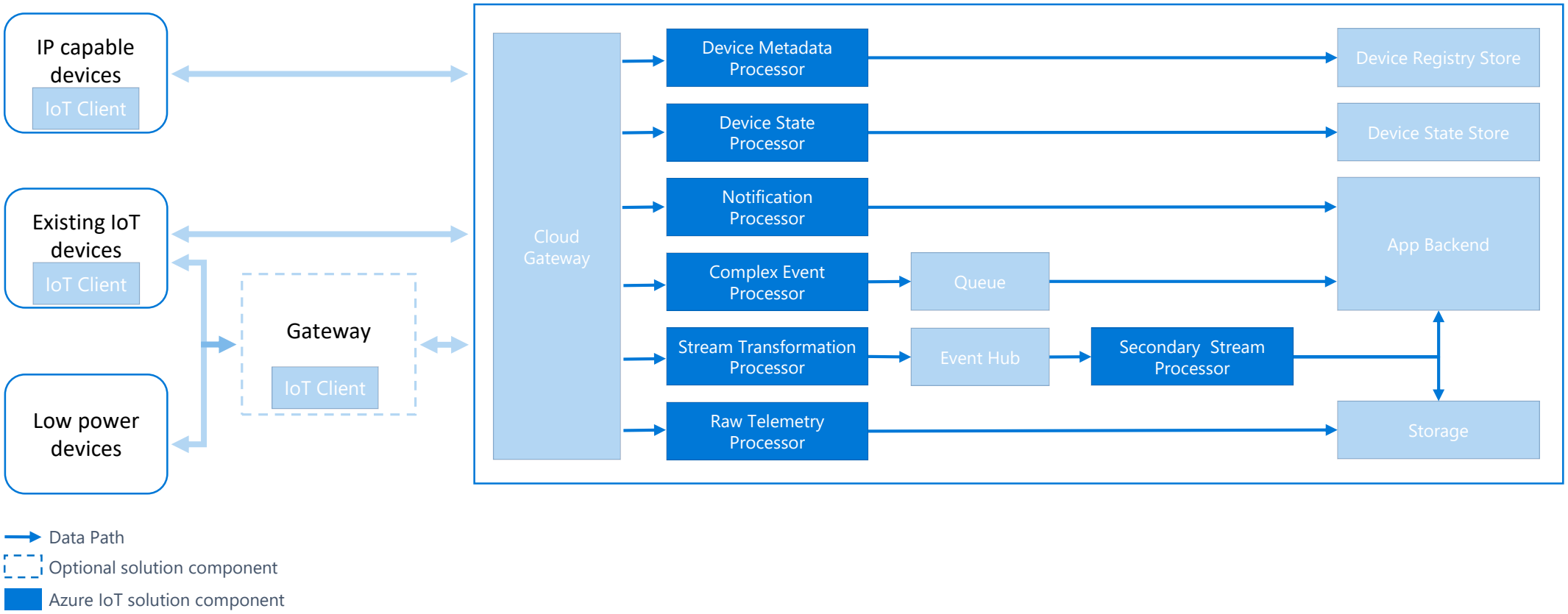
Each can perform tasks in flight:

- Data aggregation
- Data enrichment
- Complex event processing

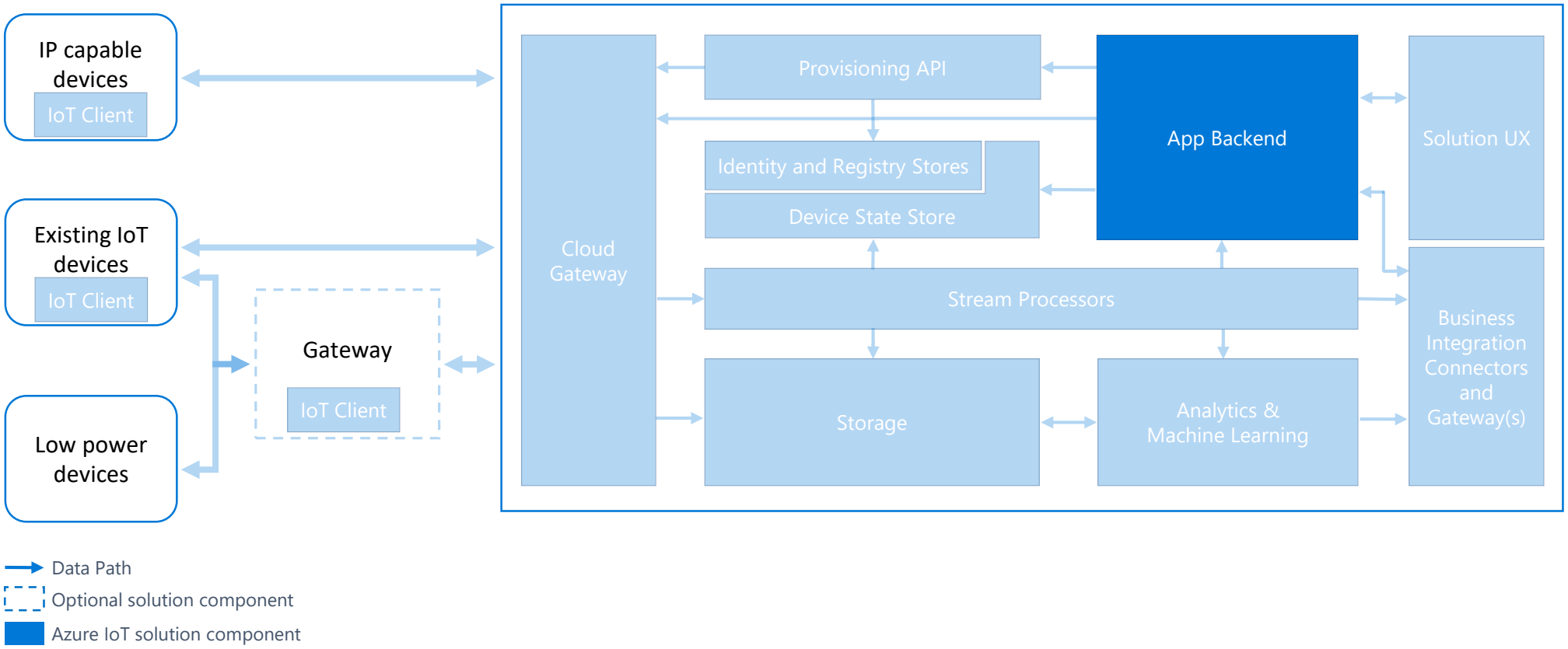
… and can output data to:

- Azure Data Lake
- Azure Blobs/Tables
- HDInsight / Hbase
- Azure SQL DB
- Time Series Databases
- Event Hub
- Service Bus Queues

Stream Processors Examples



App Backend


IP capable devices
IoT Client
Existing IoT devices
IoT Client
Low power devices
Gateway
IoT Client
Cloud Gateway
Provisioning API
Identity and Registry Stores
Device State Store
App Backend
Solution UX
Stream Processors
Storage
Analytics & Machine Learning
Business Integration Connectors and Gateway(s)
Data Path
Optional solution component
Azure IoT solution component

High-Scale Compute Models

Scale-appropriate compute models

Actor Frameworks / Service Fabric Reliable Actors:

- Distributed compute fabric hosting device (or device-group) actors
- Message-based activation of actors and dispatch of messages

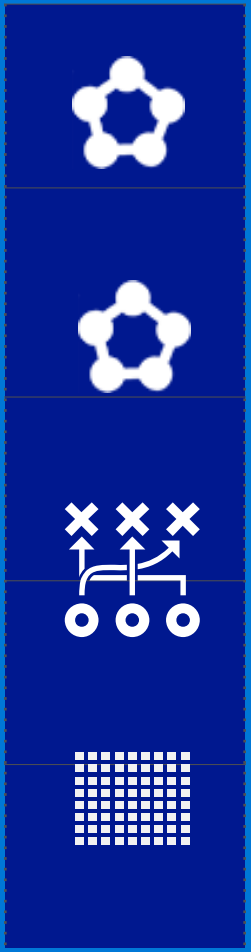
Service Fabric Reliable Collections:

- Highly available with replicated and local state management

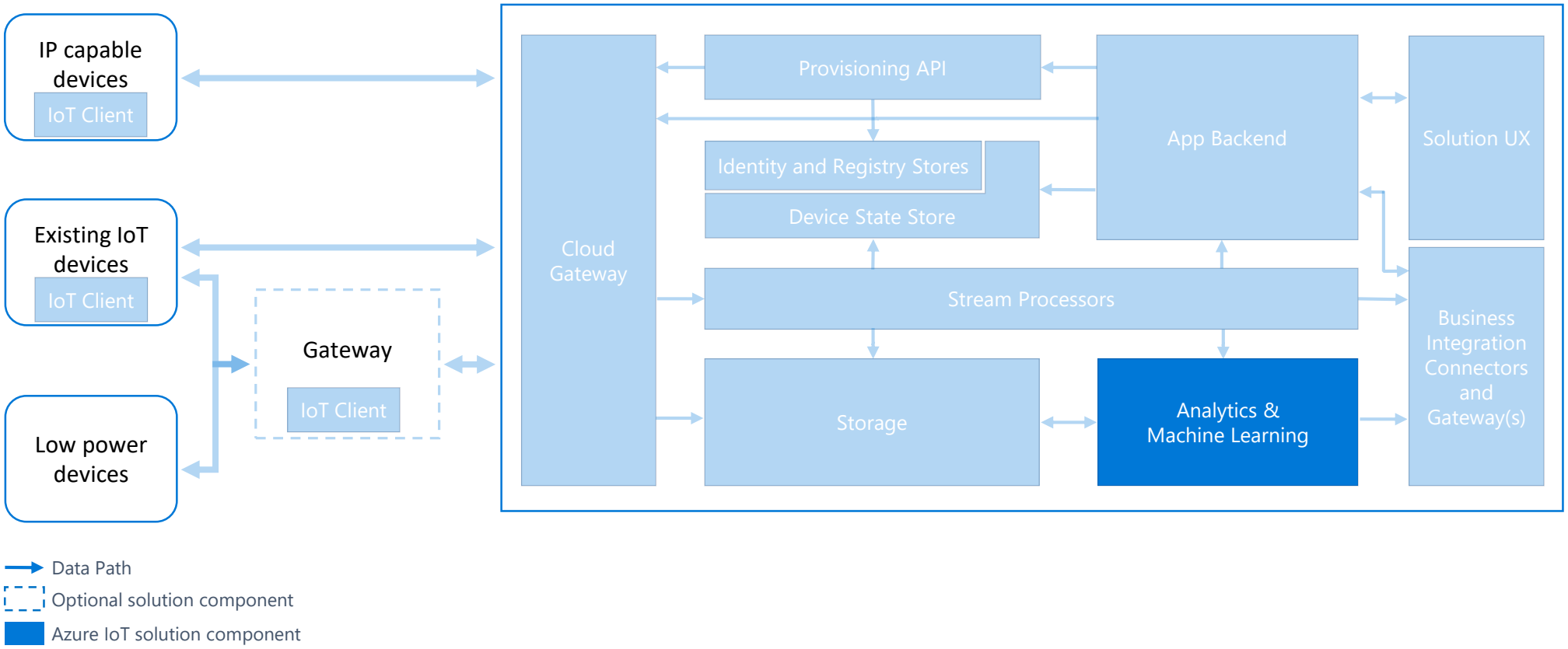
Azure Batch

- Job scheduling and compute management for highly parallelizable compute workloads

Simple programming experience in vastly scalable compute nodes



Analytics & ML



Data Analytics

Real-Time Analysis

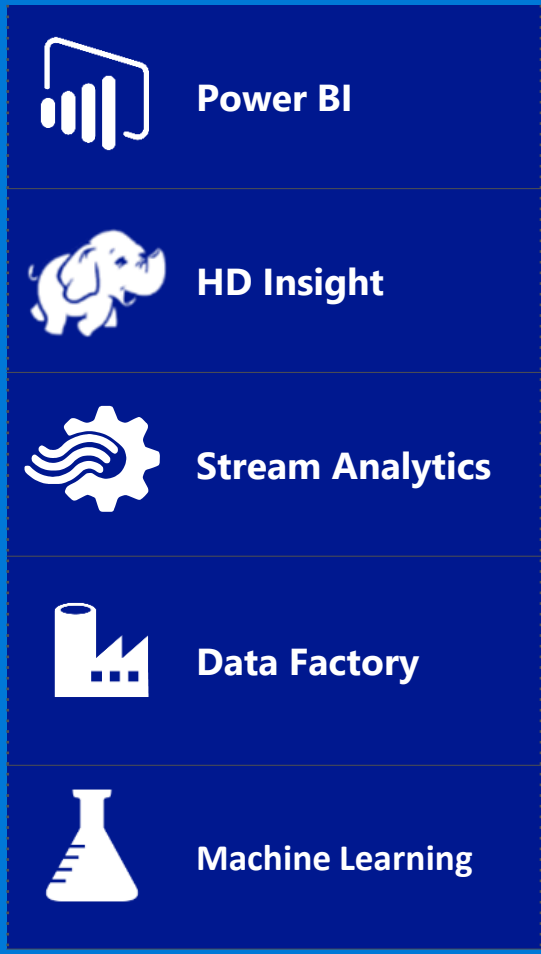
Aggregation/Reduction, Temporal Queries
State Correlation, Threshold Detection, Alerting

Data-At-Rest Analysis

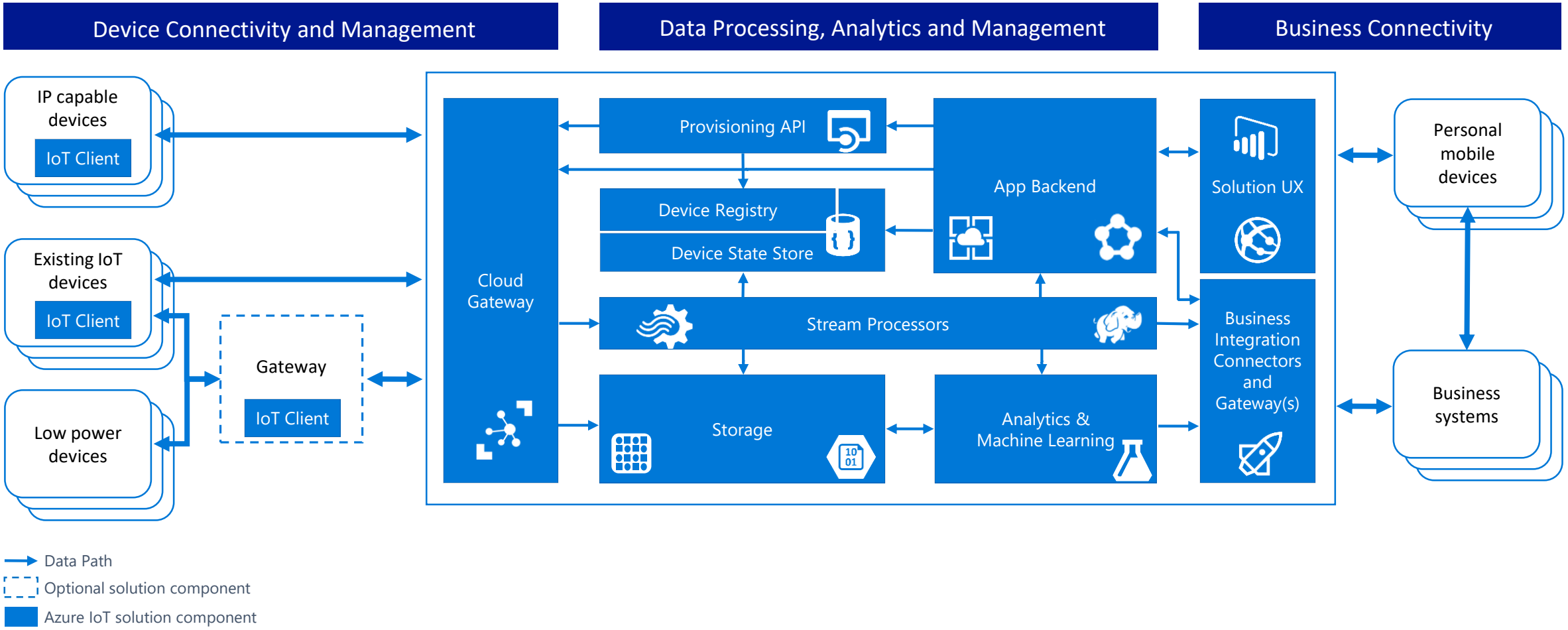
Time-Series, Map/Reduce, Correlation

Machine Learning

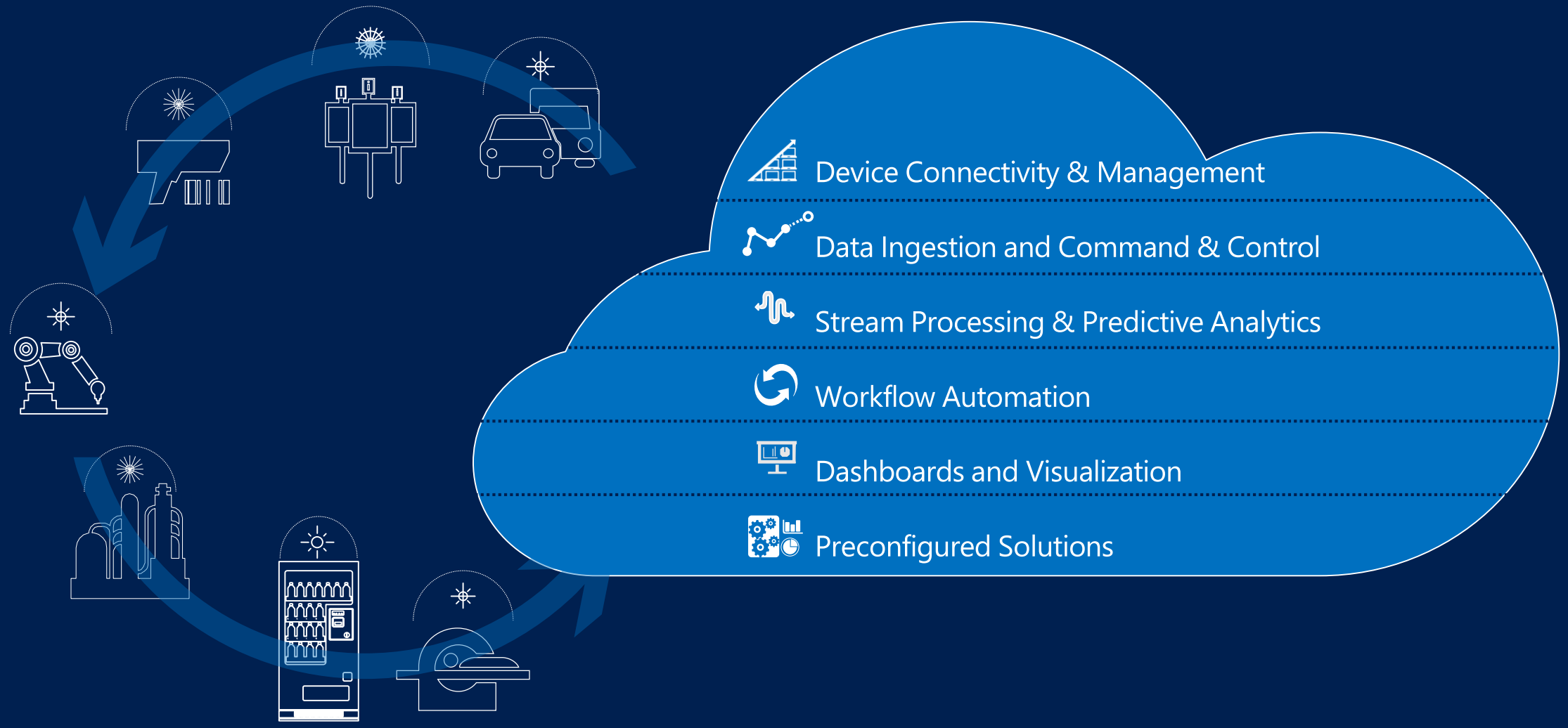
Pattern Detection, Behavior Prediction
Plausibility Analysis, Anomaly and Fraud Detection



Azure Services

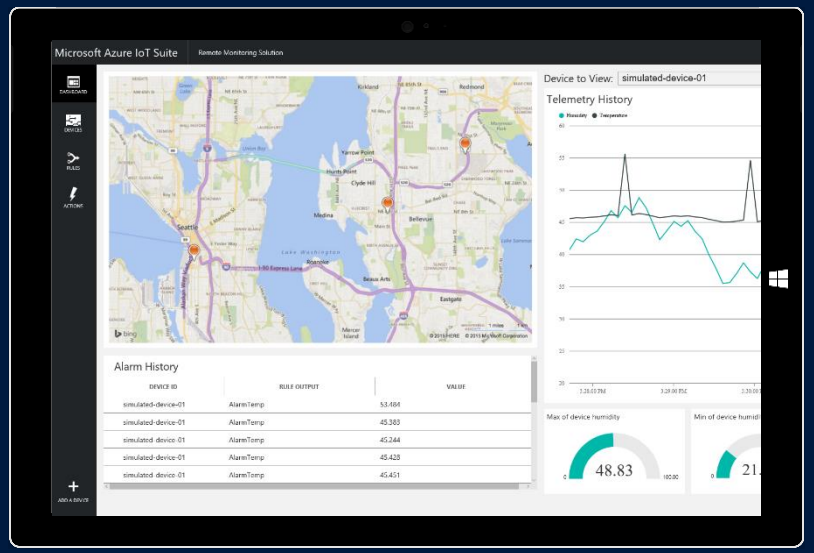


Azure IoT Suite



Accelerate time to value with preconfigured solutions

Start quickly with preconfigured solutions



- Get started in minutes
- Modify existing rules and alerts
- Add your devices and begin tailor to your needs

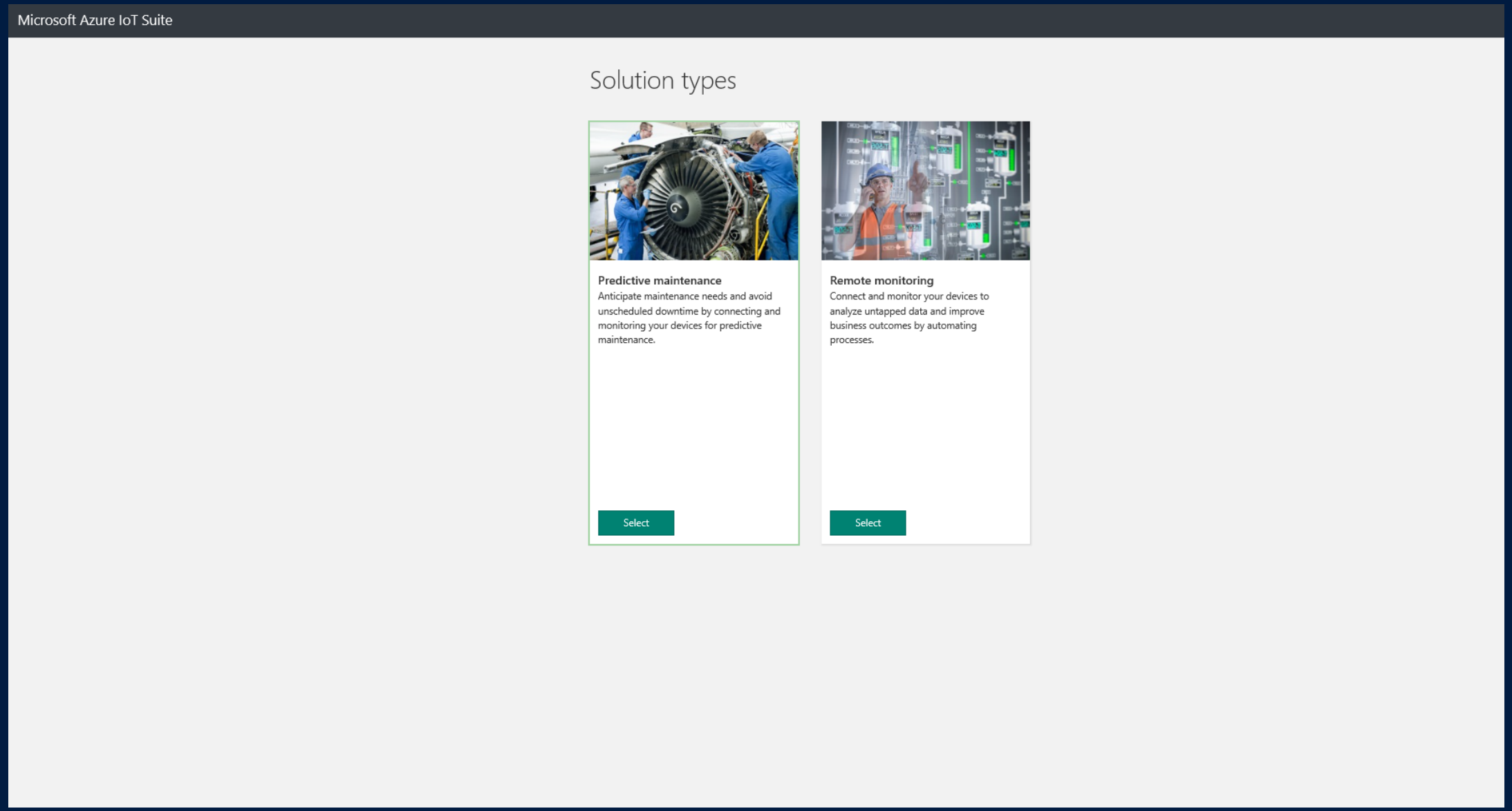
Finish with your Internet of Things application

- Fine-tuned to specific assets and processes
- Highly visual for your real-time operational data
- Integrate with back-end systems

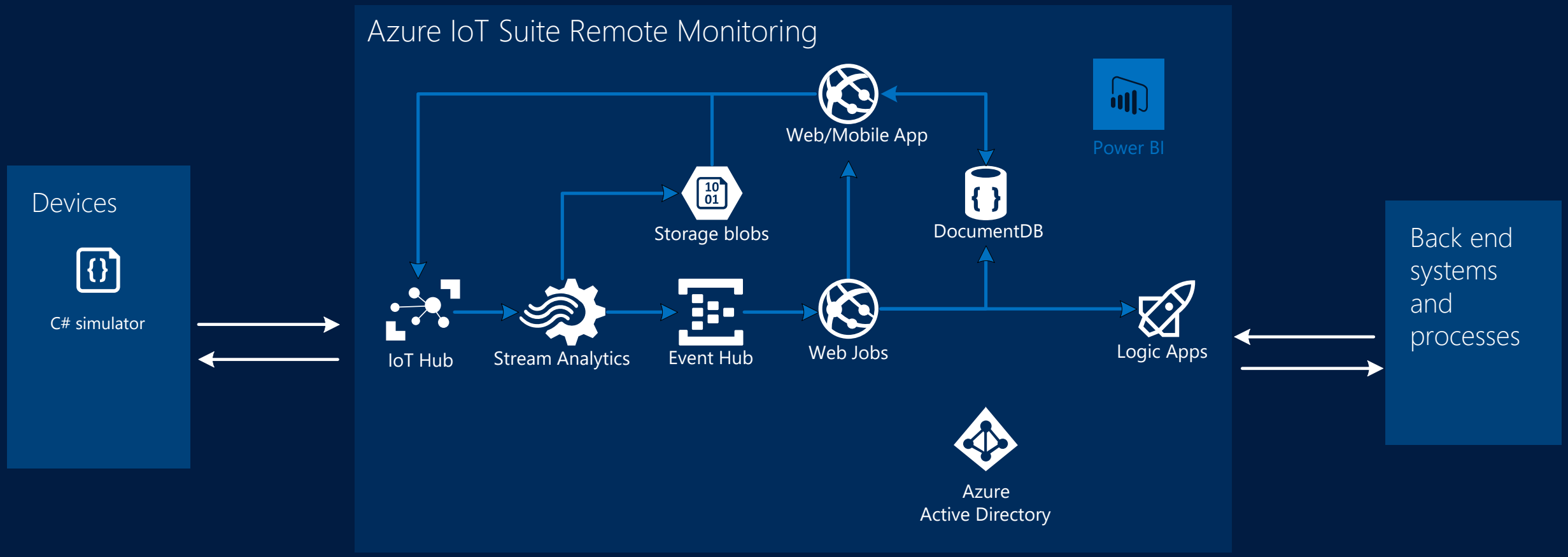
Demo

https://www.azureiotsuite.com/

https://www.azureiotsuite.com/



What you get with remote monitoring preconfigured solution



Microsoft Azure | All resources

Search resources

DEFAULT DIRECTORY

New

Resource groups

All resources

Recent

Web Apps

SQL databases

Virtual machines (classic)

Virtual machines

Cloud services

Subscriptions

Browse

All resources

Add | Columns | Refresh

Filter items ...

NAME	RESOURCE GROUP	LOCATION	SUBSCRIPTION
SolutionRM	SolutionRM	East US	Visual Studio Enterprise wi...
SolutionRM	SolutionRM	East US	Visual Studio Enterprise wi...
SolutionRM-DeviceInfo	SolutionRM	East US	Visual Studio Enterprise wi...
solutionrm-iotsuite	SolutionRM	East US	Visual Studio Enterprise wi...
SolutionRM-map	SolutionRM	West US	Visual Studio Enterprise wi...
SolutionRM-plan	SolutionRM	East US	Visual Studio Enterprise wi...
SolutionRM-Rules	SolutionRM	East US	Visual Studio Enterprise wi...
solutionrmstore	SolutionRM	East US	Visual Studio Enterprise wi...
SolutionRM-Telemetry	SolutionRM	East US	Visual Studio Enterprise wi...

Microsoft Azure IoT Suite ⓘ RMsolution

ADMINISTRATOR Sign Out

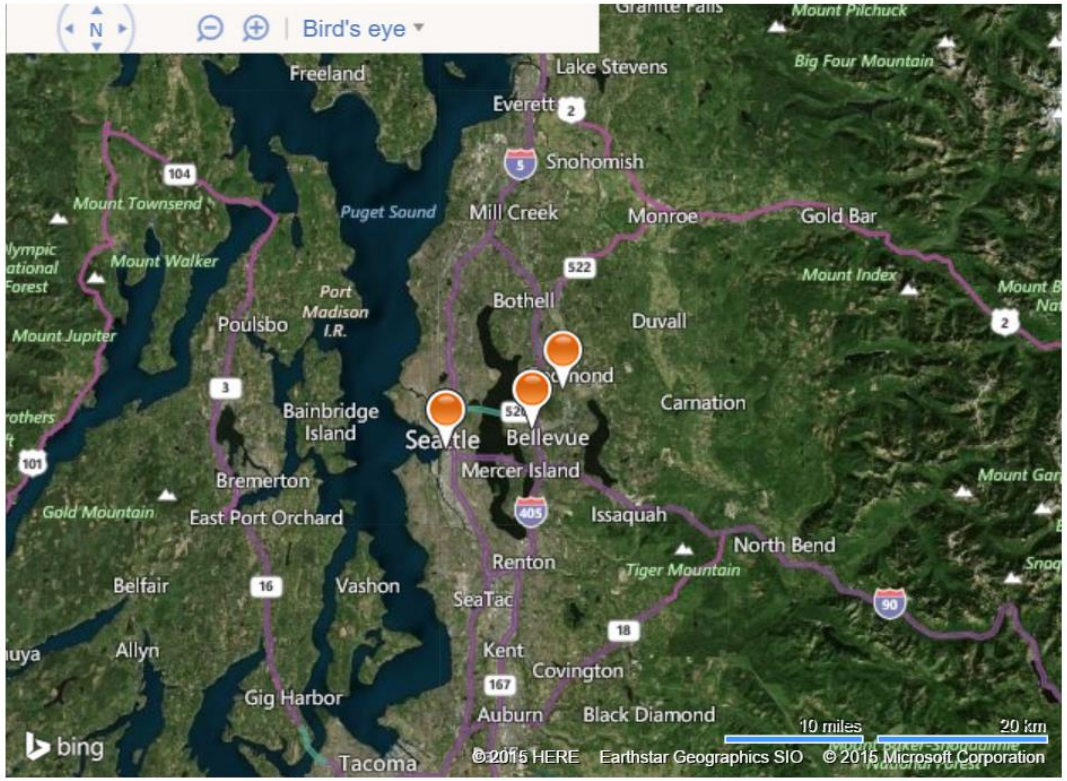
DASHBOARD

DEVICES

RULES

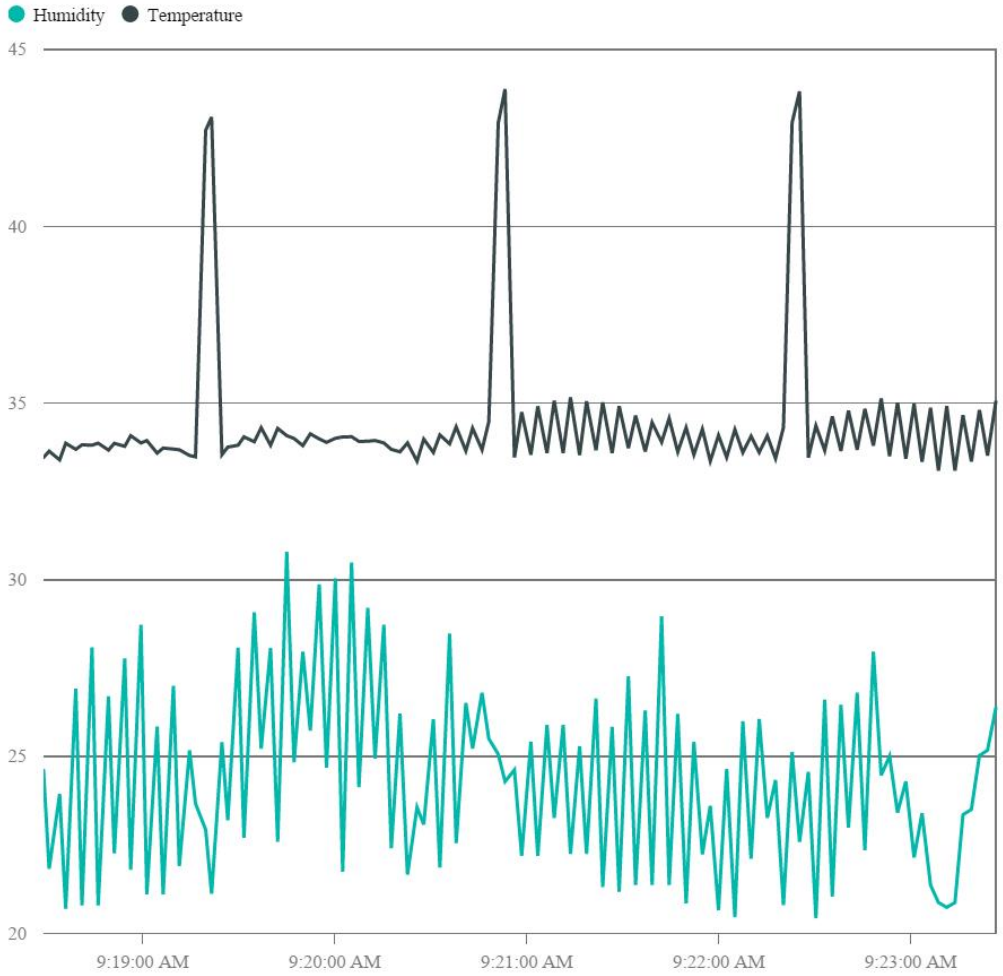
ACTIONS

ADD A DEVICE



Device to View: SampleDevice001_363

Telemetry History



Alarm History

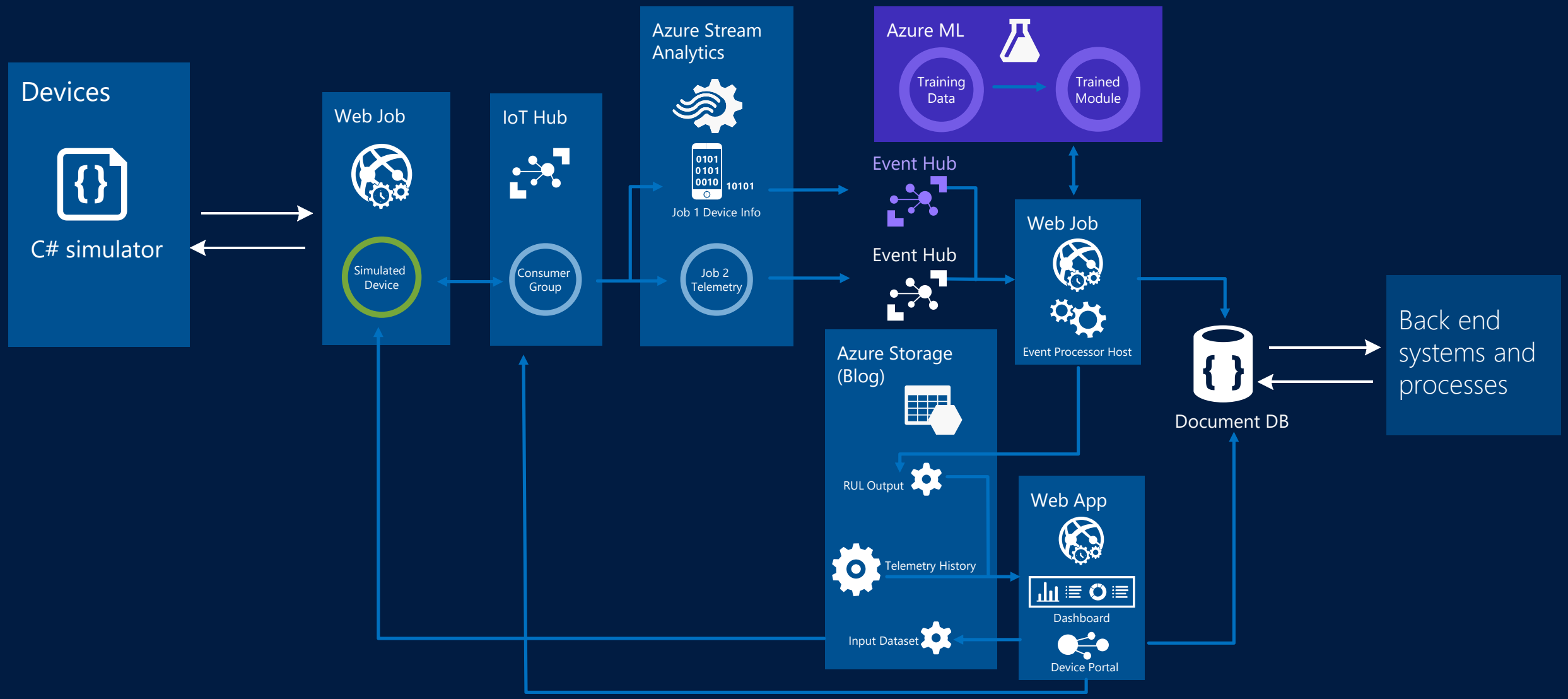
TIME	DEVICE ID	RULE OUTPUT	VALUE
09/29/2015 9:22:25 AM	SampleDevice001_363	AlarmTemp	43.817
09/29/2015 9:22:25 AM	SampleDevice001_363	AlarmHumidity	22.588
09/29/2015 9:22:23 AM	SampleDevice001_363	AlarmTemp	42.933
09/29/2015 9:22:23 AM	SampleDevice001_363	AlarmHumidity	25.135

Max of device humidity

Min of device humidity

Average of device humidity

What you get with predictive maintenance solution

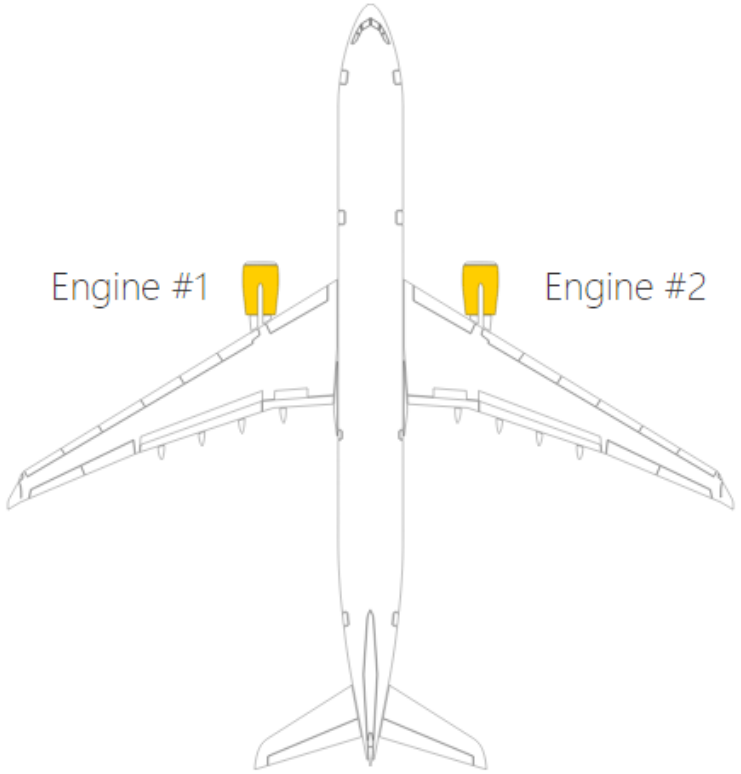


Microsoft Azure IoT Suite

DASHBOARD

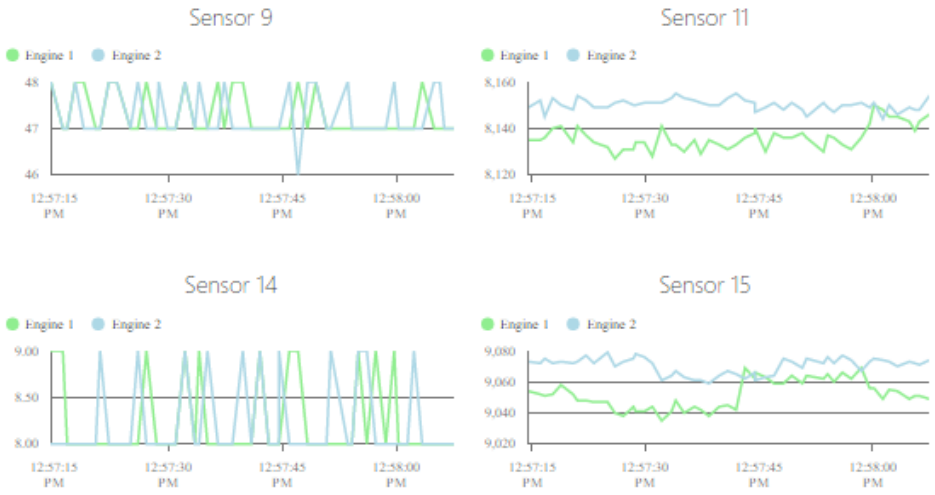
Aircraft map

Simulation in progress



Stop simulation

Sensor history



Remaining Useful Life (RUL)

IN DAYS

159 ⚠ ENGINE #1

139 ⚠ ENGINE #2

Cycles

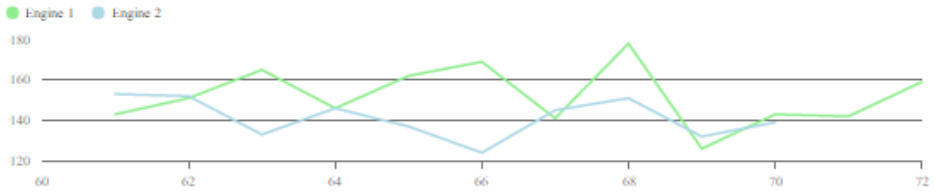
#

72 ENGINE #1

73 ENGINE #2

Remaining Useful Life (RUL) history

IN DAYS



Why security matters: October 21st 2016

Mirai

620 Gbps DDos attack gainst Dyn-DNS

GitHub, Twitter, Reddit, Netflix, Airbnb unreachable

Q & A

Feedback

Azure IoT Development and Azure IoT Security

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