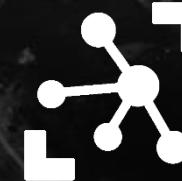




AZURE IOT CENTRAL



The industry's most comprehensive portfolio

Solutions (SaaS)

Azure IoT Central

Microsoft Dynamics
Connected Field Service

Accelerators (PaaS)

Azure IoT Solution Accelerators (PaaS)

Preconfigured solutions for common IoT scenarios

Technologies & Services (PaaS)

Device support

Azure IoT
Device SDK

Azure IoT
certified devices

Security Program for
Azure IoT

Windows 10 IoT

Platform & Edge

Azure IoT Hub

IoT Hub Device
Provisioning Service

Azure Sphere

Azure IoT Edge

Data and Analytics

Azure Stream
Analytics

Azure Time Series
Insights

Azure Machine Learning

Cosmos DB

Azure HD Insight

Azure Data Lake
Analytics

Azure Data Lake

Azure Maps

Visualization and Integration

Microsoft Flow

Azure Logic Apps

Notification Hubs

Azure Websites

Azure Active
Directory

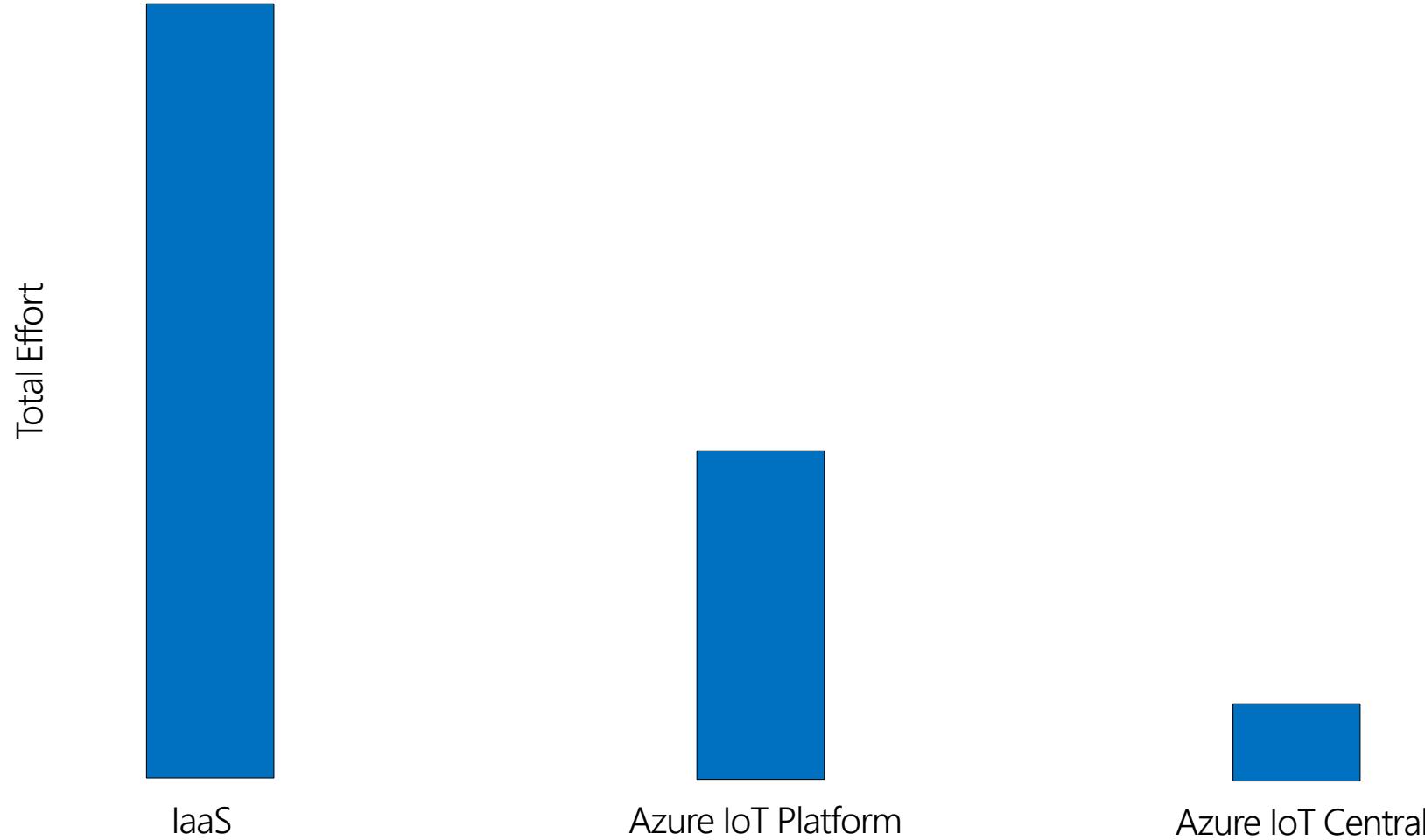
Microsoft Power BI

Azure Monitor

Azure Application
Insights

Accelerating IoT

The total effort to build and operate an IoT Solution is rapidly decreasing



What is Azure IoT Central?



Azure IoT Central



Fully hosted and managed by Microsoft



No cloud development expertise required



Device connectivity and management



Monitoring rules and triggered actions



User roles and permissions

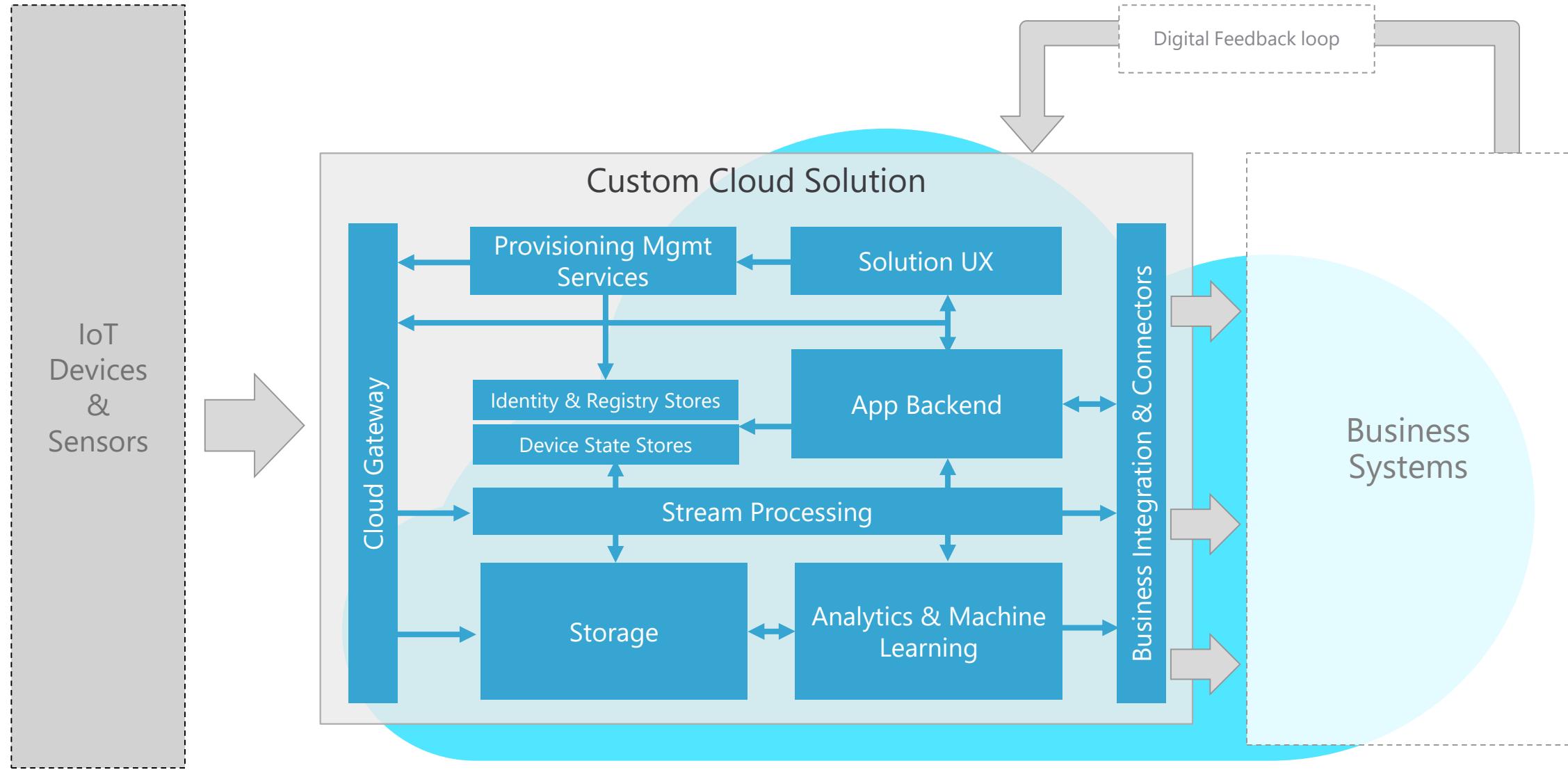


Analytics, dashboards and visualization

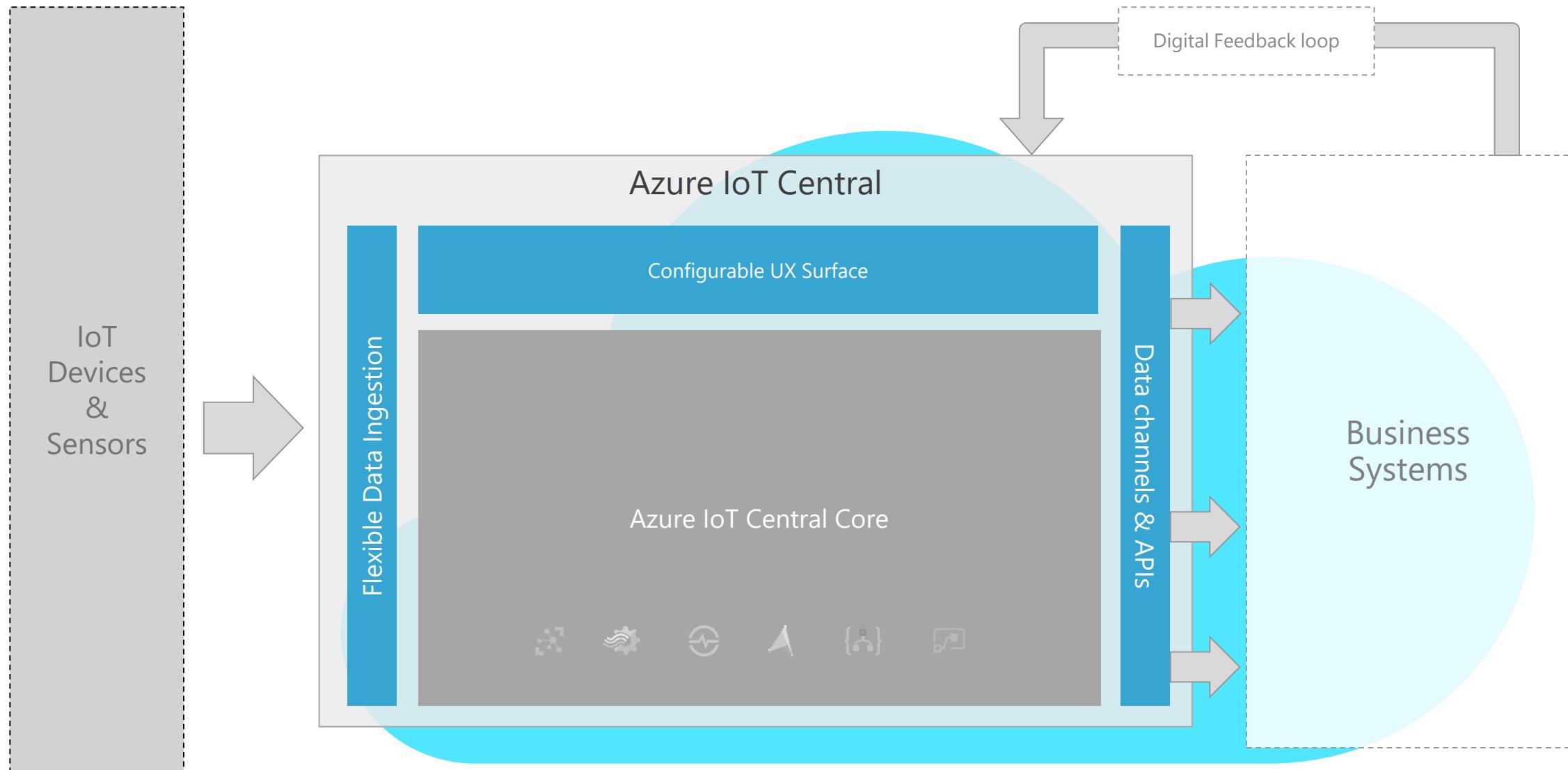


Risk-free trial with simplified pricing

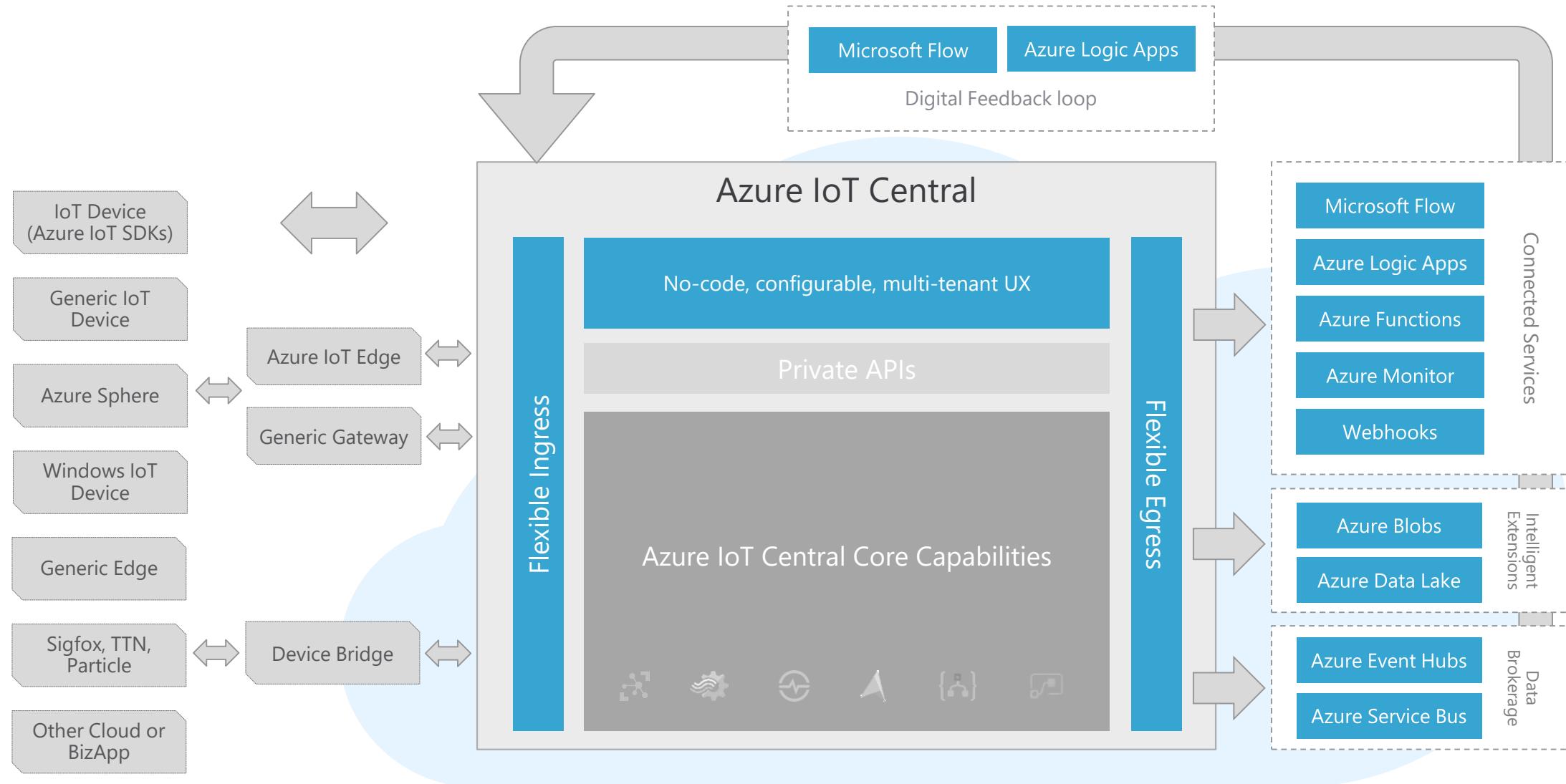
SOLUTION ARCHITECTURE - DIY



SOLUTION ARCHITECTURE – IOT CENTRAL



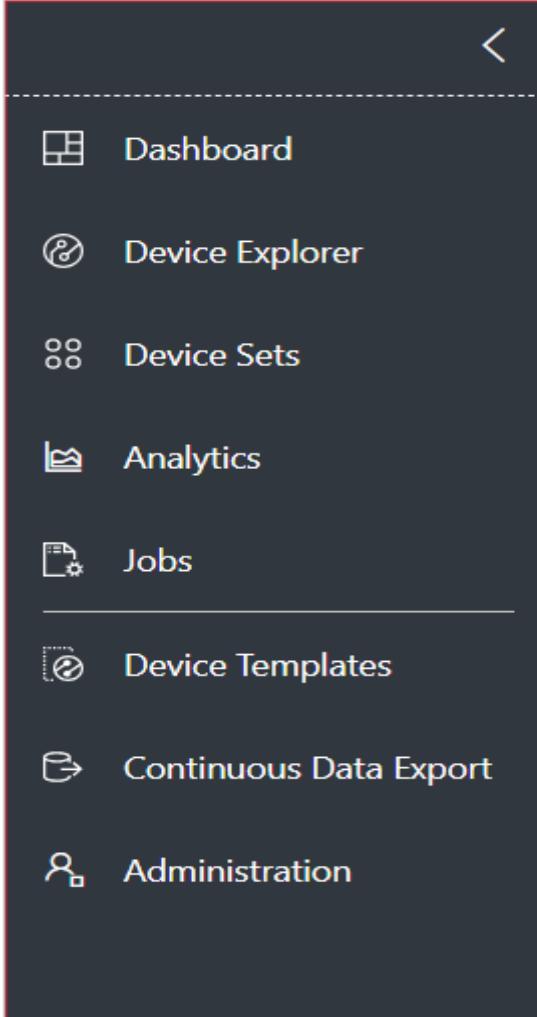
SOLUTION ARCHITECTURE



IoT central GUI

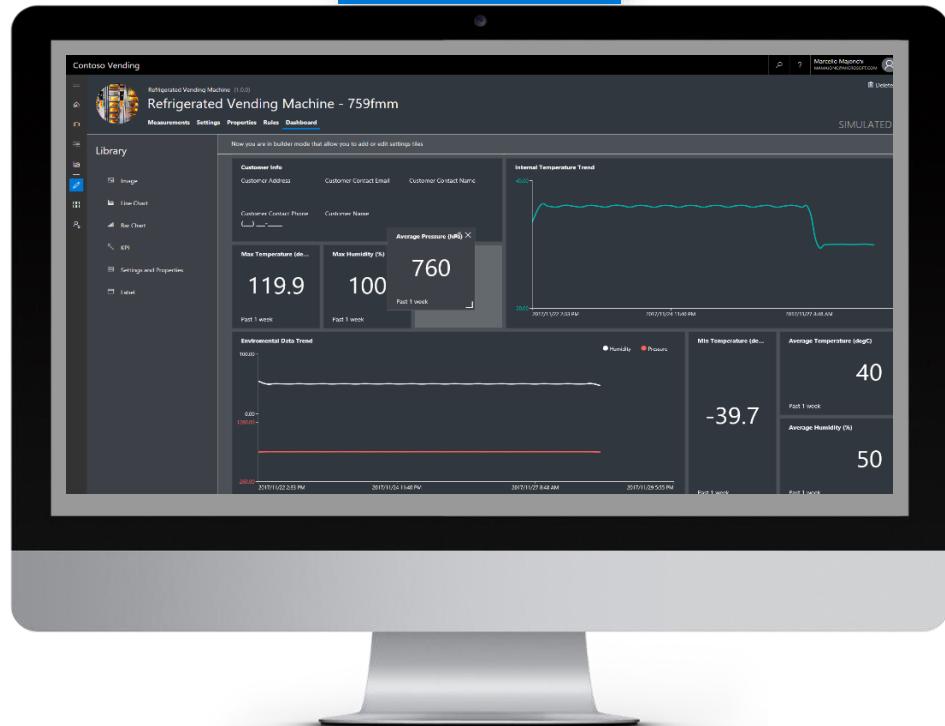
<https://docs.microsoft.com/en-us/azure/iot-central/overview-iot-central-tour>

Left navigation menu to access the different areas of the application

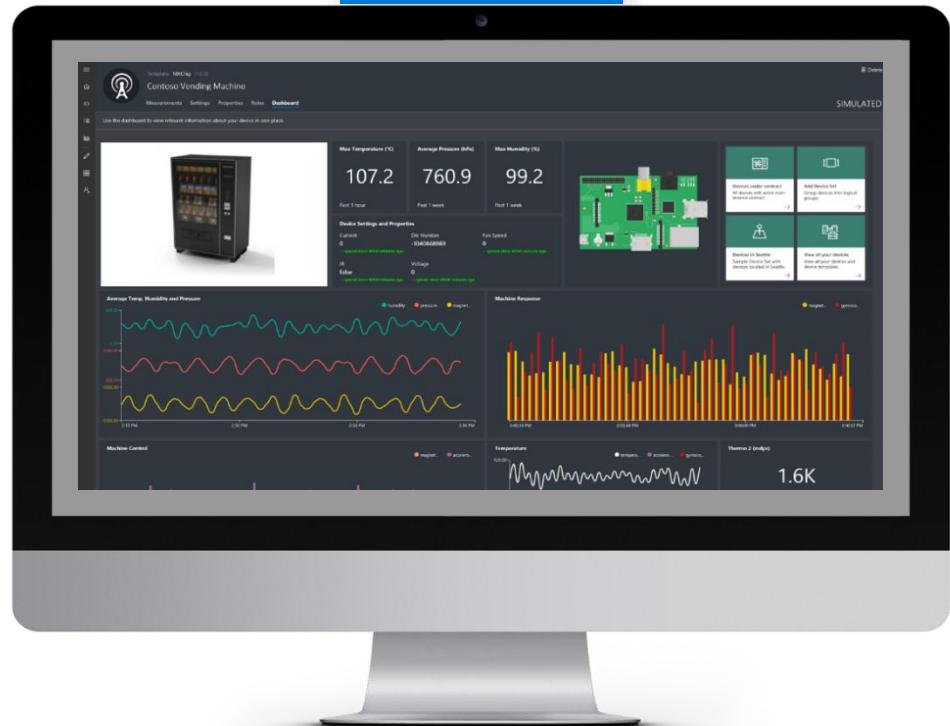
Menu	Description
 The screenshot shows the left navigation menu of the IoT Central application. It includes a back arrow at the top, followed by eight menu items: Dashboard, Device Explorer, Device Sets, Analytics, Jobs, Device Templates, Continuous Data Export, and Administration. Each item has a corresponding icon to its left.	<ul style="list-style-type: none">The Dashboard button displays your application dashboard. As a builder, you can customize the dashboard for your operators. Users can also create their own dashboards.The Device Explorer button lists the simulated and real devices associated with each device template in the application. As an operator, you use the Device Explorer to manage your connected devices.The Device Sets button enables you to view and create device sets. As an operator, you can create device sets as a logical collection of devices specified by a query.The Analytics button shows analytics derived from device telemetry for devices and device sets. As an operator, you can create custom views on top of device data to derive insights from your application.The Jobs button enables bulk device management by having you create and run jobs to perform updates at scale.The Device Templates button shows the tools a builder uses to create and manage device templates.The Continuous Data Export button allows an administrator to configure a continuous export to other Azure services such as storage and queues.The Administration button shows the application administration pages where an administrator can manage application settings, users, and roles.

Demo:
**How easy it is to create an IoT Central
Application**

Builder



Operator



**Product
Modeler**



**Rules
Workflows**



**Device
settings**



**User and
identity
management**



**Template
Management**



**Device
management**



**Time-series
Insights**



**Analytics &
dashboards**



**Alerts and
actions**

Demo:

Builder: Device template and rules workflow

Monitoring and Analytics:

Create Telemetry Rule: <https://docs.microsoft.com/en-us/azure/iot-central/howto-create-telemetry-rules>

The screenshot shows the Azure IoT Central interface for creating a Telemetry rule. It consists of two main panels. The left panel displays the 'Device Template' for a 'Refrigerator (1.0.0)' device, with the 'Rules' tab selected. The right panel shows the 'Configure Telemetry Rule' dialog. In the dialog, the 'Measurement' is set to 'Temperature', 'Aggregation' to 'Average', 'Operator' to 'is greater than', and 'Threshold' to '80'. The 'Conditions' section is expanded, showing a chart with data points. The 'Actions' section is collapsed. Below the dialog, a preview message shows a temperature alert for a device named 'Refrigerator'.

Configure the rule conditions

Configure actions

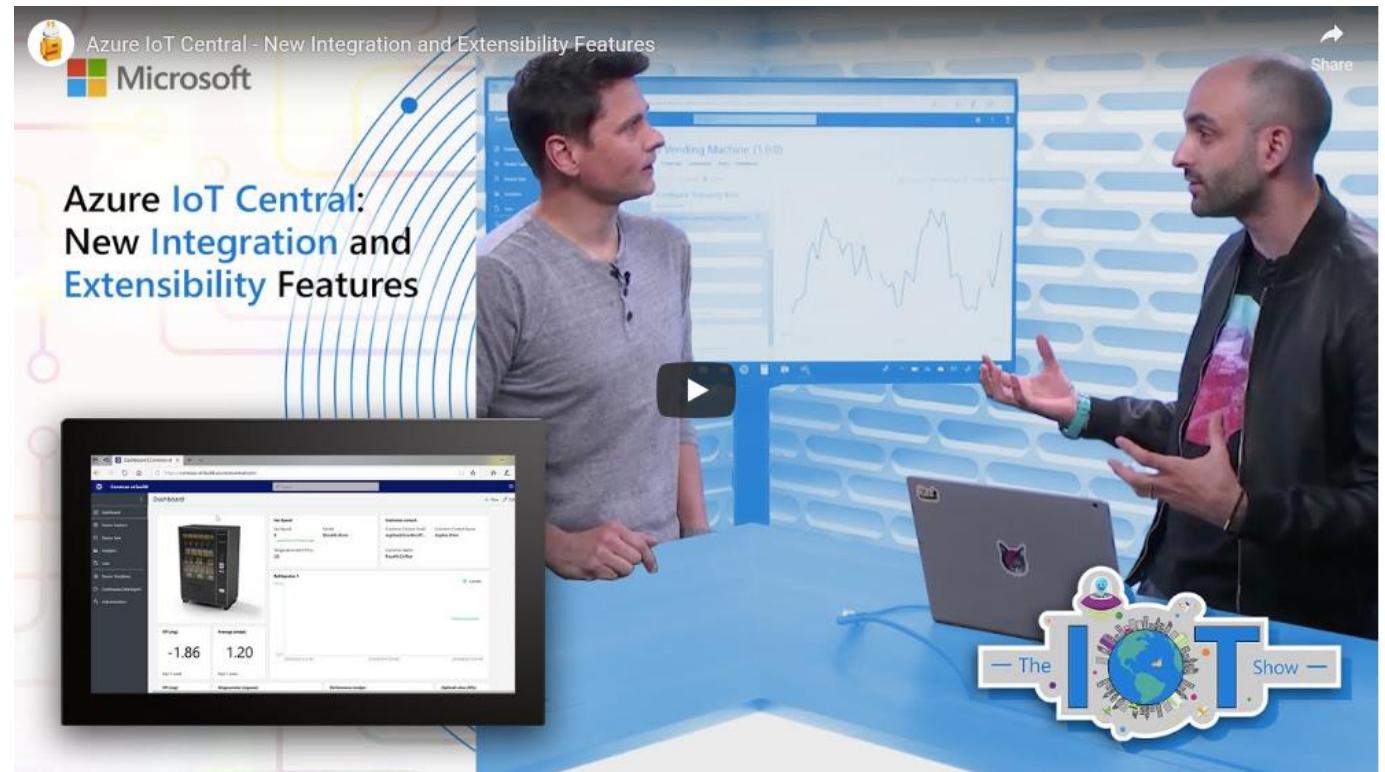
Create an Event rule: <https://docs.microsoft.com/en-us/azure/iot-central/howto-create-event-rules>

The screenshot shows the Azure IoT Central interface for creating an Event rule. It consists of two main panels. The left panel displays the 'Device Template' for a 'Refrigerator (1.0.0)' device, with the 'Rules' tab selected. The right panel shows the 'Configure Event Rule' dialog. In the dialog, the 'Measurement' is set to 'Fan Motor Error', 'Aggregation' to 'Count', 'Operator' to 'is greater than', and 'Threshold' to '1'. The 'Conditions' section is expanded, showing a chart with data points. The 'Actions' section is collapsed. Below the dialog, a preview message shows an event alert for a device named 'Refrigerator'.

Configure the rule conditions

Integration and Extensibility Features

Embedded Integration with Flow



<https://channel9.msdn.com/Shows/Internet-of-Things-Show/Azure-IoT-Central-New-Integration-and-Extensibility-Features>

Export Data to Azure:

Export to Blob Storage Azure Event Hubs and Azure Service Bus:

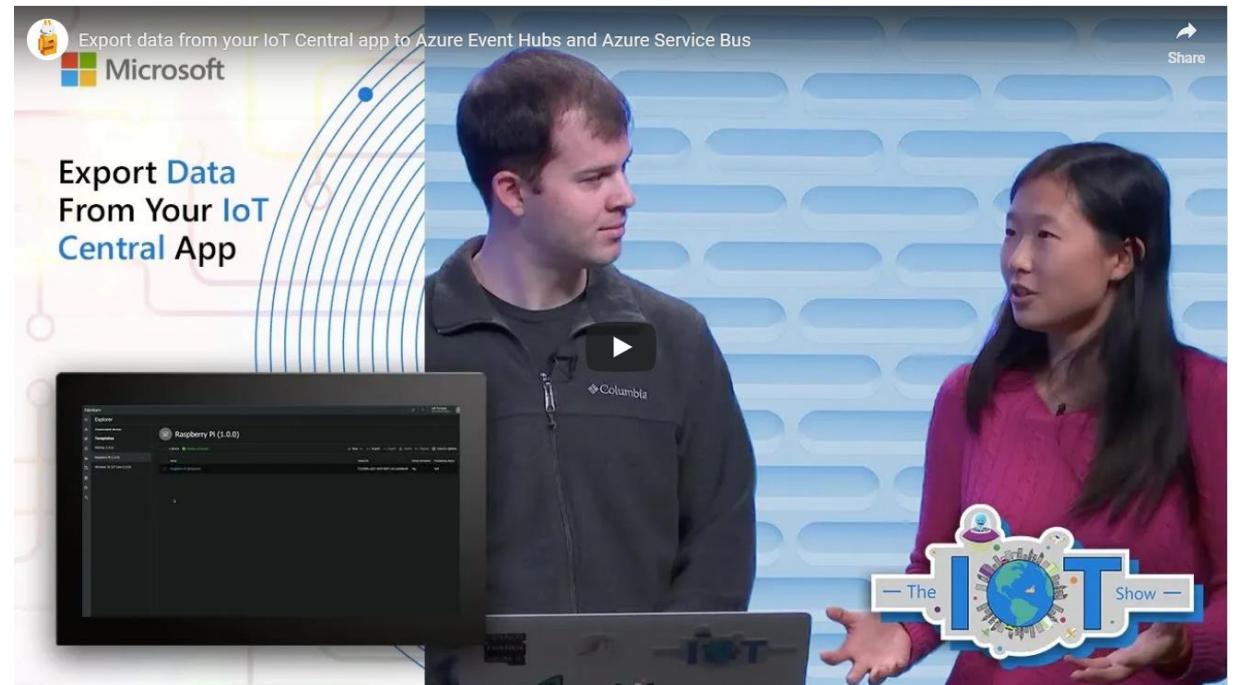
The screenshot shows the 'Continuous Data Export' page in the Microsoft IoT Central application. The left sidebar includes links for Dashboard, Device Explorer, Device Sets, Analytics, Jobs, Device Templates, and Continuous Data Export (which is highlighted with a red border), and Administration. The main area is titled 'Continuous Data Export' and contains a sub-instruction: 'Continuously export data from IoT Central to your Storage, Event Hubs, and Service Bus. Get started by creating an export.' A 'Learn more' link is also present.

Get more details about continuous data export in docs <https://docs.microsoft.com/en-us/azure/iot-central/howto-export-data>

Video:

Export data from your IoT Central app to Azure Event Hubs and Azure Service Bus

<https://channel9.msdn.com/Shows/Internet-of-Things-Show/Export-data-from-your-IoT-Central-app-to-Azure-Event-Hubs-and-Azure-Service-Bus>



Connect Other Cloud

Get the IoT Central device bridge in this Github repo: <https://github.com/Azure/iotc-device-bridge>

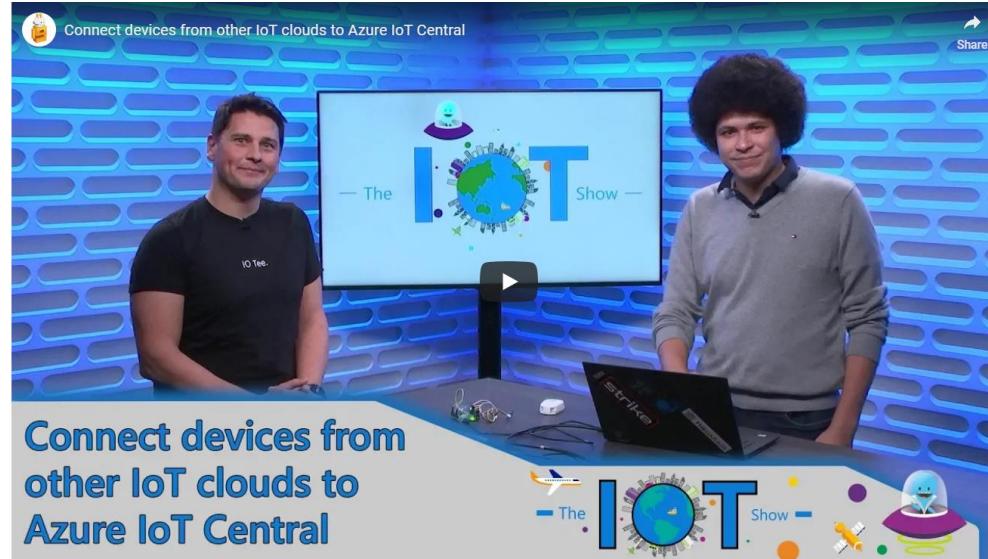
Announcement blog post: <https://azure.microsoft.com/en-us/blog/connect-devices-from-other-iot-clouds-to-azure-iot-central/>

Documentation: <https://docs.microsoft.com/en-us/azure/iot-central/howto-build-iotc-device-bridge>

Video:

Connect devices from other IoT clouds to Azure IoT Central

<https://channel9.msdn.com/Shows/Internet-of-Things-Show/Connect-devices-from-other-IoT-clouds-to-Azure-IoT-Central>

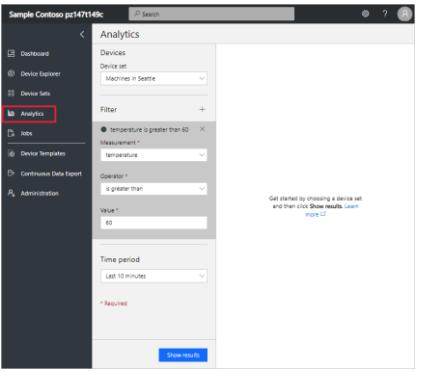


Connect devices from
other IoT clouds to
Azure IoT Central

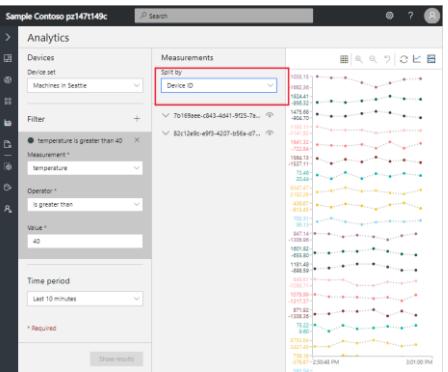
IoT Central Analytics:

Use analytics to analyze your device data: <https://docs.microsoft.com/en-us/azure/iot-central/howto-create-analytics>

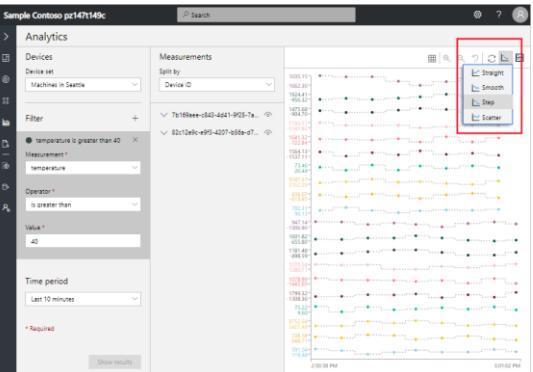
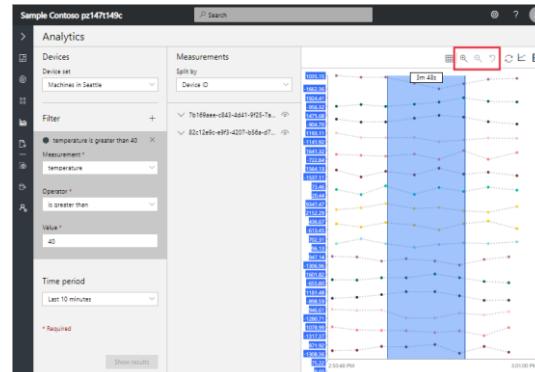
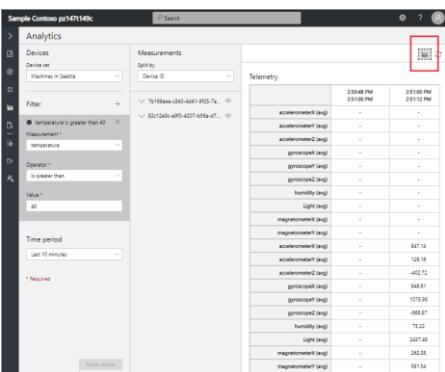
Querying your data



Visualizing your data



Interacting with your data

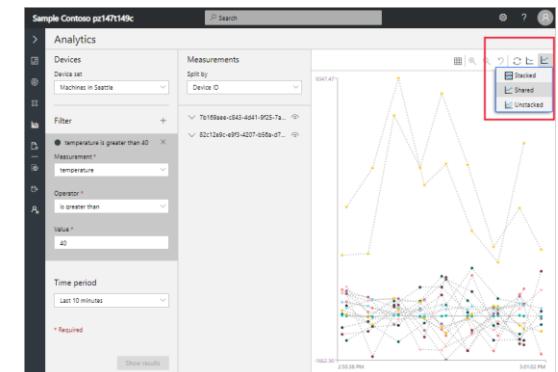


choose a
device set,
add a **filter** (optional),
and select a **time period**

graph view and a grid view,

zoom in and out

change the line style



arrange your data across the Y-axis

Monitoring and Analytics:

Power BI:

<https://docs.microsoft.com/en-us/azure/iot-central/howto-connect-powerbi>

Power BI dashboard to monitor the performance of your IoT devices. In your Power BI dashboard, you can:

- Track how much data your devices are sending over time
- Compare data volume between telemetry, states, and events
- Identify devices that are reporting lots of measurements
- Observe historical trends of device measurements
- Identify problematic devices that send lots of critical events

This solution sets up the pipeline that takes the data in your Azure Blob storage account from [Continuous Data Export](#). This data flows through to Azure Functions, Azure Data Factory, and Azure SQL Database to process and transform the data. The output can be visualized and analyzed in a Power BI report that you can download as a PBIX file. All of these resources are created in your Azure subscription, so you can customize each component to suit your needs

Get the [Power BI Solution for Azure IoT Central](#) from Microsoft AppSource



Monitor device connectivity using the Azure IoT Central Explorer

<https://docs.microsoft.com/en-us/azure/iot-central/howto-use-iotc-explorer>

Use the IoT Central Explorer CLI to see messages your devices are sending to IoT Central and observe changes in the IoT Hub twin.

Open-source tool to gain deeper insight into the state of device connectivity and diagnose issues of device messages

[Visit the iotc-explorer repository in GitHub.](#)

Install iotc-explorer

```
npm install -g iotc-explorer
```

Run iotc-explorer

```
iotc-explorer login
```

Monitor device messages

```
iotc-explorer monitor-messages
```

```
iotc-explorer monitor-messages --raw
```

To watch a specific device, just add the device id to the end of the command:

```
iotc-explorer monitor-messages <your-device-id>
```

Get device twin

```
iotc-explorer get-twin <your-device-id>
```

Demo: RaspberryPI online

Connect a single device

This approach is useful when you're experimenting with IoT Central or testing devices. You can use the device connection information from your IoT Central application to generate the connection string for a device.

For detailed steps, see

[How to generate a device connection string to connect to an Azure IoT Central application.](#)

The screenshot shows the Raspberry Pi Azure IoT Online Simulator interface. At the top, there's a title bar with the simulator logo and the text "Raspberry Pi Azure IoT Online Simulator". On the right side of the title bar are "Help" and "English ▾" buttons. Below the title bar is a breadboard circuit diagram. A blue breadboard with a red LED connected to pin 15 is shown. A green Raspberry Pi Model B+ V1.2 board is connected to the breadboard. Wires connect the breadboard to the Pi's pins 17, 27, 22, 16, 12, 11, 13, 19, 26, 24, 25, 23, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 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Demo:
Connect RaspberryPi Online

Devices Connected to IoT Central

RaspberryPi

Connect a Raspberry
(Python) Pi tutorial:

<https://docs.microsoft.com/en-us/azure/iot-central/howto-connect-raspberry-pi-python>

Python Code:

<https://github.com/Azure/iot-central-firmware/blob/master/RaspberryPi/app.py>

Python SDK:

<https://pypi.org/project/iotc/>



IoTButton

Connect teXXmoButton:

<https://github.com/mjksinc/IoTCentralButton>

Sphere

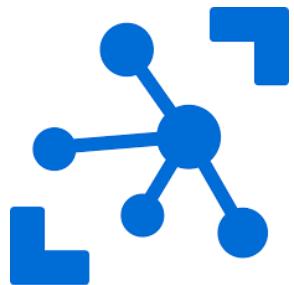
Set up Azure IoT Central
to work with Azure
Sphere:

<https://docs.microsoft.com/en-us/azure-sphere/app-development/setup-iot-central>

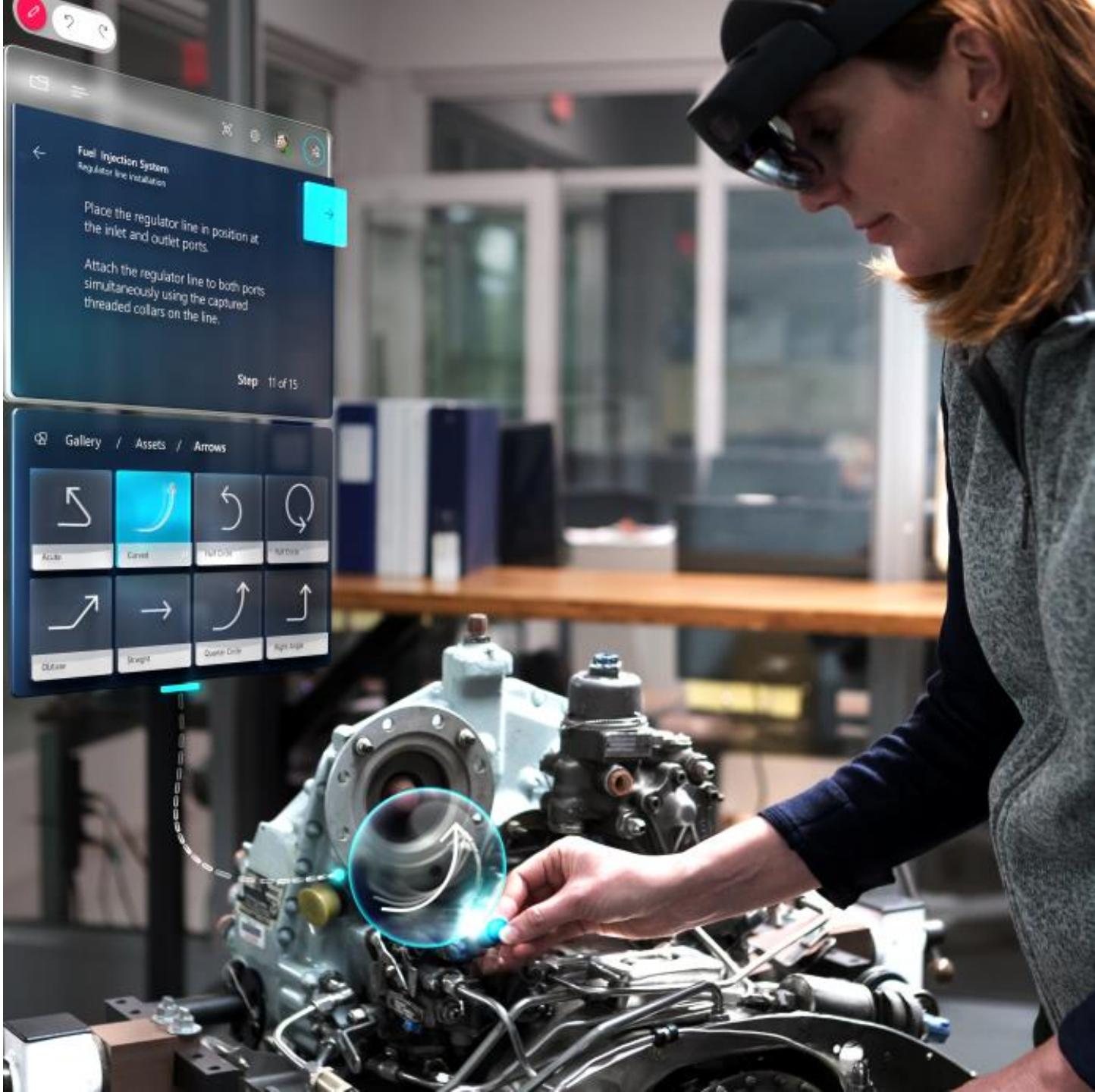
SDK example

Connect a generic client
application (Node.js)

<https://docs.microsoft.com/en-us/azure/iot-central/howto-connect-nodejs>



What's next?

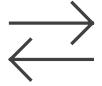


IoT Central Roadmap

Available Now



Device connectivity and management



Telemetry ingestion and command & control



Monitoring rules & triggered actions



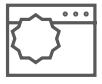
User roles and permissions



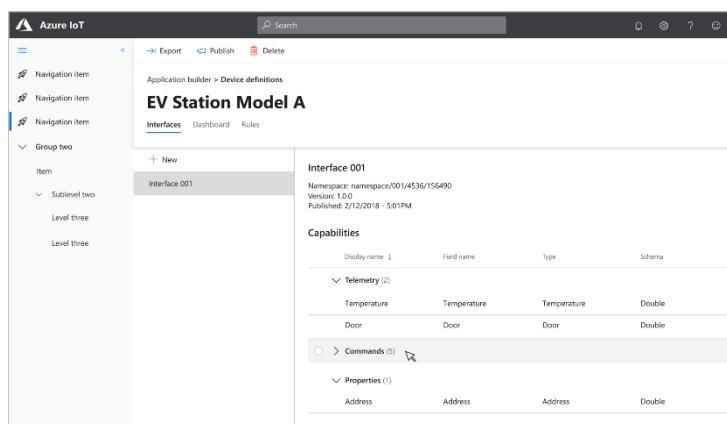
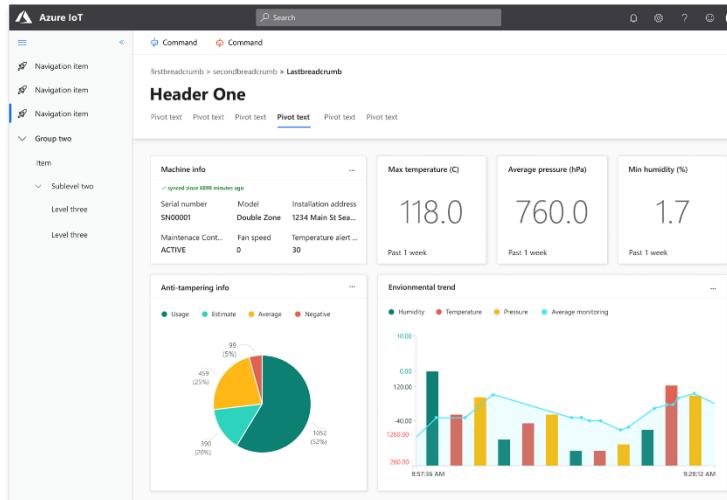
Dashboards, visualization & insights



Fully hosted and managed by Microsoft



White Labeling



Coming Soon



Multi-tenancy



Edge support



Plug-and-Play
Public Preview



Extensibility & Customization
CDE, custom connectors, ...



Location Telemetry and Geofence

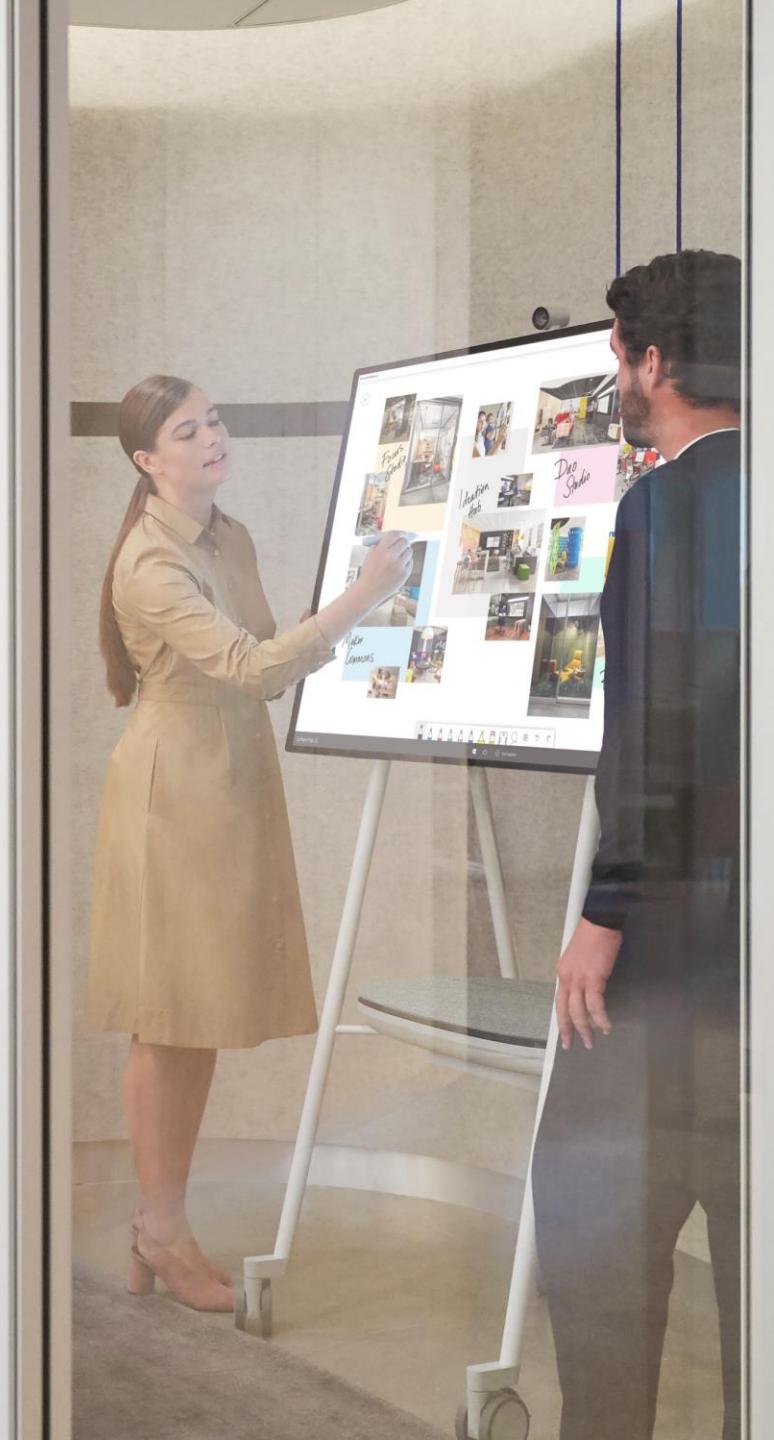


Industry Solution Accelerators
for Priority Industry Verticals

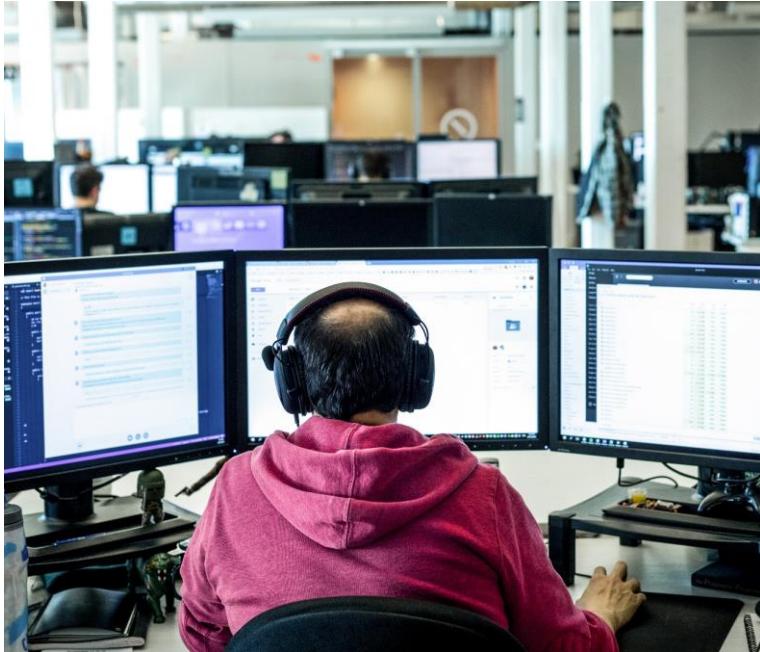


Continuous data export to
Azure EventGrid

What is IoT Plug and Play



IoT device challenges for solution developers today:



In-depth knowledge of embedded development is required to connect to the cloud, send telemetry, and apply configuration changes



Extremely difficult for solution developers to transform low-level device messages into meaningful data, events, and workflows



Hardware sourcing, integration, and ramping to production can take months or even years for most of our customers.

Azure IoT must simplify how IoT devices integrate with solutions built on the Azure platform

ACCELERATING IOT

The total effort to build and operate an IoT Solution is rapidly decreasing

Total Effort



IaaS



Azure IoT Platform



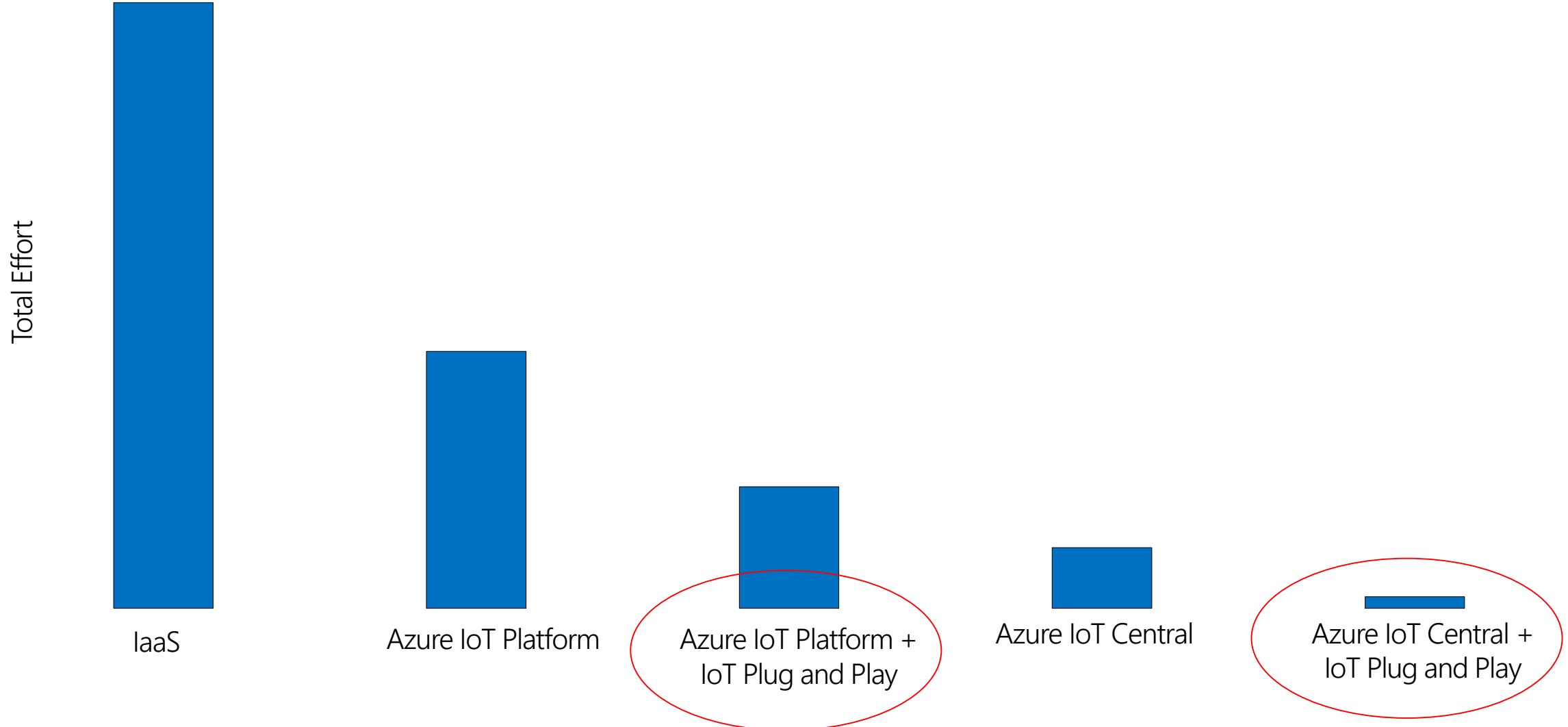
Azure IoT Central



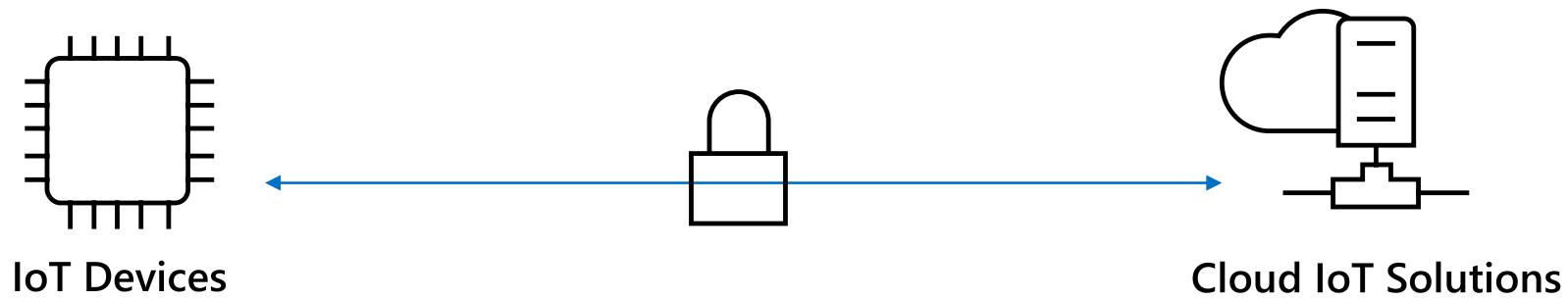
?

Accelerating IoT

The total effort to build and operate an IoT Solution is rapidly decreasing

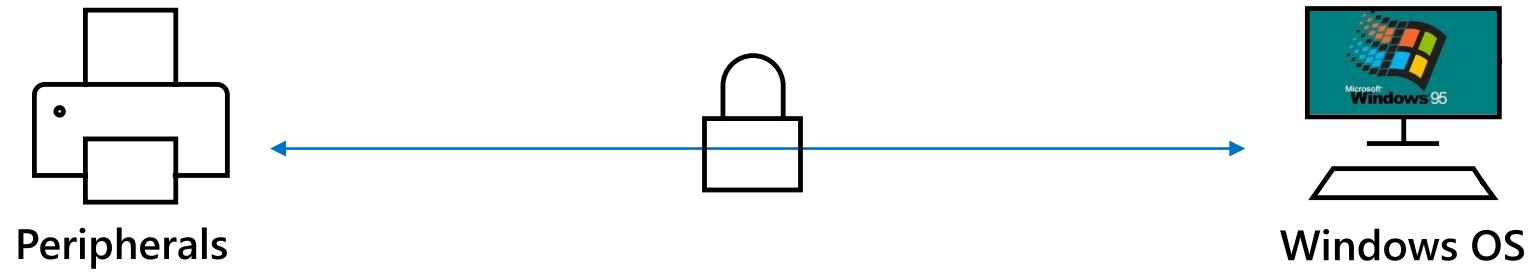


IoT Today

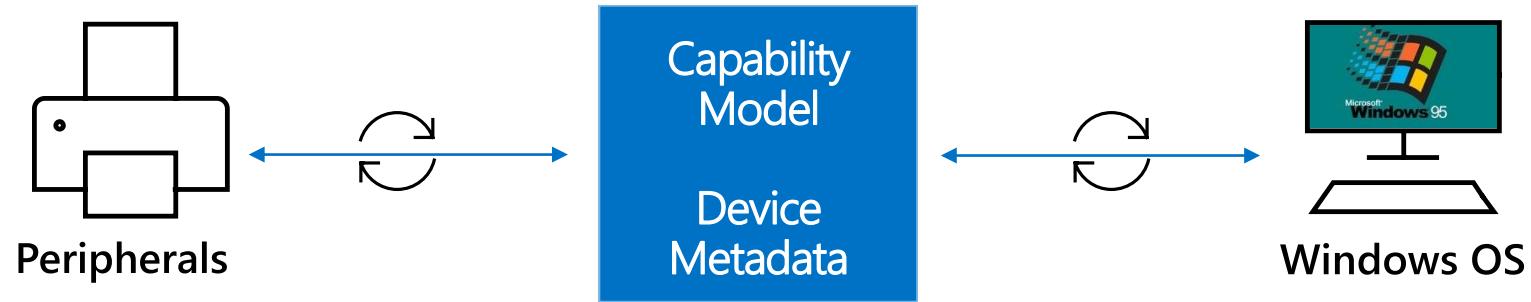


Tight coupling between software on device and IoT solution in the cloud

We had a similar challenge in the past...



That was solved with Windows “Plug and Play”



Devices published their capability models and adhered to them
Windows used the capability model to know how to interact with them

Contoso is a logistics and shipping company



They want to monitor their truck fleet activity in real-time including alerts for potential driver accidents

Mike is a solutions developer for Contoso



Let's monitor our truck fleet!

Mike wants to...

Create a solution to track the truck fleet for activity anomalies

Build the solution on Azure IoT Central

Use devices with real-time cameras, GPS, gyroscopes, etc.

...without writing a single line of device code





ASKEY



Microsoft
Azure

Certified



IoT Plug and Play

Dashcam Smart Camera

CDR8010

Mount-able device for any vehicles for enhanced
security, prevention and diagnostics

HD1080p: real-time recording and streaming

LTE support for in-car connectivity

ADAS support: Lane detection, collision warning

Hardware configuration

2.7" LCD

CPU: Qualcomm Snapdragon (SDM450)

Memory: 2GB LPDDR3

Storage: 16GB eMMC

OS: Android 9

Sensors: Location (GPS, GNSS etc) , 3 axis,

Gyroscope, G-sensor

WAN/WiFi/Bluetooth 4.2

NFC/USB Type-C/MicroSD card

Microsoft Azure Certified for IoT device catalog:
<https://catalog.azureiotsolutions.com/>

Video: Upcoming IoT Central capabilities with Device Plug and Play at Build

Briton Zurcher

<https://mybuild.techcommunity.microsoft.com/sessions/77053?source=sessions#top-anchor>

23min

Key IoT Plug and Play concepts

Interface

A shared contract that uniquely identify the capabilities exposed by a device

Expressed as Properties, Telemetry, and Commands

Interfaces are reusable across different devices and models

Device Capable Model

A collection of Interfaces representing a thing or entity

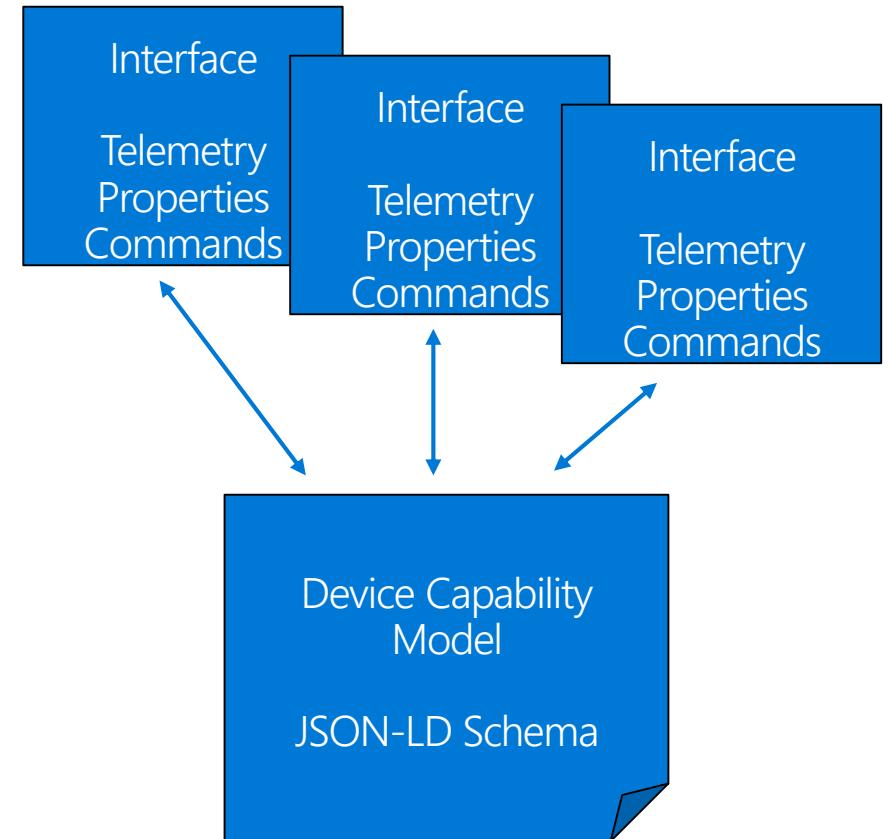
E.g. represents a specific device model/SKU

Description Language

Digital Twin Description Language (DTDL)

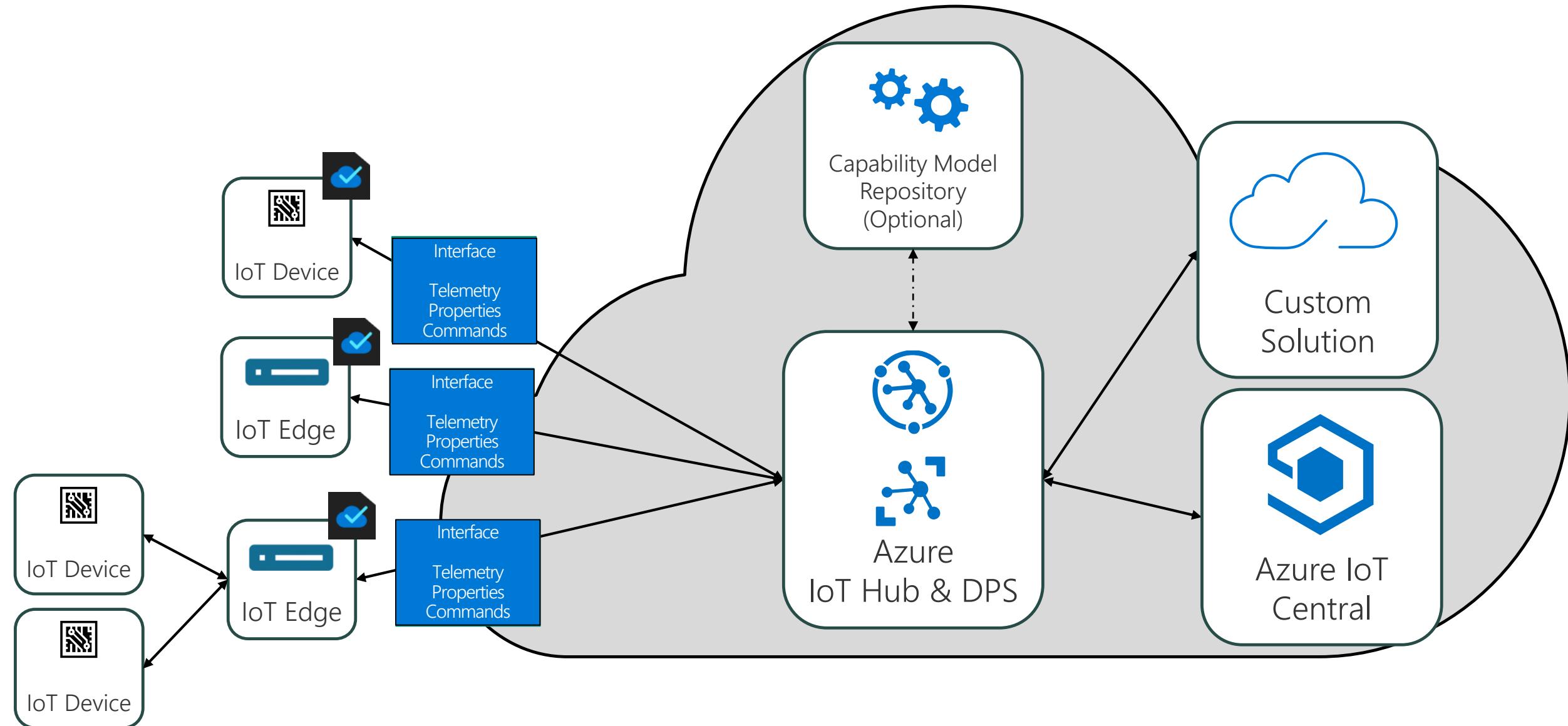
Language for describing models and interfaces for IoT digital twins (Azure Digital Twins support coming soon!)

Open source based on open standards (JSON-LD, RDF)



*Digital Twin Description Language
github: aka.ms/DTDL*

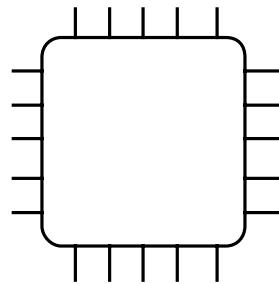
IoT Plug and Play In Platform Context



Where are capability models stored?

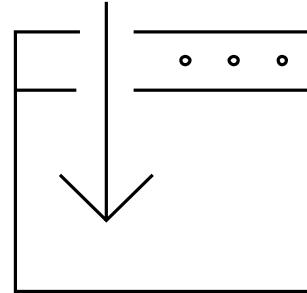
Device sends capability model ID and version expected for the solution to know

If unknown, the following are the model retrieval options for the solution:



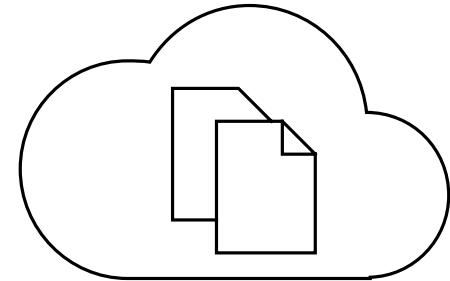
Device Sent

Stored and sent by the device to the solution. Quick and easy but device must be updated if model changes



URI Retrieval

Device sends a URI for retrieval from central location. Great for constrained devices, privacy or for simple on-premises deployments



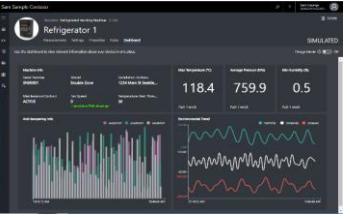
Capability Model Repository

Can be pre-cached by Azure solutions. Includes publish-time validation/versioning and integration with Azure dev tooling

IoT Plug and Play

Partner Solutions & Azure IoT Central

Devices that just work out of the box with no code required



Azure IoT Device Catalog IoT Plug & Play Certified



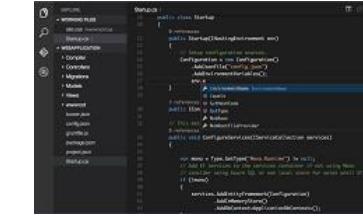
Easy to certify plug and play devices

Easy for customers and partners to find plug and play devices that just work

Azure IoT Device Simulation



VS Code



Device Capability Model
JSON-LD Schema

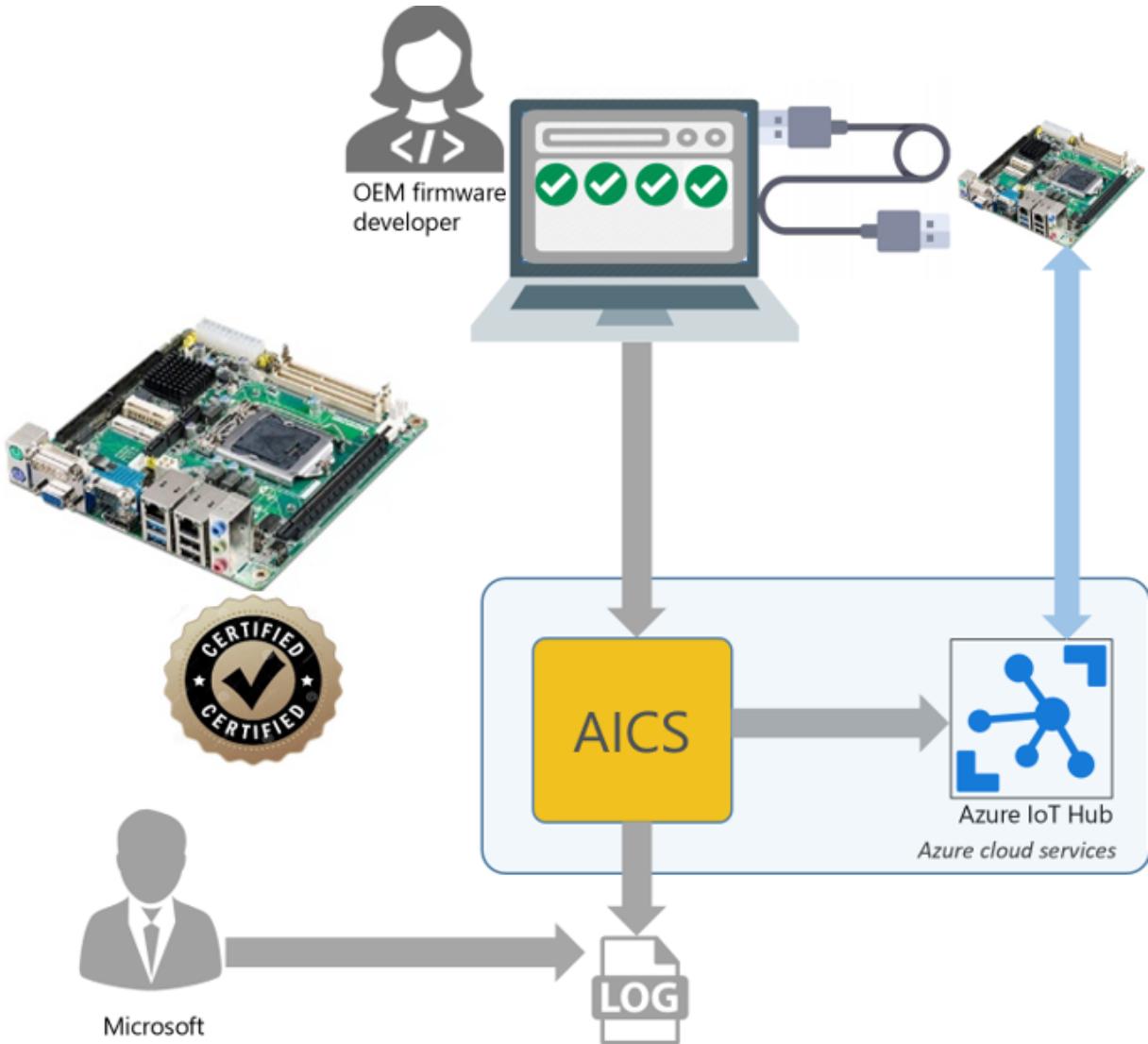
IoT Plug and Play Device Software



Easy to model device capabilities, easy to generate device software skeleton

Easy to develop device software and ensure it just works with IoT solutions

Azure Certified & IoT Plug and Play



The Azure Certified for IoT devices will move to leverage IoT Plug and Play beginning with public preview ("Certified-Ready" submissions)

Bar for certification raises the bar on out-of-the-box functionality and overall Azure IoT compatibility guarantees

Device builders will connect their real device, with working firmware, to the Azure IoT Certification Service (AICS).

Each IoT Plug and Play interface (telemetry, properties, commands) will be verified by AICS

Once certified, firmware and capability model will be made available to solution builders evaluating or purchasing a certified device

IoT Plug and Play Device and Solution Launch Partners

Device Manufacturers



Solution Providers



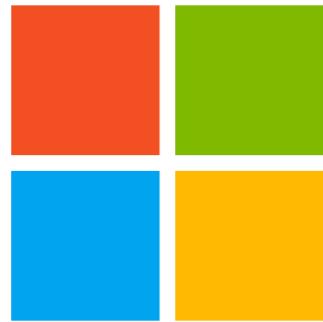
RESOURCES

Azure IoT Overview

<https://azure.microsoft.com/overview/iot/>

Product Pages

- Azure IoT Central: <https://azure.microsoft.com/en-us/services/iot-central/>
- Azure Digital Twins: <https://azure.microsoft.com/en-us/services/digital-twins/>
- Azure Maps: <https://azure.microsoft.com/en-us/services/azure-maps/>
- Azure IoT Hub: <https://azure.microsoft.com/en-us/services/iot-hub/>
- Azure IoT Edge: <https://azure.microsoft.com/en-us/services/iot-edge/>
- Azure Sphere: <https://azure.microsoft.com/en-us/services/azure-sphere/>
- Azure Time Series Insights: <https://azure.microsoft.com/en-us/services/time-series-insights/>



Microsoft