Microsoft

# IoT in Action

#IoTinActionMS

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# Architecting the Intelligent Edge

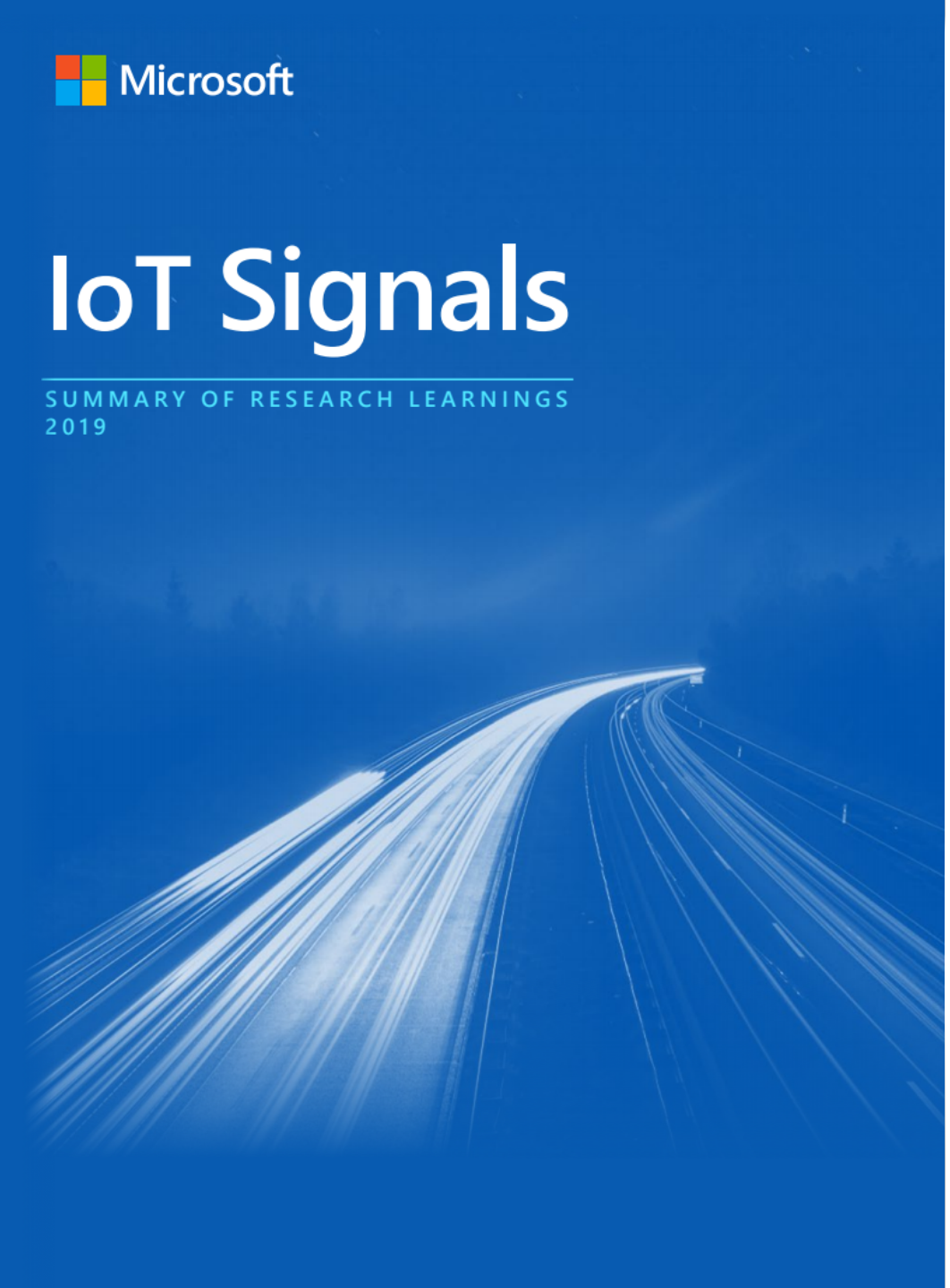
Jürgen Mayrbäurl
IoT Solution Architect

IoT in Action

Microsoft

# IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019



## Reasons for IoT adoption

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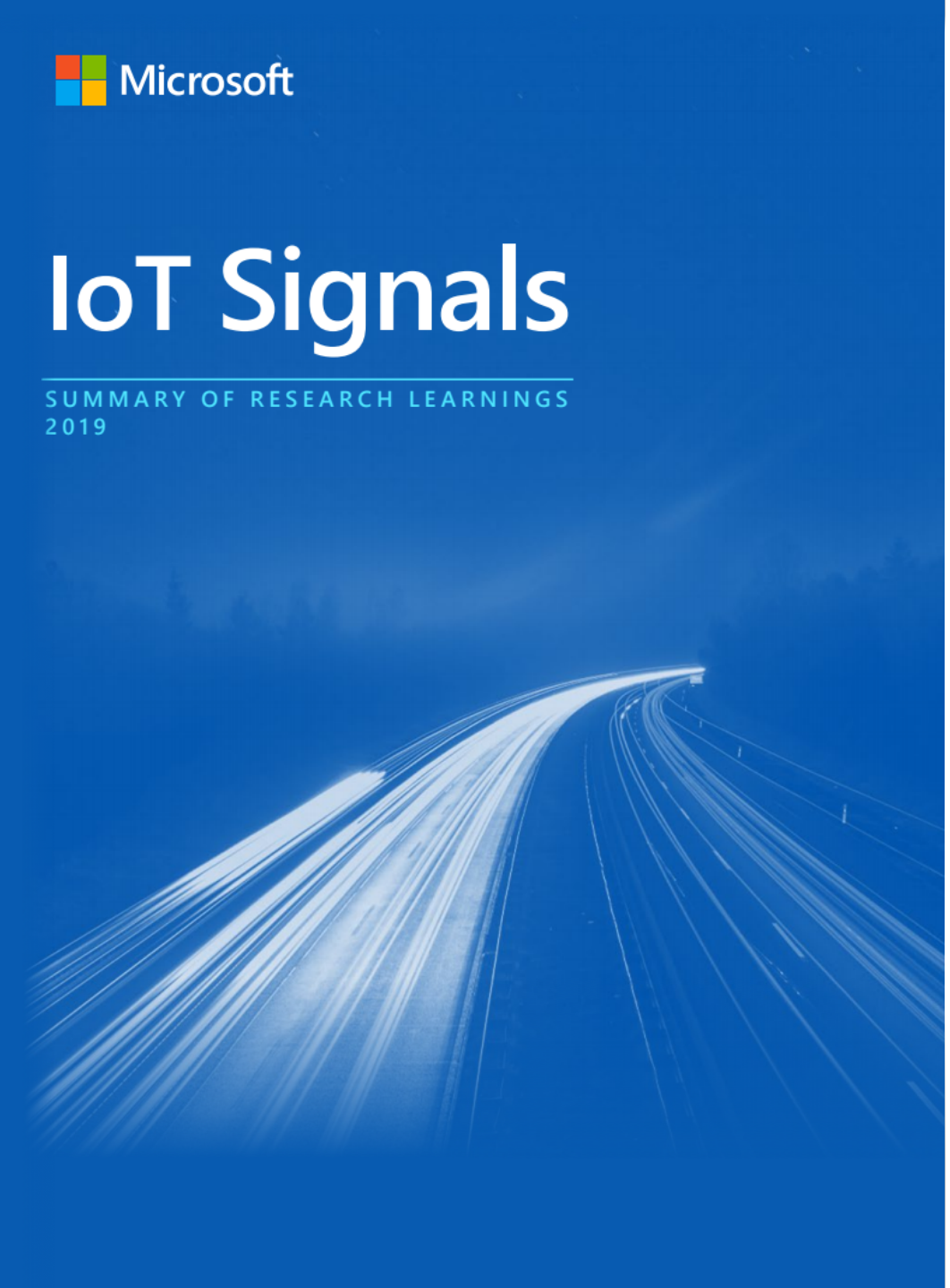
# IoT Signals

SUMMARY OF RESEARCH LEARNINGS
2019



## Additional top use case by industry

| RETAIL/ WHOLESALE | | TRANSPORTATION | | GOVERNMENT | | HEALTHCARE | |
|---|---|---|---|---|---|---|---|
| Supply chain optimization | 64% | Fleet management | 56% | Public Safety | 48% | Tracking patient, staff, and inventory | 66% |
| Inventory optimization | 59% | Security, surveillance, and safety | 51% | Infrastructure and facilities management | 40% | Remote device monitoring and service | 57% |
| Surveillance and security | 48% | Manufacturing operations efficiency | 40% | Regulations and compliance management | 38% | Remote health monitoring and assistance | 55% |
| Loss prevention | 44% | Vehicle telematics and infotainment | 38% | Fleet and asset management | 37% | Safety, security, and compliance | 53% |
| Energy optimization | 40% | Predictive maintenance | 33% | Incident response | 29% | Facilities management | 42% |

Microsoft

# IoT Signals

SUMMARY OF RESEARCH LEARNINGS
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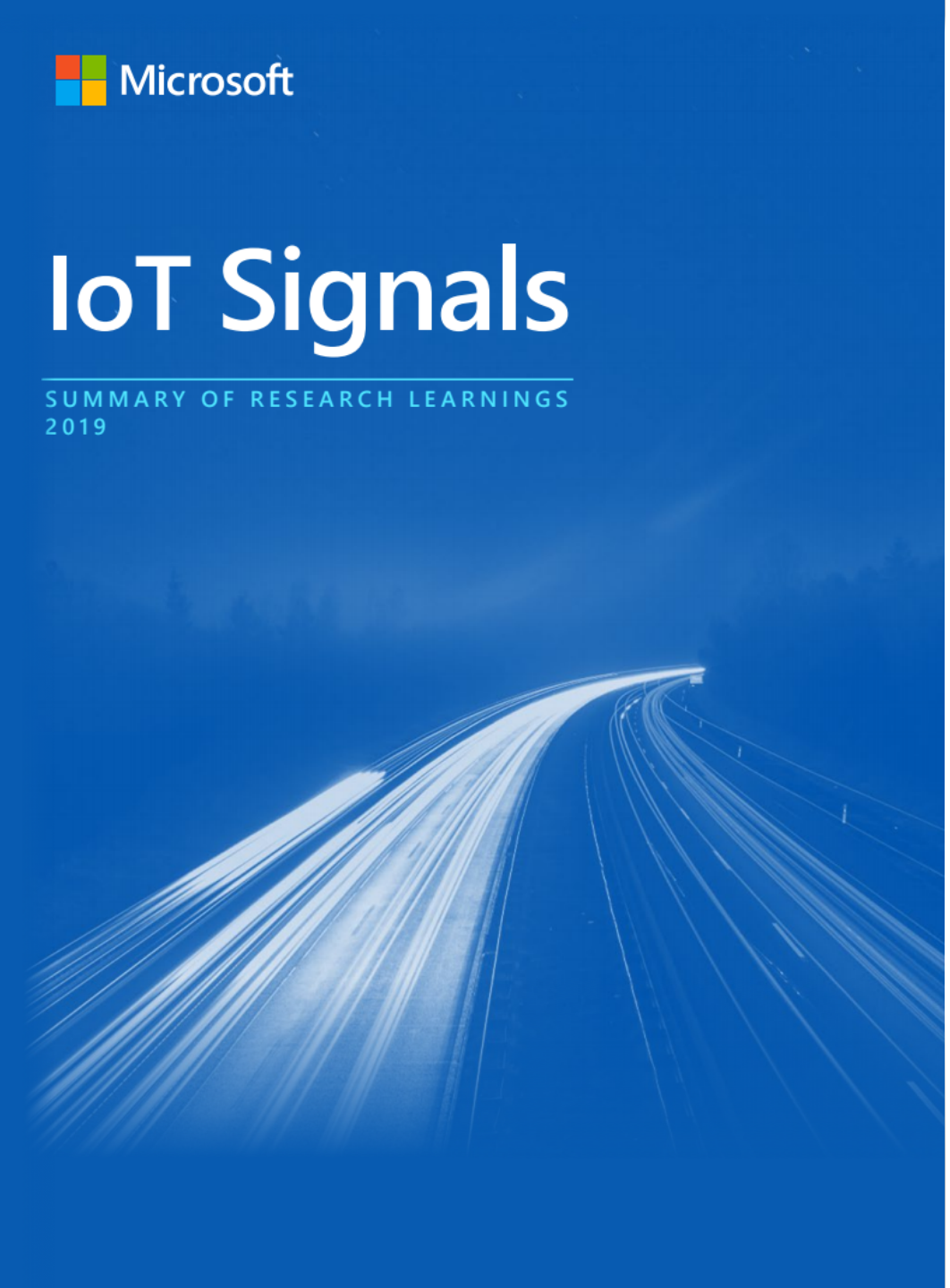
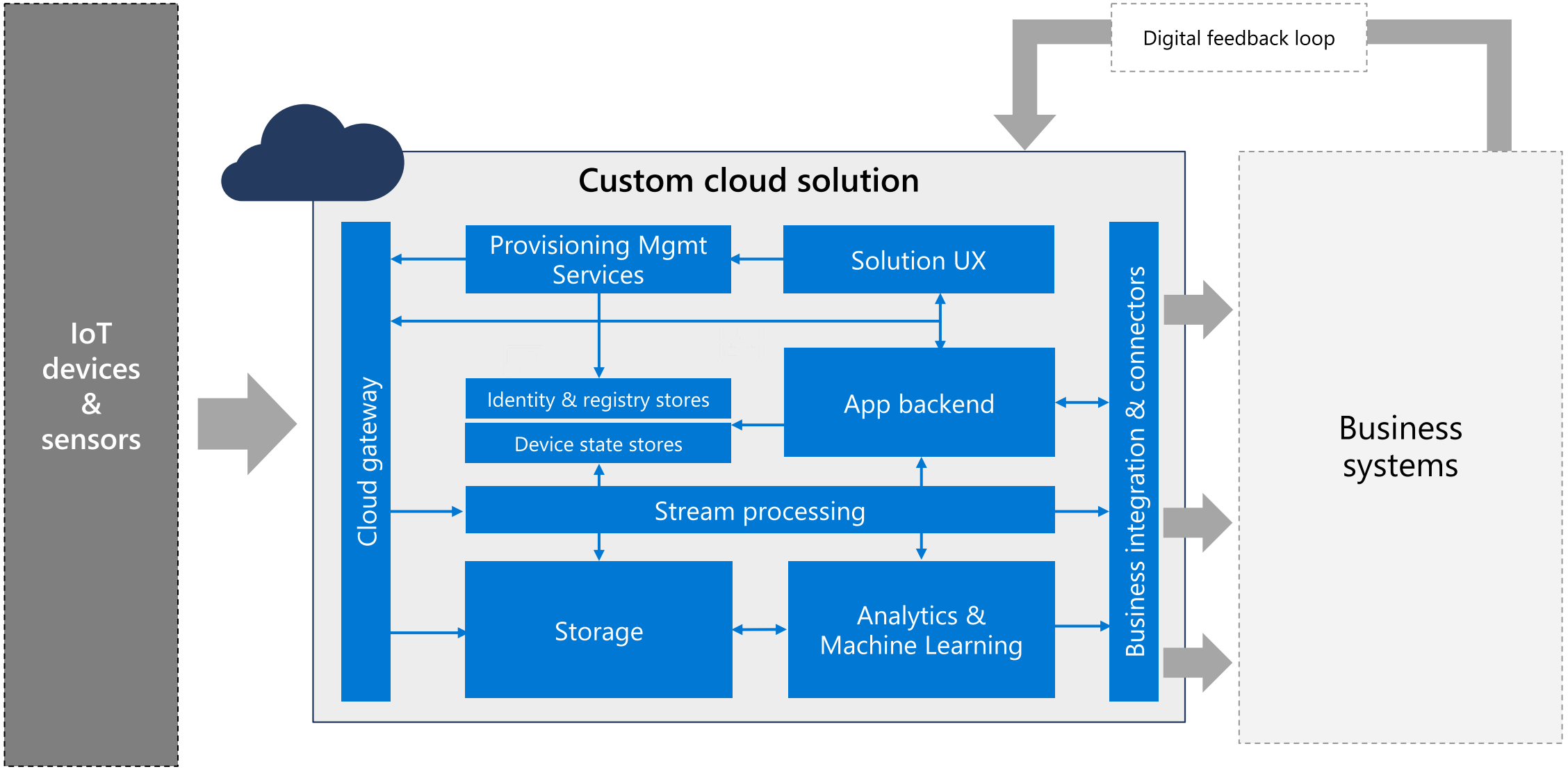
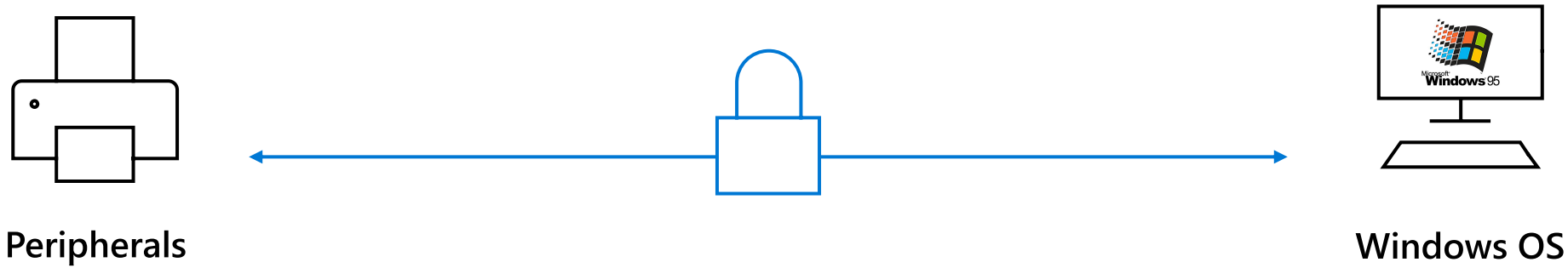


## Top challenges

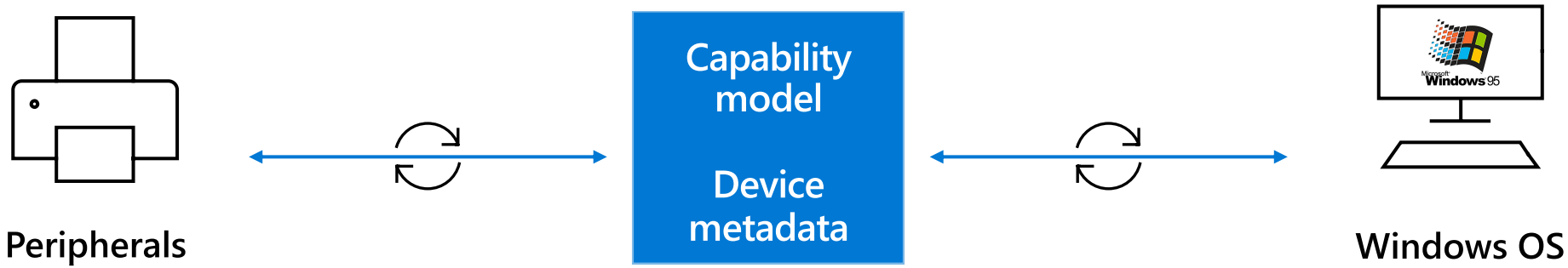
# Solution architecture—DIY



# We had a similar challenge in the past…

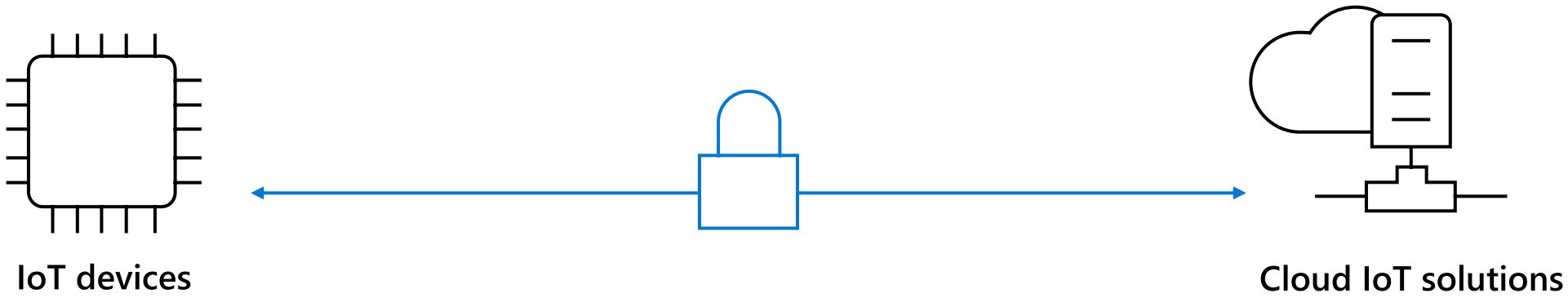


# That was solved with Windows Plug and Play




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

# IoT today

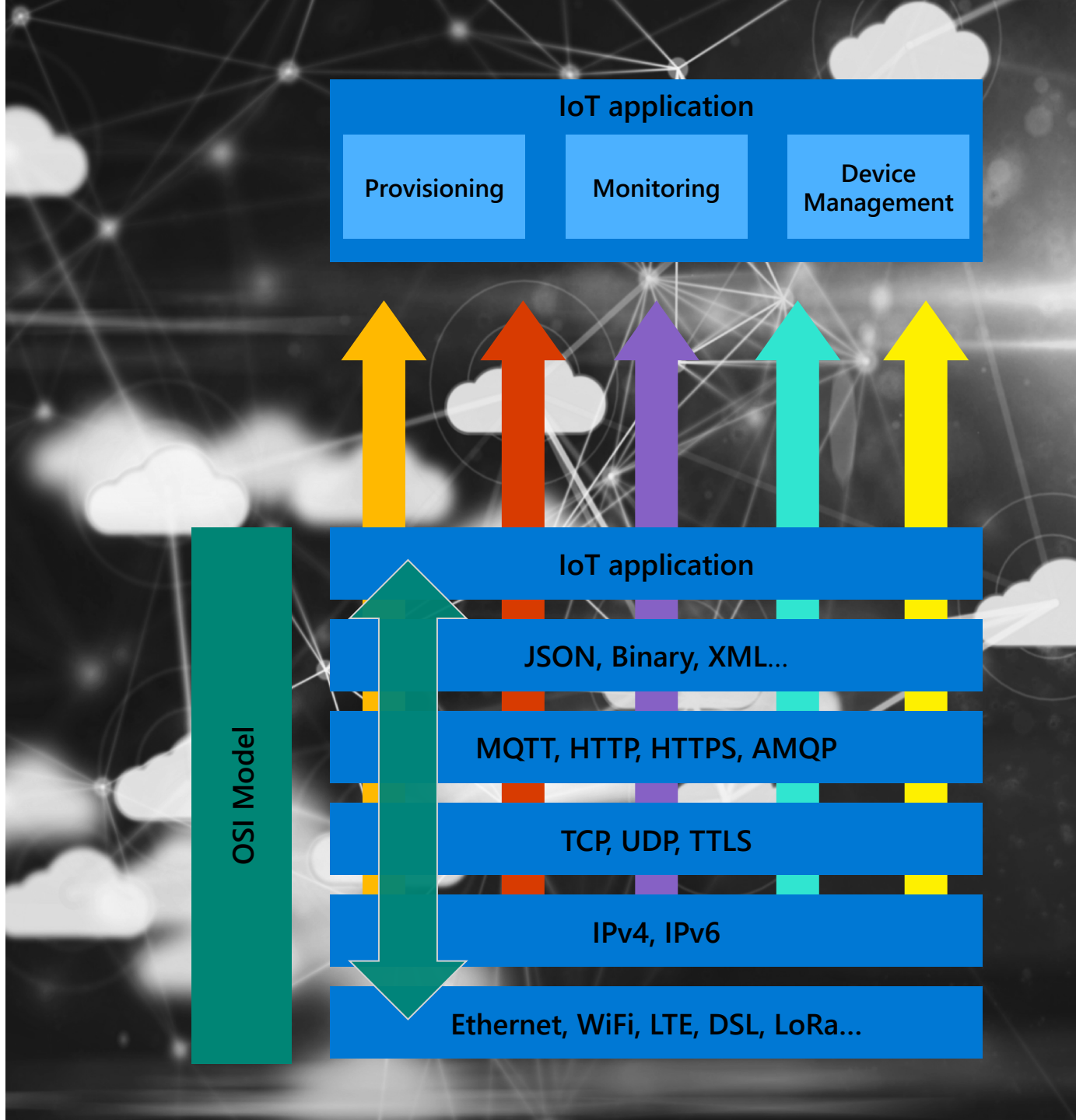



Tight coupling between software on device and IoT solution in the cloud

# IoT Plug and Play + Azure IoT Central

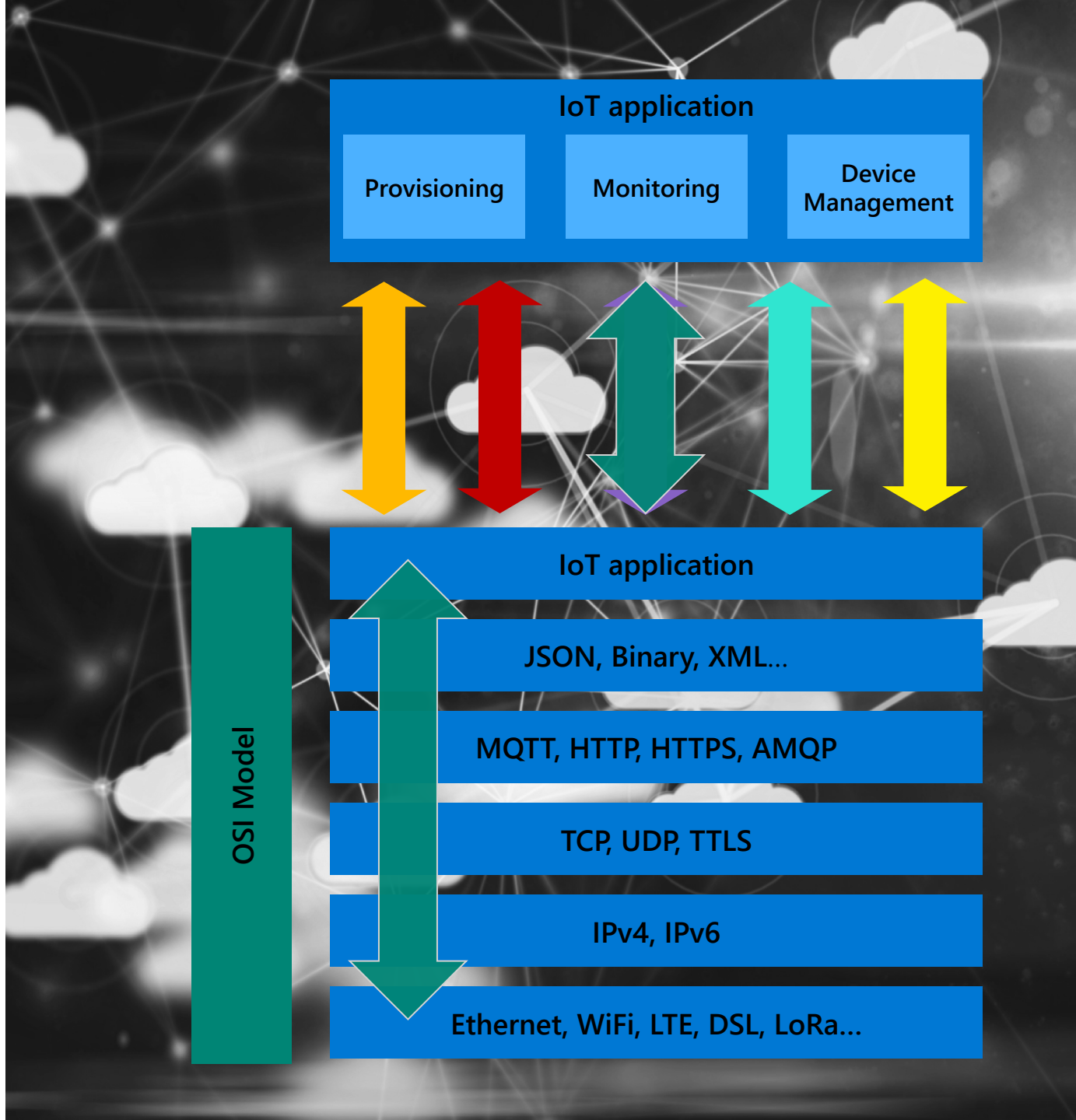
# Connecting hardware is very "hard"

- Provisioning
- Configuration
- Device management
- Deployment
- Monitoring



# IoT Plug and Play defines common language

- A platform feature to describe models and capabilities to Cloud
- Based on Digital Twin definition language
  - Open source based on open standards (JSON-LD, RDF)



# Benefits

## Solution developers

Dramatically reduces the effort needed to build software on devices

## Customers and partners

Large ecosystem of devices that just work with Azure IoT solutions, without any development required

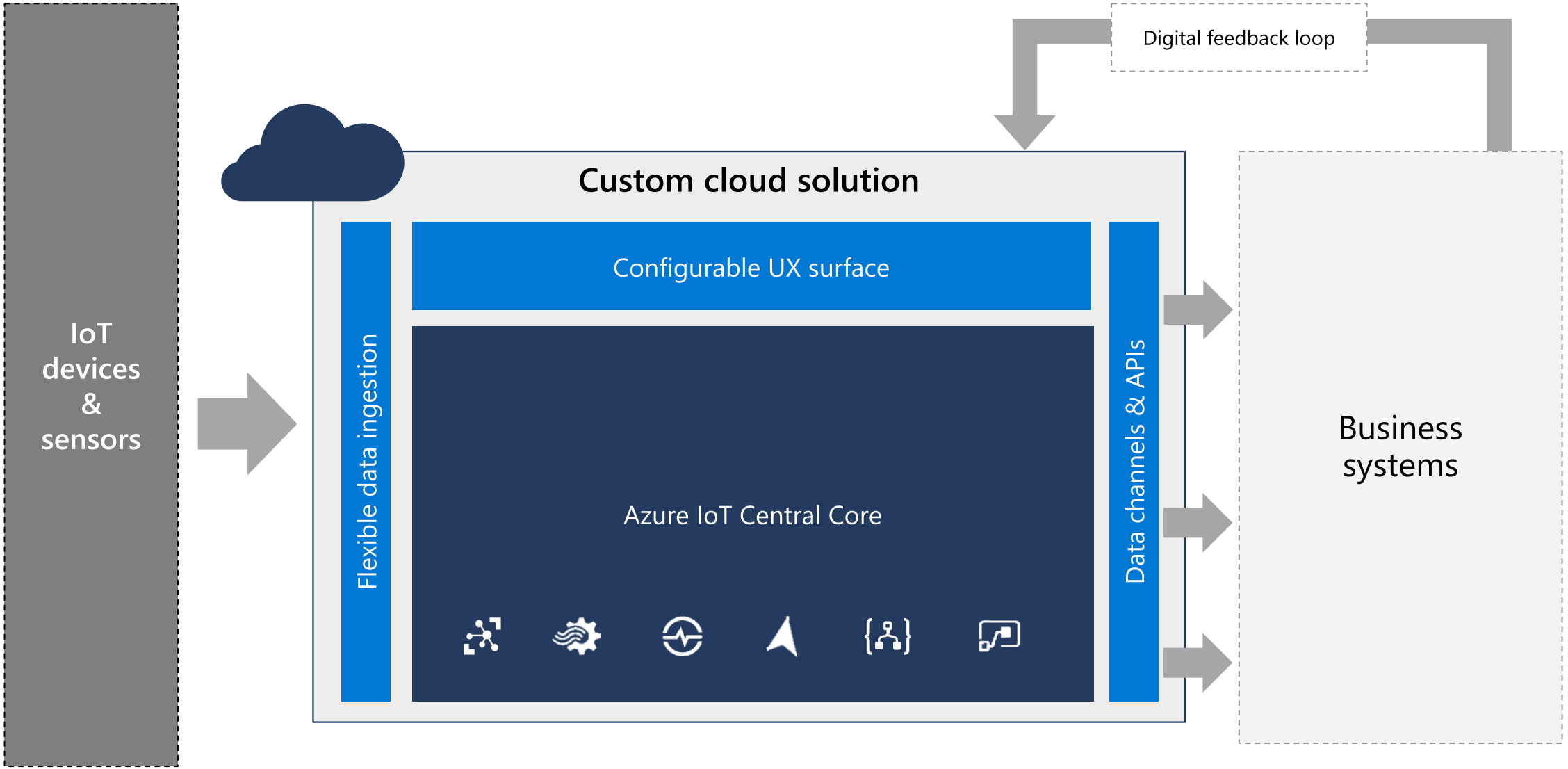
## Device builders

Certify your device for IoT Plug and Play and it can be used with thousands of Azure IoT solutions

## In public preview

http://aka.ms/IoTPlugandPlay

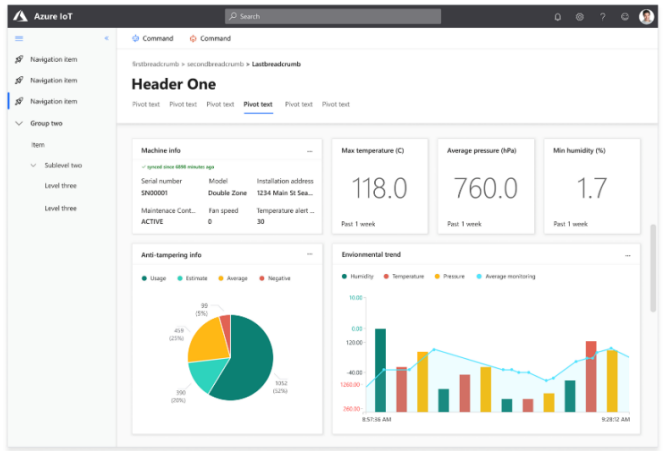
# Solution architecture—IoT Central



# Azure IoT central

## IoT app platform with security, global scale, high availability, disaster recovery built in

- Device connectivity and management
- Telemetry ingestion and command and control
- Monitoring rules and triggered actions
- User roles and permissions
- Dashboards, visualization and insights
- Fully hosted and managed by Microsoft




- Maps, location telemetry and geofencing
- Device Bridge
  Ingest data from other clouds
- Continuous Data Export
  Bring data into downstream business applications

- White labeling
  Your SaaS—your brand
- IoT Plug and Play
  Public preview

**Challenge #1**

Getting connected

**Challenge #2**

Making it easier to combine services to “do something”

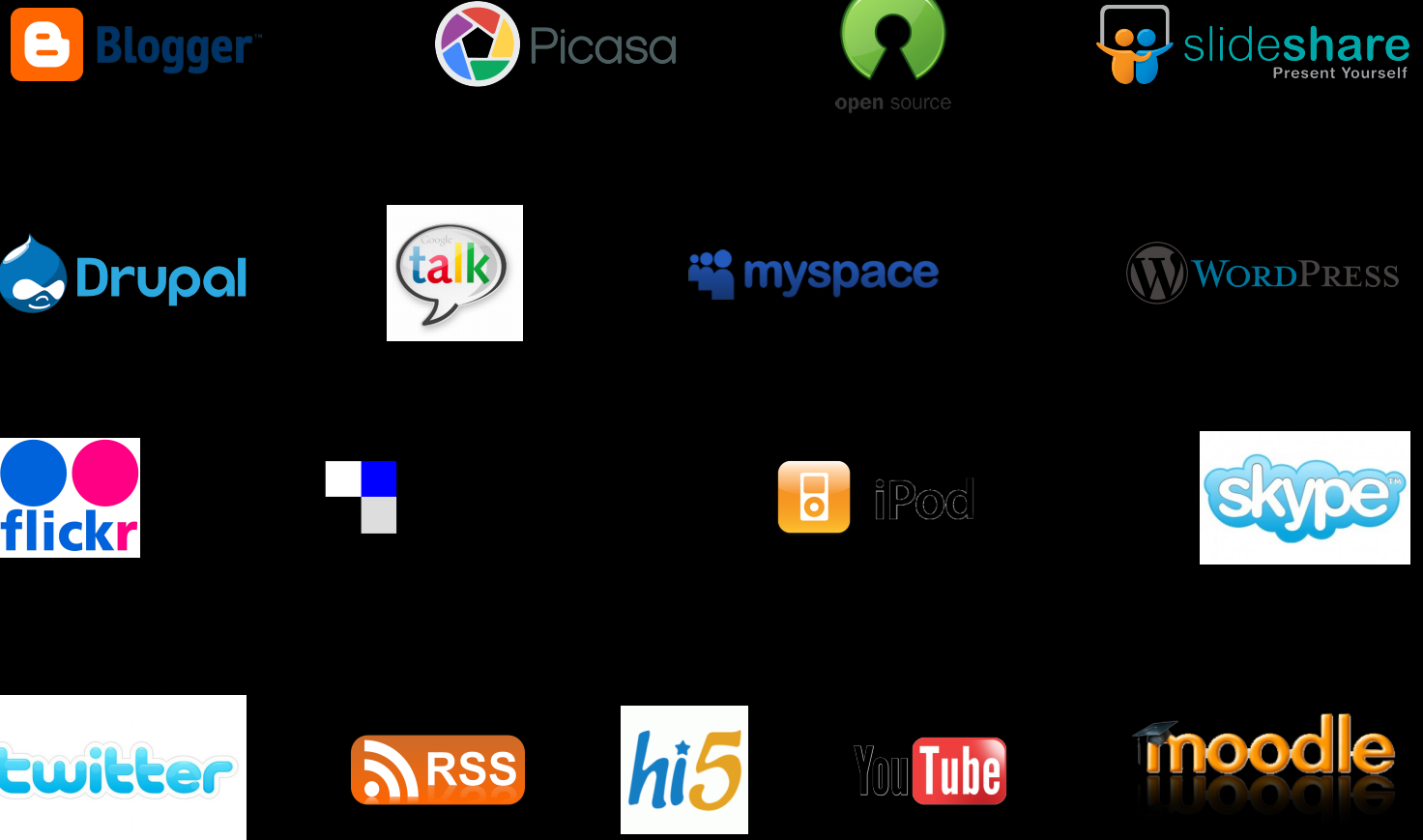
Challenge #3

Making it easier to use the data; it’s massive

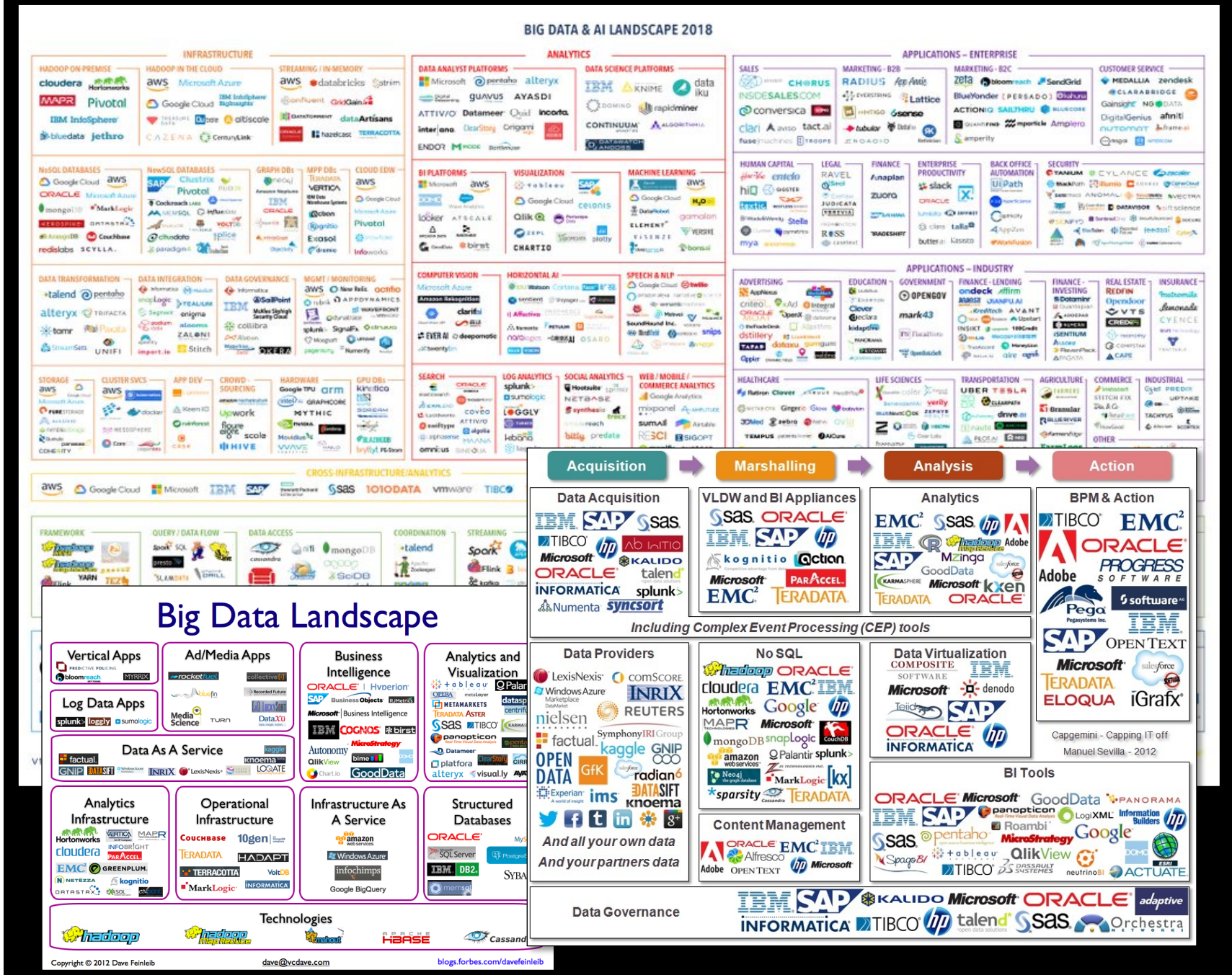
**“We’ve been here before”**

# “Big Data” started with Web 2.0

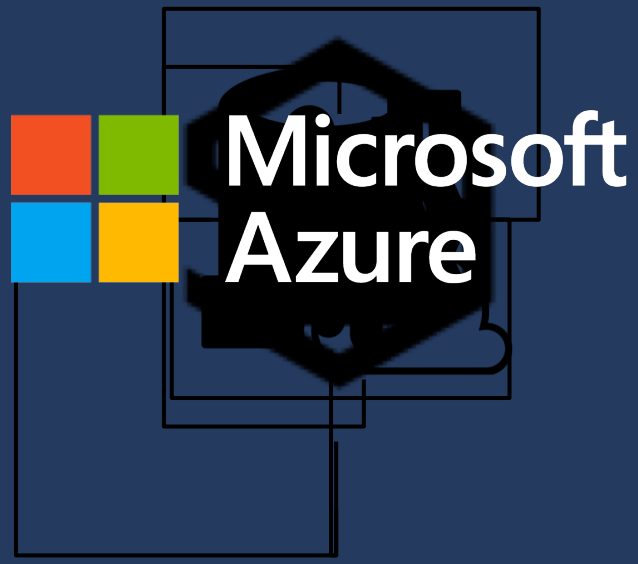
## Web 2.0 technologies

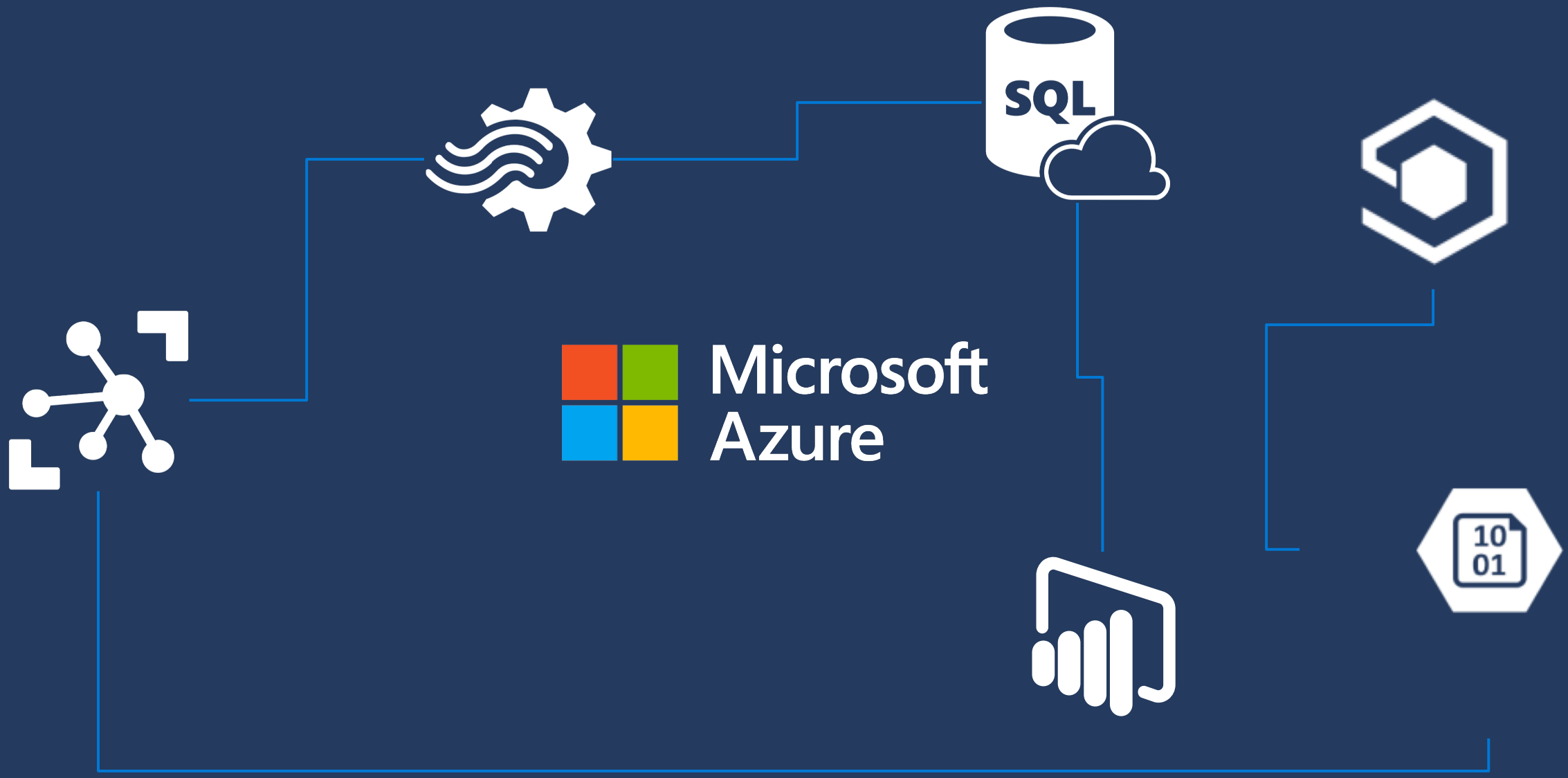


# Remember these?



# “Big Data” challenge 2.0


Microsoft
Azure


SQL
Microsoft
Azure
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# Microsoft's comprehensive IoT product portfolio

**Azure Security Center for IoT**

## Azure IoT priority verticals

Manufacturing | Retail | Agriculture | Energy | Smart Cities | Healthcare | Transportation

## Azure IoT solutions

- **Azure IoT Central** (SaaS)
- **Azure IoT reference architecture and accelerators** (PaaS)
- **Dynamics Connected Field Service** (SaaS)

## Azure Services for IoT

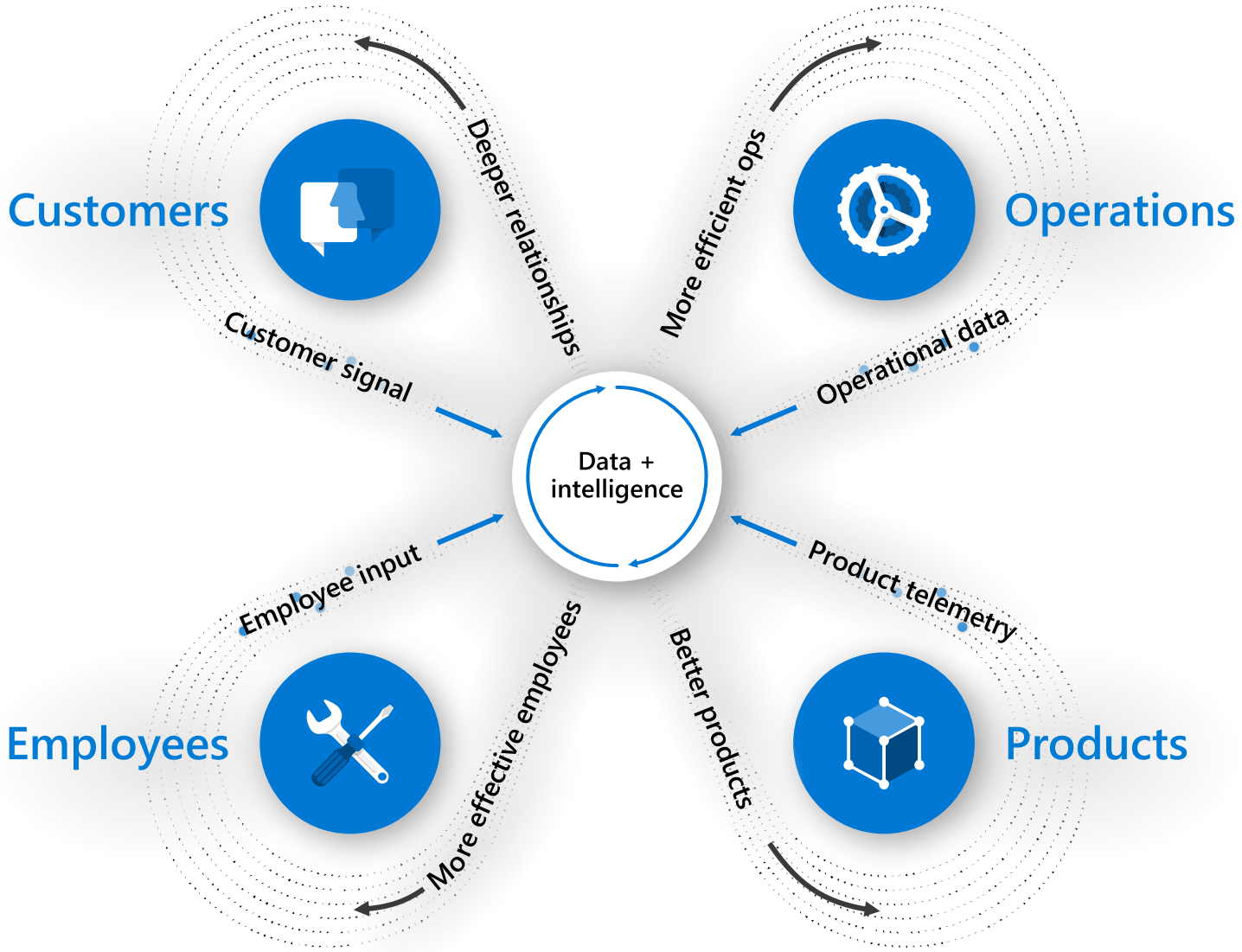
- Azure IoT Hub
- Azure IoT Hub Device Provisioning Service
- Azure Active Directory
- Azure AI
- Azure Cognitive Services
- Azure Cosmos DB
- Azure Data Share
- Azure DevOps
- Azure Digital Twins
- Azure Logic Apps
- Azure Maps
- Azure ML
- Azure Monitor
- Azure Spatial Anchors
- Azure Stream Analytics
- Azure Time Series Insights
- Power BI

## IoT and Edge device support

- Azure IoT Device SDK
- Azure IoT Edge
- Azure Sphere
- Windows IoT
- Azure Certified for IoT device catalog
- Azure Cognitive Services
- Azure Functions
- Azure ML
- Azure SQL
- Azure Storage
- Azure Stream Analytics
- Data Box Edge

# The digital feedback loop

1. Data: Capture digital signal across business
2. Insight: Connect and synthesize data
3. Action: Improve business outcomes



# What is confidential computing?

The ability to store, transport, **and act** on compute workloads without compromising privacy of data and intellectual property

# Why confidential computing in IoT

Intelligent edge computing creates the need to protect code and data in use in addition to protection in storage and transit

**Code and data confidentiality**

Proprietary code and algorithms

Sensitive data like patient information and ML models

**Actions from insights**

Safe actions from insights out of intelligent edge processing

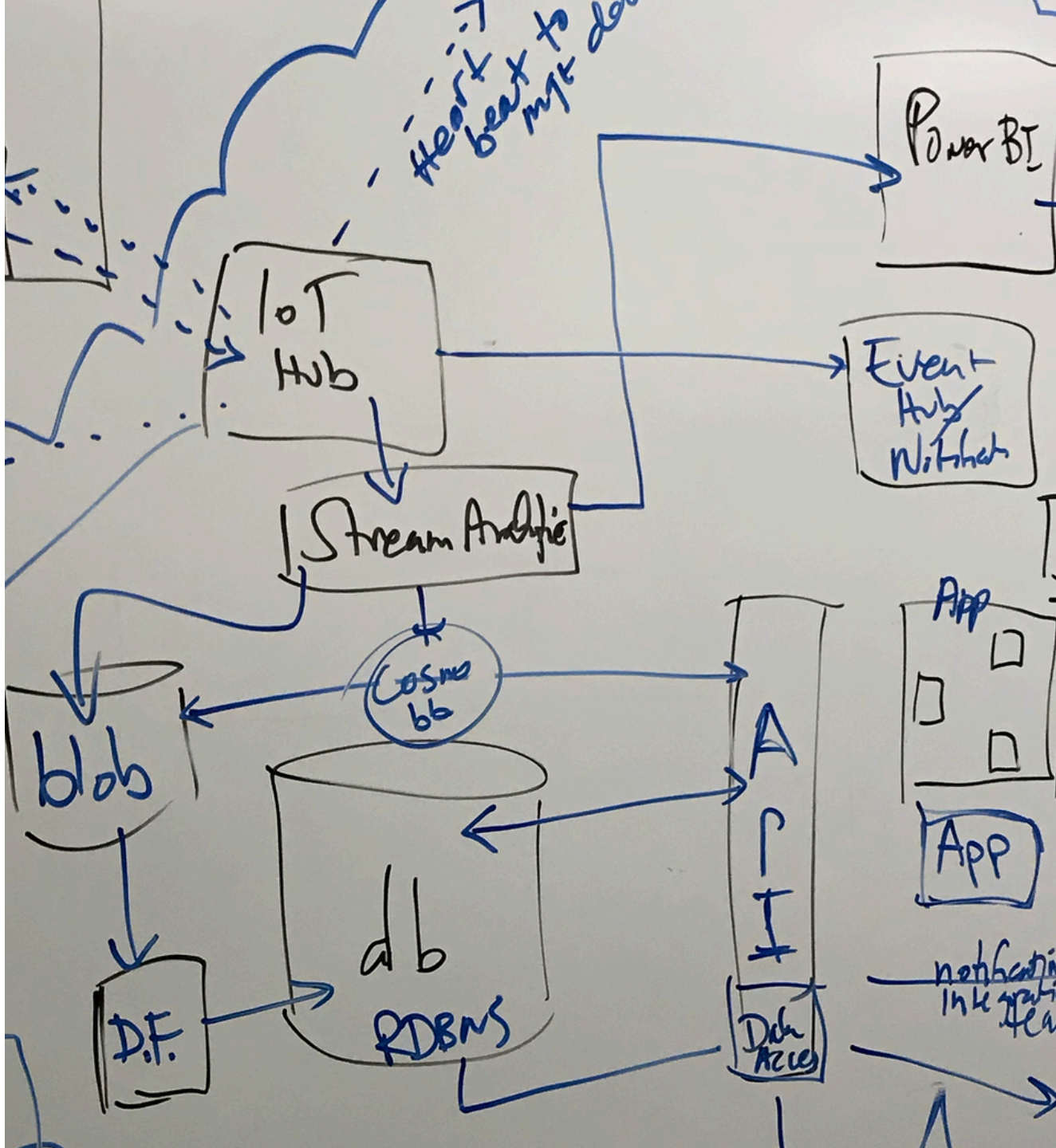
Trustworthy I/O for command and control of critical infrastructure

**Valued transactions**

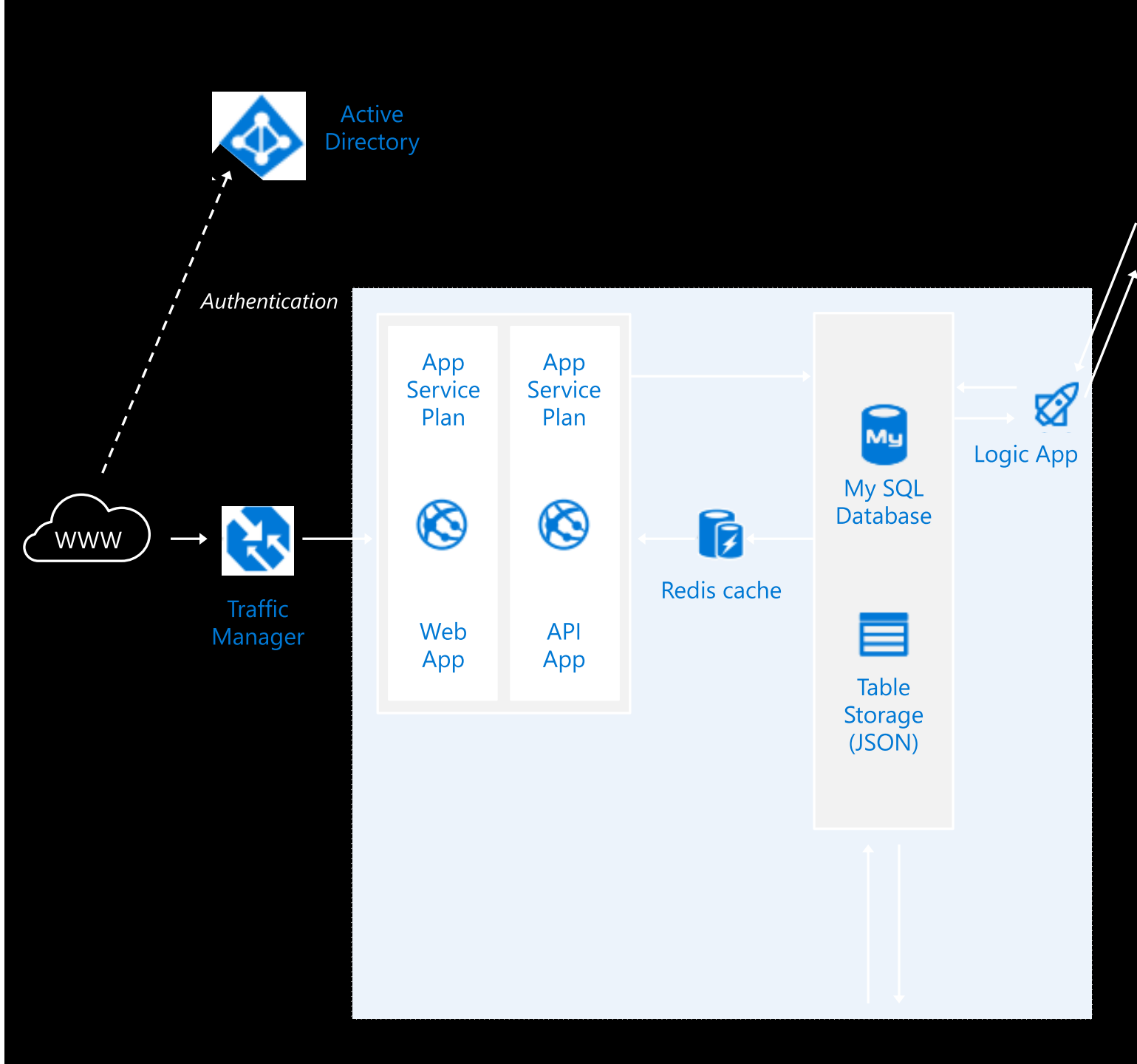
Metering actions for billing

Events tracking e.g., violations for warranty management

# The anatomy of the architectural design session



# The output

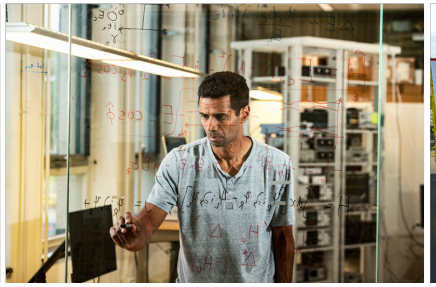

Active Directory
Authentication
WWW
Traffic Manager
App Service Plan
Web App
App Service Plan
API App
Redis cache
My SQL Database
Table Storage (JSON)
Logic App



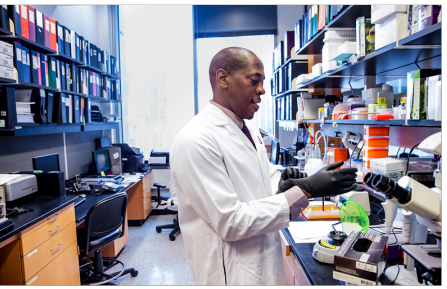


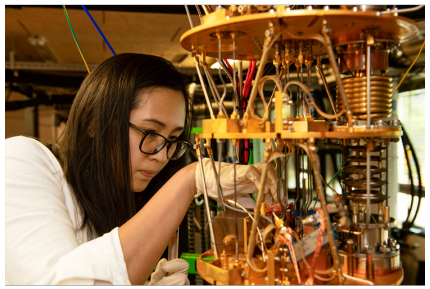




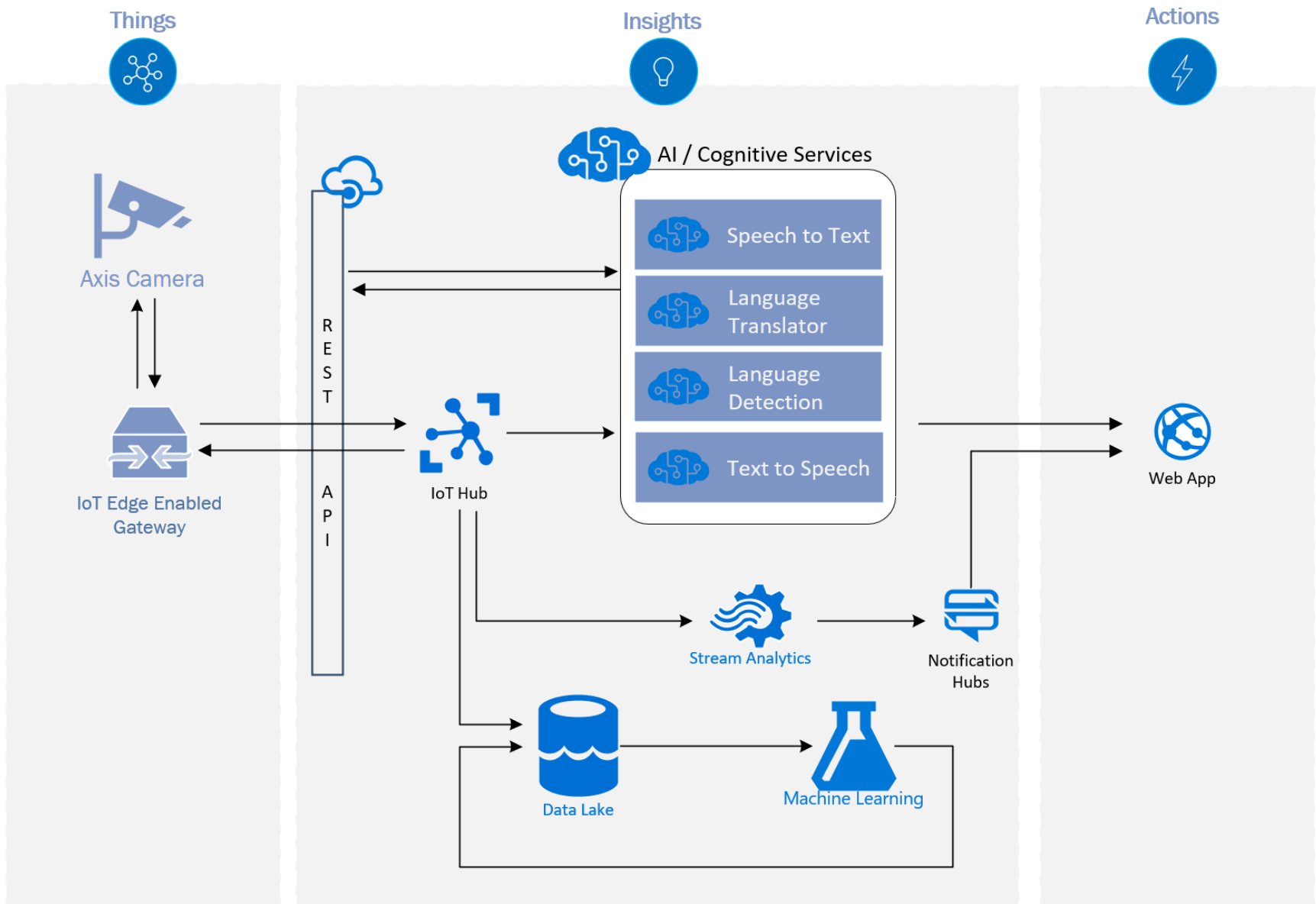
# more



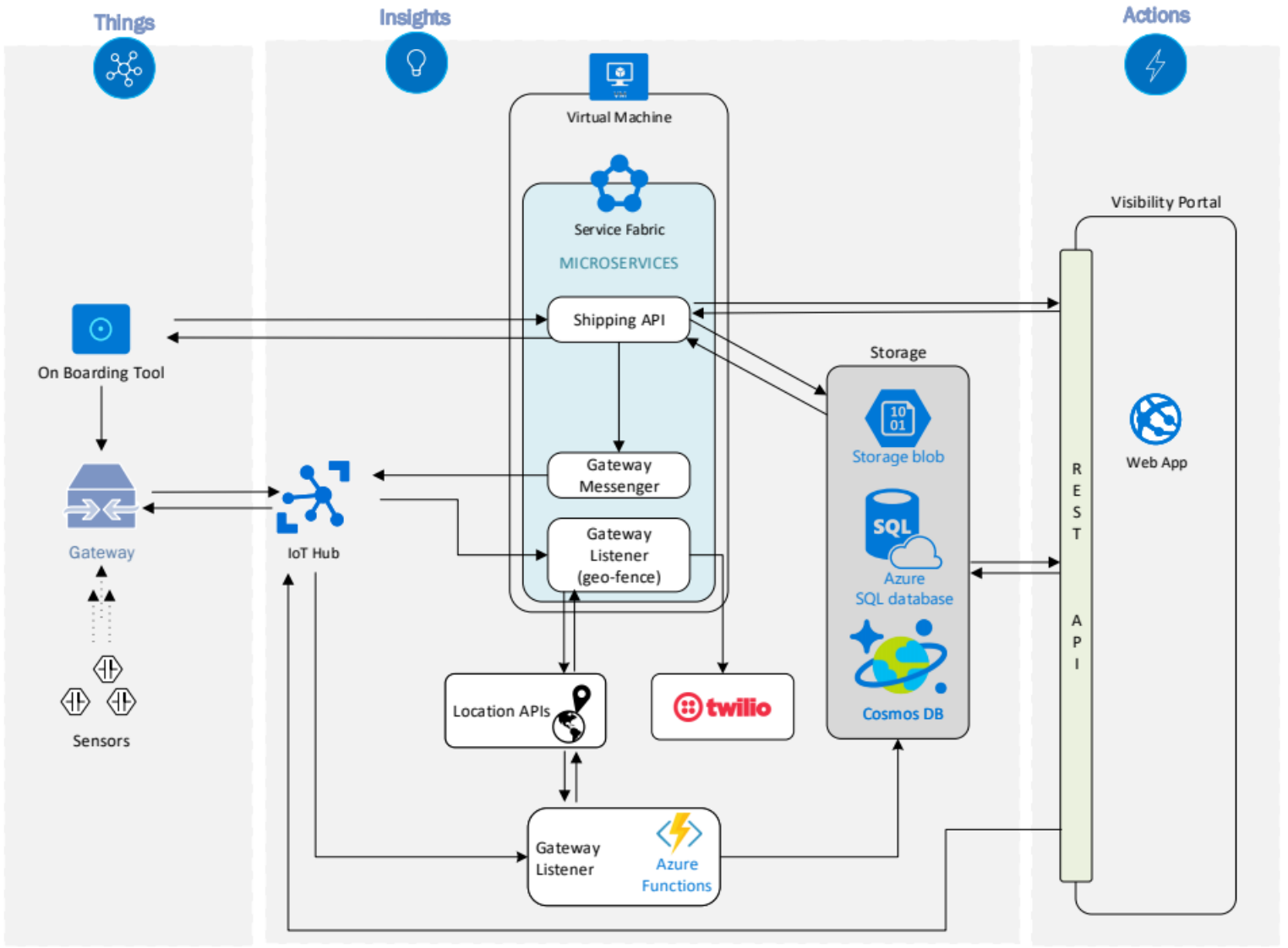





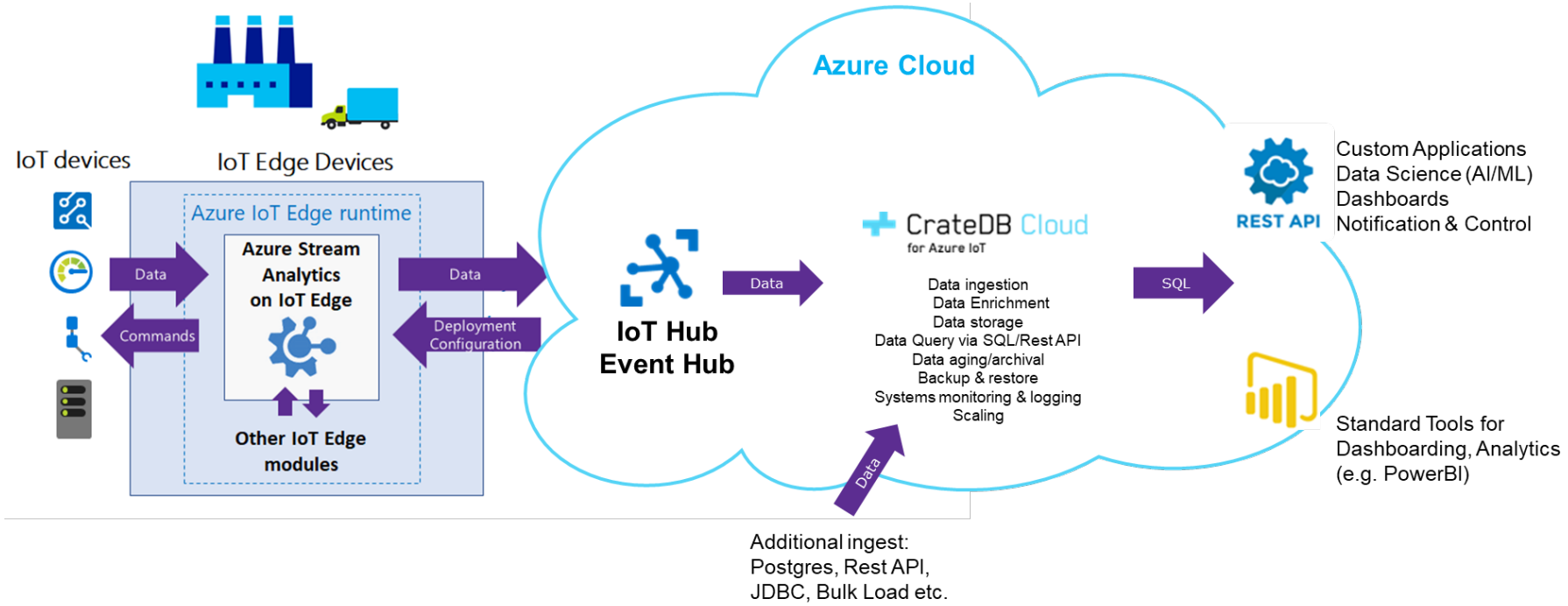




Things
Insights
Actions
AI / Cognitive Services
Speech to Text
Language Translator
Language Detection
Text to Speech
Axis Camera
IoT Edge Enabled Gateway
REST API
IoT Hub
Web App
Stream Analytics
Notification Hubs
Data Lake
Machine Learning

# And even one more



# Industrial Automation Use case



Microsoft

# Partner Crate.io

CEO Christian Lutz

IoT in Action

# CrateDB for Azure IoT

Powerful, fast, scalable and purpose-built for industrial IoT

- Built for industrial environments
- Unlimited data scaling
- Real-time insights and optimization

CrateDB

# Built for industrial environments

Get a time series database that delivers the sub-second speed, scalability, and cost efficiency required for industrial use cases.

Handle massive amounts of data quickly with 10x faster performance than traditional time series databases.

Integrates easily with existing systems (e.g. ERP, QA, Procure) to enable issue tracking throughout the supply chain.

Ensure data availability 24x7 with built-in active-active replication, self-healing failover, and rolling software updates.

Protect data with enterprise-grade security, including the ability to establish individual identities and credentials for each connected device and application.

CrateDB

# Unlimited data scaling

Meet the most demanding machine data requirements with the ability to collect and query millions of data points per second.


Sub-second, Industry 4.0 query speed (from 4 minutes on a relational database, e.g., Oracle or Db2, to 0.3 seconds on CrateDB).

Scale automatically and cost effectively without limits using automatic data rebalancing and a shared-nothing, masterless architecture.

Easily integrate and use CrateDB with BI, ETL, and other data tools via an ANSI SQL interface.

CrateDB

# Real-time insights and optimization

Analyze and act on data from factory equipment in real time to continuously improve operations and drive efficiency.

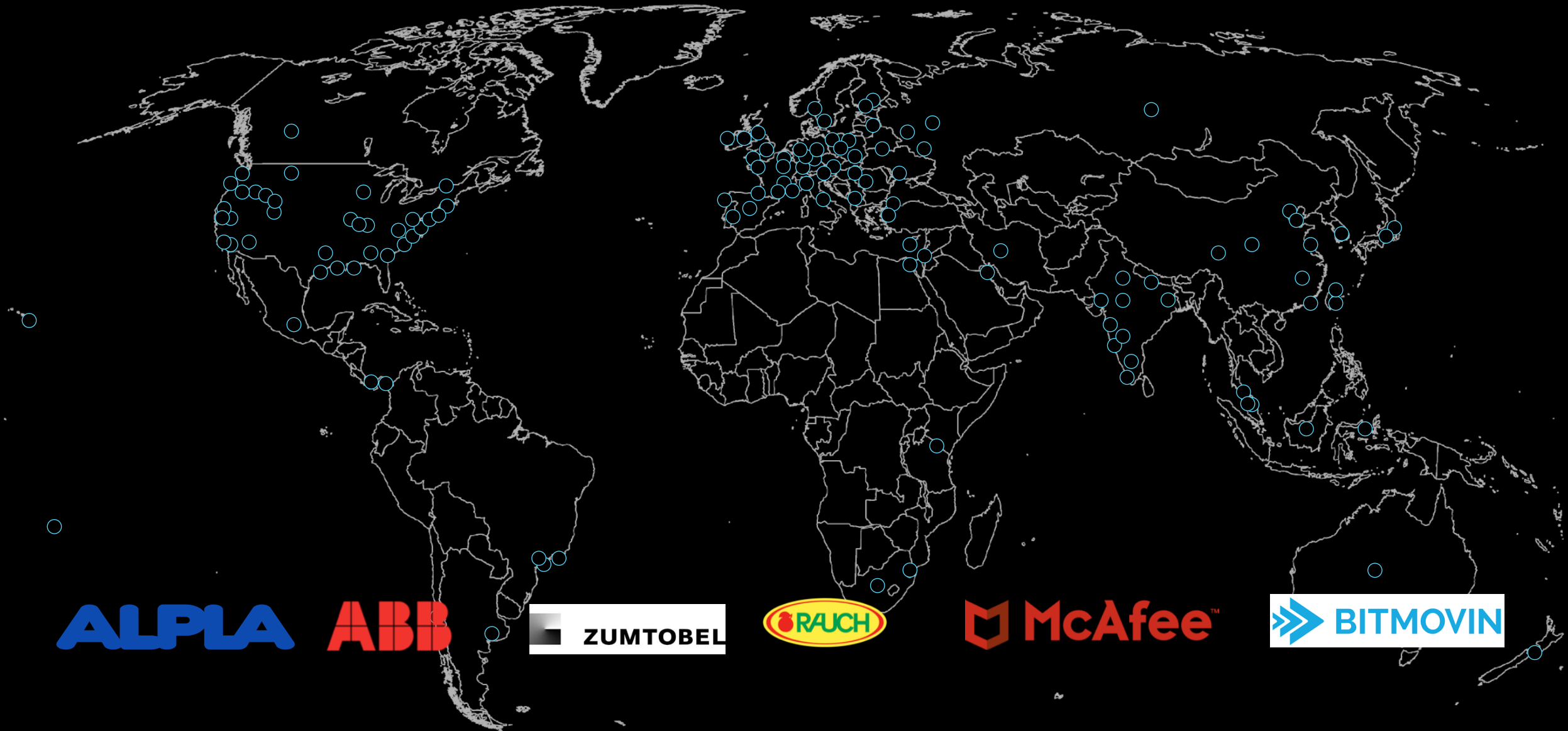
Improve equipment performance with the ability to instantly identify issues and take corrective action right on the factory floor.

Enable real-time decision making through sub-second queries, distributed processing and in-memory columnar indexes.

Create complex analytics with the full power of ANSI SQL, search, and user-defined functions.

Partition data by time intervals to speed up queries and make data aging policies easy to administer.

# 1600 customers use CrateDB already globally



Microsoft

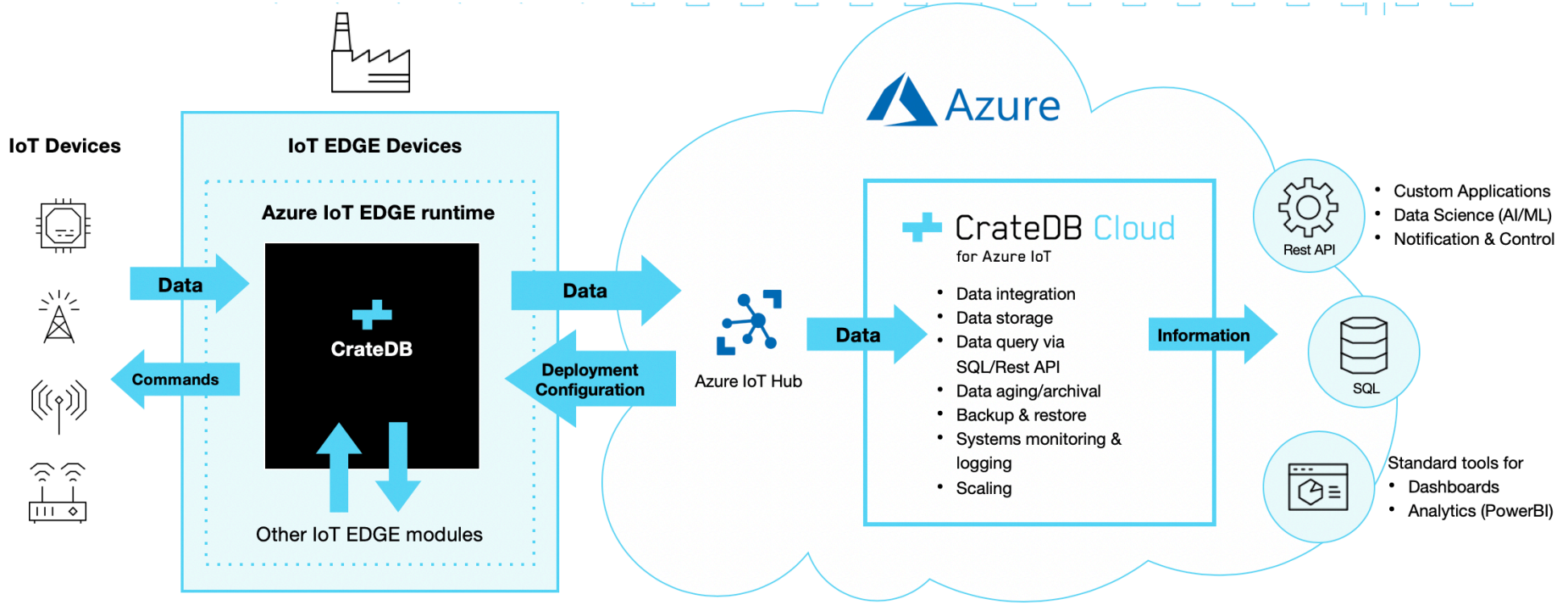
CRATE.IO

# Demo: Realtime Analytics from Edge to Cloud

CEO Christian Lutz

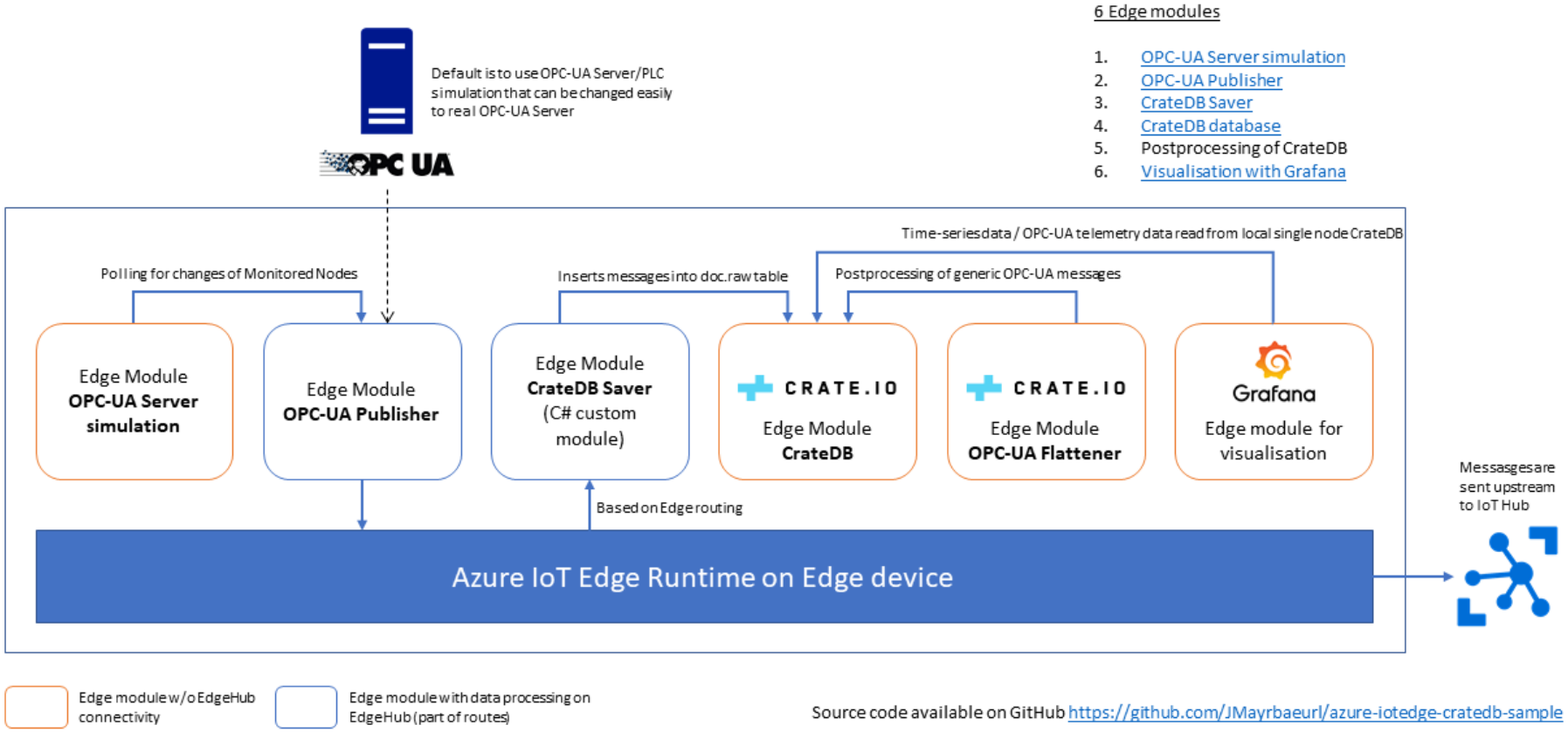
IoT in Action

# Microsoft IoT Hub & CrateDB Cloud for Azure IoT

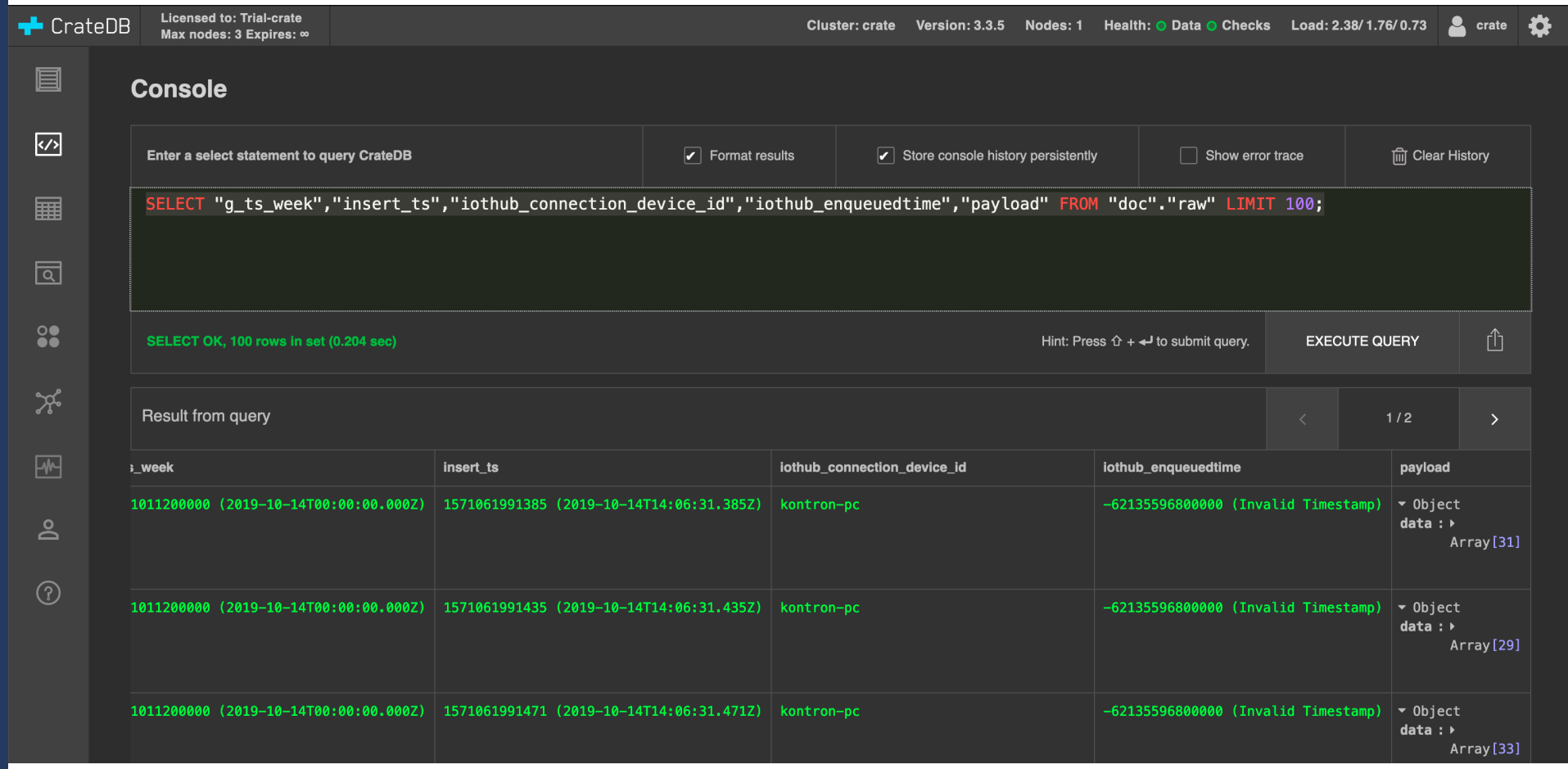



**Fully integrated in Azure stack - IoT Hub/ Event Hub connected**

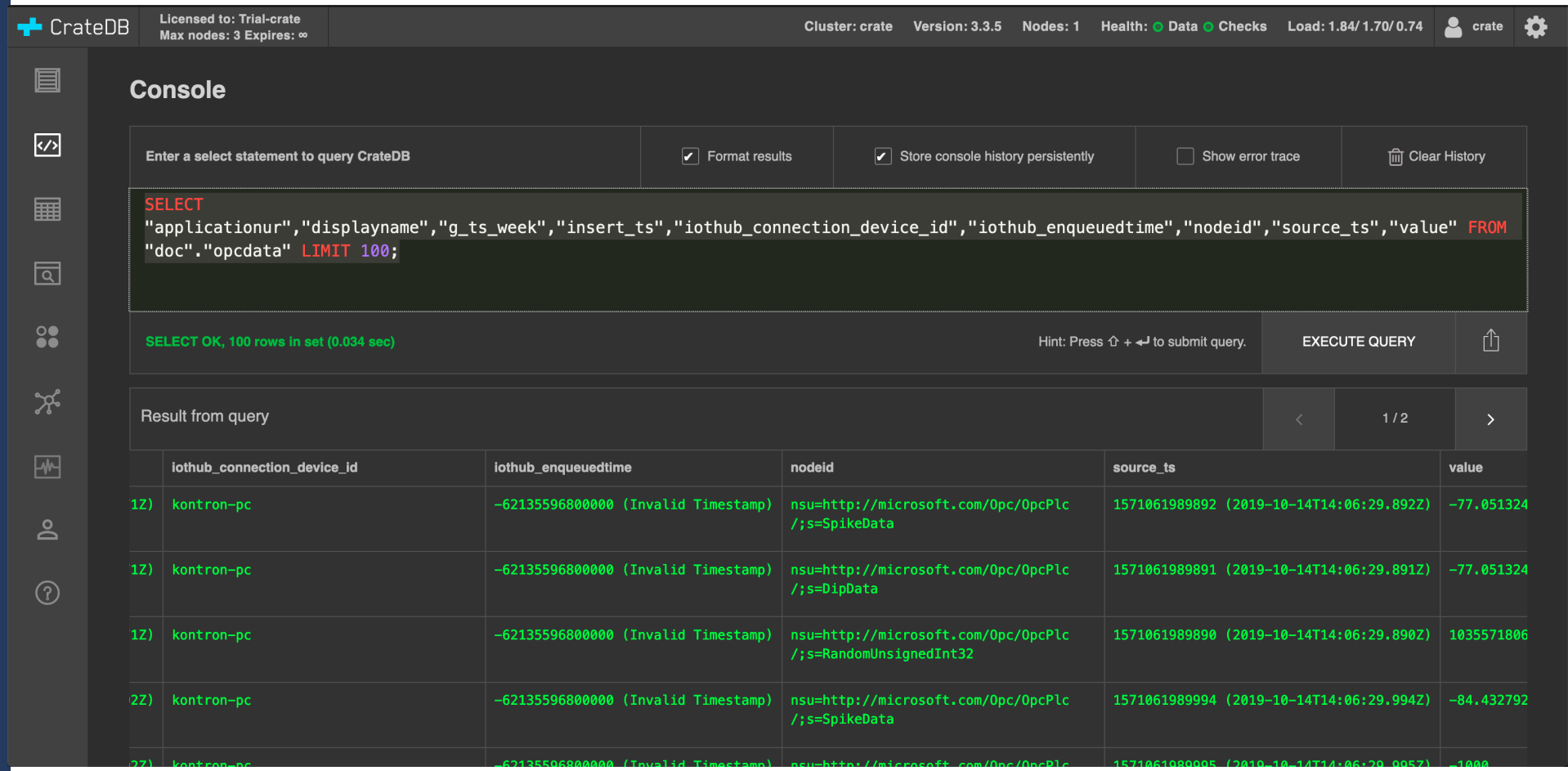
# Microsoft IoT Edge and CrateDB



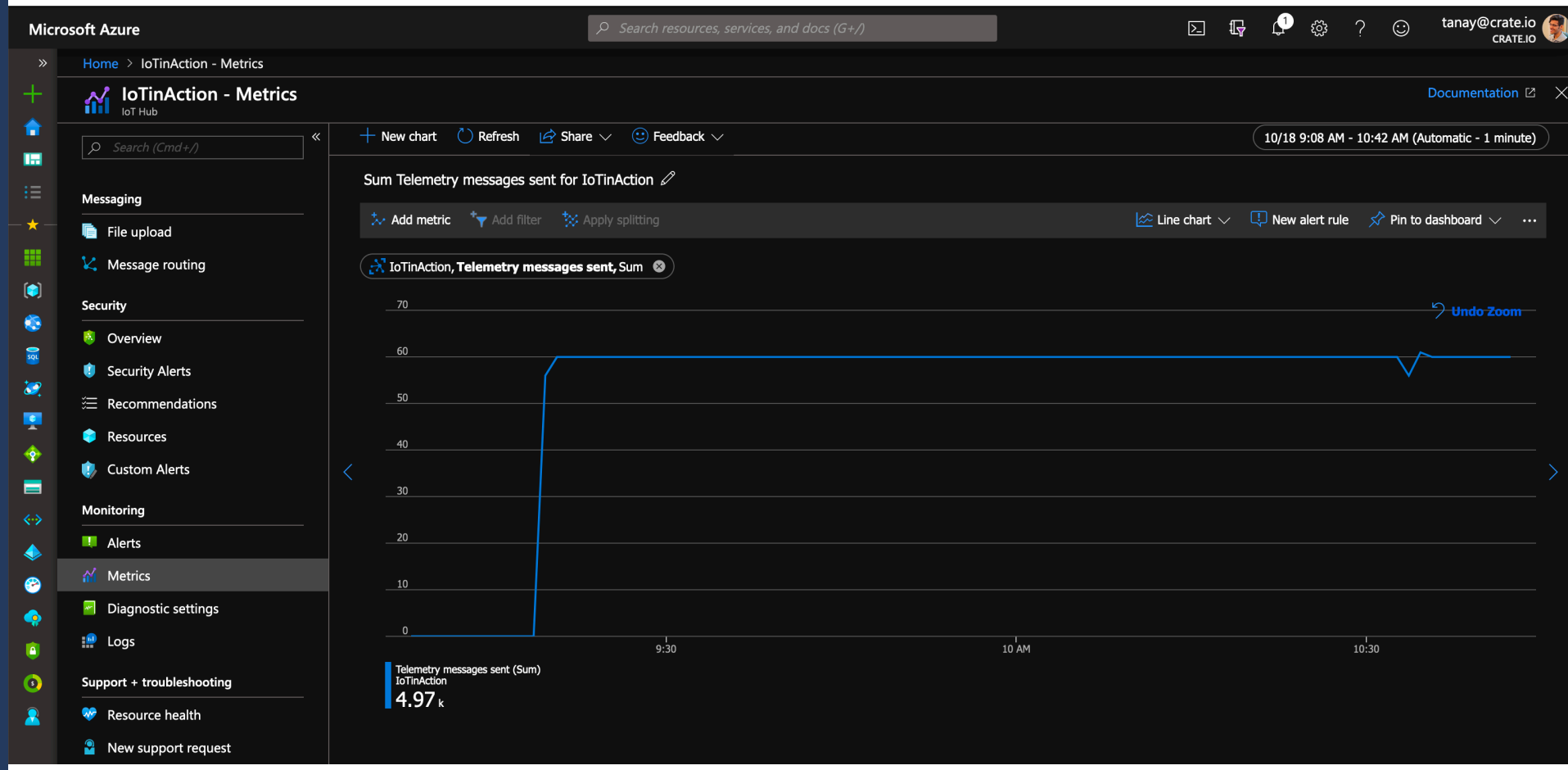
# Raw OPC-UA Data on CrateDB



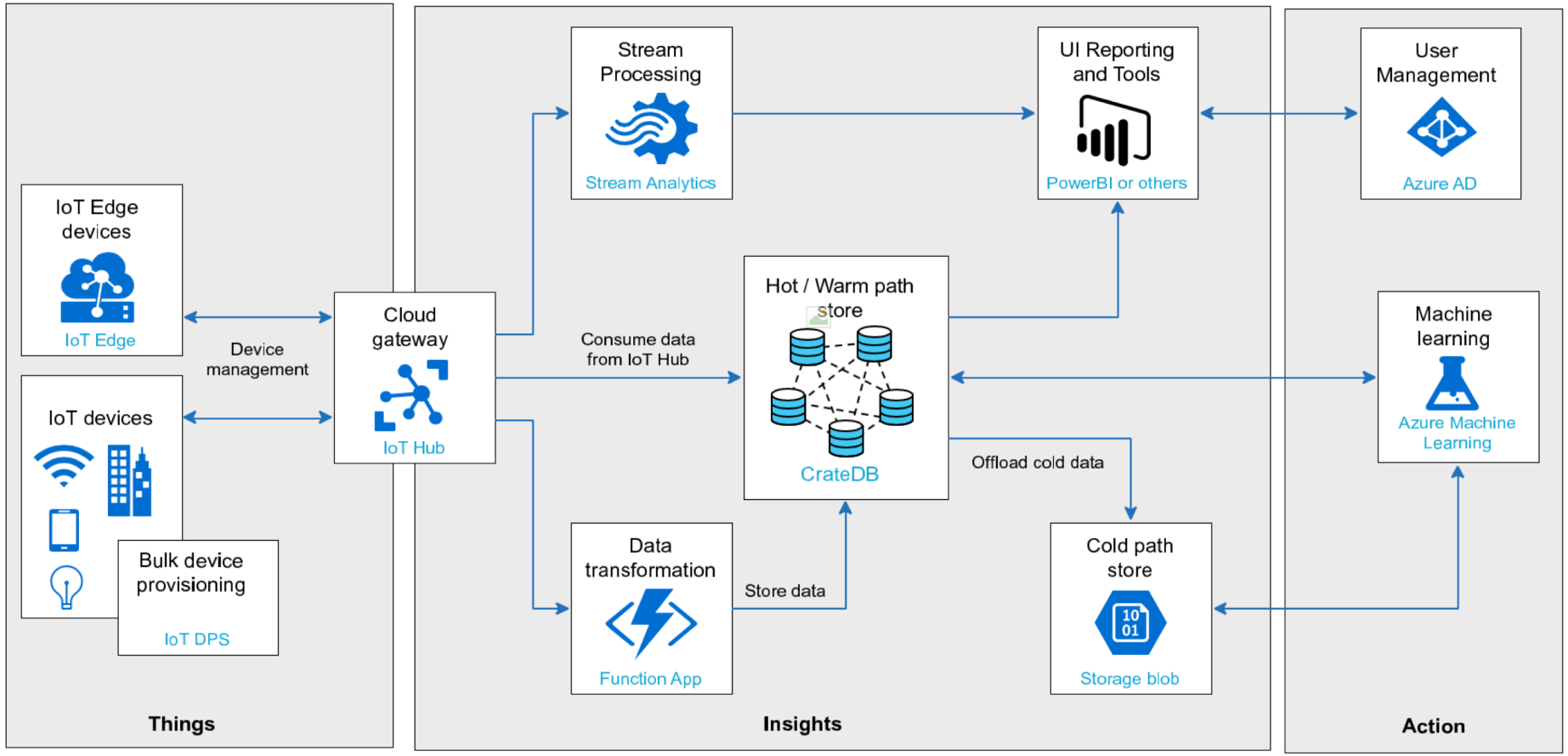
# Enriched OPC-UA Data on CrateDB



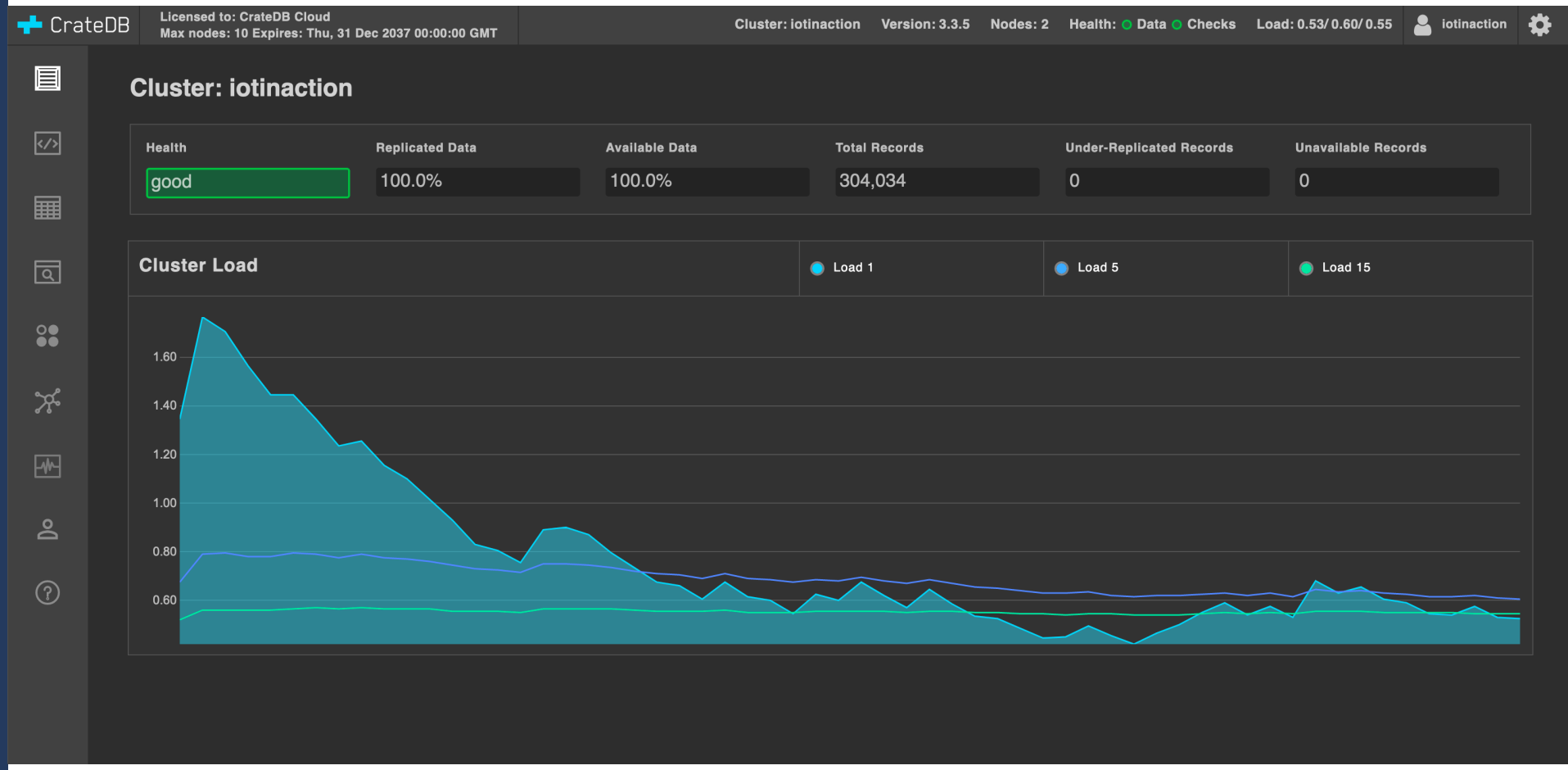
# Enriched Data in IoT Hub



# CrateDB Cloud on Microsoft Azure

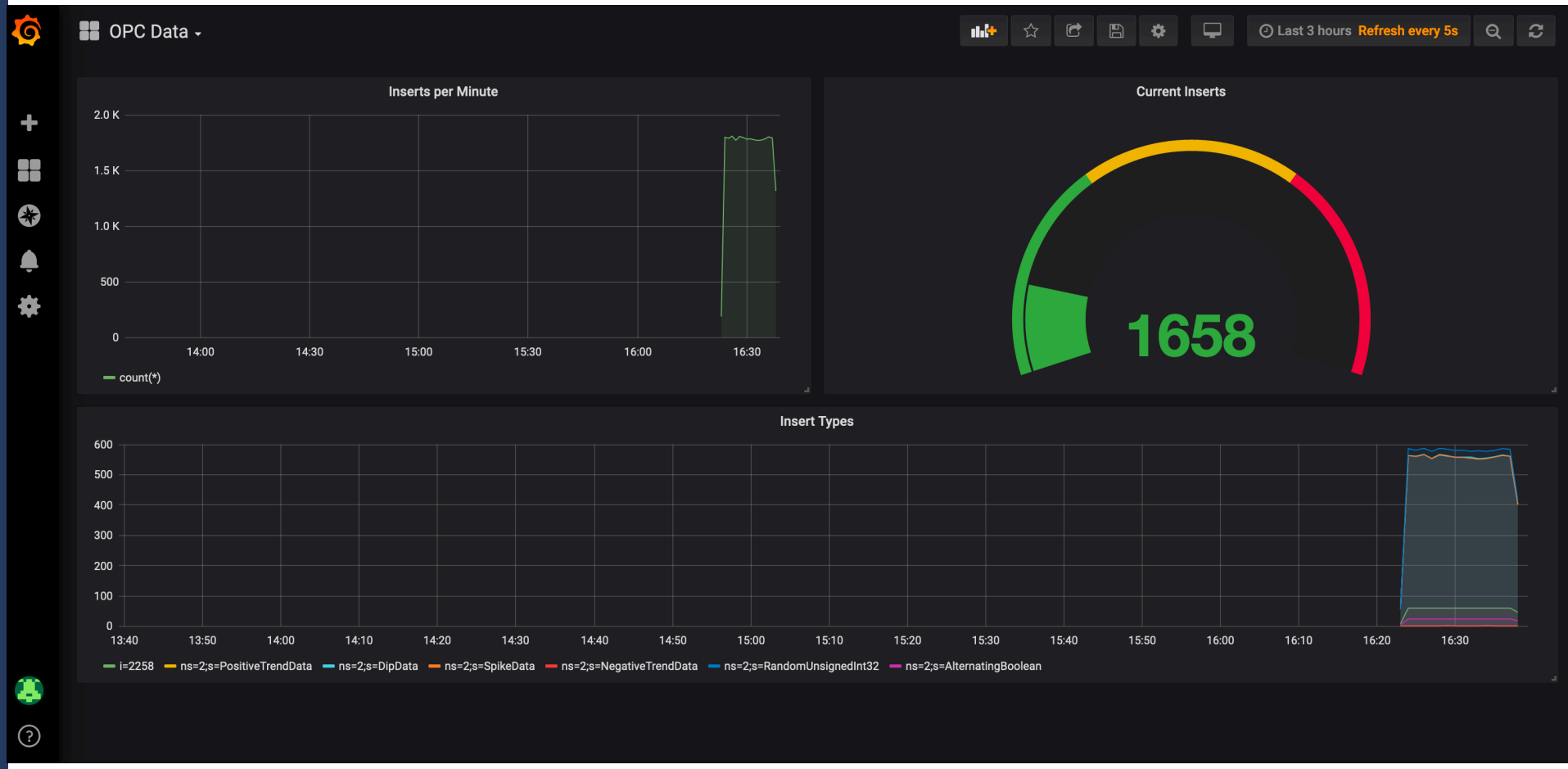


# Enriched Data on CrateDB Cloud




https://iotinaction.westeurope.azure.cratedb.net:4200/

# Visualizing Data from CrateDB Cloud with e.g. Grafana




https://westeurope.azure.cratedb.cloud/grafana/?orgId=a4e0a543-ef7b-49bb-8e89-4fb28c60204

Microsoft

CRATE.IO

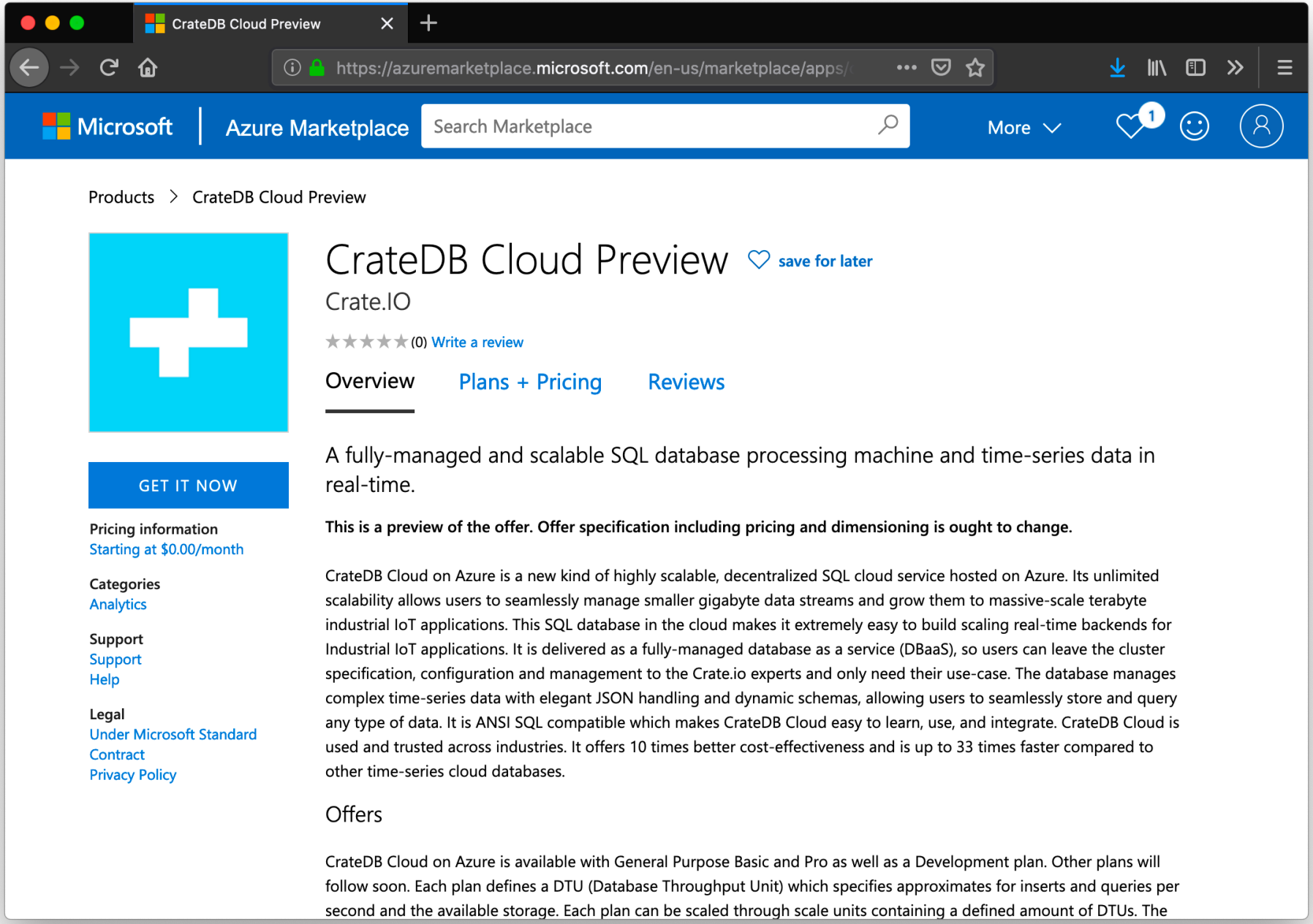
The power and ease of an SQL database. Purpose-built to scale modern applications in a machine data world.

Designed to handle the complexity of time series workloads in real-time, CrateDB Cloud is a fully-managed database-as-a-service, secured, scaled and operated by the engineers that built CrateDB.

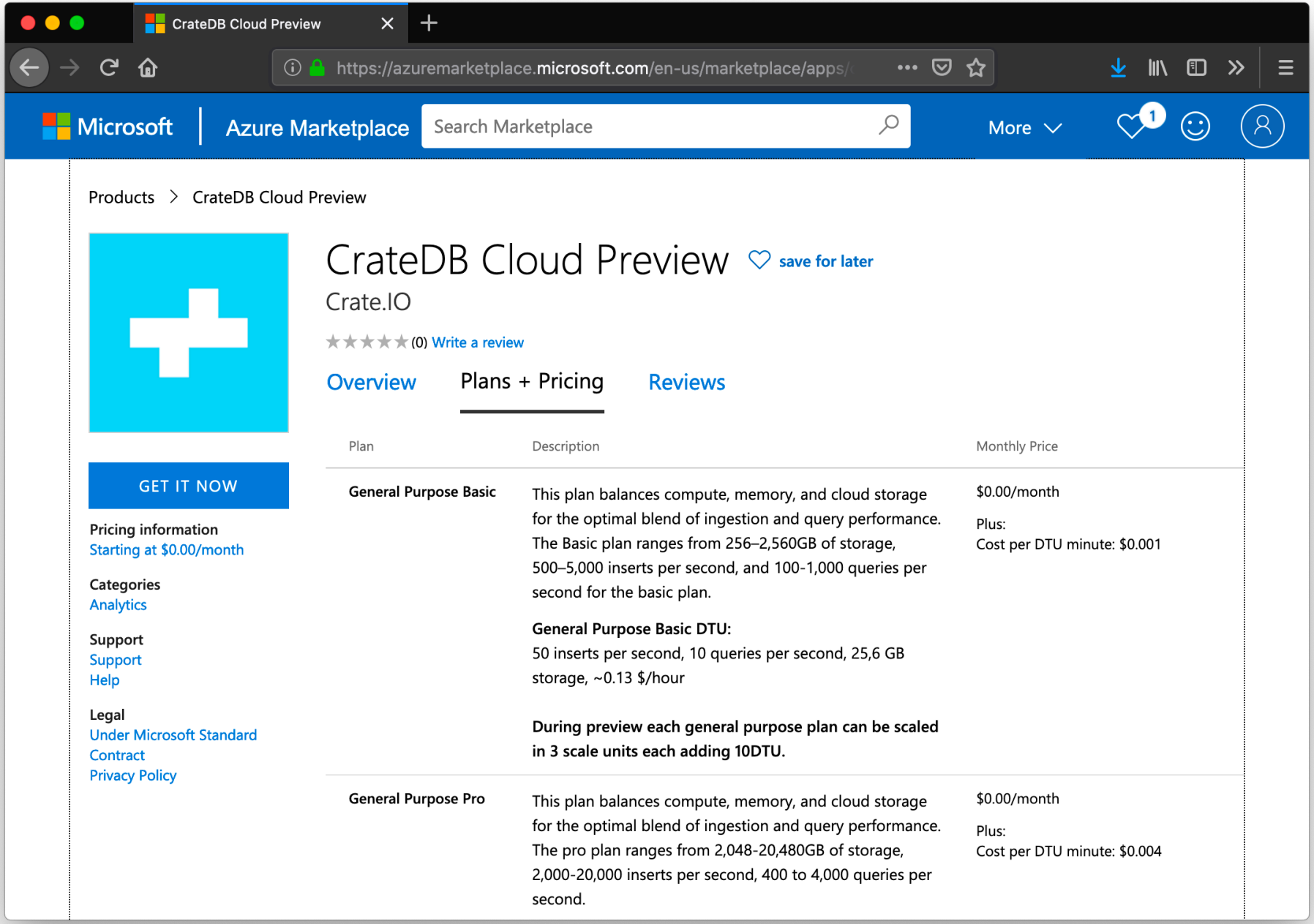
**Now fully integrated into the Azure Marketplace and Portal.**

- Built as Cloud native DBaaS
- Dimensioning and cost defined by capacity and throughput
- Comes in three flavours:
  - General Purpose
  - Storage Optimised (soon)
  - IO Optimised (soon)
- General Purpose starting at $500 for 500 Inserts and 100 queries per second
- Move from Preview to General Available in late November.

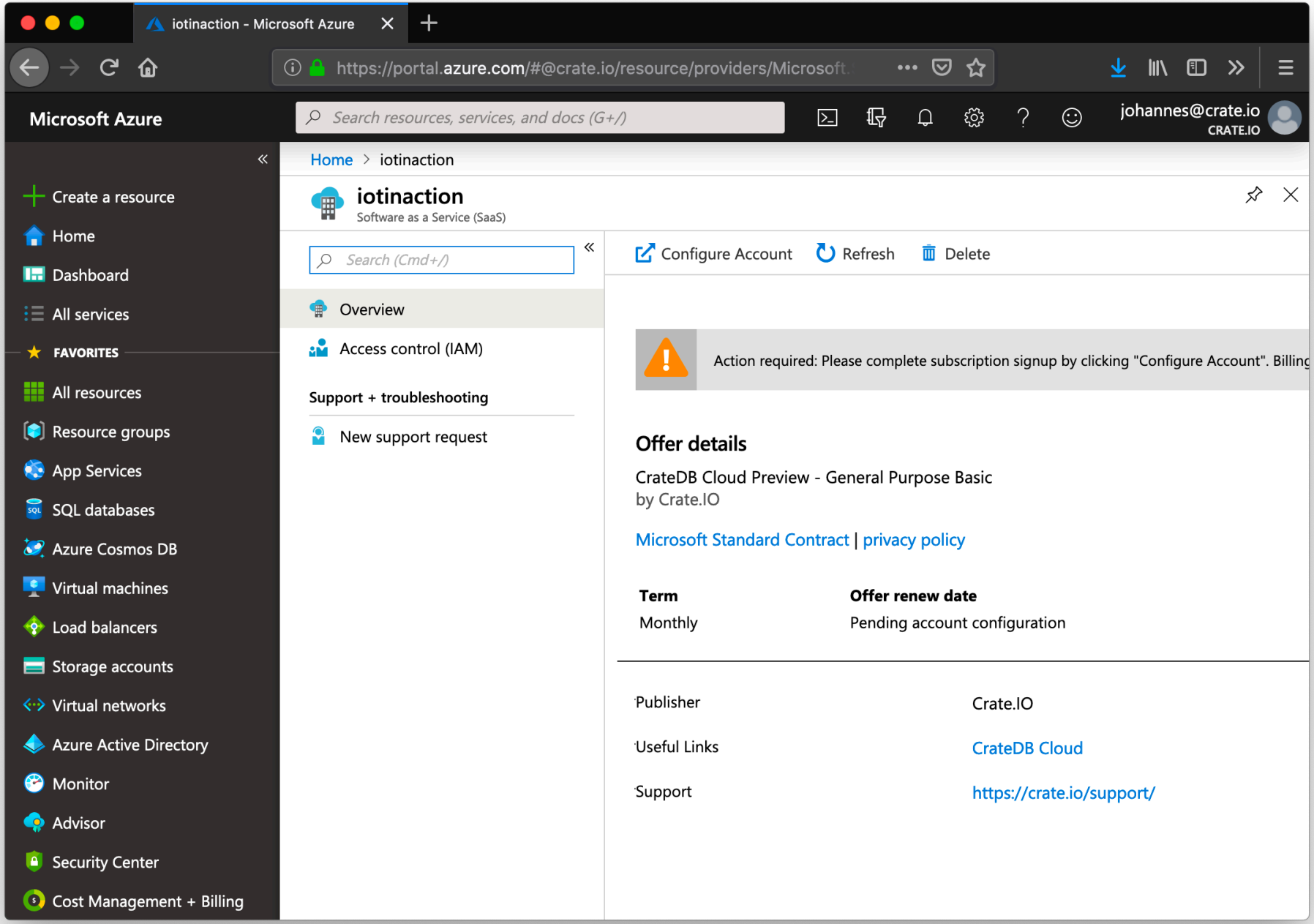
# Available in the Azure Marketplace



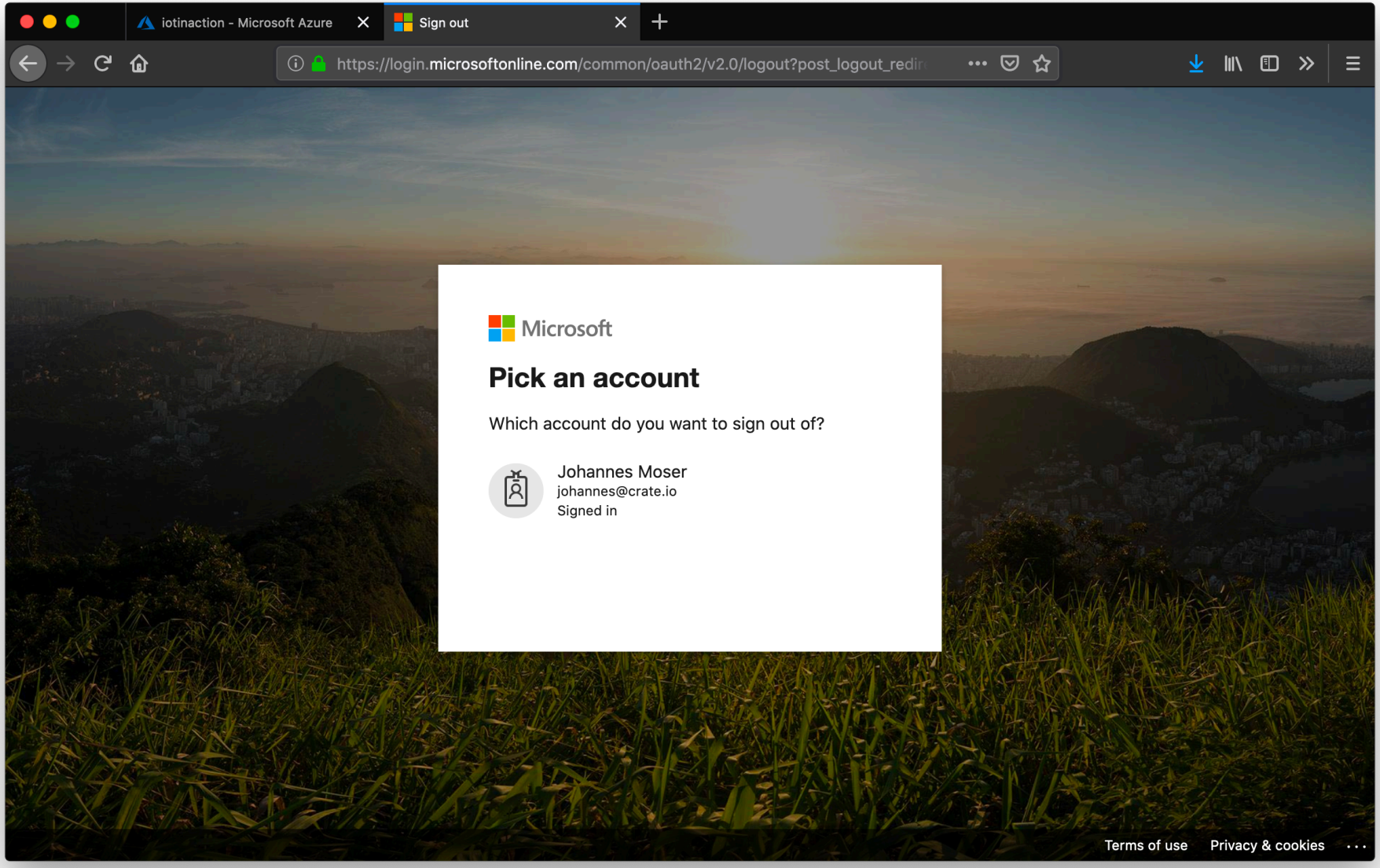
# Three optimised plans in two scale approximates each



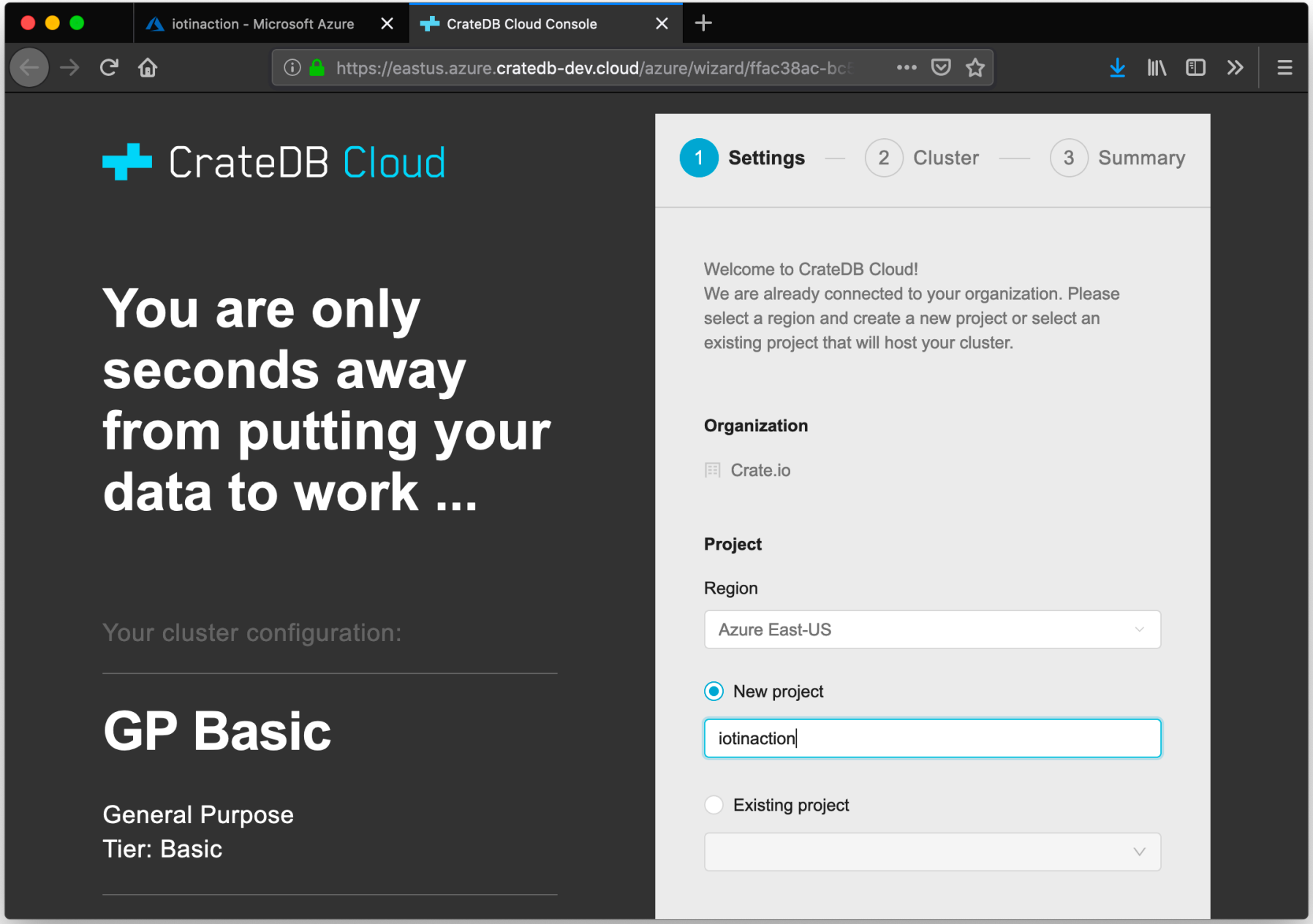
# Listed as Resource in the Azure Portal



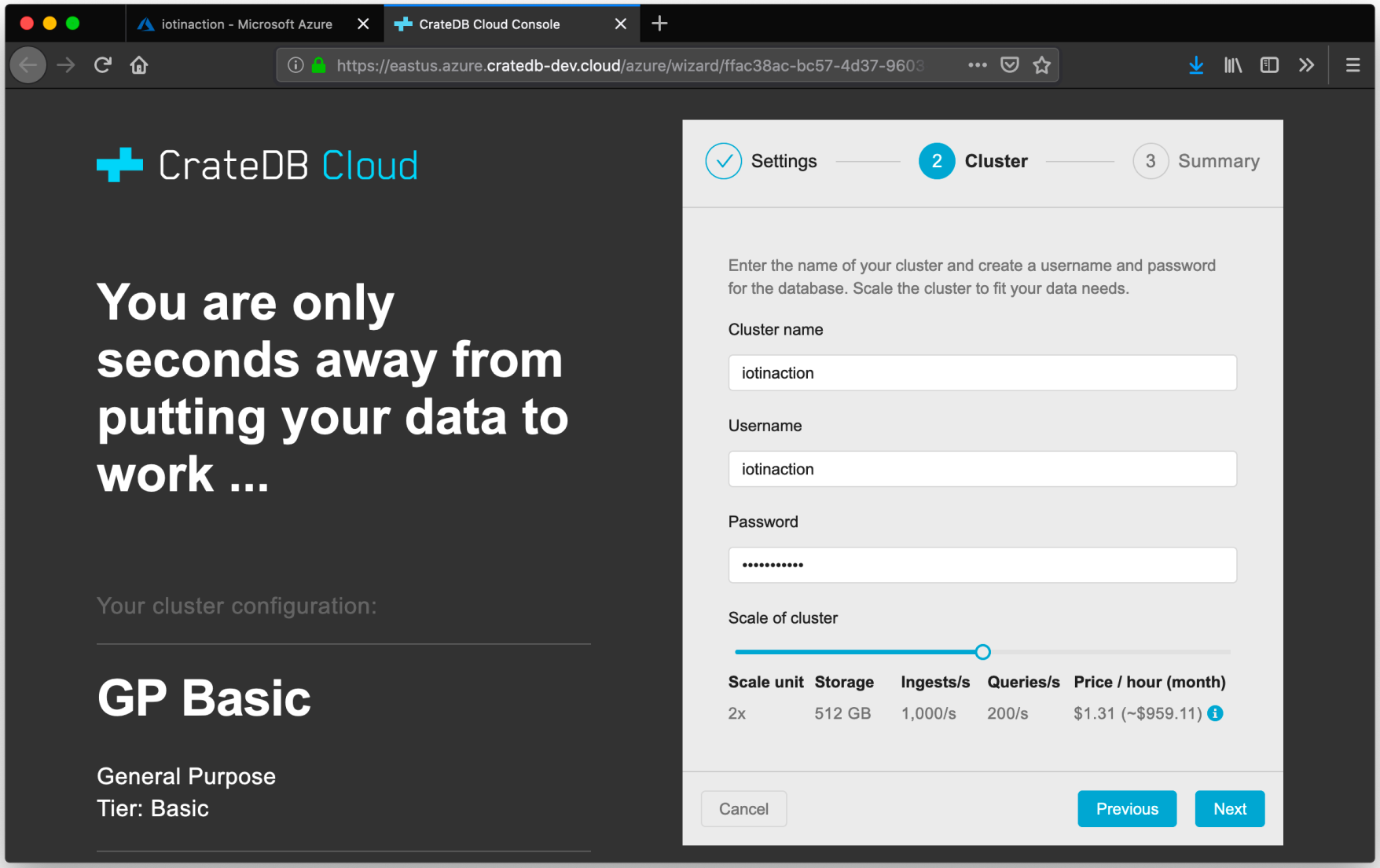
# Login through Azure AD



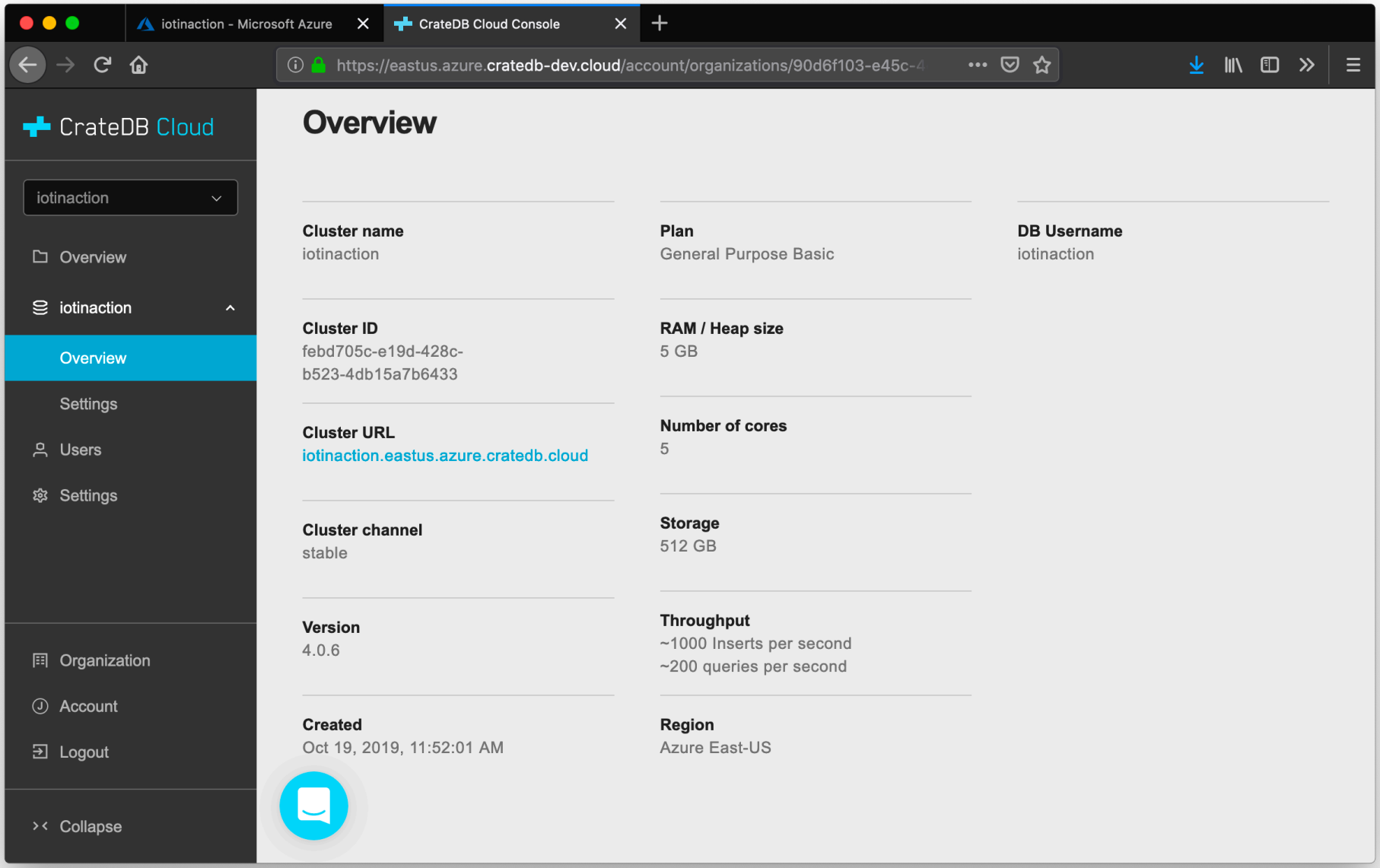
# Setting up CrateDB Cloud



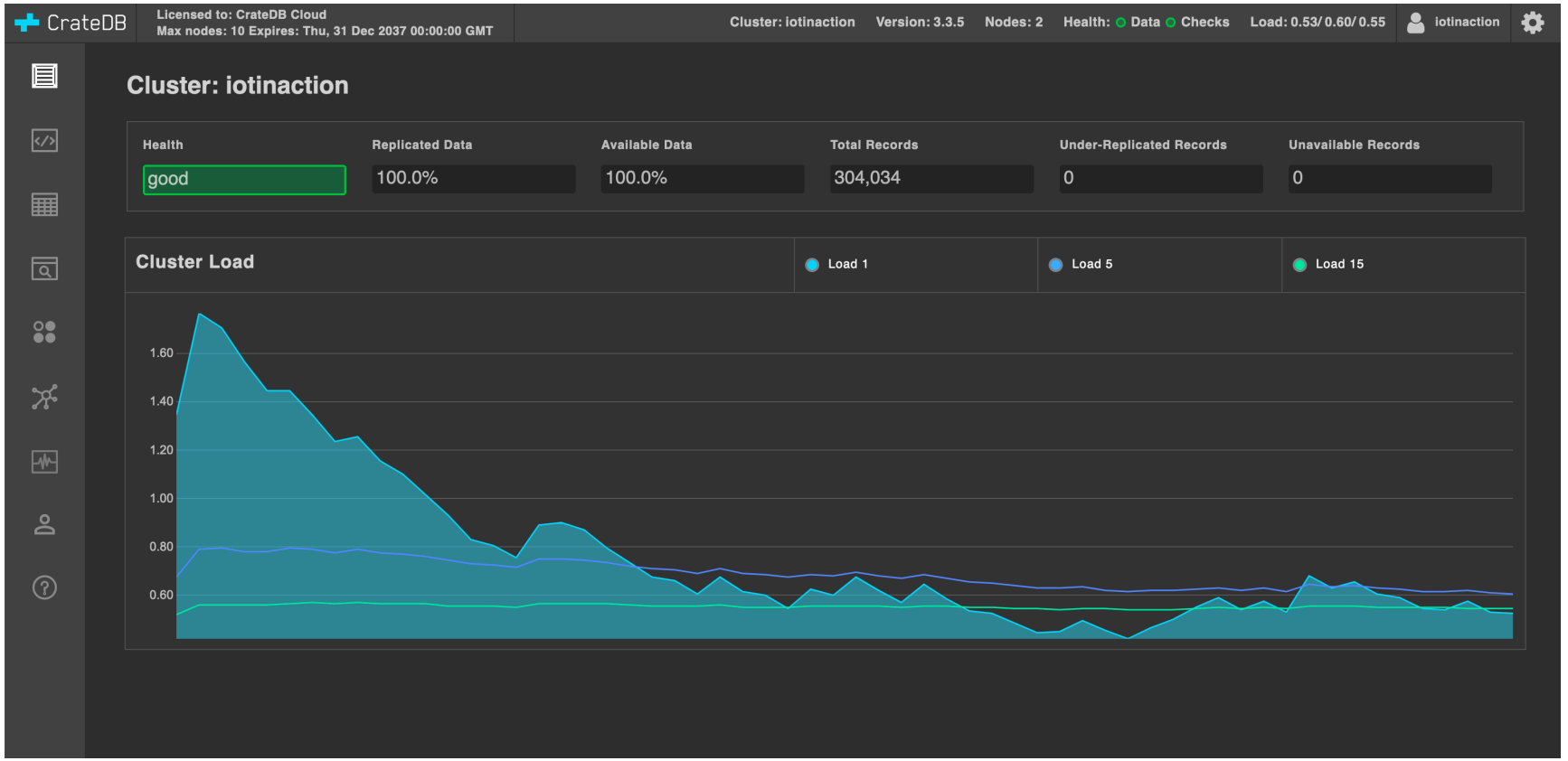
# Dimensioning the cluster



# Ready to go


iotinaction - Microsoft Azure
CrateDB Cloud Console
https://eastus.azure.cratedb-dev.cloud/account/organizations/90d6f103-e45c-4
CrateDB Cloud
iotinaction
Overview
iotinaction
Overview
Settings
Users
Settings
Organization
Account
Logout
Collapse
Overview
Cluster name
iotinaction
Plan
General Purpose Basic
DB Username
iotinaction
Cluster ID
febd705c-e19d-428c-b523-4db15a7b6433
RAM / Heap size
5 GB
Cluster URL
iotinaction.eastus.azure.cratedb.cloud
Number of cores
5
Cluster channel
stable
Storage
512 GB
Version
4.0.6
Throughput
~1000 Inserts per second
~200 queries per second
Created
Oct 19, 2019, 11:52:01 AM
Region
Azure East-US

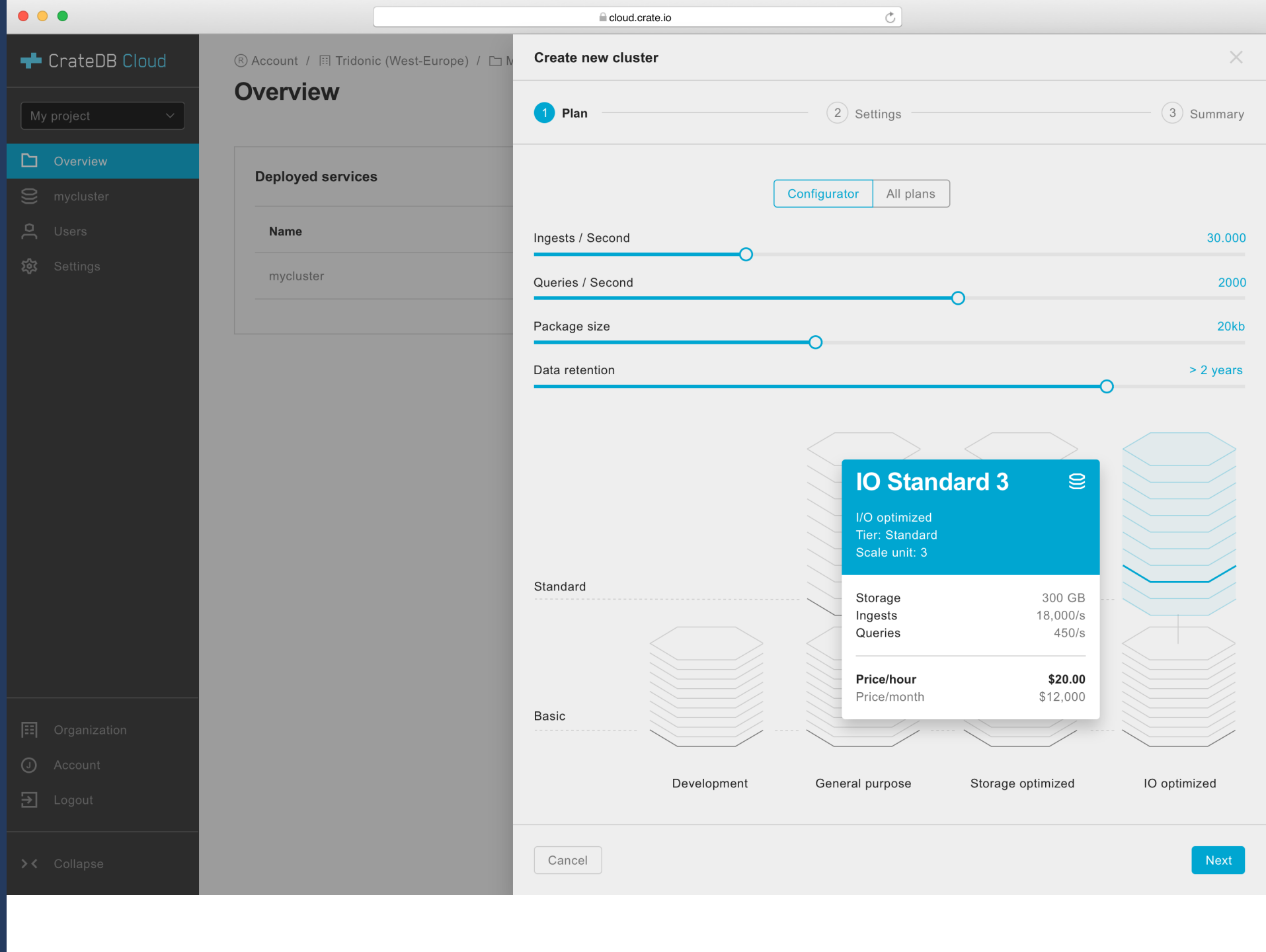
# Cluster deployed and ready for IoT in Action




CrateDB – integrated Management Console

# Dynamic Cluster Sizing and Scaling

*Full availability late November.*



Microsoft

CrateDB

# And now: try it out in Azure Marketplace :-)

See you at our booth !
Christian Lutz, CEO

IoT in Action


Skills needed
Skills currently have
SKILLS GAP

# Welcome to Microsoft Learn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Time investment expectation

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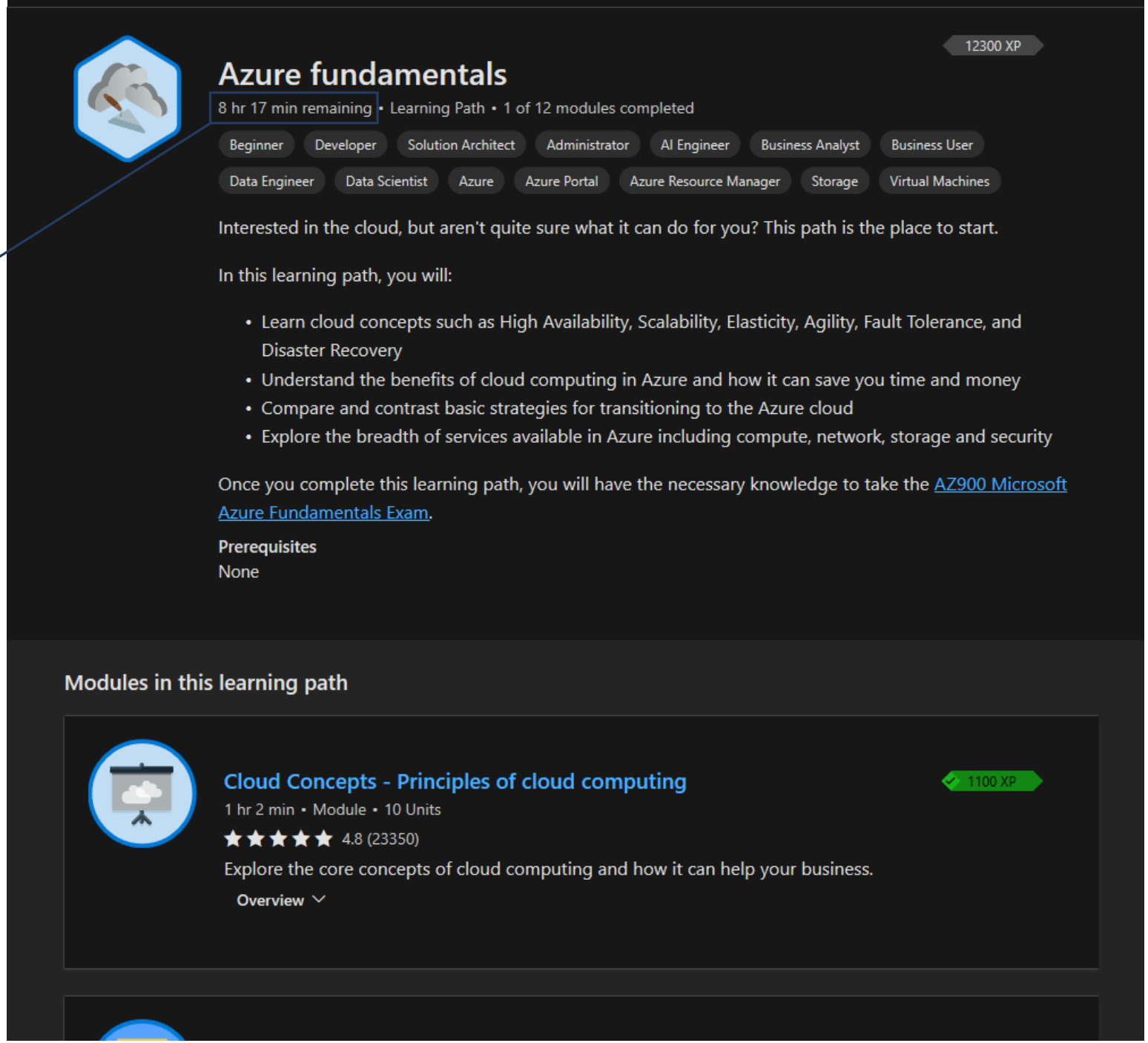

# Azure fundamentals

12300 XP

8 hr 17 min remaining • Learning Path • 1 of 12 modules completed

Beginner | Developer | Solution Architect | Administrator | AI Engineer | Business Analyst | Business User | Data Engineer | Data Scientist | Azure | Azure Portal | Azure Resource Manager | Storage | Virtual Machines

Interested in the cloud, but aren't quite sure what it can do for you? This path is the place to start.

In this learning path, you will:

- Learn cloud concepts such as High Availability, Scalability, Elasticity, Agility, Fault Tolerance, and Disaster Recovery
- Understand the benefits of cloud computing in Azure and how it can save you time and money
- Compare and contrast basic strategies for transitioning to the Azure cloud
- Explore the breadth of services available in Azure including compute, network, storage and security

Once you complete this learning path, you will have the necessary knowledge to take the AZ900 Microsoft Azure Fundamentals Exam.

**Prerequisites**
None

Total XP= 12,300

Microsoft.com/learn

## Modules in this learning path

### Cloud Concepts - Principles of cloud computing

1100 XP

1 hr 2 min • Module • 10 Units

★★★★★ 4.8 (23350)

Explore the core concepts of cloud computing and how it can help your business.

Overview

12300 XP

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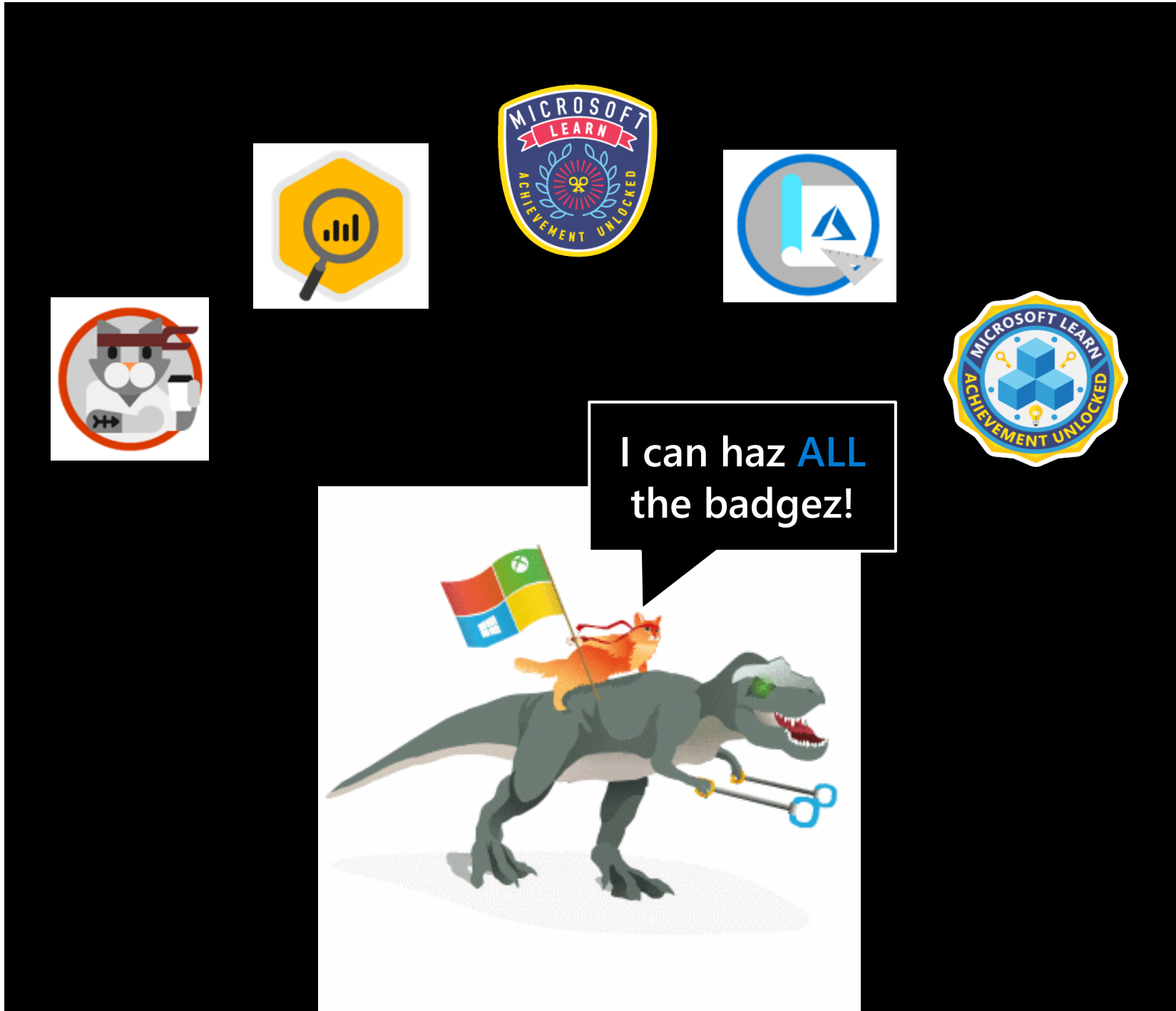
Module XP= 1,100

# Leveling up your Azure skillz with Microsoft Learn



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# Top Challenges

Complexity
- IoT PnP, IoT Central

Knowledge
- MS Learn

Security
- Confidential Computing

Solution == Partners

IoT in Action

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# Thank you!