IoT on the Edge

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Everything Gets Connected

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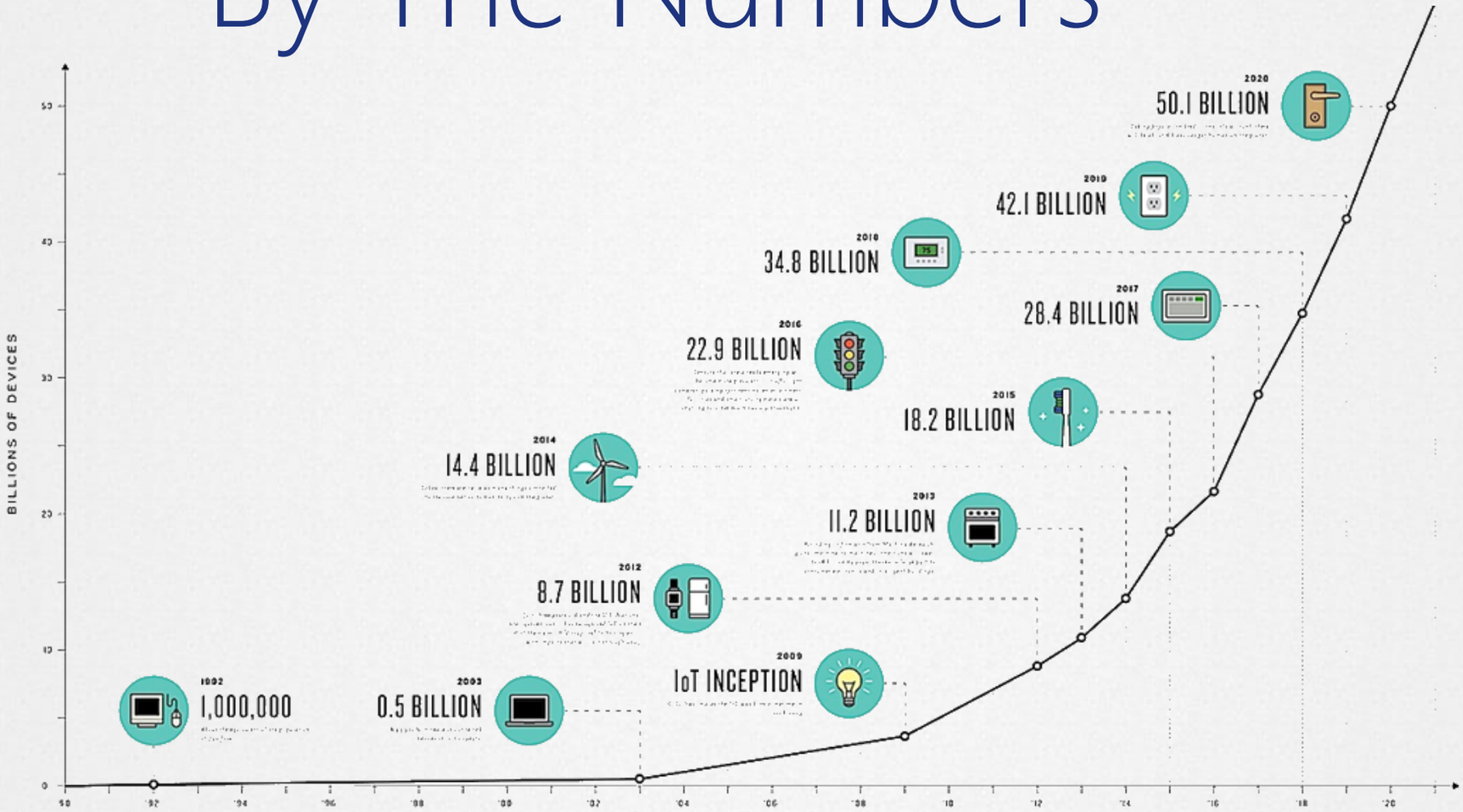
By The Numbers



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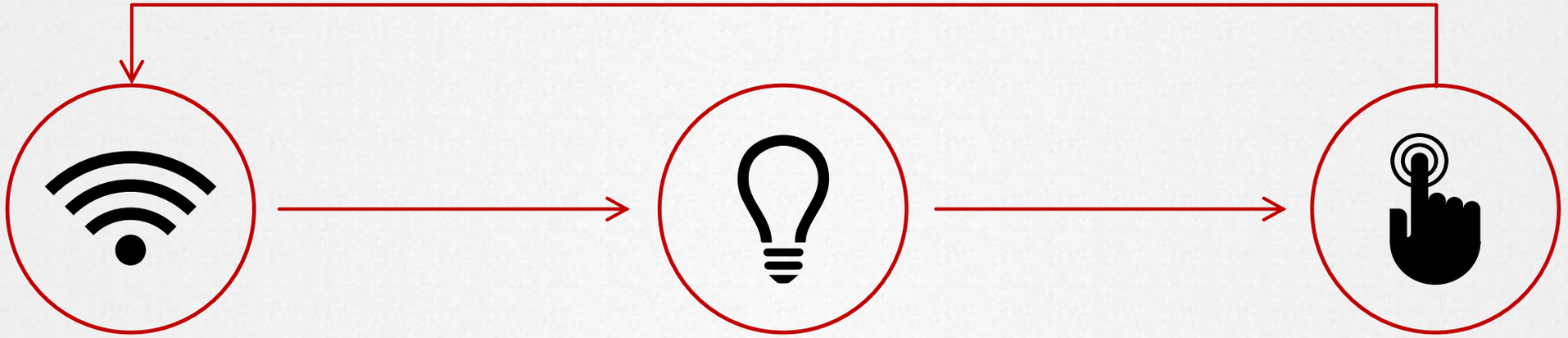
Azure IoT

A Simple View of an IoT Solution



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A More Realistic View...

Fault tolerance

Data storage

Deployment

Enterprise integration

Cloud-to-device commands

Business process integration

Cold path analytics

Device recovery

Solution scale

Operations monitoring

Cost management

Internationalization

Updating devices

High availability

Provisioning devices

Device lifecycle

Transport protocols

Warm path analytics

Drivers

Things

Disaster recovery

Insights

Hot path analytics

Actions

Device updates

Data ownership

< ---- End-to-End Security ---- >

On device analytics

Data visualization

HW certification

Manufacturing scale

Industry and government compliance

Device commercialization

Securing data

... and why IoT needs simplifying

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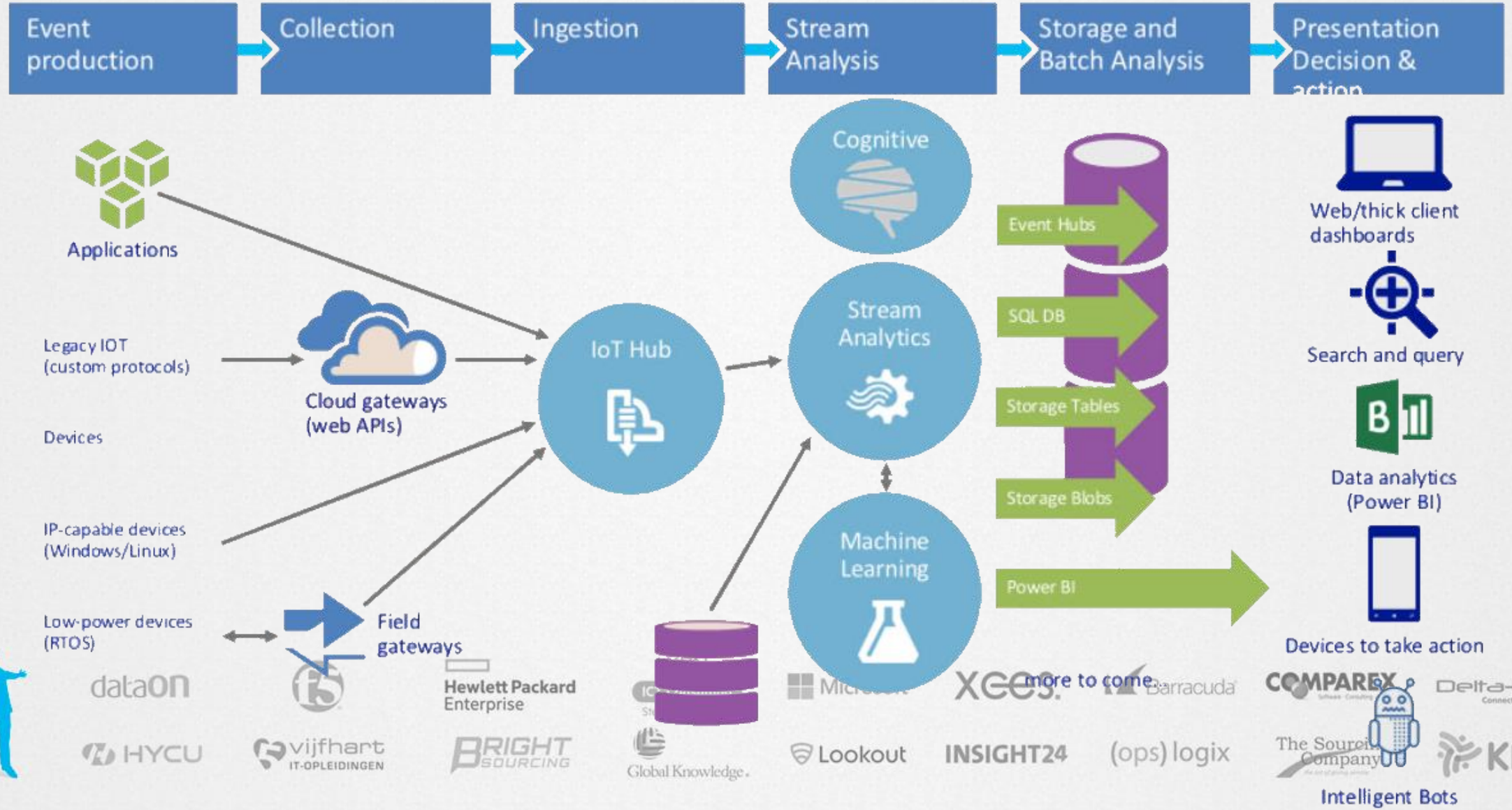
Azure IoT Architecture



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Scenario

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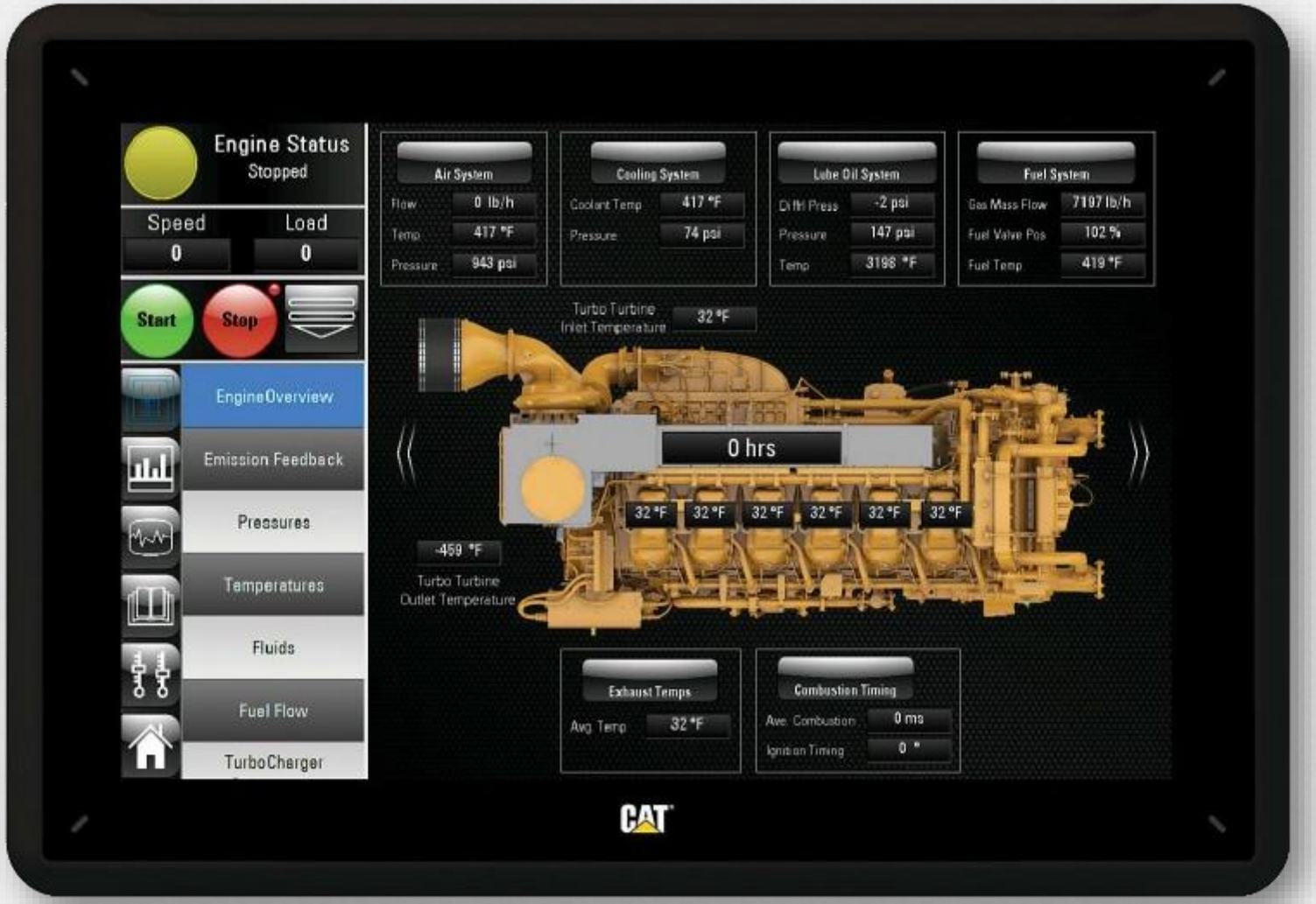

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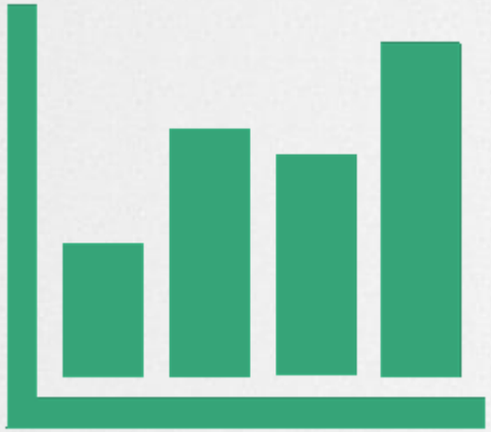

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IoT Edge

IoT Everywhere

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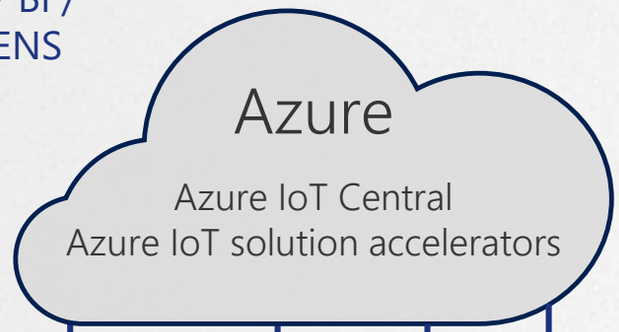
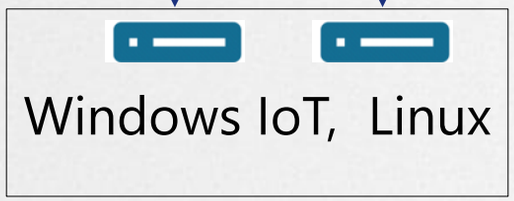


Azure Stack

- Available in Azure Regions
- Full functionality

- Azure Services & Management on-prem
- Managed by Azure or Locally

IoT Edge



- Deploy and manage cloud services
- Managed by Azure or Azure Stack
- Azure IoT Edge runs on Windows and Linux

IoT

- Multi-device, multi-language, multi-OS
- iOS, Android, Windows, Linux

IoT

- Peerless security for MCU devices
- Connect directly to Azure or via Azure IoT EdgeLinux Kernel that modernizes MCU devices

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IoT On The Edge

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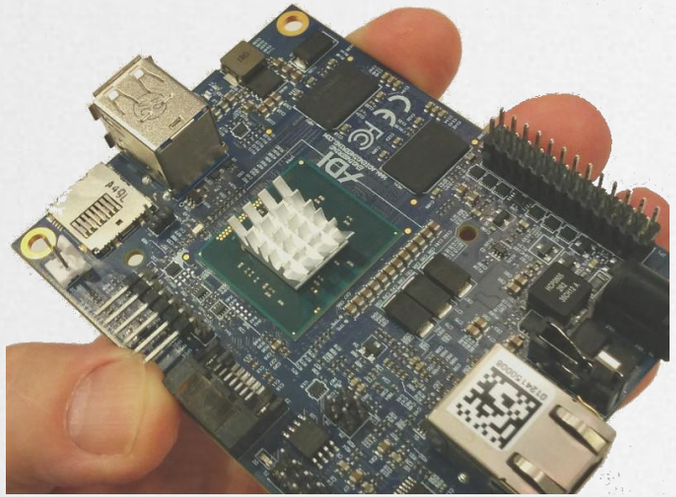
Edge Device



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Why now?

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Waves of Innovation

Cloud

- Globally available, unlimited compute resources

IoT

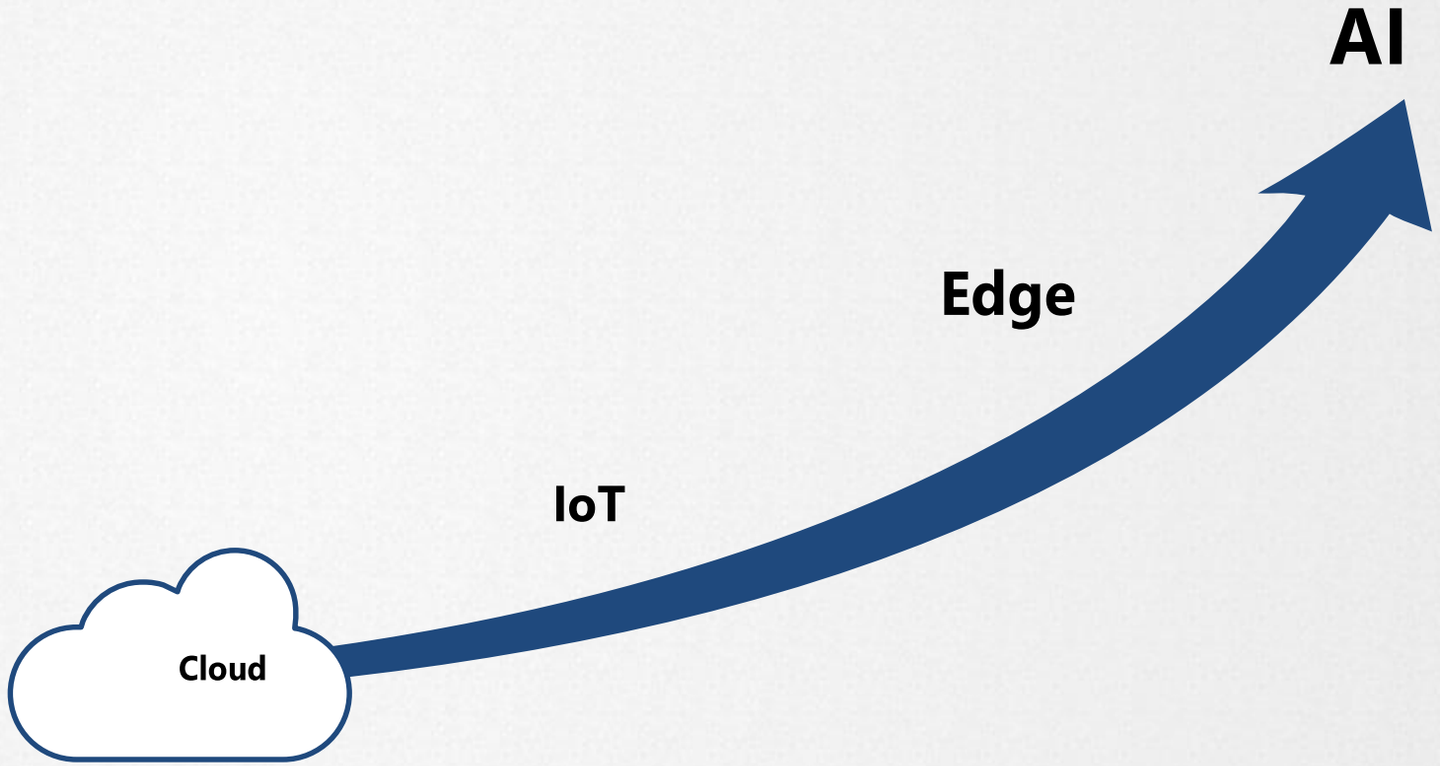
- Harnessing signals from sensors and devices, managed centrally by the cloud

Edge

- Intelligence offloaded from the cloud to IoT devices

AI

- Breakthrough intelligence capabilities, in the cloud and on the edge



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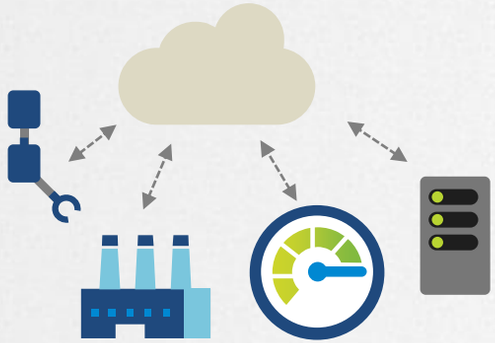
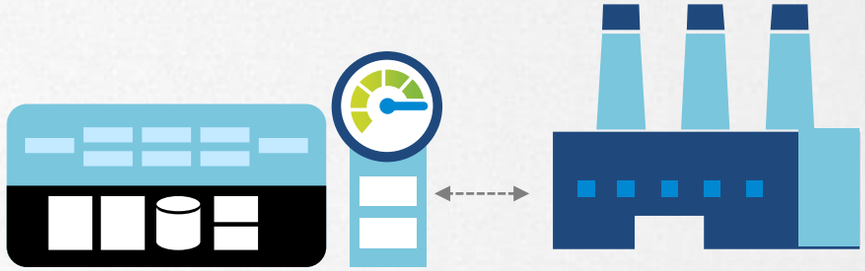
IoT in the Cloud and on the Edge





IoT in the Cloud

Remote monitoring and management

Merging remote data from multiple IoT devices

Infinite compute and storage to train machine learning and other advanced AI tools

IoT on the Edge

Low latency tight control loops require near real-time response

Protocol translation & data normalization

Privacy of data and protection of IP

Symmetry

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Azure IoT Edge principles & concepts

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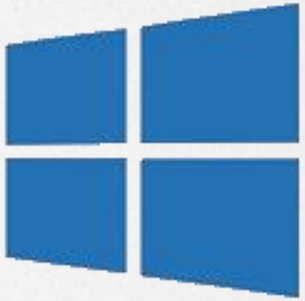
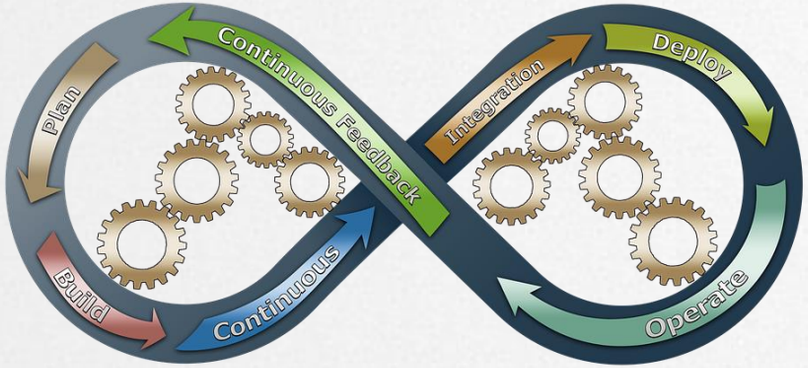
Azure IoT Edge Design Principles





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Edge Runtime

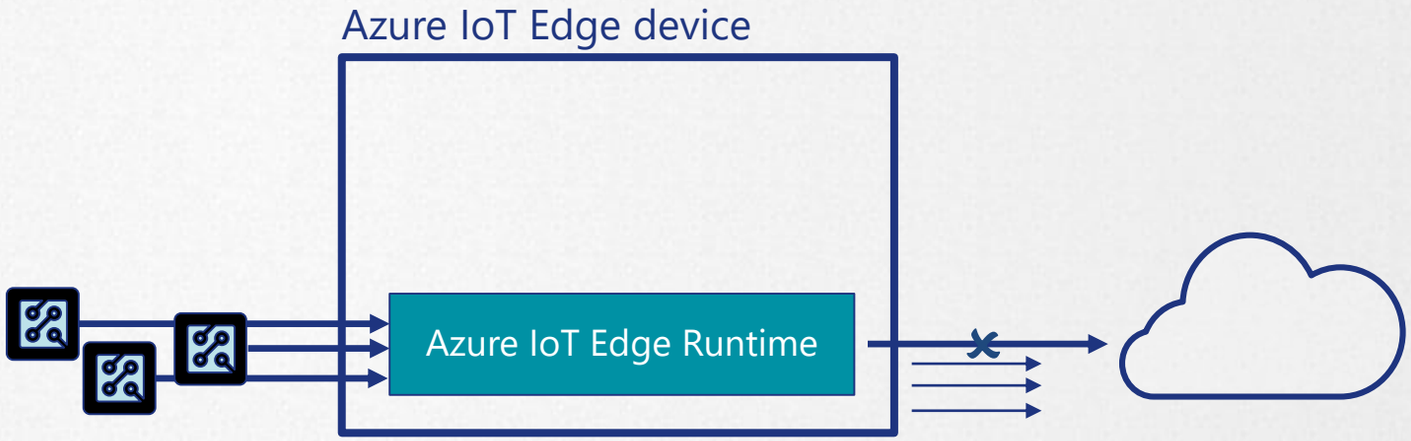
Edge Runtime provides fundamental services

Security

Multiplexing

Store and forward (Offline)

Management for devices otherwise isolated from internet



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Modules

Edge Runtime manages modules

Modules add capabilities to the runtime

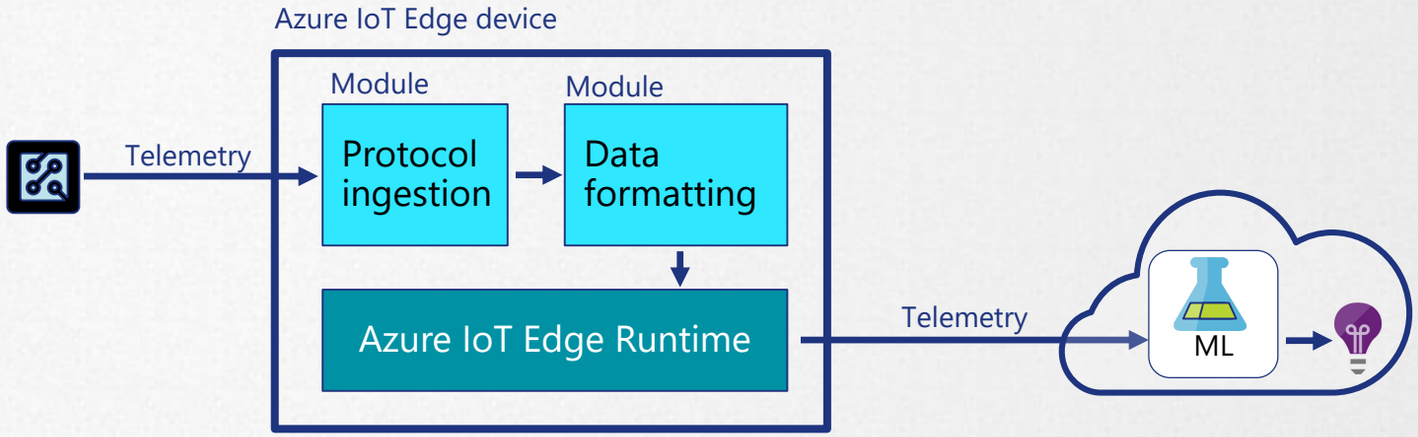
Each module performs an action

Chain of modules can be thought of as a data processing pipeline, solving an end to end scenario

Modules are Docker containers

Custom modules can be written in the language of your choice

Scenario: Find insights in the cloud from telemetry sent by a device that does not speak an internet ready protocol.



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Scenario – Custom Module

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Device Management

Device Management Building Blocks

Automatic device management

IoT Edge deployment

IoT Edge enables cloud-driven deployment of Azure services and solution-specific code to on-premise devices.

Automatic device configuration

Provides the ability to perform IoT device configuration at scale. It adds an additional layer of capability by building upon existing platform primitives, namely device twins and queries.

Device management fundamentals

- Device identity and device Twin
- Module identity and module twin
- Query
- Direct Method
- Job

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Device Management

Jobs

Schedule and broadcast Device twin changes across large fleets

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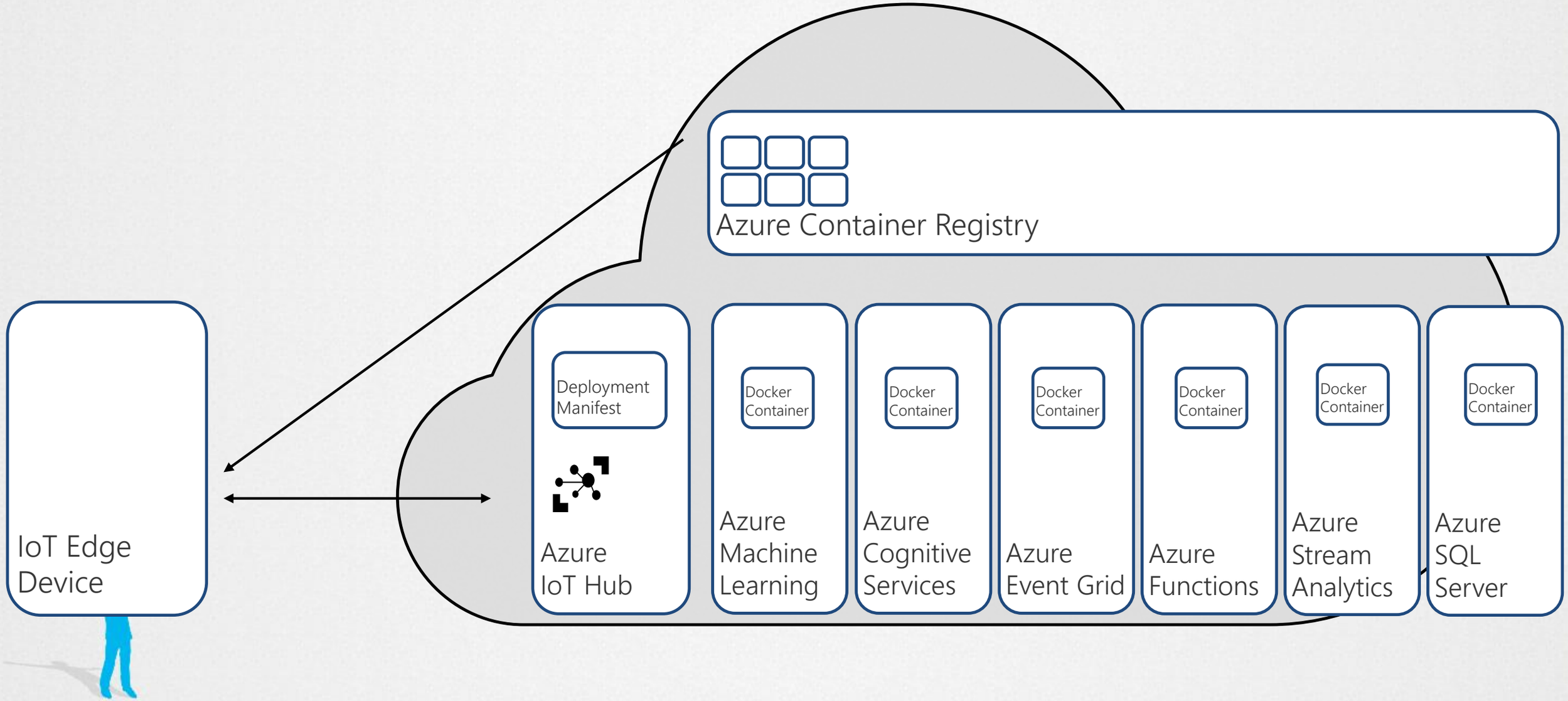
Azure IoT Edge Deployment



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Routing

```
FROM <source> WHERE <condition> INTO <sink>
```

Sources – source of messages

```
/messages/modules/{mid}/outputs/{out1}
```

Condition – expression on messages properties/body

```
sensorType = “temp” and alert = true
```

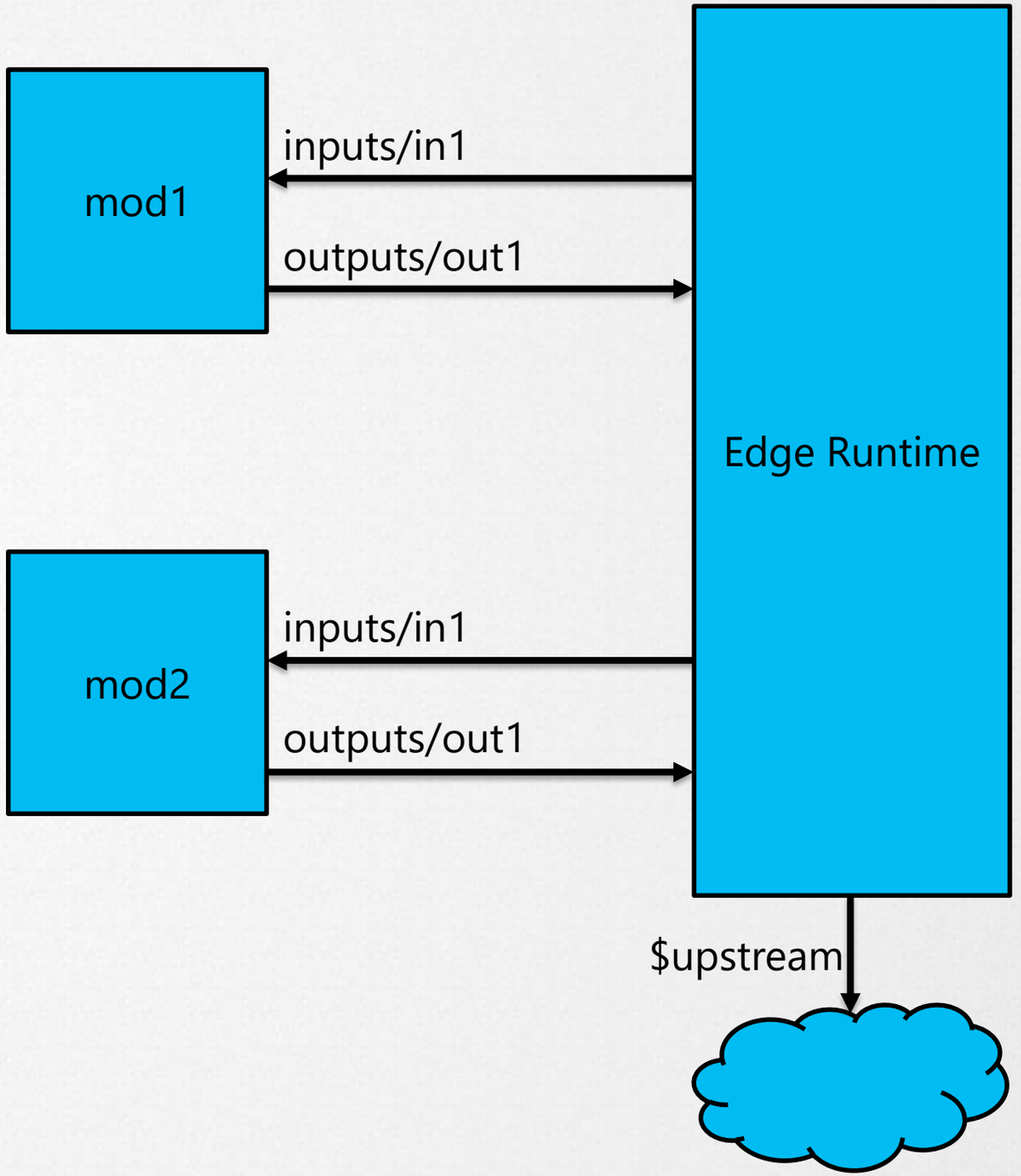
Sinks – destination for messages (endpoints)

```
$upstream
brokeredEndpoint(“/modules/{mid}/inputs/{in1}”)
```

For example:

```
FROM /messages/modules/mod1/outputs/*
WHERE sensorType = “temp”
INTO brokeredEndpoint(“/modules/mod2/inputs/in1”)
```

Query Language



Scenario – Edge Deployment

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Actions & Insights

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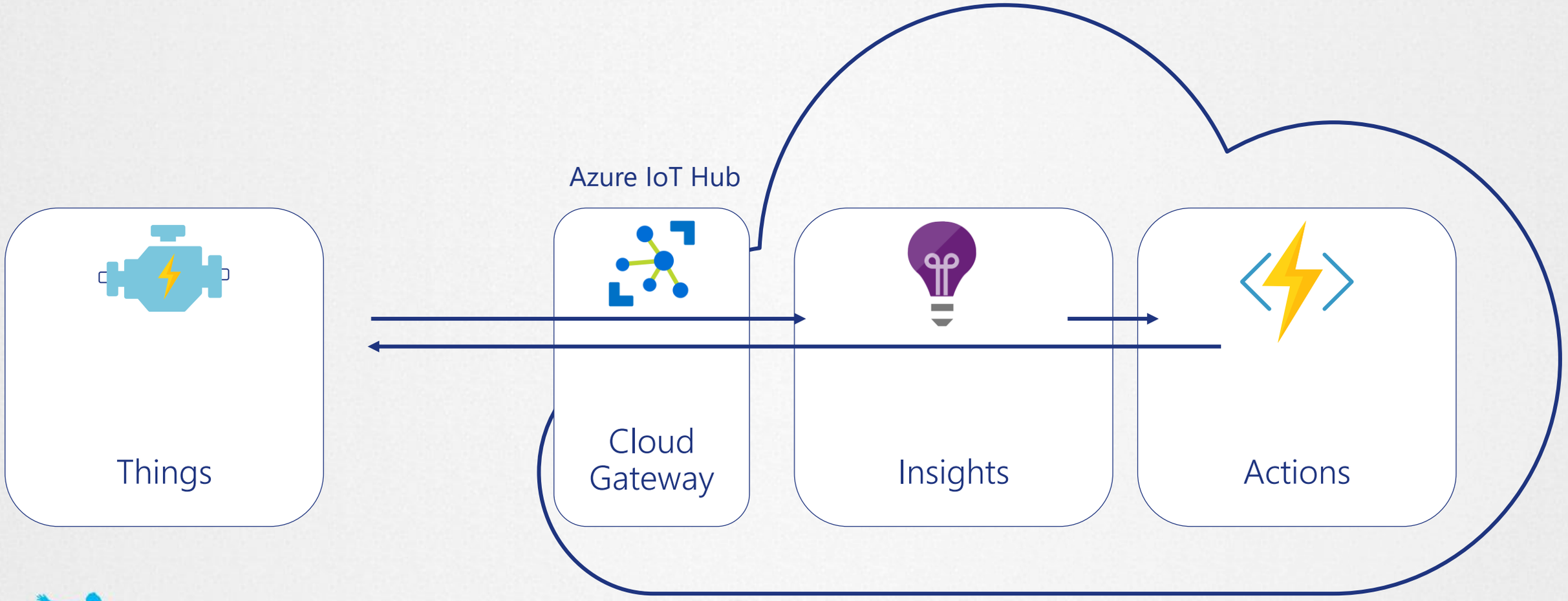
IoT Pattern



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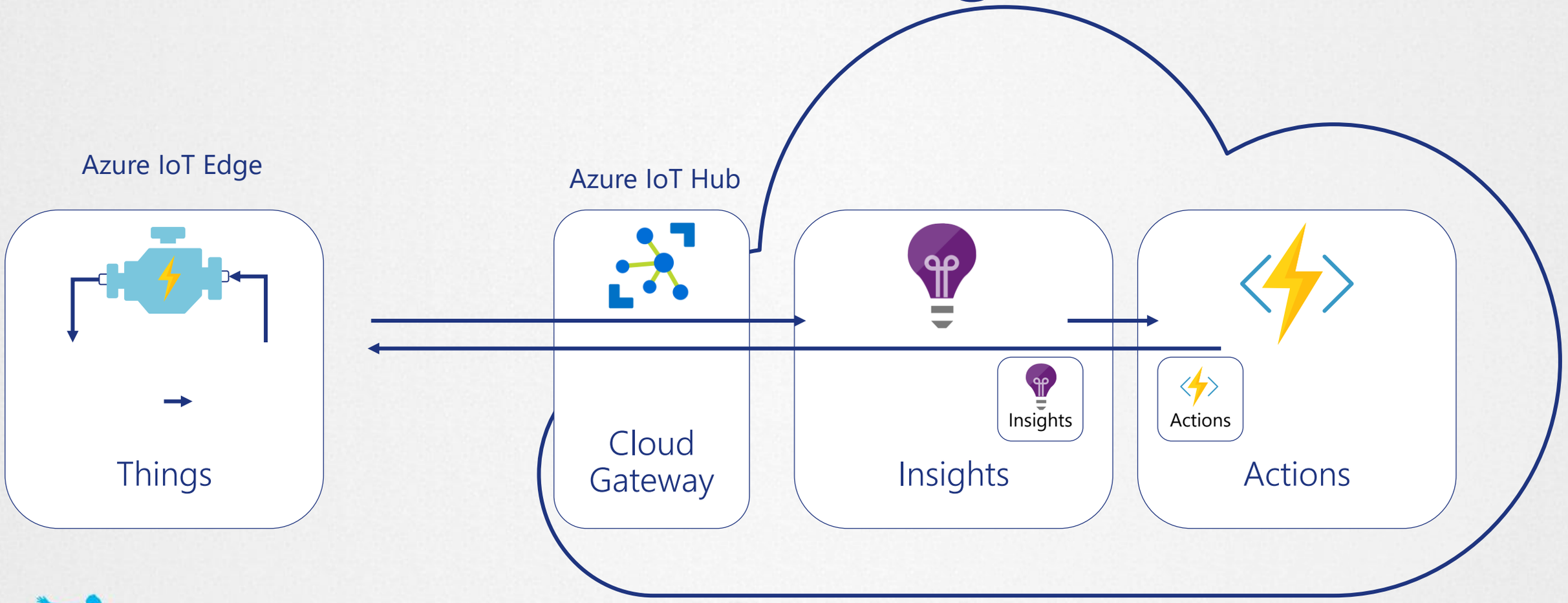
IoT Pattern + Edge



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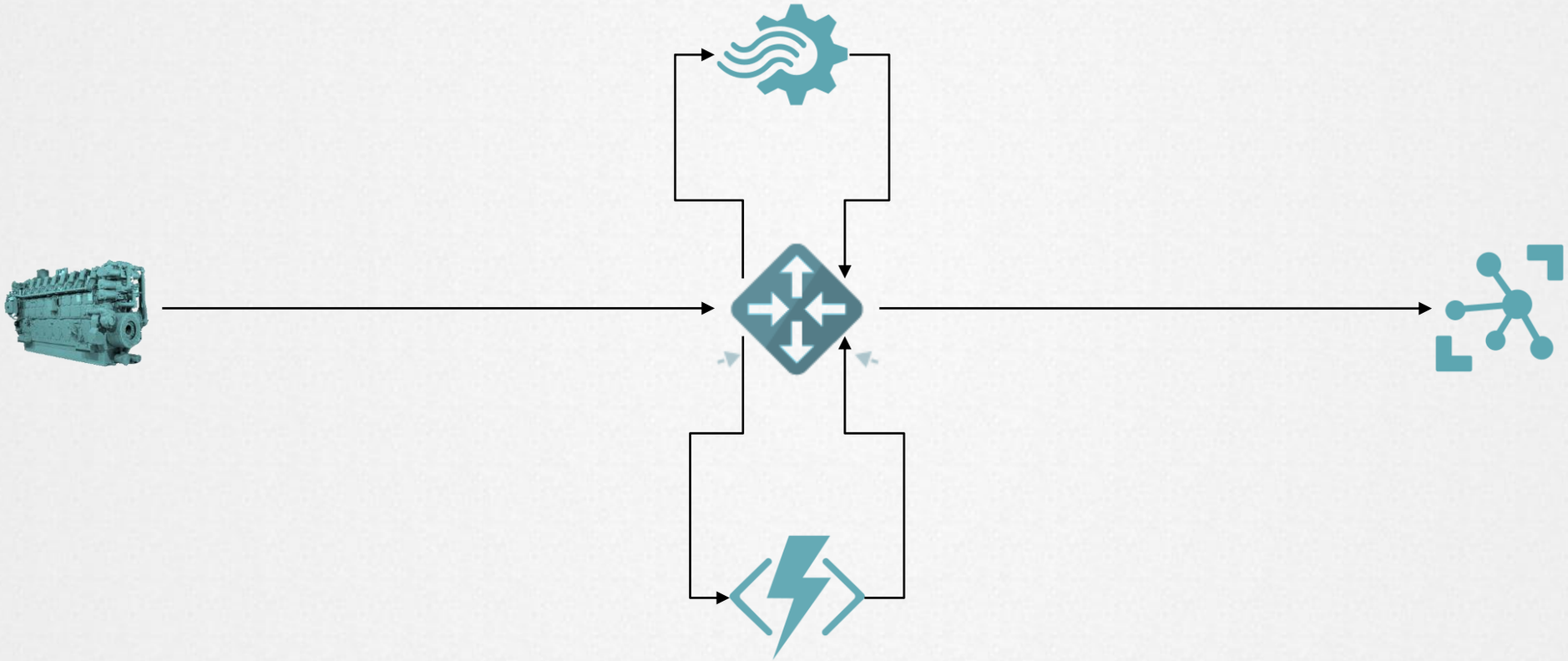
Scenario – Insights



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Almost done…

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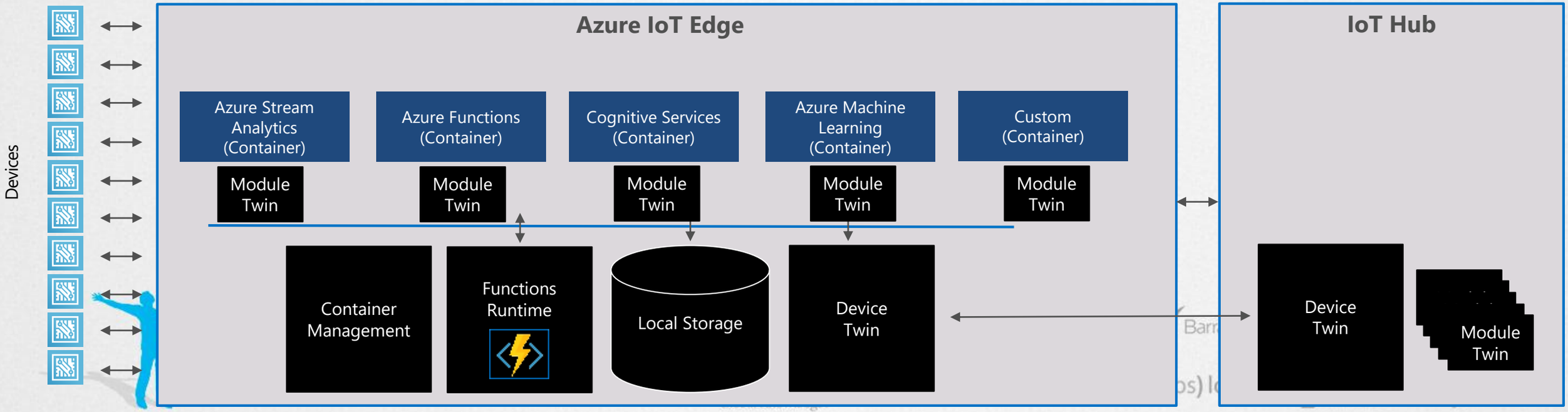
Recap

- Container based modules
- Azure Functions
- Azure Stream Analytics
- Azure Machine Learning
- Cognitive Services

- Offline / Synchronized Device Twins
- Local Storage
- Cloud Management & Deployment
- High Availability / Fault Tolerance
- Cloud Dev/Test Support



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Thank You

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Next session 09:00 – 10:00

Keynote: Hack to the future

Barry van Kampen

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One last thing!

http://feedback.expertslive.nl/

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