



Building Serverless Real-time IoT Solutions

In principle, IoT solutions are easy...



Things
(Generate Data)

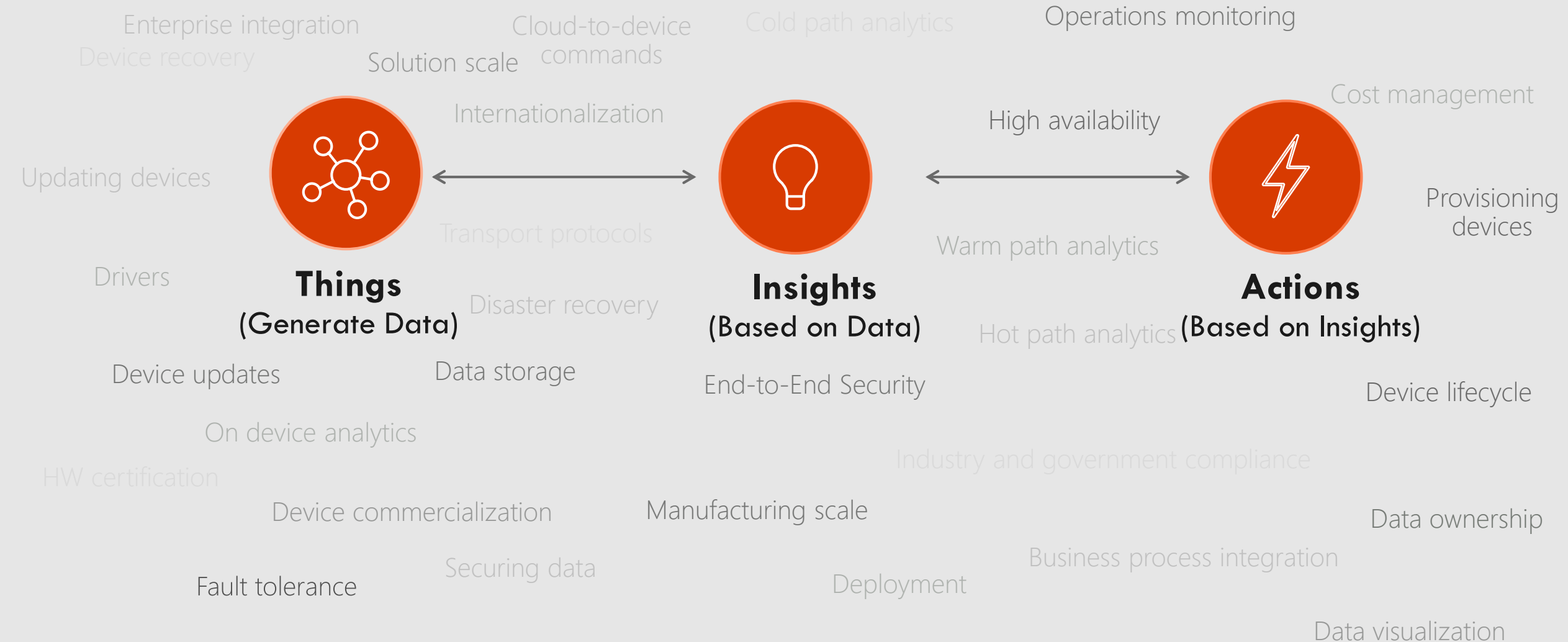


Insights
(Based on Data)

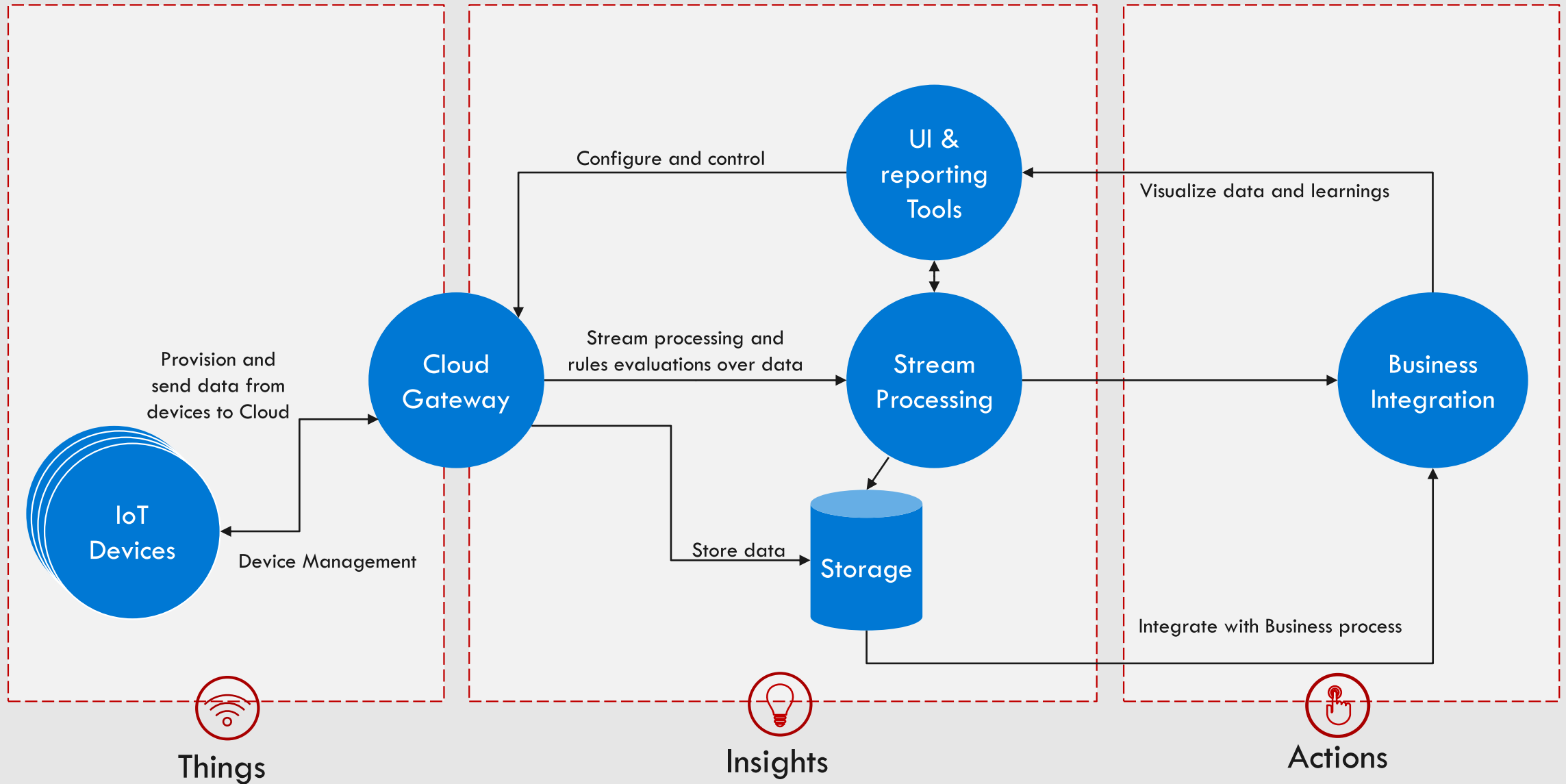


Actions
(Based on Insights)

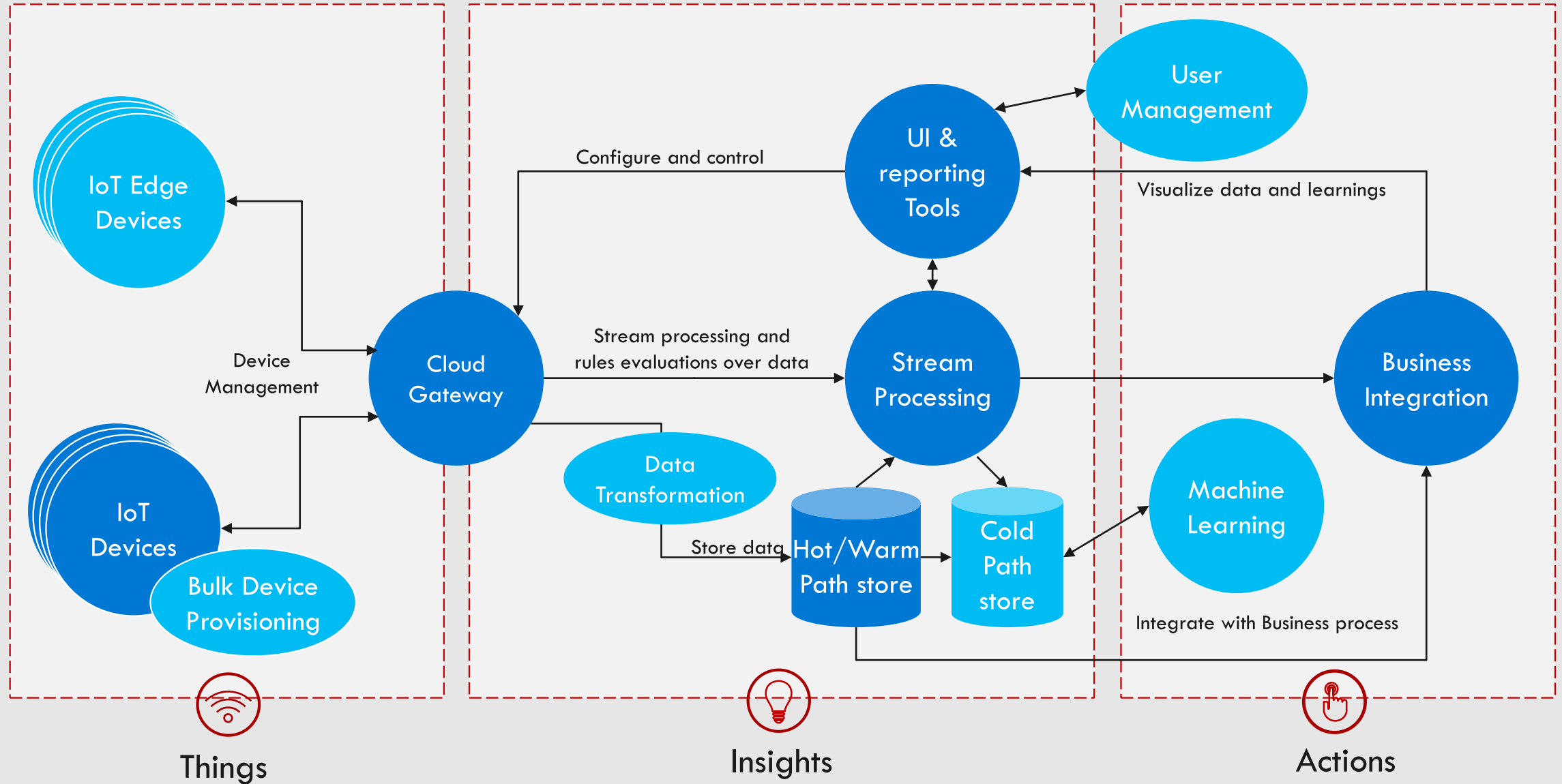
... but building a production-ready solution has many pieces!



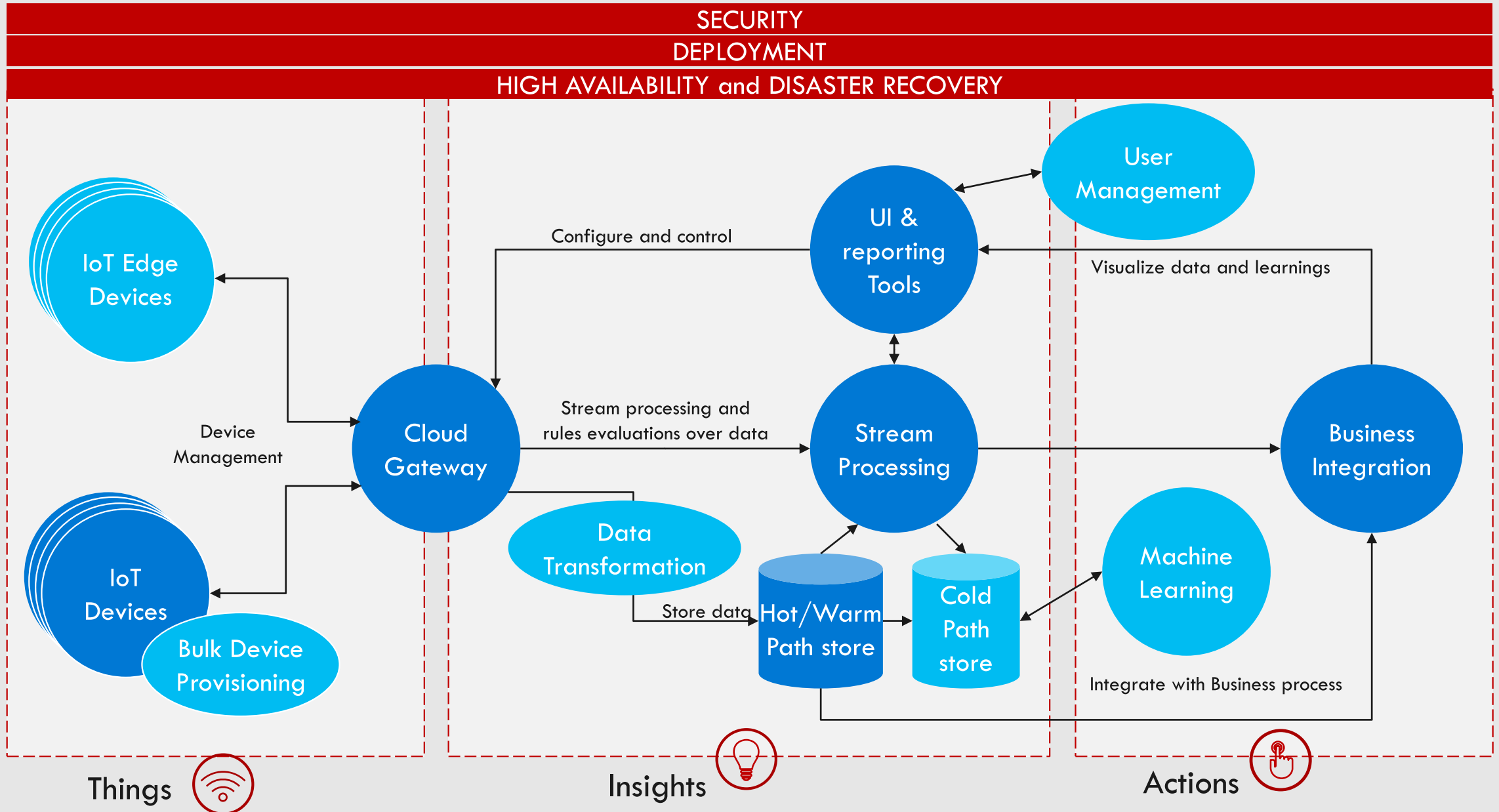
Core Subsystems



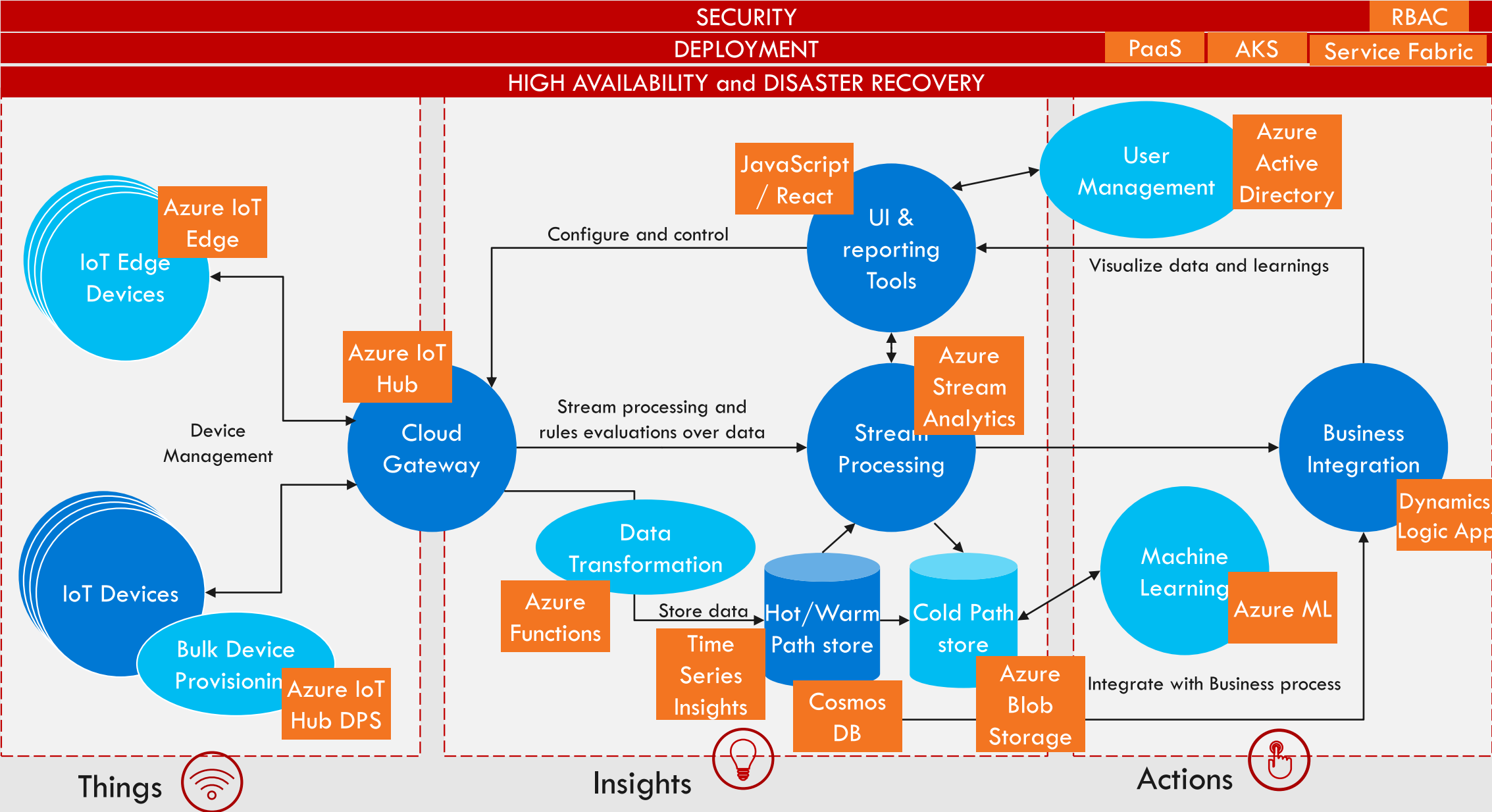
All Subsystems



All Subsystems & Cross Cutting Needs



Tech choices





Azure IoT Hub



Establish bi-directional communication with billions of IoT devices



Enhance security with per device authentication



Provision devices at scale w/ IoT Hub Device Provisioning Service



Manage devices at scale with device management



Multi-language and open source SDKs

Azure IoT Hub



Enterprise scale and integration

- Millions of devices
- Multi-language, open source SDK
- HTTPS/AMQP/MQTT
- Send telemetry
- Receive commands
- Device management
- Device twins
- Queries and jobs



End-to-end

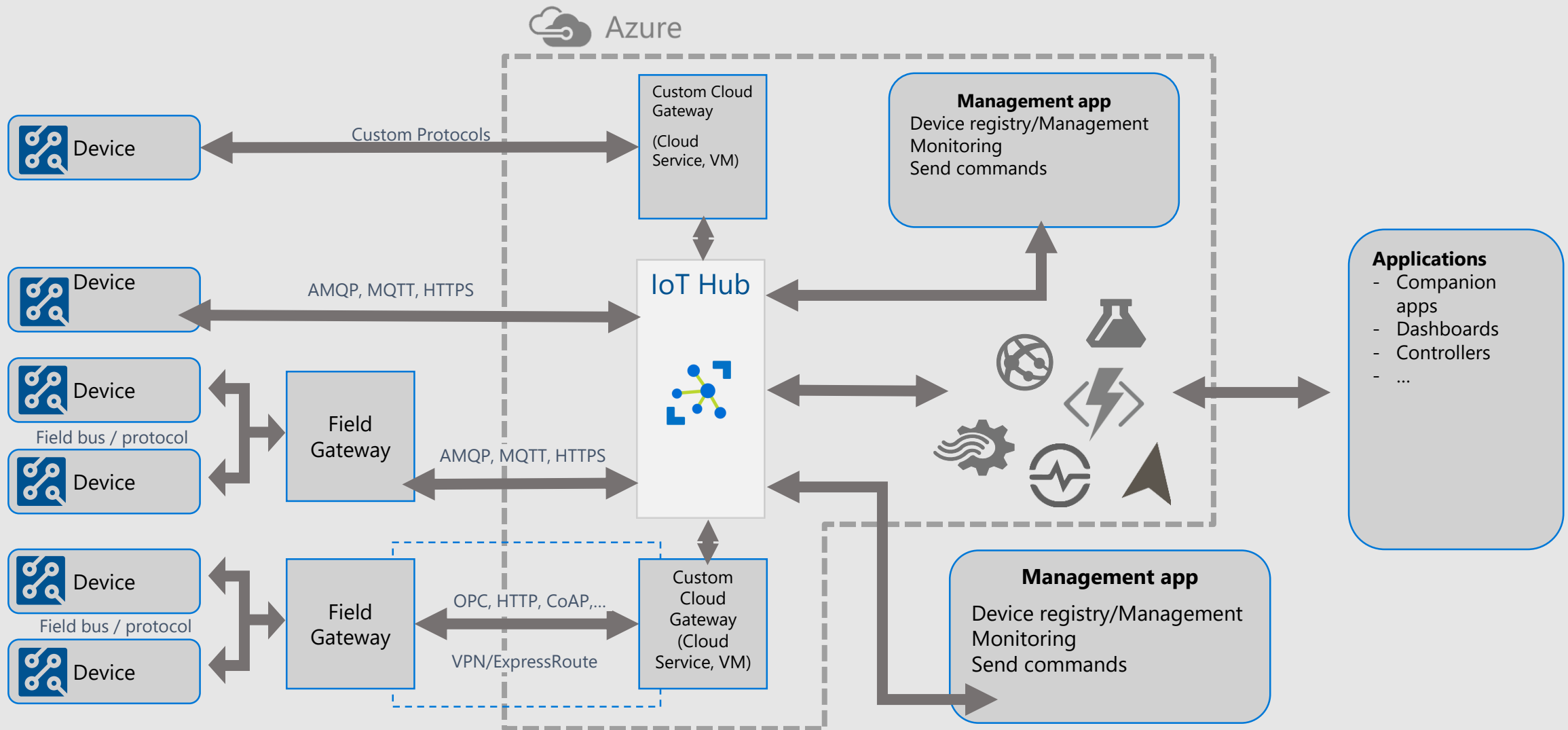
- Billions of messages
- Scale up and down
- Declarative message routes
- File upload
- Web sockets and multiplexing
- Azure monitor
- Azure resource health
- Configuration management security



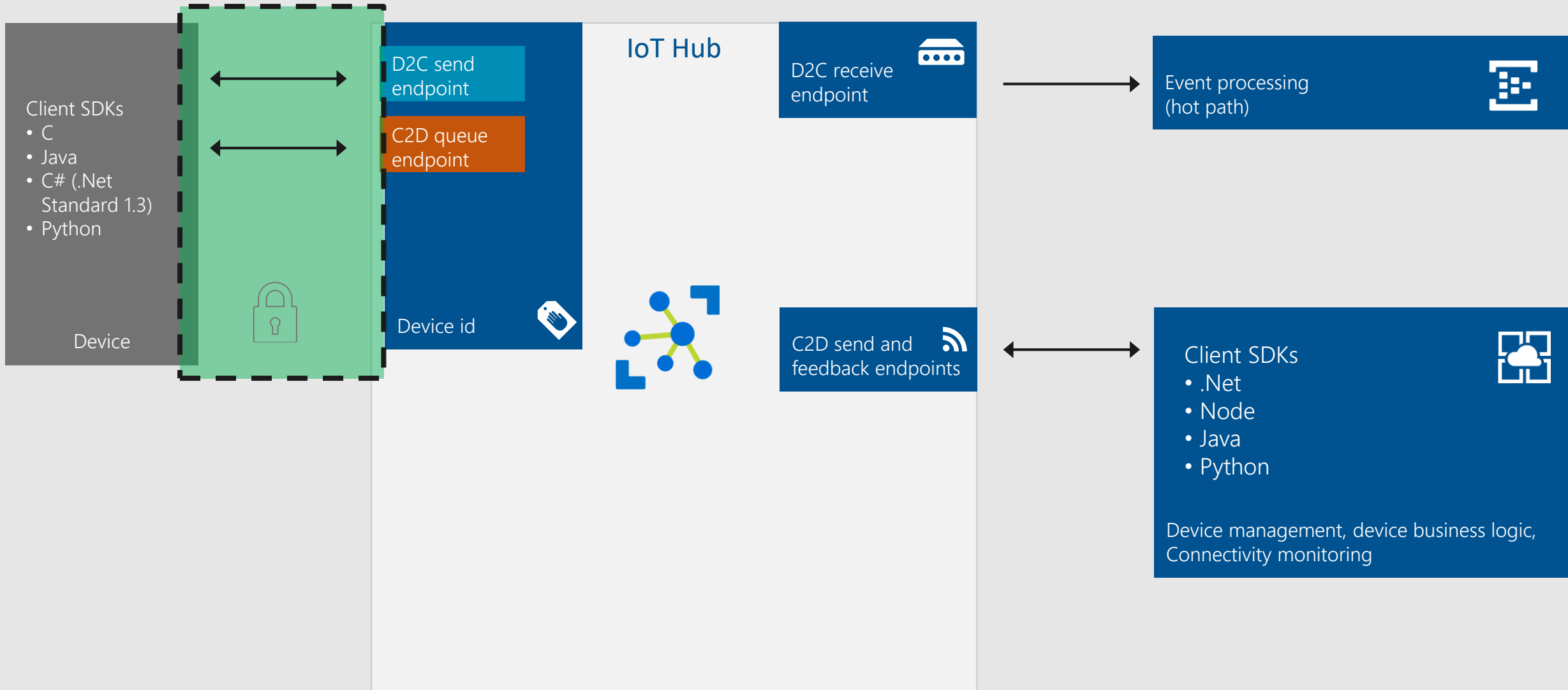
Bi-directional communication

- Per device certificates
- Per device enable/disable
- TLS security
- X.509 support
- IP whitelisting/blacklisting
- Shared access policies
- Firmware/software updates

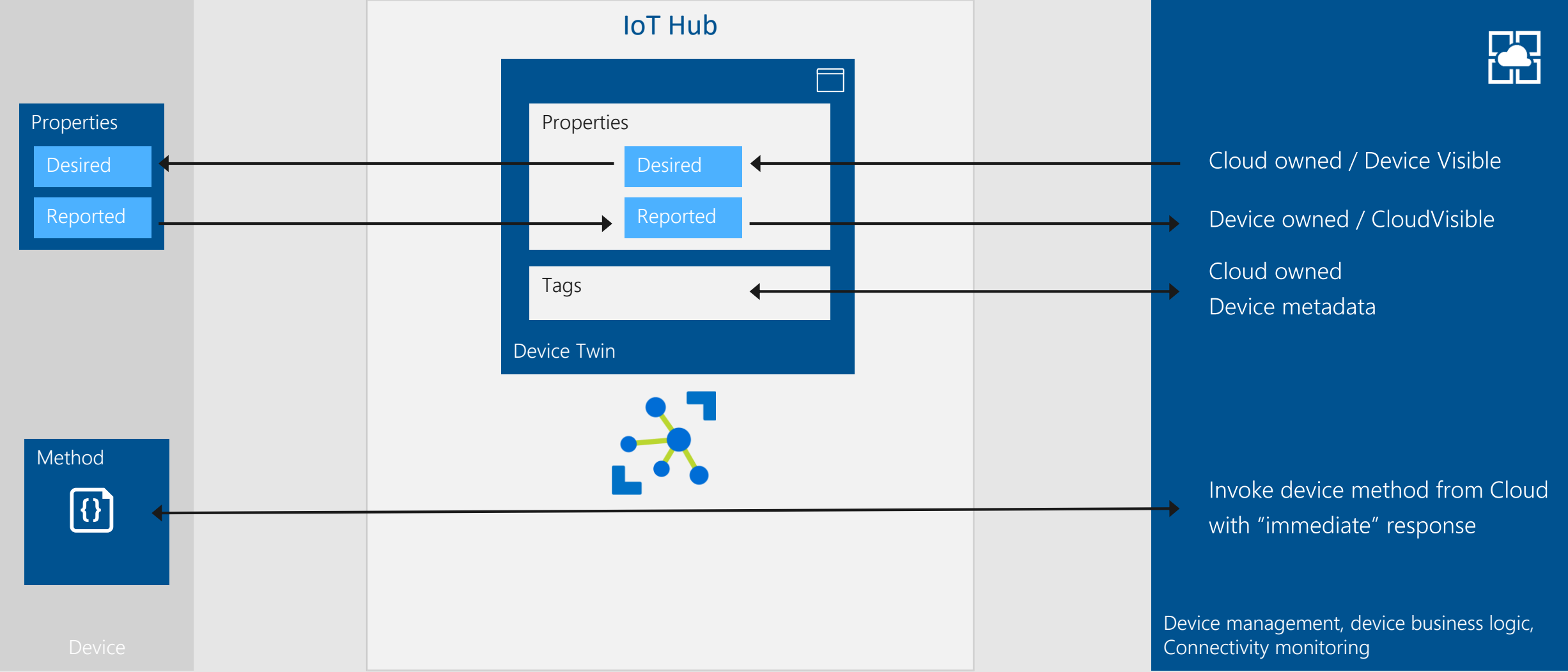
Azure IoT Hub detail architecture



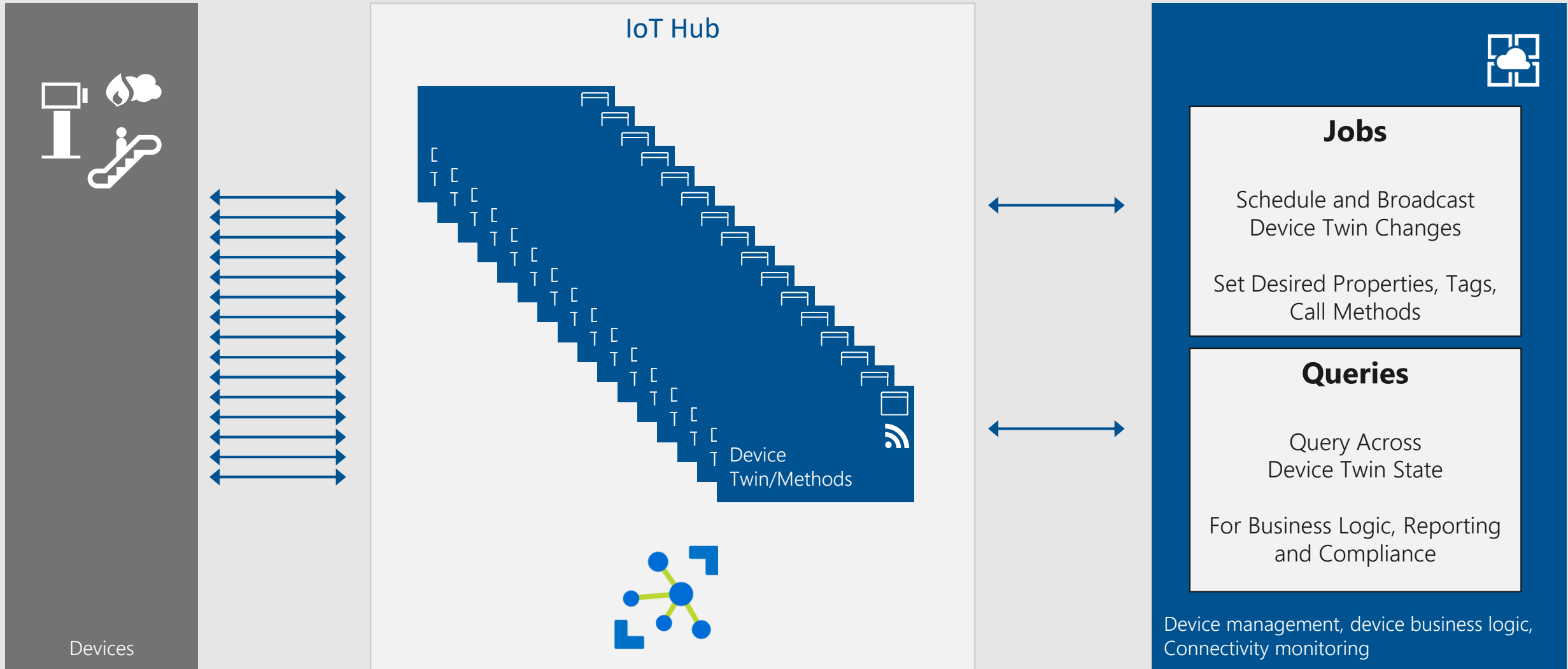
Send/receive data via IoT Hub



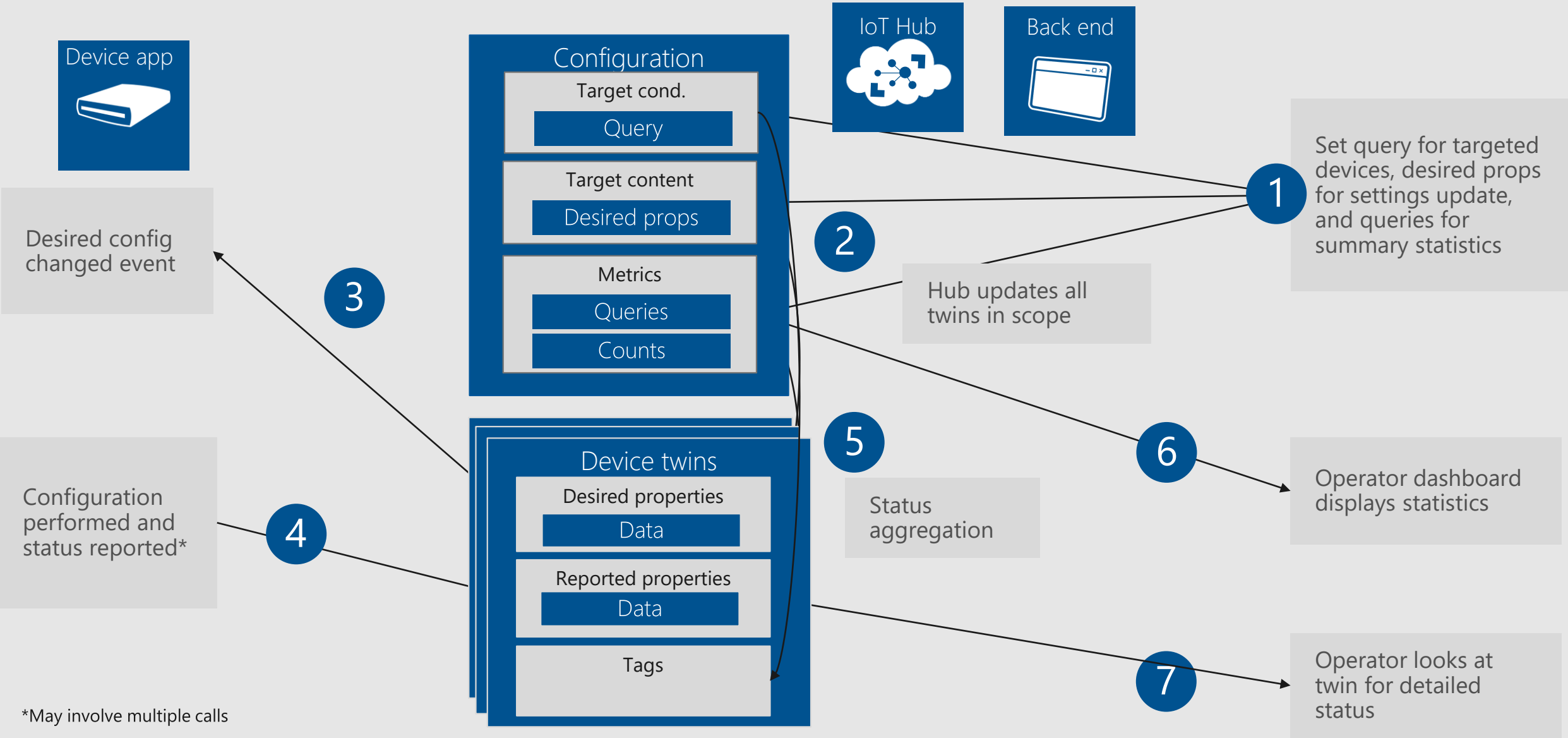
IoT Hub device management



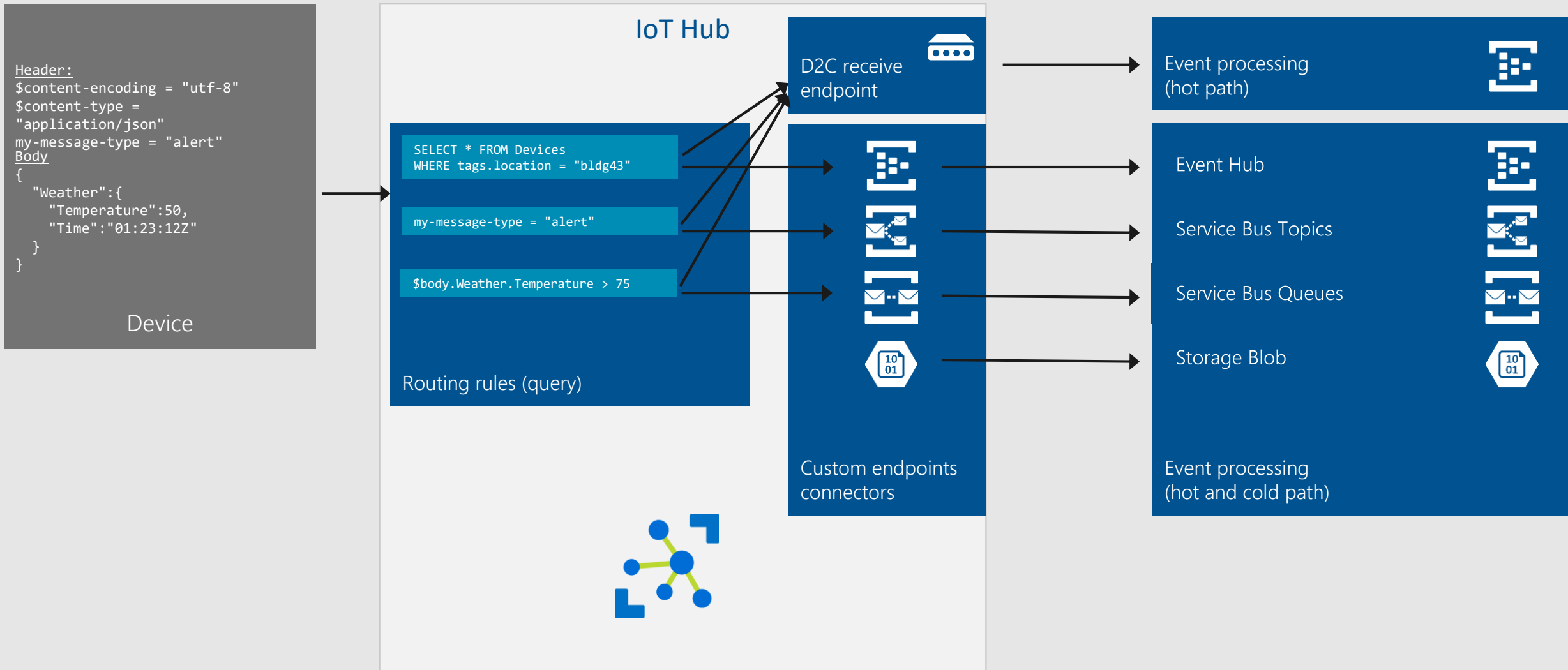
Jobs and Queries



Automatic Device Management



Routing telemetry data



End to End Security with Azure IoT Hub and Azure IoT solution accelerators

Securely connect millions of devices...

...over a secure internet connection...

...to Microsoft Azure – built with security from the ground up



Device Security

X.509 Certificate Based Identity and Attestation
Device Provisioning, Authorization & Management
Support for Diverse Hardware Secure Modules

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Connection Security

X.509/TLS-Based Handshake and Encryption



Cloud Security

Azure Security Center | Azure Active Directory
Key Vault | Policy-Based Access Control

Azure IoT Hub security controls

Three device attestation and authentication Methods with policy based access controls



Why serverless?



What are the benefits?



Focus

Solve business problems—not technology problems related to undifferentiated heavy lifting



Efficiency

Shorter time to market
Fixed costs converted to variable costs
Better service stability
Better development and testing management
Less waste



Flexibility

Simplified starting experience
Easier pivoting means more flexibility
Easier experimentation
Scale at your pace—don't bet the farm on Day 1
Natural fit for microservices





Focus on code, not plumbing



No infrastructure
management





Auto-scale based
on your workload












No wasted resources,
pay only for what you use

Full integration with Azure ecosystem

Development

	IDE support
	Integrated DevOps
	Local development
	Monitoring
	Visual debug history

Platform

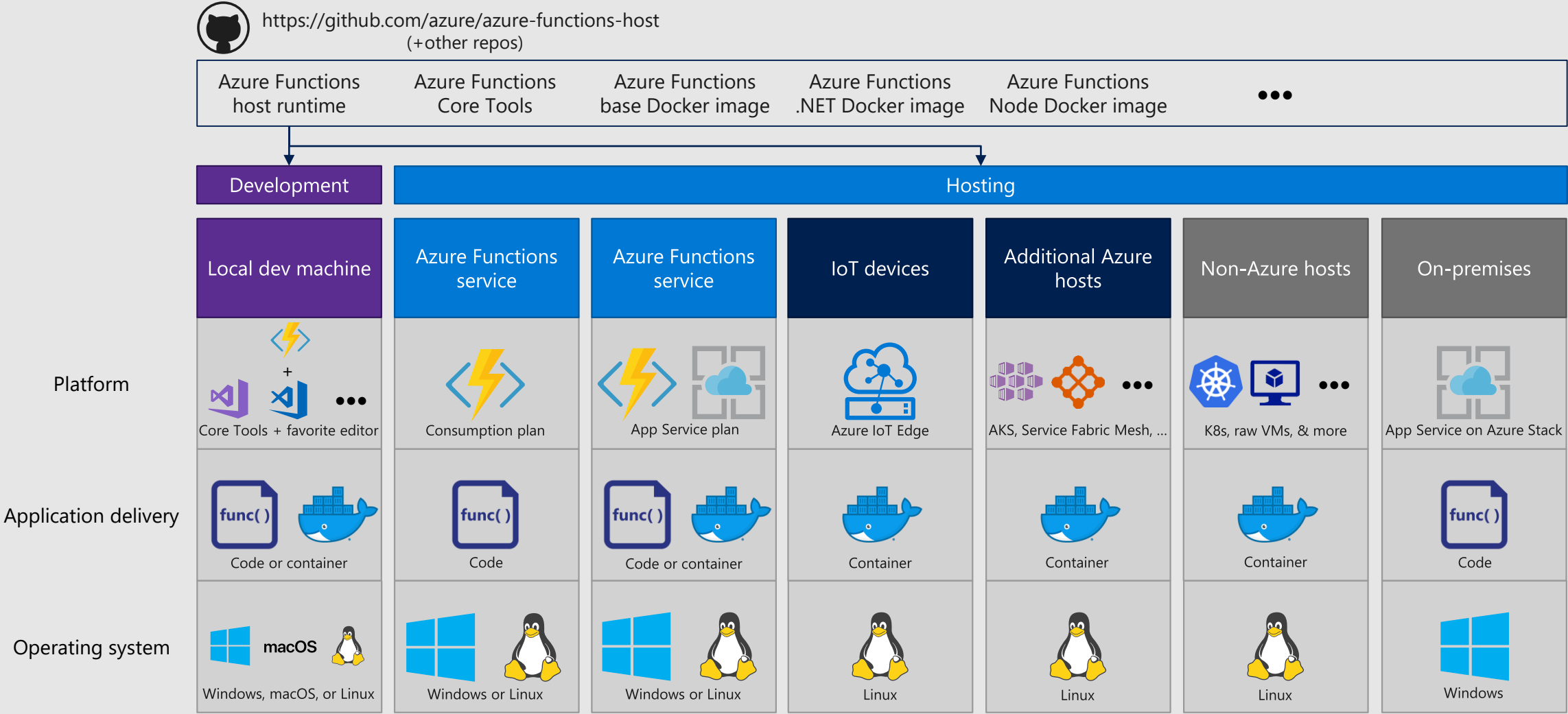
 Event Grid	 Functions	 Logic Apps			
Manage all events that can trigger code or logic	Execute your code based on events you specify	Design workflows and orchestrate processes			
Database 	Storage 	Analytics 	Intelligence 	Security 	IoT 

Introducing...

Azure Functions 2.0



Functions everywhere



Azure SignalR Service Overview



<https://azure.com/signalr>

Azure SignalR Service



Fully managed real-time messaging platform

WebSockets, Server Sent Events, Long Polling

Broadcast to all, groups, or users

Generally available!

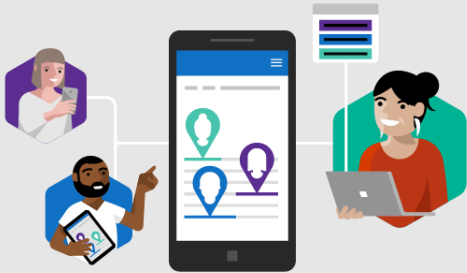
Up to 100,000 connections + free tier

99.9% SLA

11 regions, more to come

Real-time scenarios are everywhere

Real time technologies are integral to many popular apps



Co-authoring

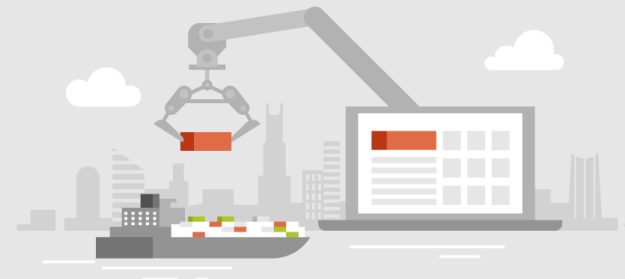


Real time location-based tracking

In-app notification



Live dashboard



Azure Functions Binding

- Monday THR2195: Build real-time serverless apps with Azure Functions and SignalR Service
- Enable serverless scenarios
- Multiple language support through Azure Functions
- Leverage the existing integration of Azure Functions with other Azure services; e.g., through Event Grid
- Preview now! Please check out the product page and documentation page for Azure SignalR Service https://aka.ms/signalr_service_doc

Develop a real-time web app using *Azure SignalR Service*

A quick walk through



HOURLY SCORE

Connected
4

Votes Casted
530

Score
0.71

Temperature
26

Humidity
26

VOTES

Time Stamp	Device	Vote	Humidity	Temperature
2:36:39 PM	MTC	1	29	32
2:36:36 PM	Malvern	0.5	34	34
2:36:33 PM	MTC	1	36	34
2:36:32 PM	Malvern	0.5	23	24
2:36:31 PM	Malvern	0.5	21	17
2:36:29 PM	Paoli	0.5	36	27
2:36:28 PM	MTC	1	22	16
2:36:27 PM	Malvern	0.5	30	26
2:36:26 PM	Malvern	0.5	23	17
2:36:24 PM	Paoli	0.5	22	29



