

TechCamp Internet of Things



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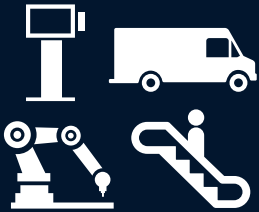
Agenda

1. Intro: What is IoT? What does Microsoft offer?
2. Things: Windows 10 IoT Overview
3. **Connectivity: Azure IoT Overview**
4. Data: Sensor data, cognitive services, etc.
5. Analytics: Stream Analytics, Power BI, Azure Machine Learning
6. Command & Control
7. Wrap-up

Azure IoT Overview

Defining Internet of Things

Things



Connectivity



Data

10101
01010
00100

Analytics



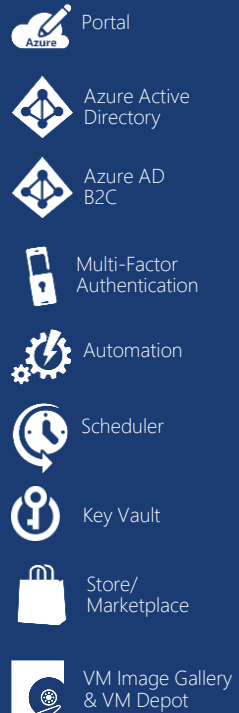
Harnessing the IoT Revolution

IoT can get complicated quickly

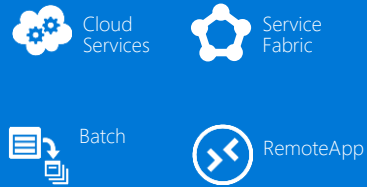
And that's where Azure comes in

Platform Services

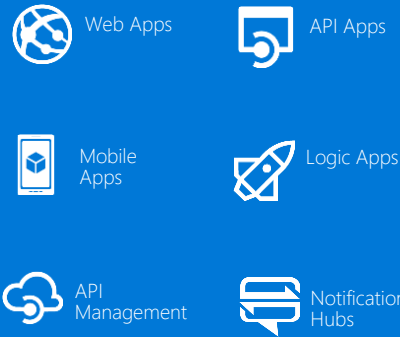
Security & Management



Services Compute



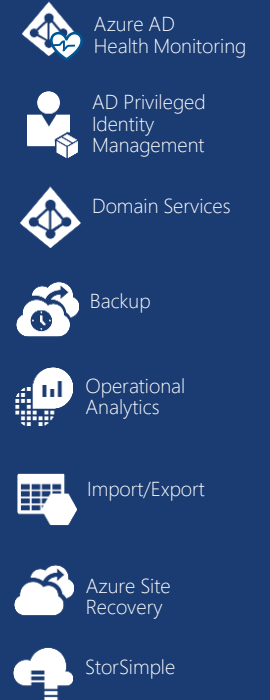
Web and Mobile



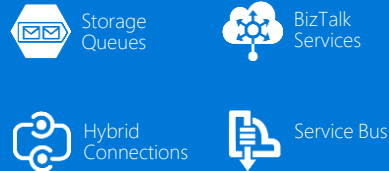
Data



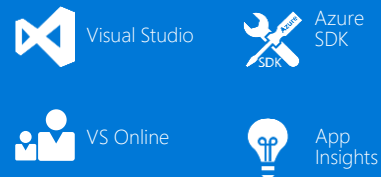
Hybrid Operations



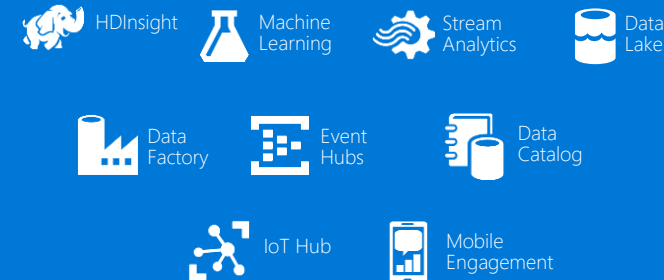
Integration



Developer Services



Analytics & IoT



Media & CDN



Infrastructure Services

OS/Server Compute



Storage



Networking



Datacenter Infrastructure (30 Regions, 22 Online)



Azure Services for IoT



Azure IoT Hub

Connect, secure, communicate, monitor and manage billions of devices



Azure Stream Analytics

Real time stream processing for billions of IoT devices



Azure Storage

Blob, SQL, DocumentDB, Data Lake. Storage to meet every need at the scale of IoT



Azure App Service

Web and mobile apps for any platform on any device



Power BI

Dashboards and data connectors to visualize any data



Logic Apps

Powerful workflows to automate business processes

And More...

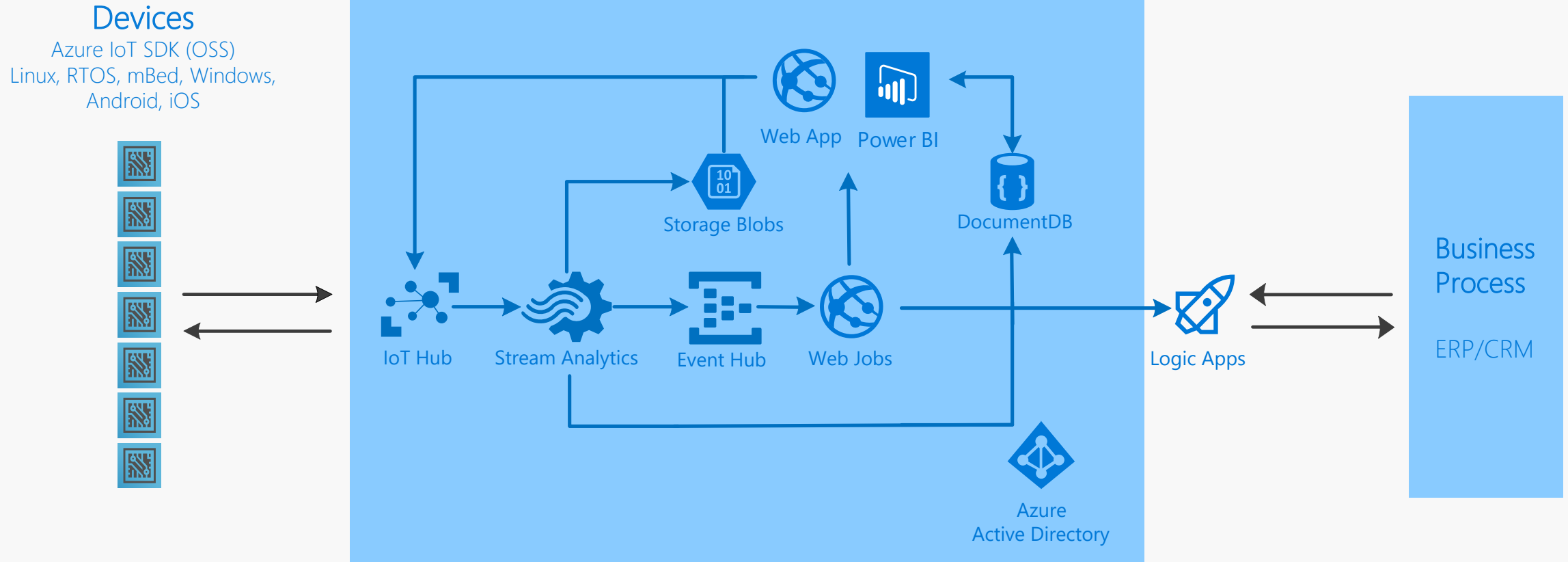
Demo:

Azure IoT Suite

<http://azureiotsuite.com>

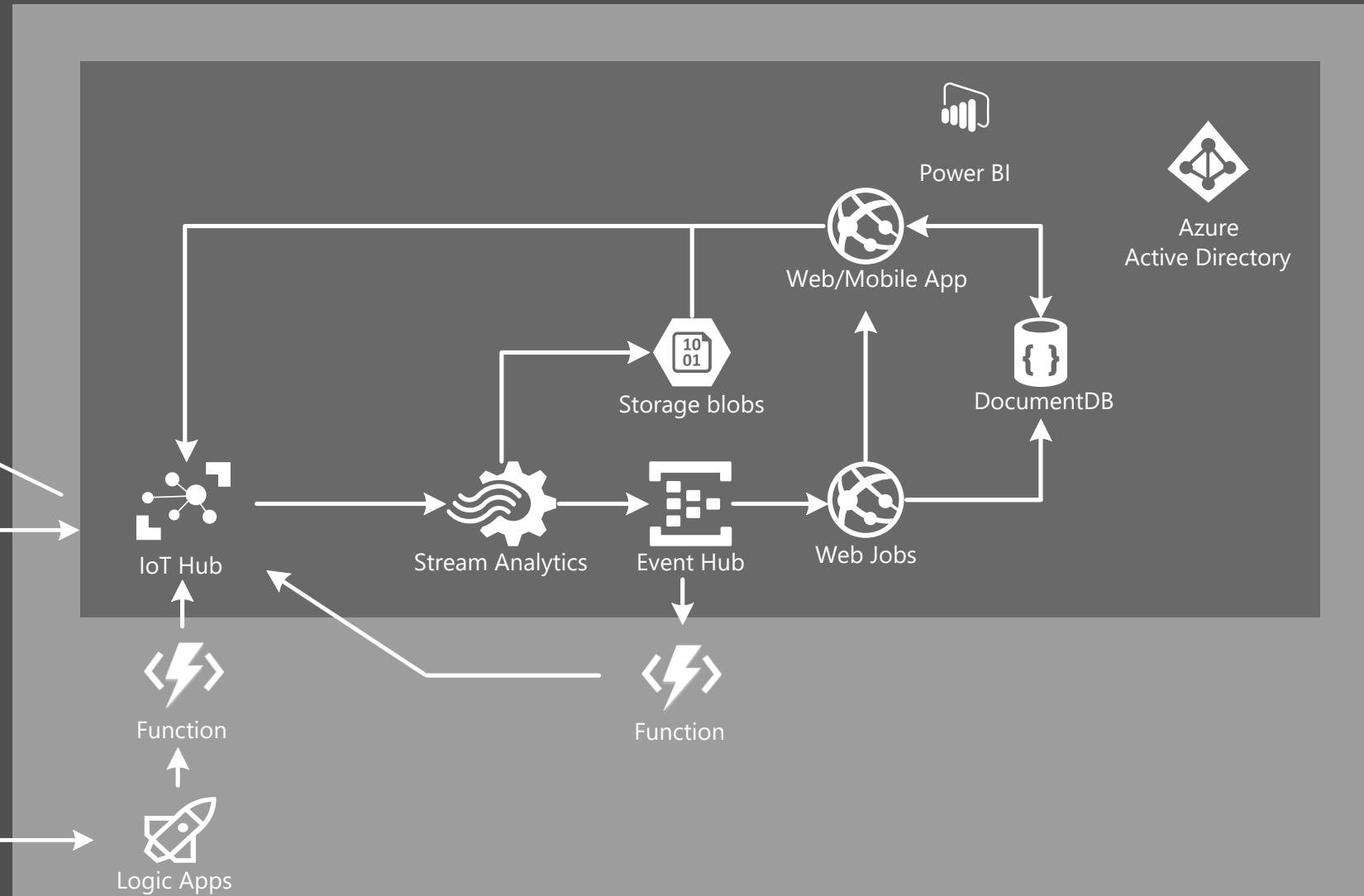
Azure IoT Suite

Remote Monitoring Service Architecture





Azure IoT Suite IoT-Shirt solution



Global Availability

New Regions

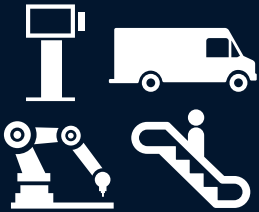
- Australia (East, Southeast)
- Japan (East, West)
- Germany (Central, Northeast) – Preview

Roadmap

	US	Europe	APAC	Japan	Australia	LATAM	China	Germany	India	UK
IoT Hub	Available	Available	Available	Available	Available	2016 Q2	2016 Q2	Available	2016 Q3	2016 Q4
IoT Suite	Available	Available	Available	2016 Q2	2016 Q2	2016 Q3	2016 Q2	2016 Q2	2016 Q4	2017 H1

Defining Internet of Things

Things



Connectivity



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10101
01010
00100

Analytics



Azure IoT Device SDK

Open Source

Everything is on GitHub, open source under MIT license

Cross-Platform Support

RTOS, Linux, Windows, iOS, Android

Multi-Language Support

C, Node.js, Java, C#, Python

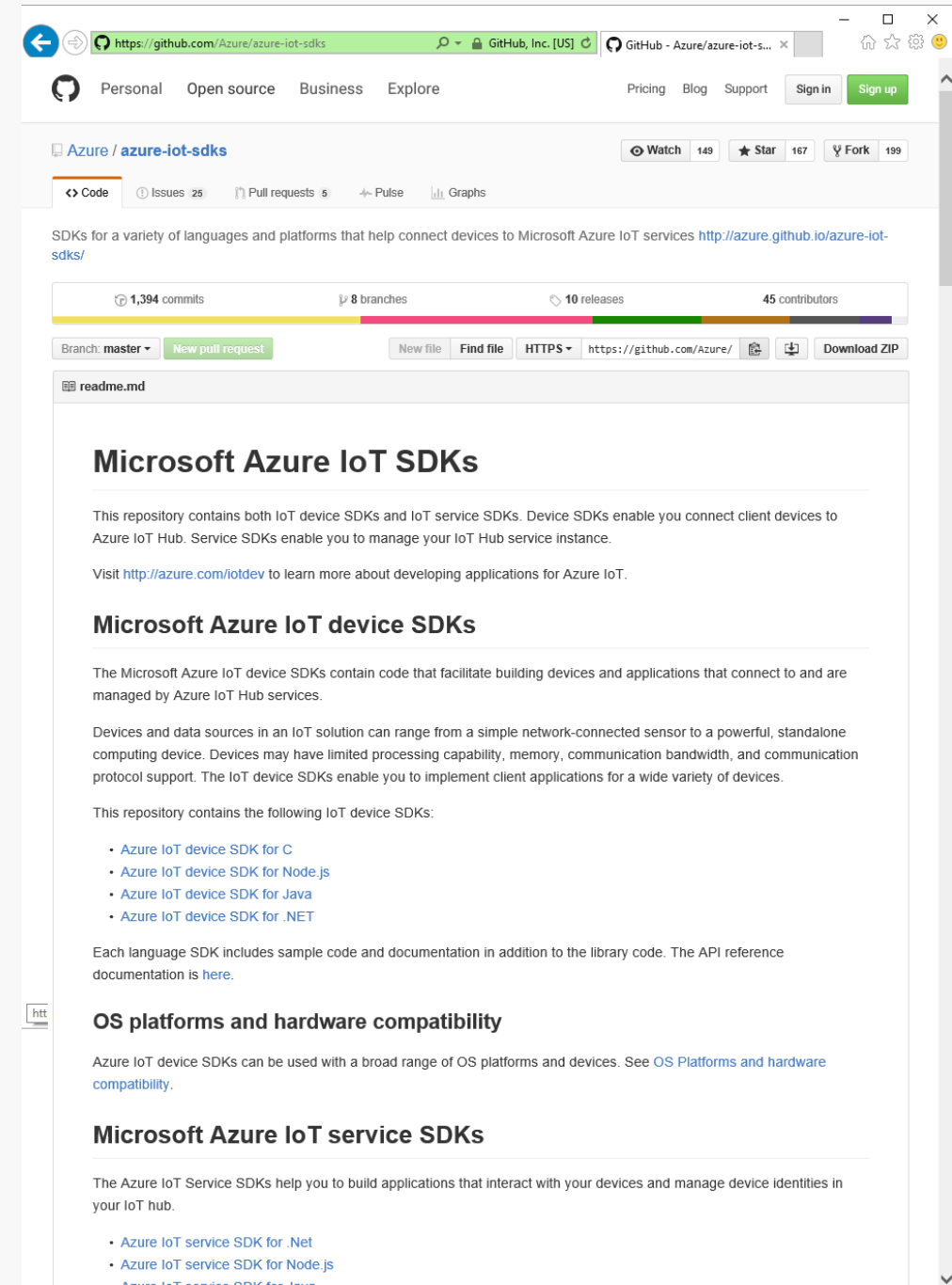
Xamarin Compatible

Includes Xamarin compatible libraries

Easy To Get Started

Samples, walkthroughs to get you started quickly

<https://github.com/Azure/azure-iot-sdks>



The screenshot shows the GitHub repository page for `Azure/azure-iot-sdks`. The repository is open source, licensed under MIT, and has 1,394 commits, 8 branches, 10 releases, and 45 contributors. The repository contains SDKs for a variety of languages and platforms that help connect devices to Microsoft Azure IoT services. The page includes a README section with the following content:

Microsoft Azure IoT SDKs

This repository contains both IoT device SDKs and IoT service SDKs. Device SDKs enable you connect client devices to Azure IoT Hub. Service SDKs enable you to manage your IoT Hub service instance.

Visit <http://azure.com/iotdev> to learn more about developing applications for Azure IoT.

Microsoft Azure IoT device SDKs

The Microsoft Azure IoT device SDKs contain code that facilitate building devices and applications that connect to and are managed by Azure IoT Hub services.

Devices and data sources in an IoT solution can range from a simple network-connected sensor to a powerful, standalone computing device. Devices may have limited processing capability, memory, communication bandwidth, and communication protocol support. The IoT device SDKs enable you to implement client applications for a wide variety of devices.

This repository contains the following IoT device SDKs:

- [Azure IoT device SDK for C](#)
- [Azure IoT device SDK for Node.js](#)
- [Azure IoT device SDK for Java](#)
- [Azure IoT device SDK for .NET](#)

Each language SDK includes sample code and documentation in addition to the library code. The API reference documentation is [here](#).

OS platforms and hardware compatibility

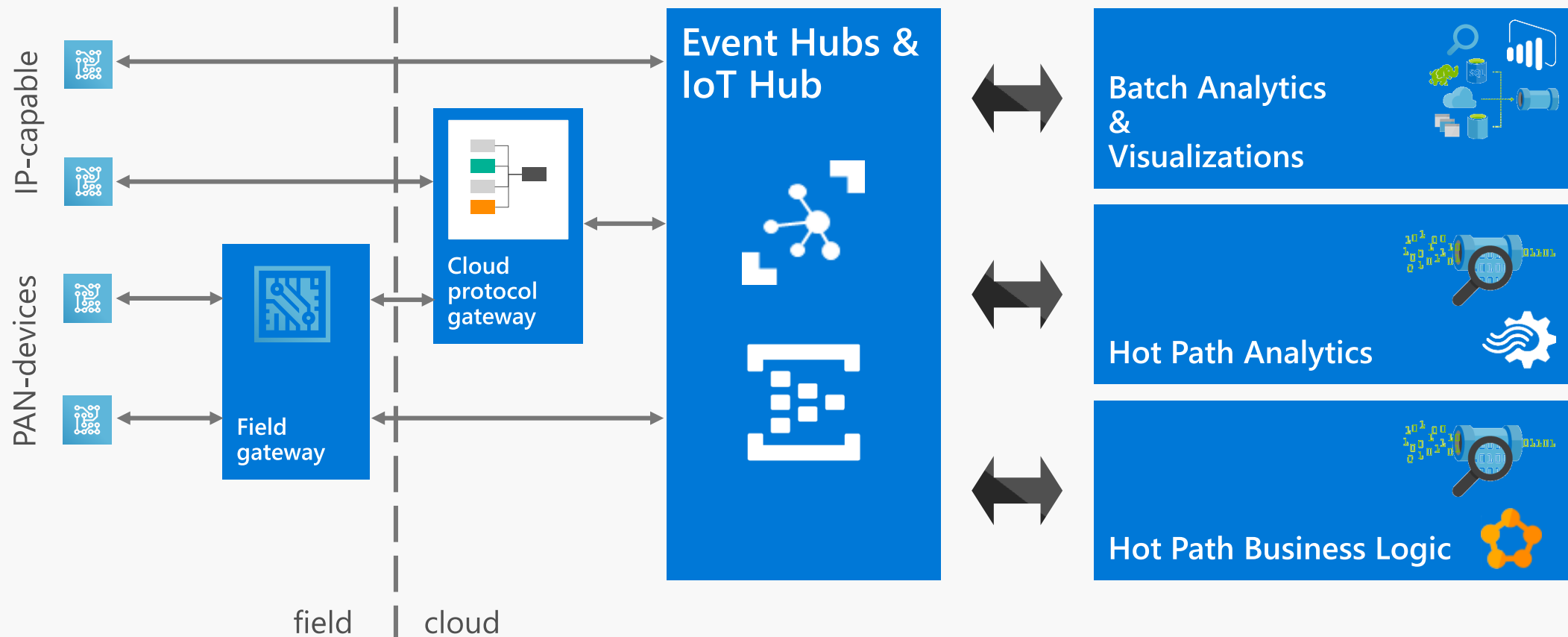
Azure IoT device SDKs can be used with a broad range of OS platforms and devices. See [OS Platforms and hardware compatibility](#).

Microsoft Azure IoT service SDKs

The Azure IoT Service SDKs help you to build applications that interact with your devices and manage device identities in your IoT hub.

- [Azure IoT service SDK for .Net](#)
- [Azure IoT service SDK for Node.js](#)
- [Azure IoT service SDK for Java](#)

Connect your devices to Azure



Azure IoT Hub

Designed for IoT

Connectivity, Security & Management for billions of devices

Service Assisted Communications

Devices are not servers

Use IoT Hub to enable secure bi-directional communications

Cloud Scale Messaging

Device-to-cloud and Cloud-to-device

Durable message inbox/outbox per device

Monitor Devices

Delivery receipts, expired messages

Device communication errors

Per-Device Authentication

Individual device identities and credentials

Connection Multiplexing

Single device-cloud connection for all communications
(device-to-cloud, cloud-to-device)

Multi-Protocol

Natively supports AMQPS, HTTPS, MQTT

Extensible protocol support for custom protocol needs

Multi-Platform

Device SDKs available for multiple platforms

RTOS, Linux, Windows, iOS, Android

Service SDK supports multiple languages (Node, Java, C#)

Azure IoT Hub Device Management

Update Software, Firmware, Configuration

Going beyond simple 'Create, Remove, Update and Delete' for devices

Fully extensible - works on any device running any operating system or firmware

Standards Based

Based on OMA LWM2M

Manage Devices The Way You Want

Group devices into custom topologies

Update devices based on sub-sections of that topology

Role based access control

Enables IT/OT Coordination

OT is responsible for keeping things running, IT is responsible for keeping things secure

IoT requires IT/OT coordination

Azure IoT Hub – Device Topology Support

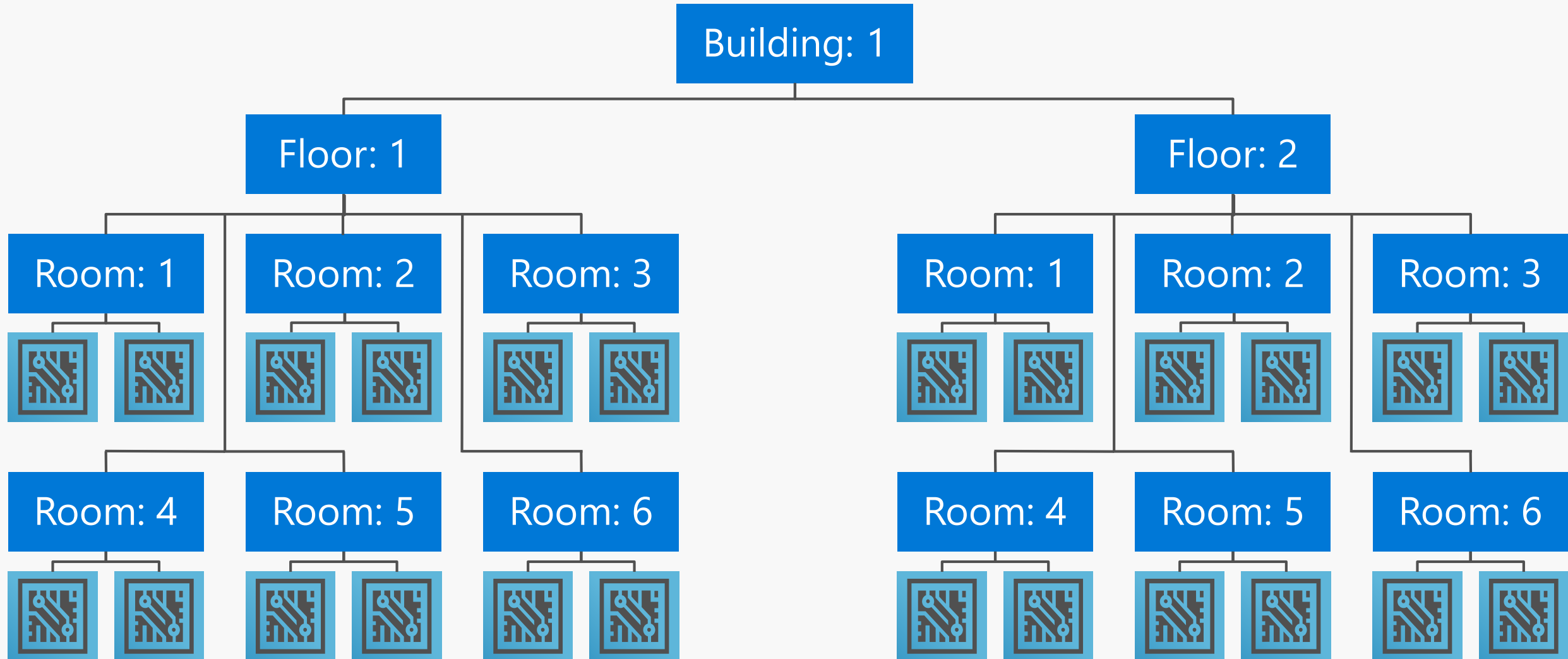
Group & Manage Devices Based On Your Scenario

Example: Building Management



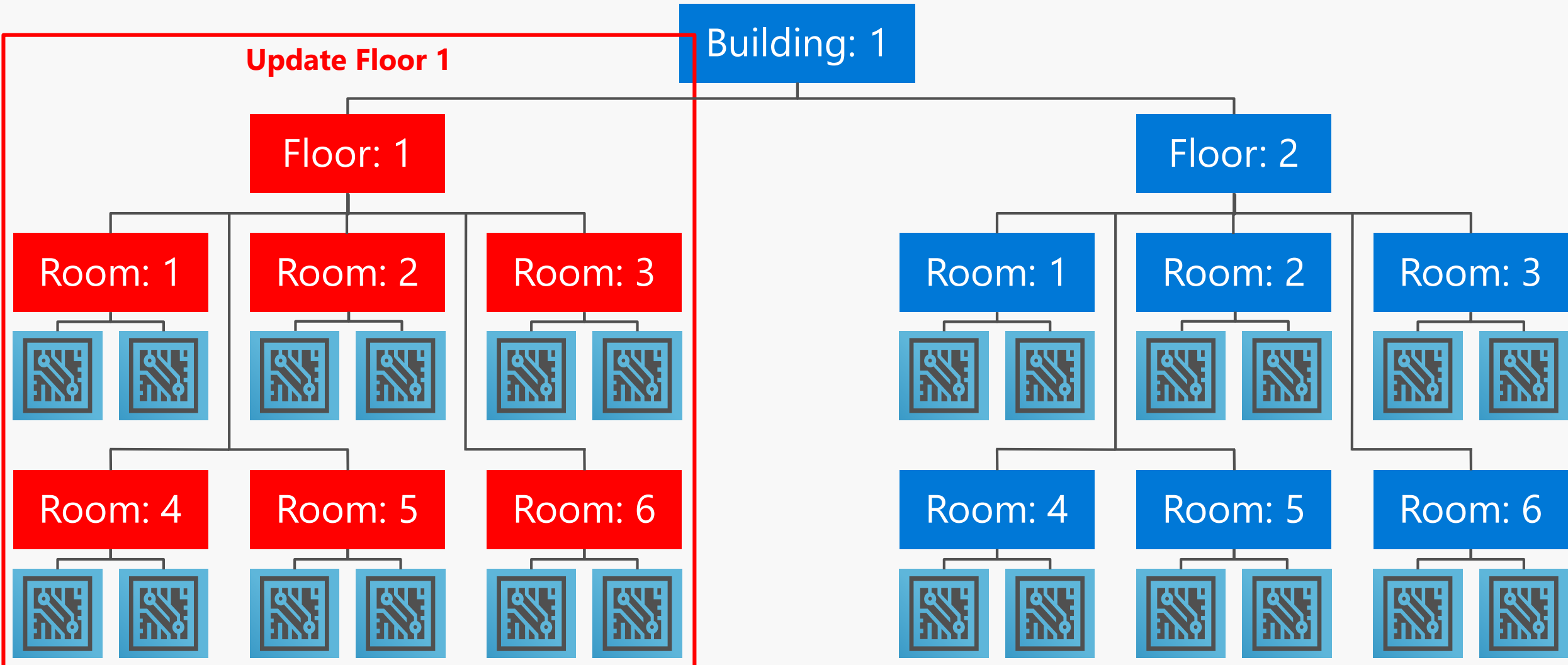
Azure IoT Hub – Device Topology Support

Group & Manage Devices Based On Your Scenario



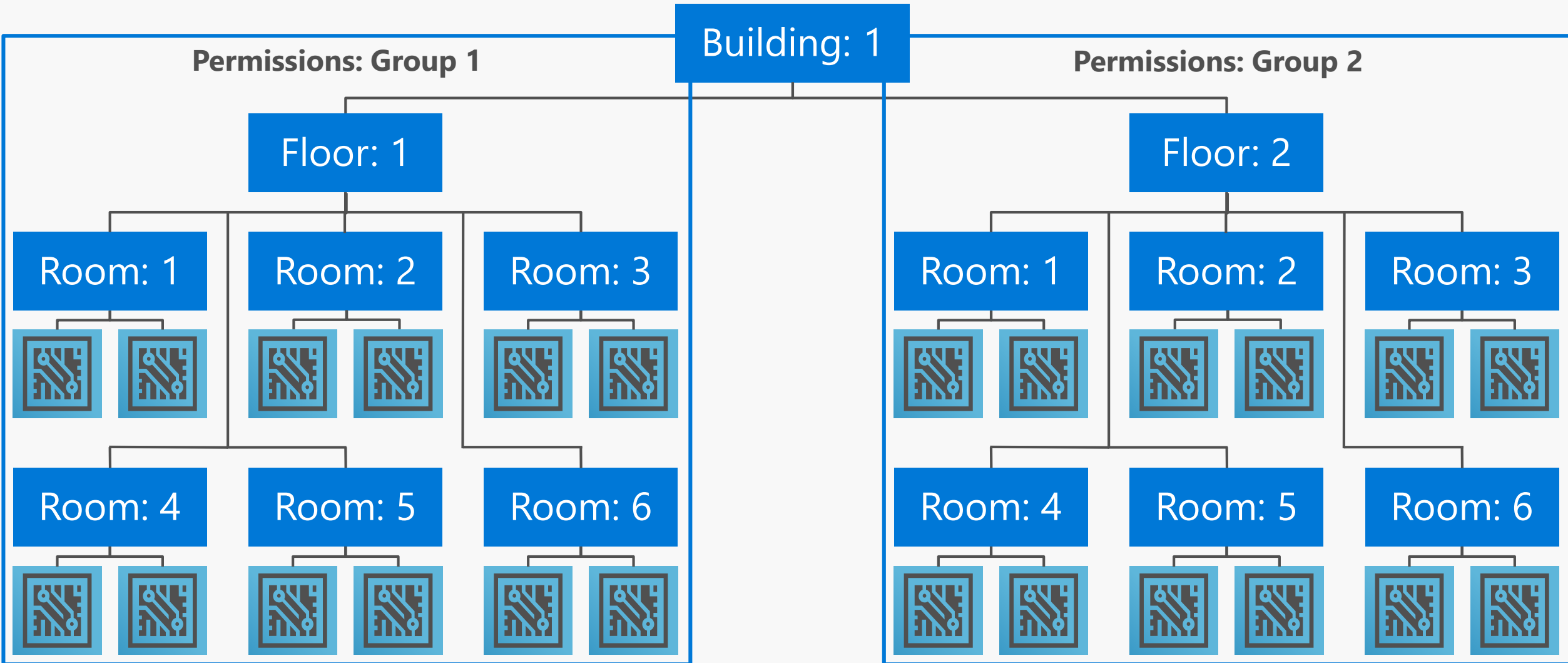
Azure IoT Hub – Device Topology Support

Update Devices Based on Sub-Topologies



Azure IoT Hub – Device Topology Support

Create Permissions Groups Based on Device Topology



Azure IoT Hub Device Management

Enroll Devices

Enroll devices and determine properties and available operations

Organize Devices

Group & manage based on your scenario

Role based access to sub-groups

Maintain Devices

Update software, firmware, configuration using “device jobs”

Operators can monitor device health and signal when it is safe to update devices

IT can update and rollback during maintenance windows

Decommission Devices

Decommission and replace devices after service lifetime

Azure IoT Gateway SDK

Open source

Cloud connectivity

for devices that don't speak TCP/IP

Security Isolation

for devices can't be updated/secured

Protocol translation

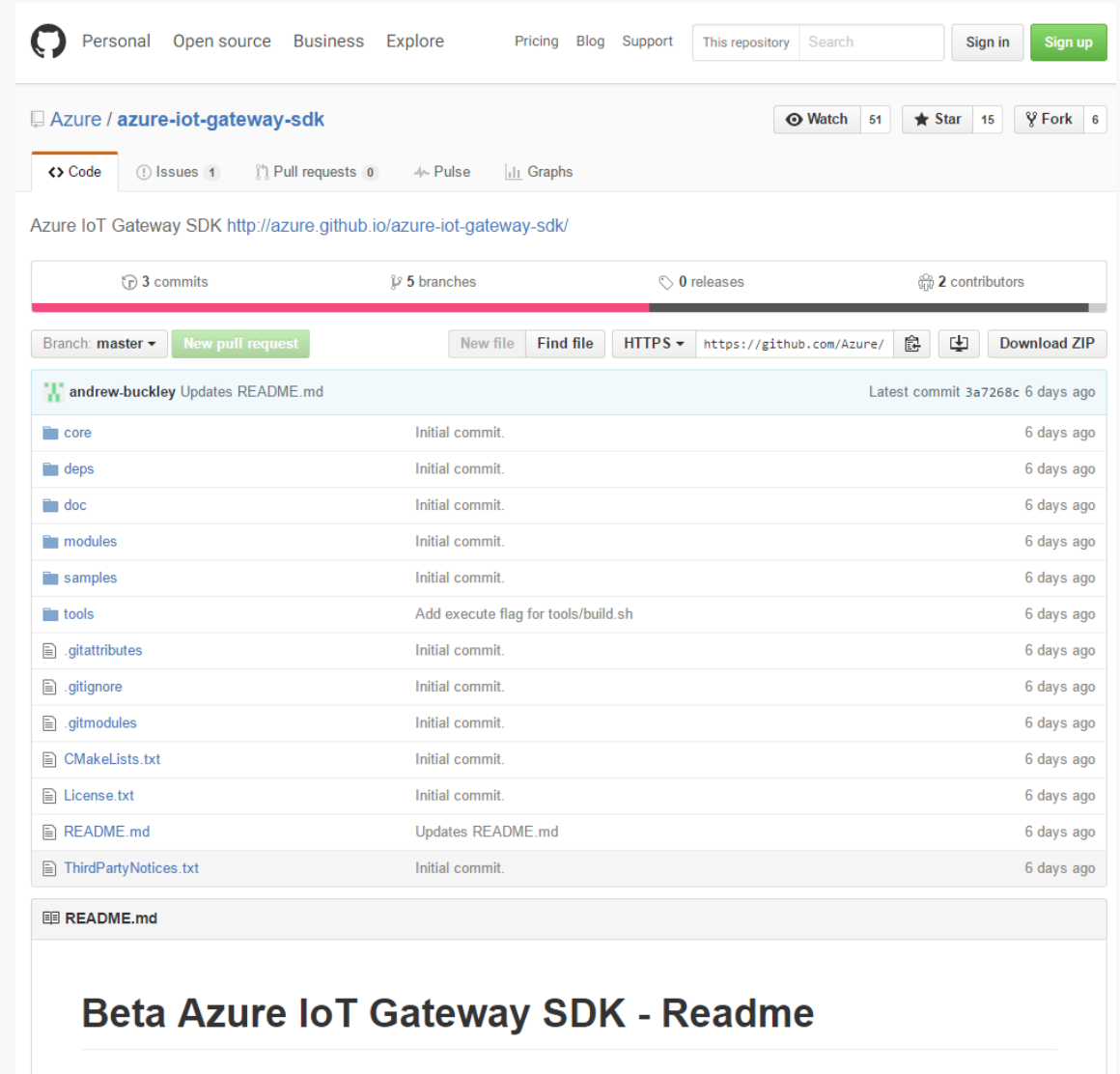
for existing and new protocols

Data transformation

compression, annotation, filtering

Local intelligence

local processing for low latency needs



The screenshot shows the GitHub repository for the Azure IoT Gateway SDK. The repository is owned by Azure and is named 'azure-iot-gateway-sdk'. It has 51 watches, 15 stars, and 6 forks. The repository is in the 'master' branch and has 3 commits, 5 branches, and 0 releases. The repository is described as 'Azure IoT Gateway SDK' with a link to the repository page. The repository is created by 'andrew-buckley' and the latest commit is '3a7268c' from 6 days ago. The repository contains the following files and folders:

File/Folder	Commit Message	Commit Date
core	Initial commit.	6 days ago
deps	Initial commit.	6 days ago
doc	Initial commit.	6 days ago
modules	Initial commit.	6 days ago
samples	Initial commit.	6 days ago
tools	Add execute flag for tools/build.sh	6 days ago
.gitattributes	Initial commit.	6 days ago
.gitignore	Initial commit.	6 days ago
.gitmodules	Initial commit.	6 days ago
CMakeLists.txt	Initial commit.	6 days ago
License.txt	Initial commit.	6 days ago
README.md	Updates README.md	6 days ago
ThirdPartyNotices.txt	Initial commit.	6 days ago

The repository also includes a 'README.md' file. The title of the README is 'Beta Azure IoT Gateway SDK - Readme'. The repository is located at <https://github.com/Azure/azure-iot-gateway-sdk/>.

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

Azure IoT Starter Kits

Get started quickly



Raspberry Pi 2 Kit

Windows 10 and Raspbian
Samples in C and C#



Intel Edison Kit

Linux Yocto
Samples in JavaScript (Node.js)



Feather M0 Wi-Fi Kit

RTOS
Samples in Arduino IDE and C



ThingDev Kit

RTOS
Samples in Arduino and C



Feather Huzzah ESP8266 Kit

RTOS
Samples in Arduino IDE and C

Start today: <http://azure.com/iotstarterkits>

Hands-on Lab

Lab 2

Setup Azure account & services, register device

<http://aka.ms/iotcamp-de>

Lab 2: Setup – Azure IoT Services



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Lab 2: Setup – Device Registration

The screenshot displays the Microsoft Azure portal interface. The top navigation bar shows the path: Microsoft Azure > oliviakiot > Shared access policies > iothubowner. The main content area is titled 'Shared access policies' and contains a table with two columns: 'POLICY' and 'PERMISSIONS'.

POLICY	PERMISSIONS
iothubowner	registry write, service connect, device connect
service	service connect
device	device connect
registryRead	registry read
registryReadWrite	registry write

On the right side of the 'Shared access policies' view, there is a section for 'iothubowner' with the following details:

- Access policy name: iothubowner
- Permissions:
 - ☒ Registry read
 - ☒ Registry write
 - ☒ Service connect
 - ☒ Device connect
- Shared access keys:
 - Primary key: [Redacted]
 - Secondary key: [Redacted]
 - Connection string—primary key: `HostName=oliviakiot.azure-devices.net;S`
 - Connection string—secondary key: `HostName=oliviakiot.azure-devices.net;S`

A blue arrow points from the 'Connection string—primary key' field in the 'Shared access keys' section to the 'IoT Hub Connection String' field in the 'Device Explorer' window. The 'Device Explorer' window shows the 'Configuration' tab with the following information:

Connection Information
IoT Hub Connection String:
`HostName=oliviakiot.azure-devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=[Redacted]`

Protocol Gateway HostName: [Redacted]

Update

Shared Access Signature

Key Name: iothubowner
Key Value: [Redacted]
Target: oliviakiot.azure-devices.net
TTL (Days): 365
Generate SAS

Further Resources

www.InternetofYourThings.com

Azure IoT Dev Center – <http://aka.ms/azureiotdev>

Azure IoT Blog – <https://blogs.microsoft.com/iot>

Azure IoT Suite – <http://azureiotsuite.com>

Starter Kits – <http://azure.com/iotstarterkits>

Azure IoT SDKs – <http://github.com/azure/azure-iot-sdks>

Azure IoT Gateway SDK – <http://github.com/Azure/azure-iot-gateway-sdk>

Developer's introduction to Azure IoT – <http://aka.ms/azureiotdevintro>