

IoT on Amazon Web Services

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Agenda

- A simple definition of the Internet of Things
- IoT projects running on AWS
- The AWS IoT platform
 - Devices & SDKs
 - The MQTT protocol
 - Moving IoT data to the cloud
- An introduction to AWS Greengrass
- Demos (second webinar)

The Internet of Things



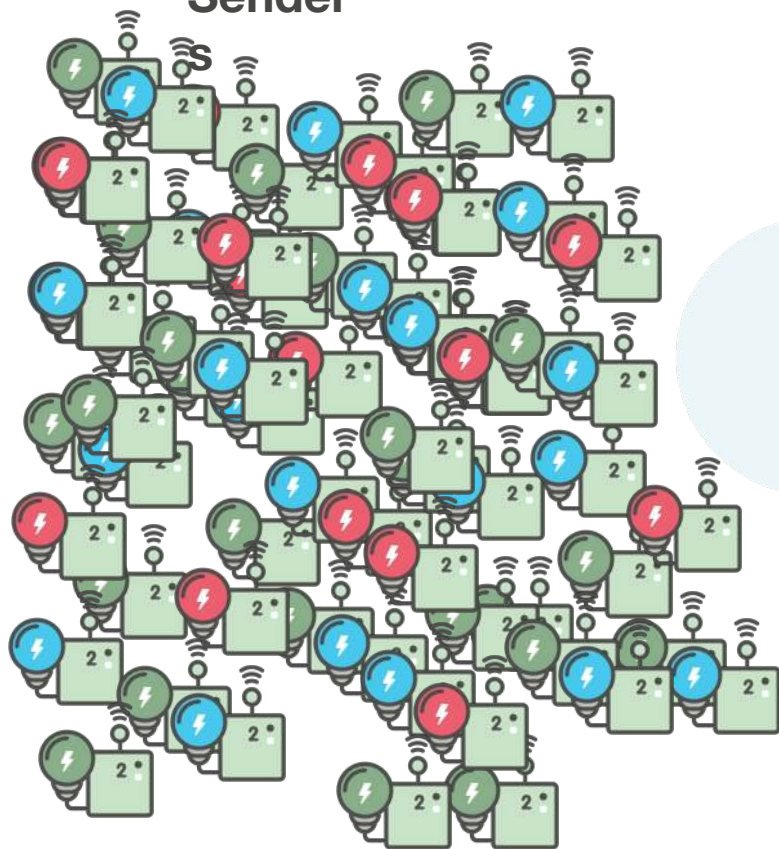
RESOURCE-CONSTRAINED COMPUTING DEVICES

**DEPLOYED IN THE
THOUSANDS, MAYBE THE
MILLIONS**

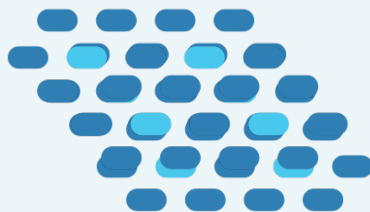
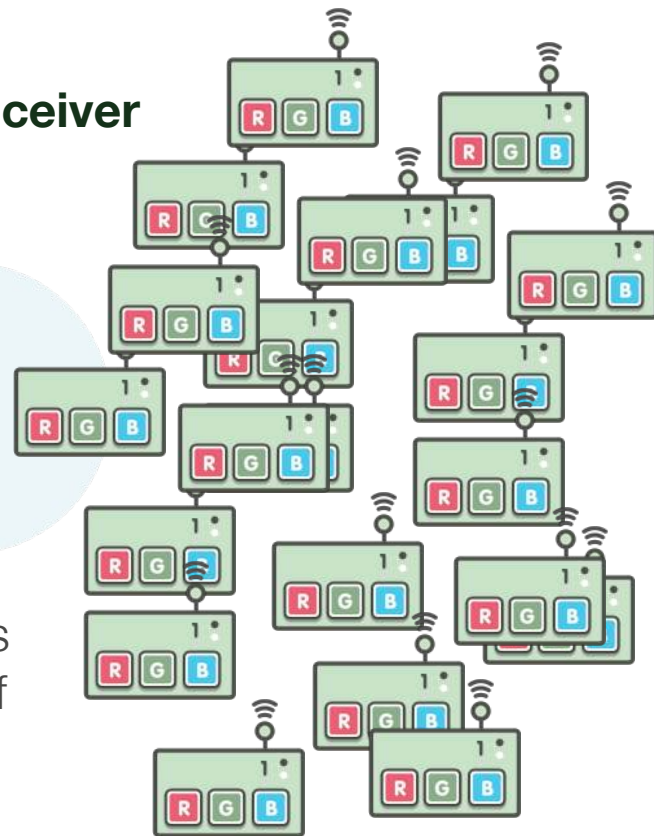
ABLE TO RUN FOR YEARS
WITHOUT HUMAN
INTERVENTION

**COLLECTING AND SENDING
STREAMS OF DATA 24/7/365**

Sender



Receiver
s



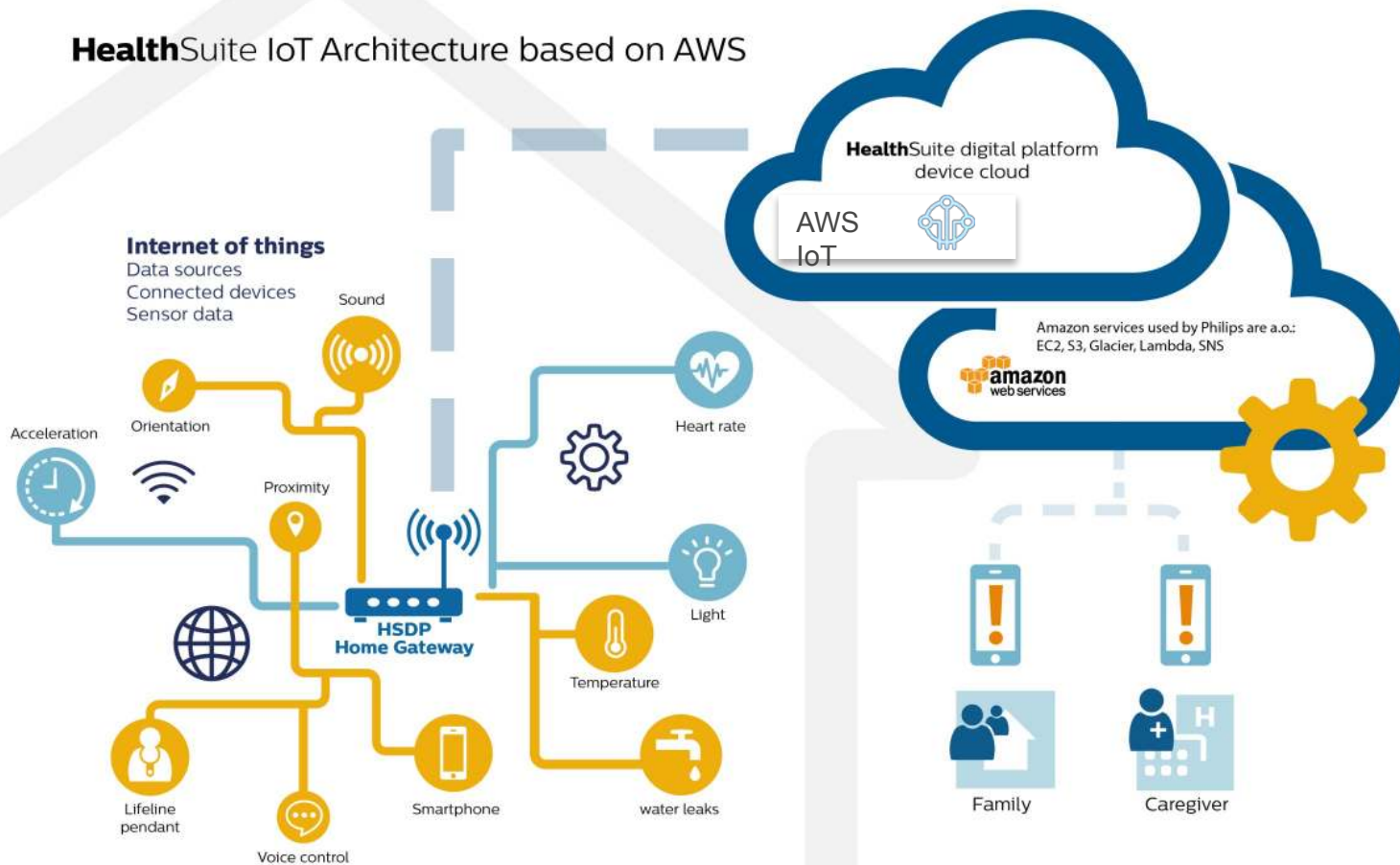
Millions of devices
sending billions of
messages



IoT projects running on AWS



HealthSuite IoT Architecture based on AWS





JOHN DEERE

Streaming, analysis, storage
and visualization of data
coming from 200,000
farming machines

Precision agriculture and
yield optimization for
farmers

New business model for
John Deere





“Car as a Sensor”

Collect sensor data
from BMW 7 Series cars
to give drivers **dynamically
updated map information**

100,000 vehicles by 2018

Service launched
in **6 months**





Connected Roomba
launched in 2015

More than 45 million
square meters mapped

Discovery and interaction
with Smart Home devices



More IoT applications based on AWS



Thermomix
Consumer equipment



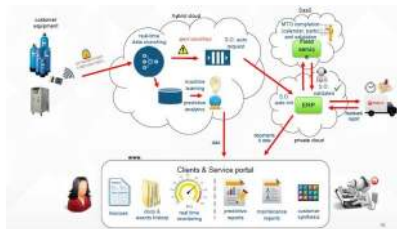
Soitec
Semiconductors



SPS
Motors



Siemens Power & Gas
Energy production



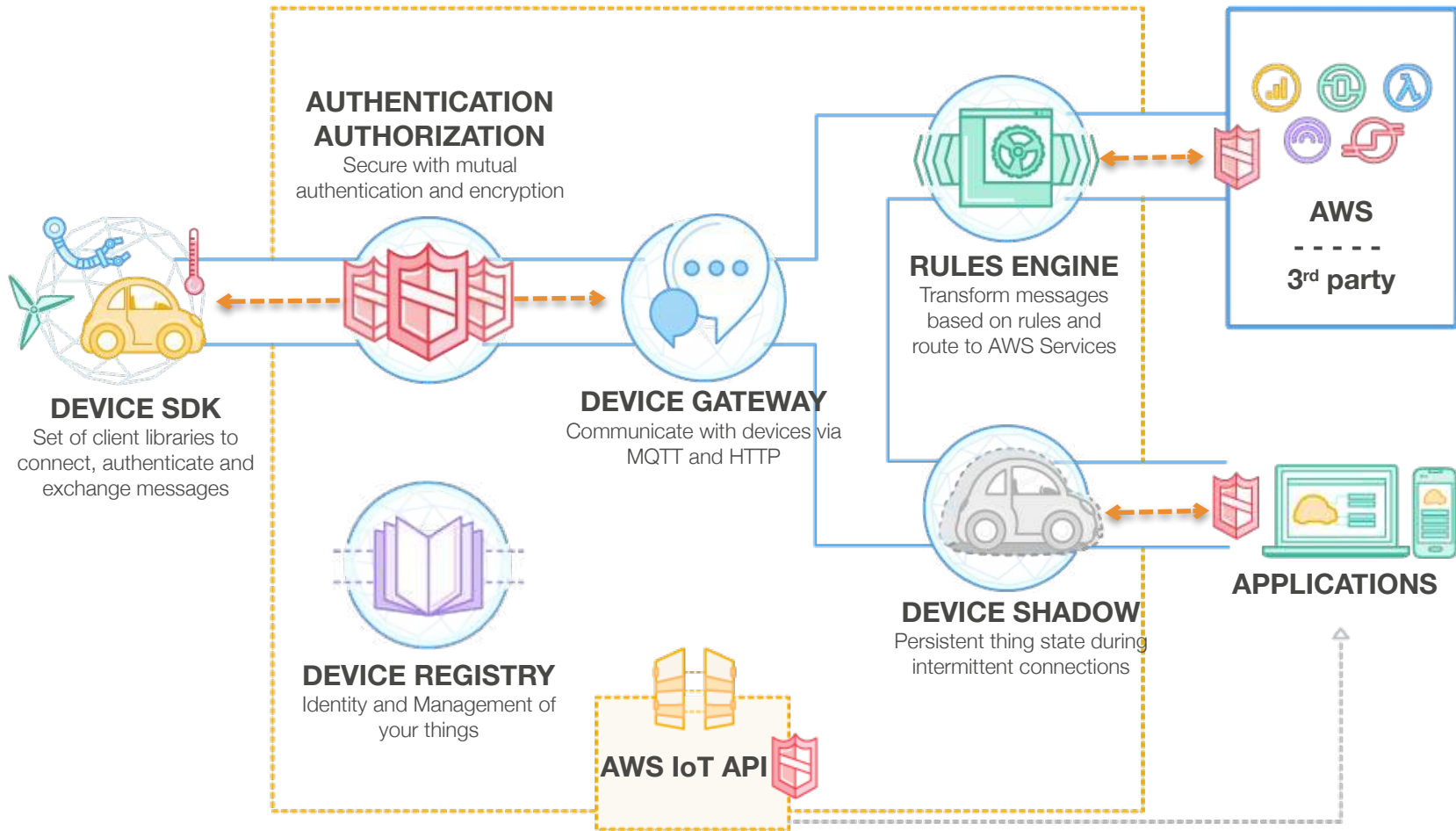
Veolia Water
Water systems



Amazon
Retail

The AWS IoT Platform





Pricing

Region	Price
US East (N. Virginia)	\$5 per million messages
US West (Oregon)	\$5 per million messages
EU (Ireland)	\$5 per million messages
EU (Frankfurt)	\$5 per million messages
Asia Pacific (Sydney)	\$6 per million messages
Asia Pacific (Seoul)	\$6 per million messages
Asia Pacific (Tokyo)	\$8 per million messages
Asia Pacific (Singapore)	\$8 per million messages

- No minimum fee
- You are only charged on the number of incoming and outgoing messages
- 1 message = 512 bytes maximum
- Free tier: 250K free messages / month for 12 months
- No charge when delivering to Amazon S3, Amazon DynamoDB, AWS Lambda, Amazon Kinesis, Amazon SNS, and Amazon SQS.

AWS IoT: Devices & SDKs



Official AWS IoT Starter Kits



Software platforms supported by AWS IoT

- Arduino Yún <https://github.com/aws/aws-iot-device-sdk-arduino-yun>
- Javascript <https://github.com/aws/aws-iot-device-sdk-js>
- Embedded C <https://github.com/aws/aws-iot-device-sdk-embedded-C>

- Android <https://github.com/aws/aws-sdk-android/>
- iOS <https://github.com/aws-labs/aws-sdk-ios-samples>

- Java (07/16) <https://github.com/aws/aws-iot-device-sdk-java>
- Python (07/16) <https://github.com/aws/aws-iot-device-sdk-python>

Managing things

- Thing **Registry**
- Secure **Identity** for Things: one certificate per thing (**mandatory**)
- Secure **Communications** with Things: one keypair per thing (**mandatory**)
- Fine-grained **Authorization** (based on Amazon IAM)
 - Thing Management
 - Access to messages
 - Access to AWS services

<https://aws.amazon.com/security/>

<https://aws.amazon.com/compliance/>

<https://aws.amazon.com/compliance/eu-data-protection/>

AWS IoT: The MQTT Protocol



Protocols supported by AWS IoT

- **MQTT over HTTPS:** publish and subscribe (IPv4 and IPv6)
- **MQTT over WebSockets:** publish and subscribe
 - Security is managed with AWS Signatures v4
- **HTTPS** publish only

MQTT Protocol



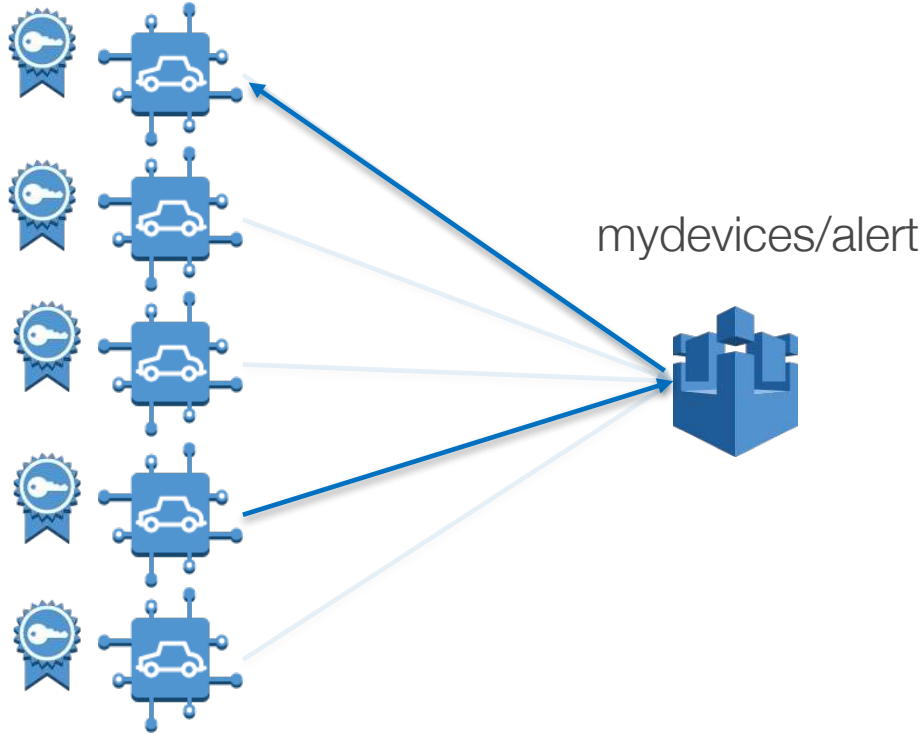
- OASIS **standard** protocol (v3.1.1)
- **Lightweight** transport protocol that is useful for connected devices
- **Publish-subscribe** with topics
- MQTT is used on oil rigs, connected trucks, and many more critical applications
- Until now, customers had to build, maintain and scale a broker to use MQTT with cloud applications

MQTTS vs HTTPS:

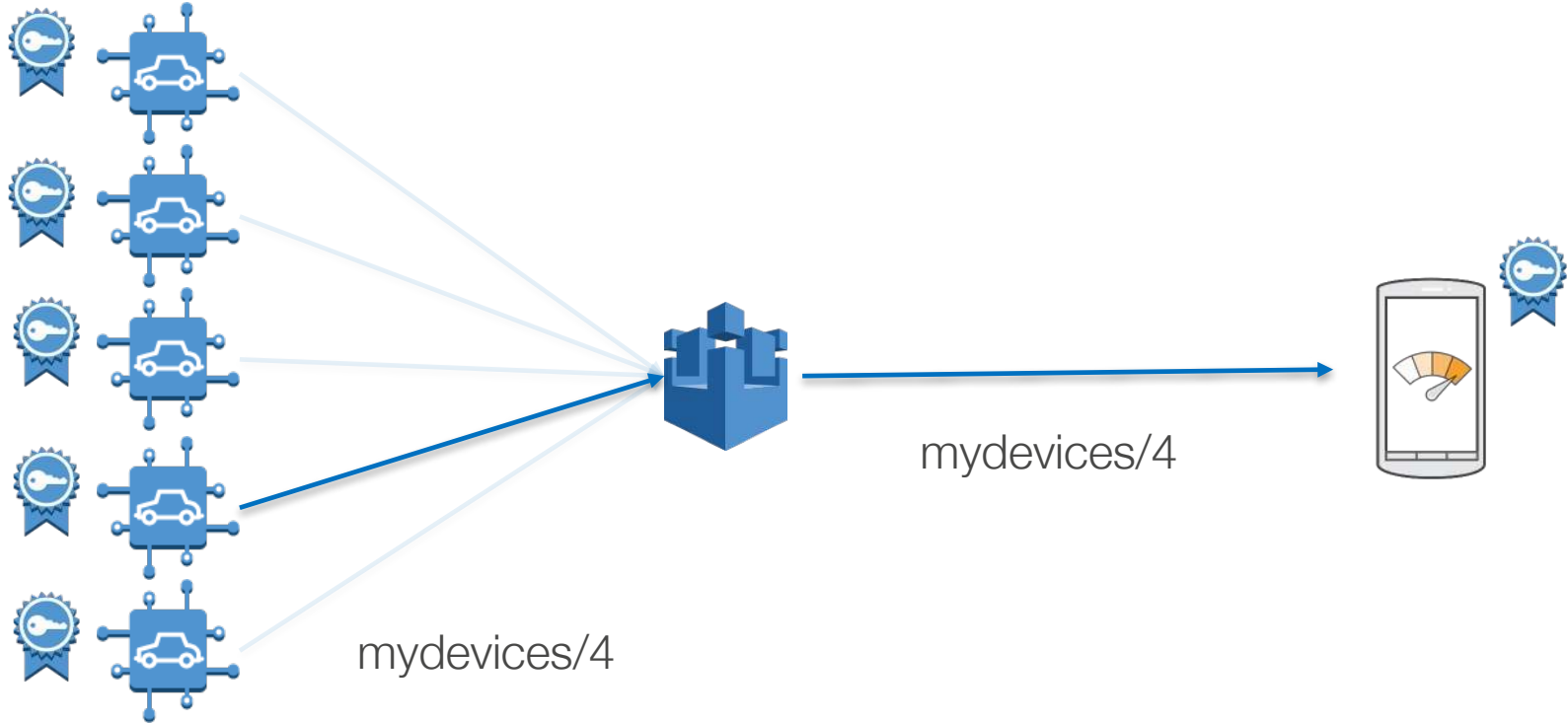
93x faster throughput
11.89x less battery to send
170.9x less battery to receive
50% less power to stay connected
8x less network overhead

Source: <http://stephendnicholas.com/archives/1217>

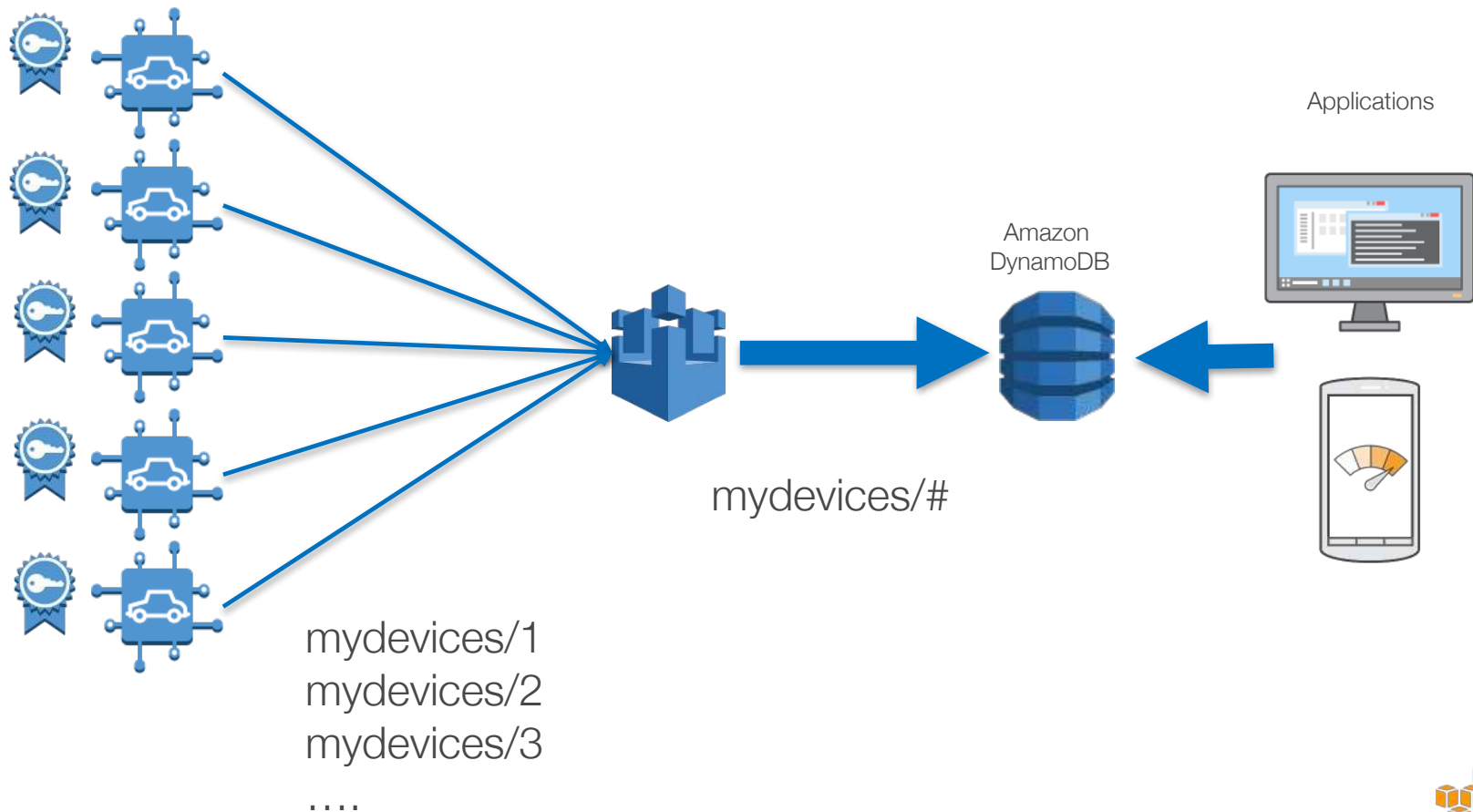
MQTT: device-to-device communication



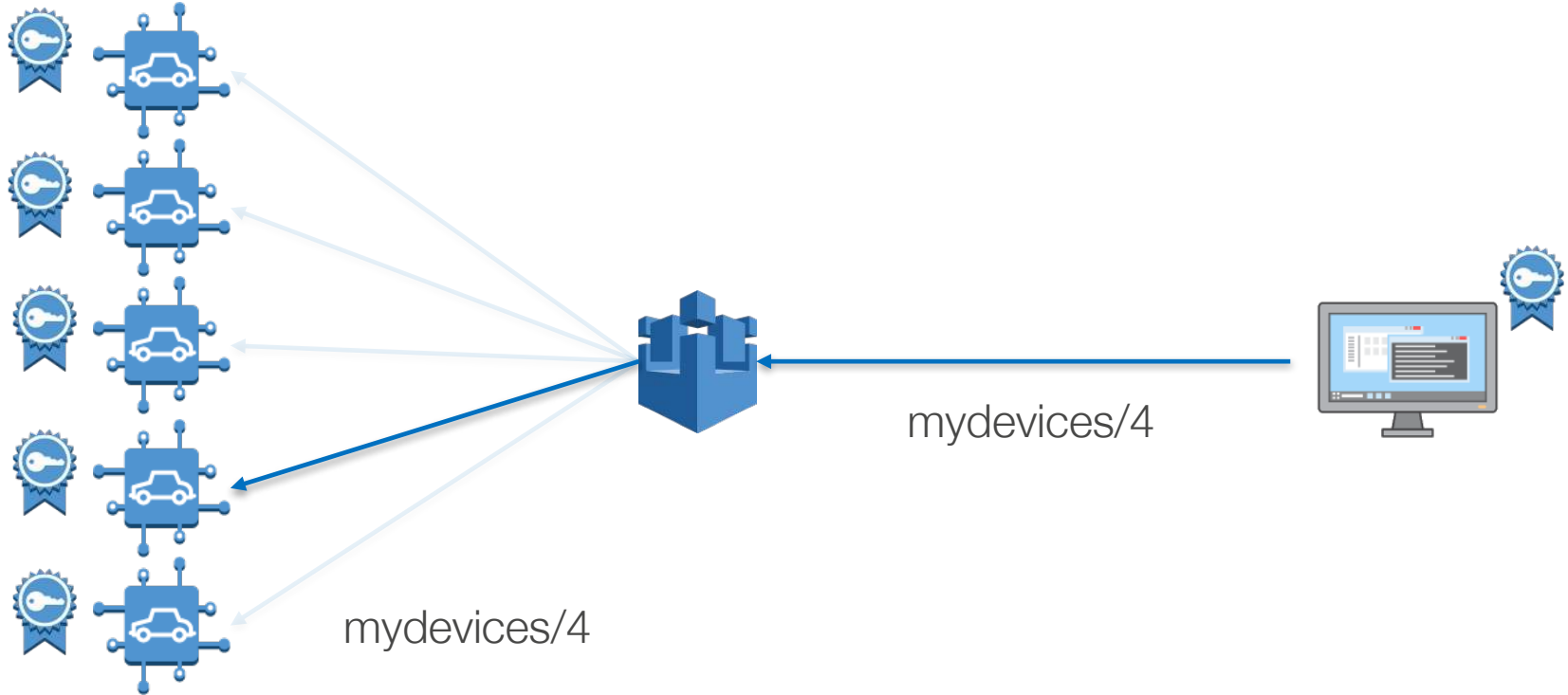
MQTT: collect data from a device



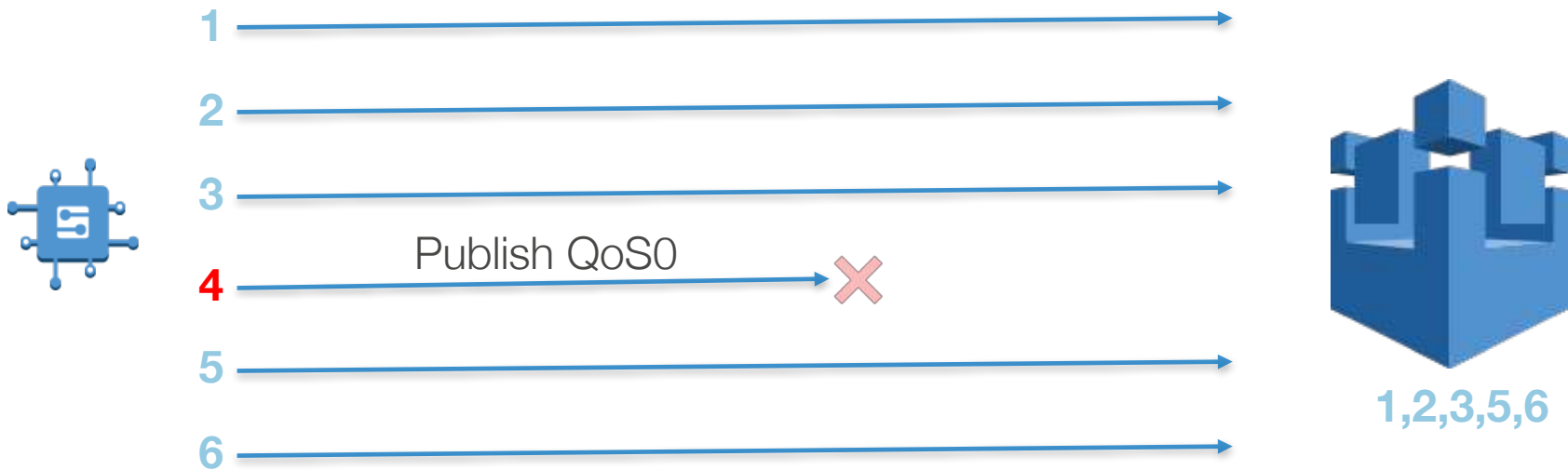
MQTT: aggregate data from many devices



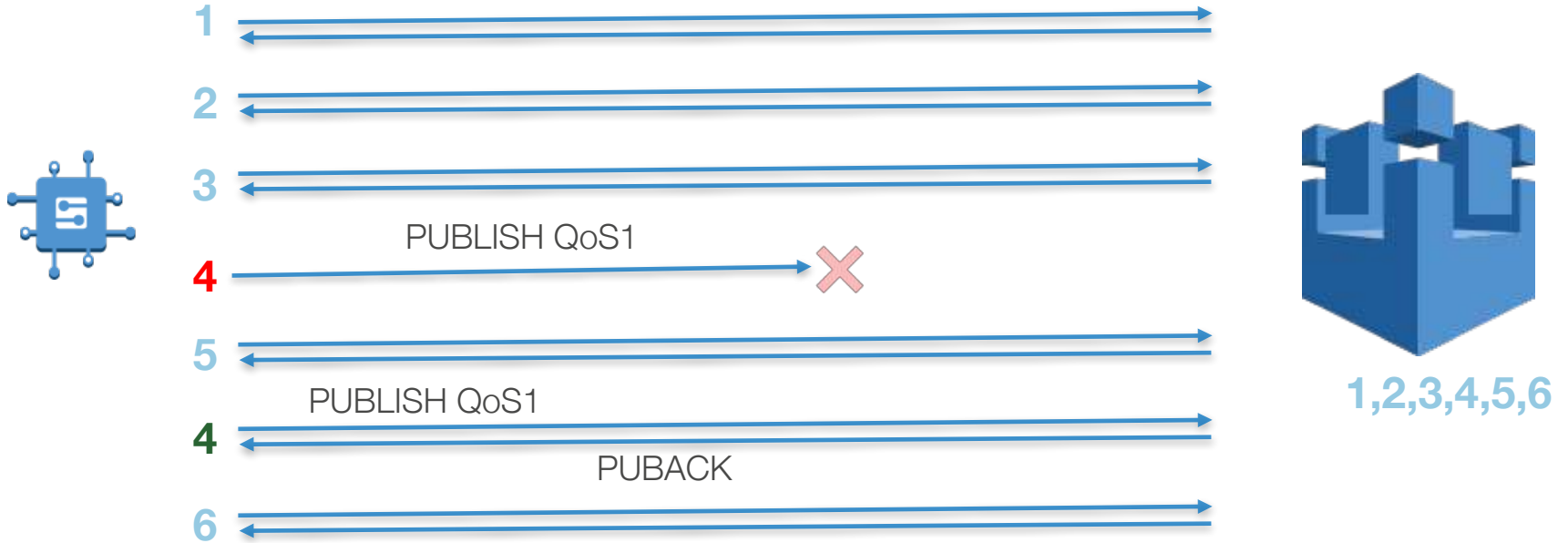
MQTT: update a device



MQTT: QoS 0 (at most once)



MQTT: QoS 1 (at least once)



AWS IoT: Moving data to the cloud

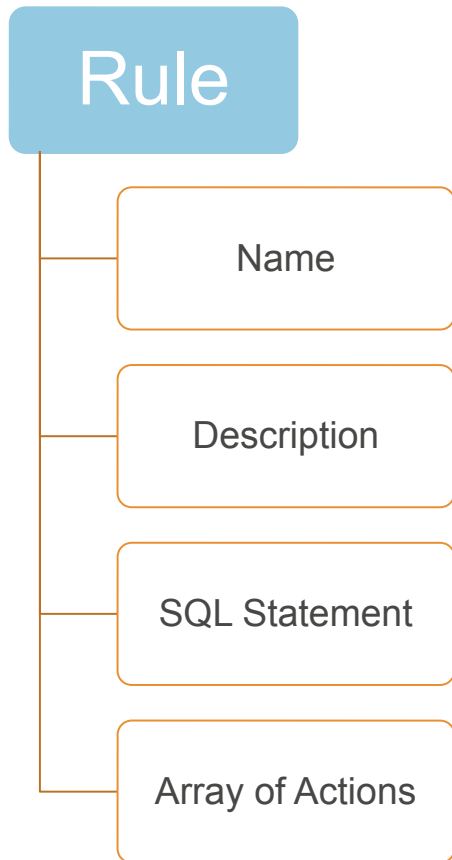


AWS IoT Rules

Rules connect AWS IoT to
External Endpoints
and AWS Services



AWS IoT Rules Engine



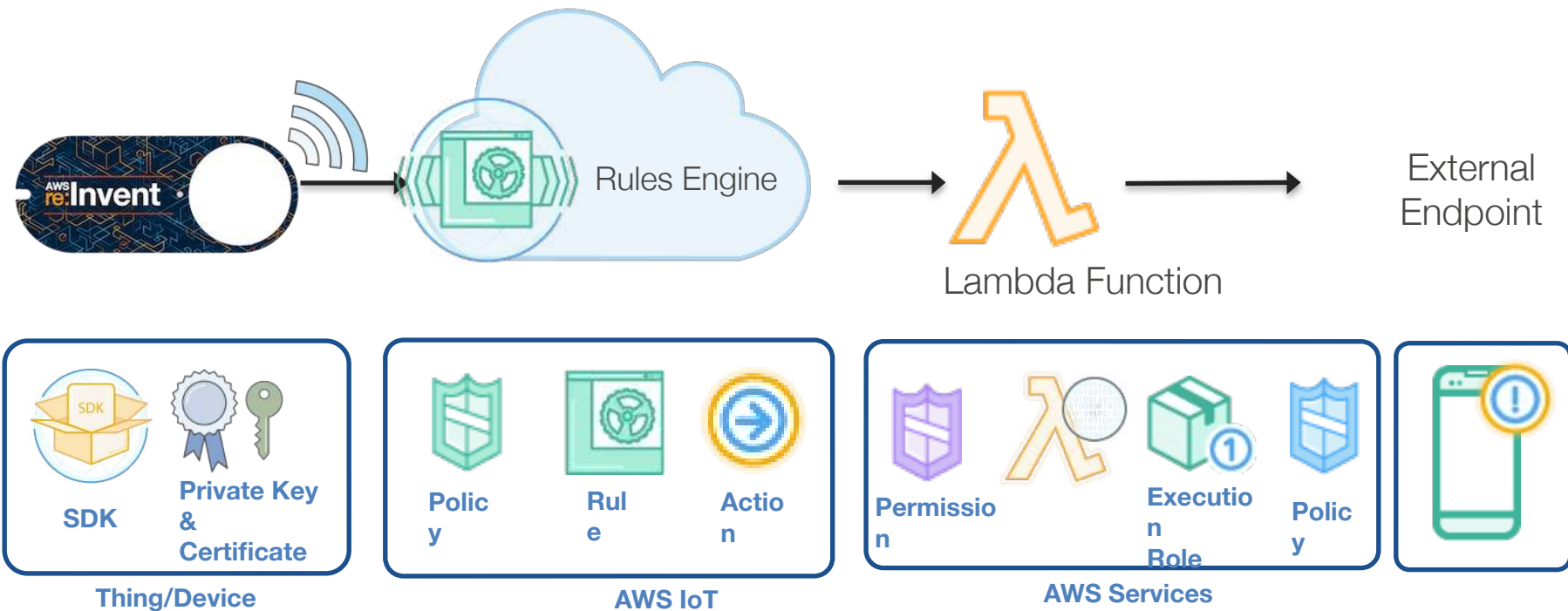
Simple & Familiar Syntax

- SQL Statement to define topic filter
- Optional WHERE clause
- Advanced JSON support

Many functions available

- String manipulation (regex support)
- Mathematical operations
- Crypto support
- UUID, Timestamp, rand, etc.

From AWS IoT to an External Endpoint



Select * from
'iotbutton/+'

