

sec_20_IoT_Core

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160. Amazon IoT - Architecture Diagram, Device Gateway, Rules Engine

AWS Data Architect Training

The diagram illustrates the AWS Data Architect Training architecture, showing the flow of data from various sources through AWS services to analytics and machine learning.

Data Sources:

- Data Files
- Data Streams
- Databases
- Data Server
- Data Messages

AWS Services (Ingestion, Transfer, Migration, API, Client Tools):

- Snowball
- Transfer for SFTP
- Kinesis Data Streams, Kafka (MSK)
- Kinesis Firehose
- Database Migration Service, Schema Conversion Tool
- DataSync
- Storage Gateway
- API Gateway
- Amazon IoT Core
- Cloud9
- EC2
- AWS CLI

AWS Services (Storage, Caching, Archival, Backups):

- S3
- Vault
- Glacier
- Archive
- RDS
- DynamoDB
- Neptune
- DocumentDB
- ElastiCache for Redis
- ElastiCache for Memcached

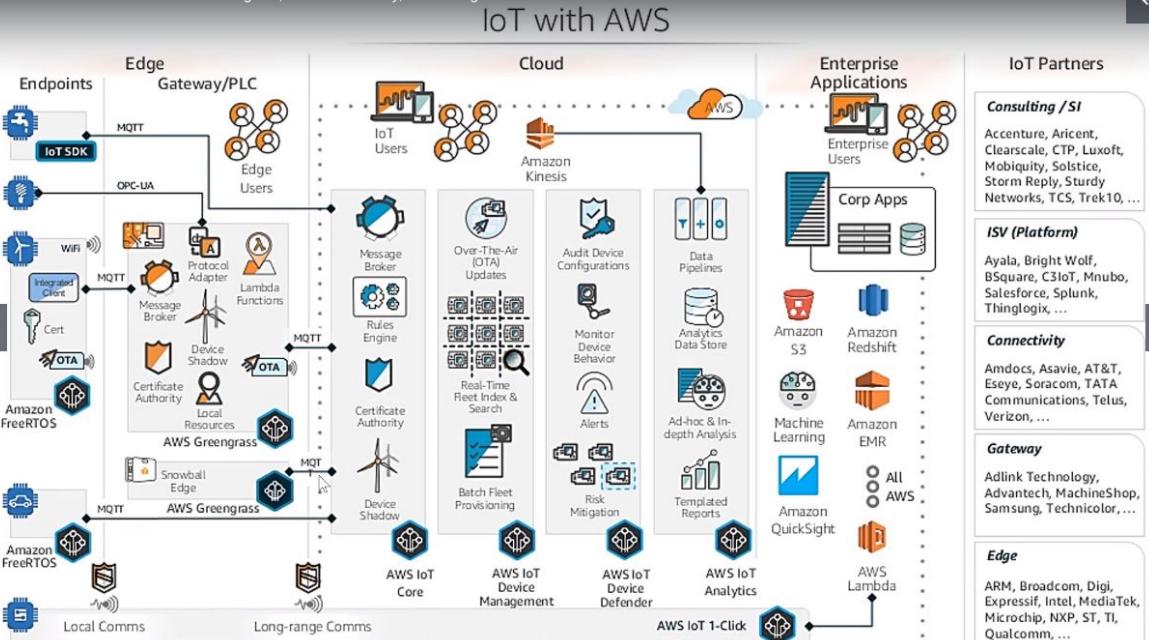
Analytics and Machine Learning:

- Machine Learning
- Recommender
- Content
- Time Series
- Search
- Graph
- Log
- CloudWatch Metrics
- CloudWatch Metrics Insights

Course content: Overview, Q&A, Notes, Announcements

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AWS IoT Overview IoT Solutions IoT Services IoT Partners IoT Devices Customers

What We Offer

AWS IoT provides device software, control services, and data services. Device software enables you to securely connect devices, gather data, and take intelligent actions locally, even when Internet connectivity is not available. Control services allow you to control, manage, and secure large and diverse device fleets. Data services help you extract value from IoT data.

The diagram illustrates the AWS IoT architecture. On the left, under 'Device Software', there are two options: 'Amazon FreeRTOS' (for microcontrollers) and 'AWS IoT Greengrass' (to extend AWS IoT to the edge). An arrow points from these to a central column of 'Control Services'. This column includes 'AWS IoT Core' (secure device connectivity and messaging), 'AWS IoT Device Management' (fleet onboarding, management, and SW updates), 'AWS IoT Device Defender' (fleet audit and protection), and 'AWS IoT Things Graph' (connect devices and web services). Below this is a row of 'Data Services': 'AWS IoT Analytics' (IoT data analytics and intelligence), 'AWS IoT SiteWise' (collect, store, and search industrial IoT data), and 'AWS IoT Events' (detect and respond to events from IoT sensors and applications).

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AWS IoT Core

Easily and securely connect devices to the cloud. Reliably scale to billions of devices and trillions of messages.

Get started for free >

What is AWS IoT Core?

AWS IoT Core is a managed cloud service that lets connected devices easily and securely interact with cloud applications and other devices. AWS IoT Core can support billions of devices and trillions of messages, and can process and route those messages to AWS endpoints and to other devices reliably and securely. With AWS IoT Core, your applications can keep track of and communicate with all your devices, all the time, even when they aren't connected.

AWS IoT Core also makes it easy to use AWS services like AWS Lambda, Amazon Kinesis, Amazon S3, Amazon SageMaker, Amazon DynamoDB, Amazon CloudWatch, AWS CloudTrail, and Amazon QuickSight, to build IoT applications that gather, process, analyze and act on data generated by connected devices, without having to manage any infrastructure.

How does AWS IoT Core work?

CONNECT AND MANAGE YOUR DEVICES

1.5x 4:11 / 14:01

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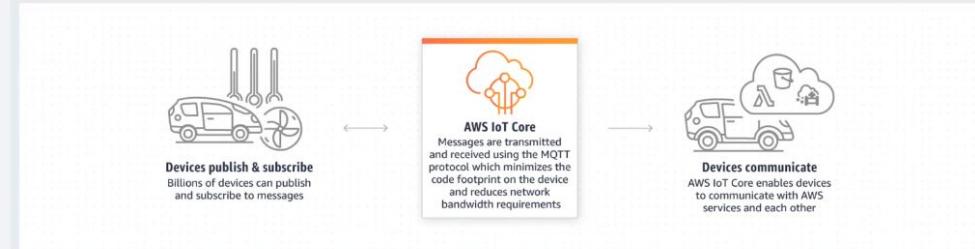
Customers

Amazon QuickSight, to build IoT applications that gather, process, analyze and act on data generated by connected devices, without having to manage any infrastructure.

How does AWS IoT Core work?

Connect and manage your devices

AWS IoT Core allows you to easily connect devices to the cloud and to other devices. AWS IoT Core supports HTTP, WebSockets, and MQTT, a lightweight communication protocol specifically designed to tolerate intermittent connections, minimize the code footprint on devices, and reduce network bandwidth requirements. AWS IoT Core also supports other industry-standard and custom protocols, and devices can communicate with each other even if they are using different protocols.



1.5x 4:50 / 14:01

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Secure device connections and data

AWS IoT Core provides authentication and end-to-end encryption throughout all points of connection, so that data is never exchanged between devices and AWS IoT Core without proven identity. In addition, you can secure access to your devices and applications by applying policies with granular permissions.

Input
An array of temperature sensors transmit data

Authenticate
The connection to AWS IoT Core is authenticated

AWS IoT Core
If the sensors agree the temperature is above a threshold, they turn on the fan. Only authenticated users can control the fan

Authenticate
The connection to the fan is authenticated

Output
The fan receives a command and turns on

Process and act upon device data

With AWS IoT Core, you can filter, transform, and act upon device data on the fly, based on business rules you define. You can update your rules to implement new device and application logic.

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Process and act upon device data

With AWS IoT Core, you can filter, transform, and act upon device data on the fly, based on business rules you define. You can update your rules to implement new device and application features at any time. AWS IoT Core makes it easy to use AWS services like AWS Lambda, Amazon Kinesis, Amazon S3, Amazon Machine Learning, Amazon DynamoDB, Amazon CloudWatch, and Amazon Elasticsearch Service for even more powerful IoT applications.

The diagram shows a flow from an input source (a car icon) to AWS IoT Core. AWS IoT Core processes data based on rules and interprets moisture levels. It then sends alerts to nearby cars via the Rules Engine. Simultaneously, AWS IoT Core stores performance data in Amazon S3 and visualizes it using Amazon QuickSight. Finally, AWS IoT Analytics uses prebuilt templates to create predictive models, which are used by Amazon SageMaker to train machine learning models over time.

Input
Data on road conditions and performance is transmitted

AWS IoT Core
Process data based on rules, and interpret that moisture levels are high. Send alert to nearby cars

The Rules Engine in AWS IoT Core alerts drivers of slick conditions

Amazon S3 Store engine performance data

Amazon QuickSight Visualize IoT data

AWS IoT Analytics Use prebuilt templates in IoT Analytics to create predictive models

Amazon SageMaker Engine performance data is used to train a machine learning model in Amazon SageMaker so predictions get more accurate over time

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AWS IoT Core

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Read and set device state at any time

AWS IoT Core stores the latest state of a connected device so that it can be read or set at anytime, making the device appear to your applications as if it were online all the time. This means that your application can read a device's state even when it is disconnected, and also allows you to set a device state and have it implemented when the device reconnects.



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169. Amazon IoT - Architecture Diagram; Device Gateway, Rules Engine

AWS IoT

The diagram illustrates the architecture of AWS IoT. At the bottom, a wind turbine and a battery represent devices. They send messages to an API, which interacts with a Registry. The API also connects to a Device Shadow and a Device Gateway. The Device Gateway manages authentication and sends messages to a Rules Engine. The Rules Engine is part of the AWS IoT core, which also includes a Device Shadow and a Device Gateway. The Rules Engine connects to various AWS services: Amazon Kinesis, Amazon DynamoDB, Amazon Machine Learning, AWS Lambda, Amazon QuickSight, Amazon SNS, and Amazon Kinesis. Applications can also interact with the Rules Engine and the AWS IoT core. The entire system is represented by a 3D perspective view.

AWS IoT

AMAZON KINESIS
AMAZON DYNAMO DB
AMAZON MACHINE LEARNING
OTHER SERVICES

AMAZON KINESIS
AMAZON DYNAMO DB
AWS LAMBDA
AMAZON QUICKSIGHT
AMAZON SNS

MESSAGES
APPLICATIONS
MESSAGES
MESSAGES

RULES ENGINE
DEVICE SHADOW
DEVICE GATEWAY

MESSAGES
MESSAGES
MESSAGES

AUTHENTICATION
API
REGISTRY

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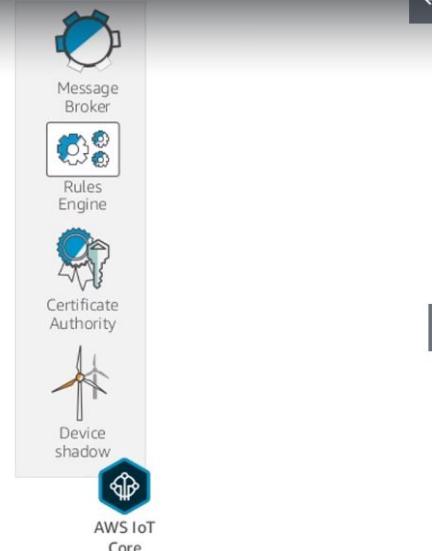
AWS IoT Core

All in one service

- Message Broker
- Rules Engine
- Certificate Authority
- Shadow
- Unbundles pricing by charging for these components independently

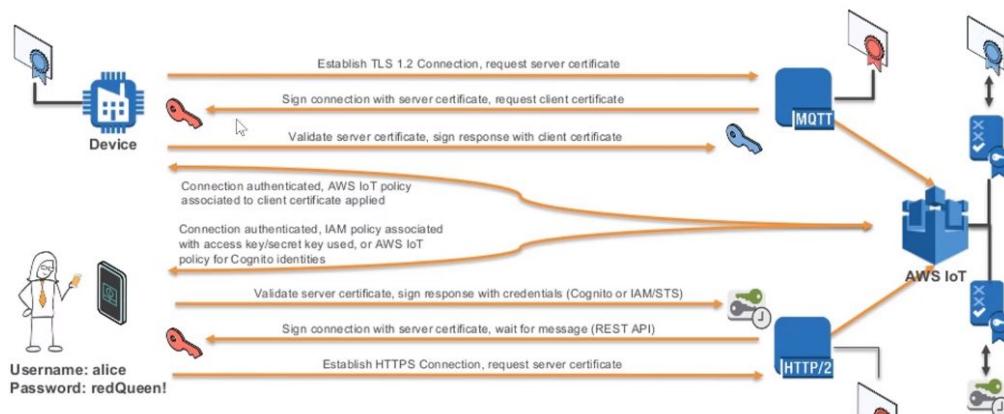
Managed service

- No installation
- Automatic scaling
- No pre-provisioning
- Redundant across AZ
- Pay as you go



169. Amazon IoT - Architecture Diagram, Device Gateway, Rules Engine

Authentication/Authorization Examples



Note: MQTT and HTTP can use cert or SigV4 on auth mechanism

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MQTT Protocol – How it Works

IoT

MQTT is one of the most commonly used protocols in IoT projects. It stands for Message Queuing Telemetry Transport.

In addition, it is designed as a lightweight messaging protocol that uses publish/subscribe operations to exchange data between clients and the server. Furthermore, its small size, low power usage, minimized data packets and ease of implementation make the protocol ideal of the “machine-to-machine” or “Internet of Things” world.

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Why MQTT?

MQTT has unique features you can hardly find in other protocols, like:

- It's a lightweight protocol. So, it's easy to implement in software and fast in data transmission.
- It's based on a messaging technique. Of course, you know how fast your messenger/WhatsApp message delivery is. Likewise, the MQTT protocol.
- Minimized data packets. Hence, low network usage.
- Low power usage. As a result, it saves the connected device's battery.
- It's real time! That's specifically what makes it perfect for IoT applications.

How MQTT works

Like any other internet protocol, MQTT is based on clients and a server. Likewise, the server is the guy who is responsible for handling the client's requests of receiving or sending data between each other.

MQTT server is called a broker and the clients are simply the connected devices.
So:

- When a device (a client) wants to send data to the broker, we call this operation a "publish".
- When a device (a client) wants to receive data from the broker, we call this operation a "subscribe".

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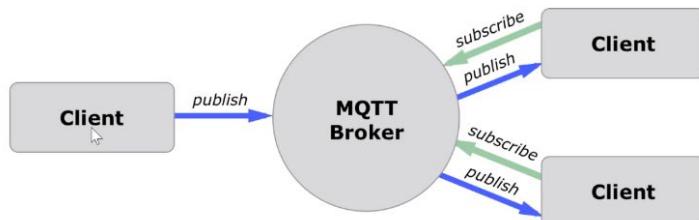
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Like any other internet protocol, MQTT is based on clients and a server. Likewise, the server is the guy who is responsible for handling the client's requests of receiving or sending data between each other.

MQTT server is called a broker and the clients are simply the connected devices.

So:

- When a device (a client) wants to send data to the broker, we call this operation a "[publish](#)".
- When a device (a client) wants to receive data from the broker, we call this operation a "[subscribe](#)".



Feedback >



In addition, These clients are publishing and subscribing to topics. So, the broker here is the one that handles the publishing/subscribing actions to the topic.

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MQTT IoT Protocol complete tutorial

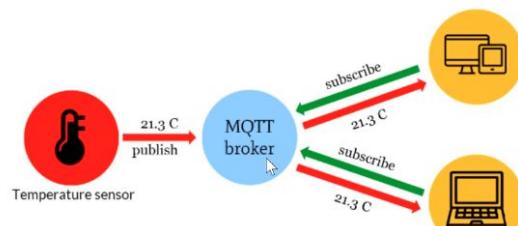
<https://1sheeld.com/mqtt-protocol/>

Example:

Let's say there is a device that has a temperature sensor. Certainly, it wants to send his readings to the broker. On the other side, a phone/desktop application wants to receive this temperature value. Therefore, 2 things will happen:

- The device defines the topic it wants to publish on, ex: "temp". Then, it publishes the message "temperature value".
- The phone/desktop application subscribes to the topic "temp". Then, it receives the message that the device has published, which is the temperature value.

Again, the broker role here is to take the message "temperature value" and deliver it to phone/desktop application.



Schematic data flow from sensor (machine) to devise (machine)

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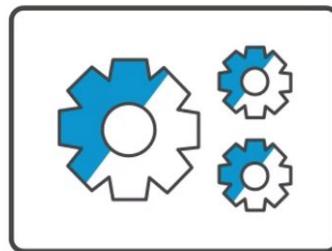
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Rules Engine

Tasks

- SQL-like syntax to write rules
- Augment or filter data
- Save data to other services
- Send data to Amazon Machine Learning
- Make predictions based on ML model



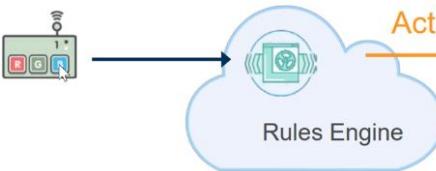
Services Supported

- Amazon DynamoDB
- Amazon S3
- Amazon SNS
- Amazon SQS
- Amazon Kinesis
- Amazon Elasticsearch
- AWS Lambda
- and more...

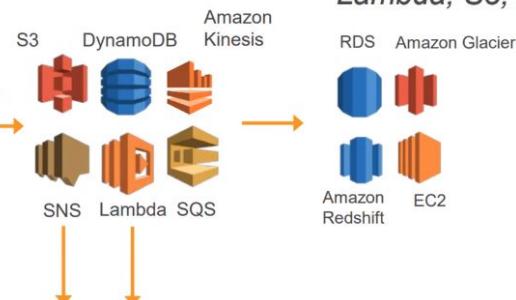


AWS IoT Rules Engine

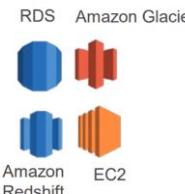
Rules Engine connects AWS IoT to external endpoints and AWS services.



1. AWS Services (*Direct Integration*)



2. Rest of AWS (via Amazon Kinesis, Lambda, S3, and more)



3. External Endpoints (via Lambda and SNS)

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Simplest way to build End to End Solutions

AWS IoT Button

Developers



Enterprise Program



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IoT Button Developers

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AWS IoT Button – Limited Release Programmable Dash Button



- An easy way to get started with the **Internet of Things**
- A **programmable Wi-Fi button** for developers to learn how to use AWS IoT, Lambda, DynamoDB, SNS
- Use the button to **count items, track usage, initiate a call, send alerts or start and stop a process** or connected product
- Eliminate the hassle of writing device-specific code; **code in the cloud** to configure your button's single, double, and long clicks.

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How does it work?



-  Invoke a Lambda function
-  Put object in an S3 bucket
-  Insert, Update, Read from a DynamoDB table
-  Publish to an SNS Topic or Endpoint
-  Publish to a Kinesis stream
-  Kinesis Firehose > Redshift
-  Republish to AWS IoT



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Alert Someone: AWS IoT to AWS Lambda to SNS

The diagram illustrates a workflow starting with an IoT button (represented by a blue circle with a gear icon). An arrow points from the button to the AWS IoT Rules Engine (a cloud icon containing a green gear). From the Rules Engine, an arrow points to a Lambda Function (an orange lambda icon). Finally, an arrow points from the Lambda Function to an SNS Topic (a smartphone icon with a speech bubble).

IoT Button Components:

- SDK
- Private Key & Certificate

AWS IoT Components:

- Policy
- Rule
- Action

AWS Services Components:

- Permission
- Event Source
- Execution Role
- Policy
- SNS Topic
- Subscription
- Function

Rule: "Select * from 'iotbutton/+'"

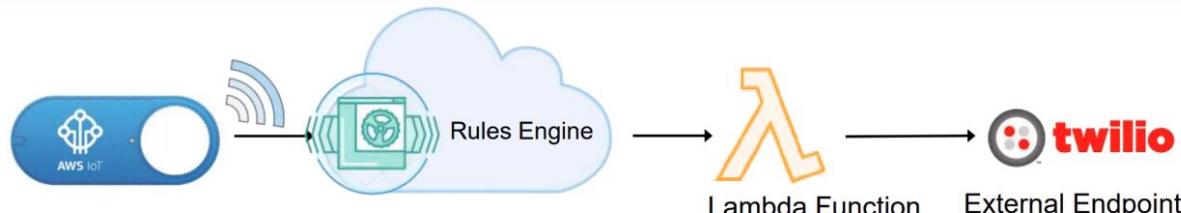
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Call Someone: AWS IoT to AWS Lambda to an External Endpoint



Rule: Select * from 'iotbutton/+'

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Count items or Track Usage: AWS IoT to DynamoDB to Dashboard

```
graph LR; IoT((AWS IoT)) --> RulesEngine((Rules Engine)); RulesEngine --> LambdaFunction((Lambda Function)); LambdaFunction --> DynamoDB((DynamoDB)); DynamoDB --> Dashboard((Dashboard))
```

The diagram illustrates a workflow for tracking IoT button usage. An AWS IoT button sends data to a Rules Engine. The Rules Engine triggers a Lambda Function, which then interacts with a DynamoDB database. Finally, the data is presented on a Dashboard.

Components:

- Button:** AWS IoT button icon.
- AWS IoT:** Icons for SDK and Private Key & Certificate.
- AWS IoTT:** Icons for Policy, Rule, and Action.
- Rules Engine:** Icons for Permission, Event Source, Execution Role, Policy, and various AWS services (DynamoDB, API Gateway, Function).
- Lambda Function:** Icon for Lambda function.
- DynamoDB:** Icon for DynamoDB.
- Dashboard:** Icon for a line graph on a laptop screen.
- S3 Website:** Icon for an S3 bucket with a warning sign.

Rule: "Select * from 'iotbutton/+'"

AWS Services: A horizontal bar showing the integration of various AWS services.

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Start or Stop Something : AWS IoT to AWS Lambda to an External Endpoint

```
graph LR; IoTButton[AWS IoT Button] --> RulesEngine[Rules Engine]; RulesEngine --> LambdaFunction[Lambda Function]; LambdaFunction --> ExternalEndpoint[External API]
```

The diagram illustrates a workflow for triggering an external action. It starts with an "AWS IoT Button" icon, which sends a signal to a "Rules Engine" (represented by a cloud icon containing a green gear). The "Rules Engine" then triggers a "Lambda Function" (represented by an orange lambda symbol). Finally, the "Lambda Function" interacts with an "External API".

Below the main diagram, there are three horizontal boxes representing different components:

- Thing/Device:** Contains icons for "SDK" (yellow book), "Private Key & Certificate" (key and shield), and "Policy" (shield).
- AWS IoT:** Contains icons for "Rule" (green gear) and "Action" (blue circle with arrow).
- AWS Services:** Contains icons for "Permission" (purple shield), "Lambda Function" (orange lambda symbol), "Execution Role" (green cube with "1"), and "Policy" (blue shield).

At the bottom, a rule definition is shown: **Rule: Select * from 'iotbutton/+'**.

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Enterprise Customer Use Cases

“Callback from Nurse” Button “Call a Cab” Button

“Callback from Agent” Button “Smart Souvenir” Button

“Create Maintenance Case” Button “Call your Mom on Mothers day” Button

“Track med compliance” Button “Check-in/Check-out” Button

“Order my favorite Pizza” Button “1-click Payment” Button

“Create Support Case/TT” Button

“Order local craft Beer” Button

Course content Overview Q&A Notes Announcements

Section 1: Introduction
3 / 3 | 13min

The screenshot shows a web browser window with the title "AWS Data Architect Bootcamp - 43 Services 500 FAQs 20+ Tools | Udemy - Chromium". The address bar contains the URL "udemy.com/course/aws-data-architect-bootcamp-training/learn/lecture/14128473#content". The page header includes the Udemy logo, course title, and navigation links for "Leave a rating", "Your progress", "Share", and "Course content", "Overview", "Q&A", "Notes", "Announcements". The main content area is titled "Enterprise Customer Use Cases" and lists ten use cases, each associated with a small icon: "Callback from Nurse" (nurse cap), "Call a Cab" (taxi), "Callback from Agent" (agent), "Smart Souvenir" (camera), "Create Maintenance Case" (wrench), "Call your Mom on Mothers day" (mother), "Track med compliance" (pill bottle), "Check-in/Check-out" (key), "Order my favorite Pizza" (pizza slice), and "1-click Payment" (credit card). Below the list is a red progress bar showing "6:41 / 10:11". The bottom of the screen features a dark footer bar with icons for volume, brightness, and other system controls.

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170. Amazon IoT - IoT Button, Use-Cases, Pricing

AWS IoT Core Pricing - Amazon

https://aws.amazon.com/iot-core/pricing/

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AWS IoT Core Overview IoT Services Features Pricing Getting Started Resources FAQs IoT Core Partners Customers

Pricing examples for AWS IoT core components

Connectivity charges

Pricing Example 1

Your cost to connect 10,000 devices to AWS IoT Core for 30 days would be calculated as follows:

- Minutes of connection = 10,000 connections * 60 minutes/hour * 24 hours/day * 30 days = 432,000,000 minutes of connection
- Total Connectivity Charges = 432,000,000 minutes of connection * \$0.08/1,000,000 minutes of connection = \$34.56

Pricing Example 2

Your cost to connect 10,000 devices to AWS IoT Core for 15 minutes each hour for 30 days would be calculated as follows:

- Minutes of connection = 10,000 connections * 15 minutes/hour * 24 hours/day * 30 days = 108,000,000 minutes of connection
- Total Connectivity Charges = 108,000,000 minutes of connection * \$0.08/1,000,000 minutes of connection = \$8.64

Messaging charges

Pricing Example 1

Over 30 days, your device publishes one 2 KB message every hour to AWS IoT Core, and AWS IoT Core then delivers each message to 5 other devices. Your charges would be calculated as follows:

Publishing cost to the AWS IoT Core

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AWS IoT Core Overview IoT Services Features Pricing Getting Started Resources FAQs IoT Core Partners Customers

Pricing example for a workload using all AWS IoT core components

100,000 devices maintain a constant connection to AWS IoT Core for 30 days. Each day, each device exchanges 325 messages of 1 KB in size. Of the 325 messages exchanged, 100 trigger a Device Shadow update and 200 trigger a rule that executes one action. Your charges would be calculated as follows:

Connectivity Charges

- Minutes of connection = 100,000 connections * 60 minutes/hour * 24 hours/day * 30 days = 4,320,000,000 minutes of connection
- Connectivity charges = 4,320,000,000 minutes of connection * \$0.08/1,000,000 minutes of connection = \$345.60

Messaging Charges

- Messages = 100,000 devices * 325 messages/device-day * 30 days = 975,000,000 messages
- Messaging charges = 975,000,000 messages * \$1.00/1,000,000 messages = \$975.00

Device Shadow & Registry Charges

- Device Shadow Requests = 100,000 devices * 100 requests/device-day * 30 days = 300,000,000 requests
- Device Shadow Size is less than 1 KB, so it is rounded up to the nearest KB (1 KB)
- Device Shadow Charges = 300,000,000 requests * \$1.25/1,000,000 operations = \$375.00

Rules Engine Charges

- Rules Triggered = 100,000 devices * 200 rules triggered/device-day * 30 days = 600,000,000 rules triggered
- Actions Executed = 600,000,000 rules triggered * 1 action executed/rule triggered = 600,000,000 actions executed

Course content Overview Q&A Notes Announcements

Section 1: Introduction

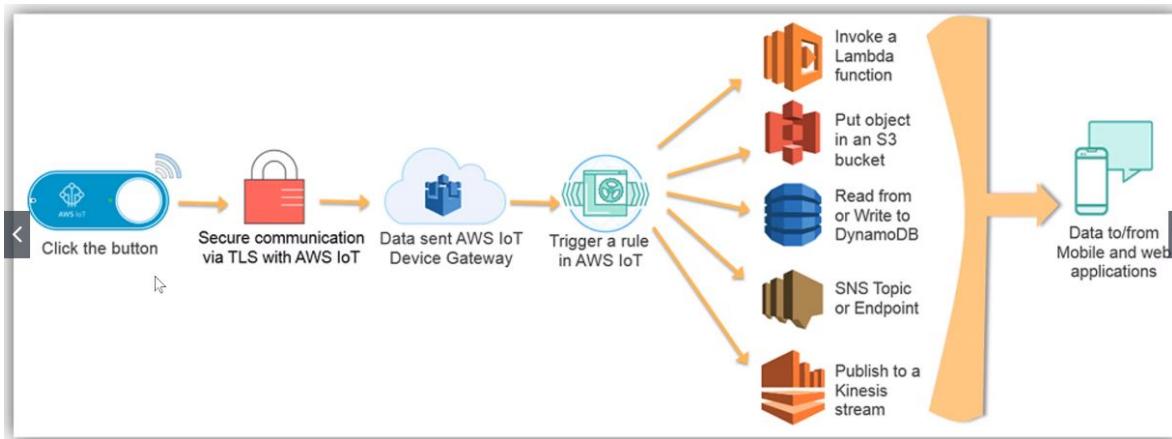
3 / 3 | 13min

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170. Amazon IoT - IoT Button, Use Cases, Pricing

AWS IoT Labs



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IoT Device Registration Process

- Register a device
- Create and Activate a certificate
- Create a policy
- Attach policy to certificate
- Attach device to certificate



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171. Lab: Amazon IoT - Register IoT Device

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https://aws.amazon.com/iotbutton/

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AWS IoT Button Overview FAQs

AWS IoT Button

Cloud Programmable Dash Button

Get your AWS IoT Button

The AWS IoT Button is a programmable button based on the Amazon Dash Button hardware. This simple Wi-Fi device is easy to configure and designed for developers to get started with AWS IoT Core, AWS Lambda, Amazon DynamoDB, Amazon SNS, and many other Amazon Web Services without writing device-specific code.

You can code the button's logic in the cloud to configure button clicks to count or track items, call or alert someone, start or stop something, order services, or even provide feedback. For example, you can click the button to unlock or start a car, open your garage door, call a cab, call your spouse or a customer service representative, track the use of common household chores, medications or products, or remotely control your home appliances.

Buy Now

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AWS IoT



https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/thinghub



Services

Resource Groups



Oregon

Support



Monitor

Onboard

Manage

Things

Types

Thing Groups

Billing Groups

Jobs

Greengrass

Secure

Defend

Act

Test

Software

Settings

Learn



You don't have any things yet

A thing is the representation of a device in the cloud.

Learn more

Register a thing



Feedback English (US)

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AWS IoT

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/provisioning>

Services

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Creating AWS IoT things

An IoT thing is a representation and record of your physical device in the cloud. Any physical device needs a thing record in order to work with AWS IoT. [Learn more.](#)

Register a single AWS IoT thing

Create a thing in your registry

[Create a single thing](#)

Bulk register many AWS IoT things

Create things in your registry for a large number of devices already using AWS IoT, or register devices so they are ready to connect to AWS IoT.

[Create many things](#)[Cancel](#)[Create a single thing](#)[Feedback](#) [English \(US\)](#)© 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)[Course content](#) [Overview](#) [Q&A](#) [Notes](#) [Announcements](#)

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171. Lab: Amazon IoT - Register IoT Device

+ [Create](https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/single-provision)<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/single-provision>

Services

Resource Groups



Oregon

Support



CREATE A THING

Add your device to the thing registry

STEP
1/3

This step creates an entry in the thing registry and a thing shadow for your device.

Name

IOTButton



Apply a type to this thing

Using a thing type simplifies device management by providing consistent registry data for things that share a type. Types provide things with a common set of attributes, which describe the identity and capabilities of your device, and a description.

Thing Type

No type selected

Create a type

Add this thing to a group

Adding your thing to a group allows you to manage devices remotely using jobs.

Thing Group

Create a group

Create a new group

Close

Cancel

Feedback

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171 Lab: Amazon IoT - Register IoT Device

AWS IoT

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/single-provision

aws Services Resource Groups

Thing Type

No type selected Create a type

Add this thing to a group

Adding your thing to a group allows you to manage devices remotely using jobs.

Thing Group

Groups / Create group Change

Set searchable thing attributes (optional)

Enter a value for one or more of these attributes so that you can search for your things in the registry.

Attribute key Value

Provide an attribute key, e.g. Manufacturer Provide an attribute value, e.g. Acme-Corporation Clear

Add another

Show thing shadow ▾

Cancel Back Next

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https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/single-provision

aws Services Resource Groups

Oregon Support

CREATE A THING Add a certificate for your thing STEP 2/3

A certificate is used to authenticate your device's connection to AWS IoT.

One-click certificate creation (recommended)
This will generate a certificate, public key, and private key using AWS IoT's certificate authority.

Create with CSR
Upload your own certificate signing request (CSR) based on a private key you own.

Use my certificate
Register your CA certificate and use your own certificates for one or many devices.

Skip certificate and create thing
You will need to add a certificate to your thing later before your device can connect to AWS IoT.

Create certificate Create with CSR Get started Create thing without certificate

Feedback English (80) 1.5x 3:01 / 7:32

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AWS IoT

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/single-provision>

Services

Resource Groups



Oregon

Support



Certificate created!

Download these files and save them in a safe place. Certificates can be retrieved at any time, but the private and public keys cannot be retrieved after you close this page.

In order to connect a device, you need to download the following:

A certificate for this thing	2d0390092b.cert.pem	Download
A public key	2d0390092b.public.key	Download
A private key	2d0390092b.private.key	Download

You also need to download a root CA for AWS IoT:

A root CA for AWS IoT [Download](#)

[Activate](#)[Cancel](#)[Done](#)[Attach a policy](#)

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AWS IoT

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Certificate created!

Download these files and save them in a safe place. Certificates can be retrieved at any time, but the private and public keys cannot be retrieved after you close this page.

In order to connect a device, you need to download the following:

A certificate for this thing	2d0390092b.cert.pem	Download
A public key	2d0390092b.public.key	Download
A private key	2d0390092b.private.key	Download

You also need to download a root CA for AWS IoT:

A root CA for AWS IoT [Download](#)

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<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/policyhub> 

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Monitor

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Manage

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Certificates

Policies

CAs

Role Aliases

Authorizers

Defend

Act

Test

Software

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Learn



You don't have any policies yet

AWS IoT policies give things permission to access AWS IoT resources (like other things, MQTT topics, or thing shadows).

[Learn more](#)[Create a policy](#)

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AWS IoT AWS IoT

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/policy

Services Resource Groups

Create a policy to define a set of authorized actions. You can authorize actions on one or more resources (things, topics, topic filters). To learn more about IoT policies go to the [AWS IoT Policies documentation page](#).

Name: IOTButtonPolicy

Add statements

Policy statements define the types of actions that can be performed by a resource.

Action: iot:*

Resource ARN: arn:aws:iot:us-west-2:█████████████████████:topic/replaceWithATopic

Effect: Allow Deny

Advanced mode Remove

Add statement

Feedback English (US)

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AWS IoT AWS IoT

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/policy

Create a policy to define a set of authorized actions. You can authorize actions on one or more resources (things, topics, topic filters). To learn more about IoT policies go to the [AWS IoT Policies documentation page](#).

Name: IOTButtonPolicy

Add statements

Policy statements define the types of actions that can be performed by a resource.

Action: iot:Connect

Resource ARN: *

Effect: Allow Deny

Advanced mode Remove

Add statement

Feedback English (US)

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AWS IoT AWS IoT

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/certificatehub

Services Resource Groups Oregon Support

AWS IoT Certificates Create

Search certificates Card

2d0390092 ACTIVE

Activate Deactivate Revoke Accept transfer Reject transfer Revoke transfer Start transfer Attach policy Attach thing Download Delete

Monitor Onboard Manage Greengrass Secure Certificates Policies CAs Role Aliases Authorizers Defend Act Test Software Settings Learn Feedback English (US)

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171 Lab: Amazon IoT - Register IoT Device x AWS IoT +

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/certificatehub

aws Services Resource Groups

Oregon Support

AWS IoT Certificates

Successfully attached policy.

Search certificates Card

2d0390092b5cb87e0... ACTIVE

Play button >

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Section 1: Introduction

3 / 3 | 13min

The screenshot shows a browser window with two tabs open. The active tab is on the Udemy platform, specifically the 'AWS Data Architect Bootcamp' course. The sub-page is '171 Lab: Amazon IoT - Register IoT Device'. Below the Udemy header, the URL is https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/certificatehub. The main content area displays the AWS IoT 'Certificates' page. A green success message box is visible, stating 'Successfully attached policy.' A large play button icon is centered on the page. On the left sidebar, under the 'Secure' section, the 'Certificates' option is selected. At the bottom of the page, there are links for 'Feedback', 'English (US)', and legal notices from Amazon. The browser's address bar also shows the AWS IoT URL.

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Services Resource Groups Oregon Support

Certificates

Search certificates

Create

Card

2d0390092 ACTIVE

Activate

Deactivate

Revoke

Accept transfer

Reject transfer

Revoke transfer

Start transfer

Attach policy

Attach thing

Download

Delete

Feedback English (US)

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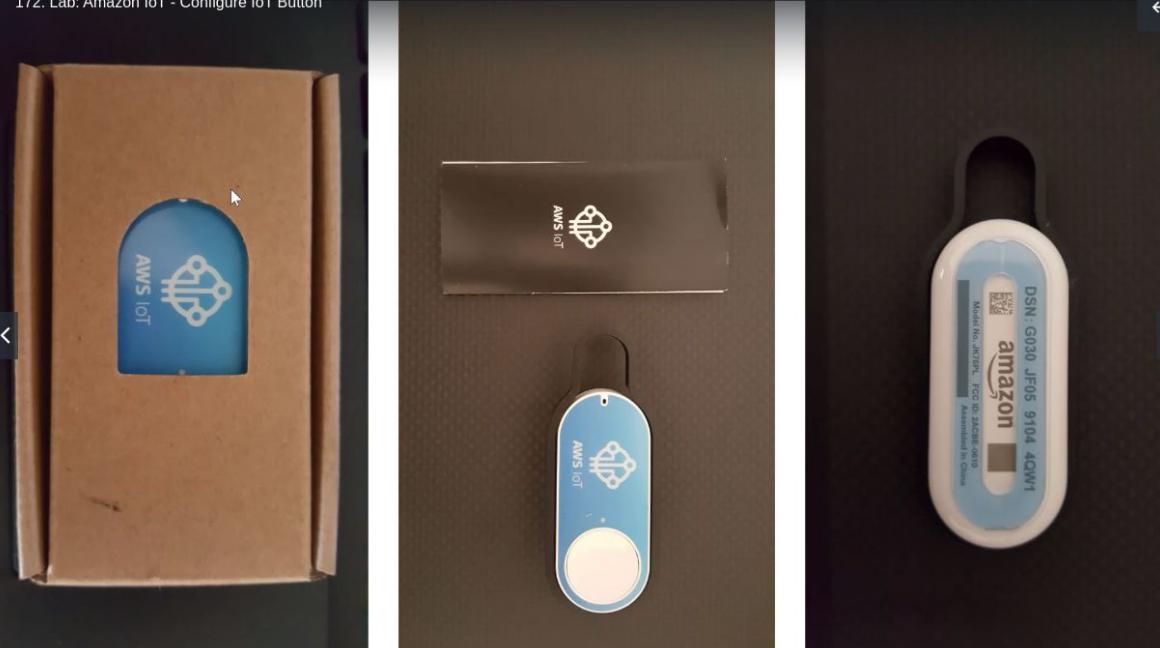
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172. Lab: Amazon IoT - Configure IoT Button



1.5x 0:11 / 9:20

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172. Lab: Amazon IoT - Configure IoT Button

AWS IoT Button Wi-Fi by Amazon Mobile LLC (Productivity)

INSTALL

3.8 ★ 15 reviews 5K+ Downloads Everyone

Setup Wi-Fi for AWS Buttons

Scan the barcode on the box Press the button until the blue light blinks

Get started by setting up your AWS Button Wi-Fi

SET UP AWS BUTTON WI-FI

Configure Wi-Fi for AWS IoT Buttons

Section 1: Introduction

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172. Lab: Amazon IoT - Configure IoT Button

Configure

Press the Button for 6 seconds until the blue light flashes



Scan Button DSN barcode on the box



Configure Wi-Fi

Enter Button DSN

G030 JF05 9104 4QW1

Scanning for Button G030JF0591044QW1

SCAN DSN BARCODE

OR

Manually enter DSN

CONFIGURE BUTTON

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172. Lab: Amazon IoT - Configure IoT Button

Configure

Configure

Setup Complete

Pick the Wi-Fi network that your Button should use

Wi-Fi network: FIOS

Wi-Fi password: 

Pick the Wi-Fi network that your Button should use

Wi-Fi network: FIOS

Wi-Fi password: 

Wi-Fi set up is complete

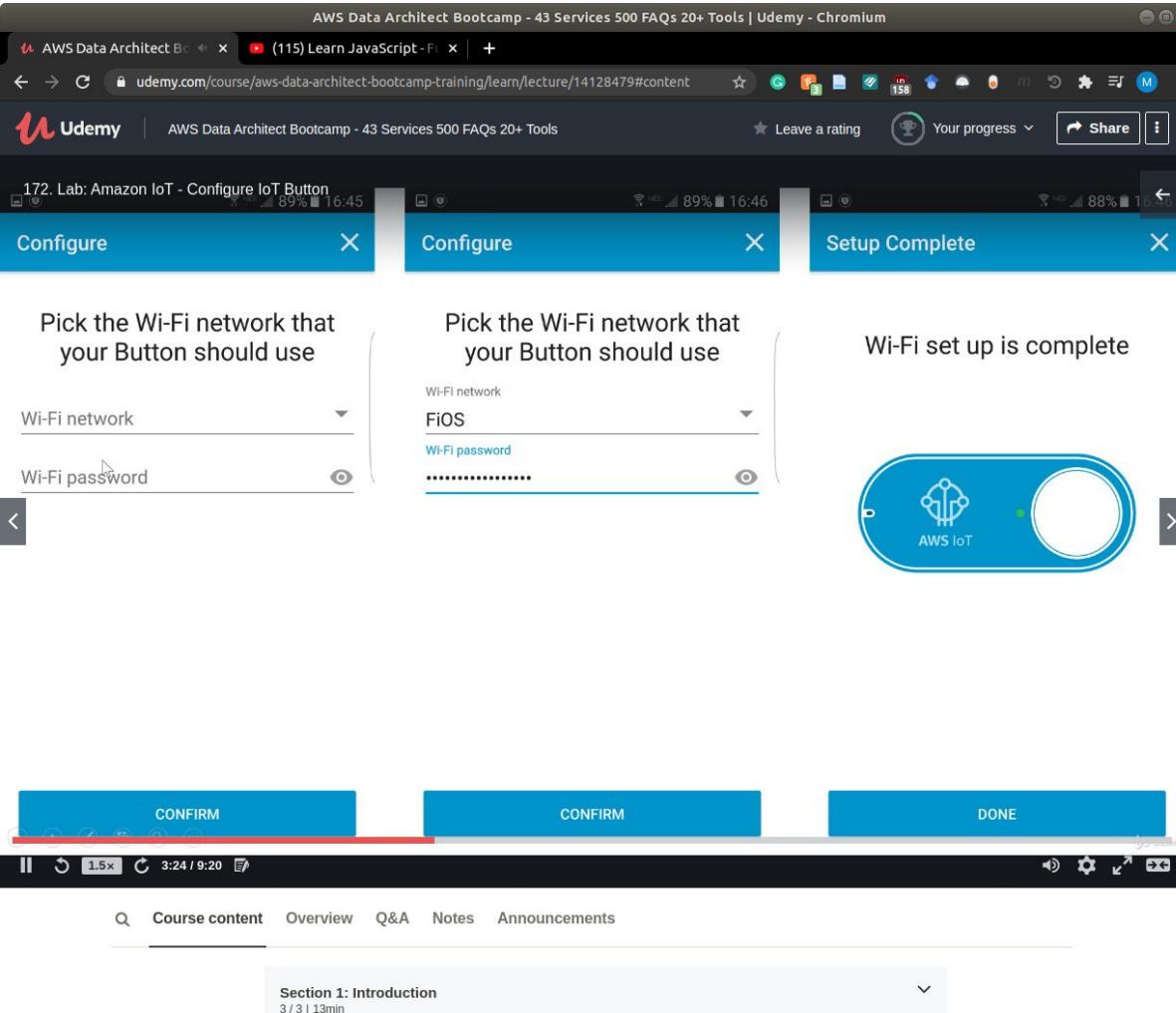


CONFIRM CONFIRM DONE

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172. Lab: Amazon IoT - Configure IoT Button

Button ConfigureMe

Not secure | 192.168.0.1

Button ConfigureMe

Enter the value for any field that you wish to change for device: G030JF0591044QW1

Wi-Fi Configuration:

SSID	FIOS
Security	<input type="checkbox"/> Open Network (No Password)
Password	(unchanged)

AWS IoT Configuration:

Endpoint Subdomain	REQUIRED (to connect to AWS IoT)
Endpoint Region	REQUIRED (to connect to AWS)
Final Endpoint	???.iot.???.amazonaws.com

By clicking this box, you agree to the [AWS IoT Button Terms and Conditions](#).

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172. Lab: Amazon IoT - Configure IoT Button

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/thing/IOTButton>

Services

Resource Groups



Oregon

Support

Things > IOTButton

THING

IOTButton

NO TYPE

Actions

Details

This thing already appears to be connected.

Connect a device

Security

Thing Groups

Billing Groups

Shadow

Interact

Activity

Jobs

Violations

Defender metrics



HTTPS

Update your Thing Shadow using this Rest API Endpoint. [Learn more](#)

a25nddm5s8d2a9-ats.iot.us-west-2.amazonaws.com

MQTT

Use topics to enable applications and things to get, update, or delete the state information for a Thing (Thing Shadow)

[Learn more](#)

Update to this thing shadow

\$aws/things/IOTButton/shadow/update

Update to this thing shadow was accepted

Feedback English (US)

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Button ConfigureMe

Not secure 192.168.0.1

Button ConfigureMe

Enter the value for any field that you wish to change for device: G030JF0591044QW1

Wi-Fi Configuration:

SSID	FIOS
Security	<input type="checkbox"/> Open Network (No Password)
Password	vat

AWS IoT Configuration:

Certificate	Choose File /2d0390092b-...ate.pem.crt
Private Key	Choose File /2d0390092b-...te.pem.key
Endpoint Subdomain	a25nddm5s8d2a9
Endpoint Region	us-west-2
Final Endpoint	a25nddm5s8d2a9.iot.us-west-2.amazonaws.com

By clicking this box, you agree to the [AWS IoT Button Terms and Conditions](#).

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172. Lab: Amazon IoT - Configure IoT Button Button ConfigureMe 158 192.168.0.1

Not secure | 192.168.0.1

Button ConfigureMe

Enter the value for any field that you wish to change for device: G030JF0591044QW1

Wi-Fi Configuration:

SSID	FIOS
Security	<input type="checkbox"/> Open Network (No Password)
Password	vat

AWS IoT Configuration:

Certificate	Choose File 2d0390092b-...ate.pem.crt
Private Key	Choose File 2d0390092b-...te.pem.key
Endpoint Subdomain	a25nddm5s8d2a9
Endpoint Region	us-west-2
Final Endpoint	a25nddm5s8d2a9.iot.us-west-2.amazonaws.com

By clicking this box, you agree to the [AWS IoT Button Terms and Conditions](#).

Configure

Network & Internet settings
Change settings, such as making a connection metered.

Airplane mode Mobile hotspot

1.5x 6:19 / 9:20

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AWS IoT AWS IoT

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/test

Services Resource Groups Oregon Support

MQTT client Connected as iotconsole-1551908976711-1

Subscriptions

Subscribe to a topic

Publish to a topic

Subscribe Devices publish MQTT messages on topics. You can use this client to subscribe to a topic and receive these messages.

Subscription topic: iotbutton/+

Subscribe to topic

Max message capture: 100

Quality of Service: 0 - This client will not acknowledge to the Device Gateway that messages are received
1 - This client will acknowledge to the Device Gateway that messages are received

MQTT payload display: Auto-format JSON payloads (improves readability)
Display payloads as strings (more accurate)
Display raw payloads (in hexadecimal)

Feedback English (US)

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AWS Data Architect Bootcamp - 43 Services 500 FAQs 20+ Tools | udemy.com/course/aws-data-architect-bootcamp-training/learn/lecture/14128483#content

173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Simple Notification Service

https://us-west-2.console.aws.amazon.com/sns/v3/home?region=us-west-2#/topic/arm:aws:sns:us-west-2: [REDACTED] aws-iot-button-sns-topic

Amazon SNS

Services Resource Groups

Amazon SNS

Dashboard

Topics **Topics**

Subscriptions

Mobile

Push notifications

Text messaging (SMS)

Details

Name: aws-iot-button-sns-topic

Display name: -

ARN: arn:aws:sns:us-west-2:[REDACTED] aws-iot-button-sns-topic

Topic owner: -

Subscriptions (3) **Create subscription**

ID	Endpoint	Status	Protocol
126fa49-1646-4f72-a0fb-32ae92fc223e	siddharth..com	Confirmed	EMAIL

Feedback English (US) 1.5x 0:23 / 7:05 Privacy Policy Terms of Use

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The screenshot shows the AWS Simple Notification Service (SNS) console. A specific topic, 'aws-iot-button-sns-topic', is selected. The 'Subscriptions' tab is active, displaying three entries. Each entry includes an 'Edit' button, a 'Delete' button, a 'Request confirmation' button, and a 'Confirm subscription' button. The third subscription entry is highlighted with a red box around its 'Confirm subscription' button. The 'Create subscription' button is also highlighted in orange. The 'Topics' section of the left sidebar is expanded, showing other options like 'Subscriptions' and 'Mobile'.

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172.16.0.1 - [Thu, 11 Apr 2019] Simple Notification Service https://us-west-2.console.aws.amazon.com/sns/v3/home?region=us-west-2#/topic/arm:aws:sns:us-west-2:aws-iot-button-sns-topic

https://us-west-2.console.aws.amazon.com/sns/v3/home?region=us-west-2#/topic/arm:aws:sns:us-west-2:aws-iot-button-sns-topic

Amazon SNS Services Resource Groups

Amazon SNS Topics Subscriptions

Mobile Push notifications Text messaging (SMS)

aws-iot-button-sns-topic

Details

Name: aws-iot-button-sns-topic

Display name:

ARN: arn:aws:sns:us-west-2:██████████:aws-iot-button-sns-topic

Topic owner:

Subscriptions Access policy Delivery retry policy (HTTP/S) Delivery status logging Encryption

Subscriptions (3)

ID	Endpoint	Status	Protocol
126fa49-1646-4f72-a0fb-32ae92fc223e	siddharth..com	Confirmed	EMAIL

Create subscription

Feedback English (US)

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The screenshot shows the AWS SNS console for the 'aws-iot-button-sns-topic'. The 'Subscriptions' tab is active, displaying three confirmed subscriptions. The first subscription is for 'siddharth..com' with the ID '126fa49-1646-4f72-a0fb-32ae92fc223e'. The status is 'Confirmed' and the protocol is 'EMAIL'. There are buttons for 'Edit', 'Delete', 'Request confirmation', 'Confirm subscription', and 'Create subscription'.

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button Lambda Management Console

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create

aws Services Resource Groups Oregon Support

Lambda Functions Create function

Create function Info

Choose one of the following options to create your function.

- Author from scratch** Start with a simple Hello World example.
- Use a blueprint** Build a Lambda application from sample code and configuration presets for common use cases.
- Browse serverless app repository** Deploy a sample Lambda application from the AWS Serverless Application Repository.

Basic information

Function name
Enter a name that describes the purpose of your function.

Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime Info
Choose the language to use to write your function.

Feedback English (US) 1.5x 1:16 / 7:05

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Lambda Management Console x + https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create?f0=a3c%3D%3ASU9U&tab=blueprints

Services Resource Groups Oregon Support

Create function

Choose one of the following options to create your function.

- Author from scratch: Start with a simple Hello World example. (Icon: document with gear)
- Use a blueprint: Build a Lambda application from sample code and configuration presets for common use cases. (Icon: document with checkmark)
- Browse serverless app repository: Deploy a sample Lambda application from the AWS Serverless Application Repository. (Icon: cloud with checkmark)

Blueprints Info

Add filter Keyword : IOT

Export

greengrass-hello-world: Deploy this lambda to a Greengrass core where it will send a hello world message to a topic. python - greengrass - iot - hello world

iot-button-email: An AWS Lambda function that sends an email on the click of an IoT button. nodejs - iot - button

greengrass-hello-world-nodejs: Deploy this lambda to a Greengrass core where it will send a hello world message to a topic. nodejs6.10 - greengrass - iot - hello world

Feedback English (US)

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console x +

<https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email>**aws** Services Resource Groups

Oregon

Support

Lambda > Functions > Create function > Using blueprint iot-button-email

Basic information [Info](#)Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).[Create a new role from AWS policy templates](#)

ⓘ Role creation might take a few minutes. The new role will be scoped to the current function. To use it with other functions, you can modify it in the IAM console.

Enter a name for your new role.

Use only letters, numbers, hyphens, or underscores with no spaces.

Policy templates [Info](#)

Choose one or more policy templates.

[AWS IoT Button permissions](#) X[Feedback](#) [English \(US\)](#)© 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)[Course content](#) [Overview](#) [Q&A](#) [Notes](#) [Announcements](#)**Section 1: Introduction**

3 / 3 | 13min

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console

<https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email>

Services

Resource Groups



Oregon

Support

Lambda > Functions > Create function > Using blueprint iot-button-email

Basic information [Info](#)

Function name

Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).[Create a new role from AWS policy templates](#)

ⓘ Role creation might take a few minutes. The new role will be scoped to the current function. To use it with other functions, you can modify it in the IAM console.

Role name

Enter a name for your new role.

Use only letters, numbers, hyphens, or underscores with no spaces.

[Policy templates](#) [Info](#)

Choose one or more policy templates.

[AWS IoT Button permissions](#) [X](#)
SNS

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button Lambda Management Console

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email

aws Services Resource Groups Oregon Support

AWS IoT trigger

IoT type
Configure a custom IoT rule, or set up an IoT button.
 Custom IoT rule
 IoT Button

Device Serial Number
The device serial number (DSN) of your button. This can be found on the back of the button. The DSN is 16 characters long, often starting with "G03".

This will generate a certificate and keys for your button, which will be made available for you to download.
[Generate certificate and keys](#)

Lambda will add the necessary permissions for AWS IoT to invoke your Lambda function from this trigger. [Learn more](#) about the Lambda permissions model.

Enable trigger
Enable the trigger now, or create it in a disabled state for testing (recommended).

Lambda function code
Code is pre-configured by the chosen blueprint. You can configure it after you create the function. [Learn more](#) about deploying Lambda functions.

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173. Let's Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email



Services

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AWS IoT trigger

Remove

IoT type

Configure a custom IoT rule, or set up an IoT button.

- Custom IoT rule
- IoT Button

Device Serial Number

The device serial number (DSN) of your button. This can be found on the back of the button. The DSN is 16 characters long, often starting with "G03".

G03JF0591044QW1

This will generate a certificate and keys for your button, which will be made available for you to download.

Generate certificate and keys

Lambda will add the necessary permissions for AWS IoT to invoke your Lambda function from this trigger. [Learn more](#) about the Lambda permissions model.

Enable trigger

Enable the trigger now, or create it in a disabled state for testing (recommended).

Lambda function code

Code is pre-configured by the chosen blueprint. You can configure it after you create the function. [Learn more](#) about deploying Lambda functions.

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Lambda Management Console x +

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email

aws Services Resource Groups Oregon Support

AWS IoT trigger

IoT type
Configure a custom IoT rule, or set up an IoT button.
 Custom IoT rule
 IoT Button

Device Serial Number
The device serial number (DSN) of your button. This can be found on the back of the button. The DSN is 16 characters long, often starting with "G03".
G03JF0591044QW1

This will generate a certificate and keys for your button, which will be made available for you to download.
[Generate certificate and keys](#)

We have created the necessary AWS IoT resources (thing, policy, certificate, private key). [Download these resources by clicking the links below.](#)
(NOTE: If you are using Internet Explorer or Safari, right click the links to save the files.)

- [Your certificate PEM](#)
- [Your private key](#)

To configure the AWS IoT Button to use your Wi-Fi and these resources to connect to AWS securely, follow these steps:

- Place the button into configuration mode by pressing the button down for 5 seconds until it flashes blue.
- Connect your computer to the button's Wi-Fi network SSID "Button ConfigureMe - A2D", using "91044QW1" (last 8 digits of device serial number) as the WPA2-PSK password.
- Click [here](#) and use the following information to fill out the form:
 - Enter your local network's Wi-Fi SSID and password.
 - Select the [certificate](#) and [private key](#) files that you just downloaded above.
 - Your endpoint subdomain is [a25nddm5s8d2a9](#).

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Lambda Management Console Button ConfigureMe

Not secure | 192.168.0.1

Button ConfigureMe

Enter the value for any field that you wish to change for device: G030JF0591044QW1

Wi-Fi Configuration:

SSID	FIOS-N3PR7
Security	<input type="checkbox"/> Open Network (No Password)
Password	(unchanged)

AWS IoT Configuration:

Certificate	<input type="button" value="Choose File"/> No file chosen
Private Key	<input type="button" value="Choose File"/> No file chosen
Endpoint Subdomain	A25NDDM5S8D2A9
Endpoint Region	us-west-2
Final Endpoint	A25NDDM5S8D2A9.iot.us-west-2.amazonaws.com

By clicking this box, you agree to the [AWS IoT Button Terms and Conditions](#).

private.key certificate.pem

Show all

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console X Button ConfigureMe

Not secure | 192.168.0.1

Button ConfigureMe

Enter the value for any field that you wish to change for device: G030JF0591044QW1

Wi-Fi Configuration:

SSID	FIOS-N3PR7
Security	<input type="checkbox"/> Open Network (No Password)
Password	(unchanged)

AWS IoT Configuration:

Certificate	Choose File certificate.pem
Private Key	Choose File private.key
Endpoint Subdomain	A25NDDM5S8D2A9
Endpoint Region	us-west-2
Final Endpoint	A25NDDM5S8D2A9.iot.us-west-2.amazonaws.com

By clicking this box, you agree to the [AWS IoT Button Terms and Conditions](#).

Configure

private.key certificate.pem Show all

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Lambda Management Console Button ConfigureMe

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/create/new?bp=iot-button-email

aws Services Resource Groups

Oregon Support

AWS Lambda

Dashboard Applications Functions Layers

```
12 * Your function's execution role needs specific permissions for SNS operations
13 * to send an email. We have pre-selected the "AWS IoT Button permissions"
14 * policy template that will automatically add these permissions.
15 */
16
17 const AWS = require('aws-sdk');
18
19 const EMAIL = process.env.email;
20 const SNS = new AWS.SNS({ apiVersion: '2010-03-31' });
21
22
23 function findExistingSubscription(topicArn, nextToken, cb) {
24     const params = {
25         TopicArn: topicArn,
26         NextToken: nextToken || null,
27     };
28     SNS.listSubscriptionsByTopic(params, (err, data) => {
29         if (err) {
30             console.log('Error listing subscriptions.', err);
31         }
32     });
33 }
```

Environment variables

You can define environment variables as key-value pairs that are accessible from your function code. These are useful to store configuration settings without the need to change function code. [Learn more.](#)

email	siddharth.	com	Remove
Key	Value	Remove	

Encryption configuration

* These fields are required.

Cancel Previous Create function

Feedback English (US)

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console | Button ConfigureMe

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/functions/IoTLambda?newFunction=true&tab=graph

aws Services Resource Groups Oregon Support

Lambda > Functions > IoTLambda

IoTLambda ARN - arn:aws:lambda:us-west-2:123456789012:function:IoTLambda

Throttle Qualifiers Actions Select a test event... Test Save

Congratulations! Your Lambda function "IoTLambda" has been successfully created and configured with iotbutton_G030JF0591044QW1 as a trigger. Choose Test to input a test event and test your function.

Configuration Monitoring

Designer

Add triggers Choose a trigger from the list below to add it to your function.

- API Gateway
- AWS IoT
- Alexa Skills Kit
- Alexa Smart Home
- Application Load Balancer

IoTLambda Layers (0)

AWS IoT Amazon CloudWatch Logs

Amazon SNS

Resources that the function's role has access to appear here

Feedback English (US) 1.5x 4:09 / 7:05

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172.16.1.17 - [17/Jan/2019:10:45:11 -0800] Lambda with IoT Button

Lambda Management Console x Button ConfigureMe x +

https://us-west-2.console.aws.amazon.com/lambda/home?region=us-west-2#/functions/IoTLambda?newFunction=true&tab=graph

aws Services Resource Groups Oregon Support

IoTLambda

Designer

Add triggers Choose a trigger from the list below to add it to your function.

API Gateway

AWS IoT

Alexa Skills Kit

Alexa Smart Home

Application Load Balancer

CloudWatch Events

IoTLambda

Layers (0)

AWS IoT

Add triggers from the list on the left

Amazon CloudWatch Logs

Amazon SNS

Resources that the function's role has access to appear here

AWS IoT

iotbutton_G030JF0591044QW1

arn:aws:iot:us-west-2:118920673979:rule/iotbutton_G030JF0591044QW1

AWS IoT SQL version: 2016-03-23 Description: Trigger for your IoT Button Rule query statement: SELECT * FROM 'iotbutton/G030JF0591044QW1'

Enabled Delete

Feedback English (US)

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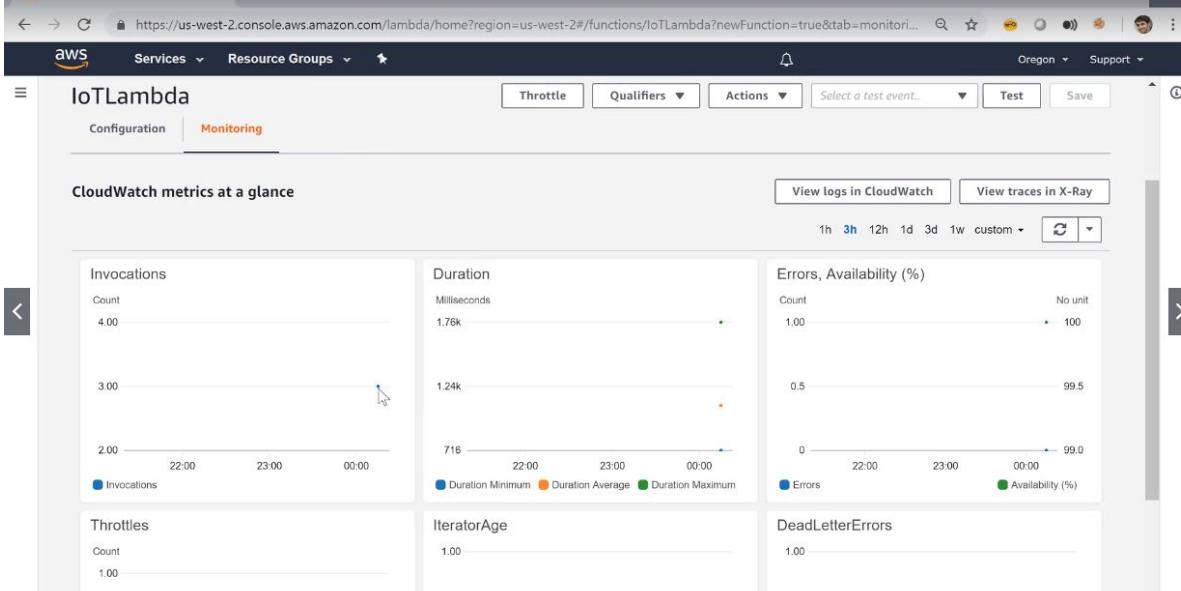
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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console



Feedback English (80)

1.5x 5:48 / 7:05

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173. Lab: Amazon IoT - Trigger Lambda with IoT Button

Lambda Management Console CloudWatch Management Console

https://us-west-2.console.aws.amazon.com/cloudwatch/home?region=us-west-2#logEventViewer:group=/aws/lambda/iotLambda;stream=2019/03/07/\$LATEST|0c84140e98b24a578db5f2670ee2758

aws Services Resource Groups Oregon Support

CloudWatch Dashboards Alarms ALARM INSUFFICIENT OK Billing Events Rules Event Buses Insights Metrics Favorites Add a dashboard

CloudWatch Log Groups /aws/lambda/iotLambda 2019/03/07/\$LATEST|0c84140e98b24a578db5f2670ee2758

Filter events all 2019-03-06 (00:16:11)

Expand all Row Text

Time (UTC +00:00)	Message
2019-03-07 00:16:11	START RequestId: c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Version: \$LATEST
2019-03-07T00:16:11.119Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Received event: SINGLE
2019-03-07T00:16:11.990Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Created topic: arn:aws:sns:us-west-2: aws-iot-button-sns-topic
2019-03-07T00:16:11.990Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Creating subscriptions.
2019-03-07T00:16:12.771Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Subscribed siddharth to arn:aws:sns:us-west-2:118920000000
2019-03-07T00:16:12.772Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Topic setup complete.
2019-03-07T00:16:12.772Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Publishing to topic arn:aws:sns:us-west-2: aws-iot-button-sns-topic
2019-03-07T00:16:12.772Z	c2b41bb0-3ab8-43e8-9012-3cb662c5b520 END RequestId: c2b41bb0-3ab8-43e8-9012-3cb662c5b520 Duration: 1755.41 ms Billed Duration: 1800 ms Memory Size: 128 MB Max Memory Used: 128 MB
2019-03-07T00:17:37.979Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e Received event: SINGLE
2019-03-07T00:17:38.136Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e Created topic: arn:aws:sns:us-west-2: aws-iot-button-sns-topic
2019-03-07T00:17:38.136Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e Creating subscriptions.
2019-03-07T00:17:38.269Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e Topic setup complete.
2019-03-07T00:17:38.269Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e Publishing to topic arn:aws:sns:us-west-2: aws-iot-button-sns-topic
2019-03-07T00:17:38.269Z	a81c3afe-0fc2-461c-92e8-9aab5c850d0e END RequestId: a81c3afe-0fc2-461c-92e8-9aab5c850d0e Duration: 770.79 ms Billed Duration: 800 ms Memory Size: 128 MB Max Memory Used: 128 MB
2019-03-07T00:18:53.460Z	4bcc66b9-b690-4cd6-82a6-ec2e7a78f420 Version: \$LATEST
2019-03-07T00:18:53.460Z	4bcc66b9-b690-4cd6-82a6-ec2e7a78f420 Received event: DOUBLE
2019-03-07T00:18:53.742Z	4bcc66b9-b690-4cd6-82a6-ec2e7a78f420 Created topic: arn:aws:sns:us-west-2: aws-iot-button-sns-topic
2019-03-07T00:18:53.742Z	4bcc66b9-b690-4cd6-82a6-ec2e7a78f420 Creating subscriptions.

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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

Simple Notification Service

https://us-west-2.console.aws.amazon.com/sns/v3/home?region=us-west-2#/topic/arm:aws:sns:us-west-2:

aws-iot-button... | Share | Your progress | Leave a rating | Edit | Delete | Publish message

Amazon SNS

Services | Resource Groups | Oregon | Support

Amazon SNS > Topics > aws-iot-button-sns-topic

aws-iot-button-sns-topic

Details

Name: aws-iot-button-sns-topic

Display name: -

ARN: arn:aws:sns:us-west-2:
Topic owner: :aws-iot-button-sns-topic

Subscriptions | Access policy | Delivery retry policy (HTTP/S) | Delivery status logging | Encryption

Subscriptions (2)

Create subscription

Search

ID | Endpoint | Status | Protocol

Feedback English (US) 1.5x 0:09 / 6:16

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Your progress

[Share](#)

174. Lab: Amazon IoT - Send Text Messages using Rules Engine

Simple Notification Service

<https://us-west-2.console.aws.amazon.com/sns/v3/home?region=us-west-2#/create-subscription>

Services

Resource Groups

Oregon

Support

Amazon SNS > Subscriptions > Create subscription

Create subscription

Details

Topic ARN

Protocol

The type of endpoint to subscribe

Select protocol

- HTTP
- HTTPS
- Email
- Email-JSON
- Amazon SQS
- AWS Lambda
- Platform application endpoint
- SMS

Email Info

Cancel

Create subscription



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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/rulehub

AWS Services Resource Groups Oregon Support

Rules

Create

Search rules

iotbutton_G030JF059... DISABLED

Card

< >

AWS IoT

Monitor

Onboard

Manage

Greengrass

Secure

Defend

Act

Test

Software

Settings

Learn

Feedback English (US) 1.5x 1:33 / 6:16

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The image shows a dual-tasking session in a Chromium browser. The top half of the screen displays the AWS IoT Rules interface, specifically the RuleHub section. It features a search bar, a card view for a rule named 'iotbutton_G030JF059...', and navigation arrows. The left sidebar of the AWS console is visible, showing options like Monitor, Onboard, Manage, Greengrass, Secure, Defend, Act (which is selected), Test, Software, Settings, and Learn. The bottom half of the screen shows a Udemy course video player for 'AWS Data Architect Bootcamp'. The video is titled '174. Lab: Amazon IoT - Send Text Messages using Rules Engine' and is at 1:33 of a 6:16 minute duration. The video controls include play/pause, volume, and full-screen. Below the video player is a navigation bar with links for Course content, Overview, Q&A, Notes, and Announcements.

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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/rule>

Services

Resource Groups



Oregon

Support



Create a rule

Create a rule to evaluate messages sent by your things and specify what to do when a message is received (for example, write data to a DynamoDB table or invoke a Lambda function).

Name

Rule1

Description



Rule query statement

Indicate the source of the messages you want to process with this rule.

Using SQL version

2016-03-23

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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/rule>

Services

Resource Groups



Oregon

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Rule query statement

Indicate the source of the messages you want to process with this rule.

Using SQL version

2016-03-23

Rule query statement

SELECT <Attribute> FROM <Topic Filter> WHERE <Condition>. For example: SELECT temperature FROM 'iot/topic' WHERE temperature > 50. To learn more, see [AWS IoT SQL Reference](#).

```
1 SELECT * FROM 'iotbutton/G030JF0591044Qv1'
```



Set one or more actions

Select one or more actions to happen when the above rule is matched by an inbound message. Actions define additional activities that occur when messages arrive, like storing them in a database, invoking cloud functions, or sending notifications. (*.required)

[Add action](#)

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Services

Resource Groups



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Select an action

Select an action.

-  Insert a message into a DynamoDB table
DYNAMODB
-  Split message into multiple columns of a DynamoDB table (DynamoDBv2)
DYNAMODBV2
-  Send a message to a Lambda function
LAMBDA
-  Send a message as an SNS push notification
SNS
-  Send a message to an SQS queue
SQS
-  Send a message to an Amazon Kinesis Stream
AMAZON KINESIS
-  Republish a message to an AWS IoT topic
AWS IOT REUBLISH TOPIC



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AWS IoT

<https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/create/rule>

aws



Services

Resource Groups



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Support

SNS target

Send a message as an SNS push notification
SNS

aws-iot-button-sns-topic

[Create](#)[Clear](#)[Select](#)

Message format

JSON

Choose or create a role to grant AWS IoT access to perform this action.

IoTRuleRole

Update Role

[Create Role](#)[Select](#)[Cancel](#)[Add action](#)[Feedback](#) [English \(US\)](#)© 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)[Course content](#) [Overview](#) [Q&A](#) [Notes](#) [Announcements](#)

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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/rulehub

AWS Services Resource Groups Oregon Support

AWS IoT

Rules

Create

Search rules

Card

Rule1 ***
ENABLED

iotbutton_G030JF059... ***
DISABLED

Act

Test

Software

Settings

Learn

Section 1: Introduction

3 / 3 | 13min

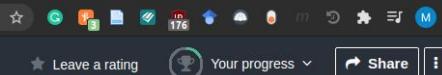
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1.5x 4:31 / 6:16

This screenshot shows a dual-pane interface. The left pane is a Udemy course video player for 'AWS Data Architect Bootcamp'. The right pane is the AWS IoT Rules Engine console. The Udemy player displays a video titled '174. Lab: Amazon IoT - Send Text Messages using Rules Engine' with a duration of 6:16. The AWS console shows the 'Rules' section with two rules listed: 'Rule1' (ENABLED) and 'iotbutton_G030JF059...' (DISABLED). The sidebar on the left includes links for Monitor, Onboard, Manage, Greengrass, Secure, Defend, Act (which is selected), Test, Software, Settings, and Learn.

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174. Lab: Amazon IoT - Send Text Messages using Rules Engine

44779
MobileAWS Notifications <no-reply@sns.amazonaws.com>
Mon 18/03/2019 01:54

{ "serialNumber": "G030JF0591044QW1", "batteryVoltage": "1708mV", "clickType": "SINGLE"}

--



1:54 AM

{ "serialNumber": "G030JF0591044QW1", "batteryVoltage": "1708mV", "clickType": "SINGLE"}

Type a message...
A red send button icon with a white arrow pointing right.

|| 1.5x 5:08 / 6:16

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Q. What does AWS IoT Core offer?

Connectivity between devices and the AWS cloud. First, with AWS IoT Core you can communicate with connected devices securely, with low latency and with low overhead. The communication can scale to as many devices as you want. AWS IoT Core supports standard communication protocols (HTTP, MQTT, and WebSockets are supported currently). Communication is secured using TLS.

Connectivity between devices and the AWS cloud. First, with AWS IoT Core you can communicate with connected devices securely, with low latency and with low overhead. The communication can scale to as many devices as you want. AWS IoT Core supports standard communication protocols (HTTP, MQTT, and WebSockets are supported currently). Communication is secured using TLS.

Processing data sent from connected devices. Secondly, with AWS IoT Core you can continuously ingest, filter, transform, and route the data streamed from connected devices. You can take actions based on the data and route it for further processing and analytics.

Application interaction with connected devices. Finally, AWS IoT accelerates IoT application development. It serves as an easy to use interface for applications running in the cloud and on mobile devices to access data sent from connected devices, and send data and commands back to the devices.

Q. What is 2lemetry and how does it relate to AWS IoT?

2lemetry was acquired by AWS in 2015, and their capabilities provided foundational elements such as the MQTT Message Broker and the Rules Engine for AWS IoT Core.

Q. What are the ways for accessing AWS IoT Core?

You can use the [AWS Management Console](#), the [AWS SDKs](#), the [AWS CLI](#), and the [AWS IoT Core APIs](#). Connected devices can use the [AWS IoT Device SDKs](#) to simplify the communication with AWS IoT Core.

The AWS IoT Core APIs and commands are largely divided into control plane operations and data plane operations. The control plane operations enable you to do tasks such as configuring security, registering devices, configuring rules for routing data, and setting up logging. The data plane operations enable you to ingest data from connected devices into AWS IoT Core with low latency and high throughput rate at a large scale.

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Q. How does AWS IoT Core work?

Connected devices, such as sensors, actuators, embedded devices, smart appliances, and wearable devices, connect to AWS IoT Core over HTTPS, WebSockets, or secure MQTT. Included in AWS IoT Core is a **Device Gateway** that allows secure, low-latency, low-overhead, bi-directional communication between connected devices and your cloud and mobile applications.

AWS IoT Core also contains a **Rules Engine** which enables continuous processing of data sent by connected devices. You can configure rules to filter and transform the data. You also configure rules to route the data to other AWS services such as DynamoDB, Kinesis, Lambda, SNS, SQS, CloudWatch, Elasticsearch Service with built-in Kibana integration, as well as to non-AWS services, via Lambda for further processing, storage, or analytics.

There is also a **Registry** where you can register and keep track of devices connected to AWS IoT Core, or devices that may connect in the future. The **Device Shadow** in AWS IoT Core enables cloud and mobile applications to query data sent from devices and send commands to devices, using a simple REST API, while letting AWS IoT Core handle the underlying communication with the devices. The Device Shadow accelerates application development by providing a uniform interface to devices, even when they use one of the several IoT communication and security protocols with which the applications may not be compatible. The Device Shadow also accelerates application development by providing an always available interface to devices even when the connected devices are constrained by intermittent connectivity, limited bandwidth, limited computing ability or limited power.

Communication with AWS IoT Core is secure. The service requires all of its clients (connected devices, server applications, mobile applications, or human users) to use strong authentication (X.509 certificates, AWS IAM credentials, or 3rd party authentication via AWS Cognito). All communication is encrypted. AWS IoT Core also offers fine-grained authorization to isolate and secure communication among authenticated clients.

Q. What communication and authentication protocols does AWS IoT Core support?

For control plane operations, AWS IoT Core supports HTTPS. For data plane operations, AWS IoT Core supports HTTPS, WebSockets, and secure **MQTT** – a protocol often used in IoT scenarios.

HTTPS and WebSockets requests sent to AWS IoT Core are authenticated using AWS IAM or AWS Cognito, both of which support the AWS SigV4 authentication. If you are using the AWS SDKs or the AWS CLI, the SigV4 authentication is taken care of for you under the hood. HTTPS requests can also be authenticated using X.509 certificates. MQTT messages to AWS IoT Core are authenticated using X.509 certificates.

With AWS IoT Core you can use AWS IoT Core generated certificates, as well as those signed by your preferred Certificate Authority (CA).

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Q. Can devices that are NOT directly connected to the Internet access AWS IoT Core?

Yes, via a physical hub. Devices connected to a private IP network and devices using non-IP radio protocols such as ZigBee or Bluetooth LE can access AWS IoT Core as long as they have a physical hub as an intermediary between them and AWS IoT Core for communication and security.

Q: What is the Device Gateway?

The Device Gateway forms the backbone of communication between connected devices and the cloud capabilities such as the Rules Engine, Device Shadow, and other AWS and 3rd-party services.

The Device Gateway supports the pub/sub messaging pattern, which enables scalable, low-latency, and low-overhead communication. It is particularly useful for IoT scenarios where billions of devices are expected to communicate frequently and with minimal delay. Pub/sub involves clients publishing messages on logical communication channels called 'topics' and clients subscribing to topics to receive messages. The device gateway enables the communication between publishers and subscribers. Traditionally, organizations have had to provision, operate, scale, and maintain their own servers as device gateways to take advantage of pub/sub. AWS IoT Core has eliminated this barrier by providing the Device Gateway.

The Device Gateway scales automatically with your usage, without any operational overhead for you. AWS IoT Core supports secure communication with the device gateway, AWS-account level isolation, as well as fine-grained authorization within an AWS account. The device gateway currently supports publish and subscribe over secure MQTT and WebSockets, as well as publish over HTTPS.

Q. What is MQTT?

MQTT is a lightweight pub/sub protocol, designed to minimize network bandwidth and device resource requirements. MQTT also supports secure communication using TLS. MQTT is often used in IoT use cases. MQTT v3.1.1 is an OASIS standard, and the Device Gateway supports most of the MQTT specification.



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Q. What is the Rules Engine?

The Rules Engine enables continuous processing of inbound data from devices connected to AWS IoT Core. You can configure rules in the Rules Engine in an intuitive, SQL-like syntax to automatically filter and transform inbound data. You can further configure rules to route data from AWS IoT Core to several other AWS services as well as your own or 3rd party services.

Here are just a few example use cases of rules:

- Filtering and transforming incoming messages and storing them as time series data in DynamoDB.
- Sending a push notification via SNS when the data from a sensor crosses a certain threshold.
- Saving a firmware file to S3
- Processing messages simultaneously from a multitude of devices using Kinesis
- Invoke Lambda to do custom processing on incoming data
- Sending a command to a group of devices with an automated republish

Q. What is the Registry and what should I use it for?

IoT scenarios can range from a small number of mission-critical devices to large fleets of devices. The Registry allows you to organize and track those devices. You can maintain a logical handle in the Registry for every device you are connecting to AWS IoT Core. Each device in the Registry can be uniquely identified and can have metadata such as model numbers, support contact, and certificates associated with it. You can search for connected devices in the Registry based on the metadata.

Q. What is the Device Shadow?

The Device Shadow enables cloud and mobile applications to easily interact with the connected devices registered in AWS IoT Core. The Device Shadow in AWS IoT Core contains properties of a connected device. You can define any set of properties applicable to your use case. For example, for a smart light bulb, you might define 'on-or-off', 'color', and 'brightness' as the properties. The connected device is expected to report the actual values of those properties, which are stored in the Device Shadow. Applications get and update the properties simply by using a RESTful API provided by AWS IoT Core. AWS IoT Core and the Device SDKs take care of synchronizing property values between the connected device and its Device Shadow in AWS IoT Core.

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[Share](#)**Q. What is the lifecycle of a device and its Device Shadow in AWS IoT Core?**

- You register a device (such as a light bulb) in the Registry.
- You program connected device to publish a set of its property values or 'state' ("I am ON and my color is RED") to the AWS IoT Core service.
- The last reported state is stored in the Device Shadow in AWS IoT Core.
- An application (such as a mobile app controlling the light bulb) uses a RESTful API to query AWS IoT Core for the last reported state of the light bulb, without the complexity of communicating directly with the light bulb.
- When a user wants to change the state (such as turning the light bulb from ON to OFF), the application uses a RESTful API to request an update, i.e. sets a 'desired' state for the device in AWS IoT Core. AWS IoT Core takes care of synchronizing the desired state to the device.
- The application gets notified when the connected device updates its state to the desired state.

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