

12 - Internet of Things (4)

Serverless Computing for IoT

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Computer Science Master Degree
Curriculum: Internet of Things

Demo
Introduction

1 - Registering a
device

2 - Device
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3 - IoT Policy

4 - Attach Policy
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- ▶ The steps of the tutorial are followed ...
- ▶ ... but only up to a certain point
- ▶ In fact, some limitations to the educational account apply, so that some of the operations will be only checked on the tutorial

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Structured in steps

1. Registering a device
2. Create and Activate a Device Certificate
3. Create an IoT Policy
4. Attach an IoT Policy to a Device Certificate
5. Attach a Certificate to a Thing
6. Testing

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1 - REGISTERING A DEVICE IN THE REGISTRY

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- ▶ Devices connected to AWS IoT are represented by things in the registry.
- ▶ The registry allows you to keep a record of all of the devices that are connected to your AWS IoT account.
- ▶ We are defining a new Thing, ...
- ▶ ...register it, attach a device certificate to it and ...
- ▶ ...and then test it



1.1 - THE BEGINNING: GO TO “MANAGE”

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Monitor

Onboard

Manage

Greengrass

Secure

Defend

Act

Test

Software

Settings

Learn

Welcome to the AWS IoT Console

To get started, you can jump into the recommended starting points below, or explore other learning resources as needed.



See how AWS IoT works

Explore an interactive tutorial through the components of AWS IoT.

[Start the tutorial](#)

It takes 5 minutes



Connect to AWS IoT

Connect a device, a mobile or web app to AWS IoT in a few easy steps!

[View connection options](#)



Explore documentation

The AWS IoT documentation is a great resource for more details.

[Go to documentation](#)

1.2 - “MANAGE”. THEN “THINGS”, “REGISTER”

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Learn



You don't have any things yet

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

[Learn more](#)

[Register a thing](#)



1.3 - “CREATE A SINGLE THING”

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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



1.4 - “CREATE” AND “NEXT”

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On the **Create a thing** page, in the **Name** field, type a name for your device, such as **MyIoTButton**. Choose **Next** to add your device to the registry.

← CREATE A THING STEP 1/3

Add your device to the thing registry

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

Name

MyIoTButton

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

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2.1 - CREATE CERTIFICATE

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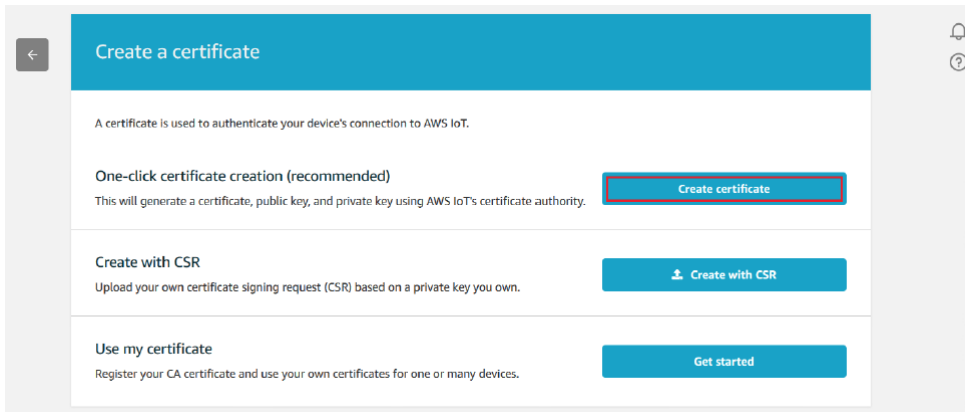
3 - IoT Policy

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Create a certificate

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 certificate

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

Create with CSR

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

Get started



2.2 - DOWNLOAD AND ACTIVATE

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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	2a540e2346.cert.pem	Download
A public key	2a540e2346.public.key	Download
A private key	2a540e2346.private.key	Download

You also need to download a root CA for AWS IoT from Symantec:
A root CA for AWS IoT [Download](#)

Activate

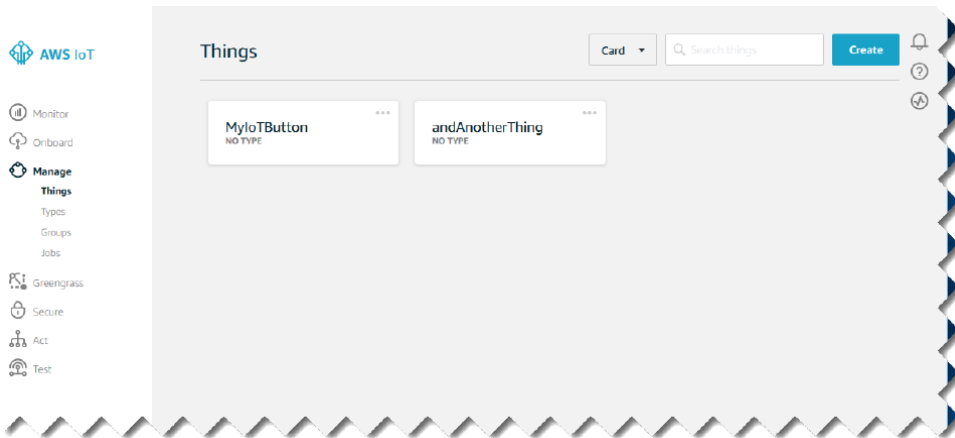
Done

Attach a policy



2.3 - IN THE CONSOLE

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- ▶ X.509 certificates are used to authenticate your device with AWS IoT:
“Who are you?”
- ▶ Then, you need to specify what a Thing can do: *“Who can **you** do?”*)
- ▶ AWS IoT policies are used to authorize your device to perform AWS IoT operations, such as subscribing or publishing to MQTT topics.
- ▶ Your device presents its certificate when sending messages to AWS IoT.
- ▶ Then, in order to allow your device to perform AWS IoT operations, ...
- ▶ we must create an AWS IoT policy ...
- ▶ ...and attach it to your device certificate

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3.1 - “SECURE” AND “CREATE POLICY”

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Manage

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Secure

Certificates

Policies

CAs

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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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3.2 - WE ALLOW CONNECTION FROM ALL CLIENTS

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Create a policy

Create a policy to define a set of authorized actions. You can authorize actions on one or more resources (things, topics, topic filters).

Name

MyIoTButtonPolicy

Add statements

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

Advanced mode

Action

iot:Connect

Resource ARN

*

Effect



Allow



Deny

Remove

Add statement



- ▶ We can restrict which clients (devices) are able to connect by specifying a client ARN as the resource.
- ▶ The client ARNs follow this format:
`arn:aws:iot:your-region:your-aws-account:client/<my-client-id>`

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3.3 - FINISH AND CREATE

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Create a policy

Create a policy to define a set of authorized actions. You can authorize actions on one or more resources (things, topics, topic filters).

Name

Add statements

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

Action

Resource ARN

Effect

☒ Allow ☐ Deny

Remove

Add statement

Create





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4.1 - CHOOSE CERTIFICATE

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Onboard



Manage



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2a540e234673bd148...

ACTIVE

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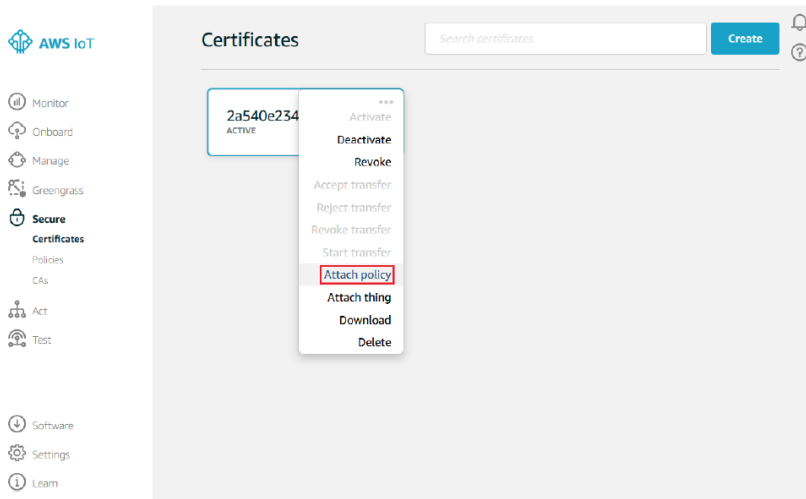
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4.2 - RIGHT CLICK

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The screenshot shows the AWS IoT console interface. On the left is a navigation sidebar with the AWS IoT logo and various icons for Monitor, Onboard, Manage, Greengrass, Secure, Certificates, Policies, CAs, Act, and Test. The main content area is titled 'Certificates' and includes a search bar labeled 'Search certificates' and a 'Create' button. A list of certificates is displayed, with one certificate having the ID '2a540e234' and a status of 'ACTIVE'. A right-click context menu is open over this certificate, listing several actions: Activate, Deactivate, Revoke, Accept transfer, Reject transfer, Revoke transfer, Start transfer, **Attach policy** (highlighted with a red box), Attach thing, Download, and Delete.

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4.3 - CHOOSE THE POLICY


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Attach policies to certificate(s)

Policies will be attached to the following certificate(s):

2a540e234673bd148f1e710ef6529602d66eaf638b3ee120a493082e4a5f11d7

Choose one or more policies

 Search policies

☒ MyIoTButtonPolicy

[View](#)

1 policy selected

Cancel

Attach

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5.1 - FROM CERTIFICATE, RIGHT CLICK AND “ATTACH THING”

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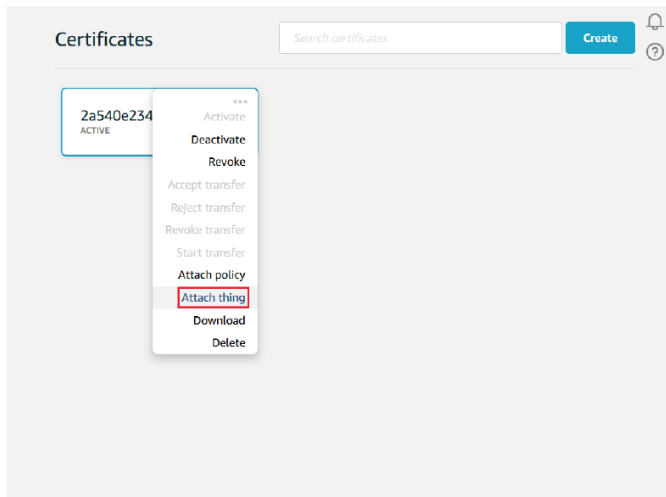
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- Monitor
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- Secure**
 - Certificates**
 - Policies
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Attach things to certificate(s)

Things will be attached to the following certificate(s):

2a540e234673bd148f1e710ef6529602d66eaf638b3ee120a493082e4a5f11d7

Choose one or more things

 Search things

☒ MyloTButton

1 thing selected

Cancel

Attach

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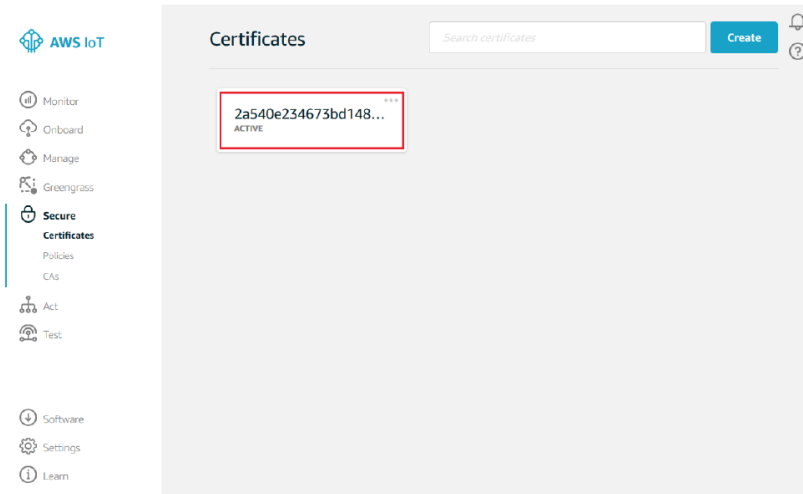
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5.3 - CERTIFICATE READY

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The screenshot displays the AWS IoT console interface. On the left is a navigation sidebar with the AWS IoT logo at the top, followed by icons and labels for Monitor, Onboard, Manage, Greengrass, Secure (which is highlighted with a blue bar), Certificates, Policies, CAs, Act, and Test. Below these are icons for Software, Settings, and Learn. The main content area is titled 'Certificates' and features a search bar with the placeholder text 'Search certificates' and a blue 'Create' button. To the right of the search bar are a notification bell icon and a help icon. The certificate list contains one entry: a certificate ID '2a540e234673bd148...' followed by three asterisks, and the status 'ACTIVE'. This entry is enclosed in a red rectangular box.

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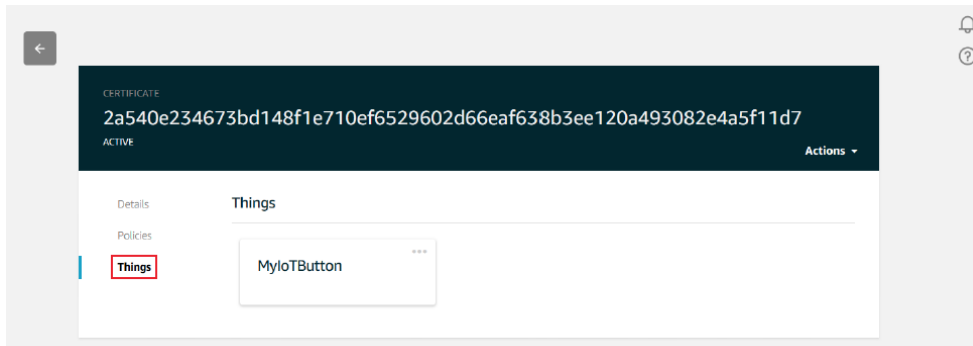
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5.4 - ... WITH THING ATTACHED

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The screenshot shows the AWS IoT console interface. At the top, a dark blue banner displays the certificate ID `2a540e234673bd148f1e710ef6529602d66eaf638b3ee120a493082e4a5f11d7` and the status `ACTIVE`. Below this, a sidebar on the left contains links for `Details`, `Policies`, and `Things`, with `Things` highlighted by a red box. The main content area, titled `Things`, shows a single entry `MyIoTButton` with a three-dot menu icon to its right. Navigation icons (back, notifications, help) are visible in the top right corner of the console window.

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5.5 - ... AND WITH A POLICY

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The screenshot displays a web interface for managing IoT certificates. At the top, a dark blue header bar contains the word "CERTIFICATE" in small white text, followed by a long alphanumeric string "2a540e234673bd148f1e710ef6529602d66eaf638b3ee120a493082e4a5f11d7" in large white text. Below the string, the word "ACTIVE" is shown in small white text. On the right side of the header bar, there is a small white "Actions" button with a downward arrow. Below the header bar, there is a white content area. On the left side of this area, there is a vertical sidebar with three items: "Details", "Policies", and "Things". "Policies" is currently selected, indicated by a blue vertical bar to its left. To the right of the sidebar, under the "Policies" heading, there is a single policy card. The card has a white background and a thin grey border. It contains the text "MyIoTButtonPolicy" in black. To the right of the text, there are three small grey dots, indicating a menu or options. In the top right corner of the interface, there are two small circular icons: a bell icon and a question mark icon.

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6.2 - SUBSCRIBE TO A TOPIC

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AWS IoT

MQTT client

Connected as iotconsole-1509388246394-0

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)

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6.3 - YOU CAN SEE THE MESSAGES PUBLISHED

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MQTT client ⓘ

Connected as iotconsole-1509399243202-6 ▾

Subscriptions

Subscribe to a topic

Publish to a topic

iotbutton/+ ✕

iotbutton/+

Export Clear Pause

Publish

Specify a topic and a message to publish with a QoS of 0.

iotbutton/+

Publish to topic

```
1 {
2   "message": "Hello from AWS IoT console"
3 }
```

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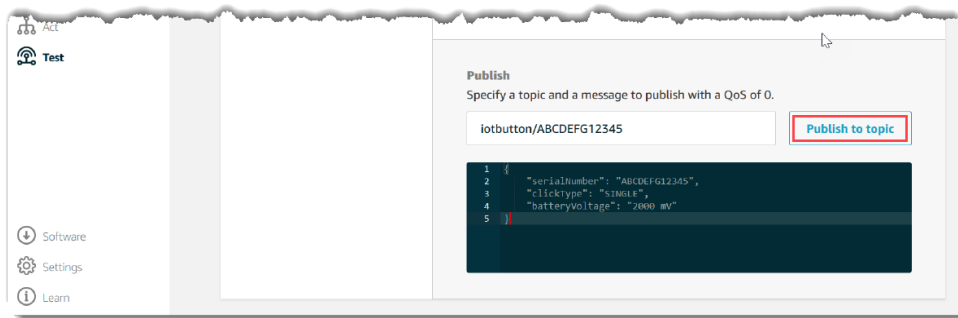
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6.4 - PUBLISH MESSAGES

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That's all Folks!