

Embedded System Design Techniques™

Connecting Edge Devices to the IoT using Amazon FreeRTOS

Class 2: Amazon Web Services Fundamentals

March 20th, 2018
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Course Overview

Topics:

- Introduction to Amazon FreeRTOS
- **Amazon Web Services Fundamentals**
- Setting up and Configuring Amazon FreeRTOS
- Amazon FreeRTOS Behind the Scenes
- Creating your own a:FreeRTOS Application

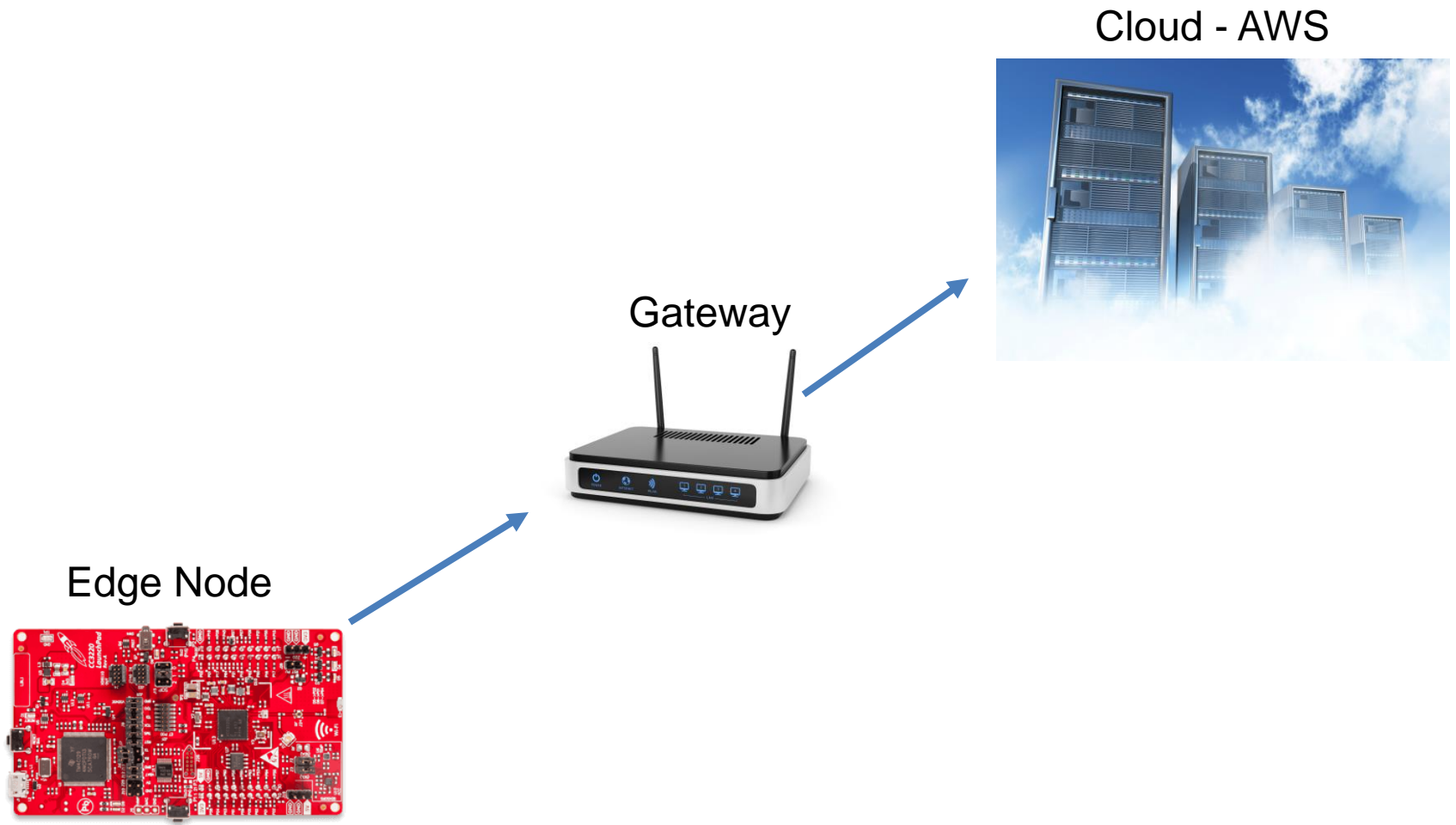
Session Overview

- IoT Edge Node Connection
- The Cloud – AWS
- Creating a Thing
- Creating a Certificate
- Defining a Policy



Presented by:

IoT Edge Node Connection



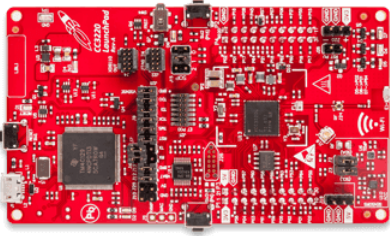
The Cloud - AWS

Several AWS Activities to connect a device

- Create a Thing
 - Identify Thing type
- Create a certificate for the Thing
 - Save the certificate, private and public keys
- Define a policy for the Thing
- Assign the policy to the certificate
- Configure the endpoint, certificate and keys in the edge device

The Cloud - AWS

Things



Thing ARN

Edit

A thing Amazon Resource Name uniquely identifies this thing.

```
arn:aws:iot:us-east-2:537122867633:thing/MyTestThing
```

Type

Q TestDevice

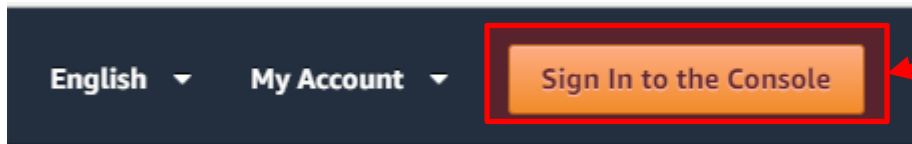
Certificates

Create certificate

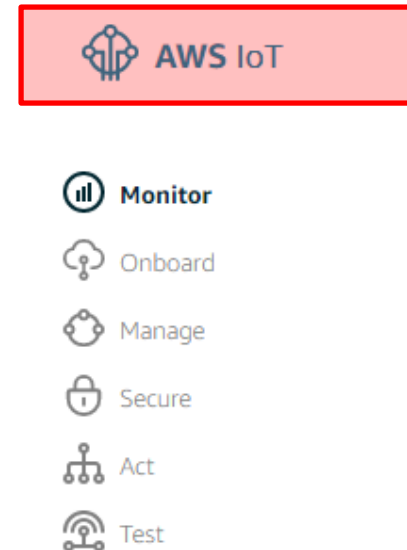
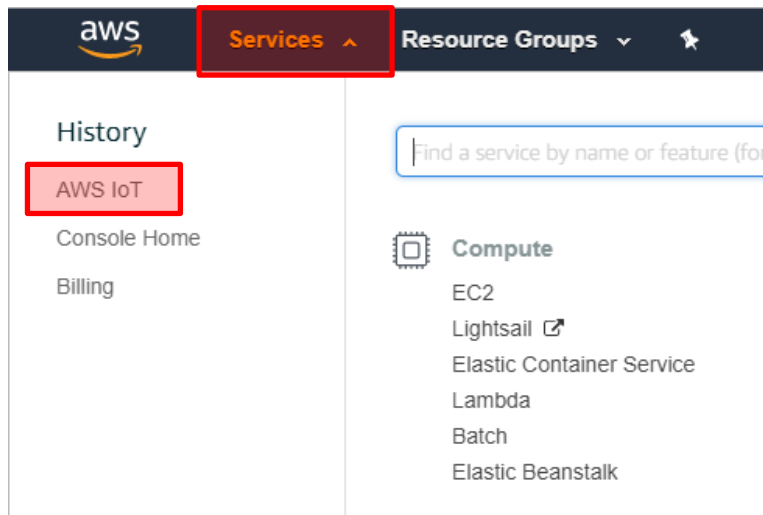
View other options

The Cloud – AWS IoT

<https://aws.amazon.com>










Sign-in / Create Account



The Cloud – AWS IoT



-  **Monitor** → AWS IoT Overview (Connections, Messages, etc)
 -  **Onboard** → Workflow to connect to AWS
 -  **Manage** → Manage Things, Create Groups and Jobs
 -  **Secure** → Create and manage certificates and policies
 -  **Act** → Manage rules that apply to your things
 -  **Test** → MQTT Client to subscribe and publish to topics
-
-  **Software** → Access Amazon FreeRTOS, AWS IoT SDK's
 -  **Settings** → Access your endpoint, logs and other settings
 -  **Learn** → Documentation

Create a Thing

The screenshot displays the AWS IoT console interface. On the left sidebar, the 'Manage' option is highlighted with a red box. A red arrow points from this 'Manage' option to the 'Create' button in the top right corner of the console header, which is also highlighted with a red box. A second red arrow points from the 'Create' button to the 'Creating AWS IoT things' section. This section contains a blue header, a descriptive paragraph, and two main options: 'Register a single AWS IoT thing' and 'Bulk register many AWS IoT things'. Each option has a corresponding button: 'Create a single thing' and 'Create many things', both of which are highlighted with red boxes.

Create a Thing

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

MyTestThing

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

TestDevice

Create a type

Create a type if one does not exist

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

Create a Thing

CREATE A THING STEP 2/3

Add a certificate for your thing

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

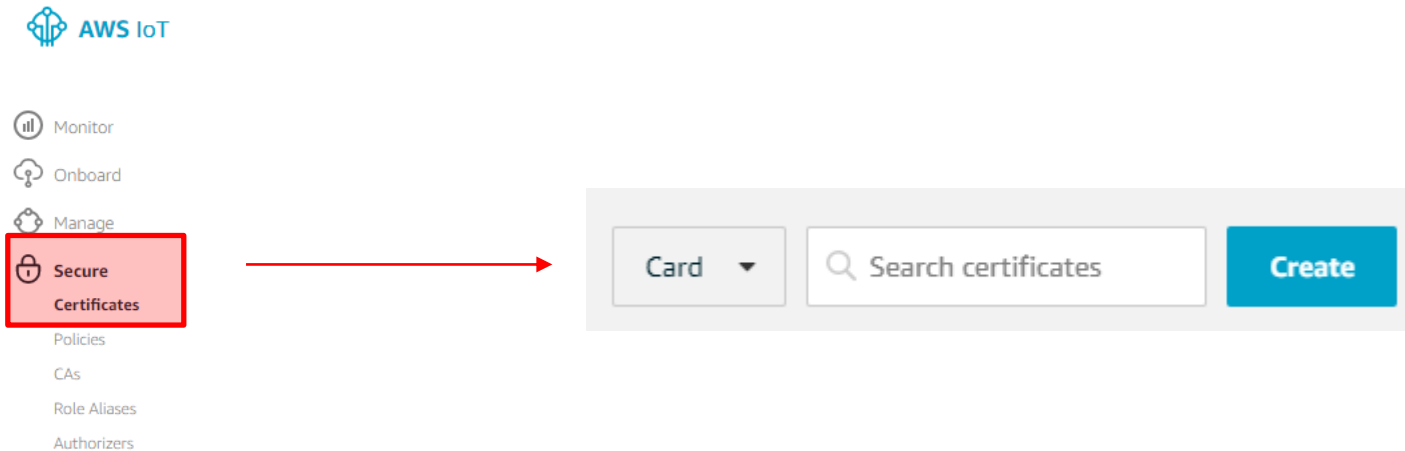
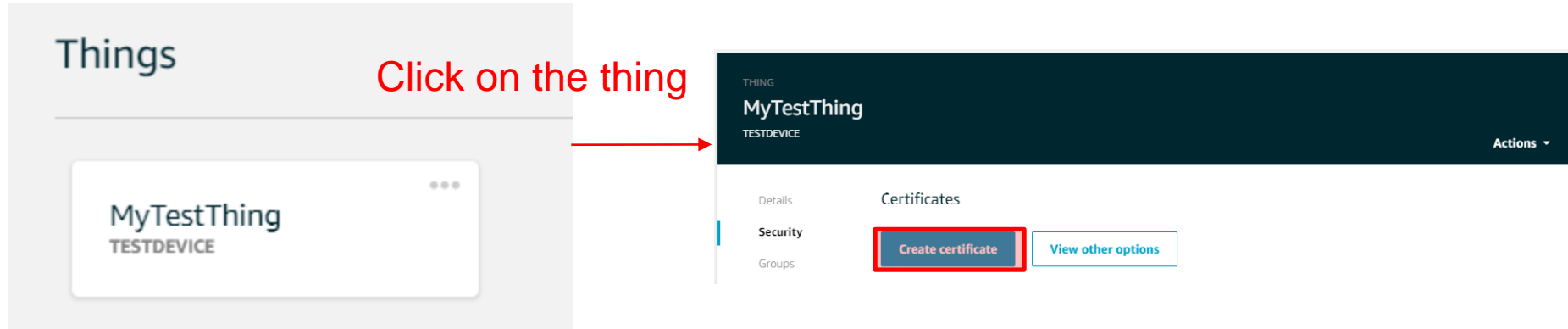
↑ Create with CSR

Get started

Create thing without certificate



Creating a Thing



Creating a Certificate

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

Creating a Certificate

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	[REDACTED]70f9.cert.pem	Download
A public key	[REDACTED]70f9.public.key	Download
A private key	[REDACTED]70f9.private.key	Download

Download All

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

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

Activate

Creating a Policy

The policy defines what it is that the Thing is allowed to do. For example:

- Connect
- Subscribe
- Publish
- Receive

Creating a Policy

The screenshot displays the AWS IoT console interface. On the left, the navigation menu includes 'Monitor', 'Onboard', 'Manage', 'Secure', 'Certificates', 'Policies', 'CAs', 'Role Aliases', 'Authorizers', 'Act', and 'Test'. The 'Secure' menu item is highlighted with a red box, and a red arrow points from it to the 'Create' button in the top navigation bar. The 'Create' button is also highlighted with a red box, and another red arrow points from it to the 'Name' input field on the 'Create a policy' page. The 'Name' input field contains the text 'IoTDevice' and is also highlighted with a red box. The 'Create a policy' page has a blue header and contains the following text: '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](#).'

Creating a Policy

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). To learn more about IoT policies go to the [AWS IoT Policies documentation page](#).

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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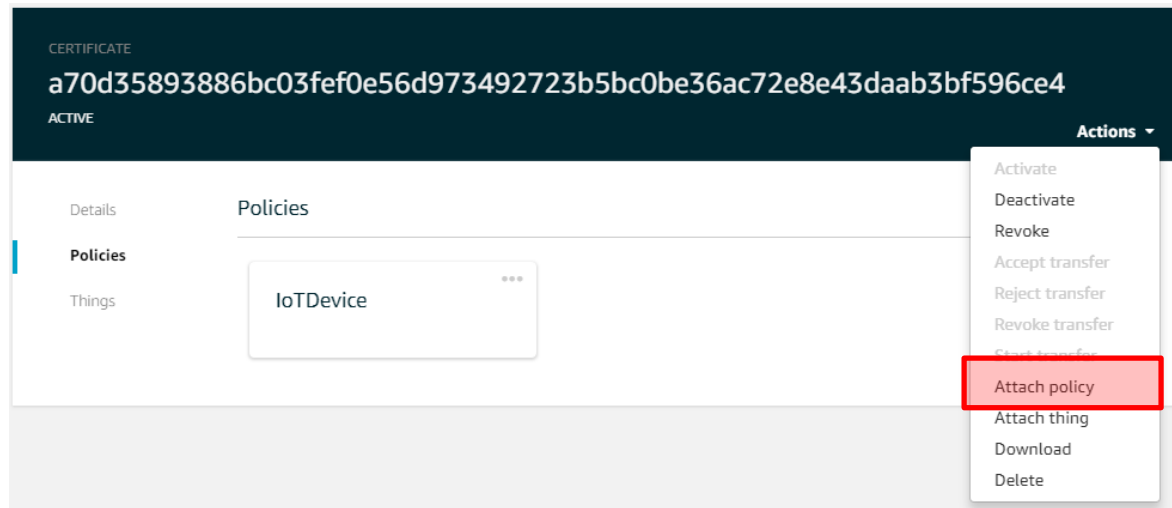
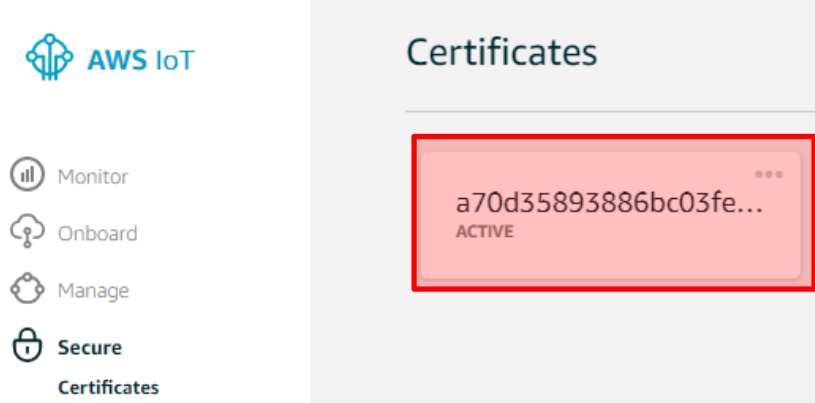
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Assign the Policy



Attach a Policy

Attach policies to certificate(s)

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

a70d35893886bc03fef0e56d973492723b5bc0be36ac72e8e43daab3bf596ce4

Choose one or more policies

Search policies	
<input type="checkbox"/> TestPolicy	View
<input checked="" type="checkbox"/> IoTDevice	View

1 policy selected

Cancel

Attach

Additional Resources

- Download Course Material for
 - C/C++ Doxygen Templates
 - Example source code
 - Blog
 - YouTube Videos
- Embedded Bytes Newsletter
 - <http://bit.ly/1BAHYXm>



From www.beningo.com under

- Blog > CEC – Connecting Edge Devices to the IoT using Amazon FreeRTOS