Chapter 05

Cloud Computing (AWS)
AWS-IoT

AWS IoT

Device software

Connect your devices and operate them at the edge.

FreeRTOS

Deploy an operating system for microcontrollers that makes small, low-power edge devices easy to manage

AWS IoT Greengrass

Build, deploy, and manage intelligent IoT applications at the edge with an open-source edge runtime and cloud service

AWS IoT ExpressLink

Quickly transform any embedded device into an IoT–connected device with minimal design effort using these hardware modules.

Connectivity and control services

Secure, control, and manage your devices from the cloud.

AWS IoT Core

Connect IoT devices to AWS without the need to provision or manage servers

AWS IoT Device Defender

Continuously audit your IoT configurations and secure your fleet of IoT devices

AWS IoT Device Management

Easily register, organize, monitor, and remotely manage your IoT devices at scale

AWS IoT FleetWise (Preview)

Easily collect, transform, and transfer vehicle data to the cloud at scale

Analytics services

Work with IoT data faster to extract value from your data.

AWS IoT SiteWise

Collect and analyze industrial data at scale and make better, data-driven decisions

AWS IoT Events

Easily detect and respond to events from many IoT sensors and applications

AWS IoT Analytics

Run analytics on volumes of IoT data easily—without building an analytics platform

AWS IoT TwinMaker (Preview)

Optimize operations by easily creating digital twins of real-world systems

AMAZON WEB SERVICE (AWS)

What we will use in this course

- **IoT Core:**

Lets you connect billions of IoT devices and route trillions of messages to AWS services without managing infrastructure.

- **IoT Analytics**

Makes it easy to run and operationalize sophisticated analytics on massive volumes of IoT data without having to worry about the cost and complexity typically required to build an IoT analytics platform.

- **QuickSight**

It allows everyone in your organization to understand your data by asking questions in natural language, exploring through interactive dashboards, or automatically looking for patterns and outliers powered by machine learning.

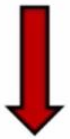
AMAZON WEB SERVICE (AWS)

What we will use in this course

- **IoT Core:**

Lets you connect billions of IoT devices and route trillions of messages to AWS services without managing infrastructure.

Publish and Subscriber managing pattern



Needs a ***Broker***

Communication protocoled options:

1- MQTT Protocol
2- HTTPS
3- Web Socket

Using the MQTT protocol – can connect esp32 to the AWS services through the internet directly without the use of a broker too

Course uses the RPi as an intermediate step to do some of the analytics locally

VEEBAR TECH

AWS IoT Core

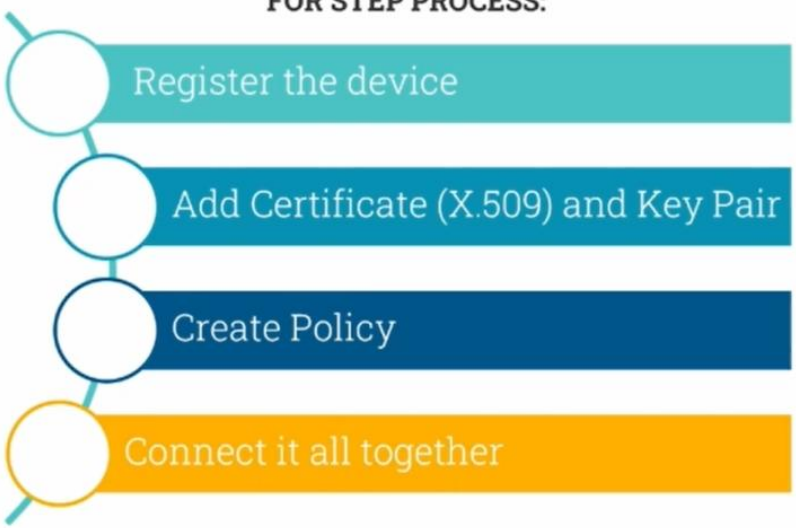
Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:



Register under the AWS service

To make it encrypted and secure

How is the device going to be treated on AWS and what kind of action can the device take

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

  Provides **identity for the device** + **Track of MetaData**

  Assigns unique identity for each device:

  FOR STEP PROCESS:

AWS IoT Core

Structure

- **IoT Shadow**

See **last state of device** + Set **status when online**

Done by CLI or Command Line

JavaScript format

Update	**Create or update shadow with time-stamp**
Get	**Get last shadow state**
Delete	**Remove a shadow**

* An action is taken when there is a difference between desired shadow and current shadow

For ex: in smart home – turn on light with phone

Pressing on button – a shadow update is sent and it requires the device to have a state of NO

Existing shadow of the light – OFF

A difference between the desired shadow and the existing shadow

Will lead to an action

VEEBAR TECH

AWS IoT Core

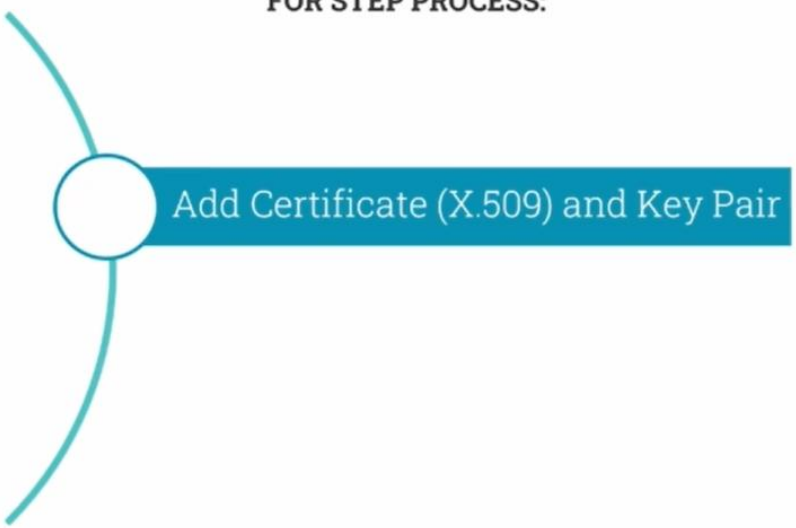
Structure

- **Registry:**

  Provides **identity for the device** + **Track of MetaData**

  Assigns unique identity for each device:

  FOR STEP PROCESS:



AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

1

2

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

Add Certificate (X.509) and Key Pair

Asymmetric or Public-key cryptography

VEEBAR TECH

AWS IoT Core

Structure

- **Registry:**

Provides **identity for the device** + **Track of MetaData**

Assigns unique identity for each device:

FOR STEP PROCESS:

VEEBAR TECH

AWS IoT Core

Structure

- **IoT Rules**

Defines **how device interact with AWS services**

Main Parts

SQL SELECT STATEMENT:	**To extract from MQTT message**
TOPIC FILTER:	**Specify MQTT Topic**
RULE ACTION:	**What to do with message**

VEEBAR TECH

AWS IoT Core

Structure

- **IoT Rules**

Defines **how device interact with AWS services**

Main Parts

SQL SELECT STATEMENT: **To extract from MQTT message**

TOPIC FILTER: **Specify MQTT Topic**

RULE ACTION: **What to do with message**

1- Amazon DynamoDB
2- AWS Lambda
3- AWS SNS
4- Amazon S3