Lab Session: AWS IoT

AWS IoT

IoT devices   AWS IoT   AWS services

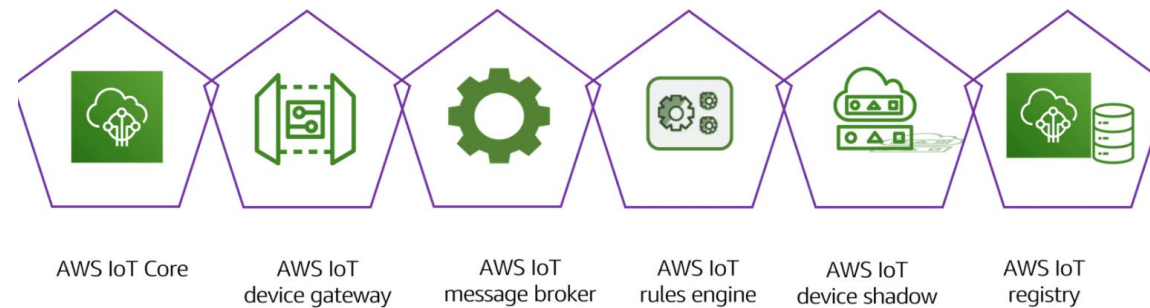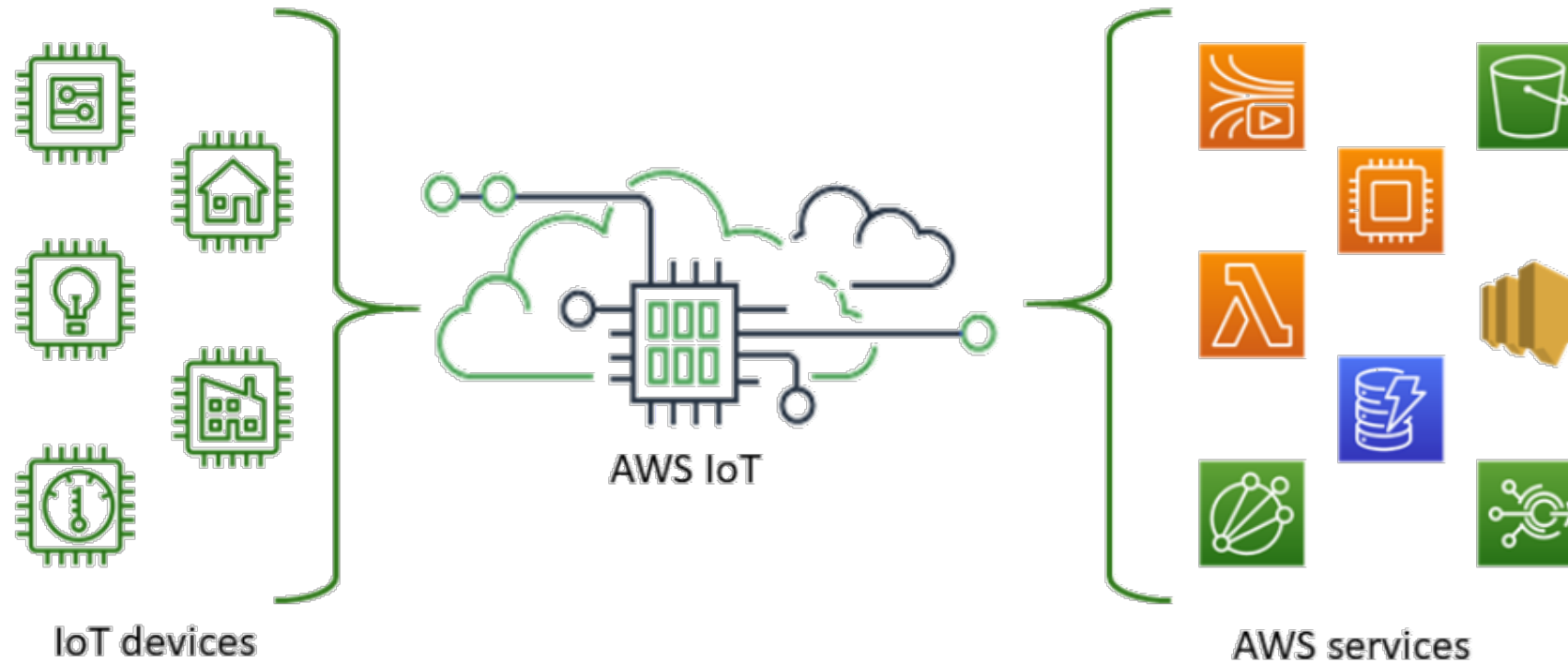AWS IoT Core   AWS IoT device gateway   AWS IoT message broker   AWS IoT rules engine   AWS IoT device shadow   AWS IoT registry

Six main components

- **Identity and access management.** Provides authentication, authorization, and easy onboarding of devices.

- **Device gateway** Securely connects IP-connected devices and edge gateways to the AWS Cloud and other devices

- **Message broker** Processes and routes data messages to the AWS Cloud.

- **Rules engine** Triggers actions in the AWS Cloud.

- **Device shadow:** Enables applications to interact with devices when they are offline through a digital twin.

- **The registry** Helps to enable device registration and acts as a catalogue of devices and their security certificates.

Identity and access management
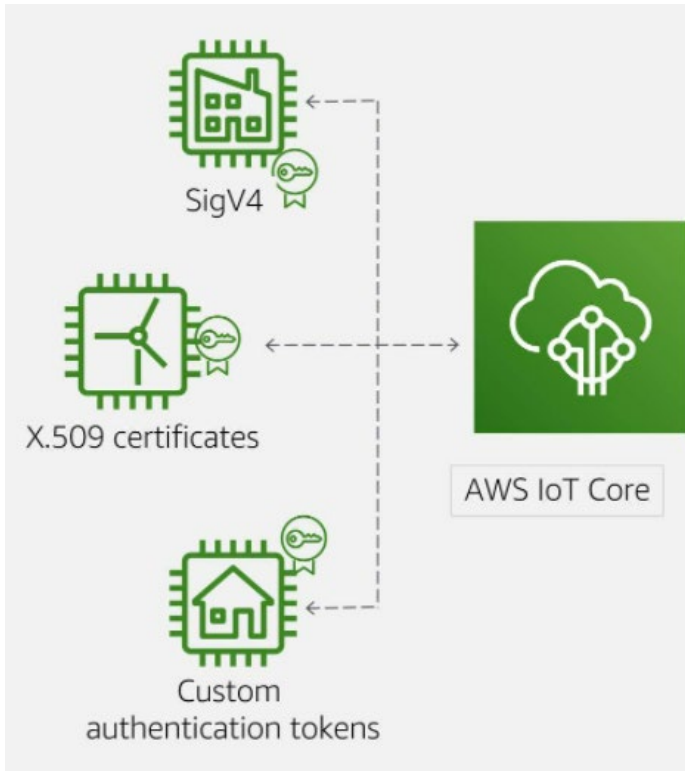
- Authentication is necessary for secure communication between devices
- AWS IoT provides authentication by offering the following options:
  - Message Queuing Telemetry Transport (MQTT) over **Transport Layer Security (TLS)** v1.2
  - **SigV4** over HTTP
  - **MQTT over WebSockets**, which is similar to other AWS services.
- You can also use custom authentication tokens

AWS IoT device gateway

- The AWS IoT device gateway enables devices to securely and efficiently communicate with AWS IoT Core.

- With the help of AWS IoT message broker, the **IoT Device Gateway can exchange messages using a publish/subscribe model**, which enables one-to-one and one-to-many communications.

AWS device gateway

AWS IoT message broker
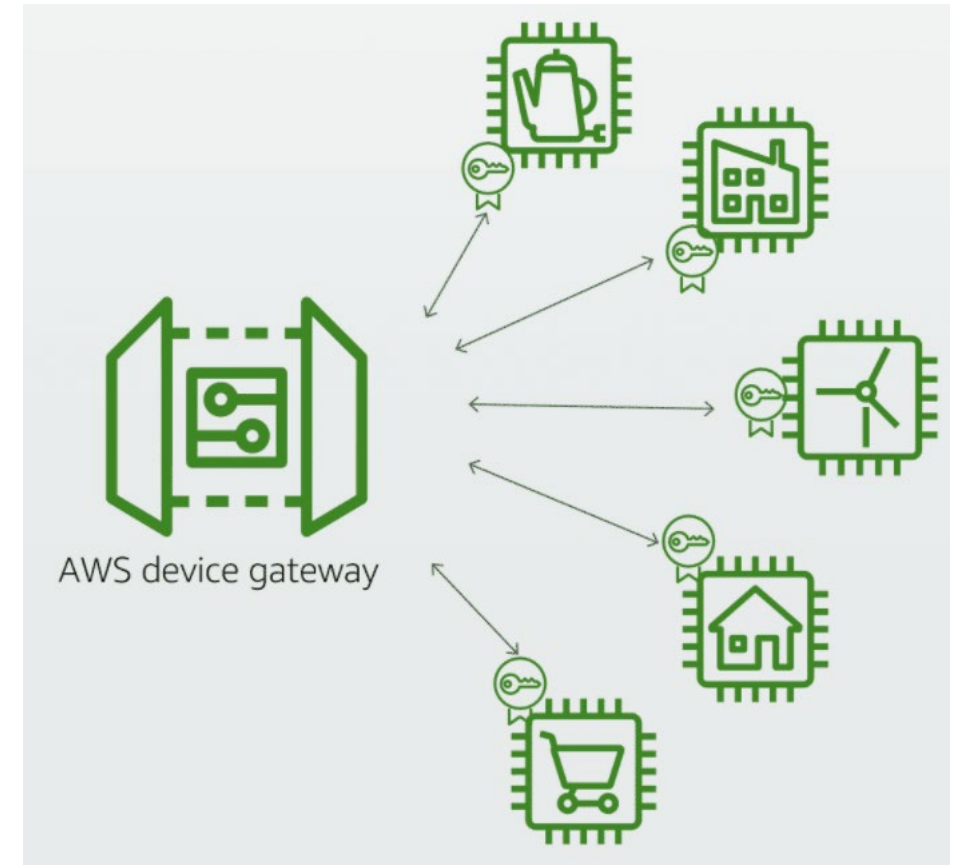

AWS IoT message broker
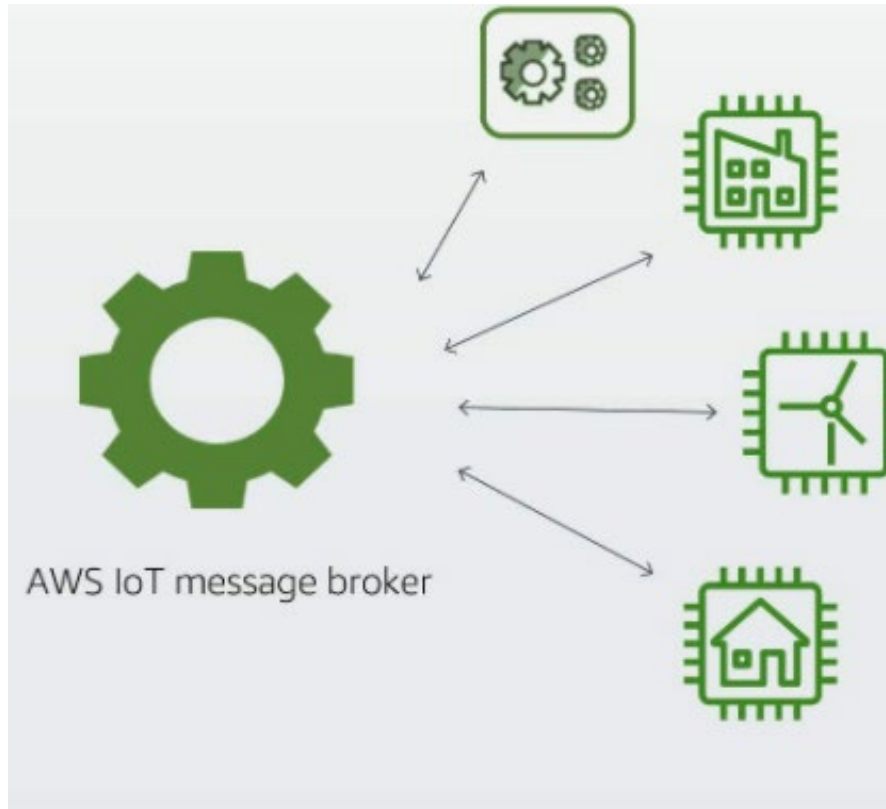
- AWS IoT message **broker processes and routes data from your devices into AWS IoT Core**. Message broker is scalable, has low-latency, and provides reliable message routing. It also uses a publish and subscribe model to decouple devices and applications.

- The message broker allows **two-way message streaming between devices and applications** and provides an opportunity for data transformation, rerouting, and enhancement with external data sources.

AWS IoT rules engine

- The rules engine **listens for incoming messages that match a rule.** When a matching message is received, the rule acts on the data, such as
  - Writing data to Amazon Simple Storage Service (Amazon S3) bucket
  - Invoking an AWS Lambda function
  - Sending a message to an Amazon Simple Notification Service (Amazon SNS) topic.
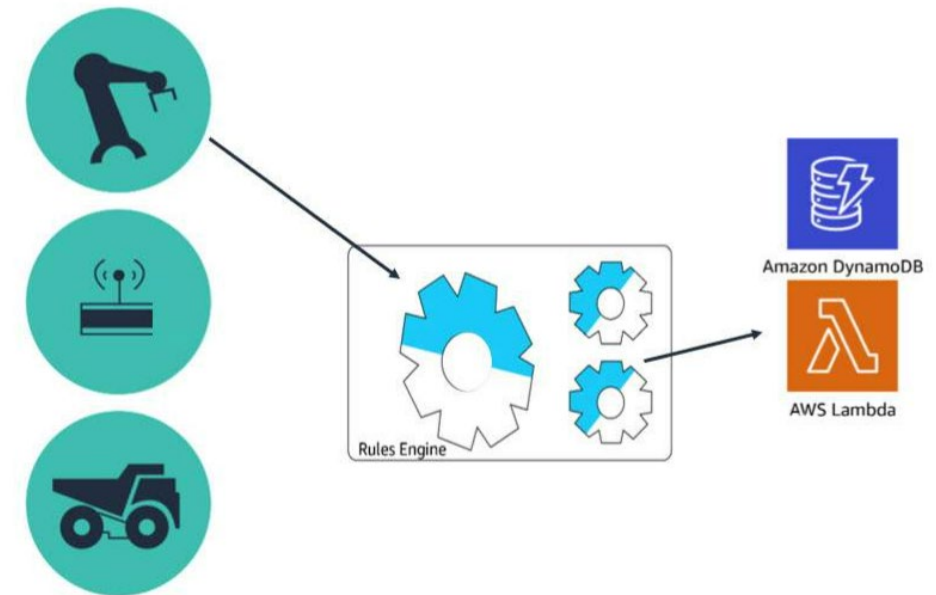
AWS IoT Device Shadow service
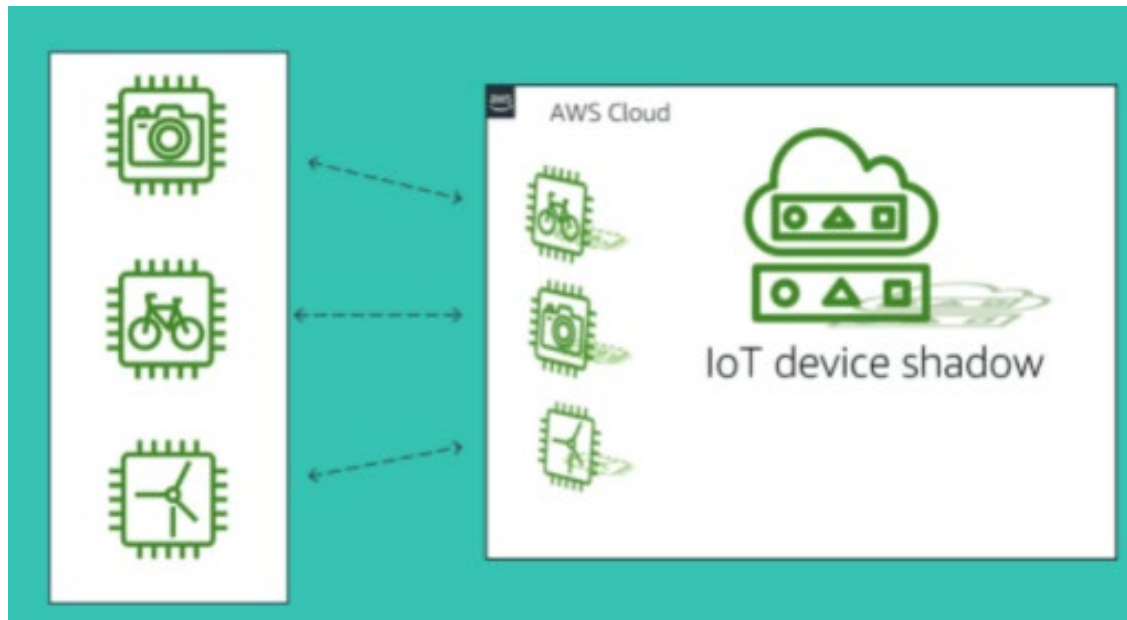
- Often referred to as a **thing shadow or a digital twin**. The Device Shadow service maintains a shadow for each device you connect to AWS IoT.
- You can use the shadow to get and set the state of a device over MQTT or HTTP, **regardless of whether the device is connected to the Internet.**

AWS IoT registry

- The AWS IoT registry is **a database of devices**. Using the registry for your devices is optional; however, the registry helps you manage your device ecosystem effectively and acts as a repository for device certificates.
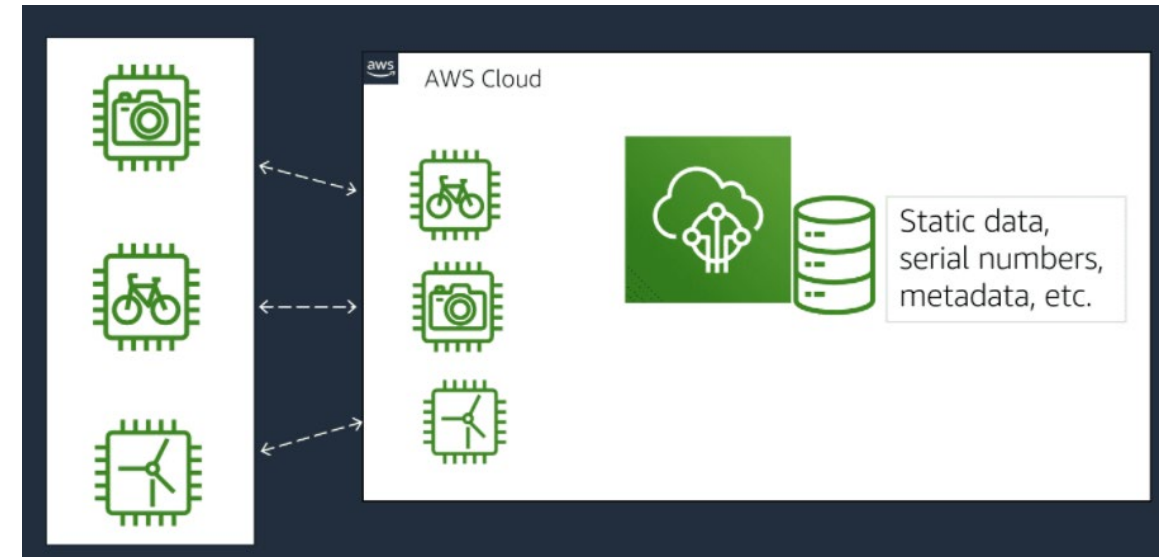
Task 1: AWS IoT architecture

- **Try the hands-on lab in**
  - https://docs.aws.amazon.com/iot/latest/developerguide/interactive-demo.html
  - This lab introduces the overall architecture and essential components in AWS IoT

- **Answer the following questions**
  - What is the role of AWS IoT in the architecture?
  - What is a device shadow and what is it used for?

IoT devices — AWS IoT — AWS services
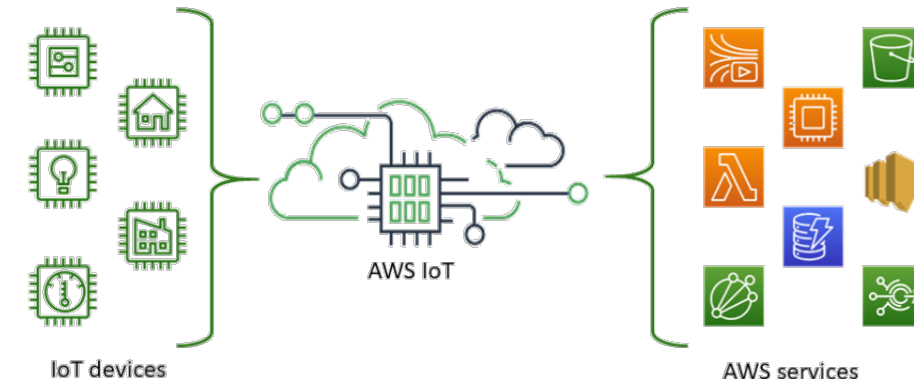
Task 2: Connect devices with AWS IoT

- **Now we try to connect IoT devices to the AWS IoT core**

- **Try the hands-on lab in**
  - https://docs.aws.amazon.com/iot/latest/developerguide/iot-quick-start.html

- **Answer the following questions**
  - How does AWS verify your credentials?
  - What is the topic in this example?
  - How can you connect a real IoT device to the IoT core in the future?
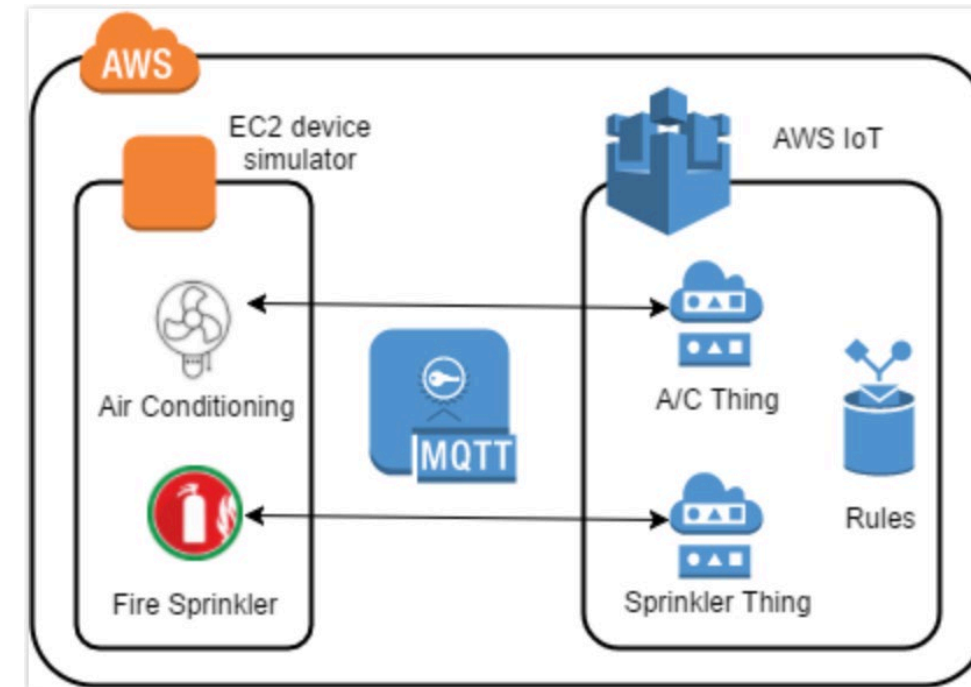
Submission

- **Finish task 1 & 2 and answer the questions**

- **Submit evidence of success (e.g., snapshot) and answers to eDimension**