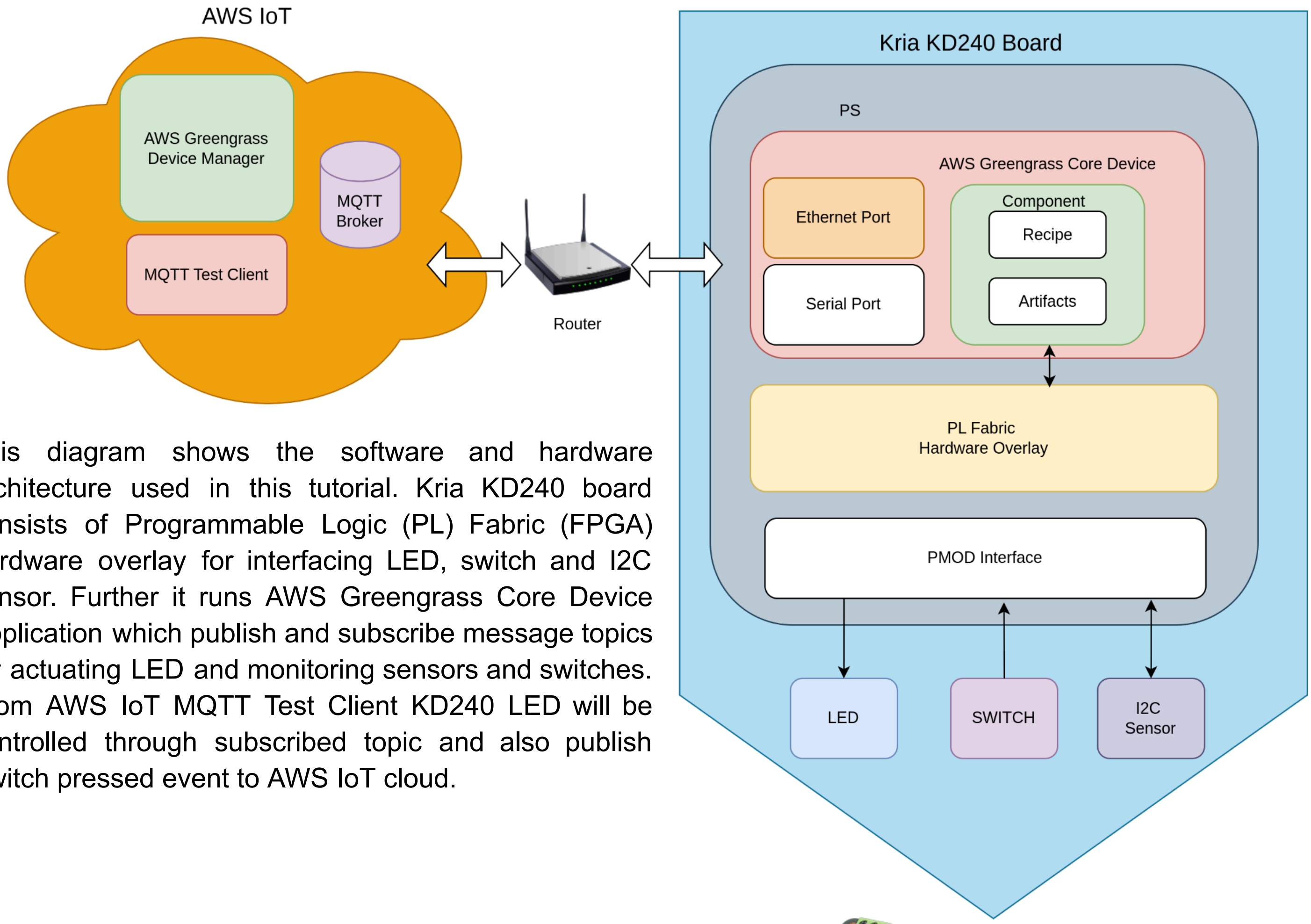
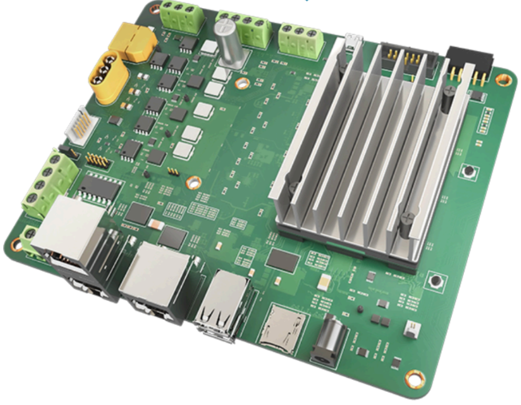
# KD240 to AWS IoT Greengrass Architecture

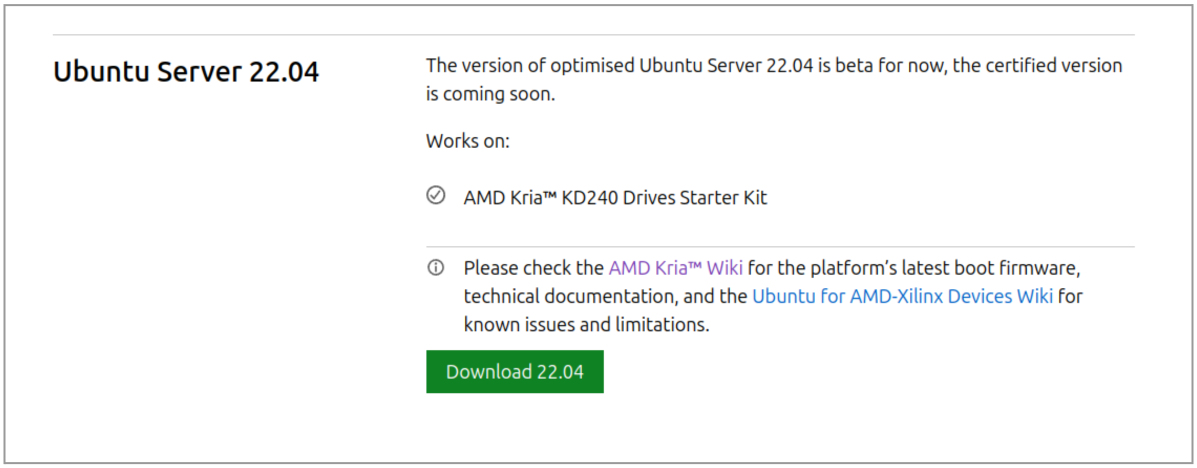


This diagram shows the software and hardware architecture used in this tutorial. Kria KD240 board consists of Programmable Logic (PL) Fabric (FPGA) hardware overlay for interfacing LED, switch and I2C sensor. Further it runs AWS Greengrass Core Device Application which publish and subscribe message topics for actuating LED and monitoring sensors and switches. From AWS IoT MQTT Test Client KD240 LED will be controlled through subscribed topic and also publish Switch pressed event to AWS IoT cloud.



# Preparing Ubuntu 22.04 OS for KRIA KD240 board

Download the Ubuntu 22.04 image from the download link



Ubuntu Server 22.04

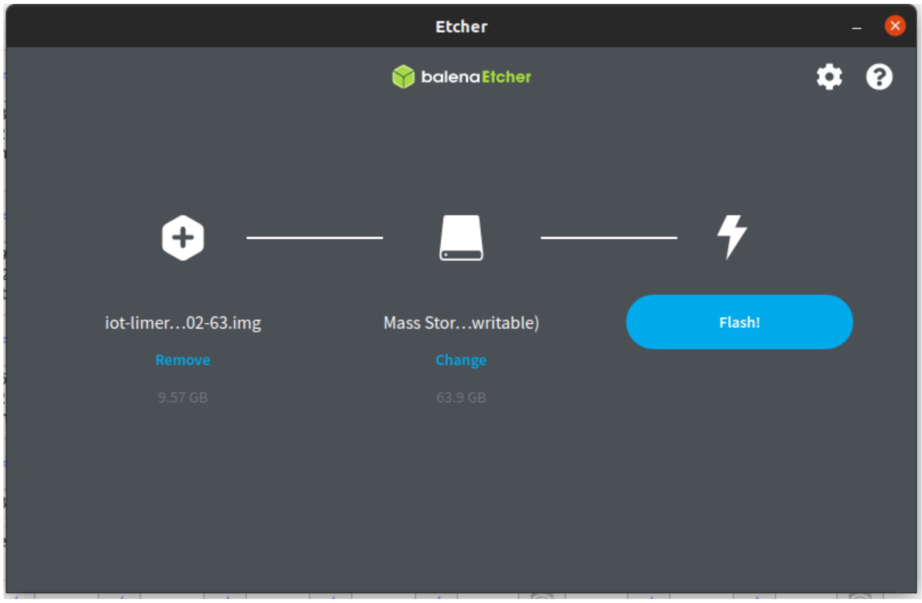
The version of optimised Ubuntu Server 22.04 is beta for now, the certified version is coming soon.

Works on:

✓ AMD Kria™ KD240 Drives Starter Kit

ⓘ Please check the AMD Kria™ Wiki for the platform's latest boot firmware, technical documentation, and the Ubuntu for AMD-Xilinx Devices Wiki for known issues and limitations.

Next, prepare the SD card with the above downloaded Ubuntu image using burning tools like Balena Etcher.



Now boot the KD240 with the SD card with Ethernet and USB to Serial cable connected to board. We will be using Serial console for initial access and debugging and Ethernet network for accessing through SSH and KD240 connected to the internet.

For initial login here are the Login Details:
Username : ubuntu
Password: ubuntu
This will ask to change the password. So update the password and login the system.
After successful login, one can access the KD240 device console.

# Installing hardware overlay in KD240

Get the KD240 firmware folder. It contains:

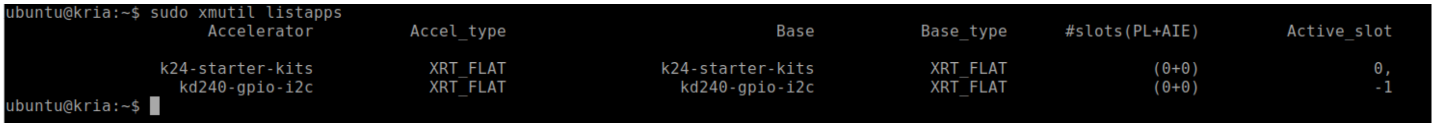
- kd240-gpio-i2c.bit.bin
- kd240-gpio-i2c.dtbo
- shell.json

Copy these file to the KD240 board. For firmware to be loaded using xmutil (FPGA manager), one has to copy these file at “/lib/firmware/xilinx”.

For this create the folder at “kd240-gpio-i2c” at “/lib/firmware/xilinx” and copy the files in “kd240-gpio-i2c” folder.

```
cd /lib/firmware/xilinx
sudo mkdir kd240-gpio-i2c
Cd kd240-gpio-i2c
sudo cp <kd240-firmware directory>/kd240-gpio-i2c* ./
sudo cp <kd240-firmware directory>/shell.json ./
```

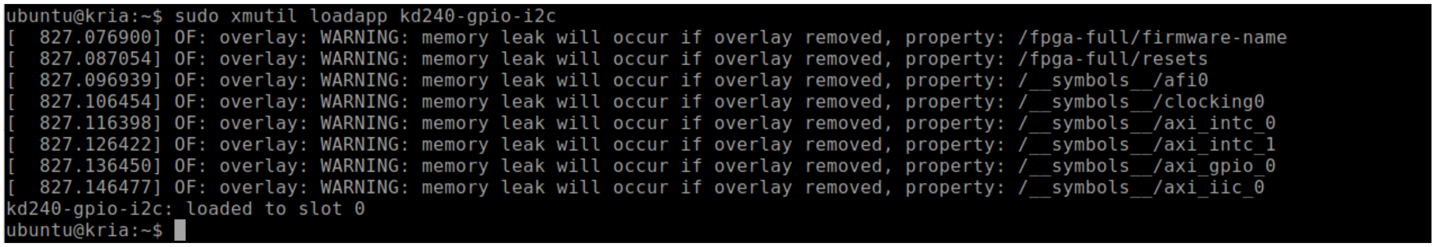
Next, check the available fpga firmware using `xmutil listapps` command. `kd240-gpio-i2c` will be available in the list.



```
ubuntu@kria:~$ sudo xmutil listapps
                     Accelerator          Accel_type                            Base           Base_type      #slots(PL+AIE)         Active_slot

                k24-starter-kits            XRT_FLAT                k24-starter-kits            XRT_FLAT               (0+0)                  0,
                  kd240-gpio-i2c            XRT_FLAT                  kd240-gpio-i2c            XRT_FLAT               (0+0)                  -1
ubuntu@kria:~$ █
```

Next load the `kd240-gpio-i2c` firmware, which contains necessary hardwares (gpio) and interfaces. In our Greengrass Demo we will be using these gpio to trigger the publishing data to AWS Greengrass IoT cloud server and also actuate GPIO on the message received from AWS cloud.

```
sudo xmutil unloadapp
sudo xmutil loadapp kd240-gpio-i2c
```



```
ubuntu@kria:~$ sudo xmutil loadapp kd240-gpio-i2c
[  827.076900] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /fpga-full/firmware-name
[  827.087054] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /fpga-full/resets
[  827.096939] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/afi0
[  827.106454] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/clocking0
[  827.116398] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/axi_intc_0
[  827.126422] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/axi_intc_1
[  827.136450] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/axi_gpio_0
[  827.146477] OF: overlay: WARNING: memory leak will occur if overlay removed, property: /__symbols__/axi_iic_0
kd240-gpio-i2c: loaded to slot 0
ubuntu@kria:~$ █
```

Now to access GPIO in user application, we will be using `gpiod` library.

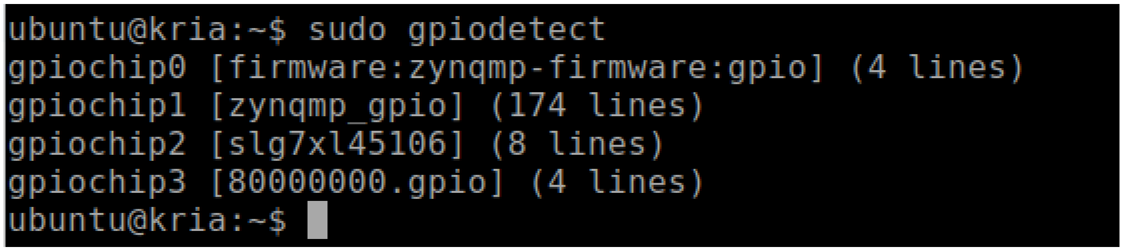
# Installing gpiod packages

GPIOD packages are required to access the GPIO channels. It also provides python binding for accessing GPIO in python programming. Install the package using apt-get:

```
sudo apt update
sudo apt-get install gpiod python3-libgpiod
```

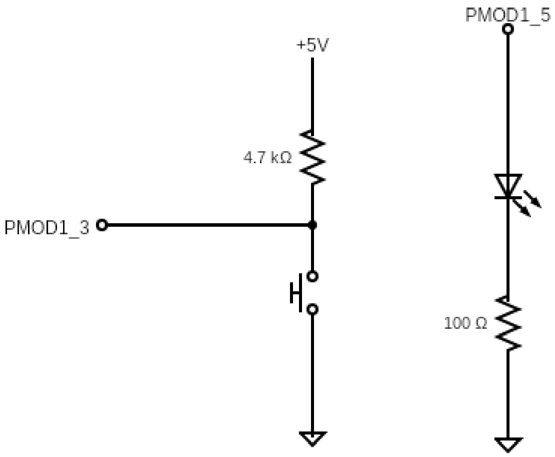
Now we can check the available gpio using gpiod  applications:

Using `gpiodetect` to get availabe gpio:

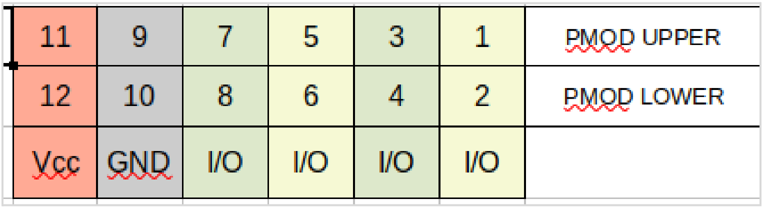


```
ubuntu@kria:~$ sudo gpiodetect
gpiochip0 [firmware:zynqmp-firmware:gpio] (4 lines)
gpiochip1 [zynqmp_gpio] (174 lines)
gpiochip2 [slg7xl45106] (8 lines)
gpiochip3 [80000000.gpio] (4 lines)
ubuntu@kria:~$
```

Here `gpiochip3` is the device corresponding to gpio in FPGA and it consists of 4 lines. Further these gpio lines are connected to PMOD 1 such that:
PMOD1-> 5 - gpiochip3 line 0
PMOD1-> 7 - gpiochip3 line 1

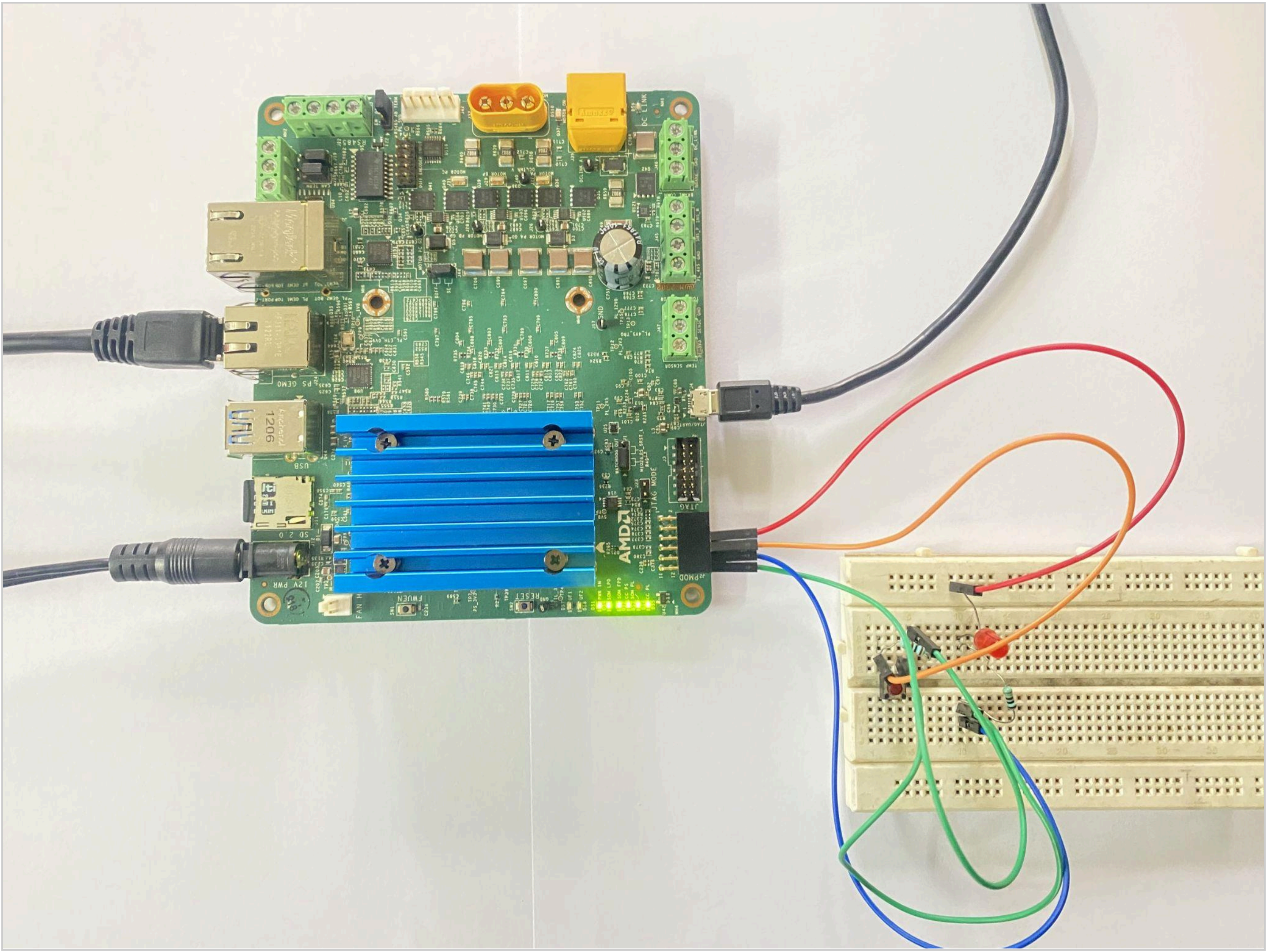


Schematic for LED and Switch Connection



| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 9 | 7 | 5 | 3 | 1 | PMOD UPPER |
| 12 | 10 | 8 | 6 | 4 | 2 | PMOD LOWER |
| Vcc | GND | I/O | I/O | I/O | I/O | |

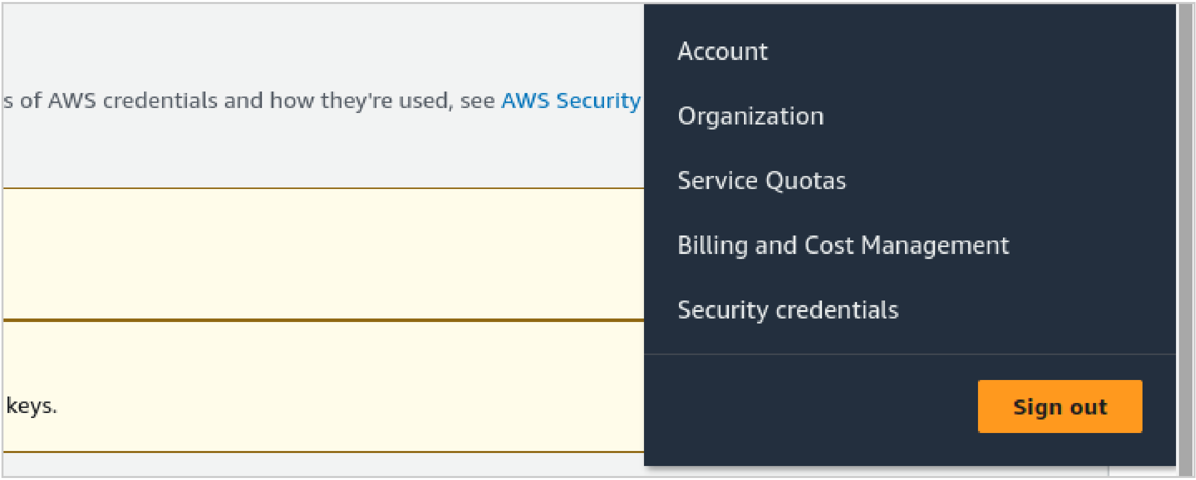
PMOD port numbering



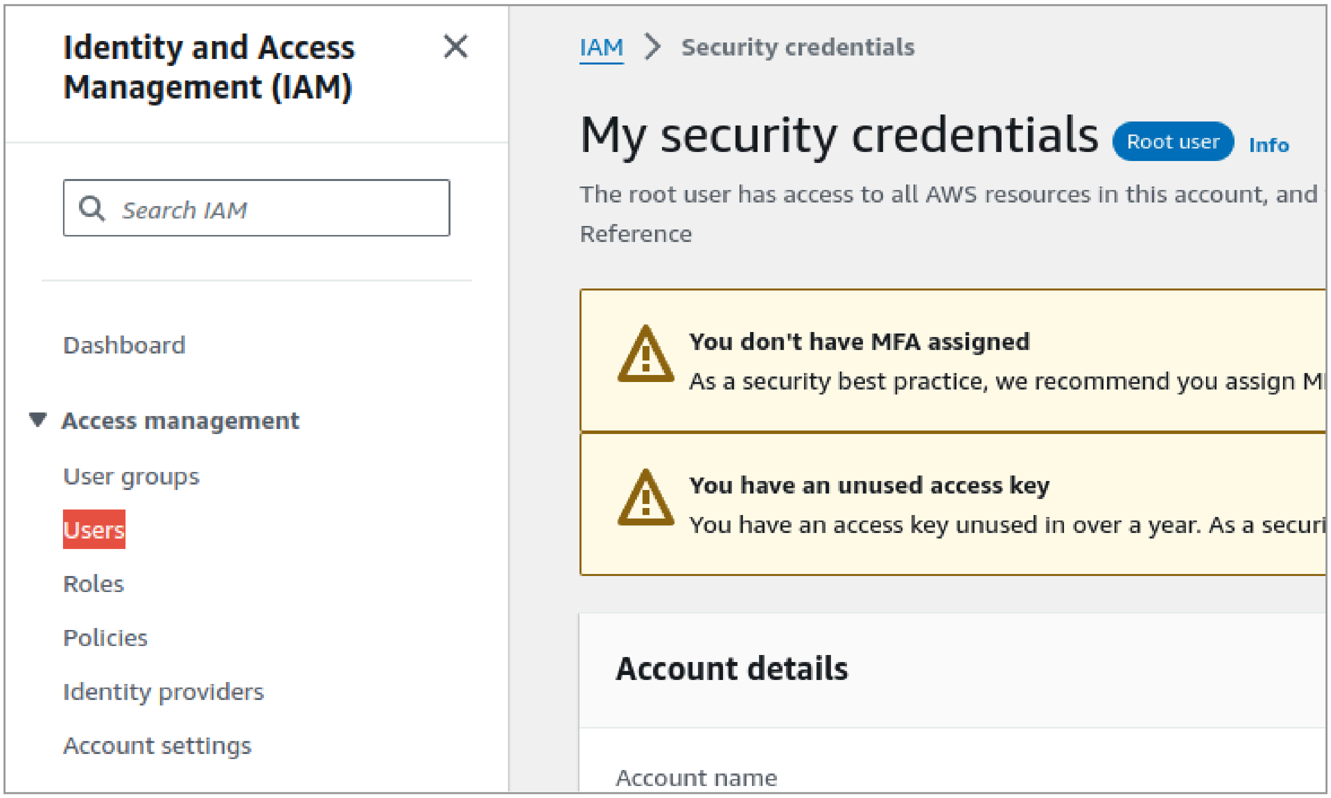
KD240 Board Connected to switch and LED through PMOD

# AWS IoT user creation

For and non human access to AWS services one has to create a user with required permissions.
- Login to AWS console
- Next go to `Security credentials` link available at root user drop down at top right corner of the AWS console


s of AWS credentials and how they're used, see AWS Security
keys.
Account
Organization
Service Quotas
Billing and Cost Management
Security credentials
Sign out

- Next Go to User management page by clicking at the User link at IAM sidebar.
This will list the available users.



My security credentials Root user Info

The root user has access to all AWS resources in this account, and
Reference

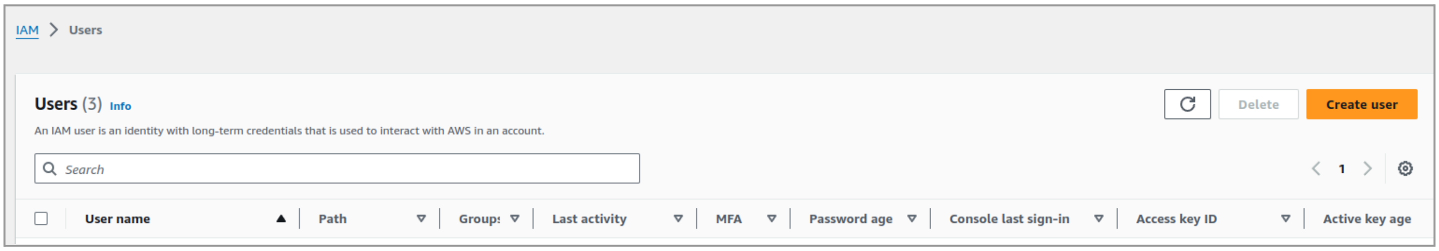
You don't have MFA assigned
As a security best practice, we recommend you assign M

You have an unused access key
You have an access key unused in over a year. As a securi

Account details

Account name

- Now create a new user for KD240 device by clicking the "Create User" button.



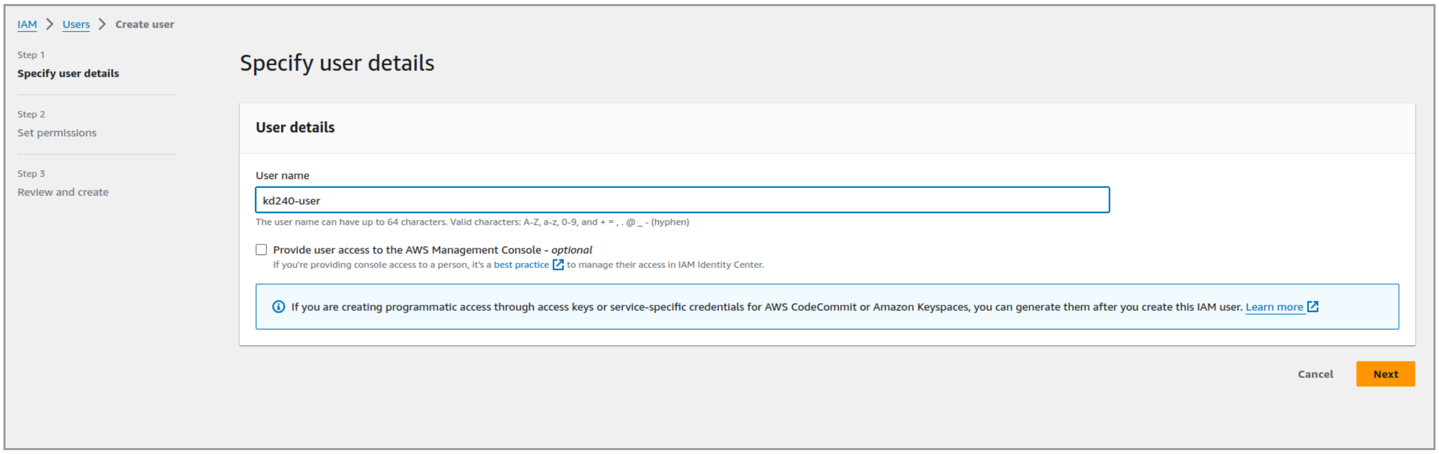
IAM > Users

Users (3) Info

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

| □ | User name ▲ | Path | Group: | Last activity | MFA | Password age | Console last sign-in | Access key ID | Active key age |
|---|---|---|---|---|---|---|---|---|---|

This will lead to step wise User creation forms. So fill the User details,
This will lead to step wise User creation forms.
So fill the User details, leave the console access unchecked as user does not have to access the AWS console through web.



IAM > Users > Create user

Step 1
Specify user details

Step 2
Set permissions

Step 3
Review and create

Specify user details

User details

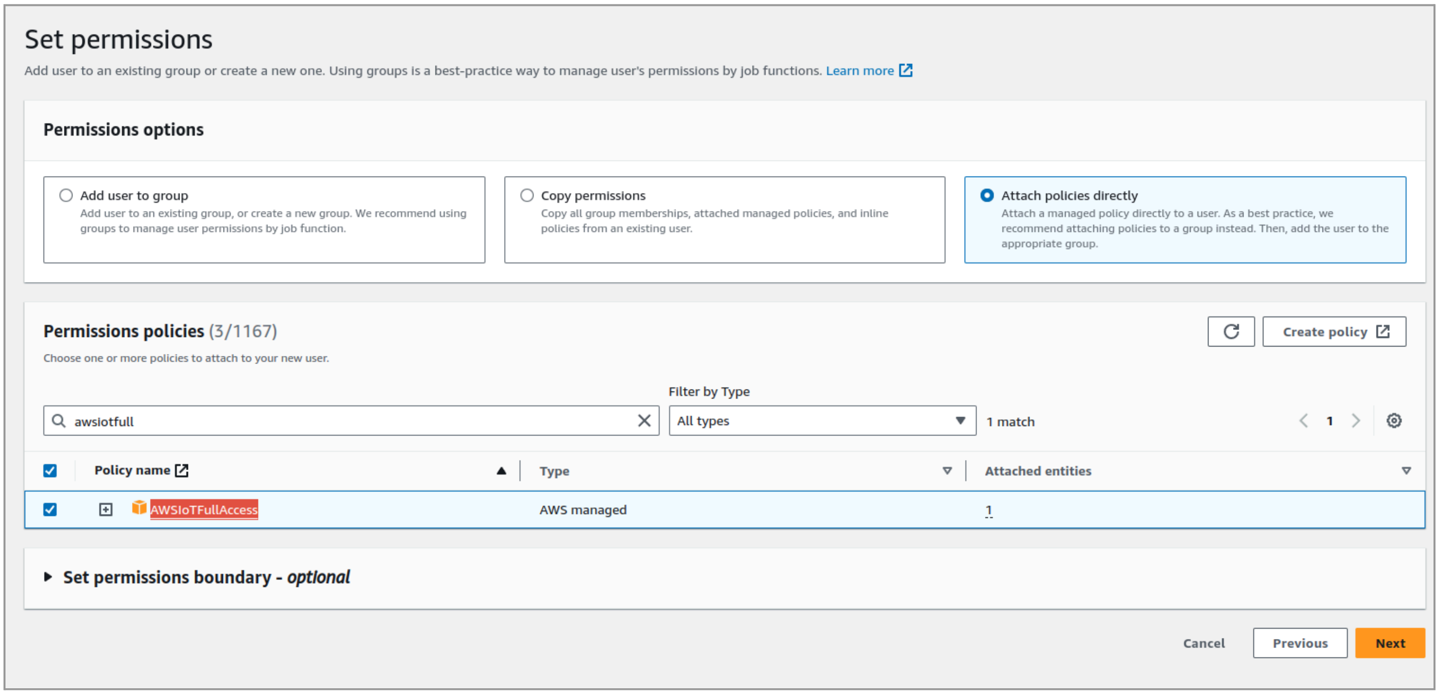
User name: kd240-user

The user name can have up to 64 characters. Valid characters: A-Z, a-z, 0-9, and + = , . @ _ - (hyphen)

□ Provide user access to the AWS Management Console - *optional*
If you're providing console access to a person, it's a best practice to manage their access in IAM Identity Center.

If you are creating programmatic access through access keys or service-specific credentials for AWS CodeCommit or Amazon Keyspaces, you can generate them after you create this IAM user. Learn more

Next, update the Permissions options by attaching following  policies by selecting “Attach policies directly” in Permission options:
- AWSGreengrassFullAccess
- IAMFullAccess
- AWSIoTFullAccess
- AmazonS3FullAccess



Set permissions

Add user to an existing group or create a new one. Using groups is a best-practice way to manage user's permissions by job functions. Learn more

**Permissions options**

○ Add user to group
Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.

○ Copy permissions
Copy all group memberships, attached managed policies, and inline policies from an existing user.

● Attach policies directly
Attach a managed policy directly to a user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.

**Permissions policies** (3/1167)

Choose one or more policies to attach to your new user.

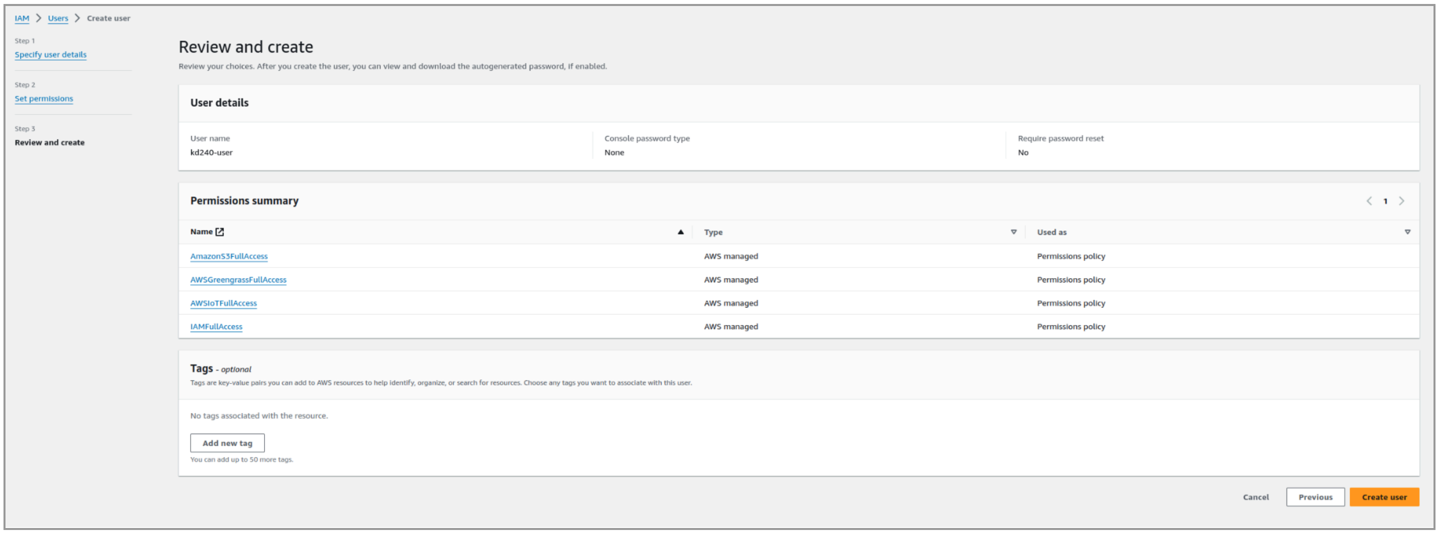
Filter by Type

Search: awsiotfull | All types | 1 match

| ☑ | Policy name | Type | Attached entities |
|---|---|---|---|
| ☑ | AWSIoTFullAccess | AWS managed | 1 |

▸ Set permissions boundary - *optional*

After finishing the above steps click "Create User" to finish the user creation.



IAM > Users > Create user

Step 1
Specify user details

Step 2
Set permissions

Step 3
Review and create

Review and create

Review your choices. After you create the user, you can view and download the autogenerated password, if enabled.

**User details**

| User name | Console password type | Require password reset |
|---|---|---|
| kd240-user | None | No |

**Permissions summary**

| Name | Type | Used as |
|---|---|---|
| AmazonS3FullAccess | AWS managed | Permissions policy |
| AWSGreengrassFullAccess | AWS managed | Permissions policy |
| AWSIoTFullAccess | AWS managed | Permissions policy |
| IAMFullAccess | AWS managed | Permissions policy |

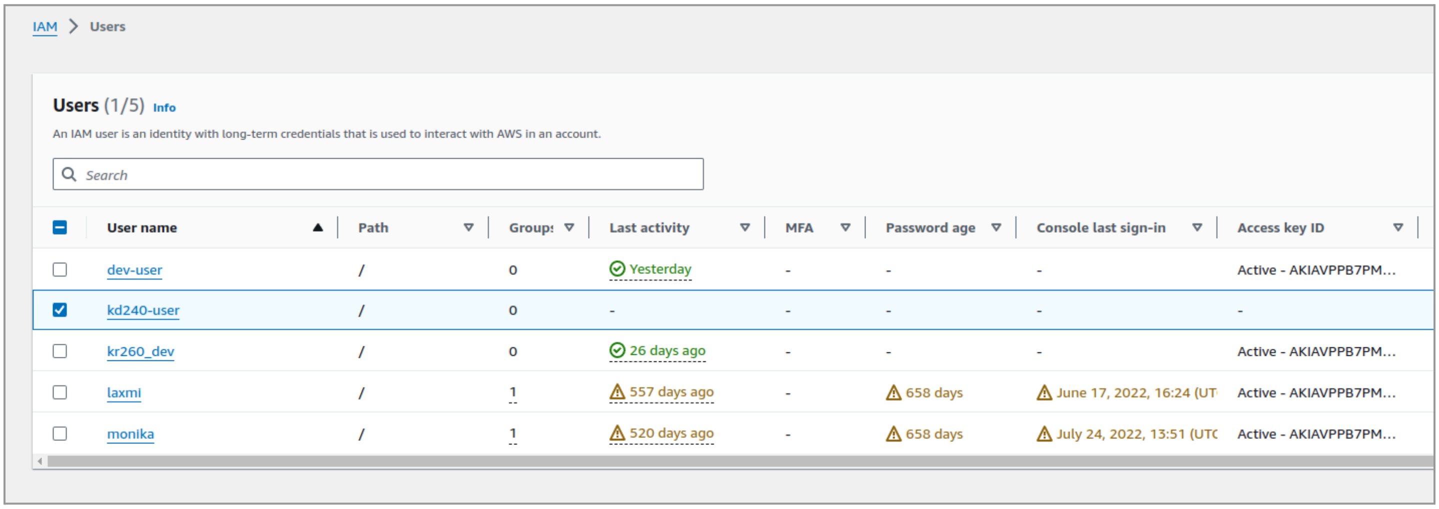
Tags - *optional*

Tags are key-value pairs you can add to AWS resources to help identify, organize, or search for resources. Choose any tags you want to associate with this user.

No tags associated with the resource.

You can add up to 50 more tags.

Next get the access token and access key for the user. For this open the user details by clicking on the user link in the Users table.



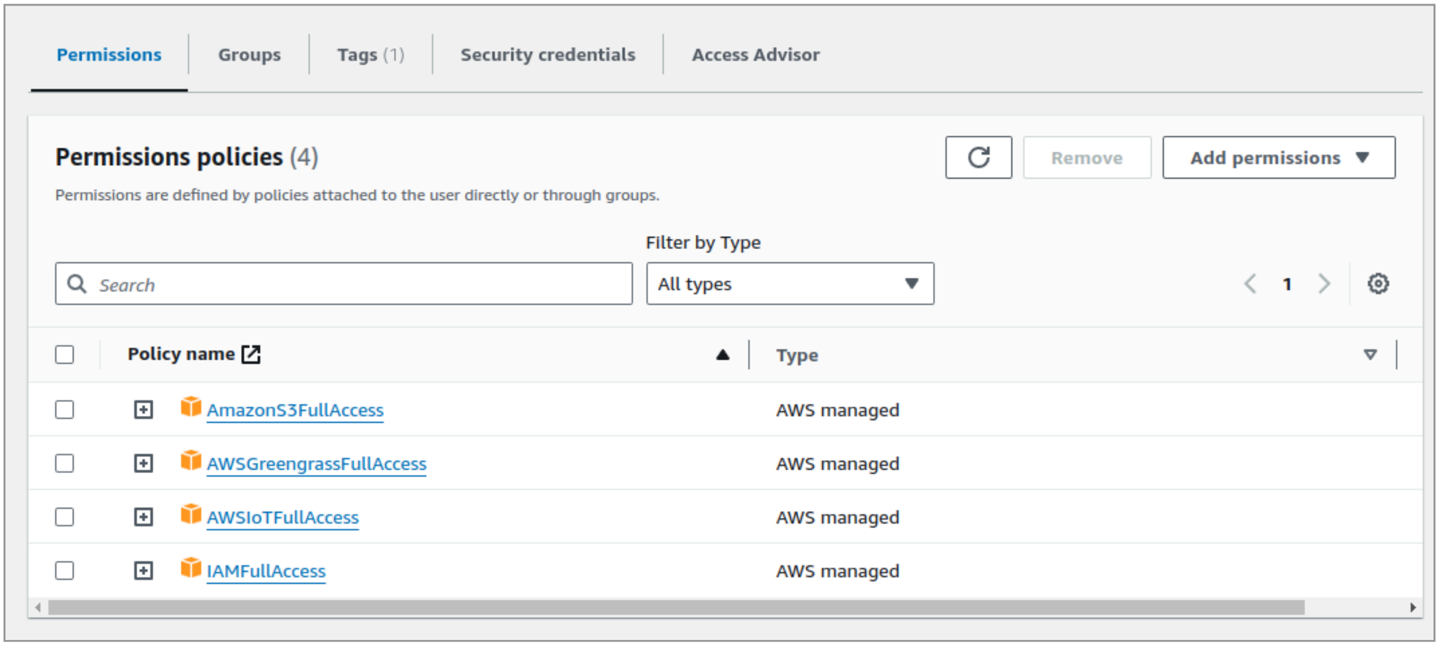
IAM > Users

**Users** (1/5) Info

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

Search

| ▬ | User name ▲ | Path | Group: | Last activity | MFA | Password age | Console last sign-in | Access key ID |
|---|---|---|---|---|---|---|---|---|
| □ | dev-user | / | 0 | ✓ Yesterday | - | - | - | Active - AKIAVPPB7PM... |
| ☑ | kd240-user | / | 0 | - | - | - | - | - |
| □ | kr260_dev | / | 0 | ✓ 26 days ago | - | - | - | Active - AKIAVPPB7PM... |
| □ | laxmi | / | 1 | ⚠ 557 days ago | - | ⚠ 658 days | ⚠ June 17, 2022, 16:24 (UT | Active - AKIAVPPB7PM... |
| □ | monika | / | 1 | ⚠ 520 days ago | - | ⚠ 658 days | ⚠ July 24, 2022, 13:51 (UTC | Active - AKIAVPPB7PM... |



**Permissions policies** (4)

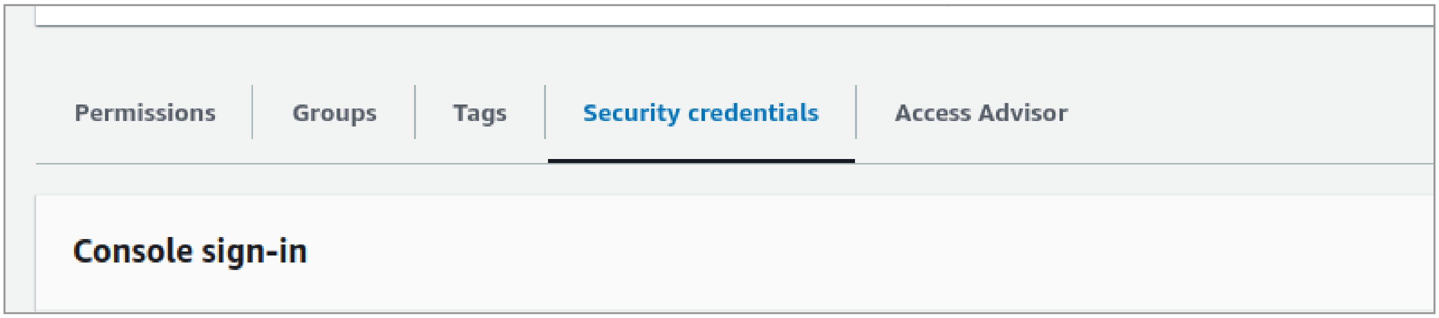
Permissions are defined by policies attached to the user directly or through groups.

Filter by Type: All types

Search

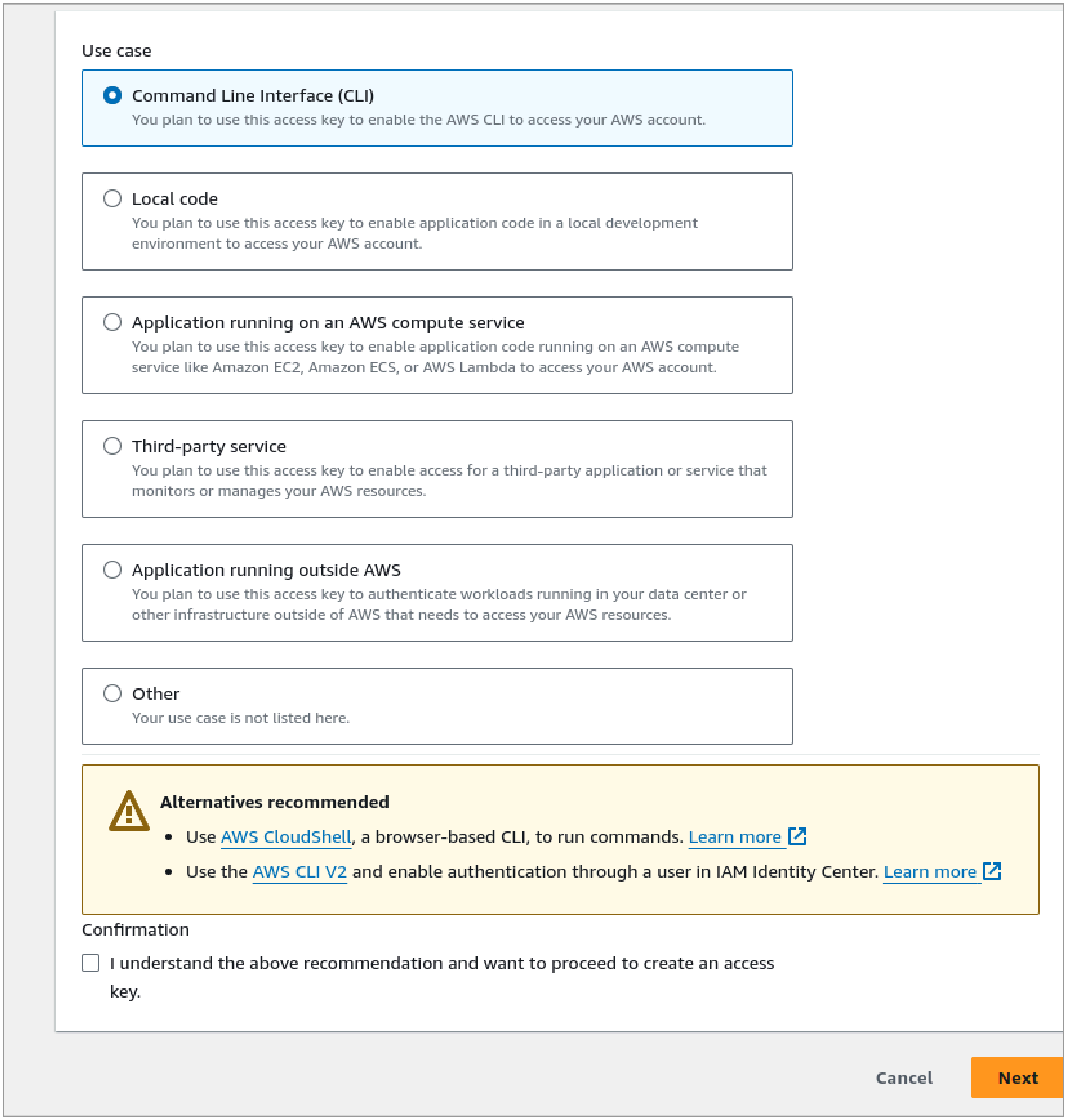
| □ | Policy name ▲ | Type |
|---|---|---|
| □ | ⊞ AmazonS3FullAccess | AWS managed |
| □ | ⊞ AWSGreengrassFullAccess | AWS managed |
| □ | ⊞ AWSIoTFullAccess | AWS managed |
| □ | ⊞ IAMFullAccess | AWS managed |

And go to "Security credentials" for creating the Access Key for the user.



**Console sign-in**

Select access key for command line based access control for user.



Use case

● Command Line Interface (CLI)
You plan to use this access key to enable the AWS CLI to access your AWS account.

○ Local code
You plan to use this access key to enable application code in a local development environment to access your AWS account.

○ Application running on an AWS compute service
You plan to use this access key to enable application code running on an AWS compute service like Amazon EC2, Amazon ECS, or AWS Lambda to access your AWS account.

○ Third-party service
You plan to use this access key to enable access for a third-party application or service that monitors or manages your AWS resources.

○ Application running outside AWS
You plan to use this access key to authenticate workloads running in your data center or other infrastructure outside of AWS that needs to access your AWS resources.

○ Other
Your use case is not listed here.

**Alternatives recommended**

- Use AWS CloudShell, a browser-based CLI, to run commands. Learn more
- Use the AWS CLI V2 and enable authentication through a user in IAM Identity Center. Learn more

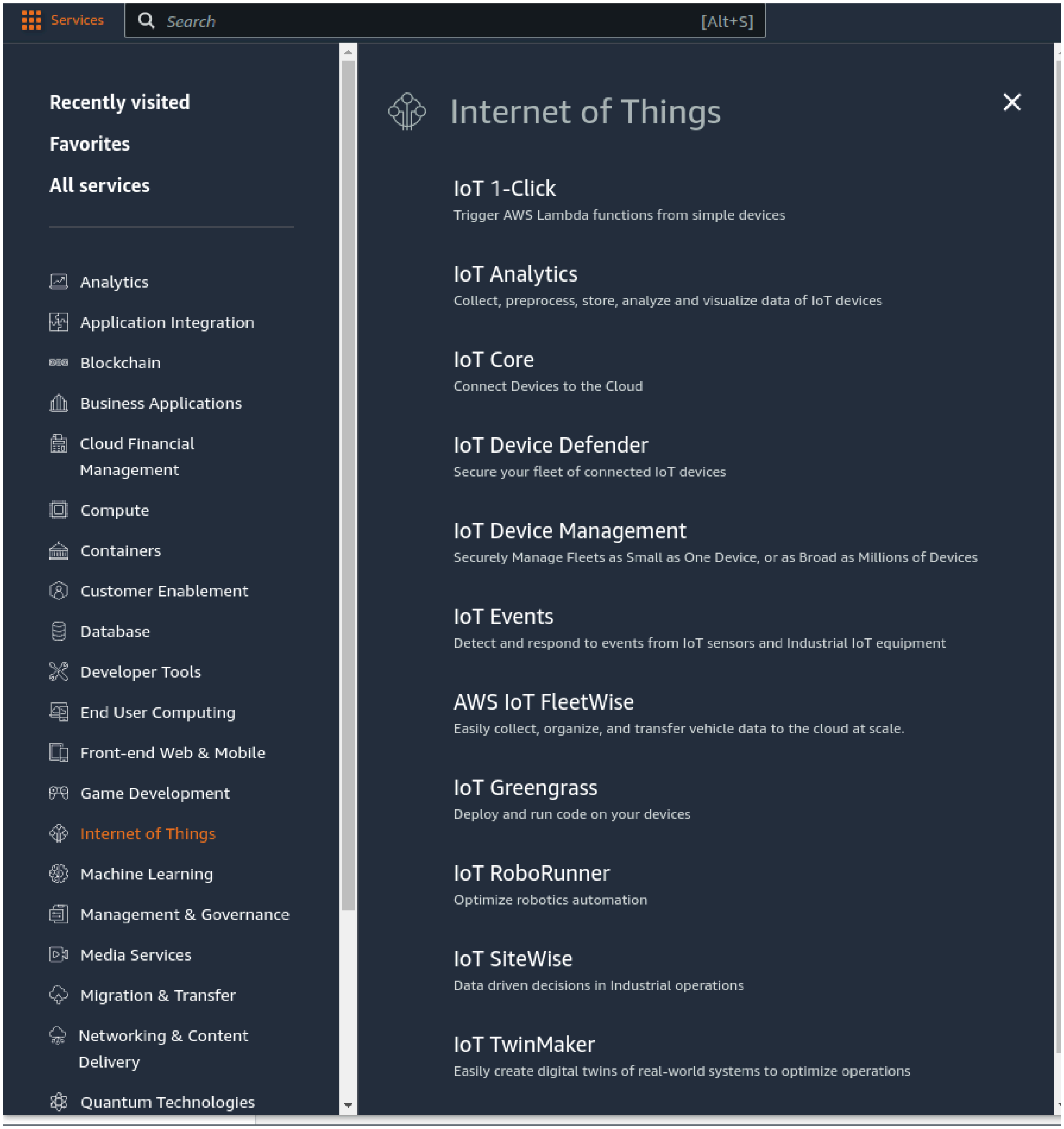
Confirmation

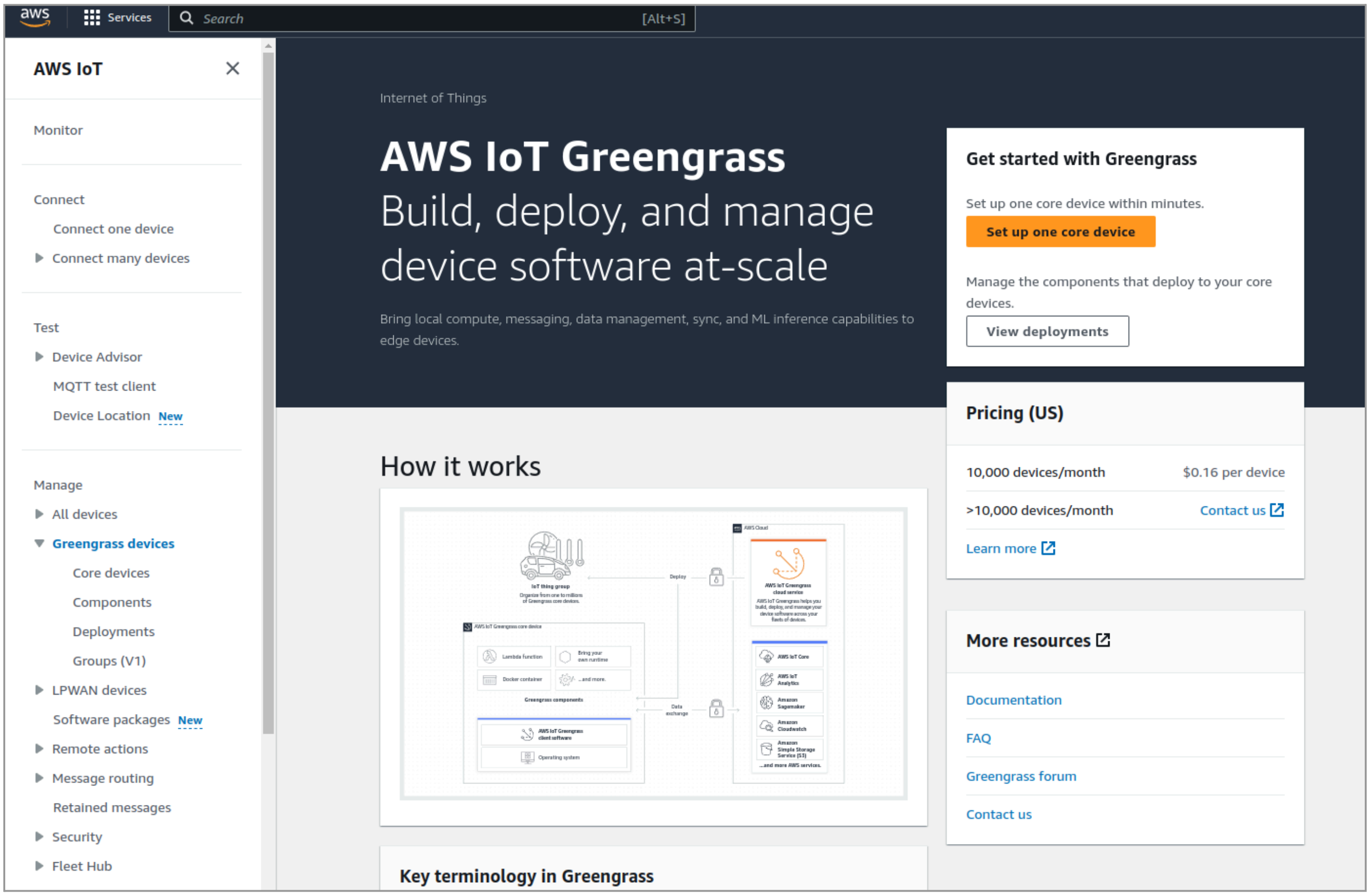
□ I understand the above recommendation and want to proceed to create an access key.

Next save the "Access Key" and "Secreat Access Key" . We will need this later while using greengrass CLI in KD240 console or downloading the csv file.

# Installing Greengrass CLI

Steps and scripts for installing greengrass device is provided by AWS Greengrass dashboard in AWS web console. So first access the AWS Greengrass IoT page, go to AWS Services -> Internet of Things -> IoT Greengrass link


Services
Search
[Alt+S]
Recently visited
Favorites
All services
Analytics
Application Integration
Blockchain
Business Applications
Cloud Financial Management
Compute
Containers
Customer Enablement
Database
Developer Tools
End User Computing
Front-end Web & Mobile
Game Development
Internet of Things
Machine Learning
Management & Governance
Media Services
Migration & Transfer
Networking & Content Delivery
Quantum Technologies
Internet of Things
IoT 1-Click
Trigger AWS Lambda functions from simple devices
IoT Analytics
Collect, preprocess, store, analyze and visualize data of IoT devices
IoT Core
Connect Devices to the Cloud
IoT Device Defender
Secure your fleet of connected IoT devices
IoT Device Management
Securely Manage Fleets as Small as One Device, or as Broad as Millions of Devices
IoT Events
Detect and respond to events from IoT sensors and Industrial IoT equipment
AWS IoT FleetWise
Easily collect, organize, and transfer vehicle data to the cloud at scale.
IoT Greengrass
Deploy and run code on your devices
IoT RoboRunner
Optimize robotics automation
IoT SiteWise
Data driven decisions in Industrial operations
IoT TwinMaker
Easily create digital twins of real-world systems to optimize operations



AWS IoT

Monitor

Connect
- Connect one device
- ▶ Connect many devices

Test
- ▶ Device Advisor
- MQTT test client
- Device Location New

Manage
- ▶ All devices
- ▼ Greengrass devices
  - Core devices
  - Components
  - Deployments
  - Groups (V1)
- ▶ LPWAN devices
- Software packages New
- ▶ Remote actions
- ▶ Message routing
- Retained messages
- ▶ Security
- ▶ Fleet Hub

Internet of Things

AWS IoT Greengrass

Build, deploy, and manage device software at-scale

Bring local compute, messaging, data management, sync, and ML inference capabilities to edge devices.

Get started with Greengrass

Set up one core device within minutes.

Set up one core device

Manage the components that deploy to your core devices.

View deployments

Pricing (US)

| | |
|---|---|
| 10,000 devices/month | $0.16 per device |
| >10,000 devices/month | Contact us |

Learn more

More resources

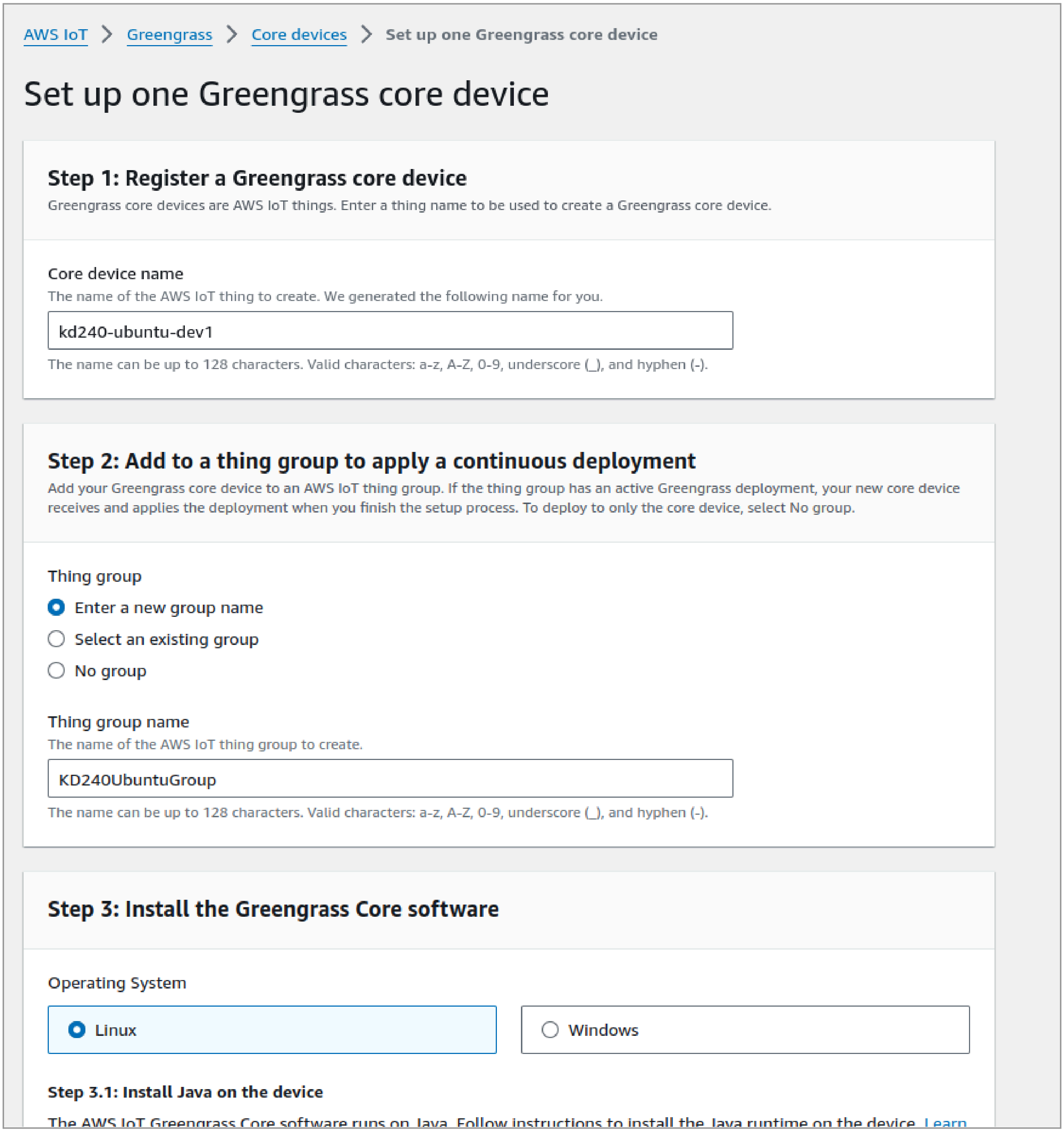
- Documentation
- FAQ
- Greengrass forum
- Contact us

How it works

IoT thing group
Organize from one to millions of Greengrass core devices.
Deploy
AWS Cloud
AWS IoT Greengrass cloud service
AWS IoT Greengrass helps you build, deploy, and manage your device software across your fleets of devices.
AWS IoT Greengrass core device
Lambda function
Bring your own runtime
Docker container
...and more.
Greengrass components
Data exchange
AWS IoT Greengrass client software
Operating system
AWS IoT Core
AWS IoT Analytics
Amazon Sagemaker
Amazon Cloudwatch
Amazon Simple Storage Service (S3)
...and more AWS services.

Key terminology in Greengrass

Now click on “Set up one core device” button
This will open the Greengrass core device setup page:
Here you change the Core device name like `kd240-ubuntu-dev1”
And set Group for KD240 group device.



AWS IoT > Greengrass > Core devices > Set up one Greengrass core device

Set up one Greengrass core device

Step 1: Register a Greengrass core device

Greengrass core devices are AWS IoT things. Enter a thing name to be used to create a Greengrass core device.

Core device name

The name of the AWS IoT thing to create. We generated the following name for you.

kd240-ubuntu-dev1

The name can be up to 128 characters. Valid characters: a-z, A-Z, 0-9, underscore (_), and hyphen (-).

Step 2: Add to a thing group to apply a continuous deployment

Add your Greengrass core device to an AWS IoT thing group. If the thing group has an active Greengrass deployment, your new core device receives and applies the deployment when you finish the setup process. To deploy to only the core device, select No group.

Thing group

● Enter a new group name

○ Select an existing group

○ No group

Thing group name

The name of the AWS IoT thing group to create.

KD240UbuntuGroup

The name can be up to 128 characters. Valid characters: a-z, A-Z, 0-9, underscore (_), and hyphen (-).

Step 3: Install the Greengrass Core software

Operating System

● Linux ○ Windows

Step 3.1: Install Java on the device

The AWS IoT Greengrass Core software runs on Java. Follow instructions to install the Java runtime on the device. Learn

Now in KD240 terminal console run following commands and scripts:

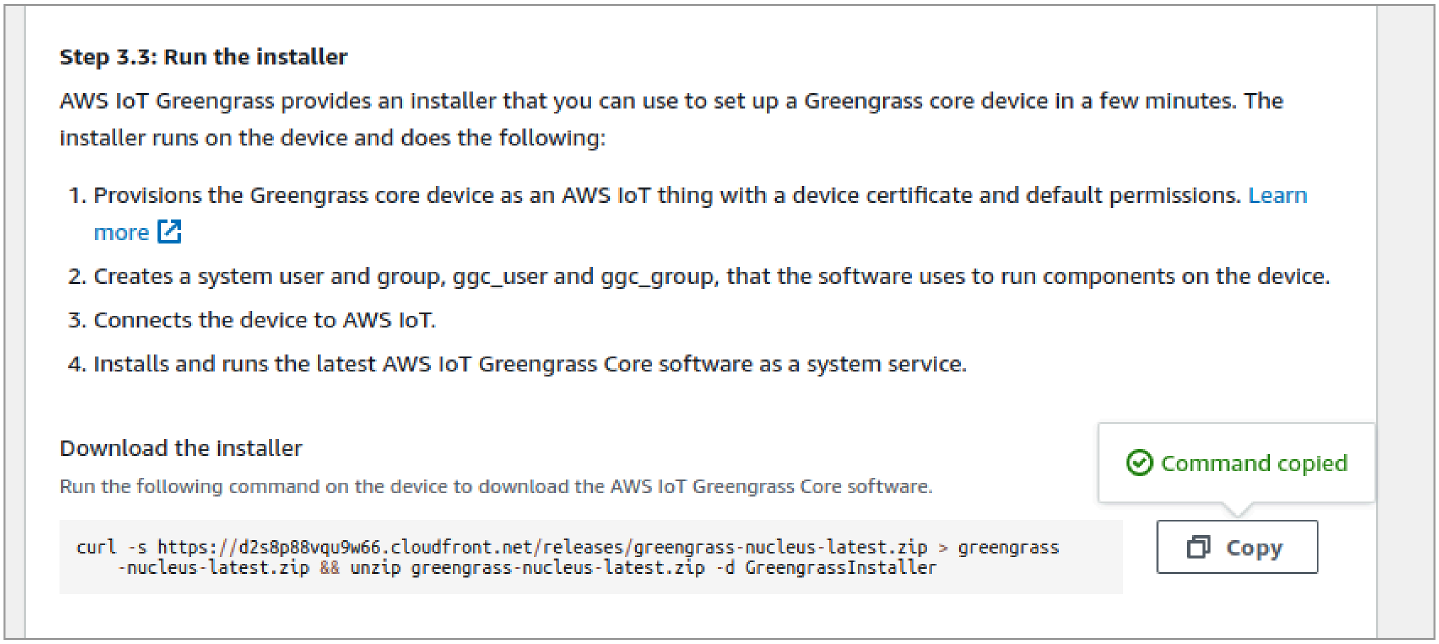
```
export AWS_ACCESS_KEY_ID=<AWS_ACCESS_KEY_ID>
export AWS_SECRET_ACCESS_KEY=<AWS_SECRET_ACCESS_KEY>
```

Greengrass CLI depends on Java. So to install the dependency run the following:

```
sudo apt install default-jre
sudo apt install default-jdk
sudo apt install unzip
```

Download and install Greengrass core software as instructed in AWS setup step 3.

```
curl -s https://d2s8p88vqu9w66.cloudfront.net/releases/greengrass-nucleus-latest.zip >
greengrass-nucleus-latest.zip && unzip greengrass-nucleus-latest.zip -d
GreengrassInstaller
```



**Step 3.3: Run the installer**

AWS IoT Greengrass provides an installer that you can use to set up a Greengrass core device in a few minutes. The installer runs on the device and does the following:

1. Provisions the Greengrass core device as an AWS IoT thing with a device certificate and default permissions. Learn more
2. Creates a system user and group, ggc_user and ggc_group, that the software uses to run components on the device.
3. Connects the device to AWS IoT.
4. Installs and runs the latest AWS IoT Greengrass Core software as a system service.

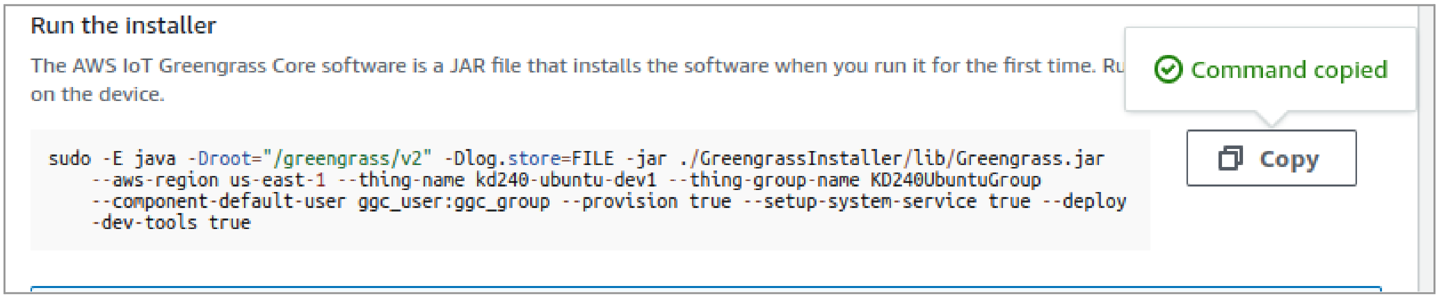
Download the installer

Run the following command on the device to download the AWS IoT Greengrass Core software.

```
curl -s https://d2s8p88vqu9w66.cloudfront.net/releases/greengrass-nucleus-latest.zip > greengrass
    -nucleus-latest.zip && unzip greengrass-nucleus-latest.zip -d GreengrassInstaller
```

Next install the Greengrass core device as instructed in AWS setup step 3.:

```
sudo -E java -Droot="/greengrass/v2" -Dlog.store=FILE -jar
./GreengrassInstaller/lib/Greengrass.jar --aws-region us-east-1 --thing-name
kd240-ubuntu-dev1 --thing-group-name KD240UbuntuGroup --component-default-user
ggc_user:ggc_group --provision true --setup-system-service true --deploy-dev-tools true
```

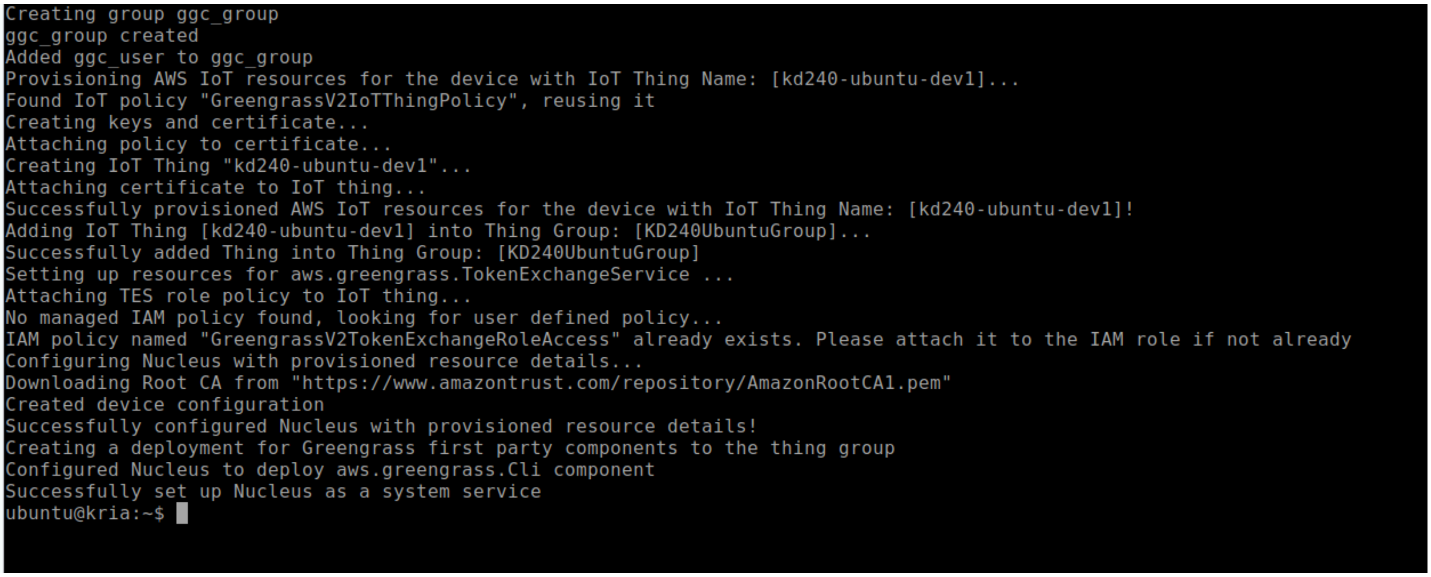


Run the installer

The AWS IoT Greengrass Core software is a JAR file that installs the software when you run it for the first time. Ru on the device.

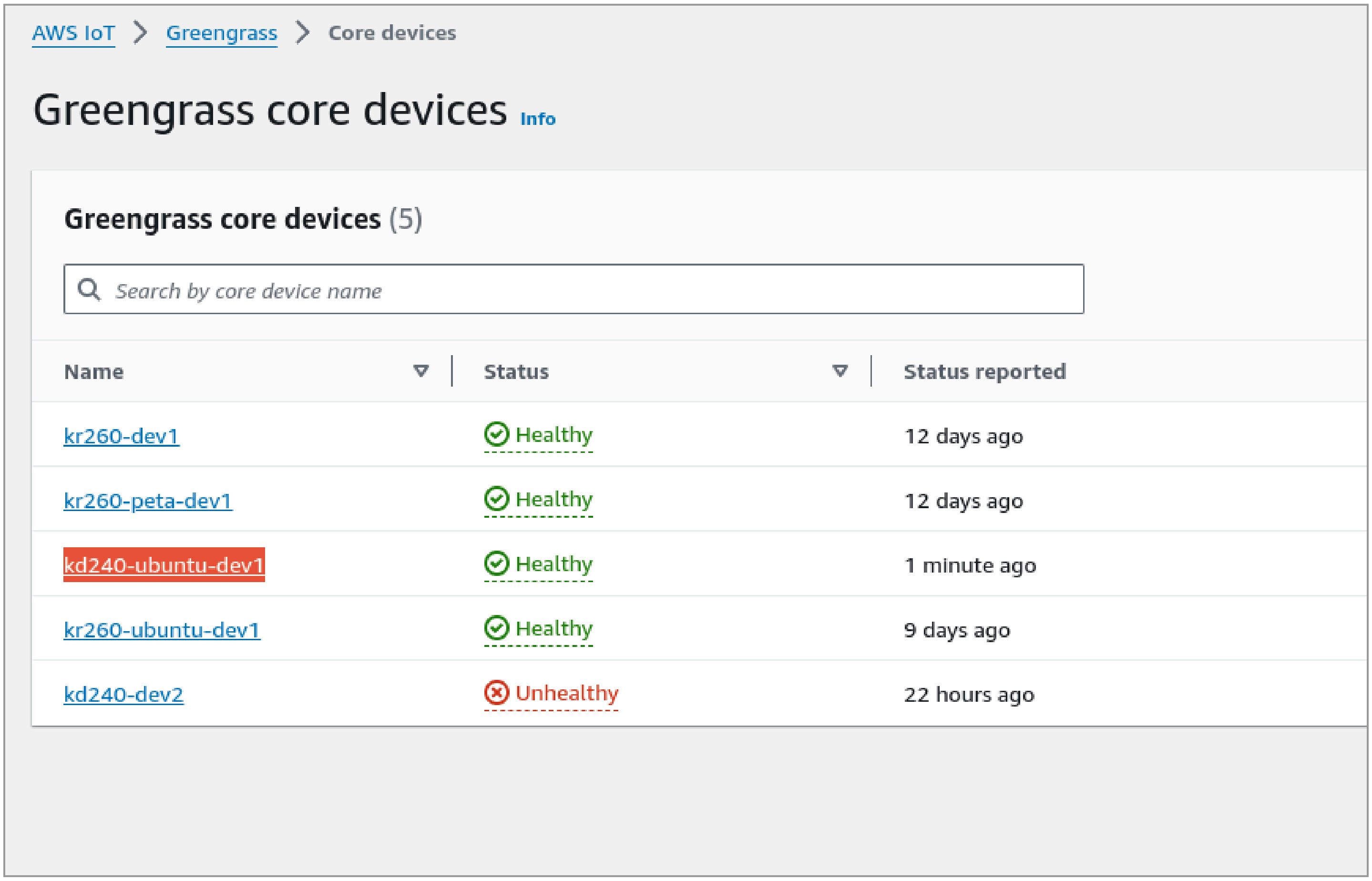
```
sudo -E java -Droot="/greengrass/v2" -Dlog.store=FILE -jar ./GreengrassInstaller/lib/Greengrass.jar
    --aws-region us-east-1 --thing-name kd240-ubuntu-dev1 --thing-group-name KD240UbuntuGroup
    --component-default-user ggc_user:ggc_group --provision true --setup-system-service true --deploy
    -dev-tools true
```

Here is the console log after running above command:



```
Creating group ggc_group
ggc_group created
Added ggc_user to ggc_group
Provisioning AWS IoT resources for the device with IoT Thing Name: [kd240-ubuntu-dev1]...
Found IoT policy "GreengrassV2IoTThingPolicy", reusing it
Creating keys and certificate...
Attaching policy to certificate...
Creating IoT Thing "kd240-ubuntu-dev1"...
Attaching certificate to IoT thing...
Successfully provisioned AWS IoT resources for the device with IoT Thing Name: [kd240-ubuntu-dev1]!
Adding IoT Thing [kd240-ubuntu-dev1] into Thing Group: [KD240UbuntuGroup]...
Successfully added Thing into Thing Group: [KD240UbuntuGroup]
Setting up resources for aws.greengrass.TokenExchangeService ...
Attaching TES role policy to IoT thing...
No managed IAM policy found, looking for user defined policy...
IAM policy named "GreengrassV2TokenExchangeRoleAccess" already exists. Please attach it to the IAM role if not already
Configuring Nucleus with provisioned resource details...
Downloading Root CA from "https://www.amazontrust.com/repository/AmazonRootCA1.pem"
Created device configuration
Successfully configured Nucleus with provisioned resource details!
Creating a deployment for Greengrass first party components to the thing group
Configured Nucleus to deploy aws.greengrass.Cli component
Successfully set up Nucleus as a system service
ubuntu@kria:~$
```

Now in Greengrass set up page, one can view the Greengrass core devices and find above `kd240-ubuntu-dev` in the list.



AWS IoT > Greengrass > Core devices

Greengrass core devices Info

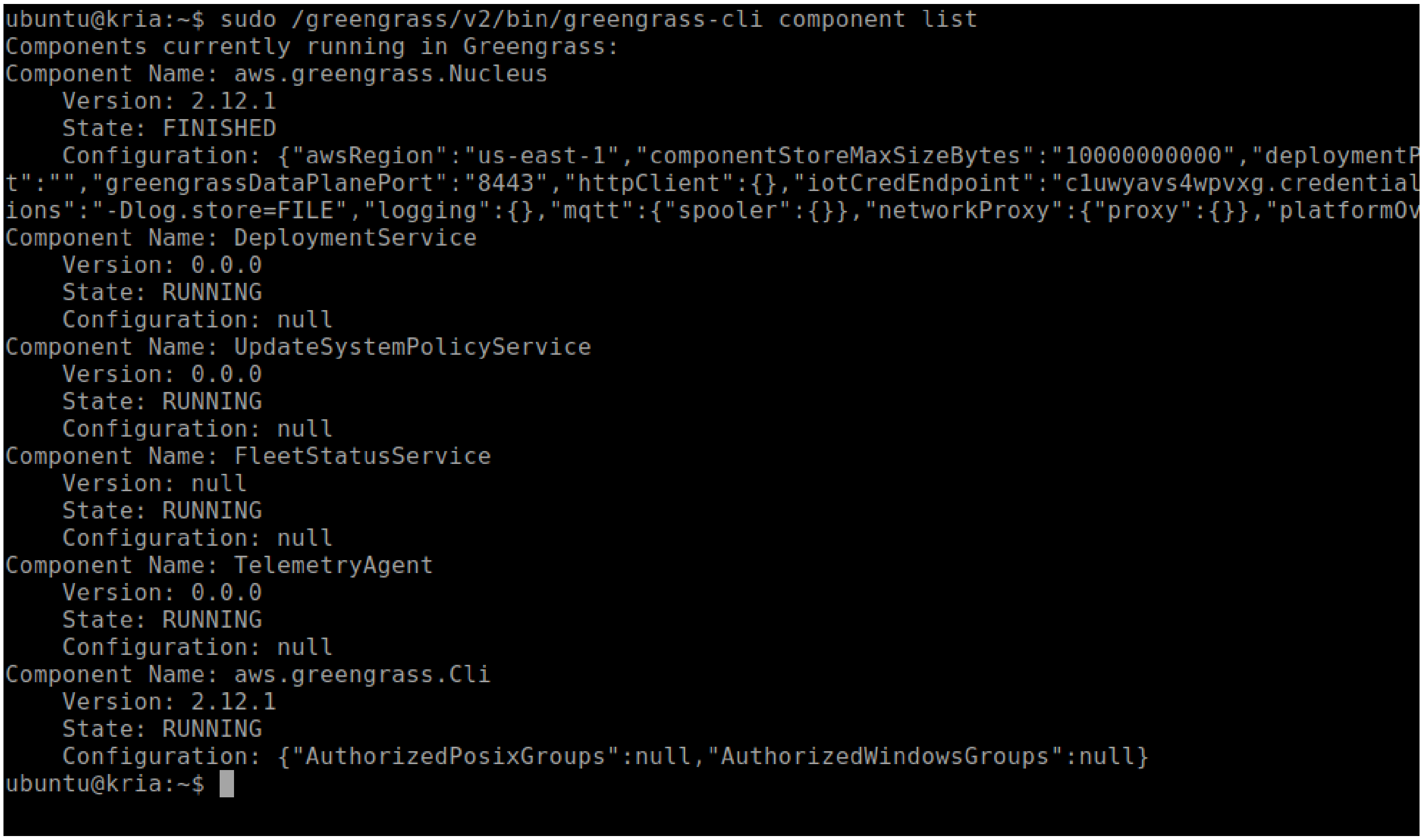
Greengrass core devices (5)

Search by core device name

| Name | Status | Status reported |
|---|---|---|
| kr260-dev1 | Healthy | 12 days ago |
| kr260-peta-dev1 | Healthy | 12 days ago |
| kd240-ubuntu-dev1 | Healthy | 1 minute ago |
| kr260-ubuntu-dev1 | Healthy | 9 days ago |
| kd240-dev2 | Unhealthy | 22 hours ago |

In KD240 terminal one can get the device components by using `greengrass-cli`:

```
sudo /greengrass/v2/bin/greengrass-cli component list
```



```
ubuntu@kria:~$ sudo /greengrass/v2/bin/greengrass-cli component list
Components currently running in Greengrass:
Component Name: aws.greengrass.Nucleus
    Version: 2.12.1
    State: FINISHED
    Configuration: {"awsRegion":"us-east-1","componentStoreMaxSizeBytes":"10000000000","deploymentP
t":"","greengrassDataPlanePort":"8443","httpClient":{},"iotCredEndpoint":"c1uwyavs4wpvxg.credential
ions":"-Dlog.store=FILE","logging":{},"mqtt":{"spooler":{}},"networkProxy":{"proxy":{}},"platformOv
Component Name: DeploymentService
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: UpdateSystemPolicyService
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: FleetStatusService
    Version: null
    State: RUNNING
    Configuration: null
Component Name: TelemetryAgent
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: aws.greengrass.Cli
    Version: 2.12.1
    State: RUNNING
    Configuration: {"AuthorizedPosixGroups":null,"AuthorizedWindowsGroups":null}
ubuntu@kria:~$
```

Next we will be adding component to publish and subscribe the topic to the AWS cloud Broker.

# Installing the component

Get the `components` folder and copy in the KD240 home directory.
It contains:

**Artifacts**

- com.example.mqtt
    - 1.0.0
        - mqtt.py (This python code published the data on button press and actuates gpio on receiving the data in subscribed topic)

**Recipe**

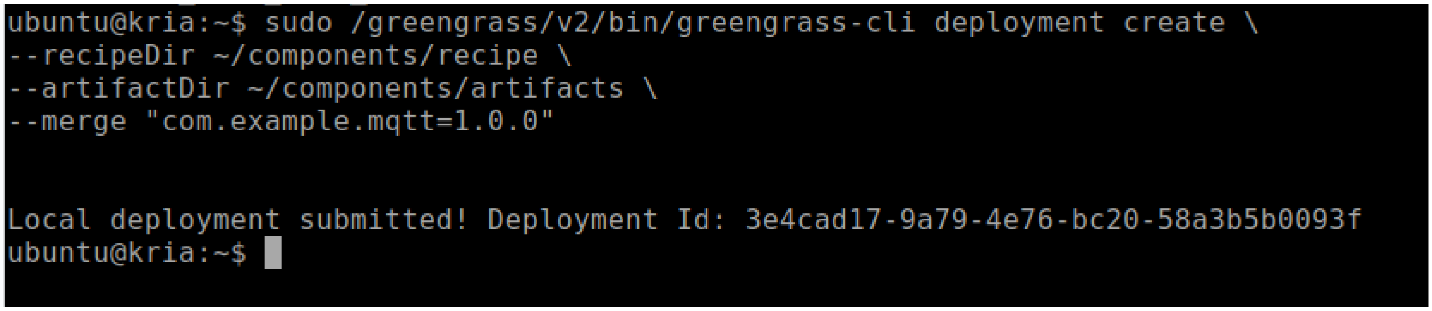
- com.example.mqtt-1.0.0.json

Before installing the component need install ‘python3-pip`

```
sudo apt install python3-pip
```

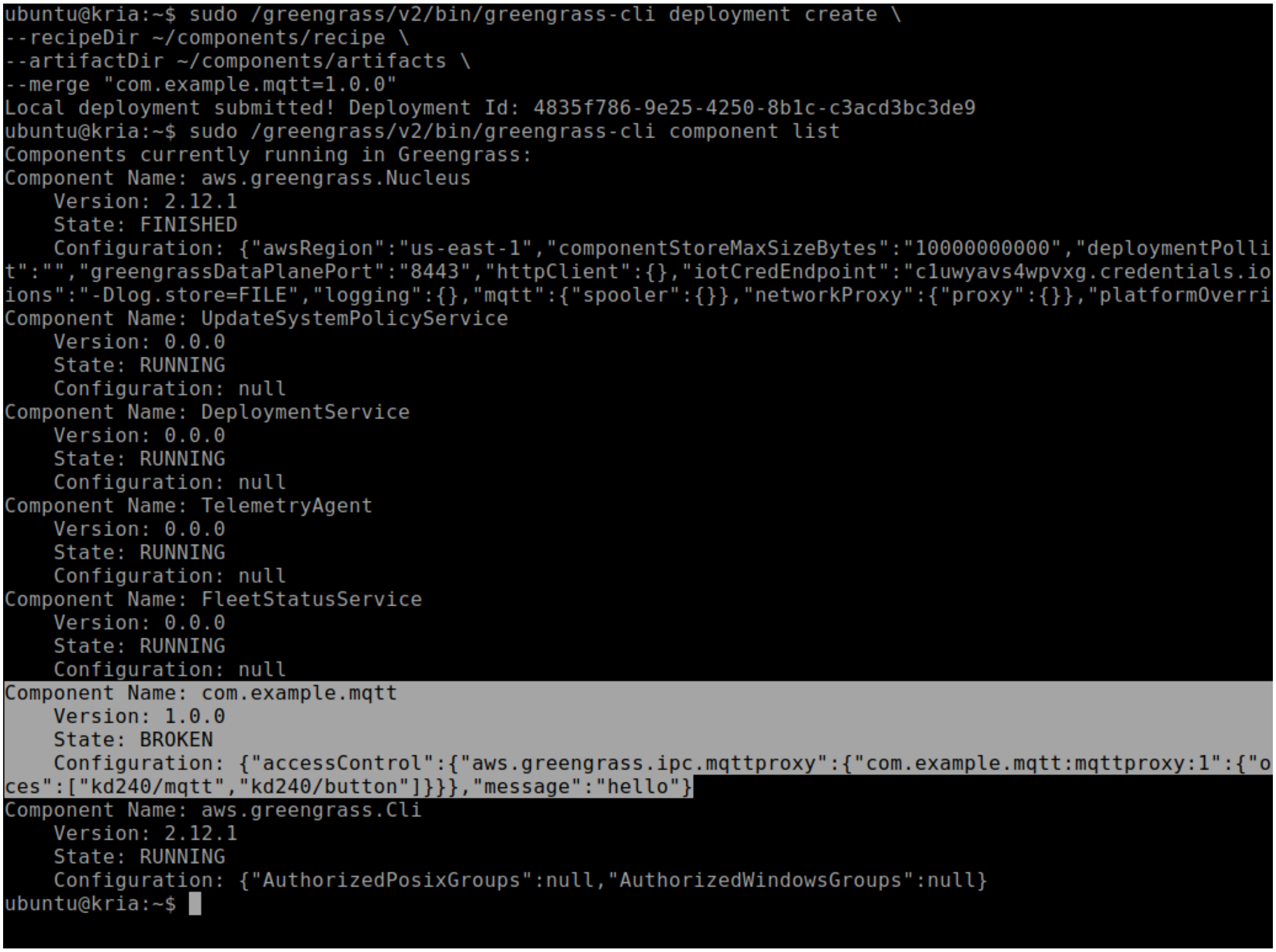
To install the above component run the following in the KD240 terminal:

```
sudo /greengrass/v2/bin/greengrass-cli deployment create \
--recipeDir ~/components/recipe \
--artifactDir ~/components/artifacts \
--merge "com.example.mqtt=1.0.0"
```



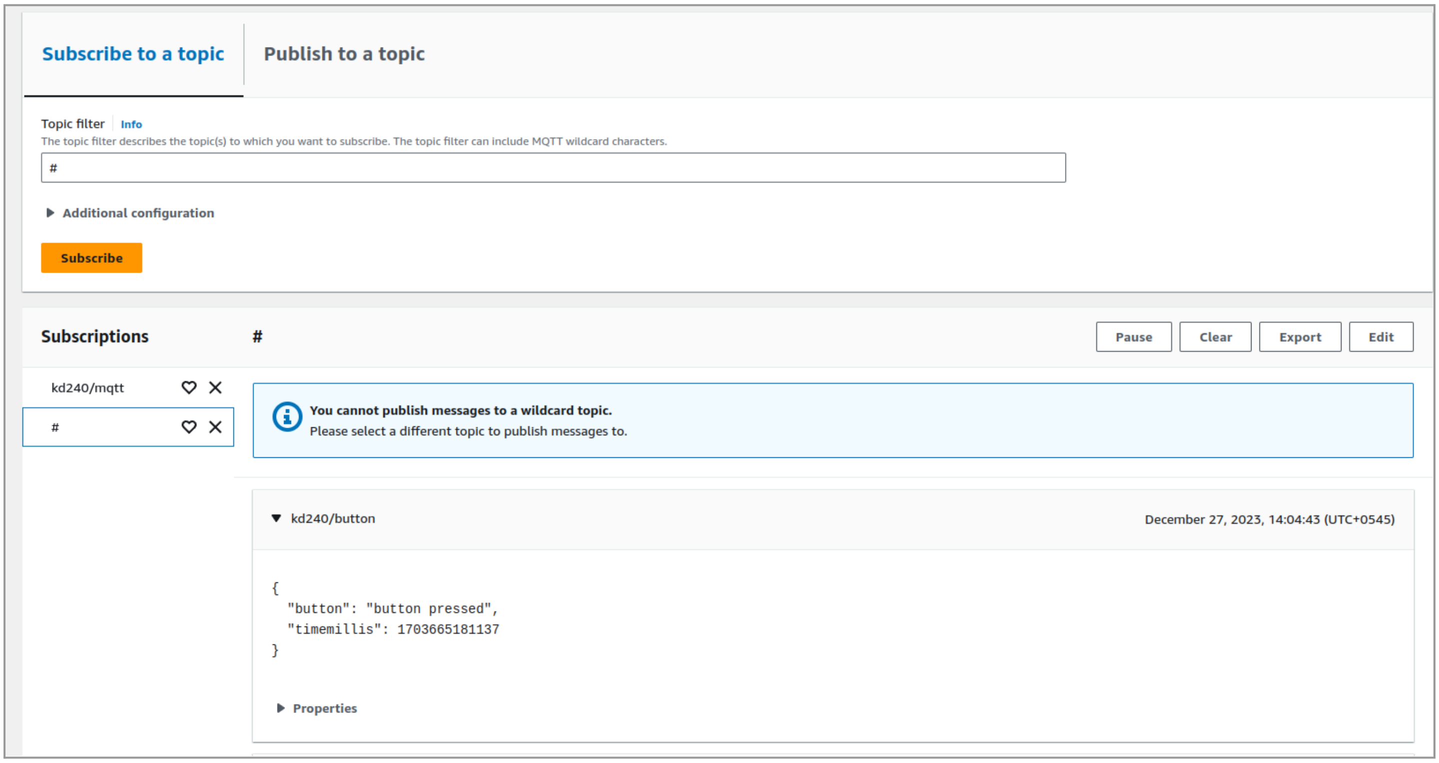
```
ubuntu@kria:~$ sudo /greengrass/v2/bin/greengrass-cli deployment create \
--recipeDir ~/components/recipe \
--artifactDir ~/components/artifacts \
--merge "com.example.mqtt=1.0.0"


Local deployment submitted! Deployment Id: 3e4cad17-9a79-4e76-bc20-58a3b5b0093f
ubuntu@kria:~$
```

Now check the installed component is in “running state”:



```
ubuntu@kria:~$ sudo /greengrass/v2/bin/greengrass-cli deployment create \
--recipeDir ~/components/recipe \
--artifactDir ~/components/artifacts \
--merge "com.example.mqtt=1.0.0"
Local deployment submitted! Deployment Id: 4835f786-9e25-4250-8b1c-c3acd3bc3de9
ubuntu@kria:~$ sudo /greengrass/v2/bin/greengrass-cli component list
Components currently running in Greengrass:
Component Name: aws.greengrass.Nucleus
    Version: 2.12.1
    State: FINISHED
    Configuration: {"awsRegion":"us-east-1","componentStoreMaxSizeBytes":"10000000000","deploymentPolli
t":"","greengrassDataPlanePort":"8443","httpClient":{},"iotCredEndpoint":"c1uwyavs4wpvxg.credentials.io
ions":"-Dlog.store=FILE","logging":{},"mqtt":{"spooler":{}},"networkProxy":{"proxy":{}},"platformOverri
Component Name: UpdateSystemPolicyService
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: DeploymentService
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: TelemetryAgent
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: FleetStatusService
    Version: 0.0.0
    State: RUNNING
    Configuration: null
Component Name: com.example.mqtt
    Version: 1.0.0
    State: BROKEN
    Configuration: {"accessControl":{"aws.greengrass.ipc.mqttproxy":{"com.example.mqtt:mqttproxy:1":{"o
ces":["kd240/mqtt","kd240/button"]}}},"message":"hello"}
Component Name: aws.greengrass.Cli
    Version: 2.12.1
    State: RUNNING
    Configuration: {"AuthorizedPosixGroups":null,"AuthorizedWindowsGroups":null}
ubuntu@kria:~$
```

Now in aws IoT console, open “MQTT test client” and subscribe to “#”



Topic filter
The topic filter describes the topic(s) to which you want to subscribe. The topic filter can include MQTT wildcard characters.
#

Subscriptions: kd240/mqtt, #

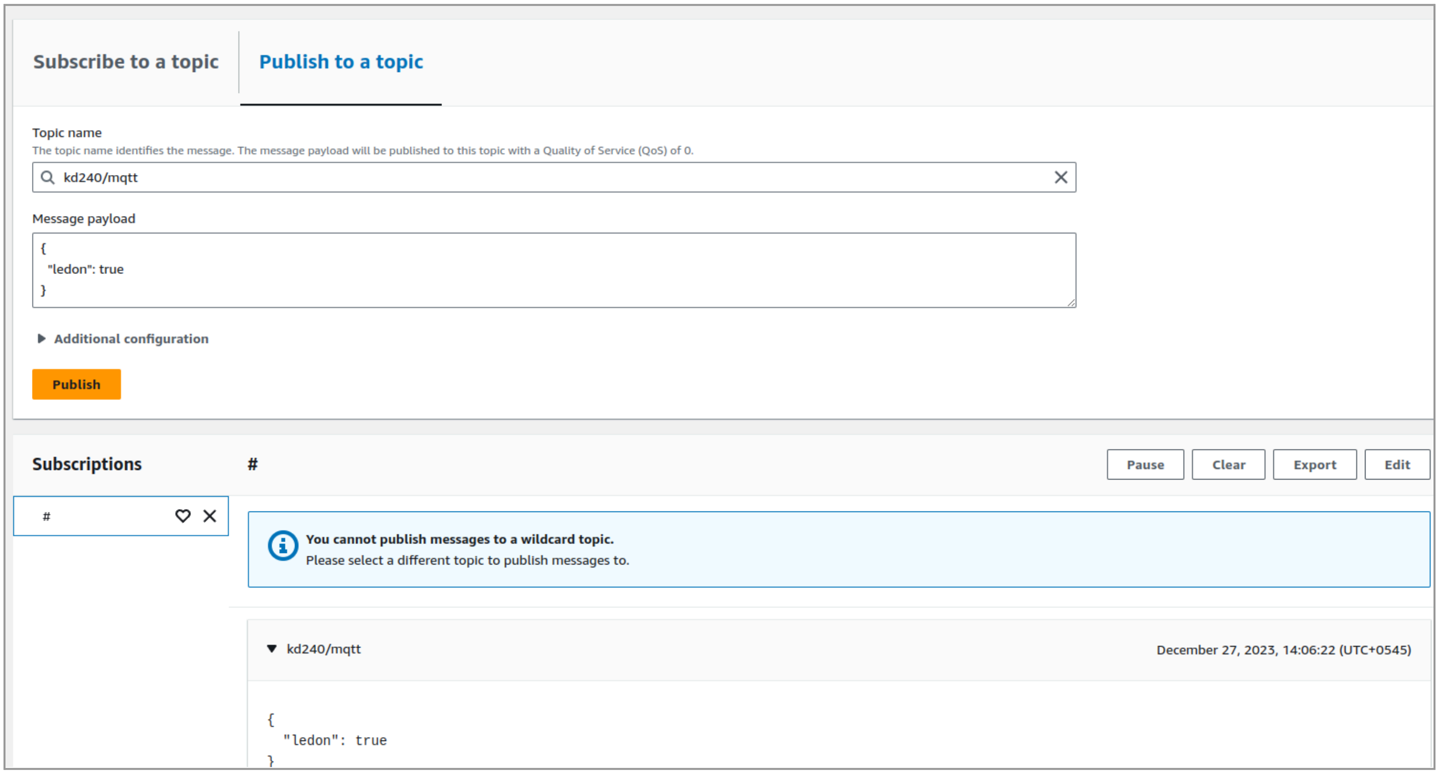
You cannot publish messages to a wildcard topic.
Please select a different topic to publish messages to.

kd240/button — December 27, 2023, 14:04:43 (UTC+0545)

```
{
  "button": "button pressed",
  "timemillis": 1703665181137
}
```

You can see the “button pressed” message once the button is pressed.

Now to control the LED, publish the message to “kd240/mqtt” topic. Here is the screenshot of the message which switch on the LED.



Topic name
The topic name identifies the message. The message payload will be published to this topic with a Quality of Service (QoS) of 0.
kd240/mqtt

Message payload

```
{
 "ledon": true
}
```

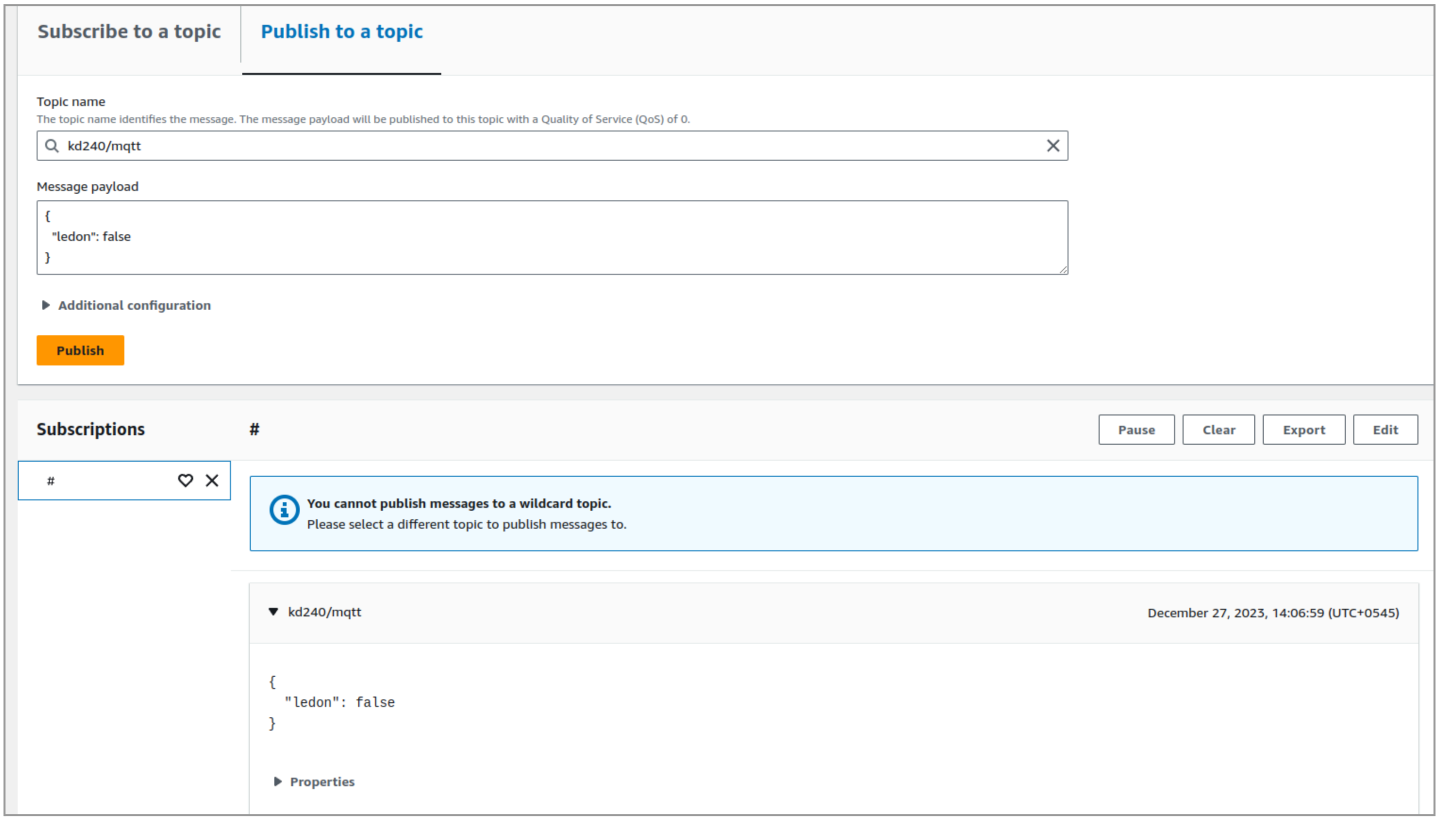
Subscriptions: #

You cannot publish messages to a wildcard topic.
Please select a different topic to publish messages to.

kd240/mqtt — December 27, 2023, 14:06:22 (UTC+0545)

```
{
  "ledon": true
}
```

Now to switch off the LED send “false” message in the “kd240/mqtt” topic.



Topic name

The topic name identifies the message. The message payload will be published to this topic with a Quality of Service (QoS) of 0.

kd240/mqtt

Message payload

```
{
  "ledon": false
}
```

**You cannot publish messages to a wildcard topic.**
Please select a different topic to publish messages to.

kd240/mqtt    December 27, 2023, 14:06:59 (UTC+0545)

```
{
  "ledon": false
}
```

***