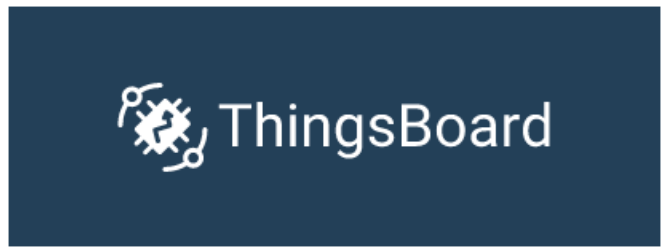


PLC KERNEL Monitoring with ThingsBoard PE Platform



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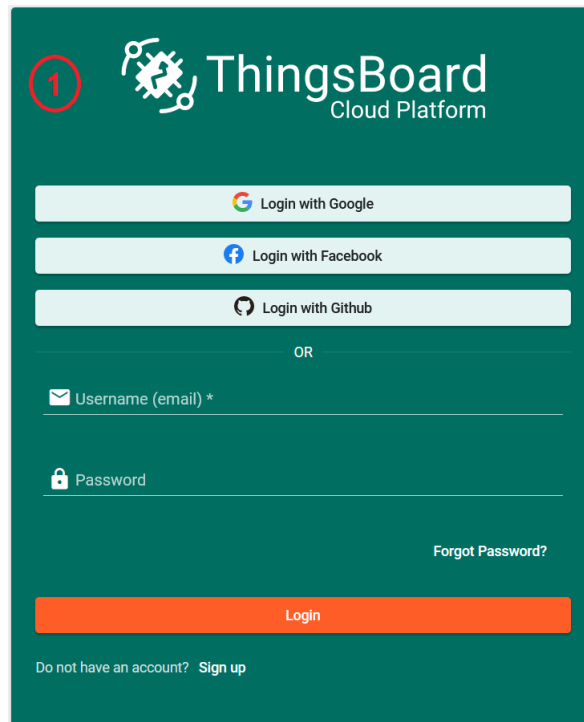
Introduction

This article contains instructions on how to configure ThingsBoard PE platform and connect KERNEL devices. [ThingsBoard PE platform](#) is an open-source IoT platform for data collection, processing, visualization, and device management. It enables device connectivity via industry standard MQTT protocol. ThingsBoard combines scalability, fault-tolerance and performance so you will never lose your data.

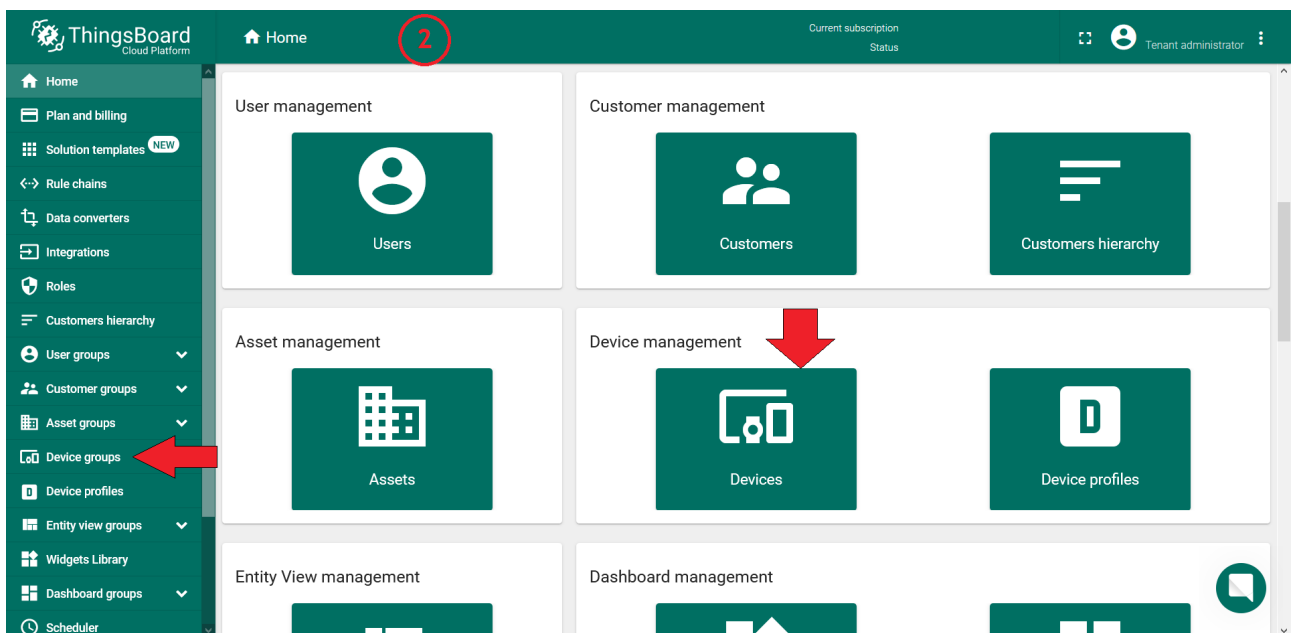
Step 1. Provision device

For simplicity, we will provision device manually using the UI.

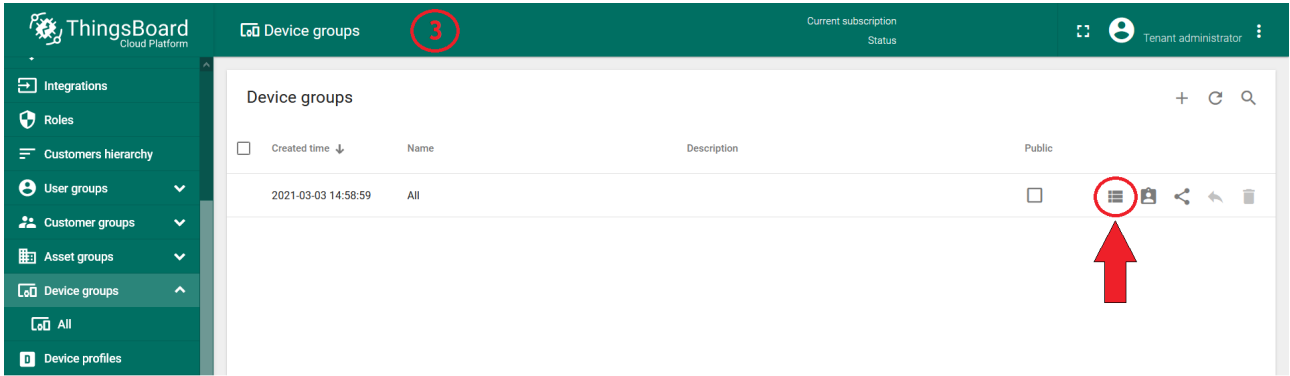
1. Login to your ThingsBoard instance.



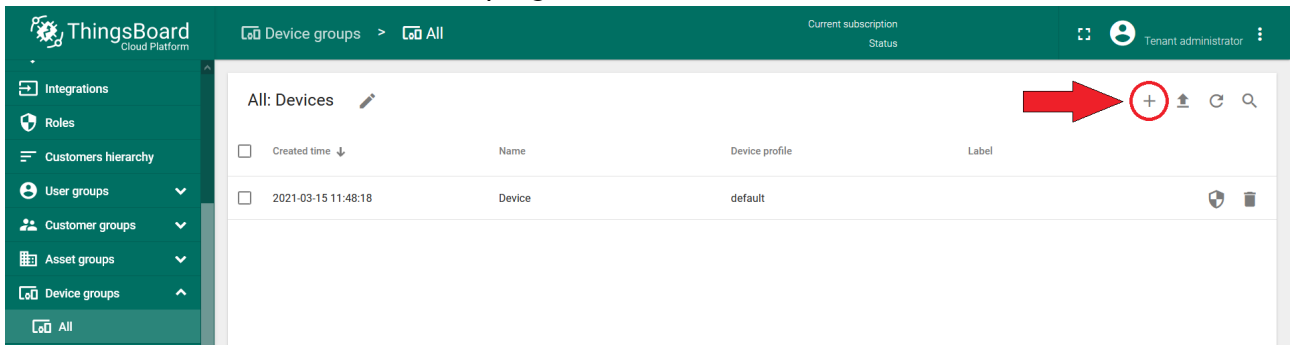
2. Open Device Groups page.



3. Navigate to default Device group "ALL".



4. Click on the "+" icon in the top right corner of the table and then select "Add Device".



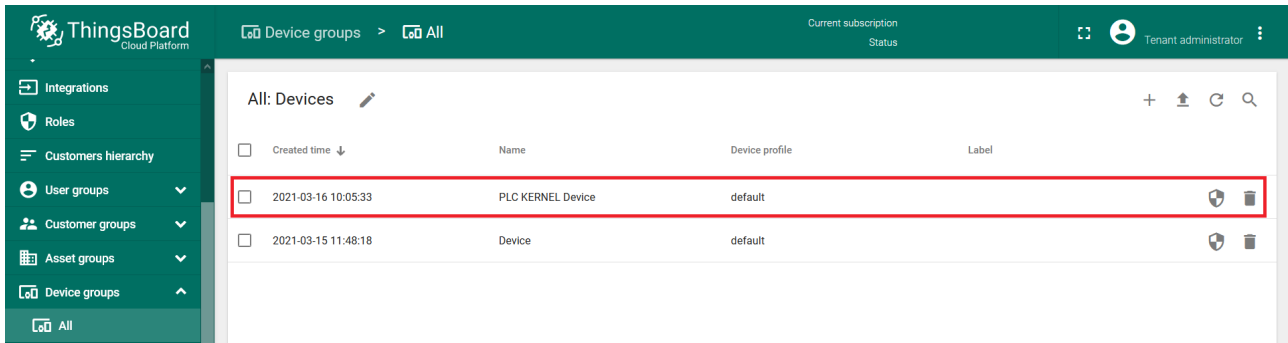
5. Input device name. For example, "My New Device". No other changes are required at this time. Click "Add" to add the device.

6. Now your device should be listed first, since the table sorts devices using the time of the creation by default.

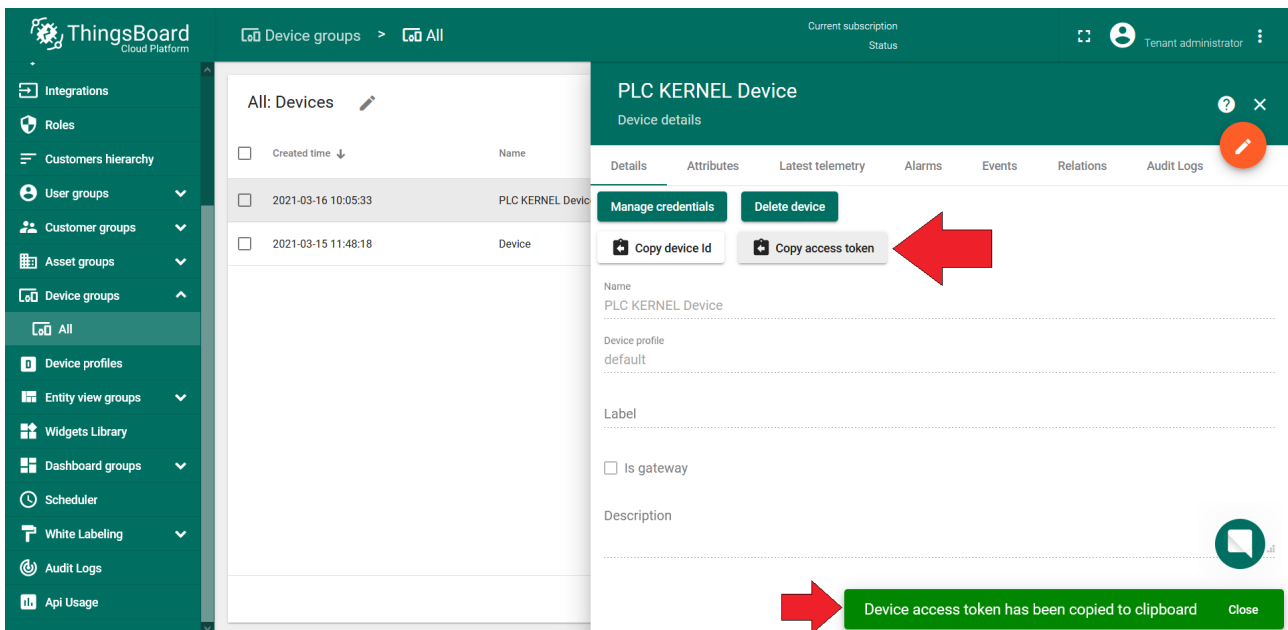
Step 2. Connect device

To connect the PLC KERNEL device you need to get the device credentials first. ThingsBoard supports various device credentials. We recommend using the default auto-generated credentials which is an access token for this guide.

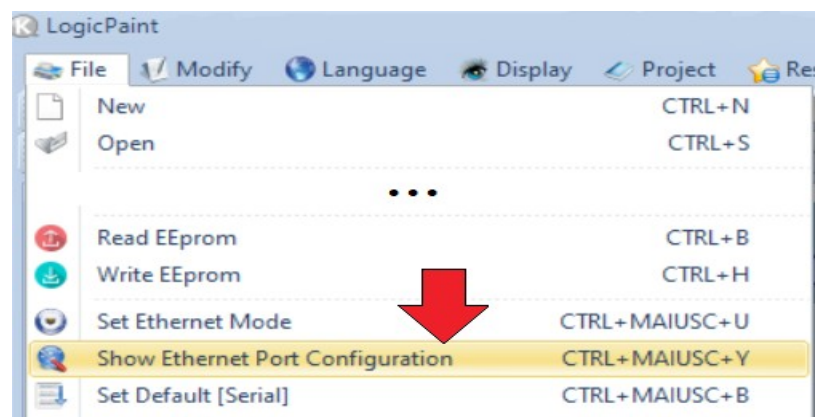
1. Click on the device row in the table to open device details;



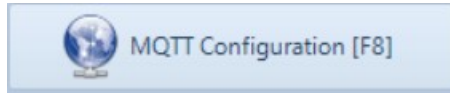
2. Click "Copy access token". Token will be copied to your clipboard. Save it to a safe place.



3. Open "LogicPaint".
4. Connect PLC KERNEL to PC (via Serial).
5. Open menu "File" >> "Show Ethernet Port Configuration" --->



6. Press the button “MQTT Configuration” :



7. Paste the copied access token into the indicated box :

The screenshot shows the MQTT Configuration window with the following settings:

- IP Address: 35.169.110.146
- Port: 1883
- Client: (empty)
- Access Token: (indicated by a red arrow)
- Password: (empty)
- Topic: v1/devices/me/telemetry
- Subscribe: v1/devices/me/rpc/request/+
- Response: (empty)
- Timer [sec]: 600
- KeepAlive [s]: 60
- Time Zone: Europe/Rome
- Slot Settings:
 - Text: temperature
 - Data: DATA, 1000
 - Timer: DATA, 1100
 - Log Timer: 10
 - Log Timer = 0 >> The SLOT is updated only when it changes value!
 - Digits: 3
 - Dec. Digits: 1
 - Dimensione: WORD_WIDE

Enter the following fields :

MQTT Configuration	
IP Address	35.169.110.146
Port	1883
Client	x
Access Token	Copied Access Token
Password	x
Topic	v1/devices/me/telemetry
Subscribe	v1/devices/me/rpc/request/+
Response	x
Timer [sec]	600
Keepalive [s]	60
Time Zone	Europe/Rome

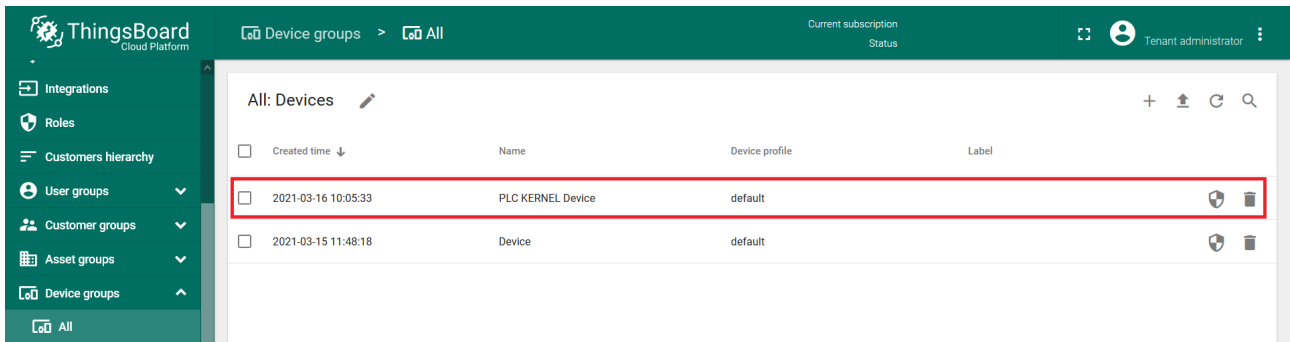
8. Add a slot for each value that needs to be monitored :

SLOT Settings	
Text	Description of the monitored data (For example: "temperature")
DATA	Number of DATA sent to be monitored
Timer	Number of DATA that contains : Time interval for sending data
Log Timer	Log Timer = 0 >> The SLOT is updated only when it changes value
Digits	Digits of the data sent
Dec.Digits	Decimal digits of the data sent
Dimension	WORD_WIDE = 16 Bits LONG_WIDE = 32 Bits BOOL_WIDE = True / False

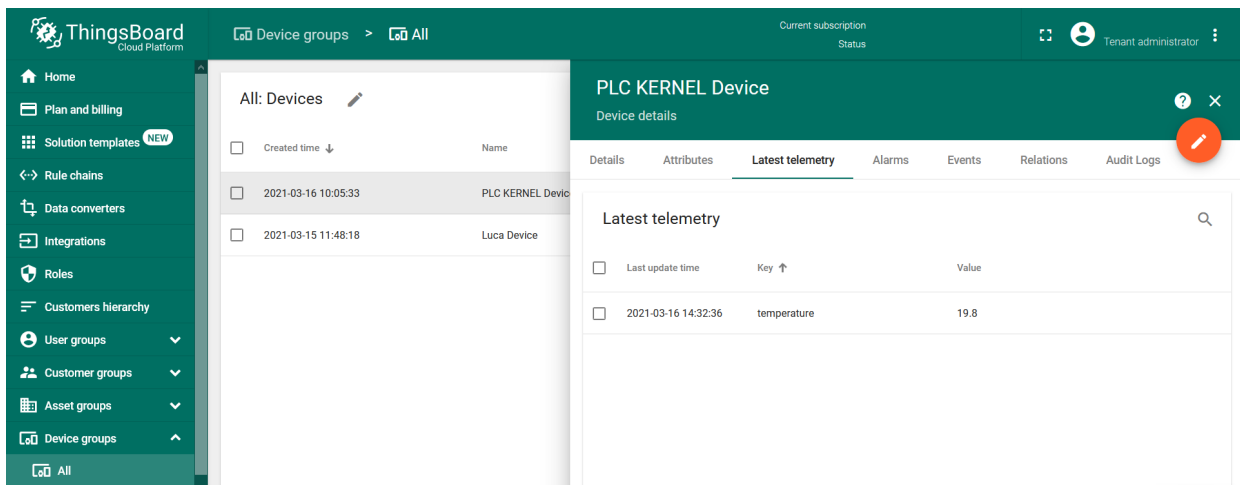
9. Close the 2 open windows with the CLOSE button.

10. Finally compile and send the application to the KERNEL PLC with the "Compile + Send Application" button.

11. Once you have successfully published the "temperature" readings, you should immediately see them in the Device Telemetry Tab.
Click on the device row in the table to open device details :



12. Navigate to the "Latest telemetry" tab :



Step 3. Create dashboard

We will create a dashboard to add the most popular widgets. See instructions below.

Step 3.1 Create an empty dashboard

- Open Dashboard Groups page. Open default dashboard group “**All**”. Click on the “+” icon in the top right corner to create a new dashboard.
- Input dashboard name. For example, “**My New Dashboard**”. Click “**Add**” to add the dashboard.
- Now your dashboard should be listed first, since the table sorts dashboards using the time of the creation by default. Click on the “**Open dashboard**” icon.

Step 3.2 Add entity alias

Alias is a reference to a single entity or a group of entities that are used in the widgets. Alias may be static or dynamic. For simplicity, we will use “**Single entity**” alias reference the one and only entity (“**PLC KERNEL Device**” in our case). It is possible to configure an alias that references multiple devices. For example, devices of a certain type or related to a certain asset. You may learn more about different aliases [here](#).

- Enter edit mode. Click on the pencil button in the bottom right corner.
- Click “**Entity Aliases**” icon in the top right part of the screen. You will see an empty list of Entity aliases.
- Click “**Add alias**”.
- Input alias name, for example “**MyDevice**”. Select “**Single entity**” Filter type. Select “**Device**” as Type and type “**My New**” to enable autocomplete. Choose your device from the auto-complete and click on the needed device.
- Click “**Add**” and then “**Save**”.
- Finally, Click “**Apply changes**” in the dashboard editor to save the changes. Then you should enter edit mode again.

Step 3.3 Add table widget

To add the table widget we need to select it from the widget library. Widgets are grouped into widget bundles. Each widget has a data source. This is how the widget “**knows**” what data to display. To see the latest value of our “**temperature**” data that we sent during step 2, we should configure the data source.

- Enter edit mode. Click on the “**Add new widget**” button.
- Select “**Cards**” widget bundle. Select “**Latest values**” tab. Click on the header of the Entities widget. The “**Add Widget**” window will appear.

- Click **"Add"** to add the data source. Widget may have multiple data sources, but we will use only one in this case.
- Select **"MyDevice"** entity alias. Then click on the input field to the right. The auto-complete with available data points will appear. Select **"temperature"** data point and click **"Add"**.
- Resize the widget to make it a little bigger. Just drag the bottom right corner of the widget. You can also play with the advanced settings if you want to edit the widget.

Step 3.4 Add chart widget

To add the chart widget we need to select it from the widget library. Chart widget displays multiple historical values of the same data key ("**temperature**" in our case). We should also configure the time window to use the chart widget.

- Enter Edit mode.
- Click **"Add new widget"** icon in the bottom right corner of the screen.
- Click **"Create new widget"** icon.
- Select **"Charts"** bundle. Scroll down and click on the **"Timeseries - Flot"** chart widget.
- Click **"Add datasource"** button.
- Select **"MyDevice"** Alias. Select **"temperature"** key. Click **"Add"**.
- Drag and Drop you widget to desired space. Resize the widget. Apply changes.
- Publish different telemetry values multiple times Step 2. Note that the widget displays only one minute of data by default.
- Enter Edit mode. Open time selection window. Change the interval and aggregation function. Update the time window and apply changes.