

LAB 6: THINGS BOARD AND NODE RED

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THINGSBOARD

- Open-source IoT Platform
- Device management, data collection, processing and visualization for your IoT solution

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP and HTTP and supports both cloud and on-premises deployments.
- ThingsBoard combines scalability, fault-tolerance and performance so you will never lose your data.

Node-RED interface showing the "User Settings" dialog box. The browser address bar displays "127.0.0.1:1880/#flow/3cf47ffb.624ea".

The "User Settings" dialog box is open, displaying the "Nodes" tab. The search bar contains "node-red-contrib-datakitjs". The results show a node named "node-red-contrib-datakitjs" with a description: "A node-red node to perform simple data analysis on a flow." and version "0.2.1". An "install" button is visible next to the node name.

The left sidebar shows the "common" and "function" node palettes. The right sidebar shows the "info" panel with a search bar and a list of flows, including "Form IoT Domain", "Flow 33", "Flow 36", "Homer Dashboard", "ThingBoard", "Flow 38", "Flow 39", "Weather Report Open Weather", and "Flow 37". The "Flow 37" is selected, showing its ID "3cf47ffb.624ea".

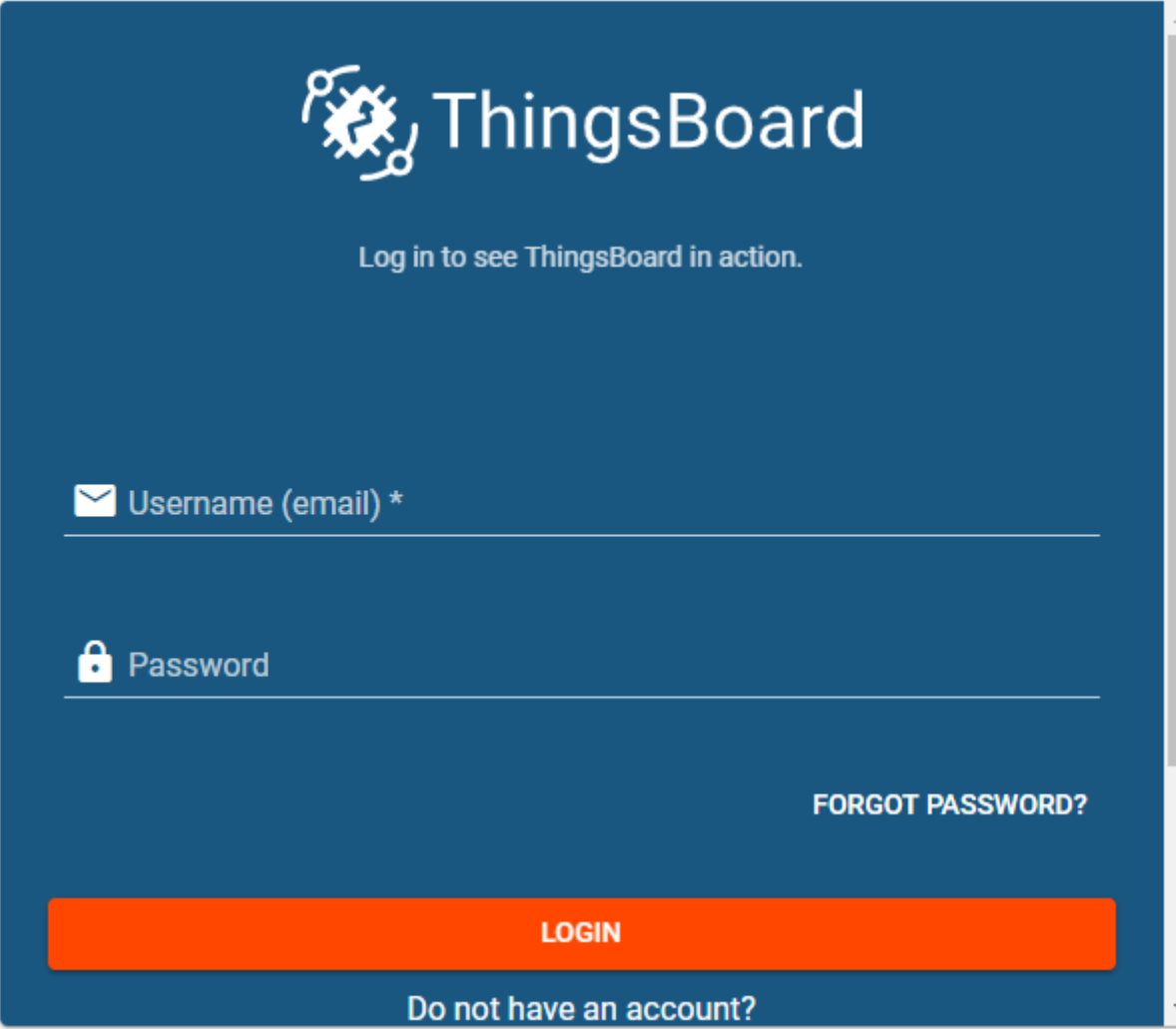
The bottom status bar shows the time "3:26 PM" and date "3/15/2021".


THINGSBOARD

- Used for data collection, processing, visualization and device management.
- Holds standard IoT protocols like CoAP, MQTT and HTTP.
- Life cycle based on life cycle events, REST API events and RPC requests.


LOGIN


[[HTTPS://DEMO.THINGSBOARD.IO/LOGIN](https://demo.thingsboard.io/login)]

The image shows a screenshot of the ThingsBoard login page. The page has a dark blue background. At the top, there is a white logo consisting of a gear with a person inside, followed by the text "ThingsBoard". Below the logo, it says "Log in to see ThingsBoard in action." There are two input fields: the first is labeled "Username (email) *" with an envelope icon, and the second is labeled "Password" with a lock icon. To the right of the password field, there is a link that says "FORGOT PASSWORD?". At the bottom, there is a large orange button labeled "LOGIN". Below the button, it says "Do not have an account?".

 ThingsBoard

Log in to see ThingsBoard in action.

 Username (email) *

 Password

[FORGOT PASSWORD?](#)

LOGIN

[Do not have an account?](#)

 HOME RULE CHAINS CUSTOMERS ASSETS DEVICES ENTITY VIEWS WIDGETS LIBRARY DASHBOARDS AUDIT LOGS

Rules management



RULE CHAINS

Customer management



CUSTOMERS

Asset management

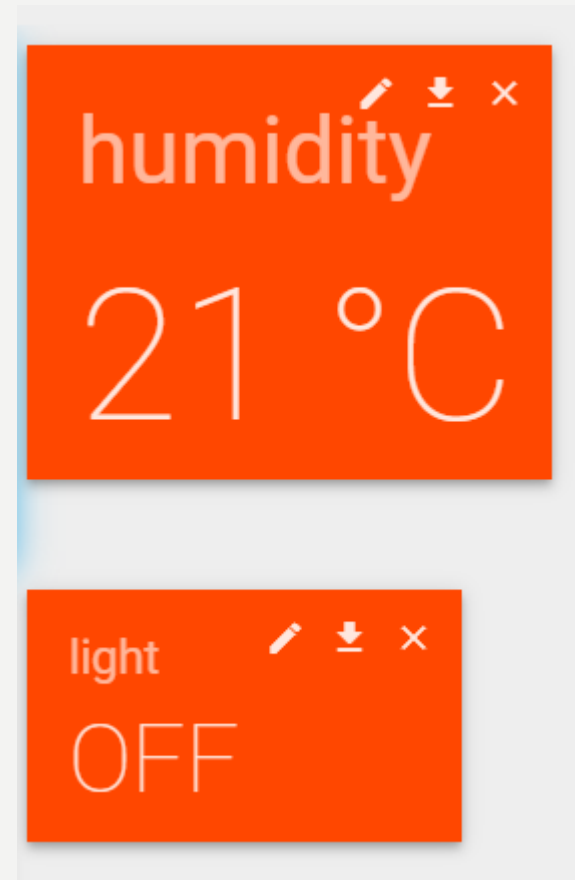
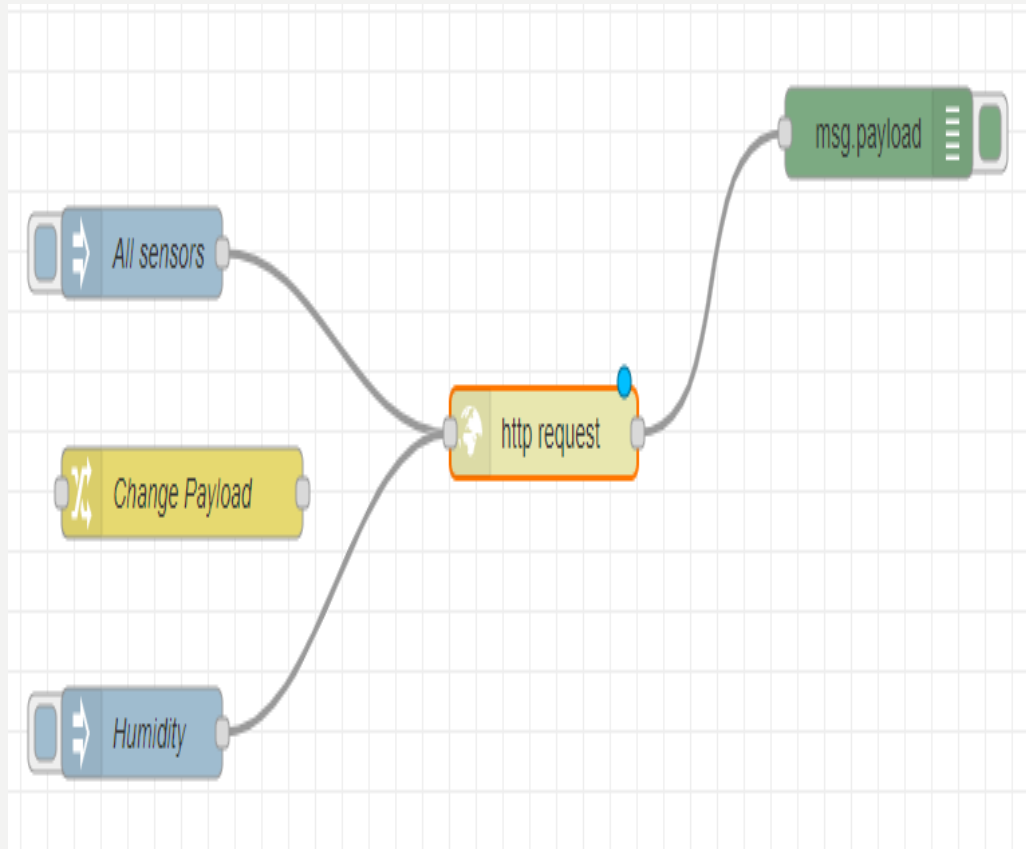


ASSETS

Device management

Entity View management

CONNECTING NODE-RED & THINGSBOARD




PROCESS OVERVIEW

- Create device or devices
- Assign device to Widget
- Assign Widget to Dashboard
- Add new widgets and edit as necessary





DEVICE CREATION

DEVICE CREATION

 ThingsBoard

Devices

  Usharani Shola
Tenant administrator

Add Device

HOME

RULE CHAINS

CUSTOMERS

ASSETS













DEVICES

ENTITY VIEWS

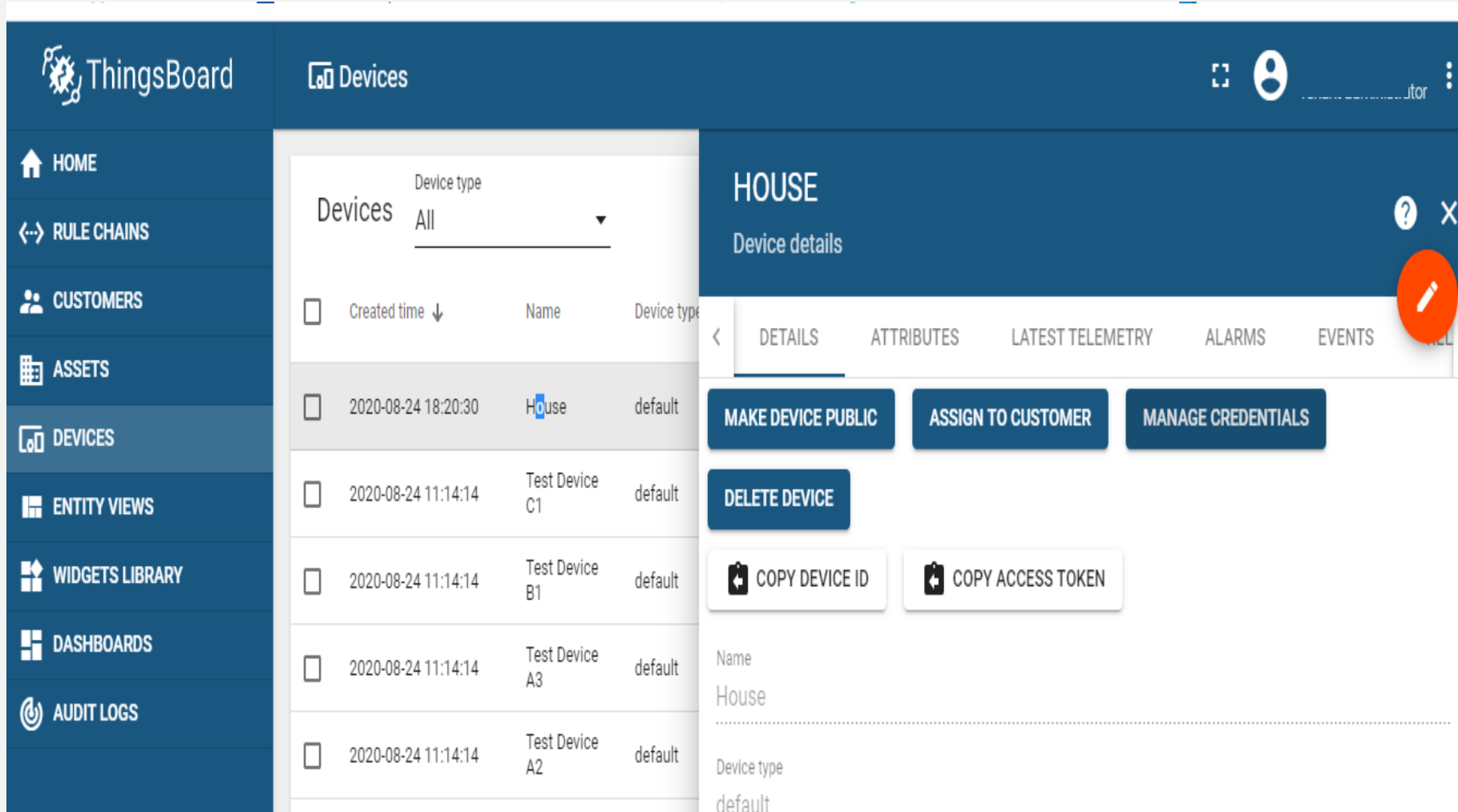
Devices

Device type
All

+ ↺ 🔍

| <input type="checkbox"/> | Created time ↓ | Name | Device type | Label | Customer | Public | Is gateway | |
|--------------------------|---------------------|-------------|-------------|-------|----------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | 2020-09-01 15:22:19 | Temperature | default | | | <input type="checkbox"/> | <input type="checkbox"/> |       |
| <input type="checkbox"/> | 2020-08-24 18:20:30 | House | default | | | <input type="checkbox"/> | <input type="checkbox"/> |       |

GETTING ACCESS KEY



The screenshot displays the ThingsBoard web interface. On the left is a dark blue sidebar with navigation links: HOME, RULE CHAINS, CUSTOMERS, ASSETS, DEVICES (highlighted), ENTITY VIEWS, WIDGETS LIBRARY, DASHBOARDS, and AUDIT LOGS. The main content area has a top header with the ThingsBoard logo, 'Devices' tab, and user profile. Below this is a 'Devices' table with columns for checkboxes, 'Created time', 'Name', and 'Device type'. The table lists several devices, with 'House' selected. To the right of the table is a 'HOUSE' device details panel. This panel has tabs for DETAILS, ATTRIBUTES, LATEST TELEMETRY, ALARMS, and EVENTS. Under the DETAILS tab, there are buttons for 'MAKE DEVICE PUBLIC', 'ASSIGN TO CUSTOMER', 'MANAGE CREDENTIALS', and 'DELETE DEVICE'. Below these are two buttons: 'COPY DEVICE ID' and 'COPY ACCESS TOKEN'. The 'COPY ACCESS TOKEN' button is highlighted with a red circle. At the bottom of the details panel, there are input fields for 'Name' (containing 'House') and 'Device type' (containing 'default').

| | Created time ↓ | Name | Device type |
|--------------------------|---------------------|----------------|-------------|
| <input type="checkbox"/> | 2020-08-24 18:20:30 | House | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device C1 | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device B1 | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device A3 | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device A2 | default |

HOUSE
Device details

DETAILS | ATTRIBUTES | LATEST TELEMETRY | ALARMS | EVENTS

MAKE DEVICE PUBLIC | ASSIGN TO CUSTOMER | MANAGE CREDENTIALS

DELETE DEVICE

COPY DEVICE ID | COPY ACCESS TOKEN

Name
House

Device type
default

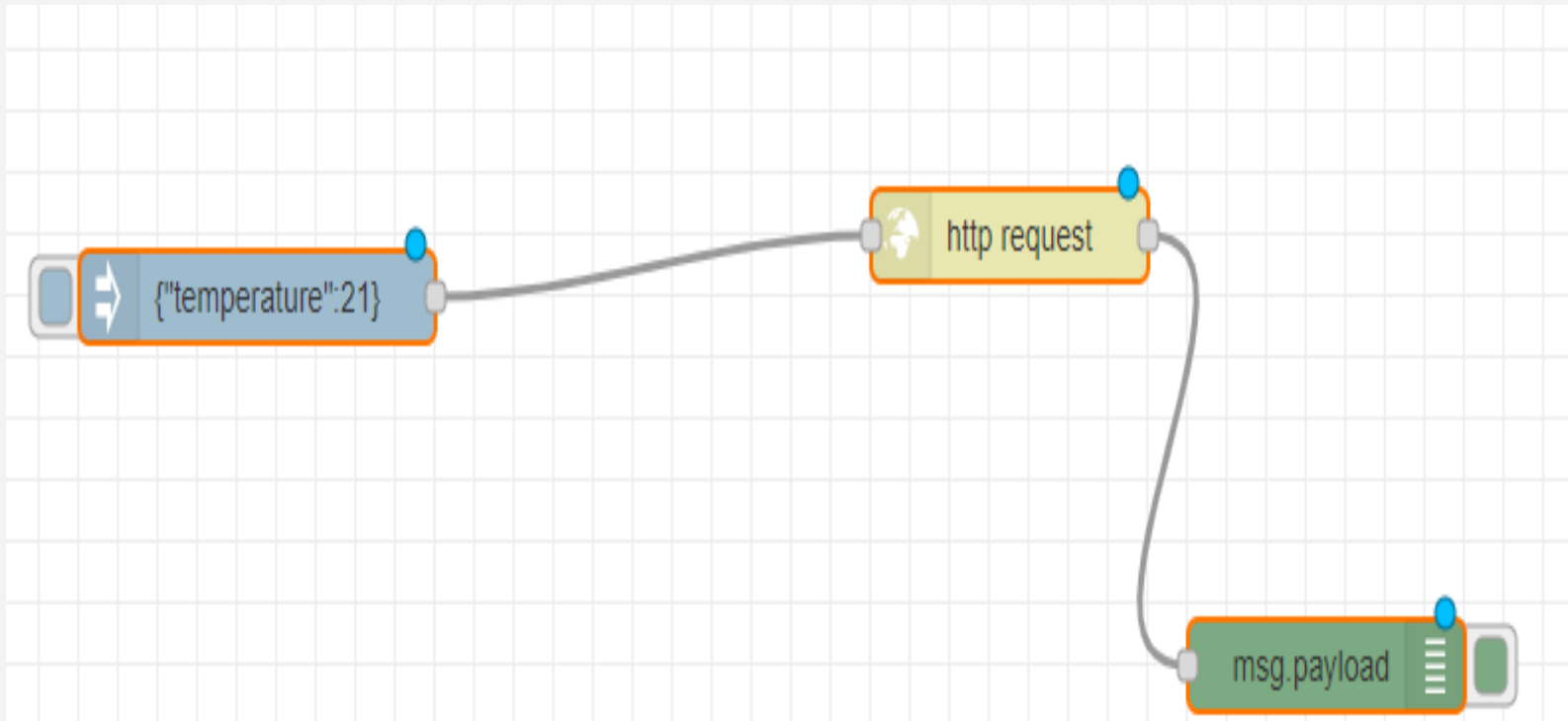
COPYING THE ACCESS KEY

The image shows a web interface for managing devices. On the left, a list of devices includes 'DHT22', 'House', and 'old Hou'. The 'House' device is selected, and its details are shown in a modal. The modal has tabs for 'DETAILS', 'ATTRIBUTES', 'LATEST TELEMETRY', and 'EVENTS'. Under the 'DETAILS' tab, there are buttons for 'MAKE DEVICE PUBLIC', 'ASSIGN TO CUSTOMER', 'MANAGE CREDENTIALS', and 'DELETE DEVICE'. Below these are two buttons: 'COPY DEVICE ID' and 'COPY ACCESS TOKEN'. A red dashed arrow points from the 'House' device in the list to the 'DETAILS' tab. Another red dashed arrow points from the 'COPY ACCESS TOKEN' button to the 'Device Credentials' modal on the right. A third red dashed arrow points from the 'MANAGE CREDENTIALS' button to the same modal. The 'Device Credentials' modal shows the 'Access token' as 'IzP4G...A30AeQJF'. A red arrow points from the text 'Need to copy this' to the access token. Red text annotations include 'click here to display properties' pointing to the 'House' device, and 'Click to copy the acces token or click on manage credentials' pointing to the 'COPY ACCESS TOKEN' and 'MANAGE CREDENTIALS' buttons.

click here to display properties

Click to copy the acces token or click on manage credentials

Need to copy this



CONFIGURING HTTP REQUEST NODE

Edit http request node

Delete

Cancel

Done

⚙ Properties

☰ Method

POST

🌐 URL

http://demo.thingsboard.io/api/v1/p

☐ Enable secure (SSL/TLS) connection

☐ Use authentication

☐ Enable connection keep-alive

☐ Use proxy

← Return

a UTF-8 string

🏷 Name

Name



Inject node as JSON Object

Edit inject node

Delete Cancel Done

⚙ Properties

Name Name

msg. payload = {"temperature":21}

msg. topic = a_z

+ add

☐ Inject once after 0.1 seconds, then

**MORE
THAN ONE
VALUE IS
SEPARATE
D BY [“,”]**

URL NODE

Device Access
key

- <http://demo.thingsboard.io/api/v1/plZmRX4DhkPcZooZe8k2/telemetry>
- Deploy and Inject

Devices

Device type
All

| <input type="checkbox"/> | Created time ↓ | Name | Device type |
|--------------------------|---------------------|----------------|-------------|
| <input type="checkbox"/> | 2020-09-01 15:22:19 | Temperature | default |
| <input type="checkbox"/> | 2020-08-24 18:20:30 | House | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device C1 | default |
| <input type="checkbox"/> | 2020-08-24 11:14:14 | Test Device B1 | default |

TEMPERATURE

Device details

?

✕

<

DETAILS

ATTRIBUTES

LATEST TELEMETRY

ALARMS

EVENTS

>

Latest telemetry

🔍

| <input type="checkbox"/> | Last update time | Key ↑ | Value |
|--------------------------|---------------------|-------------|-------|
| <input type="checkbox"/> | 2020-09-01 15:31:26 | temperature | 21 |

HOUSE

Device details

?

✕

DETAILS

ATTRIBUTES

LATEST TELEMETRY

EVENTS

2 telemetry units selected

SHOW ON WIDGET

| <input checked="" type="checkbox"/> | Last update time | Key ↑ | Value |
|-------------------------------------|---------------------|------------|--------|
| <input checked="" type="checkbox"/> | 2017-07-08 18:02:01 | main-Door | CLOSED |
| <input checked="" type="checkbox"/> | 2017-07-08 18:02:01 | main-light | OFF |

Page: 1 Rows per page: 5 1 - 2 of 2



ASSIGN DEVICE TO WIDGET





**ASSIGN WIDGET TO DASHBOARD
ADD NEW WIDGETS AND EDIT AS
NECESSARY**

Add widget to dashboard

Select existing dashboard

Select dashboard

Create new dashboard

New dashboard title*

Temperature

Test House

Open dashboard

ADD

CANCEL

Tick to open dashboard after you click on add

Temperature

temperature

21 °C

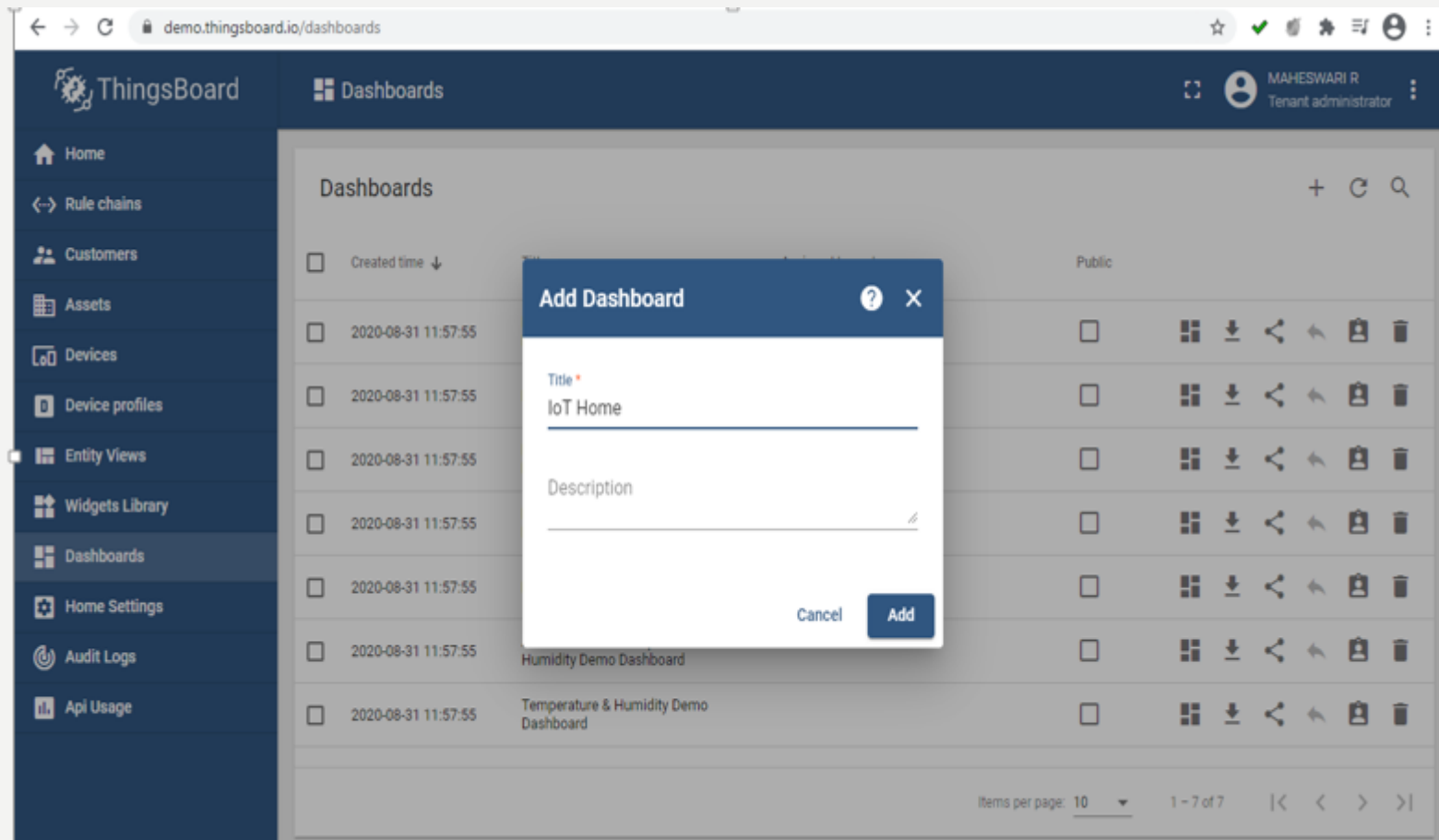
Drag to move and resize

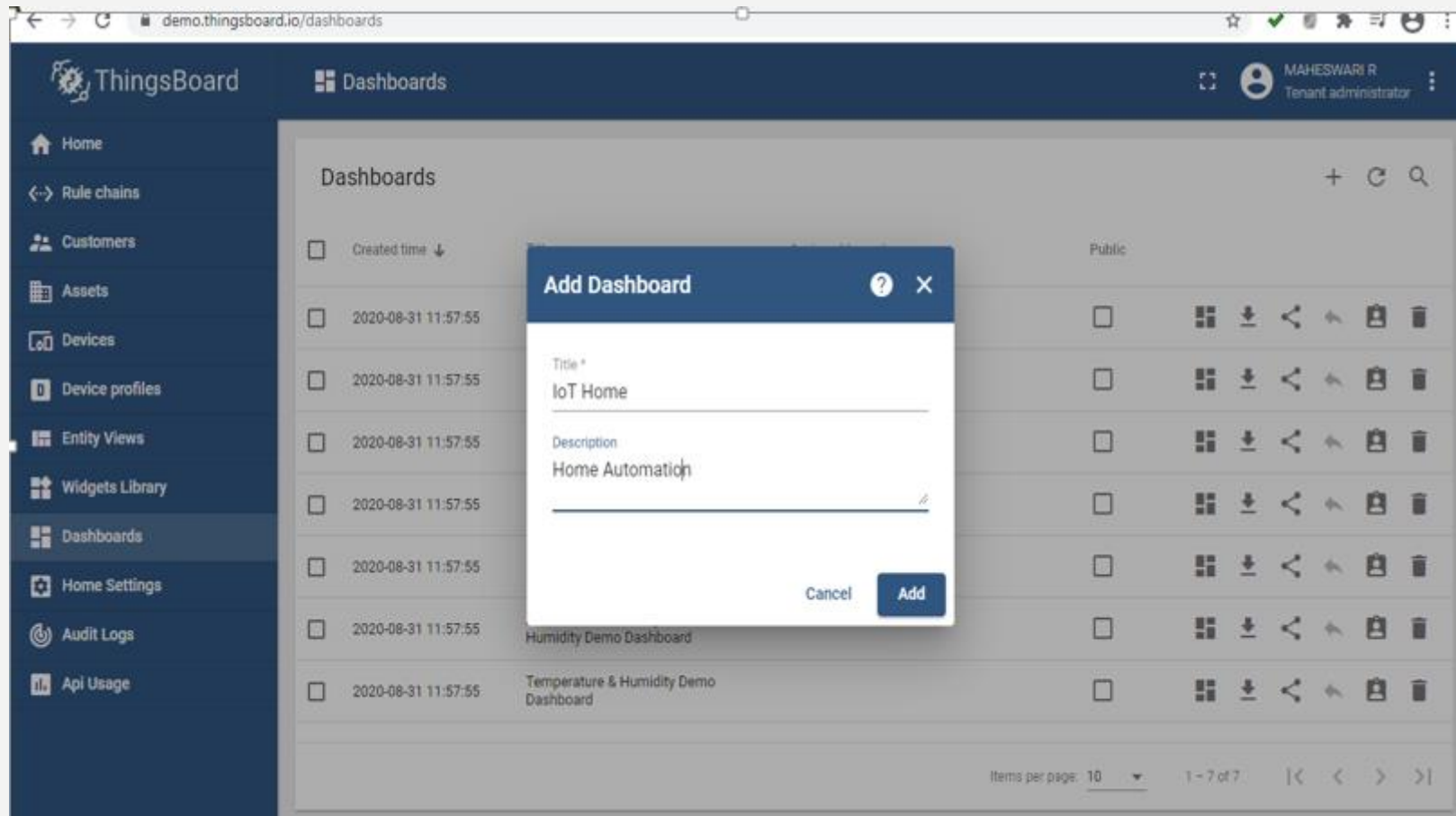
Widget now appears on dashboard.
Click the edit icon to add new widgets and edit existing widgets on the dashboard.
You can change the size of the widget by dragging on the edges

Powered by Thingsboard v1.2.3

TO OPEN DASHBOARD

| | | | |
|-------------------|--------------------------|---------------------|---|
| ➔ RULE CHAINS | Dashboards | | |
| 👤 CUSTOMERS | <input type="checkbox"/> | Created time ↓ | Title |
| 📊 ASSETS | | | Assi |
| 📁 DEVICES | <input type="checkbox"/> | 2020-09-01 16:10:12 | Temperature |
| 📑 ENTITY VIEWS | <input type="checkbox"/> | 2020-08-24 11:34:37 | New House |
| 📦 WIDGETS LIBRARY | <input type="checkbox"/> | 2020-08-24 11:14:14 | DHT22: Temperature & Humidity Demo Dashboard |
| 📊 DASHBOARDS | <input type="checkbox"/> | 2020-08-24 11:14:14 | Raspberry PI GPIO Demo Dashboard |
| 🔍 AUDIT LOGS | | | |





← → ↻ demo.thingsboard.io/dashboards

☆ ✓ 🗑 ⚙ 👤 ⋮

ThingsBoard

Home

↔ Rule chains

👤 Customers

📅 Assets

📱 Devices

👤 Device profiles

📄 Entity Views

🧩 Widgets Library

📊 Dashboards

⚙ Home Settings

🔍 Audit Logs

📄 Api Usage

Dashboards

Dashboards

+ ↻ 🔍

| <input type="checkbox"/> | Created time ↓ | Title | Assigned to customers | Public | |
|--------------------------|---------------------|--|-----------------------|--------------------------|---|
| <input type="checkbox"/> | 2021-03-15 16:05:17 | IoT Home | | <input type="checkbox"/> | <div>Open dashboard</div> <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | DHT22: Temperature & Humidity Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Raspberry Pi GPIO Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | LinkIt One GPS Tracking Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | ESP8266 DHT22: Temperature & Humidity Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | ESP8266 GPIO Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Arduino DHT22: Temperature & Humidity Demo Dashboard | | <input type="checkbox"/> | <div>📊 ⬇️ 🔗 ⚡ 👤 🗑</div> |

Items per page: 10 1 - 8 of 8 |< < > >|

demo.thingsboard.io/dashboards/2244f160-857a-11eb-9fba-415bbc924c1f

ThingsBoard

Dashboards > IoT Home

MAHESWARI R
Tenant administrator

Home

Rule chains

Customers

Assets

Devices

Device profiles

Entity Views

Widgets Library

Dashboards

Home Settings

Audit Logs

Api Usage

IoT Home

IoT Home

Realtime - last minute

No widgets configured

Powered by Thingsboard v.3.2.2



Home

Rule chains

Customers

Assets

Devices

Device profiles

Entity Views

Widgets Library

Dashboards

Home Settings

Audit Logs

Api Usage



Realtime - last minute



Title *

IoT Home

Select widgets bundle



| Alarms | | |
|---------------------------------------|----------|---------|
| <input type="checkbox"/> Type ↓ | Severity | Status |
| <input type="checkbox"/> Temperature | Major | Cleared |
| <input type="checkbox"/> Temperature | Critical | Cleared |
| <input type="checkbox"/> Low Humidity | Warning | Active |
| <input type="checkbox"/> Low Humidity | Warning | Active |

Alarm widgets

System

Visualization of alarms for devices, assets and other entities.

| Entities | | Timeseries table | |
|----------|------------|------------------|-------------|
| Name ↓ | Charged, % | Time ↓ | Humidity, % |
| Arduino | 99.6 | 10-08-15 | 41.2 |
| Linux SE | 37.2 | 10-08-14 | 94.5 |

Your HTML code here

Cards

System

Tables and cards to display latest and historical values for multiple entities simultaneously.



Analogue gauges

System

Display temperature, humidity, speed, and other latest values on various analog gauge widgets.



Charts

System

Display timeseries data using customizable line and bar charts. Use various pie charts to display latest values.



Control widgets

System

New Date-range-navigator
Date picker

Date

System



Home

Rule chains

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Api Usage

Title *

IoT Home

Analogue gauges: select widget



Radial gauge

Latest values

Preconfigured gauge to display any value reading. Allows to configure value range, gradient colors and other settings.



Speed gauge

Latest values

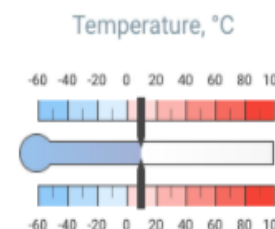
Preconfigured gauge to display speed. Allows to configure speed range, gradient colors and other settings.



Temperature radial gauge

Latest values

Preconfigured gauge to display temperature. Allows to configure temperature range, gradient colors and other settings.



Thermometer scale

Latest values

Preconfigured widget to display temperature. Allows to configure temperature range, gradient colors and other settings.

Home

Rule chains

Customers

Assets

Devices

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Api Usage

1 device selected

| <input type="checkbox"/> | Created time ↓ | Name | Device profile |
|-------------------------------------|---------------------|---------------------|----------------|
| <input checked="" type="checkbox"/> | 2021-03-12 14:29:01 | Smart Car | default |
| <input type="checkbox"/> | 2020-08-31 12:09:08 | iCAR | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device C1 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device B1 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device A3 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device A2 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | ESP8266 Demo Device | default |
| | | Arduino | |

Smart Car

Device details

[Details](#) [Attributes](#) [Latest telemetry](#) [Alarms](#) [Events](#) [Relations](#)

1 telemetry unit selected





Show on widget

| <input checked="" type="checkbox"/> | Last update time | Key ↑ | Value |
|-------------------------------------|---------------------|-------|-------|
| <input checked="" type="checkbox"/> | 2021-03-15 15:53:07 | temp | 20 |


Items per page: 10

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[<<](#) [<](#) [>](#) [>>](#)

 Home Rule chains Customers Assets Devices Device profiles Entity Views Widgets Library Dashboards Home Settings Audit Logs Api Usage

1 device selected

|  | Created time ↓ | Name | Device profile |
|---|---------------------|---------------------|----------------|
| <input checked="" type="checkbox"/> | 2021-03-12 14:29:01 | Smart Car | default |
| <input type="checkbox"/> | 2020-08-31 12:09:08 | iCAR | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device C1 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device B1 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device A3 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | Test Device A2 | default |
| <input type="checkbox"/> | 2020-08-31 11:57:55 | ESP8266 Demo Device | default |
| | | Arduino | |

Smart Car

Device details


  Details Attributes Latest telemetry Alarms Events Relations 

Add to dashboard

Current bundle

Cards

System ▾

 Add to dashboard

temp

20 °C

← → ↻ demo.thingsboard.io/devices

ThingsBoard

Devices

1 device selected

Smart Car

Device details

MAHESWARI R
Tenant administrator

Home

Rule chains

Customers

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Api Usage

Created time ↓

2021-03-12 14:29:01

2020-08-31 12:09:08

2020-08-31 11:57:55

2020-08-31 11:57:55

2020-08-31 11:57:55

2020-08-31 11:57:55

2020-08-31 11:57:55

ESP8266
Demo
Device
default
Arduino

Latest telemetry

Alarms

Events

Relations

System

Add to dashboard

temp
20 °C

Add widget to dashboard

Select existing dashboard

Dashboard *

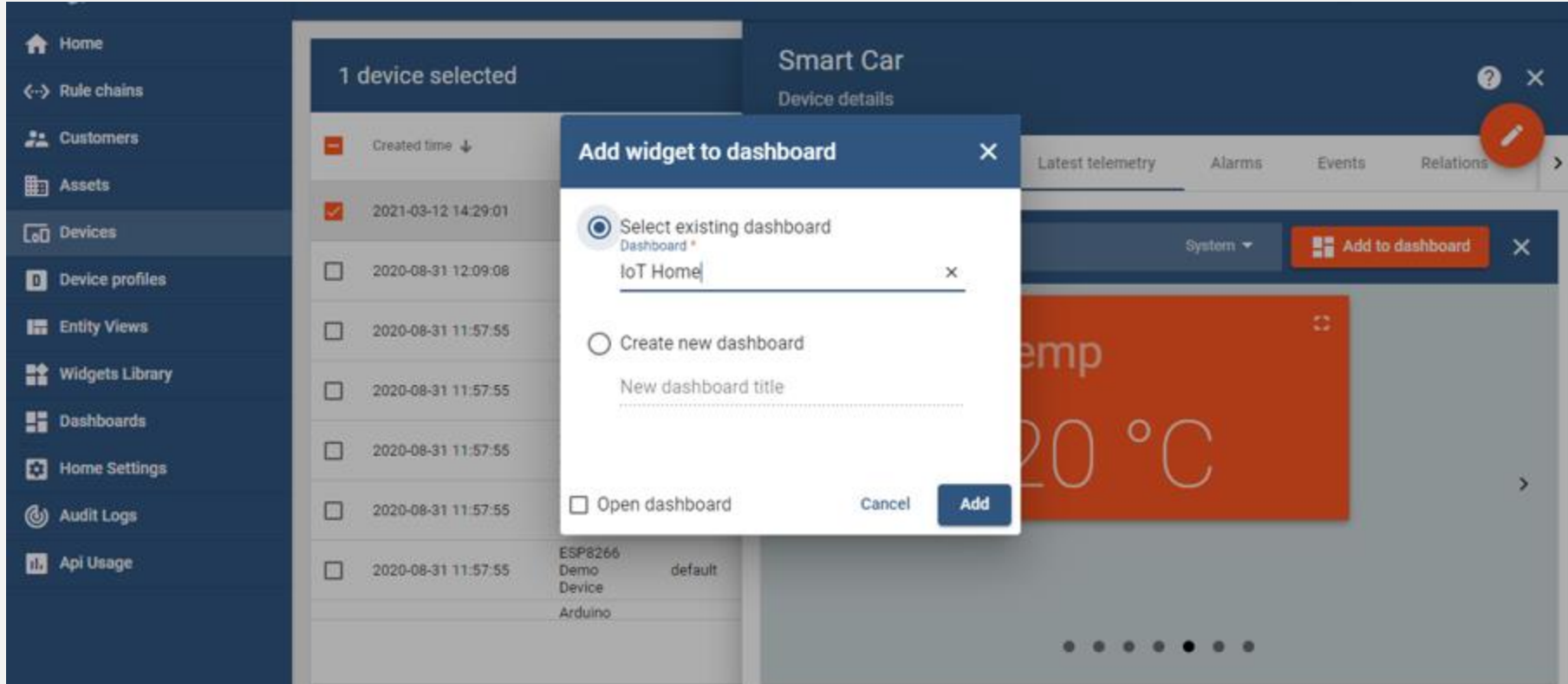
Create new dashboard

New dashboard title

Open dashboard

Cancel

Add



ThingsBoard Demo | Dashboards

demo.thingsboard.io/dashboards

ThingsBoard

Dashboards

MAHESWARI R
Tenant administrator

Home

Rule chains

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Api Usage

Dashboards

Created time ↓

Title

Assigned to customers

Public

2021-03-15 16:05:17

IoT Home

2020-08-31 11:57:55

DHT22: Temperature & Humidity Demo Dashboard

2020-08-31 11:57:55

Raspberry PI GPIO Demo Dashboard

2020-08-31 11:57:55

Linkit One GPS Tracking Demo Dashboard

2020-08-31 11:57:55

ESP8266 DHT22: Temperature & Humidity Demo Dashboard

2020-08-31 11:57:55

ESP8266 GPIO Demo Dashboard

2020-08-31 11:57:55

Arduino DHT22: Temperature & Humidity Demo Dashboard

Items per page: 10

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Windows Taskbar

System Tray

ThingsBoard

Home

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Dashboards

Dashboards

Created time ↓

Title

2021-03-15 16:05:17

IoT Home

2020-08-31 11:57:55

DHT22: Temperature & Humidity Demo Dashboard

2020-08-31 11:57:55

Raspberry PI GPIO Demo Dashboard

2020-08-31 11:57:55

Linkit One GPS Tracking Demo Dashboard

2020-08-31 11:57:55

ESP8266 DHT22: Temperature & Humidity Demo Dashboard

2020-08-31 11:57:55

ESP8266 GPIO Demo Dashboard

2020-08-31 11:57:55

Arduino DHT22: Temperature & Humidity Demo Dashboard

Temperature & Humidity Demo Dashboard

IoT Home

Dashboard details

Details

Audit Logs

Open dashboard

Export dashboard

Make dashboard public

Manage assigned customers

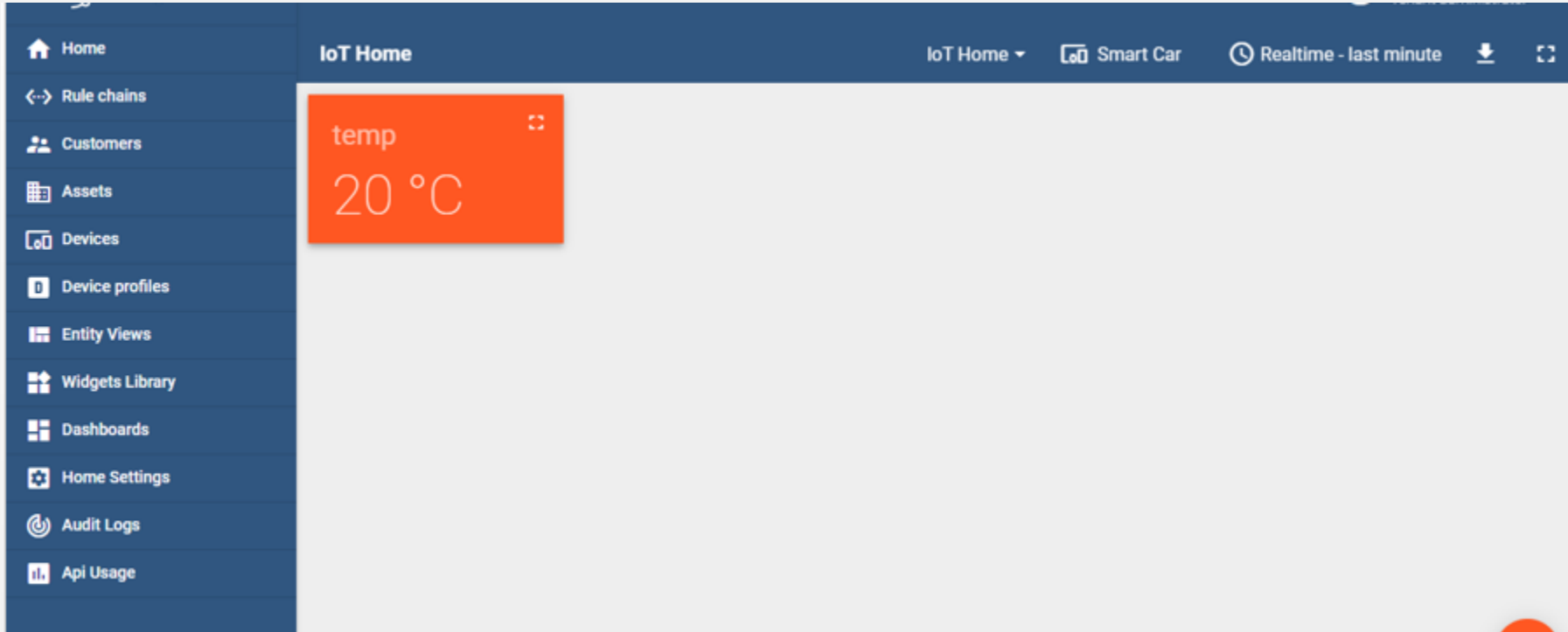
Delete dashboard

Title

IoT Home

Description

Home Automation



HOME AUTOMATION EXERCISE-I

Title *

New House

| Timestamp ↓ | humidity | light | temperature |
|---------------------|----------|-------|-------------|
| 2020-08-27 13:41:28 | 21 | ON | 33 |

1 - 10 of 58

Items per page: 10

Timeseries table

🕒 Realtime - last minute

| Timestamp ↓ | humidity | light | temperature |
|---------------------|----------|-------|-------------|
| 2020-08-27 13:41:29 | 21 | ON | 33 |

1 - 10 of 59

Items per page: 10

humidity 21 °C

light ON

+

✓

×

PLANT HEALTH MONITORING

CONFIGURING MQTT

- **broker**=demo.thingsboard.io
topic=vl/devices/me/telemetry