



Bluemix IoT LAB

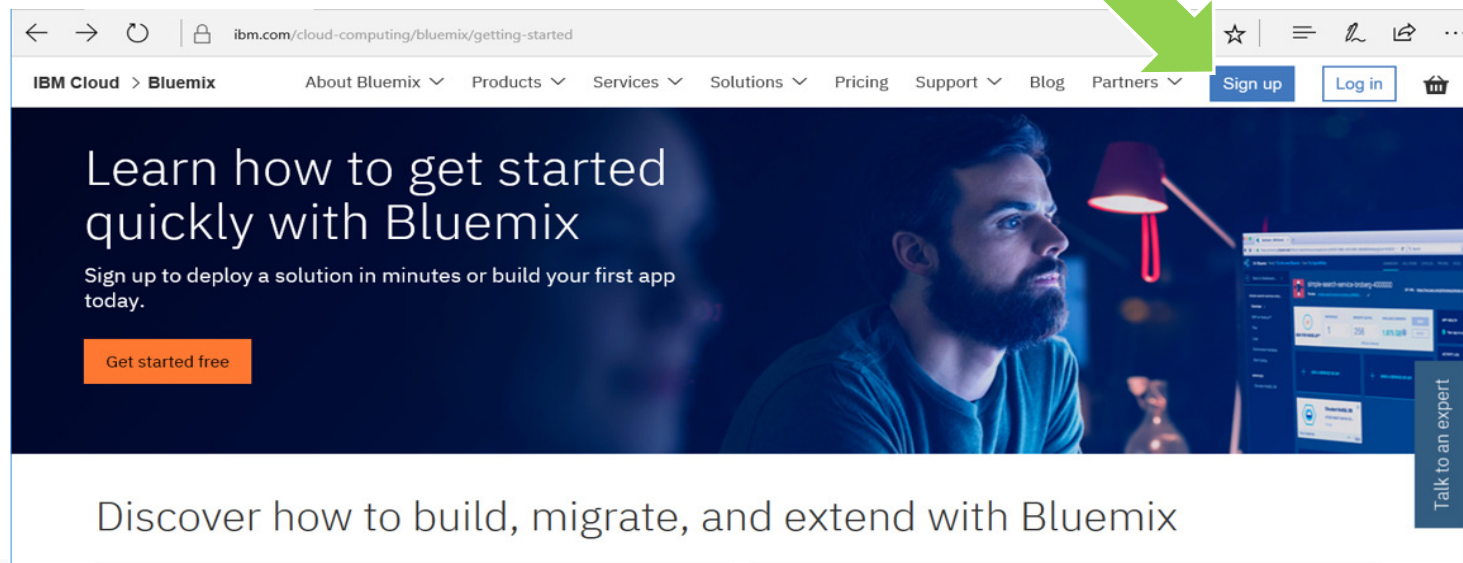
Attila Mák
06.12.2017



V | Five Years Out

Getting started...

- Sign up for 30 day trial in Bluemix at <https://www.ibm.com/cloud-computing/bluemix/getting-started>



Create account

Sign up for IBM Bluemix and create your Bluemix account
Try Bluemix free for 30 days

Need building inspiration?
Your first project? Select a course card. All you need is to sign up and start building.

Production app? No problem.
We give you 2GB of runtime and container memory free for 30 days. Also access to production on all Services.

Watch here to help.
Your first concern with free help desk support. Ask us anything along the way.

Already have a Bluemix account? [Log In](#)

Email*

First Name

Last Name

Company

Country or Region*
Afghanistan

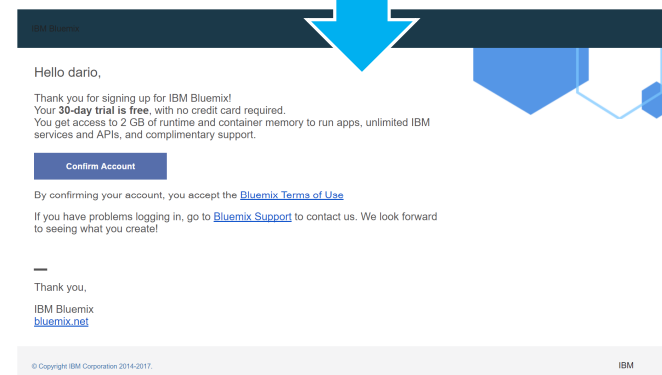
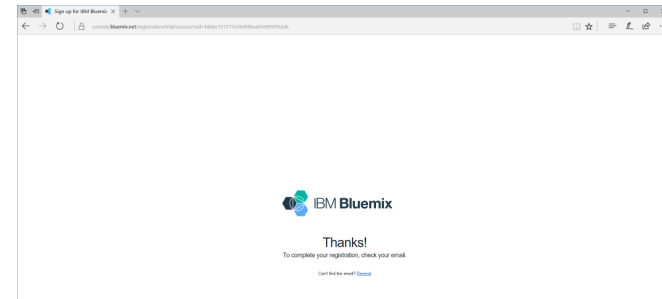
Phone Number*

Password*

Keep me informed of products, services, and offerings from IBM companies worldwide.
 No, thanks

By clicking Create Account, I accept the [Bluemix privacy policy](#) and [Bluemix terms](#).

[Create Account](#)



Success!

You successfully signed up for a Bluemix account and it is now activated.

[Log in](#)

Login and create organization

- Get back to Bluemix (<https://www.ibm.com/cloud-computing/bluemix/getting-started>) and sign in...
- You will be asked to create an organization this will be the name of your test domain choose closest region to your site.

Create organization

1 2 3

Before you start using Bluemix, you need to set up your environment.

To start, name your first organization. Think of an org as a project or team that shares resources, such as apps, databases, and other services. Orgs exist in geographic regions, so decide where you'd like to put your first one.

United Kingdom ▼

Name your organization

Create

Create your space

- Next you will be asked to create a space

Spaces are containers for projects, you can create as many as you like.

Once finished you will get to the dashboard

Create space

Now, let's get you set up with a space.

Spaces help you manage access and permissions for a set of resources, and map nicely to development stages like dev, test, and prod. Name your first space now — you can add more spaces later.

Org name: `pnndra`

Name your space [Create](#)

NEED SOME SUGGESTIONS? TRY THESE

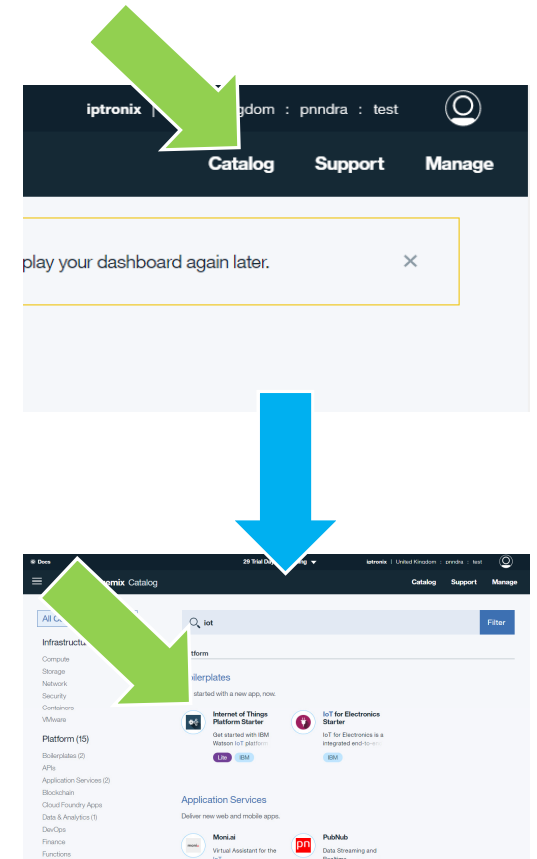
[dev](#) [test](#) [prod](#)

Dashboard

Explore our Offerings

Create a Watson IoT application

- From Dashboard click on Catalog
- Search for «iot» and select Internet of Things Platform Starter



Configure application

- Just enter some name in “app name” and leave everything as default.

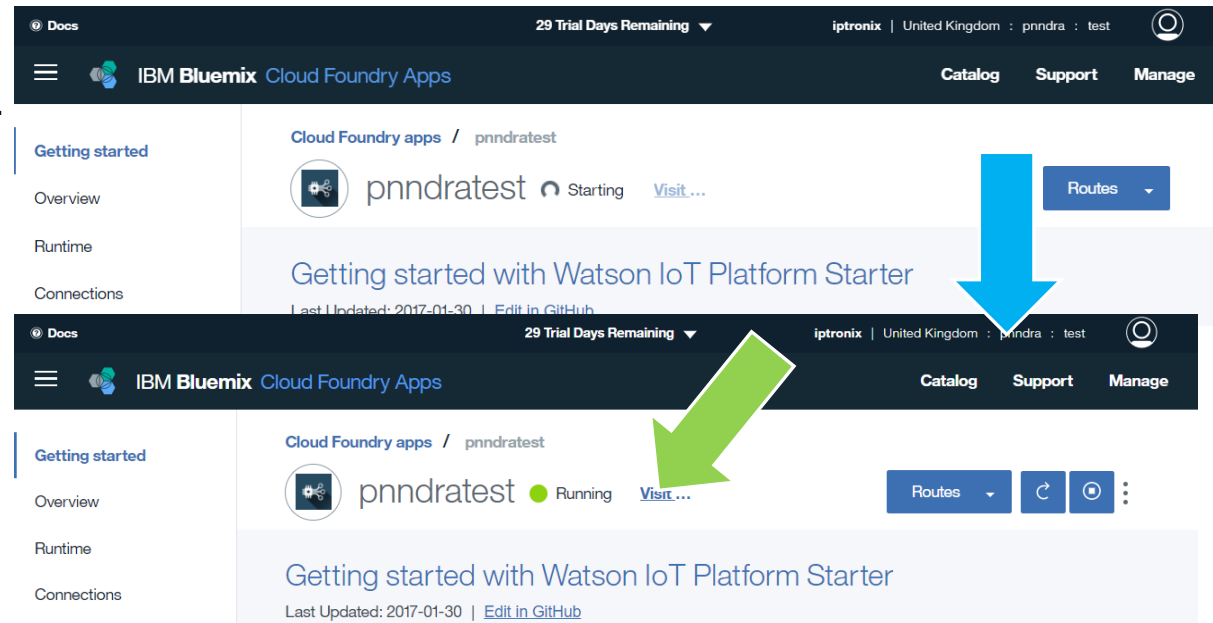
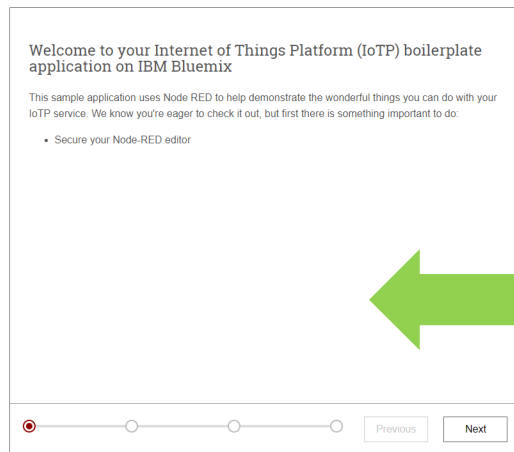
Note that name must be unique and that it must not contain symbols such as underscore

- Then click on Create

The screenshot shows the 'Create a Foundry App' interface in the IBM Bluemix Catalog. The form is titled 'Create a Foundry App' and is for an 'Internet of Things Platform Starter'. The 'app name' field contains 'test'. The 'Host name' field contains 'test'. The 'Domain' dropdown is set to 'eu-gb.mybluemix.net'. The 'Select region to deploy in' dropdown is set to 'United Kingdom'. The 'Choose an org' dropdown is set to 'pnndra'. The 'Choose a space' dropdown is set to 'test'. A blue 'Create' button is located at the bottom right of the form. Two green arrows are overlaid on the image: one points to the 'app name' input field, and the other points to the 'Create' button.

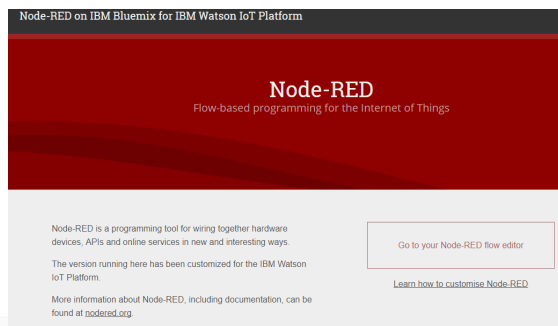
Getting around

- After creating application it will take some time to start up. Please wait until status is running, then click on visit...
- You will get to node red setup screen...



Node Red setup


- Enter a username and password. These are not linked to your IBM credentials
- The next screen is just informative. Just click Finish. You will get to node red startup screen. Save this URL for later...



Secure your Node-RED editor

Secure your editor so only authorised users can access it

Username

Password  Must be at least 8 characters

Allow anyone to view the editor, but not make any changes

Finish the configuration

You have made the following selections:

- Secure your editor so only authorised users can access it

The settings will be persisted in the CloudantDB bound to this application. You can override them at any time by setting the following environment variables via the Bluemix console:

- NODE_RED_USERNAME - the username
- NODE_RED_PASSWORD - the password
- NODE_RED_GUEST_ACCESS - if set to 'true', allows anyone read-only access to the editor

Set up Watson IoT

- Get Back to the dashboard (<https://console.bluemix.net/dashboard>) and click on <yourappname>-iotf-service
- You will get to the Watson IoT Platform home page. Click on Launch to get to the application. Click on the chip icon on the left bar...

The screenshot shows the IBM Bluemix Dashboard. At the top, there's a navigation bar with 'IBM Bluemix Dashboard', 'Catalog', 'Support', and 'Manage'. Below the navigation bar, there's a search bar and a 'Create' button. The main content area is divided into two sections: 'Cloud Foundry Apps (1)' and 'Services (2)'. The 'Cloud Foundry Apps' section has a table with columns: NAME, ROUTE, MEMORY (...), INSTANCES, RUNNING, STATE, and ACTIONS. The 'Services (2)' section has a table with columns: NAME, SERVICE OFFERING, PLAN, and ACTIONS. A green arrow points to the 'pndratest-iotf-service' row in the Services table.

NAME	ROUTE	MEMORY (...)	INSTANCES	RUNNING	STATE	ACTIONS
pndratest	pndratest.eu-gb.mybluemix.net	256	1	1	Running	

NAME	SERVICE OFFERING	PLAN	ACTIONS
pndratest-cloudantNo	Cloudant NoSQL DB	Lite	
pndratest-iotf-service	Internet of Things Platform	Lite	

The screenshot shows the IBM Bluemix Application Services page for 'pndratest-iotf-service'. The page has a navigation bar with 'IBM Bluemix Application Services', 'Catalog', 'Support', and 'Manage'. Below the navigation bar, there's a 'Manage' section with 'Plan' and 'Connections' options. The main content area shows the service name 'pndratest-iotf-service' and a 'Launch' button. A green arrow points to the 'Launch' button.

The screenshot shows the IBM Watson IoT Platform navigation menu. The menu has a 'QUICKSTART' button and three main sections: 'BOARDS', 'DEVICES', and 'M...'. A green arrow points to the 'DEVICES' section.

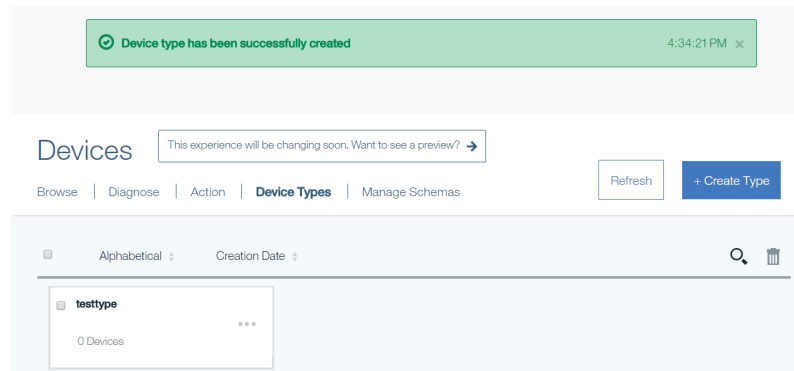
The screenshot shows the IBM Watson IoT Platform 'All Boards' page. The page has a navigation bar with 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. Below the navigation bar, there's a 'All Boards' section with a '+ Create New Board' button. The main content area shows three boards: 'USAGE', 'RULE-CENTRIC ANALYTICS', and 'DEVICE-CENTRIC ANALYTICS'. A green arrow points to the 'USAGE' board.

Watson IoT Concepts

- Watson IoT acts as a secure gateway between devices and the cloud
- Devices are categorized in device types which contain common information about devices
- Data is usually transferred through MQTT which allows sending and receiving messages.
- Messages over MQTT are usually transferred using JSON formatting

Set up device types

- Select Device Types and click on Create Type
- Chose Create Device Type and enter device type name and description. Enter any name here (no spaces or symbols) and click next
- In the subsequent pages just click next until you get back to console



Set Up Devices

- From Watson IoT Dashboard click on Browse and then on Add Device
- Select the device type we just created and click next
- Give device a name and click next until you get to the summary page, then click on add... you will get to the device credentials page

The screenshot shows the IBM Watson IoT Platform interface. At the top, there's a navigation bar with 'IBM Watson IoT Platform', 'QUICKSTART', 'SERVICE STATUS', 'DOCUMENTATION', and 'BLOG'. A user profile 'dra@gmail.com' is visible in the top right. Below the navigation bar, the 'Devices' section is active, with a sub-header 'Browse | Diagnose | Action | Device Types | Manage Schemas'. A green arrow points to the 'Browse' tab. To the right, there are 'Refresh' and '+ Add Device' buttons. A second green arrow points to the '+ Add Device' button. Below this, a table lists device types with columns for 'Device Type', 'Class ID', 'Date Added', and 'Location'. A third green arrow points to the first row of the table. A blue arrow points down to the 'Add Device' form. The form has a 'Choose Device Type' dropdown menu. A fourth green arrow points to this dropdown. Below the dropdown is a 'Create device type' button. Another blue arrow points down to the 'Device Info' section. This section contains a 'Device ID' field with the placeholder text 'Enter device ID (required)'. A fifth green arrow points to this field. At the bottom of the form, there is a '+ Additional fields' link.

Device Credentials

- In the device credentials page you will get the **ONLY** chance to write down Device's Authentication token. Write it down for later use...
- Write down also Organization ID as it will be needed to access MQTT broker.

- In the sample screenshot:

Device Type: testtype

Device ID: testdevice

Organization ID: qn6qby

Authentication Token:
M9AECqg*&k_LFqc2typ

The screenshot shows a web interface for a device named 'testdevice'. At the top, it says 'Device testdevice'. Below that, there is a 'Device' label and a 'Refresh' button. A section titled 'Your Device Credentials' is highlighted with a blue underline and an information icon. Below this, a paragraph explains that the user has registered the device and needs to add credentials to connect it. A table lists the credentials: Organization ID (qn6qby), Device Type (testtype), Device ID (testdevice), Authentication Method (token), and Authentication Token (M9AECqg*&k_LFqc2yp). A warning at the bottom states that authentication tokens are non-recoverable.

Organization ID	qn6qby
Device Type	testtype
Device ID	testdevice
Authentication Method	token
Authentication Token	M9AECqg*&k_LFqc2yp

Set up your hardware

- Provided you have a MQTT enabled board, your device should be set up as follows:
 - MQTT Host:
 - tcp://<org-id>.messaging.internetofthings.ibmcloud.com:1883
 - ssl://<org-id>.messaging.internetofthings.ibmcloud.com:8883
 - Username: use-token-auth
 - Password: <Authentication token from device creation> (eg. M9AECqg*&k_LFqc2typ in previous screenshot)
 - Device id: d:<Organization id>:<device type>:<device name> (eg. d: qn6qby:testtype:testdevice)
 - Topic: iot-2/evt/message1/fmt/json

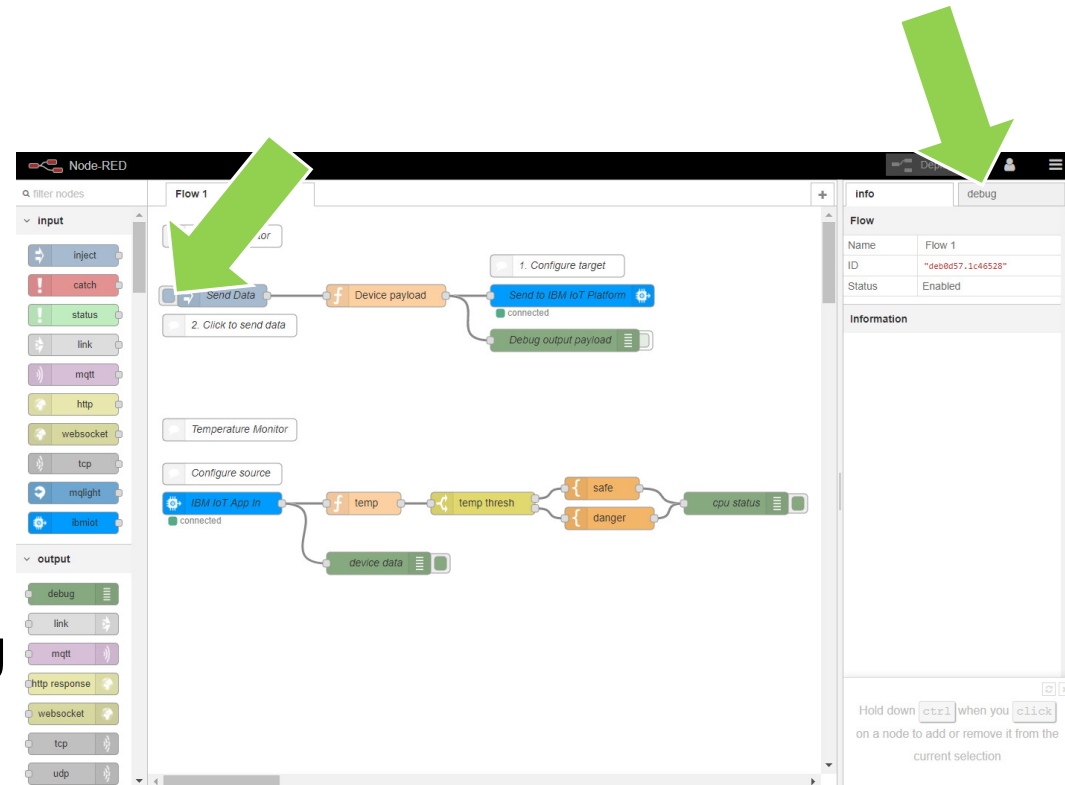
Setting up your hardware

- Make sure your MQTT payload is in the following JSON format:

```
{  
  "d": {  
    "temperature": 27.0  
    "status" : "ok"  
  }  
}
```

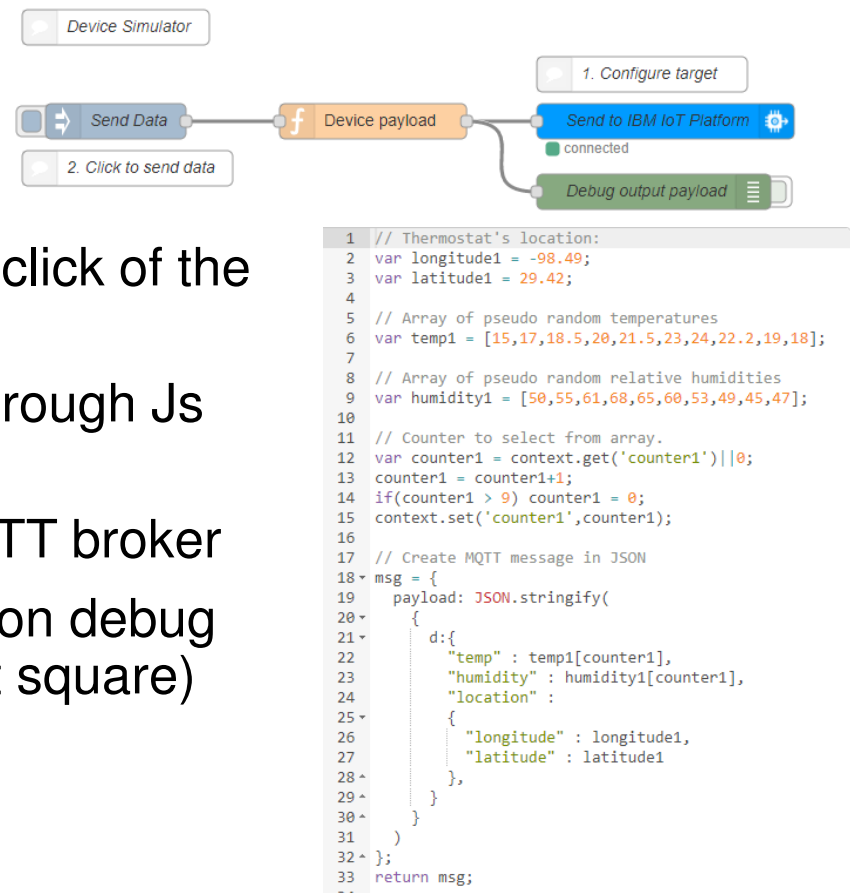

Getting started...

- Get back to node red login and enter your credentials
- You will be presented with a readymade graph that can be useful to get started.
- This simple graph allows injecting packets by clicking on send data and displaying them in the debug pane.



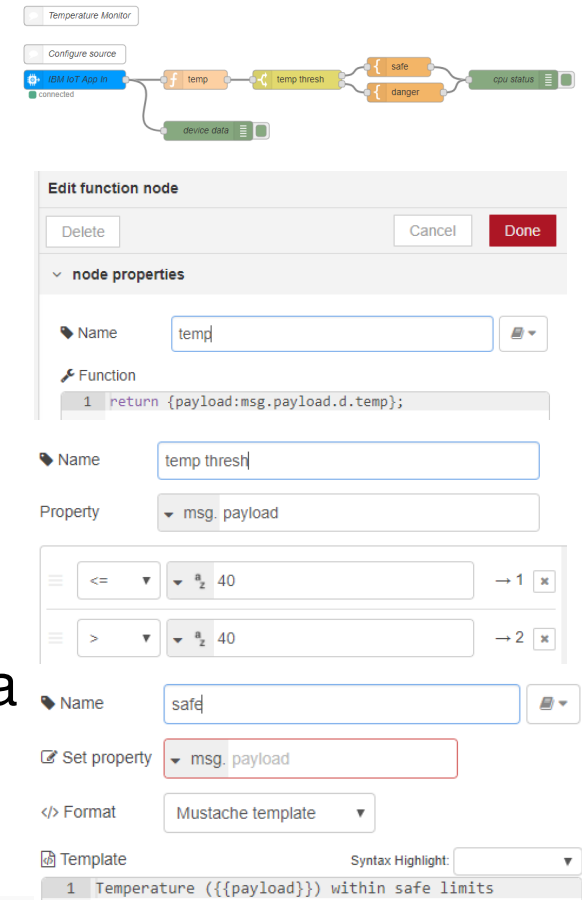
How it works... device simulator

- Top part is a device simulator
- Send data block generates an event on click of the right square
- Device payload creates JSON packet through Js code
- Send to IBM IoT injects data in IBM MQTT broker
- Debug output payload shows sent data on debug pane (if enabled by clocking on the right square)



How it works... Temperature Monitor

- IBM IoT App In fetches data from MQTT broker (demo gets any device)
- Device data sends received data to debug pane
- Temp function extracts temperature from JSON payload
- Temp threshold sends event to either safe or danger, based on data value
- Safe and danger blocks modify event payload to a string with result message
- Cpu status sends final message to debug pane

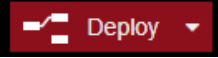


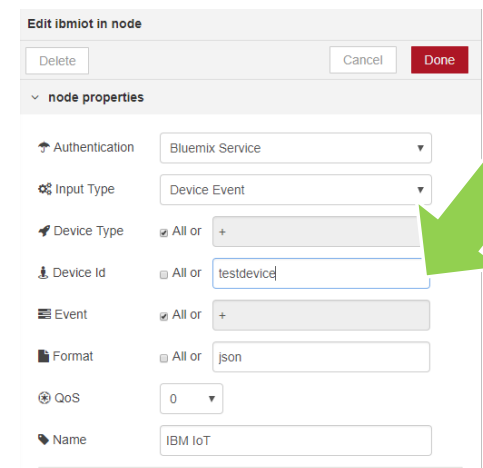
Running demo...

- Clicking on send data will create a message and send it to MQTT broker.
- Data will be received and dumped by the two debug blocks
- The device data debug block dumps all the incoming data (you can drill down on structures)



Receiving data from your device

- Setup properties of IBM IoT App in
 - Enter your device id in Device Id
- Click on deploy 
- Now you should be receiving data from your physical device and display it on debug pane

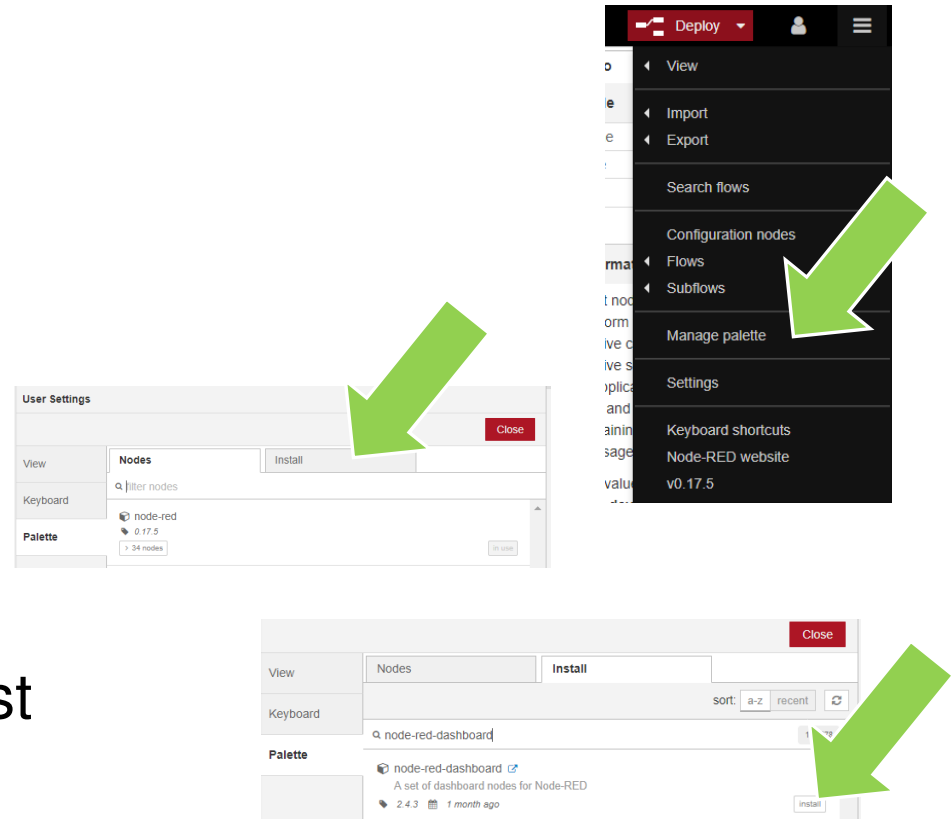


The screenshot shows the 'Edit ibmiot in node' configuration window. It includes a 'Delete' button, 'Cancel', and 'Done' buttons. Under the 'node properties' section, the following fields are visible:

- Authentication: Bluemix Service
- Input Type: Device Event
- Device Type: All or +
- Device Id: All or testdevice (highlighted with a green arrow)
- Event: All or +
- Format: All or json
- QoS: 0
- Name: IBM IoT

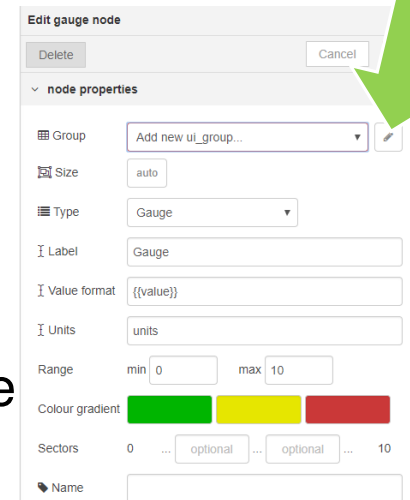
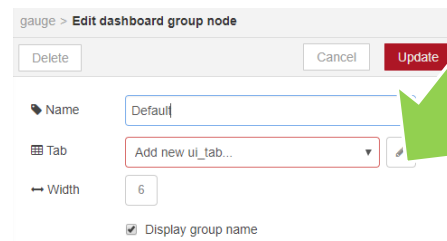
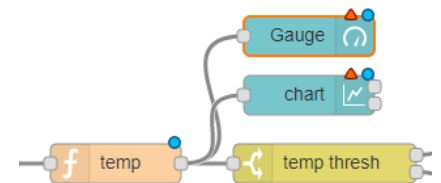
Setting up data visualization

- Add ui blocks to palette:
 - Select manage palette from menu
 - Select install tab
 - Enter node-red-dashboard in the search box
 - Click install
 - Confirm install dialog
- This will install the dashboard palette at the end of your node list (left pane)



Add some visualization

- Add and connect a gauge and a chart to the temp function
- Edit gauge:
 - Add a new UI group
 - Add a group to a new tab
 - Edit range
- Edit chart:
 - Just open and confirm... this will assign chart to the same group
- Deploy...
- Open your dashboard at the same url of nodered replacing red with ui, eg: <https://pnndratest.eu-gb.mybluemix.net/ui>

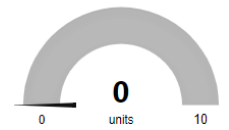


Testing the visualization

- Initially you will get an almost empty page
 - Blank chart and gauge set to 0
- Start injecting data from the device simulator or from your physical device...
- You will see chart and gauge updating in real time

Default

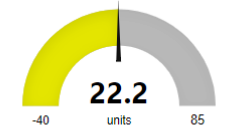
Gauge



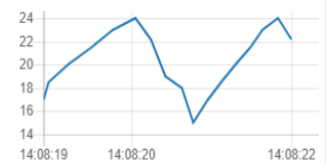
chart

Default

Gauge



chart



Putting it all together

- Creating flow graphs with node red can be very easy but
 - Each dashboard is globally identical for each viewer (you have to have a flow for each device)
 - Node red graphs can grow very complex and can have a lot of overhead
- Node red is great for quick demos
- Once the Proof of concept is ok, a custom web application needs to be developed. Using NodeJS work done on Node red can be reused and extended
- Various sample graphs can be obtained from Arrow to demonstrate interface with various reference designs



Thank You