IBM / ST Micro SensorTile Watson IoT Workshop

Connect the ST Microelectronics SensorTile to IBM Watson IoT

Download this PDF and Node-RED flows at
https://github.com/johnwalicki/SensorTile-WatsonIoT-Workshop

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Getting Started with Watson IoT Platform

This workshop details the Developer experience using the ST Microelectronics SensorTile and IBM Watson IoT Platform. You will create an IBM Bluemix IoT Cloud Foundry application that displays and analyzes ST Micro SensorTile sensor data using Quickstart and Node-RED.

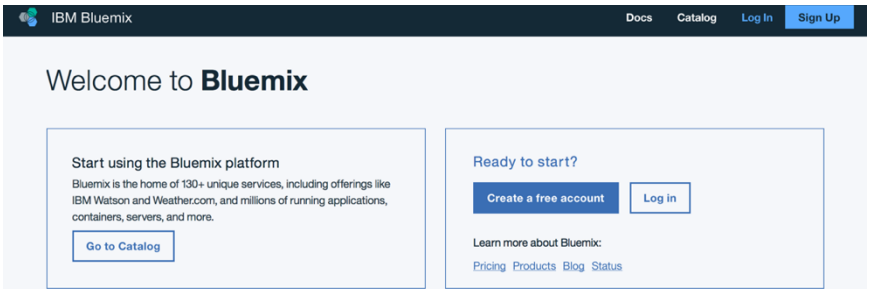
In this workshop, we will connect a ST Micro SensorTile device to IBM Bluemix and Watson IoT Platform. We will send and graph temperature and gesture data to the Watson IoT Quickstart and registered devices. Watson IoT Platform will report the SensorTile gesture events in a Node-RED Dashboard.

Section 1 – Create a Bluemix Trial Account

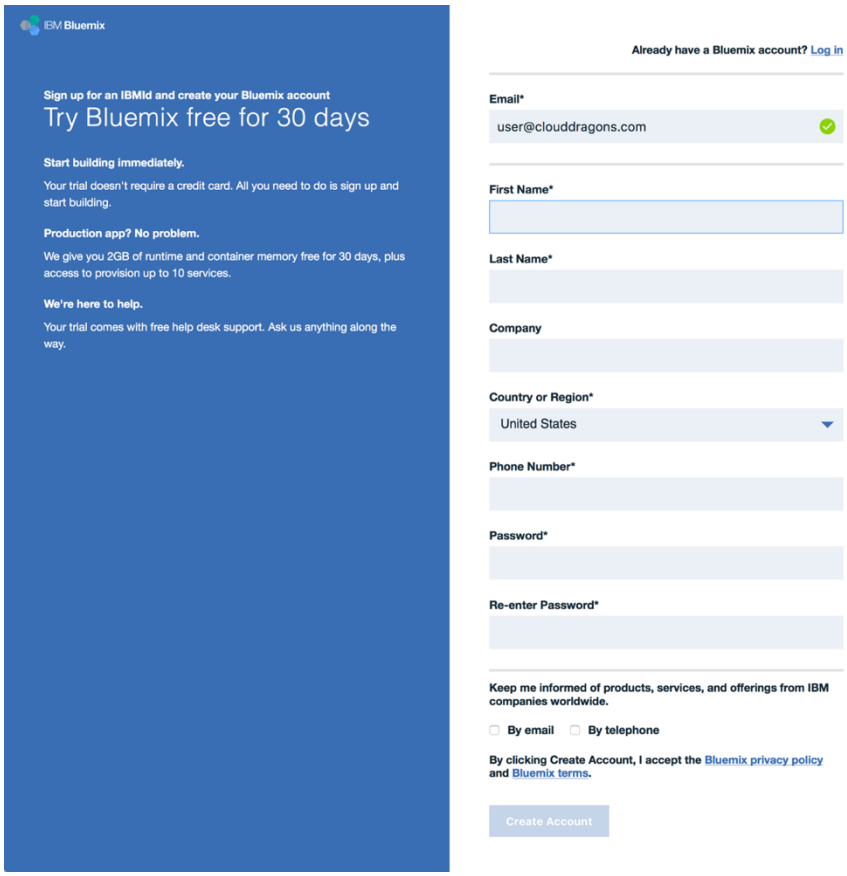
In this Section, we will create a free trial account on Bluemix.

Step 1 – Register for a Free Trial Account on Bluemix

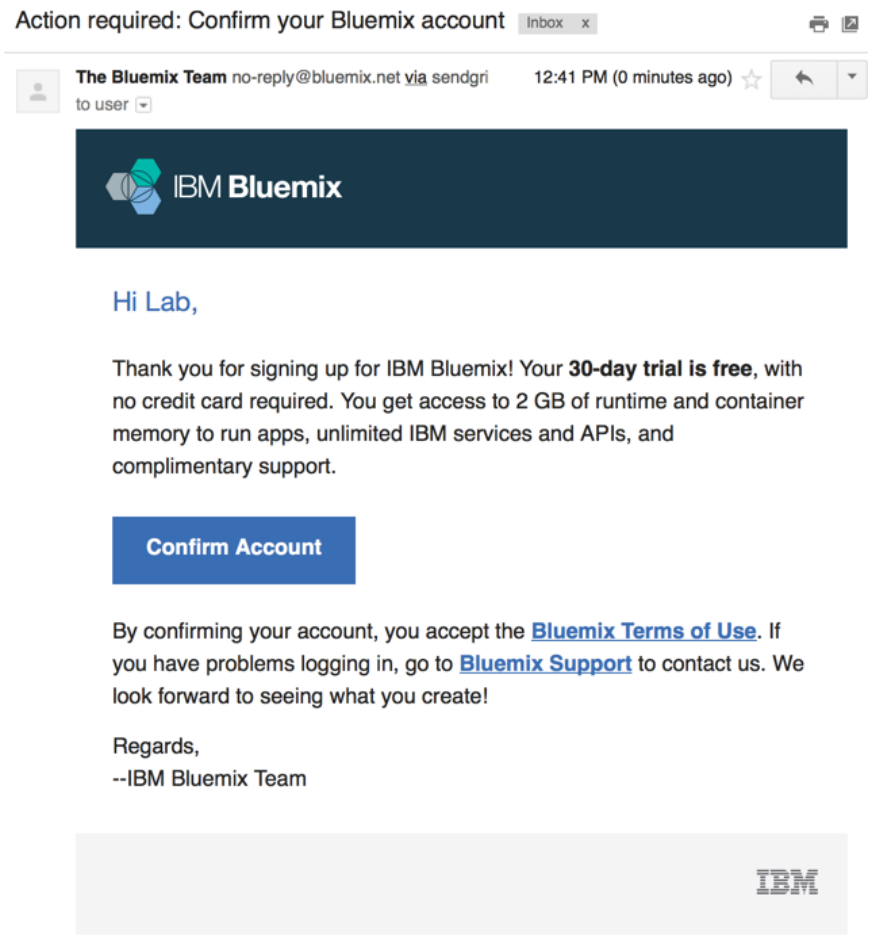
- In a new browser tab, goto http://bluemix.net and click “Create a free account”



- Enter your email, name, phone number and password and click “Create account”

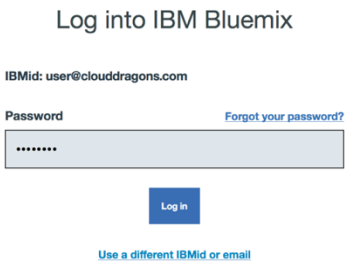


- Check your email and click the “Confirm Account” button.

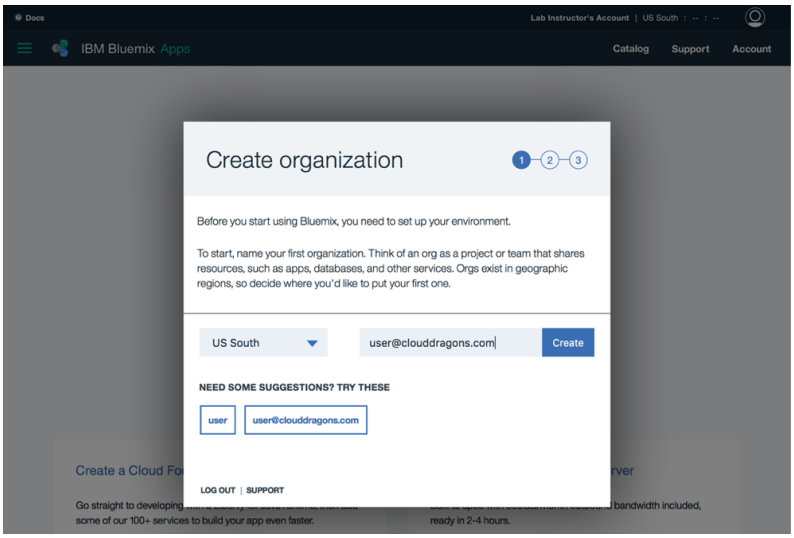


- Ensure that the resulting screen says “Success!” and log into Bluemix

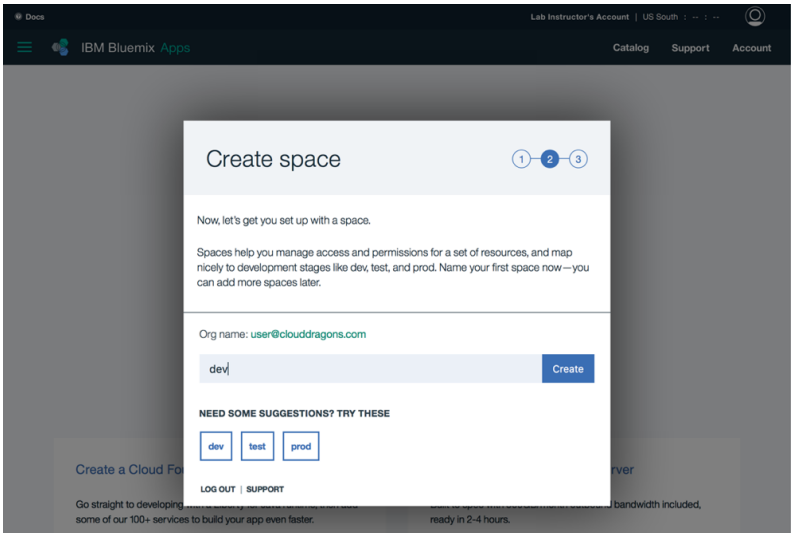
- Log In to Bluemix



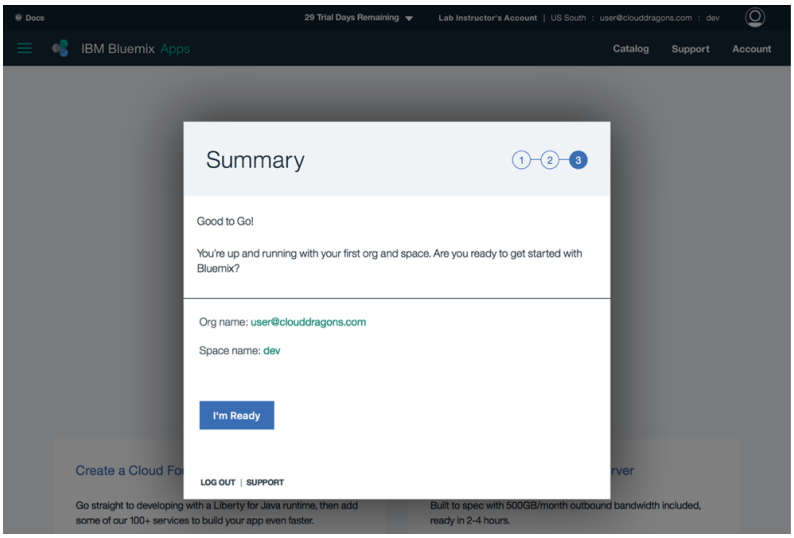
- Create an organization with the same name as your email



- Create a space

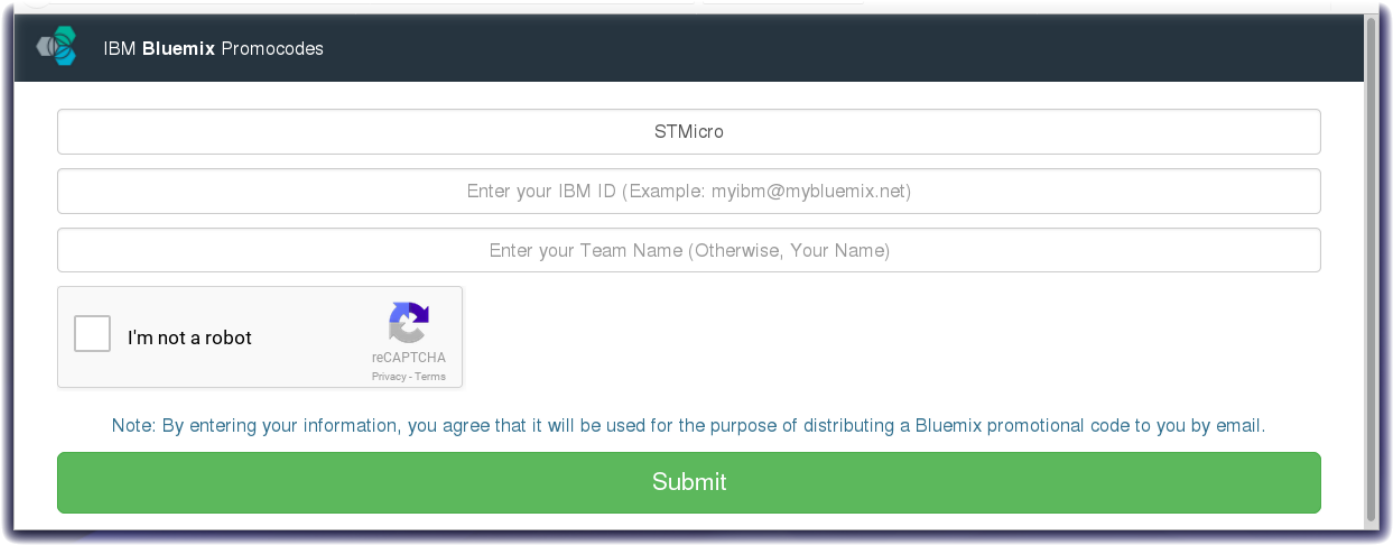


- Click “I'm Ready”



Step 2 – Get a Promocode to extend your Bluemix Trial Account

- Workshop attendees can apply a Promocode to their Bluemix account and extend the duration of the Trial period, add additional Services and increase the memory of your Bluemix Cloud Foundry applications.
- Visit **http://promocodes.mybluemix.net**
- Enter **STMicro** as the Event Name (Case sensitive)



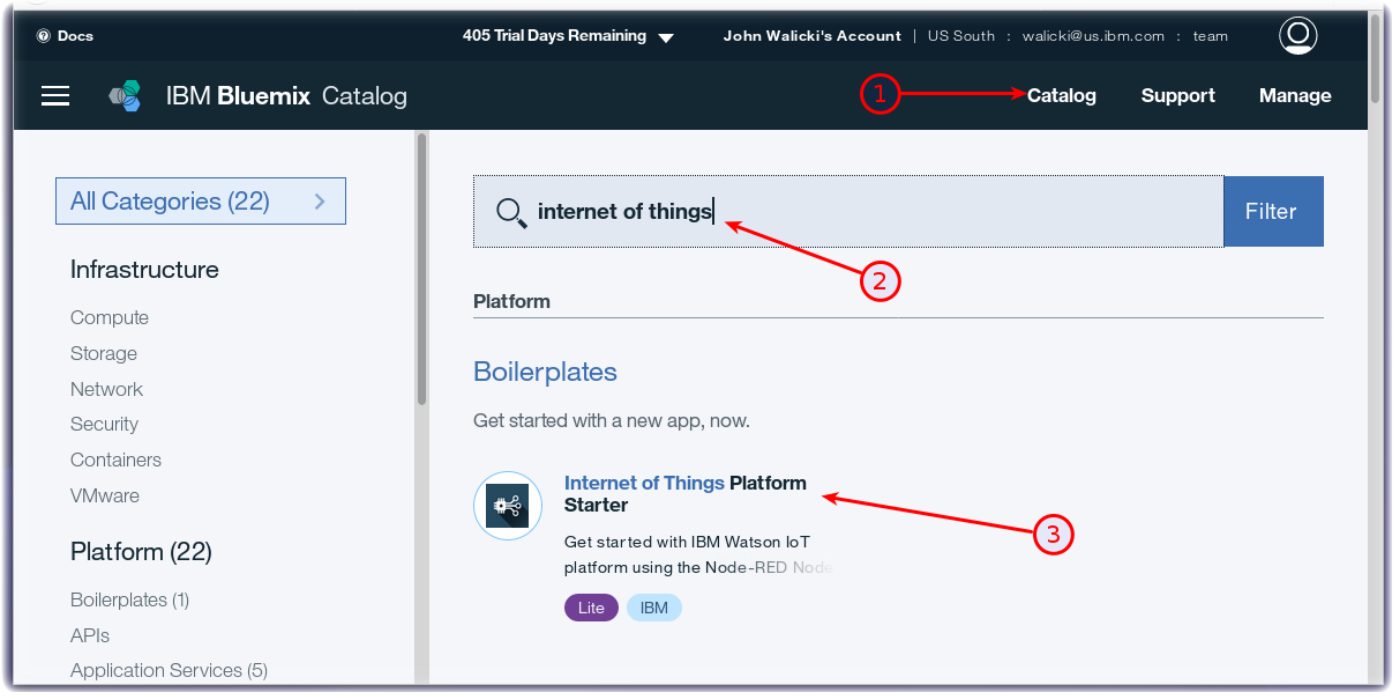
- Enter your Bluemix email address / IBM ID and your name.
- Check that you are not a robot and press the Submit button.
- Check your email for the Bluemix Promocode.
- Follow the instructions to apply the Promocode to your account.

Section 2 – Create an Internet of Things Starter App

Step 1 – Create an IoT Starter Application

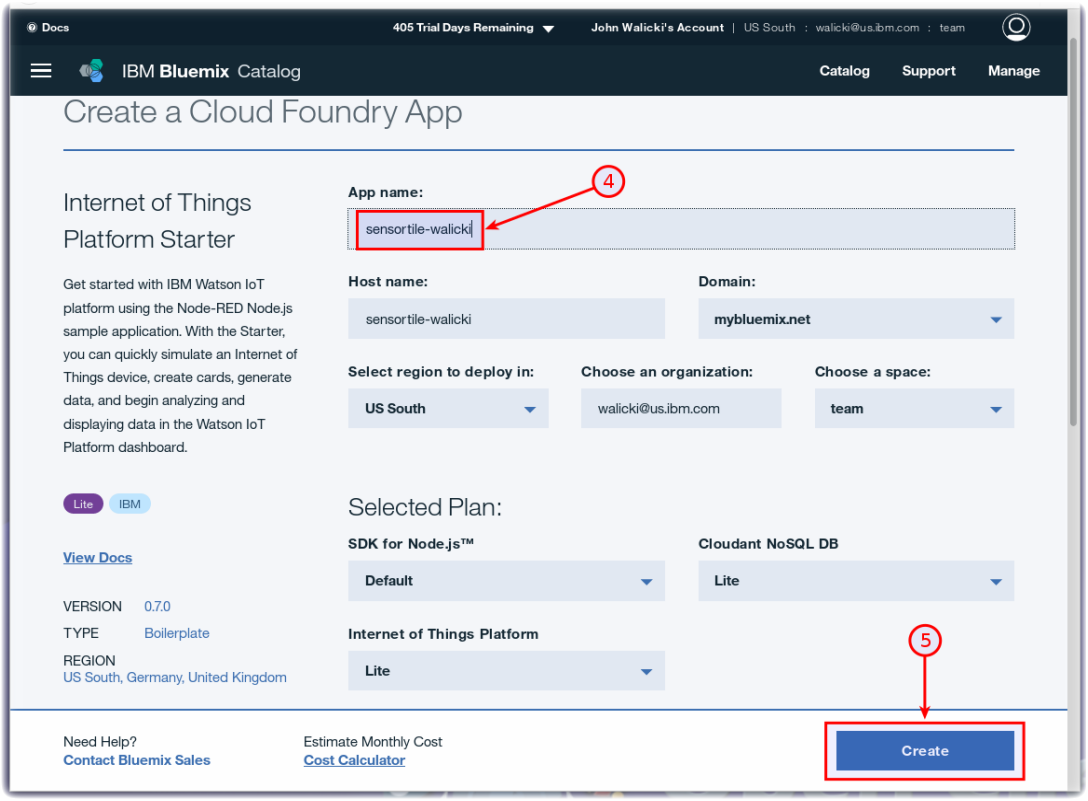
Earlier in the workshop we sent the ST Micro SensorTile data to Watson IoT Quickstart, in this Section we will create a Bluemix Cloud Foundry IoT Starter Application to ingest and analyze the Quickstart data.

- Click on the **Catalog** (1) and search for '**internet of things**' (2)
- The **Internet of Things Platform Starter** (3) boilerplate is a pattern with pre-assembled services that work together. The Internet of Things Platform Starter includes a Node-RED Node.js web server, Cloudant database to store the sensor data, and the IoT platform service so you can connect devices.



- Name your application something unique. If you choose ***myapp***, your application will be located at http://***myapp***.mybluemix.net There can only be one "***myapp***" application and URL registered in IBM Bluemix.

- Give the application a unique name (4) - eg. **sensortile-yourname**

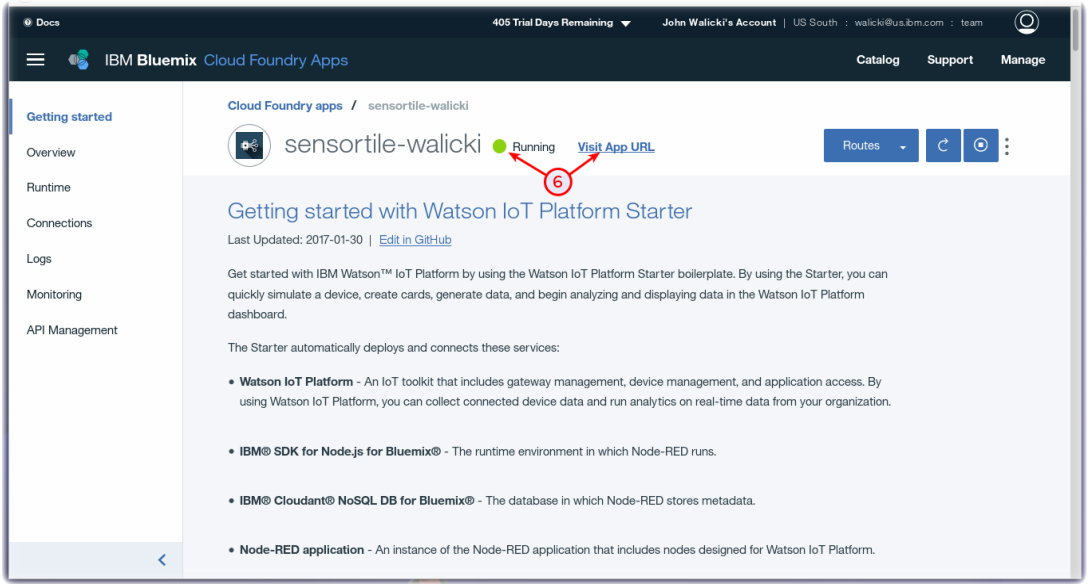


- Press the **Create** button (5).

- IBM Bluemix will create an application in your account based on the services in the boilerplate. This is called staging an application. It can take a few minutes for this process to complete. While you wait, you can click on the **Logs** tab and see activity logs from the platform and Node.js runtime.

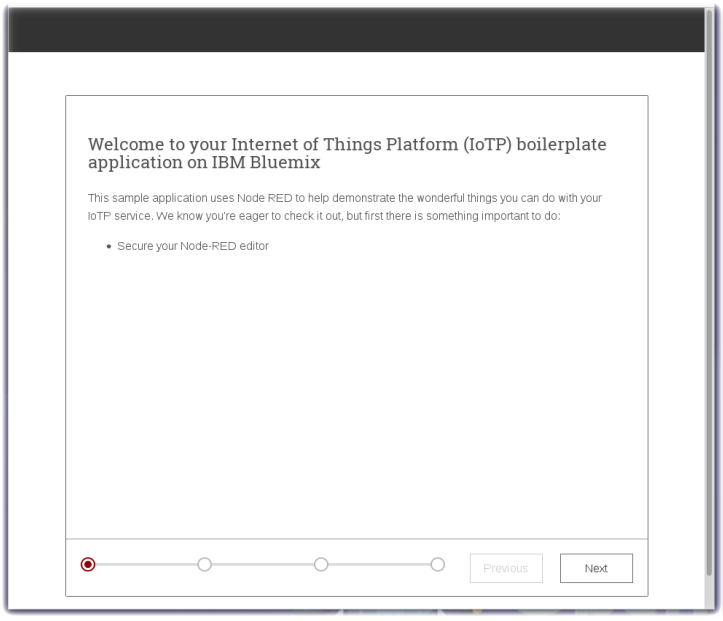
Step 2 - Launch the IoT Starter Application

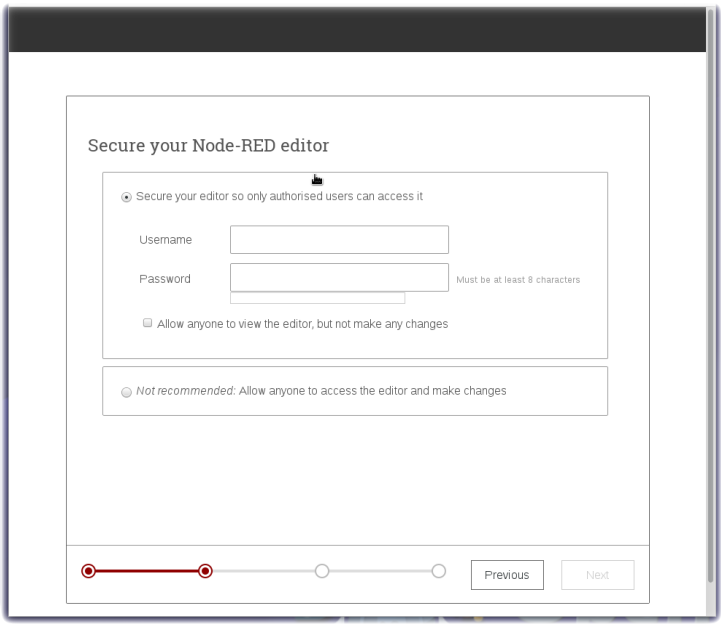
- Once the Green "**Running**" icon appears, Click the **Visit App URL** link (6).

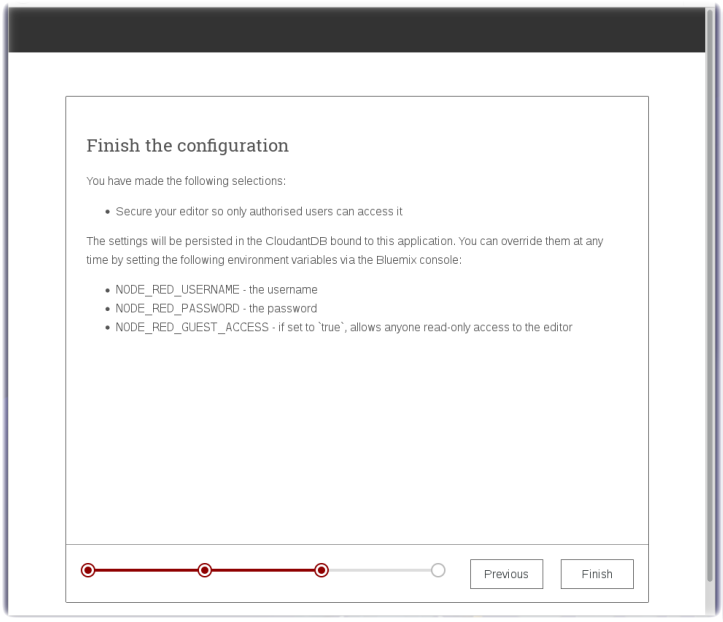


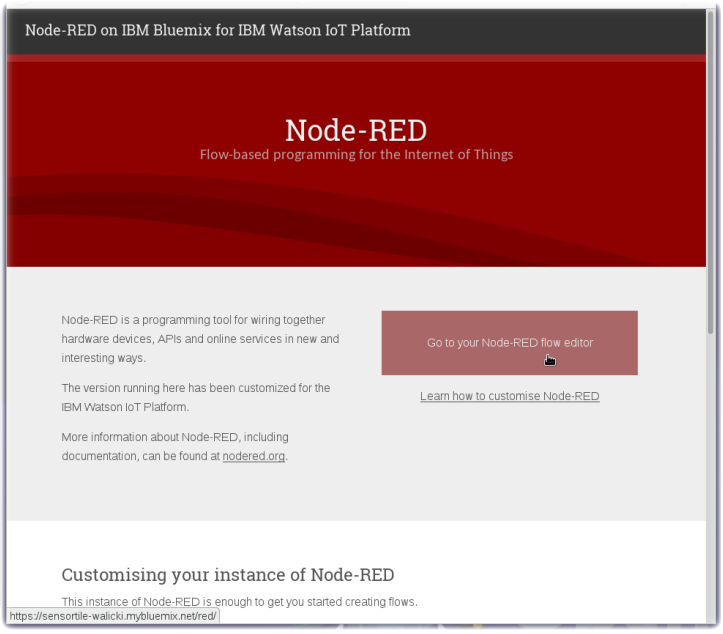
Step 3 – Open the Node-RED visual programming editor

- A new browser tab will open to the Node-RED start page. Node-RED is an open-source Node.js application that provides a visual programming editor that makes it easy to wire together flows. Select a username / password to access the Node-RED editor. Remember your username / password. Click the red button **Go to your Node-RED flow editor** to launch the editor.

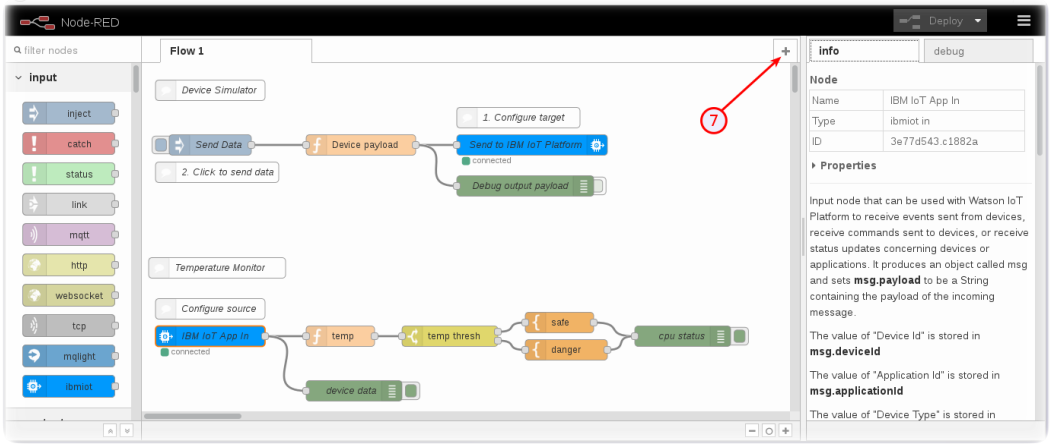




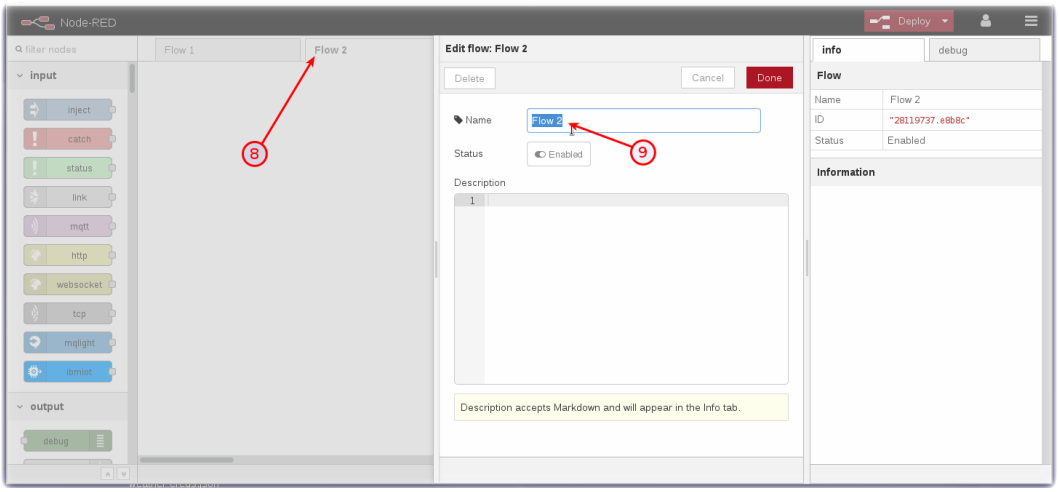




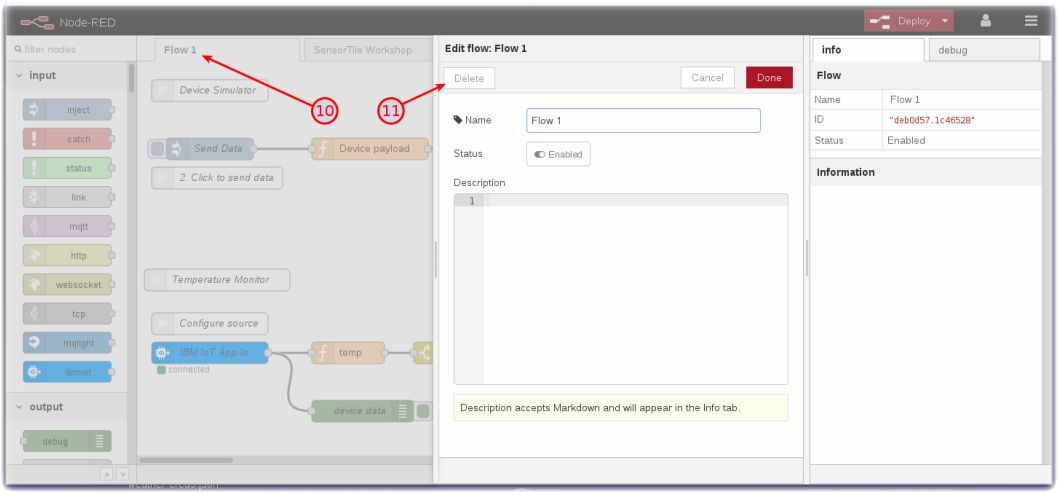
- The Node-RED Visual Programming Editor will open with a default flow.
- On the left side is a palette of nodes that you can drag onto the flow.
- You can wire nodes together to create a program.
- The sample IoT Starter flow is not applicable to this workshop and can be deleted.



- Click the **+** icon (7) to add a new tab. Click on the **Flow 2** tab header (8).
- Rename this tab from **Flow 2** to **SensorTile with Quickstart** (9)



- Click on the **Flow 1** tab header (10). Press the **Delete** button. (11)

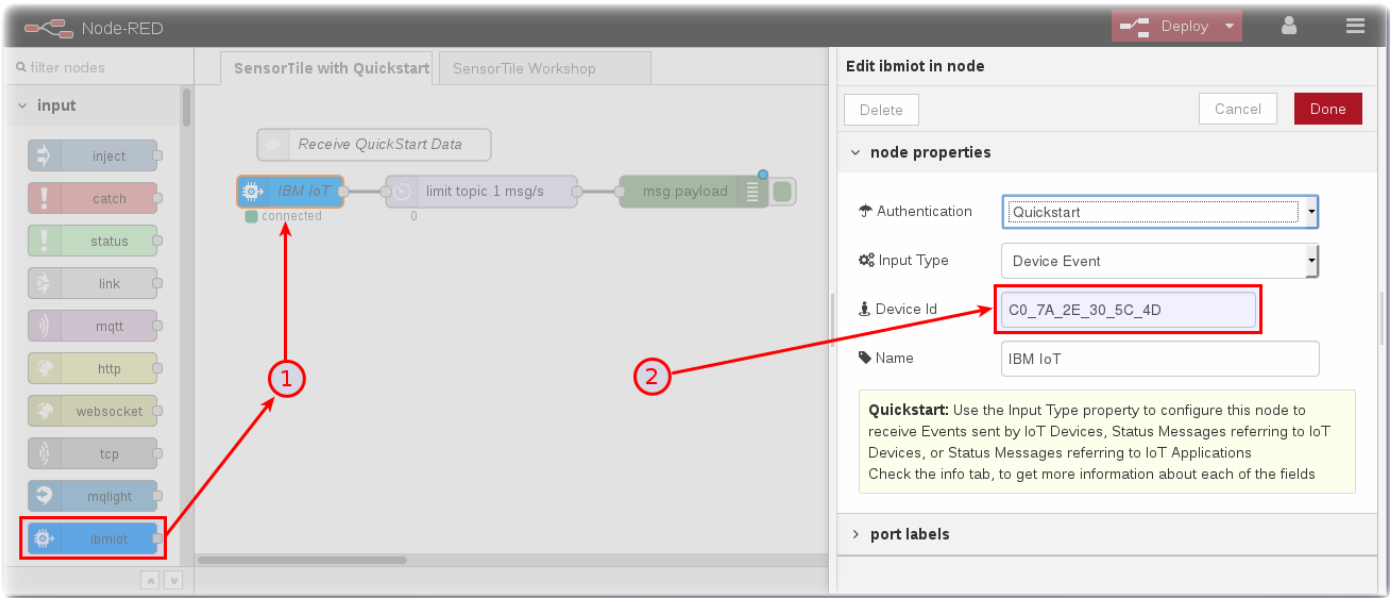


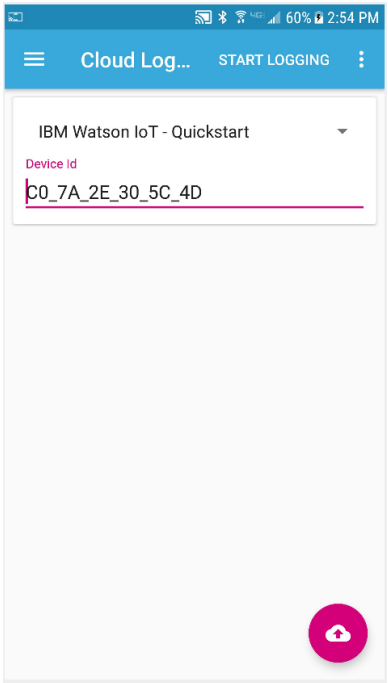
Section 3: Receive SensorTile data sent to QuickStart

Step 1 – Receive SensorTile data sent to Quickstart

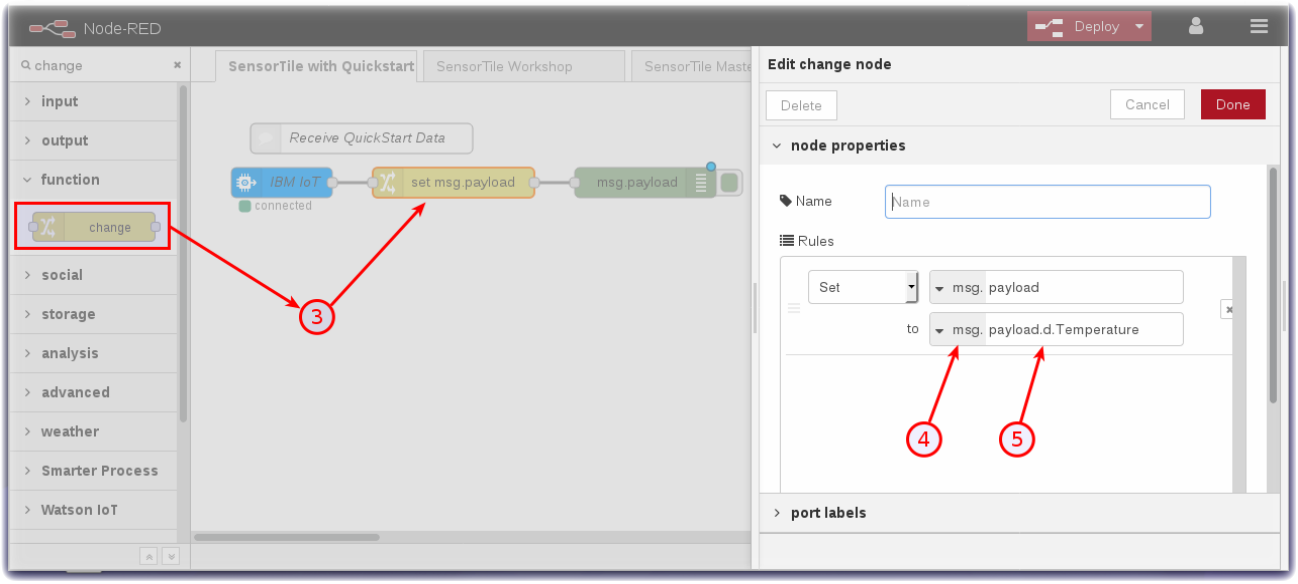
Earlier in the workshop we sent the ST Micro SensorTile data over Bluetooth to your mobile phone and then used the ST BlueMS mobile app to send the data to Watson IoT Quickstart. In this Section we will use the IoT Starter Application we just created to ingest and display the Quickstart data.

- In the **input** category of your Node-RED palette, find the **ibmiot node** and drag it onto your flow (1)
- Double click on the **IBM IoT in** node and configure the node with your SensorTile **Device Id** (2) You can find the Device Id in the ST BlueMS mobile application if you do not remember it.
- Click on the **Done** button.

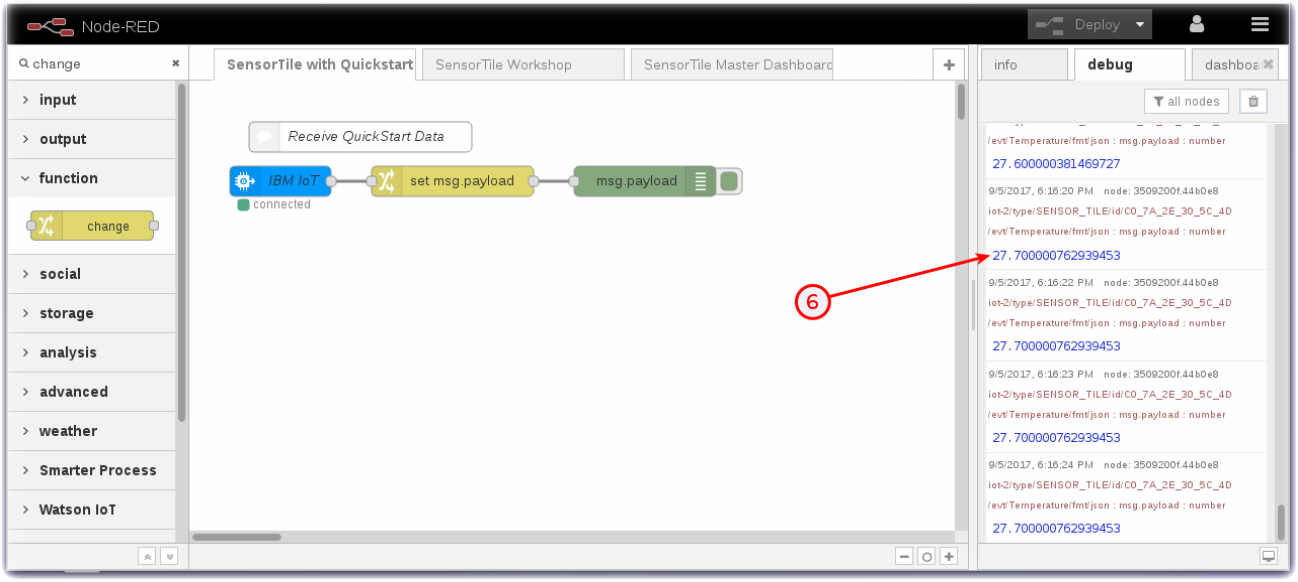




- In the **function** category of your Node-RED palette, find the **change node** and drag it onto your flow (3).
- Double click on the **change** node and configure the Rules by clicking on the "**a/z**" dropdown and select **msg.** (4) Type in **payload.d.Temperature** (5)



- Click on the **Done** button.
- In the **output** category of your Node-RED palette, find the **debug** node and drag it onto your flow.
- Wire the three nodes together as shown.
- Click the Deploy  button on the top of menu bar to deploy the Node-RED flow.
- Turn to the **debug tab** on the right sidebar of your Node-RED flow.
- You should observe Quickstart Temperature data (6) arriving from the SensorTile and the ST BlueMS application into your Bluemix application.



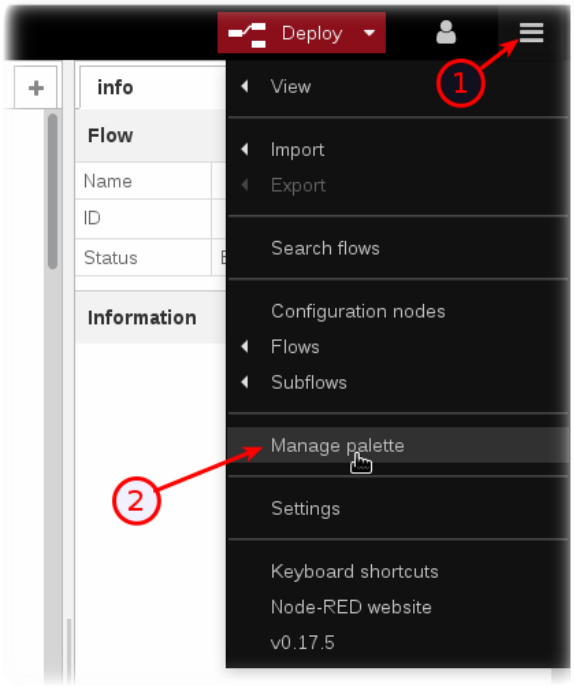
Section 4: Create a Watson IoT Node-RED Dashboard

In this Section, we will create a Node-RED Dashboard to visualize the SensorTile sensor data. Instead of ingesting publically viewable Watson IoT Quickstart data, we will switch to more secure Watson IoT Platform registered Device types and Device Ids. We will modify the ST Micro ST BlueMS mobile application to send data using registered device types and authorization tokens.

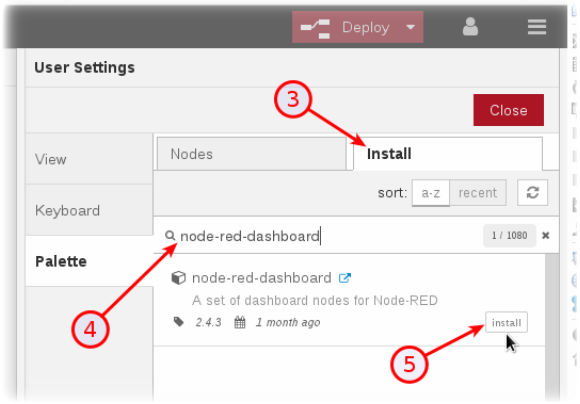
Step 1 – Install the Node-RED Dashboard nodes

The IoT Starter Application deployed into Bluemix includes just a small subset of Node-RED nodes. The Node-RED palette can be extended with over one thousand additional nodes for different devices and functionality. These NPM nodes can be browsed at **http://flows.nodered.org**

- In this Step, you will add the **Node-RED Dashboard** nodes to your Internet of Things Starter Application.
- Click on the Node-RED **Menu** (1) in the upper right corner, then **Manage palette** (2)



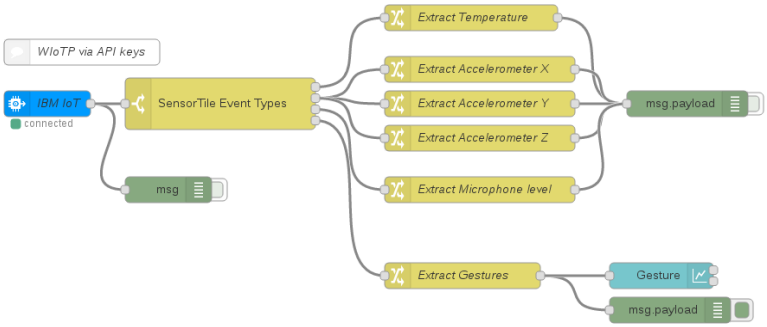
- Turn to the **Install** tab (3), type **node-red-dashboard** (4) and press the **Install** button (5).



- Press the **Install** button in the next dialog.

Step 2 – Import a prebuilt flow from GitHub

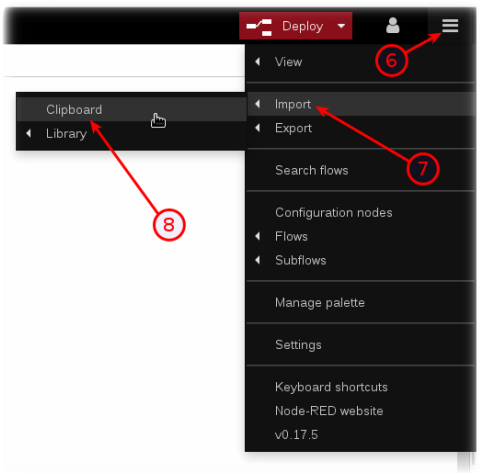
- Since configuring Node-RED nodes and wiring them together requires many steps to document in screenshots, there is an easier way to buld a flow by importing a prebuilt flow into your IoT Starter Application.



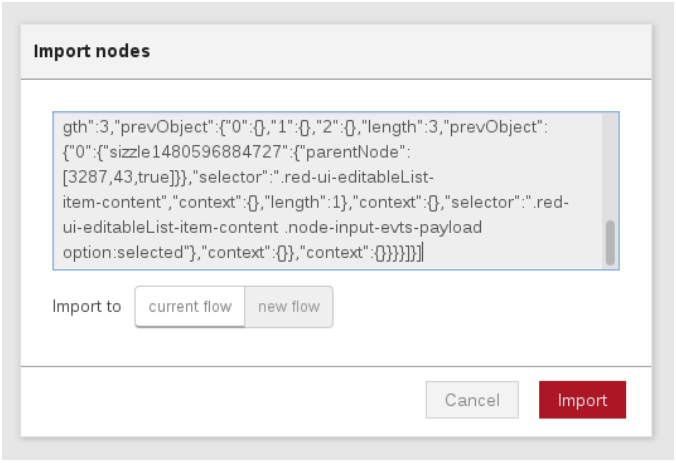
Get the Code:

http://ibm.biz/sensortile-nodered

- Open the **"Get the Code"** github URL listed above, mark or Ctrl-A to select all of the text, and copy the text for the flow to your Clipboard.
- Click on the Node-RED Menu (6), then **Import** (7), then **Clipboard** (8).



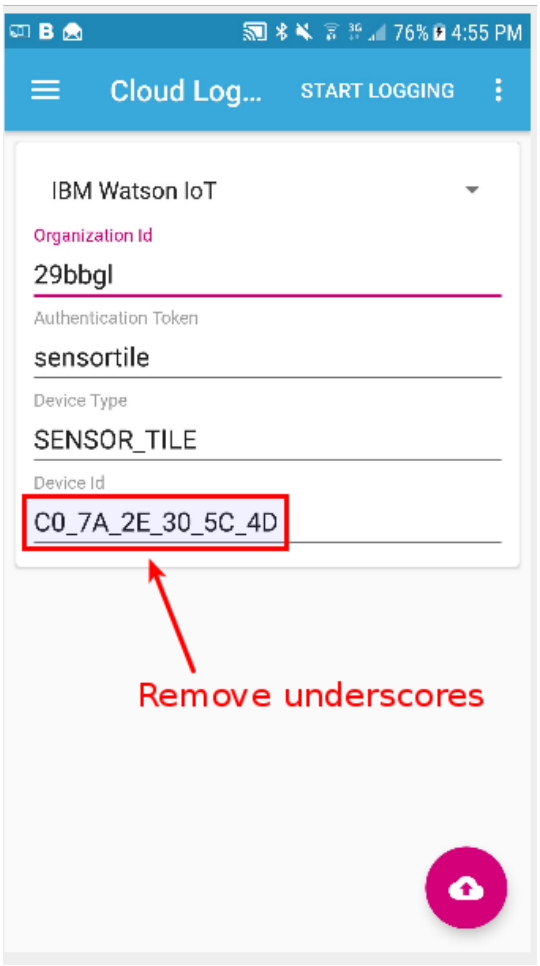
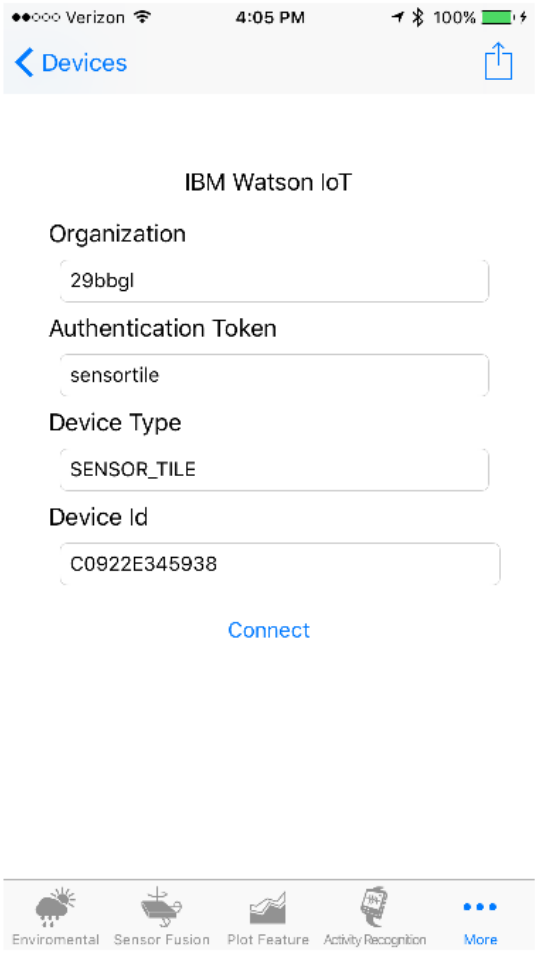
- Paste the text of the flow into the **Import nodes** dialog and press the red **Import** button.



- The new flow will be imported into a **SensorTile Workshop** tab.

Step 3 – Configure the ST BlueMS Mobile Application to send data to Watson IoT

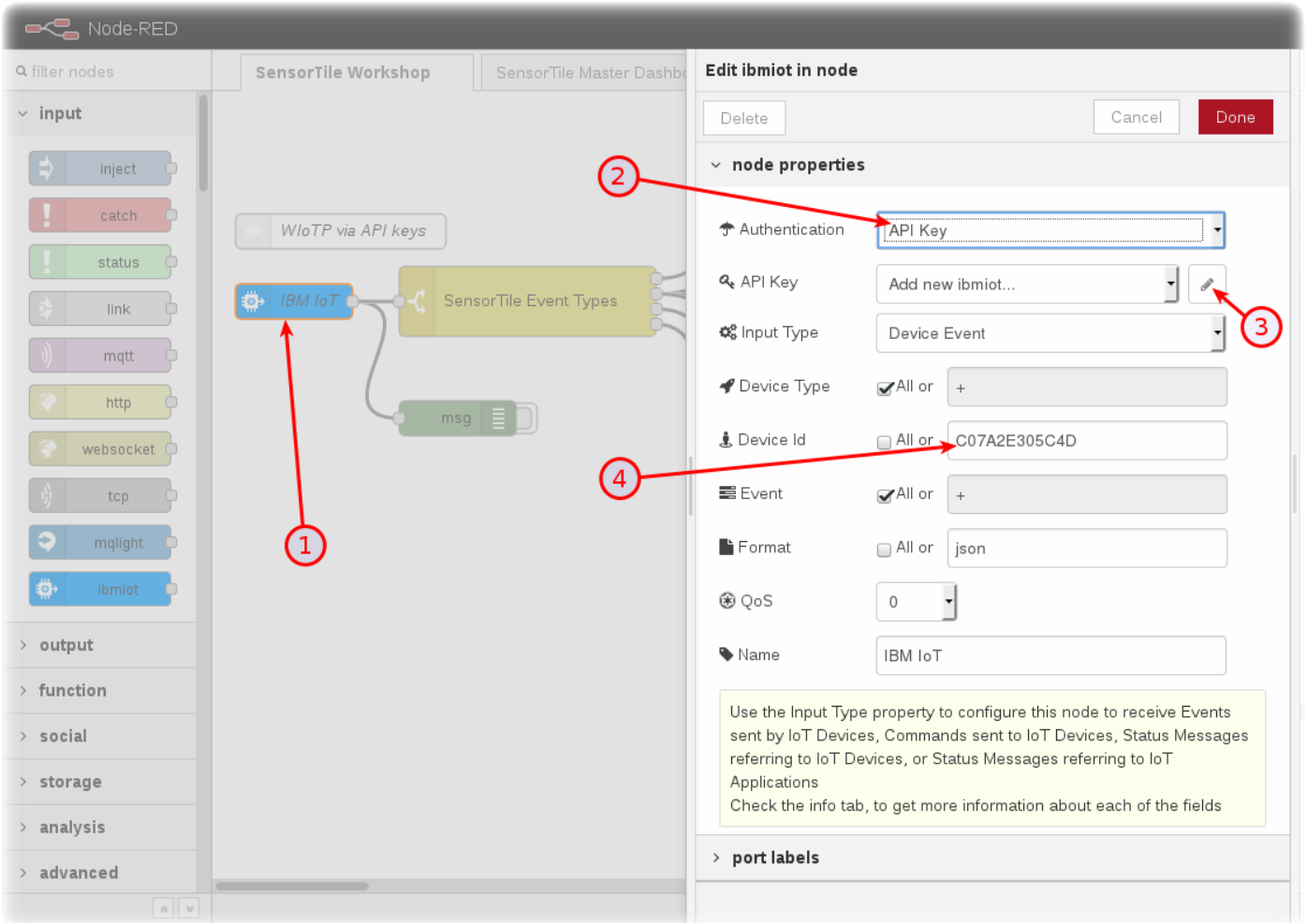
- To speed the limited time allocated to the workshop, all of the SensorTile Device Ids have been pre-registered into a single Watson IoT Platform instance. Normally, you would step through the Watson IoT Device Type and Device Id creation steps to register your SensorTiles.
- Open the ST BlueMS Mobile Application, connect to your SensorTile and turn to the **Cloud Logging** menu. Choose the **IBM Watson IoT** option from the dropdown.
- Enter **29bbgl** for the **Organization** Id
- Enter **sensortile** (in lowercase) as the **Authentication Token**
- The **Device Type** should already be prefilled with **SENSOR_TILE** (uppercase).
- The **Device Id** should already be prefilled with the MAC address of your SensorTile. REMOVE any _ underscores from the Device Id

Android	iOS
	

- Press the **Connect** icon (Android) or **Connect** (iOS).

Step 4 – Connect your SensorTile to your IoT Starter Node-RED application

- Click on the **ibmiot in** node (1) and the configuration panel will open. The SensorTile Device Ids have been pre-registered into a single Watson IoT Platform instance. You will use an API Key and API Token to receive your SensorTile data into your IoT Starter application.
- The ibmiot Authentication property should be set to **API Key** (2)
- Click on the **Edit** icon (3) to input the API Key and API Token.

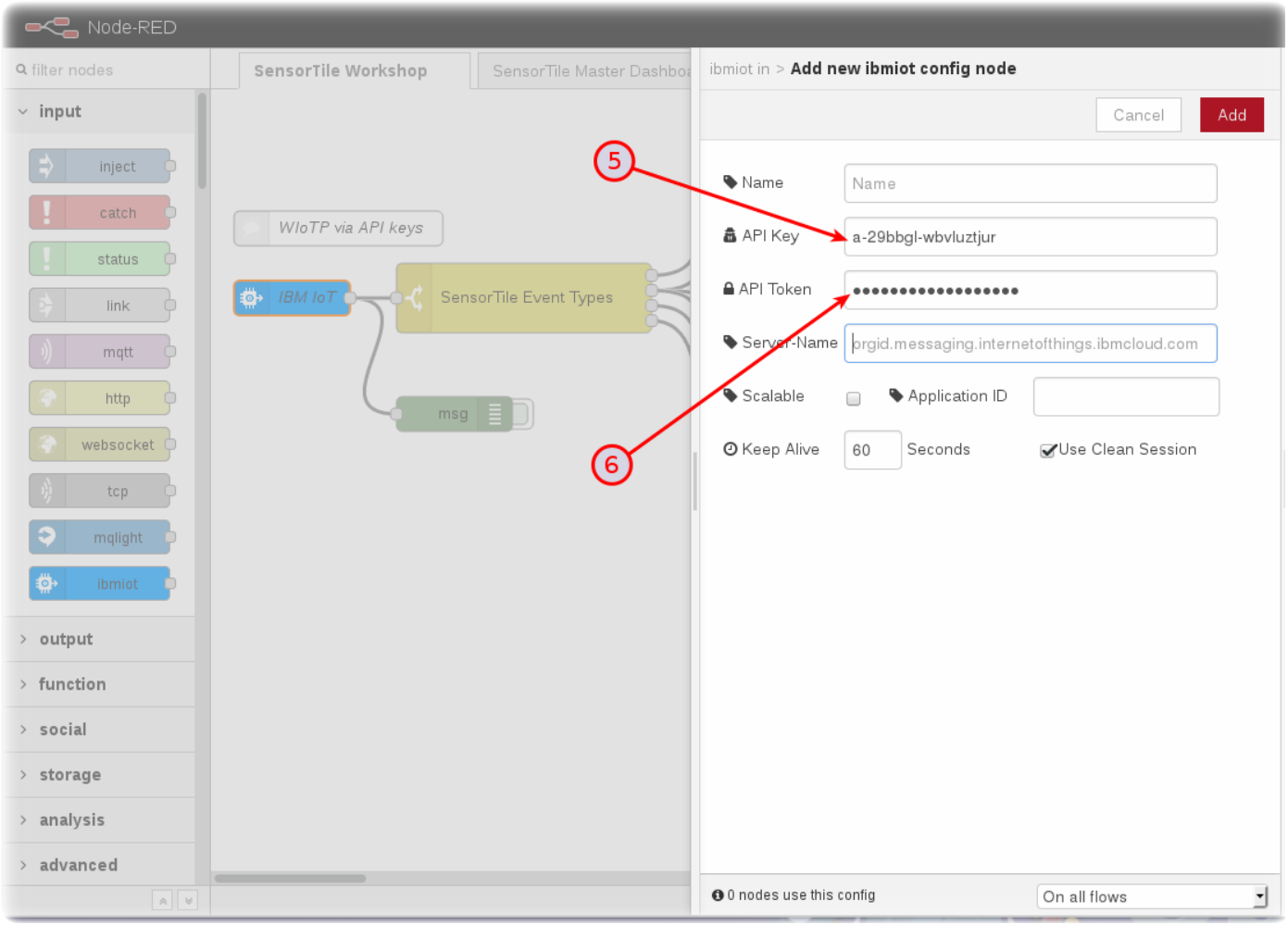


- The ST BlueMS mobile application provided your individual **SensorTile Device Id**. (4) Enter the DeviceId (without _ underscores!)

- The API Key (5) should already be entered as seen in the screenshot. If not, type in

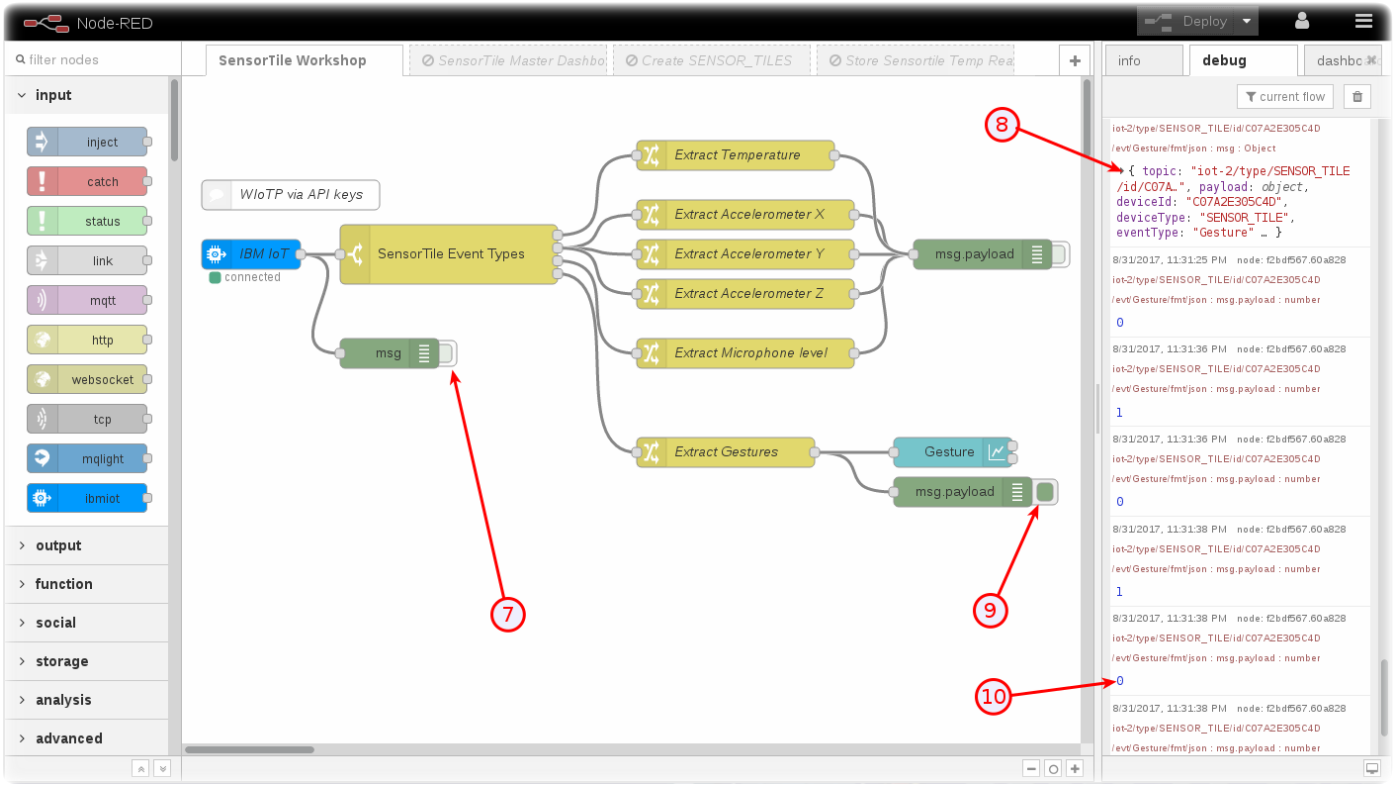
a-29bbgl-wbvluztjur

- Since the Workshop materials are posted on the public Internet github, the instructor will display the API Token on the projector for you to enter manually (6)



- Click on the red **Add** button.
- Click on the red **Done** button.
- Click the Deploy  button on the top of menu bar to deploy the Node-RED flow.

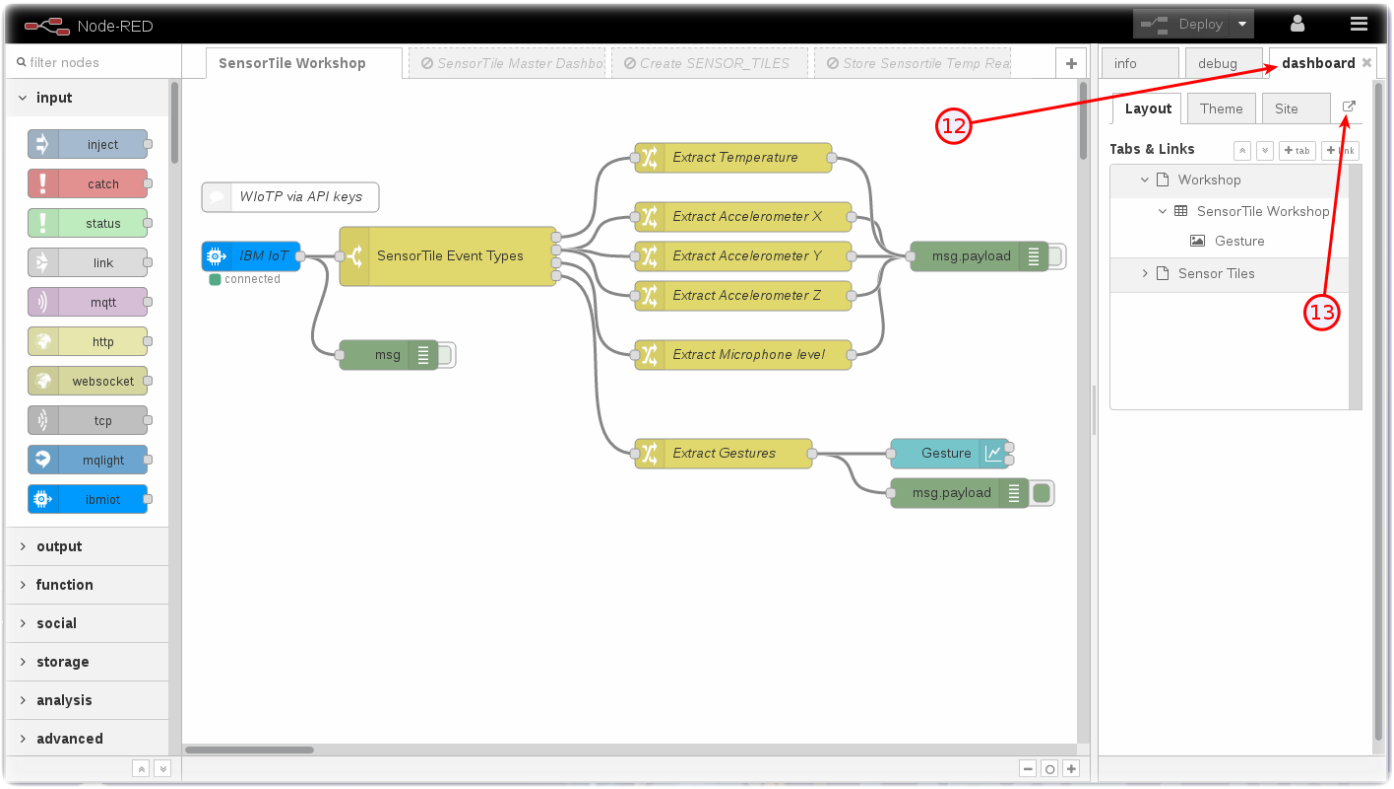
- Turn to the “debug” panel on the right Node-RED sidebar to see the SensorTile data flowing through your Node-RED application. The SensorTile and ST BlueMS mobile application sends high frequency data to Watson IoT Platform. The debug panel will scroll quickly with sensor messages (8). The data arrives in json format. You can turn on/off the output of the full messages by toggling the tab on the debug node (7).



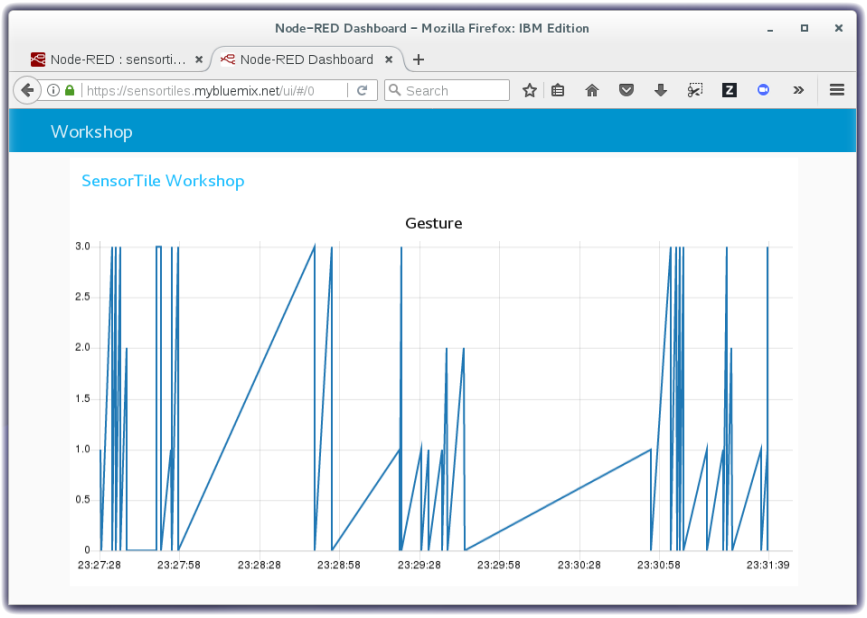
- This Node-RED flow is programmed to extract and plot several of the SensorTile sensor data. Within the ST BlueMS mobile application you can send Temperature, Acceleration and Microphone Level to this Bluemix application. As an independent excerise, you can send additional SensorTile sensor data by modifying the **SensorTile Event Types** switch node.
- As an example, the workshop will plot the Gesture events as you move the SensorTile. Observe the Gesture values (10) printed by the debug node (9).

Step 5 – Launch the Node-RED Dashboard

- At the beginning of this Section, we added the Node-RED Dashboard nodes. This set of chart, gauge, slider, text, listbox nodes can quickly create live data dashboards. To launch the Node-RED dashboard, turn to the **dashboard** tab (12) in the Node-RED sidebar. Launch the Node-RED dashboard by clicking on the **launch** icon (13).

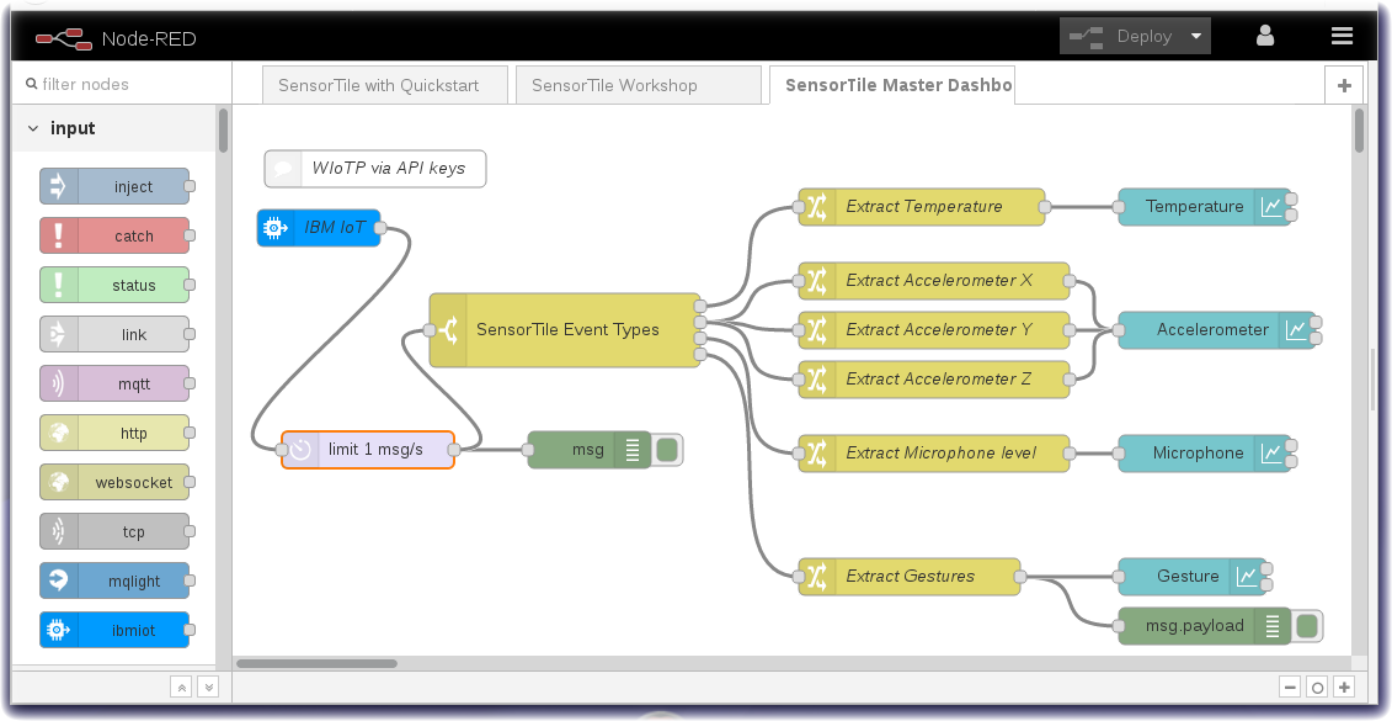


- A new browser tab will open and plots the Gesture events. Shake your SensorTile in various directions.



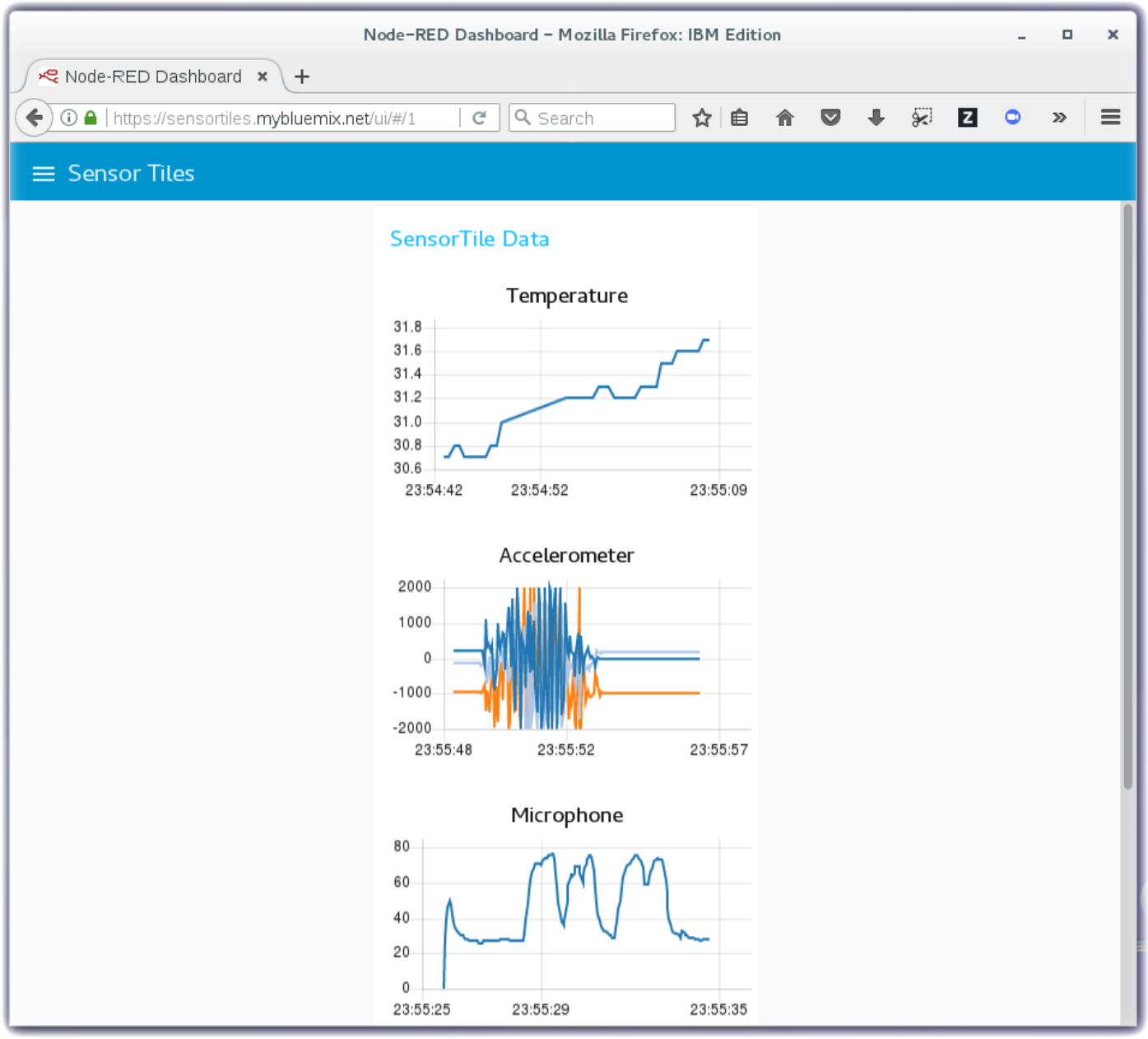
Step 6 – Extra Credit – Additional Node-RED Dashboard Charts

- The SensorTile workshop time is limited. This remaining section will be Extra Credit for further exploration. Additional Node-RED Dashboard charts can been added to plot and visualize the Temperature, Acceleration and Microphone Level data from the SensorTile. You can plot multiple datasets on a single chart. In this flow, the Acceleration X, Y, Z data is plotted in one chart.



- **Get the Code** from GitHub– **http://ibm.biz/sensortile-workshop-extra**
- **Import** the Node-RED flow into your IoT Starter Application following the procedure learned in Section 4 Step 2. This flow will open in a new Node-RED tab called SensorTile Master Dashboard.
- Configure the IBM IoT node with the **Watson IoT Platform API Key / API Token** following the procedure learned in Section 4 Step 4.
- Note that a **Rate Limit delay** node has been inserted into this flow to slow the high frequency SensorTile data being plotted.
- Click the Deploy 

button on the top of menu bar to deploy the Node-RED flow.
- Turn to the Node-RED Dashboard and switch to the new SensorTiles tab by pressing the menu in the upper left corner.



- Congratulations! You have completed the workshop.

References

In this final section, we will challenge the workshop attendee to implement other projects using Watson IoT Platform, the Watson IoT Real Time Insights rules engine and alerts.

There are many recipes available at:

https://developer.ibm.com/recipes