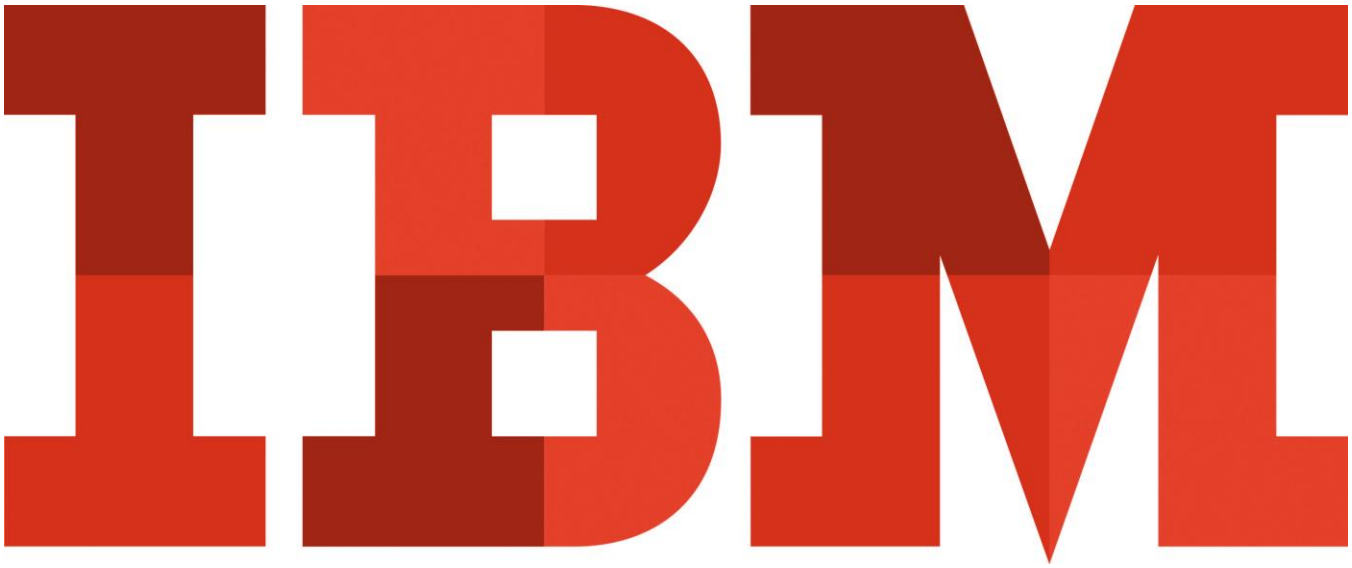
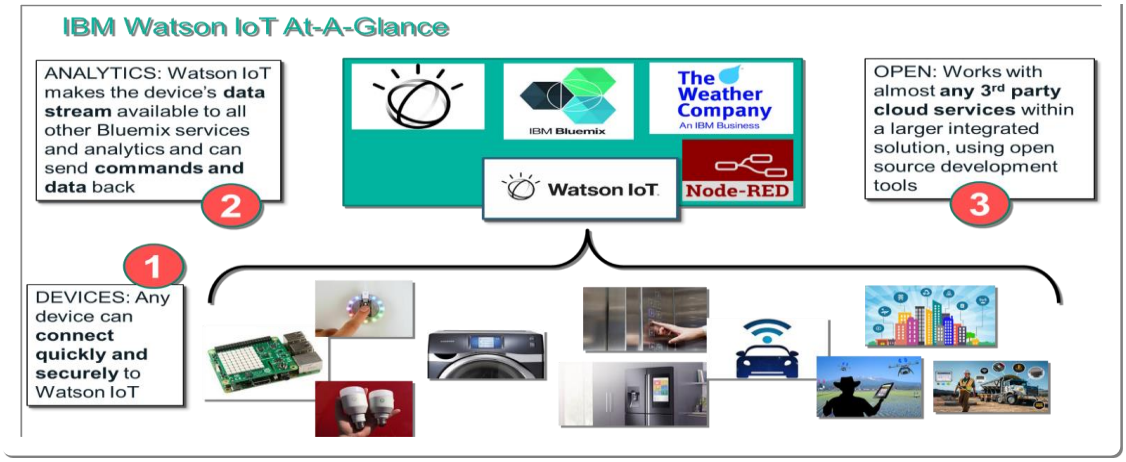
Building a Watson IoT App

V1. 2/9/2016



Assignment – Build a Watson IoT App



This assignment details a Developer Experience creating a Bluemix Watson IoT application. You will create an IoT application that analyzes simulated sensor data using Quickstart and Node-RED. Data will also be analyzed using the Watson IoT Rules Engine. Sensor data will be visualized using Watson IoT Dashboard and Cards.

In this assignment, we will connect a simulated IoT Sensor device to the IBM Bluemix and Watson IoT Platform. We will send and graph temperature data to the Watson IoT Quicktart and registered devices. Watson IoT Platform will report the temperature and compare the temperature value in each event with a threshold. Using Node-RED, the application will analyze if the temperature is above the threshold and send SMS alerts.

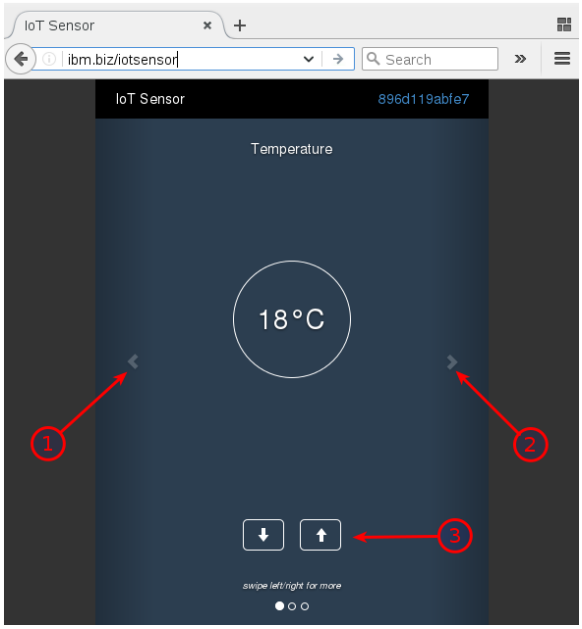
Section 1 – Create an IoT Sensor Simulator

In this Section, we will create an IoT Sensor device simulator and demonstrate sending data to the Watson IoT Platform.

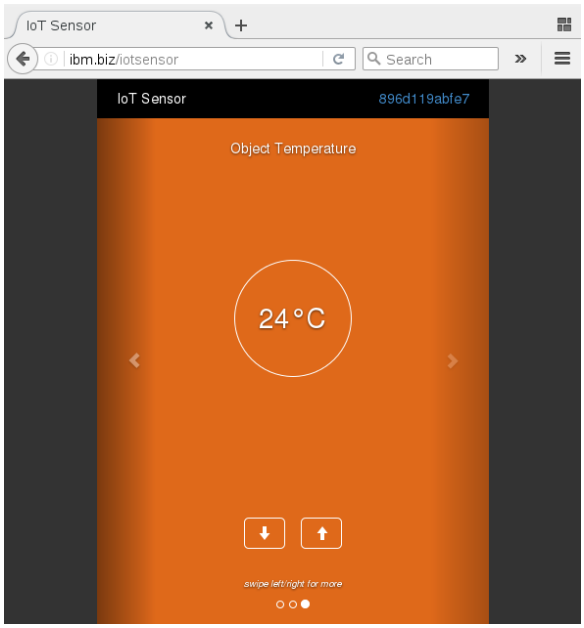
Step 1 – On your laptop, open a Firefox or Chrome browser window

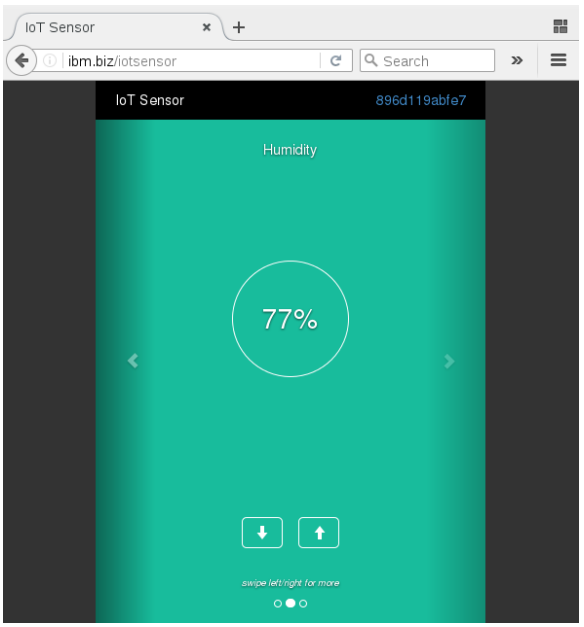
An IoT Sensor Simulator is available to demonstrate sending data to the Watson IoT Platform. It sends one simulated sensor data reading per second. There are simulated Temperature, Humidity and Object Temp sensor readings. It automatically sends the simulated data to the IBM Watson IoT Platform Quickstart.

- Open a browser tab to **http://ibm.biz/iotsensor**



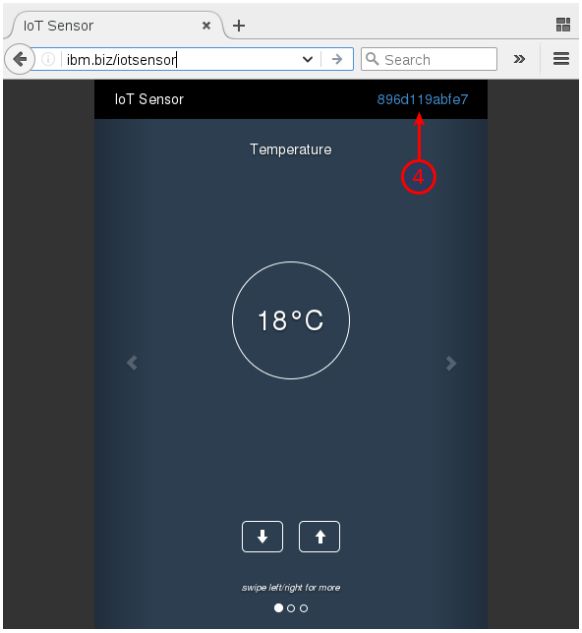
- Swipe left (1) or right (2) to view additional Object Temperature or Humidity simulated sensors. Use the Arrow buttons (3) to increase / decrease the simulated sensor value.





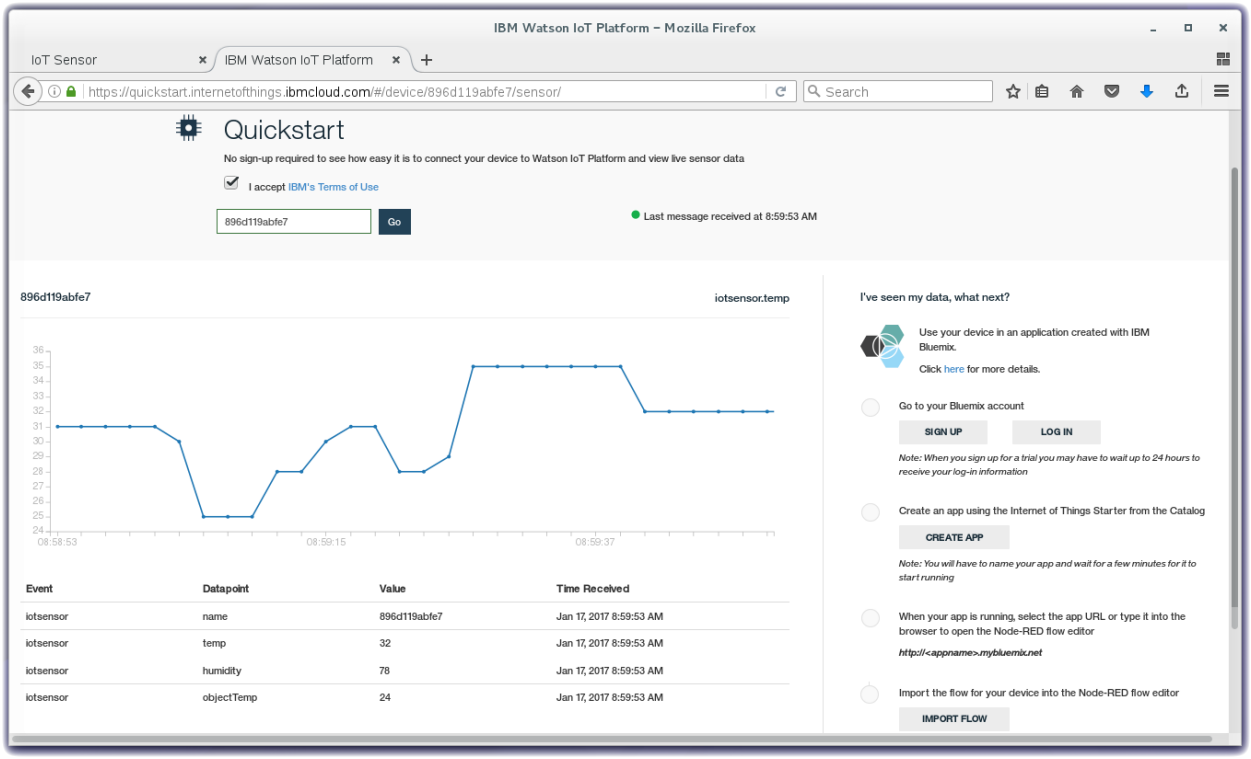
Step 2 – View the simulated data in the IBM Watson IoT Platform Quickstart

- To view this simulated data in the IBM Watson IoT Platform Quickstart, click on the generated Device ID in the upper right corner (4). **Note the unique Device ID**. This Device ID will be used in Section 2.



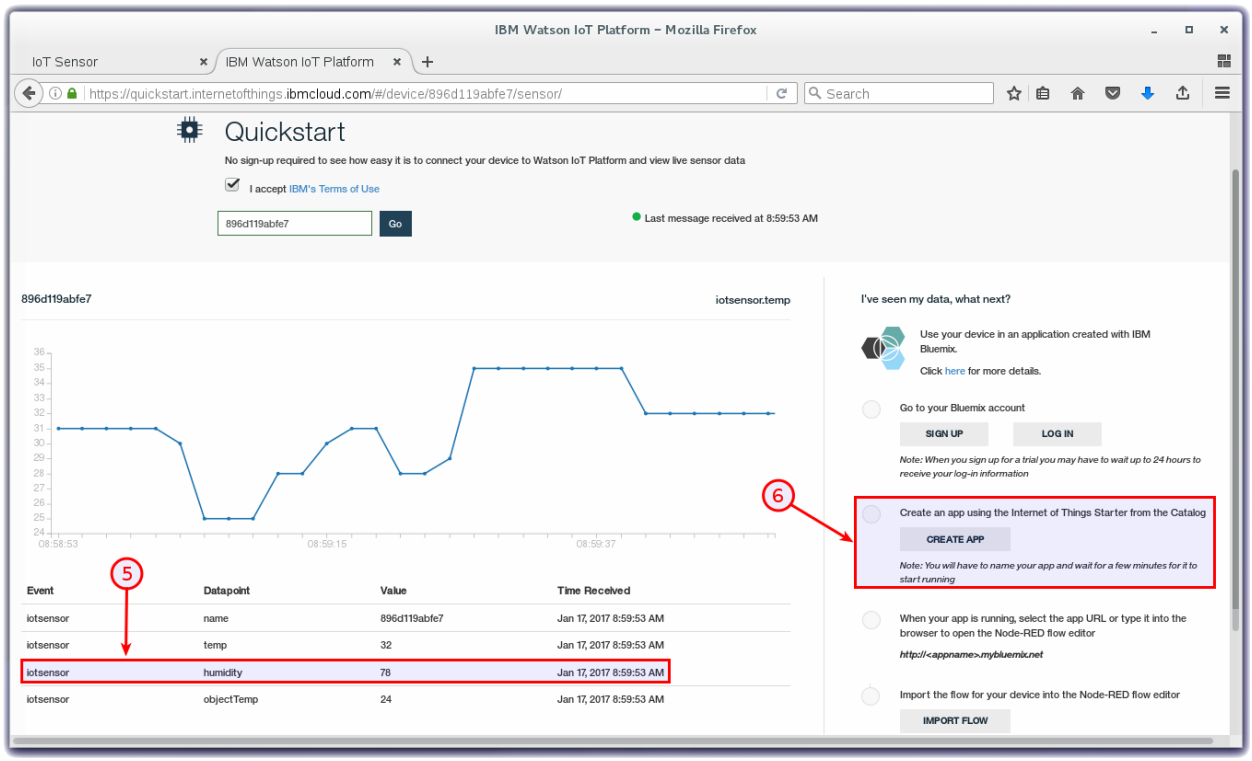
- A new browser tab will open to

http://quickstart.internetofthings.ibmcloud.com/?deviceId=<device id>



- Experiment with the up / down arrows (3) on the simulated Temperature sensor to plot different readings on the Quickstart graph.

- To view the other simulated sensor readings, select the Datapoints (5) in the table below the graph. You can click on any of the three datapoints to plot them.



- Congratulations! You have successfully sent simulated sensor data to the Watson IoT Platform.

Observations:

Step 3 – Create an app using the Internet of Things Starter

- **Important: If you have not yet logged into Bluemix, please do so at this point:**

  http://bluemix.net/

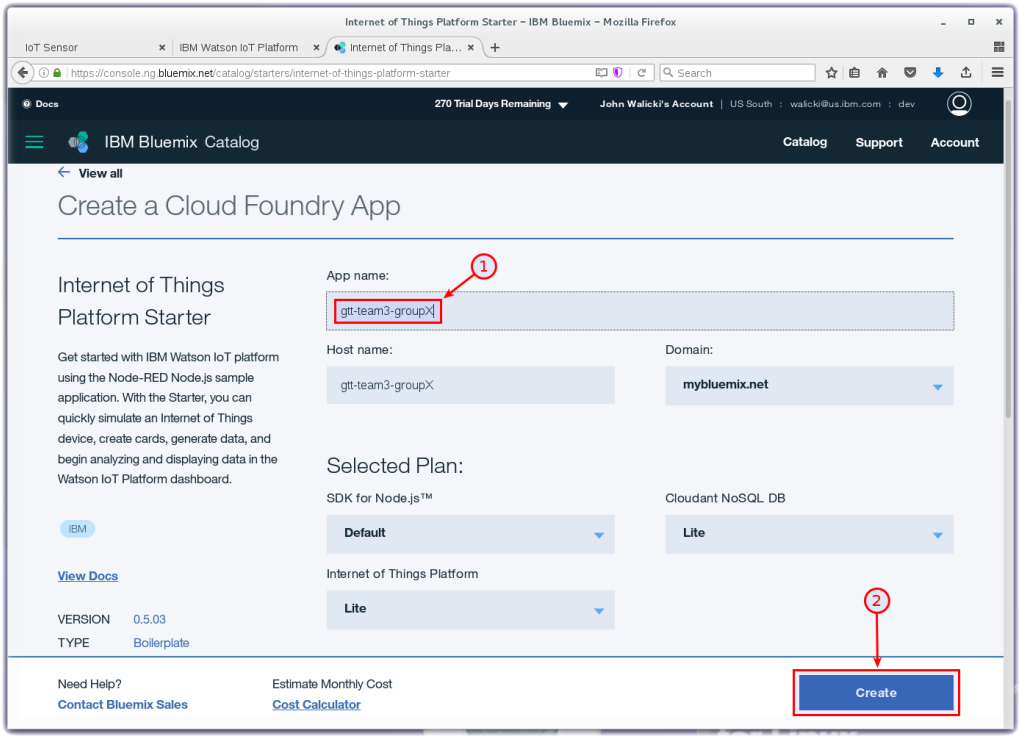
- On the right hand side of the Quickstart graph there are instructions (6) to create an app using the Internet of Things Starter.
- If you have already logged into Bluemix with your new account, click on the CREATE APP button (6)
- Proceed to Section 2 on the next page.

Section 2 – Create an Internet of Things Starter App

Step 1 – Create an IoT Starter Application

Now that we have sent the simulated IoT Sensor data readings to Watson IoT Quickstart, in this Section we will create an IoT Starter Application to ingest and analyze the Quickstart data.

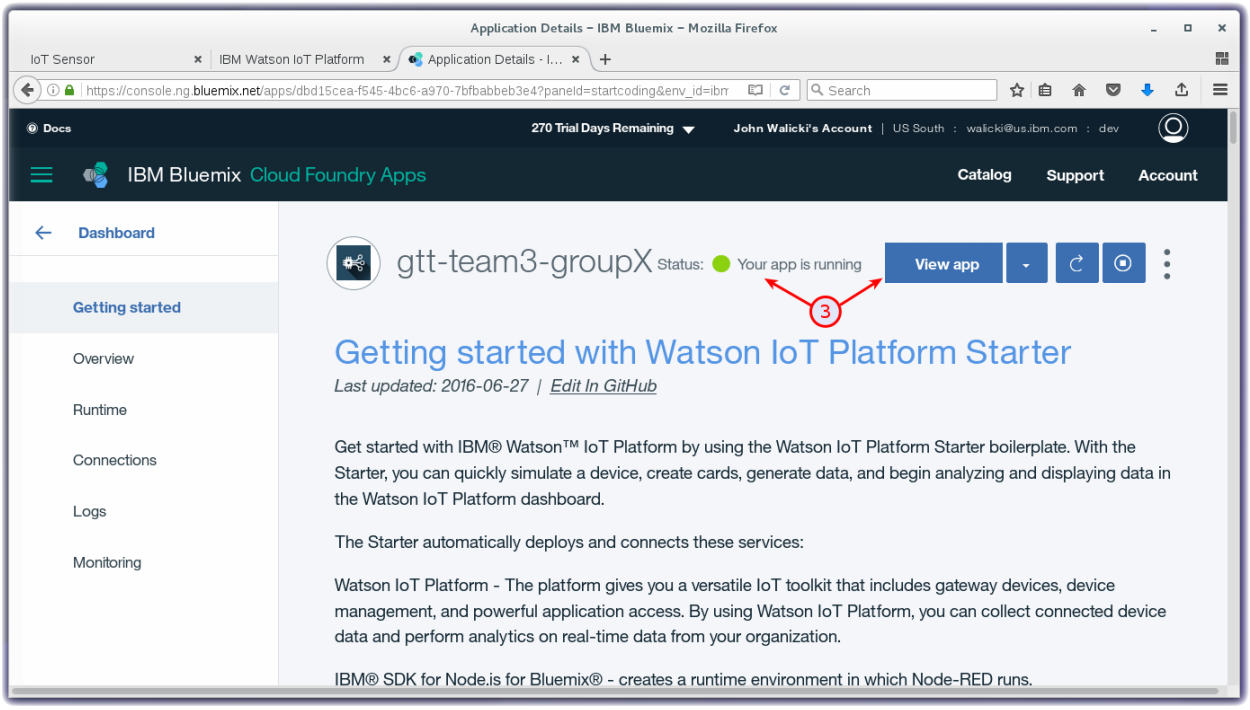
- The **Internet of Things Platform Starter** boilerplate is designed with pre-assembled services that work together. The Internet of Things Platform Starter includes a Node-RED Node.js web server, Cloudant database to store the sensor data, and the IoT platform service so you can connect devices.
- Name your application something unique (1). 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 (1) - eg. **my-team4-groupX**
- Press the Create button (2).



- 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.

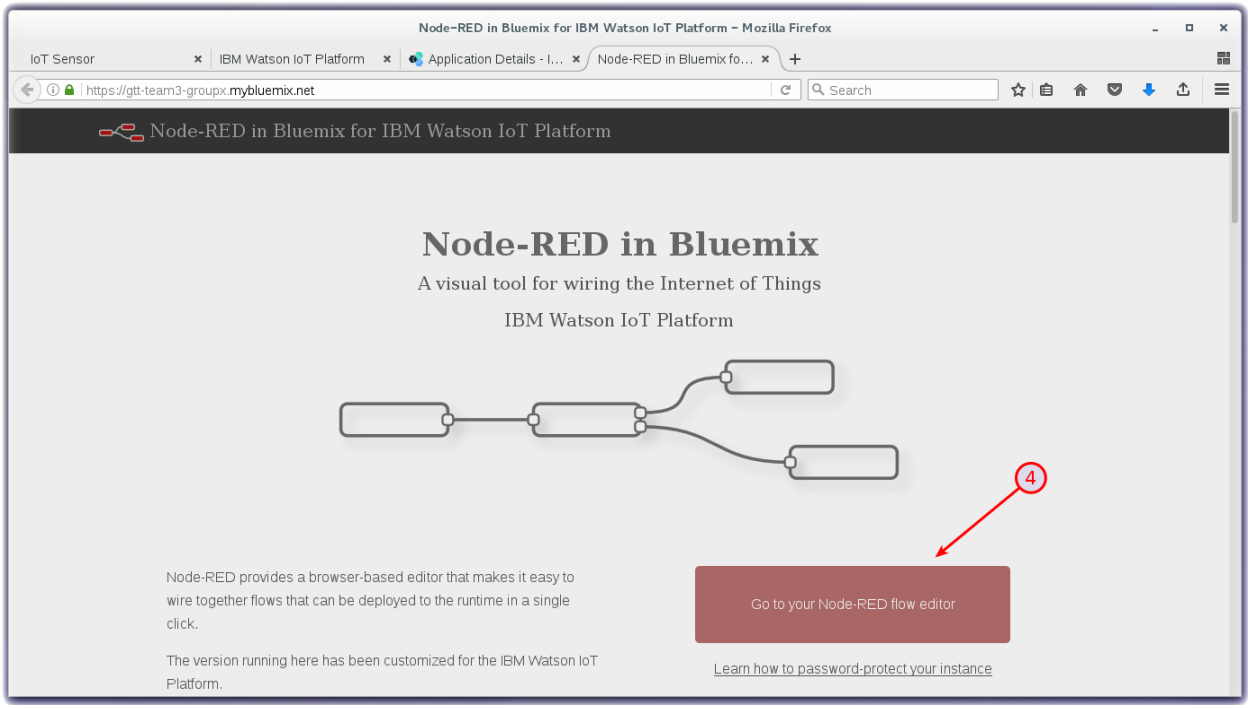
Step 2 – Launch the IoT Starter Application

- Once the Green "Your app is running" appears, Click the View app View App button (3).



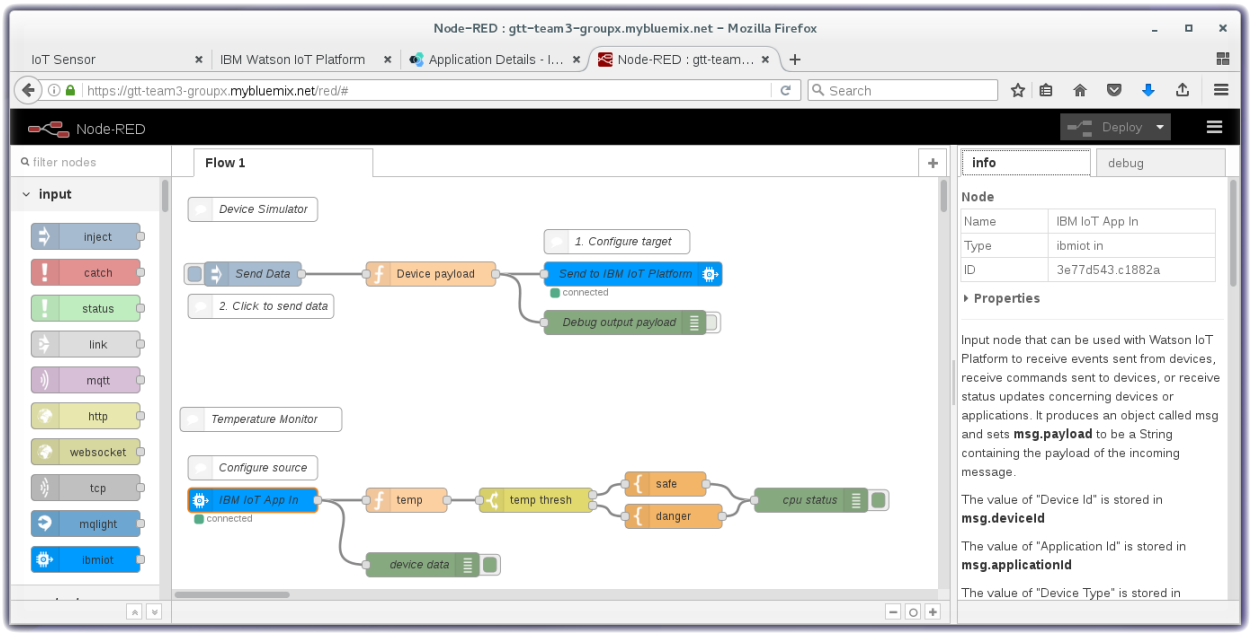
Step 3 – Open the Node-RED visual programming editor

- 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. Click

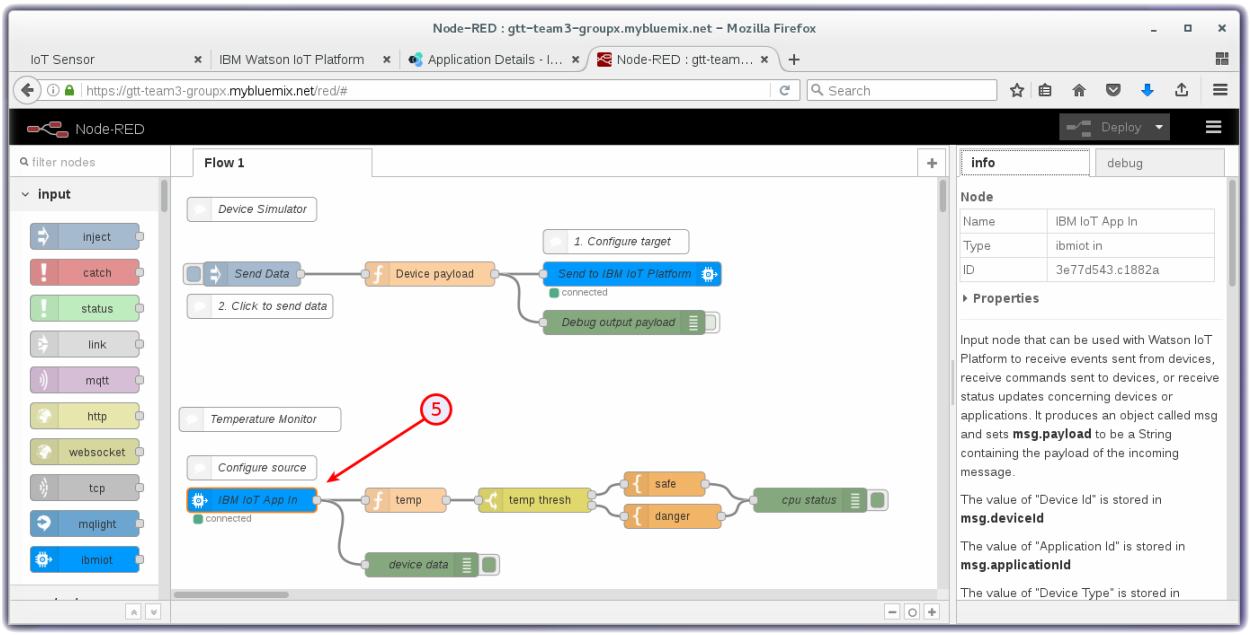


on the red button **Go to your Node-RED flow editor** (4) to launch the editor.

- 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.



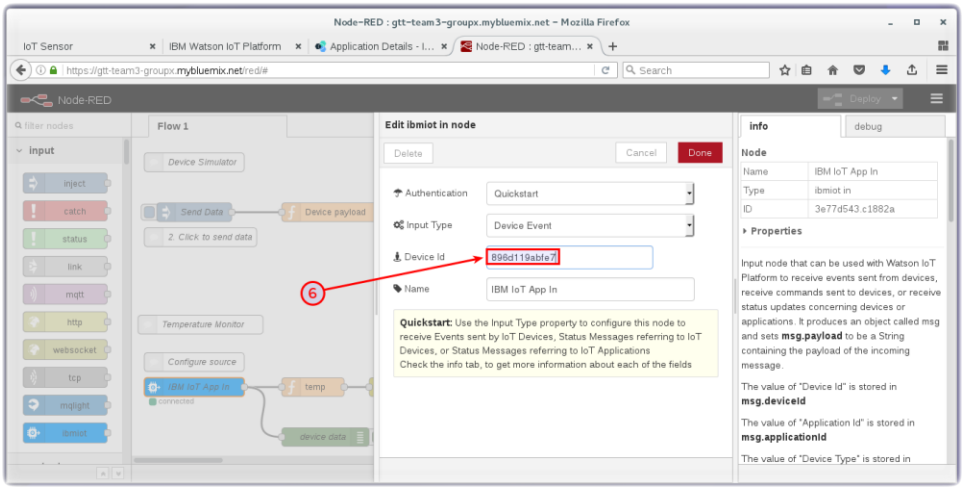
- The top half of the sample IoT Starter flow is not applicable to this workshop.
- The bottom half of the sample will be modified to send email alerts.
- Double Click on the IBM IoT App In (5) node.



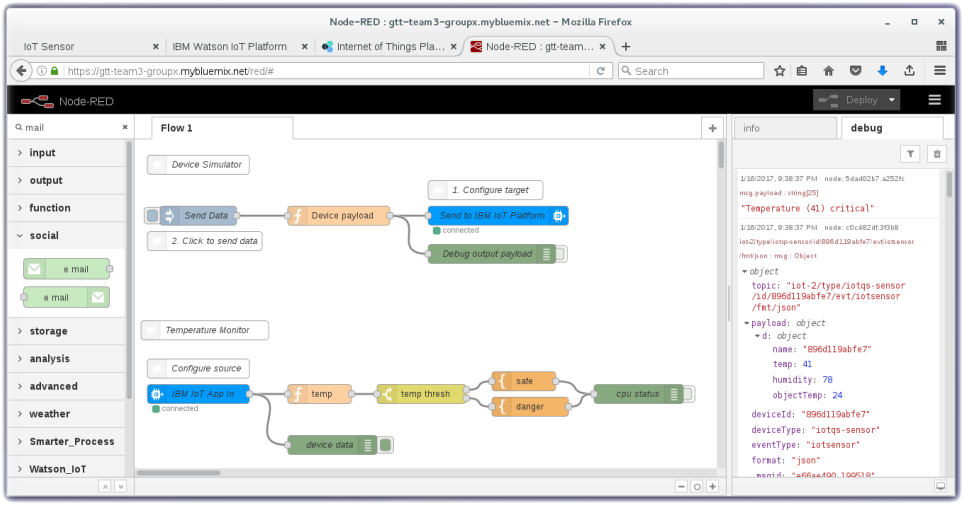
Observations:

Step 4 – Connect the IBM IoT Node to your IoT Sensor device simulator

- An ibmiot in node configuration panel will open. Paste the Simulator Device ID from Section 1 Step 2 into the "Device ID" field (6) and click on the Done button. You can Copy and Paste the Device Id between browser tabs.



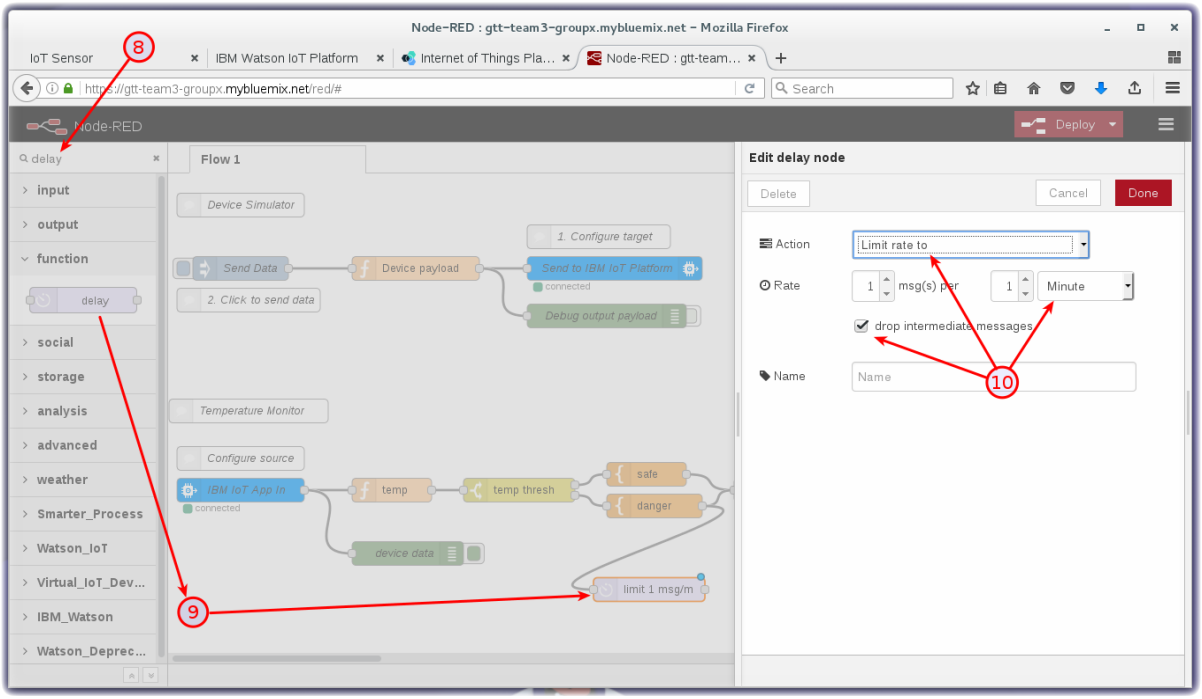
- Click the Deploy button on the top of menu bar to deploy the Node-RED flow.
- Turn to the "debug" tab to see the sensor data flowing through your Node-RED application.
- Switch to the IoT Sensor browser tab and increase / decrease the simulated values.
- Increase the temperature above 41
- If you see a debug alert "Temperature (41) critical"
- Expand the twisties in the JSON object to see the payload values.



Step 5 – Wire additional nodes into the flow

- Since we don't want to send an Critical Temperature email alert every second, Node-RED has a rate limit node.
- Search for delay node (8).

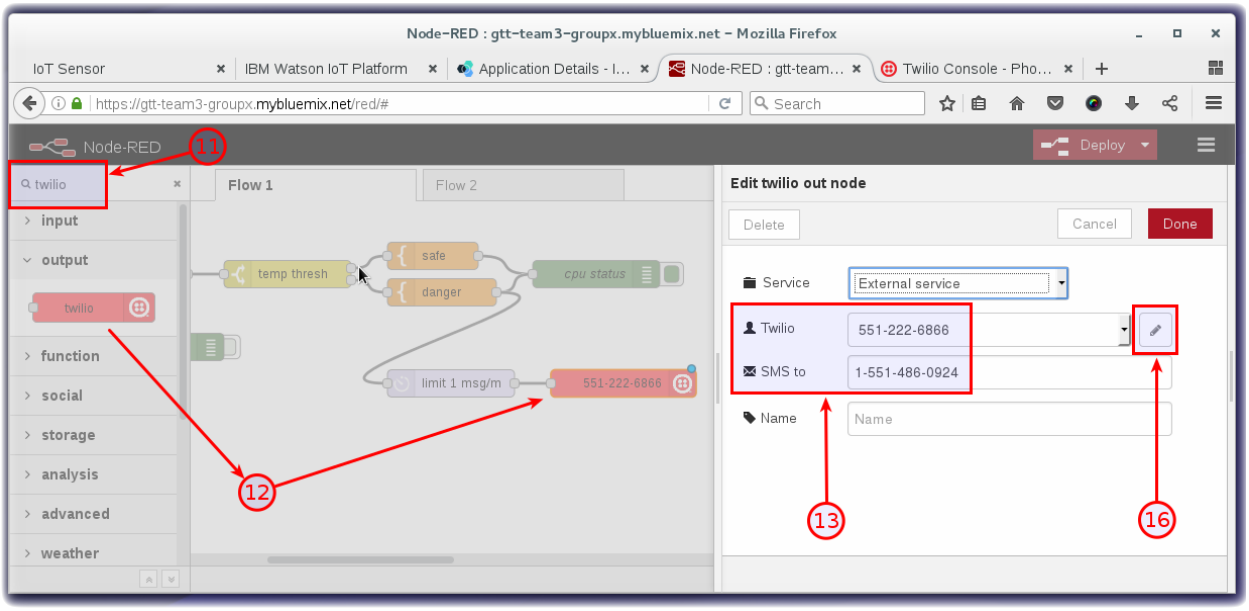
- Drag the delay node from the palette to the flow and wire it to the "danger" template node (9).
- Double click on the delay node and configure the node to **Limit the rate to 1 message per Minute** and to **drop intermediate message**s (10).
- Press the Done button.



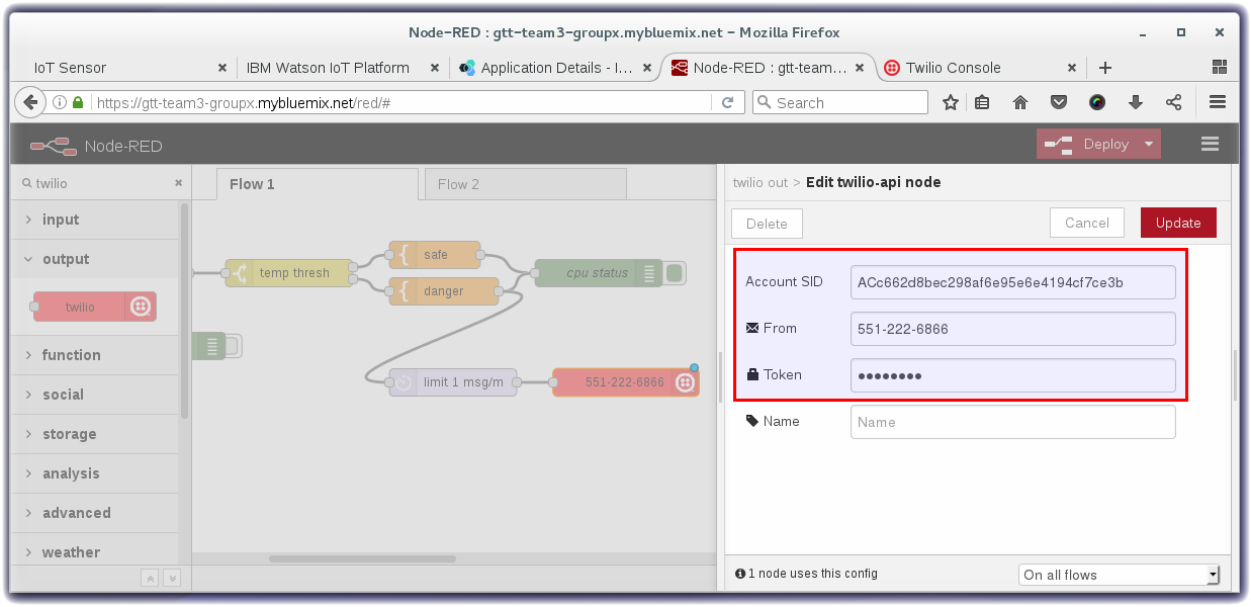
Observations:

Step 6 – Send a SMS alert

- Search for the "twilio" node (11).
- Drag the twilio node from the palette to the flow and wire it to the limit node (12).
- Double click on the twilio node and enter the twilio settings (13).
- If you are using a gmail



- Click on (16) to configure your Twilio credentials.



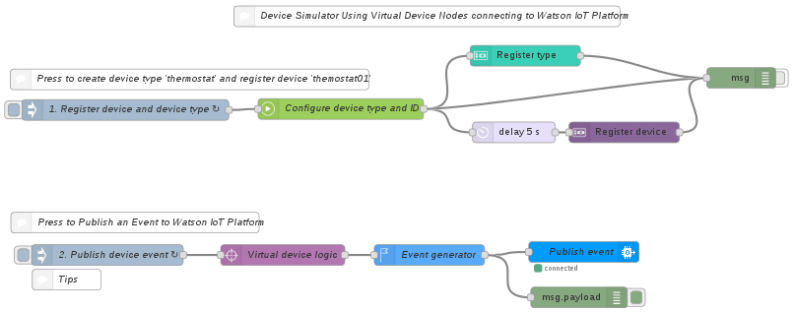
- Press the Done button.
- Click the Deploy button on the top of menu bar to deploy the Node-RED flow.

Section 3– Create a Watson IoT Dashboard Card

In this Section you will create several Cards on the Watson IoT dashboard that graph the sensor data arriving from the IoT Sensor device simulator.

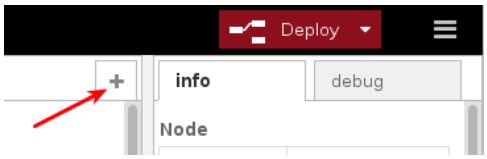
Step 1 – Create an registered IoT device simulator

- To receive data from a registered device within the Watson IoT Platform, we need to create a virtual device. This flow can be pasted into Node-RED.

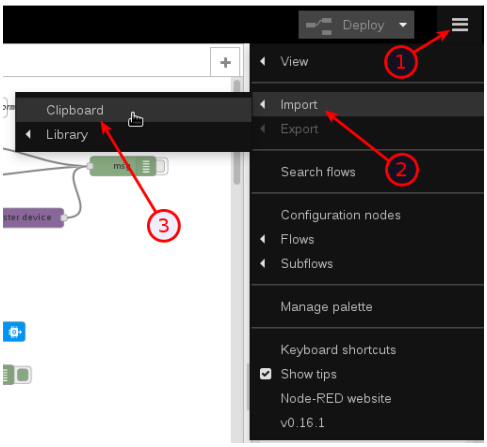


Get the Code:
Http://ibm.biz/virtualdev-nodered

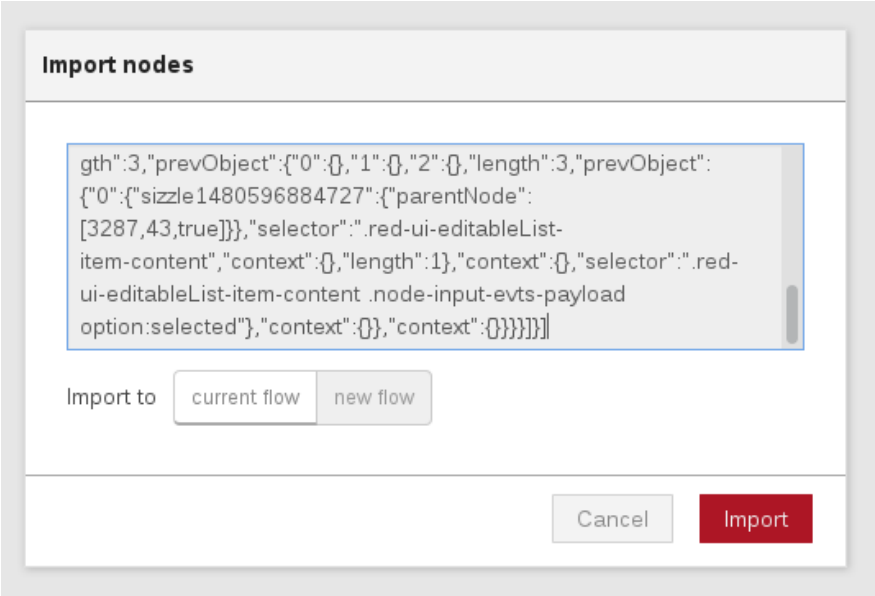
- First, download and copy the above text for the flow to your Clipboard.
- Within the browser Node-RED tab, create a new flow tab.



- Next, click on the Node-RED Menu (1), then Import (2), then Clipboard (3).



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



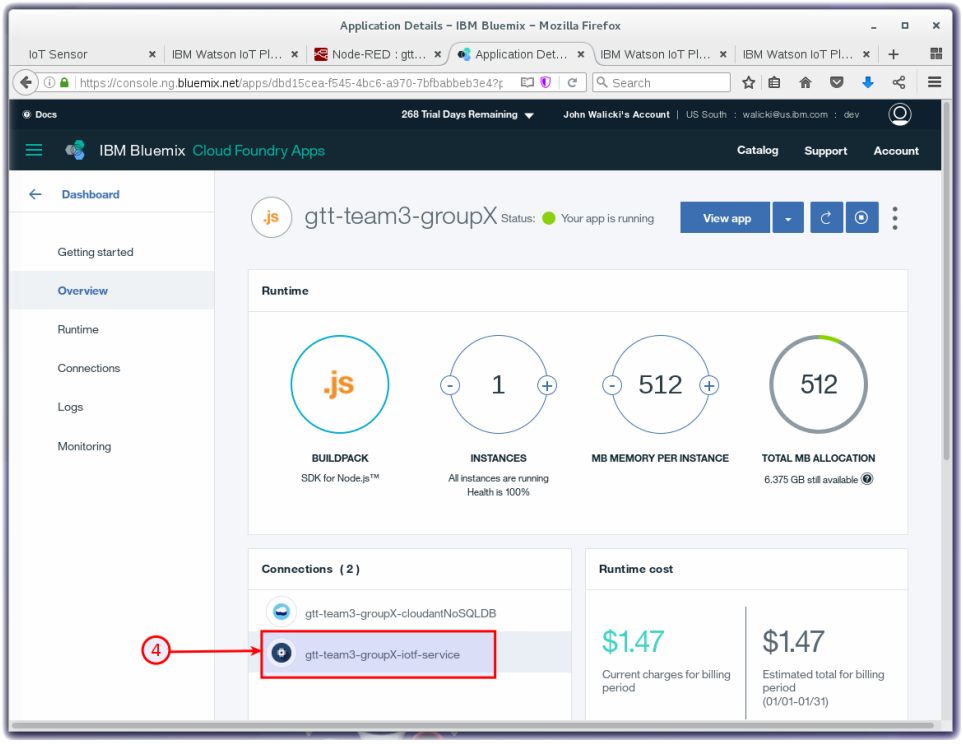
- Drag the new flow nodes to Flow 2 and click the left mouse button to drop it.
- Click on the

button in the top right of the screen to save and deploy your changes.
- The flow creates a Device Type, registers a Device ID and starts to publish virtual device data.

Observations:

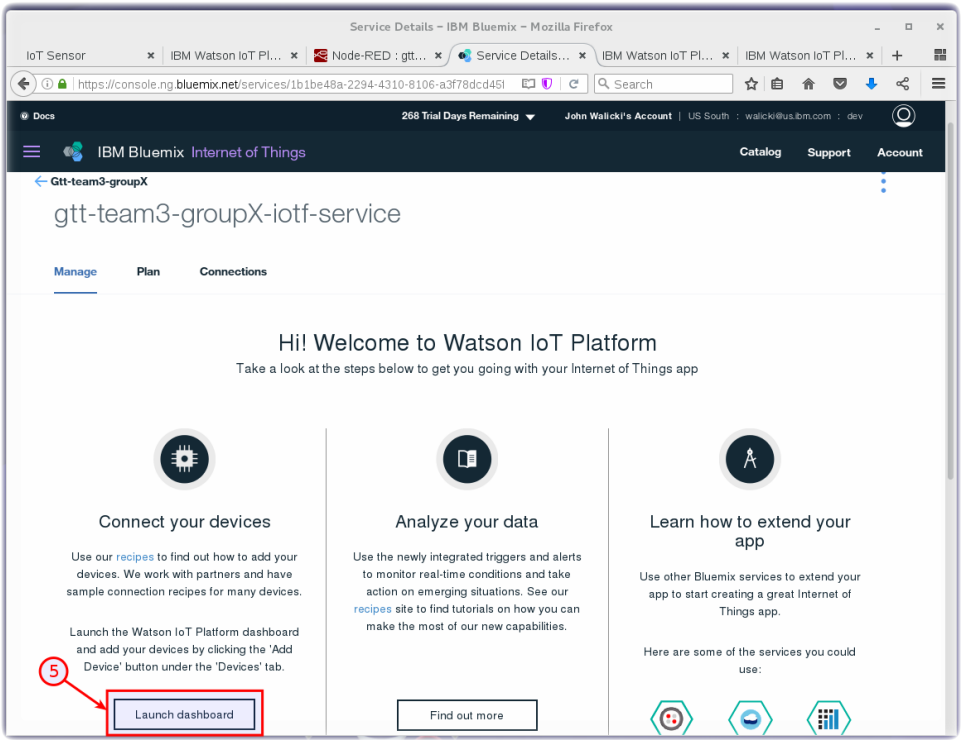
Step 2 – Open the Watson IoT Platform service page

- From Bluemix, return to the Internet of Things Starter application that you created in Section 1 Step 3.

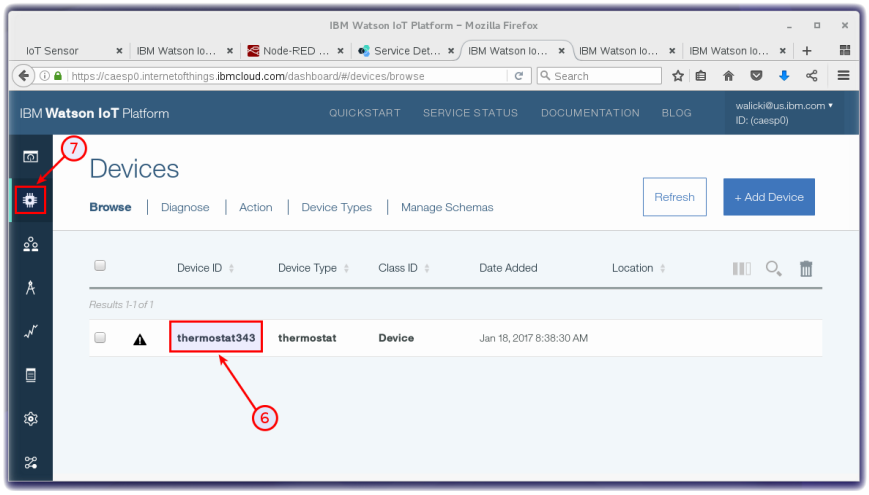


- Click on the iotf service Connection (4).

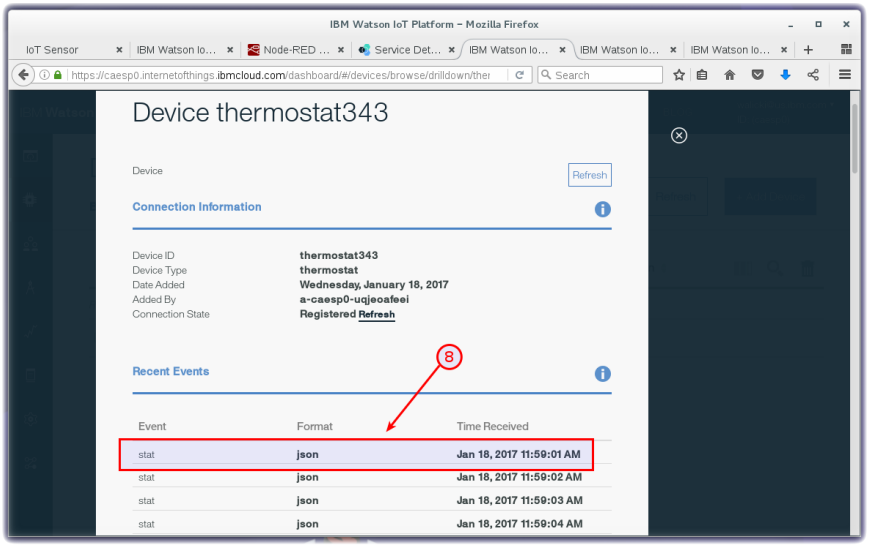
- Your browser will open to the Watson IoT Platform service page where you can interact with Devices and Analyze your device data. Click on Launch Dashboard (5).



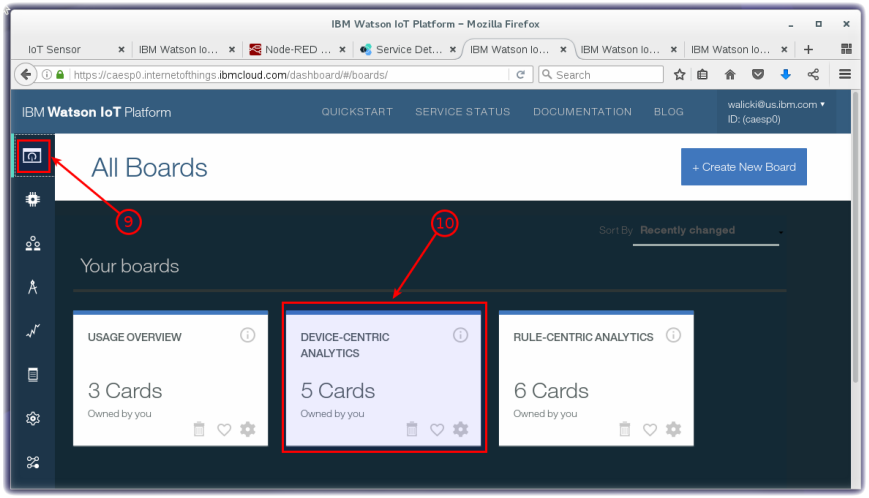
- Under the Devices (7) you should see your thermostat device (6).



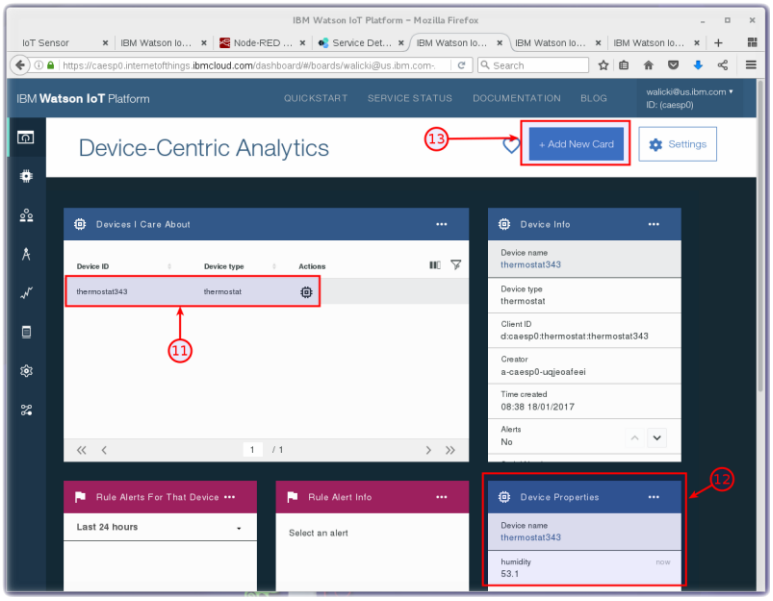
- Double Click on the thermostat device and you will see Event data (8) arriving.



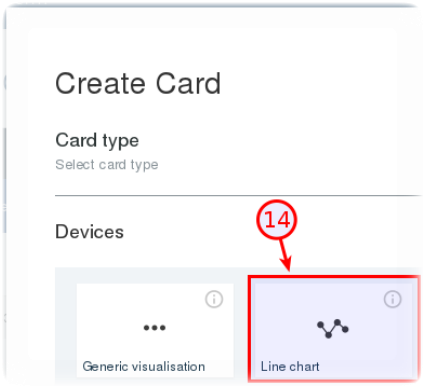
- Click on the **Boards** menu (9) and then click on the **Device-Centric Analytics** card (10).



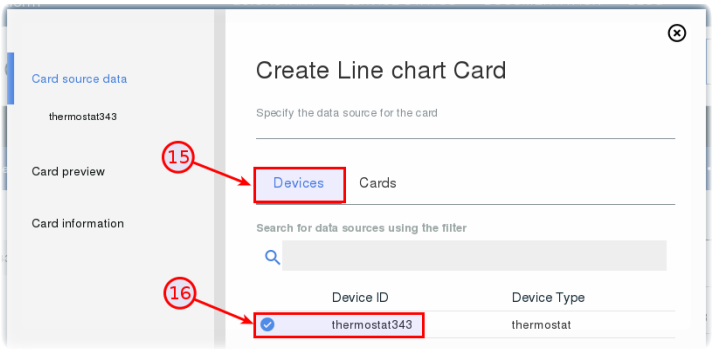
- The generated values of the simulated device (11) appear in the Device Properties card (12)
- Click on the Add New Card (13).



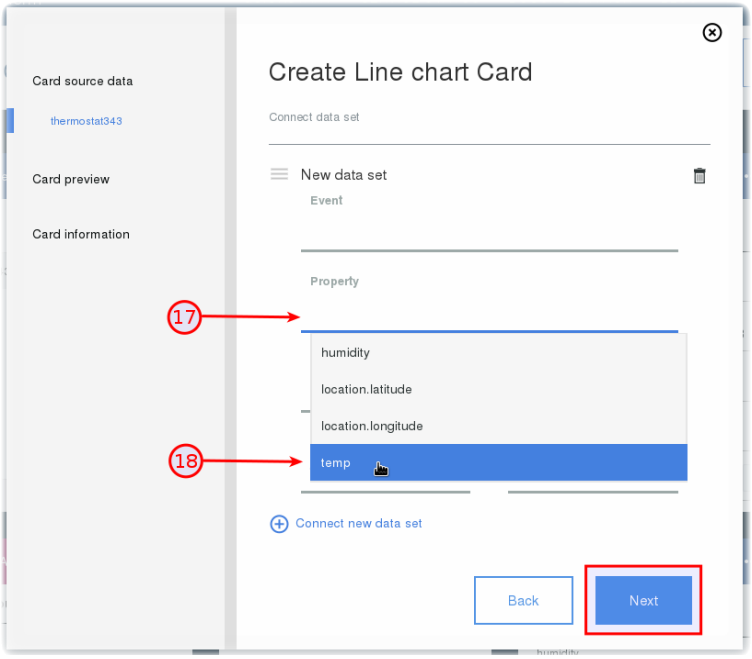
- Click on **Line chart** (14).



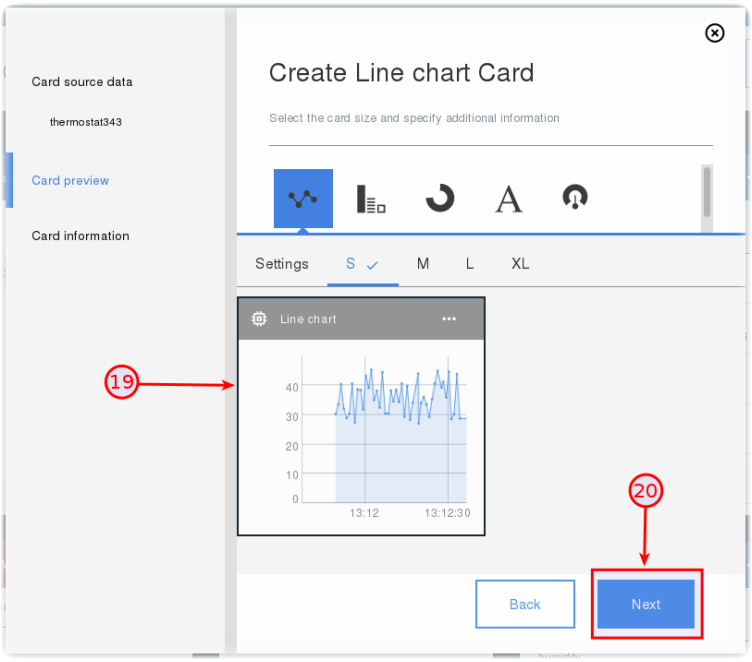
- Click on **Devices** (15) and then **check** the thermostat Device ID (16) and then press the **Next** button.



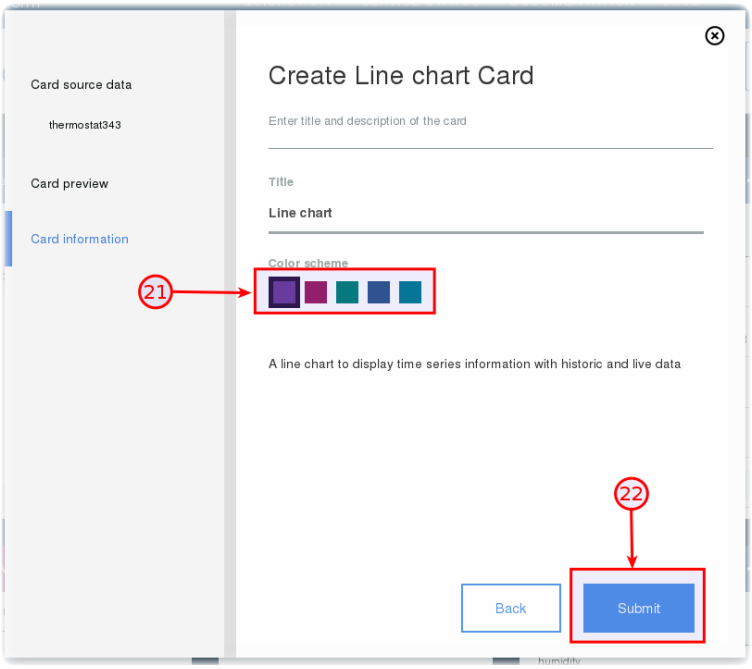
- Click on **Connect new data set**
- Click on the line under **Property** (17) and select temp (18). Press the **Next** button.



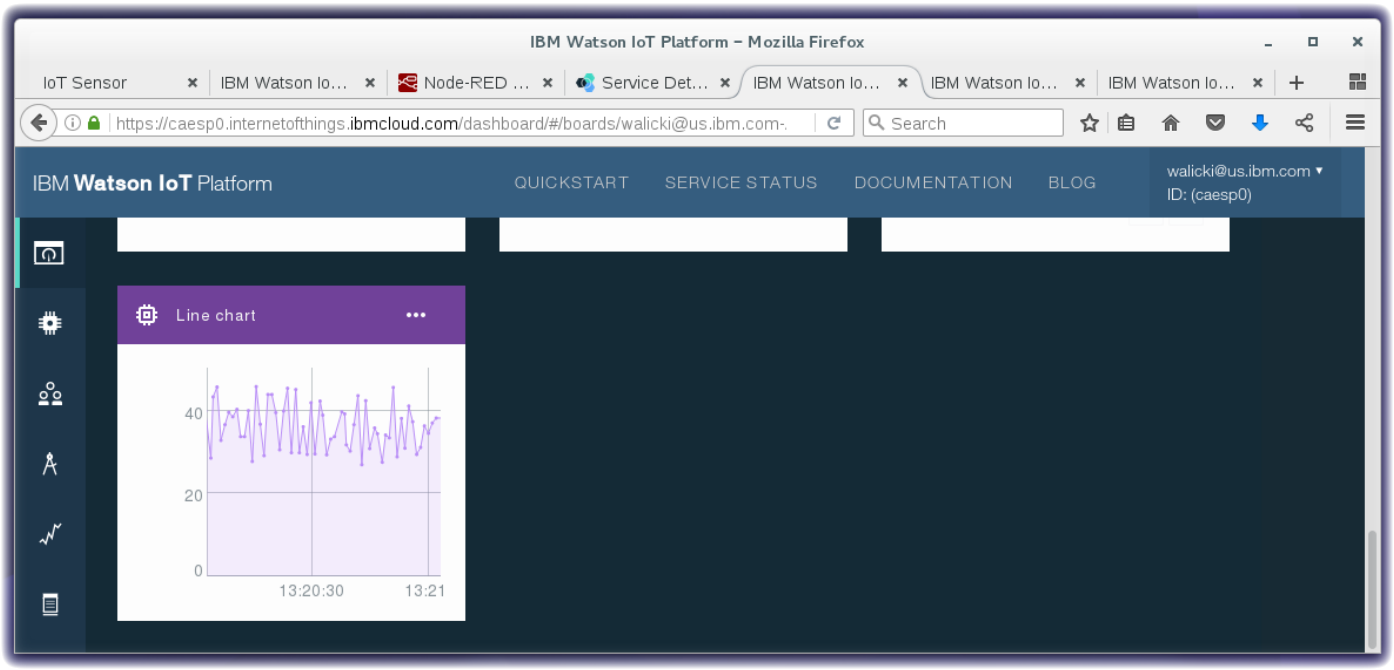
- After reviewing Line Chart preview (19), press the **Next** button (20).



- Pick a **Color scheme** (21) for the Line chart and press the **Submit** button (22).



- Scroll down in the browser and you will see a Line chart for your data.

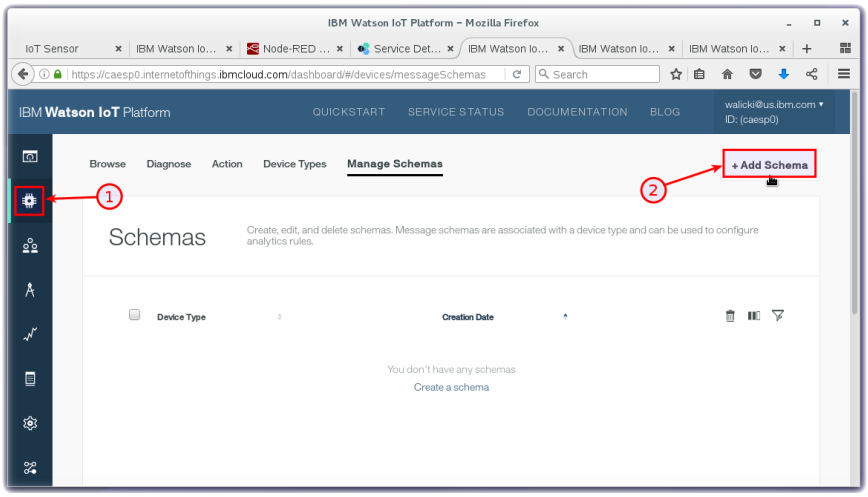


Section 4 – Analyze your Data with Watson IoT Rules

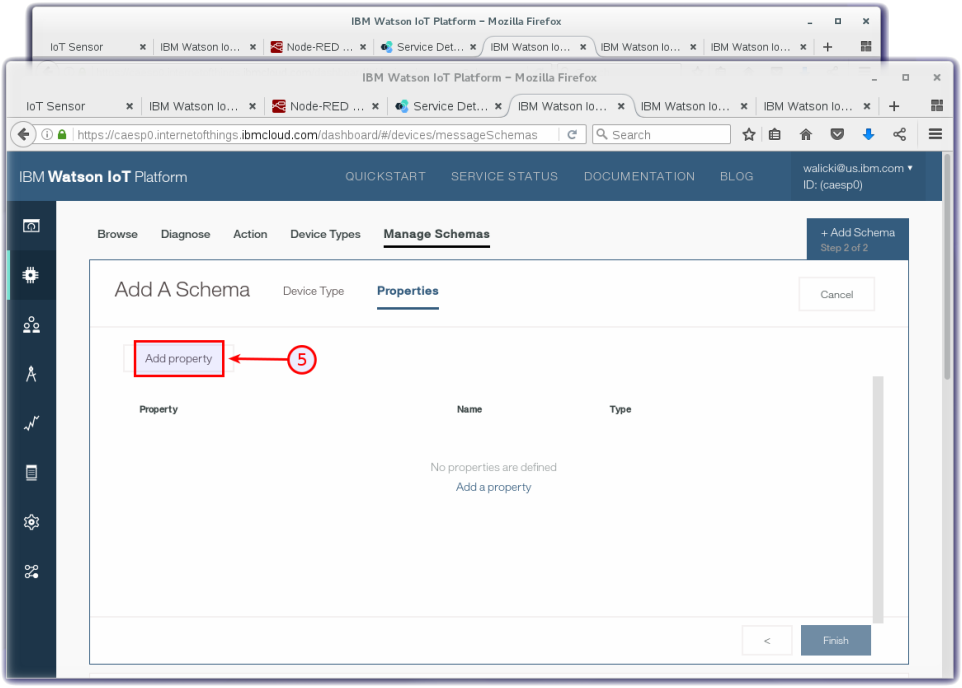
In this Section you will use the Watson IoT Real Time Insights rules engine to analyze incoming data and take actions based on thresholds defined.

Step 1 – Create a Schema

- Return to the Devices page by clicking on **Devices** (1) in the left menu **and then click on Manage Schemas** and then click on **Add Schema** (2)

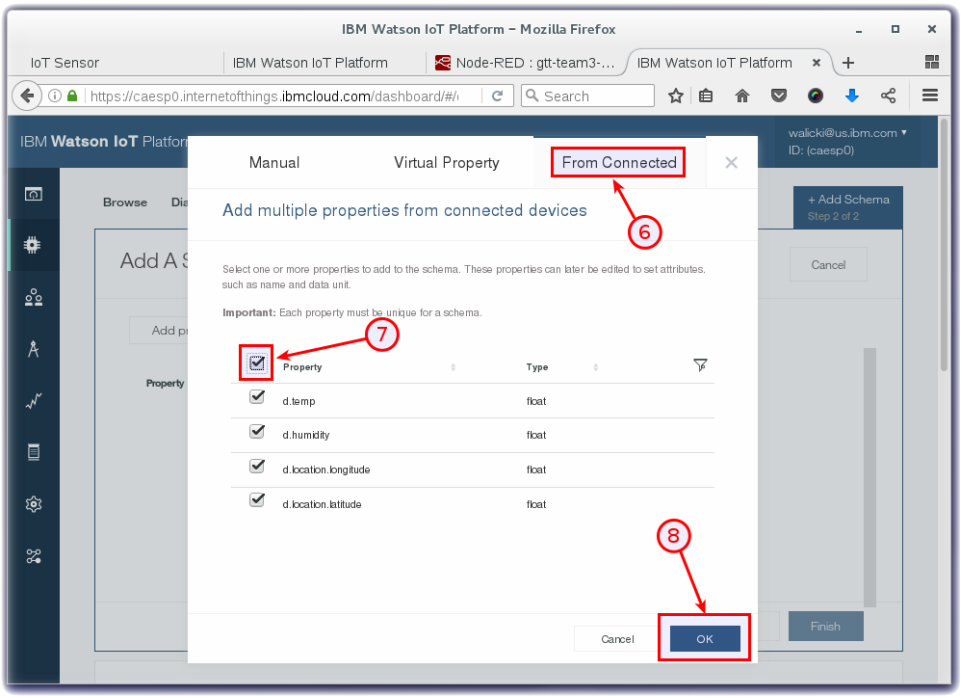


- Click on the **Select Type** drop down and choose thermostat (3) and then press the **Next** button (4).



- Click on **Add property** (5).

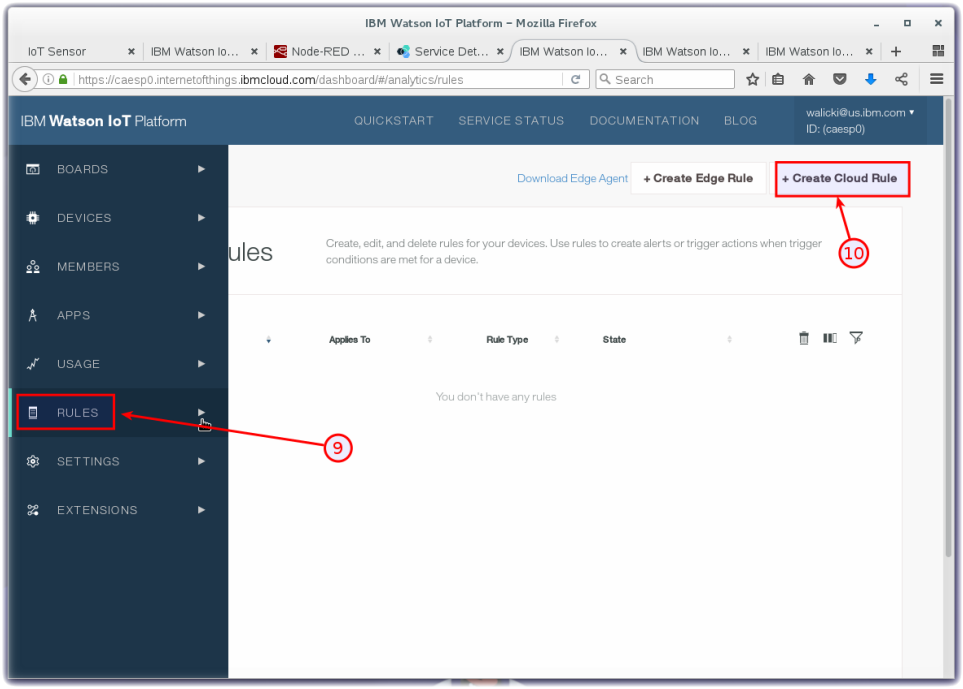
- Click on "**From Connected**" (6) and **Check Property** (7) to select all the property values. Then press **Ok** (8).



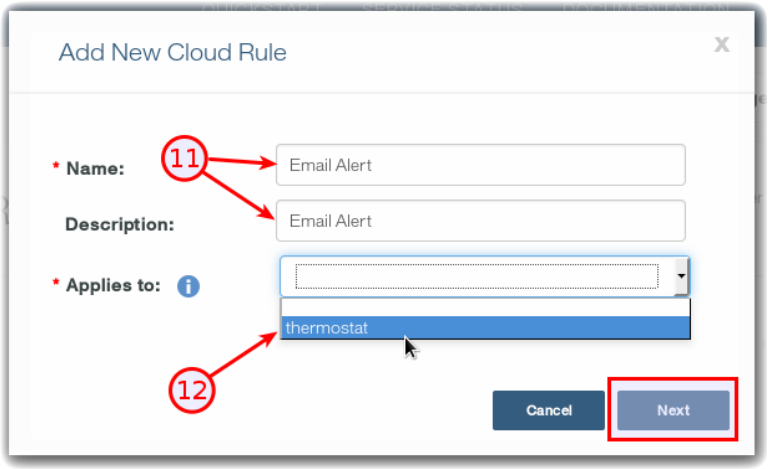
- Press the **Finish** button.

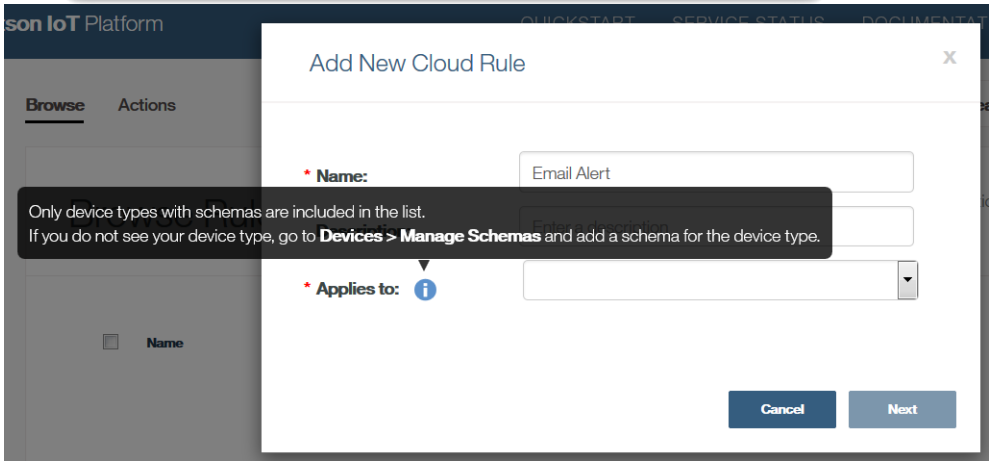
Step 2 – Create a Cloud Rule

- Switch to the Rules page by clicking on **Rules** (9) in the left menu.
- Select **Create Cloud Rules** (10).

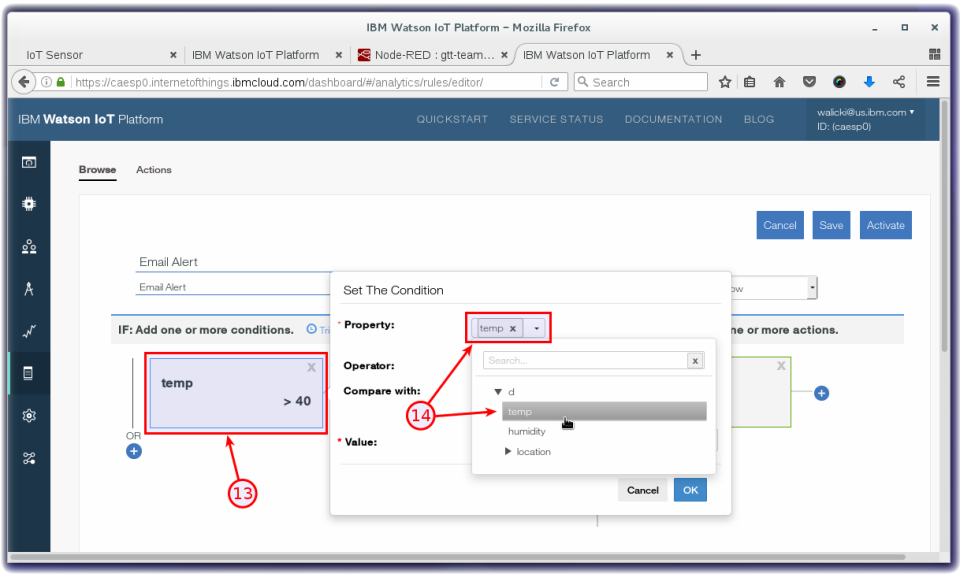


- Give this rule a **name** of Email Alert (11) and select the thermostat schema from the drop down. Press the **Next** button.

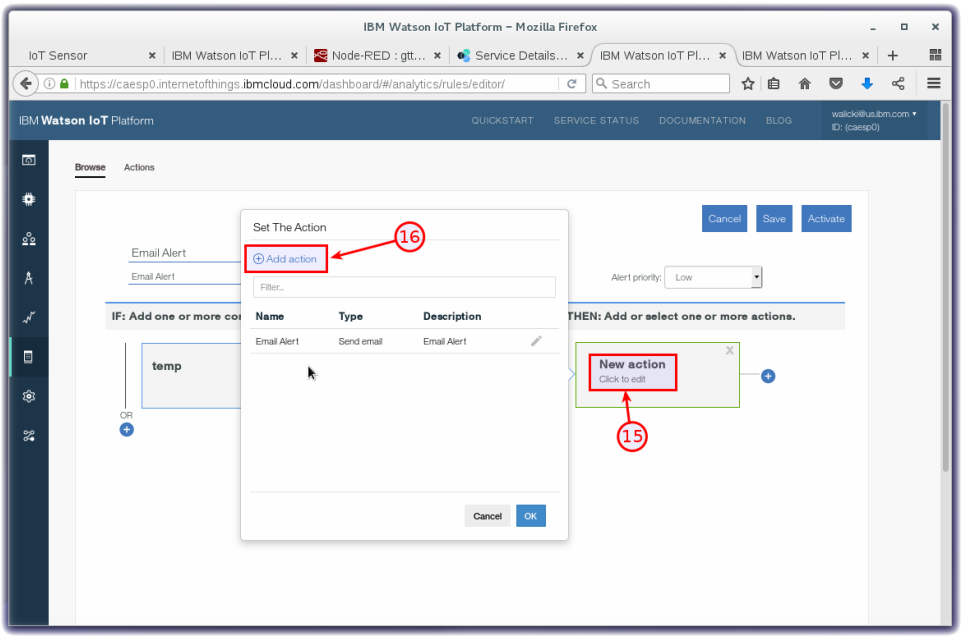

Add New Cloud Rule
* Name:
Email Alert
Description:
Email Alert
* Applies to:
thermostat
11
12
Cancel
Next


son IoT Platform
Browse
Actions
Name
Add New Cloud Rule
* Name:
Email Alert
Only device types with schemas are included in the list.
If you do not see your device type, go to Devices > Manage Schemas and add a schema for the device type.
* Applies to:
Cancel
Next

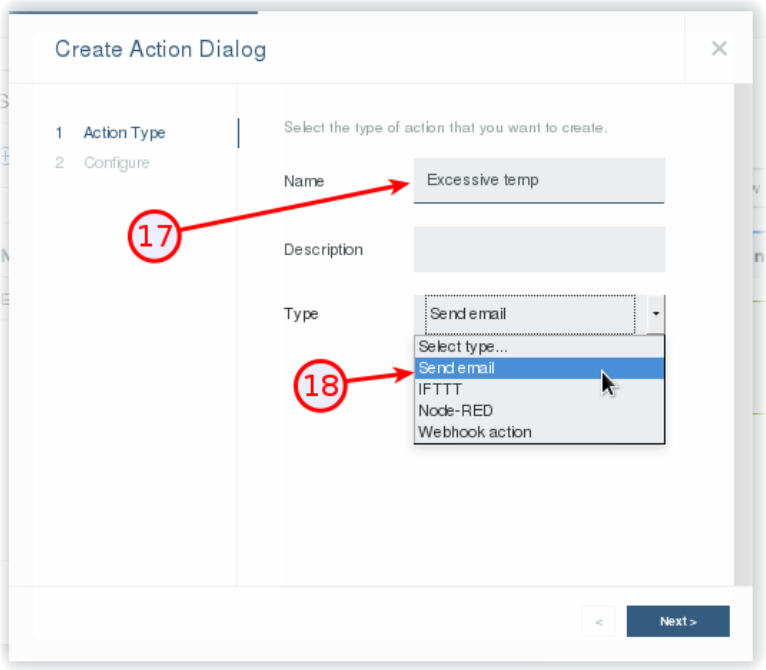
- Click on "New condition" (13) and select a property "temp" from the d.temp twistie (14). Enter a value. Press the **Ok** button.



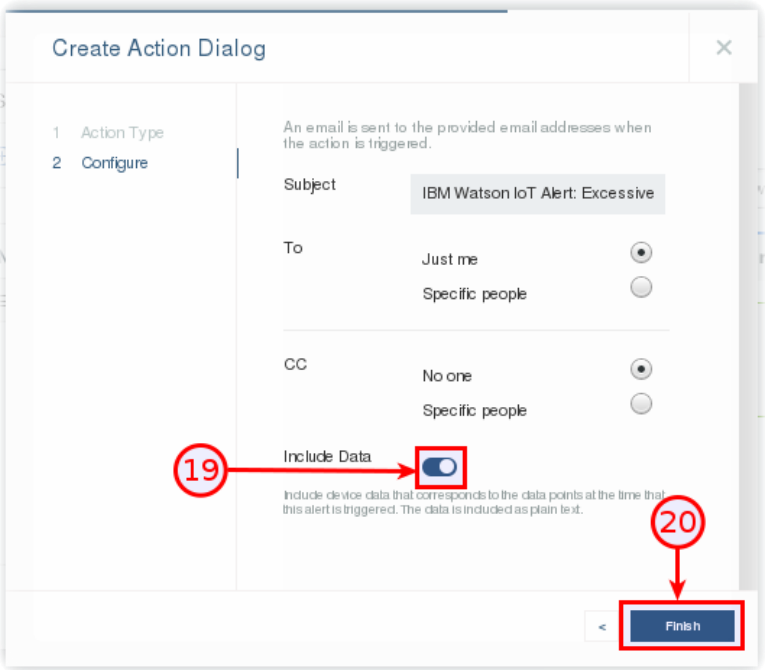
- Click on "New action" (15) and then Add Action (16).



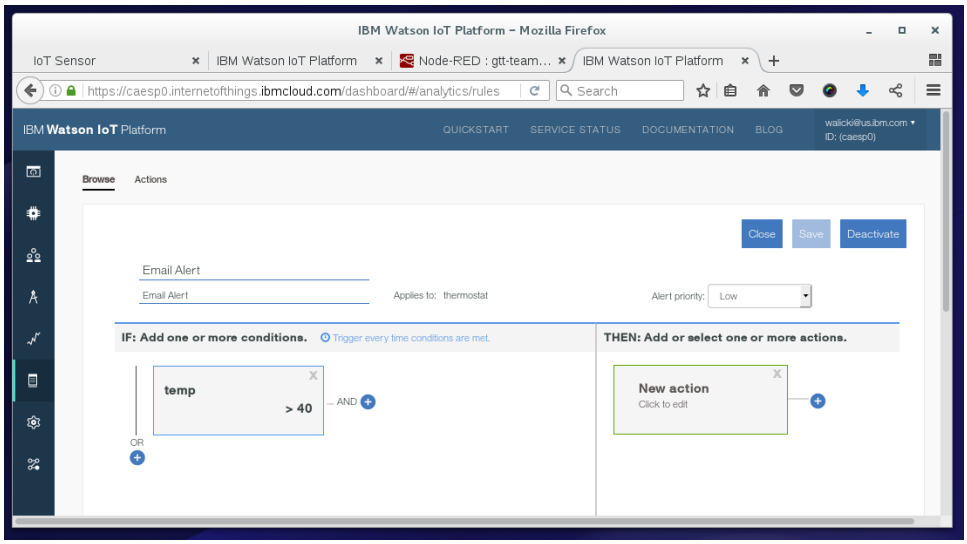
- Give this action a **name** "Excessive Temp" (17) and a **Type** of "Send email" (18) Press the **Next** button.



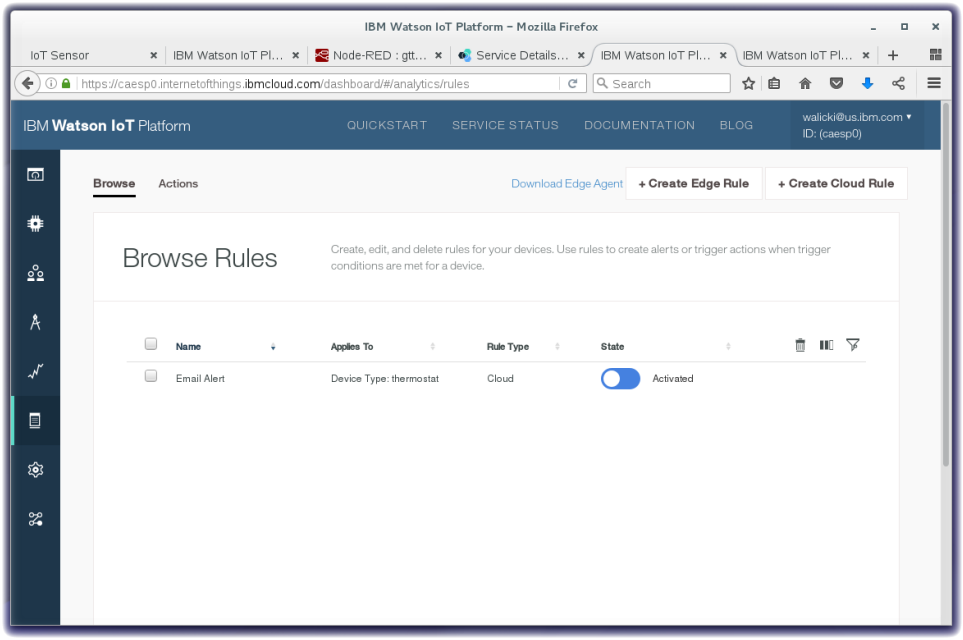
- On the **Create Action** Dialog, choose to **Include Data** (19) and press the **Finish** (20) button.



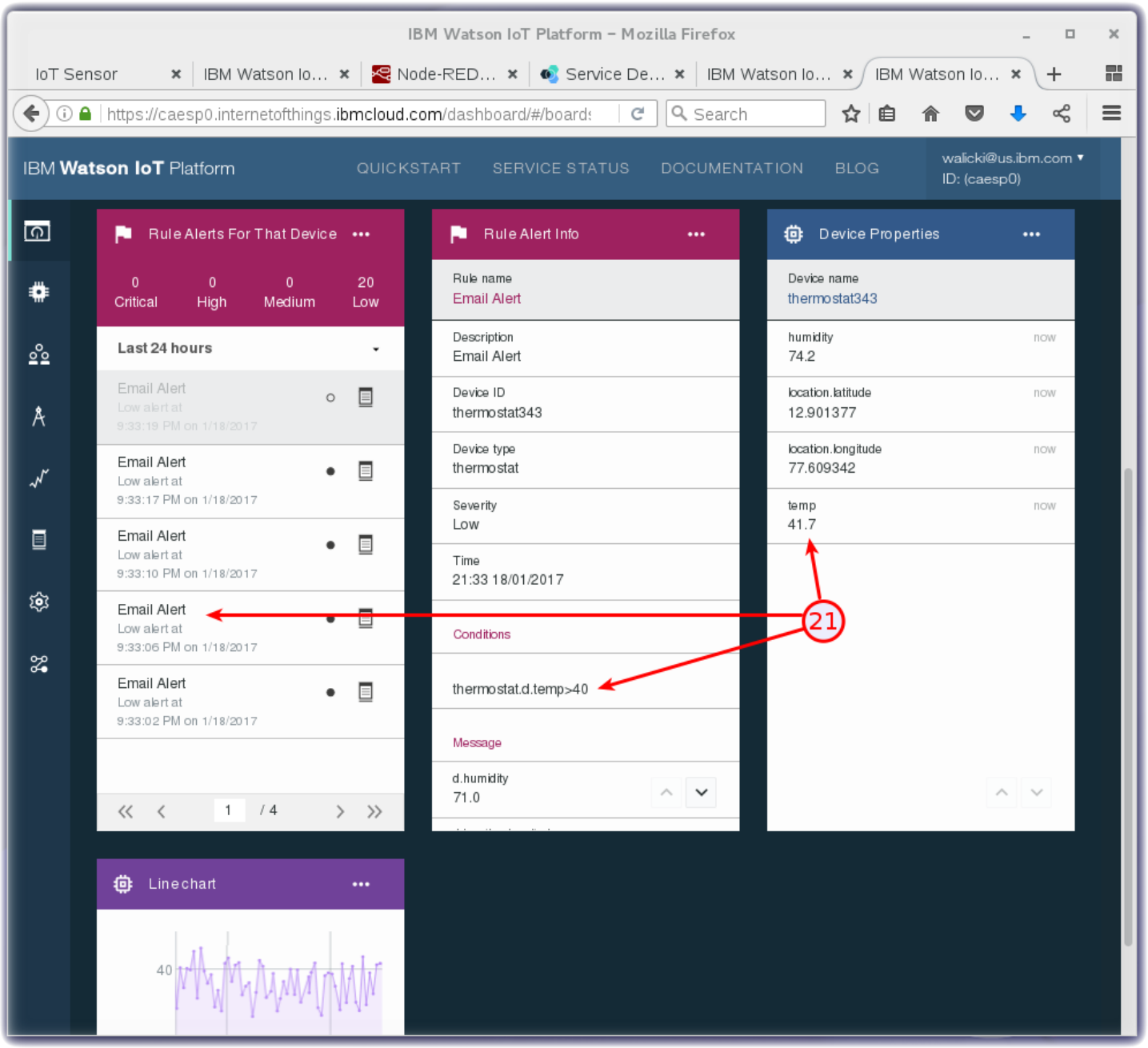
- Press the **Ok** button to set the Action.
- Press the **Activate** button and finally press the **Close** button.
- You have created a Watson IoT Rule.



- The rule is activated.



To see the final screen, below, click on **Rules** in the left pane.


IBM Watson IoT Platform – Mozilla Firefox
IoT Sensor
IBM Watson Io…
Node-RED…
Service De…
IBM Watson Io…
IBM Watson Io…
https://caesp0.internetofthings.ibmcloud.com/dashboard/#/board
Search
IBM Watson IoT Platform
QUICKSTART
SERVICE STATUS
DOCUMENTATION
BLOG
walicki@us.ibm.com
ID: (caesp0)
Rule Alerts For That Device
0 Critical
0 High
0 Medium
20 Low
Last 24 hours
Email Alert
Low alert at
9:33:19 PM on 1/18/2017
Email Alert
Low alert at
9:33:17 PM on 1/18/2017
Email Alert
Low alert at
9:33:10 PM on 1/18/2017
Email Alert
Low alert at
9:33:06 PM on 1/18/2017
Email Alert
Low alert at
9:33:02 PM on 1/18/2017
1 / 4
Rule Alert Info
Rule name
Email Alert
Description
Email Alert
Device ID
thermostat343
Device type
thermostat
Severity
Low
Time
21:33 18/01/2017
Conditions
thermostat.d.temp>40
Message
d.humidity
71.0
Device Properties
Device name
thermostat343
humidity
74.2
now
location.latitude
12.901377
now
location.longitude
77.609342
now
temp
41.7
now
21
Linechart
40