

Getting Started with Watson IoT Platform

IWT-5351 Interconnect Hands-On Lab

Download this PDF and Node-RED flows at

<https://github.com/johnwalicki/Interconnect-IoT-Labs>

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Getting Started with Watson IoT Platform

This workshop 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 workshop, 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 Quickstart 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.

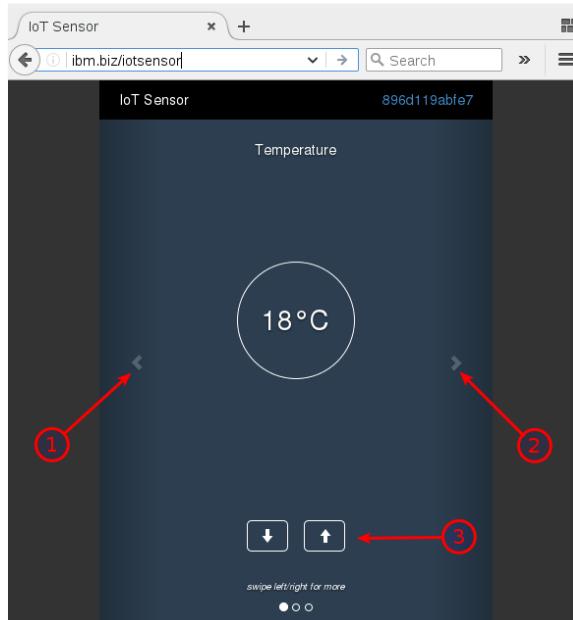
Section 1 – Create an IoT Sensor Simulator

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

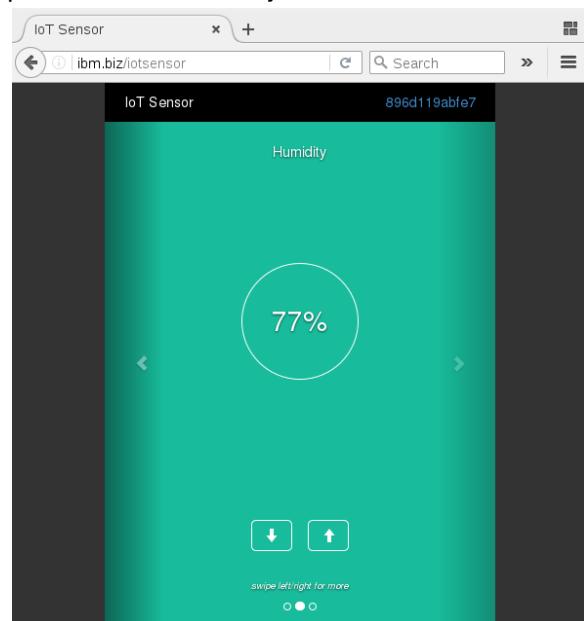
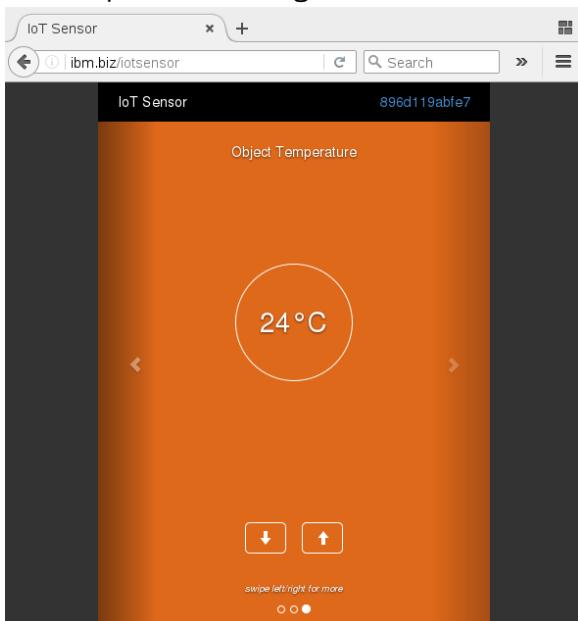
Step 1 – On your laptop, open a Firefox or Chrome browser window

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.

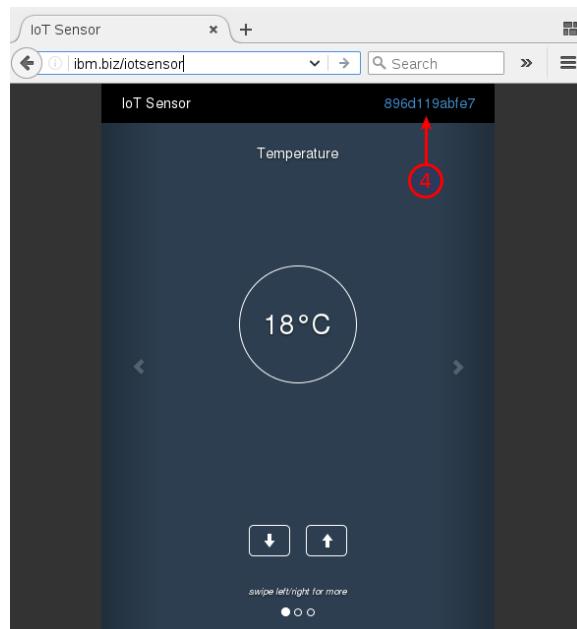


- Use the Arrow buttons (3) to increase / decrease the simulated sensor value.

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.

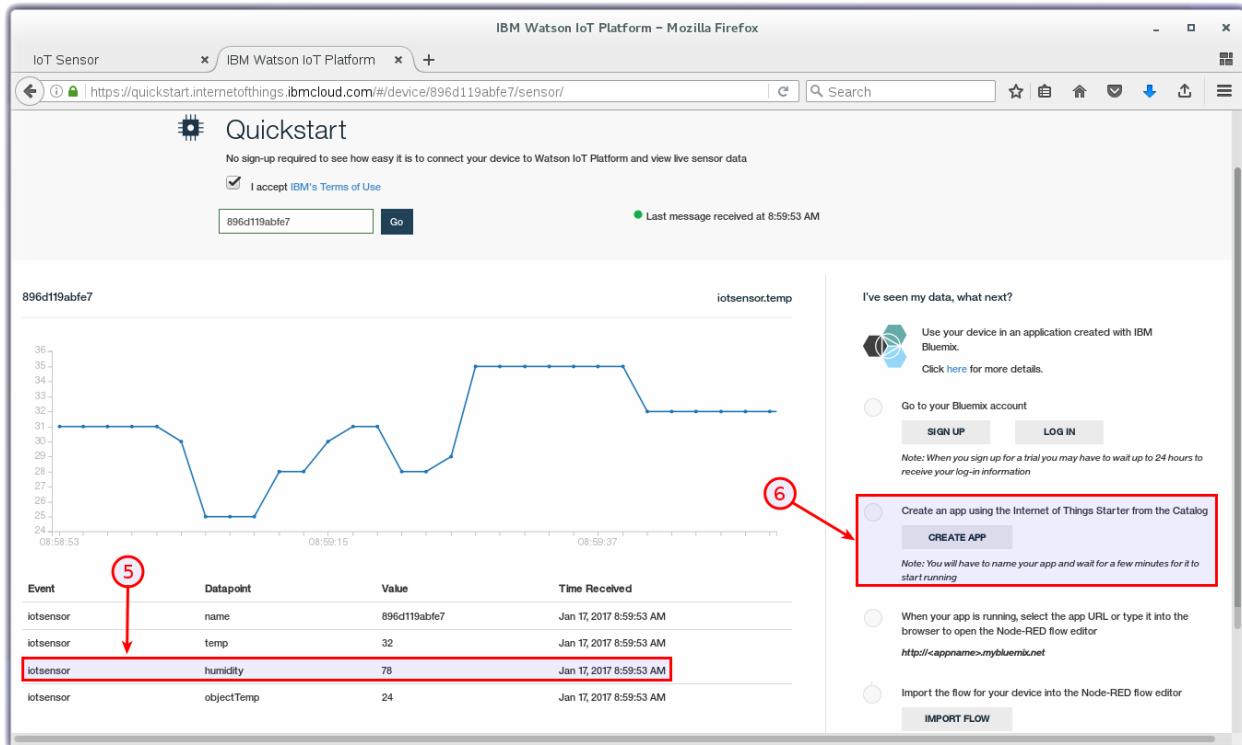


- A new browser tab will open to

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

A screenshot of the IBM Watson IoT Platform Quickstart web interface in a Mozilla Firefox browser. The title bar says 'IBM Watson IoT Platform - Mozilla Firefox'. The main content area has a header 'Quickstart' with a note 'No sign-up required to see how easy it is to connect your device to Watson IoT Platform and view live sensor data'. There is a checkbox 'I accept IBM's Terms of Use' which is checked. Below the header, there is a text input field with '896d119abfe7' and a 'Go' button. To the right, a message says 'Last message received at 8:59:53 AM'. On the left, there is a line graph titled '896d119abfe7' showing 'iotSensor.temp' over time, with values ranging from 24 to 36. On the right, there is a sidebar with the heading 'I've seen my data, what next?'. It includes a section for connecting to a Bluemix account with 'SIGN UP' and 'LOG IN' buttons, a note about trial sign-ups, and sections for creating an app using the Catalog and importing a flow into Node-RED. There is also a note about naming the app and waiting for it to start running.

- 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 with your Bluemix account and password, 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.

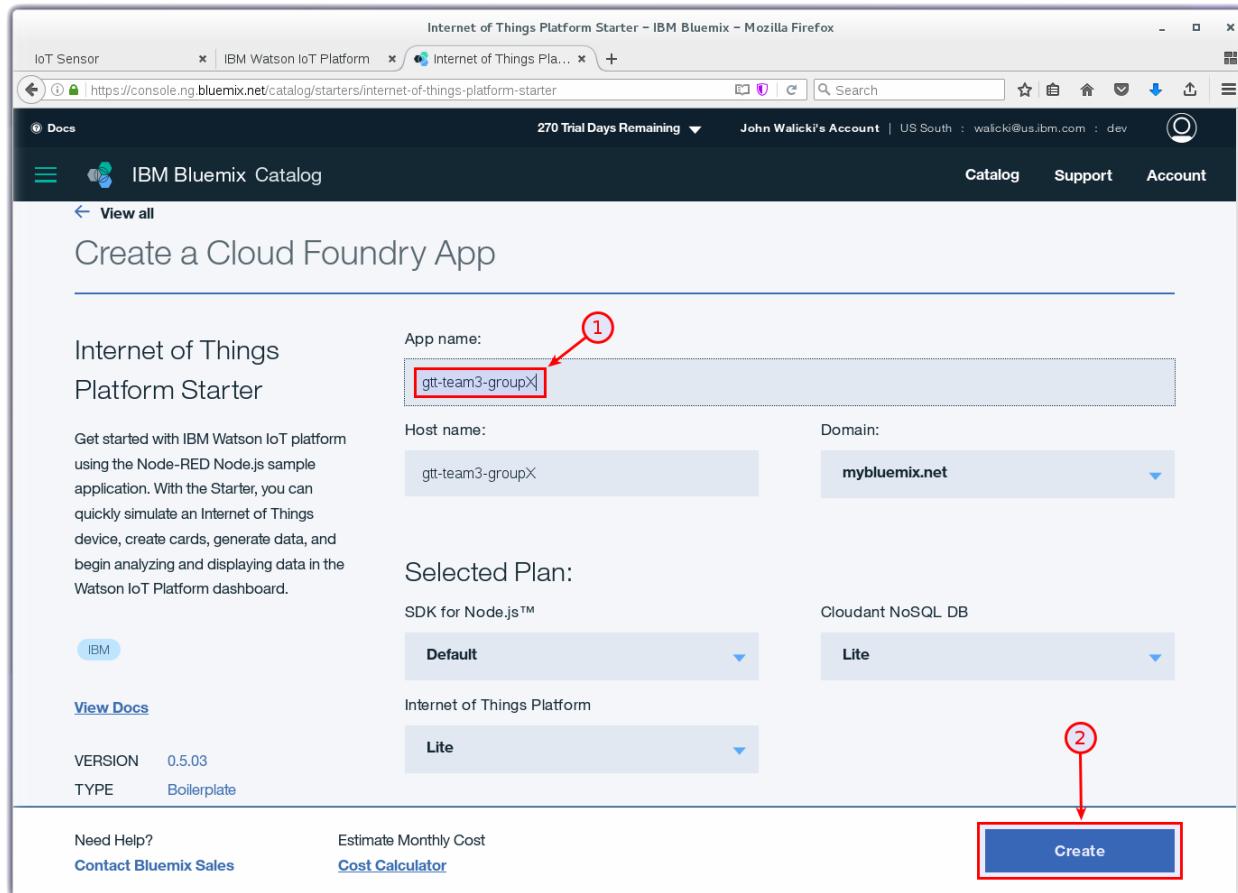
Section 2 – Create an Internet of Things Starter App

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. **gtt-team3-groupX**

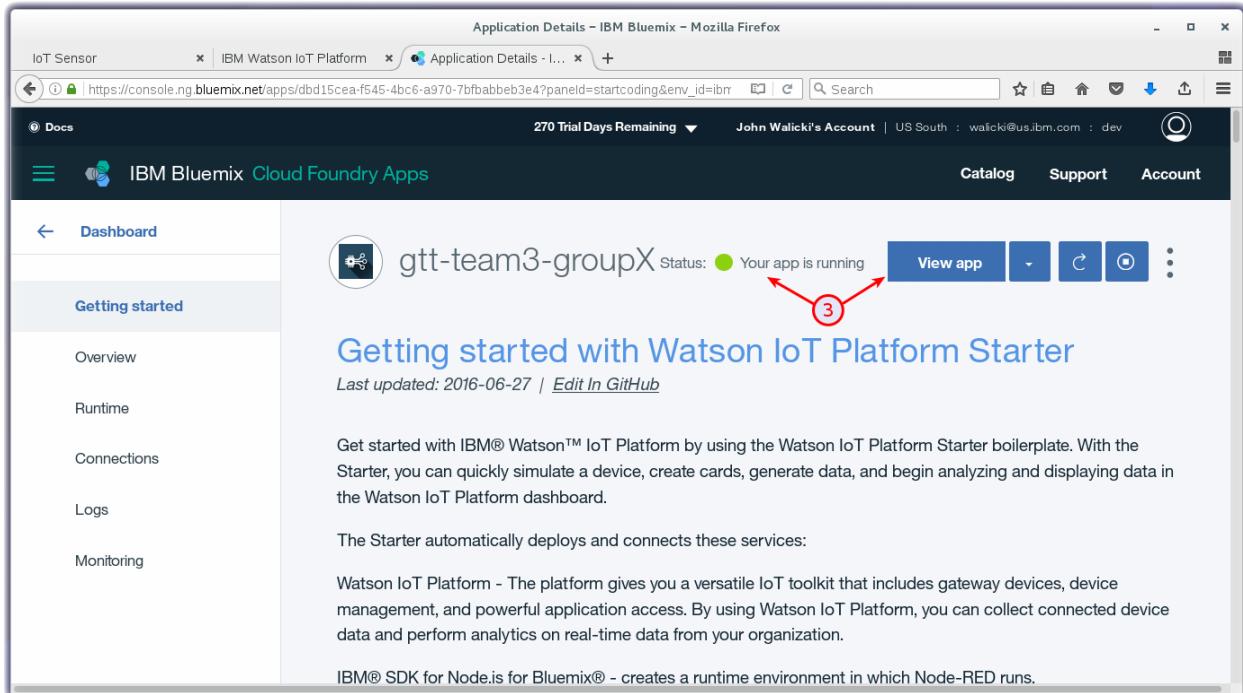
- Press the Create button (2).



- 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.

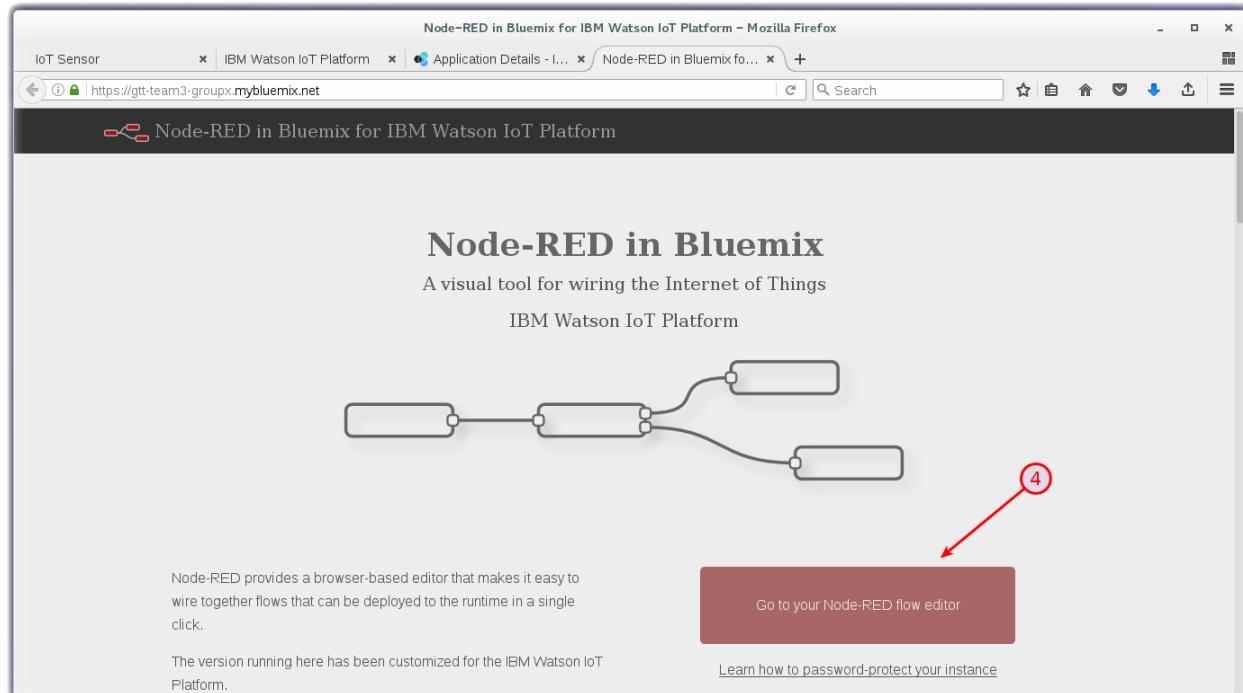
Step 2 - Launch the IoT Starter Application

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

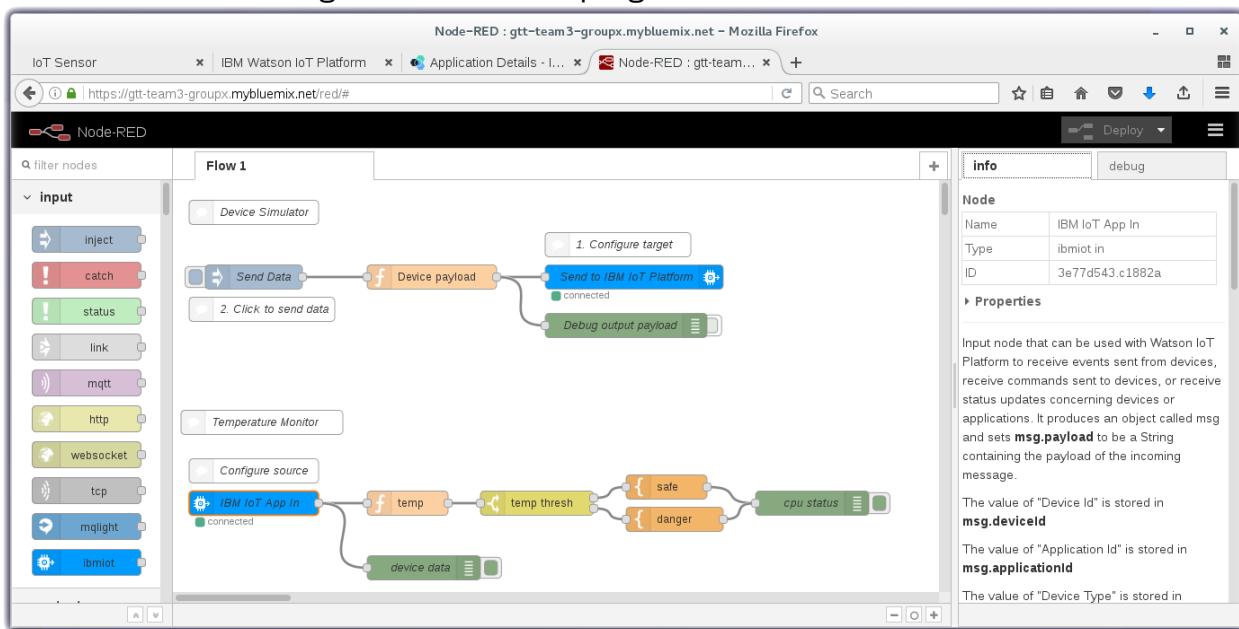


Step 3 – Open the Node-RED visual programming editor

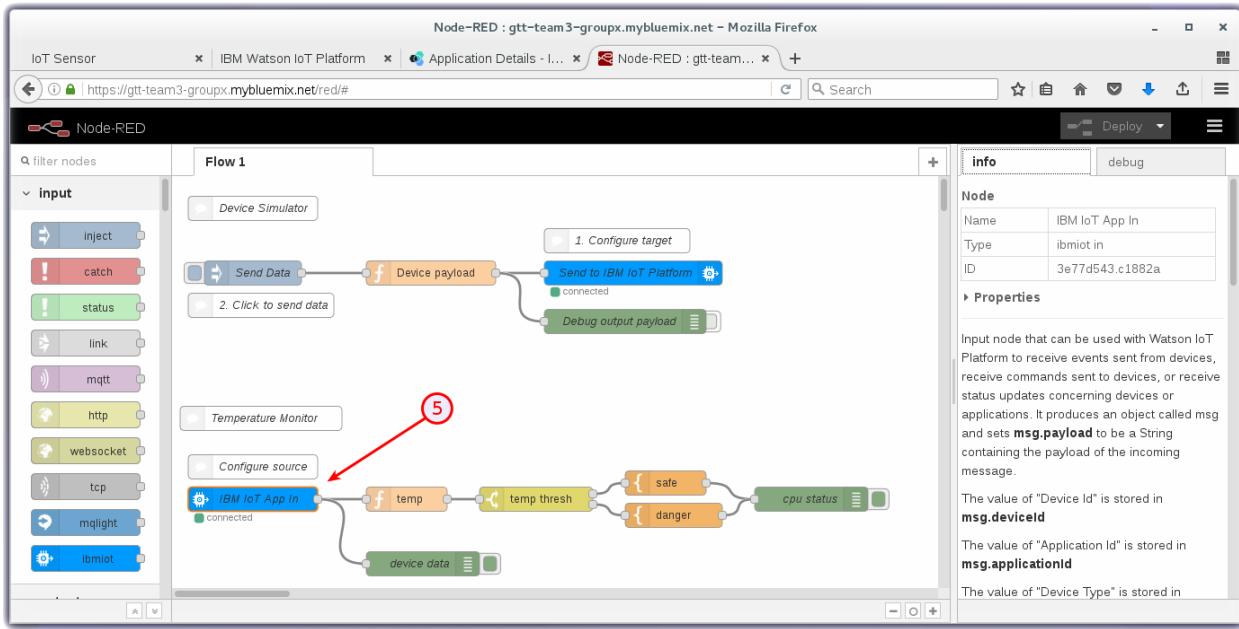
- A new browser tab will open to the Node-RED start page. Node-RED is an open-source Node.js application that provides a visual programming editor that makes it easy to wire together flows. Click the red button **Go to your Node-RED flow editor** (4) to launch the editor.



- 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.



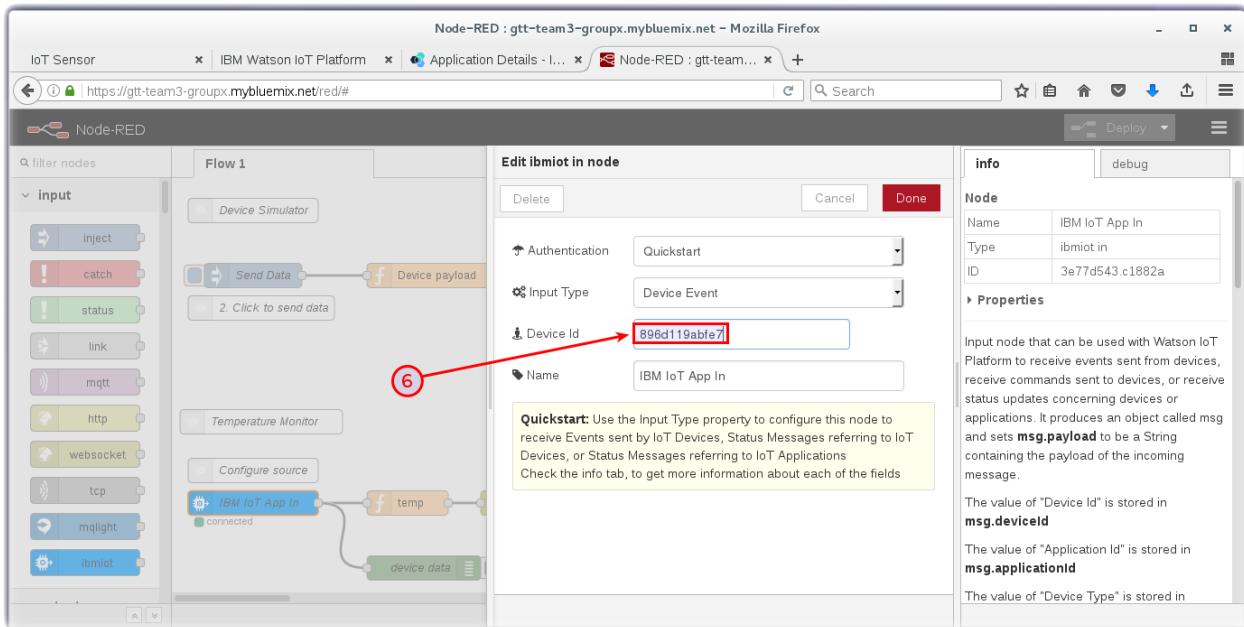
- The top half of the sample IoT Starter flow is not applicable to this workshop.
- The bottom half of the sample will be modified to send email alerts.
- Double Click on the IBM IoT App In (5) node.



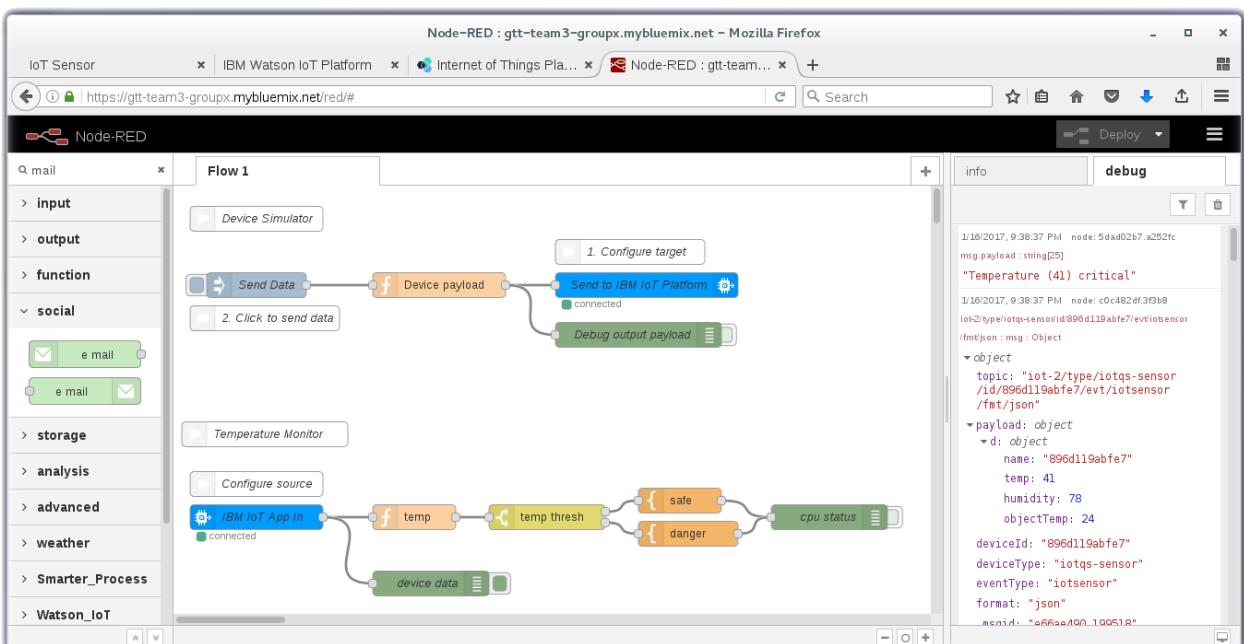
Observations:

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.

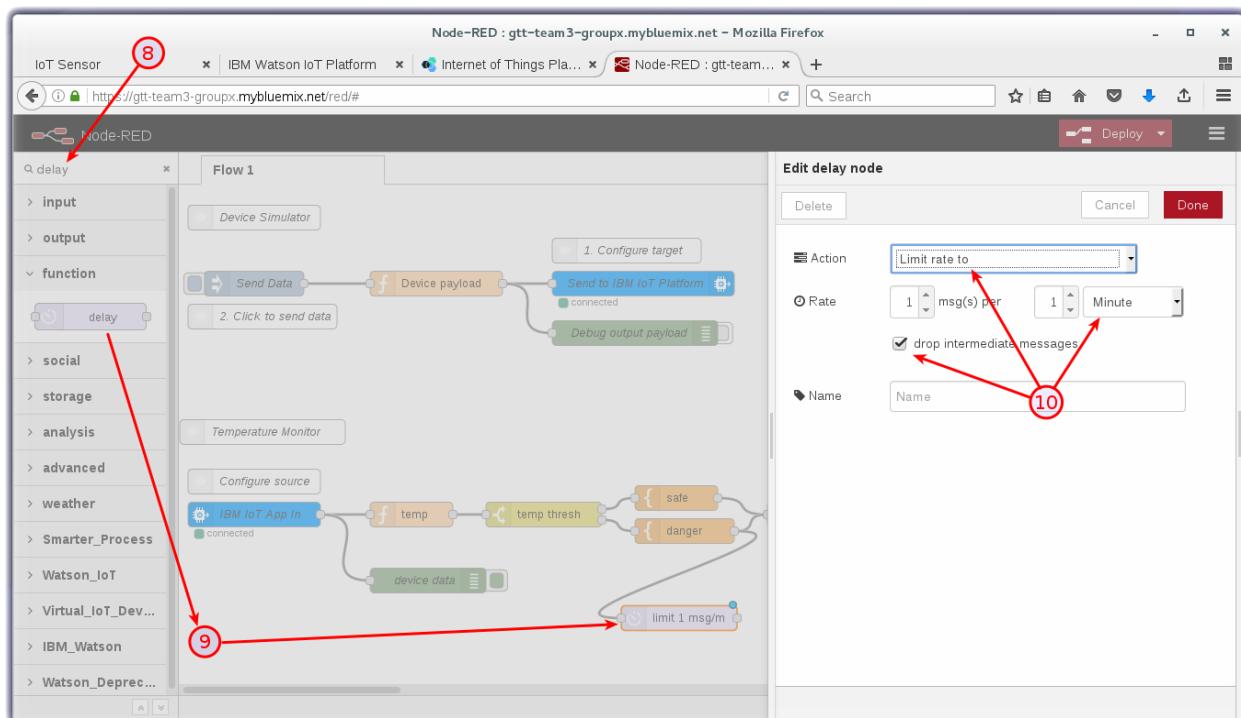


- Click the Deploy button on the top of menu bar to deploy the Node-RED flow.
- Turn to the “debug” tab to see the sensor data flowing through your Node-RED application.
- Switch to the IoT Sensor browser tab and increase / decrease the simulated values.
- Increase the temperature above 41
- If you see 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

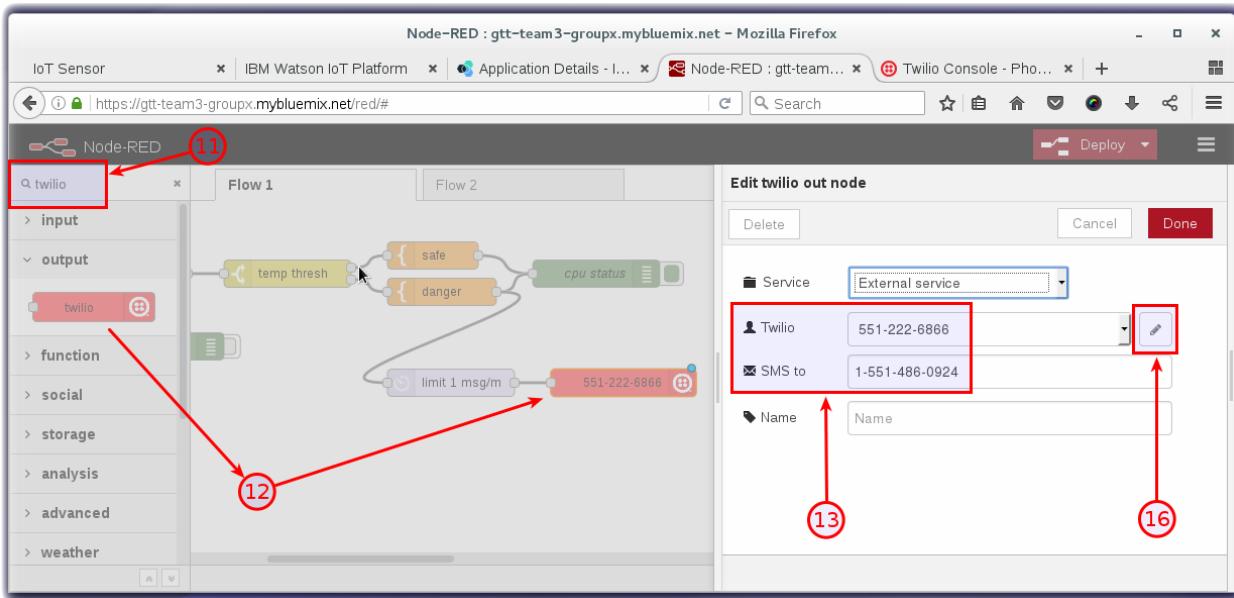
- Since we don't want to send an Critical Temperature email alert every second, Node-RED has a rate limit node.
- Search for delay node (8).
- Drag the delay node from the palette to the flow and wire it to the “danger” template node (9).
- Double click on the delay node and configure the node to **Limit the rate to 1 message per Minute** and to **drop intermediate messages** (10).
- Press the Done button.



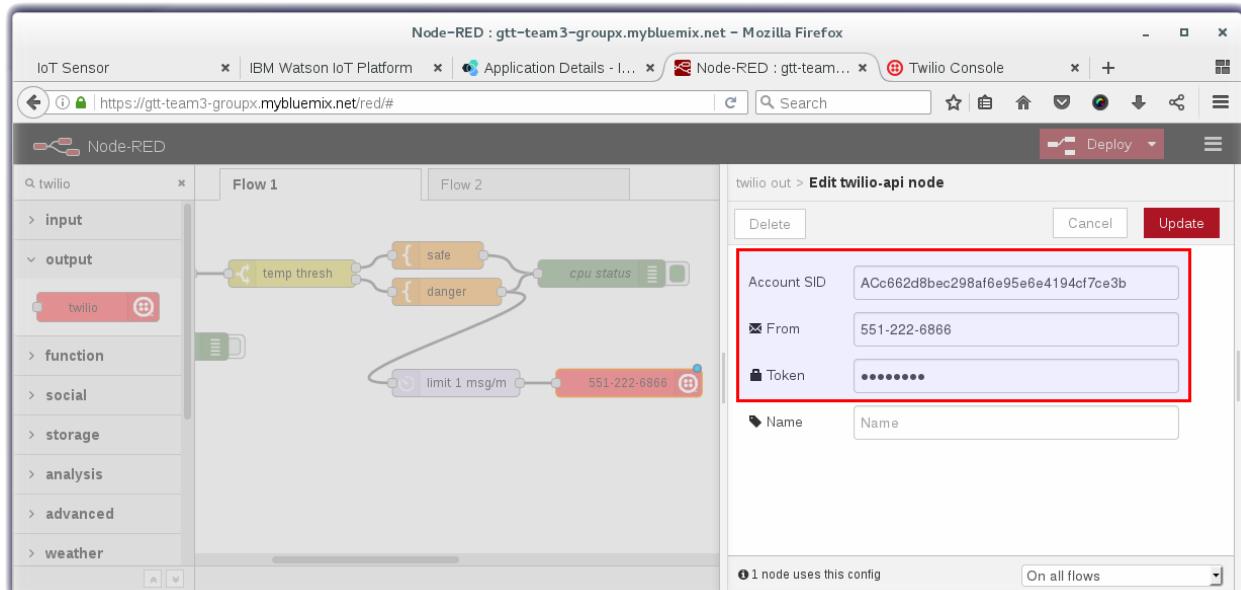
Observations:

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).



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



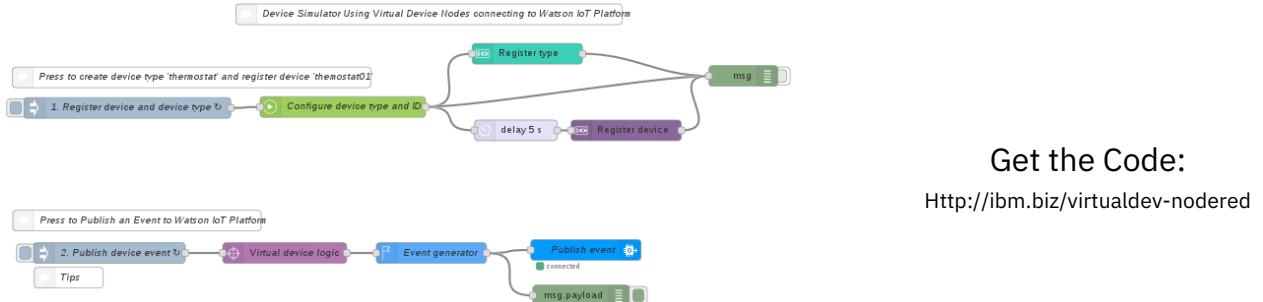
- Press the Done button.
- Click the Deploy button on the top of menu bar to deploy the Node-RED flow.

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

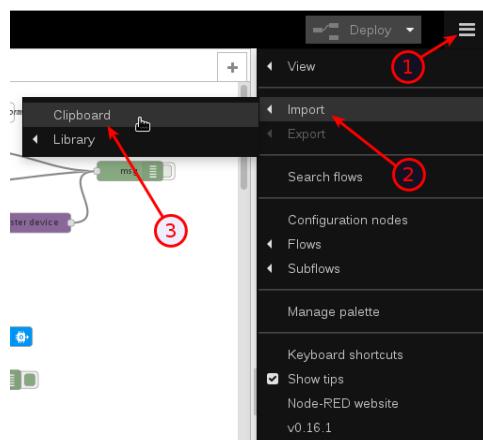
- To receive data from a registered device within the Watson IoT Platform, we need to create a virtual device. This flow can be pasted into Node-RED.



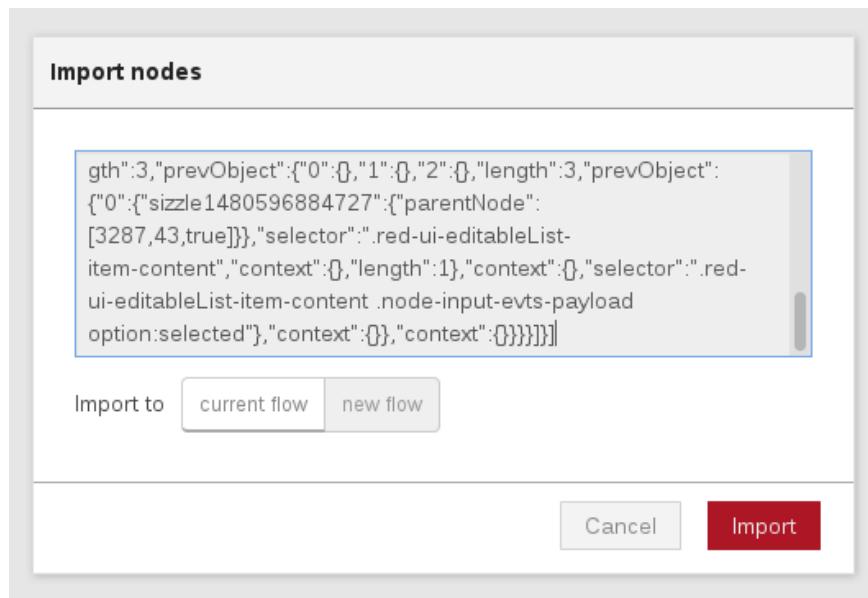
- First, open the “Get the Code” URL listed above and copy the text for the flow to your Clipboard.
- Within the browser Node-RED tab, create a new flow tab.



- 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 Deploy 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.

The screenshot shows the IBM Bluemix Cloud Foundry Apps dashboard for the application 'gtt-team3-groupX'. The 'Connections' section is highlighted with a red box and a red arrow pointing to the 'iotf-service' connection, which is labeled with the number '4'. The 'Runtime' section shows 1 instance, 512 MB memory per instance, and a total allocation of 512 MB.

- 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).

The screenshot shows the Watson IoT Platform Service Details page for the service 'gtt-team3-groupX-iotf-service'. The 'Manage' tab is selected. The 'Launch dashboard' button is highlighted with a red box and a red arrow pointing to it, labeled with the number '5'.

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

The screenshot shows the 'Devices' section of the IBM Watson IoT Platform. The left sidebar has a 'Devices' icon with a red circle containing the number 7. The main area lists one device: 'thermostat343' (6), which is a 'thermostat' device added on Jan 18, 2017, at 8:38:30 AM.

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

The screenshot shows the details for the 'thermostat343' device. The device ID is highlighted with a red box (8). The 'Recent Events' section shows four events: 'stat' in json format received on Jan 18, 2017, at 11:59:01 AM, 02 AM, 03 AM, and 04 AM.

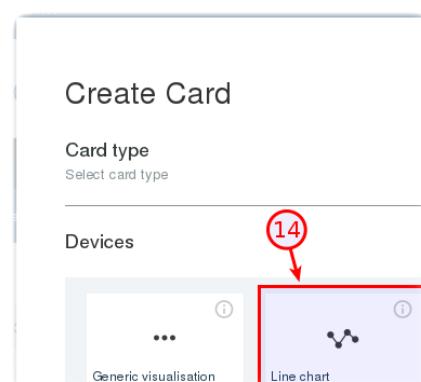
- Click on the **Boards** menu (9) and then click on the **Device-Centric Analytics** card (10).

The screenshot shows the 'Boards' section of the IBM Watson IoT Platform. The left sidebar has an 'All Boards' icon with a red circle containing the number 9. The main area displays three cards: 'USAGE OVERVIEW' (3 Cards), 'DEVICE-CENTRIC ANALYTICS' (5 Cards, highlighted with a red box 10), and 'RULE-CENTRIC ANALYTICS' (6 Cards).

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

The screenshot shows the IBM Watson IoT Platform dashboard under the 'Device-Centric Analytics' section. On the left, there's a table titled 'Devices I Care About' with one row selected, labeled 11. On the right, there are two cards: 'Device Info' (containing device details like name, type, and creation time) and 'Device Properties' (containing device name and current humidity value). A red box labeled 13 surrounds the '+ Add New Card' button at the top right. A red box labeled 12 surrounds the 'Device Properties' card.

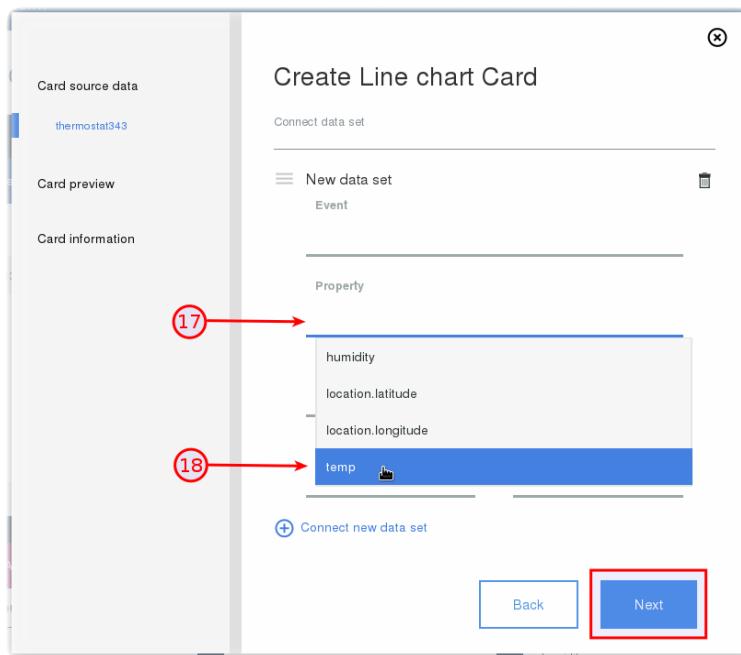
- Click on **Line chart** (14).



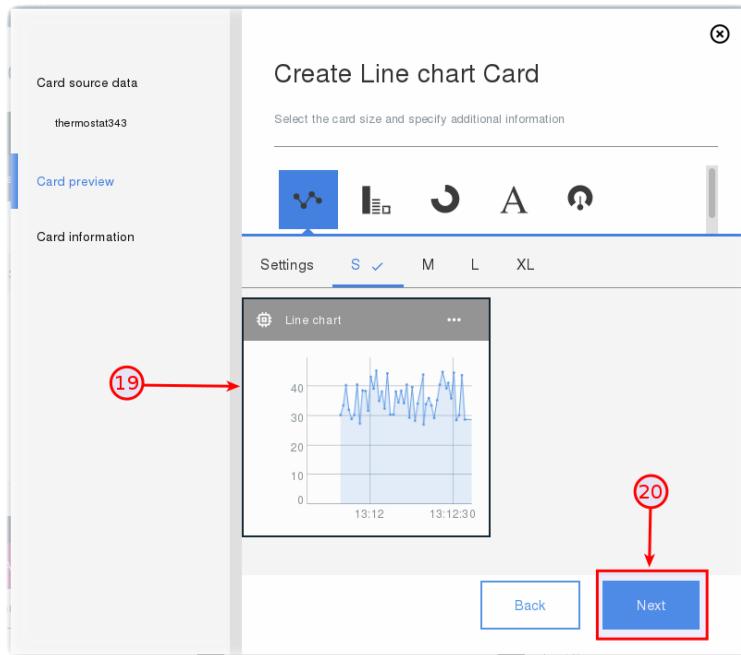
- Click on **Devices** (15) and then **check** the thermostat Device ID (16) and then press the **Next** button.

The screenshot shows the 'Create Line chart Card' dialog box. In the 'Card preview' section, the 'Devices' tab is selected, indicated by a red box labeled 15. In the 'Device ID' field, the value 'thermostat343' is entered and checked, indicated by a red box labeled 16.

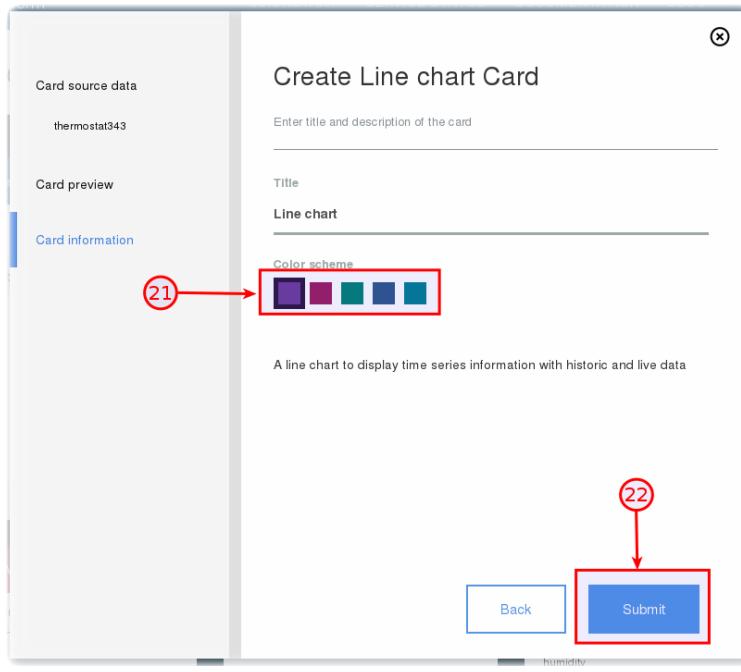
- Click on **Connect new data set**
- Click on the line under **Property** (17) and select temp (18). Press the **Next** button.



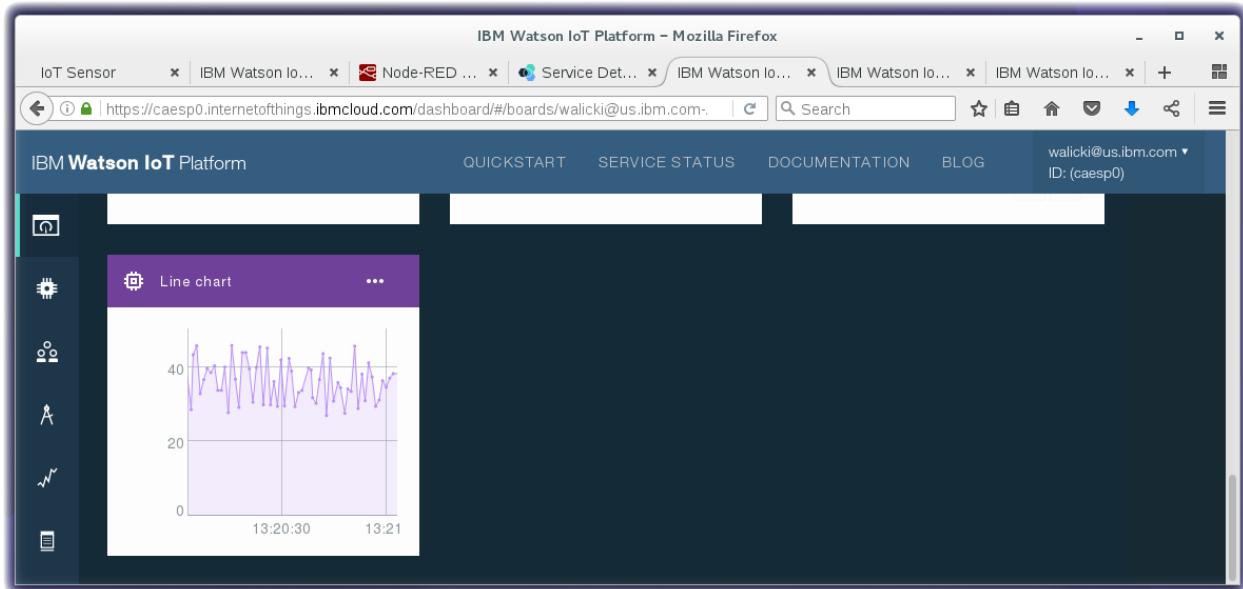
- After reviewing Line Chart preview (19), press the **Next** button (20).



- 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.

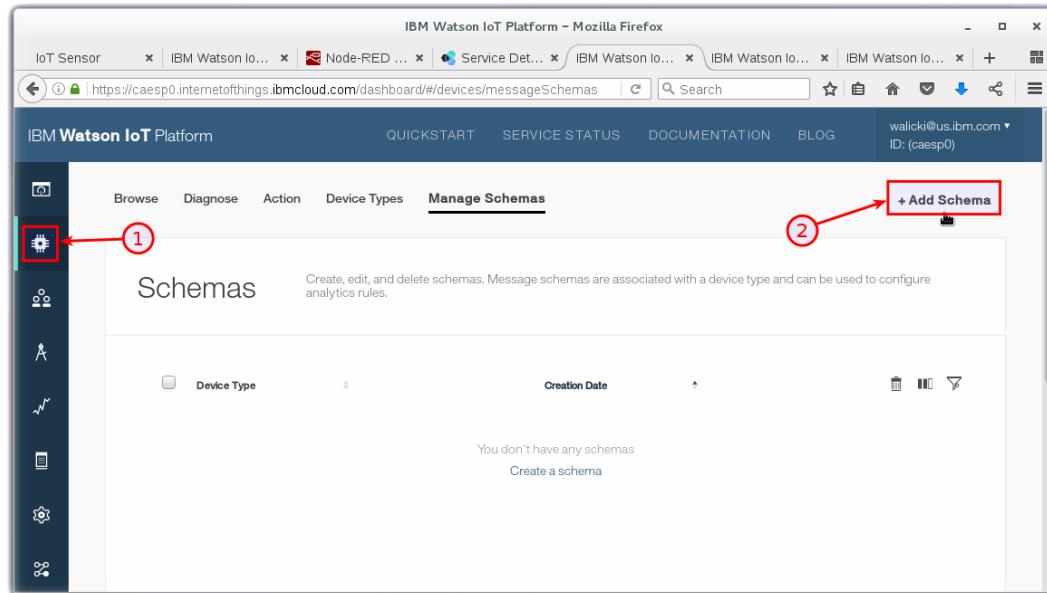


Section 4 – Analyze your Data with Watson IoT Rules

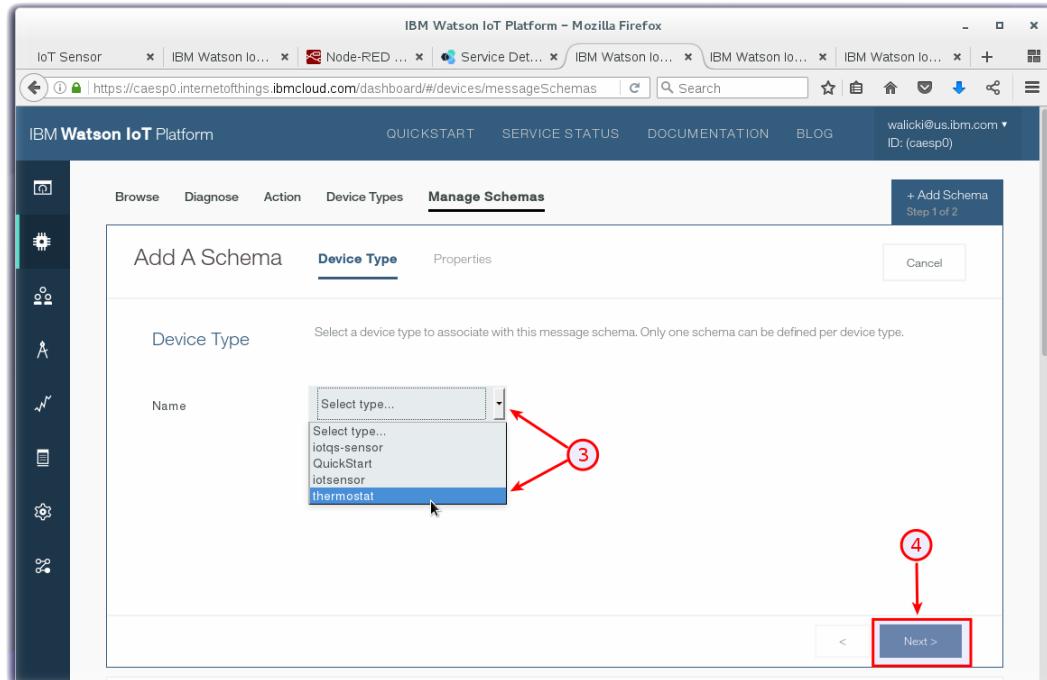
In this Section you will use the Watson IoT Real Time Insights rules engine to analyze incoming data and take actions based on thresholds defined.

Step 1 – Create a Schema

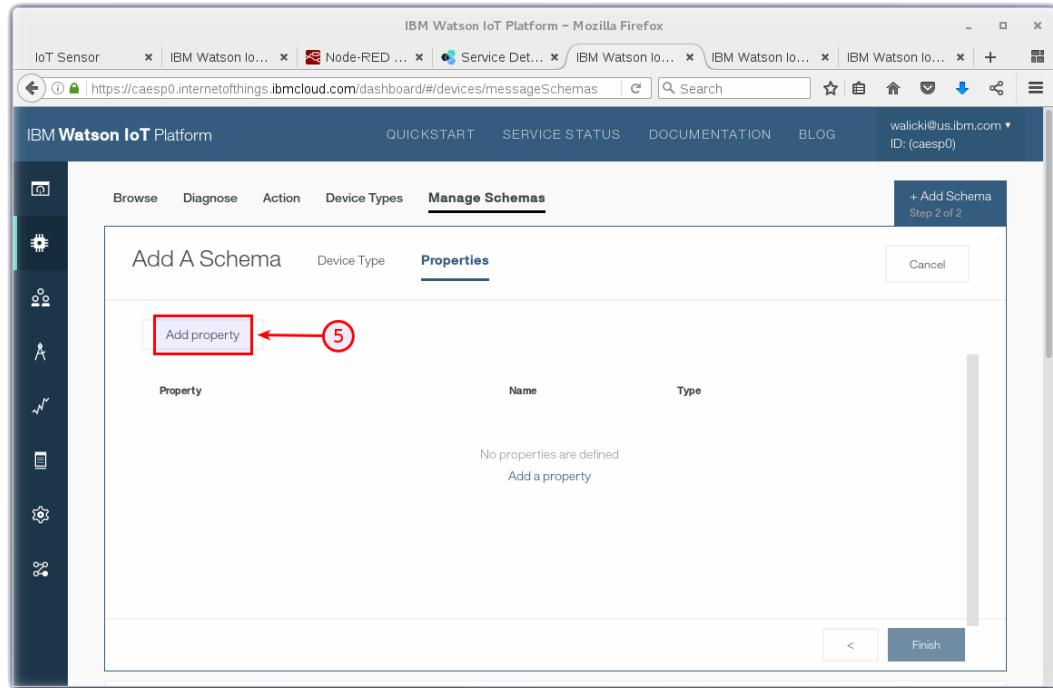
- Return to the Devices page by clicking on **Devices** (1) in the left menu and then click on **Add Schema** (2)



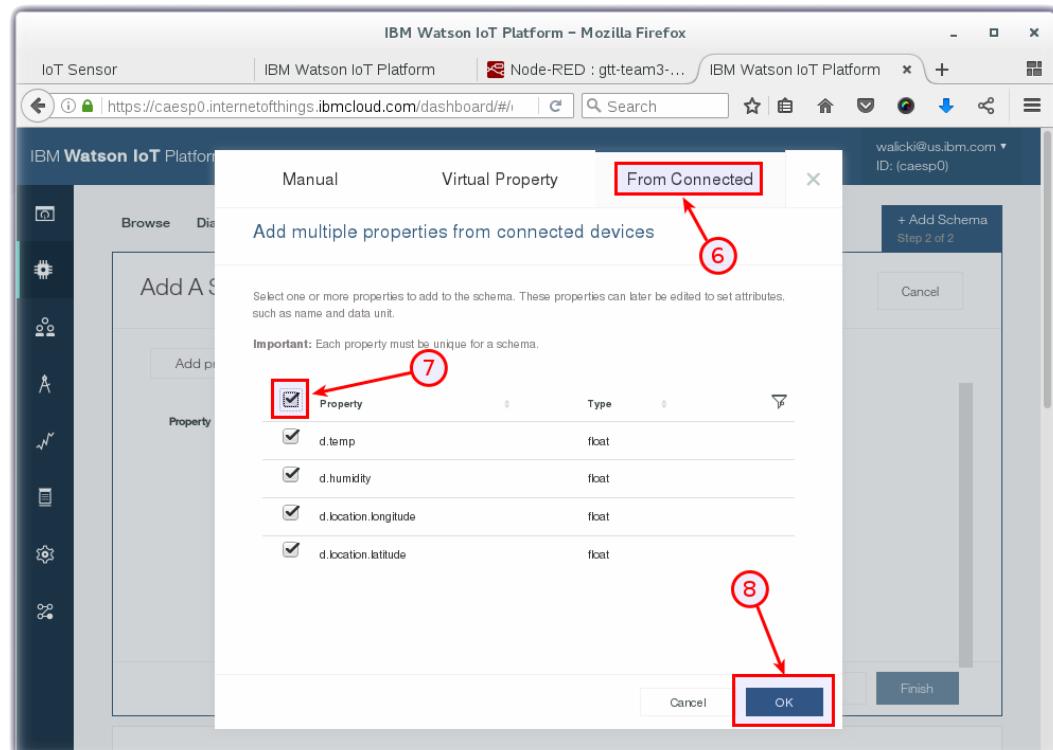
- Click on the **Select Type** drop down and choose thermostat (3) and then press the **Next** button (4).



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



- Click on “**From Connected**” (6) and **Check** (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 Rule** (10).

The screenshot shows the IBM Watson IoT Platform dashboard. On the left, there is a sidebar with various options: BOARDS, DEVICES, MEMBERS, APPS, USAGE, RULES (which is highlighted with a red box and has a red arrow pointing to it), SETTINGS, and EXTENSIONS. In the center, under the 'RULES' section, there is a heading 'Create, edit, and delete rules for your devices. Use rules to create alerts or trigger actions when trigger conditions are met for a device.' Below this, there is a table header with columns: Applies To, Rule Type, State, and three icons. A message says 'You don't have any rules'. At the top right of the central area, there are three buttons: 'Download Edge Agent', '+ Create Edge Rule', and '+ Create Cloud Rule' (which is also highlighted with a red box and has a red arrow pointing to it). The top right corner of the screen shows the user's email address: walicki@us.ibm.com and ID: (caesp0).

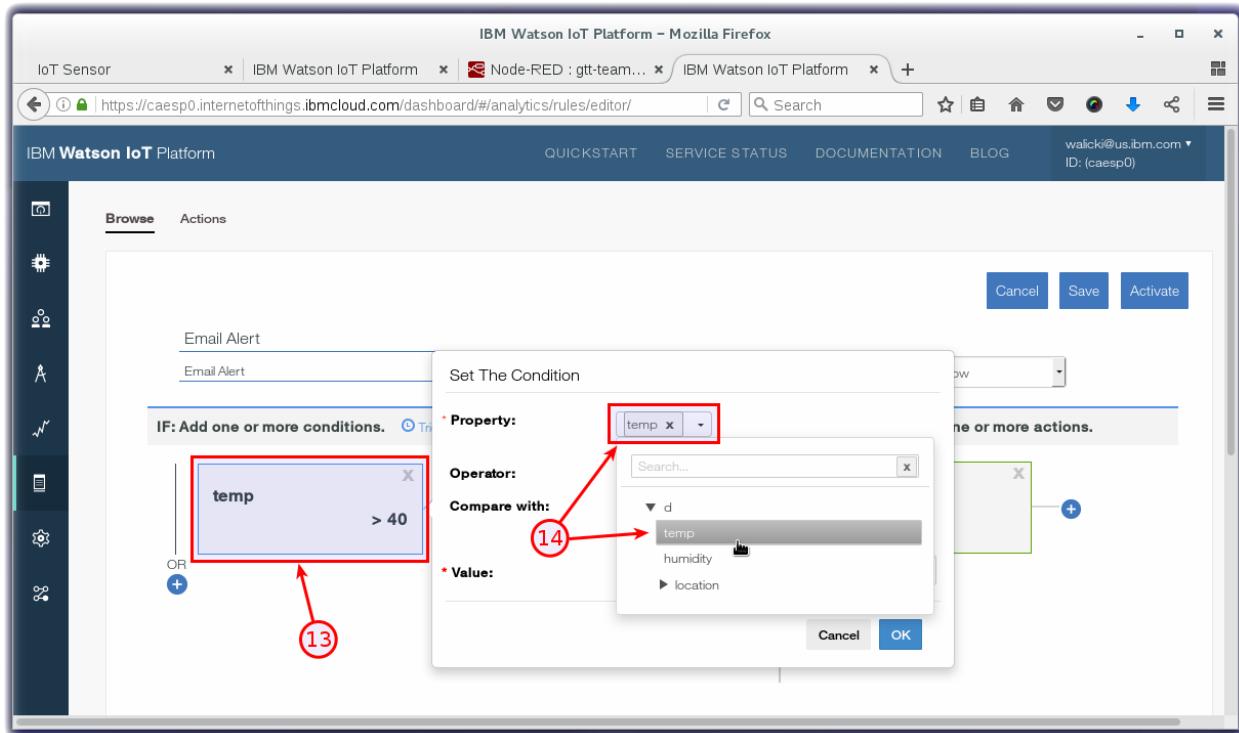
- Give this rule a **Name** of Email Alert (11) and select the thermostat schema (12) from the drop down. Press the **Next** button.

The dialog box is titled 'Add New Cloud Rule'. It contains three fields:

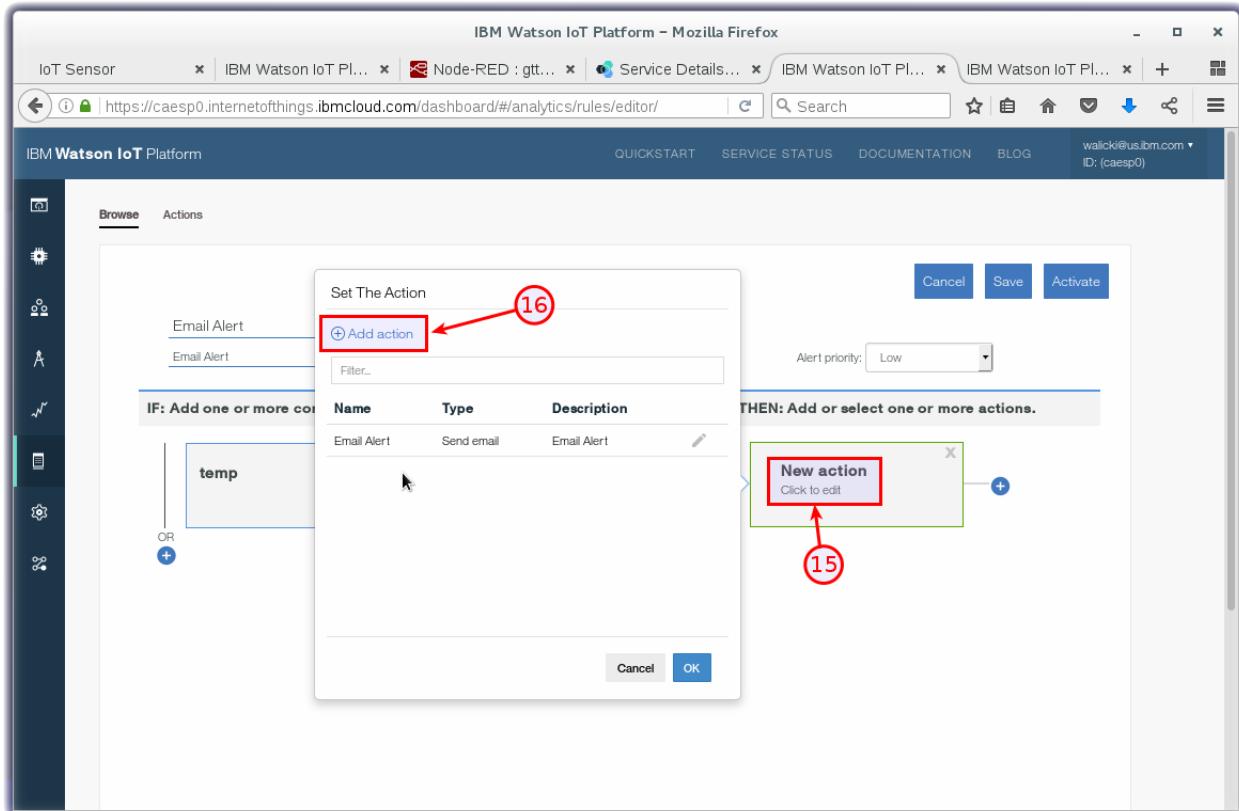
- * **Name:** A text input field containing 'Email Alert' with a red circle labeled 11 above it.
- Description:** A text input field containing 'Email Alert'.
- * **Applies to:** A dropdown menu with a list item 'thermostat' selected, indicated by a red circle labeled 12.

At the bottom right of the dialog are two buttons: 'Cancel' and 'Next' (which is highlighted with a red box and has a red arrow pointing to it).

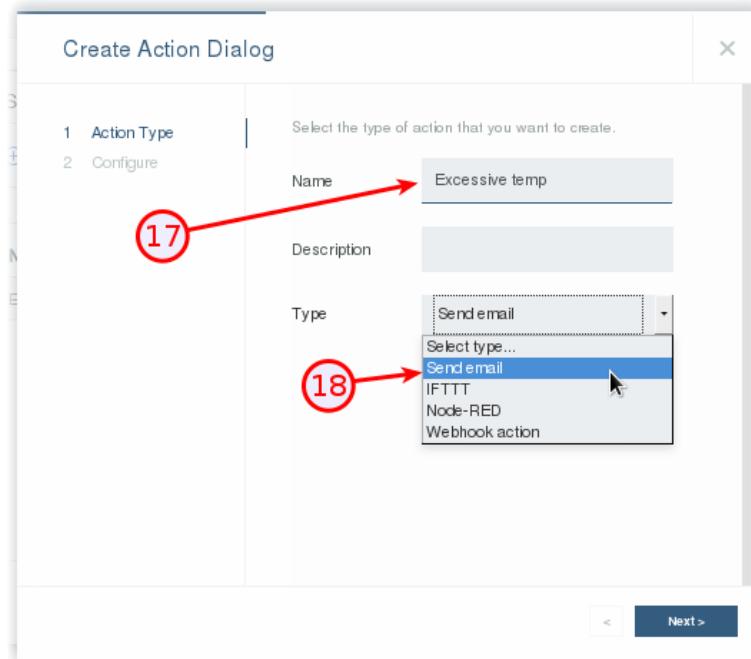
- Click on “New condition” (13) and select a property “temp” from the d.temp twistie (14). Enter a value of 40. Press the **Ok** button.



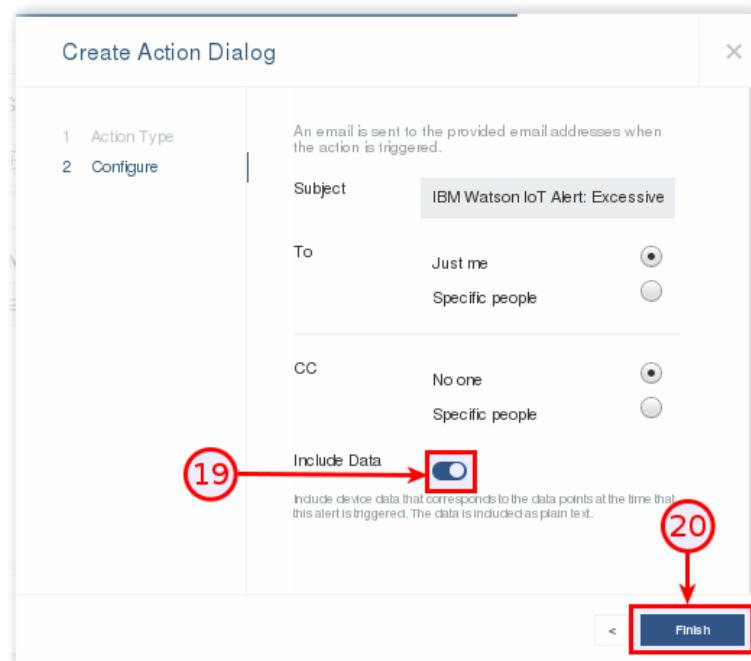
- Click on “New action” (15) and then Add Action (16).



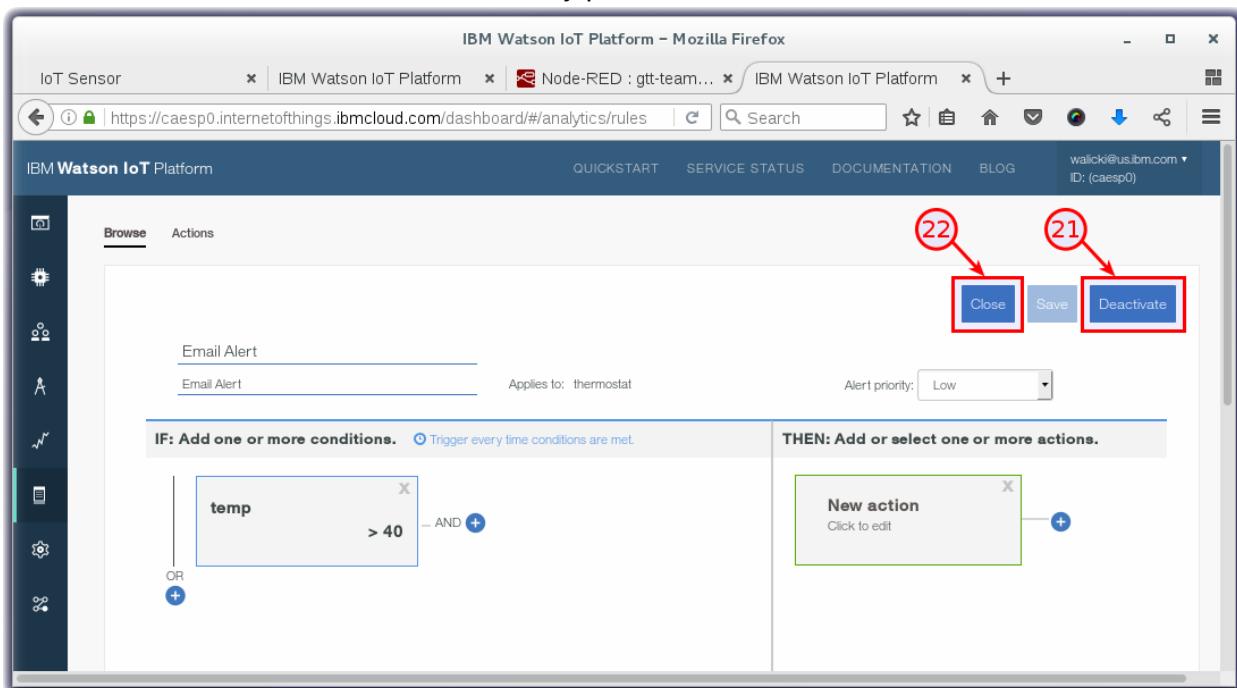
- Give this action a **name** “Excessive Temp” (17) and a **Type** of “Send email” (18). Press the **Next** button.



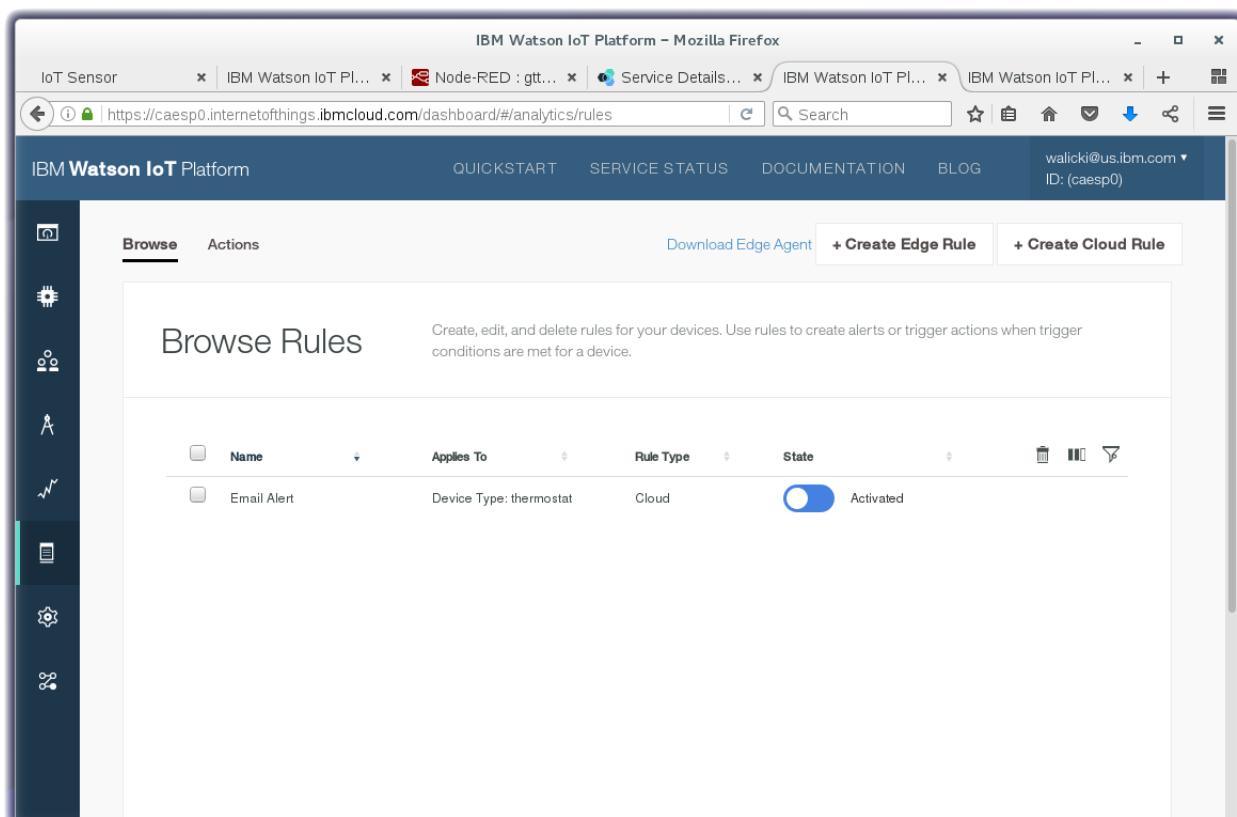
- On the **Create Action Dialog**, choose to **Include Data** (19) and press the **Finish** (20) button.



- Press the **Ok** button to set the Action.
- Press the **Activate** button (21) and finally press the **Close** button (22).



- You have created a Watson IoT Rule.



- The rule is activated.

- Email Alerts (23) are now being sent to your email address every time the temperature exceeds 40 degrees. Verify that you are receiving the Alerts and then deactivate the Rule.

The screenshot shows the IBM Watson IoT Platform dashboard. On the left, there's a sidebar with various icons. The main area has three main sections:

- Rule Alerts For That Device**: Shows counts for Critical (0), High (0), Medium (0), and Low (20) alerts over the last 24 hours. Below this is a list of recent alerts, with the last one highlighted by a red arrow pointing to it.
- Rule Alert Info**: Displays details for an alert named "Email Alert". It includes the description "Email Alert", device ID "thermostat343", device type "thermostat", severity "Low", and timestamp "21:33 18/01/2017". A condition "thermostat.d.temp>40" is also listed. A red arrow points from the condition to the number 23.
- Device Properties**: Shows device name "thermostat343" and various sensor values: humidity (65.2), location.latitude (12.901377), location.longitude (77.609342), and temp (29.9).

- 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>