Vivekanand Education Society's Institute of Technology
Department of Computer Engineering

IOT APPLICATION USING IBM BLUEMIX AND NODE RED

SUBJECT:
CLOUD COMPUTING

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DATE:
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Title

Conditional outputs on IBM Bluemix using realtime IBM simulated IoT sensor and Node Red application.

Abstract

At present, IoT related technologies such as sensors, wearables, cloud, and other related platforms are much in demand. We can also see that researchers, developers, and practitioners from diverse fields including scientists and engineers are coming together for a single cause. It looks like the world is set to see some evolutionary changes in the near future.Commonly used sensors in IoT.The variety and the type of sensors available at present make you baffled. They are used for various purposes benefitting every facet of human life. As IoT rises to dominance, a sensor takes more responsible part, which for the most part, is designed to measure a physical quality and enumerate it into a value that can be read by a user or another device. Since it is not so easy to list out or talk about all the sensors, let's focus on those sensors which are commonly used in IoT.Temperature Sensors-These are one of the most popular sensors that measure the temperature or heat of a given medium. These sensors utilize a number of different methods to determine and quantify the temperature of an object. These sensors work in a number of different ways, some of the sensors required to be in physical contact with the object while another type of sensors do not require contact as they can detect liquid or gases that emit radiant energy like spike in heat or a plummeting temperature.

Introduction

The phrase "Internet of Things" was first coined by Kevin Ashton in 1999. He stated that, "the Internet of Things (IoT) has the potential to change the world, just as the Internet did – maybe even more so." IC Insights expects that between 2014 and 2019, sensor shipments will surge with a CAGR of 11.4 percent, culminating in a total of 19.1 billion sensors by 2019. Revenues will rise 6 % annually as a result.

Commonly used sensors in IoT
The variety and the type of sensors available at present make you baffled. They are used for various purposes benefitting every facet of human life. As IoT rises to dominance, a sensor takes more responsible part, which for the most part, is designed to measure a physical quality and enumerate it into a value that can be read by a user or another device. Since it is not so easy to list out or talk about all the sensors, let's focus on those sensors which are commonly used in IoT.

They are:

1) Temperature Sensors

These are one of the most popular sensors that measure the temperature or heat of a given medium. These sensors utilize a number of different methods to determine and quantify the temperature of an object. These sensors work in a number of different ways, some of the sensors required to be in physical contact with the object while another type of sensors do not require contact as they can detect liquid or gases that emit radiant energy like spike in heat or a plummeting temperature.

2) Proximity Sensors
Proximity sensors are the best to detect motion. They are a common component in applications involving security, safety, or efficiency. These sensors are used to avoid obstacles in navigating to a crowded place or any complex route as it can be the best possible sensor for map building and guiding. Proximity sensors utilize electromagnetic radiation or radar to conclude motion or habitation.

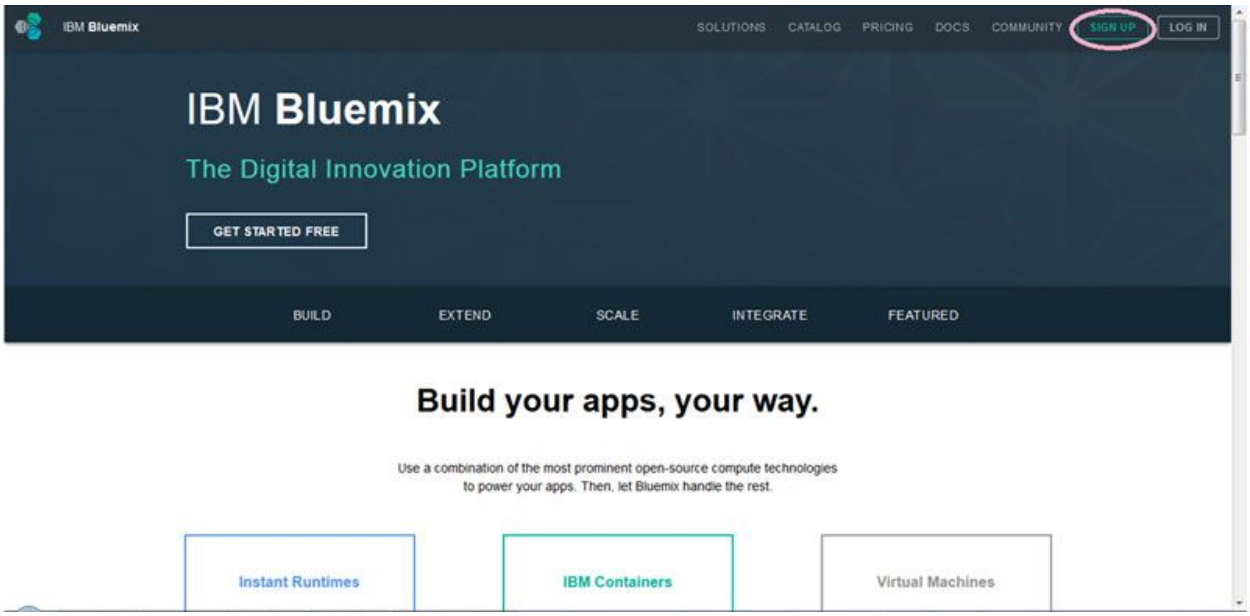
3) Pressure Sensors
Pressure sensors are used for measuring pressure of gas or liquid by converting the physical power into an electrical signal. They are also good at measuring other variables such as speed and altitude or such elements in some way. Barometers and pressure gauges are the most popular pressure sensors used for IoT ecosystem. Barometers are an absolute help in weather forecasting as it accurately measures the ambient air. Pressure gauges are mostly used in industrial sites as it is good in monitoring the pressure in sealed environments.

4) Optical Sensors
Fiber optic sensing technology is used to detect electromagnetic energies like light, electricity, or such elemental particles. They can emit, receive, and convert light energy into electrical signal. The fiber optic sensor IoT interface is connected to internet and cloud platform which collects information for monitoring various parameters. These optical sensors have great use in digital cameras which act as one of the major physical devices of an IoT ecosystem. We can expect high growth of innovative fiber optic sensors as part of the rise in sophisticated industrial automation applications. As they are passive to all forms of electrical interfaces, they are considered as the much loved sensors for IoT.

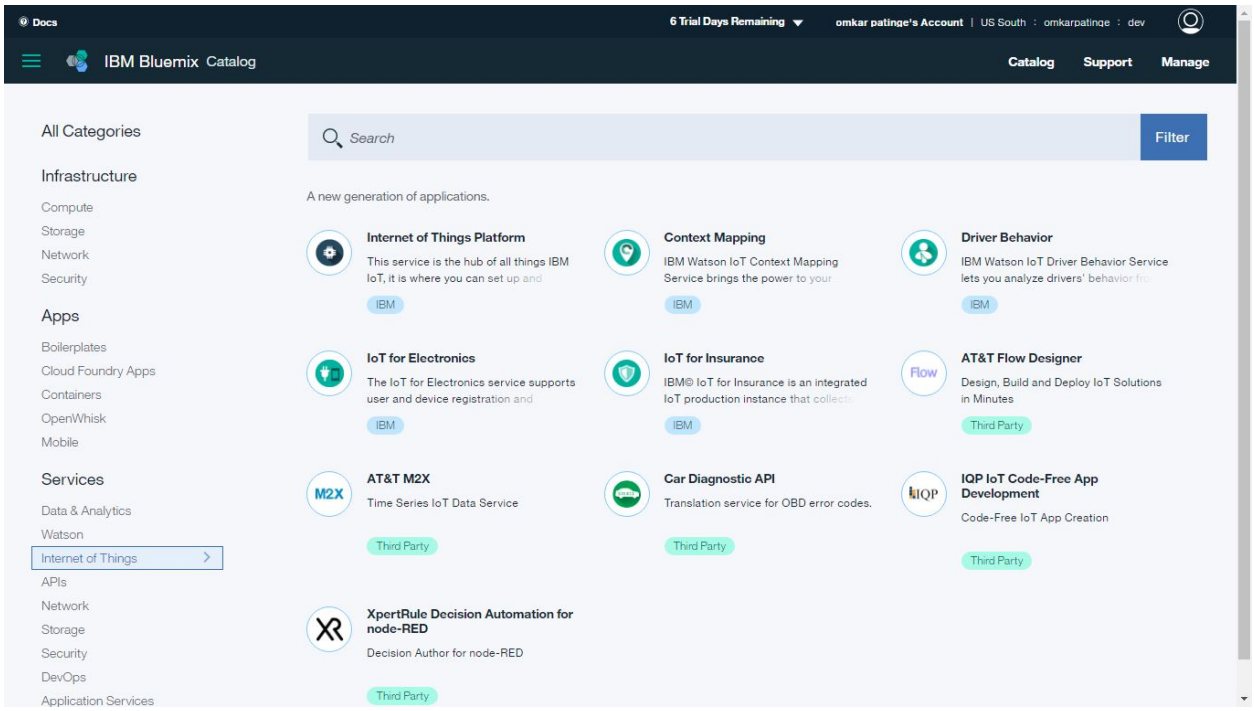
BLUEMIX
BM Bluemix is a cloud platform as a service (PaaS) developed by IBM. It supports several programming languages and services[1] as well as integrated DevOps to build, run, deploy and manage applications on the cloud. Bluemix is based on Cloud Foundry open technology and runs on SoftLayer infrastructure. Bluemix supports several programming languages[2] including Java, Node.js, Go, PHP, Swift, Python, Ruby Sinatra, Ruby on Rails and can be extended to support other languages such as Scala through the use of buildpacks.

Implementation details

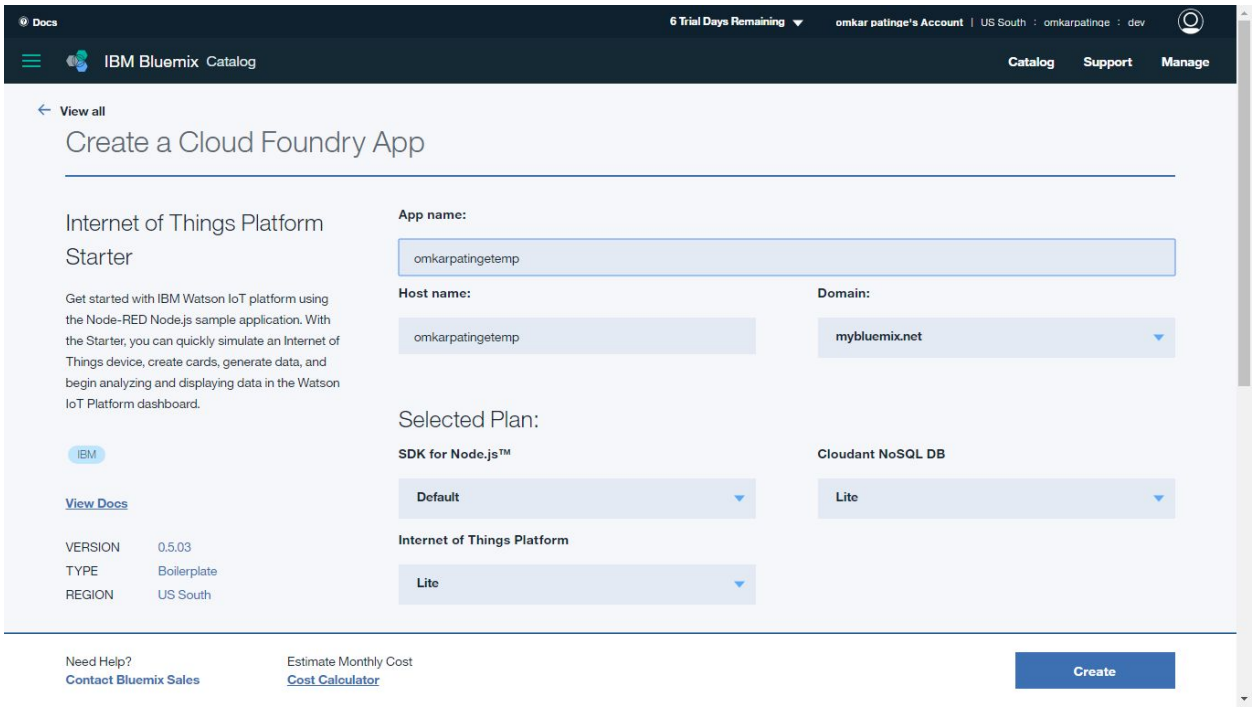
You can go to the Bluemix site and sign up if you don't have an account. It also has a 30 day free trial, after which you can continue using it through a 'freemium model.'



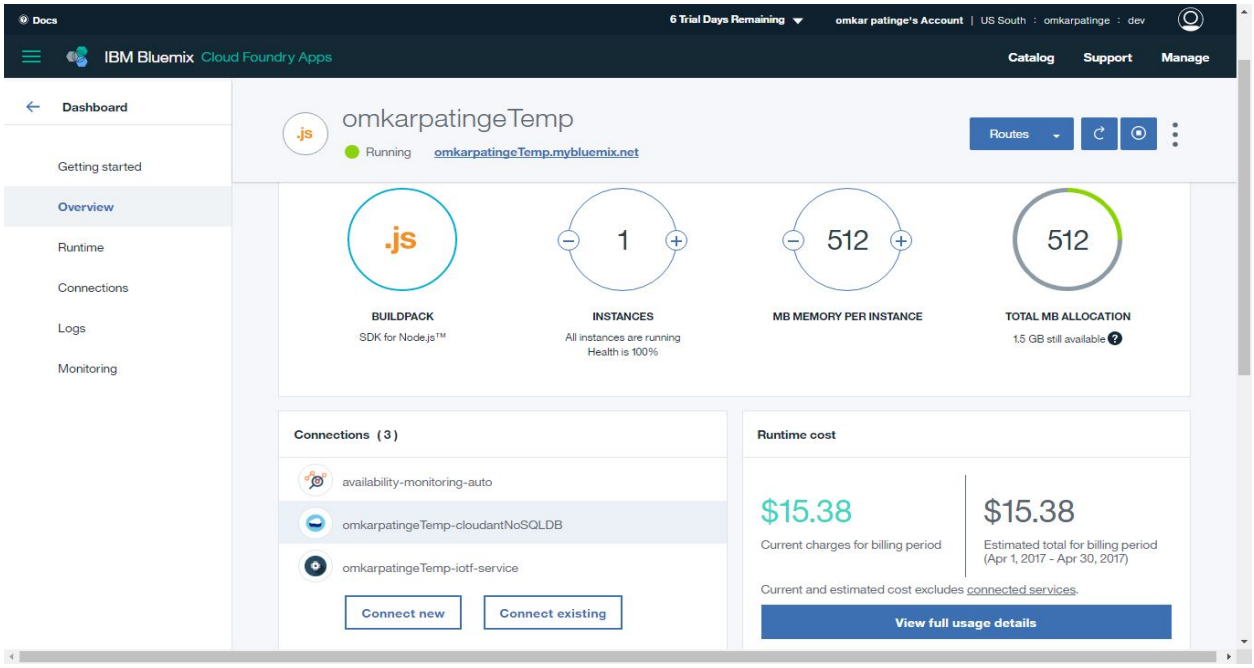
After logging in, you'll come to the screen below. Click on the highlighted 'Catalog' button.



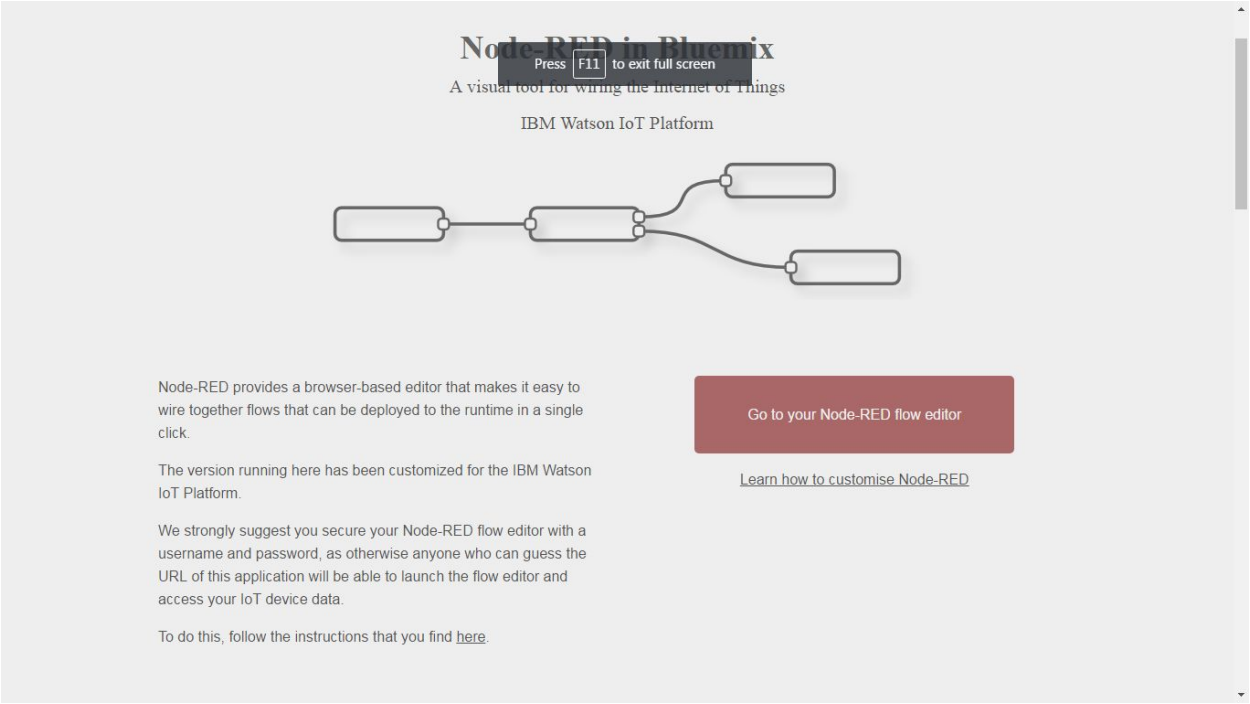
On coming to the Catalog page, click on the 'Internet of Things Platform. This is the system that'll collect data from the sensor .



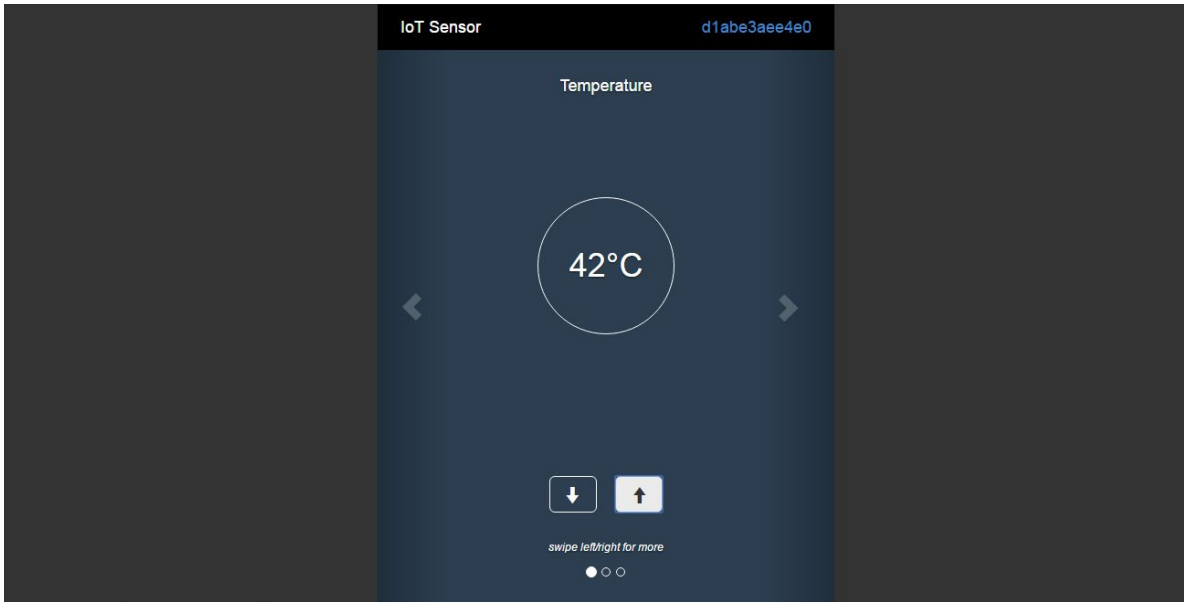
On clicking "Internet of Things platform Starter" you will be going to the screen below, where you put in the name of your application. Remember, this name has to be unique in the Bluemix domain.Click the 'Create' button, after which you'll be taken to the screen below. Click on 'View Application Overview. (Please note: If you get a 'host taken' error when you hit the "Create" button, try changing the name of your application.)



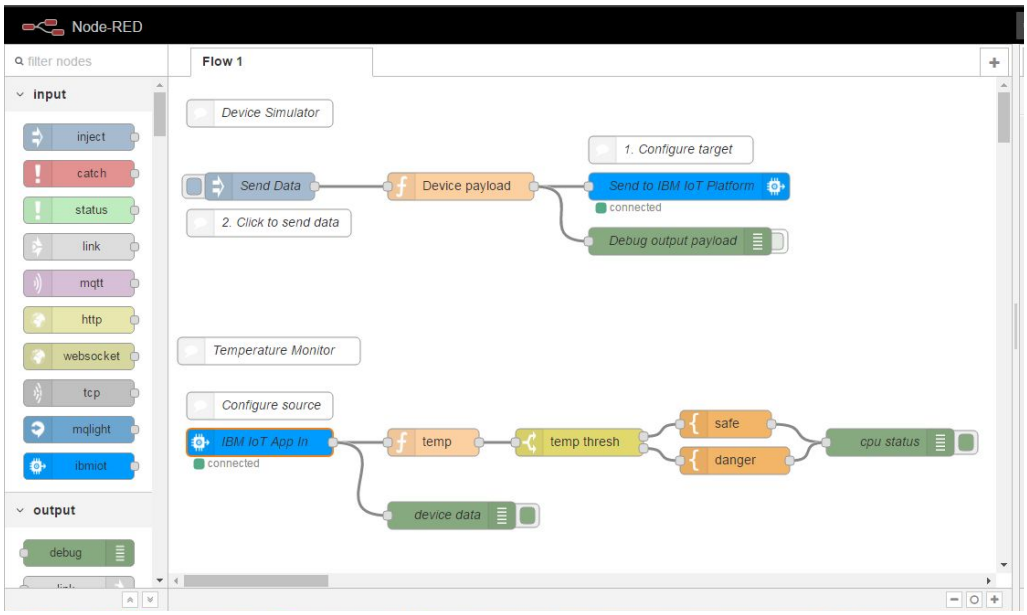
Next, you come to the screen of the ‘Overview’ This screen gives the status of the application, how many instances are active, what is the memory it is using and what back-end it is connected to. In this case, it’s a Cloudant NoSQL database.Ensure that the ‘Application Health’ shows ‘Your app is running,’ and if the app is running you can click on the URL.After that, you’ll come to the page below. Click on ‘Go to your Node ReD flow editor.’



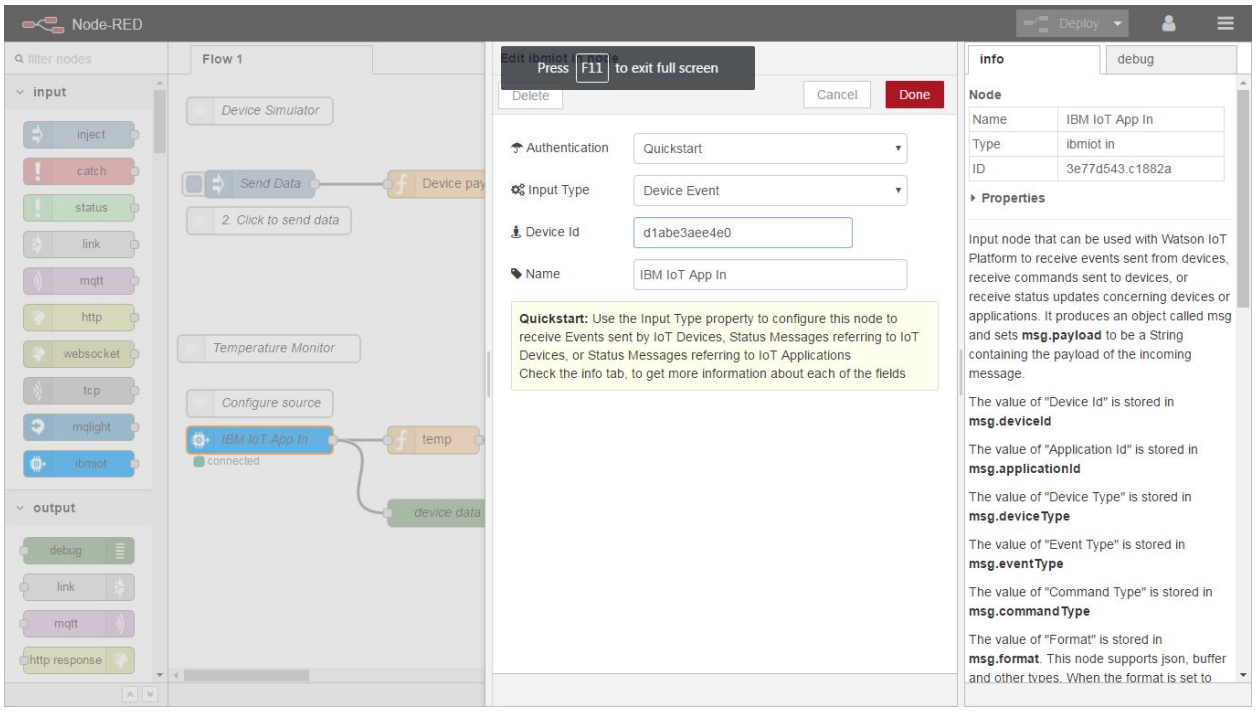
This leads you to the IoT application editor page.Temperature sensor:



Please note that a unique Device Id (it a MAC address) is generated for you , the IoT node in Bluemix will communicate to this sensor via this Device id.You can use the 'up' and 'down' buttons to increase or decrease the temperature.Create your desired app by dragging the nodes displayed on left side and writing the required code.



The device ID in this case is d1abe3aee4e0 In the field for Device Id, paste the device ID.

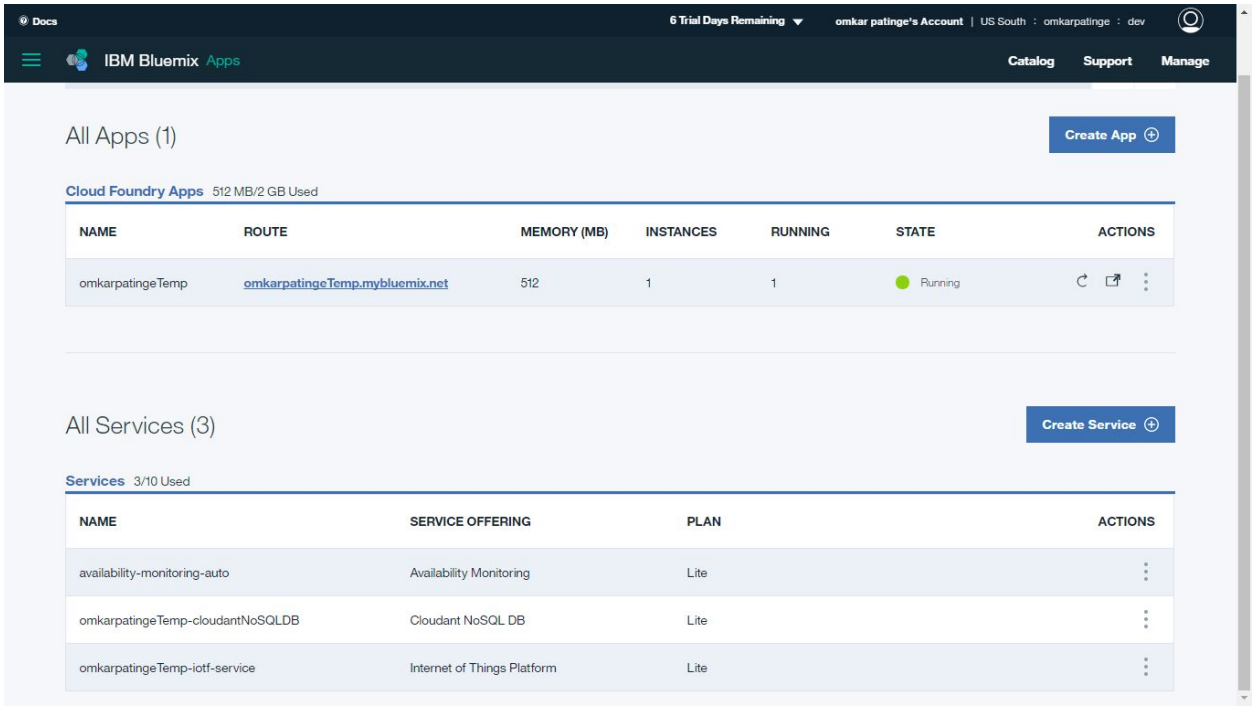


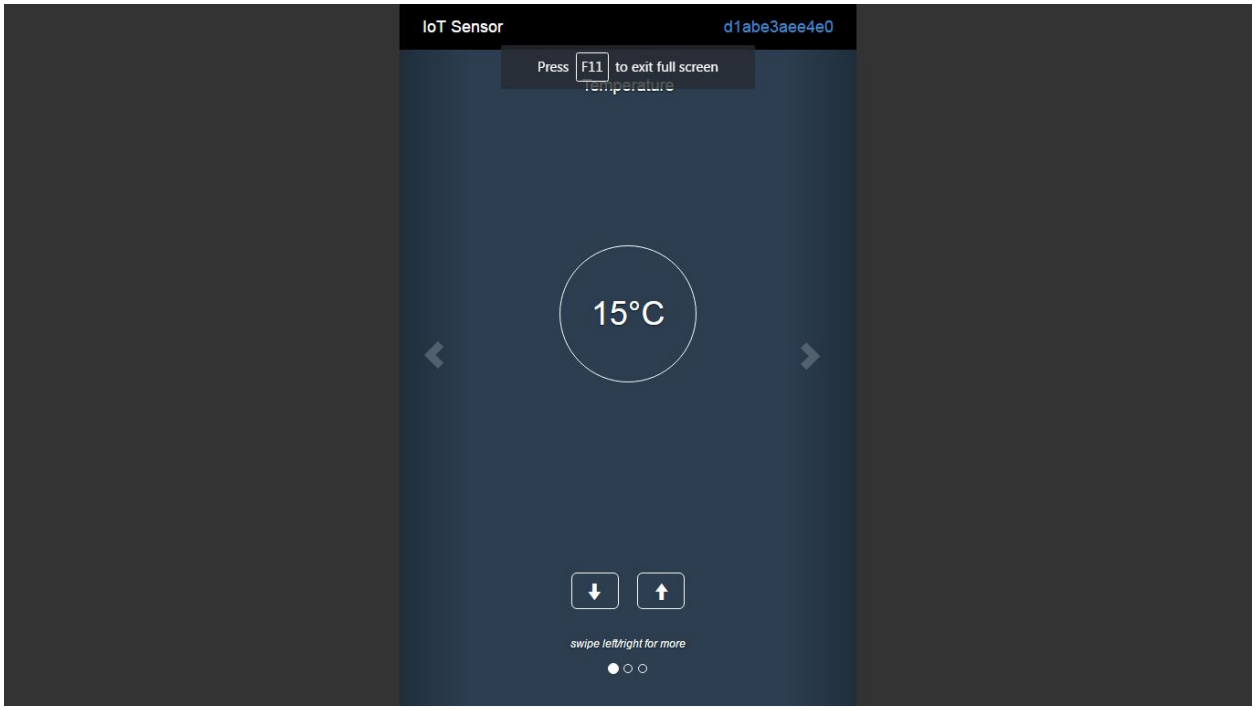
Click on the ‘Done’ button. After that click ‘Deploy’ as shown below.If the temperature is less than or equal to 40, you’ll receive an output of the ‘temperature reading’ appended with ‘within safe limits’ in the ‘Debug Console’ on the right .

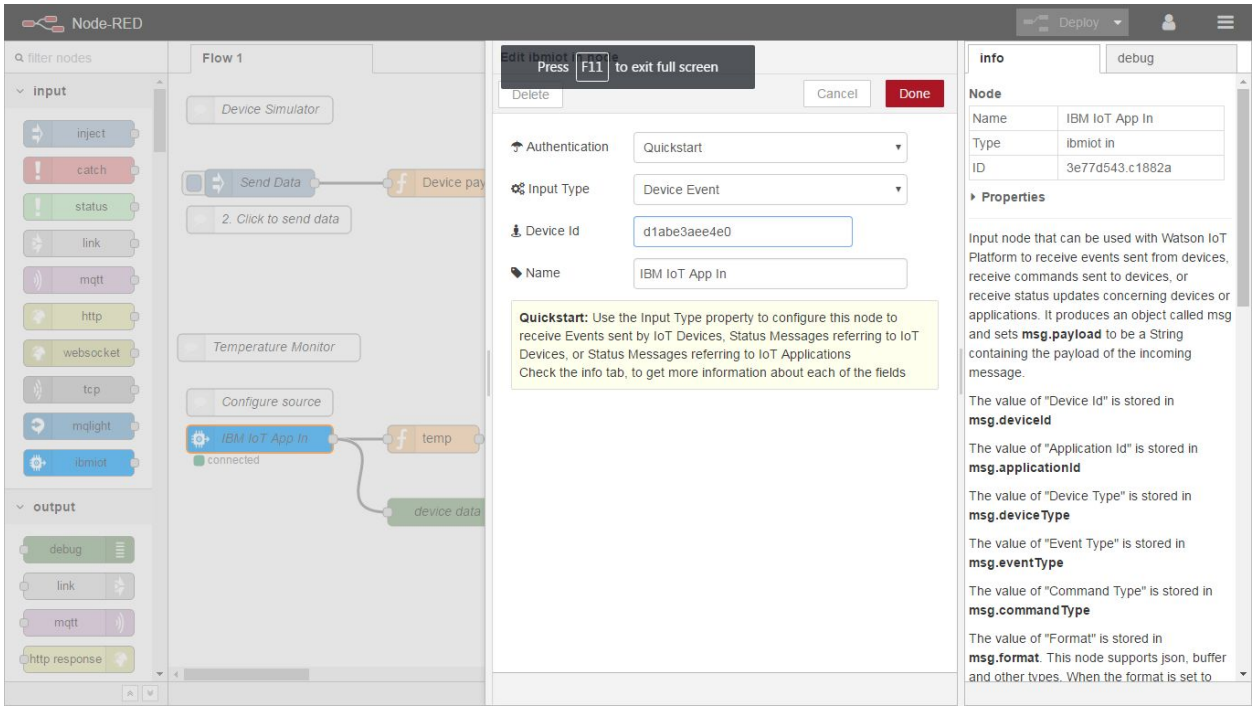
Result

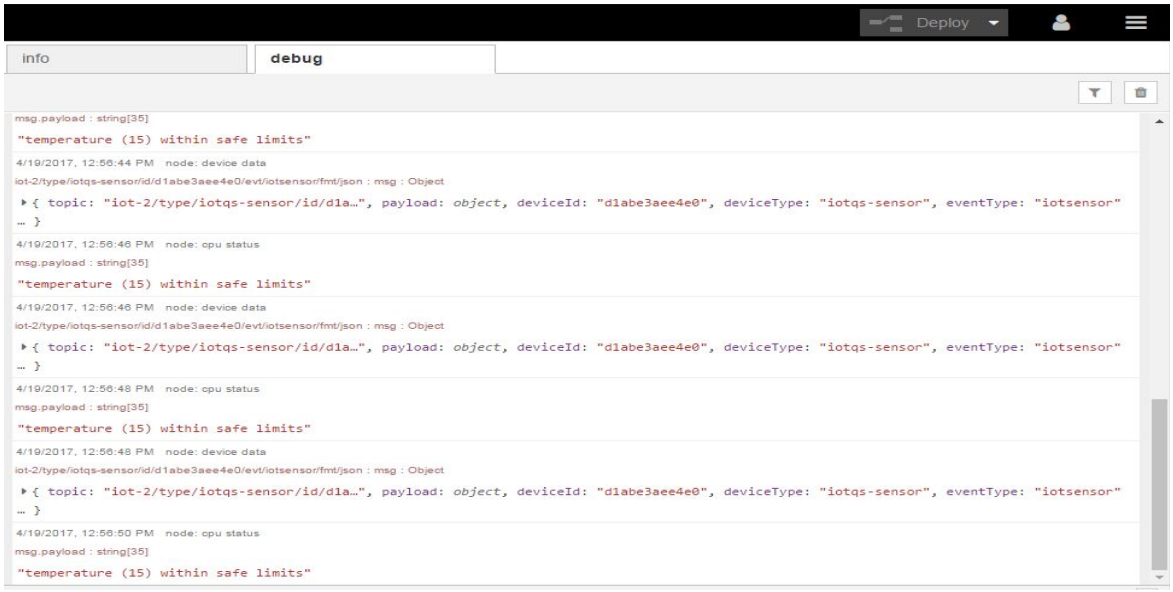
Using IoT sensor we can simulate the situation wherein there is overheating in some device and we can extend this project by implementing message alerts.

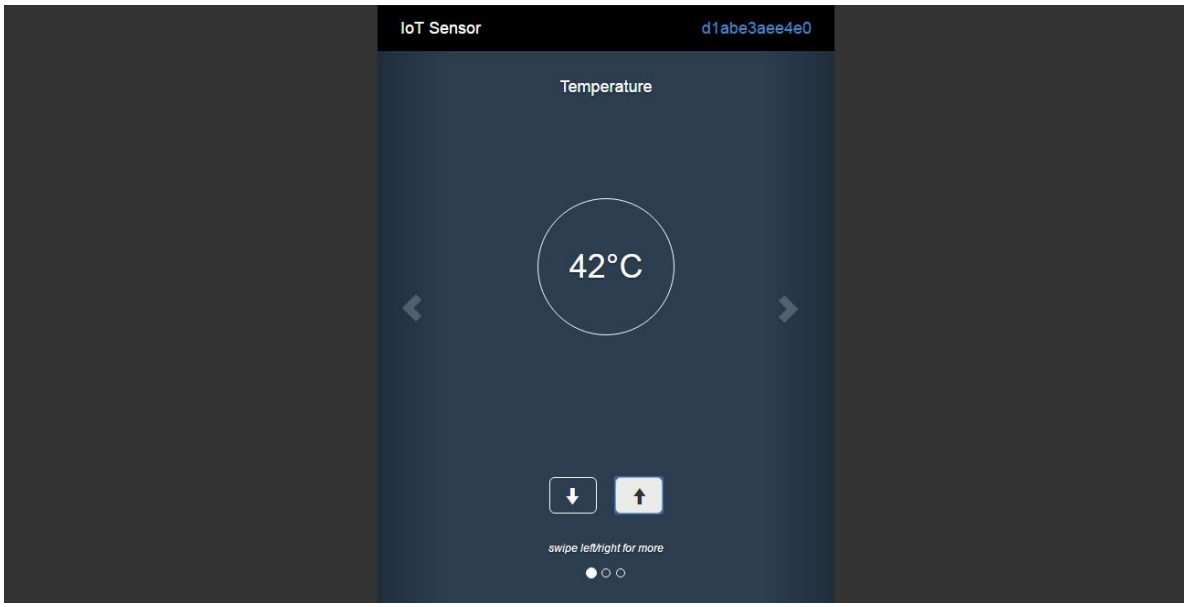
Snapshot




IoT Sensor
d1abe3aee4e0
Press F11 to exit full screen
Temperature
15°C
swipe left/right for more


Node-RED
Deploy
Flow 1
input
inject
catch
status
link
mqtt
http
websocket
tcp
mqlight
ibmiot
output
debug
link
mqtt
http response
Device Simulator
Send Data
2. Click to send data
Temperature Monitor
Configure source
IBM IoT App In
connected
temp
device data
Press F11 to exit full screen
Delete
Cancel
Done
Authentication
Quickstart
Input Type
Device Event
Device Id
d1abe3aee4e0
Name
IBM IoT App In
Quickstart: Use the Input Type property to configure this node to receive Events sent by IoT Devices, Status Messages referring to IoT Devices, or Status Messages referring to IoT Applications
Check the info tab, to get more information about each of the fields
info
debug
Node
Name
IBM IoT App In
Type
ibmiot in
ID
3e77d543.c1882a
Properties
Input node that can be used with Watson IoT Platform to receive events sent from devices, receive commands sent to devices, or receive status updates concerning devices or applications. It produces an object called msg and sets msg.payload to be a String containing the payload of the incoming message.
The value of "Device Id" is stored in msg.deviceId
The value of "Application Id" is stored in msg.applicationId
The value of "Device Type" is stored in msg.deviceType
The value of "Event Type" is stored in msg.eventType
The value of "Command Type" is stored in msg.commandType
The value of "Format" is stored in msg.format. This node supports json, buffer and other types. When the format is set to


Deploy
info
debug
msg.payload : string[35]
"temperature (15) within safe limits"
4/19/2017, 12:56:44 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotsensor/fmt/json : msg : Object
{ topic: "iot-2/type/iotqs-sensor/id/d1a…", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor" … }
4/19/2017, 12:56:46 PM node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"
4/19/2017, 12:56:46 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotsensor/fmt/json : msg : Object
{ topic: "iot-2/type/iotqs-sensor/id/d1a…", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor" … }
4/19/2017, 12:56:48 PM node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"
4/19/2017, 12:56:48 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotsensor/fmt/json : msg : Object
{ topic: "iot-2/type/iotqs-sensor/id/d1a…", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor" … }
4/19/2017, 12:56:50 PM node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"


IoT Sensor
d1abe3aee4e0
Temperature
42°C
swipe left/right for more

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Conclusion

These sensors utilize a number of different methods to determine and quantify the temperature of an object. These sensors work in a number of different ways, some of the sensors required to be in physical contact with the object while another type of sensors do not require contact as they can detect liquid or gases that emit radiant energy like spike in heat or a plummeting temperature.

References

https://www.google.co.in/url?q=https://m.yourstory.com/2015/03/internet-of-things-application/&sa=U&ved=0ahUKEwi37d7U0PnSAhWIsY8KHTH1CRYQFggLMAA&usg=AFQjCNH7MY_tA-tC11PcUS7B3VqxPQvlyA