

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

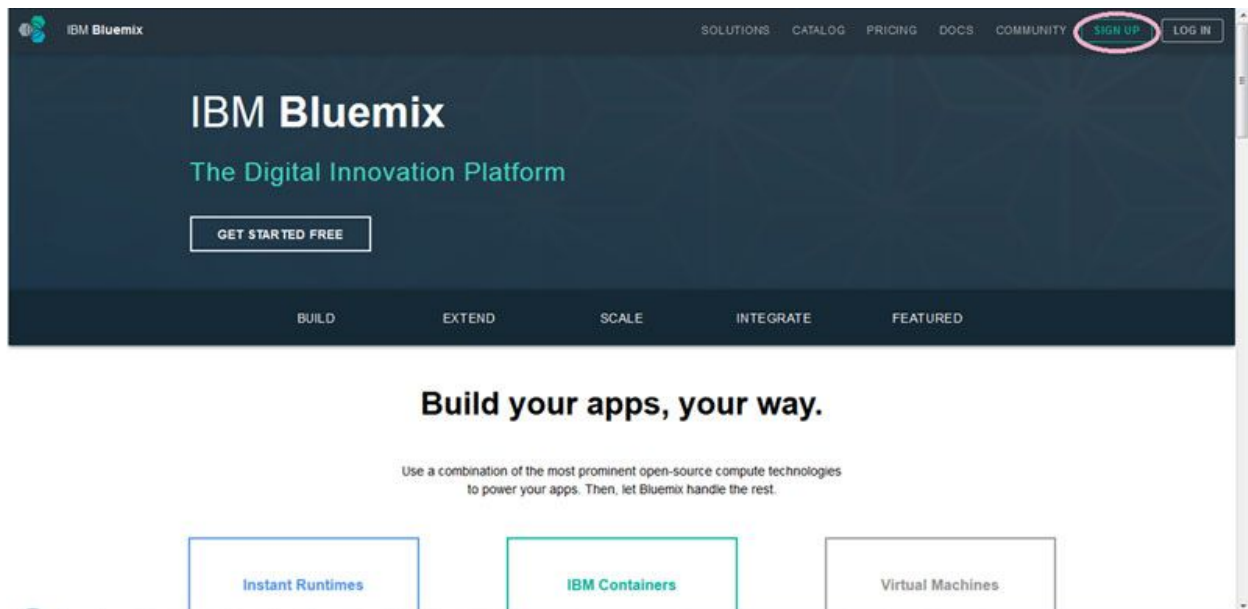
Fiber optic sensing technology is used to detect electromagnetic energies like light, electricity, or such elemental particles. They can emit, receive, and convert light energy into electrical signal. The fiber optic sensor IoT interface is connected to internet and cloud platform which collects information 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

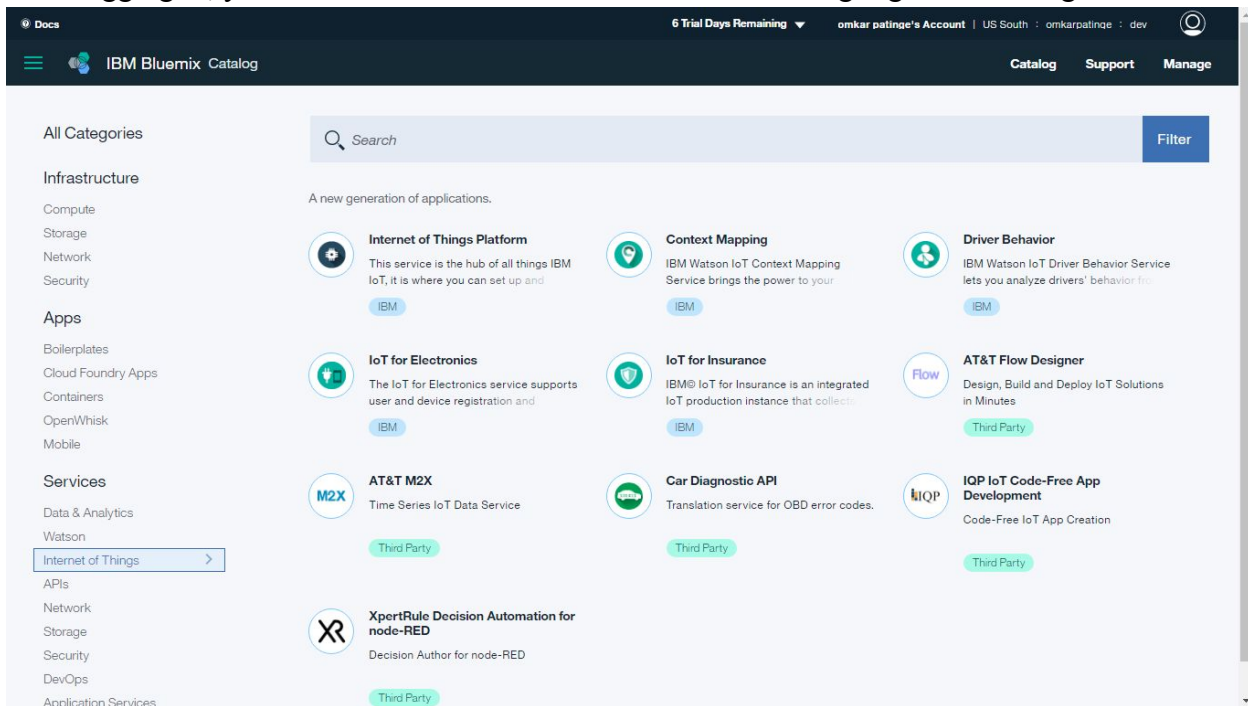
BM Bluemix is a cloud platform as a service (PaaS) developed by IBM. It supports several programming languages and services^[1] as well as integrated DevOps to build, run, deploy and manage applications on the cloud. Bluemix is based on Cloud Foundry open technology and runs on SoftLayer infrastructure. 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 .

Docs
6 Trial Days Remaining
omkar patinge's Account
US South : omkarpatinge : dev
Catalog Support Manage

View all

Create a Cloud Foundry App

Internet of Things Platform Starter

Get started with IBM Watson IoT platform using the Node-RED Node.js sample application. With the Starter, you can quickly simulate an Internet of Things device, create cards, generate data, and begin analyzing and displaying data in the Watson IoT Platform dashboard.

IBM

[View Docs](#)

VERSION	0.5.03
TYPE	Boilerplate
REGION	US South

App name:

Host name:

Domain:

Selected Plan:

SDK for Node.js™

Cloudant NoSQL DB

Internet of Things Platform

Need Help?
[Contact Bluemix Sales](#)

Estimate Monthly Cost
[Cost Calculator](#)

Create

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.)

Docs
6 Trial Days Remaining
omkar patinge's Account
US South : omkarpatinge : dev
Catalog Support Manage

Dashboard
Getting started
Overview
Runtime
Connections
Logs
Monitoring

omkarpatingeTemp

Running [omkarpatingeTemp.mybluemix.net](#)

Routes
Refresh
Stop

BUILDPACK

SDK for Node.js™

INSTANCES

All instances are running
Health is 100%

MB MEMORY PER INSTANCE

TOTAL MB ALLOCATION

1.5 GB still available

Connections (3)

- availability-monitoring-auto
- omkarpatingeTemp-cloudantNoSQLDB
- omkarpatingeTemp-iotf-service

[Connect new](#) [Connect existing](#)

Runtime cost

\$15.38

Current charges for billing period

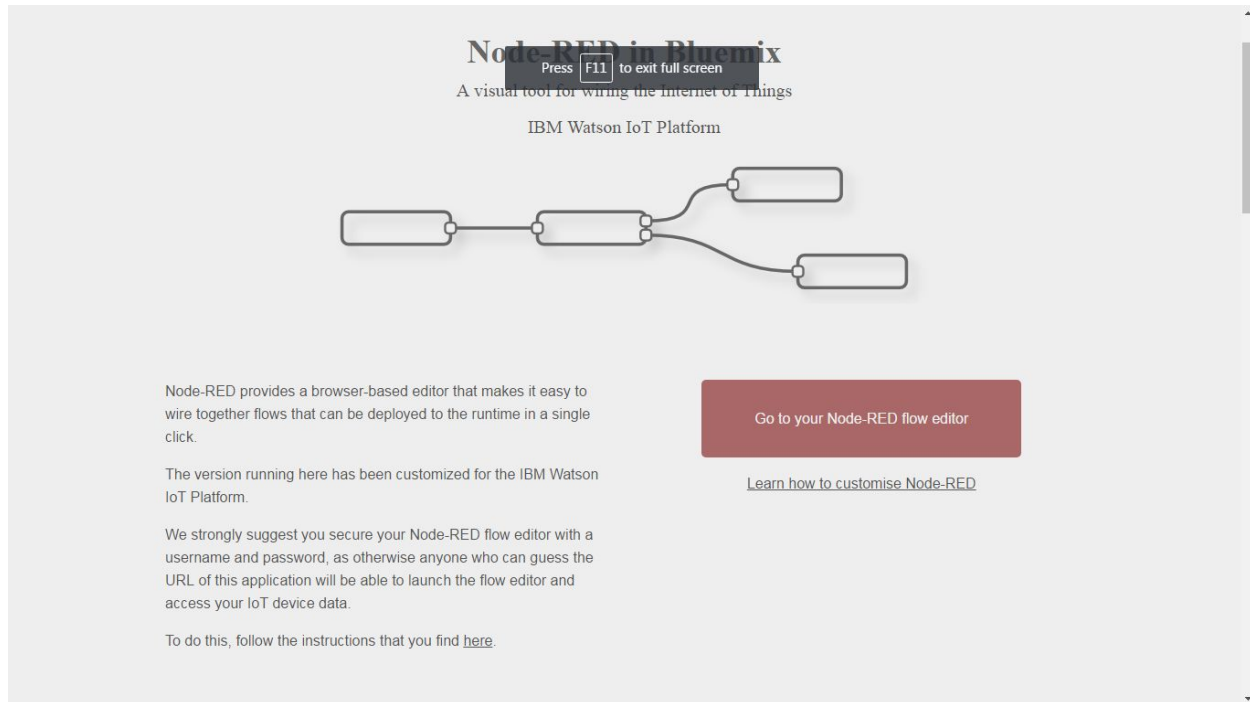
\$15.38

Estimated total for billing period
(Apr 1, 2017 - Apr 30, 2017)

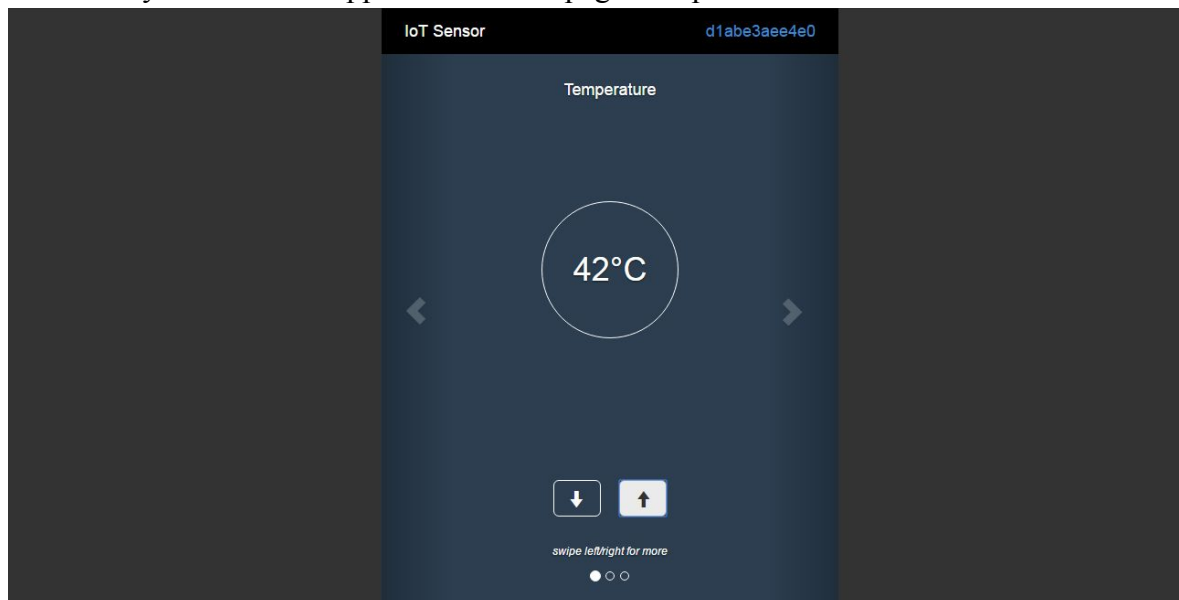
Current and estimated cost excludes [connected services](#).

[View full usage details](#)

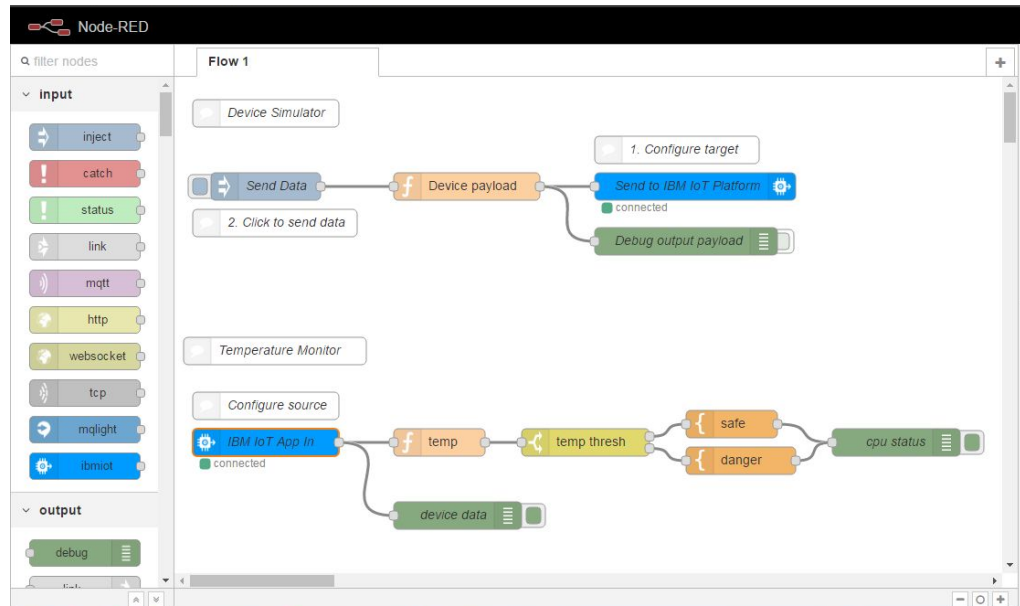
Next, you come to the screen of the ‘Overview’ This screen gives the status of the application, how many instances are active, what is the memory it is using and what back-end it is connected to. In this case, it’s a Cloudant NoSQL database.Ensure that the ‘Application Health’ shows ‘Your app is running,’ 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.

The image shows the Node-RED interface with the 'IBM IoT App In' node selected. The 'Edit' dialog is open, showing the configuration for the node. The 'Device Id' field is set to 'd1abe3aee4e0'. The 'Name' field is set to 'IBM IoT App In'. The 'Authentication' dropdown is set to 'Quickstart'. The 'Input Type' dropdown is set to 'Device Event'. The 'Info' tab is active, showing the node's properties and a description.

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**

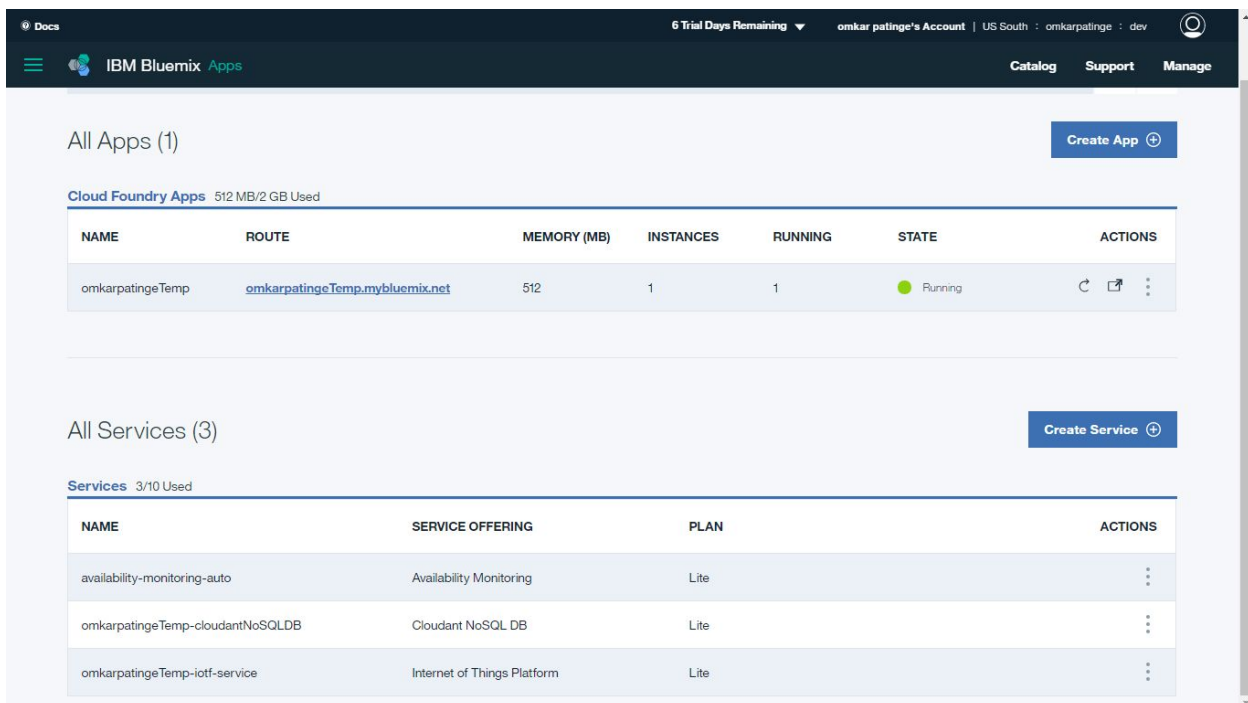
The value of "Format" is stored in **msg.format**. This node supports json, buffer and other types. When the format is set to

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



The screenshot displays the IBM Bluemix Apps management console. At the top, the navigation bar includes 'Docs', '6 Trial Days Remaining', 'omkar patinge's Account', 'US South', 'omkar patinge : dev', and a user profile icon. The main content area is divided into two sections: 'All Apps (1)' and 'All Services (3)'. The 'All Apps' section shows a table with one application, 'omkar patingeTemp', which is running on the route 'omkar patingeTemp.mybluemix.net' with 512 MB of memory and 1 instance. The 'All Services' section shows a table with three services: 'availability-monitoring-auto', 'omkar patingeTemp-cloudantNoSQLDB', and 'omkar patingeTemp-iotf-service', all using the 'Lite' plan.

All Apps (1) [Create App](#)

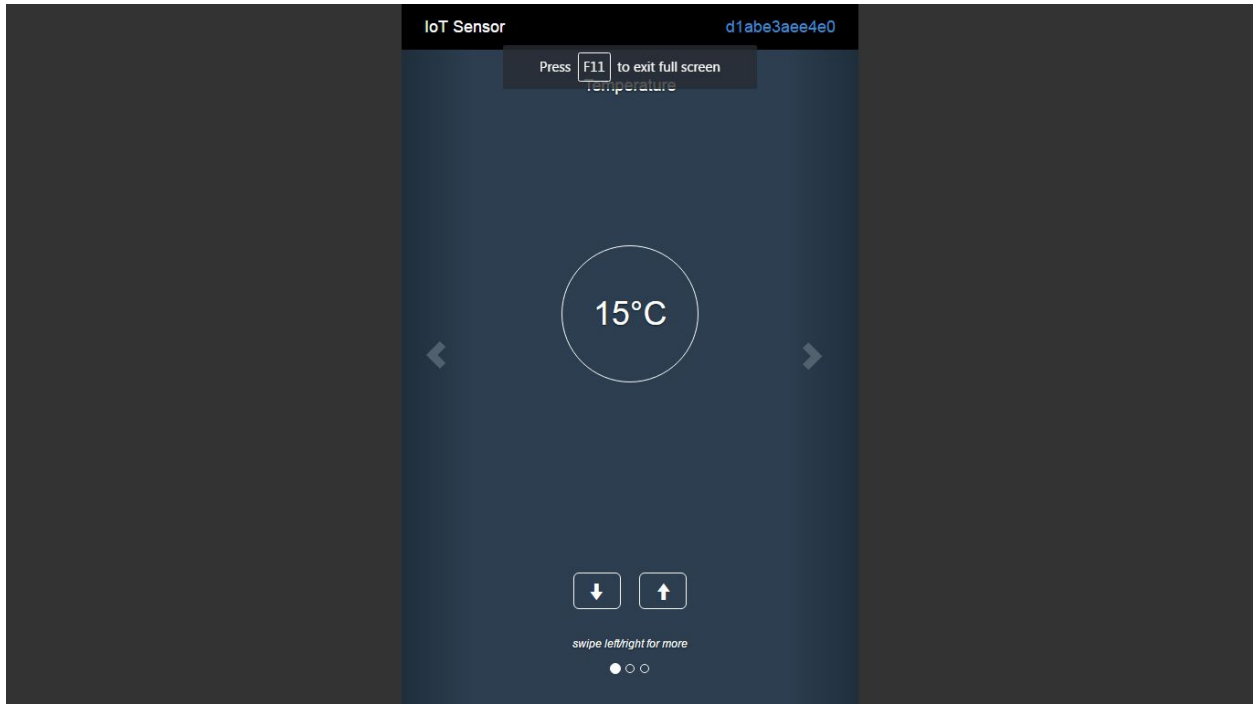
Cloud Foundry Apps 512 MB/2 GB Used

NAME	ROUTE	MEMORY (MB)	INSTANCES	RUNNING	STATE	ACTIONS
omkar patingeTemp	omkar patingeTemp.mybluemix.net	512	1	1	Running	Refresh Deploy More

All Services (3) [Create Service](#)

Services 3/10 Used

NAME	SERVICE OFFERING	PLAN	ACTIONS
availability-monitoring-auto	Availability Monitoring	Lite	More
omkar patingeTemp-cloudantNoSQLDB	Cloudant NoSQL DB	Lite	More
omkar patingeTemp-iotf-service	Internet of Things Platform	Lite	More



Node-RED interface showing the configuration of the "IBM IoT App In" node.

Flow 1:

- Device Simulator
- Send Data
- 2. Click to send data
- Temperature Monitor
- Configure source
- IBM IoT App In (connected)
- temp
- device data

Edit ibmiot

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

Property	Value
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, 12:55:44 PM  node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotensor/fmt/json : msg : Object
▶ { topic: "iot-2/type/iotqs-sensor/id/d1a...", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
... }

4/19/2017, 12:55:46 PM  node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"

4/19/2017, 12:55:46 PM  node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotensor/fmt/json : msg : Object
▶ { topic: "iot-2/type/iotqs-sensor/id/d1a...", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
... }

4/19/2017, 12:55:48 PM  node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"

4/19/2017, 12:55:48 PM  node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evt/iotensor/fmt/json : msg : Object
▶ { topic: "iot-2/type/iotqs-sensor/id/d1a...", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
... }

4/19/2017, 12:55:50 PM  node: cpu status
msg.payload : string[35]
"temperature (15) within safe limits"
```

IoT Sensor

d1abe3aee4e0

Temperature

42°C

⏮

⏭

⬇

⬆

swipe left/right for more

●

○

○

```
info | debug
{
  topic: "iot-2/type/iotqs-sensor/id/dla_", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
  ...
}
4/19/2017, 12:57:32 PM node: cpu status
msg.payload: string[25]
"Tempartuere (42) critical"
4/19/2017, 12:57:32 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evl/iotsensorfmt/json: msg: Object
{
  topic: "iot-2/type/iotqs-sensor/id/dla_", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
  ...
}
4/19/2017, 12:57:34 PM node: cpu status
msg.payload: string[25]
"Tempartuere (42) critical"
4/19/2017, 12:57:34 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evl/iotsensorfmt/json: msg: Object
{
  topic: "iot-2/type/iotqs-sensor/id/dla_", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
  ...
}
4/19/2017, 12:57:36 PM node: cpu status
msg.payload: string[25]
"Tempartuere (42) critical"
4/19/2017, 12:57:36 PM node: device data
iot-2/type/iotqs-sensor/id/d1abe3aee4e0/evl/iotsensorfmt/json: msg: Object
{
  topic: "iot-2/type/iotqs-sensor/id/dla_", payload: object, deviceId: "d1abe3aee4e0", deviceType: "iotqs-sensor", eventType: "iotsensor"
  ...
}
```

+

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