## Title:

Create Bluemix Internet of Things (IOT) app to process, visualize, and store sensor data that is sent to and from your smartphone.

## Abstract:

The project shows how you can send sensor data that is generated by your smartphone to the IBM Watson IoT Platform cloud-hosted service, and then create Bluemix™ applications that process, visualize, and store the data. Lastly, it shows you how to create an Android application for a smartphone.

## Introduction:

IBM Bluemix is an application development environment that delivers the speed and flexibility of a platform-as-a-service (PaaS). It allows developers to more quickly compose and build enterprise-grade applications for the cloud era.

## Bluemix Services

Additional services are subject to the Cloud Services Agreement and this Service Description. A service may provide its own Service Description, available through the Bluemix UI, which may provide additional or different terms that override inconsistent provisions in this Service Description. For example, a Service Description may provide a different service level commitment, unique security provisions, or identification of enabling software. Some non-IBM services will be subject to their own license terms and not be subject to the Cloud Services Agreement. Deployment and use of additional services constitutes agreement with the terms associated with the relevant services in the Bluemix UI. The documentation for Bluemix and any additional services may include usage guidelines and/or limitations to preserve the performance, responsiveness, or integrity of the Bluemix platform. Client agrees to use Bluemix and the additional services in compliance with those guidelines and understand that applications that violate these guidelines may be terminated automatically by the system or by Bluemix system administrators.

## Benefits

**1. Simplicity and speed**: By focusing on the DevOps model, Bluemix can reduce the downtime of redeploying applications. Continuous delivery is one way this can be provided. The integrated environment provided by Bluemix allows developers to automatically deliver code without the hassle of building and debugging installation scripts. This reduces the time needed to manage code delivery and puts it in the hands of the testers and user community faster.

**2. Agility:** Bluemix allows developers to focus on delivering business value, rather than on maintaining the development environment, by scaling environments elastically based on business demand. Instead of manually deploying workloads, Bluemix will automatically redeploy workloads to other virtual machines (VMs) if there is an outage. To provide continuous availability, Bluemix abstracts the underlying architecture and keeps the manageability of services and applications at an easily understood level.

**3. Tools:** With Bluemix, developers have the freedom to choose the development tools that work best for them. Developers don't always want to work with the same tool sets and Bluemix provides several options, including the following:

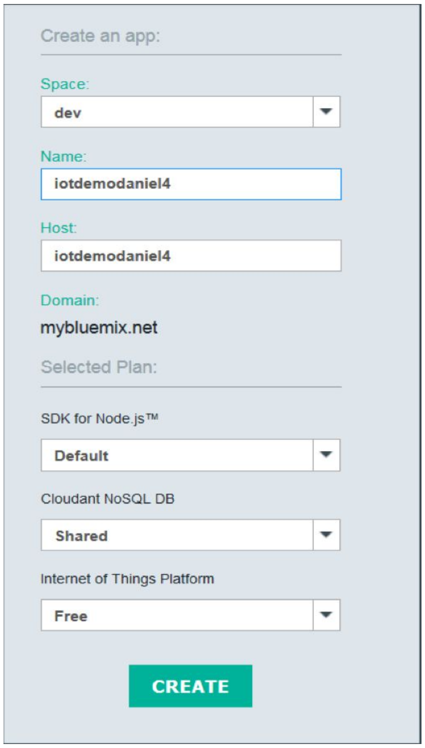
- Command line: The Cloud Foundry (CF) command line provides integration for developers that prefer coding without an integrated development environment (IDE). This is also helpful for developing automation scripts with Bluemix. The CF application programming interfaces (APIs) can be integrated with multiple languages, frameworks and services.
- Web IDE: Developers can work with the Web IDE directly in Bluemix. This allows modification of the application without any development environment installed on the developers' laptops.

**4. Source control:** Bluemix also comes with integration to several source control management (SCM) systems. These include Git, GitHub and Jazz SCM. These environments can be configured to deliver application changes continuously. Open source Cloud Foundry applications can be forked and loaded to Bluemix. This provides a great place to start development of a new project.

**5. Services marketplace:** Services leverage APIs and software development kits (SDKs) that can quickly and easily be incorporated with Bluemix applications. Although IBM provides many services, Bluemix offers an open and flexible ecosystem which allows other companies to provide services that can be integrated into applications.

## Steps in Implementation:

1.Create an IoT app in Bluemix



Create an app:

Space: dev

Name: iotdemodaniel4

Host: iotdemodaniel4

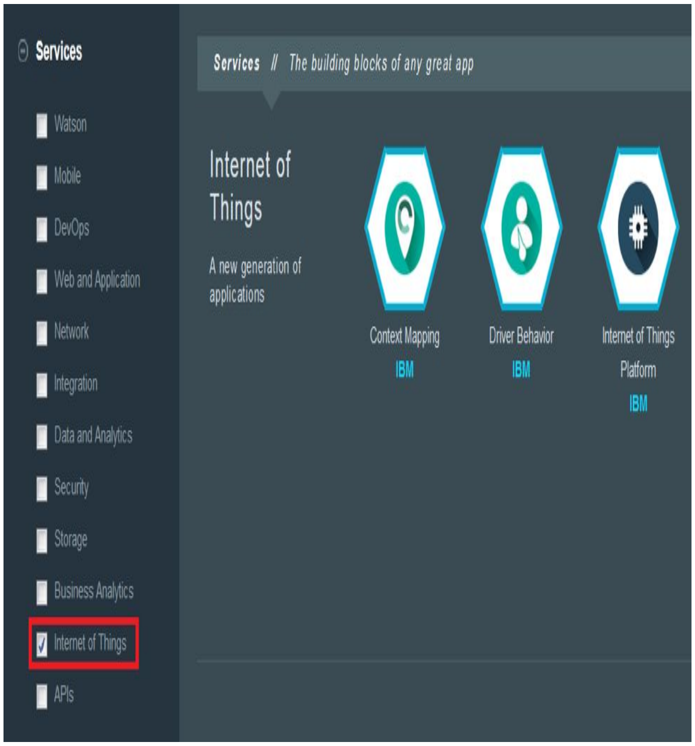
Domain: mybluemix.net

Selected Plan:

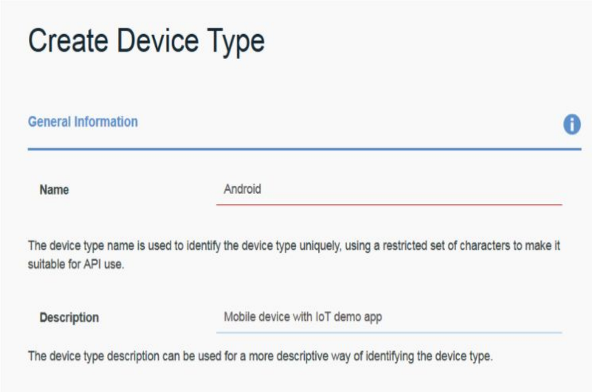
SDK for Node.js™: Default

Cloudant NoSQL DB: Shared

Internet of Things Platform: Free



2.Add a device that will send MQTT messages to the IoT server



### Create Device Type

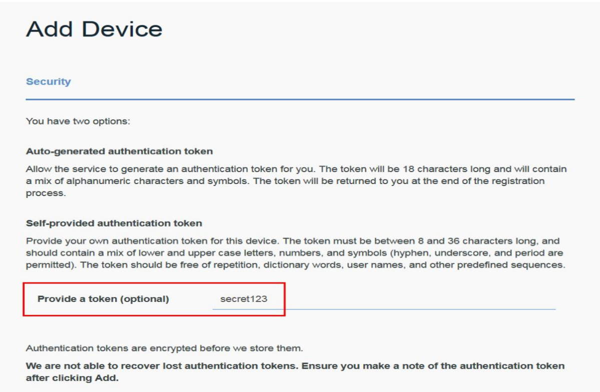
General Information

Name: Android

The device type name is used to identify the device type uniquely, using a restricted set of characters to make it suitable for API use.

Description: Mobile device with IoT demo app

The device type description can be used for a more descriptive way of identifying the device type.



### Add Device

Security

You have two options:

**Auto-generated authentication token**

Allow the service to generate an authentication token for you. The token will be 18 characters long and will contain a mix of alphanumeric characters and symbols. The token will be returned to you at the end of the registration process.

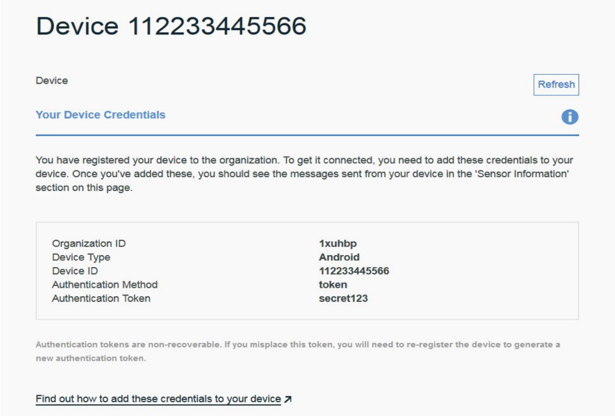
**Self-provided authentication token**

Provide your own authentication token for this device. The token must be between 8 and 36 characters long, and should contain a mix of lower and upper case letters, numbers, and symbols (hyphen, underscore, and period are permitted). The token should be free of repetition, dictionary words, user names, and other predefined sequences.

**Provide a token (optional)** secret123

Authentication tokens are encrypted before we store them.

**We are not able to recover lost authentication tokens. Ensure you make a note of the authentication token after clicking Add.**



Device 112233445566

Device

Your Device Credentials

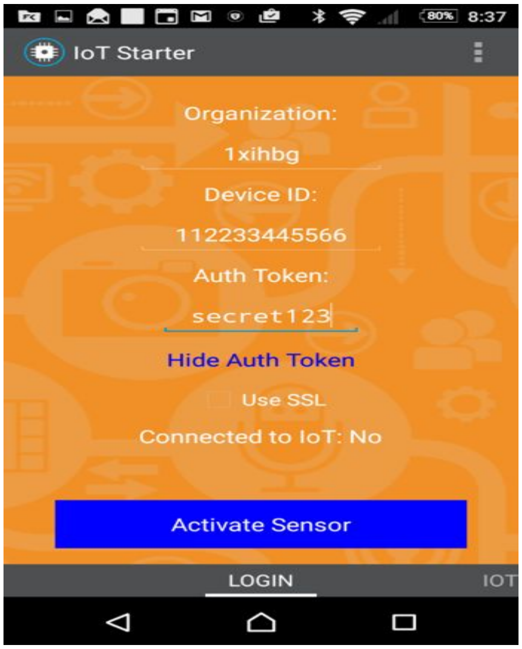
You have registered your device to the organization. To get it connected, you need to add these credentials to your device. Once you've added these, you should see the messages sent from your device in the 'Sensor Information' section on this page.

| | |
|---|---|
| Organization ID | 1xuhbp |
| Device Type | Android |
| Device ID | 112233445566 |
| Authentication Method | token |
| Authentication Token | secret123 |

Authentication tokens are non-recoverable. If you misplace this token, you will need to re-register the device to generate a new authentication token.

Find out how to add these credentials to your device ↗

3. Install and configure the Android app



Organization:

1xihbg

Device ID:

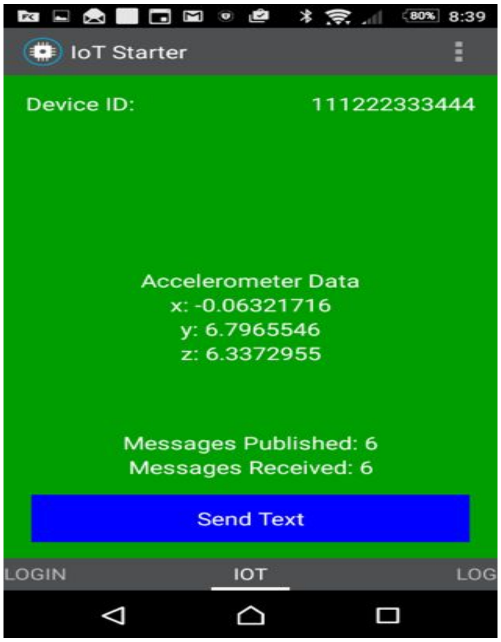
112233445566

Auth Token:

secret123

□ Use SSL

Connected to IoT: No

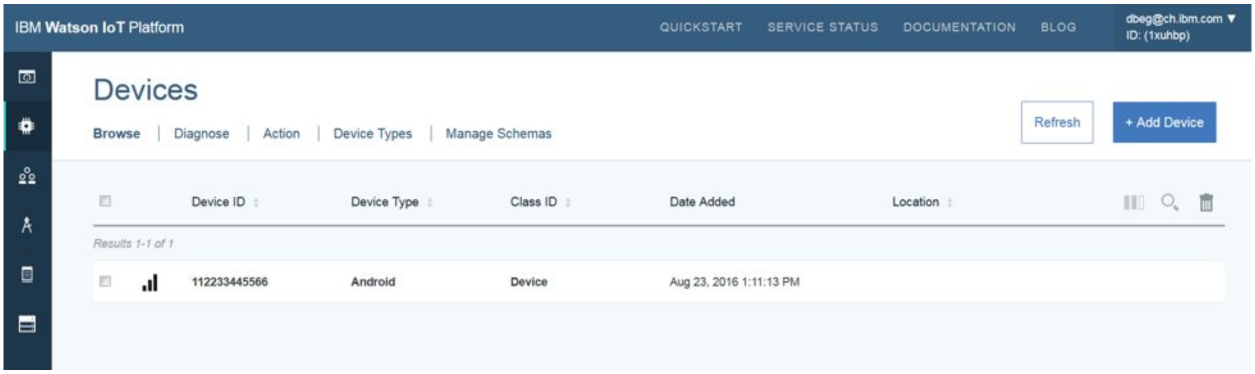


Device ID: 111222333444

Accelerometer Data
x: -0.06321716
y: 6.7965546
z: 6.3372955

Messages Published: 6
Messages Received: 6

4.Verify that messages are being sent from your smartphone to the IoT server

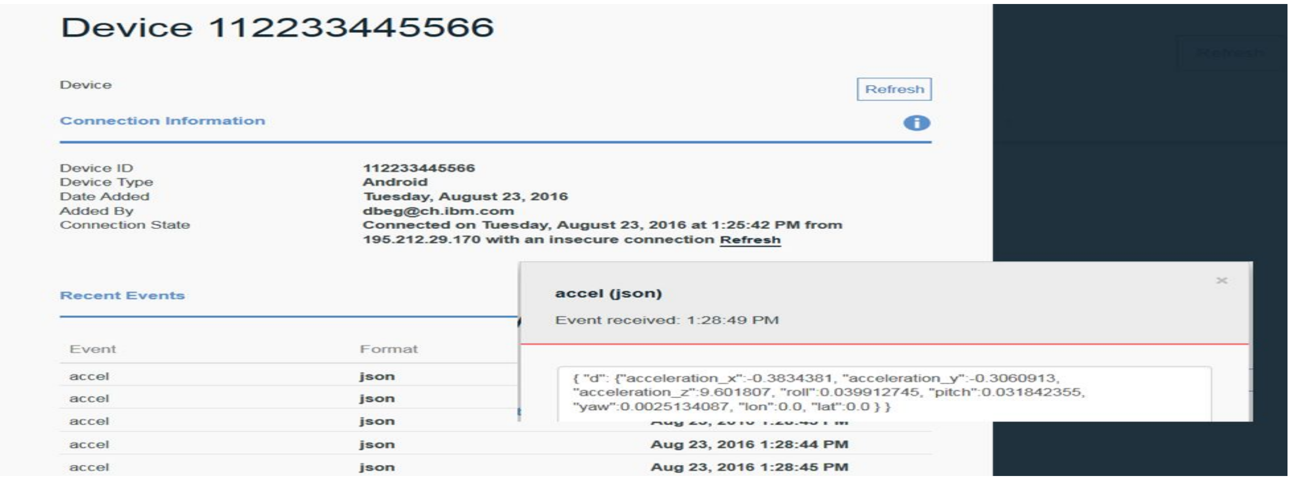


IBM Watson IoT Platform

Devices

Results 1-1 of 1

| □ | Device ID | Device Type | Class ID | Date Added | Location |
|---|---|---|---|---|---|
| □ | 112233445566 | Android | Device | Aug 23, 2016 1:11:13 PM | |



Device 112233445566

Device

Connection Information

Device ID 112233445566
Device Type Android
Date Added Tuesday, August 23, 2016
Added By dbeg@ch.ibm.com
Connection State Connected on Tuesday, August 23, 2016 at 1:25:42 PM from 195.212.29.170 with an insecure connection Refresh

Recent Events

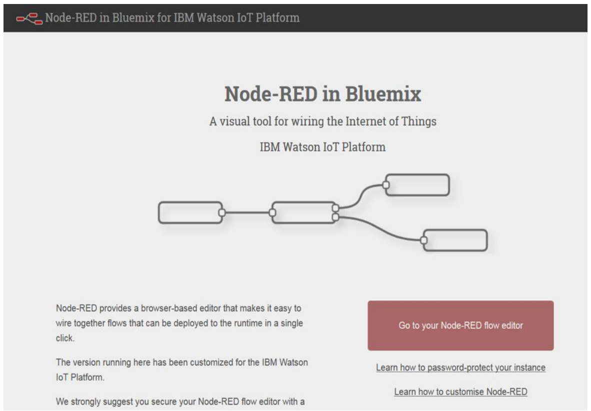
| Event | Format | |
|---|---|---|
| accel | json | |
| accel | json | |
| accel | json | |
| accel | json | Aug 23, 2016 1:28:44 PM |
| accel | json | Aug 23, 2016 1:28:45 PM |

accel (json)

Event received: 1:28:49 PM

{ "d": {"acceleration_x":-0.3834381, "acceleration_y":-0.3060913, "acceleration_z":9.601807, "roll":0.039912745, "pitch":0.031842355, "yaw":0.0025134087, "lon":0.0, "lat":0.0 } }

5. Process messages in a Node-RED flow



Node-RED in Bluemix for IBM Watson IoT Platform

Node-RED in Bluemix

A visual tool for wiring the Internet of Things

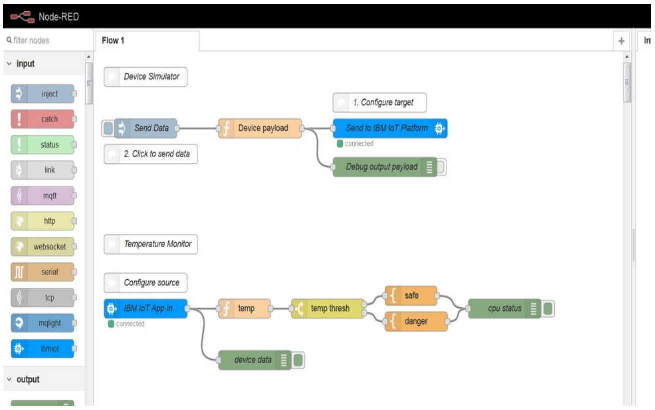
IBM Watson IoT Platform

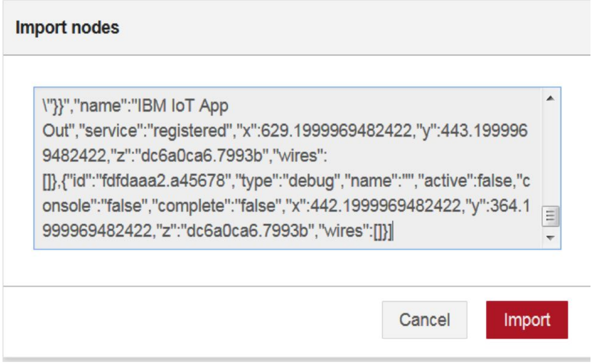
Node-RED provides a browser-based editor that makes it easy to wire together flows that can be deployed to the runtime in a single click.

The version running here has been customized for the IBM Watson IoT Platform.

We strongly suggest you secure your Node-RED flow editor with a

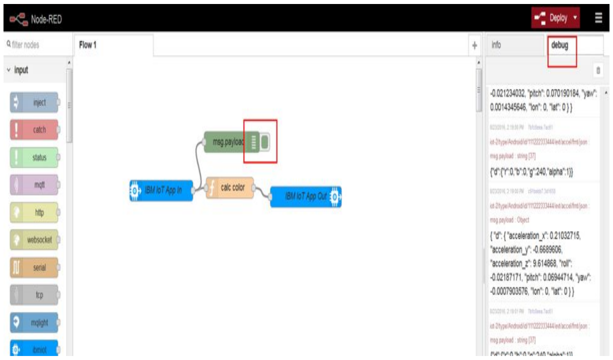
Go to your Node-RED flow editor
Learn how to password-protect your instance
Learn how to customise Node-RED





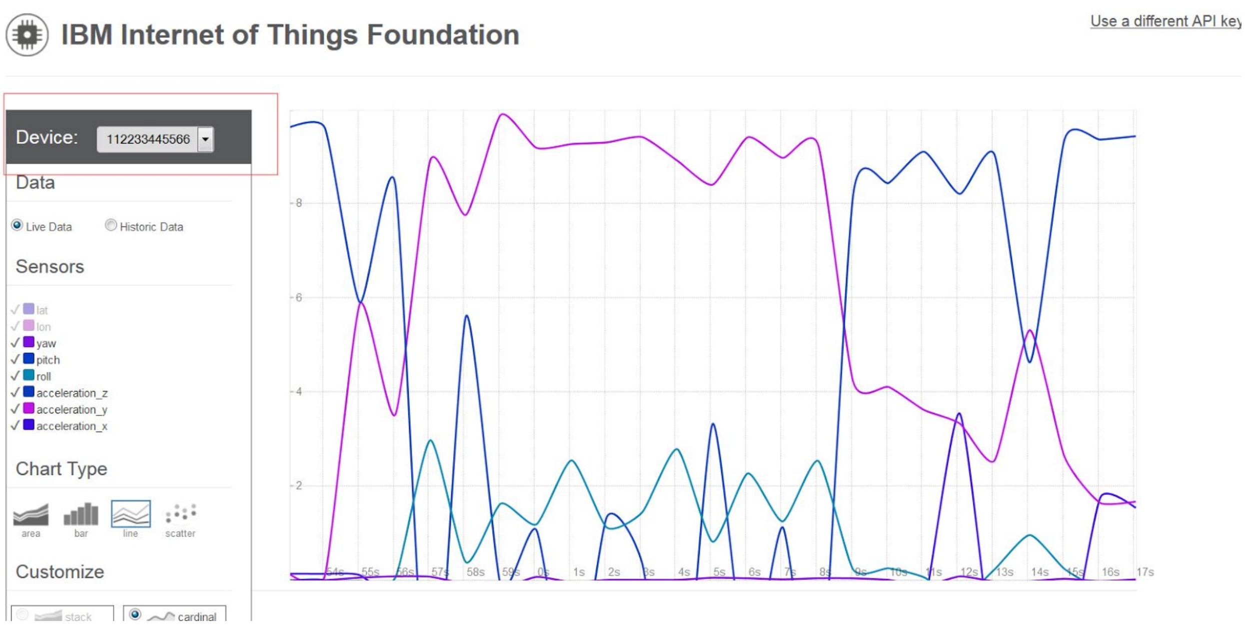
Import nodes

```
\"}}","name":"IBM IoT App Out","service":"registered","x":629.1999969482422,"y":443.1999969482422,"z":"dc6a0ca6.7993b","wires":[]},{"id":"fdfdaaa2.a45678","type":"debug","name":"","active":false,"console":"false","complete":"false","x":442.1999969482422,"y":364.1999969482422,"z":"dc6a0ca6.7993b","wires":[]}]
```



```
-0.021234032, "pitch": 0.070190184, "yaw": 0.0014345646, "lon": 0, "lat": 0 } }
8/23/2016, 2:19:00 PM 7b1c8eea.7ac81
iot-2/type/Android/id/111222333444/evt/accel/fmt/json :
msg.payload : string [37]
{"d":{"r":0,"b":0,"g":240,"alpha":1}}
8/23/2016, 2:19:00 PM c5f1beb7.3d1658
iot-2/type/Android/id/111222333444/evt/accel/fmt/json :
msg.payload : Object
{ "d": { "acceleration_x": 0.21032715, "acceleration_y": -0.6689606, "acceleration_z": 9.614868, "roll": -0.02187171, "pitch": 0.06944714, "yaw": -0.0007903576, "lon": 0, "lat": 0 } }
8/23/2016, 2:19:01 PM 7b1c8eea.7ac81
iot-2/type/Android/id/111222333444/evt/accel/fmt/json :
msg.payload : string [37]
{"d":{"r":0,"b":0,"g":240,"alpha":1}}
```

6. Create a Bluemix app to visualize sensor data



IBM Internet of Things Foundation

Device: 112233445566

## Conclusion

In this project we learned how to easily turn your smartphone into a sensor device, connect it to the IBM Internet of Things server, and send and receive data.We also learned how to process and visualize device data on Bluemix. With these two apps, we can recognize the value of Bluemix for the Internet of Things, and all we need is our own smartphone.

## References:

https://pivotal.io/platform/pcf-tutorials/getting-started-with-pivotal-cloud-foundry - To configure the cloudfoundry cli tool to push our Bluemix app on the server.