

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	16 NOVEMBER 2022
Team ID	PNT2022TMID52232
Project Name	GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

AIM:

To send sensor data (or any dummy data) from Raspberry –Pi to IBM Watson .In our case it is DHT sensors Data.

REQUIREMENTS:

HARDWARE:

- RASPBERRY-PI (3B)(WITH ETHERNET CABLE OR WIFI CONNECTED)
- USB MOUSE
- USB KEYBOARD
- VGA TO HDMI CABLE
- A MONITOR
- RASPBERRY'S POWER SUPPLY
- DHT-11 Sensor ○ Connecting Wires

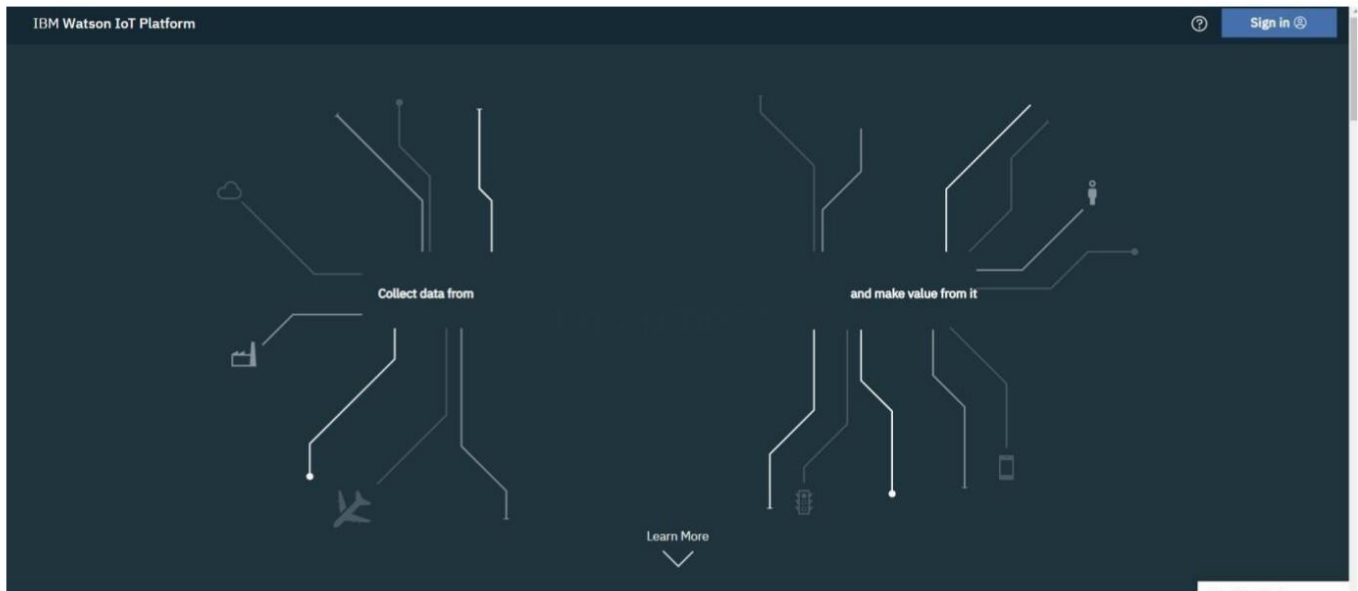
SOFTWARE:

- IBM BLUEMIX ACCOUNT

STEPS TO BE FOLLOWED

Step-1: Create a device in IBM Watson:

- Firstly, login into your IBM-Bluemix account with your e-mail ID and Password.



IBM

Log in to IBM

IBMid

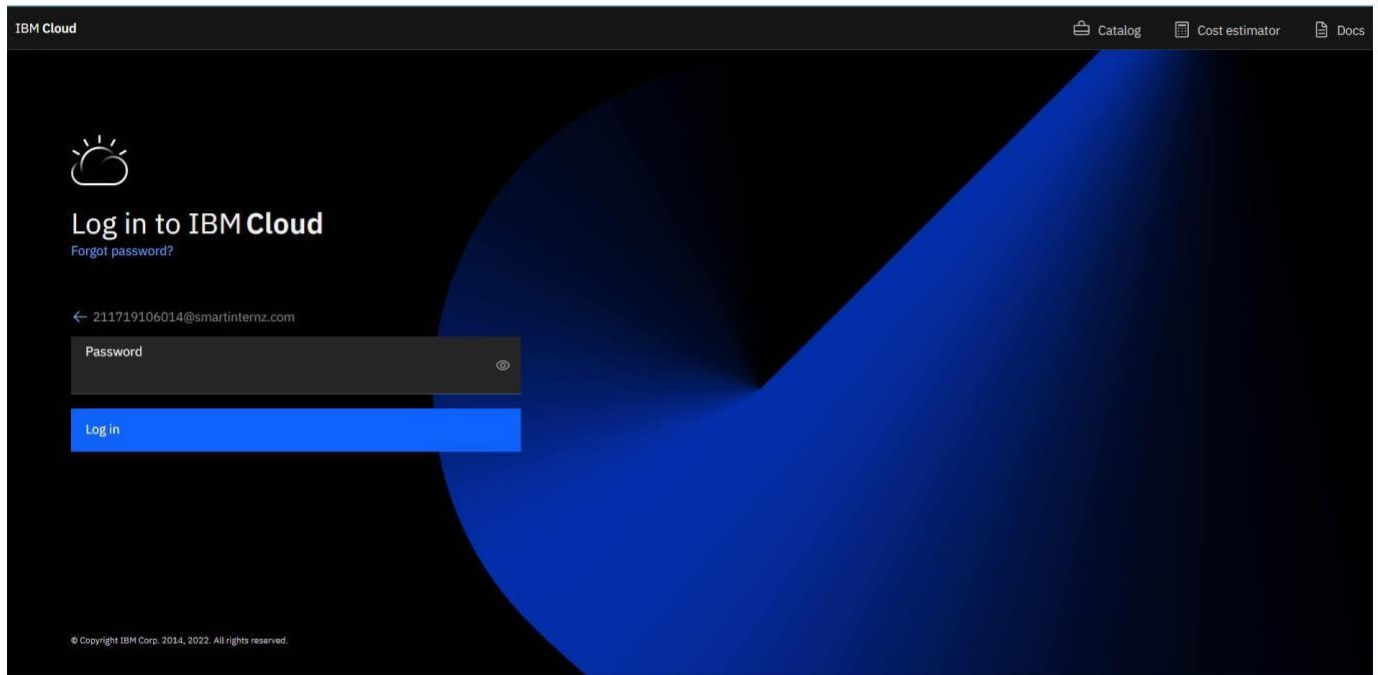
[Forgot IBMid?](#)

☒ Remember me ⓘ

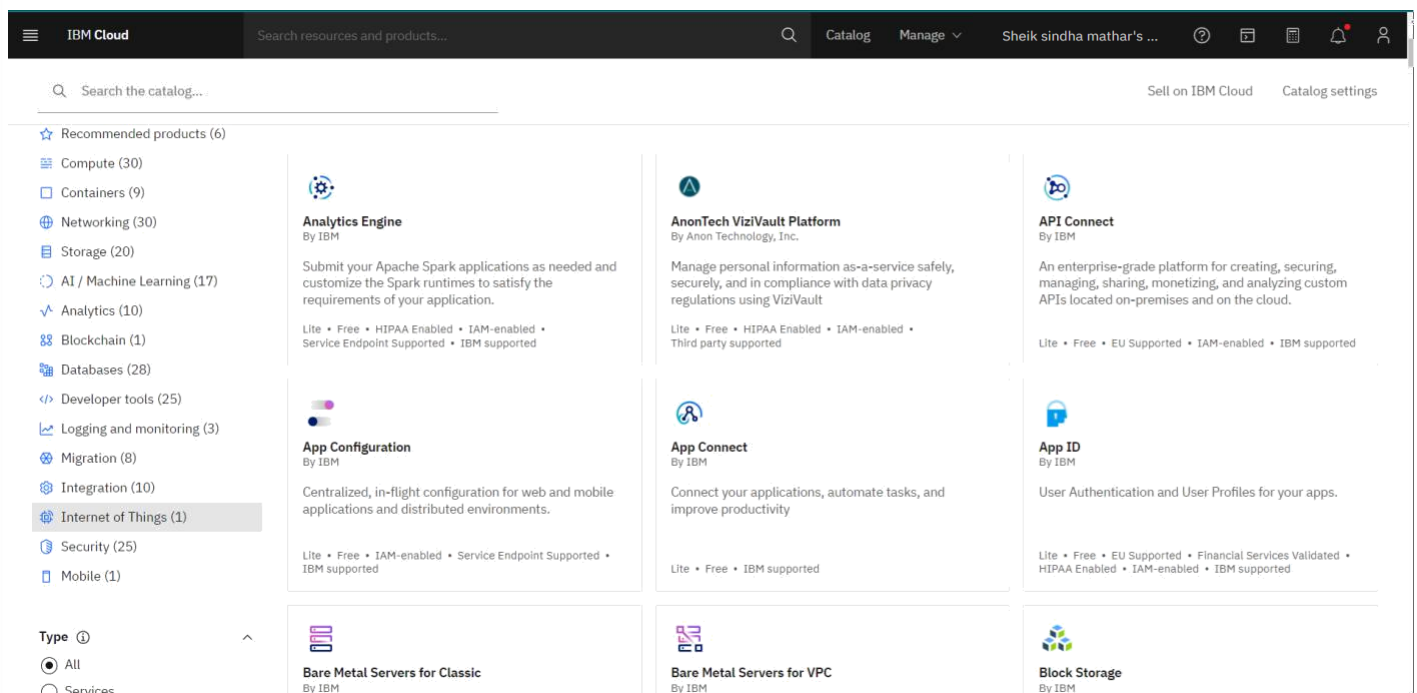
Continue →

Don't have an account? [Create an IBMid](#)

Need help? [Contact the IBMid help desk](#)



◦ Click on catalog on your dashboard screen, then under platform go IoT.



- Check all details and click on create.

IBM Cloud

Search resources and products...

Getting Started Manage IBM Cloud Account

Internet of Things Platform

This service is the hub of all things IBM IoT, it is where you can set up and manage your connected devices so that your apps can access their live and historical data.

Create About

Select a location

Frankfurt (eu-central-1)

Select a pricing plan

Deployed prices do not include tax. Monthly prices shown are for country or location: [United States](#)

Plan	Features	Pricing
Lite	Includes up to 500 registered devices, and a maximum of 200 MB of each data month. Maximum of 500 registered devices Maximum of 500 application bindings Maximum of 200 MB of each of data exchanged, data analyzed and edge data analyzed	Free

Related links

Docs Terms

Summary

Internet of Things Platform

Free

Location: Frankfurt

Plan: Lite

Service name: Internet of Things Platform-I1

Resource group: Default

Existing Lite plan instance

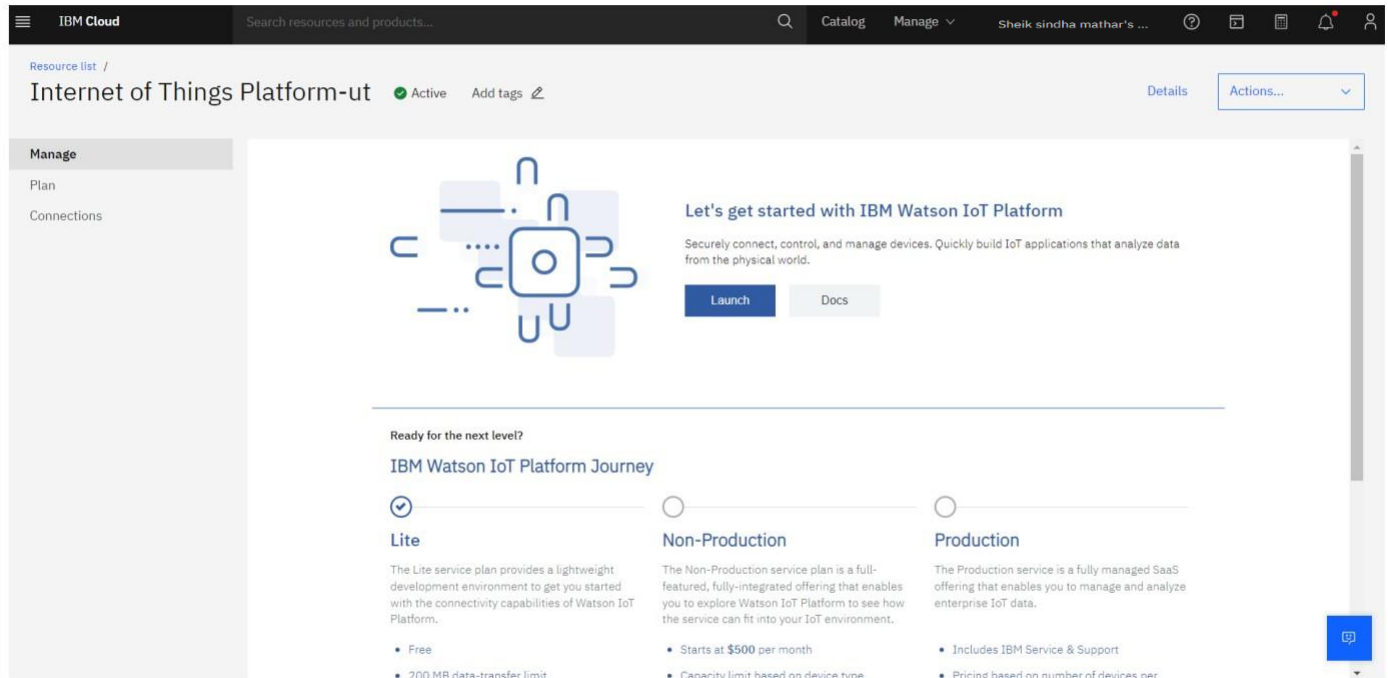
You can have only 1 Lite plan instance of this service per resource group. [Delete](#) your current Lite plan instance in Default resource group to create a new one, or [view the service instance](#).

☒ I have read and agree to the following license agreements: [Terms](#)

Create

Add to estimate

○ click on Launch



Resource list / Internet of Things Platform-ut Active Add tags Details Actions...

Manage

- Plan
- Connections

Let's get started with IBM Watson IoT Platform

Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

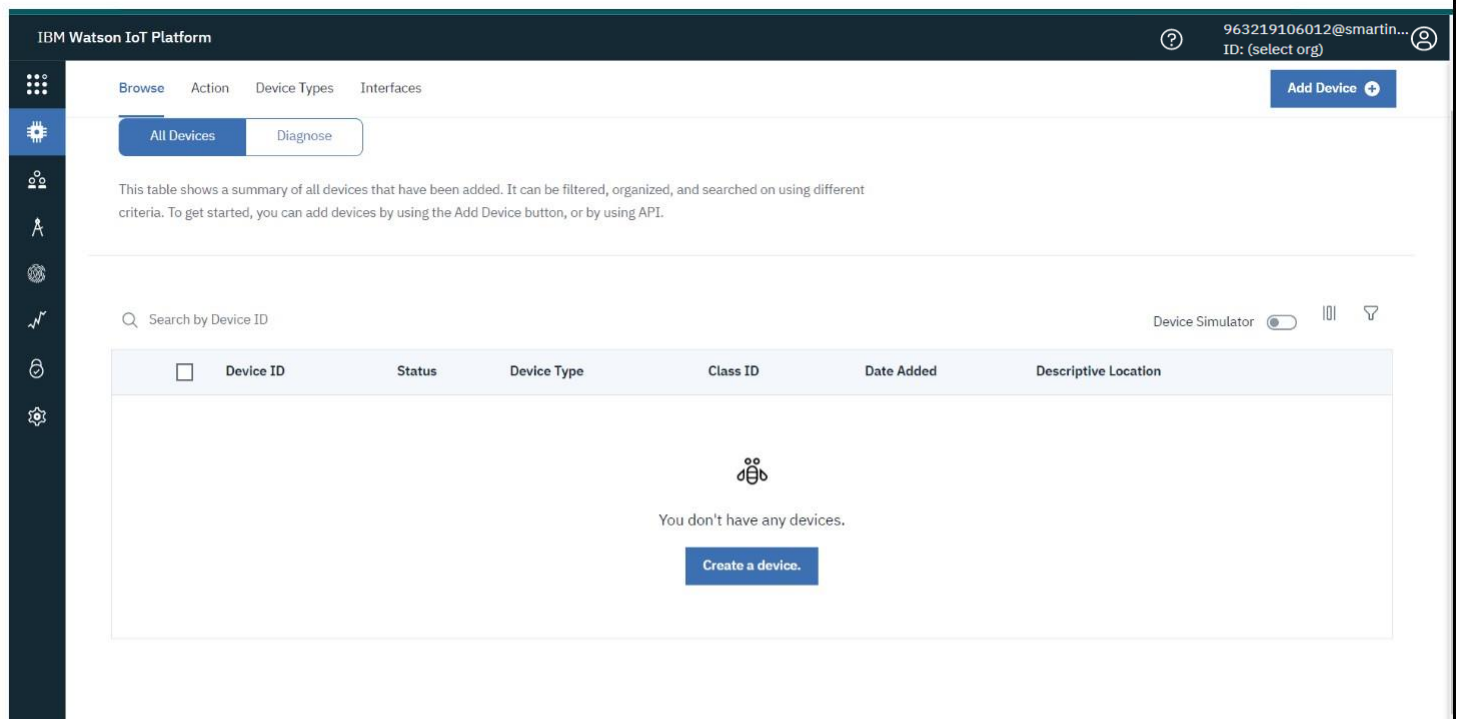
[Launch](#) [Docs](#)

Ready for the next level?

IBM Watson IoT Platform Journey

- Lite**
The Lite service plan provides a lightweight development environment to get you started with the connectivity capabilities of Watson IoT Platform.
 - Free
 - 200 MB data-transfer limit
- Non-Production**
The Non-Production service plan is a full-featured, fully-integrated offering that enables you to explore Watson IoT Platform to see how the service can fit into your IoT environment.
 - Starts at \$500 per month
 - Capacity limit based on device type
- Production**
The Production service is a fully managed SaaS offering that enables you to manage and analyze enterprise IoT data.
 - Includes IBM Service & Support
 - Pricing based on number of devices per

○ Dashboard of IBM Watson IoT platform,
Click on Add device



IBM Watson IoT Platform 963219106012@smartin... ID: (select org) Add Device +

Browse **Action** **Device Types** **Interfaces**

All Devices **Diagnose**

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Search by Device ID Device Simulator ||| 🔍

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
<p>You don't have any devices.</p> <p>Create a device.</p>						

- After click on Add device this page will open

The screenshot shows the 'Add Device' dialog box in the IBM Watson IoT Platform. The dialog has a title bar with a close button (X) and a progress bar with four steps: Identity (selected), Device Information, Security, and Summary. Below the progress bar, there is a text prompt: 'Select a device type for the device that you are adding and give the device a unique ID.' There are two input fields: 'Device Type' with a dropdown menu showing 'Select or create a device type...' and 'Device ID' with a text input field showing 'Enter Device ID'. At the bottom right, there are 'Cancel' and 'Next' buttons.

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Browse Action Device Types Interfaces

Add Device

Identity Device Information Security Summary

Select a device type for the device that you are adding and give the device a unique ID.

Device Type Select or create a device type...

Device ID Enter Device ID

Cancel Next

Browse Devices

All Devices Diagnose

- Go to device type and fill the details.

The screenshot shows the 'Add Type' dialog box in the IBM Watson IoT Platform. The dialog has a title bar with a close button (X) and a progress bar with two steps: Identity (selected) and Device Information. Below the progress bar, there is a text prompt: 'Device types group devices that have similar characteristics, such as model number, firmware version, or location. Give the device type a unique name and a description that identifies characteristics that are shared by devices of this type.' There are three input fields: 'Type' with a dropdown menu showing 'Device' and 'Gateway' separated by 'Or', 'Name' with a text input field showing 'Dhibak_kumar', and 'Description' with a text input field. Below the 'Name' field, there is a note: 'The device type name is used to identify the device type uniquely and uses a restricted set of characters to make it suitable for API use.' At the bottom right, there are 'Cancel' and 'Next' buttons.

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Browse Action Device Types Interfaces

Add Type

Identity Device Information

Device types group devices that have similar characteristics, such as model number, firmware version, or location. Give the device type a unique name and a description that identifies characteristics that are shared by devices of this type.

Type Device Or Gateway

Name Dhibak_kumar

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

Description

Cancel Next

○ Click on Finish

IBM Watson IoT Platform 963219106012@smartin... ID: (select org)

Browse Action **Device Types** Interfaces

Add Type

Identity Device Information

These attributes will be used as a template for new devices that are assigned this device type

Edit Metadata

Serial Number	Enter Serial Number	Manufacturer	Enter Manufacturer
Model	Enter Model	Device Class	Enter Device Class
Description	Enter Description	Firmware Version	Enter Firmware Version
Hardware Version	Enter Hardware Version	Descriptive Location	Enter Descriptive Location

Back Finish

Device Types

○ Click on
Register Device.

IBM Watson IoT Platform 963219106012@smartin... ID: (select org)

Browse Action **Device Types** Interfaces

You added the new device type: Dhibak_kumar

Register Device Advanced Flow

Optional

Register Devices, Define Interfaces

Now that you added a device type, you can register and connect devices for this type.

Register Devices

Cancel Next

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Browse

Action

Device Types

Interfaces

Add Device

Identity

Device Information

Security

Summary

Select a device type for the device that you are adding and give the device a unique ID.

Device Type

Dhibak_kumar

Device ID

12345

Cancel

Next

Browse Devices

All Devices

Diagnose

Choose the device and give device ID and then click on next.

Click on Next

Click on Next

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Browse

Action

Device Types

Interfaces

Identity

Device Information

Security

Summary

You can modify the default device information and enter more information about the device for identification purposes.

Serial Number

Enter Serial Number

Manufacturer

Enter Manufacturer

Model

Enter Model

Device Class

Enter Device Class

Description

Enter Description

Firmware Version

Enter Firmware Version

Hardware Version

Enter Hardware Version

Descriptive Location

Enter Descriptive Location

Add Metadata +

Back

Next

Browse Devices

All Devices

Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different

○ Click on Next

IBM Watson IoT Platform

963219106012@smartin... ID: (select org)

Browse Action Device Types Interfaces

Identity

There are two options for selecting a device authentication token.

Auto-generated authentication token (default)

Allow the service to generate an authentication token for you. Tokens are 18 characters and contain a mix of alphanumeric characters and symbols. The token is returned to you at the end of the device registration process.

Self-provided authentication token

Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix of lowercase and uppercase letters, numbers, and symbols, which can include hyphens, underscores, and periods. Do not use repeated characters, dictionary words, user names, or other predefined sequences.

Authentication Token

Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.

Authentication token are encrypted before we store them.

Back Next

Browse Devices

IBM Watson IoT Platform

963219106012@smartin... ID: (select org)

Browse Action Device Types Interfaces

Add Type

Identity Device Information

These attributes will be used as a template for new devices that are assigned this device type

Edit Metadata

Serial Number	<input type="text" value="Enter Serial Number"/>	Manufacturer	<input type="text" value="Enter Manufacturer"/>
Model	<input type="text" value="Enter Model"/>	Device Class	<input type="text" value="Enter Device Class"/>
Description	<input type="text" value="Enter Description"/>	Firmware Version	<input type="text" value="Enter Firmware Version"/>
Hardware Version	<input type="text" value="Enter Hardware Version"/>	Descriptive Location	<input type="text" value="Enter Descriptive Location"/>

Back Finish

Device Types

○ Click on Finish

Click on

- Device is created

IBM Watson IoT Platform

?

963219106012@smartin...

ID: (select org)

Browse

Action

Device Types

Interfaces

Add Device

Browse Devices

All Devices

Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Q

Search by Device ID

Device Simulator

	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
>	12345	Disconnected	Dhibak_kumar	Device	Nov 16, 2022 10:16 AM	

Items per page 50

1-1 of 1 item

1 of 1 page

<

1

>

STEP-2: INSTALLING NECESSARY PACKAGES ON YOUR PI:

- Now we are going to install necessary packages on your pi.
- Open your terminal in your pi and type the following commands
- `curl -LO https://github.com/ibm-messaging/iot-raspberrypi/releases/download/1.0.2.1/iot_1.0-2_armhf.deb`
- `sudo dpkg -i iot_1.0-2_armhf.deb`
- `service iot status`

Following are the images as to what appears on your pi's terminal when u type these commands

```
File Edit Tabs Help
2017-10-23 06:55:22-- http://ftp.nl.debian.org/debian/pool/main/o/openssl/lib
ssl1.0.0.1.0.1t-1-deb8u6_armhf.deb
Resolving ftp.nl.debian.org (ftp.nl.debian.org)... 130.89.149.21, 2801:67c:2564:
a120::21
Connecting to ftp.nl.debian.org (ftp.nl.debian.org)[130.89.149.21]:80... connect
ed
HTTP request sent, awaiting response... 200 OK
Length: 867950 (848K) [application/x-debian-package]
Saving to: 'libssl1.0.0.1.0.1t-1-deb8u6_armhf.deb'

libssl1.0.0.1.0.1t- 100%[=====] 847.61K 358KB/s in 2.4s

2017-10-23 06:55:25 (358 KB/s) - 'libssl1.0.0.1.0.1t-1-deb8u6_armhf.deb' saved [
867950/867950]

pi@raspberrypi:~$ sudo dpkg -i libssl1.0.0.1.0.1t-1-deb8u6_armhf.deb
Selecting previously unselected package libssl1.0.0:armhf.
(Reading database ... 115006 files and directories currently installed.)
Preparing to unpack libssl1.0.0.1.0.1t-1-deb8u6_armhf.deb ...
Unpacking libssl1.0.0:armhf (1.0.1t-1-deb8u6) ...
Setting up libssl1.0.0:armhf (1.0.1t-1-deb8u6) ...
pi@raspberrypi:~$ curl -LO https://github.com/ibm-messaging/iot-raspberrypi/rel
eases/download/1.0.2.1/iot_1.0-2_armhf.deb
% Total % Received % Xferd Average Speed Time Time Time Current
 100 164 0 164 0 0 157 0 --:--:-- 0:00:01 --:--:-- 157
100 609 0 609 0 0 457 0 --:--:-- 0:00:01 --:--:-- 457
100 110k 100 110k 0 0 20117 0 0:00:03 0:00:03 --:--:-- 48190
pi@raspberrypi:~$ sudo dpkg -i iot_1.0-2_armhf.deb
(Reading database ... 115626 files and directories currently installed.)
Preparing to unpack iot_1.0-2_armhf.deb ...
Unpacking iot (1.0-1) over (1.0-1) ...
Setting up iot (1.0-1) ...
Processing triggers for systemd (232-25-deb8u1) ...
pi@raspberrypi:~$ service iot status
* iot.service - LSB: iot service
   Loaded: loaded (/etc/init.d/iot; generated; vendor preset: enabled)
   Active: active (running) since Mon 2017-10-23 06:56:25 UTC; 17s ago
     Docs: man:systemd-sysv-generator(8)
    Group: /system.slice/iot.service
           L2562 /opt/iot/iot /dev/null

Oct 23 06:56:24 raspberrypi systemd[1]: Starting LSB: iot service...
Oct 23 06:56:24 raspberrypi iot[2557]: Starting the iot programe
Oct 23 06:56:25 raspberrypi iot[2562]: **** IoT Raspberry Pi Sample has started ****
Oct 23 06:56:25 raspberrypi iot[2562]: Config file not found. Going to Quickstart mode
Oct 23 06:56:25 raspberrypi iot[2562]: Running in Quickstart mode
Oct 23 06:56:25 raspberrypi systemd[1]: Started LSB: iot service.
```

- Then open your terminal and type `pip install ibmiotf`

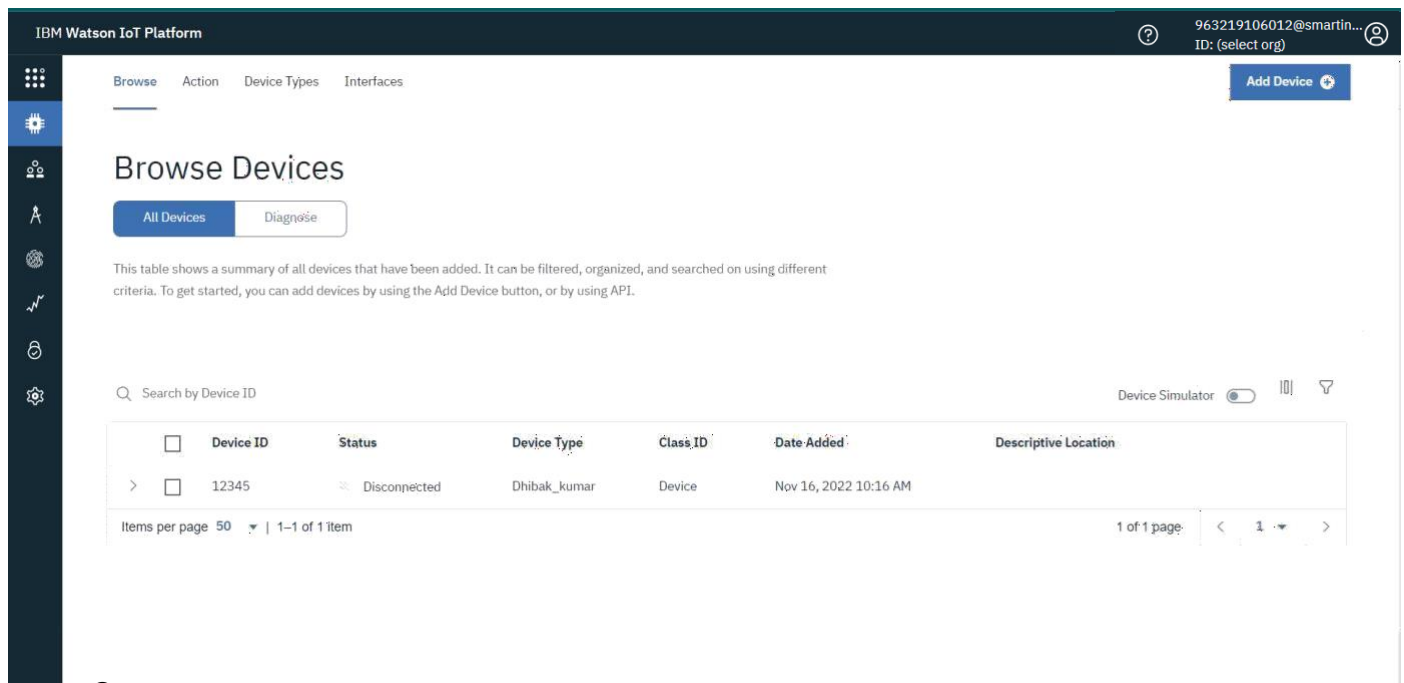
```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-3.0.0.tar.gz (58kB)
    100% |#####| 61kB 510kB/s
Collecting dicttoxml<=1.7.4 (from ibmiotf)
  Downloading dicttoxml-1.7.4.tar.gz
Collecting iso8601<=0.1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl
Collecting paho-mqtt<=1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (60kB)
    100% |#####| 61kB 916kB/s
Collecting pytz<=2014.7 (from ibmiotf)
  Using cached pytz-2017.2-py2.py3-none-any.whl
Collecting requests<=2.5.0 (from ibmiotf)
  Downloading requests-2.18.4-py2.py3-none-any.whl (88kB)
    100% |#####| 92kB 1.0MB/s
Collecting requests-toolbelt<=0.7.0 (from ibmiotf)
  Downloading requests-toolbelt-0.8.0-py2.py3-none-any.whl (54kB)
    100% |#####| 61kB 1.0MB/s
Collecting xmldict<=0.10.2 (from ibmiotf)
  Downloading xmldict-0.11.0-py2.py3-none-any.whl
Collecting urllib3<1.23,>=1.21.1 (from requests<=2.5.0->ibmiotf)
  Downloading urllib3-1.22-py2.py3-none-any.whl (132kB)
    100% |#####| 133kB 1.4MB/s
Collecting idna<2.7,>=2.5 (from requests<=2.5.0->ibmiotf)
  Downloading idna-2.6-py2.py3-none-any.whl (56kB)
    100% |#####| 61kB 1.7MB/s
Collecting chardet<3.1.0,>=3.0.2 (from requests<=2.5.0->ibmiotf)
  Downloading chardet-3.0.4-py2.py3-none-any.whl (133kB)
    100% |#####| 143kB 1.0MB/s
Collecting certifi<=2017.4.17 (from requests<=2.5.0->ibmiotf)
  Using cached certifi-2017.7.27.1-py2.py3-none-any.whl
Building wheels for collected packages: ibmiotf, dicttoxml, paho-mqtt
Running setup.py bdist_wheel for ibmiotf ... done
Stored in directory: /home/pi/.cache/pip/wheels/7e/f9/45/bbc33ad957e82f7b71ba80e316d65a83d9d735a0d12e0c9418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96910b33ec6a7b2ae66a13785401b50def5468024078e12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/20/d8/0d/acdc8f289011b7be7de71deebef0642f83be0313dfff0493
Successfully built ibmiotf dicttoxml paho-mqtt
Installing collected packages: dicttoxml, iso8601, paho-mqtt, pytz, urllib3, idna, chardet, certifi, requests, requests-toolbelt, xmldict, ibmiotf
Successfully installed certifi-2017.7.27.1 chardet-3.0.4 dicttoxml-1.7.4 ibmiotf-3.0.0 idna-2.6 iso8601-0.1.12 paho-mqtt-1.3.1 pytz-2017.2 requests-2.18.4 requests-toolbelt-0.8.0 urllib3-1.22 xmldict-0.11.0
pi@raspberrypi:~$
```

I have sent DHT-11 Sensors data to ibm bluemix .To get the code u need to login into IOT GYAN.
I get the image as follows in my pi's shell:

```
File Edit Shell Debug Options Window Help
Python 2.7.13 (default, Jan 19 2017, 14:48:08)
[GCC 6.3.0 20170124] on linux2
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/Downloads/dhtlltoibmiot.py =====
2017-10-23 07:10:37.768 ibmiotf.device.client INFO Connected successfully: d:gegtl4:mydevice:mydevice
Published Temperature = 28 C Humidity = 50 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
Published Temperature = 29 C Humidity = 50 % to IBM Watson
Published Temperature = 29 C Humidity = 50 % to IBM Watson
|
```

Step-3: checking your data sent on IBM Bluemix:

After you have sent your sensors data you can check whether it is received at your iot platform Just look at the image below and if u see the same wifi kind of symbol on your created device then your data is being received.



After double clicking on your created device you can see the received data as shown in image

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Browse Action Device Types Interfaces

12345 Disconnected Dhibak_kumar Device Nov 16, 2022 10:16 AM

Identity Device Information **Recent Events** State Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
event_1	{"Hazardous gas":93,"Temperature":100,"Humid...	json	a few seconds ago
event_1	{"Hazardous gas":72,"Temperature":49,"Humid...	json	a few seconds ago
event_1	{"Hazardous gas":36,"Temperature":27,"Humid...	json	a few seconds ago
event_1	{"Hazardous gas":30,"Temperature":54,"Humid...	json	a few seconds ago
event_1	{"Hazardous gas":75,"Temperature":45,"Humid...	json	a few seconds ago

Items per page 50 | 1-1 of 1 item

1 Simulation running

Step-4: Creating boards and cards for visualization of data:

- In your Watson platform you have an option called board .Click on it and you get the following window on your screen

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Your boards Public boards

+ Create New Board

USAGE OVERVIEW 3 Cards Owned by you

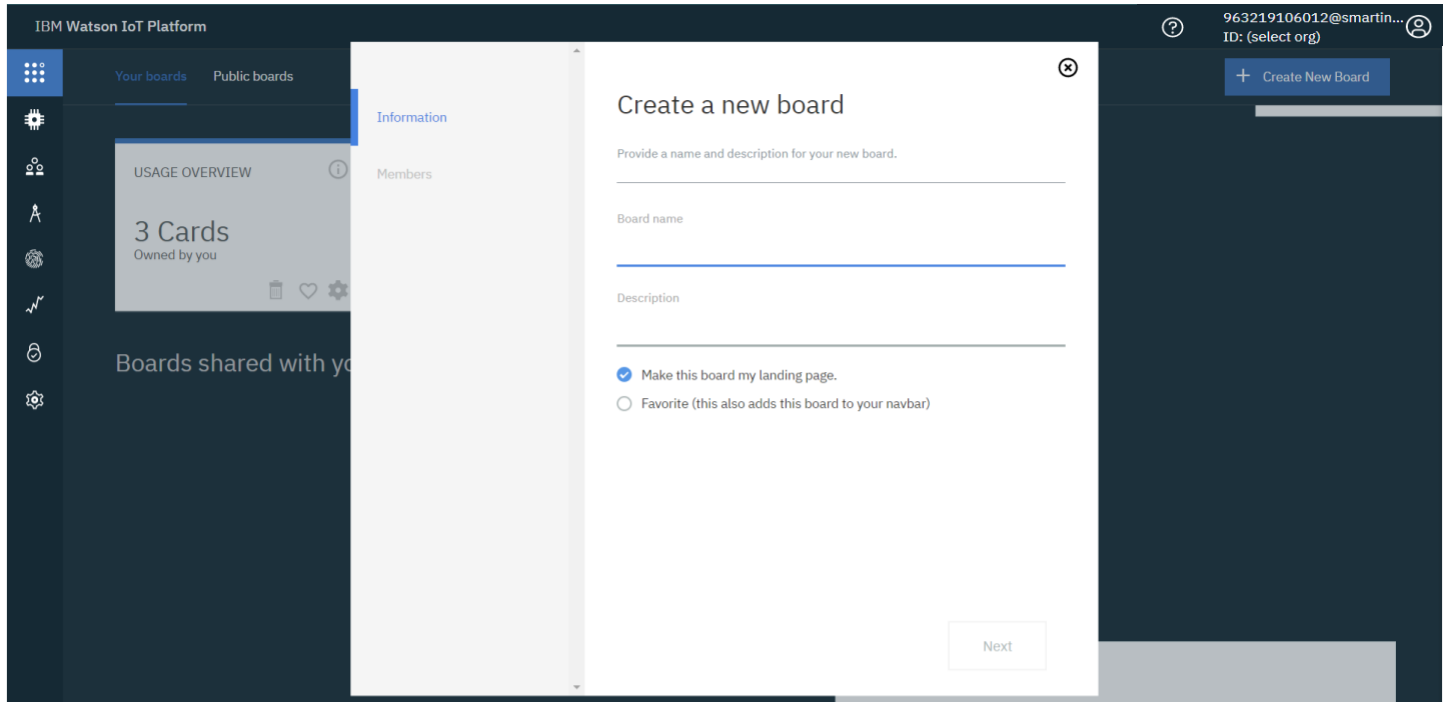
RISK AND SECURITY OVERVIEW 4 Cards Owned by you

Boards shared with you

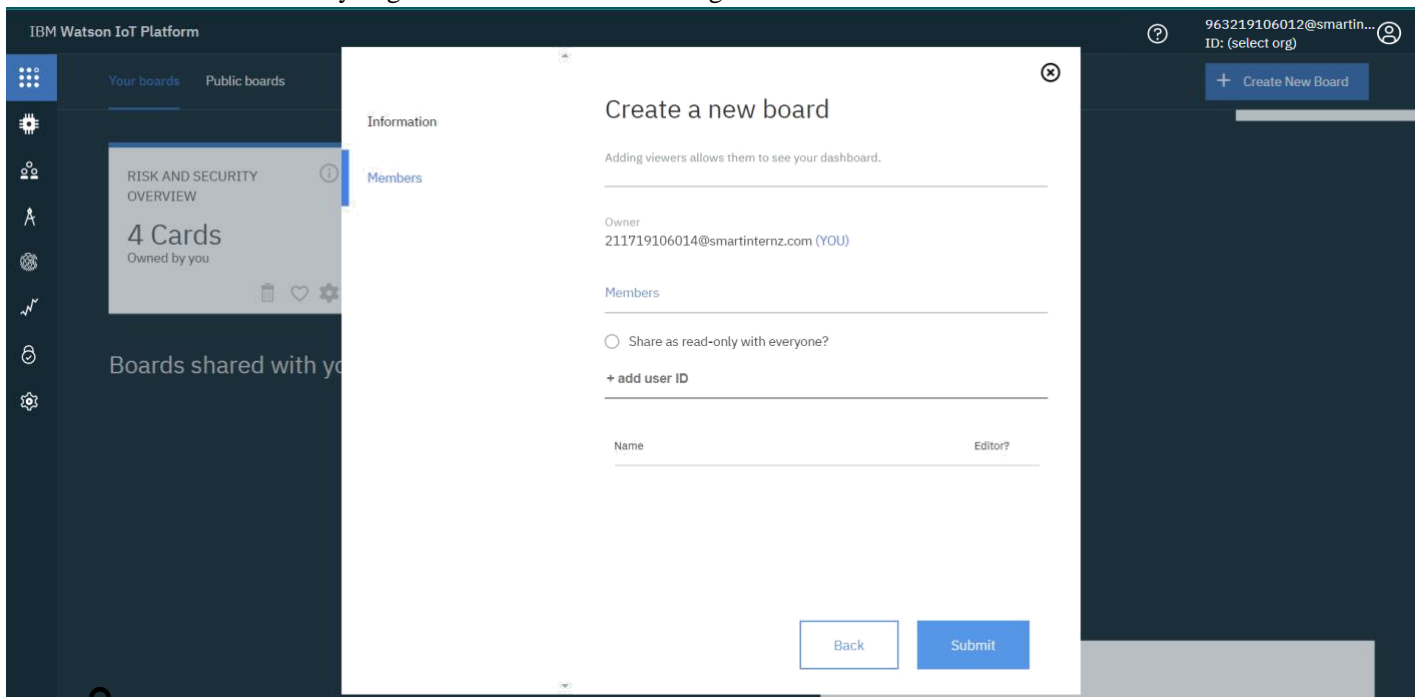
1 Simulation running

Click on Create a new board to create a board .

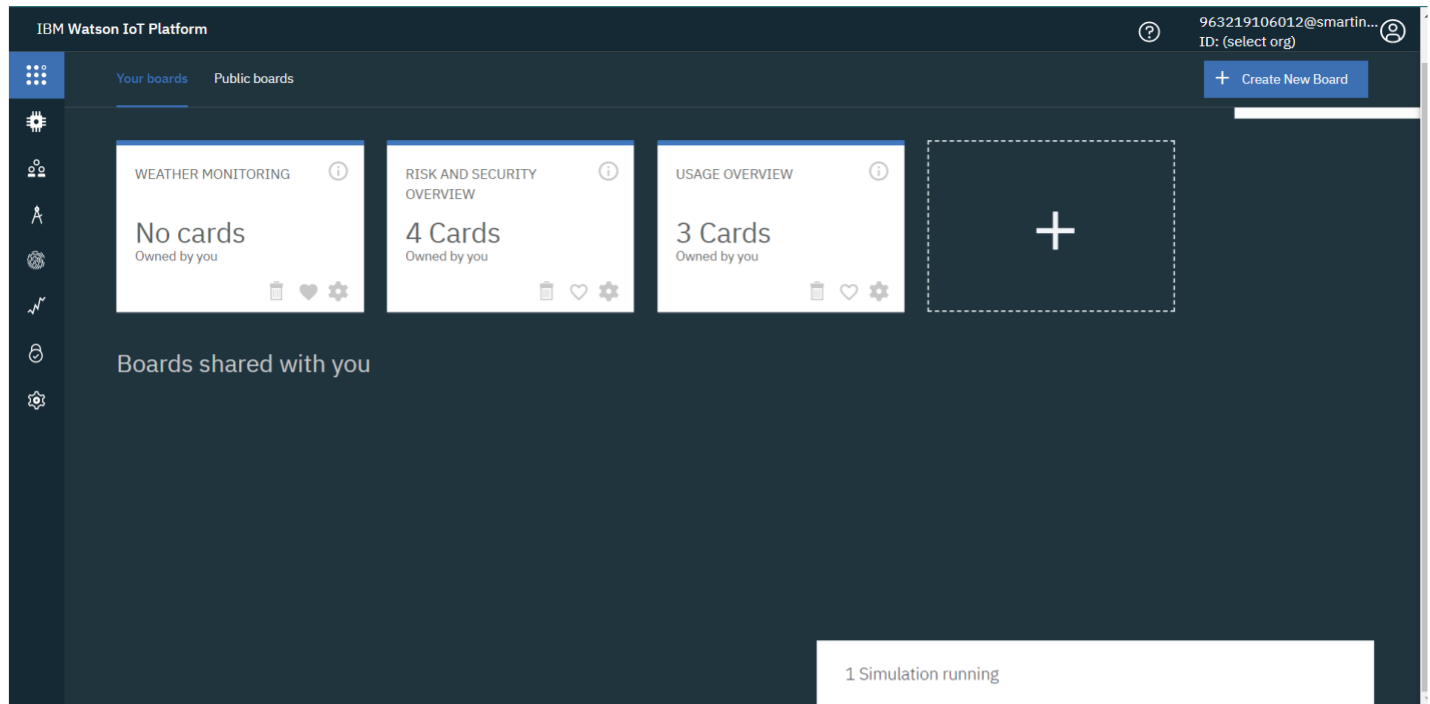
The given below window appears give a name and description to your board as shown in the window below.



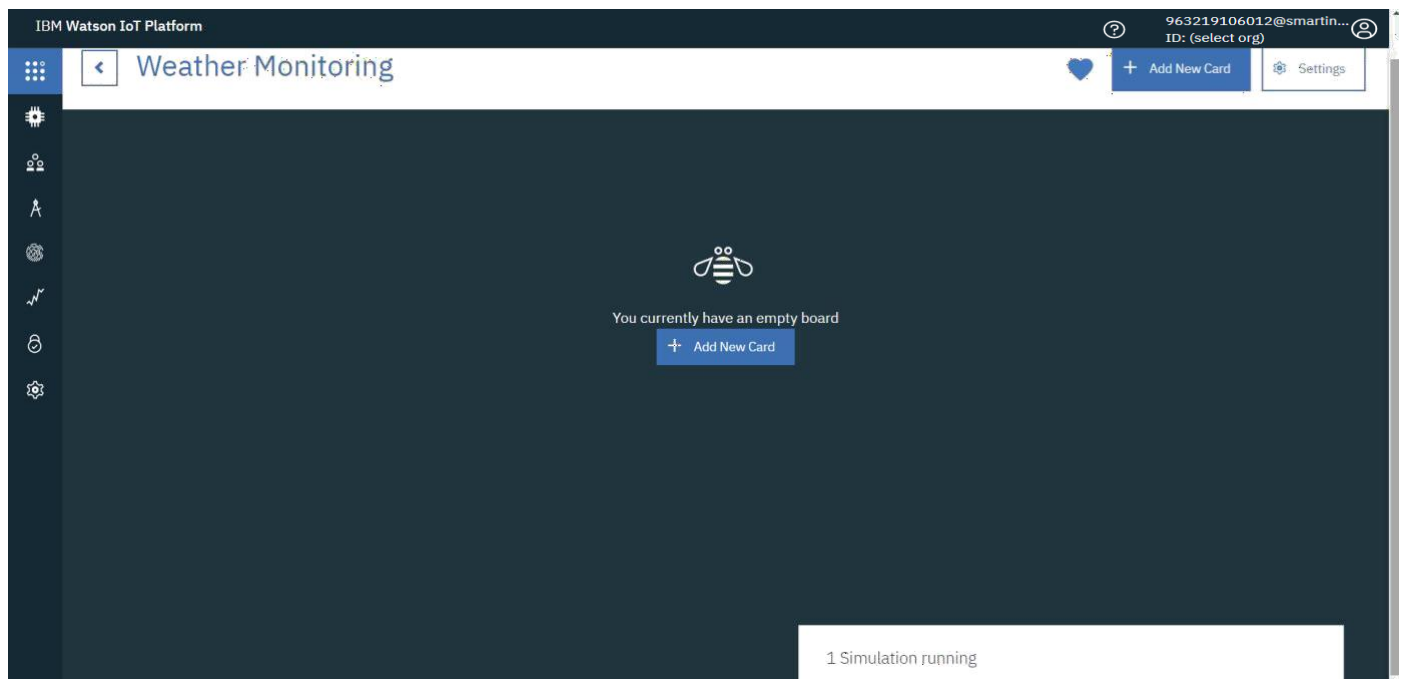
Then click on Next you get the below window then again click on Submit



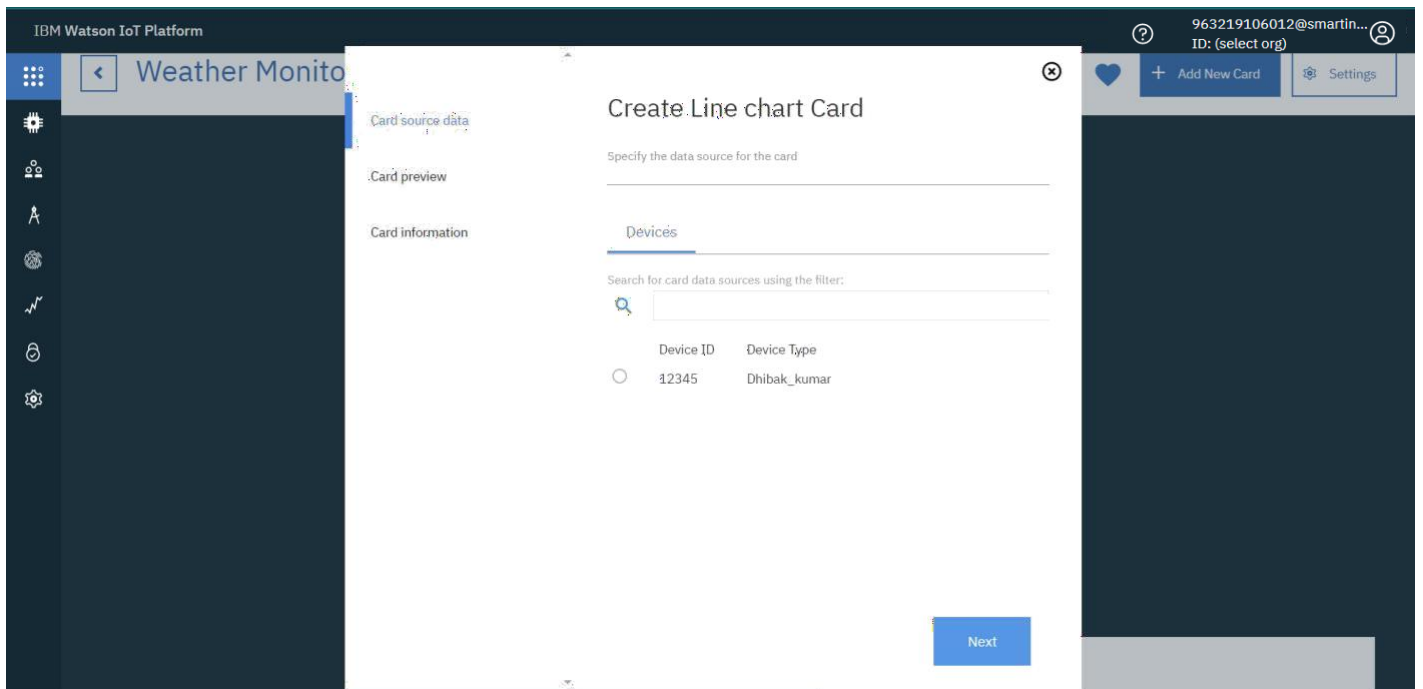
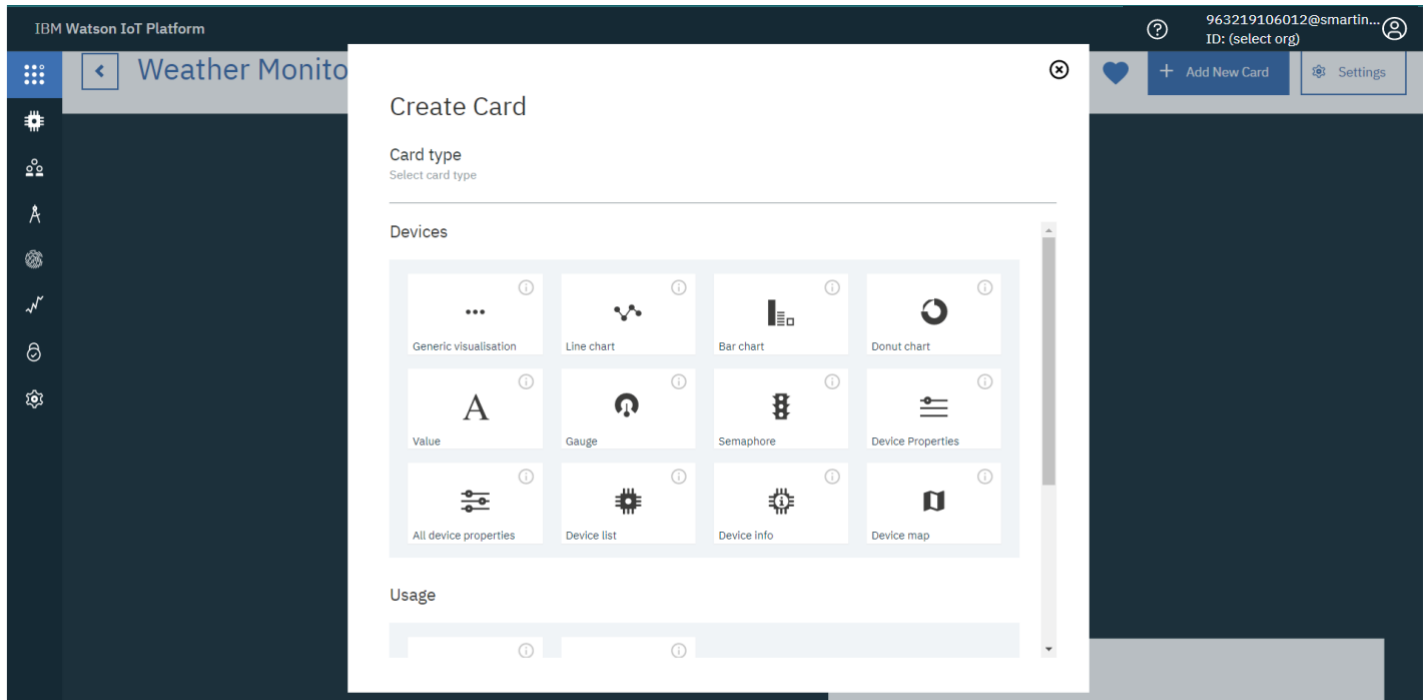
Then double click on your boards name which you have created.



○ Click on Add New Card



○ Select the type of Graph u want accordingly and click next



- You get the below window, choose the Device and click on Next.

- Select the event, properly to be visualized on your graph and click next. In my case it is humidity

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Weather Monitor

Card source data
12345

Card preview

Card information

Create Line chart Card

Connect data set

event_1

Property
Temperature

Name
Temperature

Type
Number

Unit
°C

Min
0

100

+ Connect new data set

Back Next

Then select the size of the graph and color of the graph board you want and click next

IBM Watson IoT Platform

963219106012@smartin...
ID: (select org)

Weather Monitor

Card source data
12345

Card preview

Card information

Create Line chart Card

Enter title and description of the card

Title
Line chart

Color scheme

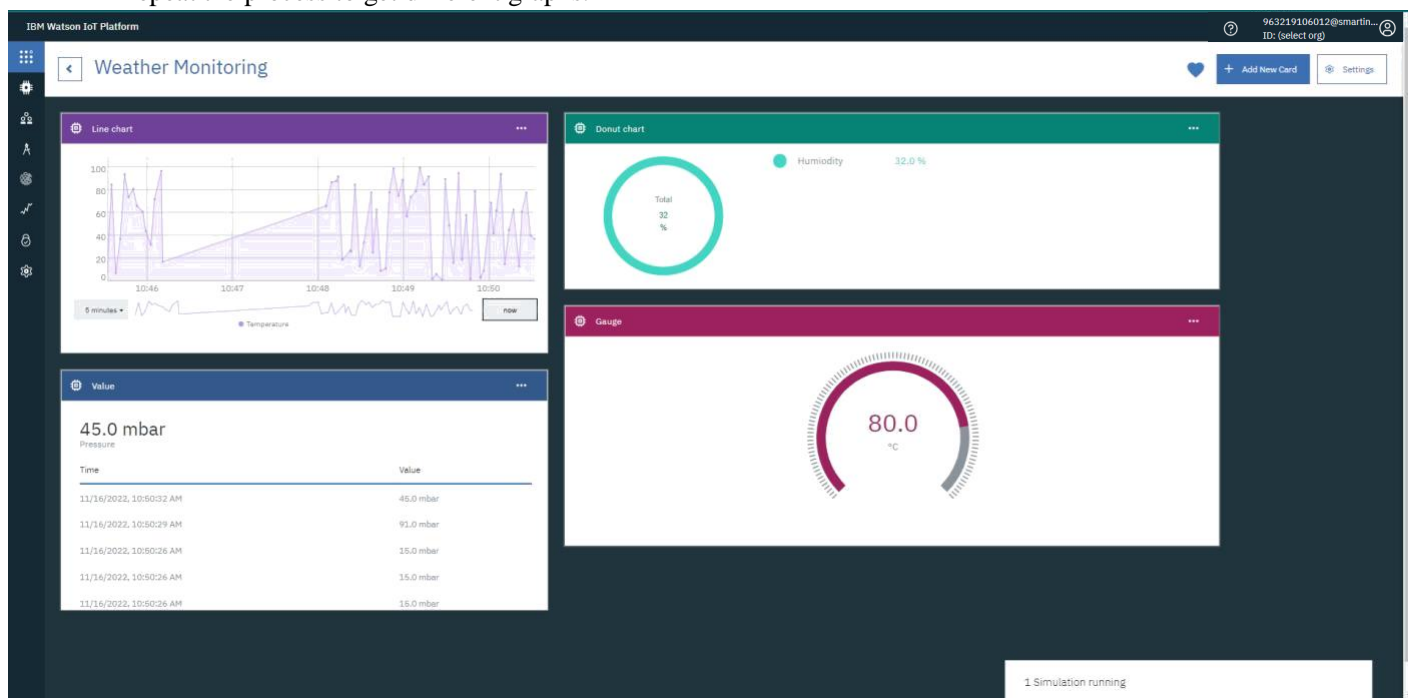
A line chart to display time series information with historic and live data

Back Submit

Here is the graph



○ Repeat the process to get different graphs.



RESULT:

Hence, we were able to send data from our pi to IBM Watson and visualize it on a graph.