

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	16 NOVEMBER 2022
Team ID	PNT2022TMID20972
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

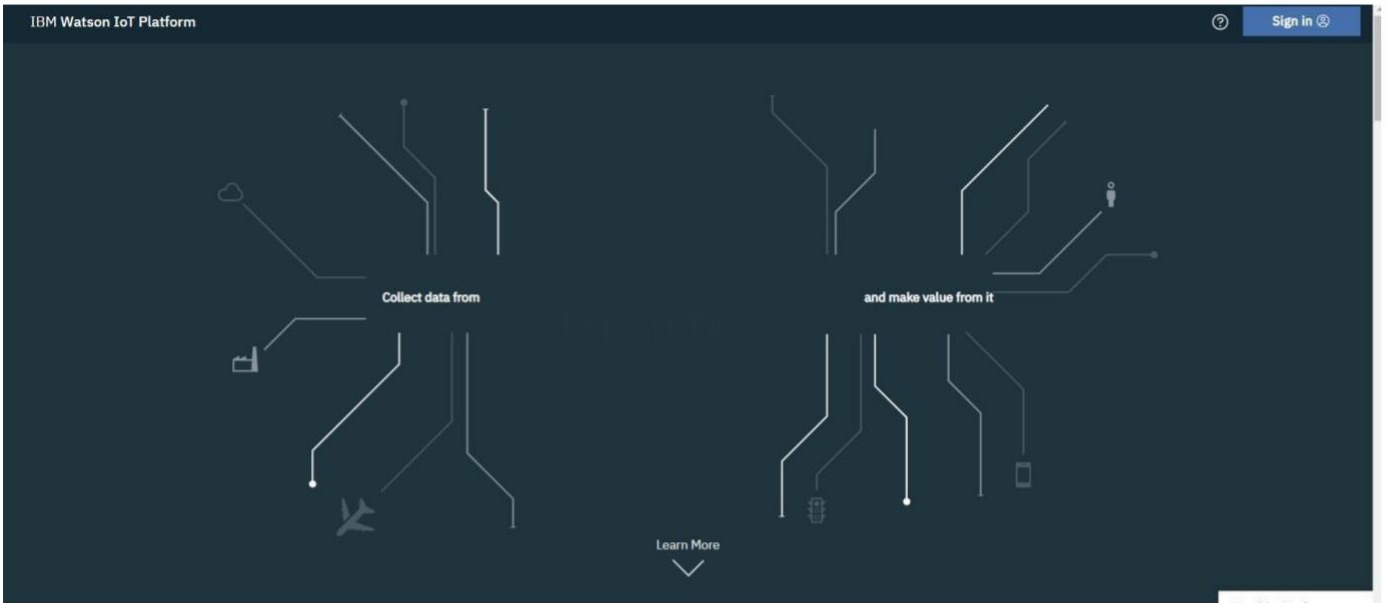
SOFTWARE:

- 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

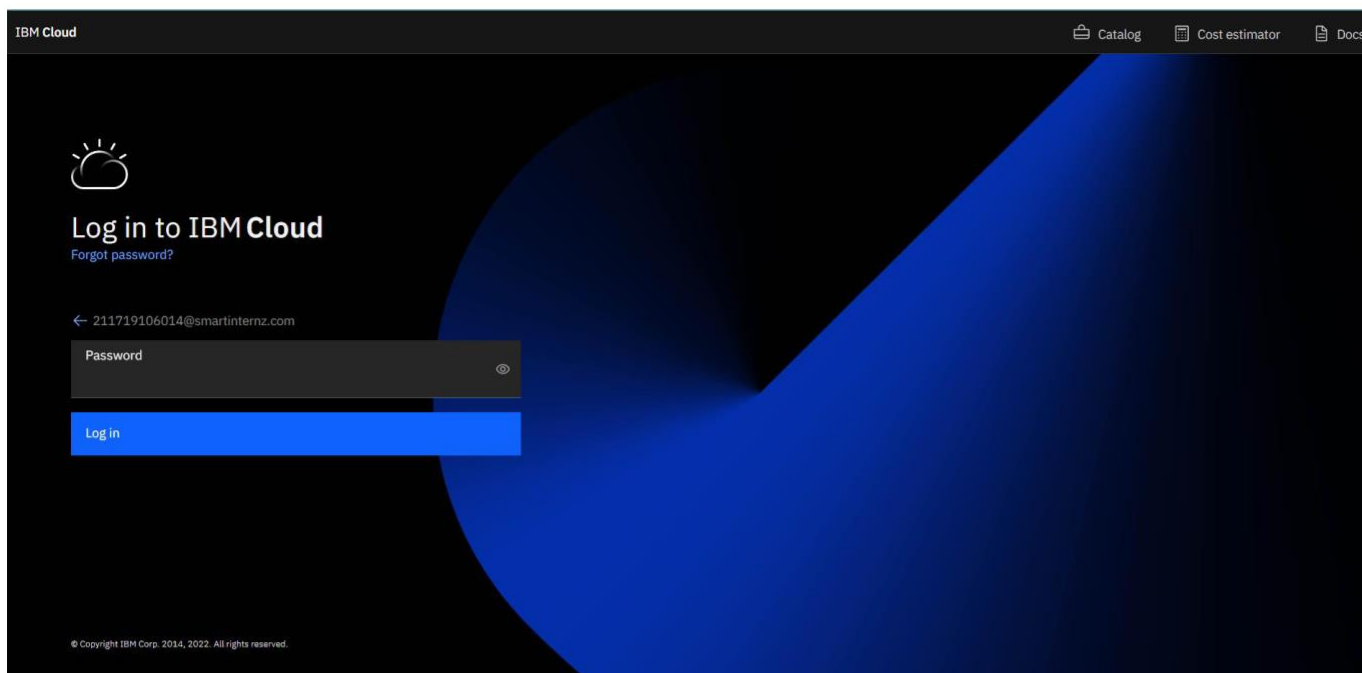
[Forgot IBMid?](#)

☒ Remember me ⓘ

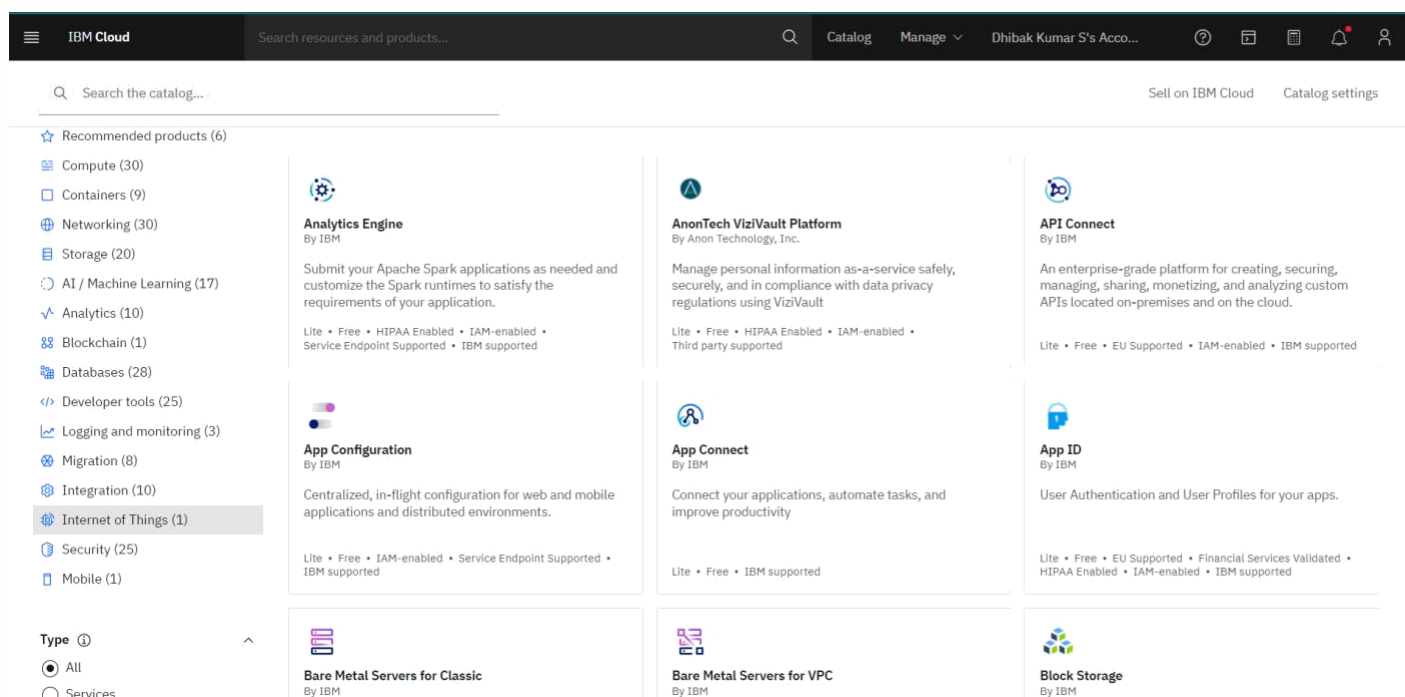
Continue →

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.

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**

Type: Service

Provider: IBM

Last updated: 08/15/2022

Category: Internet of Things

Compliance: IAM-enabled

Locations: Frankfurt, London, Dallas, Washington DC

Related links: Docs, Terms

Select a location

Frankfurt (eu-d1)

Select a pricing plan

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

Plan	Features	Pricing
Life	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

The Life service plan for Internet of Things Platform includes up to 500 registered devices, and a maximum of 200 MB each of data exchanged, data analyzed, and edge data analyzed per month.

Summary

Internet of Things Platform **Free**

Location: Frankfurt

Plan: Life

Service name: Internet of Things Platform-IT

Resource group: Default

Existing Life plan instance

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

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

Create

Add to estimate

○ click on Launch

IBM Cloud

Search resources and products...

Catalog Manage Dhibak Kumar S's Acco...

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

211719106014@smartinternz.com ID: plx096

Browse Action Device Types Interfaces

All Devices Diagnose

Add Device +

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

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
You don't have any devices.					

Create a device.

- 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. Below the dialog box, the 'Browse Devices' section is visible, with buttons for 'All Devices' and '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' (selected), 'Or', and 'Gateway'; '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.

○ Click on Finish

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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 Register Device.

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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

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

○ Click on Next

The screenshot shows the 'Add Device' wizard in the IBM Watson IoT Platform. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The wizard progress bar shows four steps: Identity (selected), Device Information, Security, and Summary. The 'Identity' step contains a form with two fields: 'Device Type' with the value 'Dhibak_kumar' and 'Device ID' with the value '12345'. At the bottom right of the form are 'Cancel' and 'Next' buttons. Below the wizard is a 'Browse Devices' section with 'All Devices' and 'Diagnose' buttons.

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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

○ Click on Next

The screenshot shows the 'Add Device' wizard in the IBM Watson IoT Platform, Step 2: Device Information. The top navigation bar is the same as the previous screenshot. The wizard progress bar shows four steps: Identity, Device Information (selected), Security, and Summary. The 'Device Information' step contains a form with eight fields: 'Serial Number', 'Model', 'Description', 'Hardware Version', 'Manufacturer', 'Device Class', 'Firmware Version', and 'Descriptive Location'. Each field has a placeholder text 'Enter [field name]'. Below the fields is an 'Add Metadata' button with a plus icon. At the bottom right of the form are 'Back' and 'Next' buttons. Below the wizard is a 'Browse Devices' section with 'All Devices' and 'Diagnose' buttons.

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Browse Action Device Types Interfaces

Add Device

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

Model Enter Model

Description Enter Description

Hardware Version Enter Hardware Version

Manufacturer Enter Manufacturer

Device Class Enter Device Class

Firmware Version Enter Firmware 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

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BrowseActionDevice TypesInterfaces

Identity

Device InformationSecuritySummary

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.

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.

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.

BackNext

Browse Devices

Click on Finish

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BrowseActionDevice TypesInterfaces

Identity

Device Information

Add Type

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

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

Edit Metadata

BackFinish

Device Types

Click on
Device is created

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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
>	<div></div> 12345	<div></div> 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/libssl1.0.0_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 ... 115606 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/rele
ases/download/1.0.2.1/iot_1.0-2_armhf.deb
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
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-deb9u1) ...
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)
    CGroup: /system.slice/iot.service
            └─2562 /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

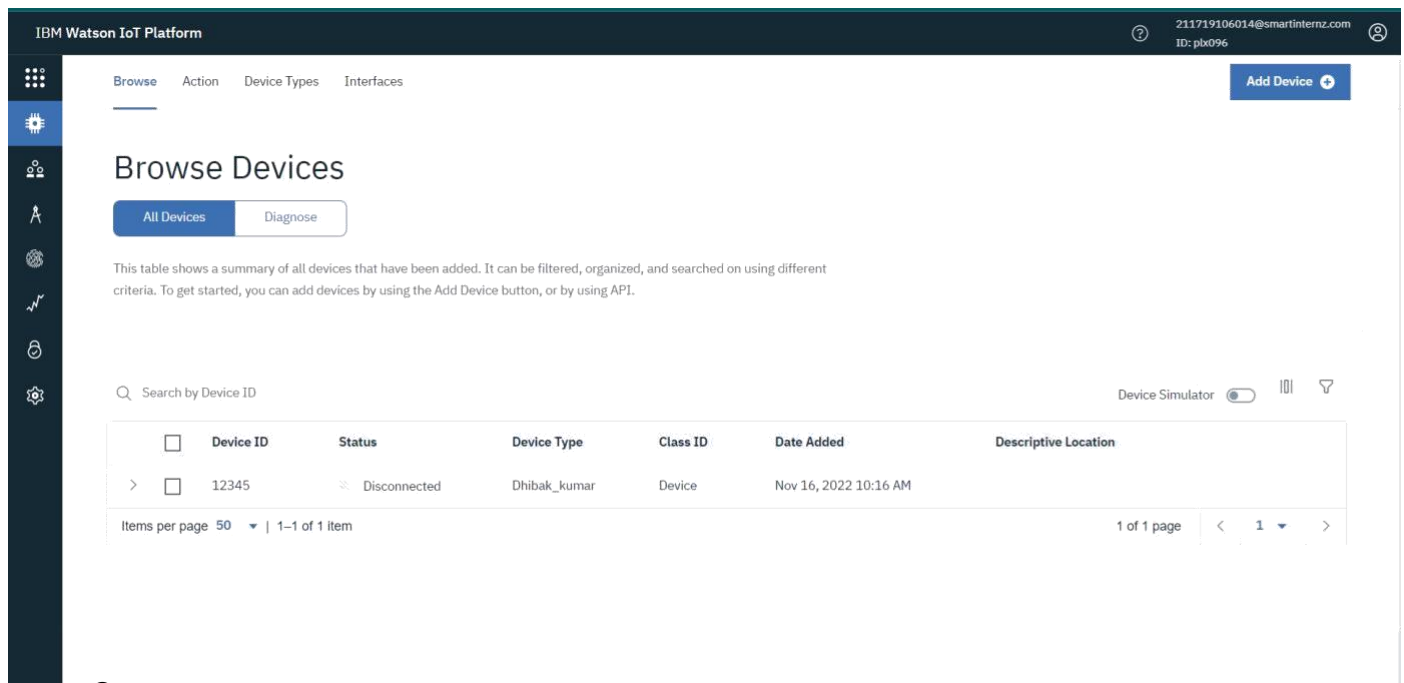
```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.3.0.tar.gz (58kB)
    100% |#####| 61kB 510KB/s
Collecting dicttoxml>=1.7.4 (from ibmiotf)
  Downloading dicttoxml-1.7.4.tar.gz
Collecting iso8601>=0.1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl (88kB)
Collecting paho-mqtt>=1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (80kB)
    100% |#####| 81kB 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 1.6MB/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 xmltodict>=0.10.2 (from ibmiotf)
  Downloading xmltodict-0.11.0-py2.py3-none-any.whl
Collecting urllib3<1.22,=>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 1.6MB/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/bbc3ad957e82f7b71ba80e316d65a83d9d735ad12e0c0418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96910b33ec6a7b2ae66a13765401b50def546802407e12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/28/d8/0d/acdc8f289011b7be7de71deeef0642fb83be0313dfff0493
Successfully built ibmiotf dicttoxml paho-mqtt
Installing collected packages: dicttoxml, iso8601, paho-mqtt, pytz, urllib3, idna, chardet, certifi, requests, requests-toolbelt, xmltodict, ibmiotf
Successfully installed certifi-2017.7.27.1 chardet-3.0.4 dicttoxml-1.7.4 ibmiotf-0.3.0 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 xmltodict-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.
- Then 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/dht11toibmiot.py =====
2017-10-23 07:10:37,768 ibmiotf.device.Client INFO Connected successfully: d:gegt14: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

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Browse Action Device Types Interfaces

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

Add Device +

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,"Humio...	json	a few seconds ago
event_1	{"Hazardous gas":72,"Temperature":49,"Humiod...	json	a few seconds ago
event_1	{"Hazardous gas":36,"Temperature":27,"Humiod...	json	a few seconds ago
event_1	{"Hazardous gas":30,"Temperature":54,"Humiod...	json	a few seconds ago
event_1	{"Hazardous gas":75,"Temperature":45,"Humiod...	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

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Your boards Public boards

Create New Board +

USAGE OVERVIEW 3 Cards Owned by you

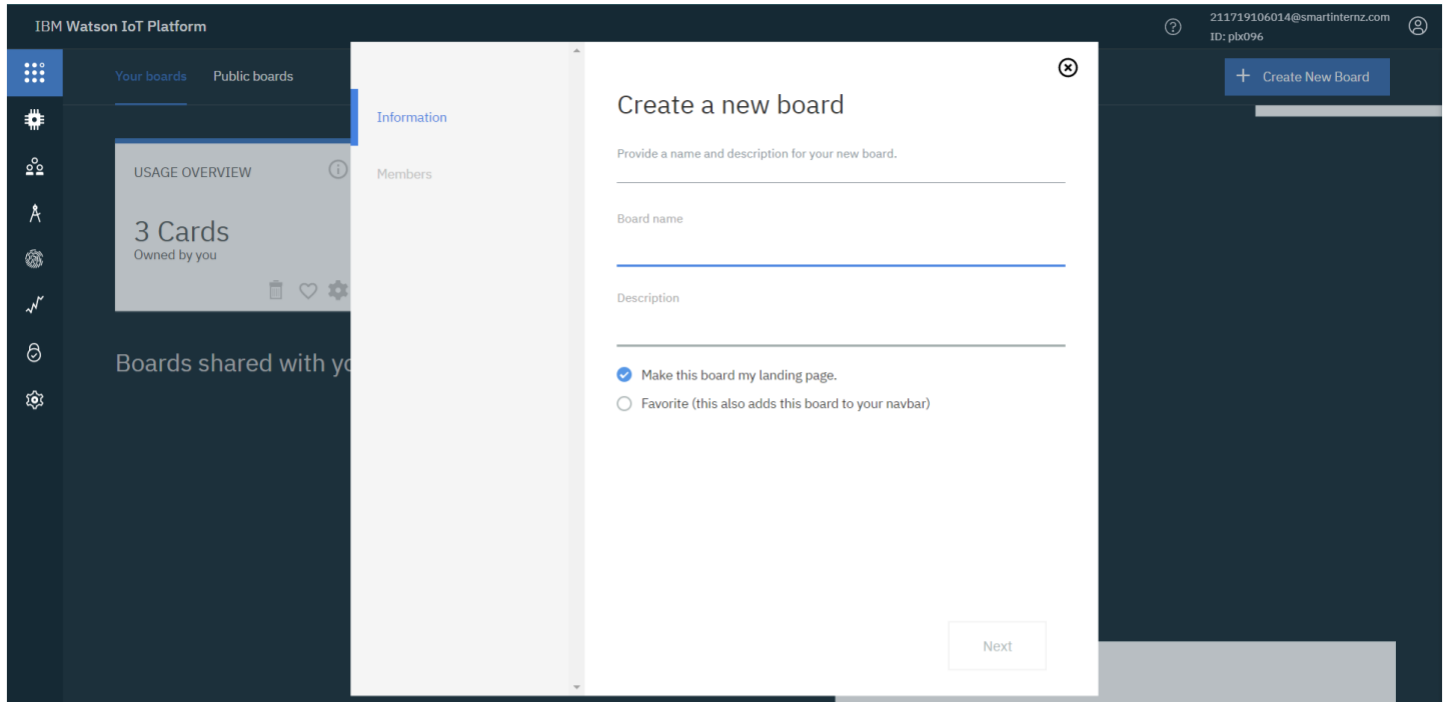
RISK AND SECURITY OVERVIEW 4 Cards Owned by you

Boards shared with you

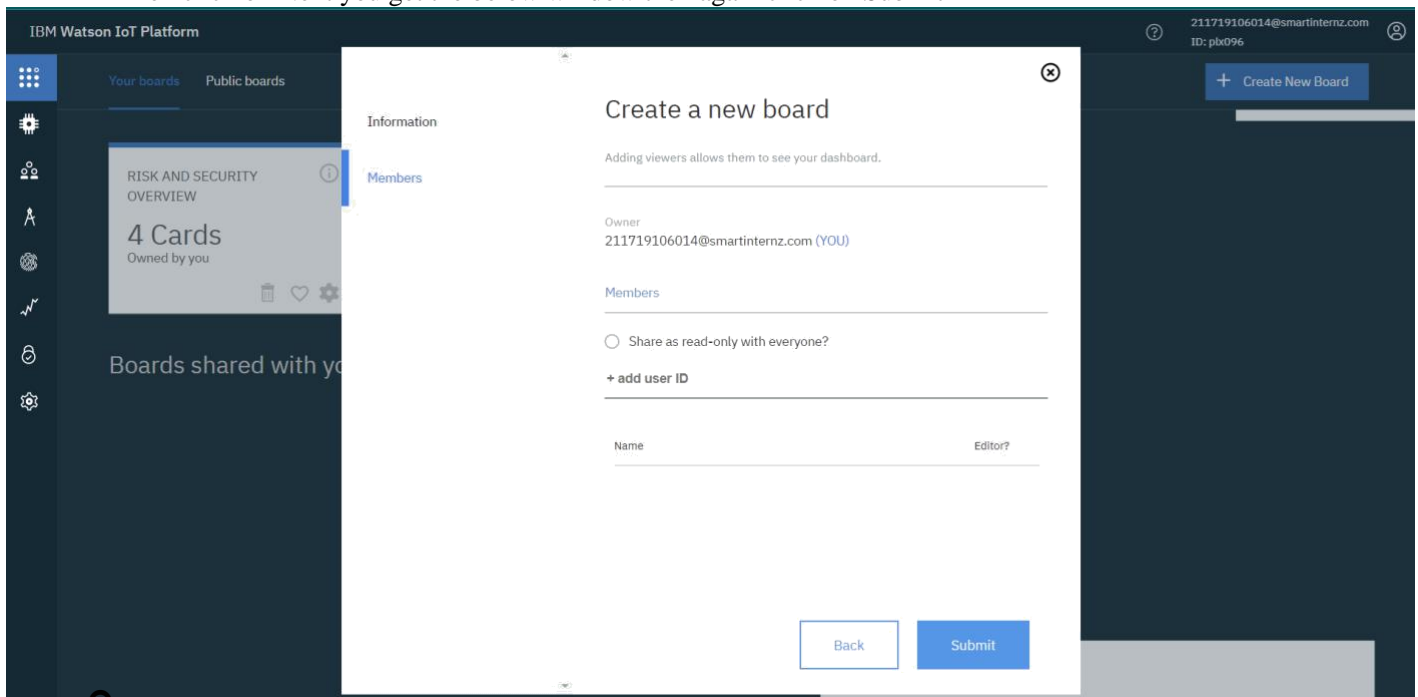
1 Simulation running

Click on Create a new board to create a board .

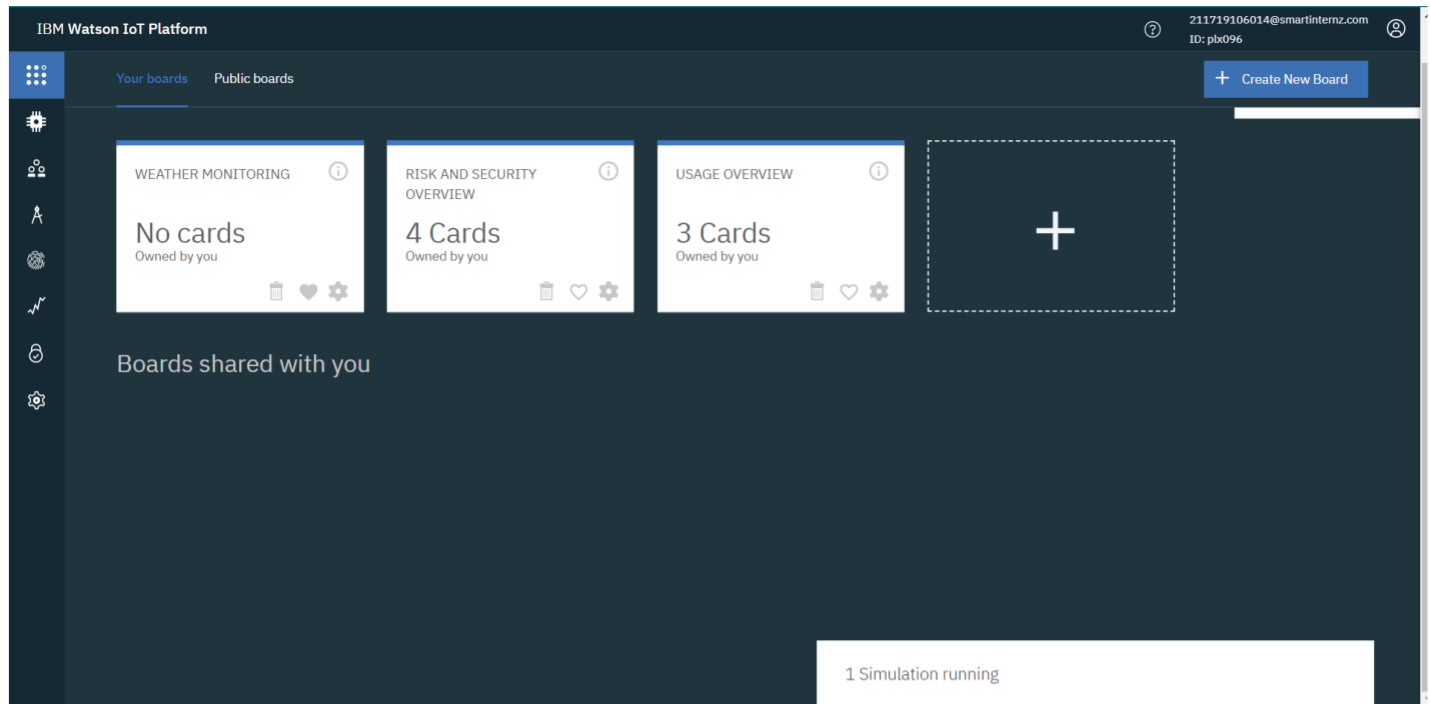
The given below window appears give a name and description to your board as shown in the window below.



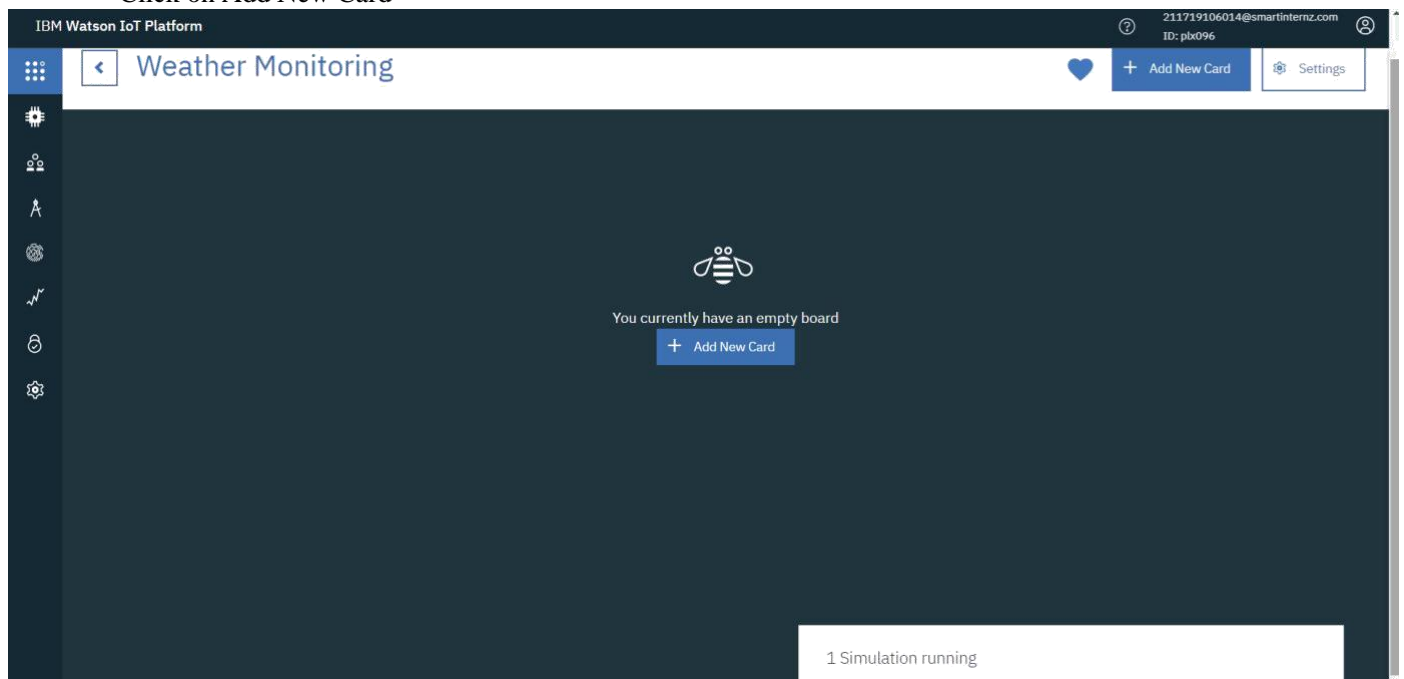
Then click on Next you get the below window then again click on Submit



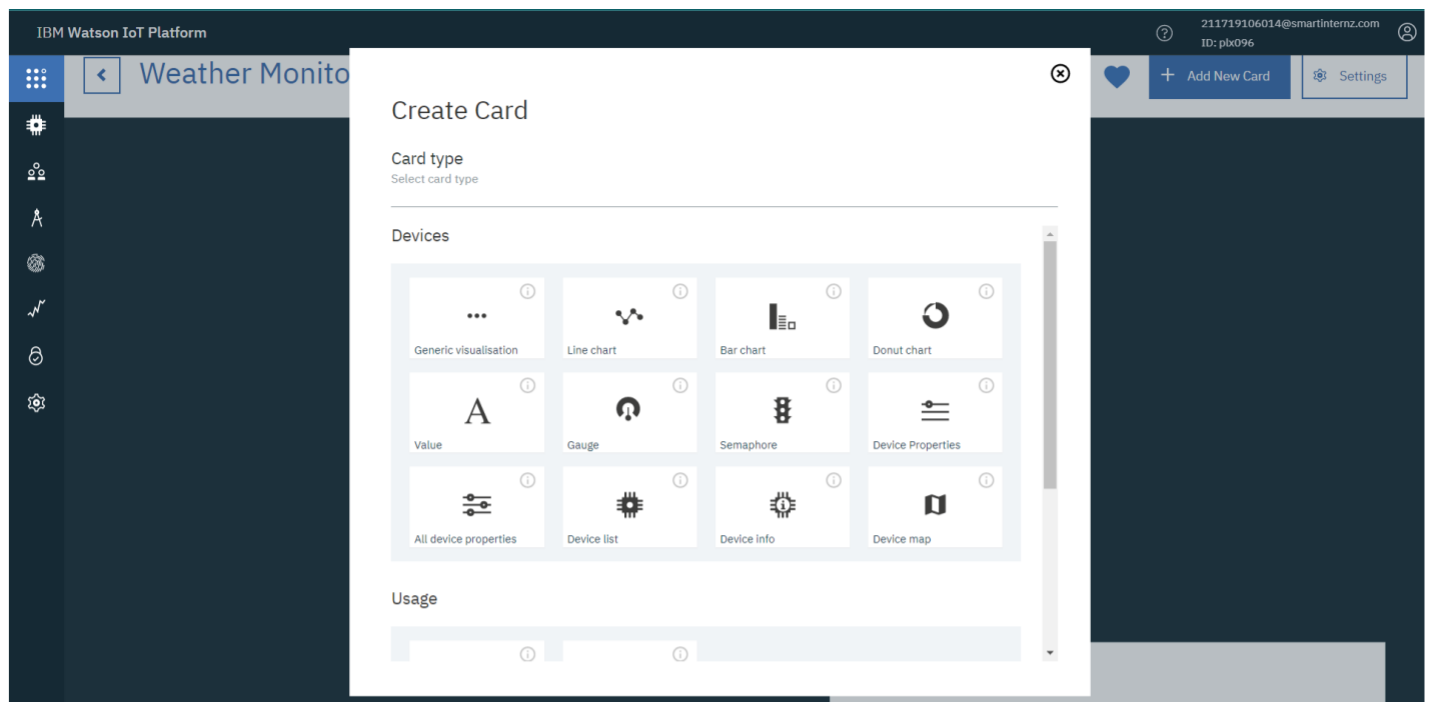
Then double click on your boards name which you have created.



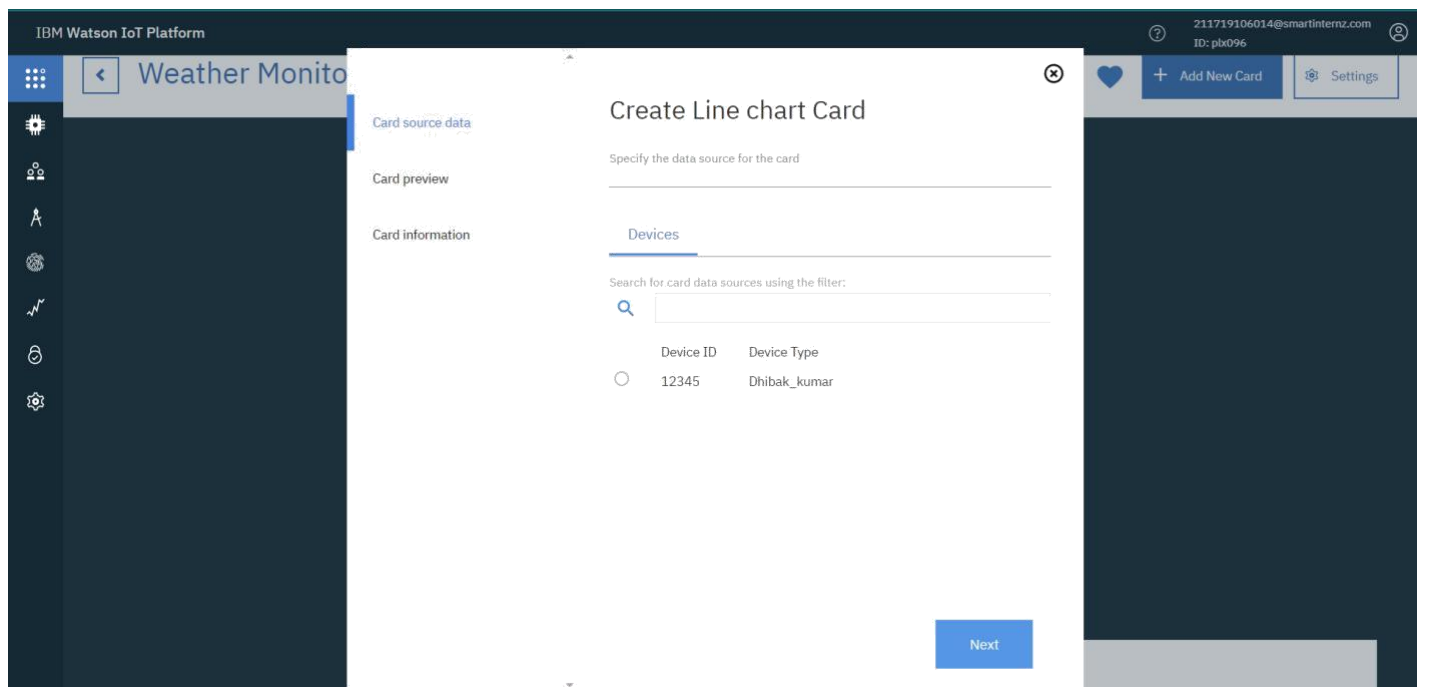
Click on Add New Card



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

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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

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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

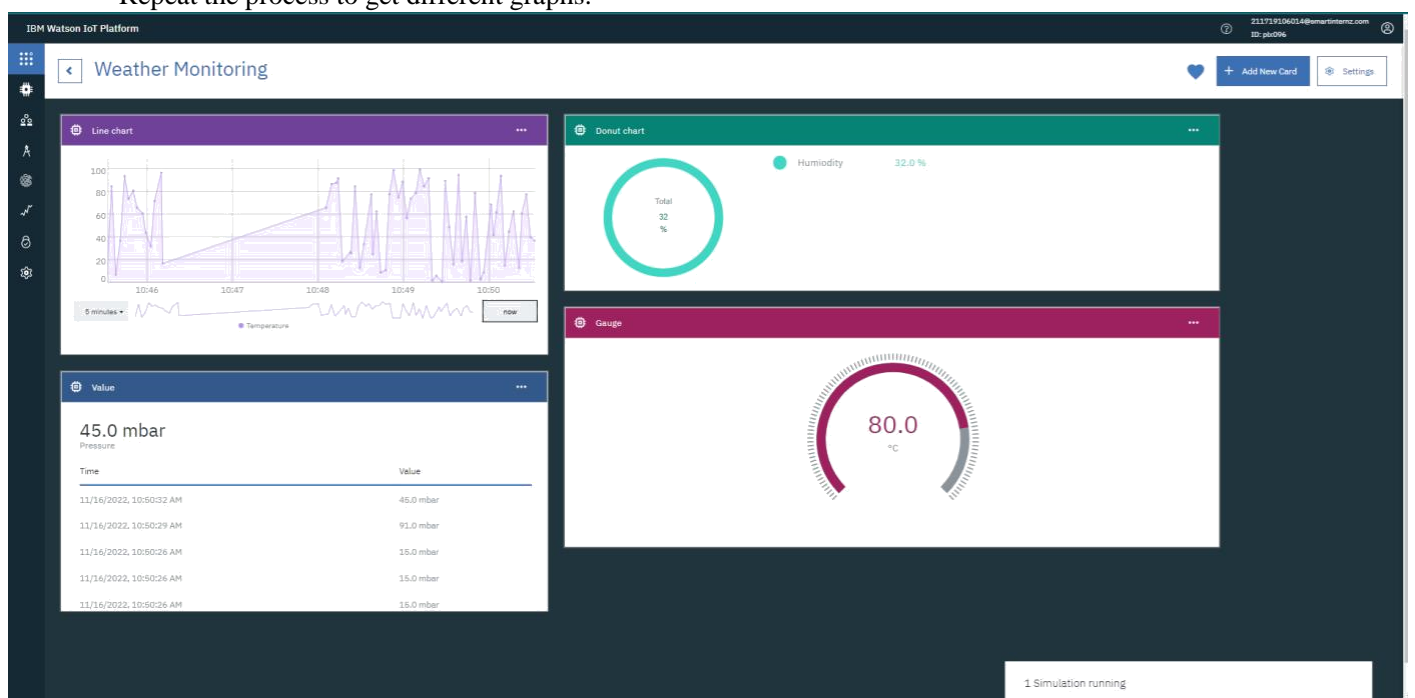
A line chart to display time series information with historic and live data

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.