

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	25 NOVEMBER 2022
Team ID	PNT2022TMID25221
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

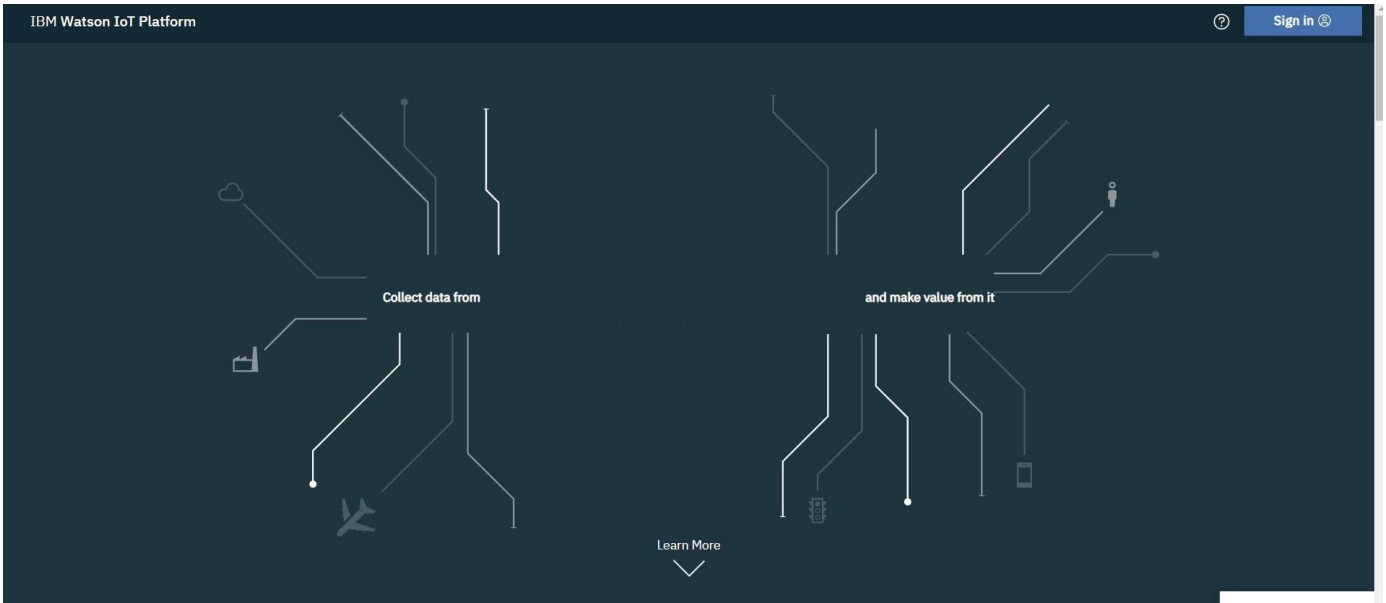
SOFTWARE:

- 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

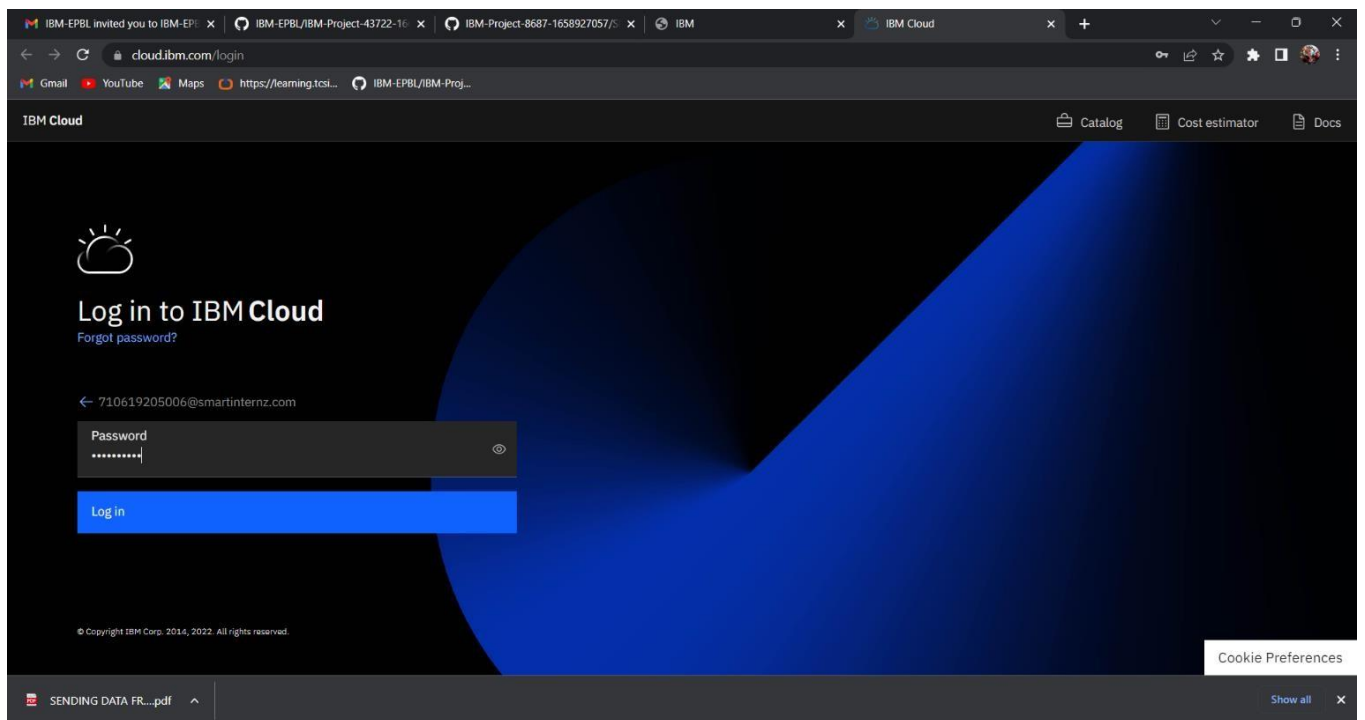
[Forgot IBMid?](#)

☒ Remember me [?](#)

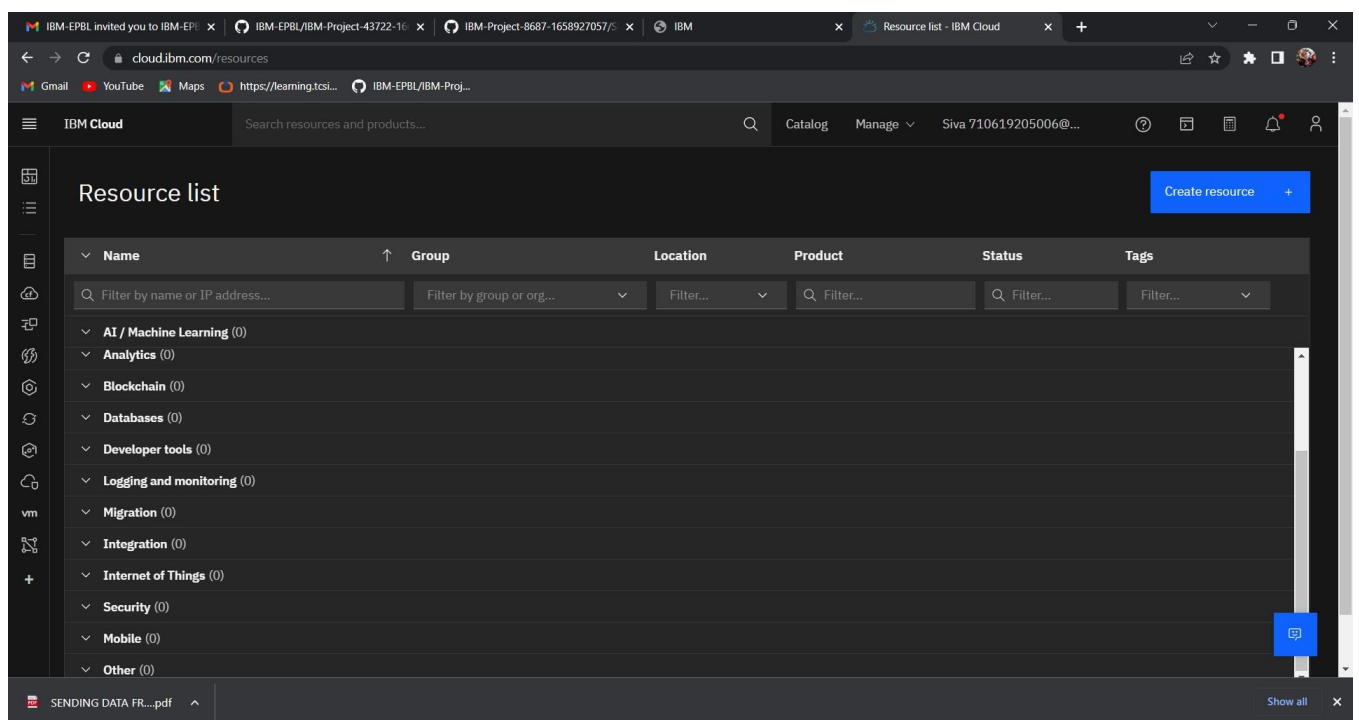
Continue [→](#)

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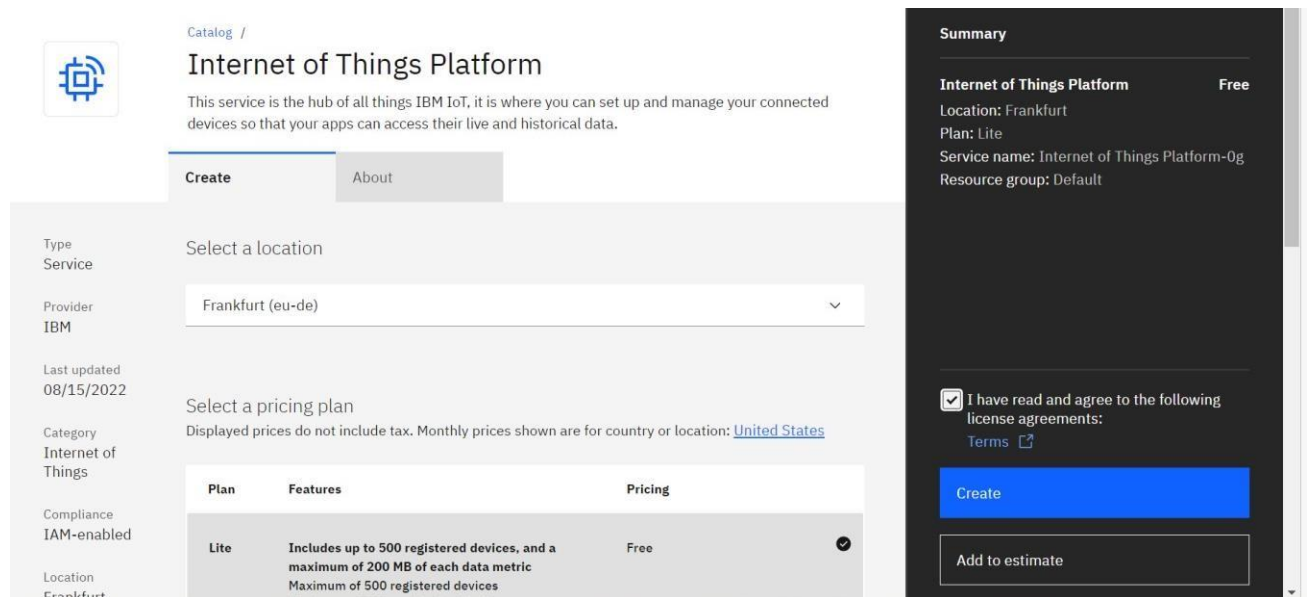
Need help? [Contact the IBMid help desk](#)



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



○ Check all details and click on create.



The screenshot shows the 'Internet of Things Platform' creation interface. On the left, a sidebar lists service details: Type (Service), Provider (IBM), Last updated (08/15/2022), Category (Internet of Things), Compliance (IAM-enabled), and Location (Frankfurt). The main content area has two tabs: 'Create' (active) and 'About'. Under 'Create', there's a 'Select a location' dropdown set to 'Frankfurt (eu-de)' and a 'Select a pricing plan' section. The pricing plan table shows a 'Lite' plan for 'Free' with features including up to 500 registered devices and 200 MB of data metric. A 'Create' button is prominent. On the right, a 'Summary' panel shows the service name 'Internet of Things Platform-0g', location 'Frankfurt', plan 'Lite', and a 'Create' button. A checkbox for license agreements is also present.

Catalog /

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

Location Frankfurt

Select a location

Frankfurt (eu-de)

Select a pricing plan

Displayed 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 metric Maximum of 500 registered devices	Free

Summary

Internet of Things Platform Free

Location: Frankfurt

Plan: Lite

Service name: Internet of Things Platform-0g

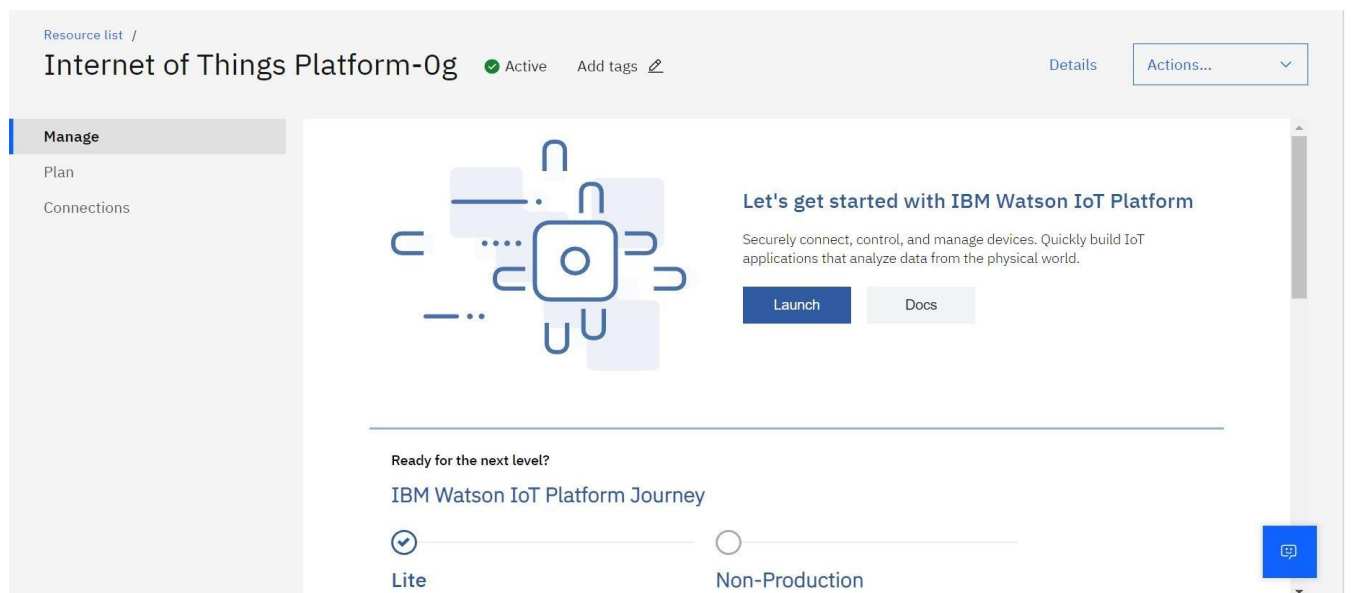
Resource group: Default

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

Create

Add to estimate

○ click on Launch



The screenshot shows the 'Internet of Things Platform-0g' dashboard. The top bar includes 'Resource list /', the service name 'Internet of Things Platform-0g', status 'Active', and 'Add tags'. A 'Details' link and an 'Actions...' dropdown are on the right. The left sidebar has 'Manage' (selected), 'Plan', and 'Connections'. The main content area features a large IoT icon, the heading 'Let's get started with IBM Watson IoT Platform', and a 'Launch' button. Below this, a section titled 'Ready for the next level?' shows the 'IBM Watson IoT Platform Journey' with two progress indicators: 'Lite' (checked) and 'Non-Production' (unchecked). A chat icon is in the bottom right corner.

Resource list /

Internet of Things Platform-0g

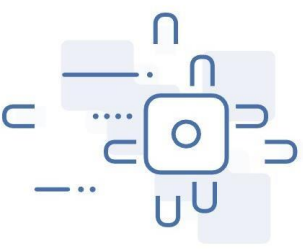
Active Add tags

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

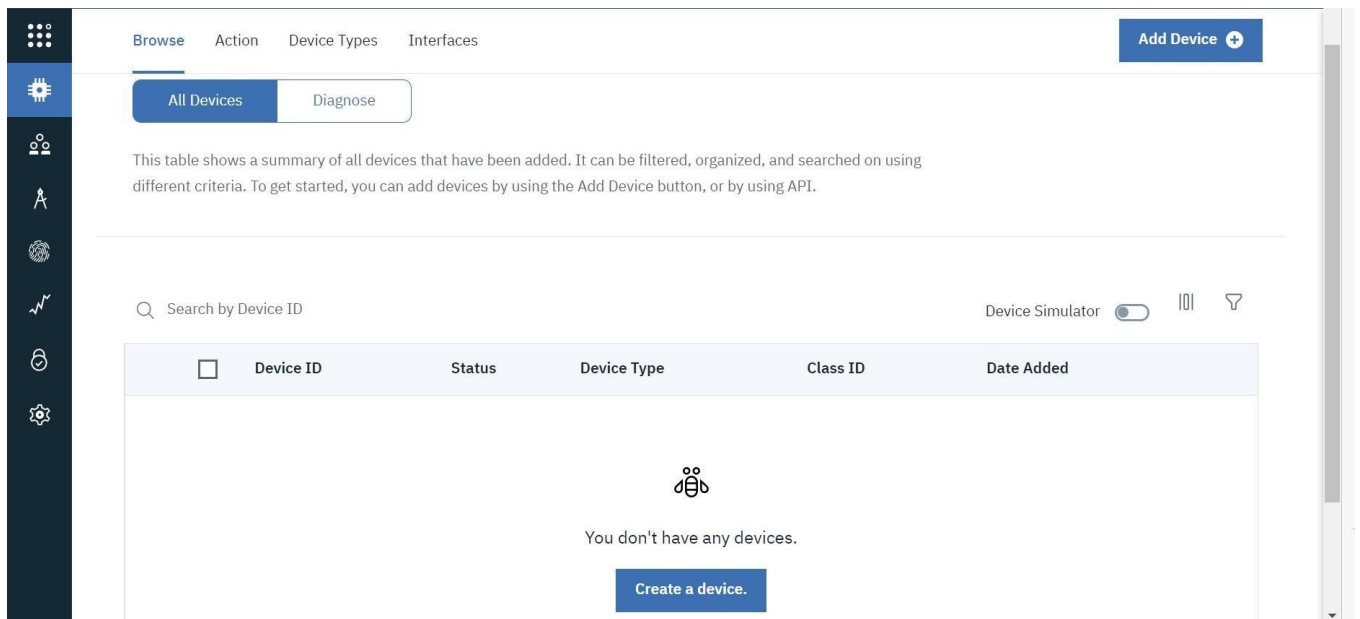
Ready for the next level?

IBM Watson IoT Platform Journey

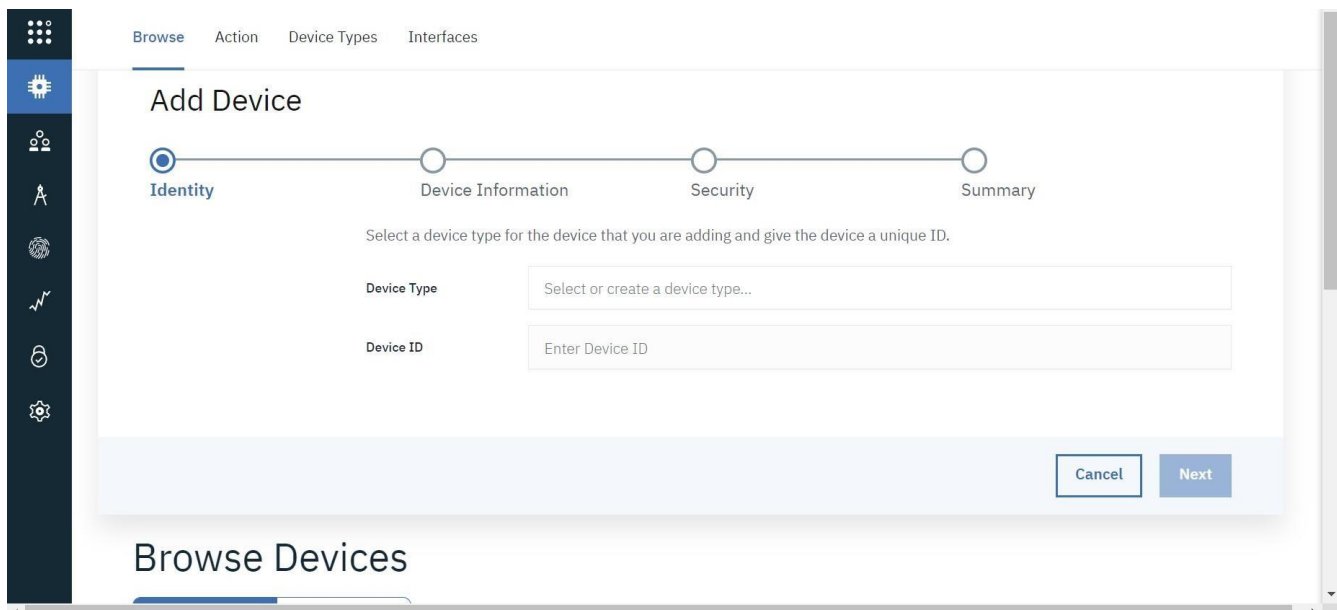
☒ Lite ☐ Non-Production

Dashboard of IBM Watson IoT platform,

○ Click on Add device



- After click on Add device this page will open



- Go to device type and fill the details.

Register Device.


Browse Action **Device Types** Interfaces

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.

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

Device ID

[Cancel](#) [Next](#)

Browse Devices

[All Devices](#) [Diagnose](#)

Click on Next

The screenshot shows the 'Add Device' form in the 'Device Information' step. The form has a progress bar at the top with four steps: Identity (checked), Device Information (active), Security, and Summary. Below the progress bar, there is a text box that says 'You can modify the default device information and enter more information about the device for identification purposes.' The form contains several input fields: 'Serial Number' (with placeholder 'Enter Serial Number'), 'Manufacturer' (with placeholder 'Enter Manufacturer'), 'Model' (with placeholder 'Enter Model'), 'Device Class' (with placeholder 'Enter Device Class'), 'Description' (with placeholder 'Enter Description'), 'Firmware Version' (with placeholder 'Enter Firmware Version'), 'Hardware Version' (with placeholder 'Enter Hardware Version'), and 'Descriptive Location' (with placeholder 'Enter Descriptive Location'). There is also an 'Add Metadata' button with a plus icon.

Click on Next

The screenshot shows the 'Security' step in the 'Add Device' form. The progress bar at the top shows four steps: Identity (checked), Device Information (checked), Security (active), and Summary. Below the progress bar, there is a text box that says 'There are two options for selecting a device authentication token.' The form is divided into two columns. The left column is titled 'Auto-generated authentication token (default)' and contains the text: '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.' The right column is titled 'Self-provided authentication token' and contains the text: 'Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix 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.' Below the text, there is an 'Authentication Token' input field with the placeholder 'Enter an optional token' and an information icon. Below the input field, there is a text box that says 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and a text box that says 'Authentication token are encrypted before we store them.'

Finish

Browse

Action

Device Types

Interfaces

Add Device

✓

Identity

✓

Device Information

✓

Security

○

Summary

Verify that the following information is correct then select Finish

Device Type

Nagarajan

Device ID

12345

View Metadata

Security Token

To be generated

Back

Finish

○ Device is created

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.

Search by Device ID

Device Simulator

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
>	<input type="checkbox"/> 12345	Disconnected	Nagarajan	Device	Oct 31, 2022 11:38 AM	

Items per page 50 | 1-1 of 1 item

1 of 1 page

1 Simulation running

Activate Windows
Go to Settings to activate Windows.

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
s11.0.0.1.0.1-t1-deb8u6_armhf.deb ...
Resolving ftp.nl.debian.org (ftp.nl.debian.org)... 130.89.149.21, 2001:67c:2564:
::2:
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: 'libssl1.0.0.1.0.1-t1-deb8u6_armhf.deb'

libssl1.0.0.1.0.1-t1- 100%[=====] 847.61K 358KB/s in 2.4s

2017-10-23 06:55:25 (358 KB/s) - 'libssl1.0.0.1.0.1-t1-deb8u6_armhf.deb' saved [
867950/867950]

pi@raspberrypi:~$ sudo dpkg -i libssl1.0.0.1.0.1-t1-deb8u6_armhf.deb
Selecting previously unselected package libssl1.0.0.1.0.1-t1-deb8u6_armhf.
(Reading database ... 115608 files and directories currently installed.)
Preparing to unpack libssl1.0.0.1.0.1-t1-deb8u6_armhf.deb ...
Unpacking libssl1.0.0.1.0.1-t1-deb8u6_armhf (1.0.0.1-t1-deb8u6) ...
Setting up libssl1.0.0.1.0.1-t1-deb8u6_armhf (1.0.0.1-t1-deb8u6) ...
https://github.com/IBM-Streams/ibm-messaging-iot-raspberrypi/releases/download/1.0.2.1/iot-1.0.2-armhf.deb
% Total % Received % Xferd Average Speed 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 10K 0 10K 0 0 29117 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) ...
Enabling 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
└─/usr/lib/systemd/systemd
└─/usr/bin/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 program
Oct 23 06:56:25 raspberrypi iot[2557]: *** 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`

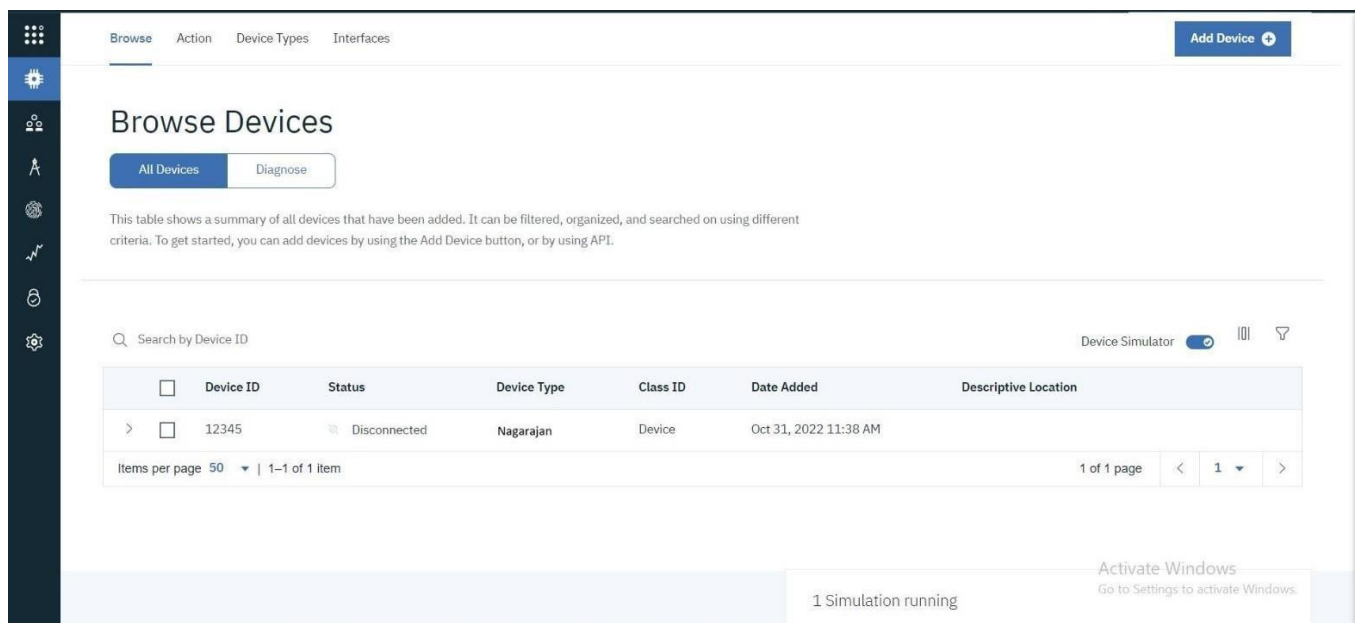
```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.3.0.tar.gz (58kB)
    100% |#####| 61kB 510kB/s
Collecting dictioxml>=1.7.4 (from ibmiotf)
  Downloading dictioxml-1.7.4.tar.gz
Collecting iso8601>=0.1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl
Collecting paho-mqtt>=1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (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 1.0MB/s
Collecting requests_toolbelt>=0.7.0 (from ibmiotf)
  Downloading requests_toolbelt-0.8.0-py2.py3-none-any.whl (54kB)
    100% |#####| 61kB 1.6MB/s
Collecting xmltodict>=0.10.2 (from ibmiotf)
  Downloading xmltodict-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 charset<3.1.0, >=3.0.2 (from requests>=2.5.0->ibmiotf)
  Downloading charset-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, dictioxml, paho-mqtt
Running setup.py bdist_wheel for ibmiotf ... done
Stored in directory: /home/pi/.cache/pip/wheels/7e/f9/45/bbc33ad95f82f7b71ba80e316d65a83d9d735a6d1e0c0418
Running setup.py bdist_wheel for dictioxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/9e916b33eca67b2ae66a137654b1b5d6ef5468624078a12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/28/d5/6d/acdc8f289911b76b7de71deebef0642f83be90313dfff0493
Successfully built ibmiotf dictioxml paho-mqtt
Installing collected packages: dictioxml, iso8601, paho-mqtt, pytz, urllib3, idna, charset, certifi, requests, requests-toolbelt, xmltodict, ibmiotf
Successfully installed certifi-2017.7.27.1 charset-3.0.4 dictioxml-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:geg14: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

Device ID: 12345, Status: Disconnected, Device Type: Nagarajan, Class ID: Device, Date Added: Oct 31, 2022 11:38 AM

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":61,"Temperature":88,"Humidit..."}	json	a few seconds ago
event_1	{"Hazardous Gas":20,"Temperature":36,"Humidit..."}	json	a few seconds ago
event_1	{"Hazardous Gas":79,"Temperature":56,"Humidit..."}	json	a few seconds ago
event_1	{"Hazardous Gas":52,"Temperature":82,"Humidit..."}	json	a few seconds ago
event_1	{"Hazardous Gas":26,"Temperature":33,"Humidit..."}	json	a few seconds ago

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

Usage Overview: 3 Cards, Owned by you

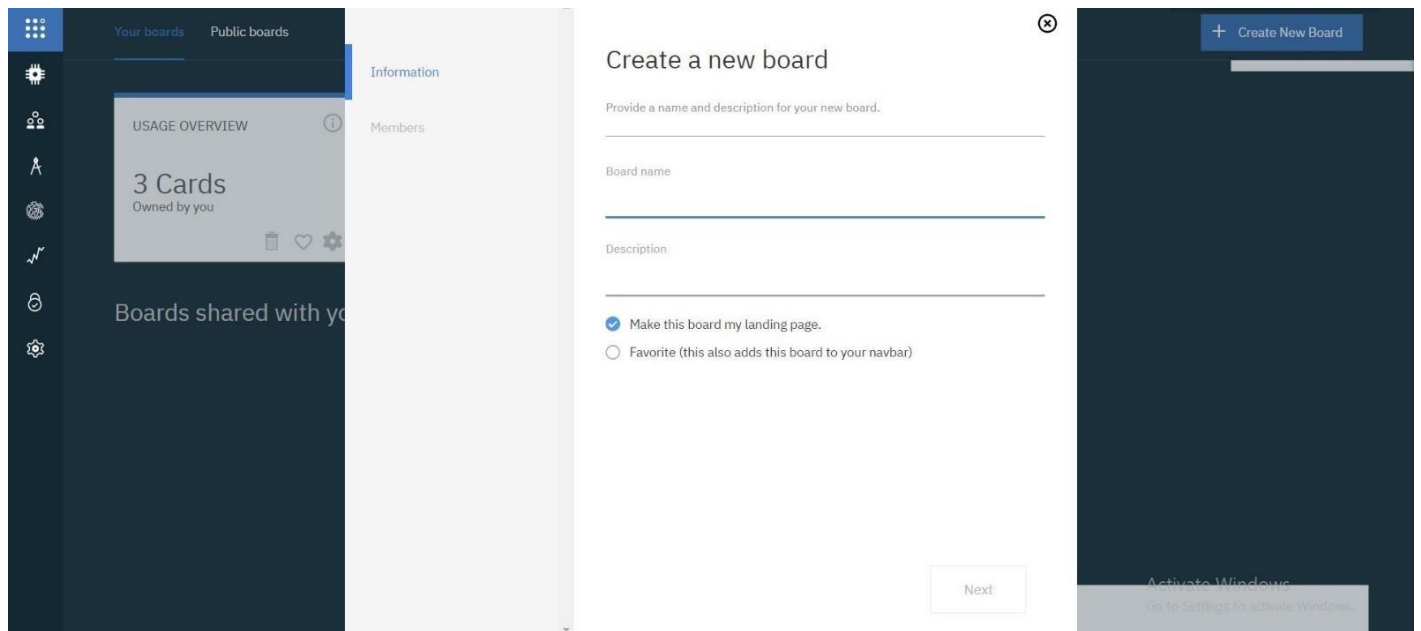
Risk and Security Overview: 4 Cards, Owned by you

Boards shared with you

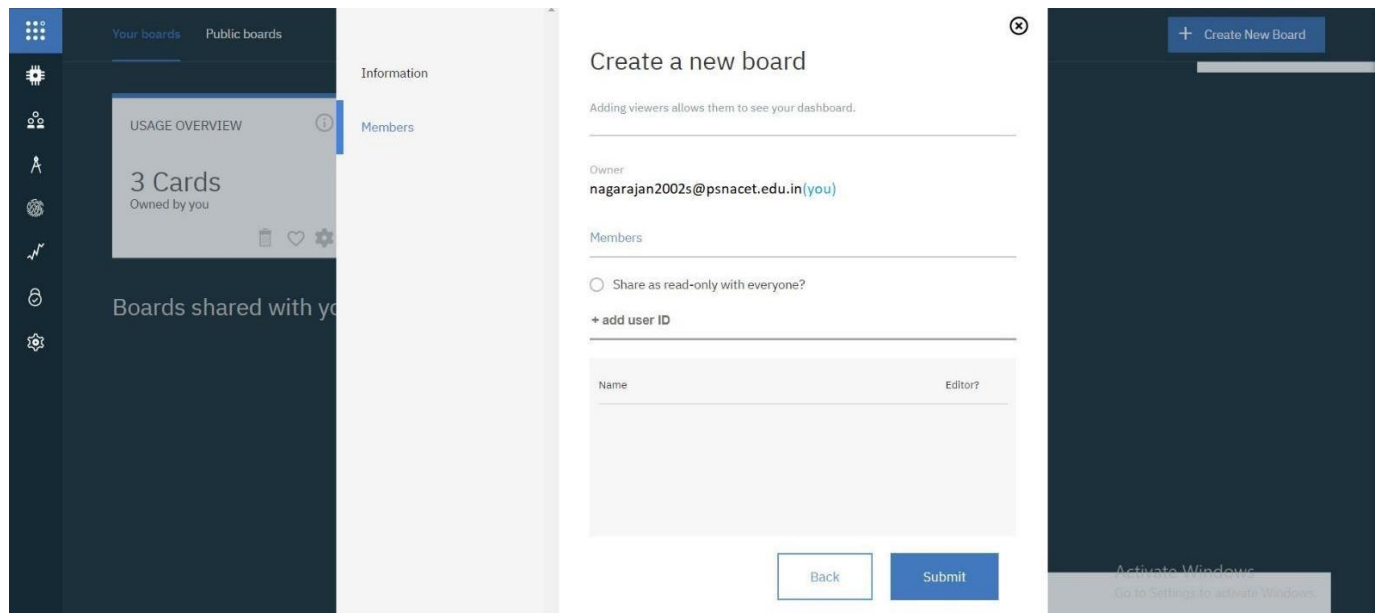
1 Simulation running

- Click on Create a new board to create a board .

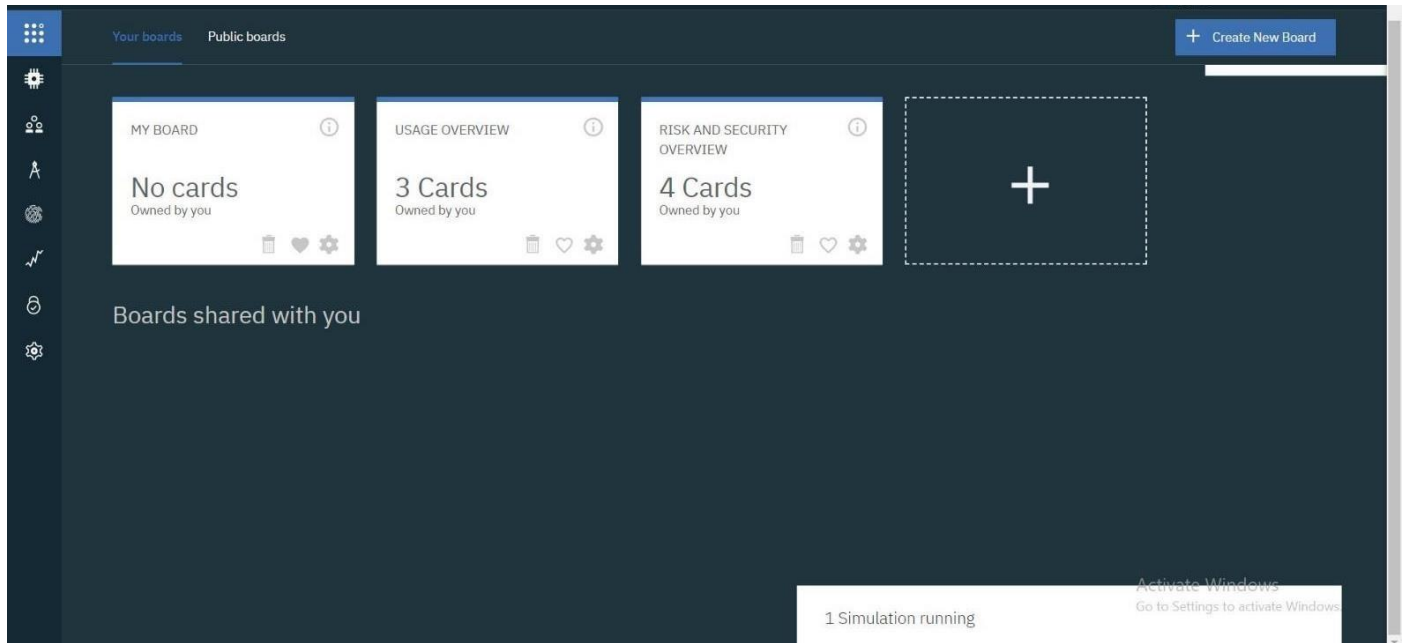
The given below window appears give a name and description to your board as shown in the window below.



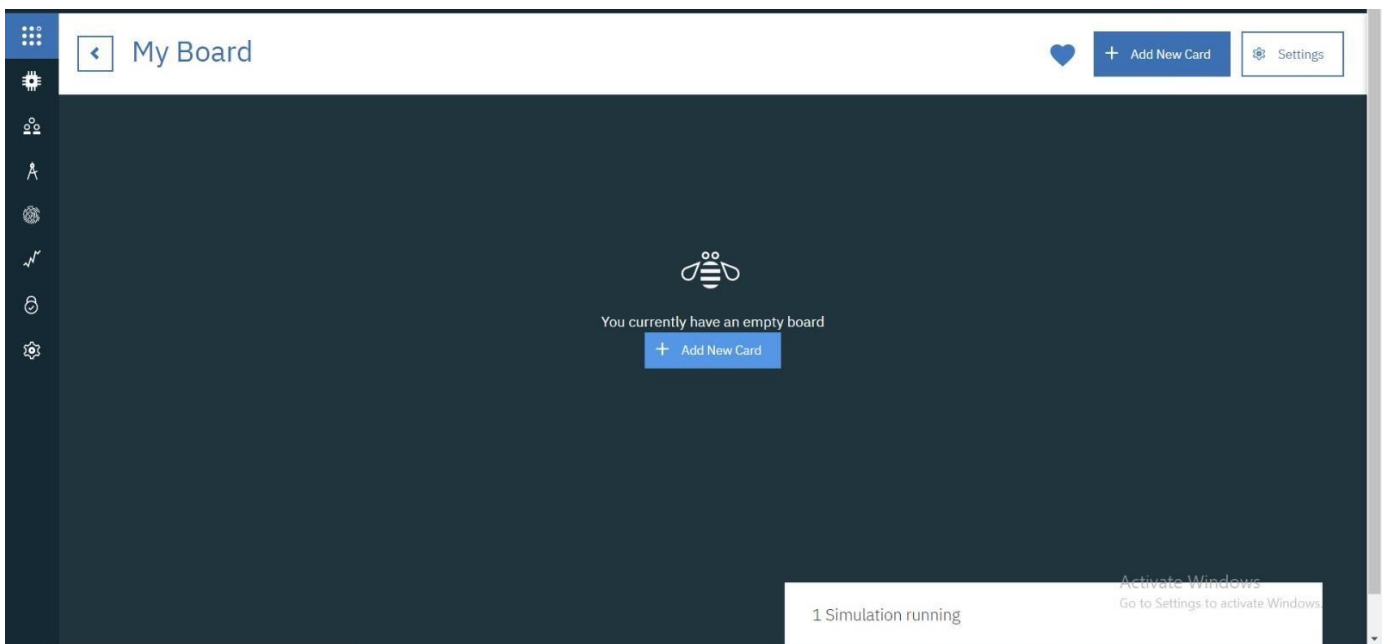
- Then click on Next you get the below window then again click on Submit



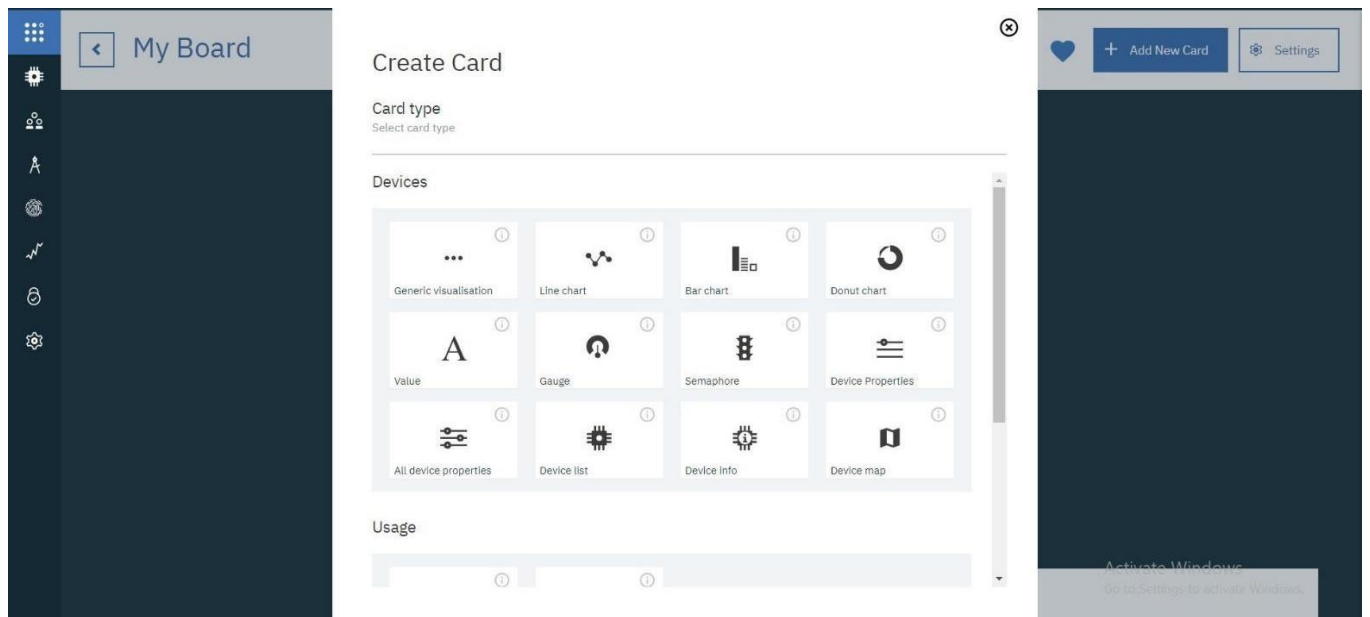
- Then double click on your boards name which you have created.



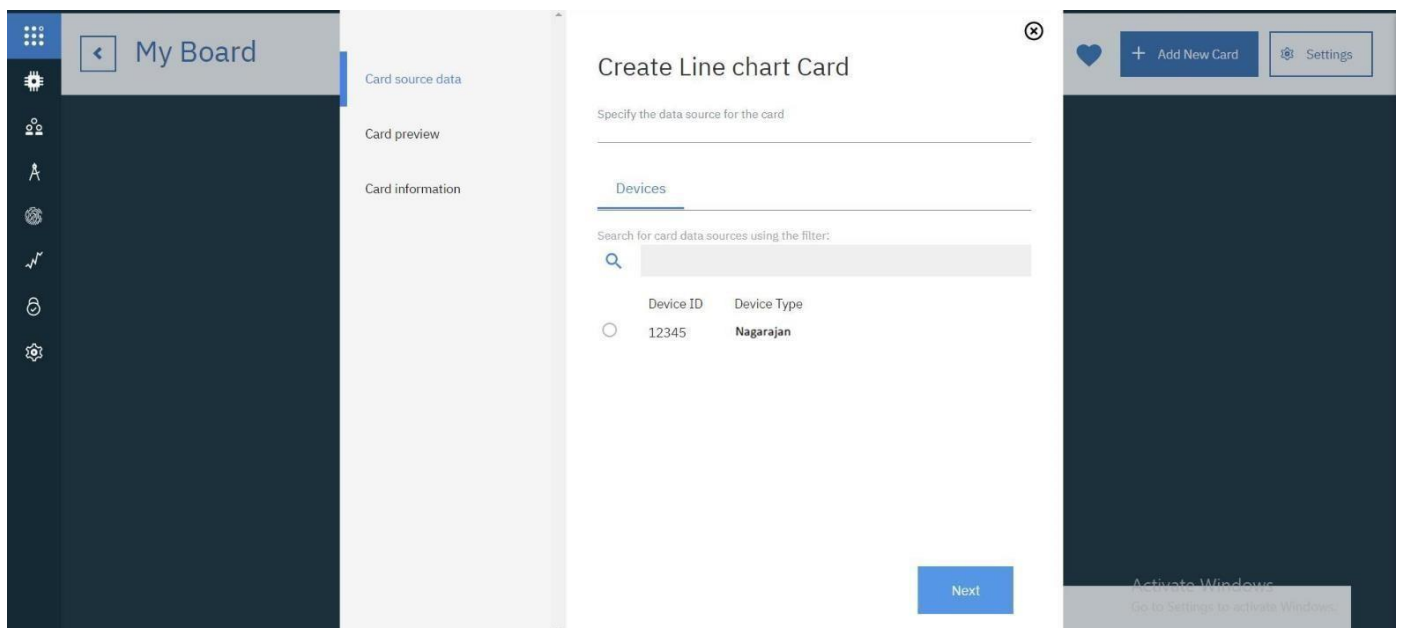
- Click on Add New Card



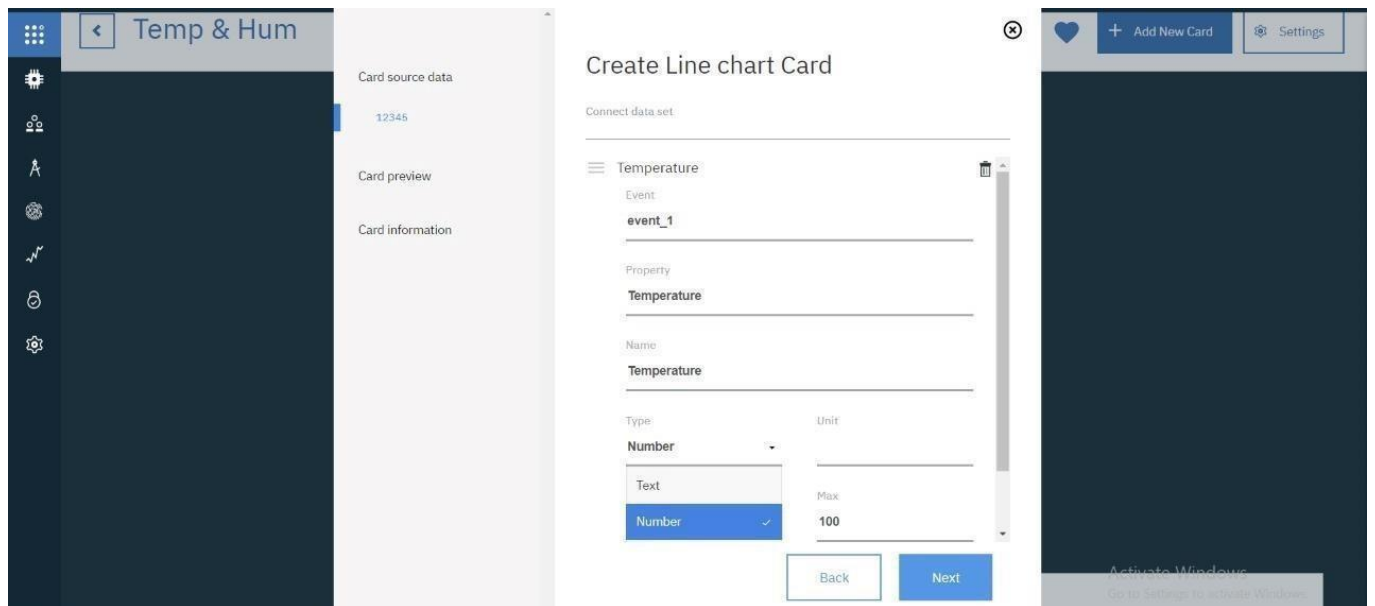
- Select the type of Graph u want accordingly and click next



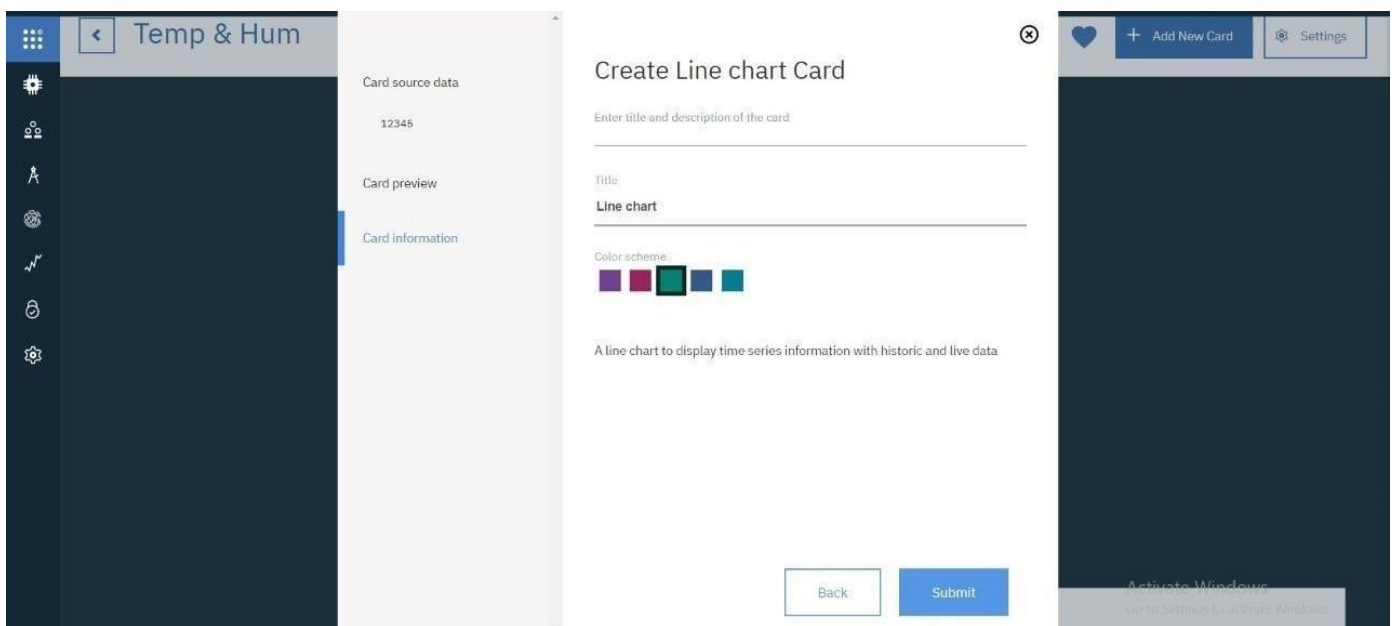
- You get the below window, choose the Device and click on Next.



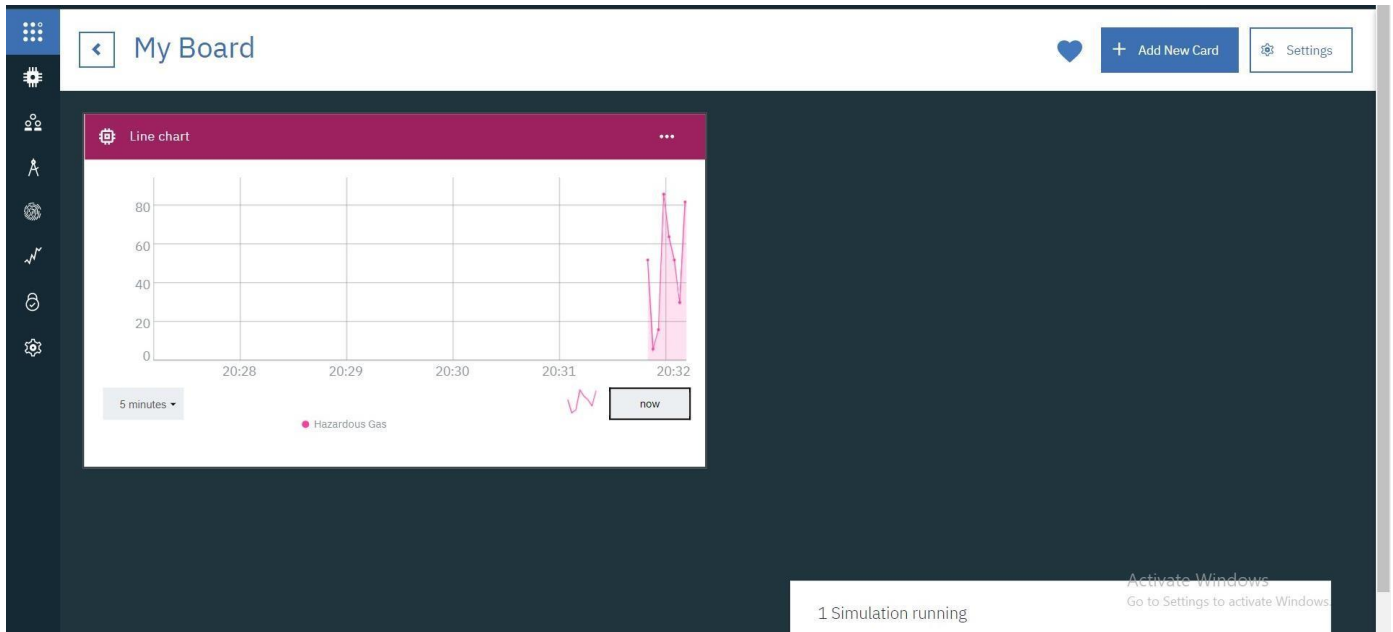
- Select the event, properly to be visualized on your graph and click next. In my case it is humidity



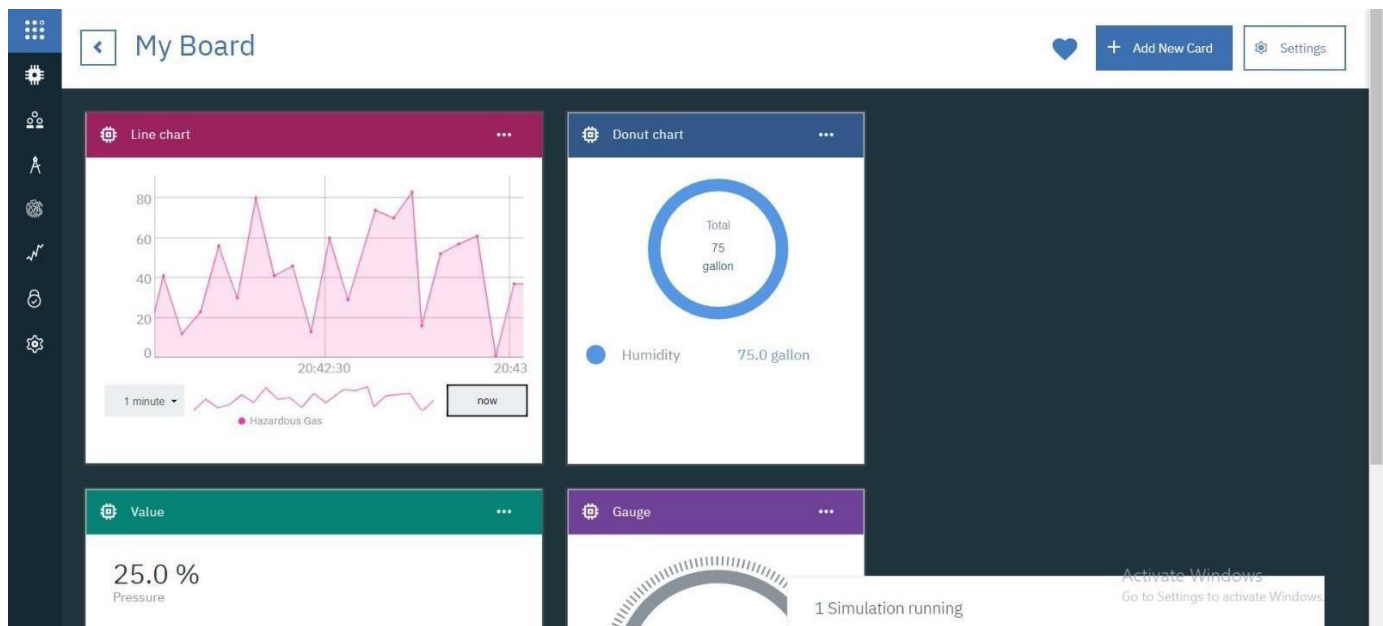
- Then select the size of the graph and color of the graph board you want and click next

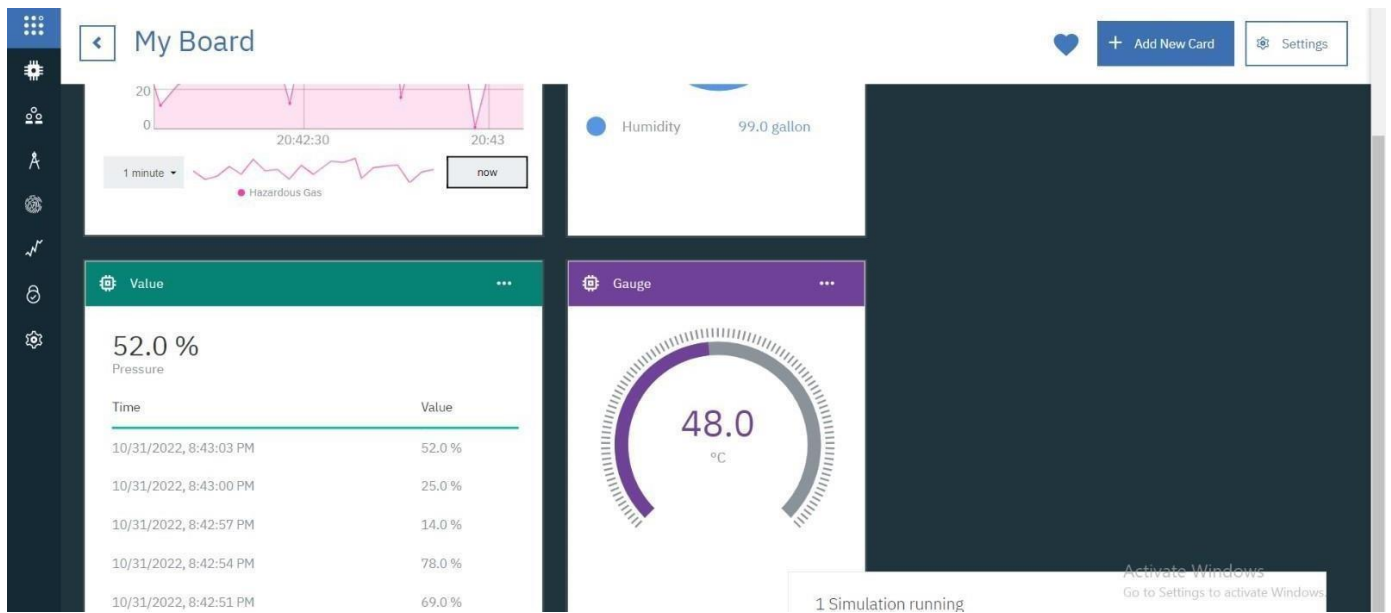


- Here is the graph



- 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.