

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	3 NOVEMBER 2022
Team ID	PNT2022TMID09849
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:

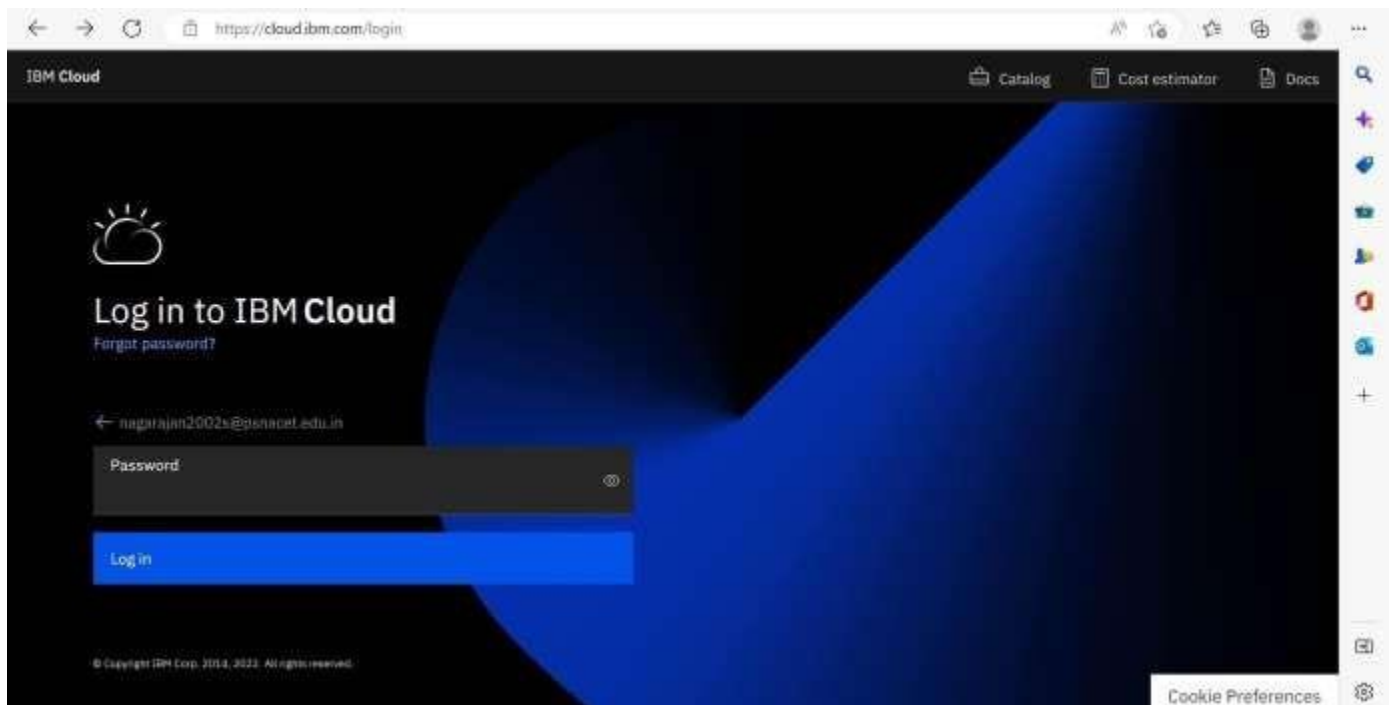
- IBM BLUEMIX ACCOUNT

STEPS TO BE FOLLOWED:

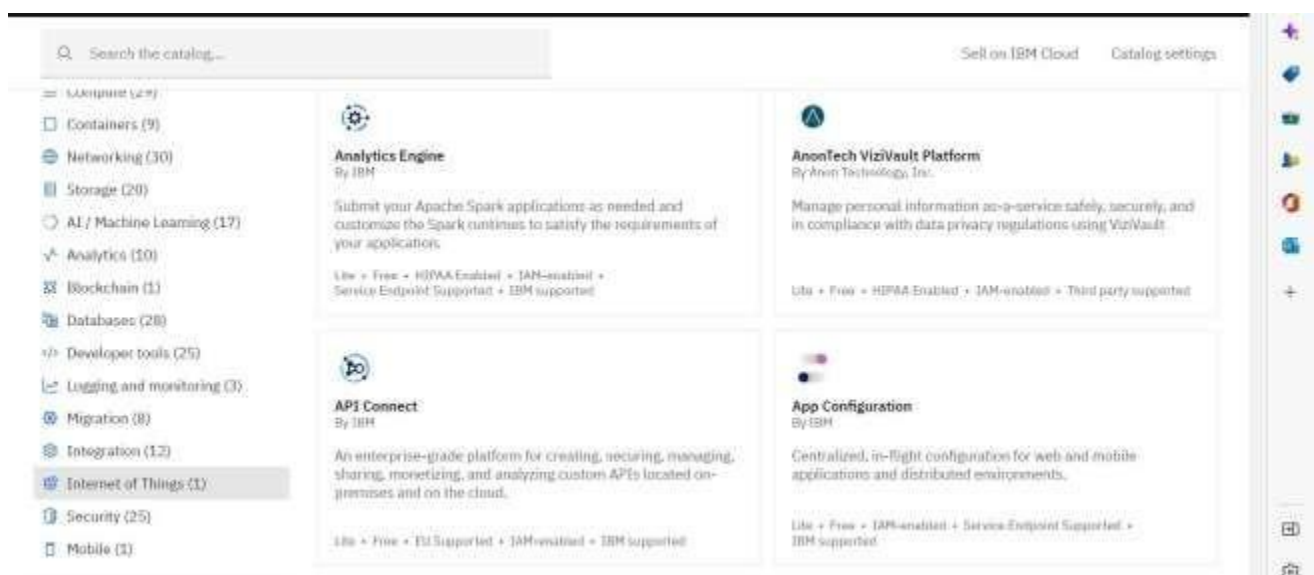
Step-1: Create a device in IBM Watson:

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





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



➤ Check all details and click on create.

➤ click on Launch

The screenshot shows the 'Internet of Things Platform' creation page in the Azure portal. The page is divided into a main content area and a right-hand 'Summary' panel.

Main Content Area:

- Header:** 'Catalog / Internet of Things Platform'. A description states: '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.'
- Tabs:** 'Create' (active) and 'About'.
- Left Sidebar:** Metadata including 'Type: Service', 'Provider: IBM', 'Last updated: 08/15/2022', 'Category: Internet of Things', 'Compliance: IAM-enabled', and 'Location: Frankfurt'.
- Select a location:** A dropdown menu showing 'Frankfurt (eu-de)'.
- Select a pricing plan:** A note states: 'Displayed prices do not include tax. Monthly prices shown are for country or location: [United States](#)'.
- Table:** A table with columns 'Plan', 'Features', and 'Pricing'. It lists the 'Lite' plan, which includes up to 500 registered devices and a maximum of 200 MB of each data metric. The pricing is 'Free'.

Summary Panel (Right):

- Section:** 'Internet of Things Platform' with a 'Free' tag.
- Details:** Location: Frankfurt, Plan: Lite, Service name: Internet of Things Platform-0g, Resource group: Default.
- Agreement:** A checkbox labeled 'I have read and agree to the following license agreements:' is checked, with a link to 'Terms'.
- Buttons:** 'Create' (blue) and 'Add to estimate' (grey).

The screenshot shows the 'Internet of Things Platform-0g' resource page in the Azure portal. The page is divided into a left-hand 'Manage' sidebar and a main content area.

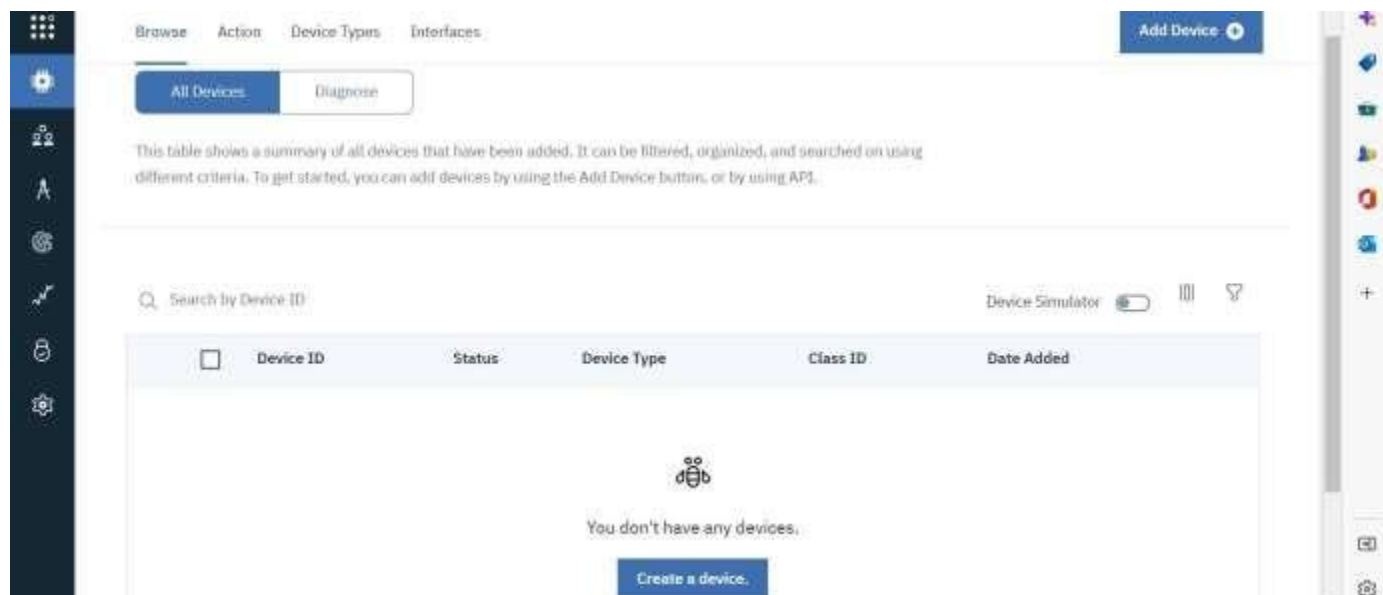
Manage Sidebar:

- Section:** 'Manage'.
- Options:** 'Plan' and 'Connections'.

Main Content Area:

- Header:** 'Internet of Things Platform-0g' with status 'Active' and 'Add tags' link. 'Details' and 'Actions...' buttons are on the right.
- Diagram:** A central icon representing a device connected to a cloud.
- Text:** 'Let's get started with IBM Watson IoT Platform'. A description states: 'Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.'
- Buttons:** 'Launch' (blue) and 'Done' (grey).
- Progress Section:** 'Ready for the next level? IBM Watson IoT Platform Journey'. It shows two progress indicators: 'Lite' (checked) and 'Non-Production' (unchecked).

- 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.

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

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

Browse Action Device Types Interfaces

Add type

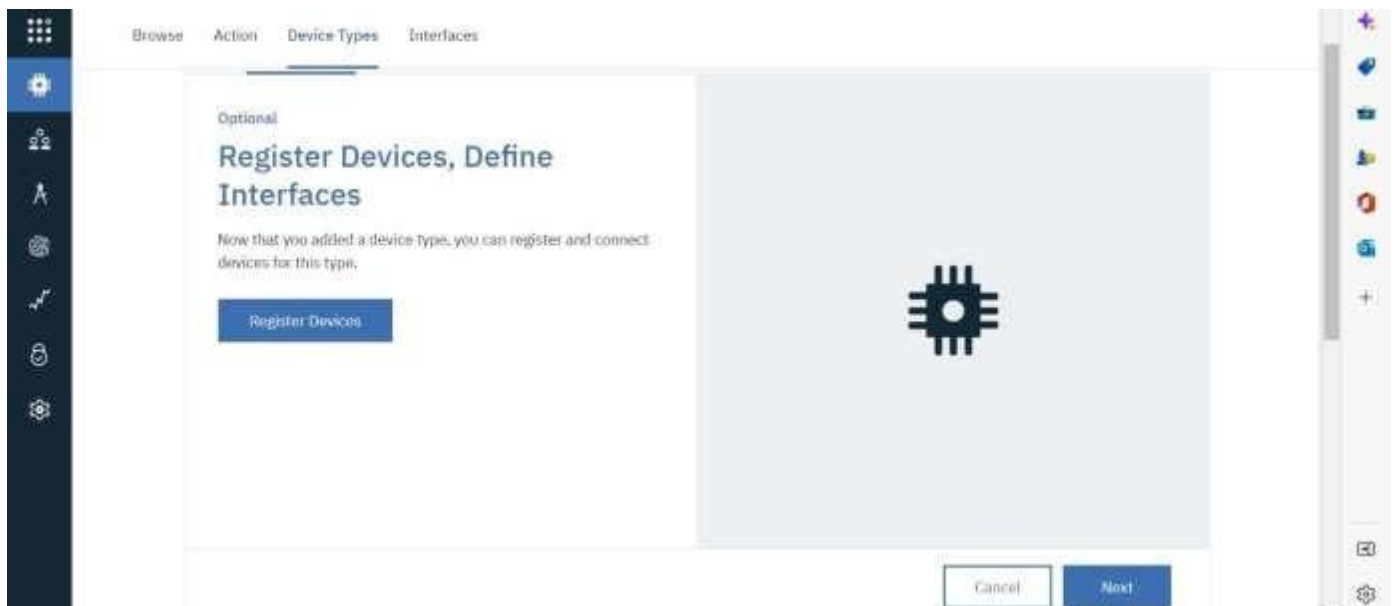
Identity Device Information

These attributes will be used as a template for new devices that are assigned this device type [Edit Metadata](#)

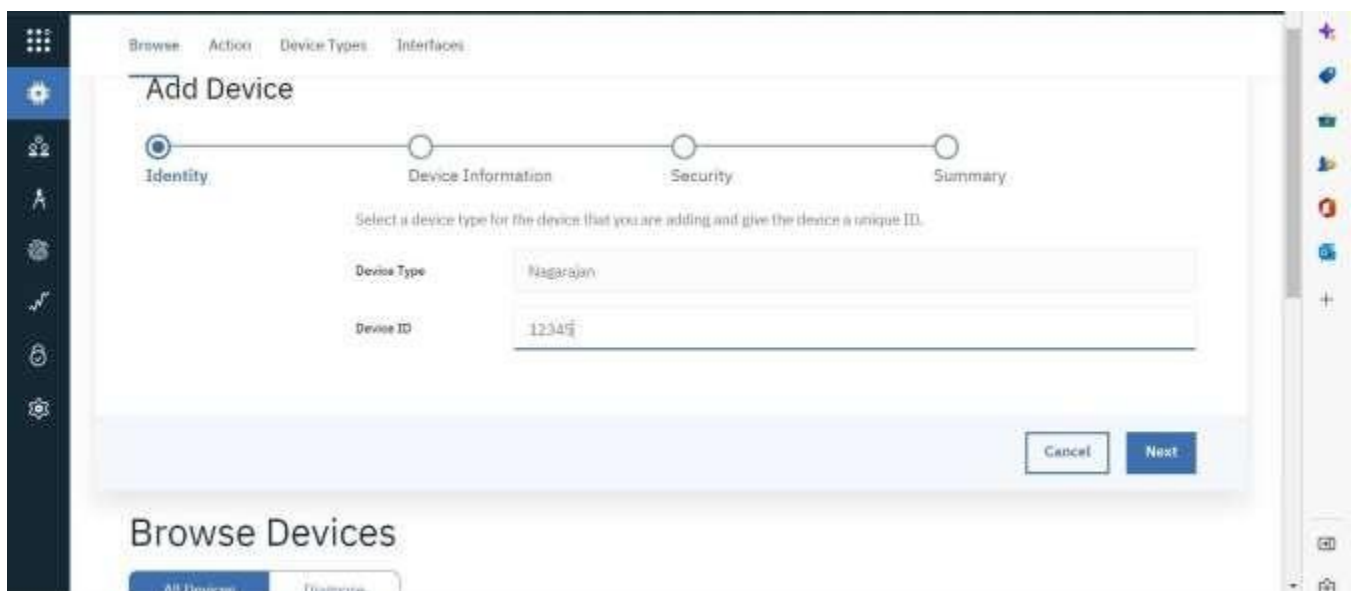
Serial Number	<input type="text" value="Enter Serial Number"/>	Manufacturer	<input type="text" value="Enter Manufacturer"/>
Model	<input type="text" value="Enter Model"/>	Device Class	<input type="text" value="Enter Device Class"/>
Description	<input type="text" value="Enter Description"/>	Firmware Version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

- Click on Register Device.



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



- Click on Next

The screenshot shows the 'Add Device' form with the 'Device Information' step selected. The form includes a progress bar at the top with four steps: Identity, Device Information (current), Security, and Summary. Below the progress bar, a message states: 'You can modify the default device information and enter more information about the device for identification purposes:'. The form contains two columns of input fields. The left column has fields for 'Serial Number', 'Model', 'Description', and 'Hardware Version'. The right column has fields for 'Manufacturer', 'Device Class', 'Firmware Version', and 'Descriptive Location'. Each field has a placeholder text 'Enter [field name]'. At the bottom left, there is a button labeled 'Add Metadata' with a plus icon.

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	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 +

- Click on Next

The screenshot shows the 'Add Device' form with the 'Security' step selected. The progress bar at the top shows four steps: Identity, Device Information, Security (current), and Summary. The main content area is titled 'There are two options for selecting a device authentication token.' and is divided into two sections. The left section 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 section 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 these sections is an input field labeled 'Authentication Token' with the placeholder text 'Enter an optional token' and a help icon. At the bottom, there is a note: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and a statement: 'Authentication tokens are encrypted before we store them.'

Browse Action Device Types Interfaces

Identity Device Information Security Summary

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

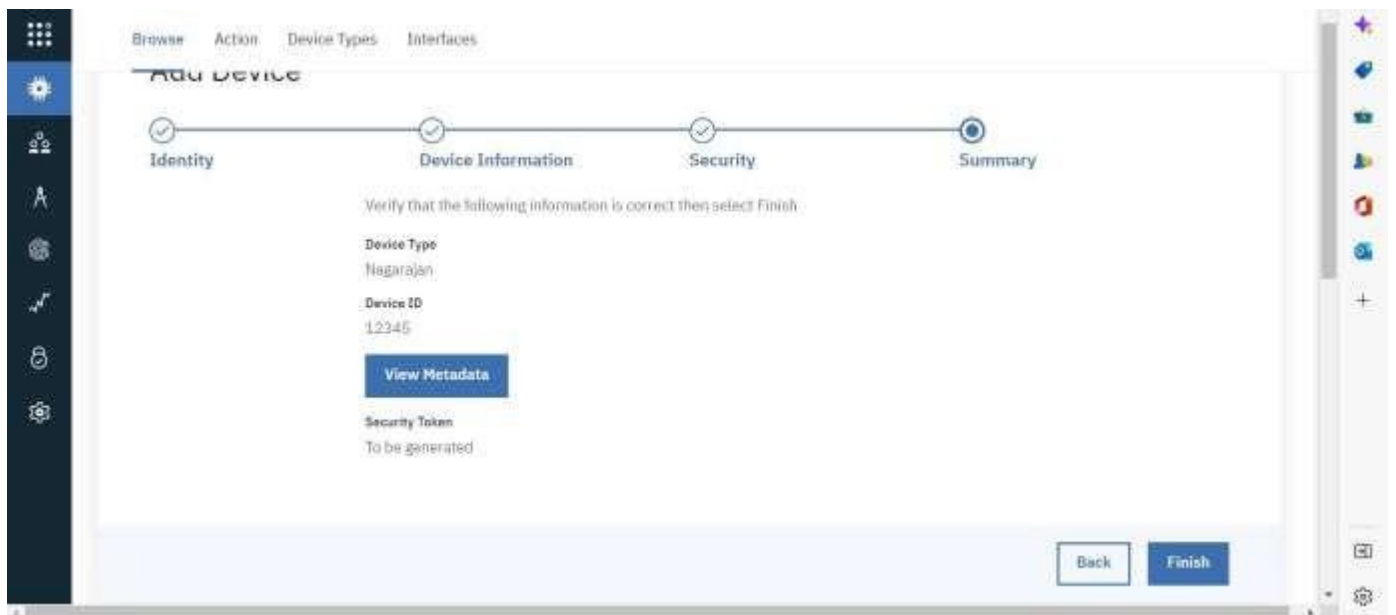
Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix lowercase and uppercase letters, numbers, and symbols, which can include hyphens, underscores, and periods. Do not use repeated characters, dictionary words, user names, or other predefined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

Authentication Token Enter an optional token ⓘ

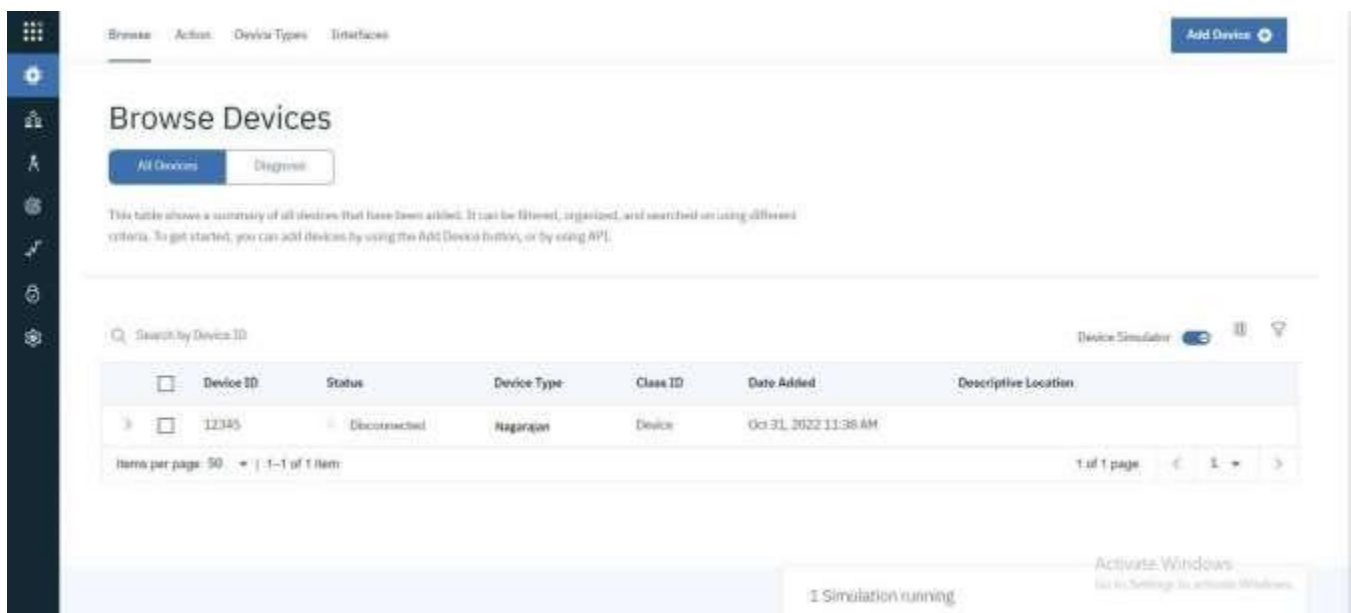
Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.

Authentication tokens are encrypted before we store them.

- Click on Finish



- Device is created



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

[illegible]

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

[illegible]

- 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:

```
python x.py --default --on --url --apikey
[600 0.3.0 20170124] on linux2
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/Downloads/ibmbluemix.py =====
2022-10-29 07:28:27.988 [ibm41 device client] INFO: Connected successfully: d1yqtl4-watson-ibmdevice
SensorData Invalid
Published Temperature = 28 C Humidity = 58 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 58 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 58 % to IBM Watson
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```

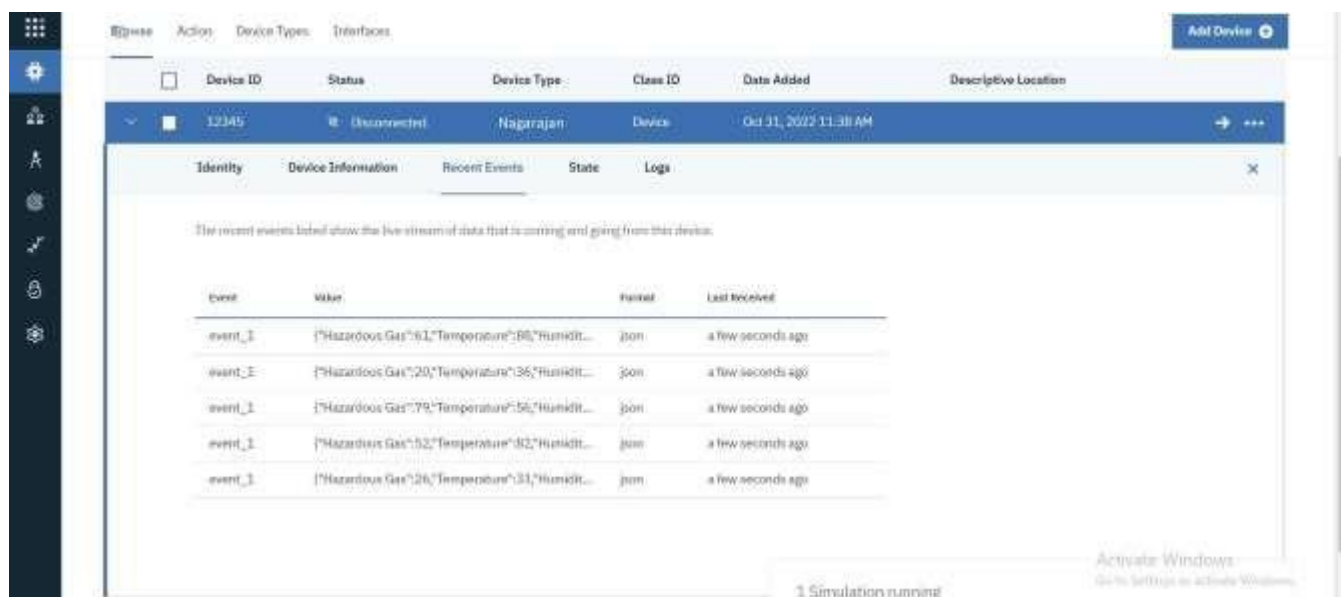
Step-3: checking your data sent on IBM Bluemix:

- 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.

The screenshot shows the IBM Watson IoT Platform interface. The main heading is 'Browse Devices'. Below it, there are buttons for 'Add Devices' and 'Diagnose'. A message states: '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.' Below this is a search bar labeled 'Search by Device ID'. To the right of the search bar is a 'Device Simulator' toggle, which is currently turned on. The main table has the following columns: Device ID, Status, Device Type, Class ID, Date Added, and Descriptive Location. There is one row in the table with the following data: Device ID 22045, Status Disconnected, Device Type Nagarajan, Class ID Device, Date Added Oct 31, 2022 11:38 AM, and Descriptive Location. At the bottom of the table, it says 'Items per page: 50' and '1 of 1 page'. In the bottom right corner, there is a notification that says '1 Simulation running'.

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
22045	Disconnected	Nagarajan	Device	Oct 31, 2022 11:38 AM	

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



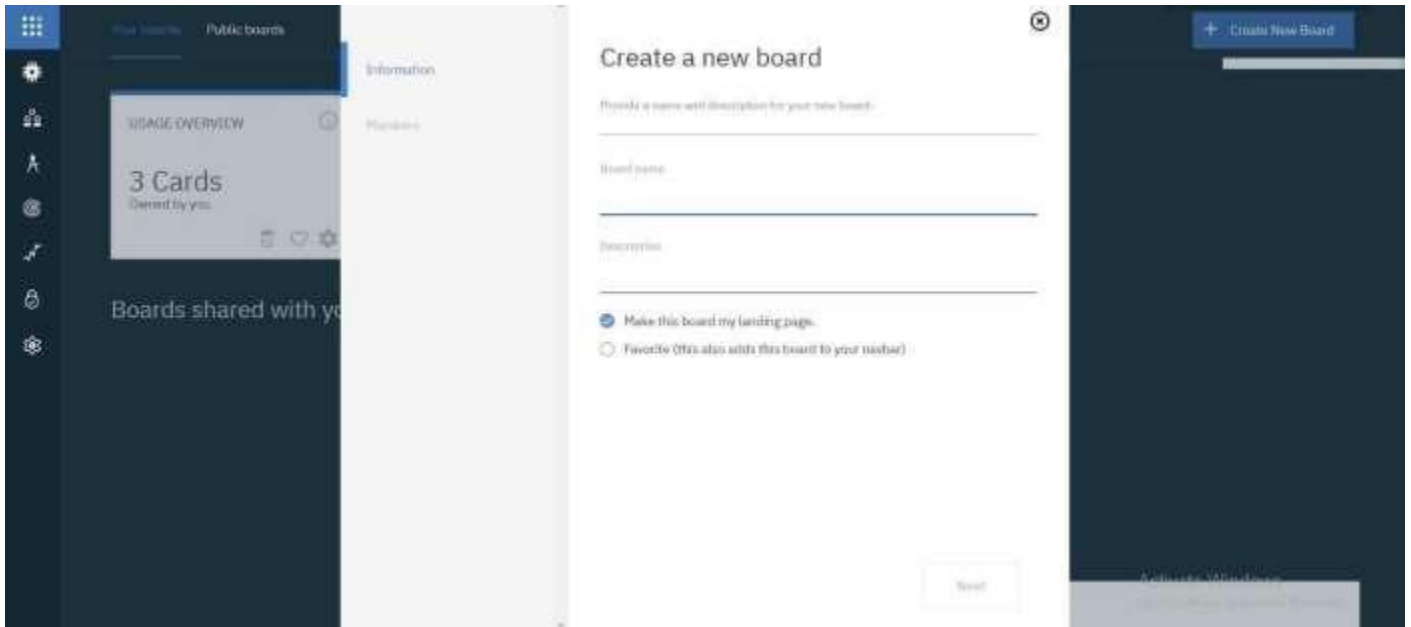
Step-4: Creating boards and cards for visualization of data:

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

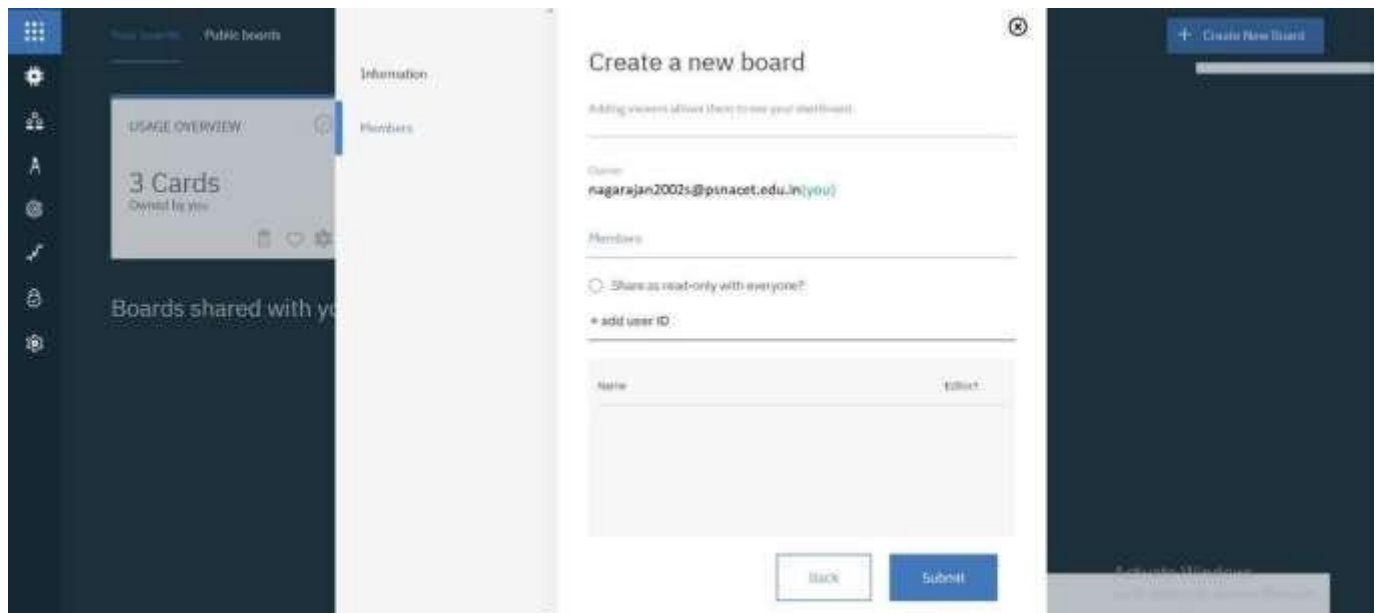


- Click on Create a new board to create a board .

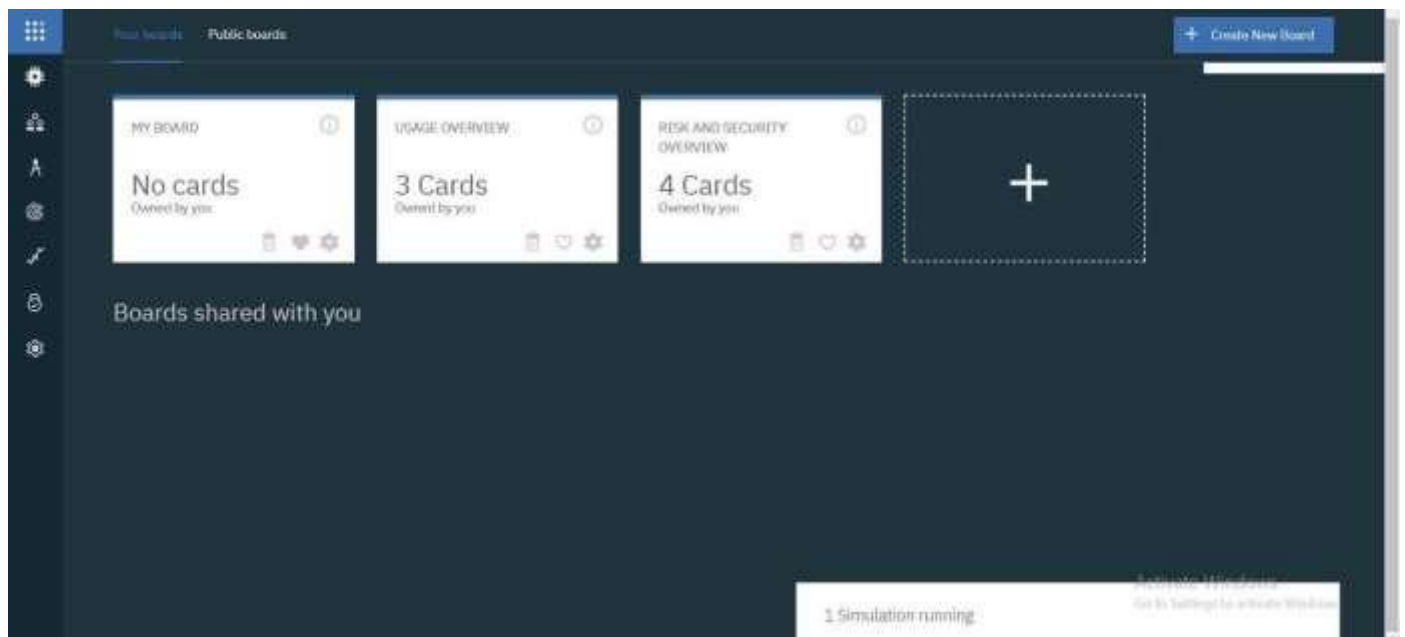
The given below window appears give a name and description to your board as shown in the window below.



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



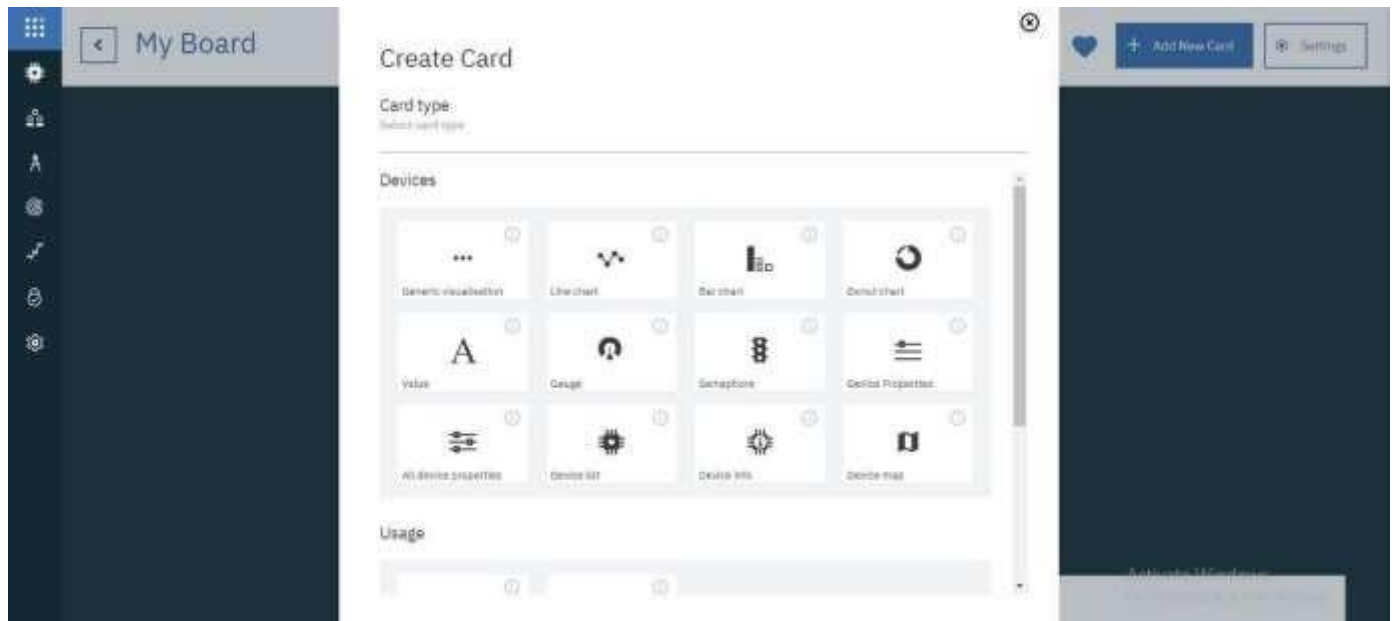
- Then double click on your boards name which you have created.



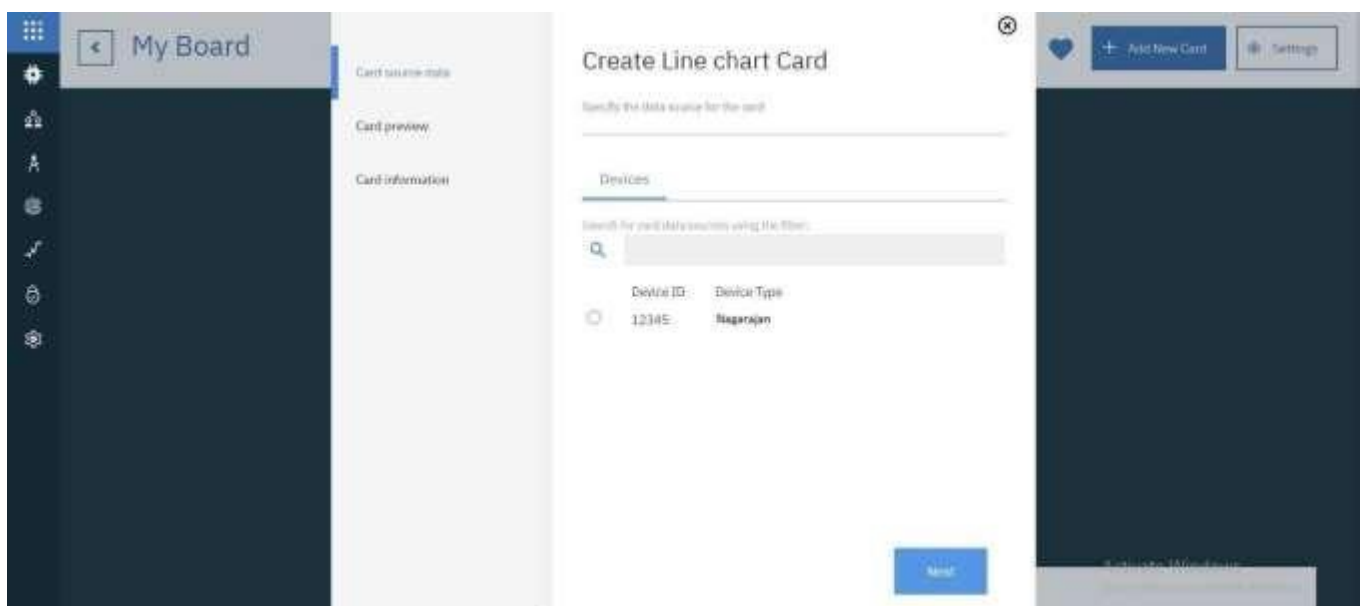
- Click on Add New Card



- 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

The screenshot shows the 'Create Line chart Card' interface. On the left, a sidebar titled 'Temp & Hum' contains a list of items: 'Card source data' (12345), 'Card preview', and 'Card information'. The main area is titled 'Create Line chart Card' and has a 'Select data set' section. Under 'Temperature', the 'Event' is set to 'event_1', the 'Property' is 'Temperature', and the 'Name' is 'Temperature'. The 'Type' is set to 'Number' (selected from a dropdown menu that also includes 'Text'). The 'Unit' is set to '100'. At the bottom, there are 'Back' and 'Next' buttons.

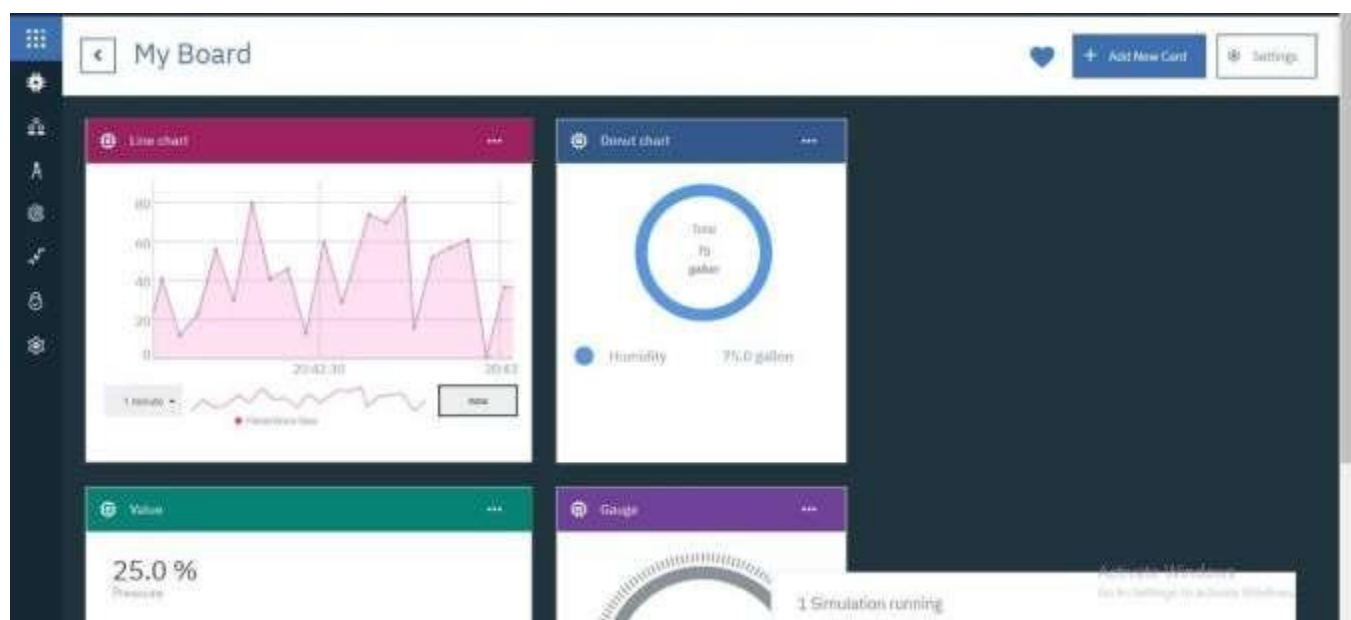
- Then select the size of the graph and color of the graph board you want and click next

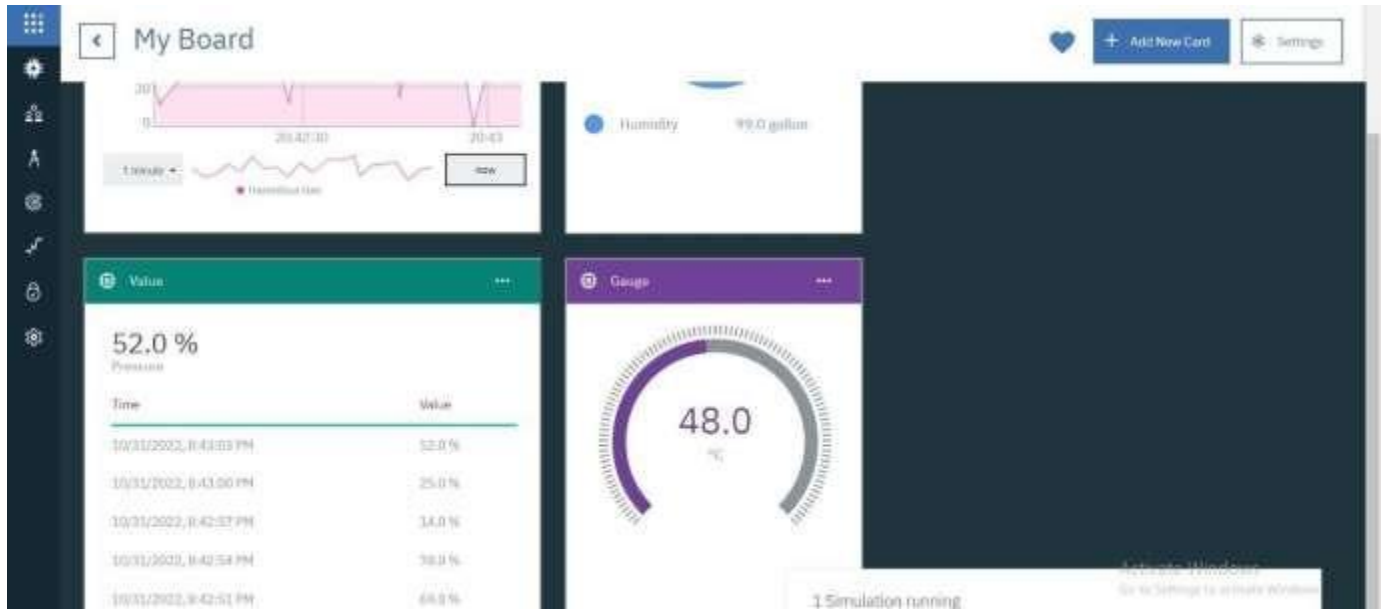
The screenshot shows the 'Create Line chart Card' interface. On the left, a sidebar titled 'Temp & Hum' contains a list of items: 'Card source data' (12345), 'Card preview', and 'Card information'. The main area is titled 'Create Line chart Card' and has a 'Select size and description of the card' section. The 'Title' is set to 'Line chart'. Below the title, there are five color swatches: purple, pink, green, blue, and teal. A description below the swatches reads: 'A line chart to display time series information with historic and live data.' At the bottom, there are 'Back' and 'Submit' buttons.

➤ 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.