

Smart Home Automation

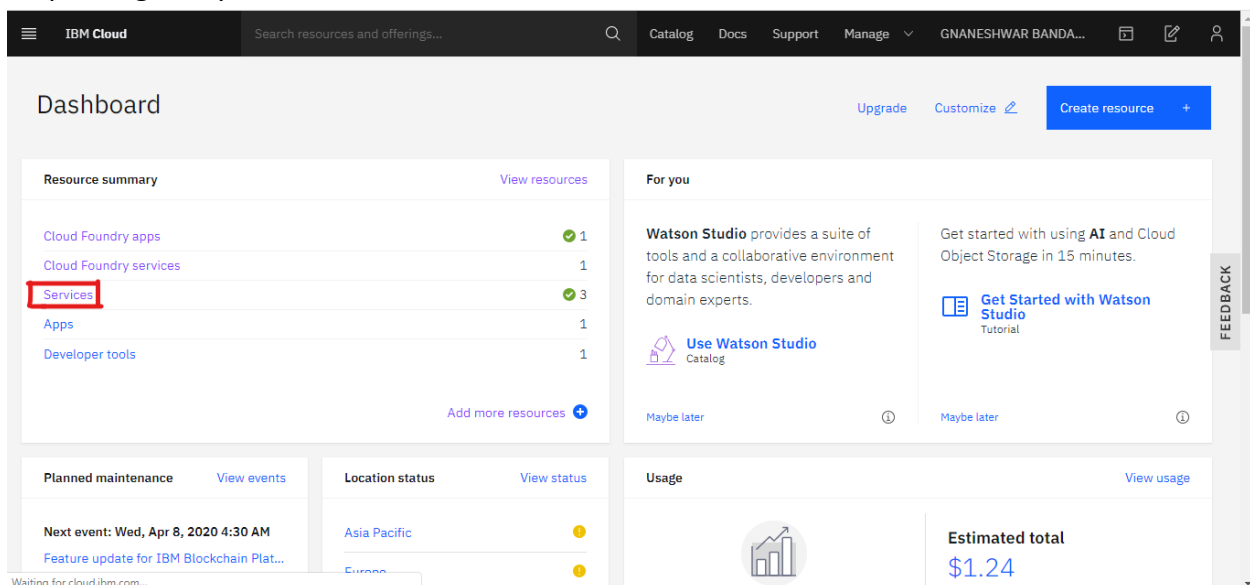
Brief: This tutorial will guide you in developing the smart home automation project using node-red and IBM IOT Platform.

Activities:

1. Check whether IOT Device is receiving the data from IOT simulator in IBM Watson IoT platform
2. Configure Node-red to get Data by installing Required nodes
3. Create the Web UI to visualize the indoor weather parameters and control the lights

TASK 1: Connecting device to cloud to see the data in the cards section

Step 1: Login to your IBM cloud account and click on services.



Step 2: In services section click on the IoT platform you have created

IBM Cloud				
Search resources and offerings...				
Catalog Docs Support Manage GANESHWAR BANDA...				
Collapse all Expand all				
Name	Group	Location	Status	Tags
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...
Devices (0)				
VPC infrastructure (0)				
Clusters (0)				
Cloud Foundry apps (1)				
Cloud Foundry services (1)				
Services (3)				
Continuous Delivery	Default	Dallas	Active	—
GNANESHWAR	Default	London	Active	—
node-red-seldz-cloudant-1584439348218	Default	Chennai 01	Active	—
Storage (0)				
Network (0)				

Step 3: In IoT platform service tab click on Launch to launch the IoT platform service

IBM Cloud

Search resources and offerings...

Catalog Docs Support Manage GANESHWAR BANDA...

Manage

Plan

Connections

Resource list /

GNANESHWAR

1.09% Used | 197.82 Megabyte exchanged available

Details

Resource group: Default

Location: London

Add tags

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

Production

Step 4: Click on the Device you have created

Step 5: You can see your information here

The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons. The main content area displays a table of devices. The first device, ID 12345, is highlighted. Below the table, a modal window titled 'Identity' is open, showing details for device 12345.

Device ID	Status	Device Type	Class ID	Date Added
12345	Disconnected	NodeMCU	Device	Mar 17, 2020 12:41 PM
54321	Disconnected	Nodemcu2	Device	Mar 17, 2020 1:00 PM

Device Information for ID 12345:

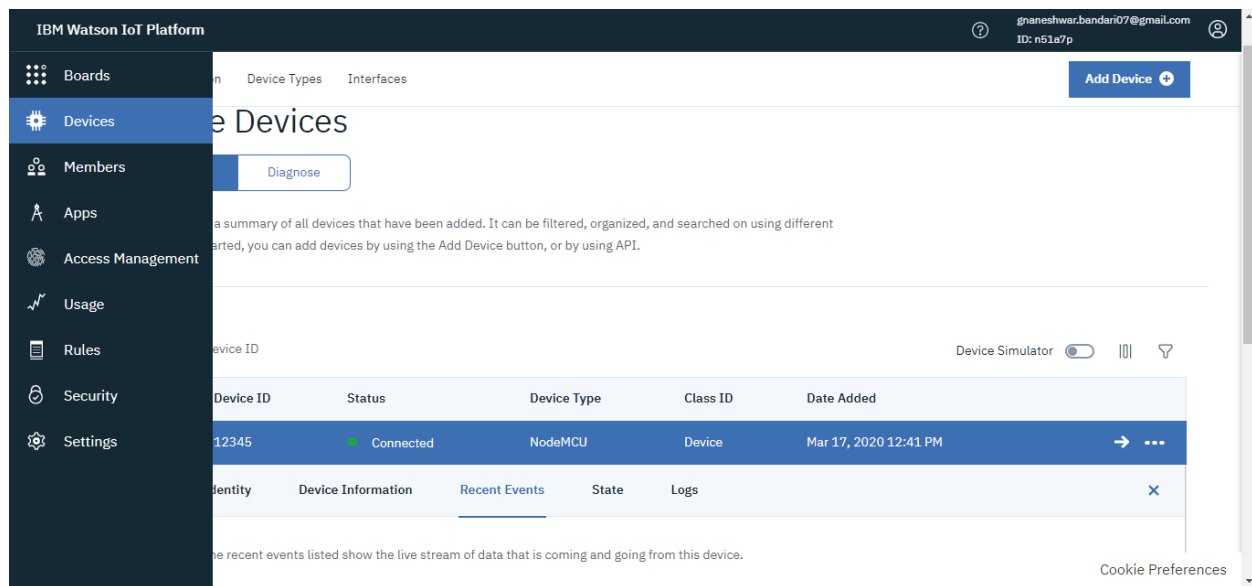
- Device ID: 12345
- Device Type: NodeMCU
- Date Added: Mar 17, 2020 12:41 PM
- Added By: gnaneshwar.bandari07@gmail.com
- Connection Status: Disconnected
- Last Connected: Mar 20, 2020 2:44 PM
- Client Address: 183.82.100.18 Insecure
- Duration: a minute
- Data Transferred: 702 B

Step 6: Now connect your NodeMCU to your system, if your sensor data is uploading to cloud goto your cloud platform and check the recent events where data from NodeMCU is sent to IBM Cloud platform

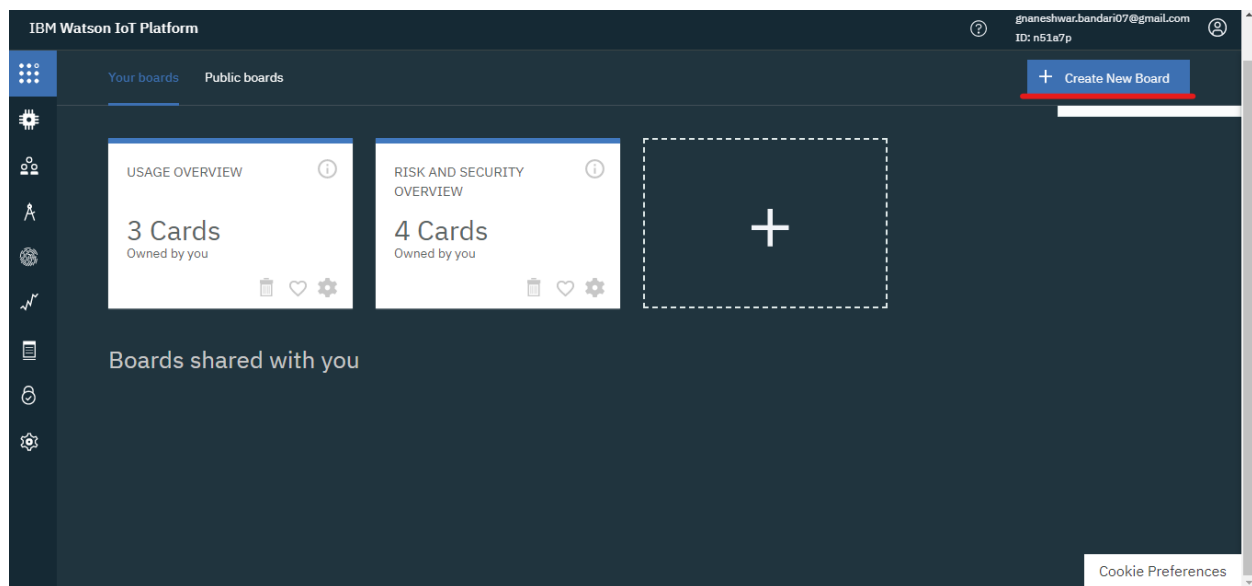
The screenshot shows the IBM Watson IoT Platform interface with the 'Recent Events' tab selected for device ID 12345. The 'Recent Events' tab is highlighted with a red box. Below the tab, a message states: 'The recent events listed show the live stream of data that is coming and going from this device.' A table displays the recent events.

Event	Value	Format	Last Received
Data	{"d":{"temperature":31.9,"humidity":50}}	json	a few seconds ago
Data	{"d":{"temperature":31.9,"humidity":48}}	json	a few seconds ago
Data	{"d":{"temperature":31.9,"humidity":48}}	json	a few seconds ago
Data	{"d":{"temperature":31.9,"humidity":48}}	json	a few seconds ago
Data	{"d":{"temperature":31.9,"humidity":48}}	json	a few seconds ago

Step 7: To see your data in graphical representation in cloud, click on boards in the left menu



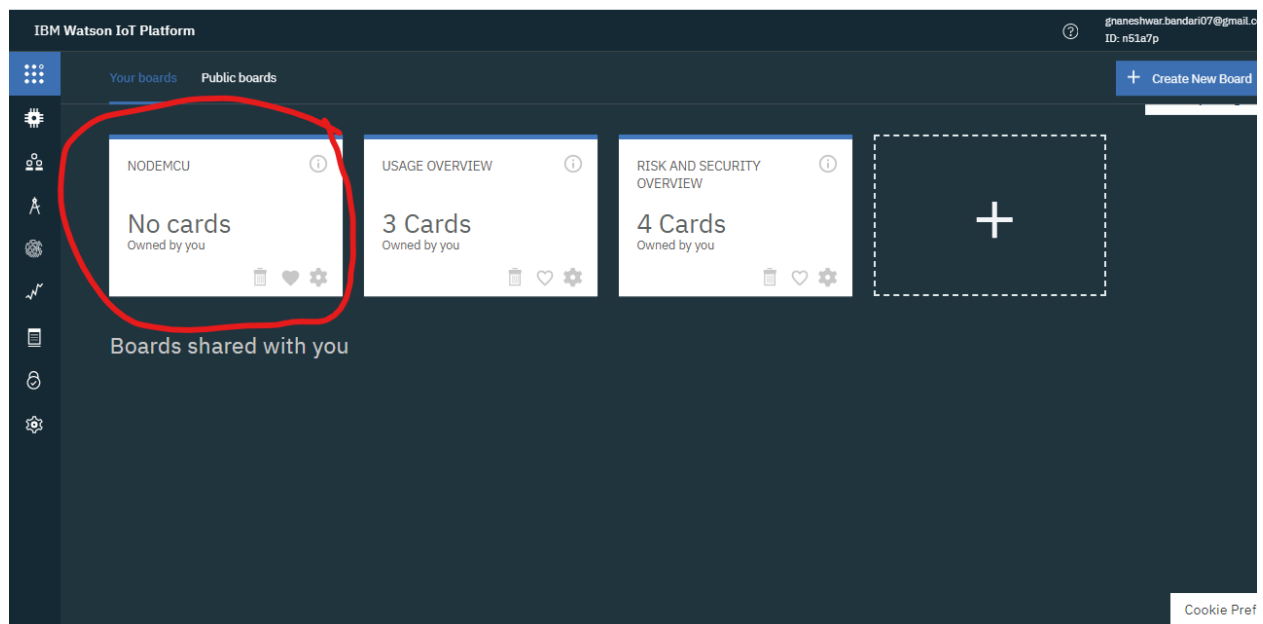
Step 8: Click on create new board which is on the top-right corner of the platform



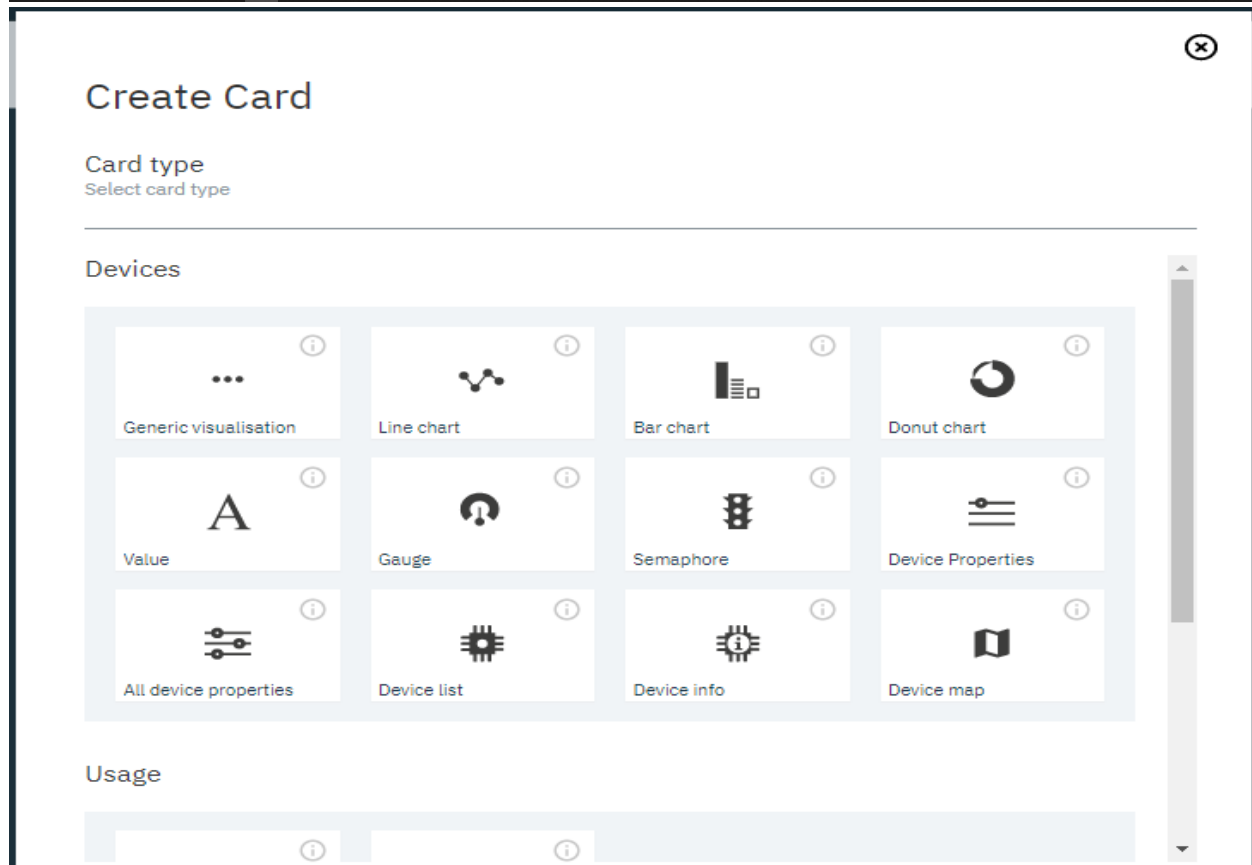
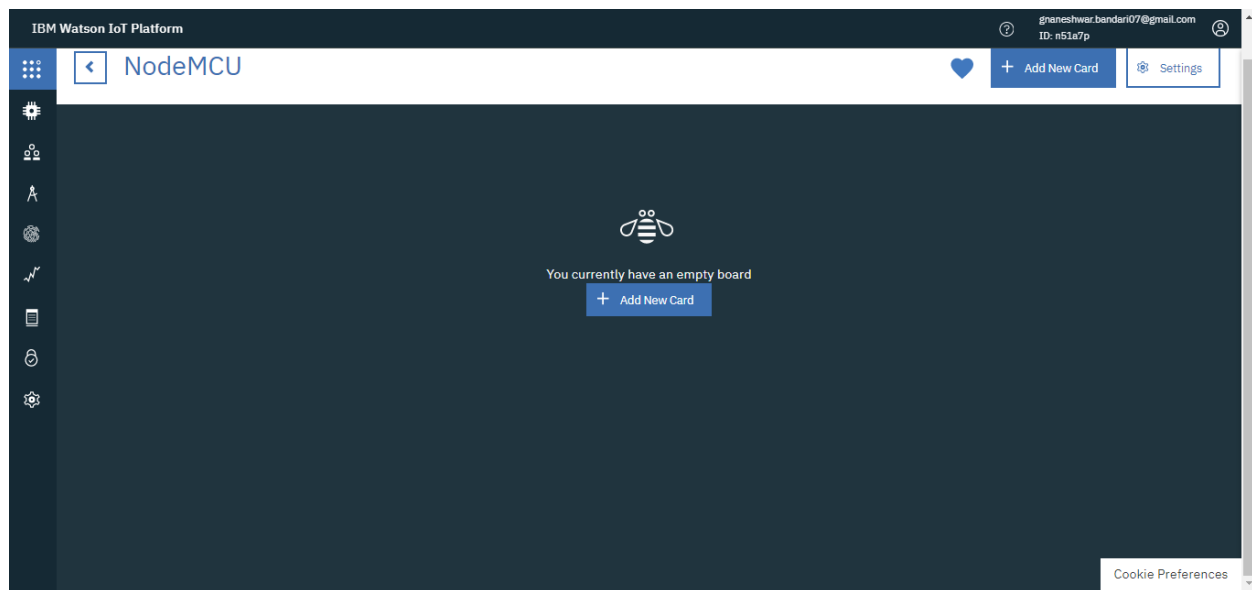
Step 9: In create new board, give board name and click on next and submit the board.

The screenshot shows a 'Create a new board' form. On the left is a sidebar with 'Information' (selected) and 'Members'. The main area has a title 'Create a new board' and a subtext 'Provide a name and description for your new board.' Below this are two input fields: 'Board name' with the value 'NodeMCU' and 'Description' which is empty. At the bottom are two radio button options: 'Make this board my landing page.' and 'Favorite (this also adds this board to your navbar)'. A blue 'Next' button is at the bottom right.

Step 10: Your board has been created and open the board



Step 11: Here you can add multiple cards with your required design specifications such as line, bar graph etc.



Step 12: Select a card type, then a pop-up appears where you need to select your device. After selecting your device click on Next.

Card source data

12345

Card preview

Card information

Create Line chart Card

Specify the data source for the card

Devices

Search for card data sources using the filter:

☒

Device ID

12345

☐

Device Type

NodeMCU

54321

Nodemcu2

Next

Step 13: You need to connect a data set to view the incoming data on the graph. Here you need to connect your data sets by selecting data, property, Name, type, min and max value. After selecting click on NEXT to continue.

Card source data

12345

Card preview

Card information

Create Line chart Card

Connect data set

temperature

Event

Data

Property

temperature

Name

temperature

Type

Number

Unit

Min

0

Max

100

Back

Next

Step 14: You can select different sizes for your chart or graph here then click on Next and submit.

The screenshot shows the 'Edit Line chart Card' interface. On the left is a sidebar with three sections: 'Card source data' (containing the value '12345'), 'Card preview' (highlighted with a blue bar), and 'Card information'. The main area is titled 'Edit Line chart Card' with a subtitle 'Select the card size and specify additional information'. Below the title is a row of five icons: a line chart (selected), a bar chart, a gauge, a text 'A', and a person icon. Underneath these icons are five tabs: 'Settings', 'S', 'M', 'L' (selected), and 'XL'. The 'L' tab displays a preview of a line chart. The chart has a y-axis from 0 to 40 and an x-axis with timestamps from 15:31 to 15:35. A legend at the bottom shows 'humidity' (selected) and 'temperature'. A '5 minutes' interval is set, and a 'now' button is present. At the bottom right are 'Back' and 'Next' buttons.

Card source data

12345

Card preview

Card information

Edit Line chart Card

Select the card size and specify additional information

Line chart icons: Line chart (selected), Bar chart, Gauge, Text A, Person icon

Settings S M **L** XL

Line chart preview:

Y-axis: 0, 10, 20, 30, 40

X-axis: 15:31, 15:32, 15:33, 15:34, 15:35

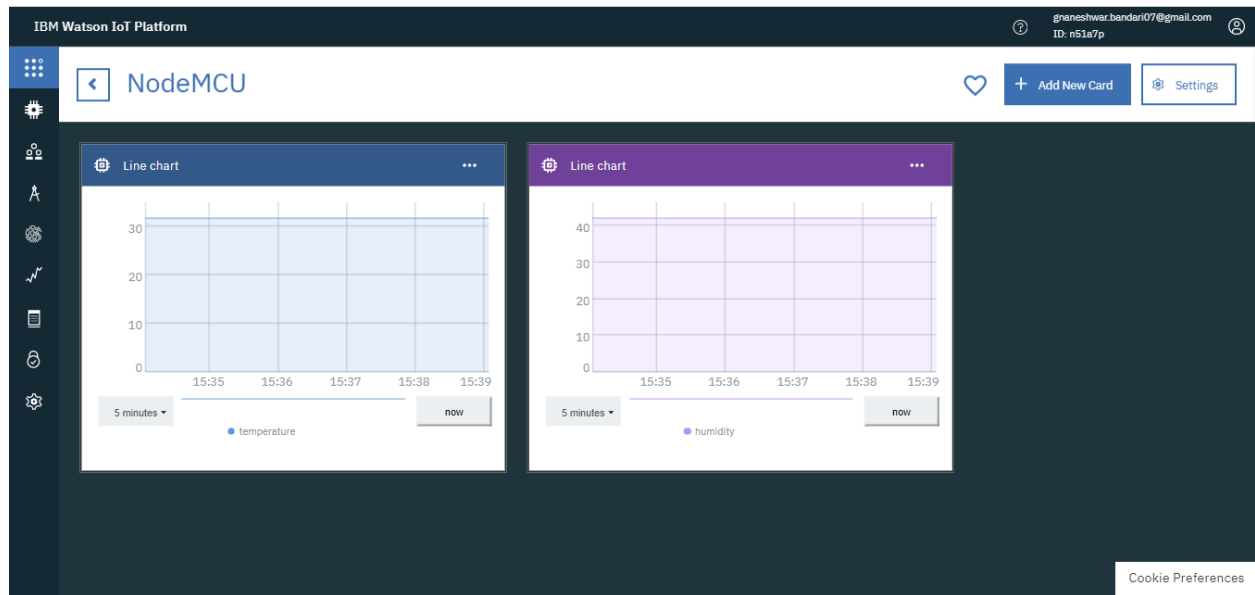
5 minutes

● humidity ● temperature

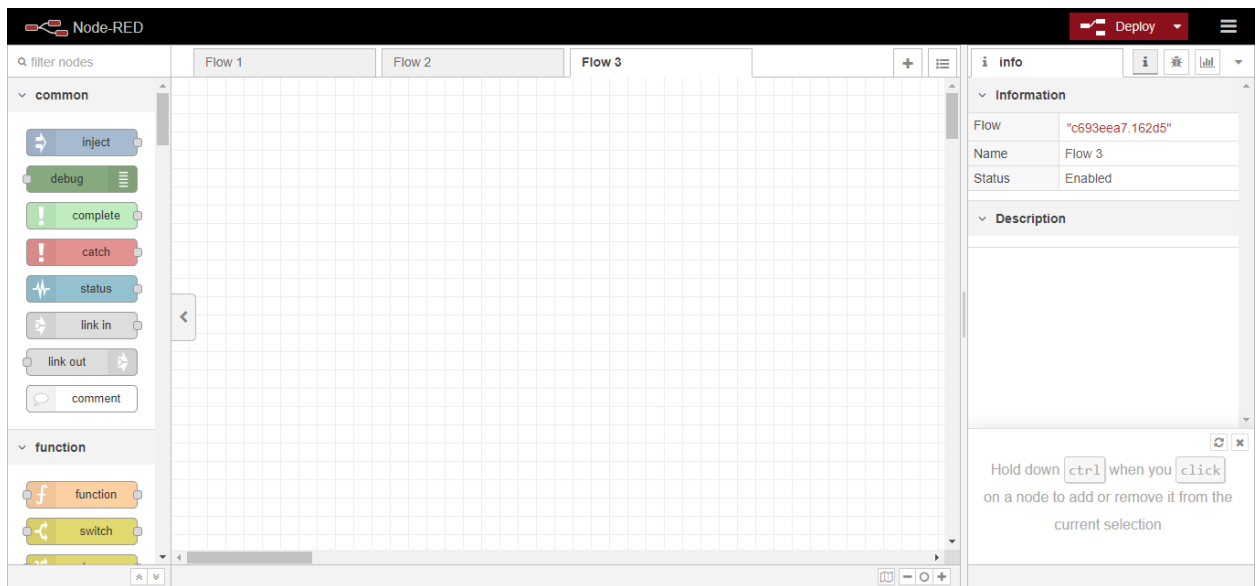
now

Back Next

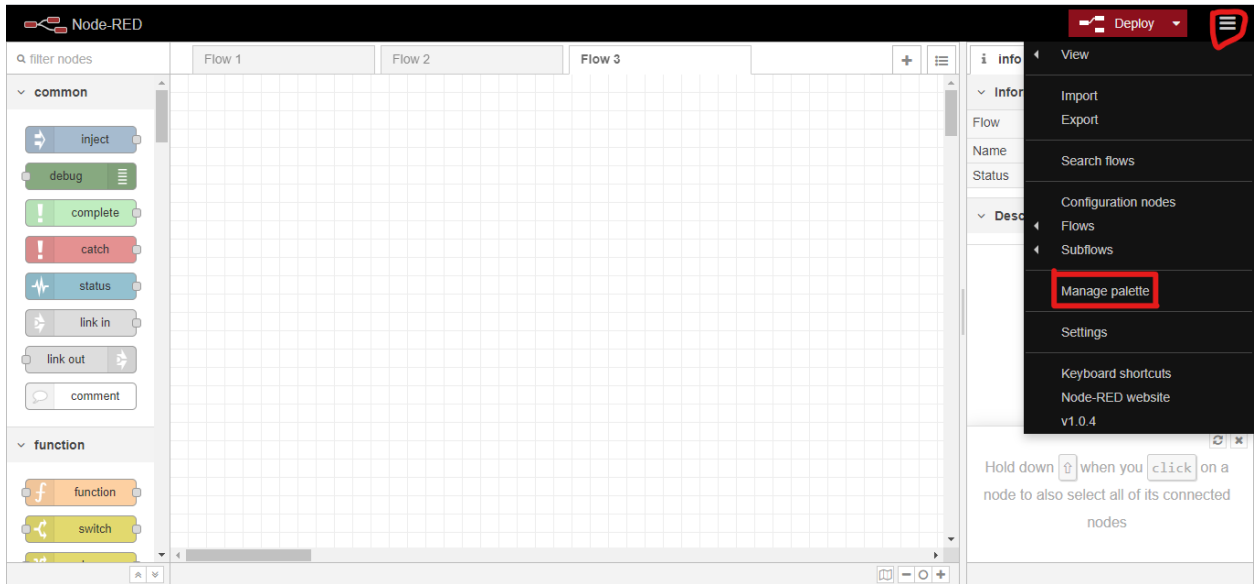
Step 15: Also create data set for humidity. Now you can see the graphs in the cards section.



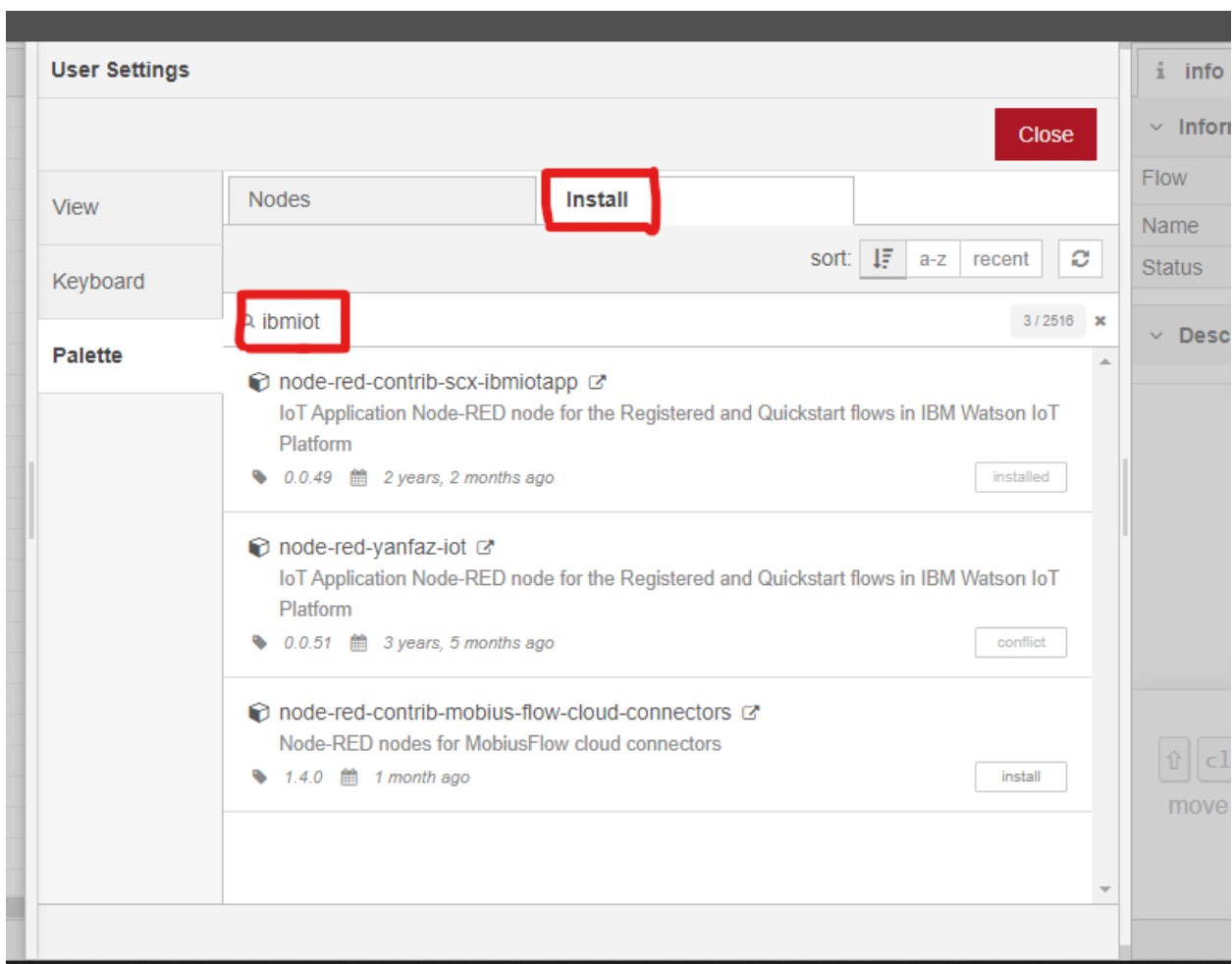
TASK 2: Creating a Node-red UI to view data in graphical form



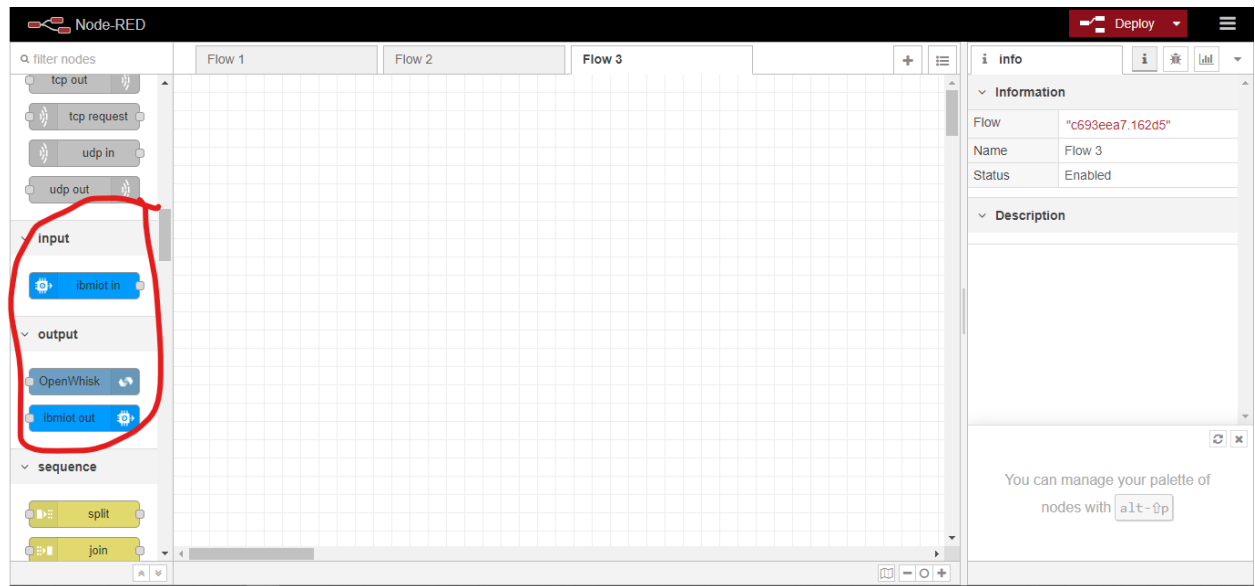
To install IBM nodes in Node-red flow editor click on manage palette in the menu option which is on the top-right of the screen.



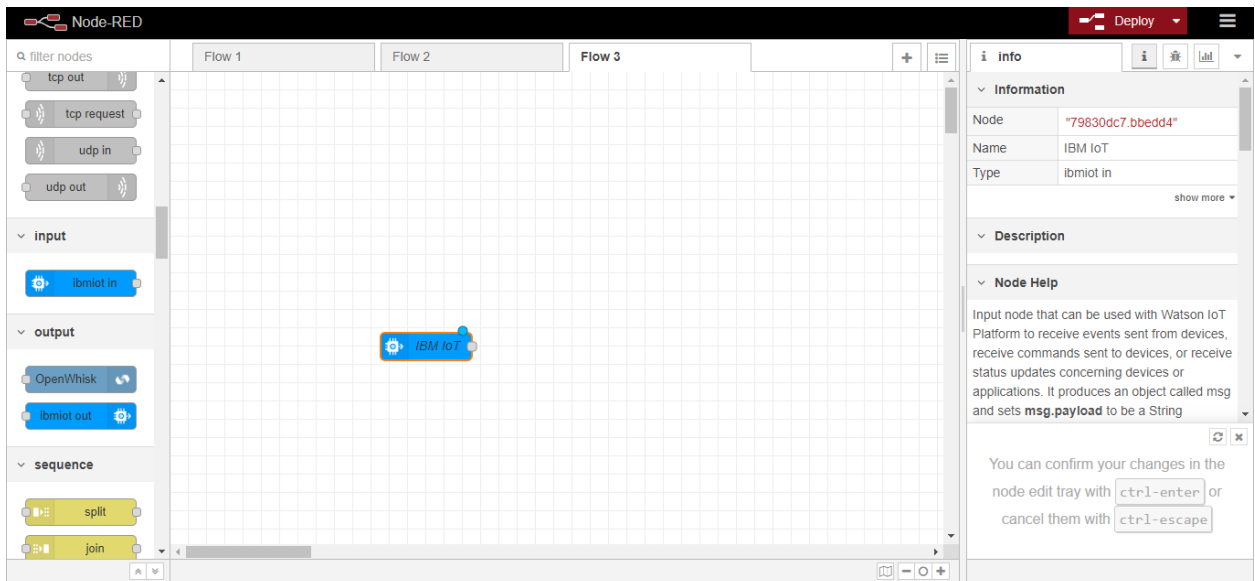
In install section search for ibmiot and install the ibm nodes to flow editor.



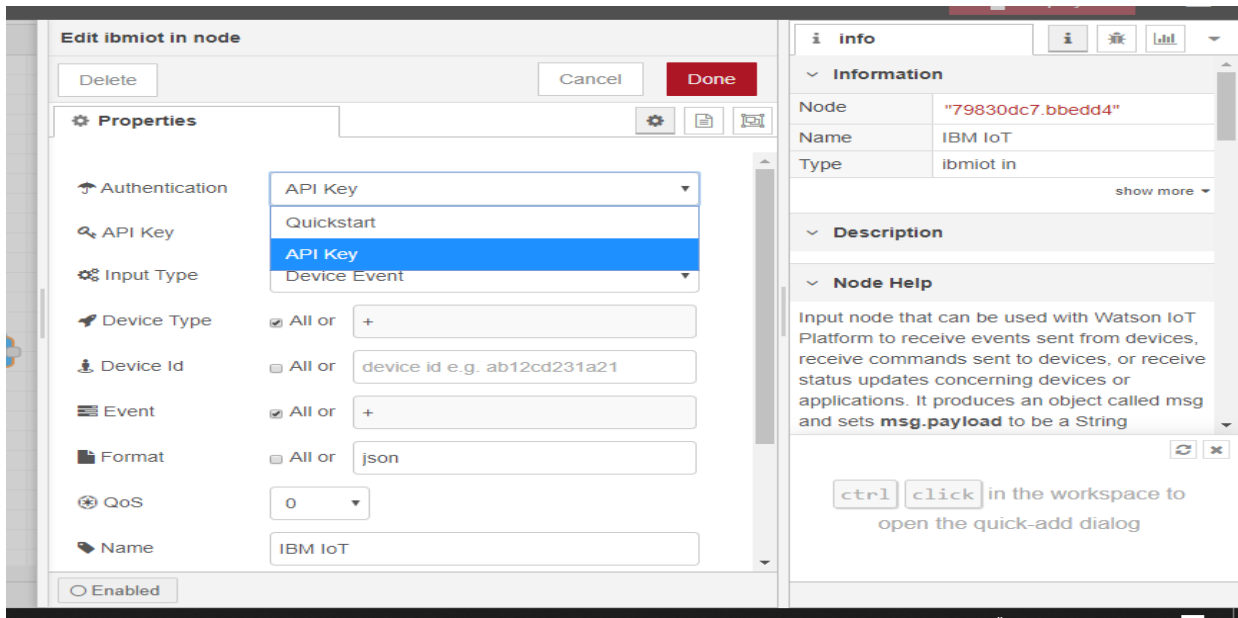
Search for IBM nodes in the filter nodes section



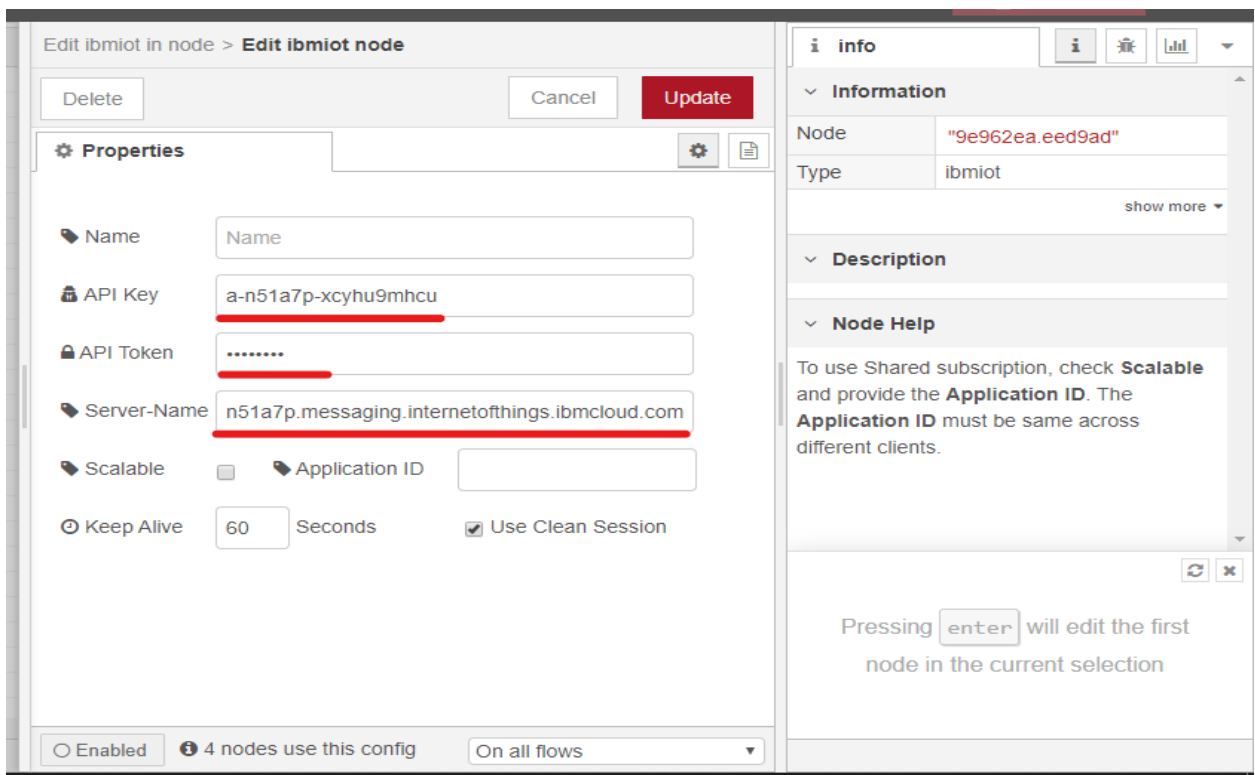
To Retrieve the data from the IBM IoT platform by using Node-RED IBM IoT Input node and double click on the IBM IoT input node



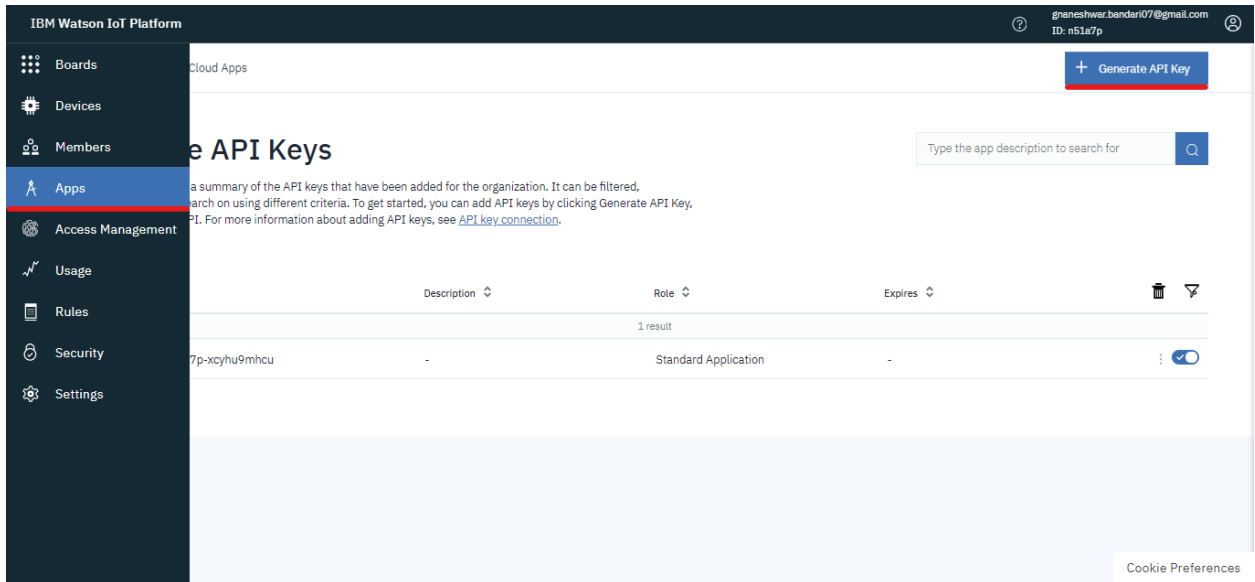
Select API Key from Authentication in properties.



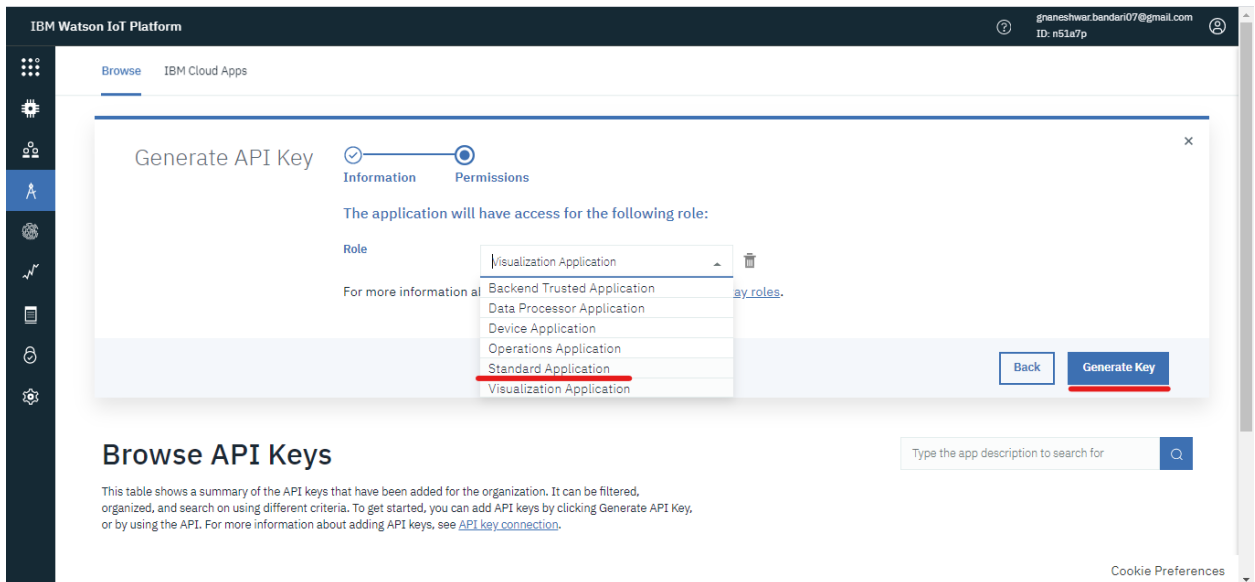
In API Key paste API Key, API Token and server name and update it



To generate API Key go to IBM IoT platform
In Apps Section -> Click on Generate API Key



Click Next for Information. In Permissions select Standard Application as Role and click on Generate API Key



Copy your API Key and Authentication token to note them in IBM input node.

**** API token is generated only once copy it to your notepad.**

Browse IBM Cloud Apps

The API key has been added.

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

Generated Details		API Key Information	
API Key	a-n51a7p-zho3knvp01	Description	-
Authentication Token	nn*ESL&BOs&cB-a8kt	Role	Standard Application
		Expires	Never

Make a note of the generated authentication token. Lost authentication tokens cannot be recovered. If you lose the token, you must reregister the API to generate a new token.

View API Key Add Another Close

Browse API Keys

Type the app description to search for

This table shows a summary of the API keys that have been added for the organization. It can be filtered.

Cookie Preferences

Also update your input type as event, Device type, Device ID, command and format in the properties section and click on Done

Edit ibmiot in node

Delete Cancel Done

Properties

Authentication API Key

API Key 9e962ea.eed9ad

Input Type Device Command

Device Type All or NodeMCU

Device Id All or 12345

Command All or Data

Format All or json

QoS 0

Name IBM IoT

Enabled

Info

Inform

Node

Name

Type

Describe

Node

Input node

Platform to

receive co

status upc

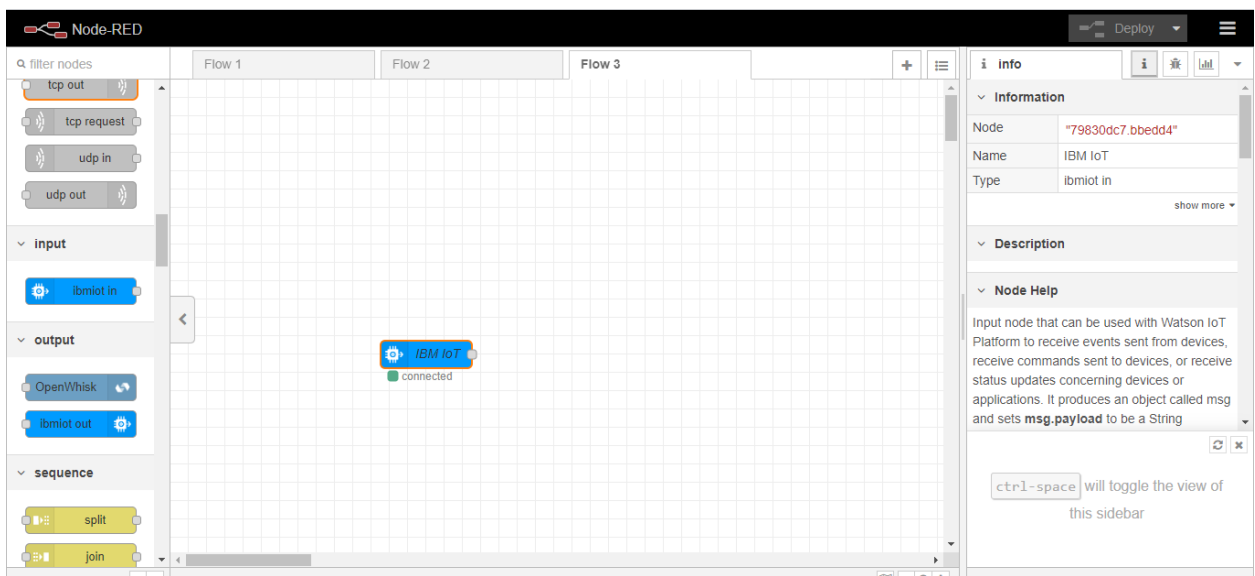
application

and sets r

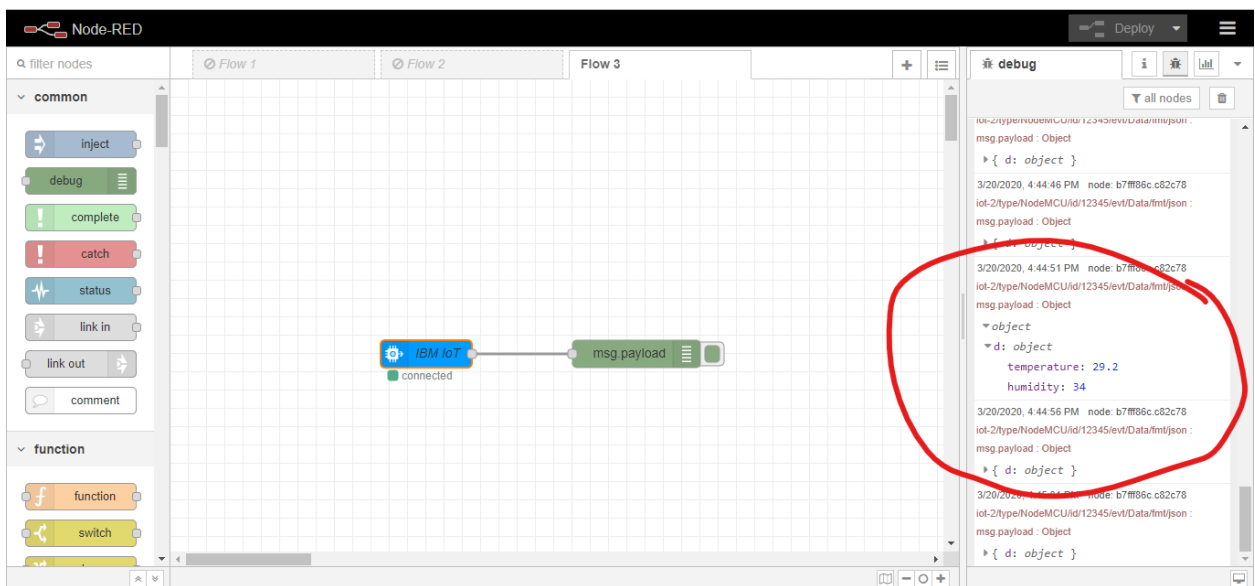
Import

into

Click on Deploy option to check the connection status. If the status is disconnected check for IBM IoT properties and try again.



Place the debug node in the flow editor and click on deploy to see the temperature and humidity value in the debug tab



Drag and Place the function node in the flow editor to separate the temperature and humidity value

Flow 2

IBM IoT
connected

Edit function node

Delete Cancel Done

Properties

Name: temperature

Function

```
1 msg.payload=msg.payload.d.temperature  
2 return msg;
```

Outputs: 1

Enabled

debug

all nodes

- 3/20/2020, 4:49:29 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:49:34 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:49:39 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:49:44 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:49:49 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }

Flow 1 Flow 2

IBM IoT
connected

Edit function node

Delete Cancel Done

Properties

Name: humidity

Function

```
1 msg.payload=msg.payload.d.humidity  
2 return msg;
```

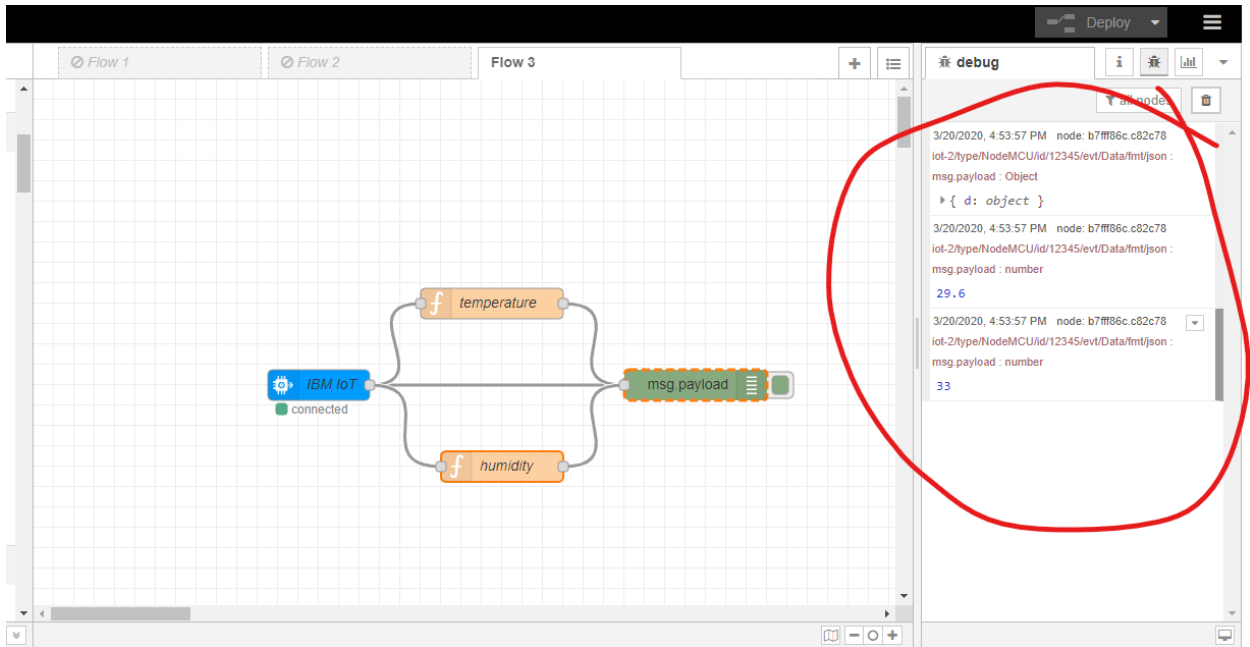
Outputs: 1

Enabled

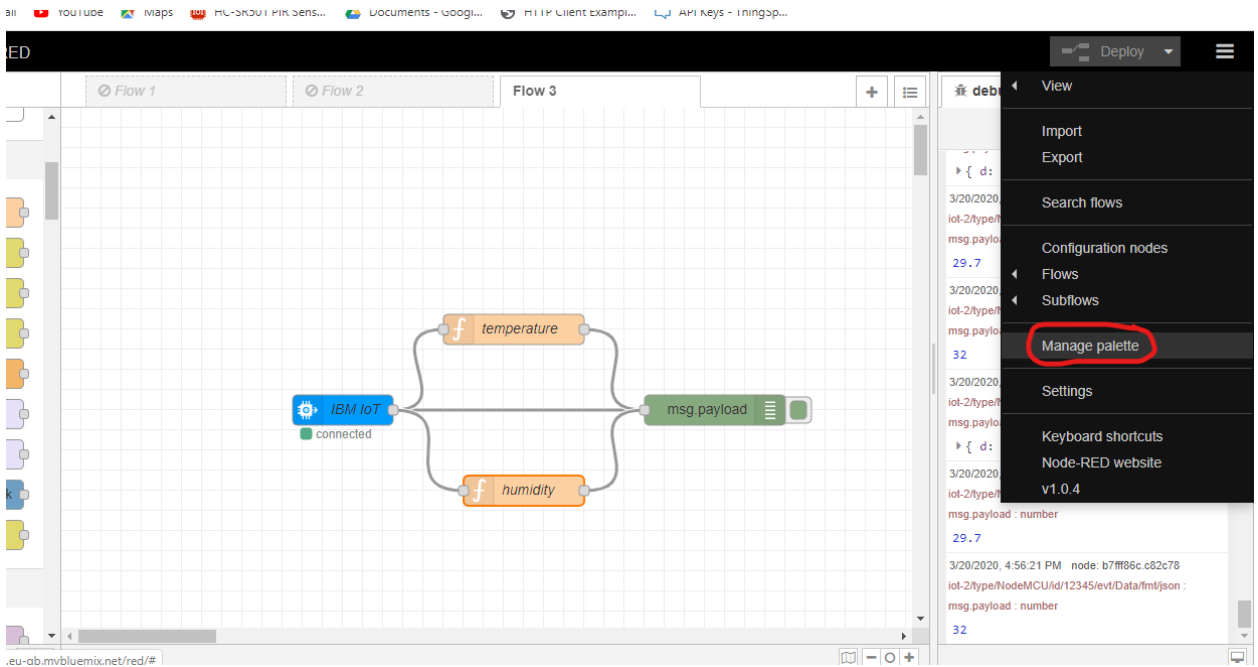
debug

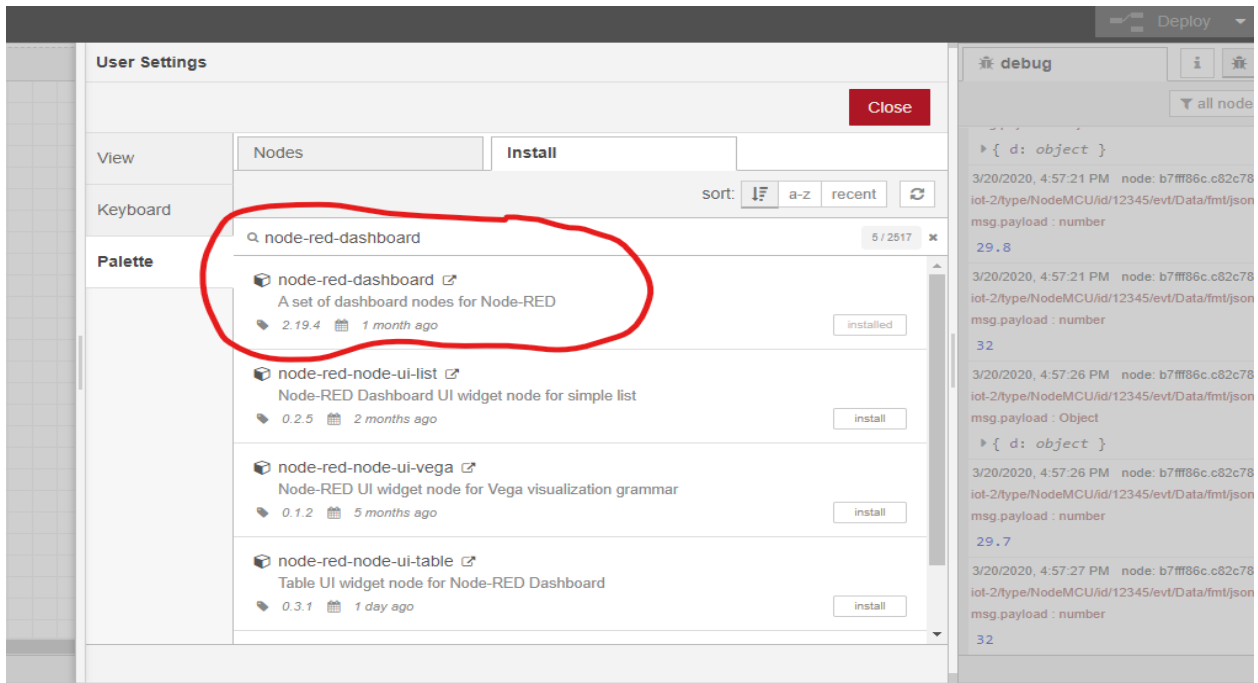
all nodes

- 3/20/2020, 4:52:15 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:52:20 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:52:25 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:52:30 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }
- 3/20/2020, 4:52:35 PM node: b7ff86c.c82c78
iot-2/type/NodeMCU/id/12345/evt/Data/fmt/json :
msg.payload : Object
{ d: object }

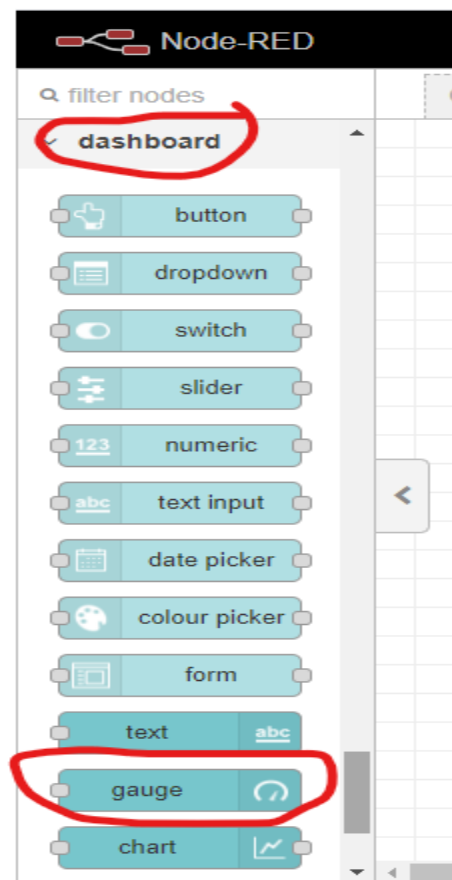


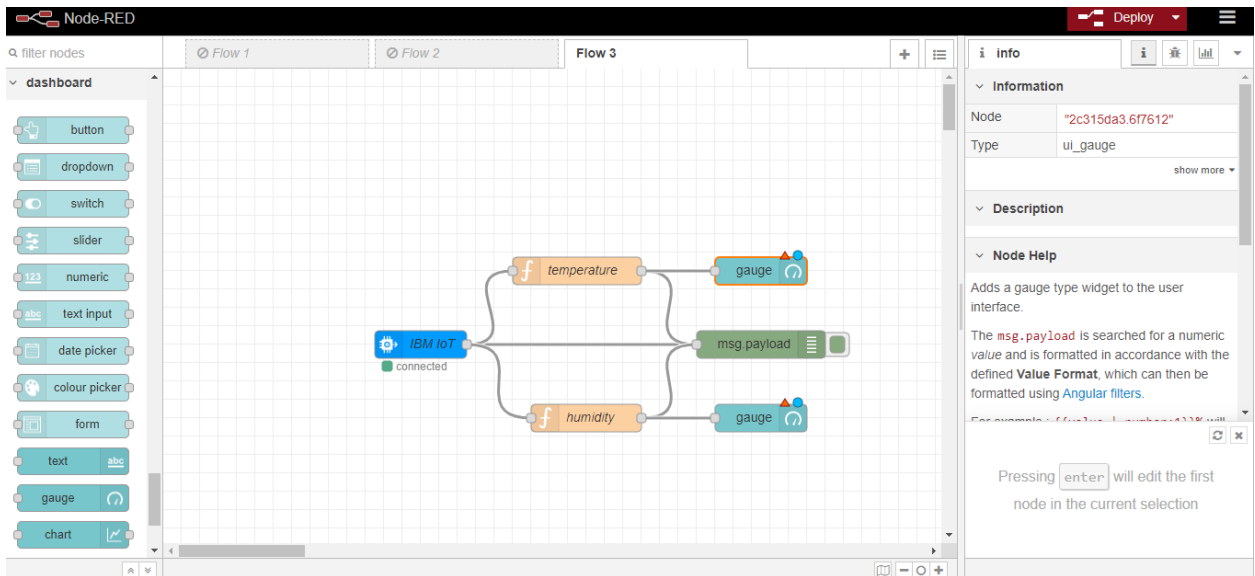
Humidity and temperature values appear separately.
Install the dashboard node from the manage pallet to create a UI to display temperature and humidity values in the Dashboard



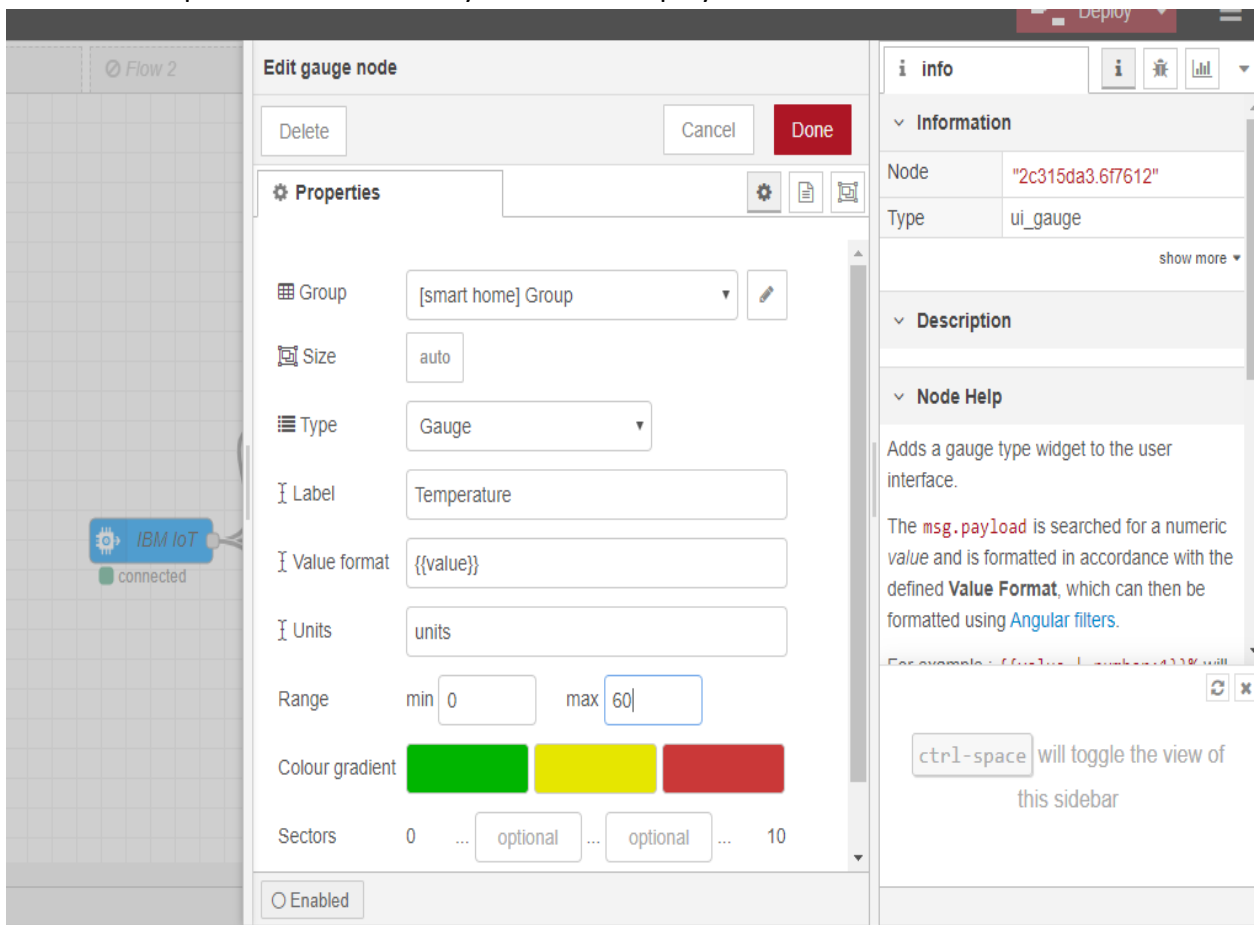


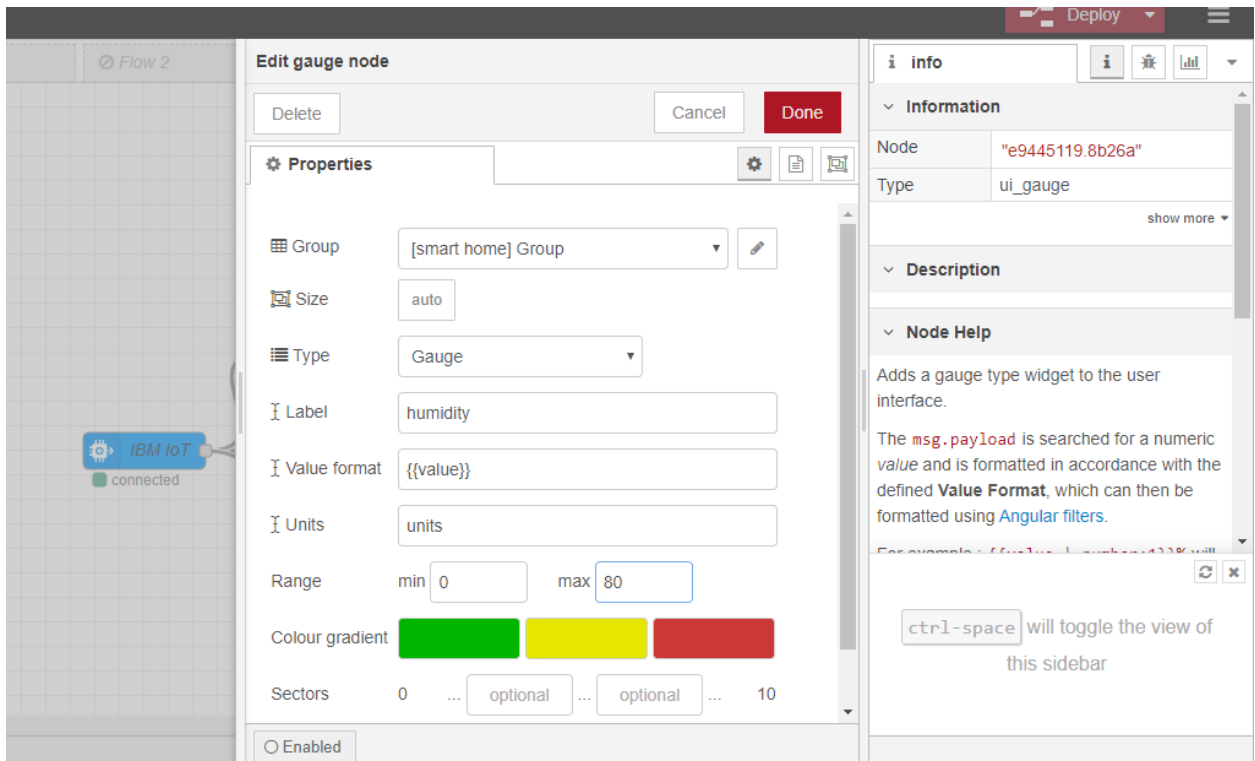
Select gauge function and these nodes to temperature and humidity functions



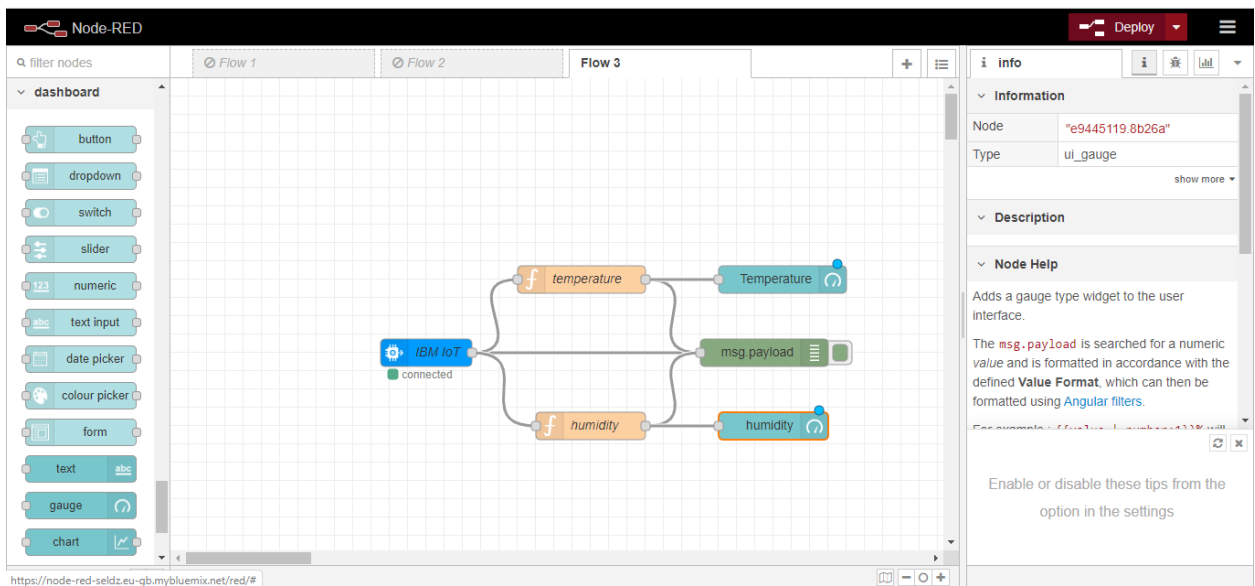


Edit both temperature and humidity nodes and deploy it.





After editing the two nodes, deploy it



Display the temperature and humidity value in the Dashboard by copying and pasting the URL of the NodeRed in the new tab

Apps Gmail YouTube Maps HC-SR501 PIR Sens... Documents - Googl... HTTP Client Exampl... API Keys - ThingSp...

Node-RED

filter nodes

Flow 1 Flow 2 Flow 3

dashboard

- button
- dropdown
- switch
- slider
- numeric
- text input
- date picker
- colour picker
- form
- text
- gauge
- chart

temperature

humidity

Temperature

humidity

msg.payload

IBM IoT

connected

info

Information

Flow "c693eea7.162d5"

Name Flow 3

Status Enabled

Description

You can remove the selected nodes or links with delete

← → ↻ http://127.0.0.1:1880/ui

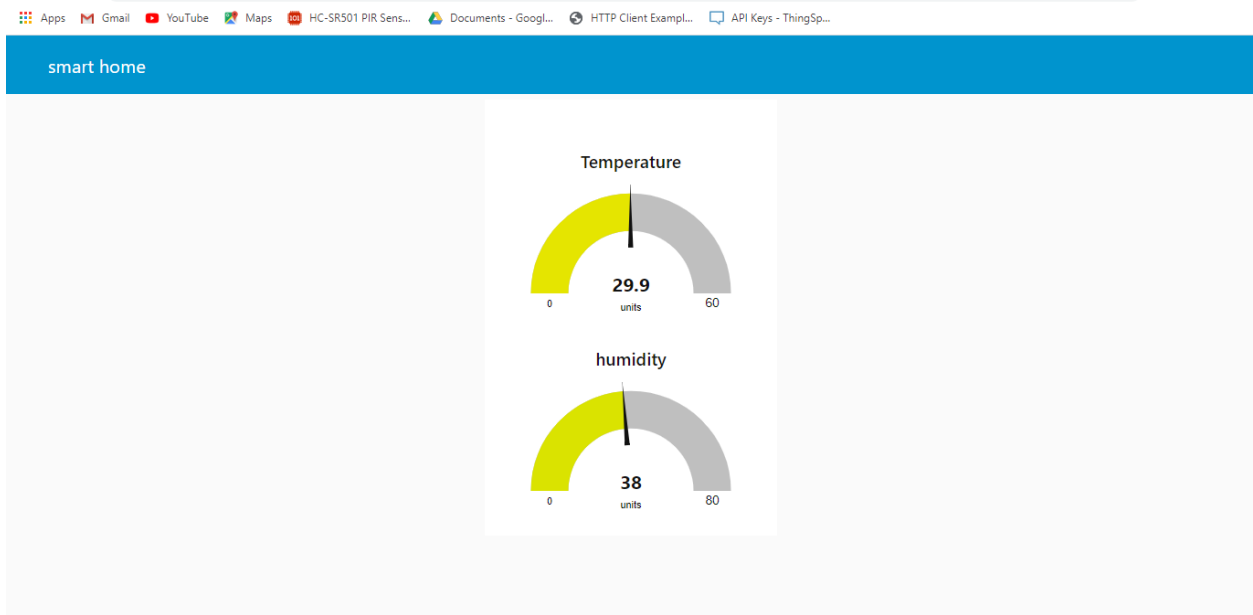
Apps Node-RED Dashboard - http://127.0.0.1:1880/ui

Q http://127.0.0.1:1880/ui - Google Search

Node-RED Dashboard

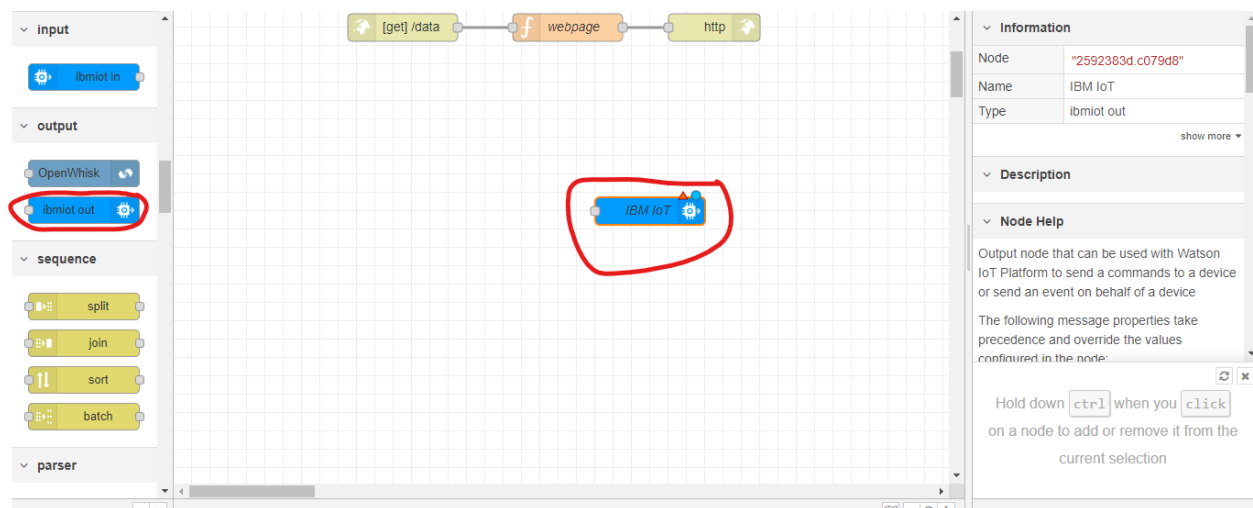
http://127.0.0.1:1880/ui/#!/0?socketid=gy9EV6cxkcL6PQxkAAAB





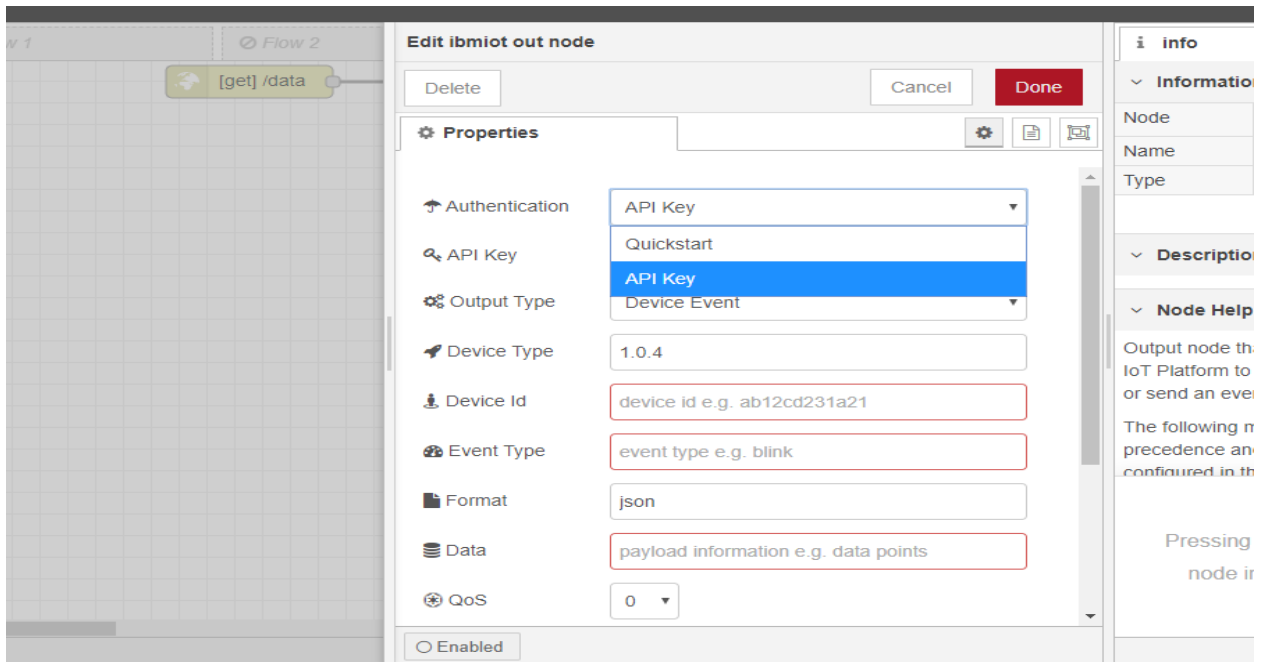
CONTROLLING THE LIGHT APPLIANCES ON/OFF BY GIVING COMMAND TO THE DEVICE

Step 1: Drag and Place the IBM IoT Output Node in the flow editor

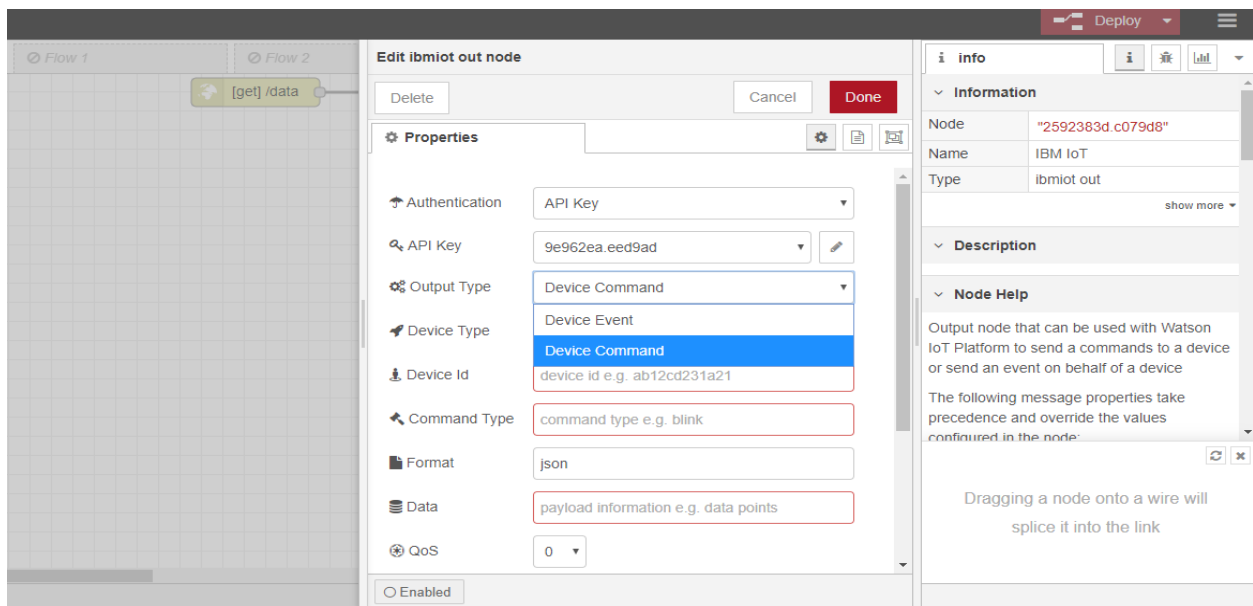


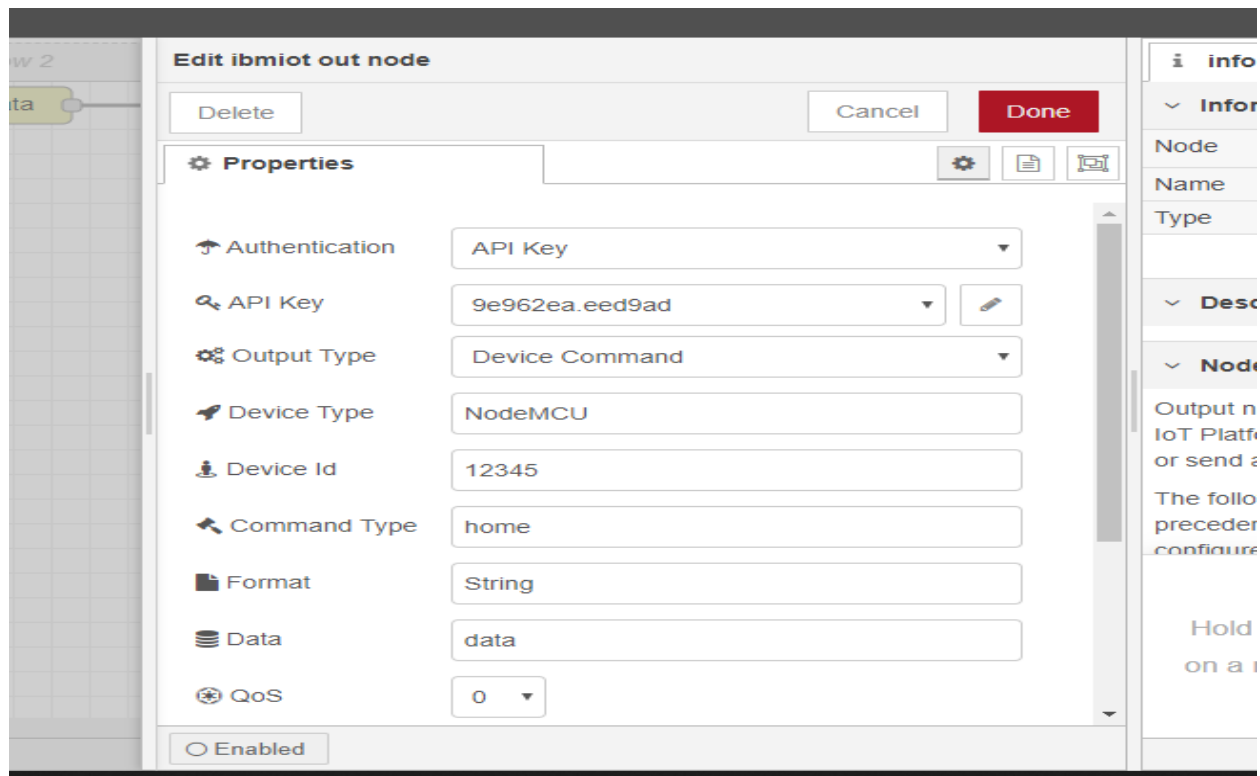
Step 2: Give the device credentials and API Key in the IBM IoT Output node and deploy it so that the status of the IBM IoT Output Node will be in connected status

1. Select the API Key in the Authentication

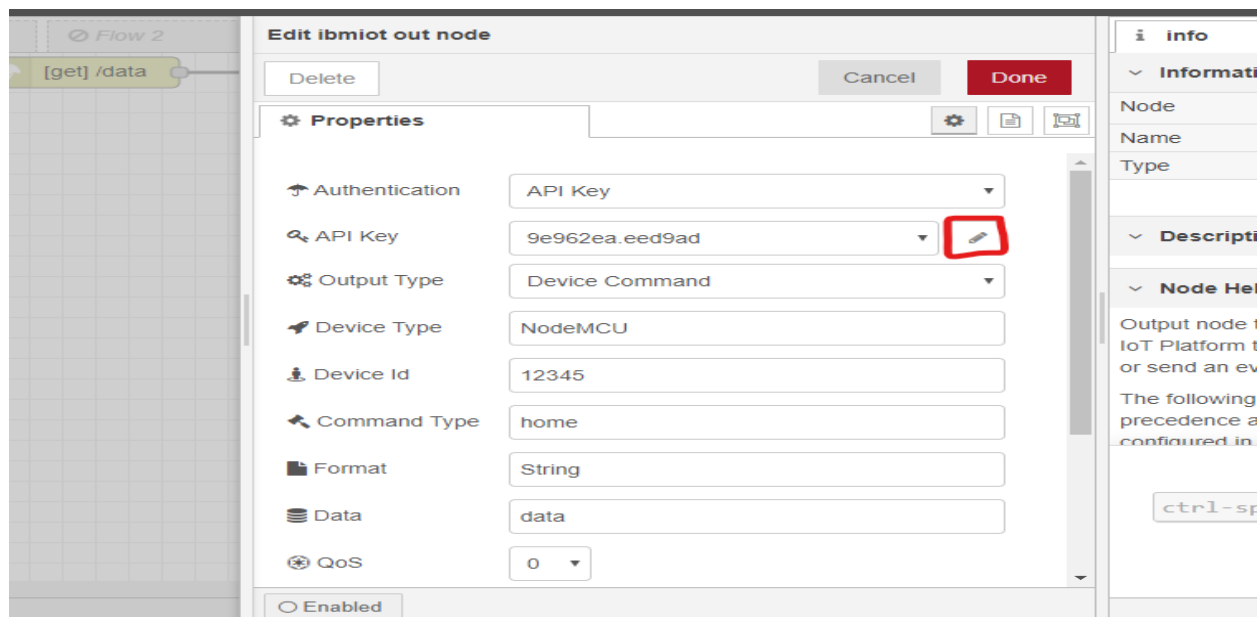


1. Select the option in the Output Type as Device Command and fill the device credentials





2. Now select the pencil type icon which is near the API Key and fill the API Key and API Token credentials and click Update



Deploy

Flow 2

/data

Edit ibmiot out node > Edit ibmiot node

Delete

Cancel

Update

Properties

Name

Name

API Key

a-n51a7p-ljlzymddlp

API Token

.....

Server-Name

n51a7p.messaging.internetofthings.ibmcloud.com

Scalable

☐

Application ID

Keep Alive

60

Seconds

☒ Use Clean Session

Enabled

6 nodes use this config

On all flows

info

Information

Node

"9e962ea.eed9ad"



Type

ibmiot

Description

Node Help

To use Shared subscription, check **Scala** and provide the **Application ID**. The **Application ID** must be same across different clients.

Hold down  when you  on a node to also select all of its connected nodes

Deploy

Flow 2

[get] /data

Edit ibmiot out node

Delete

Cancel

Done

Properties

Authentication

API Key

API Key

9e962ea.eed9ad

Output Type

Device Command

Device Type

NodeMCU

Device Id

12345

Command Type

home

Format

String

Data

data

QoS

0

Enabled

info

Information

Node

"2592383d.c079d8"

Name

IBM IoT

Type



ibmiot out

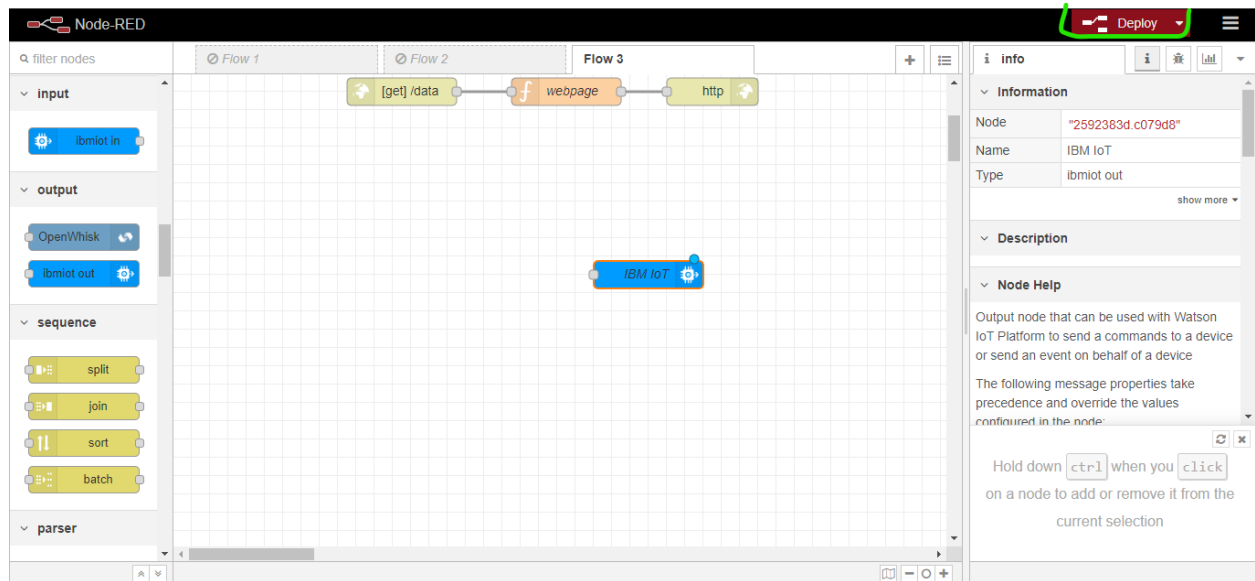
Description

Node Help

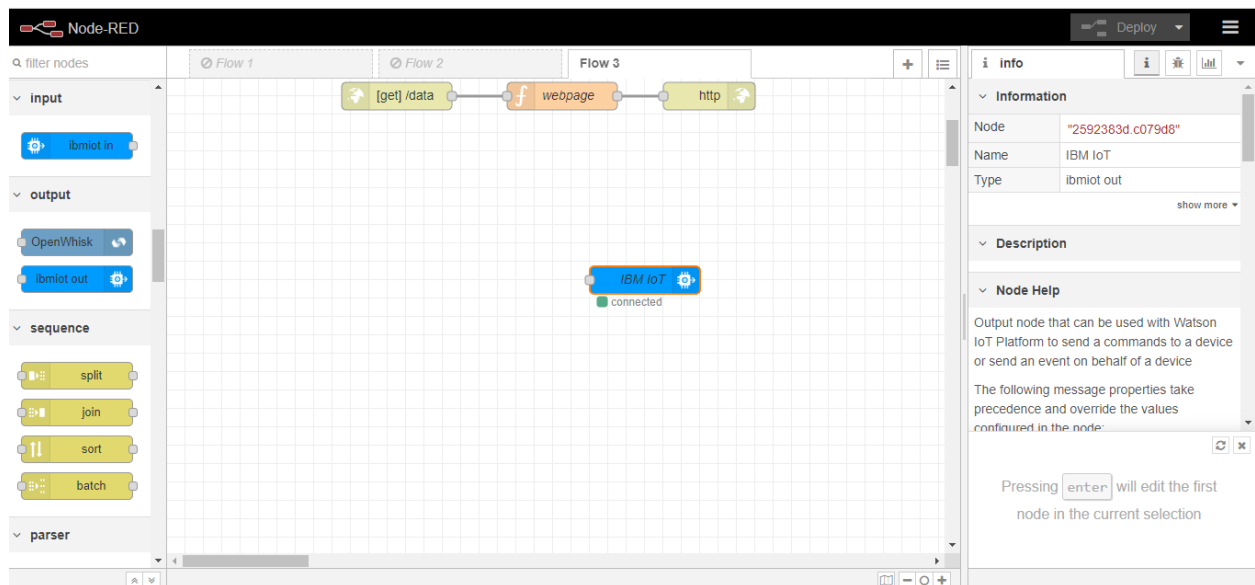
Output node that can be used with Watson IoT Platform to send a commands to a device or send an event on behalf of a device

The following message properties take precedence and override the values configured in the node:

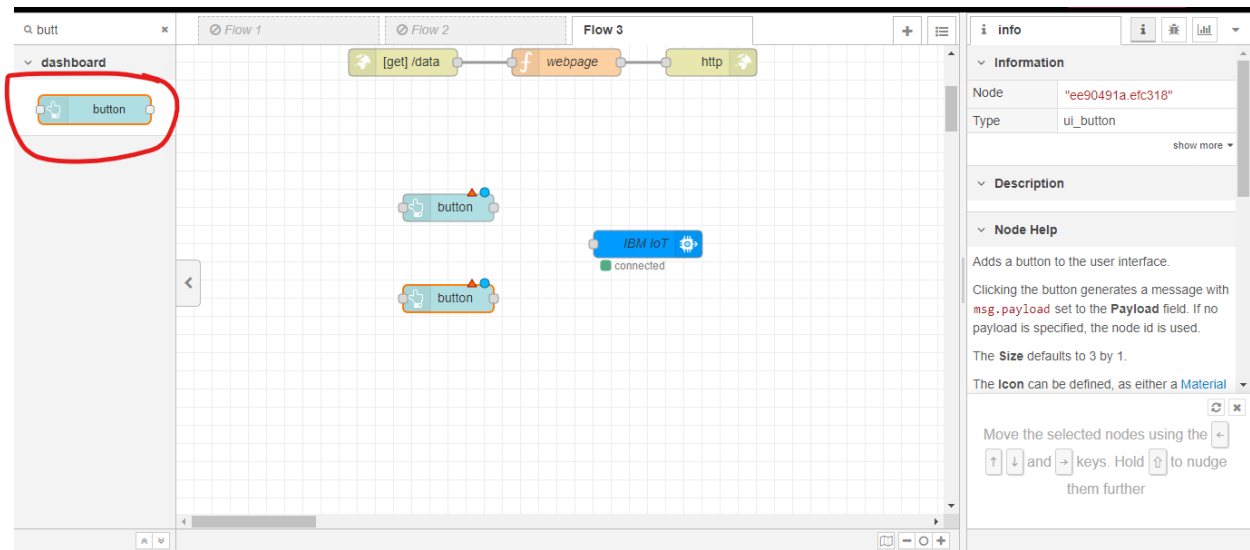
Hold down  when you  on a node to also select all of its connected nodes



3. Connected status shows for IBM IoT out node

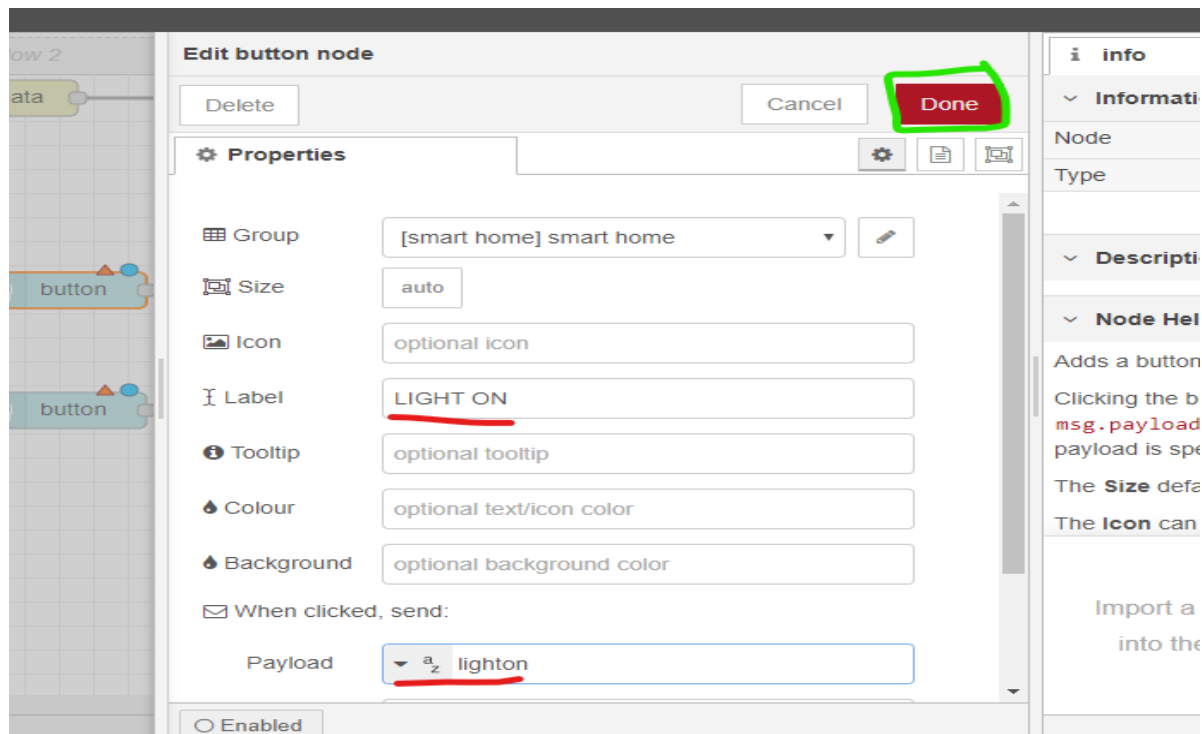


Step 3: Drag and place two Button nodes from the Dashboard node

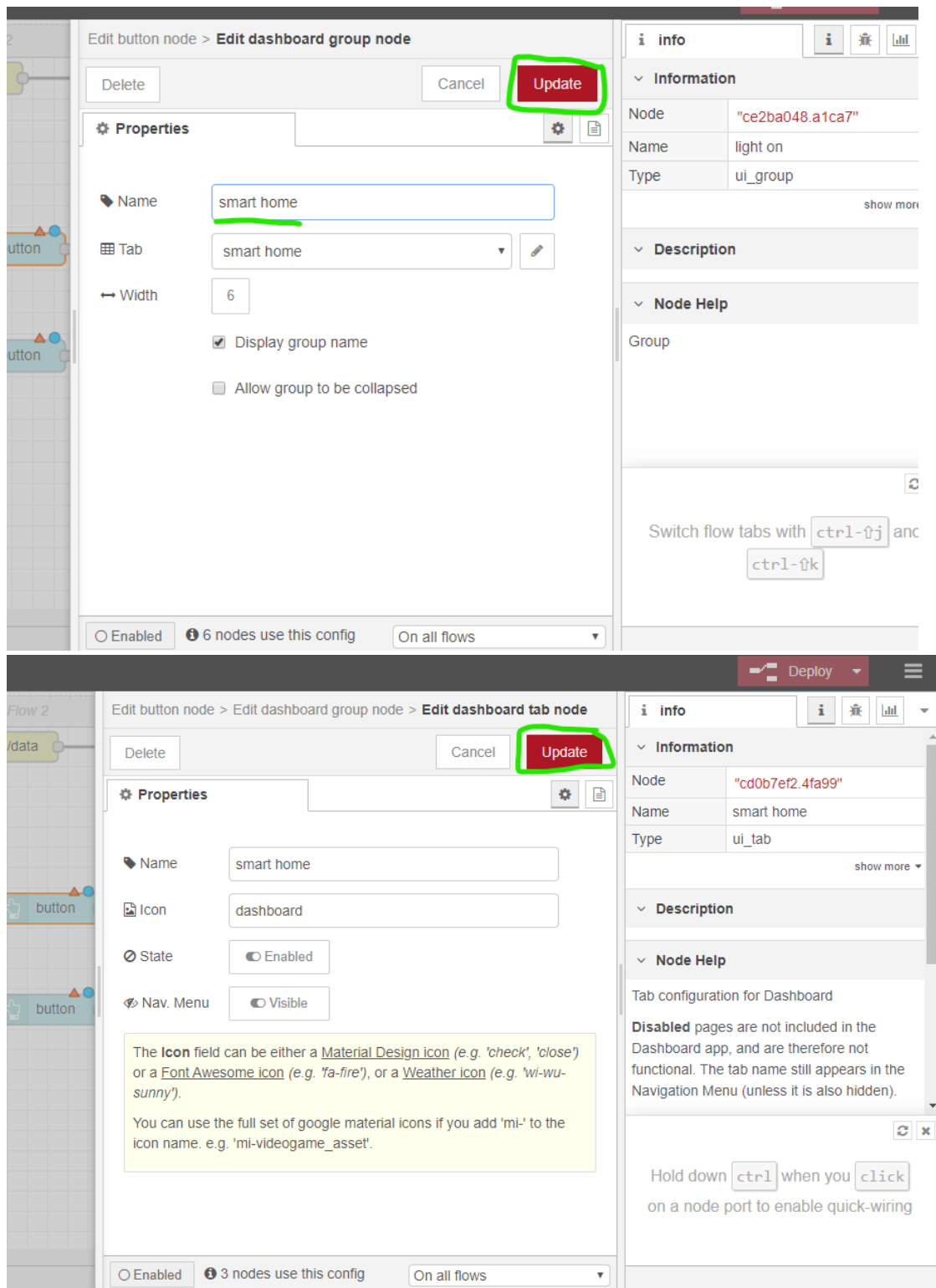


Step 4: Configure the button node for LIGHT ON and LIGHT OFF

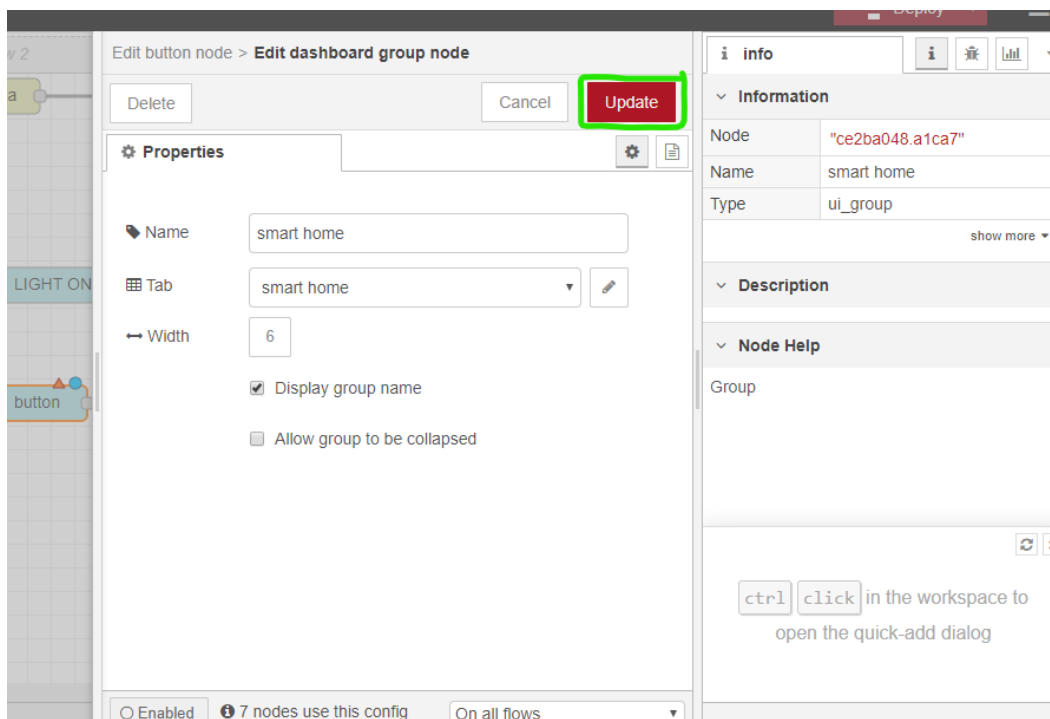
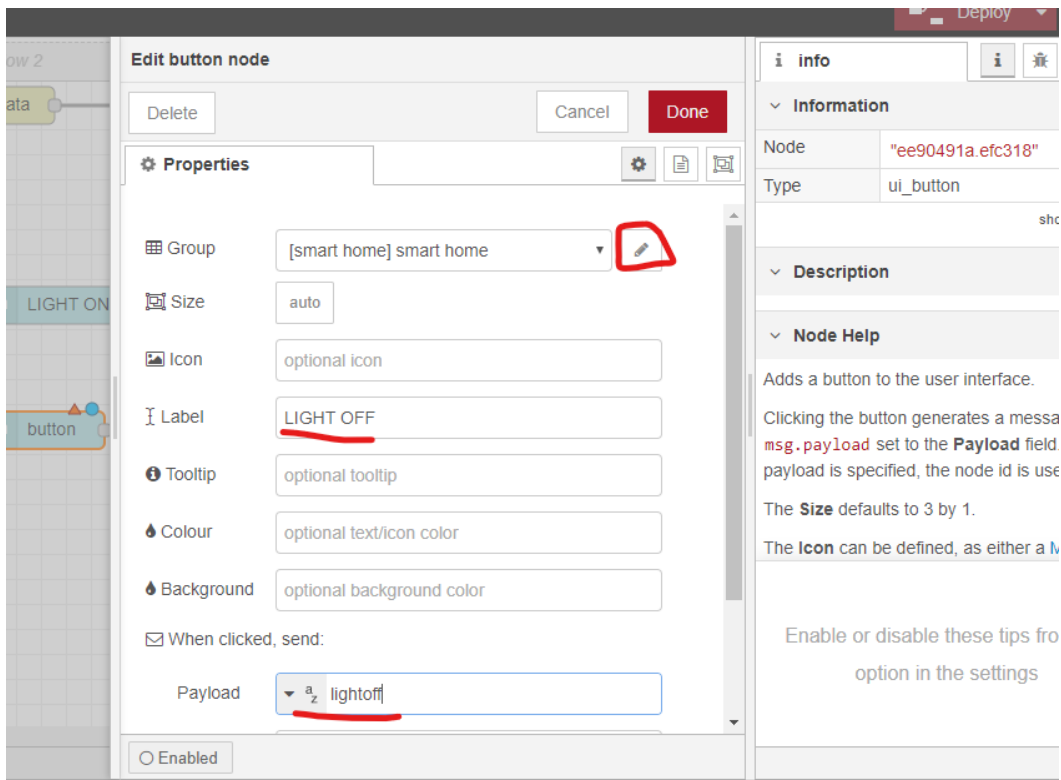
Double click on the Button for LIGHT ON and type the group name by clicking on the pencil icon near the group tab

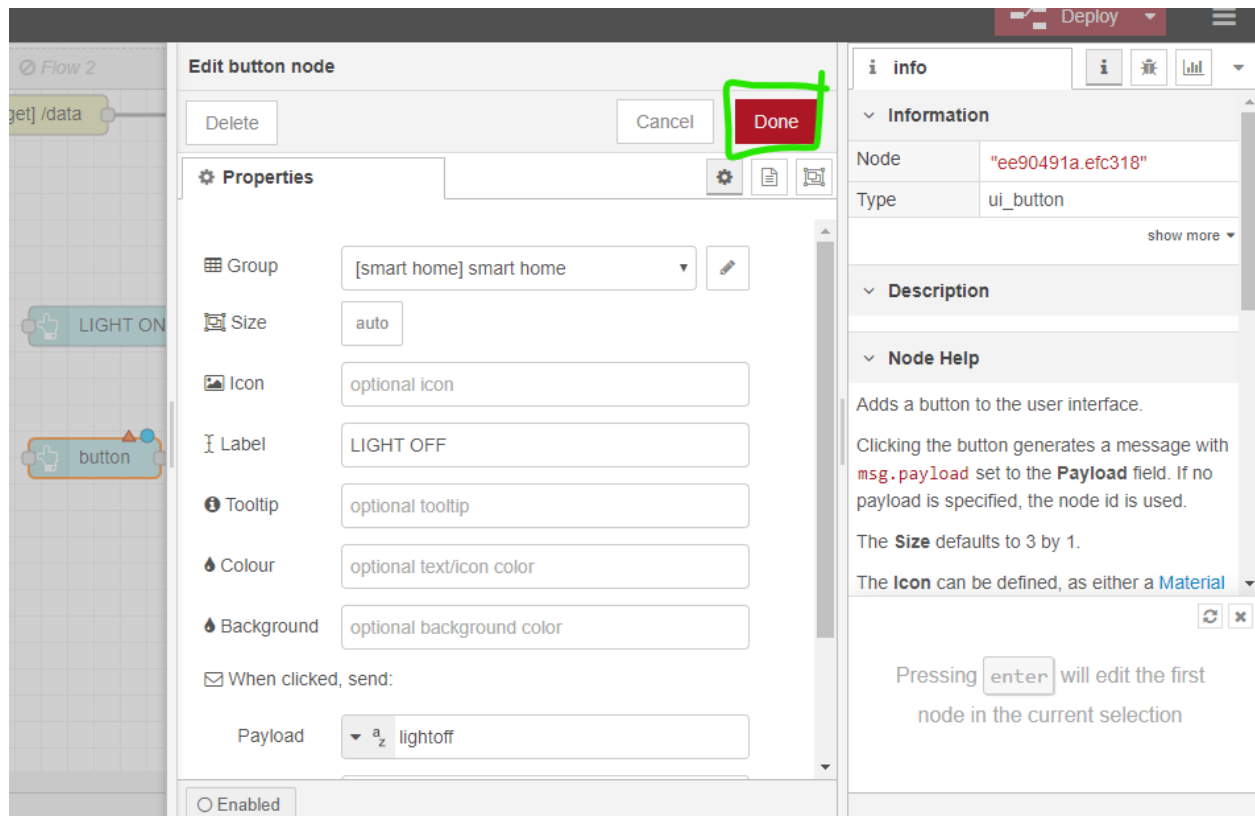


1. Type the group name as light on and click on the pencil icon which is near the tab name and type the tab name as smart home and update it

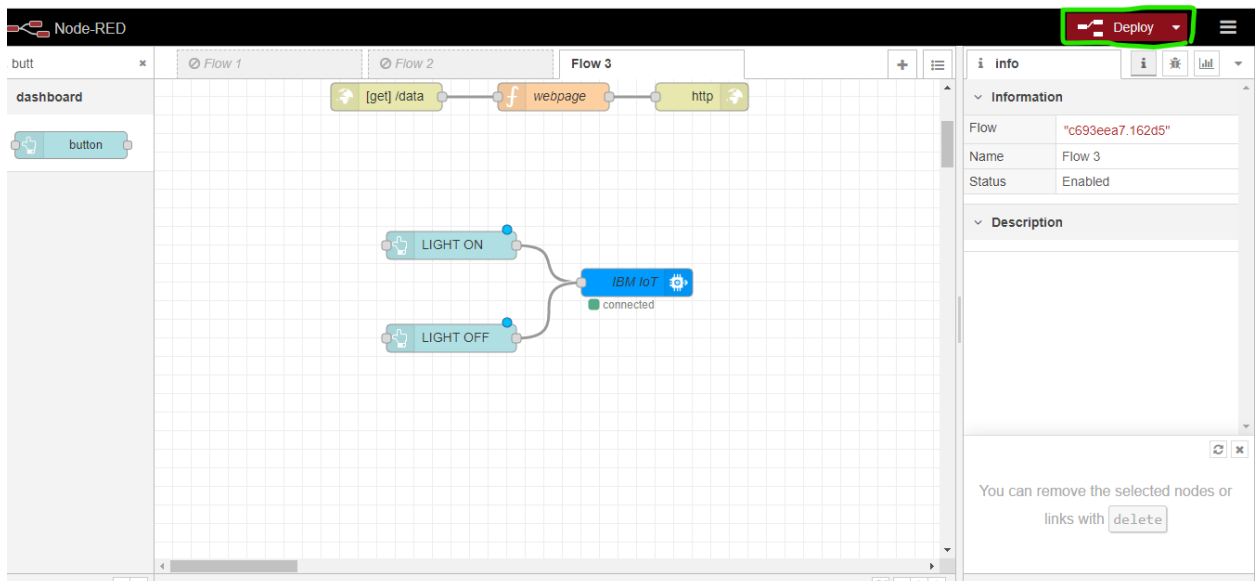


2. Double click on the 2nd Button for LIGHT OFF and type the group name by clicking on the pencil icon near the group tab





3. Deploy it



Step 5: Copy the NodeRed URL till 1880 and paste in the new tab by typing /ui along with the NodeRed URL and press ENTER which will display the UI for controlling the Light ON/OFF

Node-RED interface showing a flow named "Flow 3" with nodes: [get]/data, webpage, http, LIGHT ON, LIGHT OFF, and IBM IoT. The right sidebar shows flow information and a description area.

Flow 3 Information:

Information	
Flow	"c693eea7.162d5"
Name	Flow 3
Status	Enabled

Description:

You can manage your palette of nodes with `alt-0p`

Browser address bar showing the URL `http://127.0.0.1:1880/ui`. Below the address bar is a Google search bar with the Google logo.

Smart home dashboard interface showing temperature and humidity gauges, and light control buttons.

smart home

Temperature: 30.1 units

humidity: 39 units

LIGHT ON

LIGHT OFF