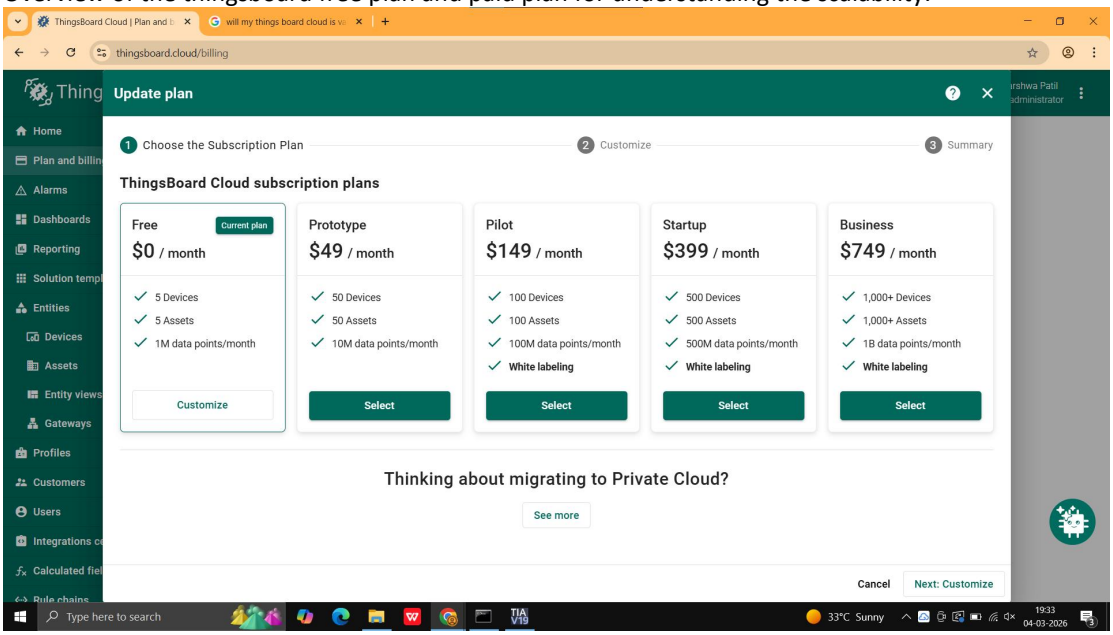
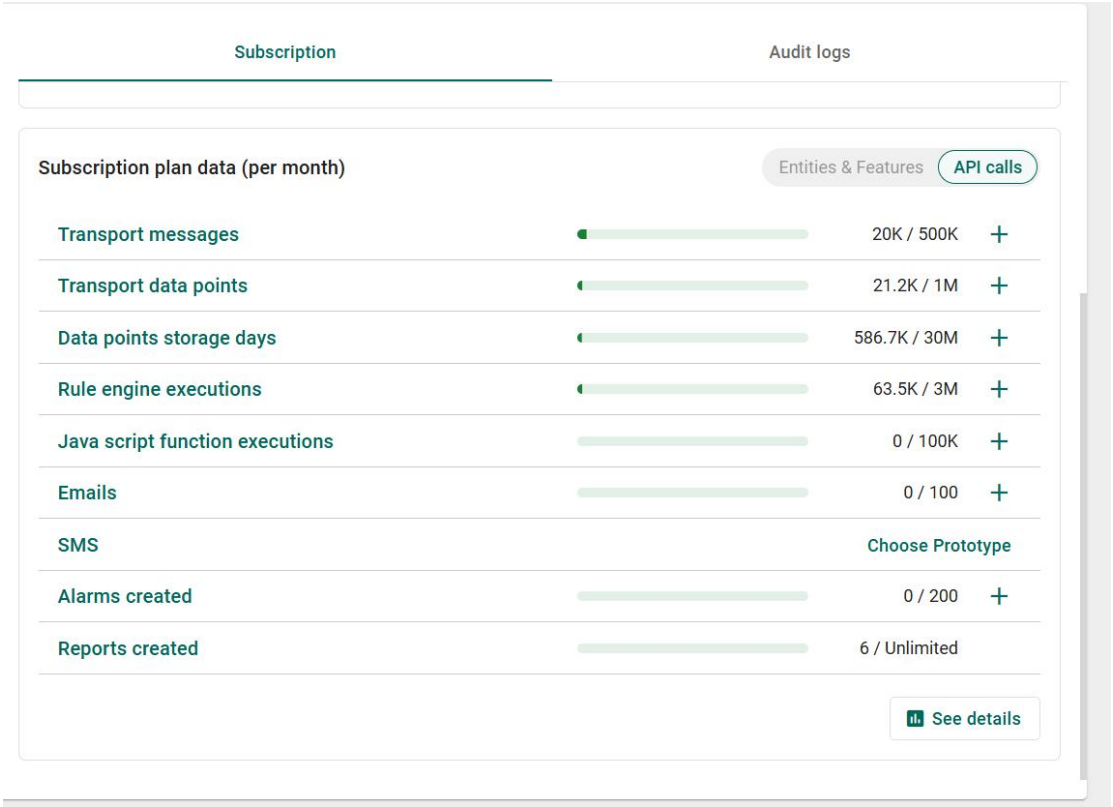
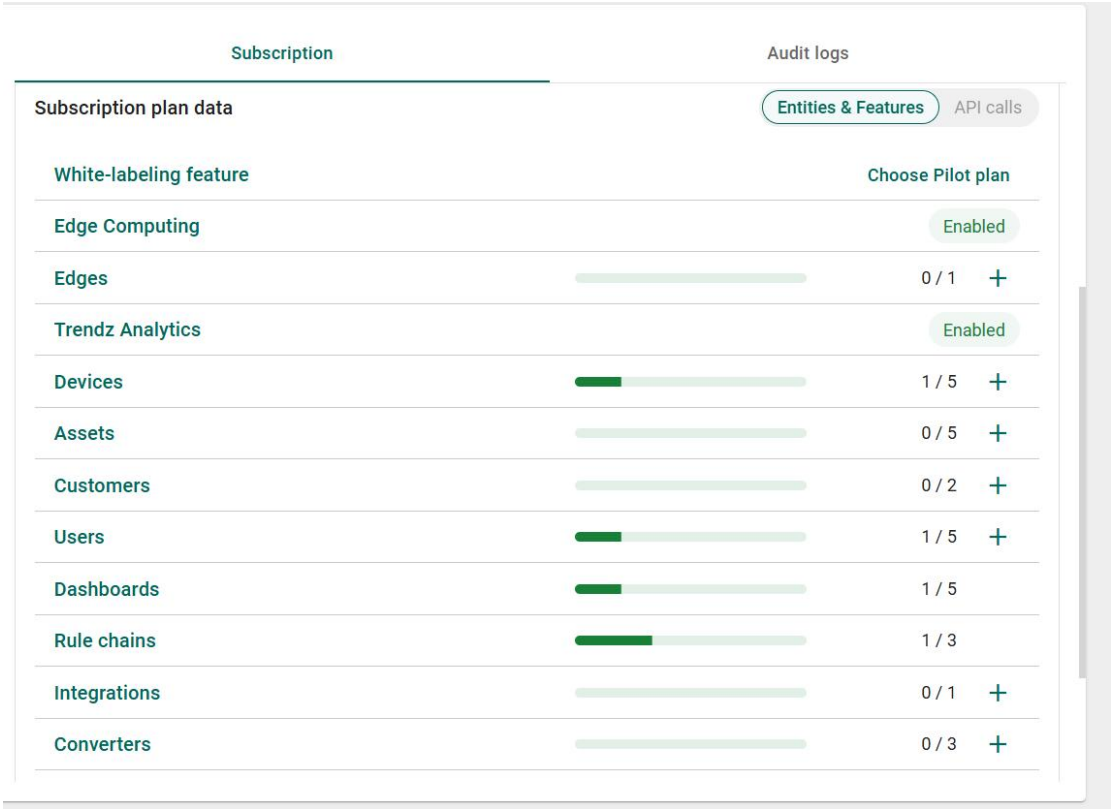
Live Cloud Dashboard PLC Node-red ThingsBoard Cloud

ThingsBoard Cloud Configuration

Overview of the thingsboard free plan and paid plan for understanding the scalability.





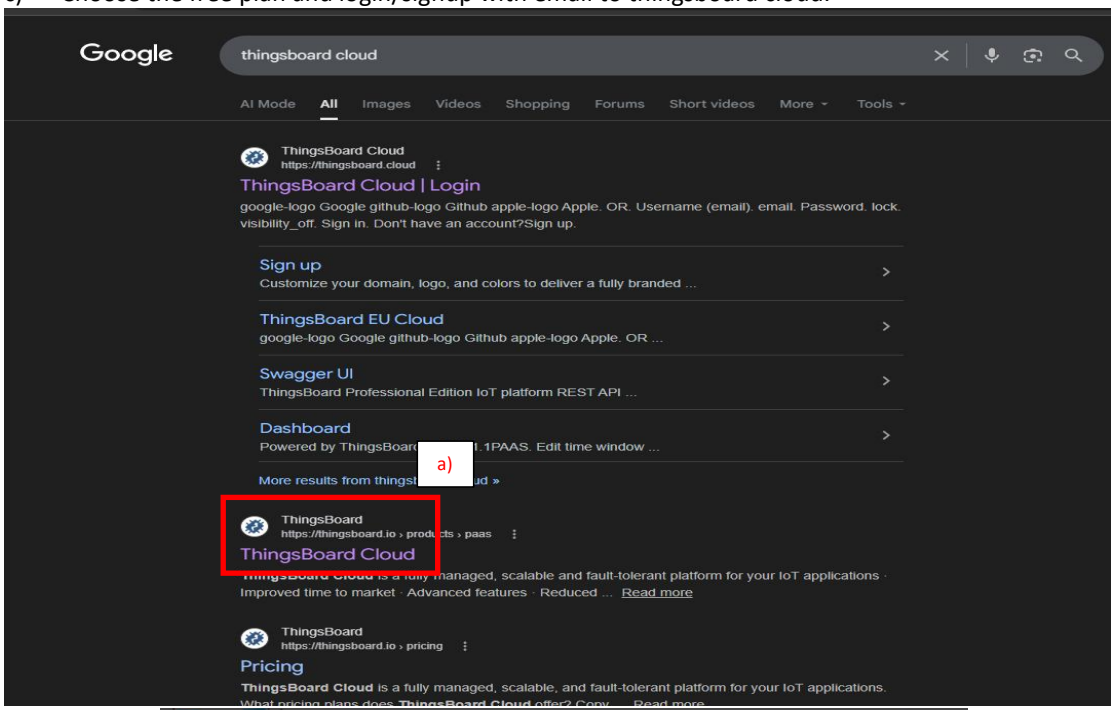

Subscription
Audit logs
Subscription plan data
Entities & Features
API calls
White-labeling feature
Choose Pilot plan
Edge Computing
Enabled
Edges
0 / 1
Trendz Analytics
Enabled
Devices
1 / 5
Assets
0 / 5
Customers
0 / 2
Users
1 / 5
Dashboards
1 / 5
Rule chains
1 / 3
Integrations
0 / 1
Converters
0 / 3

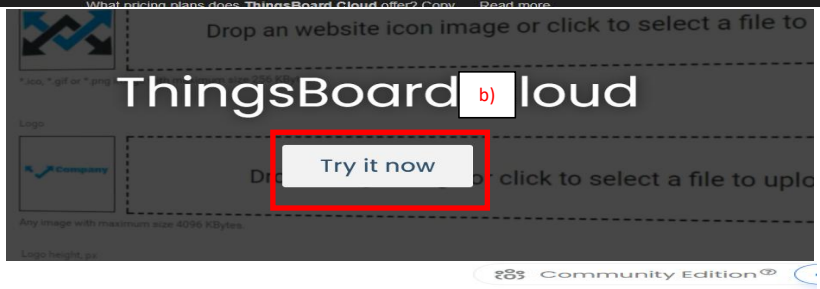
1. Create ThingsBoard cloud account and add device for communication: -

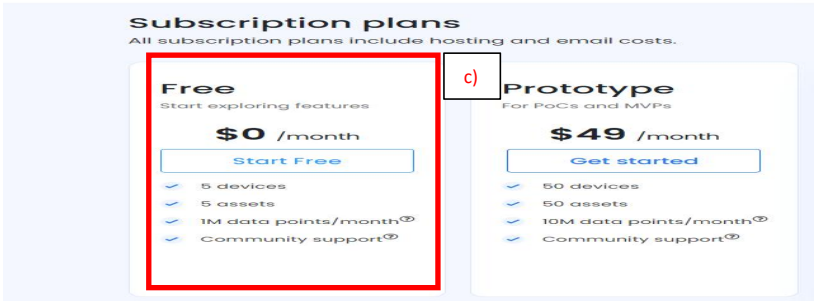
a) Search thingsboard cloud on web browser then click on “ThingsBoard Cloud”

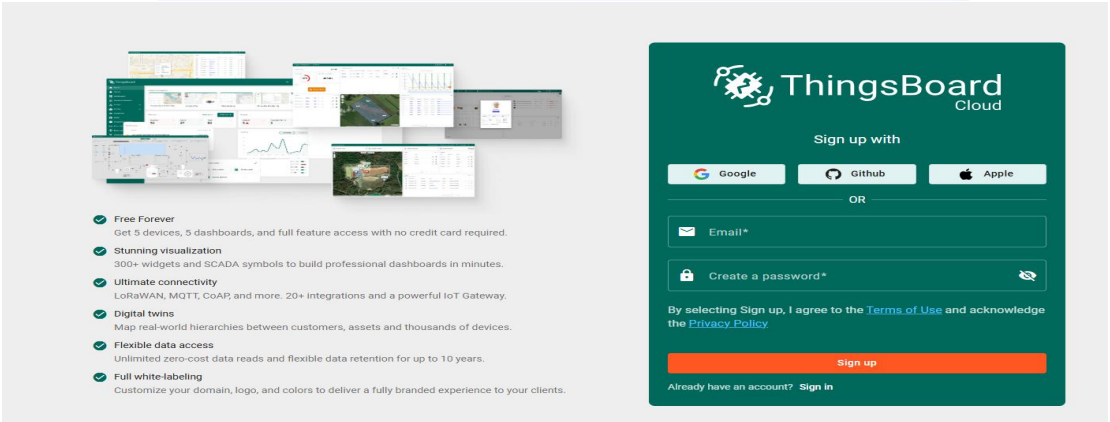
b) Then click on “Try it now”

c) Choose the free plan and login/signup with email to thingsboard cloud.



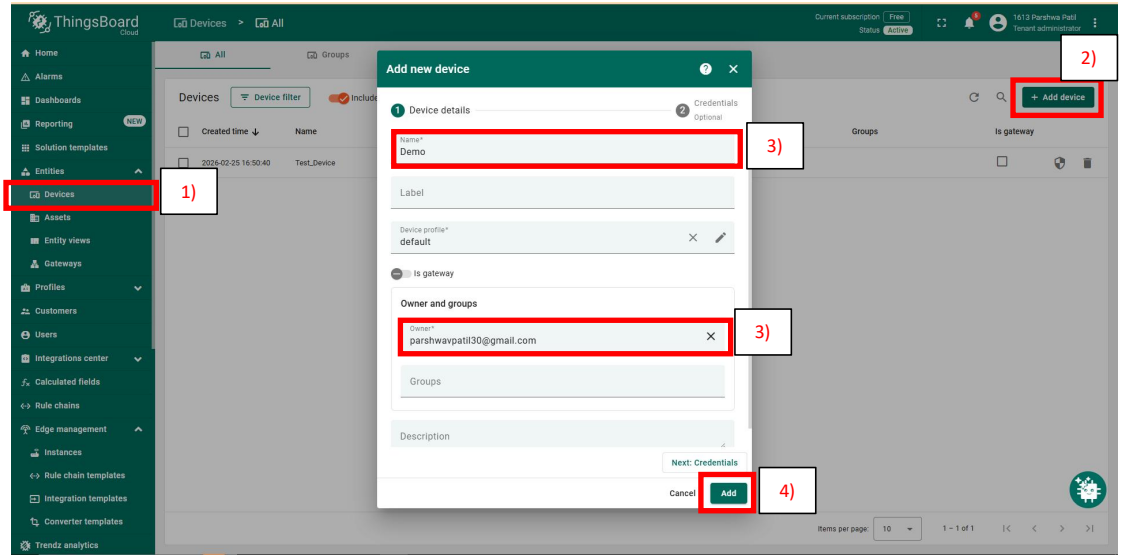






d) Add a device

1) Go to devices in the menu
2) Click “+ Add device”
3) Give Name and owner mail for the device
4) Click to “Add”

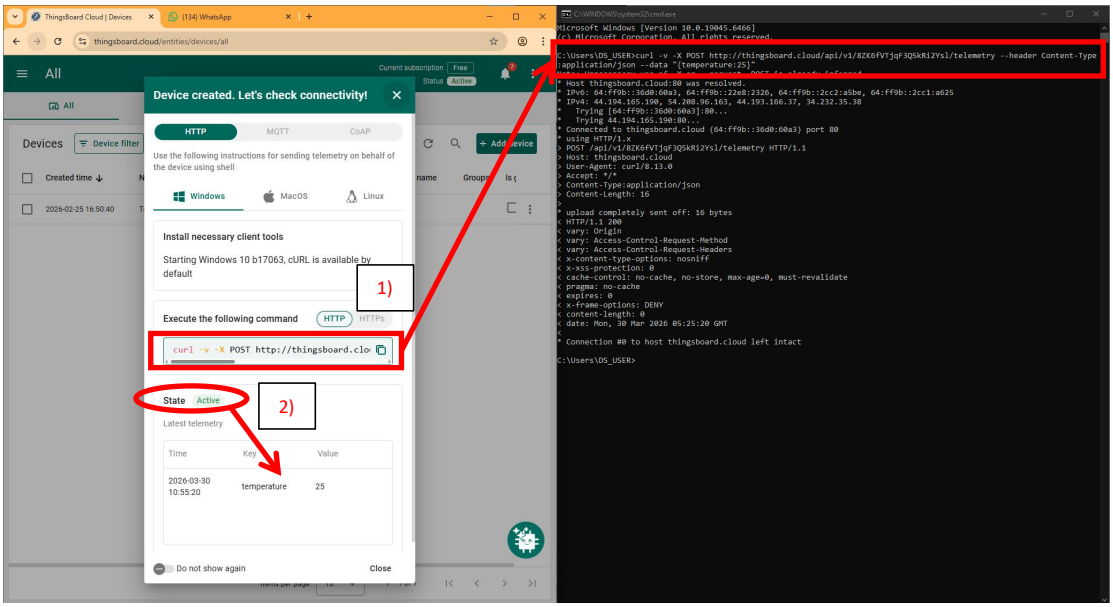


Now a pop up will appear :-

This popup is the Check Connectivity window, a built-in feature designed to help you quickly verify that your new device can successfully send data to the ThingsBoard platform.

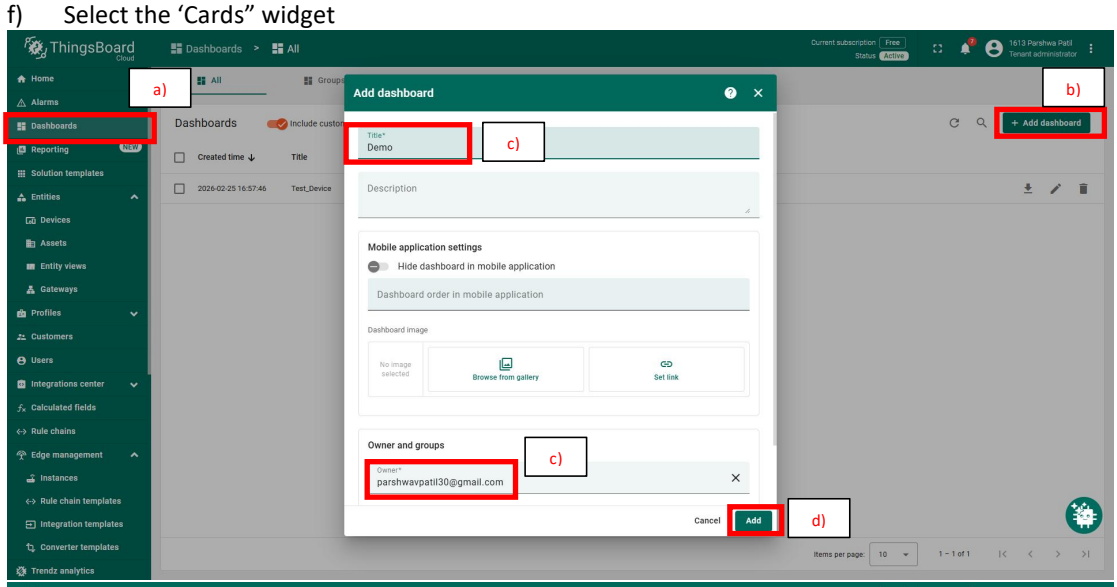
1) Copy this url and paste it in your cmd prompt and bash

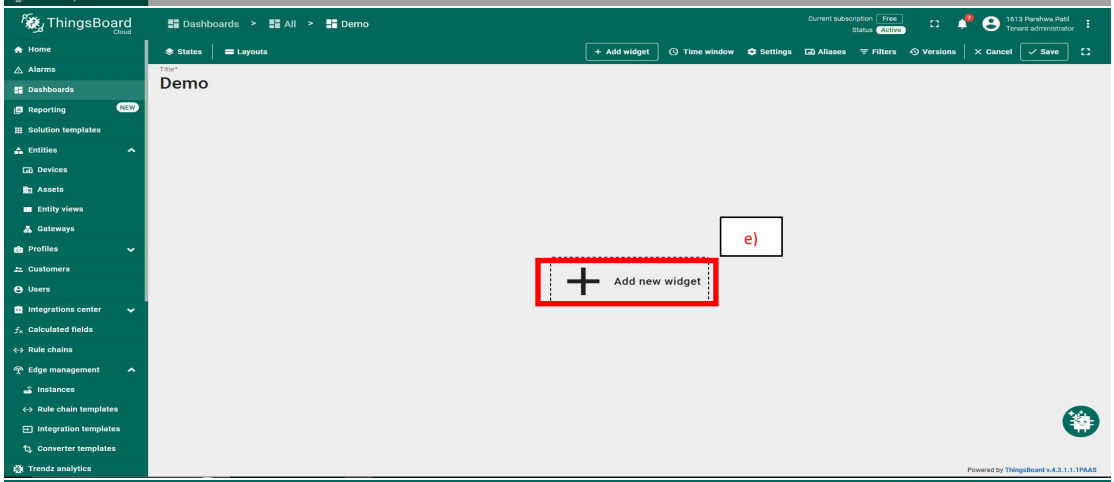
2) If the connection is successful you will see the State as Active and will see the Latest telemetry fo the value you send from your PC to thingsboard cloud.(temperature 25)

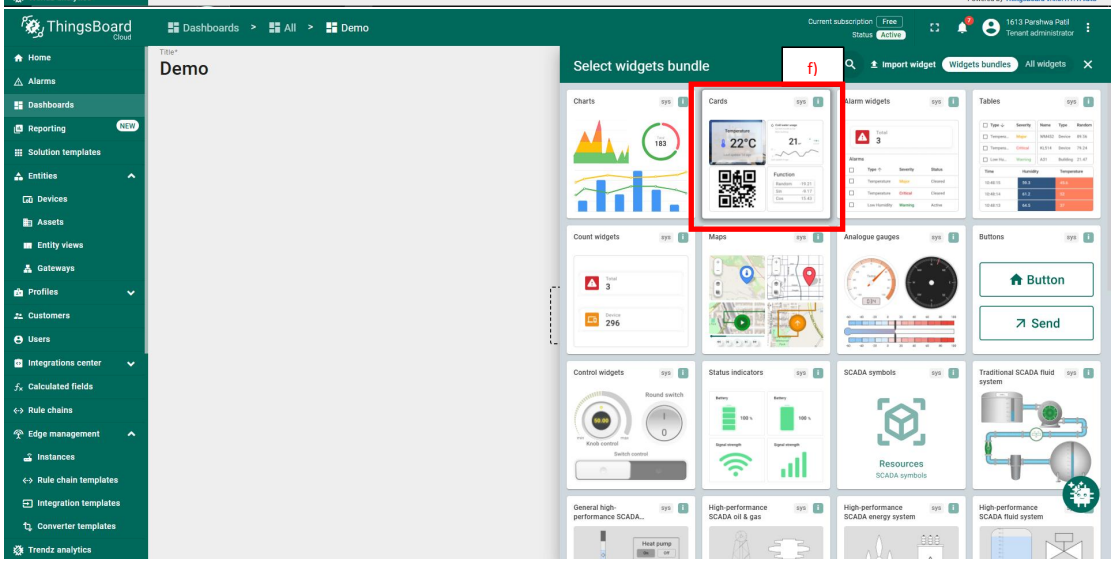


2. Configure the dashboard to get values form Node-red via MQTT.

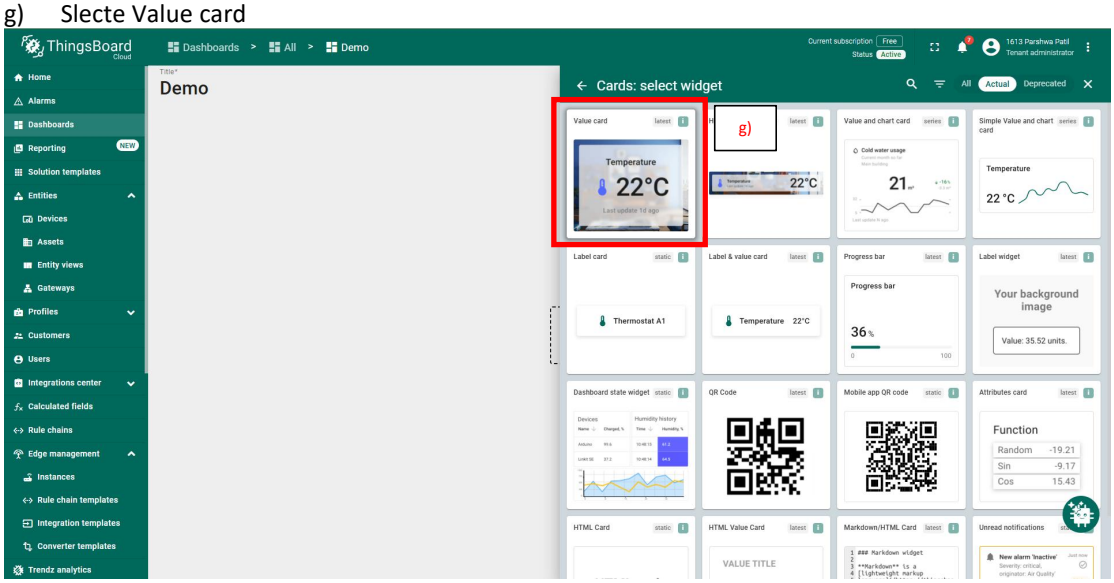
a) Go to “Dashboards” in the menu
b) Click Add “dashboard”
c) Give it a Name and email for owner
d) Click “Add”
e) Click “+ Add new widget”
f) Select the ‘Cards” widget



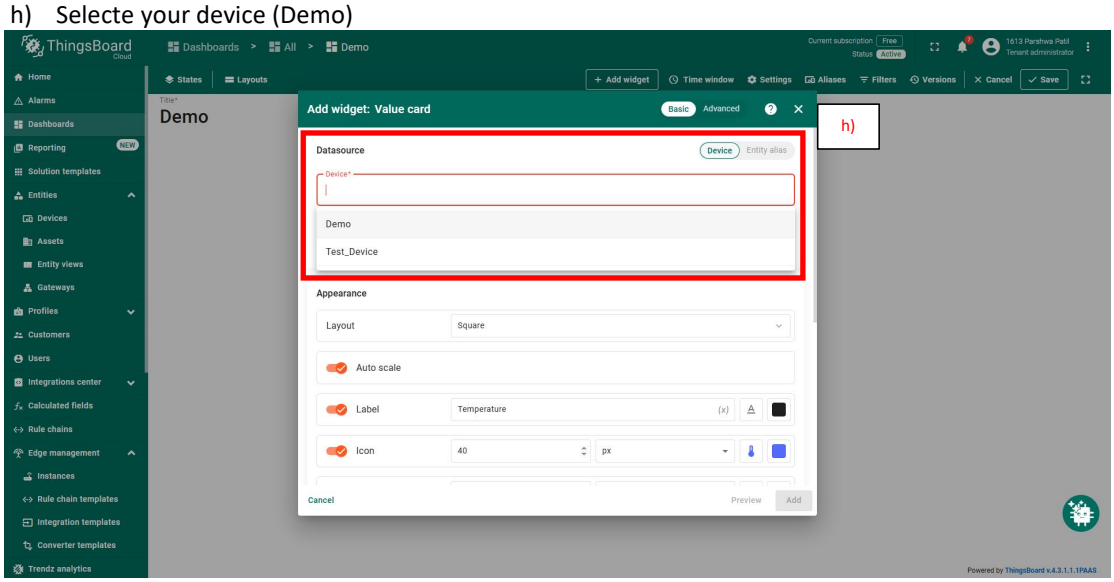




g) Slecte Value card



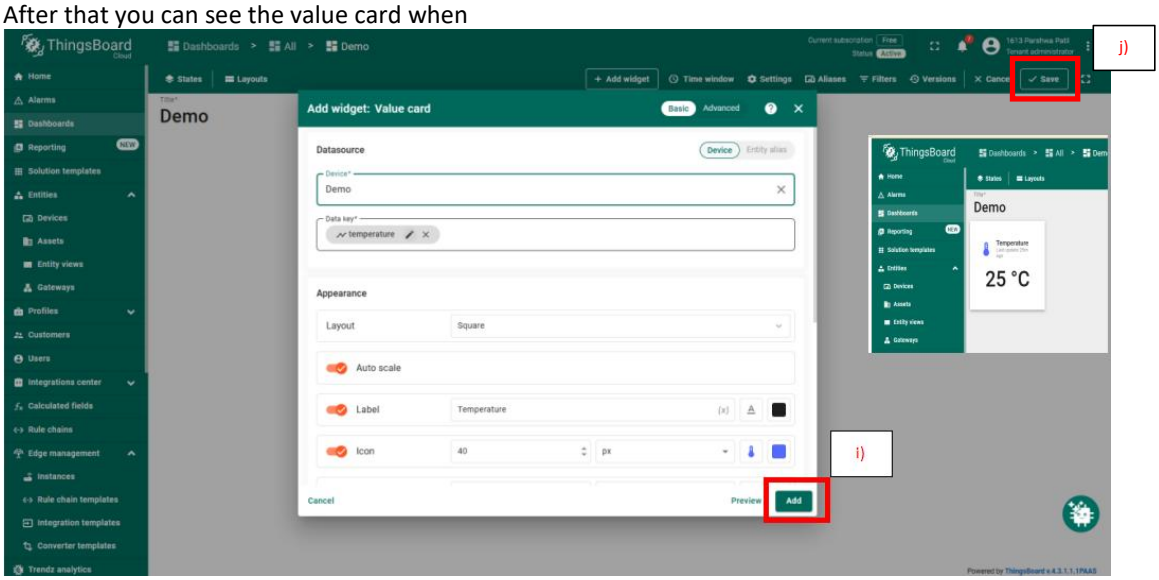
h) Selecte your device (Demo)



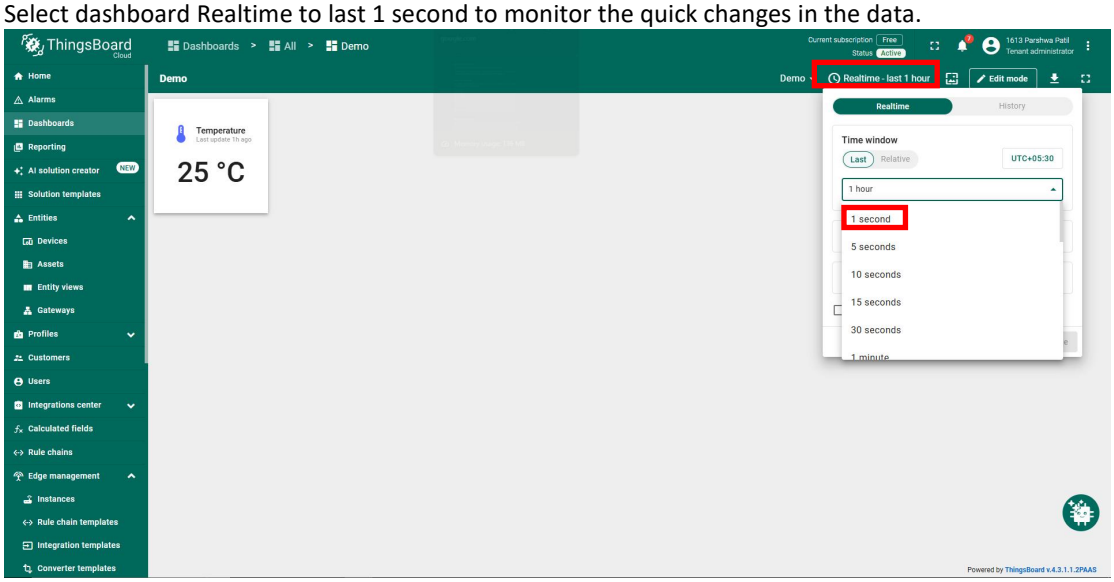
i) Data key is where you recevie value to the Value card it is default set with name temperature which we used and sent data through our pc cmd prompt before now just click “Add”

j) Click on “save”

After that you can see the value card when



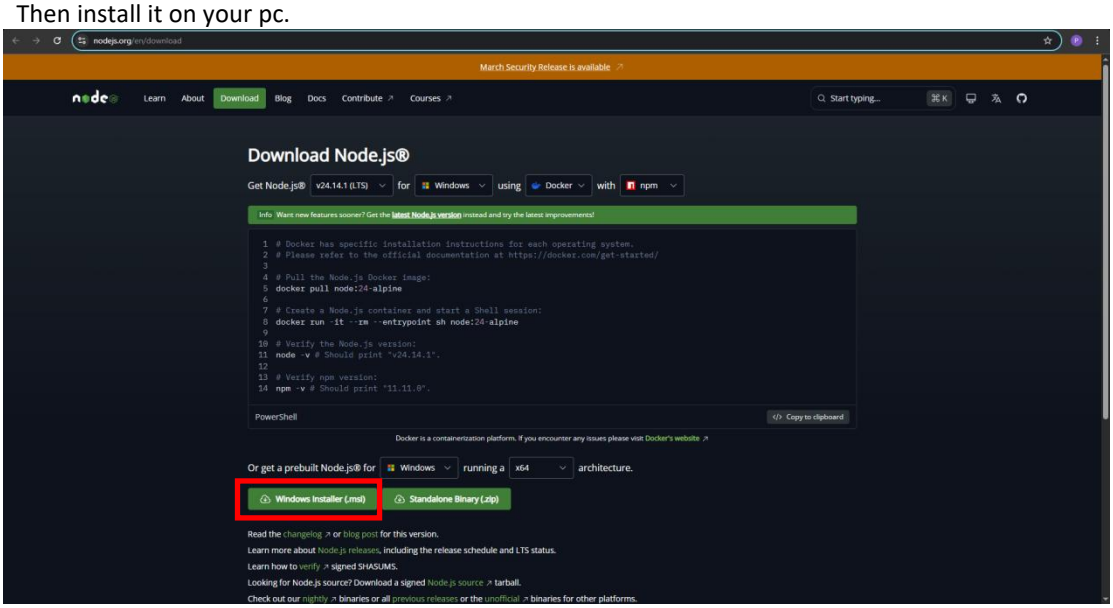
Select dashboard Realtime to last 1 second to monitor the quick changes in the data.



Installation of node-red and initialization of node-red.

1. We have to install node js for node-red

Go to this link https://nodejs.org/en/download and download the msi windows file.
Then install it on your pc.



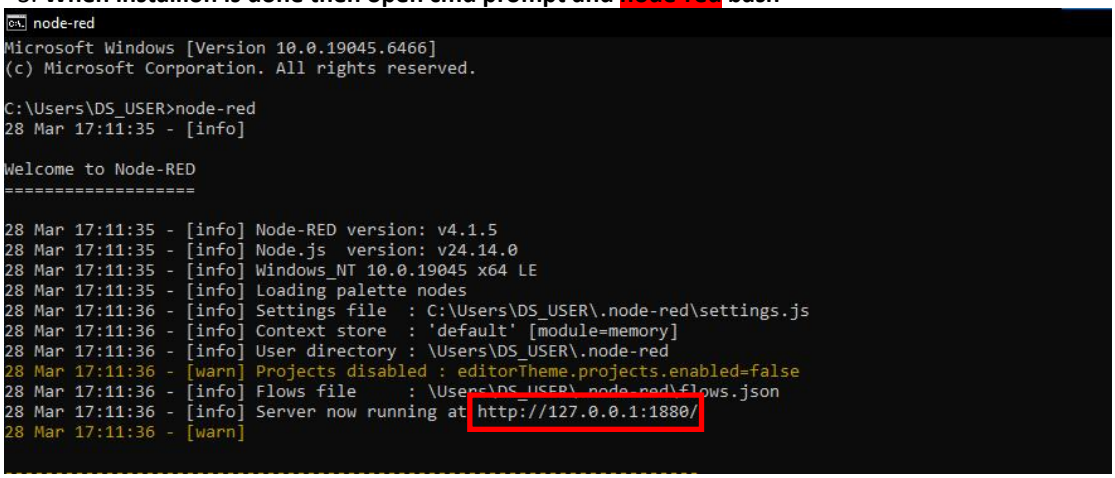
To confirm the install open cmd prompt. Press “windows+R”. type node --version bash

npm --version bash

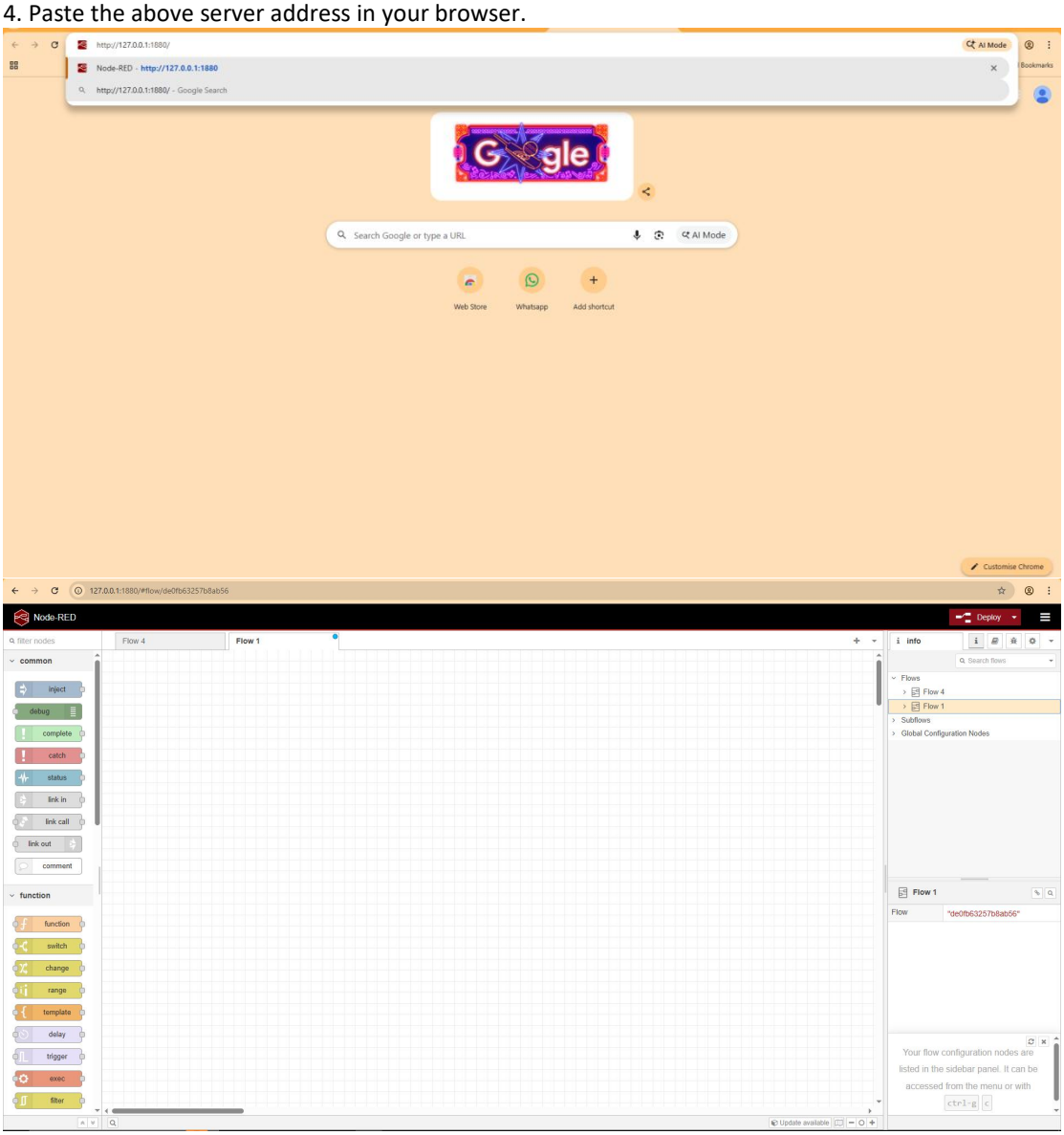


2. **Now install Node-red in cmd prompt.** npm install -g --unsafe-perm node- bash

3. **When installion is done then open cmd prompt and node-red bash**

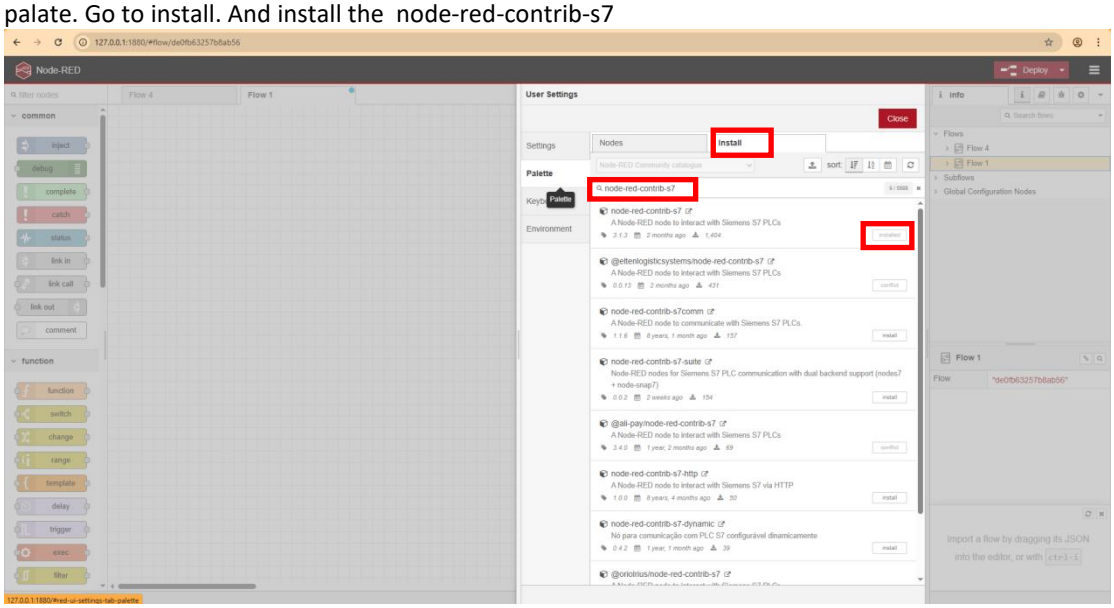


4. Paste the above server address in your browser.



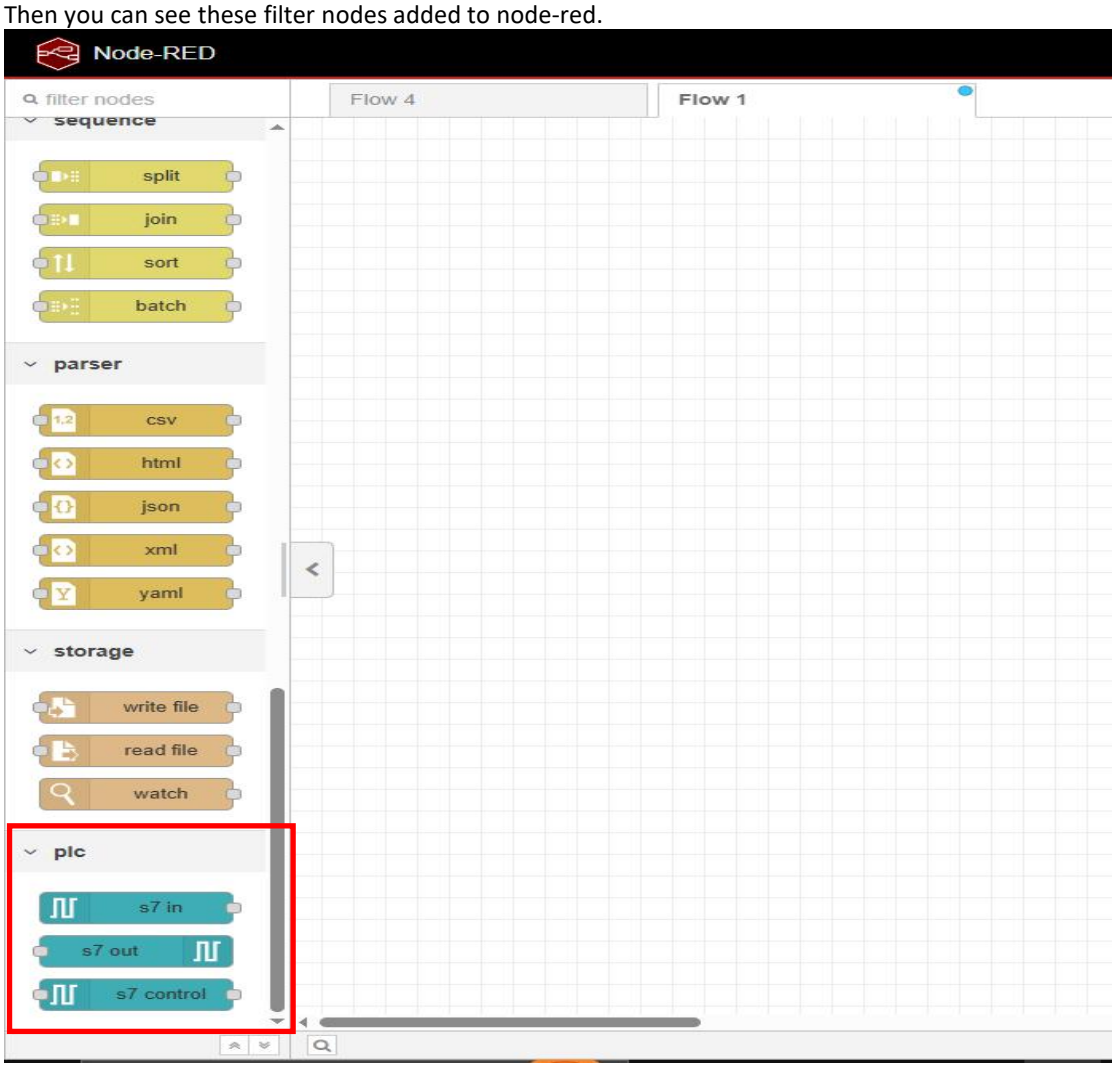
Your node-red is running. (don't close the cmd prompt where node-red is running that's your local server of your node red.

5. To connect the node red with PLC (Seimens) we have to install node-red-contrib-s7 node in node red. Go to node-red and press ALT+SHIFT+P or top right corner click on three lines and find manage palate. Go to install. And install the node-red-contrib-s7



Once installed it will reflect as installed.

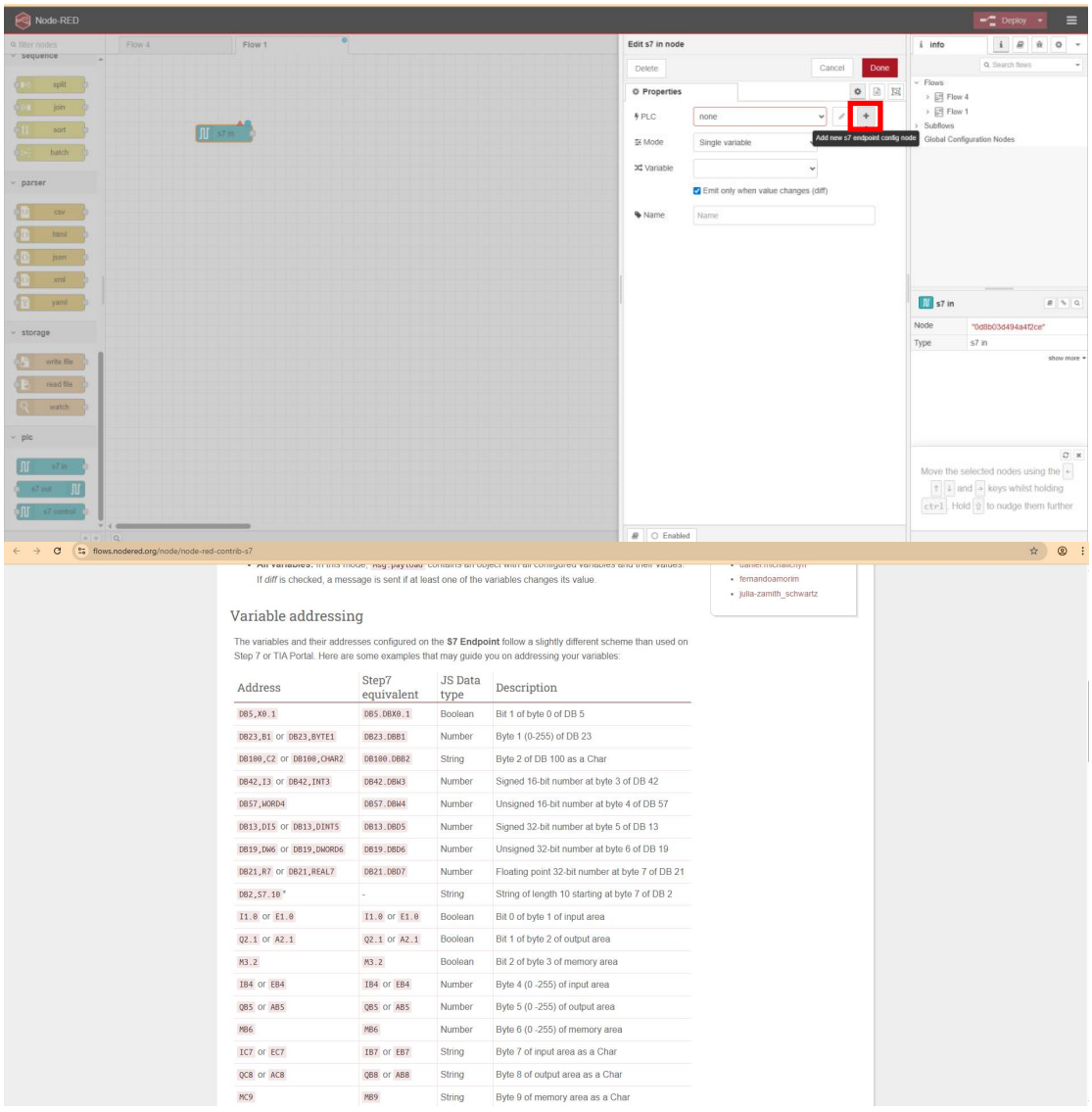
Then you can see these filter nodes added to node-red.

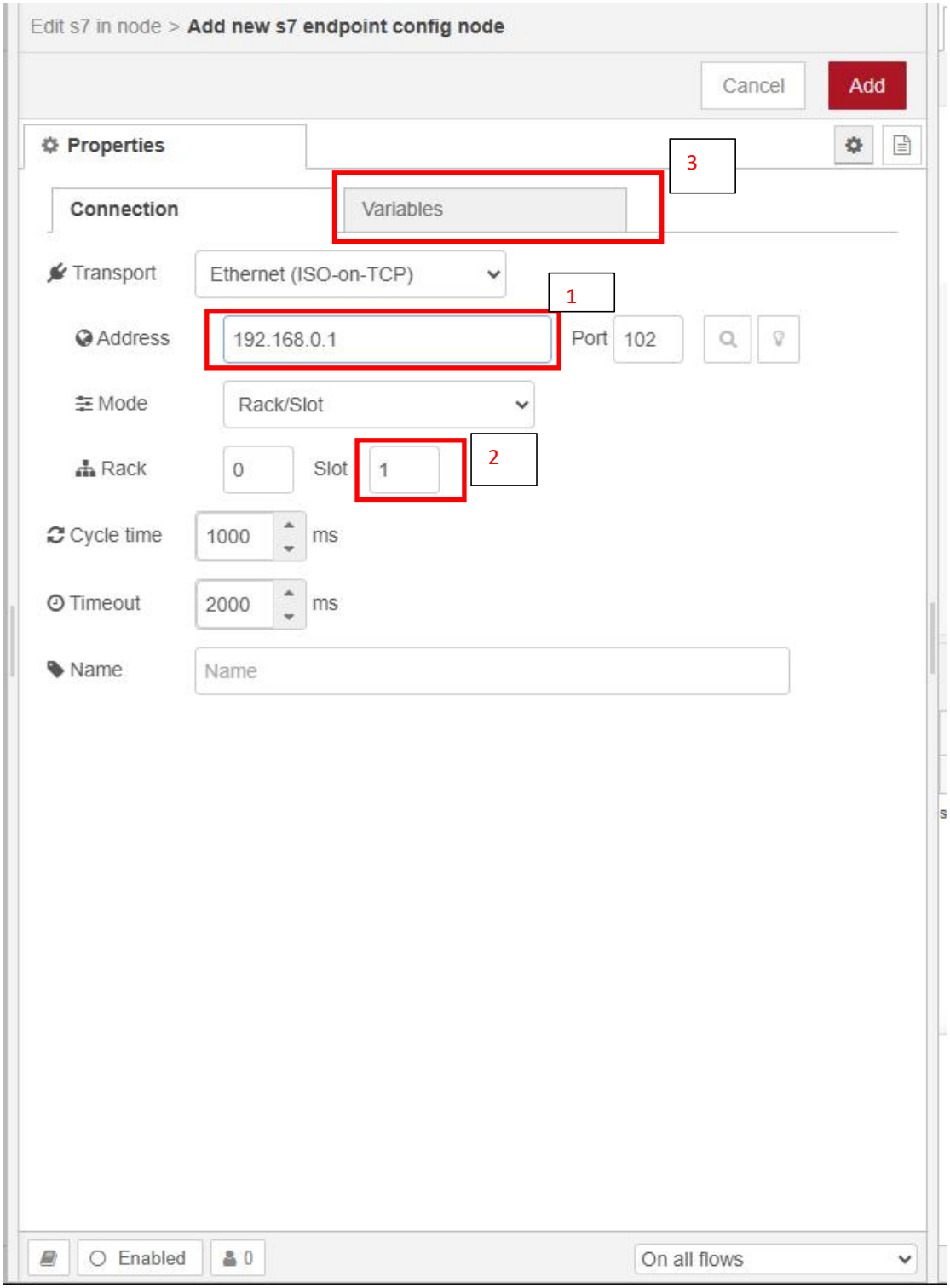


Create flow to ingest data from PLC and send to cloud. (Monitor)

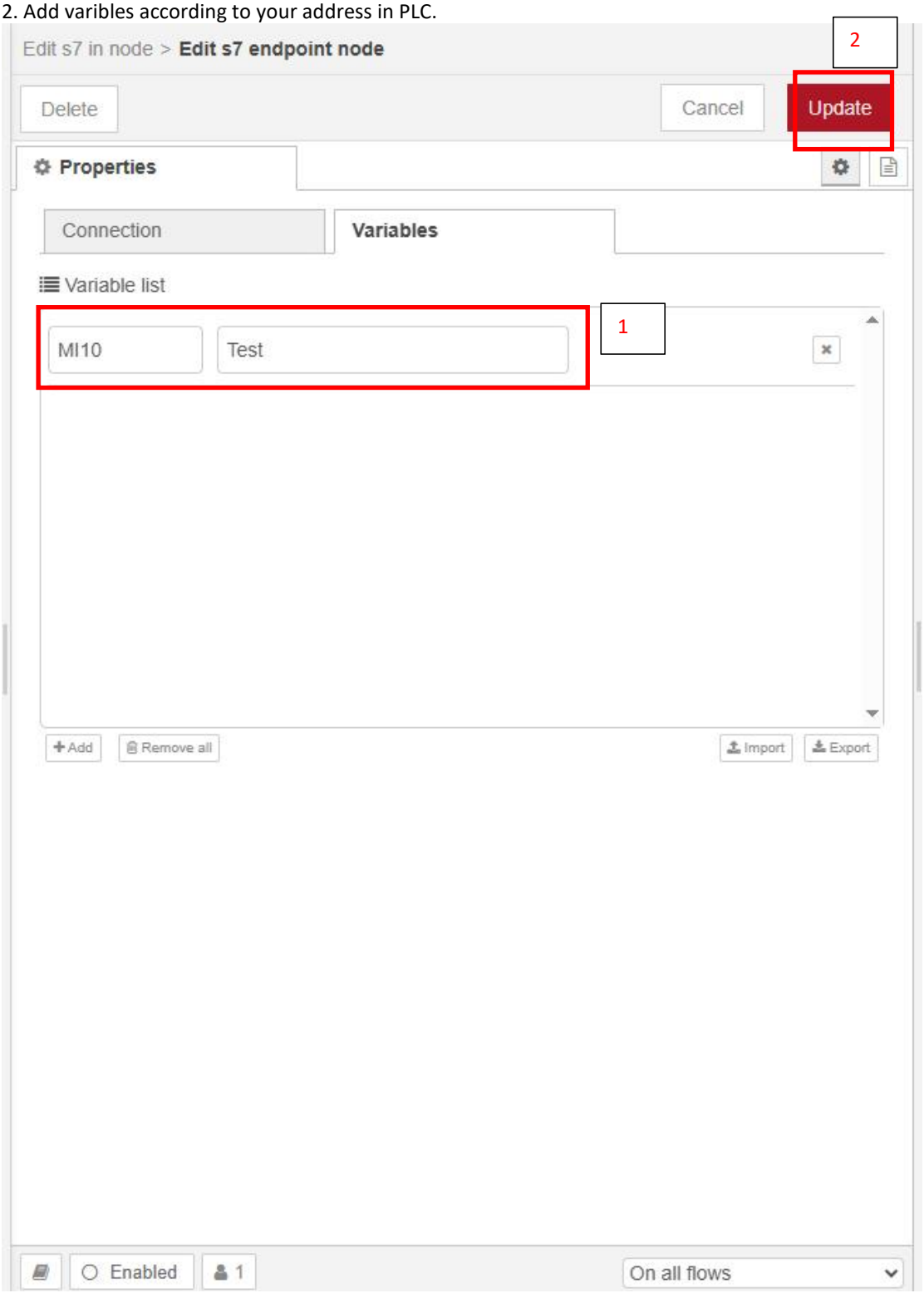
1. We will use s7 in node first to read data from s7 PLC. Now drag and drop a “s7 in”node in flow space.

Double click it to give it properties. Then click on the plus mark and add connection parameter and variable to connect with tag with PLC. The variable address in node-red is case sensitive and should be in specific format.https://flows.nodered.org/node/node-red-contrib-s7 check out the table in this link for addressing of variable according to plc addresses.

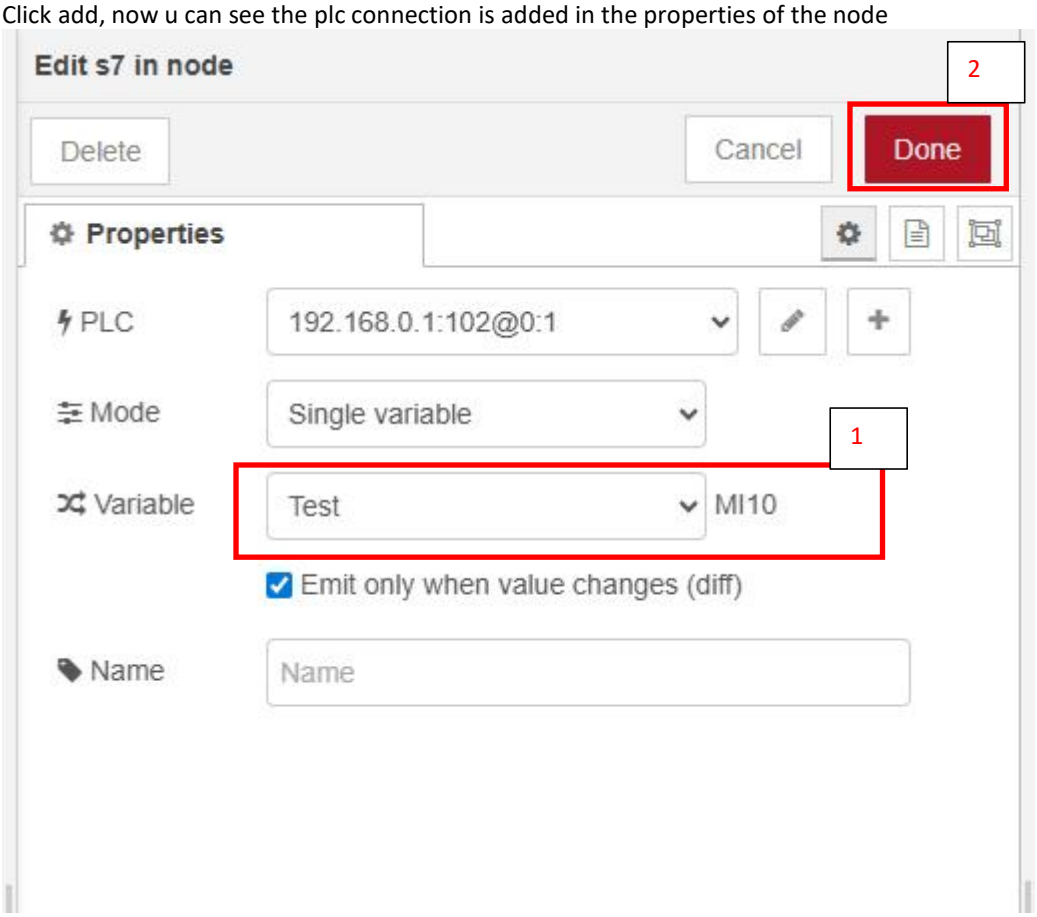



Edit s7 in node > Add new s7 endpoint config node
Cancel
Add
Properties
3
Connection
Variables
Transport
Ethernet (ISO-on-TCP)
1
Address
192.168.0.1
Port
102
Mode
Rack/Slot
Rack
0
Slot
1
2
Cycle time
1000
ms
Timeout
2000
ms
Name
Name
Enabled
0
On all flows

2. Add varibles according to your address in PLC.

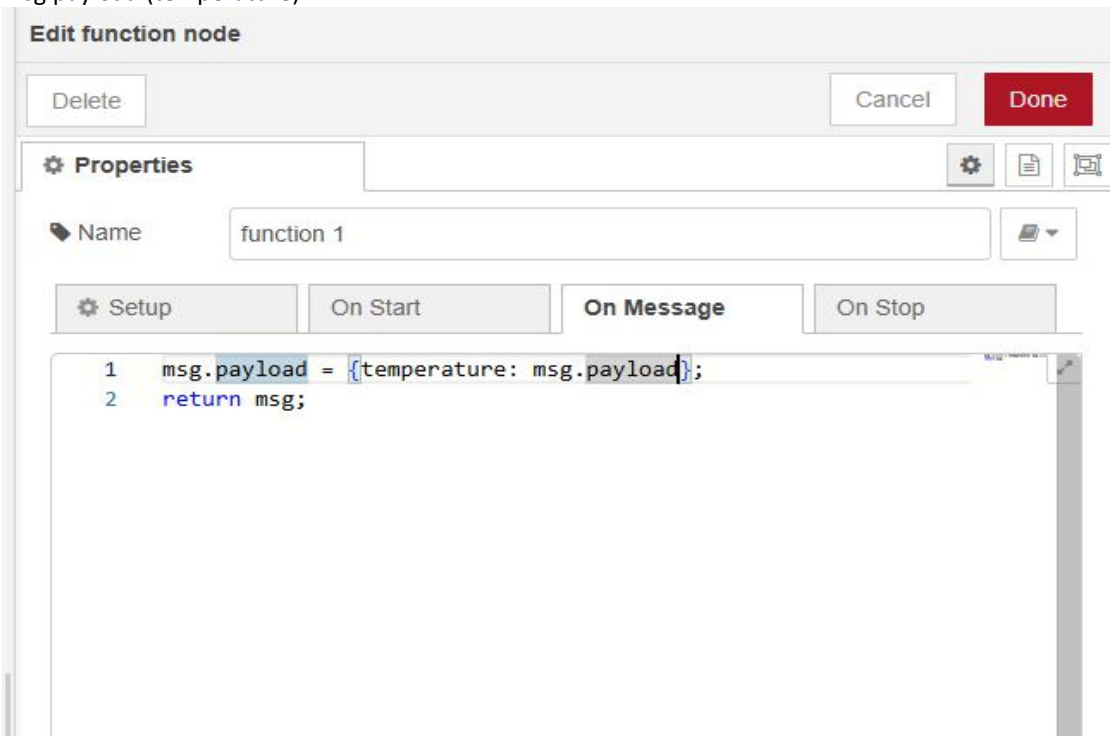


Click add, now u can see the plc connection is added in the properties of the node



3. Now assign the node with variable.

4. Function node :- Now drag and drop a “function” filter node and connect it with “s7 in” node. And write this in the function node by double clicking it. msg.payload = {temperature: msg.payload};
Note the data key in the value card in thingsboard should be same to the variable name assigning to msg.payload.(temperature)



5. MQTT out node :-

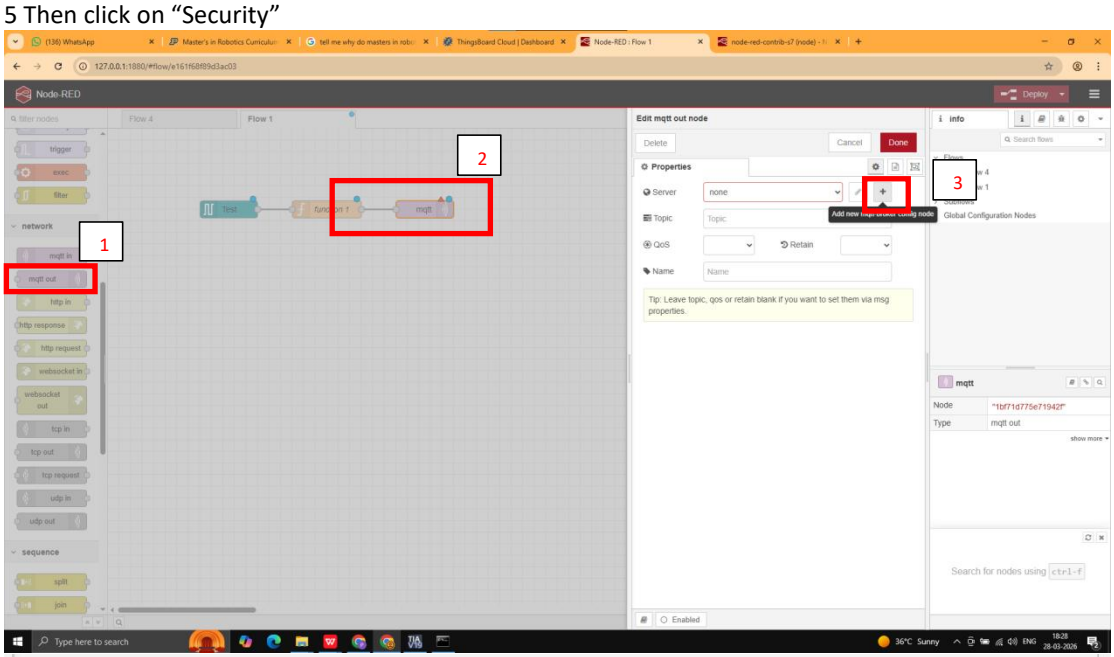
1 Drag and drop a “mqtt out” node in your node

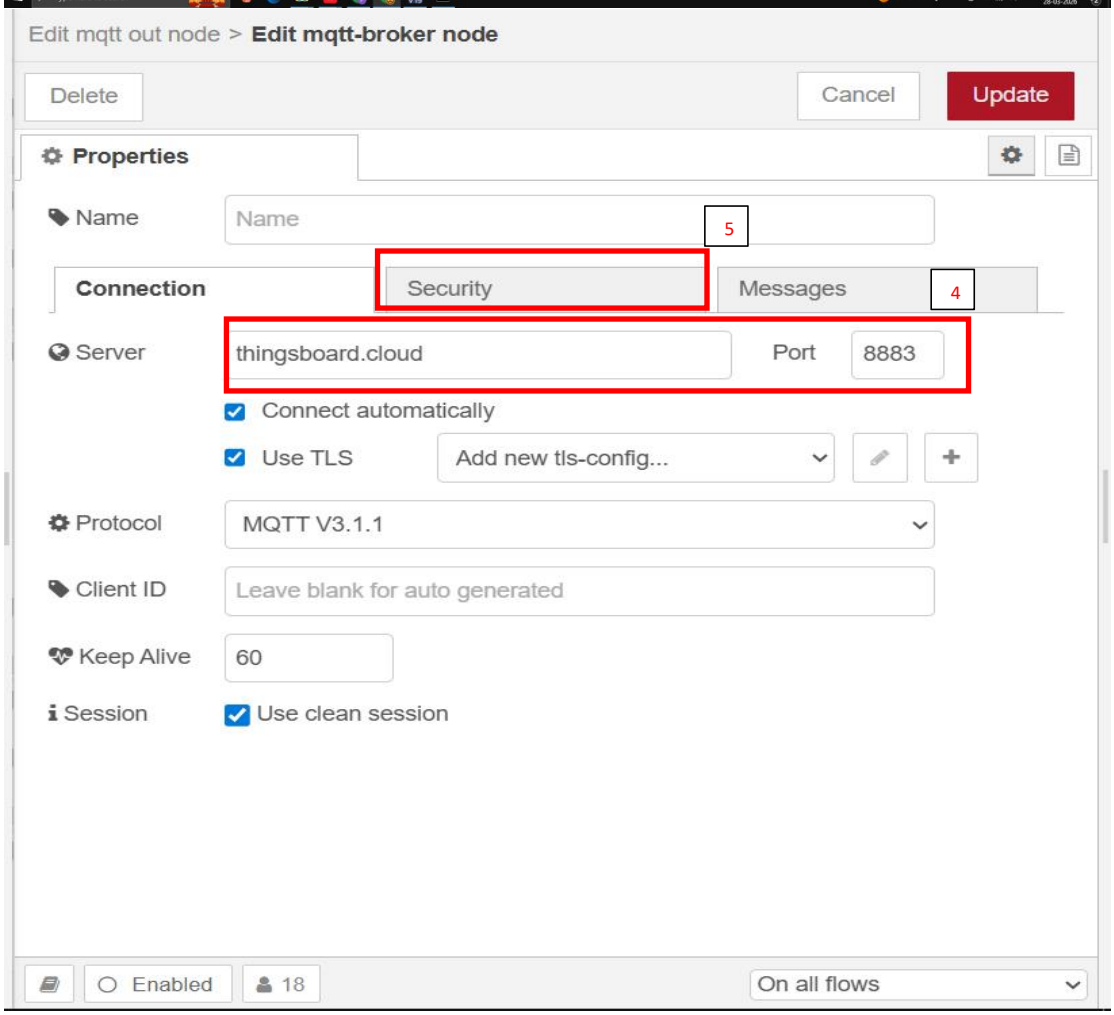
2 Connect it with function node and double click on the mqtt out node to open properties.

3 Click to add cloud server of things board.

4 Add thingsboard.cloud to server name port 8883. (Note if the node-red is unable to connect to thingsboard then cahnge port to 1883 and uncheck the TLS option.)

5 Then click on “Security”





6. Then go to thingsboard dashboard

1 go to devices

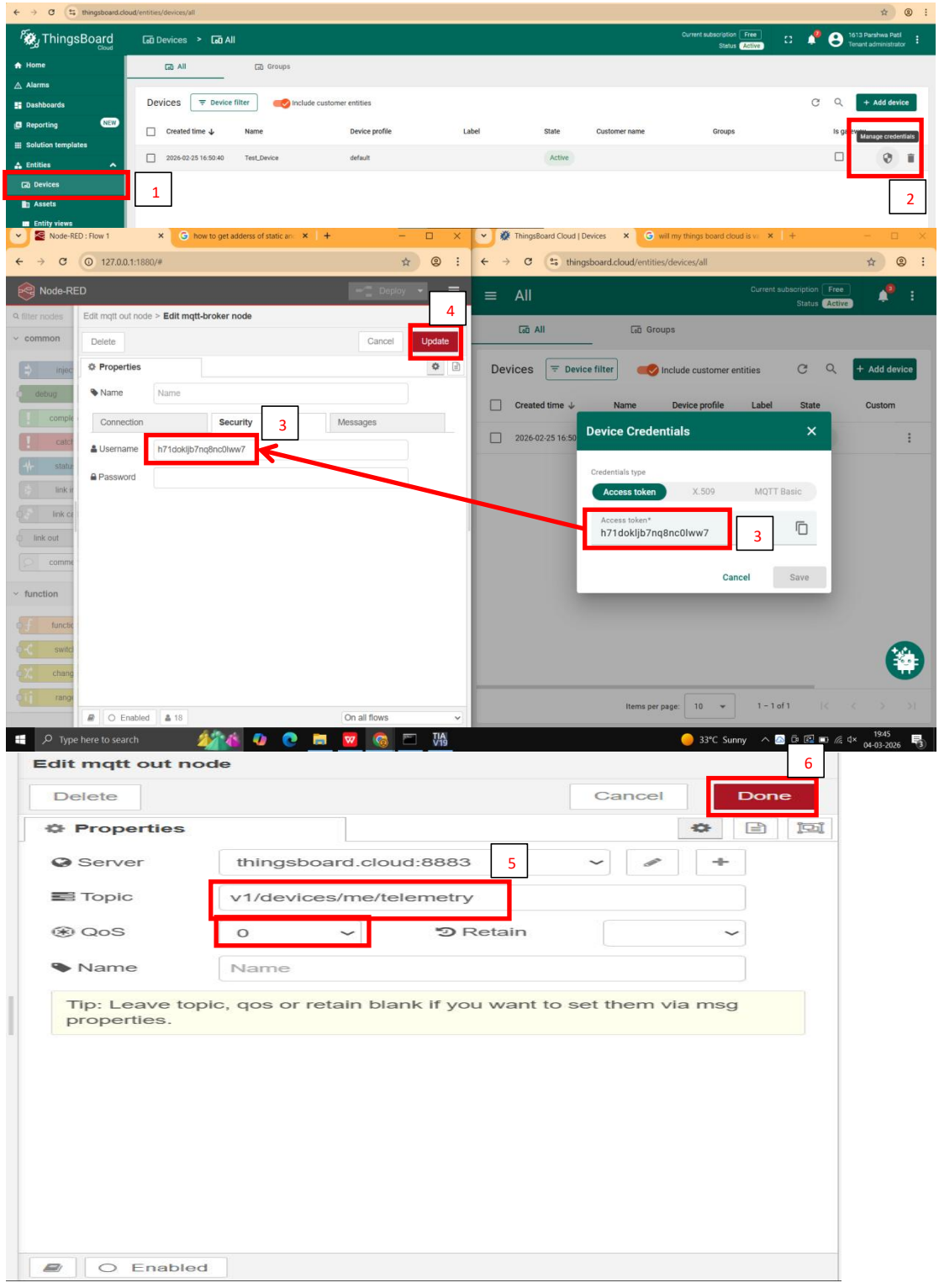
2 click on Manage credentials

3 copy paste the Access token to the node red mqtt out>Properties>Security>Username(no space or any changes in the Access token)

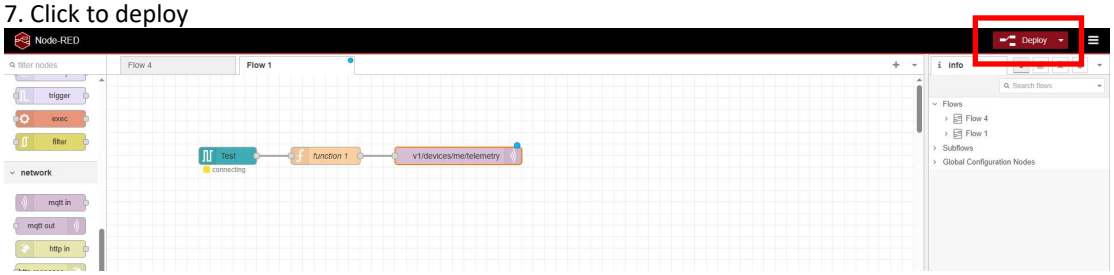
4 click “Update”

5 add topic v1/devices/me/telemetry and set QOS to 0.

6 click “Done”



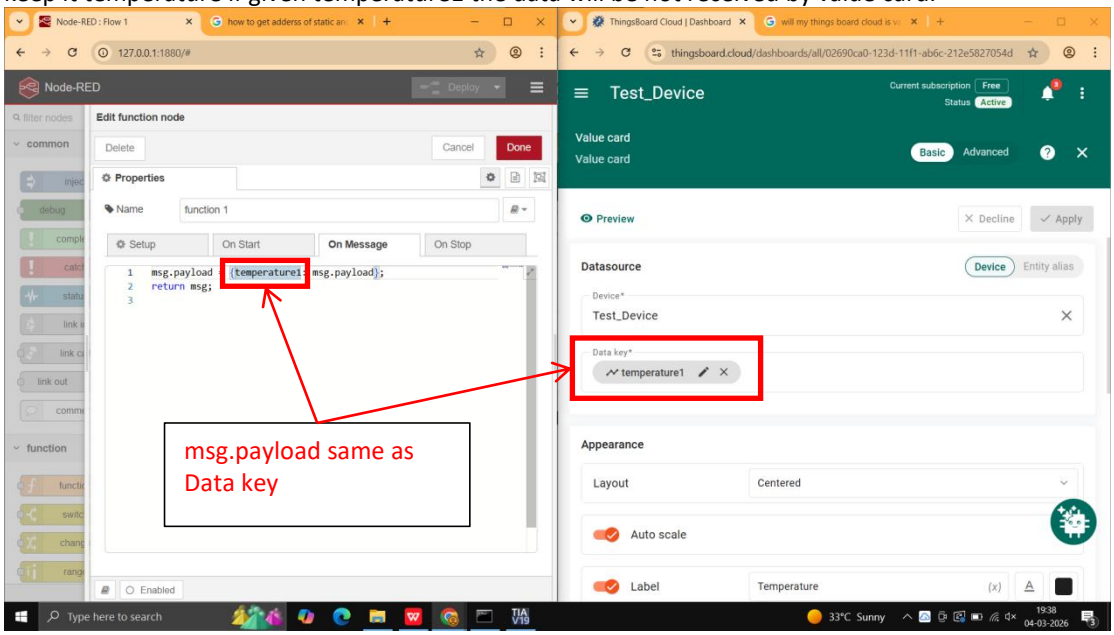
7. Click to deploy



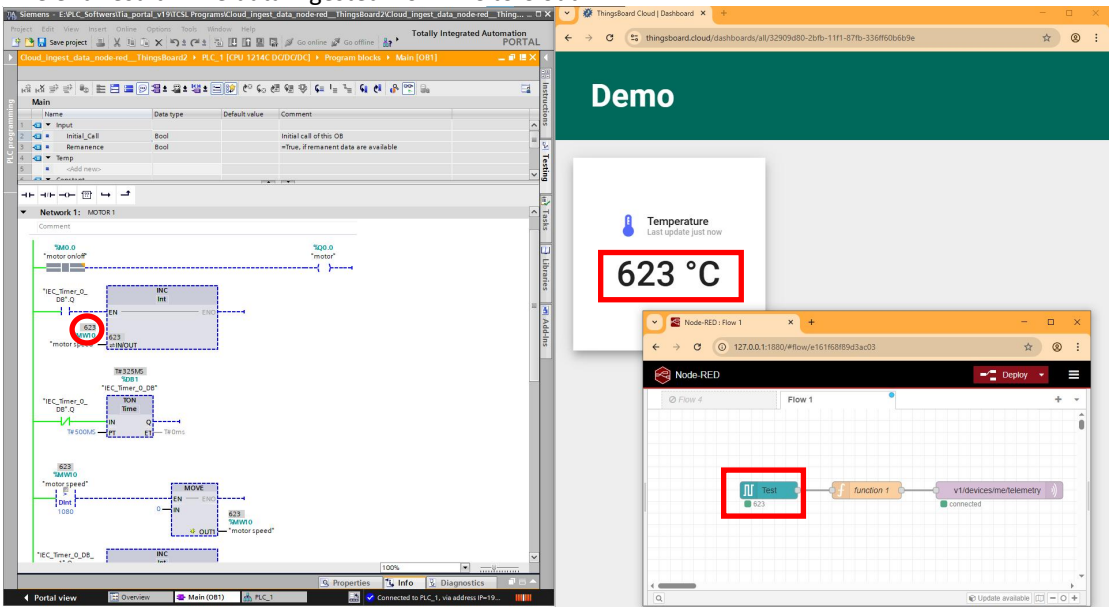
Once the s7 input show online then it starts writing the temperature values to thingsboard cloud when the temperature value changes

Now you can see the temperature live value in the thingsboard dashboard you have created.

Note: Datakey of Value card should be same to your code in the function if temperature in Value card keep it temperature if given temperature1 the data will be not received by value card.



The end result: - live data ingested from PLC to Cloud.

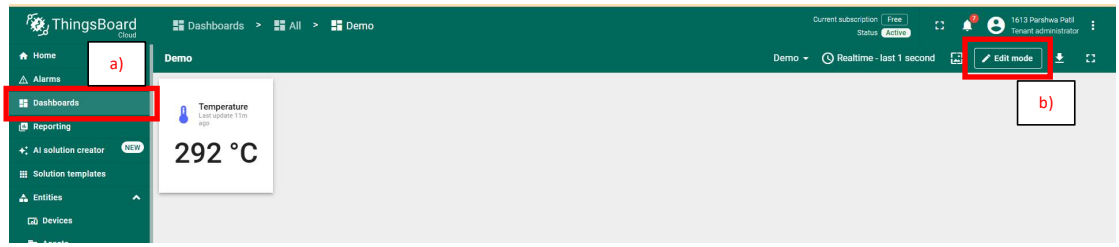


Read data from cloud and wirte to plc through node-red. (Control)

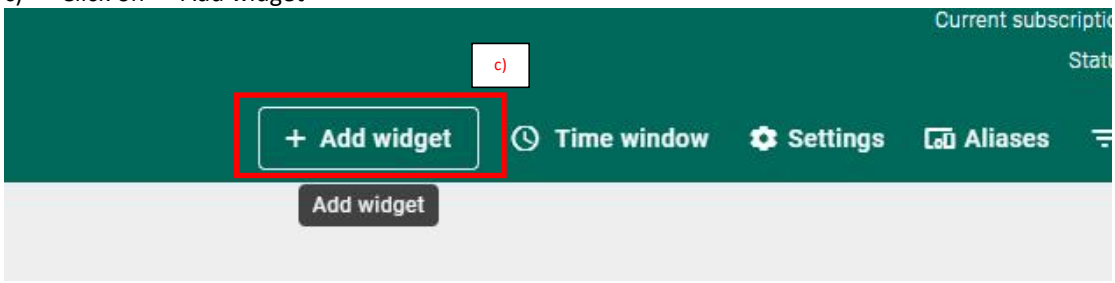
1. Add button with state reflection to control physical device from cloud.

a) Open the “Dashboard”

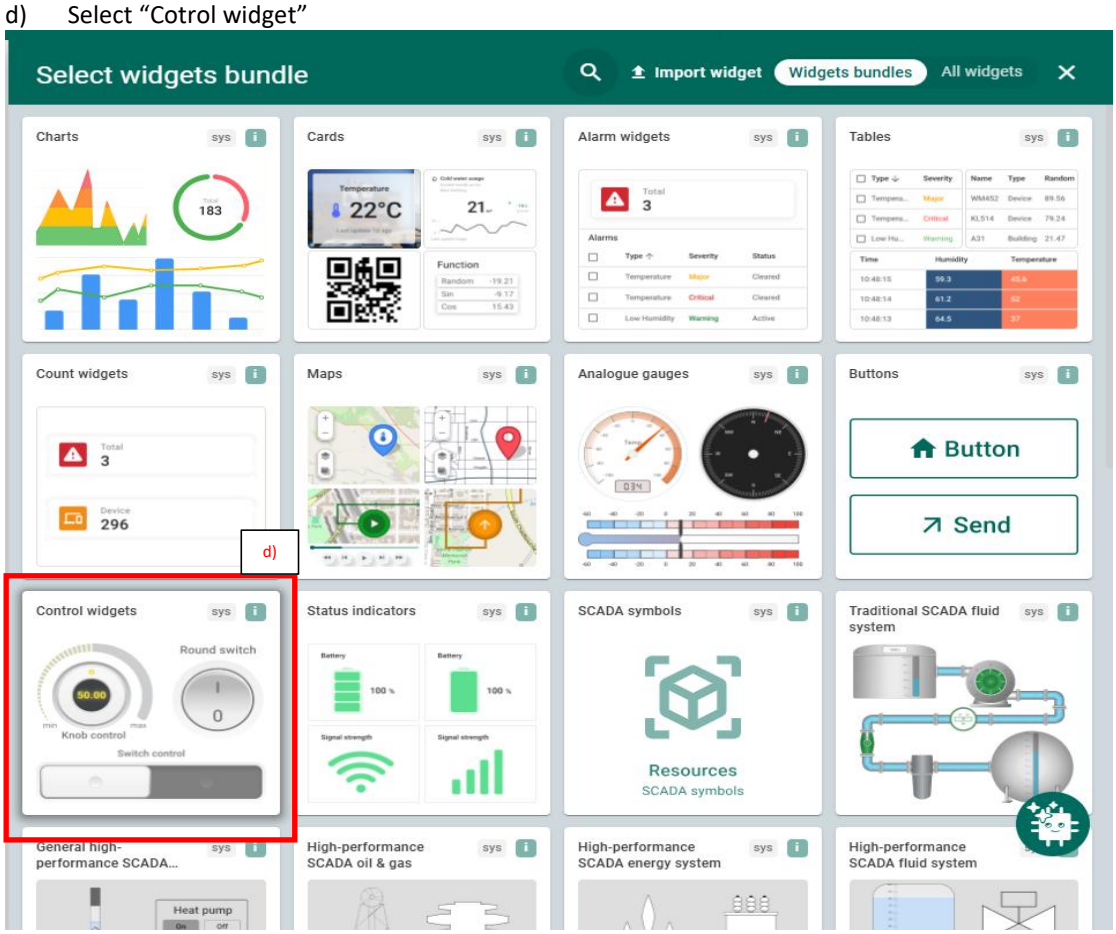
b) Click on “Edit mode”



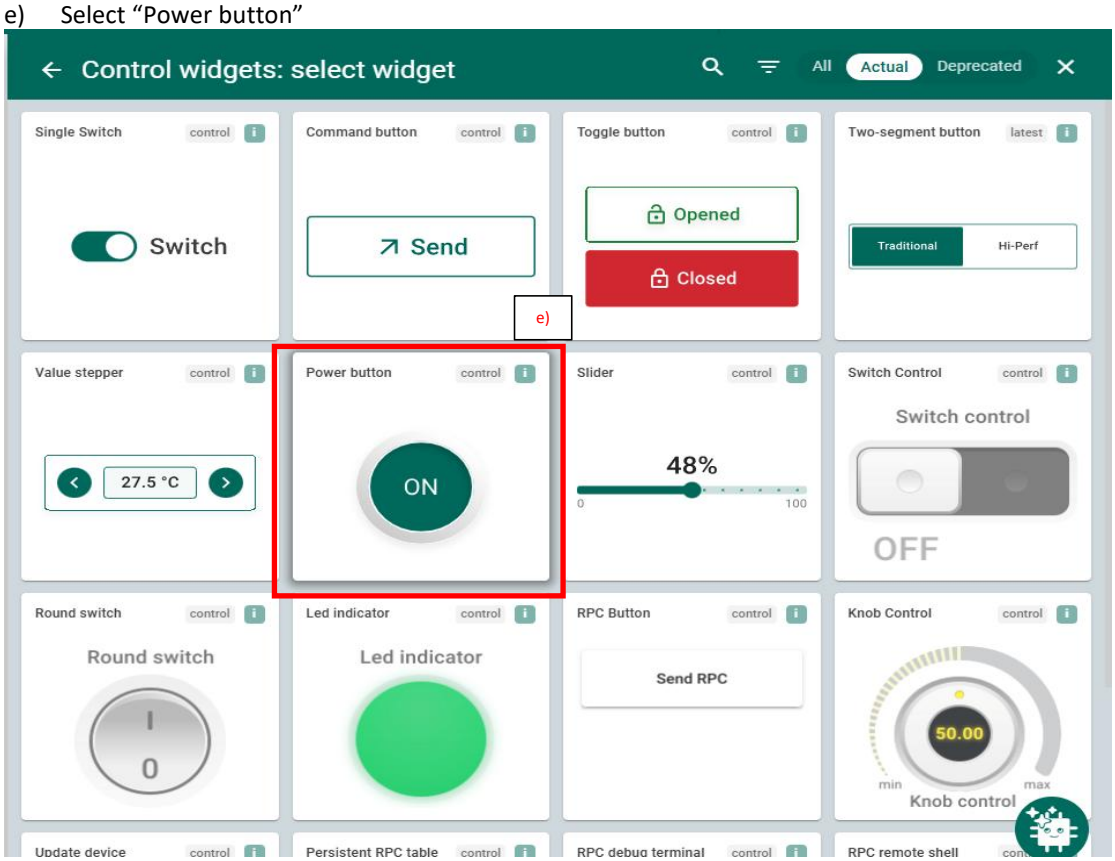
c) Click on “+ Add widget”



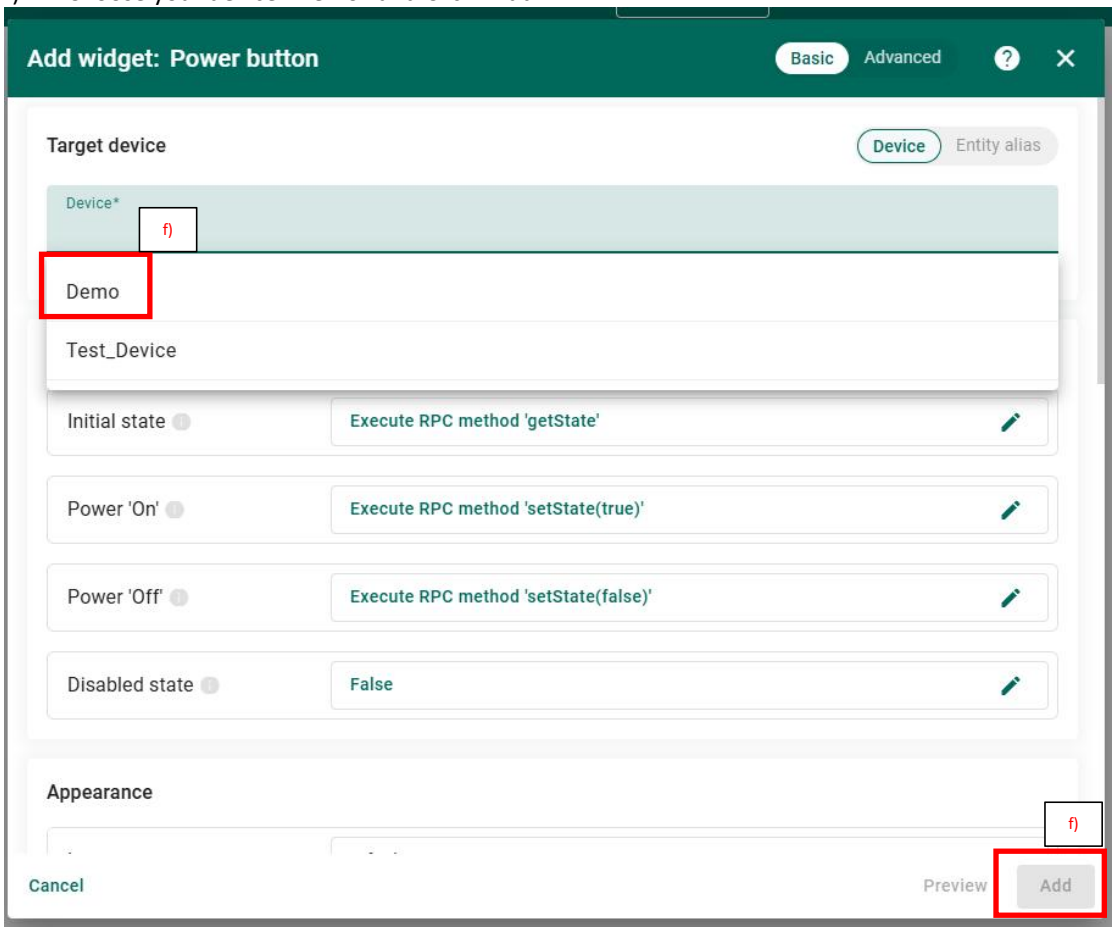
d) Select “Cotrol widget”



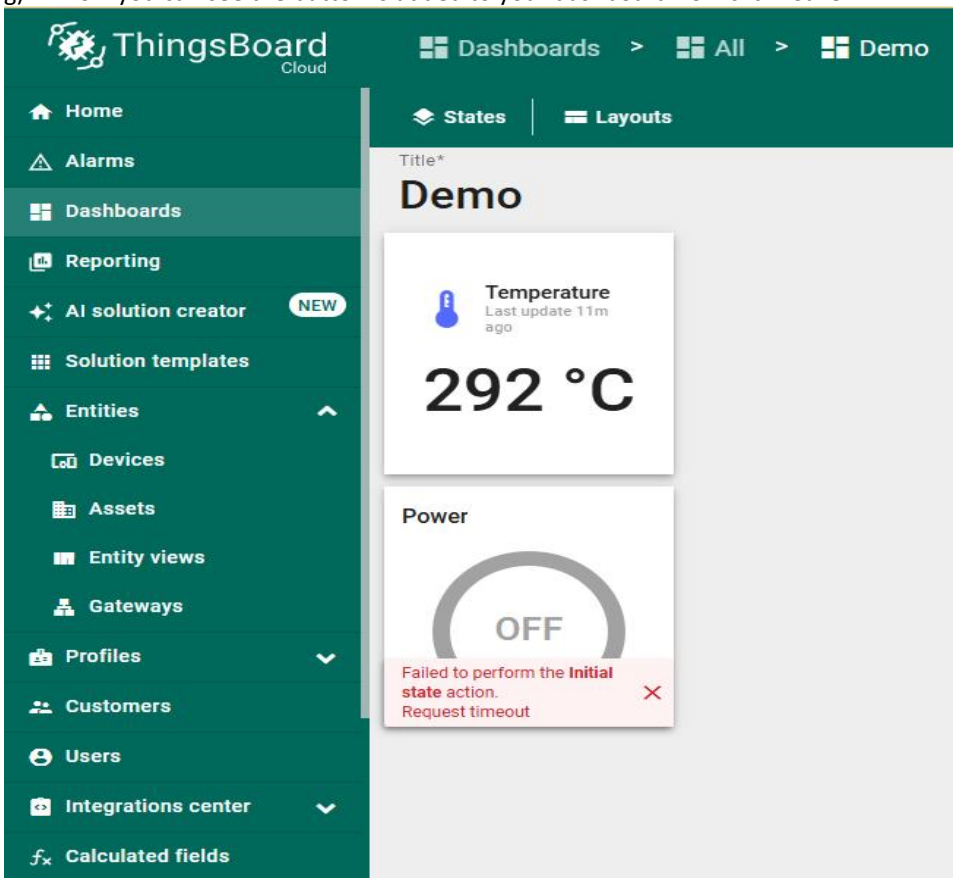
e) Select “Power button”



f) Choose your device “Demo” and Click “Add”

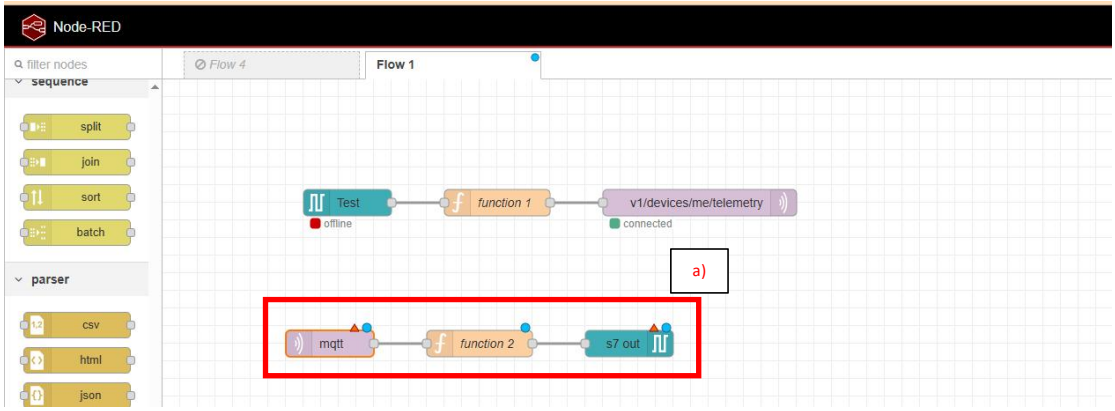


g) Now you can see the button is added to your dashboard now click “Save”.

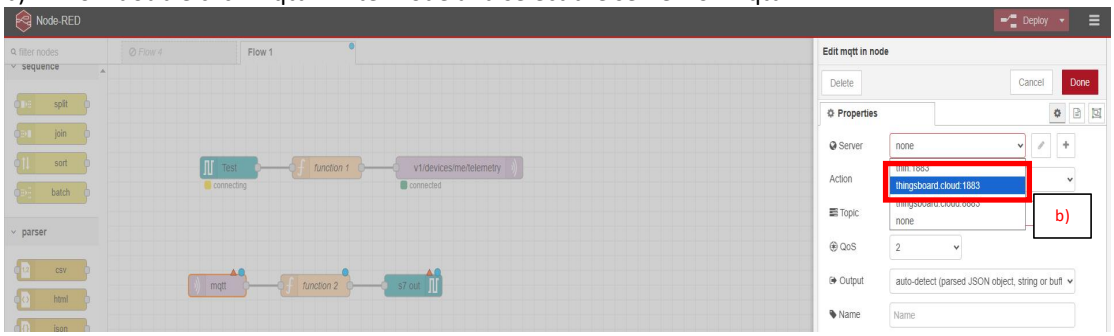


2. Configure the node-red flow to read values from button and write value to PLC .

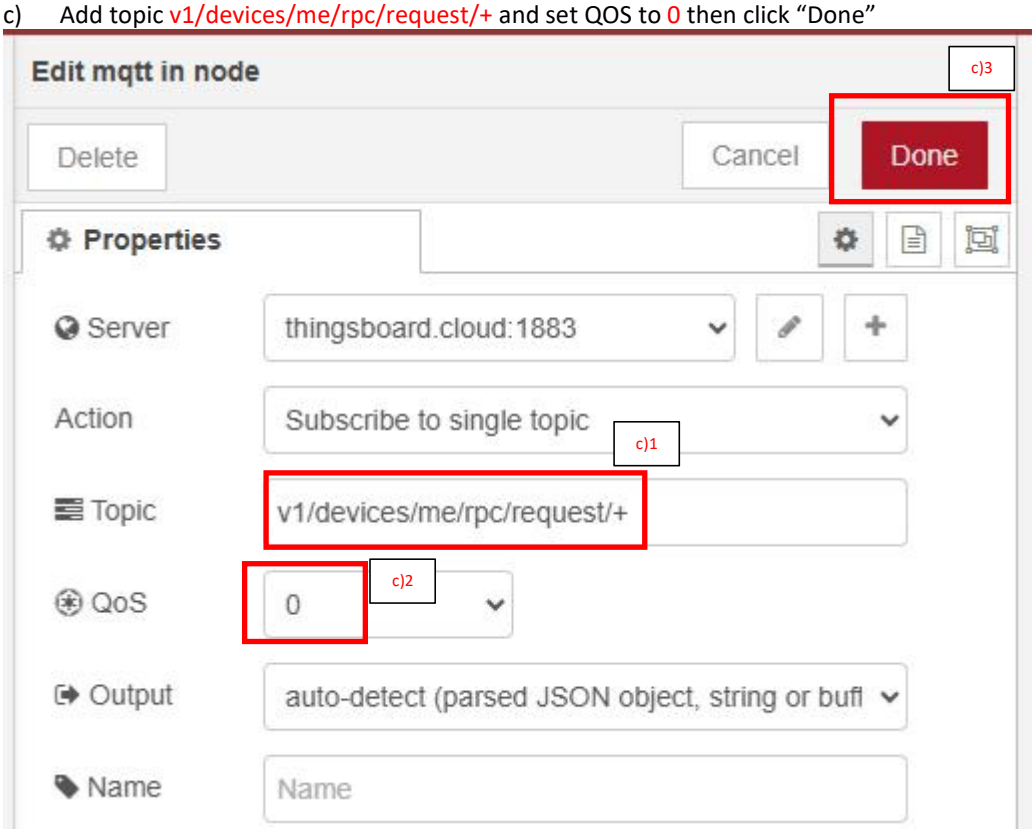
a) Grab all these filter nodes mqtt in>function>s7 out.



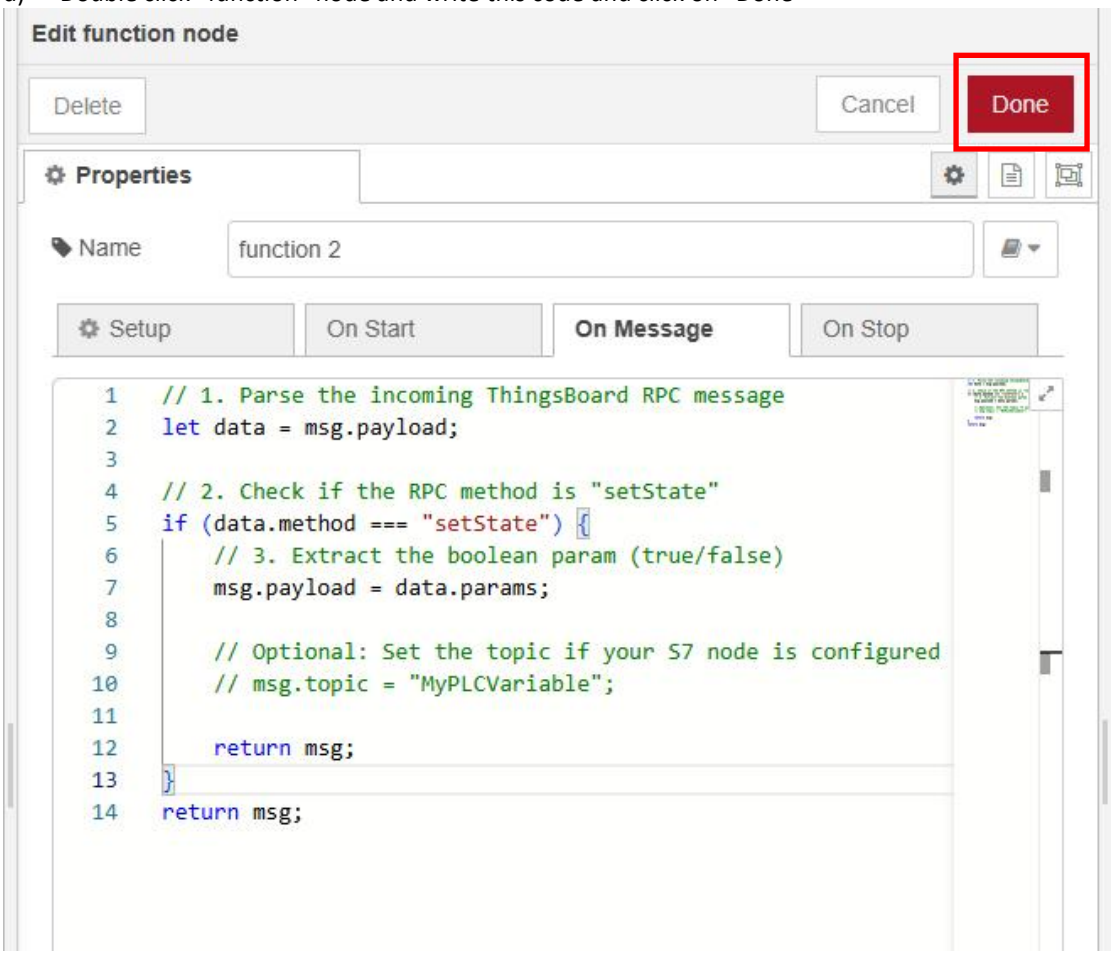
b) Now double click mqtt in filter node and select the server for mqtt in.



c) Add topic v1/devices/me/rpc/request/+ and set QOS to 0 then click “Done”



d) Double click “function” node and write this code and click on “Done”



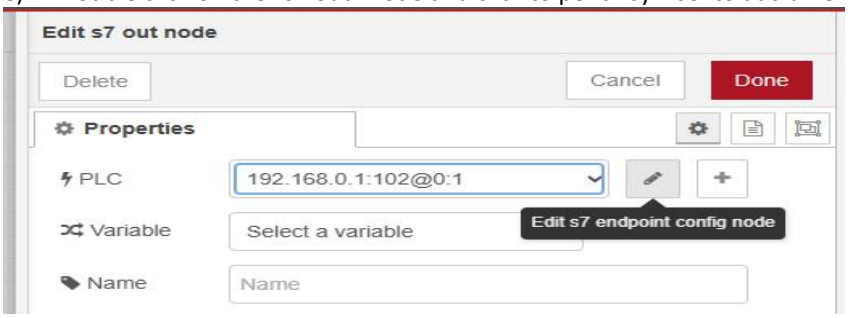
```
// 1. Parse the incoming ThingsBoard RPC message
let data = msg.payload;

// 2. Check if the RPC method is "setState"
if (data.method === "setState") {
    // 3. Extract the boolean param (true/false)
    msg.payload = data.params;

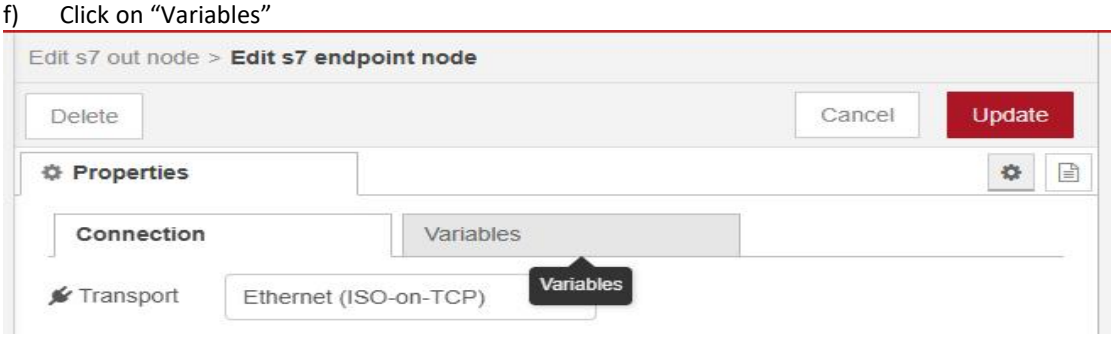
    // Optional: Set the topic if your S7 node is configured for
multiple variables
    // msg.topic = "MyPLCVariable";

    return msg;
}
return msg;
```

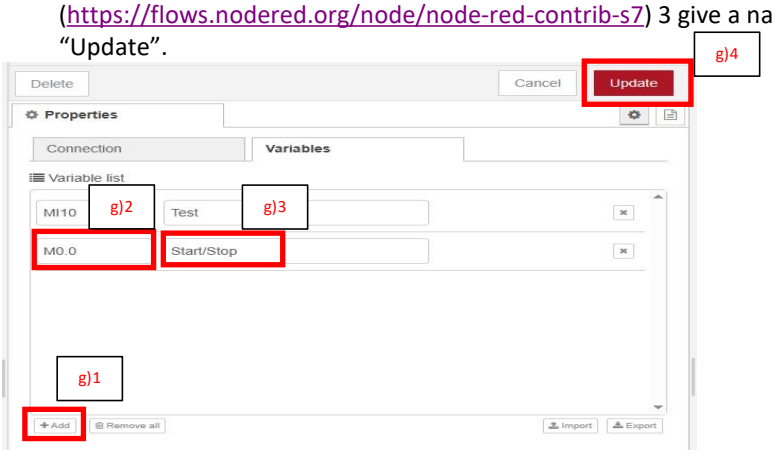
e) Double click on the “s7 out” node and click to pencil symbol to add a new variable.



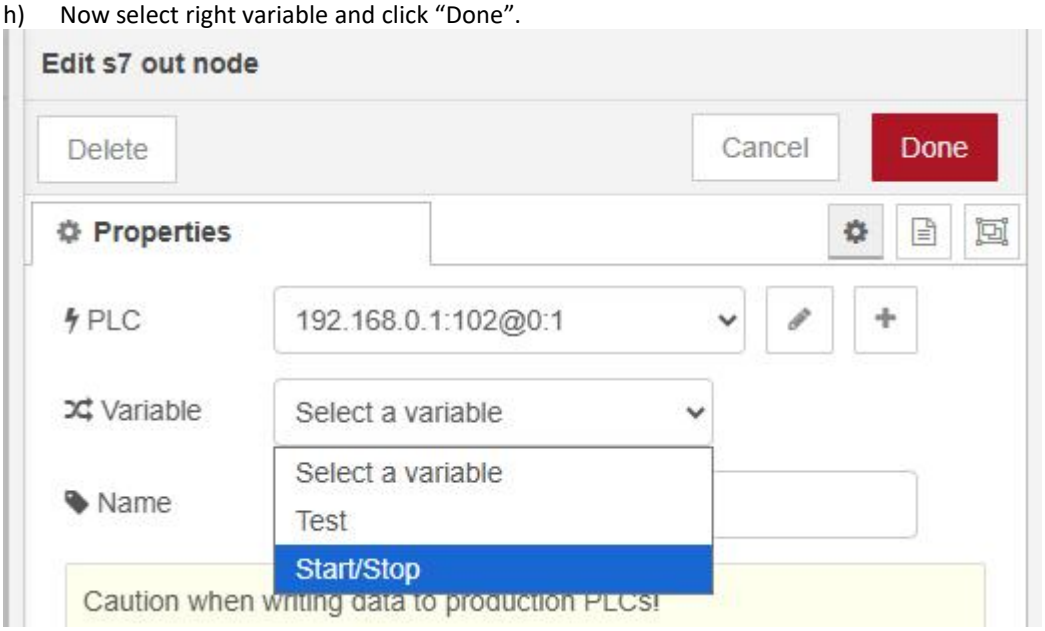
f) Click on “Variables”



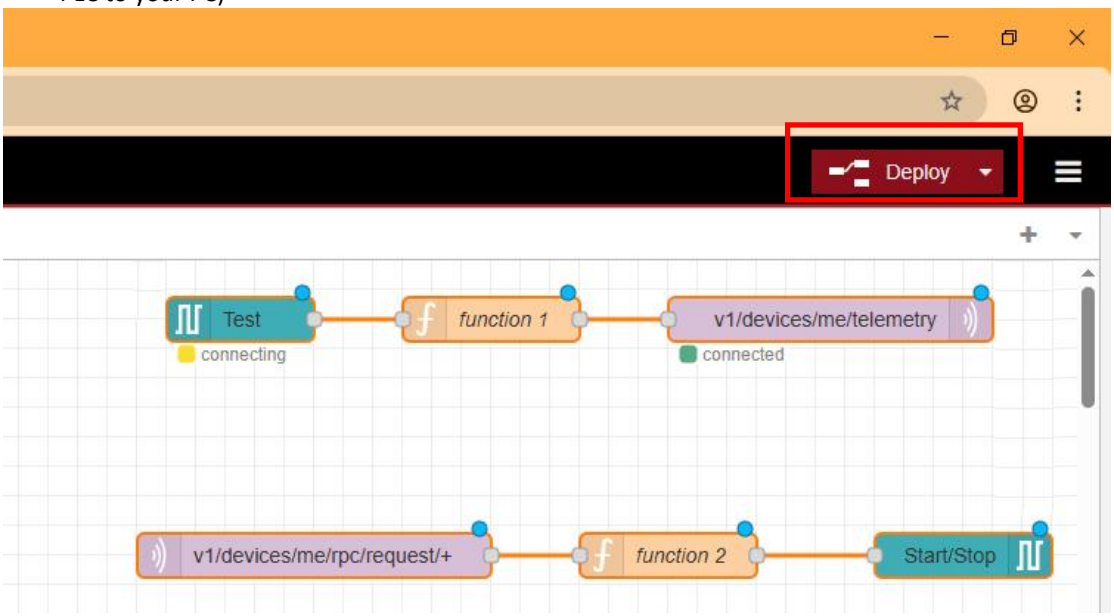
g) 1 Click “Add” then 2 give the valid node-red address for PLC address (https://flows.nodered.org/node/node-red-contrib-s7) 3 give a name to the variable 4 then click “Update”.



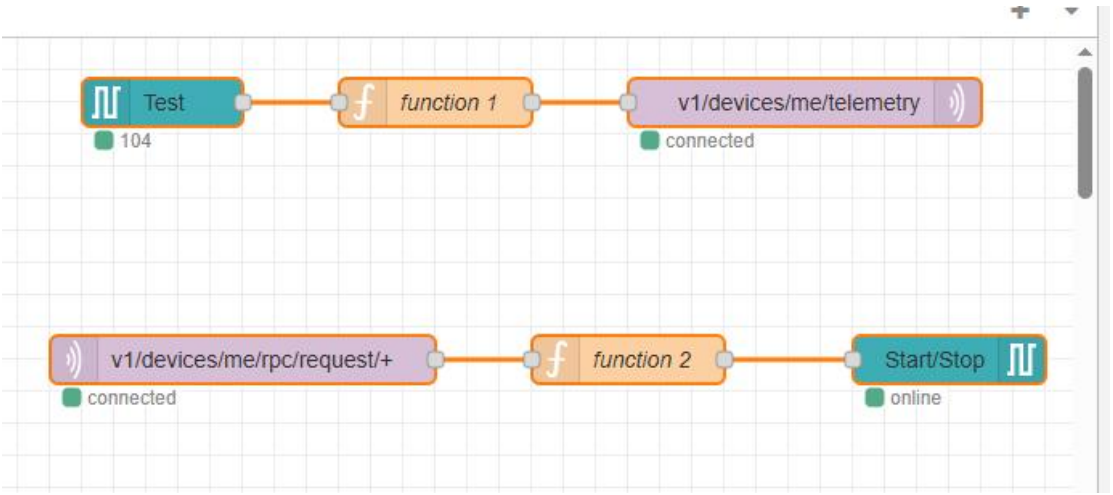
h) Now select right variable and click “Done”.



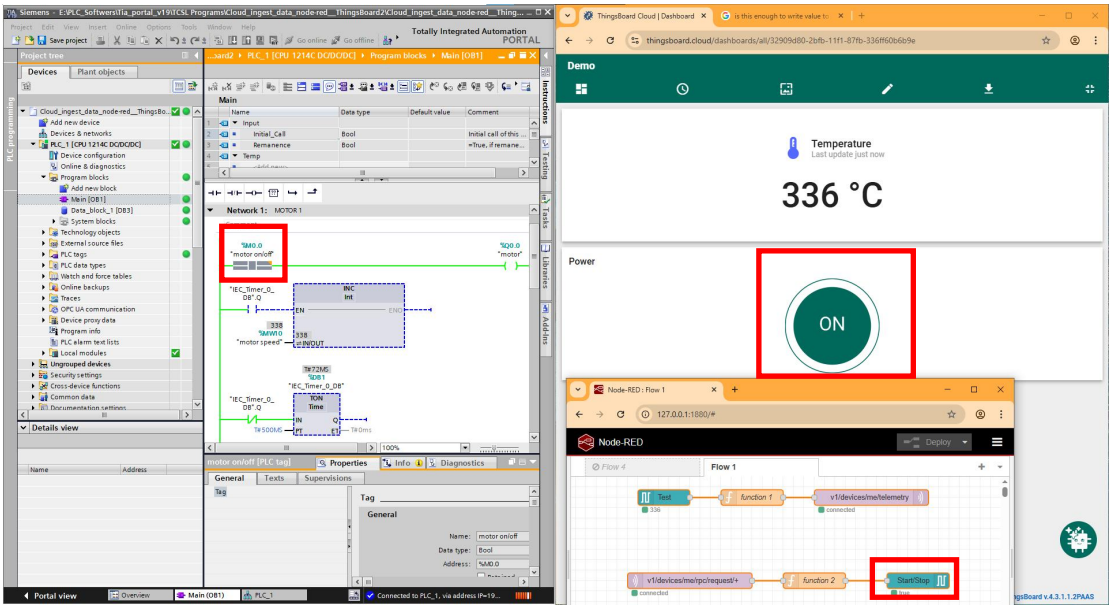
i) Now this is how your Flow looks like. Now click “Deploy”. (make sure you have connected your PLC to your PC)



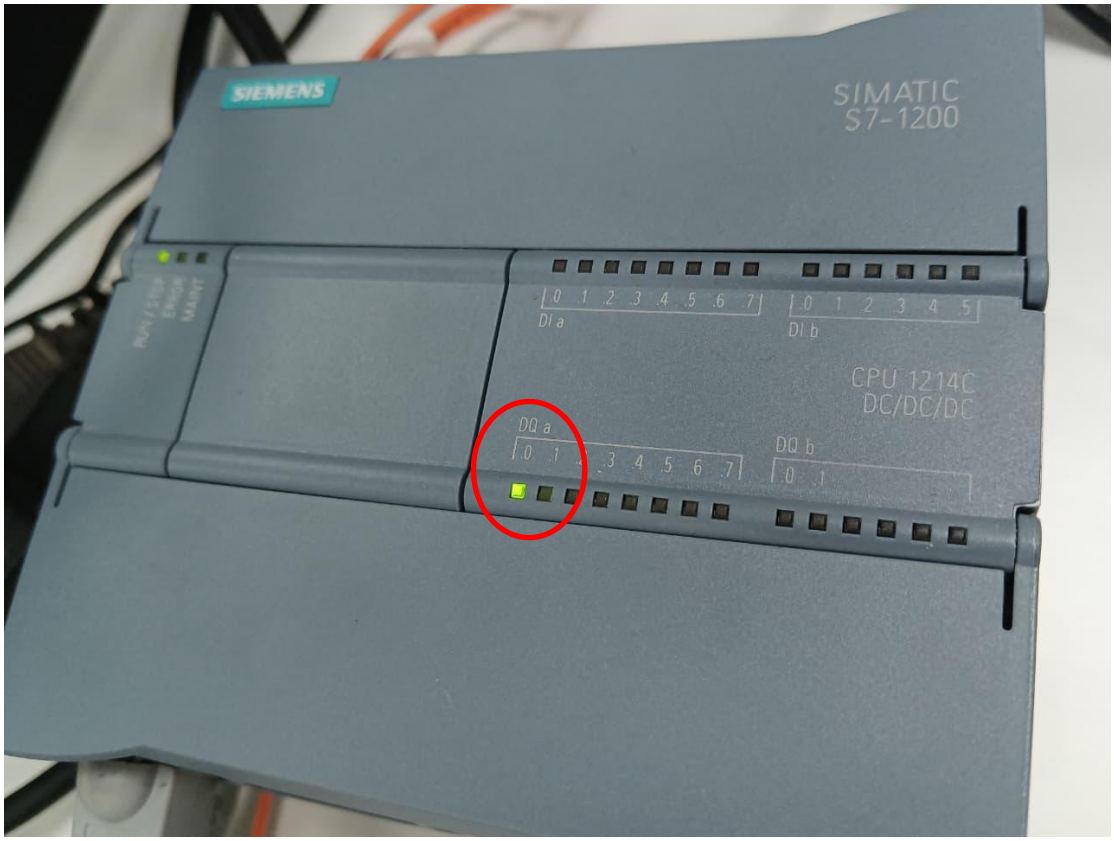
Now the PLC and cloud both are online and connected to node-red.



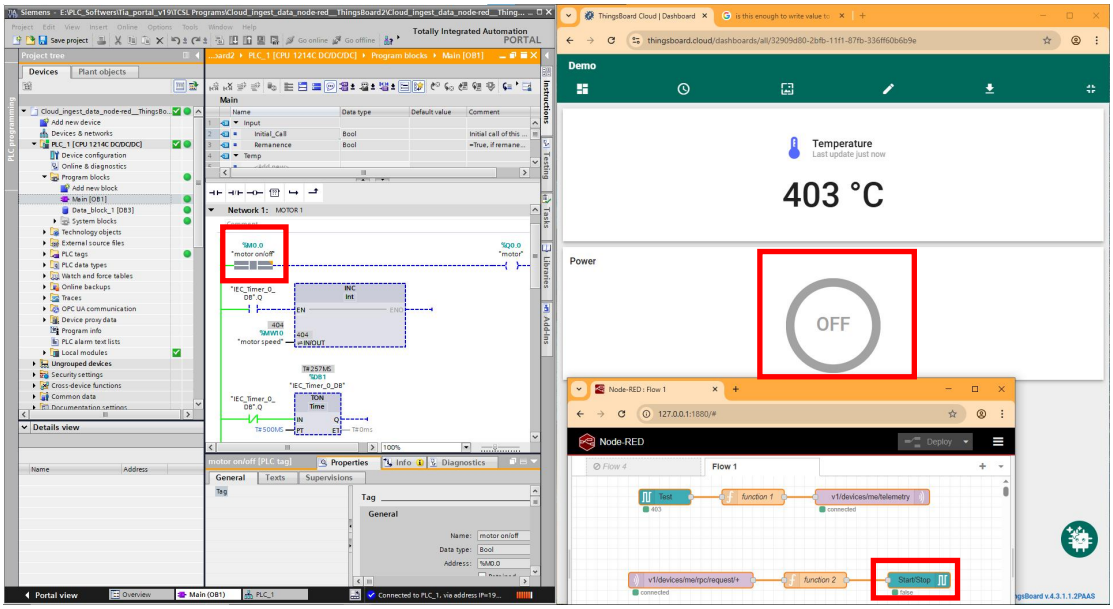
When button is turned “ON”



PLC D0 is turned ON.



When button is turned “OFF”



PLC D0 is turned OFF.

