Project Report

Dashboard And Data Analysis for IoT Application

Home automation-

Home Automation System using the various dashboard nodes with various Layout Groups which Include open weather API data which shows the city name(any) with wind speed and cloud data.

Analysis earthquake dataset-

Taking value of RMS Value from a csv file that is (http://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/2.5_day.csv)

ABSTRACT-

Home automation has achieved a lot of popularity in recent years, as day-to-day life is getting simpler due to the rapid growth of technology. Almost everything has become digitalized and automatic. In this paper, a system for interconnecting sensors, actuators, and other data sources with the purpose of multiple home automations is proposed.

In this project a dashboard is made with the help of node red to control the the things of home like Air Conditioner, Refrigerator, Light From Other place with the help of Mobile Phone or Tablets.

In this project if we input the City name and API Key and click on the inject node then with the help of debug we get the Weather details of the city like Cloud condition, Wind Speed, Wind Direction, Visibility, Sunrise and Sunset.

And in this project we get a data from an online csv file and From that csv file we can get the value of magnitude of earthquake and the RMS value of the earthquake and from that RMS value we have to see which RMS value is Better fit for the earthquake condition.

INTRODUCTION-

Dashboard and Data Analysis for IoT Application is Very Great Feature in the field of Electronics Engineering. As in the Upcoming Time Everything is going be autonomous and based on Artificial Intelligence.

Dashboard is the thing with the help of which we can control the Electronic Devices from a very far distance with the help of Internet of thing and Cloud Networking.
Dashboard give us the controls like Button, Slider, Switches on the user interface of the dashboard.

We can make the dashboard with the help of many software and one of which is NODE-RED.
In this project the dashboard is made with the help of Node-Red.

In the dashboard there are many tabs having different groups and the groups contains so many controls like Switches, Buttons and so many output representation tools like Gauge, Levels, Compass, Charts(Pie Chart, Line Chart, Bar Chart and Radar Chart) etc.

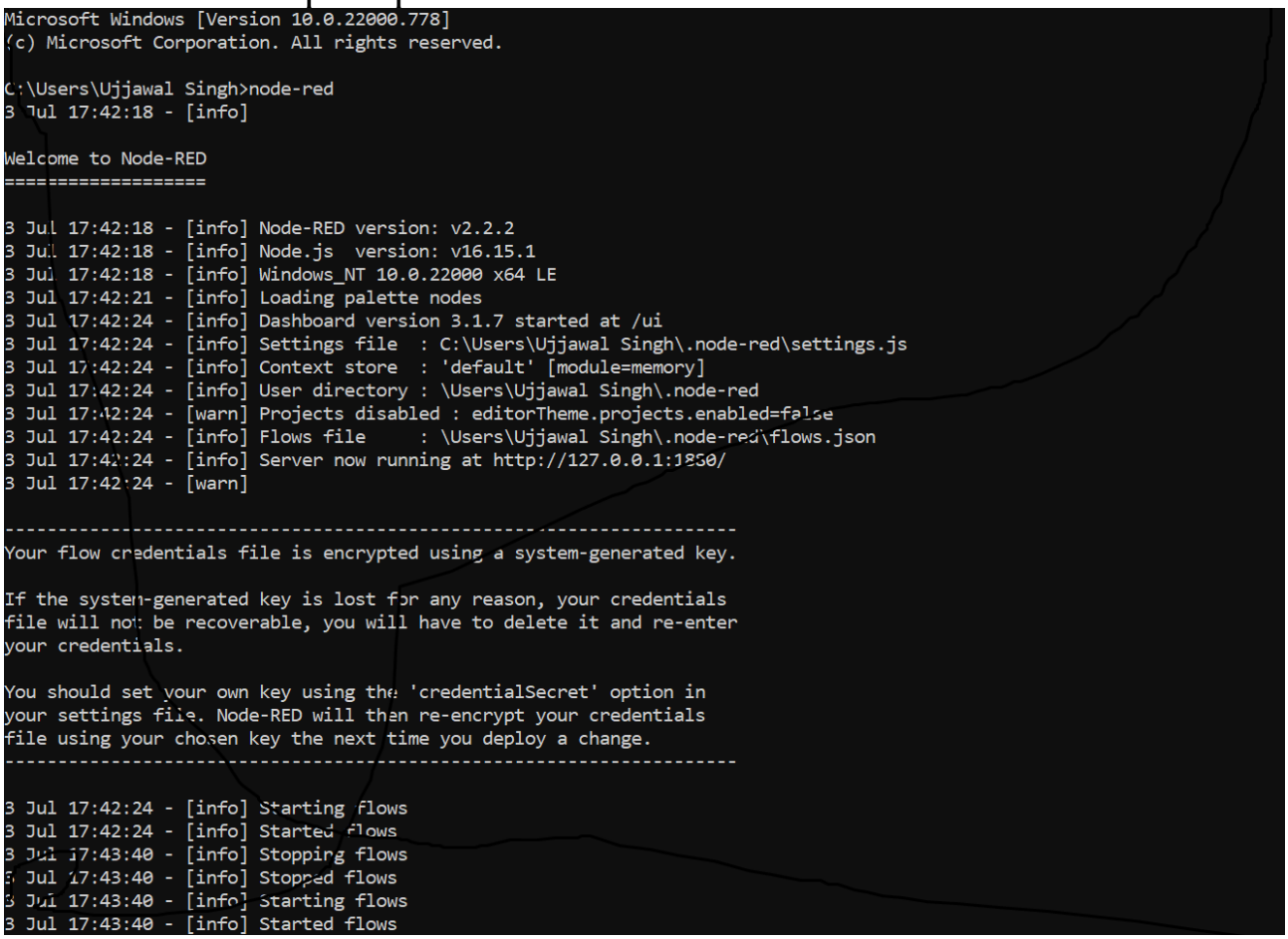
Data Analysis is the analysis of Previous Data or Current Data.
In this project we are working on Previous data of Earthquake from a csv file from online source which contain Earthquake Magnitude details, Earthquake RMS Value Details(RMS Value- This parameter provides a measure of the fit of the observed arrival times to the predicted arrival time for this location). In this Project when the inject node is pressed the http request send the data of selected property to the debug terminal and with the help of switch node.

In this project using openweathermap we get an api key and with the help of that api key and city name in the following http request (https://api.openweathermap.org/data/2.5/weather?q={Cityname} &app={Api Key})
In this project using the http request we get the current details of weather of the given city name. In the above http we have to give the city name and an api key. We can get the details by giving latitude and longitude as well. In the data analysis we can store the present data by time and interpret that data on dashboard with the help of node red.

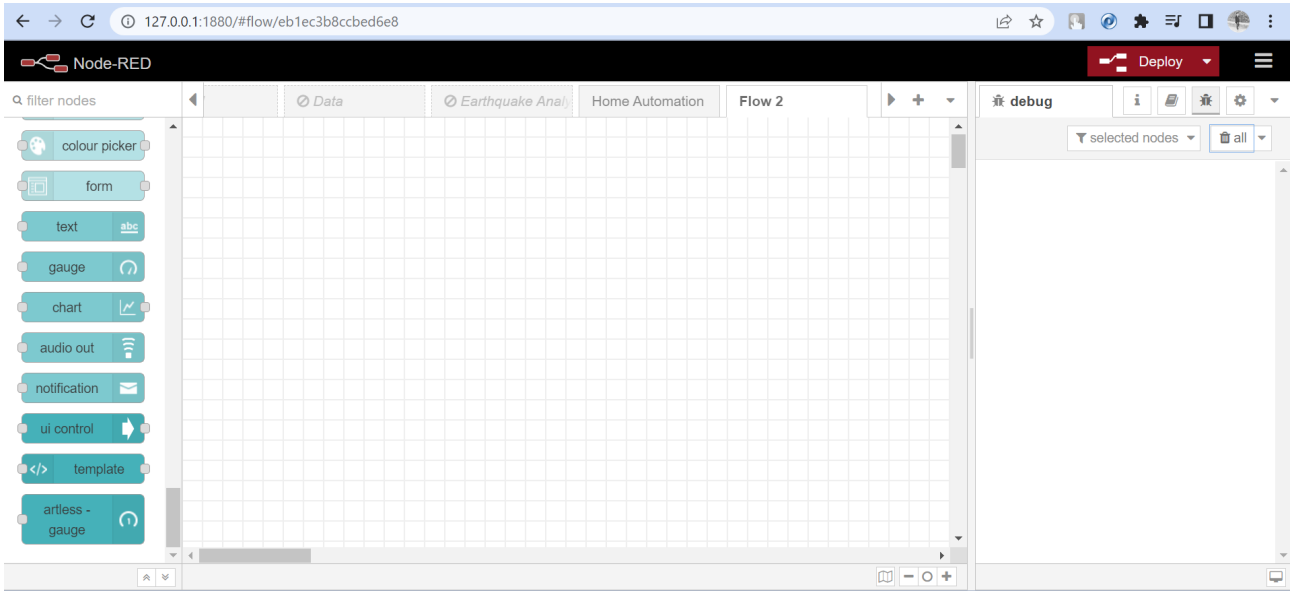
METHODOLOGY-

The methodology here means the method of making the dashboard for Home Automation and Weather Detail And the method of doing the analysis on the previous Earthquake data from the internet source.

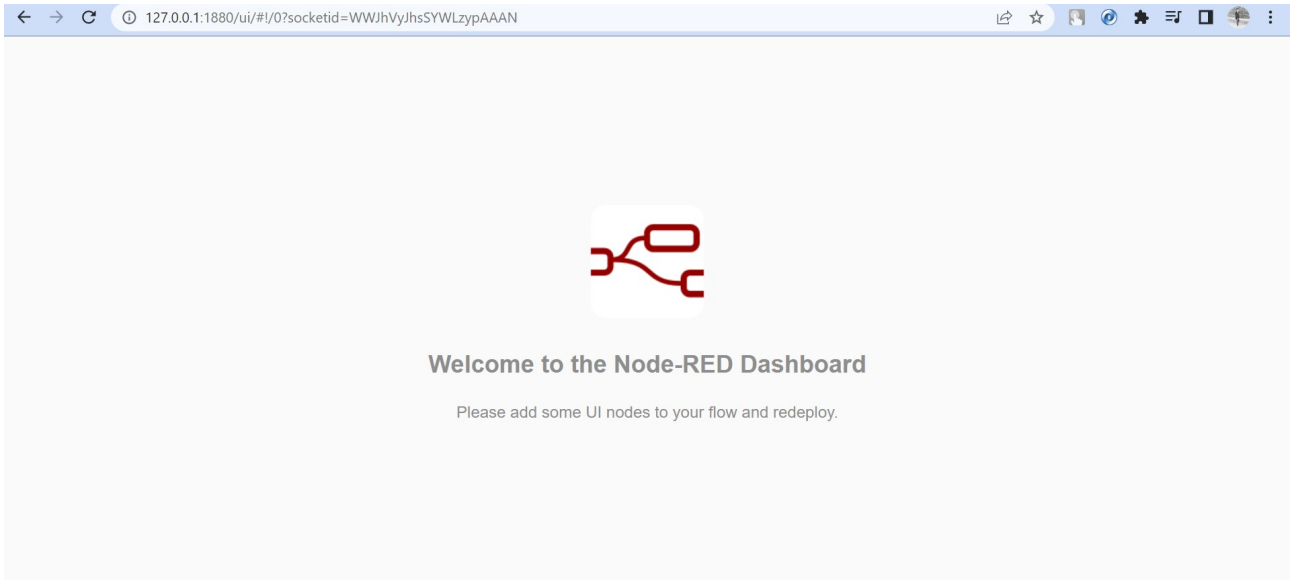
Firstly we have to install nodejs in our computer(node --version && npm --version) as it is free we can get is from internet. After that we have to install node red in our system using some commands in the command prompt of the system(npm install -g --unsafe-perm node-red). After that for running node red in the system we have use command prompt and write node-red in the command prompt and press enter as in the below shown command prompt.



After running node red we get an URL from command prompt we have to copy and paste that URL in a new browsing tab to open node red where we get an open place where different different nodes are connected with each other to create a dashboard and that place is called Flow. Flow can be enabled and disabled by double clicking on flow name.
This flow is shown below in a screenshot-



After connecting the nodes we have to deploy the connection by clicking on the deploy button in the right upper corner as shown in the above picture. After deploying if we have to see the dashboard or user interface we have to copy the URL and adding ui term in that URL we open that in new tab as shown below.



Using the above thing we can make dashboard.

To make a home automation dashboard we have to use different different nodes like Inject node(To inject some string or number or will be equal to timestamp), Debug node(It is the debug terminal where all the properties of any data is displayed after deploying), Switch node(Used to switch

between two conditions), Slider node(Used to give a control on the user interface), Button node(Gives a button on the user interface), Function node(these nodes are used to perform some specific task) and Http request node(these node are used to make http request).

In Home Automation dashboard following nodes are used and in the same home automation dashboard there is a tab of weather details like cloud percentage, Wind Speed and City Name.

To make the dashboard we firstly take an inject node and connected it with a switch node and then connect it to the message paylod (debug node) same like this we connect all other required nodes and deploy them to get a dashboard as shown in the figures below.

In Home automation dashboard made in this project contain four tabs which are as following-

- Garden
- Home
- Garage
- Current Weather Detail

In Garden there are switches to control the lights of the garden and there is water level indicator in the plants and there also a switch for irrigation control in the plants.

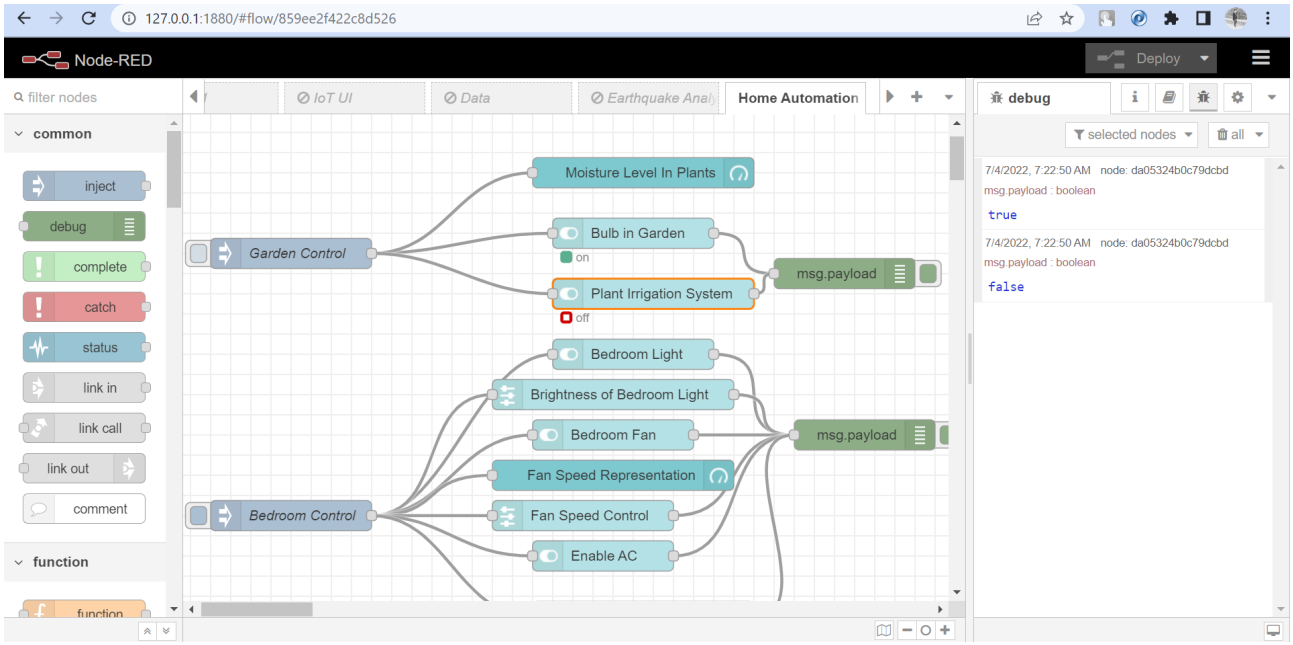
In Home there are so many switches for bulb in bedroom,hall room, bathroom, Kitchen, Stairs and Terrace. Also there is sliders to control the brightness of light in the bedroom. And there are so many switches for Fan and Air Conditioner enable and there is given sliders to control the AC temperature and Fan Speed. There is given a button for speaker to turn it on and off. And there is a switch on the dashboard for Television.
There are switches for Refrigerator, Induction, Washing Machine and the Water Heater on the Dashboard.

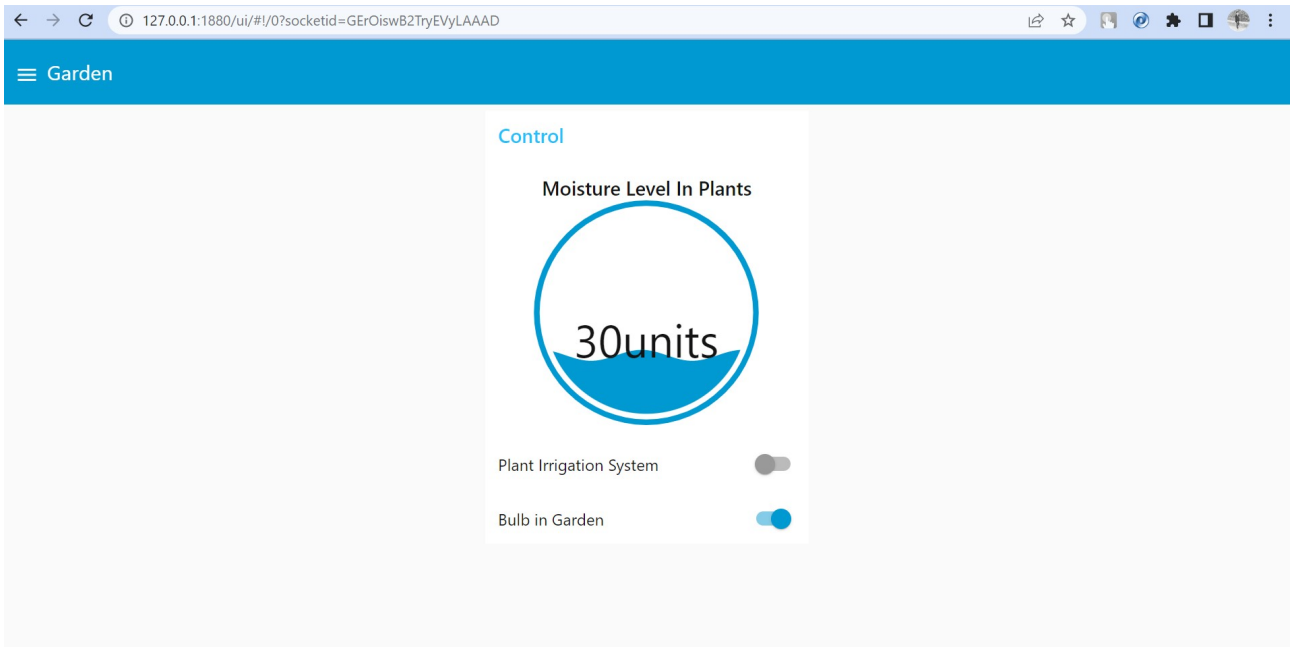
In Garage there are switches for Garage Door and Garage Lights. On enabling the Garage Door the door will open and on enabling the Garage Light the garage lights turn on.

When the switch is on it show True in debug terminal else it show false.

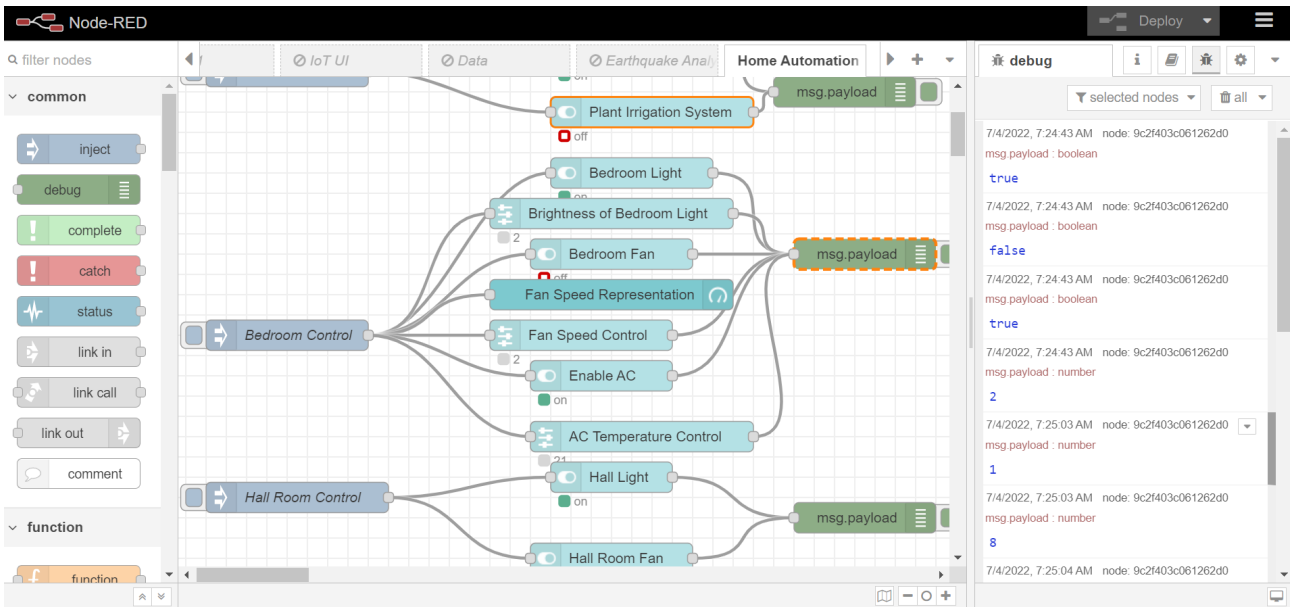
The fourth tab is about the weather details. This is made by using some function nodes and http request nodes.
In this tab at user interface we get the Wind speed, Cloud Percentage and the Name of the City.

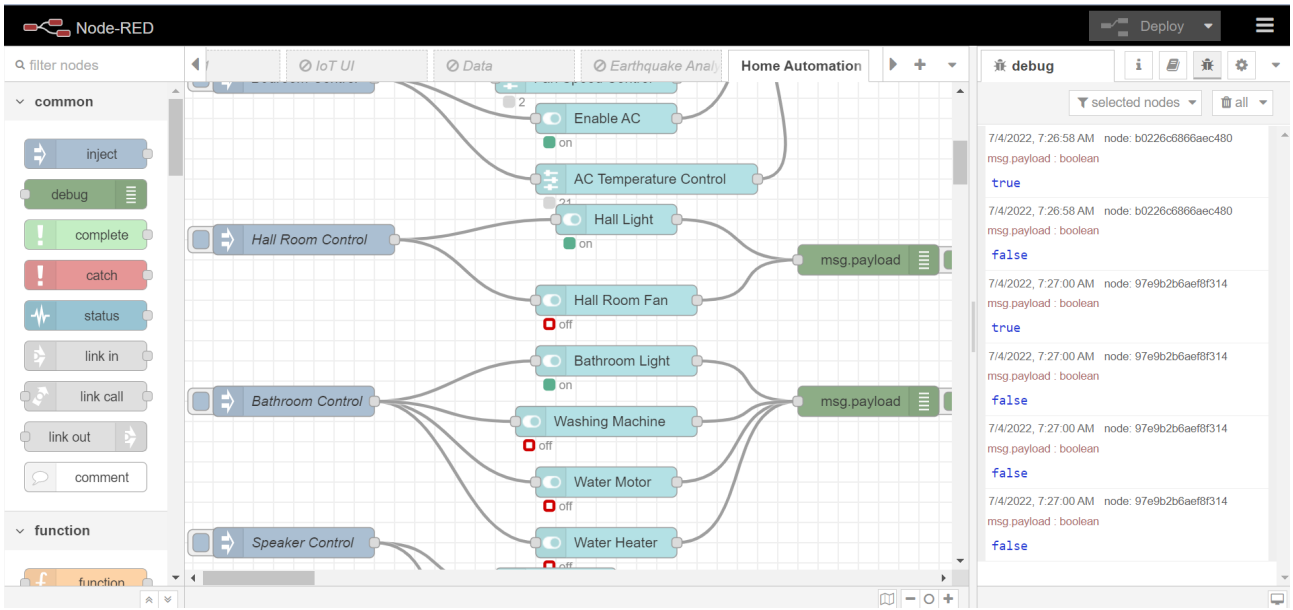
The following connection is shown below in the screenshots and there dashboard are shown as well.





The above connection is of Garden Tab and the Dashboard is also of the Garden Tab.


Node-RED
Deploy
filter nodes
IoT UI
Data
Earthquake Anal
Home Automation
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
Plant Irrigation System
Bedroom Light
Brightness of Bedroom Light
Bedroom Fan
Fan Speed Representation
Bedroom Control
Fan Speed Control
Enable AC
AC Temperature Control
Hall Light
Hall Room Control
Hall Room Fan
msg.payload
debug
selected nodes
all
7/4/2022, 7:24:43 AM node: 9c2f403c061262d0
msg.payload : boolean
true
7/4/2022, 7:24:43 AM node: 9c2f403c061262d0
msg.payload : boolean
false
7/4/2022, 7:24:43 AM node: 9c2f403c061262d0
msg.payload : boolean
true
7/4/2022, 7:24:43 AM node: 9c2f403c061262d0
msg.payload : number
2
7/4/2022, 7:25:03 AM node: 9c2f403c061262d0
msg.payload : number
1
7/4/2022, 7:25:03 AM node: 9c2f403c061262d0
msg.payload : number
8
7/4/2022, 7:25:04 AM node: 9c2f403c061262d0


Node-RED
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common
inject
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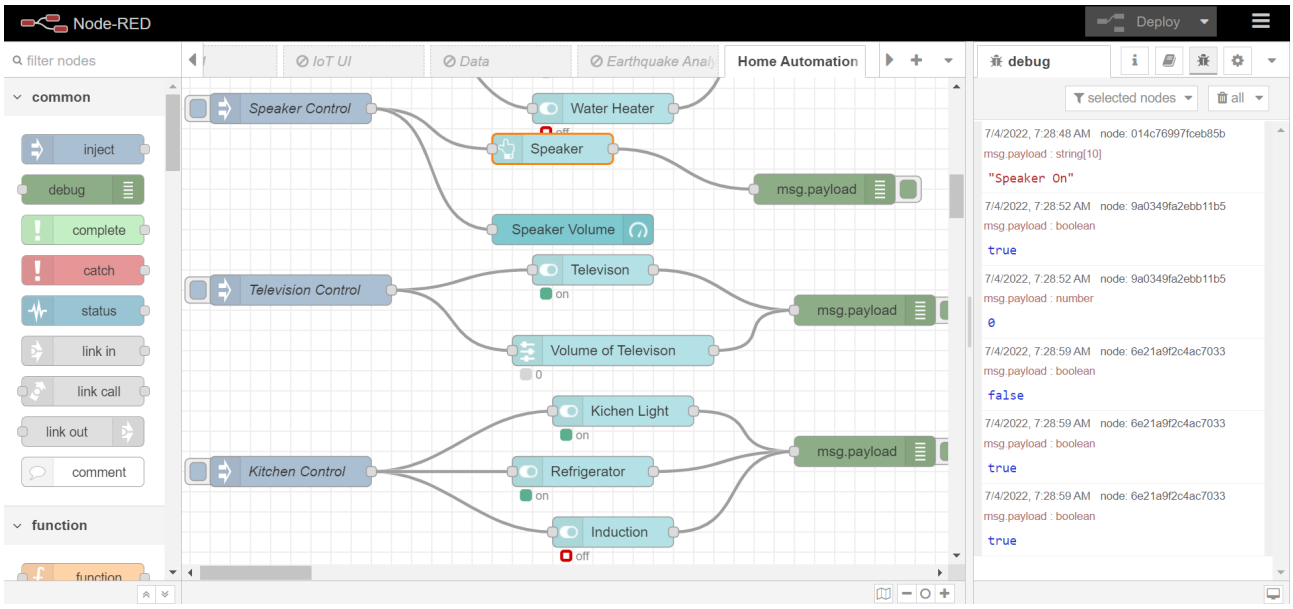
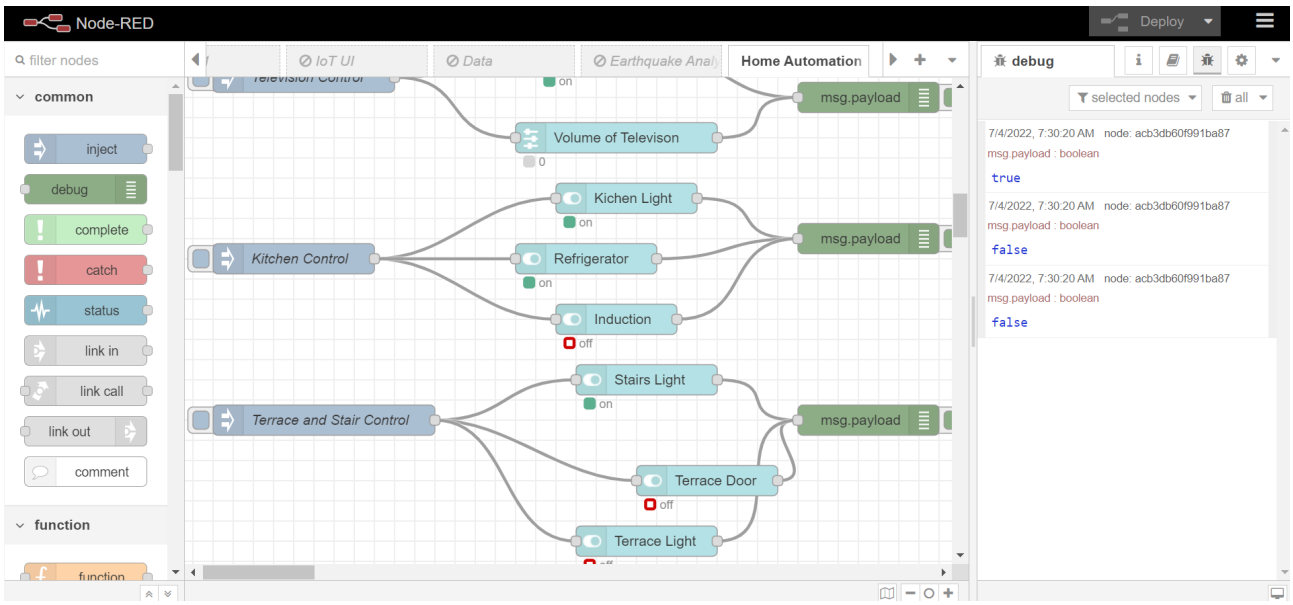
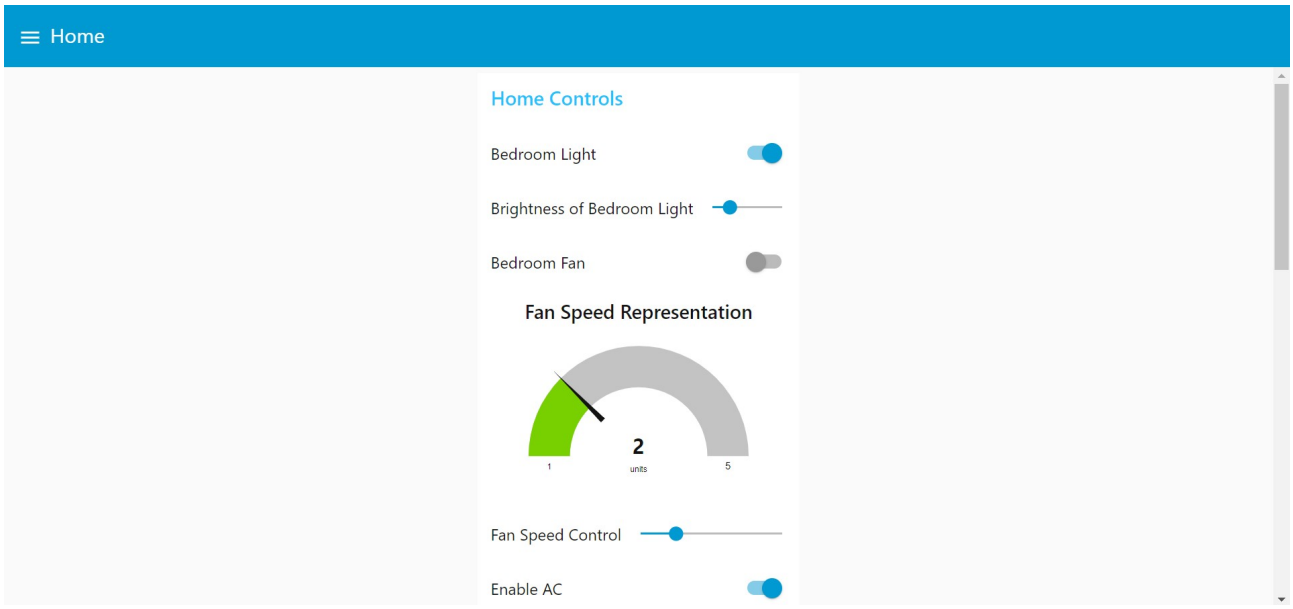
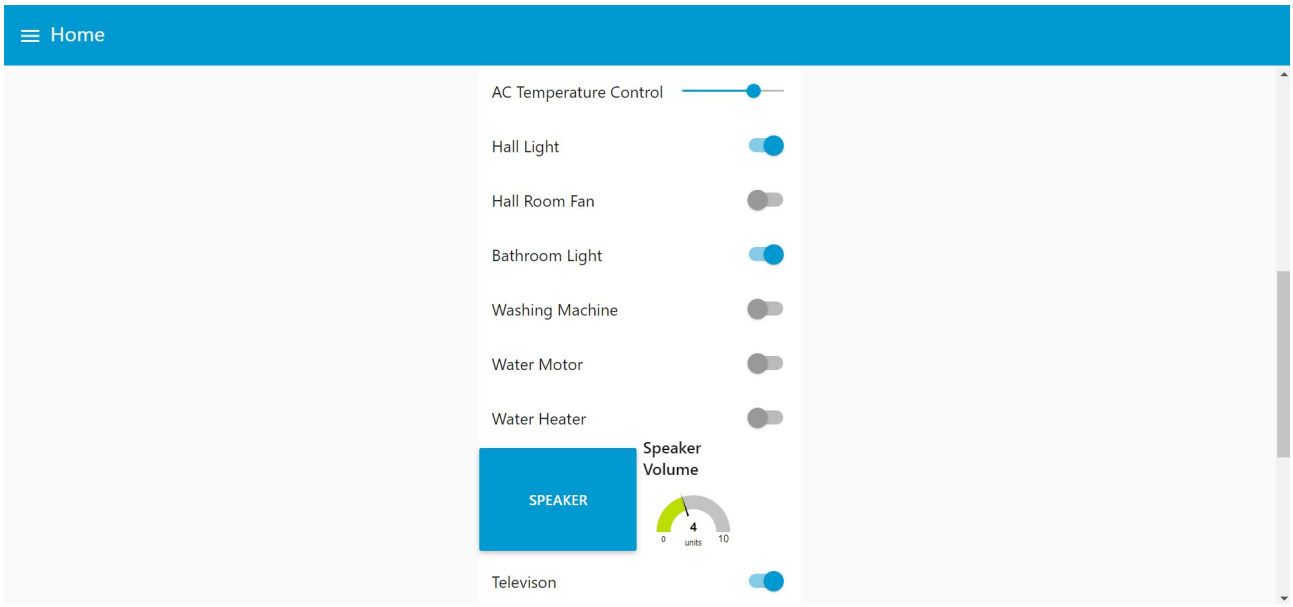
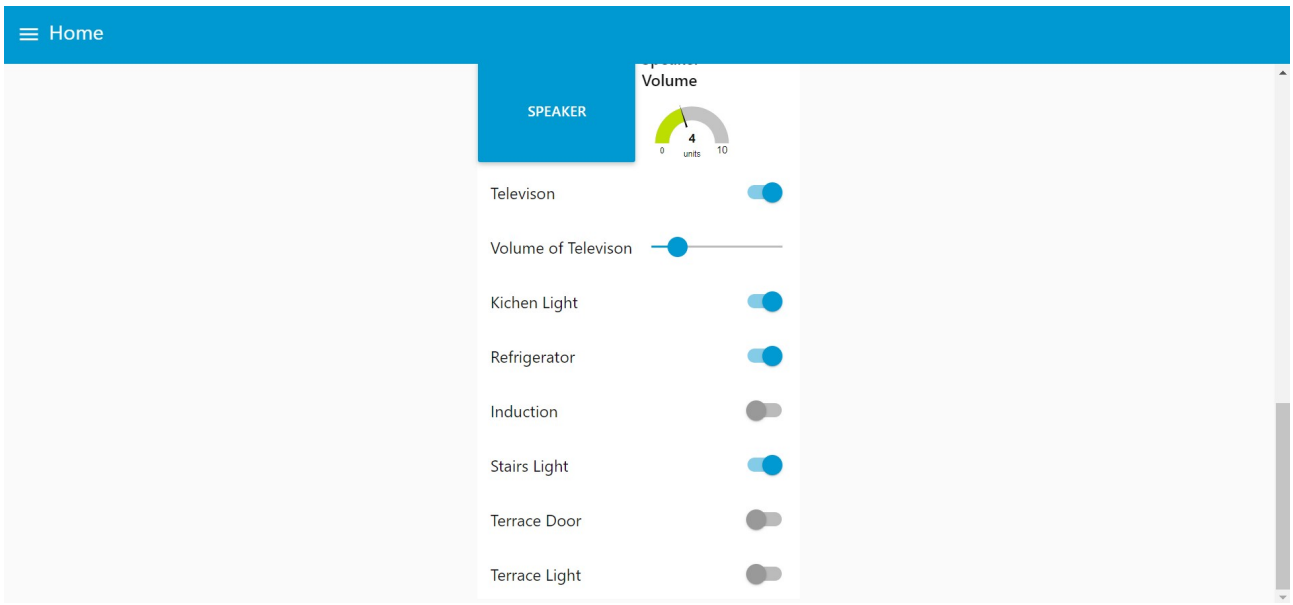
catch
status
link in
link call
link out
comment
function
Enable AC
AC Temperature Control
Hall Light
Hall Room Control
Hall Room Fan
Bathroom Light
Bathroom Control
Washing Machine
Water Motor
Water Heater
Speaker Control
msg.payload
debug
selected nodes
all
7/4/2022, 7:26:58 AM node: b0226c6866aec480
msg.payload : boolean
true
7/4/2022, 7:26:58 AM node: b0226c6866aec480
msg.payload : boolean
false
7/4/2022, 7:27:00 AM node: 97e9b2b6aef8f314
msg.payload : boolean
true
7/4/2022, 7:27:00 AM node: 97e9b2b6aef8f314
msg.payload : boolean
false
7/4/2022, 7:27:00 AM node: 97e9b2b6aef8f314
msg.payload : boolean
false
7/4/2022, 7:27:00 AM node: 97e9b2b6aef8f314
msg.payload : boolean
false


Node-RED
Deploy
filter nodes
IoT UI
Data
Earthquake Anal
Home Automation
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
Speaker Control
Water Heater
Speaker
Speaker Volume
Television Control
Televison
Volume of Televison
Kichen Light
Kitchen Control
Refrigerator
Induction
msg.payload
debug
selected nodes
all
7/4/2022, 7:28:48 AM node: 014c76997fceb85b
msg.payload : string[10]
"Speaker On"
7/4/2022, 7:28:52 AM node: 9a0349fa2ebb11b5
msg.payload : boolean
true
7/4/2022, 7:28:52 AM node: 9a0349fa2ebb11b5
msg.payload : number
0
7/4/2022, 7:28:59 AM node: 6e21a9f2c4ac7033
msg.payload : boolean
false
7/4/2022, 7:28:59 AM node: 6e21a9f2c4ac7033
msg.payload : boolean
true
7/4/2022, 7:28:59 AM node: 6e21a9f2c4ac7033
msg.payload : boolean
true

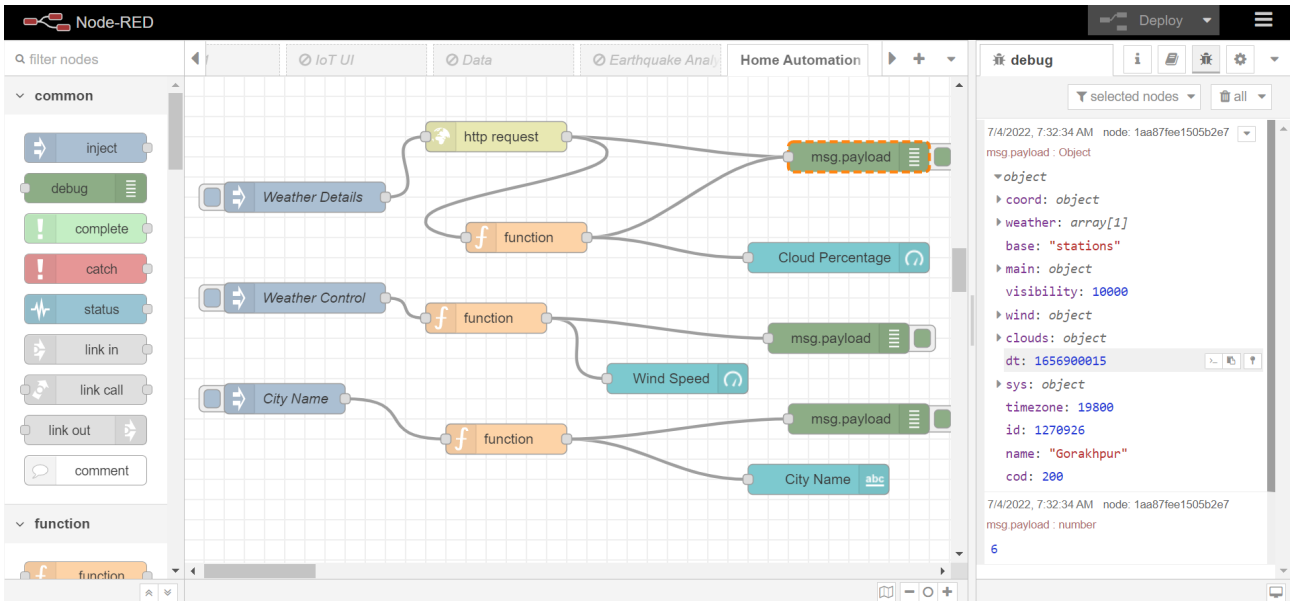

Node-RED
Deploy
filter nodes
IoT UI
Data
Earthquake Anal
Home Automation
debug
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
Volume of Televison
Kichen Light
Kitchen Control
Refrigerator
Induction
Stairs Light
Terrace and Stair Control
Terrace Door
Terrace Light
msg.payload
on
off
selected nodes
all
7/4/2022, 7:30:20 AM node: acb3db60f991ba87
msg.payload : boolean
true
false

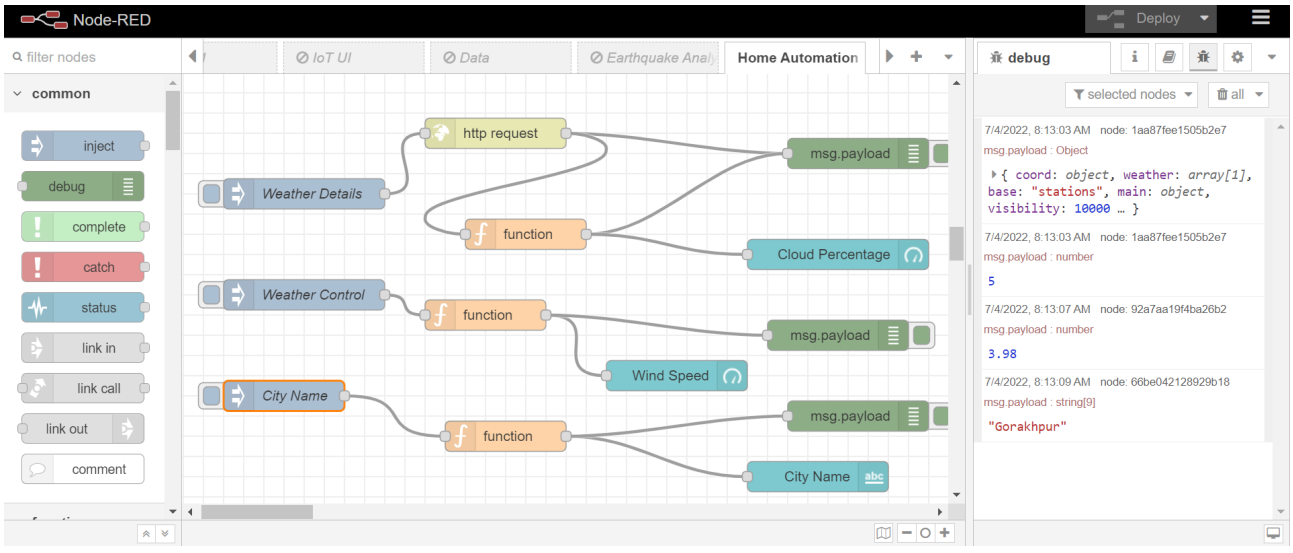

Home
Home Controls
Bedroom Light
Brightness of Bedroom Light
Bedroom Fan
Fan Speed Representation
2
units
1
5
Fan Speed Control
Enable AC

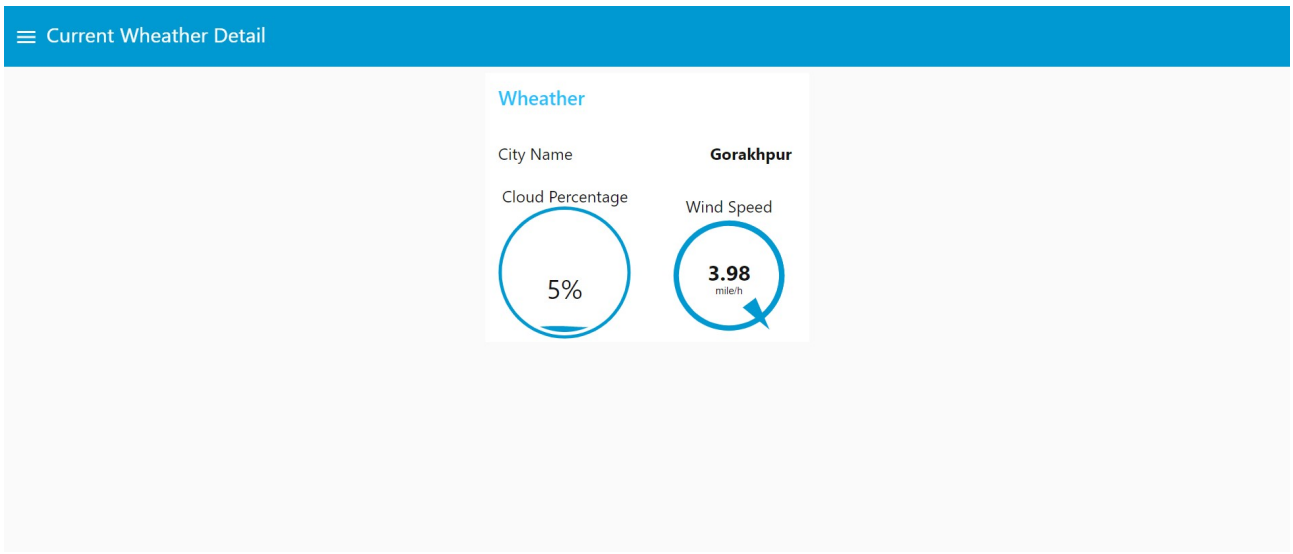

Home
AC Temperature Control
Hall Light
Hall Room Fan
Bathroom Light
Washing Machine
Water Motor
Water Heater
SPEAKER
Speaker Volume
4
units
0
10
Televison



The above connection are of the Home Tab and the Dashboard is representation of the connection.

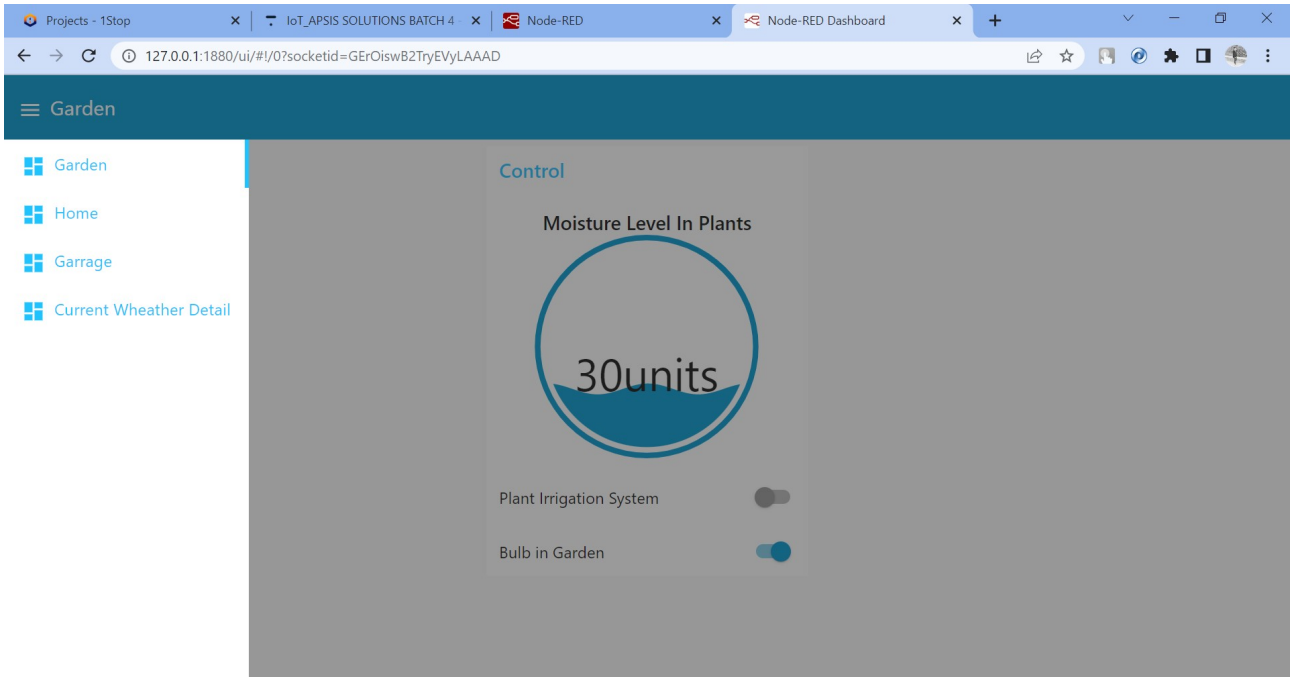






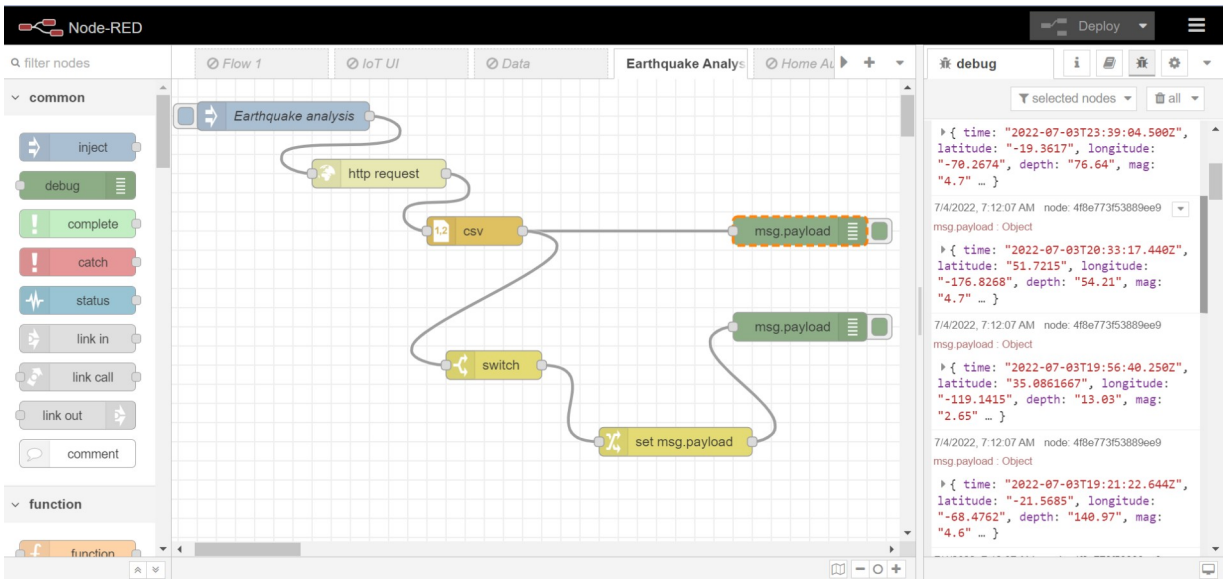
The above connection is for weather detail and the dashboard as well.

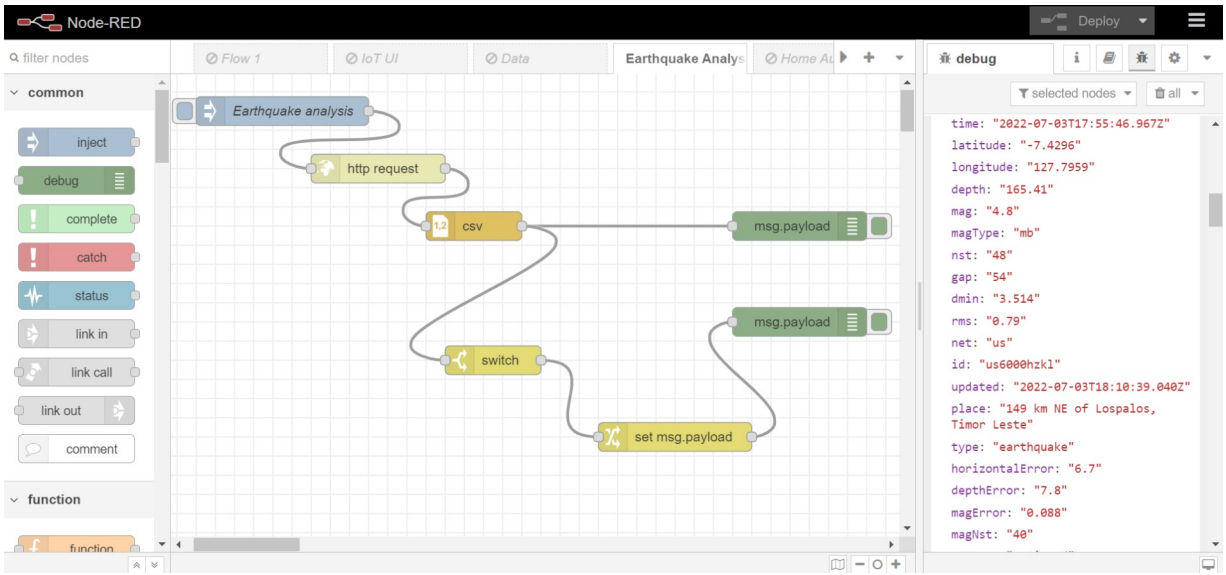
The above dashboard have four tabs in it that are as shown below-

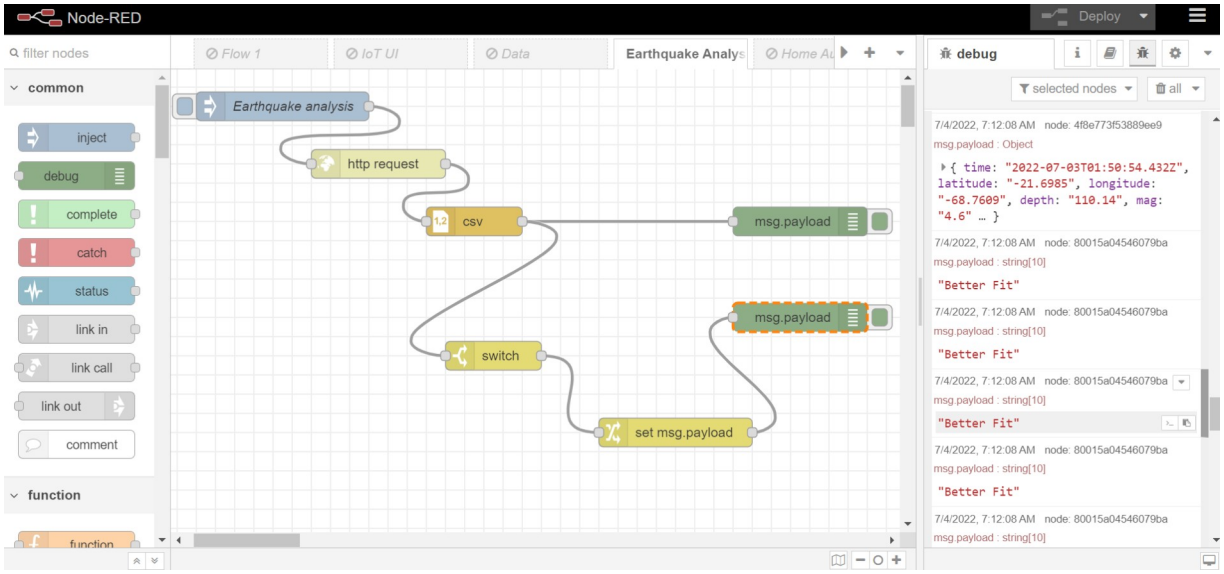


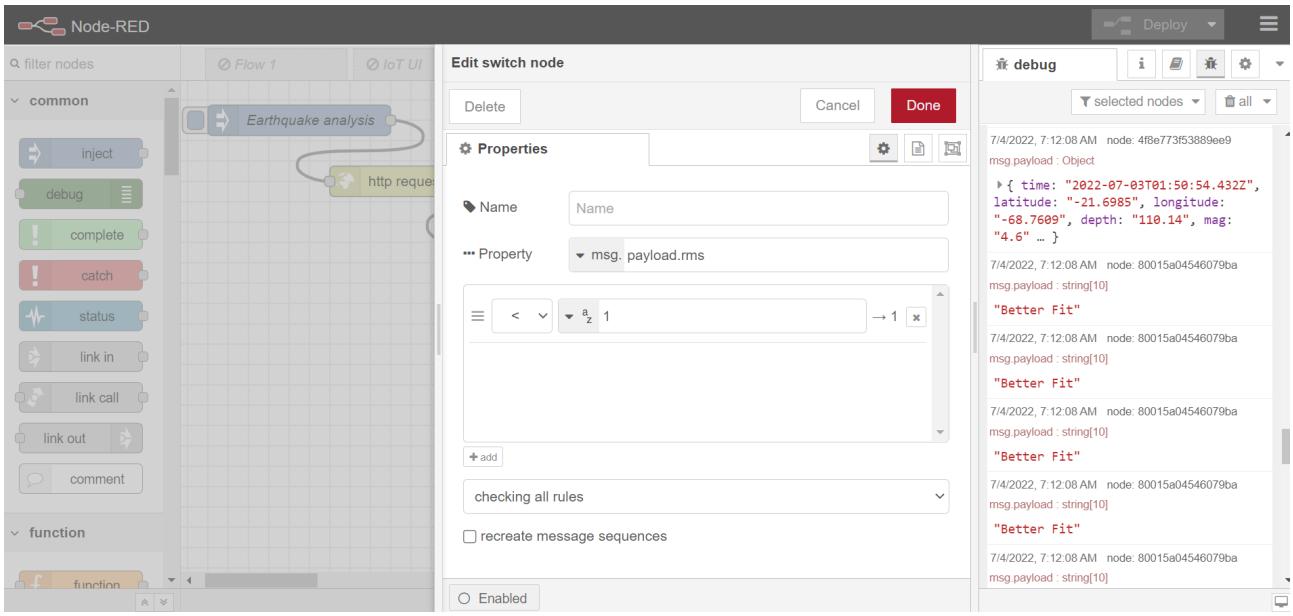
For Earthquake analysis we use a csv file from internet source for which the URL is as follow-
(http://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/2.5_day.csv)
In this we use different nodes like Inject node, Http request node, Csv node, Switch node, Change node and Debug Node.
With the help of following nodes we make a dashboard which show ”Better Fit ” when the RMS value is less than 1 in the given Csv file data.
Better Fit shown in debug terminal when **msg.payload.rms is less than 1.**

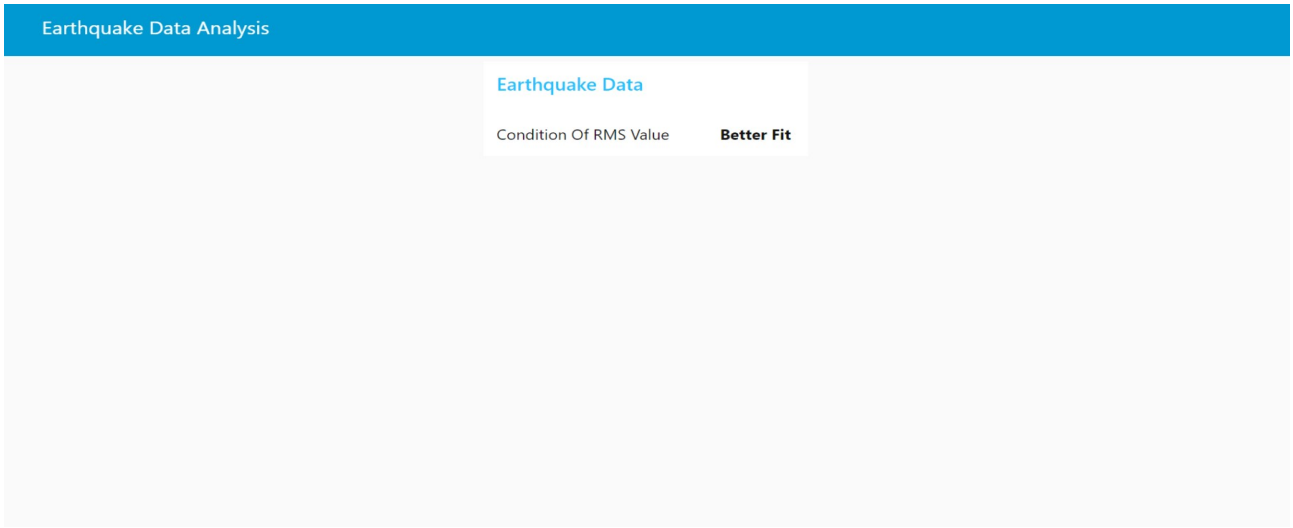
The connection for earthquake analysis is shown in below screenshots and the dashboard is shown below as well.











CONCLUSION-

The conclusion portion contain the json file of the weather details-

{
•"coord": {
•"lon": 75.6833,
•"lat": 29.45
},
•"weather": [
•{
•"id": 802,
•"main": "Clouds",

•"description": "scattered clouds",
•"icon": "03d"
}
],
•"base": "stations",
•"main": {
•"temp": 313.78,
•"feels_like": 318.02,
•"temp_min": 313.78,
•"temp_max": 313.78,
•"pressure": 995,
•"humidity": 31,
•"sea_level": 995,
•"grnd_level": 972
},
•"visibility": 10000,
•"wind": {
•"speed":3.98,
•"deg": 112,
•"gust": 2.67
},
•"clouds": {
•"all": 5
},
•"dt": 1657013393,
•"sys": {
•"country": "IN",
•"sunrise": 1656979343,
•"sunset": 1657029649
},
•"timezone": 19800,
•"id": 1270926,
•"name": "Gorakhpur",
•"cod": 200
}