IoT Domain Analyst

Lab Record — Lab 5

- 15 March 2021

Programme	:	B.Tech(CSE)	Semester	:	Winter 2020–21
Course Title	:	IoT Domain Analyst – Lab	Code	:	ECE3502
			Slot	:	L5+L6
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Faculty (s)	:	[redacted]	Expt. No	:	**5**

Experiment 1 :

Use the Open Weather Map to retrieve the real-time weather conditions of any location in the world and display it in an interactive format.

Aim :

To display the current weather conditions of any location in real-time using Open Weather API and its corresponding node in Node-Red.

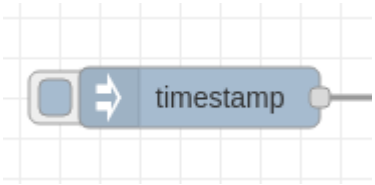
Description :

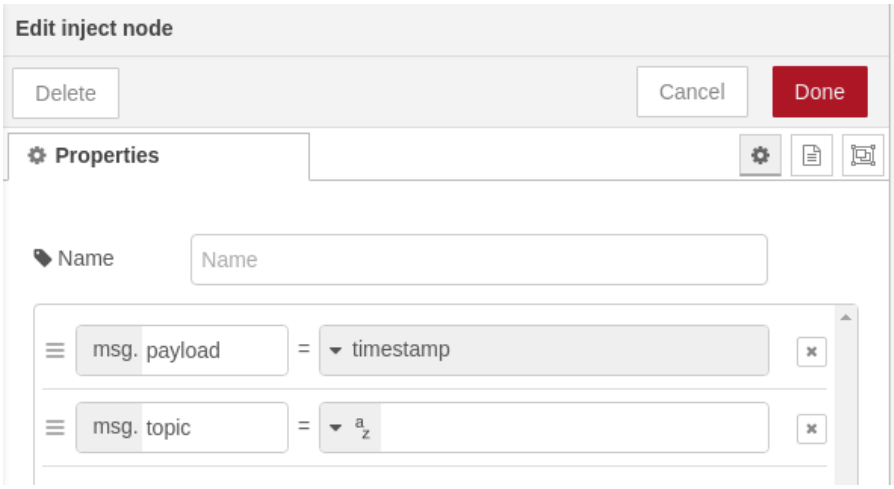
- In the Open Weather Node, we specify the API Key obtained during registration in their website, and the location for where we would need the real time weather conditions. There are two types of this node, one which triggers as soon as we deploy the flow and the other which can be triggered only when necessary, or can be in the middle of a larger flow.
- Due to this nature of the node, we have two flows utilising both of these nodes separately.
- We have debug nodes to display the data in the debug window and also compass and gauges to display the data in the dashboard, in a newly created UI group (Weather) and UI palette (Climate).

Flow Diagrams :

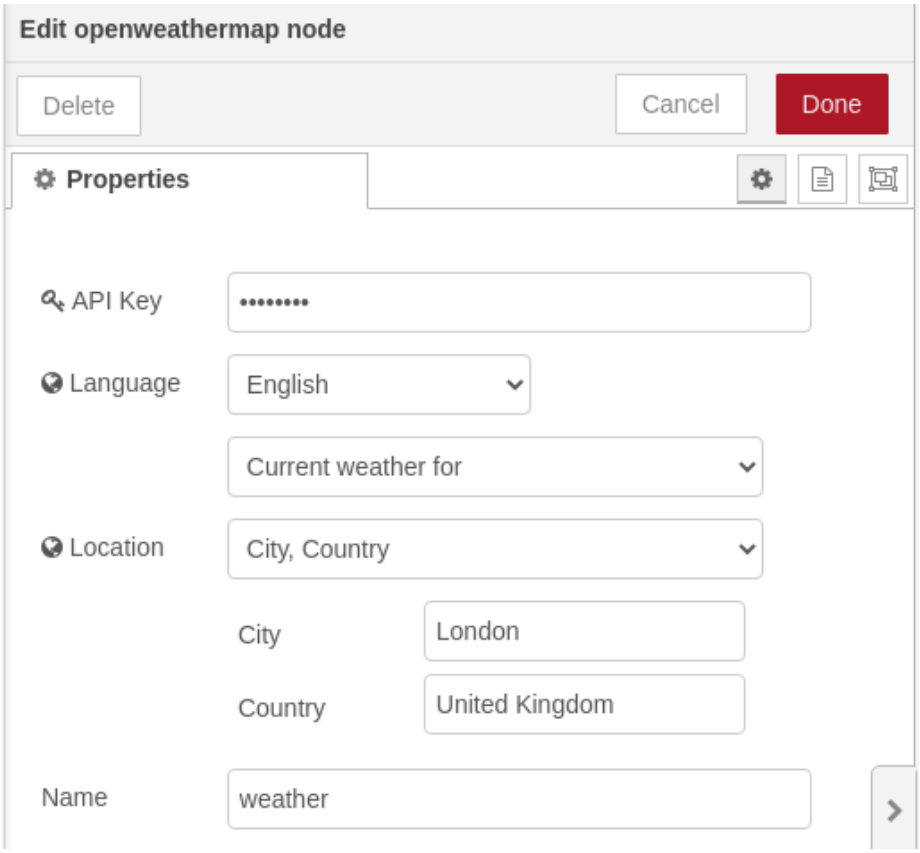
Method 1 — Stage 1 : Inject Node

This is used to start the flow and activate the other following connected nodes.



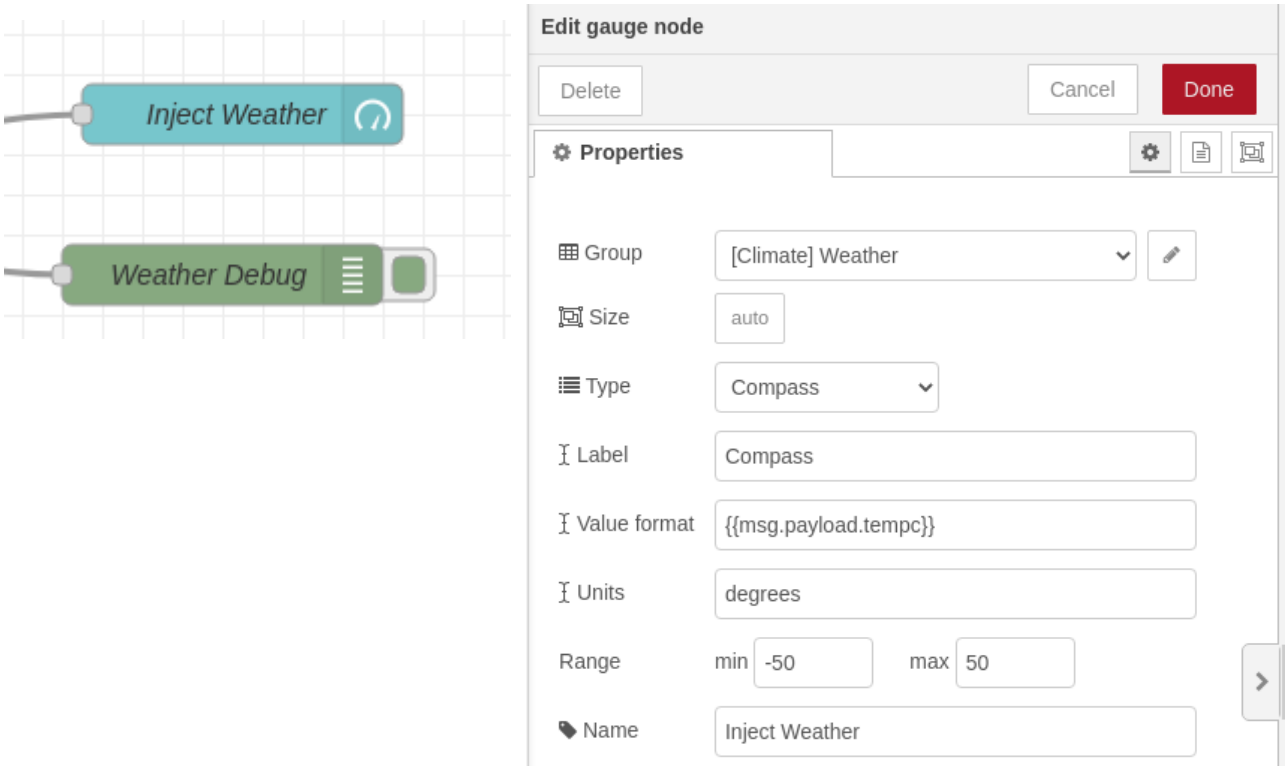


Method 1 — Stage 2 : Open Weather Node

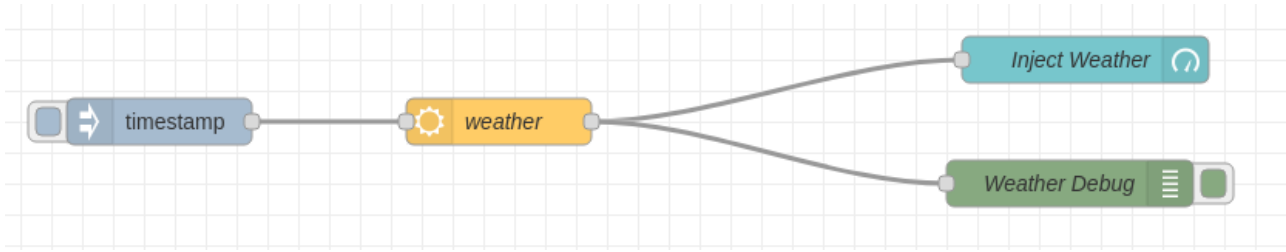


Method 1 — Stage 3 : Output Nodes

We have a debug node to display the data in the debug window and also a gauge node(compass) to visualize the real time temperature (for example) in the UI Dashboard.

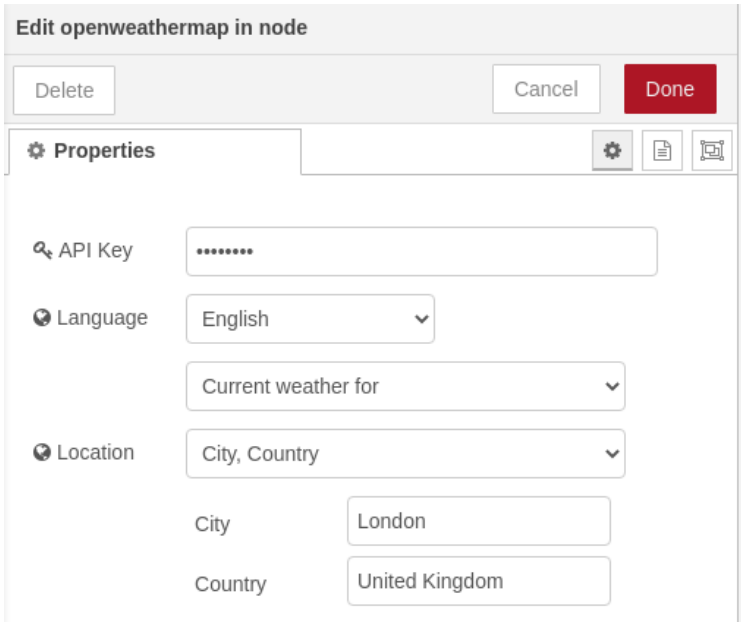


Method 1 — Stage 4 : Complete Flow Diagram



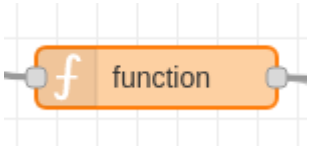
Method 2 — Stage 1 : Open Weather Node

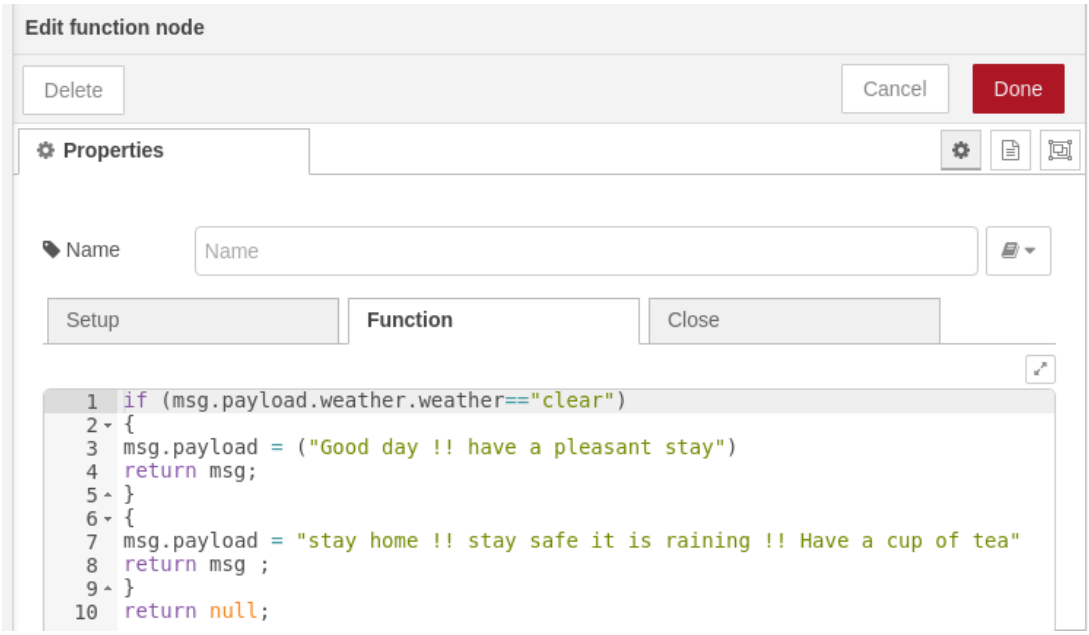
This node is used to be the starting point of a flow.



Method 2 — Stage 2 : Function Node

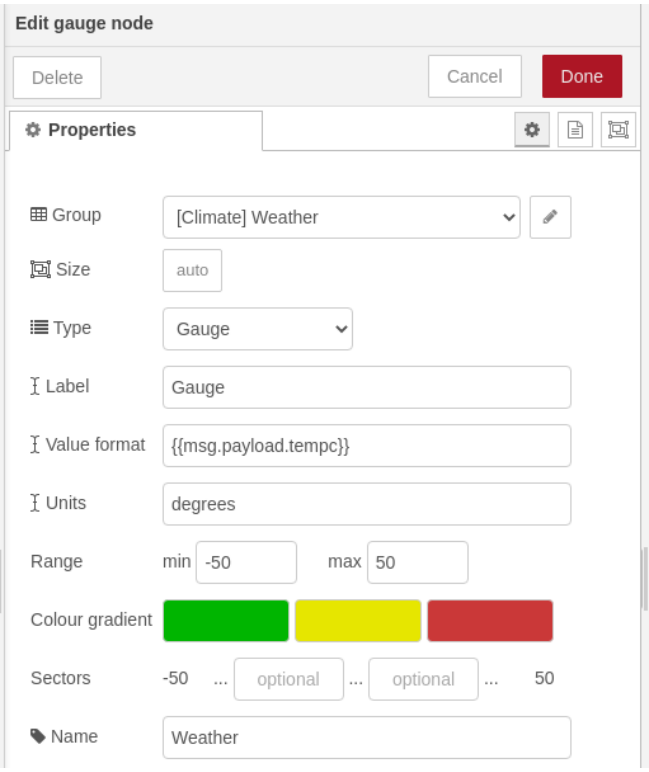
Here the function node is used to analyse the weather data and then arrive at conclusions and even give some recommendations to the user. Like for example tell the user to carry an umbrella because of rainy conditions outside.





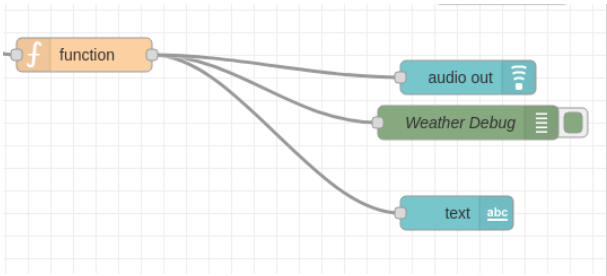
Method 2 — Stage 3 : Weather Output Nodes

These are a set of Debug node and a Gauge node, the debug node displays all the weather conditions data received from the Open Weather Node, while the Gauge node is used to visualize the temperature of the location.

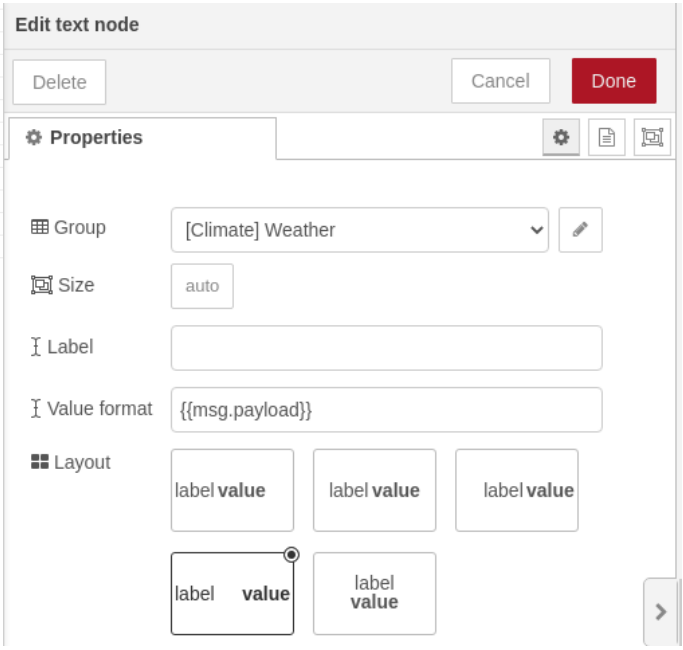


Method 2 — Stage 4 : Weather Recommendation Output Nodes

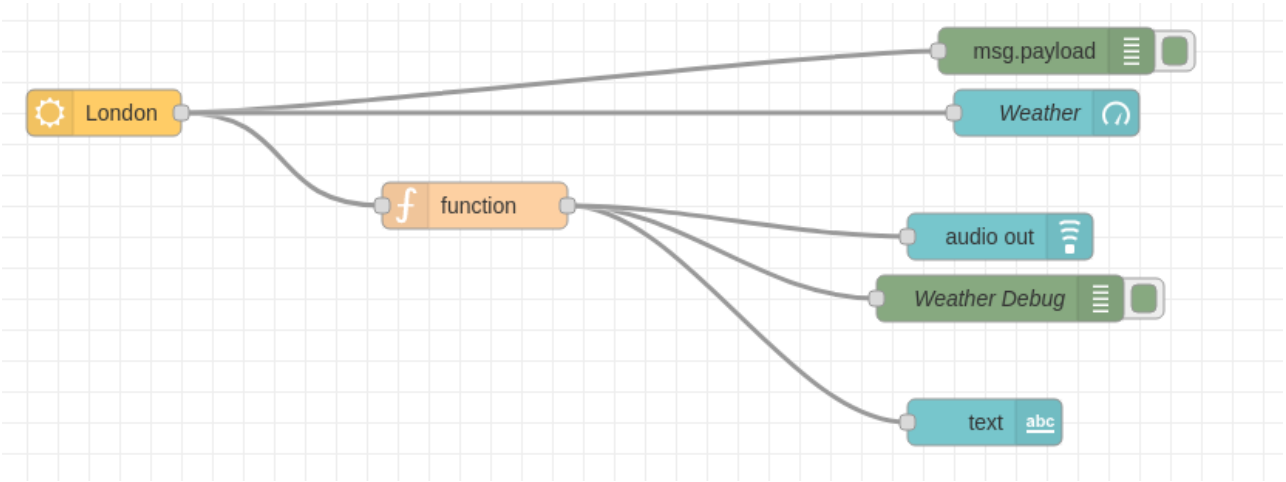
These are a set of Debug, text and audio output nodes. These are used to display the recommendation message given out by the function node, and display it in the debug window, the UI dashboard and to provide a text to speech conversion of the recommendation to warn the user of any prevailing whether conditions outside.



The debug and the audio out have their default settings.



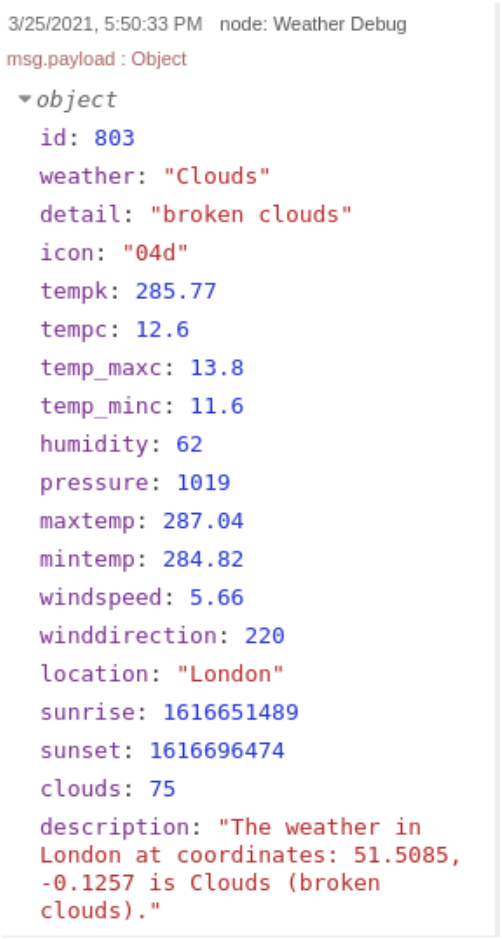
Method 2 — Stage 5 : Complete Workflow Diagram

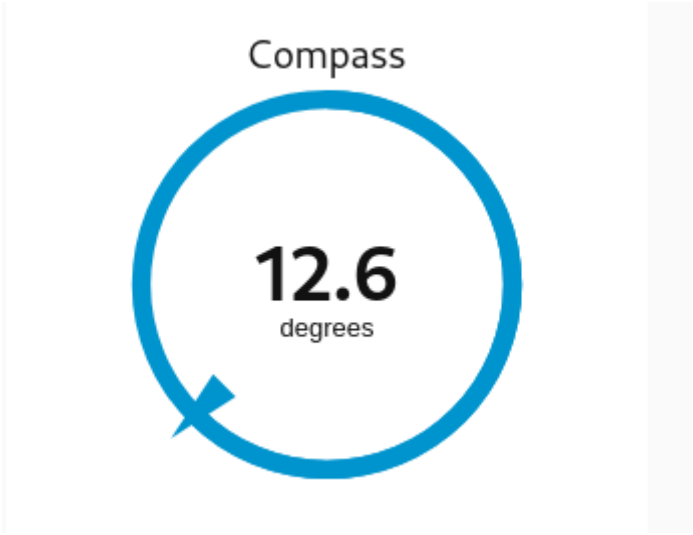


Result :

Method 1 —

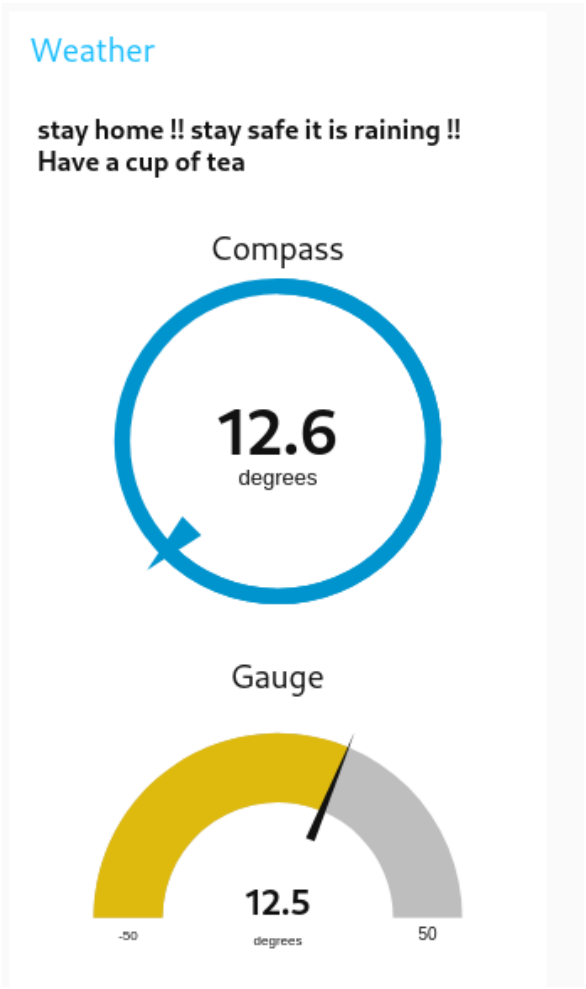
In the Method 1, we display the whether data directly when the inject node was triggered, so the. Output in the debit window and the UI dashboard is as follows :



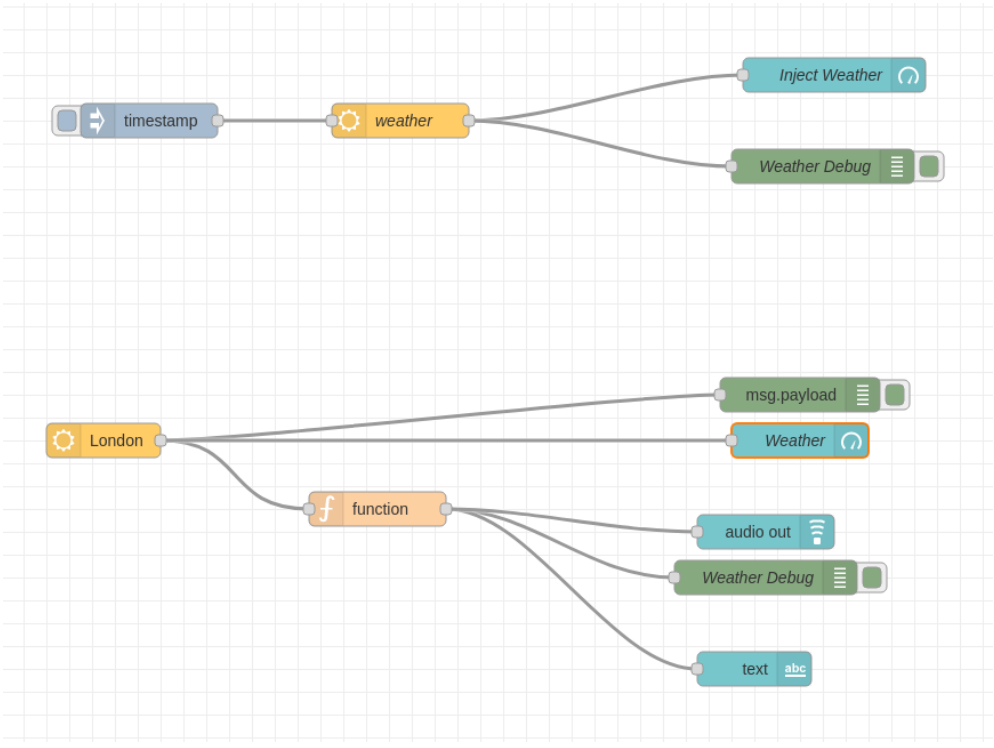


Method 2 —

In this method, we have the similar outputs as before, but in addition to the details above, we also have an additional unit which uses the function node to understand the data retrieved through the API and then use to make some real time recommendations to the user regarding the necessary steps to take to combat the various weather conditions outside.



Complete Workflow diagram combining both the sub-parts of the Experiment



Experiment 2 :

Use the Solar Power Forecast to retrieve the real-time Solar Power generated by a set of panels placed in any location in the world and display it in an interactive format.

Aim :

To display the current solar power forecast of the solar panels placed in any location in real-time using Solar Power Forecast Node in Node-Red, and visualize it in the Dashboard.

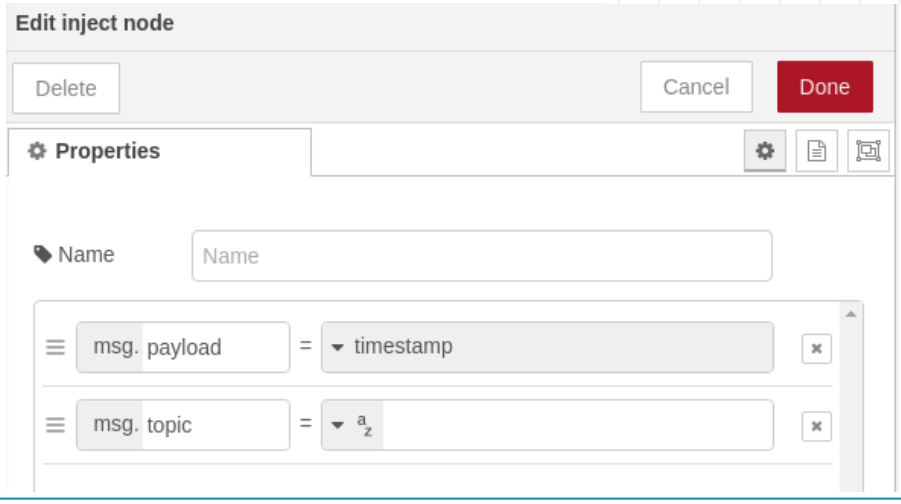
Description :

- In the Solar Power Forecast Node, we specify the latitude, longitude, altitude, panel area for the location for where we would need the data, and also the number of panels used, and the efficiency of the panel used.
- We have debug nodes to display the data in the debug window and also gauges to display the power data in the dashboard. For this, we would create a new UI Group called Solar which is still a part of the Climate UI.

Flow Diagrams :

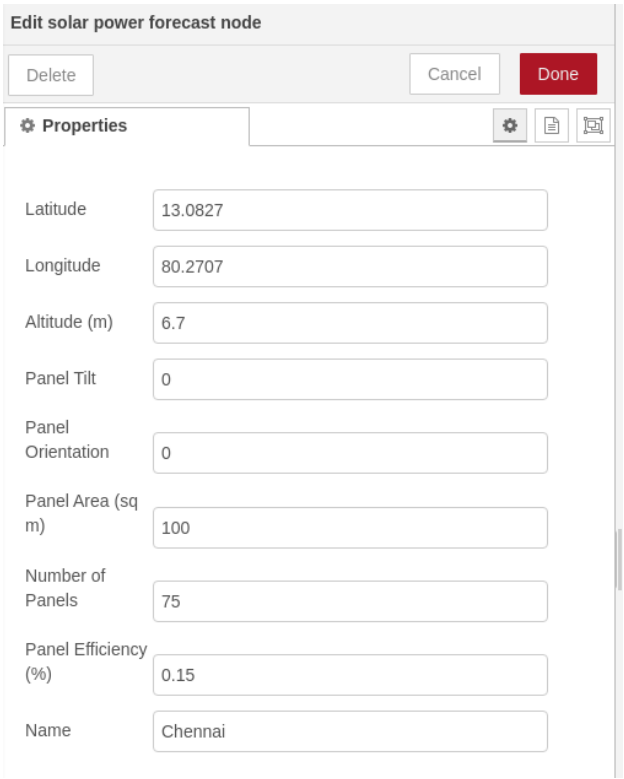
Stage 1 : Inject Node

This is used to start the flow and activate the other following connected nodes.



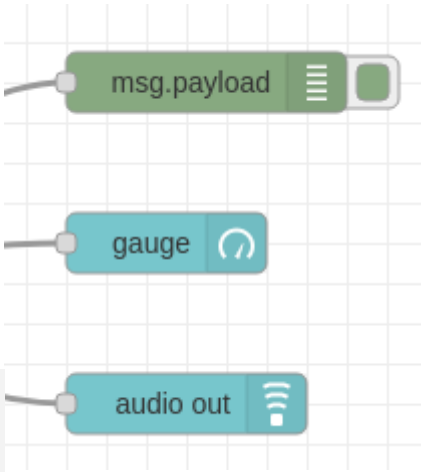
Stage 2 : Solar Power Forecast Node

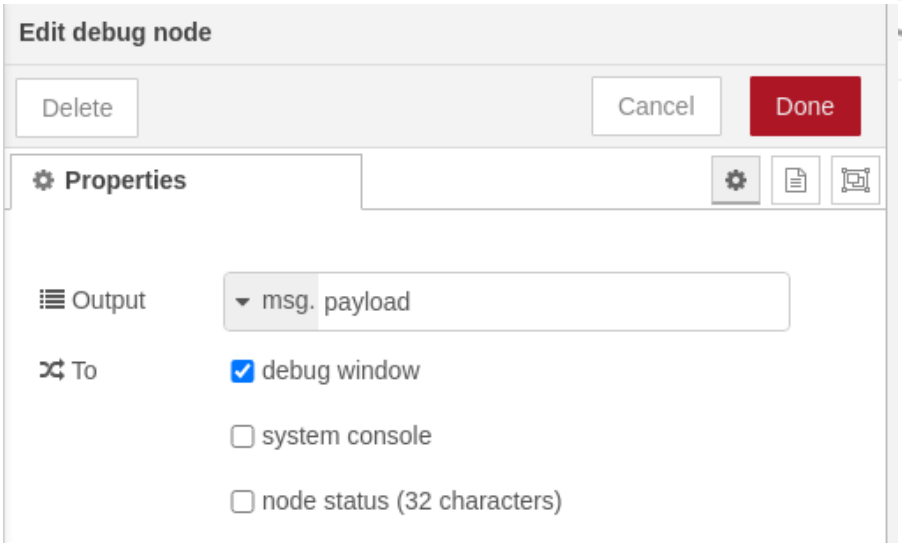
Here we pass in the latitude, longitude, altitude, panel area for the location for where we would need the data, and also the number of panels used, and the efficiency of the panel used.

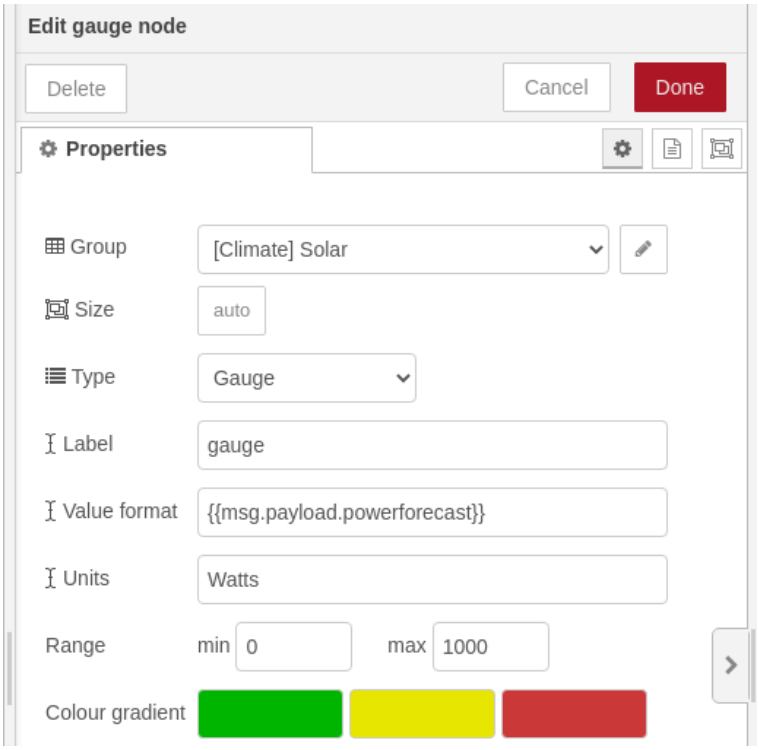


Stage 3 : Output Nodes

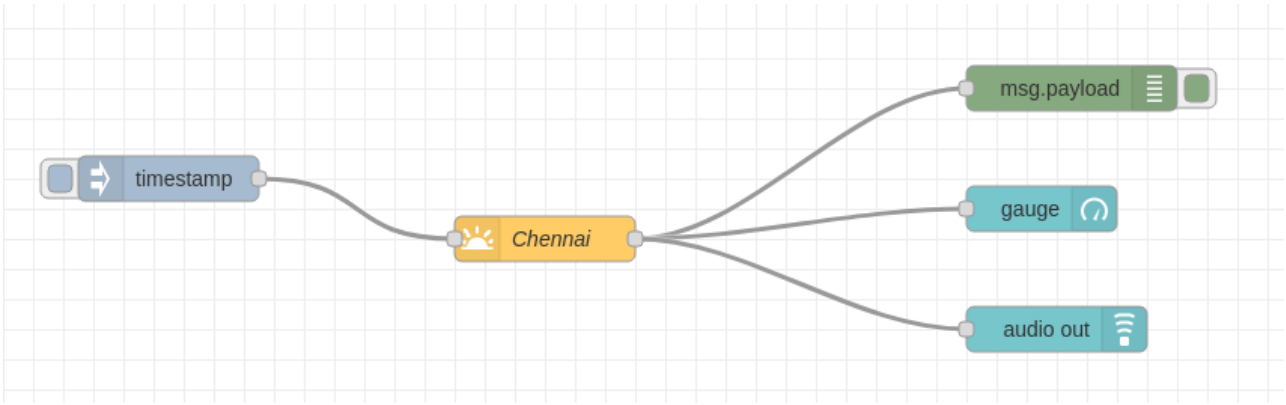
Here we have a set of 3 nodes, an audio out node and a gauge node, which are parts of the Node-Red Dashboard which is used to speak out and visualize respectively the power forecast which is derived by the Power forecast node.







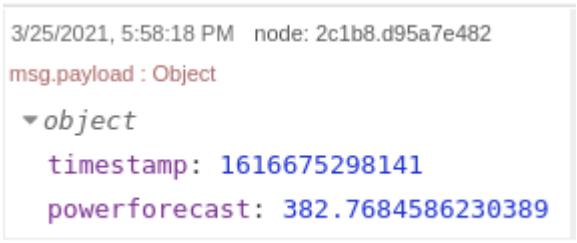
Stage 4 : Complete Workflow Diagram



Result :

The following images demonstrated the output of the power forecast node in the city of Chennai, in both the debug window and the Dashboard UI of Node-Red Dashboard.

In the debug Window, provides the accurate value of the power generated by the panels placed in the provided location :



In the Dashboard, a Gauge demonstrating the Power Currently generated by the panels placed in the provided location.