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Connecting IoT Devices to Watson IoT with Node-RED

AP Cloud 2018 Workshop

AP Cloud Team

Miracle Software Systems, Inc.

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Overview

In this lab the user will create a Bluemix IoT Service and will add Logistics Simulator Device to the IoT Platform Cloud in Registered mode. It will send events like - Fuel, Emission, Tyre Pressure, Air Bag, Temperature, and Speed to the IBM IoT Cloud.

Pre-Requisites

The following installations will need to be completed for this lab to be run successfully,

- Active email ID for registering with Bluemix
- Download and Install NodeJS
- Test Editor such as Sublime Text (or) Notepad ++

Technology Involved

- IBM Bluemix(PaaS)
- Watson IoT Platform
- Node-RED
- Miracle's Logistics Simulator

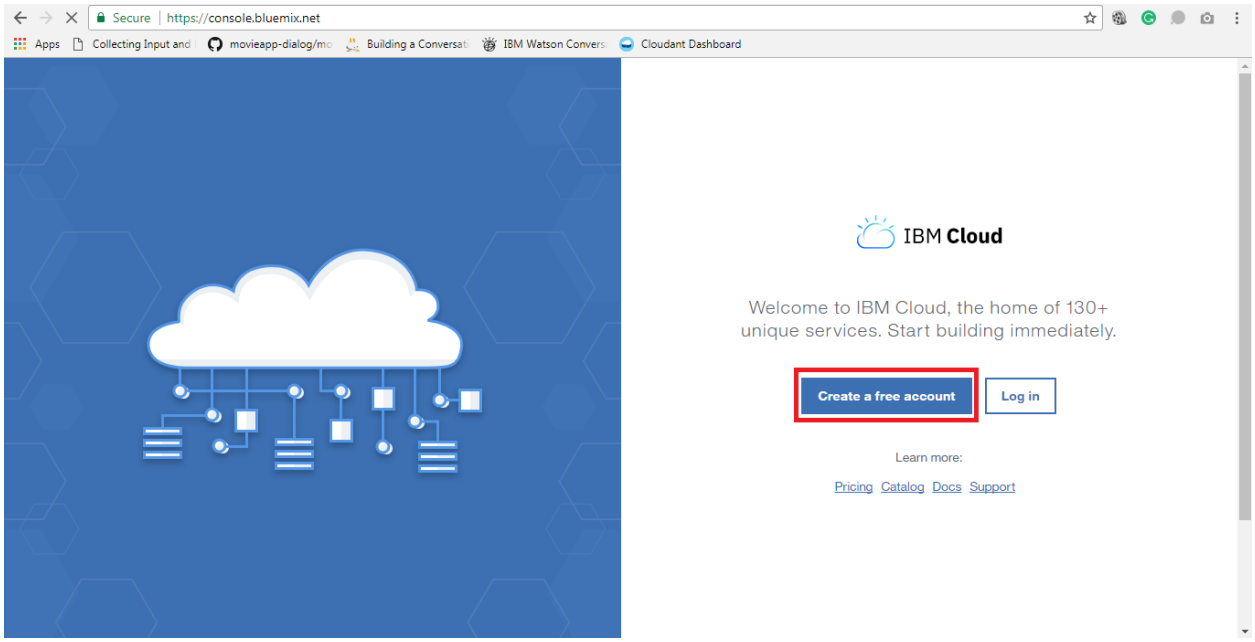
Lab Steps

So, let us get started with the lab!

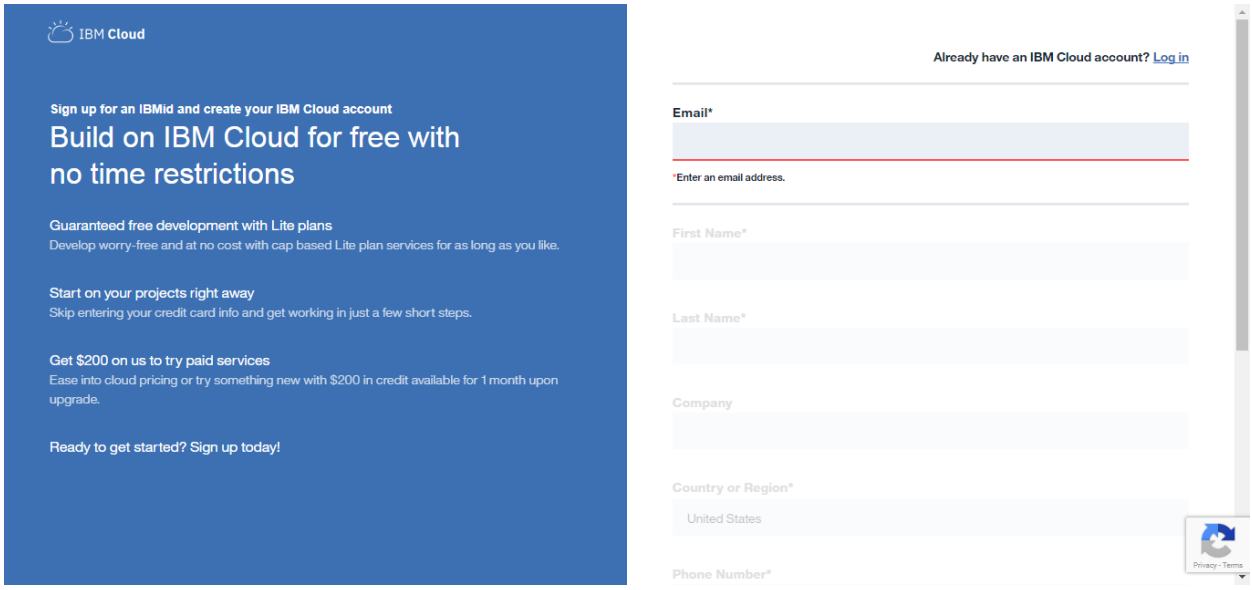
Step #1 | Create IBM Bluemix account

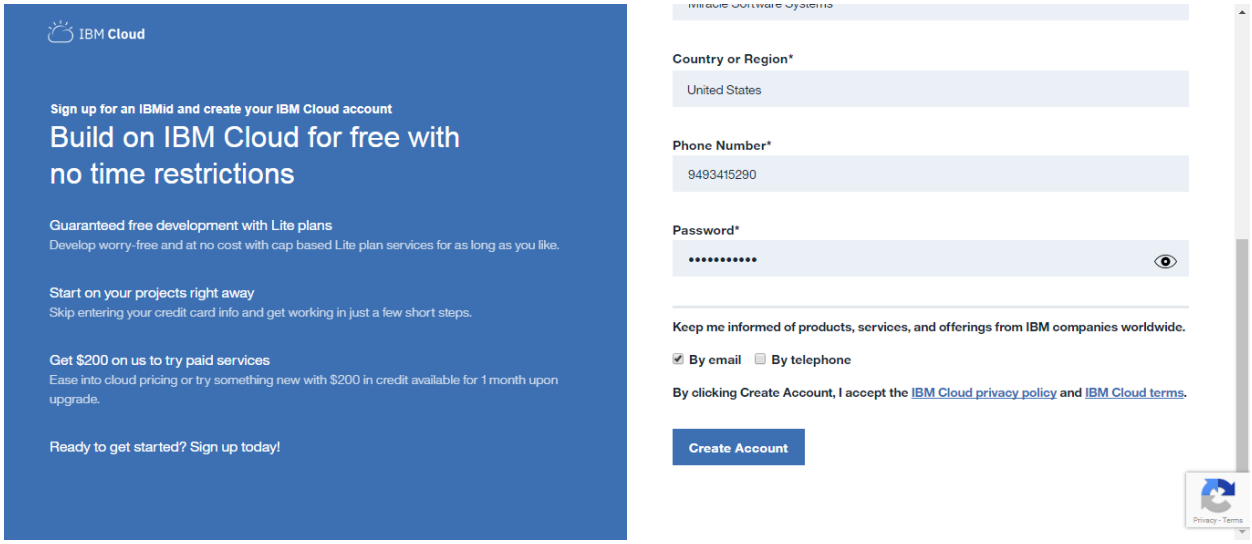
The first step will be to make sure that we have access to the IBM Bluemix Console with either the free trial option (or) the paid subscription option.

Login to Bluemix at **http://bluemix.net** (or) Register today at **https://console.ng.bluemix.net/registration/**

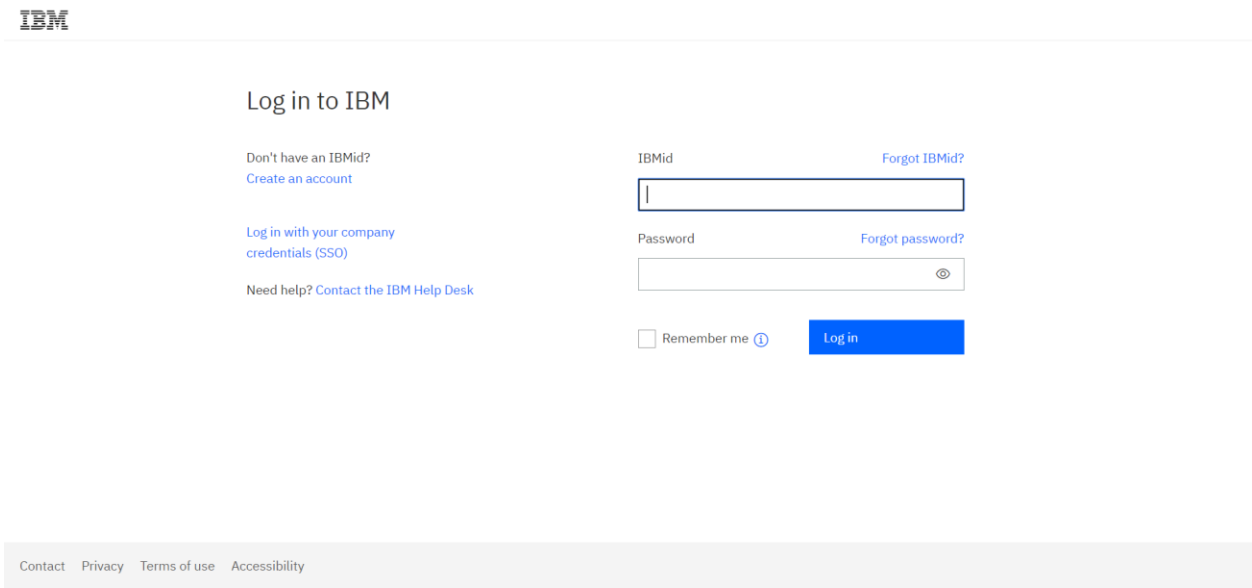


Click on Create a free account, and fill the fields as required.

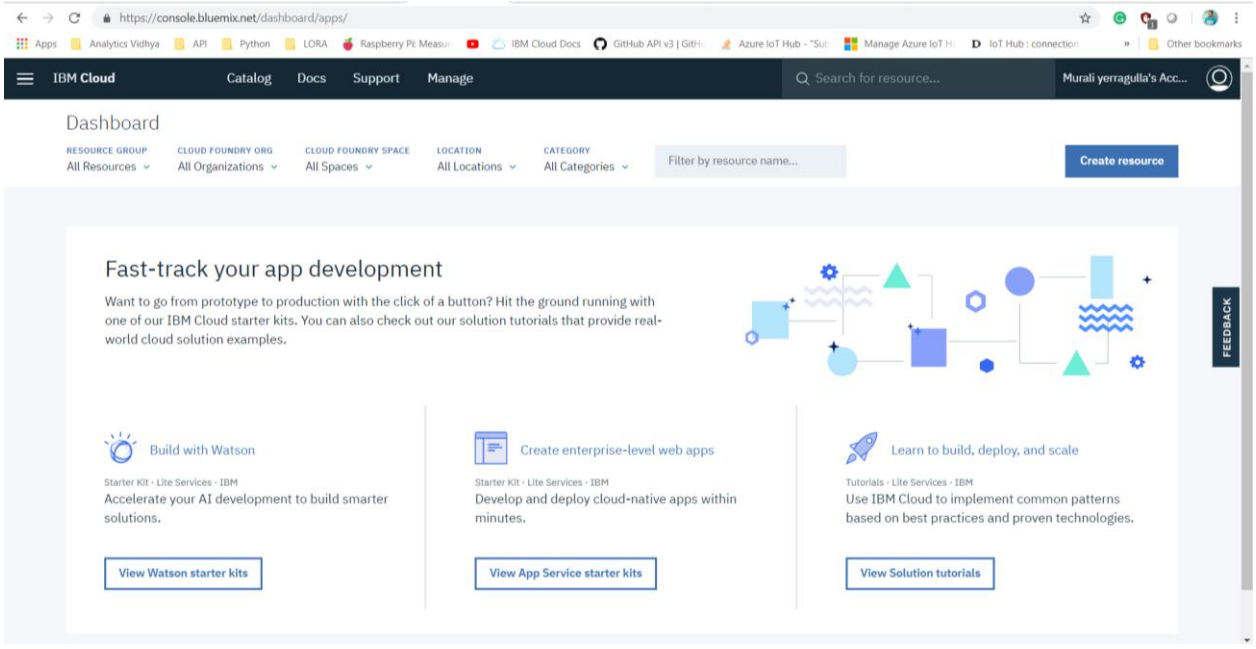




After Clicking on "**Create Account**", confirmation mail will be sent to the registered mail id. Click on Confirm account and then Login to your Bluemix account.



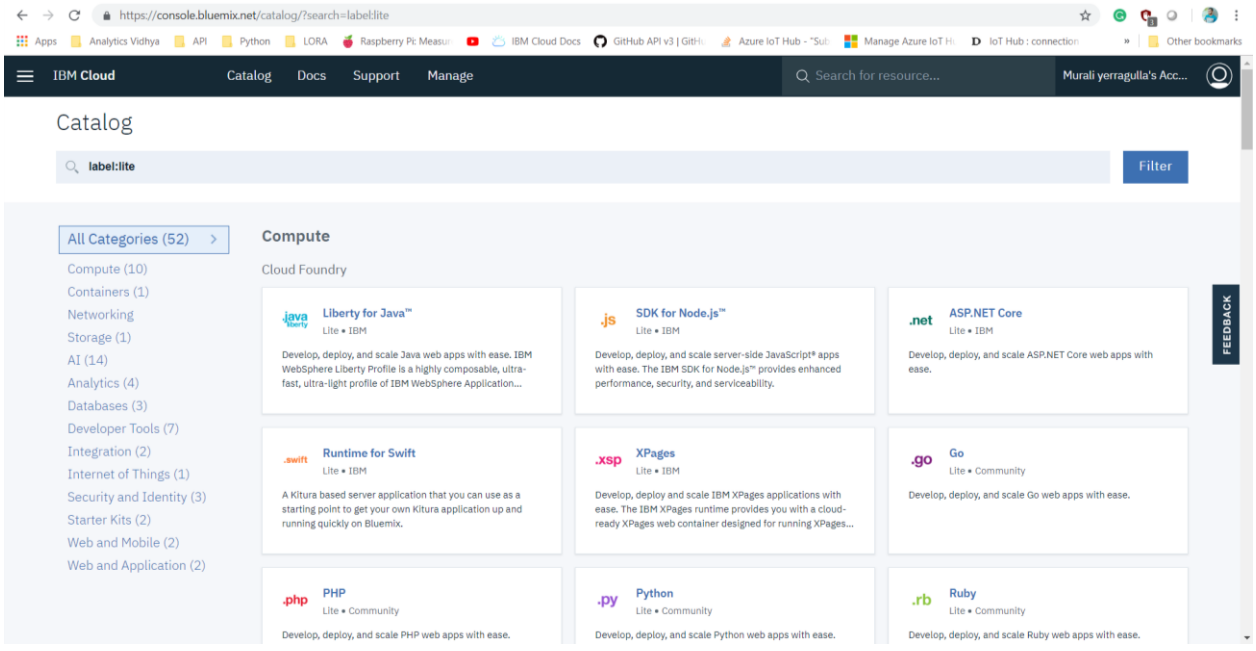
After you login, you can see the dashboard where you can take a look at your applications and services.



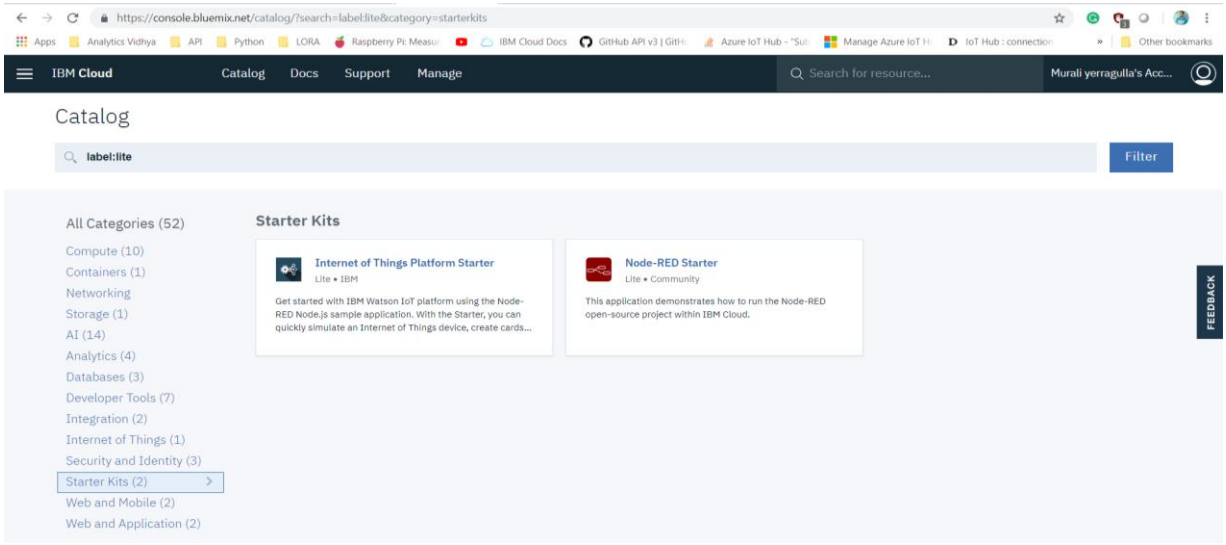
The next step will be to take your application and deploy it back to Bluemix so that you can share it with your friends.

Step #2 | Create Application and Watson IoT Service

Click on **Catalog**, for creating the application.

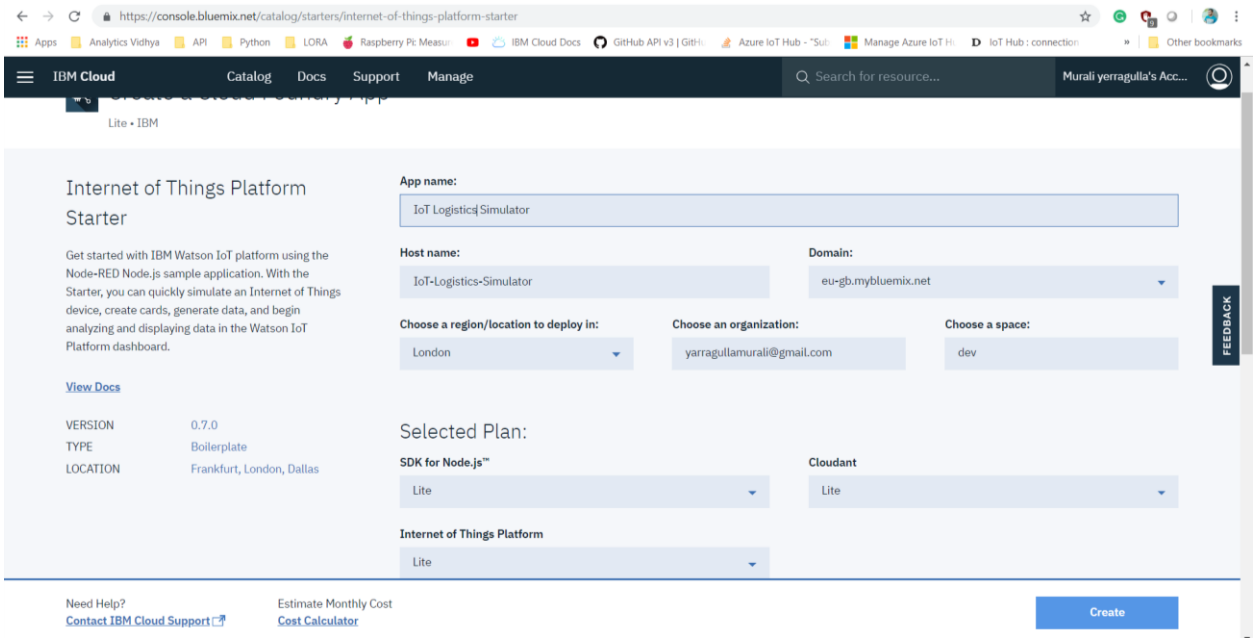


Click on Starter Kits in left side pane, and then you will be provided with available services. Select “**Internet of Things Platform Starter**"



The Starter Kit will have "**SDK for Node.js**" and "**Cloudant NoSQL DB**" services by default for us to use as services. It will also have **Node-RED** pre-installed for you.

Give a unique name to your application here and click on "**Create**". Application names must be unique as they will be on a public domain.

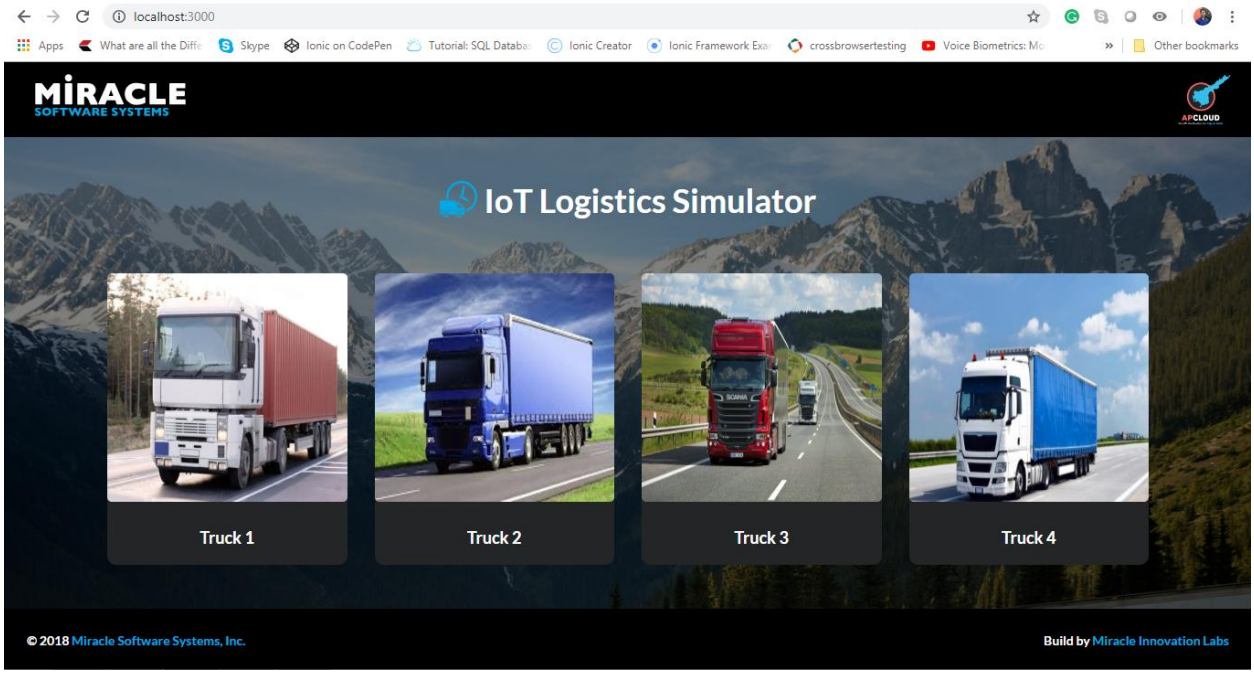


Note - Once created, the application will take about 2 minutes for staging and start running.

Step #3 | Run the Logistic Simulator

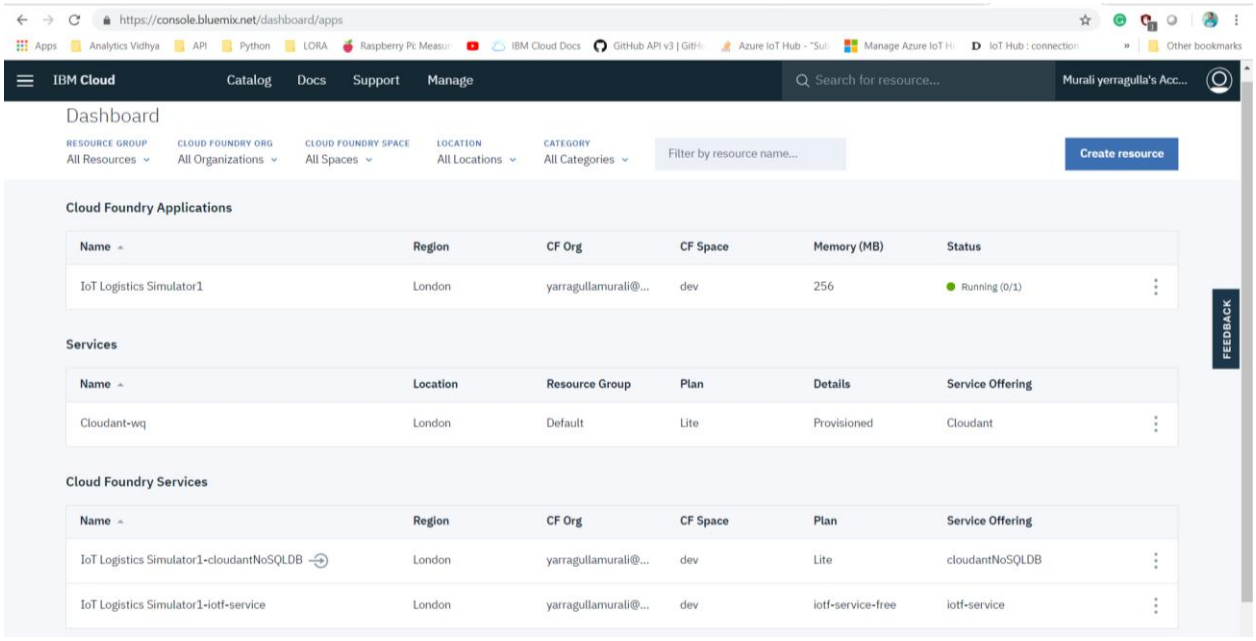
You can download the Simulator file from *<GitHub link>* send the vehicle data to the IBM Watson IoT Platform.

Run the index.html file to go to the Logistic Simulator Dashboard and it can be used to simulate Truck events, for example - Speed, Fuel, Tyre Pressure and Location.



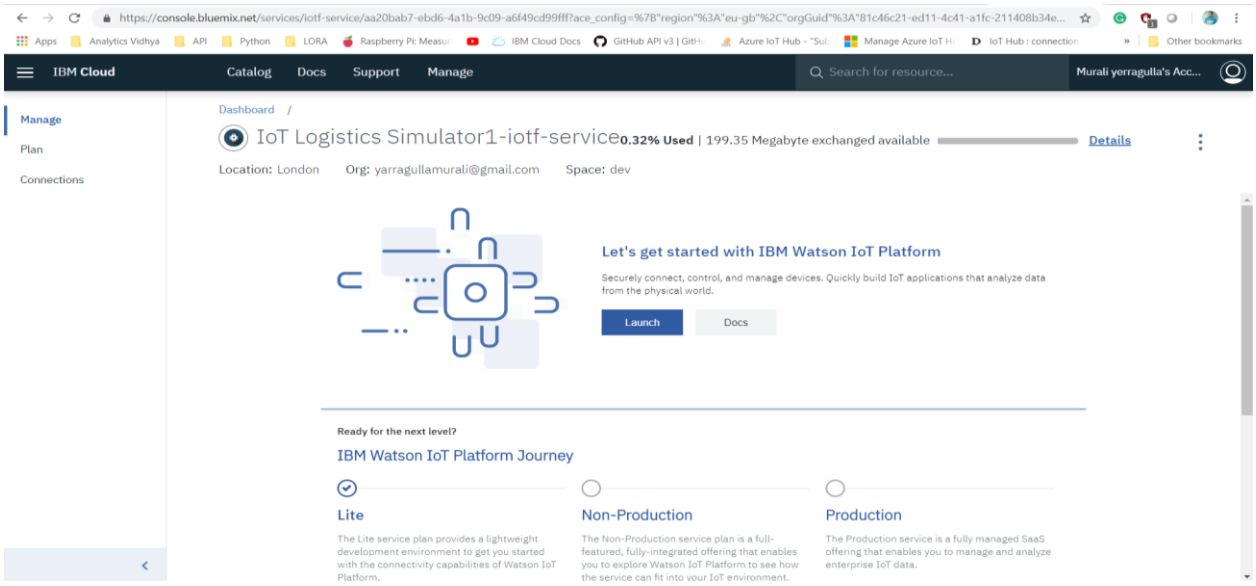
Step #4 | Register your Truck (Simulator)

Go back to your Bluemix account and click on your application.

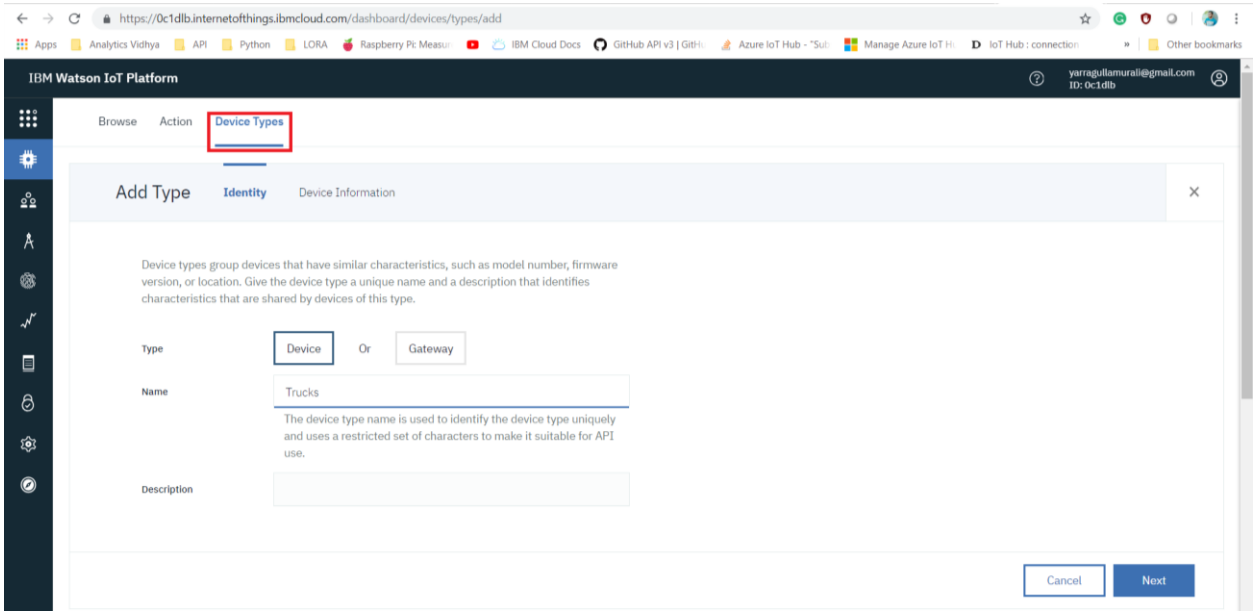


Click on "**Internet of Things Service**".

Click on **"Launch Dashboard"** button. This will take you to your IoT Platform Organization space.

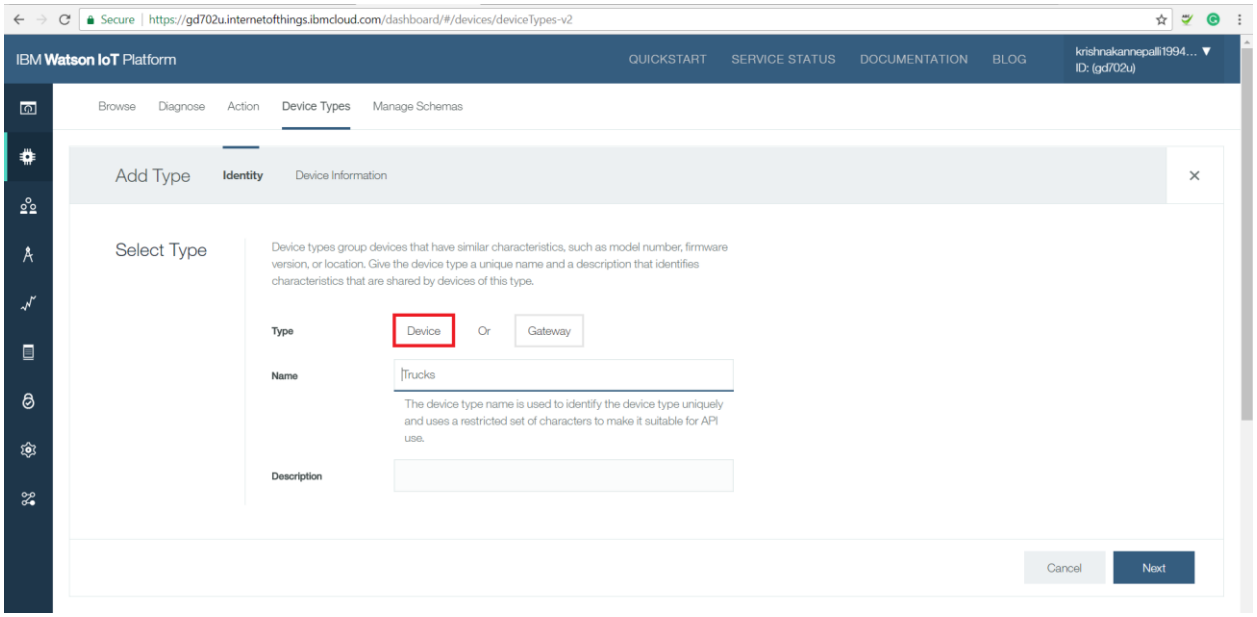


As the Organization is new, there will be no registered devices so, click on **“Device Type”.**

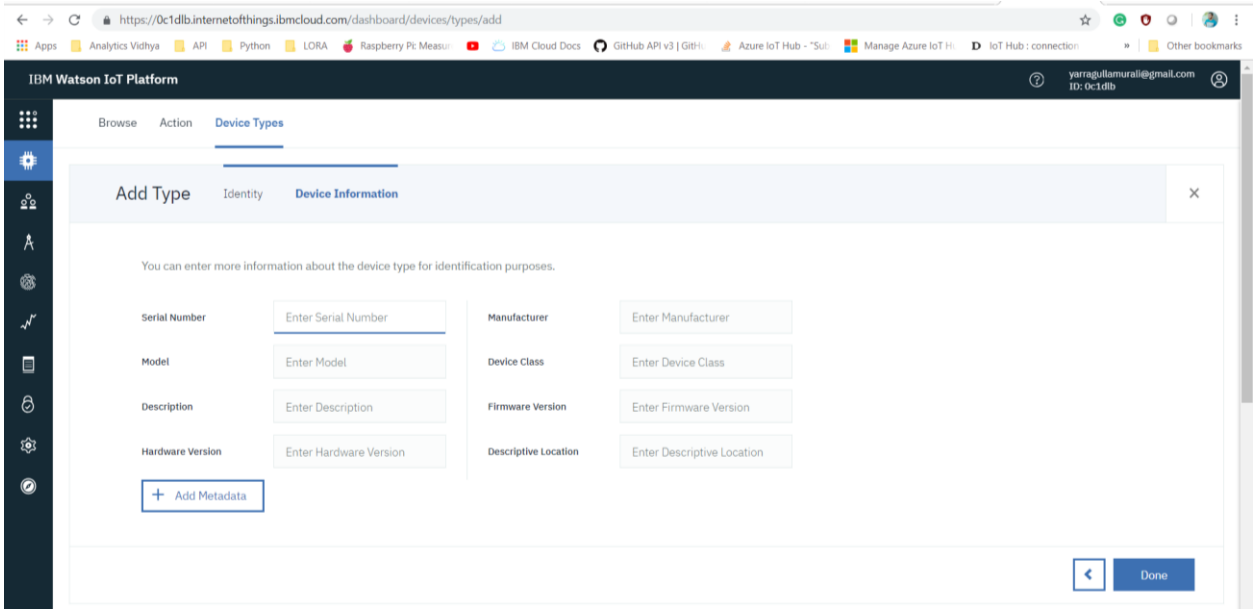


Observe that we have 2 options. As we want to create a Device Type and not a Gateway, click **"Device "**.

Specify a name for the device type to be added and give description (Optional). For example you can give "**Trucks**" for "Name" field. Click on “**Next**”.

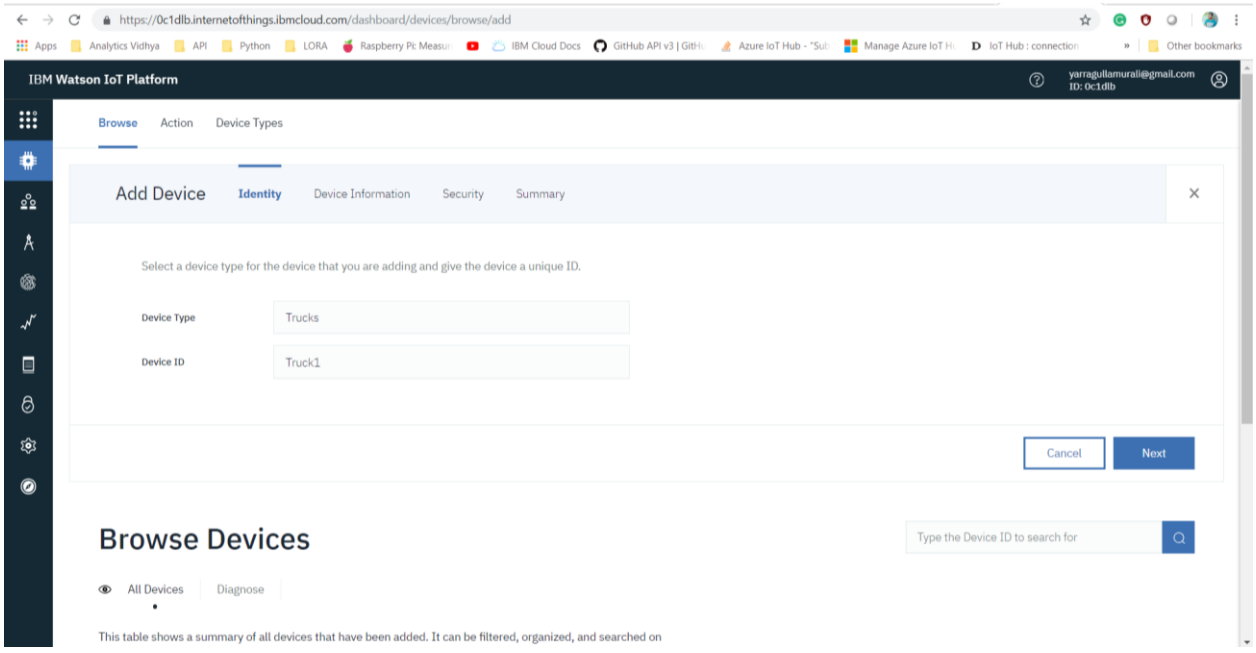


If you want to insert any "**Device Information**", you can insert it here (This is optional). Click on "**Done**".

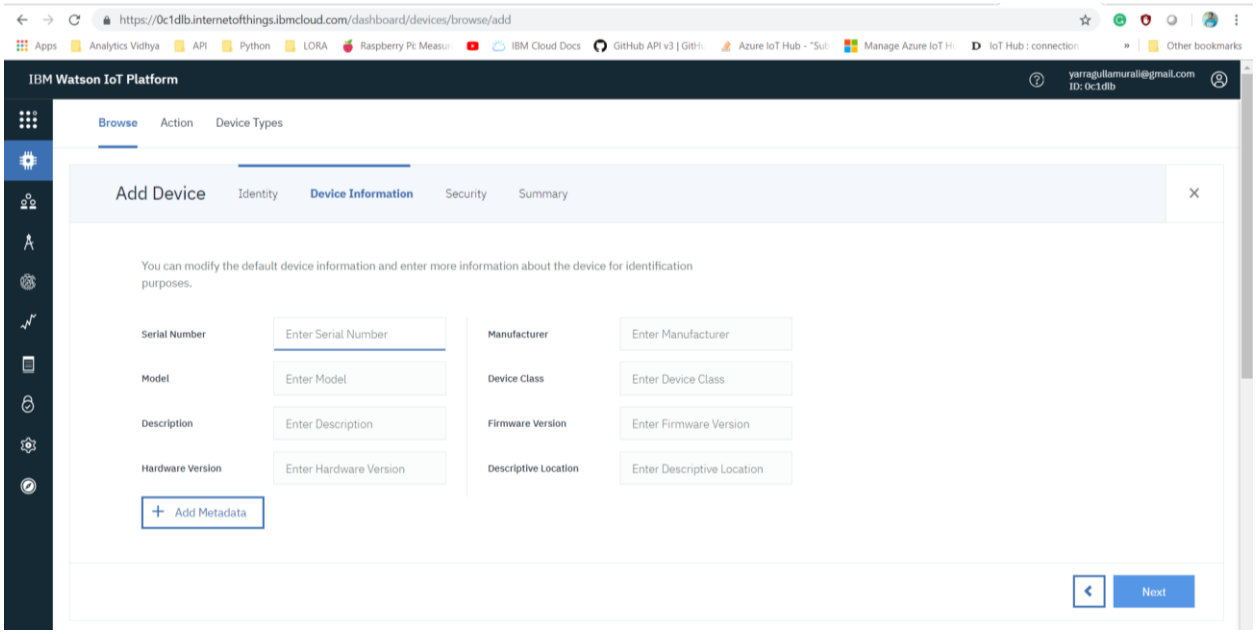


Click on "**Add Device**" on top right corner.

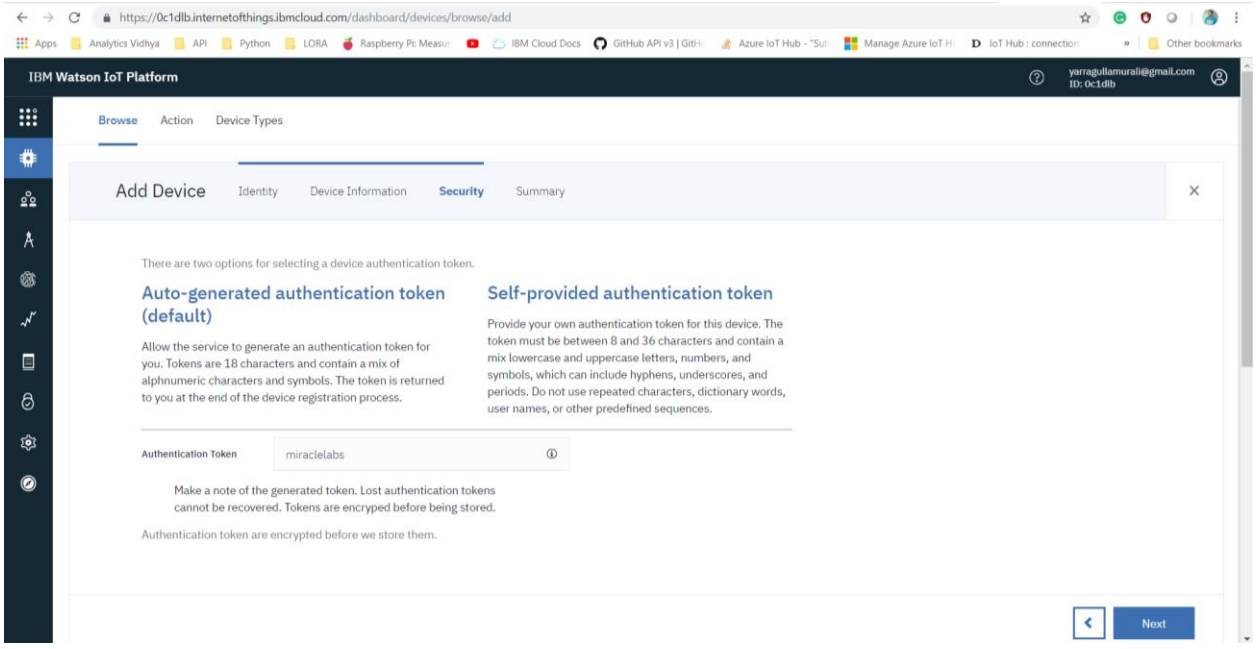
When prompted, "**Select the Existing Device Type**" as "**Trucks**" and provide the Device ID, then click on **Next**.



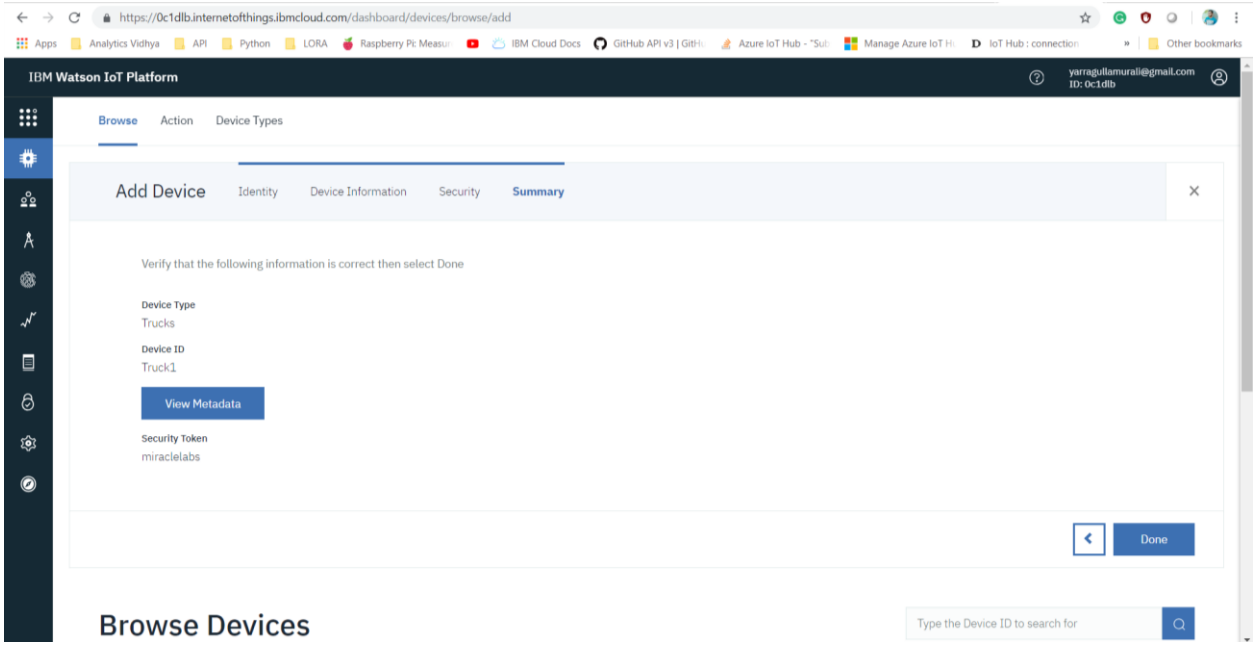
If you want to insert any "Device Information", you can insert it here (This is optional).



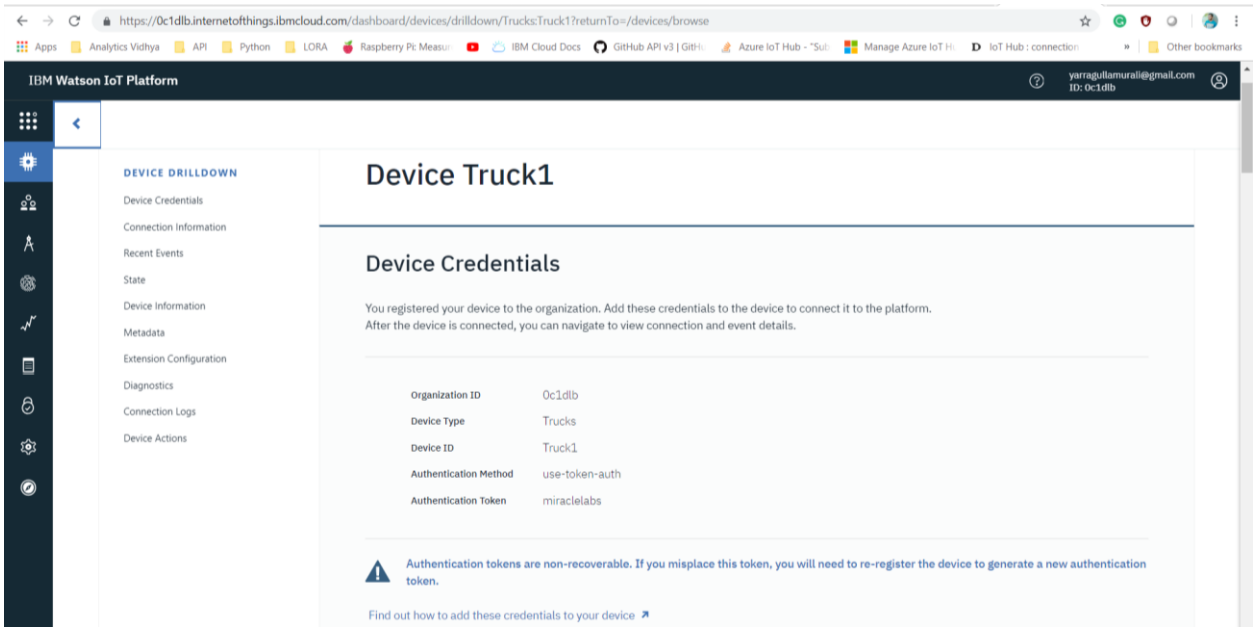
In the Next page, you can either add your own authentication token, or allow the IoT Platform to generate a token for you. If you want to add your own token, enter the token. Otherwise leave the field empty. Click on "**Next**".



Click on “**Done**”.



Click on "**Done**", then the Device Type is created successfully. After registering, store the credentials for the registered device.



Step #5 | Configure the Simulator

For your simulator to communicate sensor events via MQTT to the IoT Platform we will need to configure it with the required endpoints and the registrations details. Go to your application and open the **server.js** file.

Update the details of the file with the configuration details as mentioned in the comments. The following are the details that you should have with you to modify the file,

var orgId = “<your-Organization-ID>”

var deviceType = “<your-device-Type>”

var deviceId = “<your-device-ID>”

var deviceToken = “<your-device-Token>”

```
var iotf = require("ibmiotf");
var express=require('express');
var app = express();
const bodyParser=require('body-parser');
var server = require('http').Server(app);
var io = require('socket.io')(server);

var port=3000;
app.get('/',function(req,res){
    res.sendFile( __dirname+ '/index.html');
});
app.use(bodyParser.urlencoded({extended: true}));

app.use(bodyParser.json());

app.use(bodyParser.json());
app.use(express.static(__dirname + '/'));
app.use(function(req, res, next)
{
    res.header("Access-Control-Allow-Origin", "*");
    res.header("Access-Control-Allow-Headers", "*");
    next();
});
var config1  = {
 "org" : "hdlxmj",
 "id" : "Truck1",
 "type" : "thing",
 "auth-method" : "token",
 "auth-token" : "digitalsummit@2107"
}
```

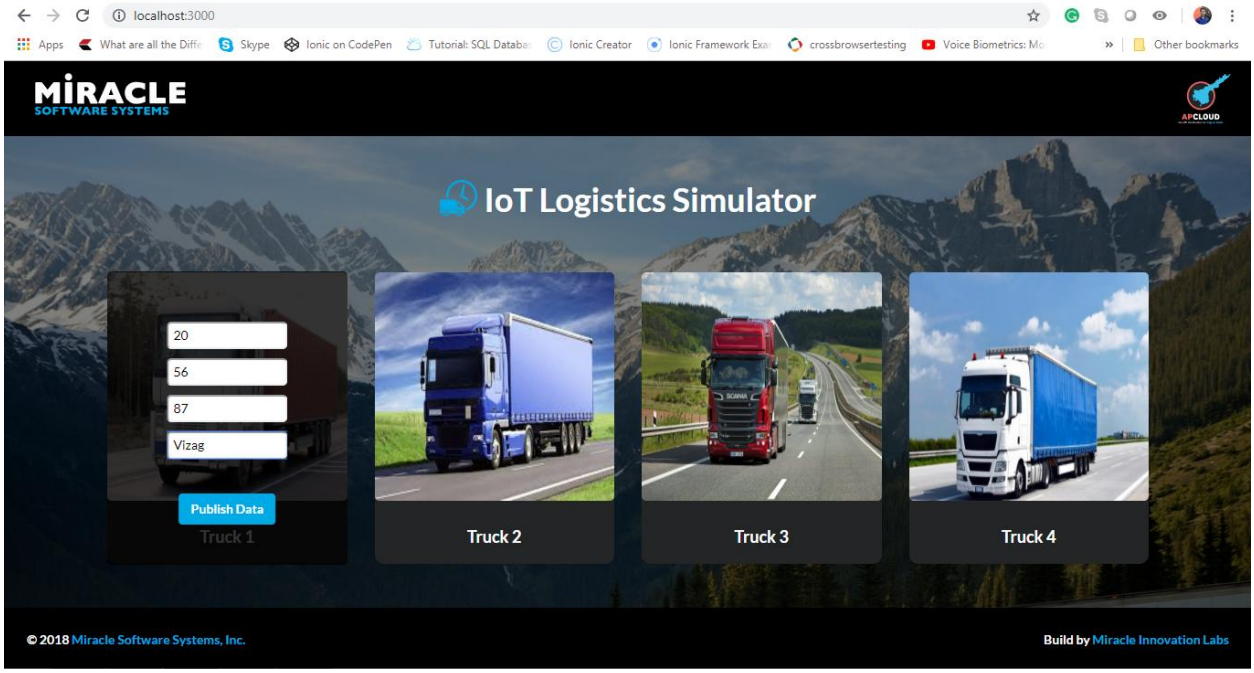
Save the file and re-load the index.html file in a browser. You can now return back to the IoT Dashboard and see that your device is connected to the cloud.

Open Command Prompt, and go to the application directory and run app.js file

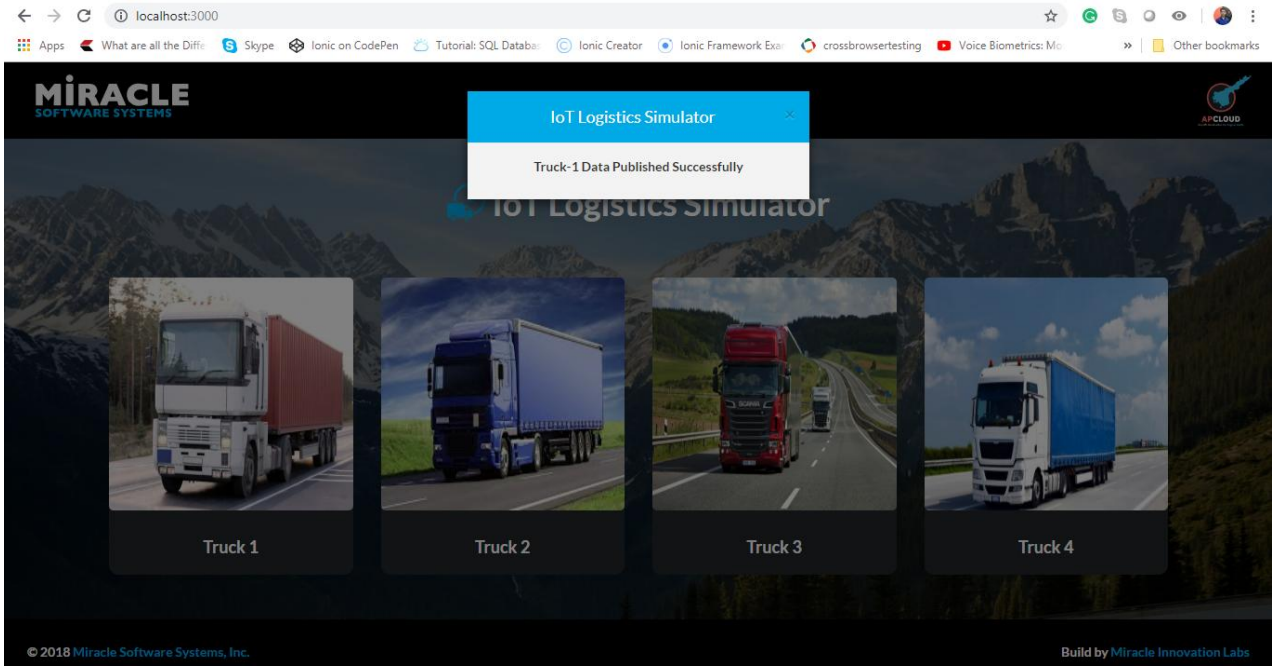
```
F:\IoT Logistics Simulator\simulator-20171205T144206Z-001\simulator>node server.js
server running at3000
```

Step #6 | Publishing the Data to Watson IoT platform

Go to Logistic Simulator dashboard. Place your mouse control over **Truck 1**. Fuel details will appear on top right corner. Give any values for the fields and click on **"Publish Data".**

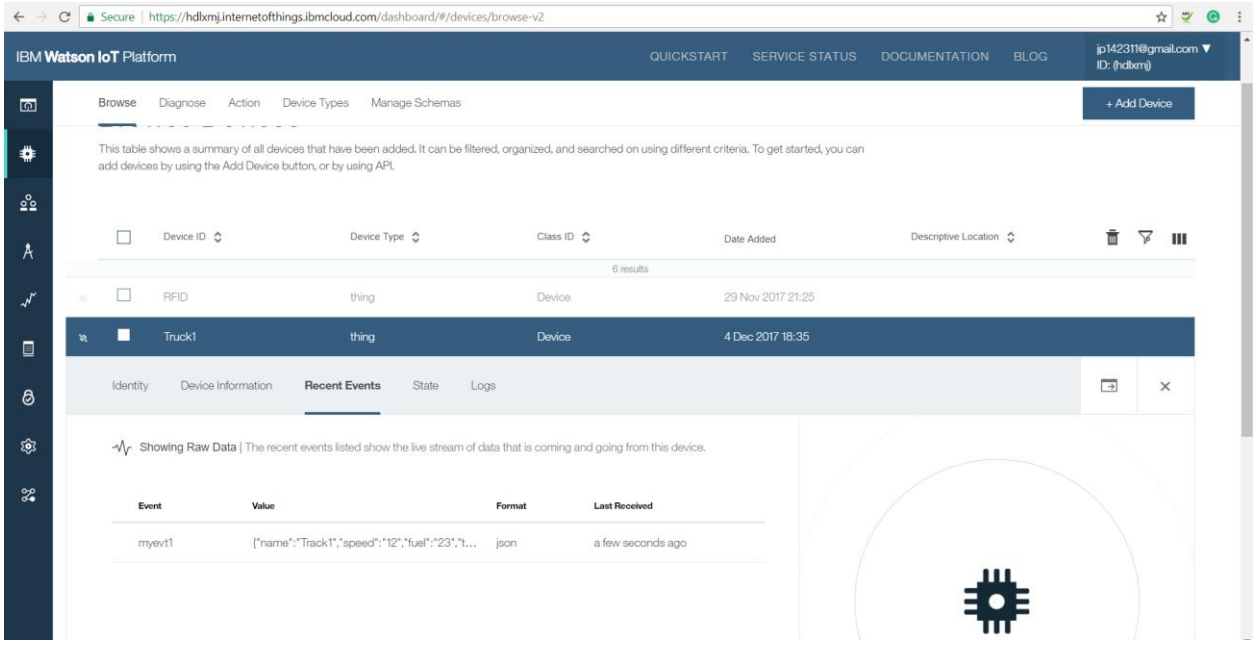


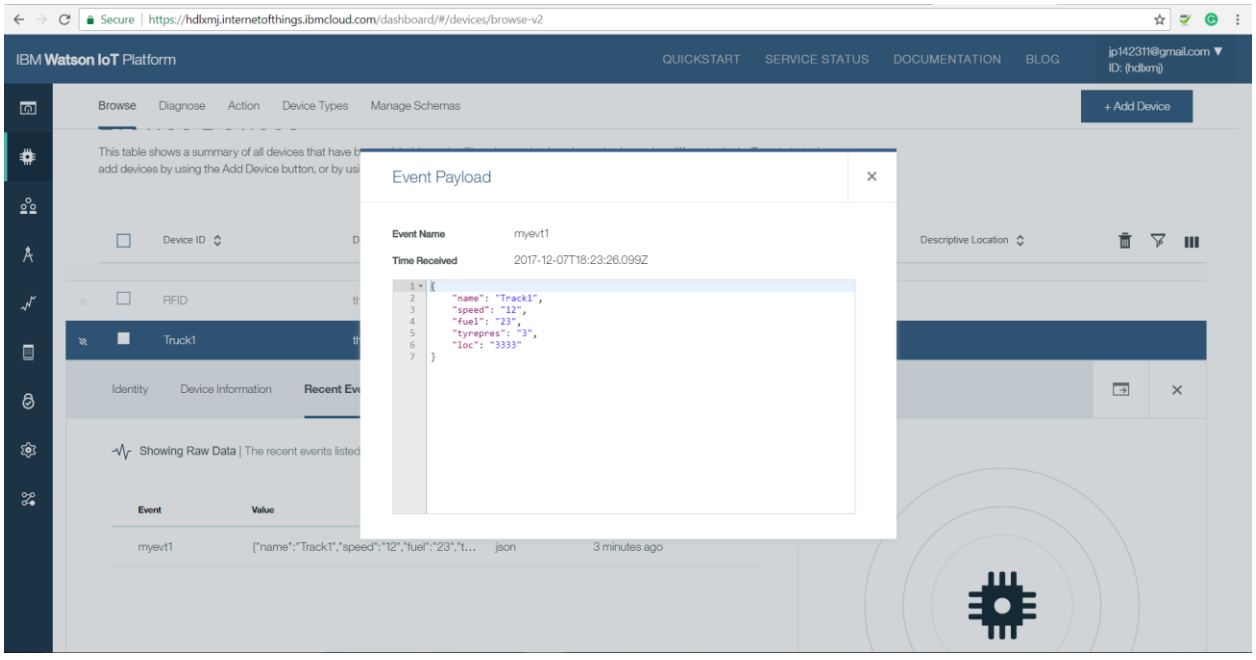
If the data is published successfully to Watson IoT platform, then a pop-up appears.



Open Command prompt for viewing the JSON response.

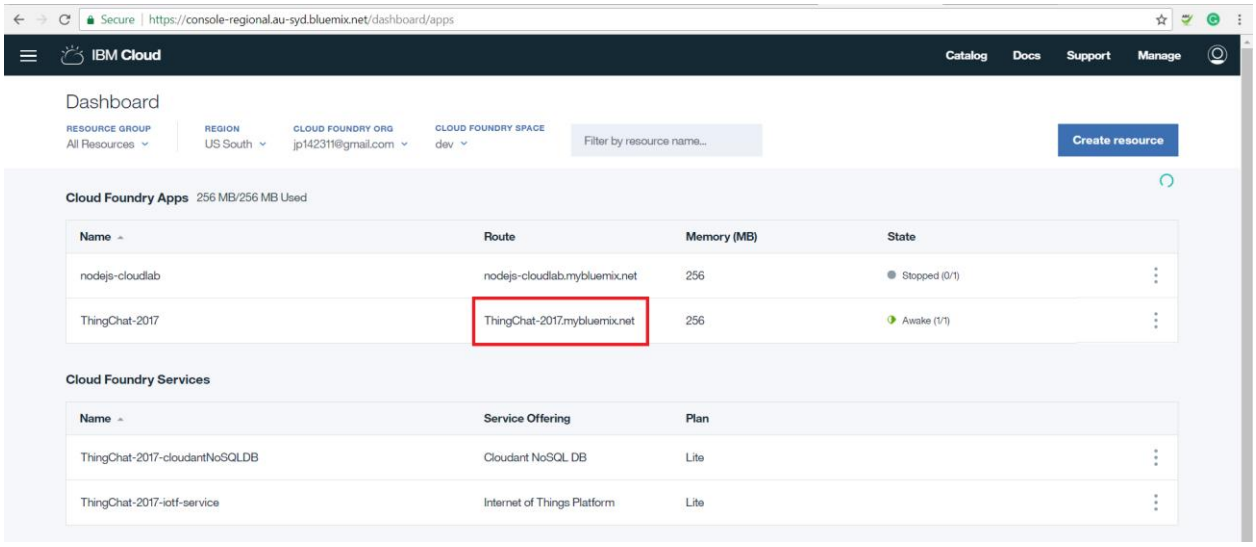
Go back to Watson IoT Dashboard for checking the JSON payload



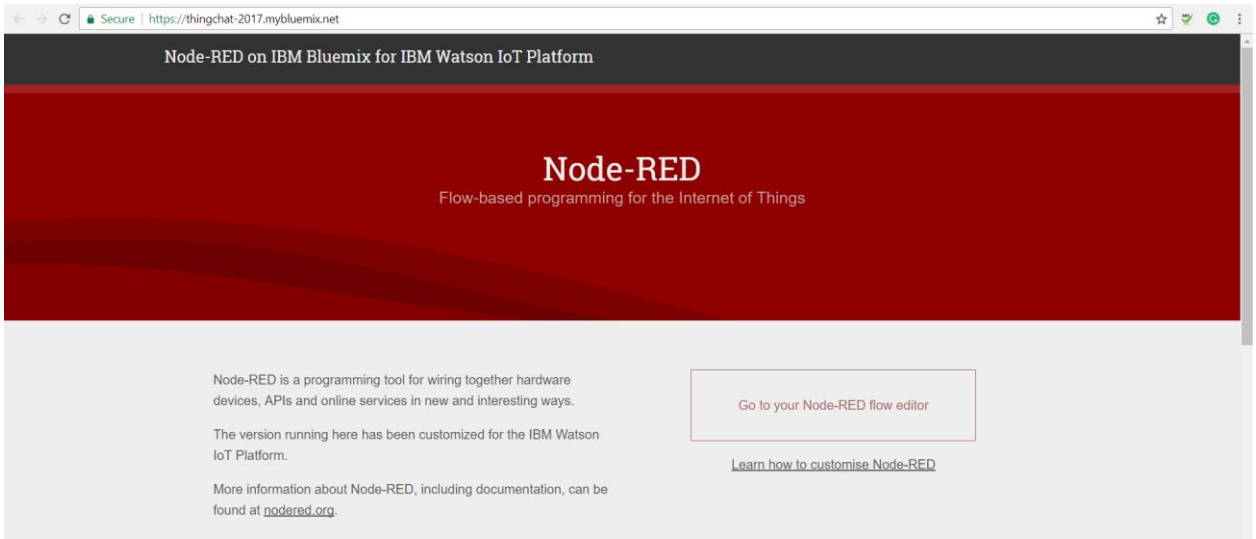


Step #7 | Persisting your data with Node-RED and Cloudant

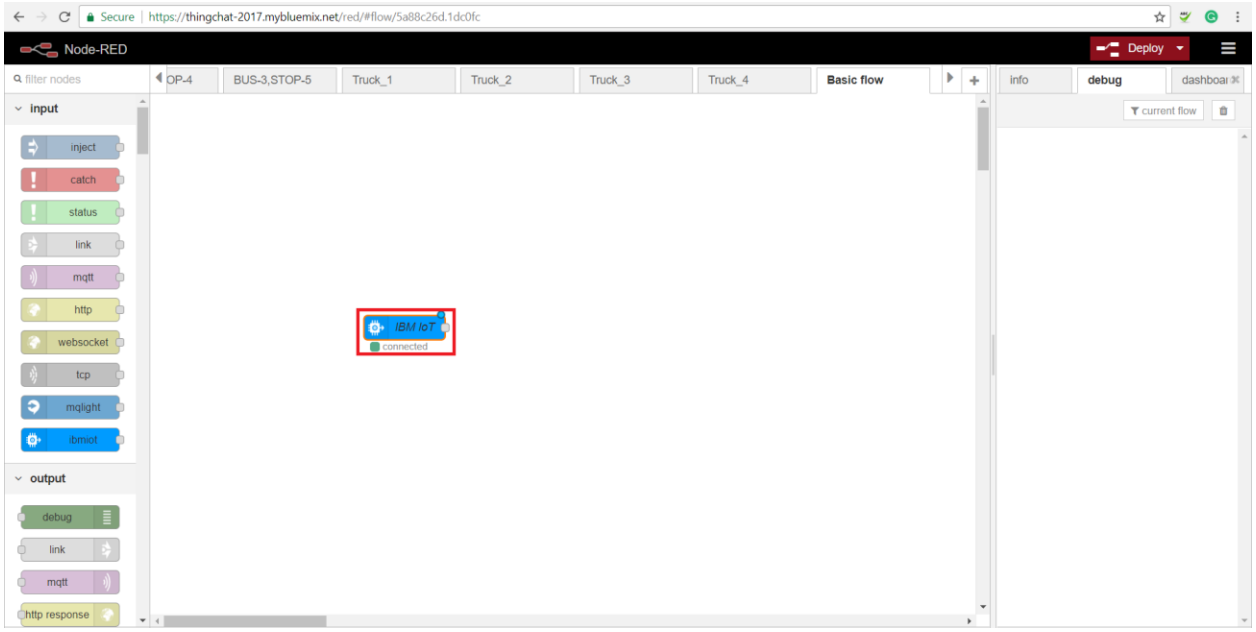
Go to your Bluemix Application Dashboard and click on **Route**



This will redirect you to Node Red tool in Bluemix. Click on **"Go to your Node-RED Flow Editor"**

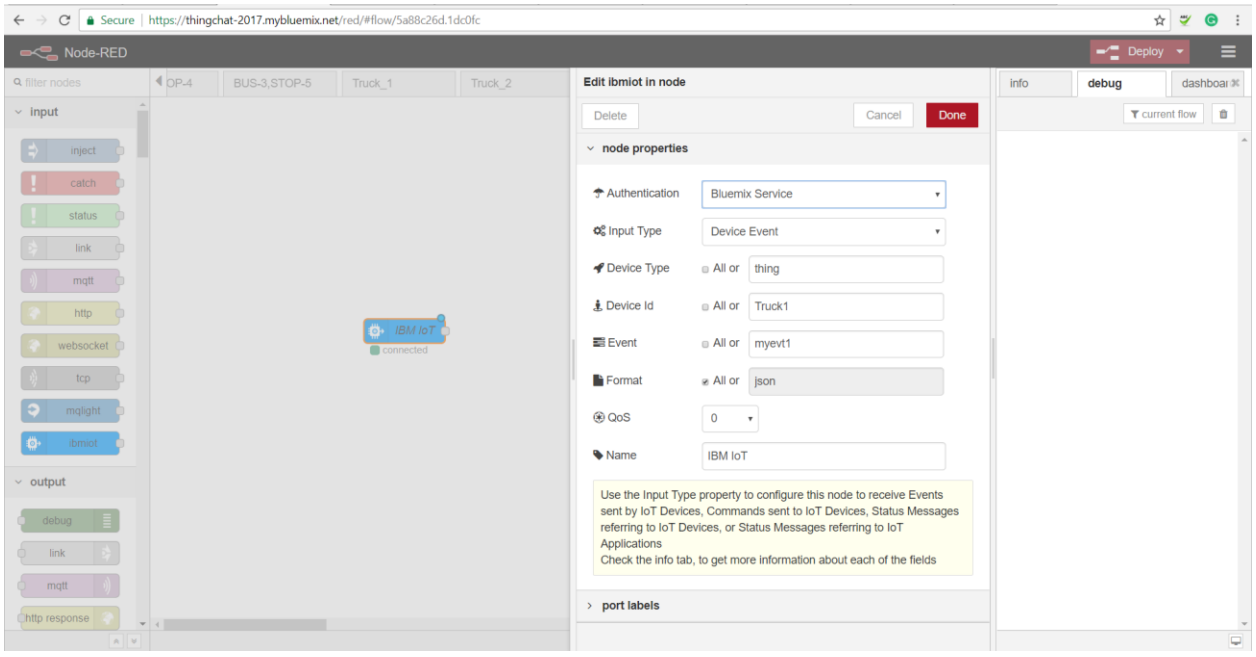


Node Red Flow sheet will be opened with a set of input and output nodes. Drag and drop "**IBM IoT**" node onto the flow sheet.

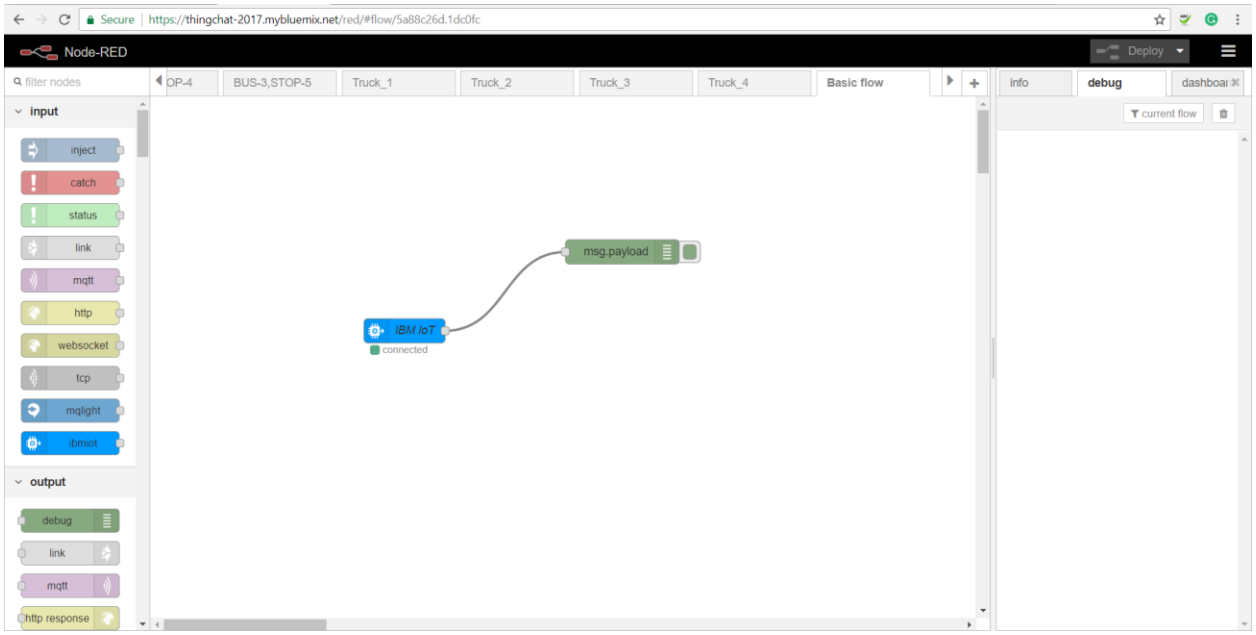


Double click on the "**IBM IoT**" node. Give the following for prompted fields,

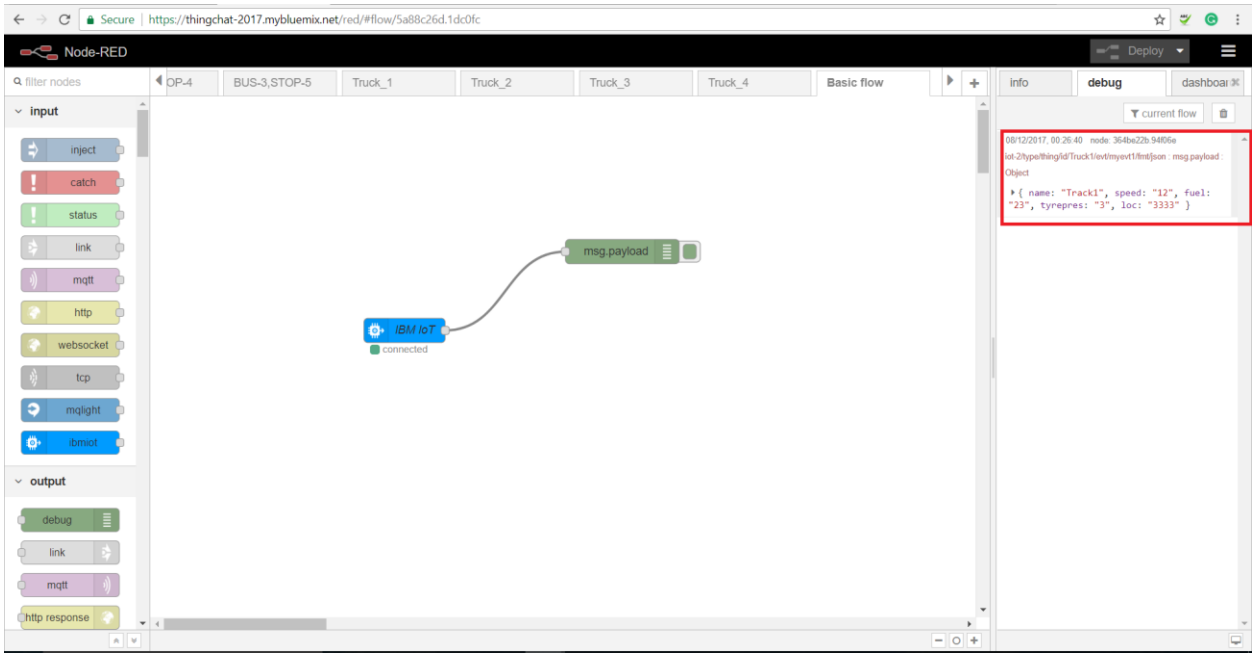
Field	Value
Authentication	Bluemix Service
Input Type	Device Event
Device Id	<Your-Device-ID(MAC ID)>
Format	JSON



Drag and drop a **"debug"** node from the list of Output nodes present in the left side menu. Give connection to both the nodes and click on **"Deploy"**.



Go to Logistic Simulator dashboard. Send the events and click **Publish Data,** then the data will be sent to Node-RED.



Step #8 | Create Dashboard using Node-RED

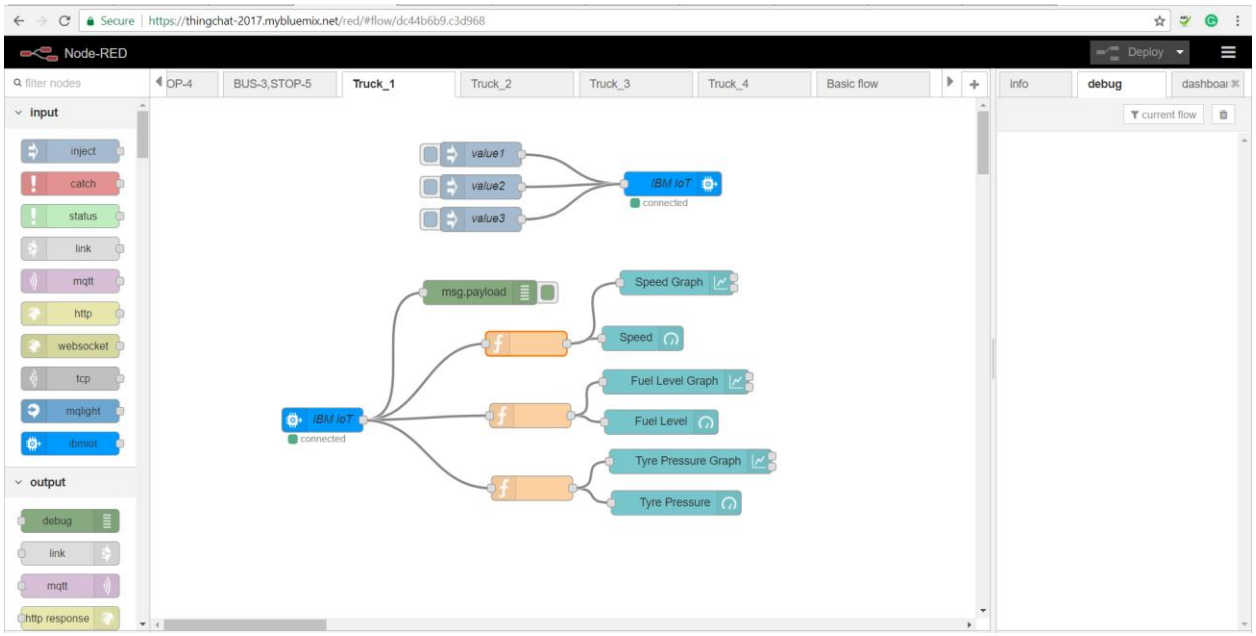
Dashboard module provides a set of nodes in Node-RED to quickly create a live data dashboard.

Install Dashboard node using, **npm i node-red-dashboard**

The dashboard layout should be considered as a grid. It contains all the elements which are used for creating Dashboard - offering graphs, gauges, basic text as well as sliders and inputs.

We'll create a simple dashboard element that displays the vales of the truck in the form of graph and gauges.

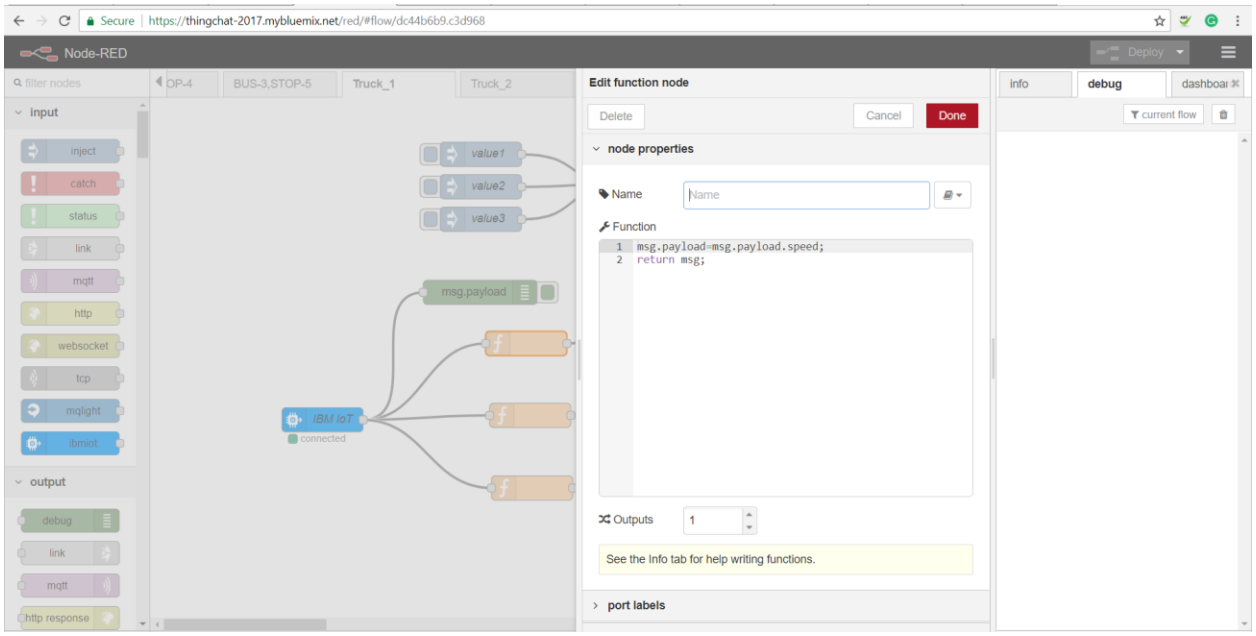
Drag and drop the gauges and graphs along with one function as below for 3 different parameters.



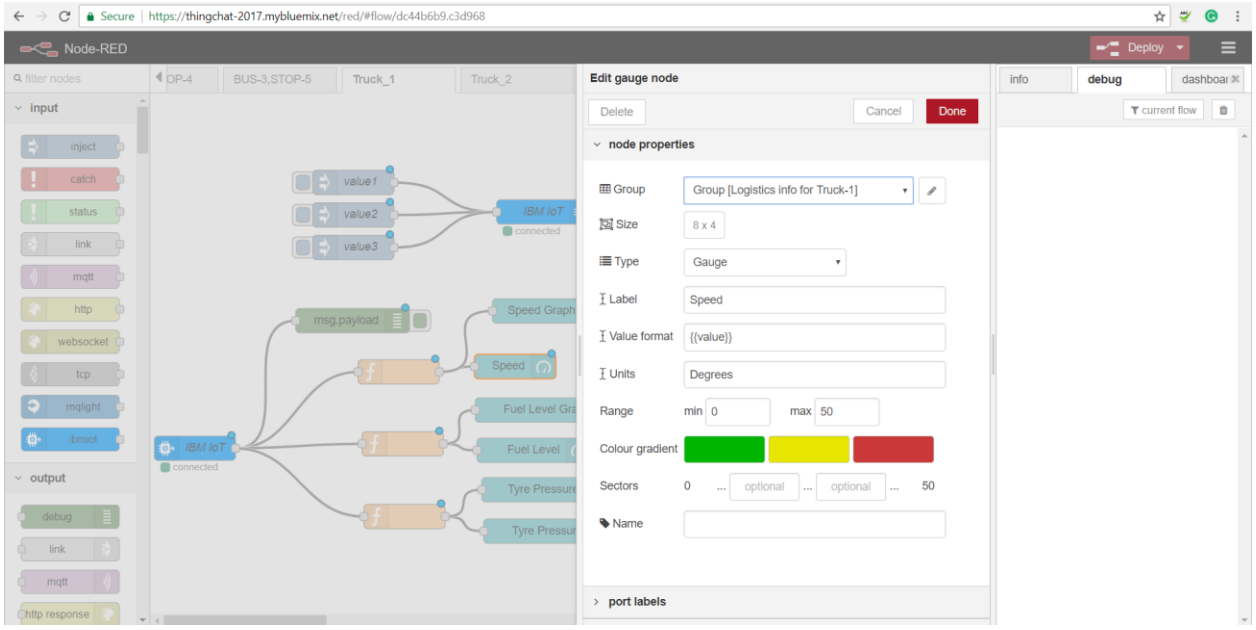
Click on the Function node and copy the below snippet,

msg.payload=msg.payload.speed;

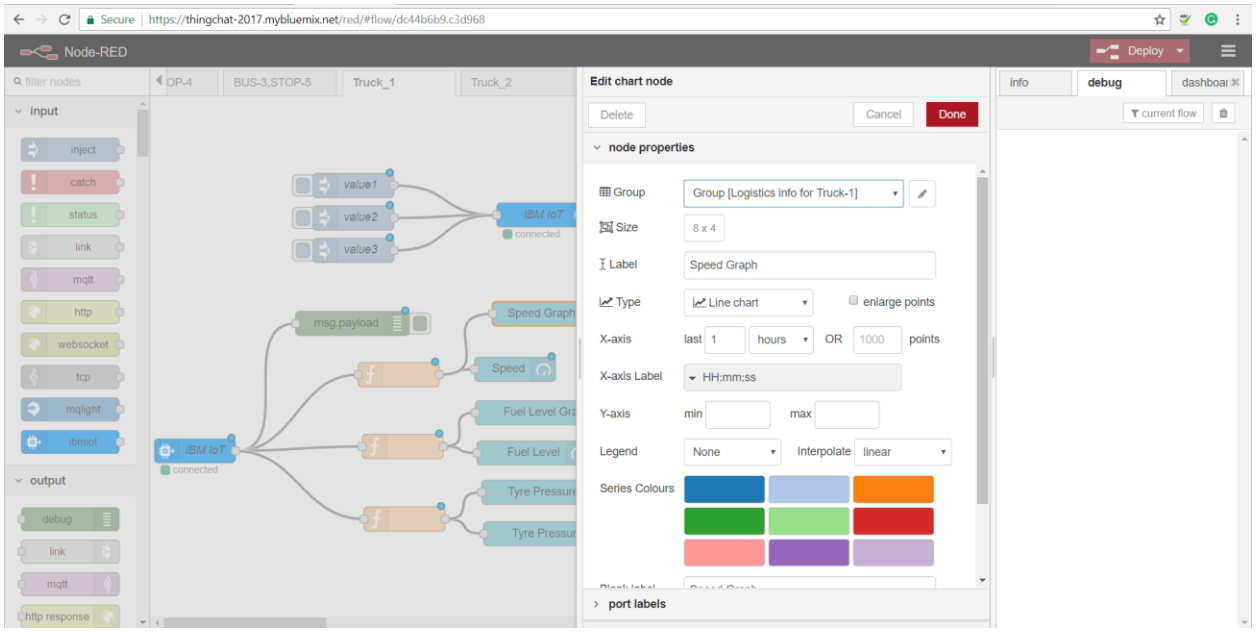
return msg;



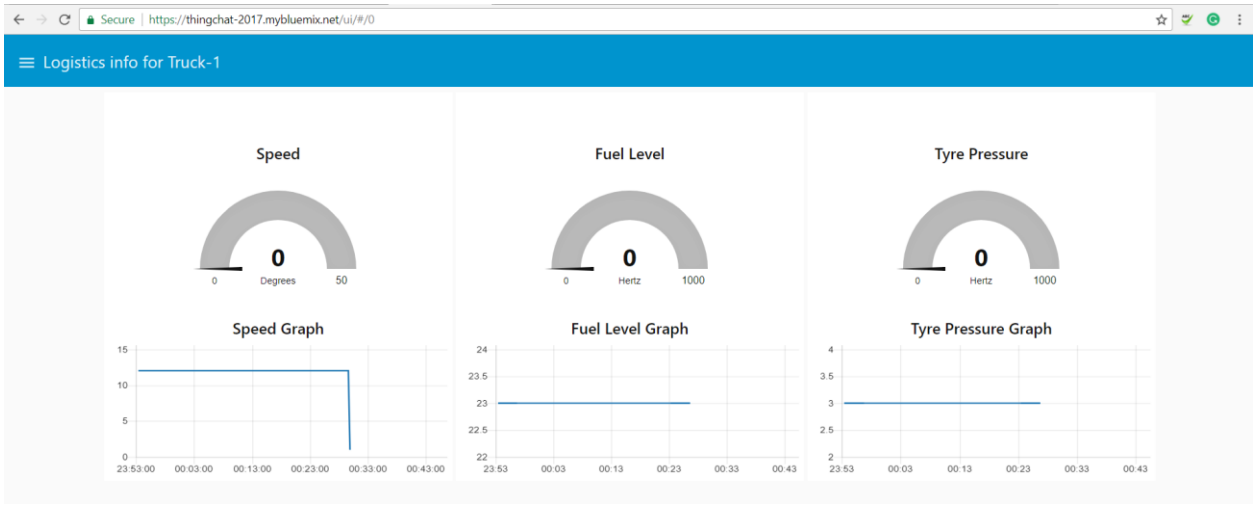
Click on Graph node and add the below details as shown



Click on Gauge node and add the below details as shown.



Open http://< application-name>/ui, for viewing the dashboard



Now, send the data from the Logistic Dashboard as above, you can see the change in Gauges and Graphs.