Water Level Data access tutorial.

This is a document explaining how one can access the water level data collected from the farm devices. The data is stored on cloudantDB, which is a No-SQL Document based database.

The water level measurement device is solar powered and is designed to work in remote places that may be off the grid.

Cloudant DB Credentials

Username: 8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix
Password: b69d78f8c5aad962b42e278c73cce8238522bdd4a73aaeec73fa8efc11524db3
Host: 8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix.cloudant.com
Port: 443
URL: https://8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix:b69d78f8c5aad962b42e278c73cce8238522bdd4a73aaeec73fa8efc11524db3@8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix.cloudant.com"
Database: levelmeters
Database read url: https://8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix.cloudant.com/levelmeters/_find
Device: Proto06V

Included is a Python application to achieve the same. Functionalities of the code are explained on the comments in the application.

This tutorial is based on the Cloudant DB documentation. Use the link below for more information.
https://console.bluemix.net/docs/services/Cloudant/basics/index.html#cloudant-basics

Sample document (Data record).

Below is a sample of a data record from the farm water level measurement device.


```
{
 "_id": "002b6de09c5d70a2317abfa3534ea209",
 "_rev": "1-248745a3d6e2fe8ba637cc83d1add7c1",
 "topic": "iot-2/type/LevelMeter/id/Proto06V/evt/status/fmt/formad:14br69:LevelMeter:Proto06V",
 "payload": {
  "data": {
   "height": "60",
   "signal": "25",
   "battery": "4019",
   "temp": "20",
   "humidity": "18",
   "err": "10"
  }
 },
 "deviceId": "Proto06V",
 "deviceType": "LevelMeter",
 "eventType": "status",
 "format": "formad:14br69:LevelMeter:Proto06V",
 "timestamp": "2017-10-26T17:39:12.401Z"
}
```


FYI:

1. **Height** is in centimetres, and this is the measurement from the top of the tank to the water level, to calculate the amount of water in the tank, subtract this value from the overall height of the tank.
2. **Battery** value is in milliVolts.
3. **Signal** value is in dBm.
4. **Temperature** value is in degrees Celsius.
5. **Humidity** value is in percentage.
6. **err** value is the count of failed connections from the device.
7. **deviceId** is the identity of the device.
8. **deviceType** is the identifier for all the devices of the same type, in this case levelmeters.
9. **timestamp** is the time the data was sent from the device **in UTC.**
10. **topic** is the mqtt topic the device used to communicate with the server.

For Analytics purposes, the height is what is required, temperature, humidity, signal level and battery level are for operational purposes.

How to read the data

There are 2 ways in which one can access the database.

1. RESTClient using the HTTP API.
2. Python Application Using HTTP API

For this tutorial we will use the **HTTP API**.

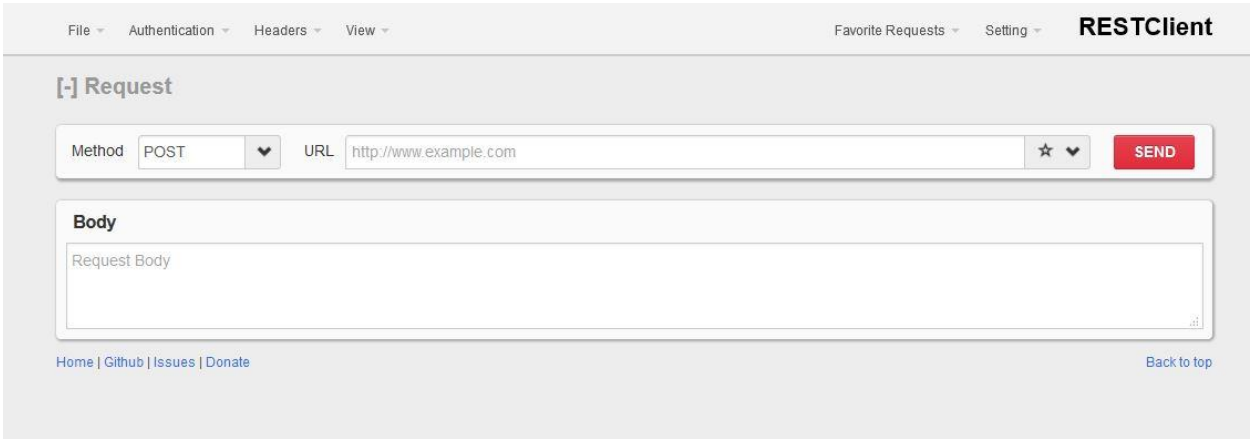
RESTClient using the HTTP API

For this tutorial, we will use a browser add-on on Mozilla Firefox called rest client.

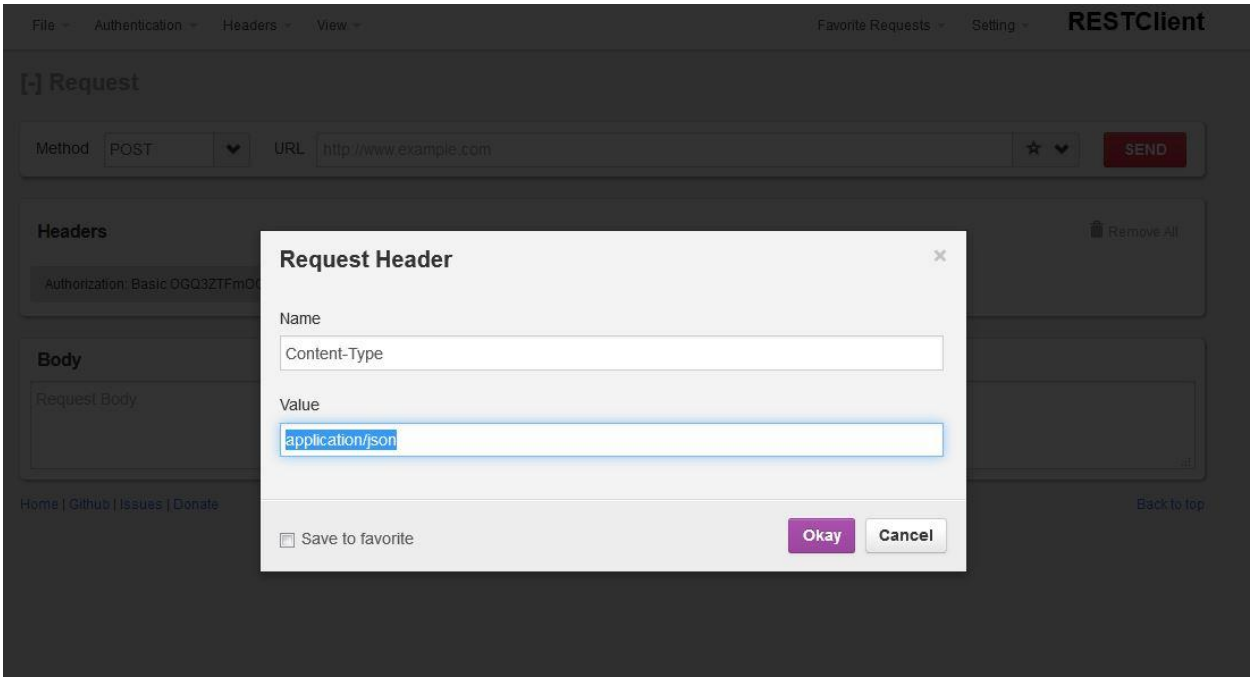
1. Install Restclient on Mozilla Firefox.

   https://addons.mozilla.org/en-US/firefox/addon/restclient/

2. Once installed, open RESTclient on Mozilla. You should see the page below.



3. Populate the content type header, click on headers, set the **name** to **Content-type** and **value** to **application/json** and click Okay.



4. Populate the request method, URL and Body.

    a. Set Method to **POST**

    b. Set URL to https://8d7e1f8e-1f7d-4d64-8788-490379bcbad5-bluemix.cloudant.com/levelmeters/_find

    c. Set the Body to

    {"selector":{"timestamp":{"$gt":"2017-11-07T12:17:48.412Z","$lt":"2017-11-08T12:17:48.412Z"},"deviceId":"Proto06V"},"sort":[{"timestamp":"desc"}]}

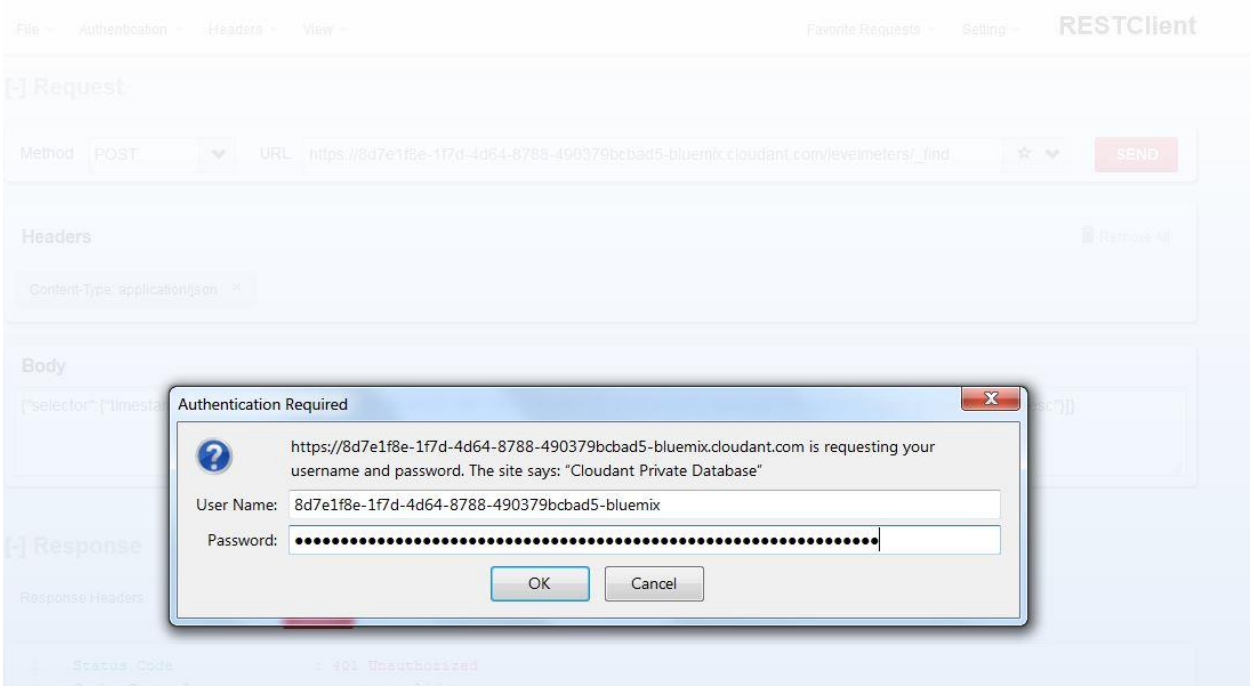
    The above is a selector object that is set on the body of the object to retrieve the data.

    The above statement will retrieve data for the **Proto06V** device, between **2017-11-07T12:17:48.412Z** and **2017-11-08T12:17:48.412Z** in a **descending order**

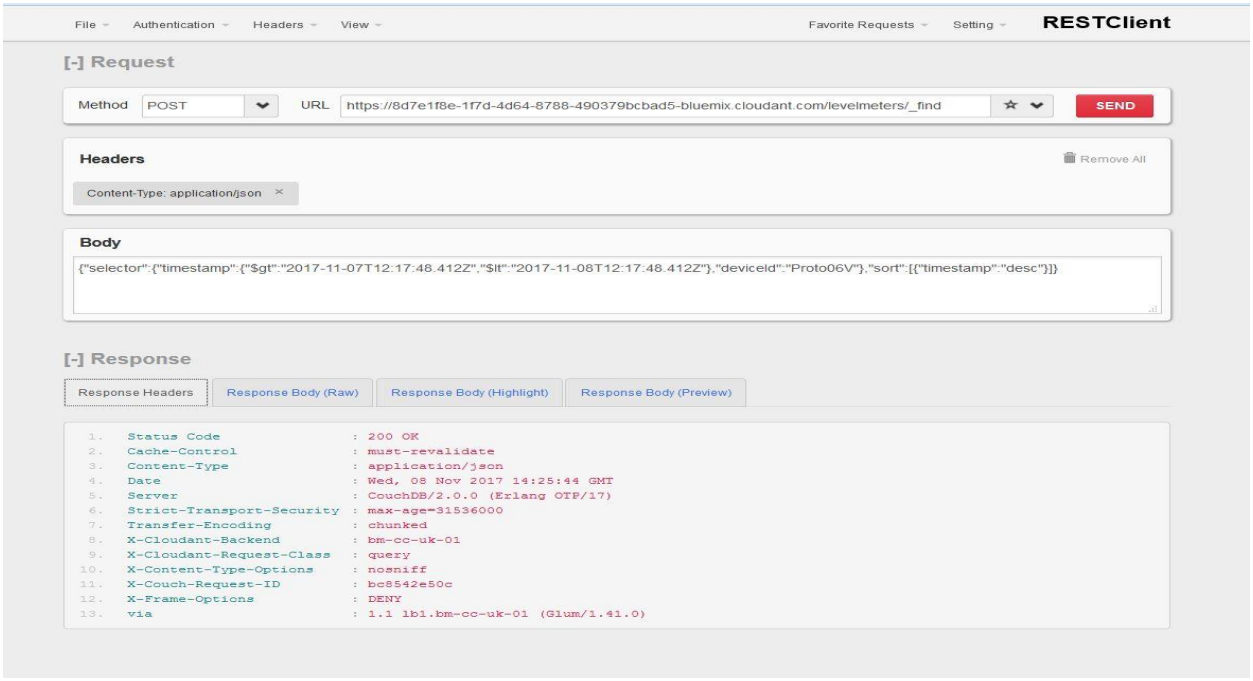
    The time record in the database is in UTC.

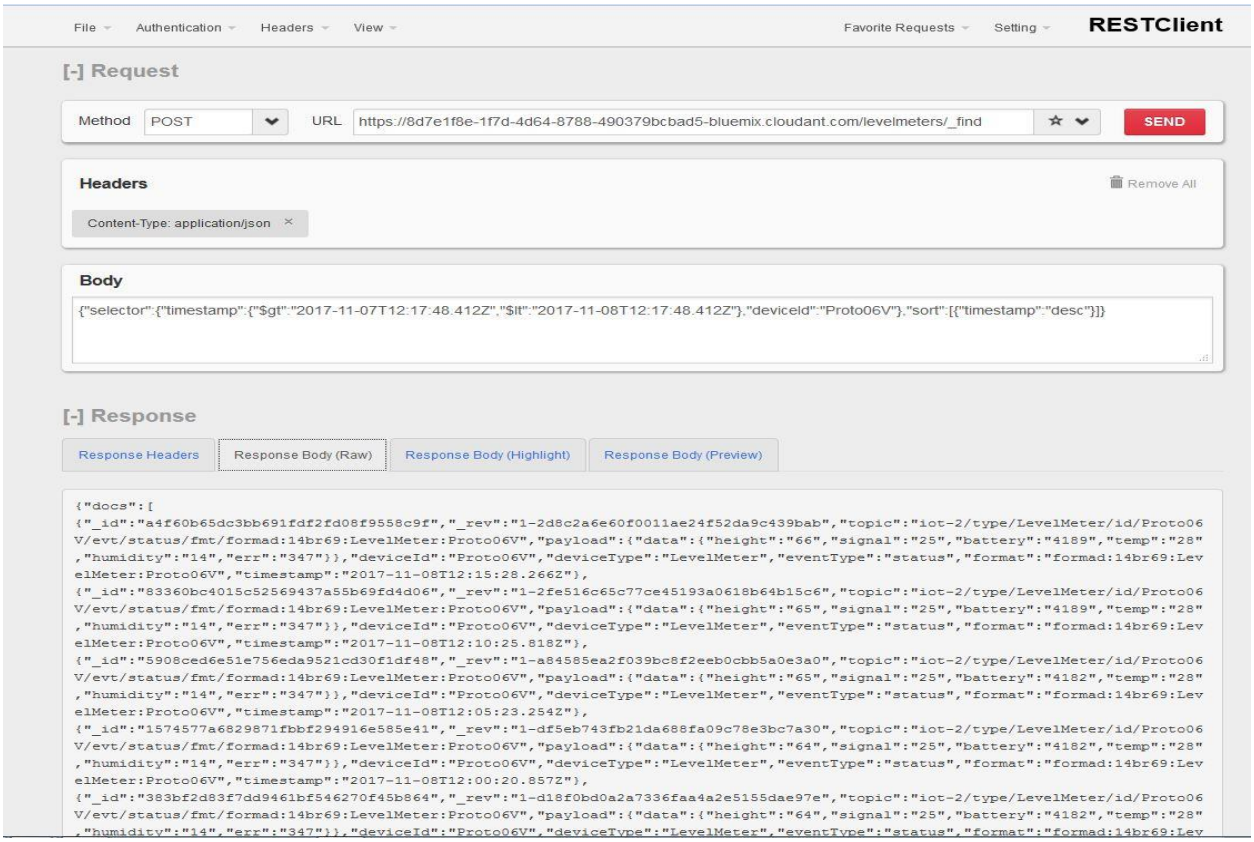
    Once all is populated, the page should be similar to this.

5. Click on Send to send the request. If you are not logged on to Cloudant on the browser, you will get a prompt to enter the username and password given above.



6. If everything was set up correctly, you should get a response status code 200 on the response headers and the collected data from the response body.





Python Application Using HTTP API

The attached Python application will achieve the same as above.

You will need to have python and pip installed on your machine and connected to the internet.

1. Run the python application.

   Command: *python cloudantTutorial.py*

2. Once the above command is run, you will get a prompt to enter the number of hours into the past that you would like to view the data for and press enter. E.g. 3 hours as below

```
[root@zaz-on3 Strathmore]#
[root@zaz-on3 Strathmore]# python cloudantTutorial.py
Fetch data for the past ...hrs ? : 3
```

3. You will then get a prompt to enter the limit of the data records to fetch and press enter. E.g. 10 as below

```
[root@zaz-on3 Strathmore]# python cloudantTutorial.py
Fetch data for the past ...hrs ? : 3
Enter the limit of the documents to fetch ? : 10
```

4. You should get an output showing the request body object and response, which is the calculated height of the water in the tank in cm and the timestamp in UTC. E.g.

```
Fetch data for the past ...hrs ? : 3
Enter the limit of the documents to fetch ? : 10
Fetching 10 latest documents for the past 3 hours
Request Body Object...
{'sort': [{'timestamp': 'desc'}], 'limit': 10, 'selector': {'timestamp': {'$gt': '2017-11-08T11:46:47.000Z', '$lt': '2017-11-08T14:46:47.000Z'}, 'd
eviceId': 'Proto06V'}}
Response status code.. 200
Calculated Height in cm
67 cm --- 2017-11-08T14:41:45.935Z
67 cm --- 2017-11-08T14:36:43.530Z
68 cm --- 2017-11-08T14:31:41.093Z
68 cm --- 2017-11-08T14:26:38.527Z
69 cm --- 2017-11-08T14:21:36.009Z
69 cm --- 2017-11-08T14:16:34.086Z
60 cm --- 2017-11-08T14:11:31.044Z
60 cm --- 2017-11-08T14:06:28.642Z
60 cm --- 2017-11-08T14:01:26.089Z
61 cm --- 2017-11-08T13:56:23.579Z
```