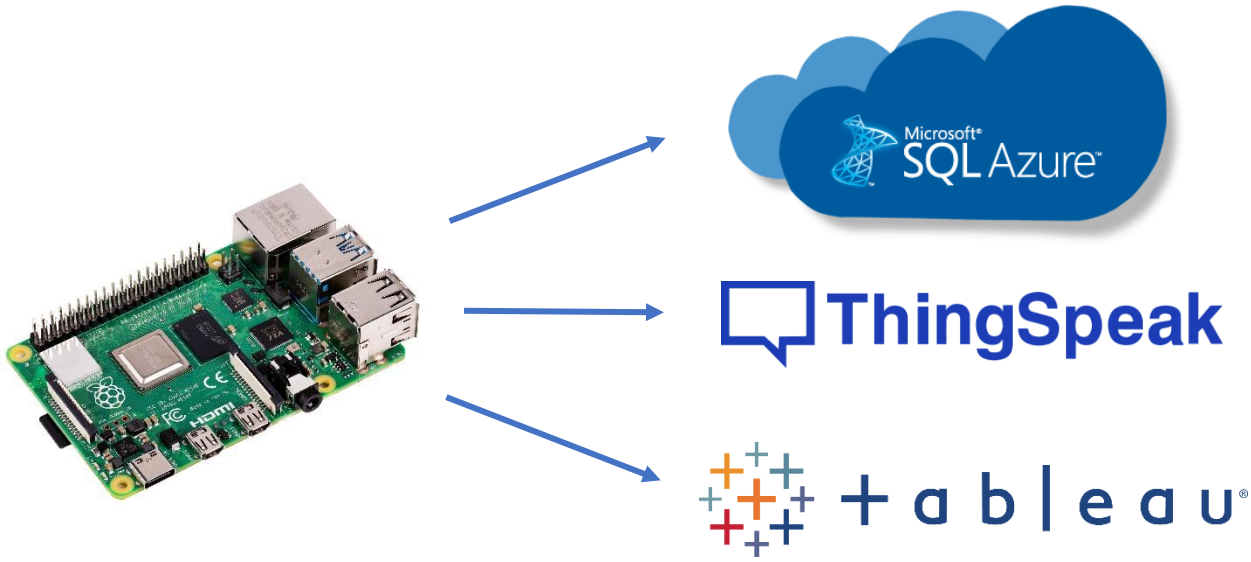
UNIVERSITÉ DES MASCAREIGNES

SAVOIR, C'EST POUVOIR

Université de Limoges

Raspberry PI connected to Azure database, Thingspeak and Tableau Software

Internet of Things, Web & Mobile

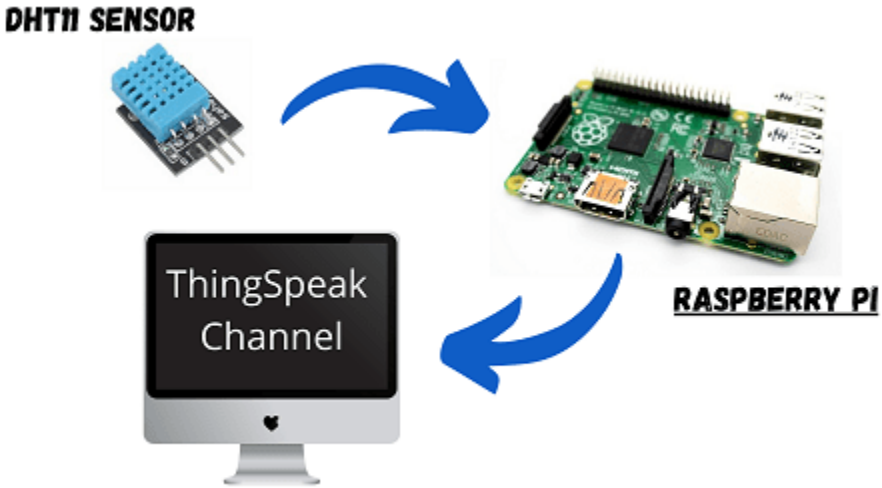


15 NOV 2022

HEMANT RAMPHUL

TP 08: Save the data from the Raspberry Pi sensor in a database and then create a dashboard to make it an insight of your data.

After doing the TP7, which have been able to capture temperature and humidity from a humiture Sensor and send it to Thingspeak in real-time.



Now I will proceed to the next step with store all collecting data local or cloud using a Microsoft SQL Server.

Step 1:

There are several items that you may retrieve before you connect Python to MS SQL Server (Portal Azure https://portal.azure.com/), including the:

- Server name
- Database name
- Table name
- User Id
- Password

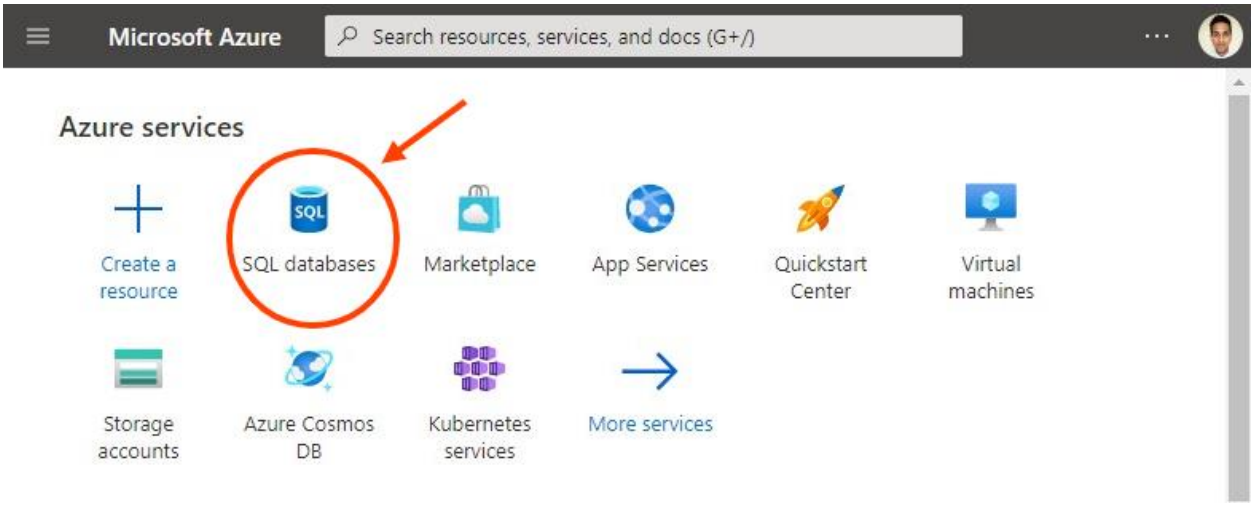


Fig 1. Select option SQL Database

Let create a database using Microsoft SQL Server Management Studio 18.

- Server name: **iot-hramphul.database.windows.net**
- Database name: **IoT_UDM_Database**
- Table name: **HumitureSensor**
- User Id: **hramphul /** Password: **{your_password}**

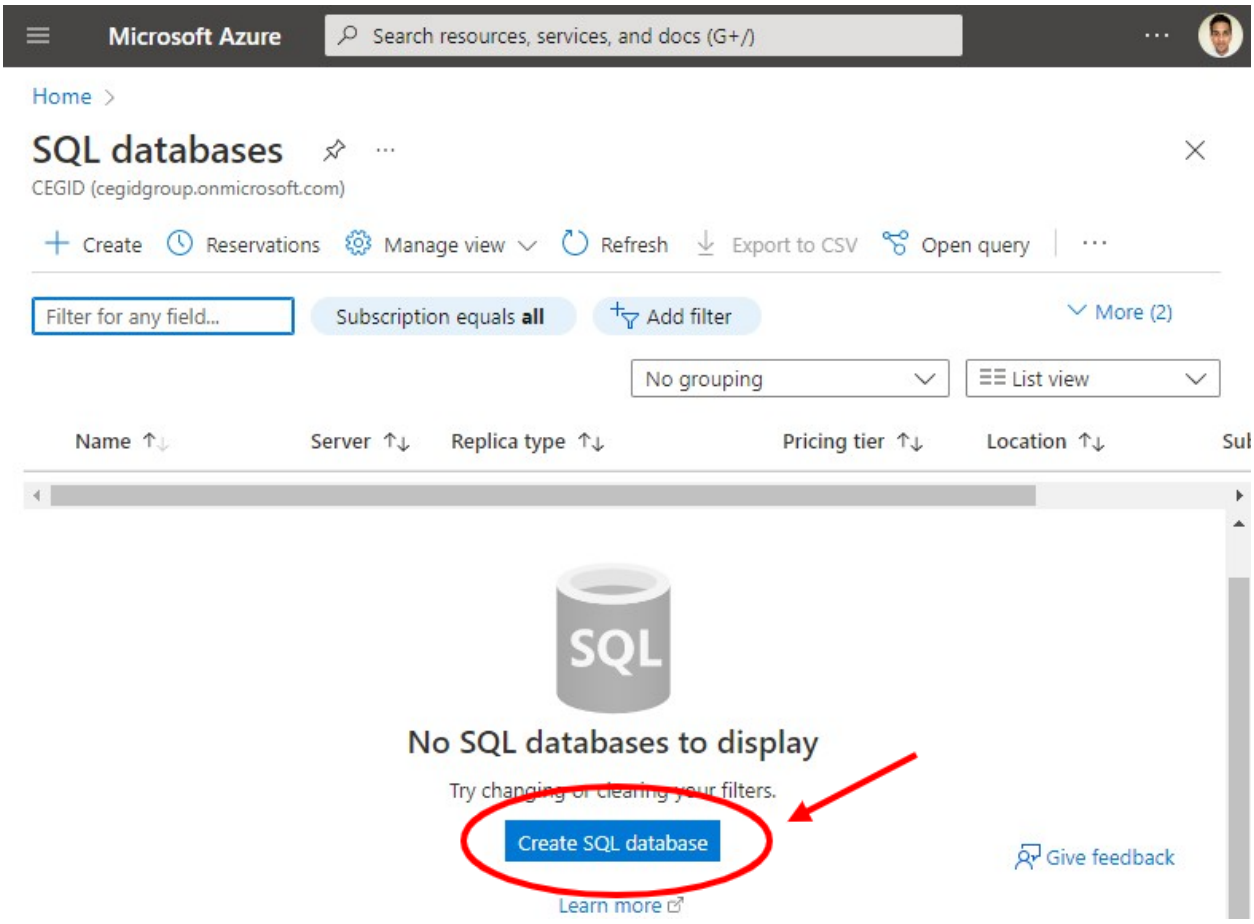


Fig 2. Create SQL Database

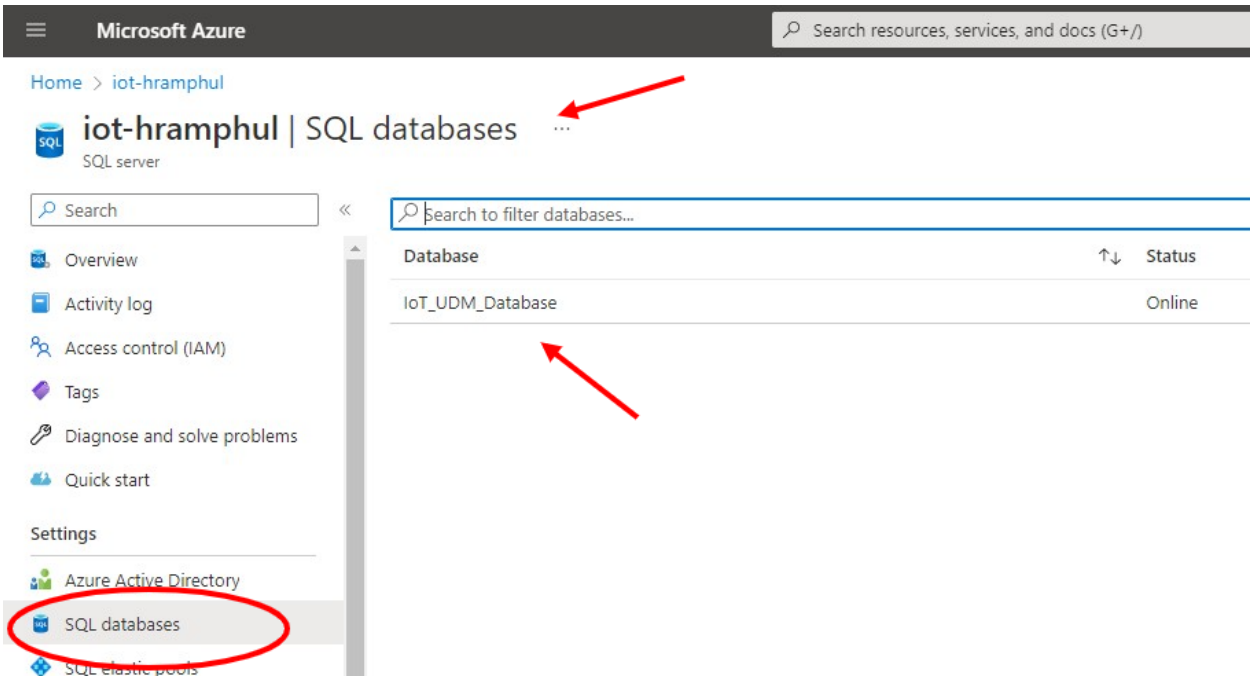


Fig 3. After create database IoT_UDM_Database

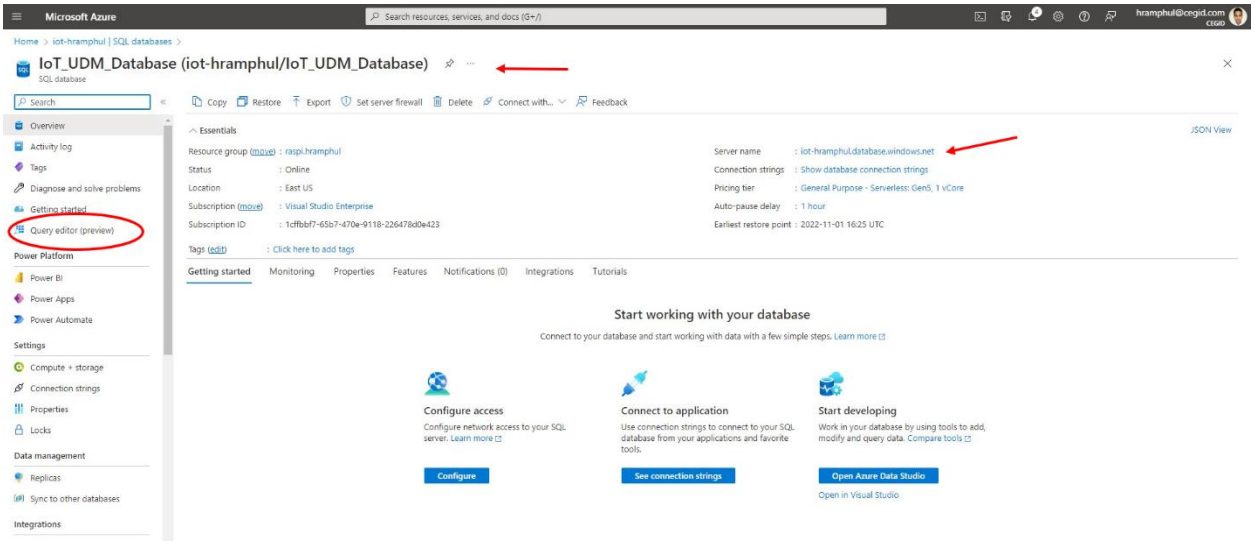


Fig 4. Connecct to database IoT_UDM_Database

Structure of table ***HumitureSensor*** in script version.

```
CREATE TABLE [dbo].[HumitureSensor](
	[Id] [int] IDENTITY(1,1) NOT NULL,
	[Temperature] [int] NULL,
	[Humidity] [int] NULL
) ON [PRIMARY]
GO
```

Step 2:

To insert values into MS SQL Server table using Python, we must use module **pyodbc.** To use it, we must install it first by using the command below:

```
pip3 install pyodbc
```

Brief note:

Pyodbc is an open source Python module that makes accessing ODBC databases simple. It implements the DB API 2.0 specification but is packed with even more Pythonic convenience.

Step 3:

After **pyodbc** installed successfull. Now let's insert our collecting data into the *HumitureSensor* table.

Here is the complete Python code how to insert those collecting data:

```
# Define a function that save data to table
# @Temperature as parameter: _temperature
# @Humidity as parameter: _humidity
def saveData(_temperature, _humidity):
    # Map to ODBC
    cursor = DB_CONNECTION.cursor()
    # Query to execute
    cursor.execute('INSERT INTO HumitureSensor (Temperature, Humidity) VALUES
(?, ?)', (_temperature, _humidity))
    # Execute my request
    DB_CONNECTION.commit()
```

Download source code from (Github) 100% executable and each line is explained.

Important: Don't forget to add **`conn.commit()`**to ensure that the insert command would get executed.

Step 4:

Finally, we can verify that all data were inserted into the *HumitureSensor* table by running the following SELECT query in MS SQL Server:

```
SELECT * FROM product
```

You should now see all additional data at the bottom of the table:

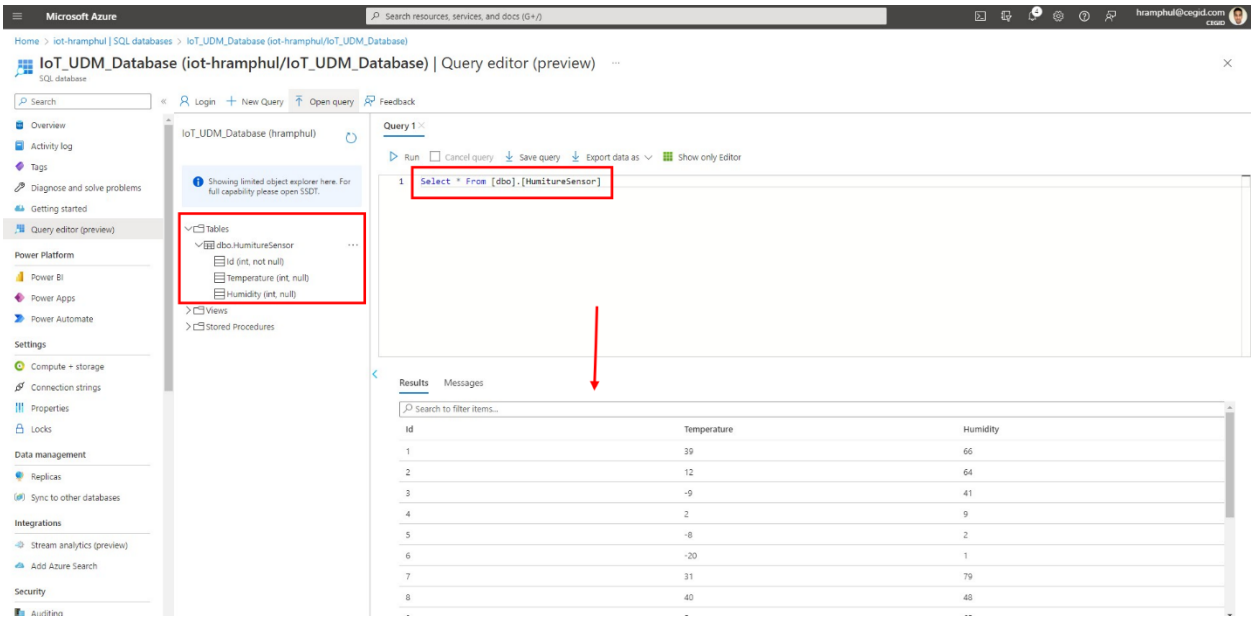
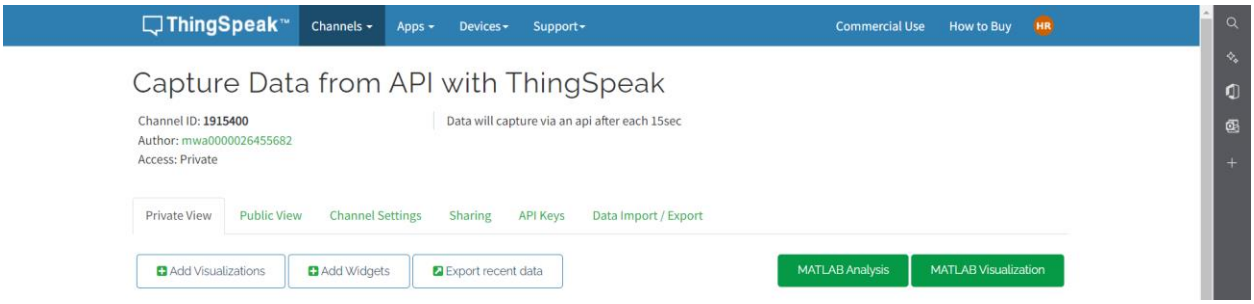
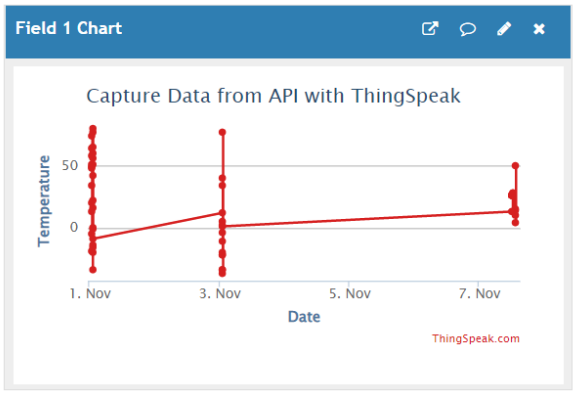


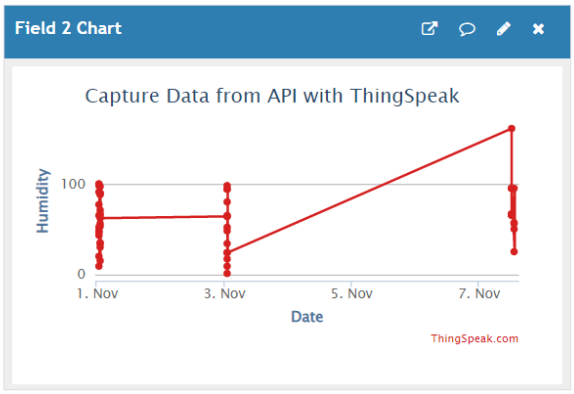
Fig 5. All data collected save to cloud database.

Step 5:

In Thingspeak dashboard you can see the graph and the readings.

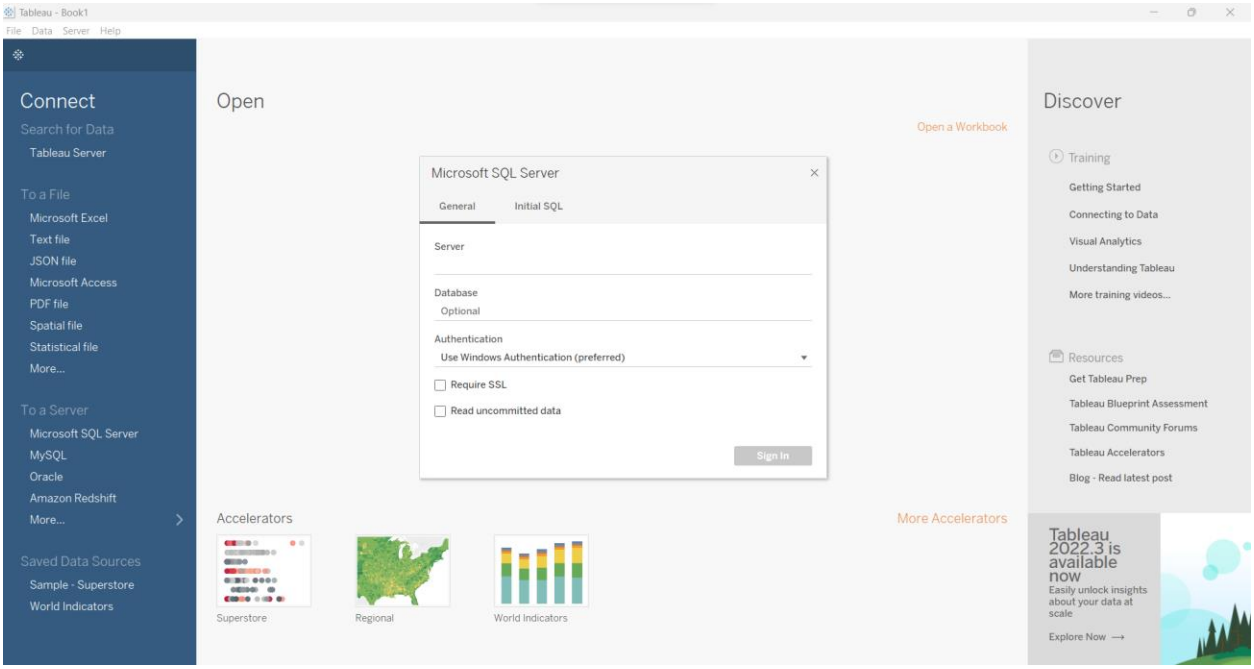




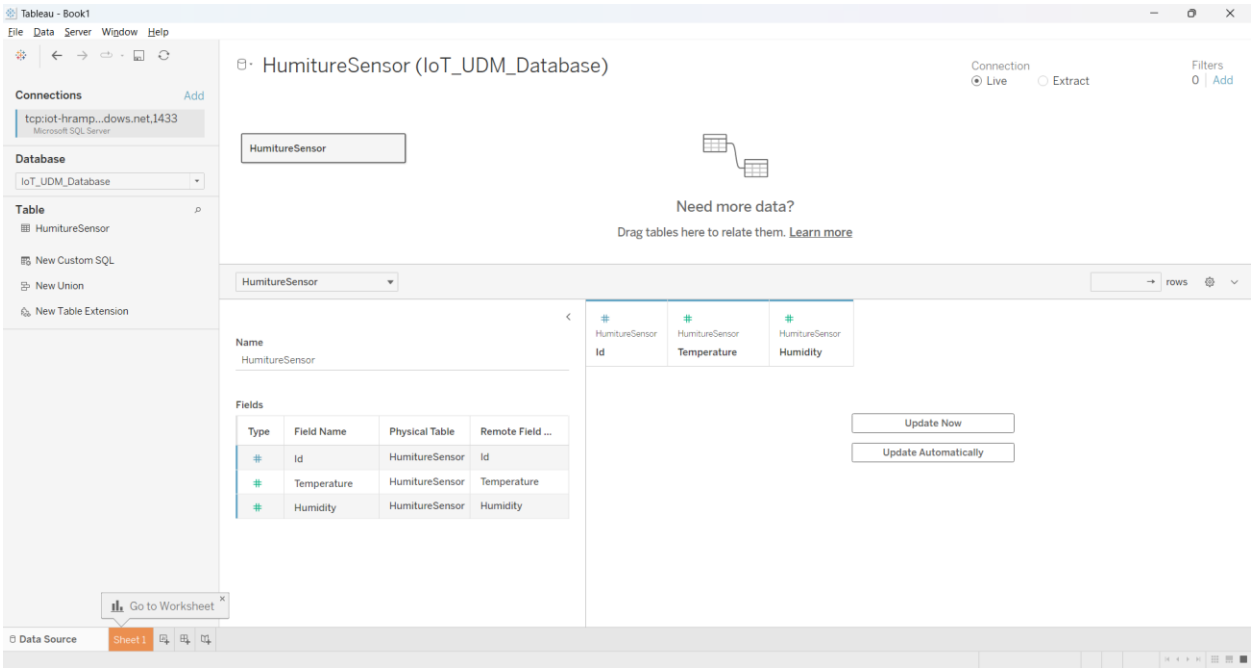


Step 6:

Now let's connect our data to Tableau to have a readable graph. First connect the Tableau to the MS SQL Server.



Connected successfully to MS SQL Server via Tableau. And can see live data entered after each 15 seconn.



Step 7:

Generate a live readable graph with Tableau by connection to the MS SQL Server.