

IoT Project Part 1

Introduction

The goal of this assignment is to create a small IoT network using Bluetooth and WiFi wireless technologies, Raspberry Pis and InsightOps by Rapid7 (formally Logentries) cloud service. This assignment should be completed in groups of 2 students.

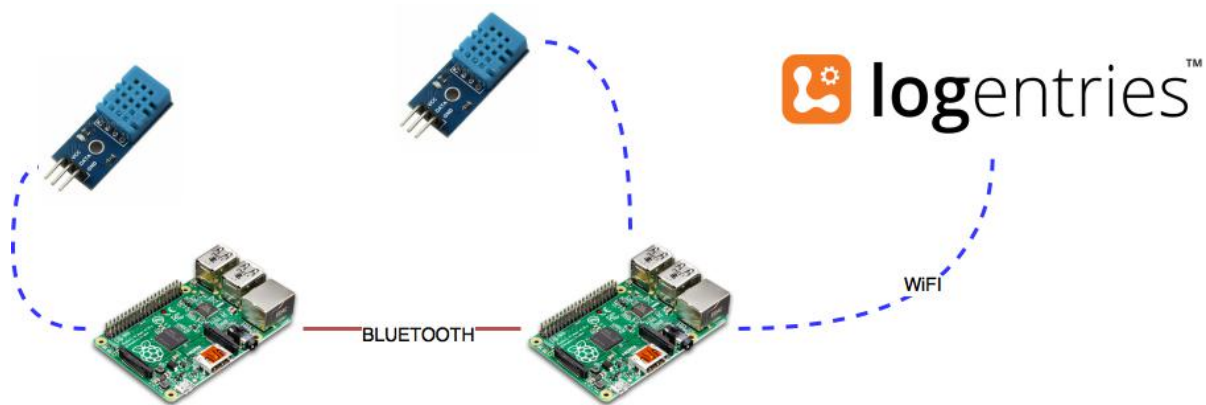


Figure 1 System architecture

At the end of this assignment each group should be able to:

1. Read temperature/humidity data from 2 DHT11 sensors connected to 2 different RPi's
2. Connect two RPi devices and send sensor data from 1st device to 2nd device (gateway) using Bluetooth
3. Send data from sensors to InsightOps
4. Create alerts and widgets in InsightOps

Log format

The format of each log line (sensor data) should be exactly as shown below:

```
YYYY-MM-DD HH:MM:SS.ms SensorID=<studentName>, Temperature=xx.x, Humidity=x
```

Make sure to:

- format milliseconds to 6 decimal places
- include SensorID for easy identification
- do not include “%” at the end of humidity and if you do, include a space character between “%” and the integer value

For example:



2017-11-01 21:22:54.327823

SensorID=John, Temperature=20.0, Humidity=30

Alerts

Alerts are notifications informing the user about an unusual event taking place in the system. Alerts usually take form of a single line message written in plain English and should be self-explanatory.

Refer to this video to learn more about tags and alerts used by Logentries. Please note that you are not required to use Logentries in this assignment:

<https://logentries.com/resources/how-to-videos/tags-alerts/>

Alerts

You are asked to design multiple alerts in the InsightOps environment. It is expected that groups are going to be working in various physical environments, hence there are no strict rules for the temperature or humidity thresholds imposed by this assignment, however each group should establish an average value for both temperature and humidity in their own environment.

*For example, being in one of the classrooms we have established that an average temperature is within 18° – 22°. We have therefore decided that any reading above 22° should trigger a tag labeled “It is very hot”, any reading below 18° should trigger a tag labeled “It is cold” and any reading within 18° - 22° should trigger “normal” alert. The same rule applies for humidity readings. **Groups can change those thresholds based on the physical environment they’re working in. Make sure to include your own table in the report.***

Alert messages should be created in the InsightOps environment only. No logging to the file is necessary.

Temperature	Alert message	Humidity	Alert message
>22	“It is very hot”	0% - 30%	“Normal”
18 - 22	“Temperature ok”	30% - 50%	“Humidity ok”
<18	“It is cold”	50% - 100%	“Humidity is very high”

Table 1 Sample table used to define tags

Architecture

You should develop 2 scripts:

Bluetooth Client (located on 1st RPi) – collects data from the first sensor and sends it to the second RPi every 5 seconds. Please note that this device is not connected to InsightOps in any way, in fact you can assume no WiFi connectivity at all.



Bluetooth Server (located on 2nd RPi) – receives data from the first sensor, whenever it's ready, as well as it's own sensor and forwards data from both sensors to InsightOps. Sensors do not need to be in sync.

Widgets

You should create the following widgets in your InsightOps dashboard:

- Multiline graph showing the average temperature for both sensors
- Bar chart showing the distribution of temperature alerts (total of 2: one for each sensor)
- Pie chart showing the distribution of humidity alerts (total of 2: one for each sensor)

Report

The purpose of the report is to present steps and methodology used when building the IoT system. Students are free to decide on the structure of the report; however, the following elements need to be included in order to obtain full marks:

- Screenshots of widgets created (source: InsightOps dashboard)
- Screenshots of alerts triggered (source: InsightOps dashboard)
- Your own Temperature/Humidity thresholds table for reference (see table 1 above)
- Short discussion on how your system could be improved in the future

Submission

Please upload **3 files only** to CS Moodle only:

- Python script (Bluetooth Server) (.py)
- Python script (Bluetooth Client) (.py)
- Report (.doc, .pdf)

