

# ***Save Water and Energy Consumption Awareness Tool***

## **INSA students**

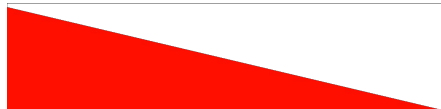
Karim Aldandachi  
Mickaël Commerot  
Vincent Laurens  
Lorine Pose  
Hamza Safri

## **ILYA founders**

Simon Buoro  
Antoine Escande

## **INSA Tutor**

Thierry Monteil



January 23, 2020

# Outline

- I. Overview
- II. The IoT architecture
- III. The solution packaging
- IV. Project Management
- V. Conclusion

# I. Overview

- A. The context
- B. The team
- C. The solution: an awareness tool

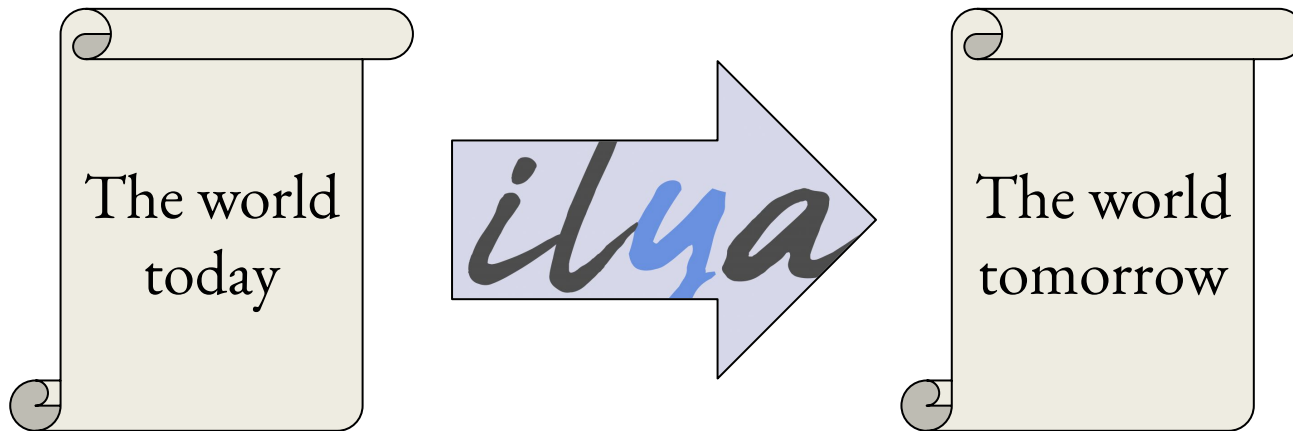
II. The IoT architecture

III. The solution packaging

IV. Project Management

V. Conclusion

# The context



Irresponsible consumption of  
water and energy in hotels

Catastrophes due to climate  
change

Water and energy consumption  
diagnostic

Sensitize people to save water  
and energy during showers

# The team



Karim Aldandachi  
SISS - IM



Mickael Commerot  
SISS - REOC



Vincent Laurens  
SISS - IR



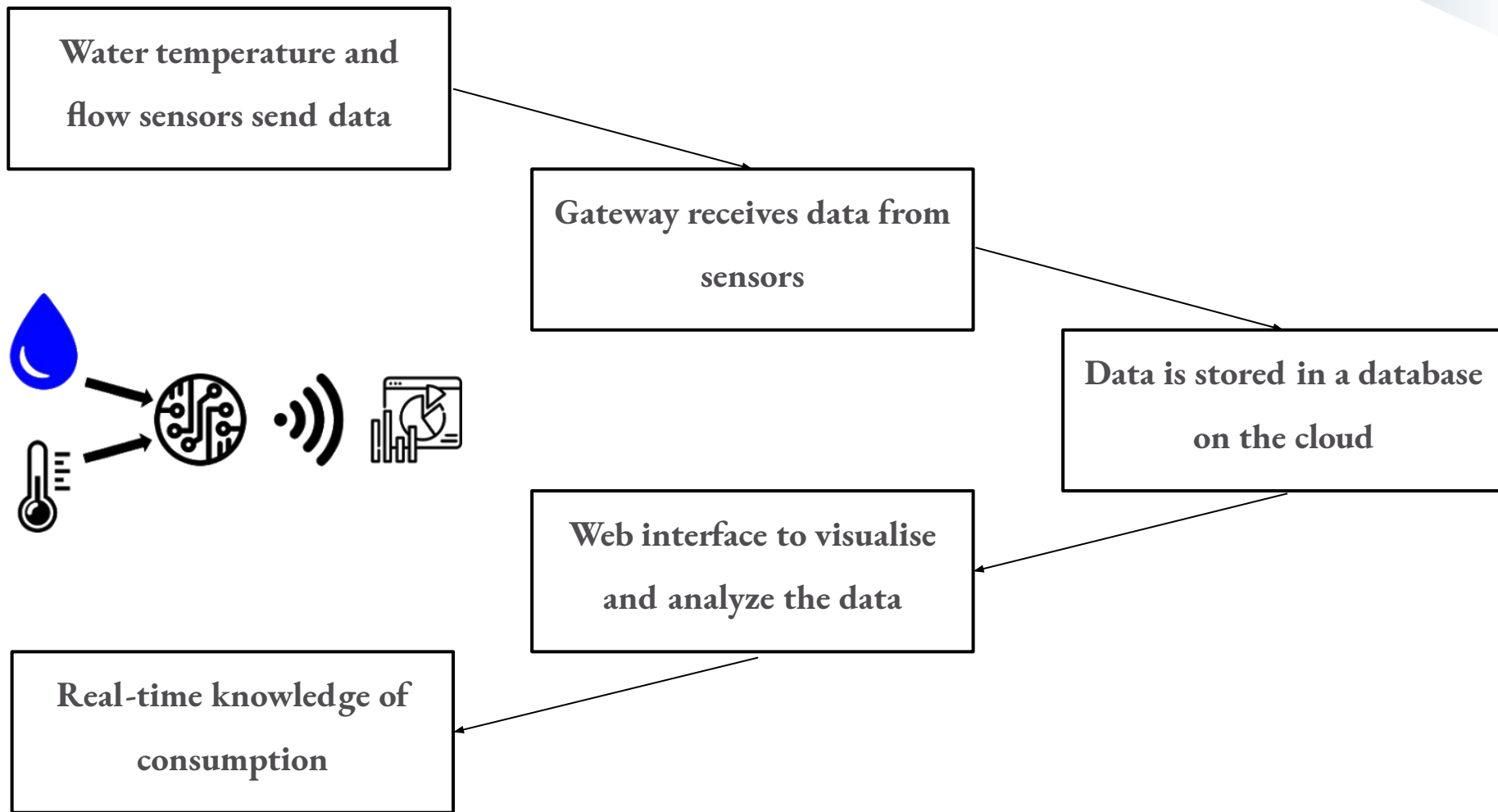
Laurine Pose  
SISS - AE



Hamza Safri  
SISS - REOC

- Diverse academic backgrounds → all aspects of the project
- Multi-cultural team

# The solution: an awareness tool



I. Overview

II. The technical requirements

# III. The IoT architecture

A. The overall architecture

B. The Device layer

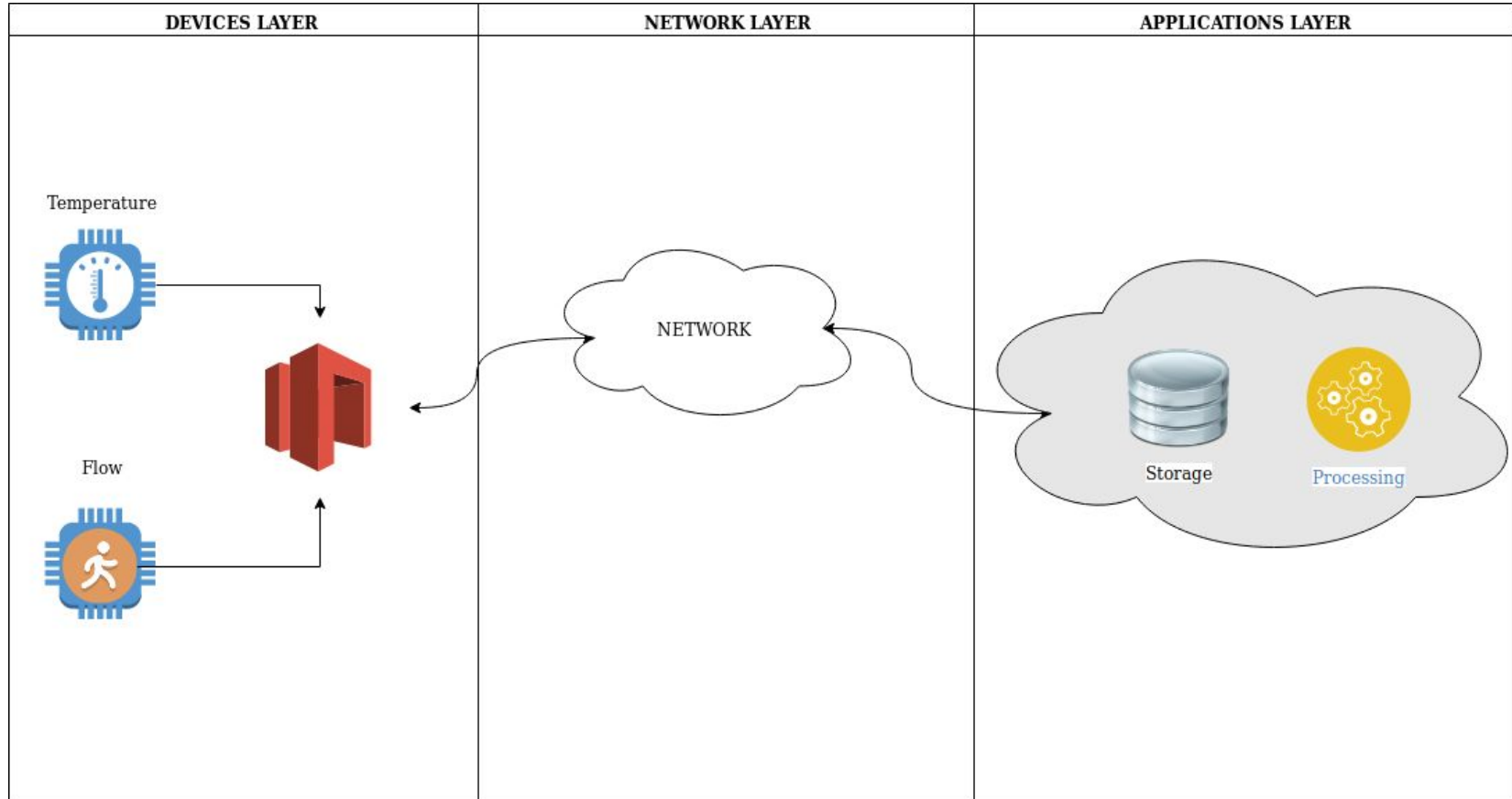
C. The Network layer

D. The Application layer

IV. Project Management

V. Conclusion

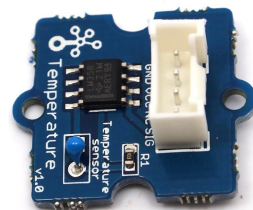
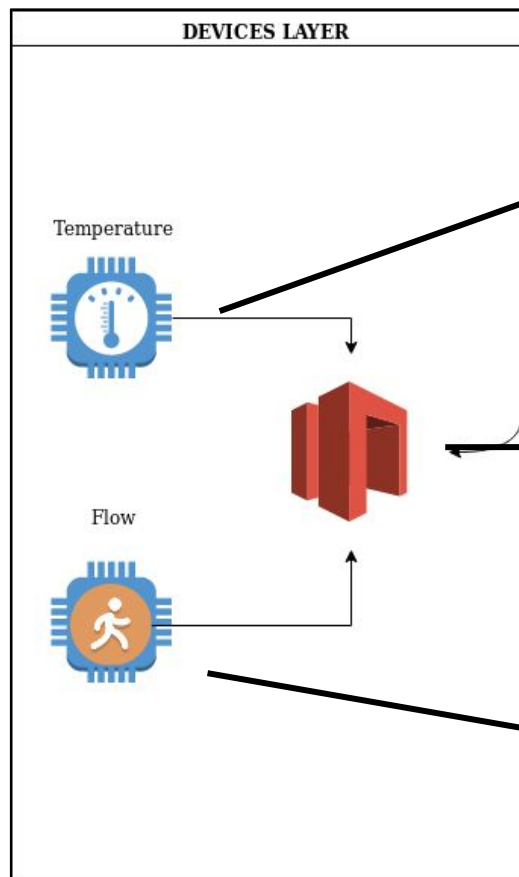
# The overall architecture



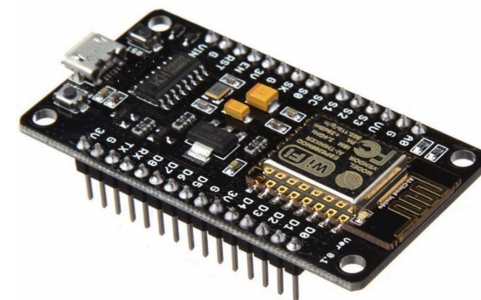


# The Device layer

## *General Architecture*



Grove  
Temperature  
sensor



ESP8266 circuit board

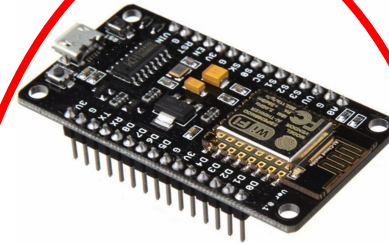
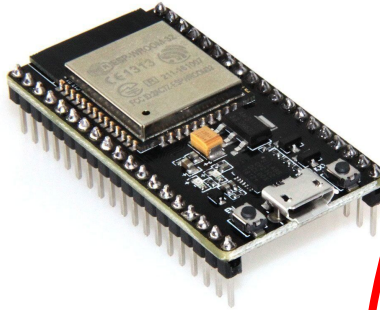


YSF 201 Flow sensor

# The Device layer

## *Hardware Requirements*

ESP8266 or  
ESP32?



	ESP 32	ESP 8266
Number of cores	2	1
Wi-Fi	Yes	Yes
Bluetooth	Yes	No
Supply needed in Run mode	110 mA	80 mA
Supply needed in Sleep mode	50 mA	20 mA
Energy consumption per min ( $I/P=UI/E=PI$ )	110mA/0.05Watts/33 Joules	80mA/0,04 Watts/24 Joules
Energy Management integrated	Yes	No



# The Device layer

## *Software Implementation*

WiFi and Id  
configuration

Acquiring the Data

Encapsulate into a  
JSON Object: data

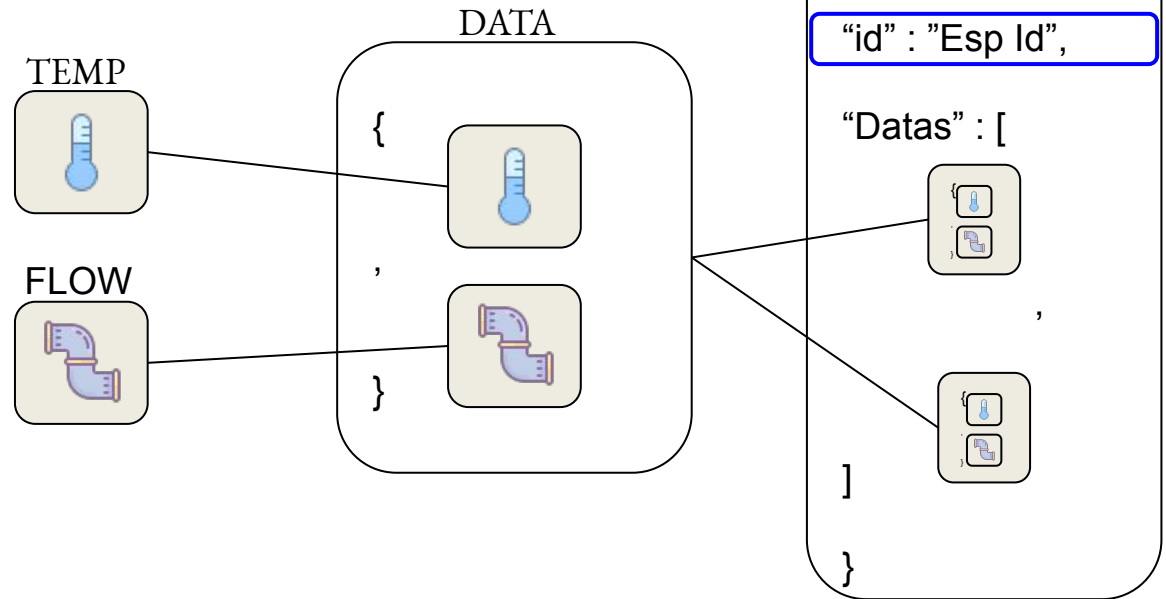
Stack data objects in  
a JSON array

×
AutoConnectAP
✓

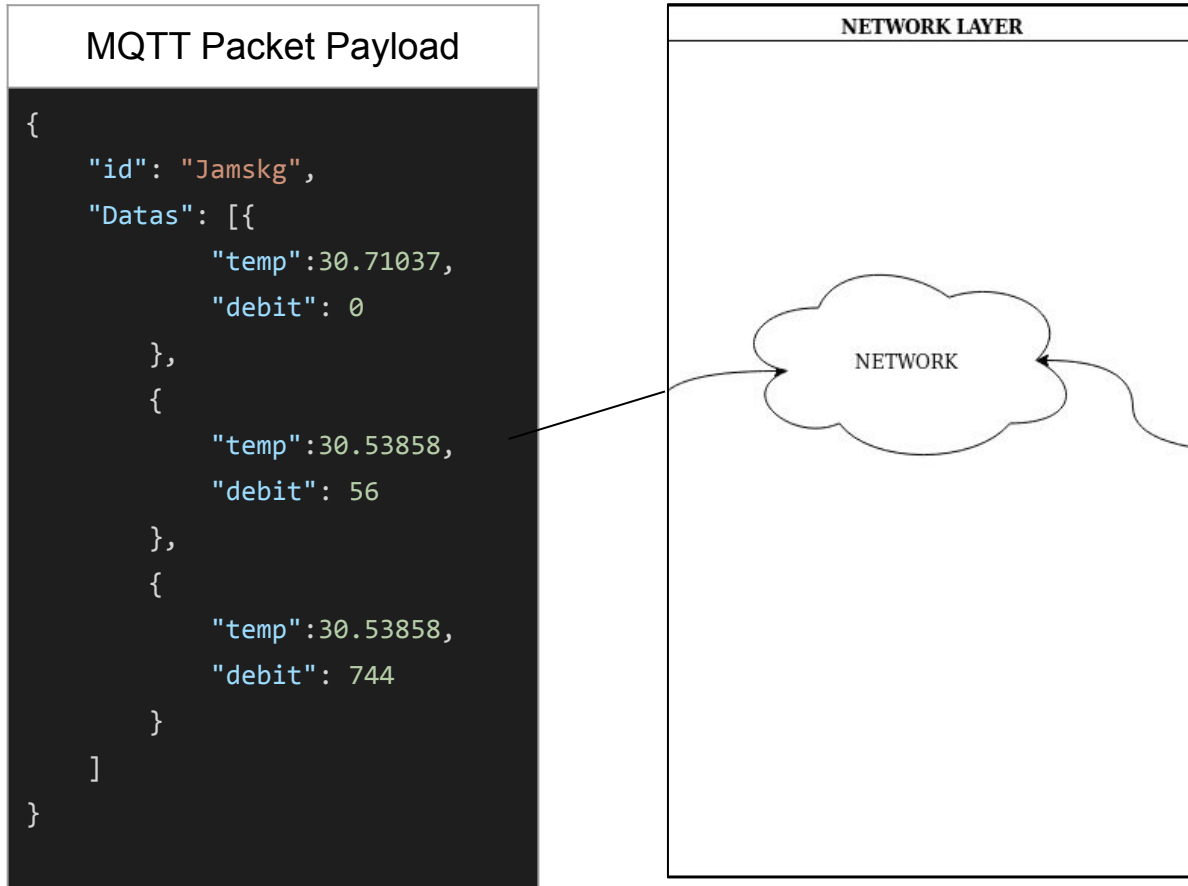
Se connecter automatiquement ☒

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[CAMPUS SOHO](#) 48%

[Scan](#)

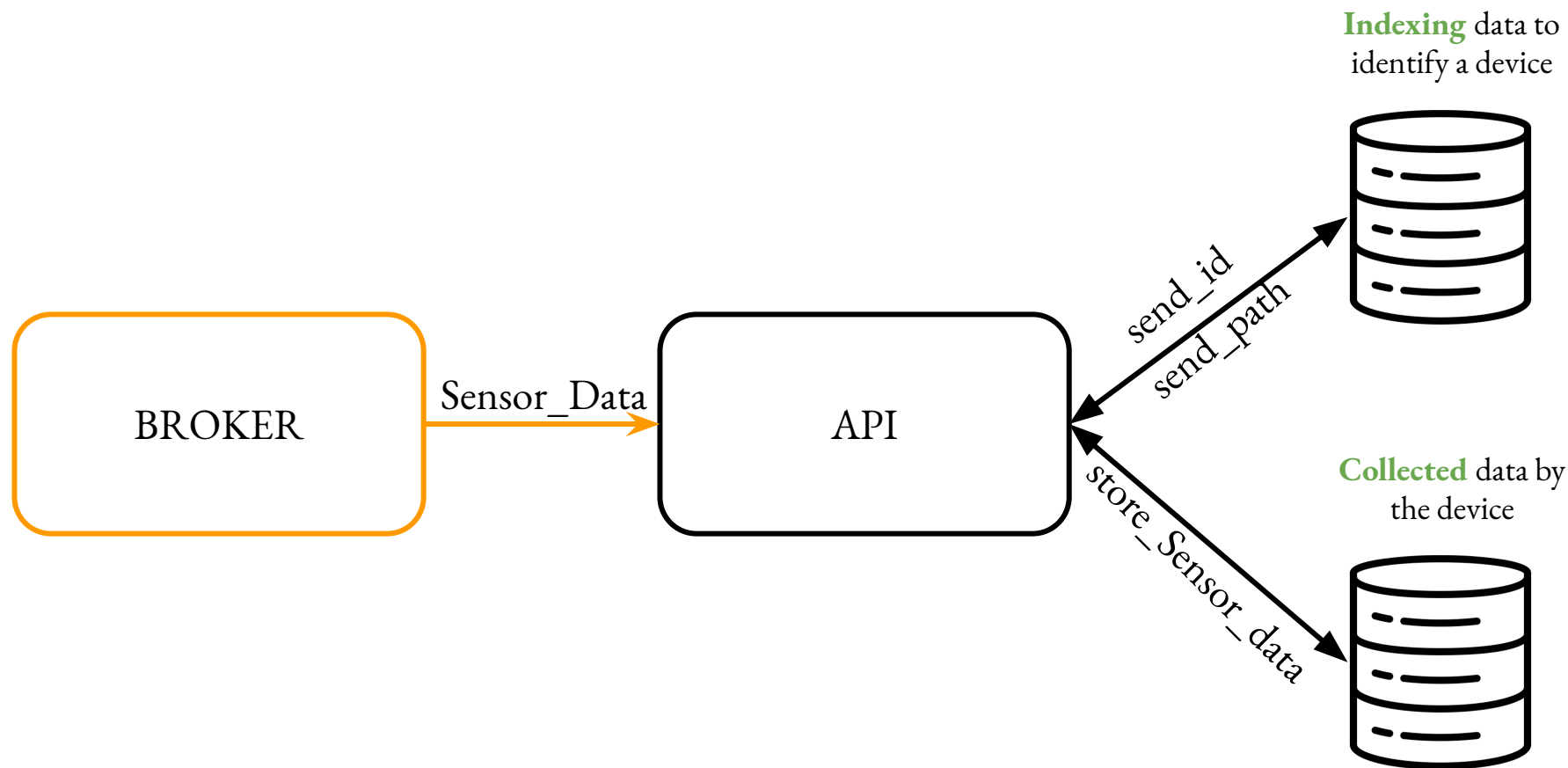


# The Network layer



# The Application layer

## Collecting and storing data



# The Application layer

## *Database requirements*

SQL or NoSQL?

**SQL**

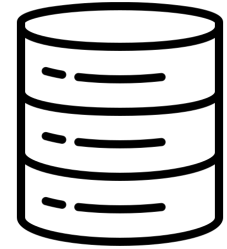


	SQL	NoSQL
<b>Model</b>	Relational database system	Non-relational database system
<b>Data storage</b>	Tables (rows and columns)	Documents, column stores, graphs, key-value pairs
<b>Schema</b>	Fixed, very hard to modify	Schema-free database, easy to modify
<b>Data structure</b>	Structured data	Semi-structured or unstructured data
<b>New fields</b>	Adding new fields in the table may require altering the schema	New fields can be added with much more ease

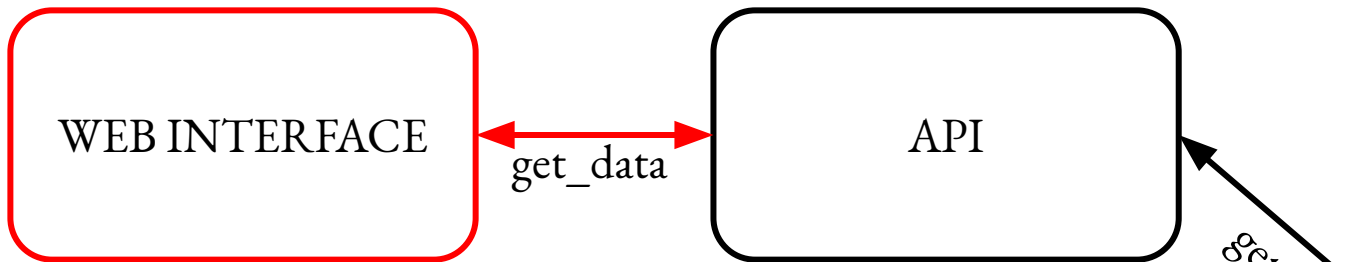
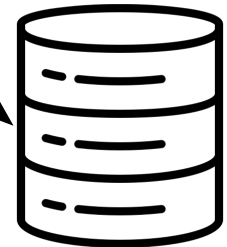
# The Application layer

Retrieving data

Collected data by  
the device



Indexing data to  
identify a device



# The Application Layer

## Web interface admin (ILYA)

Select and retrieve data from a specific hotel room:

USER	admin
GET	

Hassan 2 201

fayrouz 2 201

Generate a new id, add a device, update a device's id:

Dashboard

Dashboard

Operations

IDGENERATION

GENERATE ID

ID: 3eea9033-6ca4-4ac6-8c5b-43d685a45dec

ADDDEVICE

hotel name \*

building name \*

room number \*

id \*

SUBMIT

CANCEL

UPDATEDEVICE

CURRENT ID \*

NEW ID \*

SUBMIT

CANCEL



# The Application Layer

Web interface client

**Sign in or sign up:**

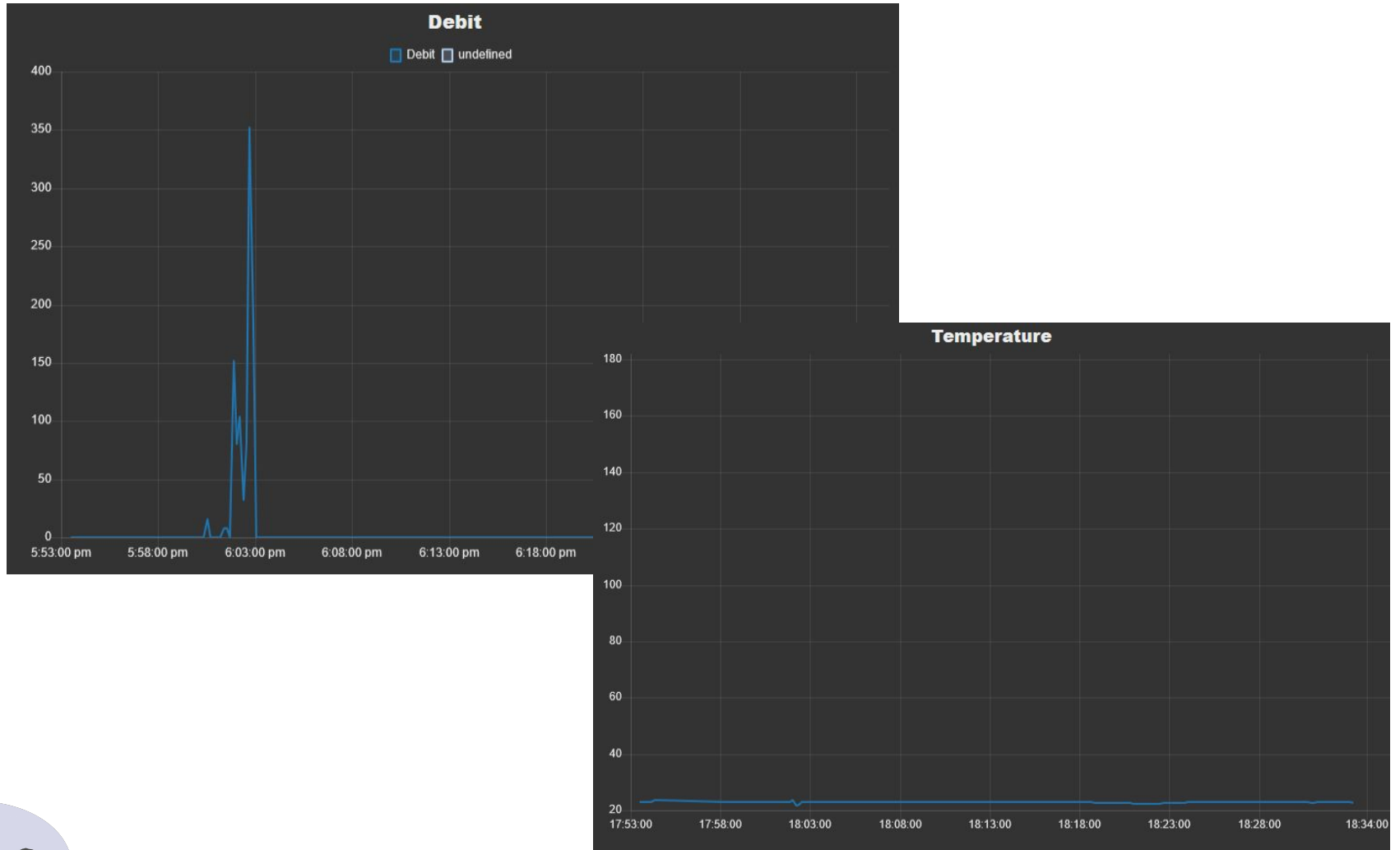
Dashboard	
<b>Signin</b>	<b>CreateUser</b>
hotel * username * password *	Hotel * Username * Password *
<input type="button" value="SUBMIT"/> <input type="button" value="CANCEL"/>	<input type="button" value="SUBMIT"/> <input type="button" value="CANCEL"/>

**Select and retrieve data from a specific hotel room:**

USER	hamza
GET	
ibis 1 101	
ibis 3 301	

# The Application Layer

## Data visualizations



I. Overview

II. The IoT architecture

## **III. The solution packaging**

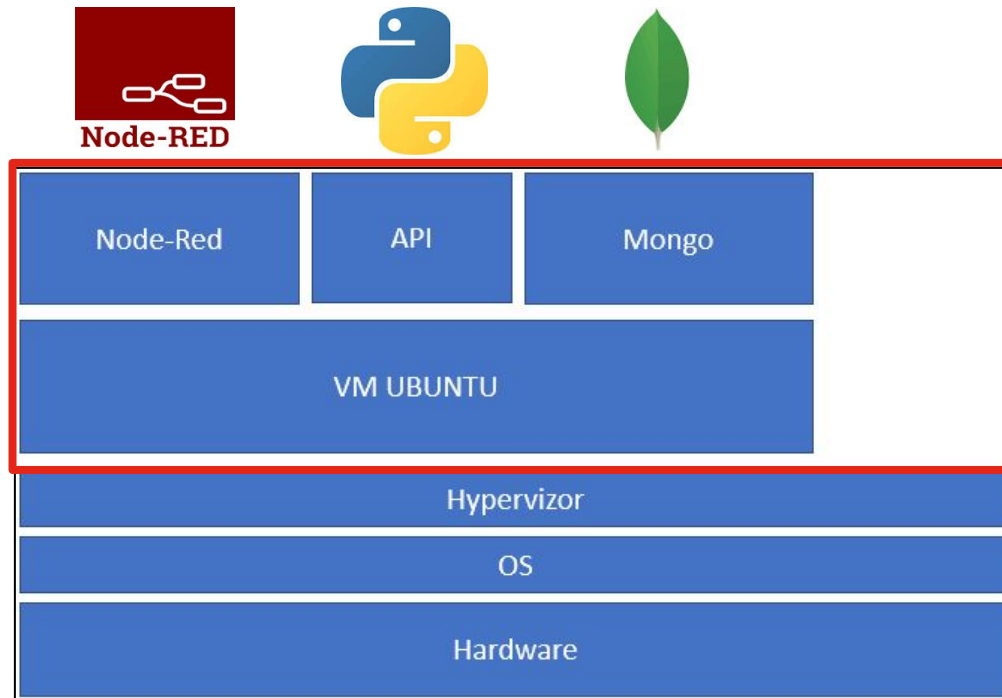
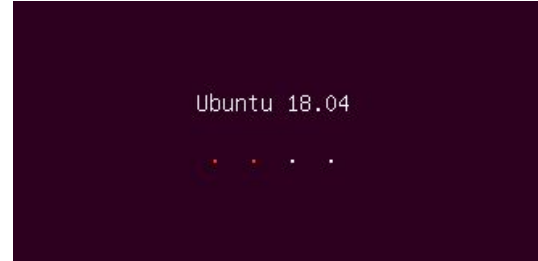
A. The package

B. From POC to industrialization

IV. Project Management

V. Conclusion

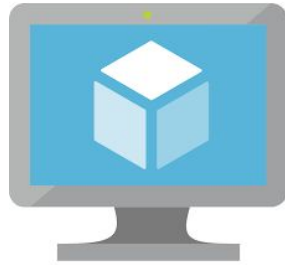
# The package



- Secure SSH
- GIT
- PYTHON
- Nodejs + NPM = NODE-RED
- MongoDB



# From POC to industrialization...



POC	Deployment
VM	Containers
Better isolation of data	Easier to configure
Turnkey solution	Fast to deploy
User-friendly	Adaptability/scalability on demand
Needs a hypervisor (VirtualBox, VmWare)	Fast recovery after failure

I. Overview

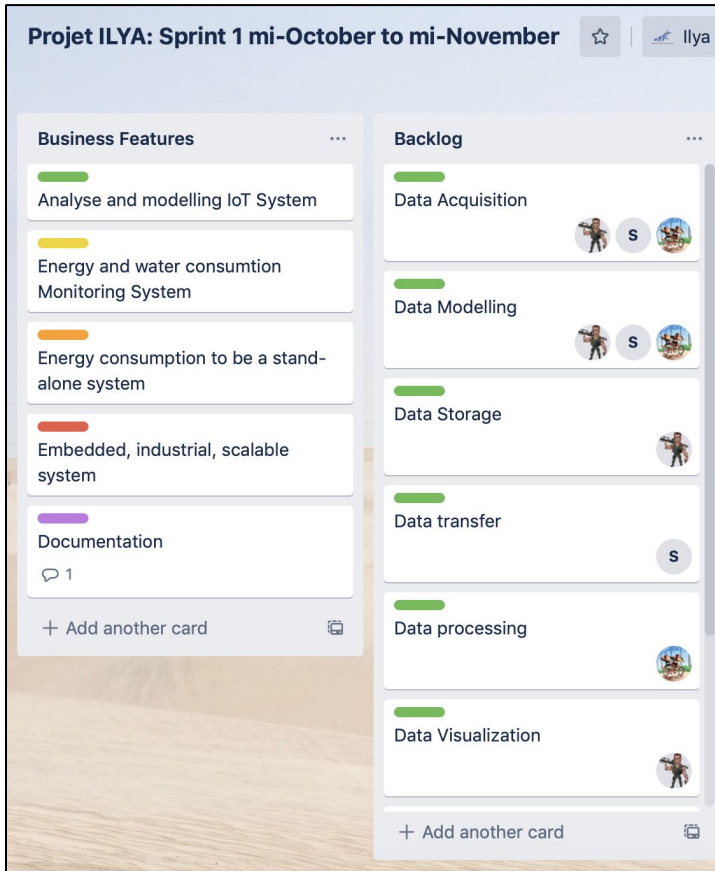
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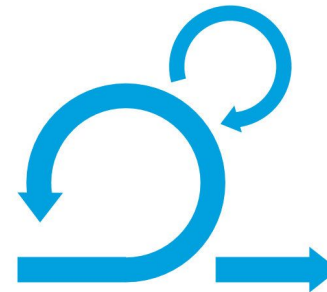
## **IV. Project Management**

V. Conclusion

# Project Management



- Team meeting: 1 every week
- Ilya meeting: 1 every 2 weeks
- Agile method
- Sprints: 3 weeks each
- Trello: task management app



I. Overview

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IV. Project Management

## **V. Conclusion**

A. Future improvements

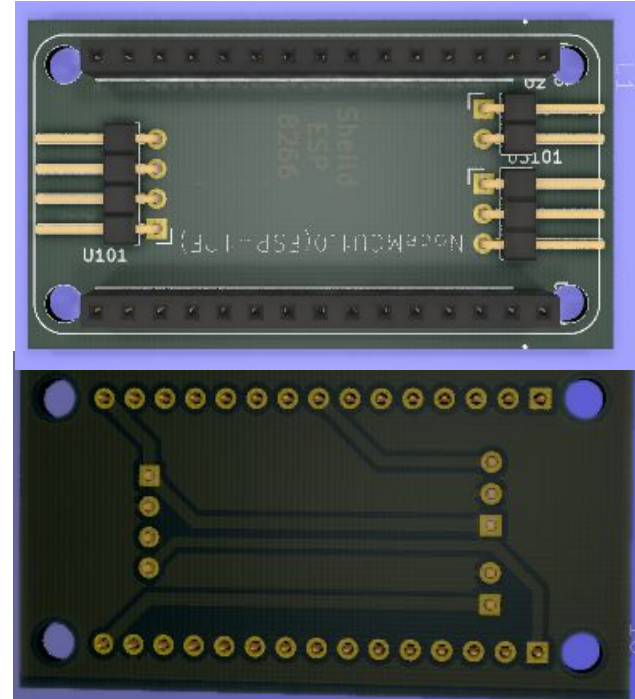
B. Summary



# Future improvements



- Minimize the size of the POC
- Develop more efficient energy management



# Summary

Requirement	State
- A functioning POC	✓
- Database management	✓
- Data analysis on dashboards	✓
- Source code comments	✓
- Documentation	✓
- Preparation for industrialization	✓
- Team management	✓

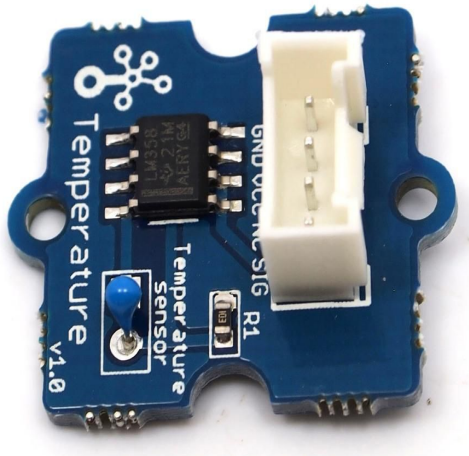
# *Save Water and Energy Consumption Awareness Tool*



January 23, 2020

# The Device layer

## *Sensors Specifications*



Grove Temperature sensor

- Thermistor
- Range: -40 - 125 °C
- Accuracy:  $\pm 1.5^{\circ}\text{C}$



YSF 201 Flow sensor

- Hall effect Sensor
- Fits well with Arduino
- Low Price