

Irem Info Bordeaux

Node-Red pour IoT

(via Raspberry Pi)

Christie Vassilian - 13 janvier 2021

Planning Présentation

1

Node-Red, c'est quoi ?
architecture & fonctionnement

2

Montage Simple mais Efficace
premiers flows IoT pour comprendre

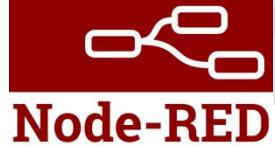
3

Mini-Projet plus élaboré
exemples intéressants IoT

4

Node-Red, une communauté
où trouver des explications ou du matériel sur Node-Red

**QUESTIONS
ECHANGES
AU FIL DE
L'H2O**

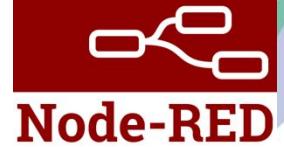


c'est quoi Node-Red

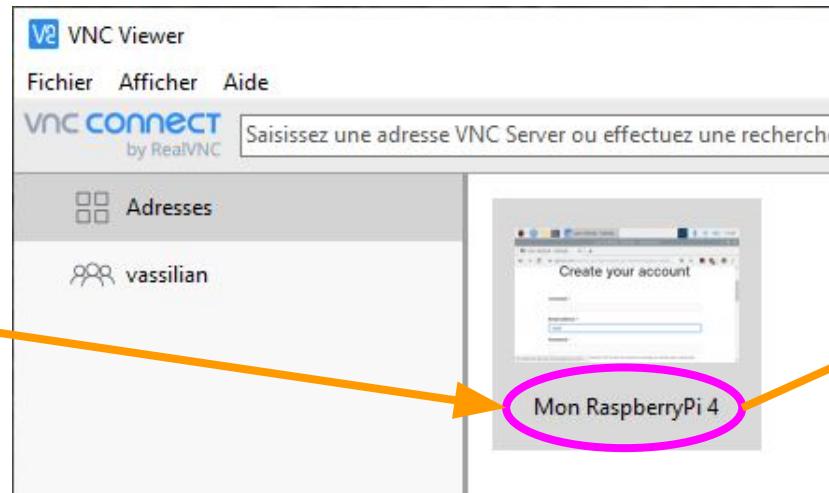
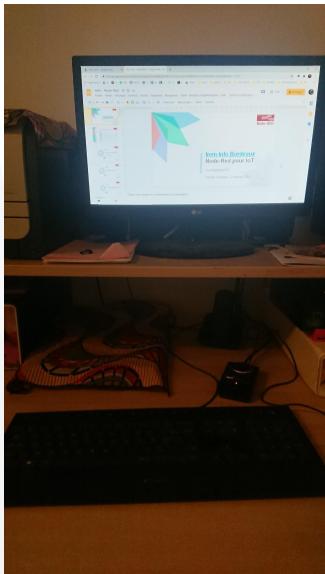
- Pi à distance : RealVNC
- architecture Node-Red
- fonctionnement sous Pi

Prise à distance du Pi

via RealVNC



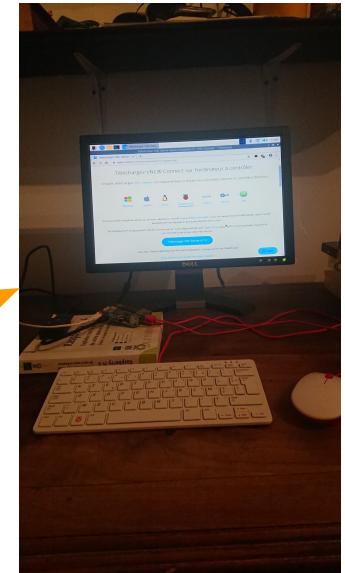
ORDI FIXE



utile pour piloter le pi
(qui peut être sans écran)

VNC Viewer

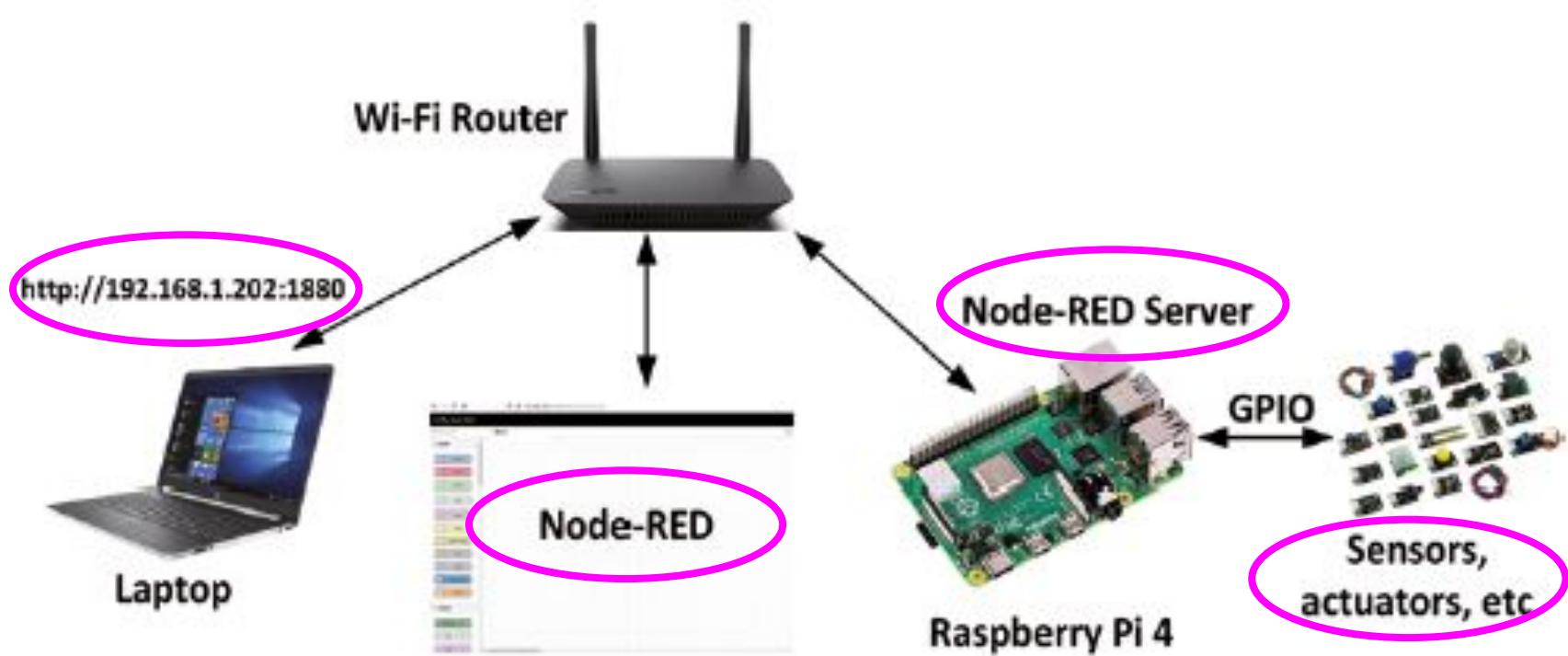
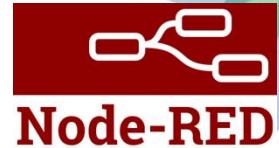
Rasp. PI



VNC Connect

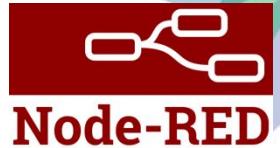
architecture Node-Red

concept / fonctionnement

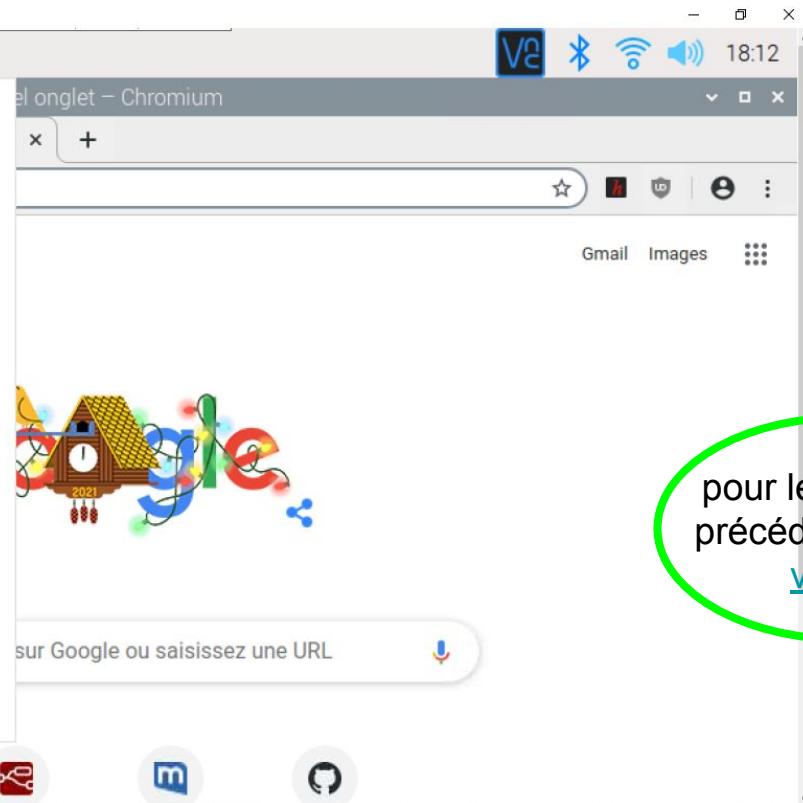
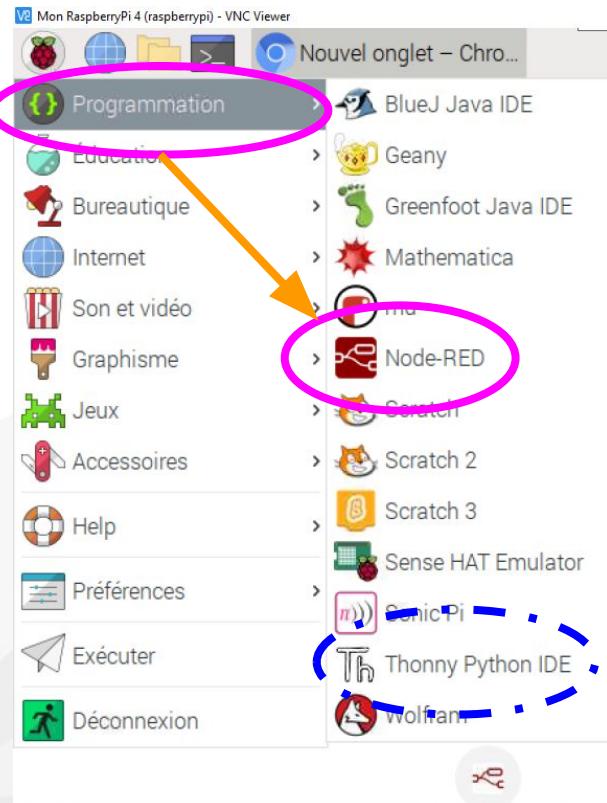


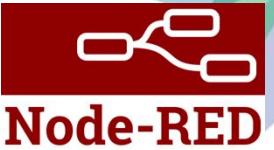
Lancement de Node-RED

sur le Pi 4



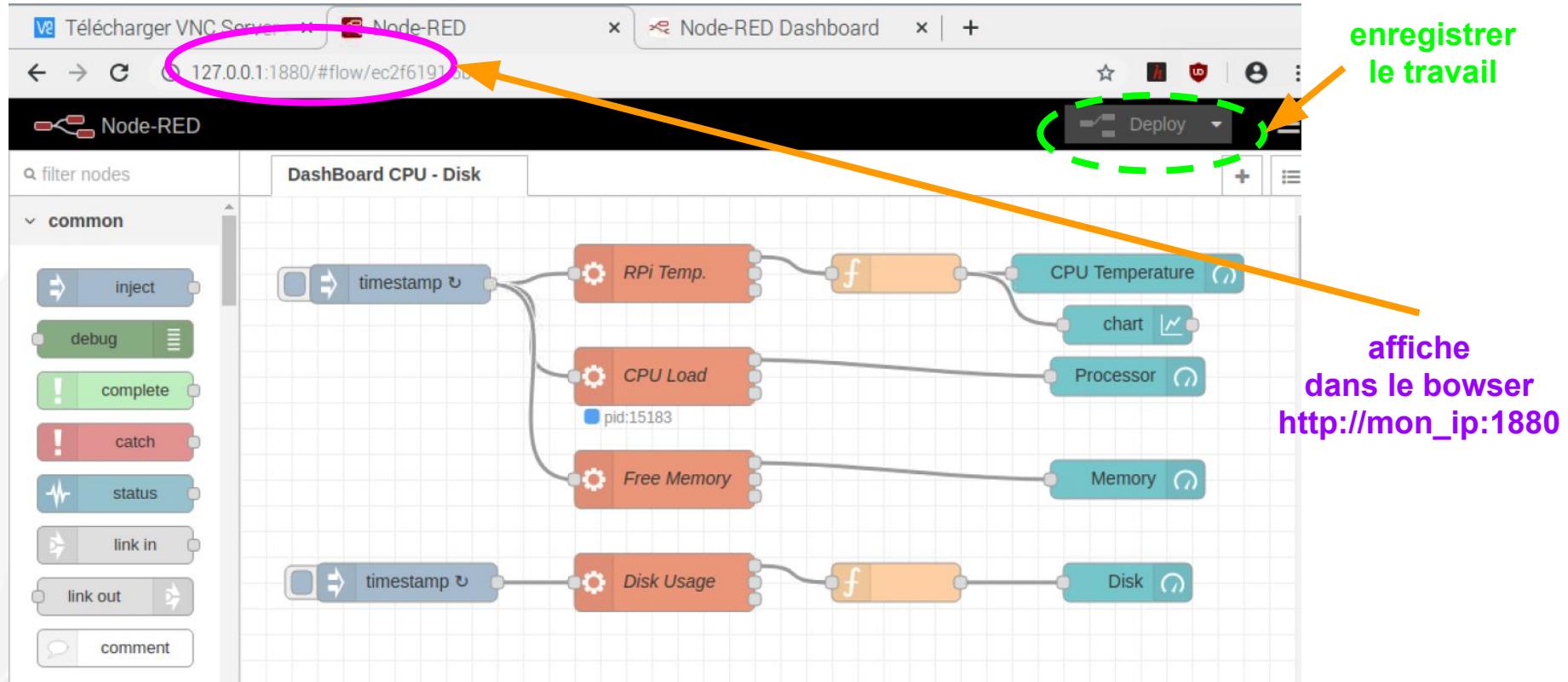
menu du Pi 4

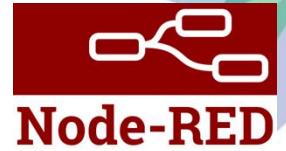




Node-Red flow

prog. graphique sur le Pi (puis deployed sur internet)





Node-Red user interface

ex de résultat sur internet

The screenshot shows a browser window displaying the Node-RED Dashboard at the URL `http://127.0.0.1:1880/ui/#!/0?socketid=2&key=CzSCK-SUvAAAA`. The dashboard has a blue header bar labeled "RPi Control". Below the header are four gauge charts:

- Processor**: CPU usage at 40%
- Memory**: RAM usage at 35.9032%
- Disk**: Usage at 30%
- CPU Temperature**: Temperature at 58°C

A pink circle highlights the URL in the browser's address bar, and an orange arrow points from this circle to a purple text annotation on the right side of the dashboard.

affiche
dans le bowser
`http://mon_ip:1880/ui`

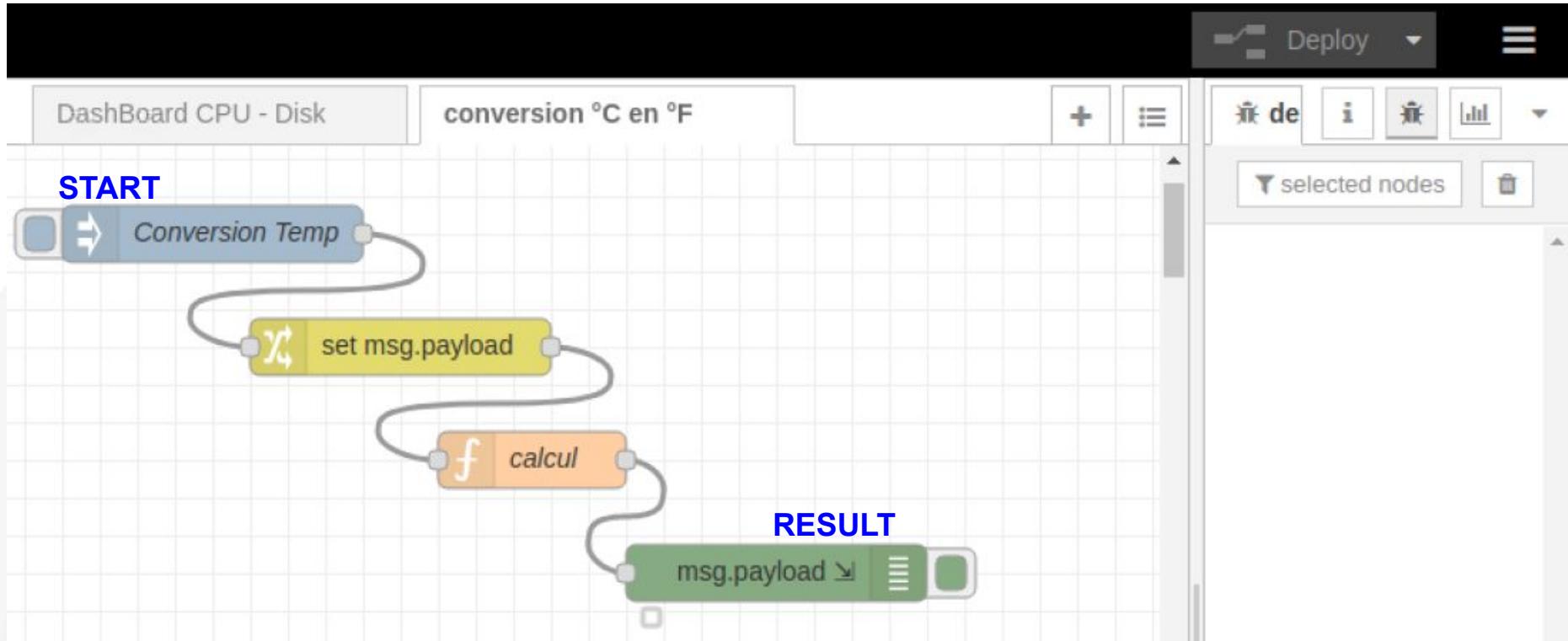


Montage simple

- 1er flow : conversion température
- 2ème flow : get/send on internet
- importer un flow (puis le modifier)

1er flow

conversion température °C -> °F



1er flow

conversion température °C -> °F

START

Edit inject node

Delete Cancel Done

Properties

Payload timestamp

Topic

Inject once after 0.1 seconds, then

Repeat none

Name Conversion Temp

RESULT

Edit debug node

Delete Cancel Done

Properties

Output msg. payload

To

debug window (checked)

system console (checked)

node status (32 characters) (checked)

Name

1er flow

conversion température °C -> °F

Edit change node

Delete
Cancel
Done

Properties

Name:

Rules:

- Set** to

Edit function node

Delete
Cancel
Done

Properties

Name:

Function:

```

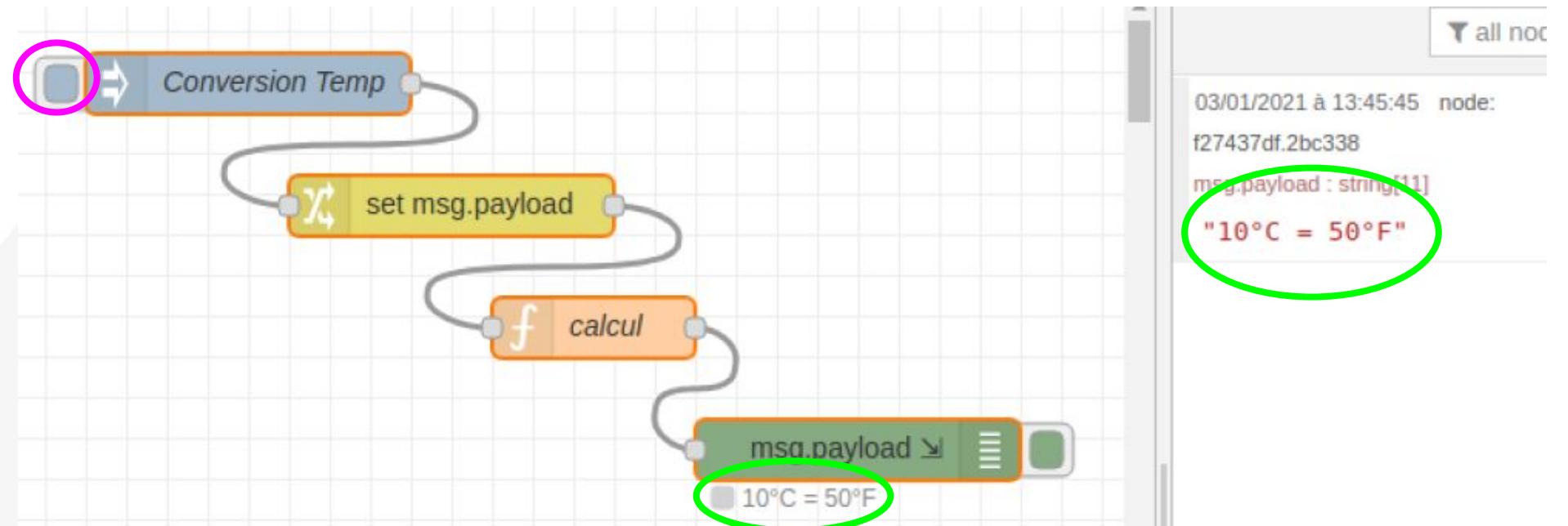
1 var C = msg.payload;
2 var F = C*1.8+32;
3 msg.payload = C + "°C = " + F.toString() + "°F";
4 return msg;

```

VALUE
PREVIOUS NODE
NEXT NODE

1er flow

conversion température °C -> °F



2ème flow

get/send info on internet

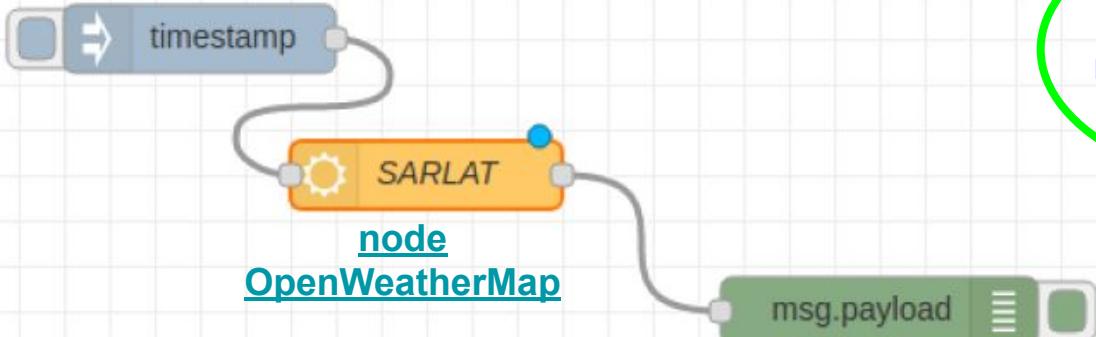
DashBoard CPU - Disk

conversion °C en °F

Climat (via internet)



selected nodes

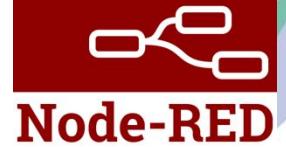


OBJECTIF :

récupérer des infos climat
Sarlat via Internet

2ème flow

get/send info on internet



2ème flow

get/send info on internet

DashBoard CPU - D

conversion °C en °F

Climate



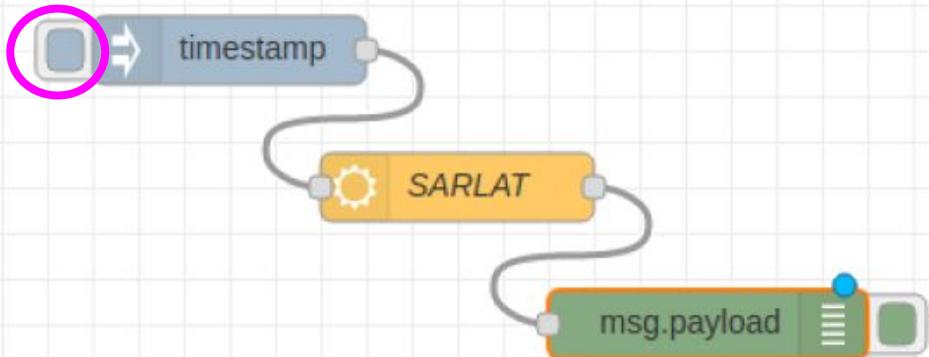
debug



selected nodes



TOUTE l'INFO en VRAC



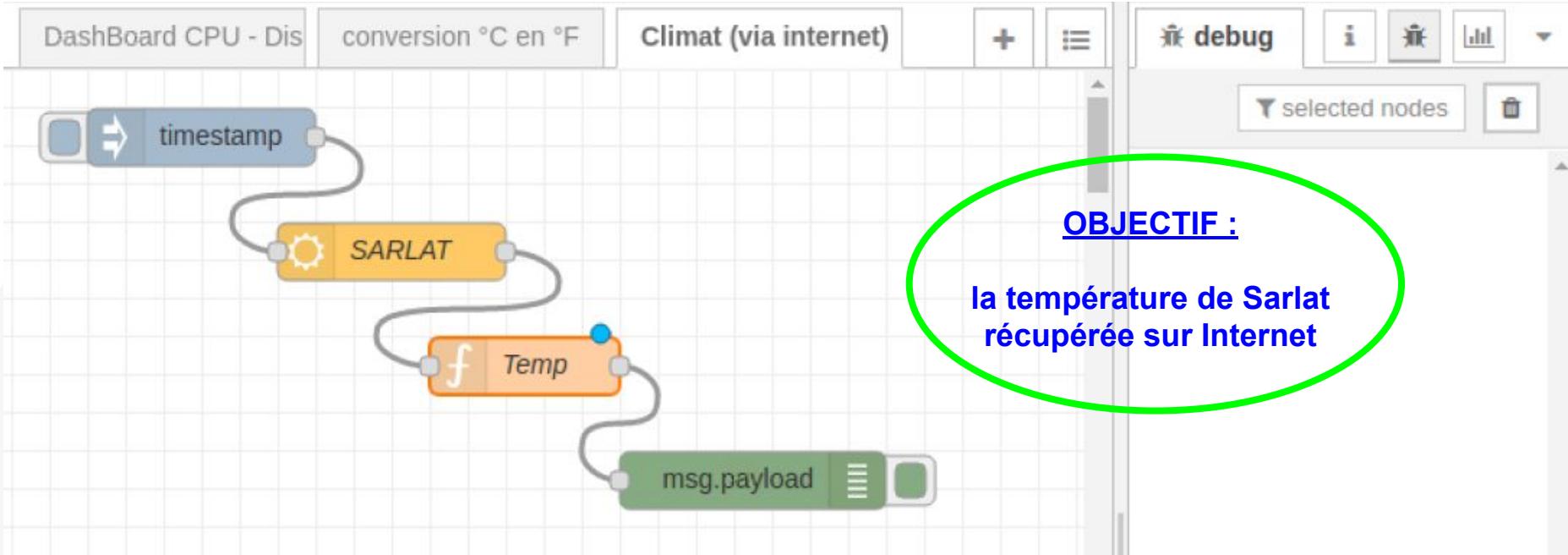
02/01/2021 à 15:00:36 Node: 29e2fbcc.ac0ccc4

msg.payload : Object

► { id: 804, weather: "Clouds", detail: "couvert", icon: "04d", tempk: 275.37 ... }

2ème flow

get/send info on internet



2ème flow

get/send info on internet

Edit function node

Delete Cancel Done

Properties

Name: Temp

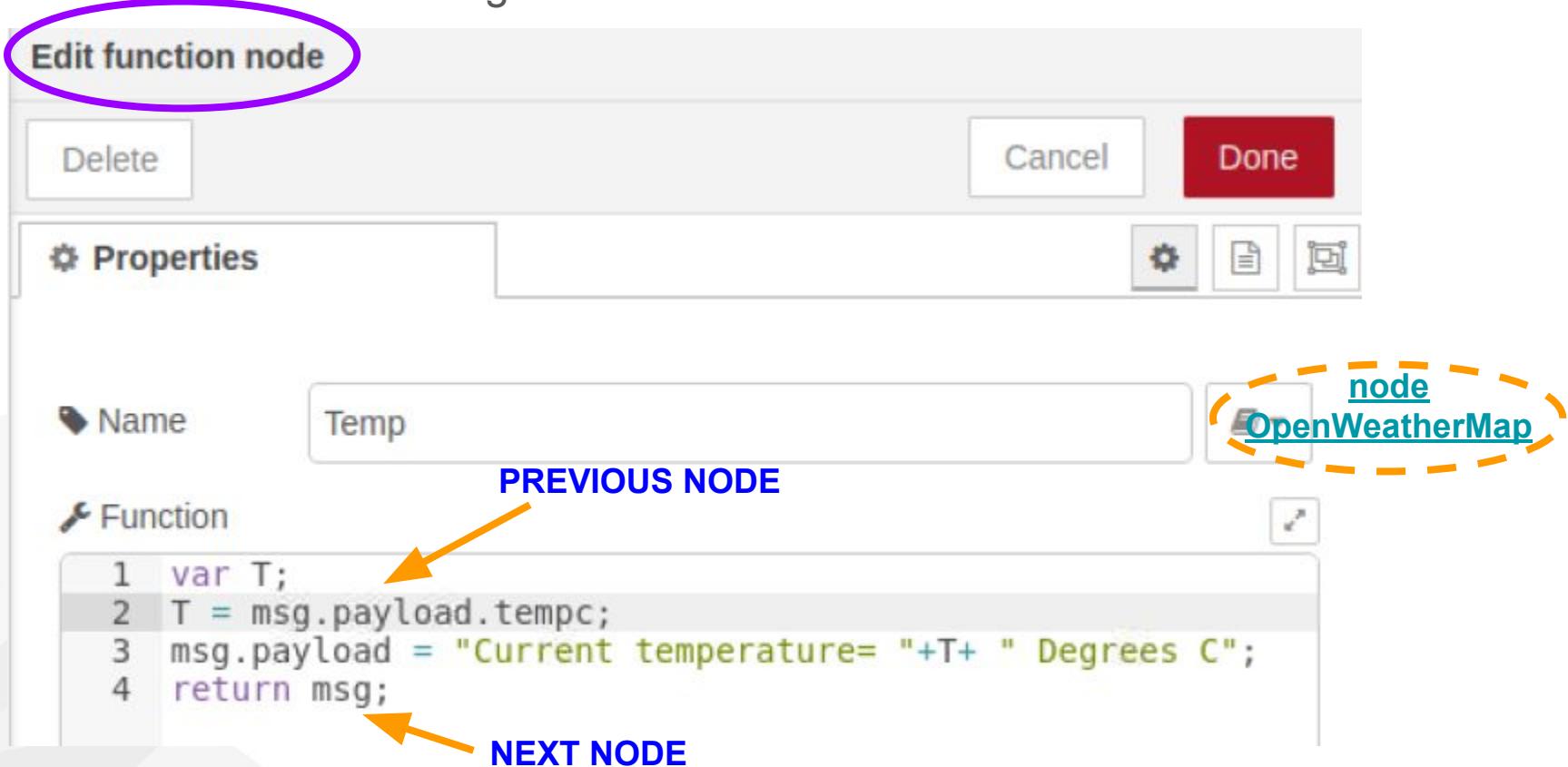
Function:

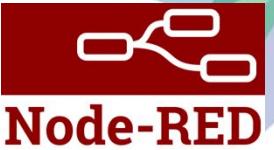
```
1 var T;
2 T = msg.payload.tempc;
3 msg.payload = "Current temperature= "+T+ " Degrees C";
4 return msg;
```

PREVIOUS NODE

NEXT NODE

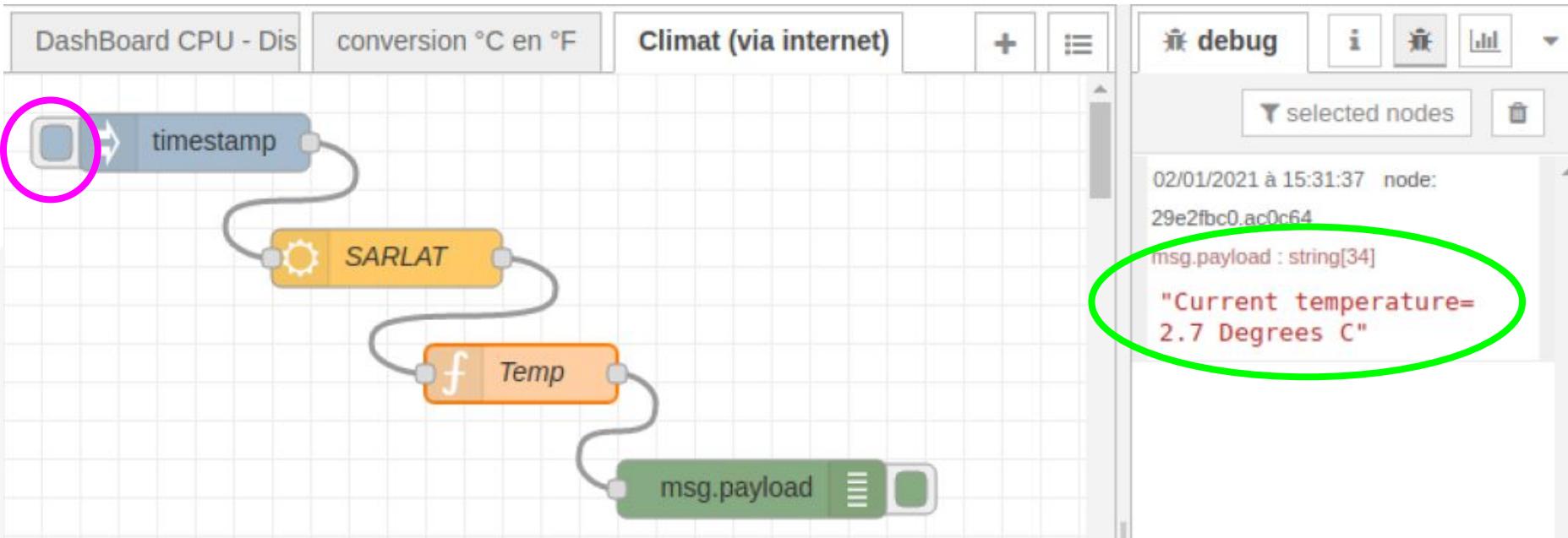
node
OpenWeatherMap





2ème flow

get/send info on internet

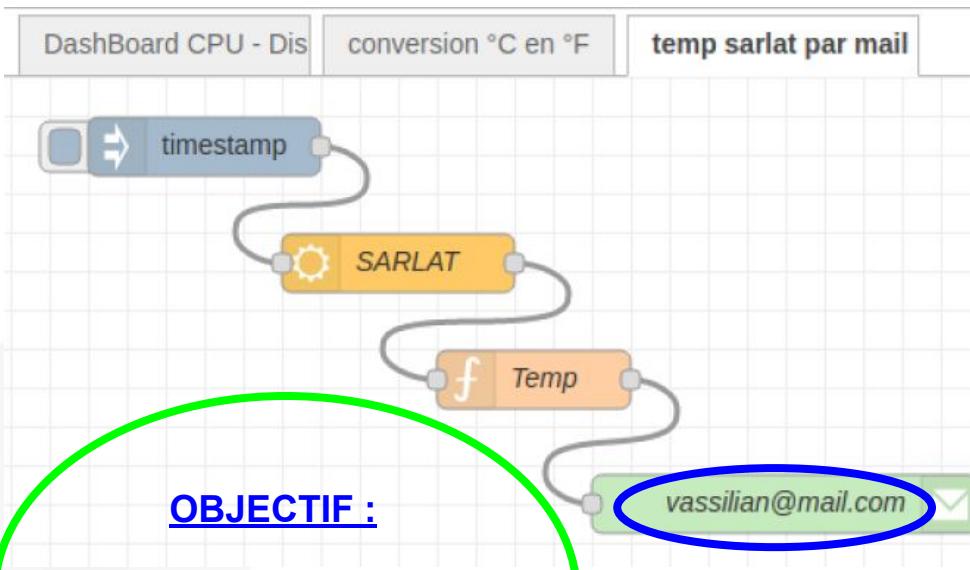


2ème flow

get/send info on internet

OBJECTIF :

récupérer la temp de Sarlat et la renvoyer par mail

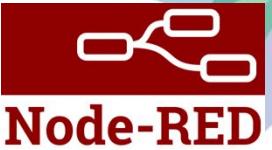


The flow starts with a timestamp node, followed by a SARLAT sensor node, then a Temp converter node, and finally an email output node set to vassilian@mail.com.

Edit email node

Properties

- To:** vassilian@mail.com **TO**
- Server:** smtp.mail.com
- Port:** 465 **Use secure connection.**
- Userid:** vassilian@mail.com **FROM**
- Password:** (redacted)
- Use TLS?**
- Name:** vassilian@mail.com



2ème flow

get/send info on internet

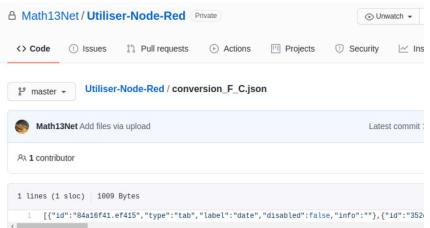
The screenshot shows the mail.com inbox interface. At the top, there's a blue header bar with icons for Home, E-mail, Contacts, Organizer, Cloud, Online Office, Premium, and More. Below the header is a sidebar with links for E-mail, Compose E-mail, Organizational Tools (Contacts, Organizer, Cloud, Online Office), and a link to show all unread e-mails. The main content area displays a greeting to "Hello Christie Vassilian" and her email address "vassilian@mail.com". It also shows the last login time as "Last Login: 1/2/21 1:49 PM". Below this, there are two notifications: "1 Unread e-mail" and "1 New e-mail". A green circle highlights the "1 New e-mail" notification. An orange arrow points from this notification to the "Compose E-mail" button in the second screenshot below.

The second screenshot shows an email message from "vassilian@mail.com" with the subject "Current Weather Information". The message content is "Current temperature= 2.2 Degrees C". The email has standard options at the top: Delete, Spam, Reply, Forward, and Move. A green circle highlights the message content. The bottom of the screen shows the mail.com inbox interface with the "Inbox" tab selected.

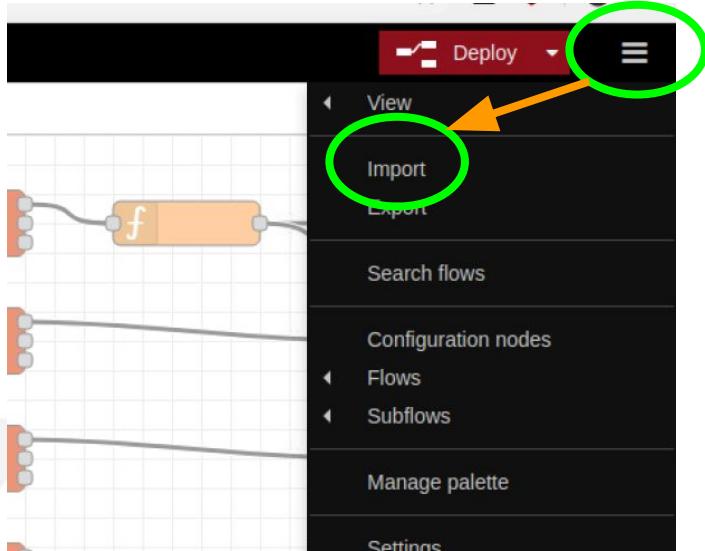
Importer un flow 1/2



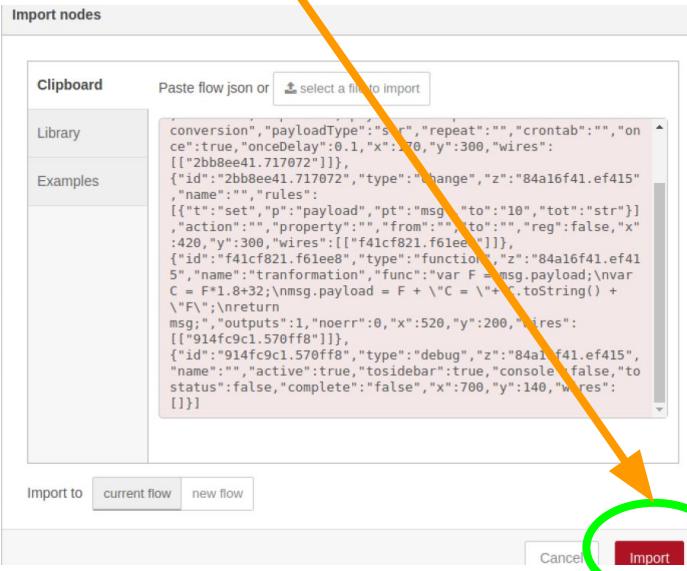
**trouver 1 flow sur le net
ctrl + C**



choisir import



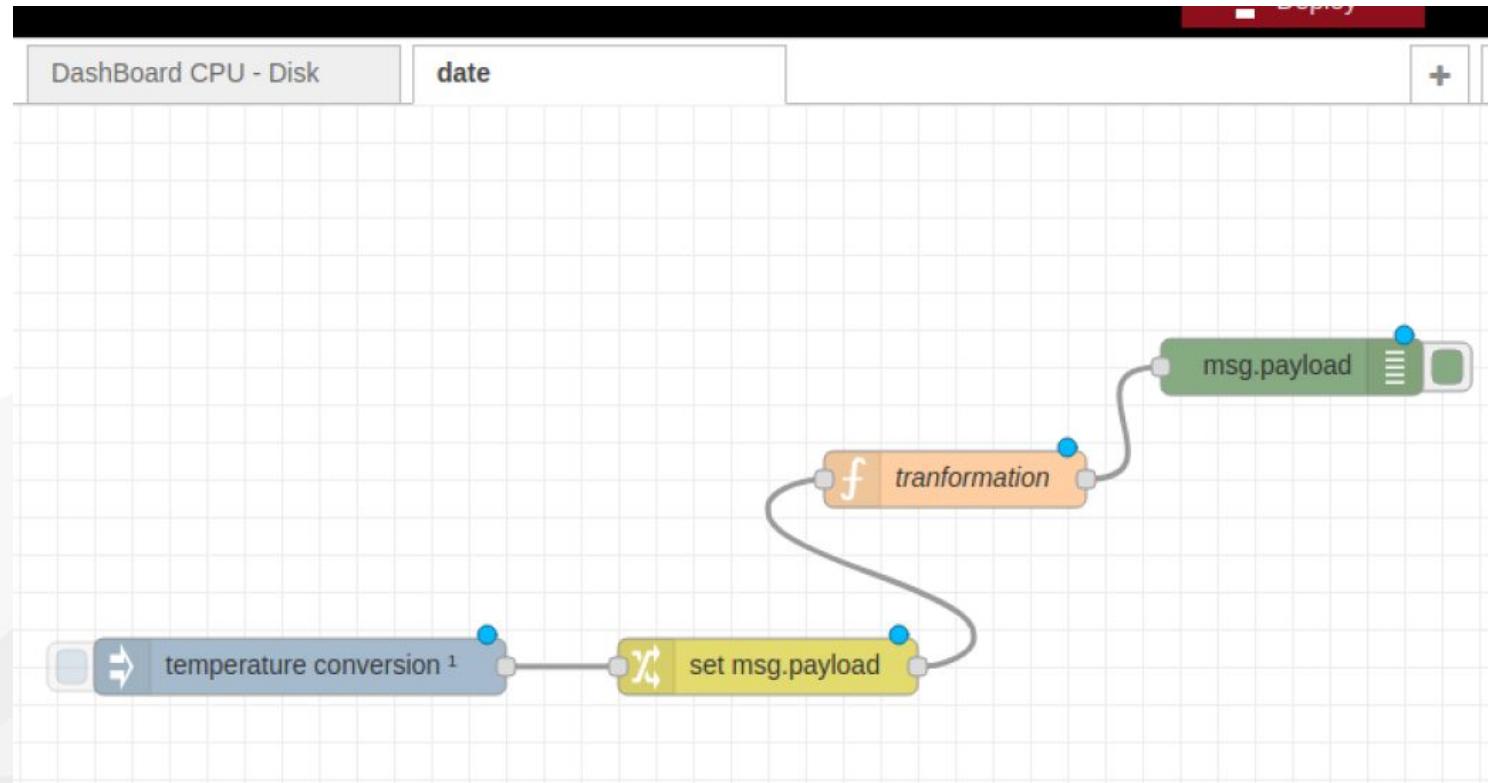
ctrl + V
appuyer sur import



Importer un flow 2/2



résultat de l'import





petit projet Node-Red

- alarme piloter à distance
- affichage sur écran I2 C LCD
- radar AV/AR voiture -> BUZZER
- dashboard sur internet



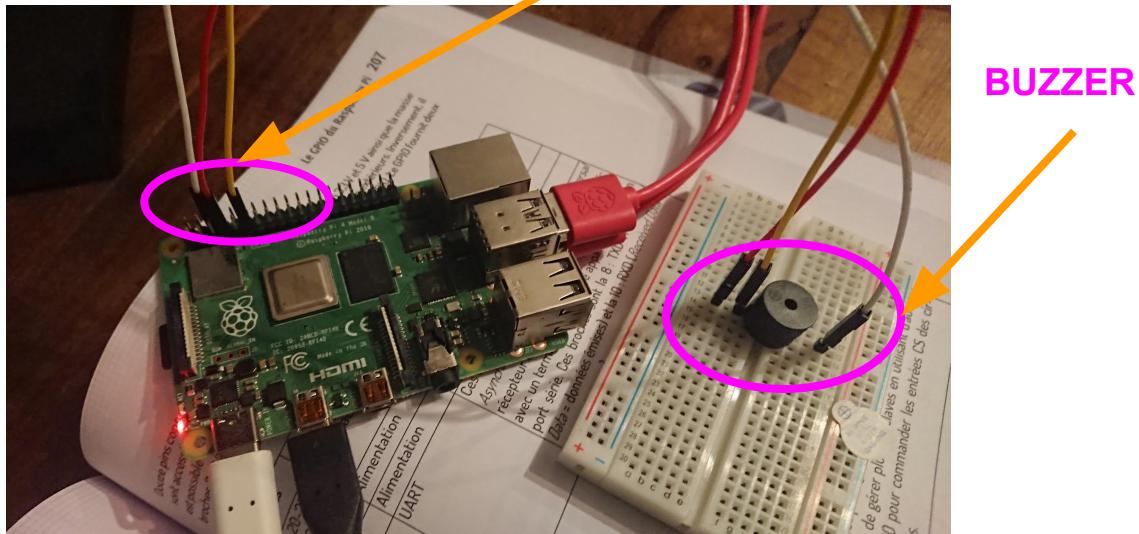
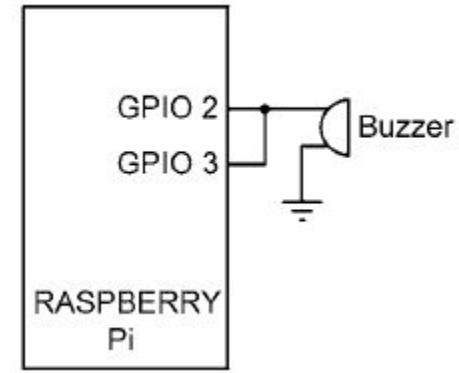


miniprojet : buzzer

GPIO on Pi

OBJECTIF :

1. envoyer un mail d'alerte au Pi
2. le Pi déclenche un buzzer
3. renvoyer 1 mail de confirmation





miniprojet : buzzer

GPIO on Pi

Configuration du Raspberry Pi

Système Display Interfaces Performance Localisation

Caméra: Activé Désactivé

SSH: Activé Désactivé

VNC: Activé

SPI: Activé

I2C: Activé

Serial Port: Activé

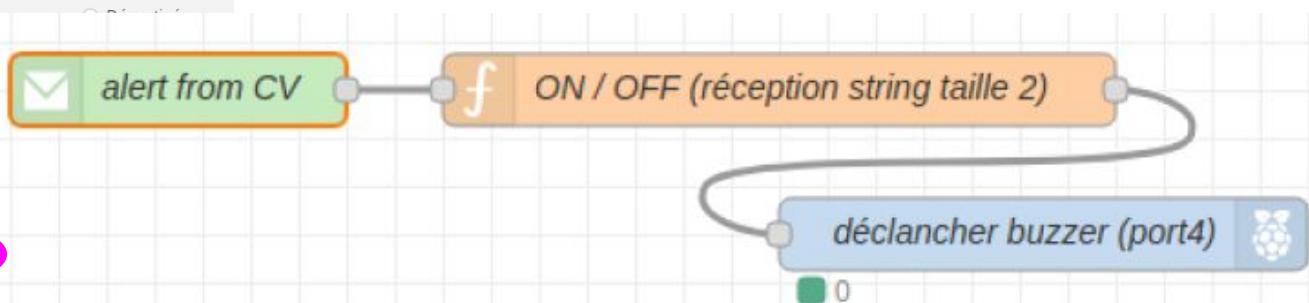
Serial Console: Activé

1-Wire: Activé

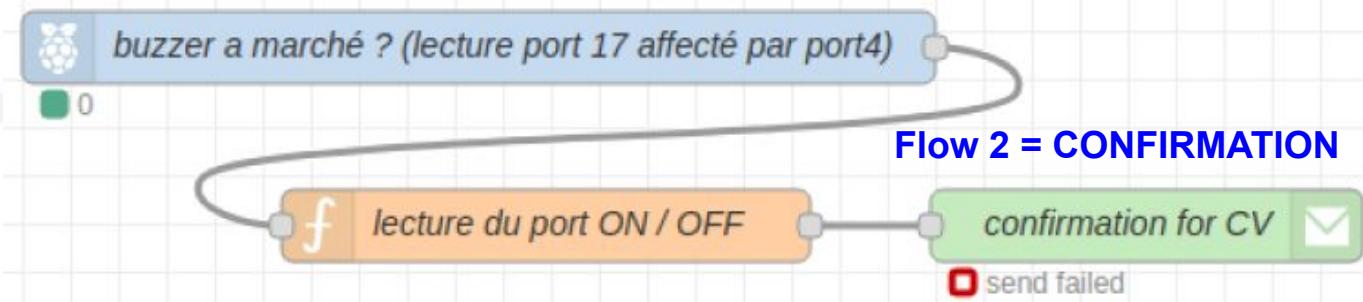
Remote GPIO: Activé

GPIO du Pi = ON

Flow 1 = ENVOI ALERTE

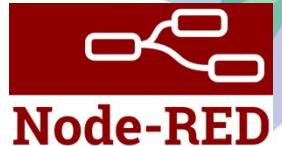


Flow 2 = CONFIRMATION



miniprojet : buzzer

GPIO on Pi



Edit email node

Delete Cancel Done

Properties

Get mail automatically every 10 seconds

Protocol IMAP

Use SSL?

Server imap.mail.com

Port 993

Userid vassilian@mail.com

Password *****

Folder INBOX

mail.com Search mail.com Help

Home Email Contacts Organizer Cloud Mobile App

i Server Status: Everything is running fine
In case you are experiencing any issues with your mail.com account, please

mail.com > mail.com Help Center > Premium > Using the IMAP protocol >

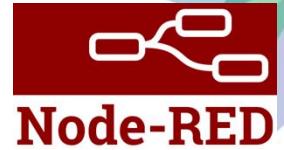
IMAP Server Data

Here you can find the relevant information for the server data to synchronize your m

	Incoming (IMAP)	Outgoing (SMTP)	Outgoing (SMTP)
Server	imap.mail.com	smtp.mail.com	smtp.mail.com
Port	993	587	465
Encryption	SSL or encryption	STARTTLS or encryption	SSL/TLS

miniprojet : buzzer

GPIO on Pi



Edit function node

Delete Cancel Done

Properties

Name: ON / OFF (réception string taille 2)

Function:

```
1 var cmd = msg.payload.substr(0,2);
2 var On = {payload: "1"};
3 var Off = {payload: "0"};
4
5 if(cmd == "ON")
6     return On;
7 else if(cmd == "OF")
8     return Off;
9
10 return msg;
```

Edit rpi-gpio out node

Delete Cancel Done

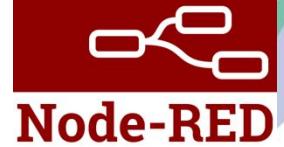
Properties

Pin

3.3V Power - 1	2 - 5V Power
SDA1 - GPIO2 - 3	4 - 5V Power
SCL1 - GPIO3 - 5	6 - Ground
GPIO04 - 7	8 - GPIO14 - TxD
Ground - 9	10 - GPIO15 - RxD
GPIO17 - 11	12 - GPIO18
GPIO27 - 13	14 - Ground
GPIO22 - 15	16 - GPIO23
3.3V Power - 17	18 - GPIO24
MOSI - GPIO10 - 19	20 - Ground
MISO - GPIO09 - 21	22 - GPIO25
SCLK - GPIO11 - 23	24 - GPIO8 - CE0
Ground - 25	26 - GPIO7 - CE1
SD - 27	28 - SC
GPIO05 - 29	30 - Ground
GPIO06 - 31	32 - GPIO12
GPIO13 - 33	34 - Ground

miniprojet : buzzer

GPIO on Pi



Edit rpi-gpio in node

Delete Cancel Done

Properties

Pin

3.3V Power - 1	2 - 5V Power
SDA1 - GPIO2 - 3	4 - 5V Power
SCL1 - GPIO3 - 5	6 - Ground
GPIO4 - 7	8 - GPIO14 - TxD
Ground - 9	10 - GPIO15 - RxD
GPIO17 - 11	12 - GPIO18
GPIO27 - 13	14 - Ground
GPIO22 - 15	16 - GPIO23
3.3V Power - 17	18 - GPIO24
MOSI - GPIO10 - 19	20 - Ground
MISO - GPIO9 - 21	22 - GPIO25
SCLK - GPIO11 - 23	24 - GPIO8 - CE0
Ground - 25	26 - GPIO7 - CE1
SD - 27	28 - SC
GPIO05 - 29	30 - Ground

Edit function node

Delete Cancel Done

Properties

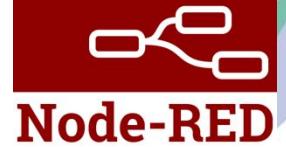
Name: lecture du port ON / OFF

Function:

```
1 if(msg.payload == "1")
2 msg.payload = "Buzzer is ON"
3 else
4 msg.payload = "Buzzer is OFF"
5 return msg;
```

miniprojet : buzzer

GPIO on Pi



Edit email node

Delete Cancel Done

Properties

To: vassilian@mail.com

Server: smtp.mail.com

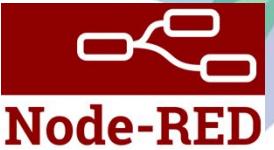
Port: 465 Use secure connection.

Userid: vassilian@mail.com

Password: *****

Use TLS?

Name: confirmation for CV



miniprojet : buzzer

GPIO on Pi

The diagram illustrates the process of triggering a GPIO pin (buzzer) via Node-RED and sending an email notification.

Node-RED Flow:

- A message is sent to the "Email" node.
- The "Email" node triggers a "Send Email" action.
- The "Send Email" action sends an email to "Mr VASSILIAN" with the subject "activer le buzzer".

Email Client Interface:

- Compose E-mail:** The message body contains "activer le buzzer".
- Send:** The "Send" button is highlighted with an orange arrow.
- Inbox:** The inbox shows the sent email with the subject "activer le buzzer".

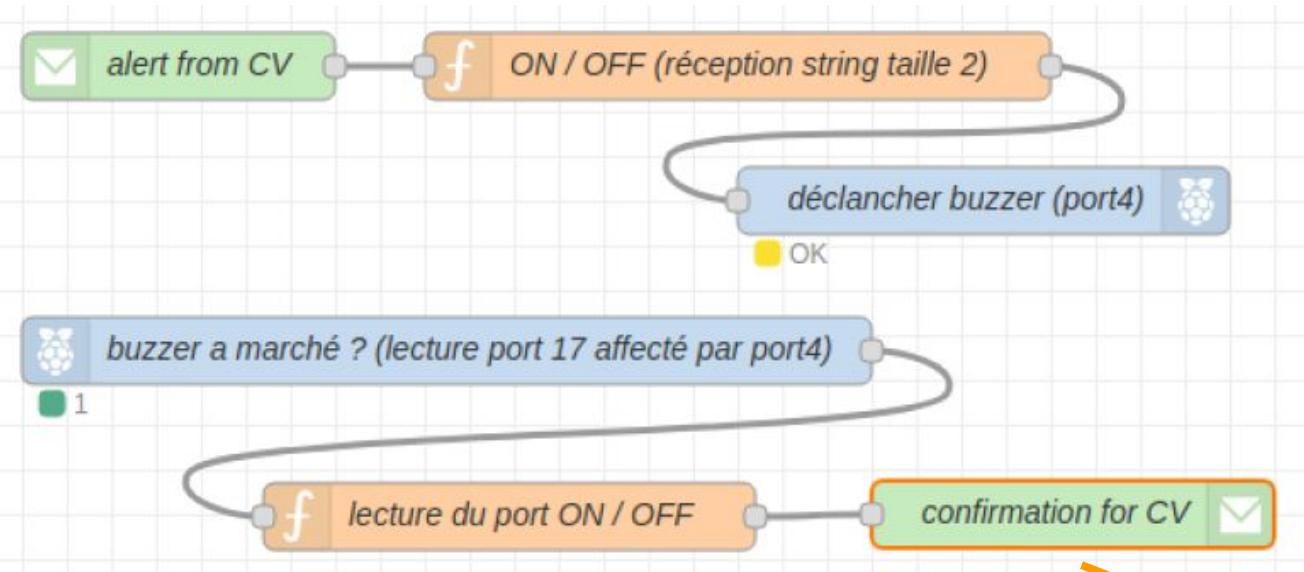
Node-RED Dashboard:

- Home:** Shows the status of the GPIO pin (ON).
- E-mail:** Shows the received email from "Christie Vassilian" with the subject "activer le buzzer".



miniprojet : buzzer

GPIO on Pi



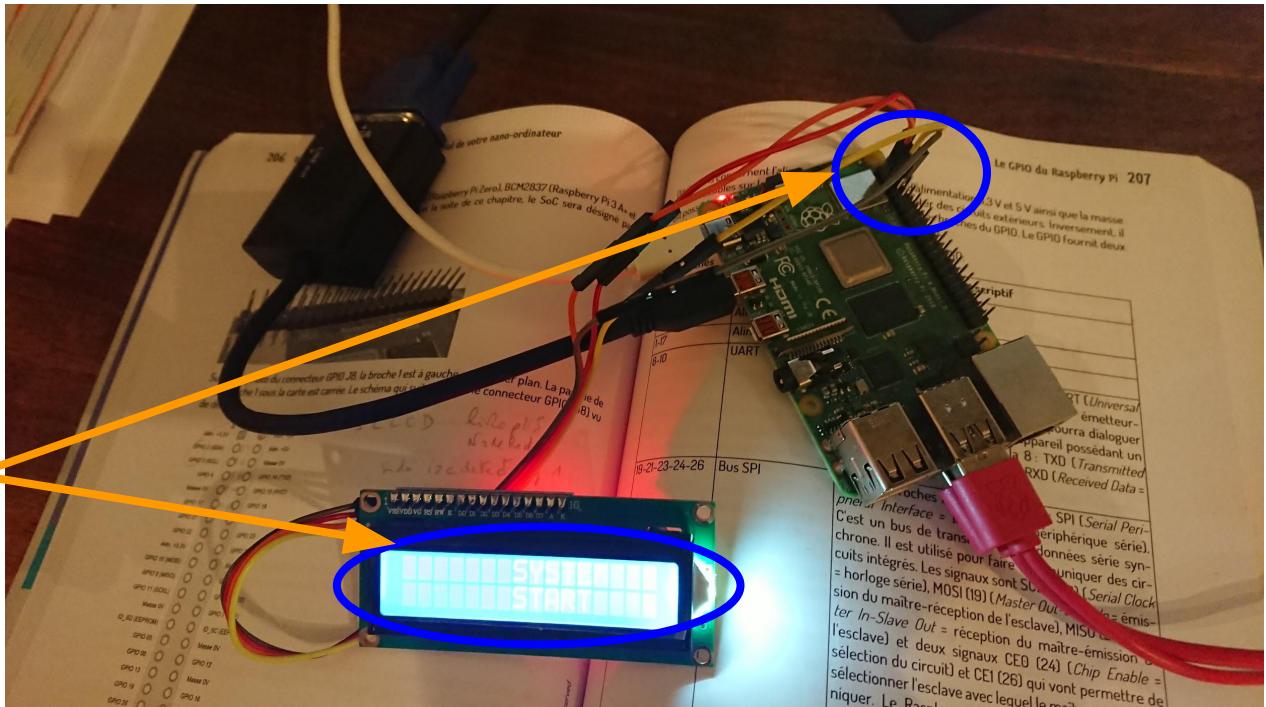
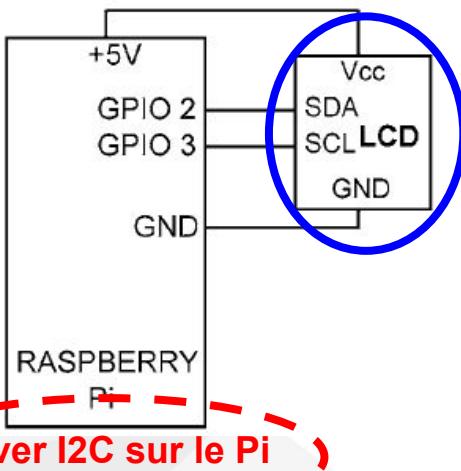
pi/7
From: vassilian@mail.com
Buzzer is ON

miniprojet : I2C LCD

GPIO on Pi

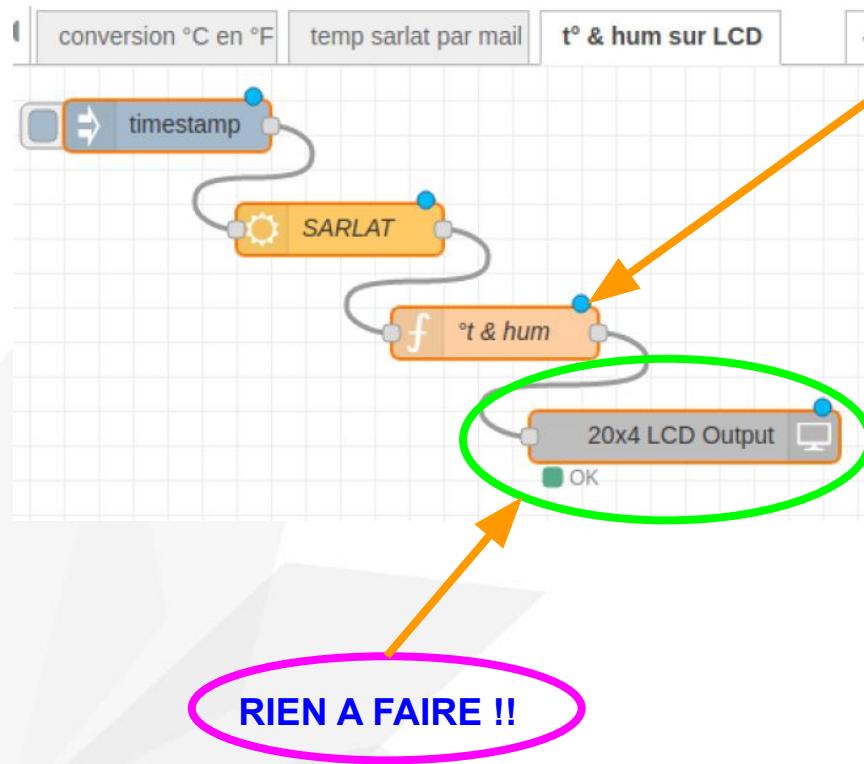
OBJECTIF :

1. récupérer la temp à Sarlat sur internet
2. l'afficher sur écran LCD via la GPIO du Pi



miniprojet : I2C LCD

GPIO on Pi



Edit function node

Delete

Properties

Name: °t & hum

Function:

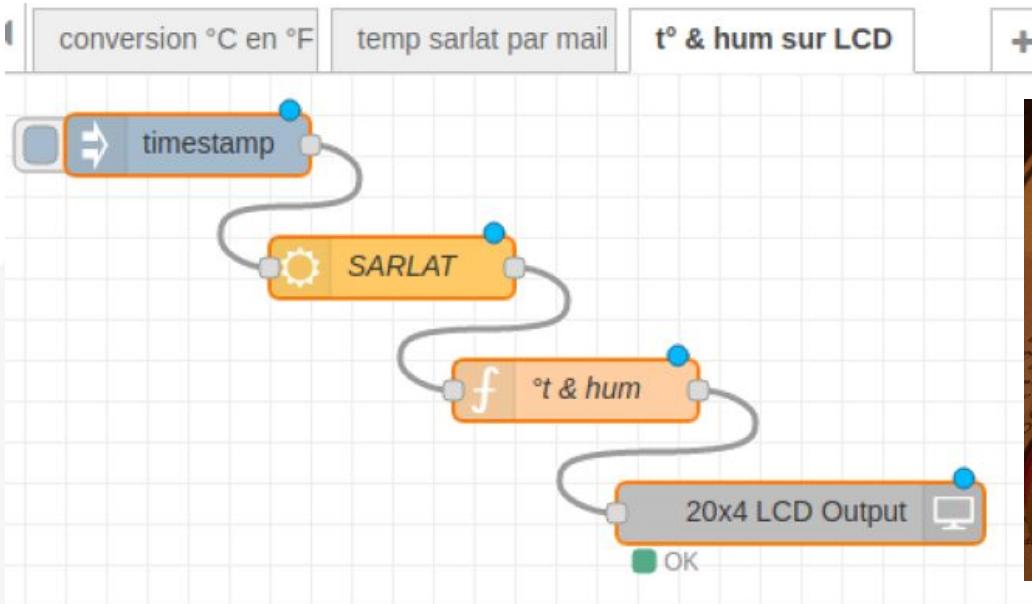
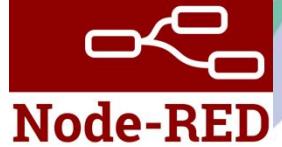
```

1 var Temp = "T°C=" + msg.payload.tempc;
2 var Hum = "Hum=" + msg.payload.humidity;
3 msg.payload={msg:[
4     {msg:"Current T & Hum"},
5     {msg:Temp + " " +Hum, pos:1}
6 ];
7 return msg;

```

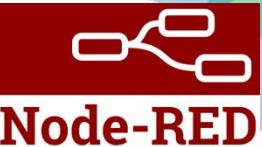
miniprojet : I2C LCD

GPIO on Pi



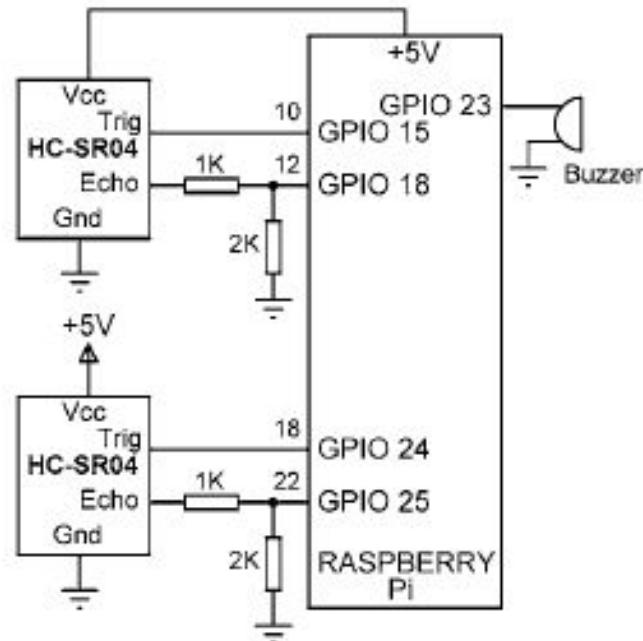
miniprojet : radar -> buzzer

GPIO on Pi



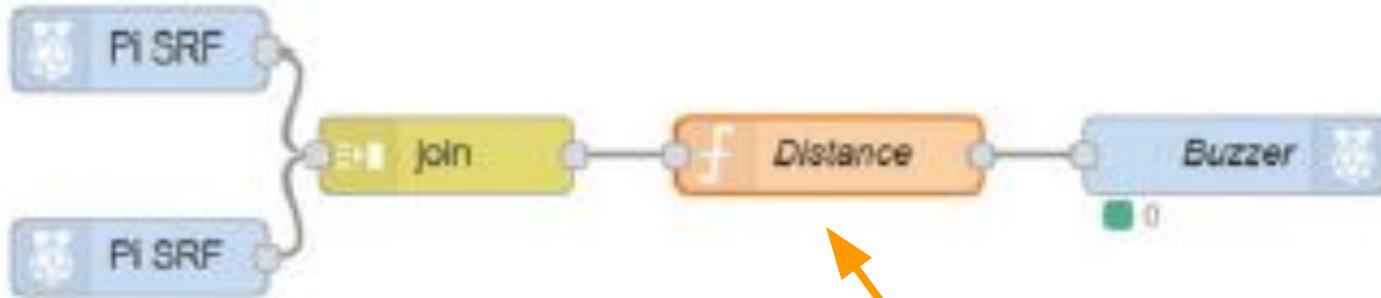
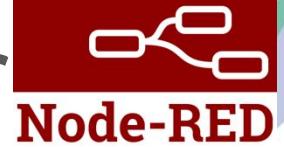
OBJECTIF :

1. véhicule se gare dans 1 parking
2. radar AV et radar AR de distance
3. buzzer se déclenche si trop près



miniprojet : radar -> buzzer

GPIO on Pi



```
var Distance1 = msg.payload[0];
var Distance2 = msg.payload[1];
if(Distance1 < 20 || Distance2 < 20)
    msg.payload = 1;
else
    msg.payload = 0;
return msg;
```

miniprojet : dashboard

affichage d'info en ligne



OBJECTIF :

1. faire fonctionner le Pi sur 1 tâche (prog Python par ex)
2. mesurer des informations du Pi (°C, mémoire, ...)
3. afficher l'info graphiquement en direct sur internet

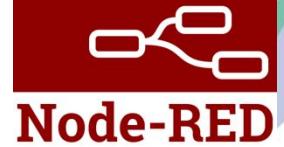
Problème du Rendu Monnaie :

analyse empirique de la **complexité**

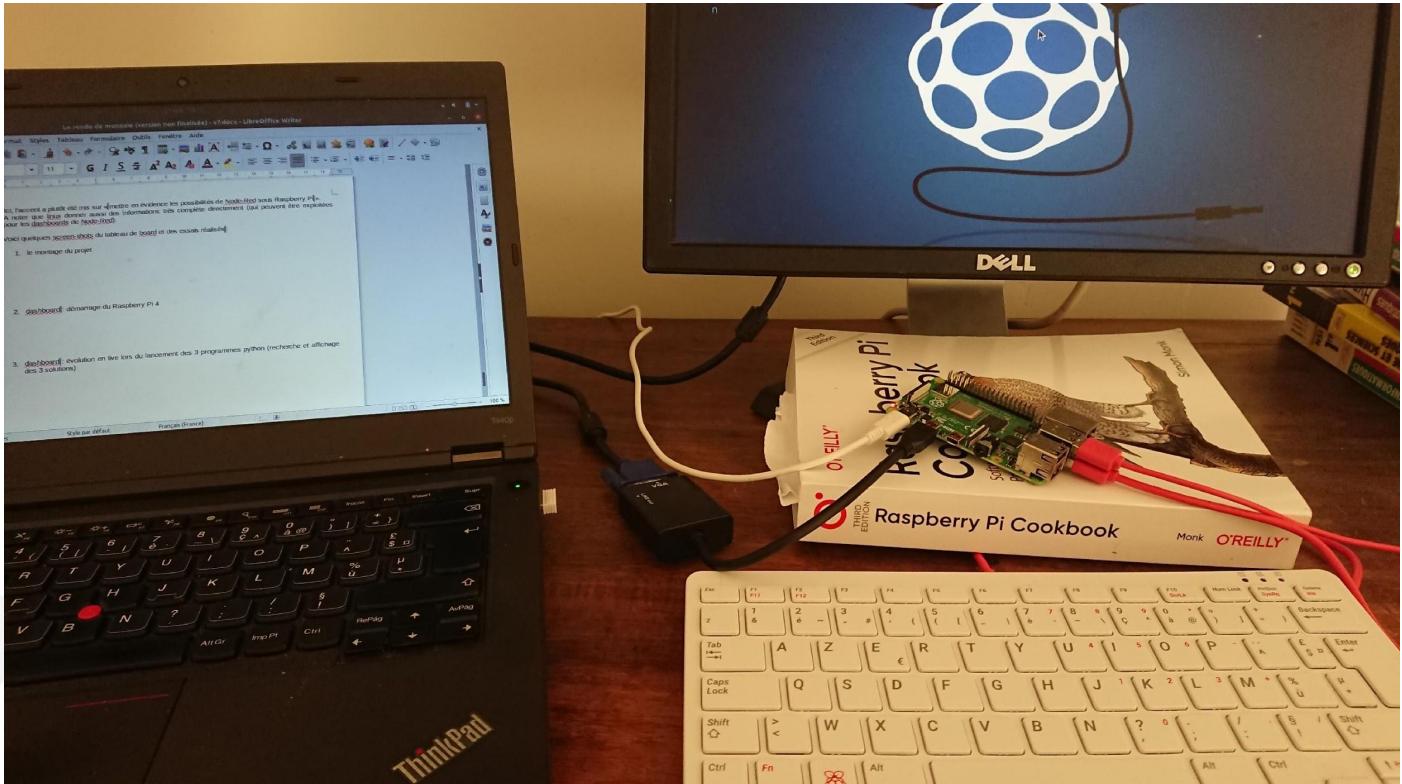
1. algo glouton - récursif - dynamique
2. faire tourner les prog python sur des jeux d'essais
3. mesurer et afficher les mesures

miniprojet : dashboard

affichage d'info en ligne

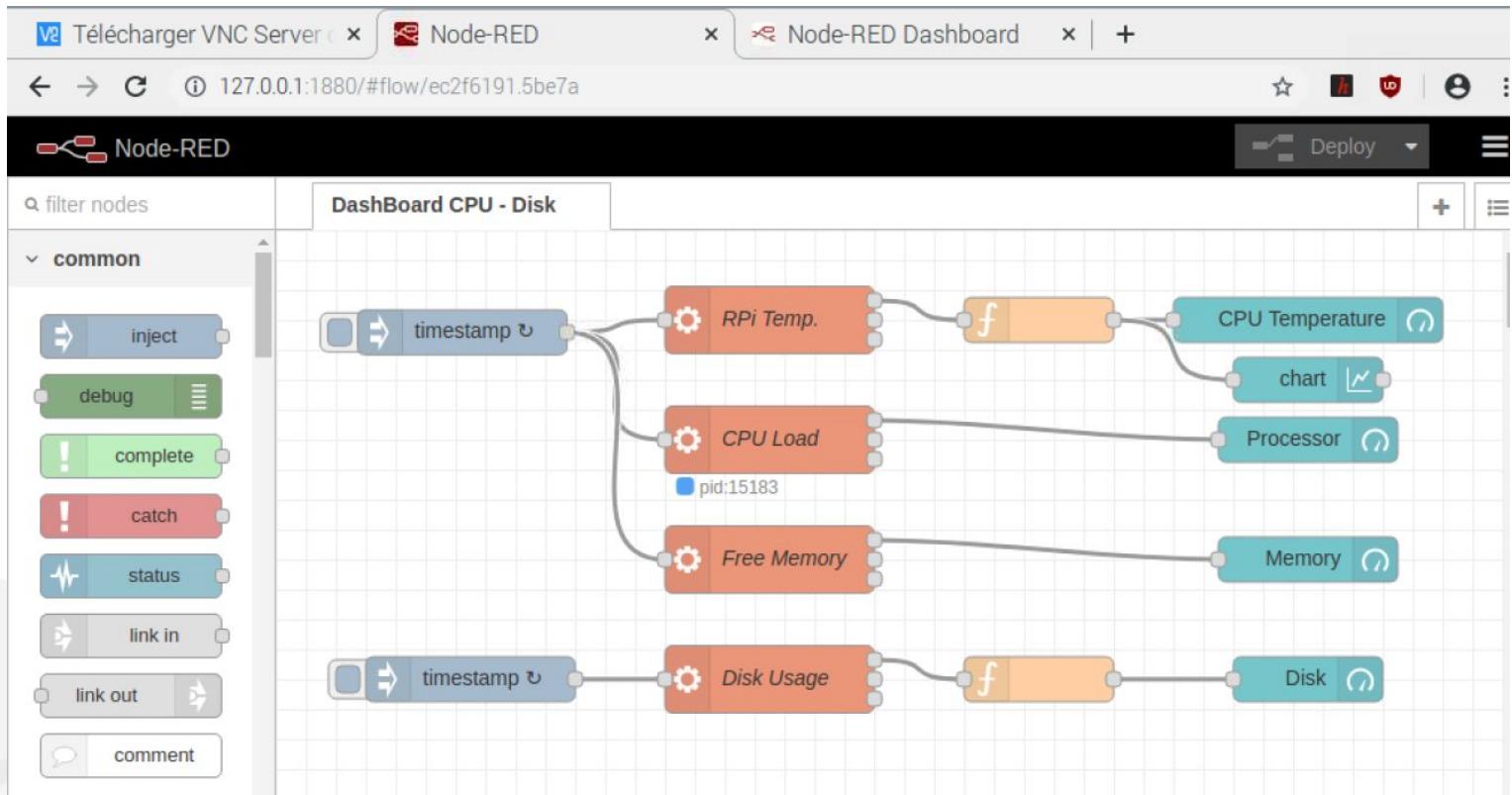
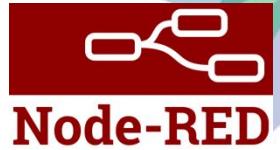


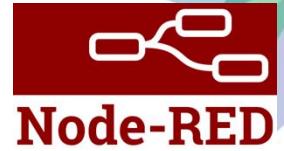
LE MONTAGE :



miniprojet : dashboard

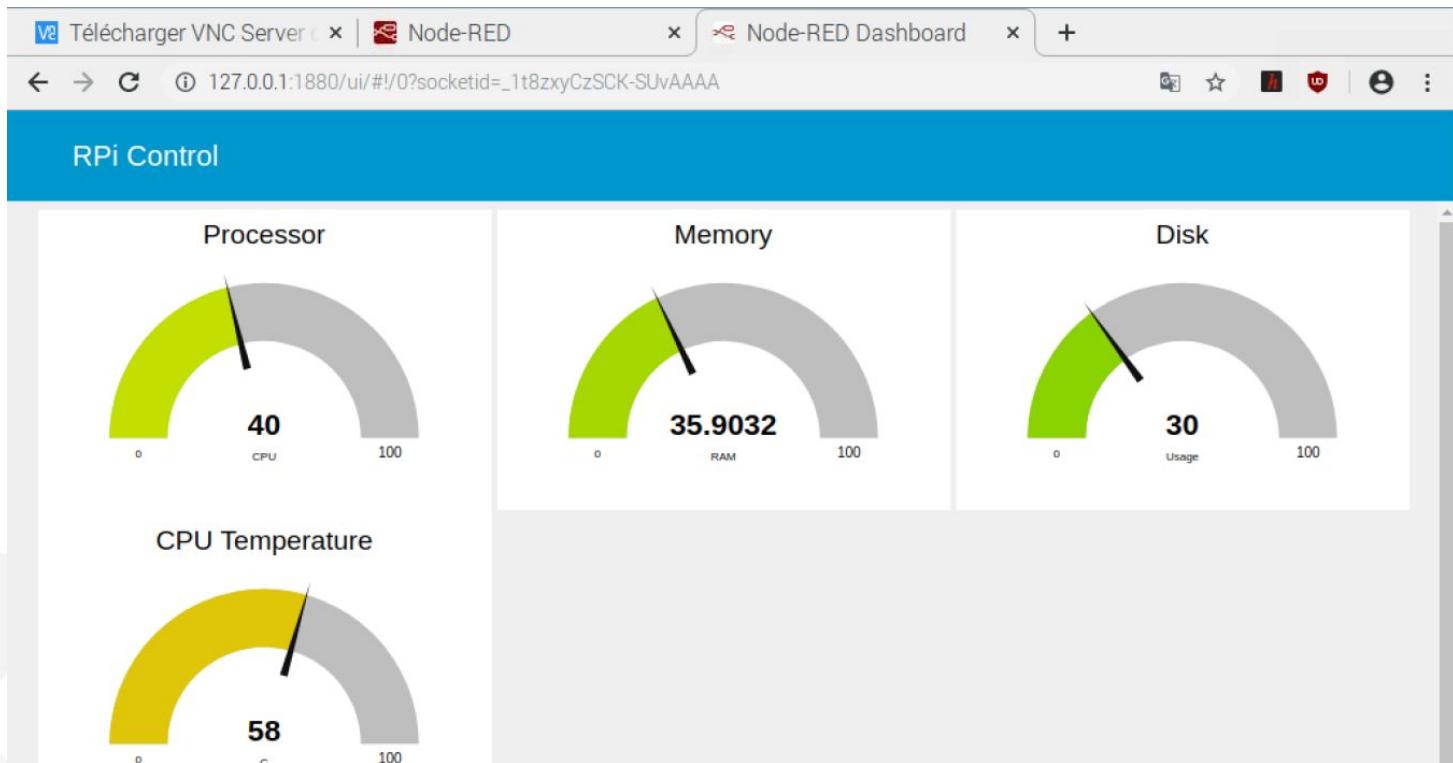
affichage d'info en ligne

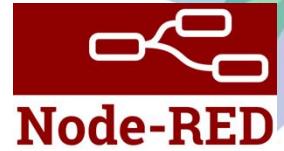




miniprojet : dashboard

affichage d'info en ligne





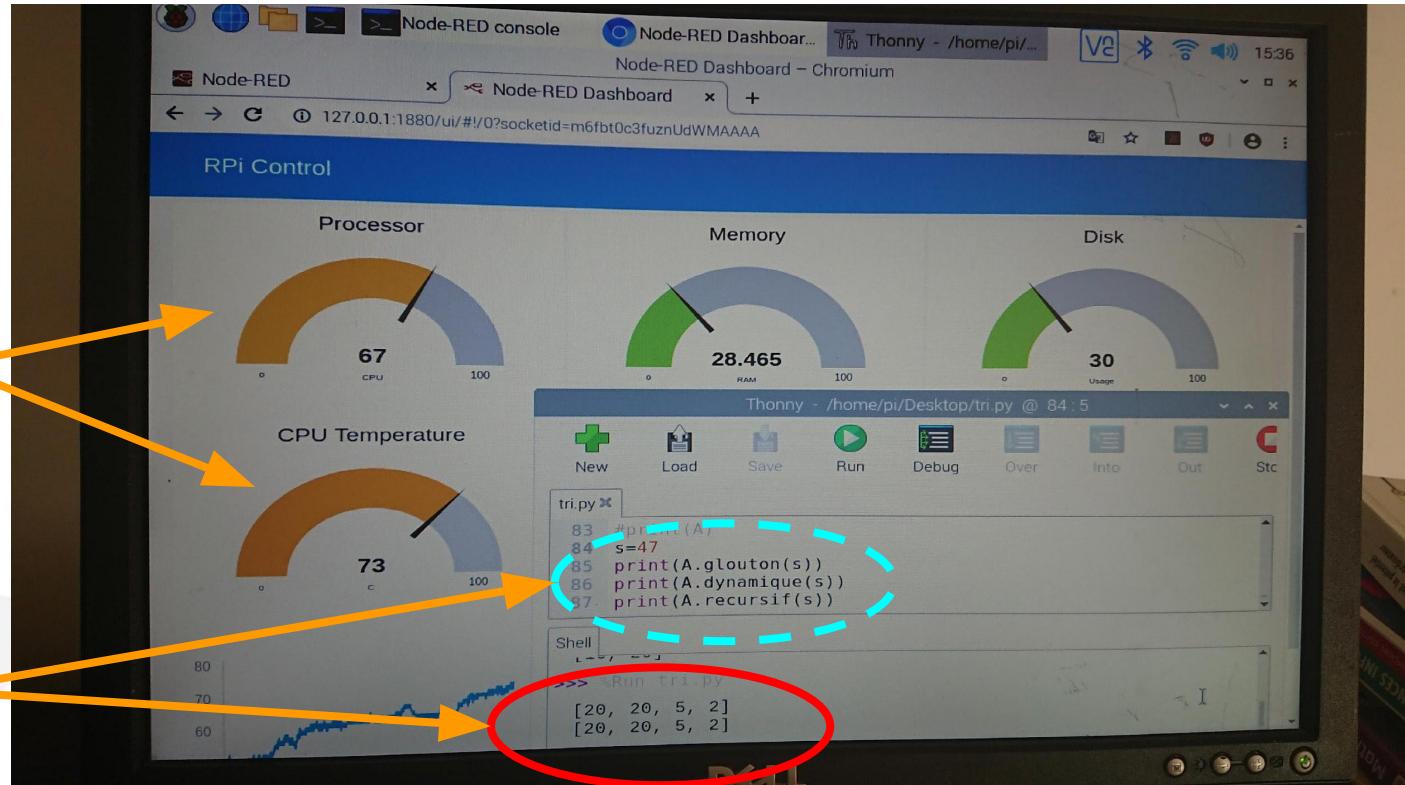
miniprojet : dashboard

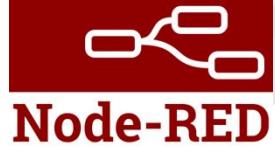
affichage d'info en ligne

L'EXPERIENCE :

CA CHAUFFE !

**ON ATTEND
TOUJOURS LE
RECURSIF !**



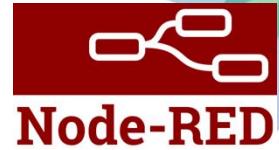


ressource Node-Red

- site et forum
- vidéo en ligne
- livre, vidéo, formation (payant)
- mon site [petitfuté.com](http://petitfute.com)

ressource Node-Red

la communauté du node



Site et Forum :

1. [node-red](#)
2. [node-red prog](#)
3. inscrivez-vous sur le forum de [node-red](#)
4. ma page perso : [petitfuté.com/nodered](#)

Pour bien démarrer :

[un petit projet bien ficelé](#)

[2 flows faciles](#)

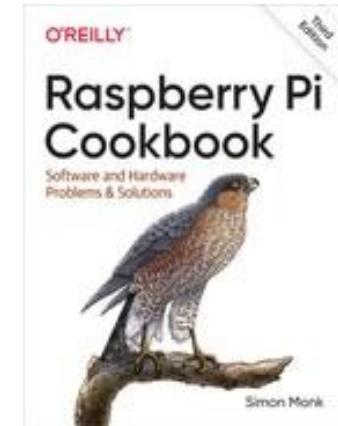
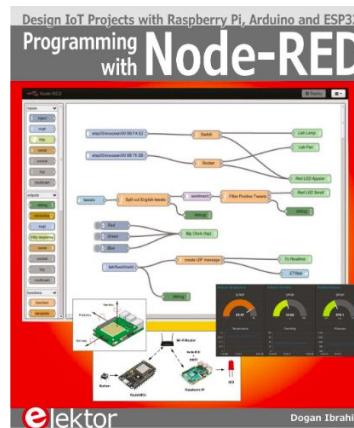
Livres pour poursuivre :

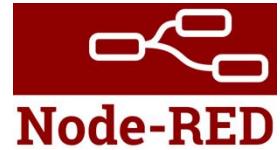
1. [programming with node-red](#)
2. [rapberry pi cookbook](#)

Ne pas oublier les vidéos (youtube ...) et les formations (udemy ...)

Vidéo et Formation :

1. [node-red channel](#) sur youtube
2. pleins d'autres chaînes (souvent plus simples) sur youtube
3. quelques formations pas cher sur udemy





Thank you

take care !

