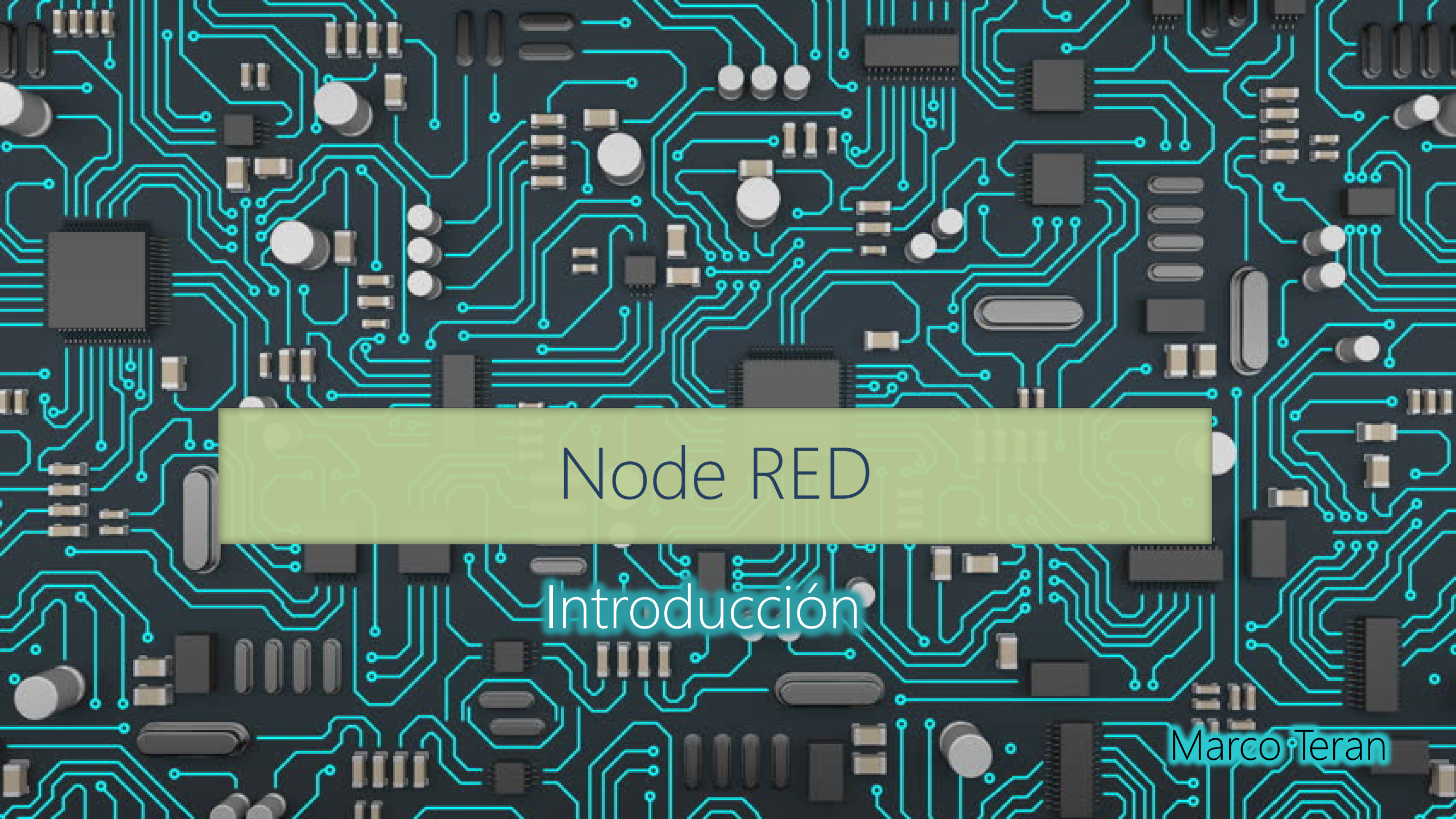


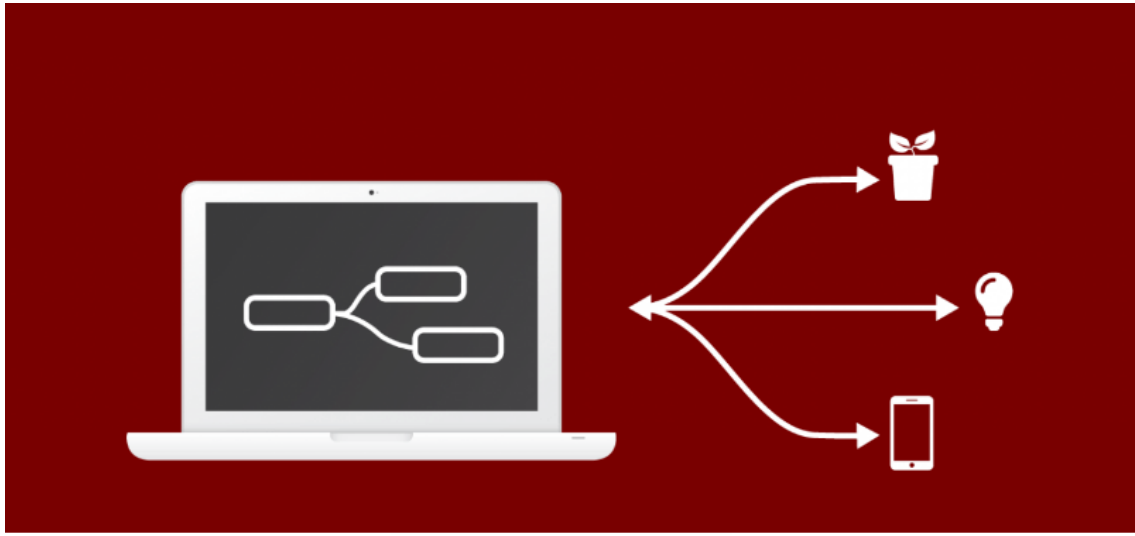
Node RED

Introducción

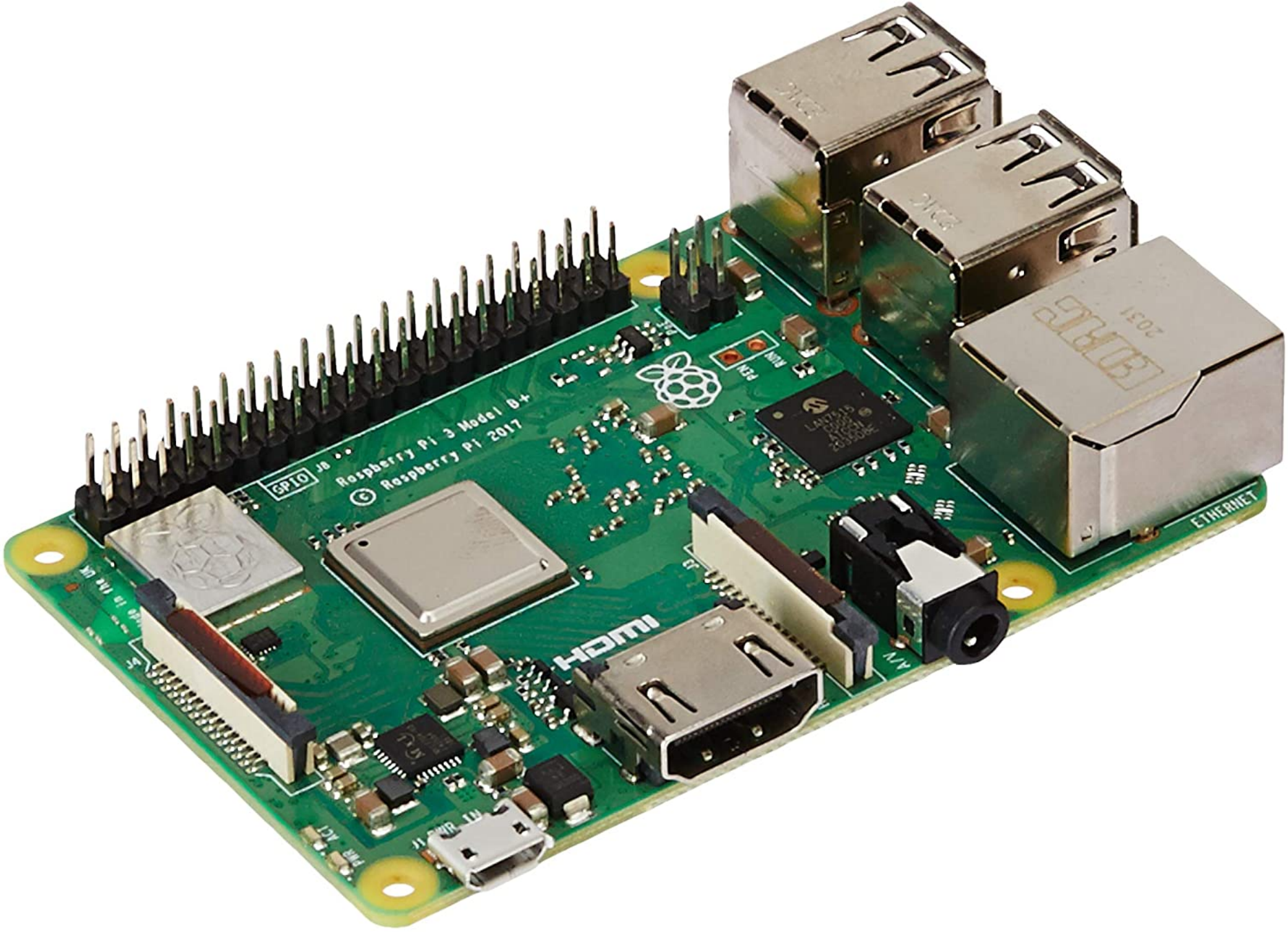
Marco Teran

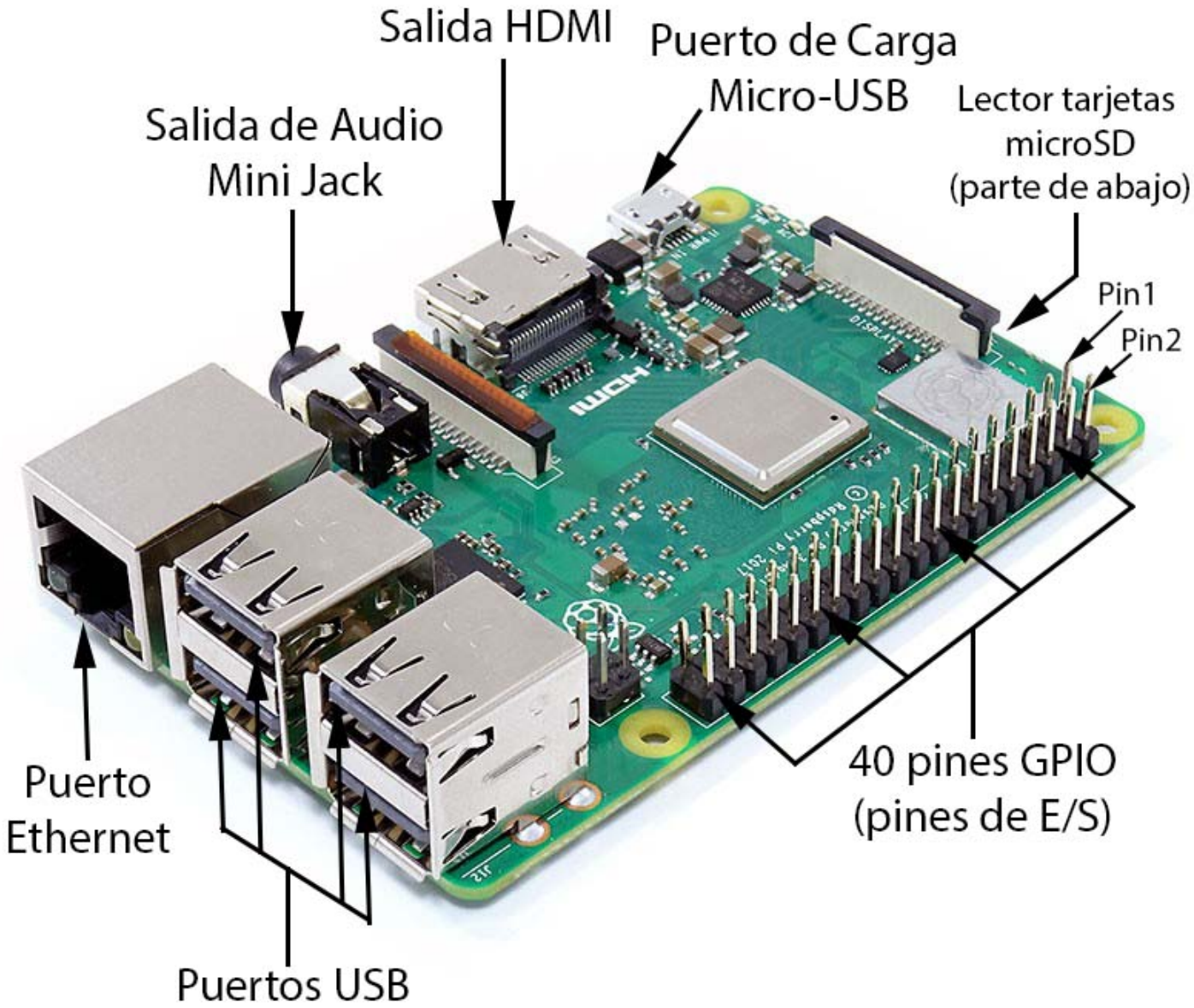
Getting Started with Node-RED on Raspberry Pi

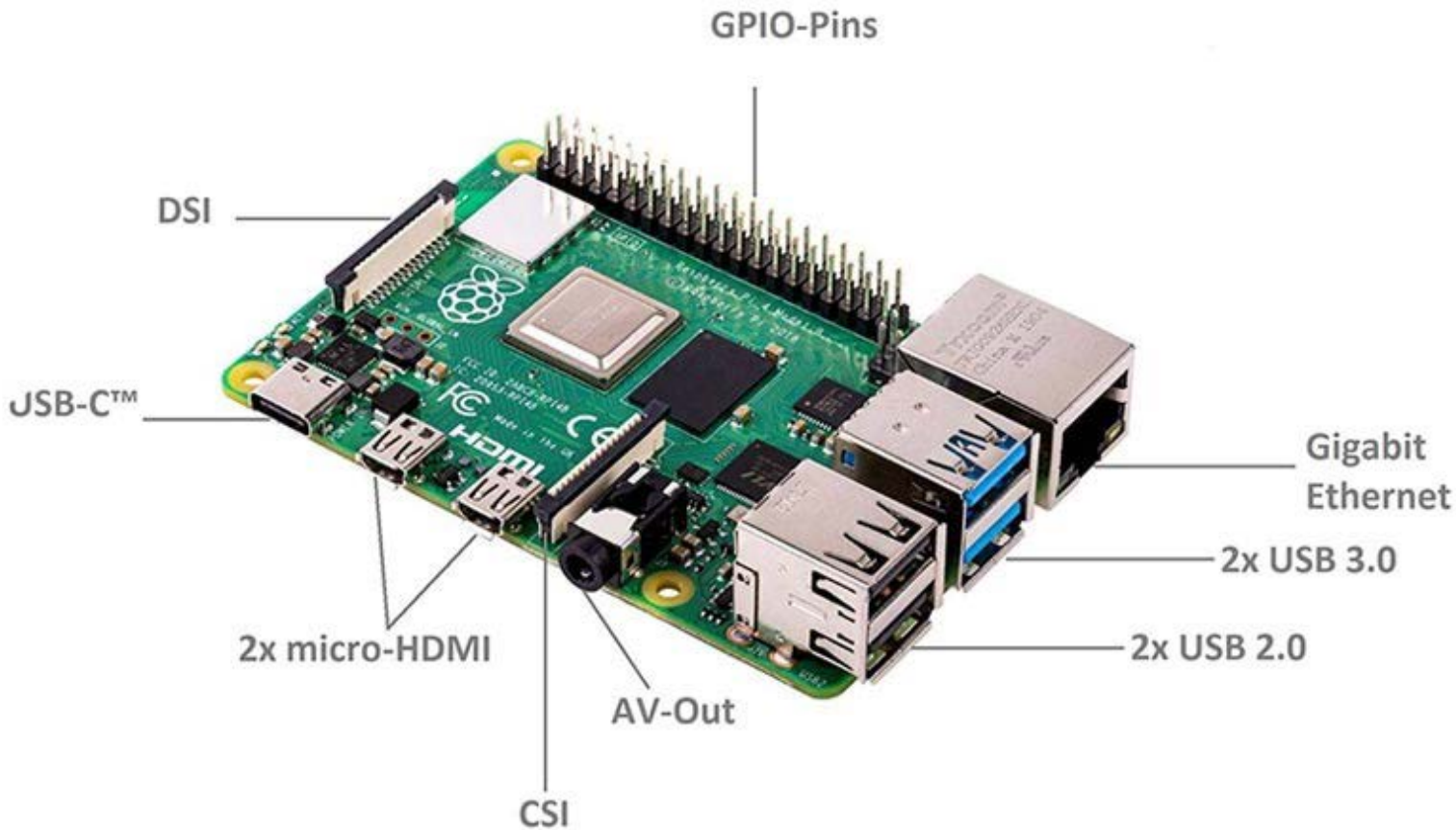
- An introductory guide to Node-RED
- What's Node-RED
- How to install it
- How to use the visual interface to create a simple flow.



Prerequisites

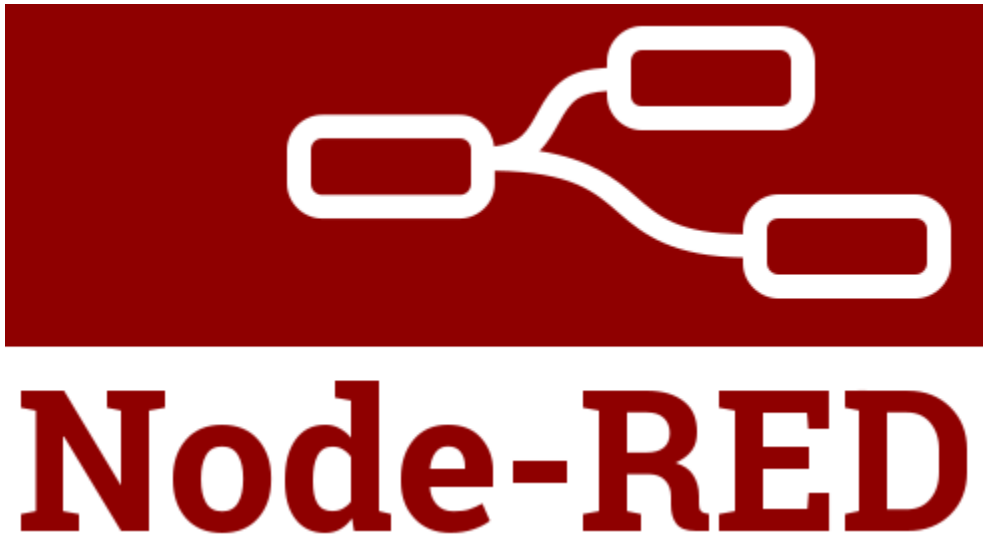

GPIO
Raspberry Pi 3 Model B+
© Raspberry Pi 2017
HDMI
ETHERNET


Salida HDMI
Puerto de Carga
Micro-USB
Salida de Audio
Mini Jack
Lector tarjetas
microSD
(parte de abajo)
Pin1
Pin2
Puerto
Ethernet
40 pines GPIO
(pines de E/S)
Puertos USB

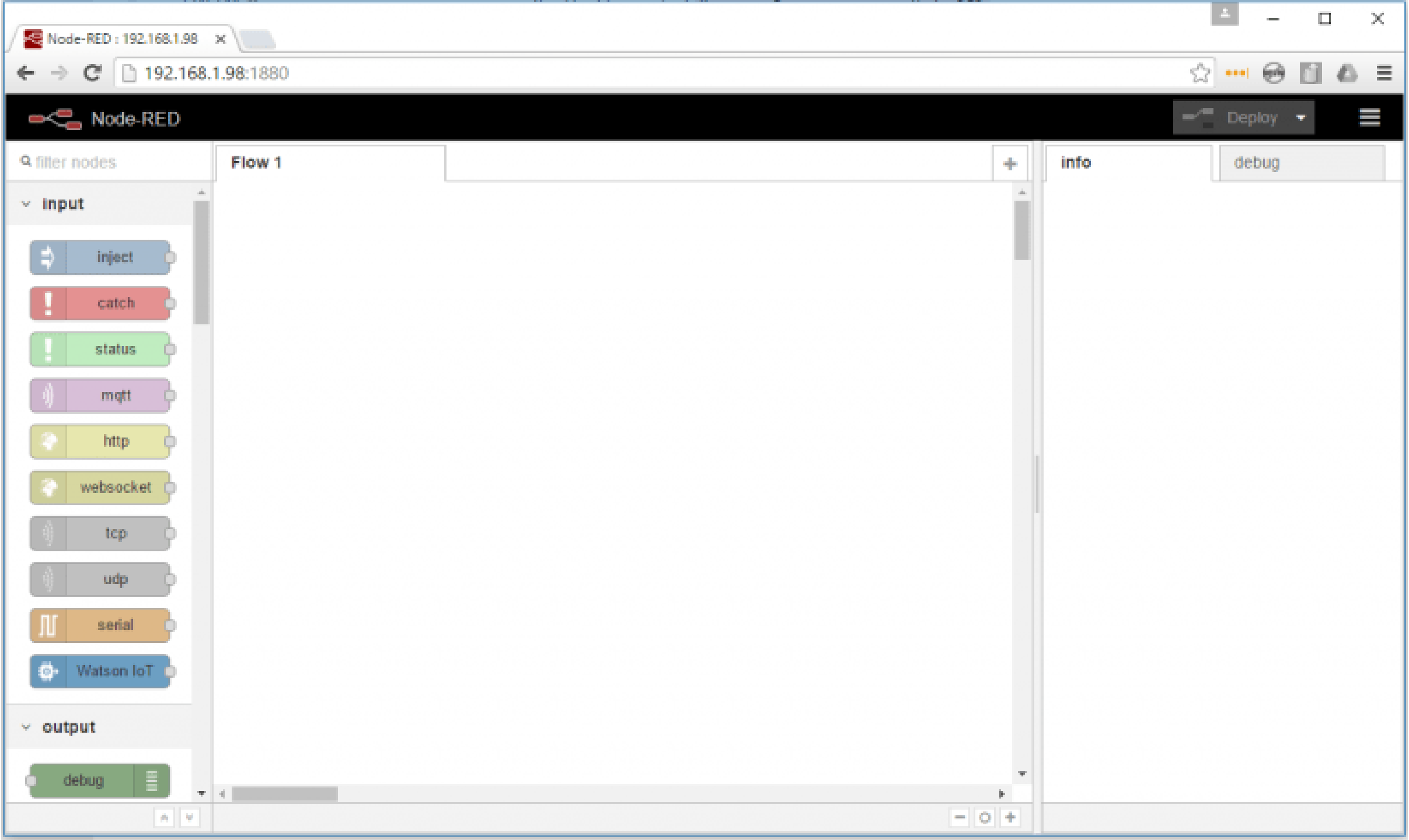

GPIO-Pins
DSI
USB-C™
Gigabit
Ethernet
2x USB 3.0
2x USB 2.0
2x micro-HDMI
AV-Out
CSI

What's Node-RED?

Node-RED is a powerful open source tool for building Internet of Things (IoT) applications with the goal of simplifying the programming component.

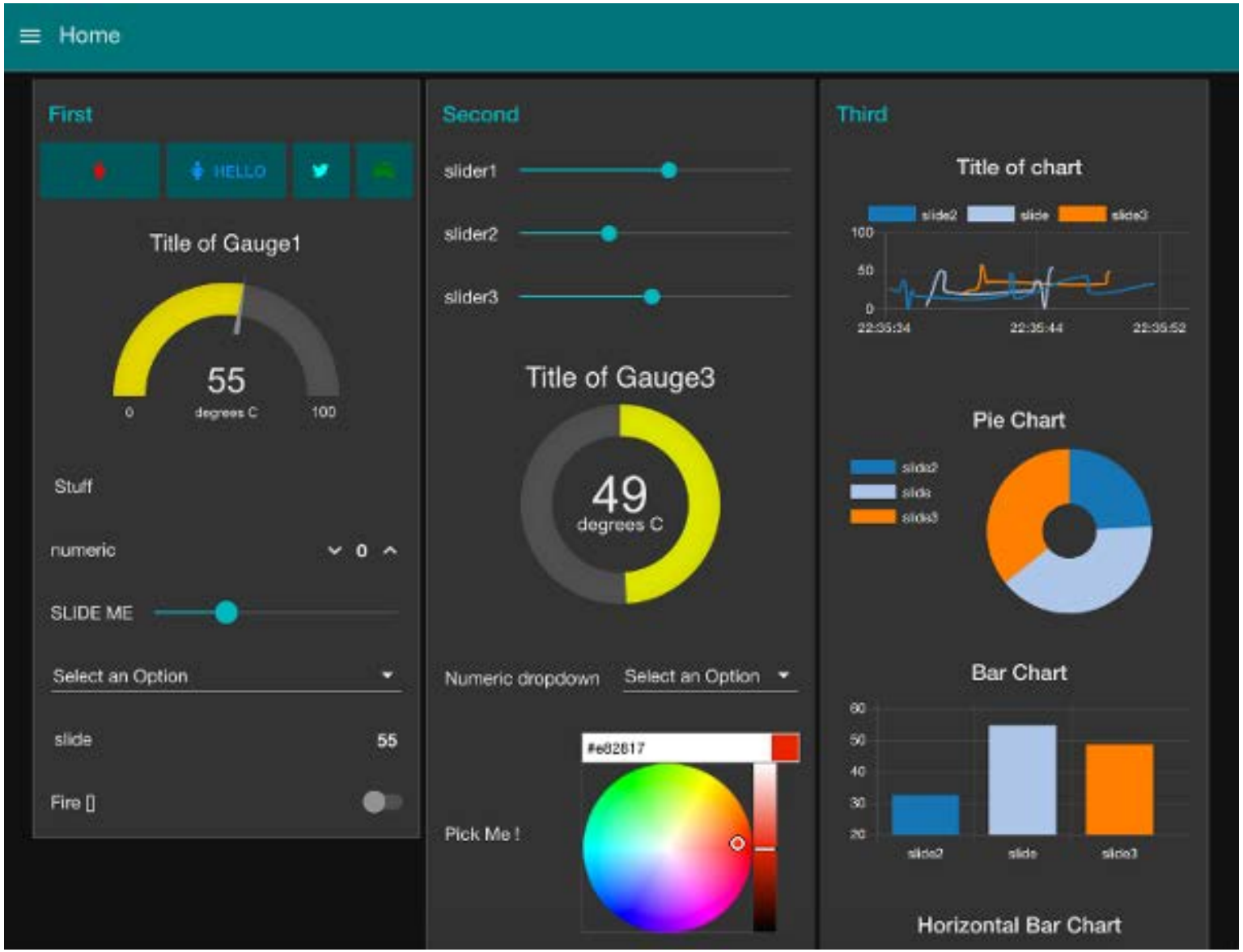


- It uses a visual programming that allows you to connect code blocks, known as nodes, together to perform a task.
- The nodes when wired together are called flows.


Node-RED : 192.168.1.98
192.168.1.98:1880
Node-RED
Deploy
filter nodes
Flow 1
info
debug
input
inject
catch
status
mqtt
http
websocket
tcp
udp
serial
Watson IoT
output
debug

Why do I think Node-RED is a great solution?

- Node-RED is open source and developed by IBM.
- The Raspberry Pi runs Node-RED perfectly.
- With Node-RED you can spend more time making cool stuff, rather than spending countless hours writing code.
- Don't get me wrong. I love programming and there is code that needs to be written throughout this course, but Node-RED allows you to prototype a complex home automation system quickly.


Home
First
HELLO
Title of Gauge1
55
0
degrees C
100
Stuff
numeric
0
SLIDE ME
Select an Option
slide
55
Fire []
Second
slider1
slider2
slider3
Title of Gauge3
49
degrees C
Numeric dropdown
Select an Option
Pick Me !
#e02817
Third
Title of chart
slide2
slide
slide3
100
50
0
22:35:34
22:35:44
22:35:52
Pie Chart
slide2
slide
slide3
Bar Chart
60
50
40
30
20
slide2
slide
slide3
Horizontal Bar Chart

What can you do with Node-RED?

- Access your RPi GPIOs
- Establish an MQTT, CoAP, HTTP connection with other boards (Arduino, ESP8266, etc)
- Create a responsive graphical user interface for your projects
- Communicate with third-party services (Azure, Ubidots, IFTTT.com, Adafruit.io, Thing Speak, etc)
- Retrieve data from the web (weather forecast, stock prices, emails. etc)
- Create time triggered events
- Store and retrieve data from a database

Installing Node-RED

- Having an SSH connection established with your Raspberry Pi, enter the following commands to install Node-RED:

```
pi@raspberry:~ $ bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)
```

```
pi@raspberrypi:~ $ bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)


This script checks the version of node.js installed is 12 or greater. It will try to
install node 14 if none is found. It can optionally install node 12 LTS or 14 LTS for you.

If necessary it will then remove the old core of Node-RED, before then installing the latest
version. You can also optionally specify the version required.

It also tries to run 'npm rebuild' to refresh any extra nodes you have installed
that may have a native binary component. While this normally works ok, you need
to check that it succeeds for your combination of installed nodes.

To do all this it runs commands as root - please satisfy yourself that this will
not damage your Pi, or otherwise compromise your configuration.
If in doubt please backup your SD card first.

See the optional parameters by re-running this command with --help

Are you really sure you want to do this ? [y/N] ?
```

```
Are you really sure you want to do this ? [y/N] ? y

Would you like to install the Pi-specific nodes ? [y/N] ? y
```

Autostart Node-RED on boot

- To automatically run Node-RED when the Pi boots up, you need to enter the following command:

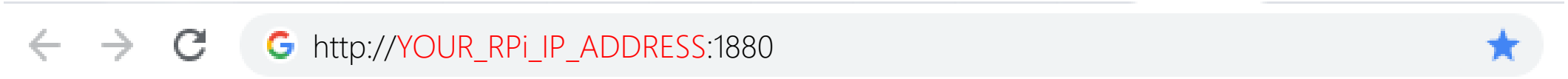
```
pi@raspberry:~ $ sudo systemctl enable nodered.service
```

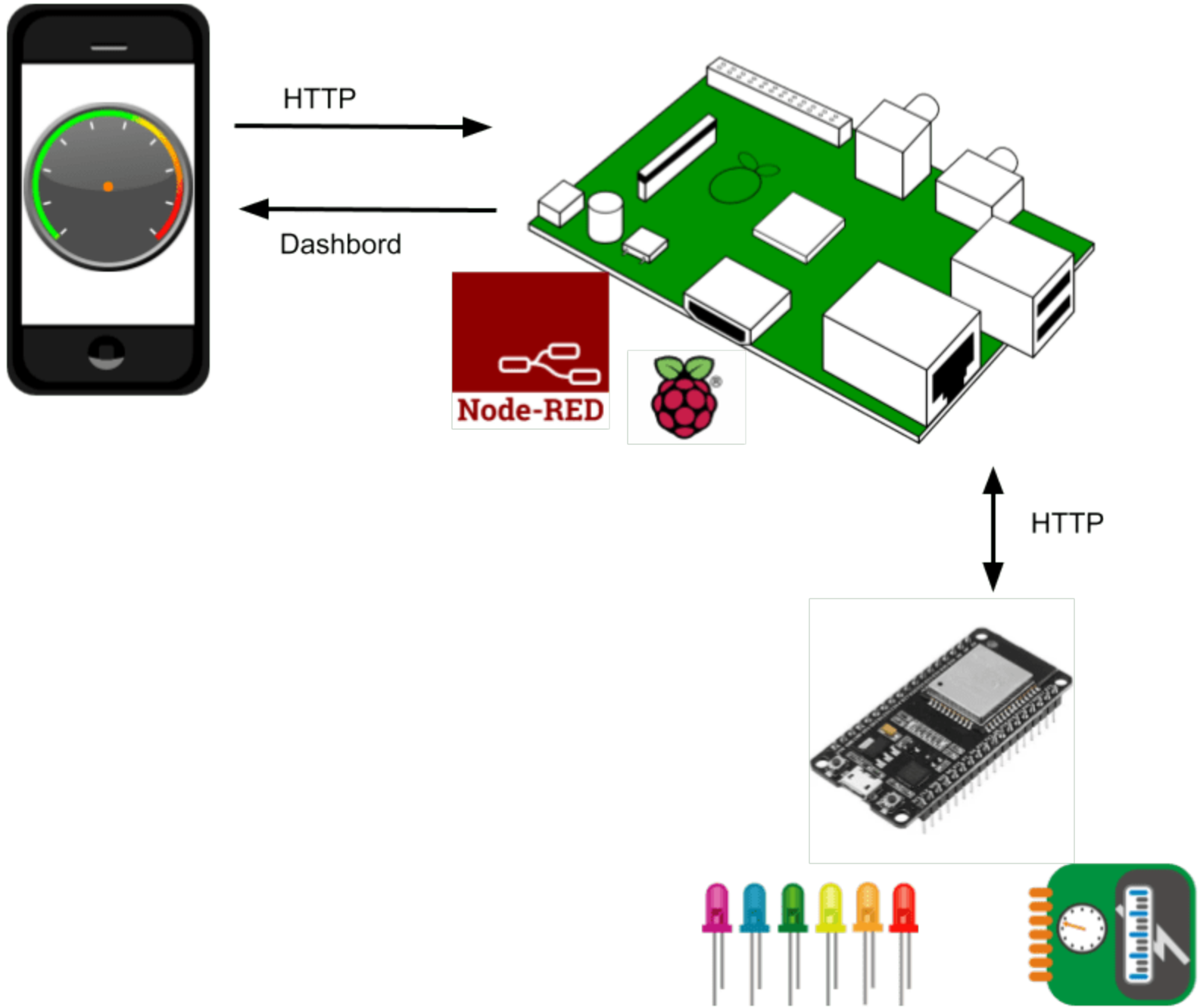
- Now, restart your Pi so the autostart takes effect:

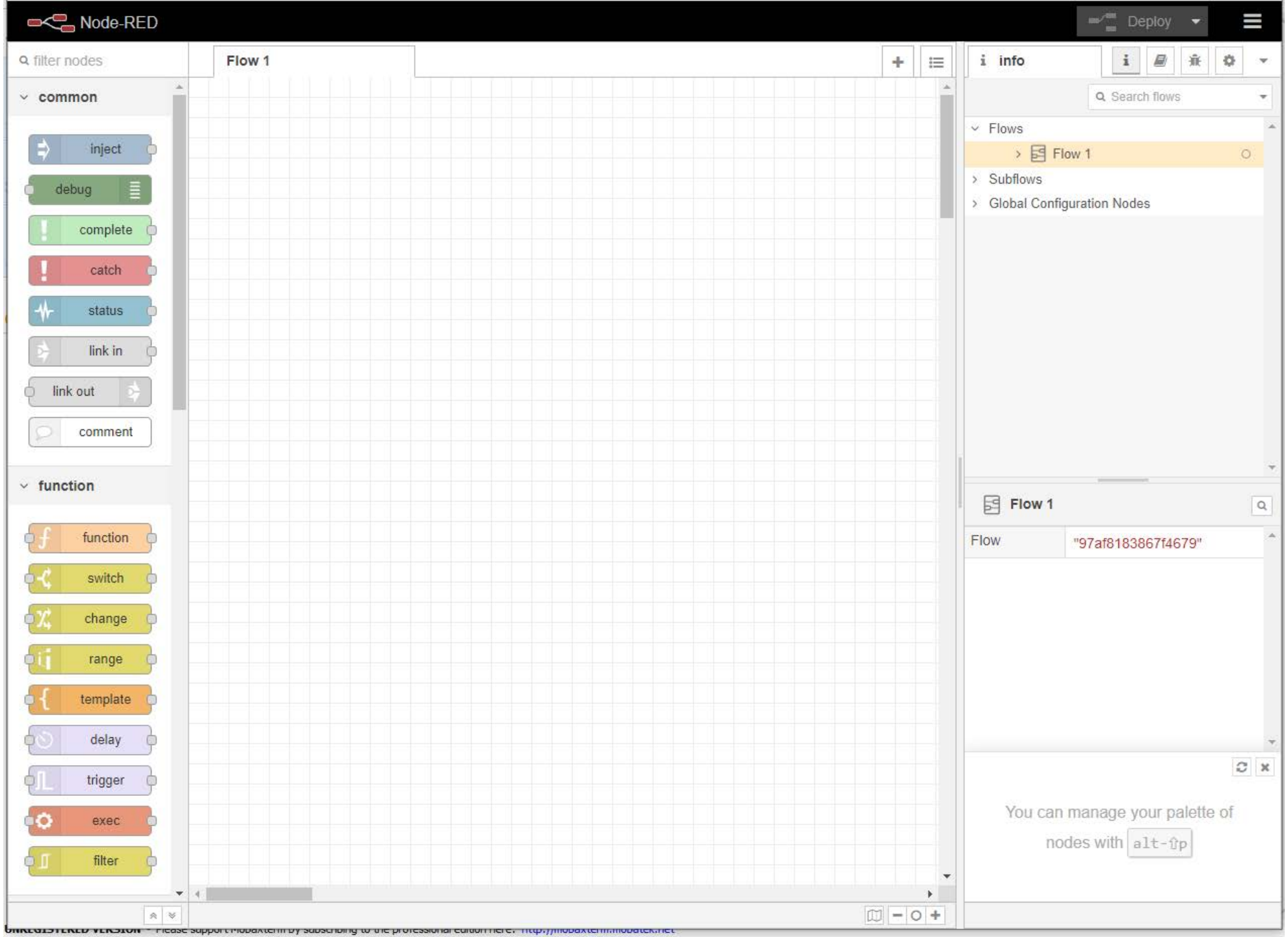
```
pi@raspberry:~ $ sudo reboot
```

Testing the Installation

- When your Pi is back on, you can test the installation by entering the IP address of your Pi in a web browser followed by the 1880 port number:

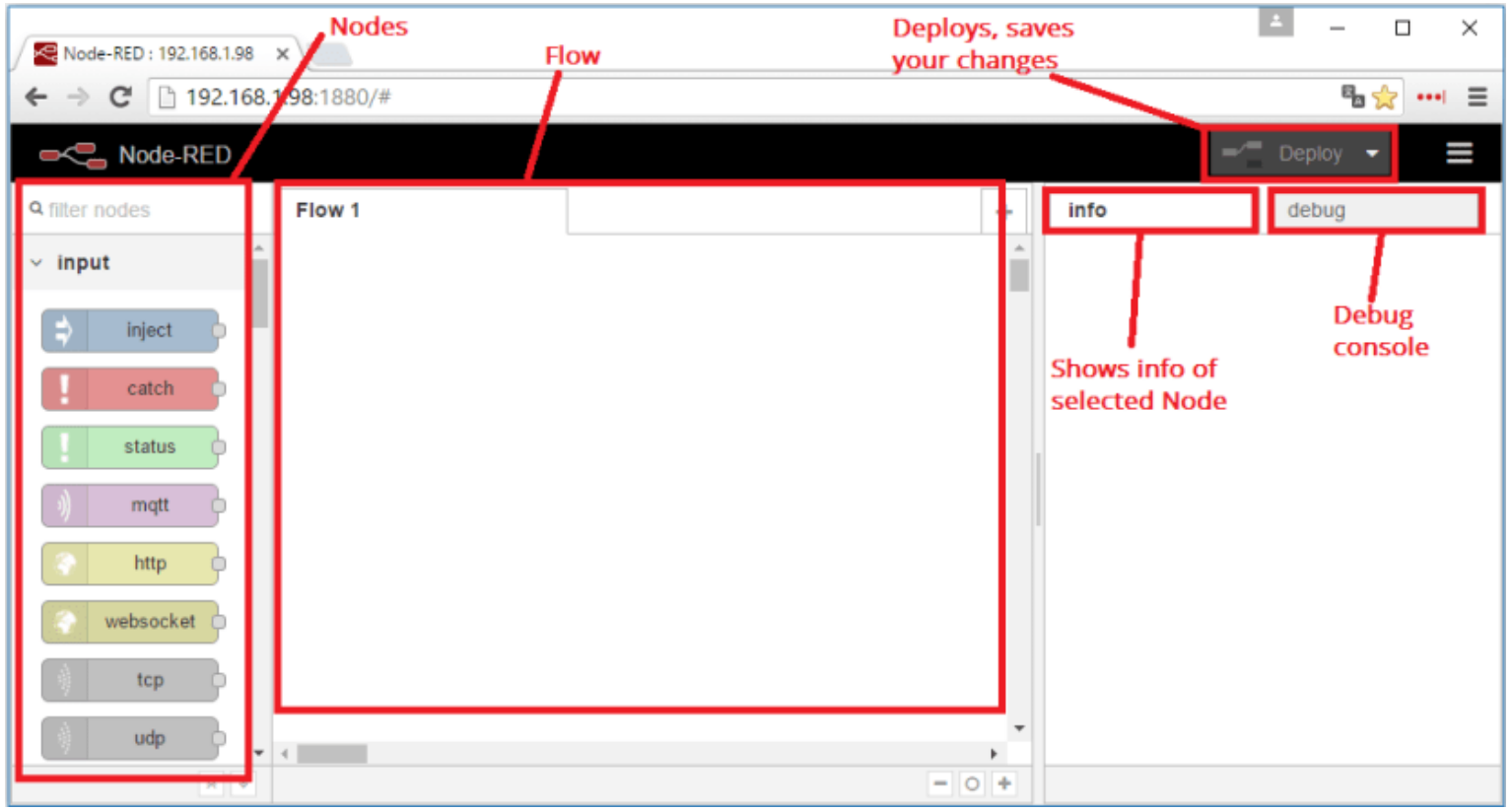



HTTP
Dashbord
Node-RED
HTTP


Node-RED
Deploy
filter nodes
Flow 1
info
Search flows
common
inject
debug
complete
catch
status
link in
link out
comment
Flows
Flow 1
Subflows
Global Configuration Nodes
function
function
switch
change
range
template
delay
trigger
exec
filter
Flow 1
Flow
"97af8183867f4679"
You can manage your palette of nodes with alt-⇧p

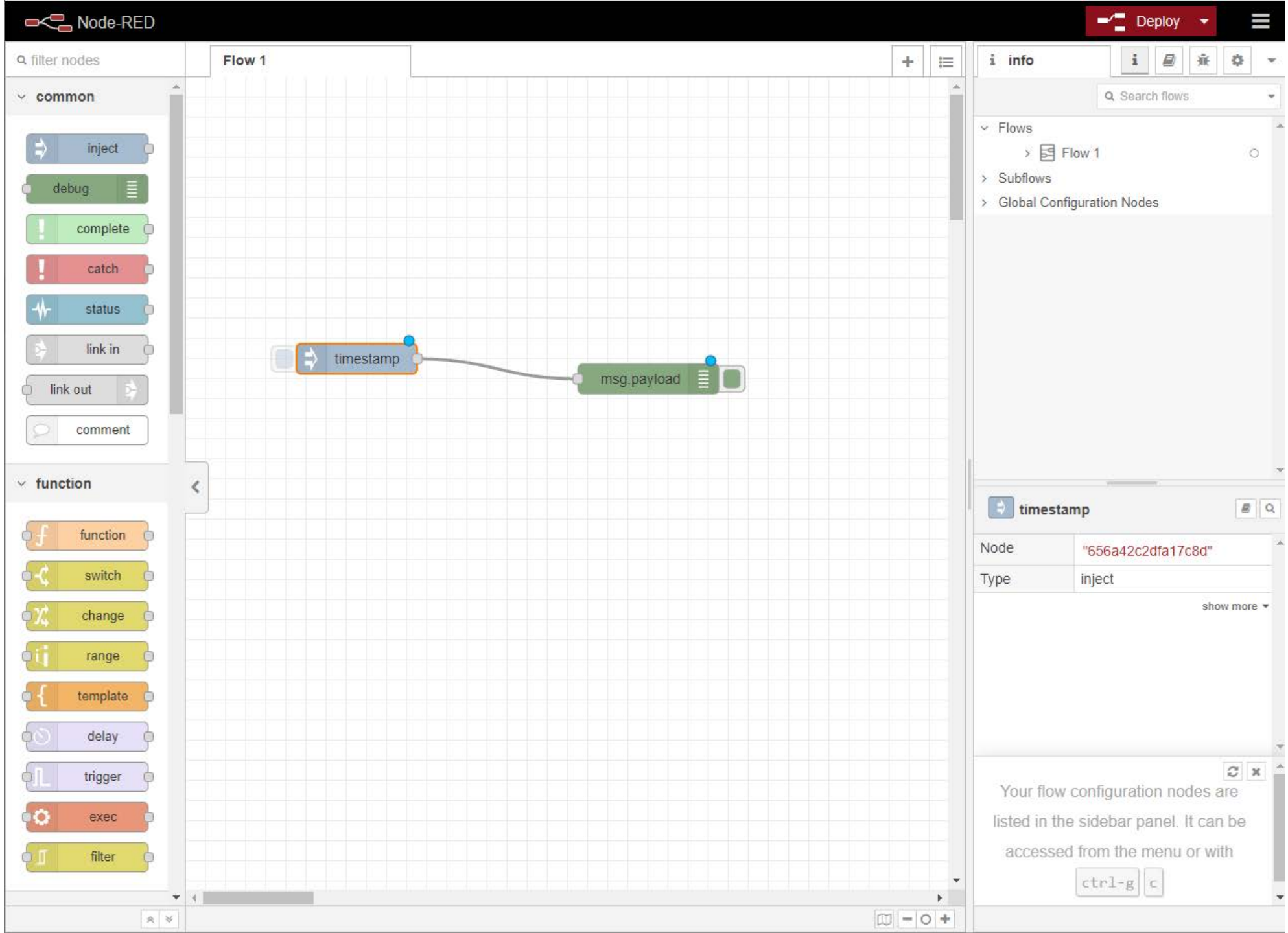
Main sections

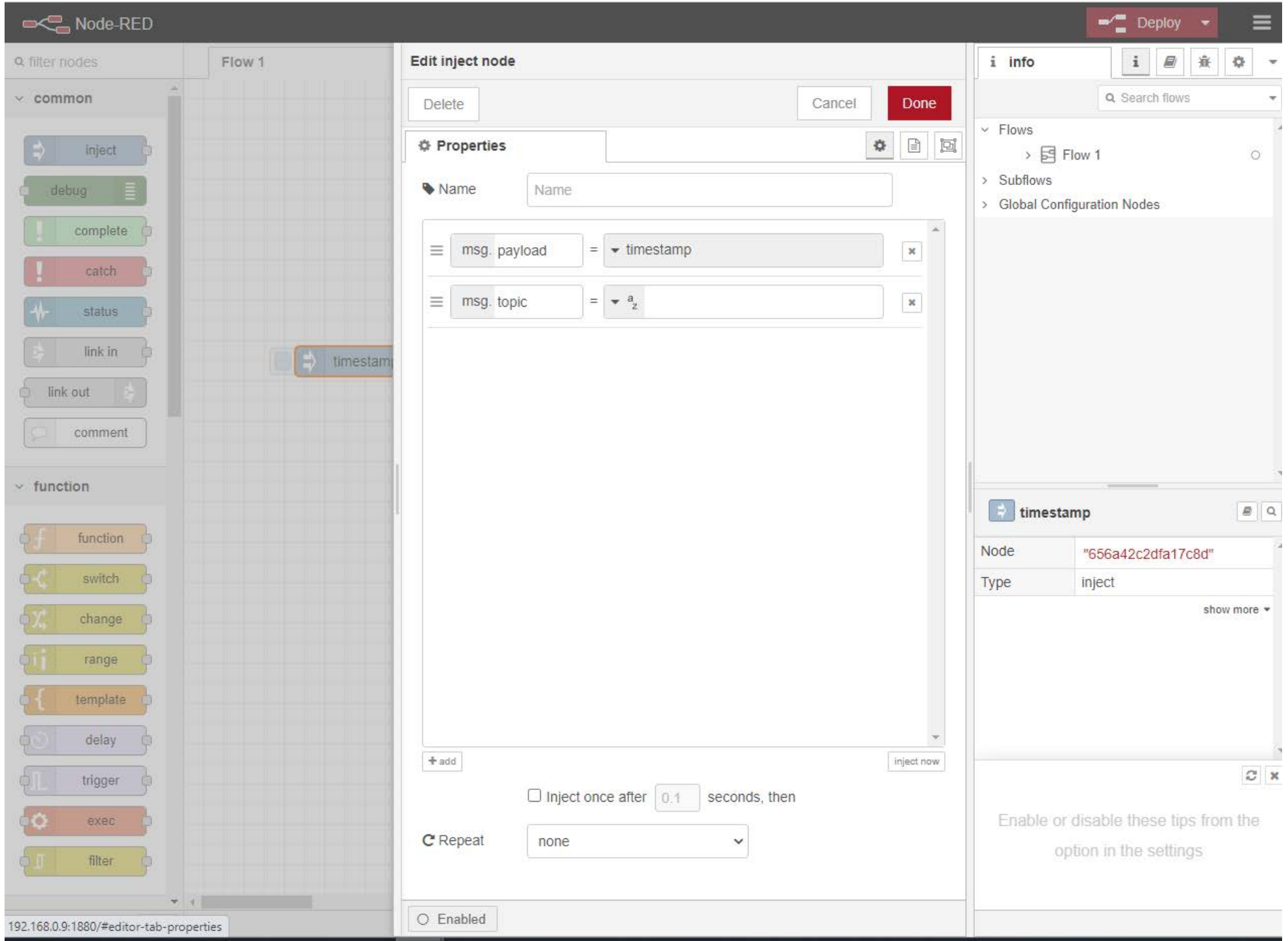
- On the left-side, you can see a list with a bunch of blocks. These blocks are called nodes and they are separated by their functionality. If you select a node, you can see how it works in the info tab.
- In the center, you have the Flow and this is where you place the nodes.



Creating a simple flow

- Let's test a simple example of a flow. Start by dragging an **Inject** node to your flow. Then, also drag a **Debug** node.

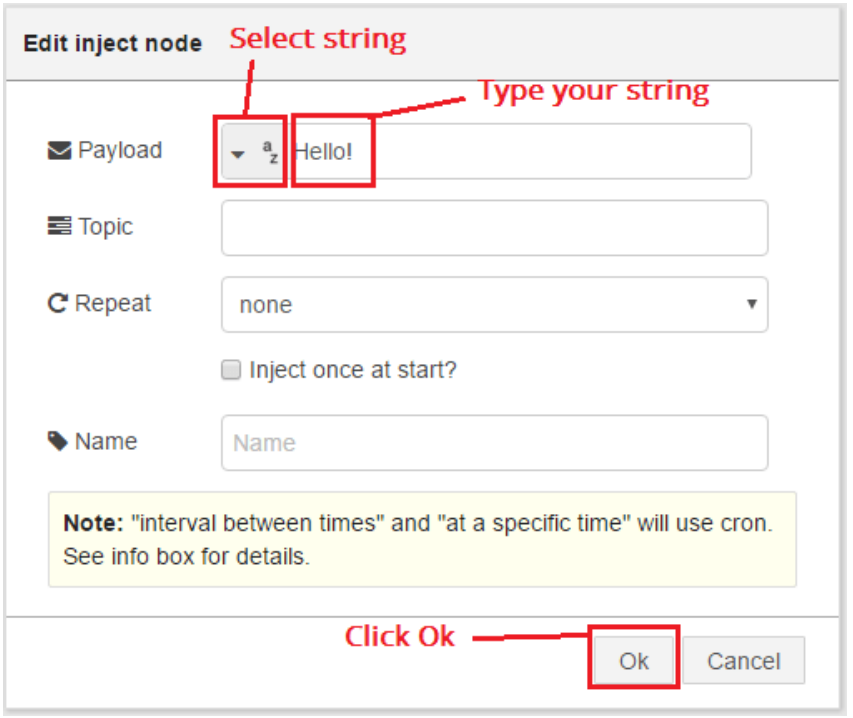

Node-RED
Deploy
filter nodes
Flow 1
common
inject
debug
complete
catch
status
link in
link out
comment
function
function
switch
change
range
template
delay
trigger
exec
filter
timestamp
msg.payload
info
Search flows
Flows
Flow 1
Subflows
Global Configuration Nodes
timestamp
Node
"656a42c2dfa17c8d"
Type
inject
show more
Your flow configuration nodes are listed in the sidebar panel. It can be accessed from the menu or with
ctrl-g
c

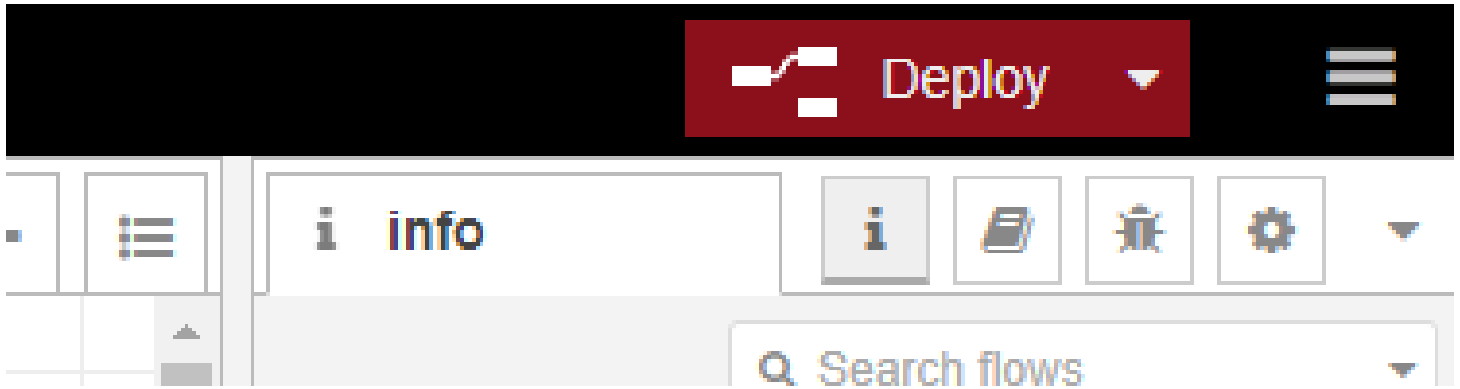

Node-RED
Deploy
filter nodes
Flow 1
common
inject
debug
complete
catch
status
link in
link out
comment
function
function
switch
change
range
template
delay
trigger
exec
filter
timestam
Edit inject node
Delete
Cancel
Done
Properties
Name
Name
msg. payload = timestamp
msg. topic =
+ add
inject now
Inject once after 0.1 seconds, then
Repeat none
Enabled
info
Search flows
Flows
Flow 1
Subflows
Global Configuration Nodes
timestamp
Node "656a42c2dfa17c8d"
Type inject
show more
Enable or disable these tips from the option in the settings
192.168.0.9:1880/#editor-tab-properties

Creating a simple flow

- Now, let's edit the inject node. Double-click the node. In the figure below you can see different settings you can change.

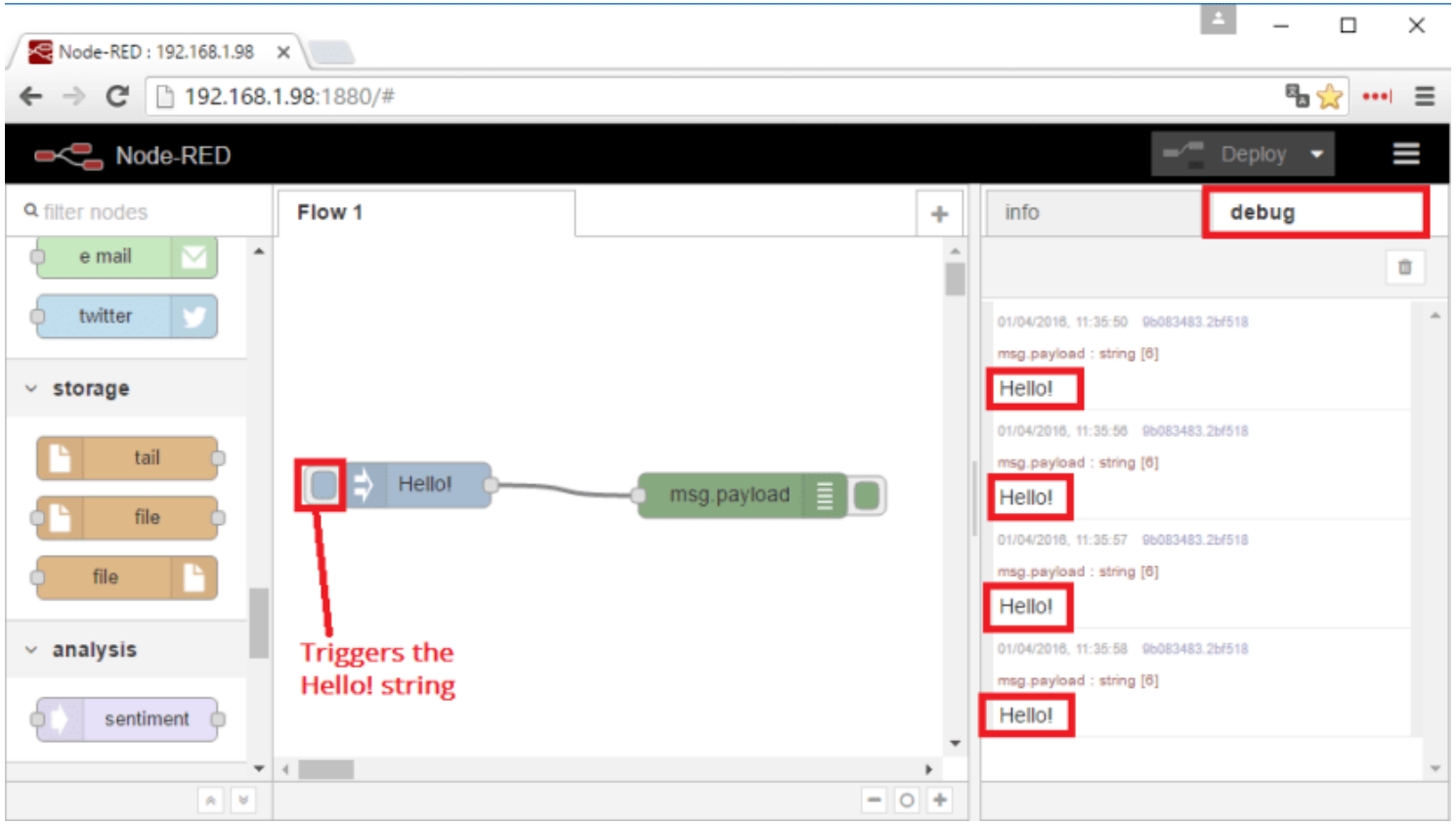
- Select string and type Hello!.

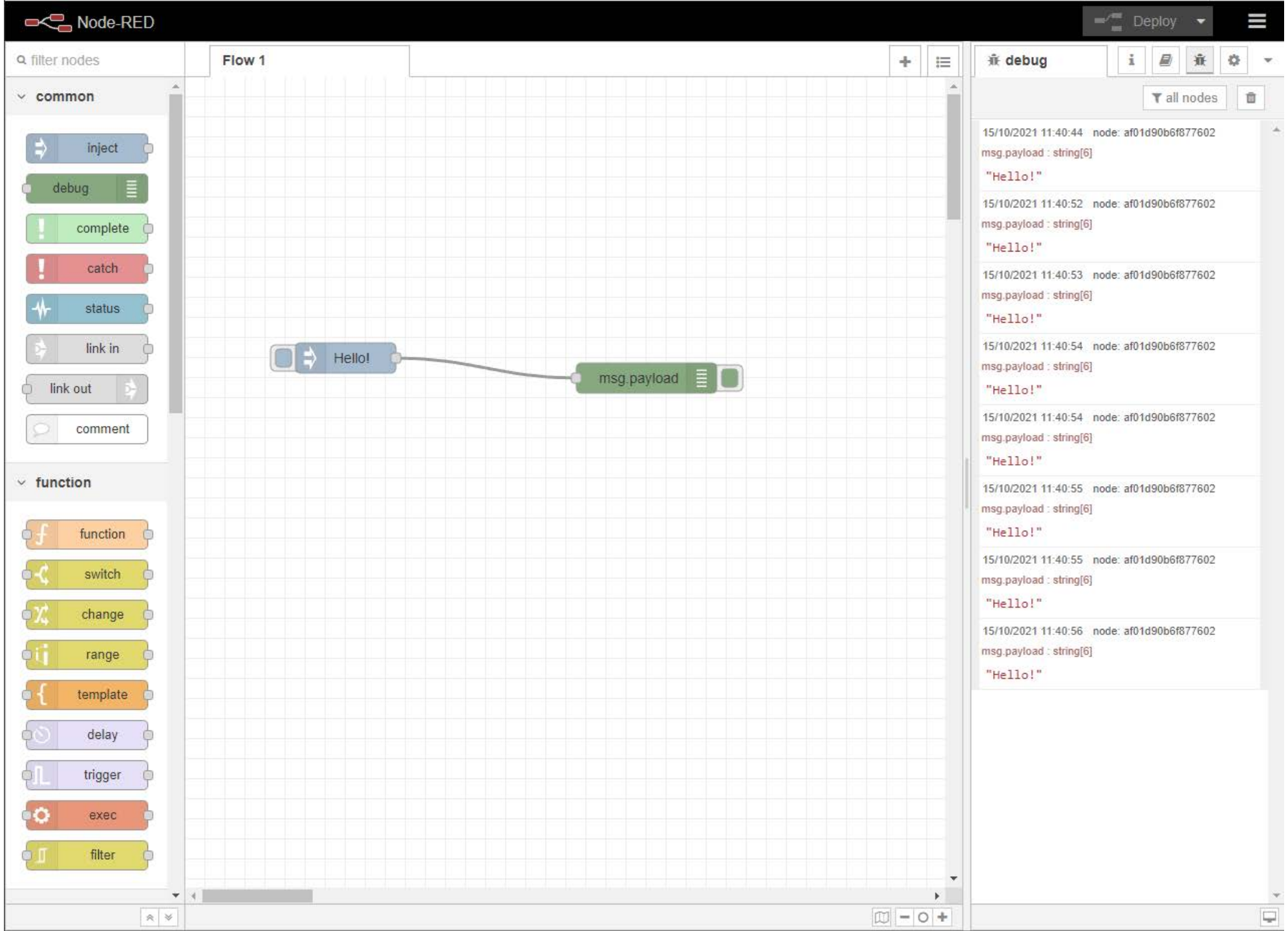



Deploy
info
Search flows

Testing the flow

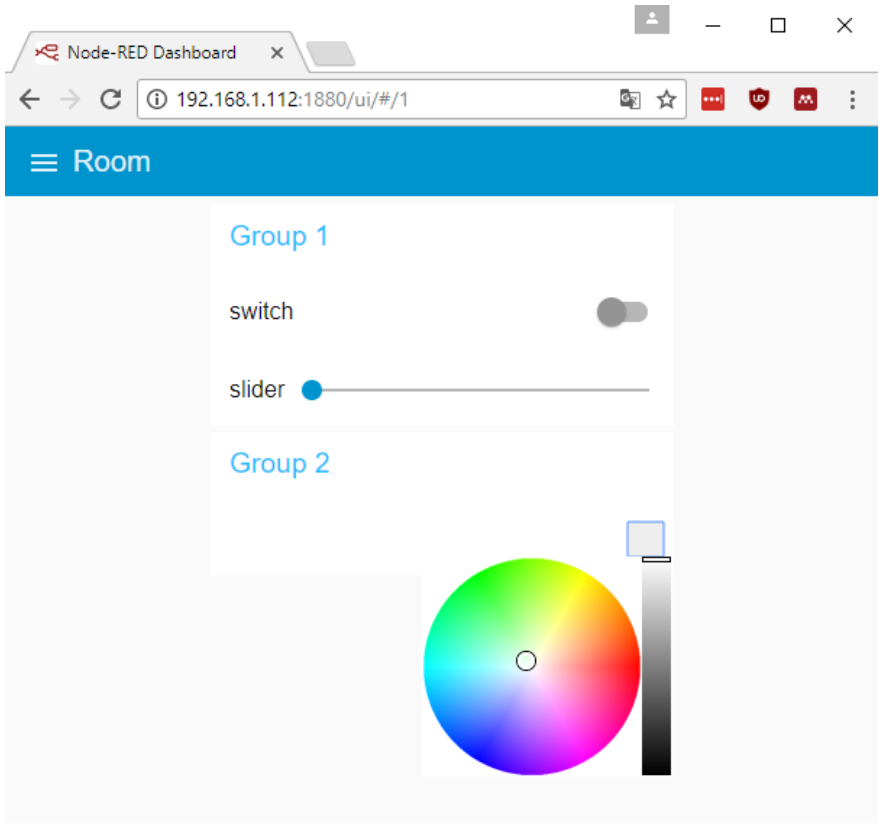
- Let's test our simple flow. Open the debug window and click the Inject node to trigger the "Hello!" string.




Node-RED
Deploy
filter nodes
Flow 1
debug
common
inject
debug
complete
catch
status
link in
link out
comment
function
function
switch
change
range
template
delay
trigger
exec
filter
Hello!
msg.payload
all nodes
15/10/2021 11:40:44 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:52 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:53 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:54 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:54 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:55 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:55 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"
15/10/2021 11:40:56 node: af01d90b6f877602
msg.payload : string[6]
"Hello!"

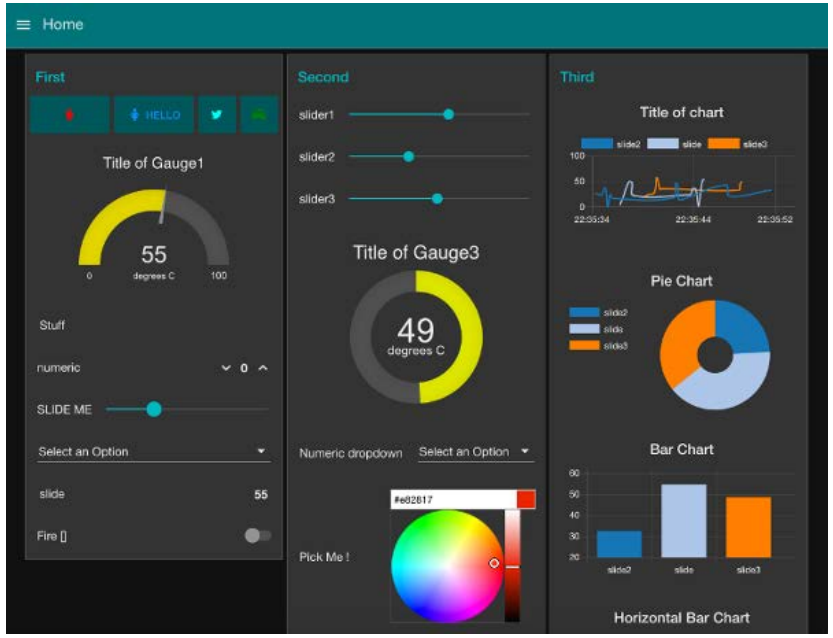
Getting Started with Node-RED Dashboard

- Introduction to Node-RED dashboard with Raspberry Pi.
- How to install Node-RED Dashboard
- How to build a graphical user interface.



What's Node-RED Dashboard?

Node-RED Dashboard is a module that provides a set of nodes in Node-RED to quickly create a live data dashboard.



- Node-RED site: http://flows.nodered.org/node/node-red-dashboard
- GitHub: https://github.com/node-red/node-red-dashboard

Installing Node-RED Dashboard

- To install the Node-RED Dashboard run the following commands:

```
pi@raspberry:~ $ node-red-stop
pi@raspberry:~ $ cd ~/.node-re
pi@raspberry:~/.node-red $ npm install node-red-dashboard
```

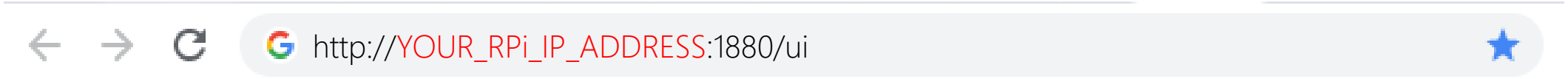
- Then, reboot your Pi to ensure that all changes take effect on Node-RED software:

```
pi@raspberry:~ $ sudo reboot
```

```
pi@raspberrypi:~ $ node-red-stop
Stop Node-RED

Use   node-red-start   to start Node-RED again

pi@raspberrypi:~ $ cd ~/.node-red
pi@raspberrypi:~/.node-red $ npm install node-red-dashboard
npm notice created a lockfile as package-lock.json. You should commit this file.
+ node-red-dashboard@3.0.4
added 56 packages from 101 contributors and audited 56 packages in 8.565s
found 0 vulnerabilities

pi@raspberrypi:~/.node-red $
```

Testing the Installation

- To open the Node-RED UI, type your Raspberry Pi IP address in a web browser followed by :1880/ui as shown below:



Welcome to the Node-RED Dashboard

Please add some UI nodes to your flow and redeploy.

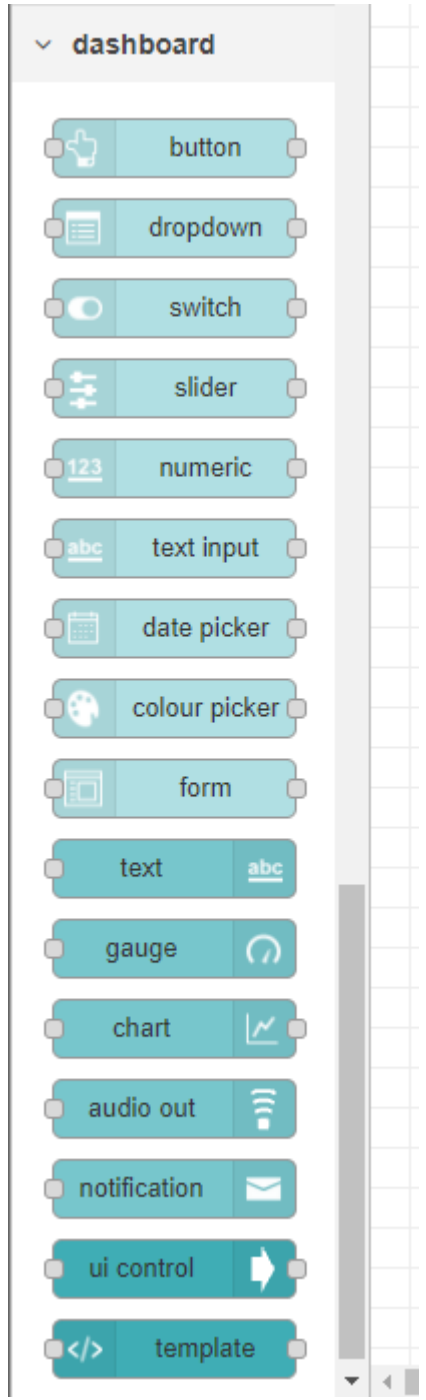
Creating a UI (User Interface)

The Dashboard Layout

- Open another tab in your browser to access Node-RED with:

  `http://Your_RPi_IP_address:1880`

- Scroll down on the nodes section. You'll see you have a set of nodes called dashboard as shown in the following figure:



Creating a UI (User Interface)

The Dashboard Layout

- Nodes from the dashboard section provide widgets that show up in your application user interface (UI).

- The user interface is organized in **tabs** and **groups**.
  - Tabs are different pages on your user interface, like several tabs in a browser.
  - Inside each tab you have groups that divide the tabs in different sections so that you can organize your widgets.
- Every widget should have an associated **group** that determines where the widget should appear on the user interface.

Creating a UI (User Interface)

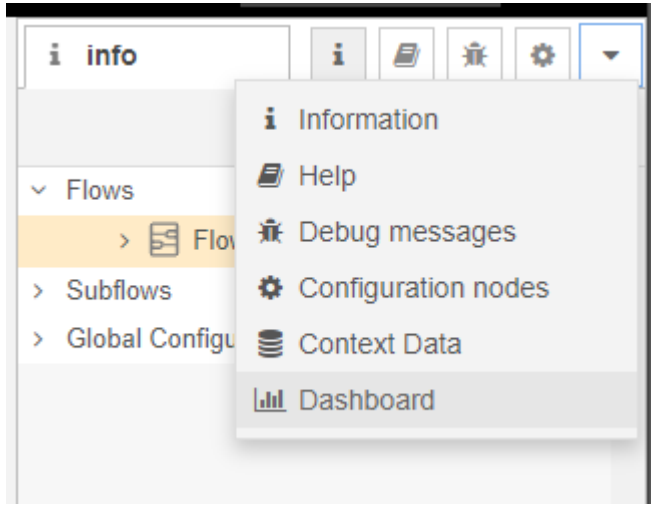
The Dashboard Layout

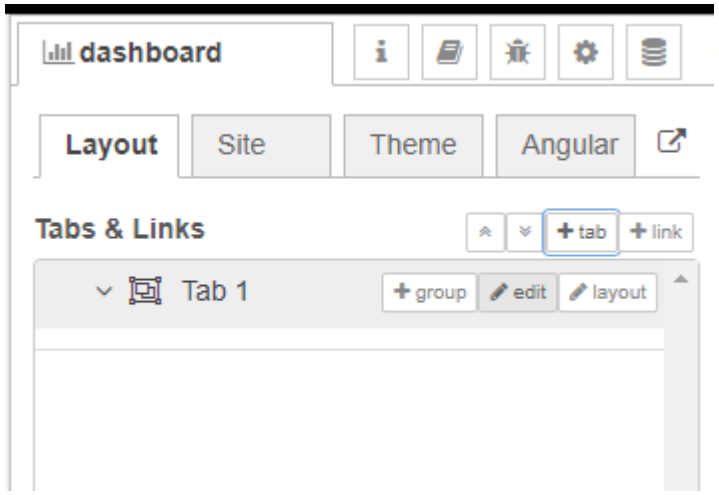
To create a tab and a group follow the following instructions:

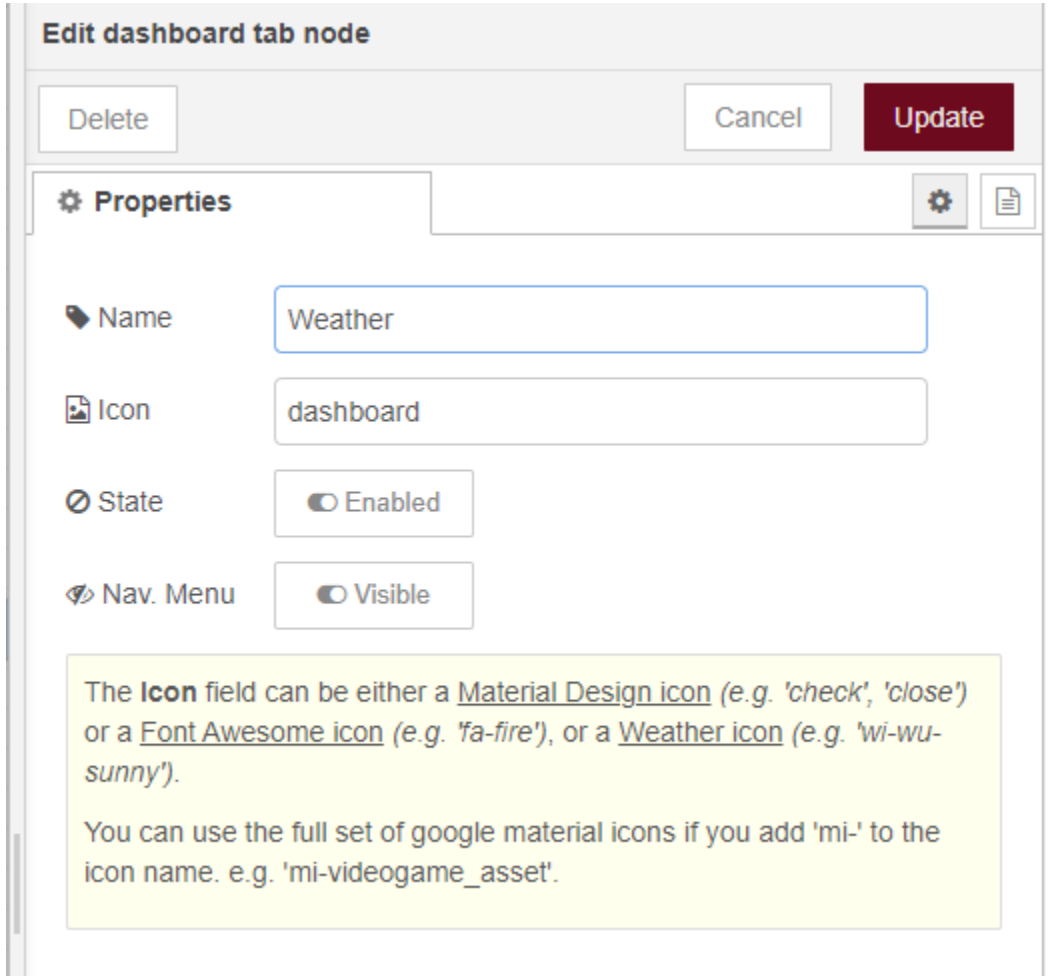
- On top right corner of the Node-RED window you have a tab called **dashboard**.
- Select that tab. To add a tab to the user interface, click on the **+tab** button
- Once created, you can edit the tab by clicking on the **edit** button

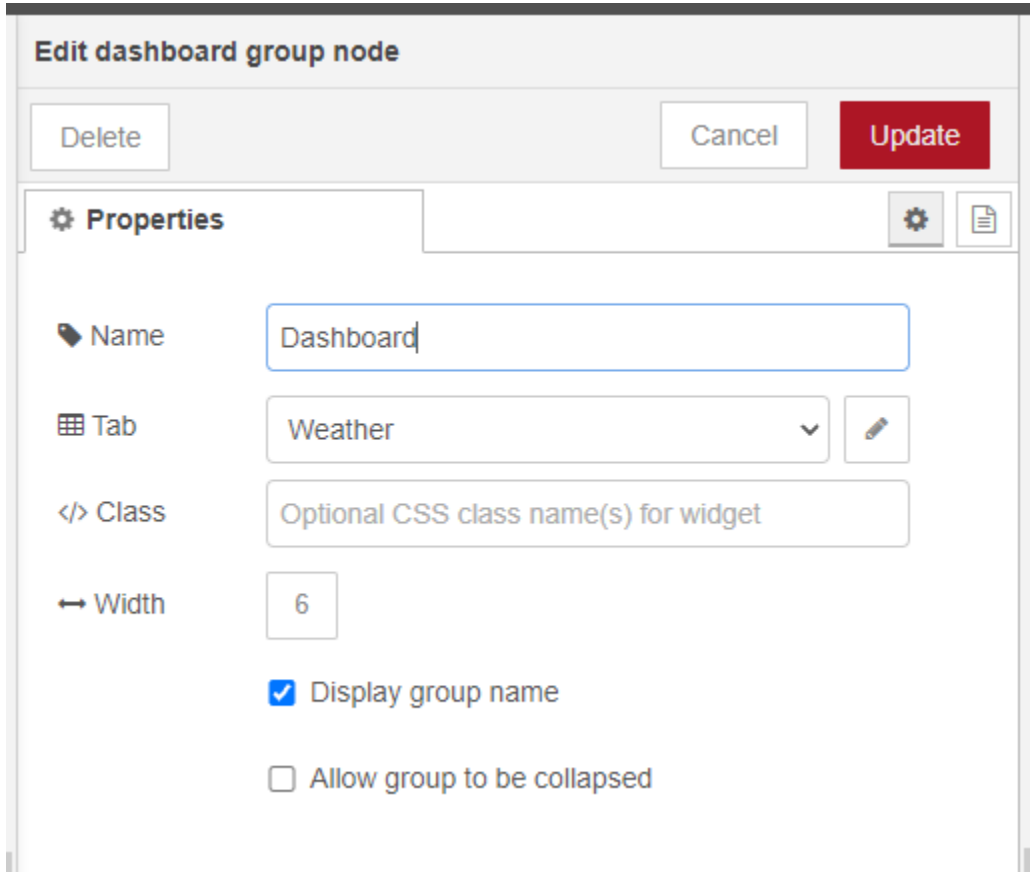
You can edit the tab's name and change its icon:

- Name: you can call it whatever you want
- Icon: you should use a name accordingly to the icon's names in this link: https://klarsys.github.io/angular-material-icons


info
Information
Help
Debug messages
Configuration nodes
Context Data
Dashboard
Flows
Subflows
Global Configu


dashboard
Layout
Site
Theme
Angular
Tabs & Links
tab
link
Tab 1
group
edit
layout


Edit dashboard tab node
Delete
Cancel
Update
Properties
Name
Weather
Icon
dashboard
State
Enabled
Nav. Menu
Visible
The Icon field can be either a Material Design icon (e.g. 'check', 'close') or a Font Awesome icon (e.g. 'fa-fire'), or a Weather icon (e.g. 'wi-wu-sunny').
You can use the full set of google material icons if you add 'mi-' to the icon name. e.g. 'mi-videogame_asset'.


Edit dashboard group node
Delete
Cancel
Update
Properties
Name
Dashboard
Tab
Weather
Class
Optional CSS class name(s) for widget
Width
6
Display group name
Allow group to be collapsed