ECAM
BRUSSELS ENGINEERING SCHOOL

IT301μ From IoT Devices to the Cloud
with the IBM Node-RED Tool

Session 2

Simple API Server and Interactive Dashboard

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Objectives

- Discover how to develop a simple API server with Node-RED

  And how to use the Postman tool to test the API server

- Learn how to create visual dashboard with Node-RED
  - Install and use the `node-red-dashboard` module
  - Discover and use output widgets to display data
  - Discover and use input widgets to interact with the user

API Server

Web Server API

- Application programming interface (API) to develop software
  - Clearly defined set of methods to interface with a system
  - APIs can be used to build application using them
- Several kinds of APIs exist depending on the accessed system

  Web server, operating system, software library, etc.
- Web server APIs used to interface with a web server

  Endpoints to request-response message system for web server API

GET Route

- Endpoints used to specify where resources lie on the server

  Accessed via a URI on which HTTP requests are posted

- Different existing HTTP request methods can be used

  `GET`, `HEAD`, `POST`, `PUT`, `DELETE`, etc.

- `GET` route used to access a resource on a web server

  Resource representation can be in plain text, XML, JSON, etc.

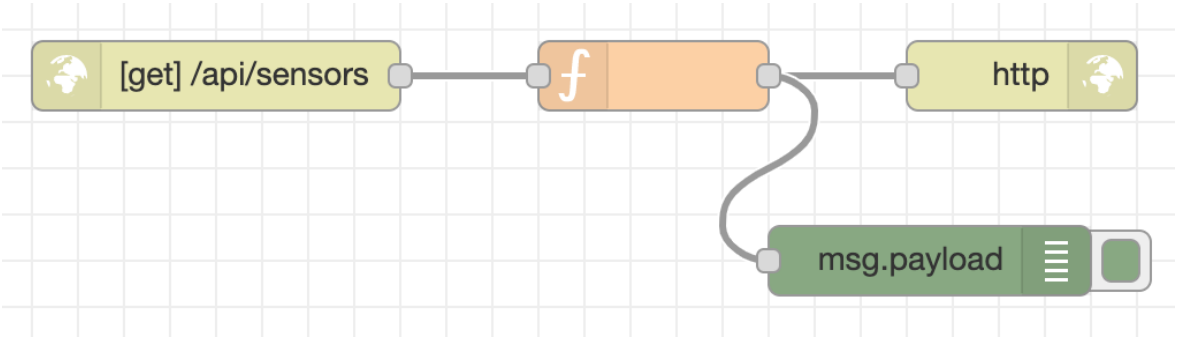
Sensor List

- HTTP endpoint to retrieve the list of all sensors of the system

  Can be accessed through the `/api/sensors` route

- Represented as a JSON object, whose `sensors` key is an array

  Each sensor is described by a unique identifier and a value




```
▾ object
  ▾ sensors: array[2]
    ▾ 0: object
        id: "temp1"
        value: 17.3
    ▾ 1: object
        id: "hum1"
        value: 45
```

function Node

- Insert JavaScript code that can modify a message

  The function just needs to return a new value

Name

Function

```
var response = {
    res: msg.res,
    headers: {
        'Content-Type': 'application/json'
    },
    payload: {'sensors': [
        {'id': 'temp1', 'value': 17.3},
        {'id': 'hum1', 'value': 45}
    ]}
};
return response;
```

Outputs 1

cURL Tool

- The cURL tool transfers data with URLs

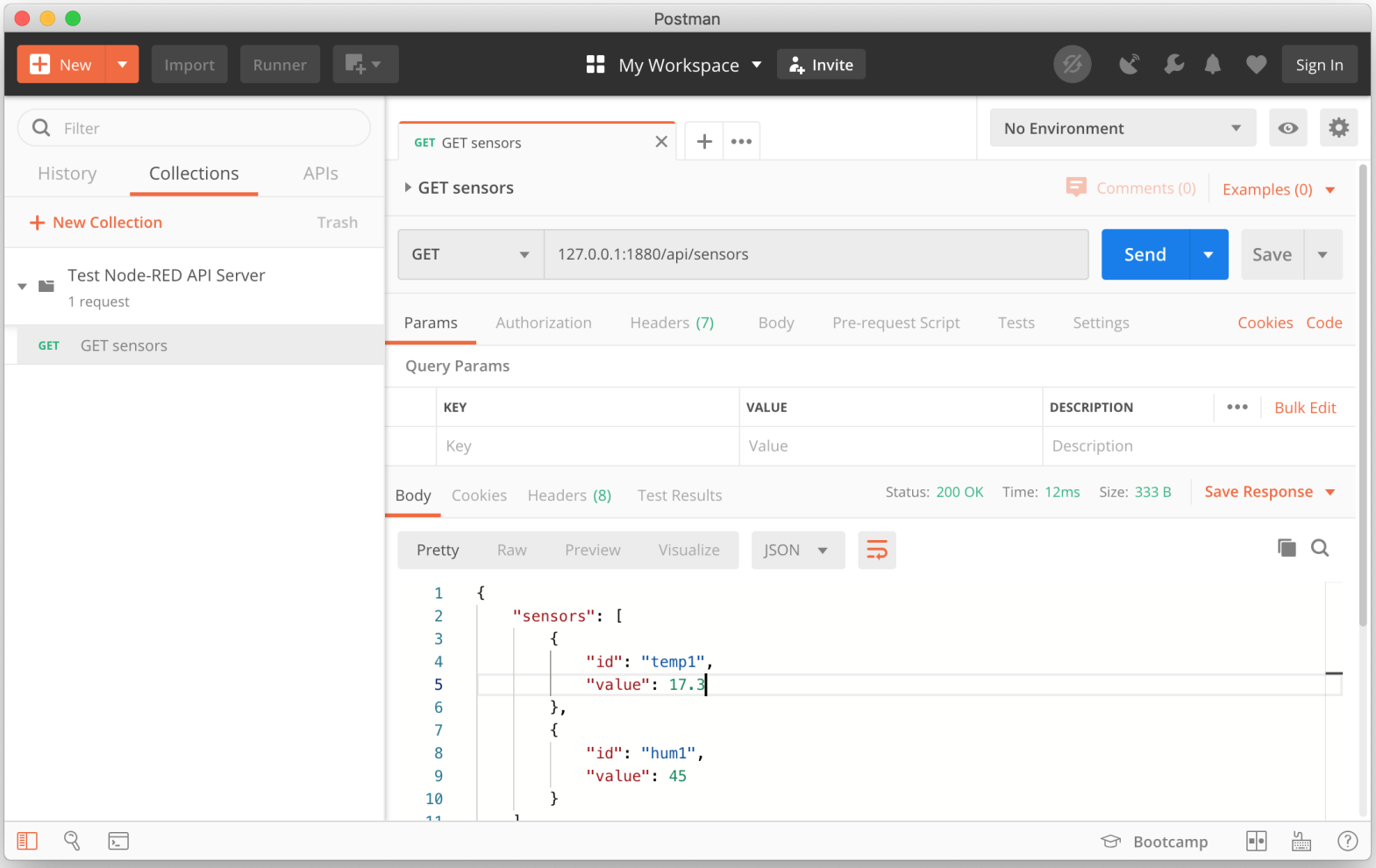
  Can be used to call a web API and print the result

test-go — -bash — 89×24

```
MBP4:test-go combefis$ curl -i http://127.0.0.1:1880/api/sensors
HTTP/1.1 200 OK
X-Powered-By: Express
Access-Control-Allow-Origin: *
Content-Type: application/json; charset=utf-8
Content-Length: 66
ETag: W/"42-mOLdLxQl7GlinkX/Xzc4MSdioLI"
Vary: Accept-Encoding
Date: Tue, 25 Feb 2020 20:25:43 GMT
Connection: keep-alive

{"sensors":[{"id":"temp1","value":17.3},{"id":"hum1","value":45}]}MBP4:test-go combefis$
```

Postman Tool



Dashboard


12:09
NP
N
93 %
AdBlue
10.6
10.6
[bar]
17°C
1651.1 km
1/min x 100
l/100 km
km/h
bar

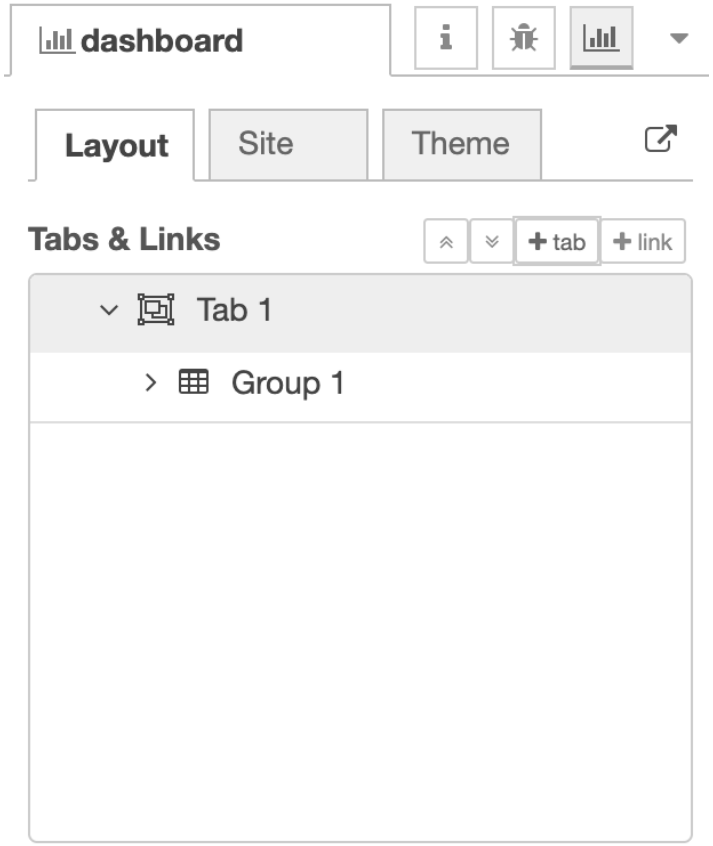
`node-red-dashboard` Module

- Displaying dashboard with `node-red-dashboard` module
  - Display data graphically inside widgets
  - Forms allowing users to enter values
- Widgets are organised following the layout of the interface
  - Widgets are placed and organised in a grid
  - Possible to define personalised widgets with Angular.js

Layout

- Configuration of the interface layout

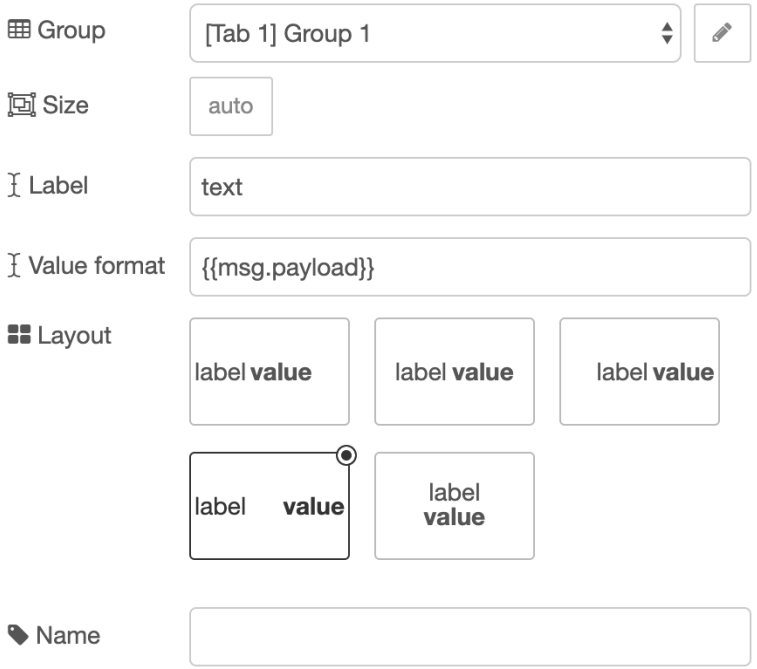
  Defining several tabs with groups to organise widgets

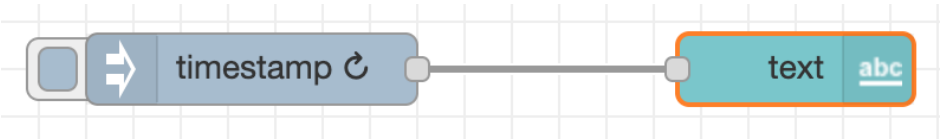


Widget

- Adding a `text` widget to display a value

  Must be added to a group of a tab

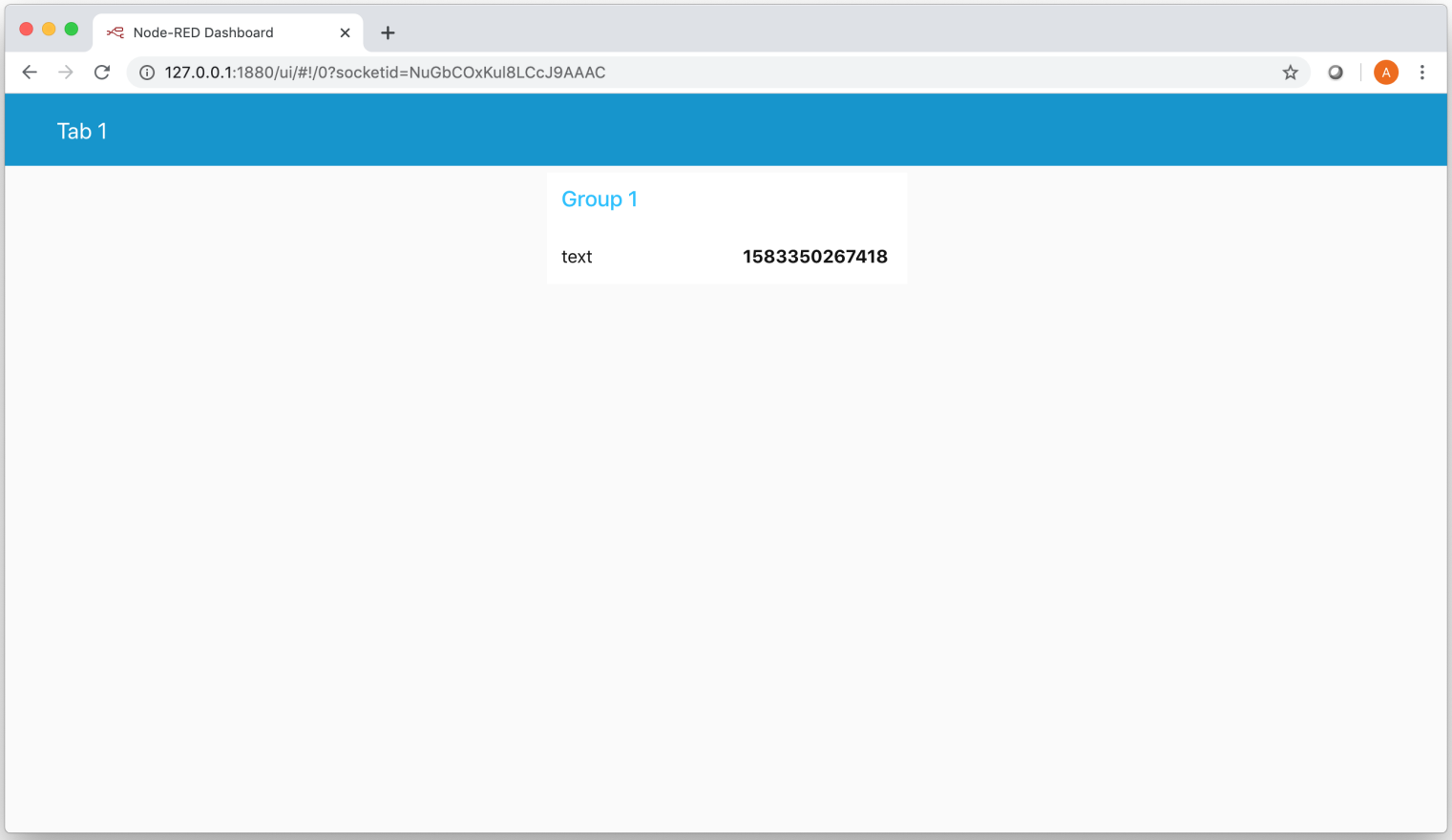




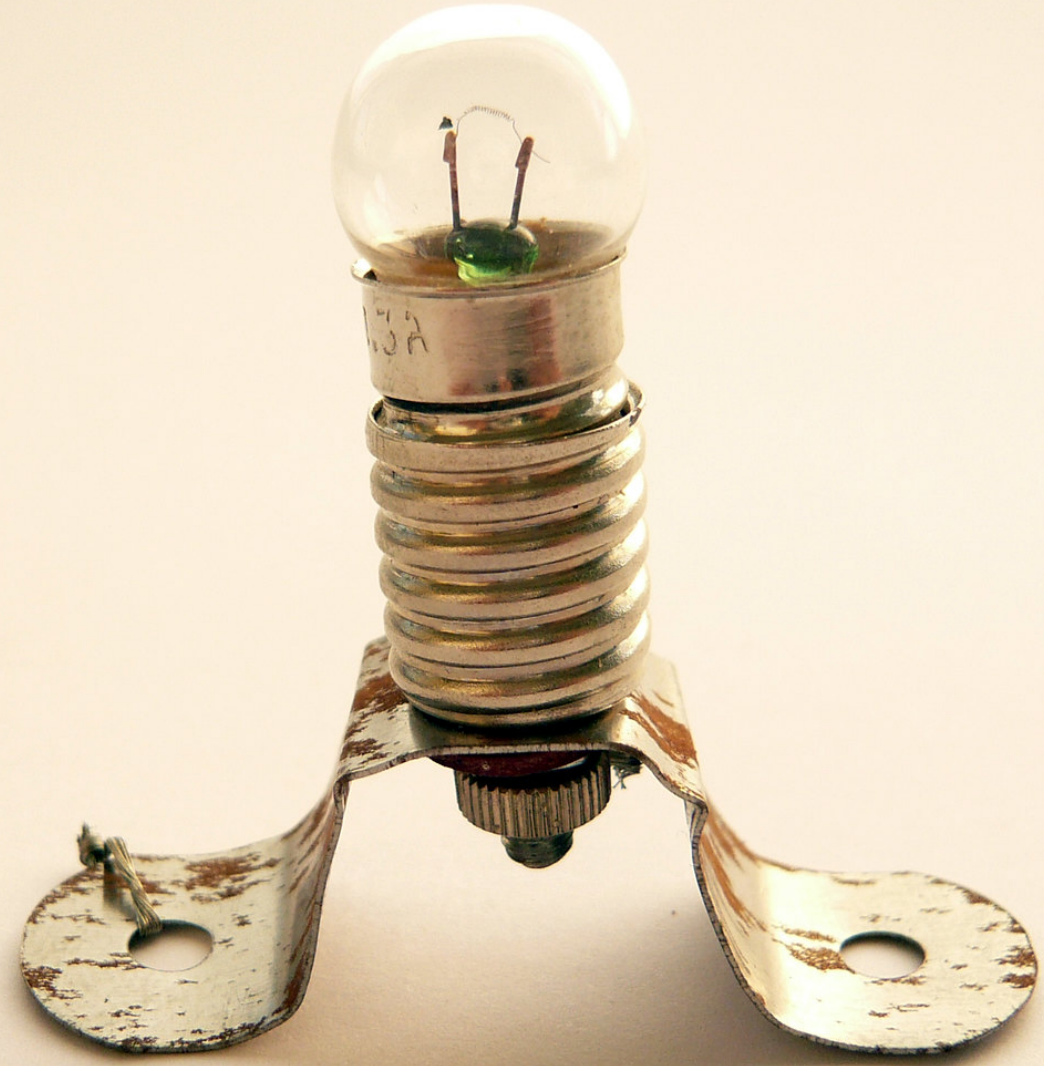
Dashboard (1)

- The dashboard is available on the `/ui` route

  On the same URL and port as the platform



Output Widget



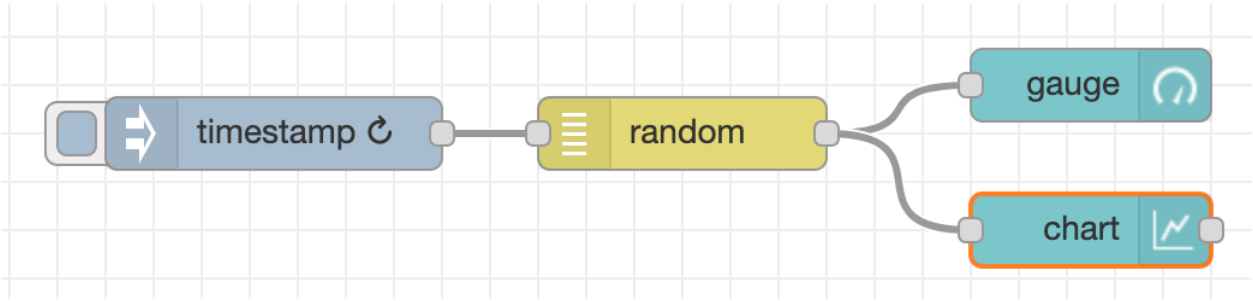
Output Widget

- An output widget is used to display some data

  Can be used with data from different types: number, array, etc.

- Five types of output widgets can be used in a dashboard

  text, gauge, chart, audio out, notification



gauge Widget

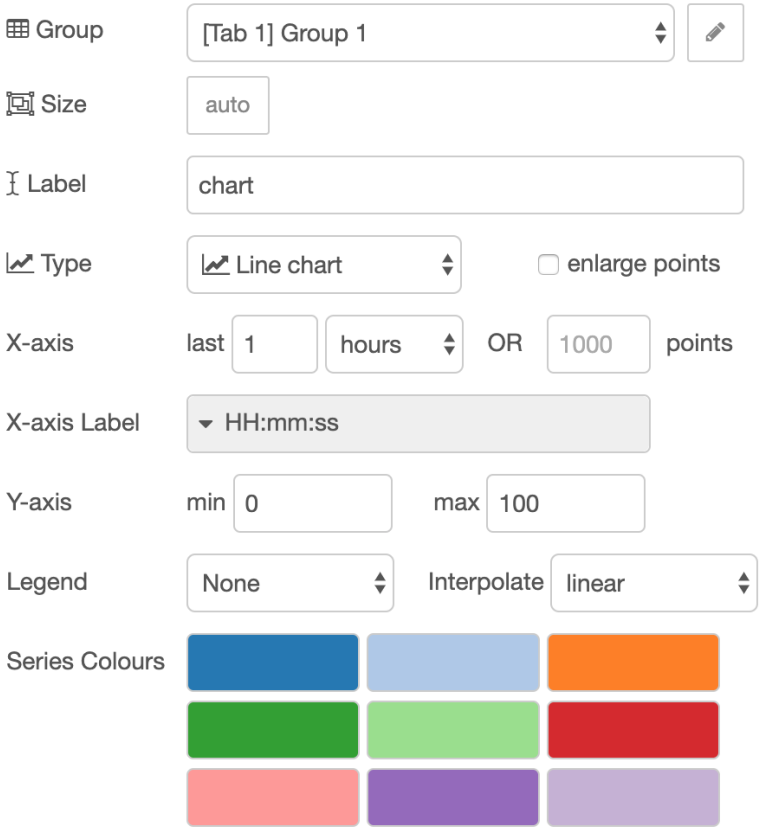
- Displaying a single number in a half-donut gauge

  Can be configured with colour ranges depending on the value

chart Widget

- Displaying a sequence of numbers on a chart

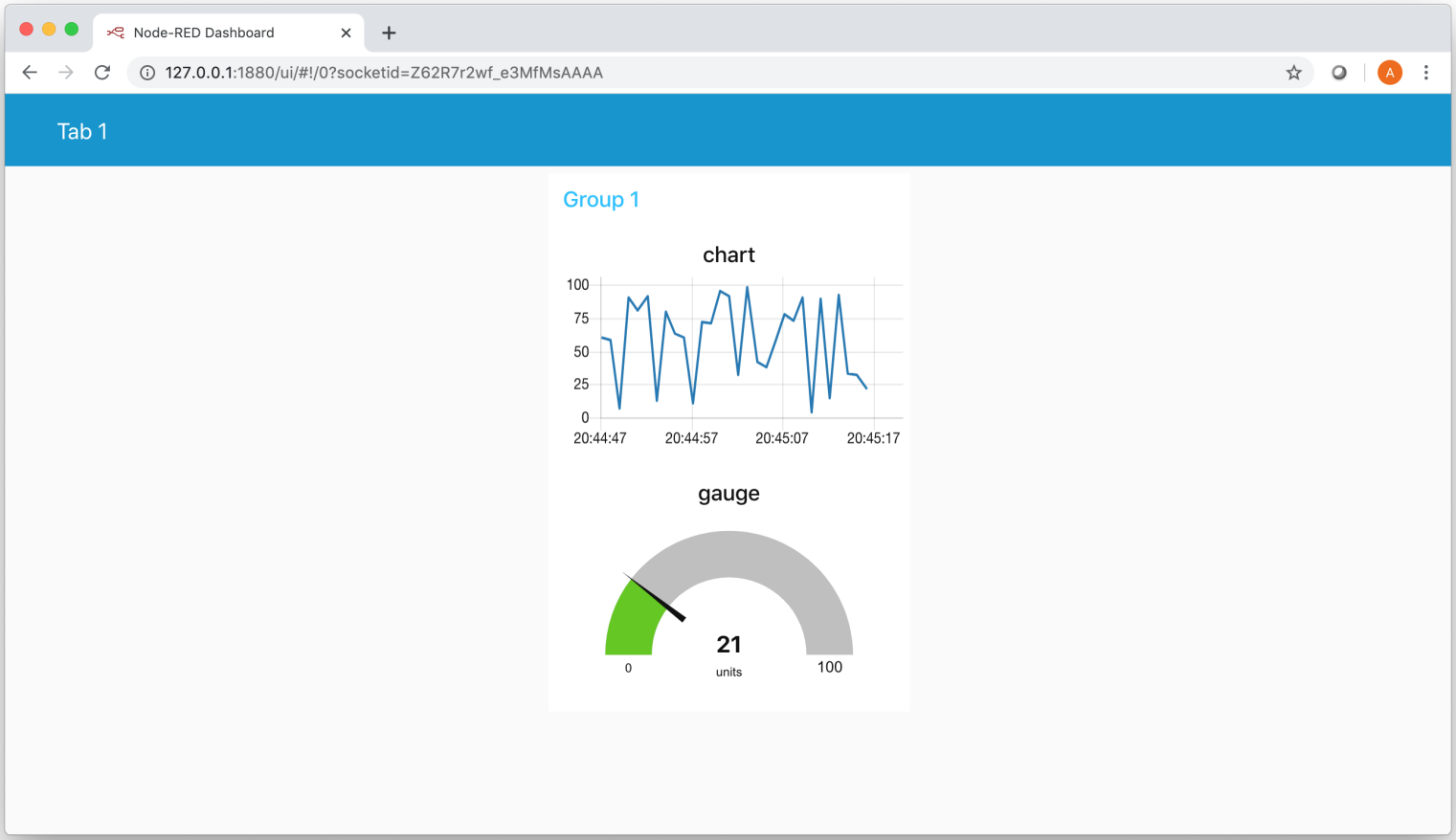
  Different kinds of configurable charts are available



Dashboard (2)

- Integer number between 0 and 100 generated every second

  Displayed at the same time on the graph and on the gauge



Input Widget

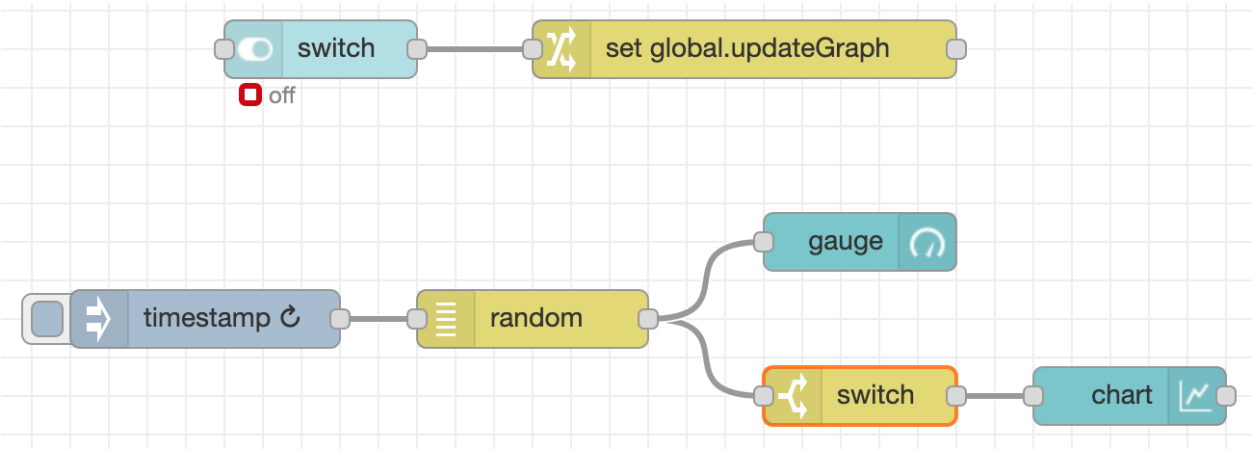
Input Widget

- An input widget is used to collect data from the user

  Can retrieve several types of data: number, boolean, colour, etc.

- Eight types of input widgets can be used in a dashboard

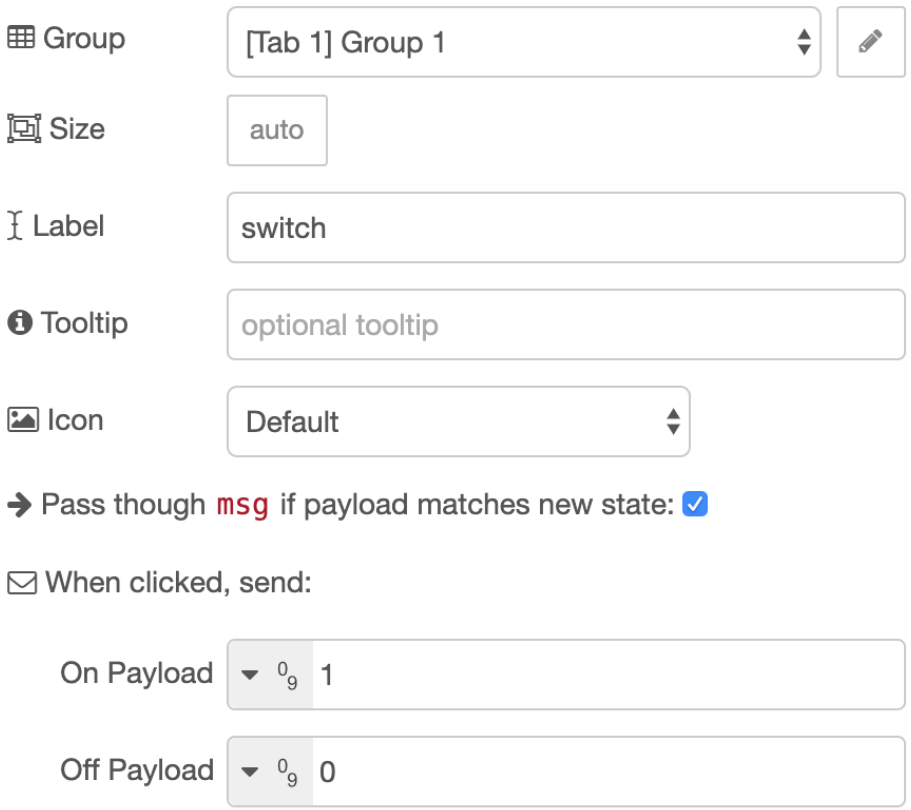
  button, dropdown, switch, slider, numeric, text input, date picker, colour picker



switch Widget

- Switch that can be toggled by the user as a on/off button

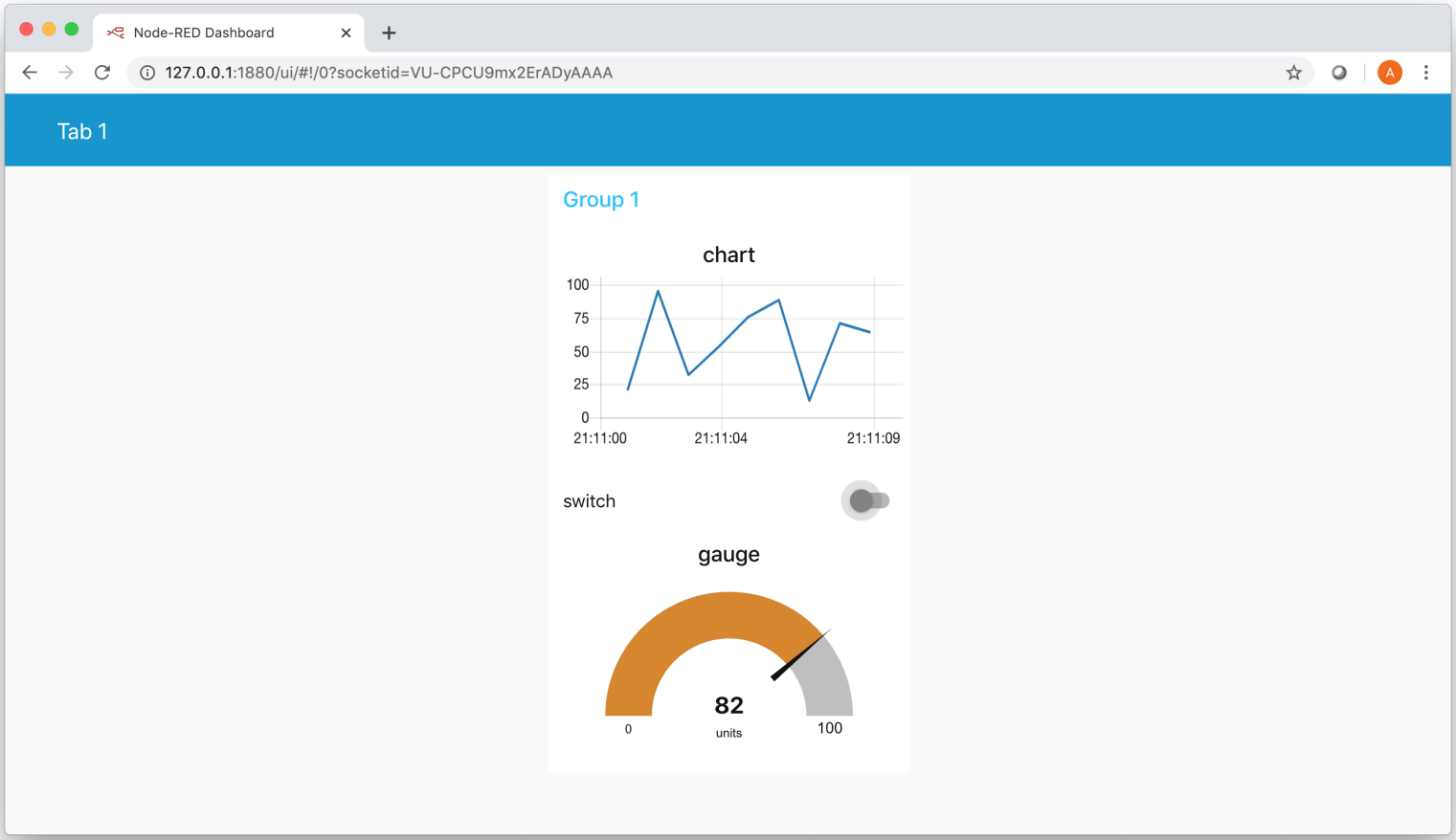
  Configured to generate a message in the flow



Dashboard (3)

- Switch used to prevent data to flow to the chart

  Using a global variable set by the switch and a `switch` *node*



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Credits

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