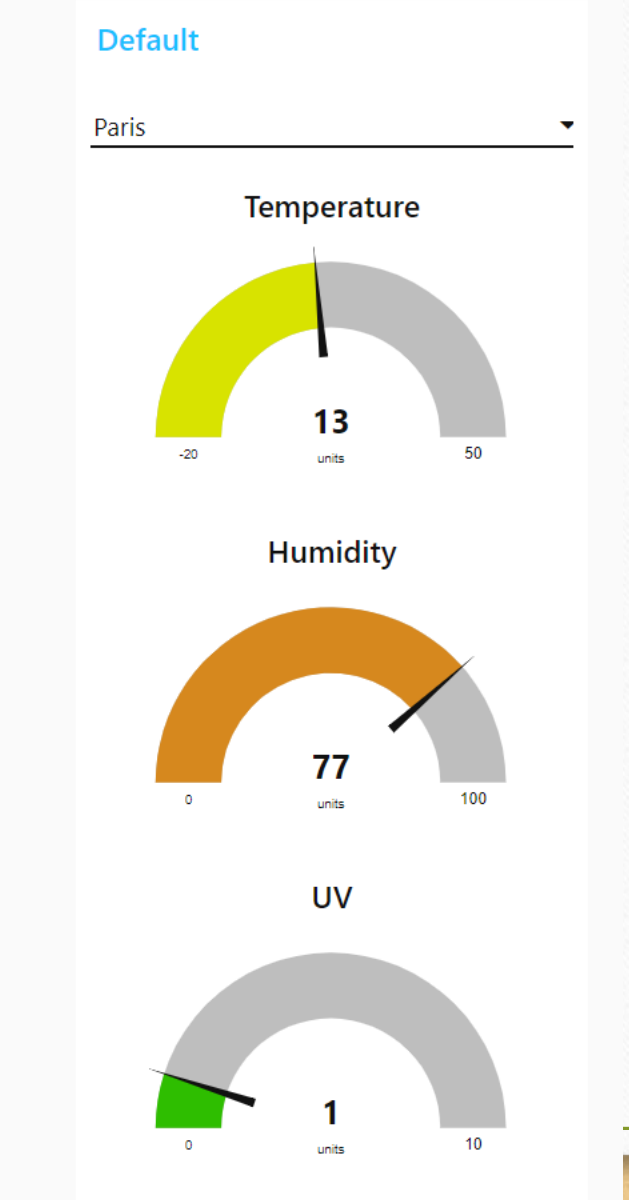
物聯網實務

(九)

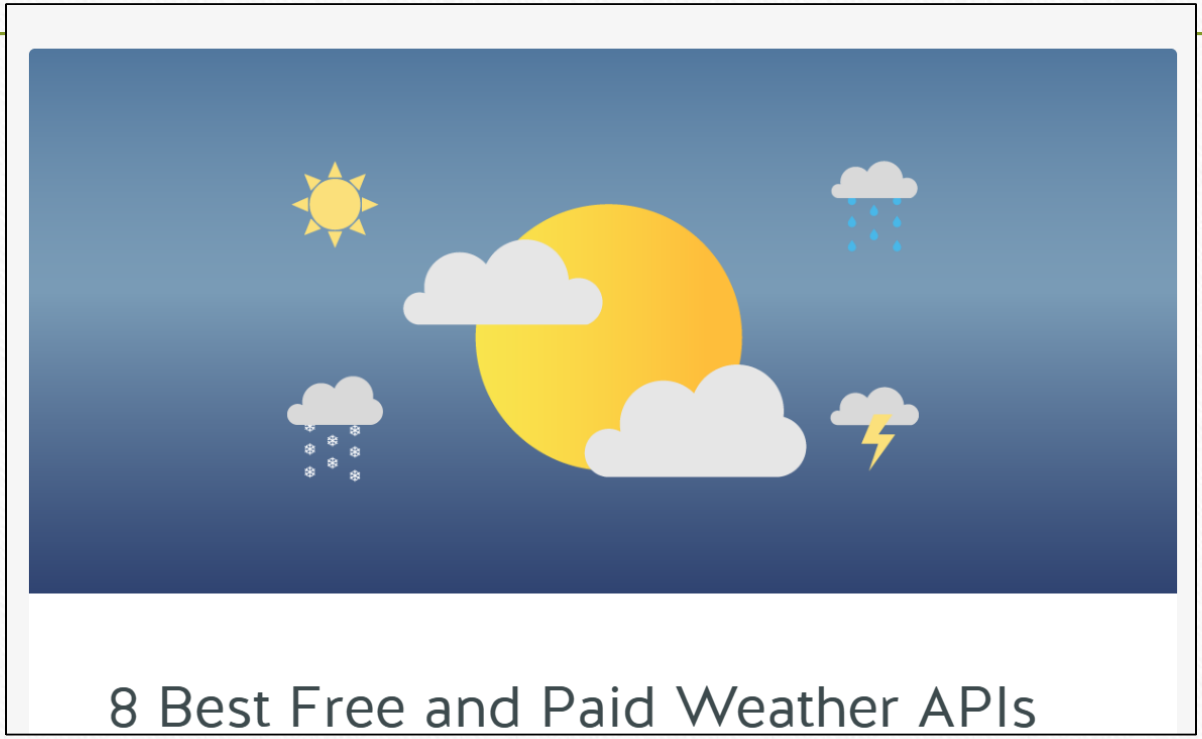
廖裕評

Building a weather station

- Weather APIs give detailed information beyond just temperature, precipitation and humidity, but also UV index and pollution levels. Time series data lets you discover trends and patterns, and plan events based on weather conditions. APIs can also be a useful resource for disaster management as some come with built-in alerting and notification mechanisms on a global scale.



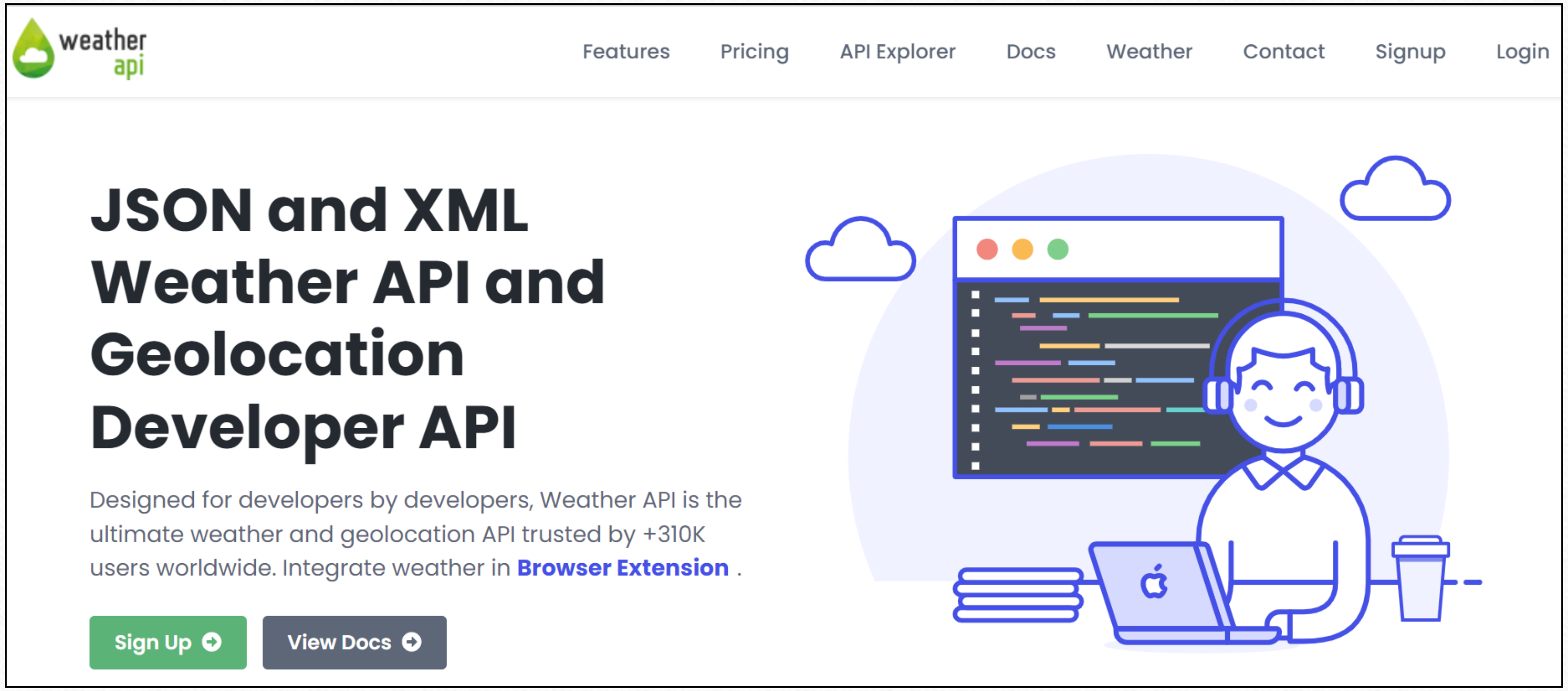
8 Best Free and Paid Weather APIs



8 Best Free and Paid Weather APIs

https://nordicapis.com/6-best-free-and-paid-weather-apis/

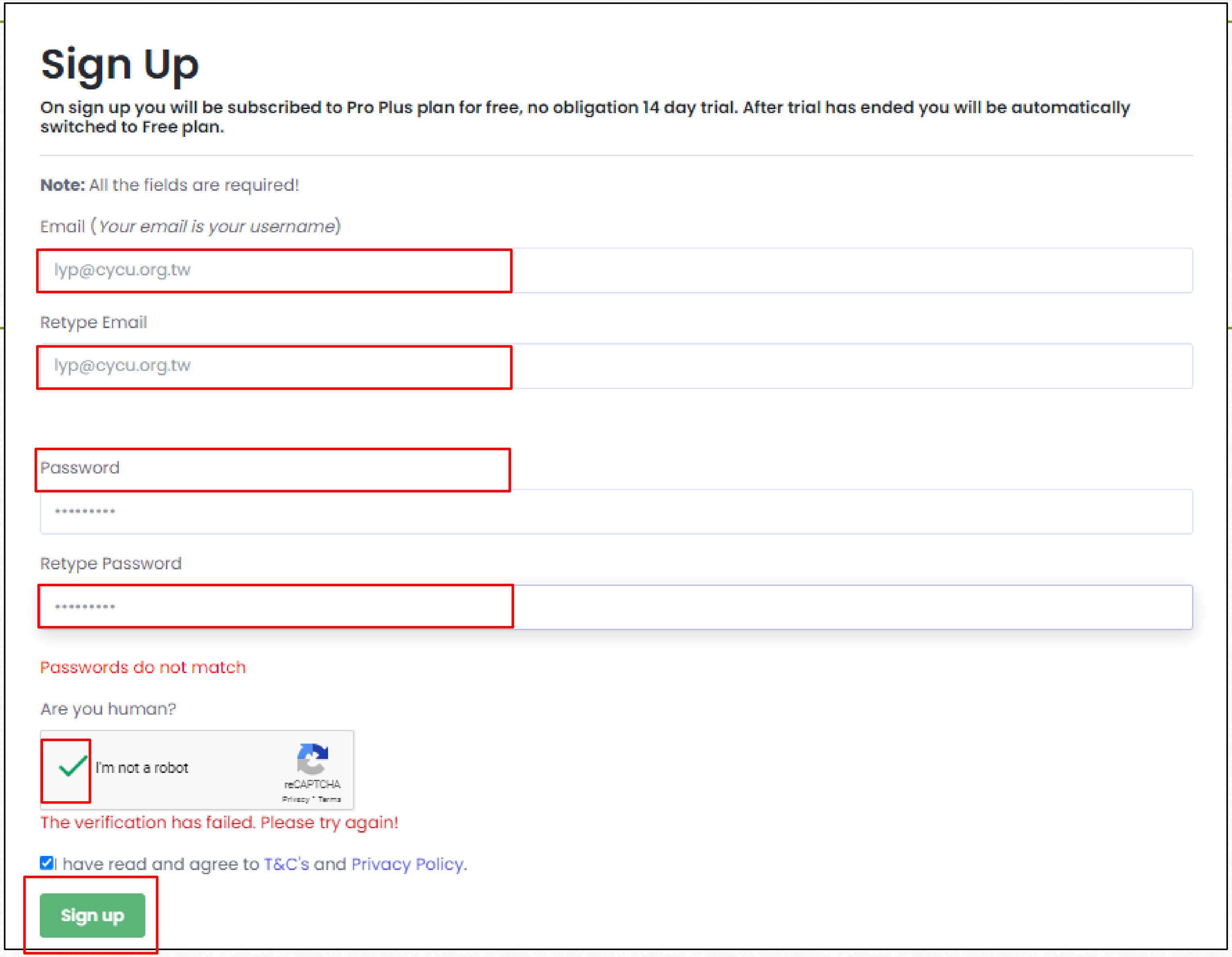
Weather API



JSON and XML Weather API and Geolocation Developer API

Designed for developers by developers, Weather API is the ultimate weather and geolocation API trusted by +310K users worldwide. Integrate weather in **Browser Extension** .

https://www.weatherapi.com/



Sign Up

On sign up you will be subscribed to Pro Plus plan for free, no obligation 14 day trial. After trial has ended you will be automatically switched to Free plan.

Note: All the fields are required!

Email (*Your email is your username*)

lyp@cycu.org.tw

Retype Email

lyp@cycu.org.tw

Password

•••••••••

Retype Password

•••••••••

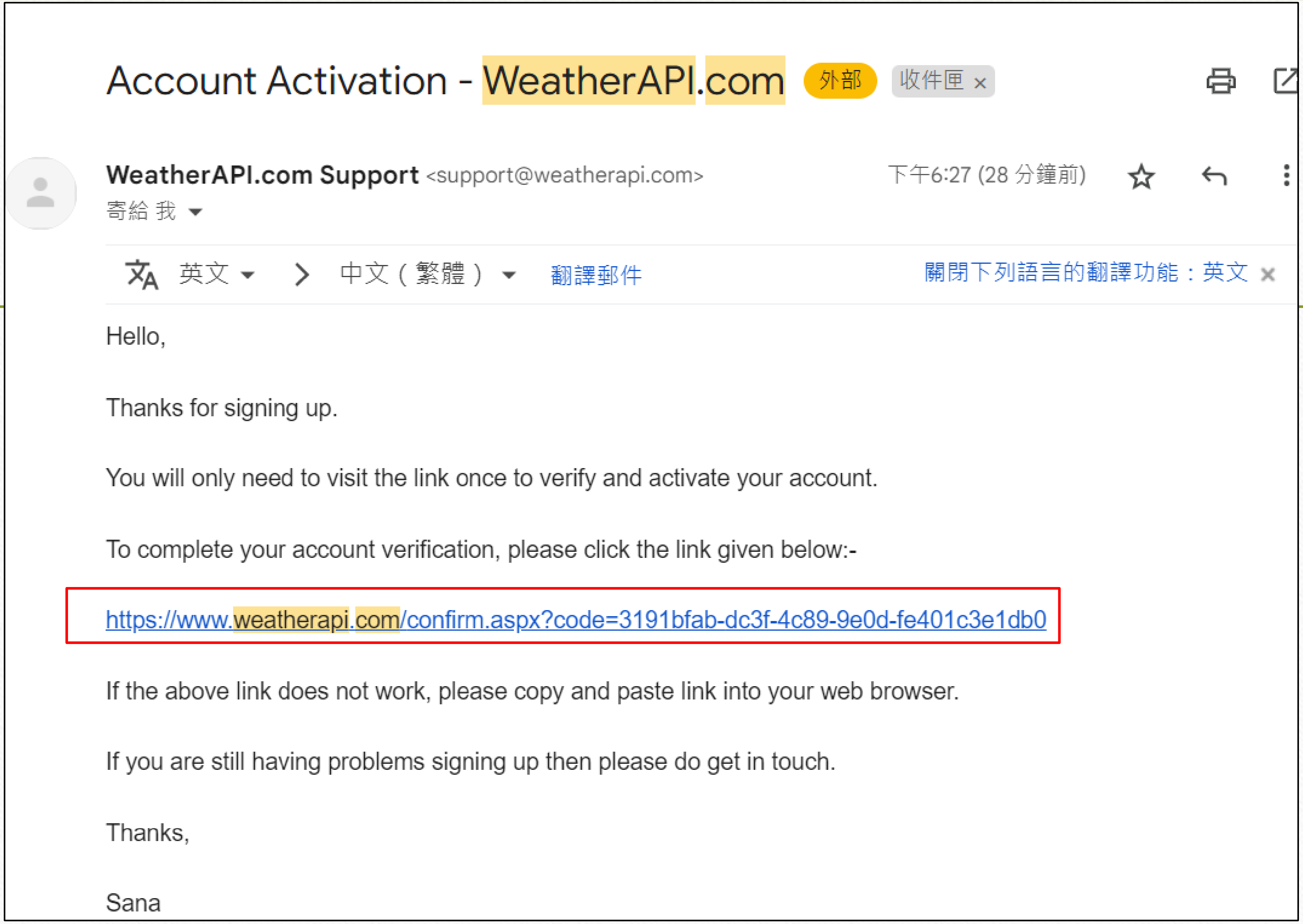
Passwords do not match

Are you human?

☑ I'm not a robot

The verification has failed. Please try again!

☑ I have read and agree to T&C's and Privacy Policy.



Account Activation - WeatherAPI.com

WeatherAPI.com Support <support@weatherapi.com>

下午6:27 (28 分鐘前)

Hello,

Thanks for signing up.

You will only need to visit the link once to verify and activate your account.

To complete your account verification, please click the link given below:-

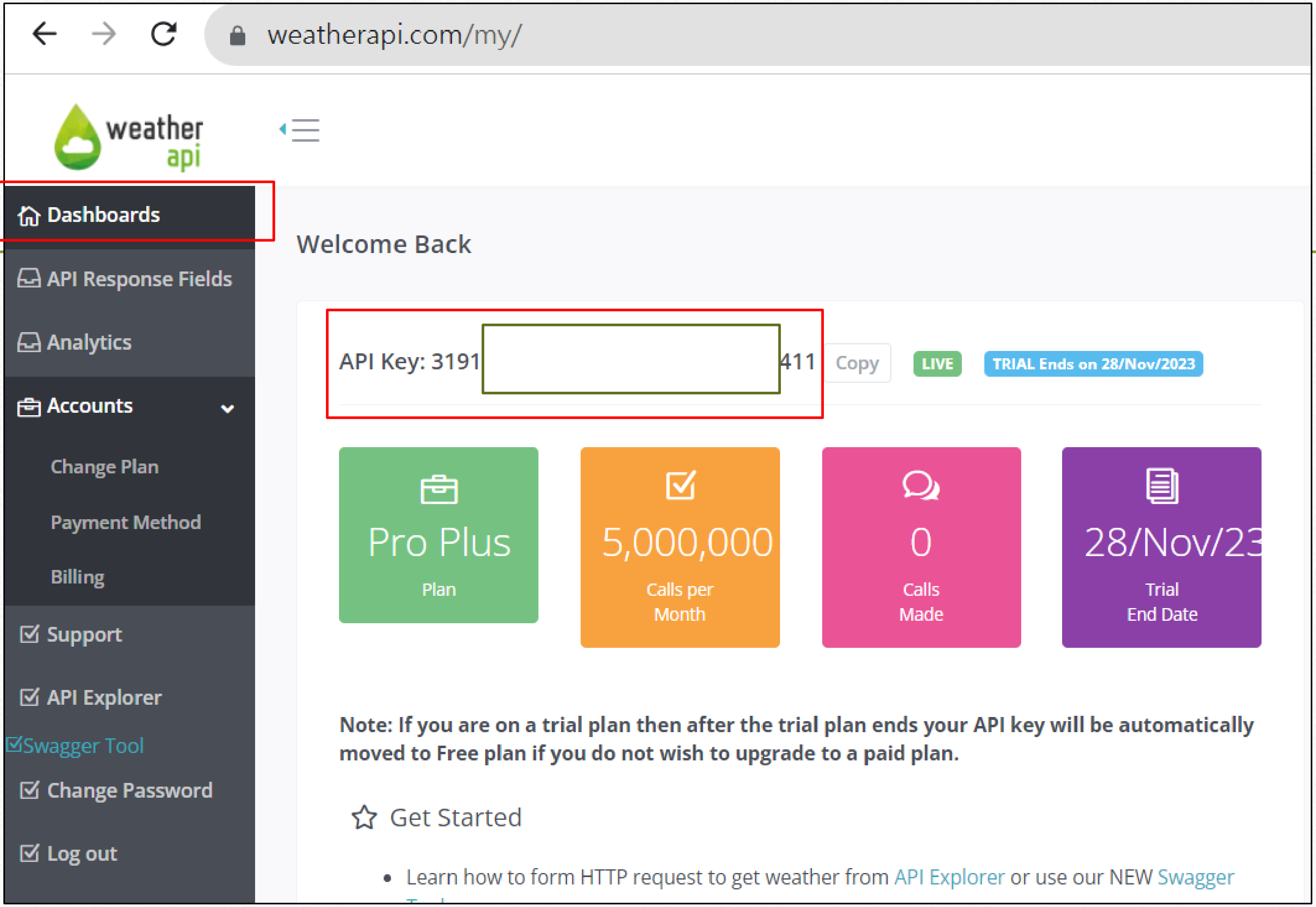
https://www.weatherapi.com/confirm.aspx?code=3191bfab-dc3f-4c89-9e0d-fe401c3e1db0

If the above link does not work, please copy and paste link into your web browser.

If you are still having problems signing up then please do get in touch.

Thanks,

Sana



Welcome Back

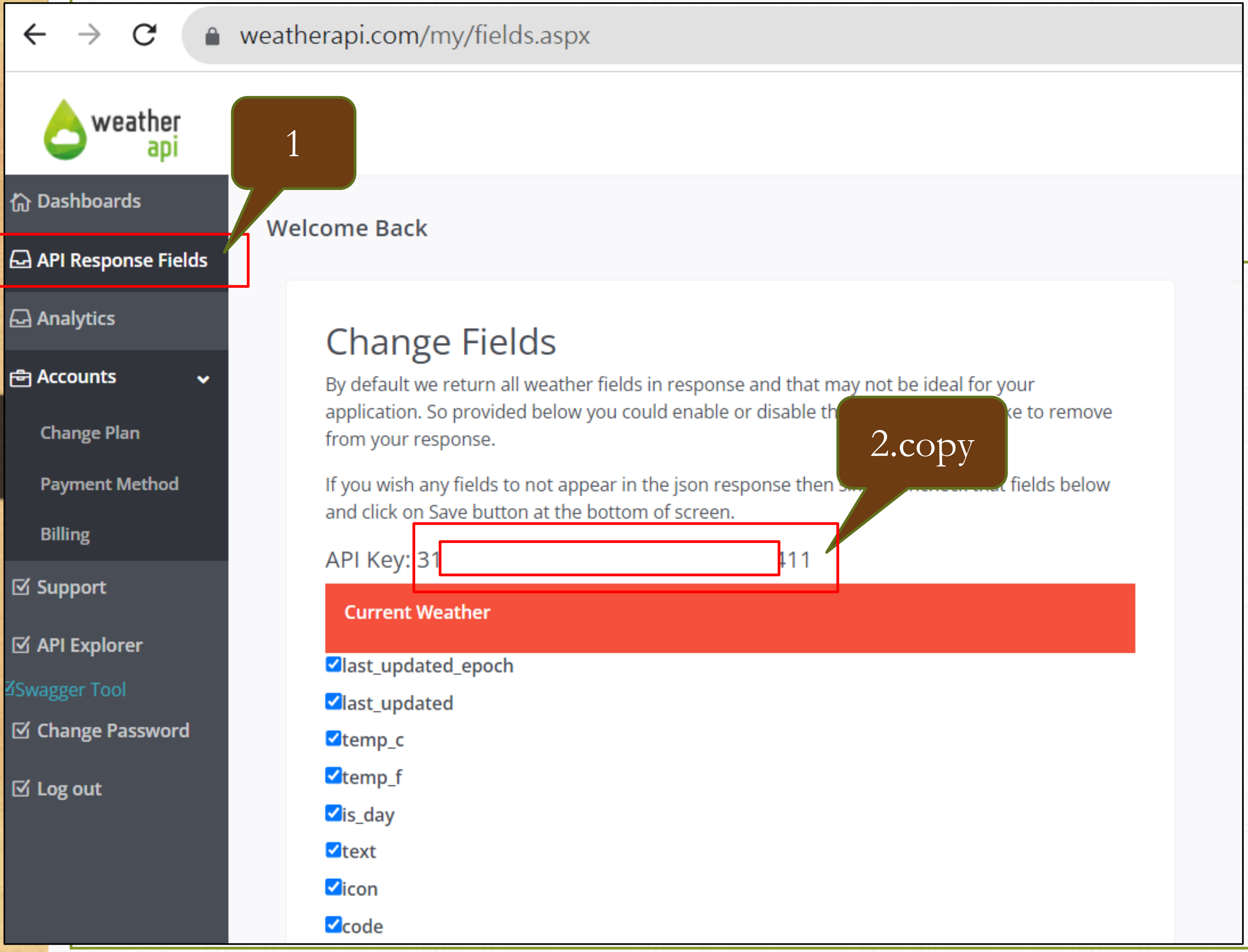
API Key: 3191[redacted]411 Copy LIVE TRIAL Ends on 28/Nov/2023

Pro Plus	5,000,000	0	28/Nov/23
Plan	Calls per Month	Calls Made	Trial End Date

Note: If you are on a trial plan then after the trial plan ends your API key will be automatically moved to Free plan if you do not wish to upgrade to a paid plan.

☆ Get Started

- Learn how to form HTTP request to get weather from API Explorer or use our NEW Swagger



1

2.copy

Welcome Back

Change Fields

By default we return all weather fields in response and that may not be ideal for your application. So provided below you could enable or disable th ke to remove from your response.

If you wish any fields to not appear in the json response then s fields below and click on Save button at the bottom of screen.

API Key: 31[redacted]11

Current Weather

☑last_updated_epoch

☑last_updated

☑temp_c

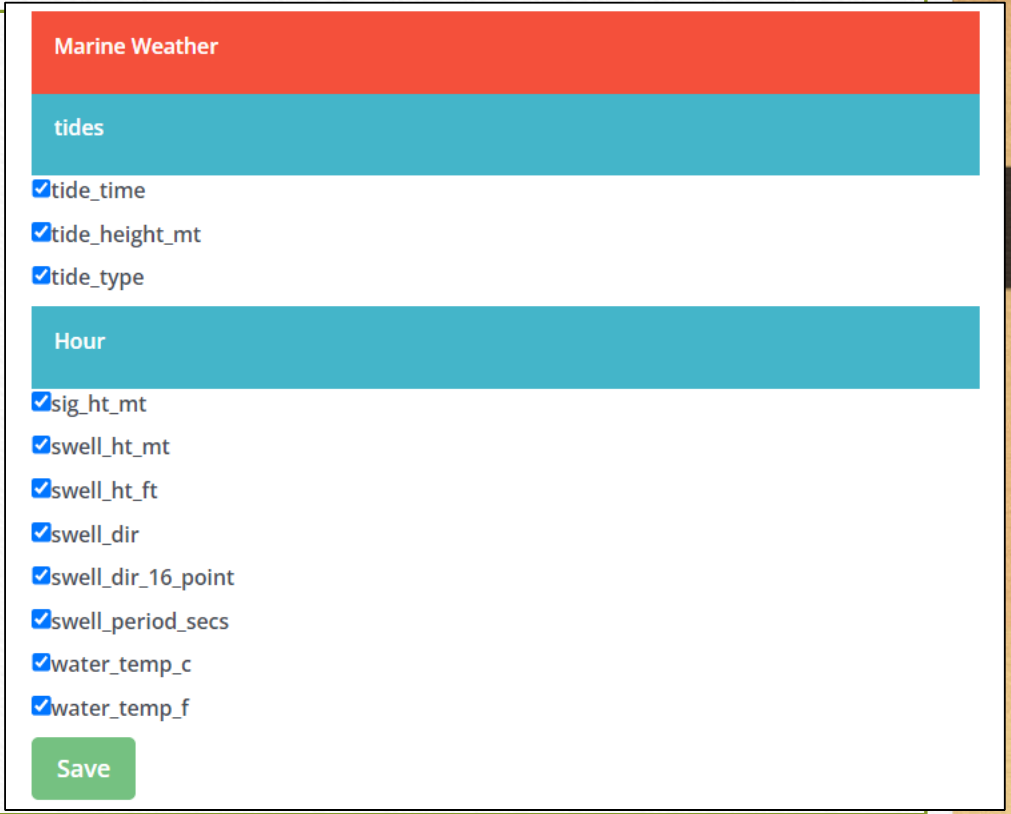
☑temp_f

☑is_day

☑text

☑icon

☑code



Marine Weather

tides

☑tide_time

☑tide_height_mt

☑tide_type

Hour

☑sig_ht_mt

☑swell_ht_mt

☑swell_ht_ft

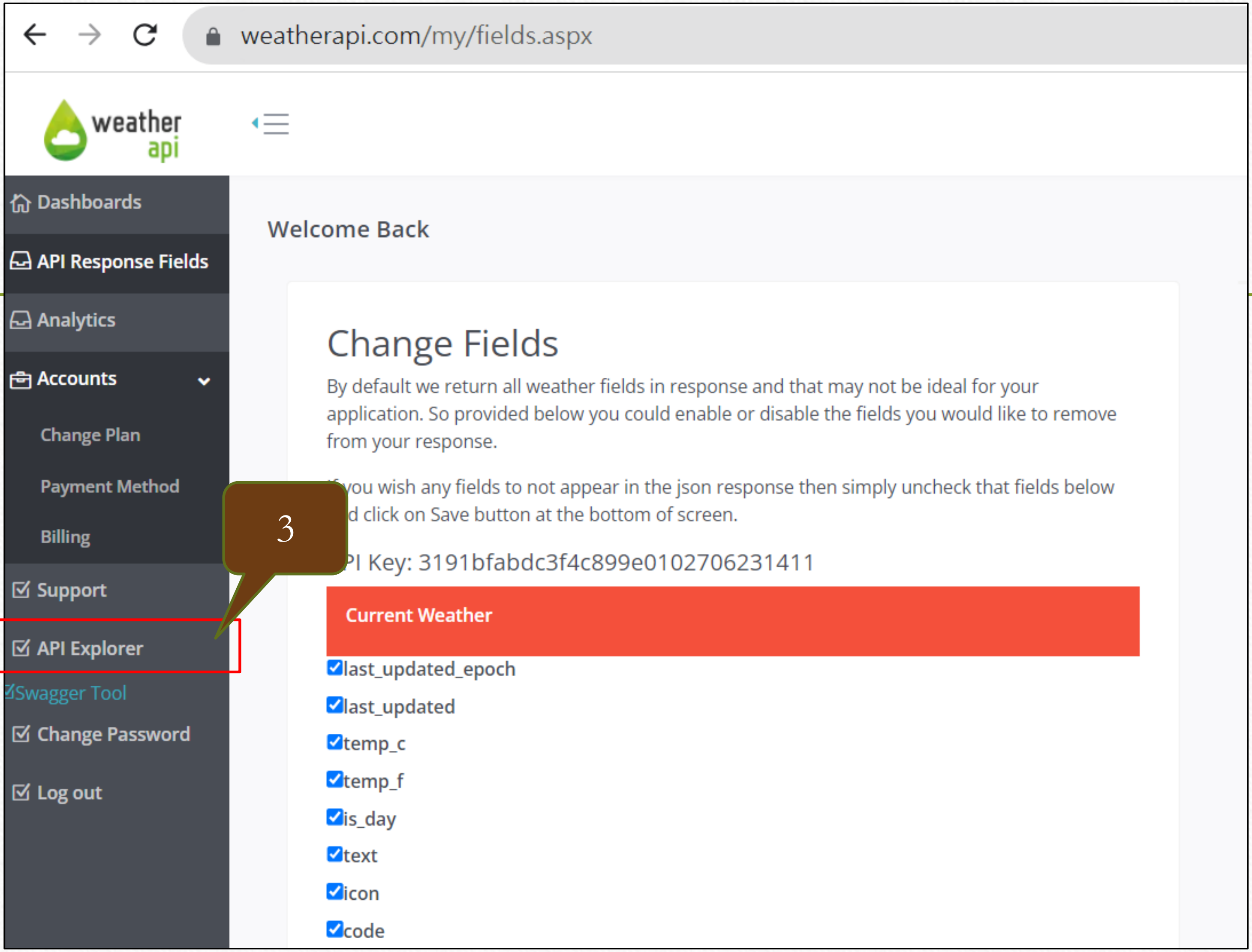
☑swell_dir

☑swell_dir_16_point

☑swell_period_secs

☑water_temp_c

☑water_temp_f



Welcome Back

Change Fields

By default we return all weather fields in response and that may not be ideal for your application. So provided below you could enable or disable the fields you would like to remove from your response.

you wish any fields to not appear in the json response then simply uncheck that fields below d click on Save button at the bottom of screen.

I Key: 3191bfabdc3f4c899e0102706231411

Current Weather

☑last_updated_epoch

☑last_updated

☑temp_c

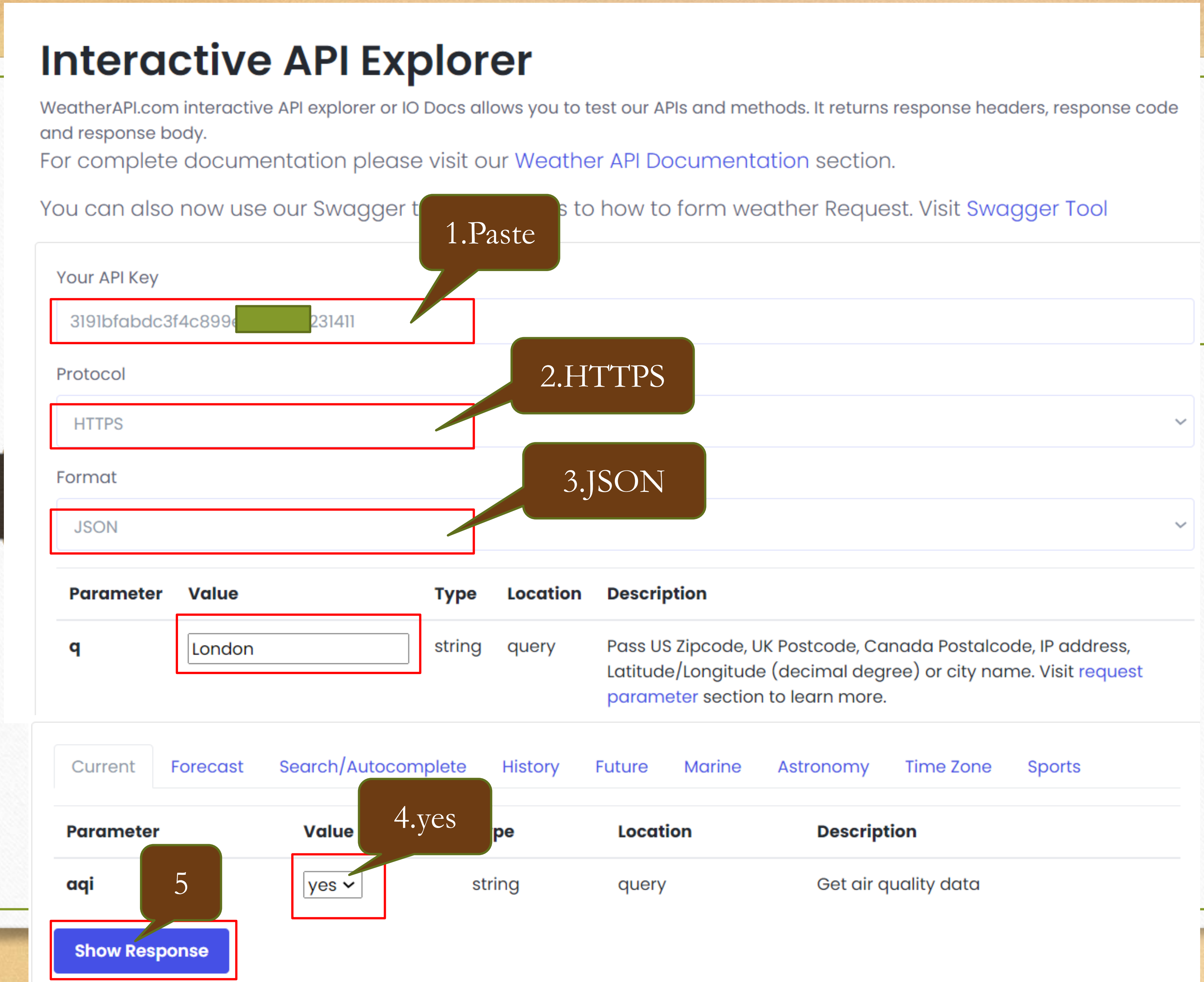
☑temp_f

☑is_day

☑text

☑icon

☑code



Interactive API Explorer

WeatherAPI.com interactive API explorer or IO Docs allows you to test our APIs and methods. It returns response headers, response code and response body.

For complete documentation please visit our Weather API Documentation section.

You can also now use our Swagger t… s to how to form weather Request. Visit Swagger Tool

Your API Key: 3191bfabdc3f4c899[redacted]231411

1.Paste

Protocol: HTTPS

2.HTTPS

Format: JSON

3.JSON

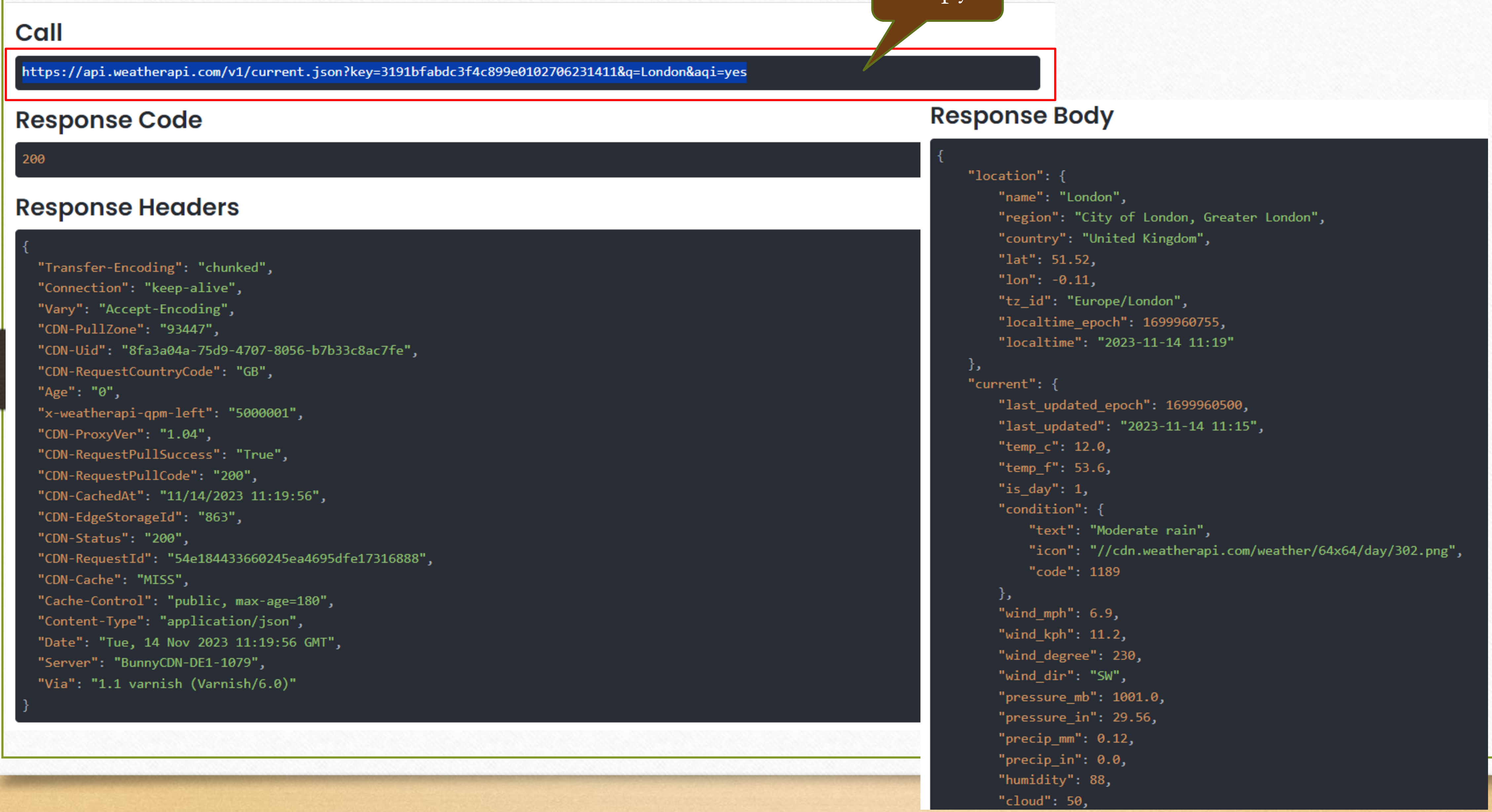
Parameter	Value	Type	Location	Description
q	London	string	query	Pass US Zipcode, UK Postcode, Canada Postalcode, IP address, Latitude/Longitude (decimal degree) or city name. Visit request parameter section to learn more.

Parameter	Value	Type	Location	Description
aqi	yes	string	query	Get air quality data

4.yes

5

Copy



Call

```
https://api.weatherapi.com/v1/current.json?key=3191bfabdc3f4c899e0102706231411&q=London&aqi=yes
```

Response Code

```
200
```

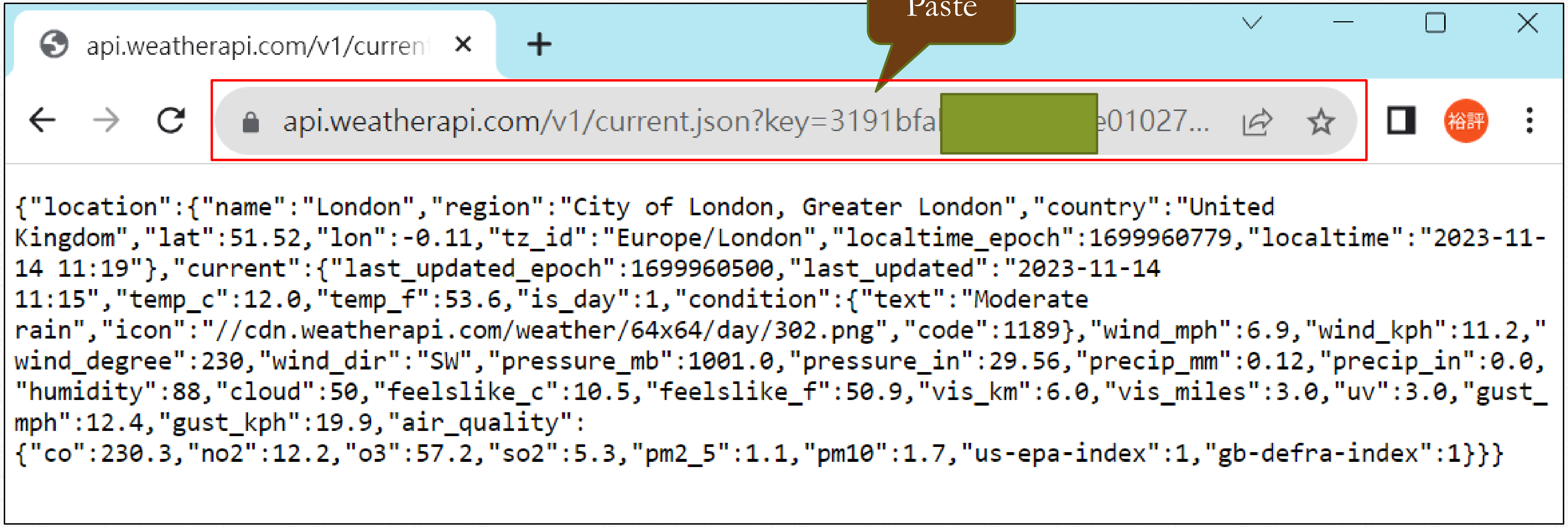
Response Headers

```
{
  "Transfer-Encoding": "chunked",
  "Connection": "keep-alive",
  "Vary": "Accept-Encoding",
  "CDN-PullZone": "93447",
  "CDN-Uid": "8fa3a04a-75d9-4707-8056-b7b33c8ac7fe",
  "CDN-RequestCountryCode": "GB",
  "Age": "0",
  "x-weatherapi-qpm-left": "5000001",
  "CDN-ProxyVer": "1.04",
  "CDN-RequestPullSuccess": "True",
  "CDN-RequestPullCode": "200",
  "CDN-CachedAt": "11/14/2023 11:19:56",
  "CDN-EdgeStorageId": "863",
  "CDN-Status": "200",
  "CDN-RequestId": "54e184433660245ea4695dfe17316888",
  "CDN-Cache": "MISS",
  "Cache-Control": "public, max-age=180",
  "Content-Type": "application/json",
  "Date": "Tue, 14 Nov 2023 11:19:56 GMT",
  "Server": "BunnyCDN-DE1-1079",
  "Via": "1.1 varnish (Varnish/6.0)"
}
```

Response Body

```
{
    "location": {
        "name": "London",
        "region": "City of London, Greater London",
        "country": "United Kingdom",
        "lat": 51.52,
        "lon": -0.11,
        "tz_id": "Europe/London",
        "localtime_epoch": 1699960755,
        "localtime": "2023-11-14 11:19"
    },
    "current": {
        "last_updated_epoch": 1699960500,
        "last_updated": "2023-11-14 11:15",
        "temp_c": 12.0,
        "temp_f": 53.6,
        "is_day": 1,
        "condition": {
            "text": "Moderate rain",
            "icon": "//cdn.weatherapi.com/weather/64x64/day/302.png",
            "code": 1189
        },
        "wind_mph": 6.9,
        "wind_kph": 11.2,
        "wind_degree": 230,
        "wind_dir": "SW",
        "pressure_mb": 1001.0,
        "pressure_in": 29.56,
        "precip_mm": 0.12,
        "precip_in": 0.0,
        "humidity": 88,
        "cloud": 50,
```

Paste the Link into a Browser Address Bar

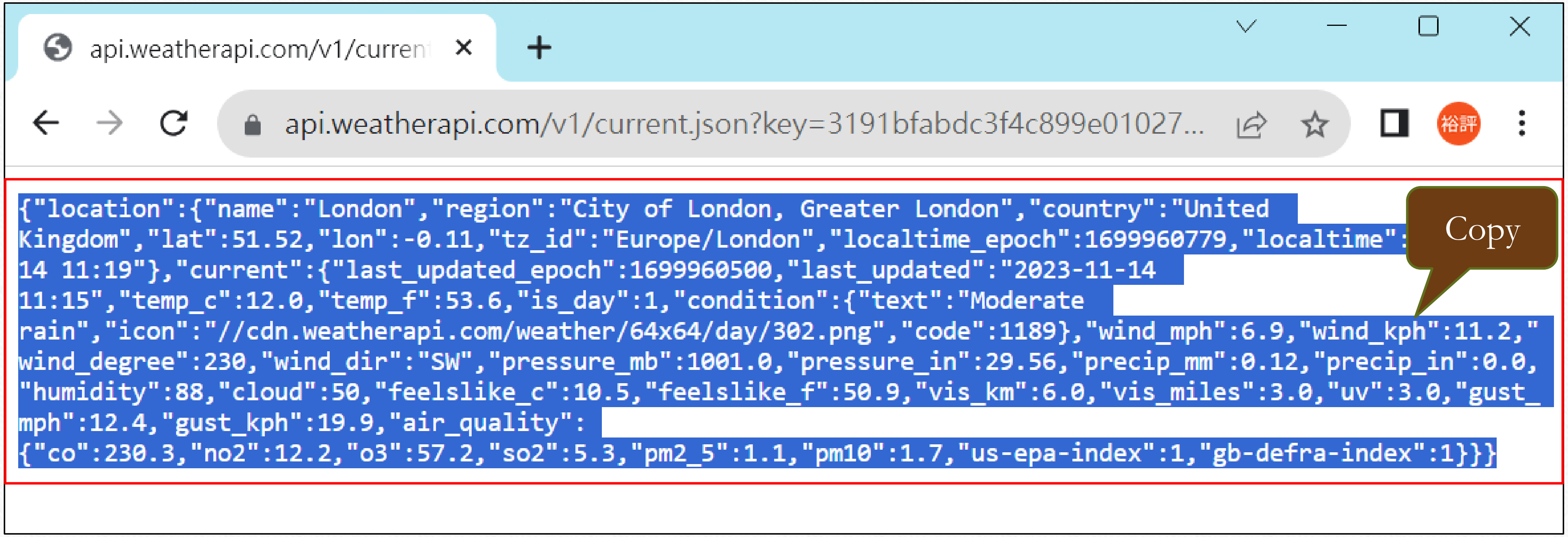


Paste

api.weatherapi.com/v1/current.json?key=3191bfa[redacted]e01027...

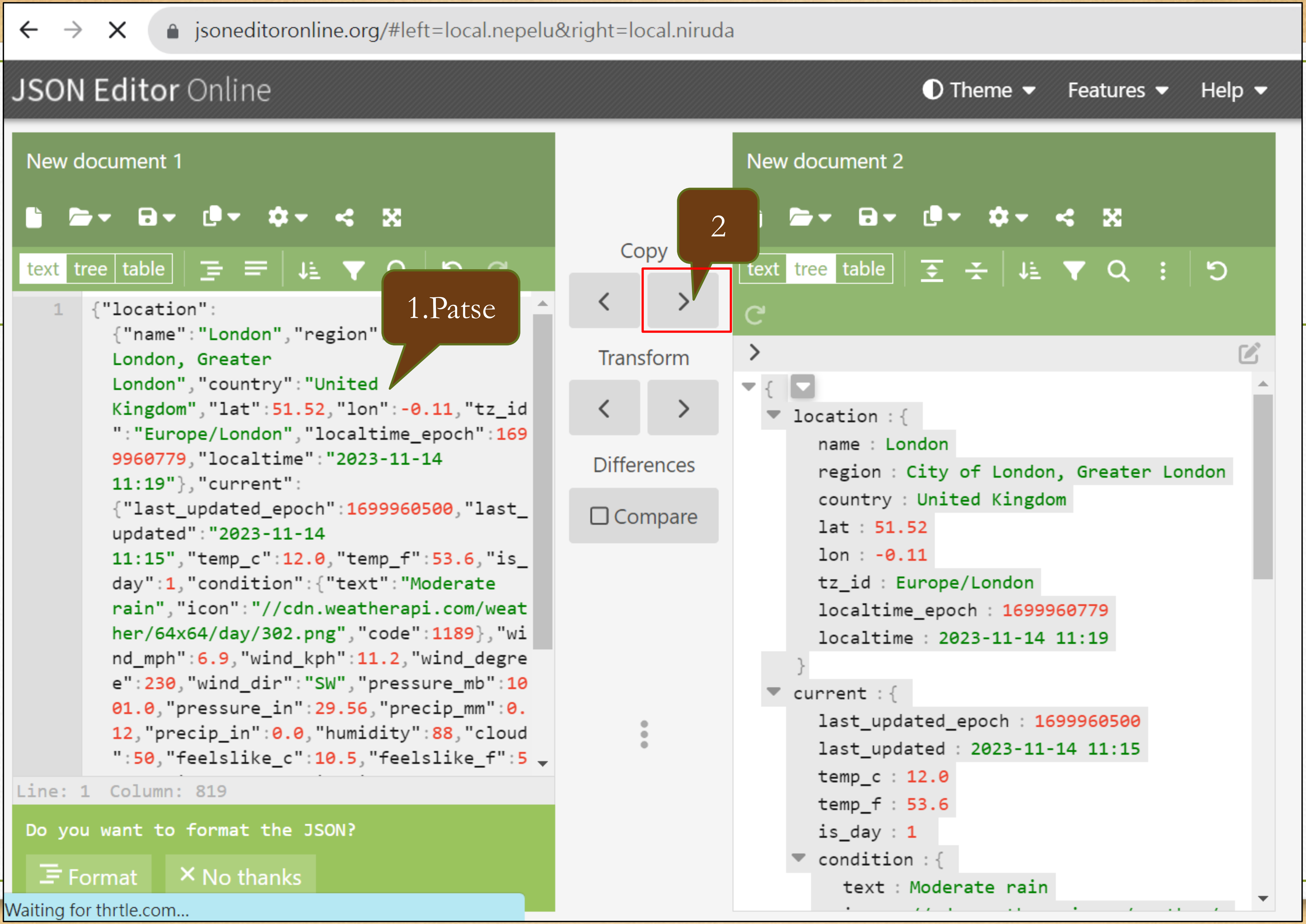
```
{"location":{"name":"London","region":"City of London, Greater London","country":"United
Kingdom","lat":51.52,"lon":-0.11,"tz_id":"Europe/London","localtime_epoch":1699960779,"localtime":"2023-11-
14 11:19"},"current":{"last_updated_epoch":1699960500,"last_updated":"2023-11-14
11:15","temp_c":12.0,"temp_f":53.6,"is_day":1,"condition":{"text":"Moderate
rain","icon":"//cdn.weatherapi.com/weather/64x64/day/302.png","code":1189},"wind_mph":6.9,"wind_kph":11.2,"
wind_degree":230,"wind_dir":"SW","pressure_mb":1001.0,"pressure_in":29.56,"precip_mm":0.12,"precip_in":0.0,
"humidity":88,"cloud":50,"feelslike_c":10.5,"feelslike_f":50.9,"vis_km":6.0,"vis_miles":3.0,"uv":3.0,"gust_
mph":12.4,"gust_kph":19.9,"air_quality":
{"co":230.3,"no2":12.2,"o3":57.2,"so2":5.3,"pm2_5":1.1,"pm10":1.7,"us-epa-index":1,"gb-defra-index":1}}}
```

Select All & Copy


api.weatherapi.com/v1/curren
api.weatherapi.com/v1/current.json?key=3191bfabdc3f4c899e01027...
裕評

```
{"location":{"name":"London","region":"City of London, Greater London","country":"United
Kingdom","lat":51.52,"lon":-0.11,"tz_id":"Europe/London","localtime_epoch":1699960779,"localtime":
14 11:19"},"current":{"last_updated_epoch":1699960500,"last_updated":"2023-11-14
11:15","temp_c":12.0,"temp_f":53.6,"is_day":1,"condition":{"text":"Moderate
rain","icon":"//cdn.weatherapi.com/weather/64x64/day/302.png","code":1189},"wind_mph":6.9,"wind_kph":11.2,"
wind_degree":230,"wind_dir":"SW","pressure_mb":1001.0,"pressure_in":29.56,"precip_mm":0.12,"precip_in":0.0,
"humidity":88,"cloud":50,"feelslike_c":10.5,"feelslike_f":50.9,"vis_km":6.0,"vis_miles":3.0,"uv":3.0,"gust_
mph":12.4,"gust_kph":19.9,"air_quality":
{"co":230.3,"no2":12.2,"o3":57.2,"so2":5.3,"pm2_5":1.1,"pm10":1.7,"us-epa-index":1,"gb-defra-index":1}}}
```

Copy



1.Patse

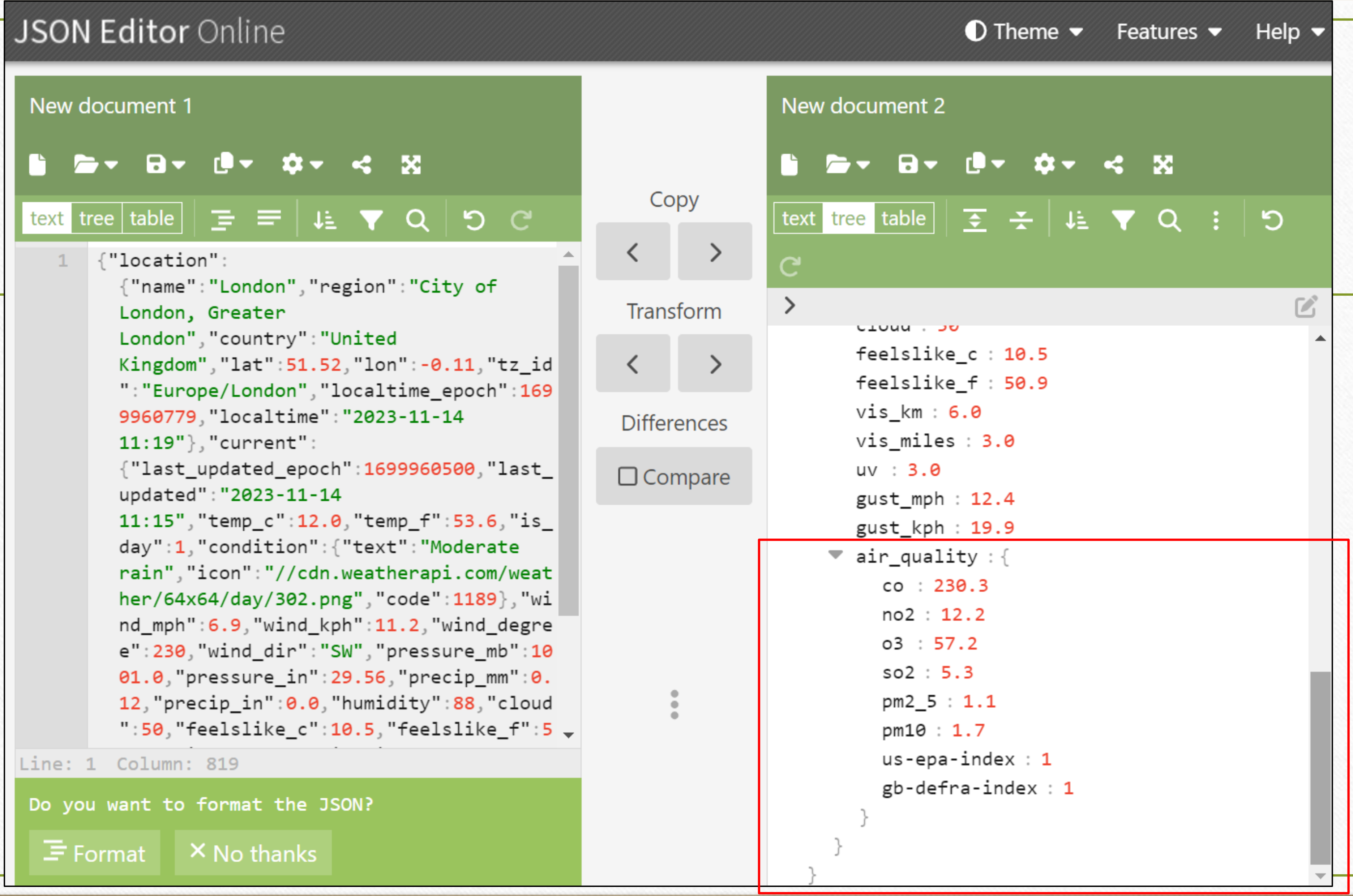
2

```
{"location":
  {"name":"London","region"
  London, Greater
  London","country":"United
  Kingdom","lat":51.52,"lon":-0.11,"tz_id
  ":"Europe/London","localtime_epoch":169
  9960779,"localtime":"2023-11-14
  11:19"},"current":
  {"last_updated_epoch":1699960500,"last_
  updated":"2023-11-14
  11:15","temp_c":12.0,"temp_f":53.6,"is_
  day":1,"condition":{"text":"Moderate
  rain","icon":"//cdn.weatherapi.com/weat
  her/64x64/day/302.png","code":1189},"wi
  nd_mph":6.9,"wind_kph":11.2,"wind_degre
  e":230,"wind_dir":"SW","pressure_mb":10
  01.0,"pressure_in":29.56,"precip_mm":0.
  12,"precip_in":0.0,"humidity":88,"cloud
  ":50,"feelslike_c":10.5,"feelslike_f":5
```

```
Line: 1  Column: 819
```

Do you want to format the JSON?

```
{
  location : {
    name : London
    region : City of London, Greater London
    country : United Kingdom
    lat : 51.52
    lon : -0.11
    tz_id : Europe/London
    localtime_epoch : 1699960779
    localtime : 2023-11-14 11:19
  }
  current : {
    last_updated_epoch : 1699960500
    last_updated : 2023-11-14 11:15
    temp_c : 12.0
    temp_f : 53.6
    is_day : 1
    condition : {
      text : Moderate rain
```



```
{"location":
  {"name":"London","region":"City of
  London, Greater
  London","country":"United
  Kingdom","lat":51.52,"lon":-0.11,"tz_id
  ":"Europe/London","localtime_epoch":169
  9960779,"localtime":"2023-11-14
  11:19"},"current":
  {"last_updated_epoch":1699960500,"last_
  updated":"2023-11-14
  11:15","temp_c":12.0,"temp_f":53.6,"is_
  day":1,"condition":{"text":"Moderate
  rain","icon":"//cdn.weatherapi.com/weat
  her/64x64/day/302.png","code":1189},"wi
  nd_mph":6.9,"wind_kph":11.2,"wind_degre
  e":230,"wind_dir":"SW","pressure_mb":10
  01.0,"pressure_in":29.56,"precip_mm":0.
  12,"precip_in":0.0,"humidity":88,"cloud
  ":50,"feelslike_c":10.5,"feelslike_f":5
```

```
Line: 1  Column: 819
```

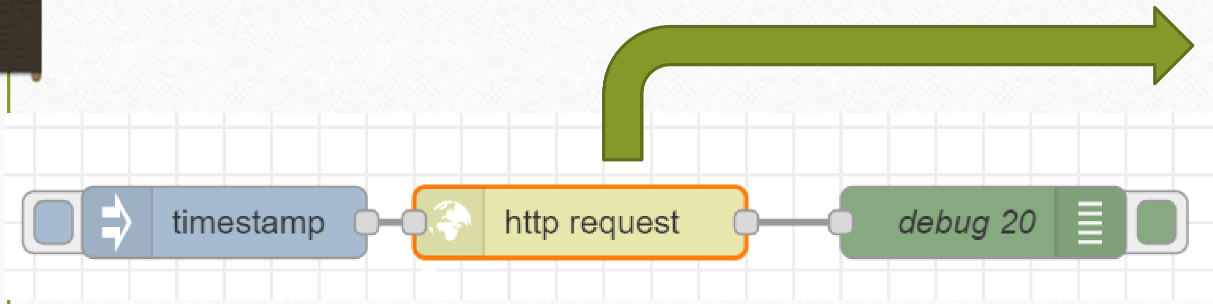
Do you want to format the JSON?

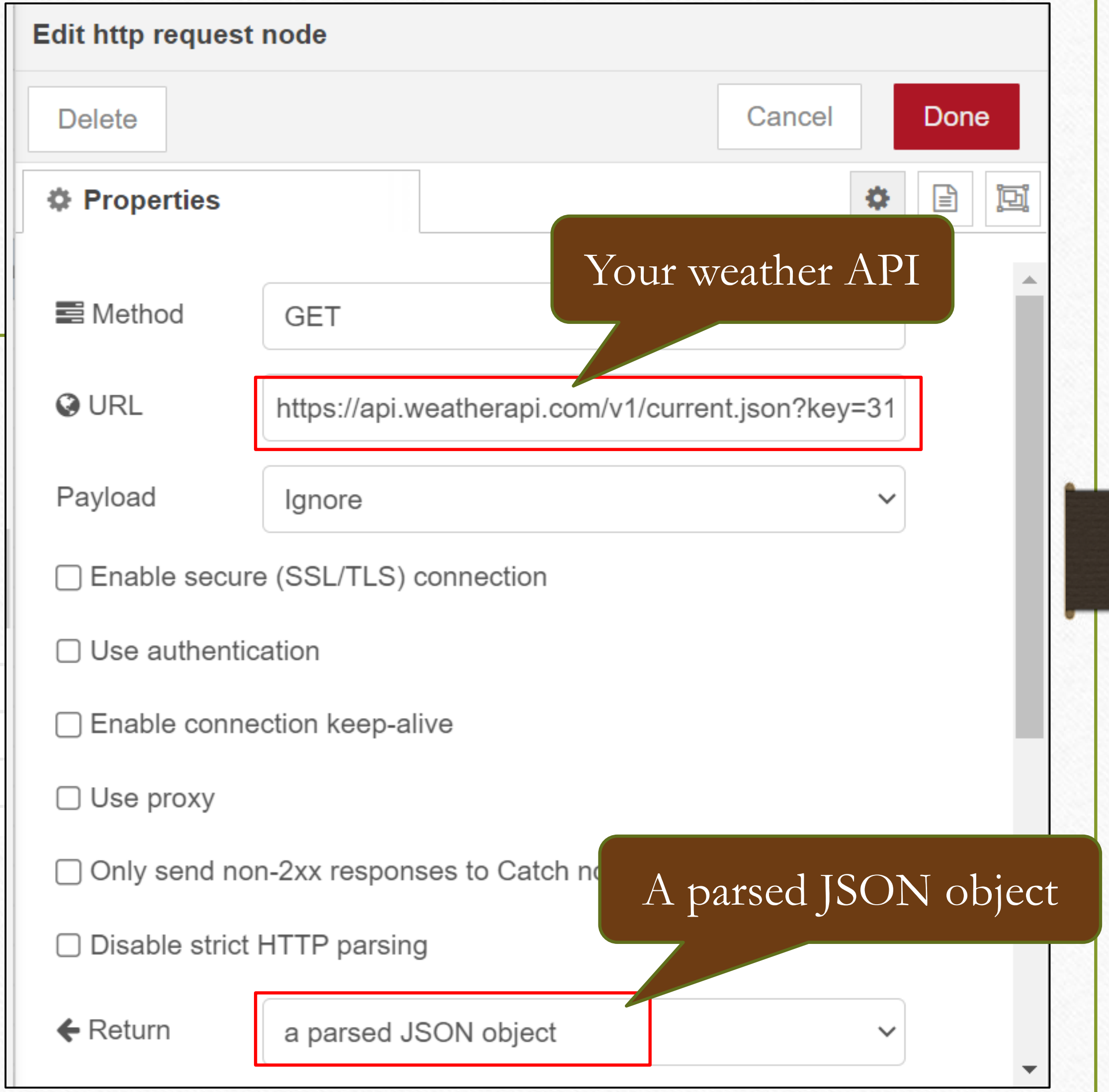
```
    cloud : 50
    feelslike_c : 10.5
    feelslike_f : 50.9
    vis_km : 6.0
    vis_miles : 3.0
    uv : 3.0
    gust_mph : 12.4
    gust_kph : 19.9
  ▾ air_quality : {
      co : 230.3
      no2 : 12.2
      o3 : 57.2
      so2 : 5.3
      pm2_5 : 1.1
      pm10 : 1.7
      us-epa-index : 1
      gb-defra-index : 1
    }
  }
}
```

Exercise 9-1

- Get the weather information form weather API and show them on the debug window in Node-RED.

http request





Method: GET

URL: https://api.weatherapi.com/v1/current.json?key=31

Payload: Ignore

☐ Enable secure (SSL/TLS) connection

☐ Use authentication

☐ Enable connection keep-alive

☐ Use proxy

☐ Only send non-2xx responses to Catch no

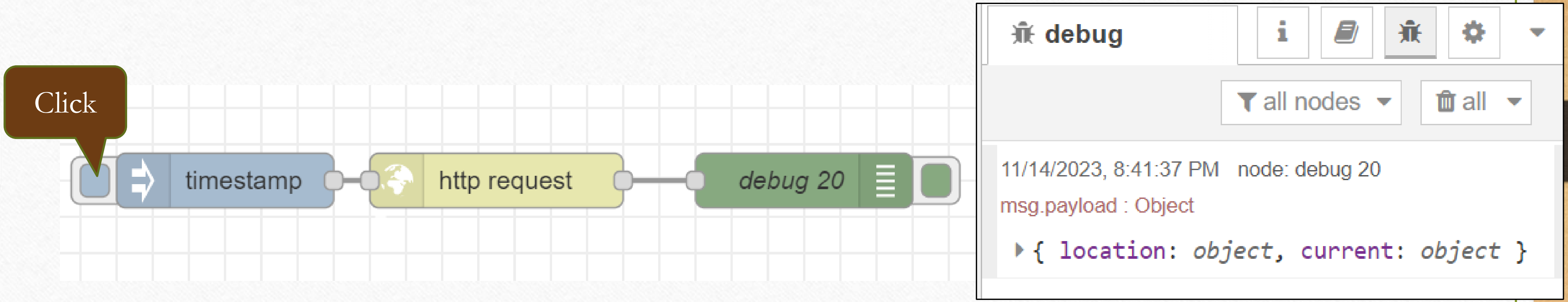
☐ Disable strict HTTP parsing

Return: a parsed JSON object

Your weather API

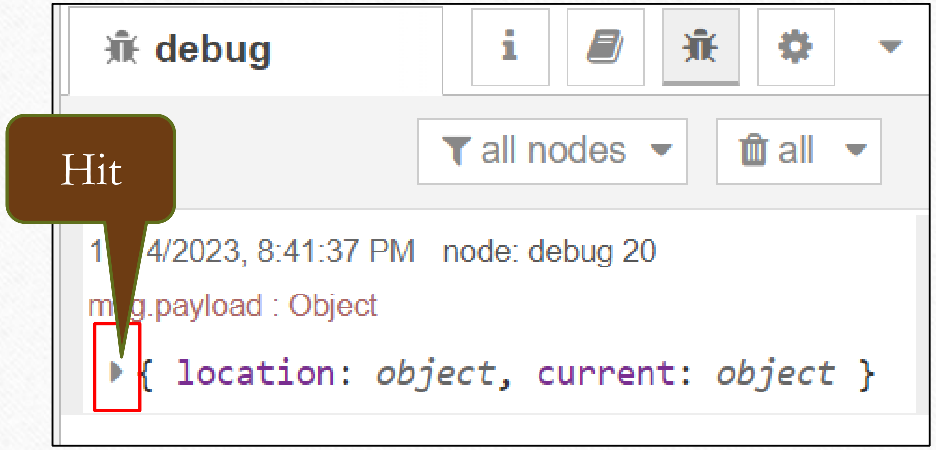
A parsed JSON object

Triger



```
11/14/2023, 8:41:37 PM   node: debug 20
msg.payload : Object
▸{ location: object, current: object }
```

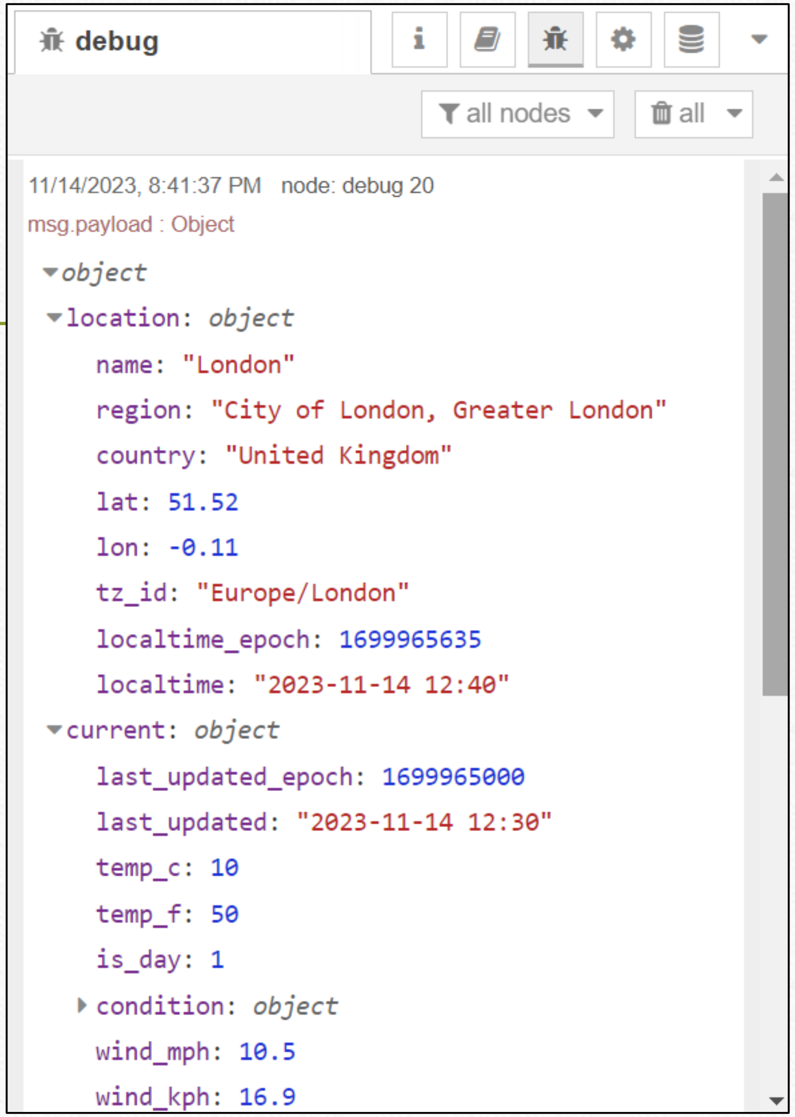
Expand



1 4/2023, 8:41:37 PM node: debug 20

m g.payload : Object

```
▸{ location: object, current: object }
```



11/14/2023, 8:41:37 PM node: debug 20

msg.payload : Object

```
▾object
 ▾location: object
    name: "London"
    region: "City of London, Greater London"
    country: "United Kingdom"
    lat: 51.52
    lon: -0.11
    tz_id: "Europe/London"
    localtime_epoch: 1699965635
    localtime: "2023-11-14 12:40"
 ▾current: object
    last_updated_epoch: 1699965000
    last_updated: "2023-11-14 12:30"
    temp_c: 10
    temp_f: 50
    is_day: 1
   ▸condition: object
    wind_mph: 10.5
    wind_kph: 16.9
```

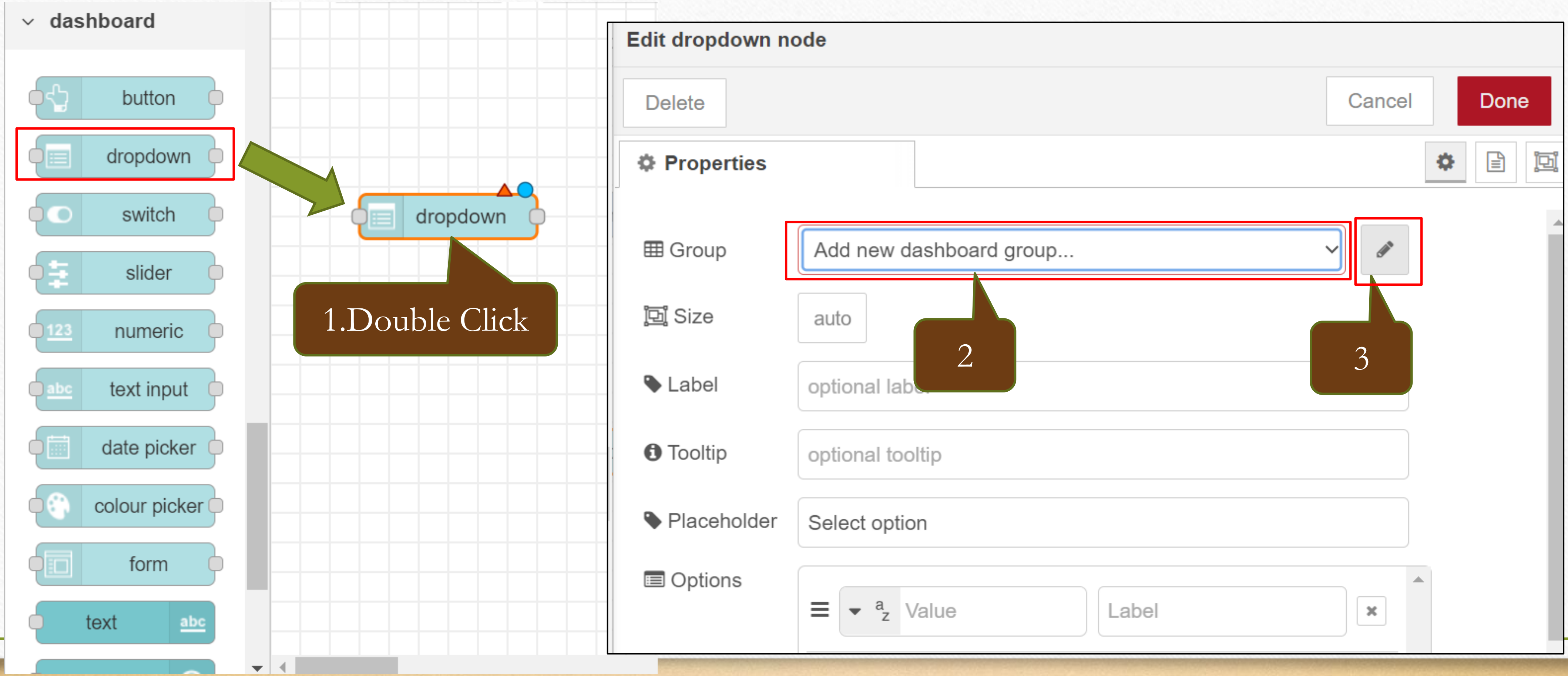
Homework 1

- Test the weather API for seven different cities.
- **Taipei**
- **London**
- **Singapur**
- **Paris**
- **Taichung**
- **Taoyuan**
- **New York**

Exercise 9-2

- Build a weather station.

Step 1



Group: Add new dashboard group...

Size: auto

Label: optional label

Tooltip: optional tooltip

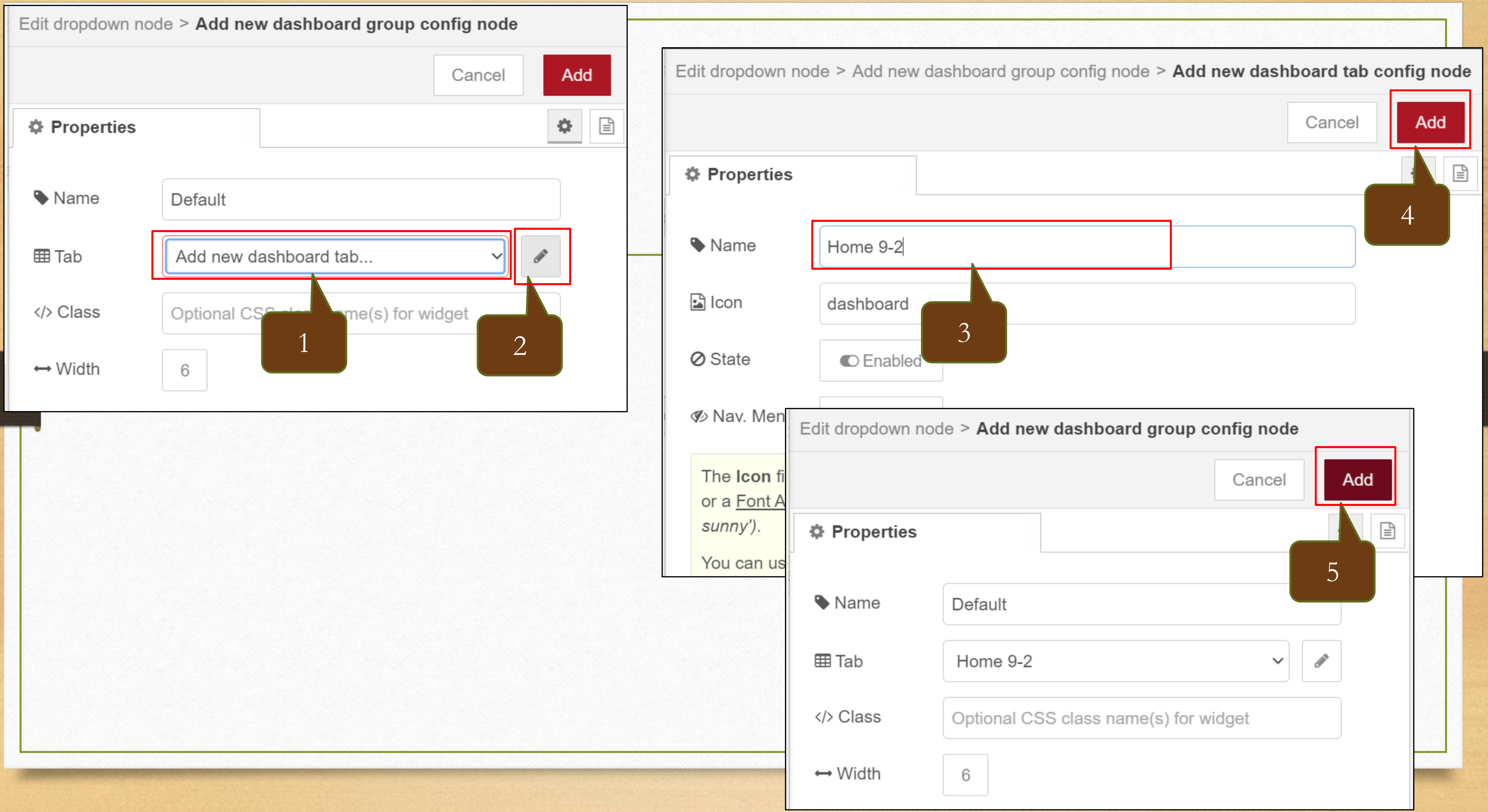
Placeholder: Select option

Options: Value Label

1.Double Click

2

3



Edit dropdown node > **Add new dashboard group config node**

Cancel Add

Properties

Name: Default

Tab: Add new dashboard tab...

Class: Optional CSS cla... me(s) for widget

Width: 6

Edit dropdown node > Add new dashboard group config node > **Add new dashboard tab config node**

Cancel Add

Properties

Name: Home 9-2

Icon: dashboard

State: Enabled

Nav. Men

The **Icon** fi
or a Font A
sunny').

You can us

Edit dropdown node > **Add new dashboard group config node**

Cancel Add

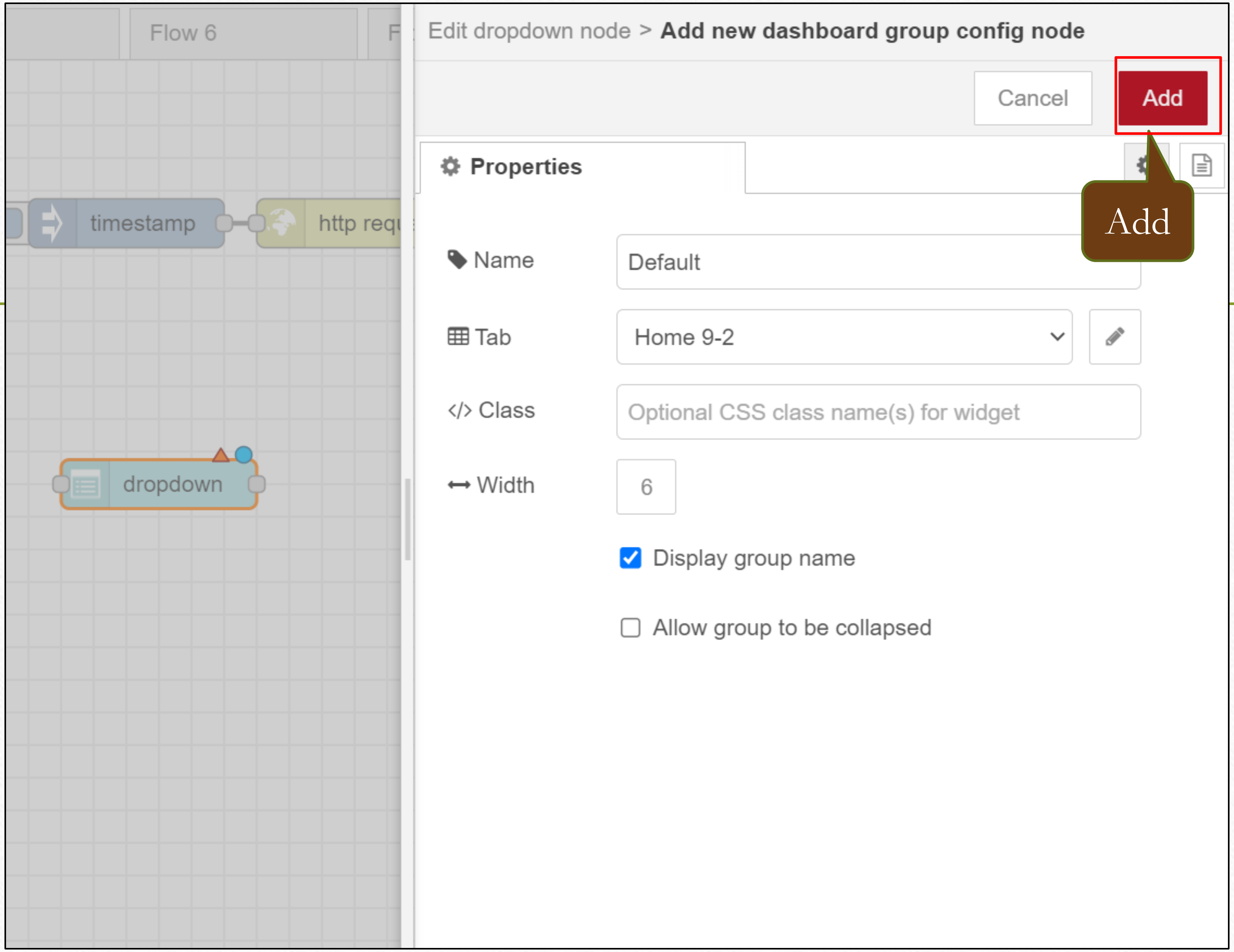
Properties

Name: Default

Tab: Home 9-2

Class: Optional CSS class name(s) for widget

Width: 6



Edit dropdown node > **Add new dashboard group config node**

Name: Default

Tab: Home 9-2

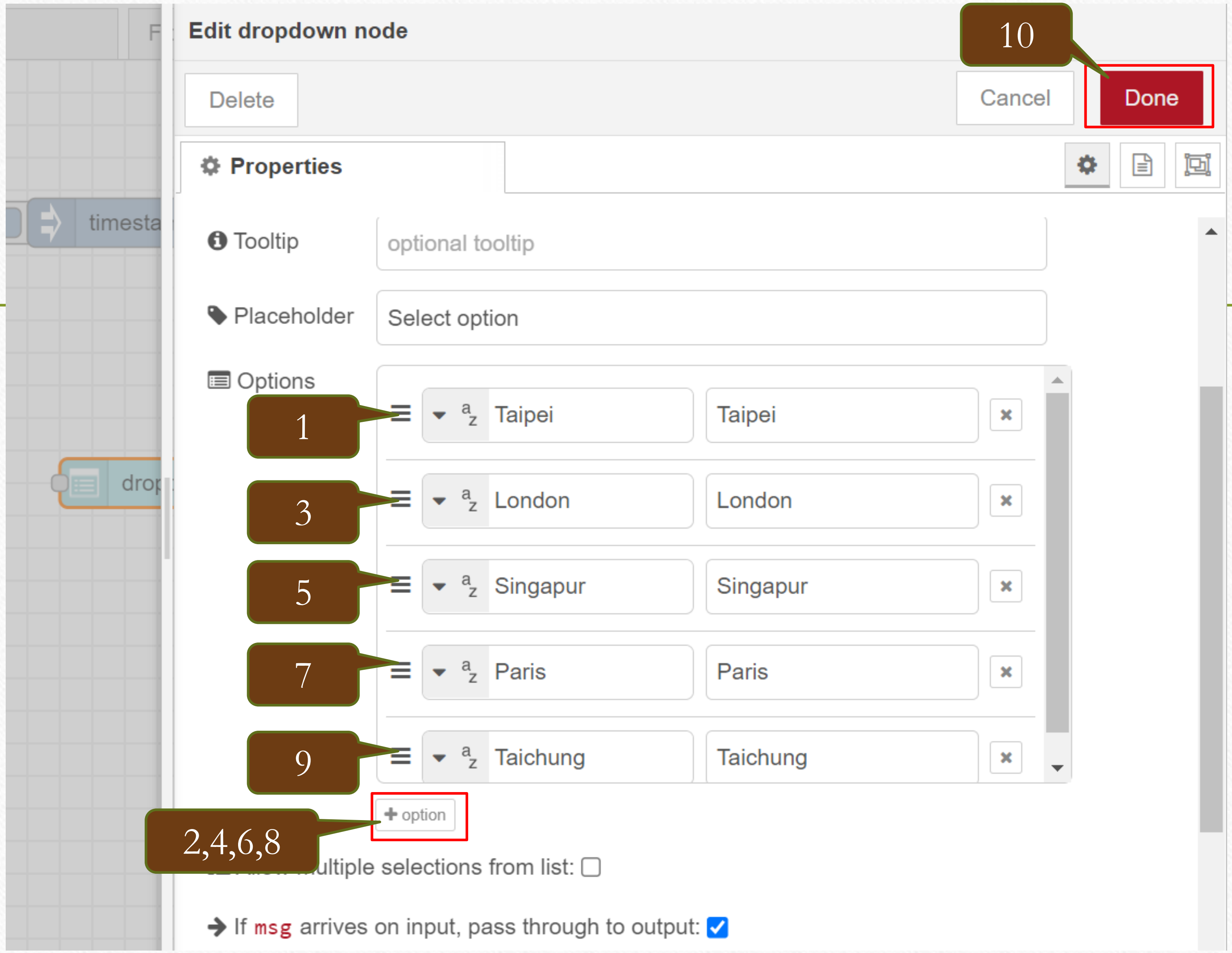
Class: Optional CSS class name(s) for widget

Width: 6

☑ Display group name

□ Allow group to be collapsed

Add



Tooltip: optional tooltip

Placeholder: Select option

Options

1	Taipei	Taipei
3	London	London
5	Singapur	Singapur
7	Paris	Paris
9	Taichung	Taichung

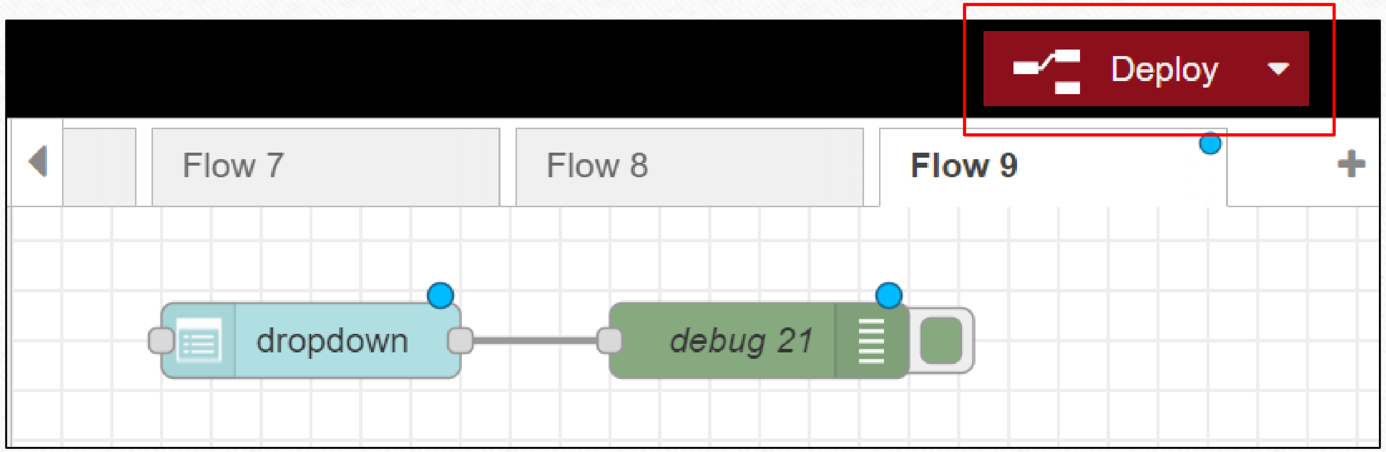
2,4,6,8 + option

Allow multiple selections from list: ☐

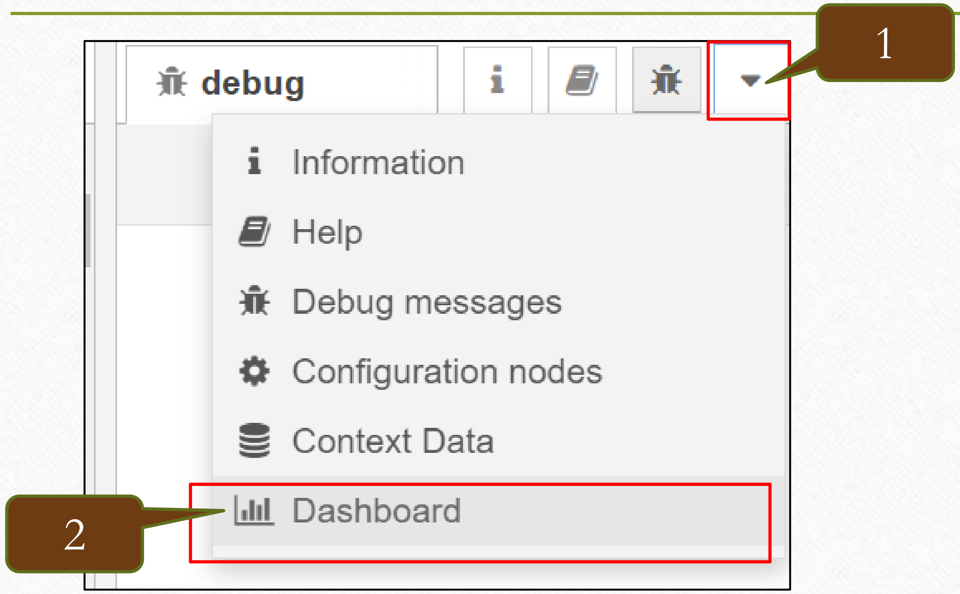
If msg arrives on input, pass through to output: ☑

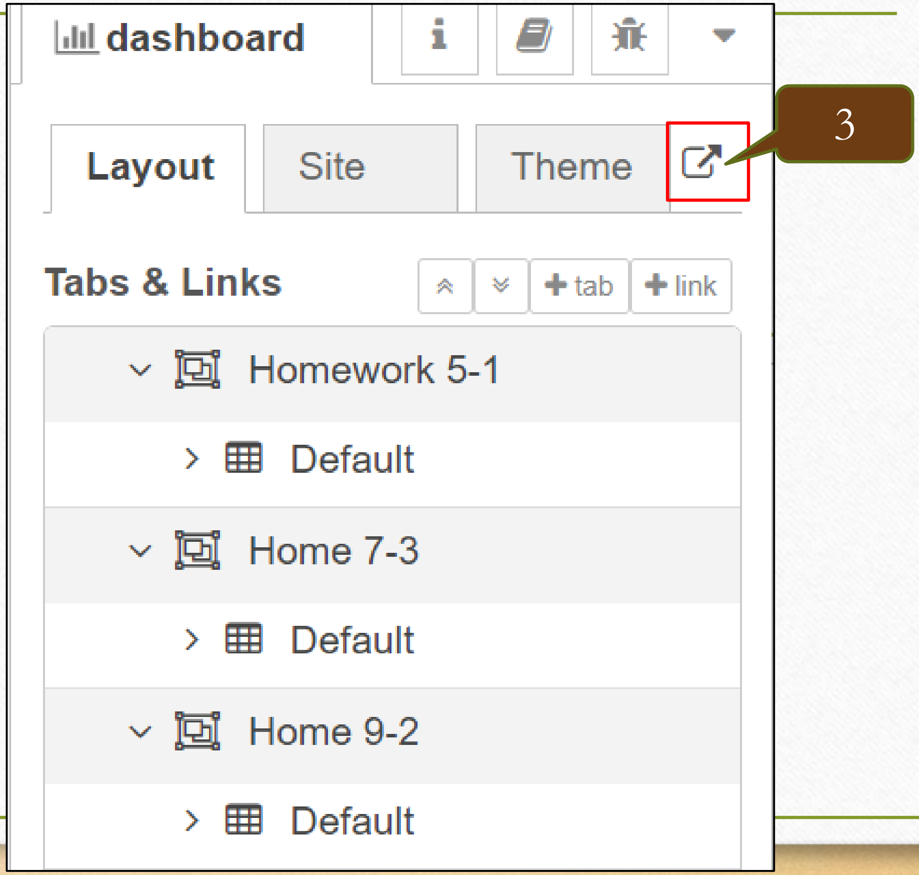
10 Done

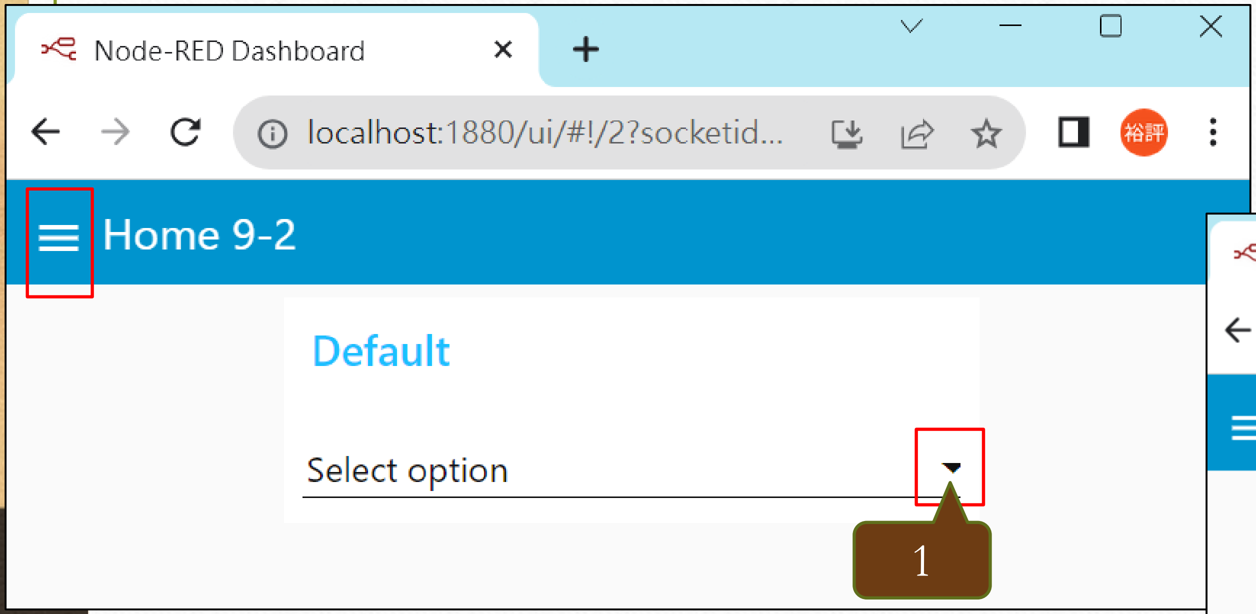
Add a debug node and Deploy



Go to Dashboard







Node-RED Dashboard

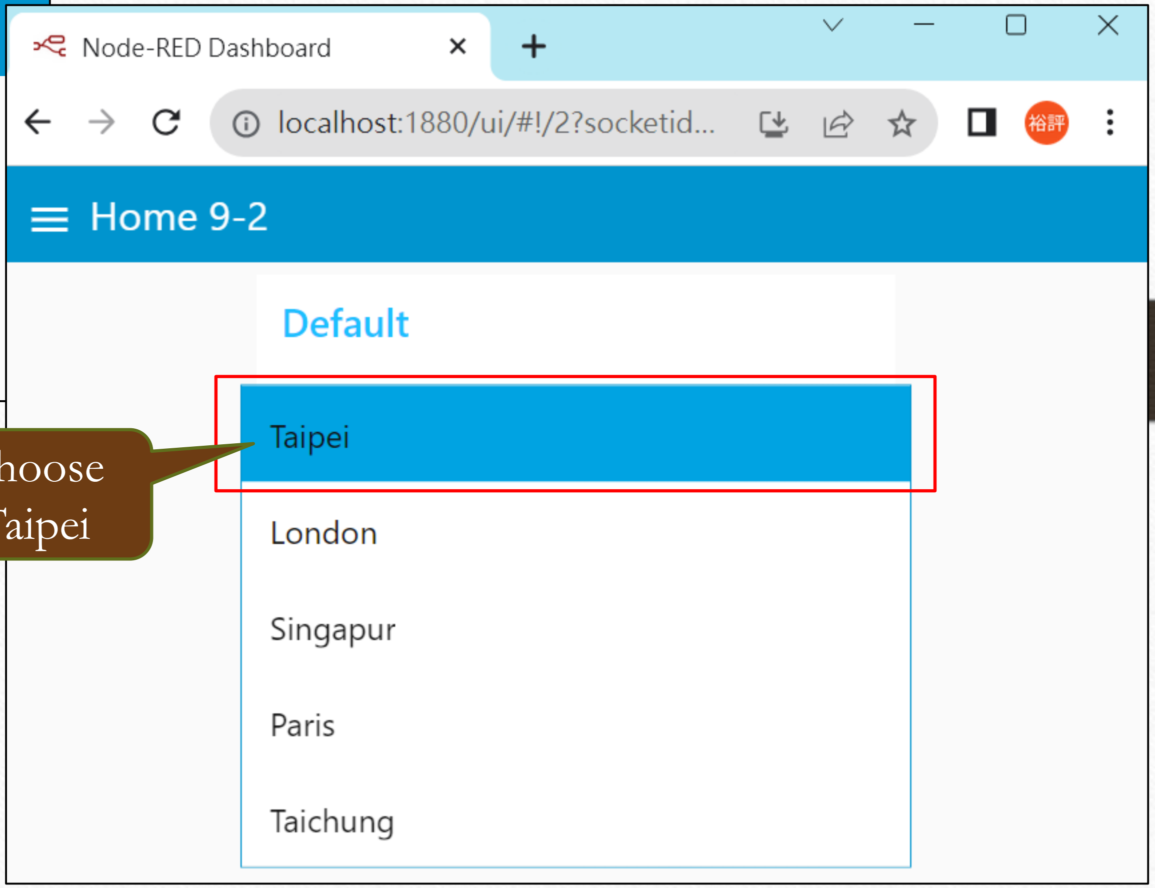
localhost:1880/ui/#!/2?socketid...

Home 9-2

Default

Select option

1



Node-RED Dashboard

localhost:1880/ui/#!/2?socketid...

Home 9-2

Default

Taipei

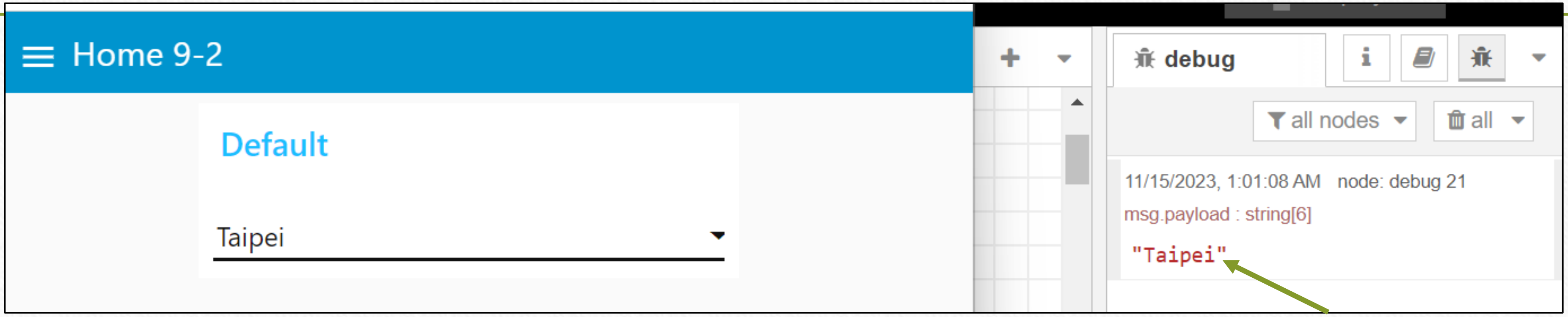
London

Singapur

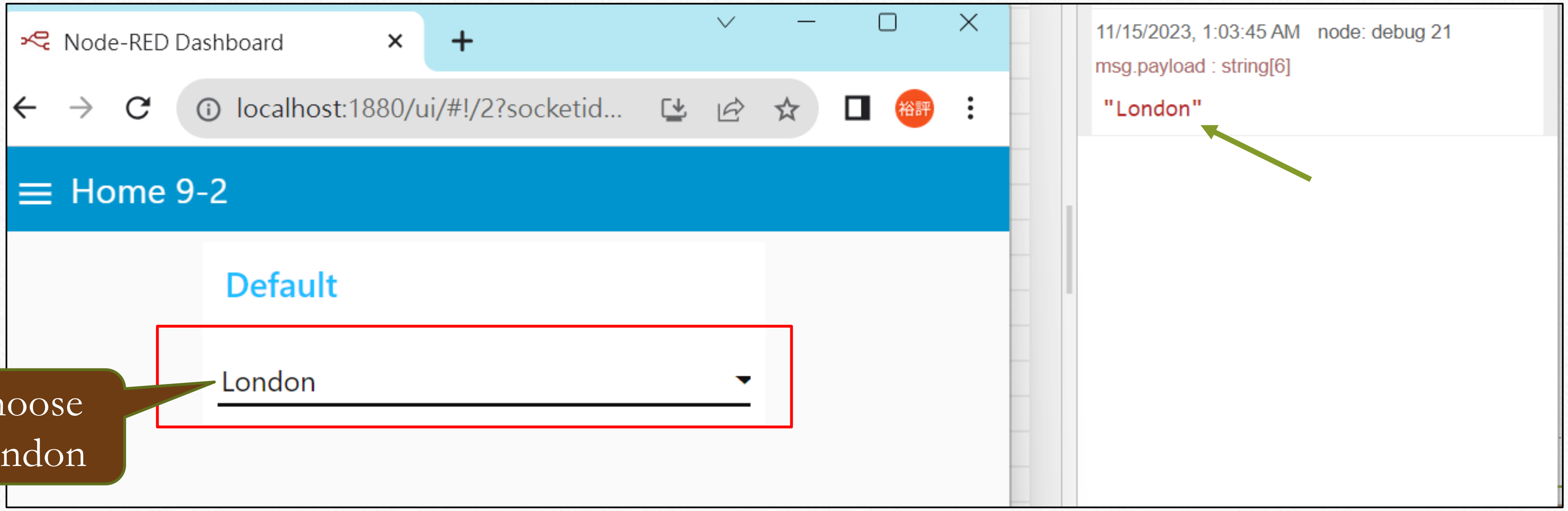
Paris

Taichung

Choose Taipei

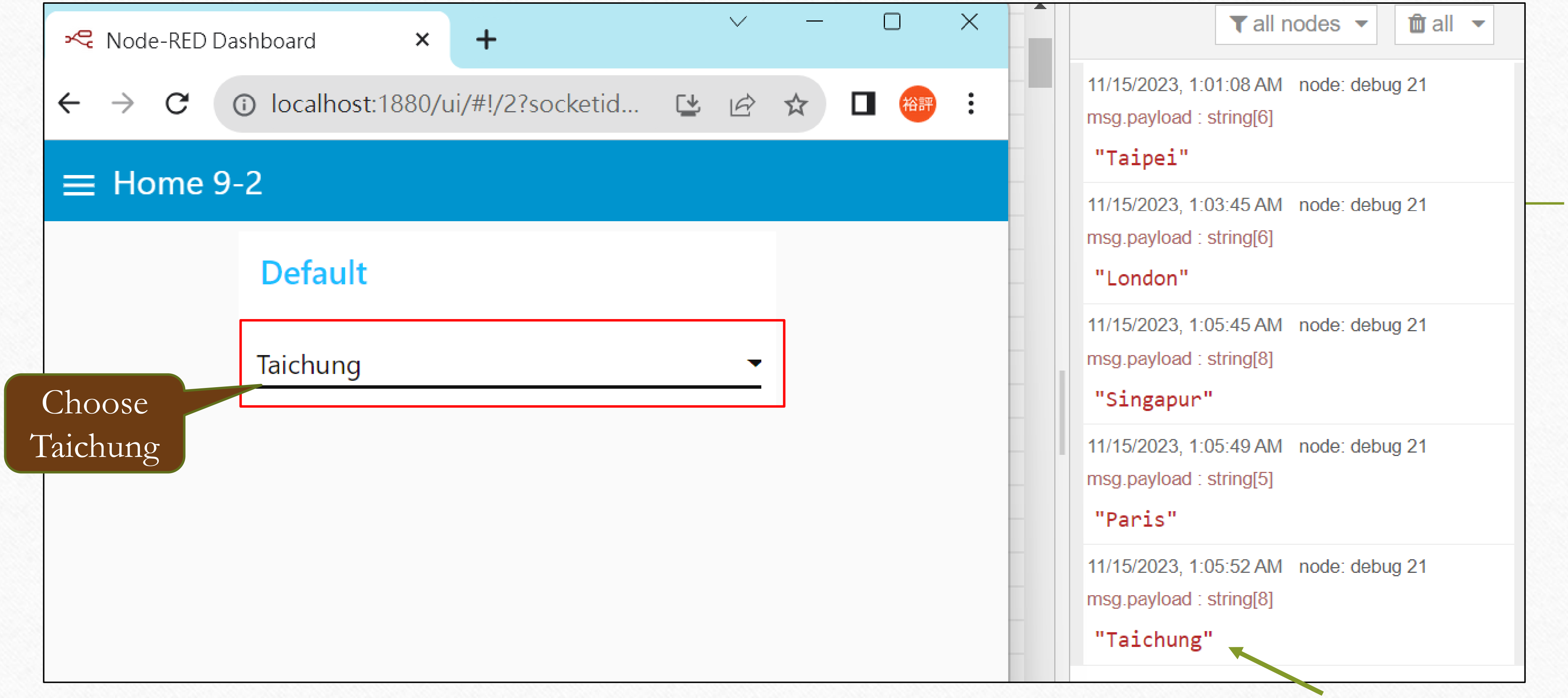


```
11/15/2023, 1:01:08 AM   node: debug 21
msg.payload : string[6]
"Taipei"
```



```
11/15/2023, 1:03:45 AM   node: debug 21
msg.payload : string[6]
"London"
```

Choose London

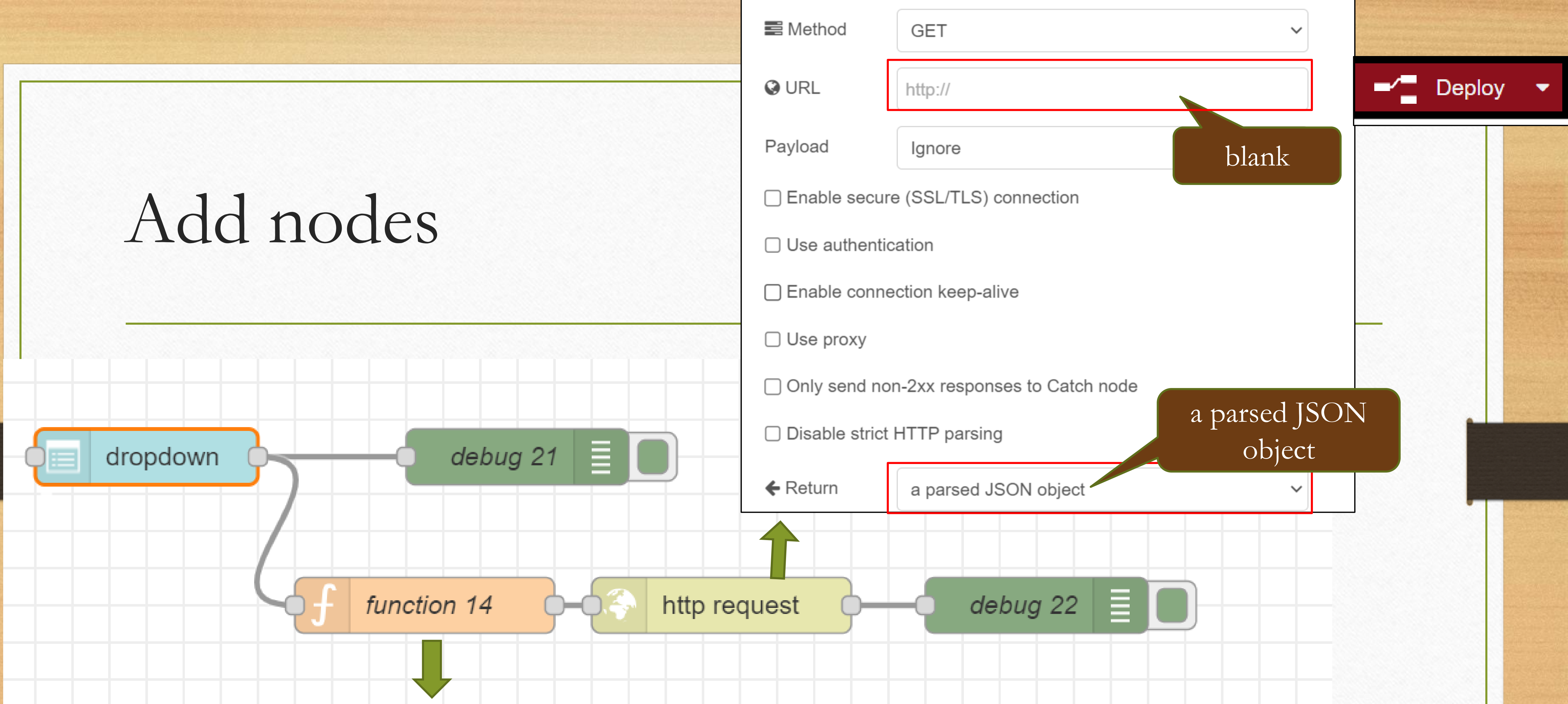


Taichung

```
11/15/2023, 1:01:08 AM   node: debug 21
msg.payload : string[6]
 "Taipei"
11/15/2023, 1:03:45 AM   node: debug 21
msg.payload : string[6]
 "London"
11/15/2023, 1:05:45 AM   node: debug 21
msg.payload : string[8]
 "Singapur"
11/15/2023, 1:05:49 AM   node: debug 21
msg.payload : string[5]
 "Paris"
11/15/2023, 1:05:52 AM   node: debug 21
msg.payload : string[8]
 "Taichung"
```

Choose Taichung

Add nodes



Method: GET

URL: http://

Payload: Ignore

□ Enable secure (SSL/TLS) connection

□ Use authentication

□ Enable connection keep-alive

□ Use proxy

□ Only send non-2xx responses to Catch node

□ Disable strict HTTP parsing

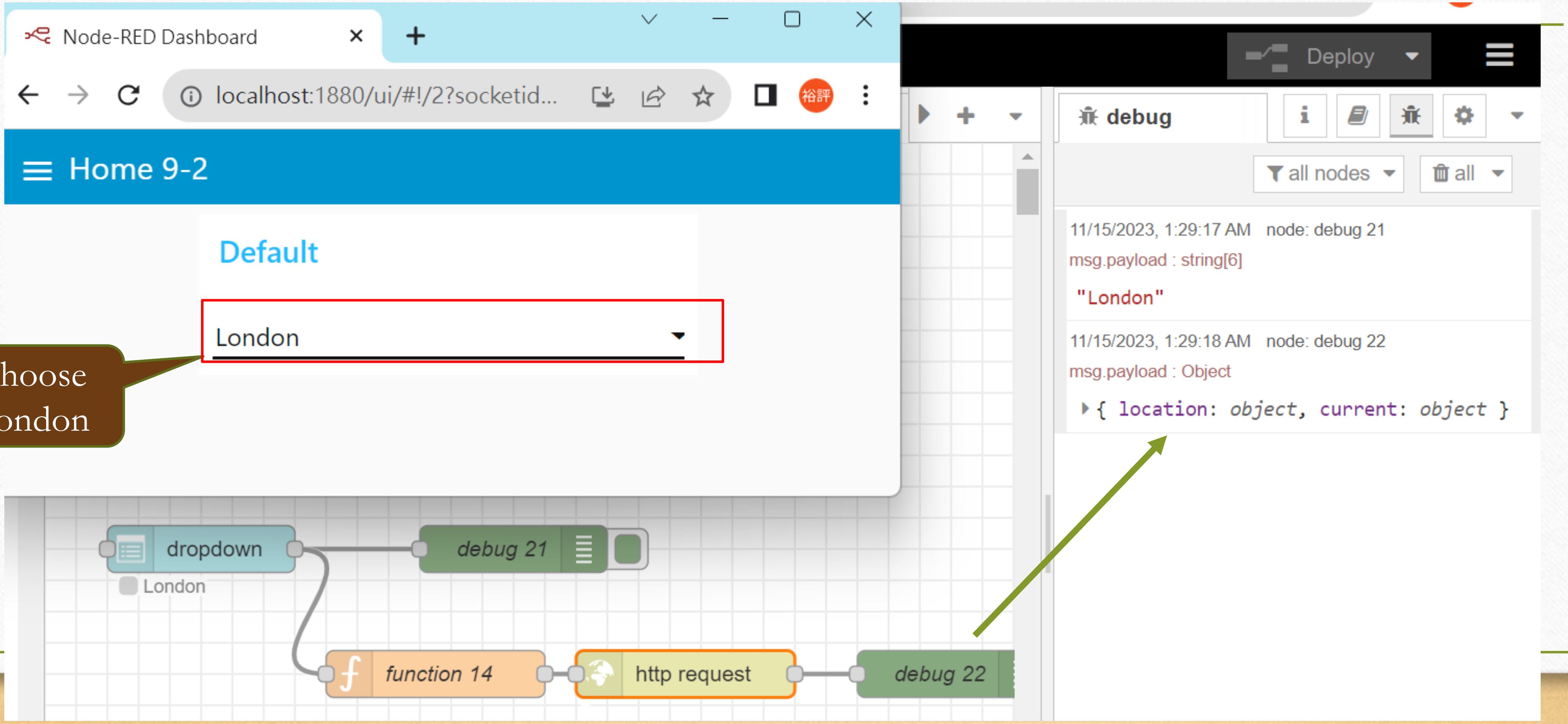
Return: a parsed JSON object

blank

a parsed JSON object

```
var city=msg.payload;
msg.url="https://api.weatherapi.com/v1/current.json?key=3xxx11&q="+city+"&aqi=yes";
return msg;
```

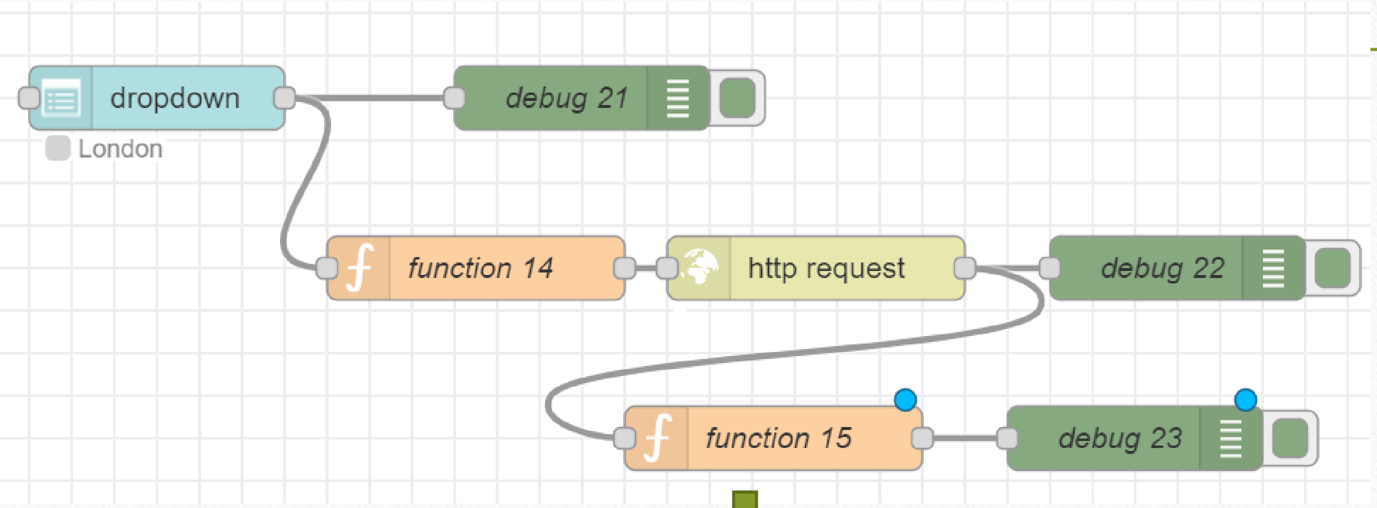
Test with choosing London



```
11/15/2023, 1:29:17 AM   node: debug 21
msg.payload : string[6]
 "London"
11/15/2023, 1:29:18 AM   node: debug 22
msg.payload : Object
 ▸{ location: object, current: object }
```

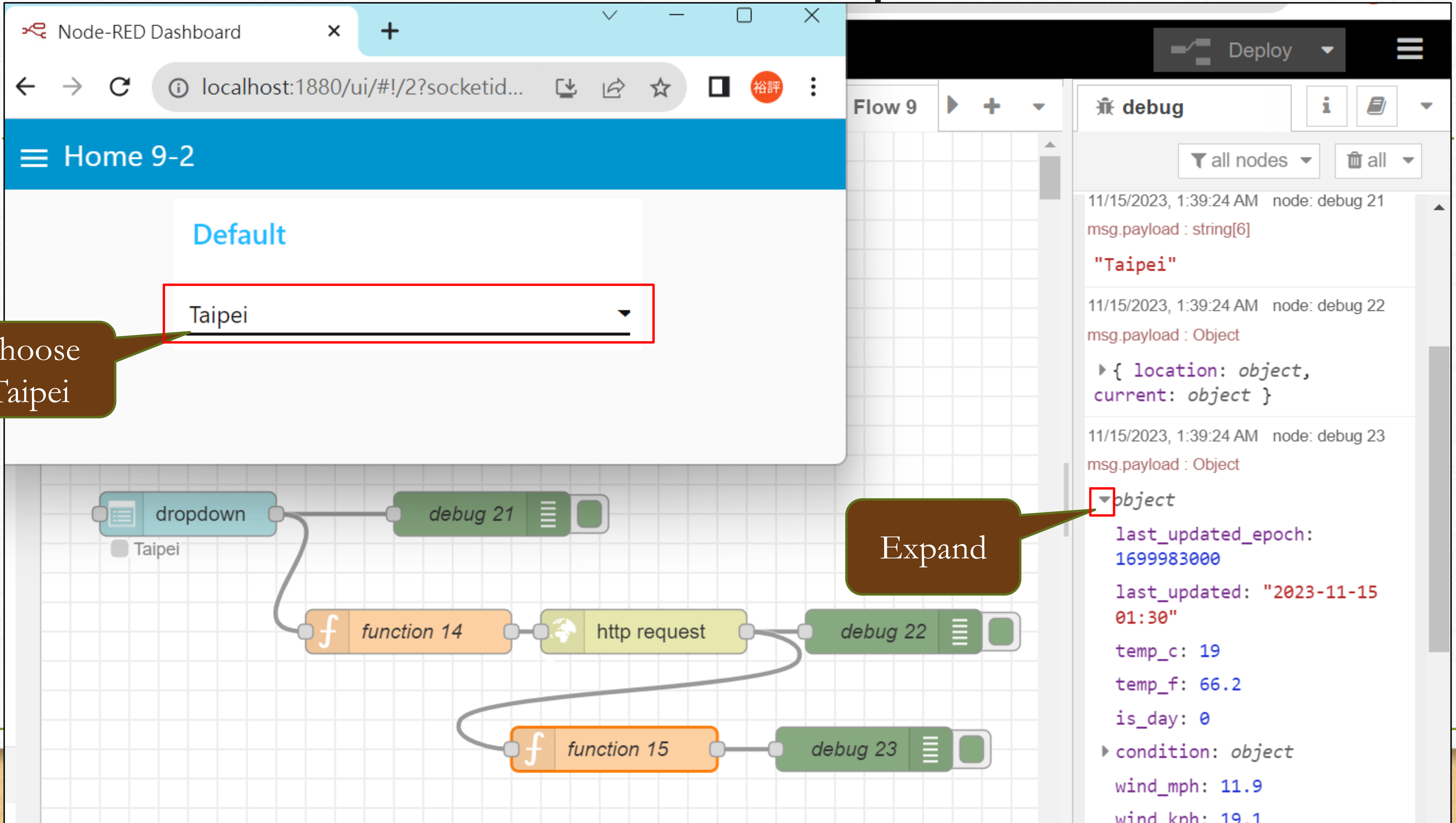
Choose London

Add a function node and a debug node



```
var obj = msg.payload;
var current = obj.current;
msg.payload = current;
return msg;
```

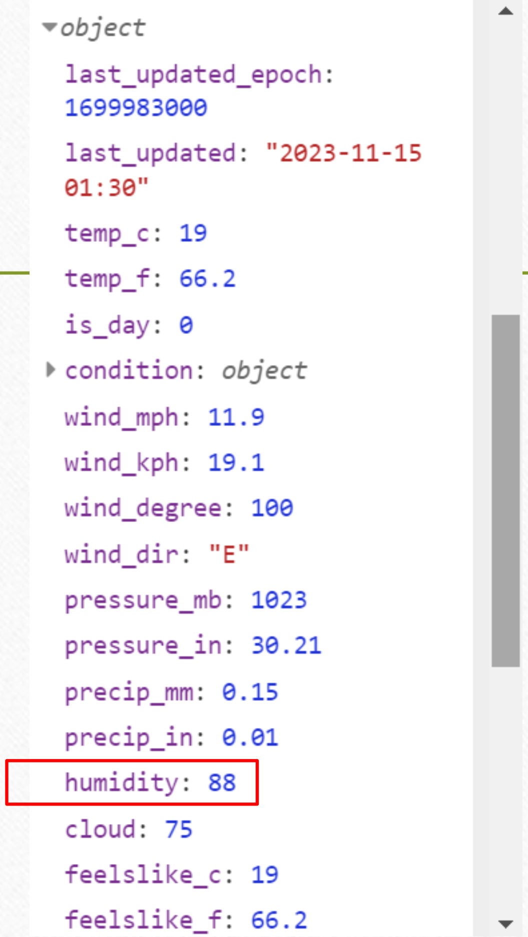
Choose Taipei



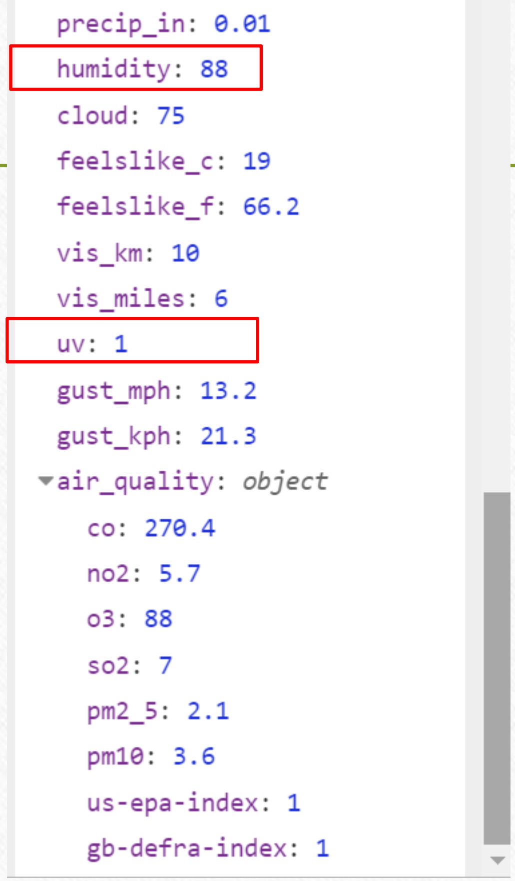
```
11/15/2023, 1:39:24 AM   node: debug 21
msg.payload : string[6]
"Taipei"

11/15/2023, 1:39:24 AM   node: debug 22
msg.payload : Object
▸{ location: object,
current: object }

11/15/2023, 1:39:24 AM   node: debug 23
msg.payload : Object
▾object
   last_updated_epoch:
   1699983000
   last_updated: "2023-11-15
   01:30"
   temp_c: 19
   temp_f: 66.2
   is_day: 0
 ▸condition: object
   wind_mph: 11.9
   wind_kph: 19.1
```

Choose Taipei

Expand

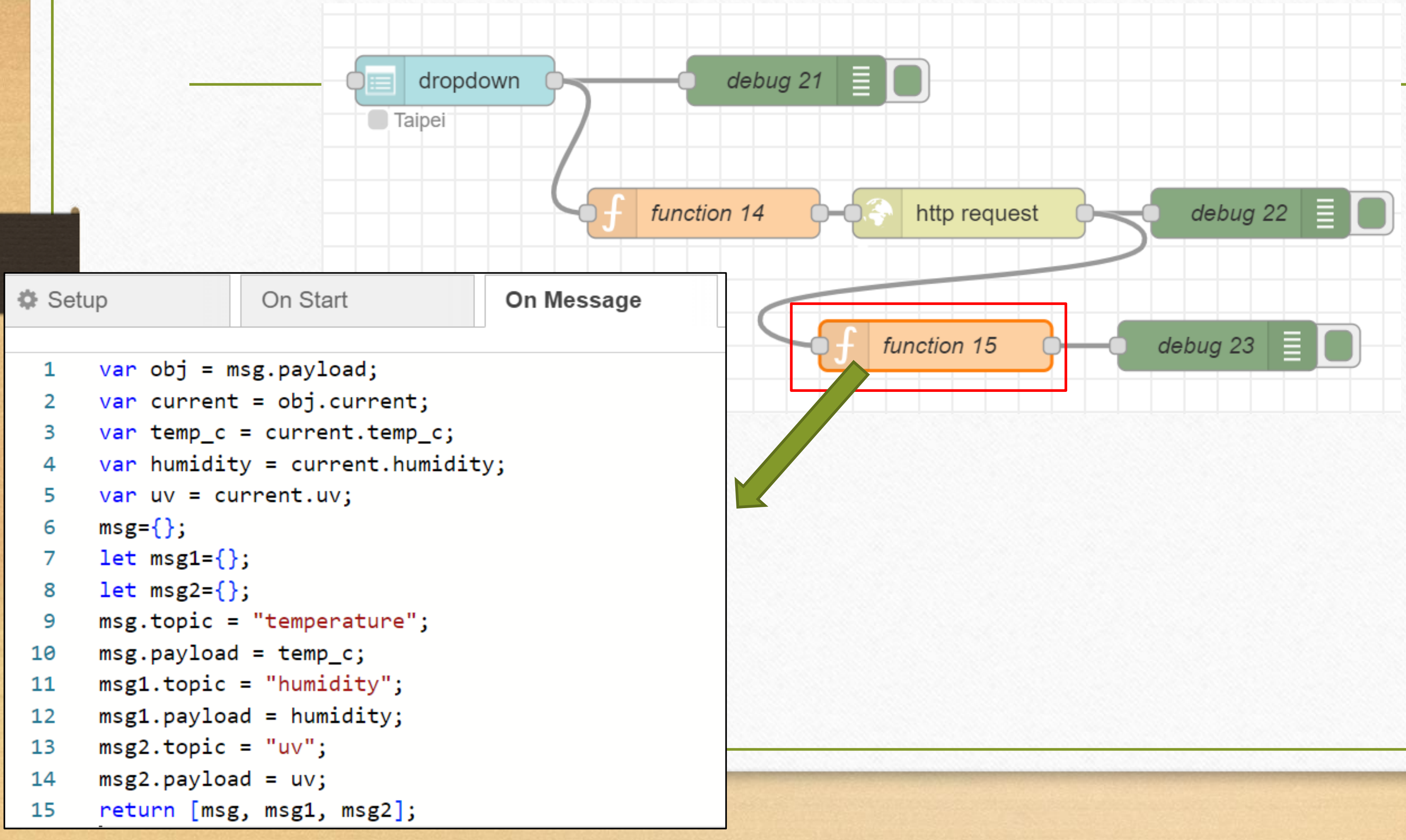


```
▾object
  last_updated_epoch:
  1699983000
  last_updated: "2023-11-15
  01:30"
  temp_c: 19
  temp_f: 66.2
  is_day: 0
 ▸condition: object
  wind_mph: 11.9
  wind_kph: 19.1
  wind_degree: 100
  wind_dir: "E"
  pressure_mb: 1023
  pressure_in: 30.21
  precip_mm: 0.15
  precip_in: 0.01
  humidity: 88
  cloud: 75
  feelslike_c: 19
  feelslike_f: 66.2
```

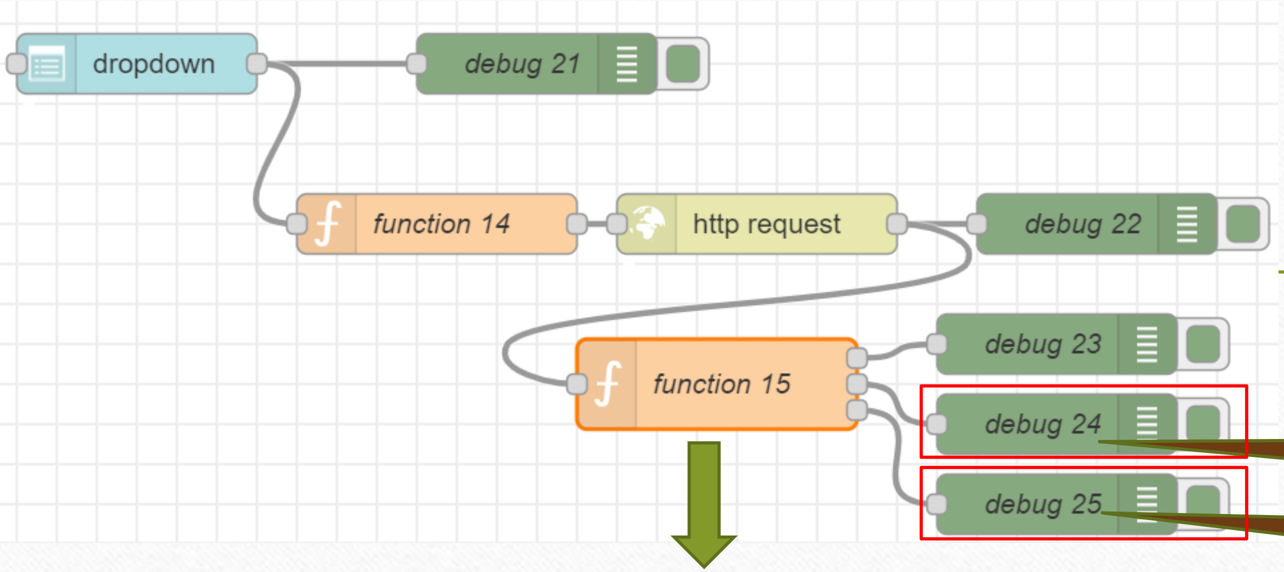


```
  precip_in: 0.01
  humidity: 88
  cloud: 75
  feelslike_c: 19
  feelslike_f: 66.2
  vis_km: 10
  vis_miles: 6
  uv: 1
  gust_mph: 13.2
  gust_kph: 21.3
 ▾air_quality: object
    co: 270.4
    no2: 5.7
    o3: 88
    so2: 7
    pm2_5: 2.1
    pm10: 3.6
    us-epa-index: 1
    gb-defra-index: 1
```

Edit function

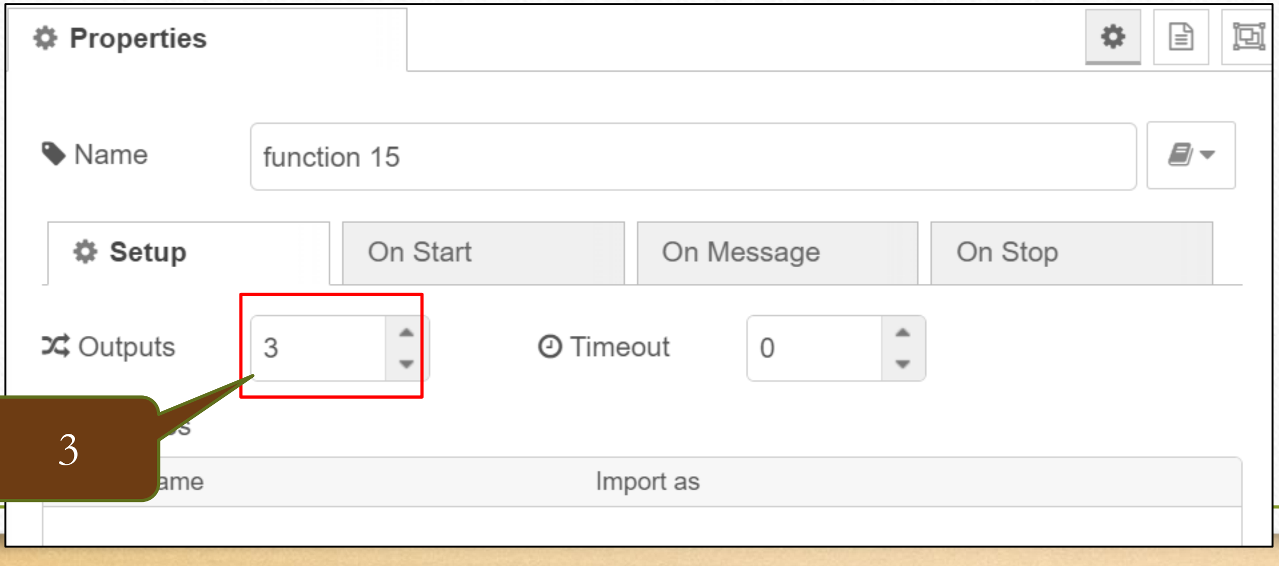


```
var obj = msg.payload;
var current = obj.current;
var temp_c = current.temp_c;
var humidity = current.humidity;
var uv = current.uv;
msg={};
let msg1={};
let msg2={};
msg.topic = "temperature";
msg.payload = temp_c;
msg1.topic = "humidity";
msg1.payload = humidity;
msg2.topic = "uv";
msg2.payload = uv;
return [msg, msg1, msg2];
```



Add

Add


Properties

Name: function 15

Setup | On Start | On Message | On Stop

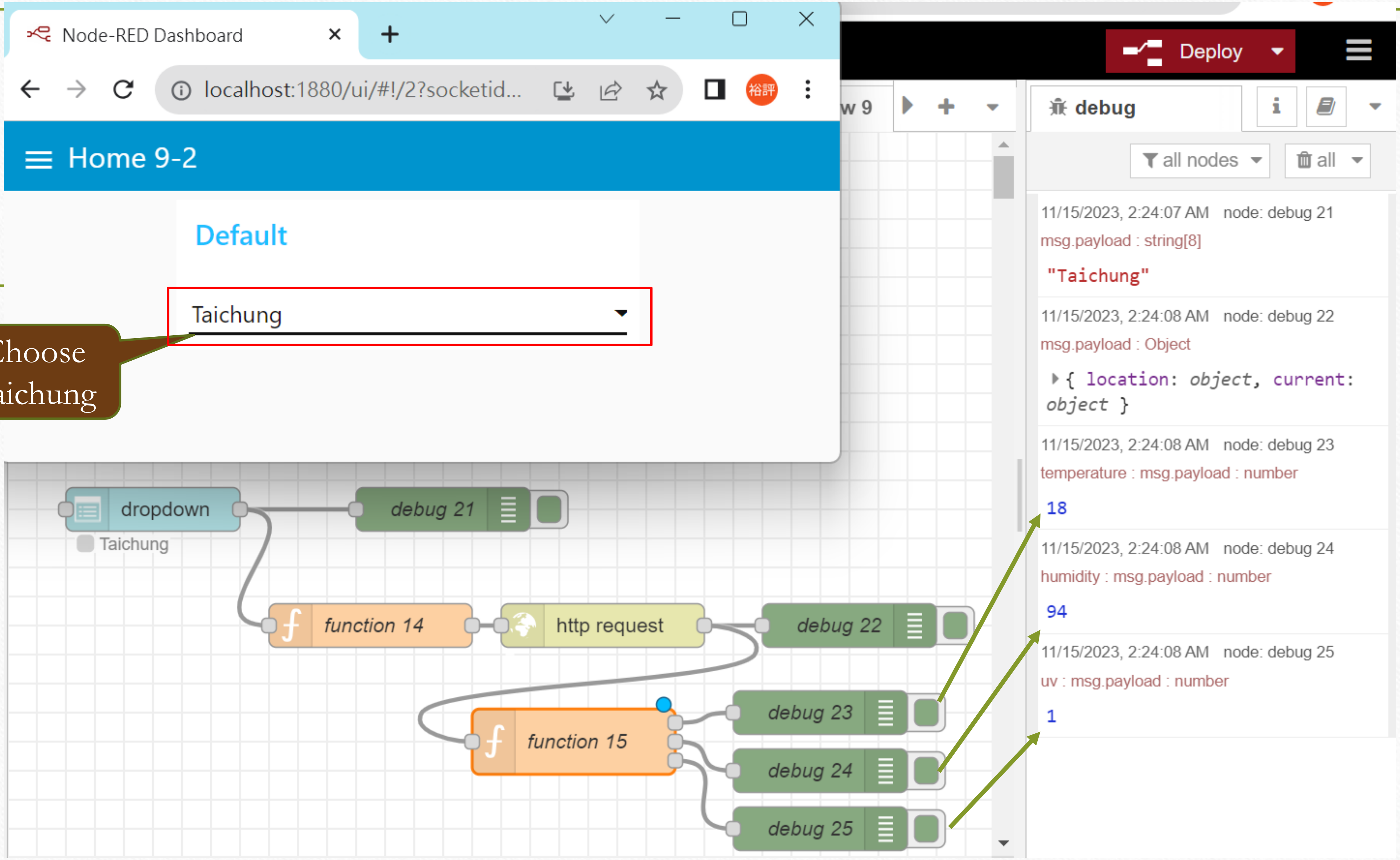
Outputs: 3

Timeout: 0

s

ame | Import as

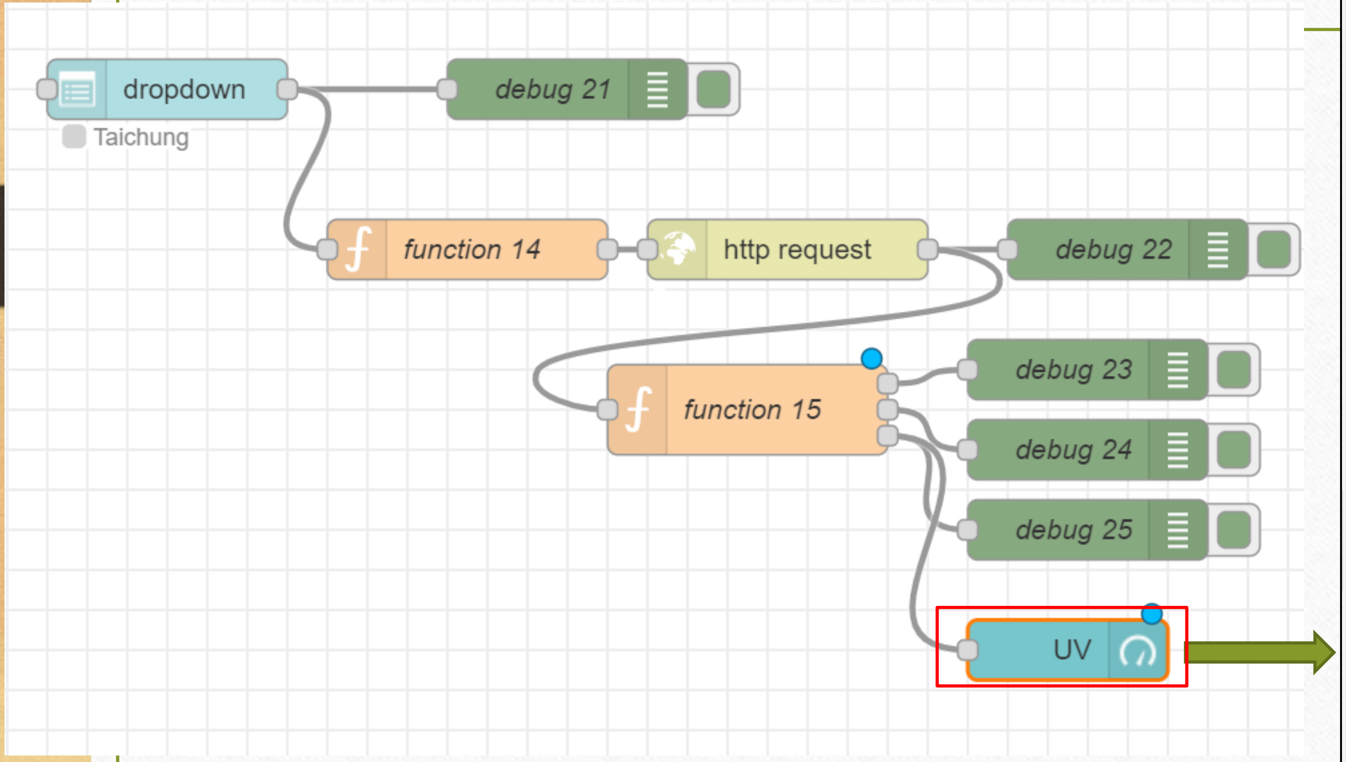
3

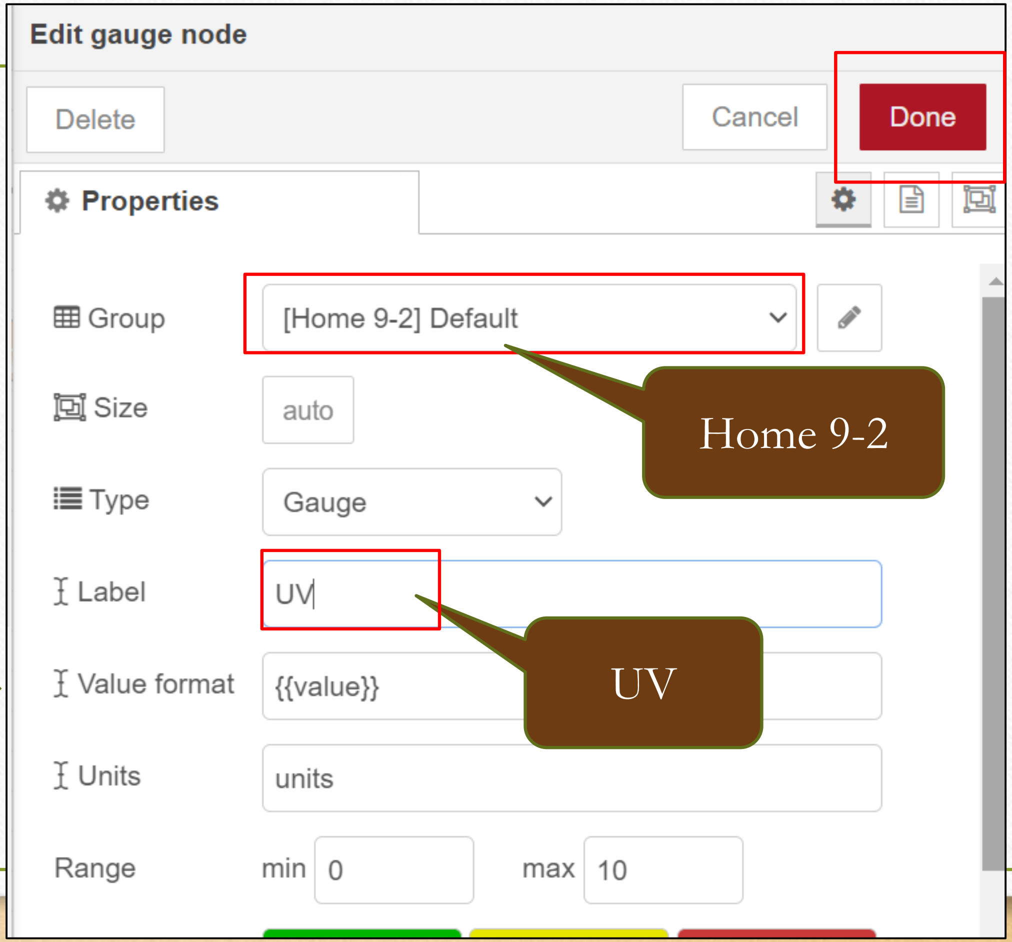


```
11/15/2023, 2:24:07 AM   node: debug 21
msg.payload : string[8]
"Taichung"

11/15/2023, 2:24:08 AM   node: debug 22
msg.payload : Object
▸{ location: object, current:
object }

11/15/2023, 2:24:08 AM   node: debug 23
temperature : msg.payload : number
18

11/15/2023, 2:24:08 AM   node: debug 24
humidity : msg.payload : number
94

11/15/2023, 2:24:08 AM   node: debug 25
uv : msg.payload : number
1
```

Choose Taichung

Add a gauge




Edit gauge node

Group: [Home 9-2] Default

Size: auto

Type: Gauge

Label: UV

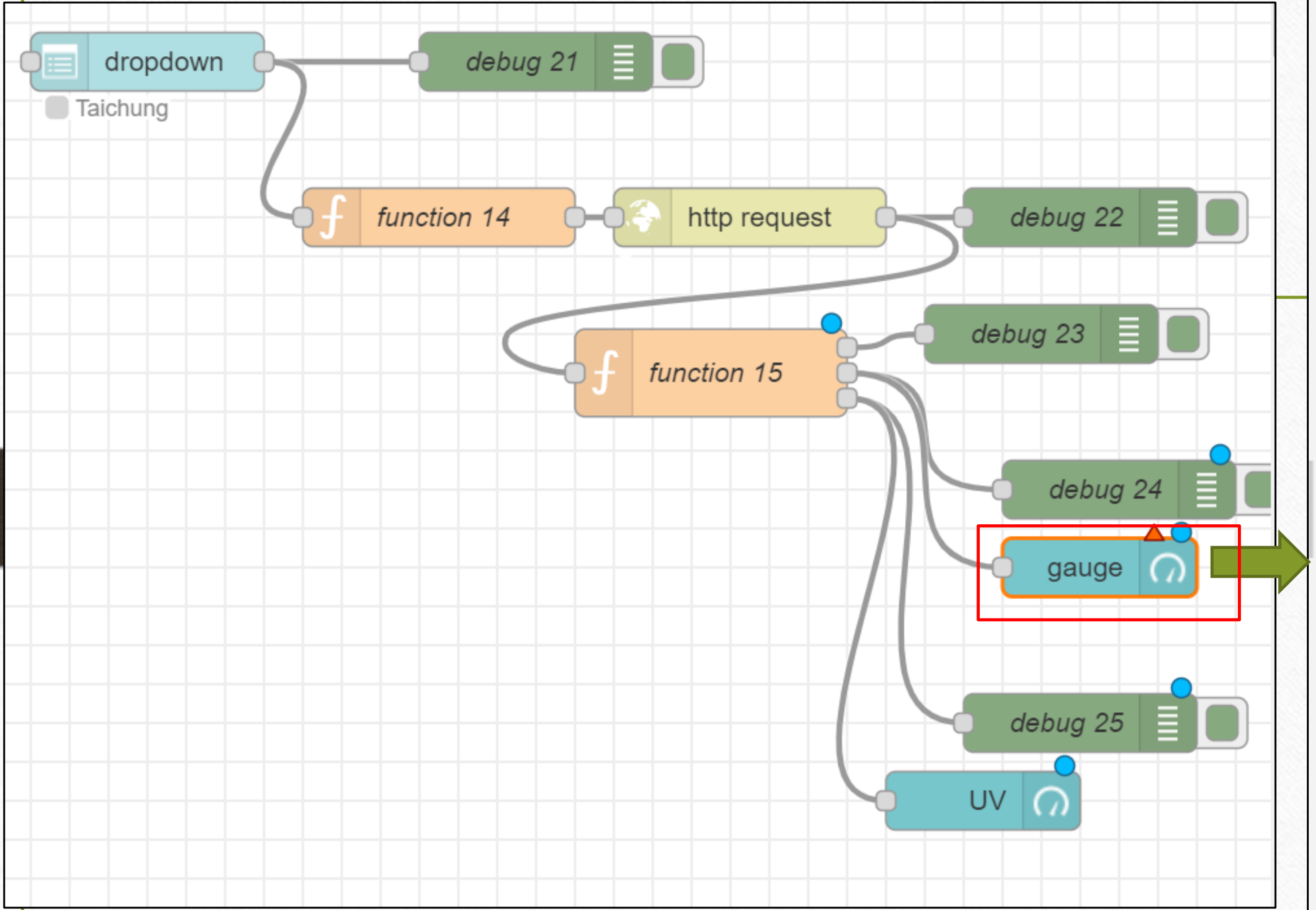
Value format: {{value}}

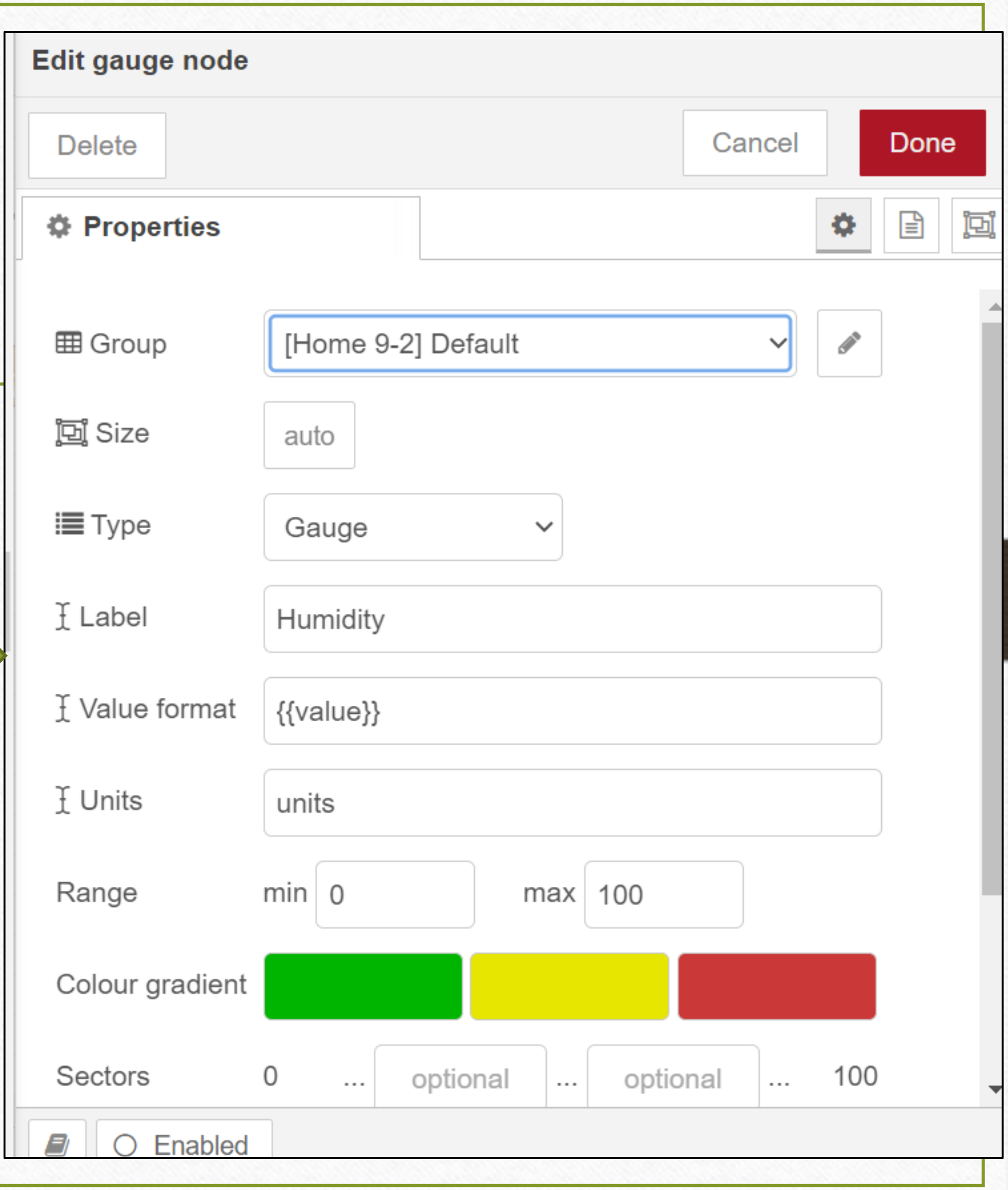
Units: units

Range: min 0 max 10

Home 9-2

UV





Edit gauge node

Properties

Group: [Home 9-2] Default

Size: auto

Type: Gauge

Label: Humidity

Value format: {{value}}

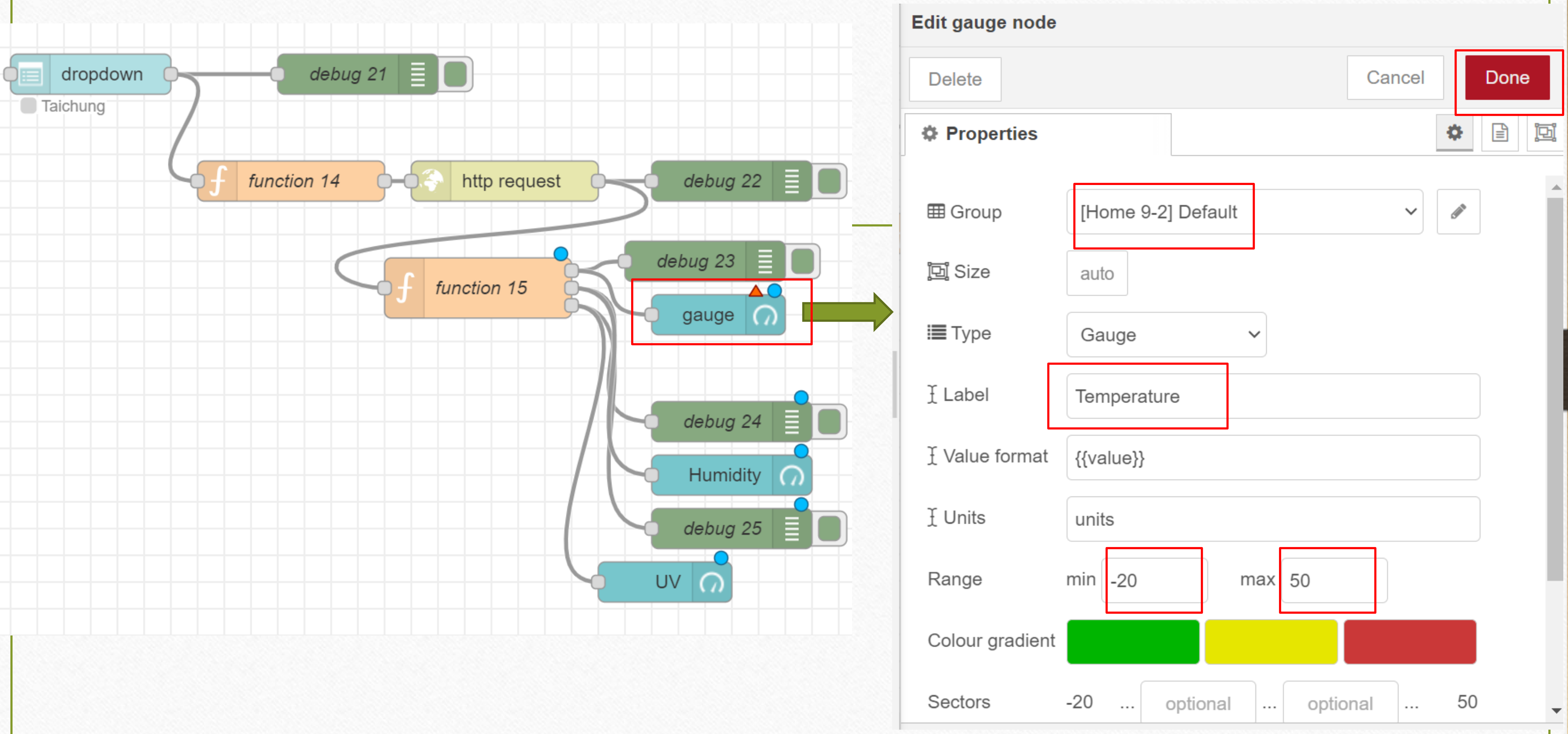
Units: units

Range: min 0 max 100

Colour gradient: 🟩 🟨 🟥

Sectors: 0 ... optional ... optional ... 100

○ Enabled



Edit gauge node

Group [Home 9-2] Default

Size auto

Type Gauge

Label Temperature

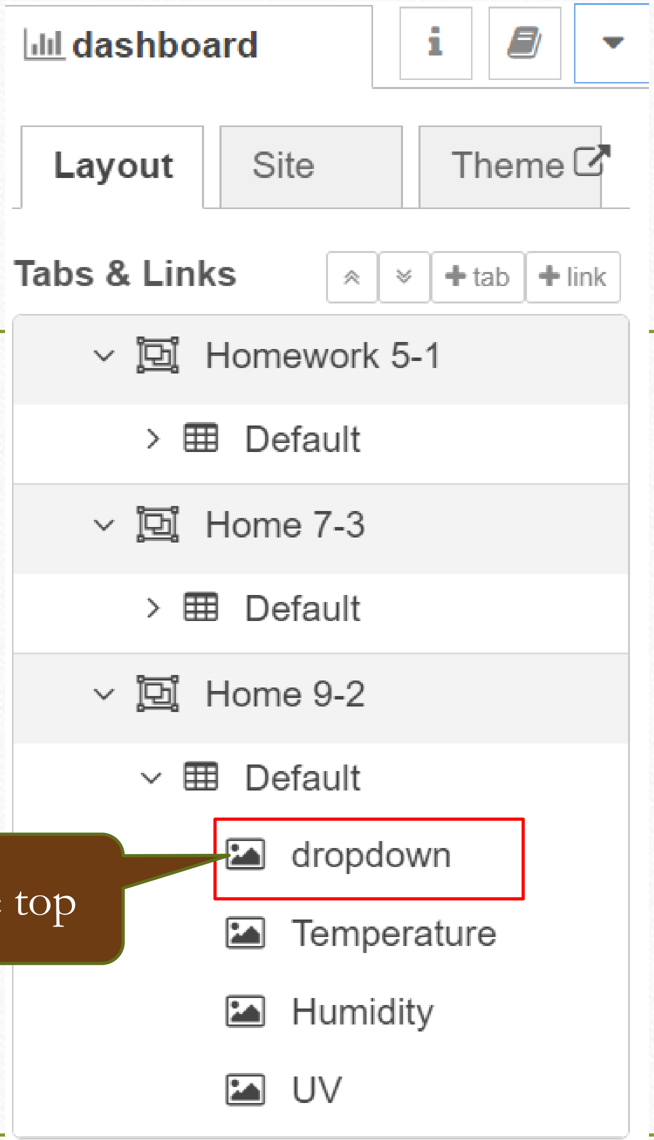
Value format {{value}}

Units units

Range min -20 max 50

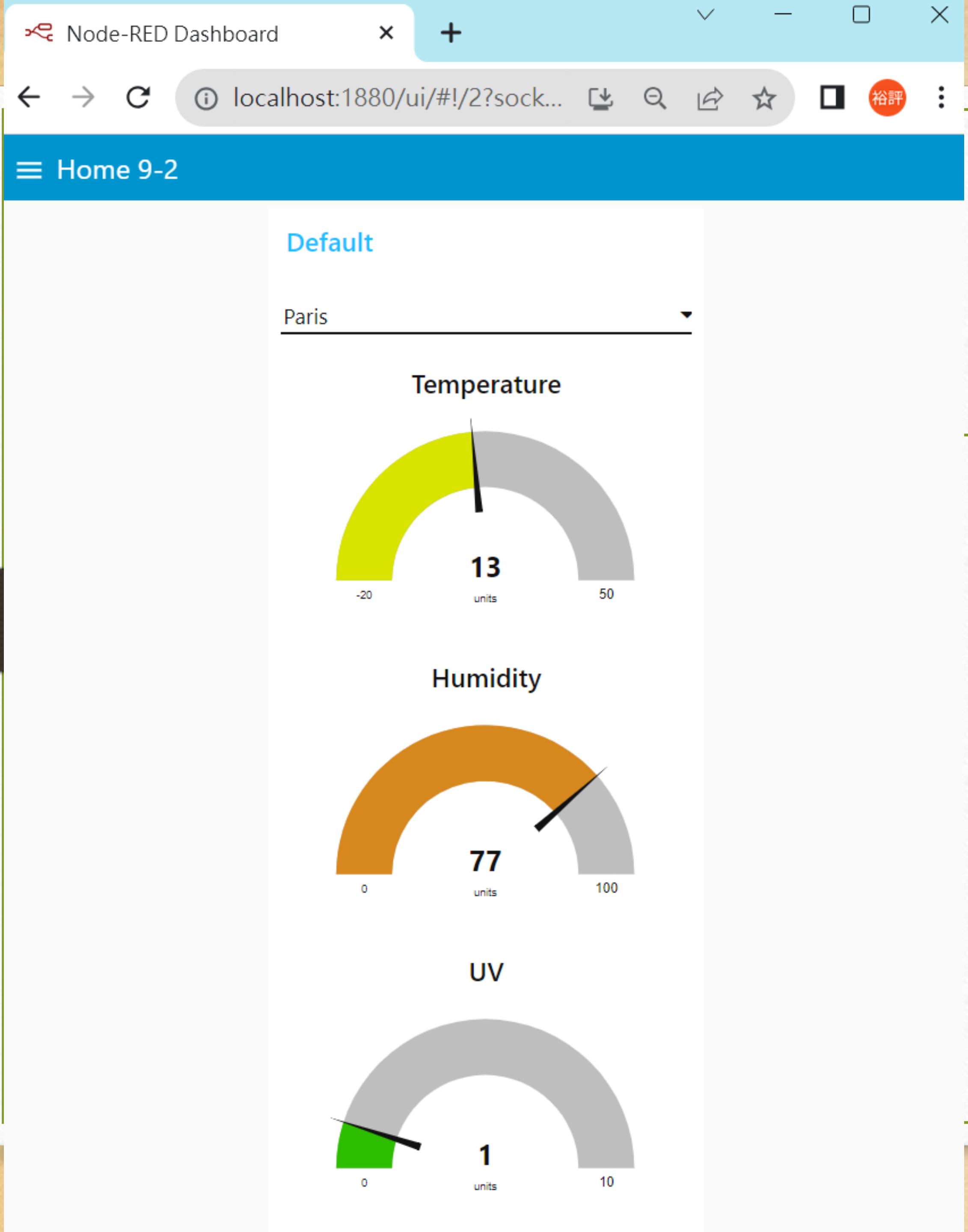
Colour gradient 🟩 🟨 🟥

Sectors -20 ... optional ... optional ... 50



- Homework 5-1
  - Default
- Home 7-3
  - Default
- Home 9-2
  - Default
    - dropdown
    - Temperature
    - Humidity
    - UV

Move to the top



Paris

Temperature

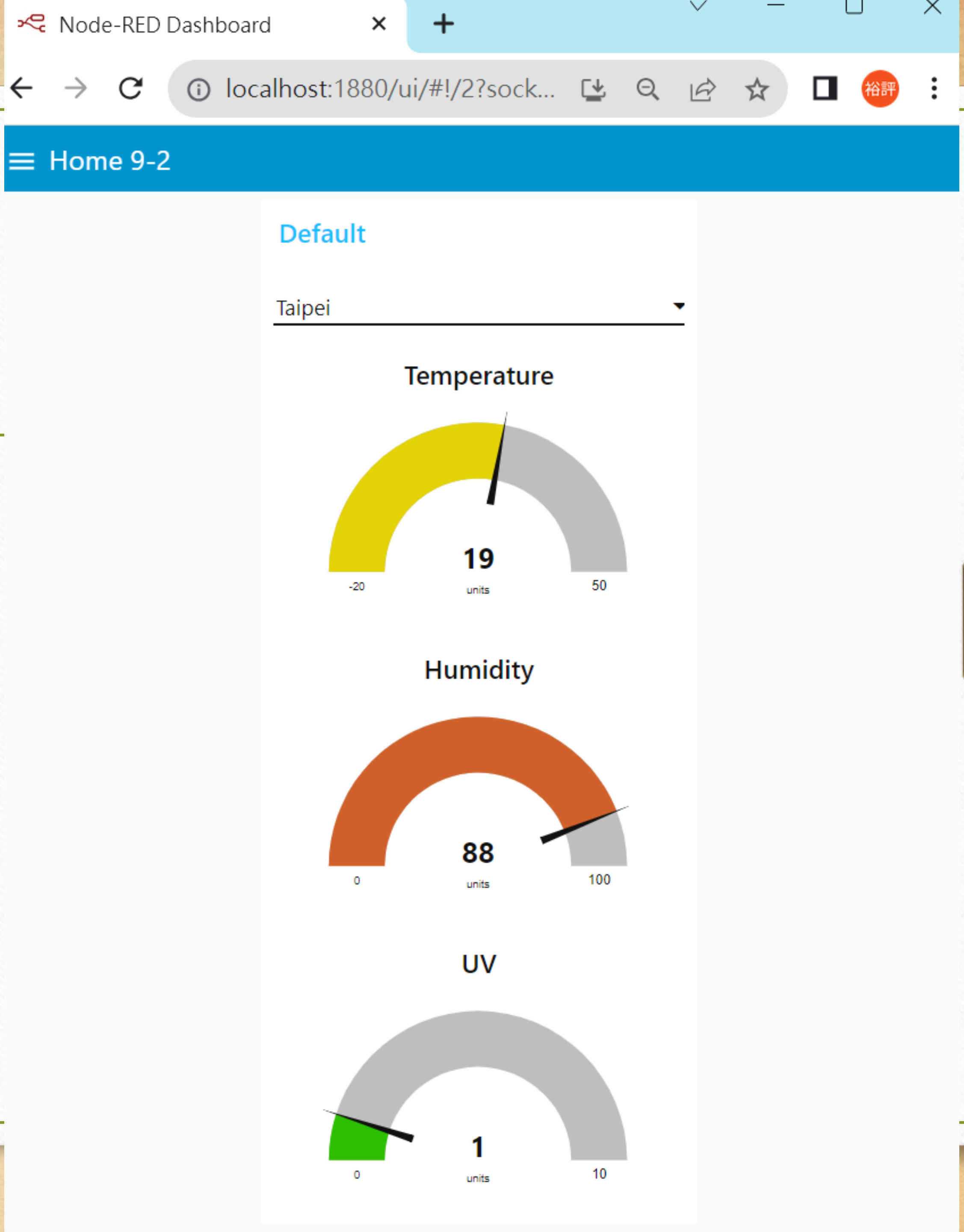
13 units (-20 – 50)

Humidity

77 units (0 – 100)

UV

1 units (0 – 10)



Taipei

Temperature

19 units (-20 – 50)

Humidity

88 units (0 – 100)

UV

1 units (0 – 10)

Homework 2: Design ten cities weather station

- London
- Singapur
- Shanghai
- Taipei
- Taichung
- Taoyuan
- New York
- ??
- ??
- ??