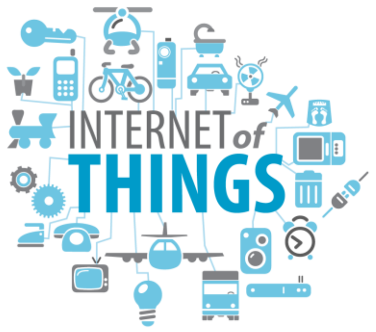
UNIVERSITY OF SCIENCE - VNUHCM

Faculty of Information Technology

INTERNET OF THINGS

4.1

MQTT IN ESP32 SIMULATOR



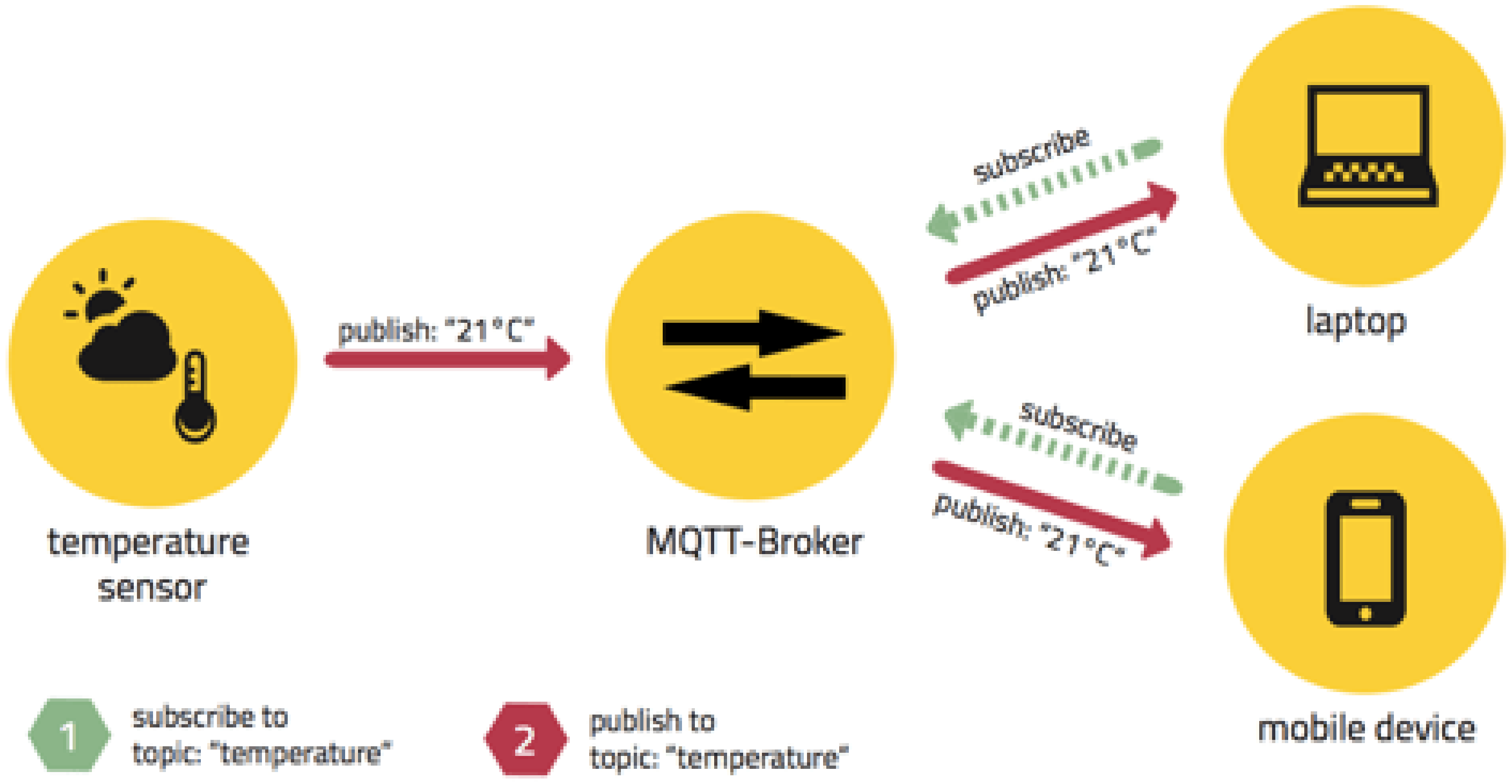
LECTURER: CAO XUÂN NAM

MQTT in ESP32 SIMULATOR

WHAT IS MQTT?

- **MQTT (Message Queuing Telemetry Transport)** is a publish-subscribe network protocol that transports messages between devices.

HOW DOES MQTT WORK?



broker.mqtt-dashboard.com

test.mosquitto.org

broker.hivemq.com

MQTT BROKER

Send message to MQTT

1. Add ***PubSubClient*** Library
2. Include lib in program

```
#include <WiFi.h>
#include "PubSubClient.h"

const char* ssid = "Wokwi-GUEST";
const char* password = "";
const char* mqttServer = "test.mosquitto.org";
int port = 1883;

WiFiClient espClient;
PubSubClient client(espClient);
```

```
void wifiConnect() {
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println(" Connected!");
}

void setup() {
  Serial.begin(9600);
  Serial.print("Connecting to WiFi");

  wifiConnect();

  client.setServer(mqttServer, port);
}
```

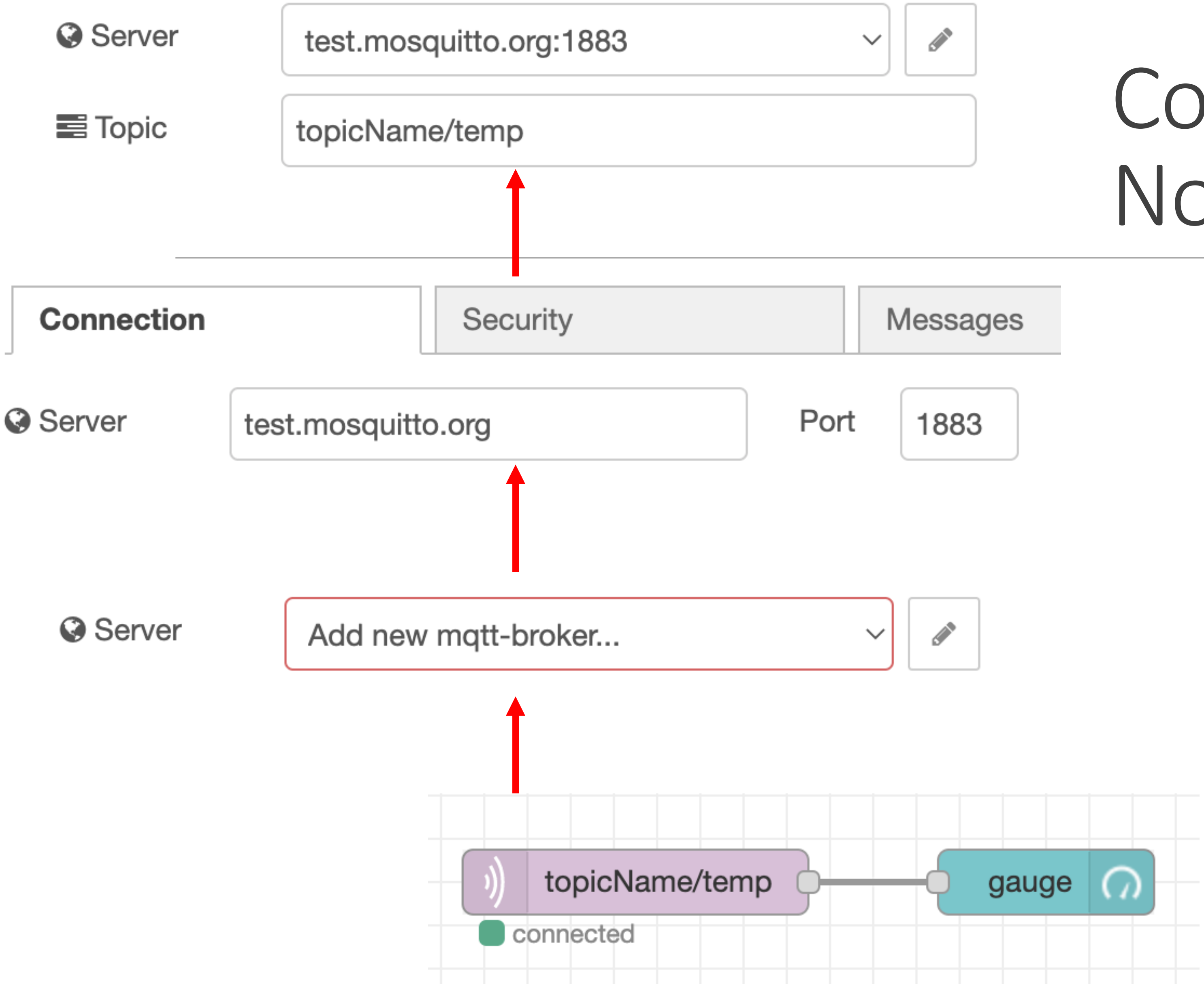
Set unique-id your device

```
void mqttReconnect() {
  while (!client.connected()) {
    Serial.print("Attempting MQTT connection...");
    if (client.connect("12345678")) {
      Serial.println(" connected");
    } else {
      Serial.println(" try again in 5 seconds");
      delay(5000);
    }
  }
}
```

```
void loop() {
  if (!client.connected()) {
    mqttReconnect();
  }
  client.loop();

  int temp = random(0, 100);
  char buffer[50];
  sprintf(buffer, "%d", temp);
  client.publish("topicName/temp", buffer);
  delay(5000);
}
```

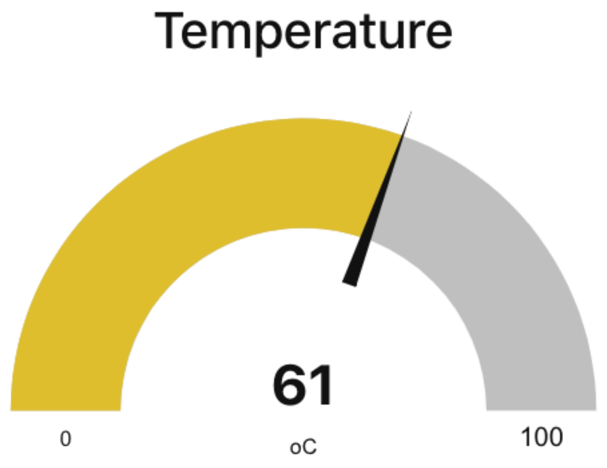
Config *"MQTT in"* in Node-RED


Server: test.mosquitto.org:1883
Topic: topicName/temp

Connection | Security | Messages

Server: test.mosquitto.org
Port: 1883

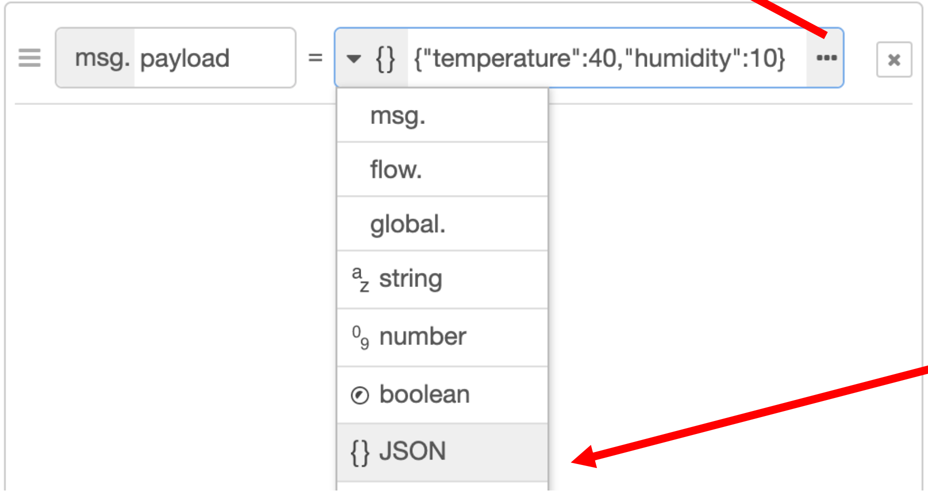
Server: Add new mqtt-broker...



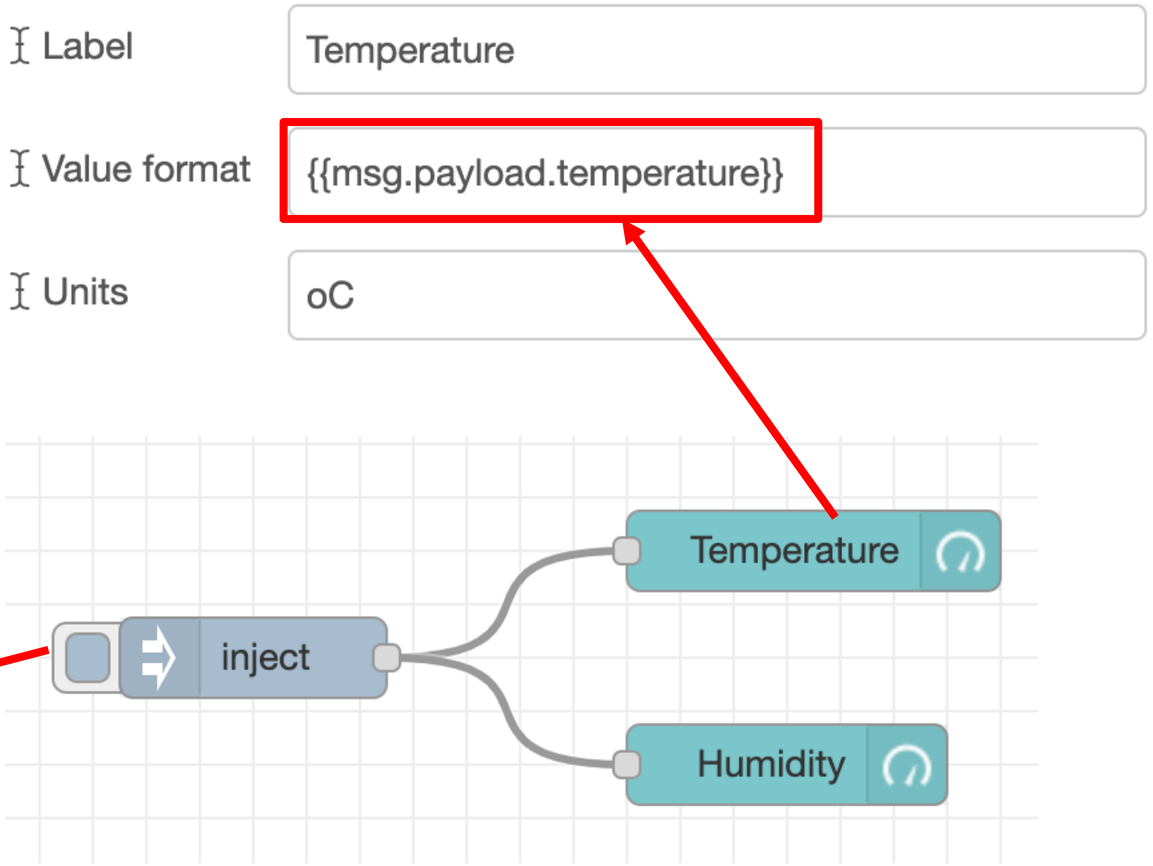
Send real temperature from DHT22 to Node-RED

JSON

```
{
    "temperature": 40,
    "humidity": 10
}
```



msg. payload = {} {"temperature":40,"humidity":10}



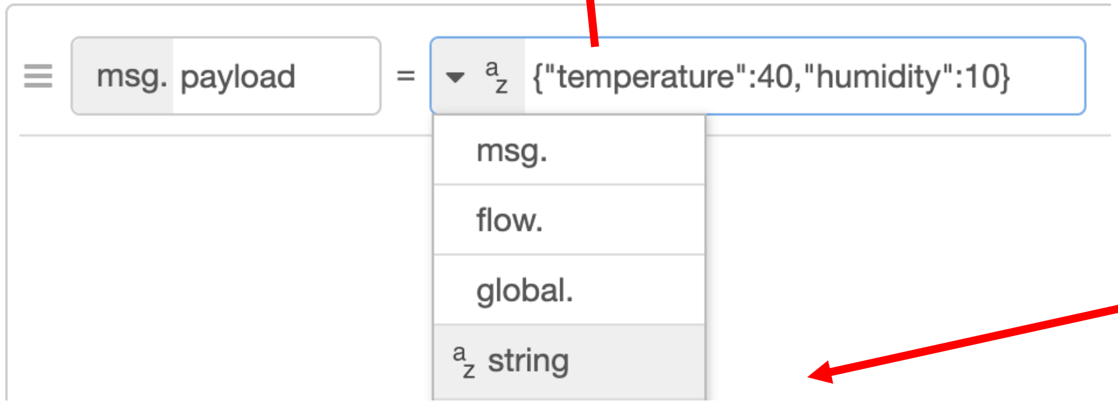
Label: Temperature

Value format: {{msg.payload.temperature}}

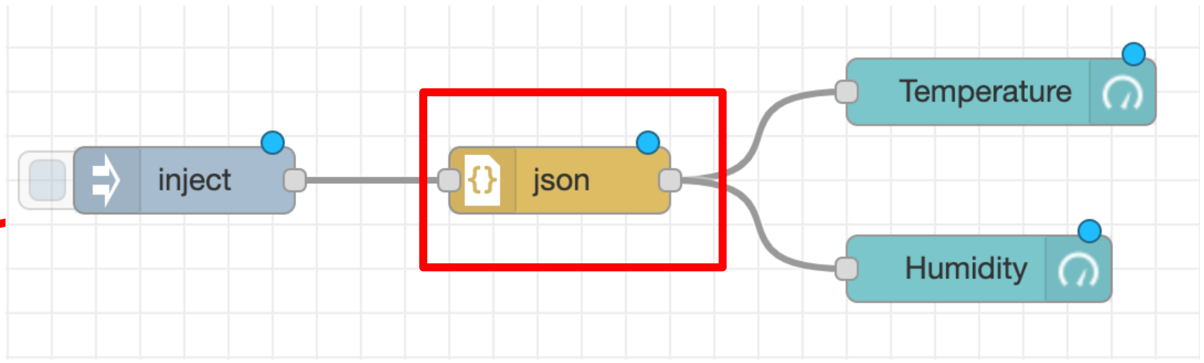
Units: oC

Parse JSON string

{"temperature":40,"humidity":10}



msg. payload = {"temperature":40,"humidity":10}



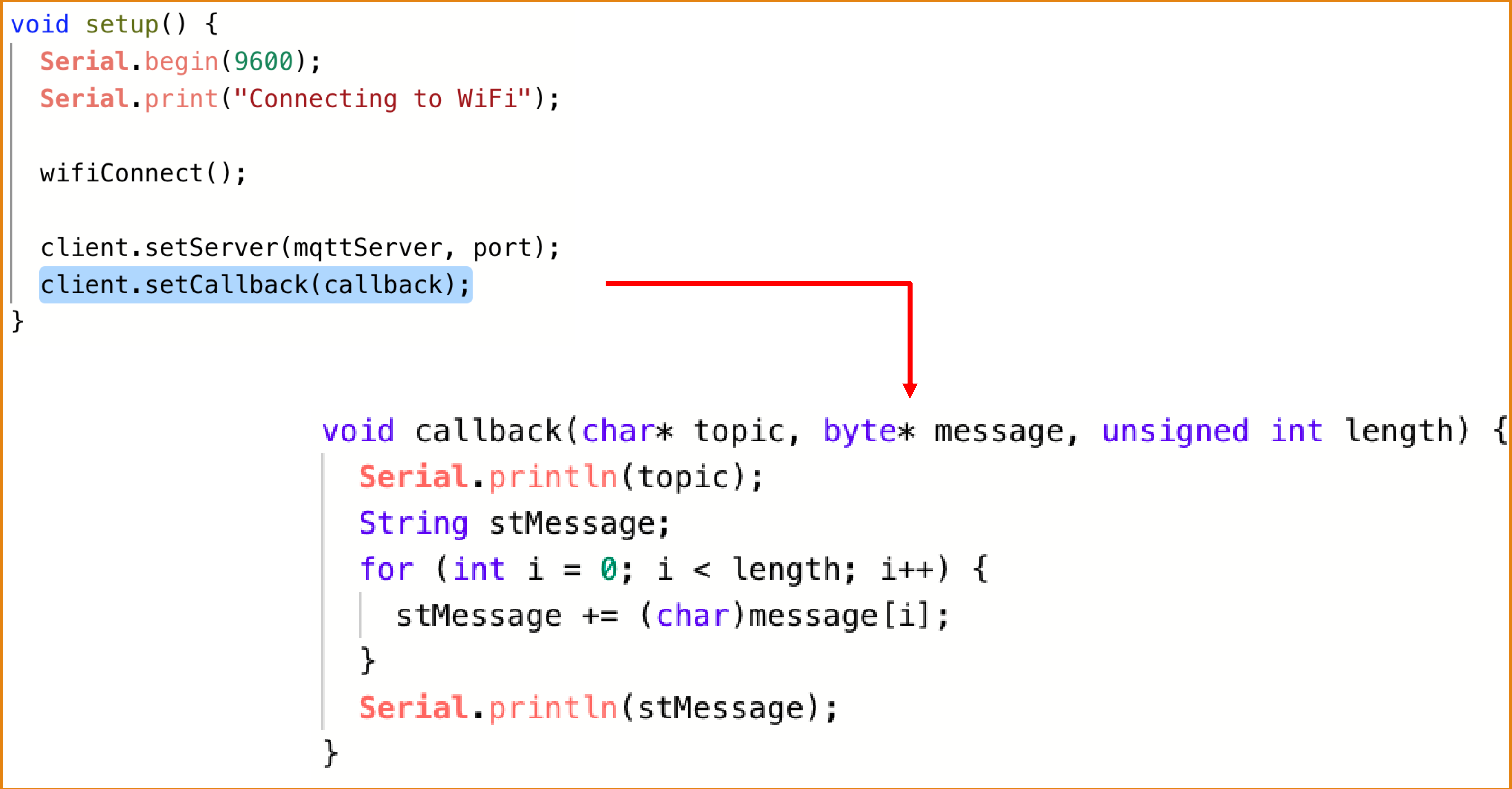
Send both temperature and humidity from DHT22 to Node-RED

```
char buffer[50];
sprintf(buffer, "{\"temperature\":%d,\"humidity\":%d}", temp, humidity);
client.publish("topicName/temp", buffer);
```

Receive message from MQTT

Subscribe topic

```
void mqttReconnect() {
  while (!client.connected()) {
    Serial.print("Attempting MQTT connection...");
    if (client.connect("12345678")) {
      Serial.println(" connected");
      client.subscribe("topicName/led");
    } else {
      Serial.println(" try again in 5 seconds");
      delay(5000);
    }
  }
}
```



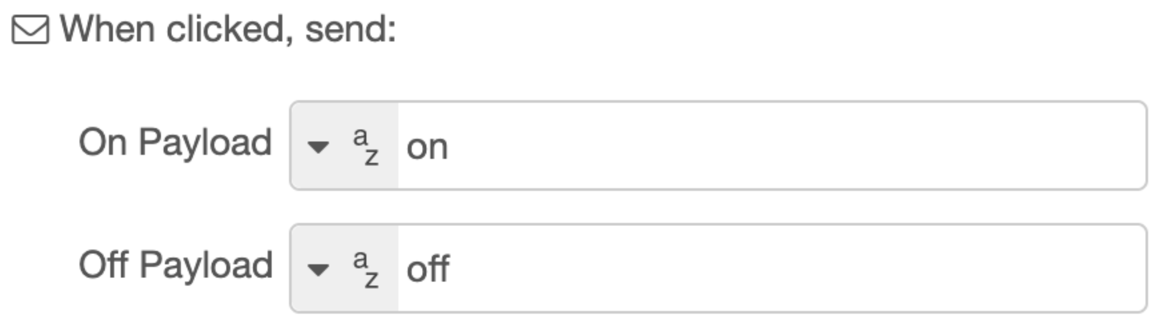
```
void setup() {
  Serial.begin(9600);
  Serial.print("Connecting to WiFi");

  wifiConnect();

  client.setServer(mqttServer, port);
  client.setCallback(callback);
}
```

```
void callback(char* topic, byte* message, unsigned int length) {
  Serial.println(topic);
  String stMessage;
  for (int i = 0; i < length; i++) {
    stMessage += (char)message[i];
  }
  Serial.println(stMessage);
}
```

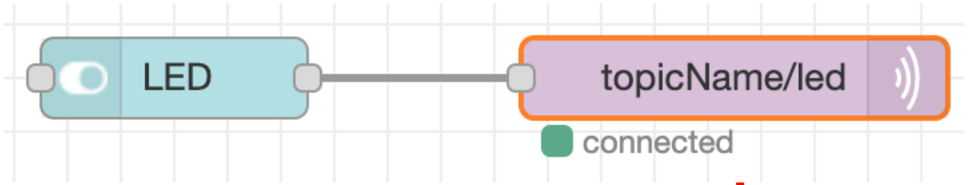
Config *"MQTT out"* in Node-RED



When clicked, send:

On Payload: on

Off Payload: off

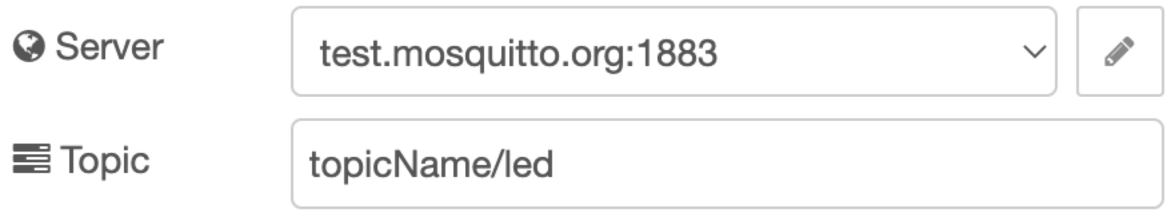


```
void callback(char* topic, byte* message, unsigned int length) {
  Serial.println(topic);
  String stMessage;
  for (int i = 0; i < length; i++) {
    stMessage += (char)message[i];
  }
  Serial.println(stMessage);
}
```

topicName/led

on

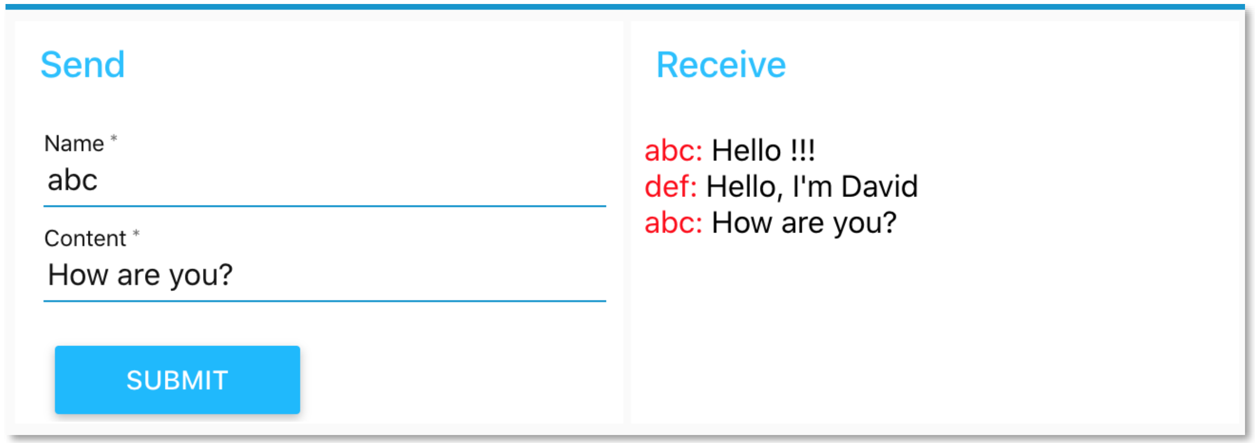
off



Server: test.mosquitto.org:1883

Topic: topicName/led

Turn LED on/off from Node-RED



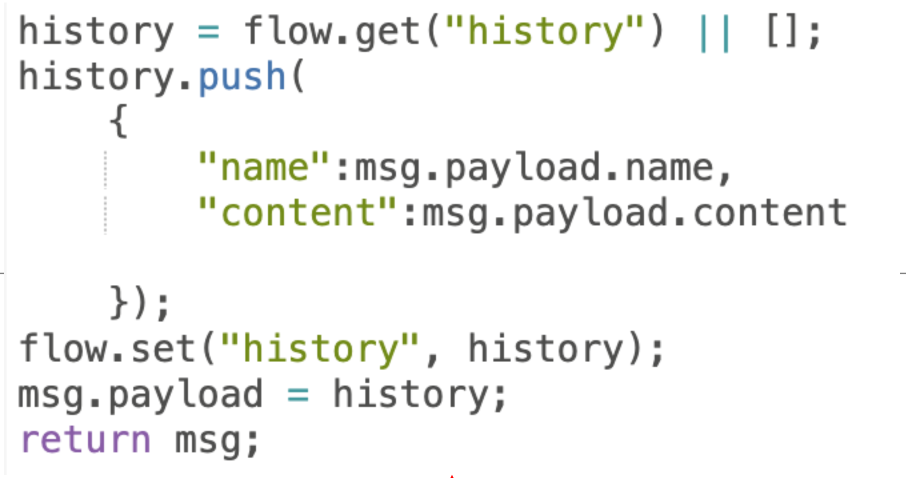
Name *
abc

Content *
How are you?

abc: Hello !!!
def: Hello, I'm David
abc: How are you?

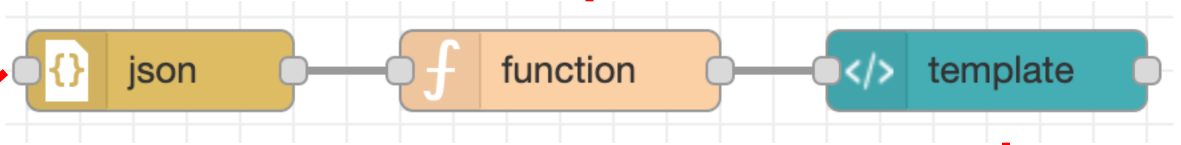
Chat App

Hint



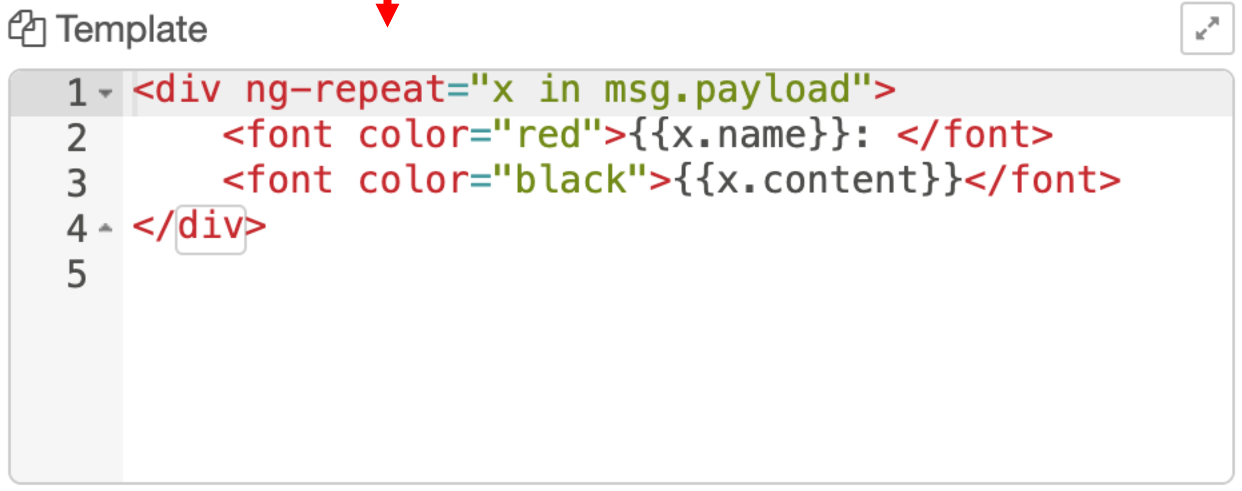
```
history = flow.get("history") || [];
history.push(
    {
        "name":msg.payload.name,
        "content":msg.payload.content

    });
flow.set("history", history);
msg.payload = history;
return msg;
```



Assume we receive a JSON string of the following format:

{"name":"abc","content":"hello"}



```
<div ng-repeat="x in msg.payload">
    <font color="red">{{x.name}}: </font>
    <font color="black">{{x.content}}</font>
</div>
```