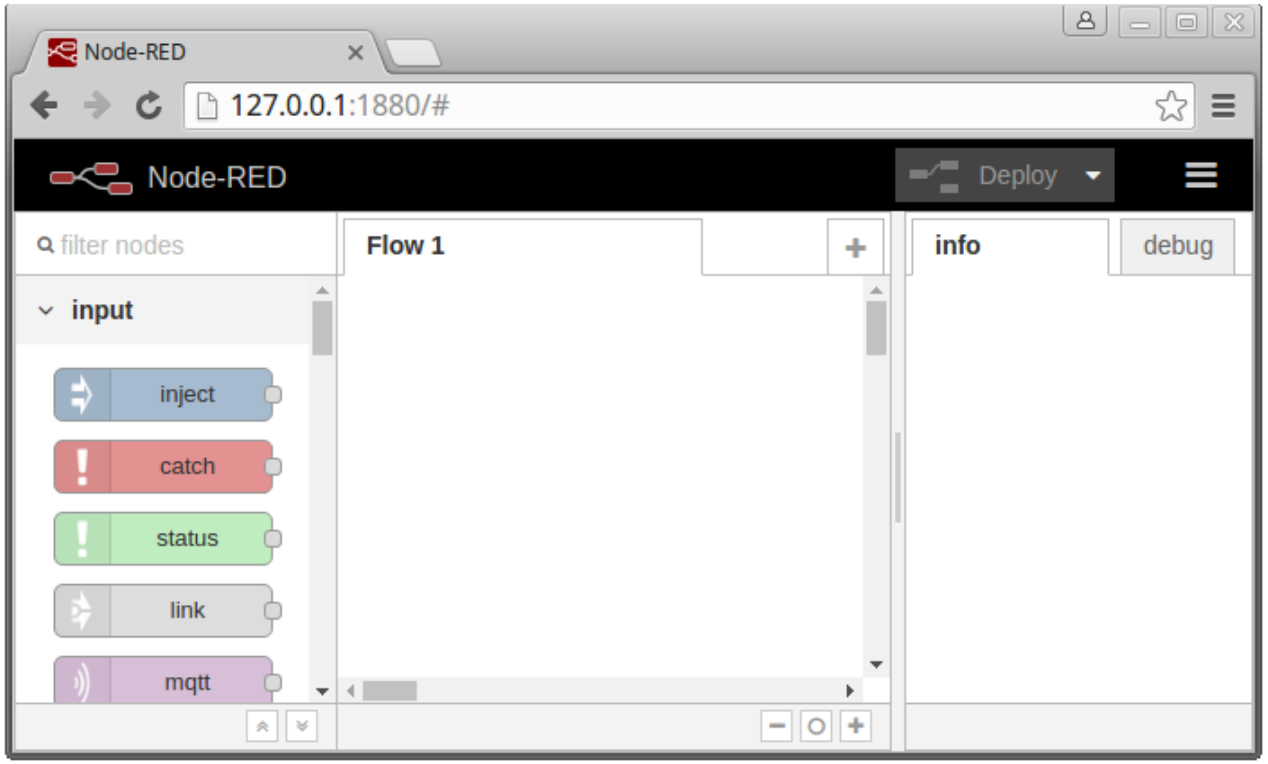
Module 4
IoT Solutions

IoT solutions through Node-red

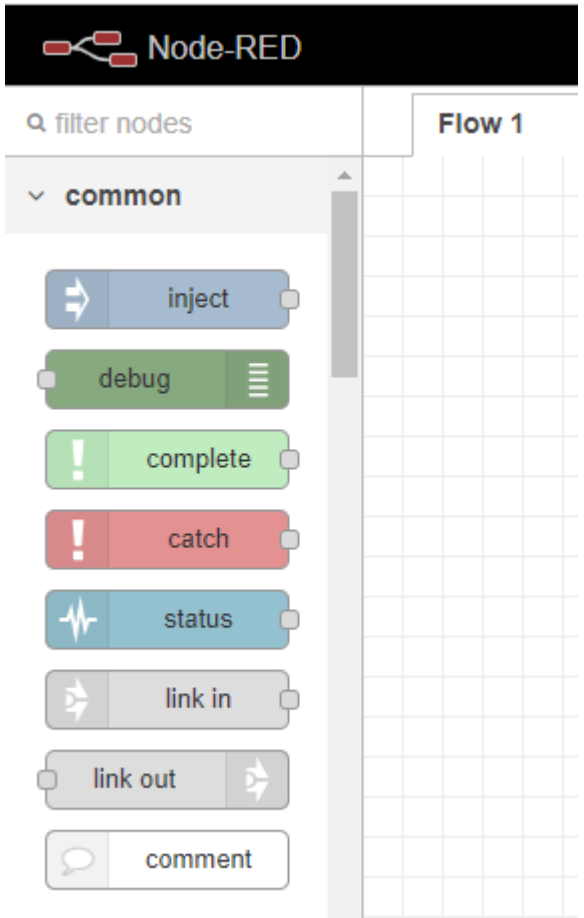
Add an Inject node

- First to start the flow:
  - **Inject Node** the main purposes of the Inject node—to inject a message into the flow.
- For first user of Node-RED there should be one empty flow named **“Flow 1”.**



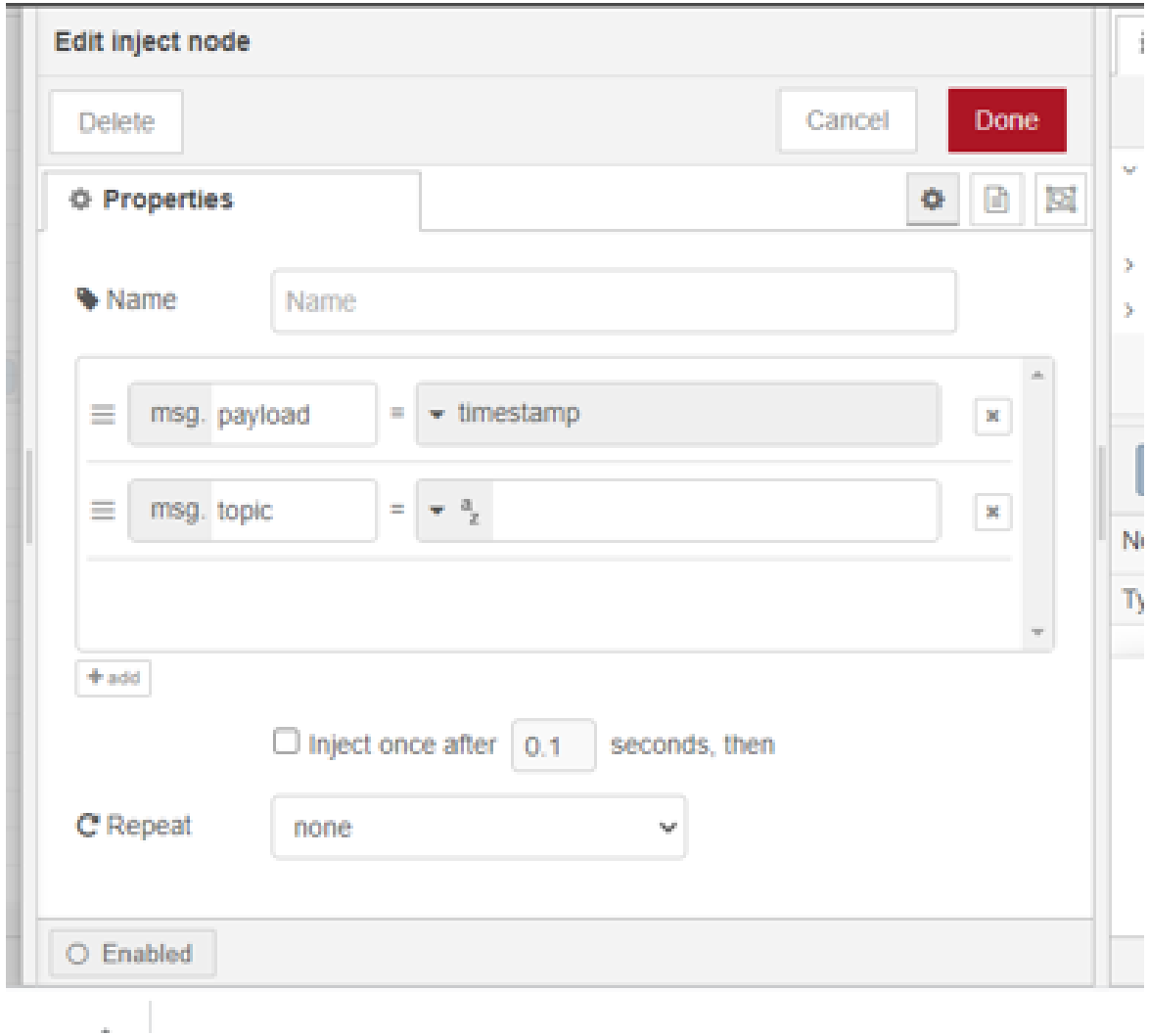
Node Palette

- **From the node palette on the left side of the Node-RED editor**
- **Select an Inject node and drag it onto the flow.**

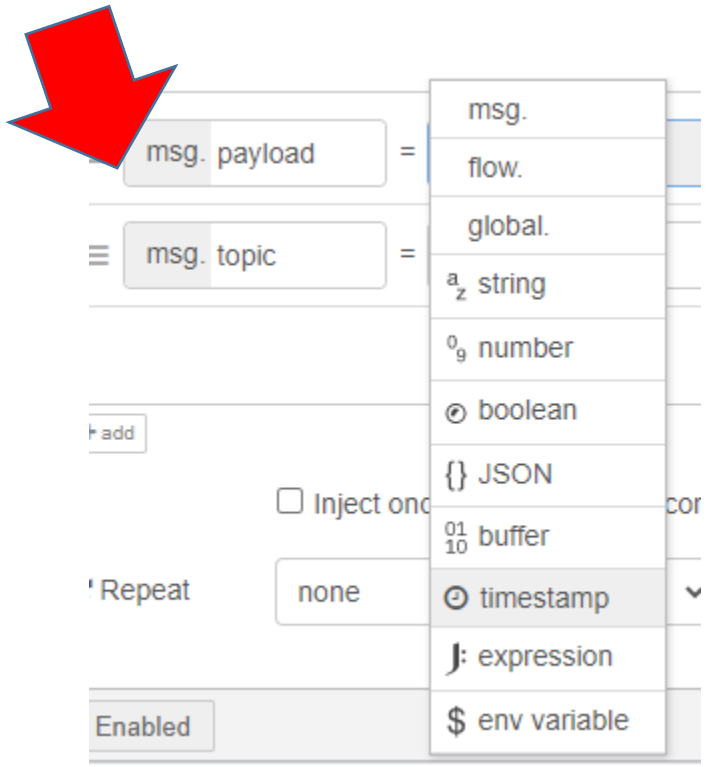


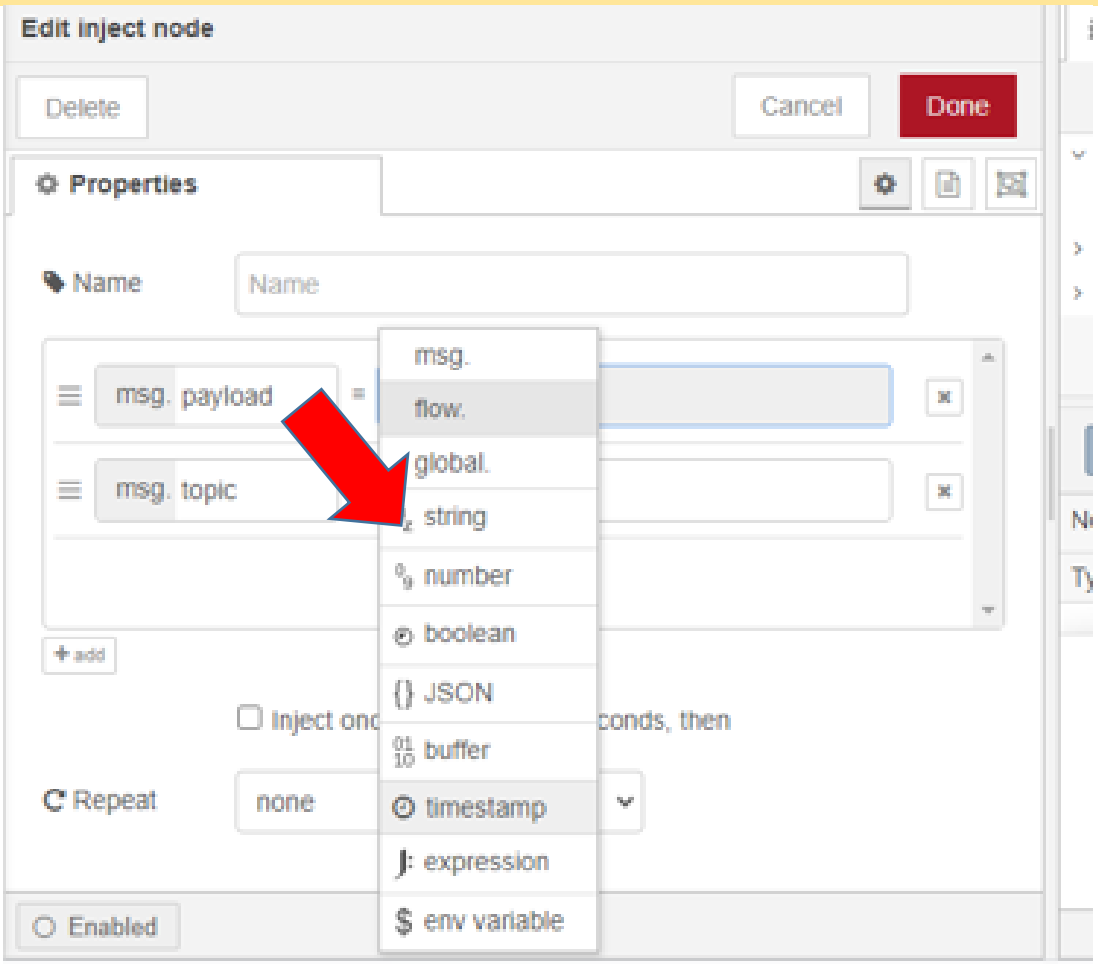
Double Click Inject Node

- Edit Inject Node
- Properties

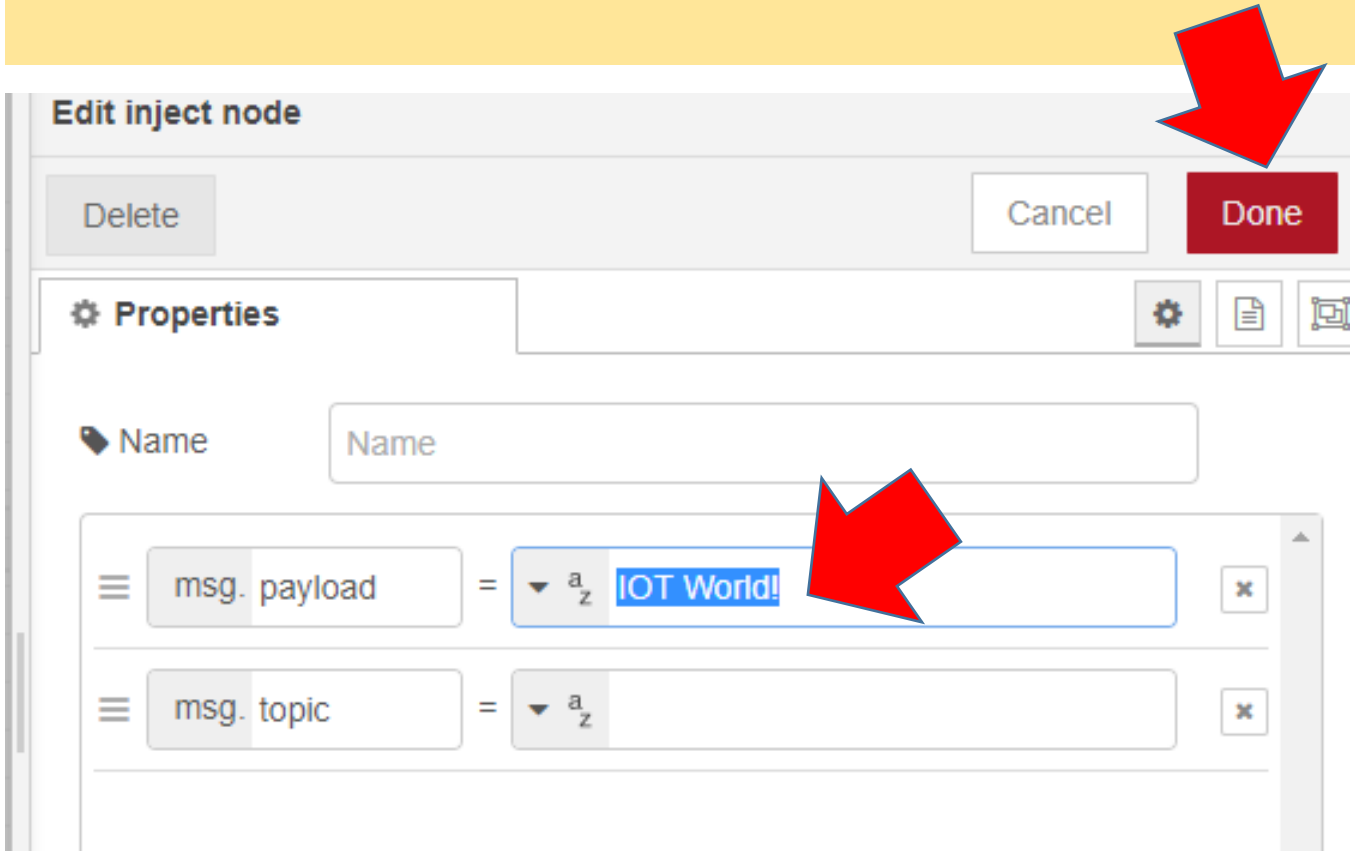


Select msg payload -> change to string





Enter String : IOT World and click “Done”



Summary :

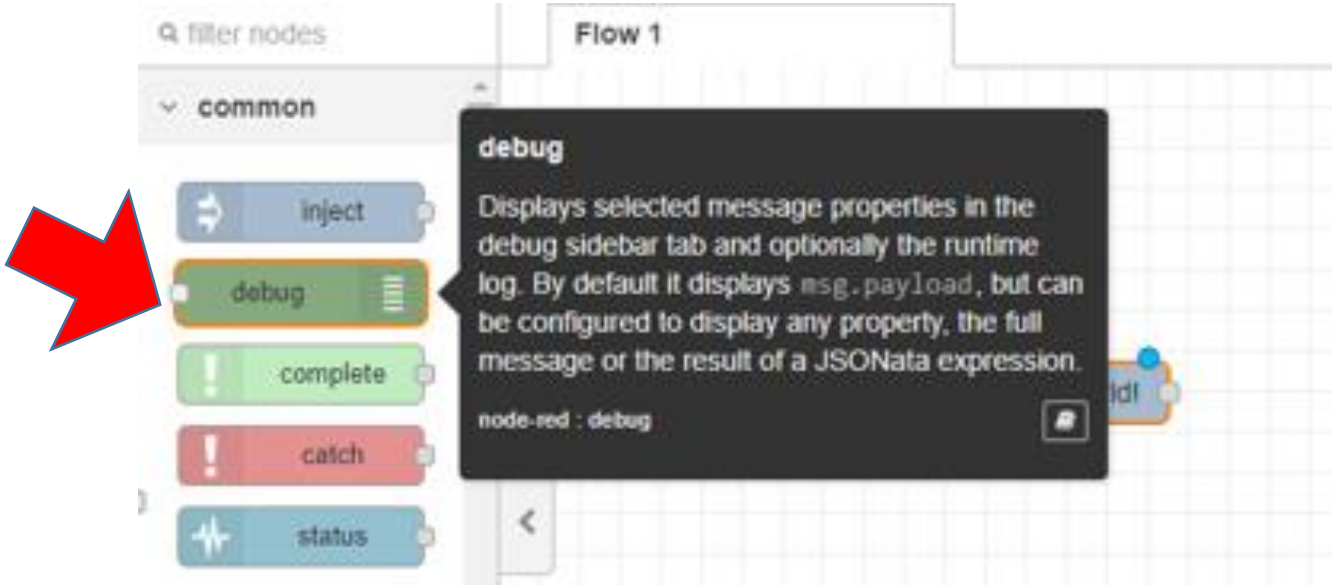
Double-click the node to open the “Edit inject node” view.

For the Payload field, select string and enter IOT , world! in the text field.

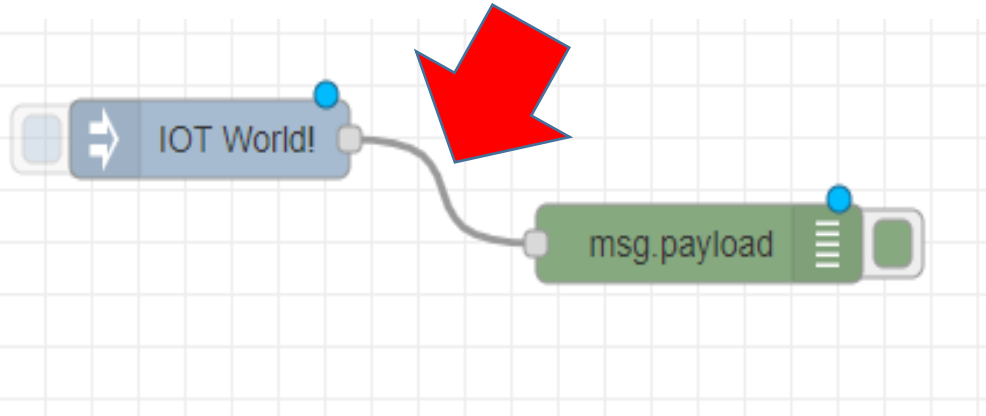
Click Done.

Add a Debug node

- Need a destination for the Inject node's message.
- Use the Debug node to print out message to the debug console window.
- From the node palette, select a Debug node and drag it onto the flow, and then place it to the right-hand side of the Inject node.



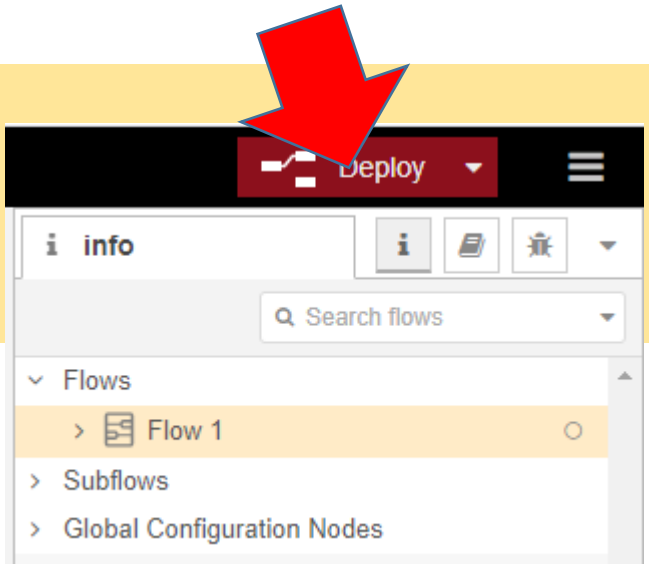
Wire



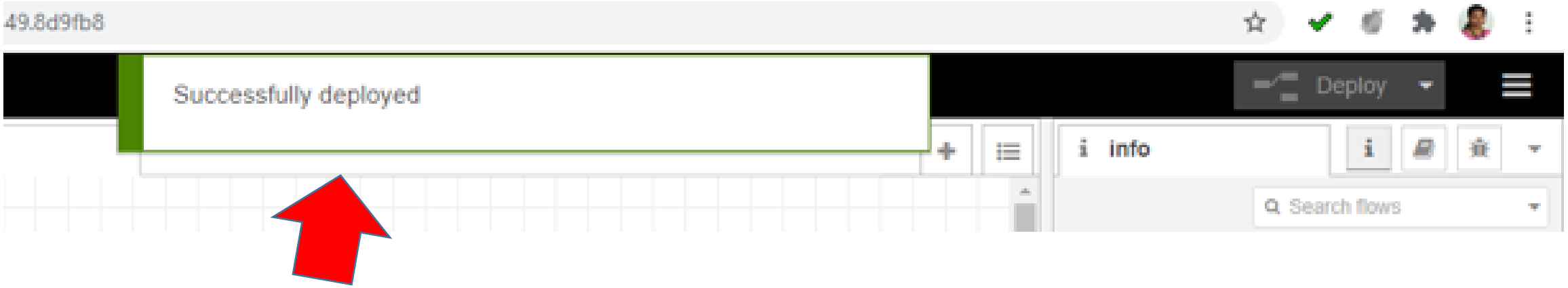
- Wire the nodes together.
- Place the mouse cursor over the Inject node's output port (a small gray square on the right-hand side of the node), then left-click and drag a wire over to the input port of the Debug node.
- A gray wire should now be connecting the output of the Inject node to the input of the Debug node.
- The Debug node will automatically **print the msg.payload** property to the console window

- Dashboard
  - Group → Tab (layout)

Deploy

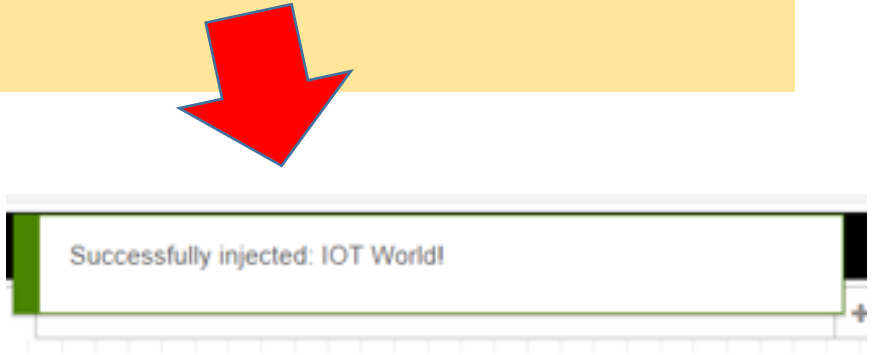


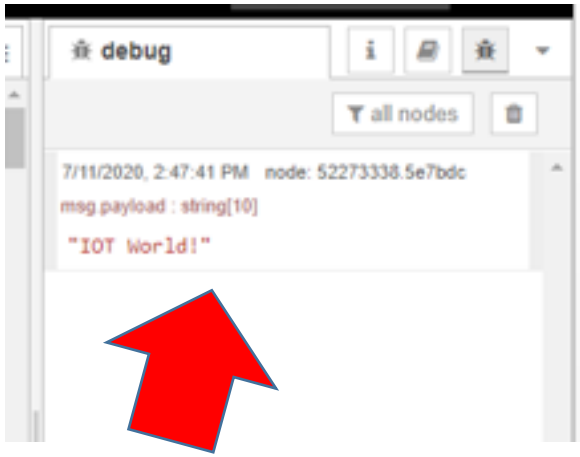
- Now that our flow is complete
- Need to deploy it to the server and run it.
- Click the Deploy button.



Run

- Click the Debug tab in the right-hand side of the editor window.
- Click the Inject node's button **the blue square** coming out from the left-hand side of the Inject node.
- Clicking the button will inject a message into the flow.
- A **"IOT, world!" message** should appear in the debug window.
- Click the Inject node again to send another message.





Inbox (49) | Invite peo | Meet | Mail - mai | Vellore In | Key differ | Node-RE | Node.js | Node-RE

127.0.0.1:1880/#flow/21076849.8d9fb8

Node-RED

Successfully injected: IOT World!

Deploy

filter nodes

Flow 1

common

inject

debug

complete

catch

status

link in

link out

comment

function

function

IOT World!

msg.payload

debug

all nodes

7/11/2020, 2:47:41 PM node: 52273338.5e7bdc

msg.payload : string[10]

"IOT World!"

MHRD_Certificate....png

blockchian.docx

Show all

2:47 PM

7/11/2020

Inbox (49) | Invite peo | Meet | Mail - mai | Vellore In | Key differ | Node-RE | Node.js | Node-RE

127.0.0.1:1880/#flow/21076849.8d9fb8

Node-RED

Successfully injected: IOT World!

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filter nodes

Flow 1

common

inject

debug

complete

catch

status

link in

link out

comment

function

function

IOT World!

msg.payload

debug

all nodes

7/11/2020, 2:47:41 PM node: 52273338.5e7bdc

msg.payload : string[10]

"IOT World!"

7/11/2020, 2:48:10 PM node: 52273338.5e7bdc

msg.payload : string[10]

"IOT World!"

MHRD_Certificate....png

blockchian.docx

Show all

2:48 PM

7/11/2020

Function Node

Add the current time to the message, and execute it every two seconds.

Add a Function node

- Add the current time to the message.
- Use the Function block - allows to enter JavaScript code to manipulate the msg object.
- Select a Function node and drag it out onto the flow.

Inbox (49) | Invite peo | Meet | Mail - mai | Vellore In | Key differ | Node-RE | Node.js | Node-RE

127.0.0.1:1880/#flow/21076849.8d9fb8

Node-RED

Deploy

filter nodes

link in

link out

comment

function

function

switch

change

range

template

delay

trigger

Flow 1

function

A JavaScript function to run against the messages being received by the node.

node-red : function

ld!

msg.payload

debug

all nodes

7/11/2020, 2:47:41 PM node: 52273338.5e7bdc

msg.payload : string[10]

"IOT World!"

7/11/2020, 2:48:10 PM node: 52273338.5e7bdc

msg.payload : string[10]

"IOT World!"

MHRD_Certificate....png

blockchian.docx

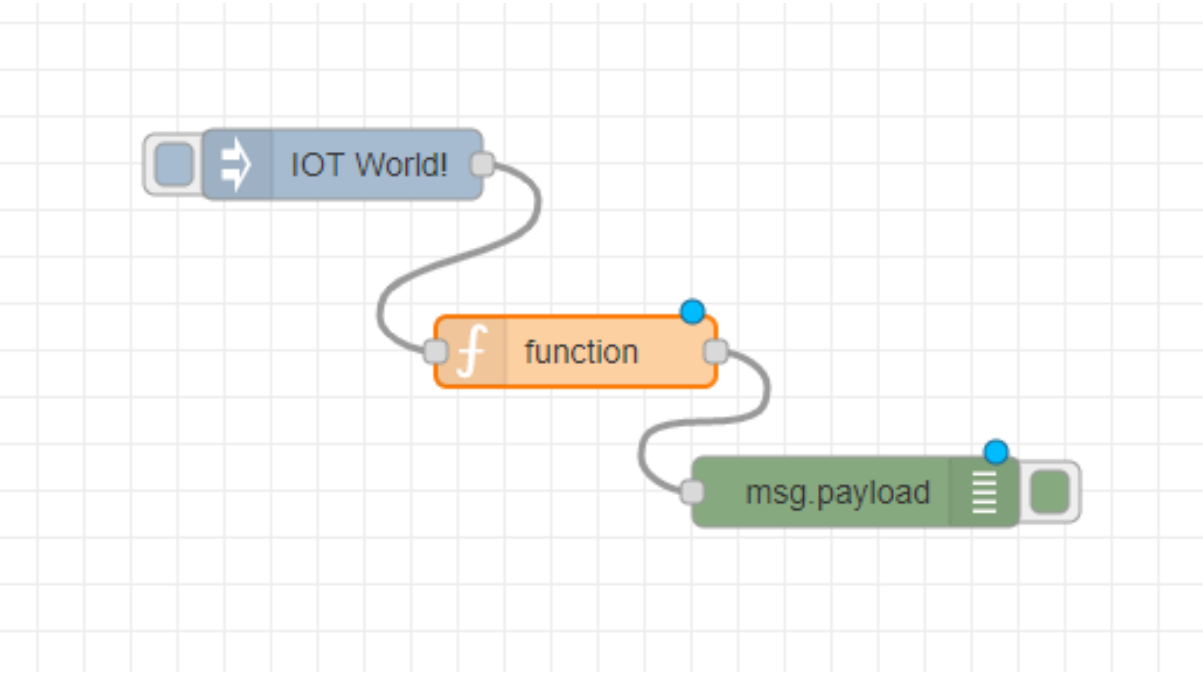
Show all

2:51 PM

7/11/2020

Placing

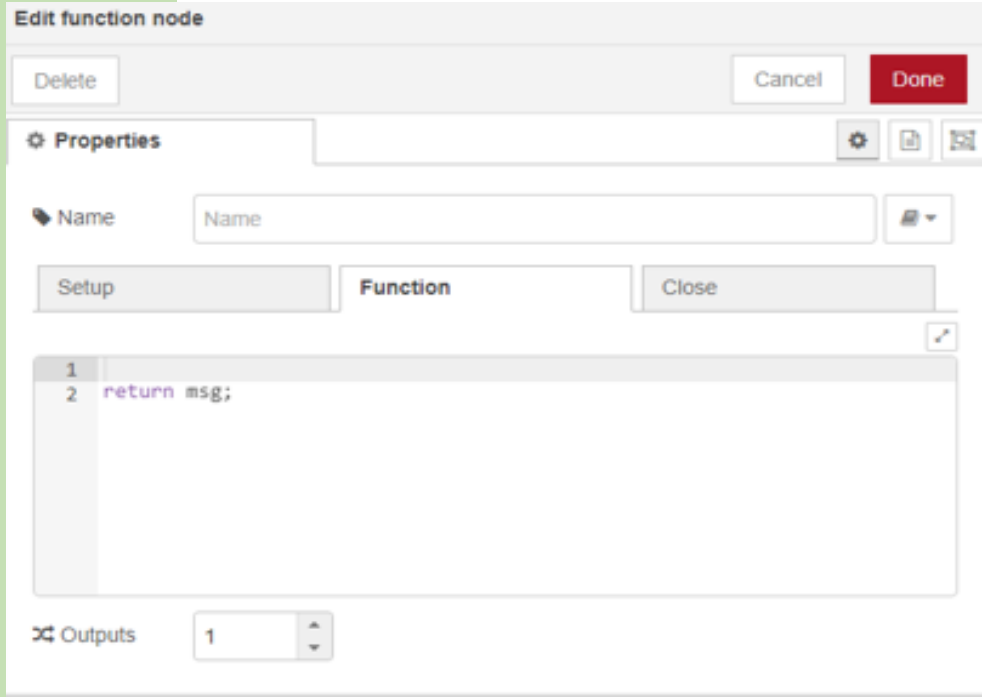
- Carefully place it over the existing wire between the existing Inject and Debug nodes.
- Node-RED will insert the new node between the two existing nodes, and **rewire** the nodes together.



Add Code and Run

- Double-click on the Function node to open the "Edit function node" view.
- Copy and paste the JavaScript code into the Function field:

```
var dateNow = new Date();
var timeAsString = dateNow.toLocaleTimeString();

msg.payload = msg.payload +
        ' The Current time is ' +
        timeAsString + '.';

return msg;
```



Click Done

Edit function node

Delete | Cancel | Done

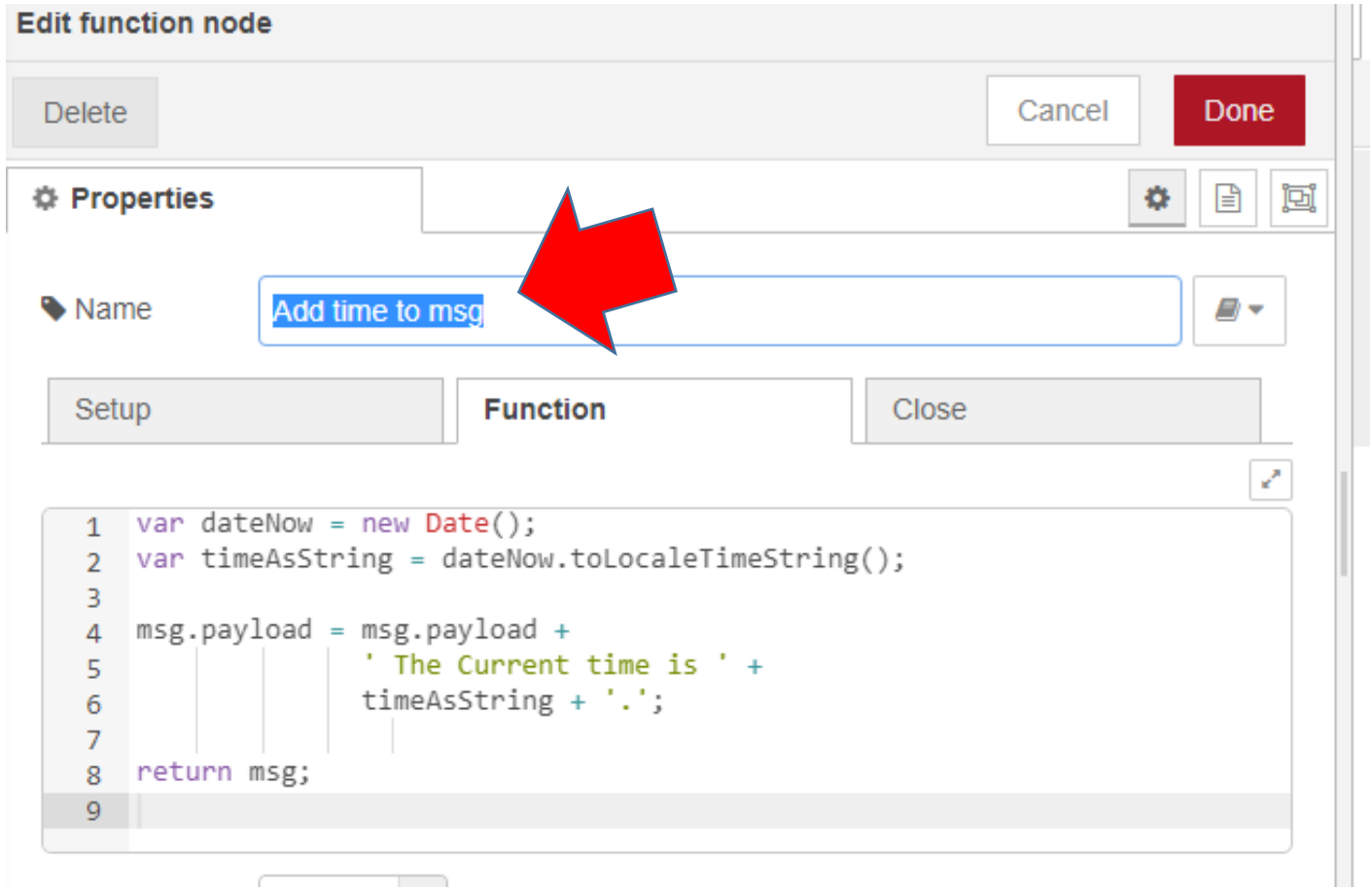
Properties

Name | Name

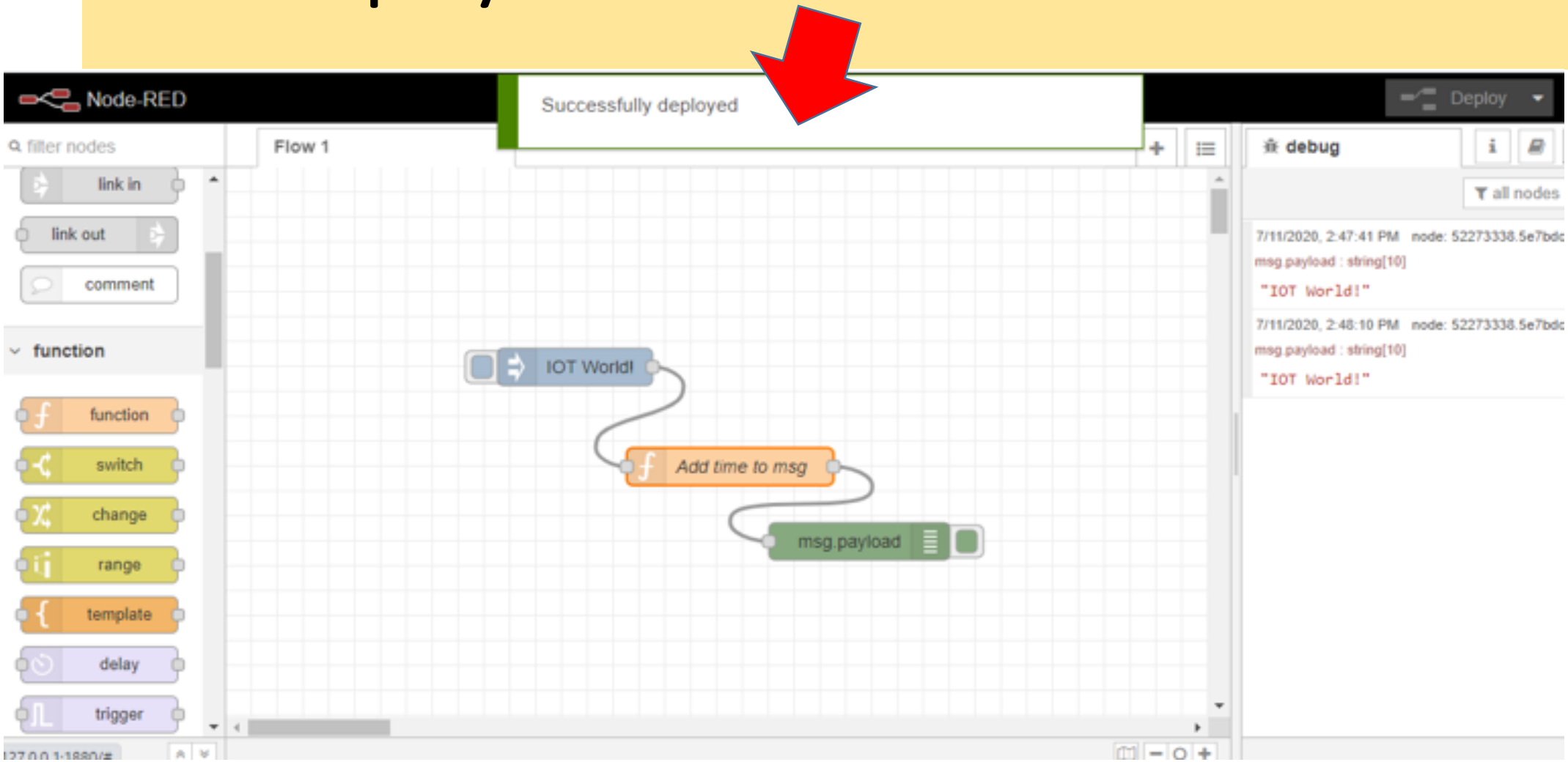
Setup | Function | Close

```
var dateNow = new Date();
var timeAsString = dateNow.toLocaleTimeString();

msg.payload = msg.payload +
              ' The Current time is ' +
              timeAsString + '.';

return msg;
```

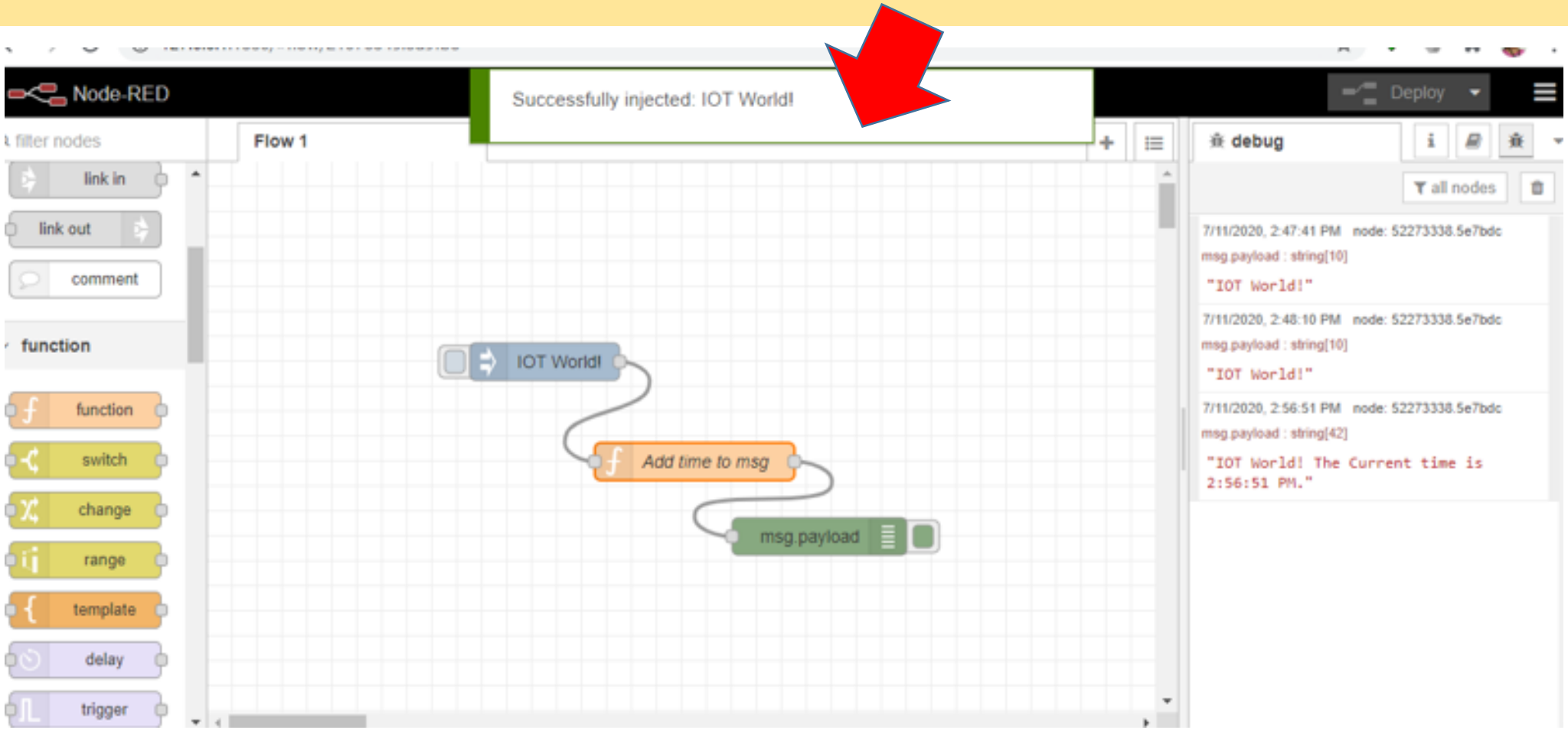
Add name : “Add time to msg”



Click Deploy



Click inject node (Blue Button)



Debug Window – Output message

7/11/2020, 2:56:51 PM node: 52273338.5e7bdc

msg.payload : string[42]

```
"IOT World! The Current time is
2:56:51 PM."
```

7/11/2020, 2:57:01 PM node: 52273338.5e7bdc

msg.payload : string[42]

```
"IOT World! The Current time is
2:57:01 PM."
```

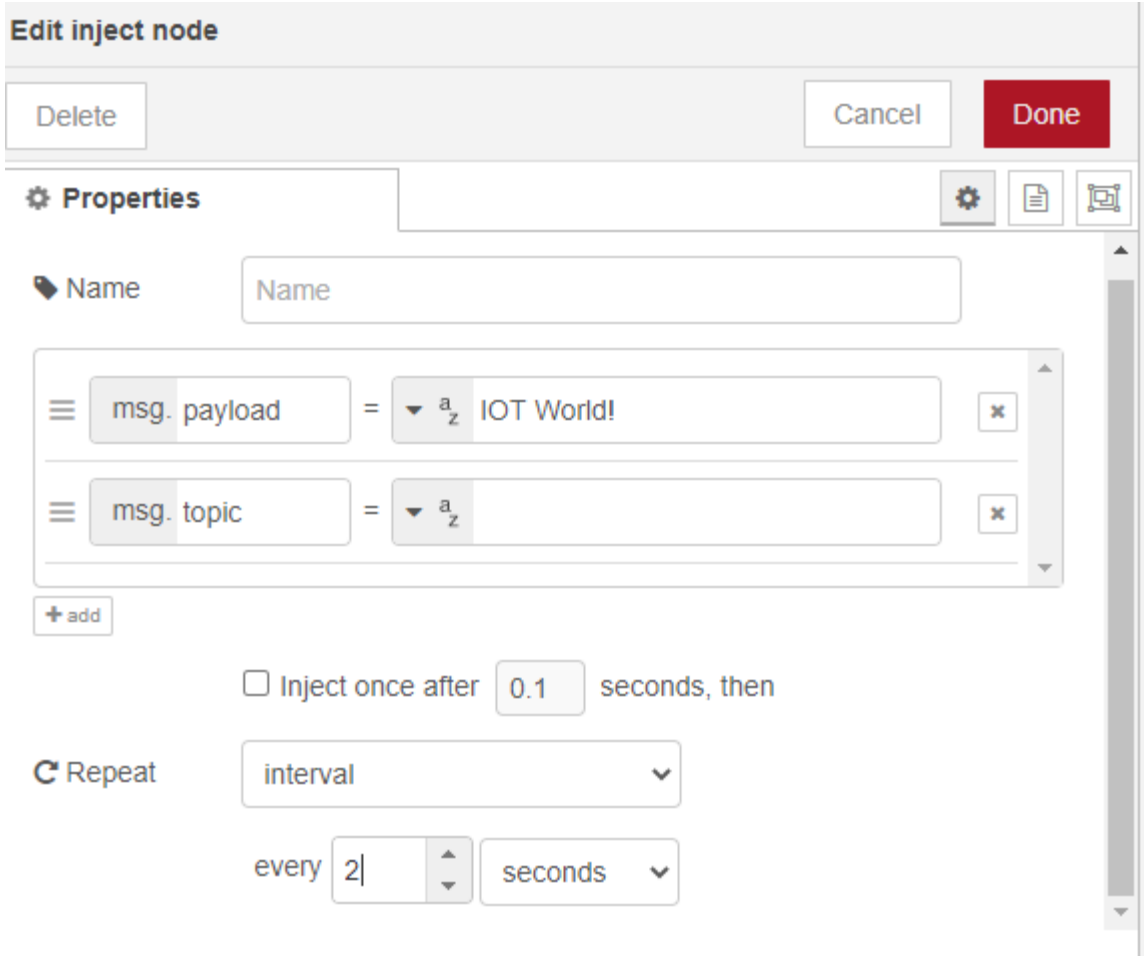
7/11/2020, 2:57:03 PM node: 52273338.5e7bdc

msg.payload : string[42]

```
"IOT World! The Current time is
2:57:03 PM."
```

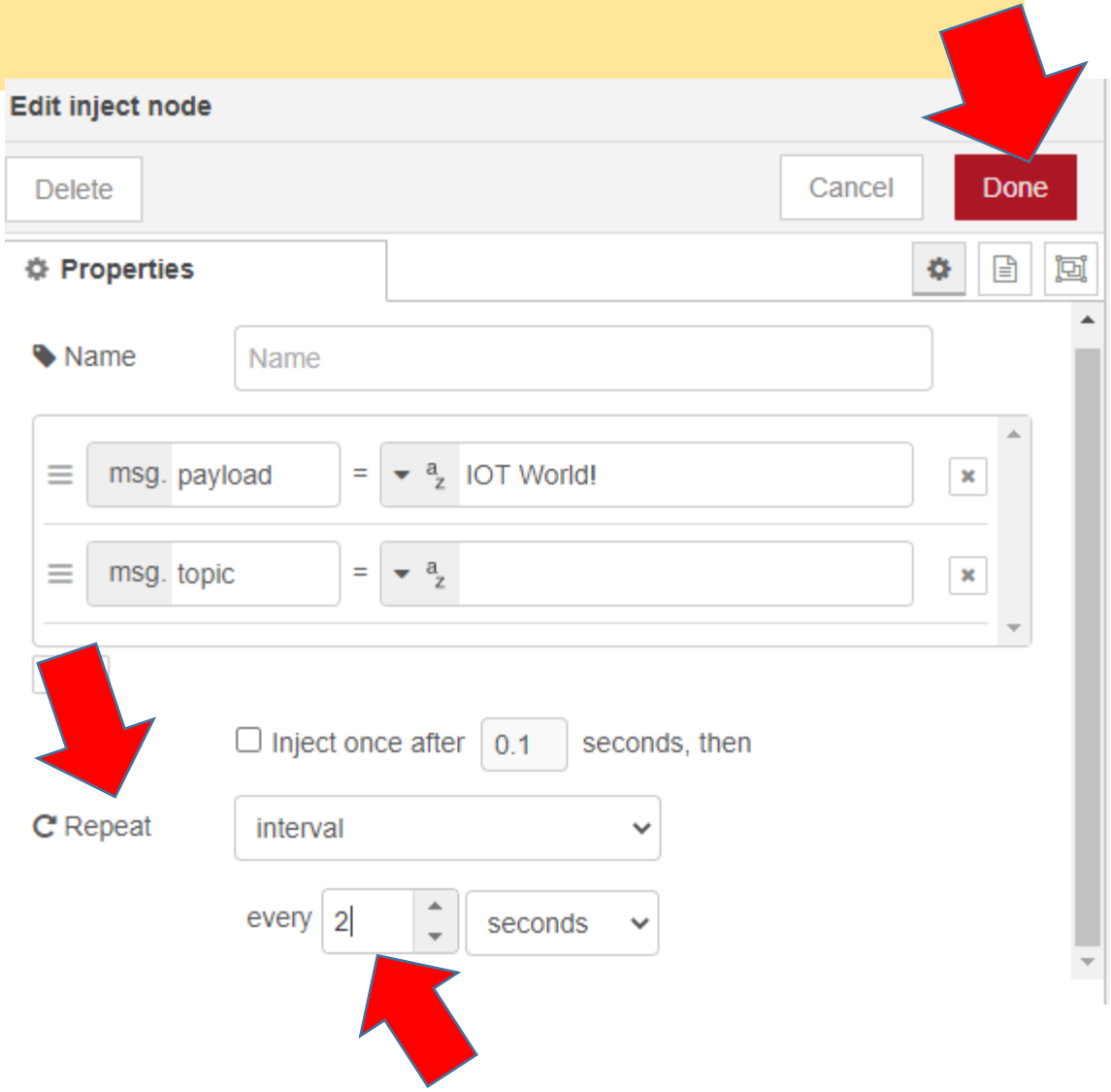
Add Two-Second Interval

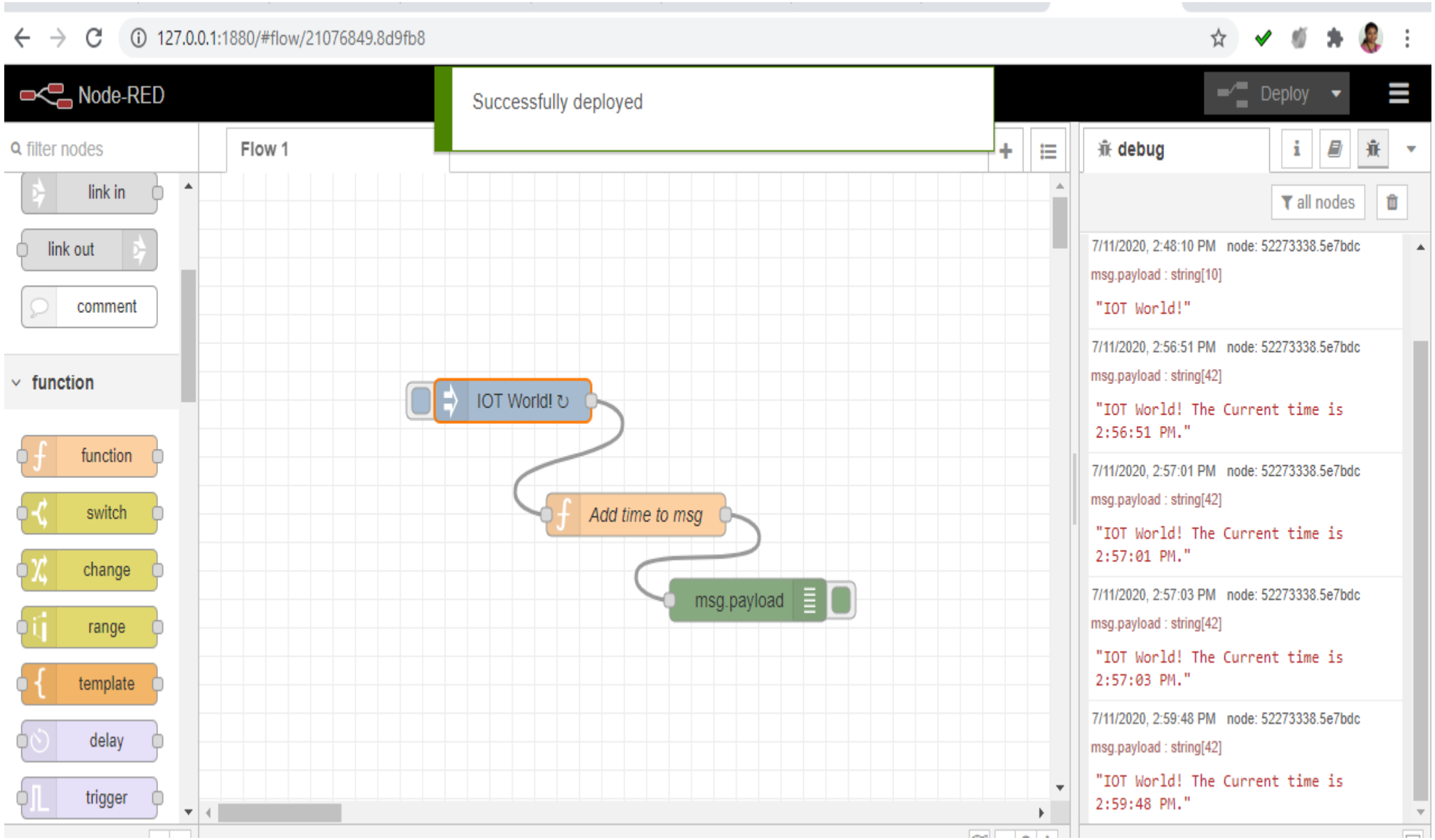
- Adjust the flow to automatically inject a new message every two seconds.
- The existing Inject node need to adjust its settings.
- Double-click on the existing Inject node to open the "**Edit inject node**" view.



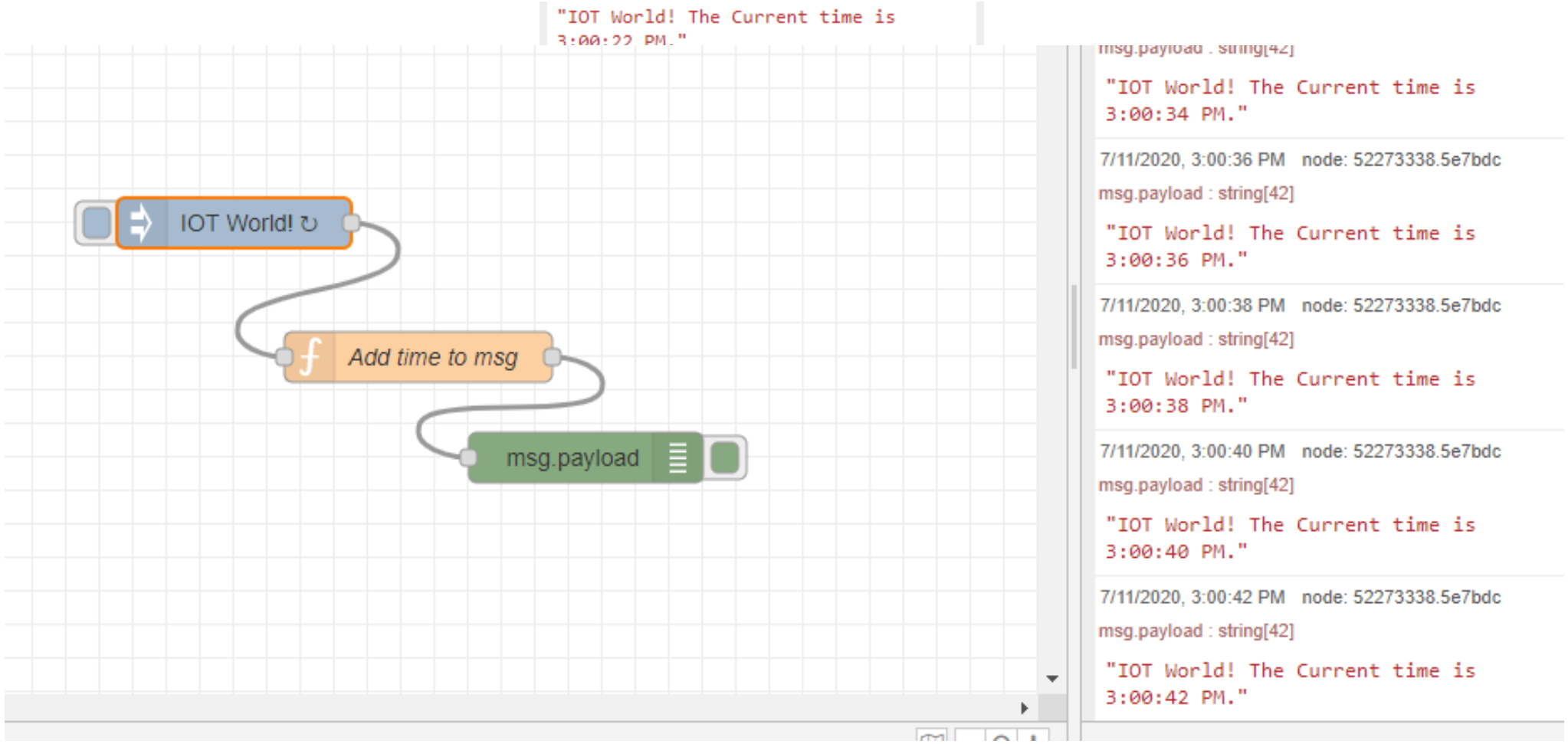
Repeat

- For the Repeat field, select **interval** and enter **2 seconds** for the period.
- Click Done.
- Click Deploy.



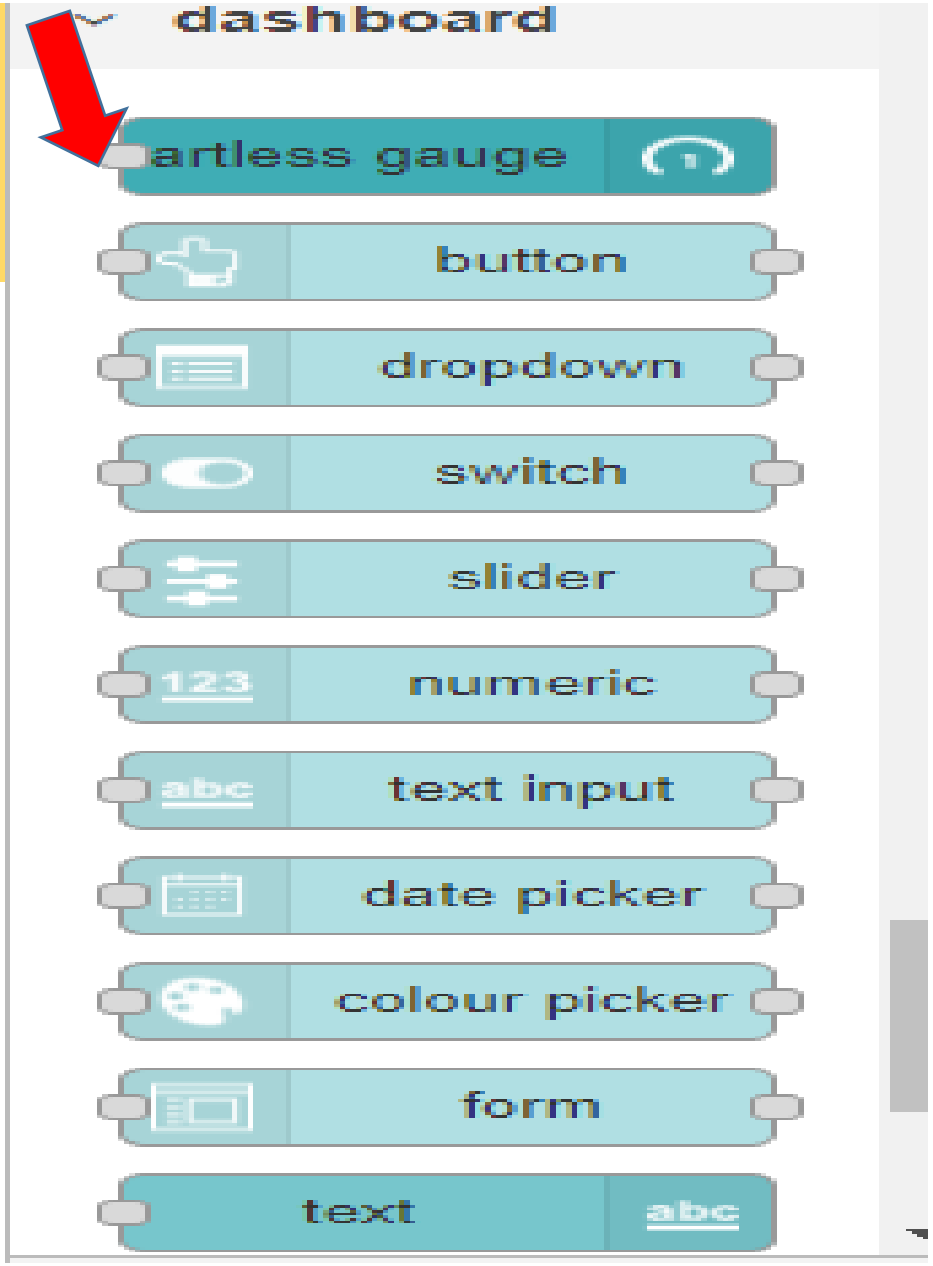

127.0.0.1:1880/#flow/21076849.8d9fb8
Node-RED
Successfully deployed
Deploy
filter nodes
Flow 1
debug
link in
link out
comment
function
function
switch
change
range
template
delay
trigger
IOT World!
Add time to msg
msg.payload
all nodes
7/11/2020, 2:48:10 PM node: 52273338.5e7bdc
msg.payload : string[10]
"IOT World!"
7/11/2020, 2:56:51 PM node: 52273338.5e7bdc
msg.payload : string[42]
"IOT World! The Current time is 2:56:51 PM."
7/11/2020, 2:57:01 PM node: 52273338.5e7bdc
msg.payload : string[42]
"IOT World! The Current time is 2:57:01 PM."
7/11/2020, 2:57:03 PM node: 52273338.5e7bdc
msg.payload : string[42]
"IOT World! The Current time is 2:57:03 PM."
7/11/2020, 2:59:48 PM node: 52273338.5e7bdc
msg.payload : string[42]
"IOT World! The Current time is 2:59:48 PM."

In the Debug tab, should now see your output every two seconds.

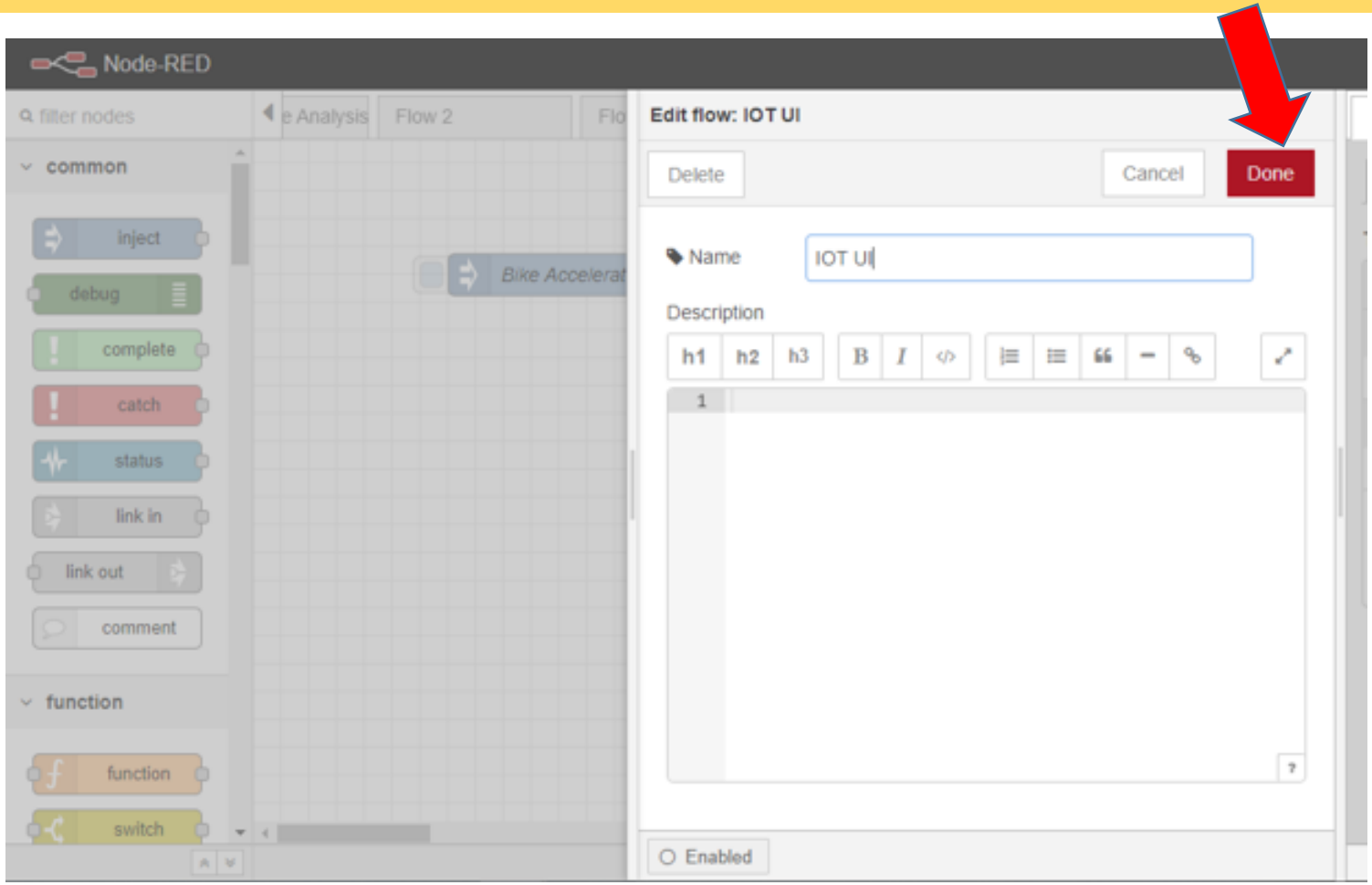


Widgets

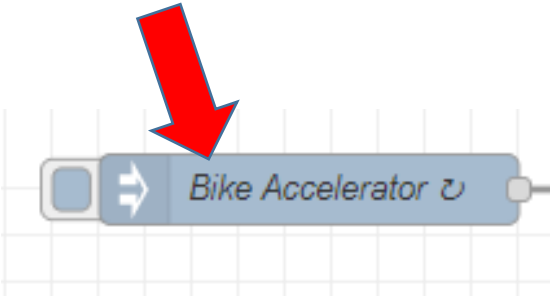

text
gauge
chart
audio out
notification
ui control
template

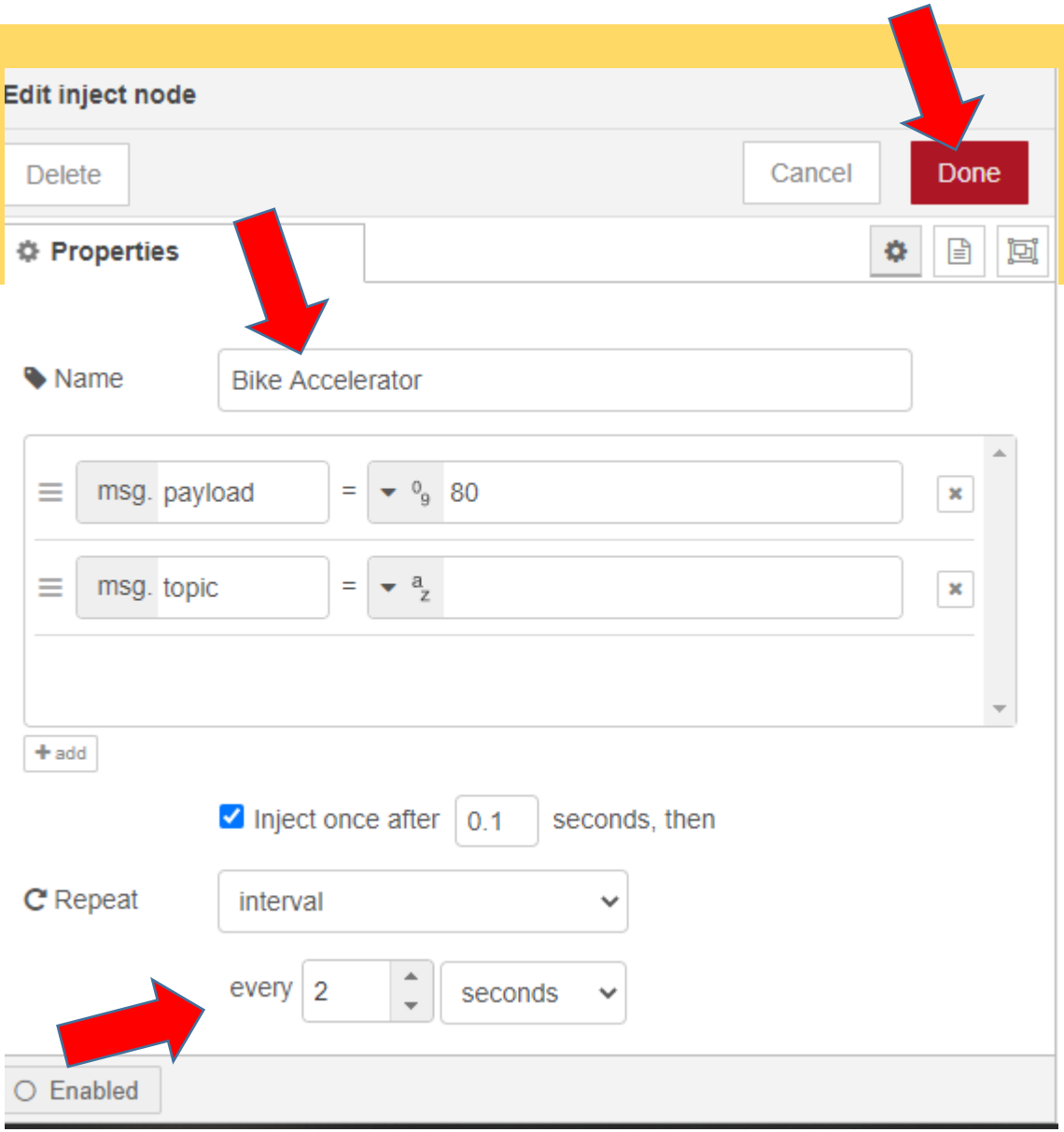

dashboard
artless gauge
button
dropdown
switch
slider
numeric
text input
date picker
colour picker
form
text

Create a Flow and edit the flow name

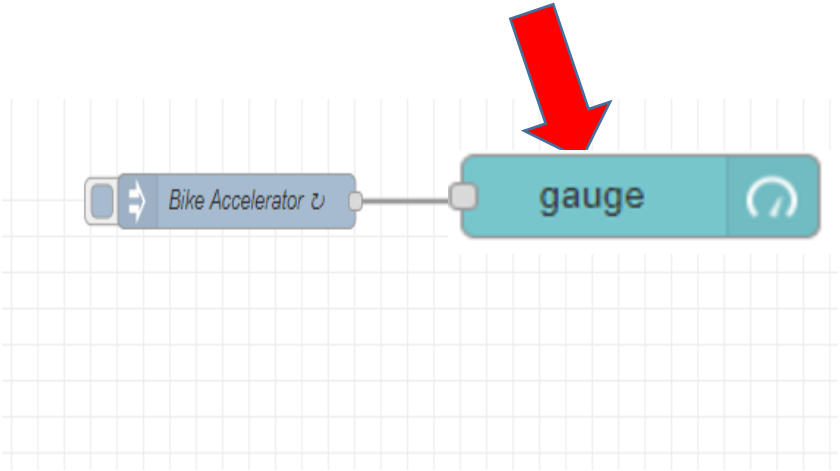


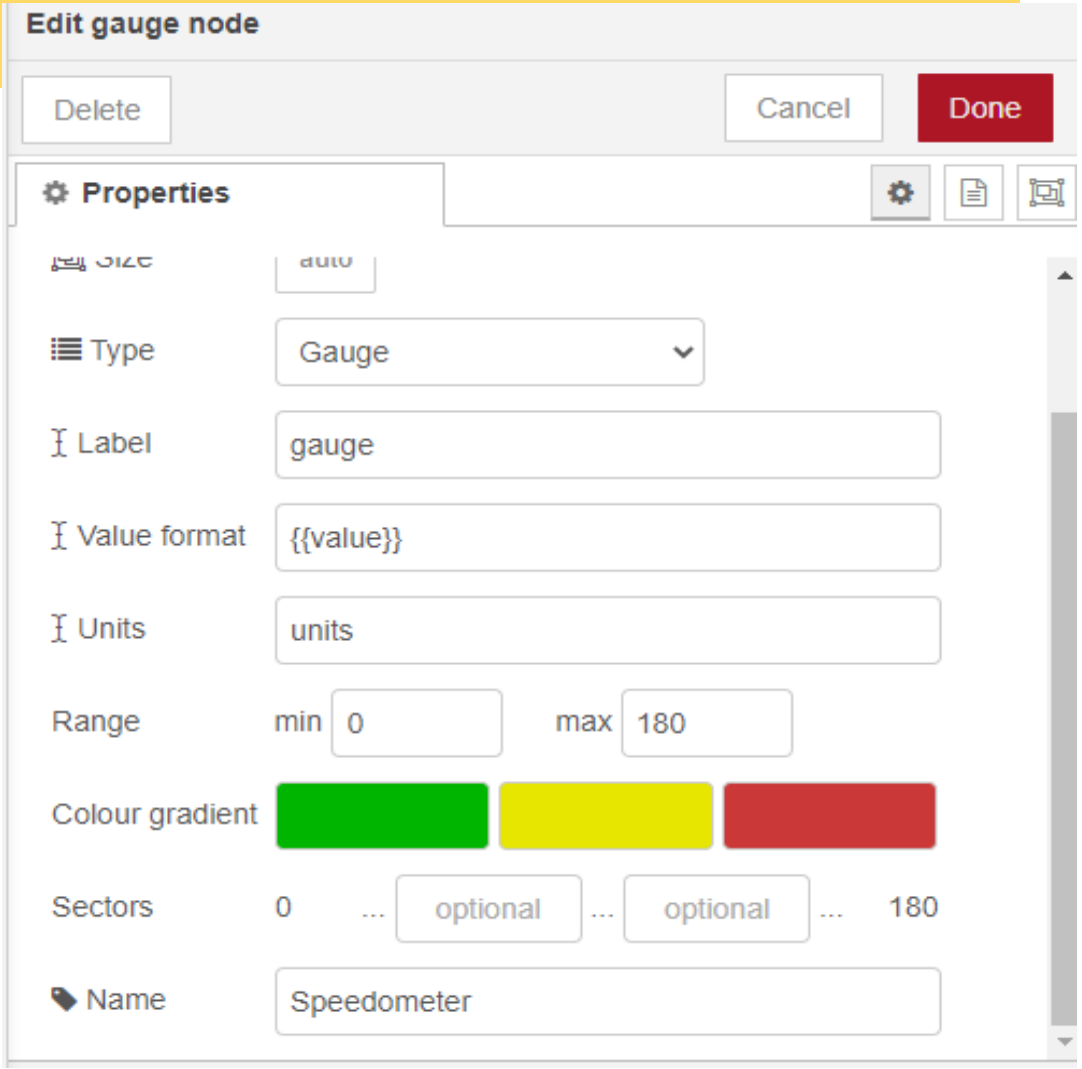
Inject Node


Bike Accelerator

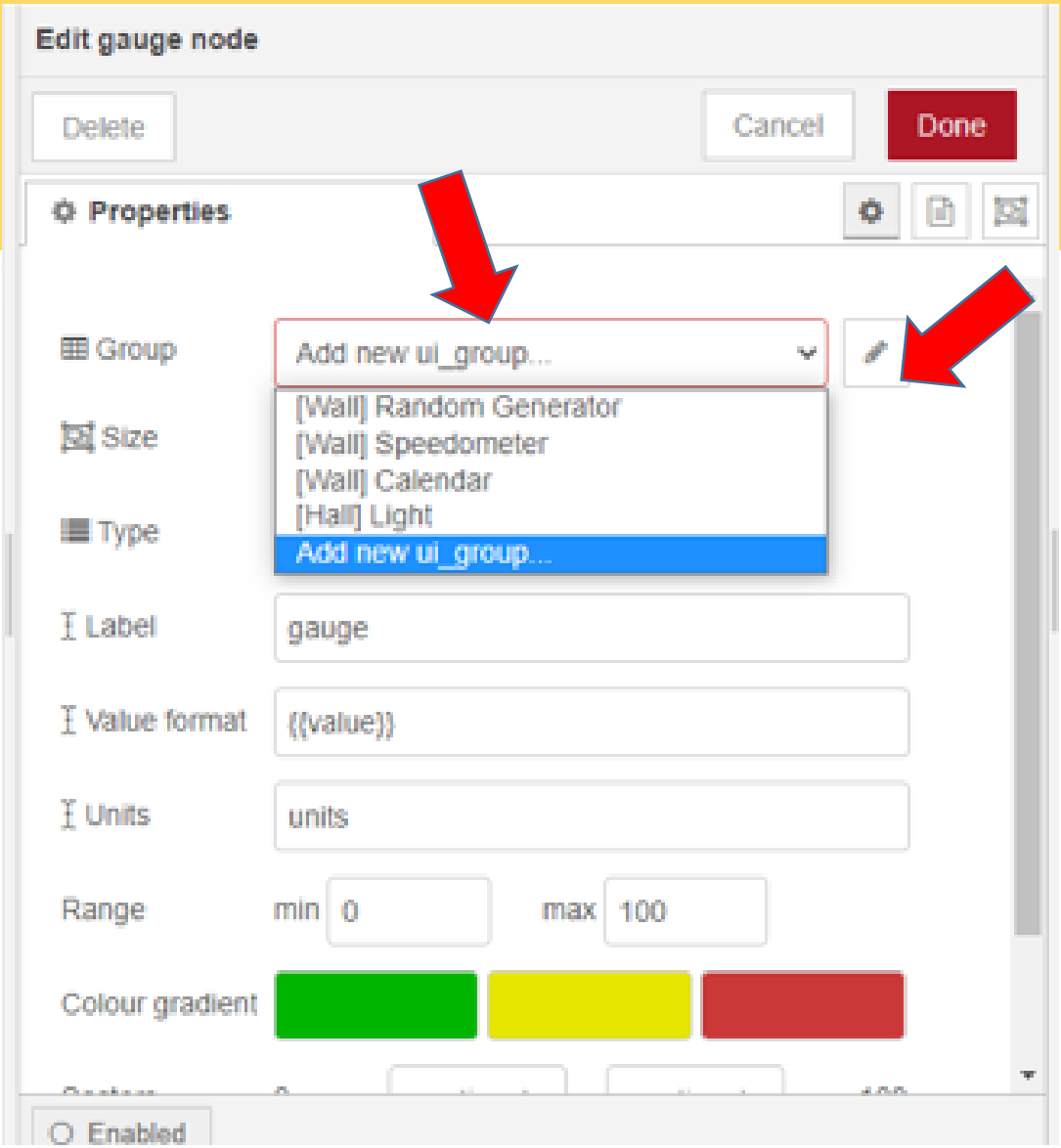

Edit inject node
Delete
Cancel
Done
Properties
Name
Bike Accelerator
msg. payload
=
80
msg. topic
=
add
Inject once after
0.1
seconds, then
Repeat
interval
every
2
seconds
Enabled

Insert and Edit Gauge Node

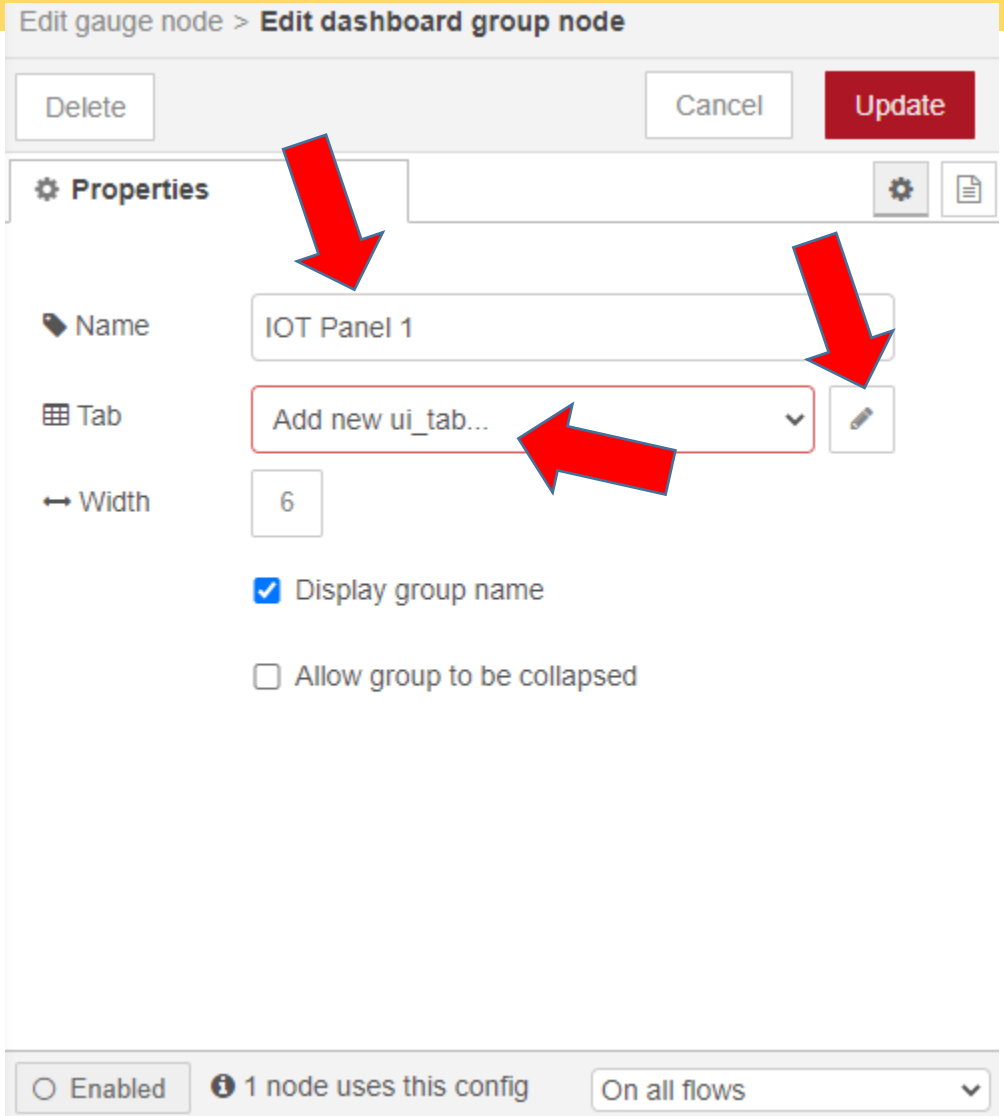


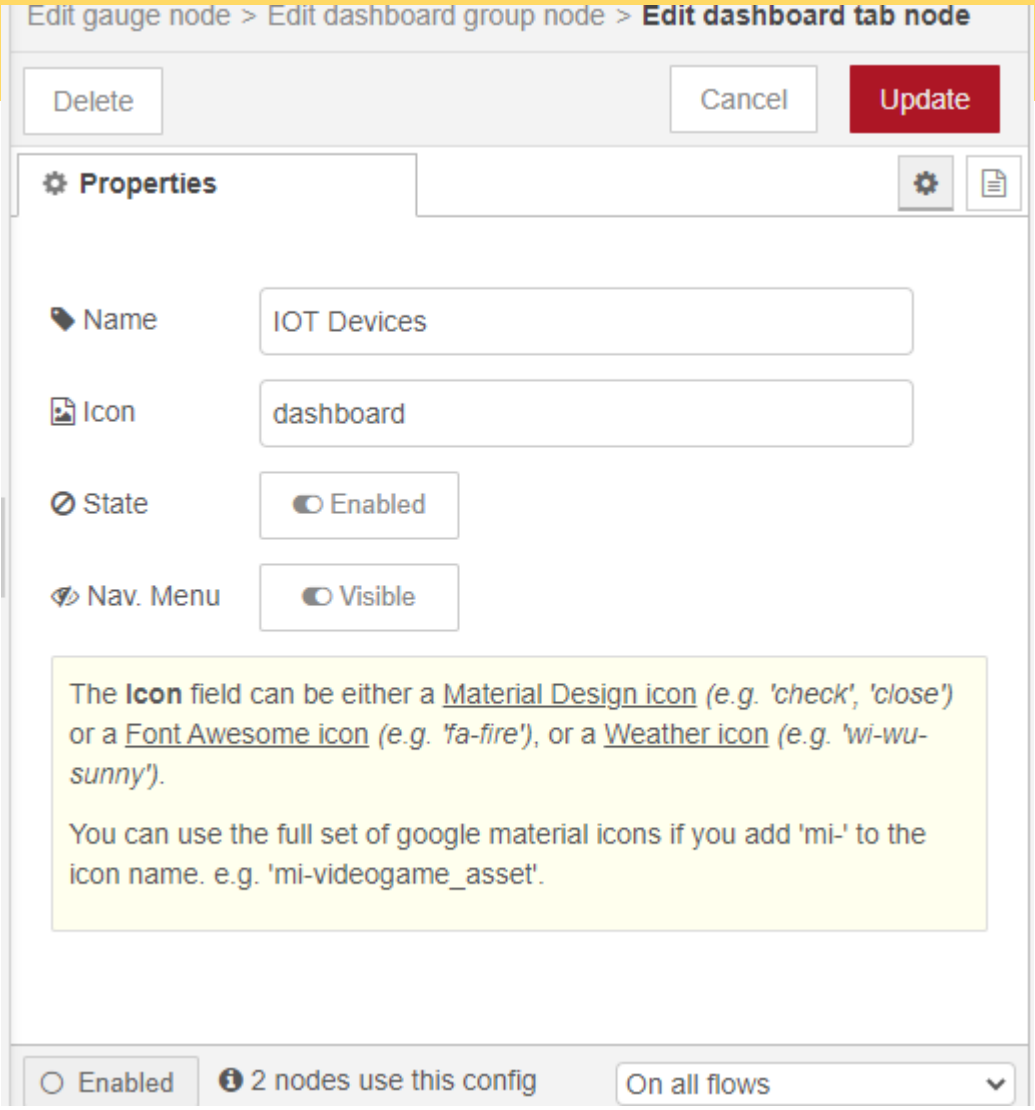


Layout :Group 1



Tab Name


Edit gauge node > Edit dashboard group node
Delete
Cancel
Update
Properties
Name
IOT Panel 1
Tab
Add new ui_tab...
Width
6
Display group name
Allow group to be collapsed
Enabled
1 node uses this config
On all flows


Edit gauge node > Edit dashboard group node > Edit dashboard tab node
Delete
Cancel
Update
Properties
Name
IOT Devices
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'.
Enabled
2 nodes use this config
On all flows

Edit gauge node > **Edit dashboard group node**

Delete | Cancel | Update

Properties

Name: IOT Panel 1

Tab: IOT Devices

Width: 6

☑ Display group name

☐ Allow group to be collapsed

Edit gauge node

Delete | Cancel | Done

Properties

Group: [IOT Devices] IOT Panel 1

Size: auto

Type: Gauge

Label: Speedometer

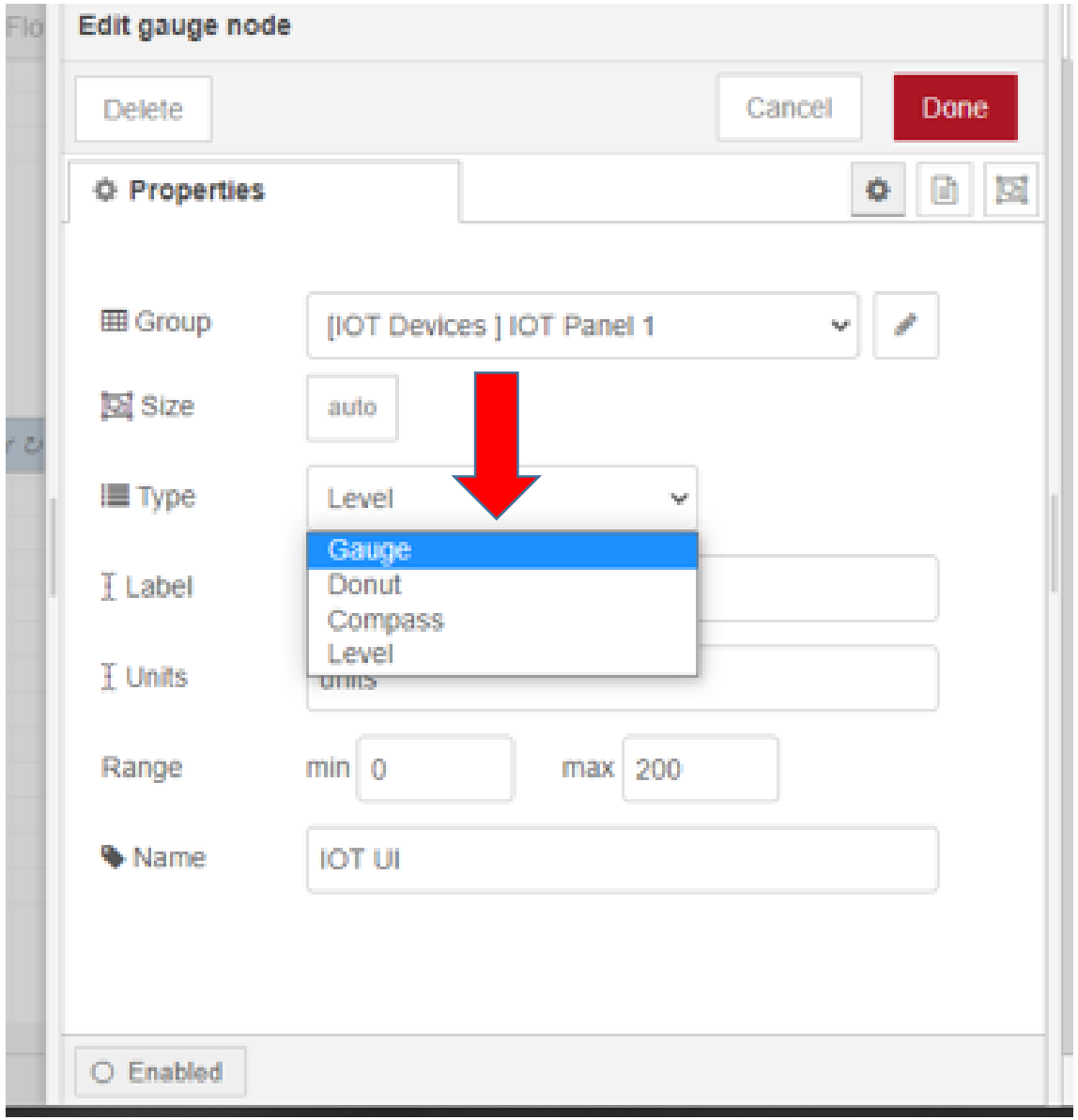
Value format: {{value}}

Units: units

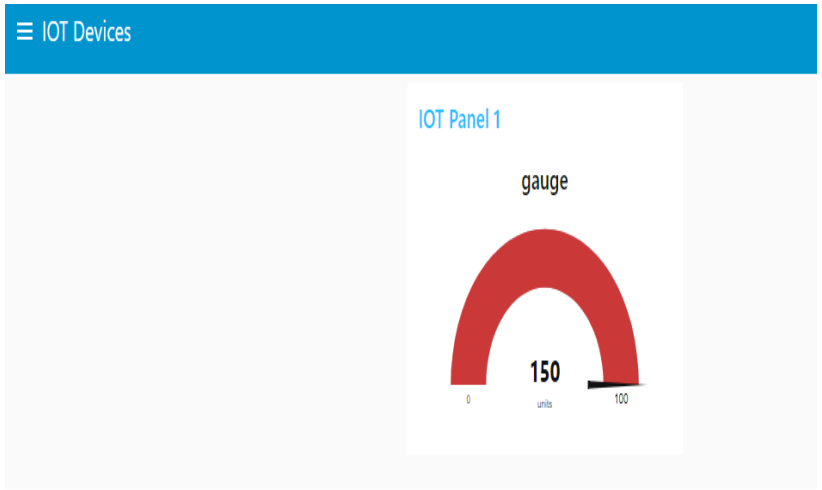
Range: min 0 max 200

Colour gradient

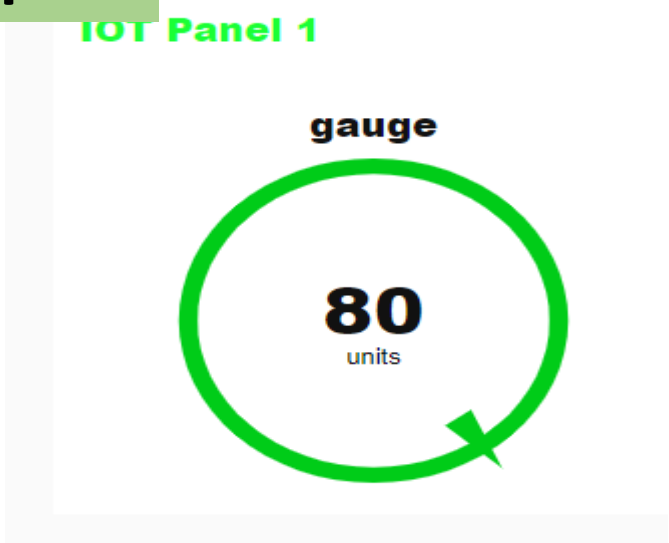
Sectors: 0 ... optional ... optional ... 200


Edit gauge node
Delete
Cancel
Done
Properties
Group
[IOT Devices] IOT Panel 1
Size
auto
Type
Level
Gauge
Donut
Compass
Level
Label
Units
Range
min
0
max
200
Name
IOT UI
Enabled

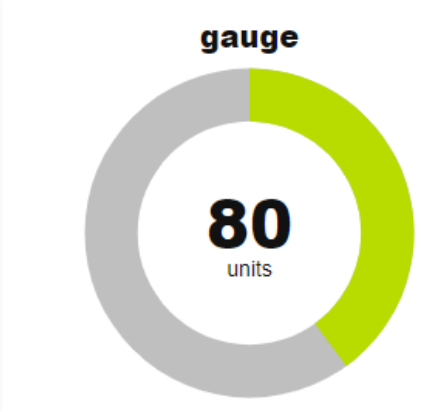
Gauge



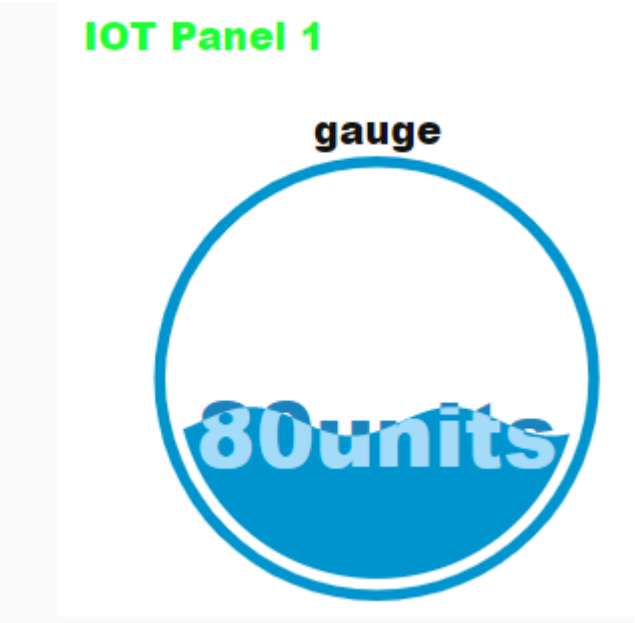
Compass

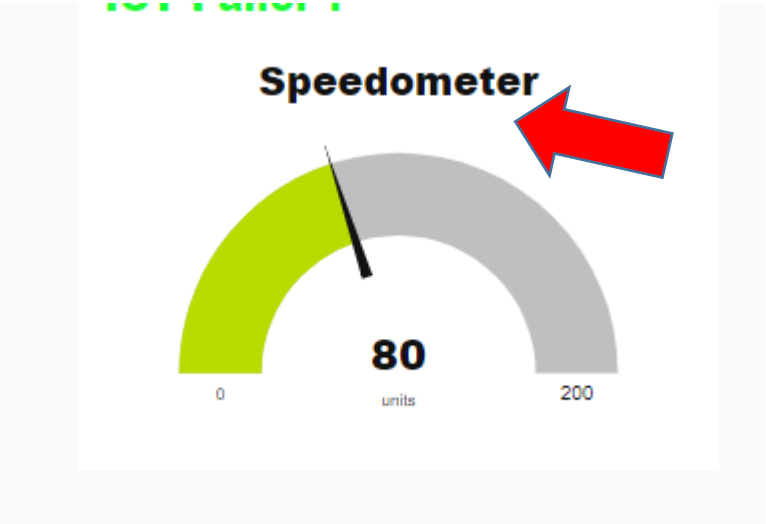


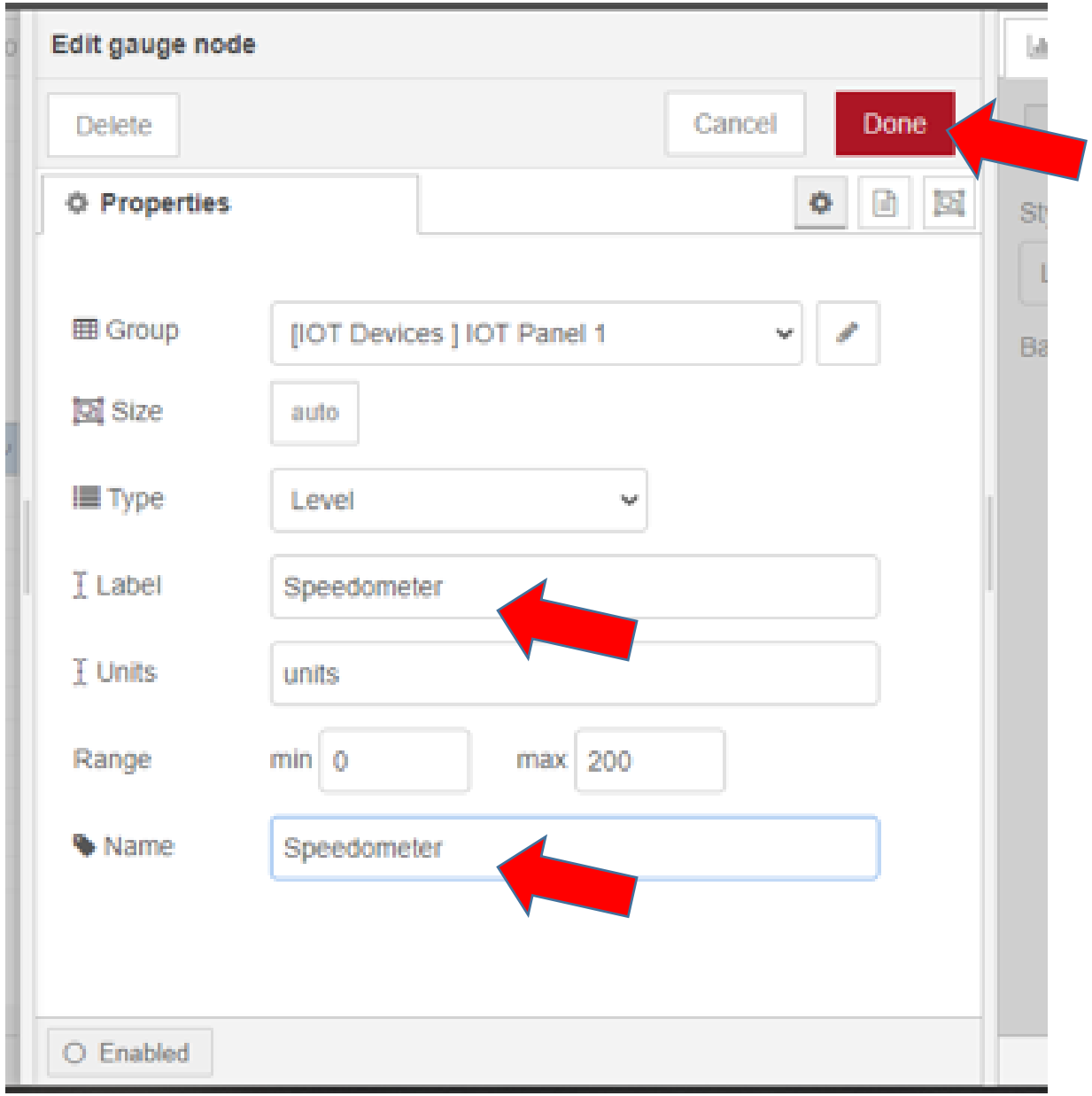
Donut

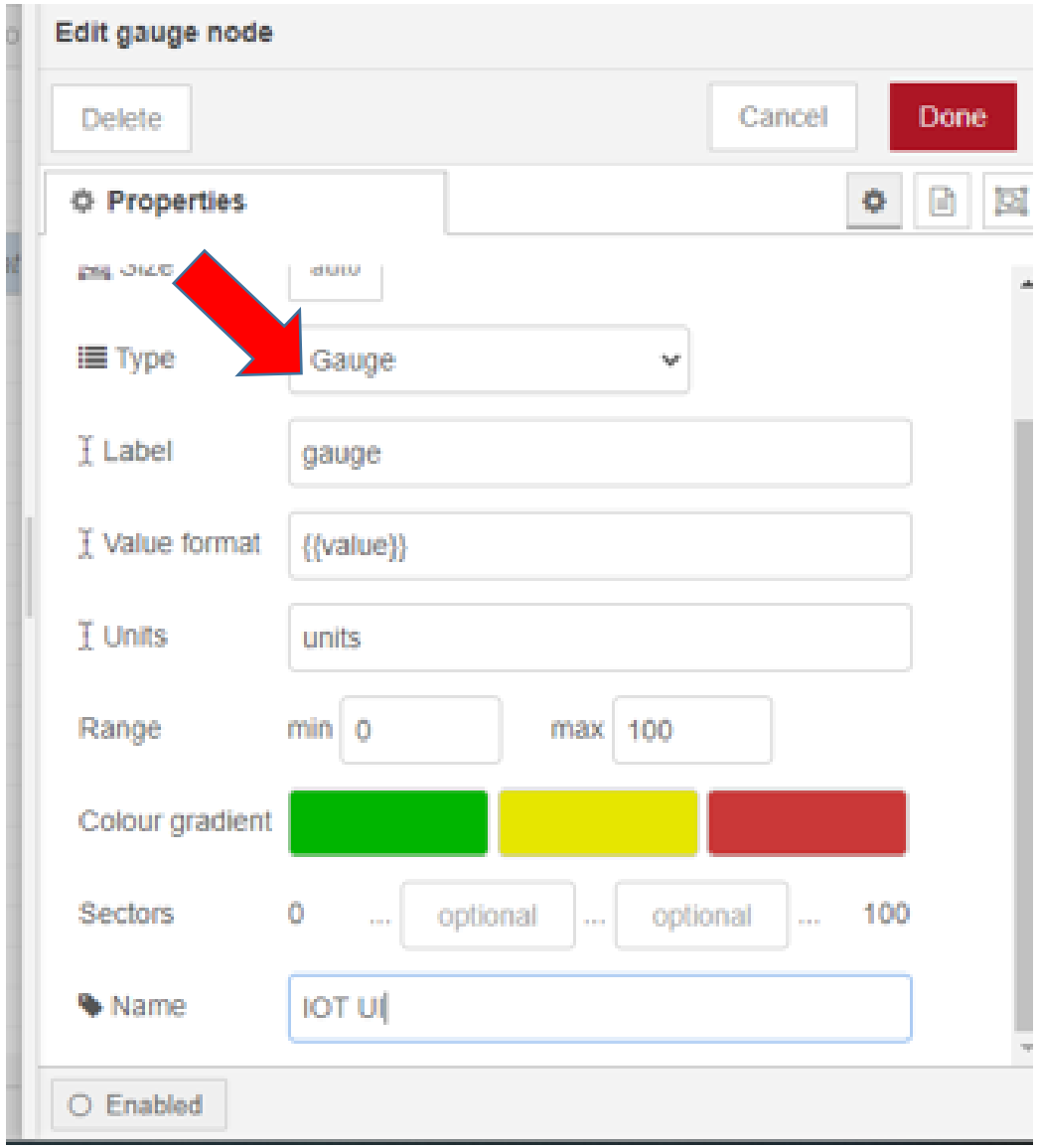


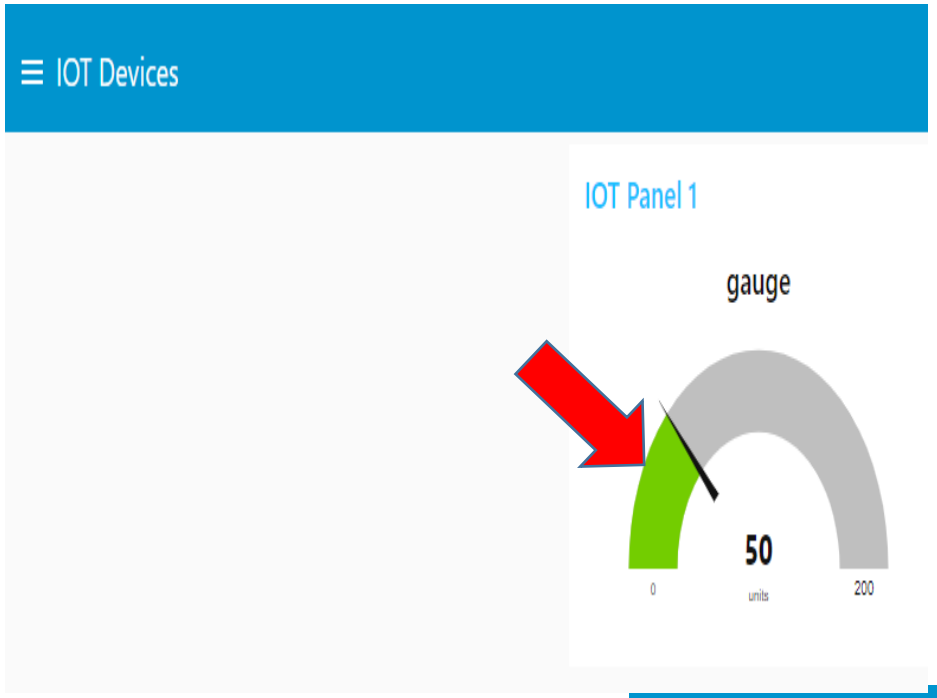
Level

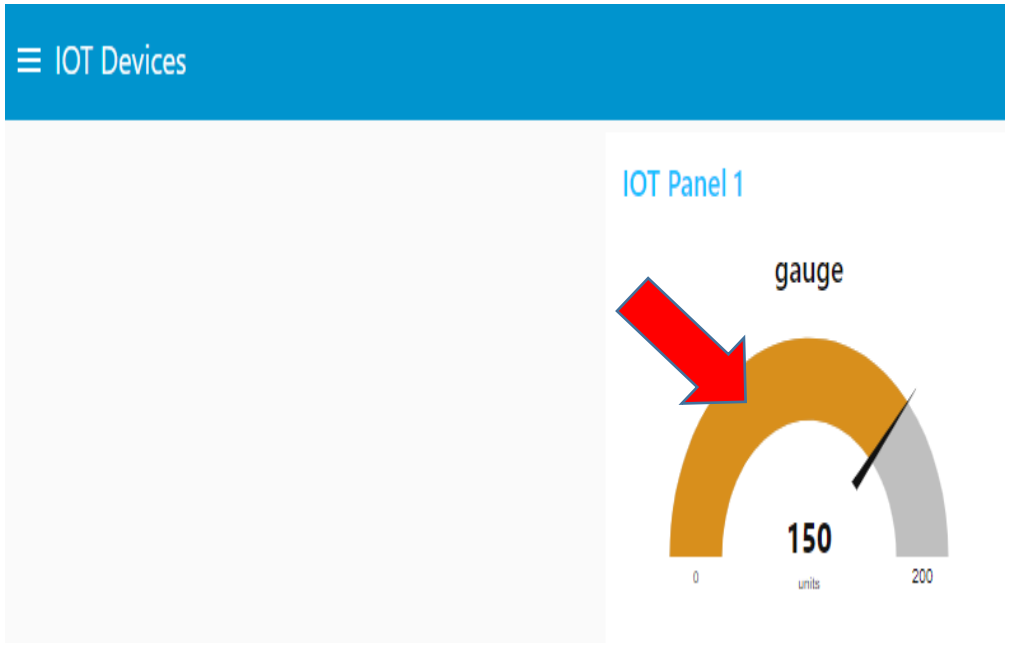


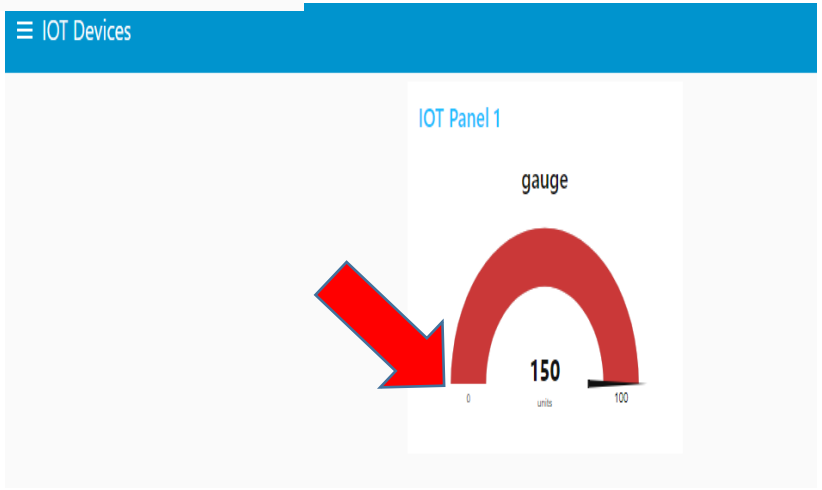

Speedometer
80
0
units
200


Edit gauge node
Delete
Cancel
Done
Properties
Group
[IOT Devices] IOT Panel 1
Size
auto
Type
Level
Label
Speedometer
Units
units
Range
min
0
max
200
Name
Speedometer
Enabled

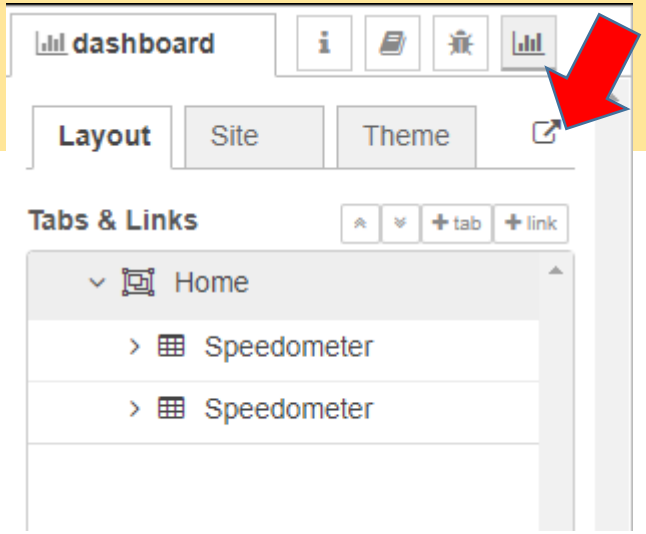

Edit gauge node
Delete
Cancel
Done
Properties
Type
Gauge
Label
gauge
Value format
{{value}}
Units
units
Range
min
0
max
100
Colour gradient
Sectors
0
...
optional
...
optional
...
100
Name
IOT UI
Enabled


IOT Devices
IOT Panel 1
gauge
50
0
units
200


IOT Devices
IOT Panel 1
gauge
150
0
units
200

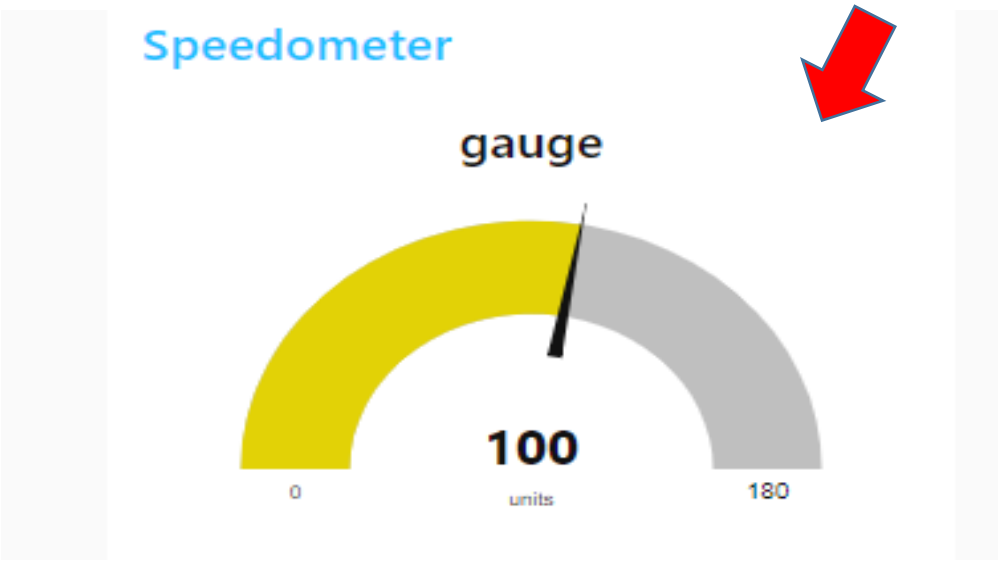

IOT Devices
IOT Panel 1
gauge
150
0
units
100

Wire, Deploy and Execute



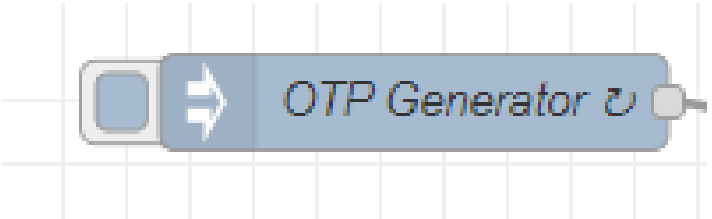
http://127.0.0.1:1880/ui

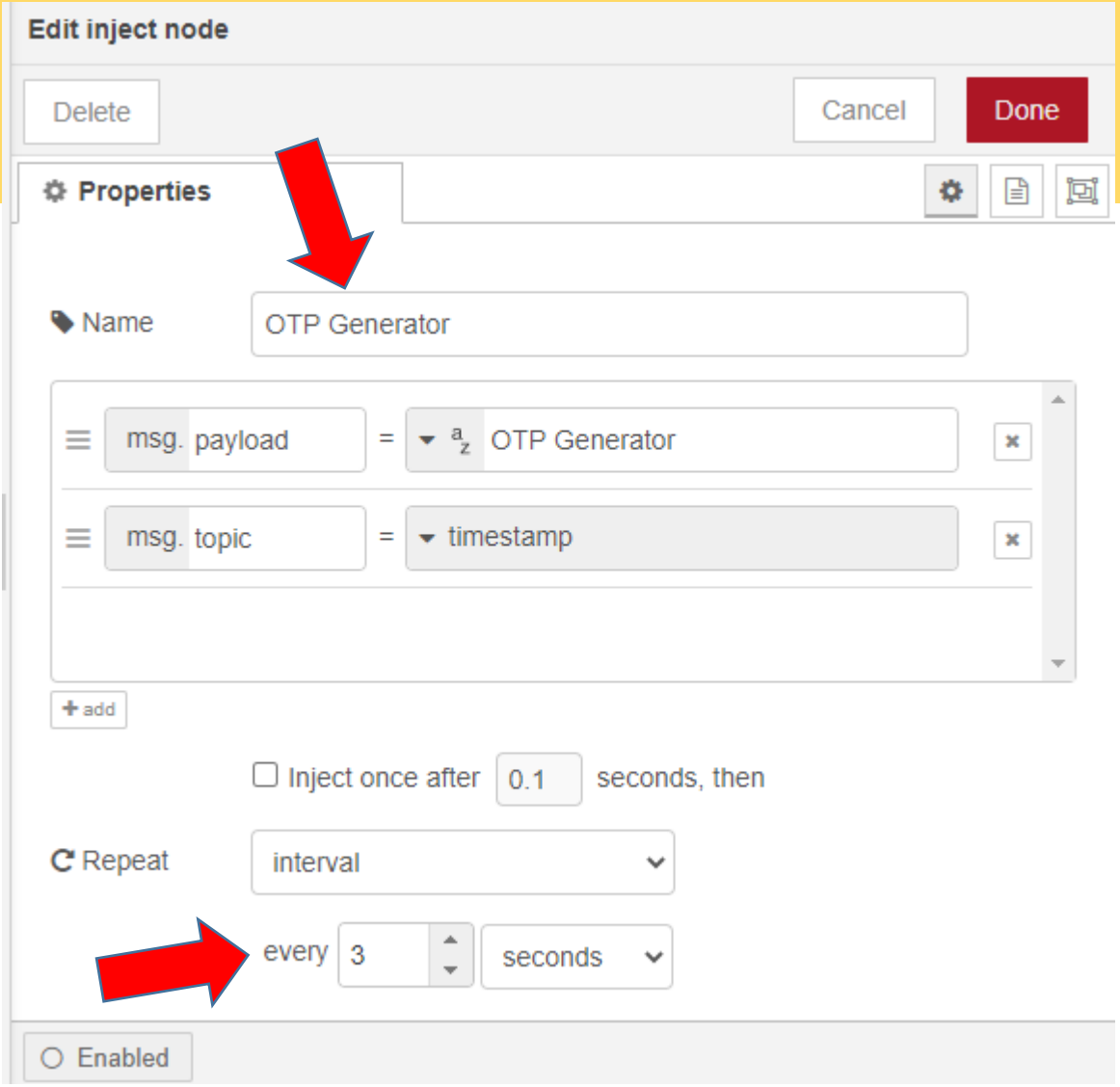

IOT World
Wall
IOT Banking
IOT Devices


Speedometer
gauge
100
0
units
180

Layout :Group 2

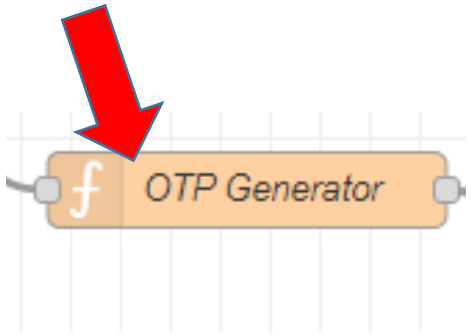
- Insert Inject Node and Edit it



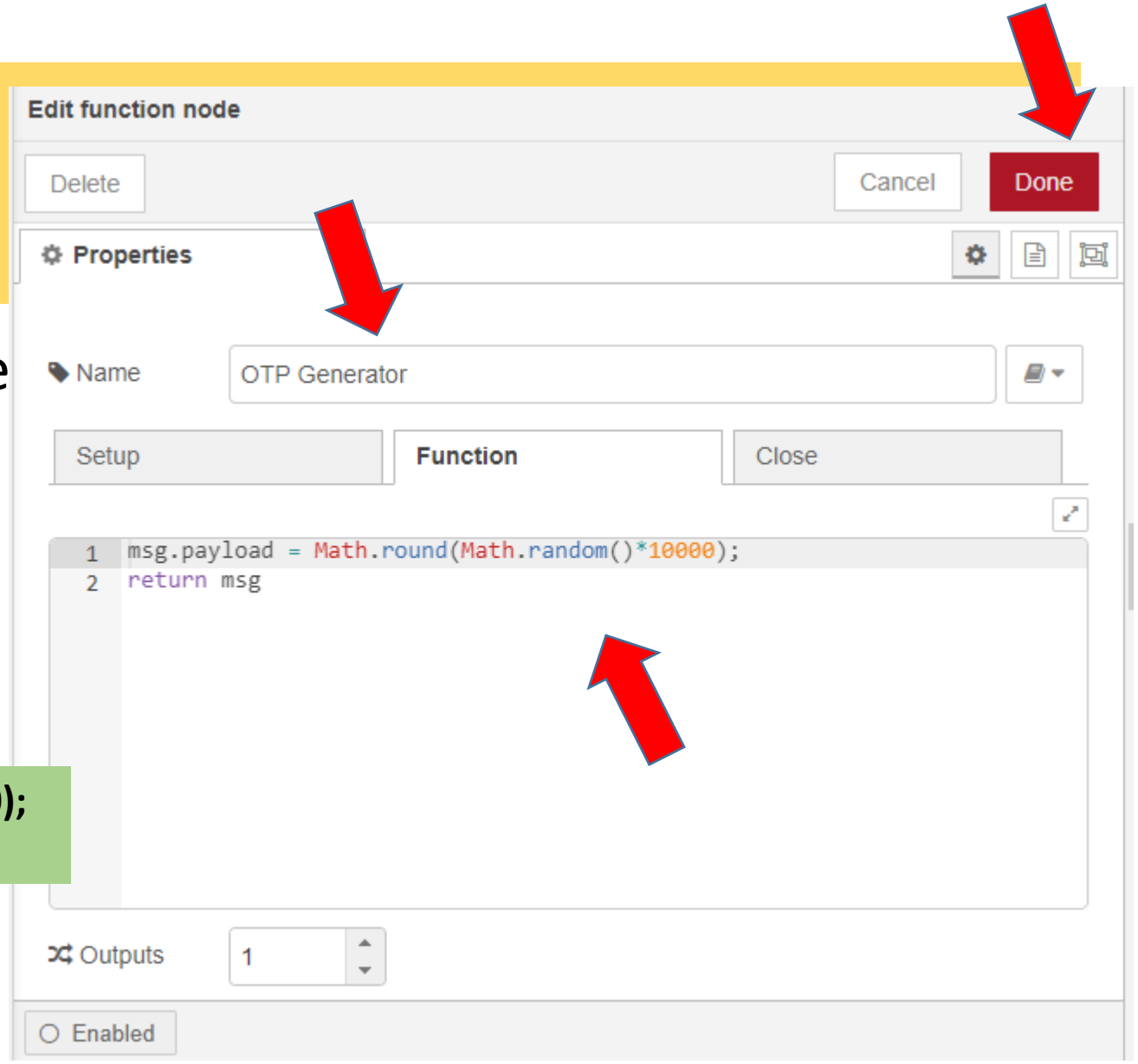


Function Node

- Insert and edit Function Node

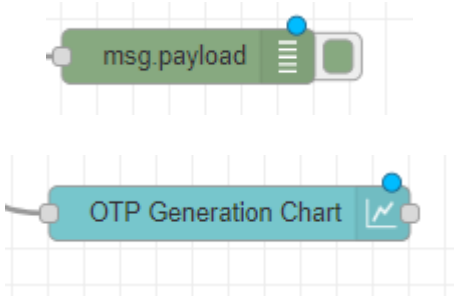


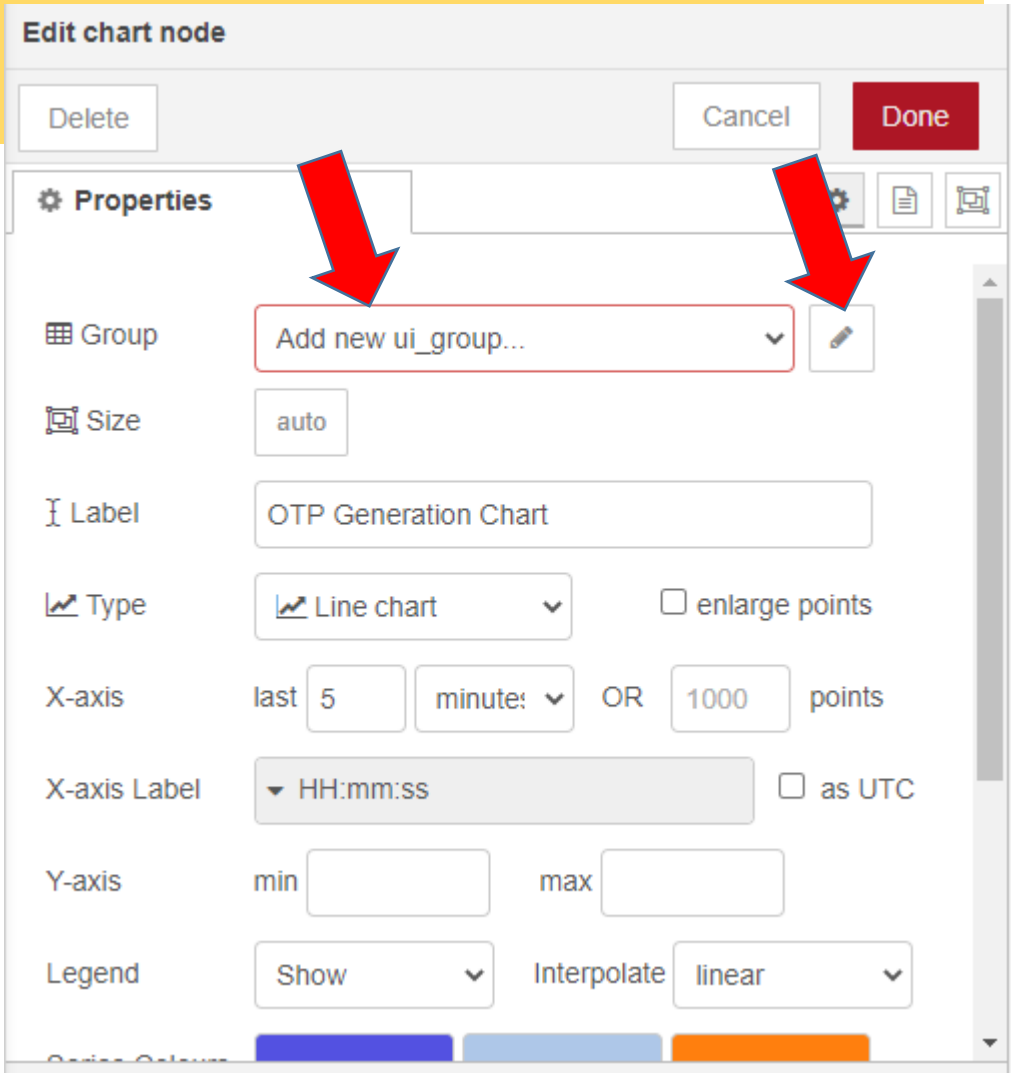
msg.payload = Math.round(Math.random()*10000);
return msg



Debug and Chart node

- Insert Debug node
- Insert Chart Node and Edit it





Group and Tab Name

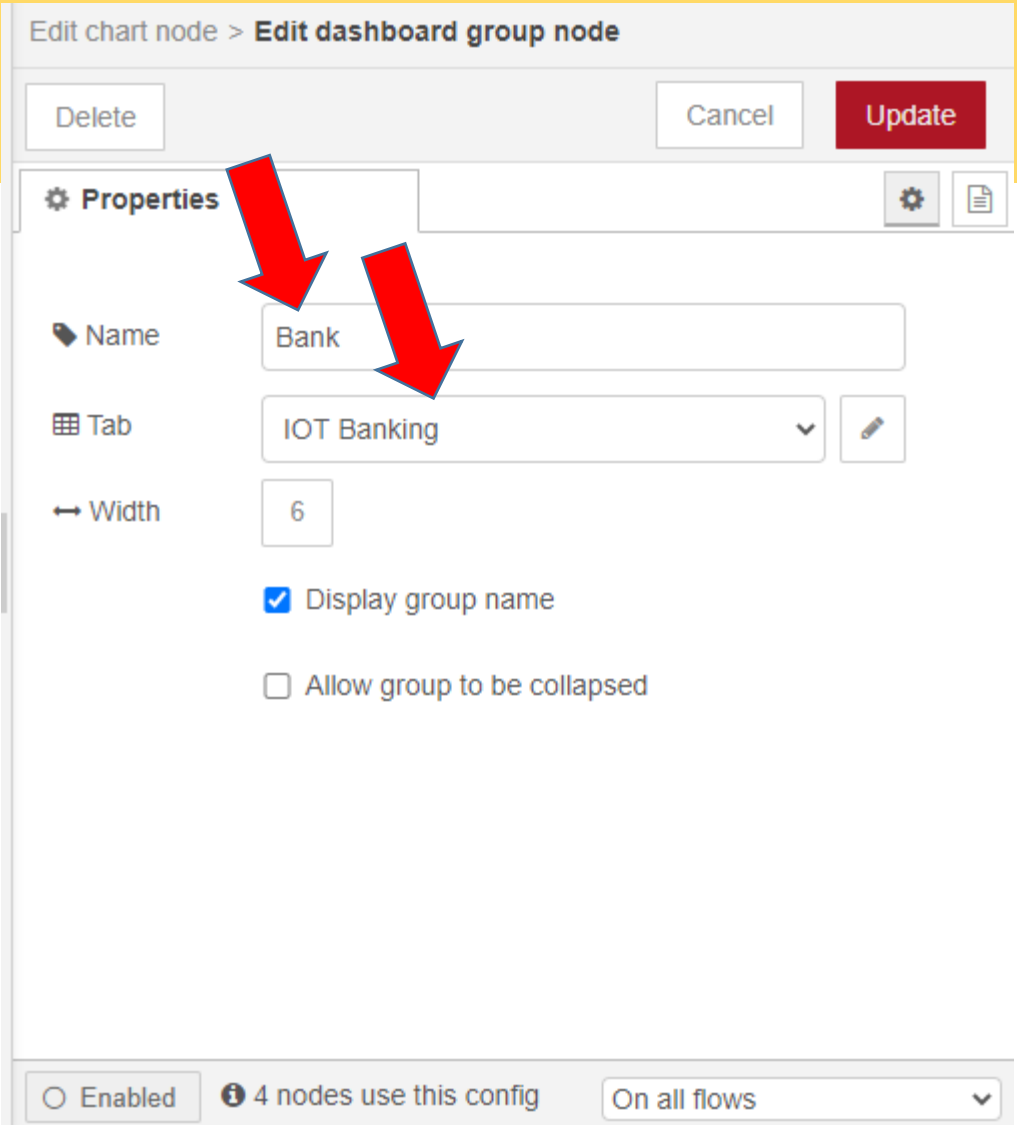


Chart Label

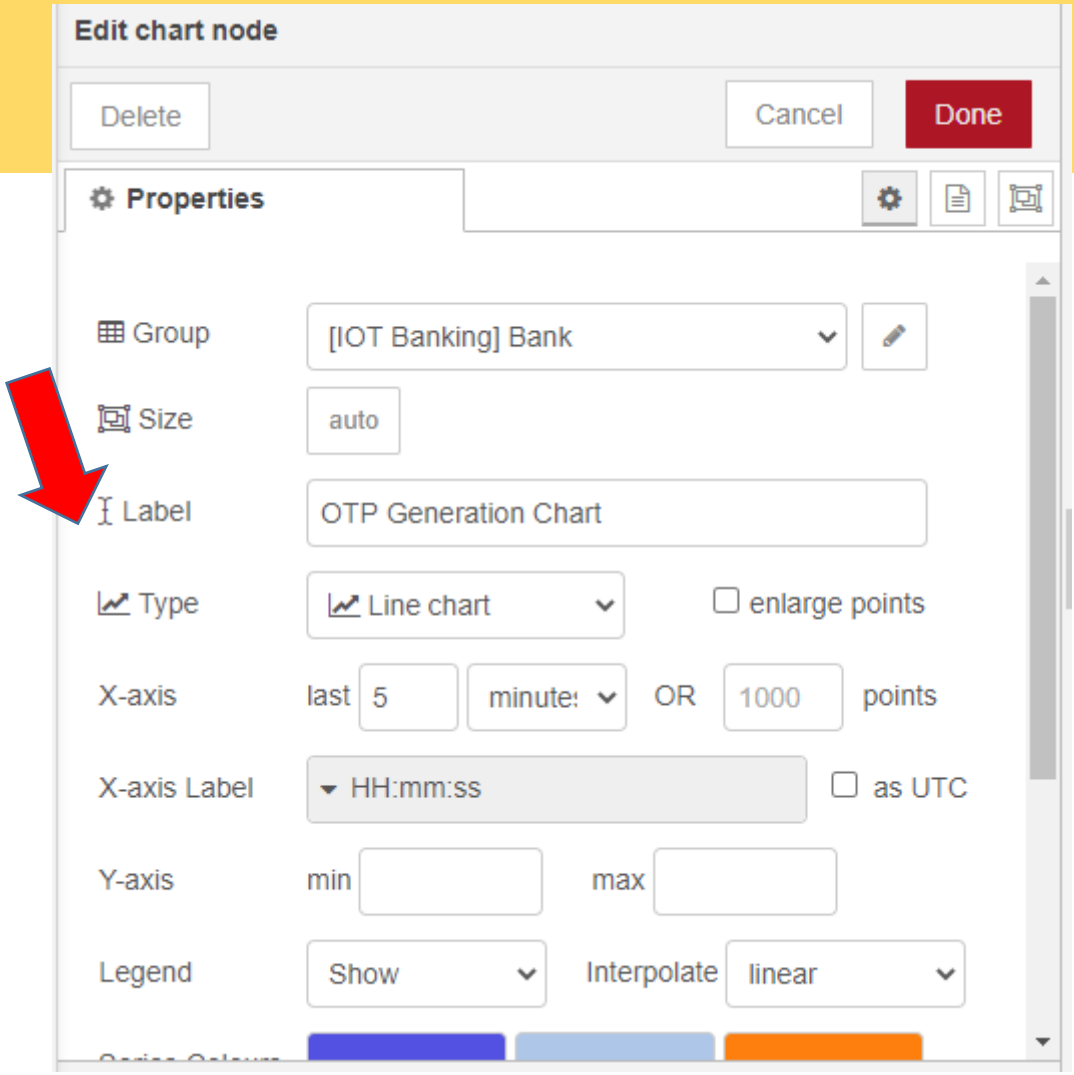

Edit chart node
Delete
Cancel
Done
Properties
Group
[IOT Banking] Bank
Size
auto
Label
OTP Generation Chart
Type
Line chart
enlarge points
X-axis
last
5
minutes
OR
1000
points
X-axis Label
HH:mm:ss
as UTC
Y-axis
min
max
Legend
Show
Interpolate
linear

Chart Type

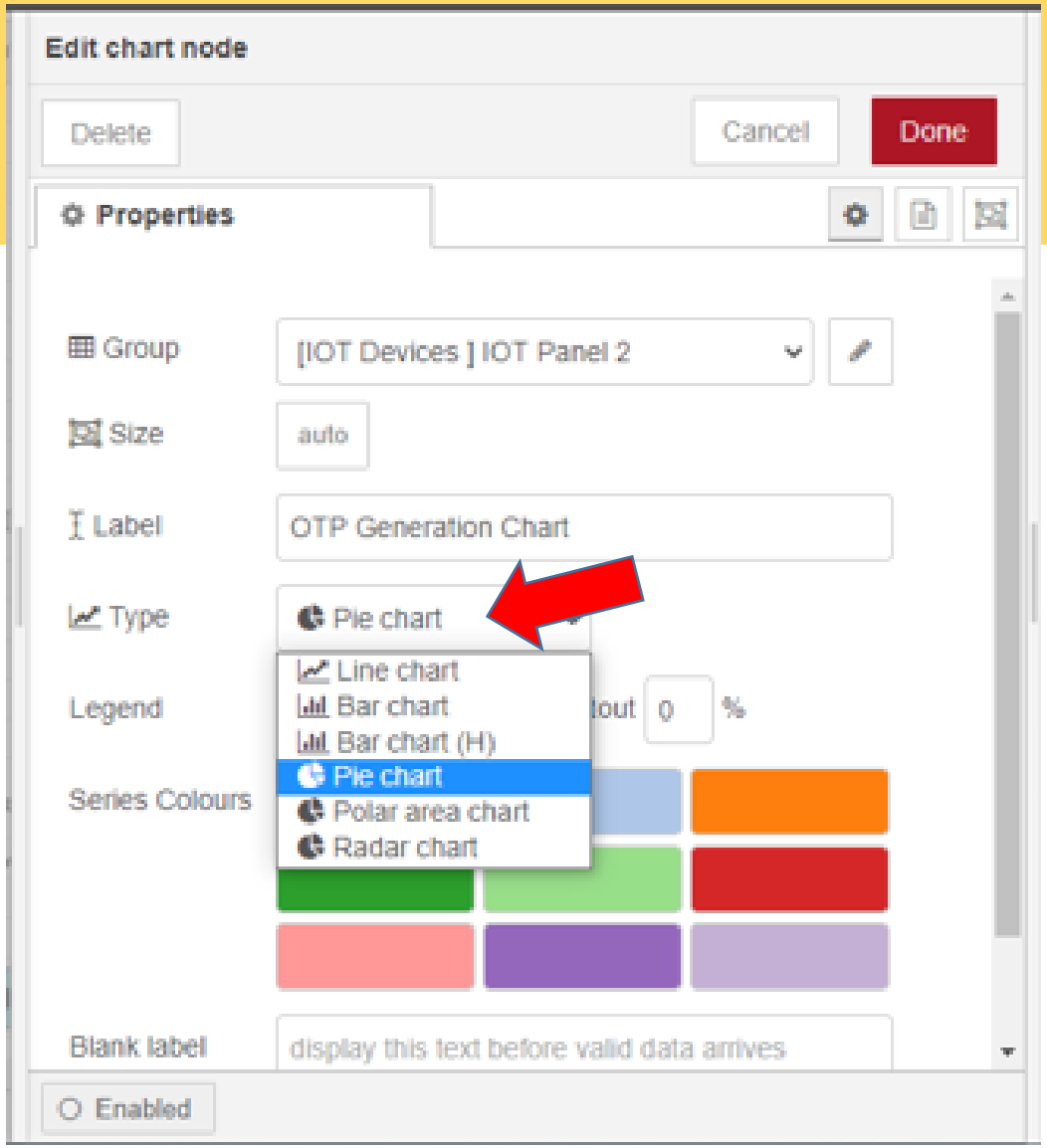

Edit chart node
Delete
Cancel
Done
Properties
Group
[IOT Devices] IOT Panel 2
Size
auto
Label
OTP Generation Chart
Type
Pie chart
Line chart
Bar chart
Bar chart (H)
Pie chart
Polar area chart
Radar chart
Legend
Series Colours
Blank label
display this text before valid data arrives
Enabled

Chart Name

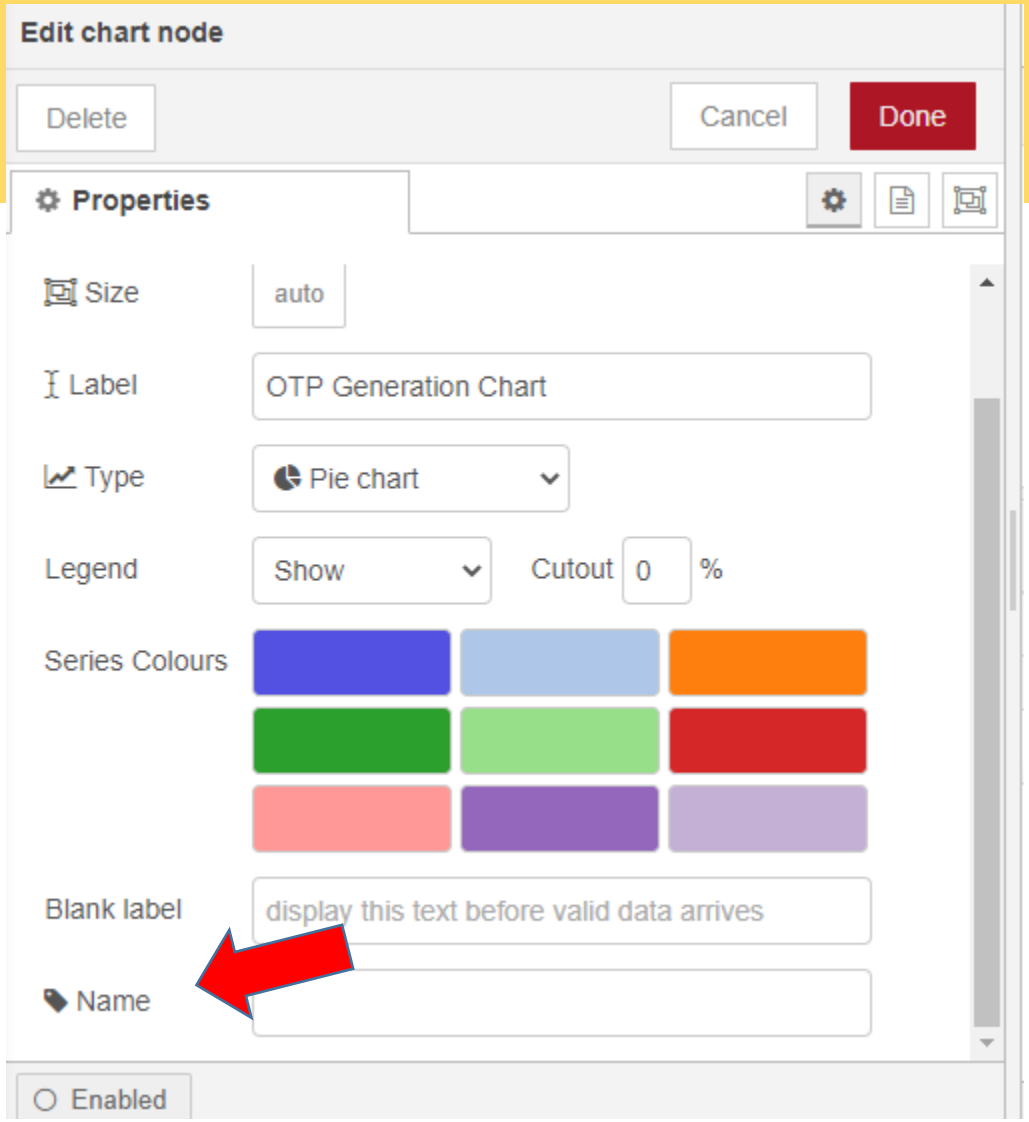
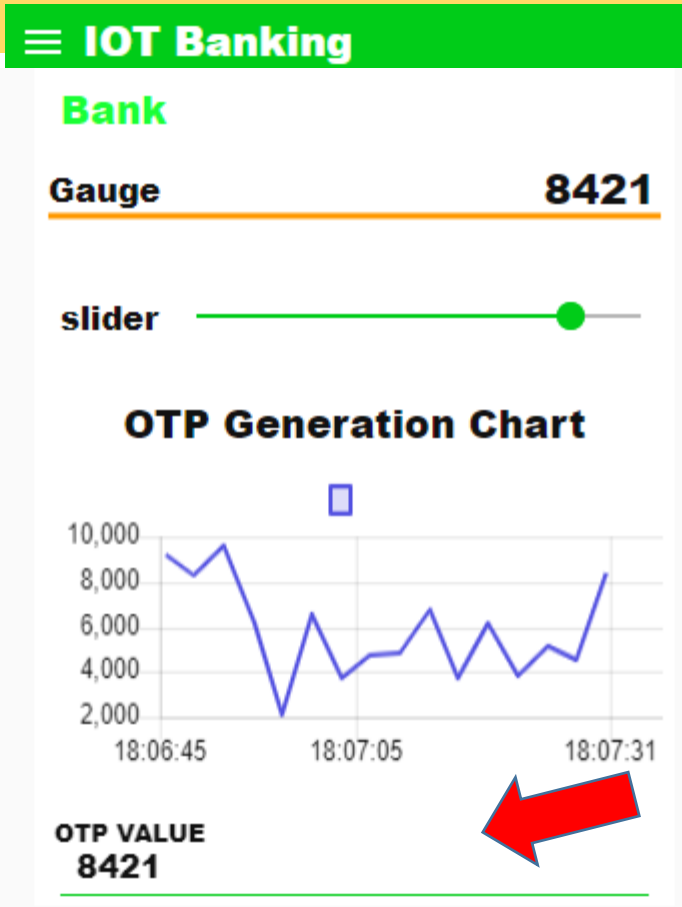
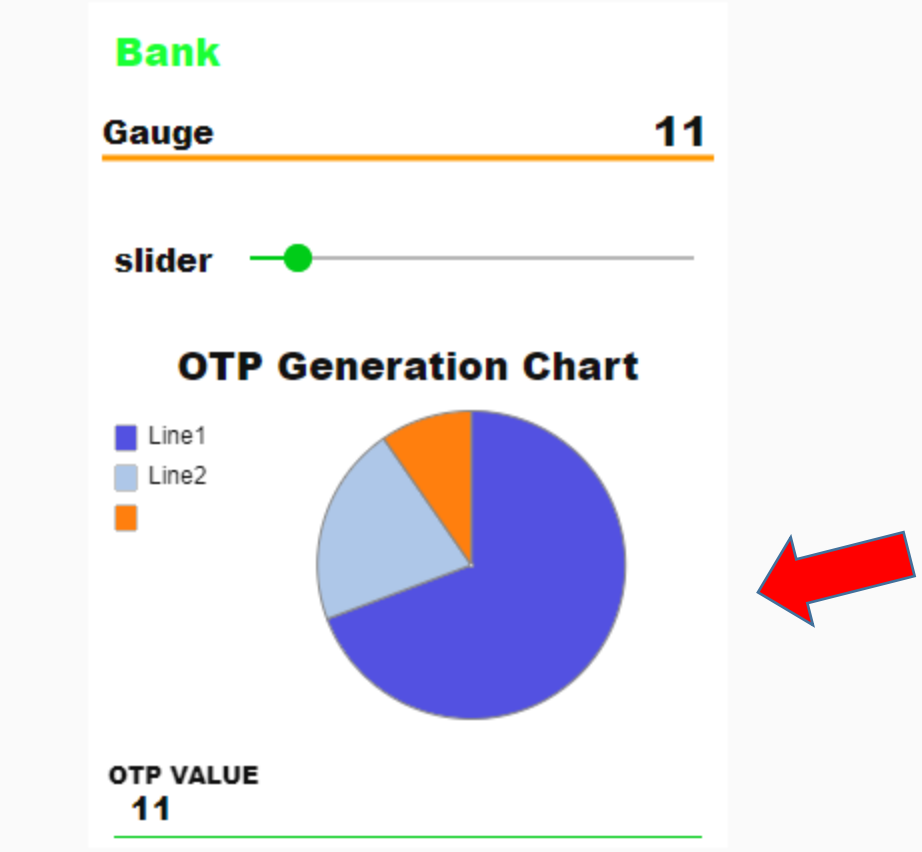
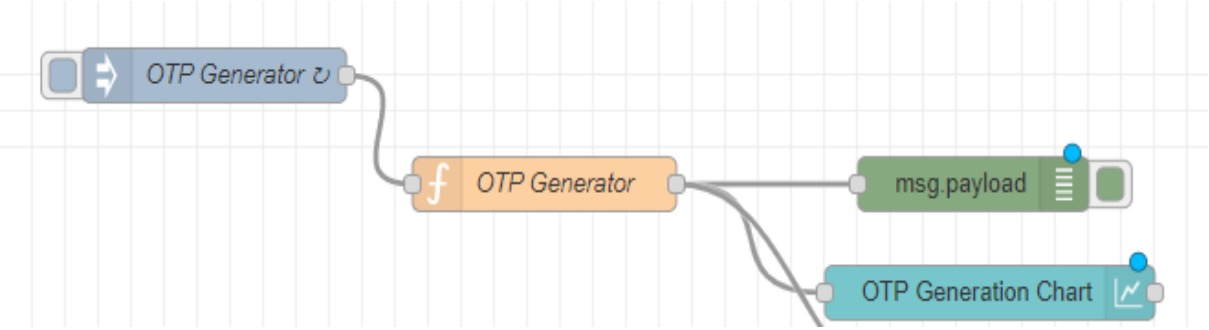

Edit chart node
Delete
Cancel
Done
Properties
Size
auto
Label
OTP Generation Chart
Type
Pie chart
Legend
Show
Cutout
0
%
Series Colours
Blank label
display this text before valid data arrives
Name
Enabled

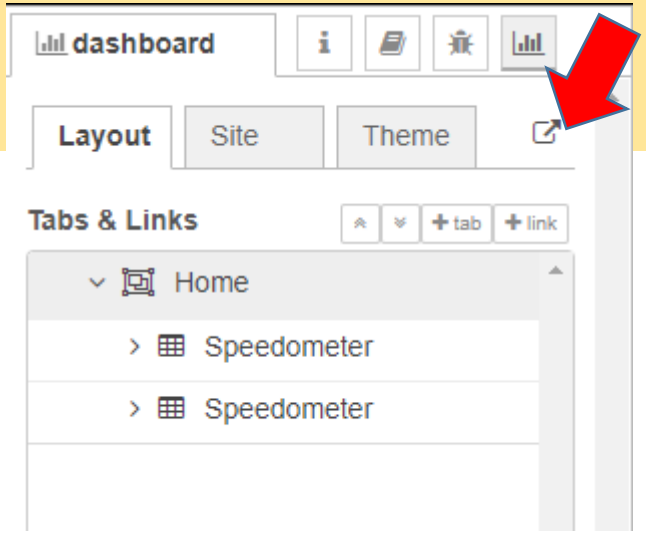
Chart Type


IOT Banking
Bank
Gauge
8421
slider
OTP Generation Chart
10,000
8,000
6,000
4,000
2,000
18:06:45
18:07:05
18:07:31
OTP VALUE
8421


Bank
Gauge
11
slider
OTP Generation Chart
Line1
Line2
OTP VALUE
11

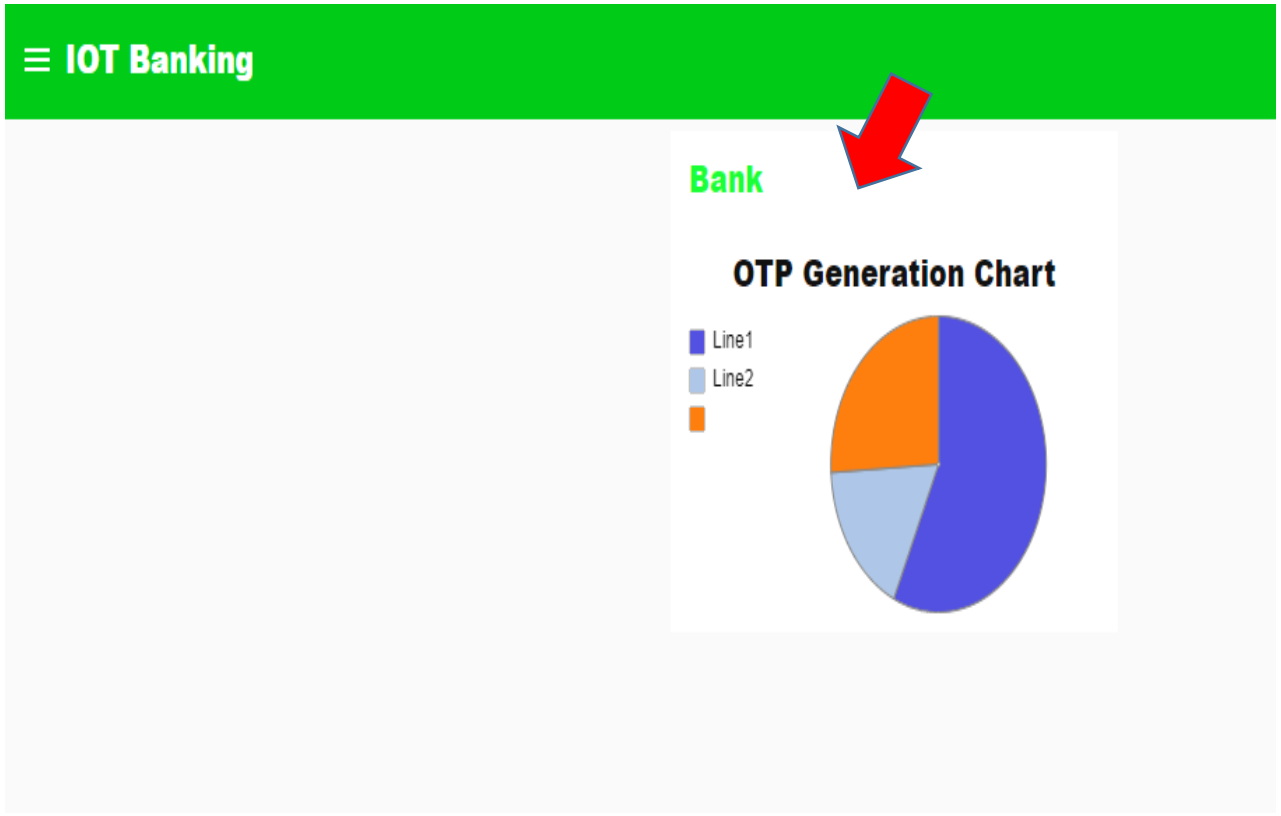
Wire, Deploy and Execute



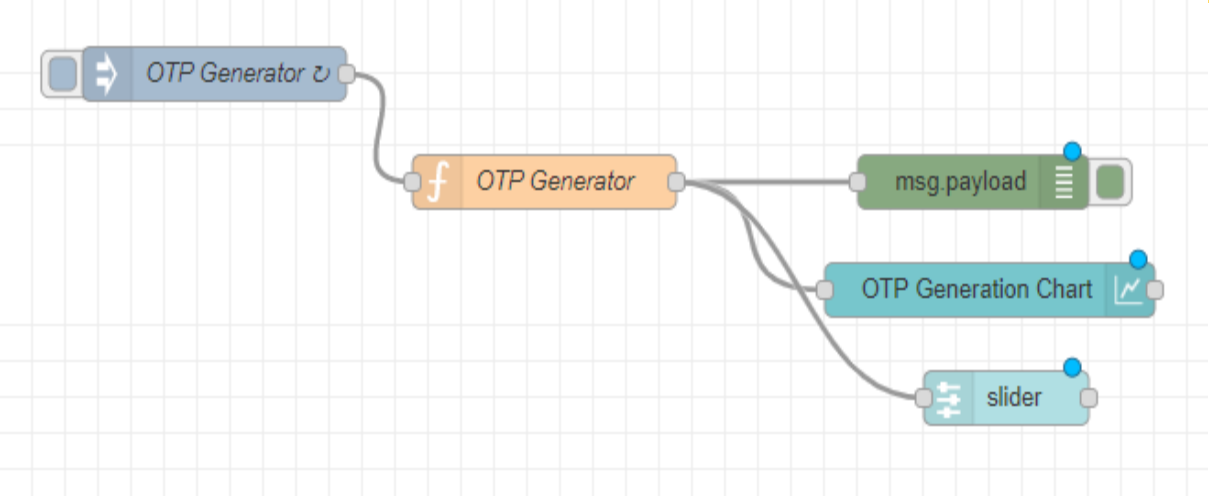


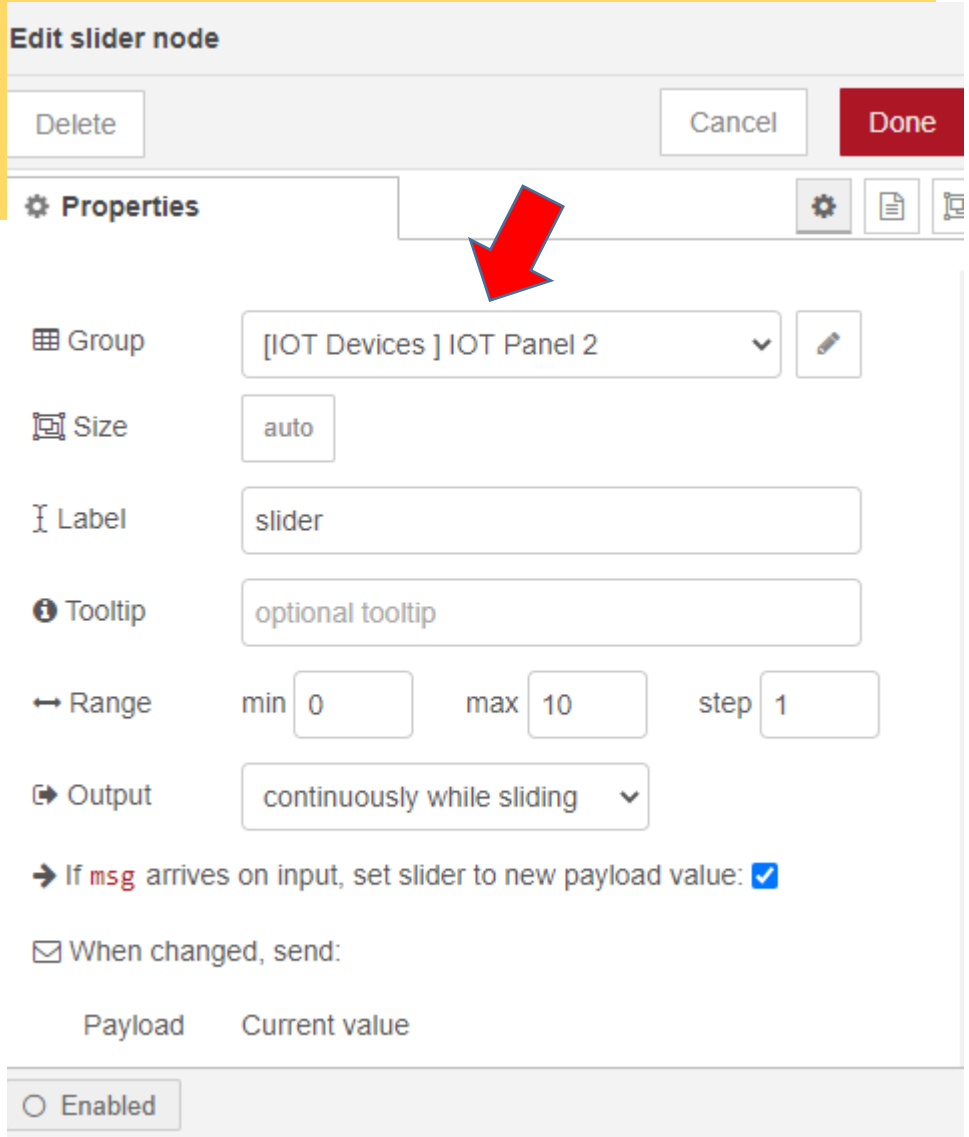
http://127.0.0.1:1880/ui

Layout Group



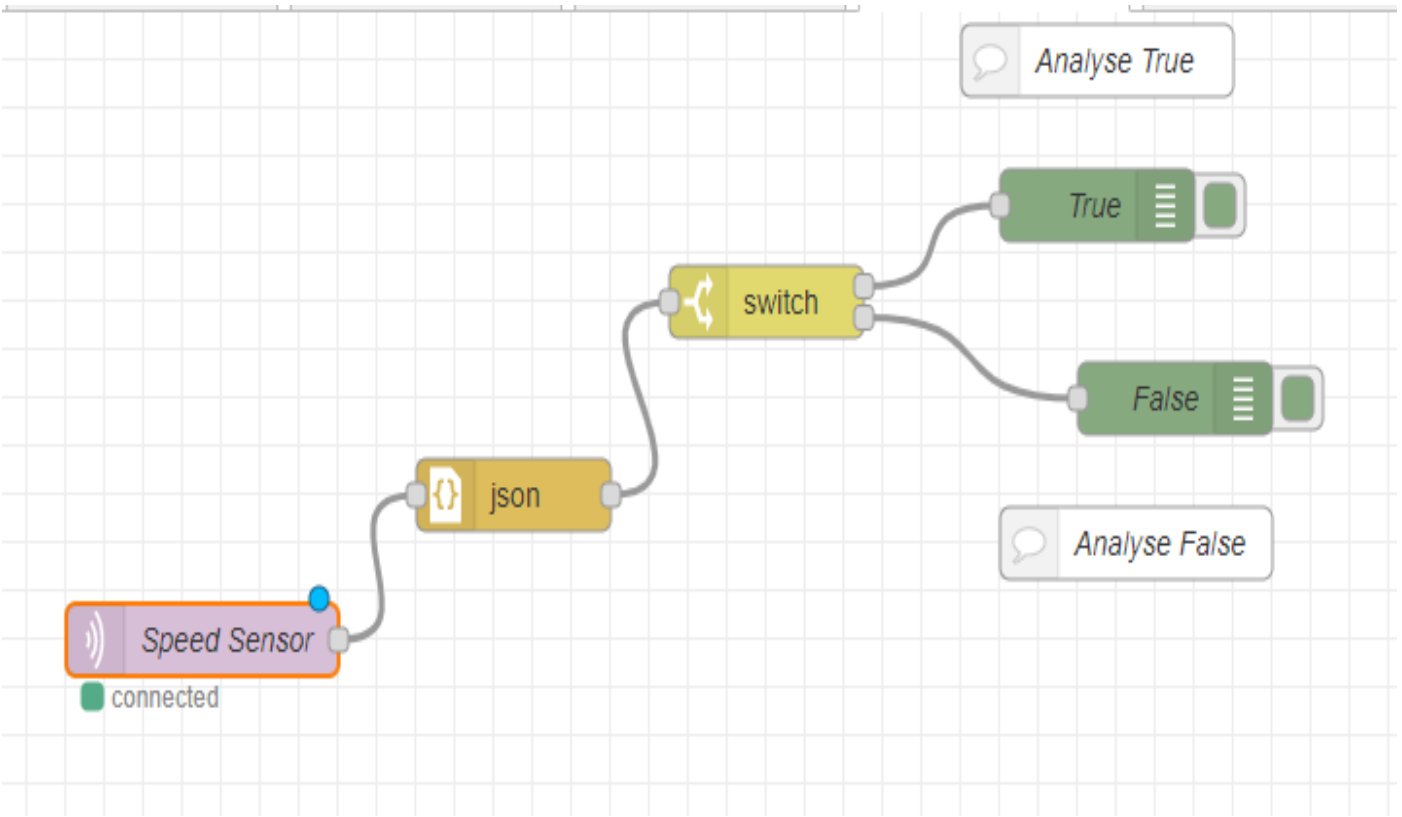
Slider Node


OTP Generator
OTP Generator
msg.payload
OTP Generation Chart
slider


Edit slider node
Delete
Cancel
Done
Properties
Group
[IOT Devices] IOT Panel 2
Size
auto
Label
slider
Tooltip
optional tooltip
Range
min 0
max 10
step 1
Output
continuously while sliding
If msg arrives on input, set slider to new payload value:
When changed, send:
Payload
Current value
Enabled

Flow : Switch Node and Comment Node

- Insert **MQTT** in Node
- Insert **Json** Node
- Insert **Switch** Node
- Insert **Debug** Node
- Insert **Comment** Node



MQTT and Json

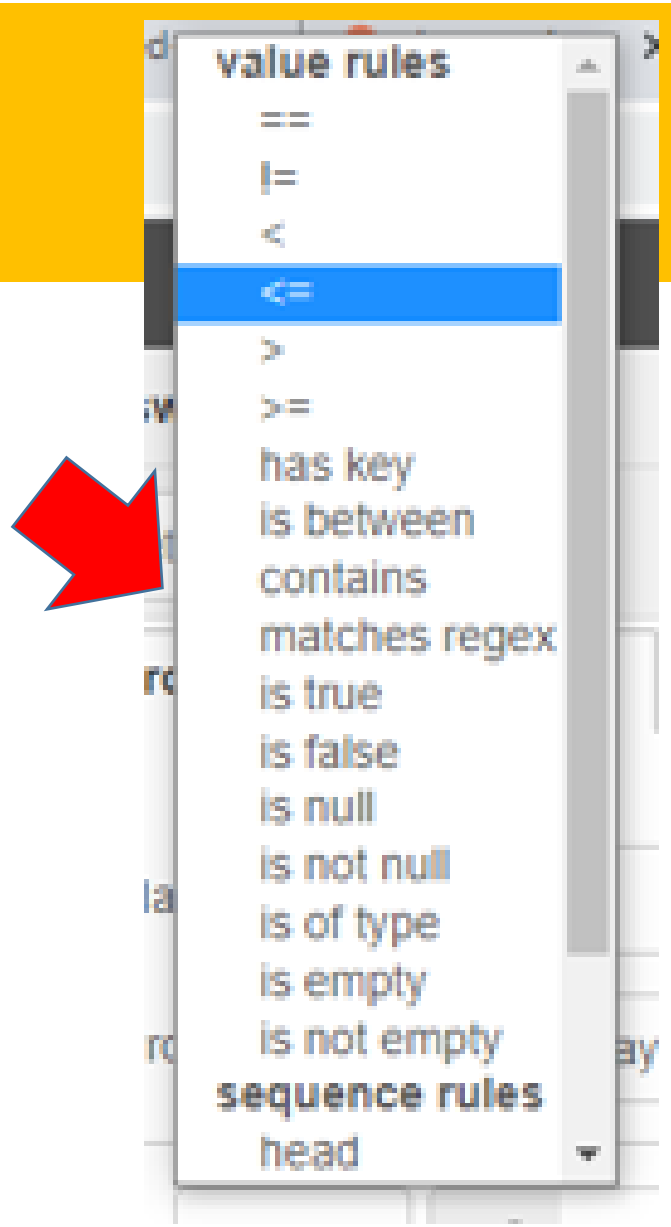
- MQTT in Node configuration (Refer pervious Session)
  - **Server : broker.mqttdashboard.com**
  - **Client ID AND Topic : Speed Sensor**
- Json

Reference Link for MQTT

- https://www.youtube.com/watch?v=LCYlFoyBn2I&t=419s

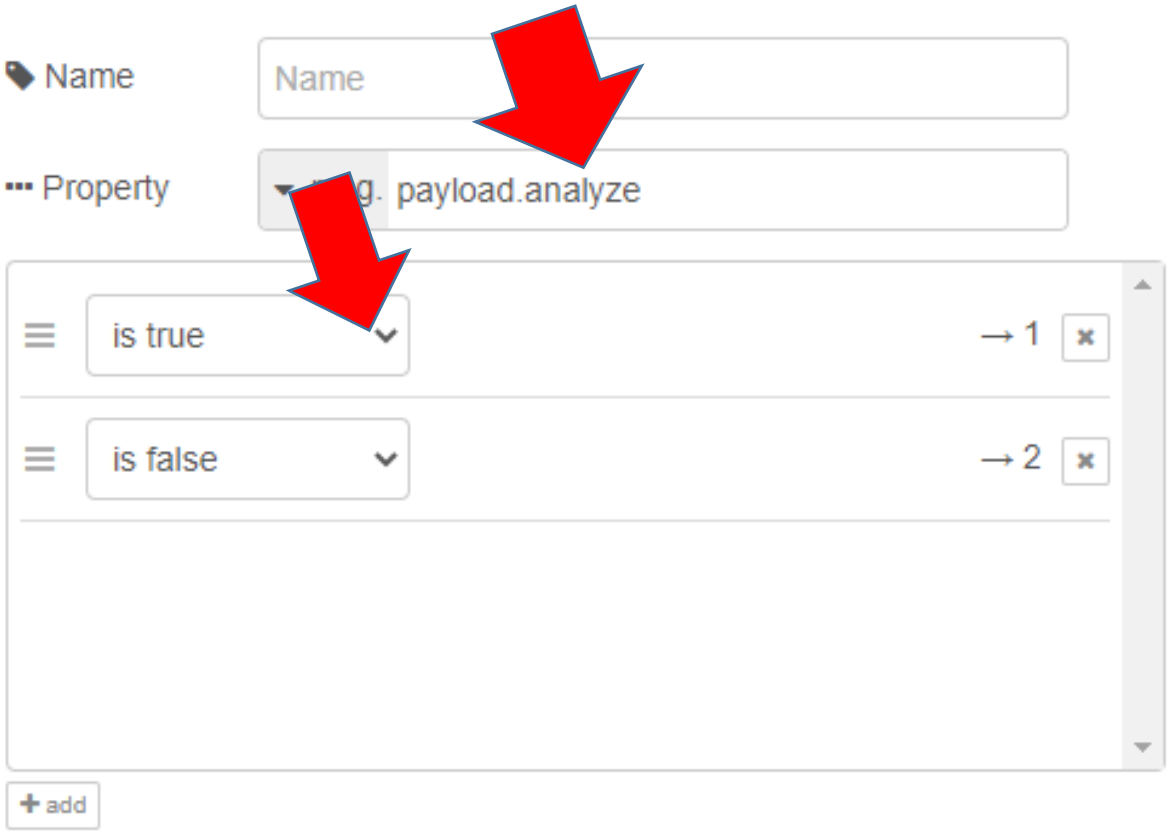
Switch Node

- Switch Node helps to ‘**switch**’ or **route messages** depending on the incoming message properties.
- Example: Check the msg.payload.analyze property and, depending on its value (true/false), **decide to route a message** to one of the switch node’s outputs.



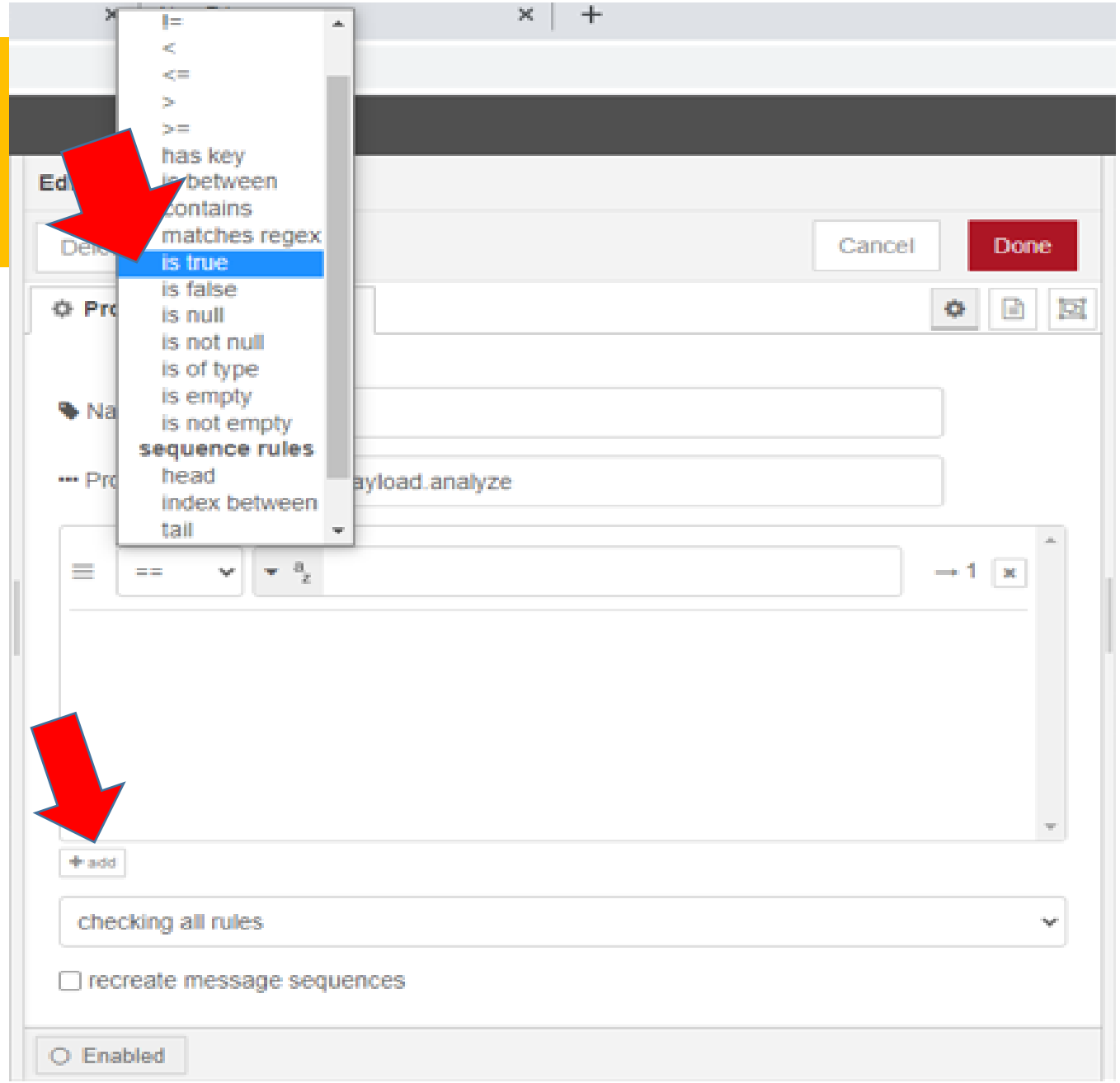
Switch Node : Edit Properties

- **Property :payload.analyze**



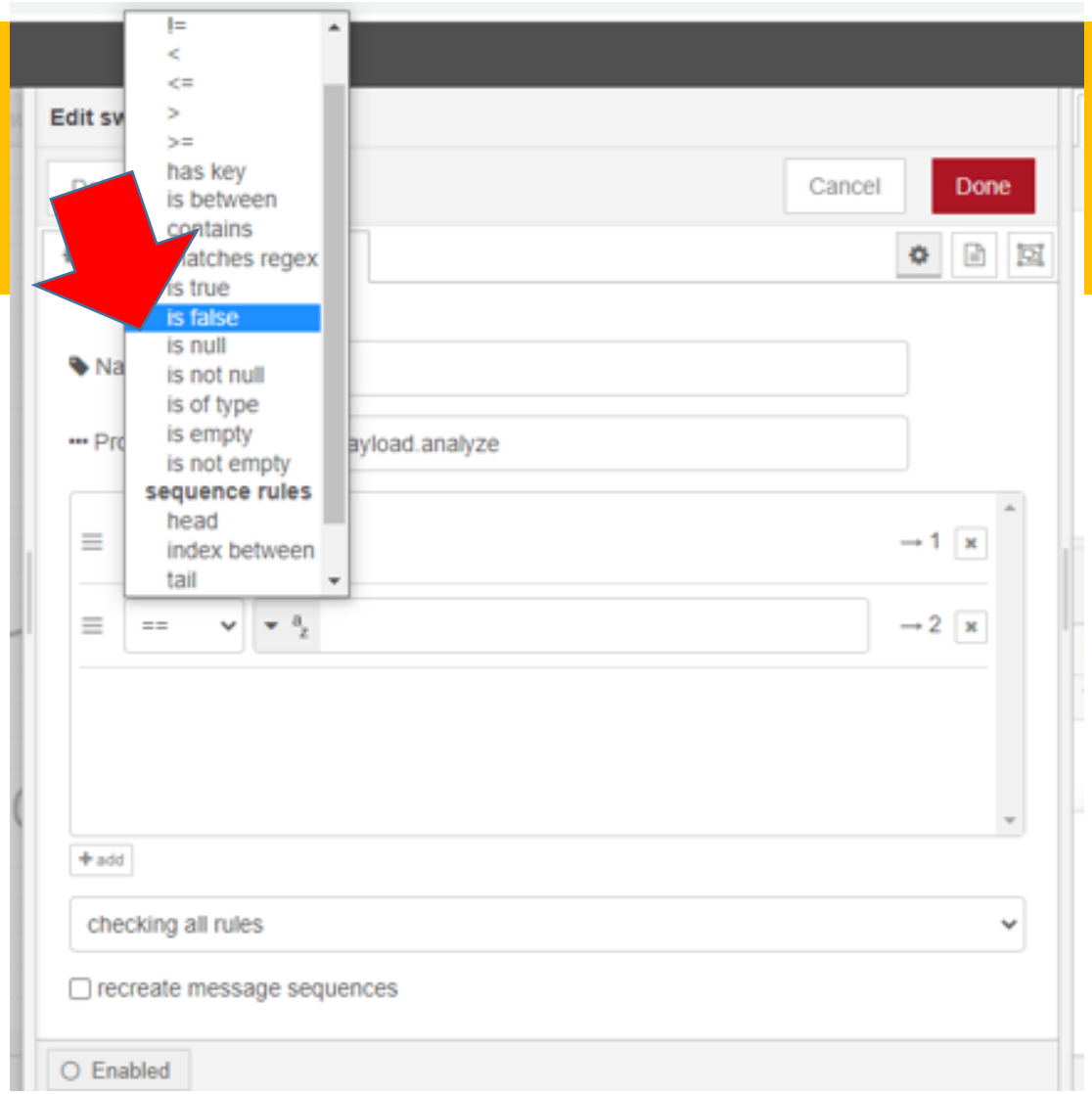
Switch Node

- Property
  - Is True
- Click **Add**



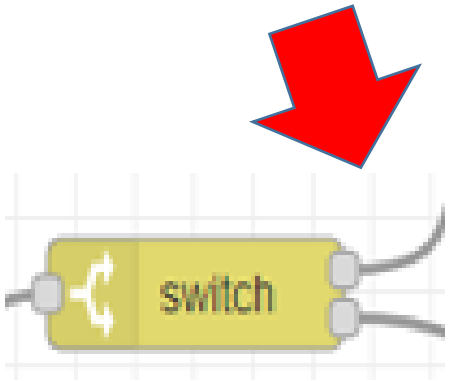
Switch Node

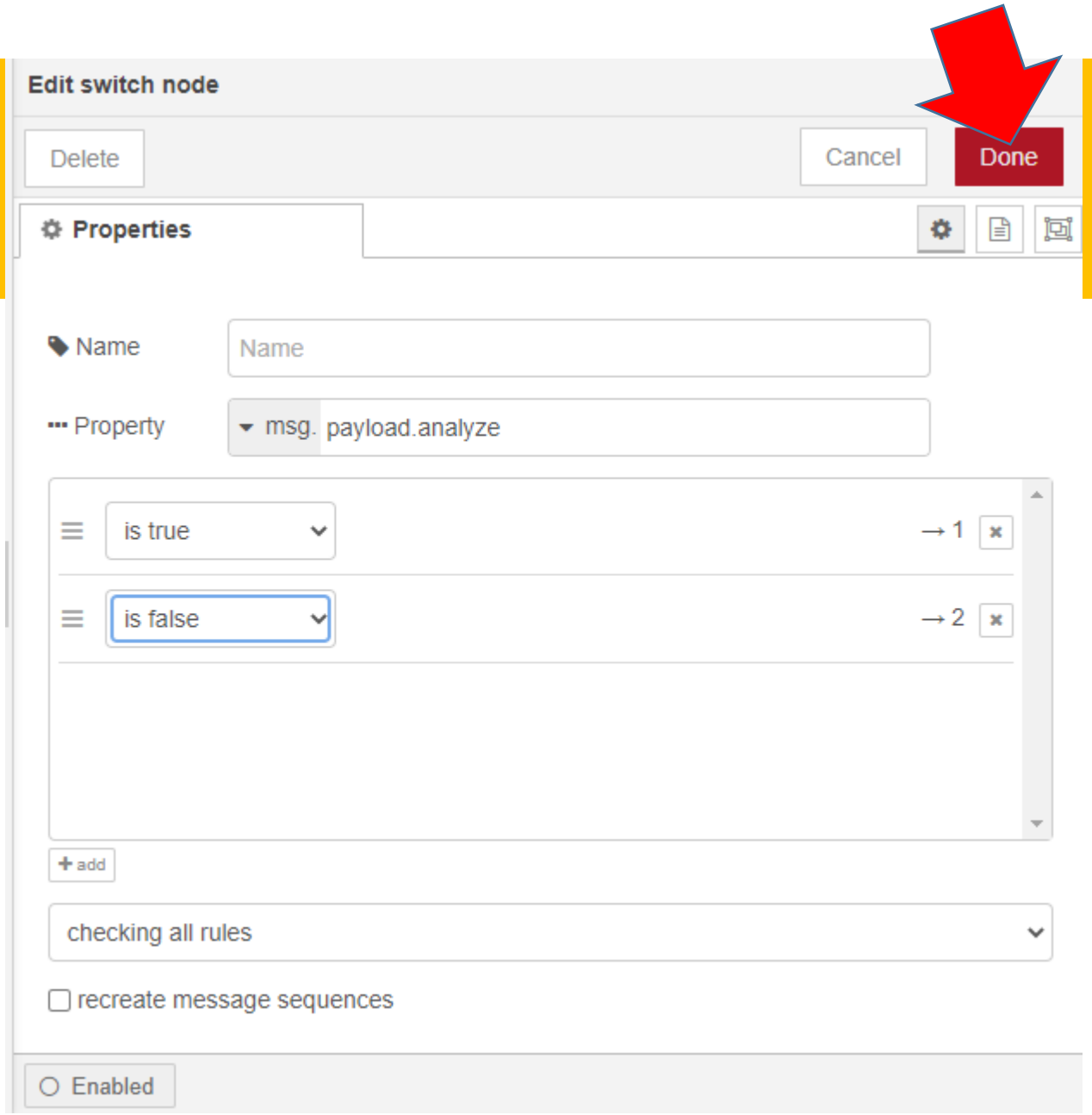
- Property
  - Is False



Switch Node

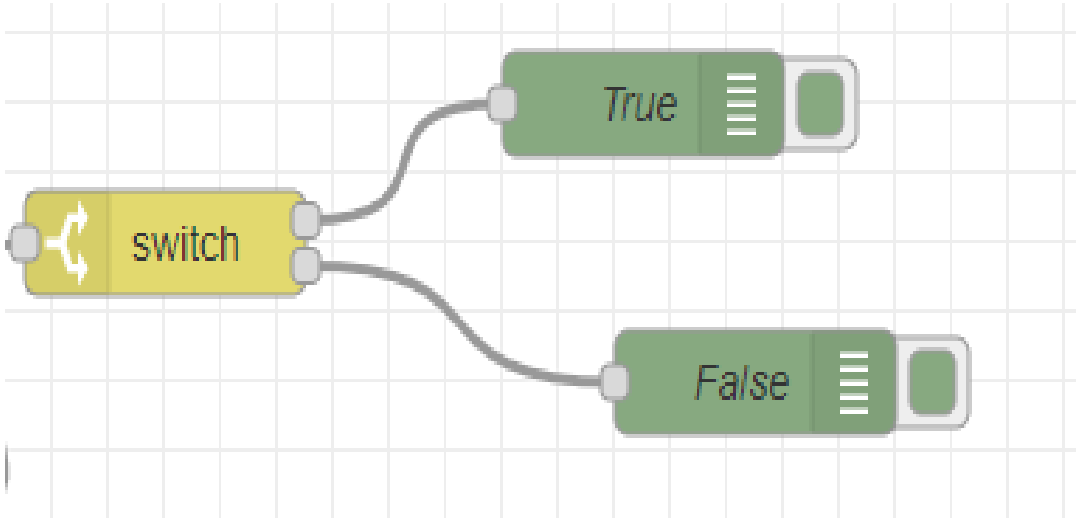
- Click Done

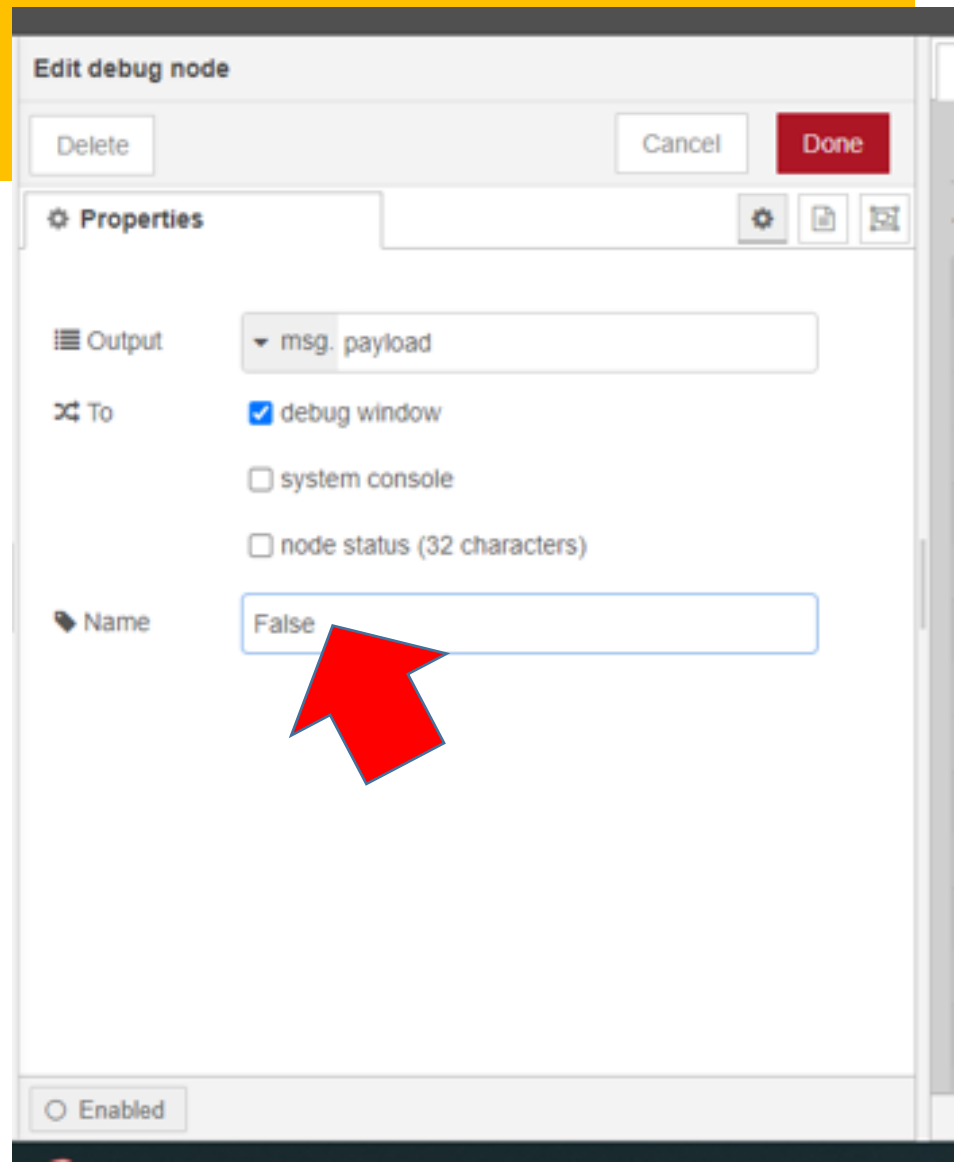




Debug Node Properties

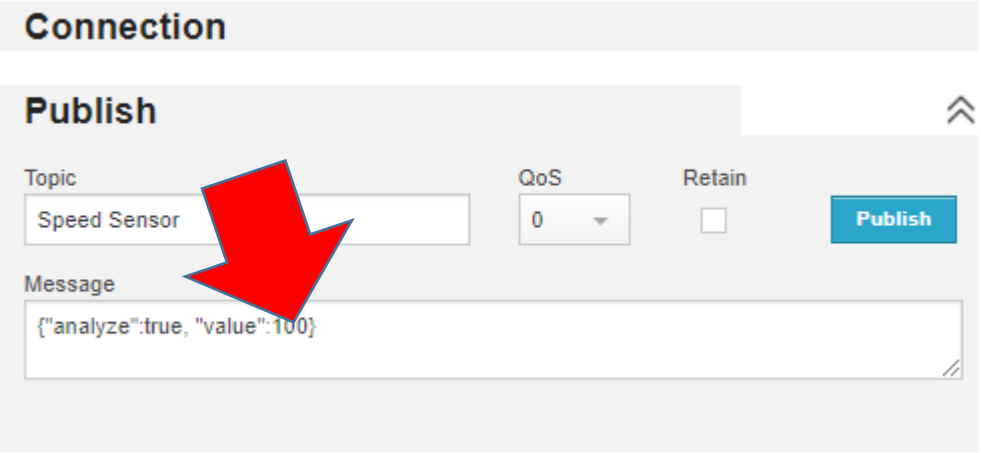
- Name : False (Analyze)





HiveMQ

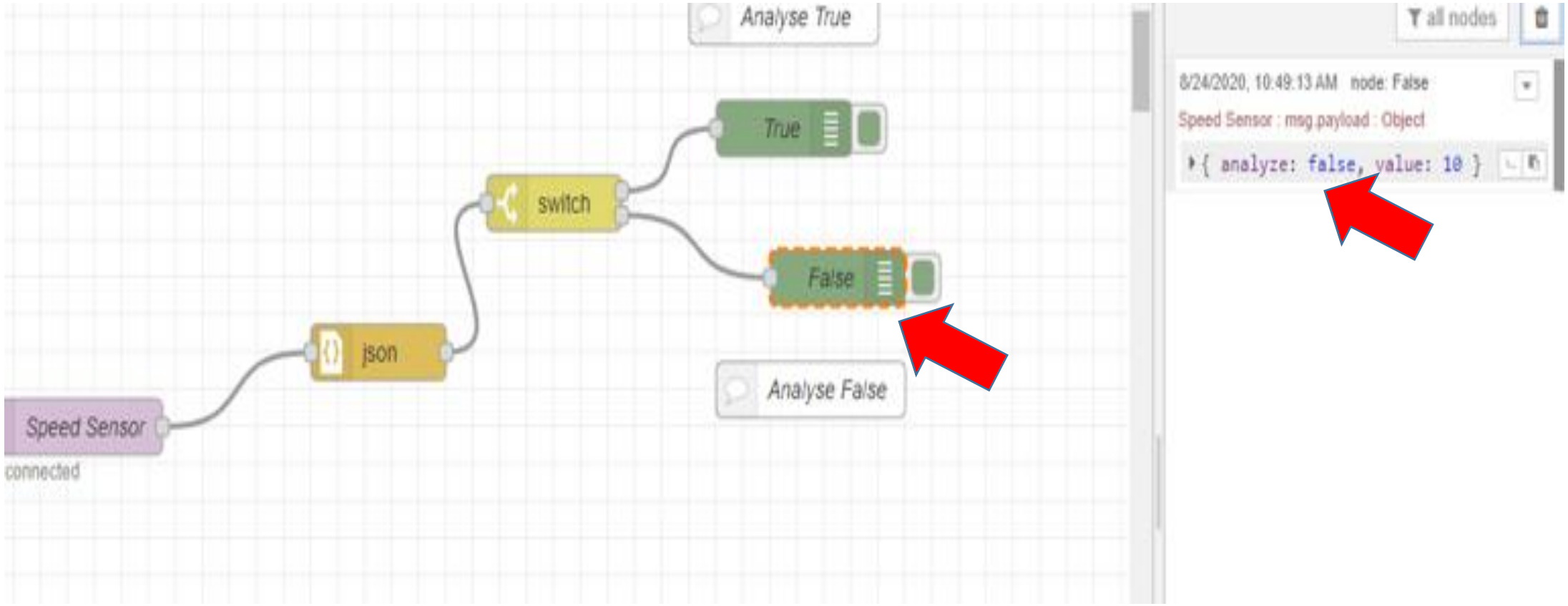
- Establish Connection
- Send Json messages through Publish
- **{"analyze":false, "value":10}**



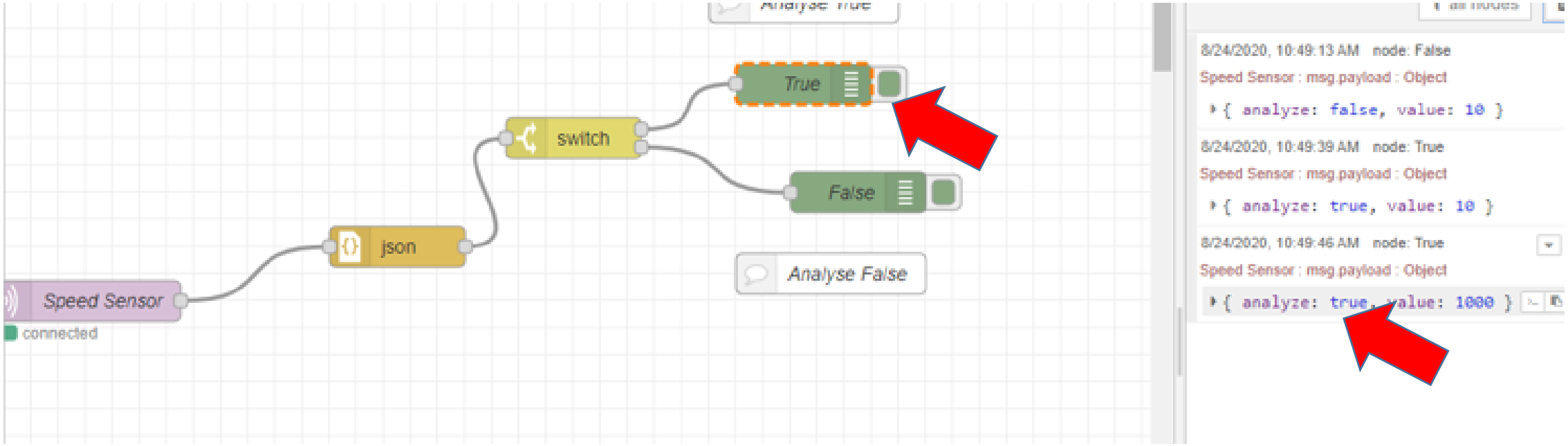
Reference Link for MQTT

- https://www.youtube.com/watch?v=LCYlFoyBn2I&t=419s

Output in Debug Monitor: False Path

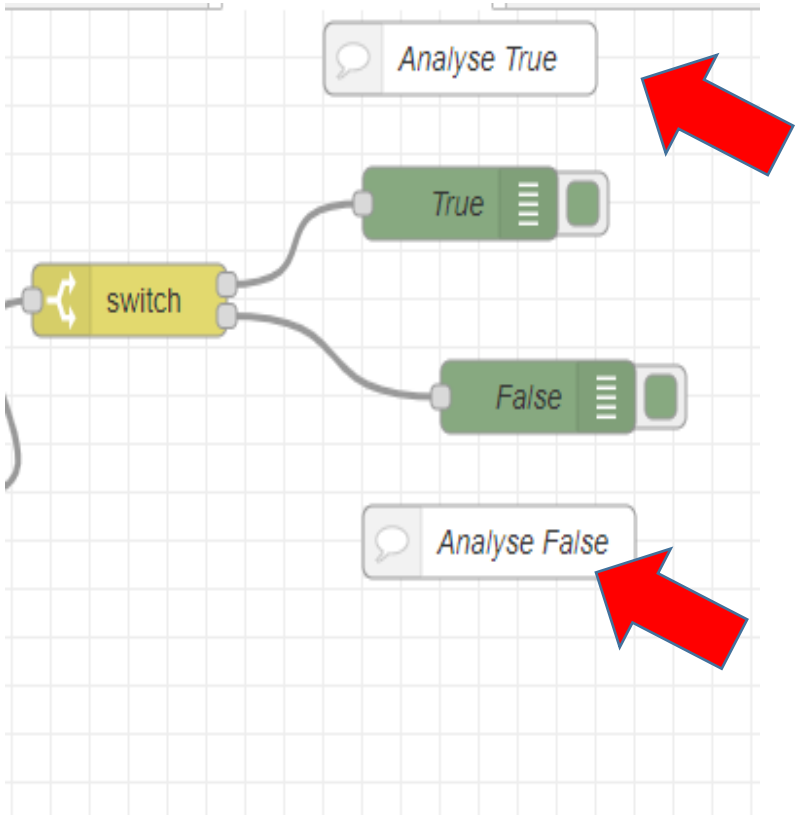


Output in Debug Monitor: True Path

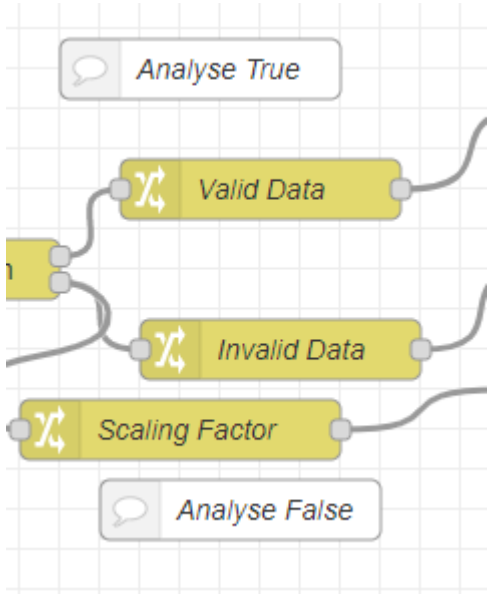


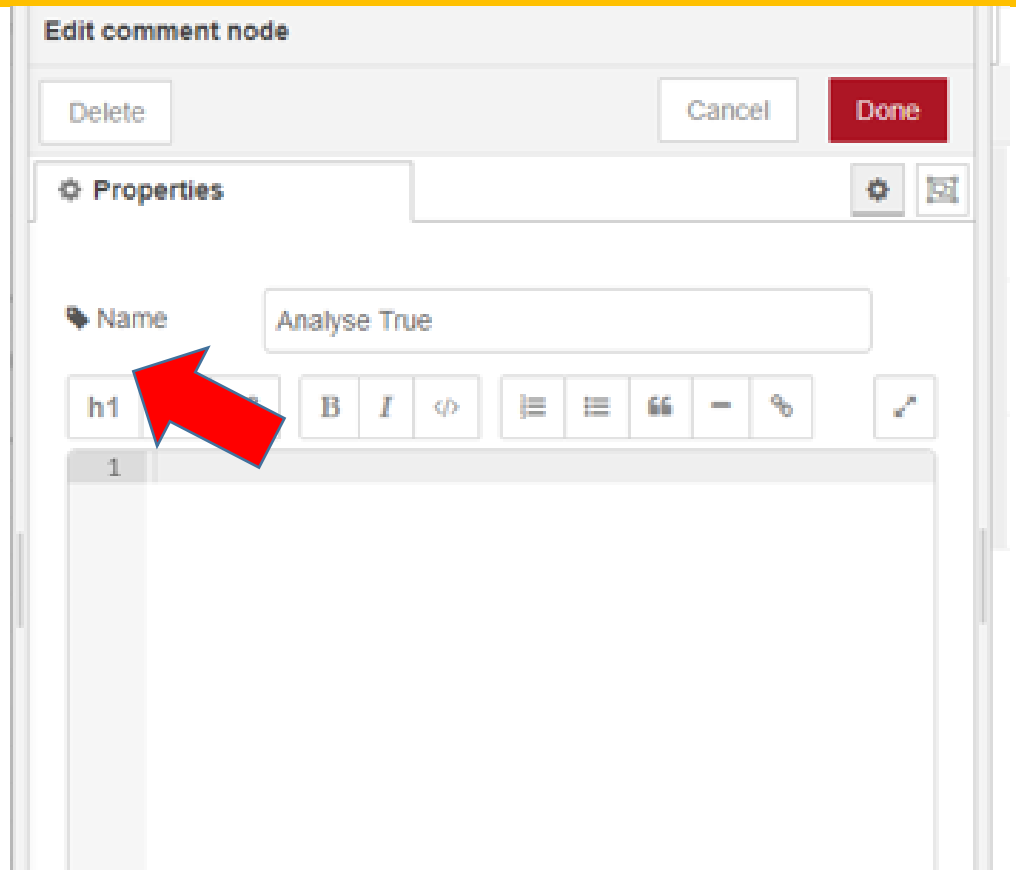
Comment Node

- Comment Nodes are useful during **designing** complex flows.



Properties of Comment Node

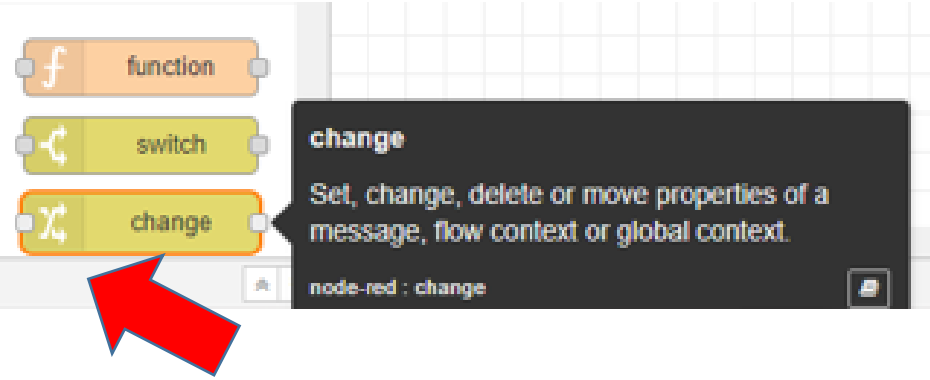


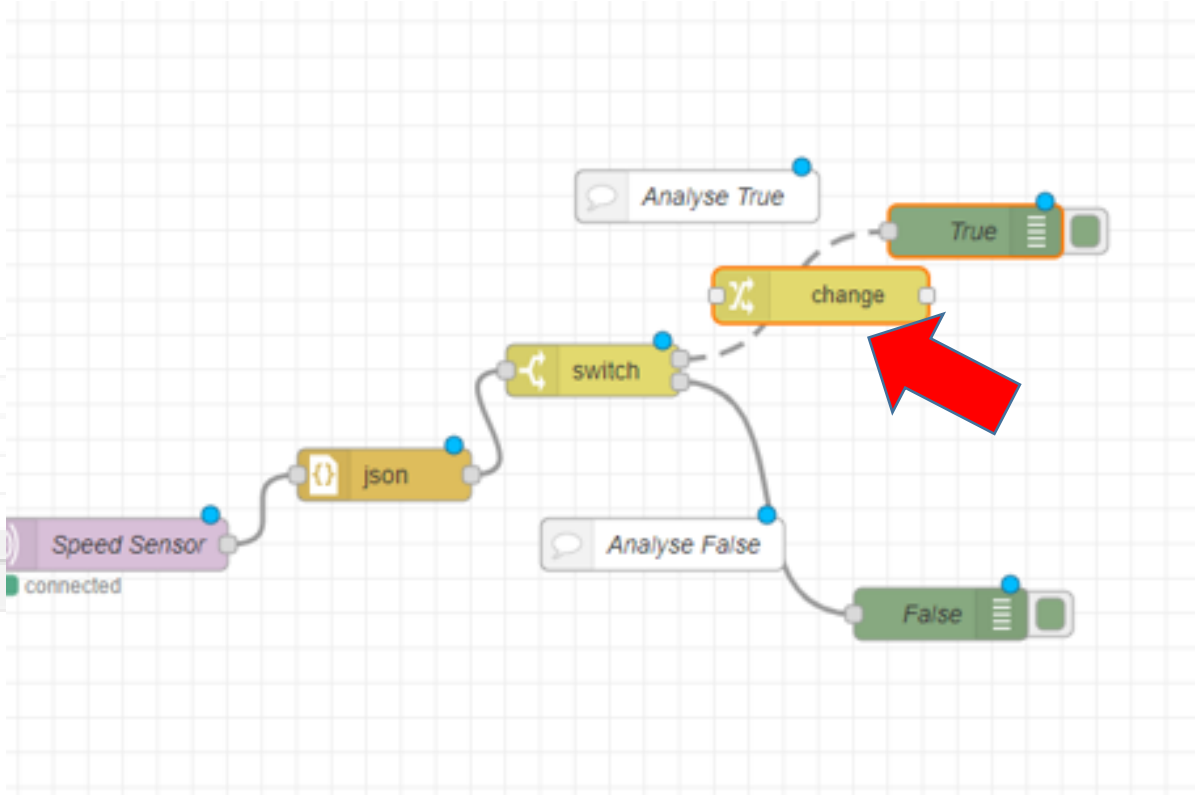


Change Node

- Change node will allow to **change a message payload or add new properties**
- It helps to **perform and send analysis** based on the received data
- Change node will affect the properties in a message:
  - **either by changing existing ones**
  - **deleting them or**
  - **adding new properties.**

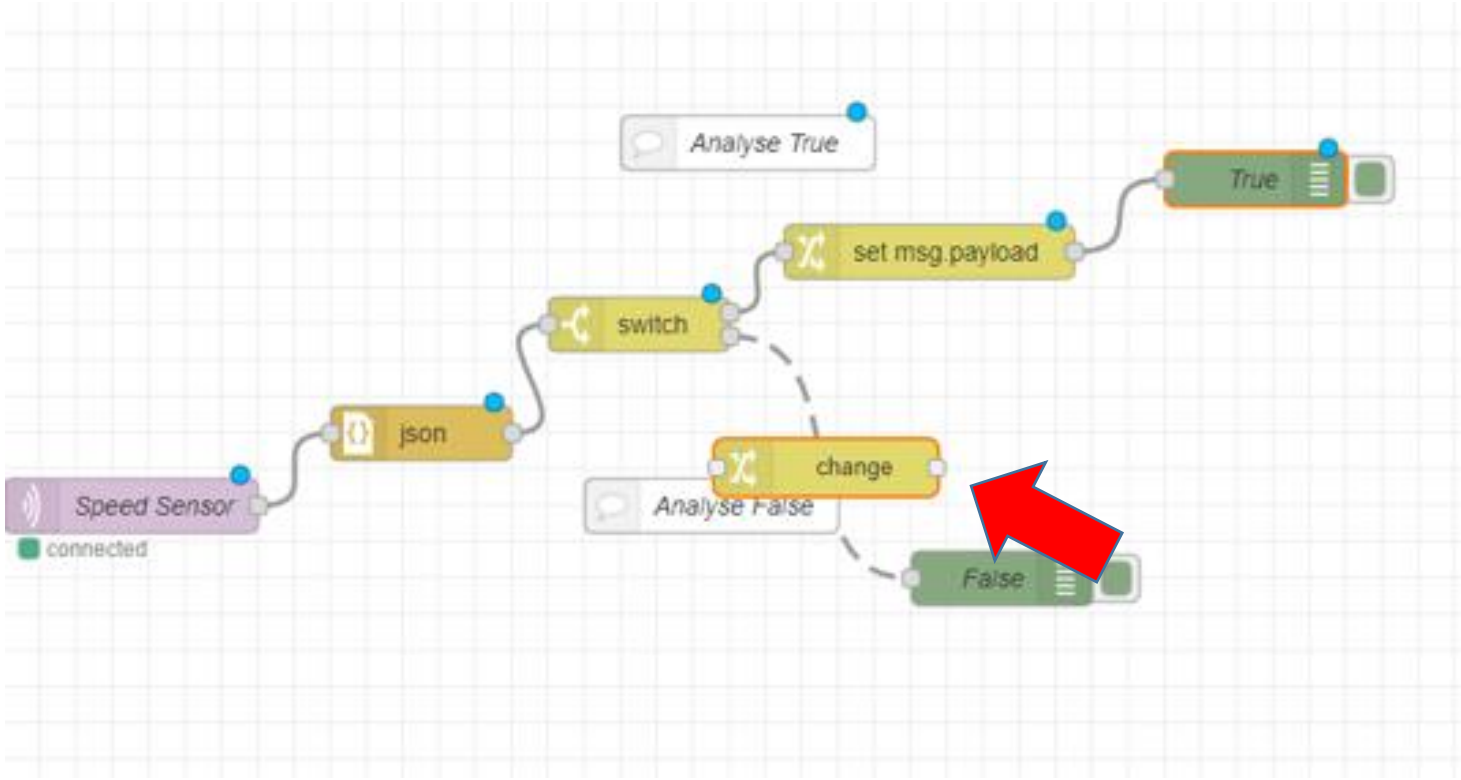
Insert Change Node



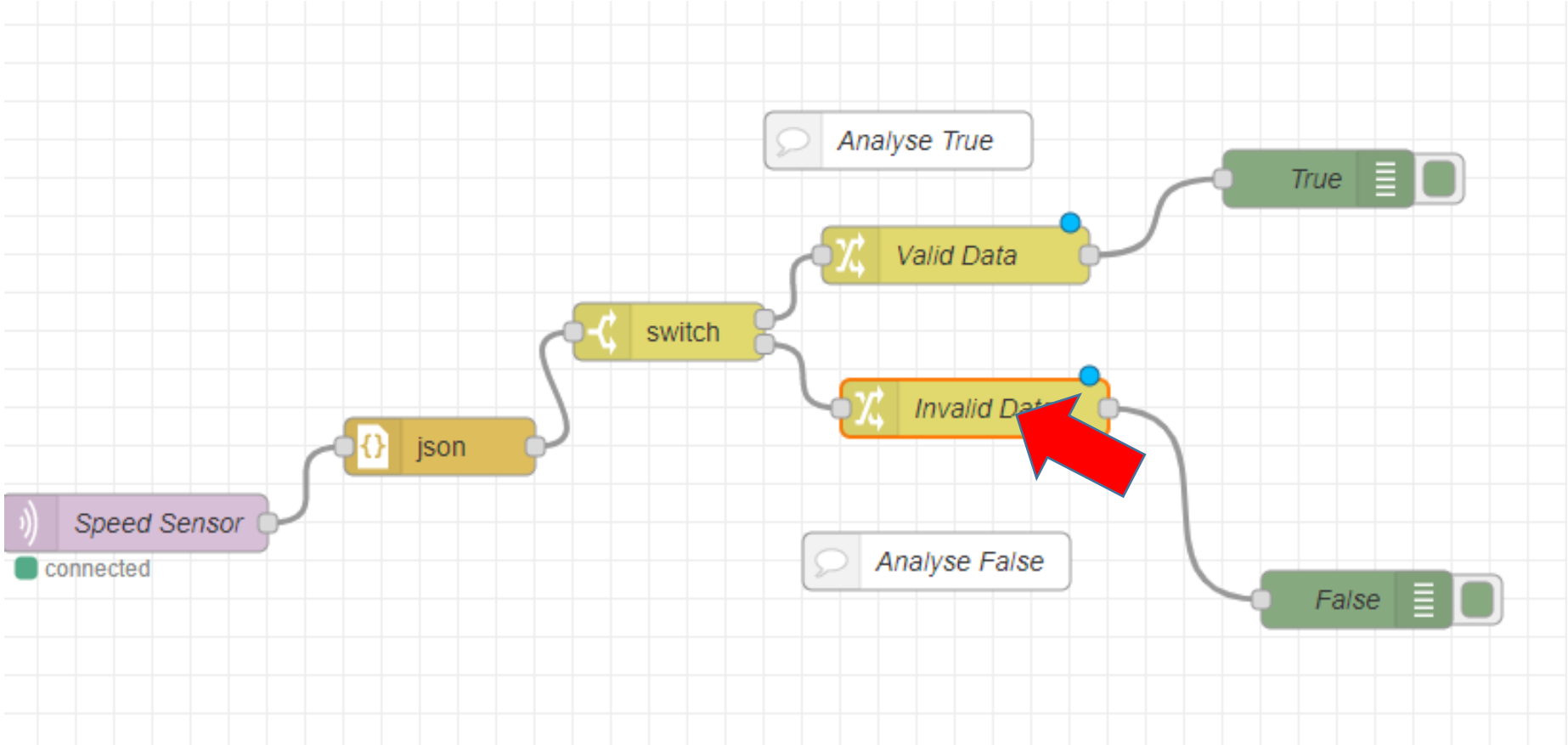


Insert Change Node

- Insert Change Node in False path Analyze

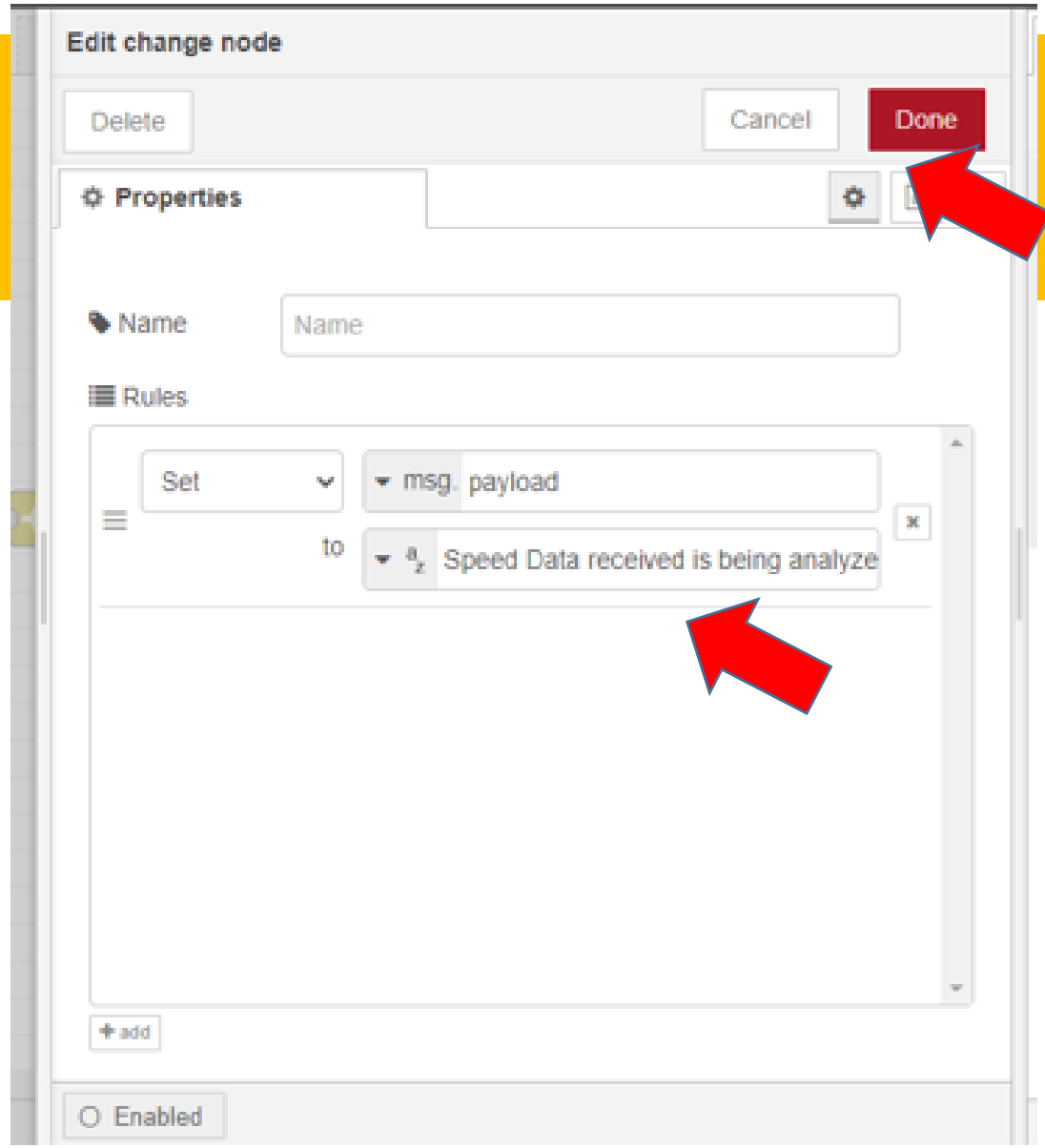


Insert Change Node

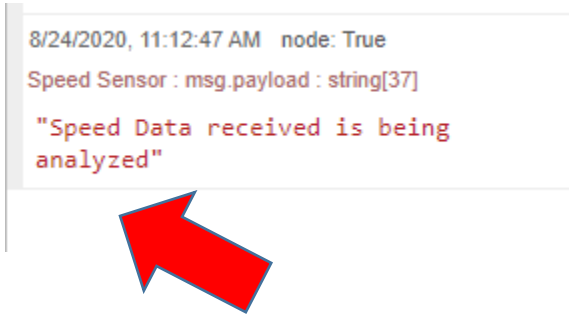


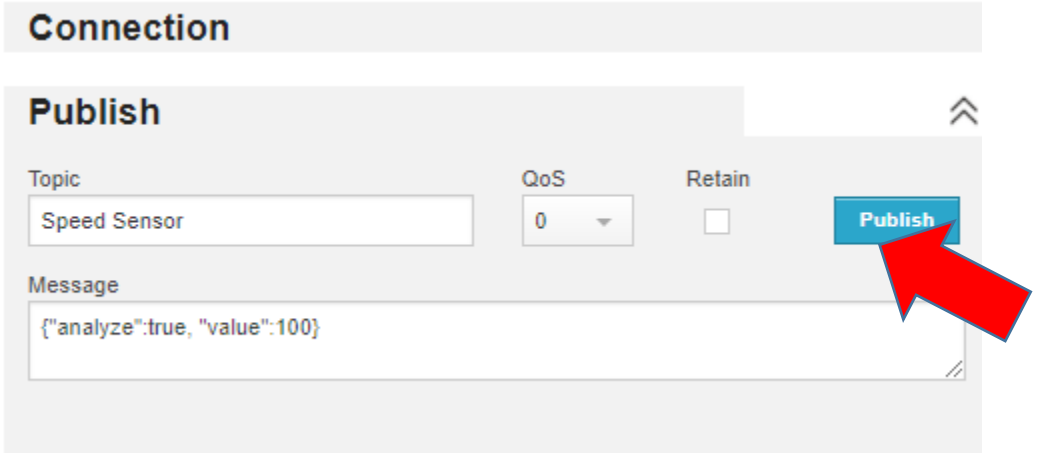
Insert Change Node

- Set Property
- Done

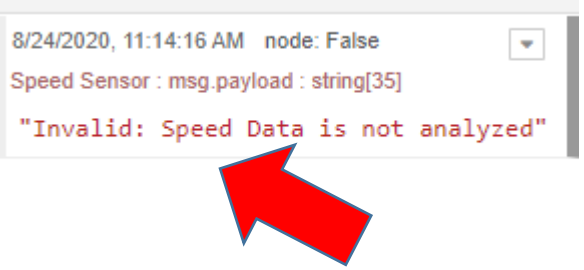


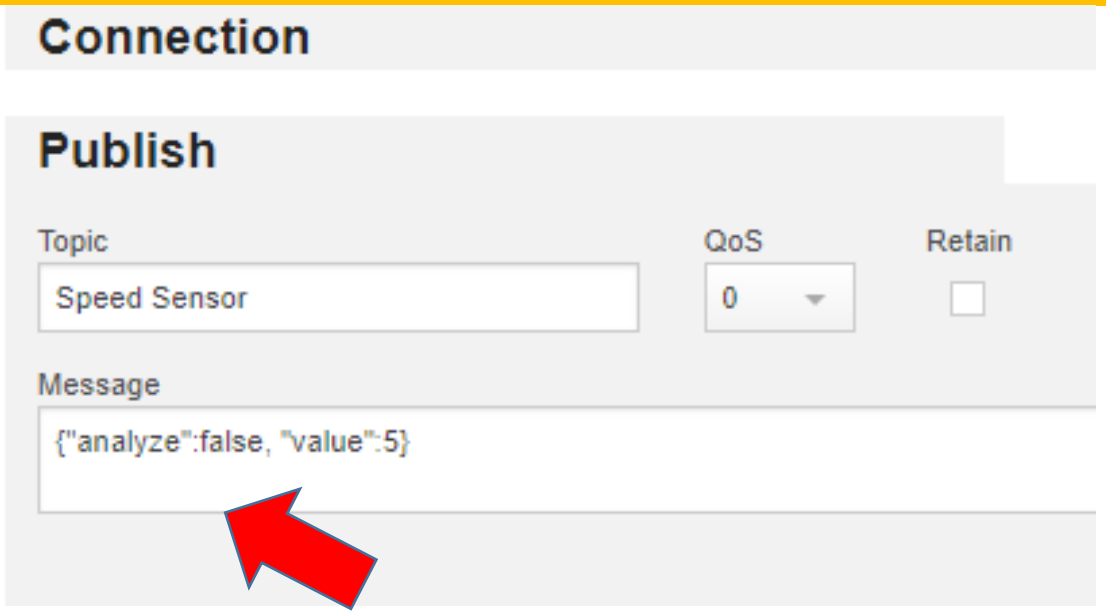
Deploy and Publish





Publish : Analyze False





msg.payload.note

- payload.note
- Done
- **Deploy and Publish**

Speed Sensor : msg.payload : Object

```
{ analyze: false, value: 1000,
note: "Invalid: Speed Data is not
ana…" }
```