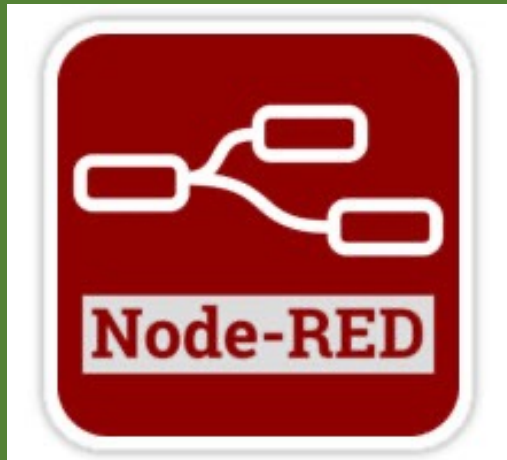


Read out data from MySQL
database using Node-RED &
display at dashboard



By Safyzan Salim
24 Jan 2023

TASK 1: Create New Database in MySQL

Task 1: Record Setup at MySQL

MySQL Schema Object Names

Item	Variables
Database Name	uptm_IoTlab_2023
Table Name	temp_humid

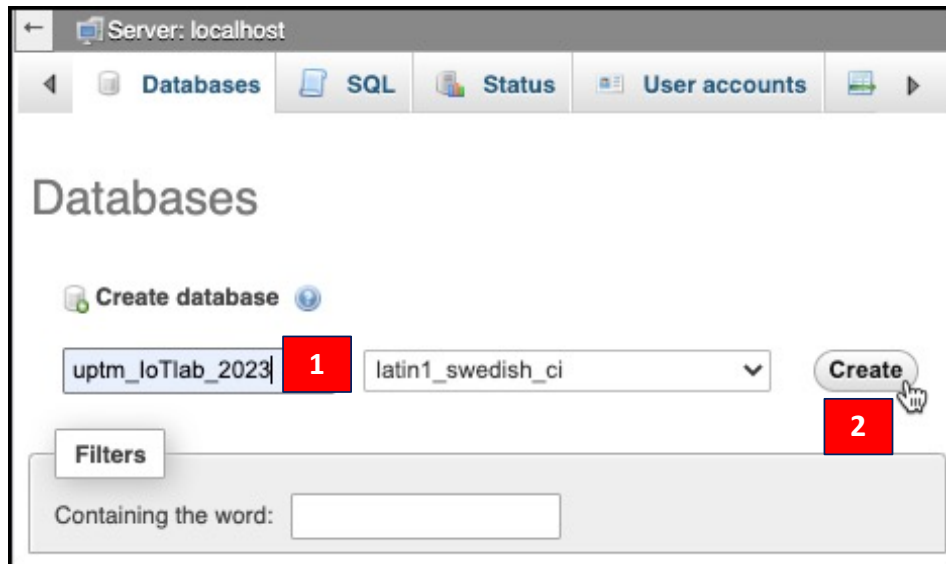
Name	Type	Length / Values	Default	Index	Auto Increment (AI)
info_id	INT	15	None	Primary	Yes
data_log	TIMESTAMP	-	CURRENT_TIME	-	-
temperature	VARCHAR	15	-	-	-
himidity	VARCHAR	15	-	-	-

Task 1: Record Setup at MySQL

STEP 1

Create database: **uptm_loTlab_2023**

Click **Create**.

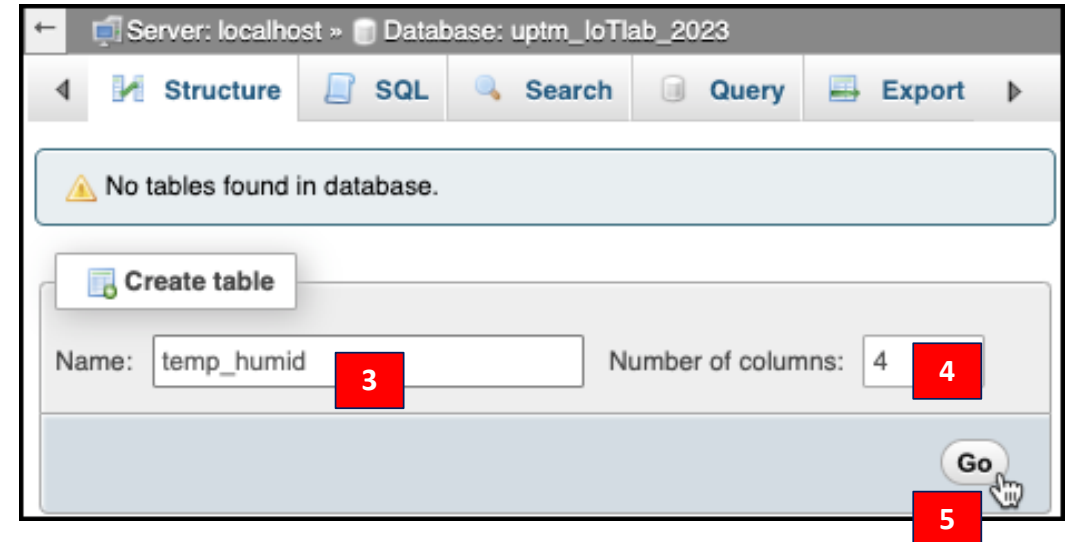


STEP 2

Create table: **temp_humid**

Number of columns: **4**

Click **Go**.



Task 1: Record Setup at MySQL

STEP 3

Create database fields and click **Save**.

Click [here](#) (slide 3) for object names.

Server: localhost » Database: uptm_IoTlab_2023 » Table: temp_humid

BrowseStructureSQLSearchInsertExportImportPrivilegesOperationsTrackingTriggers

Table name: temp_humid Add 1 column(s) Go

Structure

Name	Type	Length/Values	Default	Collation	Attributes	Null	Index	A I	Comments
info_id	INT	15	None			<input type="checkbox"/>	PRIMARY	<input checked="" type="checkbox"/>	
Pick from Central							PRIMARY		
data_log	TIMESTAMP		CURRENT_TIME			<input type="checkbox"/>		<input type="checkbox"/>	
Pick from Central									
temperature	VARCHAR	15	None			<input type="checkbox"/>		<input type="checkbox"/>	
Pick from Central									
humidity	VARCHAR	15	None			<input type="checkbox"/>		<input type="checkbox"/>	
Pick from Central Columns									

Table comments:

Collation:

Storage Engine: InnoDB

PARTITION definition:

Partition by: (Expression or column list)

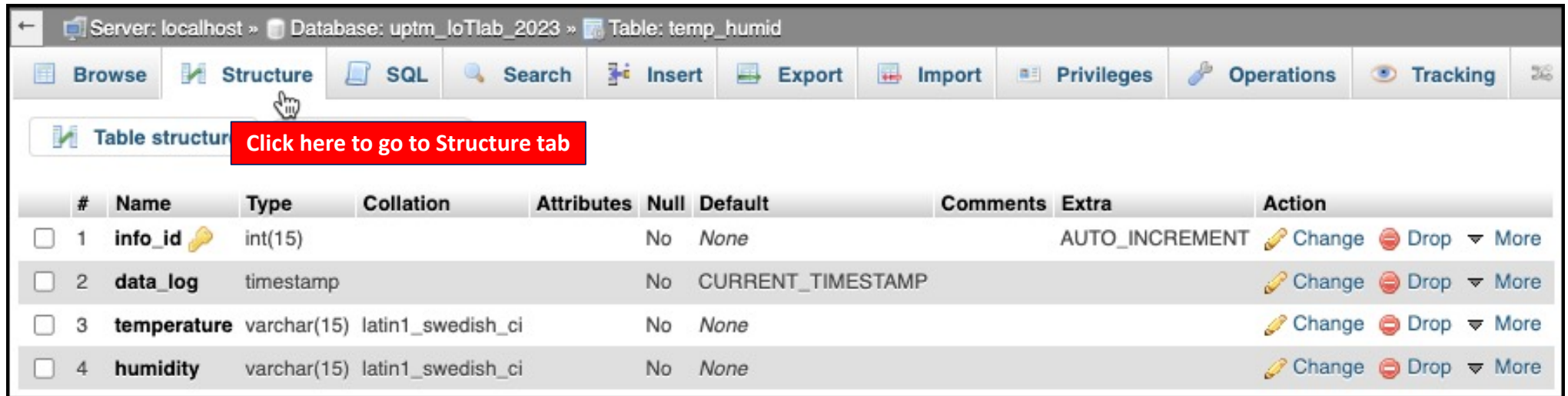
Partitions:

Preview SQL Save














Task 1: Record Setup at MySQL

STEP 4

Click **Structure** tab & check the fields.



The screenshot shows the MySQL Workbench interface. At the top, the breadcrumb navigation indicates the current context: Server: localhost » Database: upm_loTlab_2023 » Table: temp_humid. Below this is a toolbar with several tabs: Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, Operations, and Tracking. The 'Structure' tab is currently selected, and a mouse cursor is pointing at it. A red rectangular callout box with the text 'Click here to go to Structure tab' is positioned over the 'Structure' tab. Below the toolbar, the 'Table structure' section displays a table with the following columns: #, Name, Type, Collation, Attributes, Null, Default, Comments, Extra, and Action. The table contains four rows of field information:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/> 1	info_id 	int(15)			No	None		AUTO_INCREMENT	 Change  Drop  More
<input type="checkbox"/> 2	data_log	timestamp			No	CURRENT_TIMESTAMP			 Change  Drop  More
<input type="checkbox"/> 3	temperature	varchar(15)	latin1_swedish_ci		No	None			 Change  Drop  More
<input type="checkbox"/> 4	humidity	varchar(15)	latin1_swedish_ci		No	None			 Change  Drop  More

Task 1: Record Setup at MySQL

STEP 5

Click at **Insert** tab and manually key in dummy data to temperature & humidity field.
Then click **Go** to save.

Server: localhost » Database: uptm_loTlab_2023 » Table: temp_humid

Browse

Structure

SQL

Search

Insert

Export

Import

Column	Type	Function	Null	Value
info_id	int(15)			
data_log	timestamp			CURRENT_TIMESTAMP
temperature	varchar(15)			24
humidity	varchar(15)			90

Go

☐ Ignore

Column	Type	Function	Null	Value
info_id	int(15)			
data_log	timestamp			CURRENT_TIMESTAMP
temperature	varchar(15)			26
humidity	varchar(15)			89

Go

Insert as new row

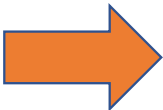
and then

Go back to previous page

Go

Preview SQL

Reset



Server: localhost » Database: uptm_loTlab_2023 » Table: temp_humid

Browse

Structure

SQL

Search

Insert

Export

Import

More

2 rows inserted.
Inserted row id: 2

INSERT INTO `temp_humid` (`info_id`, `data_log`, `temperature`, `humidity`) VALUES (NULL, CURRENT_TIMESTAMP, '24', '90'), (NULL, CURRENT_TIMESTAMP, '26', '89');

[Edit inline] [Edit] [Create PHP code]

Run SQL query/queries on table uptm_loTlab_2023.temp_humid:

1 INSERT INTO `temp_humid` (`info_id`, `data_log`, `temperature`, `humidity`) VALUES (NULL, CURRENT_TIMESTAMP, '24', '90'), (NULL, CURRENT_TIMESTAMP, '26', '89');

SELECT *

SELECT

INSERT

UPDATE

DELETE

Clear

Format

Get auto-saved query

☐ Bind parameters

Bookmark this SQL query:

[Delimiter :] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished

☒ Enable foreign key checks

Go

Columns

info_id

data_log

temperature

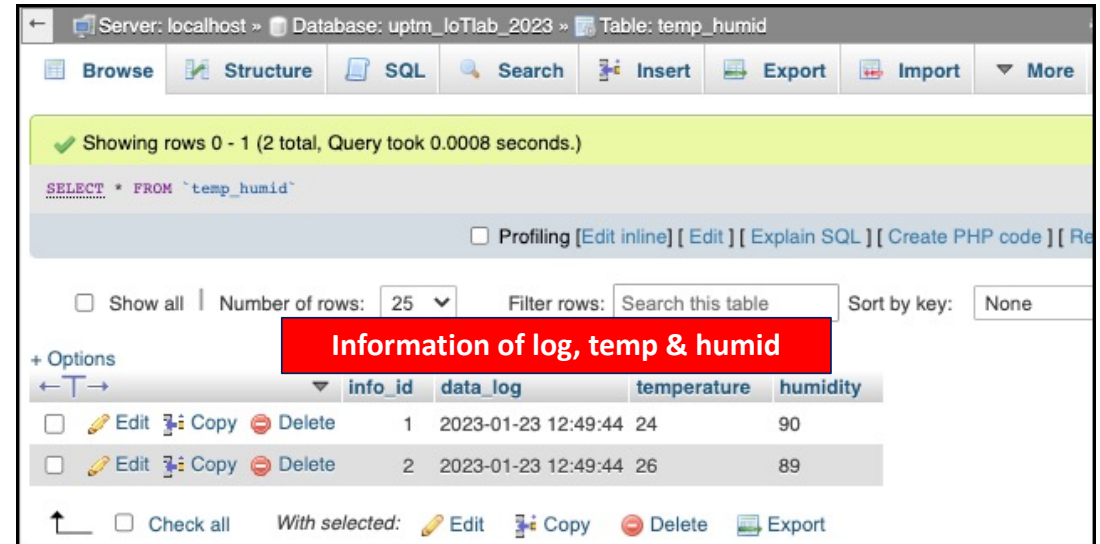
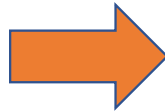
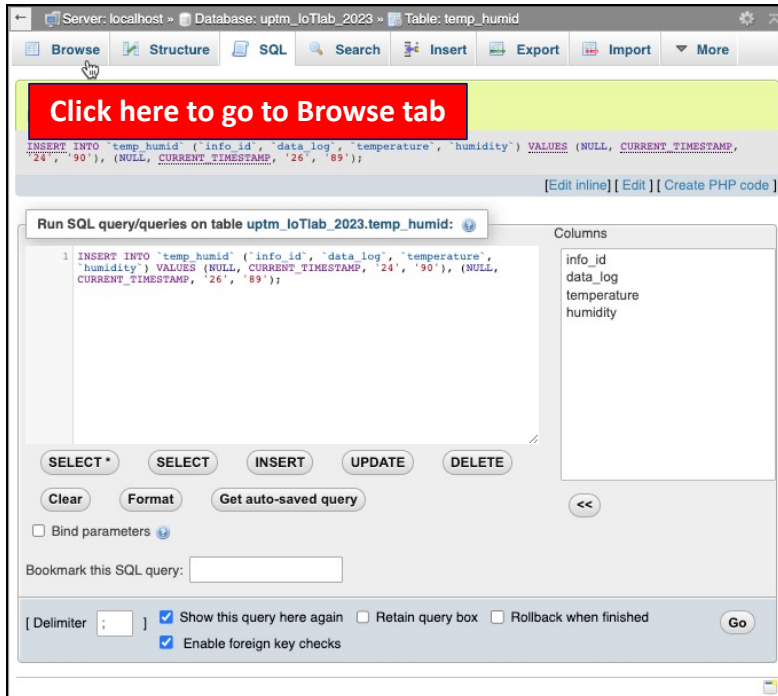
humidity

Click here to save

Task 1: Record Setup at MySQL

STEP 6

Click at **Browse** tab to view the result.



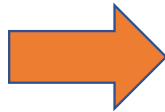
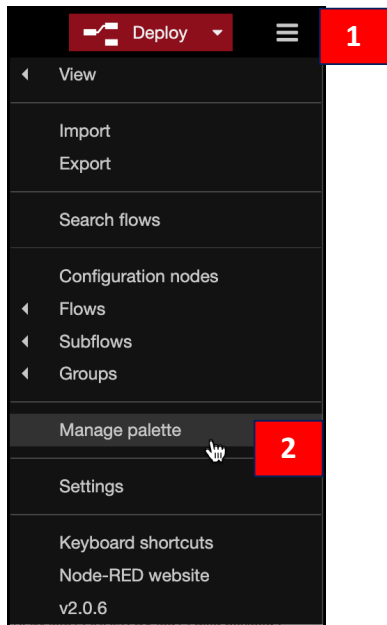
TASK 2: Create Node-RED Interfaces & Dashboard

Task 2: Node-RED Interface

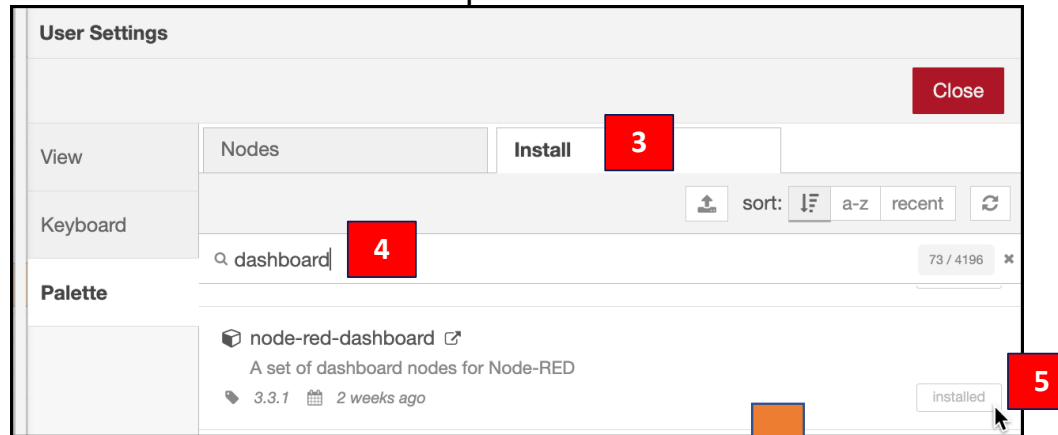
STEP 1

This Node-RED exercise requires 2 additional palettes to be downloaded from the Node-RED server:

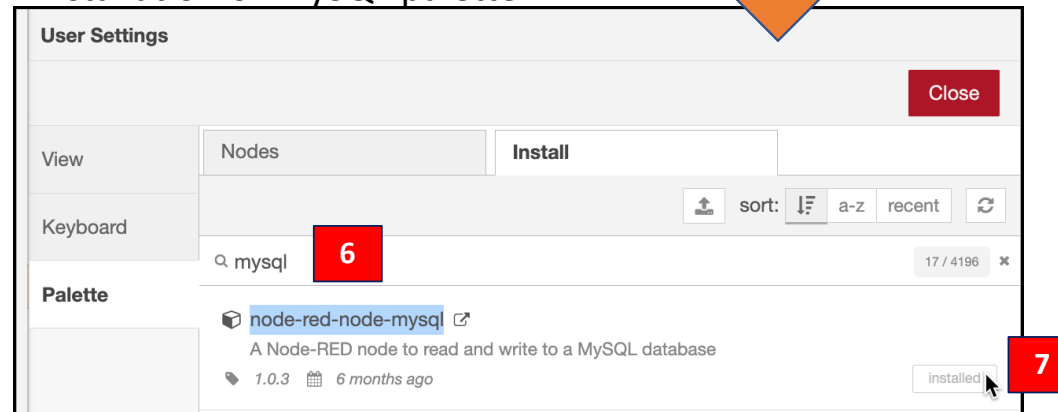
- i. Dashboard palette
- ii. MySQL palette



Installation of Dashboard palette



Installation of MySQL palette

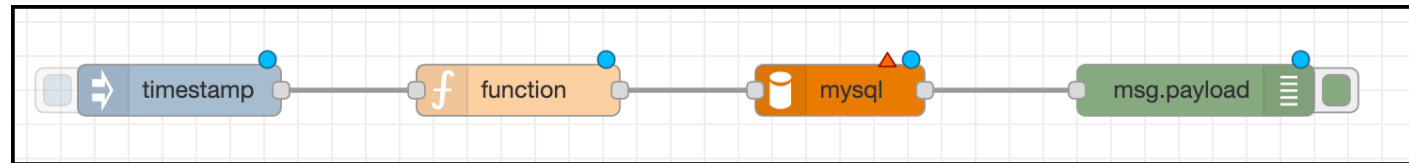
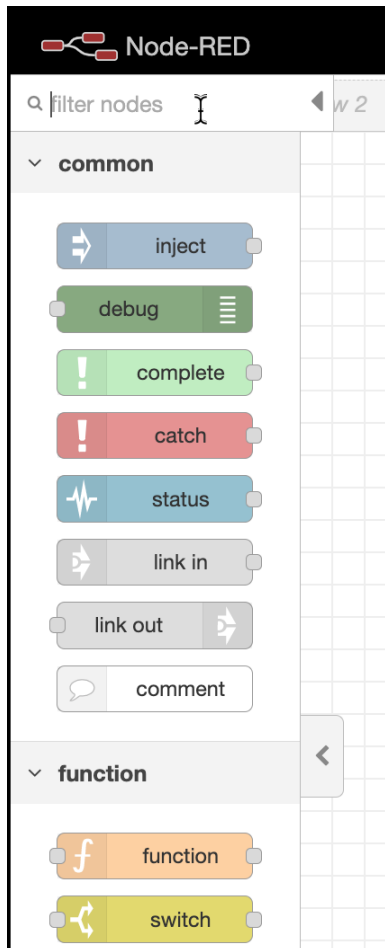


Task 2: Node-RED Interface

STEP 1

Setup the connection as shown in the figure.

The nodes can be found at filter nodes section.



The Blue dot indicates that the node has undeclared changes.

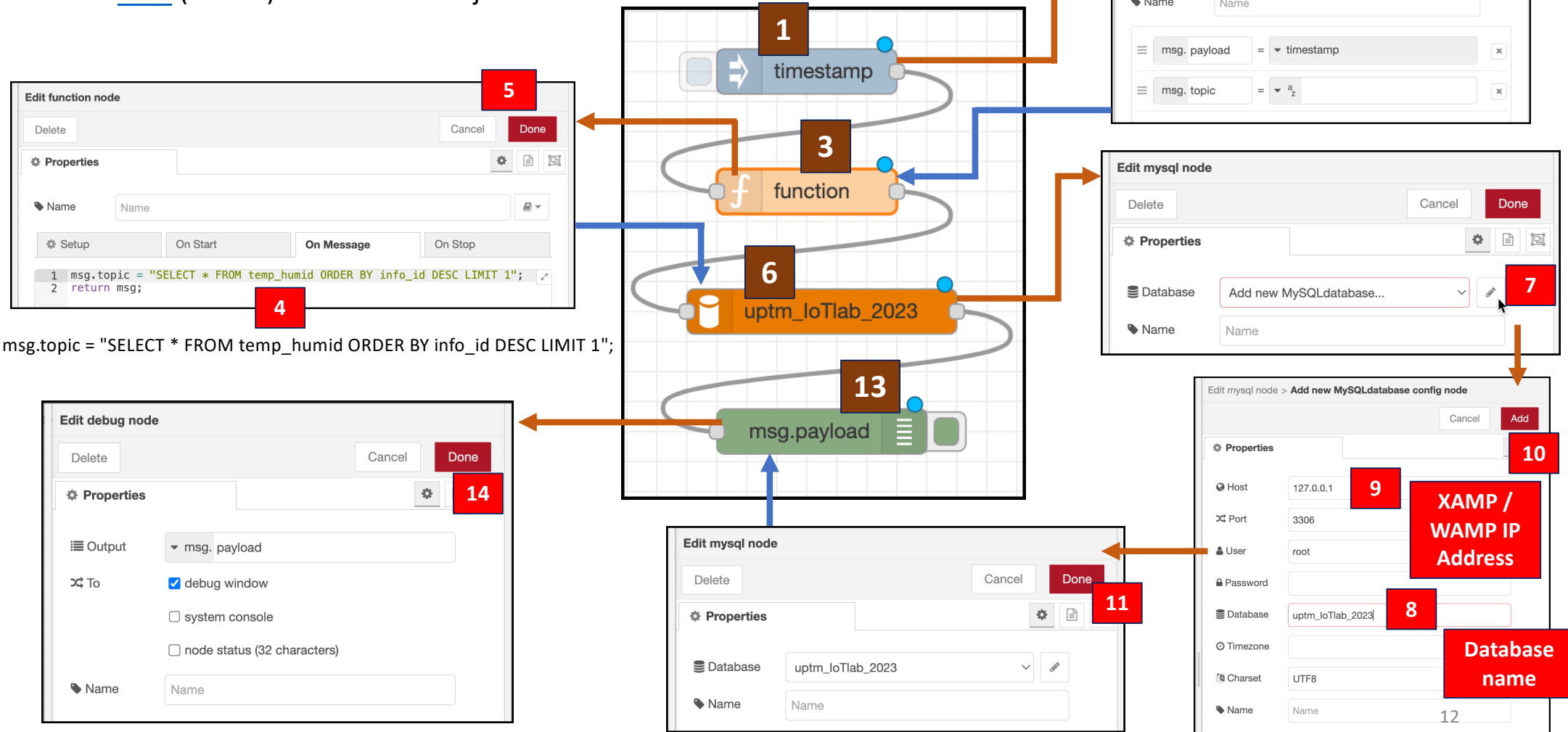
The Red triangle means that node is either missing required configuration data or has some configuration data that does not validate.

Task 2: Node-RED Interface

STEP 2

Set each node's properties accordingly by double clicking them.

Click [here](#) (slide 3) for database object names.

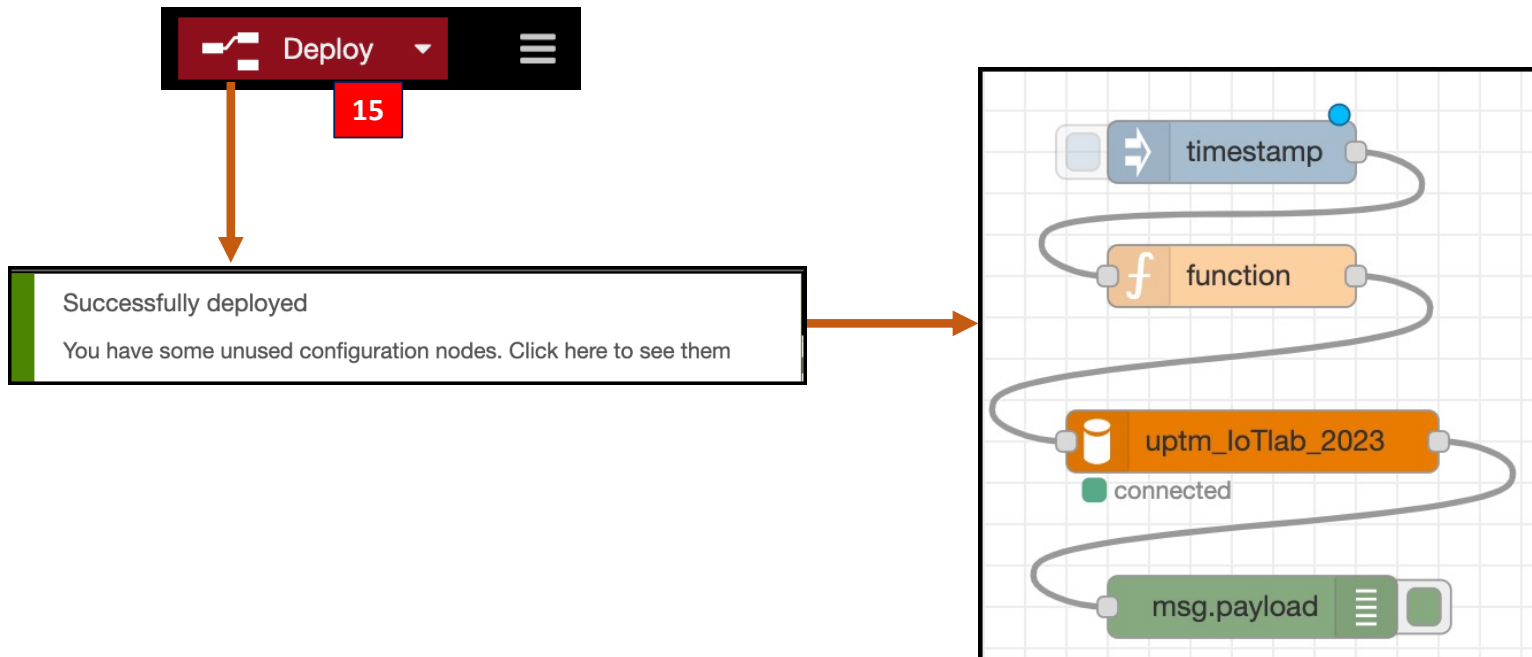


Task 2: Node-RED Interface

STEP 3

15 Click **Deploy** button to validate the nodes and execute the connection.

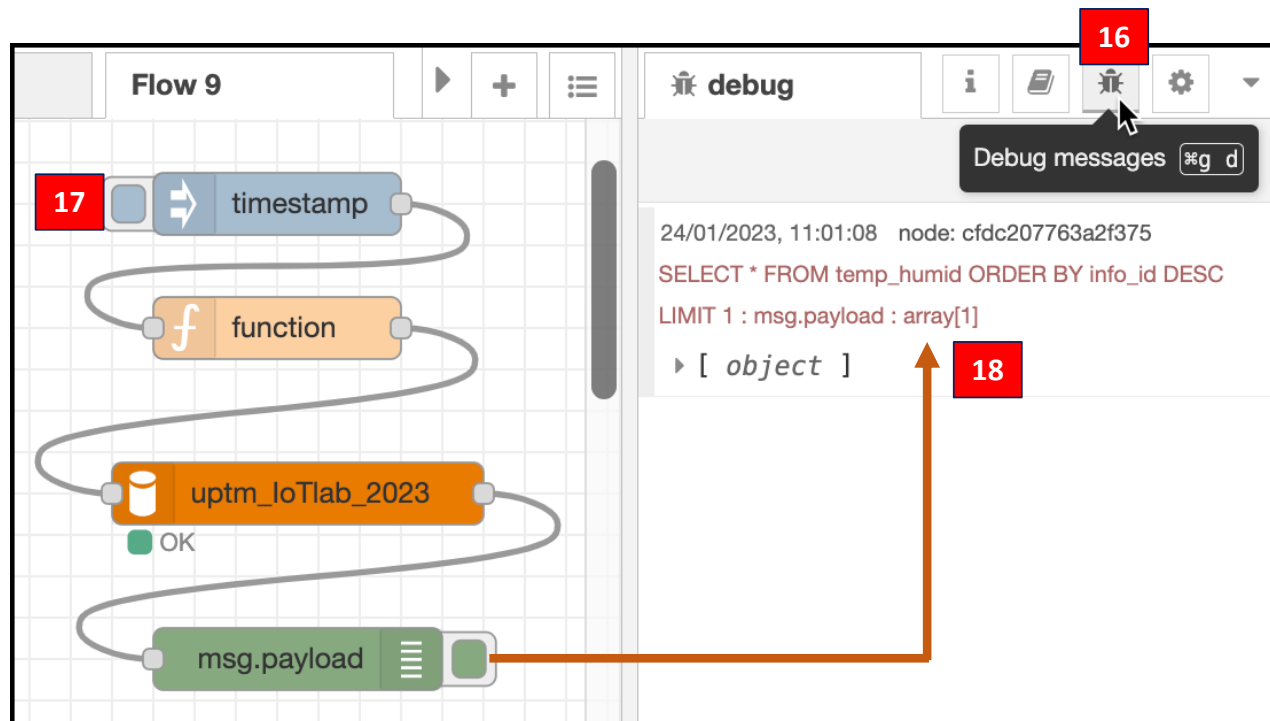
Tackle error if exists by referring previous slides.



Task 2: Node-RED Interface

STEP 4


- 16 Click **Debug** sidebar to view messages passed to Debug node.
- 17 Click button at **Timestamp**'s node to send object or request from **Function** node to MySQL node then to **Debug** node.
- 18 Messages from nodes displayed at **Debug**'s sidebar.

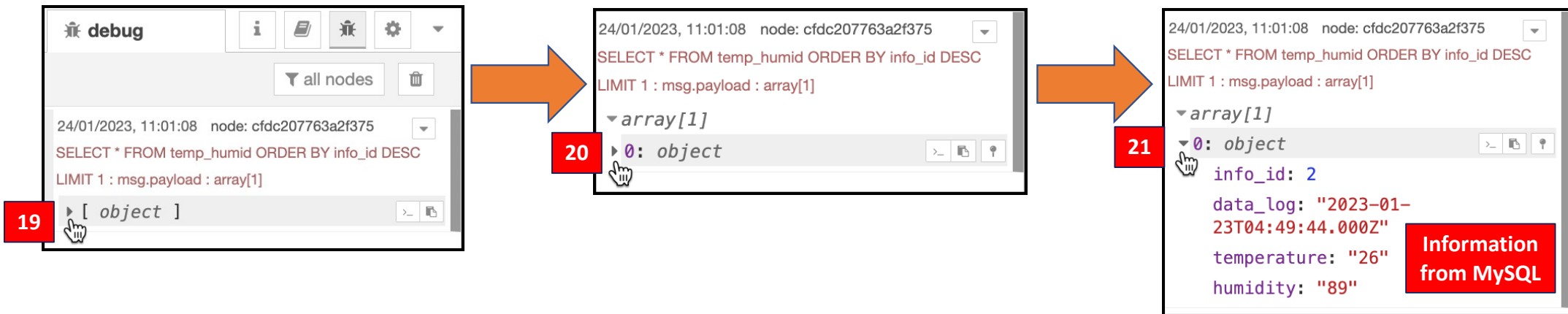


Task 2: Node-RED Interface

STEP 5

Go to **Debug** sidebar & click the arrows to reveal the content or information passed to **Debug** sidebar.

Click here  again to display latest information from MySQL.



Task 2: Node-RED Interface

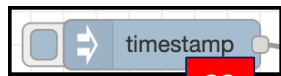
STEP 6

The **Inject** node can be manually triggered or automatically triggered & also able to set the interval repetition.

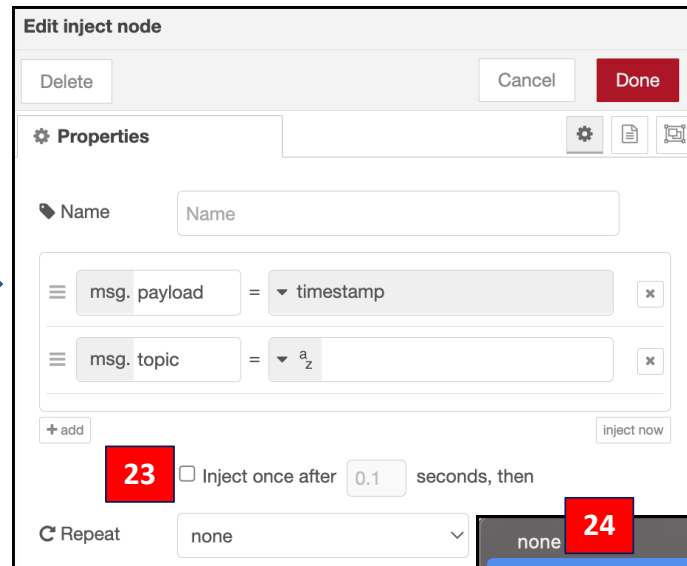
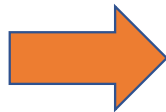
22 Double click **Inject** node.

23 Tick at the **radio** button & set the starting time to activate the system.

24 Change the **Repeat** combo-box to **interval** every **1 second** & click **Done**.
Don't forget to click **Deploy** button.



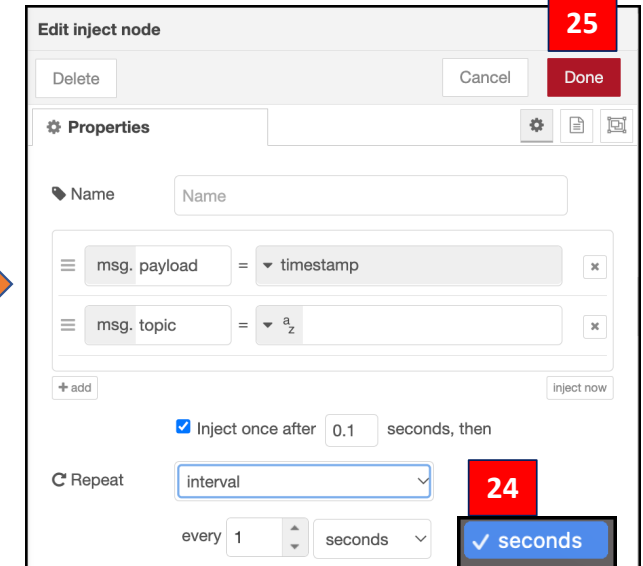
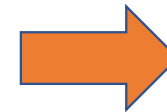
22

The 'Edit inject node' dialog box. It has a 'Delete' button, a 'Cancel' button, and a 'Done' button. Under the 'Properties' tab, there is a 'Name' field. Below that, there are two rows: 'msg. payload' set to 'timestamp' and 'msg. topic' set to 'a_z'. At the bottom, there is a checkbox 'Inject once after 0.1 seconds, then' which is unchecked. Below that is a 'Repeat' dropdown menu currently set to 'none'.

23

24

interval between times
at a specific time

The 'Edit inject node' dialog box. It has a 'Delete' button, a 'Cancel' button, and a 'Done' button. Under the 'Properties' tab, there is a 'Name' field. Below that, there are two rows: 'msg. payload' set to 'timestamp' and 'msg. topic' set to 'a_z'. At the bottom, there is a checkbox 'Inject once after 0.1 seconds, then' which is checked. Below that is a 'Repeat' dropdown menu set to 'interval'. The 'interval' is set to '1' and the unit is 'seconds'.

25

24

✓ seconds
minutes
hours

Task 2: Node-RED Interface

STEP 7

Results of automatic trigger to the system can be seen at **Debug** sidebar.

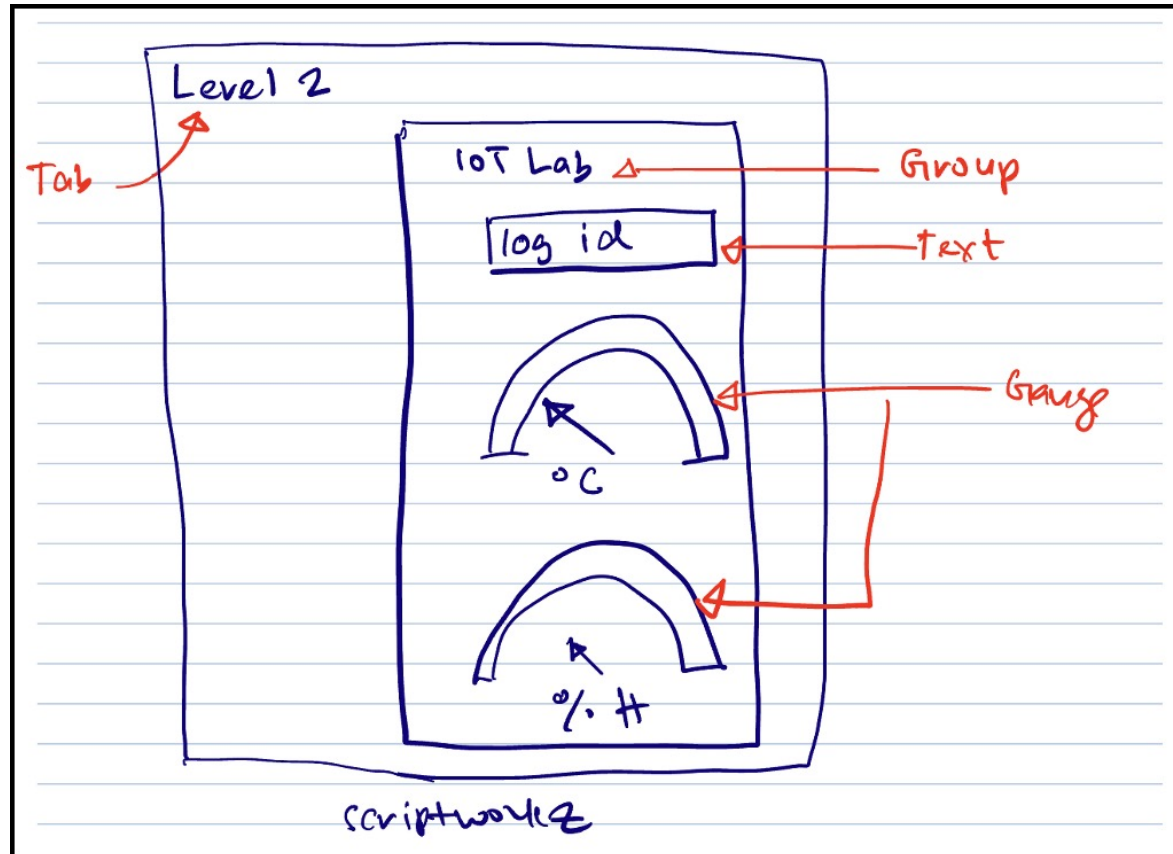
The screenshot displays the Node-RED web interface. The main workspace shows a flow with the following nodes: a **timestamp** node, a **function** node, an **uptm_loTlab_2023** node (with a green 'OK' status indicator), and a **msg.payload** node. The left sidebar contains a 'common' section with nodes like inject, debug, complete, catch, status, link in, link out, and comment, and a 'function' section with a function node. The right sidebar is the 'debug' console, showing two log entries. Each entry includes a timestamp (24/01/2023, 12:44:02 and 24/01/2023, 12:44:03), a node ID (cfdc207763a2f375), and a SQL query: `SELECT * FROM temp_humid ORDER BY info_id DESC LIMIT 1 : msg.payload :`. The payload is shown as `array[1]` and `[object]`.

TASK 3: Publish Reading from MySQL to Node-RED's Dashboard

Task 3: Setting-up Node-RED Dashboard Interface

STEP 1

Visualise the project flow by creating storyboard.



Tab = **Level 2**

Group = **IoT Lab**

Dashboard = **1 x Text node**

= 2 x Gauge nodes

Task 3: Setting-up Node-RED Dashboard Interface

STEP 2

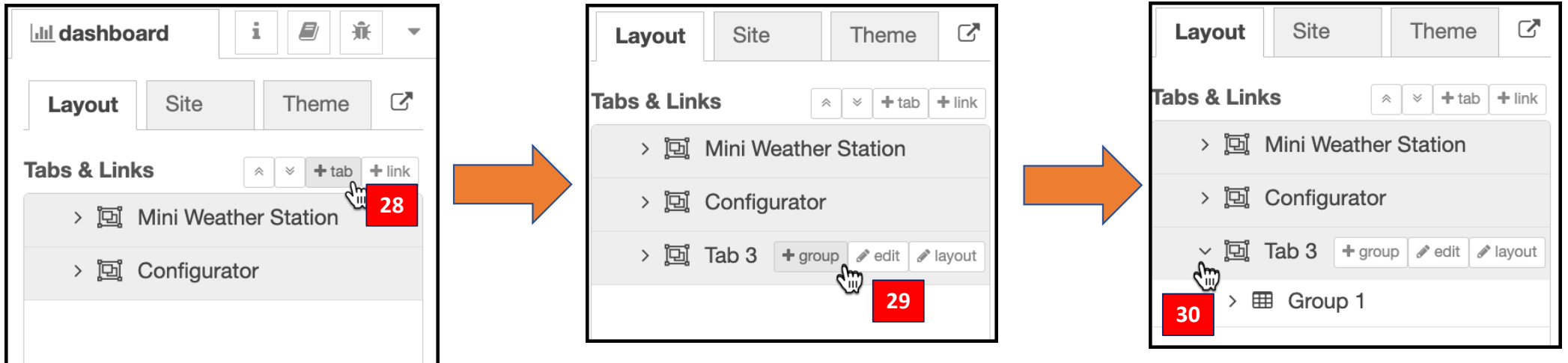
26 Click sidebar's dropdown menu & choose **Dashboard**.

The screenshot shows the Node-RED web interface. The main workspace contains a flow with four nodes: a 'timestamp' node, a 'function' node, an 'uptm_loTlab_2023' node (with a green 'OK' status), and a 'msg.payload' node. The sidebar on the right has a dropdown menu open, showing options: 'Information', 'Help', 'Debug messages', 'Configuration nodes', 'Context Data', and 'Dashboard'. The 'Dashboard' option is highlighted with a red box labeled '27'. The top of the interface shows 'Project 1' and 'Aedes' tabs, and a 'Deploy' button. A red box labeled '26' is positioned over the sidebar dropdown menu.

Task 3: Setting-up Node-RED Dashboard Interface

STEP 3

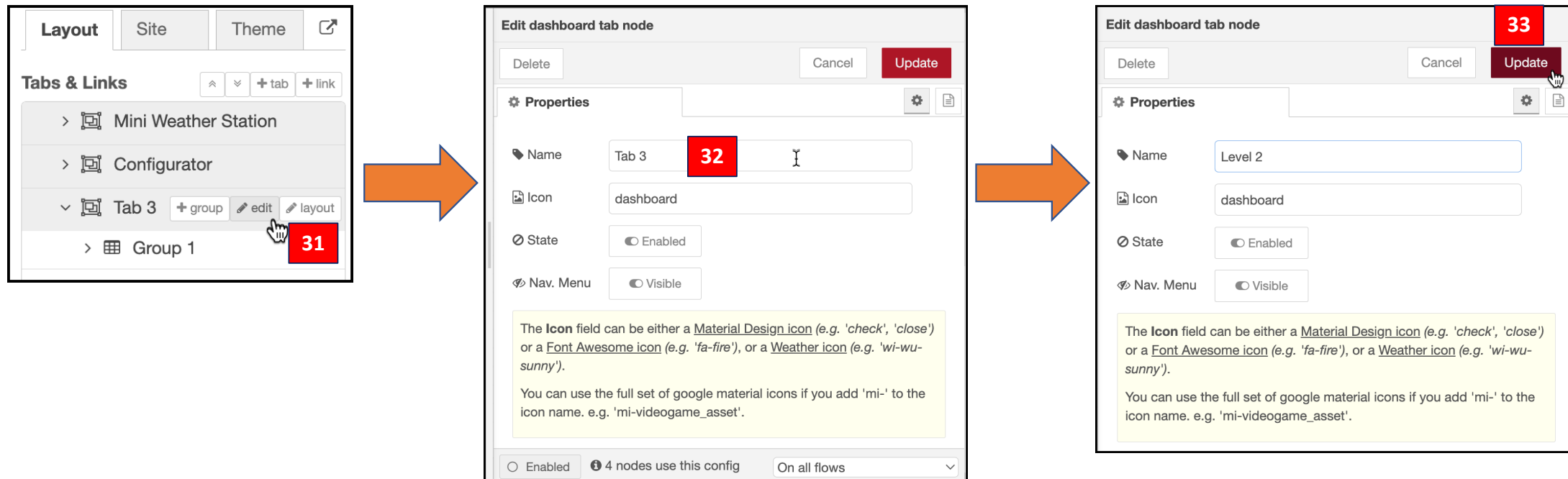
- 28** Click **+tab** **once** for new tab.
- 29** Click **+group** tab **once** within **Tab 3** drop-down button to create new group int **Tab 3**'s dashboard.
- 30** Click the arrow to the left of Tab 3, in order to view the added group.



Task 3: Setting-up Node-RED Dashboard Interface

STEP 4

- 31** Click **edit** button to edit the **Tab 3**'s property.
 - 32** At **Name** section, change **Tab 3** to **Level 2** as planned [here](#) (slide 19).
 - 33** Click **Update** button to save the new **Name**.
- You can click **Delete** button to delete the dashboard.



Task 3: Setting-up Node-RED Dashboard Interface

STEP 5

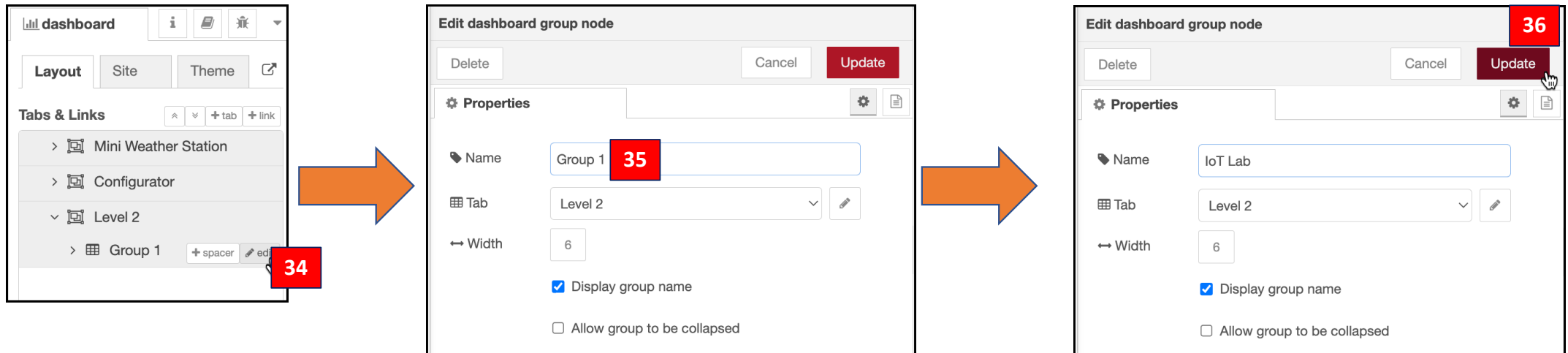
34 Click **Group 1**'s **edit** button to edit its properties.

35 At **Name** section, change **Group 1** to **IoT Lab** as planned [here](#) (slide 19).

36 Click **Update** button to save the new **Name**.

You can click **Delete** button to delete the dashboard.

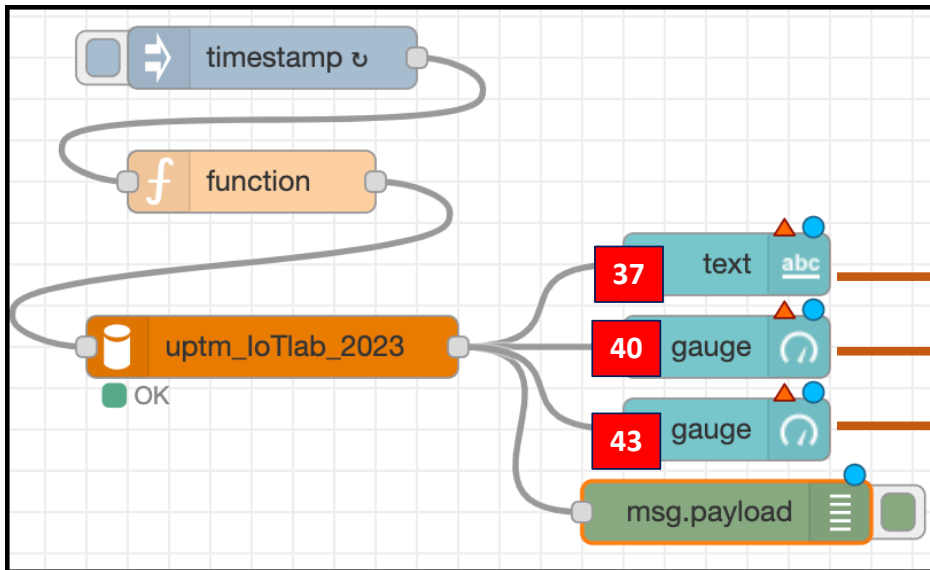
Don't forget to click **Deploy** button after changes have been made.



Task 3: Setting-up Node-RED Dashboard Interface

STEP 7

- 37** Click the **edit** icon at text node & select the **Group**'s property to **[Level 2] IoT Lab**.
- 40** Repeat the same action to both **gauge** nodes.
Don't forget to click **Deploy** button after changes have been made.



Edit text node **39**

Delete Cancel Done

Properties

Group [Level 2] IoT Lab **38**

Size auto

Label text

Value format {{msg.payload}}

Layout

label value label value label value

label value label value

Edit gauge node **42**

Delete Cancel Done

Properties

Group [Level 2] IoT Lab **41**

Size auto

Type Gauge

Label gauge

Value format {{value}}

Units units

Range min 0 max 10

Colour gradient

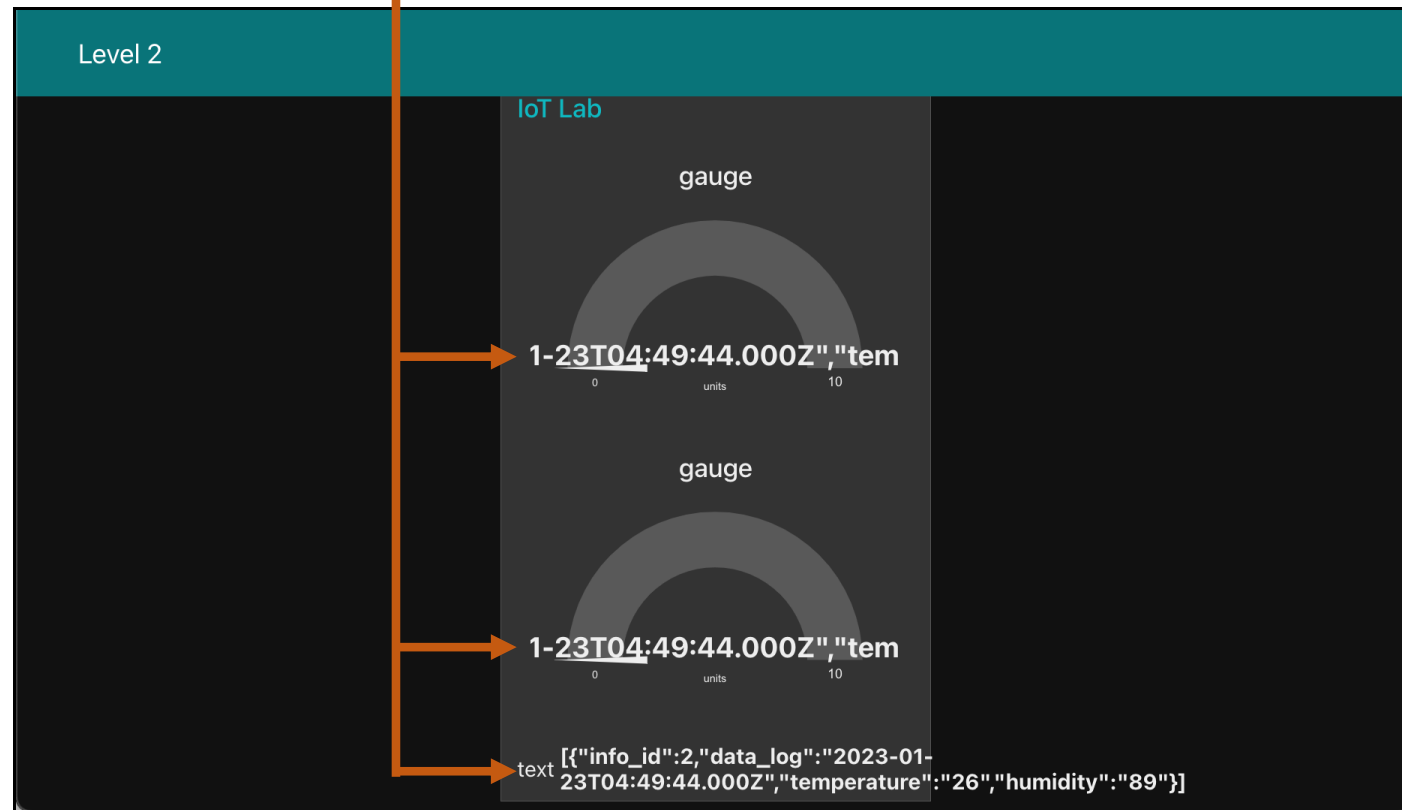
24

Task 3: Setting-up Node-RED Dashboard Interface

STEP 8

The output the nodes are messed.

Need to change **value format** of each nodes.



Task 3: Setting-up Node-RED Dashboard Interface

STEP 9

- 44 Double click **text** node.
- 45 Change at **Label** property from **text** to **Log** .
- 46 Change at **Value format** from **{{value}}** to **{{msg.payload[0].data_log}}** .
- 47 Click **Done** once completed.

The screenshot illustrates the configuration of a text node in Node-RED. On the left, a canvas shows a text node (labeled 44) and two gauge nodes. An orange arrow points from the text node to the 'Edit text node' dialog. In the dialog, the 'Label' is set to 'Log' (labeled 45) and the 'Value format' is set to '{{msg.payload[0].data_log}}' (labeled 46). An orange arrow points from the 'Value format' field to the debug console. The debug console shows a message with a payload array containing an object with 'info_id', 'data_log', 'temperature', and 'humidity' fields. The 'data_log' field value is highlighted with a red box labeled 47.

Task 3: Setting-up Node-RED Dashboard Interface

STEP 10

- 48 Double click **gauge** node.
- 49 Change at **Label** property from **text** to **Temperature**.
- 50 Change at **Value format** from **{{value}}** to **{{msg.payload[0].temperature}}**.
- 51 Change at **Units** property from **units** to **Celcius**.
- 52 Change at **Range** property from **0-10** to **15-60**.
- 53 Click **Done** once completed.

The screenshot shows the Node-RED interface with a dashboard. On the left, a flow contains a 'Log' node and two 'gauge' nodes. The first 'gauge' node is highlighted with a red box and labeled '48'. An orange arrow points from this node to the 'Edit gauge node' dialog box. The dialog box has a 'Done' button labeled '53'. The 'Properties' section of the dialog is visible, showing the following settings:

- Group: [Level 2] IoT Lab
- Size: auto
- Type: Gauge
- Label: Temperature (labeled '49')
- Value format: {{msg.payload[0].temperature}} (labeled '50')
- Units: Celcius (labeled '51')
- Range: min 15, max 60 (labeled '52')
- Colour gradient: A gradient bar with green, yellow, and red segments.

An orange arrow points from the 'Value format' field to the debug console. The debug console shows the following JSON payload:

```
SELECT * FROM temp_humid ORDER BY info_id DESC LIMIT 1 :  
msg.payload : array[1]  
  [ object ]  
24/01/2023, 17:23:12 node: cfdc207763a2f375  
SELECT * FROM temp_humid ORDER BY info_id DESC LIMIT 1 :  
msg.payload : array[1]  
  array[1]  
    0: object  
      info_id: 2  
      data_log: "2023-01-23T04:49:44.000Z"  
      temperature: "26"  
      humidity: "89"
```

Task 3: Setting-up Node-RED Dashboard Interface

STEP 11

- 54 Double click **gauge** node.
- 55 Change at **Label** property from **text** to **Humidity** .
- 56 Change at **Value format** from **{{value}}** to **{{msg.payload[0].humidity}}** .
- 57 Change at **Units** property from **units** to **%**.
- 58 Change at **Range** property from **0-10** to **0-100** .
- 59 Click **Done** once completed.

The screenshot shows the Node-RED interface with a dashboard panel on the left containing three nodes: 'Log abc', 'Temperature', and 'gauge'. The 'gauge' node is highlighted with a red box and a red number '54'. An orange arrow points from the 'gauge' node to the 'Edit gauge node' dialog box.

The 'Edit gauge node' dialog box is open, showing the 'Properties' tab. The 'Group' is '[Level 2] IoT Lab'. The 'Size' is 'auto'. The 'Type' is 'Gauge'. The 'Label' is 'Humidity' (red number 55). The 'Value format' is '{{msg.payload[0].humidity}}' (red number 56). The 'Units' is '%' (red number 57). The 'Range' is 'min 0 max 100' (red number 58). The 'Colour gradient' is a bar with green, yellow, and red segments. A red number '59' is next to the 'Done' button.

An orange arrow points from the 'Value format' field to the 'debug' console. The console shows the following JSON payload:

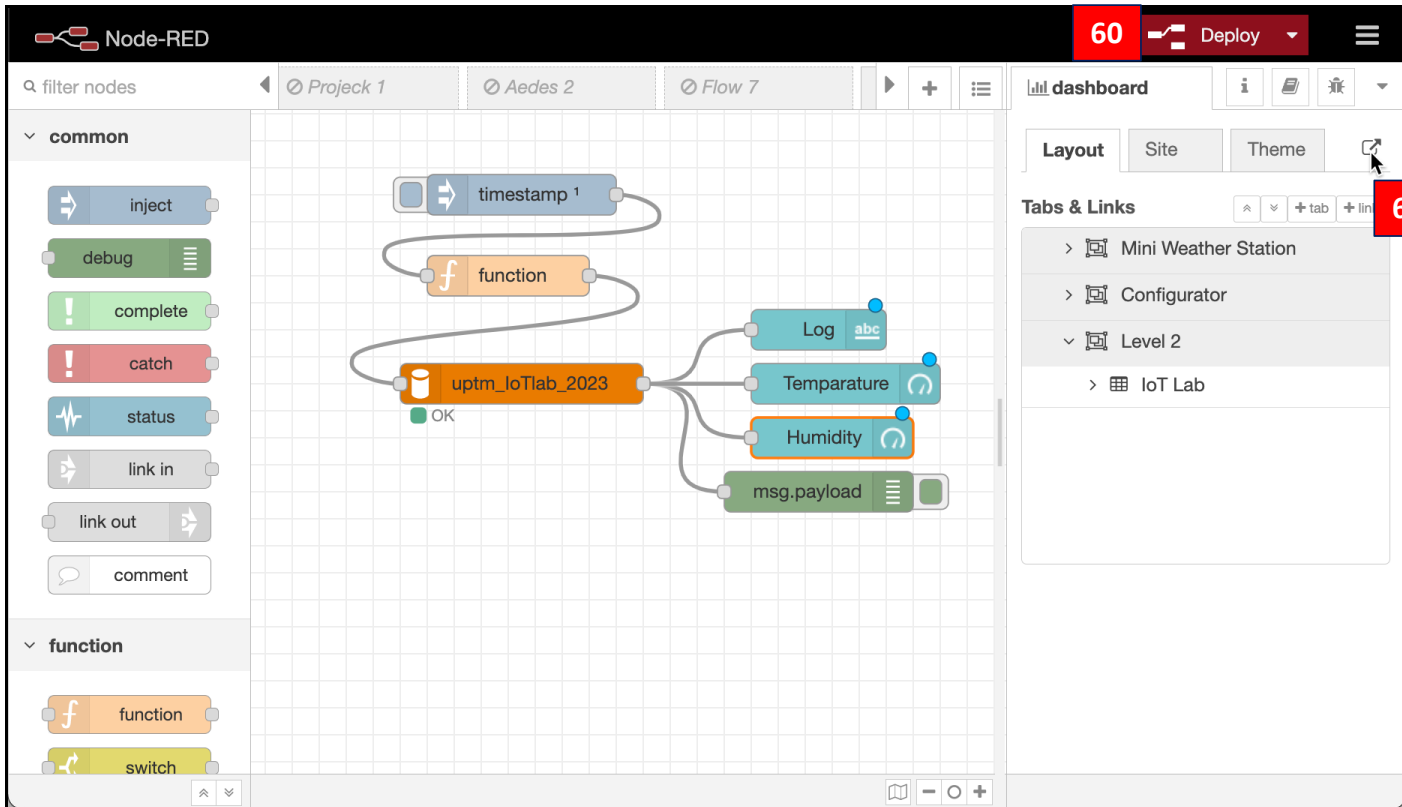
```
SELECT * FROM temp_humid ORDER BY info_id DESC LIMIT 1 :  
msg.payload : array[1]  
  [ object ]  
24/01/2023, 17:23:12 node: cfdc207763a2f375  
SELECT * FROM temp_humid ORDER BY info_id DESC LIMIT 1 :  
msg.payload : array[1]  
  array[1]  
    0: object  
      info_id: 2  
      data_log: "2023-01-23T04:49:44.000Z"  
      temperature: "26"  
      humidity: "89"
```

Task 3: Setting-up Node-RED Dashboard Interface

STEP 12

60 Click **Deploy** button to execute the configuration.

61 Click  at Dashboard sidebar or <http://localhost:1880/ui/> to open Dashboard User Interface.

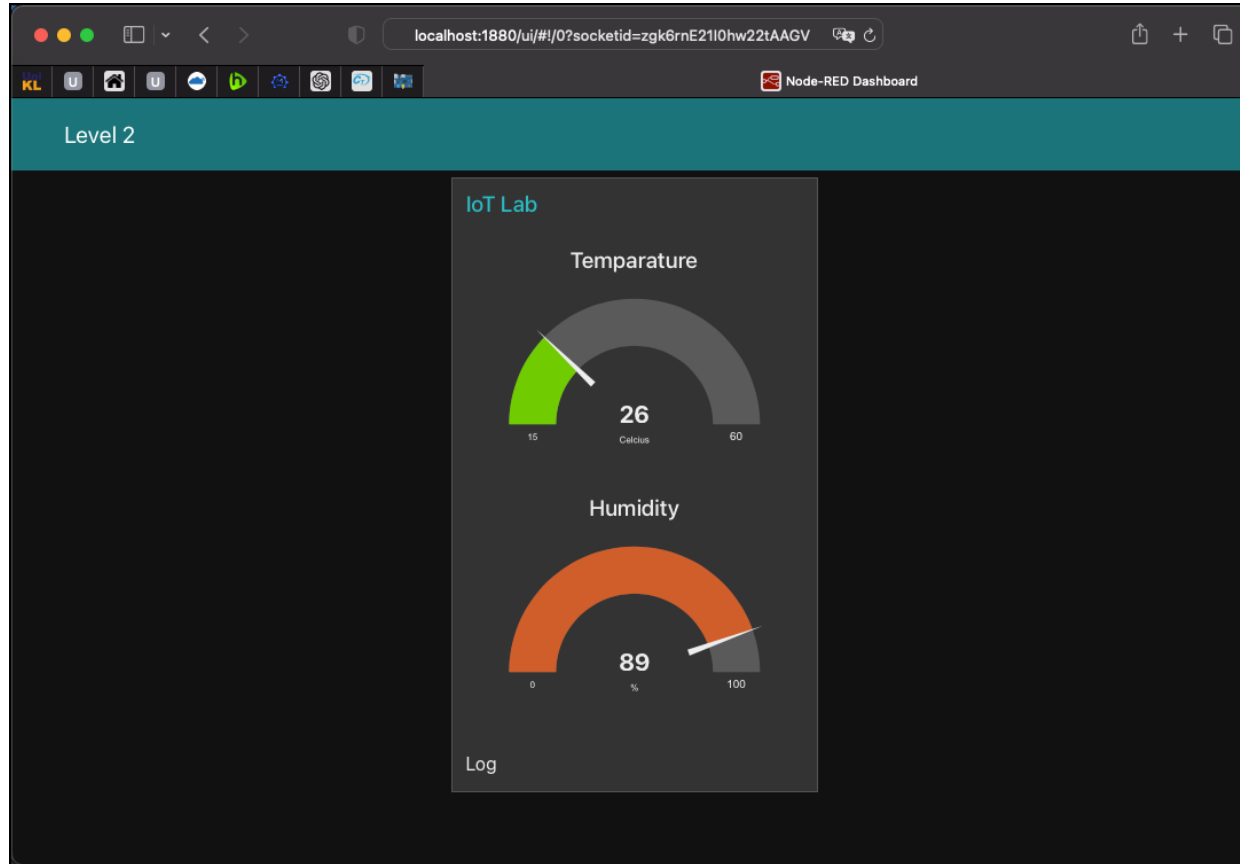


The screenshot shows the Node-RED web interface. The main workspace contains a flow with the following nodes: a 'timestamp' node, a 'function' node, an 'upm_loTlab_2023' node (with a green 'OK' status), a 'Log' node (labeled 'abc'), a 'Temperature' node, a 'Humidity' node, and a 'msg.payload' node. The left sidebar shows the 'common' and 'function' node categories. The right sidebar shows the 'dashboard' sidebar with tabs for 'Layout', 'Site', and 'Theme'. The 'Tabs & Links' section lists 'Mini Weather Station', 'Configurator', 'Level 2', and 'IoT Lab'. A red box with the number '60' highlights the 'Deploy' button in the top right corner. Another red box with the number '61' highlights the dashboard icon in the top right corner of the sidebar.

Task 3: Setting-up Node-RED Dashboard Interface

STEP 13

The Dashboard UI.



THE END

You can find more information and tutorials what Node-RED with the help of Internet.