

Indian Institute of Technology, Jodhpur

Lab Manual

Sensors and IoT

LAB - 4

Date: 30 Sept, 2024

Lab Objective

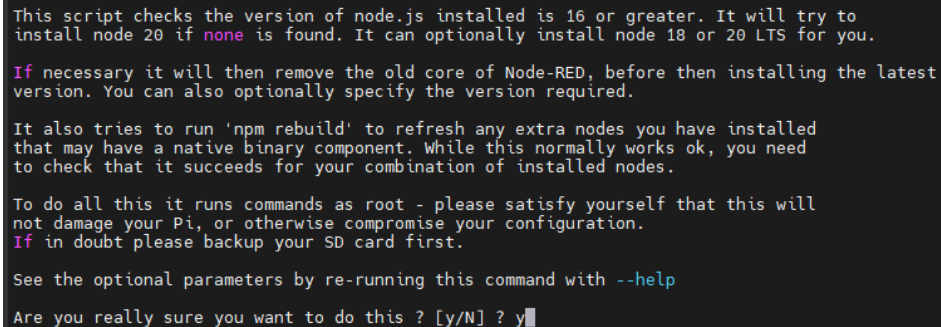
In this lab we will get familiarity with Node RED and MQTT

Part 1 : Setting Up NodeRED on Raspberry Pi

- Connect Raspberry pi to your hotspot
- Install node red on Raspberry pi. In order to do that run

```
bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)
```

- Press y and then press enter for both of them



```
This script checks the version of node.js installed is 16 or greater. It will try to
install node 20 if none is found. It can optionally install node 18 or 20 LTS for you.

If necessary it will then remove the old core of Node-RED, before then installing the latest
version. You can also optionally specify the version required.

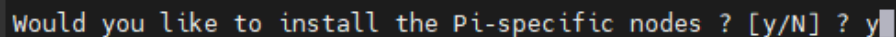
It also tries to run 'npm rebuild' to refresh any extra nodes you have installed
that may have a native binary component. While this normally works ok, you need
to check that it succeeds for your combination of installed nodes.

To do all this it runs commands as root - please satisfy yourself that this will
not damage your Pi, or otherwise compromise your configuration.
If in doubt please backup your SD card first.

See the optional parameters by re-running this command with --help

Are you really sure you want to do this ? [y/N] ? y
```

Figure 1: Enter y and press Enter



```
would you like to install the Pi-specific nodes ? [y/N] ? y
```

Figure 2: Enter y and press Enter

- Press Enter

```
*****  
  
Node-RED Settings File initialisation  
=====
```

This tool will help you create a Node-RED settings file.

```
? Settings file ▶ /home/pi/.node-red/settings.js
```

Figure 3: Press Enter

- Select Yes and press Enter

```
User Security  
=====
```

? Do you want to setup user security? ...

```
▶ Yes  
  No
```

Figure 4: Enter Caption

- Set Username as admin and Password as admin123

```
✓ Do you want to setup user security? ...
```

✓ Username ▶ admin

? Password ▶ *****

Figure 5: Username and Password setup

- Select Full access in user permission

```
? User permissions ...
```

```
▶ full access  
  read-only access
```

Figure 6: User Access Level

- Select no for add another user

```
User Security
=====
✓ Do you want to setup user security? · Yes
✓ Username · admin
✓ Password · ****
✓ User permissions · full access
✓ Add another user? · No
```

Figure 7: Add another User

- Select No for Projects features

```
? Do you want to enable the Projects feature? ...
  Yes
▶ No
```

Figure 8: Project Features

- press enter to select the default flows.json
- Enter passphrase as admin123

```
Flow File settings
=====
✓ Enter a name for your flows file · flows.json
✓ Provide a passphrase to encrypt your credentials file · ****
```

Figure 9: Flow configuration

- Select the Default Text editor by pressing enter

```
Editor settings
=====
? Select a theme for the editor. To use any theme other than "default",
▶ default
  aurora
  cobalt2
  dark
  dracula
  espresso-libre
  github-dark
  github-dark-default
  github-dark-dimmed
  midnight-red
  monoidustrial
  monokai
  monokai-dimmed
  noctis
  oceanic-next
  oled
  one-dark-pro
  one-dark-pro-darker
  solarized-dark
  solarized-light
  tokyo-night
  tokyo-night-light
  tokyo-night-storm
  totallyinformation
  zenburn
```

Figure 10: Text editor selection

- Final Configuration for nodered :-

```
Node-RED Settings File Initialisation
=====
This tool will help you create a Node-RED settings file.

✓ Settings file - /home/pi/.node-red/settings.js

User Security
=====
✓ Do you want to setup user security? - Yes
✓ Username - admin
✓ Password - *****
✓ User permissions - full access
✓ Add another user? - No

Projects
=====
The Projects feature allows you to version control your flow using a local git repository.
✓ Do you want to enable the Projects feature? - No

Flow File settings
=====
✓ Enter a name for your flow file - flow.json
✓ Provide a passphrase to encrypt your credentials file - *****

Editor settings
=====
✓ Select a theme for the editor. To use any theme other than "default", you will need to install @node-red-contrib-themes/theme-collection in your Node-RED user directory. - default
✓ Select the text editor component to use in the Node-RED Editor - monaco (default)

Node settings
=====
✓ Allow Function nodes to load external modules? (functionExternalModules) - Yes

Settings file written to /home/pi/.node-red/settings.js
```

Figure 11: Final NodeRED config

- To check nodeRED status run :-

node-red-start

```
pi@raspberrypi:~ $ node-red-start
Start Node-RED

Once Node-RED has started, point a browser at http://172.30.2.89:1880
On Pi Node-RED works better with the Firefox or Chrome browser

Use node-red-stop           to stop Node-RED
Use node-red-start          to start Node-RED again
Use node-red-log             to view the recent log output
Use sudo systemctl enable nodered.service to autostart Node-RED at every boot
Use sudo systemctl disable nodered.service to disable autostart on boot

To find more nodes and example flows - go to http://flows.nodered.org

Starting as a systemd service.
30 Sep 17:58:31 - [info] Welcome to Node-RED
=====
30 Sep 17:58:31 - [info] Node-RED version: v4.0.3
30 Sep 17:58:31 - [info] Node.js version: v20.17.0
30 Sep 17:58:31 - [info] Linux 6.6.31+rpt-rpi-v8 arm64 LE
30 Sep 17:58:32 - [info] Loading palette nodes
30 Sep 17:58:34 - [info] Settings file : /home/pi/.node-red/settings.js
30 Sep 17:58:34 - [info] Context store : 'default' [module=memory]
30 Sep 17:58:34 - [info] User directory : /home/pi/.node-red
30 Sep 17:58:34 - [warn] Projects disabled : editorTheme.projects.enabled=false
30 Sep 17:58:34 - [info] Flows file : /home/pi/.node-red/flows.json
30 Sep 17:58:34 - [info] Creating new flow file
30 Sep 17:58:34 - [warn] Encrypted credentials not found
30 Sep 17:58:34 - [info] Server now running at http://127.0.0.1:1880/
30 Sep 17:58:34 - [info] Starting flows
30 Sep 17:58:34 - [info] Started flows
```

Figure 12: Successful NodeRED installation

- Access the NodeRED using the following URL on raspberry Pi

<http://127.0.0.1:1880/>

Part 2 : Installing MQTT

- Open a new Terminal Window
- Execute :-

```
sudo apt install -y mosquitto mosquitto-clients
```

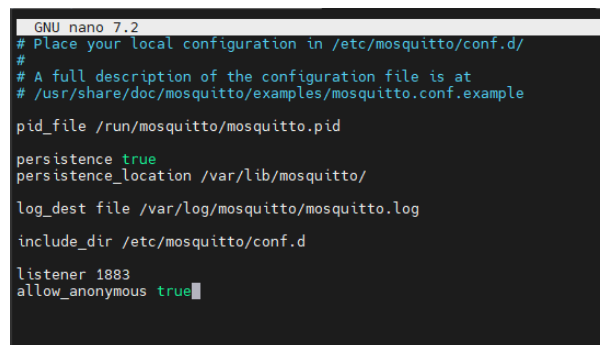
- Once installed execute :-

```
sudo nano /etc/mosquitto/mosquitto.conf
```

- Add the following lines at the end of the file :-

```
listener 1883  
allow_anonymous true
```

- Press Ctrl + X and then Y to save the file.



```
GNU nano 7.2  
# Place your local configuration in /etc/mosquitto/conf.d/  
#  
# A full description of the configuration file is at  
# /usr/share/doc/mosquitto/examples/mosquitto.conf.example  
  
pid_file /run/mosquitto/mosquitto.pid  
  
persistence true  
persistence_location /var/lib/mosquitto/  
  
log_dest file /var/log/mosquitto/mosquitto.log  
  
include_dir /etc/mosquitto/conf.d  
  
listener 1883  
allow_anonymous true
```

Figure 13: MQTT configuration

- Restart MQTT to apply changes

```
sudo systemctl restart mosquitto
```

Part 3 : Using MQTT to display data using NodeRED

- Open the NodeRED dashboard and open "Manage palette"

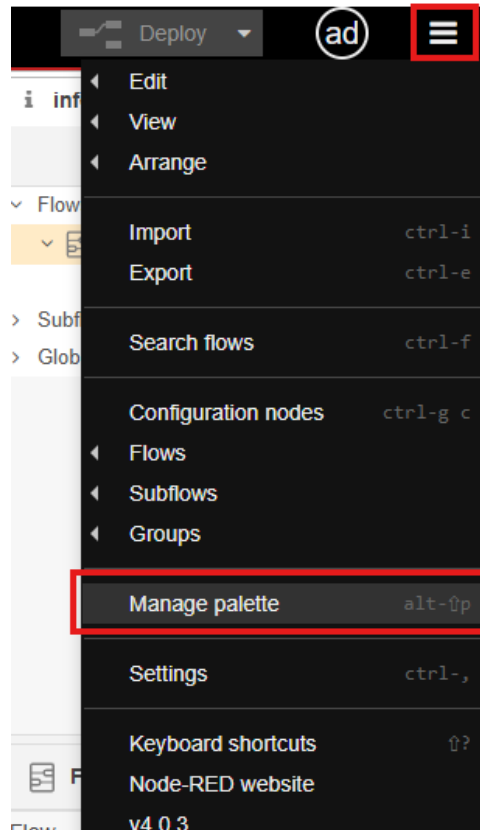


Figure 14: Edit Palette

- Under Install tab search for node-red-dashboard and install it

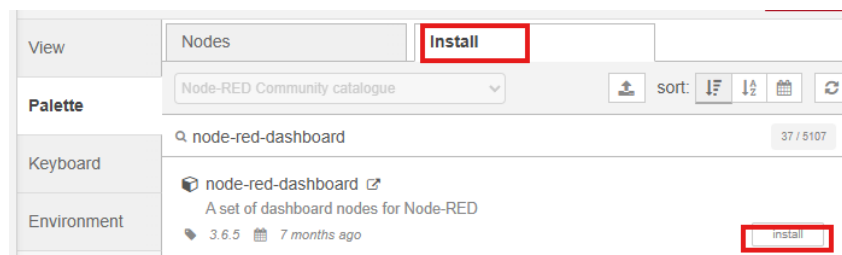


Figure 15: Install Node RED Dashboard

- Click close

- In the drop-down menu select Dashboard

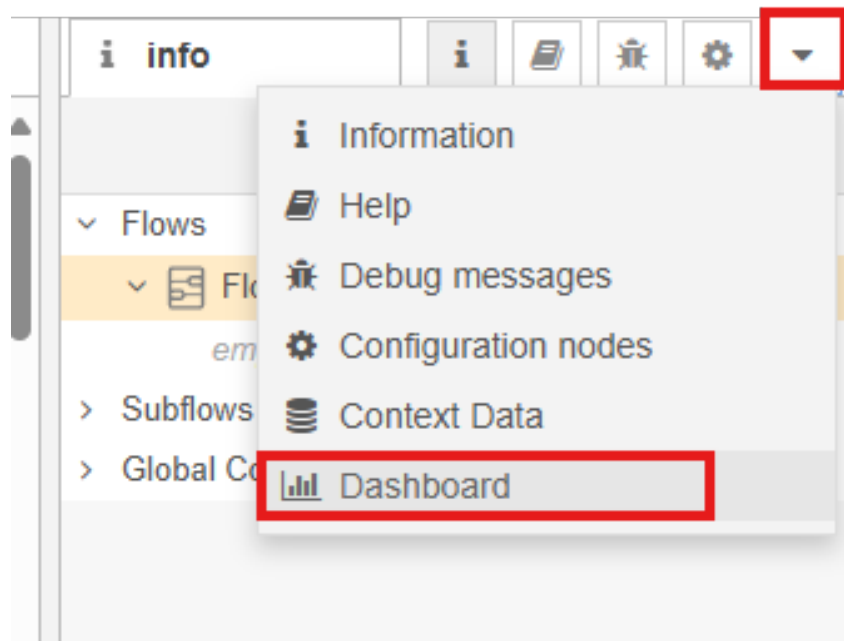


Figure 16: Select Dashboard

- Follow the following URL from "Establishing an MQTT communication with Node-RED" section to complete the LAB
NOTE :- In the provided URL please do not make any changes in the Security tab while configuring the MQTT client
<https://randomnerdtutorials.com/esp8266-and-node-red-with-mqtt/>
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