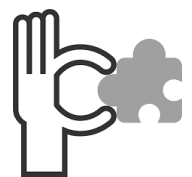


# Introducing IoT local hub for NETPIE

**Mr. Natapon Tansangworn**

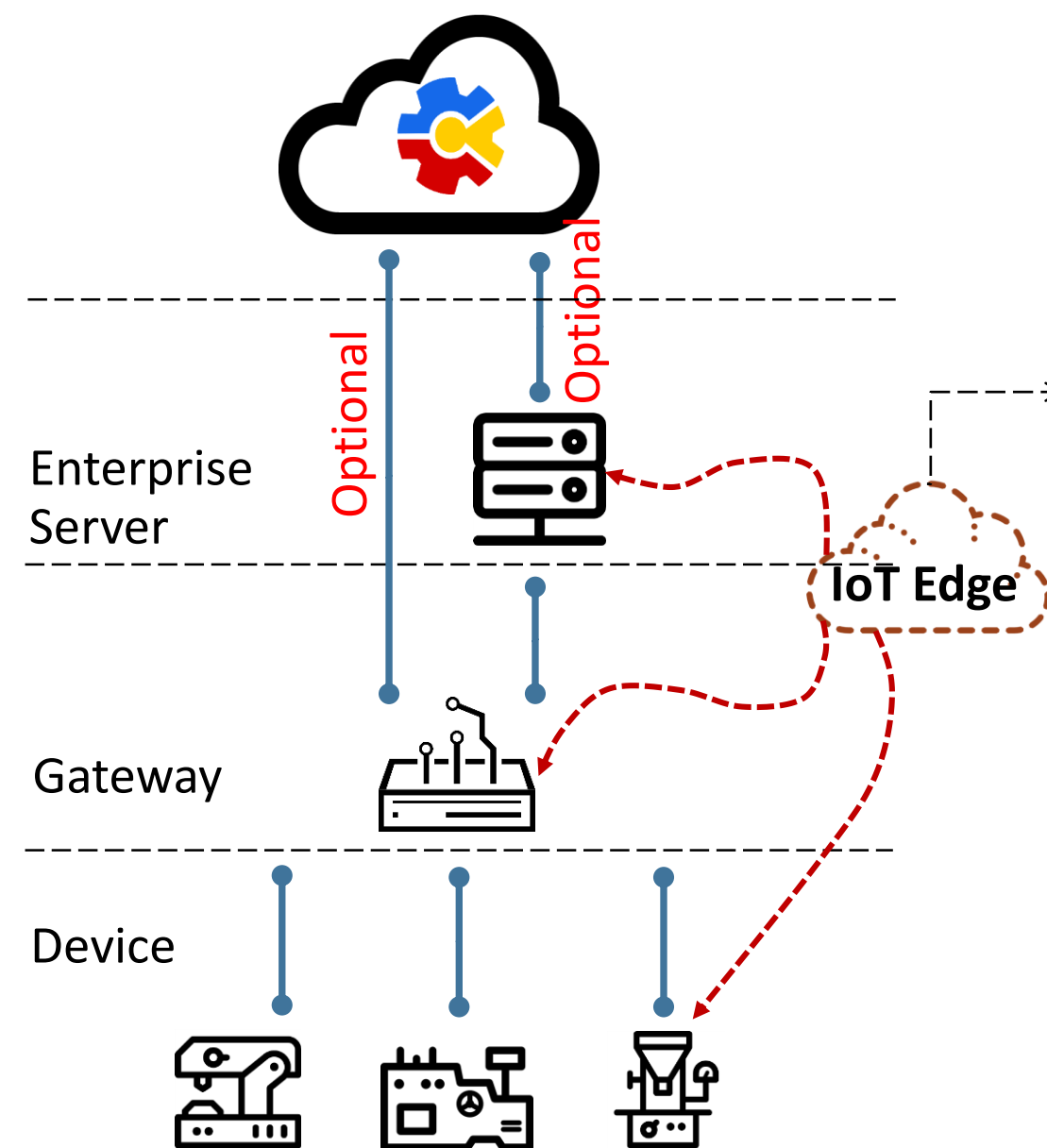
**National Electronics and Computer Technology Center (NECTEC),  
Thailand**



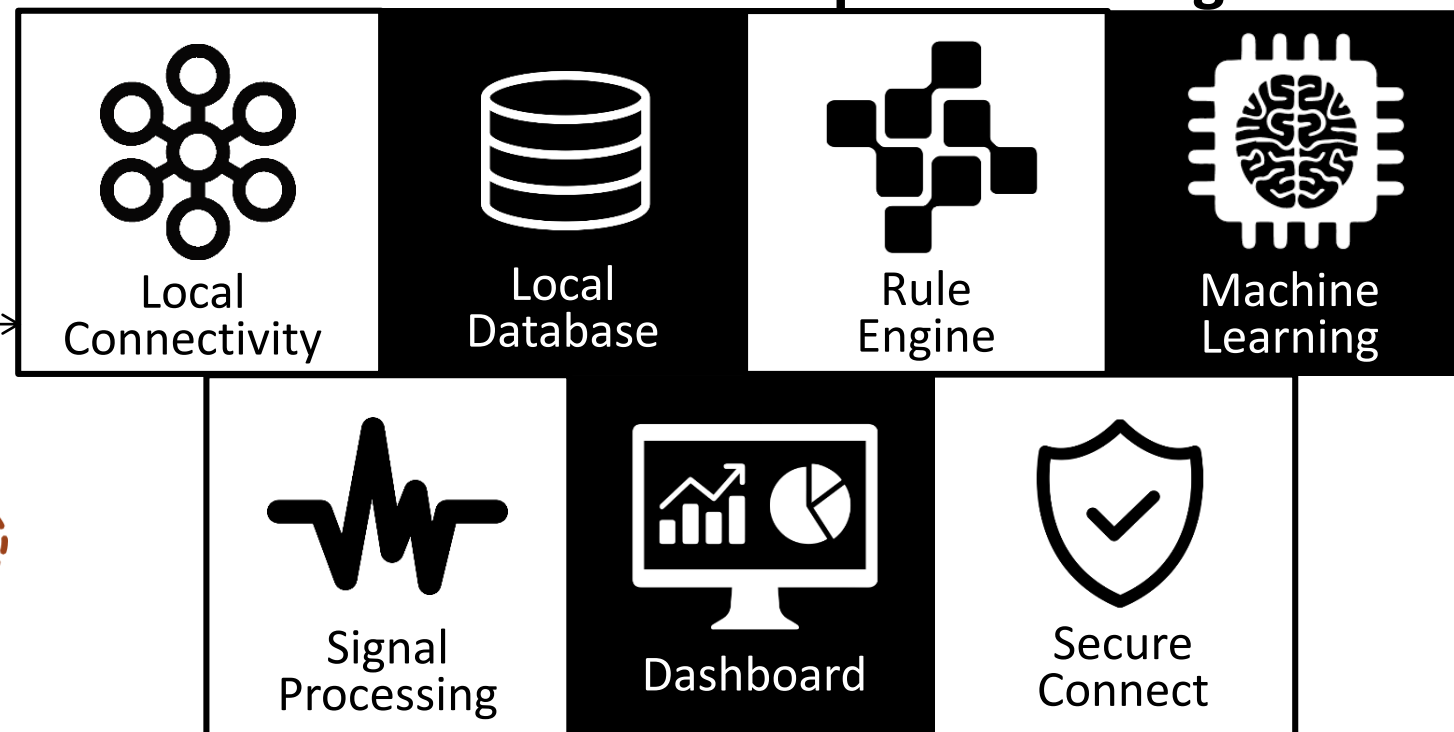


## User-Customizable IoT Edge

1



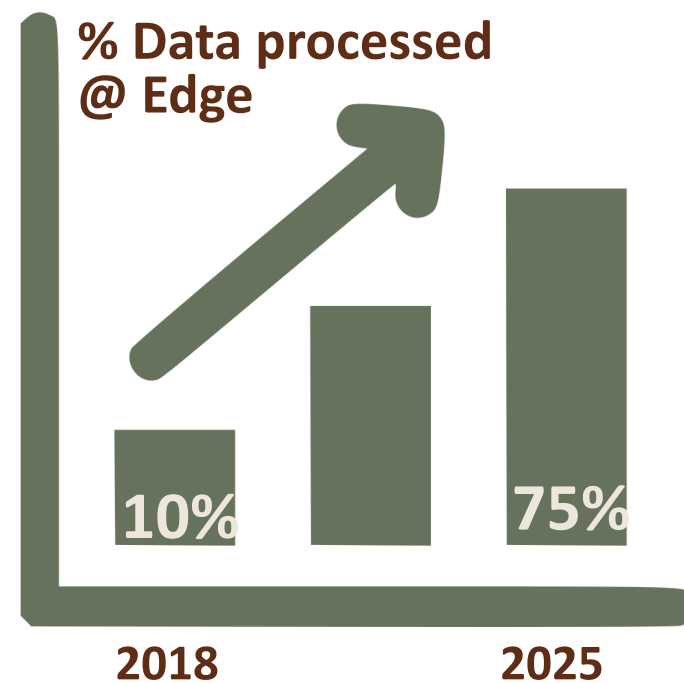
## Functionalities of Proposed IoT Edge



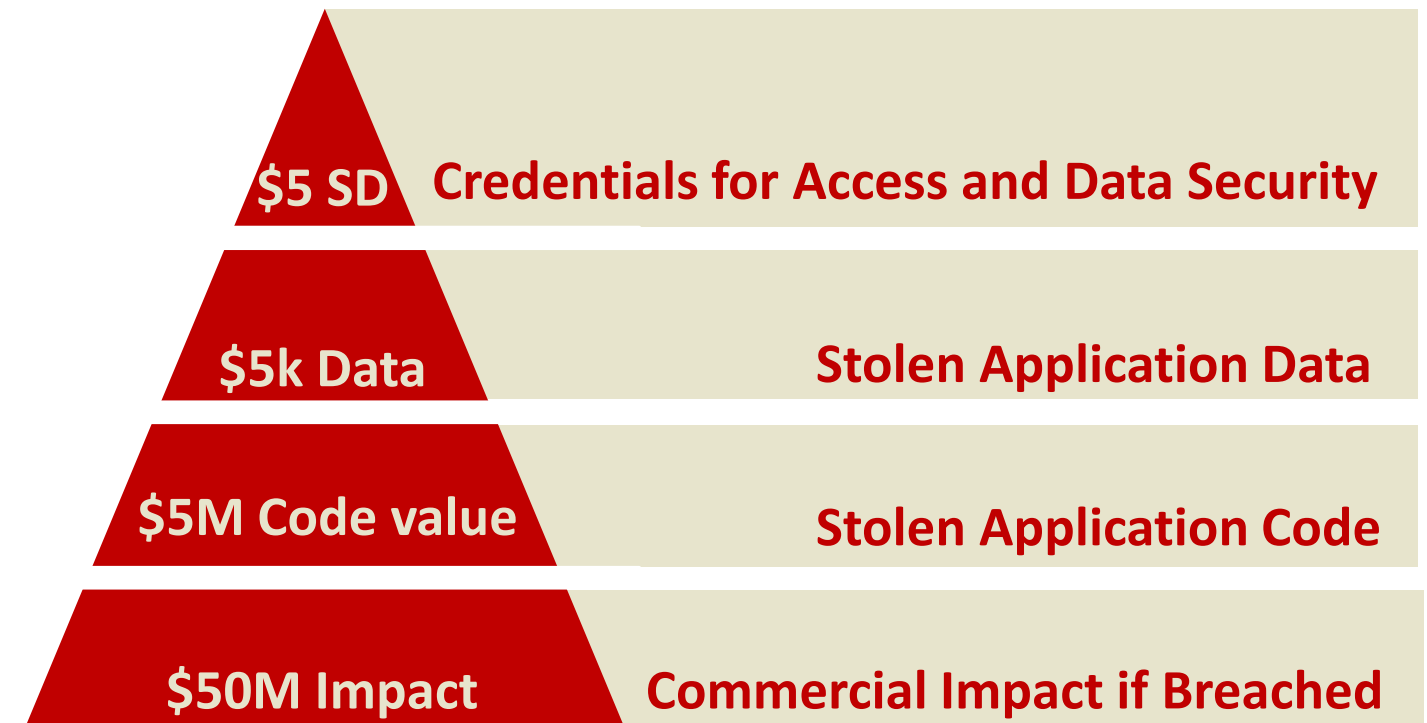


## Benefit – Alleviate Security Concern

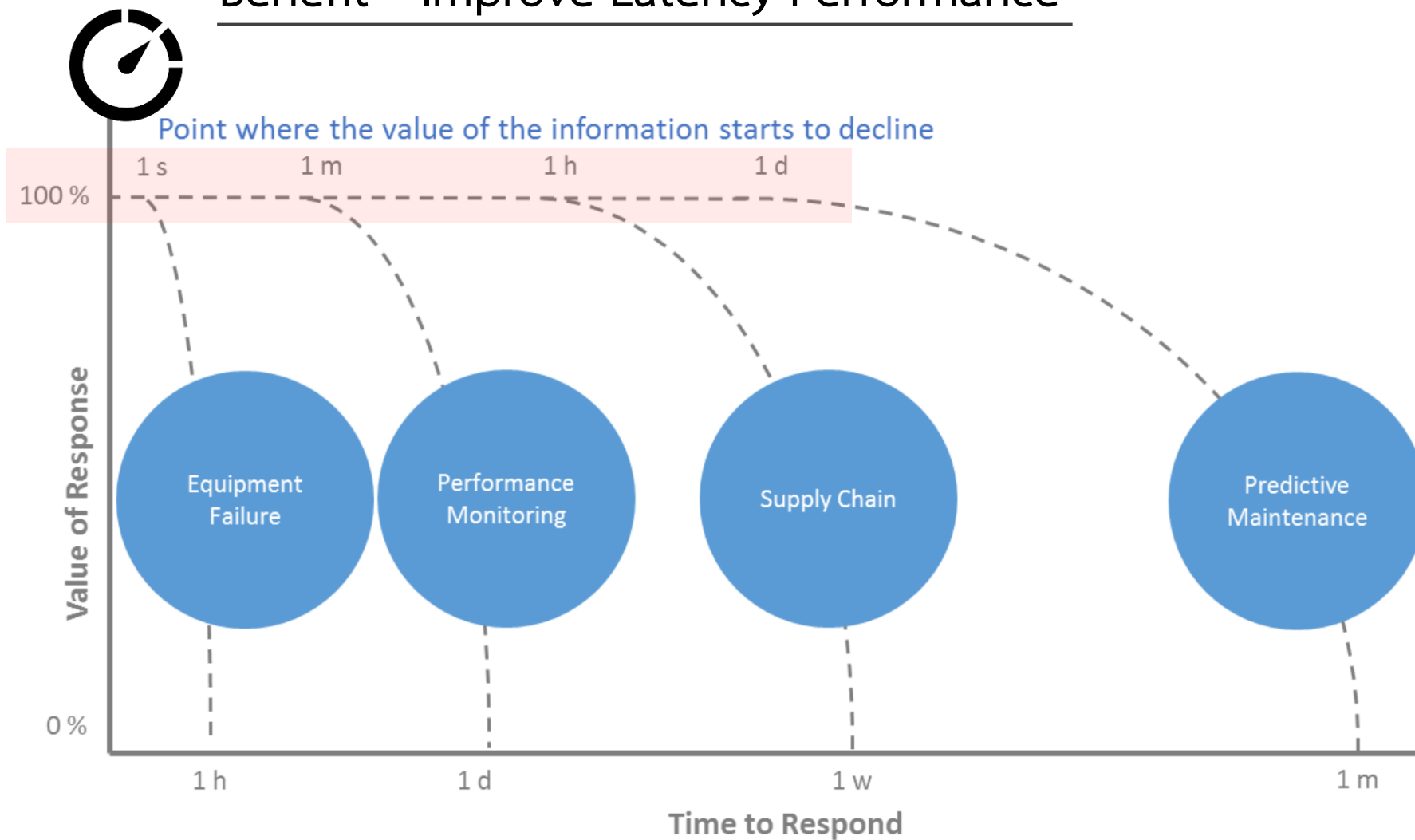
- Cloud connection can be optional
- Filter data that goes out to the Internet
- Encrypt data such that it is opaque to the cloud



Source: Gartner, AWS



## Benefit – Improve Latency Performance



### Time-Value Curve for IoT Information\*

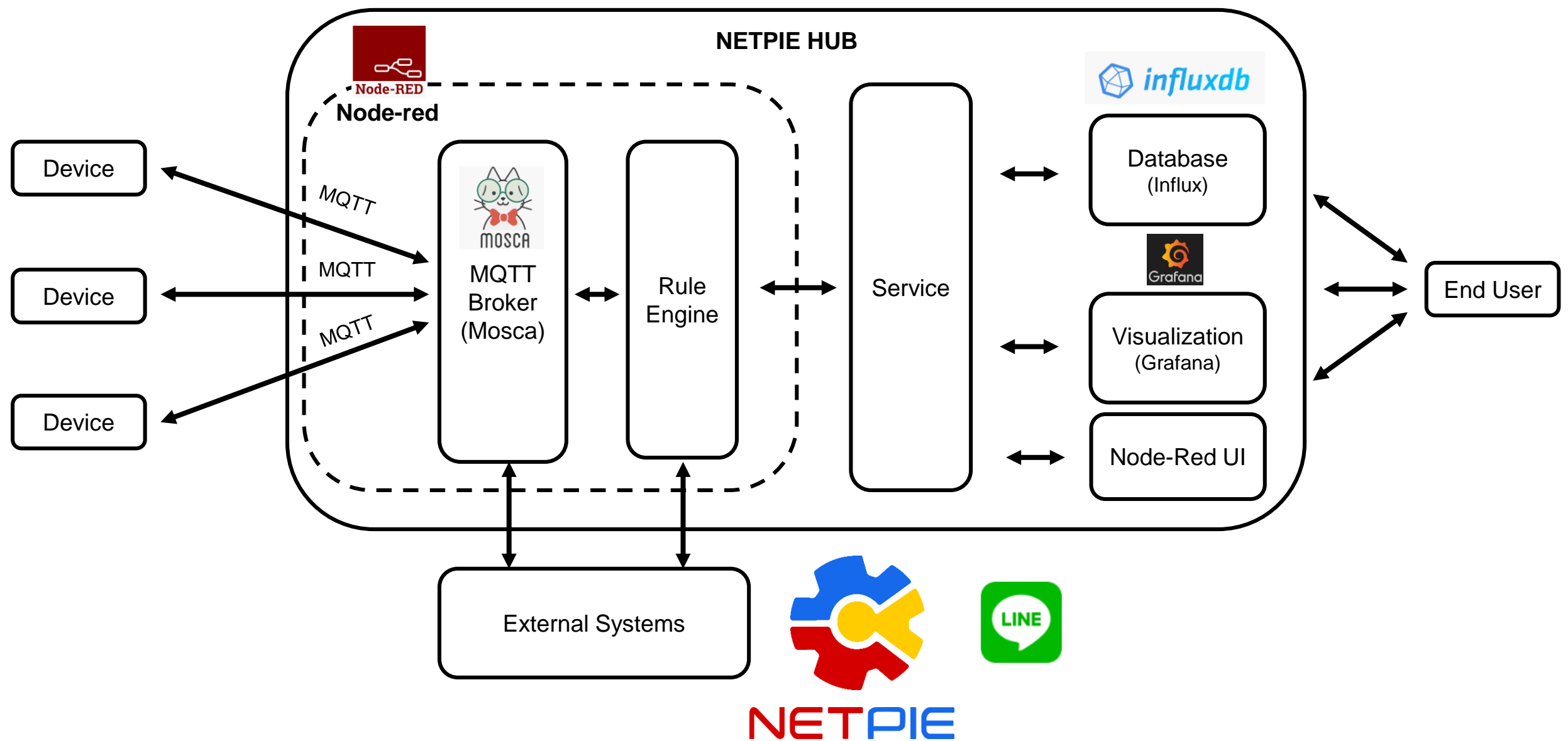
Source: \*Industrial Internet Consortium,

\*\*Maneenual, Piyawat, and Sangsuree Vasupongayya. "Logging mechanism for Internet of Things: A Case Study of Patient Monitoring System." 2018 15th International Joint Conference on Computer Science and Software Engineering (JCSSE). IEEE, 2018.

### NETPIE One-Way Latency\*\*

Data size	Average time (ms)
64B	71.25
128B	72.44
256B	73.56
512B	76.77
1KB	89.31
2KB	99.13
4KB	191.44
8KB	1,244.38
16KB	4,954.56

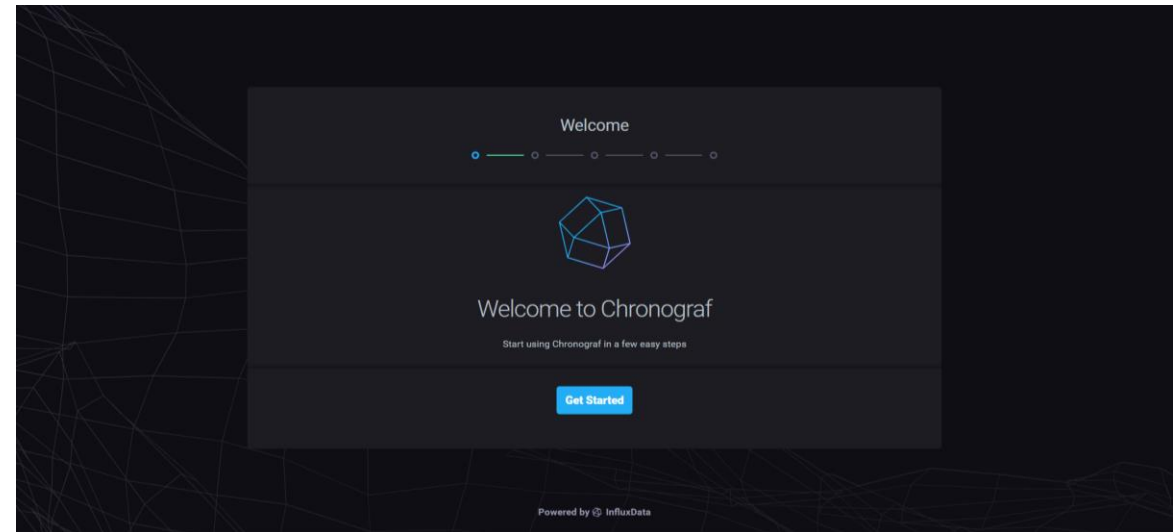
# NETPIE Hub Architecture



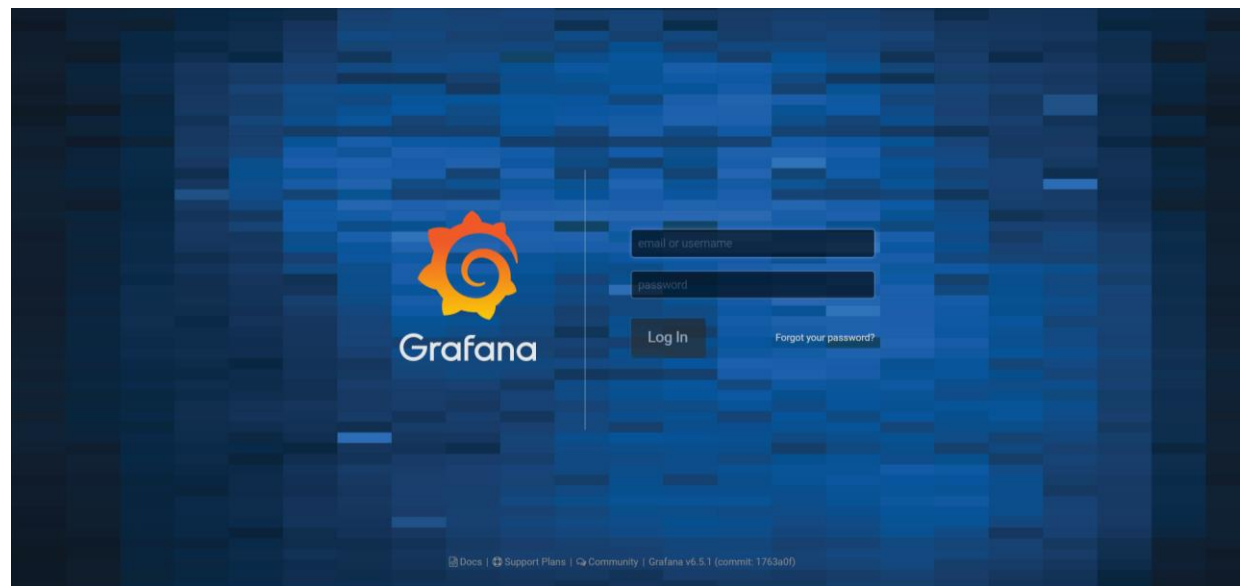
# User Interface



**Node-Red (Port:1880)**



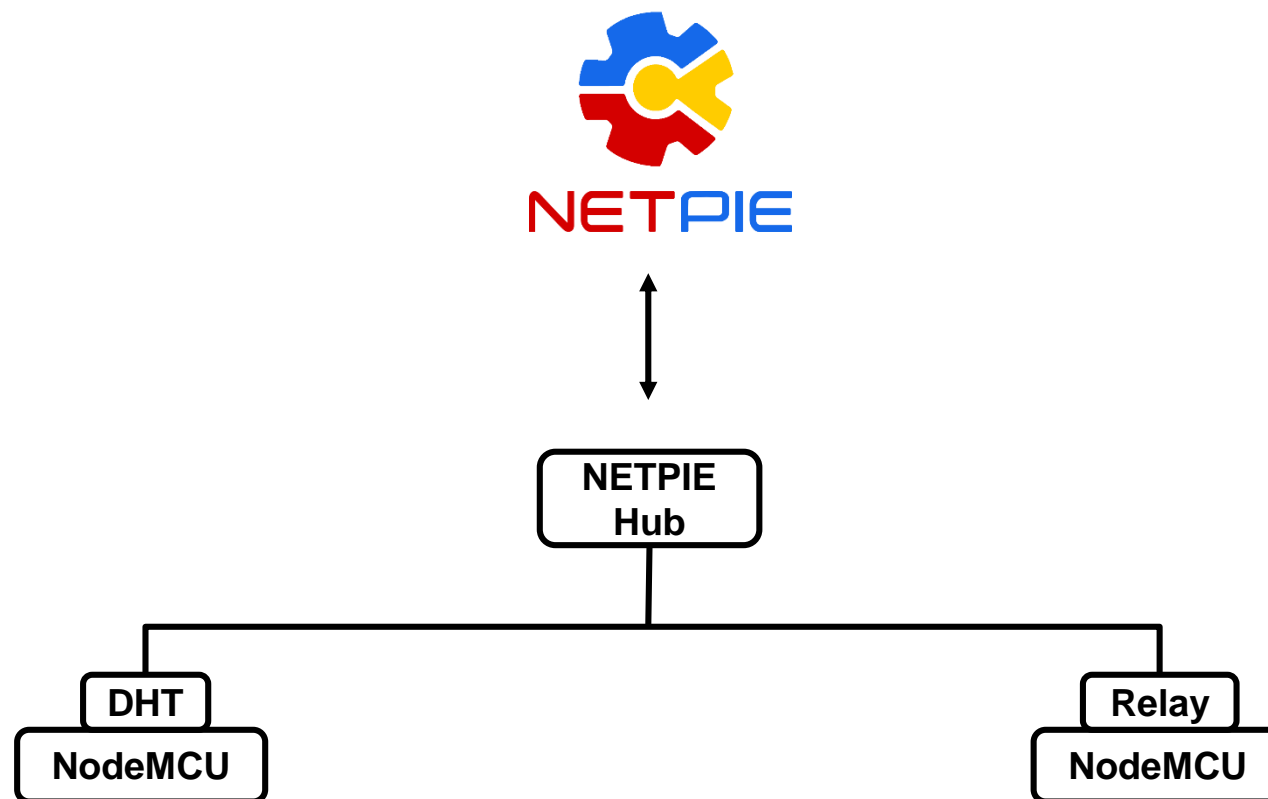
**Chronograf (Port : 8888)**



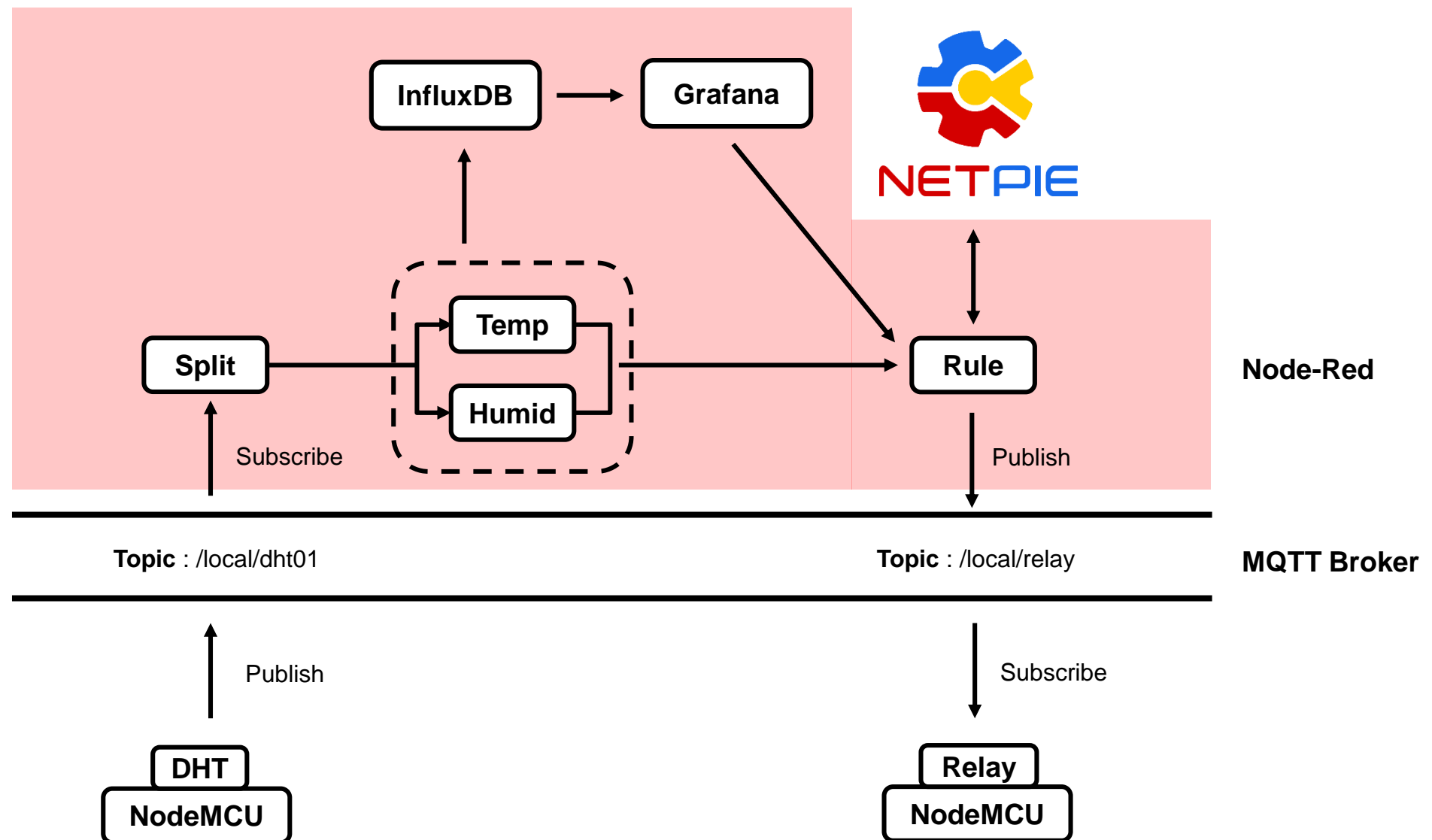
**Grafana (Port : 3000)**

# Data Flow

---

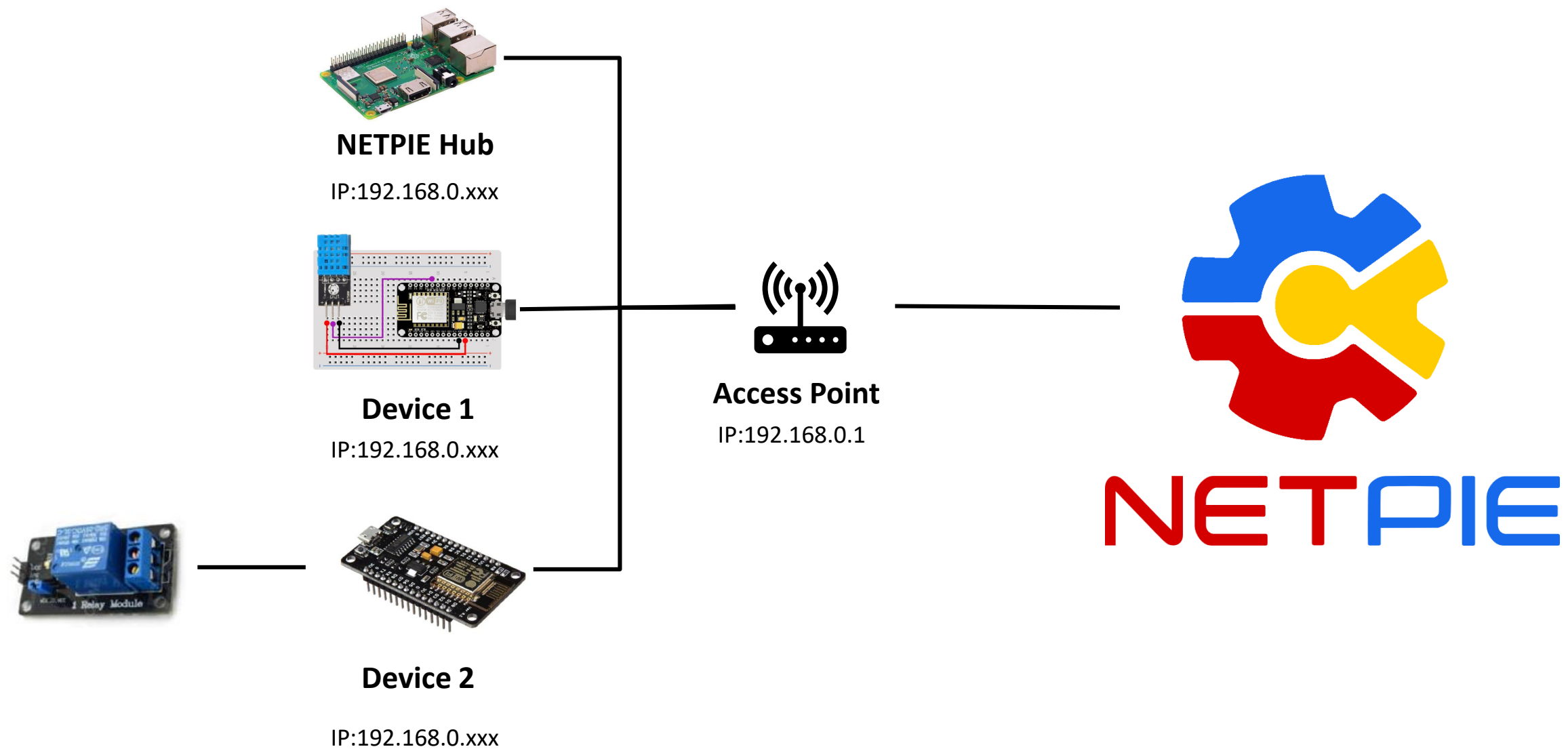


# Data Flow





# Lab Setting



# Lab 1 : Setting NETPIE Hub

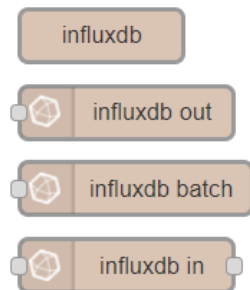
Run Node-Red : Insert URL on web browser

- `http://{hostIP}:1880` (Flow Design)
- `http://{hostIP}:1880/ui` (Web UI)

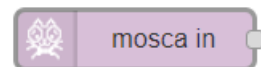


# Node Installing

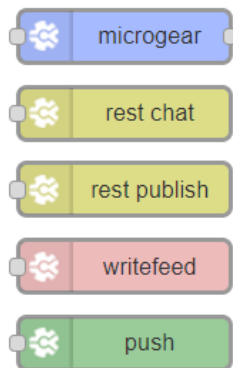
## InfluxDB Node



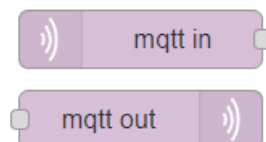
## MOSCA Node



## Microgear Node



## MQTT Node



## Dashboard Node



# Lab 1 : Setting NETPIE Hub

Run InfluxDB and Chronograf : Insert URL on web browser

- `http://{hostIP}:8888` (InfluxDB UI)

The screenshot displays the InfluxDB Chronograf interface. At the top, there's a navigation bar with 'Explore' selected, and tabs for 'Queries' and 'Visualization'. On the right, there are buttons for 'UTC', 'Local', 'Write Data', and 'Send to Dashboard'. Below the navigation bar, there's a 'Dynamic Source' dropdown set to 'InfluxQL'. The main area shows 'No Results' for the current query. Below this, a query editor contains the following InfluxQL query:

```
SELECT mean("humidity") AS "mean_humidity" FROM "workshop"."autogen"."DHT01" WHERE time > :dashboardTime: GROUP BY time(:interval:) FILL(null)
```

A warning message states: 'Your query is syntactically correct but returned no results'. Below the query editor, there's a 'DB.RetentionPolicy' section with a list of databases: '\_internal.monitor', 'db\_name.autogen', and 'workshop.autogen'. The 'Measurements & Tags' section shows 'DHT01' selected. The 'Fields' section shows 'humidity' selected. The 'Group by' dropdown is set to 'auto', 'Compare' is 'none', and 'Fill' is 'null'. A 'Submit Query' button is visible on the right.

# Chronograf Configuration

Connection Configuration

InfluxDB Connection

Connection URL

http://localhost:8086

Connection Name

Influx 1

Username

Password

Telegraf Database Name

telegraf

Default Retention Policy

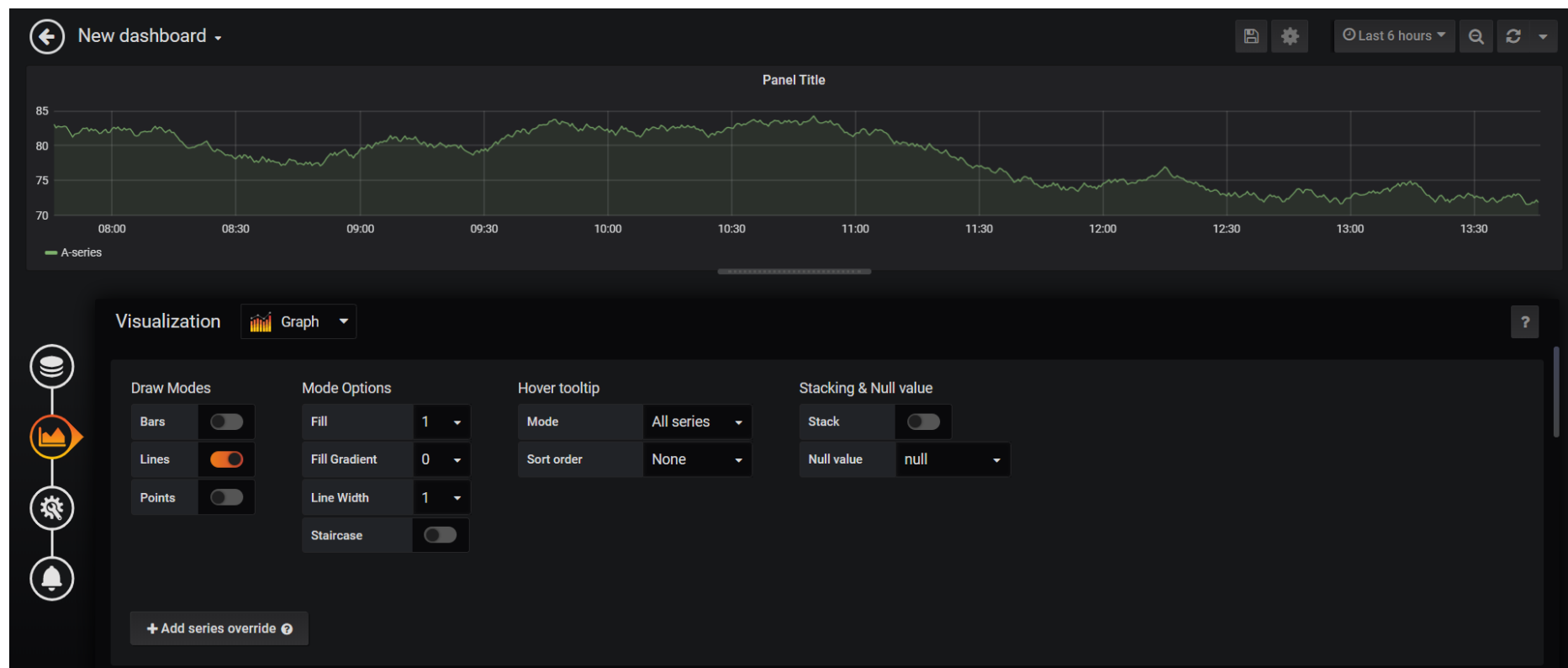
☐ Make this the default connection

Add Connection

# Lab 1 : Setting NETPIE Hub

Run Grafana : Insert URL on web browser

- <http://{hostIP}:3000> (Grafana Visualization)



# Grafana Configuration

- Select Database (InfluxDB)

The screenshot shows the Grafana configuration page for a new InfluxDB data source. The interface is dark-themed. On the left is a sidebar with navigation icons. The main content area is divided into sections:

- Name:** A text input field containing "InfluxDB-1". To its right is a "Default" toggle switch, which is currently turned off.
- HTTP:**
  - URL:** A text input field containing "http://localhost:8086".
  - Access:** A dropdown menu set to "Server (default)". A "Help" link is visible to the right.
  - Whitelisted Cookies:** A section with a text input "Add Name" and an "Add" button.
- Auth:** A section with several toggle switches:
  - Basic auth:** Toggled off. To its right is a "With Credentials" toggle, also off.
  - TLS Client Auth:** Toggled off. To its right is a "With CA Cert" toggle, also off.
  - Skip TLS Verify:** Toggled off.
  - Forward OAuth Identity:** Toggled off.
- InfluxDB Details:**
  - Database:** A text input field, currently empty.
  - User:** A text input field, currently empty.
  - Password:** Two password input fields, both currently empty.
  - HTTP Method:** A dropdown menu set to "GET".

# Lab2 : Connecting NETPIE Hub

---

## Computing Board

- NodeMCU (ESP8266) x 2
- Raspberry Pi 3 B x 1

## Sensor

- Temperature and Humidity Sensor (DHT) x 1
- Relay x 1

## Software

- Arduino IDE

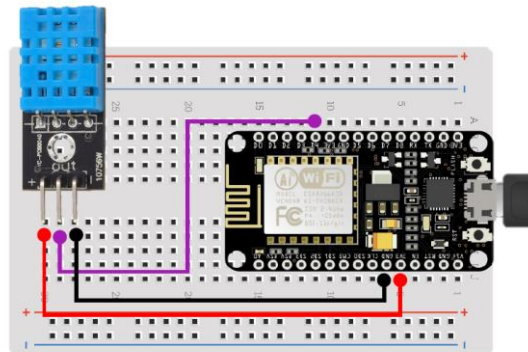


# Lab2 : Publish to NETPIE Hub

Coding on Arduino IDE : Download on link

<https://github.com/IoTcloudServe/Training-Material-for-IOTCLOUDSERVE-TEIN-COLLABORATION-WORKSHOP-II-in-Laos>

LAB02\_Pub\_to\_NETPIE\_Hub



**Publish**

**Topic : local/dht01**

**Data : temp,humid**

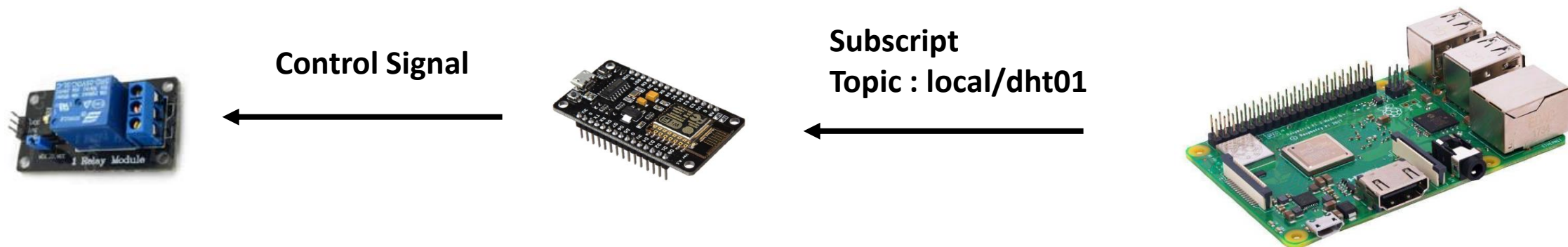


# Lab2 : Subscript to NETPIE Hub

Coding on Arduino IDE : Download on link

<https://github.com/IoTcloudServe/Training-Material-for-IOTCLOUDSERVE-TEIN-COLLABORATION-WORKSHOP-II-in-Laos>

LAB02\_Sub\_to\_NETPIE\_Hub



---

# THANK YOU



# Node –Red Installing

---

## Terminal

```
pi@raspberrypi:~$ sudo apt-get install build-essential
```

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

```
pi@raspberrypi:~$ node-red-start
```

# Influx and Chronograf Installing

---

## Terminal

```
pi@raspberrypi:~$ wget -qO- https://repos.influxdata.com/influxdb.key | sudo apt-key add -
```

```
pi@raspberrypi:~$ echo "deb https://repos.influxdata.com/debian buster stable" | sudo tee /etc/apt/sources.list.d/influxdb.list
```

```
pi@raspberrypi:~$ sudo apt update
```

```
pi@raspberrypi:~$ sudo apt install influxdb chronograf
```

```
pi@raspberrypi:~$ sudo systemctl unmask influxdb
```

```
pi@raspberrypi:~$ sudo systemctl enable influxdb
```

```
pi@raspberrypi:~$ sudo systemctl enable chronograf
```

```
pi@raspberrypi:~$ sudo systemctl start influxdb
```

```
pi@raspberrypi:~$ sudo systemctl start chronograf
```

# Grafana Installing

---

## Terminal

```
pi@raspberrypi:~$ wget https://dl.grafana.com/oss/release/grafana-rpi_6.5.1_armhf.deb
```

```
pi@raspberrypi:~$ sudo dpkg -i grafana-rpi_6.5.1_armhf.deb/etc/apt/sources.list.d/influxdb.list
```

```
pi@raspberrypi:~$ sudo apt update
```

```
pi@raspberrypi:~$ sudo systemctl enable grafana-server.service
```

```
pi@raspberrypi:~$ sudo systemctl start grafana-server
```