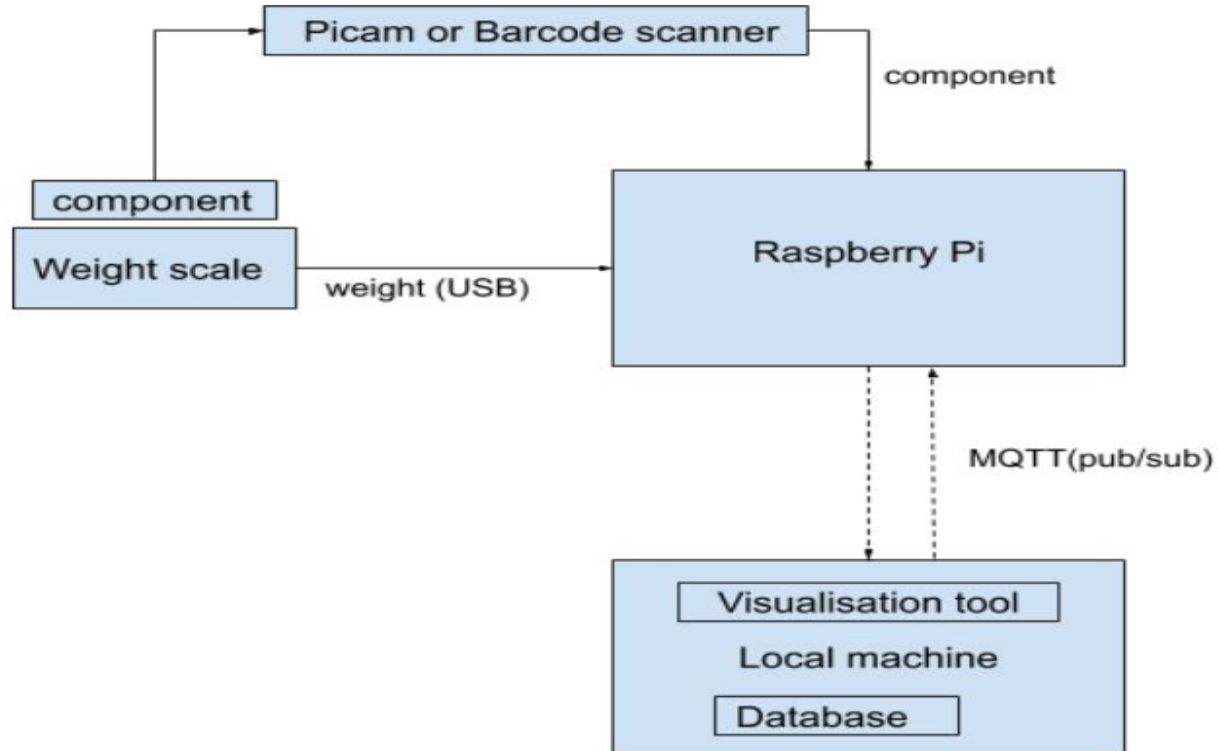# DISTRIBUTED STORAGE SYSTEM
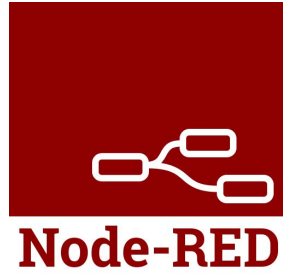
Guide :
Prof. Laura Thiele
Prof. Sascha Bosse

Abhijith Remesh - 221424
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Block diagram

**Hardware and Software used**

Articles we bought...

id	Article number	Article name	Unit Weight
1	731308	Waschenklammer	4
2	708763	Tintenpatrone	1.4
3	700555	Screws	3

Tasks

- Interfacing the scaling device with raspberry pi and parsing the data in specific data formats.

- Development of database containing the feature information of warehouse components (name, type, unit weight)

- Developing the logic to identify the counts of warehouse components accurately based on weight comparison.

- Setting up MQTT client on local machine and MQTT broker on pi.

- Implementing the dashboard to view the inventory data levels of each warehouse component.

- Developing the QR code/Bar code scanning functionality to identify the warehouse component (feature information).

- Developing the provision to store/save it's inventory history.

Progress so far...

USB

Raspberry Pi — Weight scale
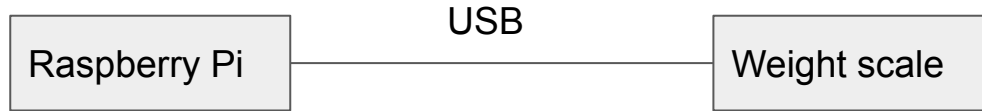
- Developed a script to test the interface and obtain the real time weight readings from the weight scale.

- Developed a node red flow to obtain the real time values at the raspberry pi end.

- The Pi acts as the MQTT publisher and publishes the real time weight values onto the topic "weight".

- The local machine acts as the MQTT subscriber and subscribes on this topic and hence, receives the real time weight values.

- For the time being, we inject the article manually every 10 seconds.

```python
#!/usr/bin/env python
import time
import serial

ser = serial.Serial(
    port='/dev/ttyUSB0',
    baudrate=9600,
    parity=serial.PARITY_NONE,
    stopbits=serial.STOPBITS_ONE,
    bytesize=serial.EIGHTBITS,
    timeout=1)

while 1:
    x=ser.readline()
    print (x)
```
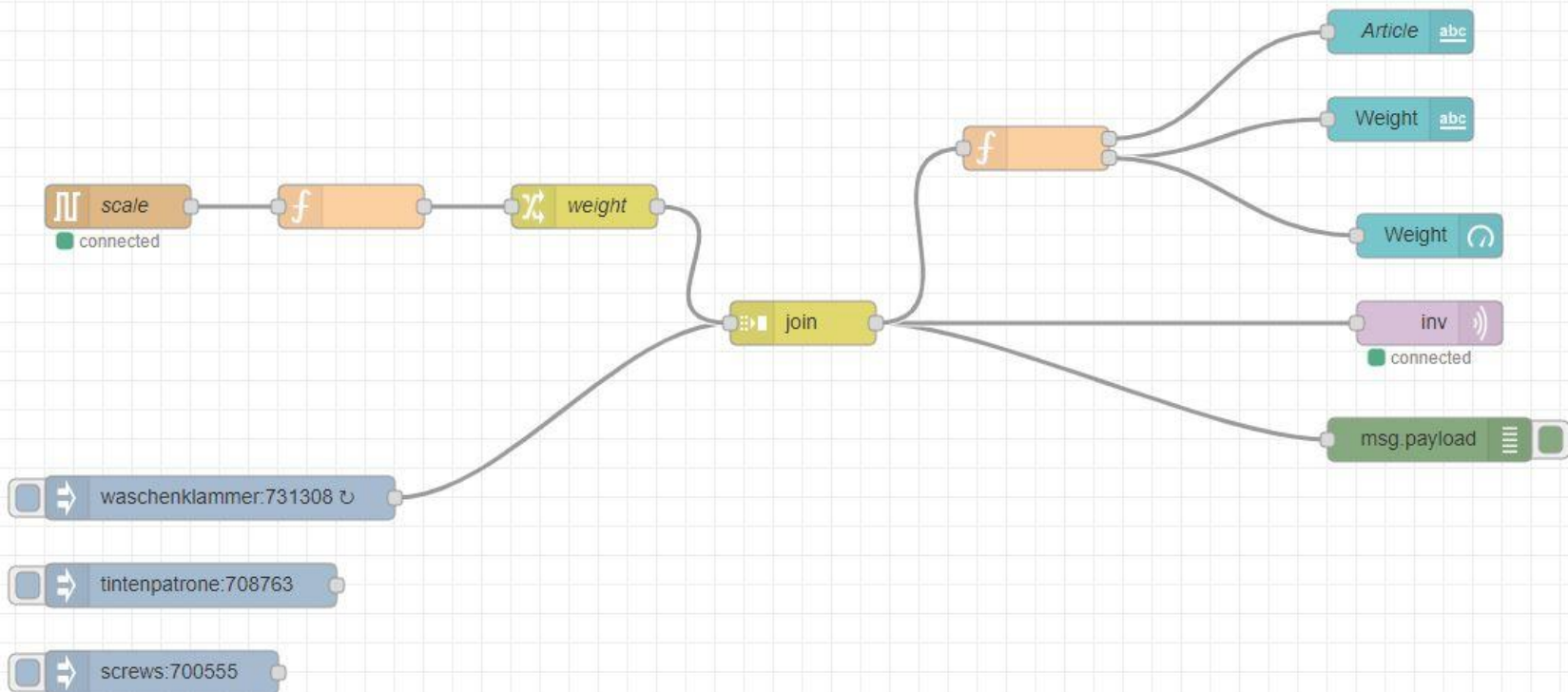
```
Coming from First device
W:+     188.8g

Coming from First device
W:+     188.8g

Coming from First device
W:+     188.8g
```

Flow 1
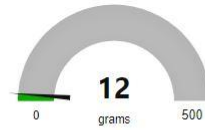
scale
connected

f

weight

join

Article abc

Weight abc

Weight

inv
connected

msg.payload

waschenklammer:731308

tintenpatrone:708763

screws:700555

Real time

Article   **731308**

Weight   **12**

Weight

12

0   grams   500

- At the client end (local machine), the inventory info {article,weight} is received over MQTT as our local machine acts as the subscriber and is subscribed onto the topic "weight".

- The data is received in the format {article,weight} and is parsed accordingly to get the individual components ie the weight information and the article information.

- The article information is then fed to the MySQL database. The MySQL database already contains the unit weight information for each article.

```sql
CREATE TABLE `distributedstorage`.`inventorydb` (
  `id` INT NOT NULL AUTO_INCREMENT,
  `article_number` INT NOT NULL,
  `article_name` VARCHAR(45) NOT NULL,
  `unit_weight` FLOAT NOT NULL,
  PRIMARY KEY (`id`),
  UNIQUE INDEX `id_UNIQUE` (`id` ASC) VISIBLE,
  UNIQUE INDEX `article_number_UNIQUE` (`article_number` ASC) VISIBLE,
  UNIQUE INDEX `article_name_UNIQUE` (`article_name` ASC) VISIBLE);

INSERT INTO `distributedstorage`.`inventorydb` (`id`,`article_number`,`article_name`,`unit_weight`)
VALUES ('1','731308','wascheklammer', 4);
INSERT INTO `distributedstorage`.`inventorydb` (`id`,`article_number`,`article_name`,`unit_weight`)
VALUES ('2','708763','tintenpatrone', 1.4);
INSERT INTO `distributedstorage`.`inventorydb` (`id`,`article_number`,`article_name`,`unit_weight`)
VALUES ('3','700555','screw', 3);
```

id	article_number	article_name	unit_weight
1	731308	wascheklammer	4
2	708763	tintenpatrone	1.4
3	700555	screw	3

- The unit weight information of the placed article is known by running a query "SELECT unit weight FROM table WHERE article = this article."

- Now, We have both the detected weight and the unit weight info of the placed article with which we can easily determine the number of pieces of article placed.

- All the relevant information is displayed on the dashboard like real-time obtained weight, unit weight, article number , number of pieces and a graph showing the inventory details over time.
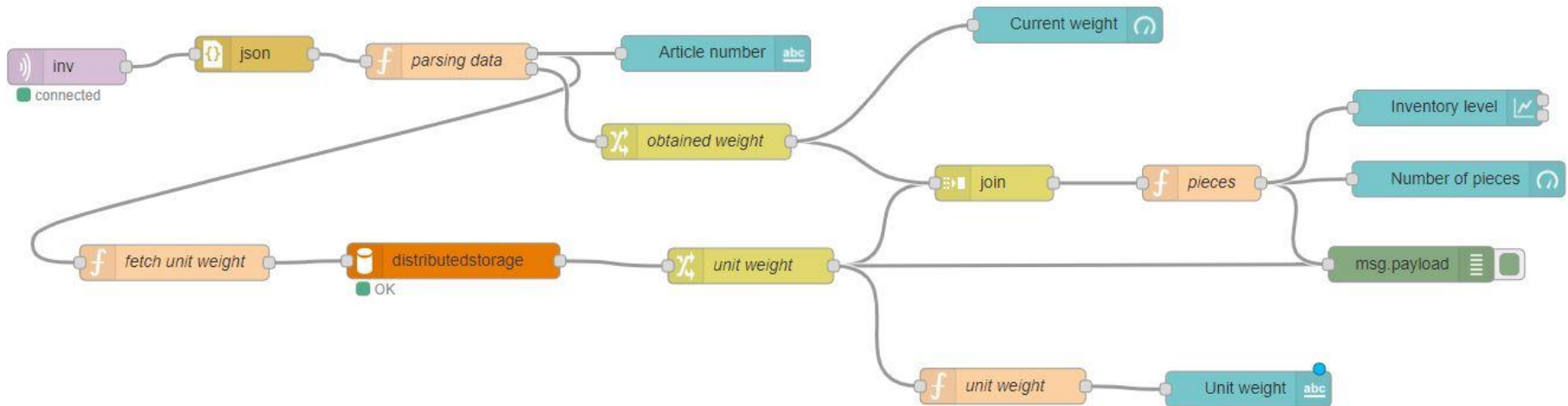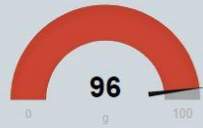
Weight Scale

Article number	731308
Unit weight	4

Current Weight

96

0   g   100

Number of pieces

24
units

Inventory level

40
30
20
10
0

16:16:00   16:26:00   16:43:00

Things to do…

- Developing the QR code/Bar code scanning functionality to identify the warehouse component (feature information).

- Developing the provision to store/save it's inventory history.

Challenges faced...

- The weight scale seldom hangs automatically.