Langkah 1: Buat Publisher dan Subscriber MQTT (HiveMQ)

Tools yang digunakan:

- Python (pakai paho-mqtt)
- HiveMQ public broker: broker.hivemq.com port 1883
- Topic: misal iot/edge/suhu

1A. Publisher Python Script

```
import paho.mqtt.client as mqtt
import time
import random

broker = "broker.hivemq.com"
port = 1883
topic = "iot/edge/suhu"

client = mqtt.Client()
client.connect(broker, port)

try:
    while True:
        suhu = round(random.uniform(20.0, 40.0), 2)
        client.publish(topic, str(suhu))
        print(f"Data suhu dikirim: {suhu} °C")
        time.sleep(5)
except KeyboardInterrupt:
    print("Publisher dihentikan.")
```

1B. Subscriber Python Script

```
import paho.mqtt.client as mqtt

broker = "broker.hivemq.com"
port = 1883
topic = "iot/edge/suhu"

def on_connect(client, userdata, flags, rc):
    print("Terhubung ke broker")
    client.subscribe(topic)

def on_message(client, userdata, msg):
    print(f"Suhu diterima: {msg.payload.decode()} °C")

client = mqtt.Client()
client.on_connect = on_connect
client.on_message = on_message

client.connect(broker, port)
client.loop_forever()
```

Langkah 2: Integrasi ke Monitoring

Tools:

- Telegraf: agen pengumpul data
- InfluxDB: penyimpanan time-series
- Grafana: visualisasi data

2A. docker-compose.yml

```
version: '3'


services:
  influxdb:
    image: influxdb:1.8
    ports:
      - "8086:8086"
    volumes:
      - influxdb:/var/lib/influxdb
    environment:
      - INFLUXDB_DB=iotdb
      - INFLUXDB_ADMIN_ENABLED=true


  telegraf:
    image: telegraf:latest
    volumes:
      - ./telegraf.conf:/etc/telegraf/telegraf.conf
    depends_on:
      - influxdb


  grafana:
    image: grafana/grafana
    ports:
      - "3000:3000"
    depends_on:
      - influxdb
volumes:
  influxdb:
```

2B. Contoh telegraf.conf (input MQTT + output InfluxDB)

```
[agent]
  interval = "10s"


[[inputs.mqtt_consumer]]
  servers = ["tcp://broker.hivemq.com:1883"]
  topics = ["iot/edge/suhu"]
  data_format = "value"
  data_type = "float"
  name_override = "suhu_sensor"


[[outputs.influxdb]]
  urls = ["http://influxdb:8086"]
  database = "iotdb"
```

Langkah 3: Menjalankan yang telah dibuat

1. Buka VSCode
2. Buat folder proyek baru, misal: iot_mqtt_project
3. Buat dua file:
    - publisher.py
    - subscriber.py

4. Install paho-mqtt:
Buka terminal dan ketik:

```
pip install paho-mqtt
```

5. Buka dua terminal di VSCode:

Terminal 1: jalankan publisher

```
python publisher.py
```

Terminal 2: jalankan subscriber

```
python subscriber.py
```

Langkah 4: Jalankan Docker Desktop

Buka Start Menu → cari Docker Desktop → klik untuk menjalankannya

Atau jalankan perintah berikut di vscode:

```
docker compose up -d
```

Tunggu sampai ikon Docker di system tray berubah jadi warna hijau / ready

Langkah 5: Buka Grafana

1. Buka: http://localhost:3000
2. Login: admin / admin
3. Tambahkan Data Source:
   - Type: InfluxDB
   - URL: http://influxdb:8086
   - Database: iotdb
   - Test & Save

Tambahkan Data Source (InfluxDB)

1. Masuk ke Gear → Data Sources → Add Data Source
2. Pilih: InfluxDB
3. Isi konfigurasi:
   - URL: http://influxdb:8086
   - Database: iotdb
   - HTTP Method: GET
   - Leave Username & Password kosong (karena tidak pakai auth)
4. Klik Save & Test

Buat Dashboard untuk Sensor Suhu

1. Masuk ke + → Dashboard → New dashboard → Add visualization
2. Di panel query (bagian bawah):

- Pilih Data source: pastikan InfluxDB yang sudah dibuat sebelumnya

3. Di query area:

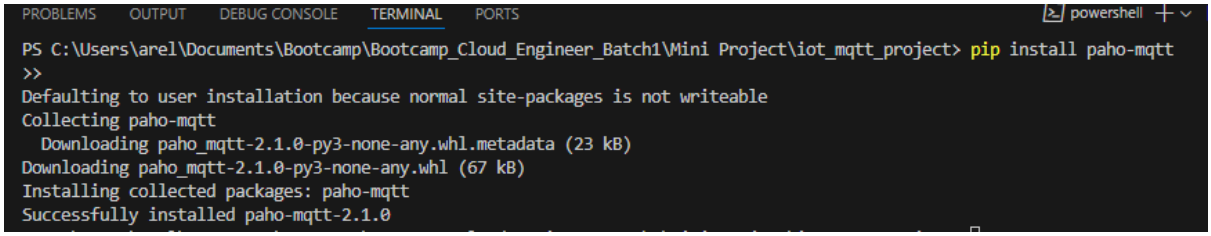
- Measurement: suhu_sensor (pakai name_override di telegraf.conf)
- Field: biasanya value (jika data_format = "value" di telegraf.conf)
- Pilih Aggregation: misalnya mean() atau last()

4. Ubah visualisasi jadi Line Chart (default-nya biasanya Line)

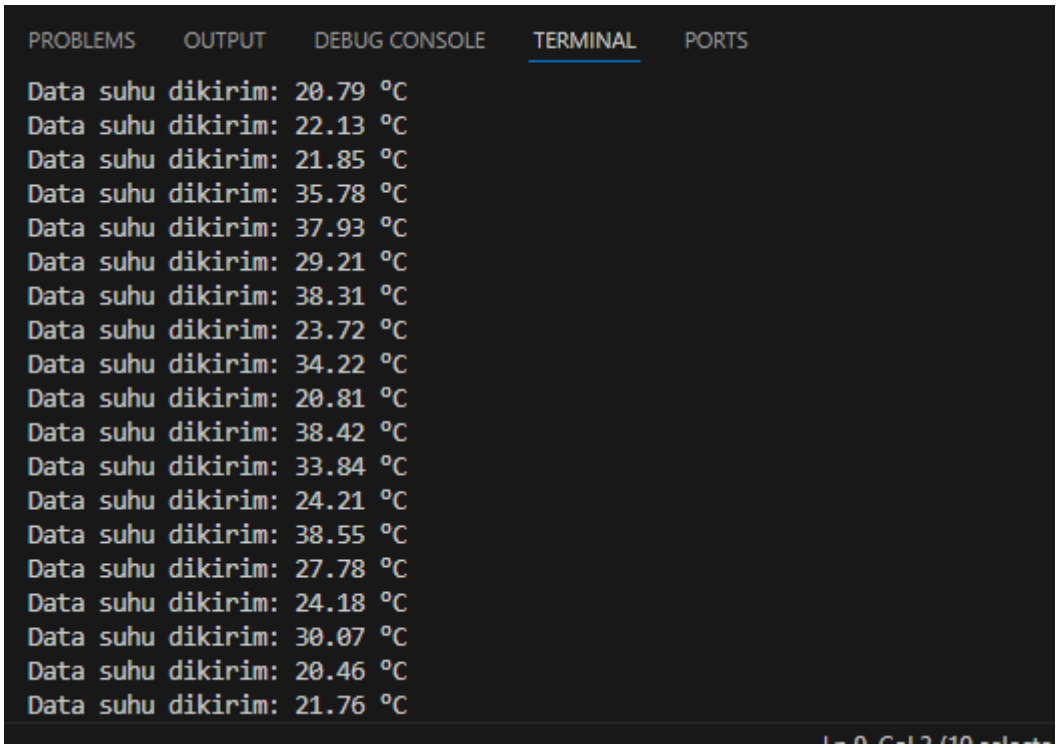
5. Klik tombol Apply

Berikut screenshot dari hasil yang telah dikerjakan :

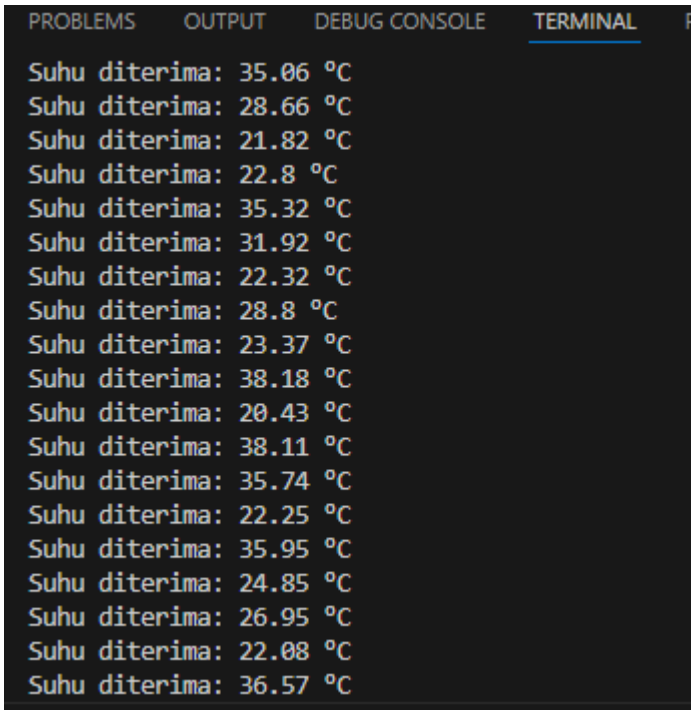
(Install paho-mqtt)



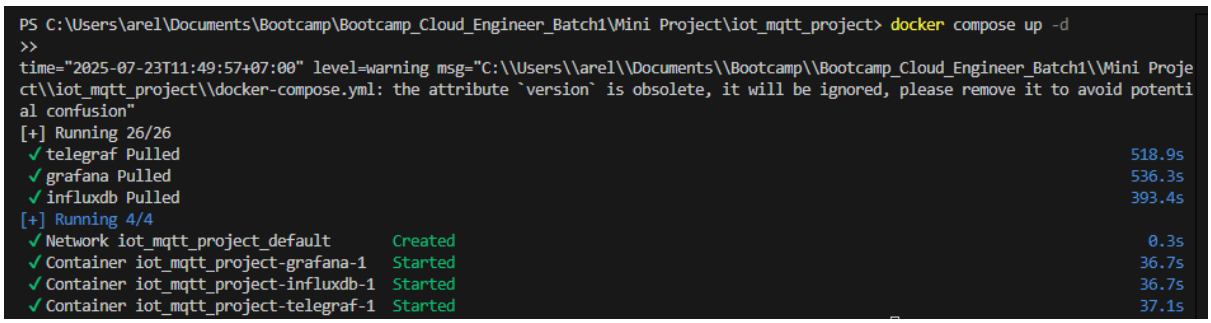
(python publisher.py)



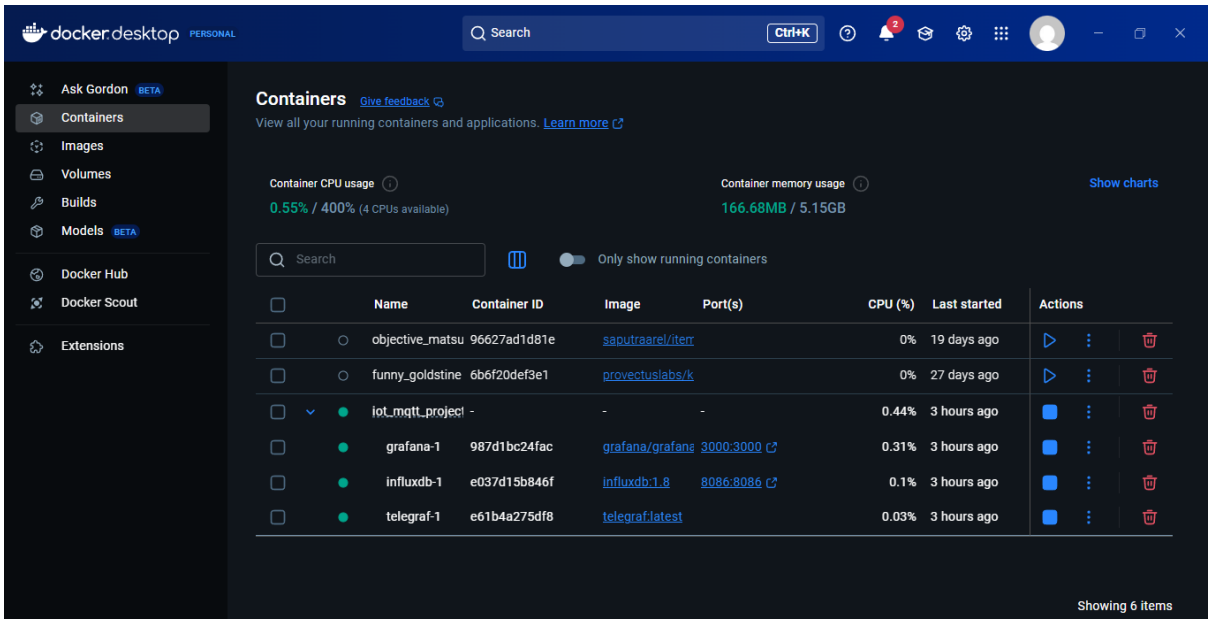
(python subscriber.py)



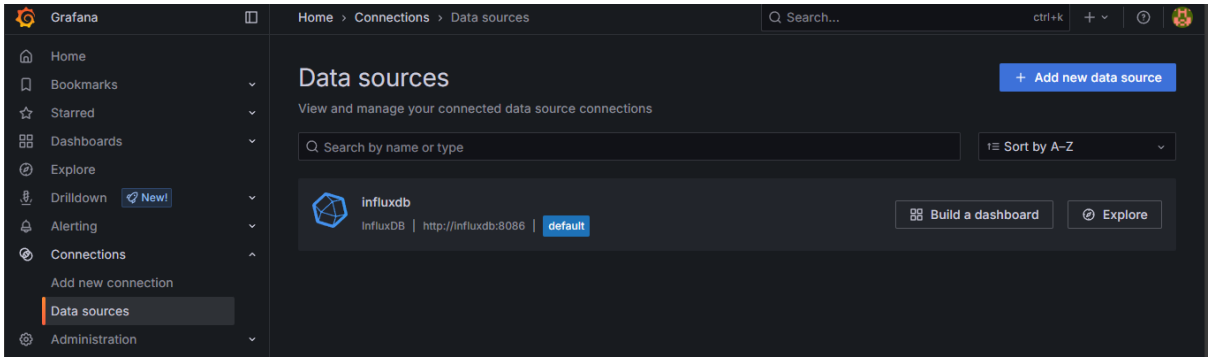
(docker compose up -d)



(Docker Desktop)



(Data Source (InfluxDB))



(Grafana Dashboard untuk Sensor Suhu)