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Course Name	IoT Fundamentals
Lab	Lab13
Submission Date	20th May,2025.
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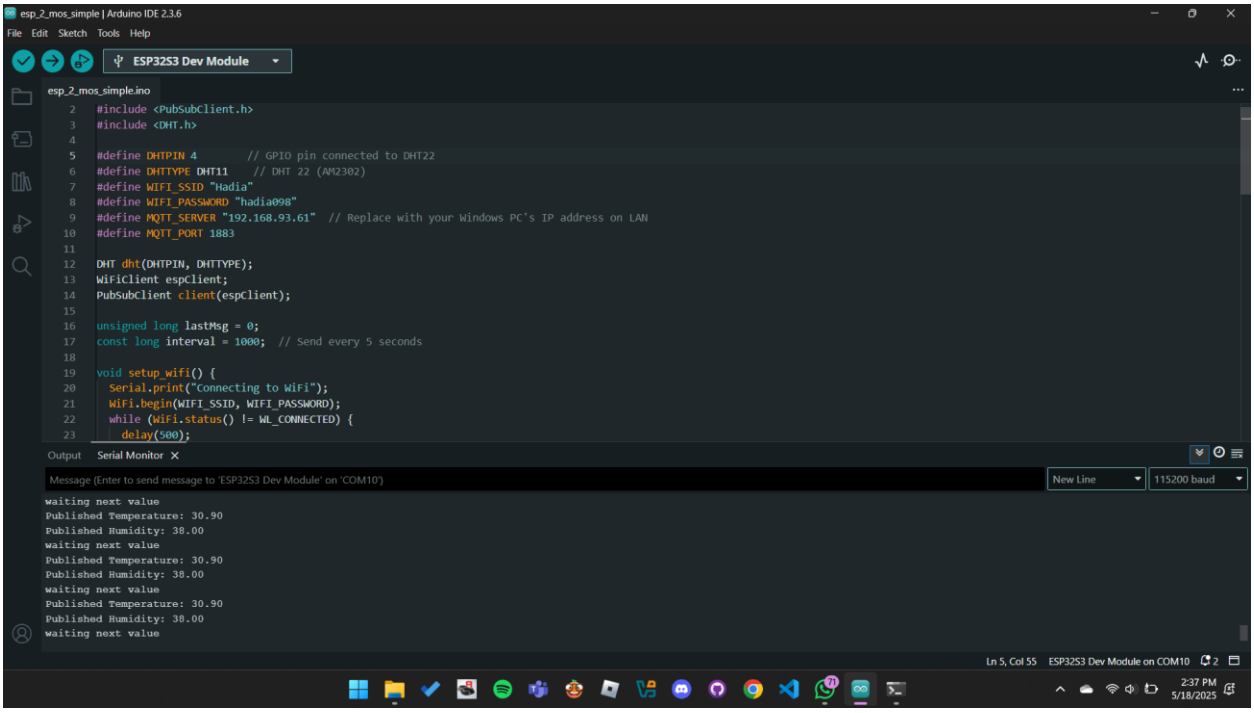
Sending data via MQTT:

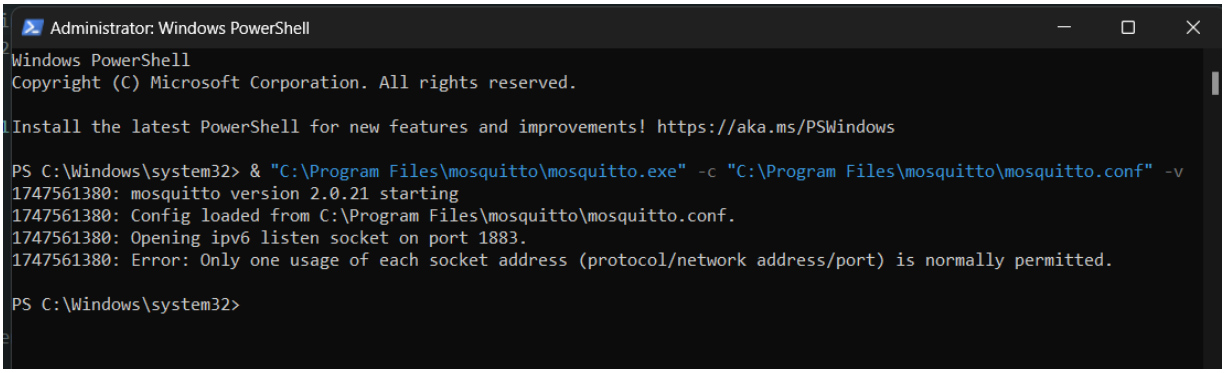
For sending data I am using ESP32S3 microcontroller that reads data from a DHT22 temperature and humidity sensor and sends it over WiFi to an MQTT broker.



Now I run This command on powershell(run as administrator):

& "C:\Program Files\mosquitto\mosquitto.exe" -c "C:\Program Files\mosquitto\mosquitto.conf" -v

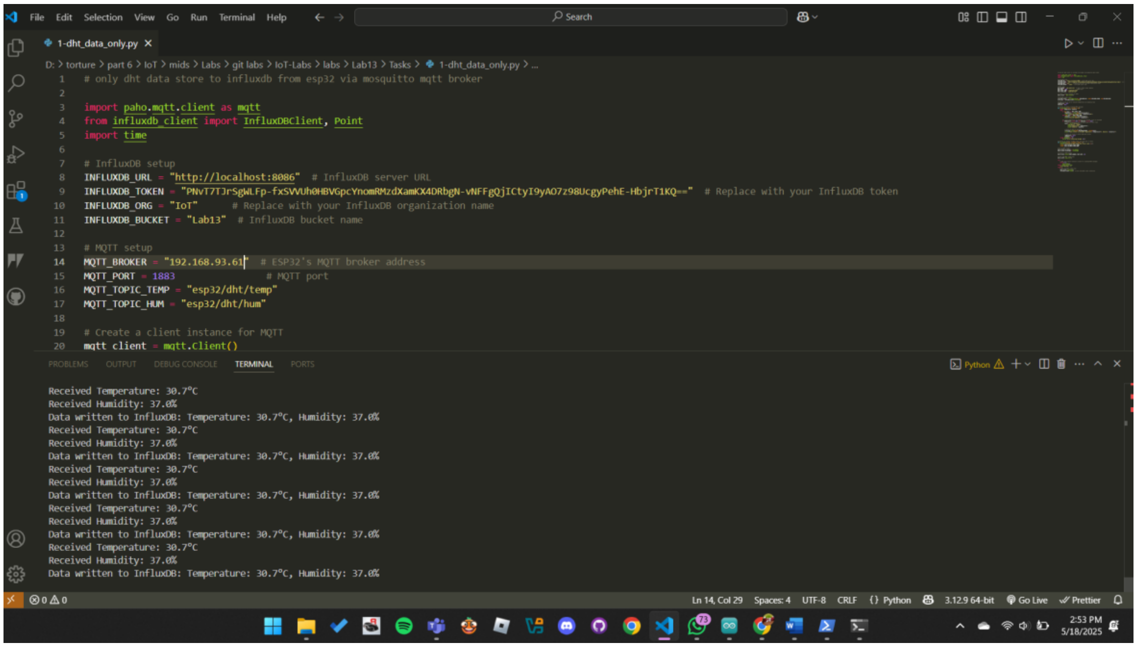
To Starts the Mosquitto broker manually



This screenshot shows the **InfluxDB** service starting up via the Windows Command Prompt.The logs confirm that the database service is successfully initializing its components, loading metadata and shards, and preparing to store and query time-series data.

```
Microsoft Windows [Version 10.0.22621.5335]
(c) Microsoft Corporation. All rights reserved.

C:\Program Files\InfluxData\influxdb>.\influxd.exe
2025-05-18T09:48:34.679823Z     info    Welcome to InfluxDB     {"log_id": "0w_hZsxW000", "version": "v2.7.11", "commit": "fbf5d4ab5e", "build_date": "2024-
12-02T17:48:13Z", "log_level": "info"}
2025-05-18T09:48:34.695087Z     info    Resources opened        {"log_id": "0w_hZsxW000", "service": "bolt", "path": "C:\\Users\\Admin\\.influxdbv2\\influxd
.bolt"}
2025-05-18T09:48:34.695087Z     info    Resources opened        {"log_id": "0w_hZsxW000", "service": "sqlite", "path": "C:\\Users\\Admin\\.influxdbv2\\influ
xd.sqlite"}
2025-05-18T09:48:34.729697Z     info    Checking InfluxDB metadata for prior version.   {"log_id": "0w_hZsxW000", "bolt_path": "C:\\Users\\Admin\\.influxdbv
2\\influxd.bolt"}
2025-05-18T09:48:34.734372Z     info    Using data dir  {"log_id": "0w_hZsxW000", "service": "storage-engine", "service": "store", "path": "C:\\Users\\Admin
\\.influxdbv2\\engine\\data"}
2025-05-18T09:48:34.734907Z     info    Compaction settings     {"log_id": "0w_hZsxW000", "service": "storage-engine", "service": "store", "max_concurrent_c
ompactions": 4, "throughput_bytes_per_second": 50331648, "throughput_bytes_per_second_burst": 50331648}
2025-05-18T09:48:34.734907Z     info    Open store (start)      {"log_id": "0w_hZsxW000", "service": "storage-engine", "service": "store", "op_name": "tsdb_
open", "op_event": "start"}
2025-05-18T09:48:34.765576Z     info    TSI log compaction (start)      {"log_id": "0w_hZsxW000", "service": "storage-engine", "index": "tsi", "tsi1_partiti
on": "5", "op_name": "tsi1_compact_log_file", "tsi1_log_file_id": 1, "op_event": "start"}
2025-05-18T09:48:34.772247Z     info    index opened with 8 partitions  {"log_id": "0w_hZsxW000", "service": "storage-engine", "index": "tsi"}
2025-05-18T09:48:34.775459Z     info    Log file compacted      {"log_id": "0w_hZsxW000", "service": "storage-engine", "index": "tsi", "tsi1_partition": "5"
, "op_name": "tsi1_compact_log_file", "tsi1_log_file_id": 1, "elapsed": "10ms", "bytes": 507, "kb_per_sec": 47}
2025-05-18T09:48:34.776014Z     info    TSI log compaction (end)        {"log_id": "0w_hZsxW000", "service": "storage-engine", "index": "tsi", "tsi1_partiti
on": "5", "op_name": "tsi1_compact_log_file", "tsi1_log_file_id": 1, "op_event": "end", "op_elapsed": "10.977ms"}
2025-05-18T09:48:34.778929Z     info    loading changes (start) {"log_id": "0w_hZsxW000", "service": "storage-engine", "engine": "tsm1", "op_name": "field i
ndices", "path": "C:\\Users\\Admin\\.influxdbv2\\engine\\data\\6ab35a10a12f1703\\autogen\\2\\fields.idxl", "op_event": "start"}
2025-05-18T09:48:34.779474Z     info    loading changes (end)   {"log_id": "0w_hZsxW000", "service": "storage-engine", "engine": "tsm1", "op_name": "field i
ndices", "path": "C:\\Users\\Admin\\.influxdbv2\\engine\\data\\6ab35a10a12f1703\\autogen\\2\\fields.idxl", "op_event": "end", "op_elapsed": "0.545ms"}
2025-05-18T09:48:34.785075Z     info    Opened file     {"log_id": "0w_hZsxW000", "service": "storage-engine", "engine": "tsm1", "service": "filestore", "pa
th": "C:\\Users\\Admin\\.influxdbv2\\engine\\data\\6ab35a10a12f1703\\autogen\\2\\000000002-000000001.tsm", "id": 1, "duration": "1.643ms"}
2025-05-18T09:48:34.785075Z     info    Opened file     {"log_id": "0w_hZsxW000", "service": "storage-engine", "engine": "tsm1", "service": "filestore", "pa
th": "C:\\Users\\Admin\\.influxdbv2\\engine\\data\\6ab35a10a12f1703\\autogen\\2\\000000001-000000001.tsm", "id": 0, "duration": "2.167ms"}
2025-05-18T09:48:34.785075Z     info    TSI log compaction (start)      {"log_id": "0w_hZsxW000", "service": "storage-engine", "index": "tsi", "tsi1_partiti
on": "1", "op_name": "tsi1_compact_log_file", "tsi1_log_file_id": 1, "op_event": "start"}
2025-05-18T09:48:34.786194Z     info    Reading file    {"log_id": "0w_hZsxW000", "service": "storage-engine", "engine": "tsm1", "service": "cacheloader", "
path": "C:\\Users\\Admin\\.influxdbv2\\engine\\wal\\6ab35a10a12f1703\\autogen\\2\\_00004.wal", "size": 15053}
2025-05-18T09:48:34.789047Z     info    Opened shard    {"log_id": "0w_hZsxW000", "service": "storage-engine", "service": "store", "op_name": "tsdb_open", "
db_shard_id": 2, "path": "C:\\Users\\Admin\\.influxdbv2\\engine\\data\\6ab35a10a12f1703\\autogen\\2", "index_version": "tsi1", "duration": "35.363ms"}
2025-05-18T09:48:34.789579Z     info    Finished loading shard, current progress 50.0% shards (1 / 2).  {"log_id": "0w_hZsxW000", "service": "storage-engine
"}
```

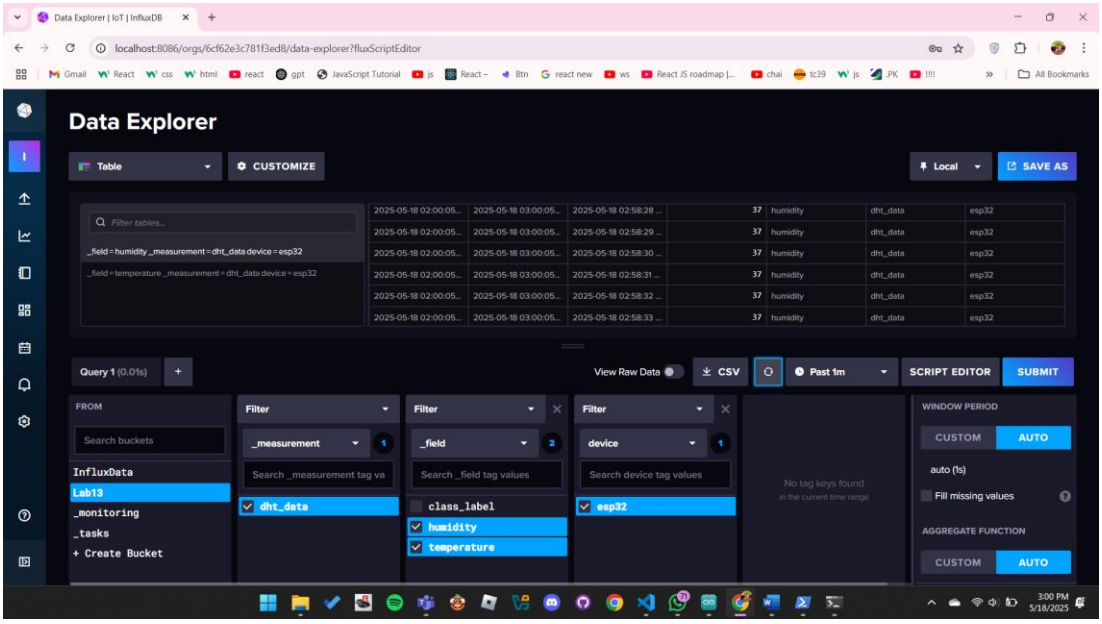
This script subscribes to MQTT topics from the ESP32, receives DHT sensor data, and saves it into an InfluxDB database. The terminal output confirms real-time data collection and successful database writes.



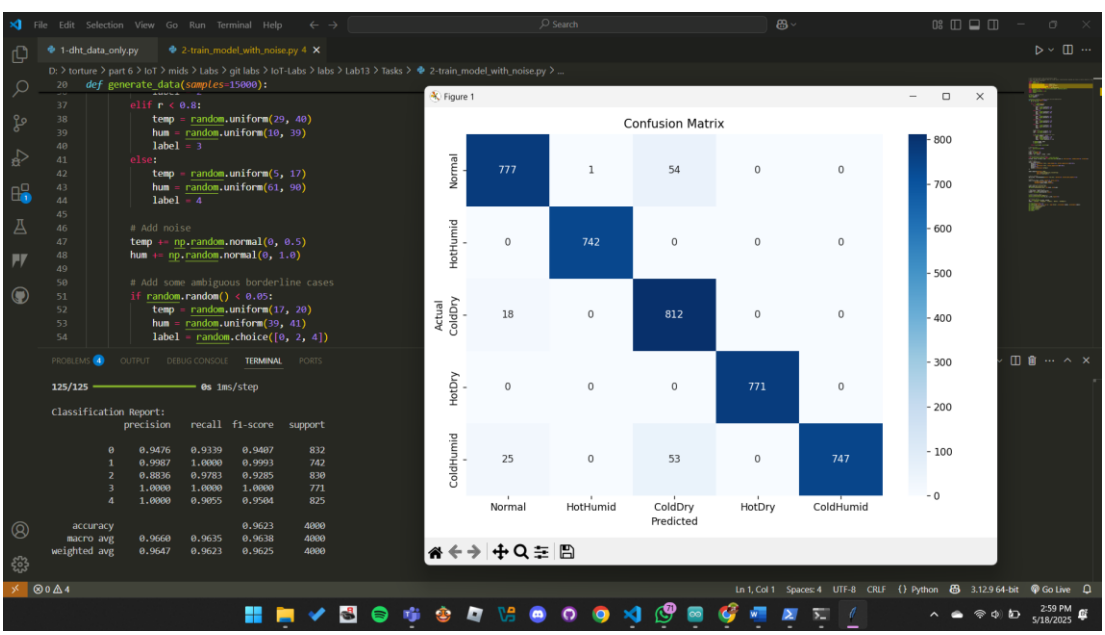
```python
# only dht data store to influxdb from esp32 via mosquitto mqtt broker

import paho.mqtt.client as mqtt
from influxdb_client import InfluxDBClient, Point
import time

# InfluxDB setup
INFLUXDB_URL = "http://localhost:8086"  # InfluxDB server URL
INFLUXDB_TOKEN = "PNvT7TJrSgWLFp-fxSVVUh0HBVGpcYnomRMzdXamKX4DRbgN-vNFFgQjICtyI9yAO7z98UcgyPehE-HbjrT1KQ=="  # Replace with your InfluxDB token
INFLUXDB_ORG = "IoT"       # Replace with your InfluxDB organization name
INFLUXDB_BUCKET = "Lab13"  # InfluxDB bucket name

# MQTT setup
MQTT_BROKER = "192.168.93.61"  # ESP32's MQTT broker address
MQTT_PORT = 1883                # MQTT port
MQTT_TOPIC_TEMP = "esp32/dht/temp"
MQTT_TOPIC_HUM = "esp32/dht/hum"

# Create a client instance for MQTT
mqtt client = mqtt.Client()
```

```
Received Temperature: 30.7°C
Received Humidity: 37.0%
Data written to InfluxDB: Temperature: 30.7°C, Humidity: 37.0%
Received Temperature: 30.7°C
Received Humidity: 37.0%
Data written to InfluxDB: Temperature: 30.7°C, Humidity: 37.0%
Received Temperature: 30.7°C
Received Humidity: 37.0%
Data written to InfluxDB: Temperature: 30.7°C, Humidity: 37.0%
Received Temperature: 30.7°C
Received Humidity: 37.0%
Data written to InfluxDB: Temperature: 30.7°C, Humidity: 37.0%
Received Temperature: 30.7°C
Received Humidity: 37.0%
Data written to InfluxDB: Temperature: 30.7°C, Humidity: 37.0%
```

- Now I have successfully sent humidity and temperature data from the:
- ESP32 → MQTT → subscriber script → InfluxDB bucket (Lab13).
- InfluxDB Data Explorer is now displaying that data in real-time.
- We're filtering and querying humidity and temperature data only, for device = esp32, in the last 1 minute.



Now we are training and evaluating a machine learning model to classify environmental conditions based on temperature and humidity data. We are using simulated data (with noise and borderline cases) to train a model and evaluate it using a confusion matrix and classification report.



This screenshot gives us a look at the real-time classification and logging system we've built using:

- An MQTT subscriber that listens to sensor data.
- A TensorFlow model to classify the environment.
- InfluxDB to store the classification results.