IoT Design and Development (CS G518)
Assignment #2
Developing an IoT Sensor Data API and Data Collection Client with MQTT Publish-Subscribe Architecture

Objective: To develop an MQTT-based API on a Raspberry Pi that serves sensor data, and create a Python-based client program that subscribes to sensor data topics and stores it in a local database.

Part 1: Developing the MQTT API on Raspberry Pi

Choose an MQTT Broker: Select an MQTT broker to facilitate communication between sensors and clients. Mosquitto is a popular choice for Raspberry Pi.

Sensor Integration: Integrate the necessary sensor(s) with the Raspberry Pi. Write code to read sensor values.

MQTT Topics:

Define MQTT topics for the different sensors to publish data.
Each sensor should publish data to its designated topic.
Consider creating separate topics for each sensor and a combined topic for multiple sensor data.

API Testing:

Use an MQTT client (e.g., mosquitto_sub or a Python MQTT library) on the Raspberry Pi to subscribe to MQTT topics and ensure they receive sensor data correctly.

Part 2: Creating the Data Collection Client on Raspberry Pi

Install Required Libraries:

Install necessary Python libraries like paho-mqtt for MQTT communication and the database connector library (e.g., mysql-connector-python for MySQL).

MQTT Subscription:

Write a Python script that subscribes to the MQTT topics for sensor data.
Use the MQTT library to receive sensor data published by the sensors.

Database Connection and Storage:

Establish a connection to the chosen local database (MySQL, ClickHouse, etc.) on the Raspberry Pi.
Define a database schema to store the received sensor data (timestamp, sensor type, value, etc.).

Data Storage:

Parse the received sensor data from MQTT messages.
Insert the parsed data into the local database on the Raspberry Pi.

Error Handling:

Implement proper error handling for MQTT communication and database operations.

Submission and Assessment:

Code Submission: Students should submit their Python scripts for the MQTT API and the client, along with any configuration files.