1. Згенерував дані аналогічно як у попередньому завданні:

```
PS C:\Users\vdubr\OneDrive\Документы\GoIT Обучение\Data Engineering\goit-de-hw-06> & C:/Users/vdubr/AppDa
oIT Обучение/Data Engineering/goit-de-hw-06/p1.py"
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 55, 'timestamp': '2024-12-01 13:09:14', 'temperature': 44.3, 'humidity': 41.5}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 55, 'timestamp': '2024-12-01 13:09:24', 'temperature': 29.6, 'humidity': 50.4}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 55, 'timestamp': '2024-12-01 13:09:34', 'temperature': 36.3, 'humidity': 76.6}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 55, 'timestamp': '2024-12-01 13:09:44', 'temperature': 37.1, 'humidity': 69.7}
Stopped by user
PS C:\Users\vdubr\OneDrive\Документы\GoIT Обучение\Data Engineering\goit-de-hw-06> & C:/Users/vdubr/AppDa
oIT Обучение/Data Engineering/goit-de-hw-06/p1.py"
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 88, 'timestamp': '2024-12-01 13:09:48', 'temperature': 32.2, 'humidity': 47.9}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 88, 'timestamp': '2024-12-01 13:09:59', 'temperature': 33.8, 'humidity': 39.7}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 88, 'timestamp': '2024-12-01 13:10:09', 'temperature': 32.1, 'humidity': 41.7}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 88, 'timestamp': '2024-12-01 13:10:19', 'temperature': 38.7, 'humidity': 68.9}
Stopped by user
PS C:\Users\vdubr\OneDrive\Документы\GoIT Обучение\Data Engineering\goit-de-hw-06> & C:/Users/vdubr/AppDa
oIT Обучение/Data Engineering/goit-de-hw-06/p1.py"
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 28, 'timestamp': '2024-12-01 13:10:53', 'temperature': 36.9, 'humidity': 67.3}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 28, 'timestamp': '2024-12-01 13:11:04', 'temperature': 41.8, 'humidity': 26.6}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 28, 'timestamp': '2024-12-01 13:11:14', 'temperature': 33.7, 'humidity': 84.7}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 28, 'timestamp': '2024-12-01 13:11:24', 'temperature': 31.1, 'humidity': 68.0}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 28, 'timestamp': '2024-12-01 13:11:34', 'temperature': 30.0, 'humidity': 17.3}
Stopped by user
PS C:\Users\vdubr\OneDrive\Документы\GoIT Обучение\Data Engineering\goit-de-hw-06> & C:/Users/vdubr/AppDa
oIT Обучение/Data Engineering/goit-de-hw-06/p1.py"
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:12:32', 'temperature': 26.9, 'humidity': 51.0}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:12:43', 'temperature': 28.2, 'humidity': 82.8}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:12:53', 'temperature': 28.2, 'humidity': 18.5}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:13:03', 'temperature': 29.5, 'humidity': 39.1}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:13:13', 'temperature': 30.9, 'humidity': 25.4}
Message delivered to vvd_building_sensors [0]
Sent data: {'sensor_id': 47, 'timestamp': '2024-12-01 13:13:23', 'temperature': 25.3, 'humidity': 59.6}
Stopped by user
PS C:\Users\vdubr\OneDrive\Документы\GoIT Обучение\Data Engineering\goit-de-hw-06>
```

Чотири рази запускав скрипт.

2. Розрахунок середніх значень:

На скрині дані сенсорів у зручному форматі, а також таблиця з результатом знаходження середніх показників

```
df:
+---------+-------------------+-----------+--------+
|sensor_id|timestamp          |temperature|humidity|
+---------+-------------------+-----------+--------+
|55       |2024-12-01 13:09:14|44.3       |41.5    |
|55       |2024-12-01 13:09:24|29.6       |50.4    |
|55       |2024-12-01 13:09:34|36.3       |76.6    |
|55       |2024-12-01 13:09:44|37.1       |69.7    |
|88       |2024-12-01 13:09:48|32.2       |47.9    |
|88       |2024-12-01 13:09:59|33.8       |39.7    |
|88       |2024-12-01 13:10:09|32.1       |41.7    |
|88       |2024-12-01 13:10:19|38.7       |68.9    |
|28       |2024-12-01 13:10:53|36.9       |67.3    |
|28       |2024-12-01 13:11:04|41.8       |26.6    |
|28       |2024-12-01 13:11:14|33.7       |84.7    |
|28       |2024-12-01 13:11:24|31.1       |68.0    |
|28       |2024-12-01 13:11:34|30.0       |17.3    |
|47       |2024-12-01 13:12:32|26.9       |51.0    |
|47       |2024-12-01 13:12:43|28.2       |82.8    |
|47       |2024-12-01 13:12:53|28.2       |18.5    |
|47       |2024-12-01 13:13:03|29.5       |39.1    |
|47       |2024-12-01 13:13:13|30.9       |25.4    |
|47       |2024-12-01 13:13:23|25.3       |59.6    |
+---------+-------------------+-----------+--------+

windowed_avg:
+------------------------------------------+-----+-----+
|window                                    |t_avg|h_avg|
+------------------------------------------+-----+-----+
|{2024-12-01 13:08:30, 2024-12-01 13:09:30}|37.0 |46.0 |
|{2024-12-01 13:09:00, 2024-12-01 13:10:00}|35.6 |54.3 |
|{2024-12-01 13:09:30, 2024-12-01 13:10:30}|35.0 |57.4 |
|{2024-12-01 13:10:00, 2024-12-01 13:11:00}|35.9 |59.3 |
|{2024-12-01 13:10:30, 2024-12-01 13:11:30}|35.9 |61.7 |
|{2024-12-01 13:11:00, 2024-12-01 13:12:00}|34.2 |49.2 |
|{2024-12-01 13:11:30, 2024-12-01 13:12:30}|30.0 |17.3 |
|{2024-12-01 13:12:00, 2024-12-01 13:13:00}|27.8 |50.8 |
+------------------------------------------+-----+-----+
```

3. Розраховуємо та будуємо таблицю з алертами:

```
alerts_filtered_columns:
+------------------------------------------+-----+-----+----+-------------+
|window                                    |t_avg|h_avg|code|message      |
+------------------------------------------+-----+-----+----+-------------+
|{2024-12-01 13:10:30, 2024-12-01 13:11:30}|35.9 |61.7 |102 |It's too wet |
|{2024-12-01 13:11:30, 2024-12-01 13:12:30}|30.0 |17.3 |101 |It's too dry |
|{2024-12-01 13:11:30, 2024-12-01 13:12:30}|30.0 |17.3 |103 |It's too cold|
|{2024-12-01 13:12:00, 2024-12-01 13:13:00}|27.8 |50.8 |103 |It's too cold|
+------------------------------------------+-----+-----+----+-------------+
```

4. Перевіряємо формат даних та записуємо дані в вихідний топік в форматі JSON:

```
root
 |-- window: struct (nullable = true)
 |    |-- start: timestamp (nullable = true)
 |    |-- end: timestamp (nullable = true)
 |-- t_avg: double (nullable = true)
 |-- h_avg: double (nullable = true)
 |-- code: string (nullable = true)
 |-- message: string (nullable = true)

JSON empty
JSON:
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
|value                                                                                                                                                                                          |
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
|{"window":{"start":"2024-12-01T13:11:30.000+02:00","end":"2024-12-01T13:12:30.000+02:00"},"t_avg":30.0,"h_avg":17.3,"code":"101","message":"It's too dry"} |
|{"window":{"start":"2024-12-01T13:10:30.000+02:00","end":"2024-12-01T13:11:30.000+02:00"},"t_avg":35.9,"h_avg":61.7,"code":"102","message":"It's too wet"} |
|{"window":{"start":"2024-12-01T13:12:00.000+02:00","end":"2024-12-01T13:13:00.000+02:00"},"t_avg":27.8,"h_avg":50.8,"code":"103","message":"It's too cold"}|
|{"window":{"start":"2024-12-01T13:11:30.000+02:00","end":"2024-12-01T13:12:30.000+02:00"},"t_avg":30.0,"h_avg":17.3,"code":"103","message":"It's too cold"}|
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
```