Створення топіків

create_topics.py > ...

```python
from kafka.admin import KafkaAdminClient, NewTopic
from configs import kafka_config

# Створення клієнта Kafka
admin_client = KafkaAdminClient(
    bootstrap_servers=kafka_config['bootstrap_servers'],
    security_protocol=kafka_config['security_protocol'],
    sasl_mechanism=kafka_config['sasl_mechanism'],
    sasl_plain_username=kafka_config['username'],
    sasl_plain_password=kafka_config['password']
)


# Визначення нового топіку
my_name = "viktoriia"
topic_names= [f'{my_name}_building_sensors', f'{my_name}_temperature_alerts', f'{my_name}_humidity_alerts']

building_sensors = NewTopic(name=topic_names[0], num_partitions=2, replication_factor=1)
temperature_alerts = NewTopic(name=topic_names[1], num_partitions=1, replication_factor=1)
humidity_alerts = NewTopic(name=topic_names[2], num_partitions=1, replication_factor=1)

# Створення нового топіку
try:
    admin_client.create_topics(new_topics=[building_sensors, temperature_alerts, humidity_alerts], validate_only=False)
    print(f"Topics {topic_names} created successfully.")
except Exception as e:
    print(f"An error occurred: {e}")

# Перевіряємо список існуючих топіків
[print(topic) for topic in admin_client.list_topics() if my_name in topic]

# Закриття зв'язку з клієнтом
admin_client.close()
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
Message 90 sent to topic 'vika_building_sensors' successfully.
Message 91 sent to topic 'vika_building_sensors' successfully.
Message 92 sent to topic 'vika_building_sensors' successfully.
Message 93 sent to topic 'vika_building_sensors' successfully.
Message 94 sent to topic 'vika_building_sensors' successfully.
Traceback (most recent call last):
  File "c:\Projects\data_engineering\HW05\producer.py", line 36, in <module>
    time.sleep(2)
KeyboardInterrupt
PS C:\Projects\data_engineering> & C:/Users/kusiy/anaconda3/envs/data_engineering/python.exe c:/Projects/data_engineering/create_topics.py
Topics ['viktoriia_building_sensors', 'viktoriia_temperature_alerts', 'viktoriia_humidity_alerts'] created successfully.
viktoriia_humidity_alerts
viktoriia_temperature_alerts
viktoriia_building_sensors
PS C:\Projects\data_engineering>
```

Відправка повідомлень з 3 датчиків

producer.py > ...

```python
from kafka import KafkaProducer
from configs import kafka_config
import json
import uuid
import time
import random

# Створення Kafka Producer
producer = KafkaProducer(
    bootstrap_servers=kafka_config['bootstrap_servers'],
    security_protocol=kafka_config['security_protocol'],
    sasl_mechanism=kafka_config['sasl_mechanism'],
    sasl_plain_username=kafka_config['username'],
    sasl_plain_password=kafka_config['password'],
    value_serializer=lambda v: json.dumps(v).encode('utf-8'),
    key_serializer=lambda v: json.dumps(v).encode('utf-8')
)

# Назва топіку
my_name = "viktoriia"
topic_name = f'{my_name}_building_sensors'
sensor_id = random.randint(1, 100)

for i in range(300):
    # Відправлення повідомлення в топік
    try:
        data = {
            "sensor_id": sensor_id,
            "timestamp": time.time(),  # Часова мітка
            "temperature": random.randint(25, 45),
            "humidity": random.randint(15, 85),
        }
        producer.send(topic_name, key=str(uuid.uuid4()), value=data)
        producer.flush()  # Очікування, поки всі повідомлення будуть відправлені
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
Message 23 sent to topic 'viktoriia_building_sensors' successfully.
Message 24 sent to topic 'viktoriia_building_sensors' successfully.
Message 25 sent to topic 'viktoriia_building_sensors' successfully.
Message 26 sent to topic 'viktoriia_building_sensors' successfully.
Message 27 sent to topic 'viktoriia_building_sensors' successfully.
Message 28 sent to topic 'viktoriia_building_sensors' successfully.
Message 29 sent to topic 'viktoriia_building_sensors' successfully.
Message 30 sent to topic 'viktoriia_building_sensors' successfully.
Message 31 sent to topic 'viktoriia_building_sensors' successfully.
Message 32 sent to topic 'viktoriia_building_sensors' successfully.
Message 33 sent to topic 'viktoriia_building_sensors' successfully.
Message 34 sent to topic 'viktoriia_building_sensors' successfully.
Message 35 sent to topic 'viktoriia_building_sensors' successfully.
Message 36 sent to topic 'viktoriia_building_sensors' successfully.
Message 37 sent to topic 'viktoriia_building_sensors' successfully.
```

```
Message 12 sent to topic 'viktoriia_building_sensors' successfully.
Message 13 sent to topic 'viktoriia_building_sensors' successfully.
Message 14 sent to topic 'viktoriia_building_sensors' successfully.
Message 15 sent to topic 'viktoriia_building_sensors' successfully.
Message 16 sent to topic 'viktoriia_building_sensors' successfully.
Message 17 sent to topic 'viktoriia_building_sensors' successfully.
Message 18 sent to topic 'viktoriia_building_sensors' successfully.
Message 19 sent to topic 'viktoriia_building_sensors' successfully.
Message 20 sent to topic 'viktoriia_building_sensors' successfully.
Message 21 sent to topic 'viktoriia_building_sensors' successfully.
Message 22 sent to topic 'viktoriia_building_sensors' successfully.
Message 23 sent to topic 'viktoriia_building_sensors' successfully.
Message 24 sent to topic 'viktoriia_building_sensors' successfully.
Message 25 sent to topic 'viktoriia_building_sensors' successfully.
Message 26 sent to topic 'viktoriia_building_sensors' successfully.
```

```
PS C:\Projects\data_engineering> python producer.py
Message 0 sent to topic 'viktoriia_building_sensors' successfully.
Message 1 sent to topic 'viktoriia_building_sensors' successfully.
Message 2 sent to topic 'viktoriia_building_sensors' successfully.
Message 3 sent to topic 'viktoriia_building_sensors' successfully.
Message 4 sent to topic 'viktoriia_building_sensors' successfully.
Message 5 sent to topic 'viktoriia_building_sensors' successfully.
Message 6 sent to topic 'viktoriia_building_sensors' successfully.
Message 7 sent to topic 'viktoriia_building_sensors' successfully.
Message 8 sent to topic 'viktoriia_building_sensors' successfully.
Message 9 sent to topic 'viktoriia_building_sensors' successfully.
Message 10 sent to topic 'viktoriia_building_sensors' successfully.
Message 11 sent to topic 'viktoriia_building_sensors' successfully.
Message 12 sent to topic 'viktoriia_building_sensors' successfully.
Message 13 sent to topic 'viktoriia_building_sensors' successfully.
```

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Отримання повідомлень та одразу ж фільтрація і відправка

consumer.py > ...

```
    value_serializer=lambda v: json.dumps(v).encode('utf-8'),
    key_serializer=lambda v: json.dumps(v).encode('utf-8')
)

# Назва топіку
my_name = "viktoriia"
topic_name = f'{my_name}_building_sensors'
topics_for_send = [f'{my_name}_temperature_alerts', f'{my_name}_humidity_alerts']

# Підписка на тему
consumer.subscribe([topic_name])

print(f"Subscribed to topic '{topic_name}'")

# Обробка повідомлень з топіку
try:
    for message in consumer:
        print(f"Received message: {message.value} with key: {message.key}, partition {message.partition}")
        if message.value["temperature"]>40:
            data = message.value
            data["message"] = "Warning! The temperature is over 40"
            producer.send(topics_for_send[0], key=str(uuid.uuid4()), value=data)
            print(f"Message sent to topic '{topics_for_send[0]}' successfully.")
        if message.value["humidity"]>80:
            data = message.value
            data["message"] = "Warning! Humidity above 80"
            producer.send(topics_for_send[1], key=str(uuid.uuid4()), value=data)
            print(f"Message sent to topic '{topics_for_send[1]}' successfully.")
        if message.value["humidity"]<20:
            data = message.value
            data["message"] = "Warning! Humidity is less than 20"
            producer.send(topics_for_send[1], key=str(uuid.uuid4()), value=data)
            print(f"Message sent to topic '{topics_for_send[1]}' successfully.")
except Exception as e:
    print(f"An error occurred: {e}")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
Received message: {'sensor_id': 34, 'timestamp': 1732973202.908838, 'temperature': 44, 'humidity': 34} with key: f761c750-9adb-4248-b080-d2559e5bfa0f, partition 1
Message sent to topic 'viktoriia_temperature_alerts' successfully.
Received message: {'sensor_id': 54, 'timestamp': 1732973203.9049714, 'temperature': 35, 'humidity': 41} with key: 441bfdb6-0fd1-4c6f-a47e-aa5c548a404a, partition 1
Received message: {'sensor_id': 96, 'timestamp': 1732973205.2035196, 'temperature': 30, 'humidity': 29} with key: 044657bc-9287-4772-b787-798620cd6806, partition 1
Received message: {'sensor_id': 34, 'timestamp': 1732973205.2035196, 'temperature': 44, 'humidity': 55} with key: 99eb8d5a-d6d9-4069-8021-5d1a314216ca, partition 1
Message sent to topic 'viktoriia_temperature_alerts' successfully.
Received message: {'sensor_id': 54, 'timestamp': 1732973206.1959994, 'temperature': 39, 'humidity': 29} with key: 7298b4ac-9a8e-407b-93e1-0f7198790f6f, partition 0
Received message: {'sensor_id': 34, 'timestamp': 1732973207.2877789, 'temperature': 35, 'humidity': 39} with key: 5fa8aa46-54ef-4abb-bafa-729733483a08, partition 0
Received message: {'sensor_id': 96, 'timestamp': 1732973207.2791772, 'temperature': 27, 'humidity': 51} with key: 428d549c-789e-436a-93d2-28db7728551c, partition 0
Received message: {'sensor_id': 54, 'timestamp': 1732973208.2786176, 'temperature': 44, 'humidity': 75} with key: ca94edbb-4253-422d-8a8e-428e59db3ac6, partition 0
Message sent to topic 'viktoriia_temperature_alerts' successfully.
Received message: {'sensor_id': 96, 'timestamp': 1732973209.3913157, 'temperature': 26, 'humidity': 57} with key: f03269b4-e13a-492d-a4a2-3e5afde6bf0a, partition 1
Received message: {'sensor_id': 34, 'timestamp': 1732973209.3913157, 'temperature': 36, 'humidity': 23} with key: b1354776-e221-4cd8-810e-6e4b47e2dad8, partition 0
Received message: {'sensor_id': 54, 'timestamp': 1732973210.3649771, 'temperature': 41, 'humidity': 49} with key: 335aa81b-d8d3-470b-88f6-7b41cf02ff2b, partition 1
Message sent to topic 'viktoriia_temperature_alerts' successfully.
```

Фінальне отримання повідомлень і виведення їх на екран

consumer_final.py > ...

```python
from configs import kafka_config
import json

# Створення Kafka Consumer
consumer = KafkaConsumer(
    bootstrap_servers=kafka_config['bootstrap_servers'],
    security_protocol=kafka_config['security_protocol'],
    sasl_mechanism=kafka_config['sasl_mechanism'],
    sasl_plain_username=kafka_config['username'],
    sasl_plain_password=kafka_config['password'],
    value_deserializer=lambda v: json.loads(v.decode('utf-8')),
    key_deserializer=lambda v: json.loads(v.decode('utf-8')),
    auto_offset_reset='earliest',  # Зчитування повідомлень з початку
    enable_auto_commit=True,       # Автоматичне підтвердження зчитаних повідомлень
    group_id='my_consumer_group_3'   # Ідентифікатор групи споживачів
)

# Назва топіку
my_name = "viktoriia"
topic_names = [f'{my_name}_temperature_alerts', f'{my_name}_humidity_alerts']

# Підписка на тему
consumer.subscribe(topic_names)

print(f"Subscribed to topic '{topic_names}'")

# Обробка повідомлень з топіку
try:
    for message in consumer:
        print(f"Received message: {message.value}")
except Exception as e:
    print(f"An error occurred: {e}")
finally:
    consumer.close()  # Закриття consumer
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
Received message: {'sensor_id': 34, 'timestamp': 1732973279.7578902, 'temperature': 43, 'humidity': 81, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 34, 'timestamp': 1732973281.8812492, 'temperature': 41, 'humidity': 41, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 96, 'timestamp': 1732973284.0659807, 'temperature': 45, 'humidity': 47, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 34, 'timestamp': 1732973288.3226333, 'temperature': 41, 'humidity': 77, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 96, 'timestamp': 1732973292.6298943, 'temperature': 44, 'humidity': 80, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 54, 'timestamp': 1732973294.8338234, 'temperature': 42, 'humidity': 24, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 54, 'timestamp': 1732973296.9287937, 'temperature': 43, 'humidity': 50, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 96, 'timestamp': 1732973299.200359, 'temperature': 41, 'humidity': 54, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 54, 'timestamp': 1732973303.8461409, 'temperature': 44, 'humidity': 69, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 96, 'timestamp': 1732973301.4583726, 'temperature': 45, 'humidity': 81, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 34, 'timestamp': 1732973306.1014776, 'temperature': 41, 'humidity': 82, 'message': 'Warning! The temperature is over 40'}
Received message: {'sensor_id': 34, 'timestamp': 1732973306.1014776, 'temperature': 41, 'humidity': 82, 'message': 'Warning! Humidity above 80'}
Received message: {'sensor_id': 96, 'timestamp': 1732973306.1014776, 'temperature': 30, 'humidity': 15, 'message': 'Warning! Humidity is less than 20'}
Received message: {'sensor_id': 54, 'timestamp': 1732973308.1722221, 'temperature': 40, 'humidity': 85, 'message': 'Warning! Humidity above 80'}
Received message: {'sensor_id': 34, 'timestamp': 1732973308.1752665, 'temperature': 41, 'humidity': 24, 'message': 'Warning! The temperature is over 40'}
```