

assignment08_Producer_MeyerJake

May 7, 2023

0.1 Assignment 8 Producer Notebook

0.2 DSC 650

0.3 Professor Iranitalab

0.4 Jake Meyer

0.5 05/06/2023

0.5.1 Import Essential Packages/Modules/Libraries

```
[1]: ## The following libraries/packages/modules are useful for completing the  
    ↪assignment.  
import numpy as np  
import pandas as pd  
import pyarrow as pa  
import pyarrow.parquet as parq  
import json  
from json import dumps  
import uuid  
import threading  
import decimal  
import shutil  
import os  
import glob  
import time  
import sys  
from time import sleep  
from kafka import KafkaProducer, KafkaAdminClient, KafkaConsumer, TopicPartition  
from kafka.errors import TopicAlreadyExistsError, KafkaError  
from kafka.admin.new_topic import NewTopic  
import dask.dataframe as dd  
from pathlib import Path  
from datetime import datetime, timedelta  
from pyspark.sql.types import *  
from pyspark.sql import SparkSession
```

```
[22]: ## Create Spark Session as previously outlined in assignment 4. Use Spark  
    ↪Session Builder.
```

```
spark = SparkSession.builder \
    .master('local') \
    .appName('parquetFile') \
    .config('spark.executor.memory', '5gb') \
    .config('spark.cores.max', '6') \
    .getOrCreate()
```

```
[3]: ## Configure Spark Session to resolve errors that were surfacing.
spark.conf.set("spark.sql.execution.arrow.pyspark.enabled", "true")
spark.conf.set("spark.rapids.sql.format.parquet.read.enabled", "true")
spark.conf.set("spark.rapids.sql.format.parquet.write.enabled", "true")
spark.conf.set("spark.rapids.sql.format.parquet.reader.type=MULTITHREADED",
    ↪ "true")
```

0.5.2 Setup Configuration

```
[4]: ## Follow details from assignment instruction for configuration
config = dict(
    bootstrap_servers=['kafka.kafka.svc.cluster.local:9092'],
    first_name='Jake',
    last_name='Meyer'
)

config['client_id'] = '{}{}'.format(
    config['last_name'],
    config['first_name']
)

config['topic_prefix'] = '{}{}'.format(
    config['last_name'],
    config['first_name']
)

config
```

```
[4]: {'bootstrap_servers': ['kafka.kafka.svc.cluster.local:9092'],
      'first_name': 'Jake',
      'last_name': 'Meyer',
      'client_id': 'MeyerJake',
      'topic_prefix': 'MeyerJake'}
```

0.5.3 Code help from the following two examples provided this week:

[Example Kafka Consumer](#) [Example Kafka Producer](#)

0.5.4 Create Topic Utility Function (From Producer Example)

```
[5]: def create_kafka_topic(topic_name, config=config, num_partitions=1,
    ↪ replication_factor=1):
    bootstrap_servers = config['bootstrap_servers']
    client_id = config['client_id']
    topic_prefix = config['topic_prefix']
    name = '{}-{}'.format(topic_prefix, topic_name)

    admin_client = KafkaAdminClient(
        bootstrap_servers=bootstrap_servers,
        client_id=client_id
    )

    topic = NewTopic(
        name=name,
        num_partitions=num_partitions,
        replication_factor=replication_factor
    )

    topic_list = [topic]
    try:
        admin_client.create_topics(new_topics=topic_list)
        print('Created topic "{}"'.format(name))
    except TopicAlreadyExistsError as e:
        print('Topic "{}" already exists'.format(name))

create_kafka_topic('locations')
```

Topic "MeyerJake-locations" already exists

0.5.5 Producer (From Producer Example)

```
[6]: producer = KafkaProducer(
    bootstrap_servers=config['bootstrap_servers'],
    value_serializer=lambda x: json.dumps(x).encode('utf-8')
)
```

0.5.6 General Consumer (From Consumer Example)

```
[7]: general_consumer = KafkaConsumer(
    bootstrap_servers=config['bootstrap_servers'],
    consumer_timeout_ms = 1000
)
```

0.5.7 Send Data Function (From Producer Example)

```
[8]: def on_send_success(record_metadata):
    print('Message sent:\n    Topic: "{}"\n    Partition: {}\n    Offset: {}'.
    ↪format(
        record_metadata.topic,
        record_metadata.partition,
        record_metadata.offset
    ))

def on_send_error(excp):
    print('I am an errback', exc_info=excp)
    # handle exception

def send_data(topic, data, config=config, producer=producer, msg_key=None):
    topic_prefix = config['topic_prefix']
    topic_name = '{}-{}'.format(topic_prefix, topic)

    if msg_key is not None:
        key = msg_key
    else:
        key = uuid.uuid4().hex
    print(data)
    sendout = producer.send(
        topic_name,
        value=data,
        key=key.encode('utf-8')
    ).add_callback(on_send_success).add_errback(on_send_error)
    ## Synchronous Sends
    try:
        record_metadata = sendout.get(timeout =15)
    except KafkaError:
        log.exception()
        pass

    print(record_metadata.topic)
    print(record_metadata.partition)
    print(record_metadata.offset)
```

```
[9]: ## Function to load the parquet file and convert from spark df to pandas df.
    ## Accepts file path as argument.
    ## Returns pandas df (parquet_df).

def loadParquet(parquet_path):
    pqr = spark.read.parquet(parquet_path)
    pqr = pqr.toPandas()
    return pqr
```

0.5.8 Create Kafka Consumer Function (From Consumer Example)

```
[10]: def create_kafka_consumer(topics, config=config):
    bootstrap_servers = config['bootstrap_servers']
    client_id = config['client_id']
    topic_prefix = config['topic_prefix']
    topic_list = ['{}-{}'.format(topic_prefix, topic) for topic in topics]

    return KafkaConsumer(
        *topic_list,
        client_id=client_id,
        bootstrap_servers=bootstrap_servers,
        auto_offset_reset='earliest',
        enable_auto_commit=False,
        value_deserializer=lambda x: json.loads(x)
    )

consumer = create_kafka_consumer(['locations', 'accelerations'])
```

0.5.9 Print Messages Function (From Consumer Example)

```
[23]: def print_messages(consumer=consumer):
    try:
        for message in consumer:
            msg_metadata = 'Message metadata: {}:{}:{}'.format(
                message.topic, message.partition, message.offset
            )

            if message.key is not None:
                msg_key = message.key.decode('utf-8')
            else:
                msg_key = ''
            msg_value = json.dumps(message.value, indent=2)
            msg_value = '\n'.join([' {} '.format(value) for value in
↪msg_value.split('\n')])

            print('Message metadata:')
            print('  Topic: {}'.format(message.topic))
            print('  Partition: {}'.format(message.partition))
            print('  Offset: {}'.format(message.offset))
            print('Message Key: {}'.format(msg_key))
            print('Message Value:')
            print(msg_value)
            print()
    except KeyboardInterrupt:
        print("STOPPING MESSAGE CONSUMER")
```

```
print_messages()
```

```
[12]: consumer.close()
```

0.5.10 Define Directories

```
[13]: cwd = os.getcwd()  
      cwd
```

```
[13]: '/home/jovyan/dsc650/dsc650/assignments/assignment08'
```

```
[14]: current_dir = Path('/home/jovyan/dsc650/dsc650/assignments/assignment08/')  
      results_dir = current_dir.joinpath('results')
```

0.5.11 Create 'Locations' and 'Accelerations'

```
[15]: create_kafka_topic('locations')  
      create_kafka_topic('acceleration')
```

Topic "MeyerJake-locations" already exists

Topic "MeyerJake-acceleration" already exists

0.5.12 Create Time Loop for 'Locations' and 'Accelerations'

```
[24]: ## Setup begin datetime, time, and interval.  
      begin_datetime = datetime.now()  
      begin_time = time.time()  
      interval = 0.1
```

```
[17]: ## Ran into issues reading from the other location, moved bdd/accelerations and  
      ↳ bdd/locations into cwd.  
      file_path = '/home/jovyan/dsc650/dsc650/assignments/assignment08/bdd/  
      ↳ accelerations/'  
      target_file_names = os.listdir(path = file_path)  
      print(target_file_names)
```

```
['t=066.7', 't=109.9', 't=010.6', 't=073.9', 't=070.9', 't=063.8', 't=052.5',  
't=121.4', 't=045.4', 't=033.7', 't=049.5', 't=014.9', 't=026.1', 't=056.4',  
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't=081.4', 't=117.2', 't=094.7', 't=021.3', 't=088.3', 't=060.1']
```

```
[21]: for file_name in target_file_names:  
      std = (time.time() - begin_time)  
      before, after = str(std).split('.')  
      file_name_seconds = decimal.Decimal(file_name.replace("t=", ""))
```

```

while std < file_name_seconds:
    sleep(0.05)
    std = (time.time() - begin_time)
    print('Looping until after...', file_name_seconds)

print(file_name_seconds)

parquet_acc = '/home/jovyan/dsc650/dsc650/assignments/assignment08/bdd/
↳accelerations/' + str(file_name)
parquet_loc = '/home/jovyan/dsc650/dsc650/assignments/assignment08/bdd/
↳locations/' + str(file_name)

if file_name_seconds == 52.5:
    print("At the 52.5 Time")
    parquet_accelerations = loadParquet(parquet_acc)
    parquet_accelerations = parquet_accelerations.to_json()
    parquet_locations = loadParquet(parquet_loc)
    parquet_locations = parquet_locations.to_json()
    send_data('accelerations', parquet_accelerations)
    send_data('locations', parquet_locations)
    break
    print('Complete: --- %s seconds have passed ---' % (time.time() -
↳begin_time))
print('Complete: --- %s seconds have passed ---' % (time.time() - begin_time))

```

```

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Partition: 0

Offset: 1

MeyerJake-locations

0

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Complete: --- 115.92359757423401 seconds have passed ---