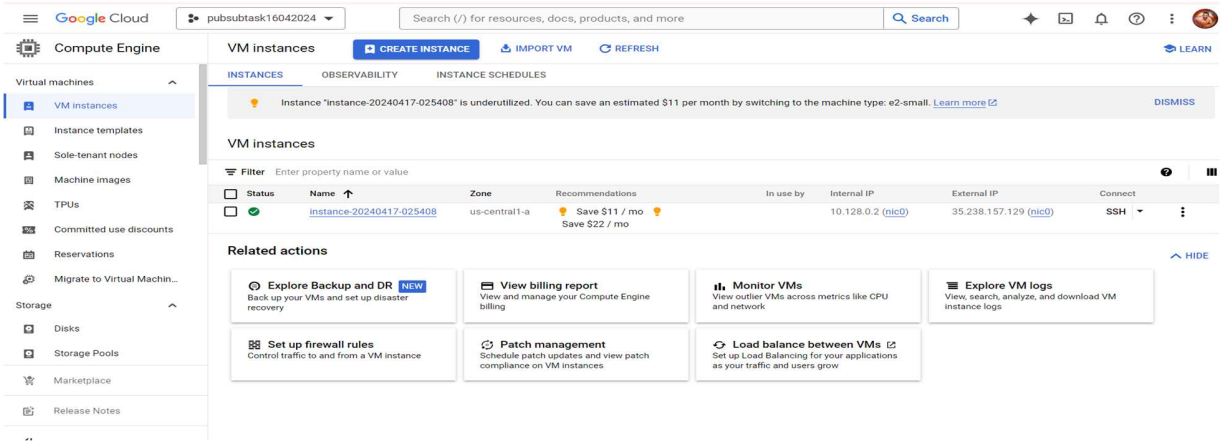
DataEng S24: PubSub

A. [MUST] PubSub Tutorial

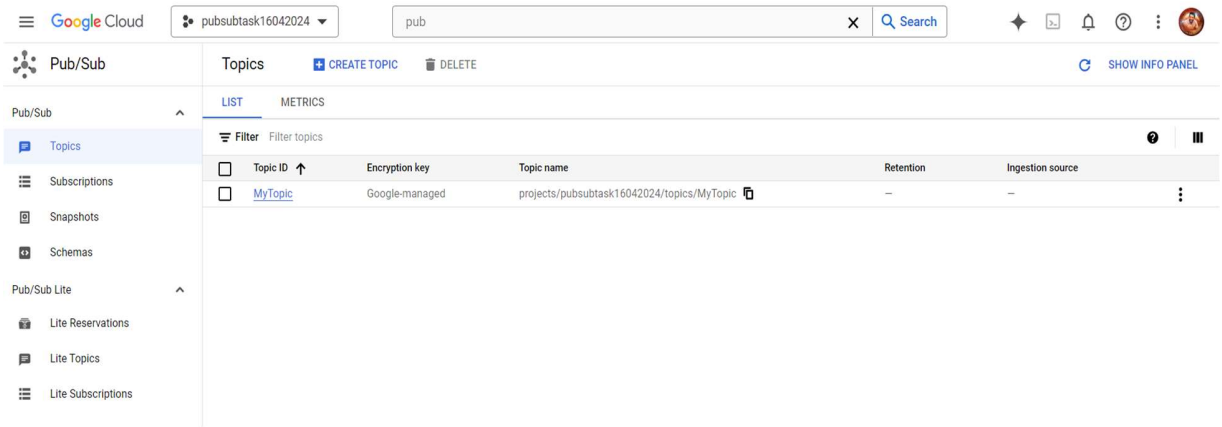
1. Get your cloud.google.com account up and running
    a. Redeem your GCP coupon
    b. Login to your GCP console
    c. Create a new, separate VM instance

Created a new VM instance in my GCP:

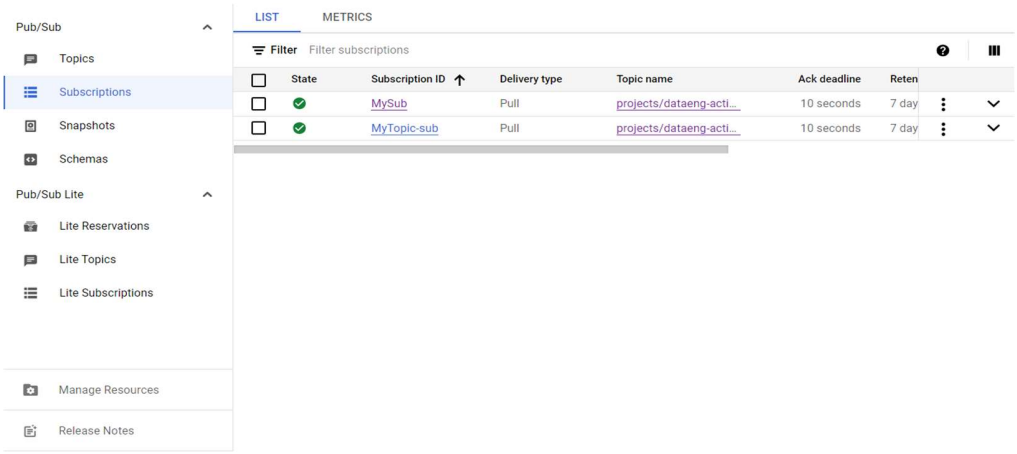


2. Complete this PubSub tutorial: link Note that the tutorial instructs you to destroy your PubSub topic, but you should not destroy your topic just yet. Destroy the topic after you finish the following parts of this in-class assignment.

Created topics with MyTopic name:

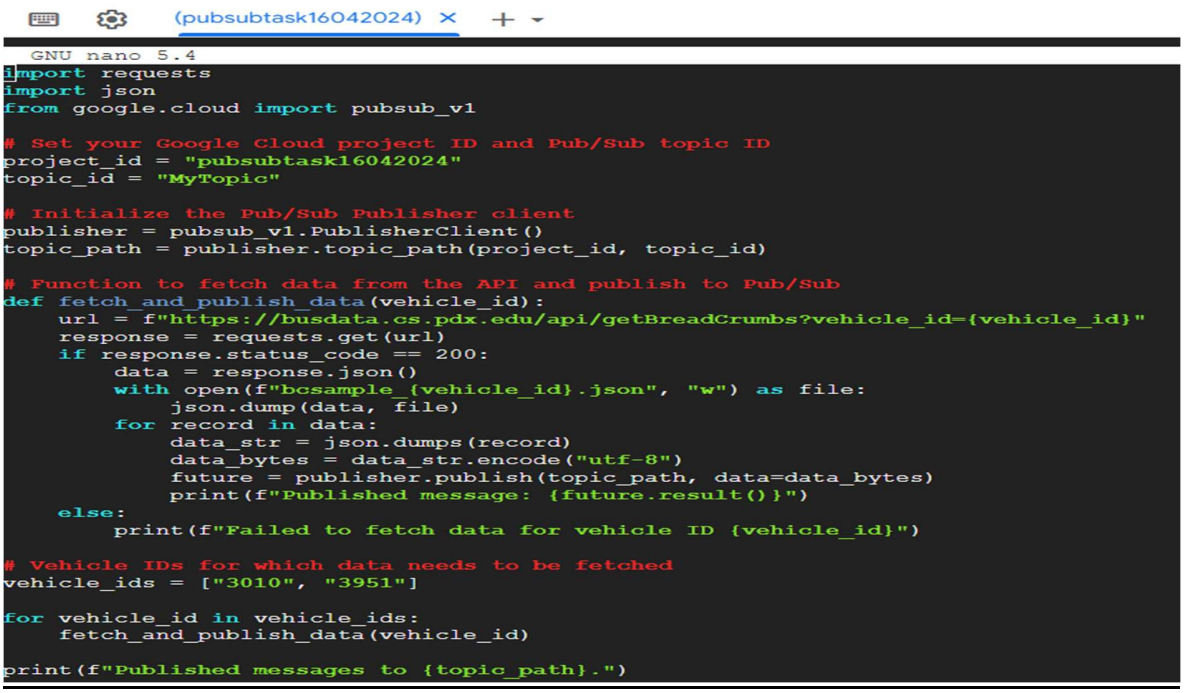


Created subscriptions:

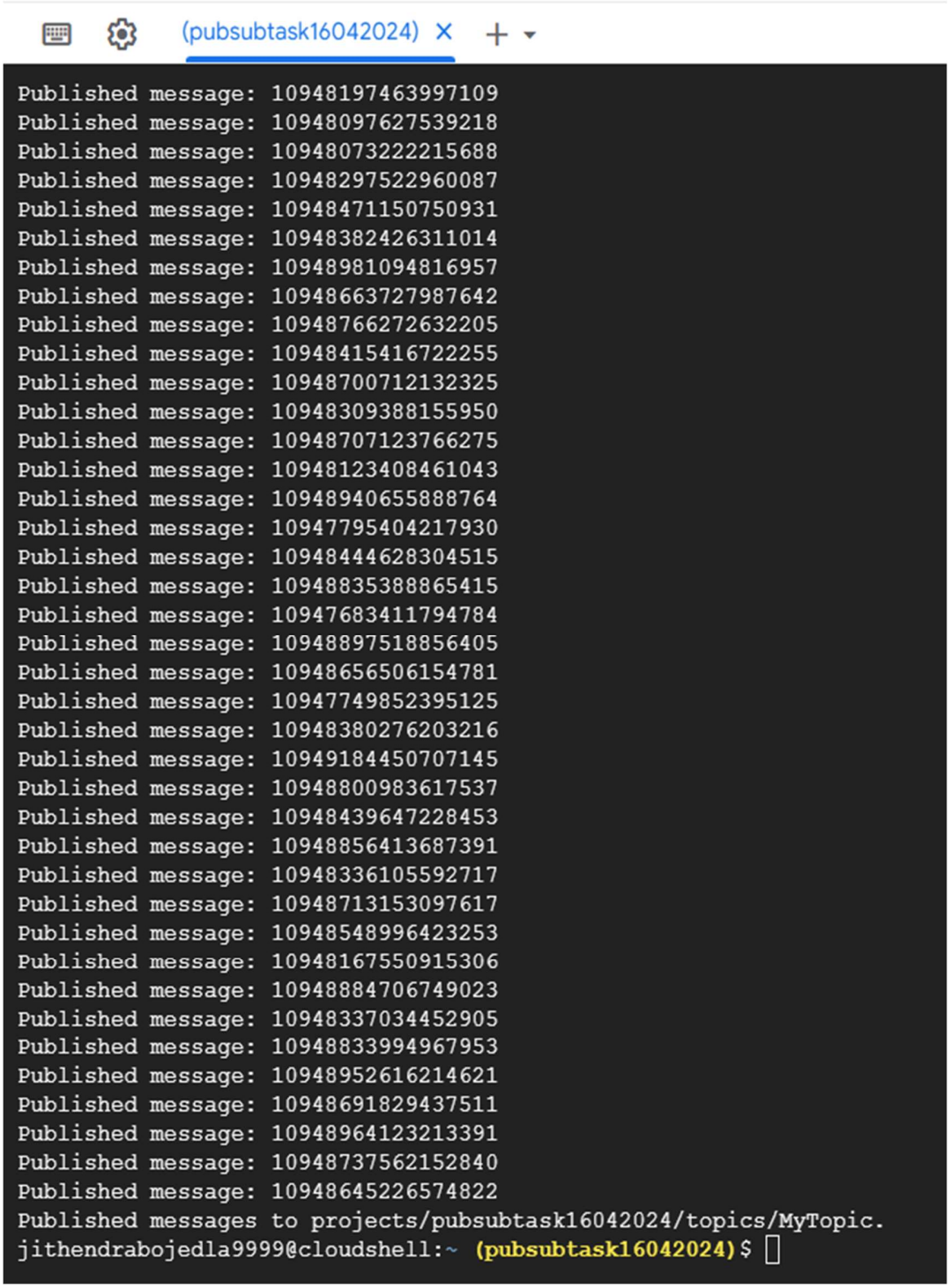


B. [MUST] Create Sample Data

1. Get data from https://busdata.cs.pdx.edu/api/getBreadCrumbs for two Vehicle IDs from among those that have been assigned to you for the class project.
2. Save this data in a sample file (named bcsample.json)
3. Update the publisher python program that you created in the PubSub tutorial to read and parse your bcsample.json file and send its contents, one record at a time, to the my-topic PubSub topic that you created for the tutorial.
   Publisher Program:



Published Messages:



4. Use your receiver python program (from the tutorial) to consume your records.

Receiver code:

(pubsubtask16042024)

```
  GNU nano 5.4
from concurrent.futures import TimeoutError
from google.cloud import pubsub_v1

# Set your Google Cloud project ID and Pub/Sub subscription ID
project_id = "pubsubtask16042024"
subscription_id = "MySub"
timeout = 5.0

# Initialize the Pub/Sub Subscriber client
subscriber = pubsub_v1.SubscriberClient()
subscription_path = subscriber.subscription_path(project_id, subscription_id)

# Define the callback function to process incoming messages
def callback(message):
    print(f"Received message: {message.data.decode('utf-8')}")
    message.ack()

# Subscribe to the Pub/Sub topic
streaming_pull_future = subscriber.subscribe(subscription_path, callback=callback)
print(f"Listening for messages on {subscription_path}...\n")

# Wait for messages
try:
    streaming_pull_future.result(timeout=timeout)
except TimeoutError:
    streaming_pull_future.cancel()  # Trigger the shutdown
    streaming_pull_future.result()  # Block until the shutdown is complete
```

Messages Received:


```
, "GPS_LATITUDE": 45.596702, "GPS_SATELLITES": 11.0, "GPS_HDOP": 0.8}
Received message: {"EVENT_NO_TRIP": 222305889, "EVENT_NO_STOP": 222305903, "OPD_DATE": "19DEC2022:00:00:00", "VEHICLE_ID": 3235, "METERS": 301724, "ACT_TIME": 77147, "GPS_LONGITUDE": -122.661468
, "GPS_LATITUDE": 45.58164, "GPS_SATELLITES": 12.0, "GPS_HDOP": 0.7}
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```
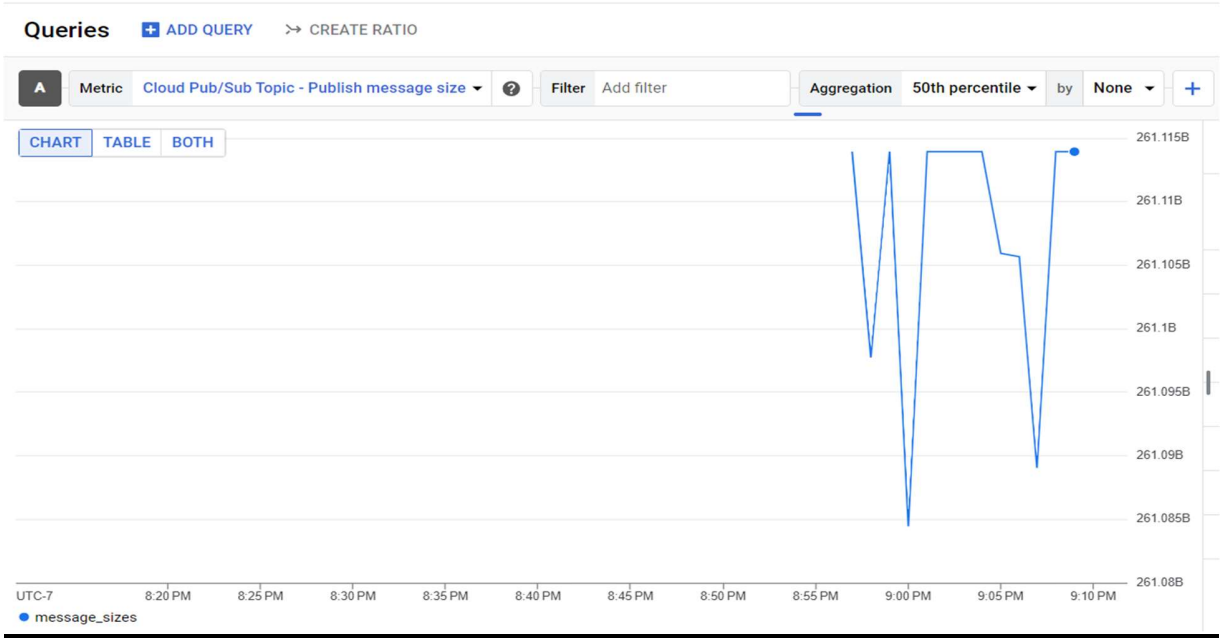

C. [MUST] PubSub Monitoring

1. Review the PubSub Monitoring tutorial: link and work through the steps listed there. You might need to rerun your publisher and receiver programs multiple times to trigger enough activity to monitor your my-topic effectively.
   Cloud PubSub subscription:



D. [MUST] PubSub Storage

1. What happens if you run your receiver multiple times while only running the publisher once?
   Ans:
   Messages from vehicle data.json files are reviewed by the publisher before being published to the my-topic. On my-sub, the subscriber keeps an ear out for communications. The subscriber processes every message sent by the publisher's single run on the first run. Until fresh messages are published by the publisher, the subscriber does not get any new messages in subsequent runs.

2. Before the consumer runs, where might the data go, where might it be stored?
   Ans:
   The publisher's data may be temporarily held in Pub/Sub before the consumer executes. Google Cloud offers Pub/Sub, a fully managed messaging service built to handle massive, real-time message intake and delivery. When a publisher posts a message to a Pub/Sub topic, the message is held there indefinitely until a subscriber acknowledges it. Messages will stay in the topic for a defined retention time if no subscriber is actively consuming them.

3. Is there a way to determine how much data PubSub is storing for your topic? Do the PubSub monitoring tools help with this?
   Ans:
   To determine how much data Pub/Sub is storing for your topic, you can use Pub/Sub monitoring tools such as Cloud Monitoring. Pub/Sub provides a number of metrics that you can keep an eye on to measure the effectiveness and utilization of your subscriptions and topics. The amount of unacknowledged messages, the message throughput rate, and the message backlog size are examples of metrics. We can learn more about the quantity of material stored in your subject and the general condition of your Pub/Sub system by looking at these metrics.

4. Create a “topic_clean.py” receiver program that reads and discards all records for a given topic. This type of program can be very useful for debugging your project code.
   Ans:

   Topic_clean.py:

```
  GNU nano 5.4
from google.cloud import pubsub_v1
project_id = "pubsubtask16042024"
topic_name = "MyTopic"
subscriber = pubsub_v1.SubscriberClient()
topic_path = subscriber.topic_path(project_id, topic_name)
subscriptions = subscriber.list_subscriptions(project=f"projects/{project_id}")
for subscription in subscriptions:
    if topic_path in subscription.topic:
        subscription_path = subscription.name
        subscriber.delete_subscription(request={"subscription": subscription_path})
        print(f"All messages in subscription '{subscription_path}' have been deleted.")

print(f"All messages in topic '{topic_path}' have been deleted.")
```

This program defines a callback function to promptly delete each message it receives and creates a subscription to the given topic. After then, it begins to consume messages continuously unless manually stopped.