CSS532(HW2)

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Student ID – 2303017

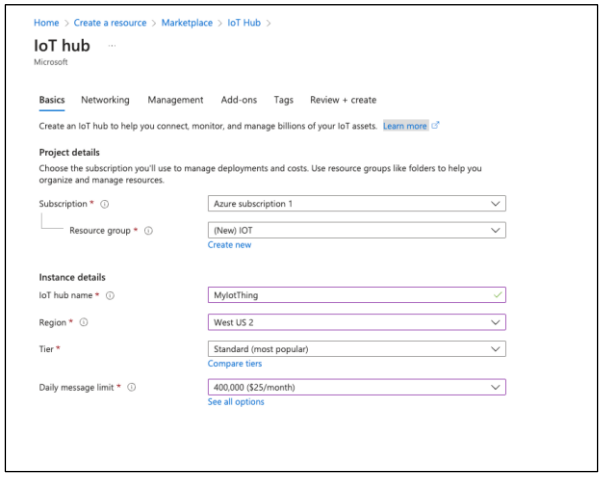
References –

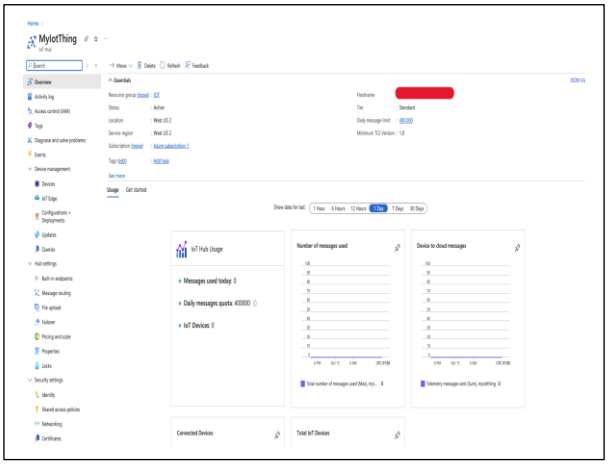
1. **YouTube videos referred –**
   a.) https://youtu.be/I-kodc4bs4I?si=IGkSPltNLjP_hbkP
   b.) https://youtu.be/HN3tUbEjgb4?si=Qz_MgglWv3naHAVD
   c.) https://youtu.be/_349bwtFkE8?si=_bbpnTvYi-cTEHD6
   d.) https://youtu.be/8Gg8EVoCxGQ?si=eJylimnsBKAYTi3-
2. **Microsoft Azure official documentation –**
   a.) https://learn.microsoft.com/en-us/azure/azure-functions/functions-run-local?tabs=macos%2Cisolated-process%2Cnode-v4%2Cpython-v2%2Chttp-trigger%2Ccontainer-apps&pivots=programming-language-python
   b.) https://learn.microsoft.com/en-us/azure/iot/howto-use-iot-explorer

HW-2 Implementation:

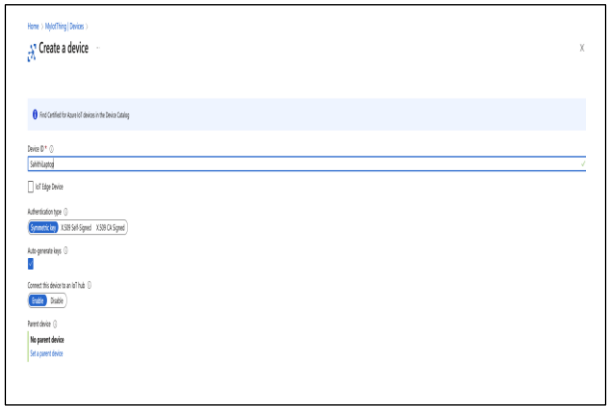
Created an Azure account, installed Azure SDK on my laptop, and implemented a virtual IoT system using Azure and my laptop.

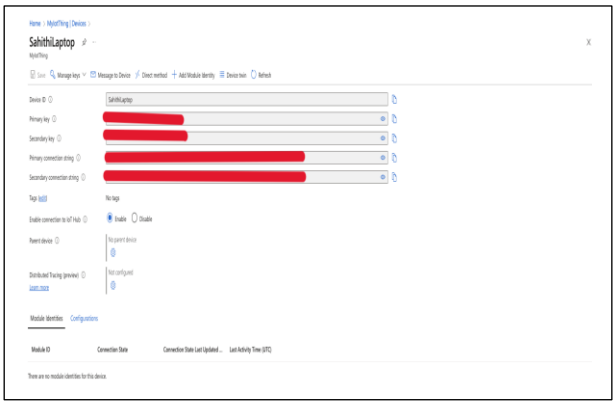
To configure my laptop as an IoT device, which can communicate with Azure IoT Hub, I created a new IOT Hub.



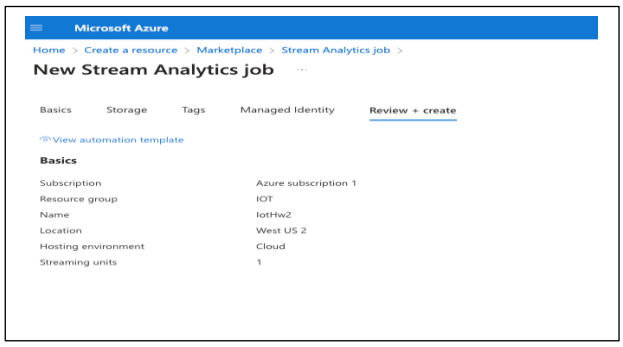


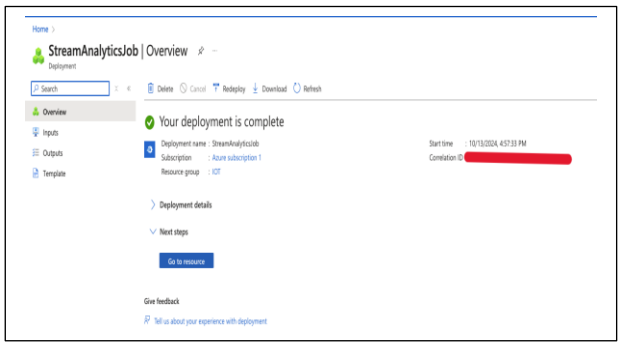
Registered and configure my laptop as an IoT device, which can communicate with Azure IoT Hub (Successfully created new device).



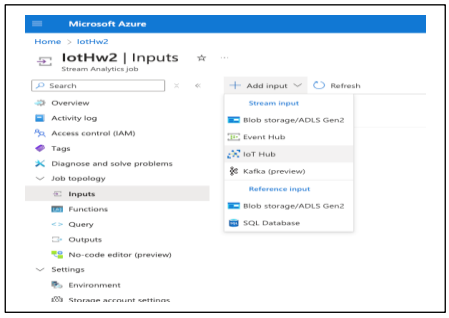


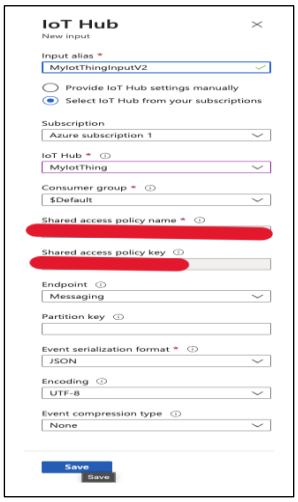
To configure Azure IoT Hub to receive messages from my device (laptop) and to show the result in Azure IoT Hub console, Successfully created a new Stream Analytics job.



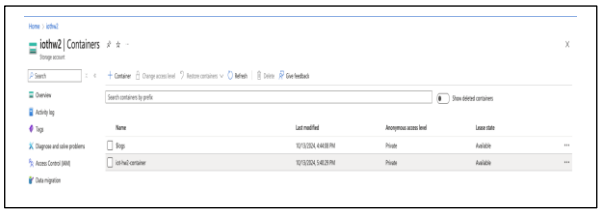


Added new input to Stream Analytics Job and selected IOT hub as an input for Stream Analytics Job. Successfully, created new input.

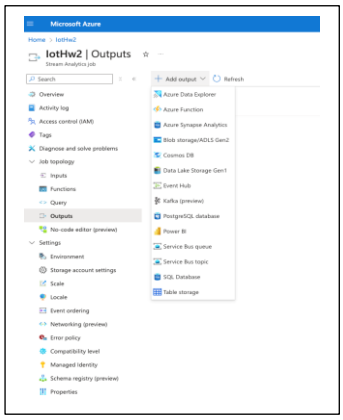


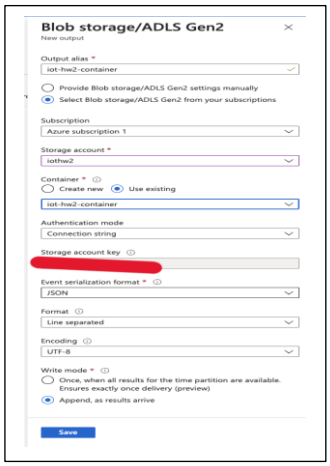


Successfully created a container for storing files.



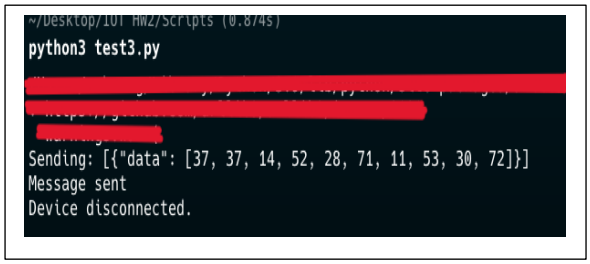
Added Blob Storage as output for Stream Analytics Job.



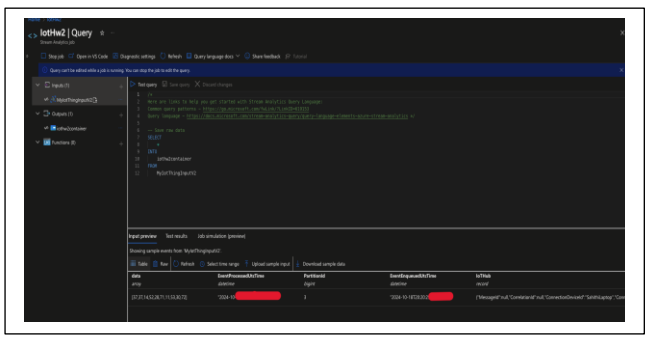


For sending messages from my device, I wrote a python script to generate random numbers list, send the data to Stream Analytics. Then wrote a SQL query to select the data from input of Stream Analytics and put the data into container.

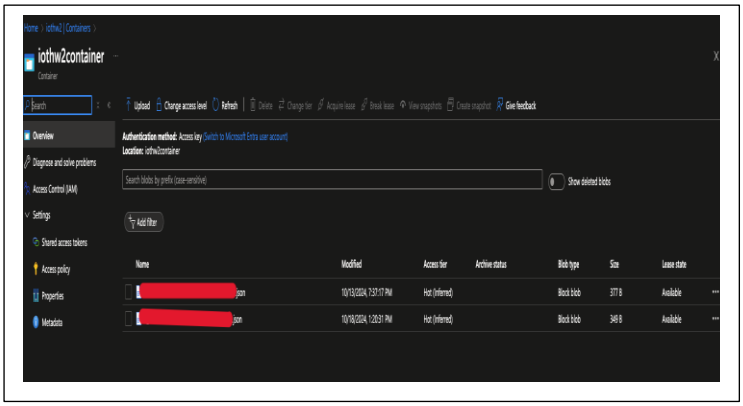
Then, I started Analytics job and ran the python script to send the data. Now, I was successfully able to preview the raw data.



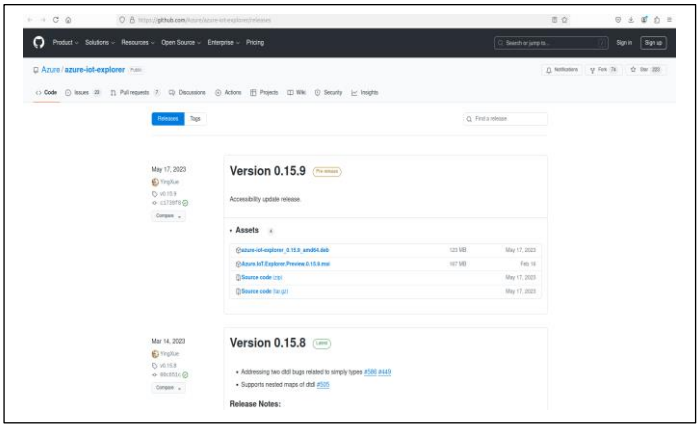
Stream Analytics successfully processed raw message.



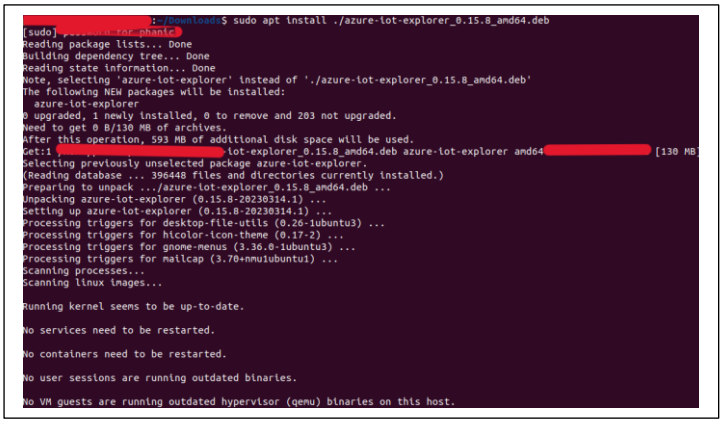
I was successfully able to store the raw data into output container.



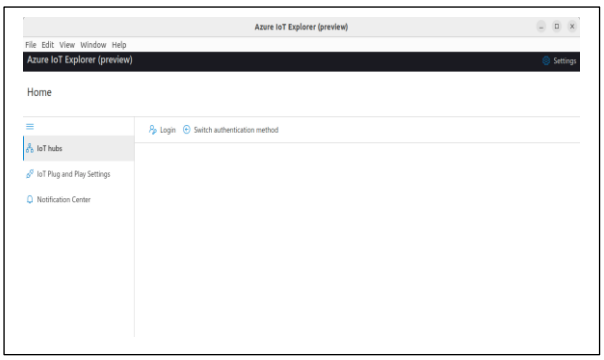
Now, to show the result in Azure IoT Hub console, I downloaded Azure IOT explorer installation file.

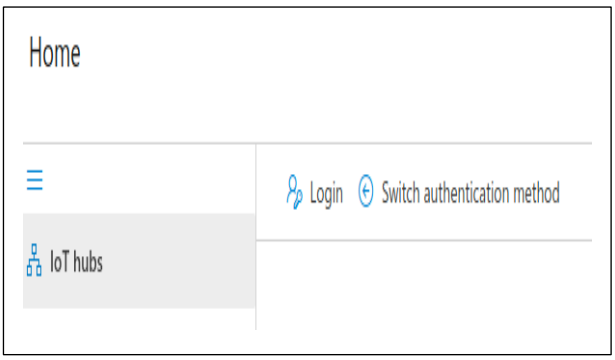


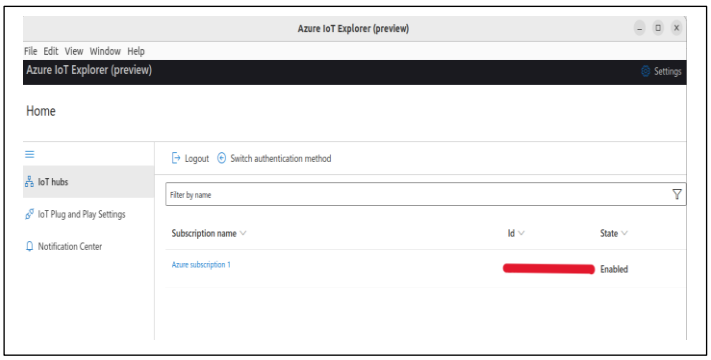
Installed Azure IOT explorer through terminal.



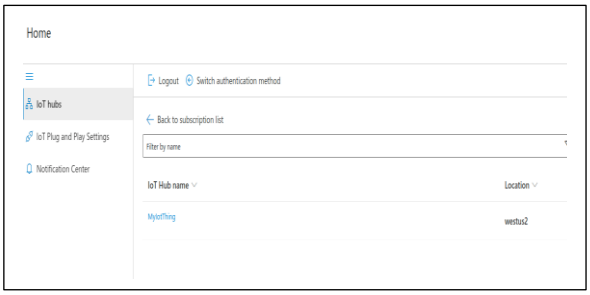
The, I opened the Azure IOT explorer, and successfully, logged into IOT hub.

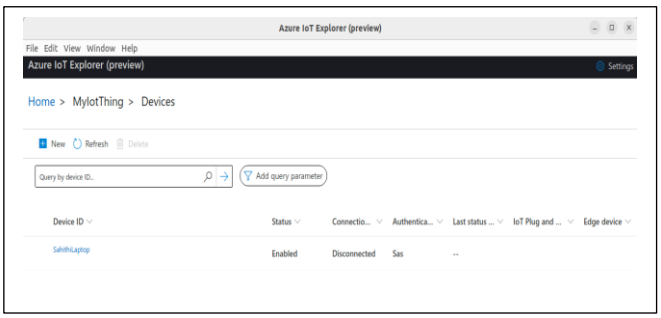




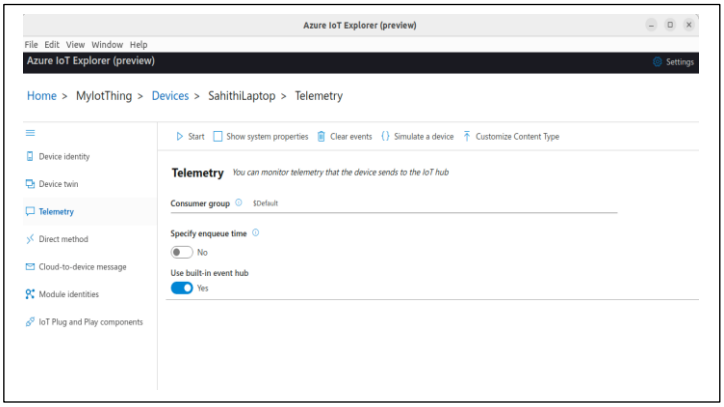


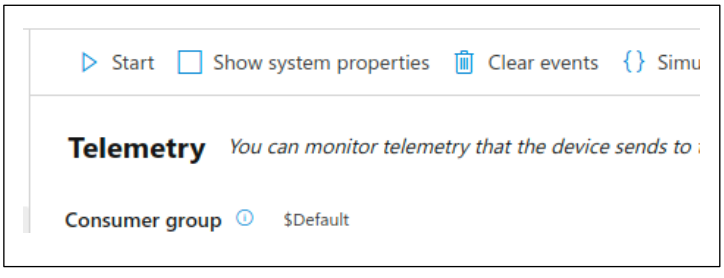
Then, I found the IOT hub and the device by ID.

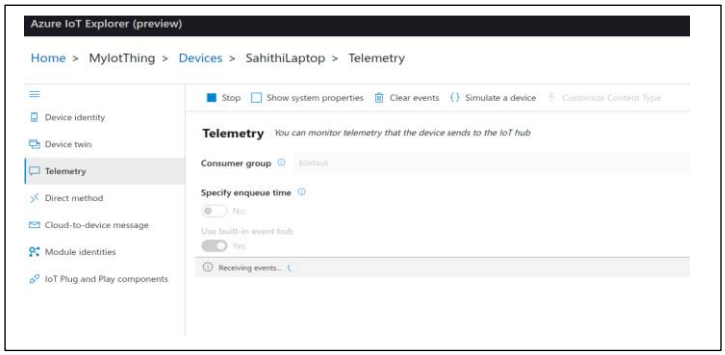




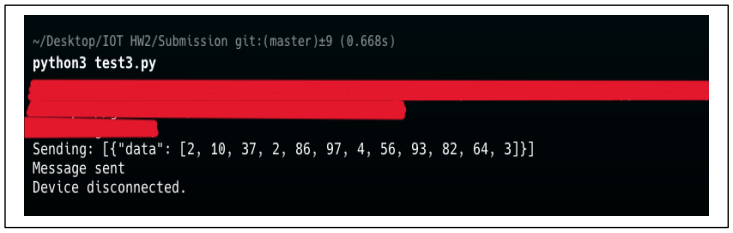
Now, I went to telemetry tab to start monitoring the messages. Successfully, started job to monitor the messages and waiting to receive the messages.

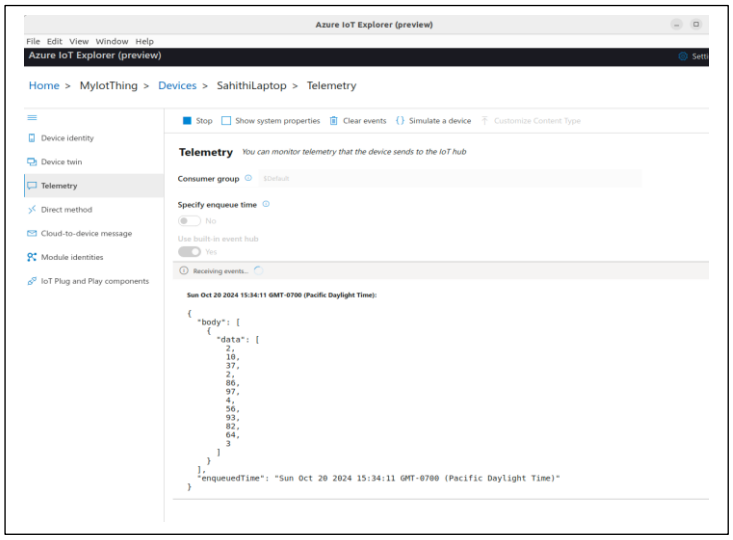






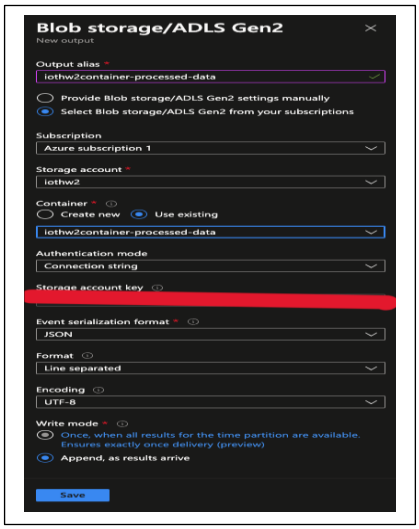
Now, I ran the python script to send the message and was successfully able to see the message on Azure IOT hub console.



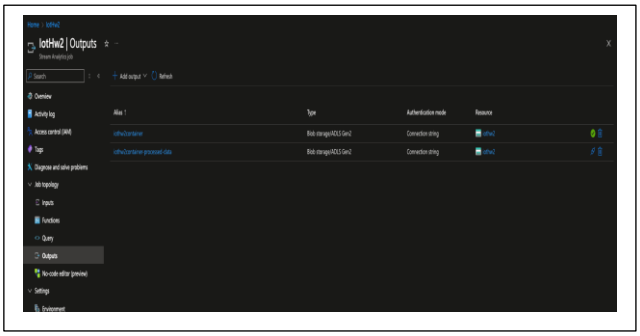


Now, to connect Azure Stream Analytics to my Azure IoT Hub to process received messages from devices and save the raw data (the data extracted from received messages) and the processed data (I used Stream Analytics to process the data) into Azure Blob.

For this, I created new container for processed data and added processed data container as new output to Stream Analytics Job.

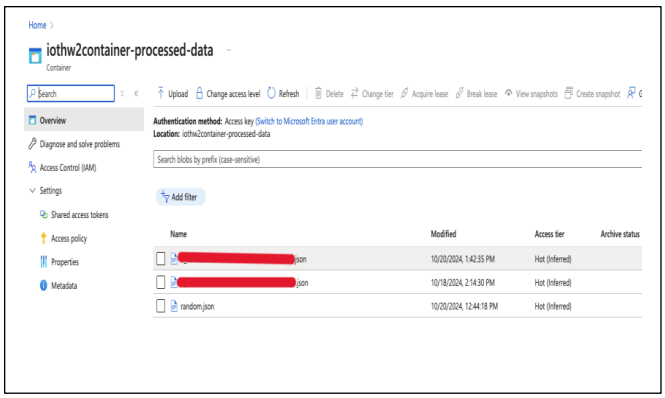


Successfully added new container as one of the outputs for the Stream Analytics Job.

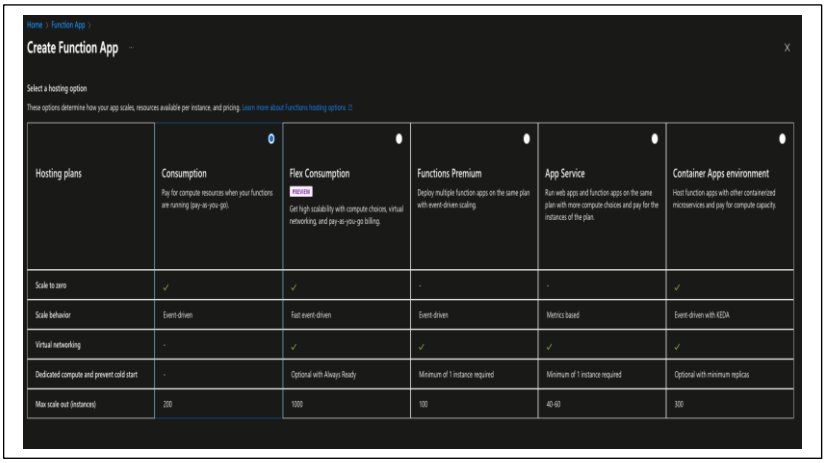


Now, for Azure IoT Hub to process received messages from the devices and save the raw data (the data extracted from received messages) and the processed data, I created a SQL Query and JavaScript script to take the raw data and process the raw data and sum the data and take average of data and store the processed (values of raw data and the average of the data) into the new output container.

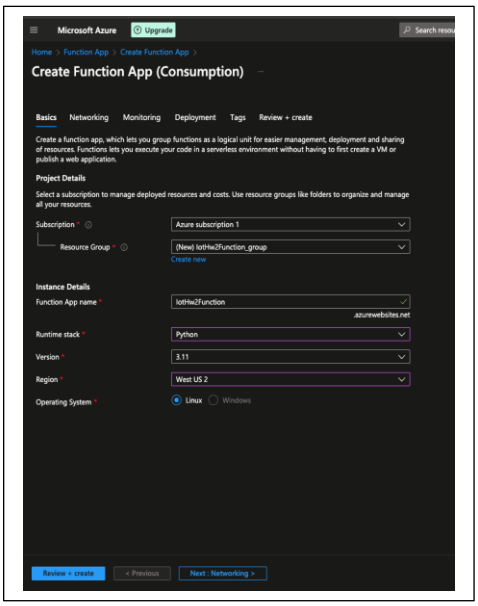
Stream Analytics processed the message and stored it in the blob container for processed data.

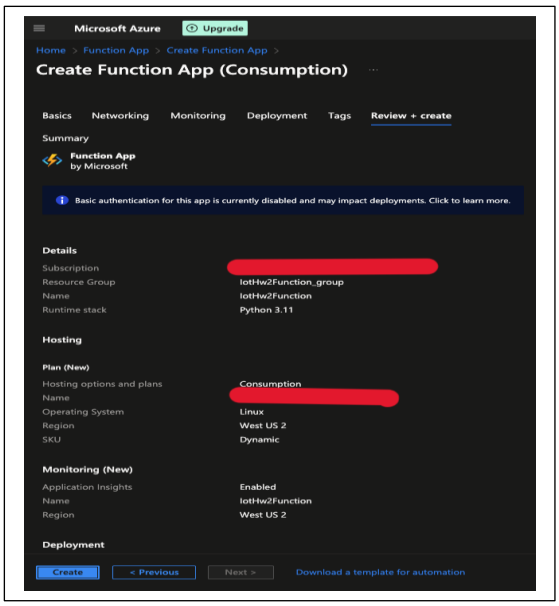


Now, to connect Azure Functions to respond to Azure Blob events when new "processed data" is added, I created a new function app with consumption plan.

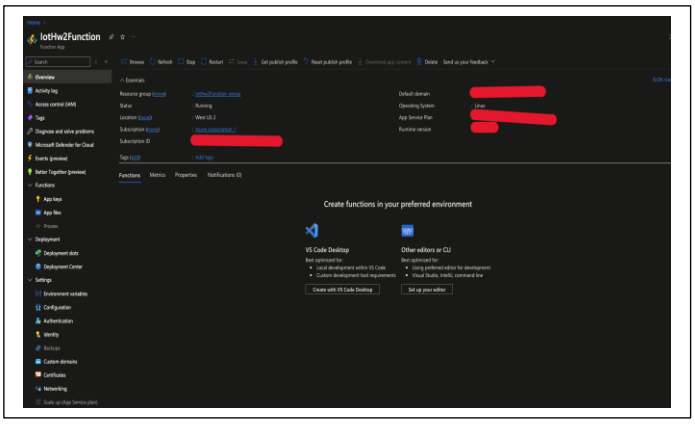


Updated the details like basics, networking, monitoring, deployment, and tags for function app and then review function details before creating.

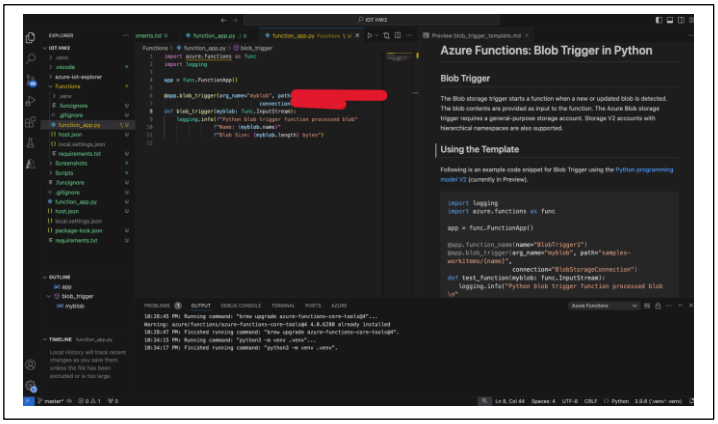




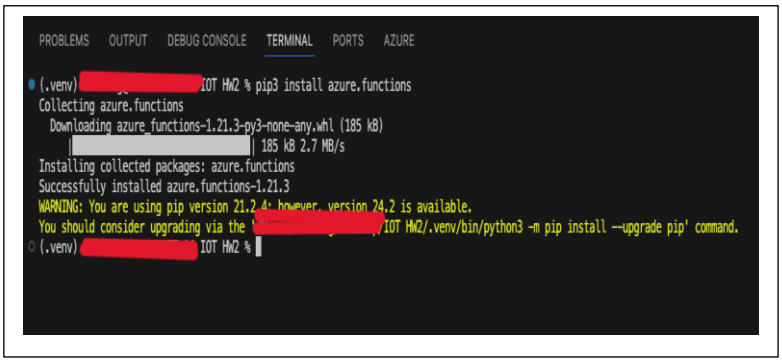
Successfully created Azure function app.



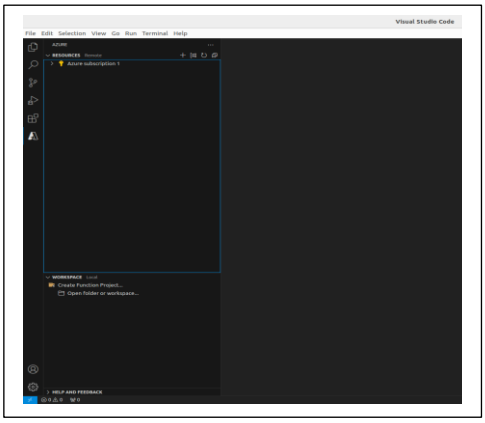
Successfully created new blob trigger function in VS code.



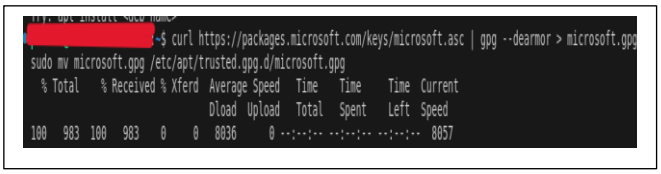
Installed azure.functions python module



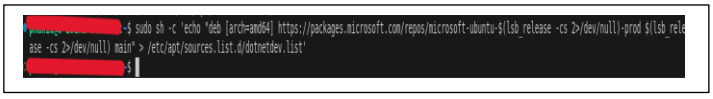
Successfully installed Azure extensions like Azurite and Azure functions, Azure Resources, Azure core tools in VS code.



Now, installed the Microsoft package repository GPG key, to validate package integrity.

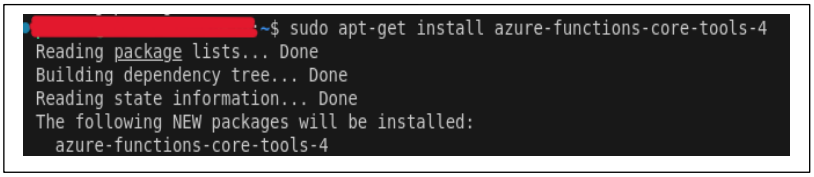


I set up the APT source list before doing an APT update.

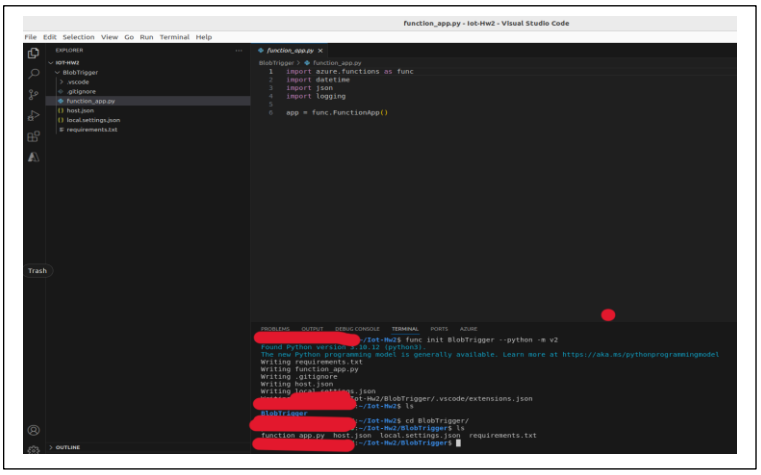


Now, I ran sudo apt-get update to update the APT.

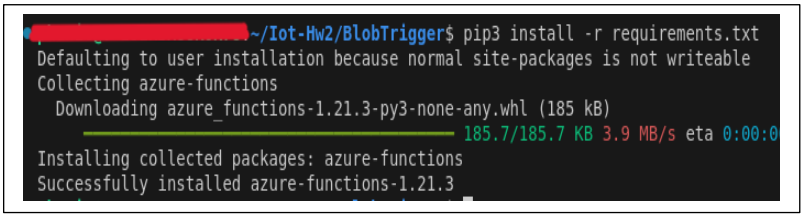
Installed, Azure-function-core-tools, successfully installed func.



Now, I was successfully able to create local project with init.



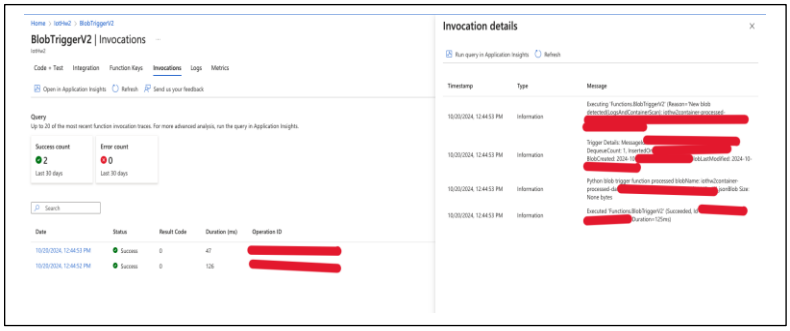
Now, I installed Azure functions from requirements.txt file.



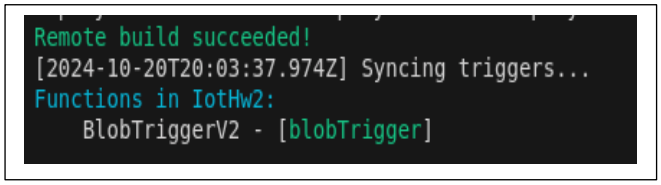
The, I wrote the sample code for function to try deploying it to Azure. Finally, I was able to deploy the function to Azure.

Now, I ran the python script to send data to Azure Analytics Job and store it in blob storage. Now, my function responded to the blob trigger as new file is created in it after processing the data I sent.

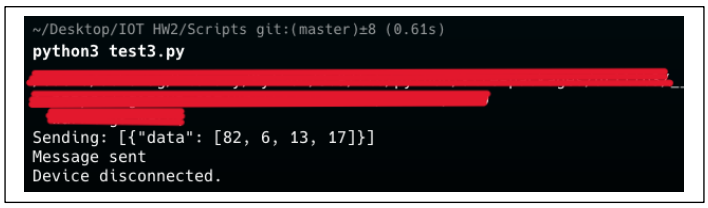
I was successfully able to see sample blob invocations.



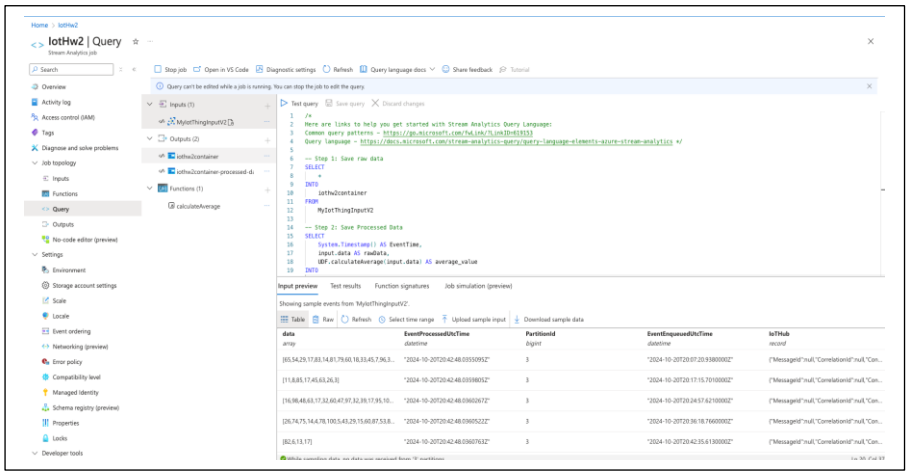
Now, I updated my function code to display file contents and deployed it to Azure.



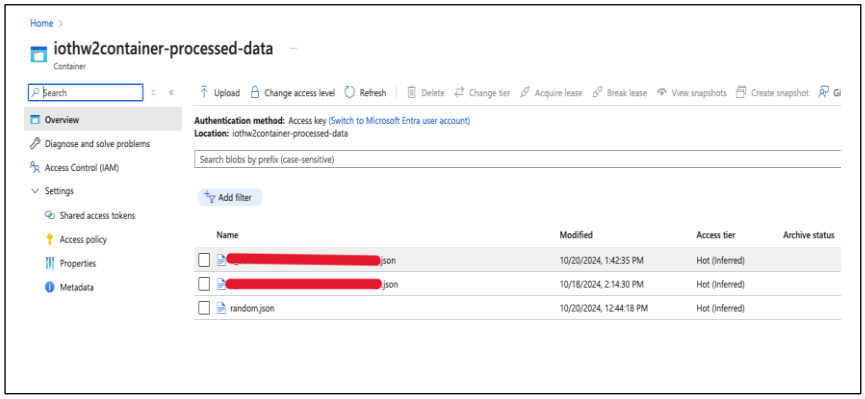
Now, I ran the python script to send data to IOT Hub.



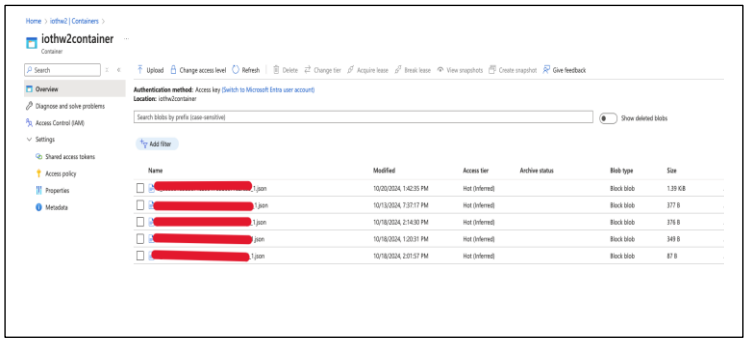
The message was successfully processed by Stream Analytics Job.

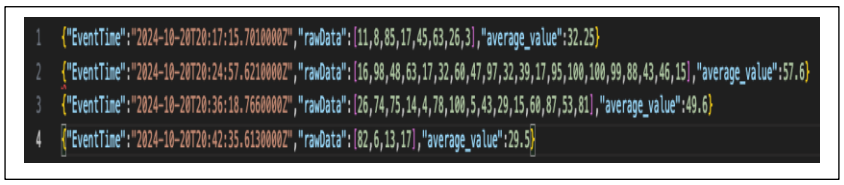


Stream Analytics Job successfully processed the message and stored it in the Blob.

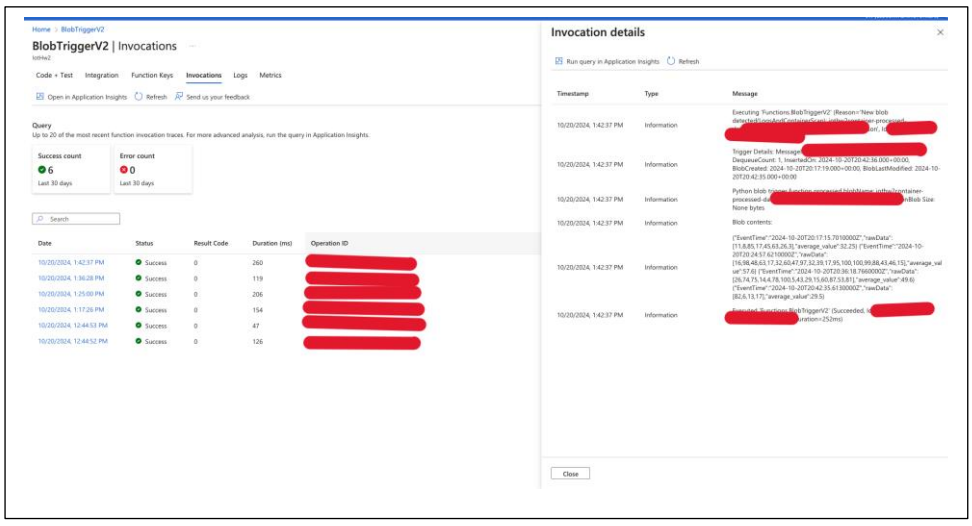


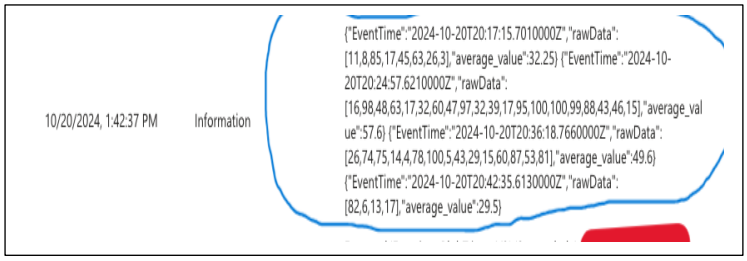
I was able to see raw and processed data in separate containers in Blob storage.

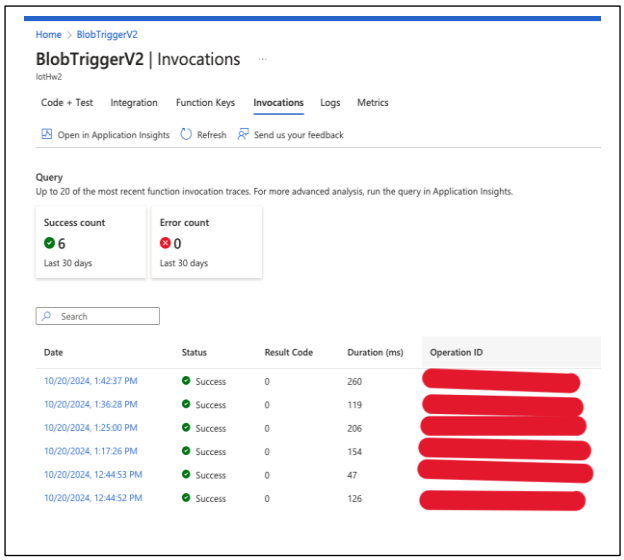


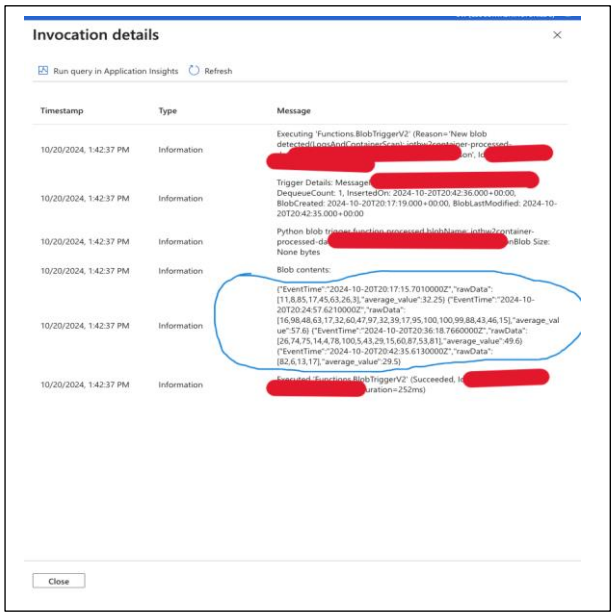


Finally, I was successfully able to invoke the Blob trigger function and print out the content of newly added data, which is the "processed data", Success count, and invocations.



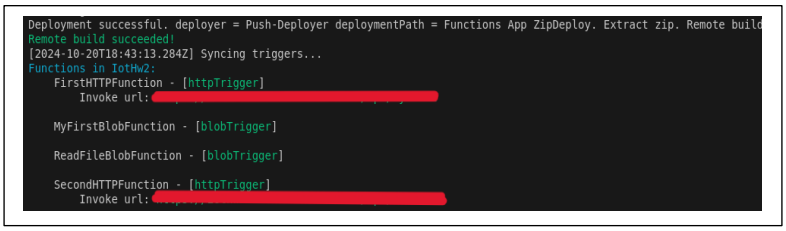






Problems encountered while working on HW-2:

1.) Had difficulty while creating Function after creating function app.
2.) Had difficulty deploying the function to Azure as the documentation was very scattered and I also implemented a sample HTTP trigger function to test before Blob trigger function.



3.) Had to install a lot of dependencies for running and deploying the function.

Amount of time you spent on this assignment:

I spent nearly 55 ~ 60 hours for this assignment.