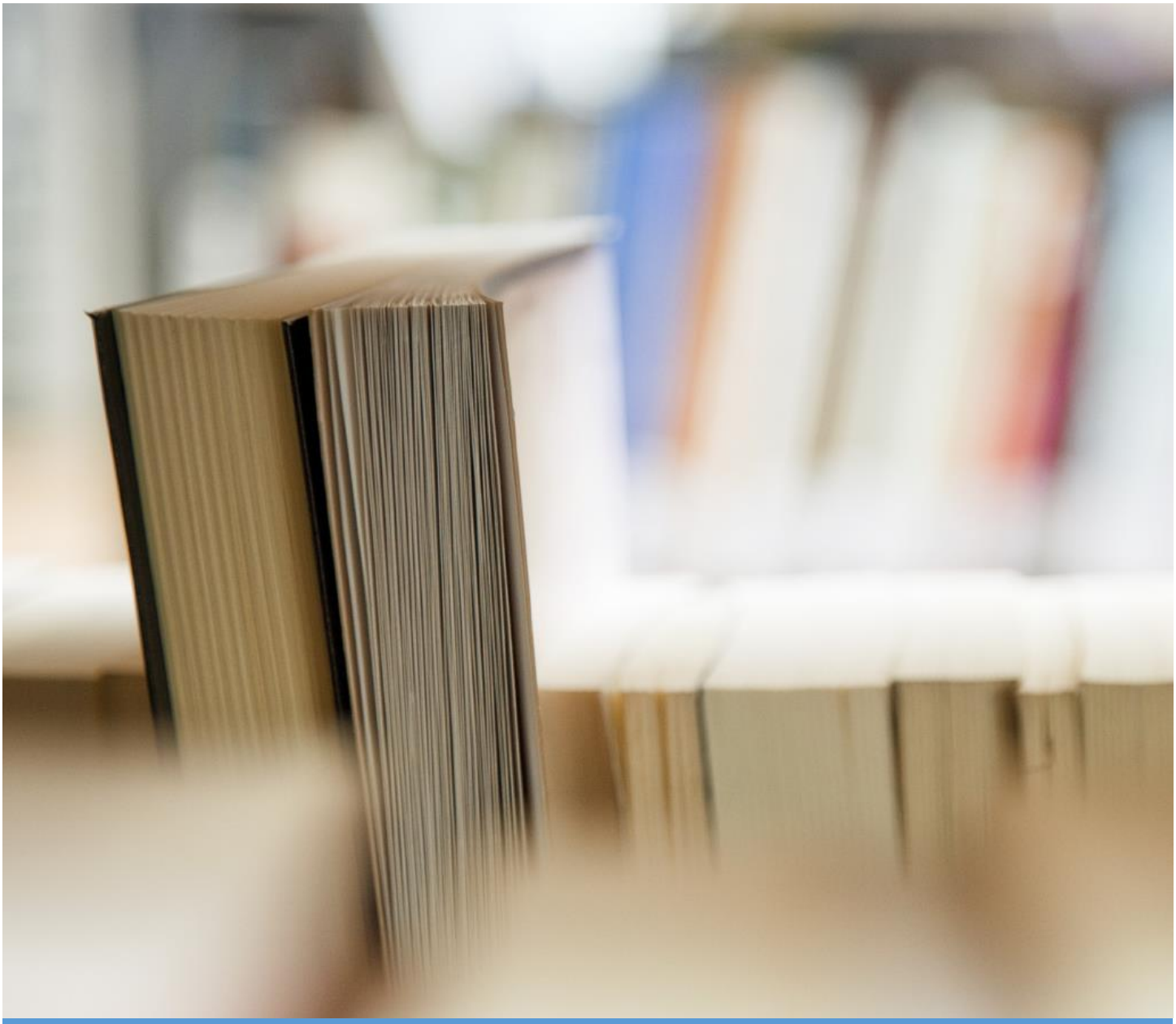


Twitter Sentiment Analysis using Azure Cognitive Services

Roy, Sandip (Cognizant)

4/1/19

Table of Contents

1. Introduction

This document outlines how to use Azure Cognitive Services (Text Analytics) to perform sentiment analysis from captured Tweet and also build a fundamental dashboard (using Power BI) to give user end to end experience.

2. Solution Components

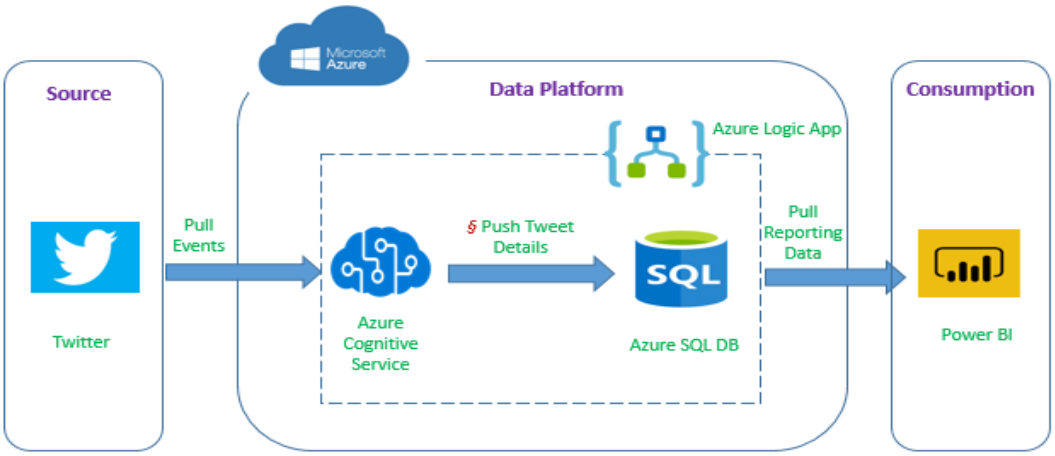
Azure Logic apps is Microsoft Azure's Integration and Work flow offering in the Cloud. Azure Logic apps directly competes with existing Integration and Workflow cloud offering such as Amazon's Simple Workflow Service. If you are SMB or event larger Enterprise then Logic Apps offers a solution to automating business processes/workflows which you may have been developing bespoke Applications for.

The **Text Analytics API** is a cloud-based service that provides advanced natural language processing over raw text, and includes four main functions: sentiment analysis, key phrase extraction, language detection, and entity linking. The API is a part of Azure Cognitive Services, a collection of machine learning and AI algorithms in the cloud for your development projects.

Microsoft **Azure SQL Database** is a managed cloud database provided as part of Microsoft Azure. A cloud database is a database that runs on a cloud computing platform, and access to it is provided as a service. Managed database services take care of scalability, backup, and high availability of the database.

Power BI is a business analytics service by Microsoft. It aims to provide interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards.

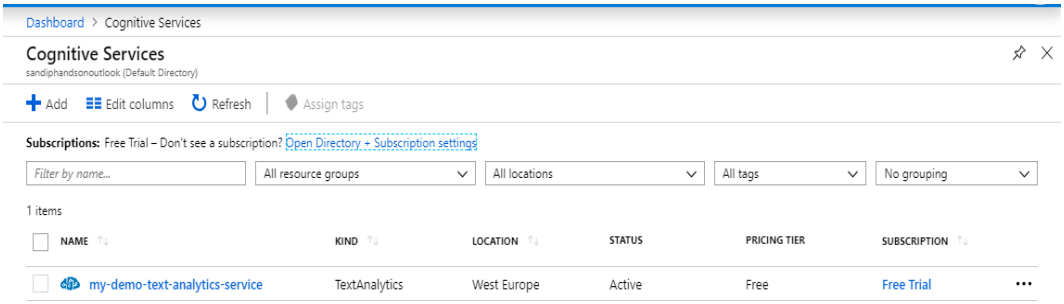
3. Solution Diagram

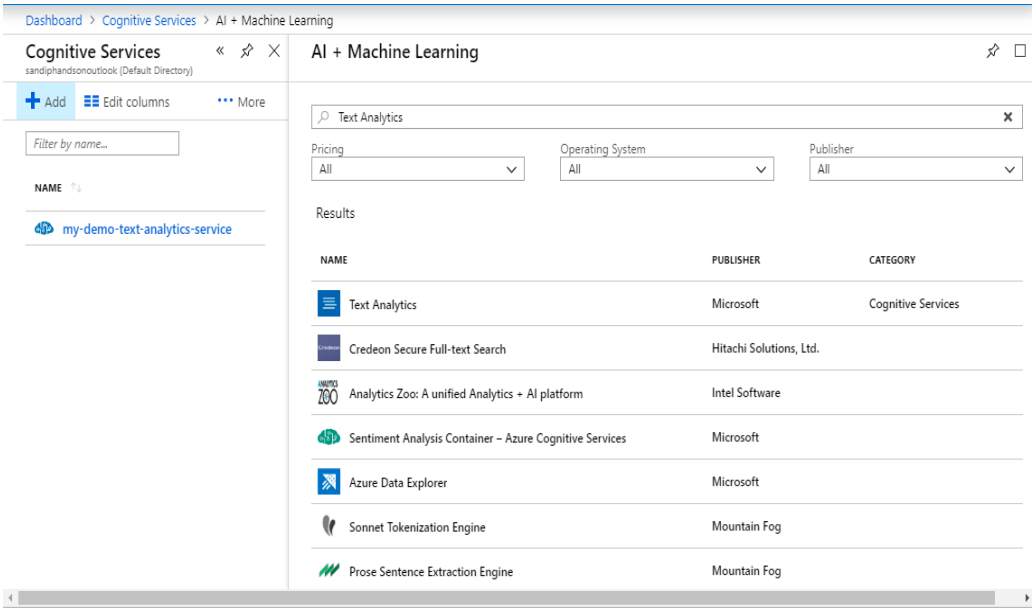


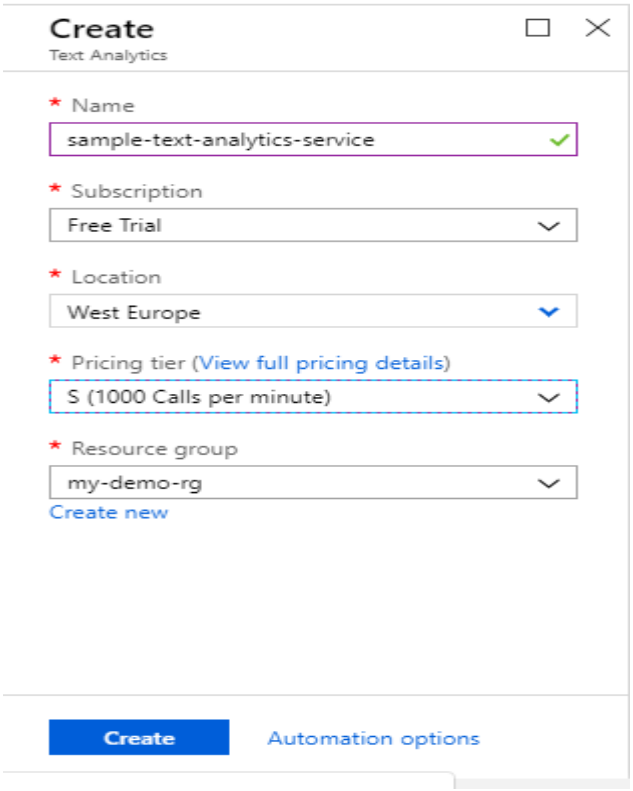
§ This includes raw Tweet details like Tweet Text, Tweeted By etc. along with output from Cognitive service like Sentiment Score

4. Detailed Steps

Step 1 – Create a Cognitive Service (Text Analytics) component and note down its key and endpoint (marked with numbered 🟡 below).




Dashboard › Cognitive Services › AI + Machine Learning
Cognitive Services
sandiphandsonoutlook (Default Directory)
Add
Edit columns
More
Filter by name...
NAME
my-demo-text-analytics-service
AI + Machine Learning
Text Analytics
Pricing
All
Operating System
All
Publisher
All
Results
NAME
PUBLISHER
CATEGORY
Text Analytics
Microsoft
Cognitive Services
Credeon Secure Full-text Search
Hitachi Solutions, Ltd.
Analytics Zoo: A unified Analytics + AI platform
Intel Software
Sentiment Analysis Container – Azure Cognitive Services
Microsoft
Azure Data Explorer
Microsoft
Sonnet Tokenization Engine
Mountain Fog
Prose Sentence Extraction Engine
Mountain Fog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* Subscription
Free Trial
* Location
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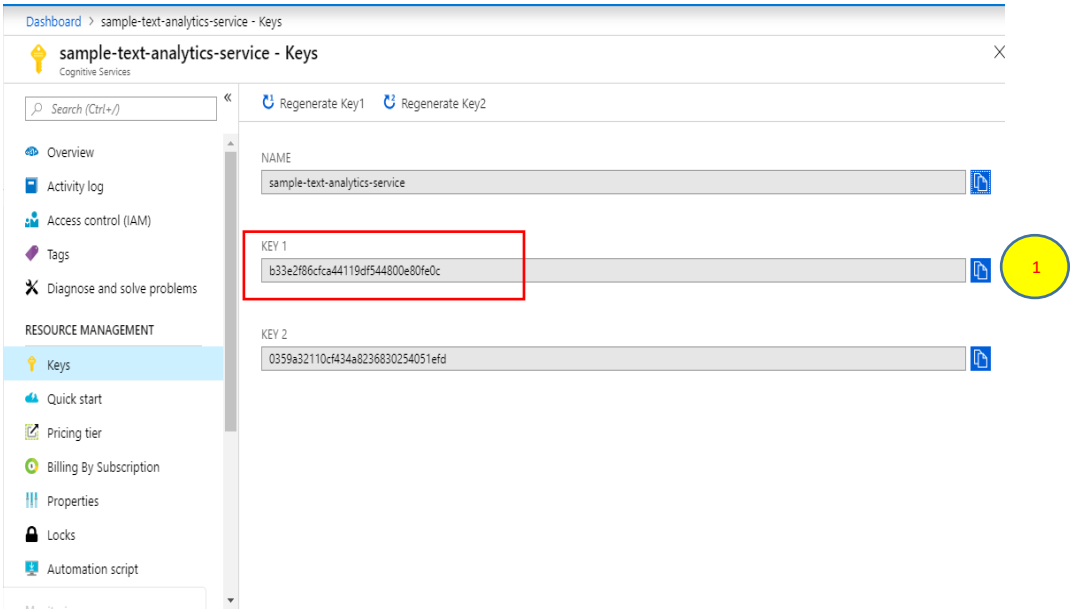
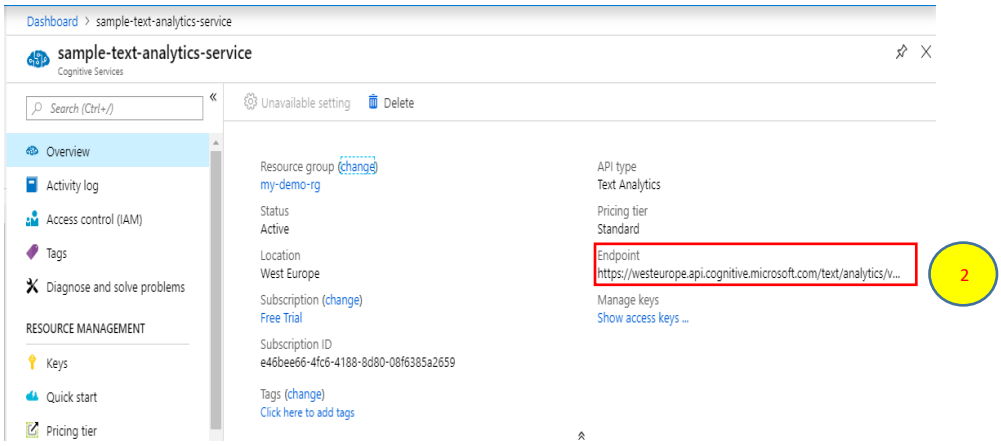
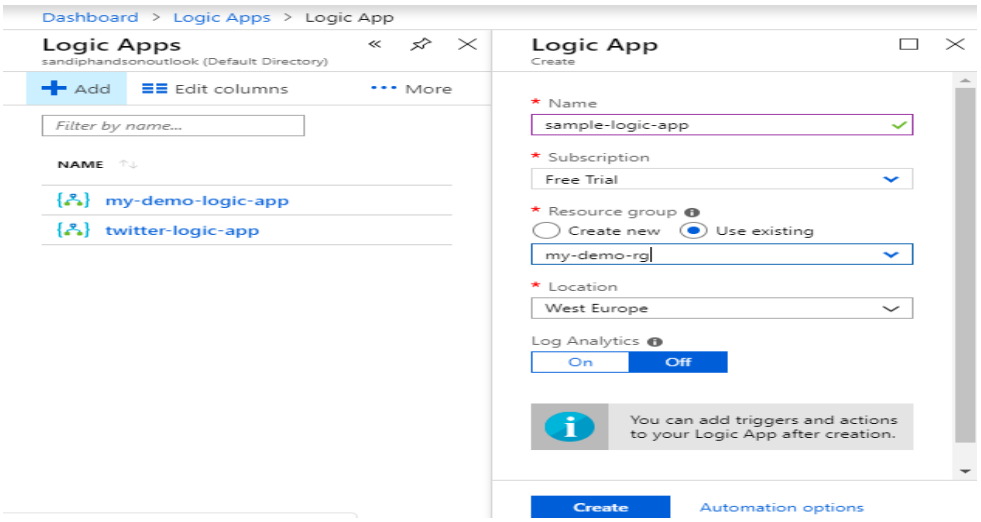
* Pricing tier (View full pricing details)
S (1000 Calls per minute)
* Resource group
my-demo-rg
Create new
Create
Automation options

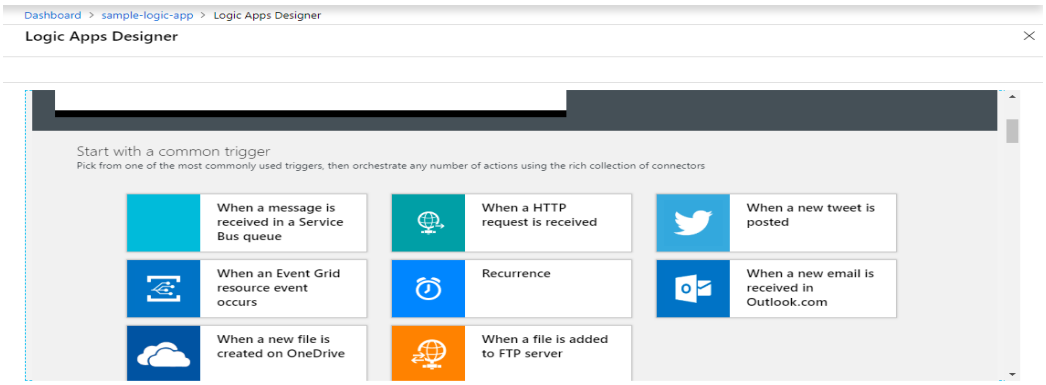




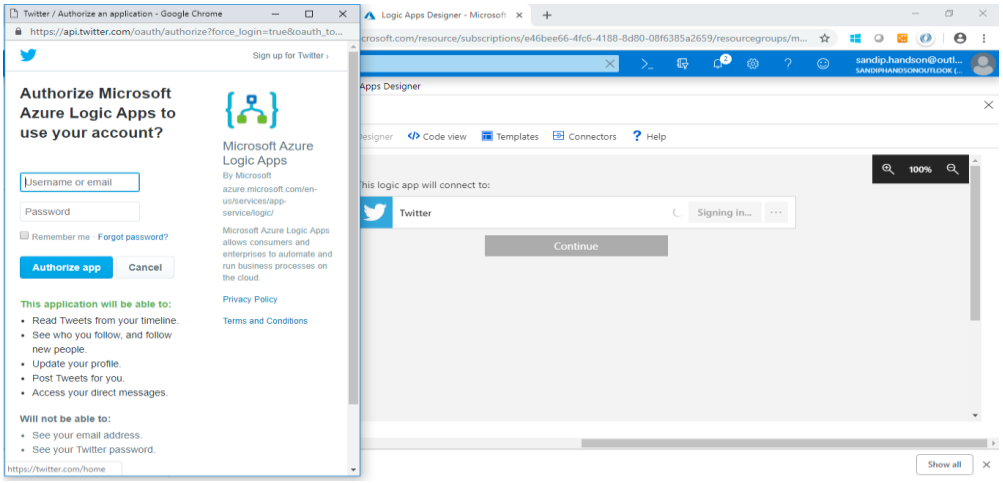
Step 2 – Create a Logic App (workflow engine) as below:

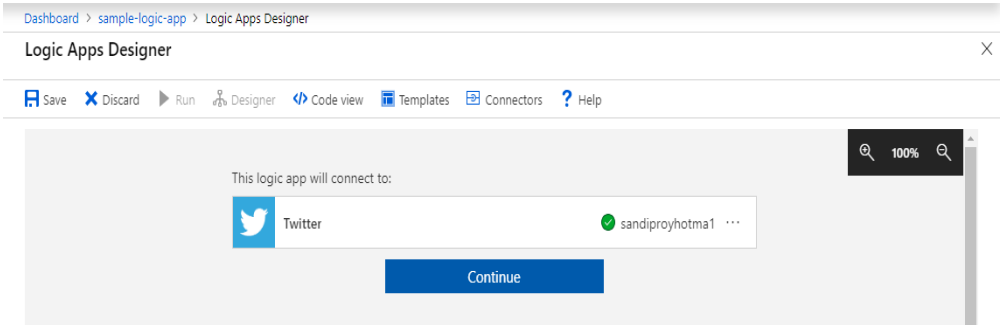


Select Twitter as entry triggering point i.e. start workflow when a new tweet is posted.

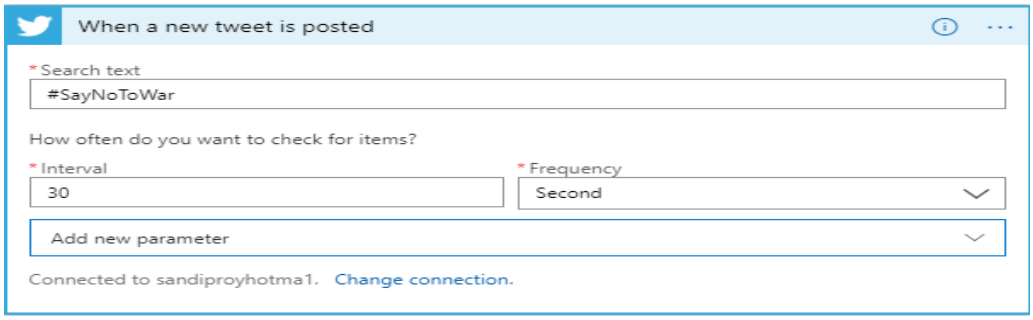


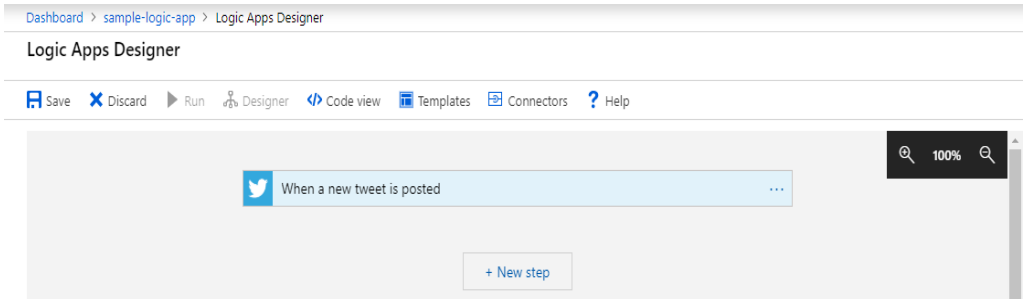
And authorize the Azure service to fetch data from Twitter through existing login.



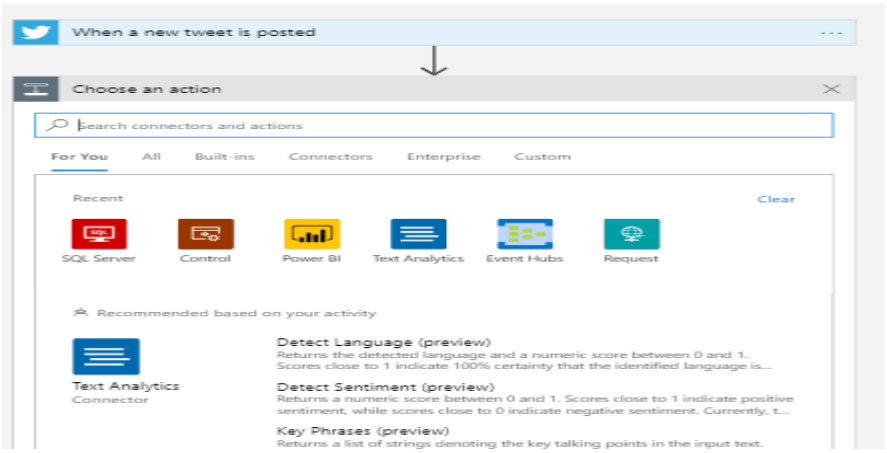


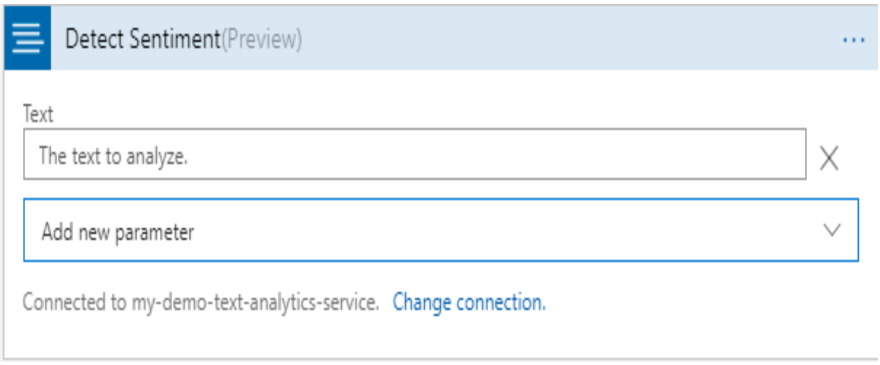
Now mark the particular event we want to capture through Twitter and also specify the frequency of the trigger/invocation.

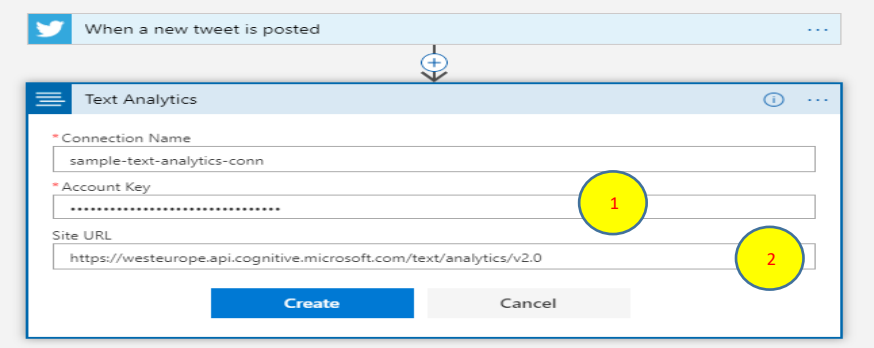




Once the tweet action is designed, choose previously created Text Analytics service so that Twitter data (Text) is feed into the Text Analytics engine.







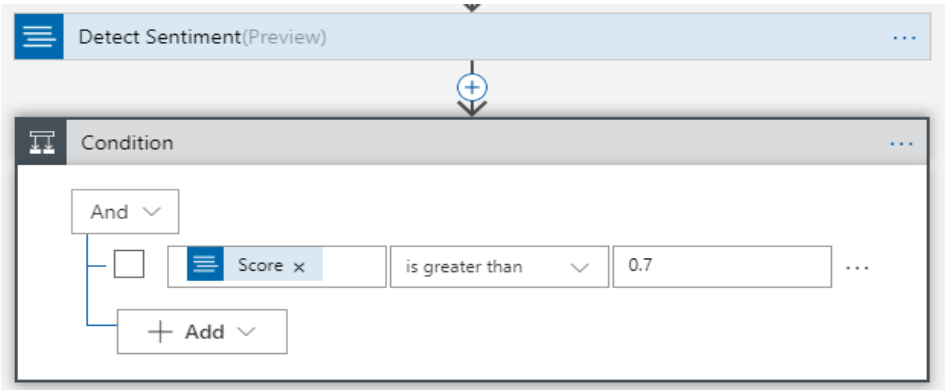
Once Text Analytics engine is integrated with Twitter output text, it will start analysing the Tweet Text and assign score indicating the sentiment for the same.

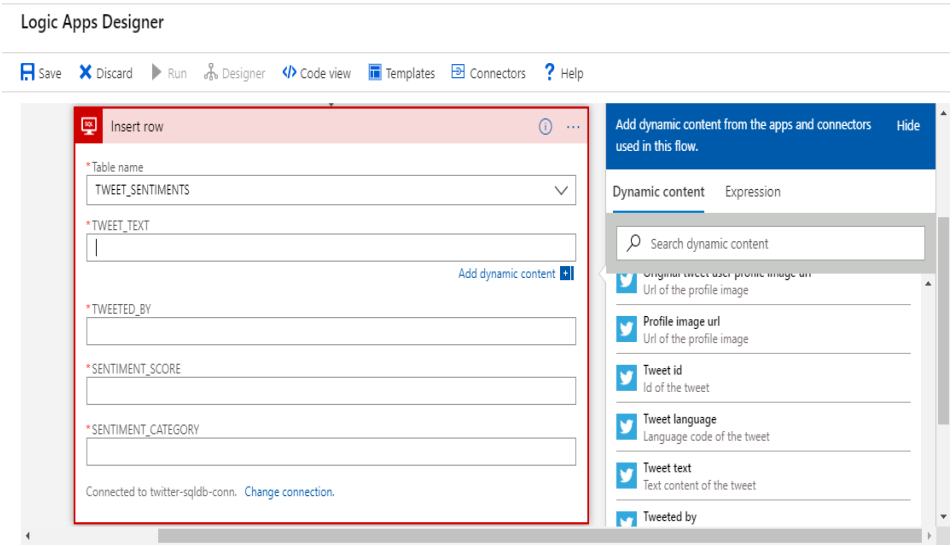
Please note that the Text Analytics API returns a numeric score (generated using classification techniques) between 0 and 1. Scores close to 1 indicate positive sentiment, and scores close to 0 indicate negative sentiment. To be more exact - scores between 0 to 0.3 indicates negative, 0.3 to 0.7 neutral and 0.7 to 1 positive sentiment.

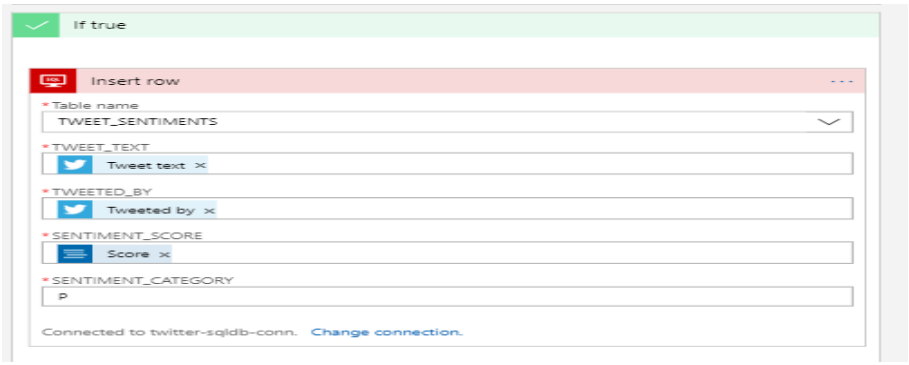
Once the sentiments are available to us, we can store them against each tweets in persistent layer (e.g. Azure SQL DB) for further reporting purpose.

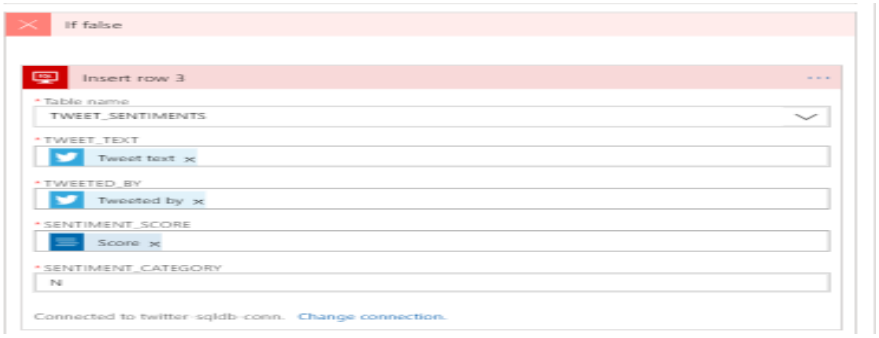
We will develop a small logic using Logic App's Condition action to store sentiment category (i.e. positive [P], negative [N] or neutral [U]) along with the Tweet text, Tweet created by and Tweet score.

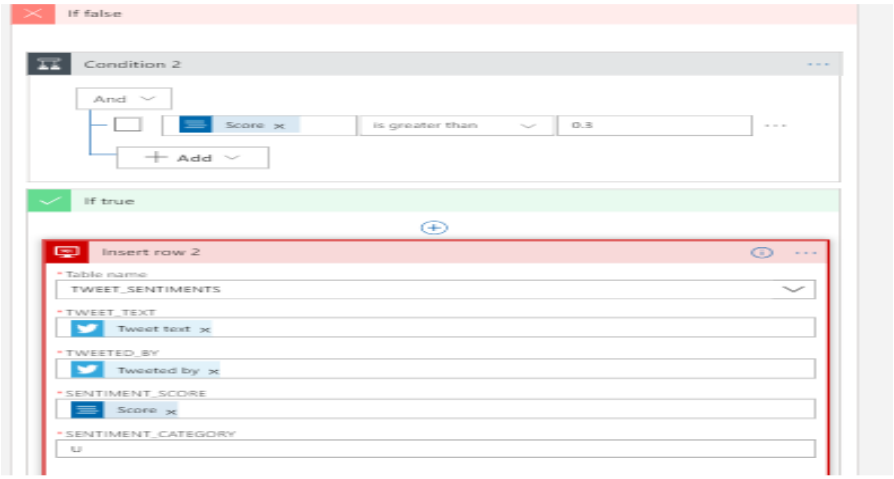
```
IF [ SCORE > 0.7 ]
        INSERT ROW IN SQL DB WITH POSITIVE sentiment (indicator 'P')
ELSE
        IF [ SCORE > 0.3 ]
                INSERT ROW IN SQL DB WITH NEUTRAL sentiment (indicator 'U')
        ELSE
                INSERT ROW IN SQL DB WITH NEGATIVE sentiment (indicator 'N')
        END

END
```



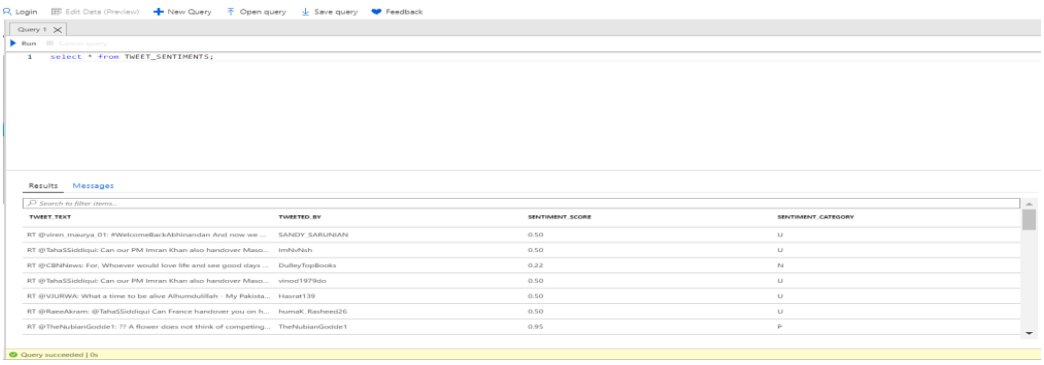

Logic Apps Designer
Save
Discard
Run
Designer
Code view
Templates
Connectors
Help
Insert row
*Table name
TWEET_SENTIMENTS
*TWEET_TEXT
Add dynamic content
*TWEETED_BY
*SENTIMENT_SCORE
*SENTIMENT_CATEGORY
Connected to twitter-sqldb-conn. Change connection.
Add dynamic content from the apps and connectors used in this flow.
Hide
Dynamic content
Expression
Search dynamic content
Profile image url
Url of the profile image
Tweet id
Id of the tweet
Tweet language
Language code of the tweet
Tweet text
Text content of the tweet
Tweeted by


If true
Insert row
*Table name
TWEET_SENTIMENTS
*TWEET_TEXT
Tweet text
*TWEETED_BY
Tweeted by
*SENTIMENT_SCORE
Score
*SENTIMENT_CATEGORY
P
Connected to twitter-sqldb-conn. Change connection.


If false
Insert row 3
*Table name
TWEET_SENTIMENTS
*TWEET_TEXT
Tweet text
*TWEETED_BY
Tweeted by
*SENTIMENT_SCORE
Score
*SENTIMENT_CATEGORY
N
Connected to twitter-sqldb-conn. Change connection.

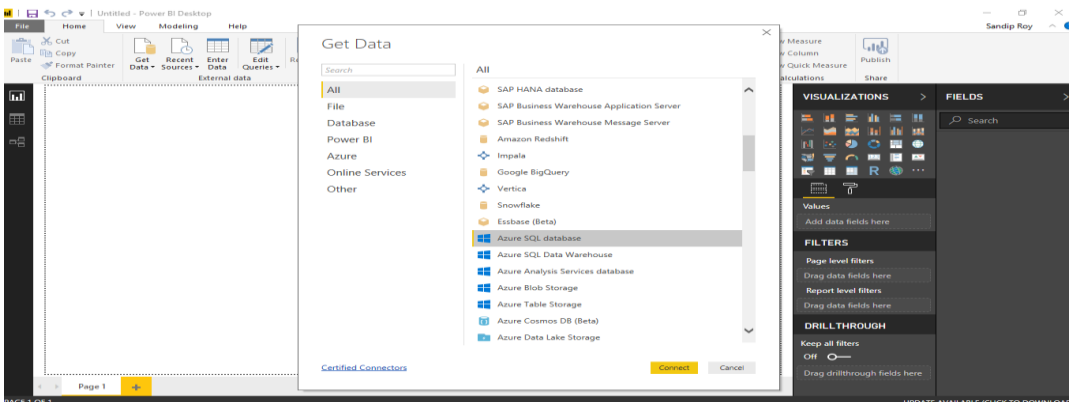


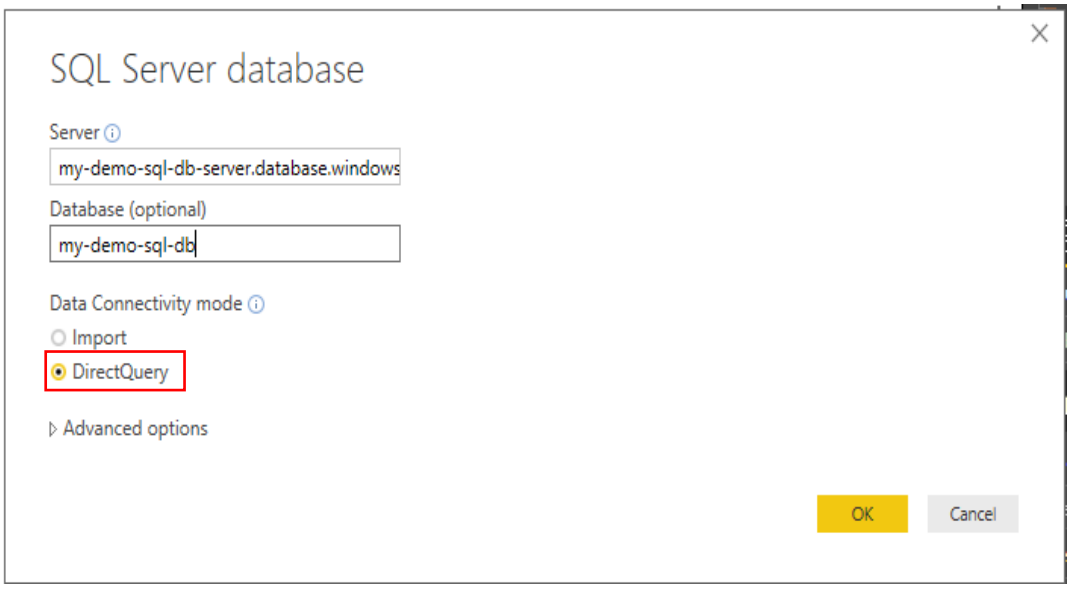
Once we have designed the record capturing in SQL DB, run the Logic App and go to SQL DB window to see the tweets getting captured there.



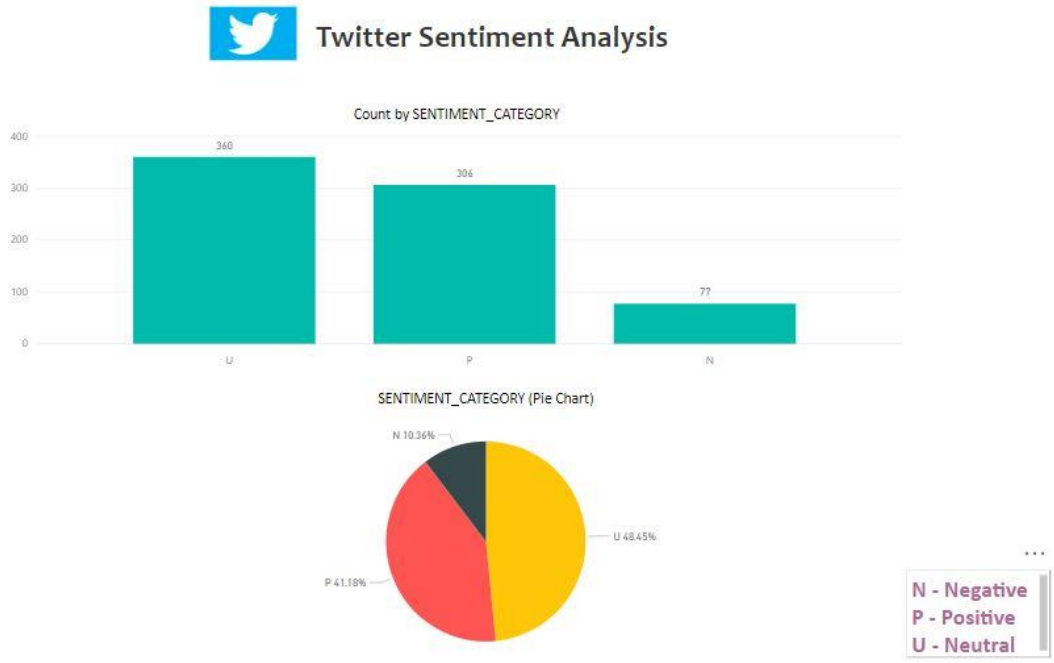
Step 3 – Launch Power BI application from Desktop and establish connection (no data import in Power BI but allow direct execution against SQL DB) with Azure SQL DB.

Please note while connecting Azure SQL DB server outside from Azure (e.g. Reporting tools Power BI Desktop or any Database Client) make sure that your client IP is empowered to connect the DB server.





Sample Dashboard (shown below)



5. References

https://docs.microsoft.com/en-us/azure/cognitive-services/text-analytics/overview
https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-overview