

Task-5: Write a Spark trigger based on the processing time. Execute the streaming query of No. 4 above at regular 10 minute intervals. After 3 hours the streaming should automatically stop.

Step 1: Login to HADOOP CLUSTER and Navigate to Pyspark using pyspark command

```
(base) Achyuthas-MacBook-Air:~ achyuthanagaveti$ ssh anagave@hadoop-nn001.cs.okstate.edu
anagave@hadoop-nn001.cs.okstate.edu's password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.4.0-62-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Last login: Fri Apr  2 02:02:28 2021 from 10.200.206.99
```

```
anagave@hadoop-nn001:~$ pyspark
```

```
Welcome to
      ____
     /  _ \   _ __   ___
    /  /_  \ / __ `\/ __ \|
   /___/\__/_/ \_,_/___/|___/
version 3.0.1

Using Python version 3.8.5 (default, Jan 27 2021 15:41:15)
SparkSession available as 'spark'.
```

Step 2: Open two terminals with two spark session. One will act as listener and other will be the data sender.

```
. . . achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...  
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflect  
ive access operations  
WARNING: All illegal access operations will be denied in a future release  
2021-04-02 02:52:06,821 WARN util.NativeCodeLoader: Unable to load native-hadoop  
library for your platform... using builtin-java classes where applicable  
Setting default log level to "WARN".  
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLeve  
l(newLevel).  
2021-04-02 02:52:08,483 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4040. Attempting port 4041.  
2021-04-02 02:52:08,484 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4041. Attempting port 4042.  
2021-04-02 02:52:09,845 WARN yarn.Client: Neither spark.yarn.jars nor spark.yarn  
.archive is set, falling back to uploading libraries under SPARK_HOME.  
Welcome to
```

```
      _--_          _--_  
     / \    / \   / \    / \  
    /\  V  /\  V /\  V  /\  '  
   /__/_/\_.\/_\_/\\_/_/\_ version 3.0.1  
    /____\_____/  
   /___/         \  
  /_____\       /
```

```
Using Python version 3.8.5 (default, Jan 27 2021 15:41:15)  
SparkSession available as 'spark'.  
>>> 
```

```
. . . achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...  
  
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLeve  
l(newLevel).  
2021-04-02 02:52:12,199 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4040. Attempting port 4041.  
2021-04-02 02:52:12,200 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4041. Attempting port 4042.  
2021-04-02 02:52:12,201 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4042. Attempting port 4043.  
2021-04-02 02:52:12,201 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4043. Attempting port 4044.  
2021-04-02 02:52:12,201 WARN util.Utils: Service 'SparkUI' could not bind on por  
t 4044. Attempting port 4045.  
2021-04-02 02:52:13,492 WARN yarn.Client: Neither spark.yarn.jars nor spark.yarn  
.archive is set, falling back to uploading libraries under SPARK_HOME.  
Welcome to
```

```
      _--_          _--_  
     / \    / \   / \    / \  
    /\  V  /\  V /\  V  /\  '  
   /__/_/\_.\/_\_/\\_/_/\_ version 3.0.1  
    /____\_____/  
   /___/         \  
  /_____\       /
```

```
Using Python version 3.8.5 (default, Jan 27 2021 15:41:15)  
SparkSession available as 'spark'.  
>>>
```

Step 3: Type the code as in

Achyutha_NagavetiBhavaniSanthoshi_Program_4 file, Type Listener session in one terminal and Type Data Sender session in other terminal.

Step 4: Import all the required packages

```
>>> import tweepy
>>> from tweepy import OAuthHandler
>>> from tweepy import Stream
>>> from tweepy.streaming import StreamListener
>>> import socket
>>> import json
>>> from datetime import datetime
>>> now = datetime.now()
[>>> print(now)
2021-04-02 02:53:03.315525]
```

Step 5: Give the access tokens and API tokens from twitter developer account

```
>>> access_token = "1163449936140222464-RtMJqcl1kbvtd0m8uAHTF3TkMp3bLP"
>>> access_secret = "9GFCAce7BMWHfPcUjYkdqomZ9Ix1GjLQei4XhpAyvl1Fw"
>>> consumer_key = "U20Ejib46e1u0V2dva3FXkTim"
>>> consumer_secret = "l1GqrSuXUNyz3767ZGaQDeJTLr4AcJCZ5lVwUraeDKxiXchxuu"]
```

Step 6: Create a class for tweets listener

```
>>> class TweetsListener(StreamListener):
[...     def __init__(self, csocket):
[...         self.client_socket = csocket
[...     def on_data(self, data):
[...         try:
[...             msg = json.loads(data)
[...             print(msg['text'].encode('utf-8'))
[...             self.client_socket.send(msg['text'].encode('utf-8'))
[...             return True
[...         except BaseException as e:
[...             print("Something is wrong : %s" % str(e))
[...             return True
[...     def on_error(self, status):
[...         print(status)
[...         return True
[...
[>>> def sendData(c_socket,Keyword):
[...     auth = OAuthHandler(consumer_key, consumer_secret)
[...     auth.set_access_token(access_token, access_secret)
[...     twitter_stream = Stream(auth, TweetsListener(c_socket))
[...     twitter_stream.filter(track=Keyword, languages=["en"])
[... ]
```

Step 7: Specify the get the host name through socket connection and Mention the port for listening and give required address.

```
>>> s = socket.socket()
>>> host = socket.gethostname()

>>> port = 5566
>>> s.bind((host, port))
>>> print("Listening on port: %s" % str(port))
Listening on port: 5566
>>> s.listen(5)
>>> c, addr = s.accept()
>>> print("Received request from: " + str(addr))
Received request from: ('192.168.122.2', 57122)
```

Step 8: Create a sender session and type the code as in Achyutha_NagavetiBhavaniSanthoshi_Program_4 file. Firstly, Import all required packages

```
>>> import pyspark
>>> from pyspark.sql import SparkSession
>>> from pyspark.sql.functions import *
>>> from pyspark.sql.types import *
>>> import pyspark.sql.functions as F
>>> from datetime import datetime
>>> session = SparkSession.builder.appName("Twitter-stream").master("local[*]").getOrCreate()
>>> now = datetime.now()
>>> print(now)
2021-04-02 02:58:18.963137
```

Step 9: Create a def for Data preprocessing

```
>>> def preprocessing(lines):
...     words = lines.select(explode(split(lines.value, "t_end")).alias("word"))
...     words = words.na.replace('', None)
...     words = words.na.drop()
...     words = words.withColumn('word', F.regexp_replace('word', r'http\S+', ''))
... )
...     words = words.withColumn('word', F.regexp_replace('word', '@\w+', ''))
...     words = words.withColumn('word', F.regexp_replace('word', '#', ''))
...     words = words.withColumn('word', F.regexp_replace('word', 'RT', ''))
...     words = words.withColumn('word', F.regexp_replace('word', ':', ''))
...     words = words.withColumn('word', F.regexp_replace('word', '[^a-z_A-Z ]', ''))
... )
...     words = words.withColumn('word', F.regexp_replace('word', "###$$$123&&'?!_!_", '[^:alnum:]' ' '), ' ')
...     return words
... 
```

Step 10: Create variables for lines and words which will be used for preprocessing

```
[>>> lines = session.readStream.format("socket").option("host", "hadoop-nn001.cs.okstate.edu").option("port", 5566).load()
2021-04-02 03:00:09,239 WARN sources.TextSocketSourceProvider: The socket source
should not be used for production applications! It does not support recovery.
[>>> words = preprocessing(lines)
```

Step 11: Use filter to search for the keywords NASA and Mars. Using a query the count is displayed.



```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
b'@fran_raga @LEGO_Group @NASA @esa Spent all day yesterday putting it together.
Started at 2pm ended at 2am.'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut https://t.co/1UGnw4VJta'
b'@stargate_ro @GeoffdBarrett @Commercial_Crew @SpaceX @Space_Station @astro_kim
brought @Astro_Megan @Thom_astro\Xe2\x80\xa6 https://t.co/fNcQXPYhgj'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @ZackSnyder: We live in a society... where you can watch #ZackSnydersJustic
eLeague on @HBOMax. https://t.co/8l3CwvynZq #SnyderCut #UsUn\Xe2\x80\xa6'
b'RT @NASAHubble: Formed from the death of a star about 20 times the size of our
Sun, the Veil Nebula proves that surprising astronomical bea\Xe2\x80\xa6'
b'RT @ZackSnyder: We live in a society... where you can watch #ZackSnydersJustic
eLeague on @HBOMax. https://t.co/8l3CwvynZq #SnyderCut #UsUn\Xe2\x80\xa6'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut https://t.co/1UGnw4VJta'
b'Stay inlove mars,\Xe2\x9d\xa6'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @FitzLeakz: BRUNO MARS EMOTE! https://t.co/LpovzUNFPz'
b'RT @konstruktivizm: These diagrams show the paths traced by Mercury, Venus, Ma
rs, Jupiter and Saturn as seen from Earth. \n by TheEternal ht\Xe2\x80\xa6'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @FitzLeakz: BRUNO MARS EMOTE! https://t.co/LpovzUNFPz'
b'@teslaownersSV @Snowy273 @elonmusk im a cynical bastard and im thinking theres
no way that little legs held up that\Xe2\x80\xa6 https://t.co/Zl5A0tmP1W'
b'if its real that's an insta cop for me'

[>>> lines = session.readStream.format("socket").option("host", " ").option("port", 5599).load()
File "<stdin>", line 1
lines = session.readStream.format("socket").option("host", " ").option("port", 5599).load()
^
SyntaxError: invalid syntax
[>>> lines = session.readStream.format("socket").option("host", "hadoop-nn001.cs.okstate.edu").option("port", 5599).load()
2021-04-02 12:46:17,767 WARN sources.TextSocketSourceProvider: The socket source
should not be used for production applications! It does not support recovery.
[>>> words = preprocessing(lines)
[>>> filtered = words.withColumn('word', explode(split(col('word'), ' '))) \
...
... .groupBy('word') \
...
... .count() \
...
... .sort('count', ascending=False). \
...
... filter((col('word').contains('NASA')) | (col('word').contains('Mars')))
[>>> query_triggered = filtered.writeStream\
...
... .outputMode("complete")\
...
... .format("memory")\
...
... .queryName("count_triggered")\
...
... .trigger(processingTime='10 minutes')\
...
... .start()
2021-04-02 12:46:48,526 WARN streaming.StreamingQueryManager: Temporary checkpoint location created which is deleted normally when the query didn't fail: /tmp/temporary-28534694-4b86-48ca-826d-7eba6e26b0b2. If it's required to delete it under any circumstances, please set spark.sql.streaming.forceDeleteTempCheckpointLocation to true. Important to know deleting temp checkpoint folder is best effort
```

Step 12: The Query will be listened by the listener spark session and wait till the stages are finished.

```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
...     except BaseException as e:
...         print("Something is wrong : %s" % str(e))
...         return True
...     def on_error(self, status):
...         print(status)
...         return True
...
>>> def sendData(c_socket,Keyword):
...     auth = OAuthHandler(consumer_key, consumer_secret)
...     auth.set_access_token(access_token, access_secret)
...     twitter_stream = Stream(auth, TweetsListener(c_socket))
...     twitter_stream.filter(track=Keyword, languages=["en"])
...
>>> s = socket.socket()
>>> host = socket.gethostname()
>>> port = 5599
>>> s.bind((host, port))
>>> print("Listening on port: %s" % str(port))
Listening on port: 5599
>>> s.listen(5)
>>> c, addr = s.accept()
>>> print("Received request from: " + str(addr))
Received request from: ('192.168.122.2', 35164)
>>> sendData(c,Keyword=['NASA','Mars'])

achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
>>> lines = session.readStream.format("socket").option("host","hadoop-nn001.cs.okstate.edu").option("port", 5599).load()
2021-04-02 12:46:17,767 WARN sources.TextSocketSourceProvider: The socket source should not be used for production applications! It does not support recovery.
>>> words = preprocessing(lines)
>>> filtered = words.withColumn('word', explode(split(col('word'), ' '))) \
...     .groupBy('word') \
...     .count() \
...     .sort('count', ascending=False) \
...     .filter((col('word').contains('NASA')) | (col('word').contains('Mars'))))
>>> query_triggered = filtered.writeStream\
...     .outputMode("complete")\
...     .format("memory")\
...     .queryName("count_triggered")\
...     .trigger(processingTime='10 minutes')\
...     .start()
2021-04-02 12:46:48,526 WARN streaming.StreamingQueryManager: Temporary checkpoint location created which is deleted normally when the query didn't fail: /tmp/temporary-28534694-4b86-48ca-826d-7eba6e26b0b2. If it's required to delete it under any circumstances, please set spark.sql.streaming.forceDeleteTempCheckpointLocation to true. Important to know deleting temp checkpoint folder is best effort
```


Step 13: Wait till the stages are completed (Stages are highlighted in below screenshots)



```
... except BaseException as e:
...     print("Something is wrong : %s" % str(e))
...     return True
... def on_error(self, status):
...     print(status)
...     return True
...
>>> def sendData(c_socket,Keyword):
...     auth = OAuthHandler(consumer_key, consumer_secret)
...     auth.set_access_token(access_token, access_secret)
...     twitter_stream = Stream(auth, TweetsListener(c_socket))
...     twitter_stream.filter(track=Keyword, languages=["en"])
...
>>> s = socket.socket()
>>> host = socket.gethostname()
>>> port = 5599
>>> s.bind((host, port))
>>> print("Listening on port: %s" % str(port))
Listening on port: 5599
>>> s.listen(5)
>>> c, addr = s.accept()
>>> print("Received request from: " + str(addr))
Received request from: ('192.168.122.2', 35164)
>>> sendData(c,Keyword=['NASA','Mars'])

>>> lines = session.readStream.format("socket").option("host","hadoop-nn001.cs.okstate.edu...
kstate.edu").option("port", 5599).load()
2021-04-02 12:46:17,767 WARN sources.TextSocketSourceProvider: The socket source
should not be used for production applications! It does not support recovery.
>>> words = preprocessing(lines)
>>> filtered = words.withColumn('word', explode(split(col('word'), ' '))) \
...     .groupBy('word') \
...     .count() \
...     .sort('count', ascending=False) \
...     .filter((col('word').contains('NASA')) | (col('word').contains('M
ars')))
>>> query_triggered = filtered.writeStream\
...     .outputMode("complete")\
...     .format("memory")\
...     .queryName("count_triggered")\
...     .trigger(processingTime='10 minutes')\
...     .start()
2021-04-02 12:46:48,526 WARN streaming.StreamingQueryManager: Temporary checkpoi
nt location created which is deleted normally when the query didn't fail: /tmp/t
emporary-28534694-4b86-48ca-826d-7eba6e26b0b2. If it's required to delete it und
er any circumstances, please set spark.sql.streaming.forceDeleteTempCheckpointLo
cation to true. Important to know deleting temp checkpoint folder is best effort

[Stage 3:=====> (156 + 2) / 200]
```

Step 14: Output for every 10 minutes. Execution started at **12:46**

Output 1 : 12:55

Output 2 : 13:08

Output 3 : 13:18

Output 1:

```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
b'RT @FitzyLeakz: BRUNO MARS EMOTE! https://t.co/LpovzUNFPz'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @ZackSnyder: We live in a society... where you can watch #ZackSnydersJustic
eLeague on @HBOMax. https://t.co/8l3CwvynZq #SnyderCut #UsUn\xe2\x80\xa6'
b'LETS FUCKING GOOOOOOOO LETS FUCKING GOOOOOOO'
b'Easy, Mars can cut. https://t.co/DsnEbtMiDA'
b'RT @JacyKhan: Feels like Geeta from Swades in a simple Pink cotton saree &
calm village like surrounding \xf0\x9f\x8c\xb8 \n\nWaiting for my Handsome Moha
n\xe2\x80\xa6'
b'Hustler Music\nRight above it'
b'RT @NASAEarth: The coastal state of Sinaloa is one of the largest shrimp farmi
ng regions in #Mexico. Vast areas of wetland (blue-green) and\xe2\x80\xa6'
b"RT @kidmingyu: who expected bruno mars and hoshi's first meeting will be on th
e charts \xf0\x9f\xa4\xa3 https://t.co/ntNzfgKKjH"
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'wait no this is groovy asf. cop!'
b'RT @FitzyLeakz: BRUNO MARS EMOTE! https://t.co/LpovzUNFPz'
b'mars. disgusting chocolate'
b'RT @CaseyDreier: A quick recap of our Day of Action:\n\n* 167 congressional me
etings\n* 145 participants from 30 different states\n* More than\xe2\x80\xa6'
b'@boonecutler ""In reaching this conclusion, the Board concluded that there was
no evidence supporting Santos\xe2\x80\x99s clai\xe2\x80\xa6 https://t.co/NSGXFh
1uhY'

achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
>>> print(datetime.now())
2021-04-02 12:55:37.754789
>>> session.sql("select * from count_triggered").show(vertical=True,truncate=Fal
se)
-RECORD 0-----
word | Mars
count | 43
-RECORD 1-----
word | NASA
count | 9
-RECORD 2-----
word | NASAs
count | 2
-RECORD 3-----
word | UsUnNASA
count | 2
-RECORD 4-----
word | UsUnNASArecently
count | 1
-RECORD 5-----
word | MarsBounty
count | 1
-RECORD 6-----
word | SailorMars
count | 1
-RECORD 7-----
word | RestoreTheSnyderVerseMars
count | 1
>>>
```


Output 2:

```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
b'RT @Hauwa_L: Me, as Elon Musk\'s wife.\n\n"Baby, I\'ve sold Mars ticket to 2,0
00 people o"\n\nElon: What?! The space ship is not working yet.\n\nMe\xe2\x80\xa
6'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @NASA_Marshall: Since its 2018 landing, @NASAInSight has detected more than
500 'marsquakes' on the Red Planet\xe2\x80\x94with two of the strongest\xe2\x80
\xa6"
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @ZackSnyder: We live in a society... where you can watch #ZackSnydersJustic
eLeague on @HBOMax. https://t.co/8l3CwvynZq #SnyderCut #UsUn\xe2\x80\xa6'
b'RT @Hauwa_L: Me, as Elon Musk\'s wife.\n\n"Baby, I\'ve sold Mars ticket to 2,0
00 people o"\n\nElon: What?! The space ship is not working yet.\n\nMe\xe2\x80\xa
6'
b'And because that was too much earnestness for my irony-poisoned brain, I will
leave you with this Russian meme from\xe2\x80\xa6 https://t.co/PiK22wMMbg'
b'RT @ShiinaBR: UPCOMING BRUNO MARS EMOTE\n\n(Thanks to @FrenzyLeaks for sending
me the post!) https://t.co/TCwjUnowxS'
b'@databourg April 3, 1926: Birth of US astronaut \xe2\x80\x94\xe2\x80\x94c Gr
issom (\xe2\x80\x94 January 27, 1967). He was crew member on space mi\xe2\x80\x
a6 https://t.co/fATSa6LB46'
b'RT @space360: NASA\xe2\x80\x94s Perseverance rover\xe2\x80\x94s latest images
of the surface of Mars. One day humans will step foot on this surface. https://
t.c\xe2\x80\xa6'

>>> print(datetime.now())
2021-04-02 13:08:22.010169
>>> session.sql("select * from count_triggered").show(vertical=True,truncate=Fa
lse)
-RECORD 0-----
word | Mars
count | 322
-RECORD 1-----
word | NASA
count | 57
-RECORD 2-----
word | NASAs
count | 19
-RECORD 3-----
word | SailorMars
count | 4
-RECORD 4-----
word | UsUnNASA
count | 4
-RECORD 5-----
word | VenusMars
count | 3
-RECORD 6-----
word | MarsHelicopter
count | 2
-RECORD 7-----
word | SnyderCutMarsIts
count | 1
-RECORD 8-----
word | UsUnNASArecently
count | 1
-RECORD 9-----
word | beaNASA
count | 1
-RECORD 10-----
word | NASAJPLCal
count | 1
-RECORD 11-----
word | MarsThis
count | 1
-RECORD 12-----
word | SnyderCutMars
count | 1
-RECORD 13-----
word | MarsHoly
count | 1
-RECORD 14-----
word | MarsOdyssey
count | 1
-RECORD 15-----
word | MarsBounty
count | 1
-RECORD 16-----
word | NASAMODIS
count | 1
-RECORD 17-----
word | SacchariNASAs
count | 1
-RECORD 18-----
word | Marss
count | 1
-RECORD 19-----
```

```
-RECORD 19-----  
word | xdddMars  
count | 1  
only showing top 20 rows  
  
>>> 
```

Output 3:

```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
b'RT @HYPEX: Bruno Mars "Leave The Door Open" Emote InGame! (Muted to avoid copy
right) https://t.co/ct1HqLbA26'
b'RT @GermanCoin_GCX: Hi #Cryptonians, \nwe #giveaway for the #holidays 300$ in
$GCX to two of you each!\n\x0f\x9f\x95\x8a\xef\xb8\x8f\x0f\x9f\x95\x8a\xef\xb8\
x8f\x0f\x9f\x95\x8a\xef\xb8\x8f\nJust do this:\n- Followus\n- Re\x02\x80\xa6'
b'@Erdayastronaut @considercosmos @SpacePadreIsle It looks a like Mars!'
b'RT @meiklwagner: Built: 1440. Rebuilt: 2013 - 2021 #BerlinerStadtschloss #Frid
aysForFuture #BerlinerDom_1905 #Berlin\x0f\x9f\x91\x91 #BMW #ClimateChange #\x02
\x80\xa6'
b'RT @NASASolarSystem: It\x02\x80\x99s a new month, stargazers. \x02\x9c\xa8 \xf
0\x9f\x94\xad In April, look for the constellation Leo, Jupiter and Saturn with
the Moon, and the\x02\x80\xa6'
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'@FitzLeakz So possible bruno Mars skin'
b'@fleiers Exactly mars...'
b'RT @NASASolarSystem: It\x02\x80\x99s a new month, stargazers. \x02\x9c\xa8 \xf
0\x9f\x94\xad In April, look for the constellation Leo, Jupiter and Saturn with
the Moon, and the\x02\x80\xa6'
b'RT @latestinspace: Ingenuity helicopter's first flight has been delayed to Apr
il 11th.\n\nvia @NASA https://t.co/dIBTedb5Wm"
b'RT @ray8fisher: We certainly do.\n\n#SnyderCut'
b'RT @rexglacer: Tired & frustrated says a guy who has done nothing in over
a year while collecting his $180++K salary for tweeting!\nYou peop\x02\x80\xa6'
```

```
2021-04-02 13:18:25.481740
>>> session.sql(select * from count_triggered").show(vertical=True,truncate=Fal
se)
-RECORD 0-----
word | Mars
count | 873
-RECORD 1-----
word | NASA
count | 119
-RECORD 2-----
word | NASAs
count | 39
-RECORD 3-----
word | SailorMars
count | 6
-RECORD 4-----
word | MarsHelicopter
count | 4
-RECORD 5-----
word | UsUnNASA
count | 4
-RECORD 6-----
word | VenusMars
count | 3
-RECORD 7-----
word | Marsemote
count | 2
-RECORD 8-----
word | SnyderCutMars
count | 2
-RECORD 9-----
```

```
achyuthanagaveti — ssh anagave@hadoop-nn001.cs.okstate.edu...
-RECORD 9-----
word | Marss
count | 2
-RECORD 10-----
word | Marsquakes
count | 2
-RECORD 11-----
word | SnyderCutMarsIts
count | 1
-RECORD 12-----
word | NASAJPLCaltechUniversity
count | 1
-RECORD 13-----
word | UsUnNASArecently
count | 1
-RECORD 14-----
word | AscenNASAs
count | 1
-RECORD 15-----
word | beaNASA
count | 1
-RECORD 16-----
word | asMars
count | 1
-RECORD 17-----
word | NASAJPLCal
count | 1
-RECORD 18-----
word | MarsThis
count | 1
-RECORD 19-----
```

```
-RECORD 19-----  
word | Marsholy  
count | 1  
only showing top 20 rows  
  
>>> 
```

To stop the query use below command

```
>>> query_triggered.stop()  
>>> triggered_then datetime.now()  
>>> print(triggered_then)  
2021-04-02 13:22:34.379944
```