Principles of Big Data Management

Project Phase - 1

Team Members:
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Goal:

- To Collect Tweets using Twitter's Streaming APIs (e.g., 100K Tweets) (https://dev.twitter.com/docs/streaming-apis)
- Extract all the hashtags and URLs in the tweets
- Run the WordCount example in Apache Hadoop and Apache Spark on the extracted hashtags/URLs and collect the output and log files from Hadoop. Add a README file.

Step 1: Collection of tweets from Twitter Streaming API:

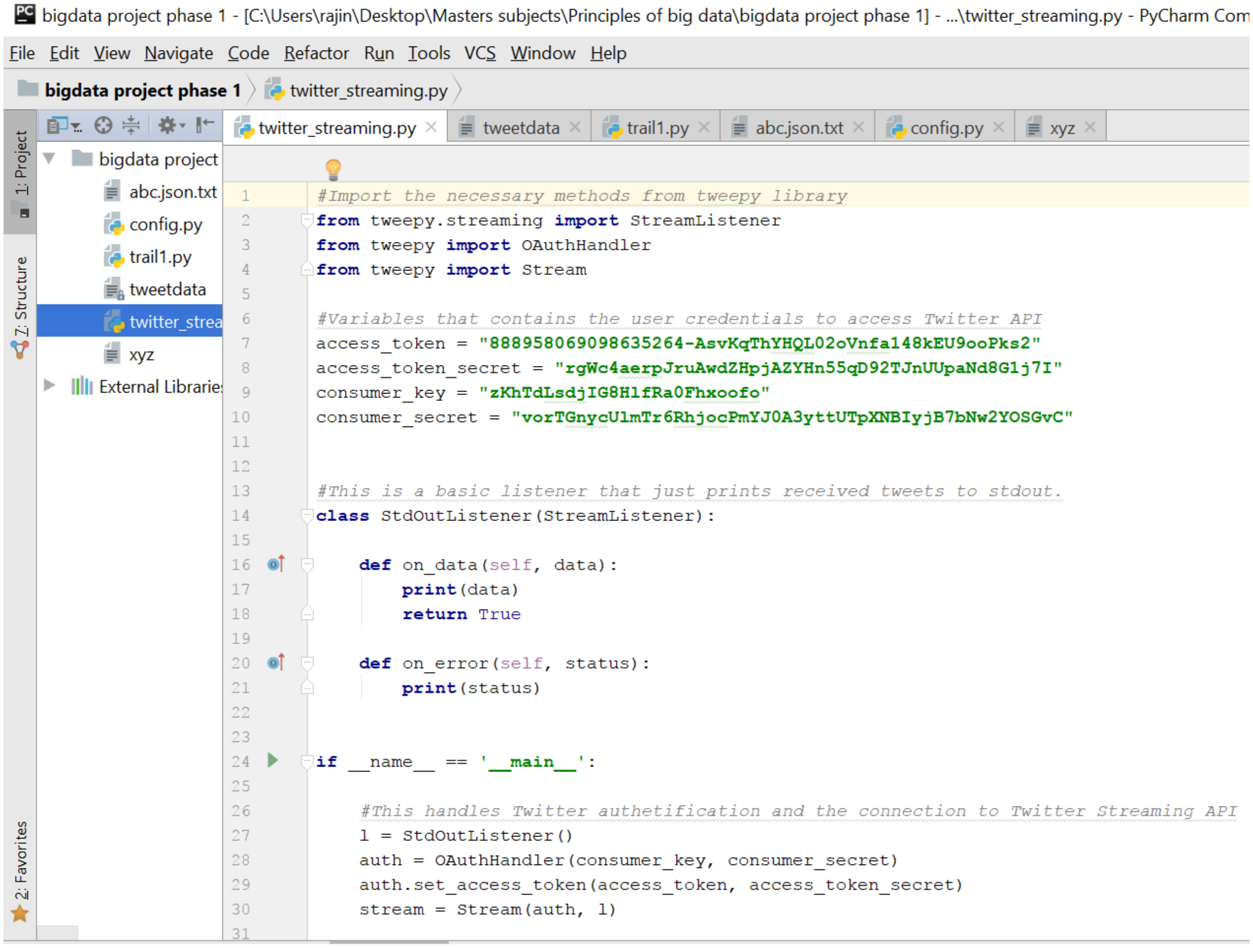
Executed code in python using tweepy library.

Code Used:

```
#Import the necessary methods from tweepy library
from tweepy.streaming import StreamListener
from tweepy import OAuthHandler
from tweepy import Stream

#Variables that contains the user credentials to access Twitter API
access_token = "888958069098635264-AsvKqThYHQL02oVnfa148kEU9ooPks2"
access_token_secret = "rgWc4aerpJruAwdZHpjAZYHn55qD92TJnUUpaNd8G1j7I"
consumer_key = "zKhTdLsdjIG8HlfRa0Fhxoofo"
consumer_secret = "vorTGnycUlmTr6RhjocPmYJ0A3yttUTpXNBIyjB7bNw2YOSGvC"

#This is a basic listener that just prints received tweets to stdout.
class StdOutListener(StreamListener):

   def on_data(self, data):
       print(data)
       return True

   def on_error(self, status):
       print(status)

if __name__ == '__main__':

   #This handles Twitter authentication and the connection to Twitter Streaming API
   l = StdOutListener()
   auth = OAuthHandler(consumer_key, consumer_secret)
   auth.set_access_token(access_token, access_token_secret)
   stream = Stream(auth, l)
```

```
#This line filter Twitter Streams to capture data by the keywords: 'mom'
#stream.filter(track=['hashtags', "(?P<url>https?://[^\s]+)"])
stream.filter(track=["mom"])
```

Code Screenshots :



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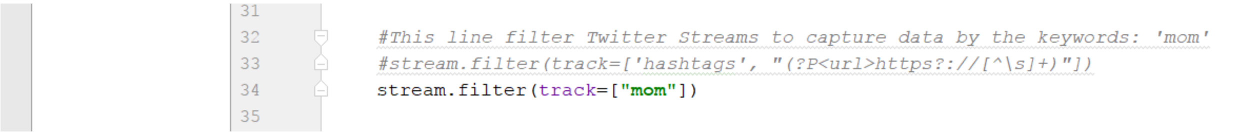

```

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    #stream.filter(track=['hashtags', "(?P<url>https?://[^\s]+)"])
    stream.filter(track=["mom"])

```
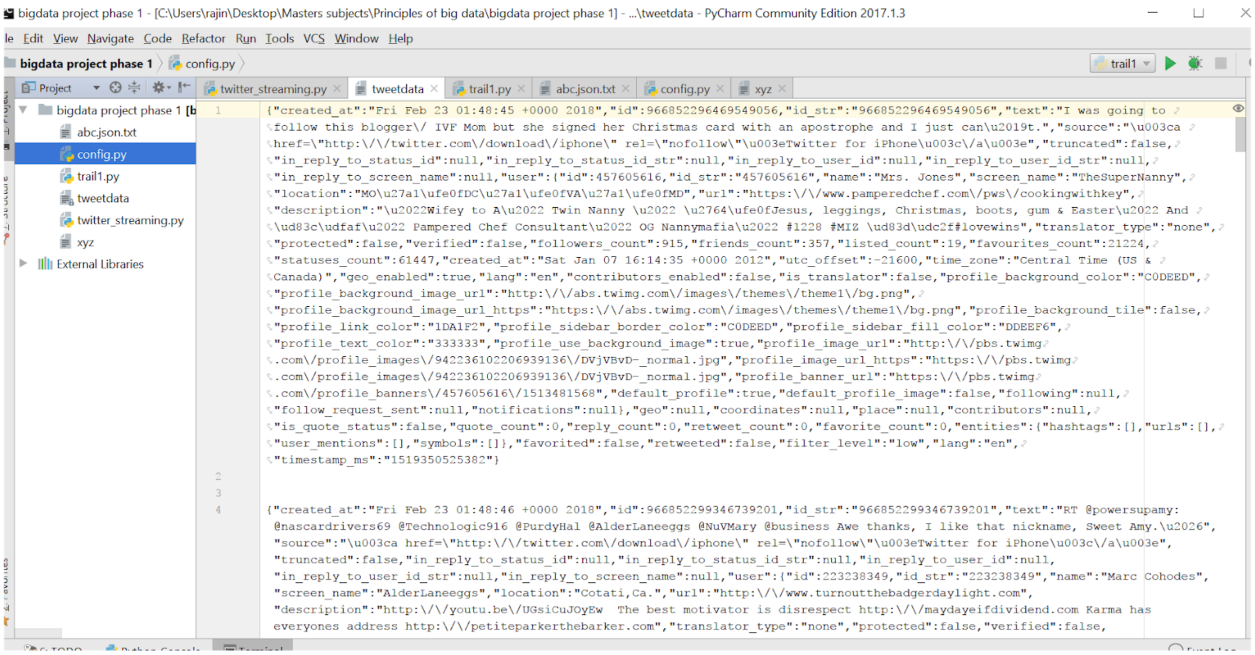

Output Screenshot: Collected Tweets:


bigdata project phase 1 - [C:\Users\rajin\Desktop\Masters subjects\Principles of big data\bigdata project phase 1] - ...\tweetdata - PyCharm Community Edition 2017.1.3
le Edit View Navigate Code Refactor Run Tools VCS Window Help
bigdata project phase 1 〉 config.py 〉
trail1
Project
twitter_streaming.py × tweetdata × trail1.py × abc.json.txt × config.py × xyz ×
bigdata project phase 1 [b
abc.json.txt
config.py
trail1.py
tweetdata
twitter_streaming.py
xyz
External Libraries

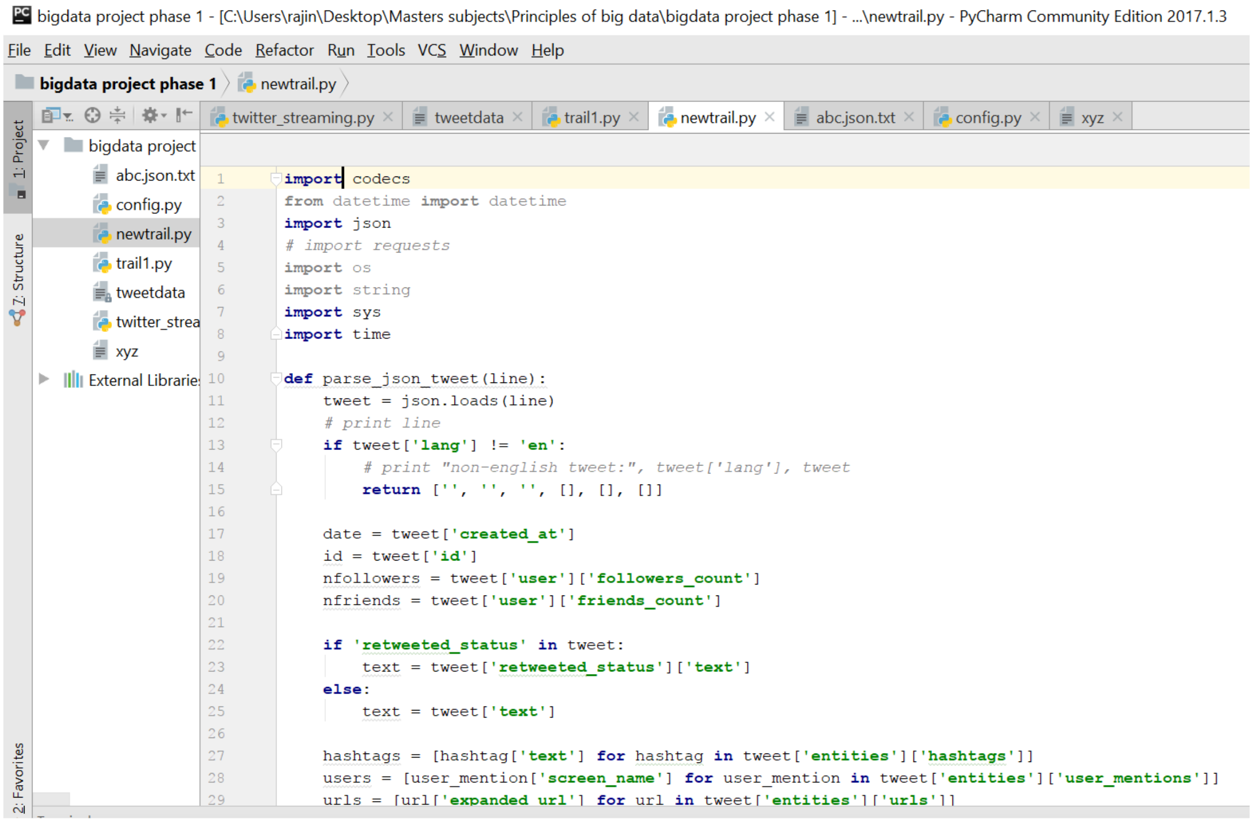
```
{"created_at":"Fri Feb 23 01:48:45 +0000 2018","id":966852296469549056,"id_str":"966852296469549056","text":"I was going to
follow this blogger\/ IVF Mom but she signed her Christmas card with an apostrophe and I just can\u2019t.","source":"\u003ca
href=\"http:\/\/twitter.com\/download\/iphone\" rel=\"nofollow\"\u003eTwitter for iPhone\u003c\/a\u003e","truncated":false,
"in_reply_to_status_id":null,"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,"in_reply_to_user_id_str":null,
"in_reply_to_screen_name":null,"user":{"id":457605616,"id_str":"457605616","name":"Mrs. Jones","screen_name":"TheSuperNanny",
"location":"MO\u27a1\ufe0fDC\u27a1\ufe0fVA\u27a1\ufe0fMD","url":"https:\/\/www.pamperedchef.com\/pws\/cookingwithkey",
"description":"\u2022Wifey to A\u2022 Twin Nanny \u2022 \u2764\ufe0fJesus, leggings, Christmas, boots, gum & Easter\u2022 And
\ud83c\udfaf\u2022 Pampered Chef Consultant\u2022 OG Nannymafia\u2022 #1228 #MIZ \ud83d\udc2f#lovewins","translator_type":"none",
"protected":false,"verified":false,"followers_count":915,"friends_count":357,"listed_count":19,"favourites_count":21224,
"statuses_count":61447,"created_at":"Sat Jan 07 16:14:35 +0000 2012","utc_offset":-21600,"time_zone":"Central Time (US &
Canada)","geo_enabled":true,"lang":"en","contributors_enabled":false,"is_translator":false,"profile_background_color":"C0DEED",
"profile_background_image_url":"http:\/\/abs.twimg.com\/images\/themes\/theme1\/bg.png",
"profile_background_image_url_https":"https:\/\/abs.twimg.com\/images\/themes\/theme1\/bg.png","profile_background_tile":false,
"profile_link_color":"1DA1F2","profile_sidebar_border_color":"C0DEED","profile_sidebar_fill_color":"DDEEF6",
"profile_text_color":"333333","profile_use_background_image":true,"profile_image_url":"http:\/\/pbs.twimg
.com\/profile_images\/942236102206939136\/DVjVBvD-_normal.jpg","profile_image_url_https":"https:\/\/pbs.twimg
.com\/profile_images\/942236102206939136\/DVjVBvD-_normal.jpg","profile_banner_url":"https:\/\/pbs.twimg
.com\/profile_banners\/457605616\/1513481568","default_profile":true,"default_profile_image":false,"following":null,
"follow_request_sent":null,"notifications":null},"geo":null,"coordinates":null,"place":null,"contributors":null,
"is_quote_status":false,"quote_count":0,"reply_count":0,"retweet_count":0,"favorite_count":0,"entities":{"hashtags":[],"urls":[],
"user_mentions":[],"symbols":[]},"favorited":false,"retweeted":false,"filter_level":"low","lang":"en",
"timestamp_ms":"1519350525382"}



{"created_at":"Fri Feb 23 01:48:46 +0000 2018","id":966852299346739201,"id_str":"966852299346739201","text":"RT @powersupamy:
 @nascardrivers69 @Technologic916 @PurdyHal @AlderLaneeggs @NuVMary @business Awe thanks, I like that nickname, Sweet Amy.\u2026",
 "source":"\u003ca href=\"http:\/\/twitter.com\/download\/iphone\" rel=\"nofollow\"\u003eTwitter for iPhone\u003c\/a\u003e",
 "truncated":false,"in_reply_to_status_id":null,"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,
 "in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":223238349,"id_str":"223238349","name":"Marc Cohodes",
 "screen_name":"AlderLaneeggs","location":"Cotati,Ca.","url":"http:\/\/www.turnoutthebadgerdaylight.com",
 "description":"http:\/\/youtu.be\/UGsiCuJOyEw  The best motivator is disrespect http:\/\/maydayeifdividend.com Karma has
 everyones address http:\/\/petiteparkerthebarker.com","translator_type":"none","protected":false,"verified":false,
```

Step 2: Extraction of URLs and hashtags from collected tweets:

Code:

```python
import codecs
from datetime import datetime
import json
import os
import string
import sys
import time

def parse_json_tweet(line):
    tweet = json.loads(line)
    # print line
    if tweet['lang'] != 'en':
        # print "non-english tweet:", tweet['lang'], tweet
        return ['', '', '', [], [], []]

    date = tweet['created_at']
    id = tweet['id']
    nfollowers = tweet['user']['followers_count']
    nfriends = tweet['user']['friends_count']

    if 'retweeted_status' in tweet:
        text = tweet['retweeted_status']['text']
    else:
        text = tweet['text']

    hashtags = [hashtag['text'] for hashtag in tweet['entities']['hashtags']]
    users = [user_mention['screen_name'] for user_mention in
tweet['entities']['user_mentions']]
    urls = [url['expanded_url'] for url in tweet['entities']['urls']]

    media_urls = []
    if 'media' in tweet['entities']:
        media_urls = [media['media_url'] for media in tweet['entities']['media']]

    return [hashtags, urls]

'''start main'''
if __name__ == "__main__":
    file_timeordered_json_tweets = codecs.open(sys.argv[1], 'r', 'utf-8')
    fout = codecs.open(sys.argv[2], 'w', 'utf-8')

    # efficient line-by-line read of big files
    for line in file_timeordered_json_tweets:
        try:
            [tweet_gmttime, tweet_id, text, hashtags, users, urls, media_urls,
nfollowers, nfriends] = parse_json_tweet(
               line)
            #     if not tweet_gmttime: continue
            #     fout.write(line)
            # "created_at":"Mon Feb 17 14:14:44 +0000 2014"
            try:
               c = time.strptime(tweet_gmttime.replace("+0000", ''), '%a %b %d
%H:%M:%S %Y')
            except:
               print("pb with tweet_gmttime", tweet_gmttime, line)
               pass
            tweet_unixtime = int(time.mktime(c))
            #        fout.write(line)
            fout.write(str(
               [tweet_unixtime, tweet_gmttime, tweet_id, text, hashtags, users, urls,
media_urls, nfollowers,
                nfriends]) + "\n")
        except:
            # print "pb with tweet:", line
            #        print sys.exc_info()[0], line
            pass
    file_timeordered_json_tweets.close()
    fout.close()
```

Code Screenshots :



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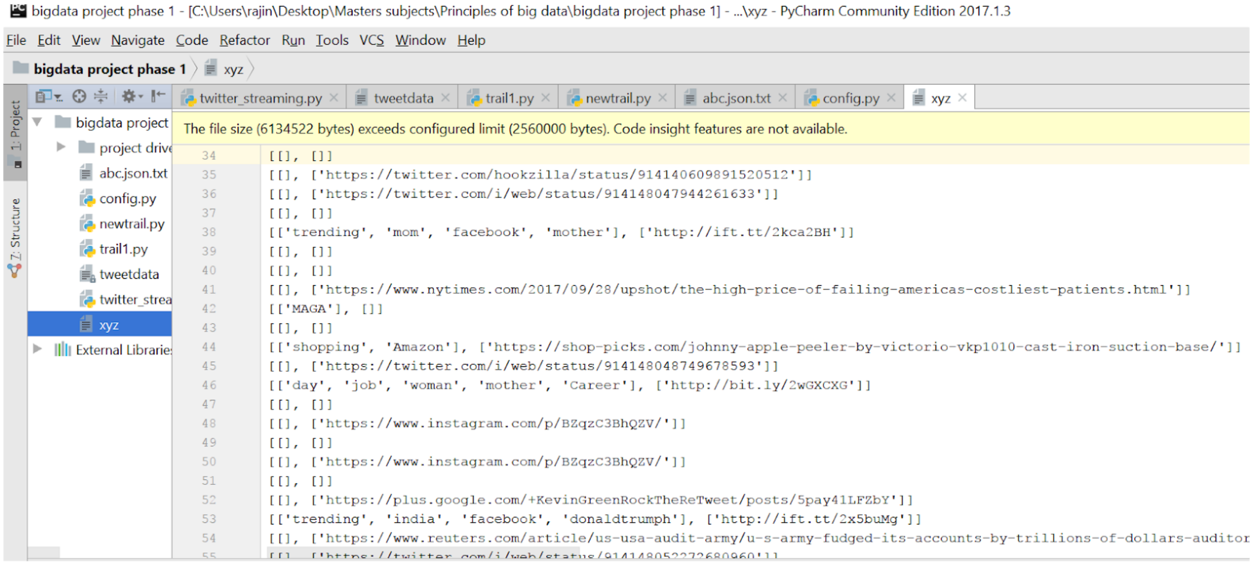
```python
import codecs
from datetime import datetime
import json
# import requests
import os
import string
import sys
import time

def parse_json_tweet(line):
    tweet = json.loads(line)
    # print line
    if tweet['lang'] != 'en':
        # print "non-english tweet:", tweet['lang'], tweet
        return '', '', '', [], [], []

    date = tweet['created_at']
    id = tweet['id']
    nfollowers = tweet['user']['followers_count']
    nfriends = tweet['user']['friends_count']

    if 'retweeted_status' in tweet:
        text = tweet['retweeted_status']['text']
    else:
        text = tweet['text']

    hashtags = [hashtag['text'] for hashtag in tweet['entities']['hashtags']]
    users = [user_mention['screen_name'] for user_mention in tweet['entities']['user_mentions']]
    urls = [url['expanded_url'] for url in tweet['entities']['urls']]
```

Output Screenshot: Extracted URLs and Hashtags:



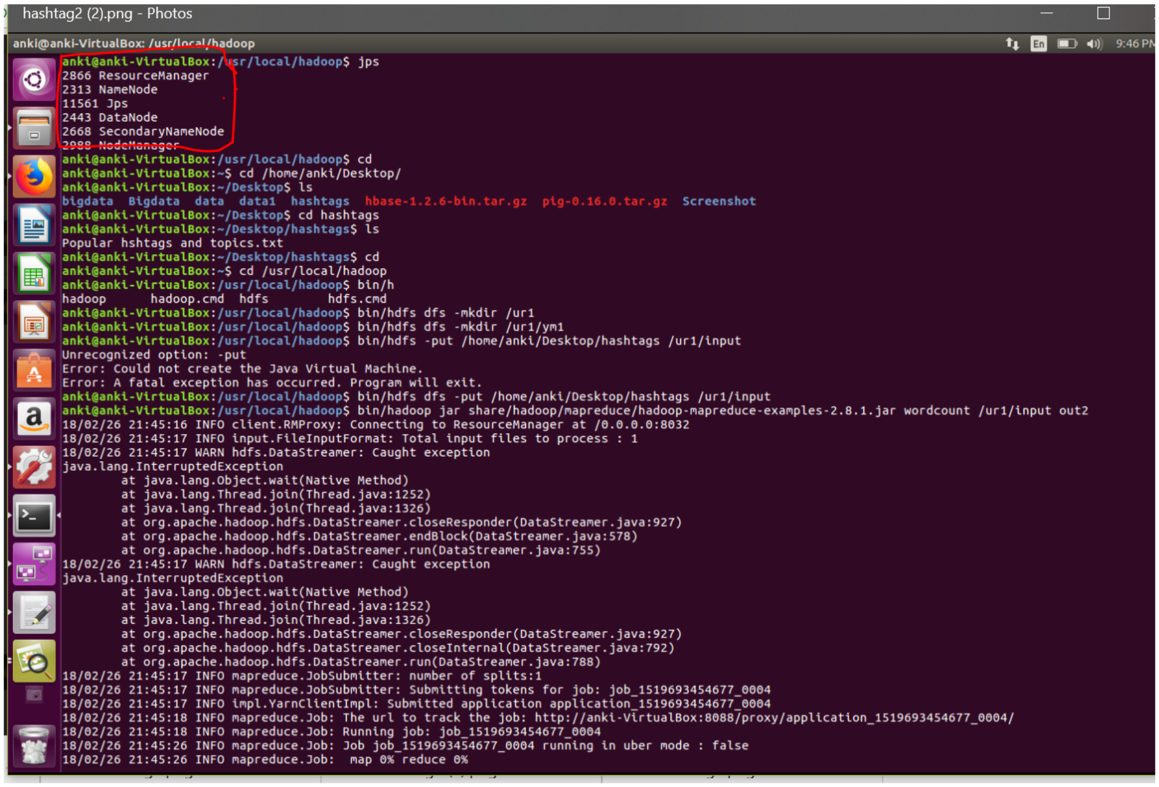
bigdata project phase 1 - [C:\Users\rajin\Desktop\Masters subjects\Principles of big data\bigdata project phase 1] - ...\xyz - PyCharm Community Edition 2017.1.3

The file size (6134522 bytes) exceeds configured limit (2560000 bytes). Code insight features are not available.

```
[[], []]
[[], ['https://twitter.com/hookzilla/status/914140609891520512']]
[[], ['https://twitter.com/i/web/status/914148047944261633']]
[[], []]
[['trending', 'mom', 'facebook', 'mother'], ['http://ift.tt/2kca2BH']]
[[], []]
[[], []]
[[], ['https://www.nytimes.com/2017/09/28/upshot/the-high-price-of-failing-americas-costliest-patients.html']]
[['MAGA'], []]
[[], []]
[['shopping', 'Amazon'], ['https://shop-picks.com/johnny-apple-peeler-by-victorio-vkp1010-cast-iron-suction-base/']]
[[], ['https://twitter.com/i/web/status/914148048749678593']]
[['day', 'job', 'woman', 'mother', 'Career'], ['http://bit.ly/2wGXCXG']]
[[], []]
[[], ['https://www.instagram.com/p/BZqzC3BhQZV/']]
[[], []]
[[], ['https://www.instagram.com/p/BZqzC3BhQZV/']]
[[], []]
[[], ['https://plus.google.com/+KevinGreenRockTheReTweet/posts/5pay41LFZbY']]
[['trending', 'india', 'facebook', 'donaldtrumph'], ['http://ift.tt/2x5buMg']]
[[], ['https://www.reuters.com/article/us-usa-audit-army/u-s-army-fudged-its-accounts-by-trillions-of-dollars-auditor
[[], ['https://twitter.com/i/web/status/914148052272680960']]
```

Step 3: Running Word Count Program in Hadoop:

Screenshots of commands executed while running word count program:



hashtag2 (2).png - Photos
anki@anki-VirtualBox: /usr/local/hadoop
En
9:46 PM

```
anki@anki-VirtualBox:/usr/local/hadoop$ jps
2866 ResourceManager
2313 NameNode
11561 Jps
2443 DataNode
2668 SecondaryNameNode
2988 NodeManager
anki@anki-VirtualBox:/usr/local/hadoop$ cd
anki@anki-VirtualBox:~$ cd /home/anki/Desktop/
anki@anki-VirtualBox:~/Desktop$ ls
bigdata  Bigdata  data  data1  hashtags  hbase-1.2.6-bin.tar.gz  pig-0.16.0.tar.gz  Screenshot
anki@anki-VirtualBox:~/Desktop$ cd hashtags
anki@anki-VirtualBox:~/Desktop/hashtags$ ls
Popular hshtags and topics.txt
anki@anki-VirtualBox:~/Desktop/hashtags$ cd
anki@anki-VirtualBox:~$ cd /usr/local/hadoop
anki@anki-VirtualBox:/usr/local/hadoop$ bin/h
hadoop      hadoop.cmd  hdfs        hdfs.cmd
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -mkdir /ur1
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -mkdir /ur1/ym1
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs -put /home/anki/Desktop/hashtags /ur1/input
Unrecognized option: -put
Error: Could not create the Java Virtual Machine.
Error: A fatal exception has occurred. Program will exit.
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -put /home/anki/Desktop/hashtags /ur1/input
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.8.1.jar wordcount /ur1/input out2
18/02/26 21:45:16 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
18/02/26 21:45:17 INFO input.FileInputFormat: Total input files to process : 1
18/02/26 21:45:17 WARN hdfs.DataStreamer: Caught exception
java.lang.InterruptedException
        at java.lang.Object.wait(Native Method)
        at java.lang.Thread.join(Thread.java:1252)
        at java.lang.Thread.join(Thread.java:1326)
        at org.apache.hadoop.hdfs.DataStreamer.closeResponder(DataStreamer.java:927)
        at org.apache.hadoop.hdfs.DataStreamer.endBlock(DataStreamer.java:578)
        at org.apache.hadoop.hdfs.DataStreamer.run(DataStreamer.java:755)
18/02/26 21:45:17 WARN hdfs.DataStreamer: Caught exception
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        at java.lang.Thread.join(Thread.java:1252)
        at java.lang.Thread.join(Thread.java:1326)
        at org.apache.hadoop.hdfs.DataStreamer.closeResponder(DataStreamer.java:927)
        at org.apache.hadoop.hdfs.DataStreamer.closeInternal(DataStreamer.java:792)
        at org.apache.hadoop.hdfs.DataStreamer.run(DataStreamer.java:788)
18/02/26 21:45:17 INFO mapreduce.JobSubmitter: number of splits:1
18/02/26 21:45:17 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1519693454677_0004
18/02/26 21:45:17 INFO impl.YarnClientImpl: Submitted application application_1519693454677_0004
18/02/26 21:45:18 INFO mapreduce.Job: The url to track the job: http://anki-VirtualBox:8088/proxy/application_1519693454677_0004/
18/02/26 21:45:18 INFO mapreduce.Job: Running job: job_1519693454677_0004
18/02/26 21:45:26 INFO mapreduce.Job: Job job_1519693454677_0004 running in uber mode : false
18/02/26 21:45:26 INFO mapreduce.Job:  map 0% reduce 0%
```

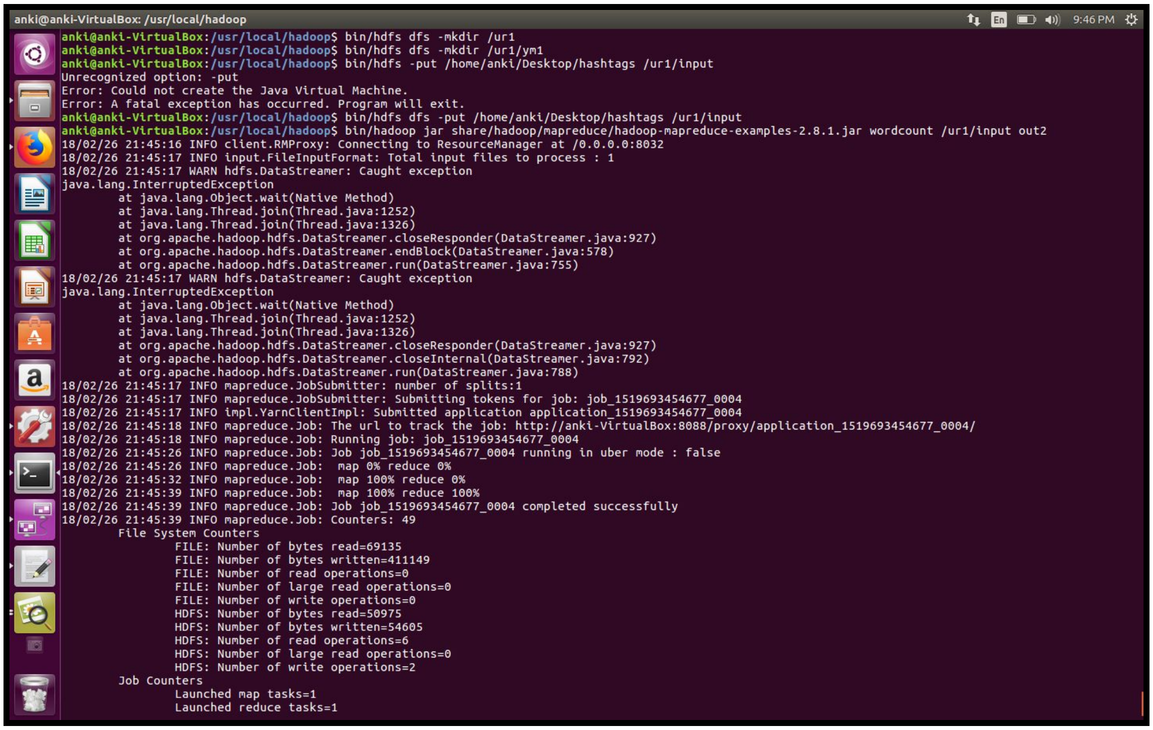

```
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -mkdir /ur1
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -mkdir /ur1/ym1
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs -put /home/anki/Desktop/hashtags /ur1/input
Unrecognized option: -put
Error: Could not create the Java Virtual Machine.
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anki@anki-VirtualBox:/usr/local/hadoop$ bin/hdfs dfs -put /home/anki/Desktop/hashtags /ur1/input
anki@anki-VirtualBox:/usr/local/hadoop$ bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.8.1.jar wordcount /ur1/input out2
18/02/26 21:45:16 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
18/02/26 21:45:17 INFO input.FileInputFormat: Total input files to process : 1
18/02/26 21:45:17 WARN hdfs.DataStreamer: Caught exception
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18/02/26 21:45:17 INFO mapreduce.JobSubmitter: number of splits:1
18/02/26 21:45:17 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1519693454677_0004
18/02/26 21:45:17 INFO impl.YarnClientImpl: Submitted application application_1519693454677_0004
18/02/26 21:45:18 INFO mapreduce.Job: The url to track the job: http://anki-VirtualBox:8088/proxy/application_1519693454677_0004/
18/02/26 21:45:18 INFO mapreduce.Job: Running job: job_1519693454677_0004
18/02/26 21:45:26 INFO mapreduce.Job: Job job_1519693454677_0004 running in uber mode : false
18/02/26 21:45:26 INFO mapreduce.Job:  map 0% reduce 0%
18/02/26 21:45:32 INFO mapreduce.Job:  map 100% reduce 0%
18/02/26 21:45:39 INFO mapreduce.Job:  map 100% reduce 100%
18/02/26 21:45:39 INFO mapreduce.Job: Job job_1519693454677_0004 completed successfully
18/02/26 21:45:39 INFO mapreduce.Job: Counters: 49
        File System Counters
                FILE: Number of bytes read=69135
                FILE: Number of bytes written=411149
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=50975
                HDFS: Number of bytes written=54605
                HDFS: Number of read operations=6
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
```
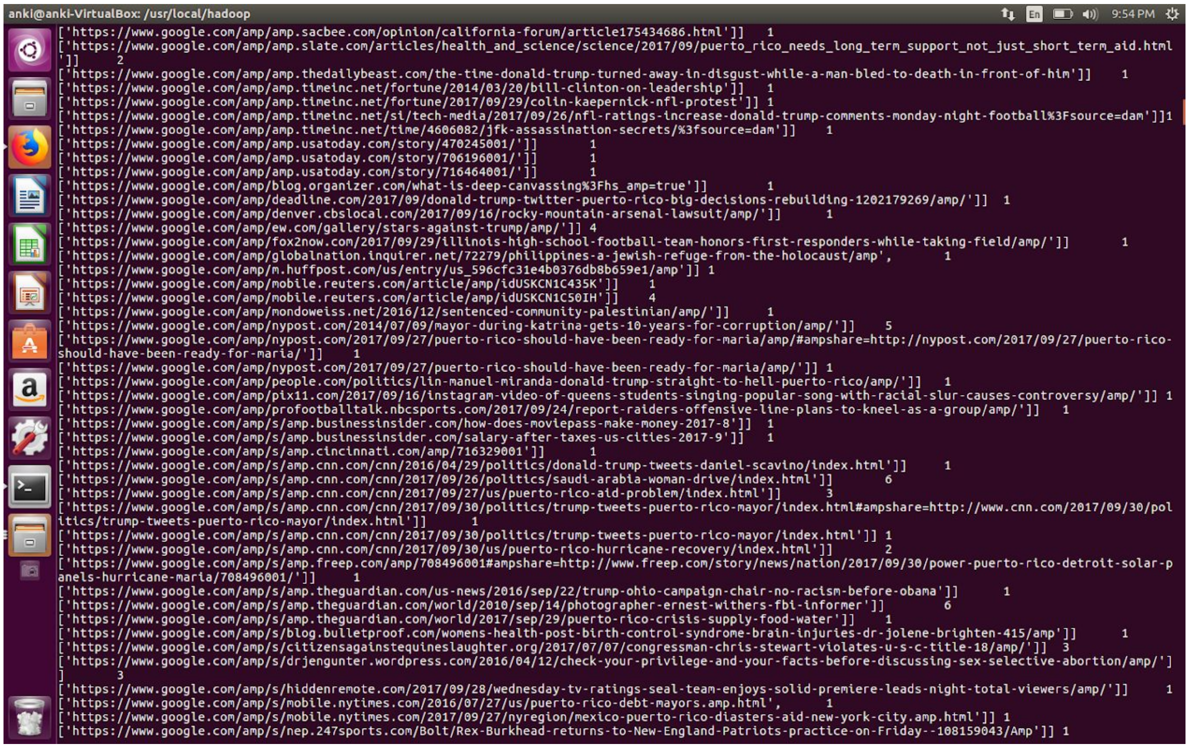
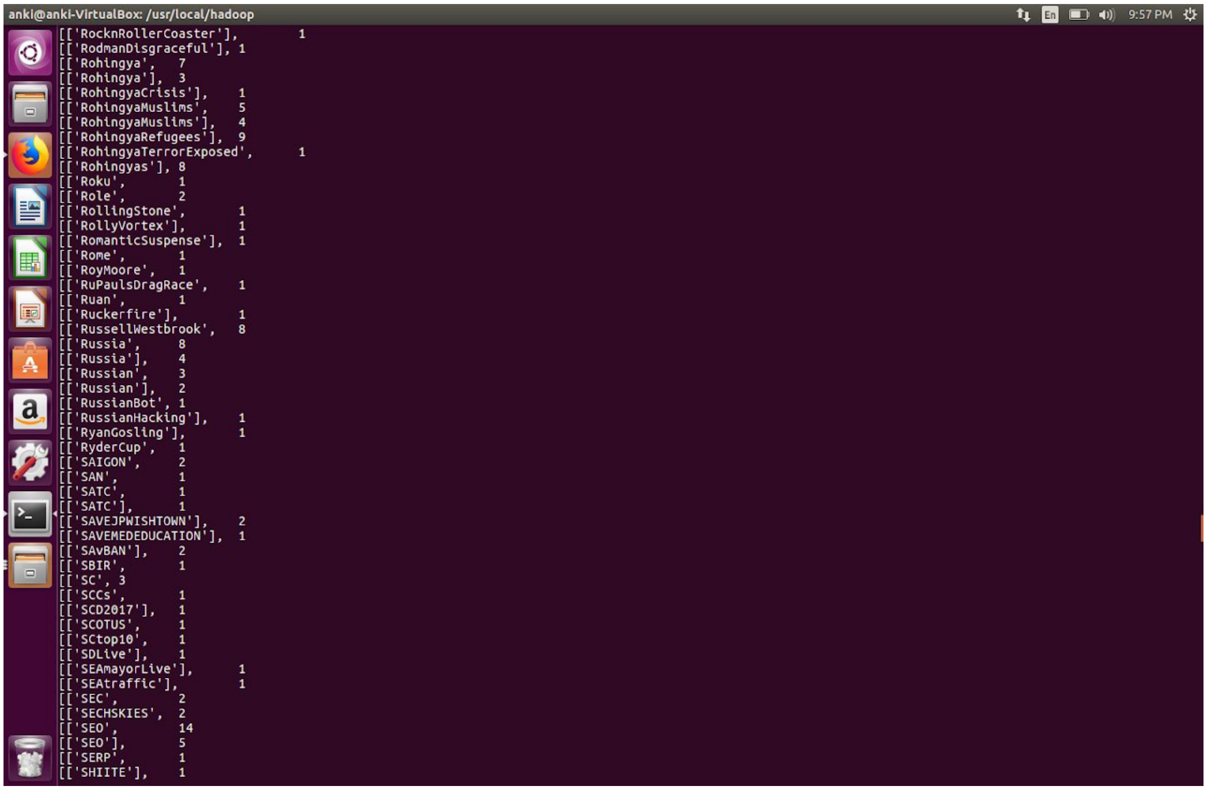

Word Count of URLs:



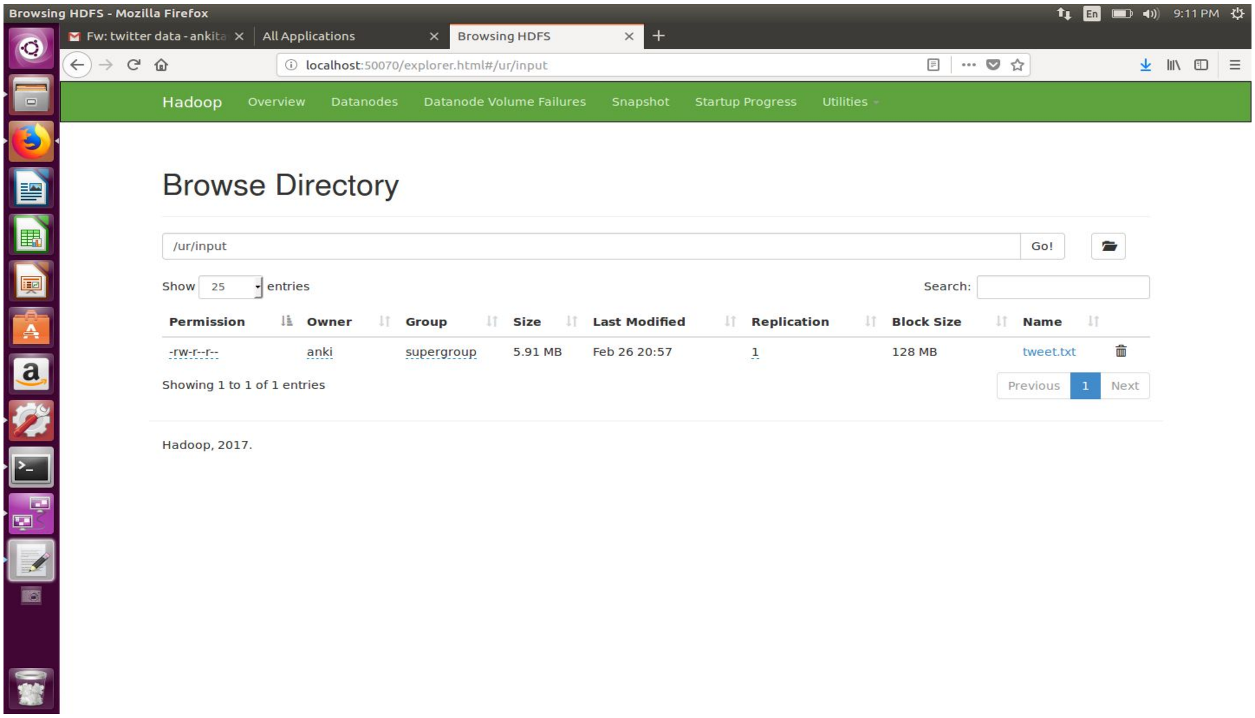
```
['https://www.google.com/amp/amp.sacbee.com/opinion/california-forum/article175434686.html']]    1
['https://www.google.com/amp/amp.slate.com/articles/health_and_science/science/2017/09/puerto_rico_needs_long_term_support_not_just_short_term_aid.html
']]     2
['https://www.google.com/amp/amp.thedailybeast.com/the-time-donald-trump-turned-away-in-disgust-while-a-man-bled-to-death-in-front-of-him']]     1
['https://www.google.com/amp/amp.timeinc.net/fortune/2014/03/20/bill-clinton-on-leadership']]    1
['https://www.google.com/amp/amp.timeinc.net/fortune/2017/09/29/colin-kaepernick-nfl-protest']] 1
['https://www.google.com/amp/amp.timeinc.net/si/tech-media/2017/09/26/nfl-ratings-increase-donald-trump-comments-monday-night-football%3Fsource=dam']]1
['https://www.google.com/amp/amp.timeinc.net/time/4606082/jfk-assassination-secrets/%3fsource=dam']]     1
['https://www.google.com/amp/amp.usatoday.com/story/470245001/']]        1
['https://www.google.com/amp/amp.usatoday.com/story/706196001/']]        1
['https://www.google.com/amp/amp.usatoday.com/story/716464001/']]        1
['https://www.google.com/amp/blog.organizer.com/what-is-deep-canvassing%3Fhs_amp=true']]        1
['https://www.google.com/amp/deadline.com/2017/09/donald-trump-twitter-puerto-rico-big-decisions-rebuilding-1202179269/amp/']]  1
['https://www.google.com/amp/denver.cbslocal.com/2017/09/16/rocky-mountain-arsenal-lawsuit/amp/']]      1
['https://www.google.com/amp/ew.com/gallery/stars-against-trump/amp/']] 4
['https://www.google.com/amp/fox2now.com/2017/09/29/illinois-high-school-football-team-honors-first-responders-while-taking-field/amp/']]       1
['https://www.google.com/amp/globalnation.inquirer.net/72279/philippines-a-jewish-refuge-from-the-holocaust/amp',       1
['https://www.google.com/amp/m.huffpost.com/us/entry/us_596cfc31e4b0376db8b659e1/amp']] 1
['https://www.google.com/amp/mobile.reuters.com/article/amp/idUSKCN1C435K']]    1
['https://www.google.com/amp/mobile.reuters.com/article/amp/idUSKCN1C50IH']]    4
['https://www.google.com/amp/mondoweiss.net/2016/12/sentenced-community-palestinian/amp/']]     1
['https://www.google.com/amp/nypost.com/2014/07/09/mayor-during-katrina-gets-10-years-for-corruption/amp/']]    5
['https://www.google.com/amp/nypost.com/2017/09/27/puerto-rico-should-have-been-ready-for-maria/amp/#ampshare=http://nypost.com/2017/09/27/puerto-rico-
should-have-been-ready-for-maria/']]    1
['https://www.google.com/amp/nypost.com/2017/09/27/puerto-rico-should-have-been-ready-for-maria/amp/']] 1
['https://www.google.com/amp/people.com/politics/lin-manuel-miranda-donald-trump-straight-to-hell-puerto-rico/amp/']]   1
['https://www.google.com/amp/pix11.com/2017/09/16/instagram-video-of-queens-students-singing-popular-song-with-racial-slur-causes-controversy/amp/']] 1
['https://www.google.com/amp/profootballtalk.nbcsports.com/2017/09/24/report-raiders-offensive-line-plans-to-kneel-as-a-group/amp/']]   1
['https://www.google.com/amp/s/amp.businessinsider.com/how-does-moviepass-make-money-2017-8']]  1
['https://www.google.com/amp/s/amp.businessinsider.com/salary-after-taxes-us-cities-2017-9']]   1
['https://www.google.com/amp/s/amp.cincinnati.com/amp/716329001']]      1
['https://www.google.com/amp/s/amp.cnn.com/cnn/2016/04/29/politics/donald-trump-tweets-daniel-scavino/index.html']]     1
['https://www.google.com/amp/s/amp.cnn.com/cnn/2017/09/26/politics/saudi-arabia-woman-drive/index.html']]       6
['https://www.google.com/amp/s/amp.cnn.com/cnn/2017/09/27/us/puerto-rico-aid-problem/index.html']]      3
['https://www.google.com/amp/s/amp.cnn.com/cnn/2017/09/30/politics/trump-tweets-puerto-rico-mayor/index.html#ampshare=http://www.cnn.com/2017/09/30/pol
itics/trump-tweets-puerto-rico-mayor/index.html']]      1
['https://www.google.com/amp/s/amp.cnn.com/cnn/2017/09/30/politics/trump-tweets-puerto-rico-mayor/index.html']] 1
['https://www.google.com/amp/s/amp.cnn.com/cnn/2017/09/30/us/puerto-rico-hurricane-recovery/index.html']]       2
['https://www.google.com/amp/s/amp.freep.com/amp/708496001#ampshare=http://www.freep.com/story/news/nation/2017/09/30/power-puerto-rico-detroit-solar-p
anels-hurricane-maria/708496001/']]     1
['https://www.google.com/amp/s/amp.theguardian.com/us-news/2016/sep/22/trump-ohio-campaign-chair-no-racism-before-obama']]      1
['https://www.google.com/amp/s/amp.theguardian.com/world/2010/sep/14/photographer-ernest-withers-fbi-informer']]        6
['https://www.google.com/amp/s/amp.theguardian.com/world/2017/sep/29/puerto-rico-crisis-supply-food-water']]    1
['https://www.google.com/amp/s/blog.bulletproof.com/womens-health-post-birth-control-syndrome-brain-injuries-dr-jolene-brighten-415/amp']]      1
['https://www.google.com/amp/s/citizensagainstequineslaughter.org/2017/07/07/congressman-chris-stewart-violates-u-s-c-title-18/amp/']]  3
['https://www.google.com/amp/s/drjengunter.wordpress.com/2016/04/12/check-your-privilege-and-your-facts-before-discussing-sex-selective-abortion/amp/']
]       3
['https://www.google.com/amp/s/hiddenremote.com/2017/09/28/wednesday-tv-ratings-seal-team-enjoys-solid-premiere-leads-night-total-viewers/amp/']]      1
['https://www.google.com/amp/s/mobile.nytimes.com/2016/07/27/us/puerto-rico-debt-mayors.amp.html',      1
['https://www.google.com/amp/s/mobile.nytimes.com/2017/09/27/nyregion/mexico-puerto-rico-diasters-aid-new-york-city.amp.html']] 1
['https://www.google.com/amp/s/nep.247sports.com/Bolt/Rex-Burkhead-returns-to-New-England-Patriots-practice-on-Friday--108159043/Amp']] 1
```

Word Count of HashTags:



```
[['RocknRollerCoaster'],        1
[['RodmanDisgraceful'], 1
[['Rohingya',   7
[['Rohingya'],  3
[['RohingyaCrisis'],    1
[['RohingyaMuslims',    5
[['RohingyaMuslims'],   4
[['RohingyaRefugees'],  9
[['RohingyaTerrorExposed',      1
[['Rohingyas'], 8
[['Roku',       1
[['Role',       2
[['RollingStone',       1
[['RollyVortex'],       1
[['RomanticSuspense'],  1
[['Rome',       1
[['RoyMoore',   1
[['RuPaulsDragRace',    1
[['Ruan',       1
[['Ruckerfire'],        1
[['RussellWestbrook',   8
[['Russia',     8
[['Russia'],    4
[['Russian',    3
[['Russian'],   2
[['RussianBot', 1
[['RussianHacking'],    1
[['RyanGosling'],       1
[['RyderCup',   1
[['SAIGON',     2
[['SAN',        1
[['SATC',       1
[['SATC'],      1
[['SAVEJPWISHTOWN'],    2
[['SAVEMEDEDUCATION'],  1
[['SAvBAN'],    2
[['SBIR',       1
[['SC', 3
[['SCCs',       1
[['SCD2017'],   1
[['SCOTUS',     1
[['SCtop10',    1
[['SDLive'],    1
[['SEAmayorLive'],      1
[['SEAtraffic'],        1
[['SEC',        2
[['SECHSKIES',  2
[['SEO',        14
[['SEO'],       5
[['SERP',       1
[['SHIITE'],    1
```

HDFS Screenshot :



Browse Directory

/ur/input

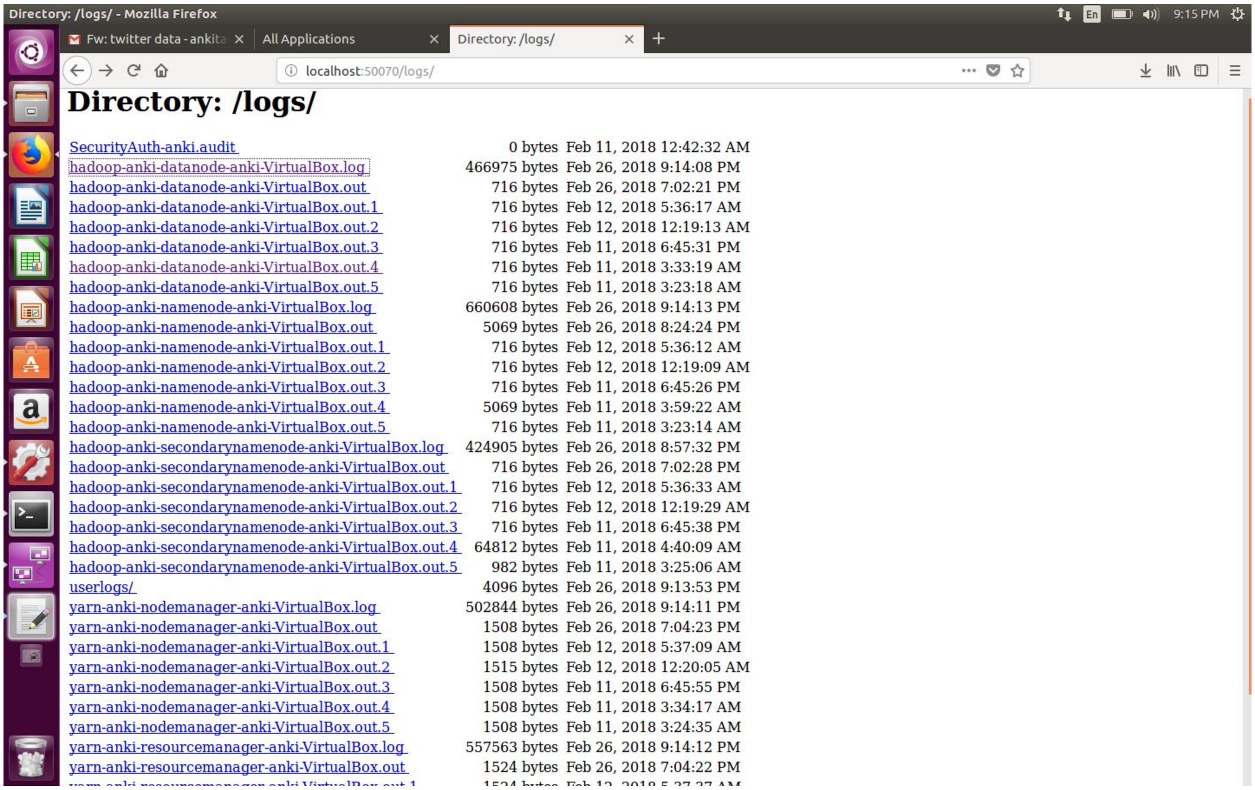
Show 25 entries Search:

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	anki	supergroup	5.91 MB	Feb 26 20:57	1	128 MB	tweet.txt

Showing 1 to 1 of 1 entries

Hadoop, 2017.

Screenshot of log files created:



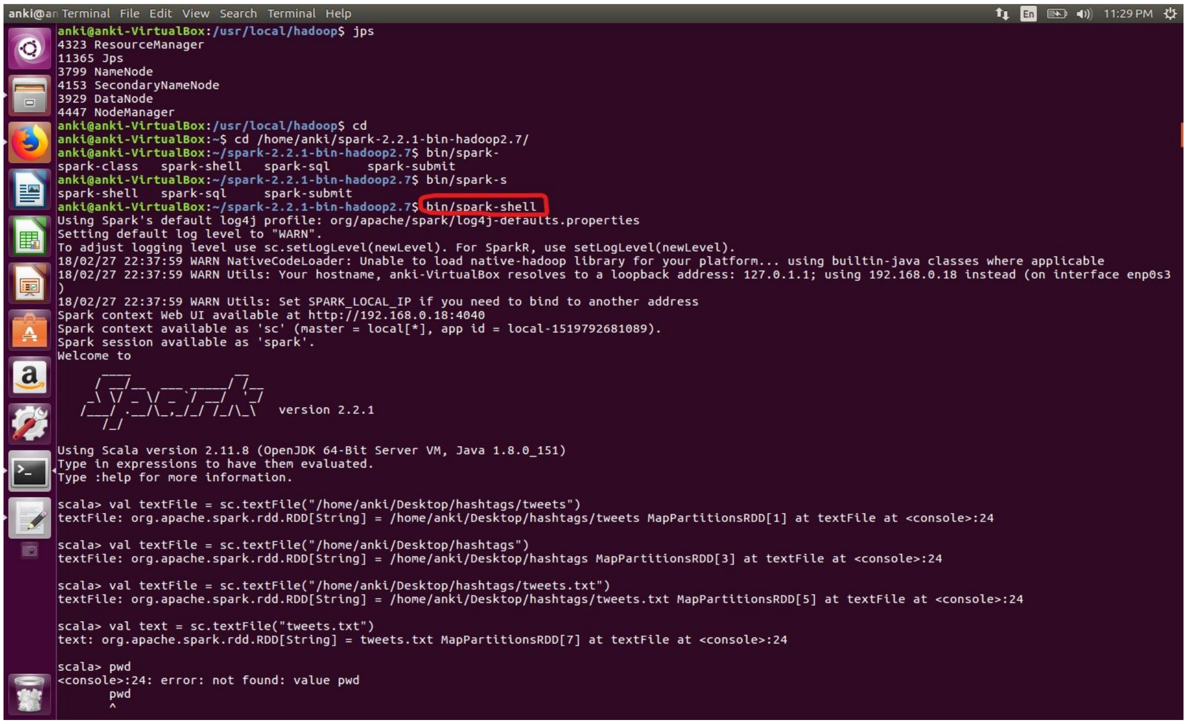
Directory: /logs/

SecurityAuth-anki.audit	0 bytes	Feb 11, 2018 12:42:32 AM
hadoop-anki-datanode-anki-VirtualBox.log	466975 bytes	Feb 26, 2018 9:14:08 PM
hadoop-anki-datanode-anki-VirtualBox.out	716 bytes	Feb 26, 2018 7:02:21 PM
hadoop-anki-datanode-anki-VirtualBox.out.1	716 bytes	Feb 12, 2018 5:36:17 AM
hadoop-anki-datanode-anki-VirtualBox.out.2	716 bytes	Feb 12, 2018 12:19:13 AM
hadoop-anki-datanode-anki-VirtualBox.out.3	716 bytes	Feb 11, 2018 6:45:31 PM
hadoop-anki-datanode-anki-VirtualBox.out.4	716 bytes	Feb 11, 2018 3:33:19 AM
hadoop-anki-datanode-anki-VirtualBox.out.5	716 bytes	Feb 11, 2018 3:23:18 AM
hadoop-anki-namenode-anki-VirtualBox.log	660608 bytes	Feb 26, 2018 9:14:13 PM
hadoop-anki-namenode-anki-VirtualBox.out	5069 bytes	Feb 26, 2018 8:24:24 PM
hadoop-anki-namenode-anki-VirtualBox.out.1	716 bytes	Feb 12, 2018 5:36:12 AM
hadoop-anki-namenode-anki-VirtualBox.out.2	716 bytes	Feb 12, 2018 12:19:09 AM
hadoop-anki-namenode-anki-VirtualBox.out.3	716 bytes	Feb 11, 2018 6:45:26 PM
hadoop-anki-namenode-anki-VirtualBox.out.4	5069 bytes	Feb 11, 2018 3:59:22 AM
hadoop-anki-namenode-anki-VirtualBox.out.5	716 bytes	Feb 11, 2018 3:23:14 AM
hadoop-anki-secondarynamenode-anki-VirtualBox.log	424905 bytes	Feb 26, 2018 8:57:32 PM
hadoop-anki-secondarynamenode-anki-VirtualBox.out	716 bytes	Feb 26, 2018 7:02:28 PM
hadoop-anki-secondarynamenode-anki-VirtualBox.out.1	716 bytes	Feb 12, 2018 5:36:33 AM
hadoop-anki-secondarynamenode-anki-VirtualBox.out.2	716 bytes	Feb 12, 2018 12:19:29 AM
hadoop-anki-secondarynamenode-anki-VirtualBox.out.3	716 bytes	Feb 11, 2018 6:45:38 PM
hadoop-anki-secondarynamenode-anki-VirtualBox.out.4	64812 bytes	Feb 11, 2018 4:40:09 AM
hadoop-anki-secondarynamenode-anki-VirtualBox.out.5	982 bytes	Feb 11, 2018 3:25:06 AM
userlogs/	4096 bytes	Feb 26, 2018 9:13:53 PM
yarn-anki-nodemanager-anki-VirtualBox.log	502844 bytes	Feb 26, 2018 9:14:11 PM
yarn-anki-nodemanager-anki-VirtualBox.out	1508 bytes	Feb 26, 2018 7:04:23 PM
yarn-anki-nodemanager-anki-VirtualBox.out.1	1508 bytes	Feb 12, 2018 5:37:09 AM
yarn-anki-nodemanager-anki-VirtualBox.out.2	1515 bytes	Feb 12, 2018 12:20:05 AM
yarn-anki-nodemanager-anki-VirtualBox.out.3	1508 bytes	Feb 11, 2018 6:45:55 PM
yarn-anki-nodemanager-anki-VirtualBox.out.4	1508 bytes	Feb 11, 2018 3:34:17 AM
yarn-anki-nodemanager-anki-VirtualBox.out.5	1508 bytes	Feb 11, 2018 3:24:35 AM
yarn-anki-resourcemanager-anki-VirtualBox.log	557563 bytes	Feb 26, 2018 9:14:12 PM
yarn-anki-resourcemanager-anki-VirtualBox.out	1524 bytes	Feb 26, 2018 7:04:22 PM
yarn-anki-resourcemanager-anki-VirtualBox.out.1	1524 bytes	Feb 12, 2018 5:37:27 AM

Step 4: Running Word Count Program in Apache Spark:

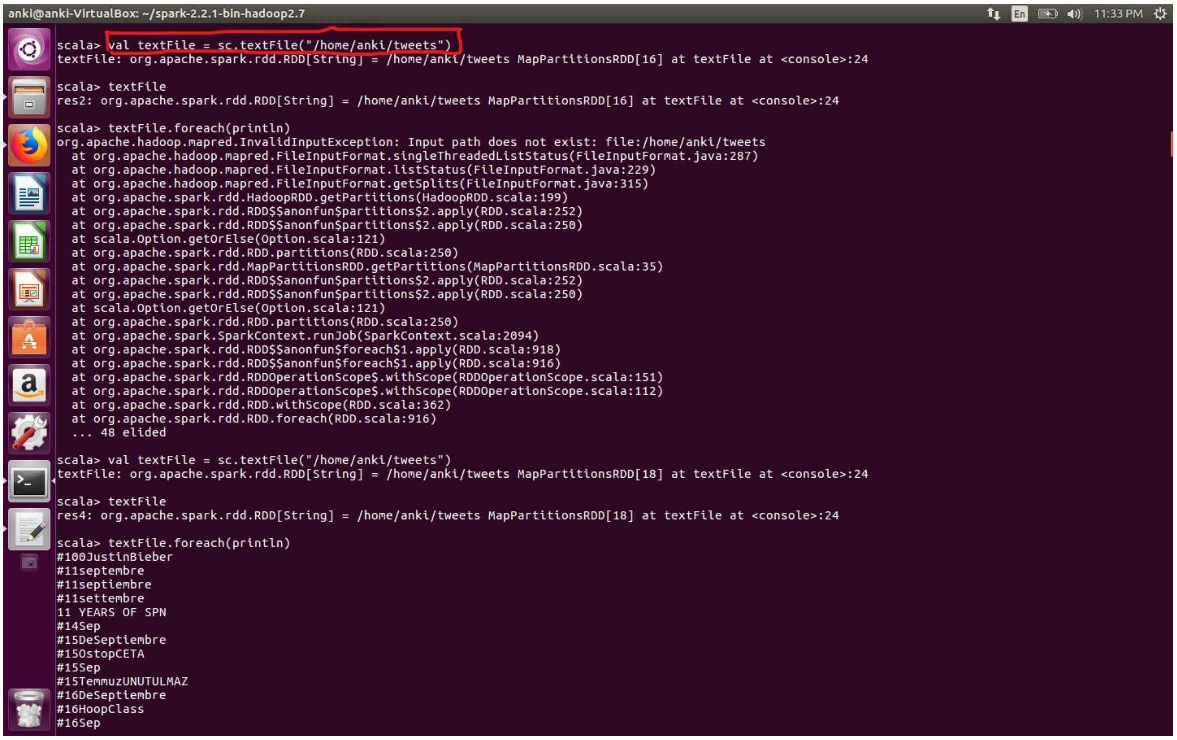
Screenshots of commands executed while running word count program:

1.Starting Spark: using bin/spark-shell command:



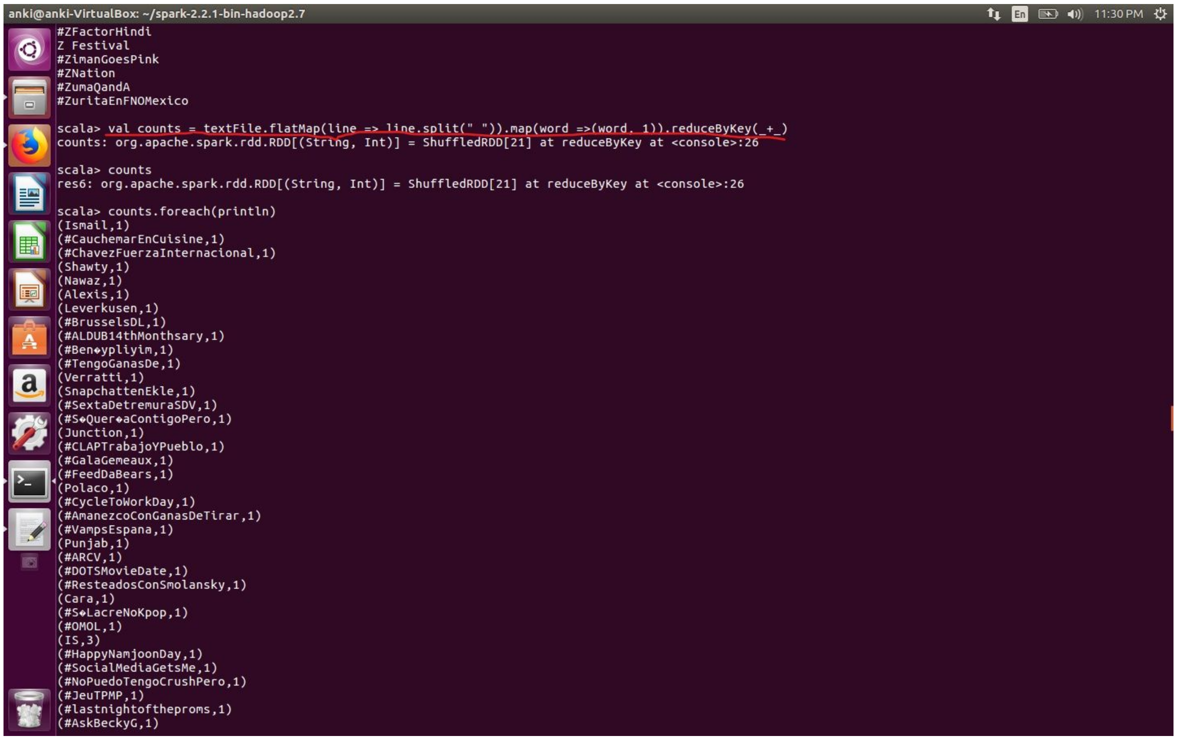
```
anki@anki-VirtualBox:/usr/local/hadoop$ jps
4323 ResourceManager
11365 Jps
3799 NameNode
4153 SecondaryNameNode
3929 DataNode
4447 NodeManager
anki@anki-VirtualBox:/usr/local/hadoop$ cd
anki@anki-VirtualBox:~$ cd /home/anki/spark-2.2.1-bin-hadoop2.7/
anki@anki-VirtualBox:~/spark-2.2.1-bin-hadoop2.7$ bin/spark-
spark-class   spark-shell   spark-sql     spark-submit
anki@anki-VirtualBox:~/spark-2.2.1-bin-hadoop2.7$ bin/spark-s
spark-shell   spark-sql     spark-submit
anki@anki-VirtualBox:~/spark-2.2.1-bin-hadoop2.7$ bin/spark-shell
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).
18/02/27 22:37:59 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
18/02/27 22:37:59 WARN Utils: Your hostname, anki-VirtualBox resolves to a loopback address: 127.0.1.1; using 192.168.0.18 instead (on interface enp0s3
)
18/02/27 22:37:59 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
Spark context Web UI available at http://192.168.0.18:4040
Spark context available as 'sc' (master = local[*], app id = local-1519792681089).
Spark session available as 'spark'.
Welcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /___/ .__/\_,_/_/ /_/\_\   version 2.2.1
      /_/

Using Scala version 2.11.8 (OpenJDK 64-Bit Server VM, Java 1.8.0_151)
Type in expressions to have them evaluated.
Type :help for more information.

scala> val textFile = sc.textFile("/home/anki/Desktop/hashtags/tweets")
textFile: org.apache.spark.rdd.RDD[String] = /home/anki/Desktop/hashtags/tweets MapPartitionsRDD[1] at textFile at <console>:24

scala> val textFile = sc.textFile("/home/anki/Desktop/hashtags")
textFile: org.apache.spark.rdd.RDD[String] = /home/anki/Desktop/hashtags MapPartitionsRDD[3] at textFile at <console>:24

scala> val textFile = sc.textFile("/home/anki/Desktop/hashtags/tweets.txt")
textFile: org.apache.spark.rdd.RDD[String] = /home/anki/Desktop/hashtags/tweets.txt MapPartitionsRDD[5] at textFile at <console>:24

scala> val text = sc.textFile("tweets.txt")
text: org.apache.spark.rdd.RDD[String] = tweets.txt MapPartitionsRDD[7] at textFile at <console>:24

scala> pwd
<console>:24: error: not found: value pwd
       pwd
       ^
```

2. Loading the data:



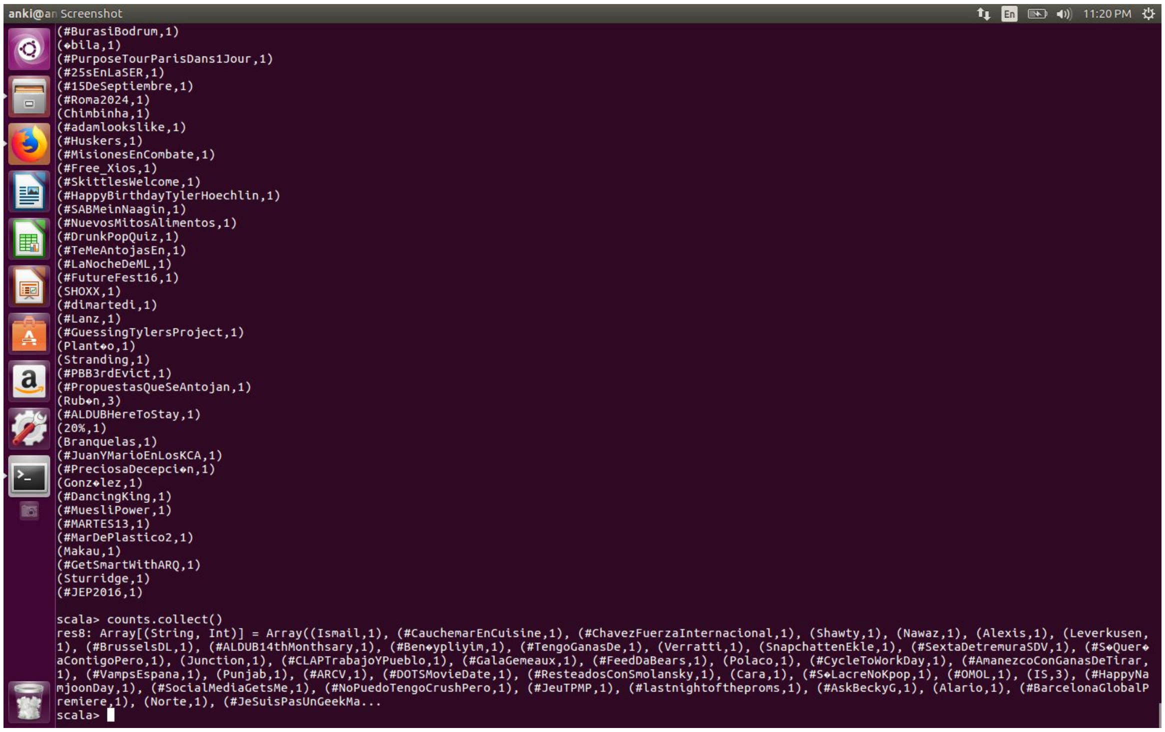
```
scala> val textFile = sc.textFile("/home/anki/tweets")
textFile: org.apache.spark.rdd.RDD[String] = /home/anki/tweets MapPartitionsRDD[16] at textFile at <console>:24

scala> textFile
res2: org.apache.spark.rdd.RDD[String] = /home/anki/tweets MapPartitionsRDD[16] at textFile at <console>:24

scala> textFile.foreach(println)
org.apache.hadoop.mapred.InvalidInputException: Input path does not exist: file:/home/anki/tweets
  at org.apache.hadoop.mapred.FileInputFormat.singleThreadedListStatus(FileInputFormat.java:287)
  at org.apache.hadoop.mapred.FileInputFormat.listStatus(FileInputFormat.java:229)
  at org.apache.hadoop.mapred.FileInputFormat.getSplits(FileInputFormat.java:315)
  at org.apache.spark.rdd.HadoopRDD.getPartitions(HadoopRDD.scala:199)
  at org.apache.spark.rdd.RDD$$anonfun$partitions$2.apply(RDD.scala:252)
  at org.apache.spark.rdd.RDD$$anonfun$partitions$2.apply(RDD.scala:250)
  at scala.Option.getOrElse(Option.scala:121)
  at org.apache.spark.rdd.RDD.partitions(RDD.scala:250)
  at org.apache.spark.rdd.MapPartitionsRDD.getPartitions(MapPartitionsRDD.scala:35)
  at org.apache.spark.rdd.RDD$$anonfun$partitions$2.apply(RDD.scala:252)
  at org.apache.spark.rdd.RDD$$anonfun$partitions$2.apply(RDD.scala:250)
  at scala.Option.getOrElse(Option.scala:121)
  at org.apache.spark.rdd.RDD.partitions(RDD.scala:250)
  at org.apache.spark.SparkContext.runJob(SparkContext.scala:2094)
  at org.apache.spark.rdd.RDD$$anonfun$foreach$1.apply(RDD.scala:918)
  at org.apache.spark.rdd.RDD$$anonfun$foreach$1.apply(RDD.scala:916)
  at org.apache.spark.rdd.RDDOperationScope$.withScope(RDDOperationScope.scala:151)
  at org.apache.spark.rdd.RDDOperationScope$.withScope(RDDOperationScope.scala:112)
  at org.apache.spark.rdd.RDD.withScope(RDD.scala:362)
  at org.apache.spark.rdd.RDD.foreach(RDD.scala:916)
  ... 48 elided

scala> val textFile = sc.textFile("/home/anki/tweets")
textFile: org.apache.spark.rdd.RDD[String] = /home/anki/tweets MapPartitionsRDD[18] at textFile at <console>:24

scala> textFile
res4: org.apache.spark.rdd.RDD[String] = /home/anki/tweets MapPartitionsRDD[18] at textFile at <console>:24

scala> textFile.foreach(println)
#100JustinBieber
#11septembre
#11septiembre
#11settembre
11 YEARS OF SPN
#14Sep
#15DeSeptiembre
#15OstopCETA
#15Sep
#15TemmuzUNUTULMAZ
#16DeSeptiembre
#16HoopClass
#16Sep
```

3. Splitting content in our file as strings and applying map and reduce functions to perform word count, using the below highlighted command:



```
#ZFactorHindi
Z Festival
#ZimanGoesPink
#ZNation
#ZumaQandA
#ZuritaEnFNOMexico

scala> val counts = textFile.flatMap(line => line.split(" ")).map(word =>(word, 1)).reduceByKey(_+_)
counts: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[21] at reduceByKey at <console>:26

scala> counts
res6: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[21] at reduceByKey at <console>:26

scala> counts.foreach(println)
(Ismail,1)
(#CauchemarEnCuisine,1)
(#ChavezFuerzaInternacional,1)
(Shawty,1)
(Nawaz,1)
(Alexis,1)
(Leverkusen,1)
(#BrusselsDL,1)
(#ALDUB14thMonthsary,1)
(#Ben◆ypliyim,1)
(#TengoGanasDe,1)
(Verratti,1)
(SnapchattenEkle,1)
(#SextaDetremuraSDV,1)
(#S◆Quer◆aContigoPero,1)
(Junction,1)
(#CLAPTrabajoYPueblo,1)
(#GalaGemeaux,1)
(#FeedDaBears,1)
(Polaco,1)
(#CycleToWorkDay,1)
(#AmanezcoConGanasDeTirar,1)
(#VampsEspana,1)
(Punjab,1)
(#ARCV,1)
(#DOTSMovieDate,1)
(#ResteadosConSmolansky,1)
(Cara,1)
(#S◆LacreNoKpop,1)
(#OMOL,1)
(IS,3)
(#HappyNamjoonDay,1)
(#SocialMediaGetsMe,1)
(#NoPuedoTengoCrushPero,1)
(#JeuTPMP,1)
(#lastnightoftheproms,1)
(#AskBeckyG,1)
```

4. Finally collecting output which displays the word count in the form of an array of key value pairs:



```
(#BurasiBodrum,1)
(◆bila,1)
(#PurposeTourParisDans1Jour,1)
(#25sEnLaSER,1)
(#15DeSeptiembre,1)
(#Roma2024,1)
(Chimbinha,1)
(#adamlookslike,1)
(#Huskers,1)
(#MisionesEnCombate,1)
(#Free_Xios,1)
(#SkittlesWelcome,1)
(#HappyBirthdayTylerHoechlin,1)
(#SABMeinNaagin,1)
(#NuevosMitosAlimentos,1)
(#DrunkPopQuiz,1)
(#TeMeAntojasEn,1)
(#LaNocheDeML,1)
(#FutureFest16,1)
(SHOXX,1)
(#dimartedi,1)
(#Lanz,1)
(#GuessingTylersProject,1)
(Plant◆o,1)
(Stranding,1)
(#PBB3rdEvict,1)
(#PropuestasQueSeAntojan,1)
(Rub◆n,3)
(#ALDUBHereToStay,1)
(20%,1)
(Branquelas,1)
(#JuanYMarioEnLosKCA,1)
(#PreciosaDecepci◆n,1)
(Gonz◆lez,1)
(#DancingKing,1)
(#MuesliPower,1)
(#MARTES13,1)
(#MarDePlastico2,1)
(Makau,1)
(#GetSmartWithARQ,1)
(Sturridge,1)
(#JEP2016,1)

scala> counts.collect()
res8: Array[(String, Int)] = Array((Ismail,1), (#CauchemarEnCuisine,1), (#ChavezFuerzaInternacional,1), (Shawty,1), (Nawaz,1), (Alexis,1), (Leverkusen,
1), (#BrusselsDL,1), (#ALDUB14thMonthsary,1), (#Ben◆ypliyim,1), (#TengoGanasDe,1), (Verratti,1), (SnapchattenEkle,1), (#SextaDetremuraSDV,1), (#S◆Quer◆
aContigoPero,1), (Junction,1), (#CLAPTrabajoYPueblo,1), (#GalaGemeaux,1), (#FeedDaBears,1), (Polaco,1), (#CycleToWorkDay,1), (#AmanezcoConGanasDeTirar,
1), (#VampsEspana,1), (Punjab,1), (#ARCV,1), (#DOTSMovieDate,1), (#ResteadosConSmolansky,1), (Cara,1), (#S◆LacreNoKpop,1), (#OMOL,1), (IS,3), (#HappyNa
mjoonDay,1), (#SocialMediaGetsMe,1), (#NoPuedoTengoCrushPero,1), (#JeuTPMP,1), (#lastnightoftheproms,1), (#AskBeckyG,1), (Alario,1), (#BarcelonaGlobalP
remiere,1), (Norte,1), (#JeSuisPasUnGeekMa...
scala> 
```

References:

http://adilmoujahid.com/posts/2014/07/twitter-analytics/
https://github.com/heerme/twitter-topics/blob/master/extract-json-to-text-stream.py
https://www.youtube.com/watch?v=YZnNb0BTrS4&list=PLJNKKS4iwuamrvNVahopRziurK7XNCc5B&index=3