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Analyzing New York Crime Data Using SparkSQL

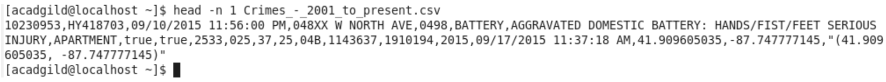
In this post, we will be analyzing the crimes dataset of New York using SparkSQL. In case you are not familiar with SparkSQL, please refer to our post on Introduction to SparkSQL.

Dataset Description:

This dataset is available publically, reflects the reported incidents of crime (with the exception of murders, where data exists for each victim) that has occurred in the City of Chicago from 2001 to present. The data is extracted from the New York Police Department's CLEAR (Citizen Law Enforcement Analysis and Reporting) system.

You can download the dataset from here.

Below is a sample record from the dataset



```
[acadgild@localhost ~]$ head -n 1 Crimes_-_2001_to_present.csv
10230953,HY418703,09/10/2015 11:56:00 PM,048XX W NORTH AVE,0498,BATTERY,AGGRAVATED DOMESTIC BATTERY: HANDS/FIST/FEET SERIOUS
INJURY,APARTMENT,true,true,2533,025,37,25,04B,1143637,1910194,2015,09/17/2015 11:37:18 AM,41.909605035,-87.747777145,"(41.909
605035, -87.747777145)"
[acadgild@localhost ~]$
```

You can click here for the complete data set column wise description.

In this post, we will be using pyspark shell for writing our queries.

Problem Statement:

1. **Find number of crimes that happened under each FBI code.**

Code:

```
#import SQLContext and row

from pyspark.sql import SQLContext,Row

sqlContext=SQLContext(sc)

#load the data set and split the records

lines =sc.textFile("hdfs://localhost:9000/Crime_dataset")

parts = lines.map(lambda l: l.split(","))

# construct the Rows by by passing a list of key/value pairs as kwargs

Crimes = parts.map(lambda p:Row(Id =p[0],case_no=p[1],date=p[2],block=p[3],IUCR=p[4],Primary_type=p[5],description=p[6],Loc_des =p[7],arrest=p[8],domestic= p[9],beat=p[10],district=p[11],ward=p[12],community=p[13],fbicode=p[14],XCor=p[15],YCor=p[16],year=p[17],Updated_on=p[18],latitude=p[19],longi=p[20],loc=p[21]))

# Create the DataFrame and register it has Table

schema1=sqlContext.createDataFrame(Crimes)

schema1.registerTempTable("Crimes")

#run the query for getting the required result

result=sqlContext.sql("select fbicode,count(fbicode) as count from Crimes group by fbicode")

result.show()
```

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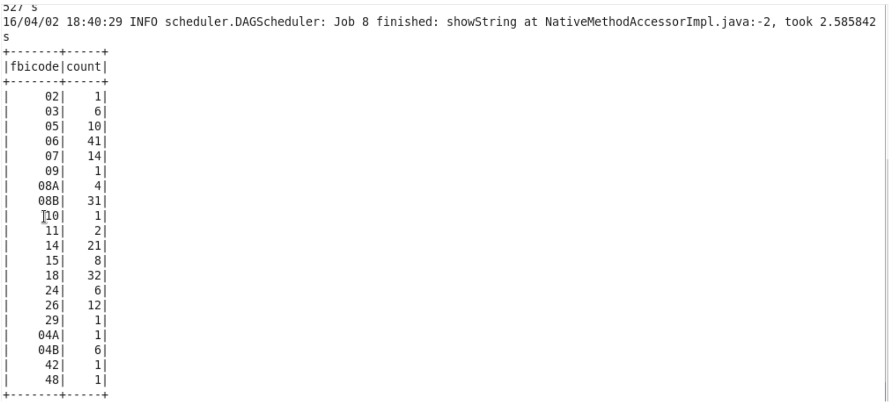
Output:



```
527 s
16/04/02 18:40:29 INFO scheduler.DAGScheduler: Job 8 finished: showString at NativeMethodAccessorImpl.java:-2, took 2.585842
s
+-------+-----+
|fbicode|count|
+-------+-----+
|     02|    1|
|     03|    6|
|     05|   10|
|     06|   41|
|     07|   14|
|     09|    1|
|    08A|    4|
|    08B|   31|
|     10|    1|
|     11|    2|
|     14|   21|
|     15|    8|
|     18|   32|
|     24|    6|
|     26|   12|
|     29|    1|
|    04A|    1|
|    04B|    6|
|     42|    1|
|     48|    1|
+-------+-----+
```

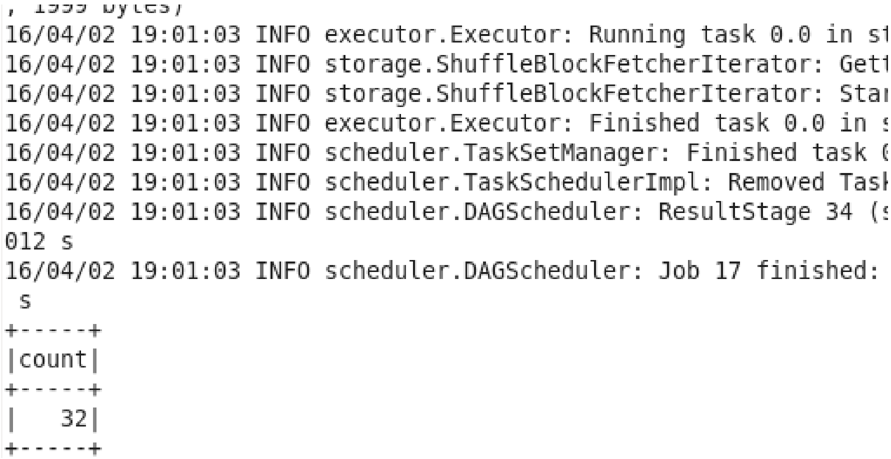
2. Find number of ‘NARCOTICS’ cases filed in the year 2015.

We have already read the data created from the Data Frame and registered as a table with the name ‘Çrimes’, in the first problem statement. Now, we can directly run the queries on this table.

Query:

```
result=sqlContext.sql("select count(*) as count from Crimes where Primary_type ='NARCOTICS' and year = 2015 ")

result.show()
```



```
, 1999 bytes)
16/04/02 19:01:03 INFO executor.Executor: Running task 0.0 in st
16/04/02 19:01:03 INFO storage.ShuffleBlockFetcherIterator: Gett
16/04/02 19:01:03 INFO storage.ShuffleBlockFetcherIterator: Star
16/04/02 19:01:03 INFO executor.Executor: Finished task 0.0 in s
16/04/02 19:01:03 INFO scheduler.TaskSetManager: Finished task 0
16/04/02 19:01:03 INFO scheduler.TaskSchedulerImpl: Removed Task
16/04/02 19:01:03 INFO scheduler.DAGScheduler: ResultStage 34 (s
012 s
16/04/02 19:01:03 INFO scheduler.DAGScheduler: Job 17 finished:
 s
+-----+
|count|
+-----+
|   32|
+-----+
```

3. Find the number of theft related arrests that happened in each district.

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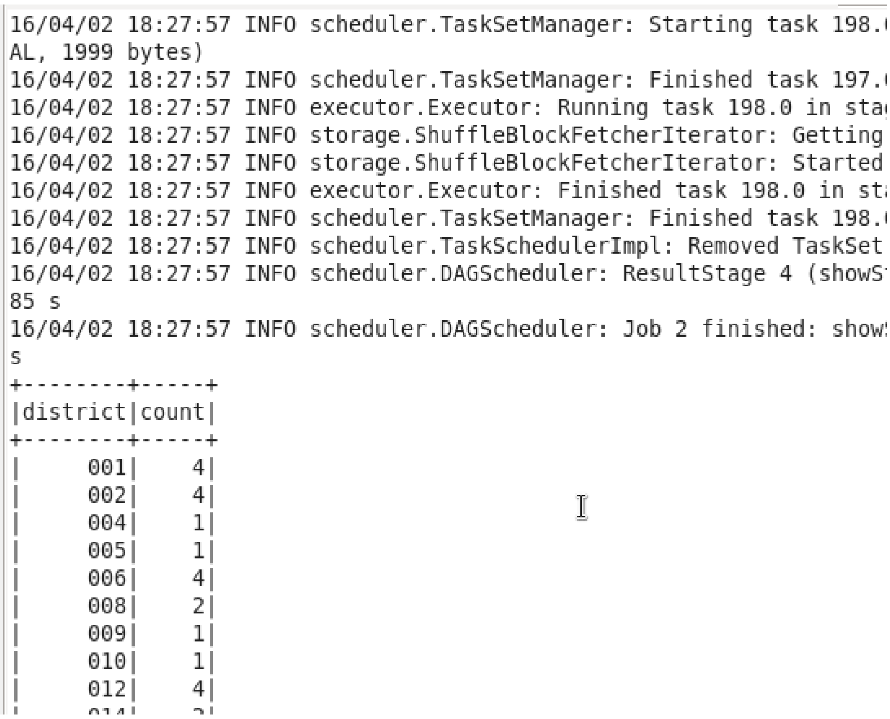
result=sqlContext.sql(“select district ,count(*) as count from Crimes where Primary_type =’THEFT’ and arrest = ‘true’ group by district “) result.show()



```
16/04/02 18:27:57 INFO scheduler.TaskSetManager: Starting task 198.(
AL, 1999 bytes)
16/04/02 18:27:57 INFO scheduler.TaskSetManager: Finished task 197.(
16/04/02 18:27:57 INFO executor.Executor: Running task 198.0 in sta
16/04/02 18:27:57 INFO storage.ShuffleBlockFetcherIterator: Getting
16/04/02 18:27:57 INFO storage.ShuffleBlockFetcherIterator: Started
16/04/02 18:27:57 INFO executor.Executor: Finished task 198.0 in st
16/04/02 18:27:57 INFO scheduler.TaskSetManager: Finished task 198.(
16/04/02 18:27:57 INFO scheduler.TaskSchedulerImpl: Removed TaskSet
16/04/02 18:27:57 INFO scheduler.DAGScheduler: ResultStage 4 (showS
85 s
16/04/02 18:27:57 INFO scheduler.DAGScheduler: Job 2 finished: show
s
+--------+-----+
|district|count|
+--------+-----+
|     001|    4|
|     002|    4|
|     004|    1|
|     005|    1|
|     006|    4|
|     008|    2|
|     009|    1|
|     010|    1|
|     012|    4|
|     014|    2|
```

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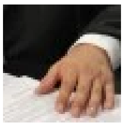

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BRUNDESH

Brundesh R currently working at AcadGild is an expert in Big Data domain with 3.5 years of Industry experience. He has rich experience in Hadoop, R, Python, Java . He has published several blogs and articles on Hadoop,Spark and have undertaken projects on Hadoop platform. AcadGild was founded with the vision of "Learn. Do. Earn". We provide skill development courses based on current industry needs. But what sets us apart is earning opportunities we provide after successful completion of course. We also provide live mentoring and 24x7 support. Our mentors are industry thought leaders in their respective fields

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