E10-2 (2)

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0.1 E10-2

This Notebook is about using SPARK Dataframe functions to process nsedata.csv.

0.1.1 Problem

- Write SPARK code to solve the problem stated at the end this Notebook (do not use the createTempView function!)

0.1.2 Submission

Create and upload a PDF of this Notebook after completing your assignment. BEFORE CONVERTING TO PDF and UPLOADING ENSURE THAT YOU REMOVE / TRIM LENGTHY DEBUG OUTPUTS . Short debug outputs of up to 5 lines are acceptable.

[19]:
```
import findspark
findspark.init()
```

[20]:
```
import pyspark
from pyspark.sql.types import *
```

[21]:
```
sc = pyspark.SparkContext(appName="E10-2")
```

[22]:
```
ss = pyspark.sql.SparkSession(sc)
```

[23]:
```
dfr = ss.read
```

[24]:
```
schemaStruct = StructType()
schemaStruct.add("SYMBOL", StringType(), True)
schemaStruct.add("SERIES", StringType(), True)
schemaStruct.add("OPEN", DoubleType(), True)
schemaStruct.add("HIGH", DoubleType(), True)
schemaStruct.add("LOW", DoubleType(), True)
schemaStruct.add("CLOSE", DoubleType(), True)
schemaStruct.add("LAST", DoubleType(), True)
```

```
schemaStruct.add("PREVCLOSE", DoubleType(), True)
schemaStruct.add("TOTTRDQTY", LongType(), True)
schemaStruct.add("TOTTRDVAL", DoubleType(), True)
schemaStruct.add("TIMESTAMP", StringType(), True)
schemaStruct.add("ADDNL", StringType(), True)
```

[24]:
```
StructType([StructField('SYMBOL', StringType(), True), StructField('SERIES',
StringType(), True), StructField('OPEN', DoubleType(), True),
StructField('HIGH', DoubleType(), True), StructField('LOW', DoubleType(), True),
StructField('CLOSE', DoubleType(), True), StructField('LAST', DoubleType(),
True), StructField('PREVCLOSE', DoubleType(), True), StructField('TOTTRDQTY',
LongType(), True), StructField('TOTTRDVAL', DoubleType(), True),
StructField('TIMESTAMP', StringType(), True), StructField('ADDNL', StringType(),
True)])
```

[25]:
```
df = dfr.csv("/home/hduser/spark/nsedata.csv", schema=schemaStruct, header=True)
```

[26]:
```
df.printSchema()
```

```
root
 |-- SYMBOL: string (nullable = true)
 |-- SERIES: string (nullable = true)
 |-- OPEN: double (nullable = true)
 |-- HIGH: double (nullable = true)
 |-- LOW: double (nullable = true)
 |-- CLOSE: double (nullable = true)
 |-- LAST: double (nullable = true)
 |-- PREVCLOSE: double (nullable = true)
 |-- TOTTRDQTY: long (nullable = true)
 |-- TOTTRDVAL: double (nullable = true)
 |-- TIMESTAMP: string (nullable = true)
 |-- ADDNL: string (nullable = true)
```

[27]:
```
from pyspark.sql.functions import col, date_format, to_date

df1 = df.withColumn("TIMESTAMP2", date_format(to_date(col("TIMESTAMP"),␣
 ↪"dd-MMM-yyyy"), "yyyy-MM"))
```

[28]:
```
df1.printSchema()
```

```
root
 |-- SYMBOL: string (nullable = true)
 |-- SERIES: string (nullable = true)
 |-- OPEN: double (nullable = true)
 |-- HIGH: double (nullable = true)
 |-- LOW: double (nullable = true)
 |-- CLOSE: double (nullable = true)
```

```
 |-- LAST: double (nullable = true)
 |-- PREVCLOSE: double (nullable = true)
 |-- TOTTRDQTY: long (nullable = true)
 |-- TOTTRDVAL: double (nullable = true)
 |-- TIMESTAMP: string (nullable = true)
 |-- ADDNL: string (nullable = true)
 |-- TIMESTAMP2: string (nullable = true)
```

0.2 Problem Statement

Using SPARK Dataframe functions write code to create the data shown below for all the traded companies. Save this data in an output file in ascending order of the company names, year and month.

SYMBOL | Month-Year | min(CLOSE) | max(CLOSE) | avg(CLOSE) | stddev(CLOSE) | traded-Count |

The output should appear as follows

```
+---------+----------+---------+---------+------------------+------------------+-----------+
|   SYMBOL|TIMESTAMP2|min(OPEN)|max(OPEN)|         avg(OPEN)|      stddev(OPEN)|count(OPEN)|
+---------+----------+---------+---------+------------------+------------------+-----------+
|20MICRONS|   2010-08|     51.6|     54.0| 52.81666666666667|0.9266876496425305|          9|
|20MICRONS|   2010-09|     54.9|     64.3| 59.11428571428571| 2.514614426564382|         21|
|20MICRONS|   2010-10|    55.05|     60.0|57.166666666666664|1.3035848009751156|         21|
|20MICRONS|   2010-11|     53.6|    61.75| 55.98809523809524|2.2001650370997603|         21|
|20MICRONS|   2010-12|     38.8|     61.0| 45.66590909090909| 5.796599708606606|         22|
|20MICRONS|   2011-01|     38.3|     48.2|44.042500000000004| 2.357310856396376|         20|
|20MICRONS|   2011-02|    35.15|     45.9|            41.635|2.3022929074248895|         20|
|20MICRONS|   2011-03|     35.2|     40.9| 37.83636363636364| 1.735770846886316|         22|
|20MICRONS|   2011-04|    37.75|     42.9| 40.66388888888889|1.4290891335511524|         18|
|20MICRONS|   2011-05|     40.1|     47.3|42.304545454545455|2.2407433445021625|         22|
+---------+----------+---------+---------+------------------+------------------+-----------+
```

tradedCount = number of times the company shares have been traded in that month

Notes and Hints:

- use the functions groupBy (based on SYMBOL and TIMESTAMP2) and agg to create the individual statistics like min, max, avg, etc.
- use join (based on SYMBOL and TIMESTAMP2) to combine the individual dataframes into a single table

This is just one method of solving the problem! You can discover of any other method, using any other combination of Dataframe functions-

[29]:
```
df1.show()
# Current df1
```

```
+----------+------+------+-------+-------+-------+-------+---------+---------+--
------------+-----------+-----+----------+
|    SYMBOL|SERIES|  OPEN|   HIGH|    LOW|  CLOSE|   LAST|PREVCLOSE|TOTTRDQTY|
```

```
TOTTRDVAL|  TIMESTAMP|ADDNL|TIMESTAMP2|
+----------+------+------+-------+-------+-------+-------+---------+---------+--
------------+-----------+-----+----------+
| 20MICRONS|    EQ| 37.75|  37.75|  36.35|  37.45|   37.3|    37.15|    38638|
1420968.1|01-APR-2011|    0|   2011-04|
|3IINFOTECH|    EQ| 43.75|   45.3|  43.75|   44.9|   44.8|    43.85|  1239690|
5.531120435E7|01-APR-2011|    0|   2011-04|
|   3MINDIA|    EQ|3374.0|3439.95| 3338.0| 3397.5| 3400.0|   3364.7|      871|
2941547.35|01-APR-2011|    0|   2011-04|
|    A2ZMES|    EQ| 281.8| 294.45|  279.8|  289.2|  287.2|    281.3|   140643|
4.02640755E7|01-APR-2011|    0|   2011-04|
|AARTIDRUGS|    EQ| 127.0|  132.0| 126.55|  131.3|  130.6|    127.6|     2972|
384468.2|01-APR-2011|    0|   2011-04|
|  AARTIIND|    EQ|  50.0|   50.0|   49.0|  49.25|  49.35|    49.05|    24056|
1188195.85|01-APR-2011|    0|   2011-04|
| AARVEEDEN|    EQ| 58.45|  58.45|   56.6|  56.65|   56.6|    56.55|      123|
7000.1|01-APR-2011|    0|   2011-04|
|      ABAN|    EQ| 620.0| 645.95|  617.0|  643.3|  644.0|   616.25|
1192421|7.5745251715E8|01-APR-2011|    0|   2011-04|
|       ABB|    EQ| 796.8|  796.8| 777.35|  785.2|  780.2|    796.8|    58038|
4.562089595E7|01-APR-2011|    0|   2011-04|
|ABBOTINDIA|    EQ|1379.0| 1379.0|1335.05| 1353.2| 1355.0|  1343.05|      587|
793494.8|01-APR-2011|    0|   2011-04|
|     ABCIL|    EQ|129.55|  130.8| 128.35|  130.0|  130.0|    129.7|     1941|
251299.4|01-APR-2011|    0|   2011-04|
|   ABGSHIP|    EQ| 367.0|  374.0|  335.6|  370.0|  370.0|   363.75|   307293|
1.134908749E8|01-APR-2011|    0|   2011-04|
|  ABHISHEK|    EQ|  15.0|   16.0|   15.0|  15.95|   16.0|     15.2|     6360|
100264.3|01-APR-2011|    0|   2011-04|
|ABIRLANUVO|    EQ|816.45|  844.7|  812.4| 824.85|  824.9|   814.35|    70865|
5.86104648E7|01-APR-2011|    0|   2011-04|
|ABSHEKINDS|    EQ|  14.4|  15.25|   14.2|  15.05|   15.2|     14.2|   159188|
2365626.1|01-APR-2011|    0|   2011-04|
|       ACC|    EQ|1070.0| 1098.0|1069.95|1091.85|1091.15|  1074.55|   240346|
2.598602339E8|01-APR-2011|    0|   2011-04|
|       ACE|    EQ|  43.2|   44.9|   42.0|   44.5|   44.5|     43.1|   142292|
6273701.1|01-APR-2011|    0|   2011-04|
|   ACKRUTI|    EQ| 228.0|  228.0|  223.1|  224.5|  225.5|    226.4|    23053|
5187103.8|01-APR-2011|    0|   2011-04|
| ACROPETAL|    EQ| 58.75|   62.7|  58.35|  58.35|  58.35|     61.4|  2507573|
1.513034327E8|01-APR-2011|    0|   2011-04|
|  ADANIENT|    EQ| 666.0|  668.2|  652.3|  661.0|  665.0|   666.55|
210396|1.3885739135E8|01-APR-2011|    0|   2011-04|
+----------+------+------+-------+-------+-------+-------+---------+---------+--
------------+-----------+-----+----------+
only showing top 20 rows
```

```
23/10/31 17:17:35 WARN CSVHeaderChecker: Number of column in CSV header is not
equal to number of fields in the schema:
 Header length: 14, schema size: 12
CSV file: file:///home/hduser/spark/nsedata.csv
```

[30]:
```
df1_min = df1.groupBy('SYMBOL', 'TIMESTAMP2').agg({'CLOSE': 'min'})
df1_max = df1.groupBy('SYMBOL', 'TIMESTAMP2').agg({'CLOSE': 'max'})
df1_avg = df1.groupBy('SYMBOL', 'TIMESTAMP2').agg({'CLOSE': 'avg'})
df1_stddev = df1.groupBy('SYMBOL', 'TIMESTAMP2').agg({'CLOSE': 'stddev'})
df1_count = df1.groupBy('SYMBOL', 'TIMESTAMP2').agg({'CLOSE': 'count'})
```

[31]:
```
df1 = df1_min.join(df1_max, on=["SYMBOL", "TIMESTAMP2"], how="inner") \
    .join(df1_avg, on=["SYMBOL", "TIMESTAMP2"], how="inner") \
    .join(df1_stddev, on=["SYMBOL", "TIMESTAMP2"], how="inner") \
    .join(df1_count, on=["SYMBOL", "TIMESTAMP2"], how="inner")
# Backslashes are only for readability.
```

[32]:
```
df1.show()
```

```
[Stage 13:>                                                         (0 + 1) / 1]

+---------+----------+----------+----------+------------------+-----------------
--+------------+
|   SYMBOL|TIMESTAMP2|min(CLOSE)|max(CLOSE)|        avg(CLOSE)|
stddev(CLOSE)|count(CLOSE)|
+---------+----------+----------+----------+------------------+-----------------
--+------------+
|20MICRONS|   2010-08|     51.55|      54.3|             52.75|
1.0647769719523452|           9|
|20MICRONS|   2010-09|      54.9|      60.9|  58.4547619047619|
1.7269123285436907|          21|
|20MICRONS|   2010-11|     53.35|      60.3| 55.69047619047619|
1.8280193549043067|          21|
|20MICRONS|   2011-01|      41.3|     47.75|43.917500000000004|
1.9892656010646148|          20|
|20MICRONS|   2011-03|     35.85|      40.1| 37.70227272727272|
1.3524648813966484|          22|
|20MICRONS|   2011-04|     37.45|     41.65|            40.425|
1.0581963011486593|          18|
|20MICRONS|   2011-08|      46.6|      54.7| 51.05952380952381|
2.2866798555776837|          21|
|20MICRONS|   2011-09|     51.85|     59.35|56.145238095238106|
1.7756621836588724|          21|
|20MICRONS|   2012-01|      61.7|      66.0| 63.04523809523808|
1.2234076141974053|          21|
|20MICRONS|   2012-03|     79.05|      85.1| 81.84761904761905|
1.578011105036673|          21|
|20MICRONS|   2012-05|     84.35|      93.1| 88.00227272727273|
2.7357630289645605|          22|
```

```
|20MICRONS|   2012-06|      84.7|     89.95| 87.38095238095237|
1.7464590025589037|          21|
|20MICRONS|   2012-07|     84.45|      97.7| 92.38181818181819|
4.4267731302067475|          22|
|20MICRONS|   2012-08|     96.85|    120.85|114.29999999999998|
7.240700932920781|          21|
|20MICRONS|   2012-10|    106.55|    123.05|115.22857142857144|
4.723784802162661|          21|
|20MICRONS|   2012-11|     125.6|     163.9|145.45499999999998|
11.469064799207526|          20|
|20MICRONS|   2012-12|     135.7|    156.95|           143.685|
6.708284352005988|          20|
|20MICRONS|   2013-01|      68.1|     160.8|136.45434782608694|
31.77105569912895|          23|
|20MICRONS|   2013-02|     30.15|     68.65|           42.2325|
14.365723780472818|          20|
|20MICRONS|   2013-05|      30.4|      31.5|
30.72954545454546|0.26306756823019073|          22|
+---------+----------+----------+----------+------------------+-----------------
--+------------+
only showing top 20 rows
```

[33]:
```
ss.stop()
sc.stop()
```