Ingeniería en sistemas computaciones

Datos masivos

Profesor
Jose Christian Romero

Unit 1

Exam 1

Alumnos:

Marquez Millan Seashell Vanessa

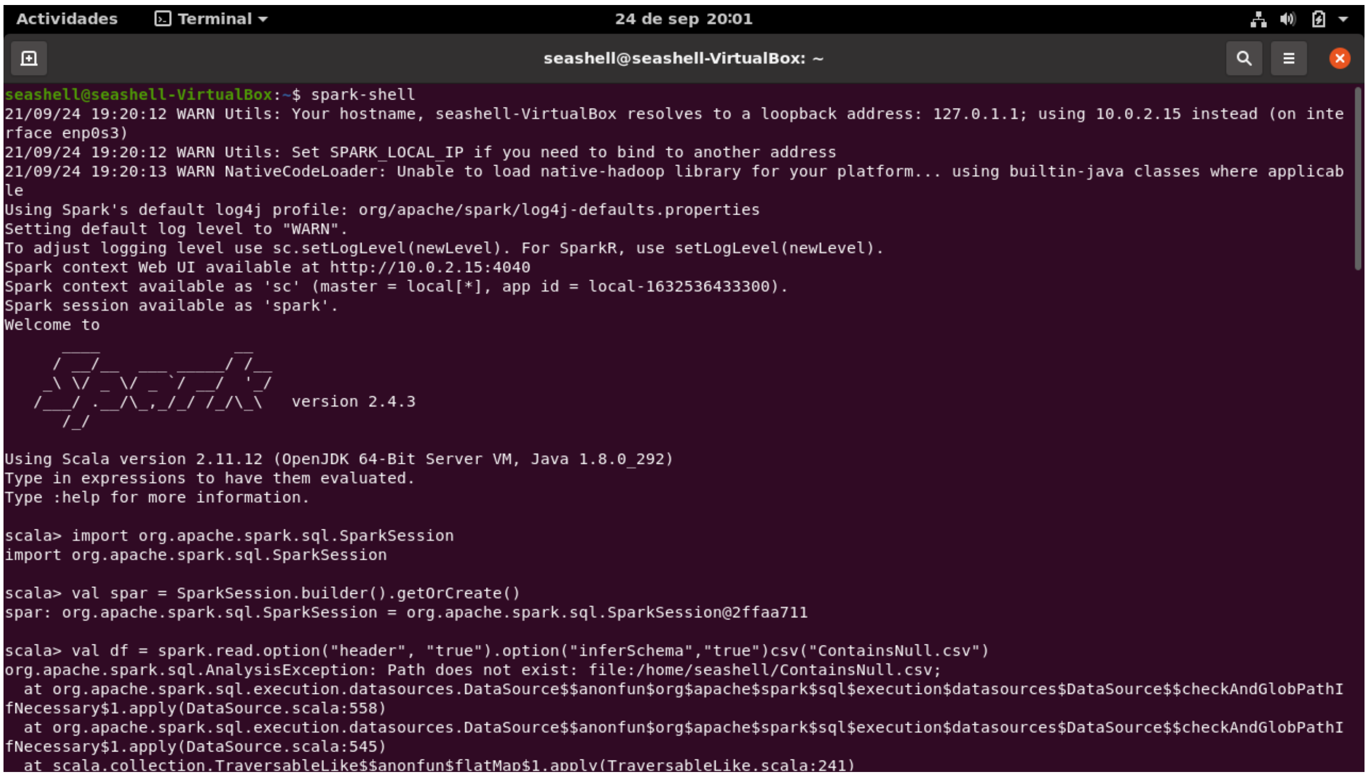
Galaviz Lona Oscar Eduardo

Desarrollo

1-.SPARK session

Only start SPARK with the comand

```
SPARK-SHELL
```

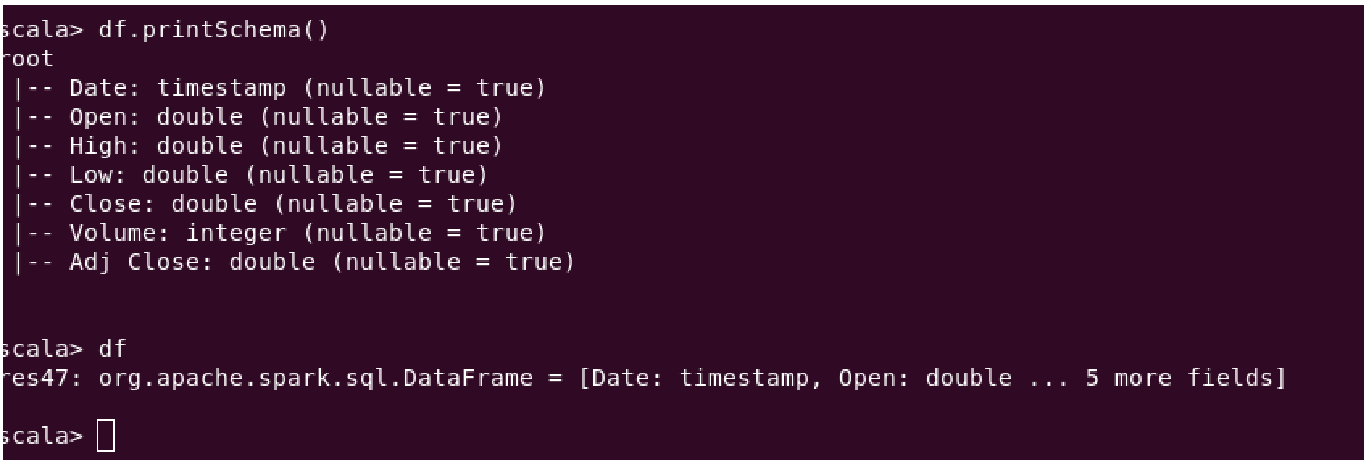


```
seashell@seashell-VirtualBox:~$ spark-shell
21/09/24 19:20:12 WARN Utils: Your hostname, seashell-VirtualBox resolves to a loopback address: 127.0.1.1; using 10.0.2.15 instead (on inte
rface enp0s3)
21/09/24 19:20:12 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
21/09/24 19:20:13 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicab
le
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).
Spark context Web UI available at http://10.0.2.15:4040
Spark context available as 'sc' (master = local[*], app id = local-1632536433300).
Spark session available as 'spark'.
Welcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /___/ .__/\_,_/_/ /_/\_\   version 2.4.3
      /_/

Using Scala version 2.11.12 (OpenJDK 64-Bit Server VM, Java 1.8.0_292)
Type in expressions to have them evaluated.
Type :help for more information.

scala> import org.apache.spark.sql.SparkSession
import org.apache.spark.sql.SparkSession

scala> val spar = SparkSession.builder().getOrCreate()
spar: org.apache.spark.sql.SparkSession = org.apache.spark.sql.SparkSession@2ffaa711

scala> val df = spark.read.option("header", "true").option("inferSchema","true")csv("ContainsNull.csv")
org.apache.spark.sql.AnalysisException: Path does not exist: file:/home/seashell/ContainsNull.csv;
  at org.apache.spark.sql.execution.datasources.DataSource$$anonfun$org$apache$spark$sql$execution$datasources$DataSource$$checkAndGlobPathI
fNecessary$1.apply(DataSource.scala:558)
  at org.apache.spark.sql.execution.datasources.DataSource$$anonfun$org$apache$spark$sql$execution$datasources$DataSource$$checkAndGlobPathI
fNecessary$1.apply(DataSource.scala:545)
  at scala.collection.TraversableLike$$anonfun$flatMap$1.apply(TraversableLike.scala:241)
```

2-. File Netflix Stock CSV

First need import the library, and is important you have the dataFrame in this address "/home/"name computer"/"name dataFrame" because the comand stearchh the archive here, then only print the data types

```
import org.apache.spark.sql.SparkSession

val spark = SparkSession.builder().getOrCreate()

val df = spark.read.option("header",
"true").option("inferSchema","true")csv("Netflix_2011_2016.csv")
df
df.printSchema()
```

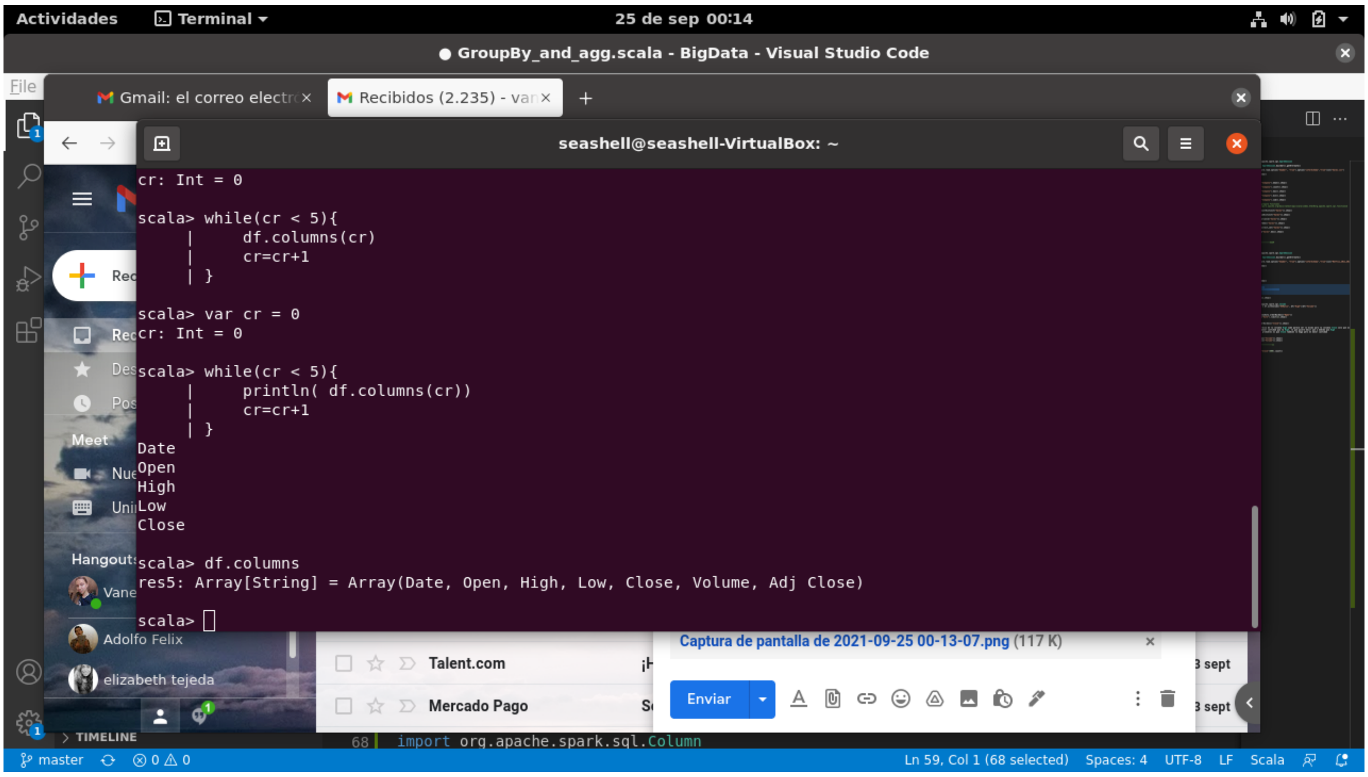


```
cala> df.printSchema()
oot
 |-- Date: timestamp (nullable = true)
 |-- Open: double (nullable = true)
 |-- High: double (nullable = true)
 |-- Low: double (nullable = true)
 |-- Close: double (nullable = true)
 |-- Volume: integer (nullable = true)
 |-- Adj Close: double (nullable = true)


cala> df
es47: org.apache.spark.sql.DataFrame = [Date: timestamp, Open: double ... 5 more fields]

cala> 
```

3-.Names columns

Only start SPARK with the comand

```
df.columns
```



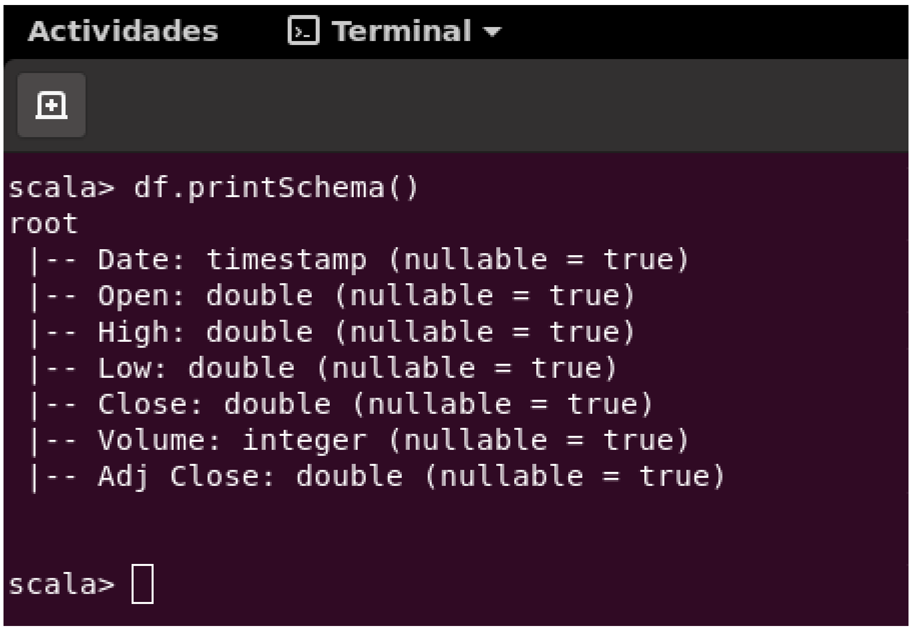
```
cr: Int = 0

scala> while(cr < 5){
     |     df.columns(cr)
     |     cr=cr+1
     | }

scala> var cr = 0
cr: Int = 0

scala> while(cr < 5){
     |     println( df.columns(cr))
     |     cr=cr+1
     | }
Date
Open
High
Low
Close

scala> df.columns
res5: Array[String] = Array(Date, Open, High, Low, Close, Volume, Adj Close)

scala> 
```

Actividades
Terminal
25 de sep 00:14
GroupBy_and_agg.scala - BigData - Visual Studio Code
Gmail: el correo electr
Recibidos (2.235) - var
seashell@seashell-VirtualBox: ~
Captura de pantalla de 2021-09-25 00-13-07.png (117 K)
Talent.com
Mercado Pago
Enviar
Adolfo Felix
elizabeth tejeda
import org.apache.spark.sql.Column
master
Ln 59, Col 1 (68 selected) Spaces: 4 UTF-8 LF Scala

4-.Schema

For know thw schema only need the dataFrame and the next reserverd word, is for can you know the structure and the types of each column

```
df.printSchema()
```

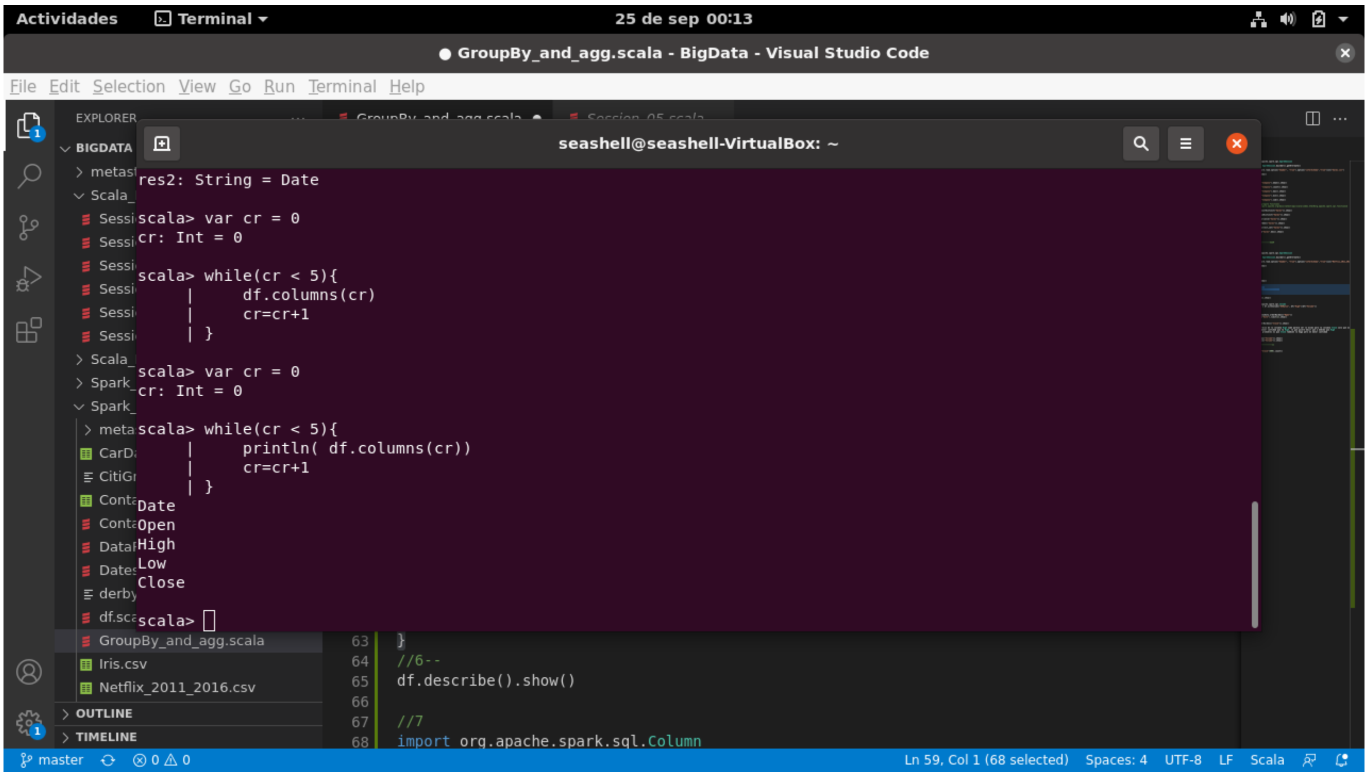


```
scala> df.printSchema()
root
 |-- Date: timestamp (nullable = true)
 |-- Open: double (nullable = true)
 |-- High: double (nullable = true)
 |-- Low: double (nullable = true)
 |-- Close: double (nullable = true)
 |-- Volume: integer (nullable = true)
 |-- Adj Close: double (nullable = true)


scala>
```

5-Print first 5 columns

For that need create a variable inthis case cr and i say is equals to 0, then use while for create a bucle ever cr is less than 5, print the columns and increase cr if i don't do that is a infinite bucle

```
var cr = 0
while(cr < 5){
    println( df.columns(cr))
    cr=cr+1
}
```



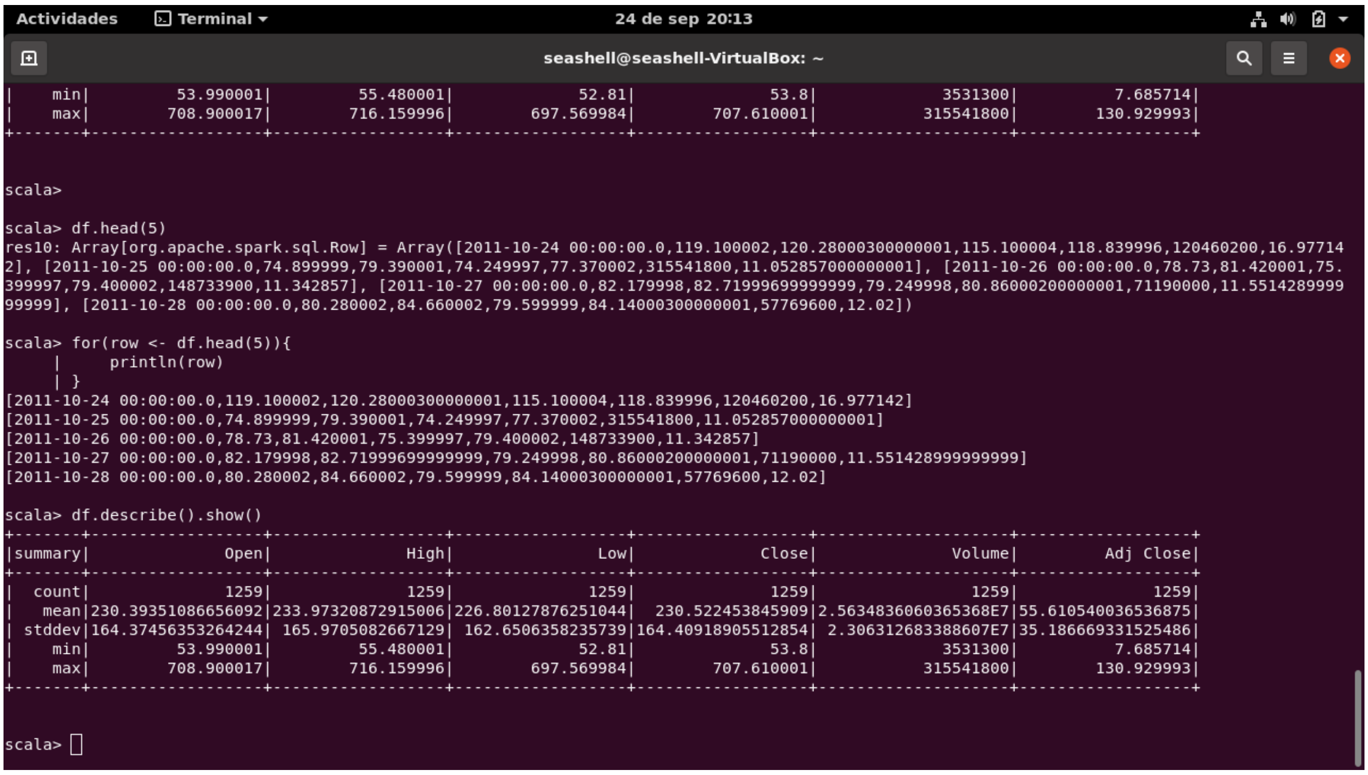
```
res2: String = Date

scala> var cr = 0
cr: Int = 0

scala> while(cr < 5){
     |     df.columns(cr)
     |     cr=cr+1
     | }

scala> var cr = 0
cr: Int = 0

scala> while(cr < 5){
     |     println( df.columns(cr))
     |     cr=cr+1
     | }
Date
Open
High
Low
Close

scala> 
```

```
}
//6--
df.describe().show()

//7
import org.apache.spark.sql.Column
```

6-.Uses describe ()

That comand is for knows more informations about the dataFrame, statistical data

```
df.describe().show()
```

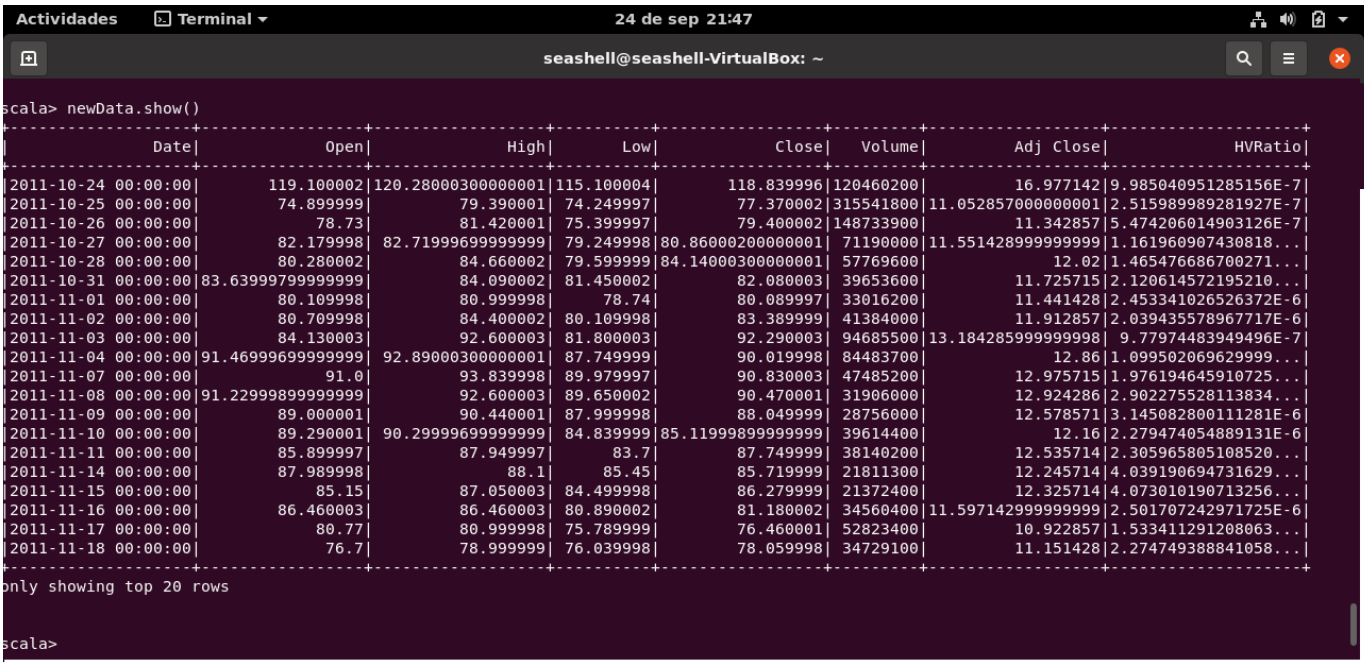


```
|    min|        53.990001|        55.480001|            52.81|             53.8|            3531300|         7.685714|
|    max|       708.900017|       716.159996|       697.569984|       707.610001|          315541800|       130.929993|
+-------+-----------------+-----------------+-----------------+-----------------+-------------------+-----------------+


scala> 

scala> df.head(5)
res10: Array[org.apache.spark.sql.Row] = Array([2011-10-24 00:00:00.0,119.100002,120.28000300000001,115.100004,118.839996,120460200,16.97714
2], [2011-10-25 00:00:00.0,74.899999,79.390001,74.249997,77.370002,315541800,11.052857000000001], [2011-10-26 00:00:00.0,78.73,81.420001,75.
399997,79.400002,148733900,11.342857], [2011-10-27 00:00:00.0,82.179998,82.71999699999999,79.249998,80.86000200000001,71190000,11.5514289999
99999], [2011-10-28 00:00:00.0,80.280002,84.660002,79.599999,84.14000300000001,57769600,12.02])

scala> for(row <- df.head(5)){
     |     println(row)
     | }
[2011-10-24 00:00:00.0,119.100002,120.28000300000001,115.100004,118.839996,120460200,16.977142]
[2011-10-25 00:00:00.0,74.899999,79.390001,74.249997,77.370002,315541800,11.052857000000001]
[2011-10-26 00:00:00.0,78.73,81.420001,75.399997,79.400002,148733900,11.342857]
[2011-10-27 00:00:00.0,82.179998,82.71999699999999,79.249998,80.86000200000001,71190000,11.551428999999999]
[2011-10-28 00:00:00.0,80.280002,84.660002,79.599999,84.14000300000001,57769600,12.02]

scala> df.describe().show()
+-------+-----------------+-----------------+-----------------+-----------------+-------------------+-----------------+
|summary|             Open|             High|              Low|            Close|             Volume|        Adj Close|
+-------+-----------------+-----------------+-----------------+-----------------+-------------------+-----------------+
|  count|             1259|             1259|             1259|             1259|               1259|             1259|
|   mean|230.39351086656092|233.97320872915006|226.80127876251044|  230.522453845909|2.5634836060365368E7|55.610540036536875|
| stddev|164.37456353264244| 165.9705082667129| 162.6506358235739|164.40918905512854| 2.306312683388607E7|35.186669331525486|
|    min|        53.990001|        55.480001|            52.81|             53.8|            3531300|         7.685714|
|    max|       708.900017|       716.159996|       697.569984|       707.610001|          315541800|       130.929993|
+-------+-----------------+-----------------+-----------------+-----------------+-------------------+-----------------+


scala> 
```

7-.Create new DataFrame with new column

We need create a new dataFrame for can to do some modification so here to make a new column with the relationship of column High and Volume

```
val newData = df.withColumn("HVRatio", df("High")/df("Volume"))
newData.show()
```

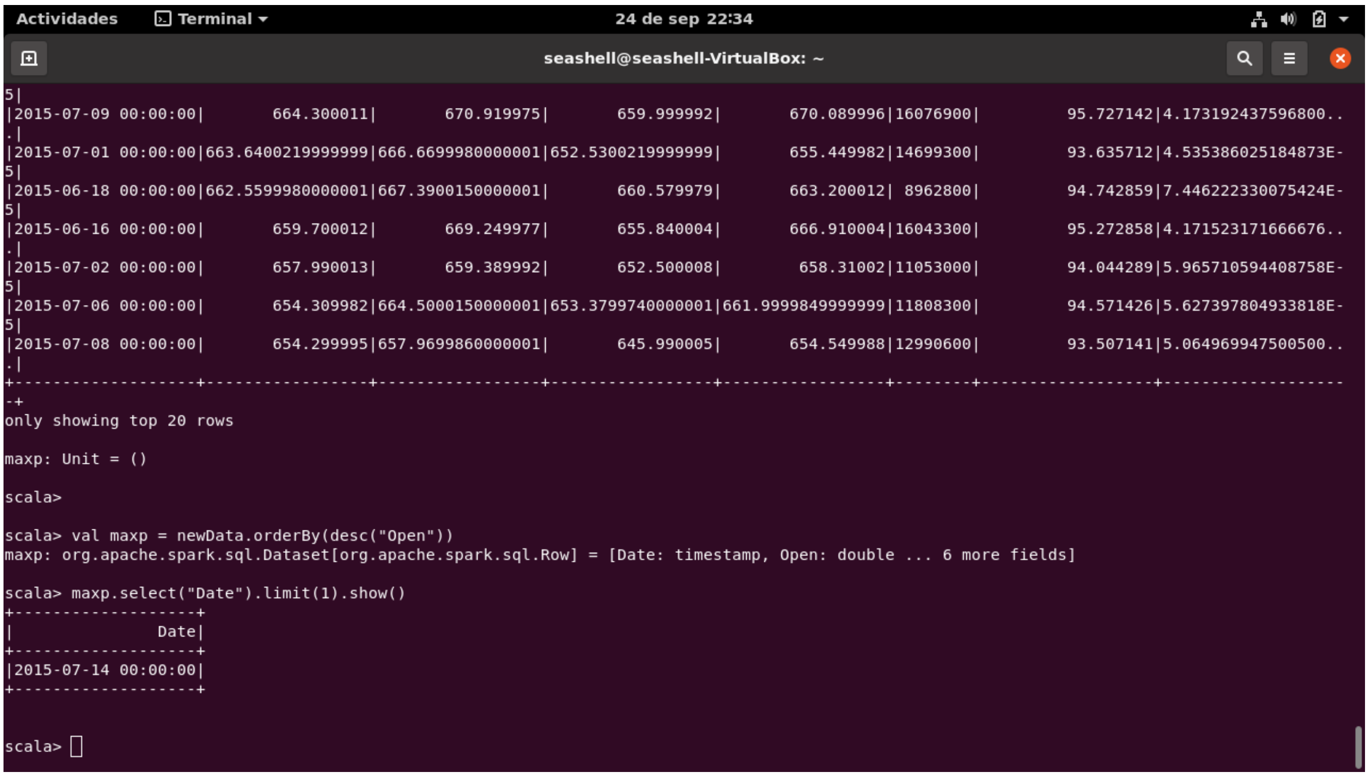


```
scala> newData.show()
+-------------------+------------------+------------------+----------+------------------+---------+------------------+--------------------+
|               Date|              Open|              High|       Low|             Close|   Volume|         Adj Close|             HVRatio|
+-------------------+------------------+------------------+----------+------------------+---------+------------------+--------------------+
|2011-10-24 00:00:00|        119.100002|120.28000300000001|115.100004|        118.839996|120460200|         16.977142|9.985040951285156E-7|
|2011-10-25 00:00:00|         74.899999|         79.390001| 74.249997|         77.370002|315541800|11.052857000000001|2.515989989281927E-7|
|2011-10-26 00:00:00|             78.73|         81.420001| 75.399997|         79.400002|148733900|         11.342857|5.474206014903126E-7|
|2011-10-27 00:00:00|         82.179998| 82.71999699999999| 79.249998| 80.86000200000001| 71190000| 11.55142899999999|1.161960907430818...|
|2011-10-28 00:00:00|         80.280002|         84.660002| 79.599999| 84.14000300000001| 57769600|             12.02|1.465476686700271...|
|2011-10-31 00:00:00| 83.63999799999999|         84.090002| 81.450002|         82.080003| 39653600|         11.725715|2.120614572195210...|
|2011-11-01 00:00:00|         80.109998|         80.999998|     78.74|         80.089997| 33016200|         11.441428|2.453341026526372E-6|
|2011-11-02 00:00:00|         80.709998|         84.400002| 80.109998|         83.389999| 41384000|         11.912857|2.039435578967717E-6|
|2011-11-03 00:00:00|         84.130003|         92.600003| 81.800003|         92.290003| 94685500|13.184285999999998| 9.77974483949496E-7|
|2011-11-04 00:00:00| 91.46999699999999| 92.89000300000001| 87.749999|         90.019998| 84483700|             12.86|1.099502069629999...|
|2011-11-07 00:00:00|              91.0|         93.839998| 89.979997|         90.830003| 47485200|         12.975715|1.976194645910725...|
|2011-11-08 00:00:00| 91.22999899999999|         92.600003| 89.650002|         90.470001| 31906000|         12.924286|2.902275528113834...|
|2011-11-09 00:00:00|         89.000001|         90.440001| 87.999998|         88.049999| 28756000|         12.578571|3.145082800111281E-6|
|2011-11-10 00:00:00|         89.290001| 90.29999699999999| 84.839999| 85.11999899999999| 39614400|             12.16|2.279474054889131E-6|
|2011-11-11 00:00:00|         85.899997|         87.949997|      83.7|         87.749999| 38140200|         12.535714|2.305965805108520...|
|2011-11-14 00:00:00|         87.989998|              88.1|     85.45|         85.719999| 21811300|         12.245714|4.039190694731629...|
|2011-11-15 00:00:00|             85.15|         87.050003| 84.499998|         86.279999| 21372400|         12.325714|4.073010190713256...|
|2011-11-16 00:00:00|         86.460003|         86.460003| 80.890002|         81.180002| 34560400| 11.59714299999999|2.501707242971725E-6|
|2011-11-17 00:00:00|             80.77|         80.999998| 75.789999|         76.460001| 52823400|         10.922857|1.533411291208063...|
|2011-11-18 00:00:00|              76.7|         78.999999| 76.039998|         78.059998| 34729100|         11.151428|2.274749388841058...|
+-------------------+------------------+------------------+----------+------------------+---------+------------------+--------------------+
only showing top 20 rows


scala>
```

8-.Max Open

We need know the date of the maxium data, so first we order the column Open and save in maxp then select Date of de maxp but only the first row

```
val maxp = newData.orderBy(desc("Open"))
maxp.select("Date").limit(1).show()
```



```
5|
|2015-07-09 00:00:00|       664.300011|       670.919975|       659.999992|       670.089996|16076900|         95.727142|4.173192437596800..
.|
|2015-07-01 00:00:00|663.6400219999999|666.6699980000001|652.5300219999999|       655.449982|14699300|         93.635712|4.535386025184873E-
5|
|2015-06-18 00:00:00|662.5599980000001|667.3900150000001|       660.579979|       663.200012| 8962800|         94.742859|7.446222330075424E-
5|
|2015-06-16 00:00:00|       659.700012|       669.249977|       655.840004|       666.910004|16043300|         95.272858|4.171523171666676..
.|
|2015-07-02 00:00:00|       657.990013|       659.389992|       652.500008|        658.31002|11053000|         94.044289|5.965710594408758E-
5|
|2015-07-06 00:00:00|       654.309982|664.5000150000001|653.3799740000001|661.9999849999999|11808300|         94.571426|5.627397804933818E-
5|
|2015-07-08 00:00:00|       654.299995|657.9699860000001|       645.990005|       654.549988|12990600|         93.507141|5.064969947500500..
.|
+-------------------+-----------------+-----------------+-----------------+-----------------+--------+------------------+-------------------
-+
only showing top 20 rows

maxp: Unit = ()

scala>

scala> val maxp = newData.orderBy(desc("Open"))
maxp: org.apache.spark.sql.Dataset[org.apache.spark.sql.Row] = [Date: timestamp, Open: double ... 6 more fields]

scala> maxp.select("Date").limit(1).show()
+-------------------+
|               Date|
+-------------------+
|2015-07-14 00:00:00|
+-------------------+


scala> 
```

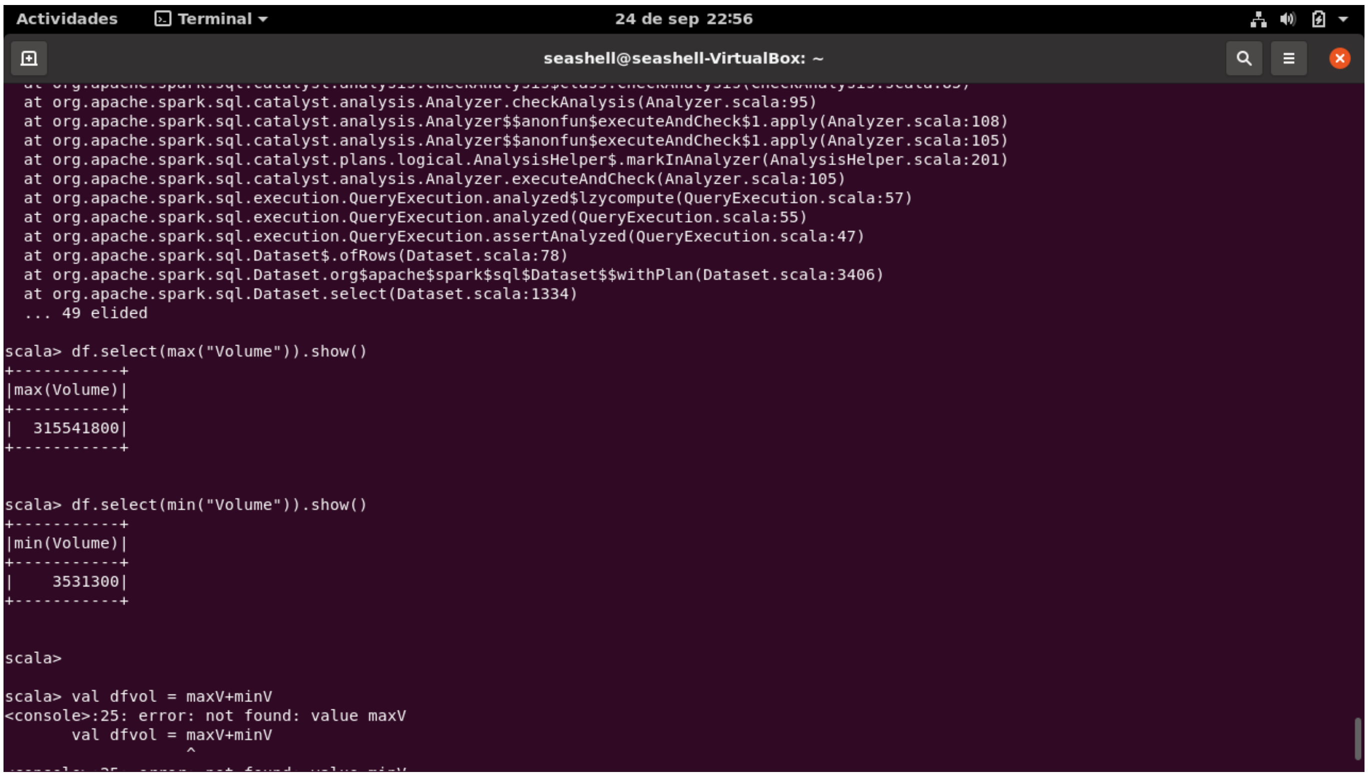
9-.Meaning Close in DataFrame

```
newData.orderBy(desc("Close")).show()
```

10-.Maximum and minimum of Volume

This is only to know thw first row the most big and the most lowest, and oly select the volume and your minium or maximun

```
df.select(max("Volume")).show()
df.select(min("Volume")).show()
```



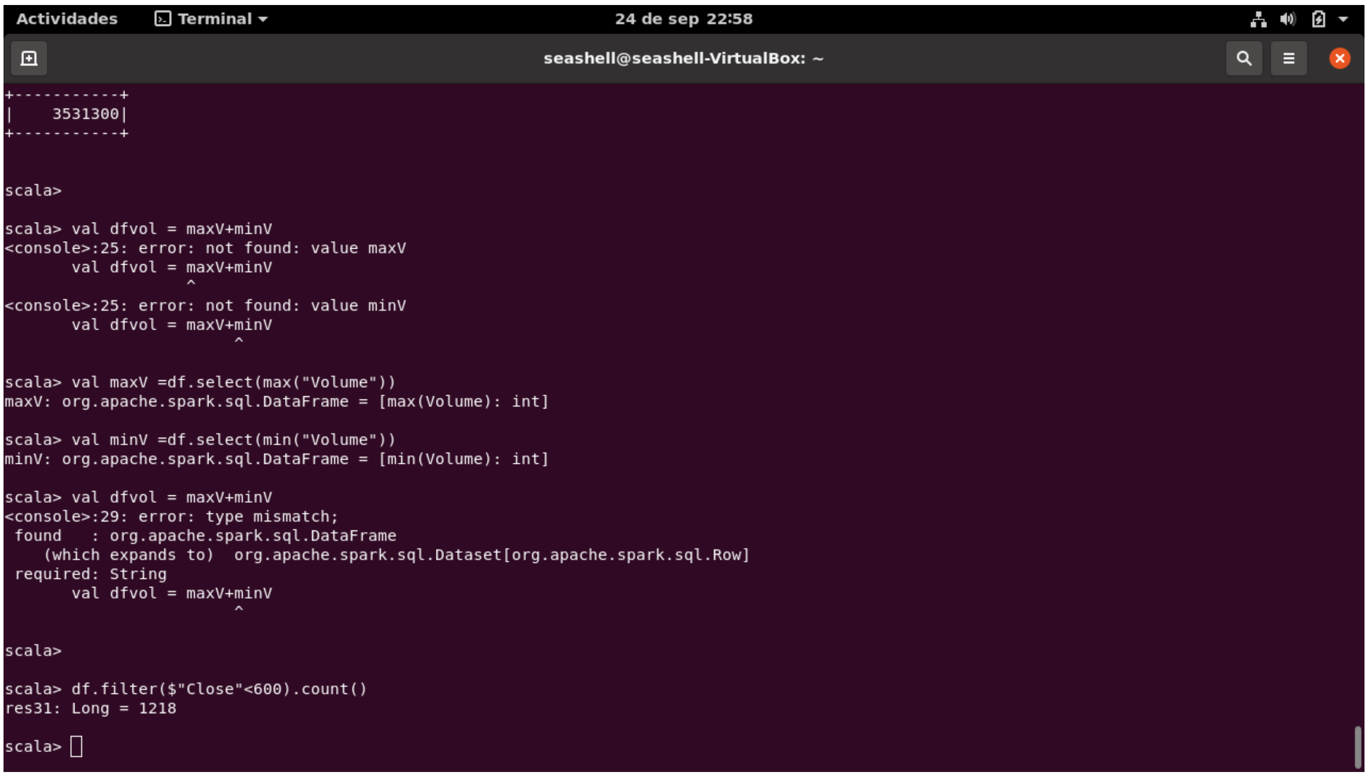
```
  at org.apache.spark.sql.catalyst.analysis.Analyzer.checkAnalysis(Analyzer.scala:95)
  at org.apache.spark.sql.catalyst.analysis.Analyzer$$anonfun$executeAndCheck$1.apply(Analyzer.scala:108)
  at org.apache.spark.sql.catalyst.analysis.Analyzer$$anonfun$executeAndCheck$1.apply(Analyzer.scala:105)
  at org.apache.spark.sql.catalyst.plans.logical.AnalysisHelper$.markInAnalyzer(AnalysisHelper.scala:201)
  at org.apache.spark.sql.catalyst.analysis.Analyzer.executeAndCheck(Analyzer.scala:105)
  at org.apache.spark.sql.execution.QueryExecution.analyzed$lzycompute(QueryExecution.scala:57)
  at org.apache.spark.sql.execution.QueryExecution.analyzed(QueryExecution.scala:55)
  at org.apache.spark.sql.execution.QueryExecution.assertAnalyzed(QueryExecution.scala:47)
  at org.apache.spark.sql.Dataset$.ofRows(Dataset.scala:78)
  at org.apache.spark.sql.Dataset.org$apache$spark$sql$Dataset$$withPlan(Dataset.scala:3406)
  at org.apache.spark.sql.Dataset.select(Dataset.scala:1334)
  ... 49 elided

scala> df.select(max("Volume")).show()
+-----------+
|max(Volume)|
+-----------+
|  315541800|
+-----------+


scala> df.select(min("Volume")).show()
+-----------+
|min(Volume)|
+-----------+
|    3531300|
+-----------+


scala>

scala> val dfvol = maxV+minV
<console>:25: error: not found: value maxV
       val dfvol = maxV+minV
                   ^
```

11-.With Scala/Spark $ resolve the next

A-.With Scala/Spark $ resolve the next

Need to know the data less than numbesr 600 and cout that

```
df.filter($"Close"<600).count()
```



```
+-----------+
|    3531300|
+-----------+


scala>

scala> val dfvol = maxV+minV
<console>:25: error: not found: value maxV
       val dfvol = maxV+minV
                   ^
<console>:25: error: not found: value minV
       val dfvol = maxV+minV
                        ^

scala> val maxV =df.select(max("Volume"))
maxV: org.apache.spark.sql.DataFrame = [max(Volume): int]

scala> val minV =df.select(min("Volume"))
minV: org.apache.spark.sql.DataFrame = [min(Volume): int]

scala> val dfvol = maxV+minV
<console>:29: error: type mismatch;
 found   : org.apache.spark.sql.DataFrame
    (which expands to)  org.apache.spark.sql.Dataset[org.apache.spark.sql.Row]
 required: String
       val dfvol = maxV+minV
                        ^

scala>

scala> df.filter($"Close"<600).count()
res31: Long = 1218

scala> 
```