TRENDY TECH

UPLIFT YOUR CAREER!

Assignment Solution

Week12: Apache Spark - Structured API Part-2

Spark StructuredAPIs -Assignment Solutions

Assignment 1 :

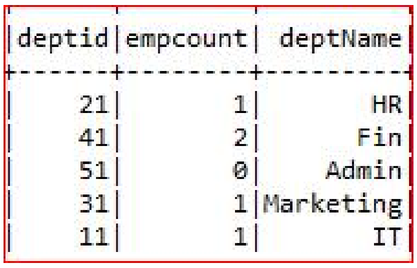
Given 2 Datasets employee.json and dept.json
We need to calculate the count of employees against each department. Use Structured APIs.

Code:

```
//Find the count of employees against each department

import org.apache.spark.SparkConf
import org.apache.spark.sql.SparkSession
import org.apache.log4j.Level
import org.apache.log4j.Logger
import org.apache.spark.sql.functions._

object Assignment1_Week12 extends App{

  //Setting the Log Level
  Logger.getLogger("org").setLevel(Level.ERROR)

  //Setting the spark conf
  val sparkConf = new SparkConf()
  sparkConf.set("spark.app.name","Assignment1_Week12")
  sparkConf.set("spark.master","local[2]")

  //Creating Spark Session
  val spark = SparkSession.builder()
  .config(sparkConf)
  .getOrCreate()

  //Load the department data into a Dataframe using dataframe reader API

   val deptDf = spark.read
  .format("json")
  .option("path","C:/TrendyTech/SparkExamples/dept.json")
  .load()

//    deptDf.show()
//    deptDf.printSchema()
```

```
    //Load the employee data into a Dataframe using dataframe reader API

      val employeeDf = spark.read
    .format("json")
    .option("path","C:/TrendyTech/SparkExamples/employee.json")
    .load()

  // employeeDf.show()
  // employeeDf.printSchema()

    //Joining of two dataframes using left outer join, with department dataframe on left
side

      val joinCondition = deptDf.col("deptid") === employeeDf.col("deptid")//join
condition

      val joinType = "left" //joinType

      val joinedDf = deptDf.join(employeeDf, joinCondition, joinType) //Joining of two
dataframes

    //drop the ambiguous column deptid of employee dataframe,from the joined
Dataframe

  val    joinedDfNew = joinedDf.drop(employeeDf.col("deptid"))

      //Use first function so as to get other columns also along with aggregated columns

joinedDfNew.groupBy("deptid").agg(count("empname").as("empcount"),first("deptNam
e").as ("deptName")).dropDuplicates("deptName").show()

spark.stop()
}
```

Output:



```
|deptid|empcount| deptName|
+------+--------+---------+
|    21|       1|       HR|
|    41|       2|      Fin|
|    51|       0|    Admin|
|    31|       1|Marketing|
|    11|       1|       IT|
```

Assignment 2

Find the top movies as shown in spark practical 18 using broadcast join. Use Dataframes or Datasets to solve it this time.

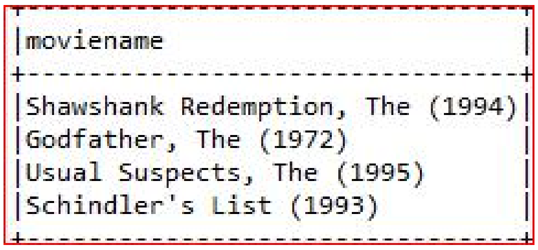
Code:

```
import org.apache.spark.SparkConf
import org.apache.spark.sql.SparkSession
import org.apache.log4j.Level
import org.apache.log4j.Logger
import org.apache.spark.sql.functions._



object Assignment2_Week12 extends App {

   //Setting the Log Level
   Logger.getLogger("org").setLevel(Level.ERROR)

   //Setting the spark conf
   val sparkConf = new SparkConf()
   sparkConf.set("spark.app.name","Assignment2_Week12")
   sparkConf.set("spark.master","local[2]")

   //Creating Spark Session
   val spark = SparkSession.builder()
   .config(sparkConf)
   .getOrCreate()


   //Creation of a ratings dataframe using a case class approach

   case class Ratings(userid:Int,movieid:Int,rating:Int,timestamp:String)//create a
case-class that represents the schema

   //Creation of base RDD for ratings data
   val ratingsRDD =
spark.sparkContext.textFile("C:/TrendyTech/SparkExamples/ratings.dat")//ratings data
does not have a schema, so first loading to an RDD

  // map the RDD elements into instances of the case class

val caseClassSchemaRDD   =   ratingsRDD.map(x => x.split("::")).map(x =>
Ratings(x(0).toInt,x(1).toInt,x(2).toInt,x(3)) )
```

```
//Transform to a Dataframe:

import spark.implicits._

  val ratingsDf = caseClassSchemaRDD.toDF()

//    ratingsDf.show()
//    ratingsDf.printSchema()

//Creation of base RDD for movies data

  val moviesRDD =
spark.sparkContext.textFile("C:/TrendyTech/SparkExamples/movies.dat")

//defining the schema using case class

  case class Movies(movieid:Int,moviename:String,genre:String)

    val moviestransformedRDD = moviesRDD.map(line => line.split("::")).map(fields =>
Movies(fields(0).toInt,fields(1),fields(2)) )

    val    moviesNewDf    =
moviestransformedRDD.toDF().select("movieid","moviename")


    // moviesNewDf.show()
    //moviesNewDf.printSchema()



  val transformedmovieDf =    ratingsDf.groupBy("movieid")
  .agg(count("rating").as("movieViewCount"),avg("rating").as("avgMovieRating"))
  .orderBy(desc("movieViewCount"))


//transformedmovieDf.show()


      val popularMoviesDf = transformedmovieDf.filter("movieViewCount > 1000 AND
avgMovieRating > 4.5")


  // popularMoviesDf.show()
```

```
    //Now we want to associate the Movie names also, so we use a broadcast join

        spark.sql("SET spark.sql.autoBroadcastJoinThreshold    = -1")

        val joinCondition = popularMoviesDf.col("movieid") ===
moviesNewDf.col("movieid") //join condition

        val joinType = "inner"                                              //type of
join

        val    finalPopularMoviesDf =
popularMoviesDf.join(broadcast(moviesNewDf),joinCondition,joinType).drop(popularM
oviesDf.col("movieid")).sort(desc("avgMovieRating")) //joining the 2 dataframes using
broadcast join where movies data is the smaller dataset


finalPopularMoviesDf.drop("movieViewCount","movieid","avgMovieRating").show(false
)

    spark.stop()



}
```

Output:



```
+--------------------------------+
|moviename                       |
+--------------------------------+
|Shawshank Redemption, The (1994)|
|Godfather, The (1972)           |
|Usual Suspects, The (1995)      |
|Schindler's List (1993)         |
+--------------------------------+
```

Assignment 3

File A is a text file of size 1.2 GB in HDFS at location /loc/x. It contains match by match statistics of runs scored by all the batsman in the history of cricket.
File B is a text file of size 1.2 MB present in local dir /loc/y. It contains list of batsman playing in cricket world cup 2019.

File A:
1 Rohit_Sharma India 200 100.2
1 Virat_Kohli India 100 98.02
1 Steven_Smith Aus 77 79.23
35 Clive_Lloyd WI 29 37.00
243 Rohit_Sharma India 23 150.00
243 Faf_du_Plesis SA 17 35.06
File B:
Rohit_Sharma India
Steven_Smith Aus
Virat_Kohli **India**

Find the batsman participating in 2019 who has the best average of scoring runs in his career. Solve this using Dataframes or Datasets.

**** File is tab separated.Headers not part of file**

Code:

```
import org.apache.spark.SparkConf
import org.apache.spark.sql.SparkSession
import org.apache.log4j.Level
import org.apache.log4j.Logger
import org.apache.spark.sql.functions._
import org.apache.spark.sql.types.StructType
import org.apache.spark.sql.types.StringType
import org.apache.spark.sql.types.StructField
import org.apache.spark.sql.Row

object Assignment3_Week12 extends App {

   //Setting the Log Level
  Logger.getLogger("org").setLevel(Level.ERROR)

  //Setting the spark conf
  val sparkConf = new SparkConf()
  sparkConf.set("spark.app.name","Assignment3_Week12")
  sparkConf.set("spark.master","local[2]")

  //Creating Spark Session
  val spark = SparkSession.builder()
  .config(sparkConf)
  .getOrCreate()
  //Case class creation

    case class BatsmenHistory(MatchNumber:Int,Batsman:String,Team:String,
RunsScored:Int,StrikeRate:Double)

//Creation of base RDD for historical data

    val batsmenHistoryRDD =
spark.sparkContext.textFile("C:/TrendyTech/SparkExamples/FileA_BatsmenDetails_Histo
ry.txt")


  val batsmenHistorySchemaRDD = batsmenHistoryRDD.map(line =>
line.split("\t")).map(fields =>
BatsmenHistory(fields(0).toInt,fields(1),fields(2),fields(3).toInt,fields(4).toDouble) )

  // Dataframe creation

  import spark.implicits._

val batsmenHistoryDf =    batsmenHistorySchemaRDD.toDF()

//batsmenHistoryDf.show()

//batsmenHistoryDf.printSchema()

//Calculating Average runs scored by a batsman in history, with highest average at top

val batsmenBestRunsAvgHistoryDf =
batsmenHistoryDf.groupBy("Batsman").agg(avg("RunsScored").as("AverageRunsScored"))
.select("Batsman","AverageRunsScored")


//batsmenBestRunsAvgHistoryDf.sort(col("AverageRunsScored").desc).show()



//create a base RDD from input data of worldcup
val batsmenWorldCupRDD =
spark.sparkContext.textFile("C:/TrendyTech/SparkExamples/FileB_BatsemenDetails_Wor
ldcup2019.txt")

//Alternative Approach instead of using case class ,though case class can also be used
instead-
```

```
//Programmatically create an explicit schema of the worldcup 2019 file:

  val batsmenworldcupSchema = StructType(List(
          StructField("batsman",StringType,false),
          StructField("team",StringType)
          ))


//Convert RDD[Array(String)] to RDD[Row].

val batsmenWorldCupRowRDD = batsmenWorldCupRDD.map(line =>
line.split("\t")).map( fields => Row(fields(0),fields(1)))

//Apply the explicitly defined Struct Type schema to the RDD[Row]

val batsmenWorldCupDf = spark.createDataFrame(batsmenWorldCupRowRDD,
batsmenworldcupSchema)

batsmenWorldCupDf.show()
batsmenWorldCupDf.printSchema()

//autoBroadcast Join is turned off
  spark.sql("SET spark.sql.autoBroadcastJoinThreshold    = -1")

  val joinCondition = batsmenBestRunsAvgHistoryDf.col("Batsman") ===
batsmenWorldCupDf.col("batsman")

  val joinType = "inner"

//Using broadcast join

  val    finalBestBatsmenPlayingWorldCupDf =
batsmenBestRunsAvgHistoryDf.join(broadcast(batsmenWorldCupDf),joinCondition,joinT
ype).drop (batsmenBestRunsAvgHistoryDf.col("Batsman"))

finalBestBatsmenPlayingWorldCupDf.orderBy(desc("AverageRunsScored")).show()

spark.stop()

}
```

Output:

```
+-----------------+------------+
|AverageRunsScored|     batsman|
+-----------------+------------+
|                  111.5|Rohit_Sharma|
|                  100.0| Virat_Kohli|
|                   77.0|Steven_Smith|
+-----------------+------------+
```

****