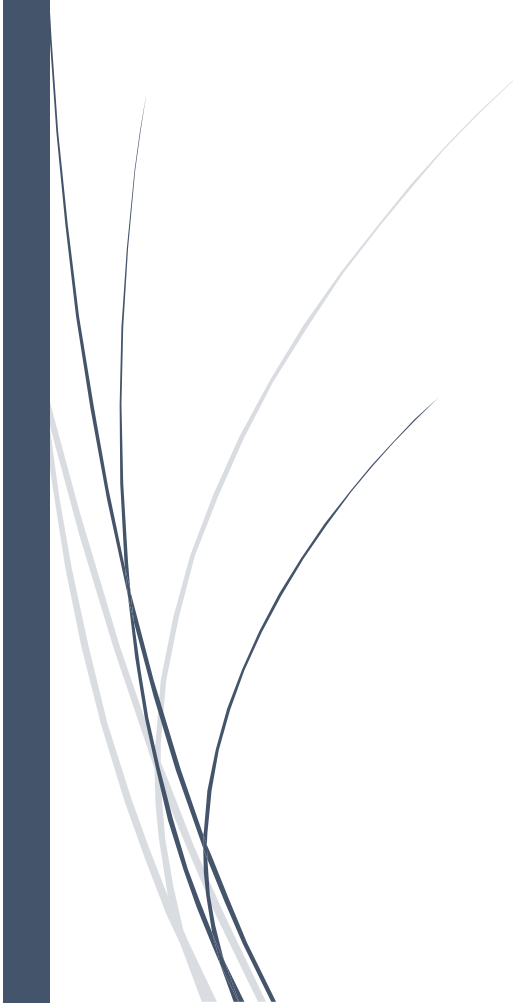
Big Data Lab

Spark Programs



1. Demonstrate case classes and tuples in spark by creating an object, copying it, and checking for equality.

CaseClassExample.scala

```
case class CaseClassExample(v1: String, v2: String)

object Test {
  def main(args: Array[String]) : Unit = {
    val caseClassExampleTest = CaseClassExample("abc", "def")

    println(caseClassExampleTest.v1)
    println(caseClassExampleTest.v2)
  }
}
```

build.sbt

```
ThisBuild / version := "0.1.0-SNAPSHOT"

ThisBuild / scalaVersion := "2.11.8"

lazy val root = (project in file("."))
  .settings(
    name := "Case Class & Tuples"
  )
```

2. Demonstrate WordCount using spark with scala.

WordCount.scala

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

object WordCount {
  def main(args: Array[String]) {
    val file = "src/main/words.txt"
    val spark: SparkSession = SparkSession.builder
      .appName("Word Count")
      .config("spark.master", "local")
      .getOrCreate()
    val fileRdd: RDD[String] = spark.sparkContext.textFile(file)

    // create the counts
    val counts = fileRdd.map(_.replaceAll("[.,]", ""))
      .map(_.replace("—", " "))
      .flatMap(line => line.split(" "))
      .map(word => (word, 1))
      .reduceByKey(_ + _)
      .sortBy(_._2)
      .collect

    println( "-----------------------------------------")
    counts.foreach(println)
    println( "-----------------------------------------")

    spark.stop()
  }

}
```

build.sbt

```
ThisBuild / version := "0.1.0-SNAPSHOT"

ThisBuild / scalaVersion := "2.11.8"

lazy val root = (project in file("."))
  .settings(
    name := "WordCount"
  )

val sparkVersion = "2.4.0"

libraryDependencies ++= Seq(
  "org.apache.spark" %% "spark-core" % sparkVersion,
  "org.apache.spark" %% "spark-sql" % sparkVersion,
)
```

words.txt

```
hi
hello
hey
hi
hi
```

3. Demonstrate use of aggregate functions (approx_count_distinct(), collect_list(), collect_set(), avg(), count(), countDistinct()) by using SQL libraries in spark.

AggregateFunctions.scala

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

object AggregateFunctions extends App {
  val spark: SparkSession = SparkSession.builder()
    .master("local[1]")
    .appName("SparkByExamples.com")
    .getOrCreate()

  spark.sparkContext.setLogLevel("ERROR")

  import spark.implicits._

  val simpleData = Seq(("James", "Sales", 3000),
    ("Michael", "Sales", 4600),
    ("Robert", "Sales", 4100),
    ("Maria", "Finance", 3000),
    ("James", "Sales", 3000),
    ("Scott", "Finance", 3300),
    ("Jen", "Finance", 3900),
    ("Jeff", "Marketing", 3000),
    ("Kumar", "Marketing", 2000),
    ("Saif", "Sales", 4100)
  )
  val df = simpleData.toDF("employee_name", "department", "salary")

  println("approx_count_distinct: "+
    df.select(approx_count_distinct("salary")).collect()(0)(0))

  println("avg: "+ df.select(avg("salary")).collect()(0)(0))

  df.select(collect_list("salary")).show(false)

  df.select(collect_set("salary")).show(false)

  val df2 = df.select(countDistinct("department", "salary"))
  df2.show(false)
  println("Distinct Count of Department & Salary: "+df2.collect()(0)(0))

  println("count: "+
    df.select(count("salary")).collect()(0))
}
```

build.sbt

```
ThisBuild / version := "0.1.0-SNAPSHOT"

ThisBuild / scalaVersion := "2.11.8"

lazy val root = (project in file("."))
  .settings(
    name := "Aggregate Functions"
  )

val sparkVersion = "2.4.0"

libraryDependencies ++= Seq(
  "org.apache.spark" %% "spark-core" % sparkVersion, "org.apache.spark" %%
"spark-sql" % sparkVersion,
)
```

4. Demonstrate basic dataframe transformation functions by using SQL libraries in spark.

TransformationFunctions.scala

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

object TransformationFunctions extends App {
  val spark: SparkSession = SparkSession.builder()
    .master("local[1]")
    .appName("SparkByExamples.com")
    .getOrCreate()

  spark.sparkContext.setLogLevel("ERROR")

  import spark.implicits._

  val simpleData = Seq(("James", "Sales", 3000),
    ("Michael", "Sales", 4600),
    ("Robert", "Sales", 4100),
    ("Maria", "Finance", 3000),
    ("James", "Sales", 3000),
    ("Scott", "Finance", 3300),
    ("Jen", "Finance", 3900),
    ("Jeff", "Marketing", 3000),
    ("Kumar", "Marketing", 2000),
    ("Saif", "Sales", 4100)
  )
  val df = simpleData.toDF("employee_name", "department", "salary")
  //show all
  df.select("*").show(truncate = false)

  //first row
  df.select(first("salary")).show(false)

  //last row
  df.select(last("salary")).show(false)

  //Select first 2 columns.
  df.select(df.columns.slice(0,2).map(m=>col(m)):_*).show()


  //Selects 3rd column (index starts from zero)
  df.select(df.columns(2)).show()

  //Selects columns from index 1 to 3
  df.select(df.columns.slice(1,3).map(m=>col(m)):_*).show()

}
```

build.sbt

```
ThisBuild / version := "0.1.0-SNAPSHOT"

ThisBuild / scalaVersion := "2.11.8"

lazy val root = (project in file("."))
  .settings(
    name := "Transformation Functions"
  )

val sparkVersion = "2.4.0"
libraryDependencies ++= Seq(
  "org.apache.spark" %% "spark-core" % sparkVersion,
  "org.apache.spark" %% "spark-sql" % sparkVersion,
)
```

5. Demonstrate basic math functions on a dataframe using SQL libraries in spark.

MathFunctions.scala

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

object MathFunctions extends App {
  val spark: SparkSession = SparkSession.builder()
    .master("local[1]")
    .appName("SparkByExamples.com")
    .getOrCreate()

  spark.sparkContext.setLogLevel("ERROR")

  import spark.implicits._

  val simpleData = Seq(("James", "Sales", 3000),
    ("Michael", "Sales", 4600),
    ("Robert", "Sales", 4100),
    ("Maria", "Finance", 3000),
    ("James", "Sales", 3000),
    ("Scott", "Finance", 3300),
    ("Jen", "Finance", 3900),
    ("Jeff", "Marketing", 3000),
    ("Kumar", "Marketing", 2000),
    ("Saif", "Sales", 4100)
  )
  val df = simpleData.toDF("employee_name", "department", "salary")

  df.select(max("salary")).show(false)

  df.select(min("salary")).show(false)

  df.select(mean("salary")).show(false)

  df.select(skewness("salary")).show(false)

  df.select(stddev("salary"), stddev_samp("salary"),
    stddev_pop("salary")).show(false)

  df.select(sum("salary")).show(false)

  df.select(sumDistinct("salary")).show(false)

  df.select(variance("salary"),var_samp("salary"),
    var_pop("salary")).show(false)

}
```

build.sbt

```
ThisBuild / version := "0.1.0-SNAPSHOT"

ThisBuild / scalaVersion := "2.11.8"

lazy val root = (project in file("."))
  .settings(
    name := "Math Functions"
  )

val sparkVersion = "2.4.0"
libraryDependencies ++= Seq(
  "org.apache.spark" %% "spark-core" % sparkVersion,
  "org.apache.spark" %% "spark-sql" % sparkVersion,
)
```