Group B

Assignment No: 12

Problem Statemen:

Write a simple program in SCALA using Apache Spark framework

Theory:

- Scala is an acronym for “Scalable Language”.
- It is a general-purpose programming language designed for the programmers who want to write programs in a concise, elegant, and typesafe way.
- Scala enables programmers to be more productive. Scala is developed as an object-oriented and functional programming language.
- If you write a code in Scala, you will see that the style is similar to a scripting language.
- Even though Scala is a new language, it has gained enough users and has a wide community support. It is one of the most user-friendly languages.

About Scala

- Scala is pure Object-Oriented programming language
- Scala is an object-oriented programming language.
- Everything in Scala is an object and any operations you perform is a method call.
- Scala, allow you to add new operations to existing classes with the help of implicit classes.
- One of the advantages of Scala is that it makes it very easy to interact with Java code.
- You can also write a Java code inside Scala class.
- The Scala supports advanced component architectures through classes and traits.

Scala is a functional language

- Scala is a programming language that has implemented major functional programming concepts.
- In Functional programming, every computation is treated as a mathematical function which avoids states and mutable data.
- The functional programming exhibits following characteristics:
- Power and flexibility
- Simplicity
- Suitable for parallel processing
- Scala is not a pure functional language. Haskell is an example of a pure functional language.

Scala is a compiler based language (and not interpreted)

- Scala is a compiler based language which makes Scala execution very fast if you compare it with Python (which is an interpreted language).

- The compiler in Scala works in similar fashion as Java compiler. It gets the source code and generates Java byte-code that can be executed independently on any standard JVM (Java Virtual Machine).
- There are more important points about Scala which I have not covered. Some of them are:
- Scala has thread based executors
- Scala is statically typed language
- Scala can execute Java code
- You can do concurrent and Synchronized processing in Scala
- Scala is JVM based languages

Installing Scala

- Scala can be installed in any Unix or windows-based system. Below are the steps to install for Ubuntu (14.04) for scala version 2.11.7.
- I am showing the steps for installing Scala (2.11.7) with Java version 7. It is necessary to install Java before installing Scala. You can also install latest version of Scala(2.12.1) as well. Step 0: Open the terminal Step 1: Install Java
- $ sudo apt-add-repository ppa:webupd8team/java $ sudo apt-get update $ sudo apt-get install oracle-java7installer
- If you are asked to accept Java license terms, click on "Yes" and proceed. Once finished, let us check whether Java has installed successfully or not. To check the Java version and installation, you can type:
- $ java -version
- Step 2: Once Java is installed, we need to install Scala
- $ cd ~/Downloads $ wget http://www.scala-lang.org/files/archive/scala-2.11.7.deb $ sudo dpkg -i scala2.11.7.deb $ scala –version

Scala Basics Terms

- Object: An entity that has state and behavior is known as an object. For example: table, person, car etc.
- Class: A class can be defined as a blueprint or a template for creating different objects which defines its properties and behavior.
- Method: It is a behavior of a class. A class can contain one or more than one method. For example: deposit can be considered a method of bank class.
- Closure: Closure is any function that closes over the environment in which it's defined. A closure returns value depends on the value of one or more variables which is declared outside this closure.
- Traits: Traits are used to define object types by specifying the signature of the supported methods. It is like interface in java.

Variable declaration in Scala

- In Scala, you can declare a variable using 'var' or 'val' keyword. The decision is based on whether it is a constant or a variable.
- If you use 'var' keyword, you define a variable as mutable variable. On the other hand, if you use 'val', you define it as immutable. Let's first declare a variable using "var" and then using "val".

Declare using var

var Var1 : String = "Ankit"

- In the above Scala statement, you declare a mutable variable called “Var1” which takes a string value. You can also write the above statement without specifying the type of variable. Scala will automatically identify it. For example:

  var Var1 = “Joshi"

Operations on Variables

- You can perform various operations on variables. There are various kinds of operators defined in Scala. For example: Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Assignment Operators.
- Lets see “+” , “==” operators on two variables ‘Var4’, “Var5”. But, before that, let us first assign values to “Var4” and “Var5”.

  scala> var Var4 = 2 Output: Var4: Int = 2 scala> var Var5 = 3

  Output: Var5: Int = 3

  Now, let us apply some operations using operators in Scala.

  Apply ‘+’ operator Var4+Var5

  Output: res1: Int = 5 Apply “==” operator

  Var4==Var5 Output: res2: Boolean = false

- In Scala, if-else expression is used for conditional statements.
- YouThe ifcan write-oneelse expression in Scalaor more conditions inside “if”.
- Let’s declare a variable called “Var3” with a value 1 and then compare “Var3” using if-else expression.

- In the above snippet, the condition evaluates to True and hence True will be printed in the output.

Iteration in Scala

Like most languages, Scala also has a FOR-loop which is the most widely used method for iteration. It has a simple syntax too.

- Declare a simple function in Scala and call it by passing value
- You can define a function in Scala using “def” keyword. Let’s define a function called
- “mul2” which will take a number and multiply it by 10.
- You need to define the return type of function, if a function not returning any value you should use the “Unit” keyword.
- In the below example, the function returns an integer value. Let’s define the function

“mul2”:

def mul2(m: Int): Int = m * 10

Output: mul2: (m: Int)Int

Example:

Here is an example of a simple Scala program that prints "Hello, World!" to the console:

```
object HelloWorld {
  def main(args: Array[String]) {
    println("Hello, World!")
  }
}
```

In this program, we define an object called "HelloWorld". Inside the object, we define a method called "main" that takes an array of strings as an argument. The method simply prints the string "Hello, World!" to the console using the println() method.

To compile and run this program on Ubuntu, you will need to follow these steps:

Install the Scala compiler by running the following command in the terminal:

sudo apt-get install scala

Save the above code as "HelloWorld.scala" in a directory of your choice.

Open a terminal in the directory where you saved the file and run the following command to compile the code:

scalac HelloWorld.scala

This will generate a class file called "HelloWorld.class" in the same directory.

Run the program by entering the following command in the terminal:

scala HelloWorld

This will execute the "main" method of the "HelloWorld" object and print "Hello, World!" to the console.

Assignment Questions

1. What are the features of scala?
2. Explain the program execution steps in scala

```scala
object WordCount {
  def main(args: Array[String]): Unit = {
    val text = "hello world hello scala this is scala word count example scala is powerful"

    val words = text.split("\\s+")
    val wordCount = words.groupBy(identity).map { case (word, instances) => word -> instances.length }

    println("Word Count Results:")
    wordCount.foreach { case (word, count) =>
      println(s"$word: $count")
    }
  }
}


//Output:

[info] running WordCount
  Word Count Results:
  this: 1
count: 1
is: 2
world: 1
powerful: 1
scala: 3
hello: 2
example: 1
word: 1
[success] Total time: 6 s, completed 11-Apr-2025, 7:41:39ΓÇ»pm

```