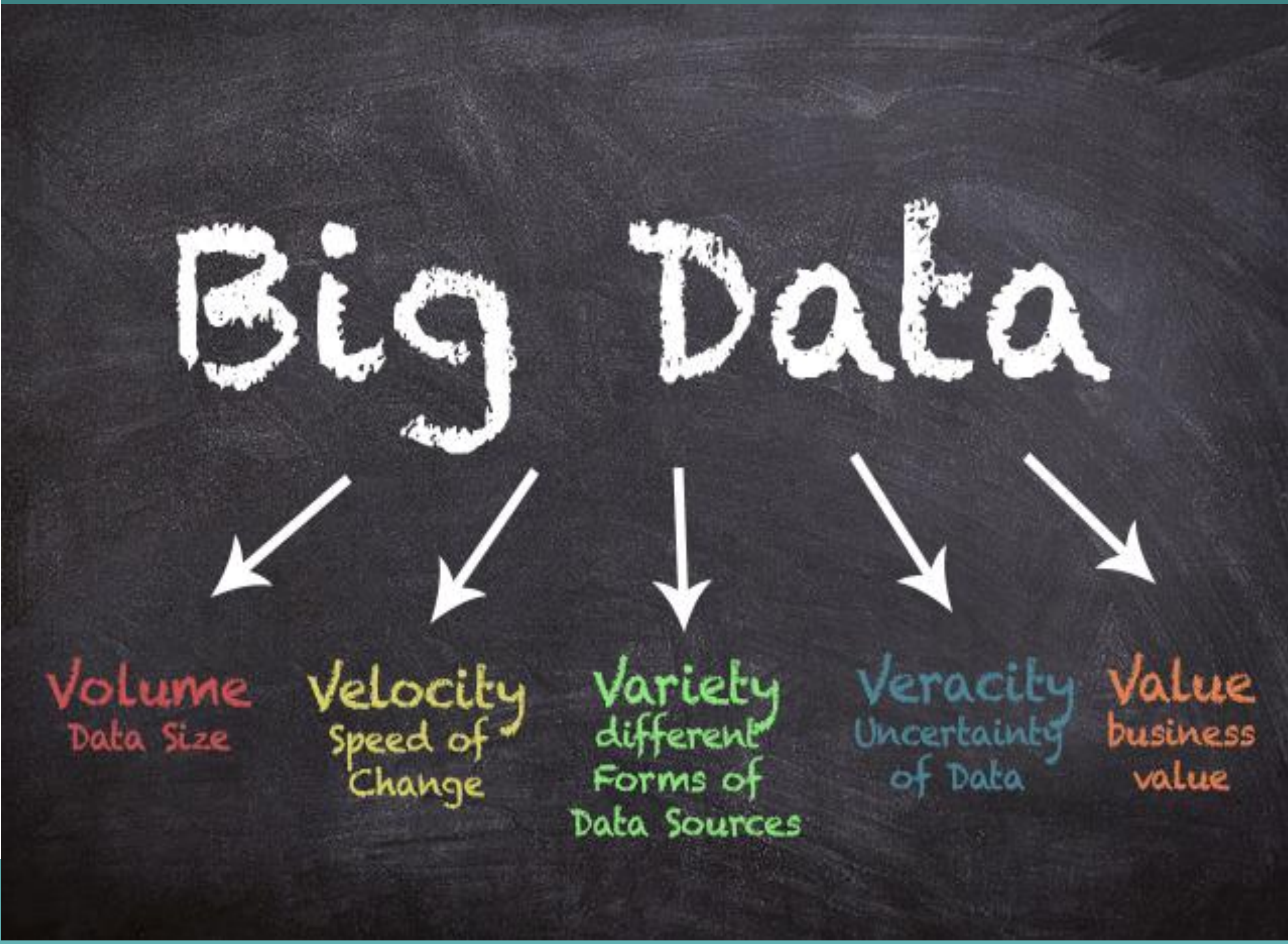
08/21/2018 | By: Ajit K Prasad



Big Data Engineering with Hadoop & Spark

Assignment on Scala Basics

Session 15: Assignment 15.1

This assignment is aimed at consolidating the concepts that was learnt during the Scala Basics session of the course.

Problem Statement

Task 1:

Create a Scala application to find the GCD of two numbers

Solution:

To find the GCD of two numbers I have used the below logic:

- If either 1st or 2nd number is 0, then other number is the Greatest Common Divisor.
- Else call the GCD function again by sending 2nd number as 1st number and difference between 2 numbers as 2nd number.
- This in turn checks for the If clause again.

Code:

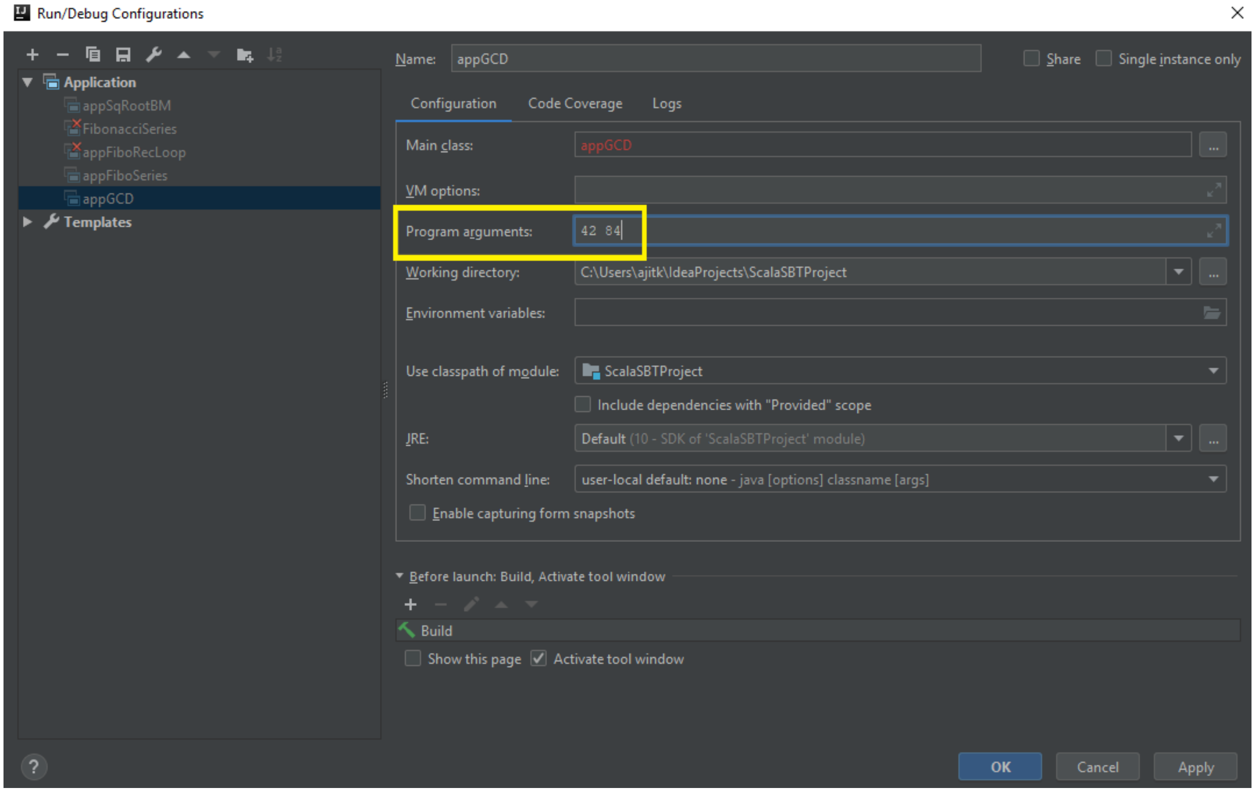
```
class appGCD {

 /***Method to find the GCD of 2 numbers***/
 def gcd(a: Int, b: Int): Int = {
  if(b == 0) a else gcd(b, a%b)
 }

 /***Method to display list of choices to the user***/
 def OptionsList(): Unit = {
  println("\nGCD of 2 numbers")
  println("--------------------")

  println("\nSelect one of the following:")
  println("1. Compute GCD with command line argument")
  println("2. Compute GCD with standard input argument")

   println("\nEnter your choice (1 or 2): ")
  }
 }

 object appGCD {
  def main(args: Array[String]): Unit = {
   var wish =""

   /***Creating the instance of the appGCD class***/
```

```
      val aGCD  = new appGCD()

      do {
        /***Calling the method to display the list of options to the user***/
        aGCD.OptionsList()

        val choice = scala.io.StdIn.readLine()

        /***Find GCD from CommandLine Input Arguments (Get from the user)***/
        if (choice.toInt == 1) {
          val input1 = args(0).toInt
          val input2 = args(1).toInt

          println("\nCMD: GCD of ${input1} and ${input2} is : " + aGCD.gcd(input1, input2))
        }
        /***Find GCD from Standard Input Arguments (Get from the user)***/
        else if (choice.toInt == 2) {
          println("Enter the 1st number : ")
          val inp1 = scala.io.StdIn.readLine().toInt

          println("Enter the 2nd number : ")
          val inp2 = scala.io.StdIn.readLine().toInt

          println("STDIN: GCD of ${inp1} and ${inp2} is : " + aGCD.gcd(inp1, inp2))
        }
        else {
          println("Invalid choice!")
        }
        /***DoWhile loop conditional variable***/
        println("\nDo you wish to continue? (Y/N) : ")
        wish = scala.io.StdIn.readLine().toUpperCase

        println("-------------------------------------------------------------------------\n")
      }
      while (wish.equals("Y"))
    }
  }
```

Output:

In the above code, I have taken the input for the GCD function in 2 ways:

1. From the Command Line Arguments
   a. For this, use “Edit Configuration” option
   b. Provide values in “Program arguments” section of dialogue box
2. From the User through the Standard Input



Run/Debug Configurations

- Application
  - appSqRootBM
  - FibonacciSeries
  - appFiboRecLoop
  - appFiboSeries
  - appGCD
- Templates

Name: appGCD

□ Share □ Single instance only

Configuration | Code Coverage | Logs

Main class: appGCD

VM options:

Program arguments: 42 84

Working directory: C:\Users\ajitk\IdeaProjects\ScalaSBTProject

Environment variables:

Use classpath of module: ScalaSBTProject

□ Include dependencies with "Provided" scope

JRE: Default (10 - SDK of 'ScalaSBTProject' module)

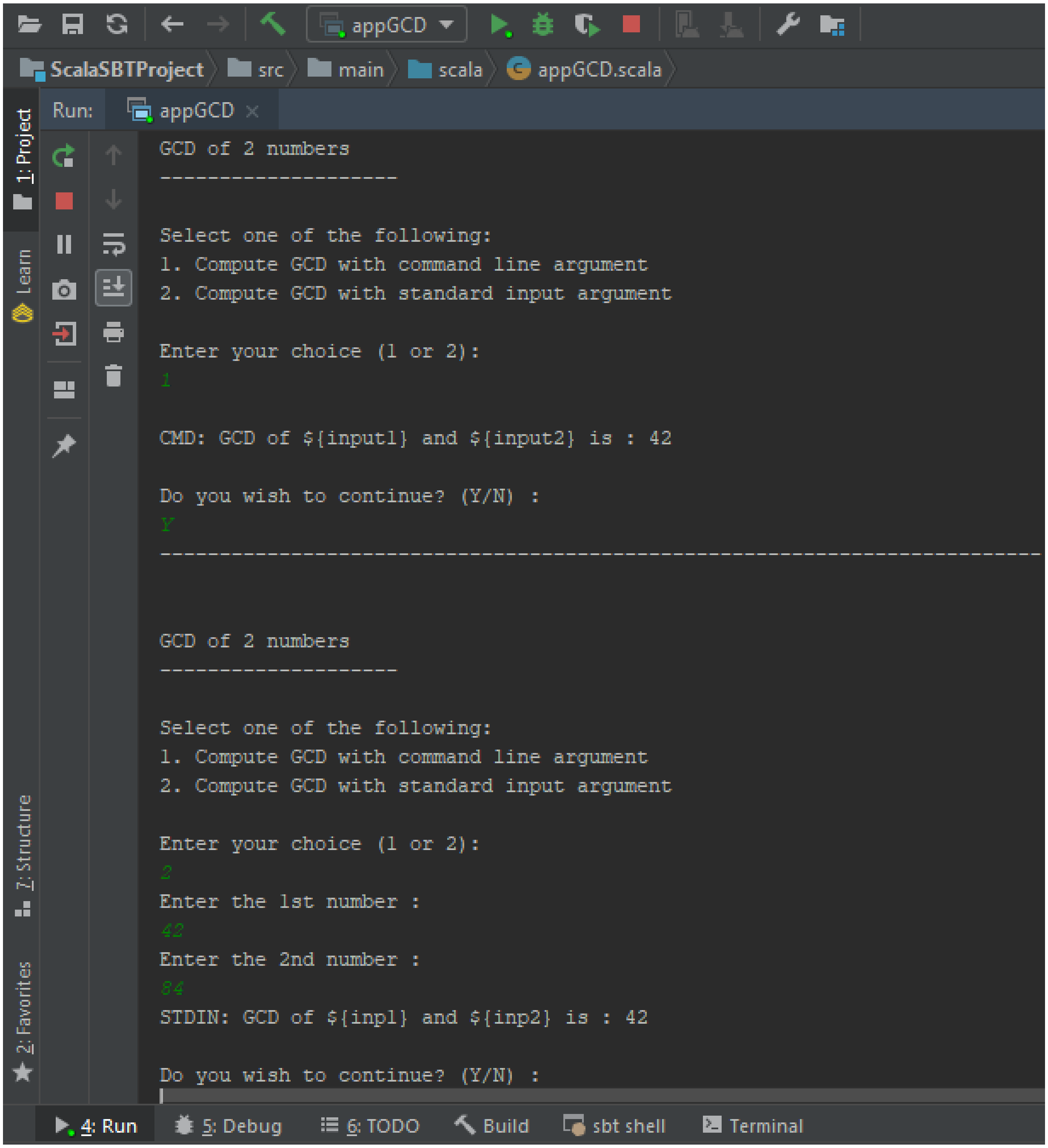
Shorten command line: user-local default: none - java [options] classname [args]

□ Enable capturing form snapshots

Before launch: Build, Activate tool window

Build

□ Show this page ☑ Activate tool window



```
GCD of 2 numbers
--------------------

Select one of the following:
1. Compute GCD with command line argument
2. Compute GCD with standard input argument

Enter your choice (1 or 2):
1

CMD: GCD of ${input1} and ${input2} is : 42

Do you wish to continue? (Y/N) :
Y
---------------------------------------------------------------------------



GCD of 2 numbers
--------------------

Select one of the following:
1. Compute GCD with command line argument
2. Compute GCD with standard input argument

Enter your choice (1 or 2):
2
Enter the 1st number :
42
Enter the 2nd number :
84
STDIN: GCD of ${inp1} and ${inp2} is : 42

Do you wish to continue? (Y/N) :
```

Task 2:

- Fibonacci series (starting from 1) written in order without any spaces in between, thus producing a sequence of digits.
- Write a Scala application to find the Nth digit in the sequence.
  - Write the function using standard for loop
  - Write the function using recursion

Solution:

To find the Fibonacci Series I have used two methods:

- Using a Standard FOR Loop. This is achieved by the method LoopFibo(digits, nthdigit)
- Using Recursion. This is achieved by the method recFibonacci(digits, nthdigit)

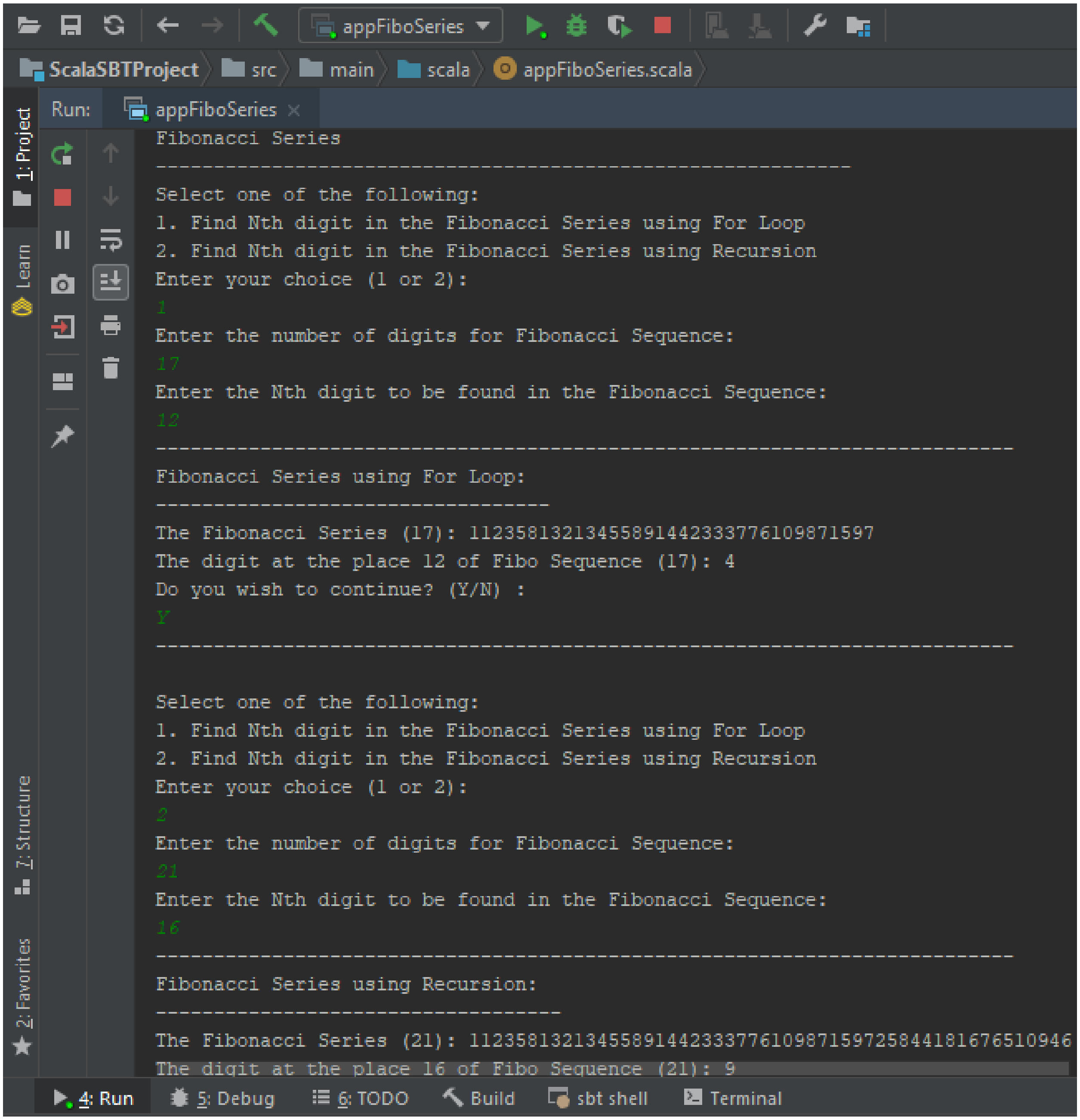
The @tailrec annotation in the code is used to indicate that this is an optimized version of the function to find the Fibonacci series.

Code:

```
import scala.annotation.tailrec
object appFiboSeries {

  def recFibonacci(n: Int, nth: Int): Unit = {
  var concat_result = "1"

  /***Method to find out the Fibonacci Series using Recursion***/
  @tailrec def fiboRecursive(n: Int, prev: BigInt = 0, next: BigInt = 1): BigInt = n match {
   case 0 => prev
   case 1 => next
   case _ =>
    concat_result = concat_result + (prev + next)
    fiboRecursive(n - 1, next, next + prev)
  }

  fiboRecursive(n)
  get_nthchar_and_print(n, concat_result, nth)
 }

 /***Method to find out the Fibonacci Series using For Loop***/
 def LoopFibo(n: Int, nth: Int): Unit = {
  var concat_result = "1"
```

```
    if (n < 2) {
      println(n)
    }

    else {
      var result: BigInt = 0
      var n1: BigInt = 0
      var n2: BigInt = 1

      for (i <- 1 until n) {
        result = n1 + n2
        n1 = n2
        n2 = result
        concat_result = concat_result + result
      }

      get_nthchar_and_print(n, concat_result, nth)
      result
    }
  }

  /***Method to display Nth character in the Fibonacci Sequence***/
  def get_nthchar_and_print(n: Int, seq: String, nth: Int): Unit = {
      println(s"The Fibonacci Series ($n): " + seq)
      println(s"The digit at the place $nth of Fibo Sequence ($n): " + seq.charAt(nth -1).toChar)
  }

  def main(args: Array[String]): Unit = {
      var wish = ""

      println("Fibonacci Series")
      println("------------------------------------------------------------")

      do {
        println("Select one of the following:")
        println("1. Find Nth digit in the Fibonacci Series using For Loop")
        println("2. Find Nth digit in the Fibonacci Series using Recursion")

        println("Enter your choice (1 or 2): ")
        var choice = scala.io.StdIn.readLine()

        println("Enter the number of digits for Fibonacci Sequence: ")
        var digits: Int = scala.io.StdIn.readLine().toInt

        println("Enter the Nth digit to be found in the Fibonacci Sequence: ")
        var nthFind: Int = scala.io.StdIn.readLine().toInt

        println("------------------------------------------------------------------------------")

        if (choice.toInt == 1) {

          /***Call to method "LoopFibo" to find out the Fibonacci Series using For Loop***/
          println(s"Fibonacci Series using For Loop:")
          println("------------------------------------")
          LoopFibo(digits, nthFind)
        }

        /***Call to method "recFibonacci" to find out the Fibonacci Series using Recursion***/
        else if (choice.toInt == 2) {
          println(s"Fibonacci Series using Recursion:")
          println("-------------------------------------")
          recFibonacci(digits, nthFind)

        }
        else {
          println(s"Invalid Choice!")
        }

        println("Do you wish to continue? (Y/N): ")

        /***Do-While Loop for condition variable***/
        wish = scala.io.StdIn.readLine().toUpperCase

        println("------------------------------------------------------------------------------\n")
      }
      while (wish.equals("Y"))
  }
 }
```

Output:



```
Fibonacci Series
------------------------------------------------------------
Select one of the following:
1. Find Nth digit in the Fibonacci Series using For Loop
2. Find Nth digit in the Fibonacci Series using Recursion
Enter your choice (1 or 2):
1
Enter the number of digits for Fibonacci Sequence:
17
Enter the Nth digit to be found in the Fibonacci Sequence:
12
--------------------------------------------------------------------------
Fibonacci Series using For Loop:
----------------------------------
The Fibonacci Series (17): 1123581321345589144233377610987 1597
The digit at the place 12 of Fibo Sequence (17): 4
Do you wish to continue? (Y/N) :
Y
--------------------------------------------------------------------------


Select one of the following:
1. Find Nth digit in the Fibonacci Series using For Loop
2. Find Nth digit in the Fibonacci Series using Recursion
Enter your choice (1 or 2):
2
Enter the number of digits for Fibonacci Sequence:
21
Enter the Nth digit to be found in the Fibonacci Sequence:
16
--------------------------------------------------------------------------
Fibonacci Series using Recursion:
-----------------------------------
The Fibonacci Series (21): 11235813213455891442333776109871597258441816765 10946
The digit at the place 16 of Fibo Sequence (21): 9
```

Task 3:

- Find square root of number using Babylonian method.
- Start with an arbitrary positive start value x (the closer to the root, the better).
- Initialize y = 1.
- Do following until desired approximation is achieved.
  - Get the next approximation for root using average of x and y
  - Set y = n/x

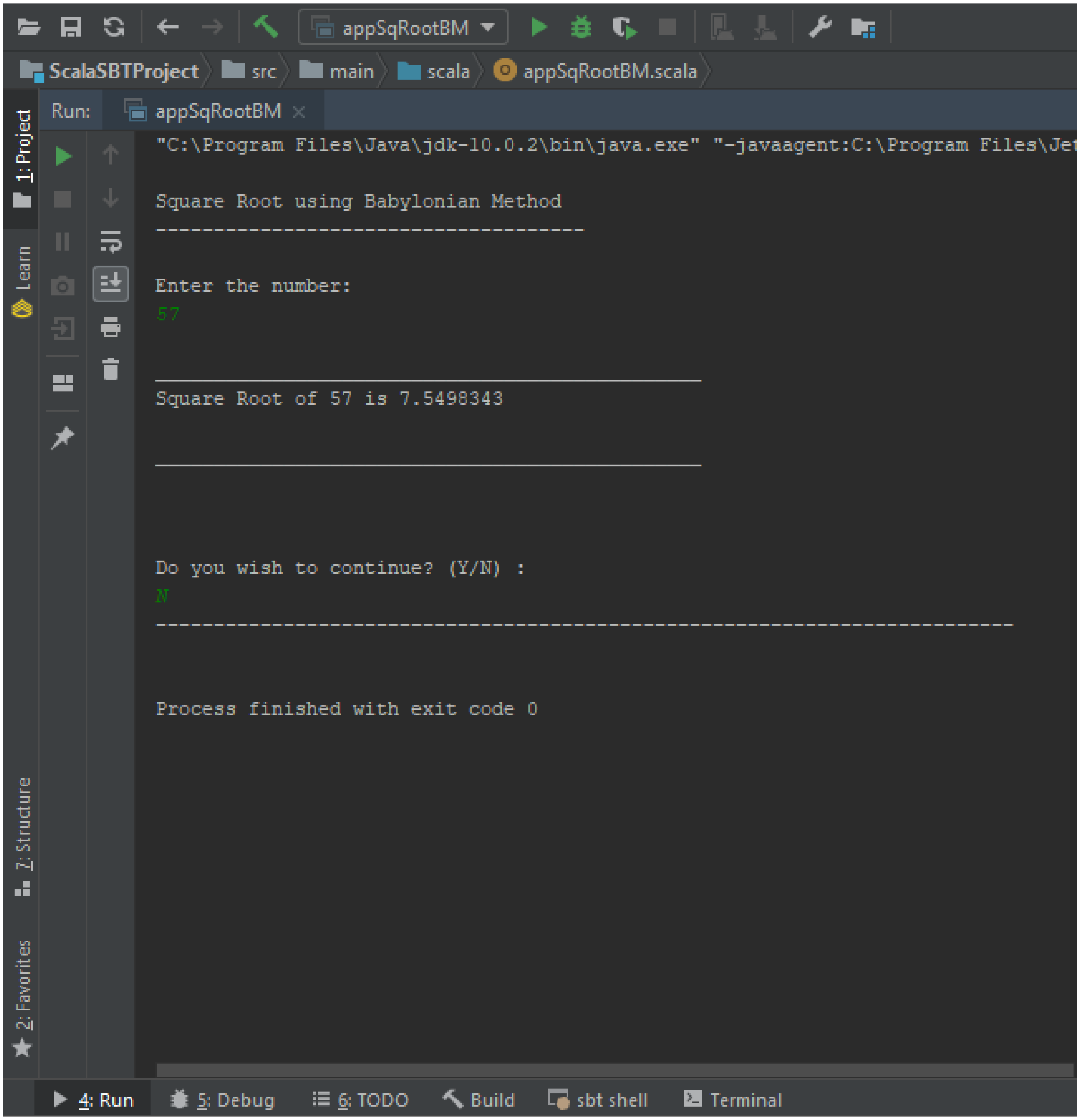
Solution:

The Babylonian method for finding square roots involves dividing and averaging, over and over, to obtain a more accurate solution with each repeat of the process.

Code:

```
/***Dividing and Averaging Method to calculate square root of a number***/
object appSqRootBM {

  /***Function to return square root of a number using Babylonian Method***/
  def squareRootBM(num: Int): Float = {

    /***Arbitrary positive value x from the user***/
    var x: Float = num

    /***Initialize y***/
    var y: Float = 1

    /***e decides the accuracy level***/
    /***This is checked when we aren't sure if the number is a perfect square***/
    val e: Double = 0.000001

    /***Performs division and averaging until the accuracy level***/
    while(x - y > e) {
      x = (x + y) / 2
      y = num / x
    }
    x /***Returns the square root value***/
  }

  def main(args: Array[String]): Unit = {
    var wish = ""

    println("\nSquare Root using Babylonian Method")
    println("------------------------------------")

    do {

      println("\nEnter the number: ")
      var input = scala.io.StdIn.readLine().toInt

      /***Calls the function to calculate Square Root using Babylonian Method***/
      println("\n____________________________________________")
      println(s"Square Root of $input is ${squareRootBM(input)}")
      println("\n____________________________________________")

      println("\n\n\nDo you wish to continue? (Y/N) : ")

      /***Do-While Loop for condition variable***/
      wish = scala.io.StdIn.readLine().toUpperCase

      println("---------------------------------------------------------------------------\n")
    }
    while (wish.equals("Y"))
  }
}
```

Output:



```
"C:\Program Files\Java\jdk-10.0.2\bin\java.exe" "-javaagent:C:\Program Files\Jet

Square Root using Babylonian Method
-------------------------------------

Enter the number:
57


_______________________________________________
Square Root of 57 is 7.5498343

_______________________________________________



Do you wish to continue? (Y/N) :
N
---------------------------------------------------------------------------


Process finished with exit code 0
```

Note:
Scala code files for each application has been provided separately along with this assignment report.