Scala Assignment 13.2

For this assignment, I've used Intellij Idea.

A Fibonacci series (starting from 1) written in order without any spaces in between, thus producing a sequence of digit

The Fibonacci sequence is a series of numbers where a number is found by adding up the two numbers before it. Starting with 0 and 1, the sequence goes 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, and so forth. Written as a rule, the expression is Xn = Xn-1 + Xn-2

In mathematical terms, the sequence Xn of Fibonacci numbers is defined by the recurrence relation

Xn = Xn-1 + Xn-2 with seed values X0 =1 ; X1=1;

Steps followed for printing the fibannoci sequence:

1) Created a method , which takes an int values as input.Here n signifies the number upto which the sequence will be found.

```
def fiboseq(n: Int,b: Int): Unit = {
}
```

2) Creating a fib_seq array,which will hold the fibanocci items. It will be of size 'n+1'

```
val fib_seq = new Array[Int](n+1)
```

3) We are creating a fibannoci series starting from 1, so initializing first value of fib_seq array with 1. From the above explanation, we see the sequence goes from 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, so initializing the second item of array also with 1.

```
fib_seq (0)=1;  // setting the value of first item
fib_seq (1)=1;  // setting the value of second item
```

4) Using while loop, going to fill the remaining items of fib_seq array.Setting the initial value of loop as 2, since we have set the first 2 items of the array previously in step 3.

```
var i=2;   //initializing the loop size.
```

5) Within while loop, we are filling the sequence with logic, current number = previous number + 2nd previous number. Incrementing the 'i' value after setting each value of the array.

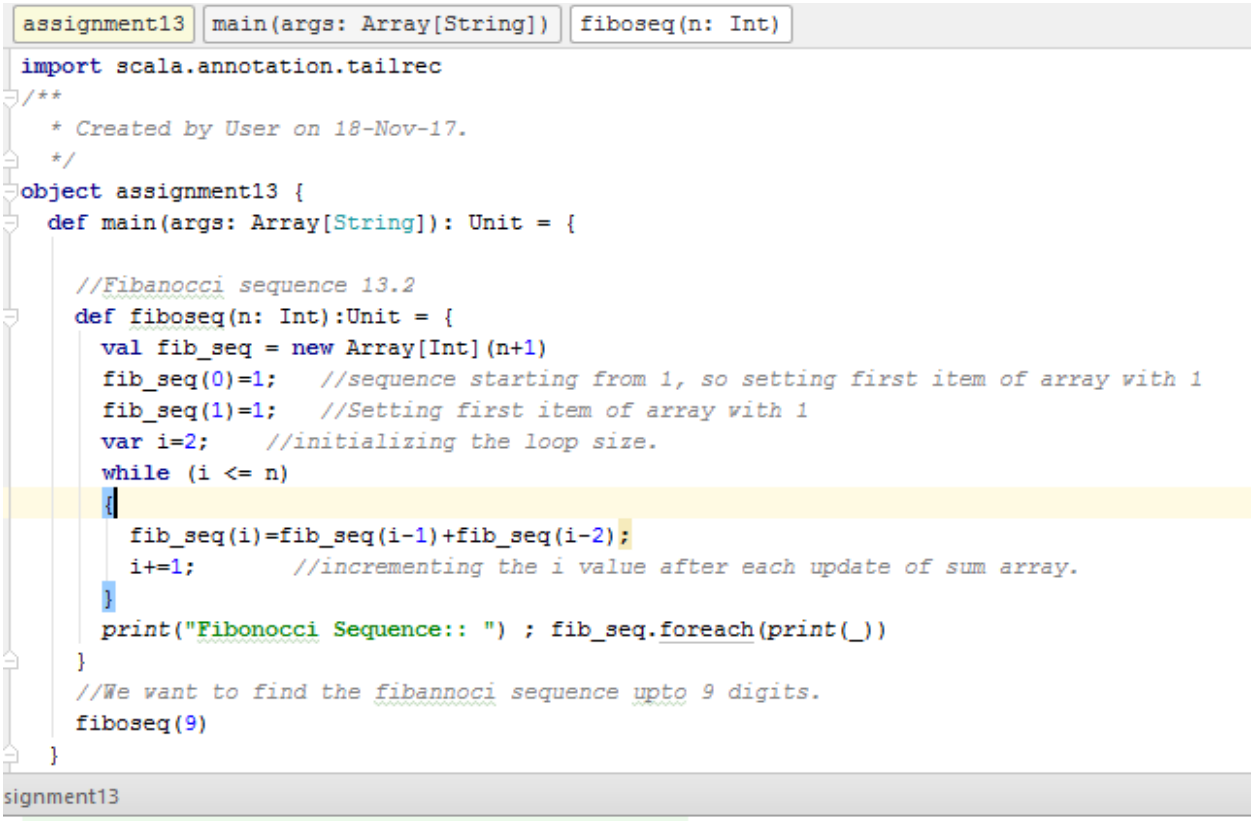
```
while (i <= n)  {
 fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
 i+=1;     //incrementing the i value after each update of sum array.
```

}

6) Finally printing the sequence using foreach

```
fib_seq.foreach(print(_))
```

Screenshot of IntelliJ and output for fibanocci sequence:



```
assignment13 | main(args: Array[String]) | fiboseq(n: Int)
import scala.annotation.tailrec
/**
  * Created by User on 18-Nov-17.
  */
object assignment13 {
  def main(args: Array[String]): Unit = {

    //Fibanocci sequence 13.2
    def fiboseq(n: Int):Unit = {
      val fib_seq = new Array[Int](n+1)
      fib_seq(0)=1;    //sequence starting from 1, so setting first item of array with 1
      fib_seq(1)=1;    //Setting first item of array with 1
      var i=2;     //initializing the loop size.
      while (i <= n)
      {
        fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
        i+=1;        //incrementing the i value after each update of sum array.
      }
      print("Fibonocci Sequence:: ") ; fib_seq.foreach(print(_))
    }
    //We want to find the fibannoci sequence upto 9 digits.
    fiboseq(9)
  }
signment13
  "C:\Program Files\Java\jdk1.8.0_121\bin\java" ...
  Fibonocci Sequence:: 11235813213455
  Process finished with exit code 0
```

Source code of fibanocci sequence:

```
//Fibanocci sequence 13.2
  def fiboseq(n: Int):Unit = {
    val fib_seq = new Array[Int](n+1)
    fib_seq(0)=1;    //sequence starting from 1, so setting first item of array with 1
    fib_seq(1)=1;    //Setting second item of array with 1
    var i=2;     //initializing the loop size.
    while (i <= n)
    {
      fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
      i+=1;        //incrementing the i value after each update of sum array.
    }
    print("Fibonocci Sequence:: ") ; fib_seq.foreach(print(_))
  }
  //We want to find the fibannoci sequence upto 9 digits.
  fiboseq(9)
}
```

Write a Scala application to find the Nth digit in the sequence using standard for loop.

<u>Steps followed in finding Nth digit in the sequence using for loop:</u>

1) Created a method , which takes an int values as input.Here n significes the digit for which we want to find the fibanocci value for.

```
def fibo_loop(n: Int): Int = {
}
```

2) Creating a fib_seq array,which will hold the fibanocci items. It will be of size 'n+1'

```
val fib_seq = new Array[Int](n+1)
```

3) We are creating a fibannoci series starting from 1, so initializing first value of fib_seq array with 1. From the above explanation, we see the sequence goes from 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, so initializing the second item of array also with 1.

```
fib_seq (0)=1;  // setting the value of first item
 fib_seq 1)=1;  // setting the value of second item
```

4) Using for loop, going to fill the remaining items of fib_seq array.Setting the initial value to loop as 2, since we have set the first 2 items of the array previously in step 3. Within the loop, we are filling the sequence with logic, current number = previous number + 2nd previous number until it reaches nth digit.

```
for (i <- 2 to n)
{
 fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
}
```

6) Finally printing the sequence using foreach

```
return fib_seq(n);
```

<u>Source code for finding fibannoci series Nth digit using for loop:</u>

```
def fibo_loop(n: Int):Int = {
  val fib_seq = new Array[Int](n+1)
  fib_seq(0)=1;      //sequence starting from 1, so setting first item of array with 1
  fib_seq(1)=1;      //Setting second item of array with 1
  for (i <- 2 to n)
  {
    fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
  }
  return fib_seq(n);
}
println("Fibanocci nth number using for loop: "+fibo_loop(9));
```

Screenshot of IntelliJ and output for fibanocci Nth digit using for loop:

```
import scala.annotation.tailrec
/**
  * Created by User on 18-Nov-17.
  */
object assignment13 {
  def main(args: Array[String]): Unit = {

    //Fibanocci nth number for loop
    def fibo_loop(n: Int):Int = {
      val fib_seq = new Array[Int](n+1)
      fib_seq(0)=1;      //sequence starting from 1, so setting first item of array with 1
      fib_seq(1)=1;      //Setting second item of array with 1
      for (i <- 2 to n)
      {
        fib_seq(i)=fib_seq(i-1)+fib_seq(i-2);
      }
      return fib_seq(n);
    }
     println("Fibanocci nth number using for loop: "+fibo_loop(9));

  }
```

```
ignment13
"C:\Program Files\Java\jdk1.8.0_121\bin\java" ...
Fibanocci nth number using for loop: 55

Process finished with exit code 0
```

Write a Scala application to find the Nth digit in the sequence using recursion.

Steps followed in finding Nth digit in the sequence using recursion:

1) Created a method , which takes an int values as input.Here n signifies the digit for which we want to find the fibanocci value for.

```
def fibo_recur(n: Int) = {
}
```

2) Created an anonymous function inside the function

```
def go(n: Int, curr: Int, next: Int): Int = {
```

3) The anonymous function will be called recursively, until n reaches 1. In the first recursion, curr+next will become 2, which will be passed as next value in the 2nd recursion.

```
if (n == 1) next
    else {
```

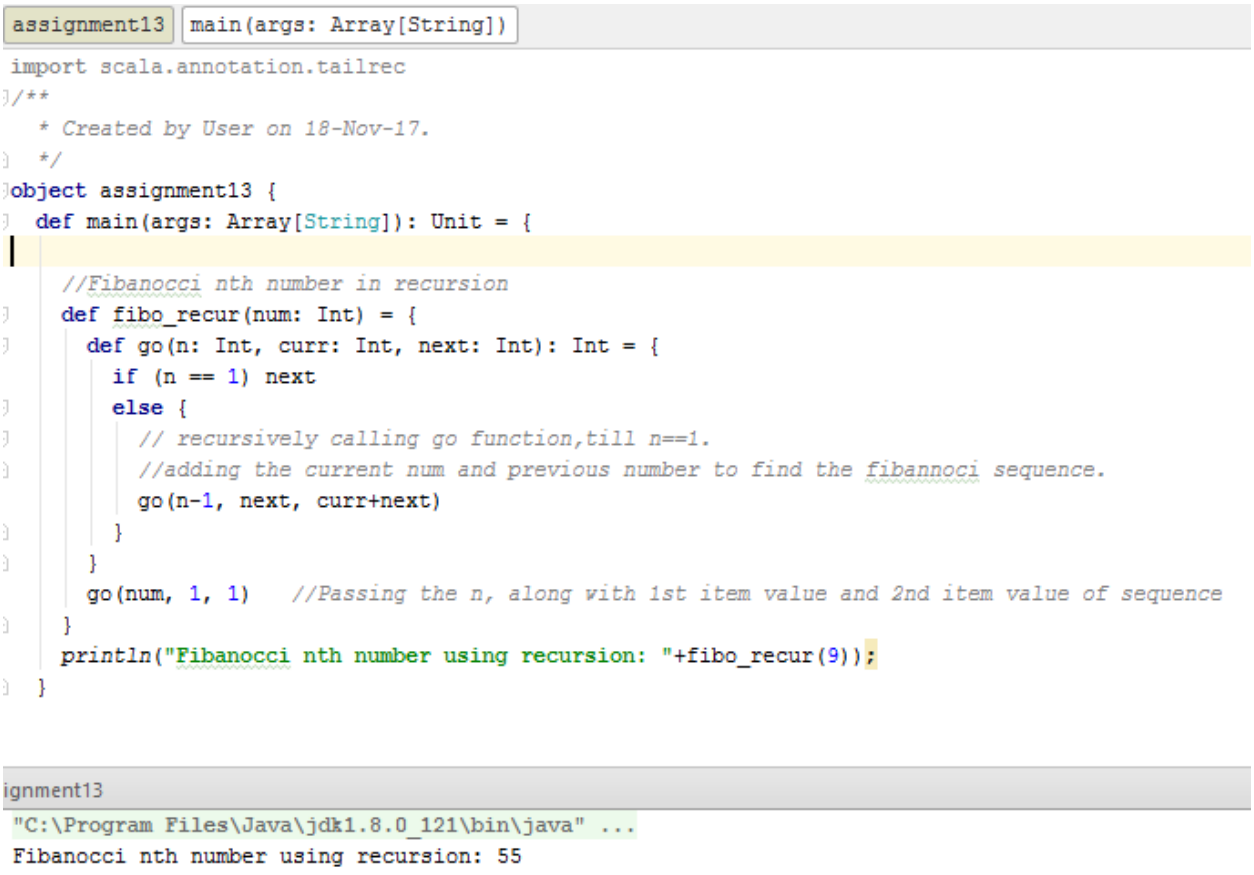
```
        // recursively calling go function,till n==1.
        //adding the current num and previous number to find the fibannoci sequence.
        go(n-1, next, curr+next)
      }
```

When n reaches 1, the value will be returned, as given in the if condition to the outer function.

4) From the outer function calling the annonymous inner function,along with n, for which we wanted to find the fibannoci value for, initial item of fibo sequence and 2nd item of fibonocci sequence.

```
    go(num, 1, 1)    //Passing the n, along with 1st item value and 2nd item value of sequence
```

Screenshot of IntelliJ and output for fibanocci Nth digit using recursion:



Source code for finding fibannoci series Nth digit using for recursion:

```
def fibo_recur(num: Int) = {
  def go(n: Int, curr: Int, next: Int): Int = {
    if (n == 1) next
    else {
      // recursively calling go function,till n==1.
      //adding the current num and previous number to find the fibannoci sequence.
      go(n-1, next, curr+next)
```

```
   }
  }
  go(num, 1, 1)   //Passing the n, along with 1st item value and 2nd item value of sequence
}
println("Fibanocci nth number using recursion: "+fibo_recur(9));
```