Scala Exception Handling:

The purpose of Exception Handling is to handle aberrant Conditions, can interrupt our program at any time unexpectedly.
Unlike java, Scala has only UnChecked Exception which is checked at runtime. All Exceptions are unchecked in it. We can handle Exception in different ways Like try-catch, throw, Throws, and many more. Let see how.

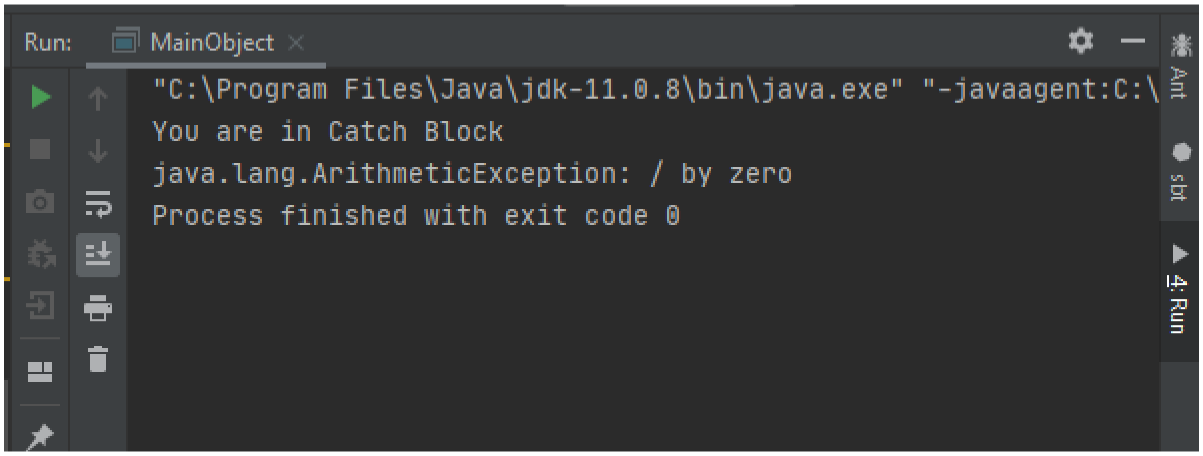
Try-Catch Exception Handling

In, Try we used to enclose the code to check the exception if exist we used catch block to handle the abnormal exception to prevent from terminating the program unexpectedly.

Example

```
class ErrorHandling{
  def div(a:Int, b:Int) = {
    try{
      a/b
    }catch{

      case e: ArithmeticException => {
println(e)
      }
    }
println(" Rest Executed !!!!!")
  }
}
object MainObject{
  def main(args:Array[String]){
    var e = new ErrorHandling()
e.div(5,0)
  }
}
```

Output

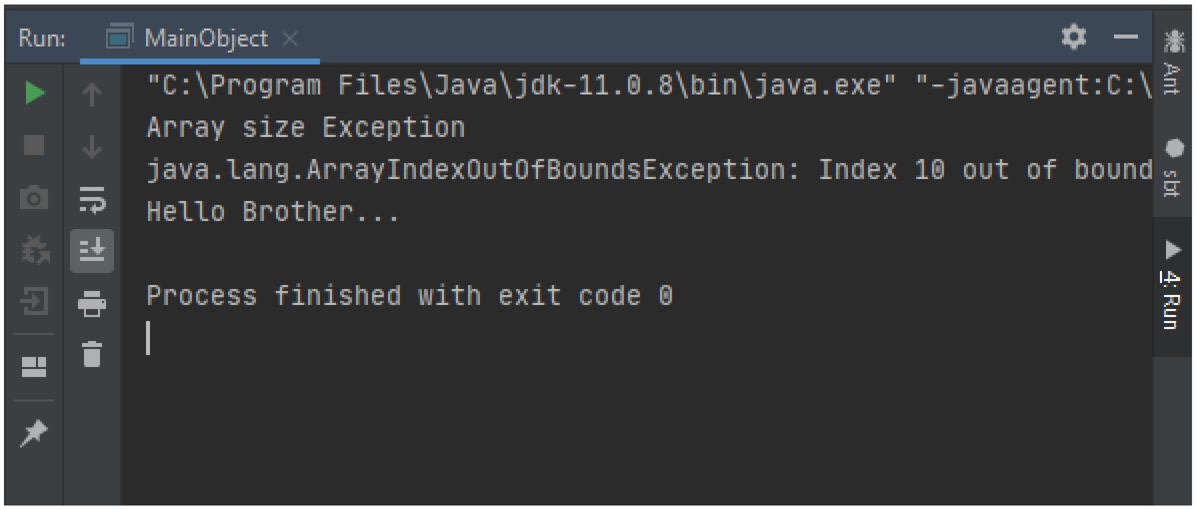


```
"C:\Program Files\Java\jdk-11.0.8\bin\java.exe" "-javaagent:C:\
You are in Catch Block
java.lang.ArithmeticException: / by zero
Process finished with exit code 0
```

Note: we can have multiple cases in catch to handle the exception also if at initial stage Exception occur it will terminate the program which means if other exceptions left in try will not run.

```
class ExceptionExample{
  def divide(a:Int, b:Int) = {
    try{
      var arr = Array(1,2)
arr(10)
      a/b
    }catch{
      case a: ArithmeticException =>println(a)
      case b: Throwable =>println("Array size Exception \n"+ b)
    }
println("Hello Brother...")
  }
}
object MainObject{
  def main(args:Array[String]){
    var e = new ExceptionExample()
e.divide(100,0)

  }
}
```

Output



```
"C:\Program Files\Java\jdk-11.0.8\bin\java.exe" "-javaagent:C:\
Array size Exception
java.lang.ArrayIndexOutOfBoundsException: Index 10 out of bound
Hello Brother...

Process finished with exit code 0
```

Note: Here java.lang.ArrayIndexOutOfBoundsException: Index 10 out of bounds for length 2 error will be catch first and java.lang.ArithmeticException: / by zero will be ignored.

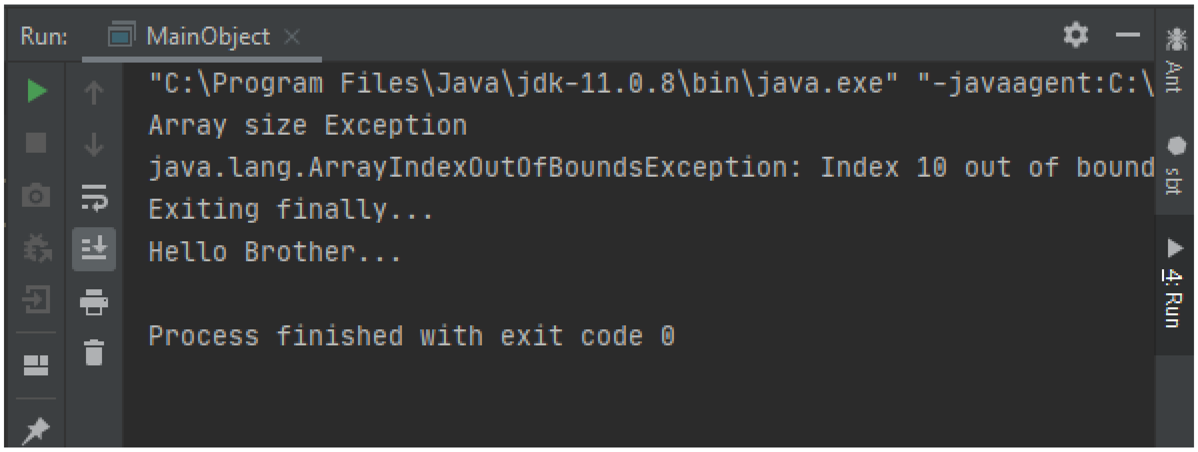
Final Block in Exception Handling:

Code inside the final block will be executed no matters how your program ends or terminate. Final Block can only be defined in Exception handling, not as a function, and must declare just after the try-catch block.

Example

```
class ExceptionExample{
  def divide(a:Int, b:Int)  {
    try{
      var arr = Array(1,2)
arr(10)
      a/b
    } catch {
      case a: ArithmeticException =>println(a)
      case b: Throwable =>println("Array size Exception \n"+ b)
    }
    finally{
println("Exiting finally...")
    }
println("Hello Brother...")
  }
}
object MainObject{
  def main(args:Array[String]){
    var e = new ExceptionExample()
e.divide(100,0)
  }
}
```

Output



```
"C:\Program Files\Java\jdk-11.0.8\bin\java.exe" "-javaagent:C:\
Array size Exception
java.lang.ArrayIndexOutOfBoundsException: Index 10 out of bound
Exiting finally...
Hello Brother...

Process finished with exit code 0
```

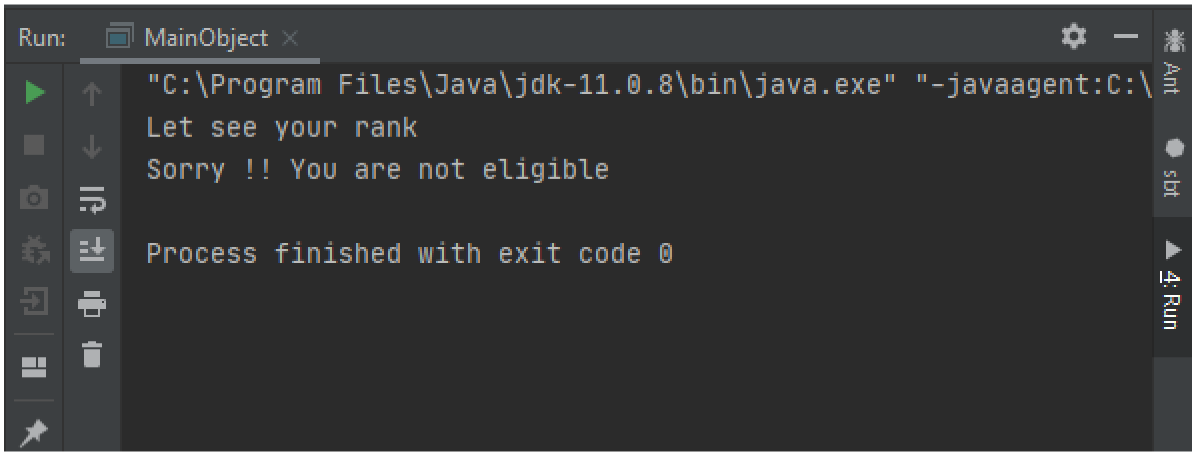
<u>Throw Keyword:</u>

Mainly we can create custom exceptions explicitly using this keyword. Means can have our own exception handling where we required. Exceptions classes are the same as java.

Example

```
import java.sql.SQLException

class Statusneo{
  def Select(Total_Rank:Int)={
    if(Total_Rank< 10)
      throw new SQLException("Hey ! Welcome for this intern")
    else
println("Sorry !! You are not eligible")
  }
 }

 object MainObject{
  def main(args:Array[String]){
    var S = new Statusneo()
println("Let see your rank")
S.Select(10)
   }
  }
```

Output



```
"C:\Program Files\Java\jdk-11.0.8\bin\java.exe" "-javaagent:C:\
Let see your rank
Sorry !! You are not eligible

Process finished with exit code 0
```

ScalaThrows Keyword :

When a method needs to throw the specific Exception then only we use Throws. A method can have multiple Exceptions which can also be known as custom Exception.

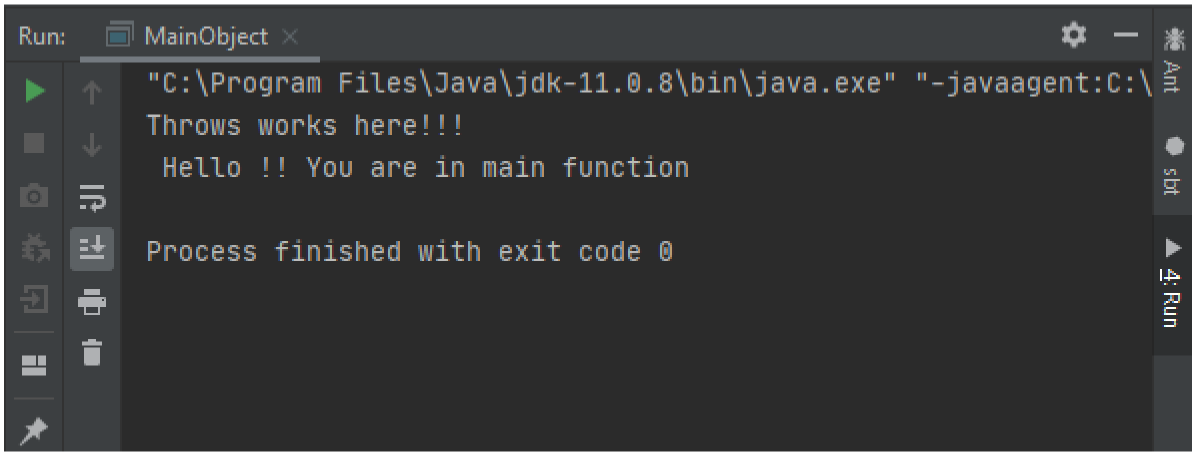
Syntax :

```

@throws(classOf[Exception])
 def Intern{
  // exception throwing code here ...
}
```

Example

```
class ErrorHandling{
 @throws(classOf[NumberFormatException])
 def LetsTry(a:Int, b:Int)={
      a/b
println(" Hey !! Remember Work hard ")
 }
}
object MainObject{
 def main(args:Array[String]){
  var E = new ErrorHandling()
  try{
E.LetsTry(10, 0)
  }catch{

    case x : ArithmeticException =>println("Throws works here!!! ")
  }
println(" Hello !! You are in main function")
 }
}
```

Output



```
"C:\Program Files\Java\jdk-11.0.8\bin\java.exe" "-javaagent:C:\
Throws works here!!!
 Hello !! You are in main function

Process finished with exit code 0
```

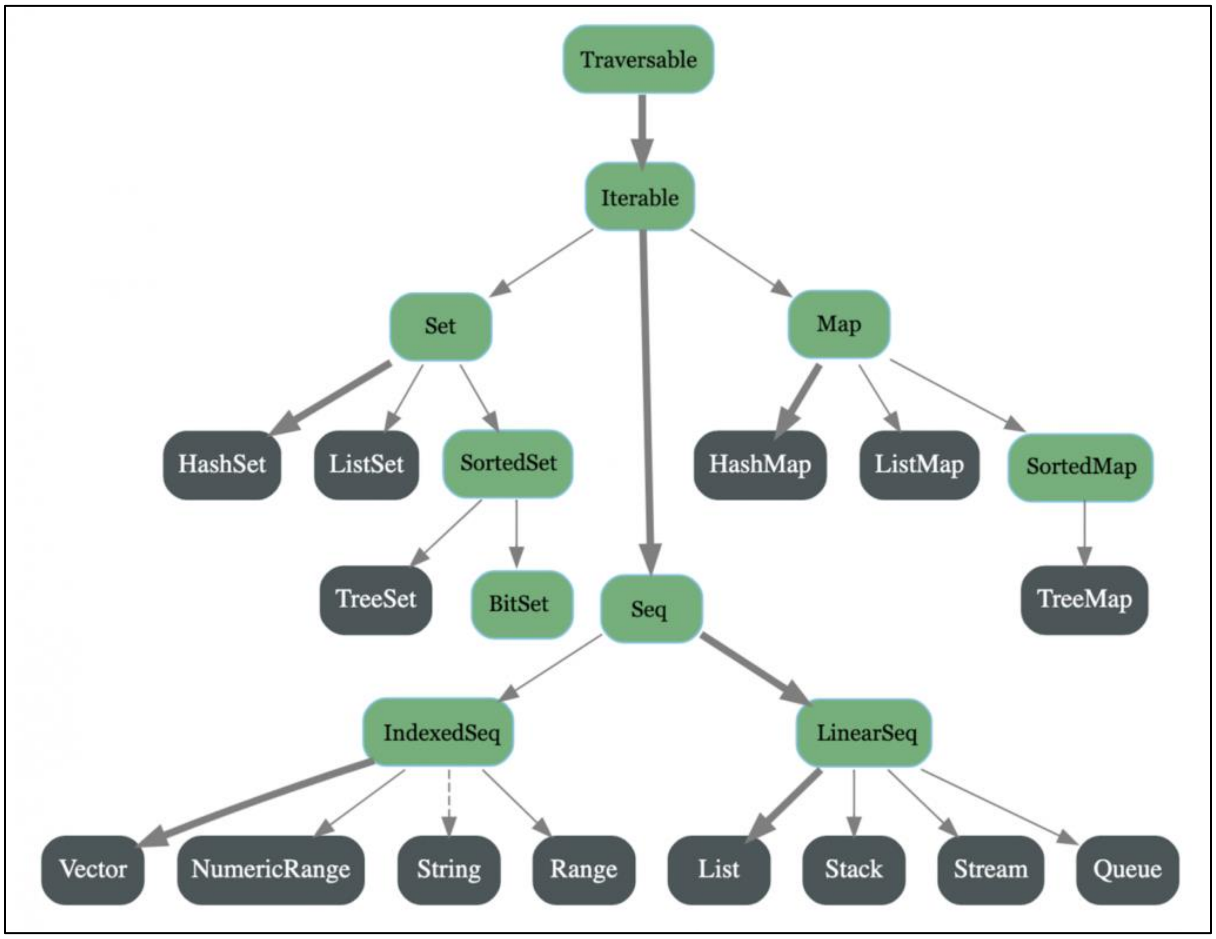
Scala Collection:

It is type of library which have classes and traits in it to collect data. These can be of two types mutable or immutable according to our requirement

- **Scala.collection.mutable** (this package contain all mutable collections)
- **Scala.collection.immutable** (this package contain all immutable collections)

The main difference between mutable and immutable package is that we can modify our data (add, remove and update) using mutable package but not with immutable

Scala Immutable Collections Hierarchy



<u>Scala Set</u>

It is used to store elements in a set and it does not have to follow any order. We can also perform various in sets

Syntax

val variableName = Set(element1, element2,... elementN)

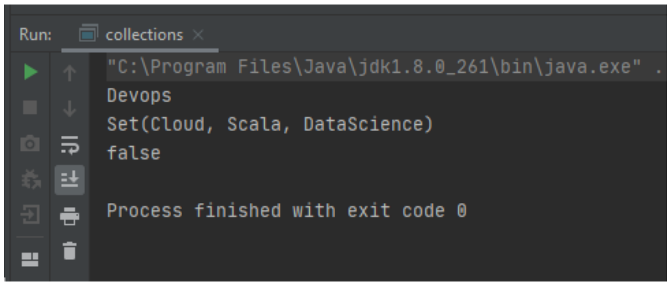
set creation

we can understand it with an example where we have created a simple set and used some inbuilt function to know about the properties of set

Example

```
import scala.collection.immutable._
object collections{
  def main(args:Array[String]){
val technologies = Set("Devops","Cloud","Scala","DataScience") //created the
Set
println(technologies.head)              // Returns first element present in
the set
println(technologies.tail)          // Returns all elements except first
element.
println(technologies.isEmpty)           // Returns either true or false
  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" .
Devops
Set(Cloud, Scala, DataScience)
false

Process finished with exit code 0
```

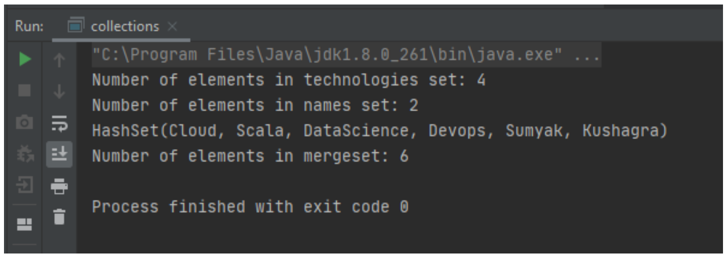
Merge set

We can merge two sets into one singleton set lets understand with it an example

Example

```
import scala.collection.immutable._
object collections{
  def main(args:Array[String]){
val technologies = Set("Devops","Cloud","Scala","DataScience") //created the
Set
val Names = Set("Sumyak","Kushagra")
valmergeset = (Names ++ technologies) //merge set
println("Number of elements in technologies set: " +technologies.size)
println("Number of elements in names set: " +Names.size)

println(mergeset)
println("Number of elements in mergeset: " +mergeset.size)

  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Number of elements in technologies set: 4
Number of elements in names set: 2
HashSet(Cloud, Scala, DataScience, Devops, Sumyak, Kushagra)
Number of elements in mergeset: 6

Process finished with exit code 0
```

NOTE: Here you can see in the output it’s given **Hashset**it is just a sealed class which uses hash code to store elements. In Scala, A concrete implementation of Set semantics is known HashSet

Adding and removing of element from set

We can add or remove the element from set using

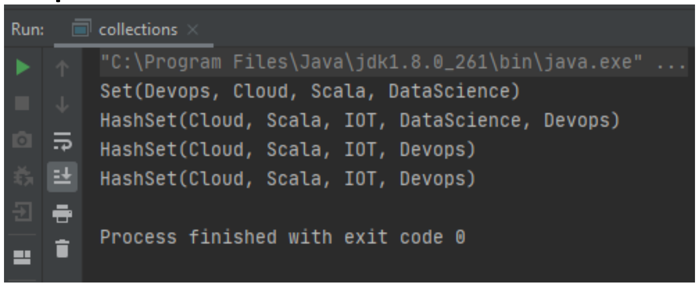
- **+=** → add element
- **-=** → remove element

Also, we cannot add similar elements in the set because duplicacy in set is not allowed

Example

```
import scala.collection.immutable._
object collections{
  def main(args:Array[String]){
    var technologies = Set("Devops","Cloud","Scala","DataScience") //created
the Set
println(technologies)

    technologies += "IOT"  //adding element
println(technologies)

    technologies -= "DataScience" // removing element
println(technologies)

    technologies += "IOT"  //duplicacy not allowed
println(technologies)

  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Set(Devops, Cloud, Scala, DataScience)
HashSet(Cloud, Scala, IOT, DataScience, Devops)
HashSet(Cloud, Scala, IOT, Devops)
HashSet(Cloud, Scala, IOT, Devops)

Process finished with exit code 0
```

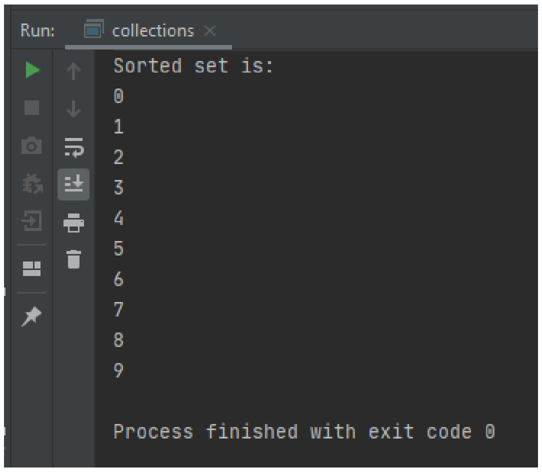
Scala Sorted set

This extends set trait and in return provides us the sorted set. We can either sort integer or string using this according to our requirements.

Example

```
import scala.collection.immutable._
object collections{
  def main(args:Array[String]){
    var sortednumbers: SortedSet[Int] = SortedSet(1,4,3,5,7,6,8,9,0,2)
println("Sorted set is:")
    for (output <- sortednumbers){  //for loop
println(output)
    }

  }
}
```

Output



```
Sorted set is:
0
1
2
3
4
5
6
7
8
9

Process finished with exit code 0
```

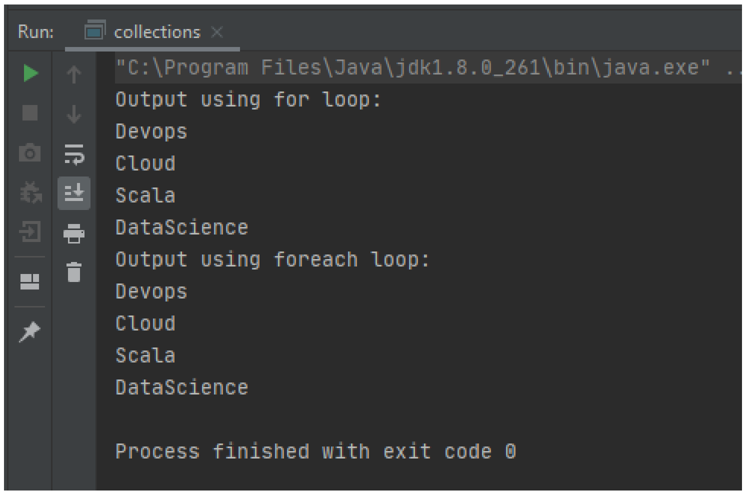
Iterating set elements using loop

We iterate elements using for loop or foreach loop in a set

Example

```
import scala.collection.immutable._
object collections{
  def main(args:Array[String]){
    var technologies = Set("Devops","Cloud","Scala","DataScience") //created
the Set
println("Output using for loop:")
    for( output <- technologies){ //using for loop
println(output)
    }

println("Output using foreach loop:")
technologies.foreach((result:String)=>println(result)) //using foreach loop
  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ..
Output using for loop:
Devops
Cloud
Scala
DataScience
Output using foreach loop:
Devops
Cloud
Scala
DataScience

Process finished with exit code 0
```

Scala Seq

It is a type of trait which follow indexed sequence to represent and also, we can access the elements using indexes also which maintains the order of insertion for our elements.

Commonly used Methods of Seq

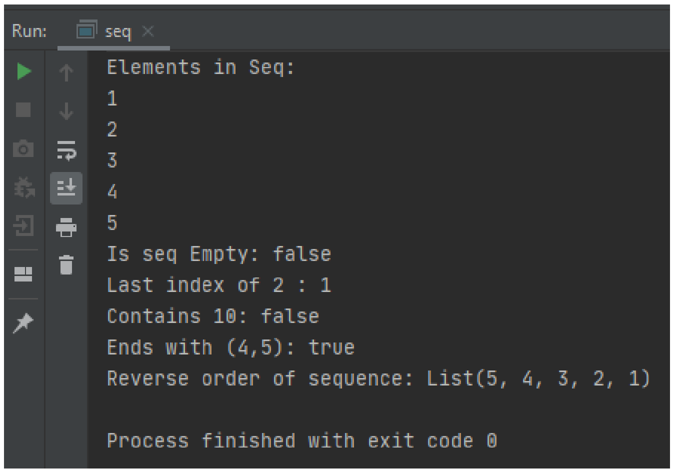
Example

```
import scala.collection.immutable._
object seq{
  def main(args:Array[String]){
    var numbers:Seq[Int] = Seq(1,2,3,4,5)
println("Elements in Seq:")
    for(output <- numbers){
println(output)
    }
println("Is seq Empty: "+numbers.isEmpty)
```

Method	Description
def contains[A1 >: A](elem: A1): Boolean	Check whether the given element present in this sequence.
def copyToArray(xs: Array[A], start: Int, len: Int): Unit	It copies the seq elements to an array.
def endsWith[B](that: GenSeq[B]): Boolean	It tests whether this sequence ends with the given sequence or not.
def head: A	It selects the first element of this seq collection.
def indexOf(elem: A): Int	It finds index of first occurrence of a value in this immutable sequence.
def isEmpty: Boolean	It tests whether this sequence is empty or not.
def lastIndexOf(elem: A): Int	It finds index of last occurrence of a value in this immutable sequence.
def reverse: Seq[A]	It returns new sequence with elements in reversed order.

```
println("Last index of 2 : "+numbers.lastIndexOf(2))
println("Contains 10: "+ numbers.contains(10))
println("Ends with (4,5): "+ numbers.endsWith(Seq(4,5)))
println("Reverse order of sequence: "+numbers.reverse)
  }
}
```

Output



```
Elements in Seq:
1
2
3
4
5
Is seq Empty: false
Last index of 2 : 1
Contains 10: false
Ends with (4,5): true
Reverse order of sequence: List(5, 4, 3, 2, 1)

Process finished with exit code 0
```

Scala Vector

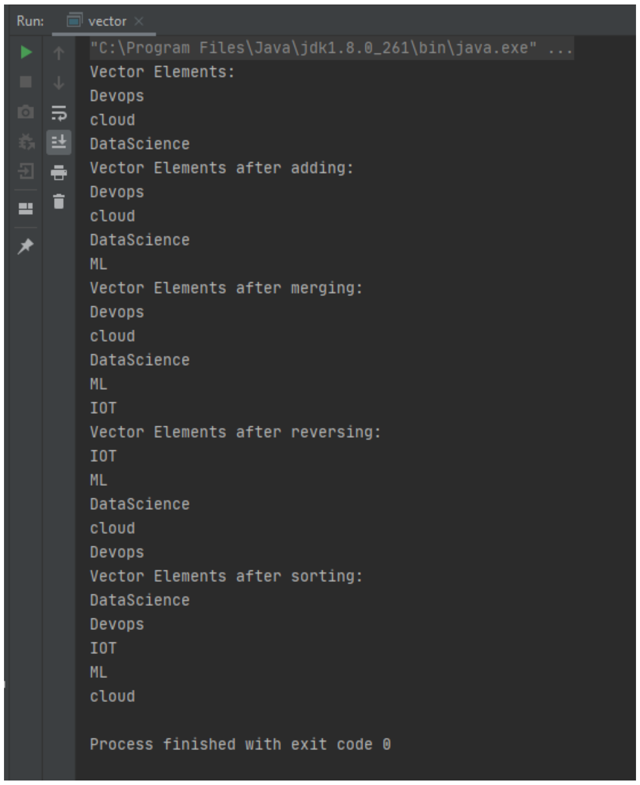
It is a type of immutable data structure and it provides random access of elements. Scala vector can be used for large collection of elements.

We can also add or remove elements from a vector.

Example

```
import scala.collection.immutable._
object vector{
def main(args:Array[String]){
    var domain = Vector("Devops","cloud","DataScience")
    var domain1 = Vector("IOT")
println("Vector Elements: ")

domain.foreach((element:String) =>println(element+" "))
    var newVector  = domain :+ "ML"  // Adding a new element into vector
println("Vector Elements after adding: ")
newVector.foreach((element:String) =>println(element+" "))

    var mergeTwoVector = newVector ++ domain1   // Merging two vector
println("Vector Elements after merging: ")
mergeTwoVector.foreach((element:String) =>println(element+" "))

    var reverse = mergeTwoVector.reverse   // Reversing vector elements
println("Vector Elements after reversing: ")
reverse.foreach((element:String) =>println(element+" "))

    var sortedVector = mergeTwoVector.sorted  // Sorting vector elements
println("Vector Elements after sorting: ")
sortedVector.foreach((element:String) =>println(element+" "))
  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Vector Elements:
Devops
cloud
DataScience
Vector Elements after adding:
Devops
cloud
DataScience
ML
Vector Elements after merging:
Devops
cloud
DataScience
ML
IOT
Vector Elements after reversing:
IOT
ML
DataScience
cloud
Devops
Vector Elements after sorting:
DataScience
Devops
IOT
ML
cloud

Process finished with exit code 0
```

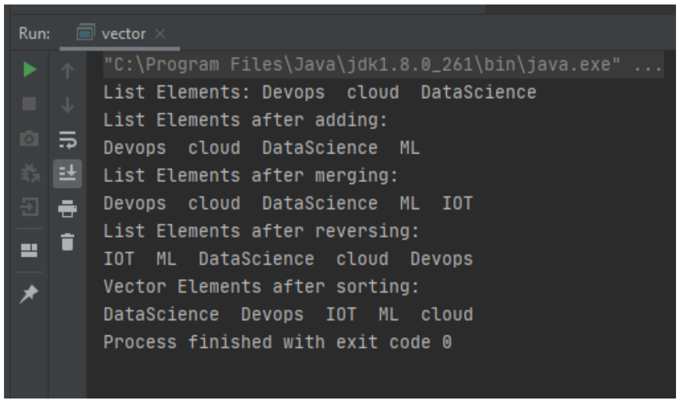
Scala List

This follows last-in-first-out (LIFO) pattern to store ordered elements. we can also use predefined function in our list to do various tasks.

Example

```
import scala.collection.immutable._
object list{
  def main(args:Array[String]){
    var domain = List("Devops","cloud","DataScience")
    var domain1 = List("IOT")
print("List Elements: ")
domain.foreach((element:String) =>print(element+"  "))

    var newList = domain :+ "ML"   // Adding a new element into list
println("\nList Elements after adding: ")
newList.foreach((element:String) =>print(element+"  "))

    var mergeTwoList = newList ++ domain1    // Merging two list
println("\nList Elements after merging: ")
mergeTwoList.foreach((element:String) =>print(element+"  "))

    var reverse = mergeTwoList.reverse   // Reversing list elements
println("\nList Elements after reversing: ")
reverse.foreach((element:String) =>print(element+"  "))

    var sortedList = mergeTwoList.sorted  // Sorting list elements
println("\nVector Elements after sorting: ")
sortedList.foreach((element:String) =>print(element+"  "))
  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
List Elements: Devops  cloud  DataScience
List Elements after adding:
Devops  cloud  DataScience  ML
List Elements after merging:
Devops  cloud  DataScience  ML  IOT
List Elements after reversing:
IOT  ML  DataScience  cloud  Devops
Vector Elements after sorting:
DataScience  Devops  IOT  ML  cloud
Process finished with exit code 0
```

Scala Queue

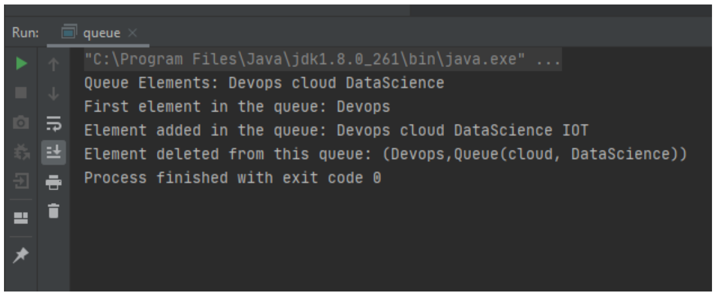
This follows first-in-first-out (FIFO) pattern to implement a data structure for inserting and retrieving elements.

For, implementing a queue we need to have a pair of lists out these one is used to insert elements and another is used to contain deleted elements. Elements are inserted in first list and deleted from second list.

Example

```
import scala.collection.immutable._
object queue{
  def main(args:Array[String]){
    var domain = Queue("Devops","cloud","DataScience")
print("Queue Elements: ")
domain.foreach((element:String)=>print(element+" "))
    var firstElement = domain.front
print("\nFirst element in the queue: "+ firstElement)
    var enqueueQueue = domain.enqueue("IOT")
print("\nElement added in the queue: ")
enqueueQueue.foreach((element:String)=>print(element+" "))
    var dequeueQueue = domain.dequeue
print("\nElement deleted from this queue: "+ dequeueQueue)
  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ...
Queue Elements: Devops cloud DataScience
First element in the queue: Devops
Element added in the queue: Devops cloud DataScience IOT
Element deleted from this queue: (Devops,Queue(cloud, DataScience))
Process finished with exit code 0
```

Scala Maps

This stores the elements in pairs of key and values we can create maps using two ways

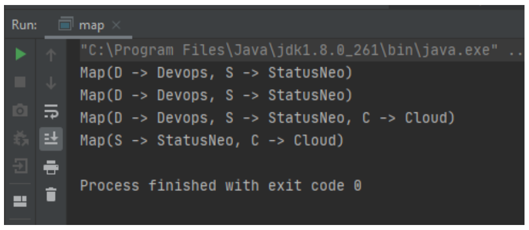
- Comma separated pairs
- Rocket operator

We can understand both using an example

Example

```
object map{
  def main(args:Array[String]){
    var map1 = Map(("D","Devops"),("S","StatusNeo"))   //comma seprated
    var map2 = Map("D"->"Devops","S"->"StatusNeo")   //rocket operator
println(map1)
println(map2)
    var newMap = map1+("C"->"Cloud")                // Adding a new element
to map
println(newMap)
    var removeElement = newMap - "D"                // Removing an element
from map
println(removeElement)

  }
}
```

Output



```
"C:\Program Files\Java\jdk1.8.0_261\bin\java.exe" ..
Map(D -> Devops, S -> StatusNeo)
Map(D -> Devops, S -> StatusNeo)
Map(D -> Devops, S -> StatusNeo, C -> Cloud)
Map(S -> StatusNeo, C -> Cloud)

Process finished with exit code 0
```