



Mobile Application Development

Produced by Dave Drohan (david.drohan@setu.ie)

Department of Computing & Mathematics
South East Technological University
Waterford, Ireland

Updated & Delivered by Gongzhe Qiao (003969@nuist.edu.cn)

Department of Computer Science
Nanjing University of Information Science and Technology
Nanjing, China

nuist.edu.cn



setu.ie



Introducing Kotlin Syntax - Part 2.2



Agenda for Part 2

- ❑ Writing Classes (properties and fields)
- ❑ Data Classes (just for data)
- ❑ Collections: Arrays and Collections
- ❑ Collections: *in* operator and lambdas
- ❑ Arguments (default and named)



Agenda for Part 2

- ❑ Writing Classes (properties and fields)
- ❑ Data Classes (just for data)
- ❑ **Collections: Arrays and Collections**
- ❑ Collections: *in* operator and lambdas
- ❑ Arguments (default and named)



Collections



Arrays and Collections



Arrays (using arrayOf)

- Arrays in Kotlin can be created using `arrayOf()` or the `Array()` constructor.

```
fun main(args: Array<String>) {  
  
    val myArray = arrayOf(4, 5, 6, 7)  
    println(myArray.asList())  
    print(myArray[2])  
  
}
```

 Console 

```
<terminated> Config - Main.kt [Java Ap  
[4, 5, 6, 7]  
6
```

Arrays (using arrayOf)


- ❑ You can create an array of mixed types (different from Java)

```
fun main(args: Array<String>) {  
  
    val myArray = arrayOf(4, 5, 6, 7, "mixed", "types", "allowed")  
    print(myArray.asList())  
}
```

Console ✕

<terminated> Config - Main.kt [Java Application] C:\Program
[4, 5, 6, 7, mixed, types, allowed]

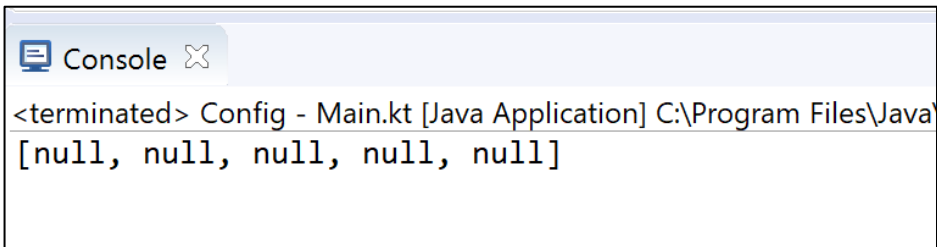
```
fun main(args: Array<String>) {  
  
    val intArray1      = intArrayOf(4, 5, 6, 7)  
    val intArray2      = arrayOf<Int>(4, 5, 6, 7)  
    val charArray      = charArrayOf('a', 'b', 'c', 'd')  
    val booleanArray   = booleanArrayOf(true, false, true)  
  
    val mixedArray1 = intArrayOf(4, 5, 6, 7, "will", "not", "compile")  
    val mixedArray2 = arrayOf<Int>(4, 5, 6, 7, "will", "not", "compile")  
}
```



Arrays (using arrayOfNulls)

- ❑ Or an array of **nulls**, in this case, to hold **Ints**

```
fun main(args: Array<String>) {  
  
    val nullArray = arrayOfNulls<Int>(5);  
    println (nullArray.asList())  
  
}
```



Console

<terminated> Config - Main.kt [Java Application] C:\Program Files\Java\ [null, null, null, null, null]

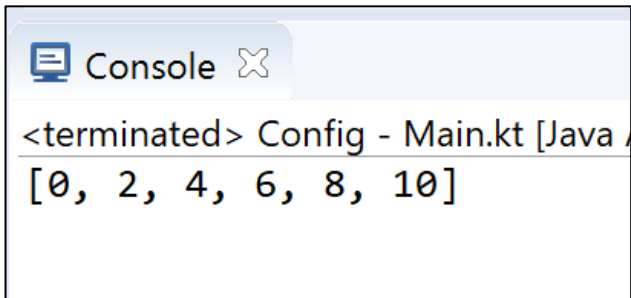
Arrays (using constructor)

- ❑ The **Array()** constructor requires a **size** and a **lambda function**.

```
fun main(args: Array<String>) {  
  
    val intArray = Array(6, { i -> i * 2 })  
    print (intArray.asList())  
  
}
```

Value to be inserted
into the index

Index of the
array element



```
Console X  
<terminated> Config - Main.kt [Java  
[0, 2, 4, 6, 8, 10]
```

Collections

- ❑ Unlike many languages, Kotlin distinguishes between **mutable** and **immutable** collections (lists, sets, maps, etc).
- ❑ Precise control over exactly when collections can be edited is useful for eliminating bugs, and for designing good APIs.

Collections – mutable Vs immutable

- ❑ The Kotlin `List<out T>` type is an interface that provides **read-only** operations like **size**, **get** and so on.
- ❑ Like in Java, it inherits from `Collection<T>` and that in turn inherits from `Iterable<T>`.
- ❑ Methods that **change** the list are added by the `MutableList<T>` interface.
- ❑ This pattern holds also for `Set<out T>/MutableSet<T>` and `Map<K, out V>/MutableMap<K, V>`.

Collections – mutable List

```
fun main(args: Array<String>) {  
  
    // Create a mutable list (MutableList).  
    val fruit = mutableListOf("Banana", "Kiwifruit", "Mango", "Apple")  
    println(fruit)  
  
    // Add a element to the list.  
    fruit.add("Pear")  
    println(fruit)  
  
    // Change an element in the list.  
    fruit[1] = "Orange"  
    println(fruit)  
  
    // Remove a existing element from the list.  
    fruit.removeAt(2)  
    println(fruit)  
}
```

Console

```
<terminated> Config - Main.kt [Java Application] C:\Program  
[Banana, Kiwifruit, Mango, Apple]  
[Banana, Kiwifruit, Mango, Apple, Pear]  
[Banana, Orange, Mango, Apple, Pear]  
[Banana, Orange, Apple, Pear]
```

Collections – immutable List – example 1

```
fun main(args: Array<String>) {  
  
    val numbers: MutableList<Int> = mutableListOf(1, 2, 3)  
    val readOnlyView: List<Int> = numbers  
  
    println(numbers)           // prints "[1, 2, 3]"  
    numbers.add(4)  
  
    println(readOnlyView)      // prints "[1, 2, 3, 4]"  
    readOnlyView.clear()       // -> does not compile  
  
}
```

Collections – immutable List – example 2

```
class Person( _firstName: String = "UNKNOWN",
              _lastName: String = "UNKNOWN") {

    private val _items = mutableListOf<String>("1", "2", "3")
    val items: List<String> get() = _items.toList()
}
```

custom function `get()`
'linking' `_items` with
`items`

`items` returns a snapshot of a collection at a particular point in time (that's guaranteed to not change) as `toList()` just duplicates `_items`.

Console

<terminated> Config - Main.kt [Java Applica
[1, 2, 3]

```
fun main(args: Array<String>) {

    val person = Person()
    println(person.items)
    //person.items.clear() //doesn't compile
}
```

Collections – Set and HashSet

```
fun main(args: Array<String>) {  
  
    // mutable set  
    val mutableSet : MutableSet<Int> = mutableSetOf(1,2,3)  
    println(mutableSet)  
    mutableSet.add(4)  
    println(mutableSet)  
  
    // immutable set  
    val immutableSet : Set<Int> = setOf(9,8,7)  
    println(immutableSet)  
    //immutableSet.add(6) //won't compile  
  
    //note: ignores duplicate items  
    val strings = hashSetOf("a", "b", "c", "c")  
    println("Size: ${strings.size}, Contents: " + strings)  
    strings.add("d")  
    println("Size: ${strings.size}, Contents: " + strings)  
}
```

Ordered
(implement LinkedHashSet)

Console ✕

```
<terminated> Config - Main.kt [Java Application] C:\Pr  
[1, 2, 3]  
[1, 2, 3, 4]  
[9, 8, 7]  
Size: 3, Contents: [a, b, c]  
Size: 4, Contents: [a, b, c, d]
```

Not ordered

Collections – Map and hashMap

```
fun main(args: Array<String>) {  
  
    // mutable map  
    val mutableMap = mutableMapOf("W" to "Watreford", "C" to "Cork")  
    println(mutableMap)  
    mutableMap.put("D", "Dublin")  
    println(mutableMap)  
    mutableMap["W"] = "Waterford"  
    println(mutableMap)  
  
    // immutable map  
    val immutableMap : Map<Int, String> = mapOf(1 to "One", 2 to "Two")  
    println(immutableMap)  
    //immutableMap.put(3, "Three") //won't compile  
}
```

Console

```
<terminated> Config - Main.kt [Java Applicati  
{W=Watreford, C=Cork}  
{W=Watreford, C=Cork, D=Dublin}  
{W=Waterford, C=Cork, D=Dublin}  
{1=One, 2=Two}
```


Some additional sources for exploration:

Inheritance	https://www.programiz.com/kotlin-programming/inheritance
Interfaces	https://www.programiz.com/kotlin-programming/interfaces
Collections	https://kotlinlang.org/api/latest/jvm/stdlib/kotlin.collections/index.html
Try examples online	https://try.kotlinlang.org/#/Examples/Hello,%20world!/Simplest%20version/Simplest%20version.kt
Encapsulation & Polymorphism	https://medium.com/@napperley/kotlin-tutorial-12-encapsulation-and-polymorphism-6e5a150f25e1
Spek (testing)	https://objectpartners.com/2016/02/23/an-introduction-to-kotlin/ https://github.com/mike-plummer/KotlinCalendar



References

Sources: <http://kotlinlang.org/docs/reference/basic-syntax.html>
<http://petersommerhoff.com/dev/kotlin/kotlin-for-java-devs/>
<https://www.programiz.com/kotlin-programming>
<https://www.baeldung.com/kotlin-lambda-expressions>
<https://www.programiz.com/kotlin-programming/lambdas>
<https://medium.com/@napperley/kotlin-tutorial-5-basic-collections-3f114996692b>

