Chapter 1: Kotlin – Data Types, Objects, and Classes

```
nom, nom, nom... delicious Blueberry cupcake
```

```
nom, nom, nom... delicious Blueberry bakery good
```

```
nom, nom, nom... delicious Blueberry cupcake
```

Chapter 2: Getting Started with Functional Programming

```
factorial :966332
functionalFactorial :1730842
tailrecFactorial :798309
```

```
fib :670550
functionalFib :1486167
tailrecFib :768623
```

```
before using i
Lazy evaluation
1
```

```
acc, i = 0, 1
acc, i = 1, 2 |
acc, i = 3, 3
acc, i = 6, 4
10
```

```
acc, i = 1, 2
acc, i = 3, 3
acc, i = 6, 4
10
```

```
fold on funList : 2138372
fold on list : 203832
```

Chapter 3: Immutability - It's Important

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Calling 1st time Mutable 1
Calling 2nd time Mutable 2
Calling 3rd time Mutable 3


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
MutableObj MutableObj(value='')
MutableObj MutableObj(value='Changed')
[a, b, c, d, e]
[a, b, c, d, e, f]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Immutable List [1, 2, 3, 4, 5, 6, 7]
Mutable List [1, 2, 3, 4, 5, 6, 7]
Mutable List after add [1, 2, 3, 4, 5, 6, 7, 8]
Mutable List after add [1, 2, 3, 4, 5, 6, 7]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
someData from 1st async 11
someData from 2nd async 12
someData from 2nd async 13
someData from 1st async 25
someData from 2nd async 26
someData from 2nd async 27
someData from 1st async 40
someData from 2nd async 41
someData from 1st async 55
someData from 2nd async 56
someData from 2nd async 57
someData from 1st async 72
someData from 2nd async 73
someData from 1st async 89
someData from 2nd async 90
someData from 2nd async 91
someData from 1st async 108
someData from 1st async 126
someData from 1st async 145
someData from 1st async 165


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
someData from 1st async 11
someData from 2nd async 1
someData from 2nd async 2
someData from 1st async 23
someData from 2nd async 3
someData from 2nd async 4
someData from 1st async 36
someData from 2nd async 5
someData from 1st async 50
someData from 2nd async 6
someData from 2nd async 7
someData from 1st async 65
someData from 2nd async 8
someData from 2nd async 9
someData from 1st async 81
someData from 2nd async 10
someData from 1st async 98
someData from 1st async 116
someData from 1st async 135
someData from 1st async 155

Process finished with exit code 0
```

Chapter 4: Functions, Function Types, and Side Effects

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Count Words: 8


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
5>0: true
5>6: false


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Nested Output: String from nested function


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
doSomeStuff called


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Sum 23
Sum 120


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
reverse 123 321
reverse 456 654
reverse 789 987


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Called with 4,(it*2): 8
Called with 5,(it*2): 5


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
n:0 it:abc
n:2 it:def
n:3 it:ghi


Process finished with exit code 0
```

Chapter 5: More on Functions

```
<generic canine noise>
woof!!
```

```
<generic feline noise>
<generic feline noise>
```

```
Koko: <generic primate noise>
Kong: <generic primate noise>
```

```
Feline reacts: PURRR!!!
Primate reacts: *Koko plays with Adam*
```

```
Caregiver Adam
Feline reacts: PURRR!!!
Primate reacts: *Koko plays with Adam*
Vet Brenda
Feline reacts: *runs away from Brenda*
Primate reacts: *Koko plays with Brenda*
```

```
*working hard*
*working on refactoring*
*playing video games*
```

```kotlin
infix fun String.`(╯°□°)╯︵ ┻━┻`(s: String) = "*$this flips table at $s*"

fun main(args: Array<String>) {

    "Adam" `(╯°□°)╯︵ ┻━┻` "Ben"*
```
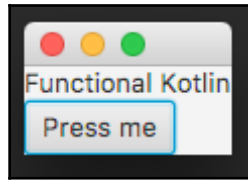
```
time = 1005449985
inTime = 1003105225
```

Chapter 6: Delegates in Kotlin

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Exception in thread "main" java.lang.IllegalStateException: Property
 notInit should be initialized before get.
    at kotlin.properties.NotNullVar.getValue(Delegates.kt:48)
    at com.rivuchk.packtpub.functionalkotlin.chapter06
 .Chapter6_1_notnullKt.getNotInit(chapter6_1_notnull.kt)
    at com.rivuchk.packtpub.functionalkotlin.chapter06
 .Chapter6_1_notnullKt.main(chapter6_1_notnull.kt:11)
Initial value


Process finished with exit code 1
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Initial value
Exception in thread "main" kotlin.UninitializedPropertyAccessException:
 lateinit property notInit1 has not been initialized
    at com.rivuchk.packtpub.functionalkotlin.chapter06
 .Chapter6_2_lateinitKt.main(chapter6_2_lateinit.kt:11)


Process finished with exit code 1
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Not yet initialised
Just Initialised
My Lazy Val


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Property `myStr` changed value from "<Initial Value>" to "Change Value"
Property `myStr` changed value from "Change Value" to "Change Value again"

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
myIntEven 0 -> 6
myIntEven 6 -> 3
myIntEven:6


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
myCounter 0 -> 2
myCounter:2
myCounter 2 -> 5
myCounter 5 -> 4
myCounter:5
myCounter 5 -> 6
myCounter 6 -> 5
myCounter:6


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Book1 Book(delegate={name=Reactive Programming in Kotlin, authors=Rivu
 Chakraborty, pageCount=400, publicationDate=Tue Dec 05 00:00:00 IST
 2017, publisher=Packt})
Book2 Book(delegate={name=Kotlin Blueprints, authors=Ashish Belagali,
 Hardik Trivedi, Akshay Chordiya, pageCount=230, publicationDate=Sun Dec
 10 00:00:00 IST 2017, publisher=Packt})


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
myEven 6 -> 6, Even:true
myEven:6
myEven 3 -> 3, Even:false
myEven:4
myEven 5 -> 5, Even:false
myEven:6
myEven 8 -> 8, Even:true
myEven:8


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Mario Arias


Printing Name:
Mario Arias


Process finished with exit code 0
```
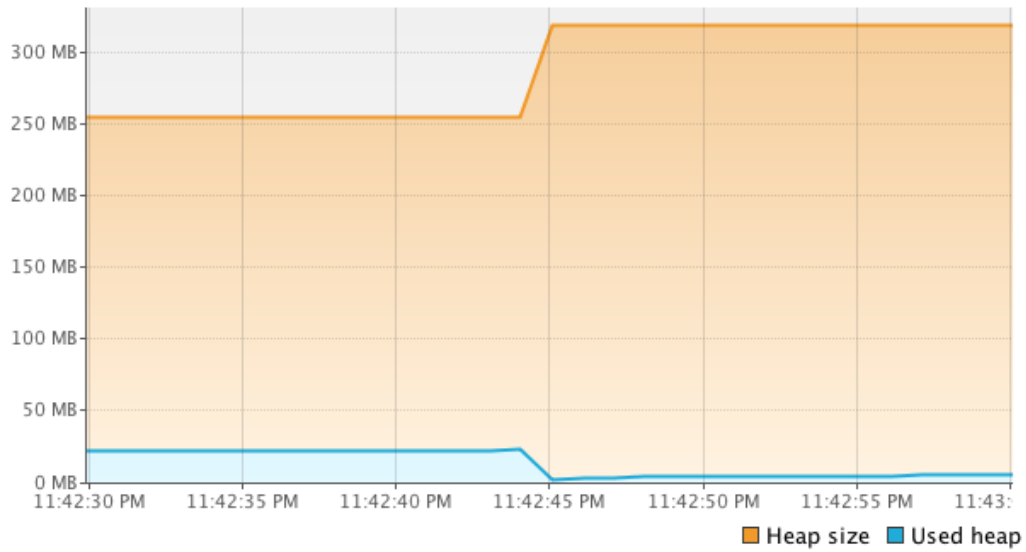
Chapter 7: Asynchronous Programming with Coroutines

Heap | Metaspace

Size: 1.610.612.736 B   **Used:** 804.648.728 B
Max: 4.294.967.296 B

■ Heap size ■ Used heap

Threads

Live: 10   **Daemon:** 10
Live peak: 1.011   **Total started:** 1.013

■ Live threads ■ Daemon threads

Heap | Metaspace | ✕

Size: 1.609.564.160 B   **Used:** 914.300.624 B
Max: 4.294.967.296 B

■ Heap size ■ Used heap

Threads | ✕

Live: 1.988   **Daemon:** 11
Live peak: 2.030   **Total started:** 2.032

■ Live threads ■ Daemon threads

Heap | Metaspace | ×

Size: 1.609.564.160 B **Used:** 758.521.768 B
Max: 4.294.967.296 B

Heap size ■ Used heap ■

Threads | ×

Live: 10 **Daemon:** 10
Live peak: 1.911 **Total started:** 1.913

Live threads ■ Daemon threads ■

Heap | Metaspace | ✕

Size: 1.610.612.736 B   **Used:** 1.004.705.720 B
Max: 4.294.967.296 B

■ Heap size   ■ Used heap

Threads | ✕

Live: 11   **Daemon:** 10
Live peak: 1.035   **Total started:** 1.035

■ Live threads   ■ Daemon threads

Heap | Metaspace

Size: 268.435.456 B   **Used:** 43.224.536 B
Max: 4.294.967.296 B

Heap size   Used heap

Threads

Live: 17   **Daemon:** 16
Live peak: 19   **Total started:** 19

Live threads   Daemon threads

Heap	Metaspace		×

Size: 653.262.848 B   **Used:** 311.627.272 B
Max: 4.294.967.296 B

Heap size   Used heap

Threads	×

Live: 16   **Daemon:** 16
Live peak: 19   **Total started:** 21

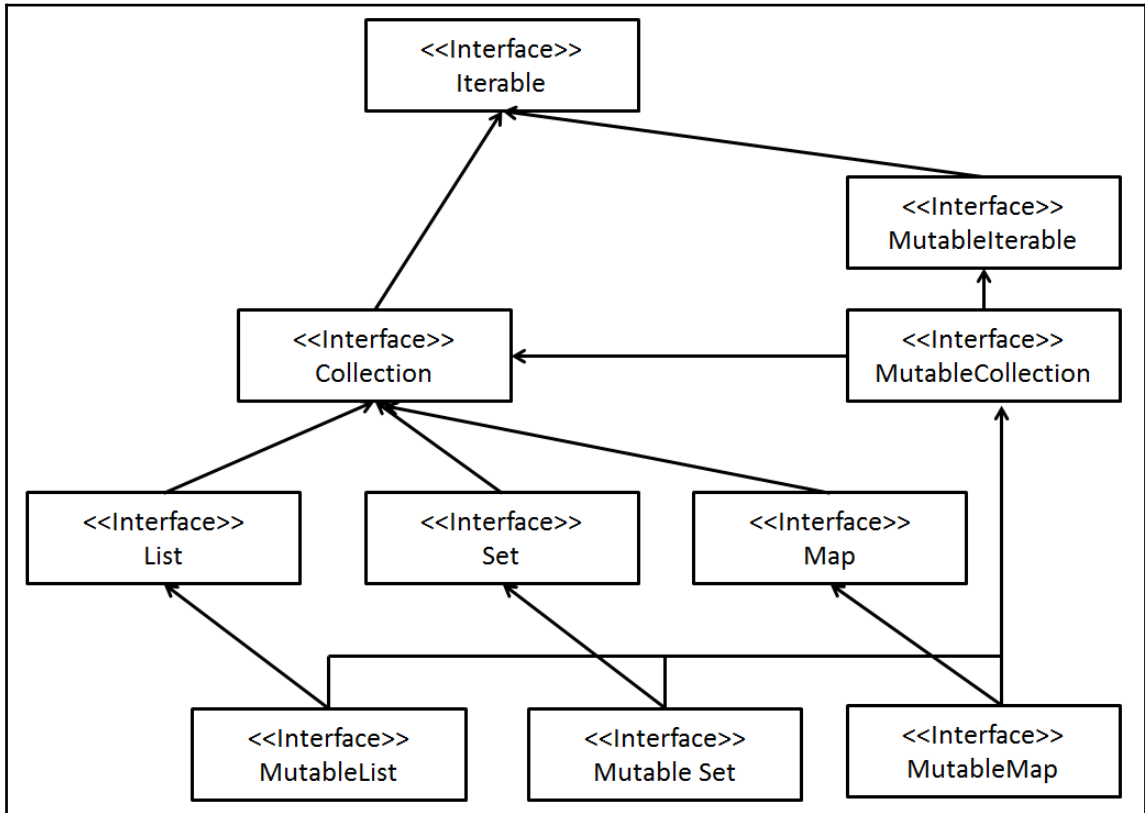Live threads   Daemon threads
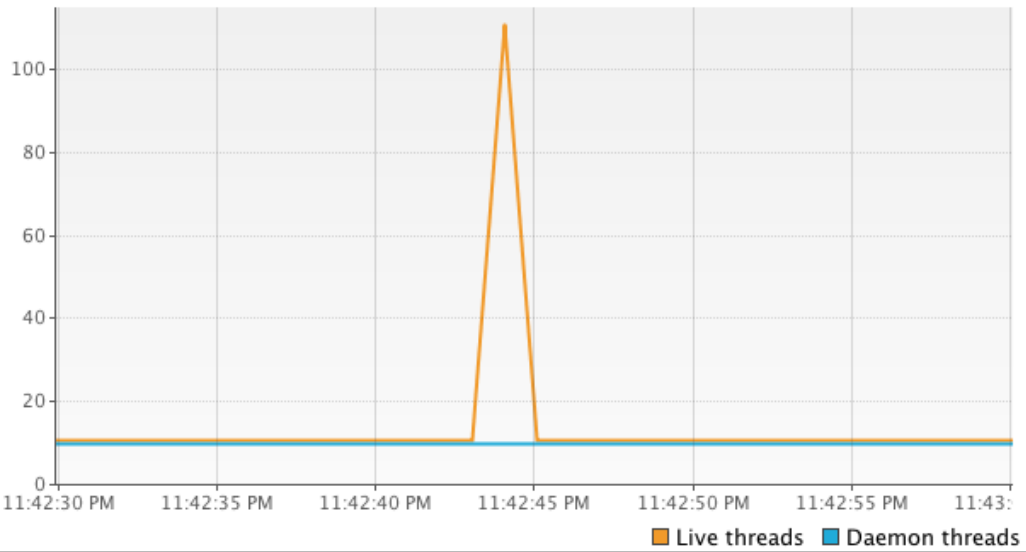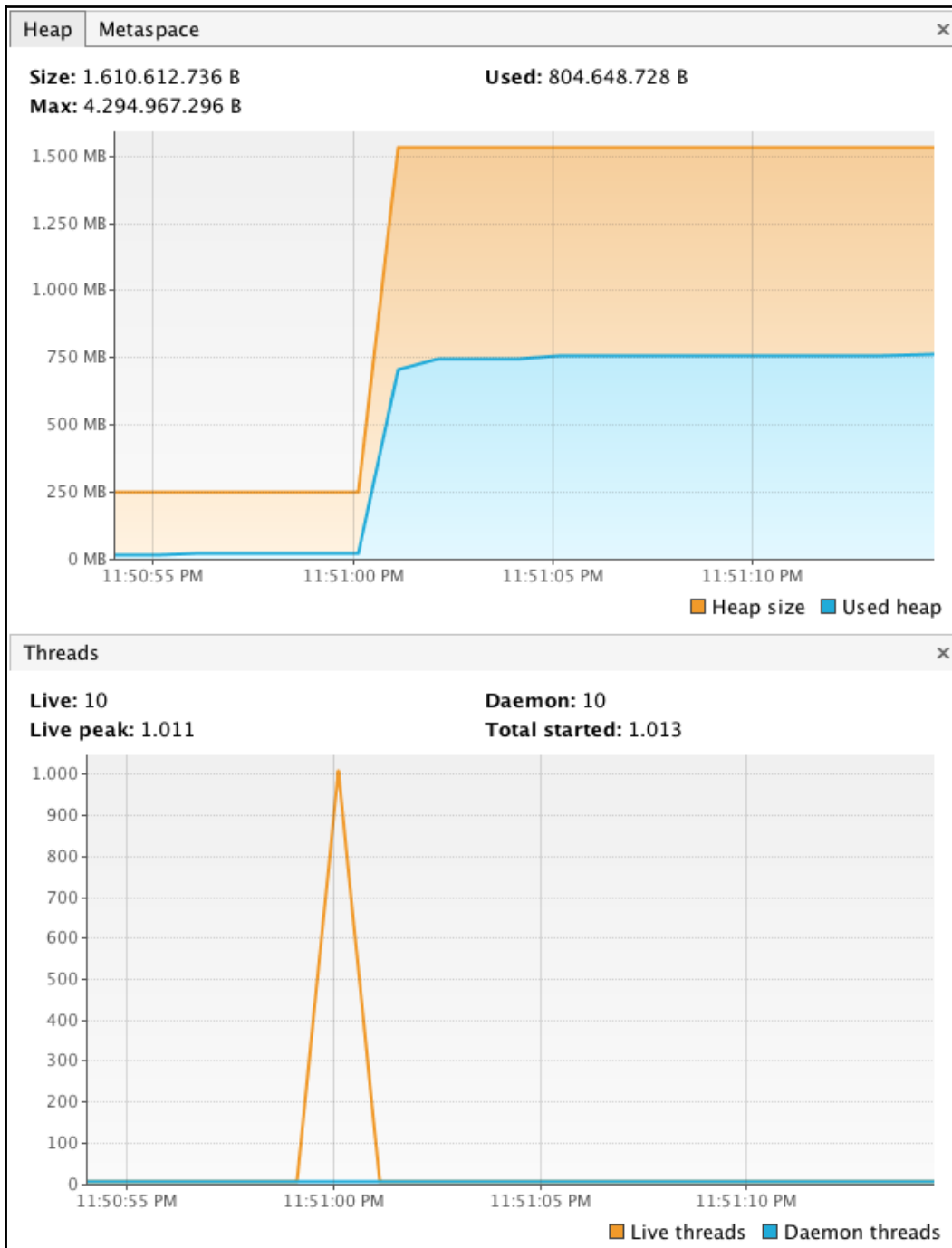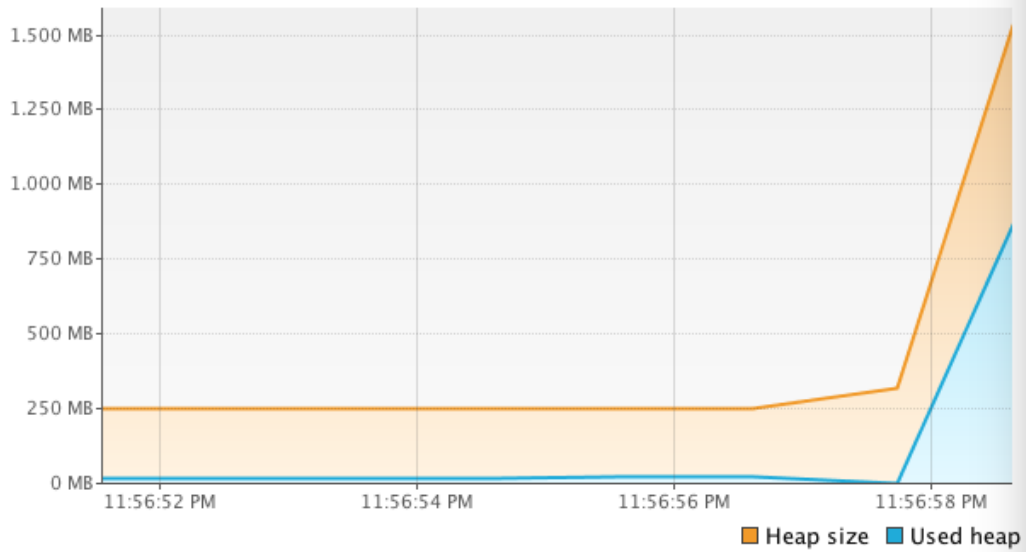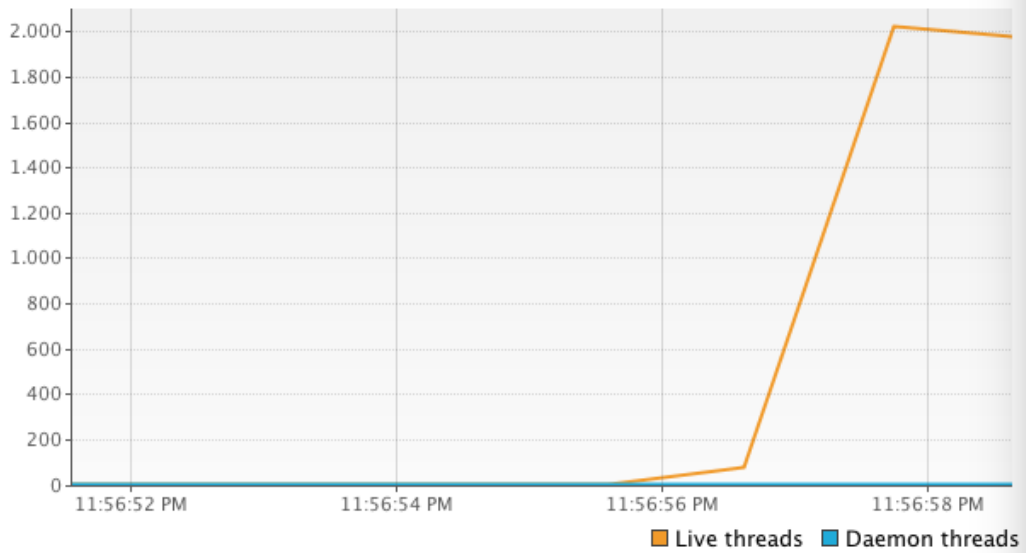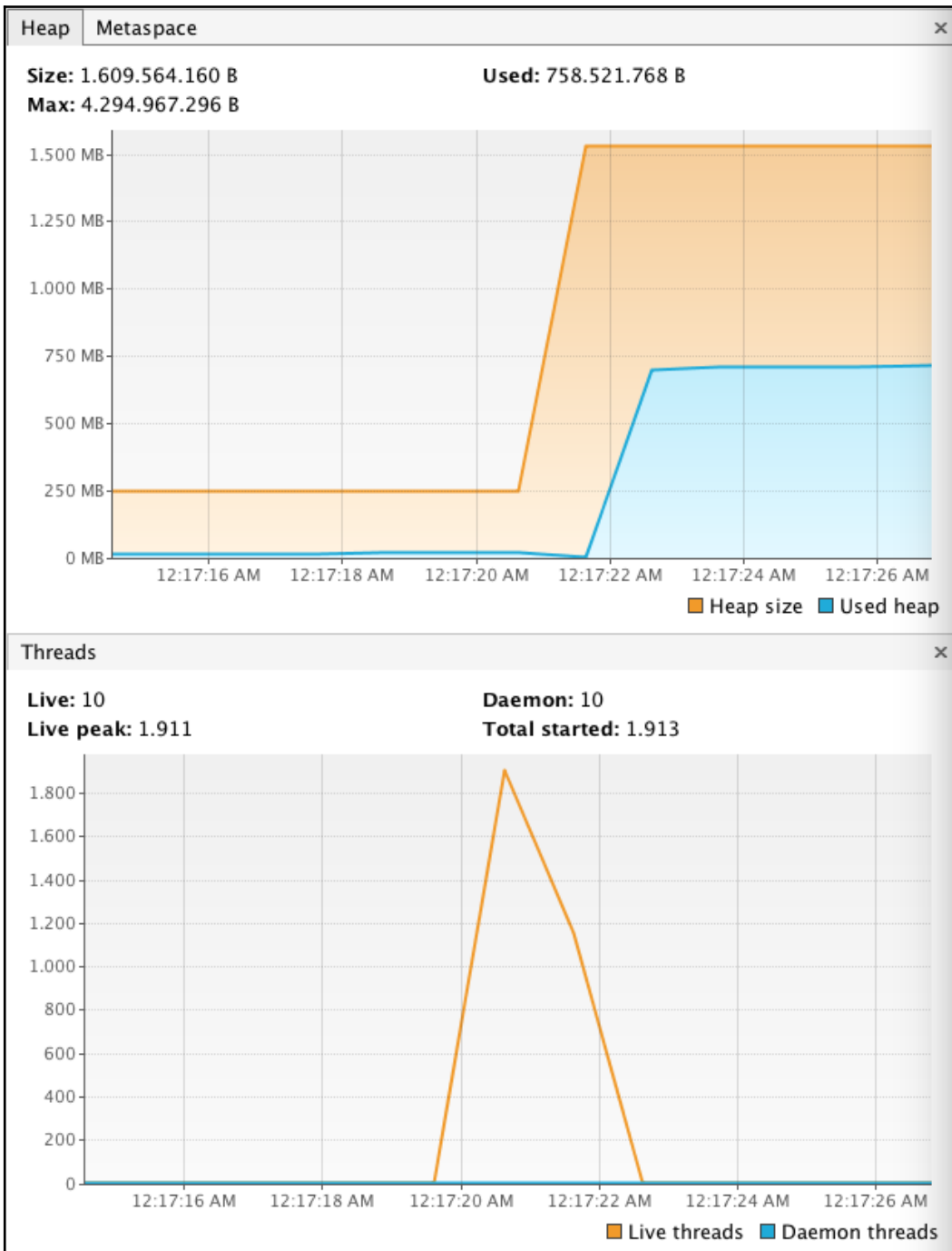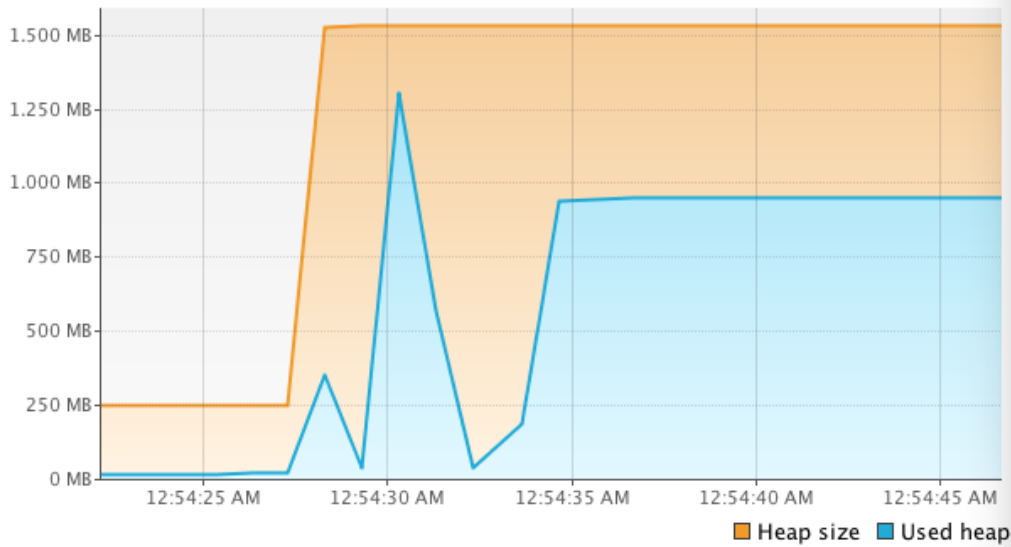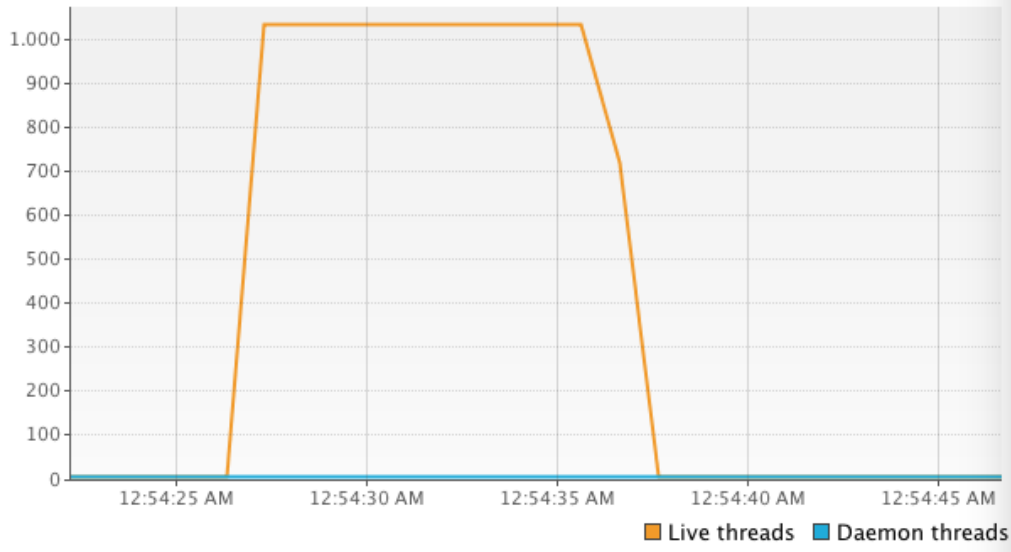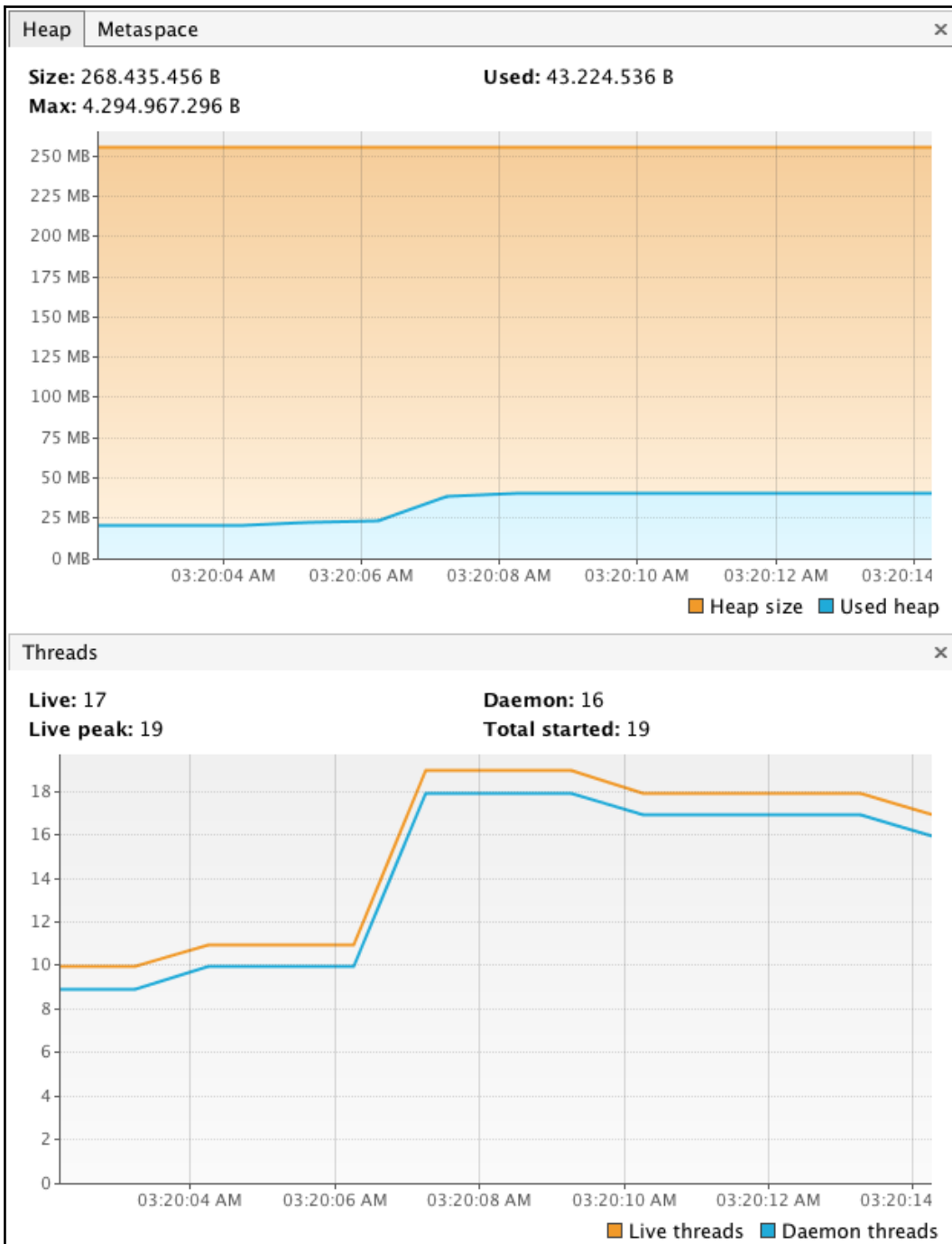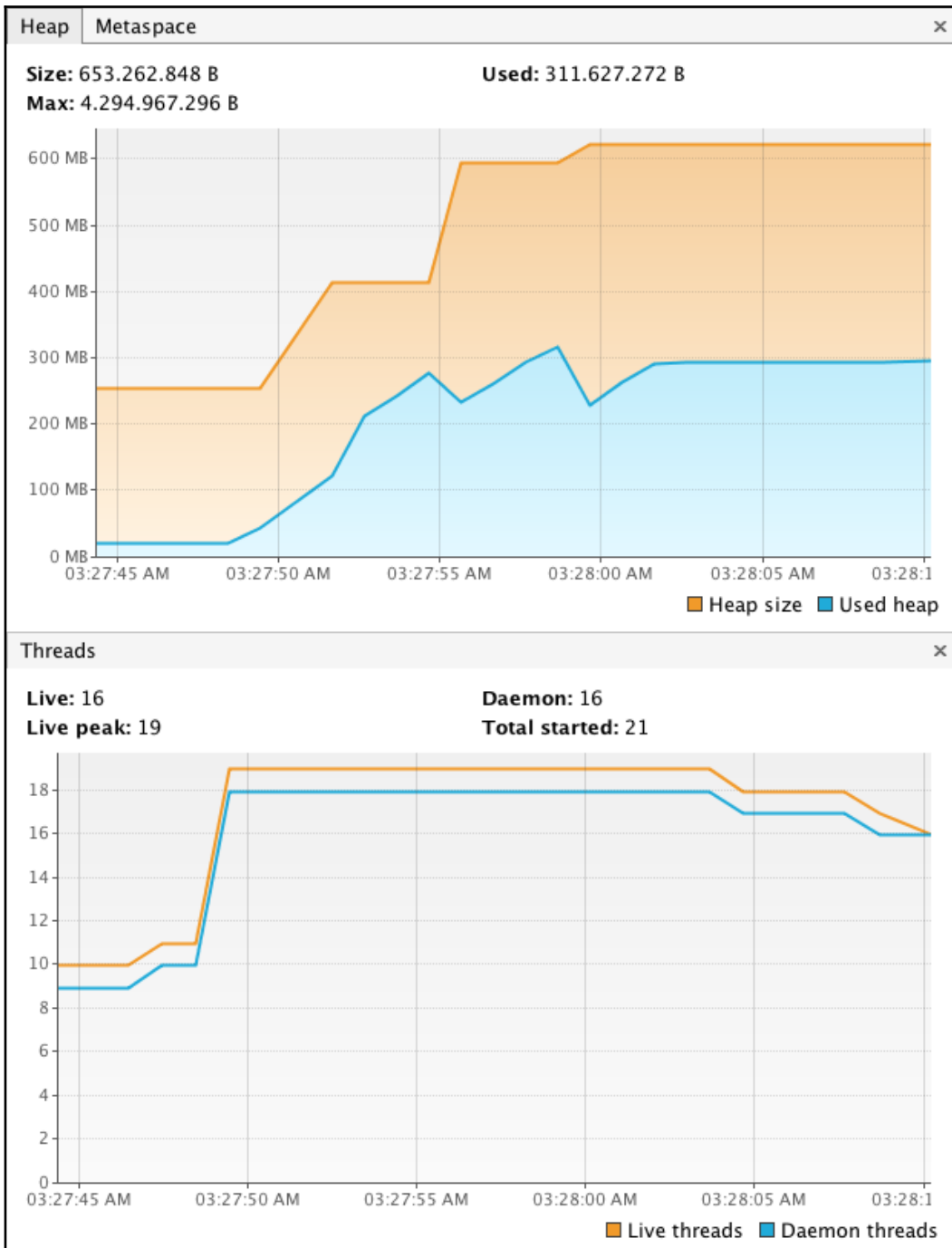
Chapter 8: Collections and Data Operations in Kotlin

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Item 1
Item 2
Item 3
Item 4
Item 5
Item 6
Item 7
Item 8
Item 9
Item 10


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
emptyList1.size = 0
emptyList2.size = 0


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
for1 item 1
for1 item 2
for1 item 4
-----Adding Items-----
for2 item 1
for2 item 2
for2 item 3
for2 item 4
for2 item 5
for2 item 6


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
set [1, 2, 3]
set [1, 2, 3, 4, 5, 6]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Printing items of dataClassSet one by one
MyDataClass(someNumericValue=1, someStringValue=1st obj)
MyDataClass(someNumericValue=2, someStringValue=2nd obj)
MyDataClass(someNumericValue=3, someStringValue=3rd obj)
MyDataClass(someNumericValue=4, someStringValue=4th obj)
MyDataClass(someNumericValue=5, someStringValue=5th obj)
MyDataClass(someNumericValue=2, someStringValue=will be
 added)
Printing items of customClassSet one by one true
MyCustomClass(someNumericValue=1, someStringValue=1st obj)
MyCustomClass(someNumericValue=2, someStringValue=2nd obj)
MyCustomClass(someNumericValue=3, someStringValue=3rd obj)
MyCustomClass(someNumericValue=4, someStringValue=4th obj)
MyCustomClass(someNumericValue=5, someStringValue=5th obj)


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
The value at Key `Four` is 4
Contents in map
Key One, Value 1
Key Two, Value 2
Key Three, Value 3
Key Four, Value 4
Key Five, Value 5
Key Six, Value 6
Replacing value at key 1 - Item 1
Contents in mutableMap
Key 1, Value Item 5
Key 2, Value Item 2
Key 3, Value Item 3
Key 4, Value Item 4


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
modifiedList -> [2, 4, 6, 8, 10, 12, 14, 16, 18, 20]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
filteredListEven -> [2, 4, 6, 8, 10, 12, 14, 16,
 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40,
 42, 44, 46, 48]
filteredListPSquare -> [1, 4, 9, 16, 25, 36, 49]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
flatMappedList -> [10, 11, 12, 20, 21, 22, 30, 31, 32]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
list.drop(25) -> [26, 27, 28, 29, 30, 31, 32, 33, 34,
 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47,
 48, 49]
list.dropLast(25) -> [1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
list.take(25) -> [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,
 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25]
list.takeLast(25) -> [25, 26, 27, 28, 29, 30, 31, 32,
 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45,
 46, 47, 48, 49]
list.takeWhile { it<=10 } -> [1, 2, 3, 4, 5, 6, 7, 8,
 9, 10]
list.takeLastWhile { it>=40 } -> [40, 41, 42, 43, 44,
 45, 46, 47, 48, 49]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java
[(1, Item 1), (2, Item 2), (3, Item 3),
 (4, Item 4), (5, Item 5)]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
list1.zip(list2)-> [(1, Item 1), (2, Item 2),
 (3, Item 3), (4, Item 4), (5, Item 5)]
list1.zipWithNext() -> [(1, 2), (2, 3), (3, 4),
 (4, 5), (5, 6), (6, 7), (7, 8)]

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
{1=[1, 6, 11, 16, 21, 26, 31, 36, 41, 46],
 2=[2, 7, 12, 17, 22, 27, 32, 37, 42, 47],
 3=[3, 8, 13, 18, 23, 28, 33, 38, 43, 48],
 4=[4, 9, 14, 19, 24, 29, 34, 39, 44, 49],
 0=[5, 10, 15, 20, 25, 30, 35, 40, 45, 50]}

Process finished with exit code 0
```

Chapter 9: Functional Programming and Reactive Programming

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
1
Two
3
Four
Five
5.5


Process finished with exit code 0
```
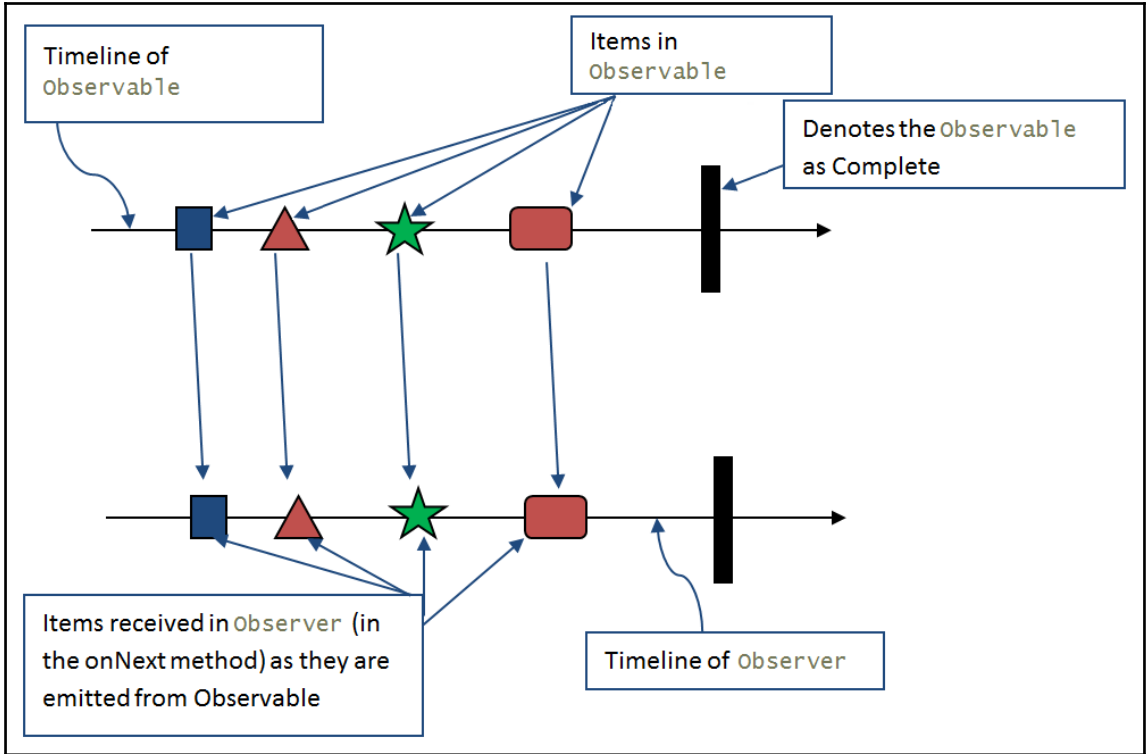
Timeline of Observable

Items in Observable

Denotes the Observable as Complete

Items received in Observer (in the onNext method) as they are emitted from Observable

Timeline of Observer

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Subscribed to io.reactivex.internal.operators.observable
 .ObservableFromIterable$FromIterableDisposable@759ebb3d
Next 1
Next Two
Next 3
Next Four
Next Five
Next 5.5
All Completed
Subscribed to io.reactivex.internal.operators.observable
 .ObservableFromArray$FromArrayDisposable@4cdf35a9
Next [One, 2, Three, Four, 4.5, Five, 6.0]
Next [List with 1 Item]
Next [1, 2, 3]
All Completed

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
New Subscription
Next Emitted 1
Next Emitted 2
Next Emitted 3
Next Emitted 4
All Completed
New Subscription
Next Emitted 1
Next Emitted 2
Error Occured => My Exception


Process finished with exit code 0
```

```
Subscription
Received-> Str 1
Received-> Str 2
Received-> Str 3
Received-> Str 4
Completed
Subscription
Received-> I'm From Callable
Completed
Subscription
Received-> I'm from Future
Completed


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Subscription
Received-> Str 1
Received-> Str 2
Received-> Str 3
Received-> Str 4
Completed


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Received 0
Received 1
Received 2
Received 3
Received 4
Received 5
Received 6
Received 7
Received 8
Received 9
Received 10
Disposed


Process finished with exit code 0
```

Chapter 11: Working with Streams in Kotlin

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
[6, 7, 8, 9, 10]
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Item 1.5
Item 1.9500000000000002
Item 2.535
Item 3.2955
Item 4.28415
Item 5.569395000000001
Item 7.240213500000001
Item 9.412277550000002
Item 12.235960815000004
Item 15.906749059500006
Average of 10 Items OptionalDouble[6.392924592450002]

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
The Stream is [Item 1, Item 2, Item 3, Item 4, Item 5, Item 6, Item 7, Item 8, Item 9, Item 10]

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Item is Optional.empty


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
Items in Stream = [Item 1, 2, Item 3, 4, 5.0, Item 6]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
resultantList = [10, 2, 10, 9, 8, 17, 14, 2, 7, 13]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
resultantSet [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]


Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
resultantMap = {0=0, 1=1, 2=4, 3=9, 4=16, 5=25, 6=36, 7=49, 8=64, 9=81, 10=100}

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java" ...
resultantString Starts Here=>Item 1 - Item 2 - Item 3 - Item 4 - Item 5 - Item 6<=Ends Here

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk1.8.0_131\bin
resultantSet {0=[5, 10, 15, 20],
 1=[1, 6, 11, 16], 2=[2, 7, 12, 17],
 3=[3, 8, 13, 18], 4=[4, 9, 14, 19]}


Process finished with exit code 0
```

Chapter 14: Kotlin's Quick Start

Examples
  Hello, world!
    Simplest version
      Simplest version.kt
    Reading a name from t...
    Reading many names f...
    A multi-language Hello
    An object-oriented Hello

Save   Save as   Arguments   JVM   Run

Program arguments

```kotlin
/**
 * We declare a package-level function main which returns Unit and takes
 * an Array of strings as a parameter. Note that semicolons are optional.
 */

fun main(args: Array<String>) {
    println("Hello, world!")
}
```

```kotlin
fun main(args: Array<String>) {
    println("Hello, World!")
}
```

IntelliJ IDEA

Version 2018.1 EAP (181.3494.3)

NEW **Create New Project**

Import Project

Open

Check out from Version Control ▾

⚙ Configure ▾   Get Help ▾

Open Project

build.gradle is a project file.
Would you like to open this project?

OPEN AS FILE   **CANCEL**   **OPEN AS PROJECT**

Gradle project: ~/IdeaProjects/KotlinProjects/FunctionalKotlin/Appendix/gradle   ...

☐ Use auto-import

☐ Create directories for empty content roots automatically

Group modules: ◉ using explicit module groups   ○ using qualified names

☑ Create separate module per source set

◉ Use default gradle wrapper (recommended)

○ Use gradle 'wrapper' task configuration   ⓘ Gradle wrapper customization in build script

○ Use local gradle distribution

Gradle home: /Users/mario/.sdkman/candidates/gradle/current   ...

Gradle JVM: ☕ Use Project JDK (java version "1.8.0_111", path: /Library/Java/JavaVirtual...k1.8.0_111.jdk/Contents/Home) ▼ ...

Project format: .idea (directory based)   ▼

> Global Gradle settings

HELP   CANCEL   OK

gradle › src › main › kotlin › com › packtpub › appendix › hello.kt

Project

hello.kt ×

gradle ~/IdeaProjects/KotlinProjects/Funct
> .gradle
> .idea
> build
> gradle
∨ src
  ∨ main
    ∨ kotlin
      ∨ com.packtpub.appendix
        hello.kt
  build.gradle
  gradle.iml
  gradlew
  gradlew.bat
> External Libraries
> Scratches and Consoles

```kotlin
1  package com.packtpub.appendix
2
3  fun main(args: Array<String>) {
4      println("Hello, World!")
5  }
```

Unregistered VCS root detected: The directory /Users/mario/IdeaProjects/KotlinProjects/FunctionalKotli... (2 minutes ago)   5:38 LF÷ UTF-8÷   877 of 3995M

Kotlin Koans › Introduction › Hello, world! › Task.kt

> Examples
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  ⊿ Introduction
    Hello, world!
    Task.kt
    Test.kt
    Java to Kotlin conversion
    Named arguments
    Default arguments
    Lambdas

Save   Save as   Arguments   JUnit   Run

Program arguments

Simple Functions

Take a look at function syntax and make the function `start` return the string `"OK"`.

In the tasks the function `TODO()` is used that throws an exception. Your job during the koans will be to replace this function invocation with a meaningful code according to the problem.

Check   Revert   Show answer

```kotlin
1  fun start(): String = TODO()
```