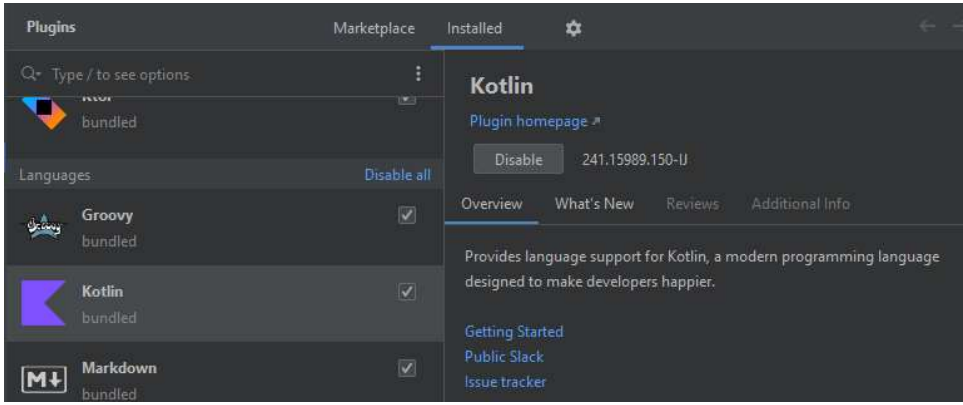
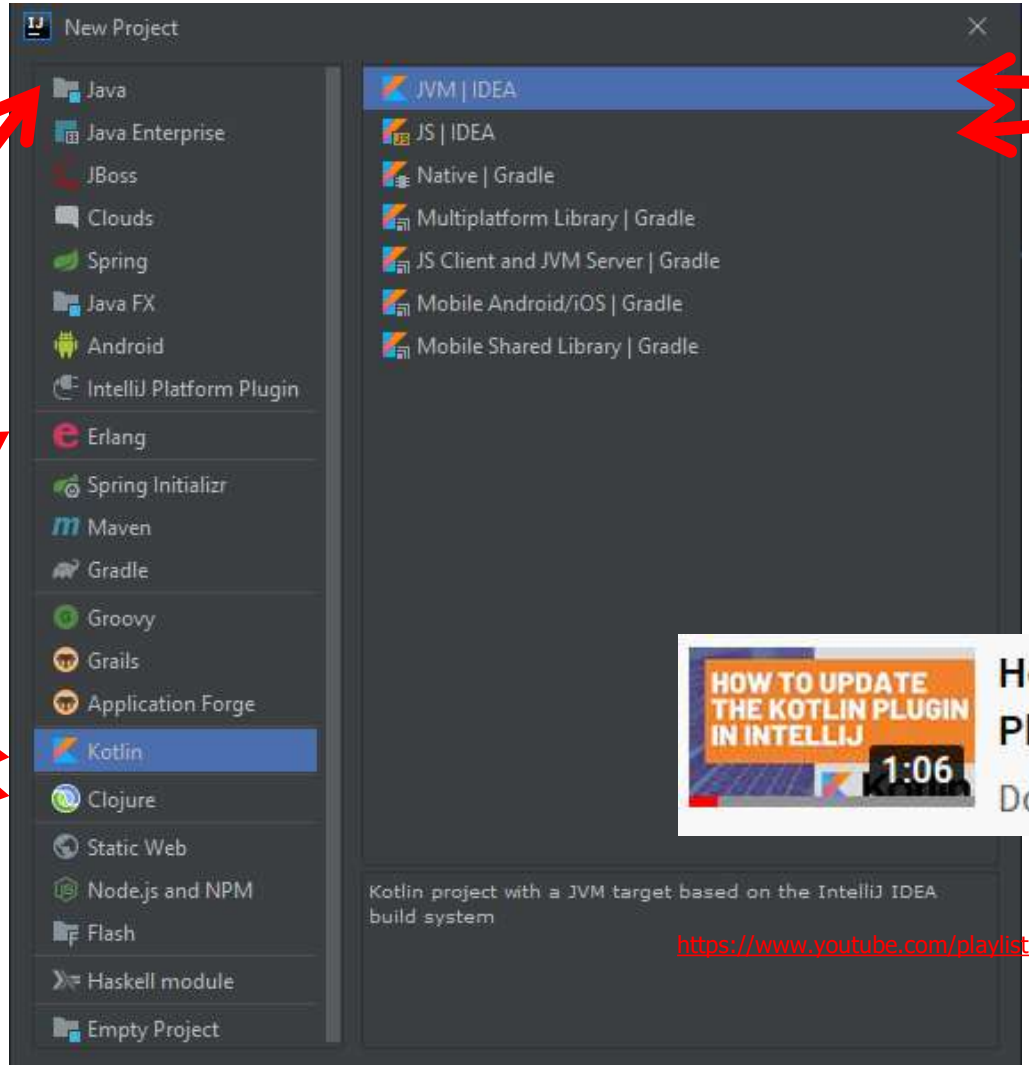
Kotlin



Peter Borovanský, KAI, I-18, borovan(a)ii.fmph.uniba.sk



Kotlin Plugin in IntelliJ

File/Settings/Plugins MarketPlace/Kotlin

Plugin od JetBrains

How to Update the Kotlin Plugin in IntelliJ

Donn Felker - Freelancing for ...

https://www.youtube.com/playlist?list=PLVUm4IewkTXqwzuRXZisWg7shMTiQhUtz

Kotlin

Modern Android development with Kotlin (September 2017) Part 1

It is really hard to find one project that covers all the things that are new in Android Development, so I decided to write one. In this article we will use the following:

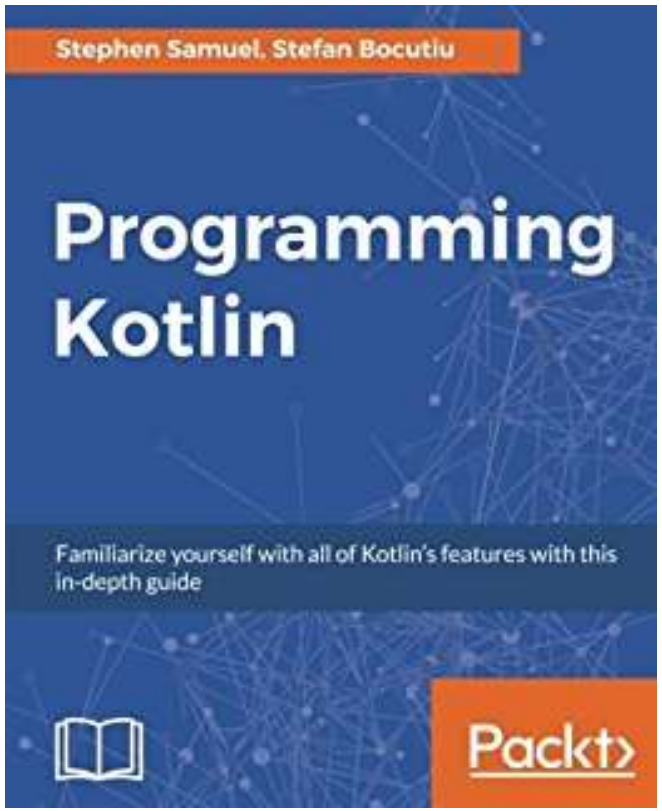
Rýchly nadhľad nad vlastnosťami jazyka Kotlin, dotyk s prvými aplikáciami

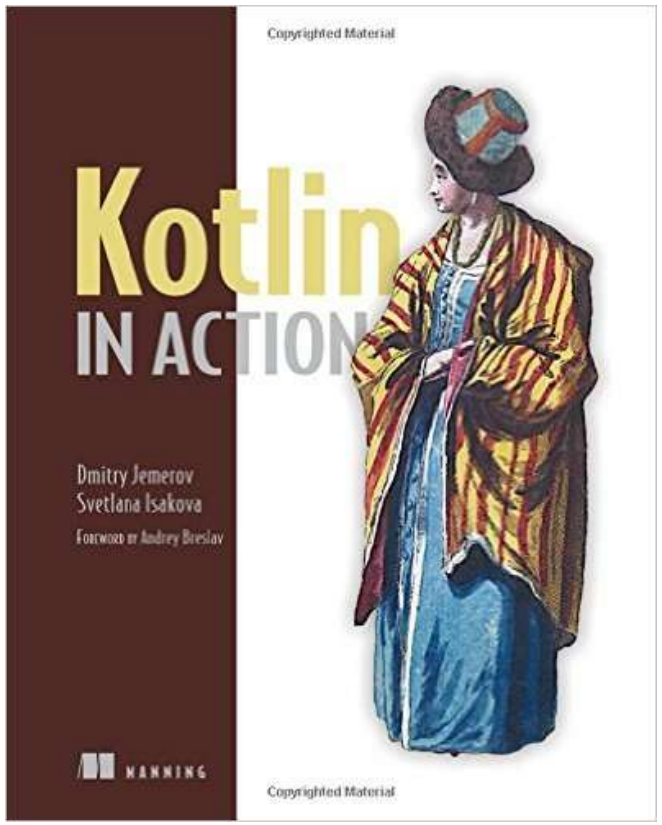
https://proandroiddev.com/modern-android-development-with-kotlin-september-2017-part-1-f976483f7bd6
https://proandroiddev.com/modern-android-development-with-kotlin-september-2017-part-2-17444fcdbe86

Literatúra

serióznejšie čítanie

- Kotlin in Action
  https://www.manning.com/books/kotlin-in-action
- Programming in Kotlin
  https://www.packtpub.com/application-development/programming-kotlin

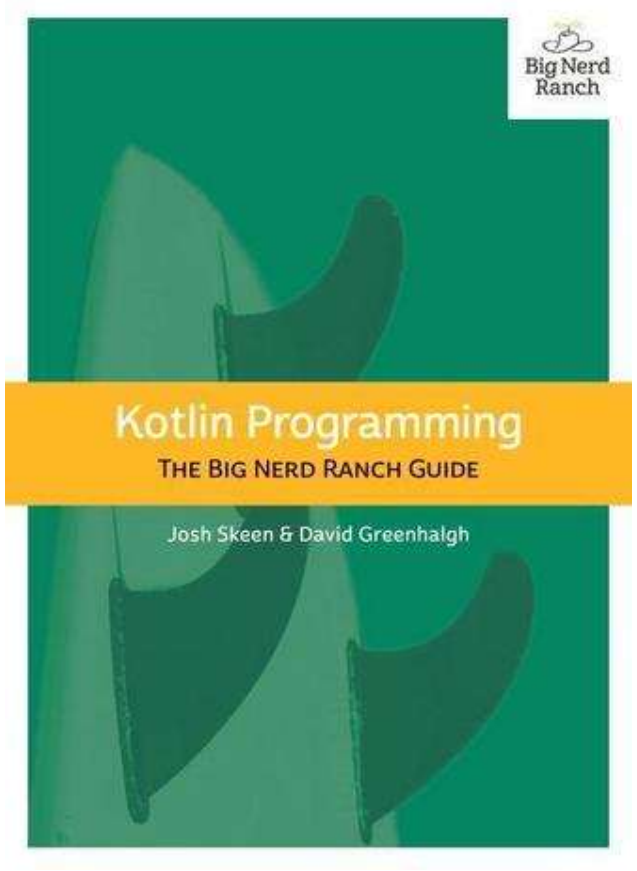


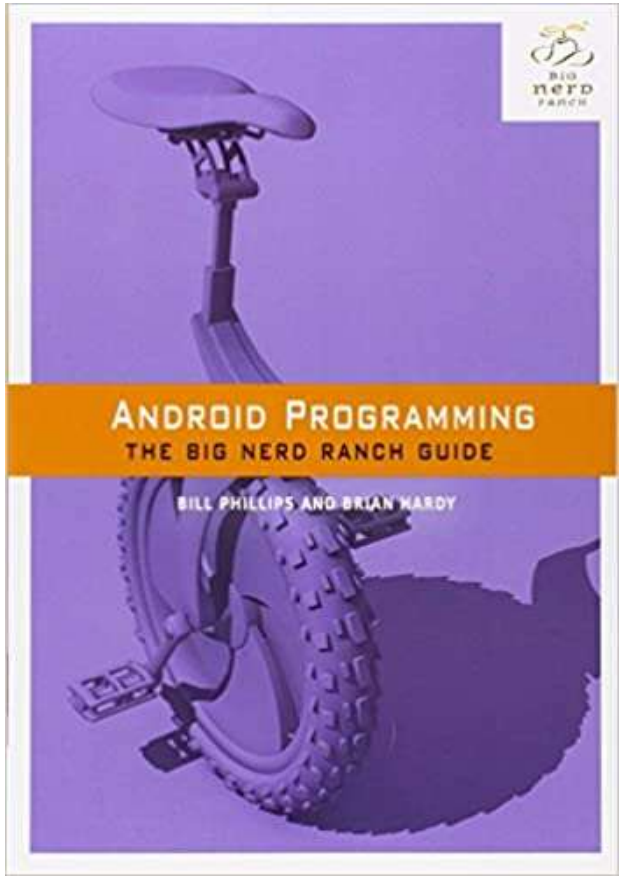


Literatúra

for nerds

- Kotlin Programming – The Big Nerd Ranch Guide
  https://www.amazon.com/Kotlin-Programming-Nerd-Ranch-Guide/dp/0135161630
- Android Programming: The Big Nerd Ranch Guide (4th Edition)
  https://www.bignerdranch.com/books/android-programming-the-big-nerd-ranch-guide-4th/



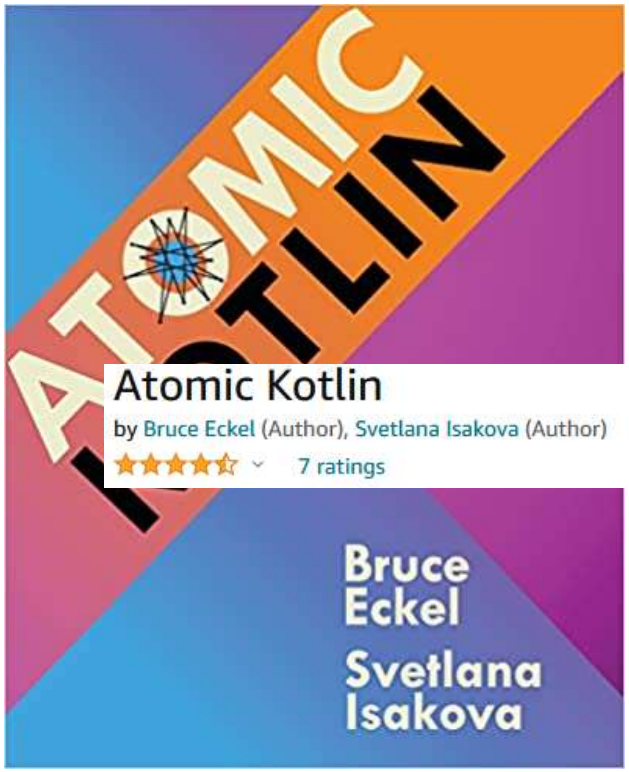


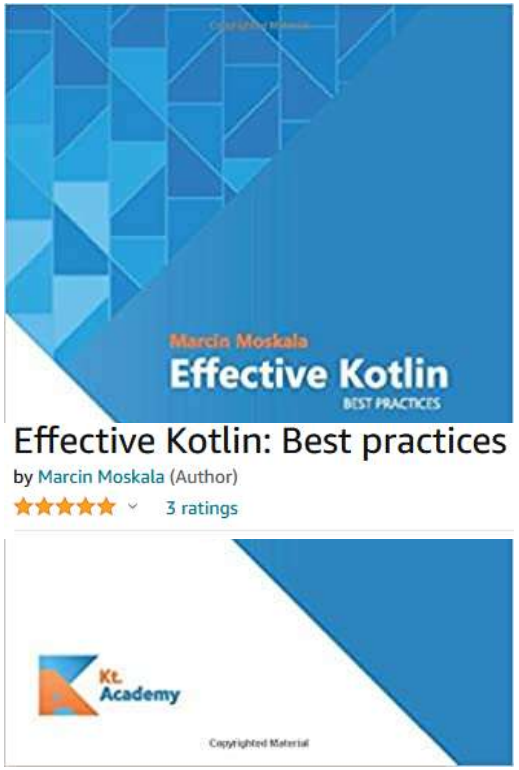
Literatúra

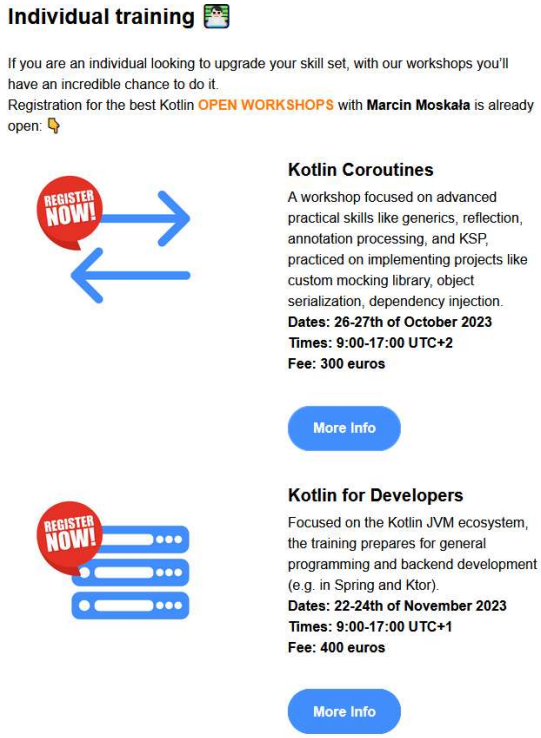
nežný úvod

Bruce Eckel, Svetlana Isakova: Atomic Kotlin - ideálne pre začiatočníkov
https://www.amazon.com/Atomic-Kotlin-Bruce-Eckel/dp/0981872557

Marcin Moskala: Effective Kotlin – Best Practices - ideálne pre pokročilejších
https://www.amazon.com/Effective-Kotlin-practices-Marcin-Moskala/dp/8395452837



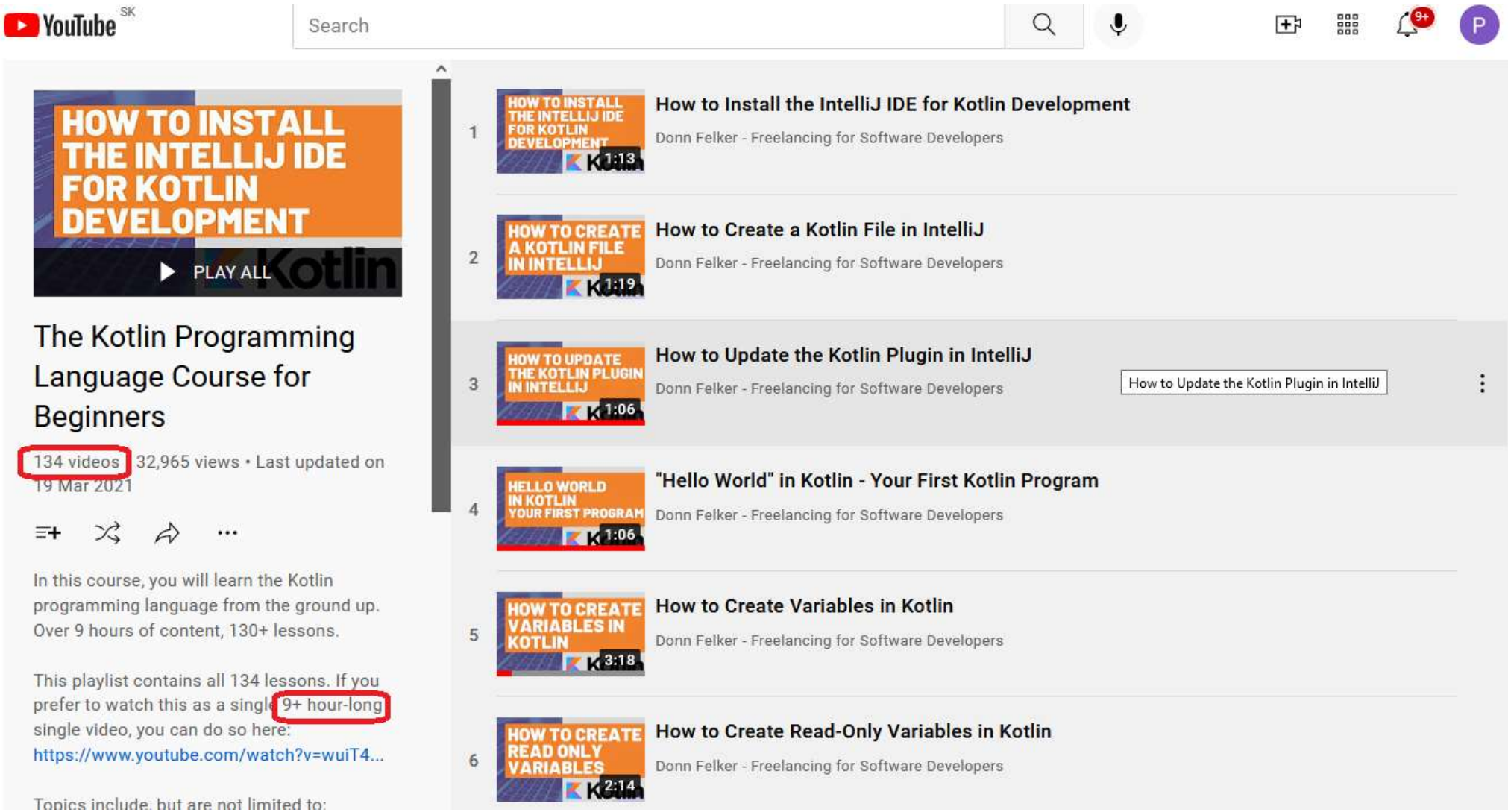




Literatúra

ideálne pre „youtuberov“

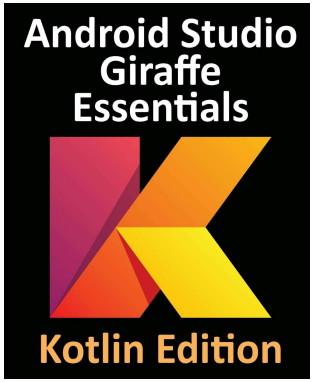
https://www.youtube.com/playlist?list=PLVUm4IewkTXqwzuRXZisWg7shM



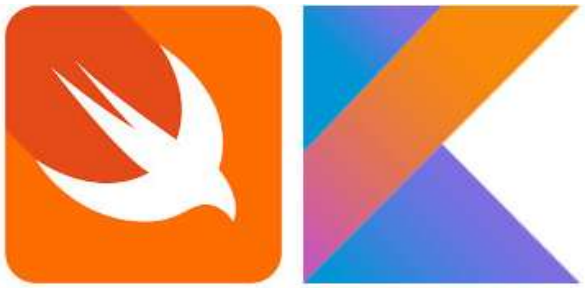
Android Stu Essentials -

Developing Android Apps Using Android Studio 2022.3.1 and Kotlin,

Neil Smyth



Kotlin vs. Swift



Swift is like Kotlin

- https://kotlinlang.org/ Kotlin Playground (https://play.kotlinlang.org/)
- Swift is like Kotlin (http://nilhcem.com/swift-is-like-kotlin/)

Swift

```
print("Hello, world!")
```

Kotlin

```
println("Hello, world!")
```

prekladový slovník pre iOSákov

Constants

Swift

```
var myVariable = 42
myVariable = 50
let myConstant = 42
```

Kotlin

```
var myVariable = 42
myVariable = 50
val myConstant = 42
```

Kotlin Playground

https://play.kotlinlang.org/

https://try.kotl.in/#/Kotlin in Action/Chapter 2/2.1/1_HelloWorld.kt

prog5 | Log out

Kotlin in Action › Chapter 2 › 2.1 › 1_HelloWorld.kt

- Examples
- Kotlin Koans 2/42
- Kotlin in Action
  - Chapter 1
  - Chapter 2
    - 2.1
      - 1_HelloWorld.kt
      - 2_Functions.kt
      - 4_1_StringTemplate...
      - 4_2_StringTemplate...

Save | Save as | Arguments

Program arguments

```
1  package ch02.ex1_1_HelloWorld
2
3  fun main(args: Array<String>) {
4      println("Hello, world!")
5  }
6
```

prog5 | Log out

Kotlin Koans › Collections › GroupB

- Examples
- Kotlin Koans 22/42
  - Introduction
  - Conventions
  - Collections
    - Introduction
    - Filter map
    - All Any and other predi...
    - FlatMap
    - Max min
    - Sort
    - Sum
    - GroupBy

Cvičenie - 1

Pošli screenshot s Koans, dostaneš Math.floor(3*% /100)

Čo sa naučíte na play.kotlinlang.org

Kotlin

Progress:30%

- Introduction
  - ✓ Hello, world!
  - ✓ Named arguments
  - ✓ Default arguments
  - ✓ Lambdas
  - ✓ Strings
  - ✓ Data classes
  - ✓ Nullable types
  - ✓ Smart casts
  - ✓ Extension functions
  - ✓ Object expressions
  - ✓ SAM conversions
  - ✓ Extensions on collecti

Kotlin

Progress:48%

- ▸ Introduction
- ▾ Conventions
  - ✓ Comparison
  - ✓ In range
  - ✓ Range to
  - ✓ For loop
  - ✓ Operators overloading
  - ✓ Destructuring declarat
  - ✓ Invoke

Kotlin

Progress:78%

- ▸ Introduction
- ▸ Conventions
- ▾ Collections
  - ✓ Introduction
  - ✓ Filter map
  - ✓ All Any and other predicates
  - ✓ FlatMap
  - ✓ Max min
  - ✓ Sort
  - ✓ Sum
  - ✓ GroupBy
  - ✓ Partition
  - ✓ Fold
  - ✓ Compound tasks
  - ✓ Get used to new style
    - TestShop.kt
    - Shop.kt

https://play.kotlinlang.org/koans/

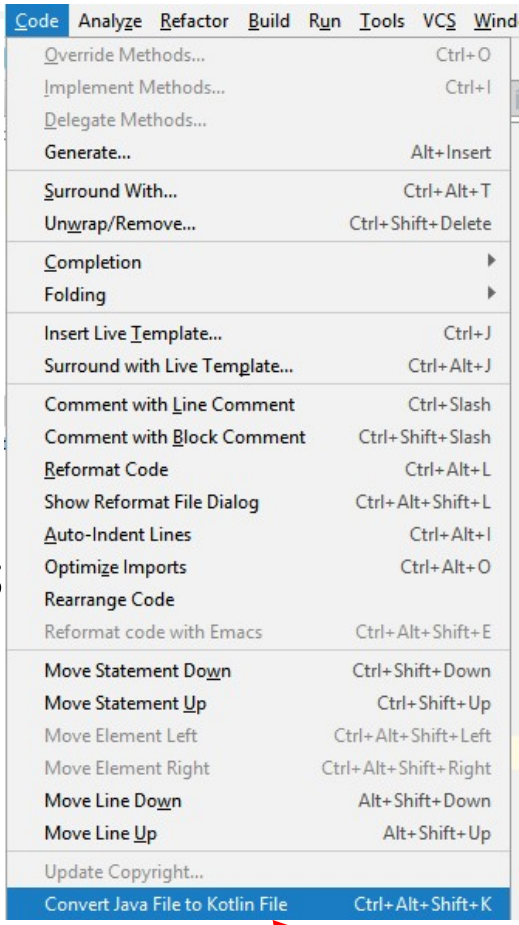
Cvičenie - 1

Pošli screenshot s Koans, dostaneš Math.floor(3*% /100)

Java -> Kotlin

„klasický" Java kód pre Fibonacciho s memoizáciou

```
public class Fib {
    static Integer[] table = new Integer[100];
    private static int fib(int n) {
        Integer result = table[n];
        if (result == null) {
            if (n < 2)
                result = 1;
            else
                result = fib(n - 2) + fib(n - 1);
            table[n] = result;
        }
        return result;
    }
    public static void main(String[] args) {
        for(int i = 0; i<20; i++)
            System.out.println("fib(" + i + ")=" + fib(i));
    }
}
```



Automatická konverzia do Kotlinu

Java -> Kotlin

výsledok automatickej konverzie

Čo nás prekvapilo

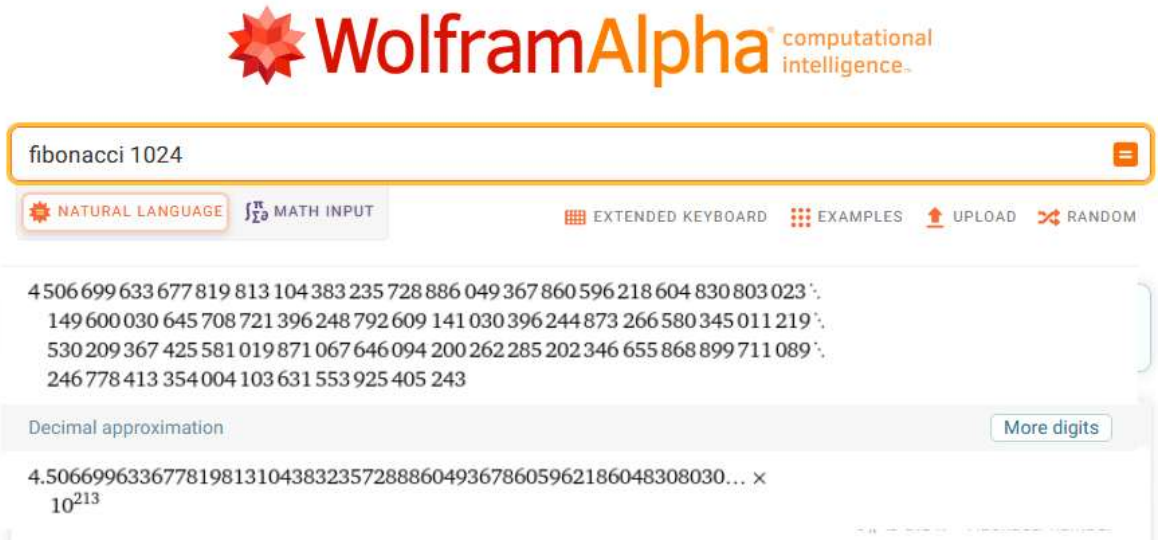
```
object fib {
    internal var table = arrayOfNulls<Int>(100)
    private fun fib(n: Int): Int {
        var result: Int? = table[n]
        if (result == null) {
            if (n < 2)
                result = 1
            else
                result = fib(n - 2) + fib(n - 1)
            table[n] = result
        }
        return result
    }
    @JvmStatic fun main(args: Array<String>) {
        for (i in 0..19)
            println("fib(" + i + ")=" + fib(i))
    }
}
```

Už nenájdete pôvodný zdroják

DÚ podobne vygenerované sa neuznajú

Kotlinish verzia

```
import java.math.BigInteger

val table = mutableMapOf<Int, BigInteger>()   // HashMap

fun fib(n: Int): BigInteger = table.getOrPut(n) {
    if (n <= 2)
        BigInteger.ONE
    else
        fib(n - 1) + fib(n - 2)
}

fun main() {
    println(fib(1024))
}
```



https://www.wolframalpha.com/input/?i=fibonacci+1024

if je výraz

- **if** je výraz

```
fun binCifSum(n : Int) : Int =
    if (n <= 0) 0
    else binCifSum(n/2) + if (n % 2 == 0) 0 else 1
     else binCifSum(n/2) + (n % 2 == 0)


fun binCifSumClassic(n : Int) : Int {
    if (n <= 0) return 0
    else if (n % 2 == 0) return binCifSumClassic(n / 2)
    else return 1 + binCifSumClassic(n / 2)
}


fun main(args:Array<String>) : Unit {
    for (n in 0..10)
        println("binCifSum $n je ${binCifSum(n)}")
}
```

0.kt

when je switch, tiež je to výraz

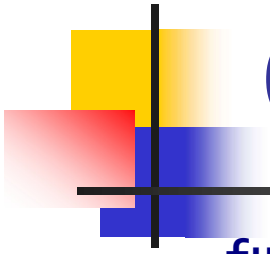
```
val kategoria =
        if (vek < 6) "predskolsky"
        else if (vek <= 11) "1.stupen"
        else if (vek <= 18) "2.stupen"
        else "mimo"
val kategoria1 =
        when (vek) {
            in 0..5 -> "predskolsky"
            in 5..11 -> "1.stupen"
            in 12..18 -> "2.stupen"
            else -> "mimo"
        }
var kategoria2 = "mimo"
when (vek) {
      in 0..5 -> kategoria2 = "predskolsky"
      in 5..11 -> kategoria2 = "1.stupen"
      in 12..18 -> kategoria2 = "2.stupen“
}
```

0.kt

For/foreach cyklus

```
for (x in 1..10) println(x)                    // 1, 2, …, 10
for (x in (1..10).toList()) println(x)         // 1, 2, …, 10
for (x in (10 downTo 1).toList()) println(x) // 10, 9, …, 1
for (x in 10 downTo 1) println(x)              // 10, 9, …, 1
for (x in 1 until 10) println(x)               // 1, 2, …, 9
for (x in 1 until 10 step 2) println(x)        // 1, 3, 5, 7, 9
for (x in listOf(2,3,5,7,11,13)) println(x)

for (x in 'a'..'z') println(x)                 // a, b, …, z
for ((index, value) in ('a'..'z').withIndex())
   println("[$index]=$value")                  // [0]=a, [1]=b,…

val map=mapOf(1 to "gula",2 to "zelen",3 to "zalud",4 to"srdce")
for ((key, value) in map) println("[$key]=$value")
                    // [1]=gula, [2]=zelen, [3]=zalud, [4]=srdce
```

0.kt



Cykly

```
fun main(args: Array<String>) {
    for(a in args)
        print("$a, ")

    for (c in 'A'..'F’)
         println(Integer.toBinaryString(c.code()))

    for (c in ' '..'z')
         if (c in 'a'..'z' || c in 'A'..'Z')
                 print(c)

    for (c in ' '..'z’)
         when (c) {
                 in '0'..'9' -> println("digit")
                 in 'a'..'z', in 'A'..'Z' -> println("letter")
         }
}
```

7.kt

Operátory porovnania

- podobne ako Java `<=, <, >=, >, !=`

ale

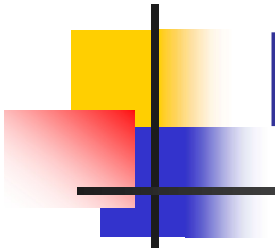
`==` je porovnanie hodnôt

`===` je porovnanie referencií

```
val a = "kot"
val b = "lin"
val c = (a+b).trim()
val d = "kotlin"
println("c==d ${c==d}, c===d ${c===d}")
```

```
c==d true, c===d false
```

0.kt



Kolekcie

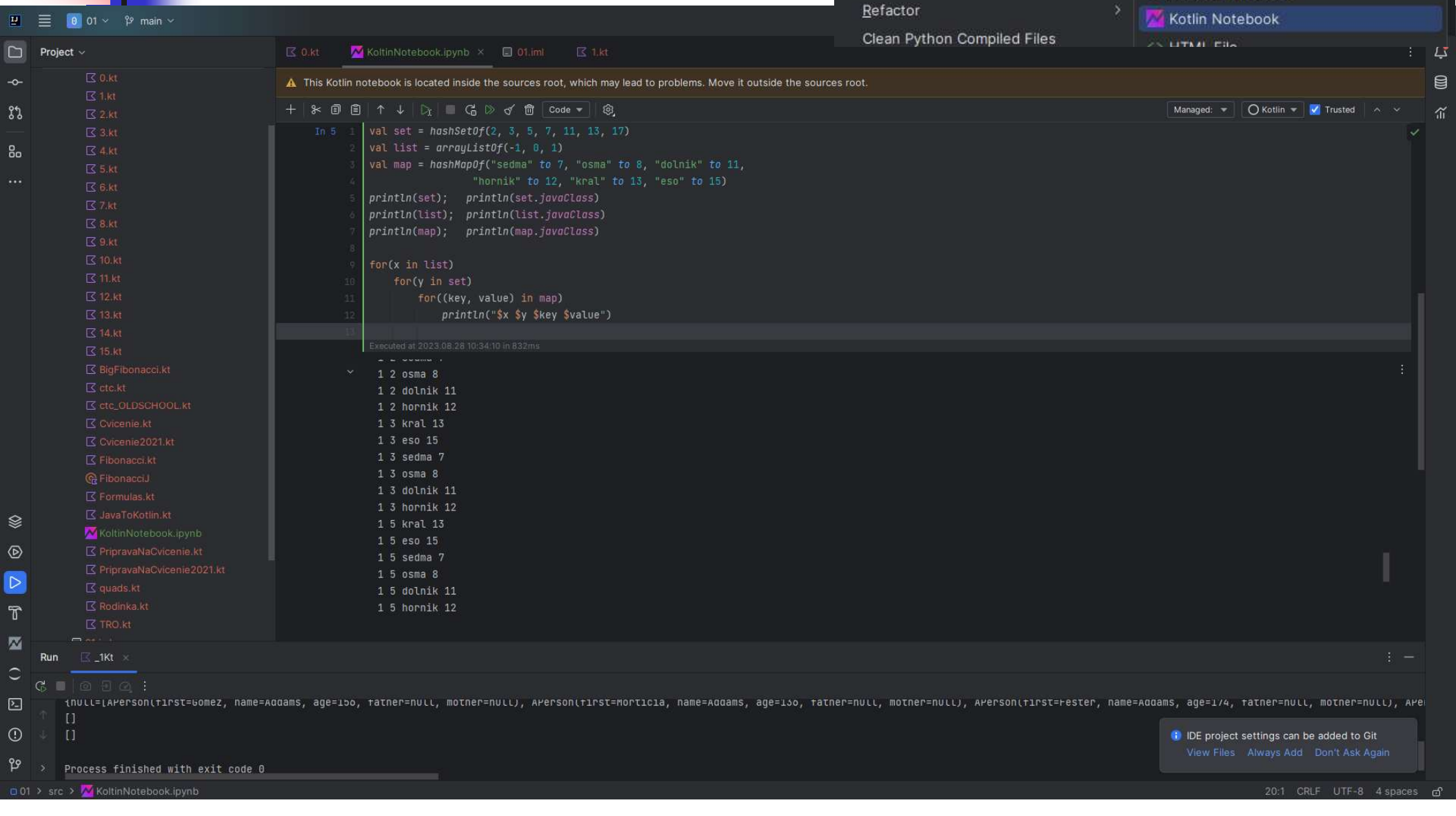
```
val set = hashSetOf(2, 3, 5, 7, 11, 13, 17)
val list = arrayListOf(-1, 0, 1)
val map = hashMapOf("sedma" to 7, "osma" to 8, "dolnik" to 11,
                    "hornik" to 12, "kral" to 13, "eso" to 15)

println(set)   println(set.javaClass)
println(list)  println(list.javaClass)
println(map)   println(map.javaClass)
```

```
[17, 2, 3, 5, 7, 11, 13]
class java.util.HashSet
[-1, 0, 1]
class java.util.ArrayList
{kral=13, eso=15, sedma=7, osma=8,
 dolnik=11, hornik=12}
class java.util.HashMap
```

```
for(x in list)                          // cyklus cez list
   for(y in set)                        // cyklus cez set
      for((key, value) in map)          // cyklus cez map
          println("$x $y $key $value")
```

8.kt

Kotlin Notebook



Číselné funkcie, String template

```
fun fib(n: Int): Int {
        return if (n < 2) 1 else fib(n-1) + fib(n-2)
}
fun fib1(n: Int): Int {
    fun fib(n: Int, a : Int = 0, b : Int = 1): Int {
        return if (n < 0) a else fib(n-1, b, a+b)
    }
    return fib(n)
}
fun main(args: Array<String>) {
    val lst = listOf(1,2,3,4,5,6,7,8,9,10)
    println(lst.map { n -> fib(n) })
    println(lst.map { fib1(it) })
    lst.forEach { println("fib($it) = ${fib1(it)}")}
    for(i in 1..11) println("fib($i) = ${fib1(i)}" )
    println("Maximum: ${lst.map { fib(it) }.max()}")
}
```

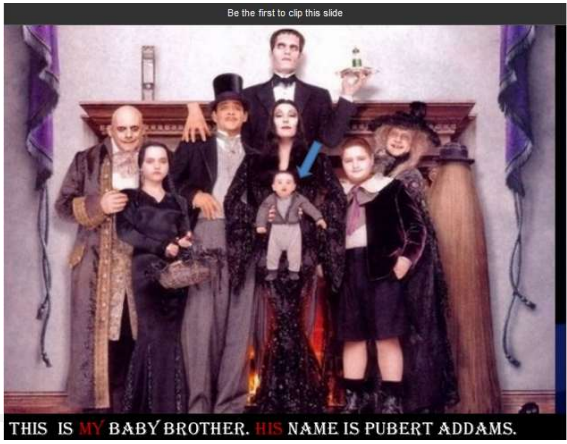
2.kt

Funkcie a `it`

```
val fcia = { x:Int, y : Int -> println("sucet $x+$y"); x+y}
val proc = { x:Int, y : Int -> println("sucet $x+$y")}

println(fcia(12,7))
proc(13,9)
println({ x:Int -> x+1 }(2))
; // inak neopochopí, že nejde o blok, ale lambda konštantu
{ x:Int -> println(x)}(4)
       // preto jasnejší zápis
run {{ x:Int -> println(x)}(4)}

val delta = 5
println(listOf(1,2,3)
                .map { it + delta}   // x -> x + delta, clojure
                .filter {it % 2 == 0} )
```

10.kt

Addams Kotlin family




```
data class Person(val first : String, val name: String,
                  val age: Int? = null,
                  val father : Person?, val mother : Person?)
```

Data class je class s predgenerovanými equals, hashCode, toString, copy

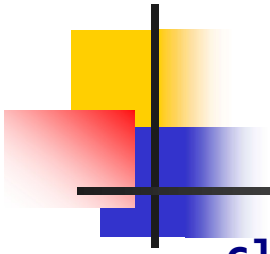
```
fun main(args: Array<String>) {
        val father = Person("Gomez", "Addams", 156, null, null)
        val mother = Person("Morticia", "Addams", 136, null, null)
        val daugther  = Person("Wednesday", "Addams", 46, father, mother)
        val son  = Person("Pugsley", "Addams", 36, father, mother)
        val family = listOf( father, mother, daugther, son,
              Person("Fester", "Addams", 174, null, null), // uncle
              Person("Pubert", "Addams", null, null, null) // on the picture
            )
        val oldest = family.maxBy { it.age ?: 0 }
        println("The oldest is: $oldest")
    }
```

1.kt

Funkcionály

```
println(family.map { it.first })  // mapToObj
println(family.filter { it.age?:0 > 100 } )
println(family.all { it.age?:0 < 100 } )
println(family.all { it.name == "Dracula" } )
println(family.groupBy { it.father } )
println(family.filter { it.age ==
    (family.maxBy { person: APerson -> person.age ?: 0 }.age?: 0) } )
println(family.filter { it.age ==
        (family.map { it.age?:0 }.max()) } )
Ak by .age bol Int, nie Int?
   it.age == family.maxBy { person: Person -> person.age }?:0 } )

val numbers = mapOf(0 to "zero", 1 to "one")
for((father, persons) in family.groupBy { it.father })
   println("${persons.size} ma otca $father")

println(listOf("a", "aba", "b", "ba", "abba").groupBy { it.length })
println(listOf("a", "aba", "b", "ba", "abba").flatMap { it.toList(
```

1.kt



Funkcie

```
class Book(val title: String, val authors: List<String>)
val books = listOf(
        Book("Action in Kotlin", listOf("Dmitry Jemerov", "Svetlana Isakova")),
        Book("Mort", listOf("Terry Pratchett")),
        Book("Good Omens", listOf("Terry Pratchett", "Neil Gaiman")),
        Book("Discworld", listOf("Terry Pratchett", "Paul Kidby")))
println(books.flatMap { it.authors }.toSet())

listOf(1, 2, 3, 4)
        .asSequence()
            .map { print("map($it) "); it * it }
            .filter { print("filter($it) "); it % 2 == 0 }
        .toList()

val nats = generateSequence(1) { it + 1 }
println(nats.takeWhile { it <= 100 }.sum())
println(nats.takeWhile { it <= 10 }.reduce({ x:Int, y : Int -> x*y}))
```

10.kt

Collection vs. sequence

```
val collection = (-100..100)
    .filter {it % 2 == 0}
    .map { it * 2 }
    .map { it/it }
    .take(10)
println(collection)
java.lang.ArithmeticException
```

```
val sequence = (-100..100)
    .asSequence()
    .filter {it % 2 == 0}
    .map { it * 2 }
    .map { it/it }
    .take(10)
println(sequence.toList())
[1, 1, 1, 1, 1, 1, 1, 1, 1, 1]
```

Kolekcie:

- vyhodnocujú sa dravo -eager
- každá transformácia sa aplikuje na celú kolekciu
- vytvorí sa nová kolekcia
- dobré pre neveľké kolekcie

Sekvencie:

- vyhodnocujú sa lenivo -lazy
- každá transformácia sa aplikuje element-po-elemente
- nevytvorí sa nová kolekcia
- vhodné pre veľké kolekcie