Coroutines 2 asynchrónnosť

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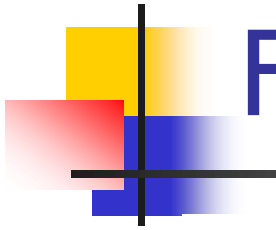
AsyncTask
Retrofit
RoomDB

Coroutines
- **channel**
- **flow**
- **Shared state**
  - **Atomická premenná**
  - **Prepínanie kontextov**
  - **mutex**

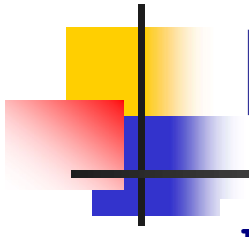


Flow

```
val numbers : Flow<Int> = flow {
    listOf(1,2,3,4,5,6,7,8,9,10).forEach{
        emit(it)
        delay(it*100L)
    }
}  // flow zaniká
runBlocking {
    numbers.collect {
        println(it)
    }
}
```

```
runBlocking {
    numbers
        .buffer
        .collect {
            println(it)
        }
}
```


```
listOf(1,2,3,4,5,6,7,8,9,10).asFlow()
flowOf(1,2,3,4,5,6,7,8,9,10)
```



Flow

Flow je niečo ako generátor v Pythone, lazy v Haskelli
Flow je typovaný, teda Flow<T>, resp. Flow<Int>

```
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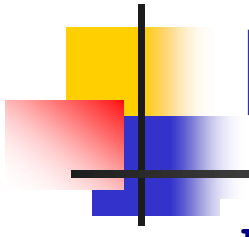
        }
    }
}
```

yield

```
18:57:57.132 1
18:57:57.244 2
18:57:57.444 3
18:57:57.756 4
18:57:58.165 5
18:57:58.672 6
18:57:59.284 7
18:57:59.994 8
18:58:00.796 9
18:58:01.704 10
```



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yield

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```

Flow

konštruktory

```
emit sám nič neurobí, kým si niekto nepýta hodnoty z Flow
.collect

fun main() {
    runBlocking {
        postupnost().collect {
            println("$it")
        }
    }
}
fun postupnost()
        = flowOf("Jeden", "Dva", "Tri", "Styri")
        = listOf(1, 2, 3).asFlow()
        = flow {
            for (i in 1..10)
              emit(i)
          }
```

Flow

take, takeWhile, map, filter, ...

```
Flow môže byť konečný alebo nekonečný (potenicálne)
Fun main() {
    runBlocking {
        println(„pred")
        aritmeticka(1,3).collect {
            println(it)
        }
        println(„po")
    }
}

fun aritmeticka(a : Int, delta : Int): Flow<Int> = flow {
    (0..9).forEach {
        delay(it * 100L)
        emit(a + it*delta)
    }
}0
```

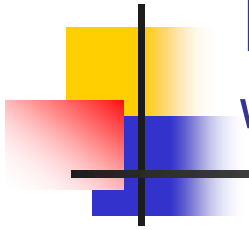
```
aritmeticka(1,3)
    .take(5)
    .takeWhile {it < 10}
    .collect {
    println(it)
}
```



```
var x = a
while (true) {
    delay(x * 100L)
    emit(x)
    x += delta
}
```

Flow

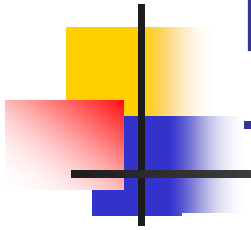
withTimeroutOrNull



```
fun main() {
    runBlocking {
        val flow = geometricka(1,2)
        println("pred")
        withTimeoutOrNull(1000L) {
            flow.collect { println(it) }
        }
        println("po")
}   }
fun geometricka(a : Int, q : Int) = flow {
    var x = 1
    (0..9).forEach {
        delay(400L)
        emit(a*x)
        x *= q
}   }
```

Flow

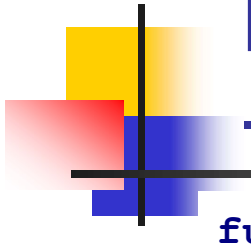
.onEach, .map, .filter, .reduce, .take, .zip, .combine, .flowOn



```
suspend fun combine() {
    val numbers = (1..5).asFlow().onEach { delay(300L) }
    val values = flowOf("One","Two","Three","Four","Five")
        .onEach { delay(400L) }
    numbers.combine(values) { a, b ->
        "$a -> $b"
    }.collect { println(it) }
}
suspend fun zip() {
    val english = flowOf("One", "Two", "Three")
    val french = flowOf("Un", "Deux", "Troix")
    english.zip(french) { a, b ->
        "'$a' in French is '$b'"
    }.collect {
        println(it)
    }
}
```

Flow

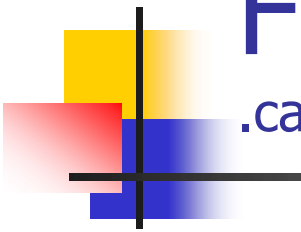
.buffer



```
fun main() {
    runBlocking {
        val time = measureTimeMillis {
            mocniny()
                .buffer()
                .collect {
                    delay(300L)
                    println(it)
                }
        }
        println("Collected in $time ms")
    }
}
fun mocniny() = flow {
    (0..10).forEach {
        delay(100L)
        emit(1 shl it)
    }
}
```

Flow

.catch



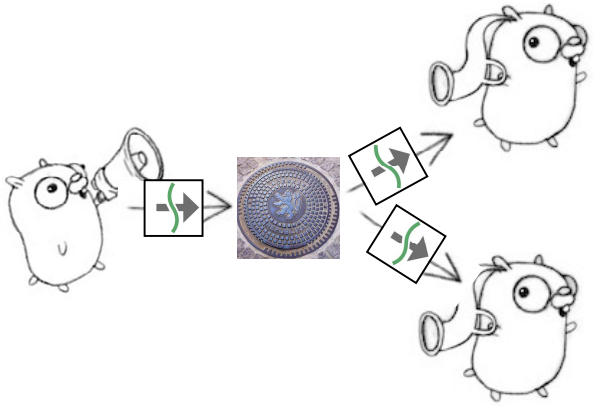
```
suspend fun onCompletion() {
    (1..3).asFlow()
        .onEach { check(it != 2) }
        .onCompletion { e ->
            if(e != null)
                println("Flow completed with exception $e")
            else
                println("Flow completed successfully")
        }
        .catch { e -> println("Caught exception $e") }
        .collect { println(it) }
}
```

Kanály

už objavili v jazyku Go

> Do not communicate by
> sharing memory; instead,
> share memory by communicating.
>
> — Effective Go

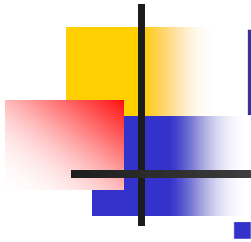
```
val channel = Channel<Int>()
GlobalScope.launch {
    for (x in channel) {
        println("a:$x")
}   }
GlobalScope.launch {
    for (x in channel) {
        println("b:$x")
}   }
runBlocking{
    listOf(1,2,3,4,5,6,7,8,9,10).forEach{
        println(" :$it")
        channel.send(it)
    }
    delay(1000)
}
```



```
 :1
 :2
 :3
a:2
b:1
a:3
 :4
 :5
 :6
b:4
b:6
 :7
b:7
 :8
b:8
 :9
b:9
 :10
b:10
a:5
```

Coroutines1/Channel

- Under construction…



RoomDB

- Room je vylepšená SQLite, ktorá existuje v Androide od API-1
- vytvoríme aplikáciu na registrovanie študentov s funkciami:
  - signup/login/logout/delete
- v návrhovom vzore MVVM
- s použitím corutín
- obohatíme build.gradle (app) o
- room

```
implementation "androidx.room:room-runtime:2.2.5"
kapt "androidx.room:room-compiler:2.2.5"
implementation "androidx.room:room-ktx:2.2.5"
```

- coroutines

```
implementation "org.jetbrains.kotlinx:kotlinx-coroutines-core:1.4.1"
implementation "org.jetbrains.kotlinx:kotlinx-coroutines-android:1.4.1"
```

- plugins

```
plugins {
    id 'com.android.application'
    id 'kotlin-android'
    id 'kotlin-android-extensions'
    id 'kotlin-kapt'}
```

- Finish it