Programação Assíncrona com Kotlin Coroutines

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- +4 anos de experiência
- Mestrando em Ciências da Computação
- Android Leader na Resource IT Solutions
- Programar é vida!
- Open source <3
- Compartilhar conhecimento <3


FIGHT !!

Exemplo

```
fun updateUserData(username: String) {
        val user = fetchUserFromApi(username)
        val repos = fetchReposFromApi(username)
        saveUserDataInDb(user, repos)
}
```

Estilo Tradicional

```
fun updateUserData(username: String) {
        val user = fetchUserFromApi(username)
        val repos = fetchReposFromApi(username)
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fun updateUserData(username: String) {
        val user = fetchUserFromApi(username)
        val repos = fetchReposFromApi(username)
        saveUserDataInDb(user, repos)
}
```

Callbacks to the rescue

Callback

```
fun updateUserData(username: String) {
        fetchUserFromApi(username) { user ->
                fetchReposFromApi(username) { repos ->
                        saveUserDataInDb(user, repos)
                }
        }
}
```

Callback

```
fun updateUserData(username: String) {
        fetchUserFromApi(username) { user ->
                fetchReposFromApi(username) { repos ->
                        saveUserDataInDb(user, repos)
                }
        }
}
```

Coroutines to the rescue

Coroutines

```
suspend fun updateUserData(username: String) {
        val user = fetchUserFromApi(username)
        val repos = fetchReposFromApi(username)
        saveUserDataInDb(user, repos)
}
```

Coroutines

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        val user = fetchUserFromApi(username)
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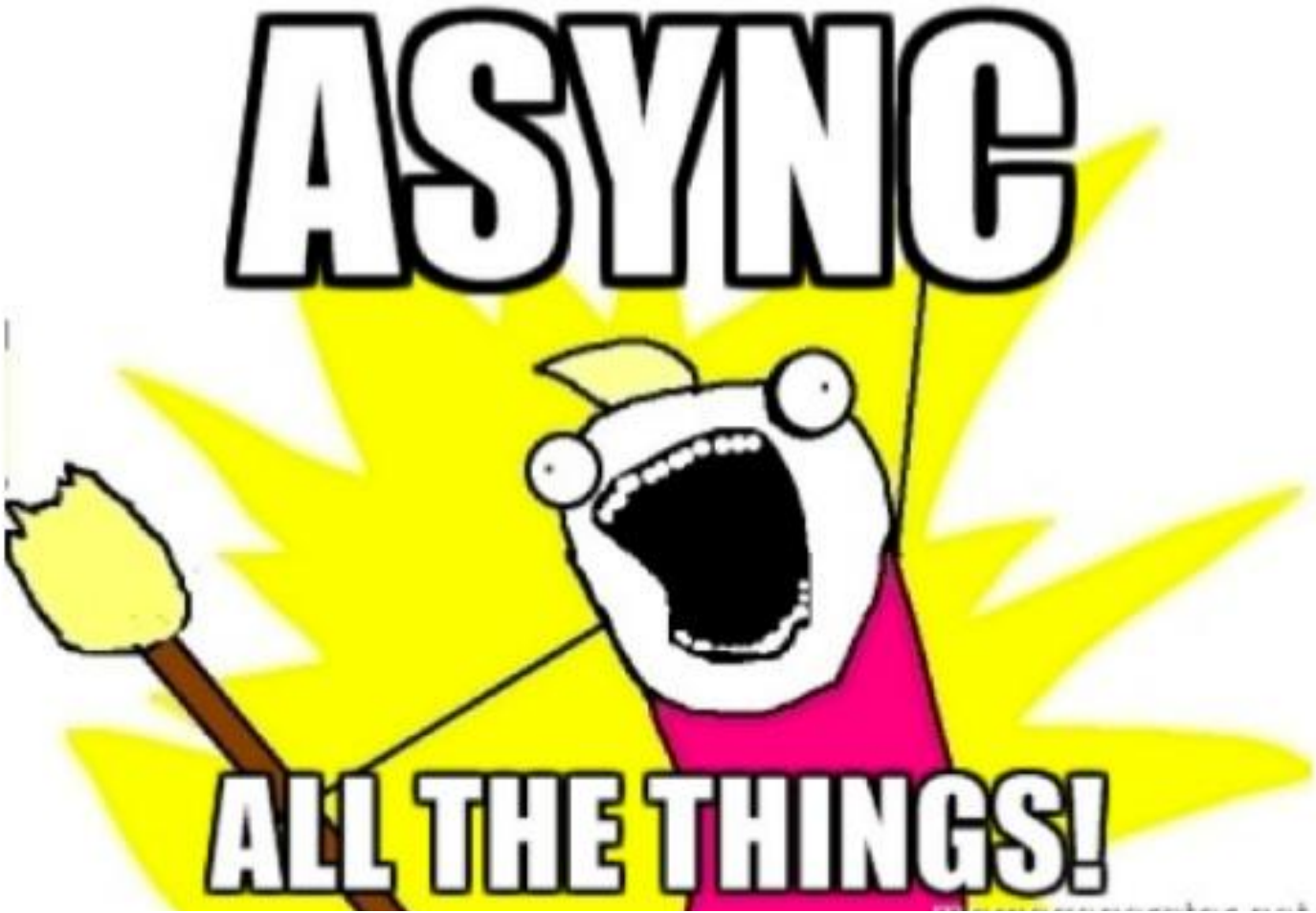
ASYNC
ALL THE THINGS!

Principais Conceitos

Principais Conceitos

- Modificador **suspend**
- *launch* vs *async*
- Dispatchers
- *withContext*
- *coroutineScope*
- *runBlocking*

*Modificador **suspend***

A suspending function is simply a function that **can be paused and resumed at a later time**. They can execute a long running operation and wait for it to complete **without blocking**.

Modificador ***suspend***

```
suspend fun updateUserData(username: String) {
        val user = fetchUserFromApi(username)
        val repos = fetchReposFromApi(username)
        saveUserDataInDb(user, repos)
}
```

launch vs *async*

launch: A background job. Conceptually, a job is a cancellable thing with a life-cycle that culminates in its completion. It returns a **Job** instance.

async: Deferred value is a non-blocking cancellable future. It’s a Job that **has a result**. It returns a **Deferred** instance.

launch vs *async*

```
fun doSomething() {
        launch {
                // do some operation
        }
}
```

launch vs *async*

```
private val jobs = ArrayList<Job>()

fun doSomething() {
        jobs.add(
                launch {
                        // do some operation
                }
        )
}

override fun onCleared() {
        jobs.forEach { if(!it.isCancelled) it.cancel() }
}
```

launch vs *async*

```
fun doSomething() {
        async {
                // do some operation
        }
}
```

launch vs *async*

```
fun doSomething() {
        val deferred = async {
                // do some operation
        }
        val result = deferred.await()
}
```

launch vs *async*

```
fun doSomething() {
        val result = async {
                // do some operation
        }.await()
}
```

Dispatchers

- Dispatchers.**Main**: A coroutine dispatcher that is confined to the Main thread operating with UI objects.
- Dispatchers.**Default**: A coroutine dispatcher to execute CPU-bound tasks.
- Dispatchers.**IO**: A coroutine dispatcher that is designed for offloading blocking IO tasks to a shared pool of threads.

withContext

Calls the suspending block with a given **coroutine context**, suspends until it completes and then returns the result.

withContext

```
suspend fun updateUserData(username: String) {
        withContext(Dispatchers.IO) {
                val user = fetchUserFromApi(username)
                val repos = fetchReposFromApi(username)
                saveUserDataInDb(user, repos)
        }
}
```

withContext

```
suspend fun updateUserData(username: String) {
        withContext(Dispatchers.IO) {
                val user = fetchUserFromApi(username)
                val repos = fetchReposFromApi(username)
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withContext

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suspend fun updateUserData(username: String) {
        withContext(Dispatchers.IO) {
                val user = fetchUserFromApi(username)
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                saveUserDataInDb(user, repos)
        }
}
```

coroutineScope

This function is designed for a ***parallel decomposition*** of work. When **any child coroutine in this scope fails**, this scope fails and all the rest of the **children are cancelled**.

coroutineScope

```
suspend fun processPayments(): List<Payment> {
    coroutineScope {
        val payments = withContext(Dispatchers.IO) {
            async { loadPayments() }
        }

        val processedPayments = withContext(Dispatchers.Default) {
            async { calculateInterestRate(payments.await()) }
        }

        return processedPayments.await()
    }
}
```

runBlocking

Runs new coroutine and **blocks** current thread until its completion.

runBlocking

```
suspend fun processPayments(): List<Payment> {
        // load payments and calculate its interest rate
}

@Test fun myAwesomeTest() {
        val payments = processPayments()
        // assert payments interest rate
}
```

runBlocking

```
suspend fun processPayments(): List<Payment> {
        // load payments and calculate its interest rate
}

@Test fun myAwesomeTest() = runBlocking {
        val payments = processPayments()
        // assert payments interest rate
}
```

Perguntas?


That's all Folks!

Obrigado!