

IMMOBILIEN  
SCOUT24

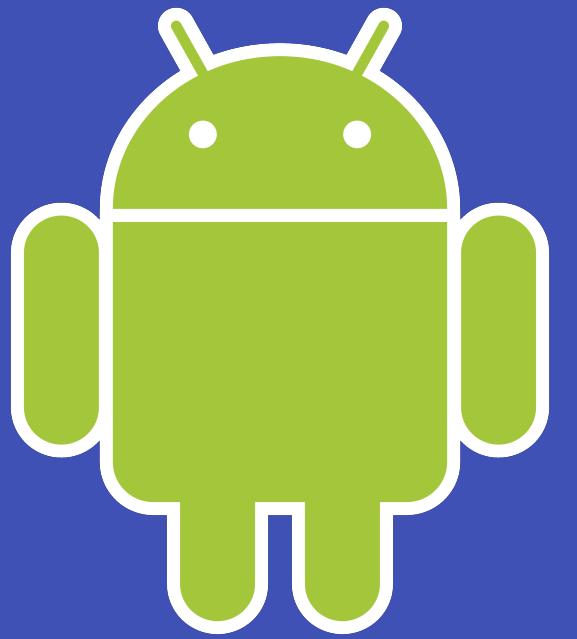
Refactoring Legacy Code with Kotlin & Coroutines



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# Kotlin Everywhere: Hamburg





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Java 

{ }

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# Streams →



SO?

# Kotlin

Null 

```
if (foo == null) {  
    bar();  
}
```

# Offensive Code <👉>

# Urgency



# Kotlin?

Kotlin 💪



# Google IO 2018





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# Google IO 2019



# Kotlin 😱

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# Libraries

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## RxKotlin

Kotlin Extensions for RxJava

## RxDownload

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# RxKotlin

## Kotlin Extensions for RxJava

Kotter Knife



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This p  
take a

## Anko

### KAndroid



## Kotlin/Native

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Notice: Kodein and Injekt, much of the same

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## Kotlin Extensions for RxJava

### Kotter Knife



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Build Rating

Build Testing

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Notice: K

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# LastAdapter

# Kanary

language

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# klutter

# Kotter Knife



# KANARY

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build passing



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# Kotlin 🤔

# Idiomacy



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# Idiomatic Code

# Idiomatic Code

- Consistent, easier to read
- Less cognitive load
- Less ambiguity
- Function > Style

# Code Style

- [kotlinlang.org/docs/reference/coding-conventions.html](https://kotlinlang.org/docs/reference/coding-conventions.html)
- [android.github.io/kotlin-guides/style.html](https://android.github.io/kotlin-guides/style.html)

# Refactoring Legacy Code

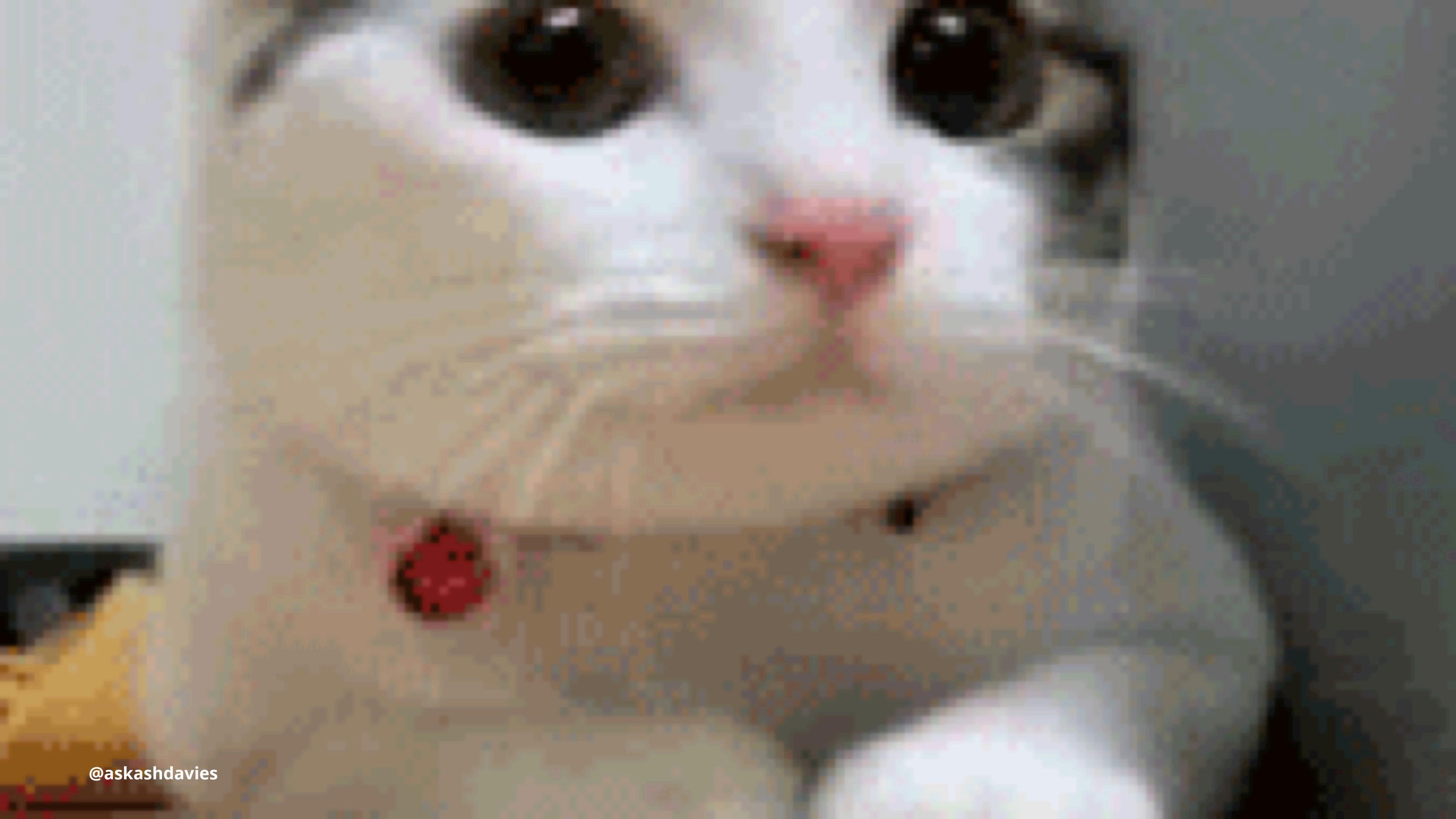
^ \n \u2191 K

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US FIGURE  
SKATING



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```
public class BadJavaActivity extends Activity {  
    @Inject Dependency dependency;  
}
```

# General Assumptions



```
class BadKotlinActivity : Activity() {  
    @Inject var dependency: Dependency? = null  
}
```

```
class SlightlyLessBadKotlinActivity : Activity() {  
    @Inject internal lateinit var dependency: Dependency  
}
```

# UninitializedPropertyAccessException!

```
lateinit var file: File
```

```
if (::file.isInitialized) { /* ... */ }
```

# Data Classes

```
public class User {  
  
    private String firstName;  
    private String lastName;  
  
    public User(String firstName, String lastName) {  
        this.firstName = firstName;  
        this.lastName = lastName;  
    }  
  
    public String getFirstName() {  
        return firstName;  
    }  
  
    public void setFirstName(String firstName) {  
        this.firstName = firstName;  
    }  
  
    public String getLastName() {  
        return lastName;  
    }  
  
    public void setLastName(String lastName) {  
        this.lastName = lastName;  
    }  
  
    @Override  
    public boolean equals(Object o) {  
        if (this == o) {  
            return true;  
        }  
        if (o == null || getClass() != o.getClass()) {  
            return false;  
        }  
        User user = (User) o;  
        return Objects.equals(firstName, user.firstName) &&  
            Objects.equals(lastName, user.lastName);  
    }  
  
    @Override  
    public int hashCode() {  
        return Objects.hash(firstName, lastName);  
    }  
}
```

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```
class User(var firstName: String?, var lastName: String?) {  
  
    override fun equals(o: Any?): Boolean {  
        if (this === o) {  
            return true  
        }  
        if (o == null || javaClass != o.javaClass) {  
            return false  
        }  
        val user = o as User?  
        return firstName == user!!.firstName && lastName == user.lastName  
    }  
  
    override fun hashCode(): Int {  
        return Objects.hash(firstName, lastName)  
    }  
}
```

```
data class User(val firstName: String, val lastName: String)
```

```
data class User(val firstName: String, val lastName: String? = null)
```

```
@NotNull  
public final User copy(@Nullable String firstName, @Nullable String lastName) {  
    return new User(firstName, lastName);  
}
```

# Kotlin

- Singleton objects
- String interpolation
- Elvis operator 
- Destructuring
- Extension functions
- Scoping functions

# Maintaining History

# Maintaining History

- Change extension .java -> .kt
- First commit
- Apply Kotlin conversion
- Second commit

# Maintaining History

## Refactoring

# Refactoring

# Refactoring

## SOLID

- Single-responsibility
- Open-closed
- Liskov substitution
- Interface segregation
- Dependency inversion

# Refactoring

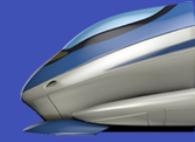
## Single Responsibility

# Perspective



# Asynchronicity

# Concurrency is Hard



# Thread

```
new Thread(() -> {  
    foo();  
}).start();
```

# CompletableFuture

```
CompletableFuture.supplyAsync(this::findSomeData)  
    .thenApply(this:: intReturningMethod)  
    .thenAccept(this::notify);
```

# RxJava

```
Observable
    .fromIterable(resourceDraft.getResources())
    .flatMap(resourceServiceApiClient::createUploadContainer)
    .zipWith(Observable.fromIterable(resourceDraft.getResources()), Pair::create)
    .flatMap(uploadResources())
    .toList()
    .toObservable()
    .flatMapMaybe(resourceCache.getResourceCachedItem())
    .defaultIfEmpty(Resource.getDefaultItem())
    .flatMap(postResource(resourceId, resourceDraft.getText(), currentUser, resourceDraft.getIntent()))
    .observeOn(AndroidSchedulers.mainThread())
    .subscribeOn(Schedulers.io())
    .subscribe(
        resource -> repository.setResource(resourceId, resource, provisionalResourceId),
        resourceUploadError(resourceId, resourceDraft, provisionalResourceId)
    );
}
```



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What If? 🤔



# Coroutines

```
fun main() {  
    GlobalScope.launch {  
        delay(1000L)  
        println("World!")  
    }  
    println("Hello,")  
    Thread.sleep(2000L)  
}
```

```
// Hello,  
// World!
```

```
fun main() {  
    GlobalScope.launch {  
        delay(1000L)  
        println("World!")  
    }  
    println("Hello,")  
    Thread.sleep(2000L)  
}
```

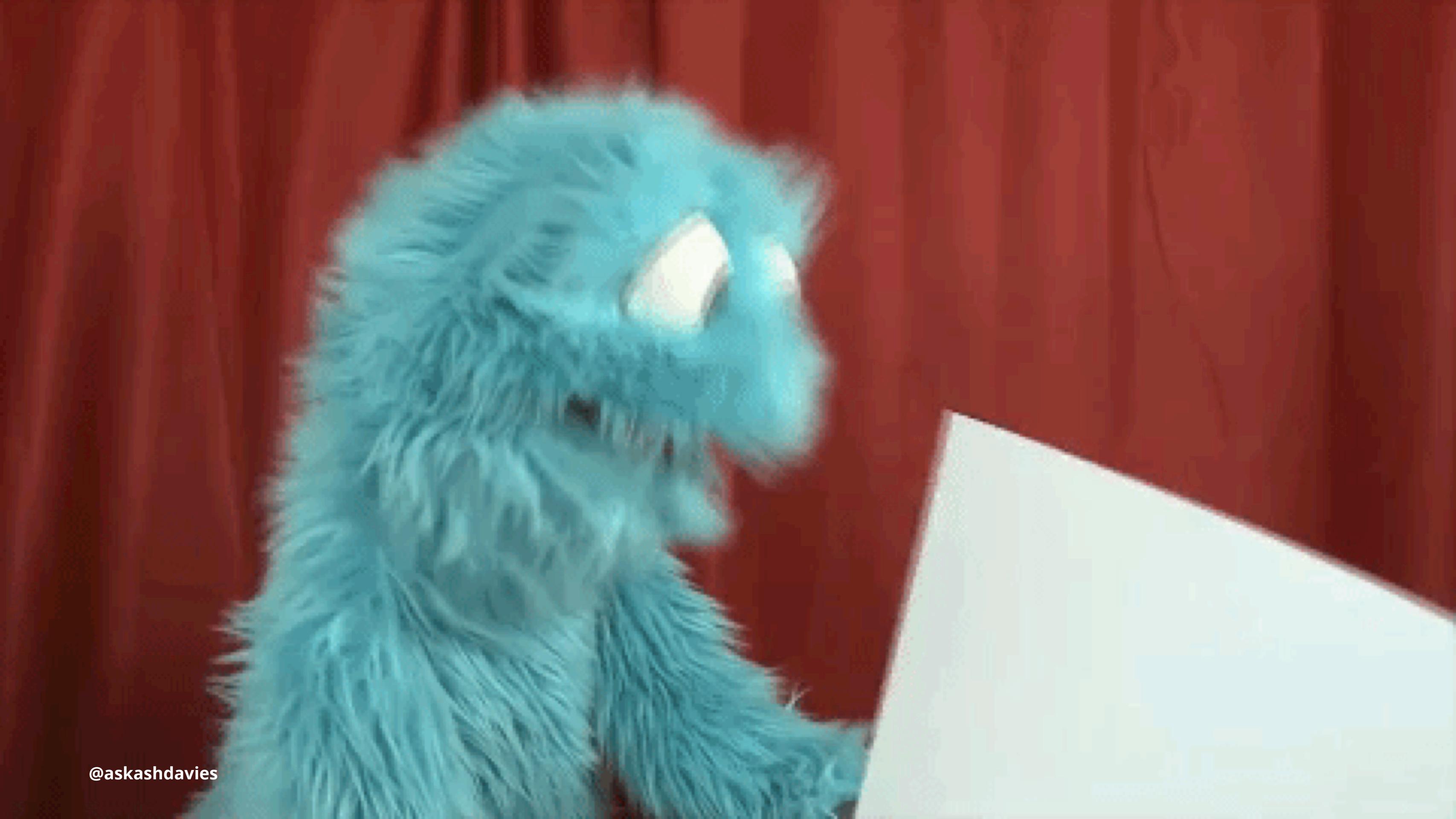
```
// Hello,  
// World!
```

```
fun main() {  
    GlobalScope.launch {  
        delay(1000L)  
        println("World!")  
    }  
    println("Hello,")  
    Thread.sleep(2000L)  
}
```

```
// Hello,  
// World!
```



# Stability



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# @Annotations

( Here be dragons)

# Annotations

@ExperimentalCoroutinesApi // !

# Annotations

@ExperimentalCoroutinesApi // !

@FlowPreview // !

# Annotations

@ExperimentalCoroutinesApi // !

@FlowPreview // !

@ObsoleteCoroutinesApi // !

# Annotations

@ExperimentalCoroutinesApi // !

@FlowPreview // !

@ObsoleteCoroutinesApi // !

@InternalCoroutinesApi // 💀

# Annotations

## @Experimental

# 💪 Coroutines 💪



# Native first-party library

# Efficient





Easy-to-use



suspend fun

# 👌 Suspend

```
fun main() {  
    GlobalScope.launch {  
        delay(1000L)  
        println("World!")  
    }  
    println("Hello,")  
    Thread.sleep(2000L)  
}
```

```
// Hello,  
// World!
```

# 👌 Suspend

```
fun main() {  
    GlobalScope.launch {  
        doWorld()  
        println("Hello,")  
        Thread.sleep(2000L)  
    }  
}
```

```
suspend fun doWorld() {  
    delay(1000L)  
    println("World!")  
}
```

```
// Hello,  
// World!
```

# 👌 Suspend

```
fun main() {  
    GlobalScope.launch {  
        doWorld()  
        println("Hello,")  
        Thread.sleep(2000L)  
    }  
}  
  
suspend fun doWorld() {  
    withContext(Dispatchers.IO) {  
        delay(1000L)  
        println("World!")  
    }  
}  
  
// Hello,  
// World!
```

# Dispatchers

# Dispatchers

- Default
- IO
- Main
  - Android (Main Thread Dispatcher)
  - JavaFx (Application Thread Dispatcher)
  - Swing (Event Dispatcher Thread)
- Unconfined

# Testing

```
@Test  
fun testFoo() = runBlockingTest {  
    val actual = foo()  
    // ...  
}
```

```
suspend fun foo() {  
    delay(1_000)  
    // ...  
}
```

# Further Reading



- **Google Codelab: Refactoring to Kotlin**  
<https://codelabs.developers.google.com/codelabs/java-to-kotlin/>
- **KotlinX Coroutine Test**  
<https://github.com/Kotlin/kotlinx.coroutines/tree/master/kotlinx-coroutines-test>
- **Sean McQuillan: Coroutines + Testing = ❤️**  
<https://www.droidcon.com/media-detail?video=352671106>
- **Ash Davies: RxJava & Coroutines: A Practical Analysis v3**  
<https://speakerdeck.com/ashdavies/rxjava-and-coroutines-a-practical-analysis-v3>

# Thanks!

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