

Kotlin/JS

Stay typesafe in the browser with Kotlin

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Java User Group
Metropolregion Nürnberg



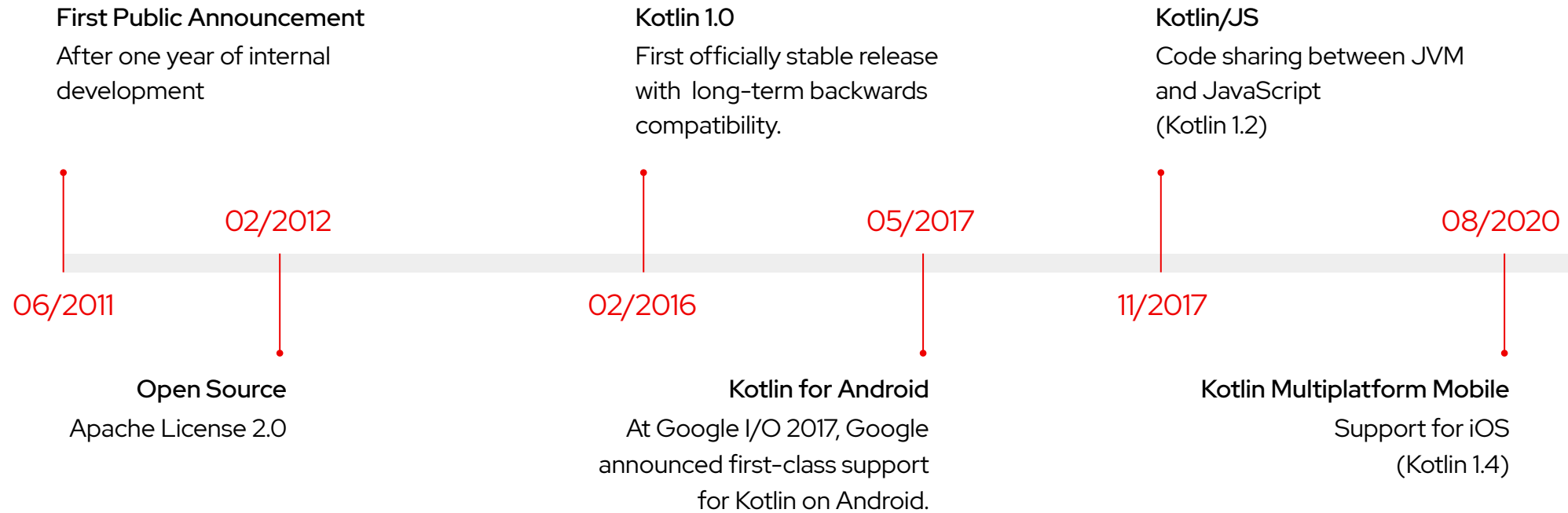
Harald Pehl

- ▶ Senior Software Engineer at Red Hat
- ▶ WildFly Management / HAL / halOS
- ▶ PatternFly Fritz2

What we'll discuss today

- ▶ Kotlin
- ▶ Getting Started
- ▶ JavaScript
- ▶ Backend
- ▶ React
- ▶ PatternFly

A Brief History



Highlights



Java Interoperability

No setup necessary
Getters / Setters
Static Members



Concise Syntax

Type Inference
Data Classes
Extension Functions



Safety First

Null Safety
Immutable



Concurrency

Suspend
Coroutines
Channels

```

// POJO with getters, setters, `equals()`, `hashCode()`,
// `toString()` and `copy()` in a single line
data class Customer(val name: String, val email: String, val company: String)

// Use `object` to create a singleton
object ThisIsASingleton {
    val companyName: String = "Red Hat"
}

// Extension function for string
fun String.reverseCase(): String = this.map {
    if (it.isUpperCase()) it.toLowerCase() else it.toUpperCase()
}.joinToString("")

println("Hello World".reverseCase()) // "hELLO wORLD"

// Operator extension function for List<Int>
operator fun List<Int>.times(by: Int): List<Int> = this.map { it * by }

// filter a list using a lambda
val numbers = listOf(4, -6, 2, -8, 12).filter { it > 0 }

// same as `numbers.times(2)`
println(numbers * 2) // "[8, 4, 24]"

```

Concise Syntax

Data classes

Objects

Extension functions

Operator overloading

```
var a: String = "abc" // Regular initialization means non-null  
a = null // compilation error
```

```
var b: String? = "abc" // can be set null  
b = null // ok
```

```
val l = a.length  
val l = b.length // error: variable 'b' can be null  
val l = if (b != null) b.length else -1  
val l = b?.length ?: -1  
val l = b!!.length
```

```
println(a?.length) // Unnecessary safe call  
println(b?.length)
```

```
fun calculateTotal(obj: Any) {  
    if (obj is Invoice)  
        obj.calculateTotal()  
}
```

Safety

Built in null safety

Smart casts

```

import kotlinx.coroutines.async
import kotlinx.coroutines.delay
import kotlinx.coroutines.runBlocking

suspend fun compute(n: Long): Long {
    delay(100) // simulate computation
    return n
}

val sum = runBlocking {
    (1..1_000_000L).map {
        async { compute(it) }
    }.sumOf { it.await() }
}
println("Sum: $sum")

```

delay	100	200	500	1000	2000
Ø time of 10 runs	2489	2533	2687	2978	3821

Concurrency

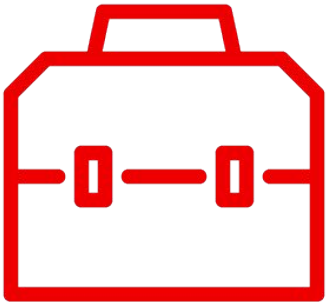
Coroutines

Suspend

Async

Kotlin/JS Setup

How to create a new project



Gradle Build Script

Write from scratch or generate using IDE wizards.

Standard Library

Most of the Kotlin standard library is available for Kotlin/JS.

Webpack

Webpack is used to build, bundle and run the application.

NPM / Yarn

Declare npm dependencies in the Gradle build script.

```
plugins {  
    kotlin("js") version "1.4.30"  
}  
  
group = "com.redhat.kotlinjs"  
version = "0.0.1"  
  
dependencies {  
    implementation("org.jetbrains.kotlinx:kotlinx-html:0.7.2")  
    implementation("org.jetbrains.kotlinx:kotlinx-coroutines-core:1.4.2")  
    testImplementation(kotlin("test-js"))  
}  
  
kotlin {  
    js {  
        browser {  
            binaries.executable()  
        }  
    }  
}
```

Gradle Build Script

Project coordinates

Dependencies

Run configuration

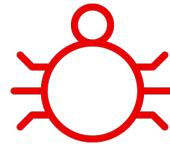
Run Debug Test

Using the Kotlin/JS
gradle plugin



Run

The run task that lets you run Kotlin/JS projects without additional configuration.



Debug

Source maps are generated automatically for debugging the code using browser development tools.



Test

Run tests through a variety of test runners that can be specified via the Gradle configuration.

JavaScript Interop

How to interact with the JavaScript ecosystem



Browser & DOM API

Typesafe wrappers for the DOM API

Use JavaScript code

Dynamic type, external declarations, Dukat

Typesafe HTML DSL

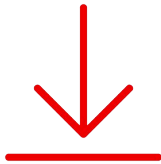
Via the `kotlinx.html` library

NPM dependencies

Managed by the gradle build script

Backend Integration

How to talk to your backend services



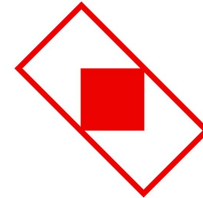
Fetch API

Standard browser API for fetching resources with support for CORS



Serialization

Compiler plugin and runtime library with support for various serialization formats

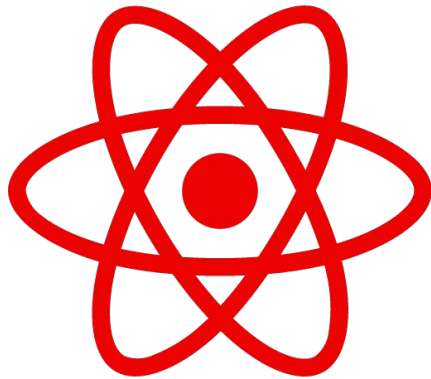


Ktor Client

Based on Fetch API. Make requests, handle responses, (de)serialization JSON

Kotlin/JS for React

How to use existing React components



IDE Support

Wizards to get started

DSL

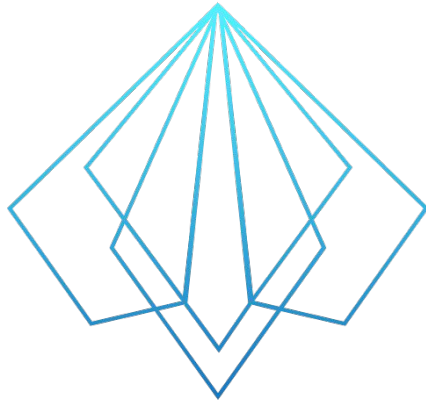
Write typesafe HTML and CSS

Components

Create own and integrate existing components

PatternFly

How to use PatternFly components



Fritz2

Reactive applications in pure Kotlin using coroutines and flows

Patternfly

Open source design system to enable consistency and usability. Provides clear standards, components and layouts.

PatternFly Fritz2

Implements PatternFly components using fritz2.

Thank you

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