Kotlin/JS

Stay typesafe in the browser with Kotlin

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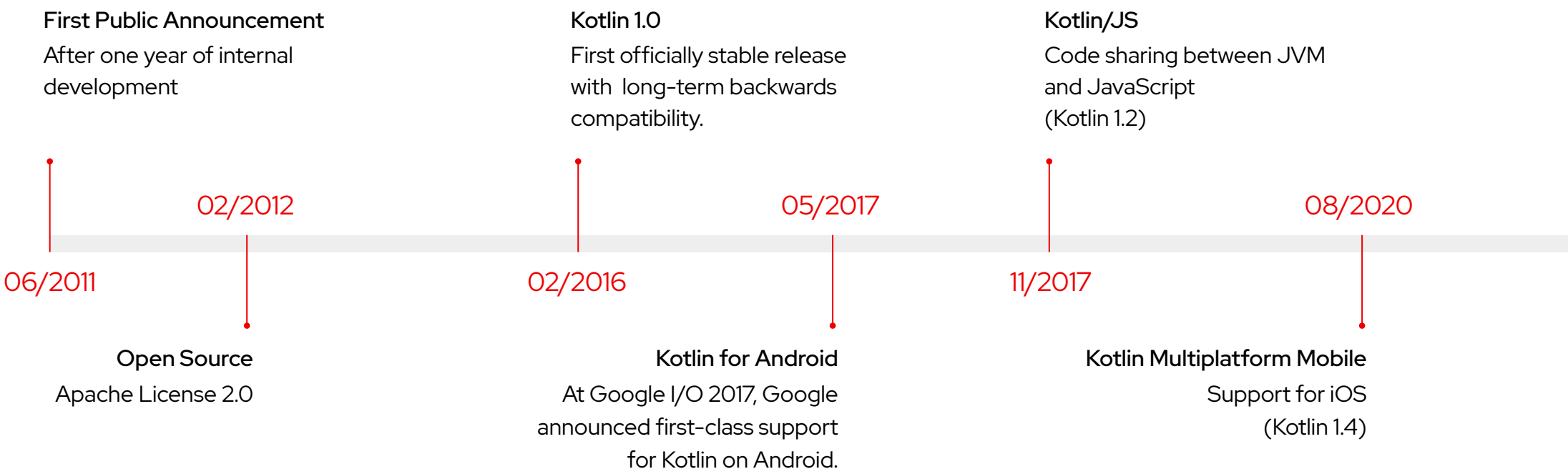
What we'll discuss today

- Kotlin
- Getting Started
- Ecosystem
- JavaScript
- React
- PatternFly

A Brief History



Highlights

Why should I use Kotlin?

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

```kotlin
// 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

```kotlin
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
∅ time of 10 runs	2489	2533	2687	2978	3821

Concurrency

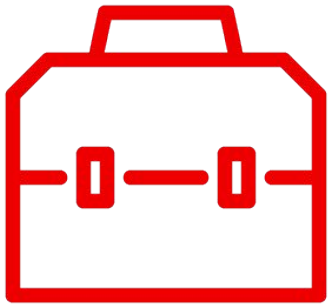
Coroutines

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 {
    testImplementation(kotlin("test-js"))
}

kotlin {
    js {
        browser {
            testTask {
                useKarma {
                    useChromeHeadless()
                }
            }
            binaries.executable()
        }
    }
}
```

Gradle Build Script

Project coordinates

Dependencies

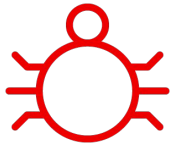
Run configuration

Run
Debug
Test

Using the Kotlin/JS gradle plugin

Run

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



Debug

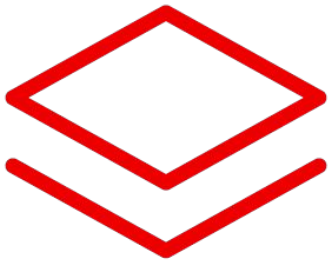
Source maps are generated automatically for debugging the code using browser development tools.

Test

Run tests through a variety of test runners that can be specified via the Gradle configuration.
For advanced testing see https://kotest.io.

Kotlin Ecosystem

Useful libraries for the JS platform



kotlinx-html
DSL for typesafe HTML

kotlinx-serialization-json
(De)serialize from / to JSON

kotlinx-coroutines-core
Concurrency in the browser

ktor-client
Fetch data from the backend

```
ul {
   listOf("Java", "Kotlin", "Scala").forEach {
       li {
           +it
       }
   }
}
```

```
<ul>
   <li>Java</li>
   <li>Kotlin</li>
   <li>Scala</li>
</ul>
```

Typesafe HTML

Based on a DSL

Fully integrated

```
@Serializable
data class Todo(
    val id: Int,
    val name: String,
    val done: Boolean
)
```

```
{
   "id": 23,
   "name": "Buy milk",
   "done": false
}
```

Serialization

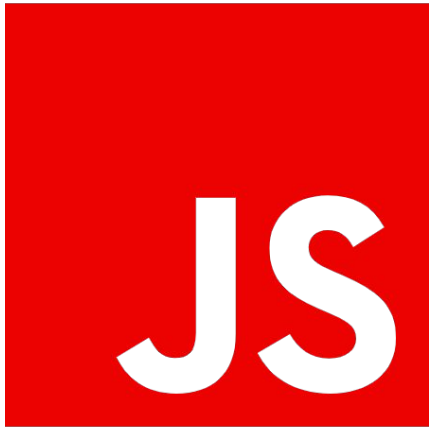
Reasonable defaults

Multiple formats

Annotation based

JavaScript Interop

How to interact with the JavaScript ecosystem



Browser & DOM API

Typesafe wrappers for the DOM API

Use JavaScript code

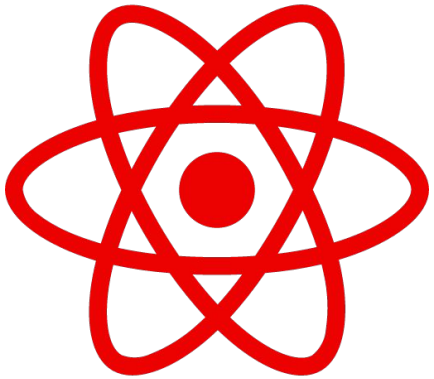
Dynamic type, external declarations, Dukat

NPM dependencies

Managed by the gradle build script

Kotlin/JS for React

How to use existing React components



IDE Support

Wizards to get started

DSL

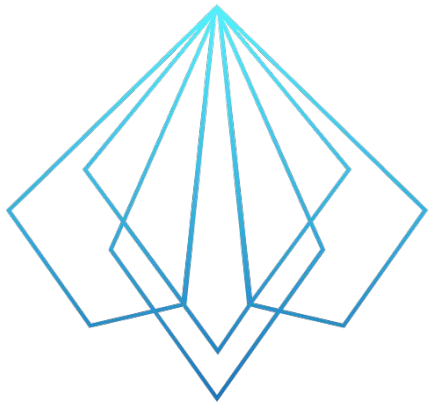
Write typesafe HTML and CSS

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.

Links

- Kotlin
- Kotlin/JS
- Slack Channel
- Playground
- React Demo
- PatternFly Fritz2
- Code Samples

Thank you

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