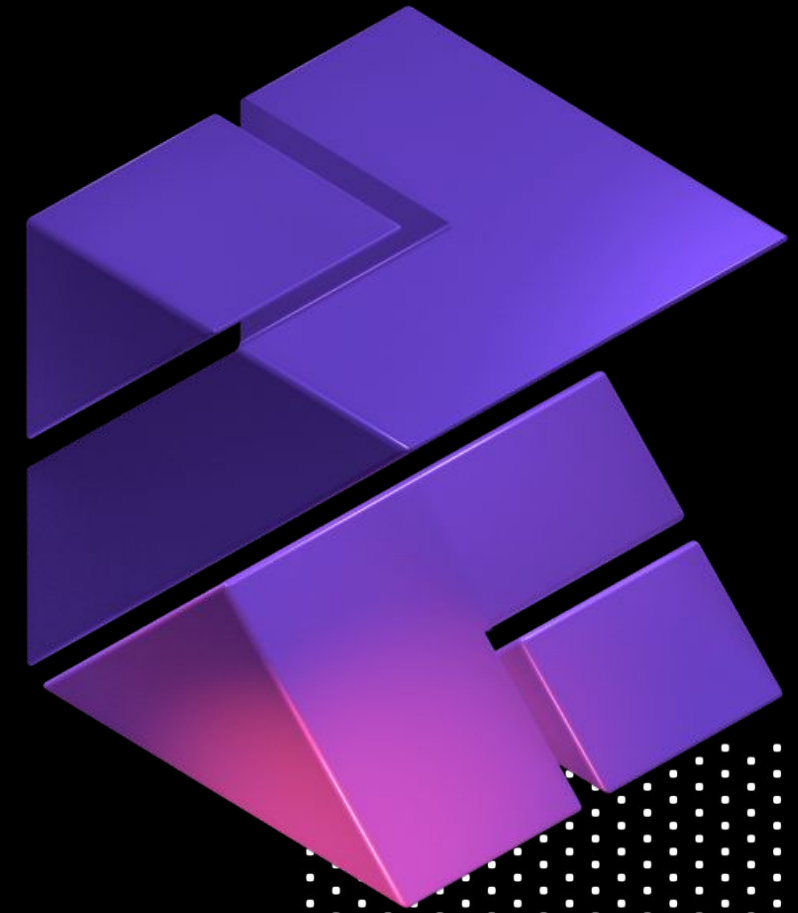
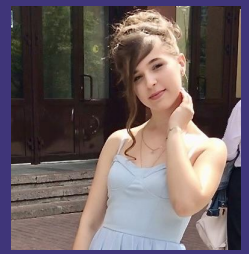


IN THE MEANTIME

KOTLIN

ABOUT US:



> Anzhelika Pokhodun

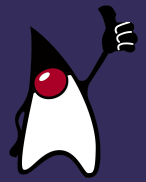
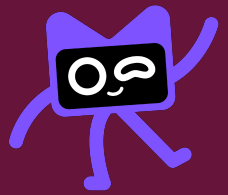
Kotlin developer

Developer in a major enterprise company, whose developers were among the first who took the risk of rolling out Kotlin, almost from the very first of its versions, into production.

> Andrey Kuleshov

Team Leader of DevTools team

An active open-source enthusiast & contributor to the Kotlin ecosystem. Creator of ktoml library and diktat static analyzer. Compiler and code analysis experience.

JAVA SE 		KOTLIN 	
18	2022	**1.7.0 – 1.7.21**	2022
19	2022	**1.8.0 – 1.8.20**	2022 – 2023
20	2023	**1.9.0 - 1.9.20**	2023
21	2023		

RELEASE VERSIONS

1.7

- Data objects
- K2 alpha
- New operator

& other

1.8

- Inline class updates
- K2 beta
- stdLib updates

& other

1.9

now

- kotlin.time updates
- K2 beta
- Stable last features

& other

2.0

- K2 stable

plan

RELEASE VERSIONS

1.7

- Data objects

K2 alpha

- New operator

& other

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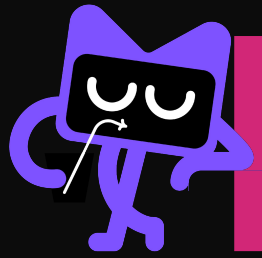
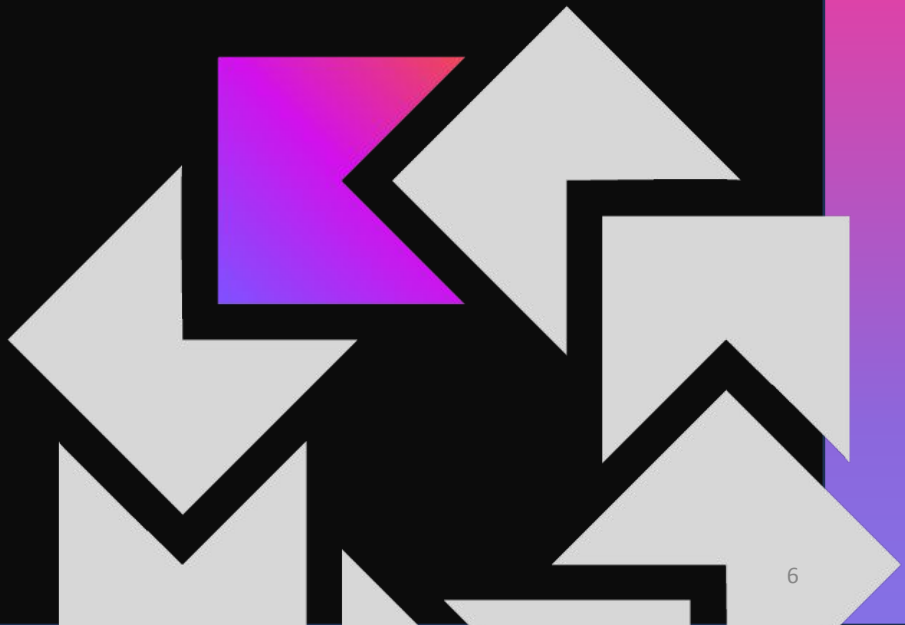
K2 stable

plan



kotlinc

THE NEW COMPILER



COMPILER TERMINOLOGY

FE/BE

AST

BINDING CONTEXT

K2

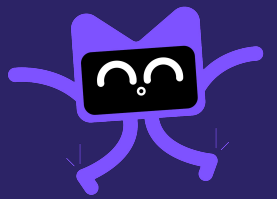
PSI

FIR

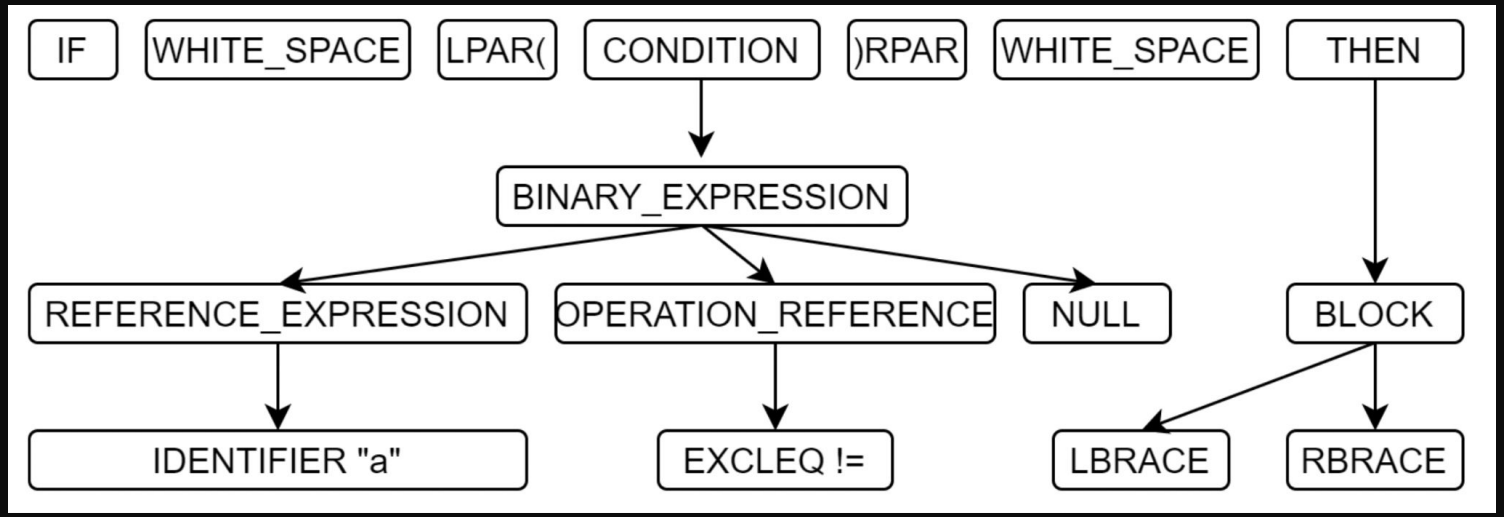
MLIR

IR

LLVM



AST/PSI syntax



“The Program Structure Interface, commonly referred to as just PSI, is the layer in the ***IntelliJ Platform*** *responsible for parsing files and creating the syntactic and semantic code model that powers so many of the platform's features.”*

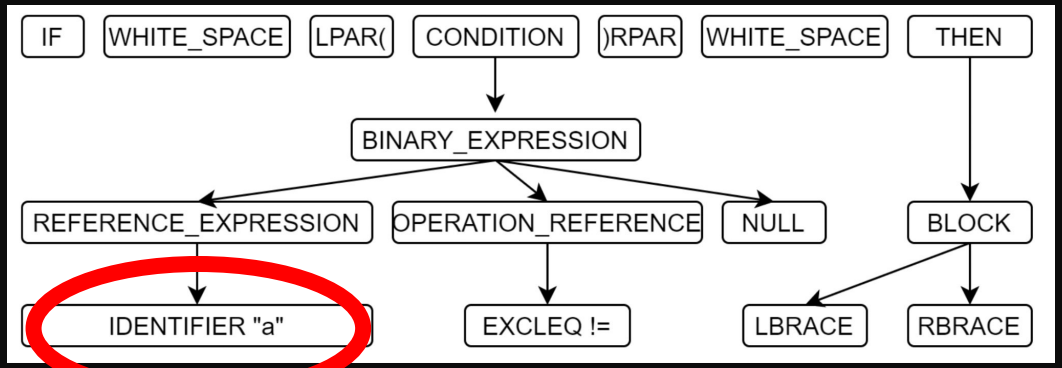
PSI/AST

source from diktat

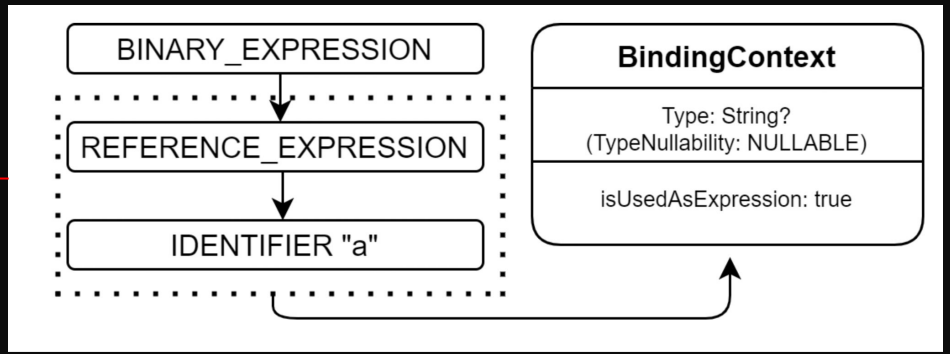
```kotlin
/**
* @return name of a function which is called in
  a [KtCallExpression] or null if it can't be found
*/
fun KtCallExpression.getFunctionName() =
    (calleeExpression as? KtNameReferenceExpression)?.getReferencedName()


/**
* Checks whether [this] node of type PROPERTY is `var`
*/
fun ASTNode.isVarProperty() =
    this.getChildren(null).any { it.elementType == KtTokens.VAR_KEYWORD }
```

Binding Context semantics



A. Kuleshov, P. Trifanov, V. Frolov and G. Liang, "Diktat: Lightweight Static Analysis for Kotlin," *2021 IEEE International Symposium on Software Reliability Engineering Workshops (ISSREW)*, pp. 365-370, doi:10.1109/ISSREW53611.2021.00103.



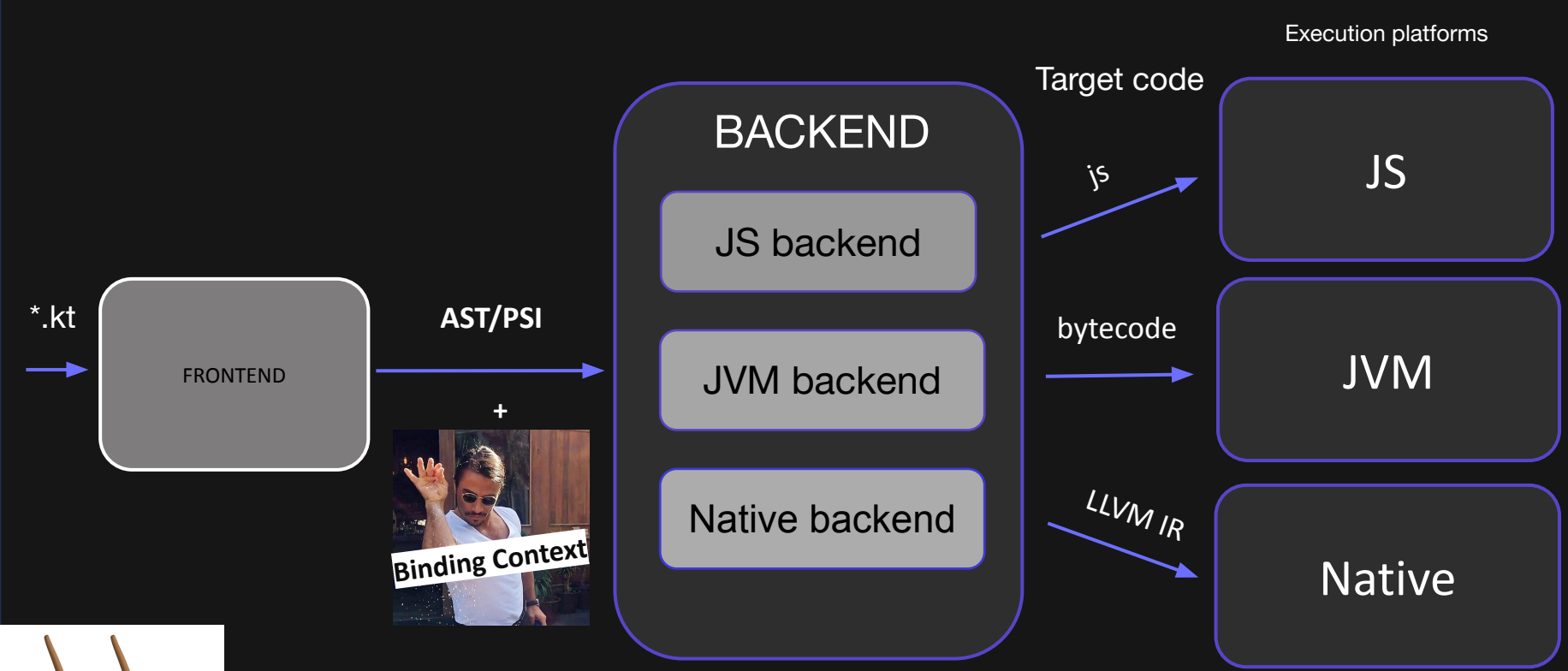
TARGETS

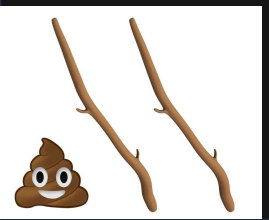
build.gradle.kts

```
kotlin {
    js(IR) { // (LEGACY)?
        browser()
        nodejs()
    }

    jvm()
    mingwX64()
    linuxX64()
    macosX64()
    macosArm64()
    ios()
    iosSimulatorArm64()
    …
}
```

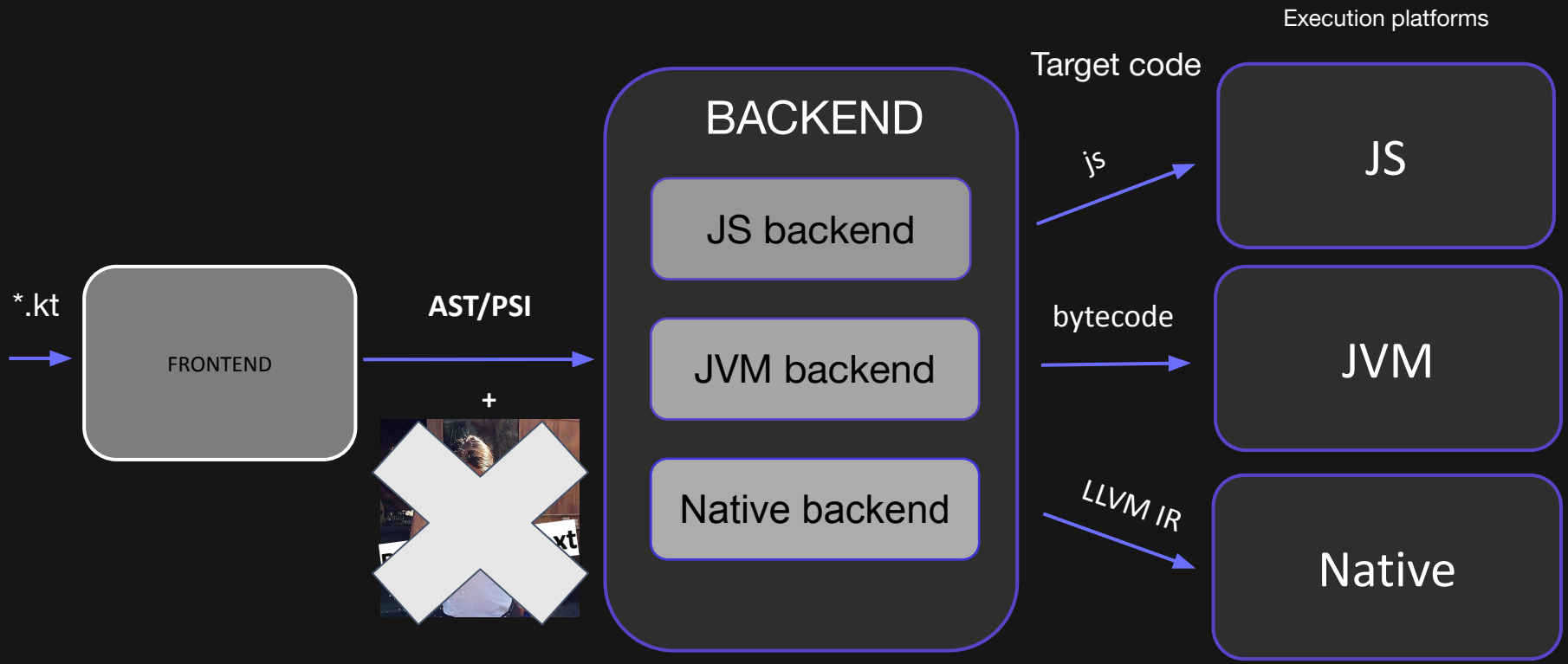
EARLY COMPILER (after adding extra backends)



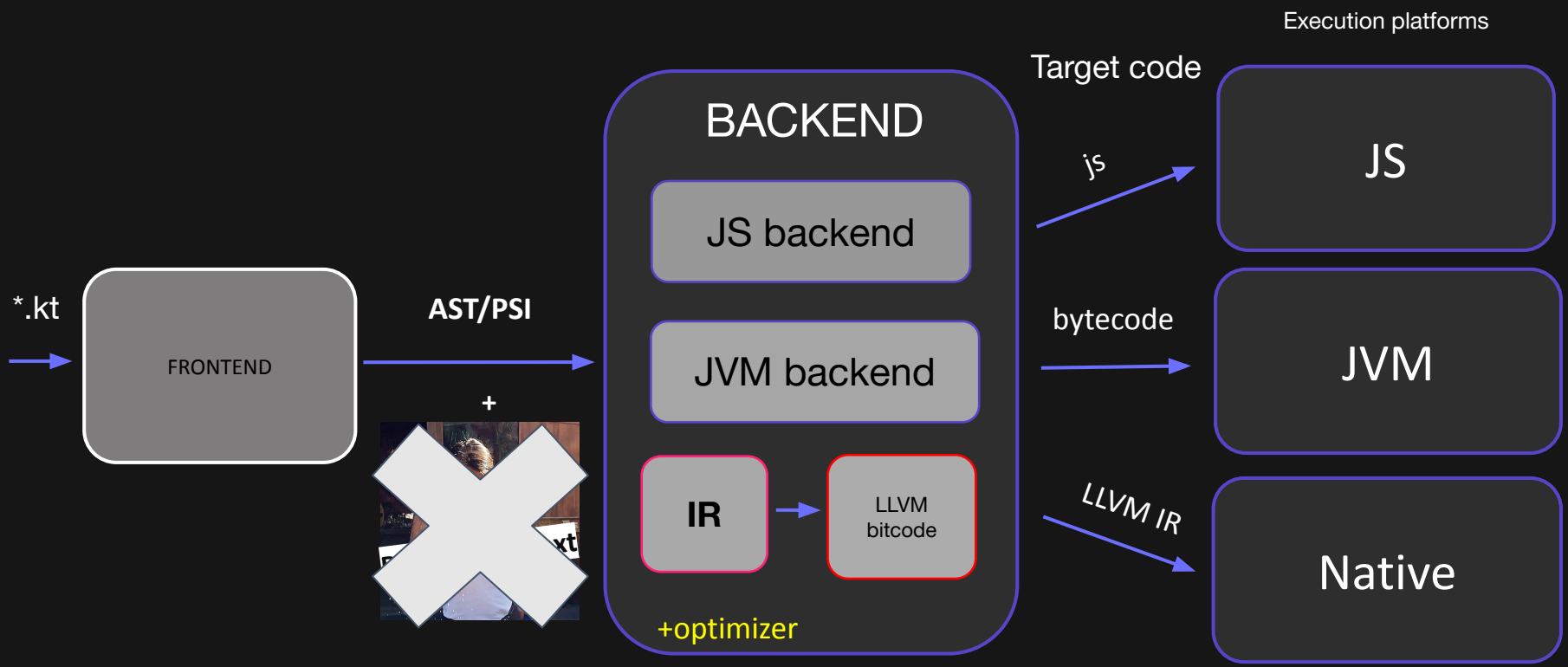


*Clang + LLVM had same child problems = MLIR

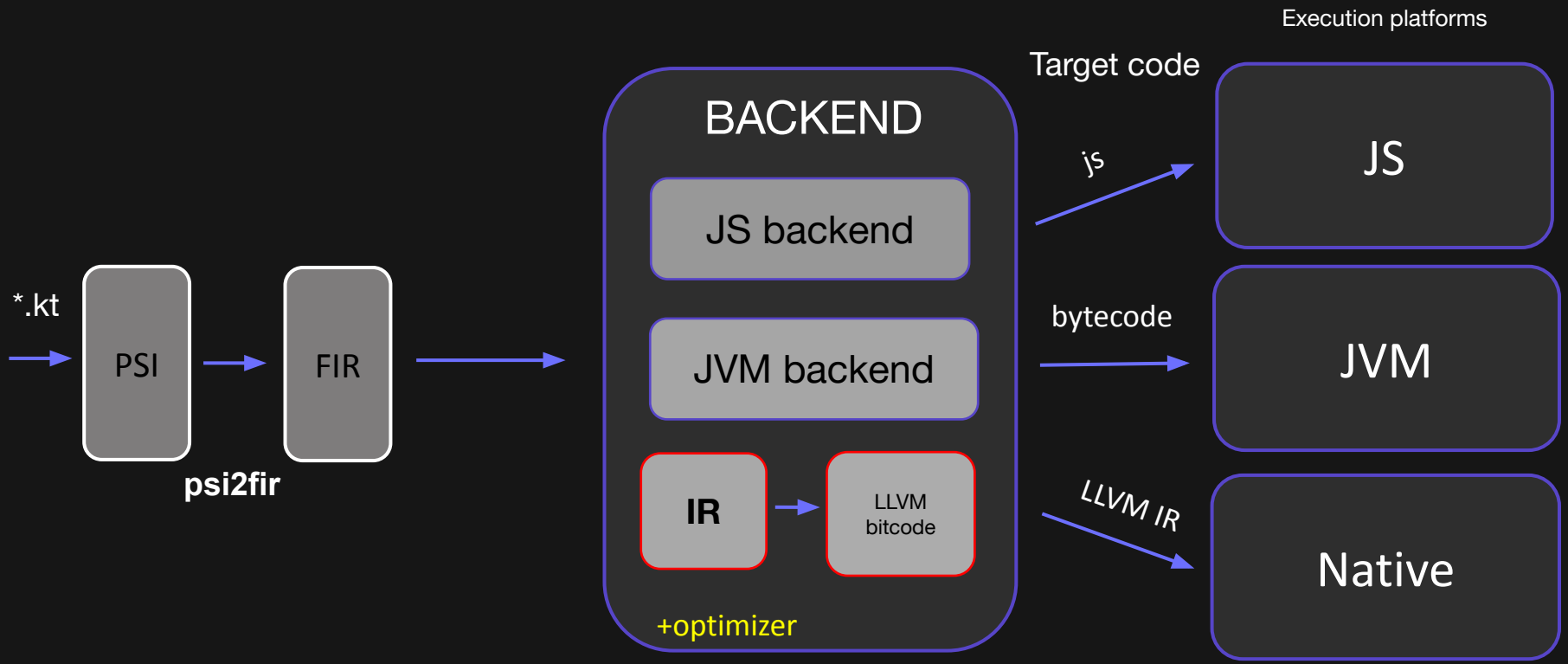
COMPILER EVOLUTION



COMPILER EVOLUTION



COMPILER EVOLUTION



compiler/fir/raw-fir/**psi2fir**/src/org/jetbrains/kotlin/fir/builder/**PsiRawFirBuilder**.kt

K1 Frontend vs K2 Frontend CompileTime is 2x time faster

#Google I/O

Kotlin 2.0 compiler

Kotlin 2.0 compiler performance

Project	Kotlin 1.8 compiler	Kotlin 2.0 compiler	Improvement
Kotlin	5m 40s *2.9 KLOC/s*	2m 37s *6.3 KLOC/s*	~2.2x
IntelliJ IDEA Ultimate	34m 15s *2.5 KLOC/s*	16m 59s *5.0 KLOC/s*	~2.0x

BUT..WHY?

KLOCs: thousands of lines of code processed per second
Source: benchmark data by JetBrains

Modern Android Development at Google I/O 2023

K1 Frontend vs K2 Frontend CompileTime is 2x time faster

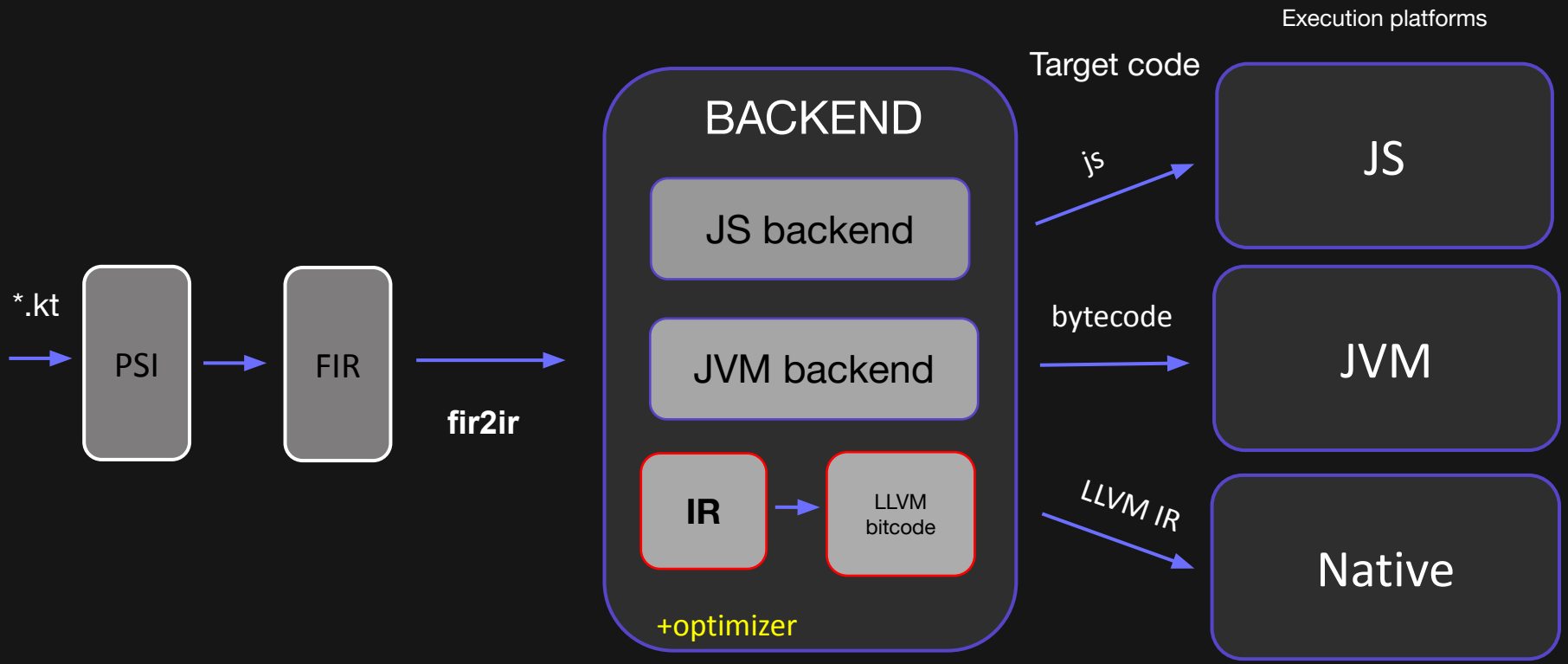
YOU MIGHT ASK WHY

K1 Frontend vs K2 Frontend CompileTime is 2x time faster

YOU MIGHT ASK WHY

AST Structure became more **“fat” (enriched)**
Less calls to the map and less resolving

COMPILER EVOLUTION



compiler/fir/**fir2ir**/src/org/jetbrains/kotlin/fir/backend/**Fir2IrConverter**.kt

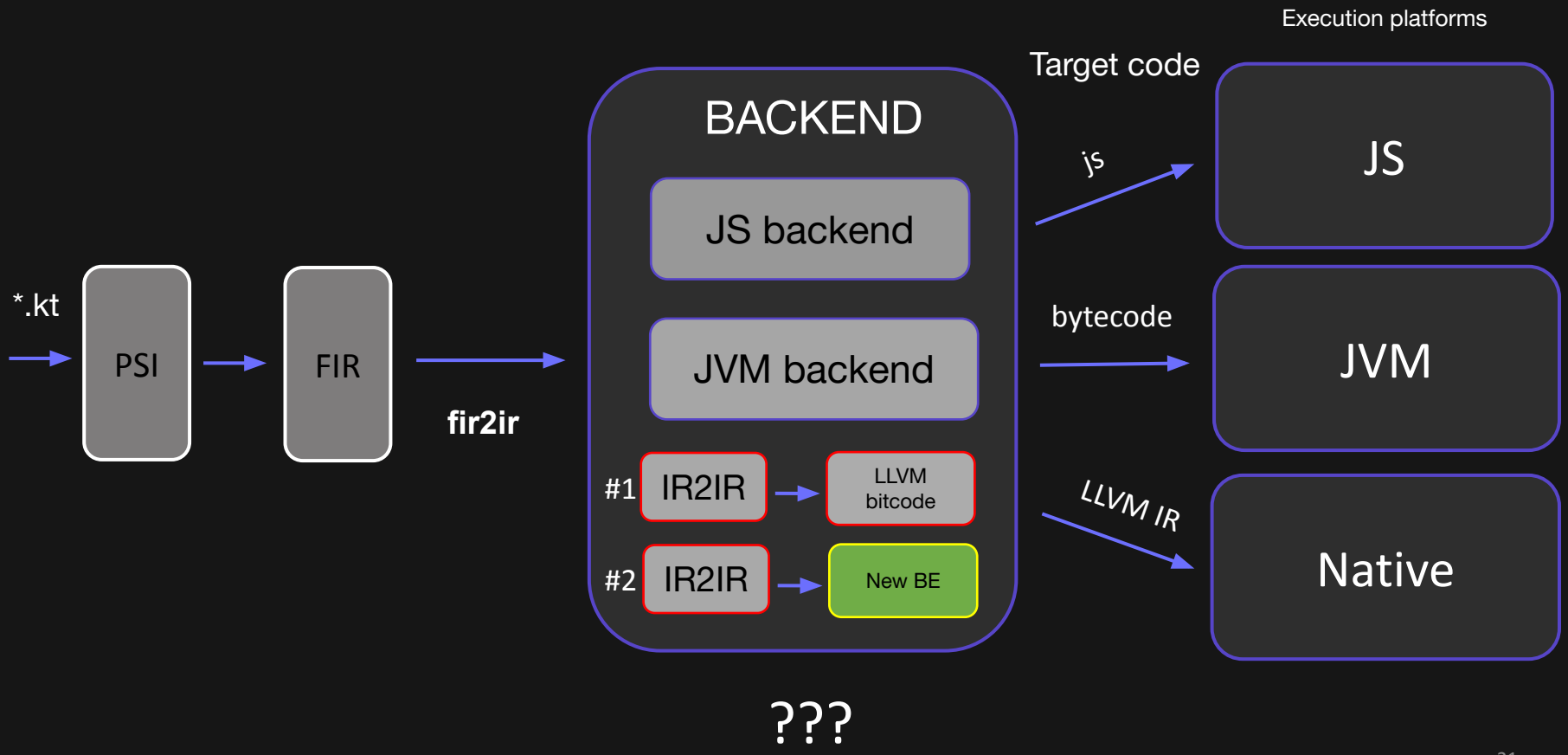
DIFFERENCE WITH NORMAL BACKEND IRs

$ clang -c -emit-llvm -S

```
define i32 @main() #0 {
  %1 = alloca i32, align 4
  store i32 0, i32* %1, align 4
  ret i32 0
}
```

```
int main() {
    return 0;
}
```

COMPILER EVOLUTION



NEW COMPILER

FRONTEND

FIR

IR BACKEND

IR → OPT → IR2IR

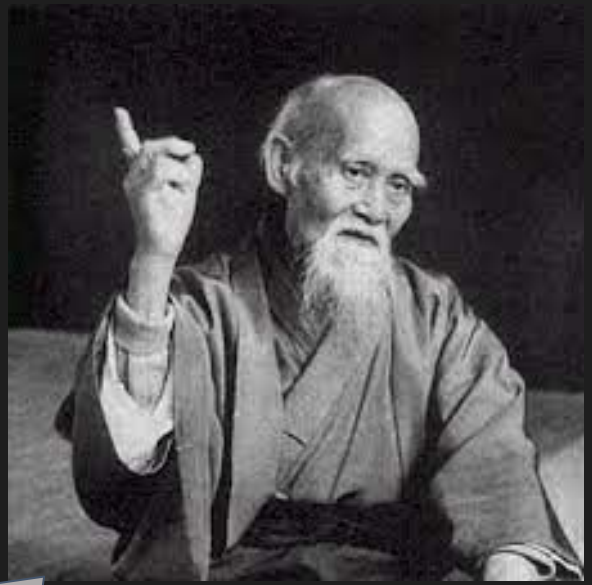
Target Platforms

- JavaScript
- JVM
- Native → WebAssembly

1.8.20

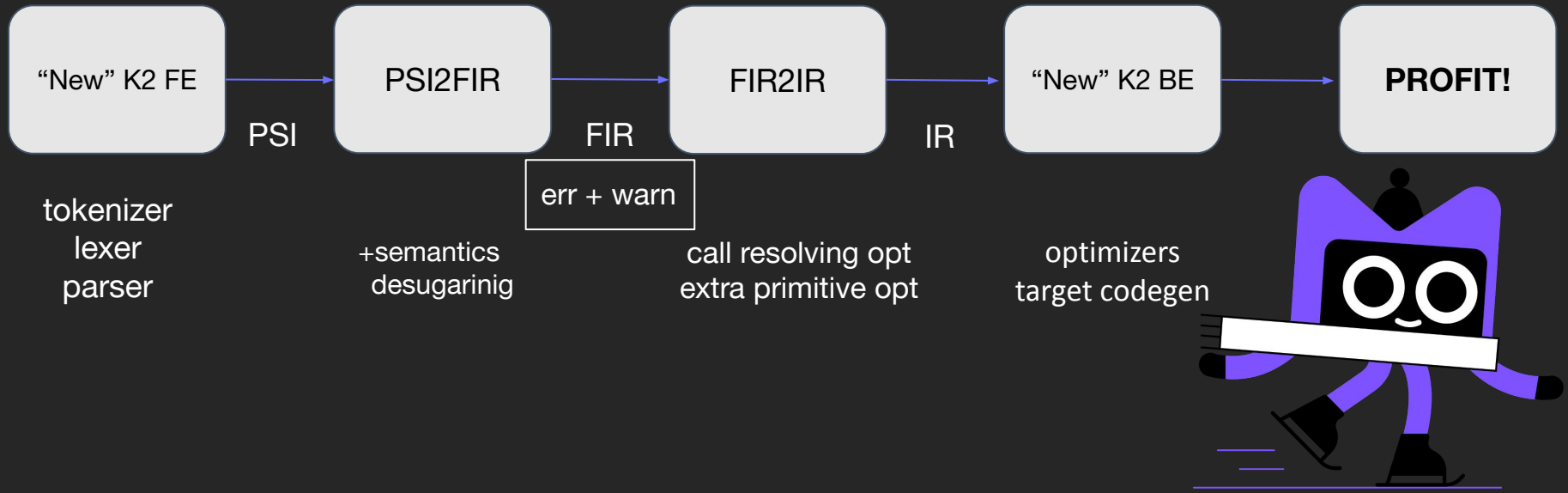
IR For Compiler Engineers life simplification, not for the performance
But K2 FIR actually boosts IDE and compiler itself

DIFFERENCE WITH NORMAL BACKEND IRs



Whole Kotlin is just one of the frontends for LLVM (c)

K2: our future



COOL STORY, BRO: 1.7 + K2

DefaultErrorMessages.**java**

```
MAP.put(
        FIR_COMPILED_CLASS,
        "{0} is compiled by the new Kotlin compiler frontend and cannot be loaded by the old compiler",
        TO_STRING
 );
```

COOL STORY, BRO: 1.7 + K2

DefaultErrorMessages.**java**

```
MAP.put(
        FIR_COMPILED_CLASS,
        "{0} is compiled by the new Kotlin compiler frontend and cannot be loaded by the old compiler",
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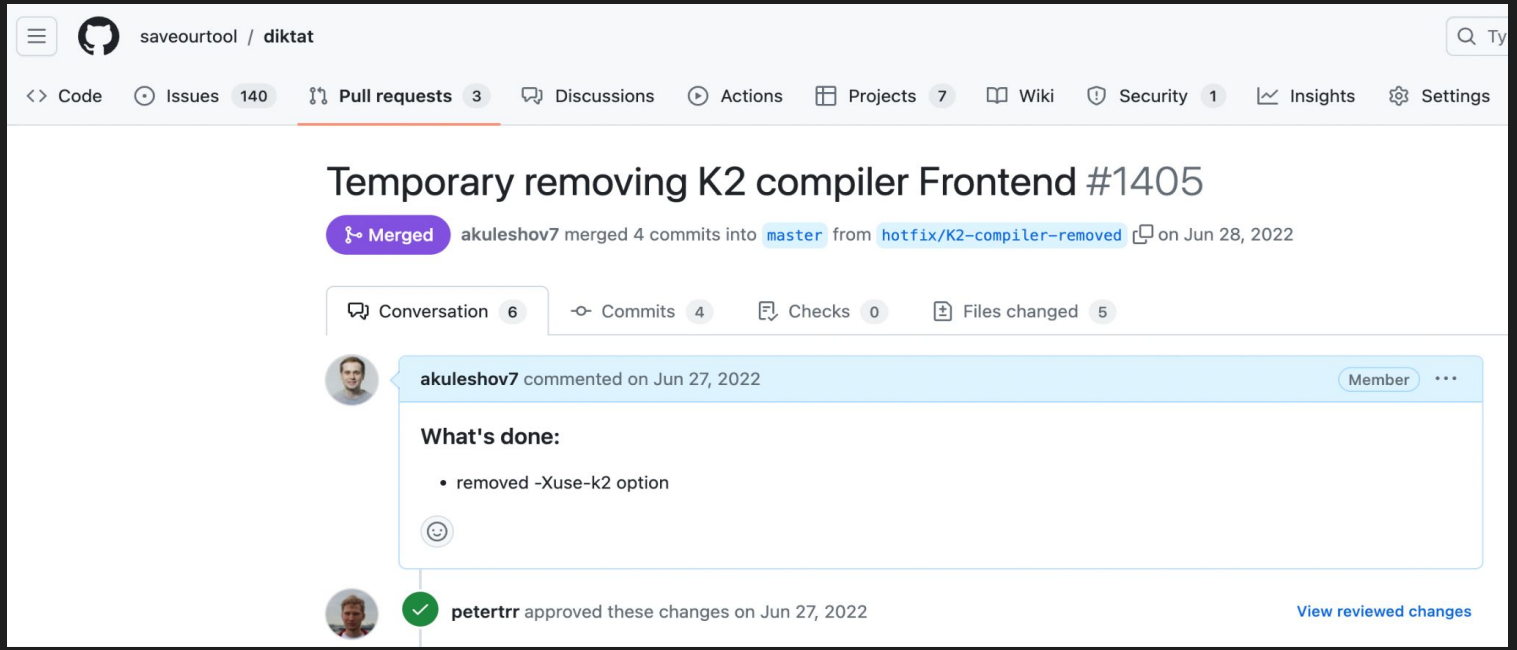
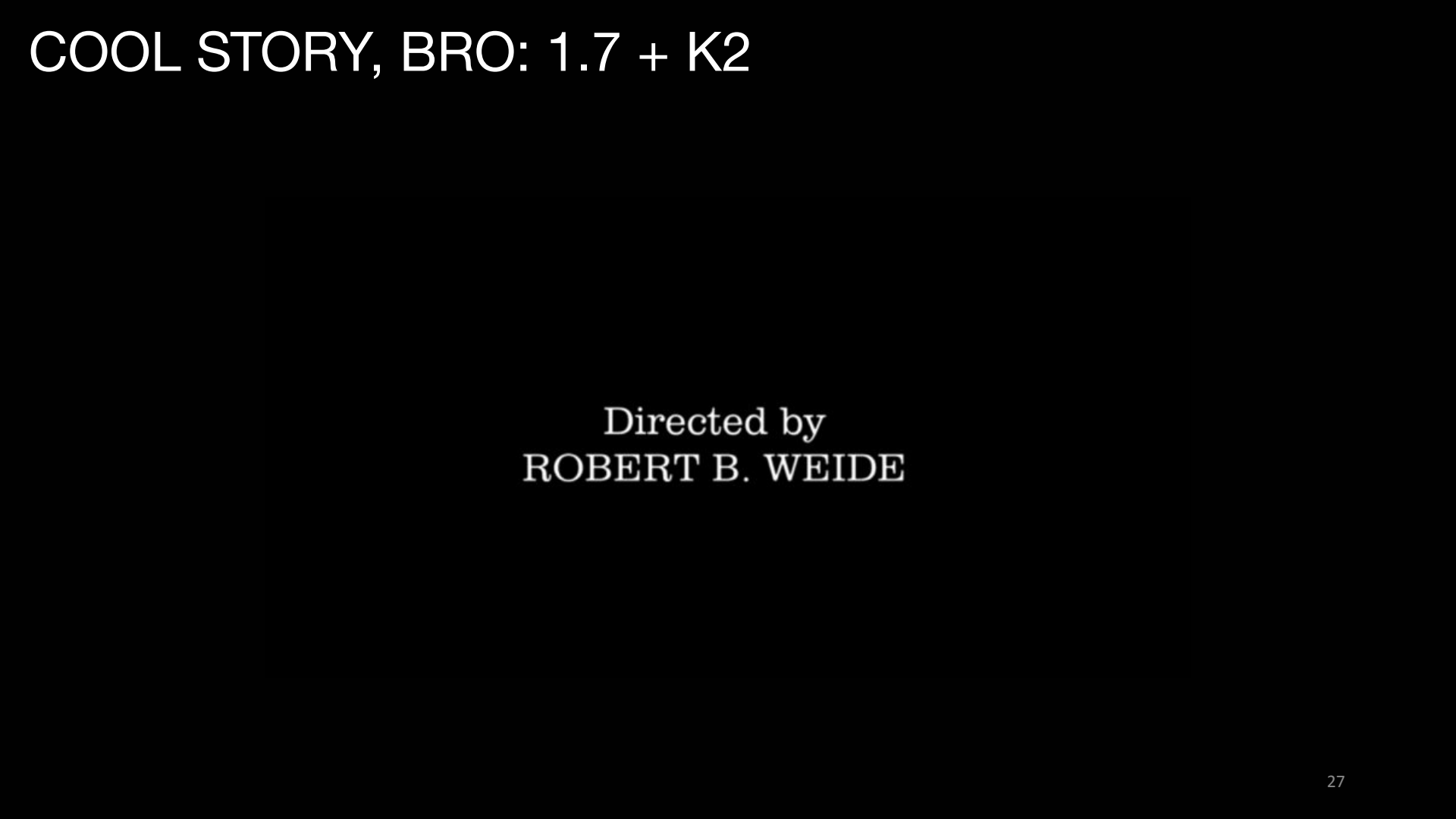


COOL STORY, BRO: 1.7 + K2



COOL STORY, BRO: 1.7 + K2

JetBrains / kotlin

Code | Pull requests 162 | Actions | Security | Insights

Commit

LV 2.0: drop reporting FIR_COMPILED_CLASS and relevant stuff

```
#KT-62056 Fixed
Related to KT-59171, KT-61951
```

master
build-2.0.0-dev-4878 ... build-2.0.0-dev-3936

mglukhikh authored and **Space Team** committed 3 weeks ago Unverified

by Alexey Belkov a year ago

Visible to issue readers

new Kotlin compiler frontend and cannot be loaded by the old

ted testing the migration to K2 compiler.
ere build with K2 cannot be loaded in projects that are built with non-K2 compiler (99.9% of user libraries).

uld be the same (and in 1.5 when you have released Kotlin IR for the JVM backend you didn't have such man-made
ecode/LLVM IR you generate by K2 and non-K2 compilers? LLVM IR as well as Java bytecode are not so flexible

to make some pluggable functionality in compiler to work with FIR (as well as Kotlin compiler plguins work with Kotlin

Click to attach, drag files, or press ⌘V to paste an image

Activity settings

SO Simon Ogorodnik commented 21 Jun 2022 18:32

1. K2 Compiler is currently in Alpha state and not yet released, so we follow the same approach as with the IR Backend preview.
   That limitation will be removed in Beta.
   Currently, there can be unexpected differences in Kotlin metadata and bytecode
2. Kotlin IR plugins should be portable to K2 if it doesn't use bindingContext or descriptors. Note: `@ObsoleteDescriptorBasedApi`
   FIR has number of extension points already and intended to be pluggable. API isn't stable yet

HOW TO TRY THE NEW COMPILER

GRADLE

```
tasks.withType<KotlinCompile> {
    kotlinOptions {
        jvmTarget = “17”
        languageVersion = "2.0"
    }
}
```

PREFERRED:

```
tasks.withType<KotlinCompile> {
   kotlinOptions.useK2 = true
}
```

MAVEN

```
<build>
<plugins>
 <plugin>
 <groupId>org.jetbrains.kotlin</groupId>
<artifactId>kotlin-maven-plugin</artifactId>
 <configuration>
   <jvmTarget>17</jvmTarget>
   <languageVersion>2.0</languageVersion>
  </configuration>
 </plugin>
</plugins>
</build>
```

```
<configuration>
 <args>
  <arg>-Xuse-k2</arg>
 </args>
 </configuration>
```

WHAT ELSE?

K2 COMPILER PLUGINS API

Frontend

Backend

WHAT ELSE?

K2 COMPILER PLUGINS API

Frontend

Backend

Allopen

Reflekt

WHAT ELSE?

K2 COMPILER PLUGINS API

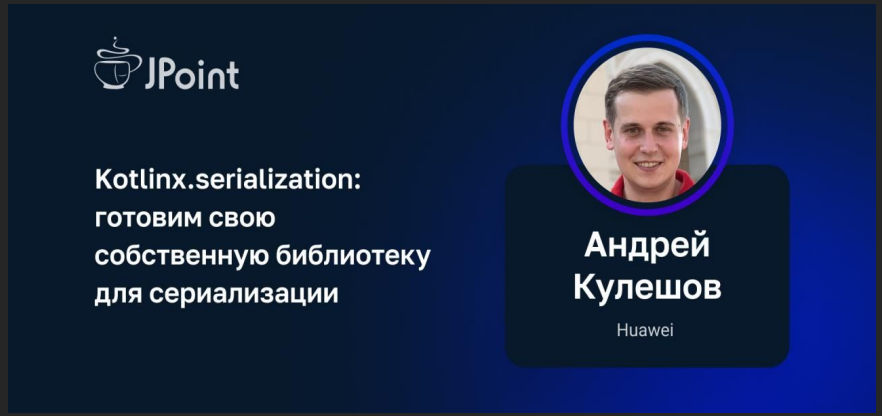
Frontend

Backend

Allopen

Reflekt

kotlinx.serialization



WHAT ELSE?

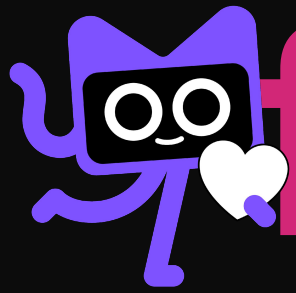
K2 COMPILER PLUGINS API

Planned new DSL for Compiler Plugins !

Generation of new declarations, including top-level functions and properties

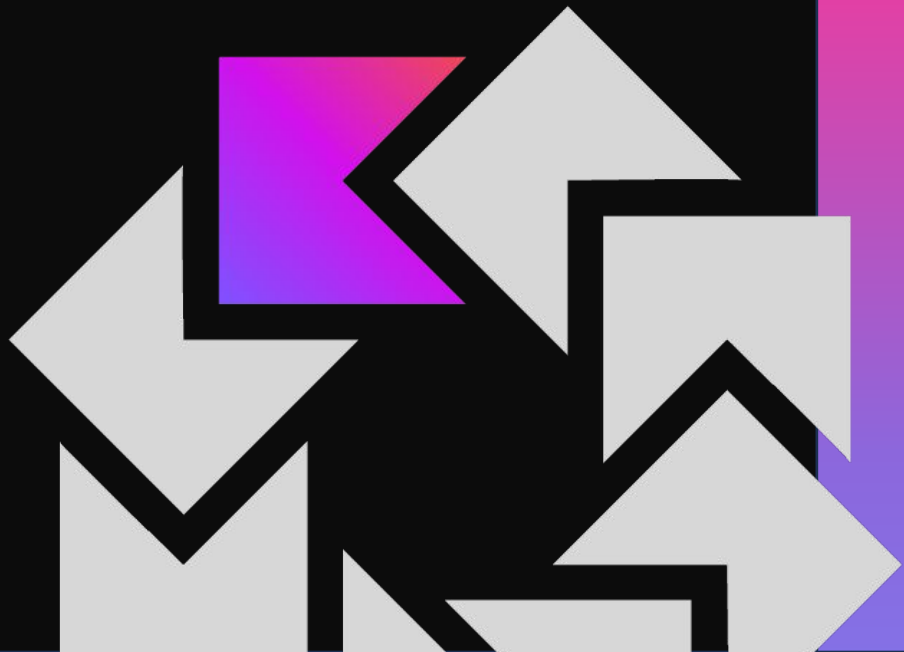
Transformation of modality and visibility

Checkers: for calls and expressions



features

LANGUAGE UPDATES



Experimental

FEATURES

stable

experimental

Java: preview features

which are marked
@ExperimentalApi
@SinceKotlin("x.x")

Experimental: is for a public review

In Kotlin 1.9, a new operator was introduced “..<”
How do you like it?
I would prefer to use the the old and gold “until” more.

“The point of this “experimental” is for the user *to* ***try it and leave the feedback*** and not to wait until it’ll finish to be experimental and
will already be casted in stone in a new release and that's it.” © Simon Ogorodnik

So, operator ..< in 1.9 is already

stable &

Experimental

TO TRY OUT EXPERIMENTAL FEATURES

opt-in

not really for trying features, but it's ok

EAP (early access preview) plugin

really for trying features

Opt-in is a mechanism for Experimental API to keep libraries written on kotlin up-to-date

Opt-in usage

..and use SomeAwesomeFeature … with

as ANNOTATION

```
@OptIn(org.foo.ExperimentalAnn::class)
```

as COMPILER ARG
(project level)

Maven kotlin plugin:

```
<configuration>
    <arg> -opt-in=org.foo.ExperimentalAnn <arg>
</configuration>
```

Gradle:

```
kotlin {
   sourceSets {
        val commonMain by getting{
      languageSettings.optIn("org.foo.ExperimentalAnn")
        }
   }
}
```

UPDATE: from 1.7 no longer required special compiler arg to work

ATTENTION! Please, do not use opt-in with any experimentals in production. Just update kotlin version in a project, when release will come. Your team lead.

Experimental: to have a quick glance

example: experimental features usage in kotlin 1.8

```
@ExperimentalStdlibApi
@SinceKotlin(1.7)
rangeUntil()
```

- use a @OptIn annotation:

```
@OptIn(ExperimentalStdlibApi::class)
fun getSimpleCount() {
    for (i in 1..<10) {
        print(i)
    }
}
```

- **OR** use a global one as a compiler arg (without annotation usage):

```
<arg>-opt-in=kotlin.ExperimentalStdlibApi</arg>
```

Experimental: to have a quick glance

example: experimental features usage in kotlin 1.8

```
@ExperimentalStdlibApi
@SinceKotlin(1.8)
sealed interface EnumEntries
```

- use a @OptIn annotation:

```
@OptIn(ExperimentalStdlibApi::class)
fun getParameterType(title: String): ParameterType =
   ParameterType.entries.find { it.title == title }
```

- **AND** you have to use a compiler arg (without annotation usage):

```
<languageVersion>1.9</languageVersion>
```

Experimental: to have a quick glance

example: experimental features usage in kotlin 1.8

```
@ExperimentalStdlibApi
@SinceKotlin(1.8)
sealed interface EnumEntries
```

- use a @OptIn annotation:

```
@OptIn(ExperimentalStdlibApi::class)
fun getParameterType(title: String): ParameterType =
   ParameterType.entries.find { it.title == title }
```

- **AND** use a compiler arg (without annotation usage):

```
<arg>-XXLanguage:+EnumEntries</arg>
```

you have to enable language version 1.9 because of this flag

which is enabled in 1.9 language version, actually

Experimental: to have a quick glance

For the features that have @SinceKotlin with the same kotlin version as yours:

SO you can USE the

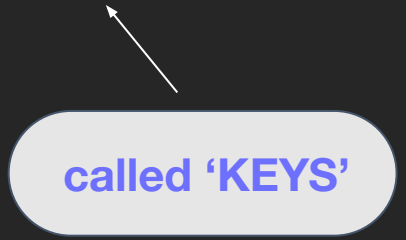
`-language-version x.x`

but you must know
that it's enable the corresponding
compiler version and it will affect you

OR

read the corresponding docs and enable a flag

`-FLAG:+FEATURENAME`



Experimental: to have a quick glance

-language-version x.x

GRADLE:

```
tasks.withType<KotlinCompile> {
    kotlinOptions {
       jvmTarget = “17”
       languageVersion = "1.9"
    }
}
```

MAVEN:

```
<groupId>org.jetbrains.kotlin</groupId>
<artifactId>kotlin-maven-plugin</artifactId>
<configuration>
   <jvmTarget>17</jvmTarget>
   <languageVersion>1.9</languageVersion>
</configuration>
```

-FLAG:+FEATURENAME

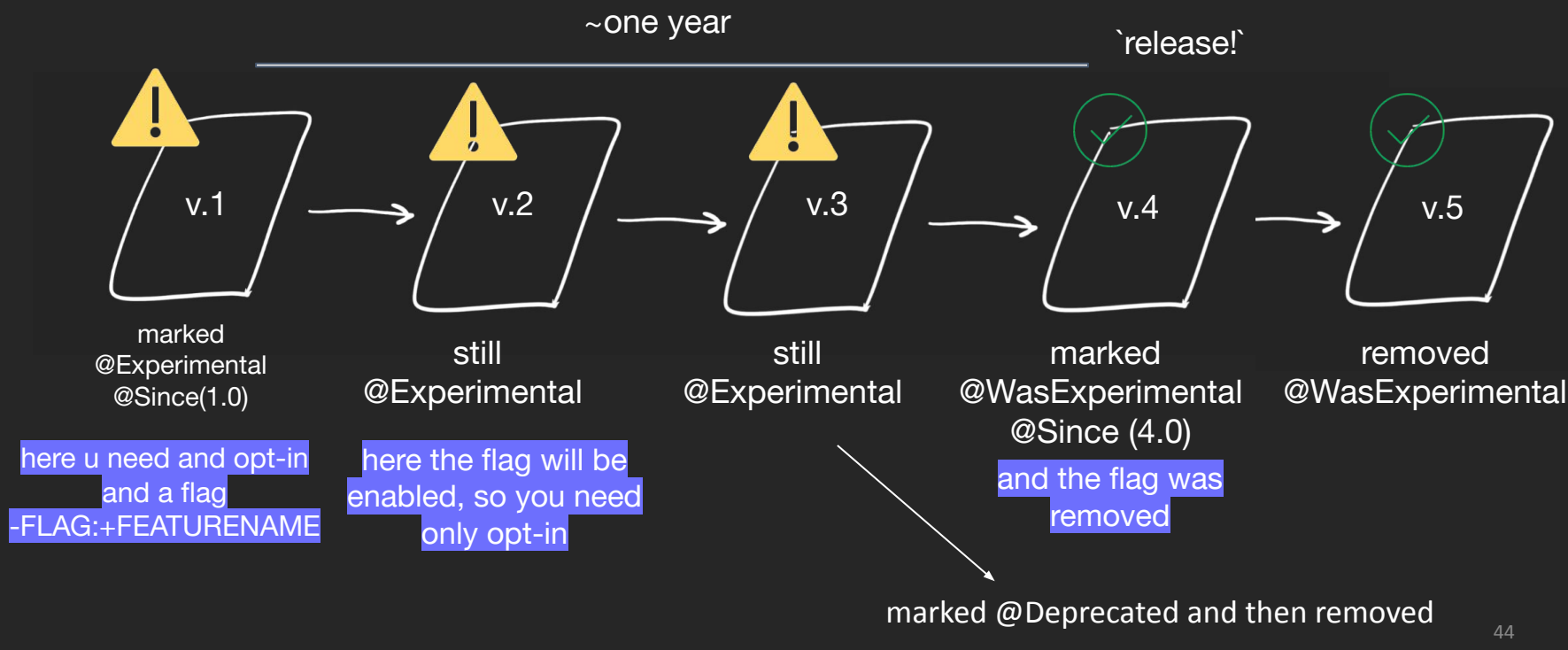
GRADLE:

```
tasks.withType<KotlinCompile> {
   kotlinOptions {
       jvmTarget = "17"
       freeCompilerArgs =
listOf("-XXLanguage:+InlineClasses")
   }
}
```

MAVEN:

```
<groupId>org.jetbrains.kotlin</groupId>
<artifactId>kotlin-maven-plugin</artifactId>
<configuration>
   <jvmTarget>17</jvmTarget>
   <args>
       <arg>-XXLanguage:+InlineClasses</arg>
   </args>
</configuration>
```

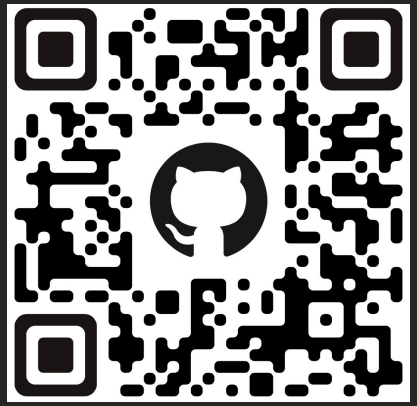
Experimental life cycle:



New features: KEEP in touch

1 step:
Kotlin releases - learn about new ones

2 step:
KEEP (kotlin evolution & enhancement process) - learn for what & how to use



3 step:
left a feedback in YouTrack or KEEP issues or telegram chat

1.7

- Data objects
- K2 alpha
- New operator

...

1.8

- Inline class updates
- K2 beta
- stdLib updates

...

1.9

- kotlin.time updates
- K2 beta
- Stable last features

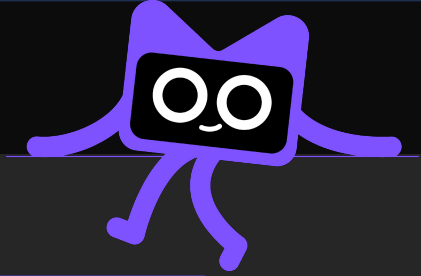
...

2.0

- K2 stable

...

Updates



1.7.0

- Using builders with builder type inference
- Implementation by delegation to an inlined value of an inline class
- Underscore operators for type arguments
- Java optional extensions added

...

1.7.20

- Range Until operator “..<” (experimental)
- Data objects
- Generic inline classes

...

Using custom builders with builder type inference

```
buildList(), buildMap(),.. // all collection builders
                           // have become stable in 1.6
```

```
fun add(value: String) {
  val result = buildList { this: MutableList<String>
      add(value)
  }
}
```

result of Builder Type Inference work

```
fun add(value: String) {
   val result : List<String> = buildList {
        add(value)
   }
}
```

without its work, you have to specify the type explicitly

SinceKotlin (1.7)

Using custom builders with builder type inference

```
class ItemHolder<T> {
  ...
}
```

Until version 1.7, when you're writing your own builder, you have to enable the opt-in or set a compiler flag: `-Xenable-builder-inference`

```
@OptIn(ExperimentalTypeInference::class)
fun <T> itemHolderBuilder(@BuilderInference builder: ItemHolder<T>.() → Unit):
ItemHolder<T> = ItemHolder<T>().apply(builder)


fun test(s: String) {
val itemHolder = itemHolderBuilder { this: ItemHolder<String>
    addItem(s)
}
```

SinceKotlin(1.7)

Using custom builders with builder type inference

As for now, the compiler option -Xenable-builder-inference is enabled by default in 1.7, so you don't have to do anything to make it's worked

```
fun <T> itemHolderBuilder(builder: ItemHolder<T>.() → Unit): ItemHolder<T> =
   ItemHolder<T>().apply(builder)


fun test(s: String) {
val itemHolder = itemHolderBuilder { this: ItemHolder<String>
    addItem(s)
}
```

SinceKotlin(1.7)

Underscore operators for type arguments

Use it to **automatically infer a type** of the argument when other type is explicitly specified:

```
fun <K, T> foo(x: (K) → T): (K) → T = x


fun main() {
    val x = foo<Int, _> { it.toFloat() } (4) // Float
    val x1 = foo<Int, _> { it.toDouble() } (4) // Double
}
```

not to type foo<Int,Double> or foo<Int,Float>

SinceKotlin(1.7)

Data objects

stable in 1.9

```
data object SomeObject
```

Intended as extension for object

- is an object declaration

```
//Characteristics:
from object keyword:
```

- creates a singleton class

```
from data keyword:
```

- equals(), hashCode(), toString()

```
//Limitations:
```

- no copy() and componentN() usage

SinceKotlin(1.7)

Data objects

stable in 1.9

```
sealed interface ReadResult
data class Text(val text: String) : ReadResult


object EndOfFile : ReadResult {
    override fun toString() = “EndOfFile” // ??
}


fun main() {
 println(Text(“some text”)) // Text: “some text”
 println(EndOfFile) // EndOfFile
}
```

SinceKotlin(1.7)

Data objects

stable in 1.9

```
sealed interface ReadResult
data class Text(val text: String) : ReadResult
data object EndOfFile : ReadResult


fun main() {
  println(EndOfFile) // EndOfFile
}
```

With ‘data’ keyword we have autogenered `equals()`, `hashcode()` and `toString()`

SinceKotlin(1.7)

Extensions for Java Optional in stdLib

stable in 1.8

kotlin-stdlib/kotlin.jvm.optionals

`getOrNull()`

`getOrDefault()`

`getOrElse()`

...

related
YouTrack ticket

Spring Data JPA How to use Kotlin nulls instead of Optional

```
Optional<T> findById(ID id);
val result = findById(id).orElse(null)
```

SinceKotlin(1.7)

Extensions for Java Optional in stdLib

stable in 1.8

kotlin-stdlib/kotlin.jvm.optionals

- `getOrNull()`
- `getOrDefault()`
- `getOrElse()`
- ...

related
YouTrack ticket

```
@SinceKotlin("1.8")
@WasExperimental(ExperimentalStdlibApi::class)
public fun <T : Any> Optional<T>.getOrNull(): T? = orElse(null)
```

SinceKotlin(1.7)

1.7

- Data objects
- K2 alpha
- New operator

...

1.8

- Inline class updates
- K2 beta
- stdLib updates

...

1.9

- kotlin.time updates
- K2 beta
- Stable last features

...

2.0

- K2 stable

...

Updates

1.8.0

- comparable and substractical Time marks
- extensions for java.nio.file.path

...

1.8.20

- secondary constructors for inline classes
- entries property for enums

...

Inline class updates

SINCE 1.2.30 inline classes was @Experimental ⚠️

```
//old version
inline class Duration(val value: Long)
```

SINCE 1.5 THEY BECAME STABLE ✓
BUT WAS MODIFIED:

```
inline function
inline property
@JvmInline
inline value class
```

KEEP Design Notes on Kotlin Value Classes

Inline class updates

```
@JvmInline
value class Duration(val value: String)
```

underlying property

Intended as a wrapper over value

- is a value-based class

```
//Characteristics:
```

- init{}, first, second constructors
- you can define member functions and properties

...

```
//Limitations:
```

- only one immutable underlying property is allowed (for now)

...

Inline class updates

OK, but..

here is the *value*

```
@JvmInline
value class Name(val s: String)
```

and *inline* is now here!

Inline class updates

Java Valhalla Project

VALUE CLASSES

the main idea - performance optimization

```
//instantiate a class
val period = new Hours(24)

//& it's compiled like a primitive
int period = 24;
```

"Codes like a class, works like an int!"

Project Valhalla docs

Actual JEP

Inline class updates

VALUE CLASSES

```
PointVal pv1 = PointVal(1, 2);
PointVal pv2 = PointVal(1, 2);

(pv1 == pv2);//false          (pv1 == pv2);//true
```

usual identity class *value class*

```
value class PointVal (Java)
```

Inline class updates

KOTLIN VALUE CLASS HAS NO IDENTITY SAME AS VALHALLA'S VALUE

Example: two Kotlin (inline) value classes comparison

```
@JvmInline
value class SomeVal(val s: Int)
```

```
fun main() {
    val some = SomeVal( s: 4)
    val some2 = SomeVal( s: 4)
    println(some === some2)
}
```

Identity equality for arguments of types SomeVal and SomeVal is forbidden

Inline class updates

Valhalla inline classes
vs Kotlin inline classes:

Inline classes in Valhalla named like that, because instead of the class *its content is substituted*.

Kotlin inline classes as soon as they appeared were realized on the Valhalla inline classes concept.

Then Valhalla simply changed the name to value classes, but regardless of them Kotlin also has changed the semantics.

Inline class updates

Optimize away boxes when possible

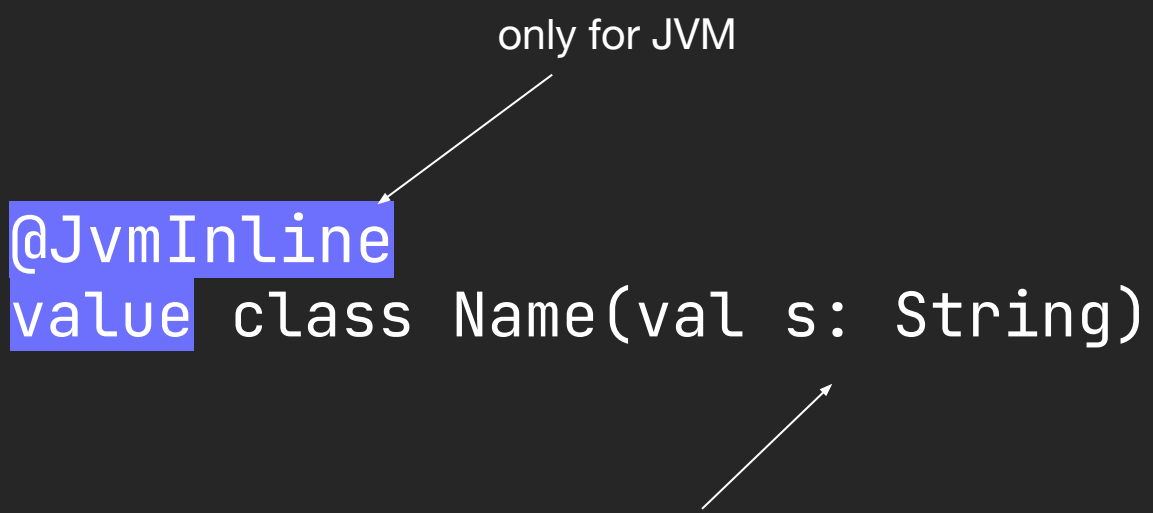
```
@__TBD__
val class Color(val rgb: Int)
```

No stable identity

We want interoperability with future Valhalla in Java, when it's JEP will be accepted

Value class updates

So, that's why we have this:



Plans & expectations

Plan: multi-field value (inline) class

Java value classes are planned as a usual classes with keyword ‘value’

```
value class PointVal {
    int x, y;
    PointVal(int x, int y){
        this.x = x;
        this.y = y;
    }
}
```

Multi-field value classes
KEEP proposal

Kotlin team already has a realization of multi-field value classes, available by key:

```
@JvmInline
value class PointVal(val x: Int, val y: Int)
```

-Xvalue-classes

Inline class updates

stable in 1.9

secondary constructors with bodies in inline classes

```
@JvmInline
value class Name(private val name: String) {

    //since kotlin 1.4.30
    init {
        check(name.isNotBlank()) {
            "shouldn't be empty"
        }
    }

    //since kotlin 1.8.20
    constructor(firstName: String, secondName: String) : this("$firstName + $secondName") {
        println(name)
    }

}
```

SinceKotlin(1.8)

Inline class updates

Implementation by delegation to inlined value of inlined class is allowed with interfaces:

```
interface MyInterface {
 fun bar()
 fun foo() = "foo"
}

@JvmInline
value class MyInterfaceWrapper(val value: MyInterface) : MyInterface by value

fun main() {
val my = MyInterfaceWrapper(object : MyInterface {
    override fun bar() {
        // body
     }
 })
}
```

SinceKotlin (1.7)

Inline class updates

Generic inline classes

```
value class MyWrapper<T>(val value: T)
```

```
sealed class Games
data class BoardGame(val name: String, val playersQty: Int) : Games()
data class Cards(val cardsInDeck: Int) : Games()

sealed class Work

@JvmInline
value class MyDailyOccupation<T>(val occupation: T)

fun getTodayOccupation(plan: MyDailyOccupation<Games>) {
    when (val toDo = plan.occupation) {
        is BoardGame → println("BoardGame ${toDo.name}! Look for friends to play: ${toDo.playersQty}")
        is Cards → println("Cards! Take along the ${toDo.cardsInDeck} deck")
    }
}

fun main() {
    getTodayOccupation(MyDailyOccupation(BoardGame("Imaginarium", 4)))
    getTodayOccupation(MyDailyOccupation(Work))
}
```

SinceKotlin (1.7)

1.7

- Data objects
- K2 alpha
- New operator

...

1.8

- Inline class updates
- K2 beta
- stdLib updates

...

1.9

- kotlin.time updates
- K2 beta
- Stable last features

...

2.0

- K2 stable

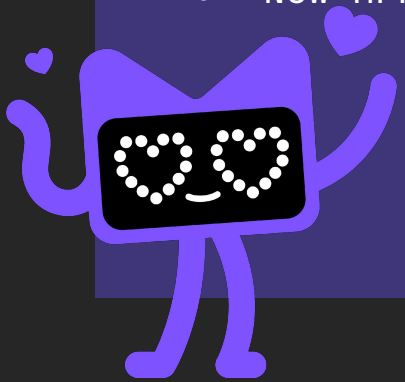
...

Updates

now 1.9.10

1.9.0

- Full time API now is stable
- New gradle settings
- Stable ..<
- New MPP project model



1.9.20

- KAPT with **K2**
- Kotlin/WASM with **K2**
- GC performance
- Xcode 15 support
- Autocreation of source sets for multiplatform

Stable ..< operator for open-ended ranges

stable in 1.9

```
number in 1..<10
```

Intended as
rangeUntil operator

```
/**
* Creates an open-ended range from this [Double] value to the specified [that]
value.
*
* Numbers are compared with the ends of this range according to IEEE-754.
*/
@SinceKotlin("1.9")
@WasExperimental(ExperimentalStdlibApi::class)
public operator fun Double.rangeUntil
```

```
for (number in 2..<10) { }
```

SinceKotlin(1.7)

Apple targets with gradle

Kotlin 1.9.0 and earlier (a standard setup)

```
kotlin {
    androidTarget()
    iosArm64()
    iosSimulatorArm64()

    sourceSets {
        val commonMain by getting

        val iosMain by creating {
            dependsOn(commonMain)
        }

        val iosArm64Main by getting {
            dependsOn(iosMain)
        }

        val iosSimulatorArm64Main by getting {
            dependsOn(iosMain)
        }
    }
}
```

Kotlin 1.9.20-RC

```
kotlin {
    androidTarget()
    iosArm64()
    iosSimulatorArm64()

    // The iosMain source set is cr
}
```

Updates

now 1.9.10

1.9.0

- Full time API now is stable
- New gradle settings
- Stable

1.9.2

- Xcode 15 support
- Autocreation of source sets for multiplatform

K2 COMPILER

1.7

- Data objects
- K2 alpha
- New operators

...

1.8

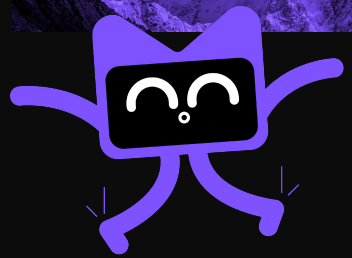
- Inline class updates
- K2 beta
- stdLib updates

...

1.9

- kotlin.time updates
- K2 beta
- Stable last features

...



IN THE MEANTIME

KOTLIN

Github: **anyonepaw**
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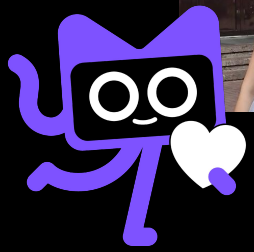

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