

The Wider Java Ecosystem



Sander Mak

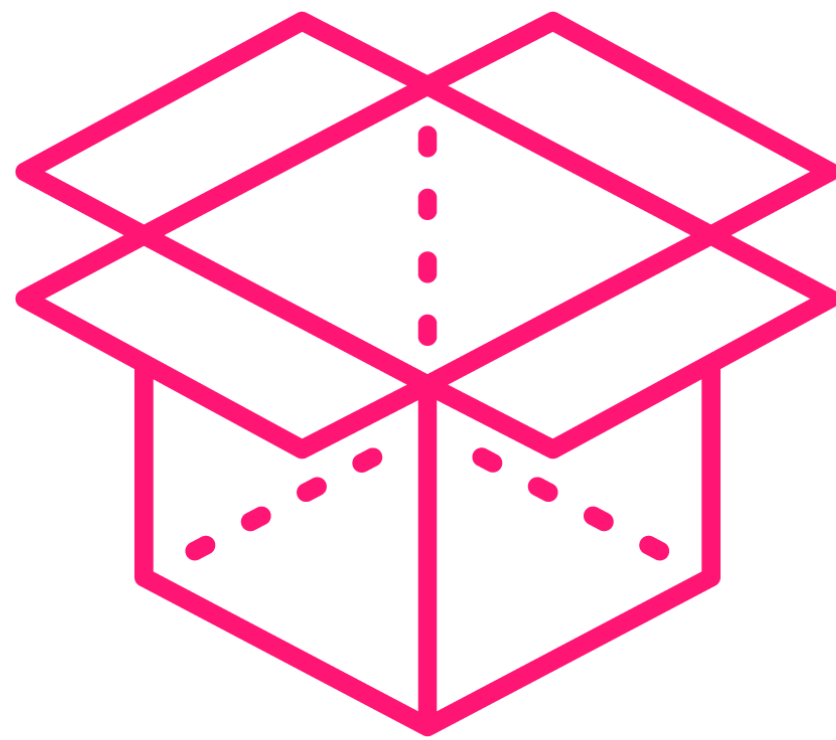
Java Champion

@sander_mak

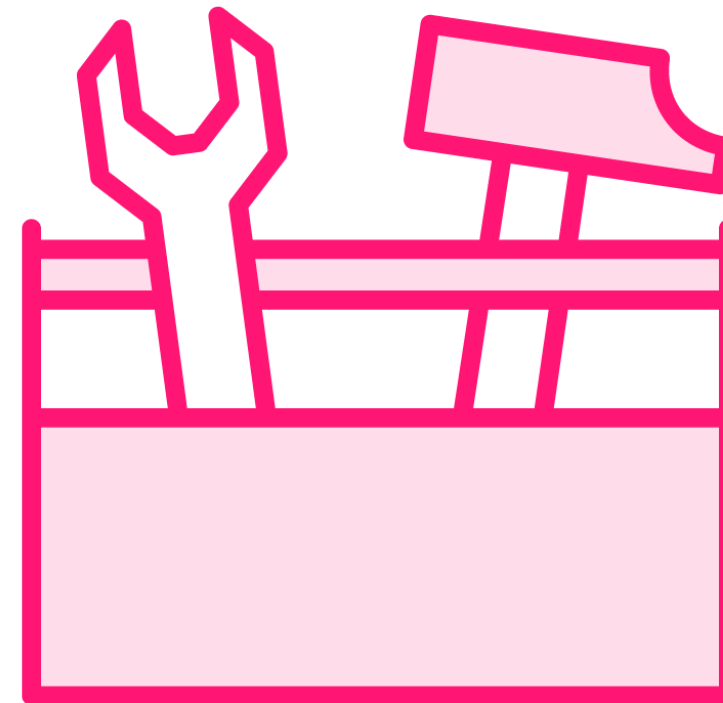


The Wider Java Ecosystem

Libraries



Tools

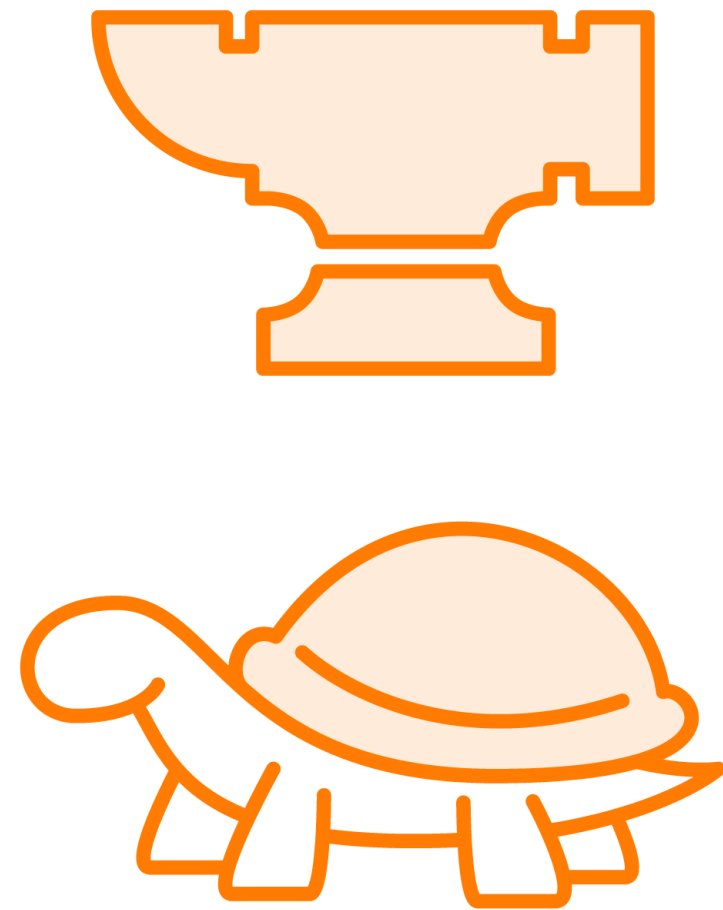


Languages

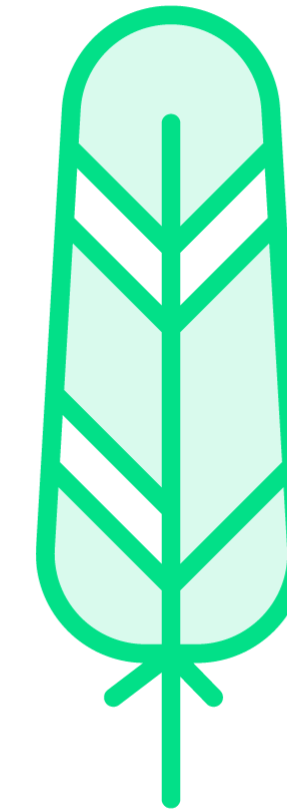


Spring Framework

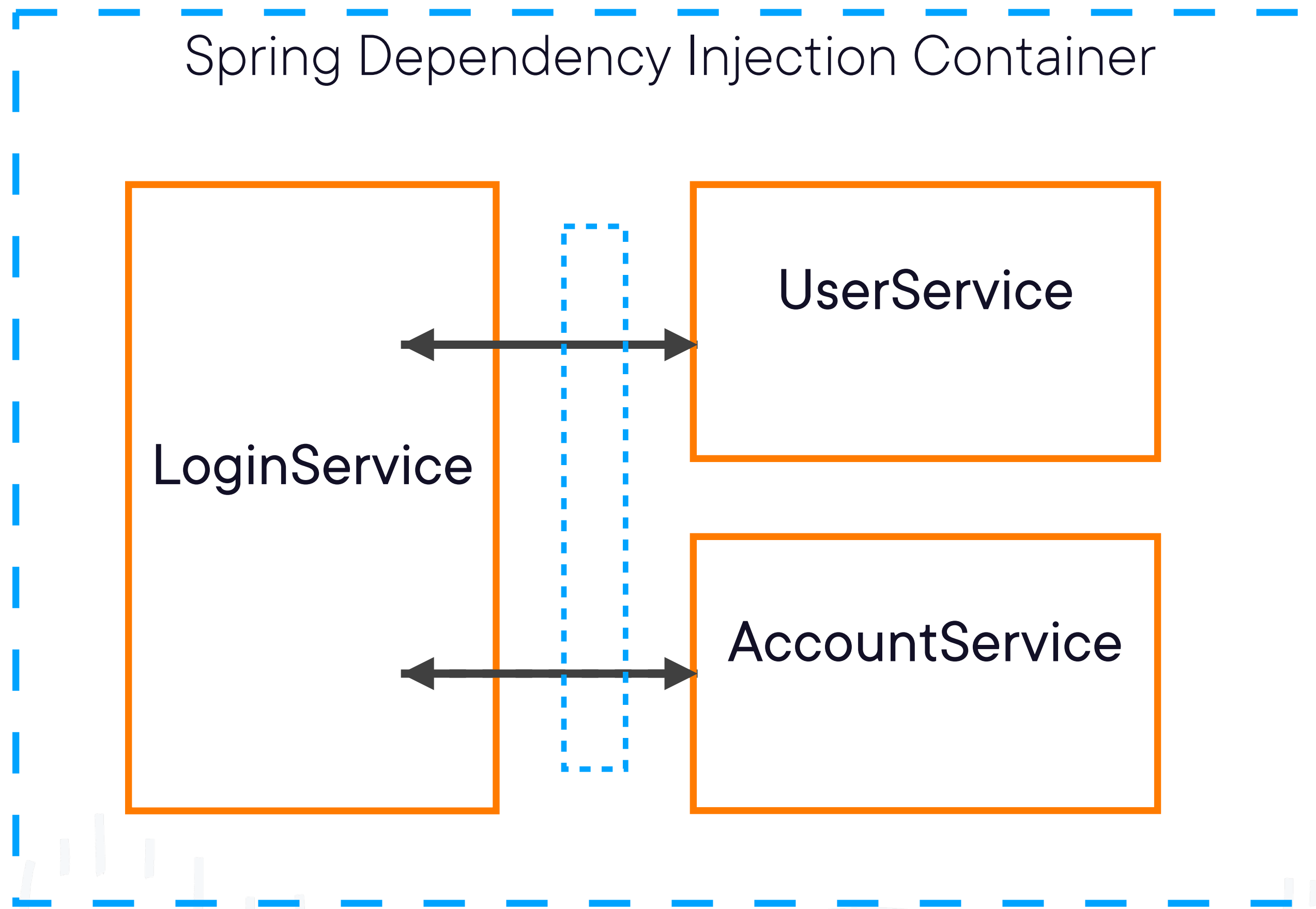
Perception of Java EE



Spring as **challenger**



Spring: Dependency Injection



Web MVC

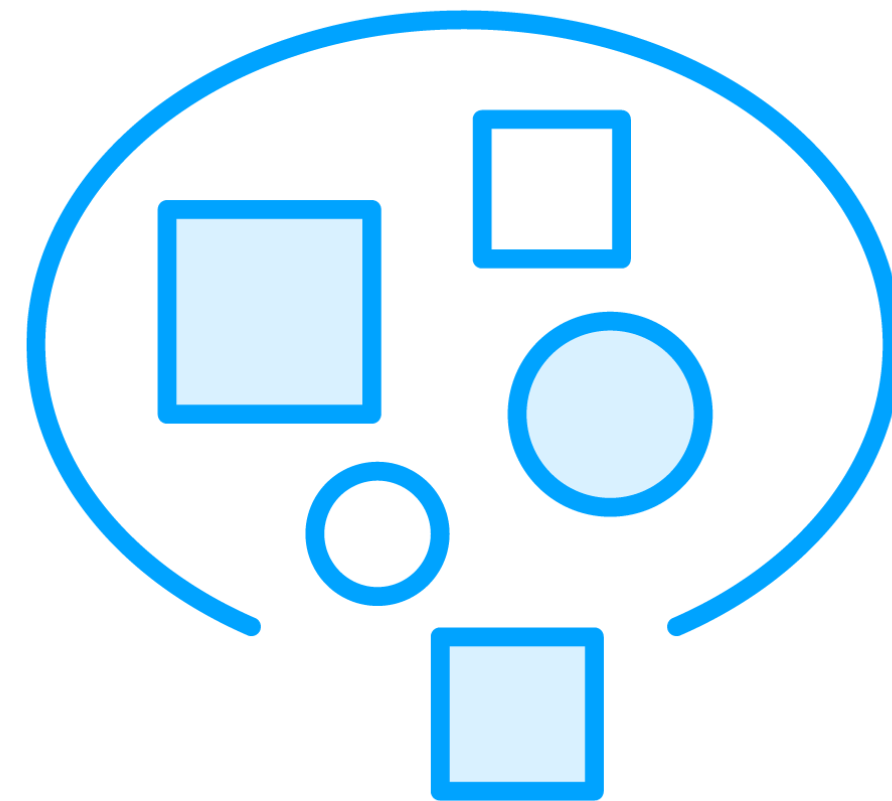
Tight coupling

WebFlux

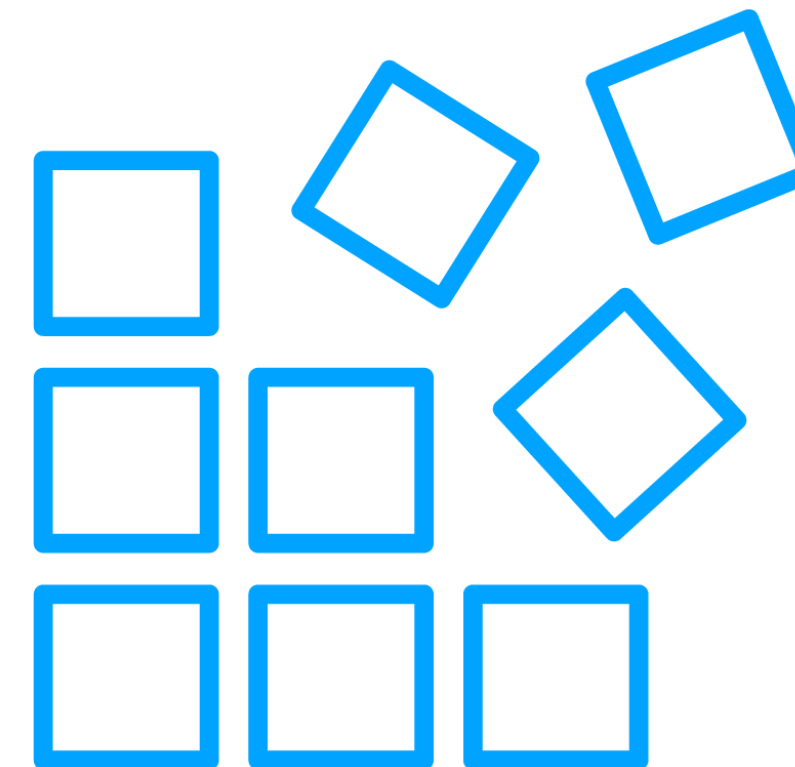
Borderless isolation

Other Popular Java Libraries

Framework



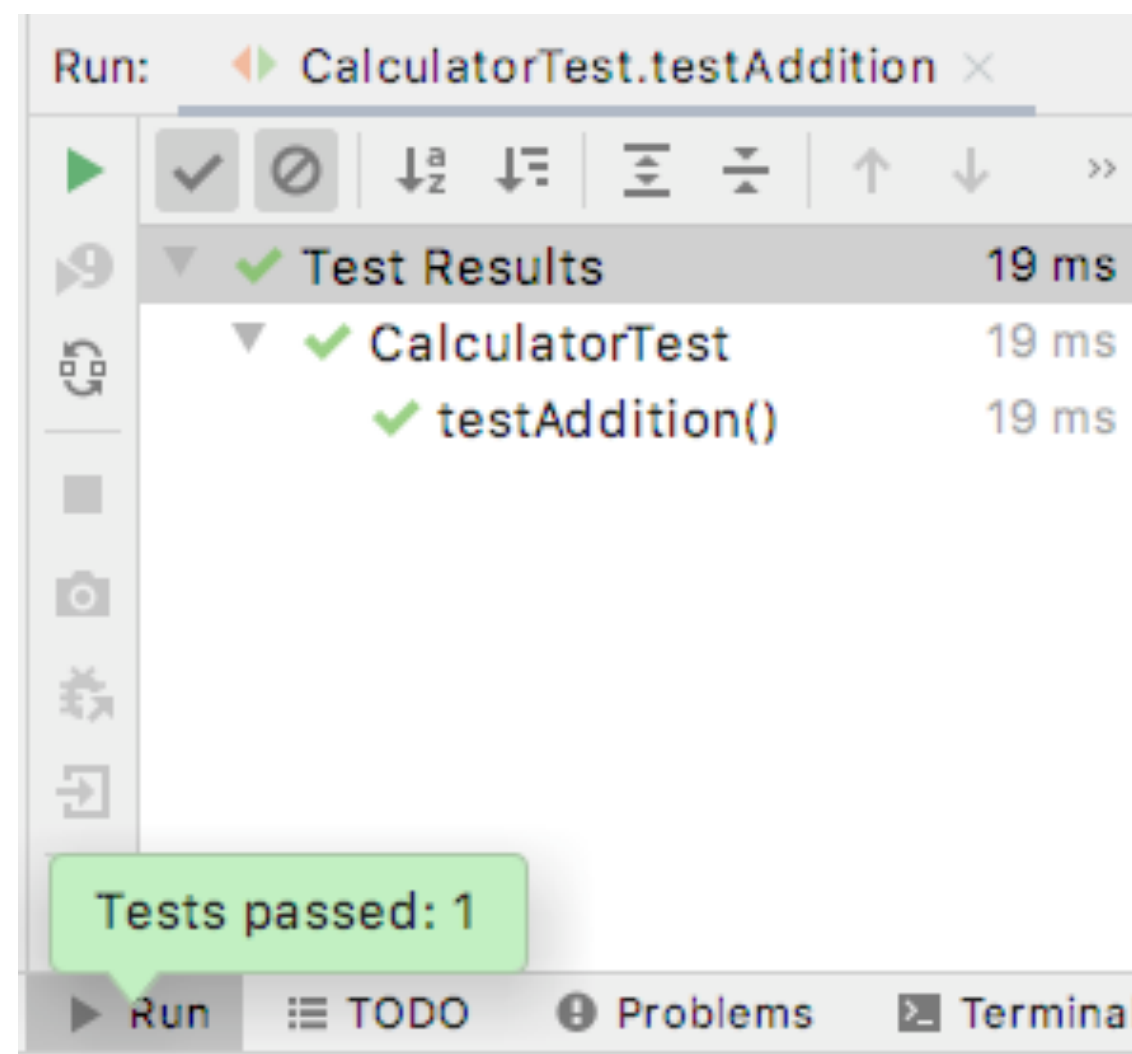
Libraries



Test Libraries

JUnit

Mockito



CalculatorTest.java

```
public class CalculatorTest {  
  
    @Test  
    public void testAddition(){  
  
    }  
  
}
```

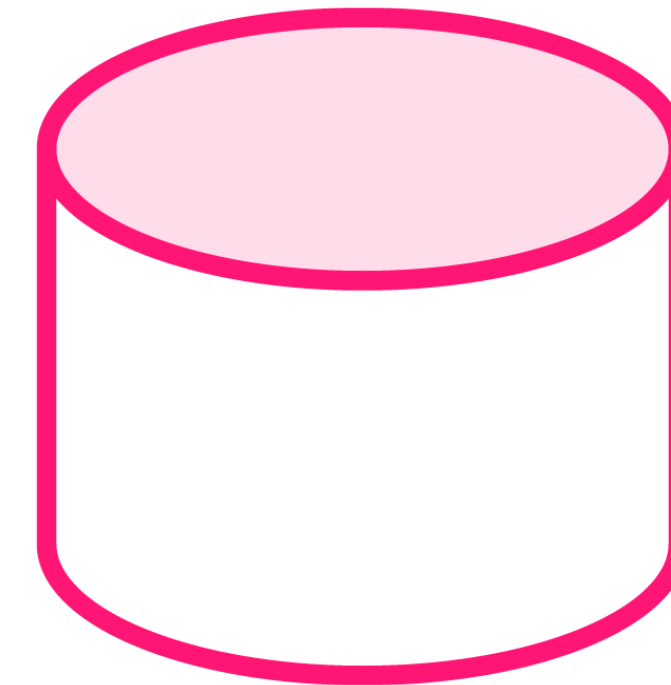
Data Persistence



Object



Object-Relational
Mapping (ORM)



Relational Database

Hibernate (JPA implementation)

Java Database Connectivity (JDBC)

JSON Processing



Object



(De-)serialization

{JSON}

JSON representation

Jackson

Gson

JSON-B(inding)

Apache Commons



<https://apache.org>

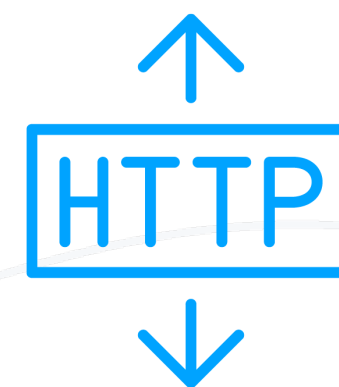
Commons CLI

Commons IO

Commons CSV

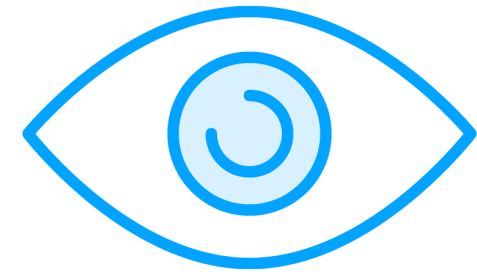
Commons ...

<https://commons.apache.org>



Apache HTTP Client

Logging



Monitoring and troubleshooting
through application logging

Simple Logging Facade for Java (SLF4J)

Logback

Log4j

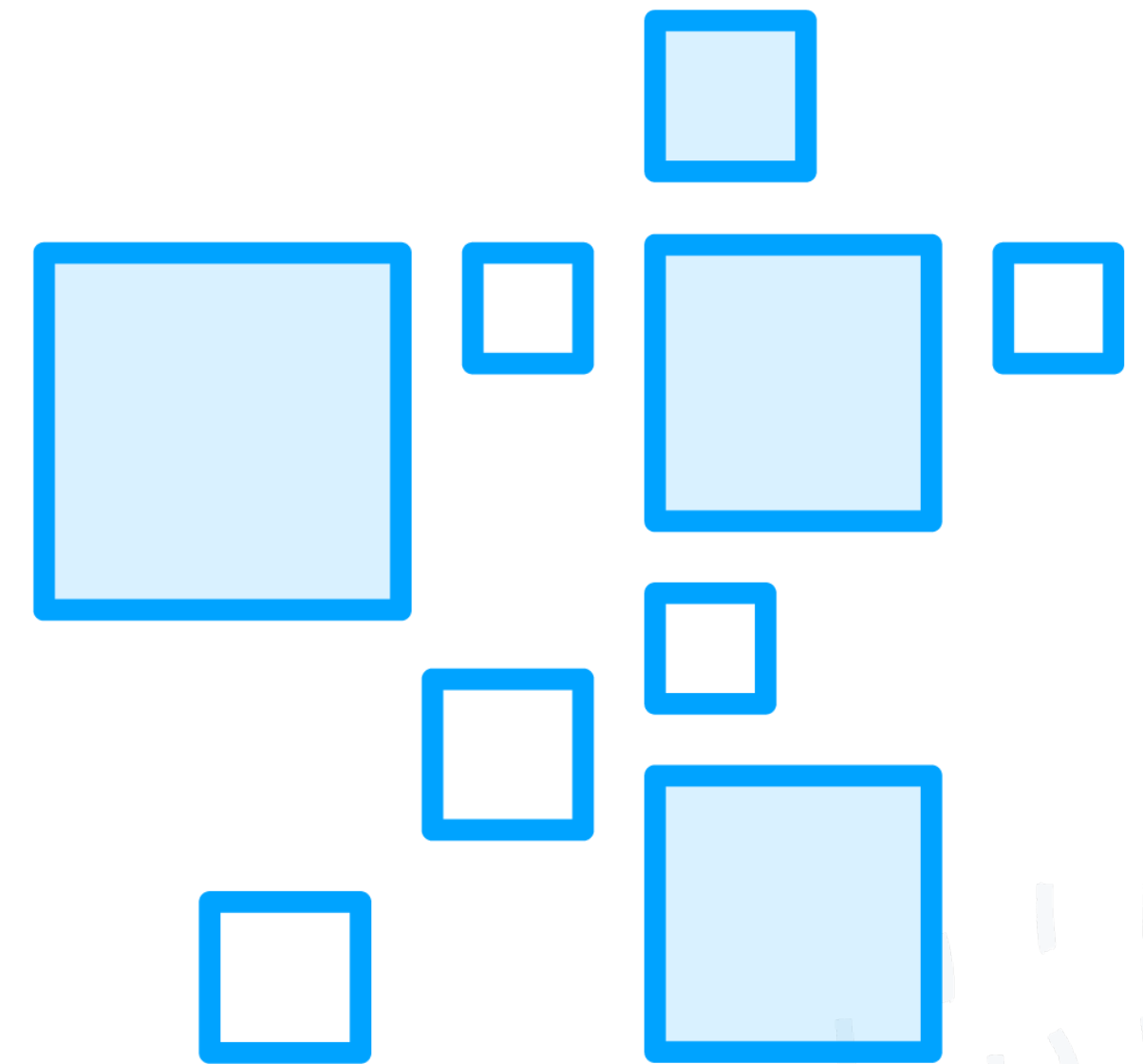
Commons Logging

Other Libraries

Reactive programming: Project Reactor, Akka

High-performance networking: Netty

Caching: Caffeine, Hazelcast, Ehcache



Tools

```
7  public class CalculatorTest {  
8  
9      @Test  
10     public void testAddition() {  
11         Calculator calc = new Calculator();  
12         int calculatedAnswer = calc.add(1, 2);  
13         assertEquals(expected: 3, calculatedAnswer);  
14     }  
15 }
```

Syntax highlighting

```
int calculatedAnswer = calc.  
└─ add(int i, int j)      int  
   hashCode()            int  
   cast                  ((SomeType) expr)  
   equals(Object obj)    boolean  
   arg                   functionCall(expr)  
   toString()            String  
   getClass()            Class<? extends Calculator>  
   notify()              void  
   notifyAll()           void  
   wait()                void  
   wait(long timeoutMillis) void  
   wait(long timeoutMillis, int nanos) void  
Press ⌘ to insert, ⇧ to replace
```

Auto-completion

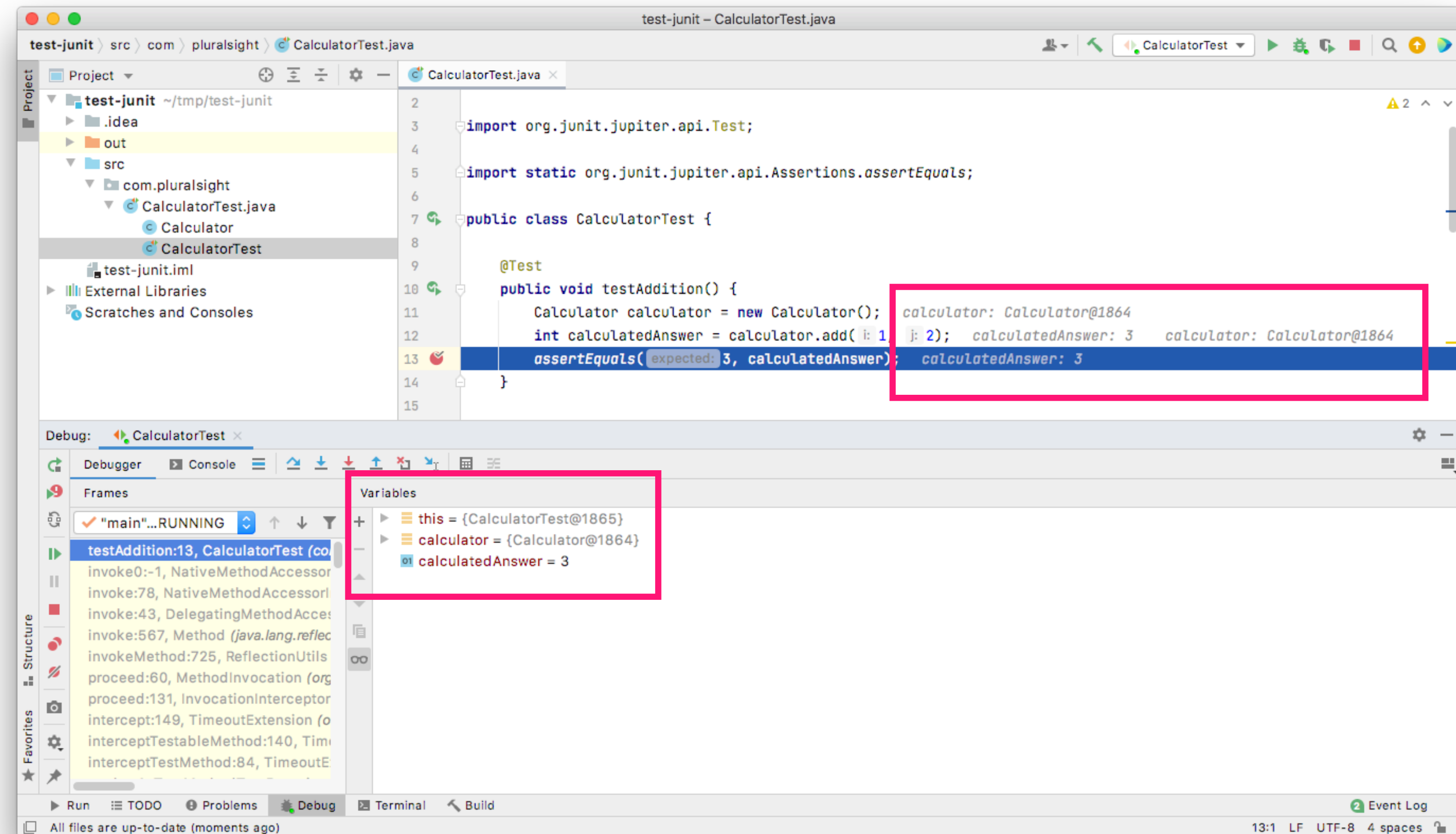
```
@Test  
public void testAddition() {  
    Calculator calculator = new Calculator();  
    int calculatedAnswer = calculator.add(1, 2);  
    assertEquals(expected: 3, calculatedAnswer);  
}
```

Refactoring

Integrated Development Environment

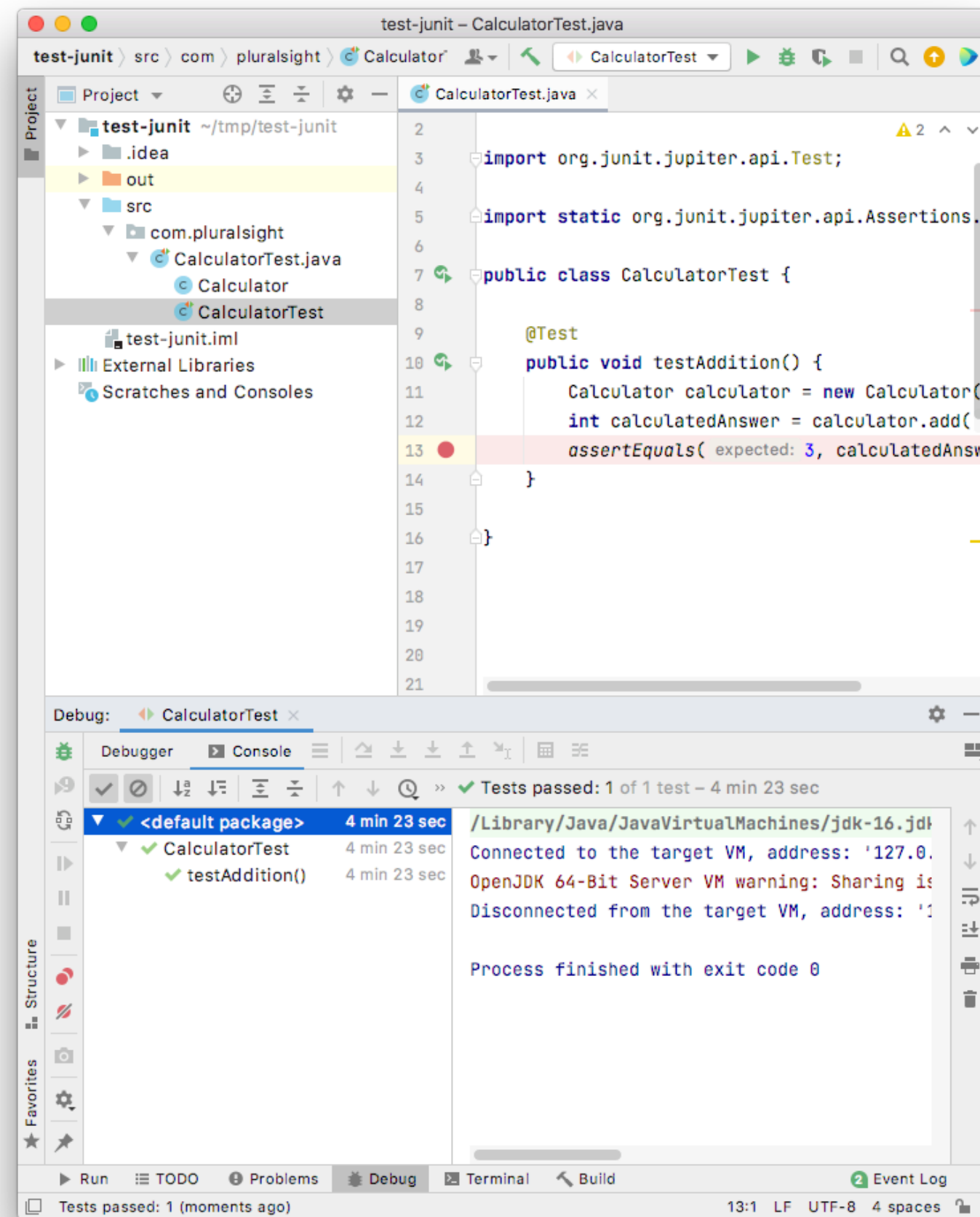
Tools: IDEs

Compiling, running,
and debugging

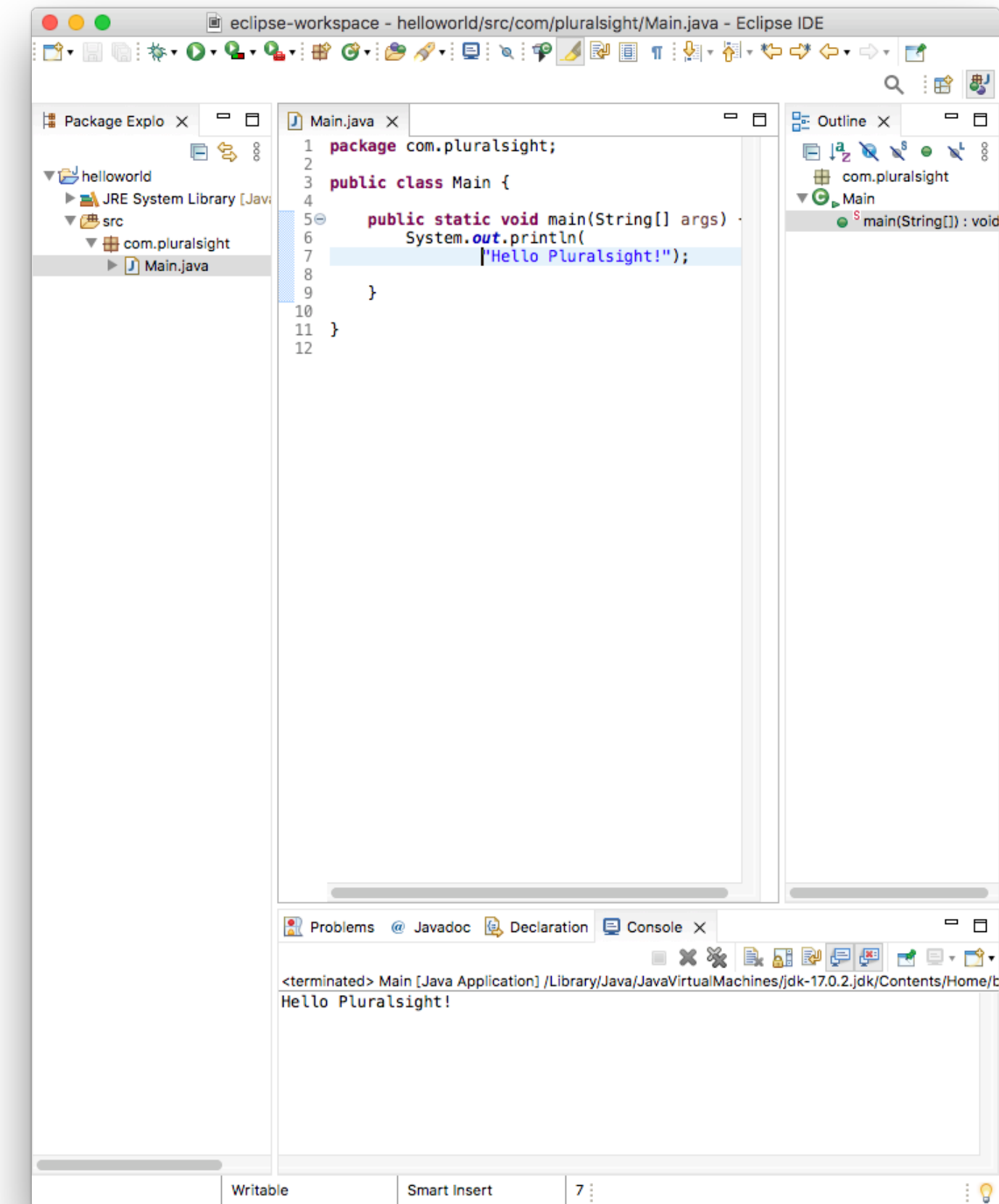


Integrated Development Environment

Tools: IDEs



**IntelliJ IDEA
(Community Edition)**



Eclipse

Build Tools

Repeatable builds:

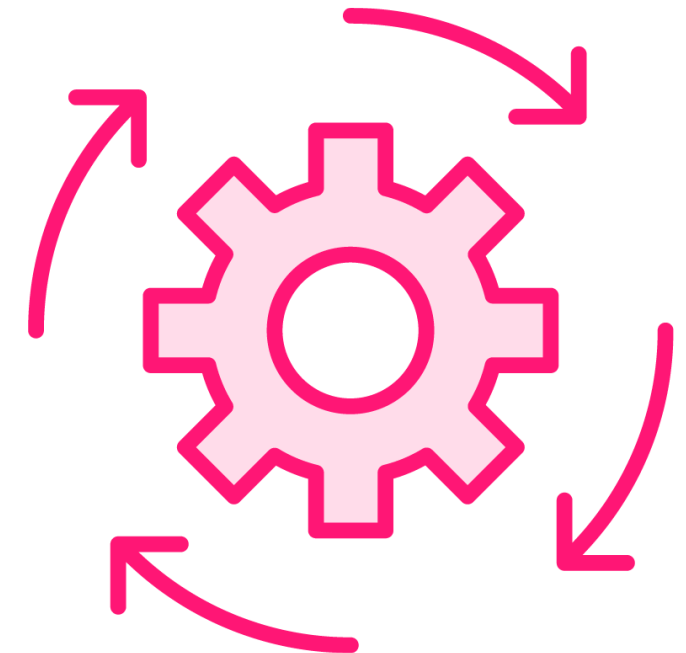
Compile

Test

Package

Managing multiple modules

Manage external dependencies



Build Tools

Maven

pom.xml

```
<project>
  <modelVersion>4.0.0</modelVersion>

  <groupId>com.mycompany.app</groupId>
  <artifactId>my-app</artifactId>
  <version>1.0</version>

  <dependencies>
    ...
  </dependencies>
</project>
```

Gradle

```
src/
  main/
    java/
      ...
  test/
    java/
      ...
      ...
```

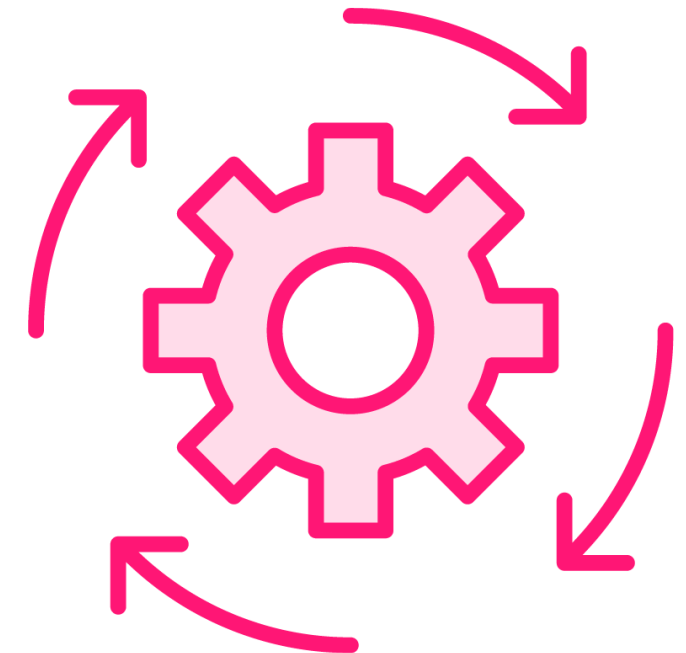
Build Tools

Gradle

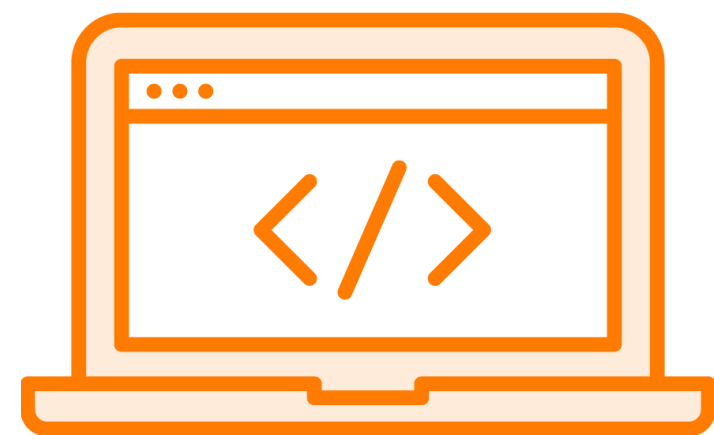
Groovy build script

Flexible, but less uniform

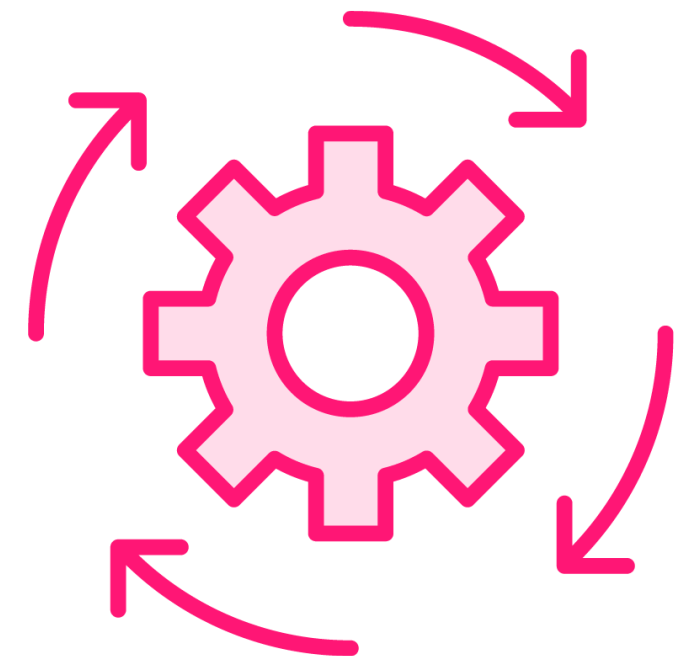
Incremental builds



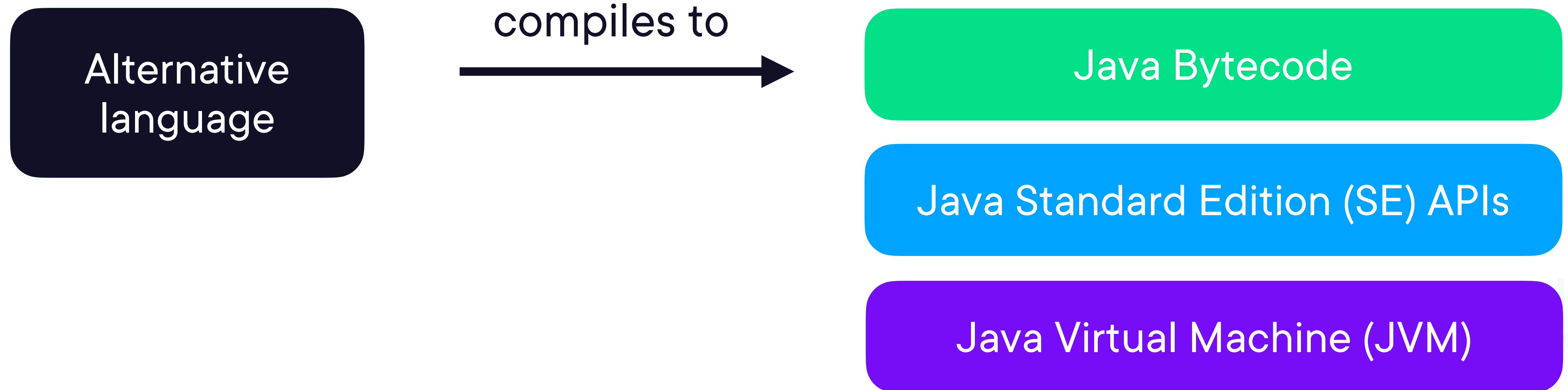
Build Tools



```
<dependency>  
  <groupId>io.netty</groupId>  
  <artifactId>netty-all</artifactId>  
  <version>4.1.30</version>  
</dependency>
```



Alternative JVM Languages



Alternative JVM Languages



Productivity

No backward compatibility constraints


Different programming paradigms

Scala

Extensive type system

OO & functional features

Steep learning curve



The screenshot shows the Scala website homepage. At the top, there is a navigation bar with links: LEARN, INSTALL, PLAYGROUND, FIND A LIBRARY, COMMUNITY, and BLOG. The main header features the Scala logo (three horizontal bars) and the word "Scala". Below the logo, a tagline reads: "A programming language that scales with you: from small scripts to large multiplatform applications." Underneath the tagline, there are buttons for "SCALA 3.4.2", "SCALA 3.3.3", "SCALA 2.13.14", and "ALL RELEASES". To the right, a code editor titled "Functional programming with immutable collections" displays Scala code for counting fruit characters. The code includes a list of fruits, a grouping operation, and a for-loop with a do-block for printing results. A "Run in playground" button is next to the code. Below the code editor, a progress bar shows "1/4". At the bottom, there are two large blue buttons: "GET STARTED" and "DOCUMENTATION", separated by the Scala logo. Below these buttons, there are links: "Overview • Guide • Courses" and "API Docs • Migrate to Scala 3".

LEARN INSTALL PLAYGROUND FIND A LIBRARY COMMUNITY BLOG

Scala

A programming language that scales with you: from small scripts to large multiplatform applications.

SCALA 3.4.2 SCALA 3.3.3 SCALA 2.13.14 ALL RELEASES

Functional programming with immutable collections

```
val fruits = List("apple", "banana", "avocado", "papaya")

val countsToFruits = // count how many 'a' in each fruit
  fruits.groupBy(fruit => fruit.count(_ == 'a'))

for (count, fruits) <- countsToFruits do
  println(s"with 'a' x $count = $fruits")
// prints: with 'a' x 1 = List(apple)
// prints: with 'a' x 2 = List(avocado)
// prints: with 'a' x 3 = List(banana, papaya)
```

Run in playground ▶

1/4

High-level operations avoid the need for complex and error-prone loops.

GET STARTED DOCUMENTATION

Overview • Guide • Courses API Docs • Migrate to Scala 3

<https://scala-lang.org>

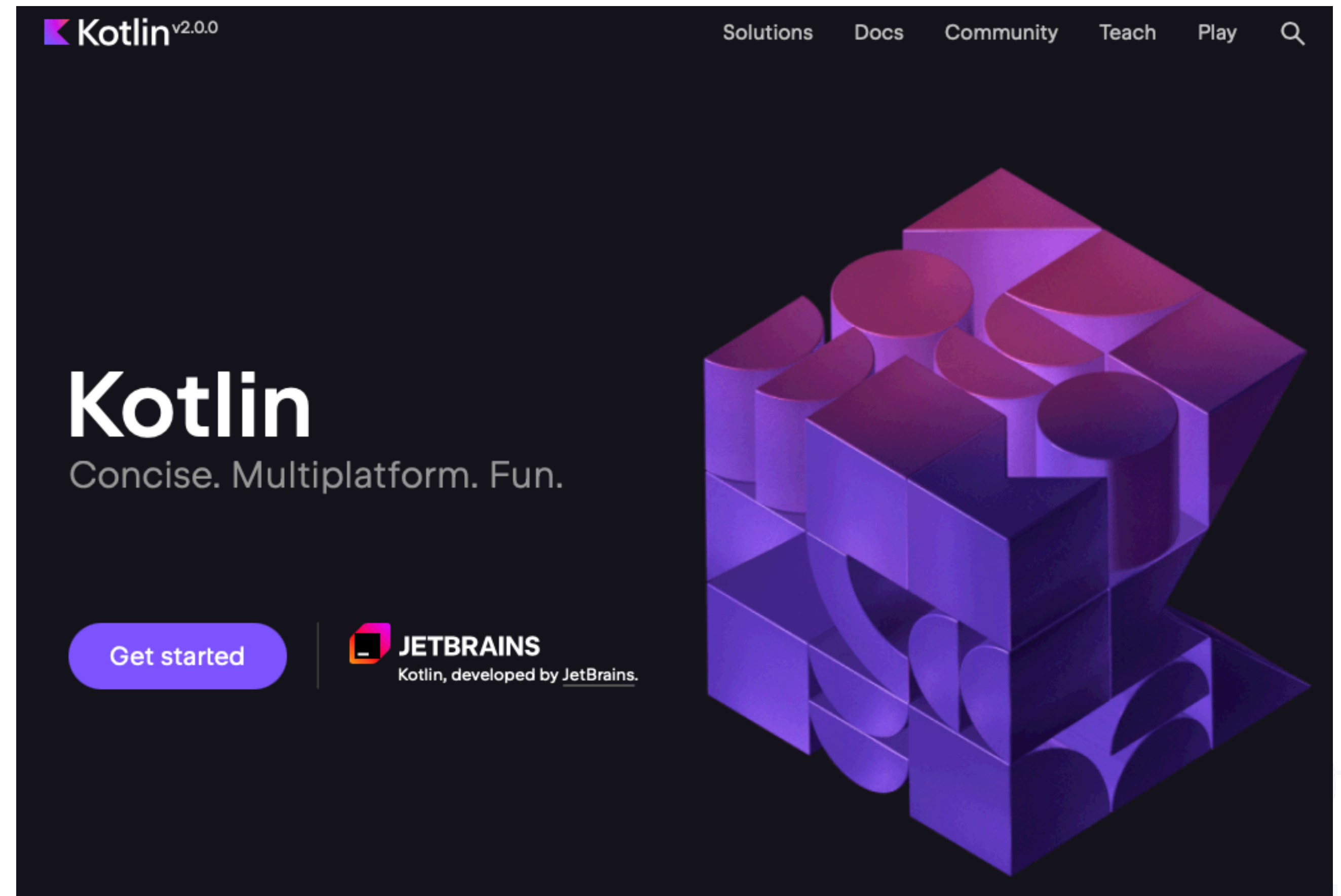
Kotlin

Created by JetBrains

Java interoperability

Official language for Android

Multiple platforms



<https://kotlinlang.org>

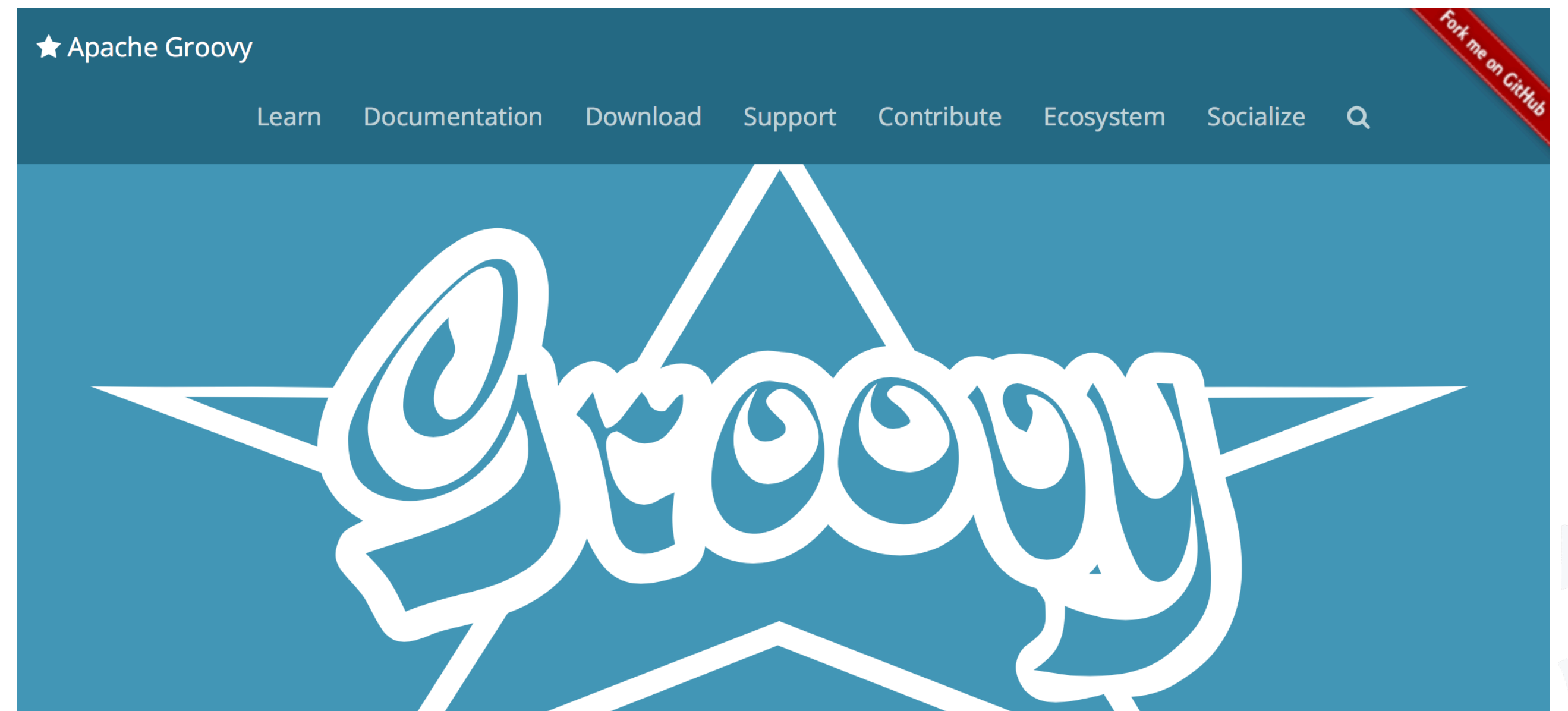
Groovy

Interpreted language

Dynamic typing

Optional typing & compilation

Mix with Java code



A multi-faceted language for the Java platform

<https://groovy-lang.org>

Course Wrap-up

**Introducing the
Java Platform**

**Adopting
Java**

**Working with
Java**

**The Wider Java
Ecosystem**

Recommend Resources



Java SE Path



Java SE Fundamentals



Spring/Jakarta EE Big Picture



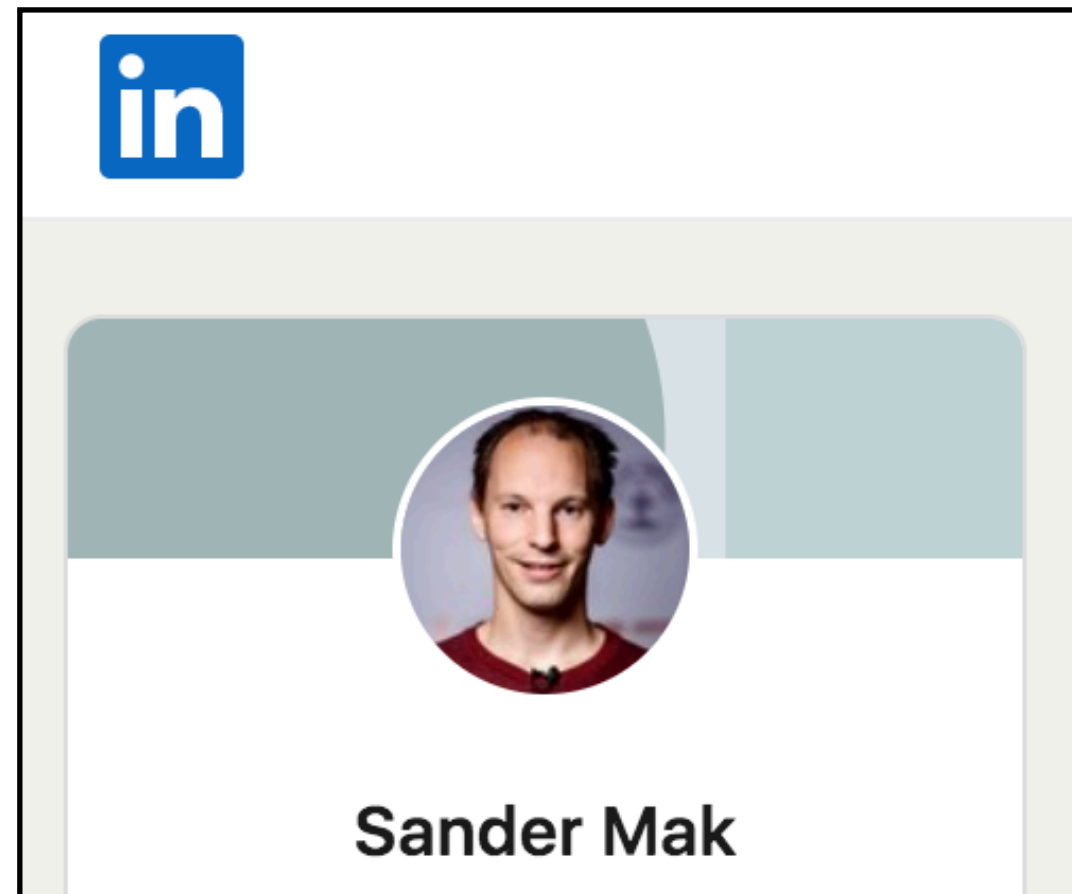
What's New in Java {9 .. 21}

Additional Resources

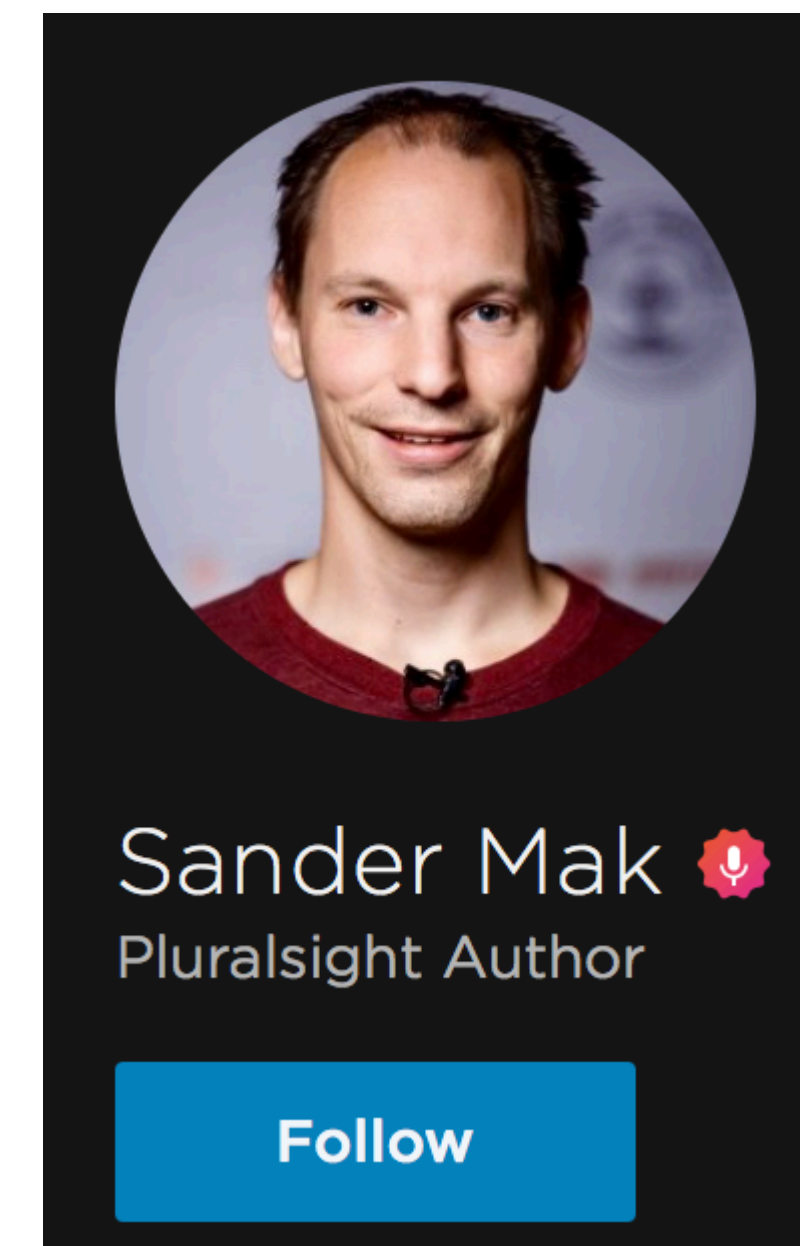
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