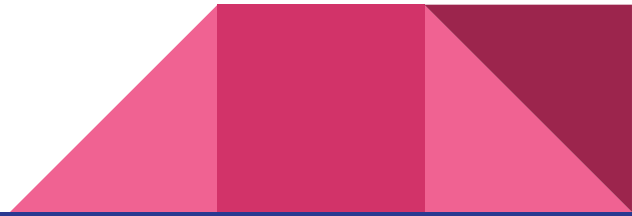
You can run (almost) anything on the JVM, so why not run everything on the same JVM?! The magic of interoperability!

Anne DeCusatis, May 2019

What is the JVM?

- The Java Virtual Machine (JVM) was created as a cross-platform environment to run code from the programming language Java
- As long as the language can compile to Java bytecode, the source language doesn’t have to be Java



Scala

Scala runs in SBT on the JVM

```scala
package interop.example1

object ScalaMain {

  def main(args: Array[String]): Unit = {
      println("Initializing Scala!")
      println("Exiting Scala!")
  }

}
```

```
sbt:interop> runMain interop.example1.ScalaMain
...
[info] Running interop.example1.ScalaMain
Initializing Scala!
Exiting Scala!
[success] Total time: 3 s
```

Java

Scala interoperates with Java

```java
package interop.example1;

public class JavaMain {
  public static void main(String[] args) {
      System.out.println("Initializing Java!");
      ScalaMain$.MODULE$.main(args);
      System.out.println("Exiting Java!");
  }
}
```

```scala
package interop.example1

object ScalaMain {
  def main(args: Array[String]): Unit = {
      println("Initializing Scala!")
      println("Exiting Scala!")
  }
}
```

```
sbt:interop> runMain interop.example1.JavaMain
...
[info] Running interop.example1.JavaMain
Initializing Java!
Initializing Scala!
Exiting Scala!
Exiting Java!
[success] Total time: 4 s
```

Scala interoperates with Java

```java
package interop.example1;

public class JavaMain {
  public static void main(String[] args) {
      System.out.println("Initializing Java!");
      ScalaMain$.MODULE$.main(args);
      System.out.println("Exiting Java!");
  }
}
```

```scala
package interop.example1

object ScalaMain {
  def main(args: Array[String]): Unit = {
      println("Initializing Scala!")
      println("Exiting Scala!")
  }
}
```

```
sbt:interop> runMain interop.example1.JavaMain
...
[info] Running interop.example1.JavaMain
Initializing Java!
Initializing Scala!
Exiting Scala!
Exiting Java!
[success] Total time: 4 s
```

Objects don’t exist as a Java construct, so Scala uses $.MODULE$

Python

Python also runs on the JVM

```
from interop.example1.JavaMain import main as jmain

def main():
      print("Initializing python!")
      jmain([])
      print("Exiting python!")

if __name__ == "__main__":
      main()
```

```
addSbtPlugin("info.hupel" % "sbt-jsr223" % "0.1.1")
addSbtPlugin("info.hupel" % "sbt-jython" % "0.1.1")
enablePlugins(JythonPlugin)
```

```
sbt:interop> runMain PythonMain$py
...
[info] Running PythonMain$py
Initializing python!
Initializing Java!
Initializing Scala!
Exiting Scala!
Exiting Java!
Exiting python!
[success] Total time: 2 s
```

Python also runs on the JVM

```
from interop.example1.JavaMain import main as jmain

def main():
      print("Initializing python!")
      jmain([])
      print("Exiting python!")

if __name__ == "__main__":
      main()
```

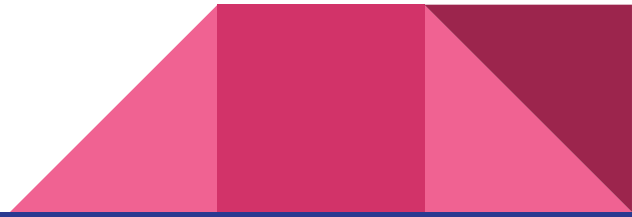
```
sbt:interop> runMain PythonMain$py
...
[info] Running PythonMain$py
Initializing python!
Initializing Java!
Initializing Scala!
Exiting Scala!
Exiting Java!
Exiting python!
[success] Total time: 2 s
```

Python also uses $ to identify internal constructs used when compiling bytecode

Clojure

Clojure Hello World

```
(ns interop.example1.core)

(defn -main
  "I can say 'Hello World'."
  ([] (println "Initializing Clojure!\nExiting Clojure!")))
```



Clojure Hello World from Scala

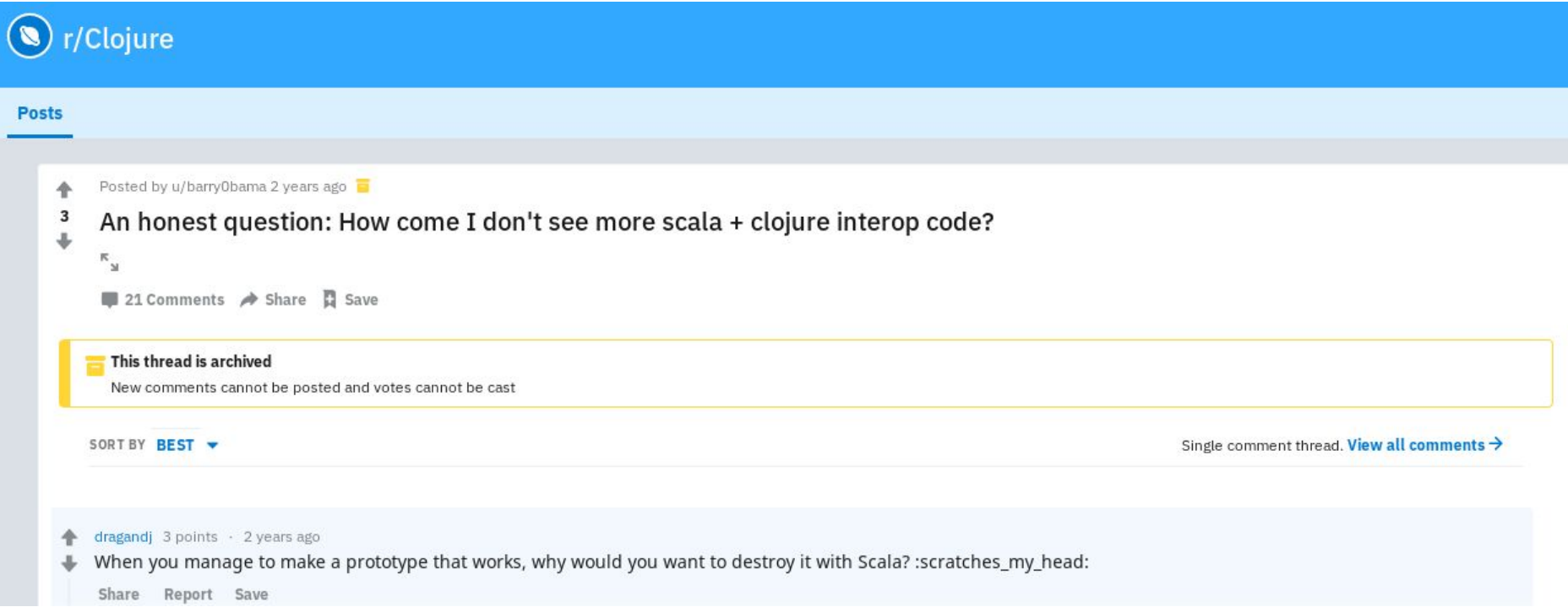
```
package interop.example1

import clojure.java.api.Clojure

object ScalaMain {
  def main(args: Array[String]): Unit = {
      println("Initializing Scala!")
      // call clojure
      // https://blog.michielborkent.nl/2016/07/26/clojure-from-scala/
      // first initialize ability to require things
      val core = Clojure.`var`("clojure.core", "require")
      // then require my namespace
      core.invoke(Clojure.read("interop.example1.core"))
      // then find my function
      val clojureMain = Clojure.`var`("interop.example1.core", "-main")
      // then run the function
      clojureMain.invoke()
      println("Exiting Scala!")
  }
}
```

```
[info] Running PythonMain$py
Initializing Python!
Initializing Java!
Initializing Scala!
[error] (run-main-0) Traceback (most recent call last):
[error]   File "PythonMain$py", line 12, in <module>
[error]   File "PythonMain$py", line 8, in main
[error]         at clojure.lang.RT.load(RT.java:466)
[error]         at clojure.lang.RT.load(RT.java:428)
[error]         at clojure.core$load$fn__6824.invoke(core.clj:6126)
[error]         at clojure.core$load.invokeStatic(core.clj:6125)
[error]         at clojure.core$load.doInvoke(core.clj:6109)
[error]         at clojure.lang.RestFn.invoke(RestFn.java:408)
[error]         at clojure.core$load_one.invokeStatic(core.clj:5908)
[error]         at clojure.core$load_one.invoke(core.clj:5903)
[error]         at clojure.core$load_lib$fn__6765.invoke(core.clj:5948)
[error]         at clojure.core$load_lib.invokeStatic(core.clj:5947)
[error]         at clojure.core$load_lib.doInvoke(core.clj:5928)
[error]         at clojure.lang.RestFn.applyTo(RestFn.java:142)
[error]         at clojure.core$apply.invokeStatic(core.clj:667)
[error]         at clojure.core$load_libs.invokeStatic(core.clj:5985)
[error]         at clojure.core$load_libs.doInvoke(core.clj:5969)
[error]         at clojure.lang.RestFn.applyTo(RestFn.java:137)
[error]         at clojure.core$apply.invokeStatic(core.clj:667)
[error]         at clojure.core$require.invokeStatic(core.clj:6007)
[error]         at clojure.core$require.doInvoke(core.clj:6007)
```

Clojure runtime exception

Eventually caused by…

```
[error] java.io.FileNotFoundException: java.io.FileNotFoundException: Could not locate
interop/example1/core__init.class, interop/example1/core.clj or interop/example1/core.cljc on classpath.
```


r/Clojure
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3
An honest question: How come I don't see more scala + clojure interop code?
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dragandj 3 points · 2 years ago
When you manage to make a prototype that works, why would you want to destroy it with Scala? :scratches_my_head:
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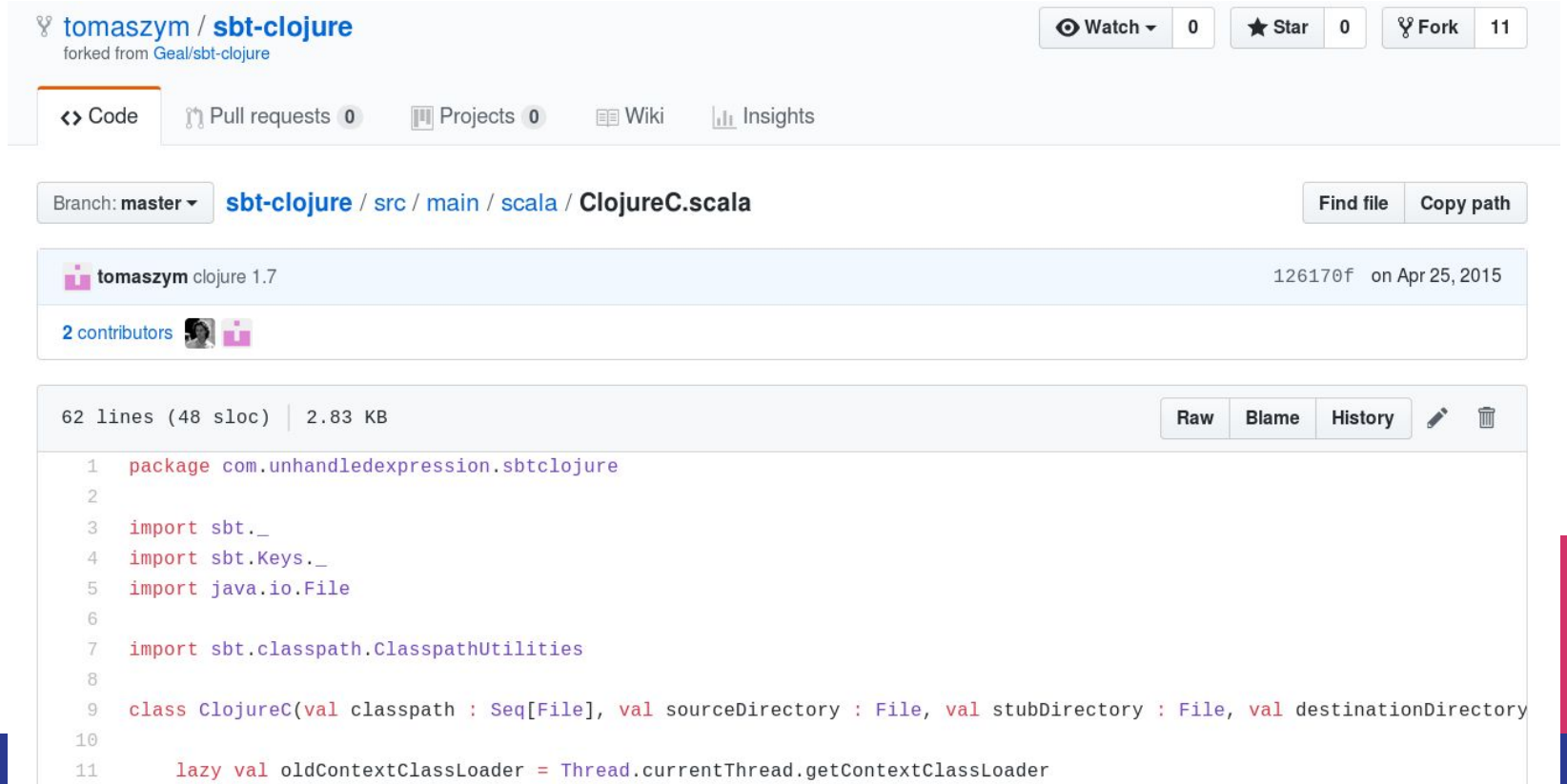
I need an SBT plugin for Clojure



tomaszym / **sbt-clojure**
forked from Geal/sbt-clojure

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Branch: **master** — **sbt-clojure** / src / main / scala / **ClojureC.scala** — Find file | Copy path

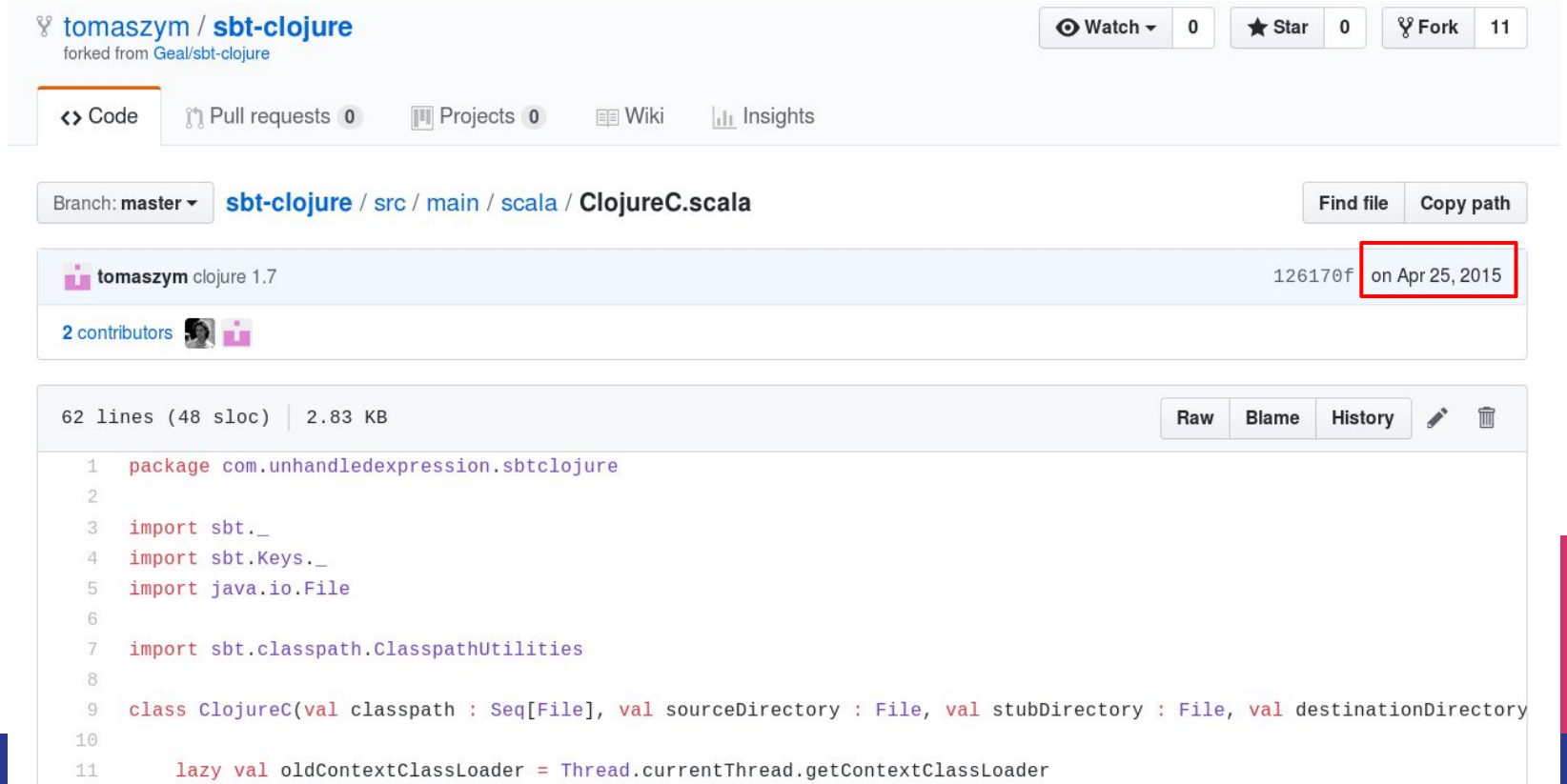
tomaszym clojure 1.7 — `126170f` on Apr 25, 2015

2 contributors

62 lines (48 sloc) | 2.83 KB — Raw | Blame | History

```
1  package com.unhandledexpression.sbtclojure
2
3  import sbt._
4  import sbt.Keys._
5  import java.io.File
6
7  import sbt.classpath.ClasspathUtilities
8
9  class ClojureC(val classpath : Seq[File], val sourceDirectory : File, val stubDirectory : File, val destinationDirectory
10
11     lazy val oldContextClassLoader = Thread.currentThread.getContextClassLoader
```

I need an SBT plugin for Clojure



Clojure

```
sbt:interop> runMain PythonMain$py
...
[info] Running PythonMain$py
Initializing Python!
Initializing Java!
Initializing Scala!
Initializing Clojure!
Exiting Clojure!
Exiting Scala!
Exiting Java!
Exiting Python!
[success] Total time: 8 s
```

Clojure

```
sbt:interop> runMain PythonMain$py
...
[info] Running PythonMain$py
Initializing Python!
Initializing Java!
Initializing Scala!
Initializing Clojure!
Exiting Clojure!
Exiting Scala!
Exiting Java!
Exiting Python!
[success] Total time: 8 s
```

Kotlin & Ruby

Additional hello world, additional AutoPlugin

```
package interop.example1

import org.jruby.Ruby

fun main() {
      println("Initializing Kotlin!")
      val rb = Ruby.getGlobalRuntime()
      rb.executeScript("puts 'Hello from an inline Ruby script!'", "RubyMain.rb")
      println("Exiting Kotlin!")
}
```

Live demo time!

Thank you!

github.com/anne-decusatis/jvm-interoperability