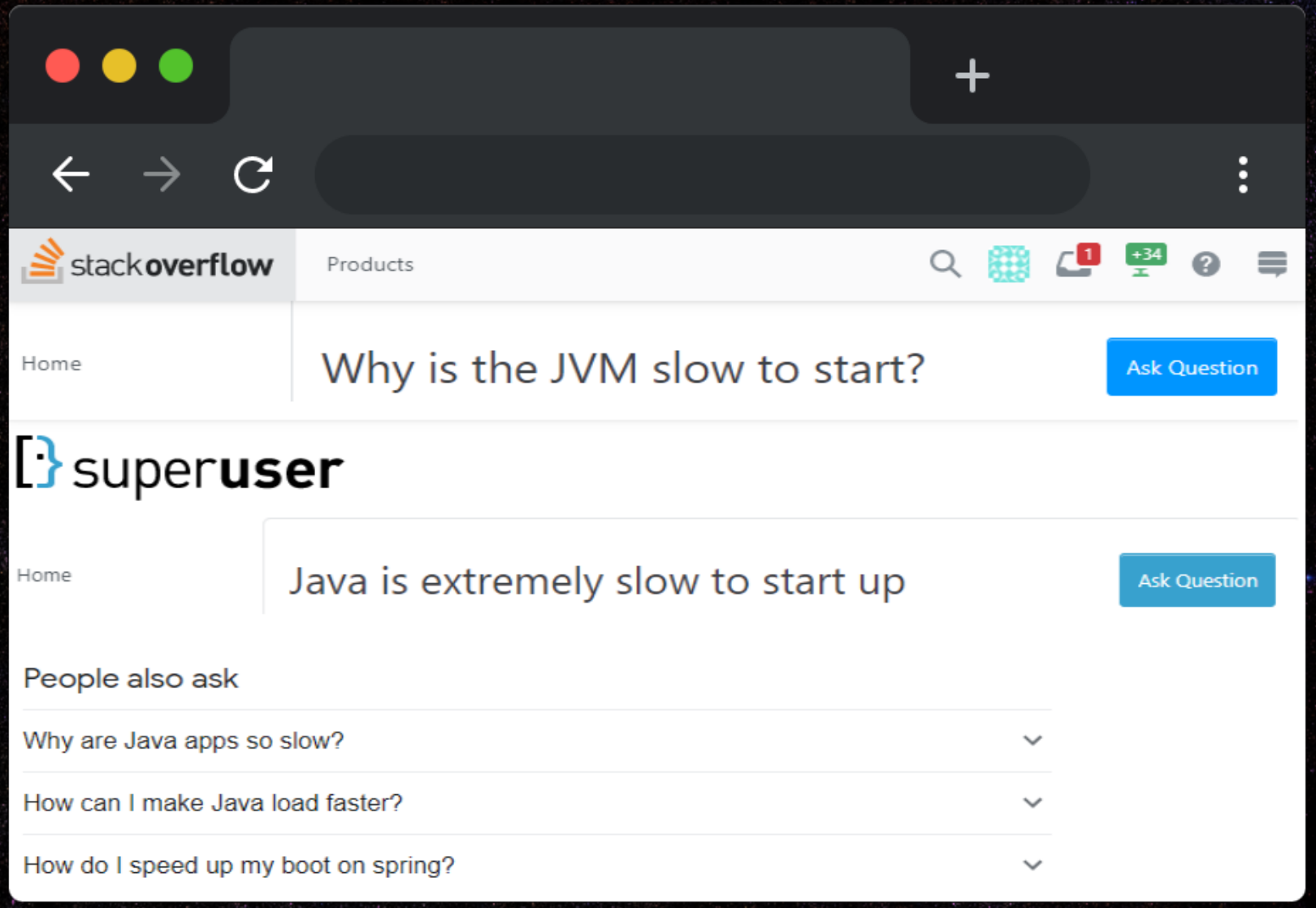
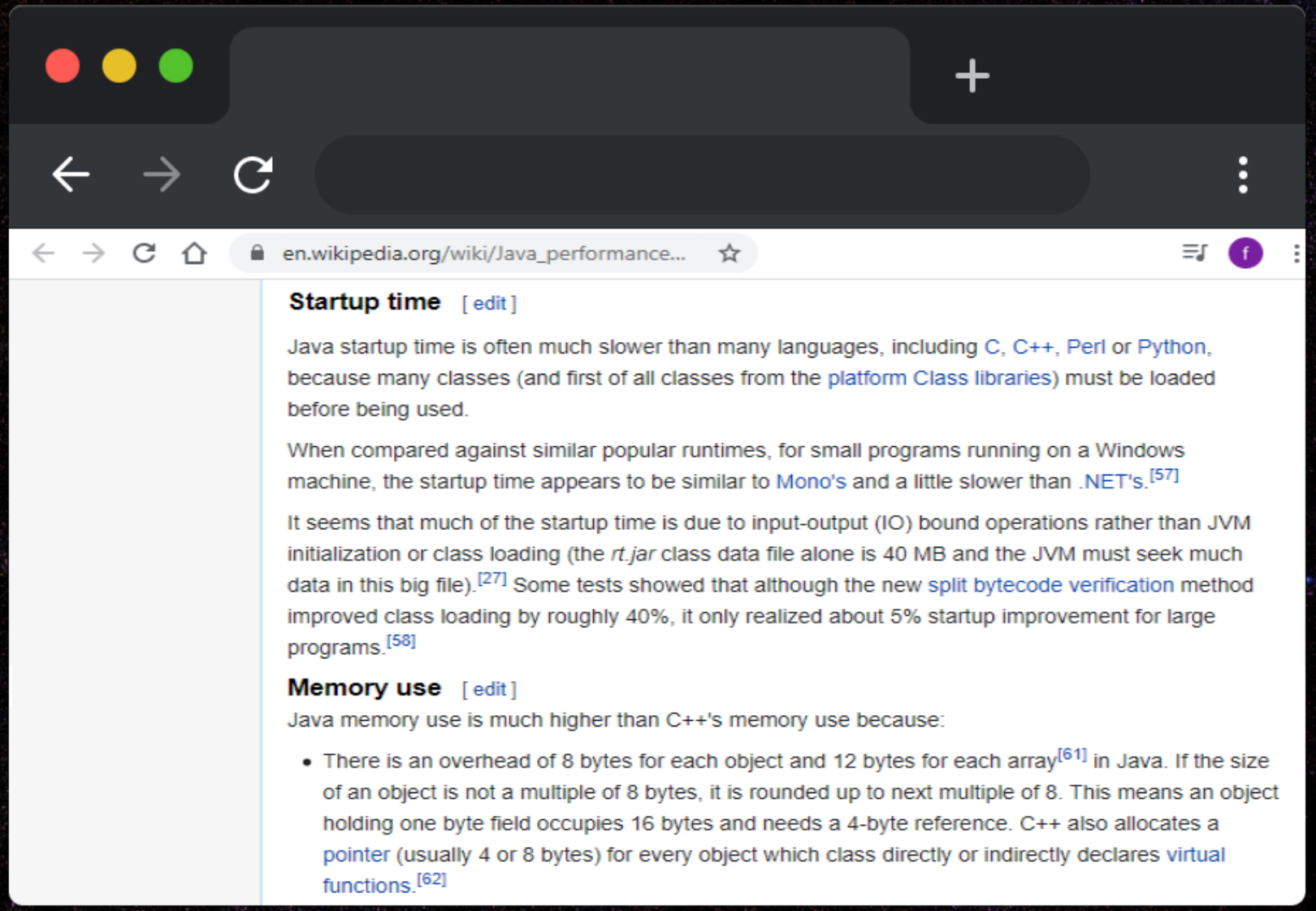
About

Fırat GÜRSOY - Senior Software Developer / May 2021

The question is



What we can do?



Startup time [edit]

Java startup time is often much slower than many languages, including C, C++, Perl or Python, because many classes (and first of all classes from the platform Class libraries) must be loaded before being used.

When compared against similar popular runtimes, for small programs running on a Windows machine, the startup time appears to be similar to Mono's and a little slower than .NET's.[57]

It seems that much of the startup time is due to input-output (IO) bound operations rather than JVM initialization or class loading (the *rt.jar* class data file alone is 40 MB and the JVM must seek much data in this big file).[27] Some tests showed that although the new split bytecode verification method improved class loading by roughly 40%, it only realized about 5% startup improvement for large programs.[58]

Memory use [edit]

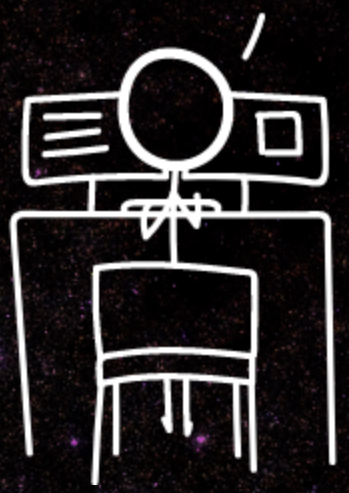
Java memory use is much higher than C++'s memory use because:

- There is an overhead of 8 bytes for each object and 12 bytes for each array[61] in Java. If the size of an object is not a multiple of 8 bytes, it is rounded up to next multiple of 8. This means an object holding one byte field occupies 16 bytes and needs a 4-byte reference. C++ also allocates a pointer (usually 4 or 8 bytes) for every object which class directly or indirectly declares virtual functions.[62]

So what is the solution?

Wait.
So you just save it,
And your code is running?
And it's Java?!

I know, right?
SUPERSONIC JAVA, FTW!



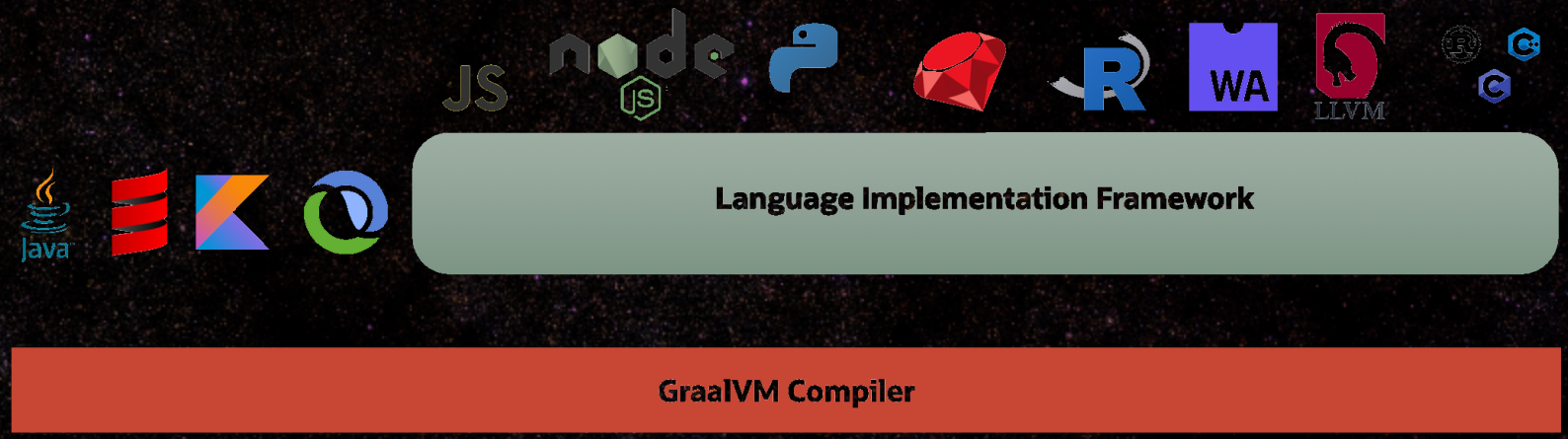
What is GraalVM ?

`GraalVM` is a **high-performance** JDK distribution designed to **accelerate the execution of applications** written in `Java` and other JVM languages along with support for `JavaScript`, `Ruby`, `Python` and ***a number of other popular languages***. `GraalVM`'s polyglot capabilities make it possible to mix multiple programming languages in a single application while ***eliminating foreign language call costs***.
`GraalVM` created by `Oracle`. The first production-ready version, `GraalVM 19.0`, was released in `May 2019`. There is no equivalent technology what GraalVM do.

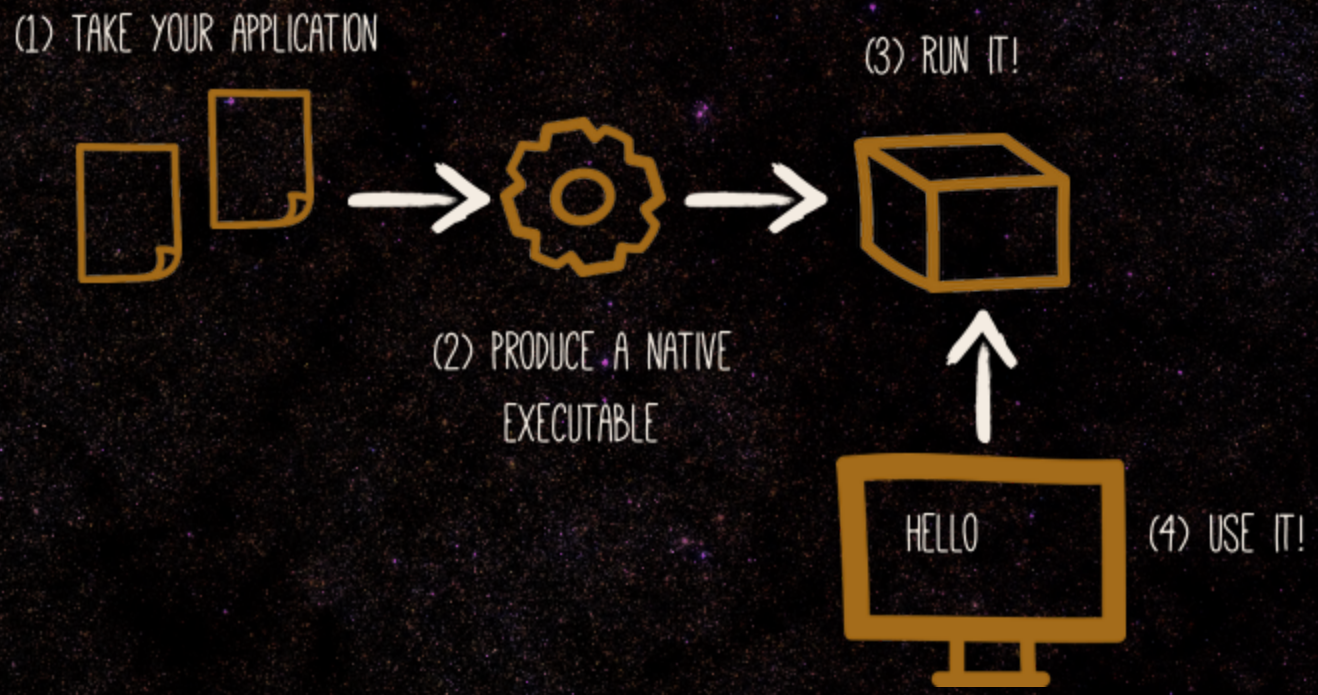
What can GraalVM give me?

- Mix multiple programming languages in a single application
- Native executables
- `Amazingly` fast boot time
- Incredibly `low RSS memory` (not just heap size!)
- Instant (relatively) scale up and high density memory utilization in container orchestration platforms like `Kubernetes`.

GraalVM Architecture



Native Image



The `native executable` for our application will contain the `application code`, `required libraries`, `Java APIs`, and `a reduced version of a VM`. The smaller VM base improves the `startup time` of the application and produces a `minimal disk footprint`.

Truffle language implementation framework

The Truffle language implementation framework (henceforth “Truffle”) is an open source library for building tools and programming languages implementations as interpreters for self-modifying Abstract Syntax Trees. Together with the open source GraalVM compiler,

```
Truffle represents a significant step forward in programming language implementation technology in the current era of dynamic languages.
```

Supported Frameworks and Tech

- Spring Framework (Experimental)
- Quarkus
- Play Framework
- Camel
- Prometheus
- JavaFX

  ...

Disadvantages

- The main downside of this approach is the platform-depended native code.

That means you need to compile source code for linux/windows etc.

Meanwhile ??

`SystemAdmin01:` server_api.so doesn't work on my server !

`Customer$$$__:` customer_api.exe doesn't work on my pc !

`DevGuy42_____:` api.jar works on my workstation !

`Fırat________:` In some cases, problems may arise from the libraries or build scripts used. In other words, it is necessary to pay attention to **tests**.

`SystemAdmin01:` hımm, server_api.so doest work on my server !

.....

`DevGuy42 writing ...`

Sample Application

Download and install GraalVM from oracle downloads. Create an `Example.java` file.

```
public class Example {

    public static void main(String[] args) {
        System.out.println("Hello GraalVM");
    }
}
```

```
#Run following commands :
javac Example.java
native-image Example
```

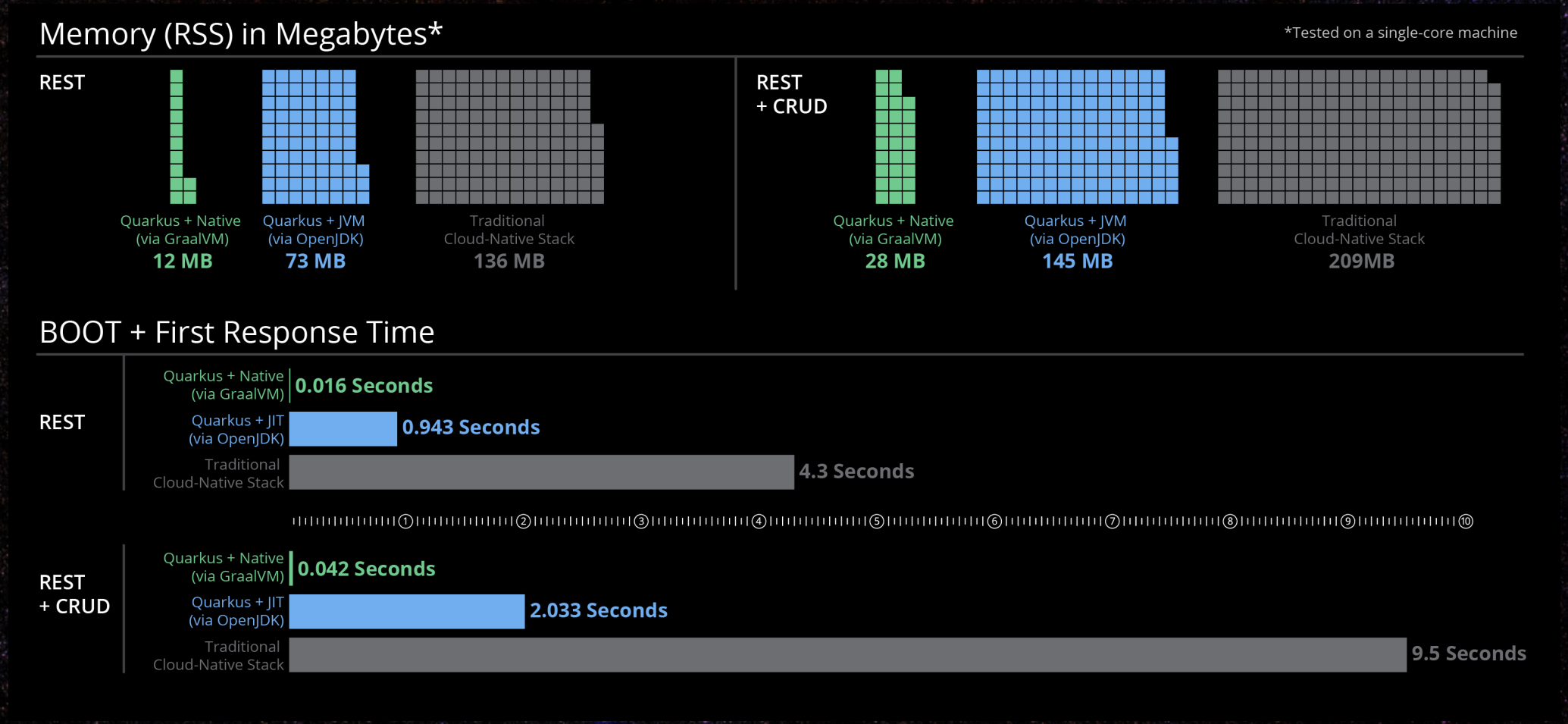
Tests : Sure

```
package org.acme.quickstart;


import io.quarkus.test.junit.NativeImageTest;

@NativeImageTest
public class NativeGreetingResourceIT extends GreetingResourceTest {
    // Run the same tests
}
```

Performance



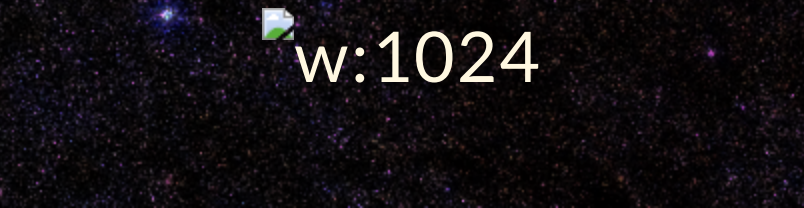
Quarkus Test

After this experience i made a demo application for my requirement.
It's really reducing startup and memory footprint dramatically. :)

Features Support

GraalVM technologies are distributed as production-ready and experimental.

Experimental features are being considered for future versions of GraalVM and are not meant to be used in production. The development team welcomes feedback on experimental features, but users should be aware that experimental features might never be included in a final version, or might change significantly before being considered production-ready.



Special thanks to

- Oracle
- Quarkus
- Spring
- JavaFX / GluonHQ
- Google and Wiki
-