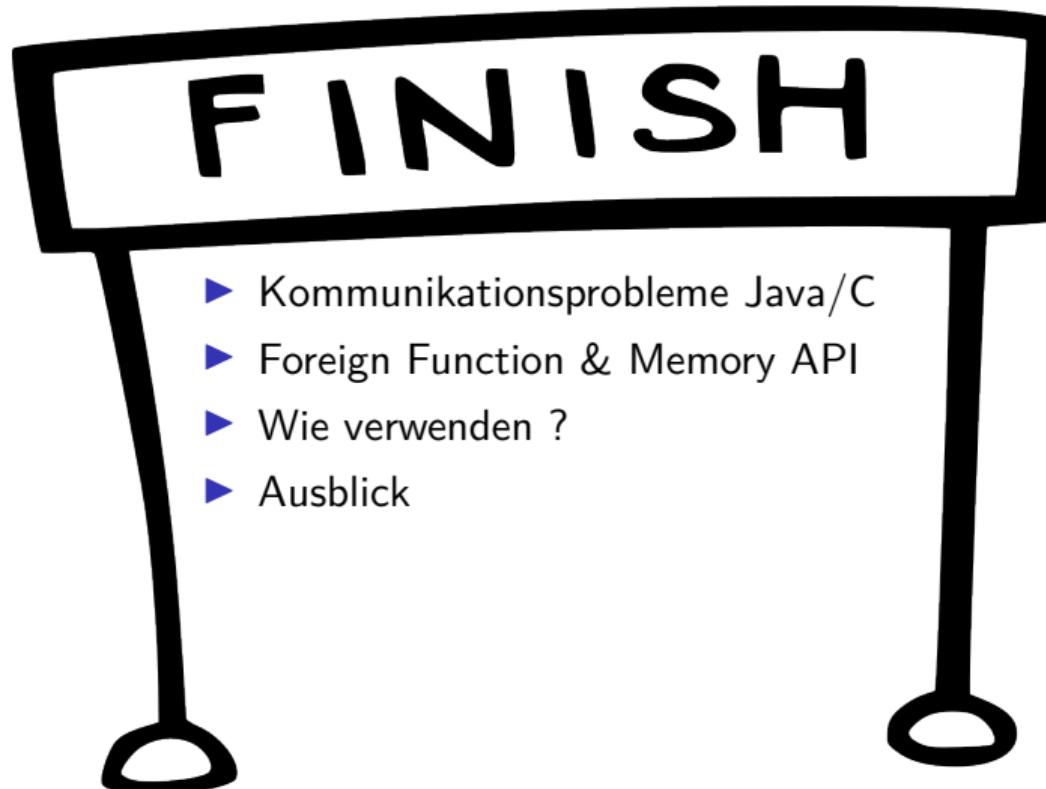


Javas neue Gesprächskultur – ganz wie in Panama –

Bernd Müller
Ostfalia





Vorstellung Referent

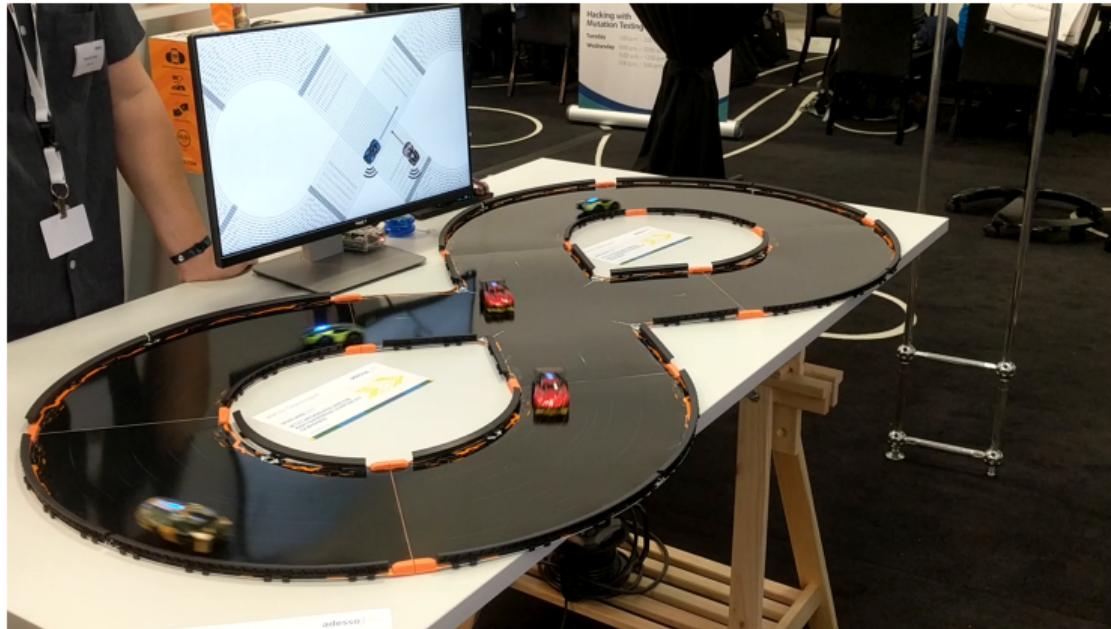
- ▶ Prof. Informatik (Ostfalia, HS Braunschweig/Wolfenbüttel)
- ▶ Buchautor (JSF, JPA, Seam, ...)



- ▶ Mitglied EGs JSR 344 (JSF 2.2) und JSR 338 (JPA 2.1)
- ▶ Geschäftsführer PMST GmbH
- ▶ JUG Ostfalen (Mitorganisator)
- ▶ Beirat der Java aktuell
- ▶ bernd.mueller@ostfalia.de
- ▶ @berndmuller
- ▶ BerndMuller

Motivation

JavaLand 2017, Adesso-Stand



GitHub: adessoAG/anki-drive-java

The screenshot shows the GitHub repository page for `adessoAG/anki-drive-java`. The repository is public and has 7 watchers, 27 forks, and 16 stars. The main navigation bar includes links for Code, Issues (3), Pull requests (1), Actions, Projects, Wiki, Security, and Insights. Below the navigation bar, it shows 1 master branch, 1 tag, and a list of recent commits by user `yeckey`. The commits are:

File	Commit Message	Date
gradle/wrapper	Initial commit	5 years ago
src/main	Make methods from anki-connector package private (#12)	5 years ago
.gitignore	#13: Make the library accessible through a Maven repository ...	5 years ago
.travis.yml	Support automated builds via Travis CI (#19)	5 years ago
LICENSE	Initial commit	5 years ago
README.md	Fix link in README (#16)	5 years ago
build.gradle	Initial commit	5 years ago
gradlew	Support automated builds via Travis CI (#19)	5 years ago
gradlew.bat	Initial commit	5 years ago
nakane.json	Initial commit	5 years ago

On the right side, there is an **About** section which describes the repository as "A Java port of the Anki Drive SDK". It lists several tags: java, vehicle, java-library, anki, anki-drive, drive-sdk, and anki-vehicles. Below the tags, there are links for Readme, MIT License, 16 stars, 7 watching, and 27 forks. A **Releases** section indicates one official release made on 4 Apr 2017.

GitHub: adessoAG/anki-drive-java

adessoAG / anki-drive-java Public

Code Issues 3 Pull requests 1 Actions Projects Wiki Star 16

master 1 branch 1 tag

yeckey Support automated builds via Travis CI (#10)

gradle/wrapper

src/main

.gitignore

Unfortunately, there is currently no cross-platform Java library to interface with Bluetooth LE devices. This project therefore requires a Node.js gateway service to handle low-level communication with the Anki vehicles. All data processing and message parsing is carried out in Java code.

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Anki vehicles. All data processing and message parsing is carried out in Java code.

private (#12)

through a Maven repository ...

builds via Travis CI (#19)

Initial commit

Fix link in README (#16)

Initial commit

Support automated builds via Travis CI (#19)

Initial commit

Initial commit

A Java port of the Anki Drive SDK

java vehicle java-library anki

anki-drive drive-sdk anki-vehicles

Readme

MIT License

16 stars

7 watching

27 forks

Releases 1

First official release Latest on 4 Apr 2017

JSR 82: Review Ballot 2000, FR3 2010



JSR-000082 Java(TM) APIs for Bluetooth 1.1.1 Final Release 3

JSRs

- » JSRs by Platform
- » JSRs by Technology
- » JSRs by Stage
- » JSRs by Committee
- » List of All JSRs

JCP Info

- » Updates
- » About JCP
- » FAQ
- » Contacts
- » Participation
- » Community Resources
- » Community News

Thank you for accepting the Software License Agreement; you may now download this software.

Download Instruction: Click the product name or the file name to start the download.

Required Files

File Description and Name	Size
JSR-000082 Bluetooth 1.1.1 Final Release 3 blueooth-1.1.1-mrel2-javadoc.zip	480.28 KB

If you need assistance with downloads, please contact Customer Service. For all other JCP related questions, please see our Frequently Asked Questions (FAQ).

JSR 82: Review Ballot 2000, FR3 2010

The screenshot shows the Java Community Process website with a specific focus on the download page for JSR-000082. The page title is "JSR-000082 Java(TM) ME for Bluetooth 1.1.1 Final Release 3". Below the title, there is a message: "Thank you for accepting the software license agreement; you may now download the software." A large red oval is drawn across the top half of the page, covering the title and the download instructions. The download section includes a table with one row:

File Description and Name	Size
JSR-000082_Bluetooth 1.1.1 Final Release 3 bluetooth-1.1.1-mrel2-javadoc.zip	480.28 KB

At the bottom of the page, there is a note: "If you need assistance with downloads, please contact Customer Service. For all other JCP related questions, please see our Frequently Asked Questions (FAQ)."

JAnki

The screenshot shows a GitHub repository page for the project "JAnki". The repository is public and owned by "BerndMuller". The main navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. Below the navigation bar, it shows 1 branch and 0 tags. A green "Code" button is highlighted. The "About" section contains the following text: "A simple library to use Anki Overdrive with Java", which is circled in red. Other sections visible include "Readme", "MIT License", "4 stars", "3 watching", "0 forks", "Releases" (with a note about no releases published), and "Packages".

BerndMuller / **JAnki** Public

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

master 1 branch 0 tags Go to file Add file Code About

BerndMuller Minor cleanups d440d00 on 13 Jan 2021 33 commits

lib	Minor cleanups	13 months ago
src	Minor cleanups	13 months ago
.gitignore	notifications refactored to package notifications, added C...	4 years ago
LICENSE.txt	license added	4 years ago
README.md	license added	4 years ago
backlog.txt	Minor cleanups	13 months ago
pom.xml	Minor cleanups	13 months ago
run-cli.sh	tracking added	4 years ago
run-tracking.sh	tracking added	4 years ago

About

A simple library to use Anki Overdrive with Java

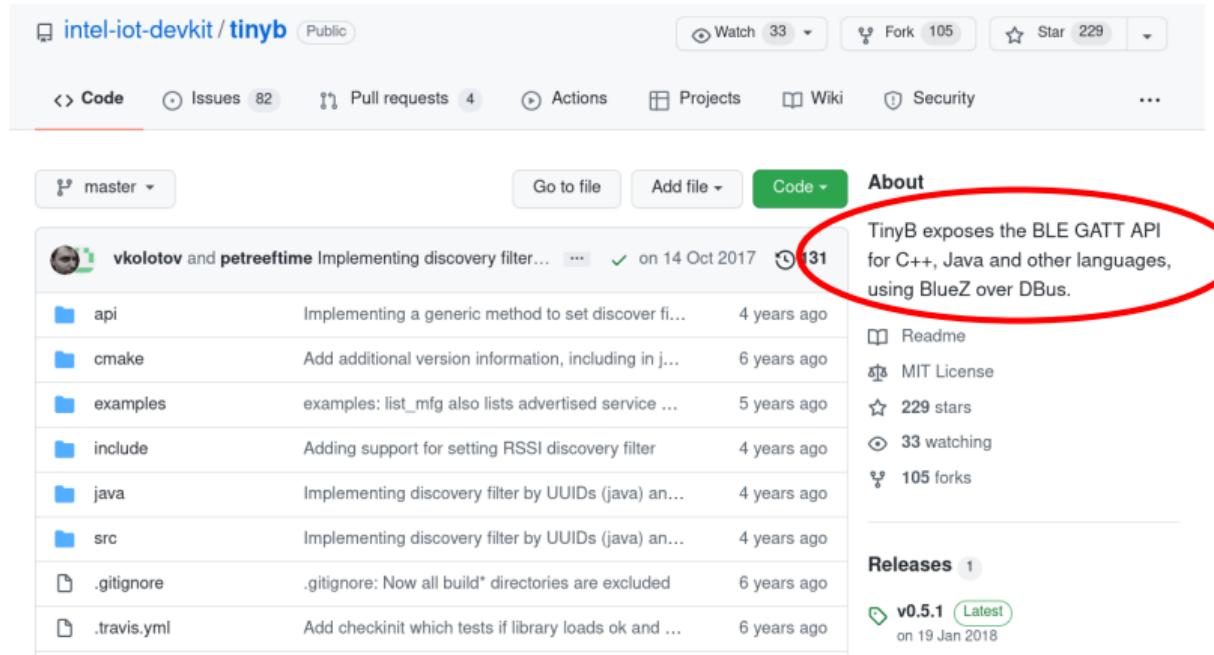
Readme MIT License 4 stars 3 watching 0 forks

Releases

No releases published Create a new release

Packages

TinyB von Intel



The screenshot shows the GitHub repository page for `intel-iot-devkit / tinyb`. The repository is public and has 33 watchers, 105 forks, and 229 stars. The main navigation tabs include Code, Issues (82), Pull requests (4), Actions, Projects, Wiki, Security, and three more options. Below the tabs, there's a dropdown for the branch (master) and buttons for Go to file, Add file, and Code. The main content area displays a list of recent commits from `vkolotov` and `petreetime`, dated 14 Oct 2017. A red oval highlights the **About** section, which contains the following text:
TinyB exposes the BLE GATT API for C++, Java and other languages, using BlueZ over DBus.
The sidebar on the right lists the repository's details: Readme, MIT License, 229 stars, 33 watching, 105 forks, and a single release labeled v0.5.1 (Latest, on 19 Jan 2018).

Code, Issues 82, Pull requests 4, Actions, Projects, Wiki, Security, ...

master ▾

Go to file, Add file, Code, About

vkolotov and petreetime Implementing discovery filter... on 14 Oct 2017 131

api, cmake, examples, include, java, src, .gitignore, .travis.yml

Implementing a generic method to set discover fi..., Add additional version information, including in j..., examples: list_mfg also lists advertised service ..., Adding support for setting RSSI discovery filter, Implementing discovery filter by UUIDs (java) an..., Implementing discovery filter by UUIDs (java) an..., .gitignore: Now all build* directories are excluded, Add checkinit which tests if library loads ok and ...

4 years ago, 6 years ago, 5 years ago, 4 years ago, 4 years ago, 6 years ago

Readme, MIT License, 229 stars, 33 watching, 105 forks

Releases 1

v0.5.1 Latest on 19 Jan 2018

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Code

Issues 82

Pull requests 4

Actions

Projects

Wiki

Security

...

master

Go to file

Add file

Code

About

`vkoletov` and `petreetime` Implementing discovery filter... on 14 Oct 2017 131

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include Adding support for setting RSSI discovery filter 4 years ago

java Implementing discovery filter by UUIDs (java) an... 4 years ago

src Implementing discovery filter by UUIDs (java) an... 4 years ago

.gitignore .gitignore: Now all build* directories are excluded 6 years ago

.travis.yml Add checkinit which tests if library loads ok and ... 6 years ago

Readme

MIT License

229 stars

33 watching

105 forks

Releases 1

v0.5.1 Latest

on 19 Jan 2018

Selbst ist der Mann
und das Ergebnis ist immer ein Erlebnis ;-)



Selbst ist der Mann
und das Ergebnis ist immer ein Erlebnis ;-)



Ziel: Keine Bibliothek, nur JDK + BlueZ

Verallgemeinerung

Keine Bibliothek, nur JDK + <your choice>

Das Problem

Das Problem – und hoffentlich die Lösung

- ▶ Manchmal genügt JDBC, HTTP, NIO, UNIX-Domain-Sockets, ... nicht
- ▶ Sogenannter *Off-Heap-Speicher* (außerhalb JVM) soll direkt zugegriffen werden
- ▶ Machen z.B. Tensorflow, Ignite, Lucene, Netty und vielen andere
- ▶ Es gibt: JNI, Byte-Buffer-API, sun.misc.Unsafe, ...
- ▶ Macht aber auf Dauer nicht glücklich ...

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- ▶ JEPs 191, 370, 383, 389, 393, 412, 419
- ▶ Mit Project Panama: Interconnecting JVM and native code

JEP 419: Foreign Function & Memory API

OpenJDK

[OpenJDK FAQ](#)
[Installing](#)
[Contributing](#)
[Sponsoring](#)
[Developers' Guide](#)
[Vulnerabilities](#)
[JDK GA/EA Builds](#)
[Mailing lists](#)
[Wiki -IRC](#)
[Bylaws - Census](#)
[Legal](#)

JEP Process

[Source code](#)
[Mercurial](#)
[GitHub](#)

Tools

[Mercurial](#)
[Git](#)
[jtreg harness](#)

Groups

[\(overview\)](#)
[Adoption](#)
[Build](#)
[Client Libraries](#)
[Compatibility & Specification Review](#)
[Compiler](#)
[Conformance](#)
[Core Libraries](#)
[Governance Board](#)

JEP 419: Foreign Function & Memory API (Second Incubator)

Owner Maurizio Cimadamore

Type Feature

Scope JDK

Status Closed / Delivered

Release 18

Component core-libs

Discussion panama dash dev at openjdk dot java dot net

Relates to [JEP 412: Foreign Function & Memory API \(Incubator\)](#)

Reviewed by Jim Laskey, Paul Sandoz

Created 2021/09/21 11:56

Updated 2022/01/18 23:13

Issue 8274073

Summary

Introduce an API by which Java programs can interoperate with code and data outside of the Java runtime. By efficiently invoking foreign functions (i.e., code outside the JVM), and by safely accessing foreign memory (i.e., memory not managed by the JVM), the API enables Java programs to call native libraries and process native data without the brittleness and danger of JNI.

JEP 419: Foreign Function & Memory API



OpenJDK FAQ
Installing
Contributing
...
...

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JEP 419: Foreign Function & Memory API

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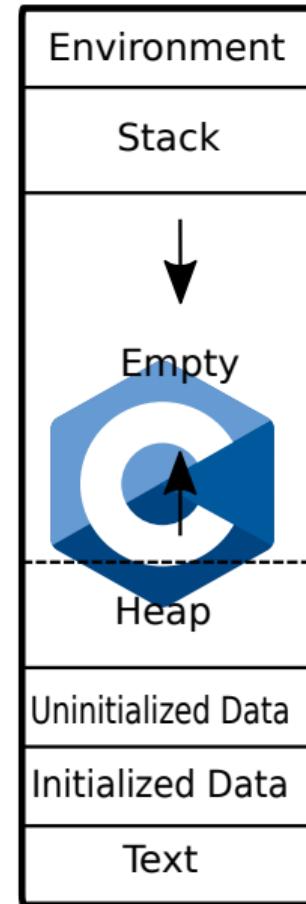
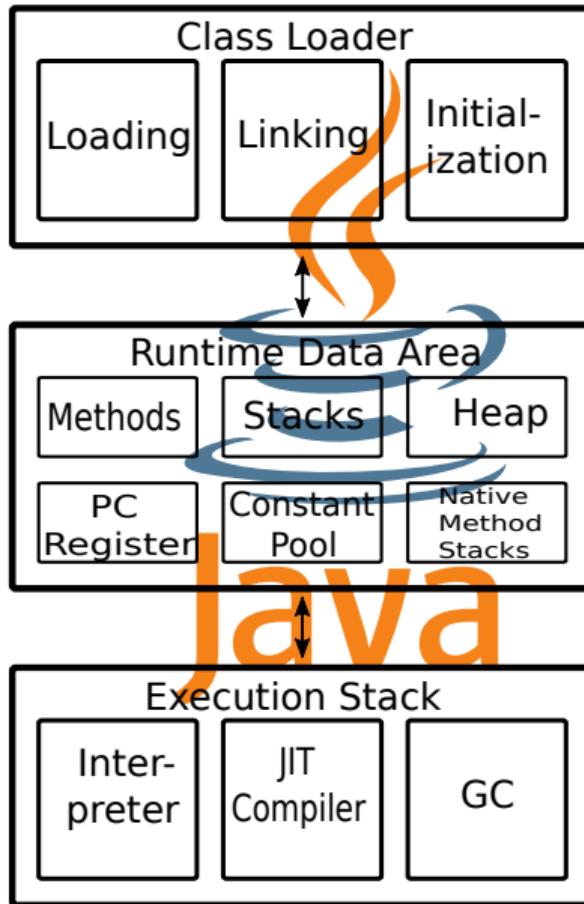
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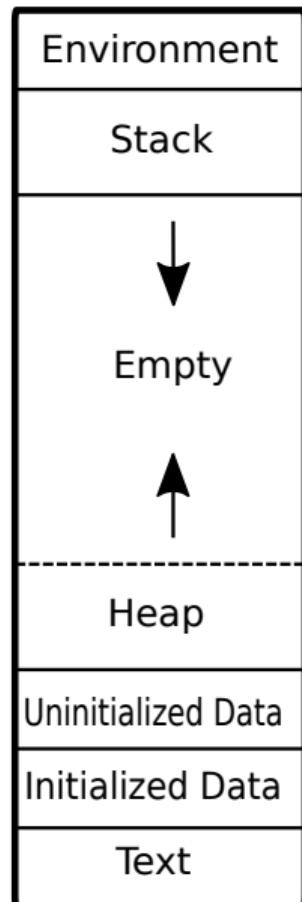
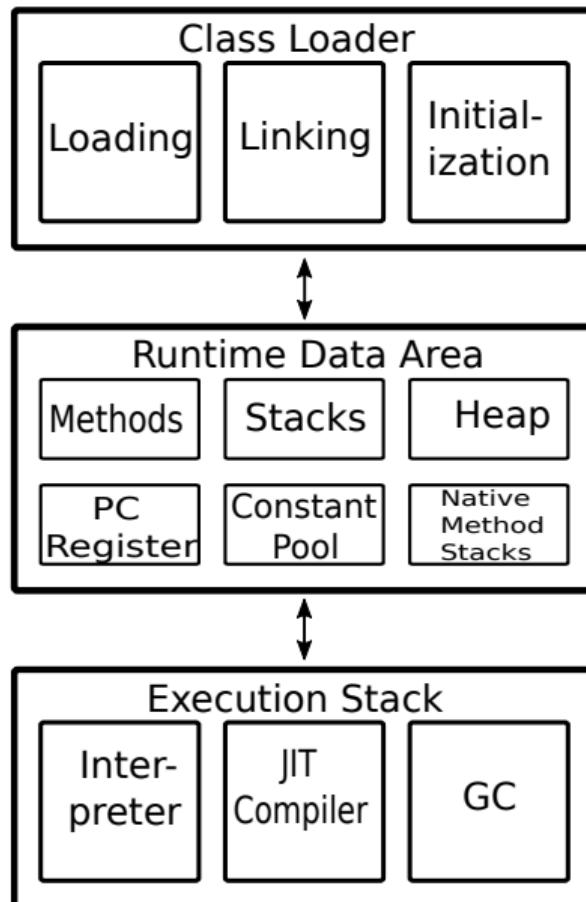
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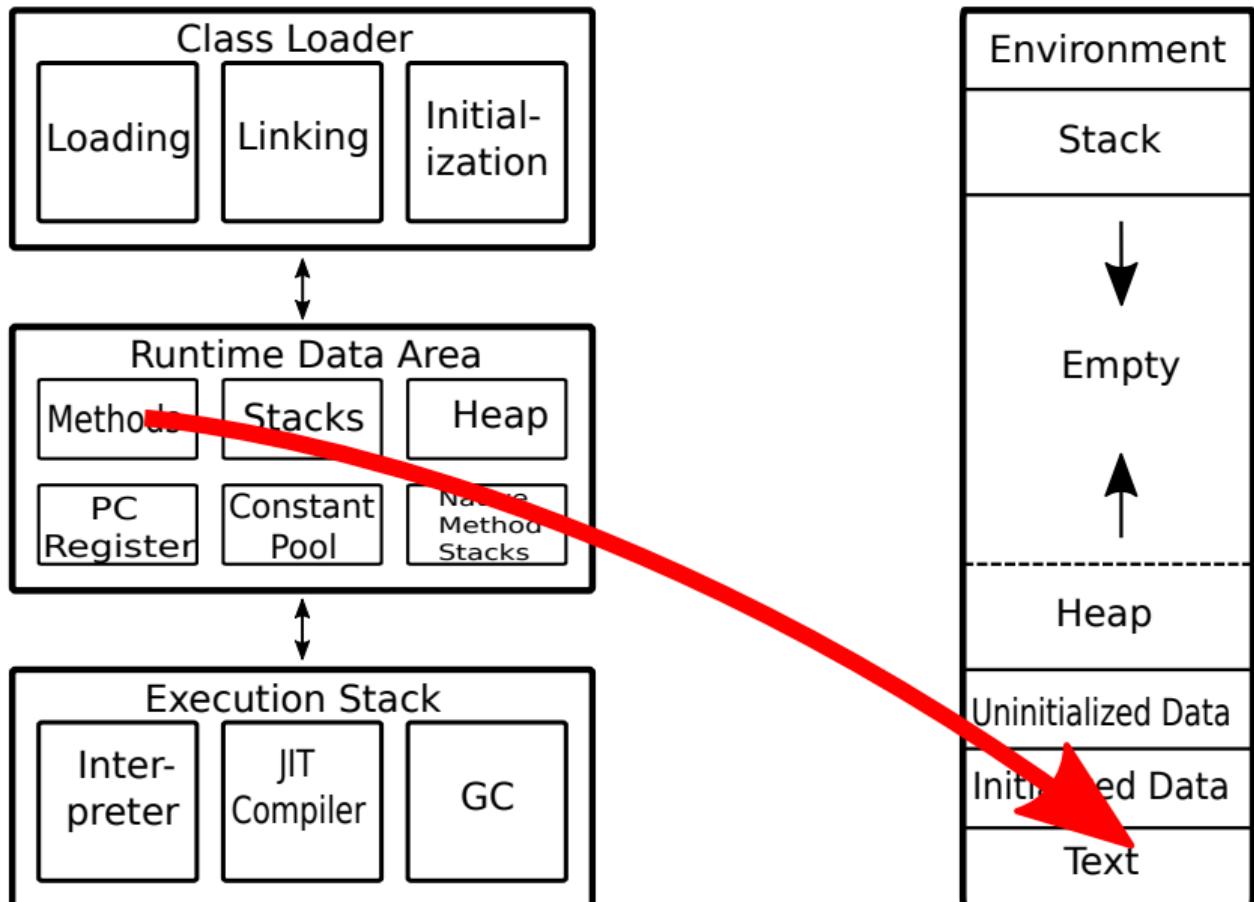
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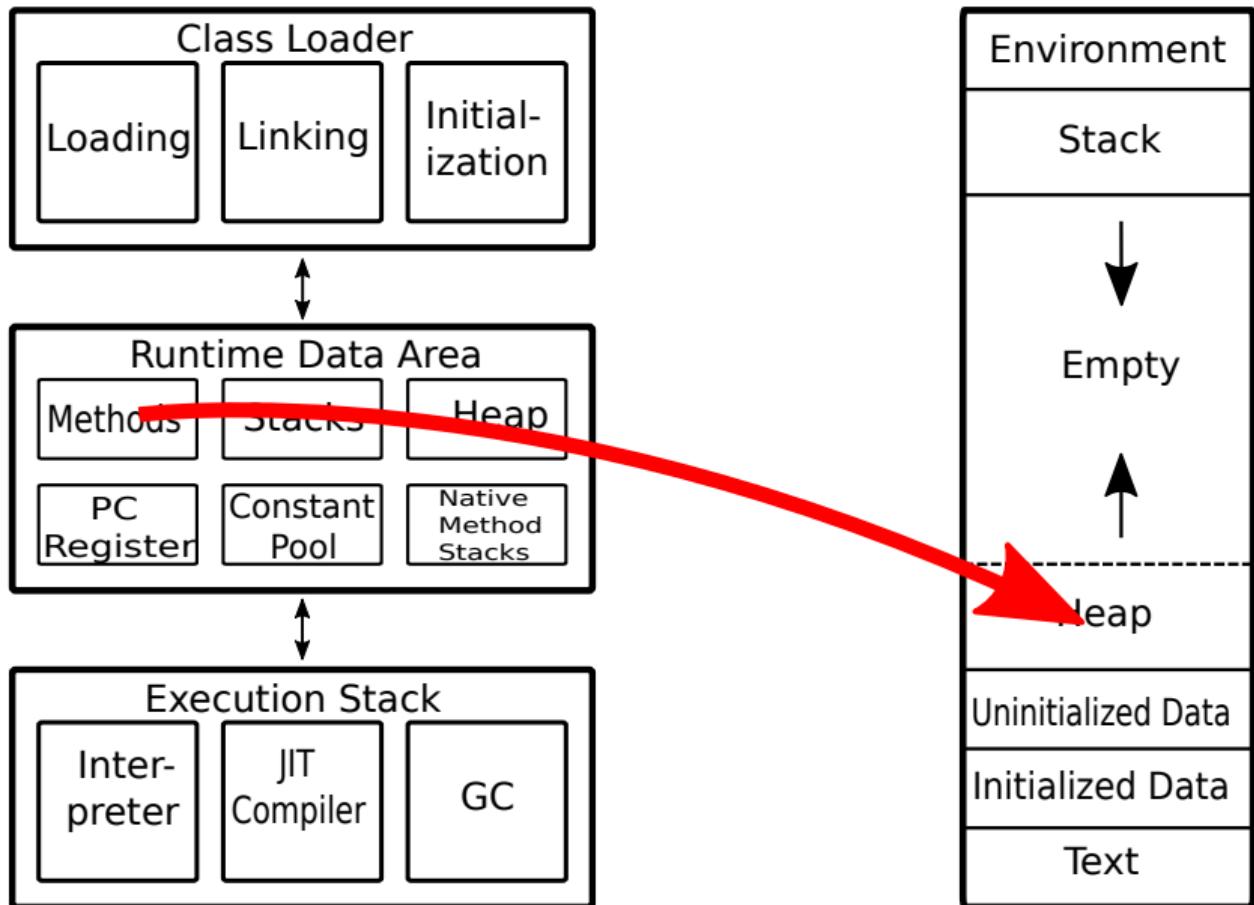
Native Method Interface + Libraries



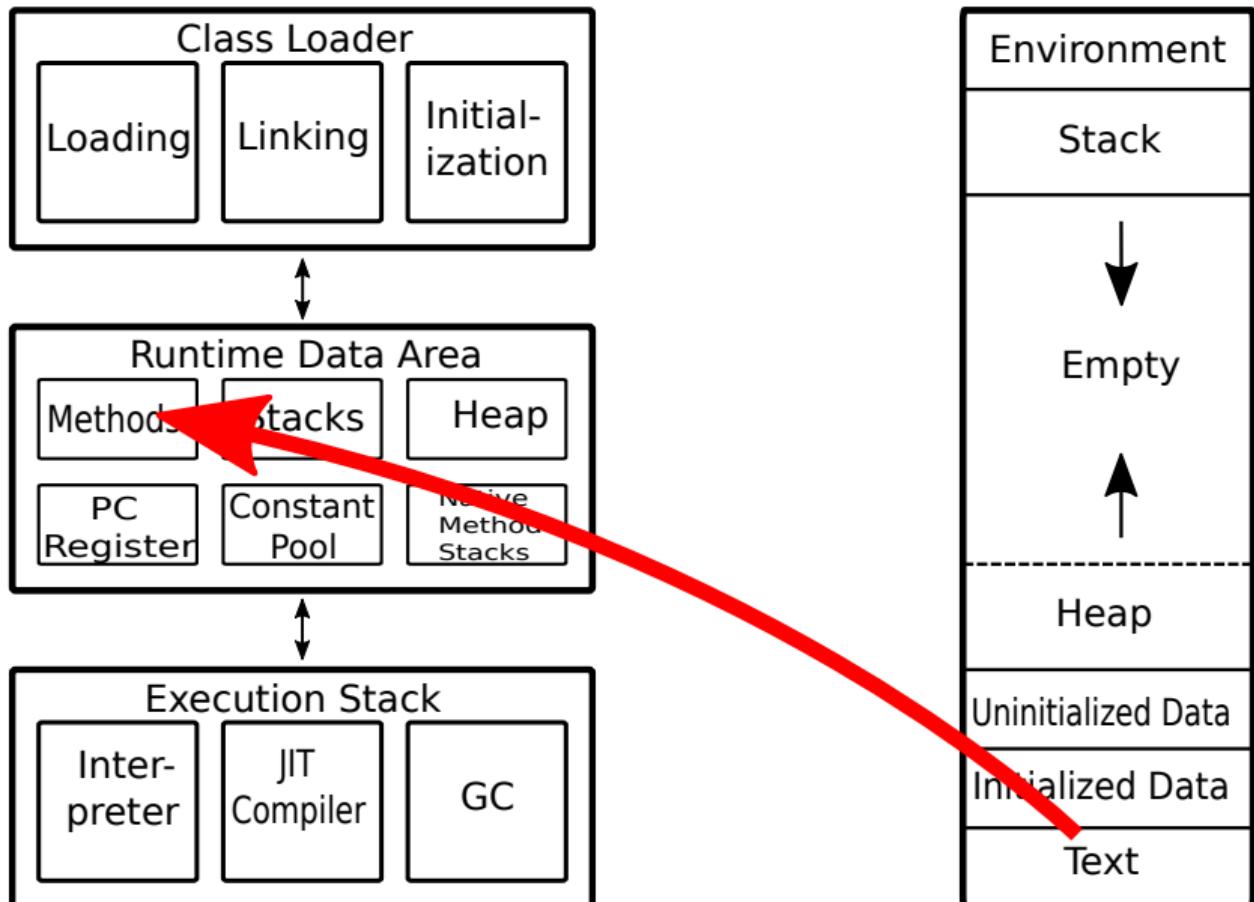
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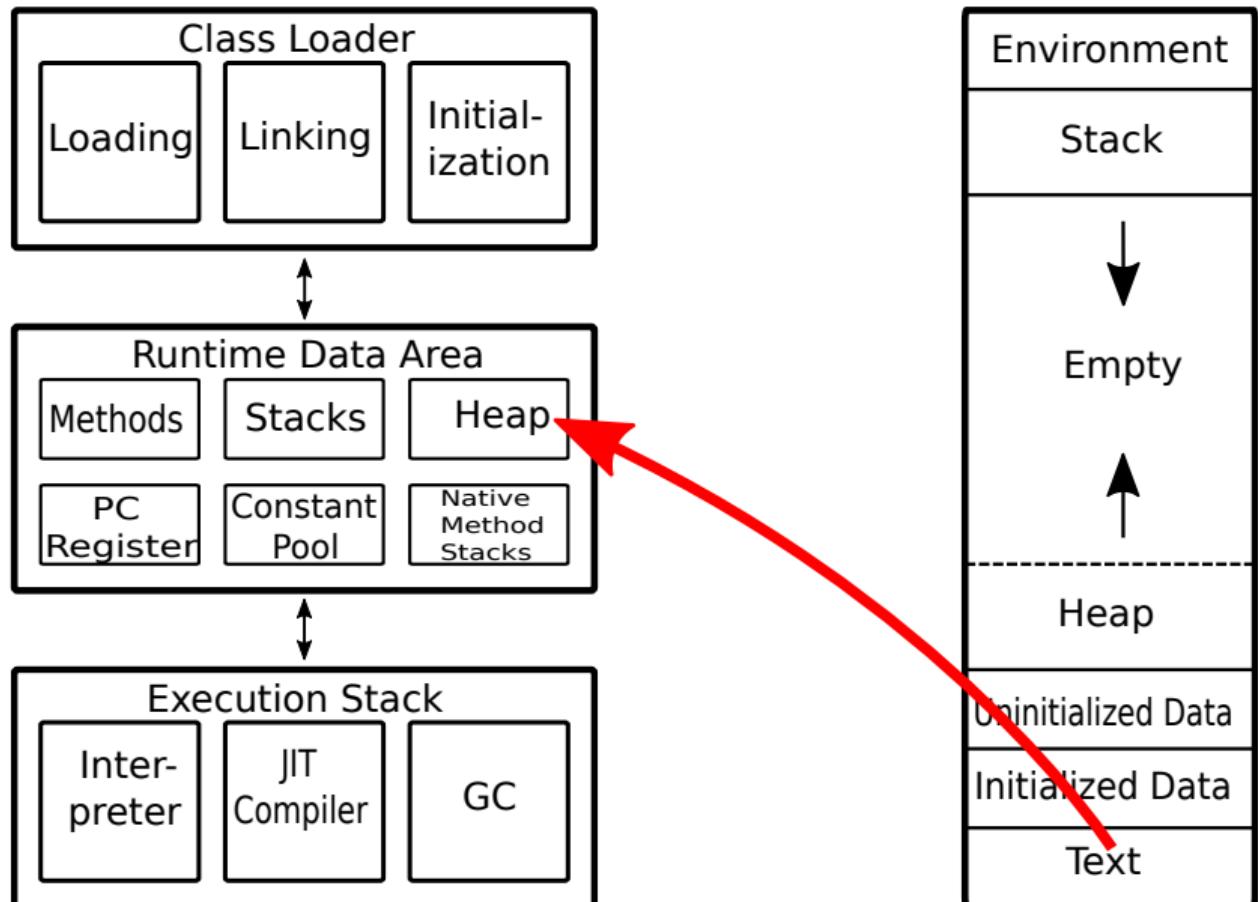
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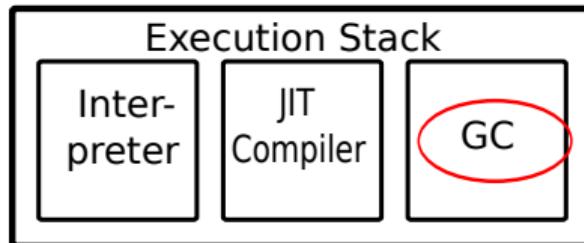
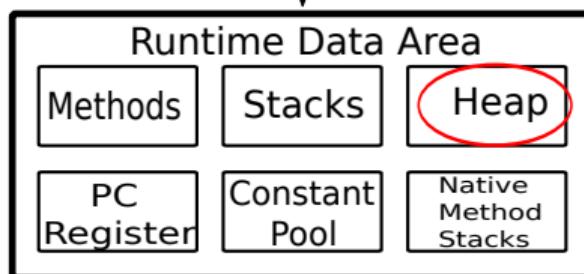
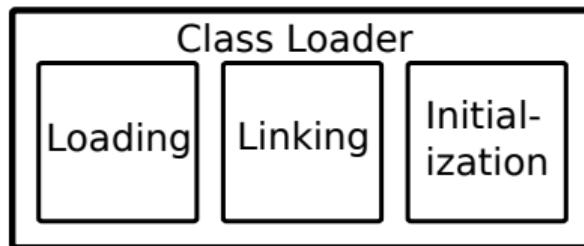
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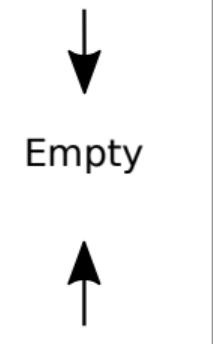
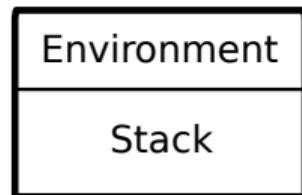
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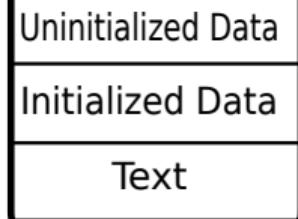
Native Method Interface + Libraries



`new Object()`



Heap `malloc()
free()`



Native Method Interface + Libraries

Lösungsversuch FFM: Konzepte und Klassen (Java 17)

- ▶ Allokation von Speicher

MemorySegment, MemoryAddress, SegmentAllocator, ...

Lösungsversuch FFM: Konzepte und Klassen (Java 17)

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MemorySegment, MemoryAddress, SegmentAllocator, ...
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MemoryLayout, VarHandle (java.lang.invoke), ...

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- ▶ Regeln des Lebenszyklus von Ressourcen
ResourceScope
- ▶ Aufruf von Funktionen
SymbolLookup, CLinker

Beispiel Memory Segment

- ▶ Zusammenhängender Speicherbereich
- ▶ On- oder Off-Heap
- ▶ Nativ, mapped (mmap), Array oder Buffer
- ▶ Garantien für räumliche, zeitliche sowie Thread-bezogene Beschränkungen
- ▶ ...

Beispiele

Prozess-Id (C)

Prozess-Id des Prozesses: keine Parameter, Integer-Rückgabe (jps-Clone)

```
#include <unistd.h>

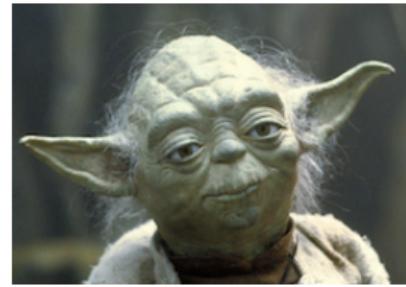
pid_t getpid(void);
```

Prozess-Id (Java)

```
MethodHandle getpid = CLinker.getInstance().downcallHandle(
    CLinker.systemLookup().lookup("getpid").get(),
    MethodType.methodType(int.class),
    FunctionDescriptor.of(CLinker.C_INT));

System.out.println("Process Id: " + (int) getpid.invokeExact());
```

Demo Time



Sleepy from slides, we are !

Quicksort

```
#include <stdlib.h>

void qsort(void *base, size_t nmemb, size_t size,
           int (*compar)(const void *, const void *));
```

Vergleichsmethode/-klasse (à la Comparator#compare())

```
static class Comparator {  
  
    static int compare(MemoryAddress addr1, MemoryAddress addr2) {  
        int v1 = MemoryAccess.getIntAtOffset(  
            MemorySegment.globalNativeSegment(),  
            addr1.toRawLongValue());  
        int v2 = MemoryAccess.getIntAtOffset(  
            MemorySegment.globalNativeSegment(),  
            addr2.toRawLongValue());  
        return v1 - v2;  
    }  
  
}
```

Method-Handle auf qsort

```
MethodHandle qsort = CLinker.getInstance().downcallHandle(  
    CLinker.systemLookup().lookup("qsort").get(),  
  
    MethodType.methodType(void.class, MemoryAddress.class, long.class,  
                         long.class, MemoryAddress.class),  
  
    FunctionDescriptor.ofVoid(C_POINTER, C_LONG, C_LONG, C_POINTER)  
);
```

Method-Handle auf Vergleichsmethode

```
MethodHandle comparHandle = MethodHandles.lookup()  
  
    .findStatic(Comparator.class, "compare",  
  
    MethodType.methodType(int.class, MemoryAddress.class,  
                          MemoryAddress.class));
```

Allokation des Arrays und eigentlicher Aufruf

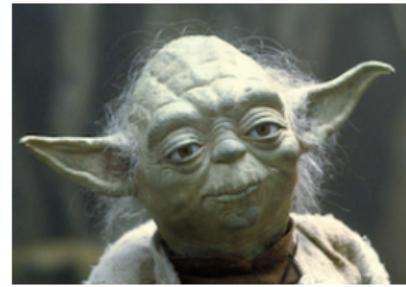
```
try (ResourceScope scope = ResourceScope.newConfinedScope()) {
    MemoryAddress comparFunc = CLinker.getInstance().upcallStub(
        comparHandle,
        FunctionDescriptor.of(C_INT, C_POINTER, C_POINTER), scope);

    MemorySegment array = SegmentAllocator.ofScope(scope)
        .allocateArray(C_INT, new int[] {0, 9, 3, 4, 6, 5, 1, 8, 2, 7});

    qsort.invokeExact(array.address(), 10L, 4L, comparFunc);

    int[] sorted = array.toIntArray();
}
```

Demo Time



Sleepy from slides, we are !

Werkzeugunterstützung

JExtract

- ▶ Reduktion des Overheads durch
 - ▶ Analyse einer Include-Datei
 - ▶ und Generierung der entsprechenden Methoden und Typen für den Aufruf

JExtract

- ▶ Reduktion des Overheads durch
 - ▶ Analyse einer Include-Datei
 - ▶ und Generierung der entsprechenden Methoden und Typen für den Aufruf
- ▶ Nicht im JDK, evtl. später separat verfügbar

getpid ohne jextract

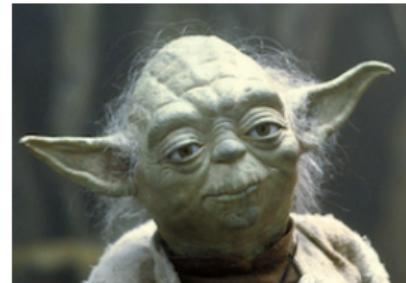
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System.out.println("Process Id: " + (int) getpid.invokeExact());
```

getpid mit jextract

```
System.out.println("Process Id: " + getpid());
```

Demo Time



Sleepy from slides, we are !

Es geht weiter . . . (Java 17 \Rightarrow 18)

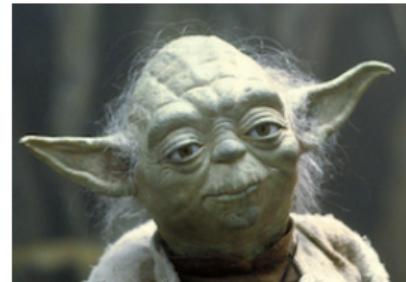
Quicksort mit Java 17 (Ausschnitt)

```
MethodHandle qsort = CLinker.getInstance().downcallHandle(
    CLinker.systemLookup().lookup("qsort").get(),
    MethodType.methodType(void.class, MemoryAddress.class,
        long.class, long.class, MemoryAddress.class),
    FunctionDescriptor.ofVoid(C_POINTER, C_LONG, C_LONG, C_POINTER)
);
```

Quicksort mit Java 18 (Ausschnitt)

```
MethodHandle qsort = CLinker.systemCLinker().downcallHandle(  
    CLinker.systemCLinker().lookup("qsort").get(),  
    FunctionDescriptor.ofVoid(ADDRESS, JAVA_LONG, JAVA_LONG, ADDRESS)  
) ;
```

Demo Time



Sleepy from slides, we are !

Fazit und Ausblick

Persönliche – und damit subjektive – Einschätzung

- ▶ Eine wirklich gute Idee
- ▶ Versuche JAnki zu migrieren. Schwierigkeit: Komplexität des D-Bus-Interface und eigene Unzulänglichkeiten ;-)
- ▶ Wenn GraalVMs Native-Image-Erzeugung FFM unterstützt: 😊

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- ▶ und was machen andere ?

Tomcat SSL

Tomcat 9.0.55 (remm)

2021-11-10

Coyote

① Improve performance of Connector shutdown - primarily to reduce the time it takes to run the test suite. (markt)

🔧 Refactor the APR/native connector shutdown to reduce the possibility of a JVM crash during the connector shutdown. (markt)

🔧 [#457](#): Add a `toString()` method to `MimeHeader` to aid debugging. (dblevins)

🔧 Add experimental OpenSSL support through the Panama API incubating in Java 17, with support for OpenSSL 1.1. This no longer requires tomcat-native or APR. Please refer to the `openssl-java17` module from the `main` branch for more details. (remm)

🔧 Fix APR connector stop so it correctly waits for the sendfile thread, if any, to exit. (markt)

🔧 Do not ignore the error condition if the APR connector is not able to open a server socket as continuing in this case will trigger a JVM crash. (markt)

Elasticsearch

Some scattered feedback on the Foreign Linker API

Chris Hegarty chegar999@gmail.com

Wed Dec 22 09:19:40 UTC 2021

- Previous message (by thread): [Calling the Port Audio C API via Panama FFI APIs](#)
- Next message (by thread): [Some scattered feedback on the Foreign Linker API](#)
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Hi,

As part of a recent prototyping effort, we evaluated replacing the usage of JNA in the core of the Elasticsearch server with the incubating Foreign Linker API.

TL;DR things just worked, perf improved and we really like the restricted native access.

Our usage (at least in this particular case) is not really performance sensitive, in that we reach into native to setup syscall filtering and check resource limits - but hey, faster is always better! We measured approximate perf improvements between 8 and 20 times faster for simple downcalls. The reason the numbers vary so much is more to do with JNA rather than Panama since the Panama times from our to our tests

JDK-Integration



Chris Vest
@chvest

...

It's happening! *jazz hands*

[Tweet übersetzen](#)

openjdk/panama-foreign

#633 **8280527: Move
jdk.incubator.foreign to
java.lang.foreign**



2 comments 0 reviews 271 files +2488 -3462



FrauBoes · January 24, 2022 · 6 commits



github.com

8280527: Move jdk.incubator.foreign to java.lang.foreign by FrauBoes · Pull Req...

To prepare for preview, this change removes the jdk.incubator.foreign module and moves the public classes to java.base/java.lang.foreign, implementation classe...

8:16 nachm. · 24. Jan. 2022 · Twitter Web App

Fragen und Anmerkungen



Vortrag und Code

<https://github.com/BerndMuller/panama-javaland-2022>

