

# SPRING BOOT NATIVE IMAGES IN PRACTICE

my journey of converting Spring Boot applications  
into native images

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# ABOUT ME

Eager to try out different tools

Developer at **HOTSOURCE** ⚡

Love puns



# TOPICS TODAY

- What positive/n(eg)ative implications it had
- My experience with native images at work
- How-To & showcase
- Performance tests results

With screenshots **from production**

# I WON'T COVER DETAILS ABOUT:

- Spring Boot
- GraalVM
- Native images

Who of you have successfully used Spring Boot in a  
native image **in production?**

# **WHICH OF THESE APPLICATIONS IS A NATIVE IMAGE?**

App 2

App 3

# NATIVE IMAGE VS NON-NATIVE

2 similar services for **comparison** of our company in production

# NATIVE IMAGE VS NON-NATIVE

Both use:

- Spring JPA
- Liquibase
- Rest API
- Calls other services
- GCP Pub/Sub

# RESOURCES

Non-native



Native



# STARTUP TIME

```
> i 2026-01-15 01:11:00.991 sharing Starting SharingApplication using Java 21.0.8 with PID 1 (/app/app.jar s
> i 2026-01-15 01:12:21.117 sharing ThreadManager of type 'VirtualThreadPerTask' started
> i 2026-01-15 01:12:21.402 sharing Started SharingApplication in 85.999 seconds (process running for 90.237)
```

```
> i 2026-02-02 11:05:36.109 permission-service Starting AOT-processed PermissionServiceApplication using Java 21.0.9 with PID 1
> i 2026-02-02 11:05:39.842 permission-service Tomcat started on port 8080 (http) with context path '/'
> i 2026-02-02 11:05:39.843 permission-service Started PermissionServiceApplication in 3.895 seconds (process running for 3.901)
```

# BENEFITS

- Amazing startup time
- Less resource usage (especially at startup)
- No JIT warmup

# DOWNSIDES

# BUILD-TIME

Non-Native

[95678f4e](#) [mobilitymarketplacecore/sharing](#)  8 min 4 sec

```
options:  
  machineType: 'E2_HIGHCPU_8'
```

Native

[f52ea647](#) [mobilitymarketplacecore/permission-service](#)  10 min 5 sec

```
options:  
  machineType: 'E2_HIGHCPU_32'
```

# REFLECTION...

...issues only occur **at runtime**

```
com.fasterxml.jackson.databind.exc.InvalidDefinitionException:  
    Cannot construct instance of `io.kay.graal.clients.PushServerRespons  
    cannot deserialize from Object value (no delegate- or property-based  
    this appears to be a native image,  
    in which case you may need to configure reflection  
    for the class that is to be deserialized
```

# DOWNSIDES

- Buildtime increases a lot (1 minute vs 8 minutes)
- Reflection issues at runtime
- Limited bytecode manipulation
- Some dependencies might not work

THERE ARE  
**SOLUTIONS FOR ALL**  
MOST DOWNSIDES

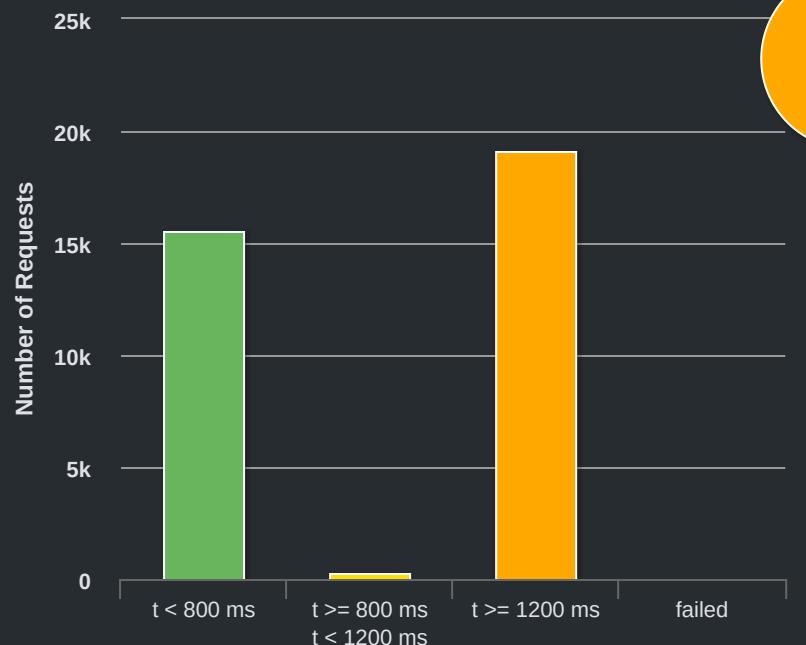
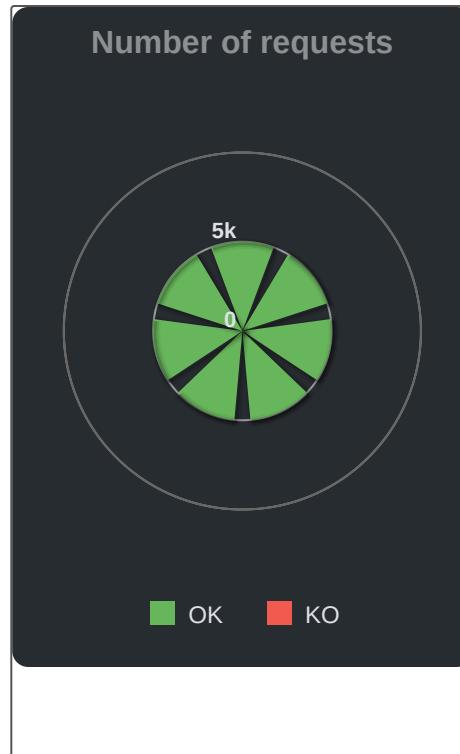
**LET'S SHOP  
INTO THE  
CODE**

# PERFORMANCE TESTS WITH GATLING

First cold start, without restart a second run

```
.injectOpen(  
    nothingFor(3),  
    rampUsers(5_000).during(10)  
)
```

# Cold Start

[Global](#)[Details](#)**Response Time Ranges****Number of requests****Gatling Version**

Version: 3.14.9

Released: 2025-11-05

**Run Information**

Date: 2026-02-14 12:42:36 (CET)

Duration: 1m 49s

Description: —

[Expand all groups](#)[Collapse all groups](#)**Executions**

Requests

Total    OK    KO    % KO    Cnt/s

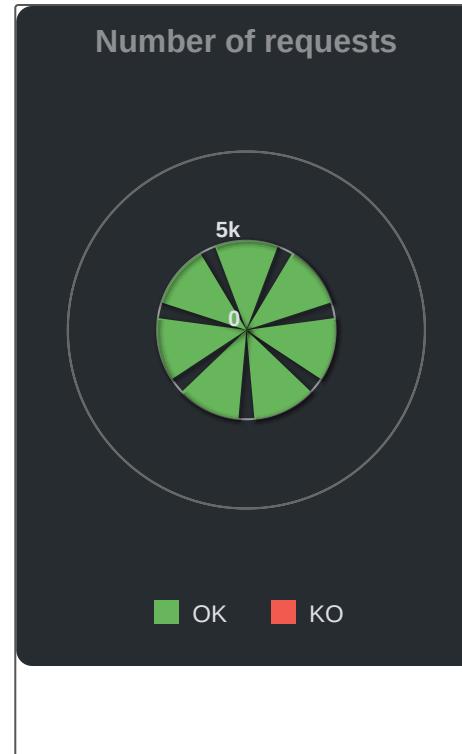
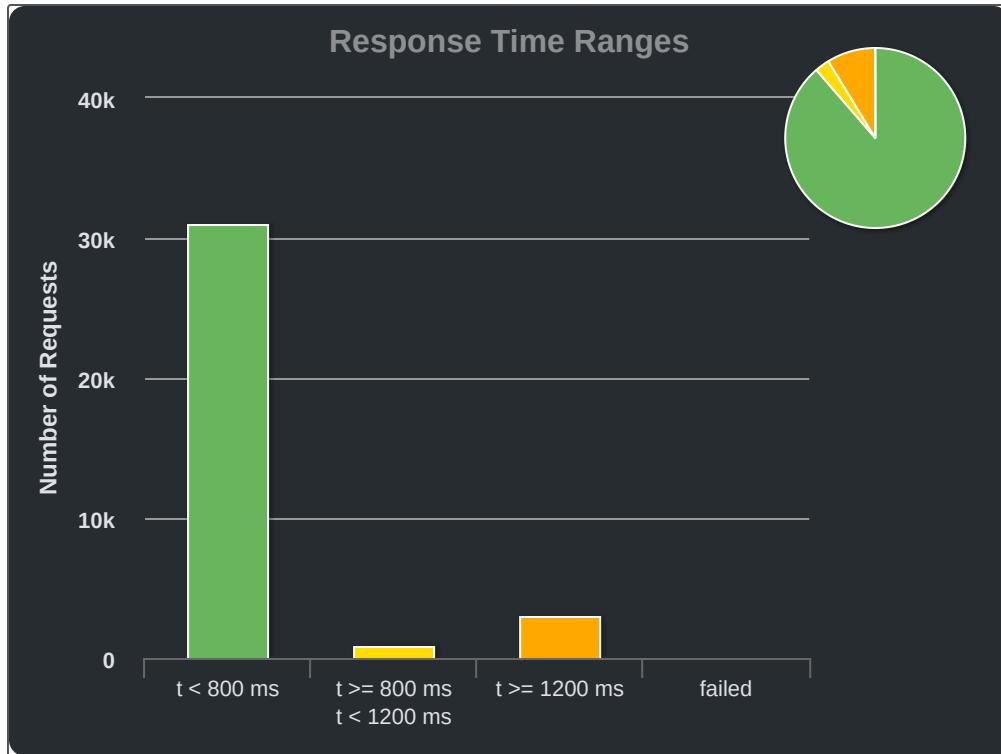
**Response Time (ms)**

Min    50th pct    75th pct    95th pct    99th pct    Max    Mean

# Warm Start

## Global

## Details



# Gatling Version

Version: 3.14.9

Released: 2025-11-05

## Run Information

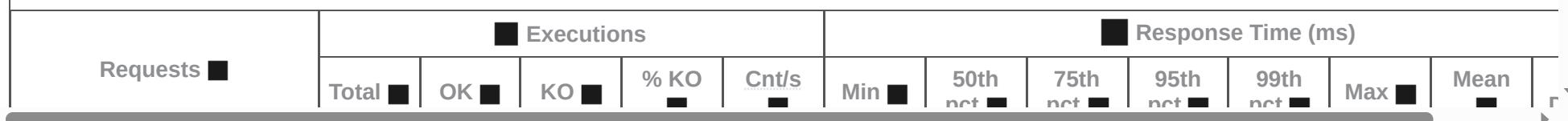
Date: 2026-02-14 12:45:48 (

Duration: 1m 33s

**Description:** —

Expand all groups

**Collapse all groups**



# TIPS & TRICKS

Understand **reflect-config.json**

Include all **needed** resources

missing in buildtime = missing in runtime

Read the docs

Test containerized applications

# TIPS & TRICKS

Run tests with non-native container first

On success: build native-image and run tests against it

Adds overhead even more, but catches most issues at  
the correct stage

# USEFUL DOCS

GraalVM docs

Spring Boot docs

reflect-configs for libraries

More spring boot docs

# COMMON ERRORS AND RESOLUTIONS

# COMMON ERRORS AND EXPLANATIONS

## Missing runtime hints

```
com.fasterxml.jackson.databind.exc.InvalidDefinitionException: Ca  
cannot deserialize from Object value (no delegate- or propert  
in which case you may need to configure reflection for the cl
```

Solution:

```
@RegisterReflectionForBinding({PushServerRequest.class, PushServe  
public PushServerResponse sendSms(String message) {  
    return restClient.post()  
        .body(new PushServerRequest(message))  
        .retrieve()  
        .body(PushServerResponse.class);  
}
```

# COMMON ERRORS AND EXPLANATIONS

## Missing resource hints

```
org.springframework.beans.factory.BeanCreationException:  
  Error creating bean with name 'entityManagerFactory':  
    Failed to initialize dependency 'liquibase' of LoadTimeWe  
  Error creating bean with name 'liquibase': liquibase.exe  
  liquibase.exception.ChangeLogParseException: The file /db
```

Solution:

```
public void registerHints(RuntimeHints hints, ClassLoader classLo  
  hints.resources()  
    .registerPattern("db/**");  
}
```

# Missing reflection hints

```
Caused by: java.util.ServiceConfigurationError: org.hibernate.ByNameProvider org.hibernate.bytecode.internal.bytebuddy.BytecodePr
```

Solution:

```
// reflect-config.json
[
  {
    "name": "org.hibernate.bytecode.internal.bytebuddy.Bytecode",
    "allDeclaredMethods": true,
    "allDeclaredFields": true,
    "allDeclaredConstructors": true
  }
]
```