Red Hat Dallas Emerging Tech Summit

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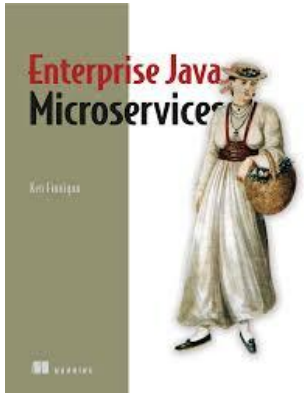
Kubernetes Native with Quarkus

Ken Finnigan, Senior Principal Software Engineer

Introductions

Name:
Ken Finnigan
Role/team:
MP/SmallRye
Where you're from:
Boston (via Aus)

- Technical Lead for Eclipse MicroProfile at Red Hat
- Project Lead for SmallRye
  - Implements Eclipse MicroProfile
- Book Author
  - Enterprise Java Microservices



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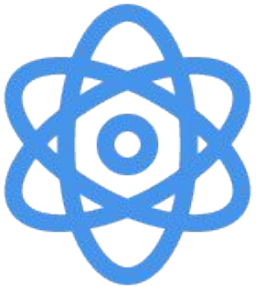
QUARKUS

An Open Source stack to write Java apps

Cloud Native,



Microservices,

Serverless

Source:
Insert source data here
Insert source data here
Insert source data here

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WHY QUARKUS?

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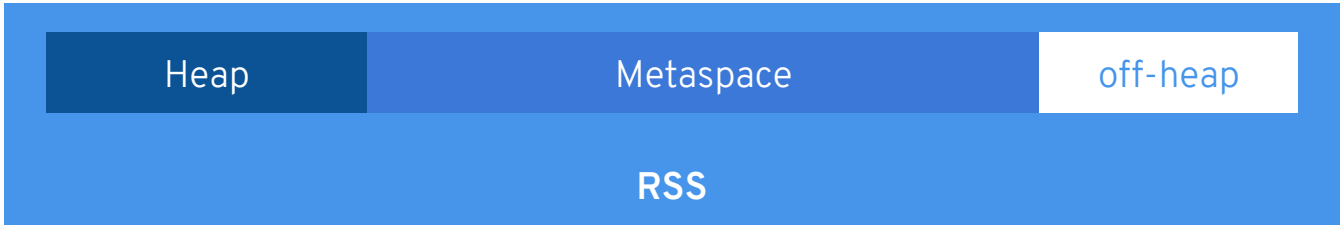
The hidden truth about Java + containers

- Designed for throughputs (requests/s)
- Startup overhead
  - # of classes, bytecode, JIT
- Memory overhead
  - # of classes, metadata, compilation



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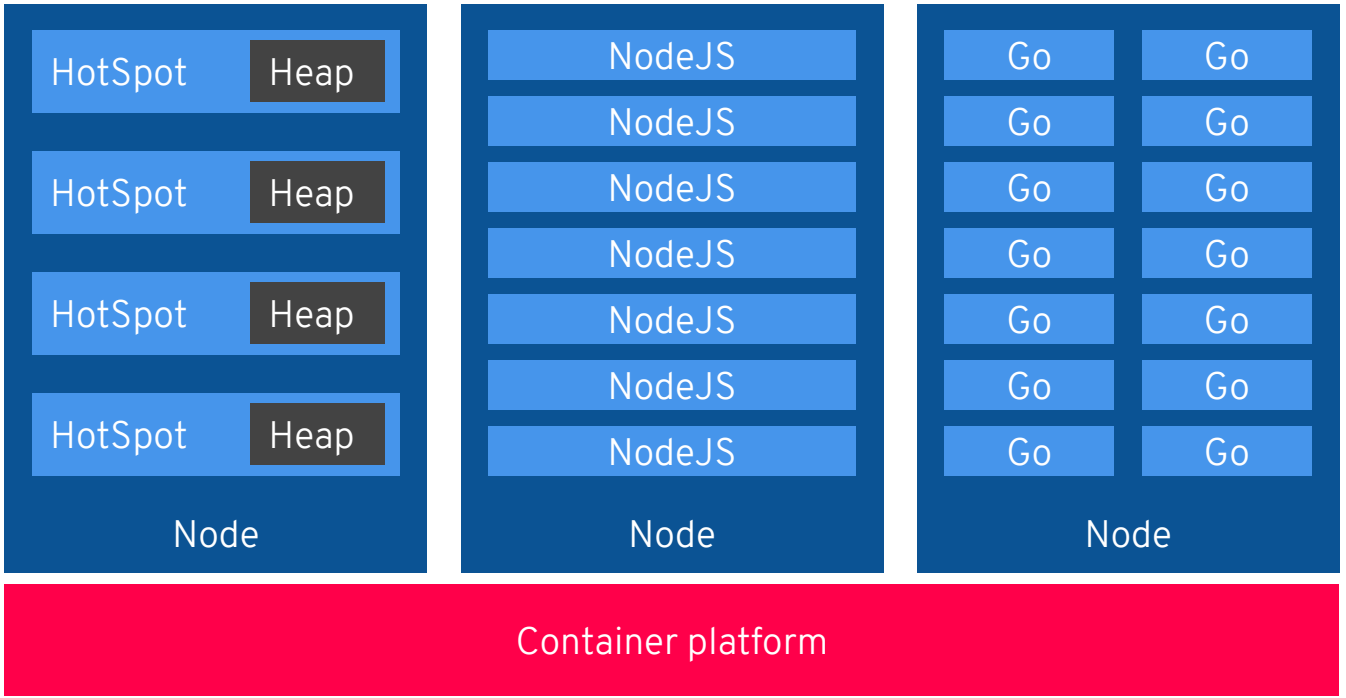
The hidden truth about Java + containers



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WHAT IS QUARKUS?

QUARK: elementary particle / **US**: hardest thing in computer science

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Quarkus Benefits

Developer Joy

Supersonic Subatomic Java

Unifies

imperative and reactive

Best-of-breed

libraries and standards

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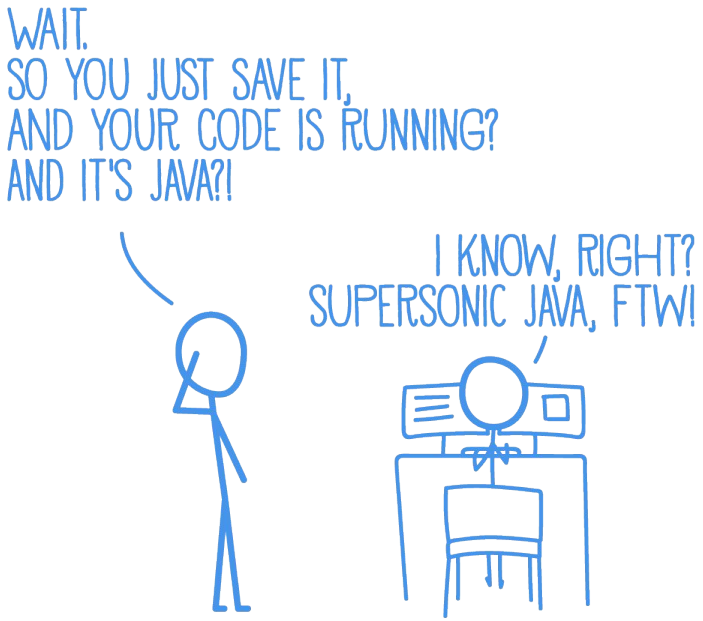
Benefit No. 1: Developer Joy

A cohesive platform for optimized developer joy:

- Based on standards, but not limited
- Unified configuration
- Zero config, live reload in the blink of an eye
- Streamlined code for the 80% common usages, flexible for the 20%
- No-hassle native executable generation



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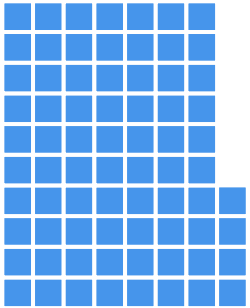
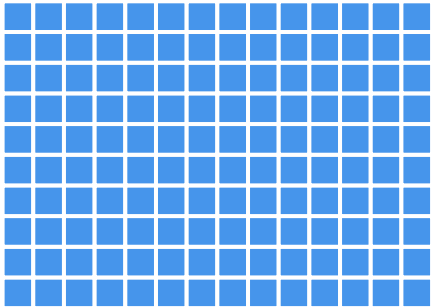
Benefit No. 2: Supersonic Subatomic Java

REST

Quarkus + AOT
19 MB



Quarkus + OpenJDK (JIT)
77 MB



Traditional Cloud-Native Stack
140 MB

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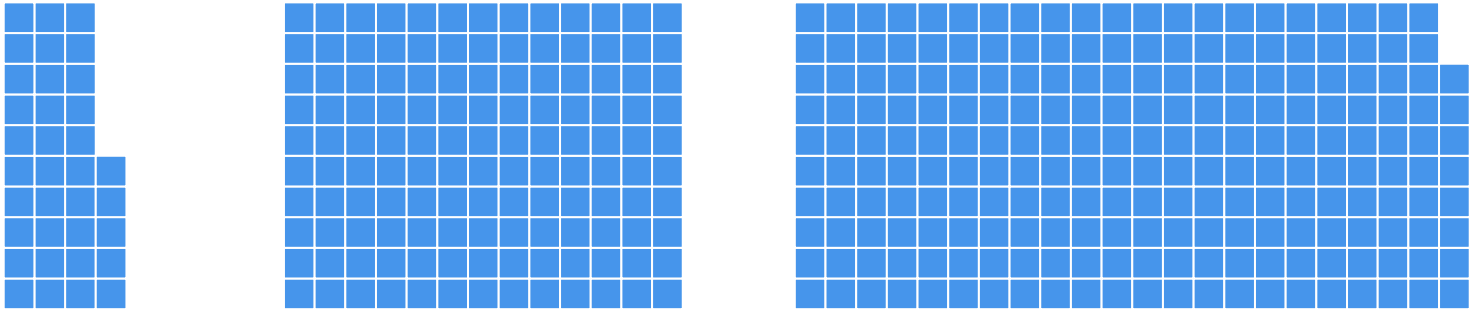
Benefit No. 2: Supersonic Subatomic Java

REST + CRUD



Quarkus + AOT
35 MB

Quarkus + OpenJDK (JIT)
130 MB

Traditional Cloud-Native Stack
218 MB

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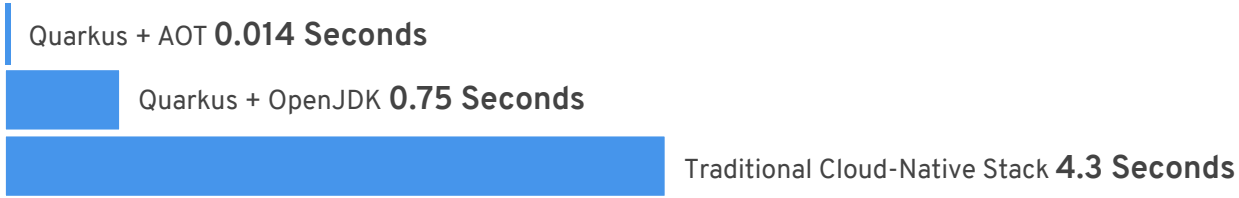
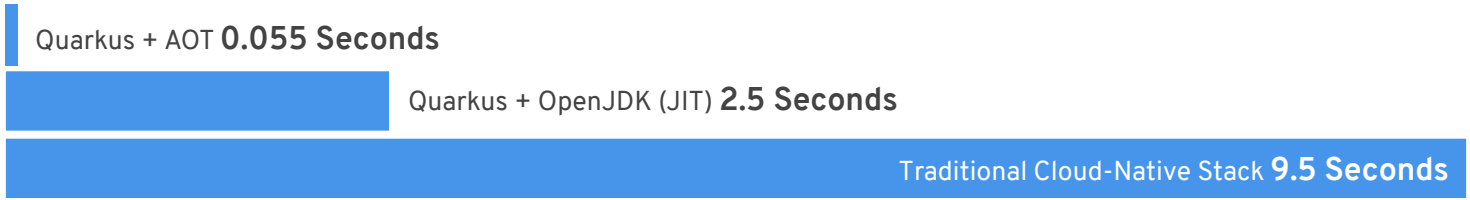
Benefit No. 2: Supersonic Subatomic Java

REST

Time to first response



REST + CRUD



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Benefit No. 3: Unifies Imperative and Reactive

```
@Inject
SayService say;

@GET
@Produces(MediaType.TEXT_PLAIN)
public String hello() {
      return say.hello();
}
```

```
@Inject @Channel("kafka")
Publisher<String> reactiveSay;

@GET
@Produces(MediaType.SERVER_SENT_EVENTS)
public Publisher<String> stream() {
      return reactiveSay;
}
```

- Combine both reactive and imperative development in the same application
- Use the technology that fits your use case
- Key for reactive systems based on event-driven apps

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Benefit No. 4: Best of Breed Frameworks & Standards

Quarkus provides a cohesive, fun to use, full-stack framework by leveraging a growing list of over fifty best-of-breed libraries that you love and use. All wired on a standard backbone.

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HOW QUARKUS WORKS

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Move startup time to build time

What does a framework do at startup time?

- Parse config files
- Classpath & classes scanning
  - for annotations, getters or other metadata
- Build framework metamodel objects
- Prepare reflection and build proxies
- *Start and open IO, threads, etc*

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Build time benefits

- Do the work once, not at each start
- All the bootstrap classes are no longer loaded
- Less time to start, less memory used
- Less or no reflection nor dynamic proxy

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SPRING COMPATIBILITY

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Why Spring on Quarkus?

- Capitalize your Spring know-how
- Speed up knowledge transfer and onboarding
- Familiarity

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Spring DI and Web

- Spring DI and Web
  - Dependency injection model
    - @Component, @Autowired, etc.
  - Spring Web - Developing REST APIs
    - @RestController, etc.
- Spring Data JPA
  - Derived methods
  - Custom query methods
  - Fragments
  - Transactional support

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NATIVE IMAGE

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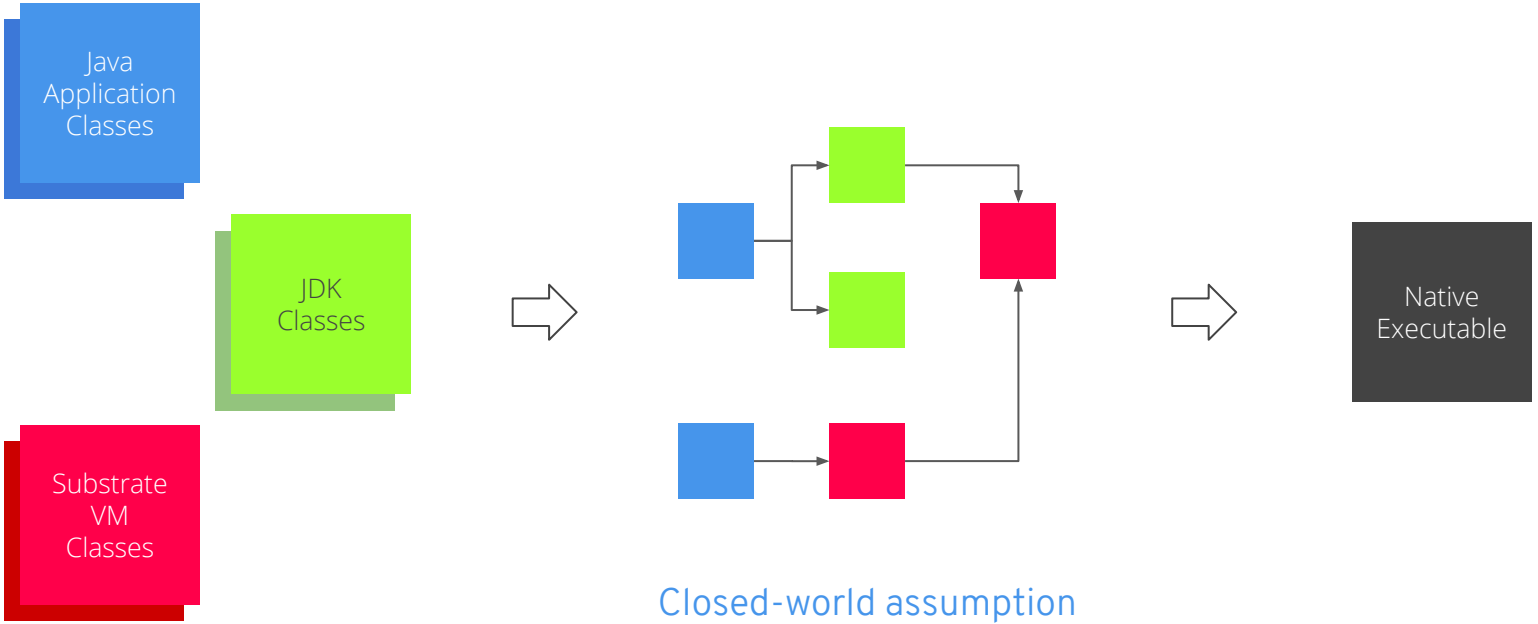
Dead code elimination



Closed-world assumption

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When to use which VM with Quarkus?

JIT - OpenJDK HotSpot

High memory-density requirements
High request/s/MB
Fast startup time

Best raw performance (CPU)
Best garbage collectors
Higher heap size usage

Known monitoring tools
Compile Once, Run anywhere
Libraries that only work in standard JDK

AOT - GraalVM native image

Highest memory-density requirements
Highest request/s/MB
    for low heap size usages
Faster startup time
    10s of ms for Serverless

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Resources

- Demos
  - https://github.com/burrsutter/quarkus-todo-app
  - https://github.com/burrsutter/springtodo
- Quarkus
  - https://quarkus.io/
  - https://code.quarkus.io/
  - https://quarkusio.zulipchat.com/
  - https://github.com/quarkusio/quarkus
  - https://twitter.com/quarkusio

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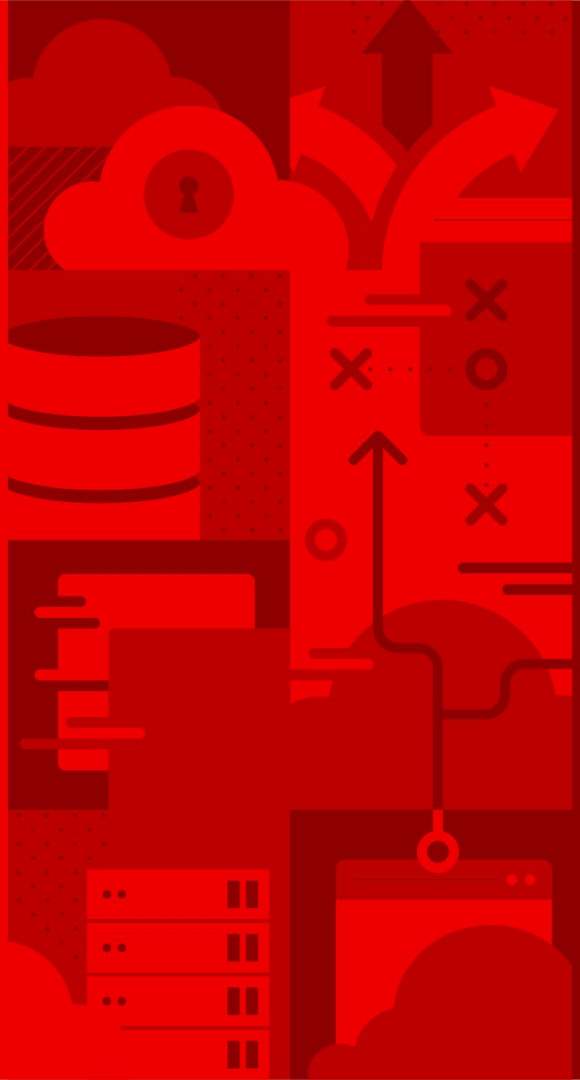

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