



QUARKUS

The Black Swan of Java ?

Max Rydahl Andersen,
Distinguished Engineer, Red Hat

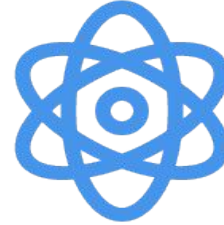
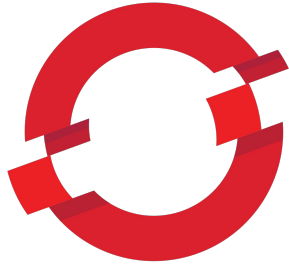


“

1. It is a surprise
2. It has a major impact
3. People contend that they expected the event to happen (in hindsight)

~ Black Swan Theory

What does not fit ?



OPENSIFT Cloud Native, Microservices,



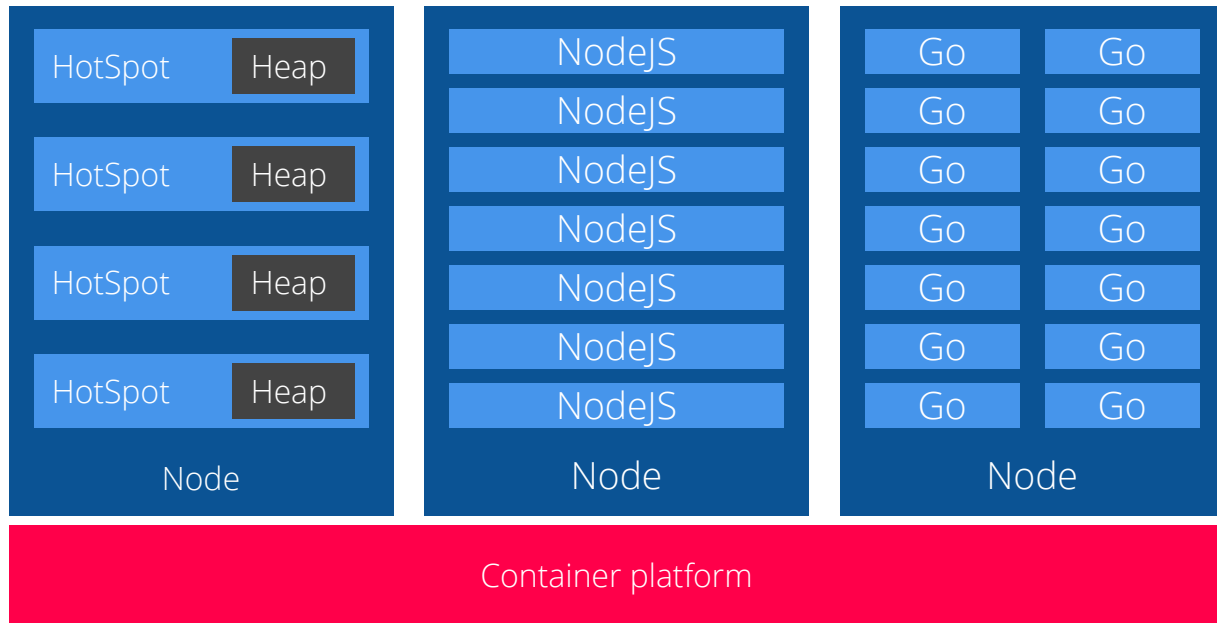
Serverless

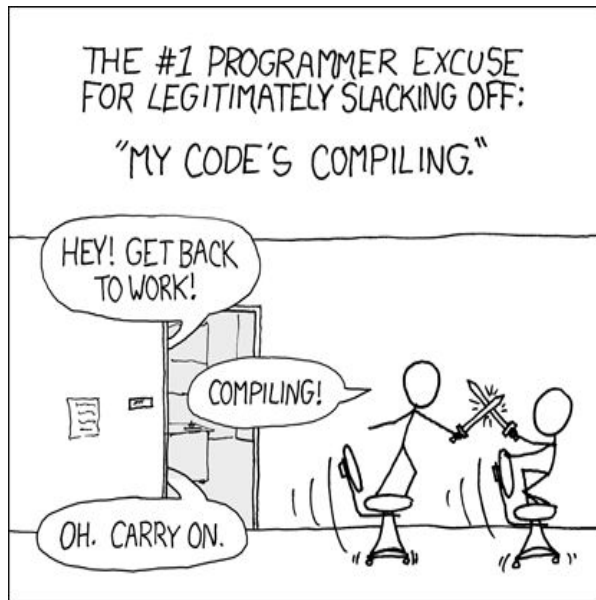


Java™



The hidden truth about Java + containers





WAIT.
SO YOU JUST SAVE IT,
AND YOUR CODE IS RUNNING?
AND IT'S JAVA?!

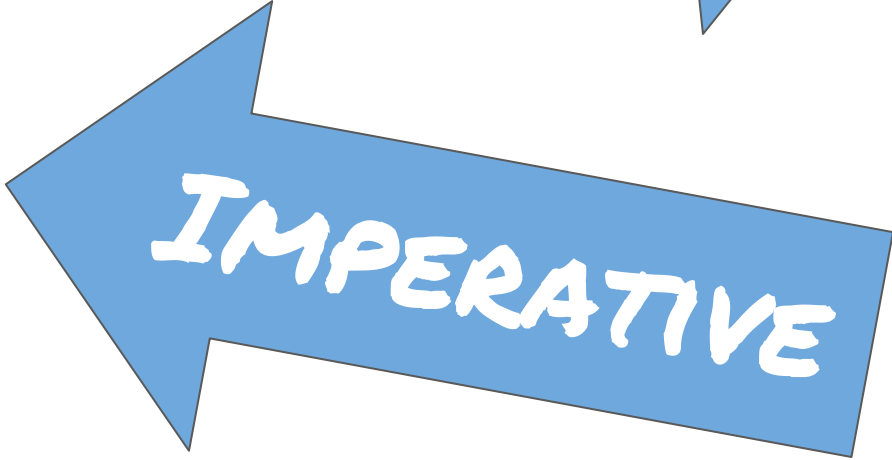


I KNOW, RIGHT?
SUPERSONIC JAVA, FTW!





REACTIVE



IMPERATIVE





Eclipse Vert.x



Eclipse MicroProfile



Spring Compat



Kubernetes



OpenShift



Jaeger



Hibernate



RESTEasy



Apache Camel



Prometheus



Apache Kafka



Netty

DEMO

```

> mvn io.quarkus:quarkus-maven-plugin:1.4.1.Final:create -DprojectId=dk.xam.devjoy -DprojectArtifactId=nordicsdemo -DclassName="dk
.xam.devjoy.Greeting" -Dpath="/hello"
No mvnw set up for this project; consider setting one up:
https://github.com/takari/takari-maven-plugin

Unable to find a mvn build file named pom.xml.
Using mvn at '/Users/max/.sdkman/candidates/maven/current/bin/mvn' to run POM '':

[INFO] Scanning for projects...
[INFO]
[INFO] -----< org.apache.maven:standalone-pom >-----
[INFO] Building Maven Stub Project (No POM) 1
[INFO] -----[ pom ]-----
[INFO]
[INFO] --- quarkus-maven-plugin:1.4.1.Final:create (default-cli) @ standalone-pom ---
Downloading from central: https://repo1.maven.org/maven2/io/quarkus/quarkus-universe-bom/maven-metadata.xml
Downloaded from central: https://repo1.maven.org/maven2/io/quarkus/quarkus-universe-bom/maven-metadata.xml (982 B at 2.7 kB/s)
Creating a new project in /Users/max/code/work/quarkus/nordicsdemo
[INFO]
[INFO] Maven Wrapper version 0.5.6 has been successfully set up for your project.
[INFO] Using Apache Maven: 3.6.3
[INFO] Repo URL in properties file: https://repo.maven.apache.org/maven2
[INFO]
[INFO]
[INFO] =====
[INFO] Your new application has been created in /Users/max/code/work/quarkus/nordicsdemo
[INFO] Navigate into this directory and launch your application with mvn quarkus:dev
[INFO] Your application will be accessible on http://localhost:8080
[INFO] =====
[INFO]
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 2.334 s
[INFO] Finished at: 2020-05-19T22:51:32+02:00
[INFO] -----

```

                                                           <

src > main > java > dk > xam > devjoy > Greeting.java > Greeting

```
1 package dk.xam.devjoy;
2
3 import javax.ws.rs.GET;
4 import javax.ws.rs.Path;
5 import javax.ws.rs.Produces;
6 import javax.ws.rs.core.MediaType;
7
8 @Path("/hello")
9 public class Greeting {
10
11     @GET
12     @Produces(MediaType.TEXT_PLAIN)
13     http://localhost:8080/hello
14     public String hello() {
15         return "hello";
16     }
17 }
```

< > C 00 | 0.0.0.0:8080/hello

Quarkus Insights #2... Quarkus dev tips an...

hello

chdemo > src > main > java > dk > xam > devjoy > Greeting.java > Greeting >

```
package dk.xam.devjoy;
```

```
import javax.ws.rs.GET;  
import javax.ws.rs.Path;  
import javax.ws.rs.Produces;  
import javax.ws.rs.core.MediaType;
```

```
@Path("/hello")
```

```
public class Greeting {
```

```
    @GET
```

```
    @Produces(MediaType.TEXT_PLAIN)
```

```
    public String hello() {  
        return aNewMethod("OpenDevHour");
```

```
    }
```

```
    private String aNewMethod(String who) {
```

```
        return "Hello" + who;
```

```
    }
```

```
}
```

< > ↺ ☐ | ⚠ 0.0.0.0:8080/hello

Hello OpenDevHour

}

That was hello world - let us make it (more) real...

todos

▼ *What needs to be done?*



~~Introduction to Quarkus~~



Hibernate with Panache



Visit Quarkus web site



Star Quarkus project

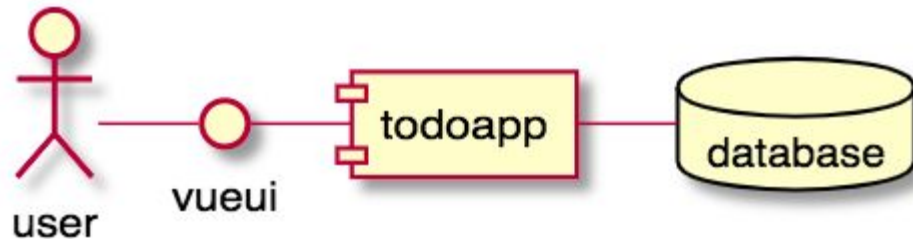
3 items left

All

Active

Completed

Clear completed



```
create table Todo (  
  id int8 not null,  
  completed boolean not null,  
  ordering int4,  
  title varchar(255),  
  url varchar(255),  
  primary key (id)  
)
```

Hibernate:

```
alter table if exists Todo  
add constraint UK_oxfuur9jdyqshux5rm7g7ga6c unique (title)
```

Hibernate:

```
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Introduction to Quarkus', true, 0, null)
```

Hibernate:

```
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Hibernate with Panache', false, 1, null)
```

Hibernate:

```
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Visit Quarkus website', false, 2, 'https://quarkus.io')
```

Hibernate:

```
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Star Quarkus project', false, 3, 'https://github.com/quarkusio/quarkus/')
```

2020-05-19 23:09:19,889 INFO [io.quarkus] (Quarkus Main Thread) todo-backend 1.0-SNAPSHOT (powered by Quarkus 1.4.0.CR1) started in 2.302s. Listening on: http://0.0.0.0:8080

2020-05-19 23:09:19,891 INFO [io.quarkus] (Quarkus Main Thread) Profile dev activated. Live Coding activated.

2020-05-19 23:09:19,891 INFO [io.quarkus] (Quarkus Main Thread) Installed features: [agroal, cdi, hibernate-orm, hibernate-orm-panache, hibernate-validator, jdbc-postgresql, narayana-jta, resteasy, resteasy-jsonb]

@Entity

```
public class Todo extends PanacheEntity {
```

```
    @NotBlank
```

```
    @Column(unique = true)
```

```
    public String title;
```

```
    public boolean completed;
```

```
    @Column(name = "ordering")
```

```
    public int order;
```

```
    public String url;
```

```
    public static List<Todo> findNotCompleted() {
```

```
        return list("completed", false);
```

```
    }
```

@Entity

```
public class Todo extends PanacheEntity {
```

```
    @NotBlank
```

```
    @Column(unique = true)
```

```
    public String title;
```

```
    public boolean completed;
```

```
    @Column(name = "ordering")
```

```
    public int order;
```

```
    public String url;
```

```
    public String context;
```

```
    /**
```

```
     * @return the title
```

```
     */
```

```
    public String getTitle() {
```

```
        return title.toUpperCase();
```

```
    }
```

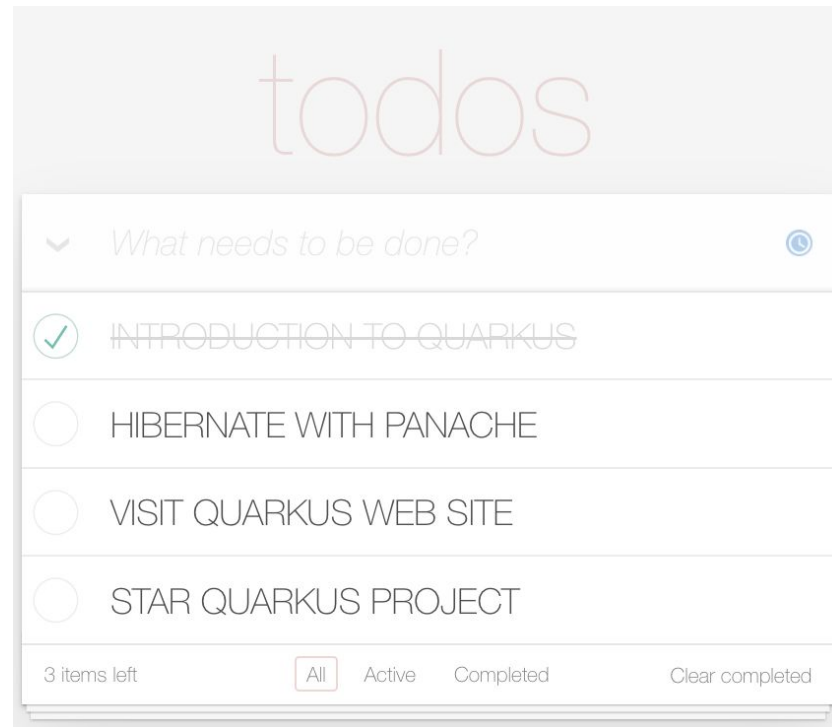
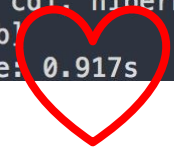
New
Database
Column and
method
change

```
    public static List<Todo> findNotCompleted() {
```

```
        return list("completed", false);
```

```
    }
```

```
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Visit Quarkus web site', false, 2, 'https://quarkus.io')
Hibernate:
INSERT INTO todo(id, title, completed, ordering, url) VALUES (nextval('hibernate_sequence'), 'Star Quarkus project', false, 3, 'https://github.com/quarkusio/quarkus/')
2020-05-19 23:16:49,408 INFO [io.quarkus] (Quarkus Main Thread) todo-backend 1.0-SNAPSHOT (powered by Quarkus 1.4.0.CR1) started in 0.135s. Listening on: http://0.0.0.0:8080
2020-05-19 23:16:49,408 INFO [io.quarkus] (Quarkus Main Thread) Profile dev activated. Live Coding activated.
2020-05-19 23:16:49,408 INFO [io.quarkus] (Quarkus Main Thread) Installed features: [agroal, cdi, hibernate-orm, hibernate-orm-panache, hibernate-validator, jdbc-postgresql, narayana-jta, resteasy, resteasy-jsonb]
2020-05-19 23:16:49,408 INFO [io.qua.dep.dev] (vert.x-worker-thread-1) Hot replace total time: 0.917s
```



```
> java -jar target/todo-backend-1.0-SNAPSHOT-runner.jar
```

--/	--	\	/	/	/	/	-		/	-	\	/	/	/	/	/	/	-	/
-/	/	_	/	/	_	/	-		,	-	,	<	/	/	_	/	\	\	
--\	--	\	\	\	--	/	/		-	/	/		-	/	/		-	\	--

Hibernate:

```
alter table if exists Todo
    add constraint UK_oxfuur9jdyqshux5rm7g7ga6c unique (title)
```

```
2020-05-19 23:35:41,059 INFO [io.quarkus] (main) todo-backend 1.0-SNAPSHOT (powered by Quarkus 1.4.0.C
R1) started in 1.965s. Listening on: http://0.0.0.0:8080
```

```
2020-05-19 23:35:41.061 INFO [io.quarkus] (main) Profile prod activated.
```

```
2020-05-19 23:35:41,061 INFO [io.quarkus] (main) Installed features: [agroal, cdi, hibernate-orm, hibernate-orm-panache, hibernate-validator, jdbc-postgresql, narayana-jta, resteasy, resteasy-jsonb]
```



```
> GRAALVM_HOME=~/.sdkman/candidates/java/20.0.0.r11-grl mvn package -Dnative
```

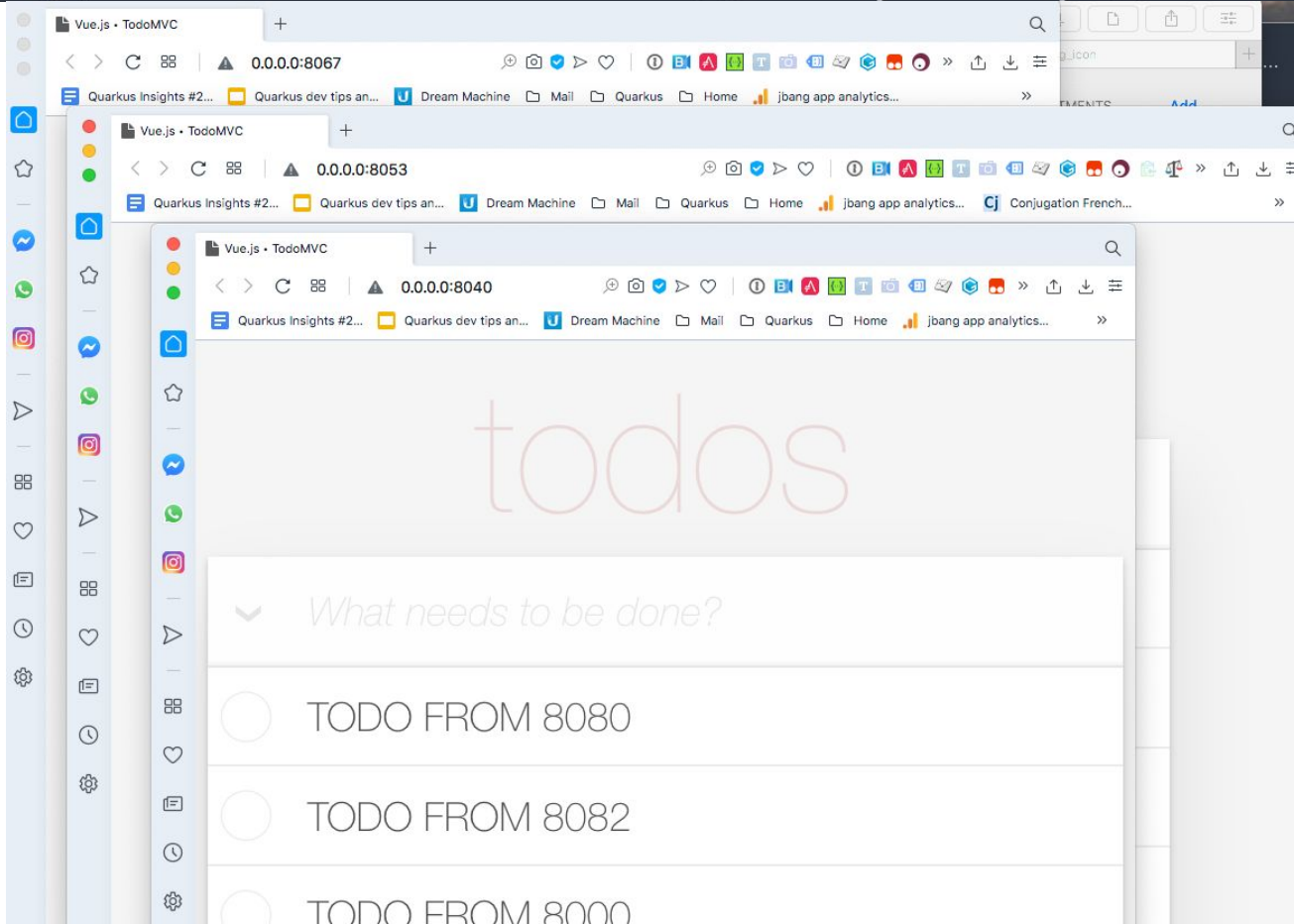
```
[todo-backend-1.0-SNAPSHOT-runner:34650]      setup: 4,717.43 ms, 1.44 GB
23:22:31,784 INFO [org.hib.Version] HHH000412: Hibernate ORM core version 5.4.14.Final
23:22:31,798 INFO [org.hib.ann.com.Version] HCANN000001: Hibernate Commons Annotations {5.1.
23:22:31,829 INFO [org.hib.dia.Dialect] HHH000400: Using dialect: io.quarkus.hibernate.orm.r
greSQL10Dialect
23:22:31,858 INFO [org.hib.val.int.uti.Version] HV000001: Hibernate Validator 6.1.3.Final
23:22:47,503 INFO [org.jbo.threads] JBoss Threads version 3.0.1.Final
[todo-backend-1.0-SNAPSHOT-runner:34650]      (typeflow): 32,683.98 ms, 8.93 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (objects): 36,680.56 ms, 8.93 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (features): 1,812.77 ms, 8.93 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      analysis: 77,022.90 ms, 8.93 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (clinit): 2,203.96 ms, 10.16 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      universe: 5,851.99 ms, 10.16 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (parse): 7,466.96 ms, 10.49 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (inline): 7,741.26 ms, 10.70 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      (compile): 66,599.57 ms, 10.99 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      compile: 90,250.64 ms, 10.99 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      image: 14,974.05 ms, 10.99 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      write: 3,066.26 ms, 10.99 GB
[todo-backend-1.0-SNAPSHOT-runner:34650]      [total]: 203,896.69 ms, 10.99 GB
[INFO] [io.quarkus.deployment.QuarkusAugmentor] Quarkus augmentation completed in 207498ms
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 03:32 min
[INFO] Finished at: 2020-05-19 23:25:43+02:00
[INFO] -----
```

“Booting”
Hibernate
during Build

native-image
“magic”

```
alter table if exists Todo
  add constraint uk_oxfuur9jdyqshux5rm7g7ga6c unique (title)
2020-05-20 00:12:00,994 INFO [io.quarkus] (main) todo-backend 1.0-SNAPSHOT (powered by Quarkus 1.4.0.C
R1) started in 0.050s. Listening on: http://0.0.0.0:8080
```

```
> for i in $(seq 8000 8100); do QUARKUS_HTTP_PORT=$i ./target/todo-backend-1.0-SNAPSHOT-runner > todo-$i.log & done  
for i in $(shuf -i 8000-8100 -n 10); do open http://0.0.0.0:$i & done
```




```

1  [|||||] 28.5%] 5 [|||] 15.2%] 9 [|||] 12.7%] 13 [||] 6.6%]
2  [|] 1.3%] 6 [|] 1.3%] 10 [|] 0.7%] 14 [|] 0.7%]
3  [|||||] 19.7%] 7 [|||] 11.2%] 11 [|||] 8.6%] 15 [||||] 8.6%]
4  [|] 1.3%] 8 [|] 0.7%] 12 [|] 0.0%] 16 [|] 0.0%]
Mem[|||||] 4G/32.0G] Tasks: 748, 7618 thr; 1 running
Swp[|||||] 6M/1.00G] Load average: 3.24 2.80 2.61
Uptime: 15:50:55

```

PID	USER	PRI	NI	VIRT	RES	SHR	PU%	MEM%	TIME+	Command
58209	max	24	0	49M	56K	2K	0.0	0.2	0:00.12	./target/todo-backend-1.0-SNAPSHOT-runner
58211	max	24	0	49M	55K	6K	0.0	0.2	0:00.14	./target/todo-backend-1.0-SNAPSHOT-runner
58166	max	24	0	49M	53808	?	0.0	0.2	0:00.14	./target/todo-backend-1.0-SNAPSHOT-runner
58204	max	24	0	48M	52080	?	0.0	0.2	0:00.14	./target/todo-backend-1.0-SNAPSHOT-runner
58189	max	24	0	48M	51380	?	0.0	0.2	0:00.13	./target/todo-backend-1.0-SNAPSHOT-runner
58196	max	24	0	46M	51368	?	0.0	0.2	0:00.14	./target/todo-backend-1.0-SNAPSHOT-runner
58143	max	24	0	48M	51308	?	0.0	0.2	0:00.11	./target/todo-backend-1.0-SNAPSHOT-runner
58159	max	24	0	49M	51200	?	0.0	0.2	0:00.12	./target/todo-backend-1.0-SNAPSHOT-runner
58182	max	24	0	49M	51140	?	0.0	0.2	0:00.12	./target/todo-backend-1.0-SNAPSHOT-runner
58136	max	24	0	49M	51124	?	0.0	0.2	0:00.11	./target/todo-backend-1.0-SNAPSHOT-runner
58169	max	24	0	49M	51116	?	0.0	0.2	0:00.15	./target/todo-backend-1.0-SNAPSHOT-runner
58226	max	24	0	49M	51096	?	0.0	0.2	0:00.13	./target/todo-backend-1.0-SNAPSHOT-runner
58192	max	24	0	49M	51048	?	0.0	0.2	0:00.11	./target/todo-backend-1.0-SNAPSHOT-runner
58212	max	24	0	46M	45464	?	0.0	0.1	0:00.10	./target/todo-backend-1.0-SNAPSHOT-runner
58163	max	24	0	47M	45180	?	0.0	0.1	0:00.12	./target/todo-backend-1.0-SNAPSHOT-runner
58161	max	24	0	47M	44420	?	0.0	0.1	0:00.09	./target/todo-backend-1.0-SNAPSHOT-runner
58220	max	24	0	46M	43632	?	0.0	0.1	0:00.09	./target/todo-backend-1.0-SNAPSHOT-runner
58156	max	24	0	46M	43624	?	0.0	0.1	0:00.12	./target/todo-backend-1.0-SNAPSHOT-runner
58178	max	24	0	46M	43592	?	0.0	0.1	0:00.09	./target/todo-backend-1.0-SNAPSHOT-runner

F1Help F2Setup F3Search F4Filter F5Free F6SortBy F7Nice -F8Nice +F9Kill F10Quit

WHY QUARKUS?

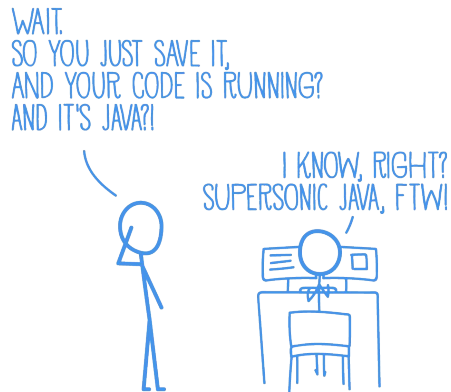
QUARK: elementary particle

US: hardest thing in computer science

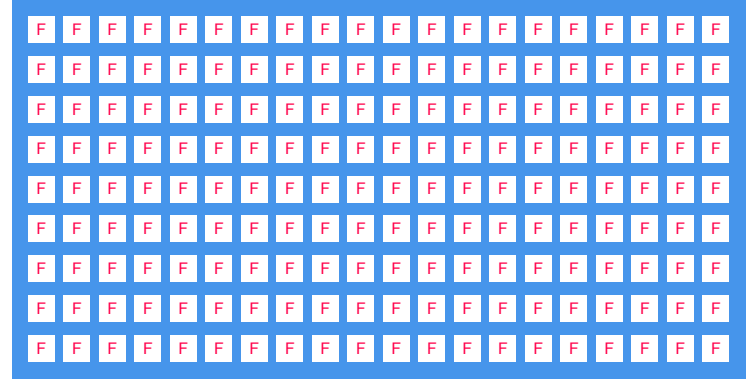
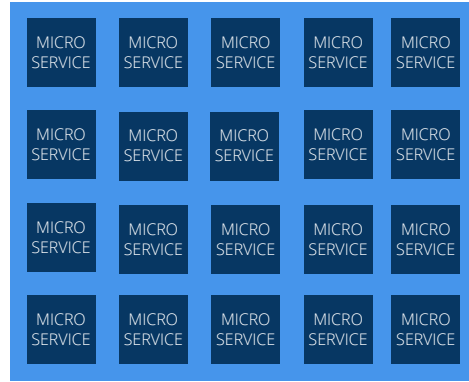
Benefit No. 1: Developer Joy

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



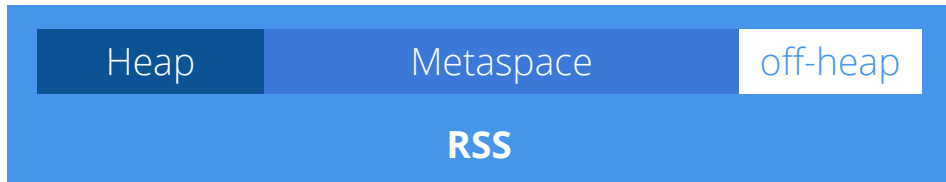
From monolith to...



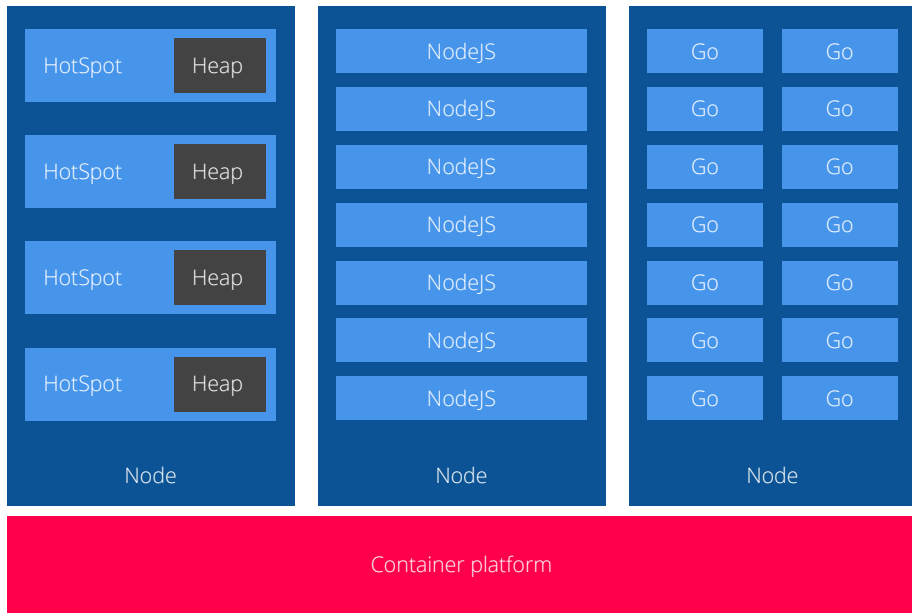
- 1 monolith $\approx$ 20 microservices $\approx$ 200 functions
- Scale to 1 vs scale to 0
- Start up time

The hidden truth about Java + containers

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

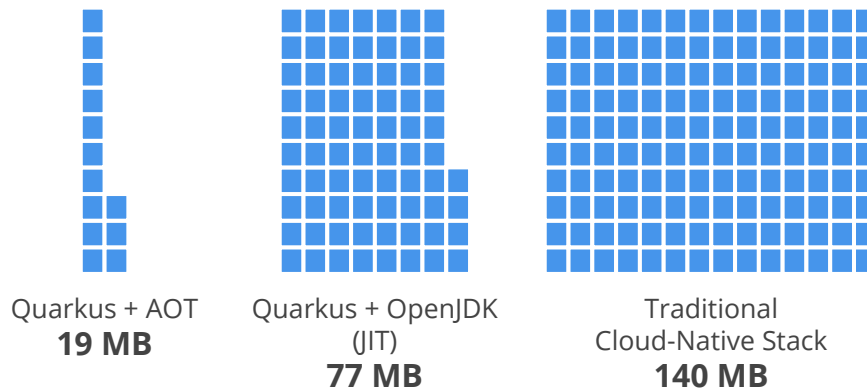


The hidden truth about Java + containers



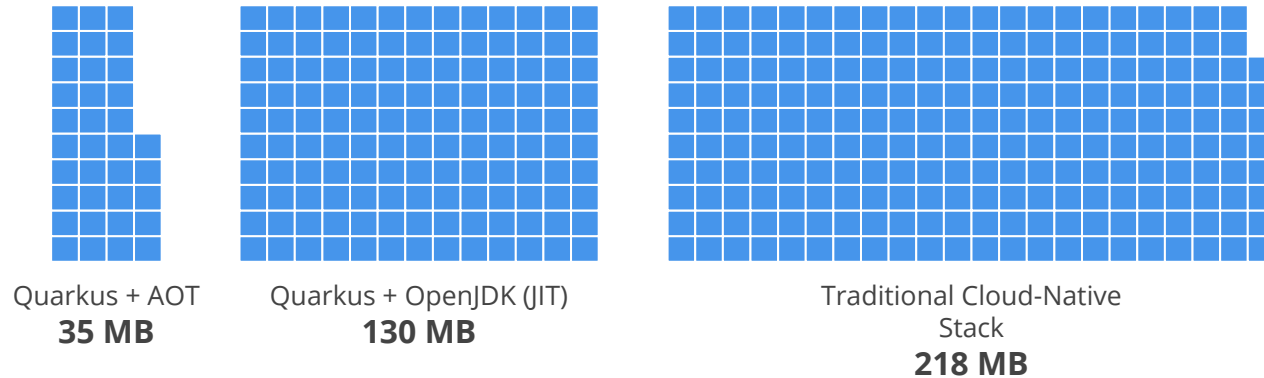
Benefit No. 2: Supersonic Subatomic Java

REST



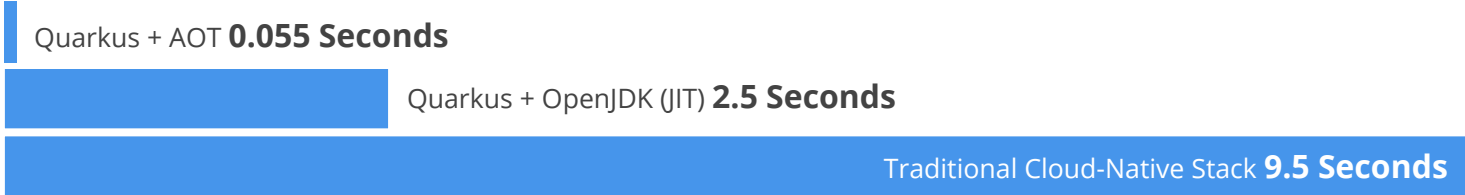
Benefit No. 2: Supersonic Subatomic Java

REST + CRUD



Benefit No. 2: Supersonic Subatomic Java

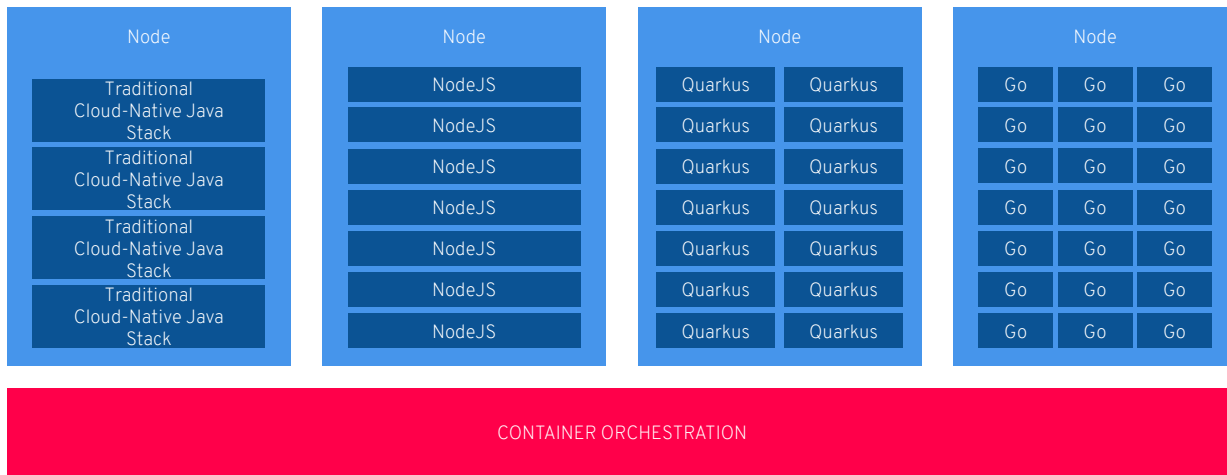
REST + CRUD



Time to first response



Benefit No. 2: Supersonic Subatomic Java



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

Benefit No. 4: Best of Breed Frameworks & Standards

The logo for Eclipse Vert.x, featuring the word "VERT.X" in a bold, sans-serif font. The "V" and "E" are purple, while the "R", "T", and ".X" are blue.

Eclipse
Vert.x



Eclipse MicroProfile



Spring
Compat



Kubernetes



OpenShift



Jaeger



Hibernate



RESTEasy



Apache
Camel



Prometheus



Apache Kafka



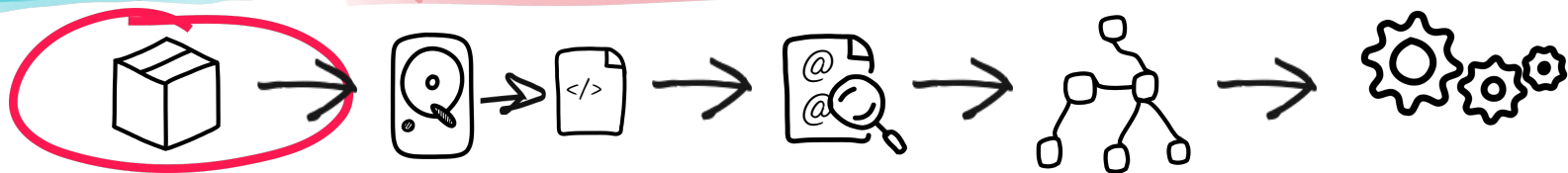
Netty

HOW QUARKUS WORKS

How does a *framework* start?

Build Time

Runtime

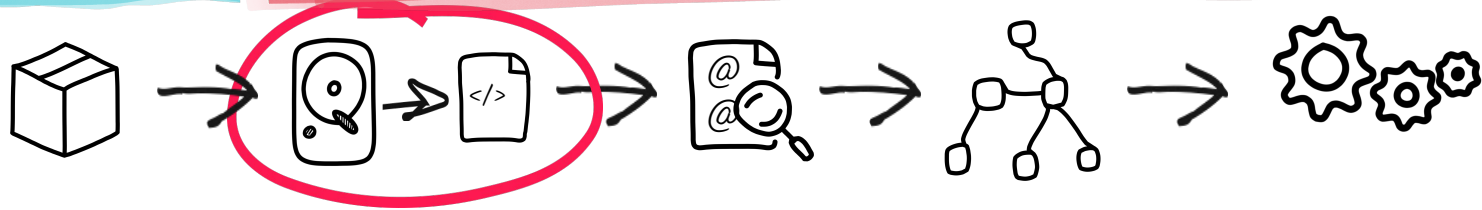


Packaging
(maven, gradle...)

How does a *framework* start?

Build Time

Runtime

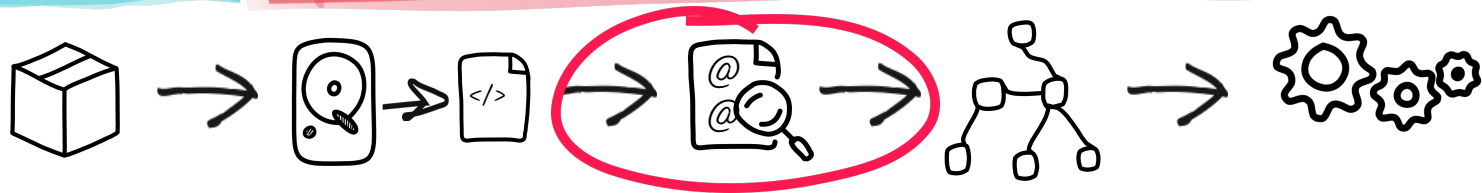


Load config file from file system
Parse it

How does a *framework* start?

Build Time

Runtime



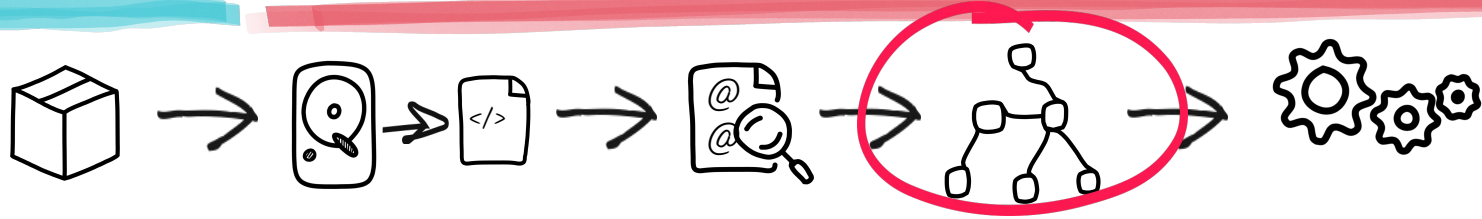
*Classpath scanning to find
annotated classes*

*Attempt to load class to
enable/disable features*

How does a *framework* start?

Build Time

Runtime



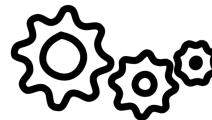
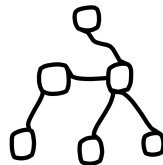
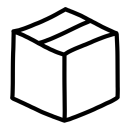
*Build its model of
the world.*

How does a *framework* start?

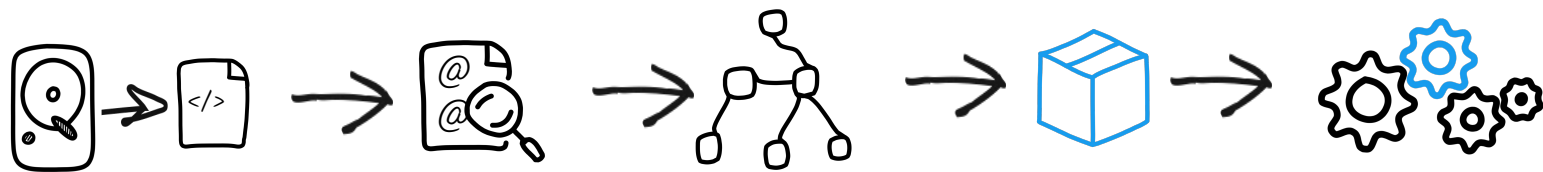
Build Time

Runtime

*Start the
management
(thread, pool...)*



The Quarkus Way



Build Time

Runtime

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

Quarkus Extensions

RESTEasy

Netty

Hibernate

Spring Compat.

MP OpenAPI

MP JWT

Eclipse Vert.X

Agroal (conn pool)

Narayana JTA

MP Reactive
Messaging

Apache Camel

...

Quarkus Core

Jandex

Gizmo

Graal SDK

Arc (DI)

JDK JIT - HotSpot

AOTC - GraalVM Native Image



code.quarkus.io
DEMO

Configure your application details

Group org.acme

Artifact code-with-quarkus

Build Tool Maven ▼

Version 1.0.0-SNAPSHOT

Package Name org.acme

Quarkus Version 1.4.2.Final

READ-ONLY

❏ CLOSE

Generate your application (⌘ + ↵)

Pick your extensions

🔍 |RESTEasy, Hibernate ORM, Web... ⌚

Selected Extensions

Web

☒ RESTEasy JAX-RS INCLUDED

REST endpoint framework implementing JAX-RS and more

☐ RESTEasy JSON-B

JSON-B serialization support for RESTEasy

☐ RESTEasy Jackson

Jackson serialization support for RESTEasy

☐ Hibernate Validator

Validate object properties (field, getter) and method parameters fo...

☐ REST Client

Call REST services

☐ REST Client JAXB

Enable XML serialization for the REST Client

☐ REST Client JSON-B

Enable JSON-B serialization for the REST client

☐ REST Client Jackson

Enable Jackson serialization for the REST Client

☐ RESTEasy JAXB

XML serialization support for RESTEasy

☐ RESTEasy Mutiny PREVIEW

Mutiny support for RESTEasy

Configure your application details

Group org.acme

Artifact code-with-quarkus

Build Tool Maven ▼

Version 1.0.0-SNAPSHOT

Package Name org.acme

Quarkus Version 1.4.2.Final

READ-ONLY

You may change the Quarkus Version after generation in the pom.xml. Just be cautious with extension compatibility.

application (⌘ + ↵)

Pick your extensions

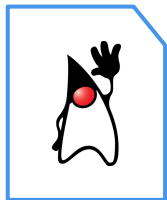
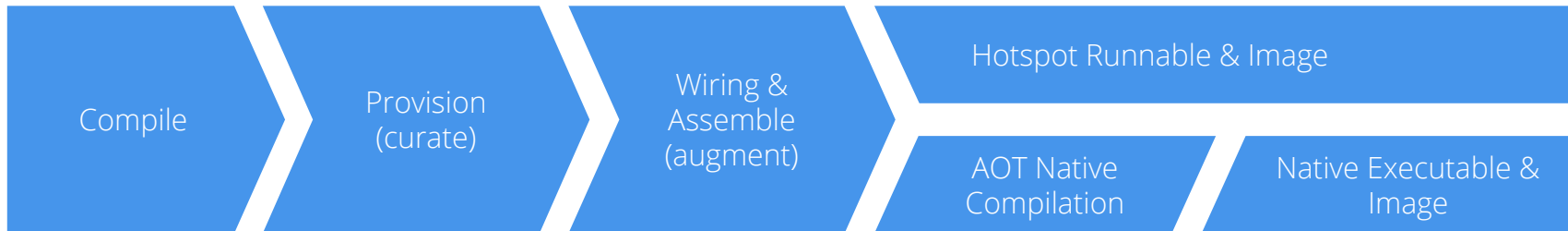
🔍 jdbc

Selected Extensions

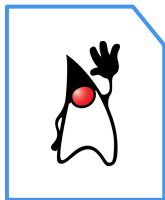
Search results ([Clear search](#))

- | | | |
|---|--|---|
| ☐ JDBC Driver - PostgreSQL | Connect to the PostgreSQL database via JDBC | ⋮ |
| ☐ JDBC Driver - MariaDB | Connect to the MariaDB database via JDBC | ⋮ |
| ☐ JDBC Driver - MySQL | Connect to the MySQL database via JDBC | ⋮ |
| ☐ JDBC Driver - Microsoft SQL Server | Connect to the Microsoft SQL Server database via JDBC | ⋮ |
| ☐ JDBC Driver - H2 | Connect to the H2 database via JDBC | ⋮ |
| ☐ JDBC Driver - Derby | Connect to the Derby database via JDBC | ⋮ |
| ☐ Agroal - Database connection pool | Pool JDBC database connections (included in Hibernate ORM) | ⋮ |
| ☐ Elytron Security JDBC | Secure your applications with username/password stored in a dat... | ⋮ |
| ☐ Camel Quarkus JDBC | Camel JDBC support | ⋮ |

An ahead-of-time, build-time, runtime



app.jar



frameworks



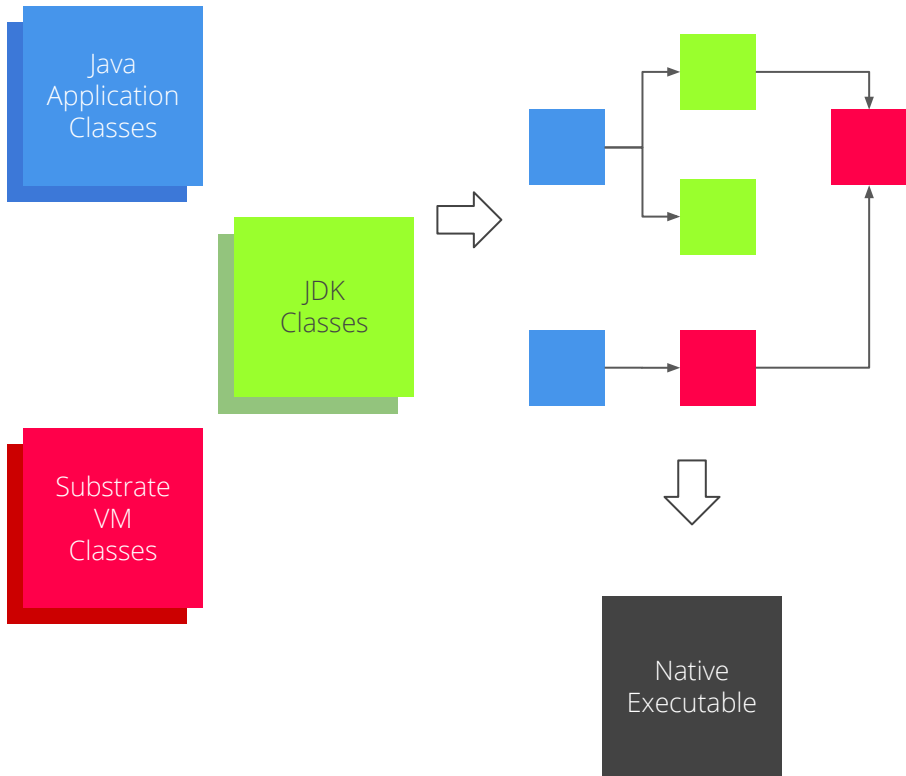
Runnable java app



native-app

AOTC - GraalVM - Dead code elimination

Closed-world assumption



The Dark Side of GraalVM

The “Good” Parts

Not supported

- **Dynamic classloading**
- InvokeDynamic & Method handles
- Finalizer
- Security manager
- JVMTI, JMX, native VM Interfaces

OK with caveats in usage

- **Reflection (manual list)**
- **Dynamic proxy (manual list)**
- JNI (manual list)
- **Static initializers (eager)**
- References (similar)

GraalVM specific benefits

Drives the gathering of metadata
needed by GraalVM

- based on framework knowledge
- Classes using reflection, resources, etc

Minimize dependencies

Help dead code elimination

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

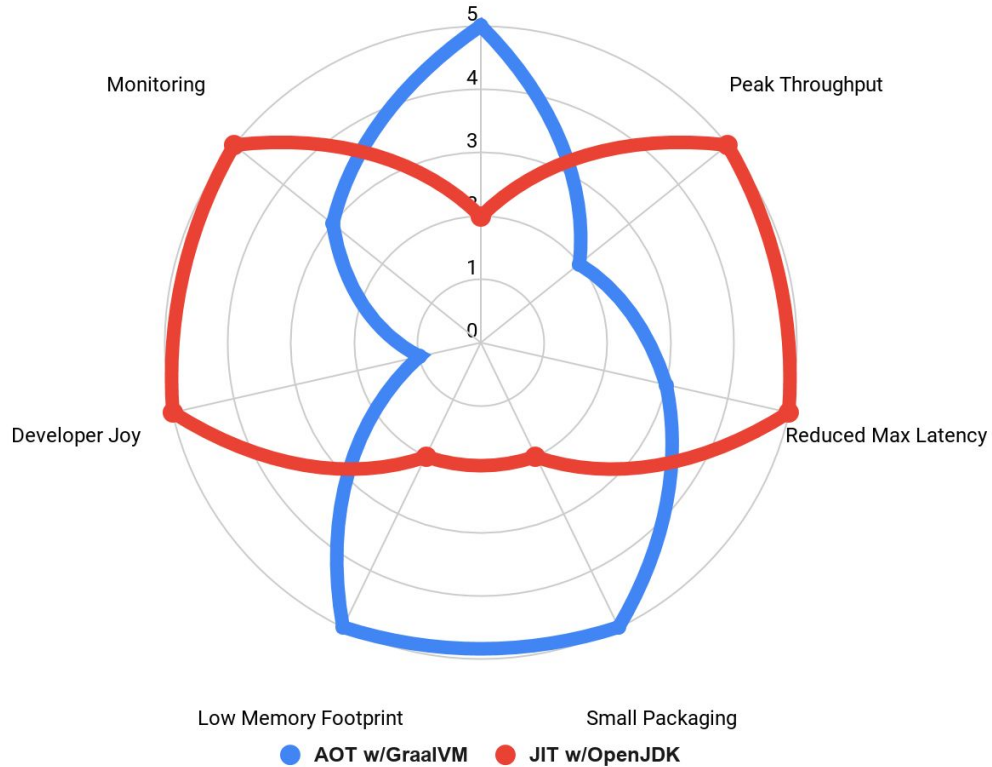
Known monitoring tools
Compile Once, Run anywhere
Libraries that only works in standard JDK

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



AOT/Native-image vs VM mode



MORE QUARKUS

More is better

Testing is running

```
@QuarkusTest
public class HelloResourceTest {

    @Inject HelloService service;

    @Test
    public void testHelloEndpoint() {
        assertEquals(
            "Hello Quarkus",
            service.greeting("Quarkus")
        );
    }
}
```

Fast start

Full start

Injection

ActiveRecord or Repository pattern

```
@Entity
public class Todo extends PanacheEntity {
    // id is inherited
    public String title;
    public boolean completed;
    public String url;

    public static List<Todo> findNotCompleted() {
        return list("completed", false);
    }
}

@Path("/api")
public class TodoResource {
    @GET
    public List<Todo> getAll() {
        return Todo.listAll(Sort.by("order"));
    }
}
```

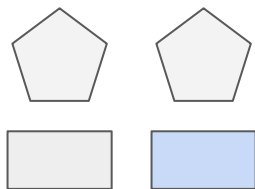
```
@Entity
public class Todo {
    @Id @GeneratedValue public Long id;
    public String title;
    public boolean completed;
    public String url;
}

@ApplicationScoped
public class TodoRepo extends
    PanacheRepository<Todo> {
    public List<Todo> findNotCompleted() {
        return list("completed", false);
    }
}

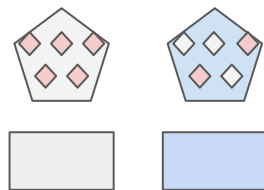
@Path("/api")
public class TodoResource {
    @Inject TodoRepo repo;
    @GET
    public List<Todo> getAll() {
        return repo.listAll(Sort.by("order"));
    }
}
```


THE VALUE OF STANDARDS

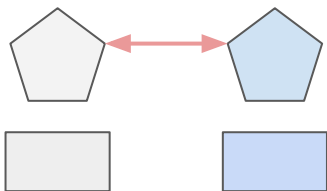
Value of Industry Standards



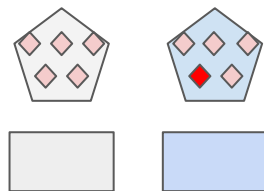
Portability



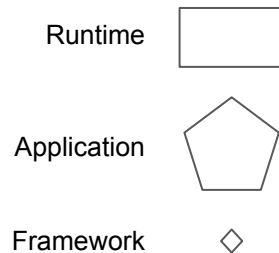
Commonality



Interoperability



Implementation
Abstraction



Quarkus - Categorizing API Support

Industry Standards



OPEN METRICS

Defacto Standards



OPENTRACING

3rd Party



DynamoDB

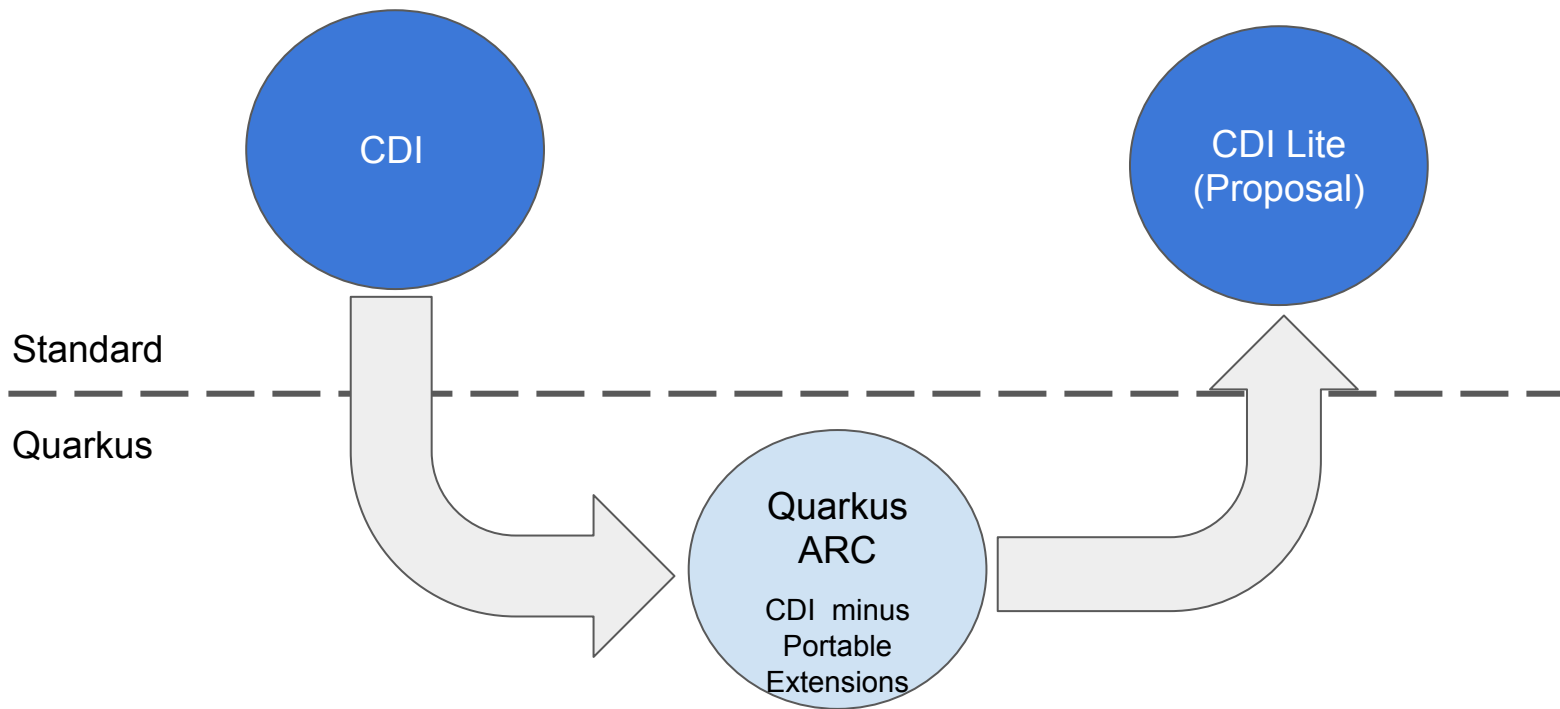


Quarkus Specific

Qute

Reactive
Routes

Using Quarkus to modernize standards



Spring compatibility extensions Demo

```
2
3 import java.util.List;
4
5 import org.springframework.data.repository.query.Param;
6 import org.springframework.web.bind.annotation.DeleteMapping;
7 import org.springframework.web.bind.annotation.GetMapping;
8 import org.springframework.web.bind.annotation.PathVariable;
9 import org.springframework.web.bind.annotation.PostMapping;
10 import org.springframework.web.bind.annotation.RequestMapping;
11 import org.springframework.web.bind.annotation.RestController;
12
```

Georgios Andrianakis, 7 months ago | 1 author (Georgios Andrianakis)

```
13 @RestController
14 @RequestMapping("/book")
15 public class BookController {
16
17     private final BookRepository bookRepository;
18
19     public BookController(BookRepository bookRepository) {
20         this.bookRepository = bookRepository;
21     }
22
23     @GetMapping
24     public Iterable<Book> findAll() {
25         return bookRepository.findAll();
26     }
27
28     @GetMapping("/year/{lower}/{higher}")
29     public List<Book> findByPublicationYearBetween(@PathVariable
30         return bookRepository.findByPublicationYearBetween(lower
```

src > main > java > com > example > BookRepository.java > {} com.example

Georgios Andrianakis, 7 months ago | 1 author (Georgios Andrianakis)

```
1 package com.example;           Georgios Andrianakis, 7 months ago • Create first demo repository
2
3 import java.util.List;
4
5 import org.springframework.data.jpa.repository.Modifying;
6 import org.springframework.data.jpa.repository.Query;
7 import org.springframework.data.repository.CrudRepository;
8 import org.springframework.data.repository.query.Param;
9
10 public interface BookRepository extends CrudRepository<Book, Integer> {
11
12     List<Book> findByPublicationYearBetween(Integer lower, Integer higher);
13
14     @Modifying
15     @Query("update Book b set b.name = concat(b.name, :suffix) where b.name like concat('%', :name, '%') ")
16     void addSuffixToMatching(@Param("name") String name, @Param("suffix") String suffix);
17 }
18
```

Quarkus Benefits

Developer Joy

Supersonic Subatomic
Java

Unifies

imperative and
reactive

Best of breed

libraries and standards



“

1. It is a surprise
2. It has a major impact
3. People contend that they expected the event to happen (in hindsight)

~ Black Swan Theory

Thank you.



QUARKUS



<https://quarkus.io>



<https://quarkusio.zulipchat.com>



@quarkusio



<https://youtube.com/c/quarkusio>



@maxandersen

OpenDevHour

Upcoming events

- **Helm for Developers**, AUGUST 18 | 16:00 CEST
- **Supersonic Secure Java with Quarkus**, SEP 14 | 16:00 CEST
- **Stream Processing with Quarkus, Kafka Streams and Knative**, OCTOBER
- **Securing Microservices**, NOVEMBER
- **DevOps with Containers**, DECEMBER
- **Orchestrating microservices the cloud-native way**, JANUARY 2021

<https://red.ht/OpenDevHour>

Markus Eisele

Developer Adoption Lead

Red Hat

markus@redhat.com

@myfear