

Java scaled to zero

Burr Sutter (burrspartner.com)

<http://bit.ly/kubernetes-tutorial>

<http://bit.ly/istio-tutorial>

<http://bit.ly/knative-tutorial>

1993





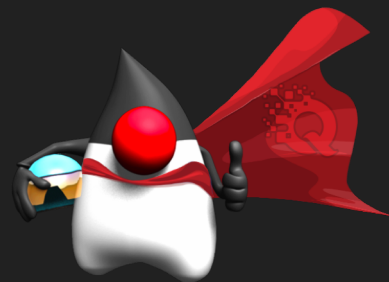
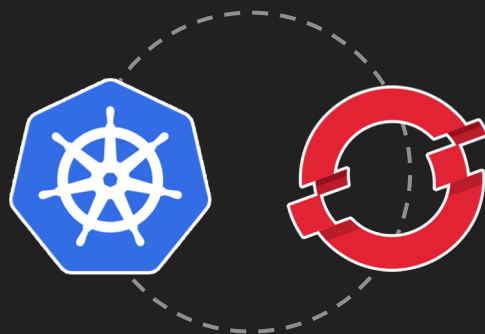
=

Linux





Linux



Cost of a Java-based Web App circa 1999

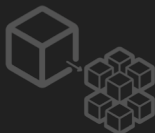
	\$18,000	Sun Sparc App Server Box (4 CPUs, 2GB of RAM)
+	\$60,000	BEA Weblogic
+	\$92,000	Sun Spark DB Server Box (8 CPUs)
+	\$243,000	Oracle RDBMS
+	\$50,000	Symantec Visual Café for 10 developers

\$463,000 (capex) + ~\$80,000 annual maint (opex)

m5ad.4xlarge	16	N/A	64 GiB	2 x 300 NVMe SSD	\$0.824 per Hour
m5ad.12xlarge	48	N/A	192 GiB	2 x 900 NVMe SSD	\$2.472 per Hour
m5ad.24xlarge	96	N/A	384 GiB	4 x 900 NVMe SSD	\$4.944 per Hour
m5d.large	2	8	8 GiB	1 x 75 NVMe SSD	\$0.113 per Hour
m5d.xlarge	4	16	16 GiB	1 x 150 NVMe SSD	\$0.226 per Hour
m5d.2xlarge	8	31	32 GiB	1 x 300 NVMe SSD	\$0.452 per Hour

MEMORY	VCPUS	SSD DISK	TRANSFER	PRICE
1 GB	1 vCPU	25 GB	1 TB	\$5/mo \$0.007/hr
2 GB	1 vCPU	50 GB	2 TB	\$10/mo \$0.015/hr
3 GB	1 vCPU	60 GB	3 TB	\$15/mo \$0.022/hr
2 GB	2 vCPUs	60 GB	3 TB	\$15/mo \$0.022/hr
1 GB	3 vCPUs	60 GB	3 TB	\$15/mo \$0.022/hr
4 GB	2 vCPUs	80 GB	4 TB	\$20/mo \$0.030/hr
8 GB	4 vCPUs	160 GB	5 TB	\$40/mo \$0.060/hr
16 GB	6 vCPUs	320 GB	6 TB	\$80/mo \$0.119/hr

INSTANCE	VCPU	RAM	TEMPORARY STORAGE	PAY AS YOU GO
D2 v3	2	8 GiB	50 GiB	\$0.096/hour
D4 v3	4	16 GiB	100 GiB	\$0.192/hour
D8 v3	8	32 GiB	200 GiB	\$0.384/hour



NETFLIX



2010
NETFLIX
TO AWS



3/2012
HYSTRIX

NETFLIX
RIBBON

3/2012
RIBBON



3/2012
MICROSERVICES
ASSESS,
THOUGHTWORKS
RADAR

NETFLIX
EUREKA

7/2012
EUREKA

2015



1997
HTTP 1.1



2000
RED HAT
ENTERPRISE
LINUX



2001
AGILE
MANIFESTO



2006
AWS EC2



2009
JAVA EE6



6/2011
VERT.X



3/2013
DOCKER



6/2014
KUBERNETES



1996
JAVA 1.0



2000
FREE BSD
JAILS



2007
KVM



2009
DEVOPS



5/2011
DROPWIZARD



9/2013
SPRING
BOOT



3/2014
MICROSERVICES
DEFINED,
THOUGHTWORKS,
FOWLER, LEWIS

1995

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RED HAT
DEVELOPER

2015

1026
Kubernetes/
Openshift
containers
launched
live

Audience
members
claim
docker
containers



<https://www.youtube.com/watch?v=GCtpncAOEa0&feature=youtu.be&t=1031>

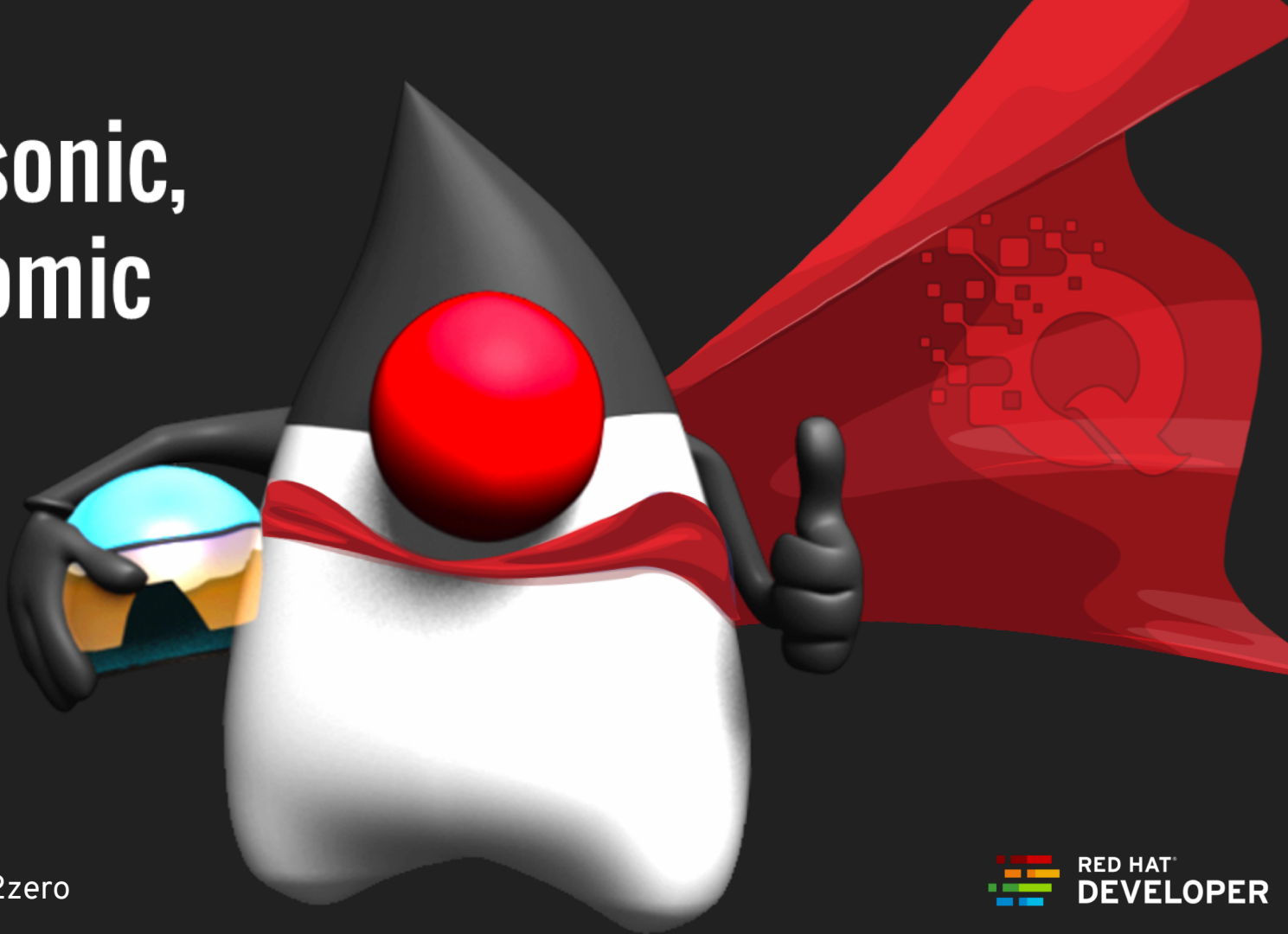
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Не удастся отобразить рисунок.

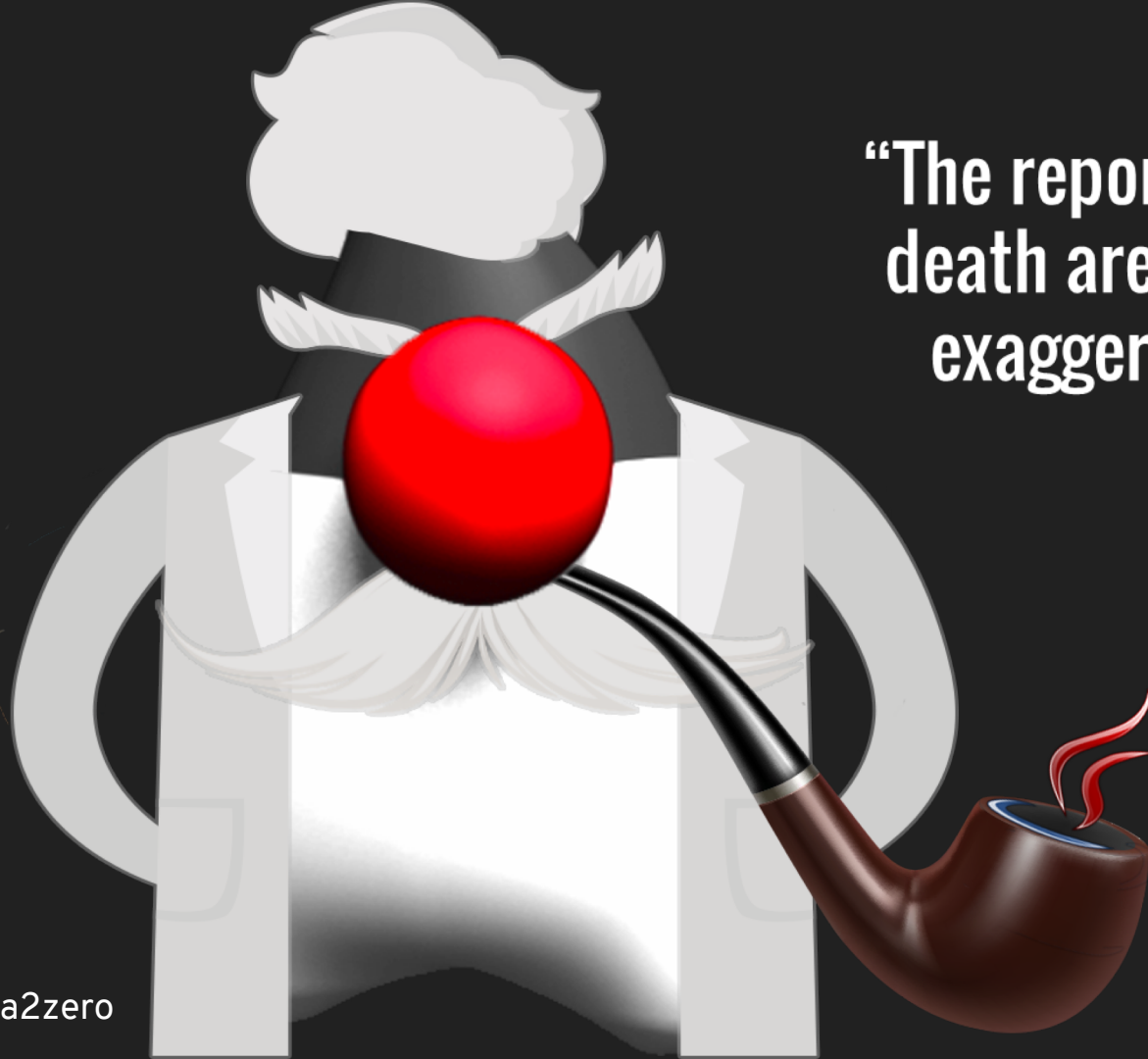
Supersonic, Subatomic Java

QUARKUS.IO



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**“The reports of my
death are greatly
exaggerated.”**



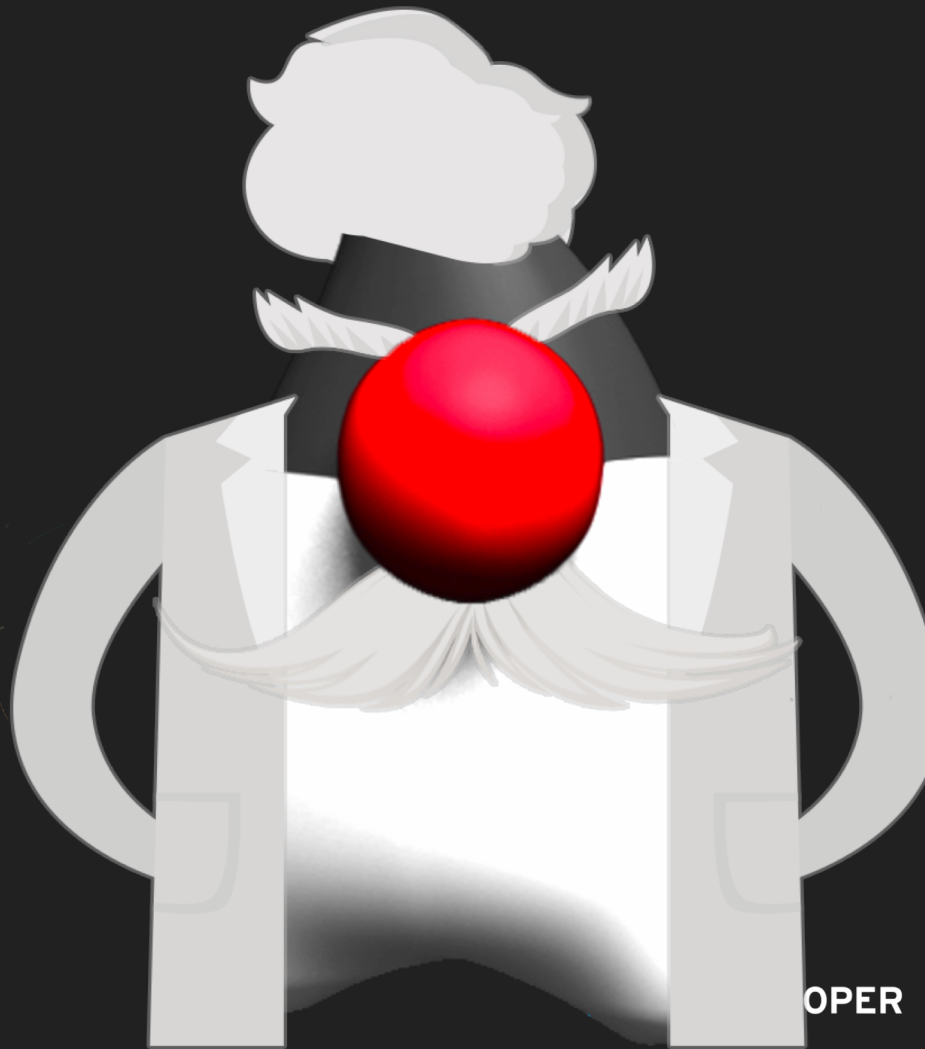
"Today, Java is old hat."

Computer World, May 22, 2006

FRANK HAYES ■ FRANKLY SPEAKING

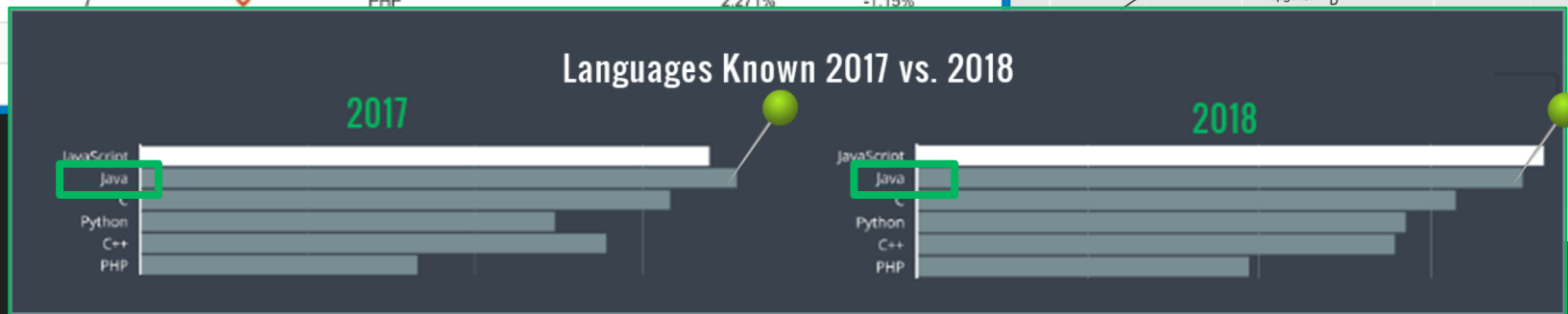
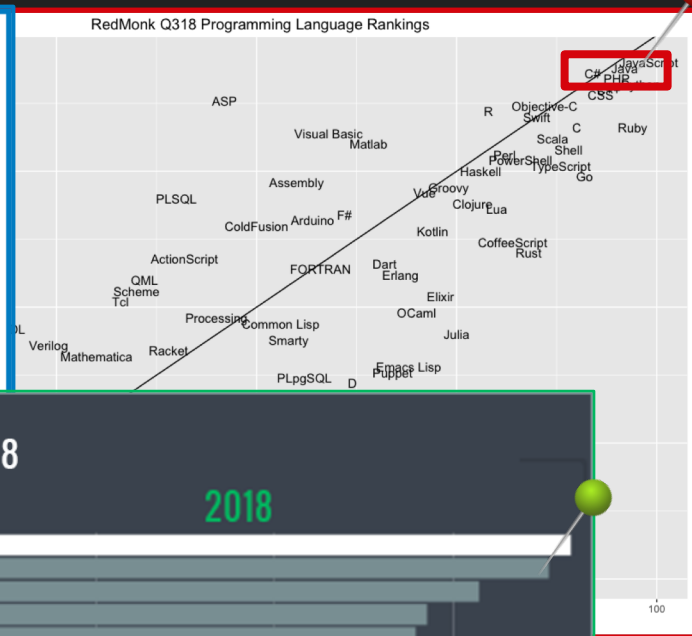
Not Dead Yet

IS JAVA DEAD? Come on, seriously — why else would Sun Microsystems be offering it up to the open-source crowd? (See story, page 1.) A decade ago, Java was the hottest, most exciting thing in IT, a certified Windows-killer that was going to wipe out Microsoft's monopoly and revolutionize the way software was made, distributed and run. Today? Today, Java is old hat. It's been eclipsed by open-source, the *new* hottest thing in IT that's going to wipe out Microsoft's monopoly and revolutionize the way software is made, distributed and run.





Feb 2019	Feb 2018	Change	Programming Language	Ratings	Change
1	1		Java	15.876%	+0.89%
2	2		C	12.424%	+0.57%
3	4	▲	Python	7.574%	+2.41%
4	3	▼	C++	7.444%	+1.72%
5	6	▲	Visual Basic .NET	7.095%	+3.02%
6	8	▲	JavaScript	2.848%	-0.32%
7	5	▼	C#	2.946%	-1.61%
8	7	▼	PHP	2.271%	-1.15%
9					
10					





Still, so much goodness ...





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In so many flavors ...



So so many flavors ...



Hey, is it getting a
little tight in here?





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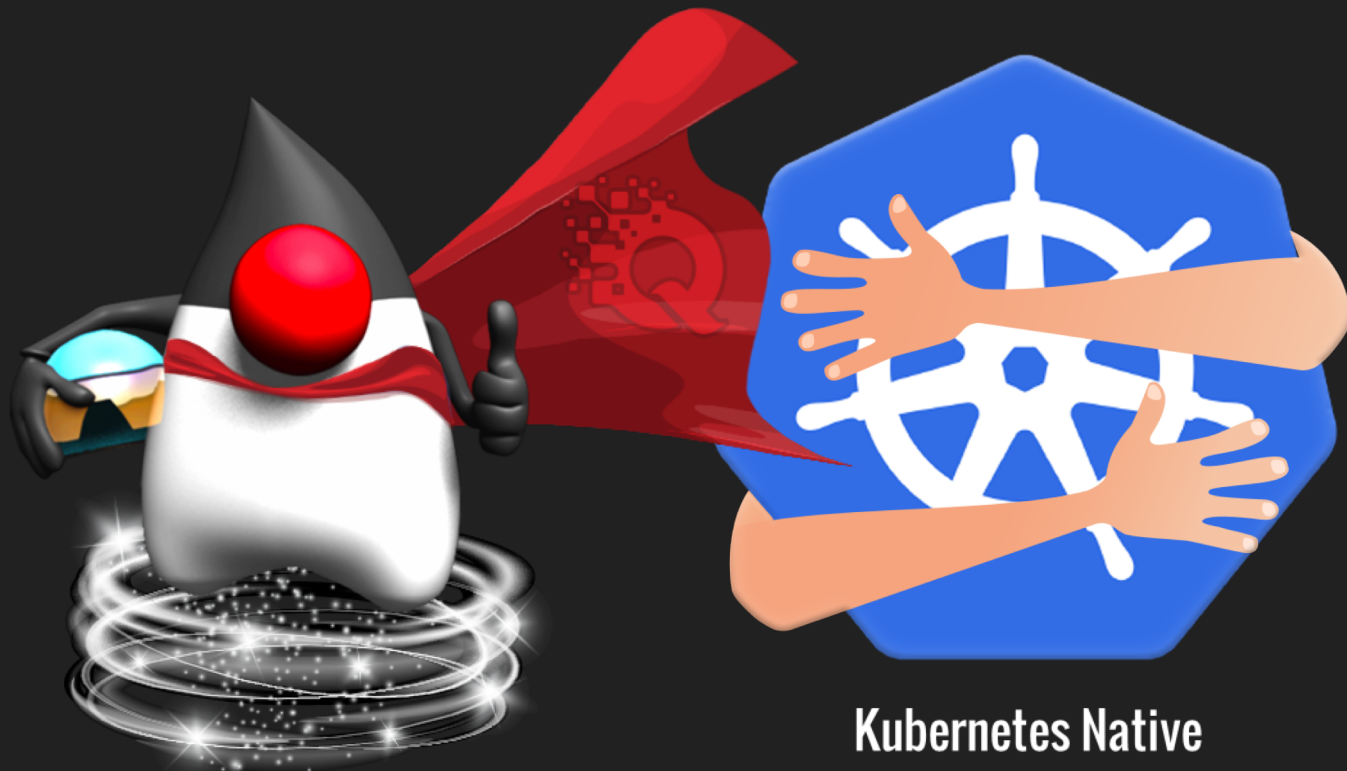




So who is this Quarkus— and what's all the fuss?



Up to 10x smaller, 100x faster.
Seriously.



Kubernetes Native

The logo for Eclipse Vert.x, featuring the text "VERT.X" in a white, sans-serif font, with the ".X" in a purple color.

ECLIPSE VERT.X



HIBERNATE



RESTEASY



APACHE CAMEL



ECLIPSE
MICROPROFILE



NETTY



KUBERNETES



OPENSIFT

OPENSIFT



JAEGER



PROMETHEUS



APACHE KAFKA



INFINISPAN

Programming Models/APIs

MicroProfile (JAX-RS, JPA, CDI)

Spring (Spring Web, Spring Data, Spring DI)

Camel (Enterprise Integration Patterns)

Vert.x (RxJava2, CompletionStage & Reactive Streams)

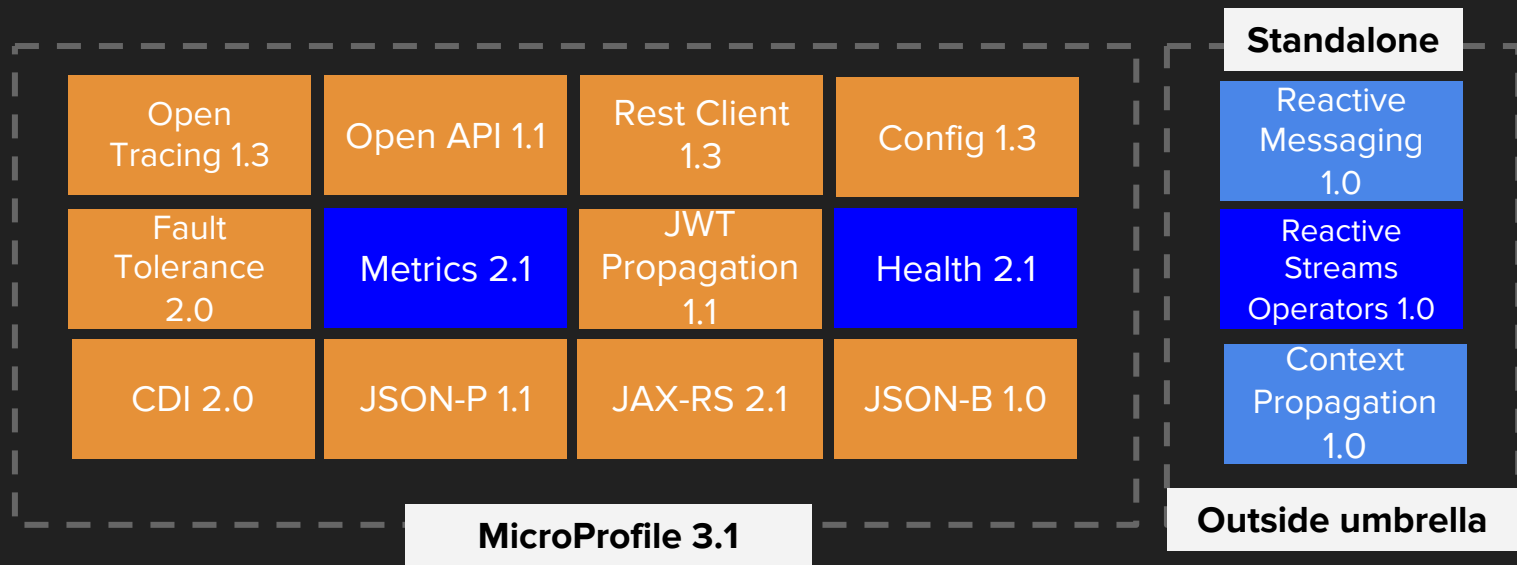
Reactive Messaging

BPMN, DML

Demo

edit-save-refresh

MicroProfile



```
@Inject
SayService say;

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

Imperative

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

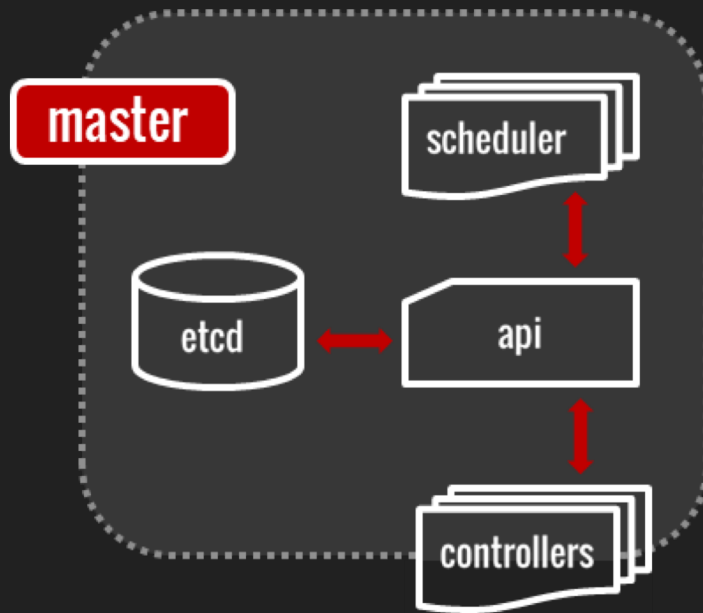
@GET
@Produces(MediaType.SERVER_SENT_EVENTS)
public Publisher<String> stream() {
    return reactiveSay;
}
```

Reactive

Single, unified engine
From CRUD to event-driven

Kubernetes Orchestration





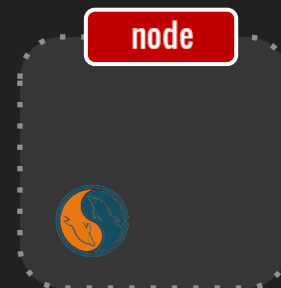
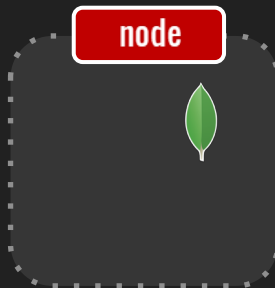
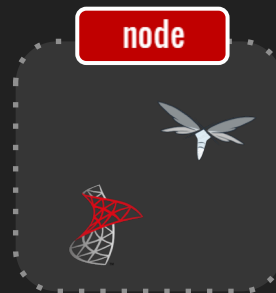
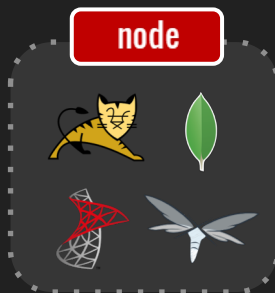
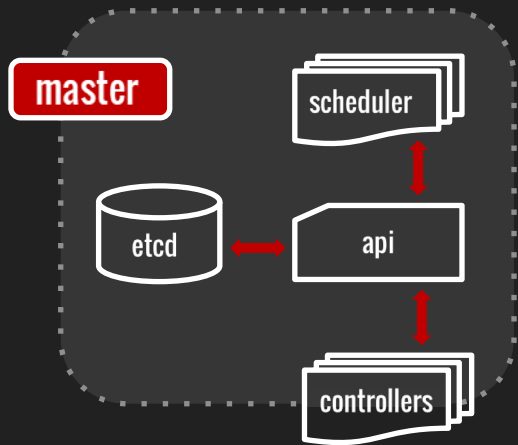


Image:
quay.io/images/custservice:1.1.0
Replicas:
2
Labels:
customerservice=prod,ci_build=1213
ConfigMap:
cust_config

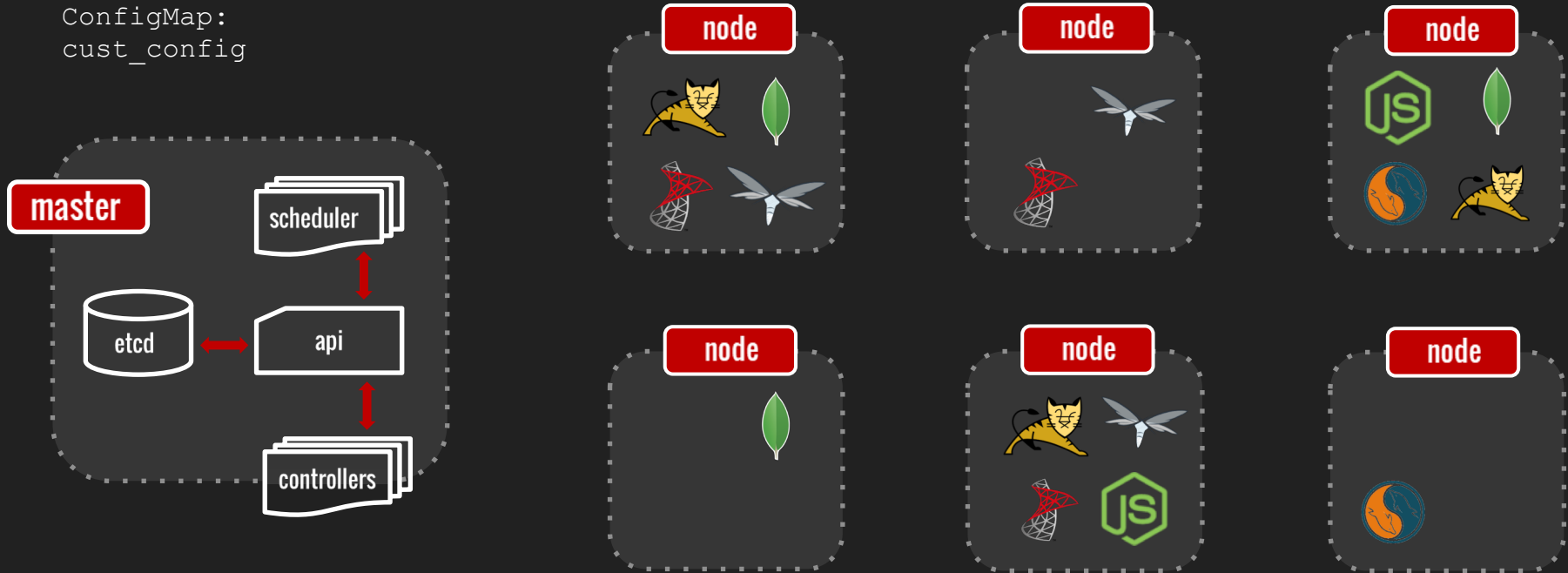


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Replicas:
2
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ConfigMap:
cust_config

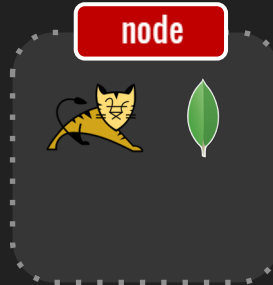
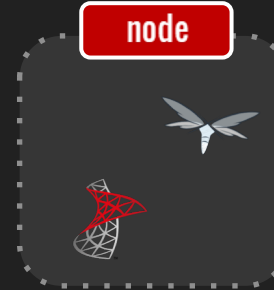
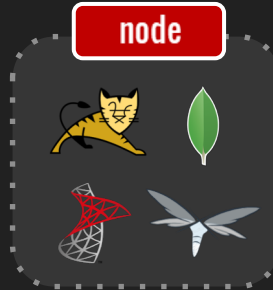
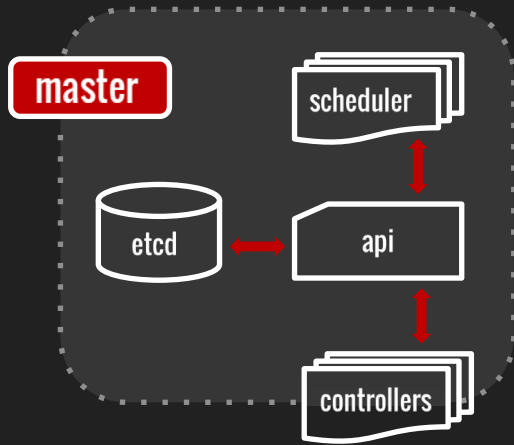


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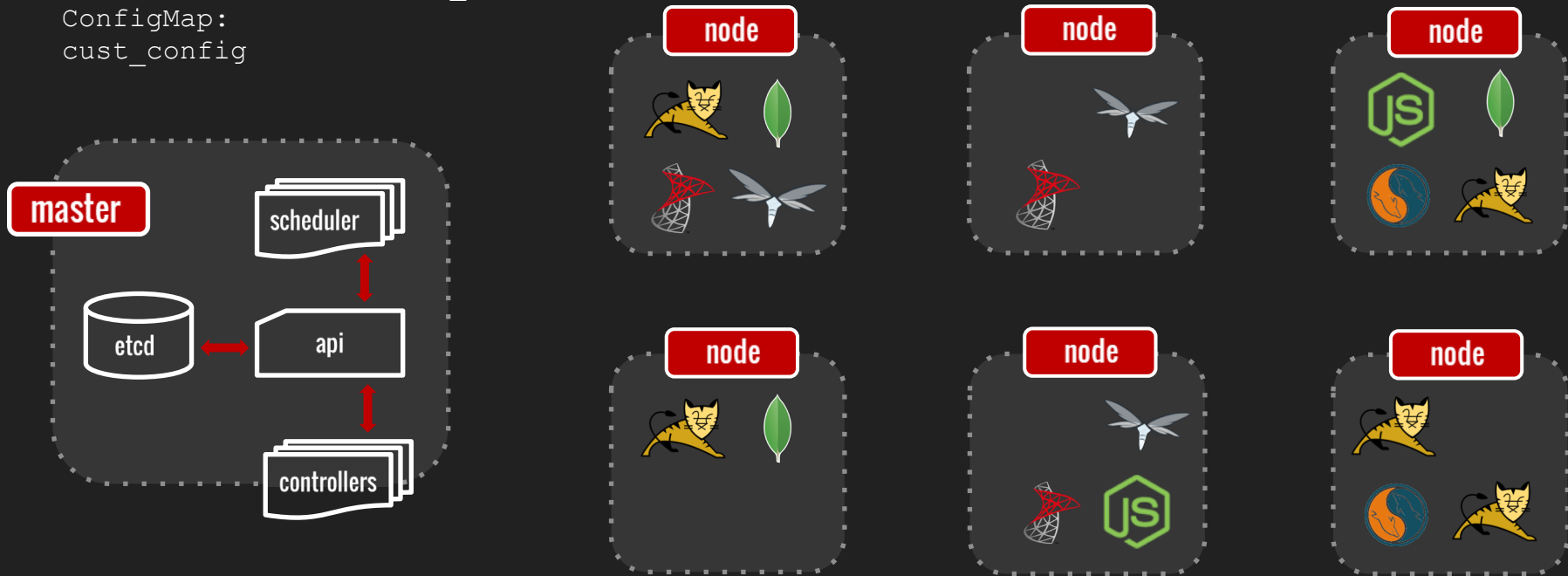
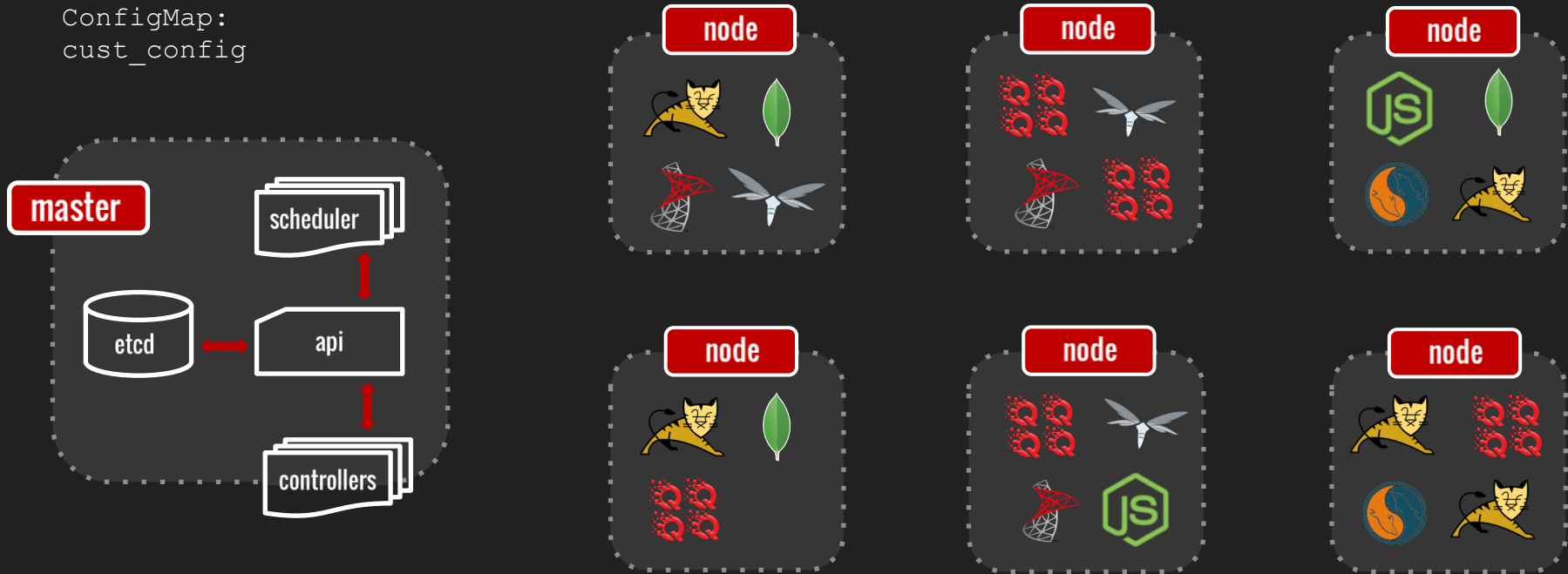


Image:
quay.io/images/custservice:1.1.0
Replicas:
20
Labels:
customerservice=prod,ci_build=1213
ConfigMap:
cust_config





10x smaller.

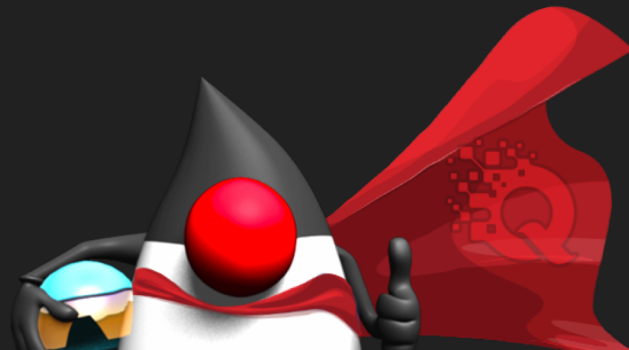
Up to 100x faster.

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GraalVM™

And

OpenJDK



Memory (RSS) in Megabytes

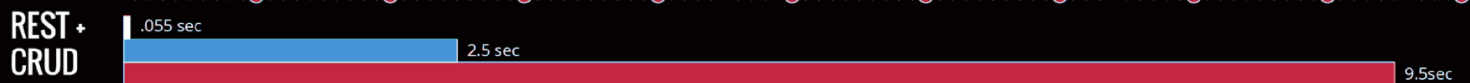


Quarkus with GraalVM

Quarkus with OpenJDK

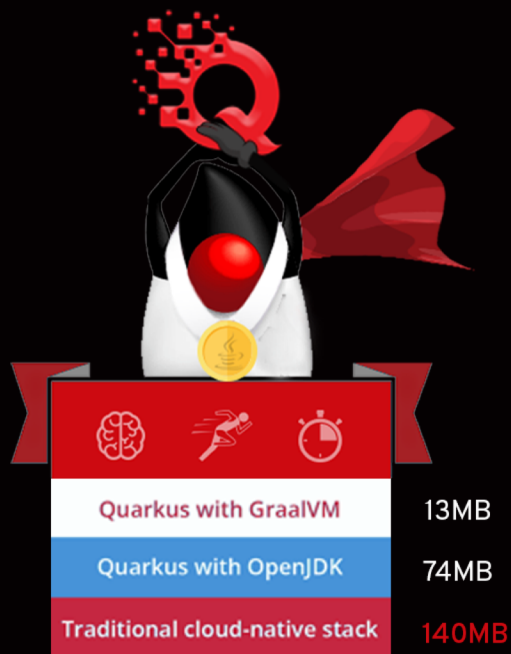
Traditional cloud-native stack

Boot + First Response Time in Seconds



MEMORY & BOOT + FIRST RESPONSE TIME

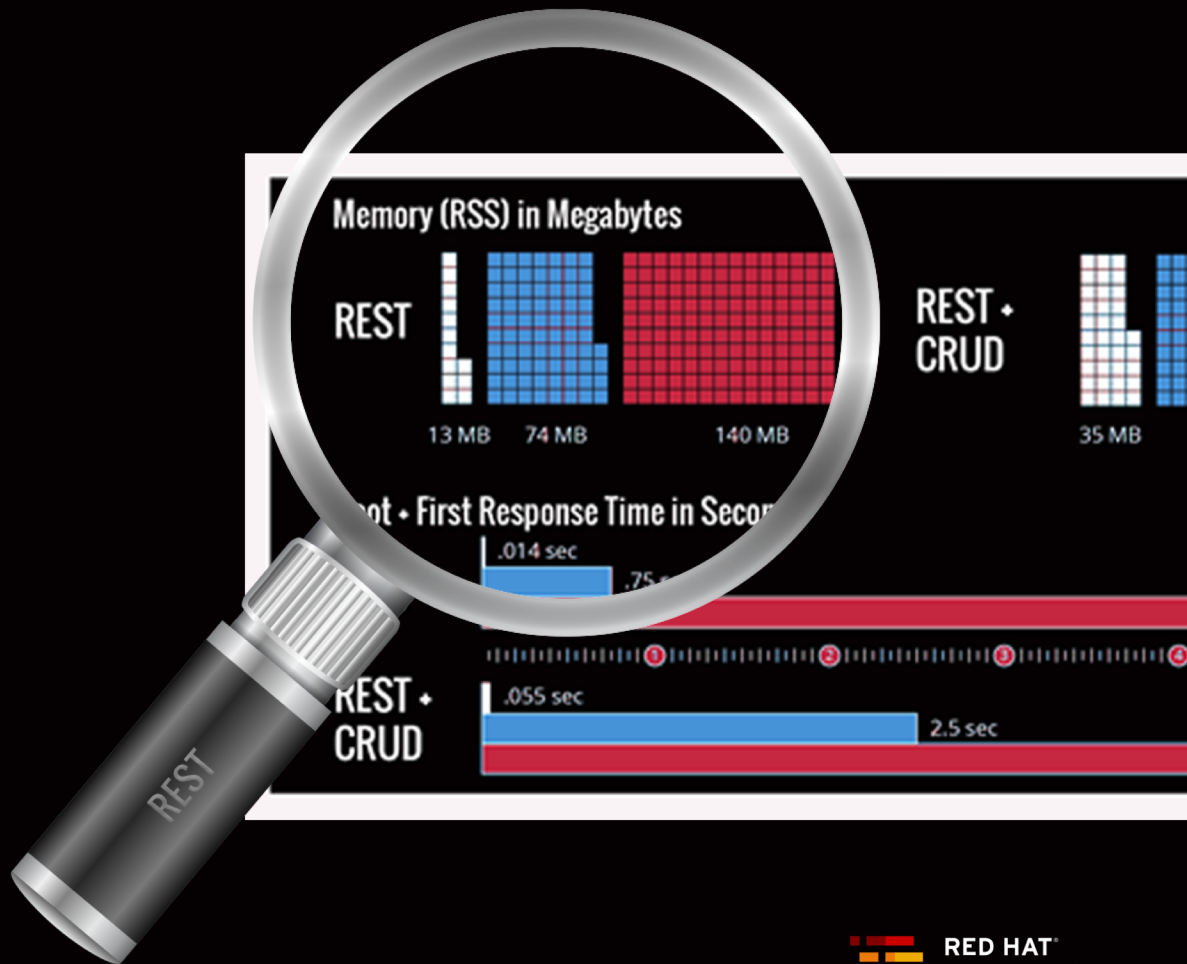


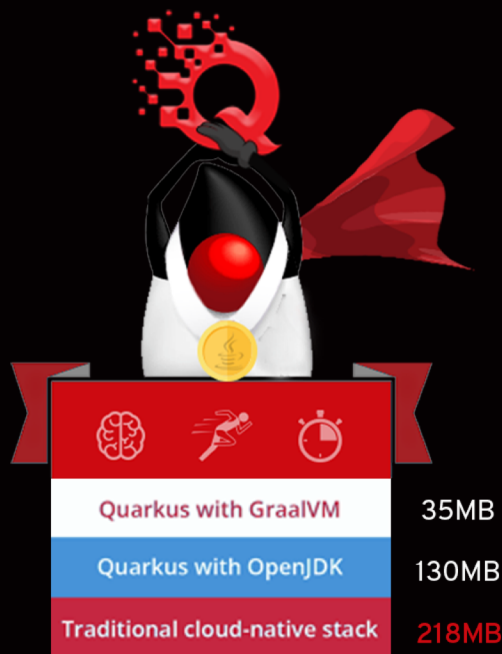


Memory (RSS) in Megabytes



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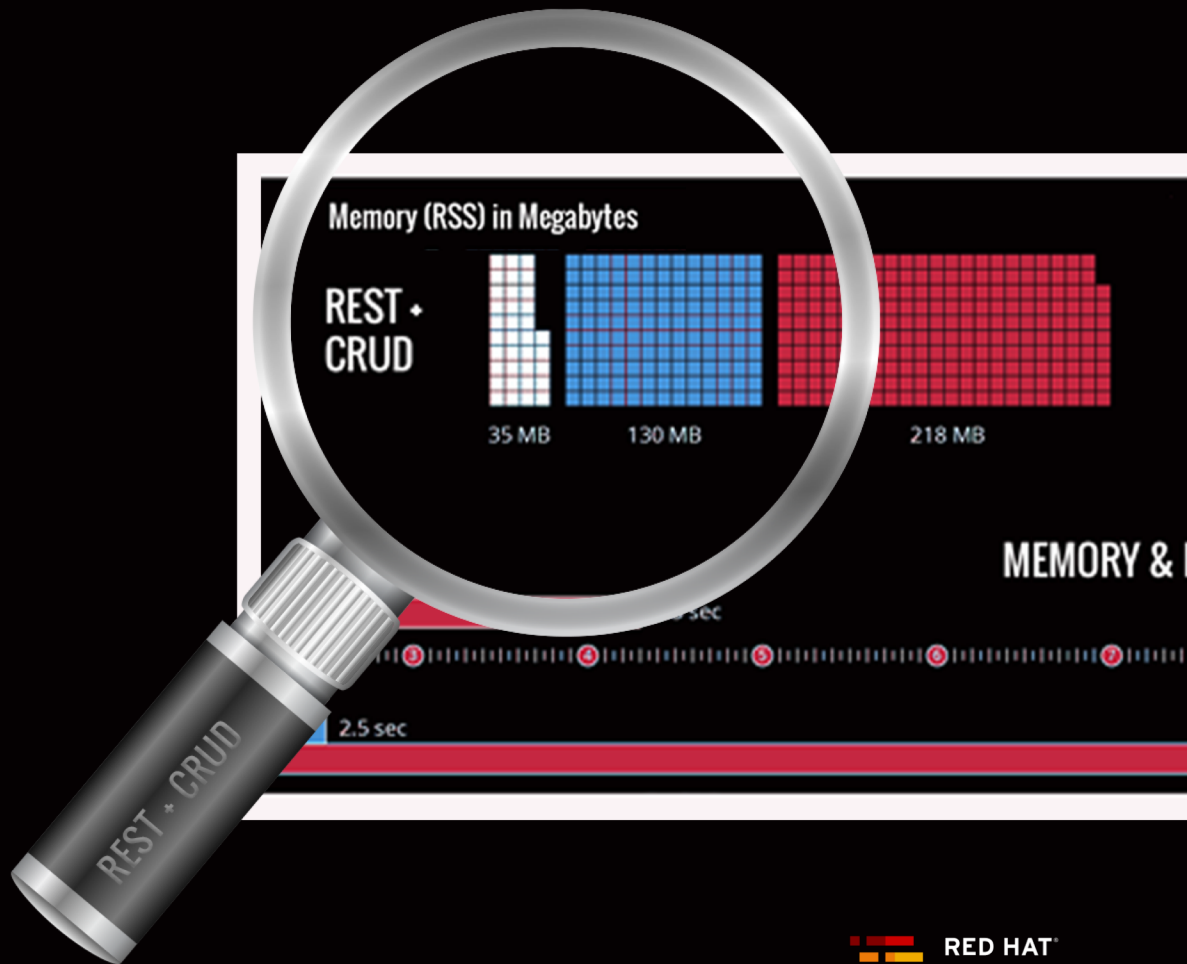




Memory (RSS) in Megabytes



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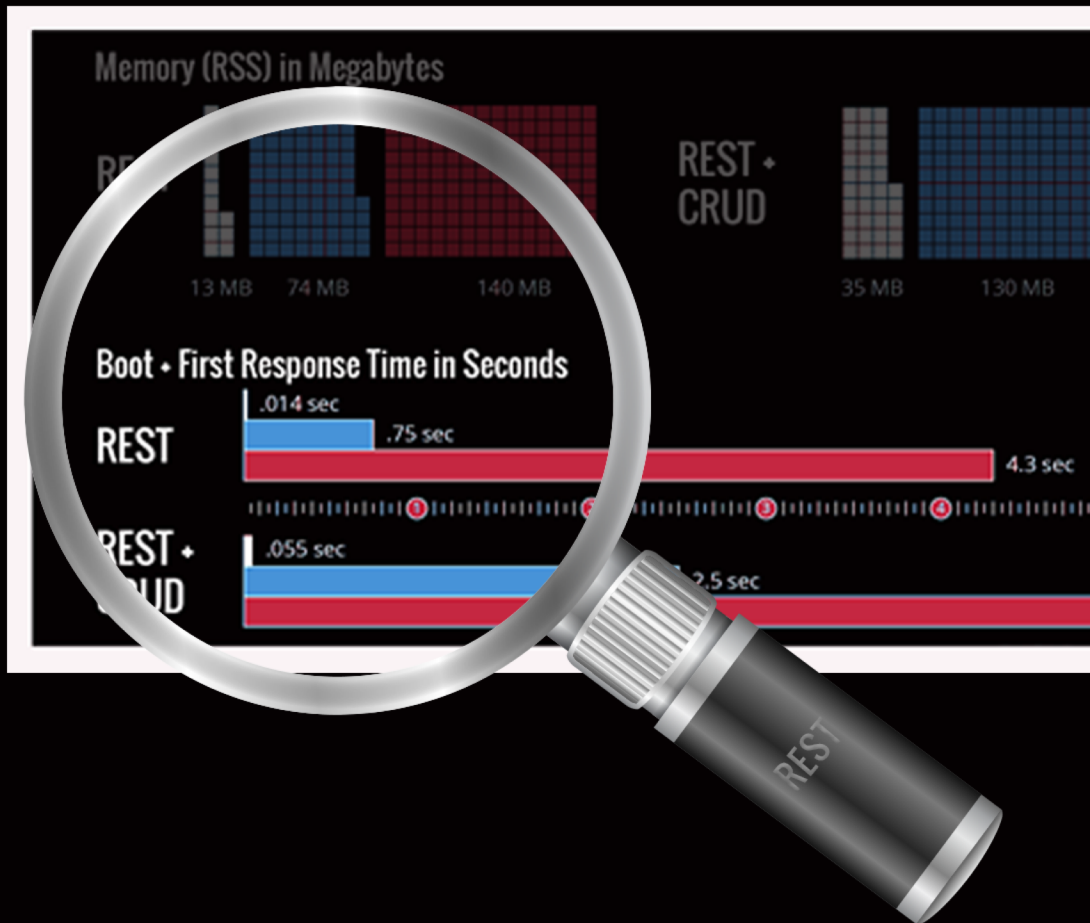




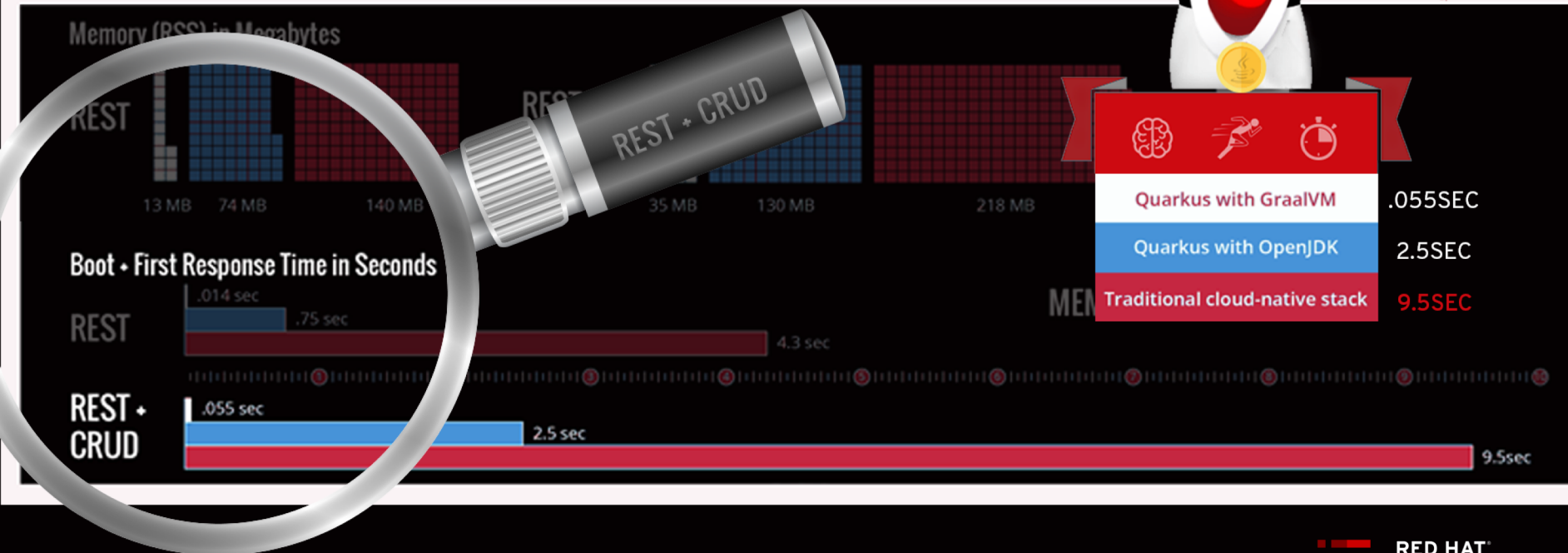
Boot + First Response Time in Seconds



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Boot + First Response Time in Seconds



Recordings

<https://www.youtube.com/watch?v=KpS3-ZNeCfE>

<https://www.youtube.com/watch?v=iJBh2NoSCKM>

<https://www.youtube.com/watch?v=pOJI1EE4geo>

<https://www.youtube.com/watch?v=w2ETHKQpkVc>

VSCode

https://www.youtube.com/watch?v=XMrLP_7lbW0