

# Java@IBM :

## Powering the next generation of innovation

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**Steve Wallin**  
Program Director  
IBM Runtime Technologies

Java™ community:

The place for  
innovation



1

**Open  
source**

projects

OpenJ9

 **Open Liberty**

 **MICROPROFILE™**  
OPTIMIZING ENTERPRISE JAVA

2

**Open  
innovation**

for cloud native  
development

3

**Future  
state**

of the Java  
development  
ecosystem

1

Open  
source

# Java

The open platform with  
staying power

## Innovation needed

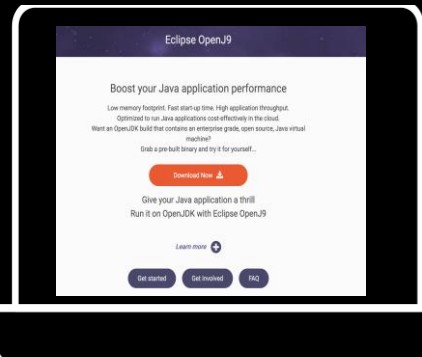
Driving innovation for microservices:

- Cloud dynamics
- Containers
- Hardware





## A better Java virtual machine



**IBM's high-performance, enterprise-class, open, cross-platform Java virtual machine:**

- IBM innovation and prototyping—packed objects, multitenancy, ahead-of-time (AOT) compilation, GPU, shared classes with more to come.
- Cloud and microservices optimized



Check it out here:

► <http://www.eclipse.org/openj9/>

# OpenJ9

IBM is driving  
innovation in hardware  
and software for Java

Concurrent copying garbage collection



**IBM z14™ Guarded Storage designed for Java, reducing pause times for critical mainframe workloads.**

# OpenJ9

**Performance, optimized  
for cloud workloads**

# 2x

smaller memory footprint\*

<https://github.com/eclipse/openj9-website/blob/master/benchmark/daytrader3.md>

# Emerging platforms for Java

Flexibility for new workloads is  
driving rampant innovation in  
open source platforms



Learn more here:

► <https://developer.ibm.com/code/reactive>



Lightbend

THE REACTIVE PLATFORM



lagom



akka

SCALA 

SERVERLESS PLATFORMS



APACHE  
OpenWhisk™

AI / BIG DATA PLATFORMS



DL4J  
DEEPLARNING4J

2

Open  
innovation

# MICROSERVICES







Microservices and  
cloud platforms have  
changed the role of the  
application container

**Developers need well-defined  
application-centric capabilities:**

- Packaged by a continuous integration and continuous deployment (CI/CD) pipeline, running in lightweight virtualization containers
- Wired to cloud platform capabilities for routing, management, scaling and fault tolerance





### Eclipse MicroProfile 1.2:

► <https://projects.eclipse.org/projects/technology.microprofile>

### Eclipse Enterprise for Java:

► <https://projects.eclipse.org/projects/ee4j/charter>



## MICROPROFILE 1.2 - NEW ENTERPRISE CAPABILITIES FOR MICROSERVICES

### Configuration

Externalize configuration to improve portability

### Health check

Common format to determine service availability.

### Health metrics

Common REST endpoints for monitoring service health

### Fault tolerance

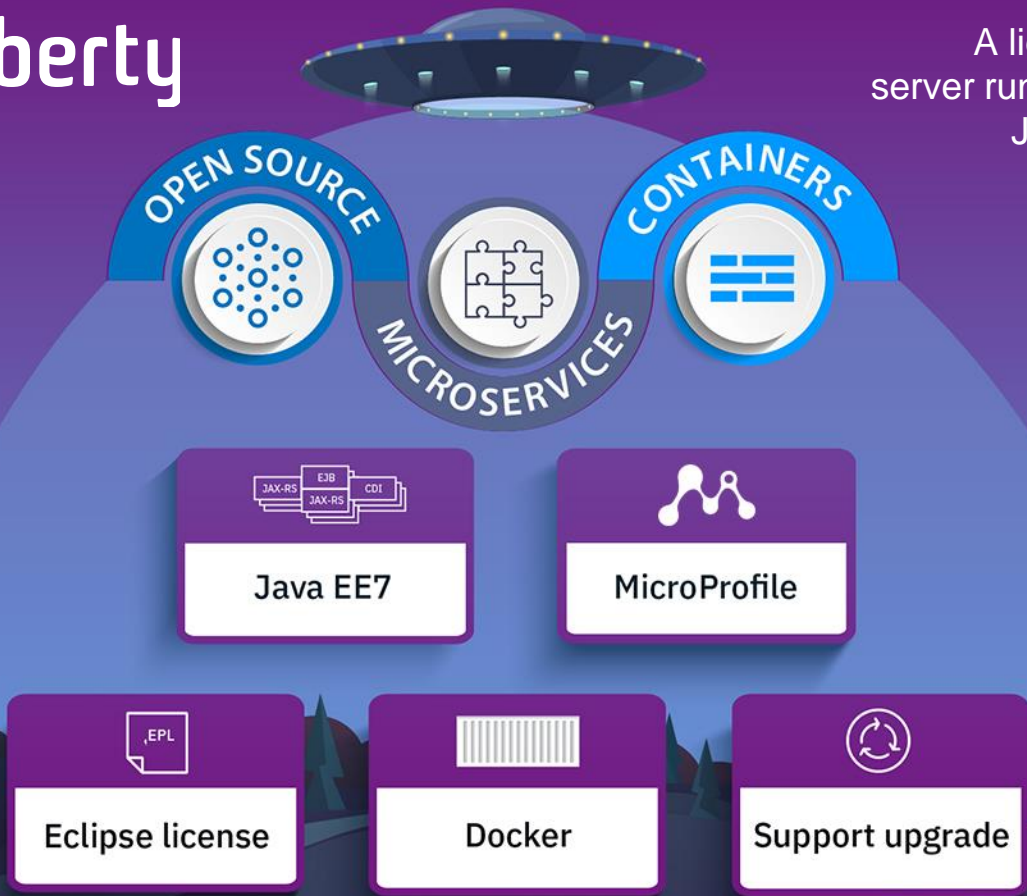
Build robust behavior to cope with unexpected failures

### JWT Propagation

Interoperable authentication and role-based access control



A lightweight open source  
server run time ideal for building  
Java microservices and  
cloud-native apps



OPEN LIBERTY



MICROSERVICE BUILDER



KUBERNETES PLATFORMS



# Get started

**Hack it:**

<https://github.com/openliberty>

**Give it a spin:**

<https://openliberty.io>

**Make it part of your cloud DevOps pipeline:**

<https://developer.ibm.com/microservice-builder>

# IBM Cloud Private

Greater flexibility and speed for  
new and existing workloads



Learn more here:

► <https://github.com/IBM/deploy-ibm-cloud-private>

## Cloud for Java developers:

- Easy integrated with Docker and Kubernetes
- Built-in, continuous development-to-deployment environment
- Cloud-ready, open source stacks and IBM middleware
- Integrated monitoring, logging and scalability

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Future  
state

# Java releases accelerating

## Rapid innovation in Java

### New Java versioning scheme

- <yy.m> e.g. 18.3 and 18.9

### New Java SE Platform every 6 months

### Introduction of LTS (Long Term Support) releases

- Every 3 years
- Starting with Java 18.9
- LTS plan is for 3+5 years support
- Java 9 has a 6 month support lifecycle !

3

Future  
state

# Access to Java technology

IBM SDK for Java 8 SR5

Based upon OpenJ9

Supported until at least 2025



OpenJDK

with

eclipse  
OpenJ9

 AdoptOpenJDK



Learn more here:

► <https://adoptopenjdk.net/?variant=openjdk9-openj9>

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Future  
state

# Your new Java ecosystem starts here

## More time for innovation

### A complete open Java cloud stack:

- OpenJ9 Java virtual machine
- Open Liberty for Java EE and MicroProfile
- Microservice Builder DevOps tools for cloud

### Community edition of IBM private cloud for integration and testing

### Innovations in the wider Java ecosystem

- New run times—Apache Spark, Akka, Lightbend, Lagom and others



Open Liberty



MICROPROFILE™  
OPTIMIZING ENTERPRISE JAVA



# Get started

## Hack it:

<https://github.com/eclipse/openj9>

<https://github.com/openliberty>

<https://github.com/eclipse/microprofile>

## Give it a spin:

<https://adoptopenjdk.net/releases.html?variant=openjdk9-openj9>

<https://openliberty.io>

<https://developer.ibm.com/microservice-builder>

## Learn more:

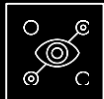
<https://developer.ibm.com/code>



# IBM code

## Learn

Take the journey  
with us @ibmcode



Check it out here:

► <https://developer.ibm.com/code>



### **developerWorks® Open technology**

- Open source projects you can use

### **Developer journeys for Java**

- Create resilient microservices with Istio
- Deploy Java microservices on Kubernetes

# Java SE Upgrade Roadmap

## Standard Java Features

### Java 6

- Performance improvements
- Improved UI
- Client WebServices Support
- Jconsole monitoring
- Collection framework enhancements

### Java 7

- Small language changes
- Improved IO APIs (NIO2)
- Invoke Dynamic
- Concurrency framework

### Java 8

- Lambdas
- Date and time
- Type annotations
- Profiles

### Java 9

- Modularity

## Additional IBM Java Features

### IBM Java 6.0

- Improvements in
  - Platform coverage
  - Performance
  - Serviceability tooling
- New Functionality
  - IBM WebSphere Real-Time V1.0
- z10 Exploitation
  - DFP exploitation for BigDecimal
  - Large Pages

### IBM Java 6.0.1 & 7.0

- Improvements in
  - Start up performance
  - Throughput performance
- New Balanced GC
- New feature in serviceability tooling
- Soft Realtime evaluation
- Performance exploitation of POWER7
- z196™ Exploitation
  - OOO Pipeline
  - 70+ New Instructions
- JZOS/Security Enhancements

### IBM Java 7.1

- Improvements in
  - Performance
  - GC technology
- zEC12 Exploitation
  - Transactional execution
  - Runtime Instrumentation
  - Flash 1Meg pageable LPs
  - 2G large pages
  - Hints/traps
- Data Access Accelerator
- Cloud: Multi-tenancy/Virtualization

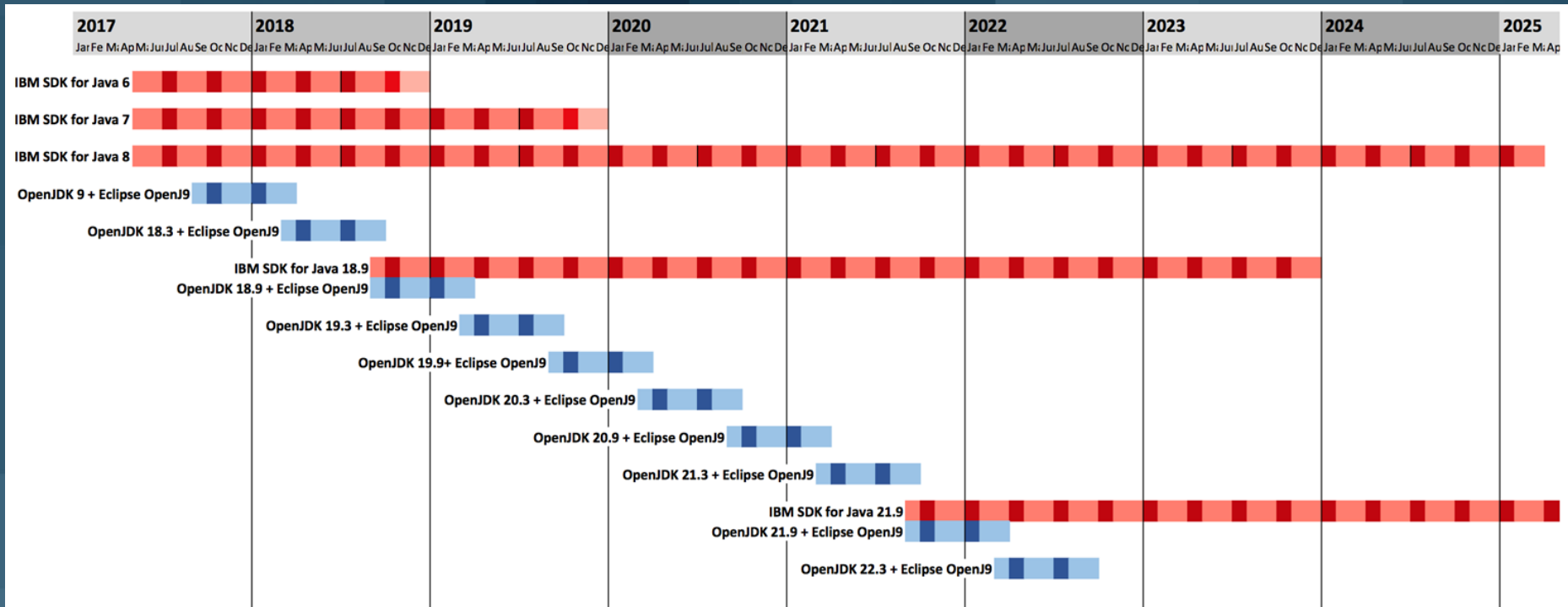
### IBM Java 8

- Improvements in
  - Performance
  - RAS
  - Monitoring
- z13™ Exploitation
  - SIMD
  - SMT
  - Crypto acceleration

### IBM Java 8 SR5

- Cloud
  - Footprint
  - Throughput
  - Modularity
- Stack
  - z14™ Exploitation
  - Spark, Scala
  - HW (GPU, RDMA)

# Java SE Release Roadmap



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