Java 2024

Hablemos de Java y Java 23

JoeDayz

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- Java Champion
- Miembro de @PeruJUG
- @jamdiazdiaz
- https://github.com/joedayz

ORACLE

Agenda

1. Historia
2. Calendario de Lanzamientos
3. Versiones, parches y actualizaciones
4. Beneficios
5. Lo nuevo de Java 23

Nuestro mundo

Movido por Java

Confianza

Modelo de desarrollo abierto y
Transparente.
Comunidad global de desarrolladores
De Java que se ayudan mutuamente
A tener éxito.

Innovación

Innovación continua para satisfacer
Las necesidades actuales mientras se
Construye para el futuro.

Previsibilidad

Enfoque implacable en la productividad
Del desarrollador, la seguridad y la estabilidad
De la plataforma, la disponibilidad oportuna
De nuevos lanzamientos.

29
Años desde
Su lanzamiento

10M
Desarrolladores Java
Full-time 2

75%
Desarrollo Cloud
Native con Java 2

#1
Lenguaje para las
tendencias tech 1

#1
Lenguaje para
desarrollo cloud
native 1

#1
Lenguaje para
iniciativas de
seguridad 1

60B
JVM activas de forma
global en el 2021 1

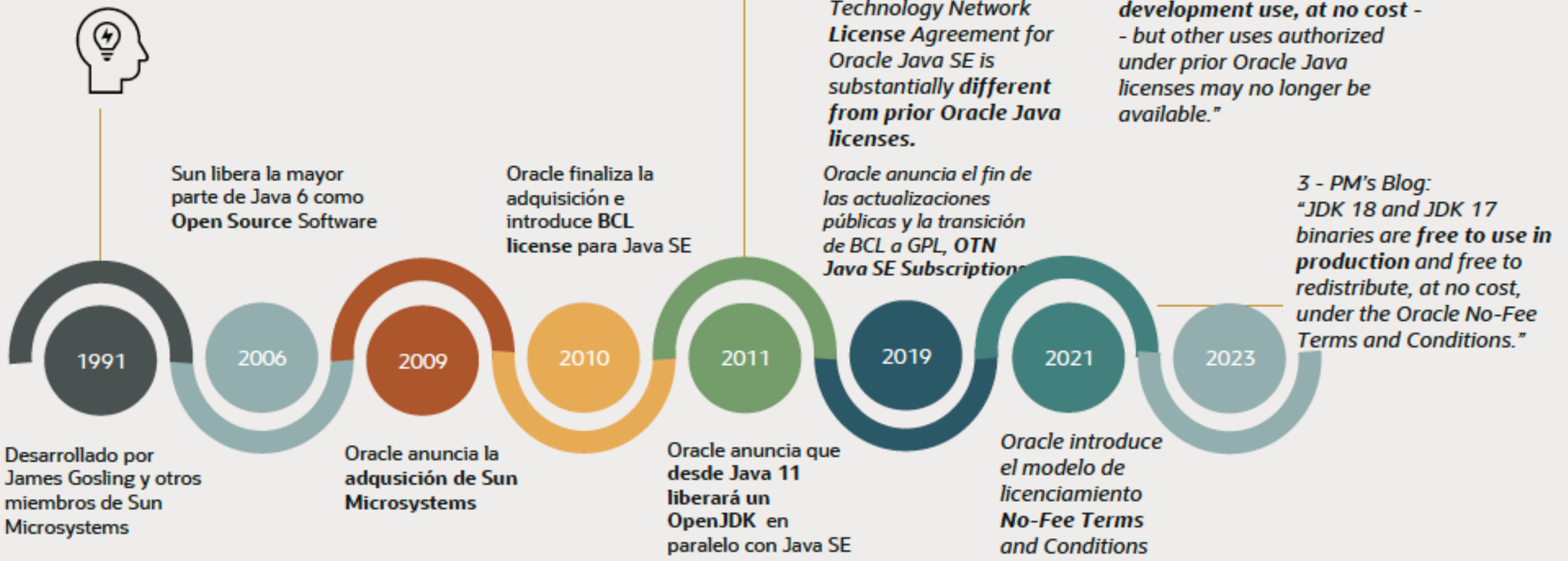
38B
De JVMs basadas en
cloud en el 2021 1

1 VDC 2022 study

2 IDC 2021 study

Java en el tiempo

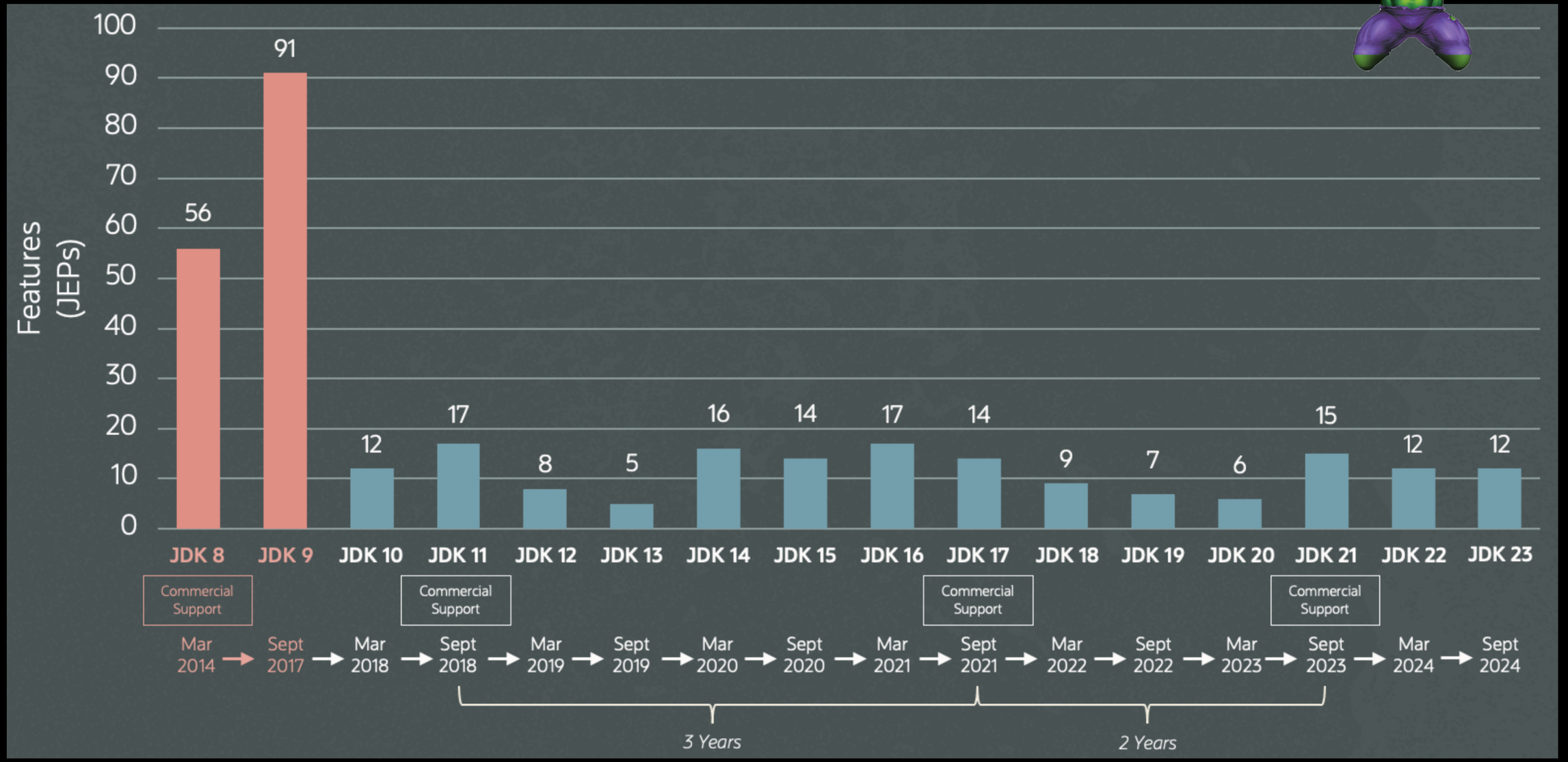
Linea de Tiempo



Source:

1 - https://blogs.oracle.com/java/post/oracle-jdk-releases-for-java-11-and-later
2 - https://www.java.com/en/download
3 - https://www.oracle.com/java/technologies/downloads/

Open JDK | Free Java License | Oracle JDK | Oracle Java Suscription



Versiones, Parches y Actualizaciones

Lanzamiento de Java	Fecha de lanzamiento	Final de actualizaciones públicas (EoPU)	Ultima version Publica	Soporte extendido hasta	Version mas reciente	Vulnerabilidades de seguridad solucionadas desde EoPU ⚠	Tickets de soporte solucionados
Java 6	Dic 2006	Abr 2013	6.0_45	Sep 2018	6.0_221	330	-
Java 7	Jul 2011	Abr 2015	7.0_80	Jul 2022	7.0_431	275	1726
Java 8	Mar 2014	Enero 2019	8.0_201/202	Dic 2030	8.0_421	148	3338
Java 11*	Sep 2018	N/A	N/A	Ene 2032	11.0.24	137	4826
Java 17 (LTS)	Sep 2021	Sep 2024	TBC	Sep 2029	17.0.12	66	2719
Java 21 (LTS)	Sep 2023	Sep 2026	21.0.1	Sep 2031	21.0.4	11	566
Java 22	Mar 2024	Sep 2024	22.0.1	No Aplica	22.0.2		

Ultima actualización: Julio de 2024

Información adicional:
https://www.oracle.com/java/technologies/java-se-support-roadmap.html
https://www.java.com/releases/matrix/
https://www.oracle.com/java/technologies/javase/22all-relnotes.html

Java™ ORACLE + ORACLE GraalVM

Java

High perf compiler

Native image enables microservices

JS

Multi-language on one JVM

24x7 support

https://www.oracle.com/graalvm

https://bit.ly/WebinarsPeruJUG

Beneficios de Graal VM

1. Mejora el rendimiento
   - Promedio 30% más rápido en puntos de referencia del mundo real.
   - Reducir la latencia para la recolección de basura.
   - Optimizaciones patentadas que maximizan el rendimiento.
2. Impulsa la innovación
   - Implementar microservicios y modernizar aplicaciones.
   - Las aplicaciones compiladas con anticipación se inician en un 94% más rápido que en JVM.
   - Ejecute varios idiomas en una maquina virtual Java (JVM).
3. Reduce costos
   - Ejecute más cargas de trabajo con los mismos servidores.
   - Reduzca el consumo de memoria entre 5-7 veces menos.
   - Reduzca el costo de TI entre 12% - 35% menos de servidores.

Modernización poliglota de alto rendimiento

- Start lenguaje C (polyglot.c)
- Start Lenguaje R (polyglot.R)
- Start Lenguaje Ruby (polyglot.rb)
- Start Lenguaje Python (polyglot.py)

Start from JavaScript / Node.js

Create the file `polyglot.js`:

R Ruby Python Java LLVM

Target Language

```
var array = Polyglot.eval("R", "c(1,4)")
console.log(array[2]);
```

Copy

Run:

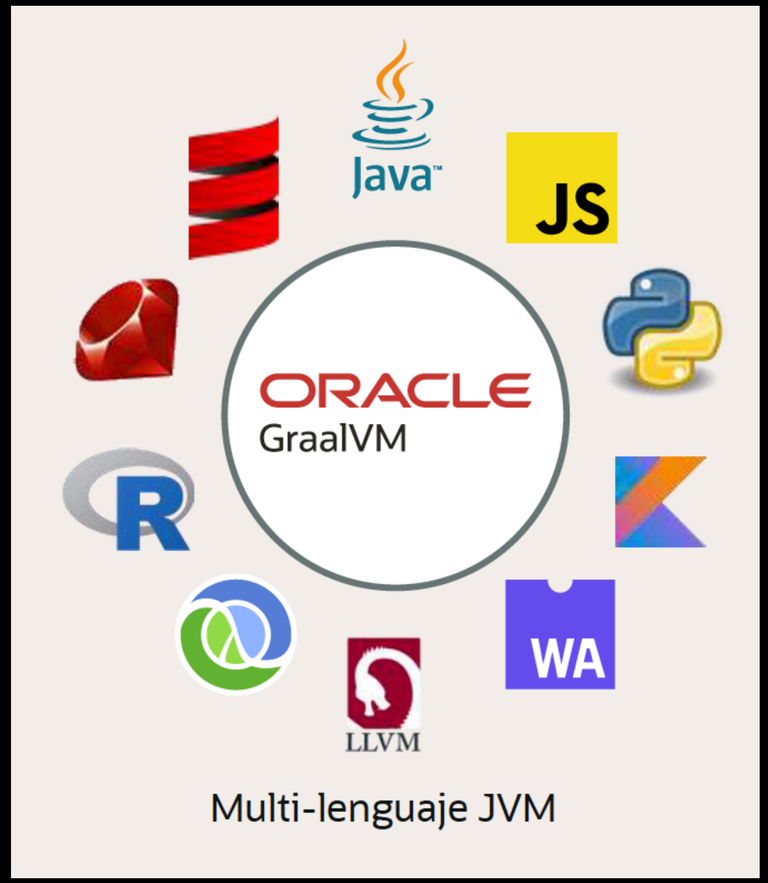
```
js --polyglot --jvm polyglot.js
42
node --polyglot --jvm polyglot.js
42
```

Copy

https://docs.oracle.com/en/graalvm/enterprise/19/guide/reference/polyglot-programs.html

Modernización poliglota de alto rendimiento

- Rapido
  - 50% mas rapido según benchmarks
  - Ejecutables nativos con inicio casi instantáneo
- Inteligente
  - 60+ optimización de compilación
  - Compilación nativa de ejecutables
  - Múltiples lenguajes soportados
- Ahorrador
  - Menor consumo de memoria
  - Mayor rendimiento y menos uso de CPU
  - Reducción de carga de Garbagge Collection
- Barato
  - Ejecute más cargas de trabajo con los mismos servidores
  - Reduzca el consumo de memoria hasta 5-7 veces menos
  - Reduzca el costo de TI con hasta un 12-35% menos de servidores.



Compilación anticipada de imágenes nativas Empresariales de GraalVM

Compatible con frameworks y plataformas de microservicios

spring by Pivotal

MICRONAUT™

QUARKUS

Netty

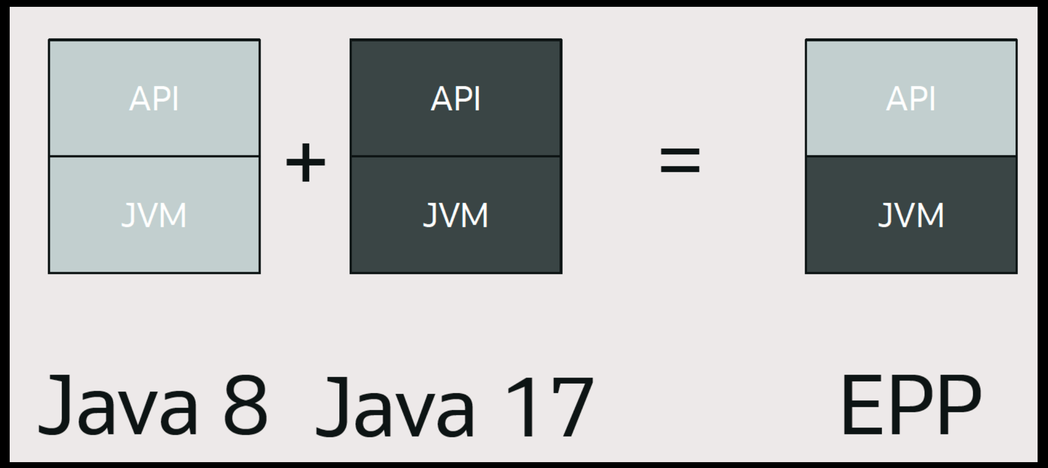
helidon

Ideal para contenedores y serverless

kubernetes

Enterprise Performance Pack

- Al usar la VM de Java 17 VM, EPP entrega las mejoras en el desempeño de Java 17 a las cargas de trabajo de Java 8, utilizando menos memoria.



- Incorpore las mejoras de Java 17 a sus aplicaciones de Java 8 sin realizar ningún cambio en el código.
- Obtenga el mismo roadmap de soporte de Java 8
- Enfocado a aplicaciones desarrolladas en Java 8 que no están siendo actualizadas ni tienen desarrollos activos.
- Disponible únicamente para aplicaciones headless en Linux de 64 bits (x86 & ARM)

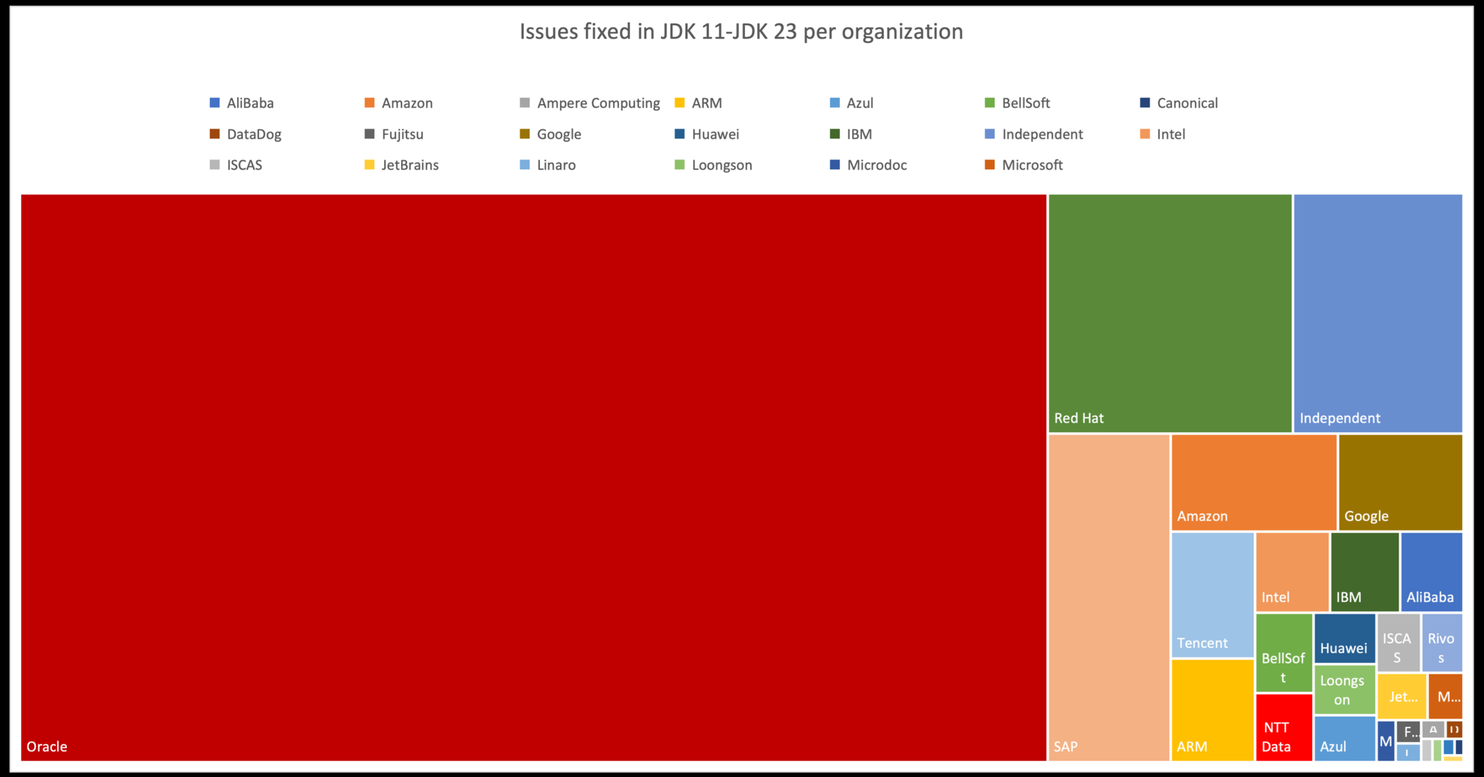
https://bit.ly/OracleEPP

Oracle hace avanzar a Java

- Java ofrece innovación continua y programada, con funciones modernas de lenguaje de programación, mejoras en la experiencia del desarrollador, servicios administrados en la nube y estabilidad, siendo especialmente relevante para las aplicaciones y cargas de trabajo modernas.

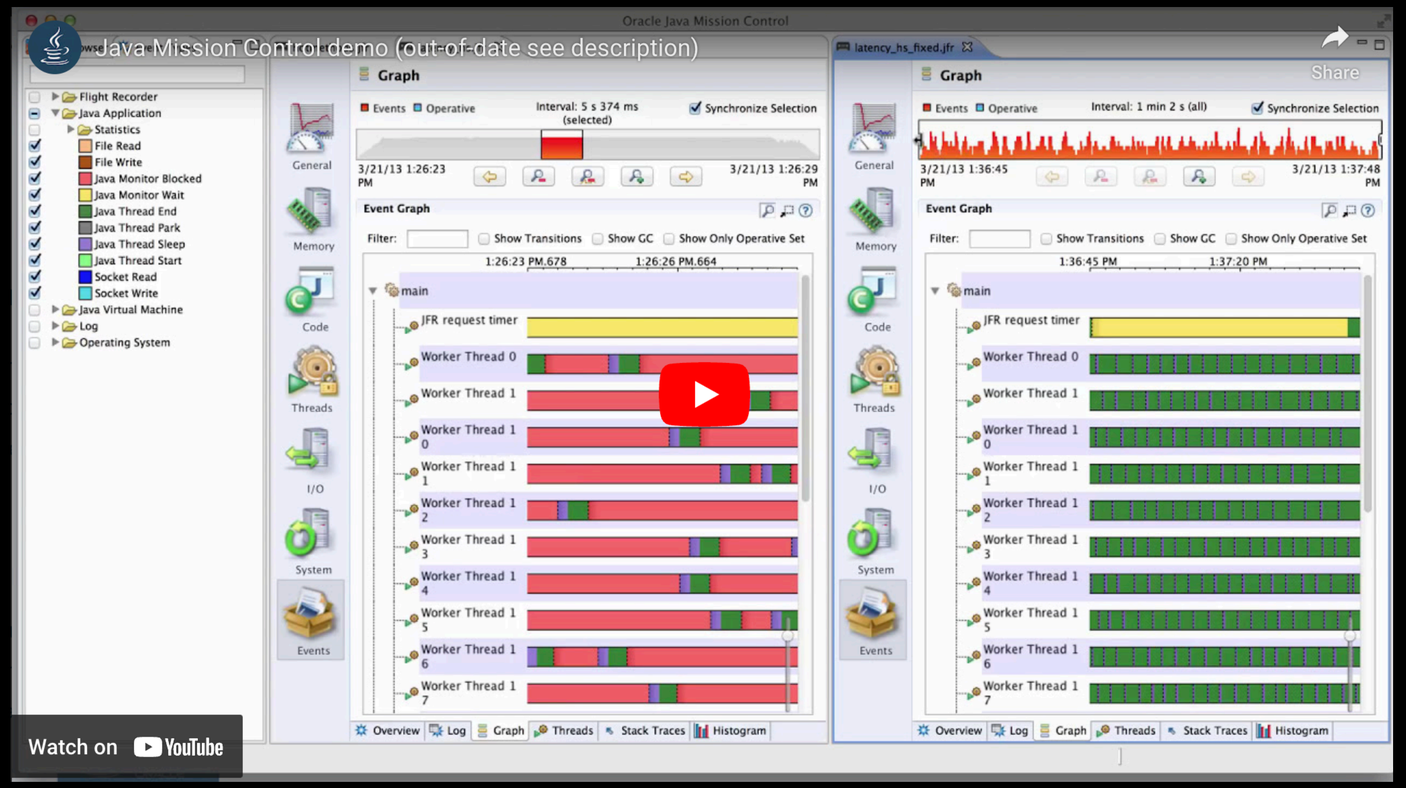
Oracle es el principal contribuyente

- Autor principal y colaborador de la tecnología Java
- Patrocinador líder y administrador del ecosistema de Java
- Impulsor líder de la innovación de plataformas.



Beneficios plus

- JDK Mission Control (JMC)
  Es un conjunto avanzado de herramientas para administrar, monitorear, crear perfiles



https://bit.ly/OracleJMC

Lo nuevo en Java 23

The Hotspot Garbage Collectors

GC	OPTIMIZED FOR
Serial	Memory footprint
Parallel	Throughput
G1	Throughput/Latency
ZGC	Low Latency and Scalability

Try them out!

Start with the default GC, G1

- -XX:+UseG1GC (don't need to specify since it is default)

If the throughput is insufficient , try enabling Parallel

- -XX:+UseParallelGC

If pause times are too long, try ZGC

- -XX:+UseZGC

Performance tuning

If most of the characteristics are pretty close, try tuning

GC tuning guide

- https://docs.oracle.com/en/java/javase/20/gctuning/introduction-garbage-collection-tuning.html

GC tuning

Help Center | HotSpot Virtual Machine Garbage Collection Tuning Guide | Search

Java / Java SE / 19

HotSpot Virtual Machine Garbage Collection Tuning Guide

Table of Contents

1 Introduction to Garbage Collection Tuning

A wide variety of applications, from small applets on desktops to web services on large servers, use the Java Platform, Standard Edition (Java SE). In support of this diverse range of deployments, the Java HotSpot VM provides multiple garbage collectors, each designed to satisfy different requirements. Java SE selects the most appropriate garbage collector based on the class of the computer on which the application is run. However, this selection may not be optimal for every application. Users, developers, and administrators with strict performance goals or other requirements may need to explicitly select the garbage collector and tune certain parameters to achieve the desired level of performance. This document provides information to help with these tasks.

First, general features of a garbage collector and basic tuning options are described in the context of the serial, stop-the-world collector. Then specific features of the other collectors are presented along with factors to consider when selecting a collector.

Topics

- What Is a Garbage Collector?
- Why Does the Choice of Garbage Collector Matter?
- Supported Operating Systems in Documentation

What Is a Garbage Collector?

The garbage collector (GC) automatically manages the application's dynamic memory allocation requests.

A garbage collector performs automatic dynamic memory management through the following operations:

- Allocates from and gives back memory to the operating system.
- Hands out that memory to the application as it requests it.
- Determines which parts of that memory is still in use by the application.

ZGC

A Scalable Low-Latency Garbage Collector

Project ZGC

- Jan 2014 Prototyping starts
- Sep 2018 First experimental release (JDK 11)
- Mar 2019 Concurrent class unloading (JDK 12)
- Sep 2019 AArch64 support (JDK 13)
- Mar 2020 Windows & macOS support (JDK 14)
- Sep 2020 First production ready release (JDK 15)
- Mar 2021 Constant pause times (JDK 16)
- Sep 2021 Dynamic tuning of GC threads (JDK 17)

Goals

Scalable

Up to TB heaps

Low Latency

< 1 ms pauses

Auto-tuning

Simpler configuration

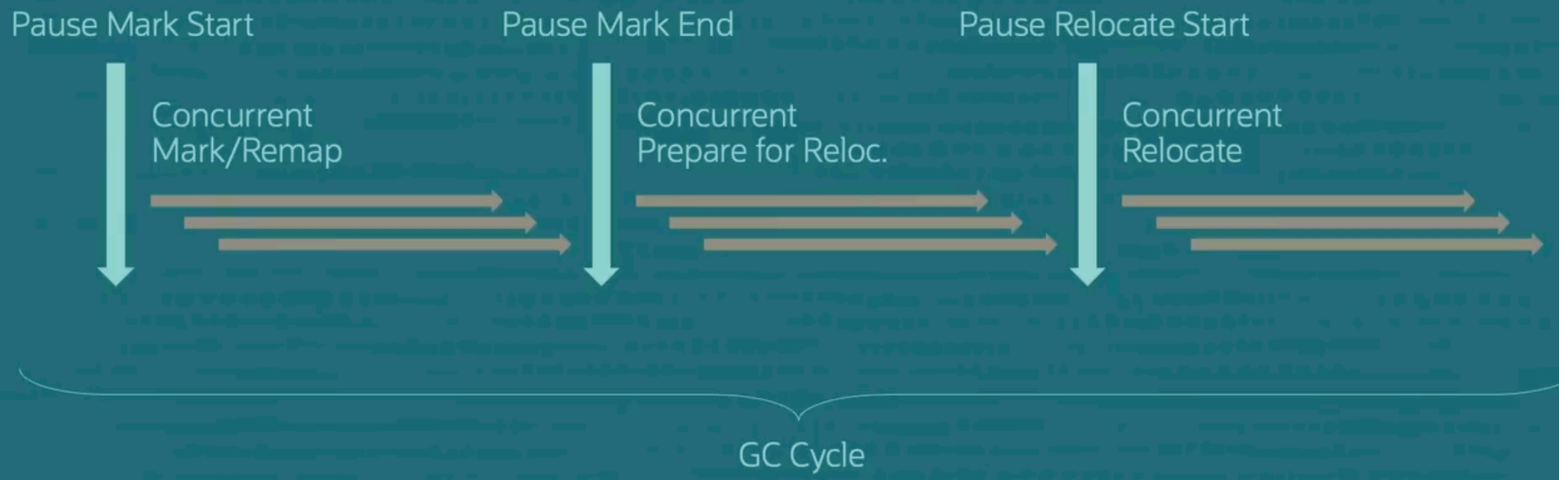
15%

Max application throughput reduction

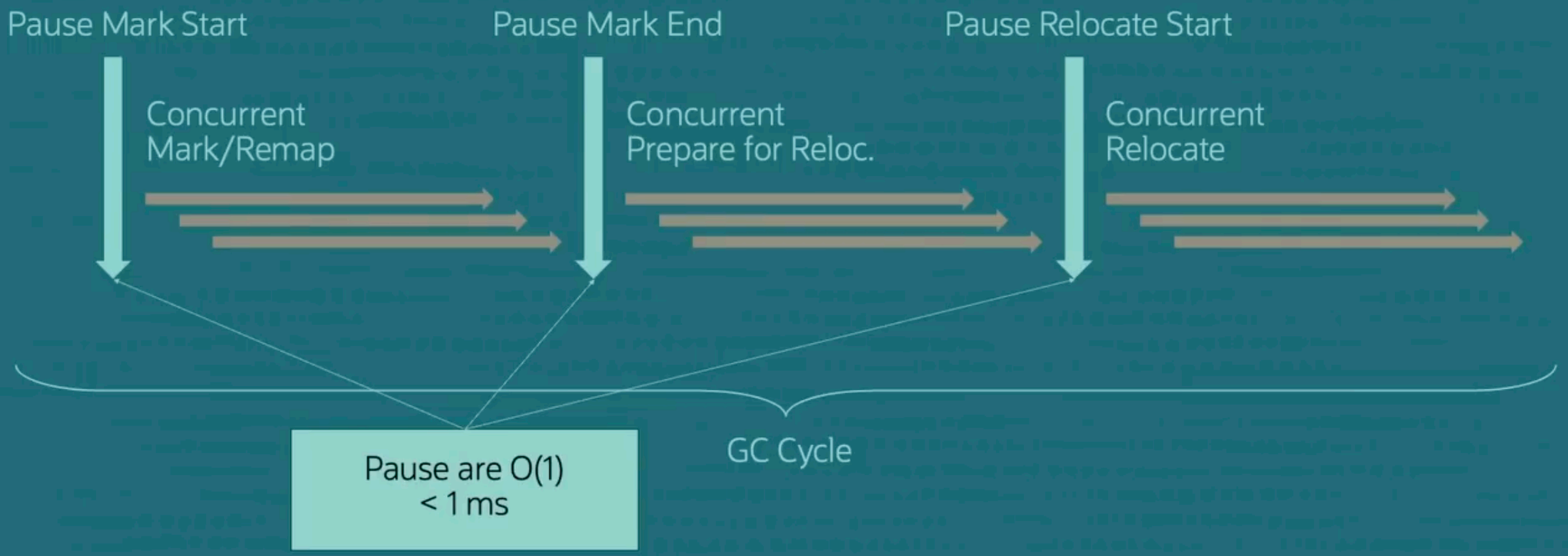
ZGC at a Glance

- Concurrent
  - All heavy lifting is done while Java threads continue to execute
- Constant pause times
  - Does not scale with the heap size, live-set size, etc
- Parallel
  - Uses multiple threads to collect garbage
- Compacting
  - Moves objects around to fight fragmentation
- Region-based
  - Focuses on regions with lots of garbage
- NUMA-aware
  - Allocates objects in memory local to the CPU
- Auto tuning
  - No complex configuration knobs
- Load barriers & Colored pointers
  - The two main techniques used to achieve concurrent garbage collection

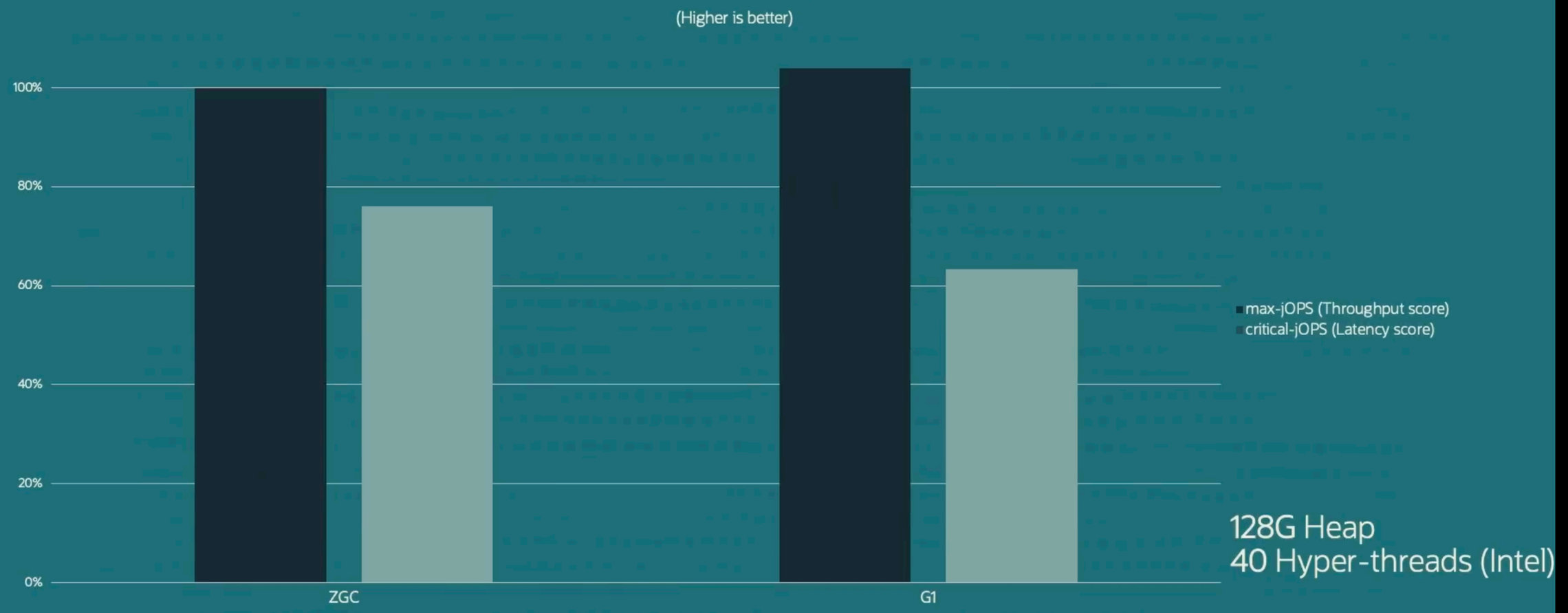
ZGC Phases


Pause Mark Start
Concurrent
Mark/Remap
Pause Mark End
Concurrent
Prepare for Reloc.
Pause Relocate Start
Concurrent
Relocate
GC Cycle

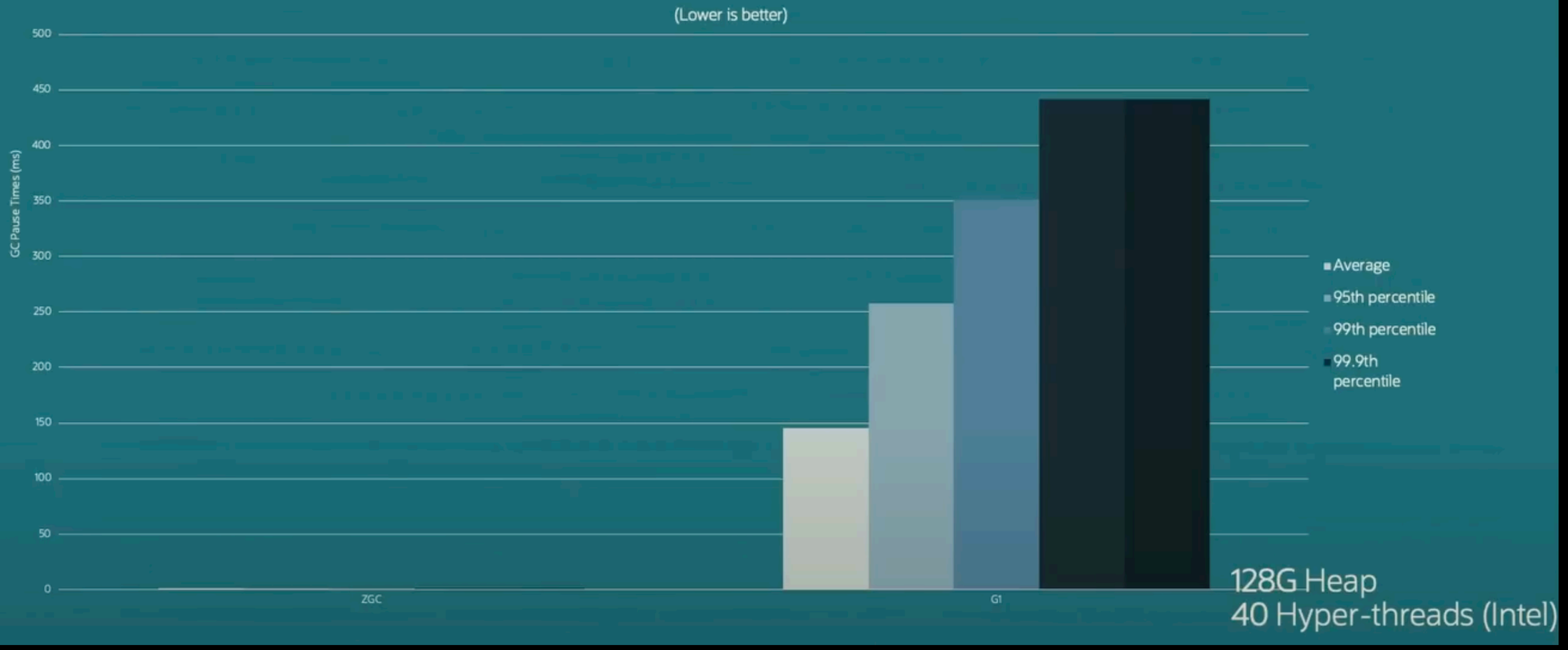
ZGC Phases


Pause Mark Start
Concurrent
Mark/Remap
Pause Mark End
Concurrent
Prepare for Reloc.
Pause Relocate Start
Concurrent
Relocate
Pause are O(1)
< 1 ms
GC Cycle

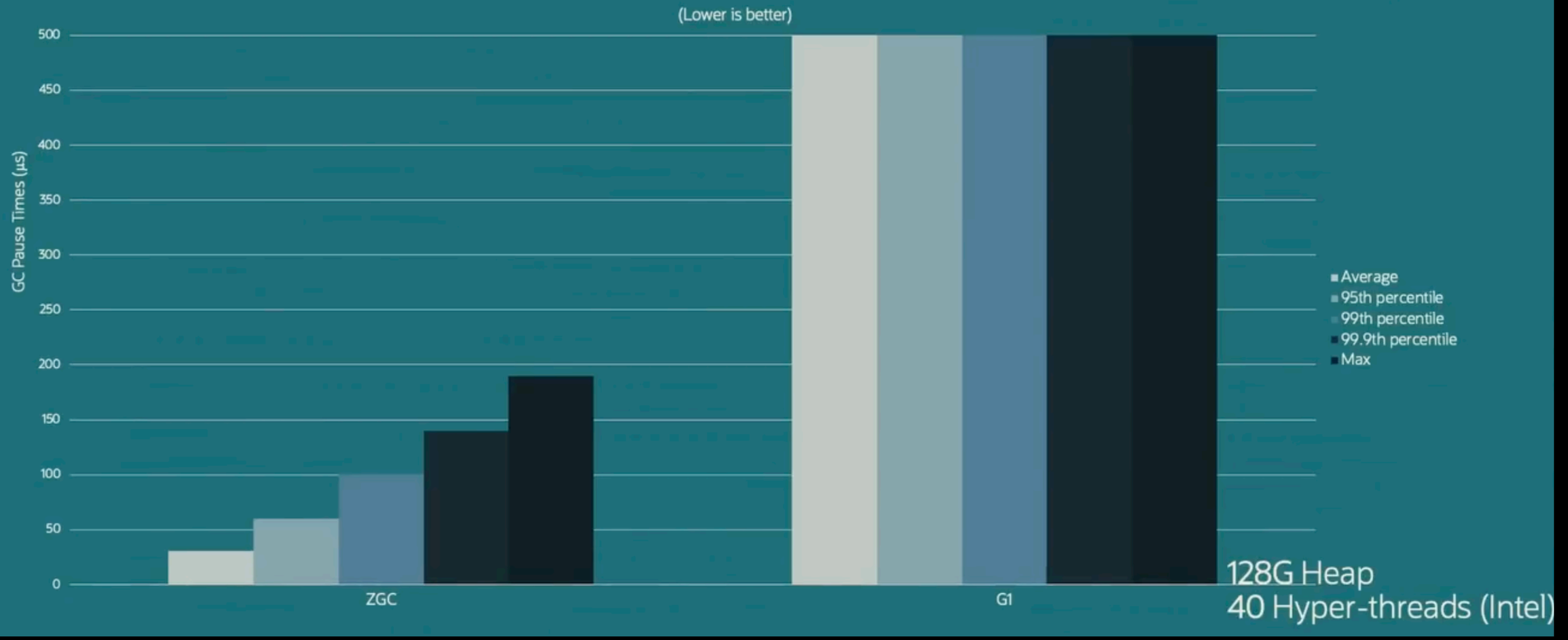
SPECjbb2015 – Benchmark Score



SPECjbb2015 – GC Pause Times



SPECjbb2015 – GC Pause Times



Performance tuning ZGC

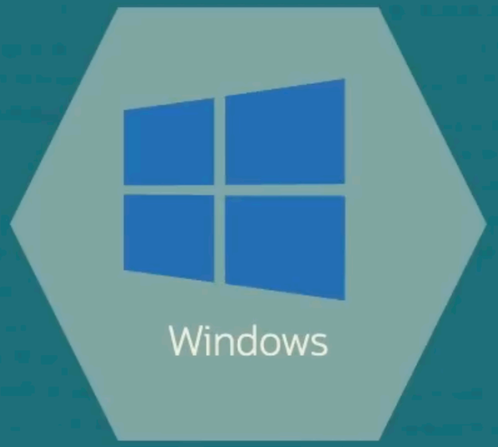
Automatic Tuning

- Dynamic number of threads
    - (No –XX:ConcGCThreads needed)

Max heap size

- –Xmx

Available on All Commonly Used Platforms



Generational support in ZGC

Why generations?

Workloads where the allocation rate exceeds the ability of the GC to keep up

Allocation Stalls

Garbage collection is a constant race between

- The java threads allocating objects
- The GC reclaiming dead objects

Allocation stalls happen when

- Heap filled up before the GC can reclaim memory of dead objects
- Java threads stand still waiting for memory

The Weak Generational Hypothesis

A very common pattern in Java applications is that
most objects are short lived

Heap

Young Generation

Old Generation

New object allocated in the young generation

Heap

Young Generation

Old Generation

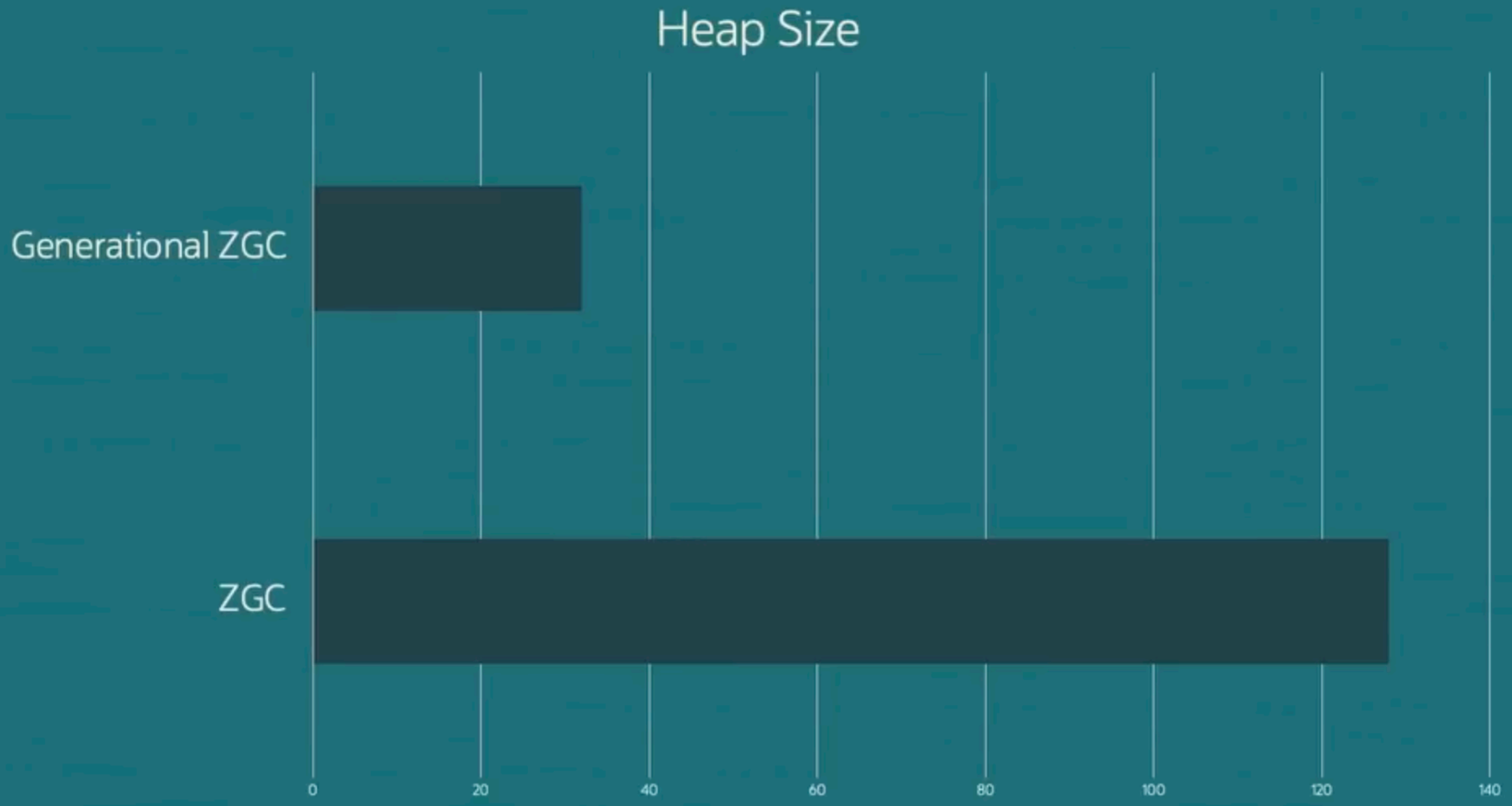
Object promoted to the old generation

Reduced Effort to Collect Garbage

Withstand higher allocation rates
Lower heap headroom
Lower CPU usage

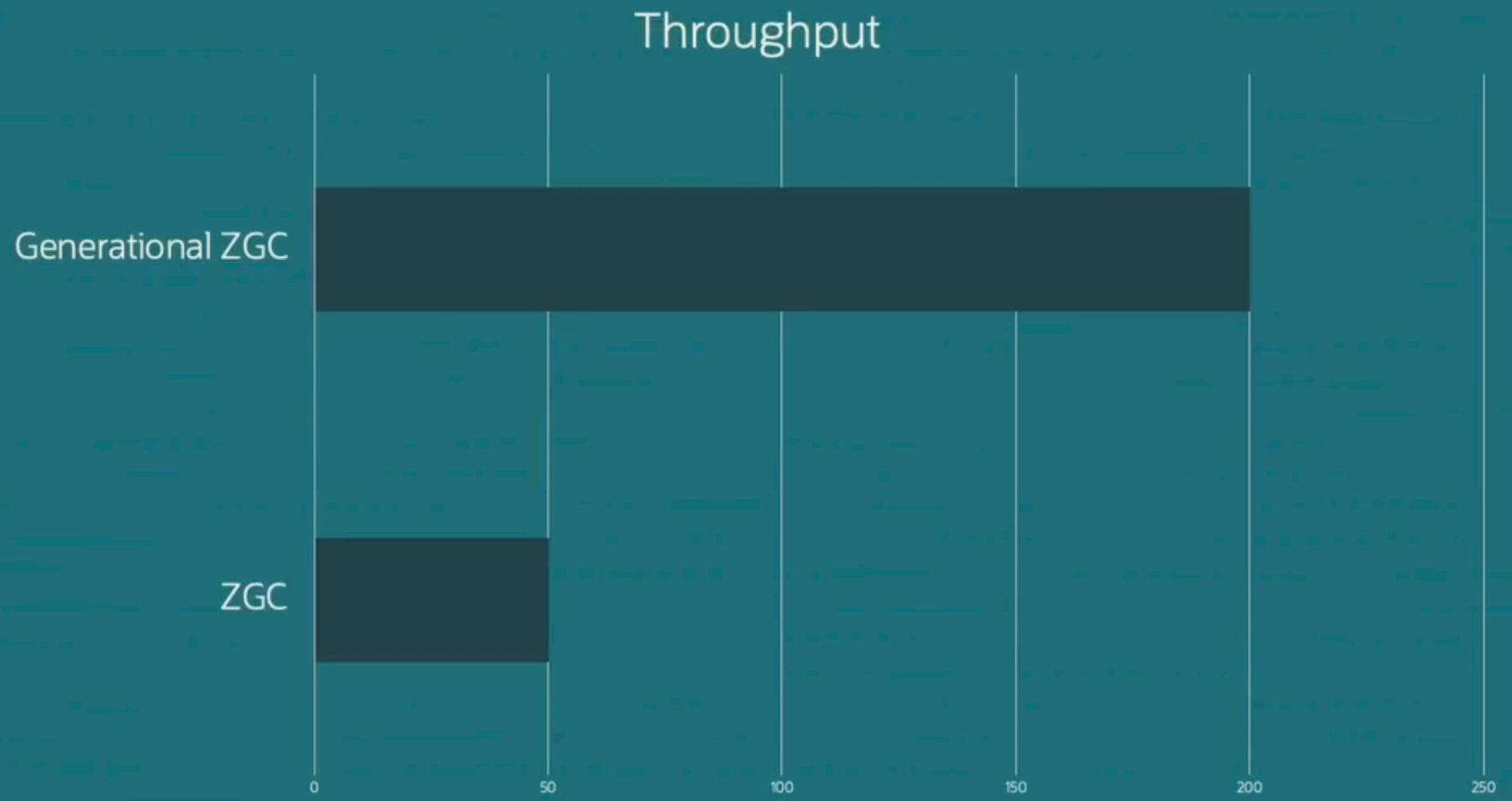
Cassandra 4 Memory Usage

With same injection rate



Cassandra 4 Throughput

With 128G heap



- 4x throughput
- 25% memory
- <1 ms GC Pauses

Performance tuning generational ZGC

Performance tuning generational ZGC

Automatic Tuning

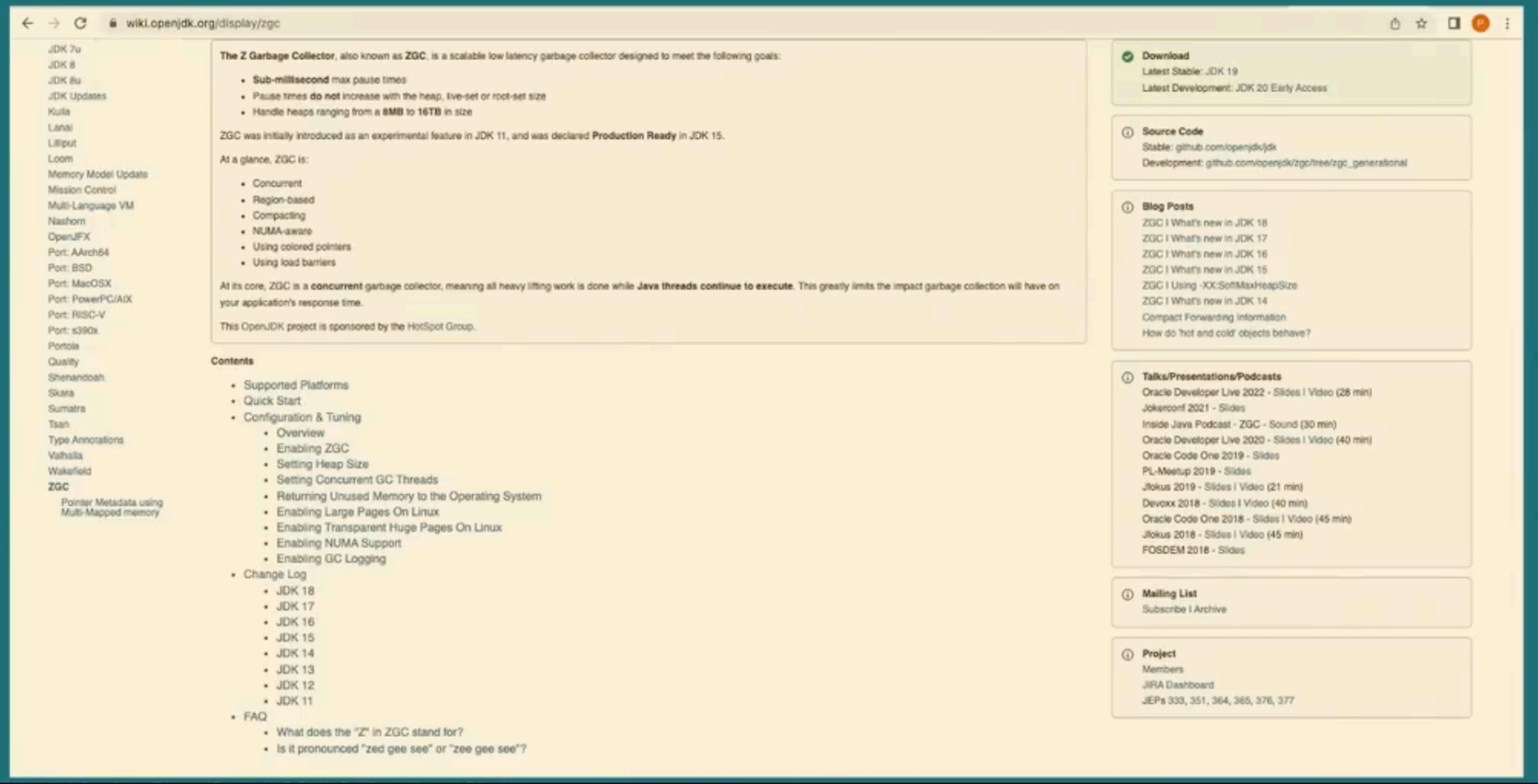
- Dynamic Generation Sizing
  - (No –Xmn needed)
- Dynamic Tenuring Threshold
  - (No –XX:TenuringThreshold needed)
- Initiating Heap Occupancy
  - (No –XX:InitiatingHeapOccupancyPercent needed)
- Dynamic number of threads
  - (No –XX:ConcGCThreads needed)

Max heap size

- –Xmx

ZGC Wiki

https://wiki.openjdk.org/display/zgc



JEP 439: Generational ZGC

https://openjdk.org/jeps/439

- Motivations and goals behind generational ZGC
- Insight into the technical design features enabling generational ZGC
- Now in Candidate state

OpenJDK

Installing
Contributing
Sponsoring
Developers' Guide
Vulnerabilities
JDK GA/EA Builds

Mailing lists
Wiki · IRC

Bylaws · Census
Legal

JEP Process

Source code
Mercurial
GitHub

Tools
Git
jtreg harness

Groups
(overview)
Adoption
Build
Client Libraries
Compatibility & Specification Review
Compiler
Conformance
Core Libraries
Governing Board
HotSpot
IDE Tooling & Support
Internationalization
JMX
Members
Networking
Porters
Quality
Security
Serviceability
Vulnerability
Web

Projects
(overview, archive)
Amber
Audio Engine

JEP 439: Generational ZGC

Owner	Stefan Karlsson
Type	Feature
Scope	Implementation
Status	Candidate
Component	hotspot / gc
Discussion	hotspot dash gc dash dev at openjdk dot org
Effort	XL
Duration	XL
Relates to	JEP 377: ZGC: A Scalable Low-Latency Garbage Collector (Production)
Reviewed by	Erik Helin, Erik Österlund, Vladimir Kozlov
Created	2021/08/25 12:01
Updated	2023/03/14 19:36
Issue	8272979

Summary

Improve application performance by extending the Z Garbage Collector (ZGC) to maintain separate generations for young and old objects. This will allow ZGC to collect young objects — which tend to die young — more frequently.

Goals

Applications running with Generational ZGC should enjoy

- Lower risks of allocations stalls,
- Lower required heap memory overhead, and
- Lower garbage collection CPU overhead.

These benefits should come without significant throughput reduction compared to non-generational ZGC. The essential properties of non-generational ZGC should be preserved:

Generational ZGC Early Access Build

https://jdk.java.net/genzgc/

Please send feedback via e-mail to zgc-dev@openjdk.org

jdk.java.net

GA Releases
JDK 19
JMC 8

Early-Access Releases
JDK 21
JDK 20
Generational ZGC
JavaFX 20
JavaFX 21
Jextract
Loom
Metropolis
Panama
Valhalla

Reference Implementations
Java SE 20
Java SE 19
Java SE 18
Java SE 17
Java SE 16
Java SE 15
Java SE 14
Java SE 13
Java SE 12
Java SE 11
Java SE 10
Java SE 9
Java SE 8
Java SE 7

Project ZGC: Generational ZGC Early-Access Builds

These are early access binaries of Generational ZGC JDK-8272979

Warning: This build is based on an incomplete version of JDK 21.

Build 21-genzgc+5-33 (2023/3/9)

These early-access builds are provided under the GNU General Public License, version 2, with the Classpath Exception.

Linux/AArch64	tar.gz (sha256)	197637312 bytes
Linux/x64	tar.gz (sha256)	199295478
macOS/AArch64	tar.gz (sha256)	193580674
macOS/x64	tar.gz (sha256)	195948493
Windows/x64	zip (sha256)	197656230

Notes

- If you have difficulty downloading any of these files please contact download-help@openjdk.org.

Feedback

Please send feedback via e-mail to zgc-dev@openjdk.org. To send e-mail to this address you must first subscribe to the mailing list.

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https://inside.java

- Aggregated blog articles and presentations

PREGUNTAS?

MUCHAS GRACIAS POR SU ASISTENCIA

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