



# Java on IBM Z – News, Updates, and other

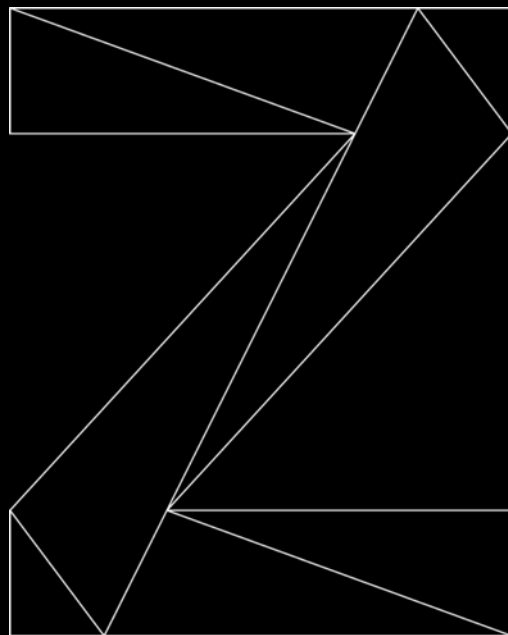


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Linux on IBM Z and LinuxONE Technical Client Workshop

Americas and EMEA | Live virtual event | 12-16 July 2022



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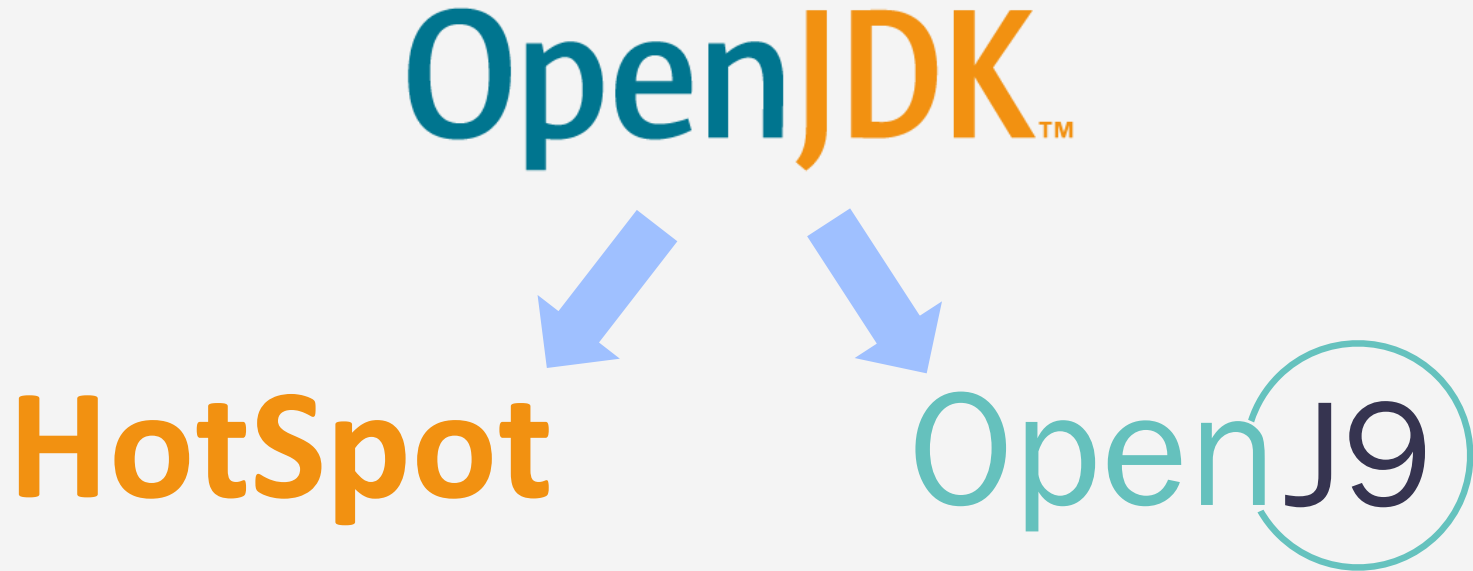
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# Agenda



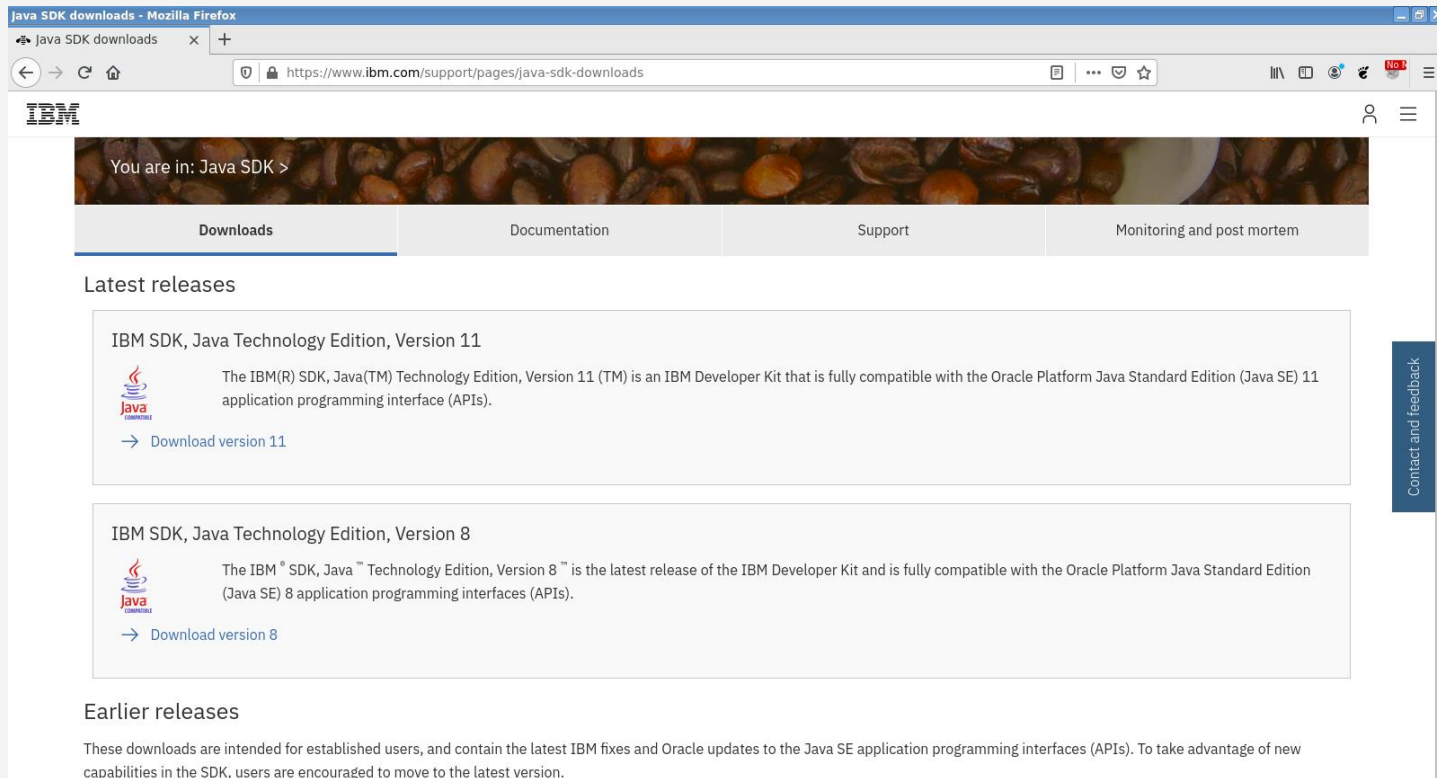
- IBM Java V11
- Avoid the pitfall – how to choose the "right" Java version
- Support for Java
- Java performance recommendation, *revised*
- Summary

# OpenJ9



Pre-built binaries available on  AdoptOpenJDK

# IBM Java V11



The screenshot shows a web browser window titled "java SDK downloads - Mozilla Firefox". The address bar displays the URL "https://www.ibm.com/support/pages/java-sdk-downloads". The page features the IBM logo in the top left and a navigation bar with the text "You are in: Java SDK >". Below this, a horizontal menu contains four items: "Downloads", "Documentation", "Support", and "Monitoring and post mortem". The "Downloads" item is currently selected. The main content area is titled "Latest releases" and contains two sections. The first section is for "IBM SDK, Java Technology Edition, Version 11", which includes a description of the IBM(R) SDK, Java(TM) Technology Edition, Version 11 (TM) as an IBM Developer Kit compatible with the Oracle Platform Java Standard Edition (Java SE) 11 application programming interface (APIs). It also features a "Download version 11" link. The second section is for "IBM SDK, Java Technology Edition, Version 8", which includes a description of the IBM® SDK, Java™ Technology Edition, Version 8™ as the latest release of the IBM Developer Kit compatible with the Oracle Platform Java Standard Edition (Java SE) 8 application programming interfaces (APIs). It also features a "Download version 8" link. On the right side of the page, there is a vertical blue button labeled "Contact and feedback".

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IBM

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### Latest releases

#### IBM SDK, Java Technology Edition, Version 11

The IBM(R) SDK, Java(TM) Technology Edition, Version 11 (TM) is an IBM Developer Kit that is fully compatible with the Oracle Platform Java Standard Edition (Java SE) 11 application programming interface (APIs).

→ Download version 11

#### IBM SDK, Java Technology Edition, Version 8

The IBM® SDK, Java™ Technology Edition, Version 8™ is the latest release of the IBM Developer Kit and is fully compatible with the Oracle Platform Java Standard Edition (Java SE) 8 application programming interfaces (APIs).

→ Download version 8

### Earlier releases

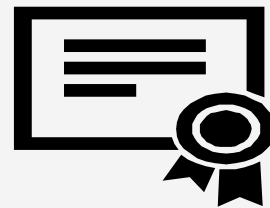
These downloads are intended for established users, and contain the latest IBM fixes and Oracle updates to the Java SE application programming interfaces (APIs). To take advantage of new capabilities in the SDK, users are encouraged to move to the latest version.

Contact and feedback

# IBM Java V11, *continued*



- It is important to understand that the release of IBM® Java® V11 is **not a shift in strategy** – IBM's major focus is still on **Open Source**, which means OpenJDK™ based on OpenJ9™
  - IBM is strongly supporting a **free** and **open** Java – in line with our commitment to Open Source
- IBM Java V11 is **functionally equivalent** to OpenJDK V11 based on OpenJ9
  - No additional features / changed functionality
- AdoptOpenJDK doesn't have a license for the **Java Compatibility Kit** (a.k.a., the JCK or TCK for Java SE)
  - See here: <https://adoptopenjdk.net/quality.html>
  - Missing license and consequently missing certification is a problem for some software vendors
- IBM Java V11 is JCK **certified**





# Agenda



- IBM Java V11
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# Java on Linux on IBM Z – performance summary



	HotSpot	OpenJ9
IBM Java V8	n/a	😊
IBM Java V11	n/a	😊
OpenJDK V8	😞 (*)	😊
OpenJDK V9	😐 ... 😊	😊
OpenJDK V10	not measured	not measured
OpenJDK V11	😐 ... 😊	😊

(\*) This version does not have a *Just-In-Time* (JIT) compiler.

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# Support for Java



- On z/OS®, service & support for **IBM Java** is included in the base product
  - IBM Java has its own no-charge *Product ID* (PID)
- On Linux® on IBM Z®, the situation is more difficult
- For **IBM Java** on Linux on Z, you can **only** get service & support by means of a **stack product** like WebSphere® Application Server, for example
  - There is **no way** to get service & support for the **standalone** version of IBM Java, which is available from the IBM Java SDK downloads page, for example
- For **OpenJDK** based on **OpenJ9** on Linux on Z, you can get service & support in 2 different ways:
  - (1) by means of a stack product like WebSphere Liberty, for example
  - (2) through the **IBM Runtimes for Business** offering

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# Java performance recommendation, *revised*



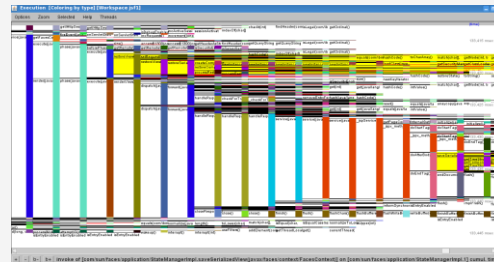
- Long-time recommendation: avoid **JavaServer Faces** (JSF) for performance-critical workloads
  - JSF **lifecycle concept** is very resource-hungry
  - **Independent** of the particular JSF implementation being used
- Performance **alternative**: plain old *JavaServer Pages* (JSP™s)
- Part of my presentation *A Hitchhiker's Guide to Java Performance on IBM Z*



# The story behind



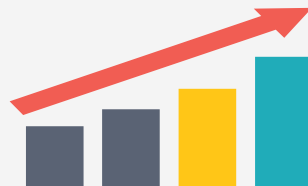
- End of 2020, a **government customer** approached me with an urgent request for support for their **COVID-19 tracing** application, which is written in Java and runs on WebSphere Liberty for z/OS
  - zIIP specialty engines were running at 100% utilization straight
- Jinsight trace revealed that vast majority of time was spent for JavaServer Faces, more specifically in the **Eclipse® Mojarra™** reference implementation of JSF
  - Initial thought: cannot do much about it
- Sat down and analyzed the traces for a **couple of days**
  - Finally developed a couple of ideas – and code – regarding how to improve performance
- Testing / rinse-and-repeat took **another week**
  - In the end, my patches passed all test cases in Eclipse Mojarra's automated test suite



# Outcome



- Implemented 3 patches: 2 x caches and 1 x algorithm change
  - Caches: (1) URL resolution for JSF resources and (2) identification of *Composite Components* (CC)
- Algorithm change: in simple terms, I changed the way that Eclipse Mojarra checks for **existing children** in the **JSF component tree**
  - Original version was based on *Breadth First Search* (BFS), my version is based on hash map lookup
- Read about it here: <https://github.com/eclipse-ee4j/mojarra/pulls>
  - Look for zjavaperf
- Net result: ca. **20-25% less** overall Java method calls (conservative educated guess)
- **Question:** Is JSF now a high-performance implementation?
- **Answer:** Still not quite, but it has become better.





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# Summary



- **IBM Java V11** is generally available
  - Important: this is **not** a shift in IBM's Java strategy
- Choosing the "right" Java version is **critical** when it comes to performance
  - Specifically avoid versions without JIT
- Make sure you are aware of how your Java is **supported**
  - Remember the different options
- Eclipse Mojarra (RI of JSF) has been **performance-improved**
  - Make sure that you have my **patches** applied



# Thank you!



# Resources



- Linux on IBM Z and IBM LinuxONE
  - Official homepage: <https://www.ibm.com/it-infrastructure/z/os/linux>
  - Documentation: [https://www.ibm.com/support/knowledgecenter/linuxonibm/liaaf/lnz\\_r\\_lib.html](https://www.ibm.com/support/knowledgecenter/linuxonibm/liaaf/lnz_r_lib.html)
  - Tuning hints and tips: <https://www.ibm.com/support/knowledgecenter/linuxonibm/liaag/tuning/tuning.htm>
- Performance Radar Blog: <https://ibm.biz/perfradar>
- IBM Java SDK downloads: <https://www.ibm.com/support/pages/java-sdk-downloads>
- Java on z/OS: <https://www.ibm.com/support/pages/java-sdk-products-zos>
- IBM Runtimes for Business: <https://www.ibm.com/support/pages/ibm-runtimes-business>
- OpenJDK V11 with OpenJ9 on AdoptOpenJDK:  
<https://adoptopenjdk.net/releases.html?variant=openjdk11&jvmVariant=openj9>
- User Guide (includes diagnostics information) for IBM Java V8:  
[https://www.ibm.com/support/knowledgecenter/SSYKE2\\_8.0.0/welcome/downloads.html](https://www.ibm.com/support/knowledgecenter/SSYKE2_8.0.0/welcome/downloads.html)