



## Zulu Community Release Notes

Zulu Releases: 15.28 (15.0.1+8), (13.34), (13.0.4.0.101+5),  
13.35 (13.0.5+3), 11.42 (11.0.8.0.101+5), 11.43 (11.0.9+11),  
8.49 (8u271-b09), 8.50 (8u272-b17), 7.41 (7u281-b07), and 7.42  
(7u282-b10)

Release Date: October 20, 2020

Document version: 1.2

Last Modified: October 30, 2020

## Revision History

Revision	Date	Description
1.0	October 20, 2020	Initial version of the document
1.1	October 27, 2020	Increased the font size in the CVE table. Updated information about Lucida fonts in Zulu non-FX builds.
1.2	October 30, 2020	Updated the description of CA builds.

---

Revision History .....	2
Azul Zulu Overview .....	5
October 2020 Release Details .....	5
Summary .....	5
IANA time zone data version .....	6
New Features .....	7
Additions and Changes in Behavior .....	8
Common Vulnerabilities and Exposures Fixes .....	11
Non-CVE Security Fixes, OpenJDK, OpenJFX, and Zulu Bug Fixes .....	14
Non-CVE Security Fixes .....	14
OpenJDK Bug Fixes .....	15
OpenJFX Bug Fixes .....	43
Zulu Bug Fixes .....	46
Supported Platforms .....	48
Target Operating Environments .....	50
Running Zulu .....	52
Deployment Targets .....	52
Performance and Standards .....	52
Zulu Commercial Compatibility Kit .....	53
Troubleshooting Tips .....	54
Preparation Tips .....	54

---

VM Property Override .....	54
JRE-only Tips .....	54
Tomcat Advisory .....	55
Cassandra Issue .....	55
Time Zone Data Update .....	55
Azul Repository Tips .....	55
New mapping rules from a Java native method name to a C native library implementation function name .....	56
Creating a Symlink to the jvm-exports Directory .....	57
Running Java Flight Recording in Zulu 8 .....	58
CKR_SAVED_STATE_INVALID exception on Solaris 10 .....	58
Open Product Issues .....	59
Support Information .....	60

## Azul Zulu Overview

Azul® Zulu® is a Java Development Kit (JDK), and a compliant implementation of the Java Standard Edition (SE) specification that contains all the Java components needed to build and run Java SE applications. Zulu has been verified by passing all tests of the OpenJDK Community Technology Compatibility Kit (TCK) as available for each respective Java SE version.

Java SE Certified is a certification mark of the Java Community Project.

## October 2020 Release Details

### Summary

Quarterly JDK 15, 13, 11, 8, and 7 update

Released: October 20, 2020

Azul Zulu distribution types:

**SA** are tested, certified, and commercially supported Azul Zulu builds of OpenJDK whereby Azul ensures that software that uses the Accessible APIs of the product is not required to carry a specific license and that such use does not contaminate the code or intellectual property of such software with any license requirements.

**NV** are tested, certified, and commercially supported Azul Zulu builds of OpenJDK.

**CA** are Azul Zulu builds of OpenJDK that are free to download and use.

The details of the released Zulu versions are specified in the following table:

Java SE Version	Java Update Type*	Zulu Version	JDK Version	Based on**		Includes Support for JavaFX Version***
				Zulu Version	JDK Version	
15	PSU	15.28	15.0.1+8	15.27	15 GA	15.0.1+100

Java SE Version	Java Update Type*	Zulu Version	JDK Version	Based on**		Includes Support for JavaFX Version***
				Zulu Version	JDK Version	
13	CPU	13.34	13.0.4.0.101+5	13.33	13.0.4+8	14.0.2.0.101+100
	PSU	13.35	13.0.5+3	13.34	13.0.4.0.101+5	15.0.1+100
11	CPU	11.42	11.0.8.0.101+5	11.41	11.0.8+10	14.0.2.0.101+100
	PSU	11.43	11.0.9+11	11.42	11.0.8.0.101+5	15.0.1+100
8	CPU	8.49	8u271-b09	8.48	8u265-b11	8u271-b01
	PSU	8.50	8u272-b17	8.49	8u271-b09	8u272-b02
7	CPU	7.41	7u281-b07	7.40	7u272-b10	N/A
	PSU	7.42	7u282-b10	7.41	7u281-b07	N/A

#### \*Java Update Type:

- **CPU** (Critical Patch Updates) contain fixes to security vulnerabilities and critical bug fixes. Zulu CPU releases are generally based on prior-cycle PSU releases, with only security fixes applied. They provide a low-risk vehicle for the potentially urgent deployment of security fixes when issues of sufficient severity arise. CPU releases are available in SA and NV distributions.
- **PSU** (Patch Set Updates) incorporates all of fixes in the corresponding CPU, as well as additional non-security bug fixes. Zulu PSU releases incorporate both security fixes and other accumulated changes that align the release contents with the associated OpenJDK project quarterly release. PSU releases are available in SA, NV, and CA distributions.

**\*\*Based on:** Zulu CPU releases are based on prior-cycle PSU releases. Zulu PSU releases are based on the current-cycle CPU releases.

**\*\*\*Includes Support for JavaFX Version:** Information is relevant for the builds that include JavaFX support.

## IANA time zone data version

This release of Zulu comes with IANA time zone data version 2020a. For more information, see [Timezone Data Versions in the JRE Software](#). Please note that

Zulu with IANA time zone data version 2020b version or later will be delivered shortly.

## New Features

### Lucida fonts added to Zulu 8.50 SA builds with JavaFX functionality

Starting with Zulu 8.50 (8u272), Zulu 8 PSU SA bundles with JavaFX functionality include Lucida Monotype fonts.

Note that Zulu non-FX builds don't contain any fonts and will automatically use the best matching high quality TTF fonts provided by the Operating System. On Linux those are for example the DejaVu fonts. Optionally, you can install the Zulu Commercial Compatibility Kit (ZCCK), which includes Lucida fonts. For more information on ZCCK, see [Zulu Installation Guide](#).

### Shenandoah garbage collector included in Zulu 11.43

Now both Zulu 11 and Zulu 15 PSU releases include Shenandoah as a product feature. Please note, it is disabled by default in runtime. To enable Shenandoah in runtime, use `-XX:+UseShenandoahGC` flag. Please note that the product may not be mature enough for production use and should be pre-tested with your application.

### Zulu path prefixed to the PATH environment variables

Now, when you install Zulu from a `.msi` file, the Zulu installation directory is prefixed to the PATH environment variable (in earlier versions, it was appended). Note, if your system has older versions of Zulu and applications that depend on a particular JDK installation, this change may impact those applications. When installing the latest version of Zulu, all previous dependencies may be affected.

### Fallback option for the Zulu 8 users who require the legacy Base64 format for XML message signing

A new system property

`com.sun.org.apache.xml.internal.security.lineFeedOnly` was added to Zulu 8. Now, if you want to fallback to legacy Base64 encoded format, you can set this flag in one of the following ways:

As a command line option:

```
-Dcom.sun.org.apache.xml.internal.security.lineFeedOnly=true
```

Programmatically:

```
System.setProperty  
("com.sun.org.apache.xml.internal.security.lineFeedOnly",  
"true")
```

Note that later JDK family versions will only support the recommended property `com.sun.org.apache.xml.internal.security.ignoreLineBreaks`.

## Additions and Changes in Behavior

### JDK-8237990: New system and environment runtime property for LDAP context

Introduced in all Zulu versions.

The `jdk.jndi.ldap.mechsAllowedToSendCredentials` property sets the list of authentication mechanisms that are allowed to send credentials over a non-encrypted connection in the LDAP context. Possible values are:

- `all` allows all mechanisms
- (empty value) allows none
- `mech1,mech2,...,mechN` allows the given authentication mechanisms



If the property is not set, all mechanisms are allowed. Note that "none" and "anonymous" authentication mechanisms are always allowed irrespective of the property value.

In previous versions, user credentials could be sent over an unencrypted connection.

### **JDK-8245417: New runtime properties to control TLS workflow**

Introduced in all Zulu versions.

- The `jdk.tls.maxHandshakeMessageSize` property controls the maximum size limit for the handshake message. The default property value is 32768.
- The `jdk.tls.maxCertificateChainLength` property controls the maximum length for the certificate chain. The default property value is 10.

Note that when the corresponding data size exceeds the allowed value, an exception is thrown from various parts of the JDK. For example: `The size of the handshake message <actual size> exceeds the maximum allowed size <maxHandshakeMessageSize>.`

In previous versions, the maximum handshake messages size was limited to  $2^{24}$  bytes, and there was no limit on the length of certificate chains.

### **JDK-8236862: New runtime property to control the number of interfaces allowed for Proxies**

Introduced in all Zulu versions.

The `jdk.serialProxyInterfaceLimit` property sets the implementation limit on the number of interfaces allowed for Proxies. The property range is from 0 to 65535; the default value is 65535.

In previous versions, the maximum number of interfaces was 65535 and you couldn't set a lower value.

## JDK-8233624: New mapping rules from a Java native method name to a C native library implementation function name

Introduced in all Zulu versions.

The JNI methods mapping rules have been changed, for details on new rules, see [Troubleshooting tips](#).

Note, if a Java class or package name for some reason begins with a digit "0", "1", "2", or "3", no native library search is performed, and the attempt to link the native method invocation throws `UnsatisfiedLinkError`.

To resolve compatibility issues, you can either set the `XX:+UseLegacyJNINameEscaping` runtime flag to skip the extra mapping check or notify your library provider to update the JNI names according to the new mapping rules and to reissue and redeploy the libraries.

## Common Vulnerabilities and Exposures Fixes

This section summarizes JDK Common Vulnerabilities and Exposure (CVE ) fixes reflecting October 2020 OpenJDK changes implemented for the following Zulu levels:

- Zulu 15
- Zulu 13
- Zulu 11
- Zulu 8
- Zulu 7

### October 2020 CVE Fixes

CVSS VERSION 3.0 RISK														
CVE #	Component	Protocol	Remote Exploit without Auth.	Base Score	Attack Vector	Attack Complex	Privs Req'd	User Interact	Scope	Confidentiality	Integrity	Availability	Supported Zulu Versions Affected	Notes
<a href="#">CVE-2020-14803</a>	Libraries	Multiple	Yes	5.3	Network	Low	None	None	Unchanged	Low	None	None	15, 13, 11	Note 1
<a href="#">CVE-2020-14792</a>	Hotspot	Multiple	Yes	4.2	Network	High	None	Required	Unchanged	Low	Low	None	15, 13, 11, 8, 7, 6	Note 2
<a href="#">CVE-2020-14797</a>	Libraries	Multiple	Yes	3.7	Network	High	None	None	Unchanged	None	Low	None	15, 13, 11, 8, 7	Note 2
<a href="#">CVE-2020-14782</a>	Libraries	Multiple	Yes	3.7	Network	High	None	None	Unchanged	None	Low	None	15, 13, 11, 8, 7	Note 2
<a href="#">CVE-2020-14781</a>	JNDI	Multiple	Yes	3.7	Network	High	None	None	Unchanged	Low	None	None	15, 13, 11, 8, 7, 6	Note 2
<a href="#">CVE-2020-14779</a>	Serialization	Multiple	Yes	3.7	Network	High	None	None	Unchanged	None	None	Low	15, 13, 11, 8, 7, 6	Note 2

## October 2020 CVE Fixes

CVSS VERSION 3.0 RISK														
CVE #	Component	Protocol	Remote Exploit without Auth.	Base Score	Attack Vector	Attack Complex	Privs Req'd	User Interact	Scope	Confidentiality	Integrity	Availability	Supported Zulu Versions Affected	Notes
<a href="#">CVE-2020-14798</a>	Libraries	Multiple	Yes	3.1	Network	High	None	Required	Unchanged	None	Low	None	15, 13, 11, 8, 7	Note 1
<a href="#">CVE-2020-14796</a>	Libraries	Multiple	Yes	3.1	Network	High	None	Required	Unchanged	Low	None	None	15, 13, 11, 8, 7	Note 1

## Base and Impact Metric:

Metric	Values
Attack Vector	Network (N), Adjacent (A), Local (L), and Physical (P)
Attack Complexity	Low (L) and High (H)
Privileges Required	None (N), Low (L), and High (H)
User Interaction	None (N) and Required (R)
Scope	Unchanged (U) and Changed (C)
Confidentiality Impact	High (H), Low (L), and None (N)
Integrity Impact	High (H), Low (L), and None (N)
Availability Impact	High (H), Low (L), and None (N)

## Notes:

ID	Notes
1	This vulnerability applies to Java deployments that load and run untrusted code (e.g., code that comes from the internet) and rely on the Java sandbox for

ID	Notes
	security. This vulnerability does not apply to Java deployments, typically in servers, that load and run only trusted code (e.g., code installed by an administrator).
2	This vulnerability applies to client and server deployment of Java. This vulnerability can be exploited through untrusted code executed under Java sandbox restrictions. It can also be exploited by supplying data to APIs in the specified Component without using untrusted code executed under Java sandbox restrictions, such as through a web service.

## Non-CVE Security Fixes, OpenJDK, OpenJFX, and Zulu Bug Fixes

This section summarizes October 2020 changes implemented for Zulu 15, 13, 11, 8, and 7.

- [Non-CVE Security Fixes](#)
- [OpenJDK Bug Fixes](#)
- [OpenJFX Bug Fixes](#)
- [Zulu Bug Fixes](#)

### Non-CVE Security Fixes

The following table summarizes non-CVE security fixes implemented in October 2020 Zulu release.

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8253019</a>	15, 13, 11, 8, 7, 6	Enhanced JPEG decoding	CPU
<a href="#">JDK-8249927</a>	15, 13, 11, 8, 7, 6	Specify limits of <code>jdk.serialProxylInterfaceLimit</code>	CPU
<a href="#">JDK-8248574</a>	15, 13, 11, 8, 7, 6	Improve jpeg processing	CPU
<a href="#">JDK-8248177</a>	15, 13, 11, 8	Improve XML support	CPU
<a href="#">JDK-8248171</a>	15, 13, 11, 8	Better query support	CPU
<a href="#">JDK-8245417</a>	15, 13, 11, 8, 7, 6	Improve certificate chain handling	CPU
<a href="#">JDK-8245412</a>	15, 13, 11, 8, 7, 6	Better class definitions	CPU
<a href="#">JDK-8245407</a>	15, 13, 11, 8, 7, 6	Enhance zoning of times	CPU
<a href="#">JDK-8244955</a>	15, 13, 11, 8, 7, 6	Additional Fix for JDK-	CPU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		8240124	
<a href="#">JDK-8244479</a>	15, 13, 11, 8, 7, 6	Further constrain certificates	CPU
<a href="#">JDK-8243302</a>	15, 13, 11, 8, 7, 6	Advanced class supports	CPU
<a href="#">JDK-8240124</a>	15, 13, 11, 8, 7, 6	Better VM Interning	CPU
<a href="#">JDK-8236196</a>	15, 13, 11, 8	Improve string pooling	CPU
<a href="#">JDK-8233624</a>	15, 13, 11, 8, 7, 6	Enhance JNI Inkage	CPU

### OpenJDK Bug Fixes

The following table describes the OpenJDK changes implemented in October 2020 Zulu release.

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8254937</a>	8	Revert JDK-8148854 for 8u272	PSU
<a href="#">JDK-8254673</a>	8	call for JvmtiExport::post_vm_start() was removed by the fix for JDK-8249158	PSU
<a href="#">JDK-8253813</a>	11	Backout JDK-8244287 from 11u: it causes several crashes	PSU
<a href="#">JDK-8253283</a>	11	[11u] Test build/translations/VerifyTranslations.java failing after JDK-8252258	PSU
<a href="#">JDK-8253134</a>	11	JMM_VERSION should remain at 0x20020000 (JDK 10) in JDK 11	PSU
<a href="#">JDK-8253050</a>	11	jfr disassemble command processes --max-chunks incorrectly	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8253019</a>	15, 13, 11, 8, 7, 6	Enhanced JPEG decoding	CPU
<a href="#">JDK-8252886</a>	8	[TESTBUG] sun/security/ec/TestEC.java : Compilation failed	PSU
<a href="#">JDK-8252804</a>	11	[test] Fix 'ReleaseDeflater.java' test after downport of 8234011	PSU
<a href="#">JDK-8252573</a>	8	8u: Windows build failed after 8222079 backport	PSU
<a href="#">JDK-8252497</a>	13, 11, 8	Incorrect numeric currency code for ROL	PSU
<a href="#">JDK-8252258</a>	11	[11u] JDK-8242154 changes the default vendor	PSU
<a href="#">JDK-8252157</a>	11	JDK-8231209 11u backport breaks jmm binary compatibility	PSU
<a href="#">JDK-8252120</a>	11	compiler/oracle/TestCompileCommand.java misspells "occured"	PSU
<a href="#">JDK-8252084</a>	8	Minimal VM fails to bootcycle: undefined symbol: AgeTableTracer::is_tenuring_distribution_event_enabled	PSU
<a href="#">JDK-8251910</a>	15	Shenandoah: Handshake threads between weak-roots and reset phases	PSU
<a href="#">JDK-8251859</a>	15	sun/security/validator/PKIXValAndRevCheckTests.java fails with "RuntimeException: Received unexpected exception"	PSU
<a href="#">JDK-8251546</a>	8	8u backport of JDK-8194298 breaks AIX and Solaris builds	PSU
<a href="#">JDK-8251487</a>	11	Shenandoah: missing detail timing tracking for final mark cleaning phase	PSU
<a href="#">JDK-8251478</a>	8	Backport TLSv1.3 regression tests to JDK8u	PSU



OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8251469</a>	11	Better cleanup for test/jdk/javax/imageio/SetOutput.java	PSU
<a href="#">JDK-8251451</a>	15, 11	Shenandoah: Remark ObjectSynchronizer roots with I-U	PSU
<a href="#">JDK-8251359</a>	15	Shenandoah: filter null oops before calling enqueue/SATB barrier	PSU
<a href="#">JDK-8251354</a>	11	Shenandoah: Fix JFR test failures	PSU
<a href="#">JDK-8251341</a>	8	Minimal Java specification change	PSU
<a href="#">JDK-8251120</a>	8	[8u] HotSpot build assumes ENABLE_JFR is set to either true or false	PSU
<a href="#">JDK-8251117</a>	11, 8	Cannot check P11Key size in P11Cipher and P11AEADCipher	PSU
<a href="#">JDK-8250876</a>	15, 8	Fix issues with cross-compile on macos	PSU
<a href="#">JDK-8250875</a>	8	Incorrect parameter type for update_number in JDK_Version::jdk_update	PSU
<a href="#">JDK-8250844</a>	15, 11	Make sure {type,obj}ArrayOopDesc accessors check the bounds	PSU
<a href="#">JDK-8250841</a>	15	Shenandoah: need to reset/finish dead counters for StringTable/ResolvedMethodTable during STW root processing	PSU
<a href="#">JDK-8250827</a>	11	Shenandoah: needs to reset/finish StringTable's dead count before/after parallel walk	PSU
<a href="#">JDK-8250826</a>	11	jhsdb does not work with coredump which comes from Substrate VM	PSU
<a href="#">JDK-8250787</a>	11	Provider.put no longer registering aliases in FIPS env	PSU
<a href="#">JDK-8250784</a>	11	Shenandoah: A Low-Pause-Time Garbage Collector	PSU
<a href="#">JDK-8250755</a>	11, 8	Better cleanup for jdk/test/-	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		javax/imageio/plugins/shared/CanWriteSequence.java	
<a href="#">JDK-8250665</a>	15	Wrong translation for the month of May in ar_JO, ar_LB and ar_SY	PSU
<a href="#">JDK-8250636</a>	11, 8	iso8601_time returns incorrect offset part on MacOS	PSU
<a href="#">JDK-8250627</a>	11, 8	Use -XX:+/-UseContainerSupport for enabling/disabling Java container metrics	PSU
<a href="#">JDK-8250612</a>	15	jvmtciCompilerToVM.cpp declares jio_printf with "void" return type, should be "int"	PSU
<a href="#">JDK-8250609</a>	13, 11	C2 crash in IfNode::fold_compares	PSU
<a href="#">JDK-8250582</a>	15, 11, 8	Revert Principal Name type to NT-UNKNOWN when requesting TGS Kerberos tickets	PSU
<a href="#">JDK-8250548</a>	15	libgraal can deadlock in -Xcomp mode	PSU
<a href="#">JDK-8250546</a>	8	Expect changed behaviour reported in JDK-8249846	PSU
<a href="#">JDK-8249953</a>	15, 11	Shenandoah: gc/shenandoah/mxbeans tests should account for corner cases	PSU
<a href="#">JDK-8249927</a>	15, 13, 11, 8, 7, 6	Specify limits of jdk.serialProxyInterfaceLimit	CPU
<a href="#">JDK-8249801</a>	15, 11	Shenandoah: Clear soft-refs on requested GC cycle	PSU
<a href="#">JDK-8249672</a>	15	Include microcode revision in features_string on x86	PSU
<a href="#">JDK-8249649</a>	15	Shenandoah: provide per-cycle pacing stats	PSU
<a href="#">JDK-8249610</a>	8	Make sun.security.krb5.Config.getBooleanObject (String... keys) method public	PSU
<a href="#">JDK-8249560</a>	11	Shenandoah: Fix racy GC request handling	PSU
<a href="#">JDK-8249278</a>	13, 11, 8	Revert JDK-8226253 which breaks the spec of Access-	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		ibleState.SHOWING for JList	
<a href="#">JDK-8249277</a>	11	TestVerifyIterativeGVN.java is failing with timeout in OpenJDK 11	PSU
<a href="#">JDK-8249255</a>	11	Build fails if source code in cygwin home dir	PSU
<a href="#">JDK-8249251</a>	11, 8	[dark_mode ubuntu 20.04] The selected menu is not highlighted in GTKLookAndFeel	PSU
<a href="#">JDK-8249230</a>	15	Shenandoah: assertion failure with -XX:-ResizeTLAB	PSU
<a href="#">JDK-8249215</a>	11	JFrame::setVisible crashed with -Dfile.encoding=UTF-8 on Japanese Windows.	PSU
<a href="#">JDK-8249159</a>	11, 8	Downport test rework for SSLSocketTemplate from 8224650	PSU
<a href="#">JDK-8249158</a>	8	THREAD_START and THREAD_END event posted in primordial phase	PSU
<a href="#">JDK-8248987</a>	15, 11	AOT's Linker.java seems to eagerly fail-fast on Windows.	PSU
<a href="#">JDK-8248851</a>	13, 11, 8	CMS: Missing memory fences between free chunk check and klass read	PSU
<a href="#">JDK-8248745</a>	15	Add jarsigner and keytool tests for restricted algorithms	PSU
<a href="#">JDK-8248652</a>	15	Shenandoah: SATB buffer handling may assume no forwarded objects	PSU
<a href="#">JDK-8248643</a>	8	Remove extra leading space in JDK-8240295 8u backport	PSU
<a href="#">JDK-8248634</a>	15	Shenandoah: incorrect include in shenandoahInitLogger.cpp	PSU
<a href="#">JDK-8248632</a>	15	Shenandoah: build fails without both JVMTI and JFR	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8248574</a>	15, 13, 11, 8, 7, 6	Improve jpeg processing	CPU
<a href="#">JDK-8248495</a>	15, 13, 11, 8	[macos] zerovm is broken due to libffi headers location	PSU
<a href="#">JDK-8248467</a>	15	C2: compiler/intrinsics/object/TestClone fails with -XX:+VerifyGraphEdges	PSU
<a href="#">JDK-8248385</a>	11	[testbug][11u] Adapt TestInitExceptions to jtreg 5.1	PSU
<a href="#">JDK-8248348</a>	13, 11	Regression caused by the update to BCEL 6.0	PSU
<a href="#">JDK-8248219</a>	11	aarch64: missing memory barrier in fast_storefield and fast_accessfield	PSU
<a href="#">JDK-8248214</a>	11	Add paddings for TaskQueueSuper to reduce false-sharing cache contention	PSU
<a href="#">JDK-8248041</a>	15	Shenandoah: pre-Full GC root updates may miss some roots	PSU
<a href="#">JDK-8247979</a>	11	aarch64: missing side effect of killing flags for clearArray_reg_reg	PSU
<a href="#">JDK-8247874</a>	11	Replacement in VersionProps.java.template not working when --with-vendor-bug-url contains '&'	PSU
<a href="#">JDK-8247873</a>	13	[arm32] client vm build failure	PSU
<a href="#">JDK-8247860</a>	15	Shenandoah: add update watermark line in rich assert failure message	PSU
<a href="#">JDK-8247845</a>	15	Shenandoah: refactor TLAB/GCLAB retirement code	PSU
<a href="#">JDK-8247824</a>	11	CTW: C2 (Shenandoah) compilation fails with SEGV in SBC2Support::pin_and_expand	PSU
<a href="#">JDK-8247757</a>	15	Shenandoah: split heavy tests by heuristics to improve	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		parallelism	
<a href="#">JDK-8247754</a>	15	Shenandoah: mxbeans tests can be shorter	PSU
<a href="#">JDK-8247751</a>	15	Shenandoah: options tests should run with smaller heaps	PSU
<a href="#">JDK-8247736</a>	15	Shenandoah: assert(_nm->is_alive()) failed: only alive nmethods here	PSU
<a href="#">JDK-8247615</a>	11	Initialize the bytes left for the heap sampler	PSU
<a href="#">JDK-8247607</a>	13	Bump update version for OpenJDK: jdk-13.0.5	PSU
<a href="#">JDK-8247593</a>	15	Shenandoah: should not block pacing reporters	PSU
<a href="#">JDK-8247502</a>	11	PhaseStringOpts crashes while optimising effectively dead code	PSU
<a href="#">JDK-8247367</a>	15	Shenandoah: pacer should wait on lock instead of exponential backoff	PSU
<a href="#">JDK-8247350</a>	11	[aarch64] assert(false) failed: wrong size of mach node	PSU
<a href="#">JDK-8247246</a>	11	[JVMCI] `ResolvedJavaType.getDeclaredMethod()` can throw NoClassDefFoundError.	PSU
<a href="#">JDK-8246453</a>	11	TestClone crashes with "all collected exceptions must come from the same place"	PSU
<a href="#">JDK-8246384</a>	8	Enable JFR by default on supported architectures for October 2020 release	PSU
<a href="#">JDK-8246330</a>	11, 8	Add TLS Tests for Legacy ECDSA curves	PSU
<a href="#">JDK-8246310</a>	8	Clean commented-out code about ModuleEntry andPackageEntry in JFR	PSU
<a href="#">JDK-8246203</a>	11	Segmentation fault in verification due to stack overflow with -XX:+VerifyIterativeGVN	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8246196</a>	11	javax/-management/MBeanServer/OldMBeanServerTest fails with AssertionError	PSU
<a href="#">JDK-8246193</a>	11, 8	Possible NPE in ENC-PA-REP search in AS-REQ	CPU
<a href="#">JDK-8246153</a>	11	TestEliminateArrayCopy fails with -XX:+StressReflectiveCode	PSU
<a href="#">JDK-8246094</a>	11, 8	[macos] Sound Recording and playback is not working	PSU
<a href="#">JDK-8246027</a>	11	Minimal fastdebug build broken after JDK-8245801	PSU
<a href="#">JDK-8245981</a>	11	Upgrade to jQuery 3.5.1	PSU
<a href="#">JDK-8245880</a>	11	Shenandoah: check class unloading flag early in concurrent code root scan	PSU
<a href="#">JDK-8245832</a>	11	JDK build make-static-libs should build all JDK libraries	PSU
<a href="#">JDK-8245801</a>	11	StressRecompilation triggers assert "redundant OSR recompilation detected. memory leak in CodeCache!"	PSU
<a href="#">JDK-8245714</a>	11	"Bad graph detected in build_loop_late" when loads are pinned on loop limit check uncommon branch	PSU
<a href="#">JDK-8245616</a>	11	Bump update version for OpenJDK: jdk-11.0.9	PSU
<a href="#">JDK-8245417</a>	15, 13, 11, 8, 7, 6	Improve certificate chain handling	CPU
<a href="#">JDK-8245412</a>	15, 13, 11, 8, 7, 6	Better class definitions	CPU
<a href="#">JDK-8245407</a>	15, 13, 11, 8, 7, 6	Enhance zoning of times	CPU
<a href="#">JDK-8245283</a>	11	JFR: Can't handle constant dynamic used by Jacoco agent	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8245151</a>	11	jarsigner should not raise duplicate warnings on verification	PSU
<a href="#">JDK-8245005</a>	8	javax/net/ssl/compatibility/BasicConnectTest.java failed with No enum constant	PSU
<a href="#">JDK-8244955</a>	15, 13, 11, 8, 7, 6	Additional Fix for JDK-8240124	CPU
<a href="#">JDK-8244818</a>	13, 11, 8	[macos] Java2D Queue Flusher crash while moving application window to external monitor	PSU
<a href="#">JDK-8244777</a>	13	ClassLoaderStats VM Op uses constant hash value	PSU
<a href="#">JDK-8244763</a>	11	Update --release 8 symbol information after JSR 337 MR3	PSU
<a href="#">JDK-8244729</a>	11	Shenandoah: remove resolve paths from SBSA:::-generate_shenandoah_lrb	PSU
<a href="#">JDK-8244719</a>	11	CTW: C2 compilation fails with "assert(!VerifyHashTableKeys    _hash_lock == 0) failed: remove node from hash table before modifying it"	PSU
<a href="#">JDK-8244703</a>	11	"platform encoding not initialized" exceptions with debugger, JNI	PSU
<a href="#">JDK-8244548</a>	7	JDK 8u: sun.misc.Version.jdkUpdateVersion() returns wrong result	PSU
<a href="#">JDK-8244479</a>	15, 13, 11, 8, 7, 6	Further constrain certificates	CPU
<a href="#">JDK-8244287</a>	11	JFR: Methods samples have line number 0	PSU
<a href="#">JDK-8244225</a>	11, 8	stringop-overflow warning on strncpy call from compile_the_world_in	PSU
<a href="#">JDK-8244196</a>	11	adjust output in os_linux	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8244164</a>	11	AArch64: jaotc generates incorrect code for compressed OOPs with non-zero heap base	PSU
<a href="#">JDK-8244151</a>	11, 8	Update MUSCLE PC/SC-Lite headers to the latest release 1.8.26	PSU
<a href="#">JDK-8244136</a>	15, 13, 11, 8, 7, 6	Improved Buffer supports	CPU
<a href="#">JDK-8244087</a>	11	2020-04-24 public suffix list update v ff6fcea	PSU
<a href="#">JDK-8243925</a>	11	Toolkit# <code>getScreenInsets()</code> returns wrong value on HiDPI screens (Windows)	PSU
<a href="#">JDK-8243489</a>	11, 8	Thread CPU Load event may contain wrong data for CPU time under certain conditions	PSU
<a href="#">JDK-8243470</a>	15, 13, 11	[macos] bring back O2 opt level for unsafe.cpp	PSU
<a href="#">JDK-8243453</a>	11	java --describe-module failed with non-ASCII module name under non-UTF8 environment	PSU
<a href="#">JDK-8243389</a>	11	enhance os::pd_print_cpu_info on linux	PSU
<a href="#">JDK-8243326</a>	11	Cleanup use of volatile in taskqueue code	PSU
<a href="#">JDK-8243321</a>	15, 11, 8	Add Entrust root CA - G4 to Oracle Root CA program	PSU
<a href="#">JDK-8243320</a>	15, 11, 8	Add SSL root certificates to Oracle Root CA program	PSU
<a href="#">JDK-8243302</a>	15, 13, 11, 8, 7, 6	Advanced class supports	CPU
<a href="#">JDK-8243138</a>	11, 8	Enhance BaseLdapServer to support starttls extended request	PSU
<a href="#">JDK-8243029</a>	11, 8	Rewrite javax/net/ssl/compatibility/Compatibility.java with a flexible interop test framework	PSU
<a href="#">JDK-8242793</a>	11	Incorrect copyright header in Continu-	PSU



OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		ousCallSiteTargetChange.java	
<a href="#">JDK-8242695</a>	15, 13, 11, 8, 7	Enhanced Buffer Support	CPU
<a href="#">JDK-8242685</a>	15, 13, 11, 8, 7	Better Path Validation	CPU
<a href="#">JDK-8242680</a>	15, 13, 11, 8, 7	Improved URI support	CPU
<a href="#">JDK-8242556</a>	11, 8	Cannot load RSASSA-PSS public key with non-null params from byte array	PSU
<a href="#">JDK-8242283</a>	11	Can't start JVM when java home path includes non- ASCII character	PSU
<a href="#">JDK-8242184</a>	11	Default signature algorithm for an RSASSA-PSS key	PSU
<a href="#">JDK-8241888</a>	8	Mirror jdk.security.allowNonCaAnchor system property with a security one	PSU
<a href="#">JDK-8241750</a>	11	x86_32 build failure after JDK-8227269	CPU
<a href="#">JDK-8241602</a>	13	jlink does not produce reproducible jimage files	PSU
<a href="#">JDK-8241574</a>	15, 11	Shenandoah: remove Shen- andoahAssertToSpaceClosure	PSU
<a href="#">JDK-8241478</a>	11	vmTestbase/gc/gctests/Steal/steal001/steal001.java fails with OOME	PSU
<a href="#">JDK-8241319</a>	11	WB_GetCodeBlob doesn't have ResourceMark	PSU
<a href="#">JDK-8241138</a>	11	http.nonProxyHosts=* causes StringIn- dexOutOfBoundsExpection in DefaultProxySelector	PSU
<a href="#">JDK-8241130</a>	11	com.sun.jndi.ldap.EventSupport.removeDeadNotifier: java.lang.NullPointerException	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8241114</a>	15, 13, 11, 8, 7, 6	Better range handling	CPU
<a href="#">JDK-8241086</a>	11	Test runtime/NMT/HugeArenaTracking.java is failing on 32bit Windows	PSU
<a href="#">JDK-8241065</a>	15, 11	Shenandoah: remove leftover code after JDK-8231086	PSU
<a href="#">JDK-8241007</a>	15, 11	Shenandoah: remove ShenandoahCriticalControlThreadPriority support	PSU
<a href="#">JDK-8240676</a>	11, 8	Meet not symmetric failure when running lucene on jdk8	PSU
<a href="#">JDK-8240295</a>	11, 8	hs_err elapsed time in seconds is not accurate enough	PSU
<a href="#">JDK-8240169</a>	11	javadoc fails to link to docs with non-matching modularity	PSU
<a href="#">JDK-8240124</a>	15, 13, 11, 8, 7, 6	Better VM Interning	CPU
<a href="#">JDK-8239819</a>	8	XToolkit: Misread of screen information memory	PSU
<a href="#">JDK-8239385</a>	11	Support the 'canonicalize' setting (krb5.conf) in the Kerberos client	PSU
<a href="#">JDK-8239083</a>	11	C1 assert(known_holder == NULL    (known_holder->is_instance_class() && (!known_holder->is_interface()    ((cilInstanceClass*)known_holder)->has_nonstatic_concrete_methods())), "should be non-static concrete method");	PSU
<a href="#">JDK-8238898</a>	8	Missing hash characters for header on license file	PSU
<a href="#">JDK-8238710</a>	11	LingeredApp doesn't log stdout/stderr if exits with non-zero code	PSU
<a href="#">JDK-8238448</a>	11	RSASSA-PSS signature verification fail when using certain odd key sizes	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8238388</a>	11, 8	libj2gss/NativeFunc.o "multiple definition" link errors with GCC10	PSU
<a href="#">JDK-8238386</a>	11, 8	(sctp)jdk.sctp/unix/native/libj2gss/SctpNet.c "multiple definition" link errors with GCC10	PSU
<a href="#">JDK-8238380</a>	11, 8	java.base/unix/native/libjava/childproc.c "multiple definition" link errors with GCC10	PSU
<a href="#">JDK-8238284</a>	13, 11	[macos] Zero VM build fails due to an obvious typo	PSU
<a href="#">JDK-8238270</a>	11	java.net HTTP/2 client does not decrease stream count when receives 204 response	PSU
<a href="#">JDK-8237995</a>	15, 13, 11, 8, 7	Enhance certificate processing	CPU
<a href="#">JDK-8237990</a>	15, 13, 11, 8, 7, 6	Enhanced LDAP contexts	CPU
<a href="#">JDK-8237977</a>	11	Further update javax/net/ssl/-compatibility/Compatibility.java	PSU
<a href="#">JDK-8237951</a>	8	CTW: C2 compilation fails with "malformed control flow"	PSU
<a href="#">JDK-8237888</a>	11	security/infra/java/security/cert/CertPathValidator/certification/LuxTrustCA.java fails when checking validity interval	PSU
<a href="#">JDK-8237182</a>	11	Update copyright header for shenandoah and epsilon files	PSU
<a href="#">JDK-8236862</a>	15, 13, 11, 8, 7, 6	Enhance support of Proxy class	CPU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8236617</a>	11	jtreg test containers/docker/TestMemoryAwareness.java fails after 8226575	PSU
<a href="#">JDK-8236548</a>	11	Localized time zone name inconsistency between English and other locales	PSU
<a href="#">JDK-8236464</a>	11, 8	SO_LINGER option is ignored by SSLSocket in JDK 11	PSU
<a href="#">JDK-8236196</a>	15, 13, 11, 8	Improve string pooling	CPU
<a href="#">JDK-8235846</a>	11	Improve WindbgDebuggerLocal implementation	PSU
<a href="#">JDK-8235325</a>	8	build failure on Linux after 8235243	PSU
<a href="#">JDK-8235243</a>	8	handle VS2017 15.9 and VS2019 in abstract_vm_version	PSU
<a href="#">JDK-8235153</a>	8	[TESTBUG] [macos 10.15] java/awt/Graphics/DrawImageBG/SystemBgColorTest.java fails	PSU
<a href="#">JDK-8234687</a>	11	change javap reporting on unknown attributes	PSU
<a href="#">JDK-8234645</a>	13	ARM32: C1: PatchingStub for field access: not enough bytes	PSU
<a href="#">JDK-8234617</a>	8	C1: Incorrect result of field load due to missing narrowing conversion	PSU
<a href="#">JDK-8234541</a>	11	C1 emits an empty message when it inlines successfully	PSU
<a href="#">JDK-8234535</a>	13, 11	Cross compilation fails due to missing CFLAGS for the BUILD_CC	PSU
<a href="#">JDK-8234385</a>	11	[TESTBUG] java/awt/EventQueue/6980209/bug6980209.java fails in linux nightly	PSU
<a href="#">JDK-8234347</a>	11	"Turkey" meta time zone does not generate composed	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		localized names	
<a href="#">JDK-8234149</a>	11	[TESTBUG]Several swing regression tests do not dispose Frame at end	PSU
<a href="#">JDK-8234058</a>	11	runtime/CompressedOops/CompressedClassPointers.java fails with 'Narrow class base: 0x0000000000000000' missing from stdout/stderr	PSU
<a href="#">JDK-8234011</a>	11	(zipfs) Memory leak in ZipFileSystem.releaseDeflater()	PSU
<a href="#">JDK-8233958</a>	11	Memory retention due to HttpURLConnection finalizer that serves no purpose	PSU
<a href="#">JDK-8233829</a>	11	javac cannot find non-ASCII module name under non-UTF8 environment	PSU
<a href="#">JDK-8233787</a>	13	Break cycle in vm_version* includes	PSU
<a href="#">JDK-8233741</a>	11	AES Countermode (CTR) optimization using AVX512 + VAES instructions	PSU
<a href="#">JDK-8233686</a>	11	XML transformer uses excessive amount of memory	PSU
<a href="#">JDK-8233624</a>	15, 13, 11, 8, 7, 6	Enhance JNI linkage	CPU
<a href="#">JDK-8233621</a>	8	Mismatch in jsse.enableMFLNExtension property name	PSU
<a href="#">JDK-8233452</a>	11	java.math.BigDecimal.sqrt() with RoundingMode.FLOOR results in incorrect result	PSU
<a href="#">JDK-8233386</a>	11	Initialize NULL fields for unused decorations	PSU
<a href="#">JDK-8233228</a>	11, 8	Disable weak named curves by default in TLS, CertPath, and Signed JAR	PSU
<a href="#">JDK-8233097</a>	8	Fontmetrics for large Fonts has zero width	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8233027</a>	11	OopMapSet::all_do does oms.next() twice during iteration	PSU
<a href="#">JDK-8232864</a>	13	Classes generated at link time by GenerateJLIClassesPlugin are not reproducible	PSU
<a href="#">JDK-8232855</a>	11	jshell missing word in /help help	PSU
<a href="#">JDK-8232161</a>	11	Align some one-way conversion in MS950 charset with Windows	PSU
<a href="#">JDK-8232083</a>	11	Minimal VM is broken after JDK-8231586	PSU
<a href="#">JDK-8231968</a>	11	getCurrentThreadAllocatedBytes default implementation s/b getThreadAllocatedBytes	PSU
<a href="#">JDK-8231953</a>	11	Wrong assumption in assertion in oop::register_oop	PSU
<a href="#">JDK-8231649</a>	13	PPC64: Intrinsic for Math.ceil, floor, rint on Power	PSU
<a href="#">JDK-8231586</a>	11	enlarge encoding space for OopMapValue offsets	PSU
<a href="#">JDK-8231449</a>	13	HttpClient's client ssl certificate authentication seems to be broken.	CPU
<a href="#">JDK-8231213</a>	8	Migrate SimpleDateFormatConstTest to JDK Repo	PSU
<a href="#">JDK-8231209</a>	11	[REDO] JDK-8207266 ThreadMXBean::getThreadAllocatedBytes() can be quicker for self thread	PSU
<a href="#">JDK-8230870</a>	11	(zipfs) Add a ZIP FS test that is similar to test/jdk/java/util/zip/EntryCount64k.java	PSU
<a href="#">JDK-8230769</a>	7	BufImg_SetupICM add ReleasePrimitiveArrayCritical call in early return	PSU
<a href="#">JDK-8230767</a>	11	FlightRecorderListener returns null recording	PSU
<a href="#">JDK-8230711</a>	8	ConnectionGraph::unique_java_object(Node* N) return NULL if n is not in the CG	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8230591</a>	13	AArch64: Missing intrinsics for Math.ceil, floor, rint	PSU
<a href="#">JDK-8230402</a>	11	Allocation of compile task fails with assert: "Leaking compilation tasks?"	PSU
<a href="#">JDK-8230094</a>	13, 11	CCE in createXMLEventWriter(Result) over an arbitrary XMLStreamWriter	PSU
<a href="#">JDK-8230010</a>	11	Remove jdk8037819/BasicTest1.java	PSU
<a href="#">JDK-8230002</a>	11	javax/xml-jaxp/unittest/transform/SecureProcessingTest.java runs zero test	PSU
<a href="#">JDK-8230000</a>	11	some httpclients testing tests run zero test	PSU
<a href="#">JDK-8229899</a>	7	java.io.File.isInvalid() is racy	PSU
<a href="#">JDK-8229815</a>	11	Upgrade Jline to 3.12.1	PSU
<a href="#">JDK-8229378</a>	11, 8	jdwp library loader in linker_md.c quietly truncates on buffer overflow	PSU
<a href="#">JDK-8228967</a>	11, 8	Trust/Key store and SSL context utilities for tests	PSU
<a href="#">JDK-8228448</a>	11	Jconsole can't connect to itself	PSU
<a href="#">JDK-8227595</a>	11	keytool/fakegen/DefaultSignatureAlgorithm.java fails due to "exitValue = 6"	PSU
<a href="#">JDK-8227269</a>	11	Slow class loading when running with JDWP	CPU
<a href="#">JDK-8227059</a>	11	sun-/security/tools/keytool/DefaultSignatureAlgorithm.java timed out	PSU
<a href="#">JDK-8226892</a>	7	ActionListeners on JRadioButtons don't get notified when selection is changed with arrow keys	PSU
<a href="#">JDK-8226848</a>	11	jline/terminal/impl files missing classpath exception	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		clause in license header	
<a href="#">JDK-8226809</a>	11, 8	Circular reference in printed stack trace is not correctly indented & ambiguous	PSU
<a href="#">JDK-8226806</a>	8	[macOS 10.14] Methods of Java Robot should be called from appropriate thread	PSU
<a href="#">JDK-8226697</a>	11, 8	Several tests which need the @key headful keyword are missing it.	PSU
<a href="#">JDK-8226575</a>	11, 8	OperatingSystemMXBean should be made container aware	PSU
<a href="#">JDK-8226536</a>	11	Catch OOM from deopt that fails rematerializing objects	PSU
<a href="#">JDK-8225625</a>	11	AES Electronic Codebook (ECB) encryption and decryption optimization using AVX512 + VAES instructions	PSU
<a href="#">JDK-8225037</a>	11	java.net.JarURLConnection::getJarEntry() throws NullPointerException	PSU
<a href="#">JDK-8224234</a>	11	compiler/codegen/TestCharVect2.java fails in test_mulc	PSU
<a href="#">JDK-8224184</a>	11	jshell got IOException at exiting with AIX	PSU
<a href="#">JDK-8223777</a>	11	In posix_spawn mode, failing to exec() jspawnhelper may not result in an error	PSU
<a href="#">JDK-8223688</a>	11	JShell: crash on the instantiation of raw anonymous class	PSU
<a href="#">JDK-8222769</a>	11	[TESTBUG] TestJFRNetworkEvents should not rely on hostname command	PSU
<a href="#">JDK-8222079</a>	11, 8	Don't use memset to initialize fields decode_env constructor in disassembler.cpp	PSU
<a href="#">JDK-8222074</a>	11	Enhance auto vectorization for x86	PSU



OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8221918</a>	11	runtime/SharedArchiveFile/serviceability/ReplaceCriticalClasses.java fails: Shared archive not found	PSU
<a href="#">JDK-8221759</a>	11	Crash when completing "java.io.File.path"	PSU
<a href="#">JDK-8221658</a>	11	aarch64: add necessary predicate for ubfx patterns	PSU
<a href="#">JDK-8220674</a>	8	[TESTBUG] MetricsMemoryTester failcount test in docker container only works with debug JVMs	PSU
<a href="#">JDK-8220313</a>	8	[TESTBUG] Update base image for Docker testing to OL 7.6	PSU
<a href="#">JDK-8220150</a>	11, 8	[macos] macos10.14 Mojave returns anti-aliased glyphs instead of aliased B&W glyphs	PSU
<a href="#">JDK-8219919</a>	8	RuntimeStub's name lost with PrintFrameConverterAssembly	PSU
<a href="#">JDK-8219712</a>	11	code_size2 (defined in stub_routines_x86.hpp) is too small on new Skylake CPUs	PSU
<a href="#">JDK-8218948</a>	11	SimpleDateFormat :: format - Zone Names are not reflected correctly during run time	PSU
<a href="#">JDK-8217647</a>	8	JFR: recordings on 32-bit systems unreadable	PSU
<a href="#">JDK-8217606</a>	8	LdapContext#reconnect always opens a new connection	PSU
<a href="#">JDK-8216974</a>	11	HttpConnection not returned to the pool after 204 response	PSU
<a href="#">JDK-8216021</a>	11	RunTest.gmk might set concurrency level to 1 on Windows	PSU
<a href="#">JDK-8215438</a>	11	jshell tool: Ctrl-D causes EOF	PSU
<a href="#">JDK-8215354</a>	11	x86_32 build failures after JDK-8214074 (Ghash optim-	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		ization using AVX instructions)	
<a href="#">JDK-8215265</a>	7, 6	C2: range check elimination may allow illegal out of bound access	CPU
<a href="#">JDK-8215244</a>	11	jdk/jshell/ToolBasicTest.java testHistoryReference failed	PSU
<a href="#">JDK-8215243</a>	11	JShell tests failing intermittently with "Problem cleaning up the following threads:"	PSU
<a href="#">JDK-8214862</a>	8	assert(proj != __null) at compile.cpp:3251	PSU
<a href="#">JDK-8214797</a>	11	TestJmapCoreMetaspace.java timed out	PSU
<a href="#">JDK-8214491</a>	11	Upgrade to JLine 3.9.0	PSU
<a href="#">JDK-8214074</a>	11	Optimize Ghash using AVX instructions	PSU
<a href="#">JDK-8213703</a>	11	LambdaConversionException: Invalid receiver type not a subtype of implementation type interface	PSU
<a href="#">JDK-8213574</a>	11	Deadlock in string table expansion when dumping lots of CDS classes	PSU
<a href="#">JDK-8213275</a>	11	runtime/SharedArchiveFile/serviceability/ReplaceCriticalClasses.java fails with ClassNotFoundException: jdk.internal.vm.PostVMInitHook	PSU
<a href="#">JDK-8213214</a>	11	Set -Djava.io.tmpdir= when running tests	PSU
<a href="#">JDK-8213182</a>	11	Minimal VM build failure after JDK-8212200 (assert when shared java.lang.Object is redefined by JVMTI agent)	PSU
<a href="#">JDK-8212807</a>	11	tools/jar/multiRelease/Basic.java times out	PSU
<a href="#">JDK-8212665</a>	11	com/sun/jdi/DeferredStepTest.java: jj1 (line 57) - unexpected. lastLine=52, minLine=52, maxLine=55	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8212629</a>	11	[TEST] wrong breakpoint in test/jdk/-com/sun/jdi/DeferredStepTest	PSU
<a href="#">JDK-8212200</a>	11	assert(on_stack()) failed when shared java.lang.object is redefined by JVMTI agent	PSU
<a href="#">JDK-8211714</a>	8	Need to update vm_version.cpp to recognise VS2017 minor versions	PSU
<a href="#">JDK-8211694</a>	11	JShell: Redeclared variable should be reset	PSU
<a href="#">JDK-8211296</a>	8	Remove HotSpot deprecation warning suppression for Mac/clang	PSU
<a href="#">JDK-8211292</a>	11	[TEST] convert com/sun/jdi/DeferredStepTest.sh test	PSU
<a href="#">JDK-8211163</a>	8	UNIX version of Java_java_io_Console_echo does not return a clean boolean	PSU
<a href="#">JDK-8211049</a>	8	Second parameter of "initialize" method is not used	PSU
<a href="#">JDK-8210977</a>	11	jdk/jfr/event/oldobject/TestThreadLocalLeak.java fails to find ThreadLocalObject	PSU
<a href="#">JDK-8210760</a>	11	[TEST] rewrite com/sun/jdi shell tests to java version - step4	PSU
<a href="#">JDK-8210748</a>	11	[TESTBUG] lib.jdb.Jdb.waitForPrompt() should clarify which output is the pending reply after a timeout	PSU
<a href="#">JDK-8210725</a>	11	com/sun/jdi/RedefineClearBreakpoint.java fails with waitForPrompt timed out after 60 seconds	PSU
<a href="#">JDK-8210560</a>	11	[TEST] convert com/sun/jdi redefineClass-related tests	PSU
<a href="#">JDK-8210527</a>	11	JShell: NullPointerException in jdk.jshell.Eval.translateExceptionStack	PSU
<a href="#">JDK-8210422</a>	11	runtime/-	CPU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		modules/ModuleStress/ExportModuleStressTest.java - assertion failed: address not aligned: 0x00000008baad- babe	
<a href="#">JDK-8210243</a>	11	[TEST] rewrite com/sun/jdi shell tests to java version - step3	PSU
<a href="#">JDK-8210155</a>	11	Lock ClassLoaderDataGraph	CPU
<a href="#">JDK-8210131</a>	11	vmTest- base/n- sk/jvmti/s- cen- arios/allocation/AP10/ap10t001/TestDescription.java failed with ObjectFree: GetCurrentThreadCpuTimerInfo returned unexpected error code	PSU
<a href="#">JDK-8209821</a>	11	Make JVMTI GetClassLoaderClasses not walk CLDG	CPU
<a href="#">JDK-8209608</a>	11	Problem list com/sun/jdi/BreakpointWithFullGC.java	PSU
<a href="#">JDK-8209605</a>	11	com/sun/jdi/BreakpointWithFullGC.java fails with ZGC	PSU
<a href="#">JDK-8209604</a>	11	[TEST] rewrite com/sun/jdi shell tests to java version - step2	PSU
<a href="#">JDK-8209517</a>	11	com/sun/jdi/BreakpointWithFullGC.java fails with timeout	PSU
<a href="#">JDK-8209378</a>	11	Fix Minimal VM after JDK-8208677 Move inner metaspace cleaning out of class unloading	CPU
<a href="#">JDK-8209343</a>	11	Test javax/swing/border/TestTitledBorderLeak.java should be marked as headful	PSU
<a href="#">JDK-8209342</a>	11	Problemlist SA tests on Solaris due to Error attaching to process: Can't create thread_db agent!	PSU
<a href="#">JDK-8209332</a>	11	[TEST] test/jdk/com/sun/jdi/CatchPatternTest.sh is	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		incorrect	
<a href="#">JDK-8209113</a>	8	Use WeakReference for lastFontStrike for created Fonts	PSU
<a href="#">JDK-8209109</a>	11	[TEST] rewrite com/sun/jdi shell tests to java version - step1	PSU
<a href="#">JDK-8208677</a>	11	Move inner metaspace cleaning out of class unloading	CPU
<a href="#">JDK-8208281</a>	11	java/nio/channels/AsynchronousSocketChannel/Basic.java timed out	PSU
<a href="#">JDK-8206309</a>	11	Tier1 SA tests fail	PSU
<a href="#">JDK-8205534</a>	11	Remove SymbolTable dependency from serviceability agent	PSU
<a href="#">JDK-8204994</a>	11	SA might fail to attach to process with "Windbg Error: WaitForEvent failed"	PSU
<a href="#">JDK-8203928</a>	11	[Test] Convert non-JDB scaffolding serviceability shell script tests to java	PSU
<a href="#">JDK-8203393</a>	11	com/sun/jdi/JdbMethodExitTest.sh and JdbExprTest.sh fail due to timeout	PSU
<a href="#">JDK-8203382</a>	11	Rename SystemDictionary::initialize_wk_klass to resolve_wk_klass	PSU
<a href="#">JDK-8203357</a>	8	Container Metrics	PSU
<a href="#">JDK-8203281</a>	11	[Windows] JComboBox change in ui when editor.setBorder() is called	PSU
<a href="#">JDK-8203026</a>	11	java.rmi.NoSuchObjectException: no such object in table	PSU
<a href="#">JDK-8202117</a>	11	com/sun/jndi/ldap/RemoveNamingListenerTest.java fails intermittently: Connection reset	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8202076</a>	8	test/jdk/java/io/File/WinSpecialFiles.java on windows with VS2017	PSU
<a href="#">JDK-8198004</a>	8	javax/swing/JFileChooser/6868611/bug6868611.java throws error	PSU
<a href="#">JDK-8194298</a>	8	Add support for per Socket configuration of TCP keepalive	PSU
<a href="#">JDK-8193367</a>	11	annotated type variables bounds crash javac	PSU
<a href="#">JDK-8193234</a>	8	When using -Xcheck:jni an internally allocated buffer can leak	PSU
<a href="#">JDK-8192953</a>	8	sun/management/jmxremote/bootstrap/*.sh tests fail with error : revokeall.exe: Permission denied	PSU
<a href="#">JDK-8191678</a>	8	[TESTBUG] Add keyword headful in java/awt and javax tests.	PSU
<a href="#">JDK-8184762</a>	8	ZapStackSegments should use optimized memset	PSU
<a href="#">JDK-8183351</a>	8	Better cleanup for jdk/test/- javax/im- ageio/spi/AppleContextTest/BadPluginConfigurationTest.sh	PSU
<a href="#">JDK-8183349</a>	8	Better cleanup for jdk/test/- javax/imageio/plugins/shared/CanWriteSequence.java and WriteAfterAbort.java	PSU
<a href="#">JDK-8183341</a>	8	Better cleanup for javax/imageio/AllowSearch.java	PSU
<a href="#">JDK-8182657</a>	8	Make the required changes in Runtime code to build on OSX 10 + Xcode 8	PSU
<a href="#">JDK-8178784</a>	8	Revisit changes for making Serviceability Agent attach functionality optional	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8177628</a>	8	Opensource unit/regression tests for ImageIO	PSU
<a href="#">JDK-8173300</a>	8	[TESTBUG]compiler/tiered/NonTieredLevelsTest.java fails with compiler.whitebox.SimpleTestCaseHelper(int) must be compiled	PSU
<a href="#">JDK-8172404</a>	11	Tools should warn if weak algorithms are used before restricting them	PSU
<a href="#">JDK-8172012</a>	8	[TEST_BUG] delays needed in javax/swing/JTree/4633594/bug4633594.java	PSU
<a href="#">JDK-8169925</a>	8	Organize licenses by module in source, JMOD file, and run-time image	PSU
<a href="#">JDK-8168517</a>	8	java/lang/ProcessBuilder/Basic.java failed with "java.lang.AssertionError: Some tests failed"	PSU
<a href="#">JDK-8167615</a>	8	Opensource unit/regression tests for JavaSound	PSU
<a href="#">JDK-8167300</a>	8	Scheduling failures during gcm should be fatal	PSU
<a href="#">JDK-8166015</a>	8	[PIT][TEST_BUG] stray character in java/awt/Focus/ModalDialogActivationTest/ModalDialogActivationTest.java	PSU
<a href="#">JDK-8165996</a>	8	PKCS11 using NSS throws an error regarding secmod.db when NSS uses sqlite	PSU
<a href="#">JDK-8160768</a>	11	Add capability to custom resolve host/domain names within the default JNDI LDAP provider	PSU
<a href="#">JDK-8160217</a>	8	JavaSound should clean up resources better	PSU
<a href="#">JDK-8156169</a>	8	Some sound tests rarely hangs because of incorrect synchronization	PSU
<a href="#">JDK-8154313</a>	8	Generated javadoc scattered all over the place	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8153725</a>	8	Problem list javax/sound/sampled/DirectAudio/bug6400879.java for Linux	PSU
<a href="#">JDK-8153583</a>	8	Make OutputAnalyzer.reportDiagnosticSummary public	PSU
<a href="#">JDK-8152077</a>	8	(cal) Calendar.roll does not always roll the hours during daylight savings changes	PSU
<a href="#">JDK-8151788</a>	8	NullPointerException from ntlm.Client.type3	PSU
<a href="#">JDK-8151678</a>	11, 8	com/sun/jndi/ldap/LdapTimeoutTest.java failed due to timeout on DeadServerNoTimeoutTest is incorrect	PSU
<a href="#">JDK-8151582</a>	7	(ch) test java/nio/channels/AsyncCloseAndInterrupt.java failing due to "Connection succeeded"	PSU
<a href="#">JDK-8148983</a>	8	Fix extra comma in changes for JDK-8148916	PSU
<a href="#">JDK-8148916</a>	8	Mark bug6400879.java as intermittently failing	PSU
<a href="#">JDK-8148915</a>	8	Intermittent failures of bug6400879.java	PSU
<a href="#">JDK-8148754</a>	8	C2 loop unrolling fails due to unexpected graph shape	PSU
<a href="#">JDK-8147087</a>	7	Race when reusing PerRegionTable bitmaps may result in dropped remembered set entries	PSU
<a href="#">JDK-8145808</a>	8	[PIT] test java/awt/Graphics2D/MTGraphicsAccessTest/MTGraphicsAccessTest.java hangs on Win. 8	PSU
<a href="#">JDK-8145096</a>	7, 6	Undefined behaviour in HotSpot	CPU
<a href="#">JDK-8144539</a>	8	Update PKCS11 tests to run with security manager	PSU
<a href="#">JDK-8137087</a>	8	[TEST_BUG] Cygwin failure of java/awt/appletviewer/IOEx-	PSU



OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		cep- tionIfEn- codedURLTest/IOExceptionIfEncodedURLTest.sh	
<a href="#">JDK-8134599</a>	11	TEST_BUG: java/rmi/trans- port/closeServerSocket/CloseServerSocket.java fails intermittently with Address already in use	PSU
<a href="#">JDK-8132745</a>	8	TEST_BUG: minor cleanup of java/util/Scan- ner/ScanTest.java	PSU
<a href="#">JDK-8132376</a>	8	Add @requires os.family to the client tests with access to internal OS-specific API	PSU
<a href="#">JDK-8132206</a>	8	move ScanTest.java into OpenJDK	PSU
<a href="#">JDK-8080953</a>	8	[TEST_BUG]Test java/awt/FontClass/DebugFonts.java fails due to wrongly typed bugid	PSU
<a href="#">JDK-8078880</a>	8	Mark a few more intermittently failing security-libs tests	PSU
<a href="#">JDK-8078334</a>	8	Mark regression tests using randomness	PSU
<a href="#">JDK-8076151</a>	8	[TESTBUG] Test java/awt/FontClass/CreateFont/- fileaccess/FontFile.java fails	PSU
<a href="#">JDK-8075774</a>	8	Small readability and performance improvements for zipfs	PSU
<a href="#">JDK-8067354</a>	11	com/sun/jdi/GetLocalVariables4Test.sh failed	PSU
<a href="#">JDK-8064319</a>	8	Need to enable -XX:+TraceExceptions in release builds	PSU
<a href="#">JDK-8062947</a>	11, 8	Fix exception message to correctly represent LDAP con- nection failure	PSU
<a href="#">JDK-8061616</a>	8	HotspotDiagnosticMXBean.getVMOption() throws Illegal- ArgumentException for flags of type double	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8060027</a>	8	Tests java/beans/XMLEncoder/Test4903007.java and java/beans/XMLEncoder/java_aws_GridBagLayout.java	PSU
<a href="#">JDK-8057003</a>	8	Large reference arrays cause extremely long synchronization times	PSU
<a href="#">JDK-8048933</a>	8	-XX:+TraceExceptions output should include the message	PSU
<a href="#">JDK-8039082</a>	8	[TEST_BUG] Test java/awt/dnd/BadSerializationTest/BadSerializationTest.java fails	PSU
<a href="#">JDK-8036088</a>	8	Replace strtok() with its safe equivalent strtok_s() in DefaultProxySelector.c	PSU
<a href="#">JDK-8031625</a>	8	javadoc problems referencing inner class constructors	PSU
<a href="#">JDK-8030123</a>	8	java/beans/Introspector/Test8027648.java fails	PSU
<a href="#">JDK-8026236</a>	8	Add PrimeTest for BigInteger	PSU
<a href="#">JDK-8025886</a>	8	replace [[ and == bash extensions in regtest	PSU
<a href="#">JDK-8025430</a>	8	[TEST_BUG] closed/- javax/swing/JEditorPane/5076514/bug5076514.java failed since jdk8b108	PSU
<a href="#">JDK-8023697</a>	8	failed class resolution reports different class name in detail message for the first and subsequent times	PSU
<a href="#">JDK-8022535</a>	11	[TEST_BUG] javax/swing/- text/html/parser/Test8017492.java fails	PSU
<a href="#">JDK-8011541</a>	8	[TEST_BUG] closed/- javax/swing/plaf/metal/MetalUtils/bug6190373.java fails NPE since 7u25b03	PSU
<a href="#">JDK-7188942</a>	8	Remove support of pbuffers in OGL Java2d pipeline	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-6949753</a>	11	[TEST BUG]: java/awt/- print/PageFormat/PDialogTest.java needs update by removing a infinite loop	PSU
<a href="#">JDK-6574989</a>	8	TEST_BUG: javax/- sound/sampled/Clip/bug5070081.java fails sometimes	PSU
<a href="#">JDK-6532025</a>	11	GIF reader throws misleading exception with truncated images	PSU

### OpenJFX Bug Fixes

The following table describes the OpenJFX changes implemented in October 2020 Zulu release

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8252547</a>	15	Correct transformations docs in Node	PSU
<a href="#">JDK-8252546</a>	15	Move ObservableValue's equality check and lazy evaluation descriptions to @implSpec	PSU
<a href="#">JDK-8252387</a>	15	Deprecate for removal css Selector and ShapeConverter constructors	PSU
<a href="#">JDK-8252381</a>	15, 8	Cherry pick GTK WebKit 2.28.4 changes	PSU
<a href="#">JDK-8252107</a>	15, 8	Media pipeline initialization can crash if audio or video bin state change fails	PSU
<a href="#">JDK-8252062</a>	15	WebKit build fails with recent VS 2019 com- piler	PSU
<a href="#">JDK-8252060</a>	15	gstreamer fails to build with gcc 10	PSU
<a href="#">JDK-8251941</a>	15	ListCell: visual artifact when items contain null	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
		values	
<a href="#">JDK-8251858</a>	15	Update to Xcode 11.3.1	PSU
<a href="#">JDK-8251555</a>	15	Remove unused focusedWindow field in glass Window to avoid leak	PSU
<a href="#">JDK-8251353</a>	15	Many javafx scenegraph classes have implicit no-arg constructors	PSU
<a href="#">JDK-8251352</a>	15	Many javafx.base classes have implicit no-arg constructors	PSU
<a href="#">JDK-8251241</a>	15	macOS: iconify property doesn't change after minimize when resizable is false	PSU
<a href="#">JDK-8249839</a>	15, 8	Cherry pick GTK WebKit 2.28.3 changes	PSU
<a href="#">JDK-8249777</a>	15	build.gradle: project.version should not contain time stamps	PSU
<a href="#">JDK-8248908</a>	15	Printer.createPageLayout() returns 0.75" margins instead of hardware margins	PSU
<a href="#">JDK-8248490</a>	8	[macOS] Undecorated stage does not minimize	PSU
<a href="#">JDK-8248365</a>	15, 8	Debug build crashes on Windows when playing media file	PSU
<a href="#">JDK-8248317</a>	15	Change JavaFX release version to 16	PSU
<a href="#">JDK-8248177</a>	15, 13, 11, 8	Improve XML support	CPU
<a href="#">JDK-8248171</a>	15, 13, 11, 8	Better query support	CPU
<a href="#">JDK-8247963</a>	15, 13, 11, 8	Update SQLite to version 3.32.3	CPU
<a href="#">JDK-8247947</a>	8	Build DirectShow Samples (Base Classes) from source checked into repo	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8246745</a>	15	ListCell/Skin: misbehavior on switching skin	PSU
<a href="#">JDK-8246348</a>	8	Crash in libpango on Ubuntu 20.04 with some unicode chars	PSU
<a href="#">JDK-8246204</a>	8	No 3D support for newer Intel graphics drivers on Linux	PSU
<a href="#">JDK-8246099</a>	8	Intermittent test failures in SandboxAppTest	PSU
<a href="#">JDK-8245284</a>	15, 8	Update to 610.1 version of WebKit	PSU
<a href="#">JDK-8245053</a>	15	Keyboard doesn't show when TextInputControl has focus	PSU
<a href="#">JDK-8244487</a>	8	One Windows 10 SDK file missing from FX build	PSU
<a href="#">JDK-8242508</a>	8	Upgrade to Visual Studio 2019 version 16.5.3	PSU
<a href="#">JDK-8242507</a>	8	Add support for Visual Studio 2019	PSU
<a href="#">JDK-8241840</a>	15	Memoryleak: Closed focused Stages are not collected with Monocle.	PSU
<a href="#">JDK-8240969</a>	15	WebView does not allow to load style sheet in modularized applications	PSU
<a href="#">JDK-8240499</a>	15	Enforce whitespace checking for additional source files	PSU
<a href="#">JDK-8239095</a>	8	Upgrade libFFI to the latest 3.3 version	PSU
<a href="#">JDK-8208169</a>	8	can not print selected pages of web page	PSU
<a href="#">JDK-8202990</a>	15	javafx webview css filter property with display scaling	PSU
<a href="#">JDK-8196079</a>	15	Remove obsolete Pisces rasterizer	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
<a href="#">JDK-8193800</a>	8	TreeTableView selection changes on sorting	PSU
<a href="#">JDK-8191758</a>	8	Match WebKit's font weight rendering with JavaFX	PSU
<a href="#">JDK-8181775</a>	15	JavaFX WebView does not calculate border-radius properly	PSU
<a href="#">JDK-8160464</a>	8	Application.getHostServices throws ClassNotFoundException	CPU
<a href="#">JDK-8129582</a>	8	Controls slow considerably when displaying RTL-languages text on Linux	PSU

### Zulu Bug Fixes

The following table describes the Zulu bug fixes implemented in October 2020 Zulu release.

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
ZULU-18893	8	Backout fix for JDK-8148854	PSU
ZULU-18668	11	missing part of JDK-8213250 backport	CPU
ZULU-18667	8	SSL debug log prints incorrect caller info	PSU
ZULU-18552	8, 7, 6	JCK regression: rmi.activation.ActivationGroup in 8.49.0.13	CPU
ZULU-18524	8	Duplicated license info	PSU
ZULU-18268	8	Fix hotspot/test/vmTestbase/gc/g1 tests	PSU
ZULU-18239	8	Fix Reserved space to be non rwx on zero_mac_arm64	PSU

OpenJDK Patch ID	Zulu Version	Synopsis	CPU/PSU
ZULU-18237	8	Initial support for xcode8+ for zulu8	PSU
ZULU-18068	8	[REGRESSION] Tests for JVMTI event SingleStep and function GetPhase fail	PSU
ZULU-17965	8	[Missmerge] tools/launcher/Settings.java test defines runTestOptionSystem() twice	PSU
ZULU-17870	8	Solaris build failures	PSU
ZULU-17256	8	Remove obsolete code in AWTView.m	PSU
ZULU-13915	8	Replace with parameter a hardcoded by mistake libnuma version	PSU
ZULU-13894	8	Change list of client enabled CustomizedTLSContext cipher suites	PSU
ZULU-13879	8	Remove NONEwithDSAINP1363Format from the default enabled set	PSU

## Supported Platforms

This compatibility matrix provides information about the operating systems that are supported by this release. The matrix may be updated over the course of the release cycle.

**Note:** Zulu community distributions support JavaFX on all tested and verified platforms except Oracle Solaris Operating Systems and Alpine Linux.

Platform	Zulu Version				
	7	8	11	13	15
<b>Windows</b>					
Windows Server 2019	✓	✓	✓	✓	✓
Windows Server 2016	✓	✓	✓	✓	✓
Windows Server 2012 RC2	✓	✓	✓	✓	✓
Windows Client 10	✓	✓	✓	✓	✓
Windows Client 8.1	✓	✓	✓	✓	✓
Windows Client 7*	n/a	✓	✓	n/a	n/a
<b>Linux</b>					
RHEL 8.x	✓	✓	✓	✓	✓
RHEL 7.x	✓	✓	✓	✓	✓
SLES 15	✓	✓	✓	✓	✓
SLES 12	✓	✓	✓	✓	✓
CentOS 8.x	✓	✓	✓	✓	✓



Platform	Zulu Version				
	7	8	11	13	15
Ubuntu 20.04	✓	✓	✓	✓	✓
Ubuntu 18.04	✓	✓	✓	✓	✓
Debian 10	✓	✓	✓	✓	✓
Debian 9	✓	✓	✓	✓	✓
Windriver 9.x	✓	✓	n/a	n/a	n/a
Windriver 8.x	✓	✓	n/a	n/a	n/a
CoreOS	✓	✓	✓	✓	✓
Alpine Linux	n/a	✓	✓	✓	✓
<b>macOS</b>					
macOS 10.15	✓	✓	✓	✓	✓
macOS 10.14	✓	✓	✓	✓	✓
<b>Solaris</b>					
Solaris 11	✓	✓	✓	n/a	n/a
Solaris 10	✓	✓	n/a	n/a	n/a

\* To be retired in January 2021 due to its EOL.

## Target Operating Environments

In order to remain current, each Zulu release targets reasonably current Microsoft® Windows®, Linux, and Apple® macOS® operating environments.

Most of the Zulu JDK is "pure" OpenJDK native binary with direct dependence on the underlying operating system. The chief dependence is on the native OS runtime and processor family architecture. Java API class library portions and sample applications are common to all operating environments. You must select the Zulu architecture to match your OS architecture, download either the archive or install package for that platform, and run the Zulu installer package or unpack the archived file.

In general, Zulu 15.x provides a Java Standard Edition 15 package, Zulu 14.x provides a Java Standard Edition 14 package, Zulu 13.x provides a Java Standard Edition 13 package, Zulu 12.x provides a Java Standard Edition 12 package, Zulu 11.x provides a Java Standard Edition 11 package, Zulu 8.x provides a Java Standard Edition 8 package, Zulu 7.x provides a Java Standard Edition 7 package, and Zulu 6.x provides a Java Standard Edition 6 package, each with associated Java source compiler, runtime JVM, API classfile hierarchy, and JDK tools. Zulu as a whole is targeted as a self-contained complete package suitable for deployment into modern, production-grade server OS environments, many popular desktop OS configurations, and virtualized OS contexts running under hypervisors provisioned on premise or in the cloud. Functionality meets the corresponding OpenJDK version and update level for the respective Java Standard Edition.

There are many different implementations of kernel, core OS, and patches atop a variety of Windows, Linux, and macOS operating system distributions. Azul focuses testing on a handful of popular combinations of operating systems and deployment contexts; these are our reference platforms. Zulu undoubtedly runs fine in many operating environments beyond the reference platforms Azul tests as long as Zulu architecture matches OS architecture. However, since we do not systematically test

them, we cannot vouch for them. Problems encountered when running Zulu on a non-reference platform might not be immediately rejected, though those recreated on a reference platform will be given higher priority than problems with running Zulu outside reference platforms.

## Running Zulu

### Deployment Targets

Zulu offers a stable JDK development kit, and runtime JVM runtime for server applications authored in Java. For production environments, Zulu works in bare OS, virtualized OS, or cloud hosted contexts. Zulu implements the Java SE standard, so can be used in any application architecture that likewise adheres to Java SE standards. Zulu does not implement the Java Enterprise Edition (JEE) specification; however Zulu can be used as runtime core for containers and services that do implement JEE functionality. Zulu also does not implement Java Platform, Micro Edition (Java ME) and it does not have a browser plugin or Java Network Launching Protocol (JNLP).

In development or testing environments, Zulu supplies base tools for debugging and runtime inspection, as well as the Java source code compiler (javac). Configure Zulu to host your target under test to further ensure consistency with your production deployments.

Cloud deployments in both Azure (VM and VHD) and Amazon (EC2 or S3) involve installing Zulu onto hosted virtual machine instances. Once you create a virtual machine instance, you can clone the VM and reuse Zulu in each instance. In Azure, Zulu systems appear in the Azure portal as Gallery items, able to instantiate new virtual machines with Zulu preinstalled. See the [Zulu Installation Guide](#) for more cloud deployment details.

### Performance and Standards

JVM runtime performance varies with workload and set of enabled flags, but in general should match OpenJDK and remain comparable to other OpenJDK derived JVMs. Other vendor specific optimizations, extensions, or responses based on non-

standard X or XX variables have no guarantee of working inside Zulu unless they already also work in base OpenJDK.

## Zulu Commercial Compatibility Kit

The Zulu Commercial Compatibility Kit (Zulu CCK) provides non-open source enhancements to Zulu 8, Zulu 7, Zulu 6. It includes its own licensing. Zulu CCK features include support for Monotype fonts, Rhino JavaScript Engine (for Java 7). See the [Zulu Installation Guide](#) for more Zulu CCK details. You can [download the CCK here](#).

## Troubleshooting Tips

The Azul Community site contains a running list of recent tips. The following is a brief list of common trouble points:

### Preparation Tips

Ensure your `PATH` and `JAVA_HOME` variables are set accurately in the shell or context of your runtime application. Crosstalk with other installed JVMs leads to aberrant, often random unwanted behaviors.

Ensure you have the proper Zulu architecture for your OS and kernel. Using incorrect processor type or bitness may fail to operate at all.

### VM Property Override

Some applications may expect particular VM property string values, such as `vendor`, set to values different from OpenJDK defaults. Zulu provides the `-XX:+OverrideVMProperties` argument to allow new property values. Use `-XX:+OverrideVMProperties` with a `-D` option for the property to be overridden. For example:

```
-XX:+OverrideVMProperties -Djava.vm.vendor="CompanyName"
```

### JRE-only Tips

Zulu builds are generally visible to monitoring tools by default. In JRE-only Zulu builds, Java may be invisible to monitoring tools. This is due to the `-XX:-UsePerfData` flag default setting to off for JRE-only builds.

To resolve this issue, run the target JRE with `-XX:+UsePerfData`. This enables monitoring tools to see the Java instance.

## Tomcat Advisory

To avoid unexpected failures of Zulu 8, it is recommended to upgrade your Tomcat 6 to the version 6.0.37 or higher, and Tomcat 7 to the version 7.0.34 or higher.

## Cassandra Issue

Cassandra 3.7 cannot start with Zulu 8.27 because of the known dependencies on some JDK internal classes and interfaces that have been changed in Java SE 8, update 162. See [CASSANDRA-14173](#).

## Time Zone Data Update

The [ZUpdater](#) tool does not support Zulu version 9 and later versions of Zulu.

## Azul Repository Tips

Azul provides many Linux binaries on the Azul Repository. They remain predominantly compatible for x86-64. To install Arm packages from the repository using APT, run the following command with the term `embedded` in the package name:

```
$ sudo apt-get install zulu-embedded-8
```

The Azul repository can determine whether your Arm processor is hard-float or soft-float, and whether it is 32-bit or 64-bit.

Notice how this differs from the command for x86-64 which omits `embedded` in the package name:

```
$ sudo apt-get install zulu-8
```

All other APT commands are applicable to all platforms. Review [Installation on Linux Using an APT Repository](#) for more on installing Zulu through APT.

## New mapping rules from a Java native method name to a C native library implementation function name

The mapping produces a native method name by concatenating the following components derived from a native method declaration:

1. prefix `Java_`
2. escaped binary class name (in internal form) which declares the native method
3. underscore separator `_`
4. escaped method name

**Note:** Overloaded native method names, in addition to the above components, have an extra two underscore separators `__` appended to the escaped parameter descriptor (JVMS 4.3.3) of the method declaration.

The escaping process leaves every alphanumeric ASCII character (A-Za-z0-9) unchanged and replaces each UTF-16 code unit with the corresponding escape sequence, see the table below.

Character	UTF-16 code unit	Escape sequence
Forward slash <code>/</code>	U+002F	<code>_</code>
Unicode character, representing characters other than ASCII alphanumeric ([A-Za-z0-9]), forward slash, underscore, semicolon or left square bracket.	U+WXYZ	<code>_0wxyz*</code>
Underscore <code>_</code>	U+005F	<code>_1</code>
Semicolon <code>;</code>	U+003B	<code>_2</code>
Left square bracket <code>[</code>	U+005B	<code>_3</code>

\* where w, x, y, and z are the lower-case forms of the hexadecimal digits W, X, Y, and Z. For example, `U+ABCD` becomes `_0abcd`.



Since names of classes and methods in Java source code never begin with a number, we

**Note:** can use `_0`, ..., `_9` for escape sequences. However, that is not the case for class files that were not generated from Java source code.

If the native name to be escaped contains a surrogate pair, then the high-surrogate code unit and the low-surrogate code unit are processed separately. The escaping process result is a name string consisting of only ASCII characters A-Za-z0-9 and underscores.

To preserve one-to-one mapping to a native method name, the VM makes the following extra check:

If after the escape processing of any string (class or method name, or argument type) from the native method declaration, we have in the result an unchanged "0", "1", "2", or "3" character standing at the beginning of the escaped string, or immediately after an underscore separator, then the escaping process is considered as "failed." In this case, no further search of the native library is performed, and the attempt to link the native method invocation throws `UnsatisfiedLinkError`.

To avoid legacy compatibility issue, skip the extra check by setting the `UseLegacyJNINameEscaping` flag.

## Creating a Symlink to the `jvm-exports` Directory

While installing Zulu on RPM systems, the installer adds it to the `/usr/lib/jvm/zulu-8/` directory. Certain tools, such as `ant` expects Java executable to be present from the following location `/usr/lib/jvm-exports`. To avoid error messages, you need to create a symlink to the `jvm-exports` directory after Zulu installation. For example, assume that Zulu is installed in `/usr/lib/jvm/zulu-8-x86`. Perform the following steps to create a symlink:

```
$ cd /usr/lib/jvm-exports
```

```
$ ln -s /usr/lib/jvm/zulu-8-x86 zulu-8-x86
```

To verify the symlink, run:

```
$ ls -lart | grep -i "zulu-8-x86"
```

You should expect the following output:

```
0 lrwxrwxrwx    1 root root    34 Sep 29 18:22  zulu-8-x86 ->
/usr/lib/jvm/zulu-8-x86
```

## Running Java Flight Recording in Zulu 8

Zulu 8 inherits the implementation of Java Flight Recorder (JFR) from OpenJDK 11.

To use JFR on an active Zulu java process no command-line option is necessary, just run `jcmd JAVAPID JFR.start` to enable recording when needed. The overhead of JFR before it gets activated with `JFR.start` is negligible since none of the events get sent and no JFR java classes get loaded (JFR java classes undergo class transformation during the load time). Alternatively, you can enable recording directly on the launch of the Java process by adding and configuring `-XX:StartFlightRecording`. Setting `-XX:-FlightRecorder` on the command line prevents JFR from being enabled during runtime. It gives absolutely no performance benefit.

## CKR\_SAVED\_STATE\_INVALID exception on Solaris 10

Zulu 8 might throw CKR\_SAVED\_STATE\_INVALID exception due to issues in Solaris 10 (see [JDK-2209405](#)).

### Workaround

Disable broken mechanisms by updating the configuration file `$JAVA_HOME/jre/lib/security/sunpkcs11-solaris.cfg` and including the following entries into the list of disabled mechanisms:

CKM\_SHA256 CKM\_SHA384 CKM\_SHA512

## Open Product Issues

- **Windows:** Observed hang issue with Maven projects launched under Eclipse. See the [detailed explanation and workaround](#) for the Eclipse bug. Applies to: all Zulu releases.
- **Zulu RPM Installers on SLES 11.3:** Using the Zulu `.rpm` installer on a SLES 11.3 system requires RPM version 4.8 or later. Workaround: Use the Zulu `.zip` installer or upgrade your RPM to 4.8 or later.
- **Zulu 8.14, 7.16, and 6.14 cannot be downgraded** to the earlier versions by using an RPM package.

Workaround: Uninstall Zulu 8.14, 7.16, or 6.14 and then install an earlier version of Zulu.

- **CoreOS:** CoreOS cannot transfer zero-length packets using datagram sockets. See more details in <https://github.com/coreos/bugs/issues/1834>. Workaround: Upgrade CoreOS to the kernel version 4.9.9 or higher.
- **OpenJSSE:** The following algorithms are not supported by default by Zulu11.41 on Solaris 11.4: `SSL_RSA_EXPORT_WITH_DES40_CBC_SHA` and `SSL_DHE_RSA_EXPORT_WITH_DES40_CBC_SHA`.

Workaround:

1. Open the `$JAVA_HOME/jre/lib/security/java.security` file.
2. Find the following entry:

```
security.provider.1=OracleUcrypto
security.provider.2=SunPKCS11
${java.home}/conf/security/sunpkcs11-solaris.cfg
security.provider.3=SUN
```

3. Replace the value for security.provider.2:

```
security.provider.2=SUN
```

4. After the change, the entry should look like this:

```
security.provider.1=OracleUcrypto  
security.provider.2=SUN  
security.provider.3=SUN
```

## Support Information

For more information on Zulu, please visit the Azul website at one of the following locations:

- Zulu Installation Guide: <http://docs.azul.com/zulu/zuludocs/>
- Zulu Community Forum: <http://zulu.org/forum/>
- Zulu Support: <https://www.azul.com/support/>