



**Azul Zulu builds of OpenJDK
April 20, 2021 Update Release**

Azul Zulu 11.48 (CA) for Arm 64-bit

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Revision History

Revision	Date	Description
0.1	April 20, 2021	Initial version of the document.
1.0	April 20, 2021	Added information about CVEs fixed in this release.

What's New

April 20, 2021 PSU Release

This section describes new features and changes in behavior introduced in April 20, 2021 Azul Zulu PSU Update Release.

Azul Zulu Version:	11.48 (11.0.11+9)
Release Date:	April 20, 2021
Based on Azul Zulu Version:	11.47 (11.0.10.0.101+1)

A CPU (Critical Patch Update) release incorporates critical bug fixes and security vulnerability fixes. Azul Zulu CPU releases are based on the prior PSU release and are available commercially.

A PSU (Patch Set Updates) release is based on the current CPU release, i.e. it includes all bug fixes that have been fixed in the CPU release, and a number of [non-security bug fixes](#).

IANA time zone data version

This release of Azul Zulu comes with IANA time zone data version 2021a. For more details, see <https://data.iana.org/time-zones/tzdb-2021a/NEWS>.

New Features and Enhancements

TLS 1.0 and 1.1 is turned off

TLS 1.0 and 1.1 is turned off in the PSU builds in this release.

Fixed Issues

JDK Common Vulnerabilities and Exposure (CVE) Fixes

This section summarizes Common Vulnerabilities and Exposure (CVE) fixes of the April 2021 OpenJDK release.

CVE #	Component	Protocol	Remote Exploit without Auth.	Base Score	Attack Vector	Attack Complexity	Privileges Required	User Interaction	Scope	Confidentiality	Integrity	Availability	Supported Zulu Versions Affected	Modules Changed to Address CVE	Notes
CVE-2021-2161	Libraries	Multiple	Yes	5.9	Network	High	None	None	Unchanged	None	High	None	6, 7, 8, 11, 13, 15, 16	6, 7, 8: JDK 11, 13, 15, 16: java.base	Note 1
CVE-2021-2163	Libraries	Multiple	Yes	5.3	Network	High	None	Required	Unchanged	None	High	None	6, 7, 8, 11, 13, 15, 16	6, 7, 8: JDK 11, 13, 15, 16: java.base	Note 2
CVE-2021-23841	Oracle GraalVM Enterprise Edition: Node (OpenSSL)	HTTPS	Yes	7.5	Network	Low	None	None	Unchanged	None	None	High	N/A	N/A	

CVE #	Component	Protocol	Remote Exploit without Auth.	Base Score	Attack Vector	Attack Complexity	Privileges Required	User Interaction	Scope	Confidentiality	Integrity	Availability	Supported Zulu Versions Affected	Modules Changed to Address CVE	Notes
CVE-2021-3450	Oracle GraalVM Enterprise Edition: Node (Node.js)	HTTPS	Yes	7.4	Network	High	None	None	Unchanged	High	High	None	N/A	N/A	

Metrics	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 security. It can also be exploited by supplying untrusted data to APIs in the specified Component.
2	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 security.

Non-CVE Security Fixes

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8261183	Follow on to Make lists of normal filenames	CPU
JDK-8259633	compiler/graalunit/CoreTest.java fails with NPE after JDK-8244543	CPU
JDK-8259428	AlgorithmId.getEncodedParams() should return copy	CPU
JDK-8258247	Couple of issues in fix for JDK-8249906	CPU
JDK-8257001	Improve HTTP client support	CPU
JDK-8253799	Make lists of normal filenames	CPU
JDK-8244543	Enhanced handling of abstract classes	CPU
JDK-8244473	Contextualize registration for JNDI	CPU

OpenJDK Bug Fixes

The following table describes the OpenJDK changes implemented in April 20, 2021 Zulu release.

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8260356	(tz) Upgrade time-zone data to tzdata2021a	CPU
JDK-8259048	(tz) Upgrade time-zone data to tzdata2020f	CPU
JDK-8263069	Exclude some failing tests from security/infra/java/security/cert/CertPathValidator	PSU
JDK-8262018	Wrong format in SAP copyright header of OsVersionTest	PSU
JDK-8261920	[AIX] jshell command throws java.io.IOException on non English locales	PSU
JDK-8261912	Code IfNode::fold_compares_helper more defensively	PSU
JDK-8261829	Exclude tools/jlink/JLinkReproducibleTest.java in 11u	PSU
JDK-8261753	Test java/lang/System/OsVersionTest.java still failing on BigSur patch versions after JDK-8253702	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8261585	Restore HandleArea used in Deoptimization::uncommon_trap	PSU
JDK-8261534	Test sun/security/pkcs11/KeyAgreement/IllegalPackageAccess.java fails on platforms where no nsslib artifacts are defined	PSU
JDK-8261522	[PPC64] AES intrinsics write beyond the destination array	PSU
JDK-8261413	Shenandoah: Disable class-unloading in I-U mode	PSU
JDK-8261397	try catch Method failing to work when dividing an integer by 0	PSU
JDK-8261334	NMT: tuning statistic shows incorrect hash distribution	PSU
JDK-8261310	PPC64 Zero build fails with 'VMError::controlled_crash(int)::FunctionDescriptor functionDescriptor' has incomplete type and cannot be defined	PSU
JDK-8261251	Shenandoah: Use object size for full GC humongous compaction	PSU
JDK-8261231	Windows IME was disabled after DnD operation	PSU
JDK-8261209	isStandalone property: remove dependency on pretty-print	PSU
JDK-8261089	[TESTBUG] native library of test TestCheckedReleaseCriticalArray.java fails to compile with gcc 4.x	PSU
JDK-8261022	Fix incorrect result of Math.abs() with char type	PSU
JDK-8260704	ParallelGC: oldgen expansion needs release-store for _end	PSU
JDK-8260632	Build failures after JDK-8253353	PSU
JDK-8260502	[s390] NativeMovRegMem::verify() fails because it's too strict	PSU
JDK-8260497	Shenandoah: Improve SATB flushing	PSU
JDK-8260378	[TESTBUG] DcmdMBeanTestCheckJni.java reports false positive	PSU
JDK-8260349	Cannot programmatically retrieve Metaspace max set via JAVA_TOOL_OPTIONS	PSU
JDK-8260338	Some fields in HaltNode is not cloned	PSU
JDK-8260308	Update LogCompilation junit to 4.13.1	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8260029	aarch64: fix typo in verify_oop_array	PSU
JDK-8259954	gc/shenandoah/mxbeans tests fail with -Xcomp	PSU
JDK-8259949	x86 32-bit build fails when -fcf-protection is passed in the compiler flags	PSU
JDK-8259849	Shenandoah: Rename store-val to IU-barrier	PSU
JDK-8259773	Incorrect encoding of AVX-512 kmovq instruction	PSU
JDK-8259707	LDAP channel binding does not work with StartTLS extension	PSU
JDK-8259706	C2 compilation fails with assert(vtable_index == Method::invalid_vtable_index) failed: correct sentinel value	PSU
JDK-8259619	C1: 3-arg StubAssembler::call_RT stack-use condition is incorrect	PSU
JDK-8259580	Shenandoah: uninitialized label in VerifyThreadGCState	PSU
JDK-8259451	Zero: skip serviceability/sa tests, set vm.hasSA to false	PSU
JDK-8259446	runtime/jni/checked/TestCheckedReleaseArrayElements.java fails with stderr not empty	PSU
JDK-8259339	AllocateUninitializedArray C2 intrinsic fails with void.class input	PSU
JDK-8259319	Illegal package access when SunPKCS11 requires SunJCE's classes	PSU
JDK-8259312	VerifyCACerts.java fails as soneraclass2ca cert will expire in 90 days	PSU
JDK-8259271	gc/parallel/TestDynShrinkHeap.java still fails "assert(covered_region.contains(new_memregion)) failed: new region is not in covered_region"	PSU
JDK-8259231	Epsilon: improve performance under contention during virtual space expansion	PSU
JDK-8259049	Uninitialized variable after JDK-8257513	PSU
JDK-8259007	This test printed a blank page	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8258884	[TEST_BUG] Convert applet-based test open/test/jdk/javax/swing/JMenuItem/8031573/bug8031573.java to a regular java test	PSU
JDK-8258836	JNI local refs exceed capacity getDiagnosticCommandInfo	PSU
JDK-8258833	Cancel multi-part cipher operations in SunPKCS11 after failures	PSU
JDK-8258805	Japanese characters not entered by mouse click on Windows 10	PSU
JDK-8258534	Epsilon: clean up unused includes	PSU
JDK-8258471	"search codecache" clhsdb command does not work	PSU
JDK-8258419	RSA cipher buffer cleanup	PSU
JDK-8258396	SIGILL in jdk.jfr.internal.PlatformRecorder.rotateDisk()	PSU
JDK-8258373	Update the text handling in the JPasswordField	PSU
JDK-8258077	Using -Xcheck:jni can lead to a double-free after JDK-8193234	PSU
JDK-8257999	Parallel GC crash in gc/parallel/TestDynShrinkHeap.java: new region is not in covered_region	PSU
JDK-8257997	sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java again reports leaks after JDK-8257884	PSU
JDK-8257910	[JVMCI] Set exception_seen accordingly in the runtime.	PSU
JDK-8257884	Re-enable sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java as automatic test	PSU
JDK-8257798	[PPC64] undefined reference to Klass::vtable_start_offset()	PSU
JDK-8257746	Regression introduced with JDK-8250984 - memory might be null in some machines	PSU
JDK-8257707	Fix incorrect format string in Http1HeaderParser	PSU
JDK-8257670	sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java reports leaks	PSU
JDK-8257633	Missing -mmacosx-version-min=X flag when linking libjvm	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8257594	C2 compiled checkcast of non-null object triggers endless deoptimization/recompilation cycle	PSU
JDK-8257575	C2: "failed: onlyphis" assert failure in loop strip mining verification	PSU
JDK-8257565	epsilonBarrierSet.hpp should not include barrierSetAssembler	PSU
JDK-8257561	Some code is not vectorized after 8251925 and 8250607	PSU
JDK-8257547	Handle multiple prereqs on the same line in deps files	PSU
JDK-8257513	C2: assertconstant_addr - _masm.code()&const()&start(== con.offset())	PSU
JDK-8257436	AArch64: Regressions in ArrayCopyUnalignedDst.testByte/testChar for 65-78 bytes when UseSIMDForMemoryOps is on	PSU
JDK-8257423	[PPC64] Support -XX:-UseInlineCaches	PSU
JDK-8257414	Drag n Drop target area is wrong on high DPI systems	PSU
JDK-8257408	Bump update version for OpenJDK: jdk-11.0.11	PSU
JDK-8257083	Security infra test failures caused by JDK-8202343	PSU
JDK-8256888	Client manual test problem list update	PSU
JDK-8256818	SSLSocket that is never bound or connected leaks socket resources	PSU
JDK-8256810	Incremental rebuild broken on Macosx	PSU
JDK-8256807	C2: Not marking stores correctly as mismatched in string opts	PSU
JDK-8256806	Shenandoah: optimize shenandoah/jni/TestPinnedGarbage.java test	PSU
JDK-8256757	Incorrect MachCallRuntimeNode::ret_addr_offset() for CallLeafNoFP on x86_32	PSU
JDK-8256751	Incremental rebuild with precompiled header fails when touching a header file	PSU
JDK-8256682	JDK-8202343 is incomplete	PSU
JDK-8256633	Fix product build on Windows+Arm64	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8256501	libTestMainKeyWindow fails to build with Xcode 12.2	PSU
JDK-8256489	Make gtest for long path names on Windows more resilient in the presence of virus scanners	PSU
JDK-8256488	AArch64: Use ldpq/stpq instead of ld4/st4 for small copies in StubGenerator::copy_memory	PSU
JDK-8256421	Add 2 HARICA roots to cacerts truststore	PSU
JDK-8256387	Unexpected result if patching an entire instruction on AArch64	PSU
JDK-8256359	AArch64: runtime/ReservedStack/ReservedStackTestCompiler.java fails	PSU
JDK-8256290	javac/lambda/T8031967.java fails with StackOverflowError on x86_32	PSU
JDK-8256264	Printed GlyphVector outline with low DPI has bad quality on Windows	PSU
JDK-8256258	some missing NULL checks or asserts after CodeCache::find_blob_unsafe	PSU
JDK-8256220	C1: x86_32 fails with -XX:UseSSE=1 after JDK-8210764 due to mishandled lir_neg	PSU
JDK-8256187	[TEST_BUG] Automate bug4275046.java test	PSU
JDK-8256061	RegisterSaver::save_live_registers() omits upper halves of ZMM0-15 registers	PSU
JDK-8256056	Deoptimization stub doesn't save vector registers on x86	PSU
JDK-8256025	AArch64: MachCallRuntimeNode::ret_addr_offset() is incorrect for stub calls	PSU
JDK-8255908	ExceptionInInitializerError due to UncheckedIOException while initializing cgroupv1 subsystem	PSU
JDK-8255880	UI of Swing components is not redrawn after their internal state changed	PSU
JDK-8255845	Memory leak in imageFile.cpp	PSU
JDK-8255742	PrintInlining as compiler directive doesn't print virtual calls	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8255734	VM should ignore SIGXFSZ on ppc64, s390 too	PSU
JDK-8255681	Print callstack in error case in runAWTLoopWithApp	PSU
JDK-8255559	Leak File Descriptors Because of ResolverLocalFilesystem#engineResolveURI()	PSU
JDK-8255544	Create a checked cast	PSU
JDK-8255479	AArch64: assert(src->section_index_of(target) == CodeBuffer::SECT_NONE) failed: sanity	PSU
JDK-8255401	Shenandoah: Allow oldval and newval registers to overlap in cmpxchg_oop()	PSU
JDK-8255387	Japanese characters were printed upside down on AIX	PSU
JDK-8255368	Math.exp() gives wrong result for large values on x86 32-bit platforms	PSU
JDK-8255351	Add detection for Graviton 2 CPUs	PSU
JDK-8255058	C1: assert(is_virtual()) failed: type check	PSU
JDK-8254799	runtime/ErrorHandling/TestHeapDumpOnOutOfMemoryError.java fails with release VMs	PSU
JDK-8254748	Bad Copyright header format after JDK-8212218	PSU
JDK-8254734	"dead loop detected" assert failure with patch from 8223051	PSU
JDK-8254104	MethodCounters must exist before nmethod is installed	PSU
JDK-8253756	C2 CompilerThread0 crash in Node::add_req(Node*)	PSU
JDK-8253702	BigSur version number reported as 10.16, should be 11.nn	PSU
JDK-8253681	closed java/awt/dnd/MouseEventAfterStartDragTest/MouseEventAfterStartDragTest.html test failed	PSU
JDK-8253644	C2: assert(skeleton_predicate_has_opaque(iff)) failed: unexpected	PSU
JDK-8253524	C2: Refactor code that clones predicates during loop unswitching	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8253476	TestUseContainerSupport.java fails on some Linux kernels w/o swap limit capabilities	PSU
JDK-8253409	Double-rounding possibility in float fma	PSU
JDK-8253404	C2: assert(C2::live_nodes() < C2::max_node_limit()) failed: Live Node limit exceeded limit	PSU
JDK-8253368	TLS connection always receives close_notify exception	PSU
JDK-8253353	Crash in C2: guarantee(n != NULL) failed: No Node	PSU
JDK-8253274	The CycleDMLmagetest brokes the system	PSU
JDK-8253220	Epsilon: clean up unused code/declarations	PSU
JDK-8251992	VM crashed running TestComplexAddrExpr.java test with -XX:UseAVX=X	PSU
JDK-8251944	Add Shenandoah test config to compiler/gcbarriers/UnsafeIntrinsicsTest.java	PSU
JDK-8251925	C2: RenaissanceStressTest fails with assert(!had_error): bad dominance	PSU
JDK-8251359	Shenandoah: filter null oops before calling enqueue/SATB barrier	PSU
JDK-8251255	[linux] Add process-memory information to hs-err and VM.info	PSU
JDK-8250911	[windows] os::pd_map_memory error detection broken	PSU
JDK-8249867	XML declaration is not followed by a newline	PSU
JDK-8249787	Make TestGCLocker more resilient with concurrent GCs	PSU
JDK-8249749	modify a primitive array through a stream and a for cycle causes jre crash	PSU
JDK-8249588	libwindowsaccessbridge issues on 64bit Windows	PSU
JDK-8249543	(bf) Force DirectBufferAllocTest to run with -ExplicitGCInvokesConcurrent	PSU
JDK-8248901	Signed immediate support in ../share/assembler.hpp is broken.	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8248865	Document JNDI/LDAP timeout properties	PSU
JDK-8248336	AArch64: C2: offset overflow in BoxLockNode::emit	PSU
JDK-8247766	AArch64: guarantee(val < (1U << nbits)) failed: Field too big for insn	PSU
JDK-8247200	AArch64: assert((unsigned)fpargs < 32)	PSU
JDK-8246709	sun/security/tools/jarsigner/TsacertOptionTest.java compilation failed after JDK-8244683	PSU
JDK-8246707	(sc) SocketChannel.read/write throws AsynchronousCloseException on closed channel	PSU
JDK-8245512	CRC32 optimization using AVX512 instructions	PSU
JDK-8245026	PsAdaptiveSizePolicy::_old_gen_policy_is_ready is unused	PSU
JDK-8245005	javax/net/ssl/compatibility/BasicConnectTest.java failed with No enum constant	PSU
JDK-8244683	A TSA server used by tests	PSU
JDK-8244573	java.lang.ArrayIndexOutOfBoundsException thrown for malformed class file	PSU
JDK-8244340	Handshake processing thread lacks yielding	PSU
JDK-8244154	Update SunPKCS11 provider with PKCS11 v3.0 header files	PSU
JDK-8244088	[Regression] Switch of Gnome theme ends up in deadlocked UI	PSU
JDK-8243670	Unexpected test result caused by C2 MergeMemNode::Ideal	PSU
JDK-8243618	compiler/rtm/cli tests can be run w/o WhiteBox	PSU
JDK-8242565	Policy initialization issues when the denyAfter constraint is enabled	PSU
JDK-8242030	Wrong package declarations in jline classes after JDK-8241598	PSU
JDK-8241911	AArch64: Fix a potential issue about register allocation effect rule in reduce_add2I	PSU
JDK-8241770	Module xxxAnnotation() methods throw NCDFE if module-info.class found as resource in unnamed module	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8241649	Optimize Character.toString	PSU
JDK-8241598	Upgrade JLine to 3.14.0	PSU
JDK-8240795	[REDO] 8238384 CTW: C2 compilation fails with "assert(store != load.find_exact_control(load.in(0))) failed: dependence cycle found"	PSU
JDK-8240751	Shenandoah: fold ShenandoahTracer definition	PSU
JDK-8240704	ProcessBuilder/checkHandles/CheckHandles.java failed "AssertionError: Handle use increased by more than 10 percent."	PSU
JDK-8240353	AArch64: missing support for -XX:+ExtendedDTraceProbes in C1	PSU
JDK-8239355	(dc) Initial value of SO_SNDBUF should allow sending large datagrams (macOS)	PSU
JDK-8237495	Java MIDI fails with a dereferenced memory error when asked to send a raw 0xF7	PSU
JDK-8237483	AArch64 C1 OopMap inserted twice fatal error	PSU
JDK-8237392	Shenandoah: Remove unreliable assertion	PSU
JDK-8237369	Shenandoah: failed vmTestbase/nsk/jvmti/AttachOnDemand/attach021/TestDescription.java test	PSU
JDK-8235351	Lookup::unreflect should bind with the original caller independent of Method's accessible flag	PSU
JDK-8235324	Dying objects are published from users of CollectedHeap::object_iterate	PSU
JDK-8234796	Refactor Handshake::execute to take a more complex type than ThreadClosure	PSU
JDK-8234742	Improve handshake logging	PSU
JDK-8234508	VM_HeapWalkOperation::iterate_over_object reads non-strong fields with an on-strong load barrier	PSU
JDK-8233912	aarch64: minor improvements of atomic operations	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8233910	java/awt/ColorClass/AlphaColorTest.java is failing intermittently in nightly Linux-x64 system	PSU
JDK-8233164	C2 fails with assert(phase%C%get_alias_index(t) == phase%C%get_alias_index(t_adr)) failed: correct memory chain	PSU
JDK-8232905	JFR fails with assertion: assert(t%unflushed_size() == 0) failed: invariant	PSU
JDK-8232225	Rework the fix for JDK-8071483	PSU
JDK-8229474	Shenandoah: Cleanup CM::update_roots()	PSU
JDK-8229396	jdeps ignores multi-release when generate-module-info used on command line	PSU
JDK-8226810	Failed to launch JVM because of NullPointerException occurred on System.props	PSU
JDK-8225805	Java Access Bridge does not close the logger	PSU
JDK-8225773	jdeps --check produces NPE if there is any missing module dependence	PSU
JDK-8223186	HotSpot compile warnings from GCC 9	PSU
JDK-8222785	aarch64: add necessary masking for immediate shift counts	PSU
JDK-8222518	Remove unnecessary caching of Parker object in java.lang.Thread	PSU
JDK-8221995	AARCH64: problems with CAS instructions encoding	PSU
JDK-8221584	SIGSEGV in os::PlatformEvent::unpark() in JvmtiRawMonitor::raw_exit while posting method exit event	PSU
JDK-8218550	Add test omitted from JDK-8212043	PSU
JDK-8218482	sun/security/krb5/auto/ReplayCachePrecise.java failed - no KrbException thrown	PSU
JDK-8217848	[Graal] vmTestbase/nsk/jvmti/ResourceExhausted/resexhausted003/TestDescription.java fails	PSU
JDK-8215687	[Graal] unit test CheckGraalIntrinsics failed after 8212043	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8214741	docs/index.html has no title or copyright	PSU
JDK-8214230	Classes generated by SystemModulesPlugin.java are not reproducible	PSU
JDK-8214223	tools/jdeps/listdeps/ListModuleDeps.java failed due to missing Lib2 file	PSU
JDK-8214180	Need better granularity for sleeping	PSU
JDK-8213909	jdeps --print-module-deps should report missing dependences	PSU
JDK-8213116	javax/swing/JComboBox/WindowsComboBoxSize/WindowsComboBoxSizeTest.java fails in Windows	PSU
JDK-8212218	[TESTBUG] runtime/ErrorHandling/TestHeapDumpOnOutOfMemoryErrorInMetaspace.java timed out	PSU
JDK-8212043	AArch64: Add floating-point Math.min/max intrinsics	PSU
JDK-8211825	ModuleLayer.defineModulesWithXXX does not setup delegation when module reads automatic module	PSU
JDK-8211150	G1 Full GC not purging code root memory and hence causing memory leak	PSU
JDK-8211057	Gensrc step CompileProperties generates unstable CompilerProperties output	PSU
JDK-8211051	jdeps usage of --dot-output doesn't provide valid output for modular jar	PSU
JDK-8210578	AArch64: Invalid encoding for fmlsvs instruction	PSU
JDK-8210413	AArch64: Optimize div/rem by constant in C1	PSU
JDK-8209447	vmTestbase/vm/mlvm/indy/func/jvmti/mergeCP_none2indy_b/TestDescription.java timed out	PSU
JDK-8209193	Fix aarch64-linux compilation after -Wreorder changes	PSU
JDK-8206925	Support the certificate_authorities extension	PSU
JDK-8205992	jhsdb cannot attach to Java processes running in Docker containers	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8202343	Disable TLS 1.0 and 1.1	PSU
JDK-8180837	SunPKCS11-NSS tests failing with CKR_ATTRIBUTE_READ_ONLY and CKR_MECHANISM_PARAM_INVALID	PSU
JDK-8168869	jdeps: localized messages don't use proper line breaks	PSU
JDK-8086003	Test fails on OSX with java.lang.RuntimeException 'Narrow klass base: 0x0000000000000000, Narrow klass shift: 3' missing	PSU
JDK-7146776	Deadlock between URLStreamHandler.getHostAddress and file.Handler.openConnection	PSU
JDK-7107012	sun.jvm.hostspot.code.CompressedReadStream readDouble() conversion to long mishandled	PSU

About This Build

Azul Zulu for Arm 64-bit is a binary build of OpenJDK that Azul builds for the platforms based on the Arm 64-bit architecture. Azul Zulu binary builds are distributed as bundles. A bundle is a package that includes specific components of the binary build (e.g. headless JRE, Compact Profiles, specific CPU types, etc.). This section details the target platforms and the bundles included with this Azul Zulu build.

Azul Zulu 11.48 for Arm 64-bit provides the following bundles:

- Java Development Kit:

```
zulu11.48.21-ca-jdk11.0.11-linux_aarch64.tar.gz
```

Supported Platforms

Azul Zulu 11.48 for Arm 64-bit is built for the platforms that meet the following requirements:

- Linux-based operating system with a kernel version of 3.10.x and higher.
- Arm v8 CPU with 64-bit support.
- Linux Arm 64-bit EABI.

Supported Functionality

HotSpot Compilers

In addition to the optimized template interpreter, Azul Zulu includes the following HotSpot just-in-time (JIT) compiler(s):

- Client Compiler (C1)
- Server Compiler (C2)

Use the following command-line options to change compilation behavior:

- `-Xint` – Runs the application in interpreted-only mode.
- `-Xcomp` – Enforces compilation of methods on first invocation.
- `-Xbatch` – Disables background compilation so that compilation of all methods proceeds as a foreground task until completed.
- `-XX:[+/-]TieredCompilation` – Enables or disables the tiered compilation (enabled by default). When the tiered compilation is disabled, only the server compiler is used.
- `-XX:TieredStopAtLevel=X` – Limits the compilation level (0 - interpreted, 1 - only the client compiler is used, 4 - full tiered compilation up to C2).

For more information on how to fine-tune compilation behavior, refer to the extended list of [Advanced JIT Compiler Options](#).

Getting Started with Azul Zulu

To start using Azul Zulu, follow the steps given below.

1. Extract the installation archive to a dedicated directory. The name of the installation archive depends on the type of bundle:

- JDK bundle:

```
zulu11.48.21-ca-jdk11.0.11-linux_aarch64.tar.gz
```

You can extract the archive by running the following command in the terminal:

```
$ tar -xzf zulu11.48.21-ca-jdk11.0.11-linux_aarch64.tar.gz
```

The command will create a new directory named after the archive but without the extension (`.tar.gz`). This directory contains all the files of your Azul Zulu bundle. We will refer to this directory as `<ZULU_HOME>`.

2. Verify the Java version of your Azul Zulu installation.

Run `<ZULU_HOME>/bin/java -version` command and verify that the output is similar to the example below:

```
$ <ZULU_HOME>/bin/java -version
openjdk version "11.0.11" 2021-04-20 LTS
OpenJDK Runtime Environment Zulu11.48+21-CA (build 11.0.11+9-LTS)
OpenJDK 64-Bit Server VM Zulu11.48+21-CA (build 11.0.11+9-LTS,
mixed mode)
```

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