



**Azul Zulu builds of OpenJDK
April 21, 2021 Update Release**

Azul Zulu 8.54 (CA) for Arm 32-bit Soft-Float

Document Version: 1.0

Updated: Apr 21, 2021

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Revision History

Revision	Date	Description
1.0	April 21, 2021	Initial version of the document.

What's New

April 21, 2021 PSU Release

This section describes new features and changes in behavior introduced in April 21, 2021 Azul Zulu PSU Update Release.

Azul Zulu Version:	8.54.0.21 (8u292-b10)
Release Date:	April 21, 2021
Based on Azul Zulu Version:	8.53.0.12 (8u291-b01)

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 21, 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-8227467	Better class method invocations	CPU
JDK-8035166	Remove dependency on EC classes from pkcs11 provider	CPU
JDK-8264171	Missing aarch64 parts of JDK-8236179 (C1 register allocation failure with T_ADDRESS)	PSU
JDK-8263008	AARCH64: Add debug info for libsaproc.so	PSU
JDK-8262073	assert(allocates2(pc)) failed: not in CodeBuffer memory	PSU
JDK-8261952	Avoid converting path to vcruntime140.dll to short-style path	PSU
JDK-8261790	(zipfs) Files.setPosixFilePermission does not work with CIFS share	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8261766	[8u] hotspot needs to recognise cl.exe 19.16 to build with VS2017	PSU
JDK-8261231	Windows IME was disabled after DnD operation	PSU
JDK-8260349	Cannot programmatically retrieve Metaspace max set via JAVA_TOOL_OPTIONS	PSU
JDK-8259568	PPC64 builds broken after JDK-8221408 8u backport	PSU
JDK-8259384	CUP version wrong in THIRD_PARTY_README after JDK-8233548	PSU
JDK-8259312	VerifyCACerts.java fails as soneraclass2ca cert will expire in 90 days	PSU
JDK-8258833	Cancel multi-part cipher operations in SunPKCS11 after failures	PSU
JDK-8258430	8u backport of JDK-8063107 missing test/javax/swing/JRadioButton/8041561/bug8041561.java changes	PSU
JDK-8258396	SIGILL in jdk.jfr.internal.PlatformRecorder.rotateDisk()	PSU
JDK-8258241	[8u] Missing doPrivileged() hunks from JDK-8226575	PSU
JDK-8257746	Regression introduced with JDK-8250984 - memory might be null in some machines	PSU
JDK-8257242	[macOS] Java app crashes while switching input methods	PSU
JDK-8257192	Integrate AArch64 JIT port into 8u	PSU
JDK-8256682	JDK-8202343 is incomplete	PSU
JDK-8256642	[TEST_BUG] jdk/test/javax/sound/midi/MidiSystem/DefaultProperties.java failed	PSU
JDK-8256421	Add 2 HARICA roots to cacerts truststore	PSU
JDK-8255937	Better cleanup for test/jdk/javax/imageio/stream/StreamFlush.java	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

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8254854	[cgroups v1] Metric limits not properly detected on some join controller combinations	PSU
JDK-8253932	SSL debug log prints incorrect caller info	PSU
JDK-8253476	TestUseContainerSupport.java fails on some Linux kernels w/o swap limit capabilities	PSU
JDK-8253368	TLS connection always receives close_notify exception	PSU
JDK-8253015	Aarch64: Move linux code out from generic CPU feature detection	PSU
JDK-8252470	java/awt/dnd/DisposeFrameOnDragCrash/DisposeFrameOnDragTest.java fails on Windows	PSU
JDK-8251930	AArch64: Native types mismatch in hotspot	PSU
JDK-8251397	NPE on ClassValue.ClassValueMap.cacheArray	PSU
JDK-8250984	Memory Docker tests fail on some Linux kernels w/o cgroupv1 swap limit capabilities	PSU
JDK-8250824	AArch64: follow up for JDK-8248414	PSU
JDK-8249588	libwindowsaccessbridge issues on 64bit Windows	PSU
JDK-8249183	JVM crash in "AwtFrame::WmSize" method	PSU
JDK-8248532	Every time I change keyboard language at my MacBook, Java crashes	PSU
JDK-8248414	AArch64: Remove uses of long and unsigned long ints	PSU
JDK-8248336	AArch64: C2: offset overflow in BoxLockNode::emit	PSU
JDK-8248219	aarch64: missing memory barrier in fast_storefield and fast_accessfield	PSU
JDK-8247979	aarch64: missing side effect of killing flags for clearArray_reg_reg	PSU
JDK-8246482	Build failures with +JFR -PCH	PSU
JDK-8244621	[macos10.15] Garbled FX printing plus CoreText warnings on Catalina when building with Xcode 11	PSU
JDK-8240353	AArch64: missing support for -XX:+ExtendedDTraceProbes in C1	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8239091	Reversed arguments in call to strstr in freetype "debug" code.	PSU
JDK-8238579	URLConnection drops the timeout and hangs forever in read	PSU
JDK-8237512	AArch64: aarch64TestHook leaks a BufferBlob	PSU
JDK-8236500	Windows ucrt.dll should be looked up in versioned WINSDK subdirectory	PSU
JDK-8233839	aarch64: missing memory barrier in NewObjectArrayStub and NewTypeArrayStub	PSU
JDK-8230388	ProblemList additional compiler/rtm tests	PSU
JDK-8229284	[TESTBUG] jdk/internal/platform/cgroup/TestCgroupMetrics.java fails for - memory:getMemoryUsage	PSU
JDK-8229145	Revert TemplateTable::bytecode() visibility change	PSU
JDK-8229124	Revert disassembler.cpp changes	PSU
JDK-8229123	Revert build fixes for aarch64/zero	PSU
JDK-8228770	Revert development hsdisk changes	PSU
JDK-8228767	Revert ResourceMark additions	PSU
JDK-8228747	Revert "unused" attribute from test_arraycopy_func	PSU
JDK-8228725	AArch64: Purge method call format support	PSU
JDK-8228718	Revert incorrect backport of JDK-8129757 to 8-aarch64	PSU
JDK-8228716	Revert InstanceKlass::print_on debug additions	PSU
JDK-8228593	Revert explicit JDK 7 support additions	PSU
JDK-8228434	jdk/net/sockets/Test.java fails after JDK-8227642	PSU
JDK-8228406	Superfluous change in chaitin.hpp	PSU
JDK-8228400	Remove built-in AArch64 simulator	PSU
JDK-8227642	[TESTBUG] Make docker tests podman compatible	PSU
JDK-8226899	ProblemList compiler/rtm tests	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8225805	Java Access Bridge does not close the logger	PSU
JDK-8224880	AArch64: java/javac error with AllocatePrefetchDistance	PSU
JDK-8224851	AArch64: fix warnings and errors with Clang and GCC 8.3	PSU
JDK-8224828	aarch64: rflags is not correct after safepoint poll	PSU
JDK-8224671	AArch64: mauve System.arraycopy test failure	PSU
JDK-8223186	HotSpot compile warnings from GCC 9	PSU
JDK-8221658	aarch64: add necessary predicate for ubfx patterns	PSU
JDK-8221408	Windows 32bit build build errors/warnings in hotspot	PSU
JDK-8221220	AArch64: Add StoreStore membar explicitly for Volatile Writes in TemplateTable	PSU
JDK-8219635	aarch64: missing LoadStore barrier in TemplateTable::fast_storefield	PSU
JDK-8219011	Implement MacroAssembler::warn method on AArch64	PSU
JDK-8218185	aarch64: missing LoadStore barrier in TemplateTable::putfield_or_static	PSU
JDK-8217368	AArch64: C2 recursive stack locking optimisation not triggered	PSU
JDK-8217338	[Containers] Improve systemd slice memory limit support	PSU
JDK-8216989	CardTableBarrierSetAssembler::gen_write_ref_array_post_barrier() does not check for zero length on AARCH64	PSU
JDK-8216987	ciMethodData::load_data() unpacks MDOs with non-atomic copy	PSU
JDK-8216350	AArch64: monitor unlock fast path not called	PSU
JDK-8215961	jdk/jfr/event/os/TestCPUInformation.java fails on AArch64	PSU
JDK-8215951	AArch64: jtreg test vmTestbase/nsk/jvmti/PopFrame/popframe005 segfaults	PSU
JDK-8214857	"bad trailing membar" assert failure at memnode.cpp:3220	PSU
JDK-8213134	AArch64: vector shift failed with MaxVectorSize=8	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8211233	MemBarNode::trailing_membar() and MemBarNode::leading_membar() need to handle dying subgraphs better	PSU
JDK-8211064	[AArch64] Interpreter and c1 don't correctly handle jboolean results in native calls	PSU
JDK-8209835	AArch64: elide barriers on all volatile operations	PSU
JDK-8209420	Track membars for volatile accesses so they can be properly optimized	PSU
JDK-8209415	Fix JVMTI test failure HS202	PSU
JDK-8209414	AArch64: method handle invocation does not respect JVMTI interp_only mode	PSU
JDK-8209413	AArch64: NPE in clhsdb jstack command	PSU
JDK-8207838	AArch64: Float registers incorrectly restored in JNI call	PSU
JDK-8207345	AArch64: Trampoline generation code reads from uninitialized memory	PSU
JDK-8206179	com/sun/management/OperatingSystemMXBean/GetCommittedVirtualMemorySize.java fails with Committed virtual memory size illegal value	PSU
JDK-8206163	AArch64: incorrect code generation for StoreCM	PSU
JDK-8205421	AArch64: StubCodeMark should be placed after alignment	PSU
JDK-8203699	java/lang/invoke/SpecialInterfaceCall fails with SIGILL on aarch64	PSU
JDK-8203481	Incorrect constraint for unextended_sp in frame:safe_for_sender	PSU
JDK-8202343	Disable TLS 1.0 and 1.1	PSU
JDK-8198334	java/awt/FileDialog/8003399/bug8003399.java fails in headless mode	PSU
JDK-8196221	AArch64: Mistake in committed patch for JDK-8195859	PSU
JDK-8196136	AArch64: Correct register use in patch for JDK-8195685	PSU
JDK-8195859	AArch64: vtableStubs gtest fails after 8174962	PSU
JDK-8195685	AArch64 cannot build with JDK-8174962	PSU
JDK-8193133	Assertion failure because 0xDEADDEAD can be in-heap	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8191915	JCK tests produce incorrect results with C2	PSU
JDK-8191129	AARCH64: Invalid value passed to critical JNI function	PSU
JDK-8189170	Add option to disable stack overflow checking in primordial thread for use with JNI_CreateJavaJVM	PSU
JDK-8187224	aarch64: some inconsistency between aarch64_ad.m4 and aarch64.ad	PSU
JDK-8186325	AArch64: jtreg test hotspot/test/gc/g1/TestJNIWeakG1/TestJNIWeakG1.java SEGV	PSU
JDK-8186090	java.nio.Bits.unaligned() doesn't handle aarch64	PSU
JDK-8185934	keytool and jarsigner shows "Signature algorithm: SHA1withECDSA, -1-bit key"	PSU
JDK-8182581	aarch64: fix for crash caused by earlyret of compiled method	PSU
JDK-8179954	AArch64: C1 and C2 volatile accesses are not sequentially consistent	PSU
JDK-8177661	AArch64: Incorrect C2 patterns cause system register corruption	PSU
JDK-8173472	AArch64: C1 comparisons with null only use 32-bit instructions	PSU
JDK-8172881	AArch64: assertion failure: the int pressure is incorrect	PSU
JDK-8172404	Tools should warn if weak algorithms are used before restricting them	PSU
JDK-8171537	aarch64: compiler/c1/Test6849574.java generates guarantee failure in C1	PSU
JDK-8171410	aarch64: long multiplyExact shifts by 31 instead of 63	PSU
JDK-8170873	PPC64/aarch64: Poor StrictMath performance due to non-optimized compilation	PSU
JDK-8170188	aarch64: jtreg test compiler/types/TestMeetIncompatibleInterfaceArrays.java causes JVM crash	PSU
JDK-8170100	AArch64: Crash in C1-compiled code accessing References	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8168996	C2 crash at postaloc.cpp:140 : assert(false) failed: unexpected yanked node	PSU
JDK-8168888	AArch64 port of JDK-8160591	PSU
JDK-8168699	Validate special case invocations [AArch64 support]	PSU
JDK-8167595	AArch64: SEGV in stub code cipherBlockChaining_decryptAESCrypt	PSU
JDK-8167421	AArch64: in one core system, fatal error: Illegal threadstate encountered	PSU
JDK-8167281	IIOMetadataNode bugs in getElementByTagName and NodeList.item methods	PSU
JDK-8167200	AArch64: Broken stack pointer adjustment in interpreter	PSU
JDK-8166607	G1 needs klass_or_null_acquire	PSU
JDK-8165673	AArch64: Fix JNI floating point argument handling	PSU
JDK-8164113	AArch64: follow-up the fix for 8161598	PSU
JDK-8163363	AArch64: Stack size in tools/launcher/Settings.java needs to be adjusted	PSU
JDK-8161190	AArch64: Fix overflow in immediate cmp instruction	PSU
JDK-8161072	AArch64: jtreg compiler/uncommontrap/TestDeoptOOM failure	PSU
JDK-8160748	Inconsistent types for ideal_reg	PSU
JDK-8159063	aarch64: optimise unaligned array copy long	PSU
JDK-8159052	AArch64: Optimise unaligned copies in pd_disjoint_words and pd_conjoint_words	PSU
JDK-8158913	aarch64: SEGV running Spark terasort	PSU
JDK-8158525	Update a few java/net tests to use the loopback address instead of the host address	PSU
JDK-8157906	aarch64: some more integer rotate instructions are never emitted	PSU
JDK-8157841	aarch64: prefetch ignores cache line size	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8156731	aarch64: java/util/Arrays/Correct.java fails due to _generic_arraycopy stub routine	PSU
JDK-8155653	TestVectorUnalignedOffset.java not pushed with 8155612	PSU
JDK-8155627	Enable SA on AArch64	PSU
JDK-8155617	aarch64: ClearArray does not use DC ZVA	PSU
JDK-8155612	Aarch64: vector nodes need to support misaligned offset	PSU
JDK-8155100	AArch64: Relax alignment requirement for byte_map_base	PSU
JDK-8155015	Aarch64: bad assert in spill generation code	PSU
JDK-8154739	AArch64: TemplateTable::fast_xaccess loads in wrong mode	PSU
JDK-8154537	AArch64: some integer rotate instructions are never emitted	PSU
JDK-8154413	AArch64: Better byte behaviour	PSU
JDK-8153797	aarch64: Add Arrays.fill stub code	PSU
JDK-8153713	aarch64: improve short array clearing using store pair	PSU
JDK-8153172	aarch64: hotspot crashes after the 8.1 LSE patch is merged	PSU
JDK-8152840	aarch64: improve _unsafe_arraycopy stub routine	PSU
JDK-8152537	aarch64: Make use of CBZ and CBNZ when comparing unsigned values with zero	PSU
JDK-8151775	aarch64: add support for 8.1 LSE atomic operations	PSU
JDK-8151502	aarch64: optimize pd_disjoint_words and pd_conjoint_words	PSU
JDK-8151340	aarch64: prefetch the destination word for write prior to ldxr/stxr loops	PSU
JDK-8150652	Remove unused code in AArch64 back end	PSU
JDK-8150394	aarch64: add support for 8.1 LSE CAS instructions	PSU
JDK-8150313	aarch64: optimise array copy using SIMD instructions	PSU
JDK-8150229	aarch64: pipeline class for several instructions is not set correctly	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8150204	(fs) Enhance java/nio/file/Files/probeContentType/Basic.java debugging output	PSU
JDK-8150082	aarch64: optimise small array copy	PSU
JDK-8150045	AArch64: arraycopy causes segfaults in SATB during garbage collection	PSU
JDK-8150038	aarch64: Make use of CBZ and CBNZ when comparing narrow pointer with zero	PSU
JDK-8149907	aarch64: use load/store pair instructions in call_stub	PSU
JDK-8149365	aarch64: memory copy does not prefetch on backwards copy	PSU
JDK-8149080	AArch64: Recognize disjoint array copy in stub code	PSU
JDK-8148948	aarch64: generate_copy_longs calls align() incorrectly	PSU
JDK-8148783	aarch64: SEGV running SpecJBB2013	PSU
JDK-8148328	aarch64: redundant lsr instructions in stub code	PSU
JDK-8145320	Create unsafe_arraycopy and generic_arraycopy for AArch64	PSU
JDK-8145051	Wrong parameter name in synthetic lambda method leads to verifier error	PSU
JDK-8141457	keytool default cert fingerprint algorithm should be SHA-256	PSU
JDK-8135018	AArch64: Missing memory barriers for CMS collector	PSU
JDK-8132875	AArch64: Fix error introduced into AArch64 CodeCache by commit for 8130309	PSU
JDK-8131779	AArch64: add Montgomery multiply intrinsic	PSU
JDK-8130309	Need to bailout cleanly if creation of stubs fails when codecache is out of space	PSU
JDK-8129626	G1: set_in_progress() and clear_started() needs a barrier on non-TSO platforms	PSU
JDK-8081547	Prepare client libs regression tests for running in a concurrent, headless jtreg environment	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-8080911	sun/security/krb5/auto/UseCacheAndStoreKey.java timed out intermittently	PSU
JDK-8078614	WindowsClassicLookAndFeel : MetalComboBoxUI.getbaseLine fails with IllegalArgumentException	PSU
JDK-8078450	Implement consistent process for quarantine of tests	PSU
JDK-8078024	javac, several incorporation steps are silently failing when an error should be reported	PSU
JDK-8061777	(zipfs) IllegalArgumentException in ZipCoder.toString when using Shift_JIS	PSU
JDK-8043264	hdsis library not picked up correctly on expected paths	PSU
JDK-8041561	Inconsistent opacity behaviour between JCheckBox and JRadioButton	PSU
JDK-8041464	[TEST_BUG] CustomClassLoaderTransferTest does not support OS X	PSU
JDK-8038723	Open up some PrinterJob tests	PSU
JDK-8035186	j2se_jdk/jdk/test/java/lang/invoke/lambda/LogGeneratedClassesTest.java - assertion error	PSU
JDK-8031126	java/lang/management/ThreadMXBean/ThreadUserTime.java fails intermittently	PSU
JDK-7185221	[macosx] Regtest should not throw exception if a suitable display mode found	PSU
JDK-7131835	[TEST_BUG] Test does not consider that the rounded edges of the window in Mac OS 10.7	PSU
JDK-7112454	TEST_BUG: java/awt/Choice/PopdownGeneratesMouseEvents/PopdownGeneratesMouseEvents.html failed	PSU
JDK-7107012	sun.jvm.hostspot.code.CompressedReadStream readDouble() conversion to long mishandled	PSU
JDK-7009641	Don't use CodeCache for allocations if it is already full	PSU

OpenJDK Patch ID	Synopsis	CPU/PSU
JDK-6896810	TEST_BUG: java/lang/ref/SoftReference/Pin.java fails with OOME during System.out.println	PSU
JDK-6345095	regression test EmptyClipRenderingTest fails	PSU

About This Build

Azul Zulu for Arm 32-bit Soft-Float is a binary build of OpenJDK that Azul builds for the platforms based on the Arm 32-bit Soft-Float 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 8.54.0.21 for Arm 32-bit Soft-Float provides the following bundles:

- Java Development Kit:

```
zulu8.54.0.21-ca-jdk8.0.292-linux_aarch32sf.tar.gz
```

Supported Platforms

Azul Zulu 8.54 for Arm 32-bit Soft-Float is built for the platforms that meet the following requirements:

- Linux-based operating system with a kernel version of 3.10.x (or higher) and glibc 2.9.
- Arm version 5TE and above, excluding ARMv5TEv8. Arm v6k (and higher) CPU architecture with or without VFP.
- Linux soft-float EABI. If FPU is present and available, it will be used to speed up floating point operations.

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)

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.

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:

```
zulu8.54.0.21-ca-jdk8.0.292-linux_aarch32sf.tar.gz
```

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

```
$ tar -xzf zulu8.54.0.21-ca-jdk8.0.292-linux_aarch32sf.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 "1.8.0_292"
OpenJDK Runtime Environment (Zulu 8.54.0.21-CA-linux_aarch32sf)
(build 1.8.0_292-b10)
OpenJDK Client VM (Zulu 8.54.0.21-CA-linux_aarch32sf) (build
25.292-b10, mixed mode)
```

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