



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

Azul Zulu 8.56 (CA) for Arm 64-bit

Document Version: 1.1

Updated: Jul 23, 2021

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Revision History

| Revision | Date | Description |
|----------|---------------|--|
| 0.1 | July 20, 2021 | Initial version of the document. |
| 1.0 | July 20, 2021 | Added information about the CVEs fixed in this release. |
| 1.1 | July 23, 2021 | Added more explanation about Azul Zulu dropping support for OpenJSSE and Legacy8uJSSE. In previous versions of the document, some OpenJDK bugs were erroneously marked as CPU bugs instead of PSU bugs. The error is corrected in this version. |

What's New

July 20, 2021 PSU Release

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

| | |
|------------------------------------|-----------------------|
| Azul Zulu Version: | 8.56.0.23 (8u302-b08) |
| Release Date: | July 20, 2021 |
| Based on Azul Zulu Version: | 8.55.0.14 (8u301-b02) |

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 does not contain any changes to the time zone data.

What's New

Third Party Licenses documents now combine licenses for CPU and PSU bundles

Starting with this release, Azul will provide third party licenses for CPU and PSU bundles in a single document, which contains the superset of the licenses. See <https://docs.azul.com/core/tpl>.

Notice of Upcoming Changes

- Azul Zulu 8 is dropping support for OpenJSSE and Legacy8uJSSE by January 2022.

[OpenJSSE](#) is a JSSE provider that was ported from Java 11 to add support for TLS 1.3, because OpenJDK 8 did not support TLS 1.3 at the time. Later, OpenJSSE became part of OpenJDK 8u272. [Legacy8uJSSE](#) is a JSSE provider that falls back to legacy TLS 1.2 protocol implementation. It was added to Azul Zulu 8 for compatibility reasons.

Since support for TLS 1.3 was integrated into OpenJDK 8 (and became part of Java SE 8 specification), both OpenJSSE and Legacy8uJSSE are no longer needed and will be removed from Azul Zulu.

Fixed Issues

JDK Common Vulnerabilities and Exposure (CVE) Fixes

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

| CVE # | Component | Protocol | Remote Exploit w/o Auth. | Base Score | Attack Vector | Attack Complex | Privileges Req'd | User Interact | Scope | Confidentiality | Integrity | Availability | Azul Zulu Versions Affected | Notes |
|--------------------------------|---|----------|--------------------------|------------|---------------|----------------|------------------|---------------|-----------|-----------------|-----------|--------------|-----------------------------|--------|
| CVE-2021-2388 | Hotspot | Multiple | Yes | 7.5 | Network | High | None | Required | Unchanged | High | High | High | 16, 15, 13, 11, 8 | Note 1 |
| CVE-2021-2369 | Library | Multiple | Yes | 4.3 | Network | Low | None | Required | Unchanged | None | Low | None | 16, 15, 13, 11, 8, 7, 6 | Note 1 |
| CVE-2021-2432 | JNDI | Multiple | Yes | 3.7 | Network | High | None | None | Unchanged | None | None | Low | 7, 6 | Note 2 |
| CVE-2021-2341 | Networking | Multiple | Yes | 3.1 | Network | High | None | Required | Unchanged | Low | None | None | 16, 15, 13, 11, 8, 7, 6 | Note 1 |
| CVE-2021-29921 | Oracle GraalVM Enterprise Edition: Python interpreter and runtime (CPython) | Multiple | Yes | 9.8 | Network | Low | None | None | Unchanged | High | High | High | None | |
| CVE-2020-28928 | Oracle GraalVM Enterprise Edition: LLVM Interpreter (musl libc) | None | No | 5.5 | Local | Low | Low | None | Unchanged | None | None | High | None | |

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. 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). |

| ID | Notes |
|----|--|
| 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. This vulnerability can also be exploited by using APIs in the specified Component, e.g., through a web service which supplies data to the APIs. |

Non-CVE Security Fixes

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|--|---------|
| JDK-8264460 | Improve NTLM support | CPU |
| JDK-8264079 | Improve abstractions | CPU |
| JDK-8263111 | Enhance String Conclusions | CPU |
| JDK-8262975 | Upgrade Glib support | CPU |
| JDK-8262967 | Improve Zip file support | CPU |
| JDK-8262477 | Enhance String Conclusions | CPU |
| JDK-8262410 | Enhanced rules for zones | CPU |
| JDK-8262403 | Enhanced data transfers | CPU |
| JDK-8262380 | Enhance XML processing passes | CPU |
| JDK-8260960 | Signs of jarsigner signing | CPU |
| JDK-8260453 | Improve Font Bounding | CPU |
| JDK-8256491 | Better HTTP transport | CPU |
| JDK-8256157 | Improve bytecode assembly | CPU |
| JDK-8160768 | Add capability to custom resolve host/domain names within the default JNDI LDAP provider | CPU |

OpenJDK Bug Fixes

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

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|-----------------------------|---------|
| JDK-8264460 | Improve NTLM support | CPU |
| JDK-8264079 | Improve abstractions | CPU |
| JDK-8264066 | Enhance compiler validation | CPU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|--|---------|
| JDK-8262967 | Improve Zip file support | CPU |
| JDK-8262477 | Enhance String Conclusions | CPU |
| JDK-8262410 | Enhanced rules for zones | CPU |
| JDK-8262403 | Enhanced data transfers | CPU |
| JDK-8262380 | Enhance XML processing passes | CPU |
| JDK-8260967 | Better jar file validation | CPU |
| JDK-8260960 | Signs of jarsigner signing | CPU |
| JDK-8260453 | Improve Font Bounding | CPU |
| JDK-8258432 | Improve file transfers | CPU |
| JDK-8256491 | Better HTTP transport | CPU |
| JDK-8256157 | Improve bytecode assembly | CPU |
| JDK-8242565 | Policy initialization issues when the denyAfter constraint is enabled | CPU |
| JDK-8241248 | NullPointerException in sun.security.ssl.HKDF.extract(HKDF.java:93) | CPU |
| JDK-8141422 | G1 eager reclaim card dirtying may dirty outside of allocated objects | CPU |
| JDK-8069034 | gc/g1/TestEagerReclaimHumongousRegionsClearMarkBits.java nightly failure | CPU |
| JDK-8035134 | JDK9 unix debug bundle manifest file list issue | CPU |
| JDK-8270533 | AArch64: size_fits_all_mem_uses should return false if its output is a CAS | PSU |
| JDK-8269468 | JDK-8269388 breaks the build on older GCCs | PSU |
| JDK-8269388 | default build of jdk8 fails on newer GCCs with warnings as errors on format-overflow | PSU |
| JDK-8268444 | keytool -v -list print is incorrect after backport JDK-8141457 | PSU |
| JDK-8267689 | [8u] [aarch64] Crash due to bad shift in indirect addressing mode | PSU |
| JDK-8267545 | [8u] Enable Xcode 12 builds on macOS | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|---|---------|
| JDK-8267426 | MonitorVmStartTerminate test timed out on Embedded VM | PSU |
| JDK-8267235 | [macos_aarch64] InterpreterRuntime::throw_pending_exception messing up LR results in crash | PSU |
| JDK-8266929 | Unable to use algorithms from 3p providers | PSU |
| JDK-8266723 | JFR periodic events are causing extra allocations | PSU |
| JDK-8266191 | Missing aarch64 parts of JDK-8181872(C1: possible overflow when strength reducing integer multiply by constant) | PSU |
| JDK-8265988 | Fix sun/text/IntHashtable/Bug4170614 for JDK 8u | PSU |
| JDK-8265832 | runtime/StackGap/testme.sh fails to compile in 8u | PSU |
| JDK-8265666 | Enable AIX build platform to make external debug symbols | PSU |
| JDK-8265462 | Handle multiple slots in the NSS Internal Module from SunPKCS11's Secmod | PSU |
| JDK-8264816 | Weak handles leak causes GC to take longer | PSU |
| JDK-8264640 | CMS ParScanClosure misses a barrier | PSU |
| JDK-8264562 | assert(verify_field_bit(1)) failed: Attempting to write an uninitialized event field: type | PSU |
| JDK-8264509 | jdk8u MacOS zipped debug symbols won't build | PSU |
| JDK-8263504 | Some OutputMachOpcodes fields are uninitialized | PSU |
| JDK-8263061 | copy wrong unpack200.diz to bin directory on linux after 8252395 | PSU |
| JDK-8262864 | No debug symbols in image for Windows --with-native-debug-symbols=external | PSU |
| JDK-8262730 | Enable jdk8u MacOS external debug symbols | PSU |
| JDK-8262726 | AArch64: C1 StubAssembler::call_RT can corrupt stack | PSU |
| JDK-8262446 | DragAndDrop hangs on Windows | PSU |
| JDK-8262110 | DST starts from incorrect time in 2038 | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|--|---------|
| JDK-8261867 | Backport relevant test changes & additions from JDK-8130125 | PSU |
| JDK-8261355 | No data buffering in SunPKCS11 Cipher encryption when the underlying mechanism has no padding | PSU |
| JDK-8261183 | Follow on to Make lists of normal filenames | PSU |
| JDK-8260704 | ParallelGC: oldgen expansion needs release-store for _end | PSU |
| JDK-8260484 | CheckExamples.java / NoJavaLangTest.java fail with jtreg 4.2 | PSU |
| JDK-8260356 | (tz) Upgrade time-zone data to tzdata2021a | PSU |
| JDK-8260255 | C1: LoopInvariantCodeMotion constructor can leave some fields uninitialized | PSU |
| JDK-8260236 | better init AnnotationCollector _contended_group | PSU |
| JDK-8260029 | aarch64: fix typo in verify_oop_array | PSU |
| JDK-8259886 | Improve SSL session cache performance and scalability | PSU |
| JDK-8259619 | C1: 3-arg StubAssembler::call_RT stack-use condition is incorrect | PSU |
| JDK-8259428 | AlgorithmId.getEncodedParams() should return copy | 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-8259048 | (tz) Upgrade time-zone data to tzdata2020f | PSU |
| JDK-8258753 | StartTlsResponse.close() hangs due to synchronization issues | PSU |
| JDK-8258669 | fastdebug jvm crashes when do event based tracing for monitor inflation | PSU |
| JDK-8258419 | RSA cipher buffer cleanup | PSU |
| JDK-8258247 | Couple of issues in fix for JDK-8249906 | PSU |
| JDK-8257999 | Parallel GC crash in gc/parallel/TestDynShrinkHeap.java: new region is not in covered_region | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|---|---------|
| JDK-8257997 | sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java again reports leaks after JDK-8257884 | PSU |
| JDK-8257884 | Re-enable sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java as automatic test | PSU |
| JDK-8257670 | sun/security/ssl/SSLSocketImpl/SSLSocketLeak.java reports leaks | PSU |
| JDK-8257039 | [8u] GenericTaskQueue destructor is incorrect | PSU |
| JDK-8256818 | SSLSocket that is never bound or connected leaks socket resources | PSU |
| JDK-8255734 | VM should ignore SIGXFSZ on ppc64, s390 too | PSU |
| JDK-8255716 | AArch64: Regression: JVM crashes if manually offline a core | PSU |
| JDK-8255086 | Update the root locale display names | PSU |
| JDK-8254631 | Better support ALPN byte wire values in SunJSSE | PSU |
| JDK-8253799 | Make lists of normal filenames | PSU |
| JDK-8252883 | AccessDeniedException caused by delayed file deletion on Windows | PSU |
| JDK-8250568 | Less ambiguous processing | PSU |
| JDK-8249906 | Enhance opening JARs | PSU |
| JDK-8249142 | java/awt/FontClass/CreateFont/DeleteFont.sh is unstable | PSU |
| JDK-8247350 | [aarch64] assert(false) failed: wrong size of mach node | PSU |
| JDK-8244543 | Enhanced handling of abstract classes | PSU |
| JDK-8244473 | Contextualize registration for JNDI | PSU |
| JDK-8243559 | Remove root certificates with 1024-bit keys | PSU |
| JDK-8241960 | The SHA3 message digests impl of SUN provider are not thread safe after cloned | PSU |
| JDK-8241829 | Cleanup the code for PrinterJob on windows | PSU |
| JDK-8241649 | Optimize Character.toString | PSU |
| JDK-8239400 | [8u] clean up delete-non-virtual-dtor warnings in HotSpot | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|---|---------|
| JDK-8239053 | [8u] clean up undefined-var-template warnings | PSU |
| JDK-8234011 | (zipfs) Memory leak in ZipFileSystem.releaseDeflater() | PSU |
| JDK-8231949 | [PPC64, s390]: Make async profiling more reliable | PSU |
| JDK-8231841 | AArch64: debug.cpp help() is missing an AArch64 line for pns | PSU |
| JDK-8231631 | sun/net/ftp/FtpURLConnectionLeak.java fails intermittently with NPE | PSU |
| JDK-8230428 | Cleanup dead CastIP node code in formssel.cpp | PSU |
| JDK-8227467 | Better class method invocations | PSU |
| JDK-8225116 | Test OwnedWindowsLeak.java intermittently fails | PSU |
| JDK-8225081 | Remove Telia Company CA certificate expiring in April 2021 | PSU |
| JDK-8217348 | assert(thread.is_Java_thread()) failed: just checking | PSU |
| JDK-8217230 | assert(t == t_no_spec) failure in NodeHash::check_no_speculative_types() | PSU |
| JDK-8214345 | infinite recursion while checking super class | PSU |
| JDK-8209996 | [PPC64] Fix JFR profiling. | PSU |
| JDK-8206243 | java -XshowSettings fails if memory.limit_in_bytes overflows LONG.max | PSU |
| JDK-8205014 | com/sun/jndi/ldap/DeadSSLLdapTimeoutTest.java failed with "Read timed out" | PSU |
| JDK-8203196 | C1 emits incorrect code due to integer overflow in _tableswitch keys | PSU |
| JDK-8199265 | java/util/Arrays/TimSortStackSize2.java fails with OOM | PSU |
| JDK-8196092 | javax/swing/JComboBox/8032878/bug8032878.java fails | PSU |
| JDK-8191955 | AArch64: incorrect prefetch distance causes an internal error | PSU |
| JDK-8190679 | java/util/Arrays/TimSortStackSize2.java fails with "Initial heap size set to a larger value than the maximum heap size" | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|--|---------|
| JDK-8190332 | PngReader throws NegativeArraySizeException/OOM error when IHDR width is very large | PSU |
| JDK-8183910 | gc/arguments/TestAggressiveHeap.java fails intermittently | PSU |
| JDK-8180478 | tools/launcher/MultipleJRE.sh fails on Windows because of extra- | PSU |
| JDK-8178403 | DirectAudio in JavaSound may hang and leak | PSU |
| JDK-8177809 | File.lastModified() is losing milliseconds (always ends in 000) | PSU |
| JDK-8172188 | JDI tests fail due to "permission denied" when creating temp file | PSU |
| JDK-8166724 | gc/g1/TestHumongousShrinkHeap.java fails with OOME | PSU |
| JDK-8166046 | [TESTBUG] compiler/stringopts/TestStringObjectInitialization.java fails with OOME | PSU |
| JDK-8159898 | Negative array size in java/beans/Introspector/Test8027905.java | PSU |
| JDK-8151786 | [TESTBUG] java/beans/XMLEncoder/Test4625418.java timed out intermittently | PSU |
| JDK-8138820 | JDK Hotspot build fails with Xcode 7.0.1 | PSU |
| JDK-8136592 | [TEST_BUG] Fix 2 platform-specific closed regtests for jigsaw | PSU |
| JDK-8134883 | C1 hard crash in range check elimination in Nashorn test262parallel | PSU |
| JDK-8134672 | [TEST_BUG] Some tests should check isDisplayChangeSupported | PSU |
| JDK-8132709 | [TESTBUG] gc/g1/TestHumongousShrinkHeap.java might fail on embedded | PSU |
| JDK-8132148 | G1 hs_err region dump legend out of sync with region values | PSU |
| JDK-8130430 | [TEST_BUG] remove unnecessary internal calls from javax/swing/JRadioButton/8075609/bug8075609.java | PSU |
| JDK-8130308 | Too low memory usage in TestPromotionFromSurvivorToTenuredAfterMinorGC.java | PSU |
| JDK-8129511 | PlatformMidi.c:83 uses malloc without malloc header | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|--|---------|
| JDK-8081764 | [TEST_BUG] Test javax/swing/plaf/aqua/CustomComboBoxFocusTest.java fails on Windows, Solaris Sparcv9 and Linux but passes on MacOSX | PSU |
| JDK-8078855 | [TEST_BUG] javax/swing/JComboBox/8032878/bug8032878.java fails in WindowsClassicLookAndFeel | PSU |
| JDK-8075071 | [TEST_BUG] TimSortStackSize2.java: OOME: Java heap space: MaxHeap shrunk by MaxRAMFraction | PSU |
| JDK-8074836 | Resolve disabled warnings for libosxkrb5 | PSU |
| JDK-8074835 | Resolve disabled warnings for libj2gss | PSU |
| JDK-8073446 | TimeZone getOffset API does not return a DST offset between years 2038-2137 | PSU |
| JDK-8071374 | Native disassembler implementation may be not thread-safe | PSU |
| JDK-8066807 | langtools/test/Makefile should use -agentvm not -samevm | PSU |
| JDK-8066508 | JTReg tests timeout on slow devices when run using JPRT | PSU |
| JDK-8064909 | FragmentMetaspace.java got OutOfMemoryError | PSU |
| JDK-8055754 | filemap.cpp does not compile with clang | PSU |
| JDK-8047939 | [TESTBUG] Rewrite test/runtime/8001071/Test8001071.sh | PSU |
| JDK-8042891 | Format issues embedded in macros for two g1 source files | PSU |
| JDK-8037825 | Fix warnings and enable "warnings as errors" in serviceability native libraries | PSU |
| JDK-8036095 | RMI tests using testlibrary.RMID and testlibrary.JavaVM do not pass through vmoptions | PSU |
| JDK-8035287 | gcc warnings compiling various libraries files | PSU |
| JDK-8035054 | JarFacade.c should not include ctype.h | PSU |
| JDK-8034857 | gcc warnings compiling src/solaris/native/sun/management | PSU |
| JDK-8034856 | gcc warnings compiling src/solaris/native/sun/security/pkcs11 | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|-----------------------------|---|---------|
| JDK-8033289 | clang: clean up unused function warning | PSU |
| JDK-8032050 | TEST_BUG: Clean up for java/rmi/activation/Activatable/shutdownGracefully/ShutdownGracefully.java | PSU |
| JDK-8028618 | [TEST_BUG] javax/swing/JScrollBar/bug4202954/bug4202954.java fails | PSU |
| JDK-7106851 | Test should not use System.exit | PSU |
| JDK-7059970 | Test case: javax/imageio/plugins/png/ITXtTest.java is not closing a file | PSU |
| JDK-6990210 | [TEST_BUG] EventDispatchThread/HandleExceptionOnEDT/HandleExceptionOnEDT.java fails on gnome | PSU |
| JDK-6878250 | (so) IllegalBlockingModeException thrown when reading from a closed SocketChannel's InputStream | PSU |

Zulu Bug Fixes

The following table describes the Azul Zulu bug fixes implemented in this release.

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|------------------|---|---------|
| ZULU-26149 | .diz bundles contain incorrect paths | CPU |
| ZULU-25214 | Flag -XX:+UseBCFIPS does not work on windows | CPU |
| ZULU-27870 | qnx-arm32hf build fails: 'struct stat64' has no members named 'st_mtim' and 'st_atim' | PSU |
| ZULU-26949 | Update OpenJSSE version to 1.1.7 | PSU |
| ZULU-26940 | Zulu installation fails on Debian Slim | PSU |
| ZULU-26220 | MSI Installer Should Update JAVA_HOME | PSU |

| OpenJDK Patch ID | Synopsis | CPU/PSU |
|------------------|--|---------|
| ZULU-25949 | Test sun/management/jmxremote/bootstrap/CustomLauncherTest.java bug: libjvmPath should be checked, not libPath | PSU |
| ZULU-25372 | Bump LZ4 version to 1.9.3 | PSU |
| ZULU-23831 | [HSDIS] Fix HSDIS build scripts to make it work on embedded architectures | PSU |
| ZULU-22367 | Swing classes are extremely slow when displaying Hebrew text | PSU |
| ZULU-22234 | CRIU exec "iptables" message mis-labeled as error | PSU |
| ZULU-20055 | Failure in tools/pack200/TimeStamp.java - jre/bin/unpack200 should exist and be executable | PSU |
| ZULU-13025 | sun/jvmsstat/monitor/MonitoredVm/MonitorVmStartTerminate.java timed out | 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 8.56.0.23 for Arm 64-bit provides the following bundles:

- Java Development Kit:

```
zulu8.56.0.23-ca-jdk8.0.302-linux_aarch64.tar.gz
```

Supported Platforms

Azul Zulu 8.56 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:

```
zulu8.56.0.23-ca-jdk8.0.302-linux_aarch64.tar.gz
```

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

```
$ tar -xzf zulu8.56.0.23-ca-jdk8.0.302-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 "1.8.0_302"
OpenJDK Runtime Environment (Zulu 8.56.0.23-CA-linux_aarch64)
(build 1.8.0_302-b08)
OpenJDK 64-Bit Server VM (Zulu 8.56.0.23-CA-linux_aarch64) (build
25.302-b08, mixed mode)
```

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