



Enabling RISC-V Support in Android

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Status of Android on RISC-V

Android can build and run in an emulator using the same mechanisms as any other platform.

- Android Common Kernel is now on 6.6
- Vector crypto, bit manipulation (Zba/b/s) landed, Vector in progress
- NDK canaries are available
- Cuttlefish now uses QEMU 8.1 with vector
- GFXStream support added for better local graphics performance
- Work is ongoing to land performance optimizations upstream first for various libraries

What's up with the Android ABI???

The short answer: it's still a work in progress.

There are some important decisions in the extension space that have not converged on a consensus yet, so we don't want to lock in an ABI too soon.

The long answer....



Supported ABI will be added to the CDD list per top-right ("riscv64", with no 32-bit equivalent); Will be linked to the descriptive text in the NDK Supported ABIs.

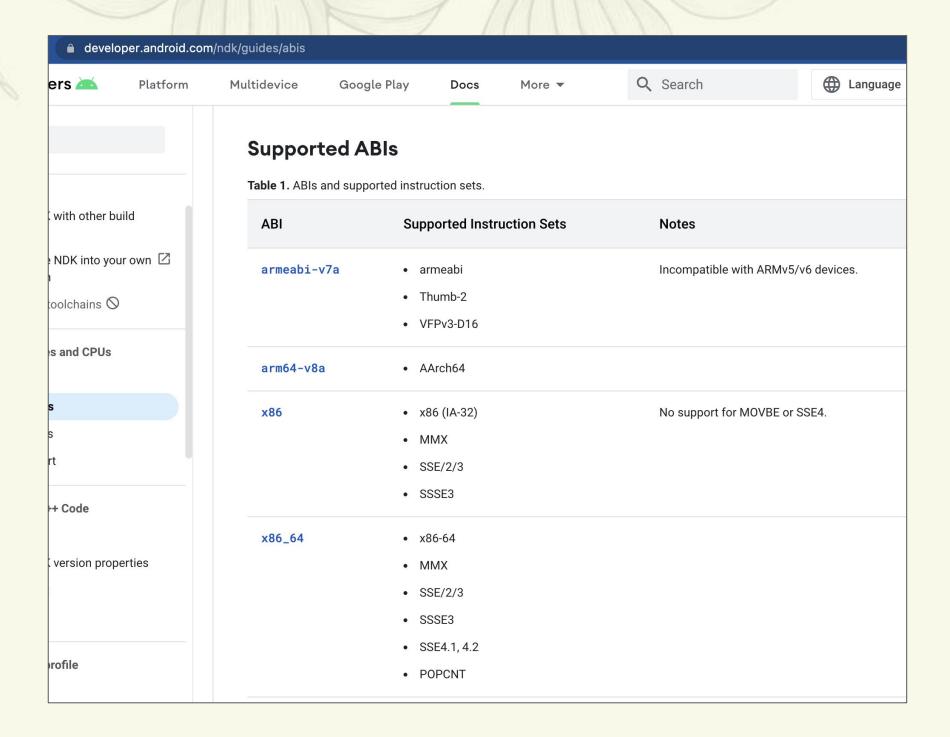
- All "supported instruction sets" will be a combination of
 - A RISC-V profile (still probably RVA22)
 - Ratified extensions (probably vector + vector crypto)
 - Intentional omissions: SIMD, Scalar Crypto

Will require Android-compatible devices to be conforming hardware

- Must correctly implement the RISC-V ISA
- Must not misuse elements of the encoding space reserved for future extensions

Android will only support ratified RISC-V extensions.

- [C-0-3] MUST be source-compatible (i.e. header-compatible) and binary-compatible (for the ABI) with each required library in the list below.
- [C-0-5] MUST accurately report the native Application Binary Interface (ABI) supported by the device, via the android.os.Build.SUPPORTED_ABIS, android.os.Build.SUPPORTED_32_BIT_ABIS, and android.os.Build.SUPPORTED_64_BIT_ABIS parameters, each a comma separated list of ABIs ordered from the most to the least preferred one.
- [C-0-6] MUST report, via the above parameters, a subset of the following list of ABIs and MUST NOT report any ABI not on the list.
 - armeabi (no longer supported as a target by the NDK)
 - armeabi-v7a
 - arm64-v8a
 - x86
 - x86-64
- [C-0-7] MUST make all the following libraries, providing native APIs, available to apps that include native code:



Interesting boards are starting to become available now.

Example: <u>Kendryte K230</u> which supports Vector 1.0
(Useful for library work but not to run Android)

More boards are on the horizon in 2024; RISE is working on a board farm for developers to use for testing.



How to participate

- Visit https://github.com/google/android-riscv64
 - Try it out
 - Check out the <u>issues list</u>
 - Check out this <u>Google Open Source Blog post</u> for more info
- For RISC-V generally:
 - Subscribe to the Android SIG mailing list: https://lists.riscv.org/g/sig-android
 - Check out RISE: https://riseproject.dev
 - The wiki has more info on the working groups
 - Also: help your favorite open source project optimize for RISC-V
 - QEMU improvement in particular will help everyone



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