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# Pine 64 ARM Linux Benchmark Comparison

Pine 64 1GB ARM SBC computer benchmarks using the Arch Linux spin. Comparison to other ARM platforms for a future article on Phoronix.com by Michael Larabel.

**Automated Executive Summary**

*Intel 4690k had the most wins, coming in first place for 85% of the tests.*

*Based on the geometric mean of all complete results, the fastest (Intel 4690k) was 124.668x the speed of the slowest (Raspberry Pi Zero). Jetson TX1 was 0.122x the speed of Intel 4690k, Jetson TK1 was 0.753x the speed of Jetson TX1, Raspberry Pi 3 was 0.592x the speed of Jetson TK1, PINE 64 1GB was 0.965x the speed of Raspberry Pi 3, ODROID C1 Plus was 0.983x the speed of PINE 64 1GB, Banana Pi M2 was 0.764x the speed of ODROID C1 Plus, Orange Pi PC was 0.821x the speed of Banana Pi M2, Raspberry Pi 2 was 0.997x the speed of Orange Pi PC, Orange Pi Plus was 0.83x the speed of Raspberry Pi 2, Raspberry Pi Zero was 0.299x the speed of Orange Pi Plus.*

## Test Systems:

## Raspberry Pi 3

Processor: ARMv7 rev 4 @ 1.20GHz (4 Cores), Motherboard: BCM2709 Raspberry Pi 3 Model B Rev 1.2, Memory: 925MB, Disk: 16GB SD16G, Graphics: LLVMpipe

OS: Raspbian 8.0, Kernel: 4.1.18-v7+ (armv7l), Desktop: LXDE 0.7.2, Display Server: X Server 1.17.2, OpenGL: 3.0 Mesa 11.1.0 Gallium 0.4, Compiler: GCC 4.9.2, File-System: ext4, Screen Resolution: 1824x984

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand

## Raspberry Pi 2

Processor: ARMv7 rev 5 @ 0.90GHz (4 Cores), Motherboard: BCM2709 Raspberry Pi 2 Model B Rev 1.1, Memory: 925MB, Disk: 8GB SD

OS: Raspbian 8.0, Kernel: 4.1.13-v7+ (armv7l), Desktop: LXDE 0.7.2, Display Server: X Server 1.16.4, Compiler: GCC 4.9.2, File-System: ext4, Screen Resolution: 1824x984

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand

## Raspberry Pi Zero

Processor: ARMv6-compatible rev 7 @ 1.00GHz (1 Core), Motherboard: BCM2708 Raspberry Pi ? Rev 1.2, Memory: 434MB, Disk: 8GB SL08G

OS: Raspbian 8.0, Kernel: 4.1.13+ (armv6l), Desktop: LXDE 0.7.2, Display Server: X Server 1.16.4, Compiler: GCC 4.9.2, File-System: ext4, Screen Resolution: 1776x952

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand

## Banana Pi M2

Processor: ARMv7 rev 3 @ 1.01GHz (4 Cores), Motherboard: Allwinner sun6i (A31) Family Banana Pi BPI-M2, Memory: 1024MB, Disk: 8GB SD

OS: Debian 8.1, Kernel: 4.2.0-BPI-kernel+ (armv7l), Compiler: GCC 4.9.2, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb -v
Processor Notes: Scaling Governor: cpufreq-dt ondemand

## ODROID C1 Plus

Processor: ARMv7 rev 1 @ 1.54GHz (4 Cores), Motherboard: ODROIDC, Memory: 836MB, Disk: 8GB SD

OS: Ubuntu 14.04, Kernel: 3.10.80-135 (armv7l), Desktop: LXDE 0.6.1, Display Server: X Server 1.15.1, OpenGL: 2.1 Mesa 10.1.3, Compiler: GCC 4.9.3, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --disable-werror --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-multilib --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb -v
Processor Notes: Scaling Governor: meson_cpufreq performance

## Orange Pi PC

Processor: ARMv7 rev 5 @ 1.20GHz (4 Cores), Motherboard: sun8i, Memory: 1024MB, Disk: 16GB SL16G

OS: Raspbian GNU/Linux 7, Kernel: 3.4.39 (armv7l), Desktop: LXDE 0.7.1, Display Server: X Server 1.12.4, Compiler: GCC 4.6.3, File-System: ext4, Screen Resolution: 1280x720

Compiler Notes: --build=arm-linux-gnueabihf --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,c++,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: cpufreq-sunxi ondemand

## Orange Pi Plus

Processor: ARMv7 rev 5 @ 1.20GHz (3 Cores), Motherboard: sun8i, Memory: 1024MB, Disk: 16GB SL16G

OS: Raspbian GNU/Linux 7, Kernel: 3.4.39 (armv7l), Desktop: LXDE 0.7.1, Display Server: X Server 1.12.4, Compiler: GCC 4.6.3, File-System: ext4, Screen Resolution: 1280x720

Compiler Notes: --build=arm-linux-gnueabihf --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,c++,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: cpufreq-sunxi ondemand

## Jetson TK1

Processor: ARMv7 rev 3 @ 2.32GHz (4 Cores), Motherboard: jetson-tk1, Memory: 2048MB, Disk: 16GB SEM16G, Graphics: GK20A/NullRM/AXI, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 14.04, Kernel: 3.10.40-gdacac96 (armv7l), Desktop: Unity 7.2.2, Display Server: X Server 1.15.1, Display Driver: NVIDIA 21.4, OpenGL: 4.3.0, Compiler: GCC 4.8.4 + CUDA 6.5, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libmudflap --disable-libquadmath --disable-sjlj-exceptions --disable-werror --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb -v
Processor Notes: Scaling Governor: tegra interactive

## Jetson TX1

Processor: Cortex A57 rev 1 @ 1.91GHz (4 Cores), Motherboard: jetson_tx1, Memory: 4096MB, Disk: 16GB 016G32, Graphics: NVIDIA Tegra X1 (nvgpu)/, Monitor: Acer G237HL

OS: Ubuntu 14.04, Kernel: 3.10.67-g3a5c467 (aarch64), Desktop: Unity 7.2.2, Display Server: X Server 1.15.1, Display Driver: NVIDIA 23.1.1, OpenGL: 4.3.0, Compiler: GCC 4.8.4 + Clang 3.4-1ubuntu3 + CUDA 7.0, File-System: ext4, Screen Resolution: 1920x1080

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Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libmudflap --disable-libquadmath --disable-sjlj-exceptions --disable-werror --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb -v
Processor Notes: Scaling Governor: tegra interactive

## PINE 64 1GB

Processor: AArch64 rev 4 @ 1.15GHz (4 Cores), Motherboard: sun50iw1p1, Memory: 1024MB, Disk: 16GB SL16G

OS: Arch Linux ARM, Kernel: 3.10.65-2-pine64-longsleep (aarch64), Desktop: Xfce 4.12, Display Server: X Server 1.18.1, Compiler: GCC 5.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=aarch64-unknown-linux-gnu --disable-libssp --disable-libstdcxx-pch --disable-libunwind-exceptions --disable-multilib --disable-werror --enable-__cxa_atexit --enable-checking=release --enable-clocale=gnu --enable-gnu-indirect-function --enable-gnu-unique-object --enable-install-libiberty --enable-languages=c,c++,fortran,go,lto,objc,obj-c++ --enable-lto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-unknown-linux-gnu --mandir=/usr/share/man --with-arch=armv8-a --with-isl --with-linker-hash-style=gnu
Processor Notes: Scaling Governor: cpufreq-sunxi performance

## Intel 4690k

Processor: Intel Core i5-4690K @ 3.90GHz (4 Cores), Motherboard: Gigabyte Z87X-UD5H-CF (10c BIOS), Chipset: Intel 4th Gen Core DRAM, Memory: 16384MB, Disk: 4001GB Seagate ST4000DM004-2CV1 + 240GB SanDisk SDSSDXPS, Graphics: ASUS NVIDIA GeForce GTX 750 Ti, Audio: Realtek ALC898, Monitor: Philips FTV + SyncMaster, Network: Intel I217-V + Intel I210

OS: Arch Linux, Kernel: 5.2.8-arch1-1-ARCH (x86_64), Compiler: GCC 9.1.0, File-System: btrfs, Screen Resolution: 1024x768, System Layer: systemd-nspawn

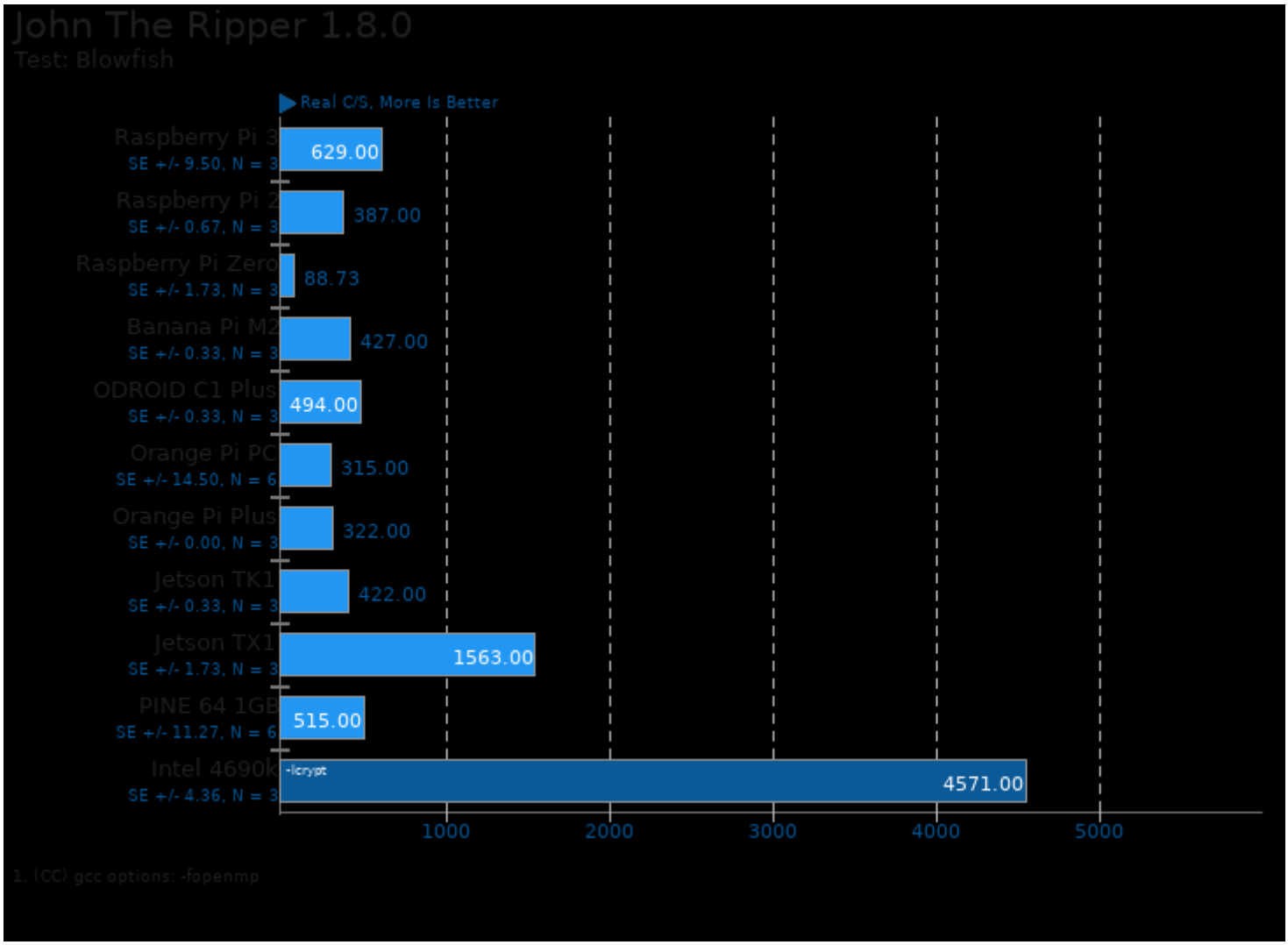
Compiler Notes: --disable-libssp --disable-libstdcxx-pch --disable-libunwind-exceptions --disable-werror --enable-__cxa_atexit --enable-cet=auto --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-gnu-indirect-function --enable-gnu-unique-object --enable-install-libiberty --enable-languages=c,c++,ada,fortran,go,lto,objc,obj-c++ --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-isl --with-linker-hash-style=gnu
Processor Notes: Scaling Governor: intel_pstate powersave
Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: disabled RSB filling

| | Raspberry Pi 3 | Raspberry Pi 2 | Raspberry Pi Zero | Banana Pi M2 | ODROID C1 Plus | Orange Pi PC | Orange Pi Plus | Jetson TK1 | Jetson TX1 | PINE 64 1GB | Intel 4690k |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **John The Ripper - Blowfish (Real** | 629 | 387 | **88.73** | 427 | 494 | 315 | 322 | 422 | 1563 | 515 | **4571** |
| **Normalized** | 13.76% | 8.47% | 1.94% | 9.34% | 10.81% | 6.89% | 7.04% | 9.23% | 34.19% | 11.27% | 100% |
| **Standard Deviation** | 2.6% | 0.3% | 3.4% | 0.1% | 0.1% | 11.3% | 0% | 0.1% | 0.2% | 5.4% | 0.2% |
| **C-Ray - Total Time (sec)** | 247.37 | 505.44 | **3038** | 436.18 | 323.08 | 951.10 | 1425 | 95.01 | 85.30 | 269.72 | **22.42** |
| **Normalized** | 9.06% | 4.44% | 0.74% | 5.14% | 6.94% | 2.36% | 1.57% | 23.6% | 26.28% | 8.31% | 100% |
| **Standard Deviation** | 0.4% | 0.3% | 0.9% | 0.2% | 0.9% | 0.9% | 2% | 13.4% | 3.5% | 0.8% | 0.1% |
| **Smallpt - G.I.R.1.S (sec)** | 1388 | 2175 | **12029** | 1984 | 1590 | 1982 | 3042 | 2888 | 613 | 972 | **106** |
| **Normalized** | 7.64% | 4.87% | 0.88% | 5.34% | 6.67% | 5.35% | 3.48% | 3.67% | 17.29% | 10.91% | 100% |
| **Standard Deviation** | 0.4% | 0.5% | 0.5% | 0.1% | 0.2% | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% | |

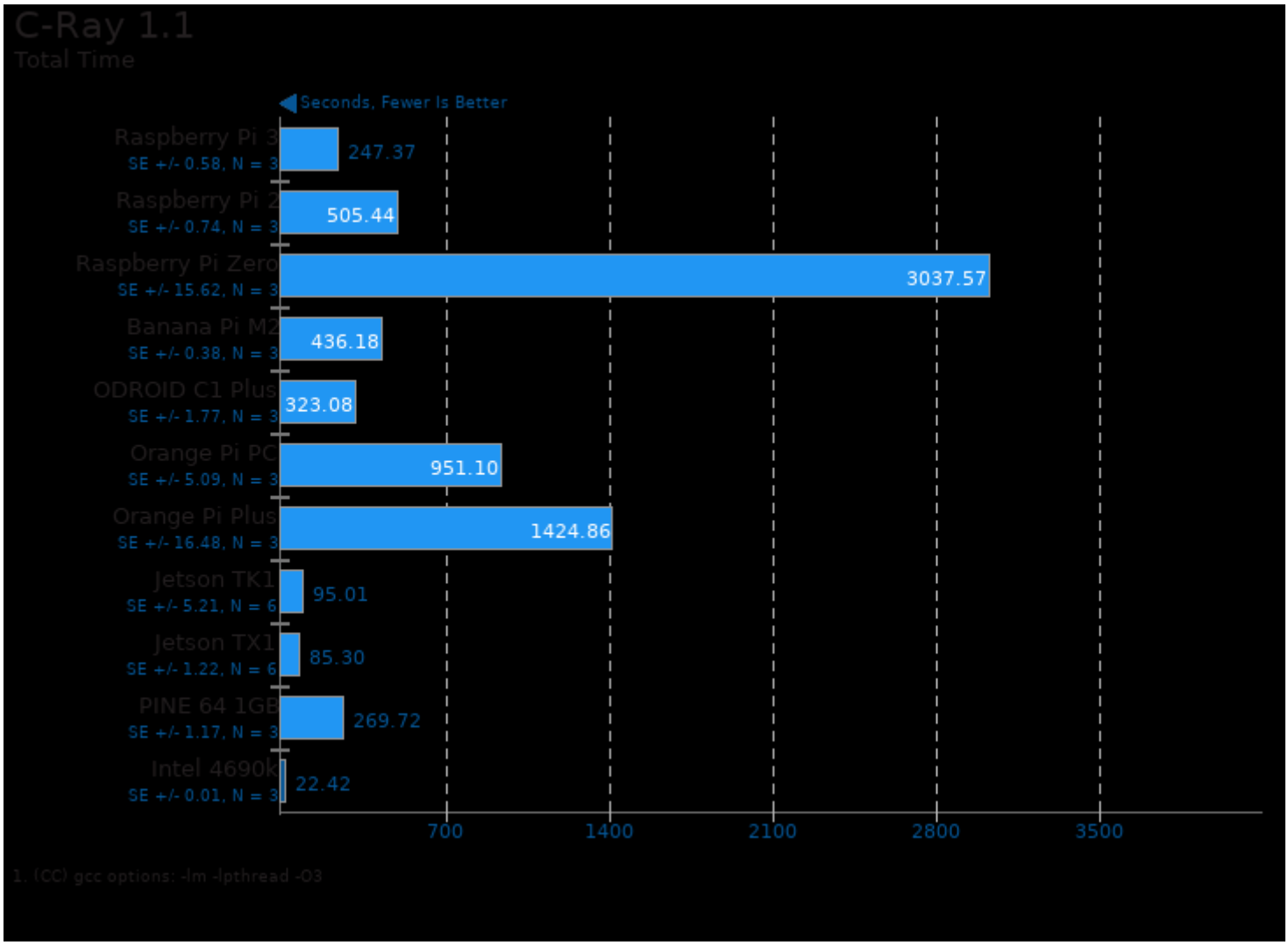
# Pine 64 ARM Linux Benchmark Comparison

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Timed MAFFT Alignment - M.S.A (sec)** | 53.62 | 75.46 | **501.11** | 71.58 | 51.54 | 77.16 | 103.05 | **15.10** | 16.56 | 54.37 | |
| **Normalized** | 28.16% | 20.01% | 3.01% | 21.1% | 29.3% | 19.57% | 14.65% | 100% | 91.18% | 27.77% | |
| **Standard Deviation** | 3.3% | 2.3% | 1.8% | 7% | 0.8% | 0.9% | 5.5% | 5.6% | 0.7% | 1.5% | |
| **Himeno Benchmark -** | 62.54 | 33.29 | **10.00** | 60.08 | 81.97 | 59.24 | 64.38 | 141.30 | 83.40 | 58.30 | **2102** |
| **Normalized** | 2.98% | 1.58% | 0.48% | 2.86% | 3.9% | 2.82% | 3.06% | 6.72% | 3.97% | 2.77% | 100% |
| **Standard Deviation** | 5.9% | 2.4% | 1.2% | 2.3% | 3% | 1.2% | 0.1% | 1.8% | 1.8% | 8.7% | 0.2% |
| **OpenSSL - R.4.b.P (Signs/sec)** | 20.25 | 11.93 | **2.60** | 13.40 | 18.80 | 11.93 | 7.83 | 54.40 | 24.67 | 15.05 | **570.00** |
| **Normalized** | 3.55% | 2.09% | 0.46% | 2.35% | 3.3% | 2.09% | 1.37% | 9.54% | 4.33% | 2.64% | 100% |
| **Standard Deviation** | 8.6% | 0.5% | 0% | 0% | 0% | 0.5% | 0.7% | 0.2% | 0.2% | 3.3% | 0.3% |
| **FLAC Audio Encoding - WAV To FLAC (sec)** | 228.37 | 314.58 | **606.76** | 269.63 | 200.50 | 261.83 | 257.87 | 50.29 | 47.64 | 210.46 | **5.89** |
| **Normalized** | 2.58% | 1.87% | 0.97% | 2.18% | 2.94% | 2.25% | 2.28% | 11.71% | 12.36% | 2.8% | 100% |
| **Standard Deviation** | 0.3% | 0.9% | 1.5% | 0.1% | 2.7% | 2.2% | 1.1% | 0.1% | 0.2% | 0.2% | 0.1% |

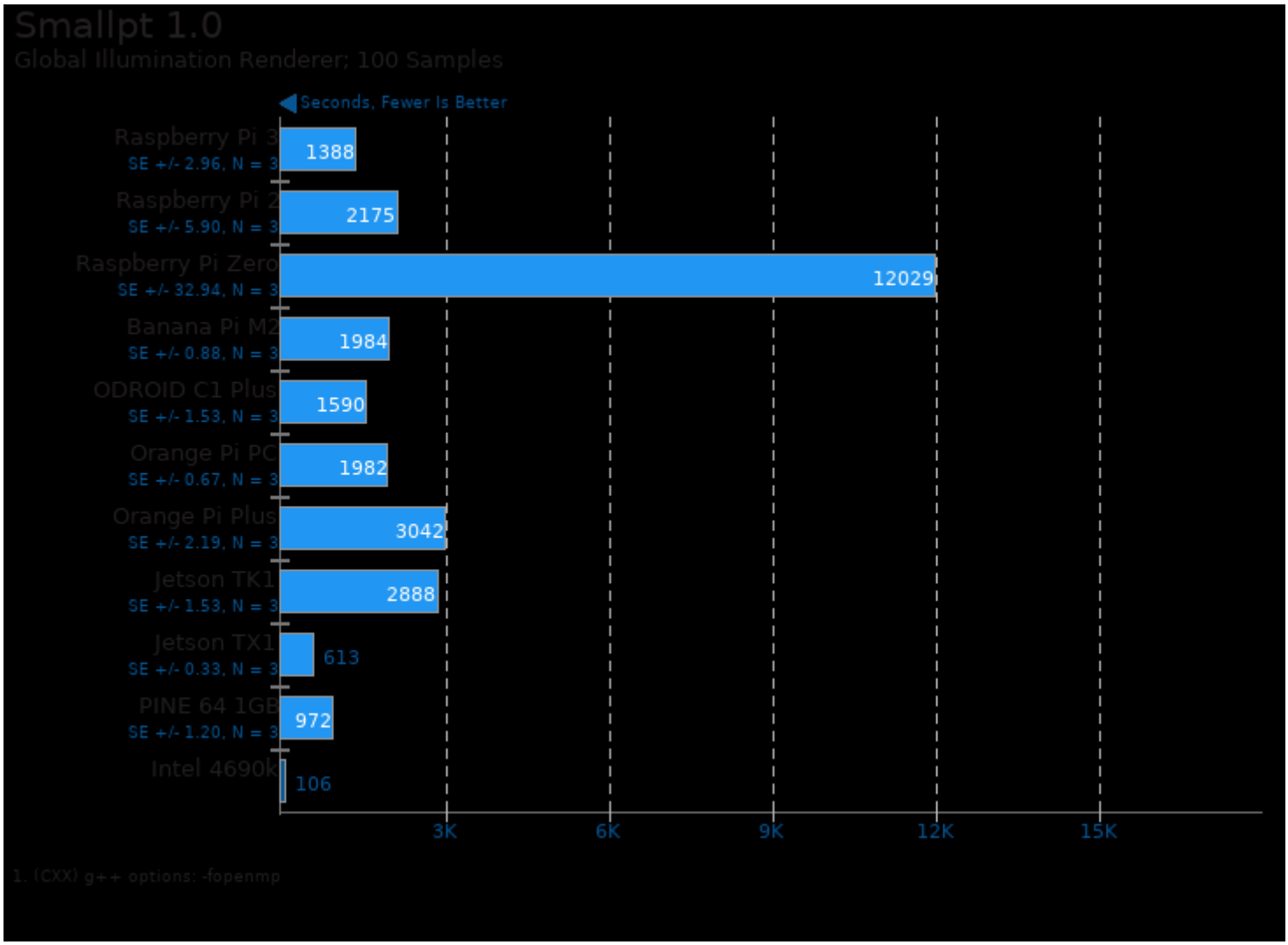
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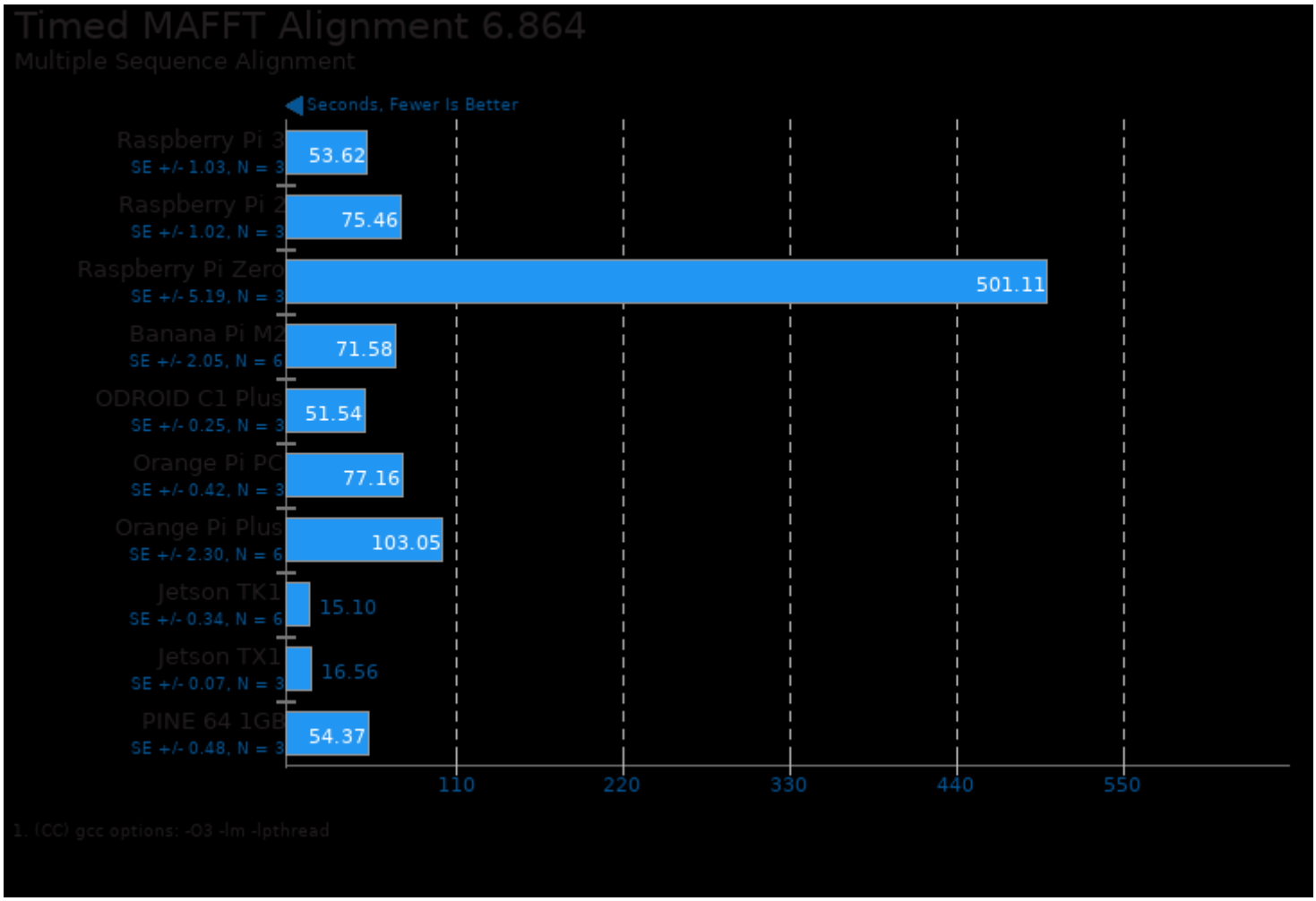
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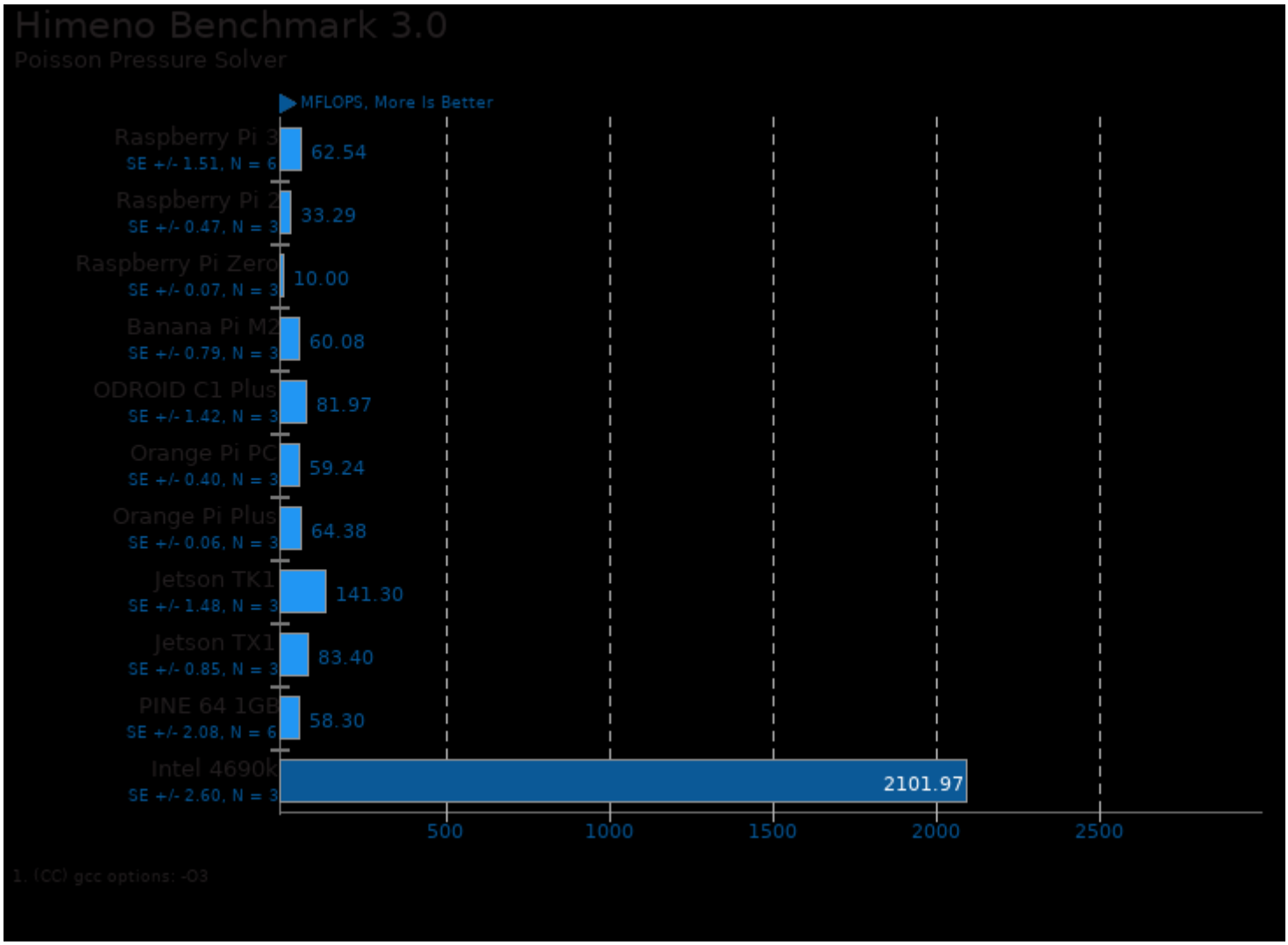
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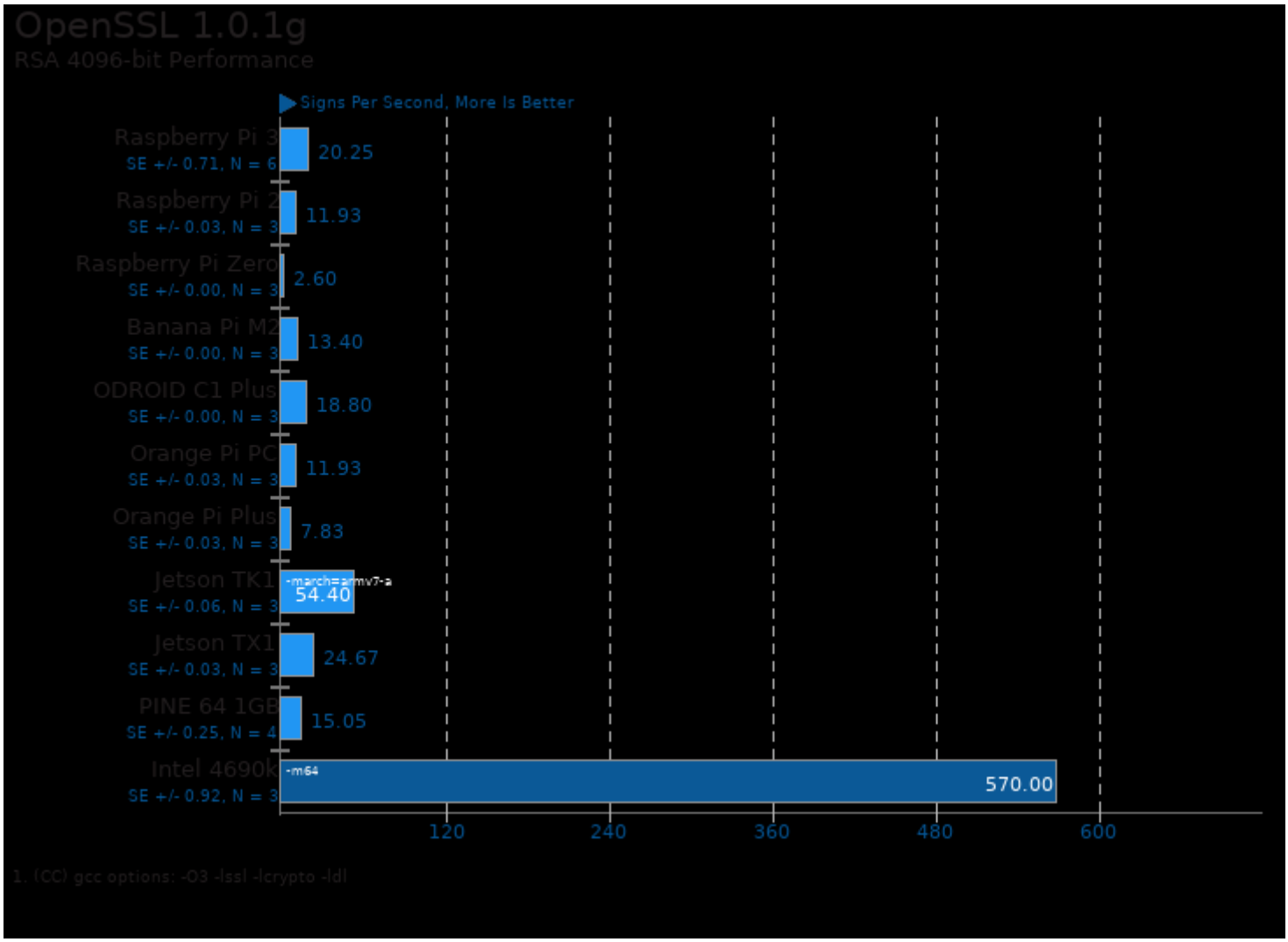
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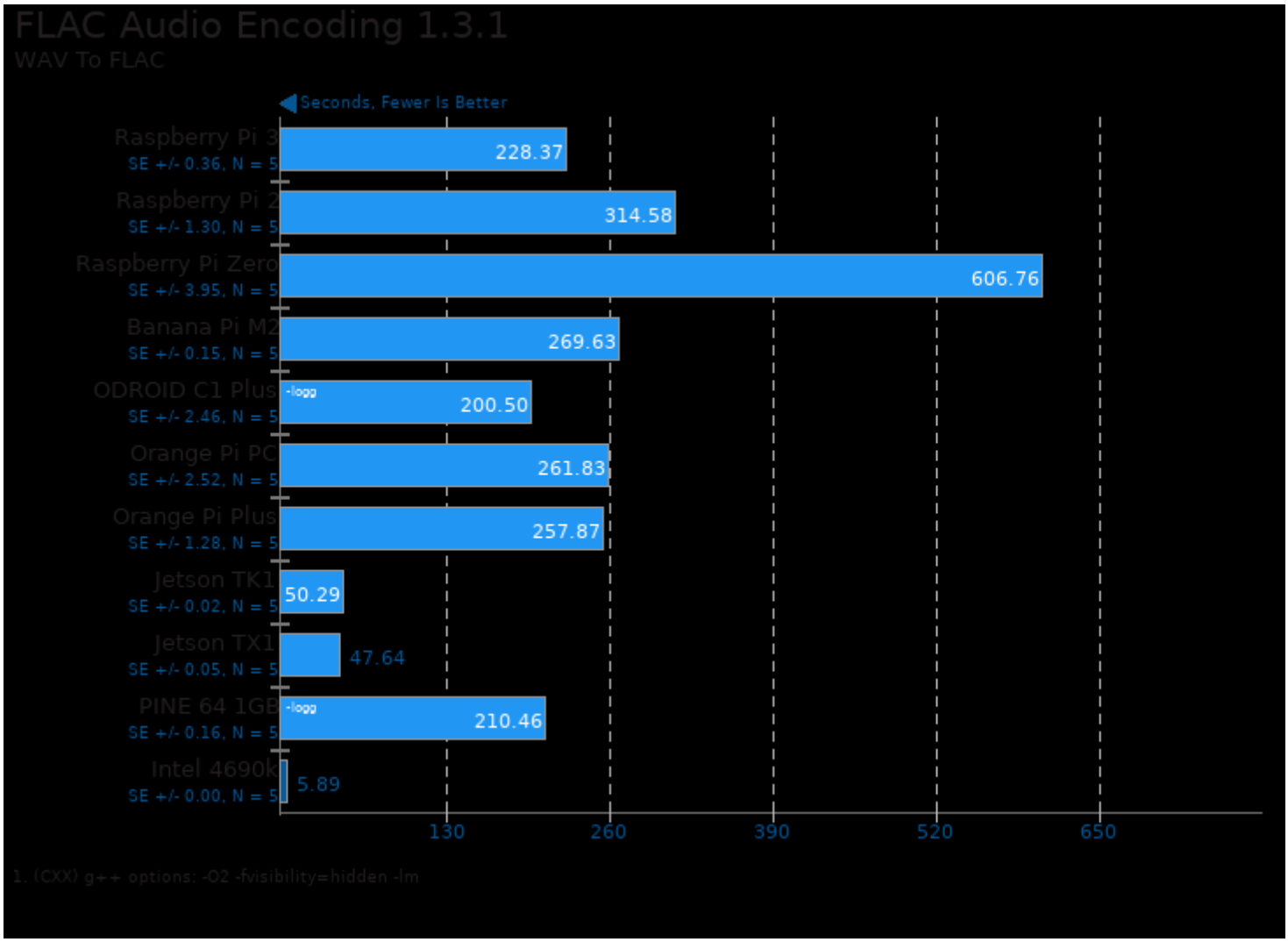
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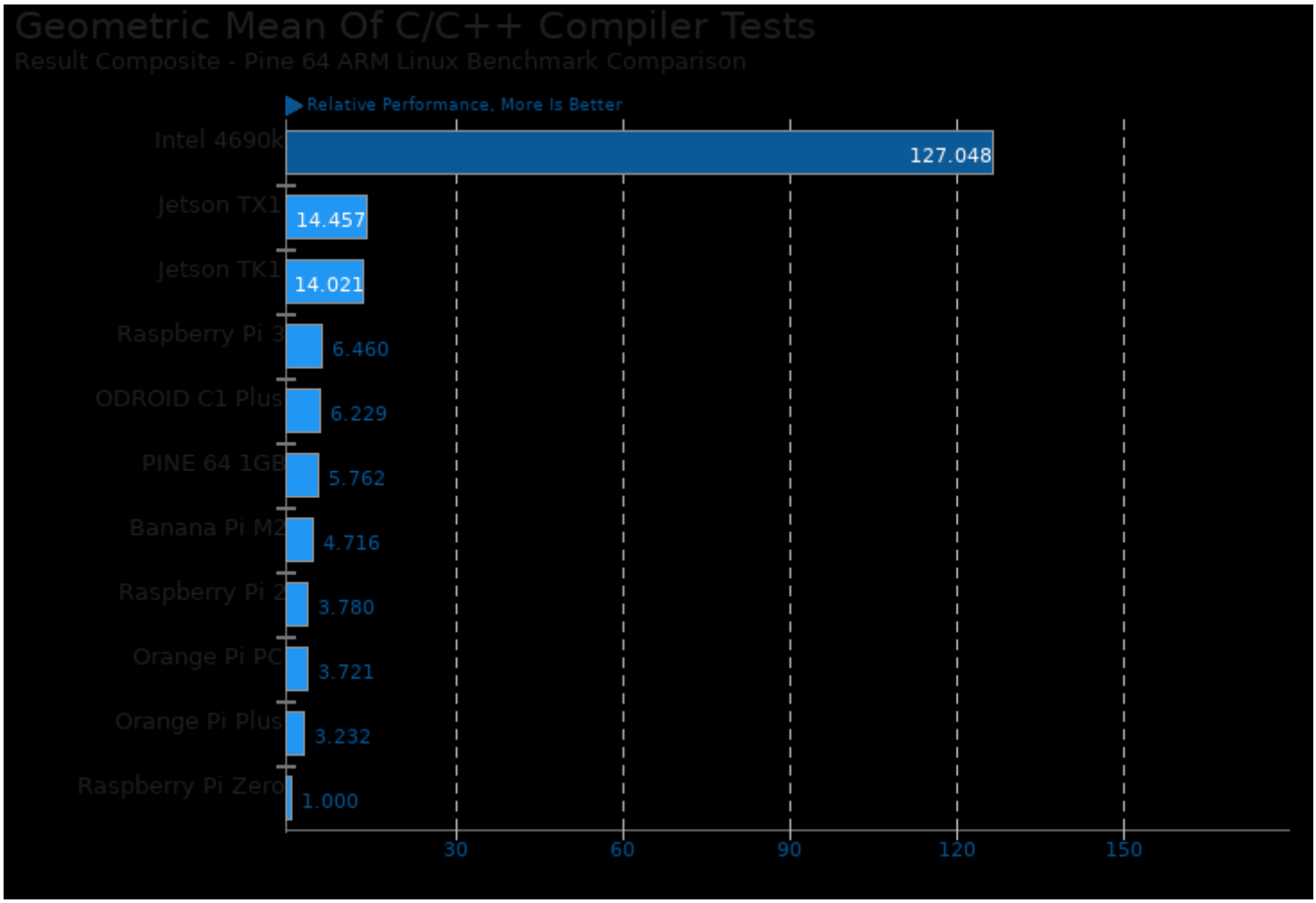
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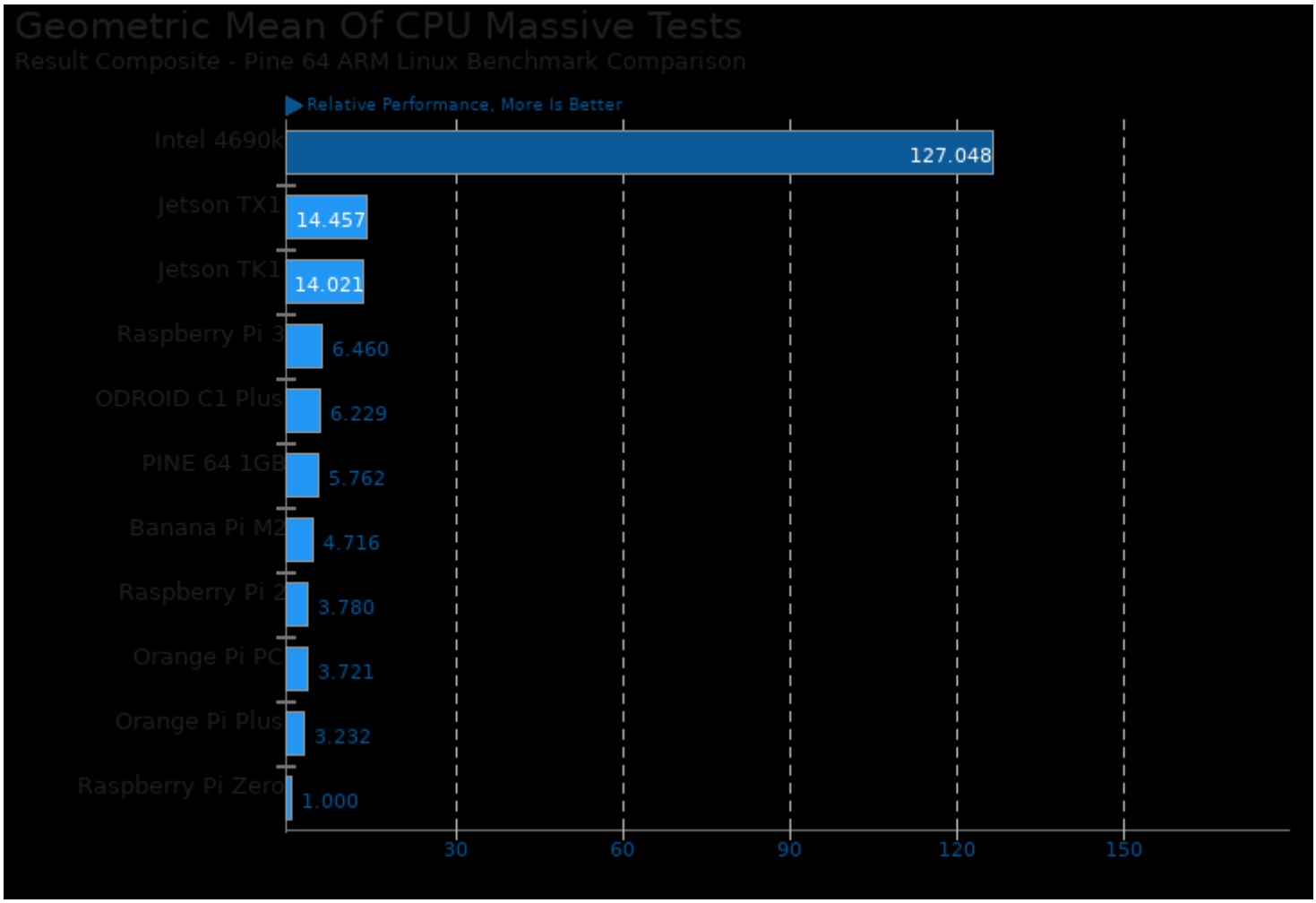


These geometric means are based upon test groupings / test suites for this result file.



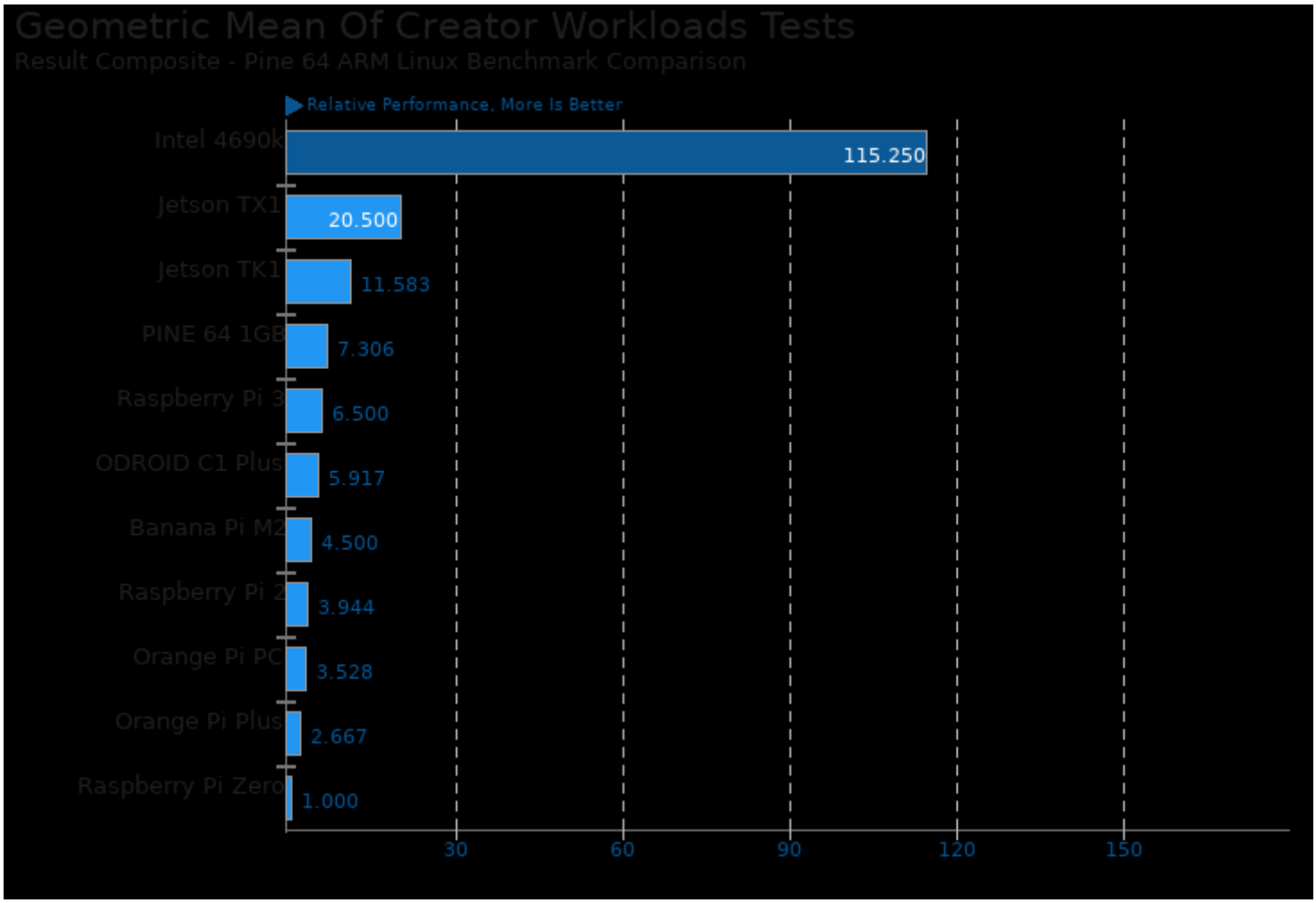

Geometric mean based upon tests: pts/mafft, pts/himeno, pts/c-ray, pts/encode-flac, pts/john-the-ripper and pts/openssl

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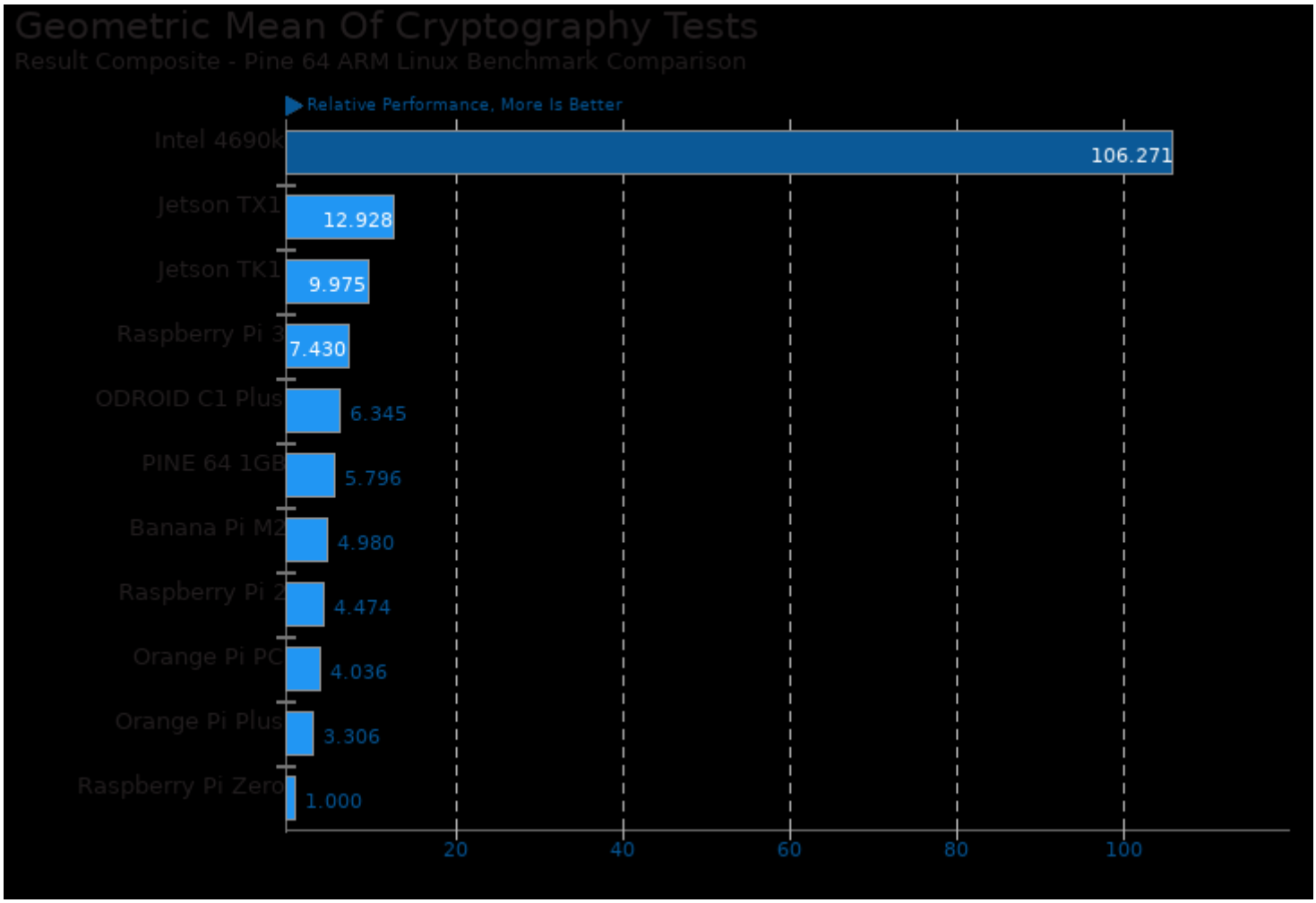

Geometric mean based upon tests: pts/c-ray, pts/encode-flac, pts/himeno, pts/john-the-ripper, pts/openssl and pts/mafft

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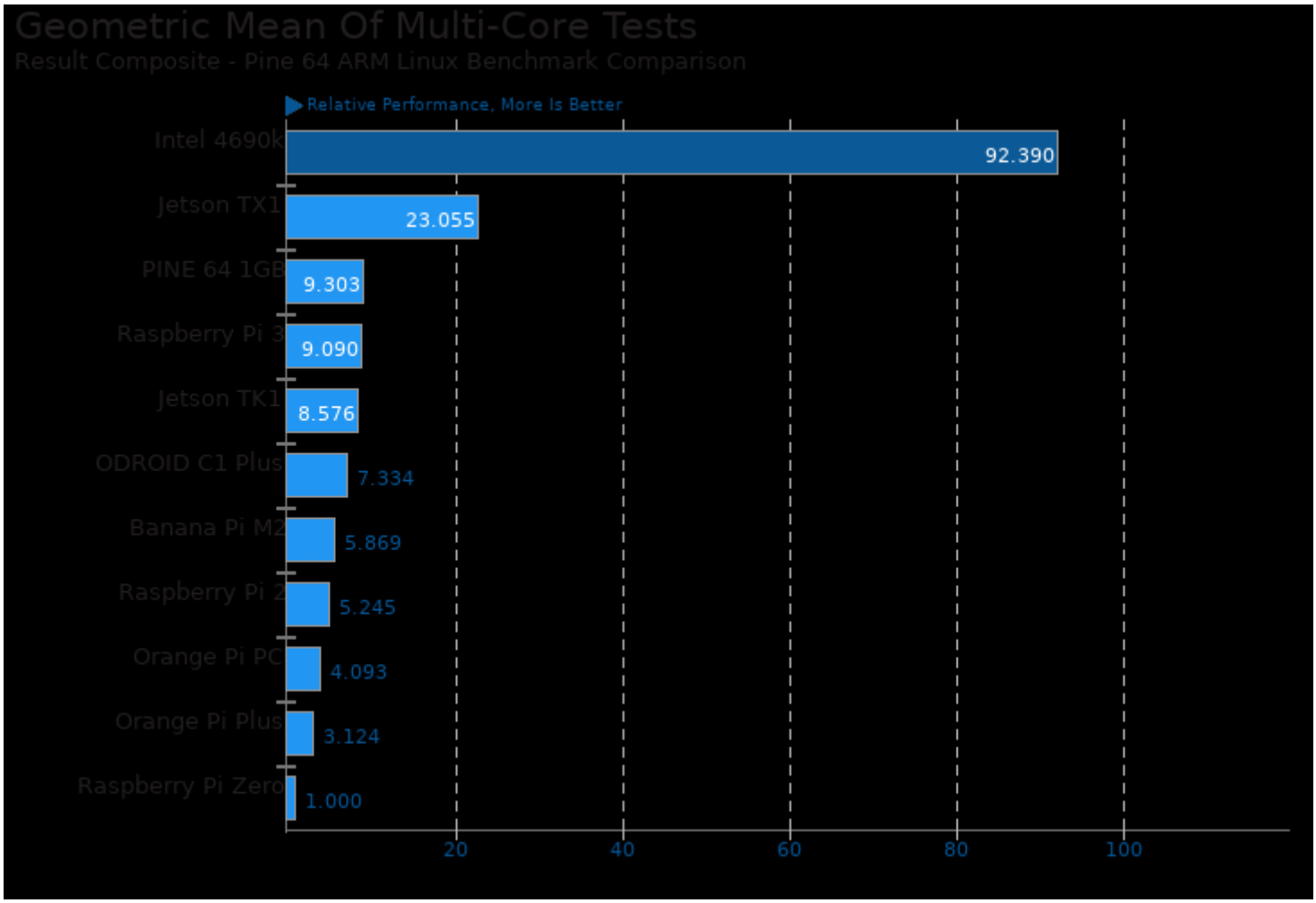



Geometric mean based upon tests: pts/c-ray, pts/smallpt and pts/encode-flac

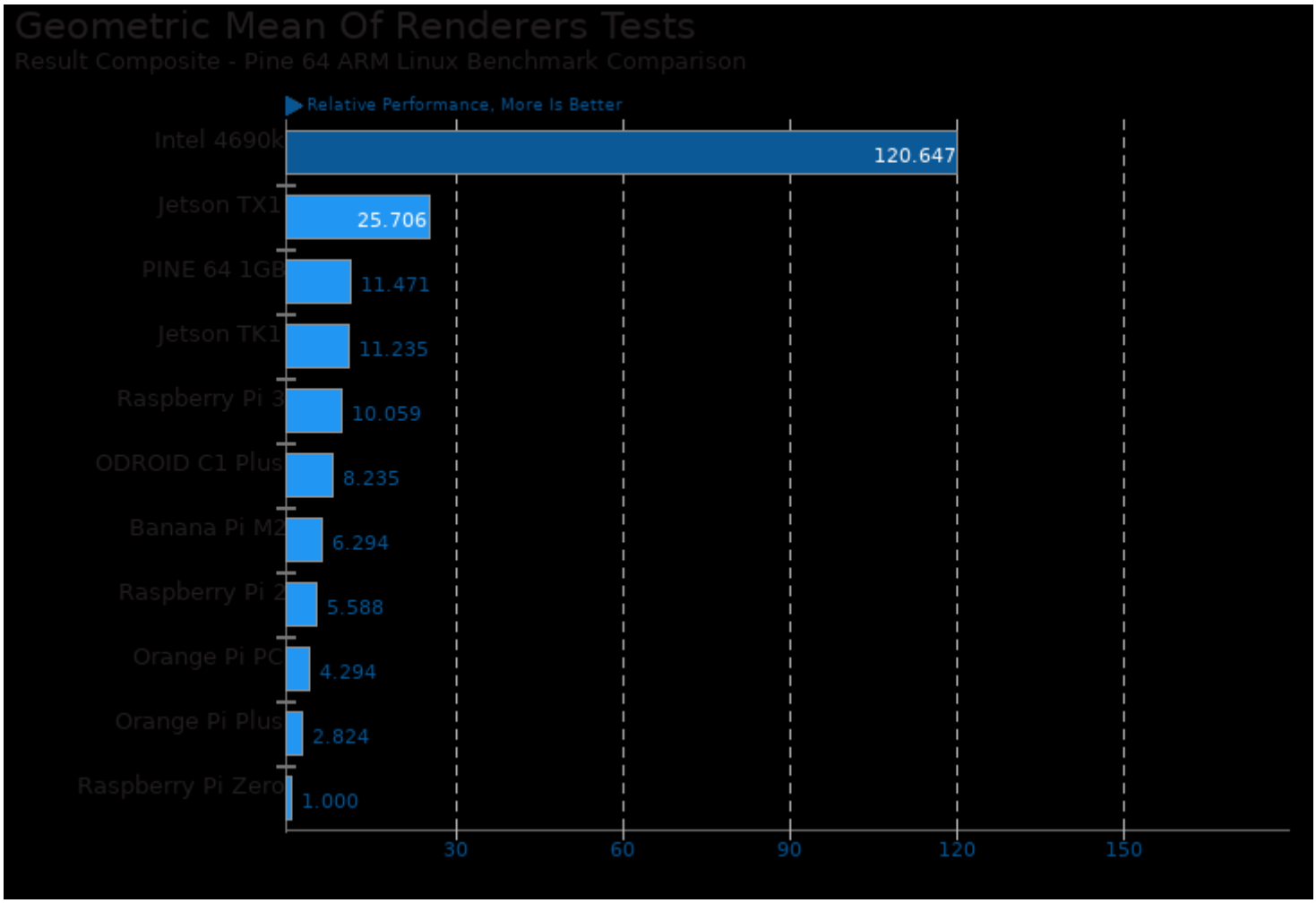
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Geometric mean based upon tests: pts/openssl and pts/john-the-ripper

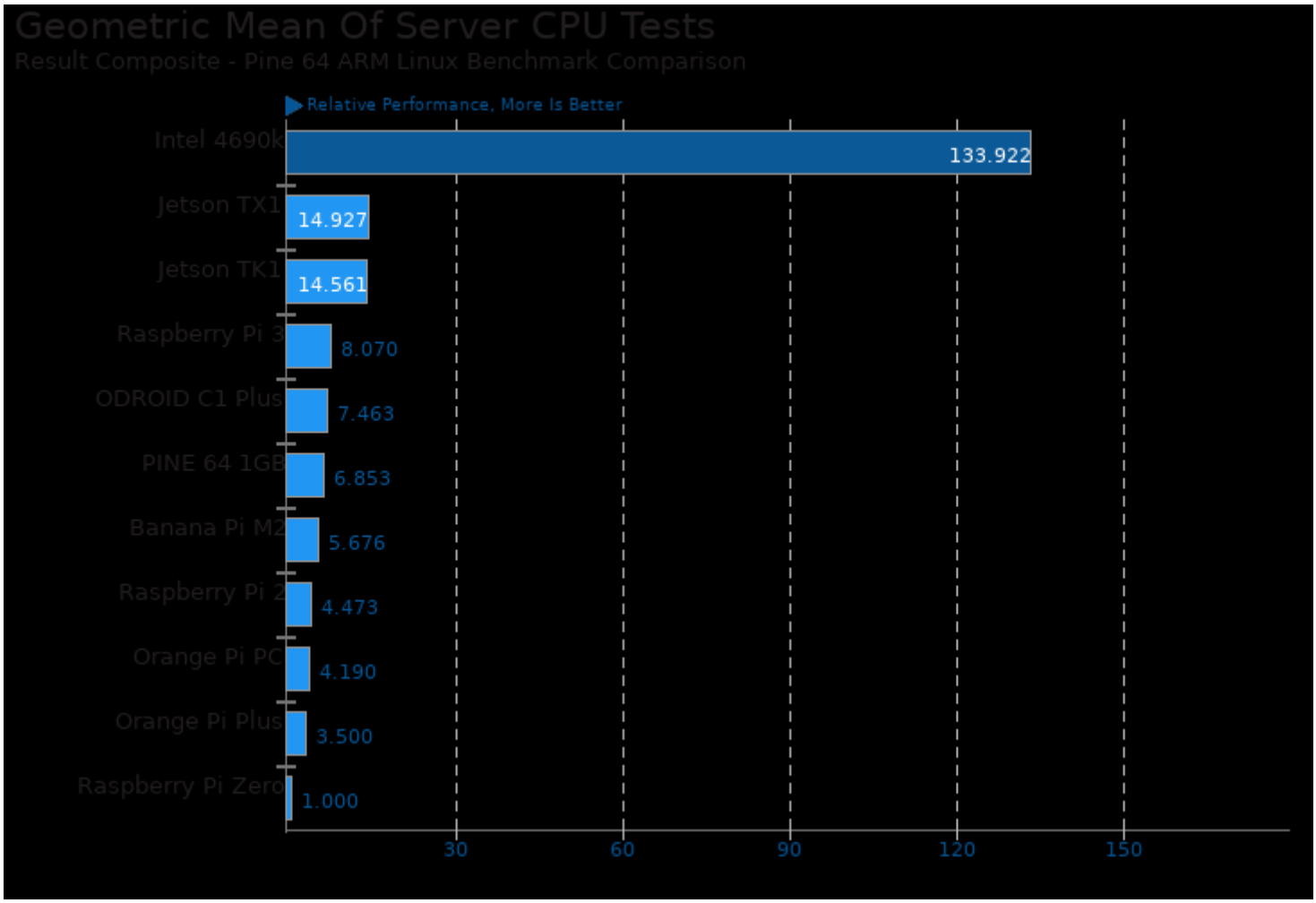



Geometric mean based upon tests: pts/c-ray, pts/john-the-ripper and pts/smallpt




Geometric mean based upon tests: pts/c-ray and pts/smallpt

# Pine 64 ARM Linux Benchmark Comparison




Geometric mean based upon tests: pts/john-the-ripper, pts/himeno, pts/c-ray and pts/openssl

*This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 03:56.*