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ARM-SBC-Benchmarks-RPi-B-Plus

ARMv8 Cortex-A72 testing on Ubuntu 21.04 via the Phoronix Test Suite.

Automated Executive Summary

nfs-boot-rpi4 had the most wins, coming in first place for 46% of the tests.

Based on the geometric mean of all complete results, the fastest (nfs-boot-rpi4) was 9.95x the speed of the slowest (Raspberry Pi B+). rpi4 was 0.967x the speed of nfs-boot-rpi4, Raspberry Pi 2 was 0.27x the speed of rpi4, Raspberry Pi 2 - 20212 was 0.946x the speed of Raspberry Pi 2, Raspberry Pi 2 - 2021 was 0.895x the speed of Raspberry Pi 2 - 20212, Raspberry Pi B was 0.457x the speed of Raspberry Pi 2 - 2021, Raspberry Pi B+ was 0.997x the speed of Raspberry Pi B.

Test Systems:

Raspberry Pi B+

Raspberry Pi B

Processor: ARMv6-compatible rev 7 @ 0.90GHz (1 Core), Motherboard: BCM2708, Memory: 469MB, Disk: 8GB SL08G

OS: Debian Linux 7.5, Kernel: 3.12.22+ (armv6l), Compiler: GCC 4.6, File-System: ext4, Screen Resolution: 656x416

```
Compiler Notes: --build=arm-linux-gnueabihf --disable-sjlij-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  
System Notes: Python 2.7.3.
```

Raspberry Pi 2

Processor: ARMv7 rev 5 @ 0.90GHz (4 Cores), Motherboard: BCM2709, Memory: 741MB, Disk: 8GB SL08G

OS: Arch Linux ARM, Kernel: 3.18.6-2-ARCH (armv7l), Compiler: GCC 4.9.2 20141224, File-System: ext4, Screen Resolution: 1920x1080

```
Compiler Notes: --build=armv7l-unknown-linux-gnueabihf --disable-libssp --disable-libstdcxx-pch --disable-libunwind-exceptions --disable-multilib --disable-werror  
--enable__cxa_atexit --enable-checking=release --enable-clocale=gnu --enable-cloog-backend=isl --enable-gnu-unique-object --enable-install-liberty  
--enable-languages=c,c++,fortran,go,lto,objc,obj-c++ --enable-lto --enable-plugin --enable-shared --enable-threads=posix --host=armv7l-unknown-linux-gnueabihf  
--mandir=/usr/share/man --with-arch=armv7-a --with-float=hard --with-fpu=vfpv3-d16 --with-linker-hash-style=gnu  
Processor Notes: Scaling Governor: BCM2835 Freq ondemand  
System Notes: Python 2.7.9.
```

Raspberry Pi 2 - 2021

Processor: ARMv7 Cortex-A7 @ 0.90GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 2 Model B Rev 1.1, Memory: 855MB, Disk: 16GB SL16G, Graphics: simple

OS: Ubuntu 20.04, Kernel: 5.4.0-1045-raspi (armv7l), Vulkan: 1.0.2, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1824x984

```
Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1  
Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlij-exceptions --disable-werror  
--enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2  
--enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiauth --enable-multilib --enable-multilib --enable-nls --enable-objc-gc=auto --enable-plugin  
--enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv7-a  
--with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-gcc-major-version-only --with-mode=thumb --with-target-system-zlib=auto -v  
Processor Notes: Scaling Governor: cpufreq-dt ondemand  
Python Notes: Python 3.8.10
```

Raspberry Pi 2 - 20212

Processor: ARMv7 Cortex-A7 @ 0.90GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 2 Model B Rev 1.1, Memory: 855MB, Disk: 16GB SL16G, Graphics: simple

OS: Ubuntu 20.04, Kernel: 5.4.0-1045-raspi (armv7l), Vulkan: 1.0.2, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 656x416

```
Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1  
Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlij-exceptions --disable-werror  
--enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2  
--enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiauth --enable-multilib --enable-multilib --enable-nls --enable-objc-gc=auto --enable-plugin  
--enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv7-a  
--with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-gcc-major-version-only --with-mode=thumb --with-target-system-zlib=auto -v  
Processor Notes: Scaling Governor: cpufreq-dt ondemand  
Python Notes: Python 3.8.10
```

nfs-boot-rpi4

Processor: ARMv7 Cortex-A72 @ 1.50GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 4 Model B Rev 1.4,

Memory: 8GB, Disk: 15GB, Graphics: DRM emulated, Monitor: HP 27er

OS: Raspbian 10, Kernel: 4.19.97-v7l+ (armv7l), Compiler: GCC 8.3.0, File-System: nfs, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjij-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale-gnu --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-gcc-major-version-only --with-target-system-zlib -v

Processor Notes: Scaling Governor: cpufreq-dt ondemand

Python Notes: Python 2.7.16 + Python 3.7.3

rpi4

Processor: ARMv8 Cortex-A72 @ 1.50GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 4 Model B Rev 1.4, Chipset: Broadcom BCM2711, Memory: 8GB, Disk: 16GB SC16G

OS: Ubuntu 21.04, Kernel: 5.11.0-1027-raspi (aarch64), Vulkan: 1.0.2, Compiler: GCC 10.3.0, File-System: ext4

Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1 - Transparent Huge Pages: madvise

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale-gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v

Processor Notes: Scaling Governor: cpufreq-dt ondemand

Python Notes: Python 3.9.5

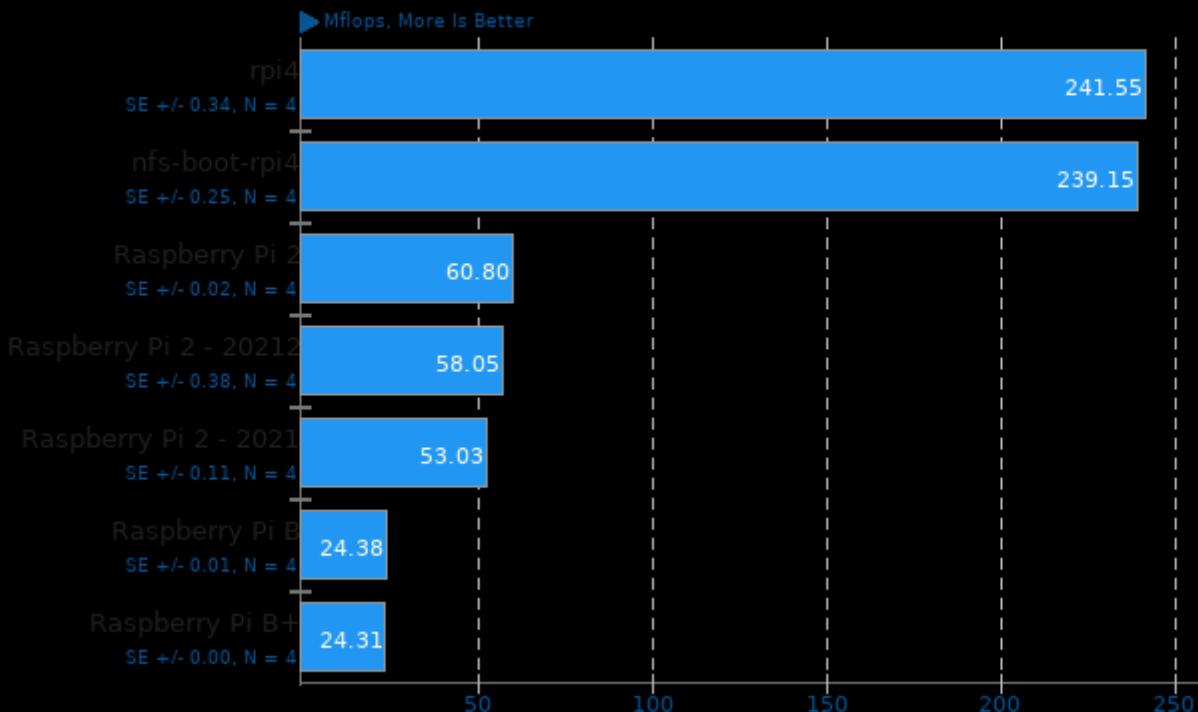
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Vulnerable + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Vulnerable + srbs: Not affected + tsx_async_abort: Not affected

	Raspberry Pi B+	Raspberry Pi B	Raspberry Pi 2	Raspberry Pi 2 - 2021	Raspberry Pi 2 - 20212	nfs-boot-rpi 4	rpi4
SciMark - Composite (Mflops)	24.31	24.38	60.80	53.03	58.05	239.15	241.55
Normalized	10.06%	10.09%	25.17%	21.95%	24.03%	99.01%	100%
Standard Deviation	0%	0.1%	0.1%	0.4%	1.3%	0.2%	0.3%
SciMark - F.F.T (Mflops)	6.76	6.78	15.50	12.94	14.75	34.33	33.48
Normalized	19.69%	19.75%	45.15%	37.69%	42.97%	100%	97.52%
Standard Deviation	0.2%	0.2%	0.3%	1.2%	1.2%	7.9%	9%
SciMark - J.S.O.R (Mflops)	44.82	44.88	124.73	115.61	127.77	327.17	392.14
Normalized	11.43%	11.44%	31.81%	29.48%	32.58%	83.43%	100%
Standard Deviation	0.2%	0.3%	0.1%	1.1%	1.8%	0.2%	0.1%
SciMark - Monte Carlo (Mflops)	25.79	25.79	34.90	34.59	35.21	239.84	152.91
Normalized	10.75%	10.75%	14.55%	14.42%	14.68%	100%	63.76%
Standard Deviation	0.2%	0.2%	0%	0.3%	0.7%	0.2%	0.2%
SciMark - S.M.M (Mflops)	18.47	18.69	38.65	31.85	35.65	362.75	388.38
Normalized	4.76%	4.81%	9.95%	8.2%	9.18%	93.4%	100%
Standard Deviation	0.4%	0.3%	0.1%	0.5%	1.2%	0.3%	0.2%
SciMark - D.L.M.F (Mflops)	25.71	25.79	90.20	70.15	76.86	231.66	240.81
Normalized	10.68%	10.71%	37.46%	29.13%	31.92%	96.2%	100%
Standard Deviation	0%	0%	0%	0.4%	1.3%	1%	0.3%

7-Zip Compression - C.S.T (MIPS)	225	227	1129	798	1058	3250
Normalized	6.92%	6.98%	34.74%	24.55%	32.55%	100%
Standard Deviation	0.3%	0.5%	0.4%	0.4%	0.6%	0.5%
NGINX Benchmark - S.W.P.S (Req/s/sec)	392.37	396.33	2696			
Normalized	14.56%	14.7%	100%			
Standard Deviation	0.6%	0%	0.7%			
PHPBench - P.B.S (Score)	4066	3995	8591			
Normalized	47.33%	46.5%	100%			
Standard Deviation	5%	5.6%	0.1%			
OpenSSL - R.4.b.P (Signs/sec)	2.40	2.40	12	8.7	11.0	38.6
Normalized	6.22%	6.22%	31.09%	22.54%	28.5%	100%
Standard Deviation	0%	0%	0%	2.3%	0.5%	0%
PyBench - T.F.A.T.T (Milliseconds)	62962	64355	37293			6065
Normalized	9.63%	9.42%	16.26%			100%
Standard Deviation	4.6%	2.8%	0.1%			1.2%
Parallel BZIP2	832.78	826.77	149.13			
Compression - 2.F.C (sec)						
Normalized	17.91%	18.04%	100%			
Standard Deviation	1.8%	1.7%	1.9%			
LAME MP3 Encoding - WAV To MP3 (sec)	301.66	302.63	155.61	164.447	151.782	43.193
Normalized	14.32%	14.27%	27.76%	26.27%	28.46%	100%
Standard Deviation	2%	2.9%	0.2%	1.3%	1.5%	0.4%

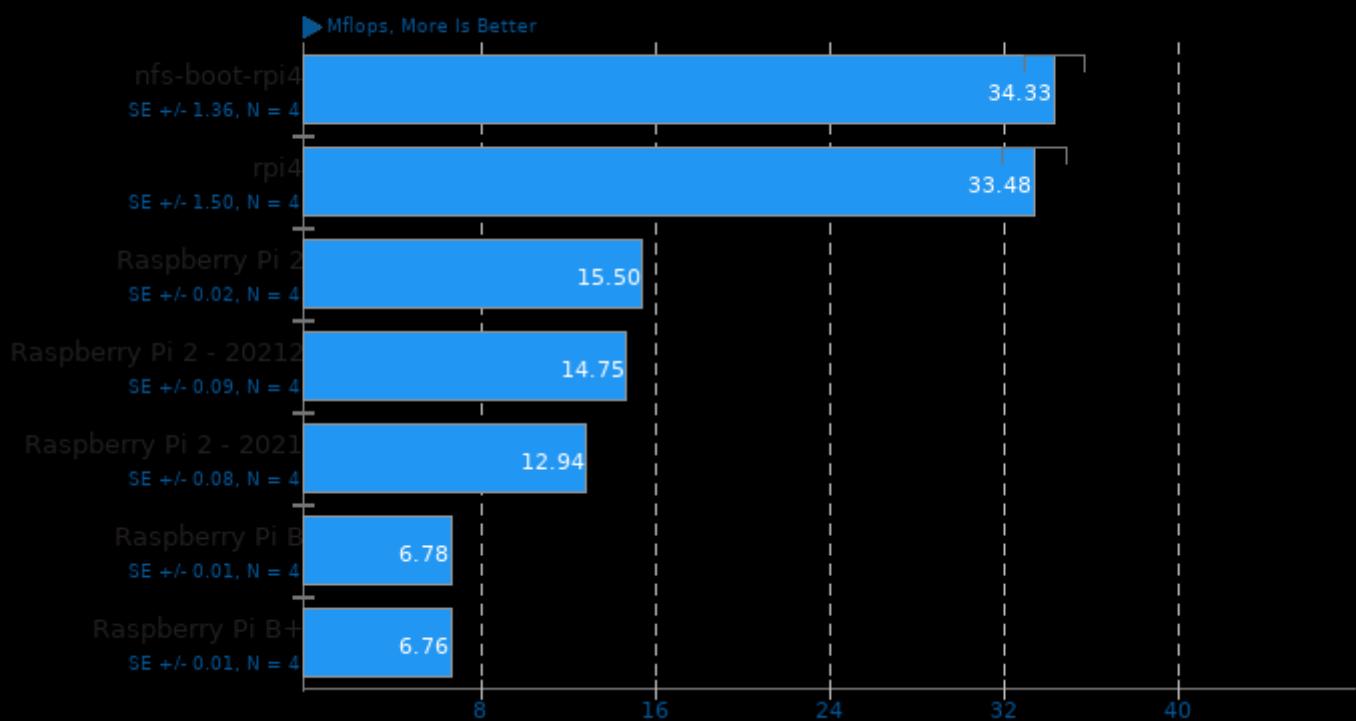
SciMark 2.0

Computational Test: Composite



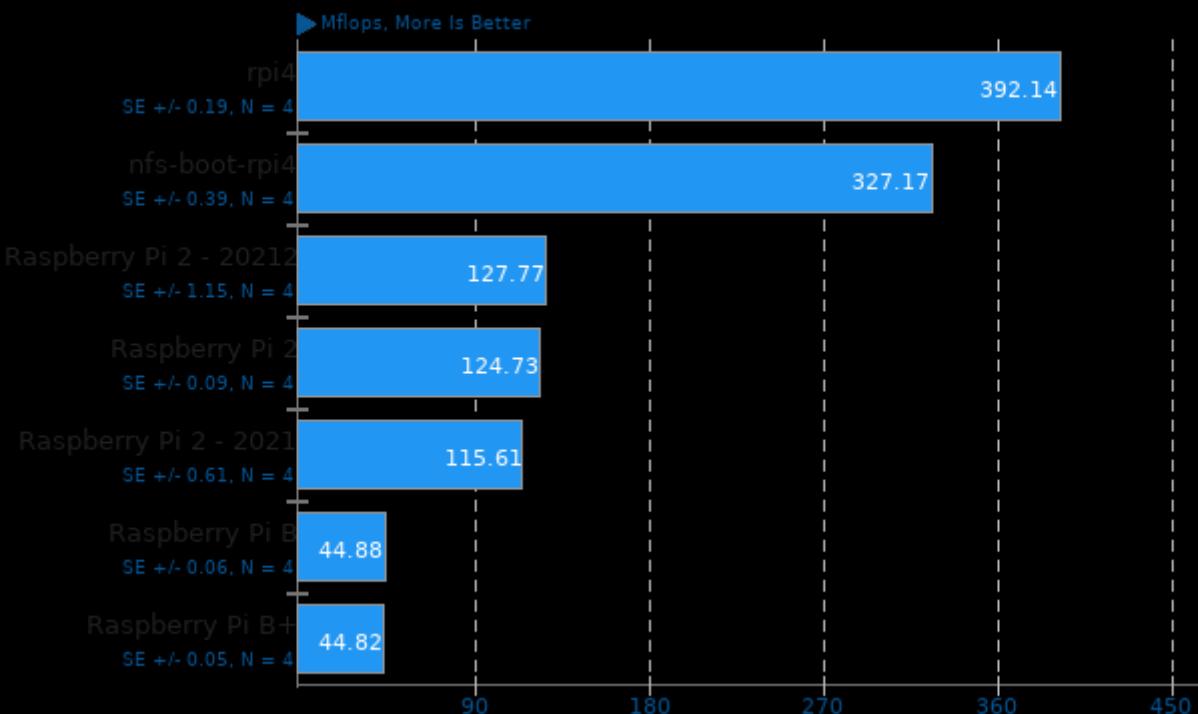
SciMark 2.0

Computational Test: Fast Fourier Transform



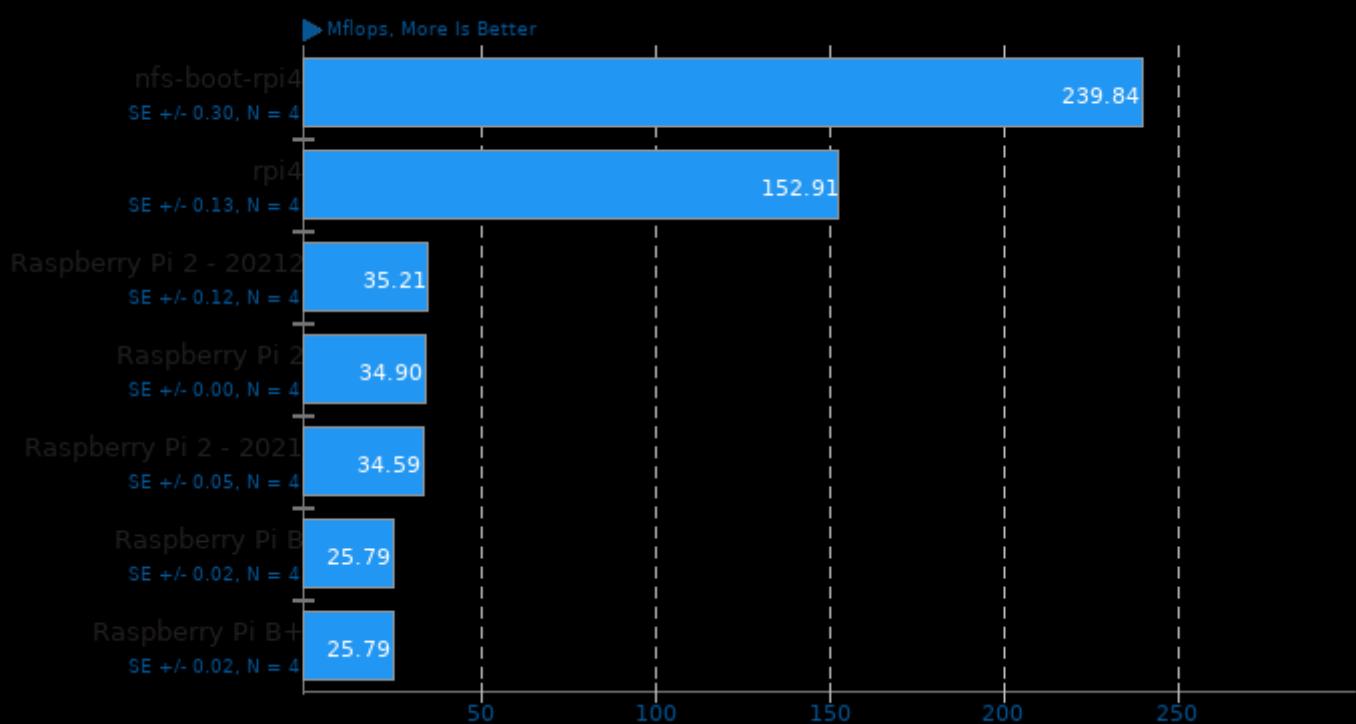
SciMark 2.0

Computational Test: Jacobi Successive Over-Relaxation



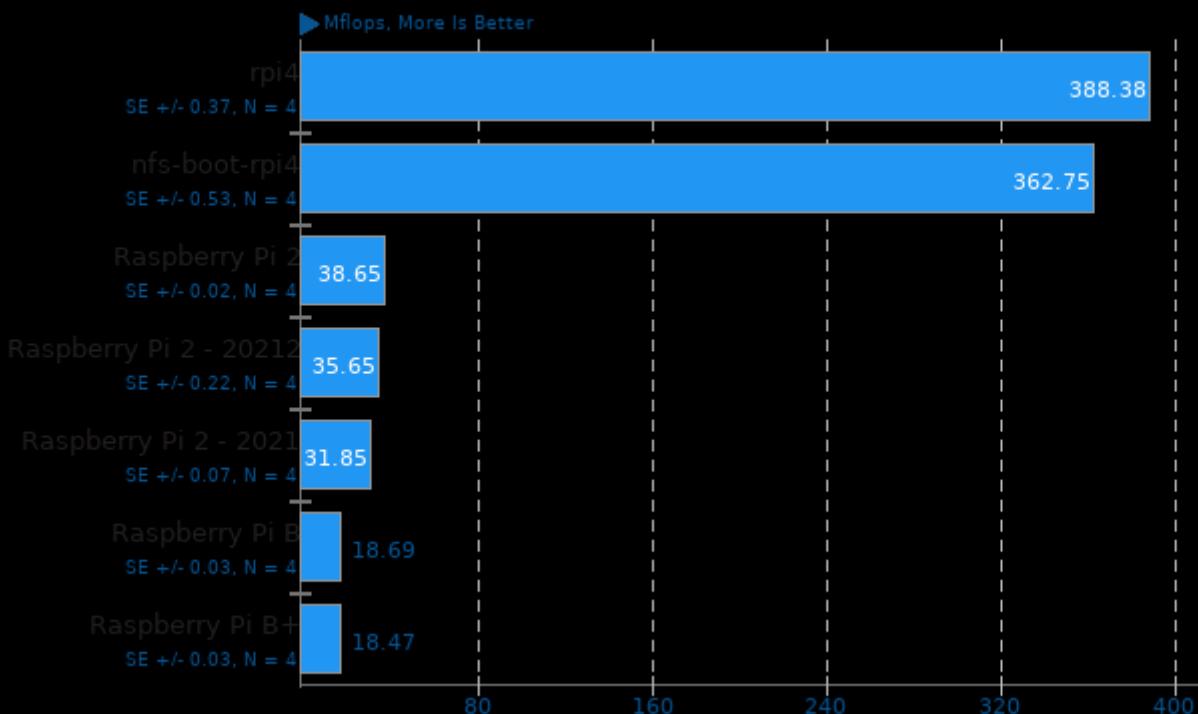
SciMark 2.0

Computational Test: Monte Carlo



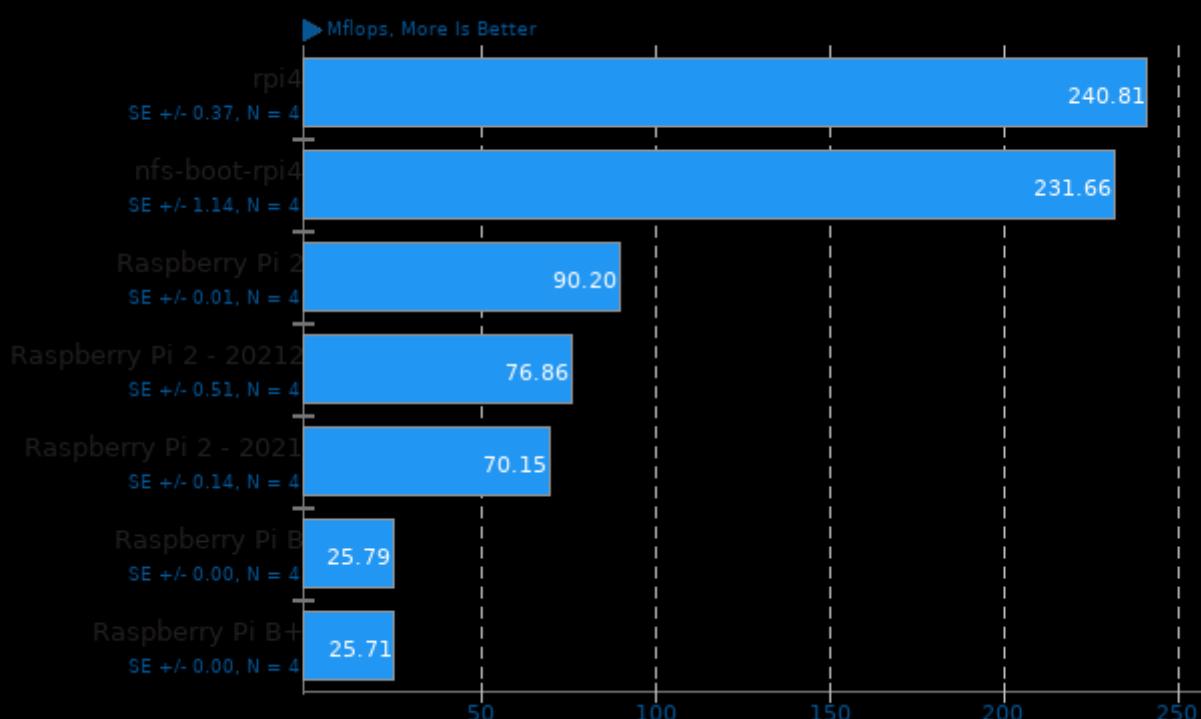
SciMark 2.0

Computational Test: Sparse Matrix Multiply



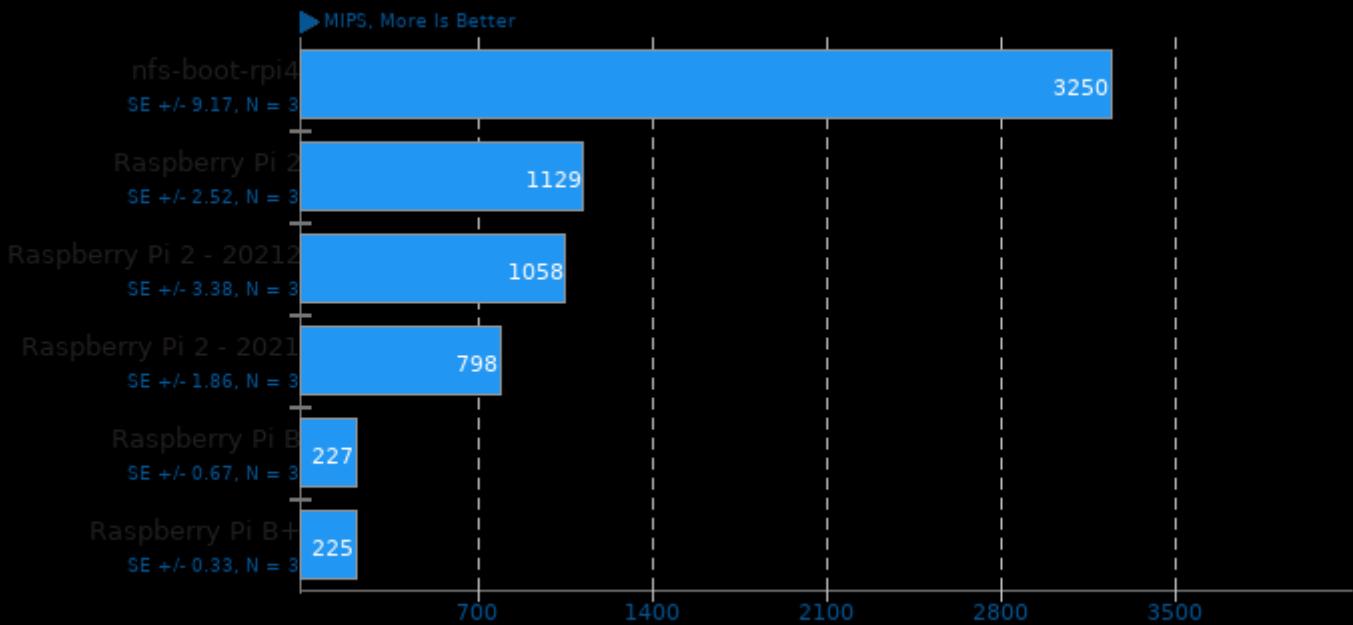
SciMark 2.0

Computational Test: Dense LU Matrix Factorization



7-Zip Compression 9.20.1

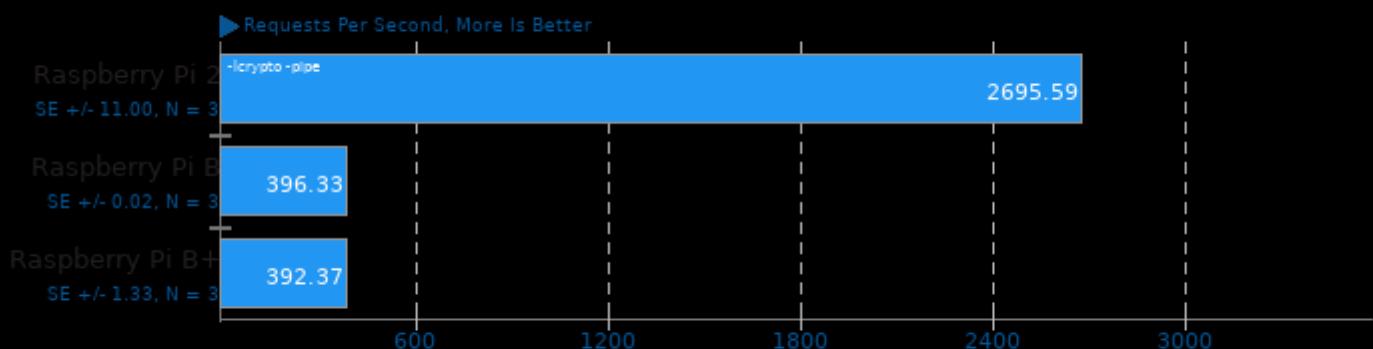
Compress Speed Test



1. (CXX) g++ options: -pipe -lpthread

NGINX Benchmark 1.0.11

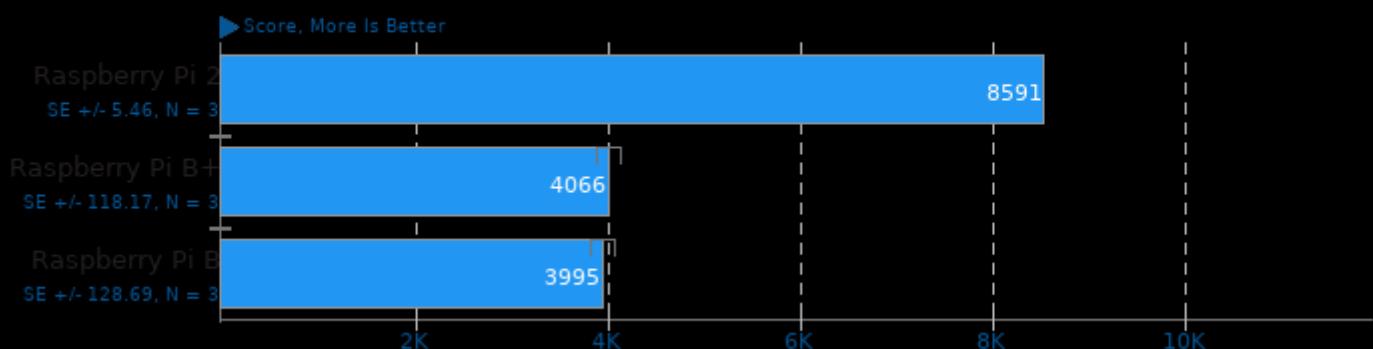
Static Web Page Serving



1. (CC) gcc options: -lpthread -lcrypt -lz

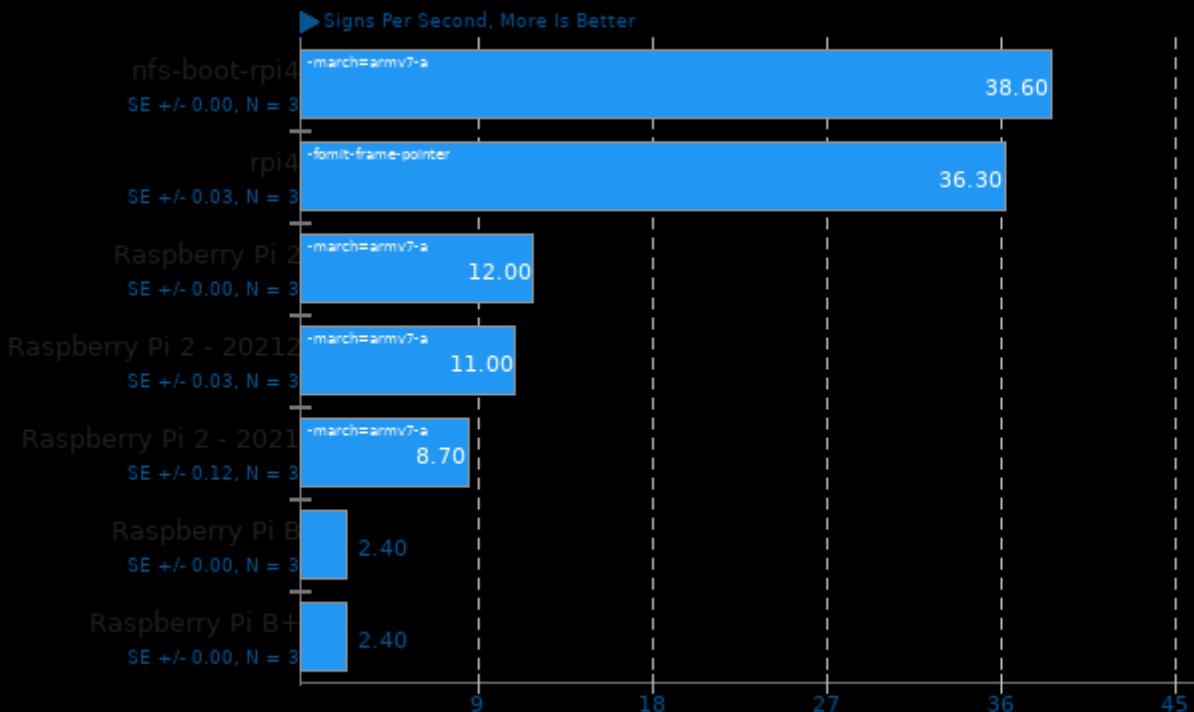
PHPBench 0.8.1

PHP Benchmark Suite



OpenSSL 1.0.1g

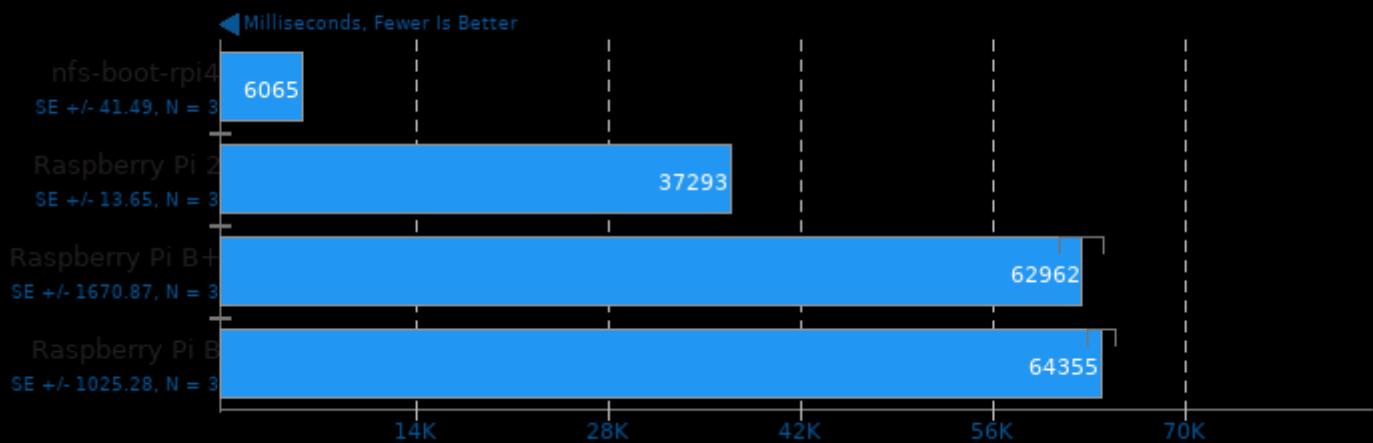
RSA 4096-bit Performance



1. (CC) gcc options: -O3 -lssl -lcrypto -ldl

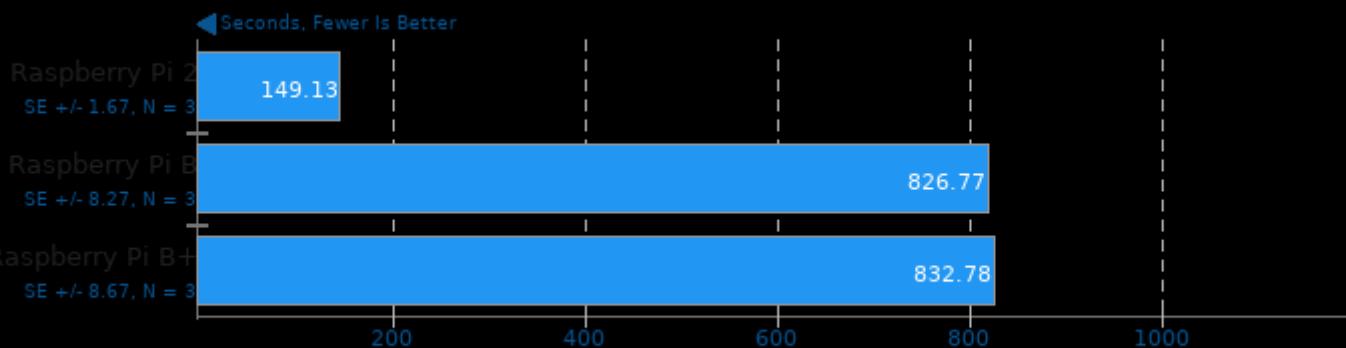
PyBench 2008-08-14

Total For Average Test Times



Parallel BZIP2 Compression 1.1.6

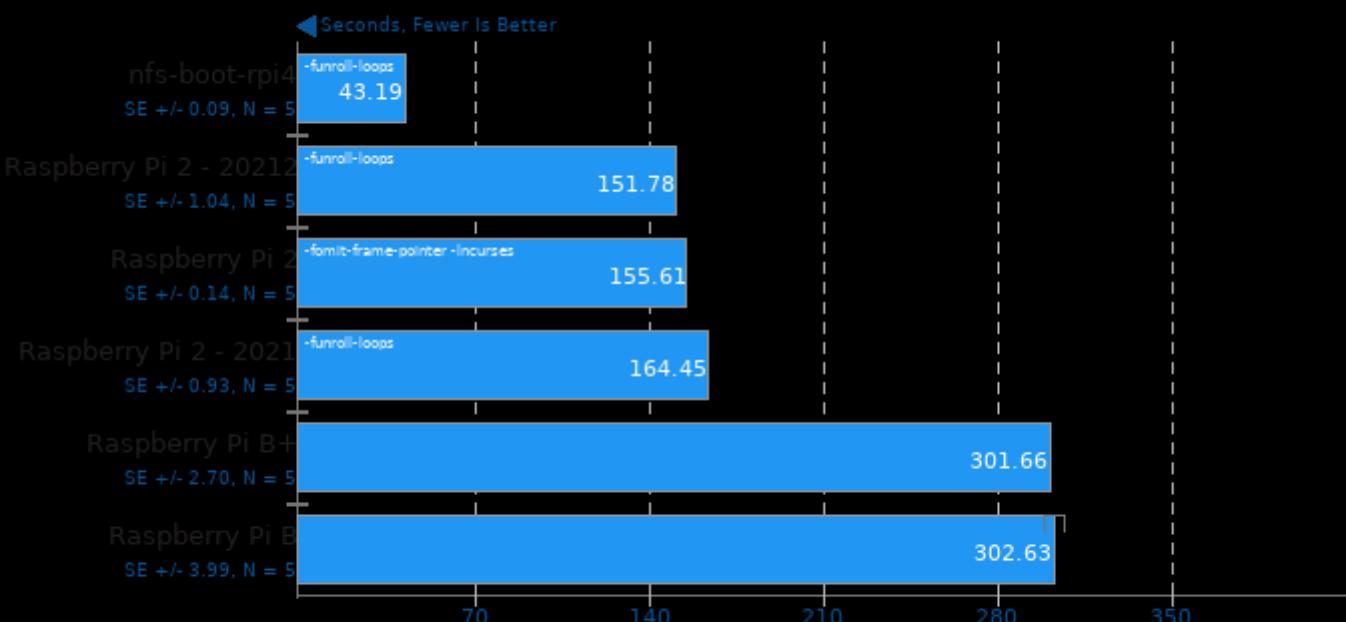
256MB File Compression



1. (CXX) g++ options: -O2 -pthread -lbz2 -lpthread

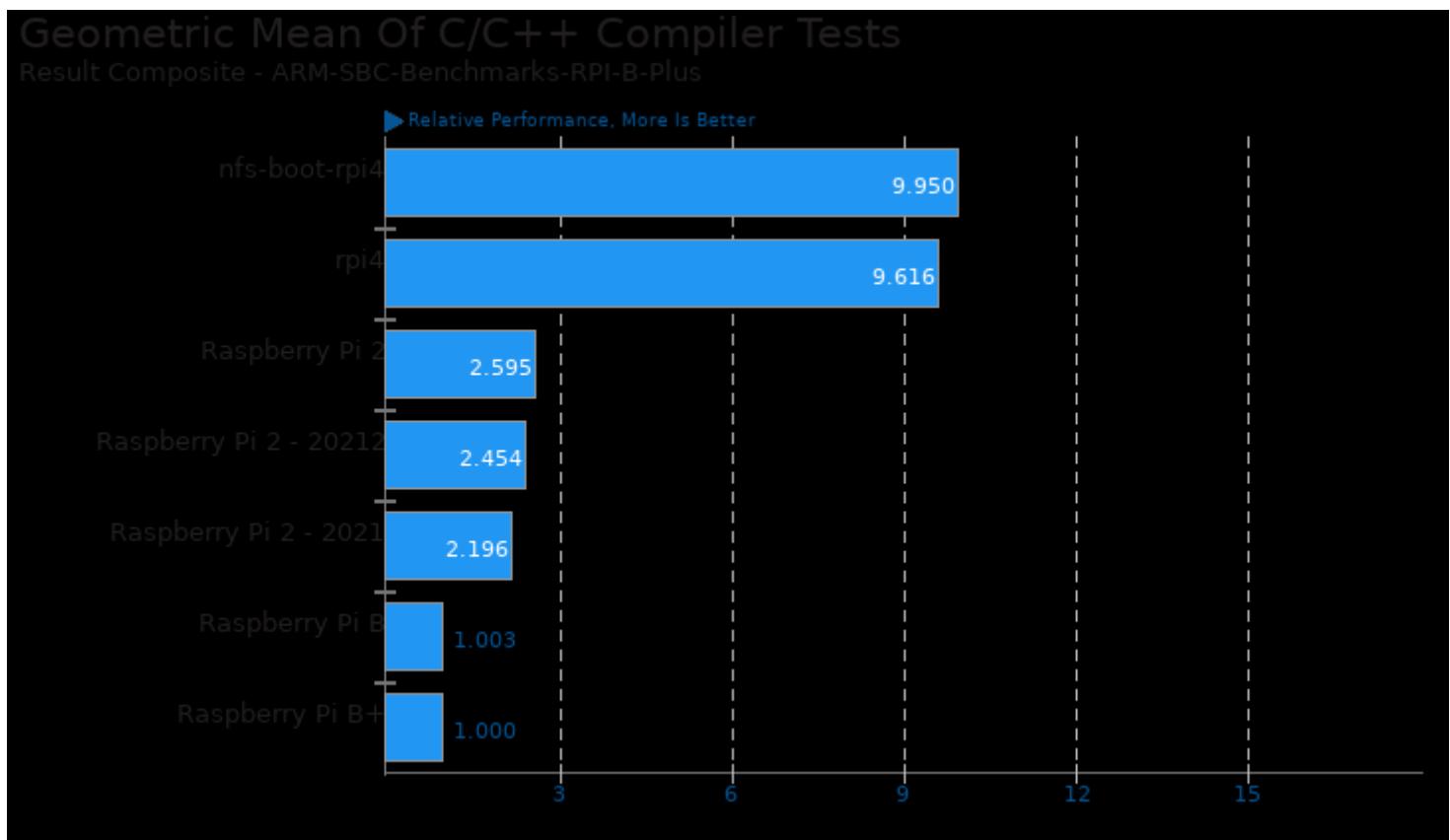
LAME MP3 Encoding 3.99.3

WAV To MP3

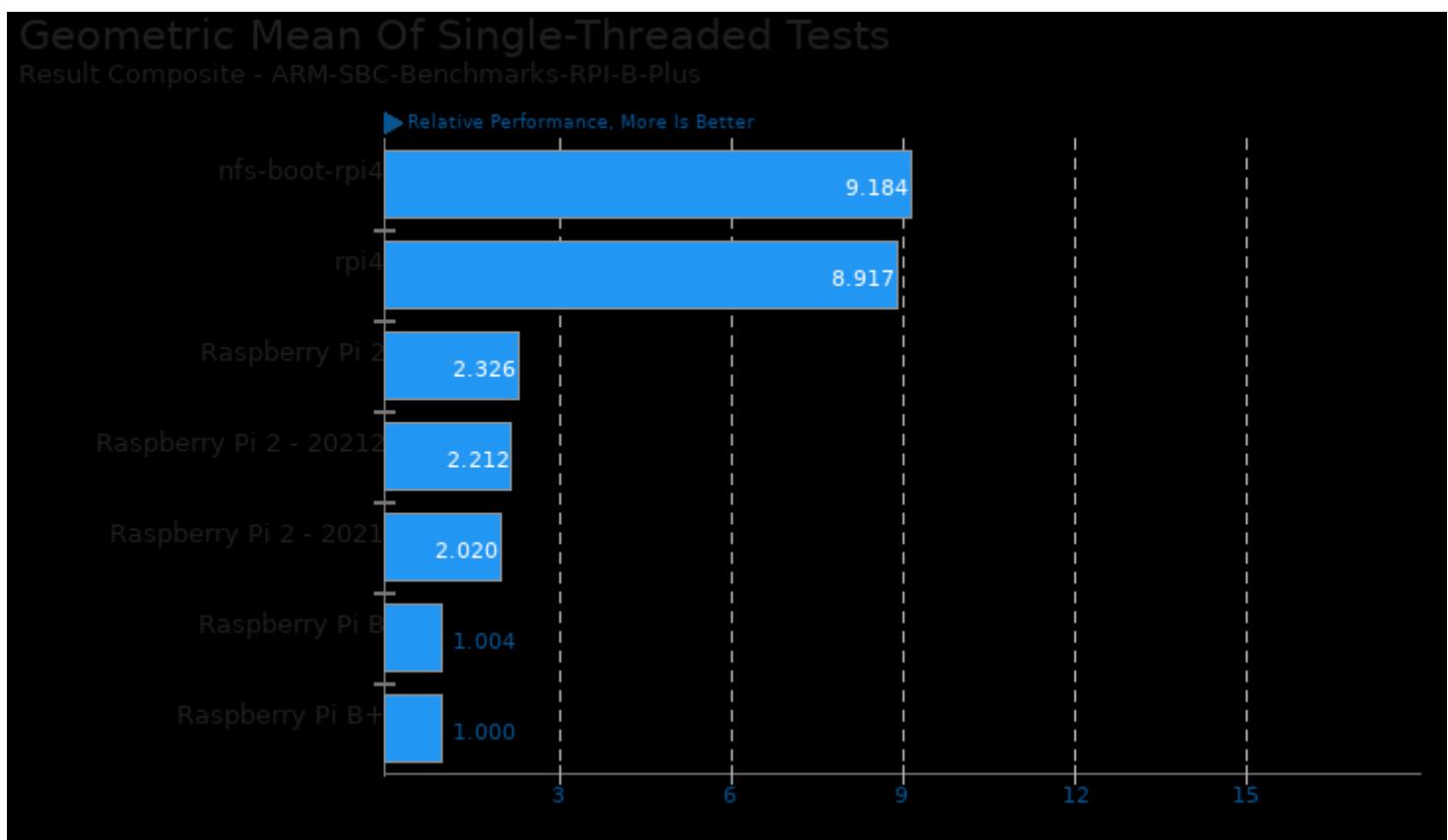


1. (CC) gcc options: -O3 -ffast-math -pipe -lm

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



Geometric mean based upon tests: pts/scimark2, pts/compress-7zip, pts/encode-mp3, pts/openssl and pts/nginx



Geometric mean based upon tests: pts/scimark2, pts/encode-mp3, pts/pybench, pts/phpbench and pts/nginx

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