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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-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
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-libiberty --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-sjlj-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-multiarch --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-sjlj-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-multiarch --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,

ARM-SBC-Benchmarks-RPI-B-Plus

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-sjlj-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

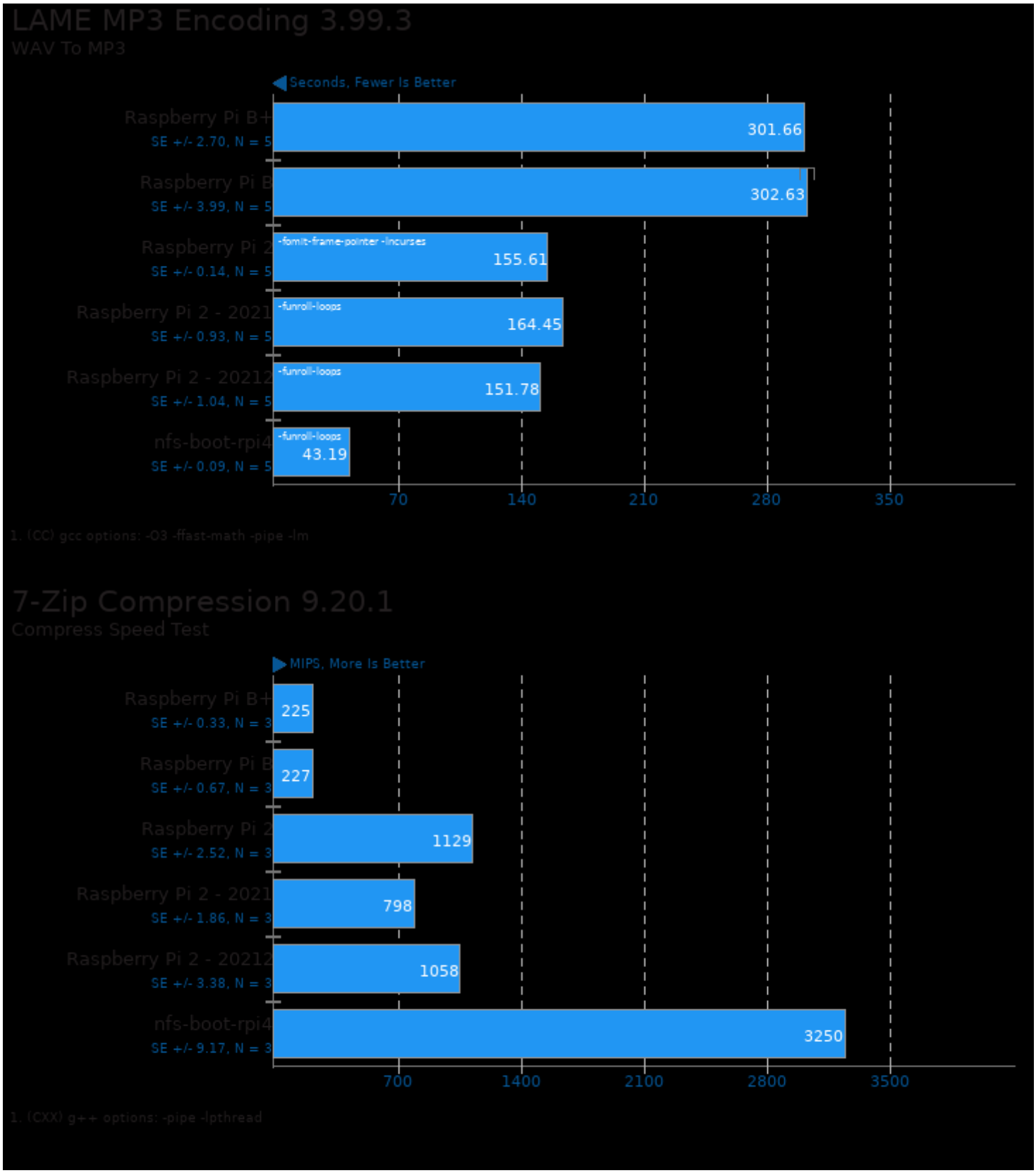
OS: Ubuntu 21.04, Kernel: 5.11.0-1027-raspi (aarch64), Vulkan: 1.0.2, Compiler: GCC 10.3.0, File-System: ext4

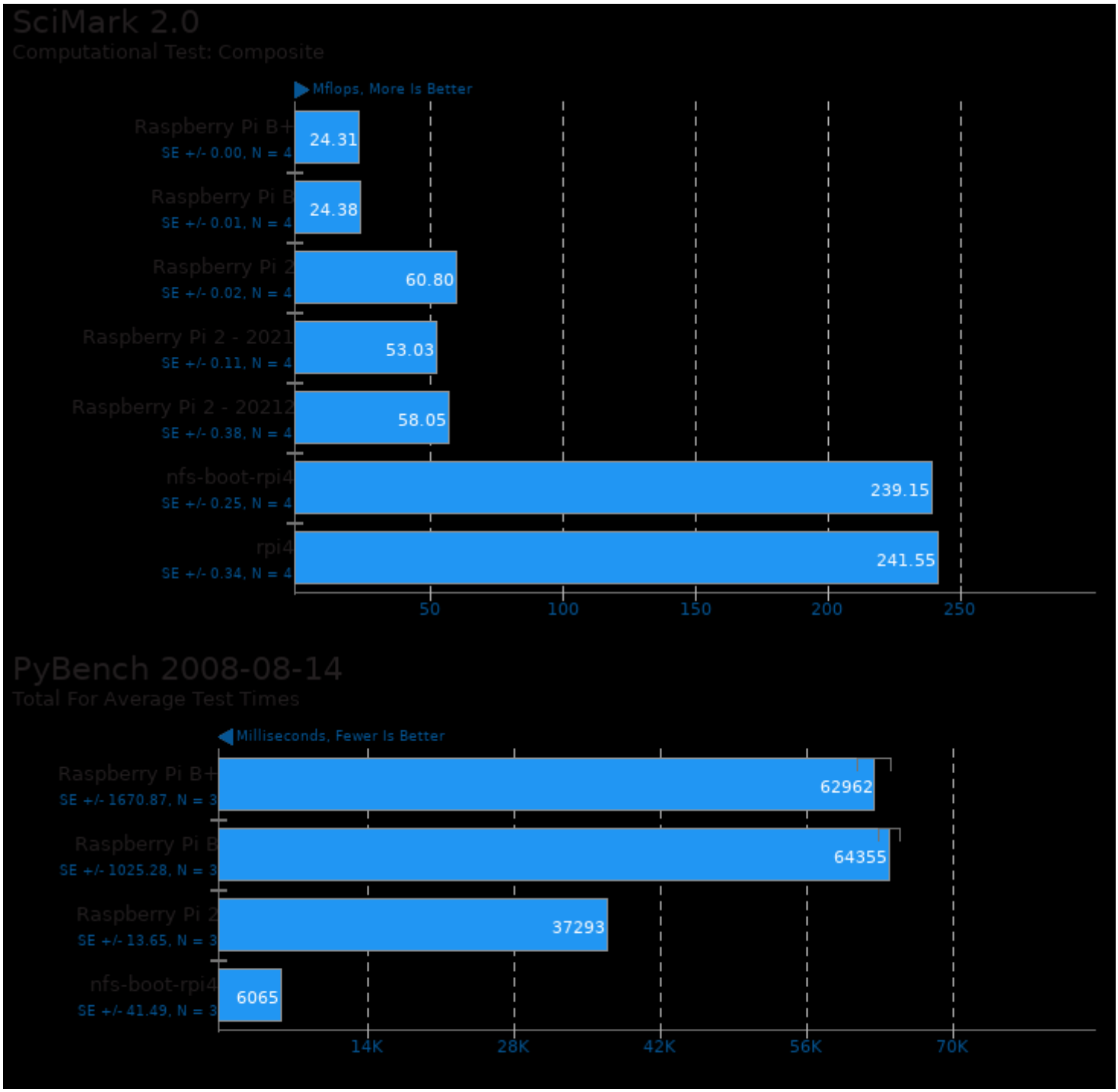
Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1 - Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --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 + srbds: Not affected + tsx_async_abort: Not affected

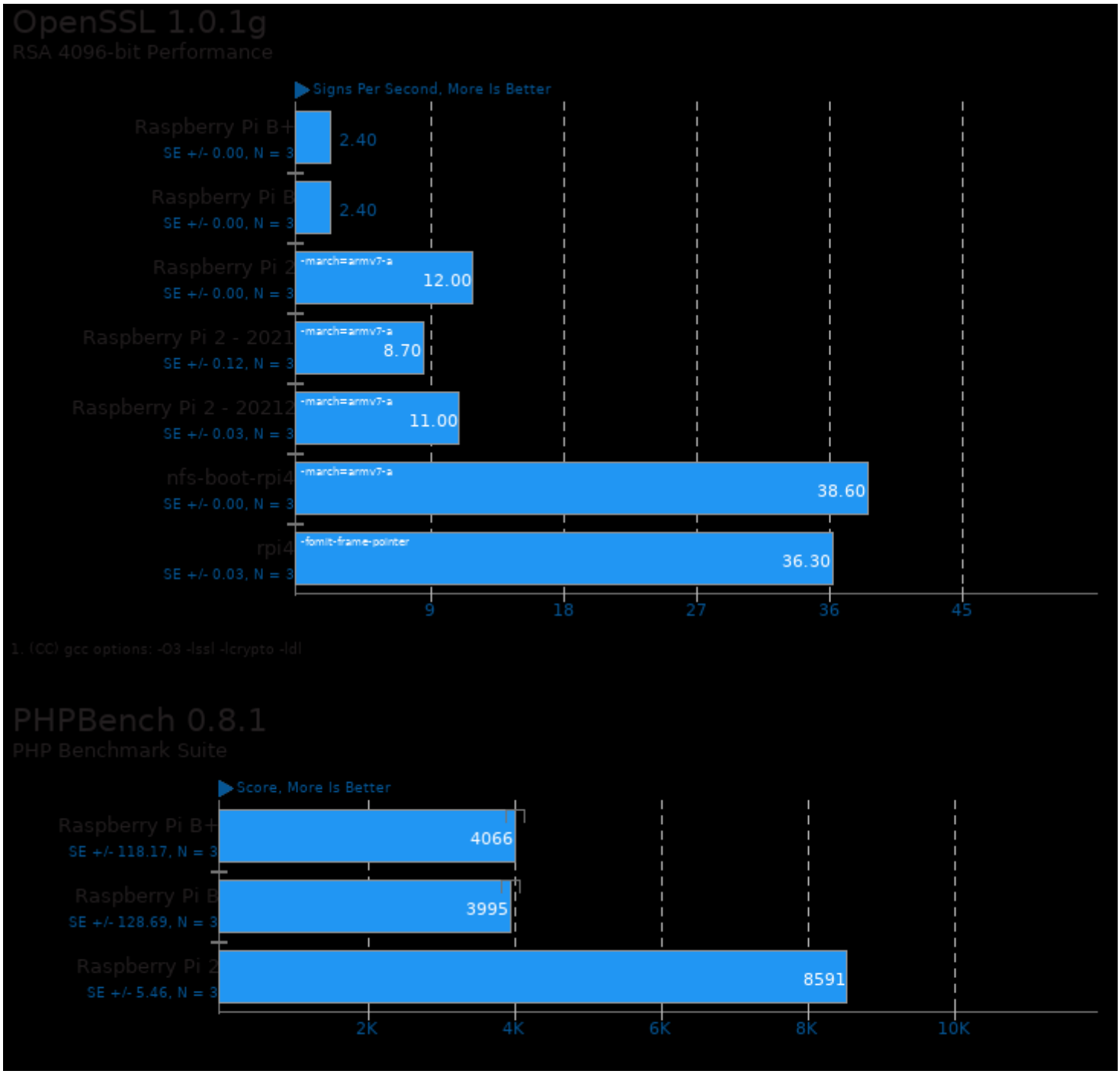
	Raspberry Pi B+	Raspberry Pi B	Raspberry Pi 2	Raspberry Pi 2 - 2021	Raspberry Pi 2 - 20212	nfs-boot-rpi 4	rpi4
LAME MP3 Encoding - WAV To MP3 (sec)	301.66	302.63	155.61	164.447	151.782	43.193	
Normalized	14.32%	14.27%	27.76%	26.27%	28.46%	100%	
Standard Deviation	2%	2.9%	0.2%	1.3%	1.5%	0.4%	
7-Zip Compression - 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%	
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%
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%	
OpenSSL - R.4.b.P (Signs/sec)	2.40	2.40	12	8.7	11.0	38.6	36.3
Normalized	6.22%	6.22%	31.09%	22.54%	28.5%	100%	94.04%
Standard Deviation	0%	0%	0%	2.3%	0.5%	0%	0.2%
PHPBench - P.B.S (Score)	4066	3995	8591				
Normalized	47.33%	46.5%	100%				

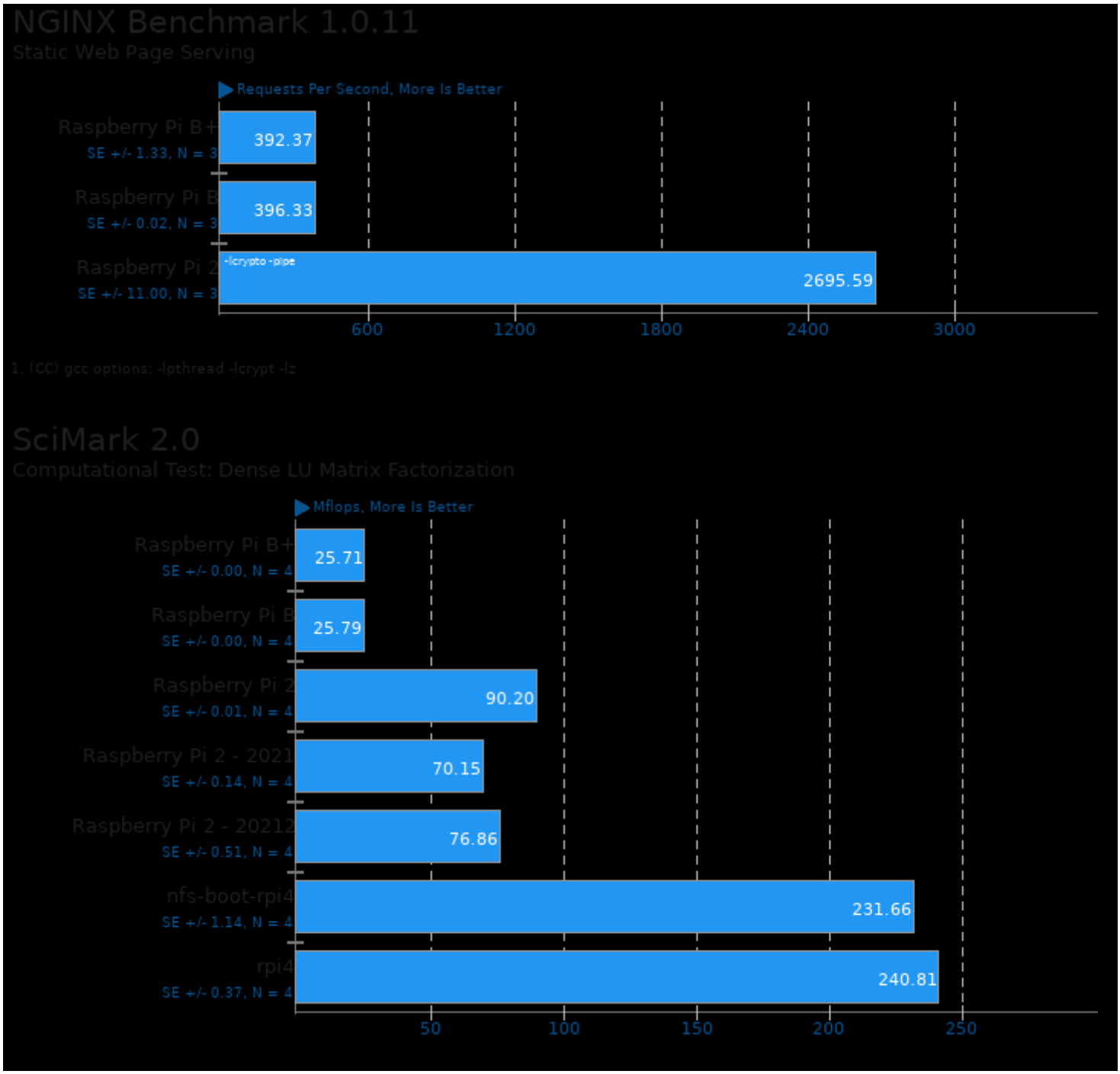
ARM-SBC-Benchmarks-RPI-B-Plus

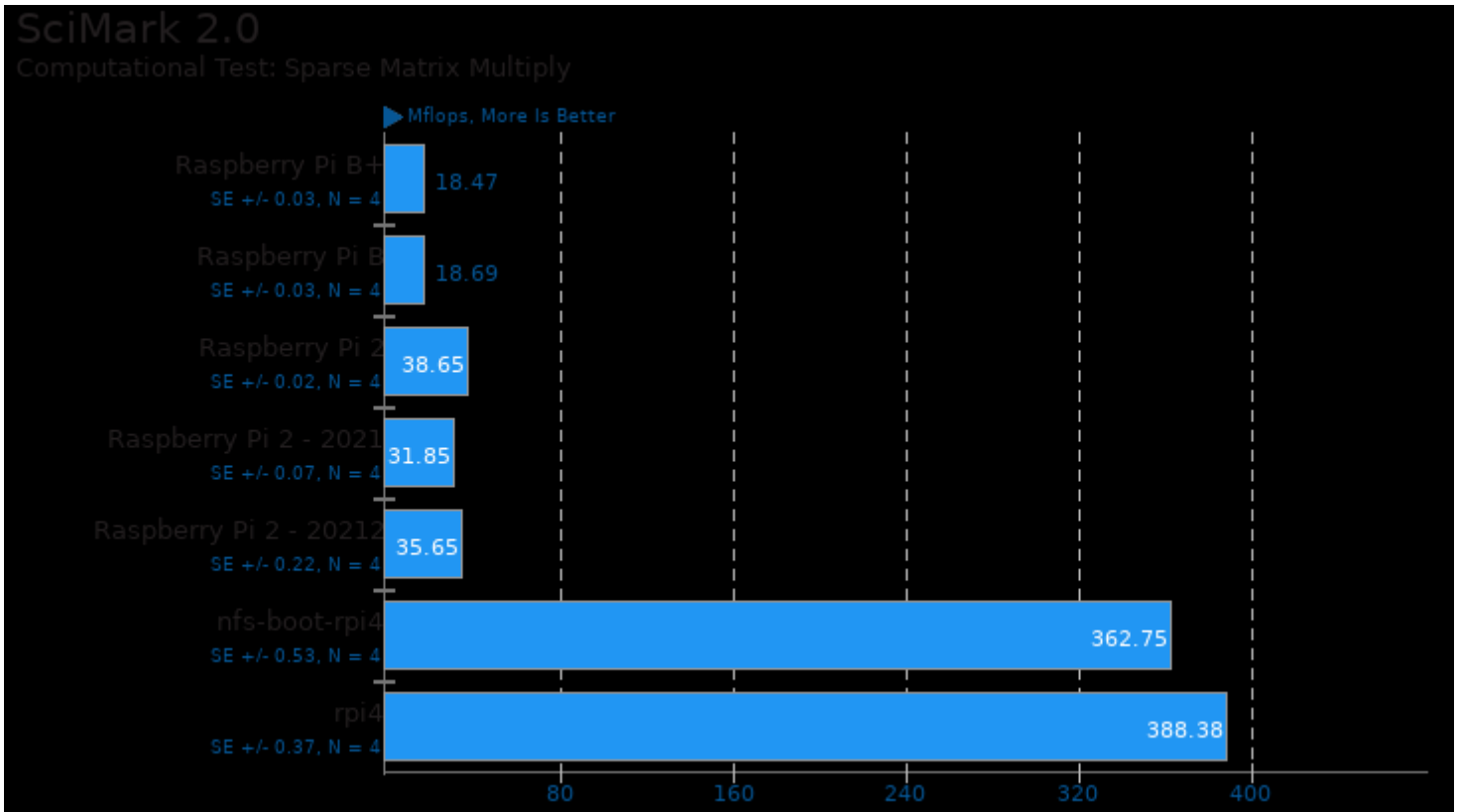
Standard Deviation	5%	5.6%	0.1%				
NGINX Benchmark - S.W.P.S (Reqs/sec)	**392.37**	396.33	**2696**				
Normalized	14.56%	14.7%	100%				
Standard Deviation	0.6%	0%	0.7%				
SciMark - D.L.M.F (Mflops)	**25.71**	25.79	90.20	70.15	76.86	231.66	**240.81**
Normalized	10.68%	10.71%	37.46%	29.13%	31.92%	96.2%	100%
Standard Deviation	0%	0%	0%	0.4%	1.3%	1%	0.3%
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 - 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 - 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 - 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%
Parallel BZIP2 Compression - 2.F.C (sec)	**832.78**	826.77	**149.13**				
Normalized	17.91%	18.04%	100%				
Standard Deviation	1.8%	1.7%	1.9%				

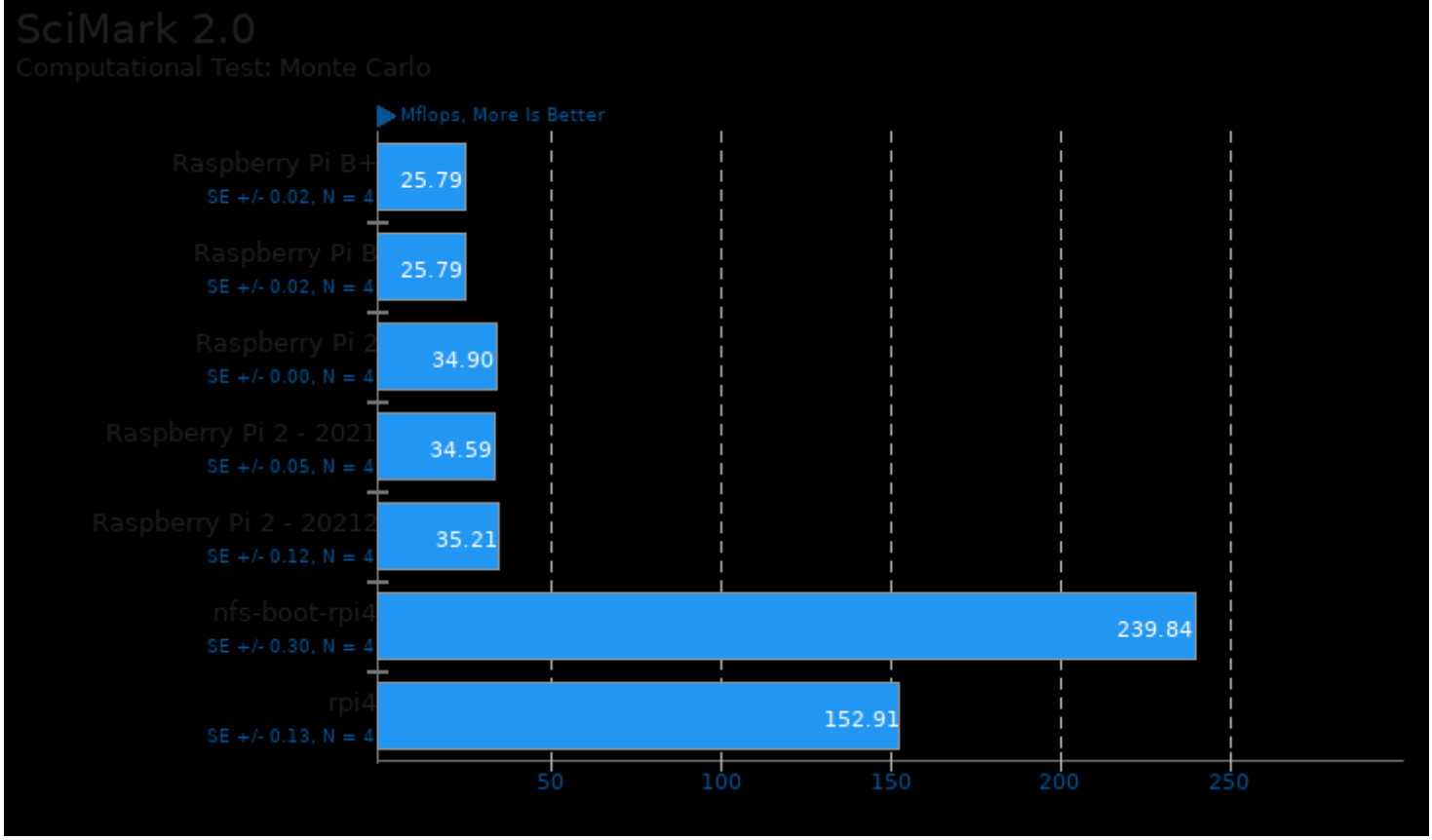

LAME MP3 Encoding 3.99.3
WAV To MP3
Seconds, Fewer Is Better
Raspberry Pi B+
SE +/- 2.70, N = 5
301.66
Raspberry Pi B
SE +/- 3.99, N = 5
302.63
Raspberry Pi 2
SE +/- 0.14, N = 5
-fomit-frame-pointer -lncurses
155.61
Raspberry Pi 2 - 2021
SE +/- 0.93, N = 5
-funroll-loops
164.45
Raspberry Pi 2 - 20212
SE +/- 1.04, N = 5
-funroll-loops
151.78
nfs-boot-rpi4
SE +/- 0.09, N = 5
-funroll-loops
43.19
70
140
210
280
350
1. (CC) gcc options: -O3 -ffast-math -pipe -lm
7-Zip Compression 9.20.1
Compress Speed Test
MIPS, More Is Better
Raspberry Pi B+
SE +/- 0.33, N = 3
225
Raspberry Pi B
SE +/- 0.67, N = 3
227
Raspberry Pi 2
SE +/- 2.52, N = 3
1129
Raspberry Pi 2 - 2021
SE +/- 1.86, N = 3
798
Raspberry Pi 2 - 20212
SE +/- 3.38, N = 3
1058
nfs-boot-rpi4
SE +/- 9.17, N = 3
3250
700
1400
2100
2800
3500
1. (CXX) g++ options: -pipe -lpthread

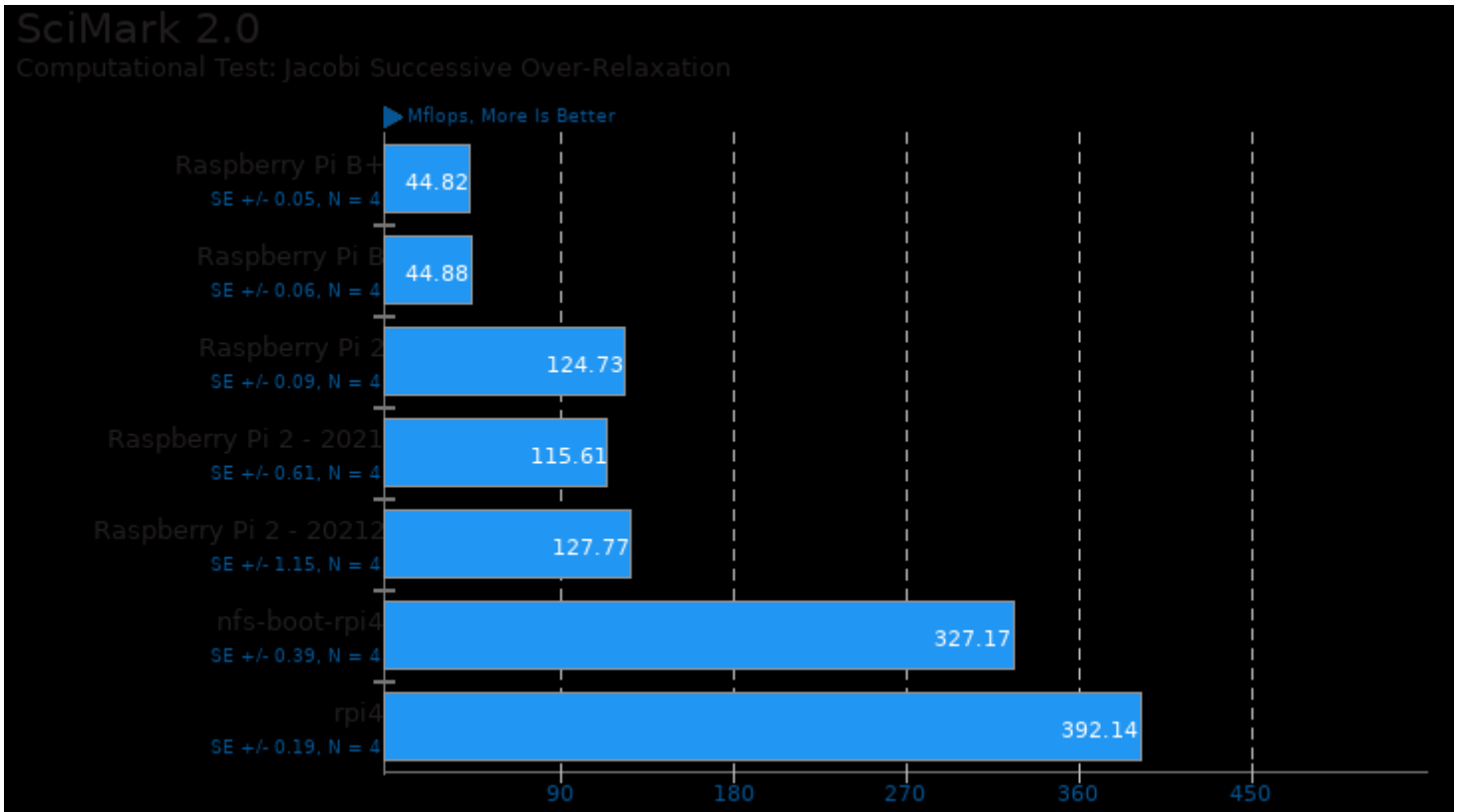

SciMark 2.0
Computational Test: Composite
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.00, N = 4
24.31
Raspberry Pi B
SE +/- 0.01, N = 4
24.38
Raspberry Pi 2
SE +/- 0.02, N = 4
60.80
Raspberry Pi 2 - 2021
SE +/- 0.11, N = 4
53.03
Raspberry Pi 2 - 20212
SE +/- 0.38, N = 4
58.05
nfs-boot-rpi4
SE +/- 0.25, N = 4
239.15
rpi4
SE +/- 0.34, N = 4
241.55
50
100
150
200
250
PyBench 2008-08-14
Total For Average Test Times
Milliseconds, Fewer Is Better
Raspberry Pi B+
SE +/- 1670.87, N = 3
62962
Raspberry Pi B
SE +/- 1025.28, N = 3
64355
Raspberry Pi 2
SE +/- 13.65, N = 3
37293
nfs-boot-rpi4
SE +/- 41.49, N = 3
6065
14K
28K
42K
56K
70K

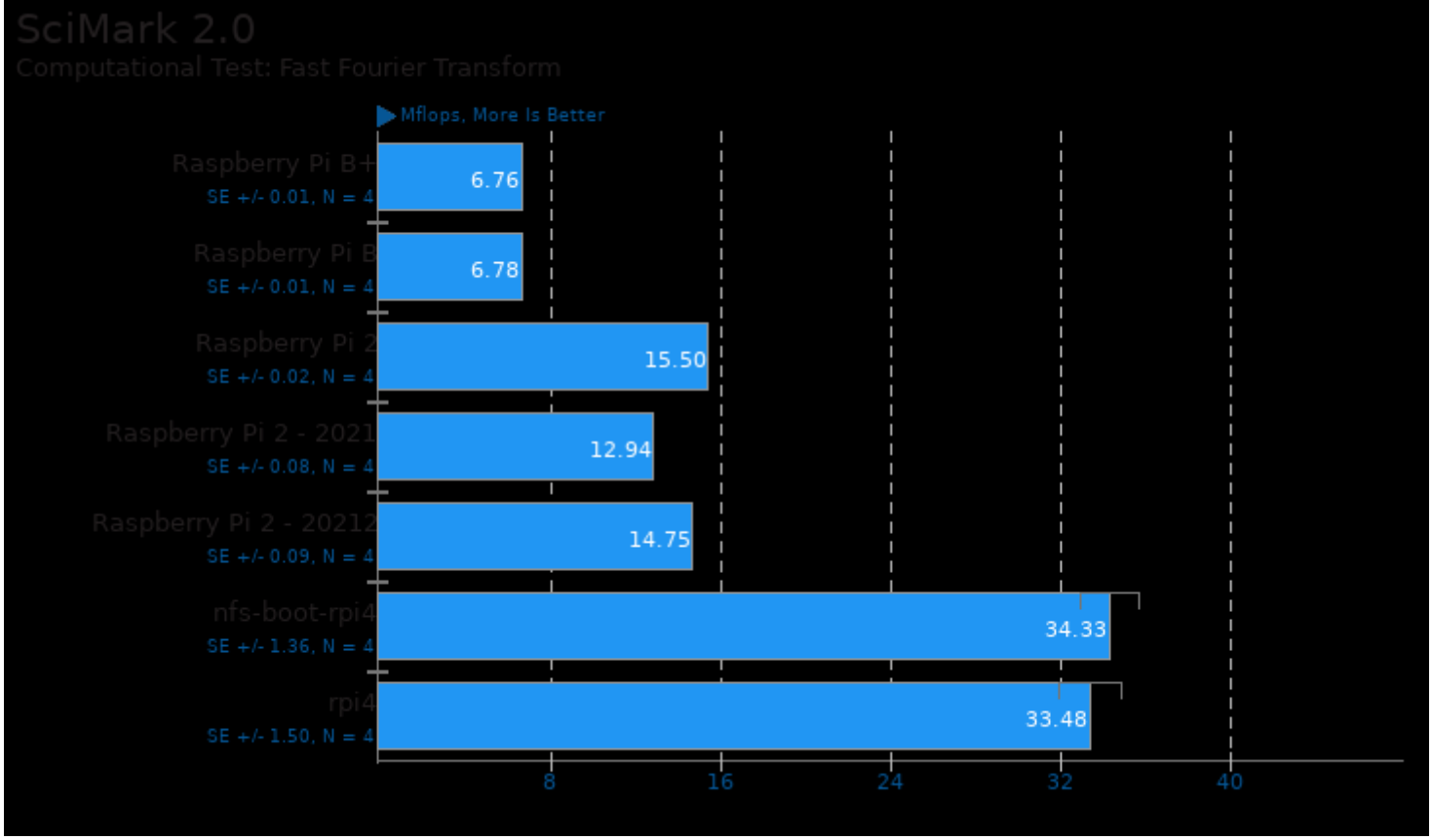

OpenSSL 1.0.1g
RSA 4096-bit Performance
Signs Per Second, More Is Better
Raspberry Pi B+
SE +/- 0.00, N = 3
2.40
Raspberry Pi B
SE +/- 0.00, N = 3
2.40
Raspberry Pi 2
SE +/- 0.00, N = 3
-march=armv7-a
12.00
Raspberry Pi 2 - 2021
SE +/- 0.12, N = 3
-march=armv7-a
8.70
Raspberry Pi 2 - 20212
SE +/- 0.03, N = 3
-march=armv7-a
11.00
nfs-boot-rpi4
SE +/- 0.00, N = 3
-march=armv7-a
38.60
rpi4
SE +/- 0.03, N = 3
-fomit-frame-pointer
36.30
9
18
27
36
45
1. (CC) gcc options: -O3 -lssl -lcrypto -ldl
PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
Raspberry Pi B+
SE +/- 118.17, N = 3
4066
Raspberry Pi B
SE +/- 128.69, N = 3
3995
Raspberry Pi 2
SE +/- 5.46, N = 3
8591
2K
4K
6K
8K
10K

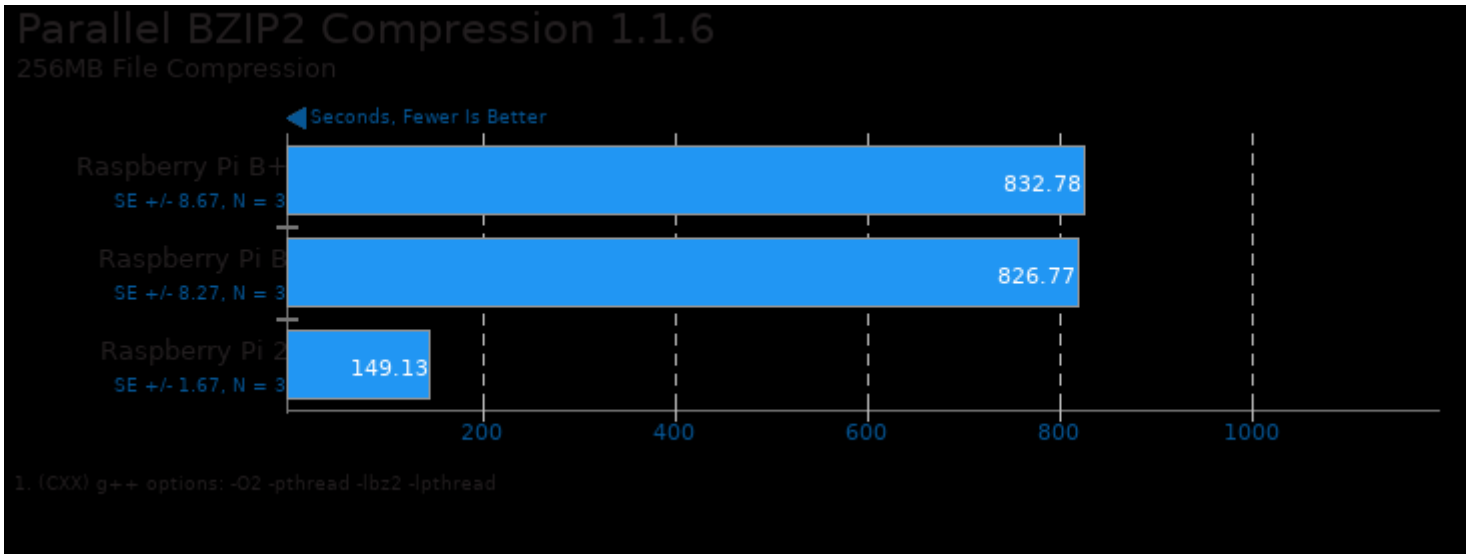

NGINX Benchmark 1.0.11
Static Web Page Serving
Requests Per Second, More Is Better
Raspberry Pi B+
SE +/- 1.33, N = 3
392.37
Raspberry Pi B
SE +/- 0.02, N = 3
396.33
Raspberry Pi 2
SE +/- 11.00, N = 3
-lcrypto -pipe
2695.59
600
1200
1800
2400
3000
1. (CC) gcc options: -lpthread -lcrypt -lz
SciMark 2.0
Computational Test: Dense LU Matrix Factorization
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.00, N = 4
25.71
Raspberry Pi B
SE +/- 0.00, N = 4
25.79
Raspberry Pi 2
SE +/- 0.01, N = 4
90.20
Raspberry Pi 2 - 2021
SE +/- 0.14, N = 4
70.15
Raspberry Pi 2 - 20212
SE +/- 0.51, N = 4
76.86
nfs-boot-rpi4
SE +/- 1.14, N = 4
231.66
rpi4
SE +/- 0.37, N = 4
240.81
50
100
150
200
250


SciMark 2.0
Computational Test: Sparse Matrix Multiply
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.03, N = 4
18.47
Raspberry Pi B
SE +/- 0.03, N = 4
18.69
Raspberry Pi 2
SE +/- 0.02, N = 4
38.65
Raspberry Pi 2 - 2021
SE +/- 0.07, N = 4
31.85
Raspberry Pi 2 - 20212
SE +/- 0.22, N = 4
35.65
nfs-boot-rpi4
SE +/- 0.53, N = 4
362.75
rpi4
SE +/- 0.37, N = 4
388.38
80
160
240
320
400

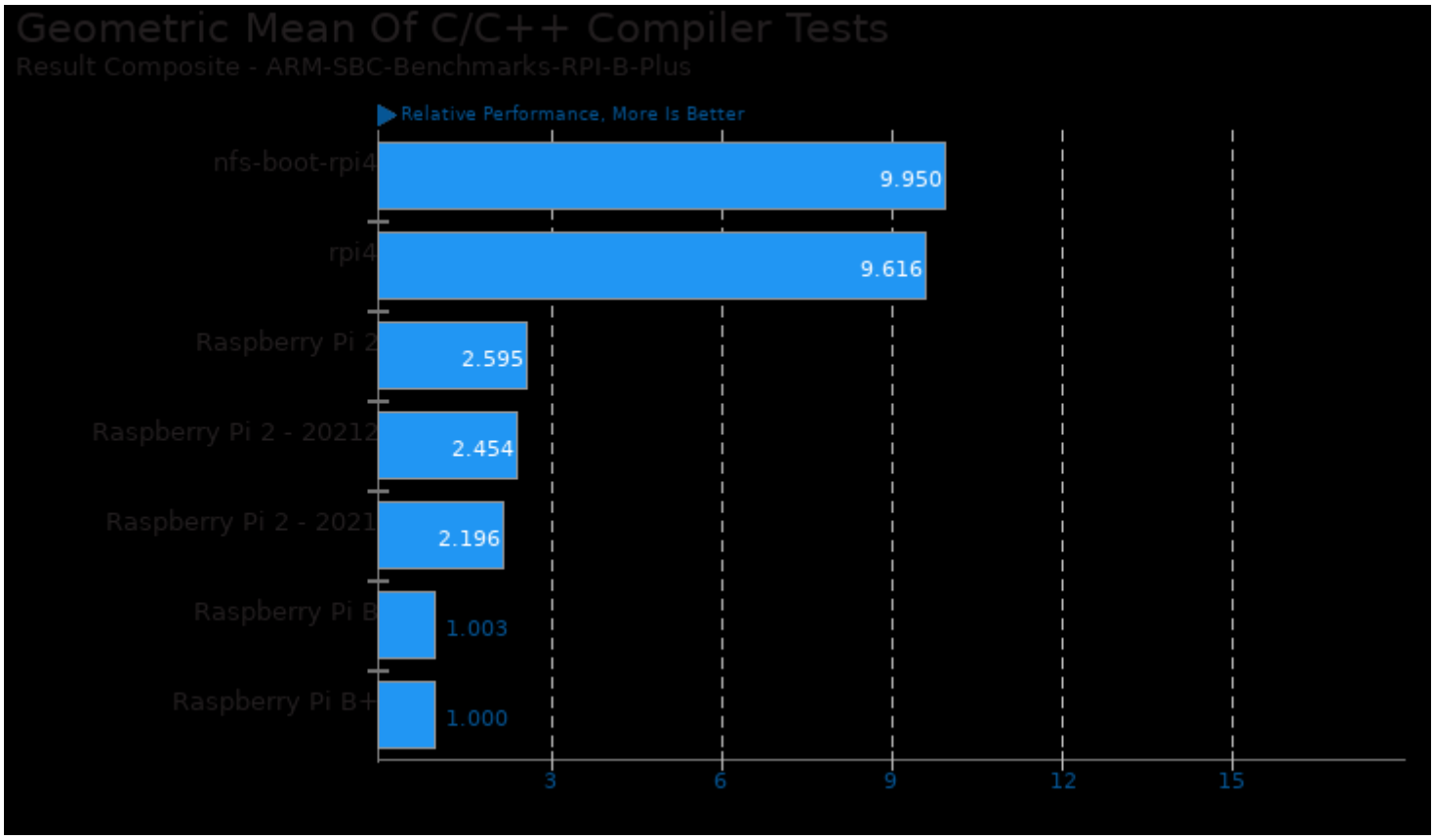

SciMark 2.0
Computational Test: Monte Carlo
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.02, N = 4
25.79
Raspberry Pi B
SE +/- 0.02, N = 4
25.79
Raspberry Pi 2
SE +/- 0.00, N = 4
34.90
Raspberry Pi 2 - 2021
SE +/- 0.05, N = 4
34.59
Raspberry Pi 2 - 20212
SE +/- 0.12, N = 4
35.21
nfs-boot-rpi4
SE +/- 0.30, N = 4
239.84
rpi4
SE +/- 0.13, N = 4
152.91
50
100
150
200
250


SciMark 2.0
Computational Test: Jacobi Successive Over-Relaxation
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.05, N = 4
44.82
Raspberry Pi B
SE +/- 0.06, N = 4
44.88
Raspberry Pi 2
SE +/- 0.09, N = 4
124.73
Raspberry Pi 2 - 2021
SE +/- 0.61, N = 4
115.61
Raspberry Pi 2 - 20212
SE +/- 1.15, N = 4
127.77
nfs-boot-rpi4
SE +/- 0.39, N = 4
327.17
rpi4
SE +/- 0.19, N = 4
392.14
90
180
270
360
450

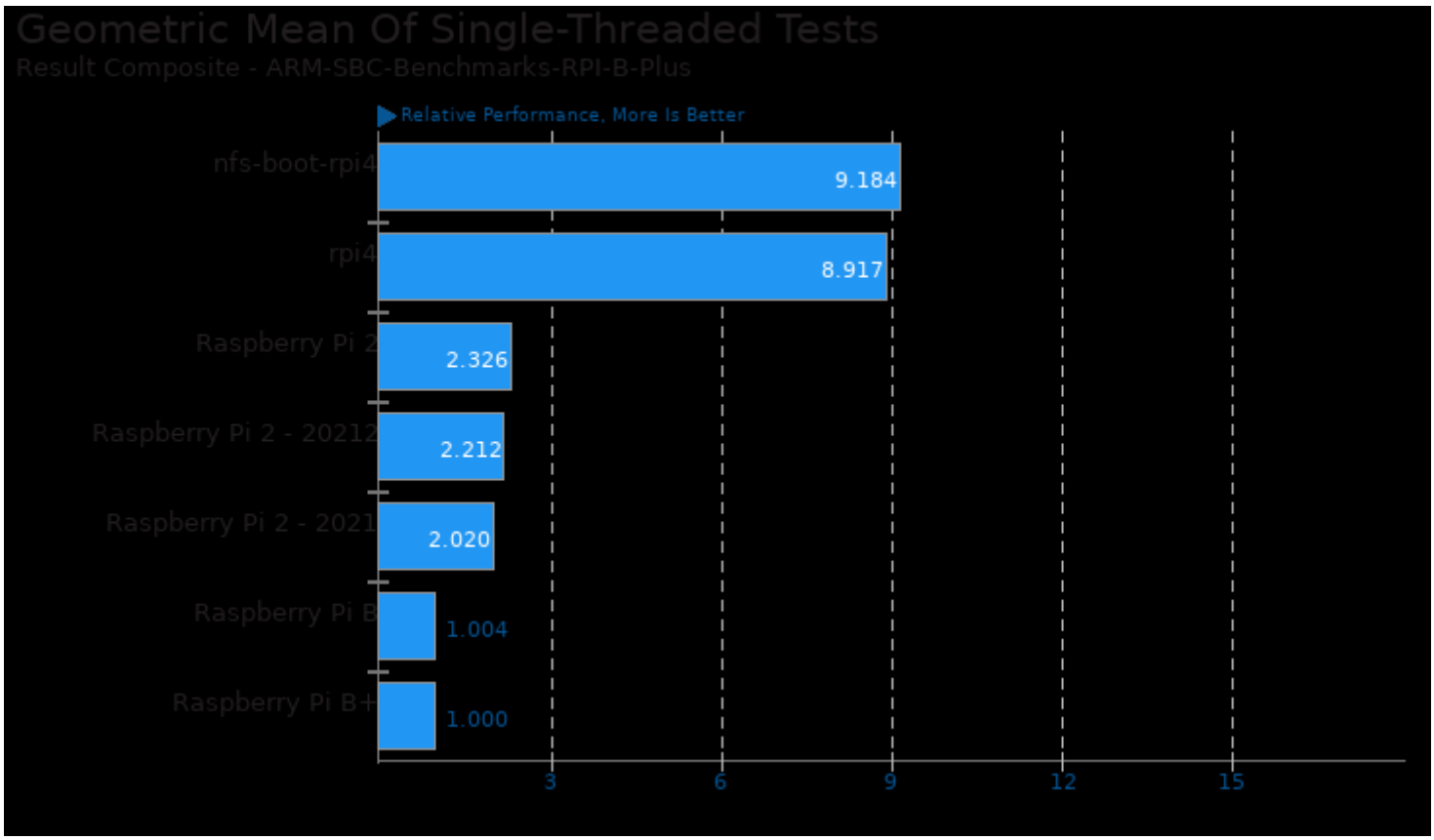

SciMark 2.0
Computational Test: Fast Fourier Transform
Mflops, More Is Better
Raspberry Pi B+
SE +/- 0.01, N = 4
6.76
Raspberry Pi B
SE +/- 0.01, N = 4
6.78
Raspberry Pi 2
SE +/- 0.02, N = 4
15.50
Raspberry Pi 2 - 2021
SE +/- 0.08, N = 4
12.94
Raspberry Pi 2 - 20212
SE +/- 0.09, N = 4
14.75
nfs-boot-rpi4
SE +/- 1.36, N = 4
34.33
rpi4
SE +/- 1.50, N = 4
33.48
8
16
24
32
40


Parallel BZIP2 Compression 1.1.6
256MB File Compression
Seconds, Fewer Is Better
Raspberry Pi B+
SE +/- 8.67, N = 3
832.78
Raspberry Pi B
SE +/- 8.27, N = 3
826.77
Raspberry Pi 2
SE +/- 1.67, N = 3
149.13
200
400
600
800
1000
1. (CXX) g++ options: -O2 -pthread -lbz2 -lpthread

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



ARM-SBC-Benchmarks-RPI-B-Plus

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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 18:05.