



Raspberry Pi 4 vs. Intel Comet Lake

Benchmarks for a future article.

Automated Executive Summary

Core i3 10100 had the most wins, coming in first place for 73% of the tests.

Based on the geometric mean of all complete results, the fastest (Core i3 10100) was 5.551x the speed of the slowest (Raspberry Pi 4). Intel Core i5-8500T was 0.752x the speed of Core i3 10100, Pentium Gold G6400 was 0.993x the speed of Intel Core i5-8500T, Celeron G5900 was 0.783x the speed of Pentium Gold G6400, Raspberry Pi 4 was 0.308x the speed of Celeron G5900.

The results with the greatest spread from best to worst included:

PyPerformance (Benchmark: 2to3) at 282.123x

GNU Octave Benchmark at 16.278x

PolyBench-C (Test: Covariance Computation) at 14.306x

PolyBench-C (Test: Correlation Computation) at 14.295x

Numpy Benchmark at 14.15x

OpenSSL (RSA 4096-bit Performance) at 13.69x

Aircrack-ng at 13.351x

GraphicsMagick (Operation: Rotate) at 13.341x

FLAC Audio Encoding (WAV To FLAC) at 12.989x

GraphicsMagick (Operation: HWB Color Space) at 11.241x.

Test Systems:

Raspberry Pi 4

Processor: ARMv7 Cortex-A72 @ 1.50GHz (4 Cores), Motherboard: BCM2711 Raspberry Pi 4 Model B Rev 1.1, Memory: 2048MB, Disk: 32GB SC32G, Graphics: V3D 4.2 2GB, Monitor: VA2431

OS: Raspbian 10, Kernel: 5.4.51-v7l+ (armv7l), Desktop: LXDE 0.10.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 2.1 Mesa 19.3.2, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: snd_bcm2835.enable_compat_alsa=0 snd_bcm2835.enable_hdmi=1 snd_bcm2835.enable_headphones=1
Compiler Notes: --build=arm-linux-gnueabi --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=glibc --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-gnueabi --program-prefix=arm-linux-gnueabi --target=arm-linux-gnueabi --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
Java Notes: OpenJDK Runtime Environment (build 11.0.8+10-post-Raspbian-1deb10u1)
Python Notes: Python 2.7.16 + Python 3.7.3

Core i3 10100

Processor: Intel Core i3-10100 @ 4.30GHz (4 Cores / 8 Threads), Motherboard: Gigabyte B460M DS3H (F2 BIOS), Chipset: Intel Device 9b63, Memory: 16GB, Disk: 500GB Western Digital WDS500G3X0C-00SJG0, Graphics: EFI VGA, Audio: Realtek ALC887-VD, Network: Realtek RTL8111/8168/8411

OS: Debian 10, Kernel: 4.19.0-9-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=glibc --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu --target=x86_64-linux-gnu --with-abi=m64 --with-arch=32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xcc
Java Notes: OpenJDK Runtime Environment (build 11.0.8+10-post-Debian-1deb10u1)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 11f: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Pentium Gold G6400

Processor: Intel Pentium Gold G6400 @ 4.00GHz (2 Cores / 4 Threads), Motherboard: Gigabyte B460M DS3H (F2 BIOS), Chipset: Intel Device 9b73, Memory: 16GB, Disk: 500GB Western Digital WDS500G3X0C-00SJG0, Graphics: EFI VGA, Audio: Realtek ALC887-VD, Network: Realtek RTL8111/8168/8411

OS: Debian 10, Kernel: 4.19.0-9-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=glibc --enable-default-pie

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--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes
--enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix
--host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new
--with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xcc
Java Notes: OpenJDK Runtime Environment (build 11.0.8+10-post-Debian-1deb10u1)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 11tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB
disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB:
conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected
```

Celeron G5900

Processor: Intel Celeron G5900 @ 3.40GHz (2 Cores), Motherboard: Gigabyte B460M DS3H (F2 BIOS), Chipset: Intel Device 9b73, Memory: 16GB, Disk: 500GB Western Digital WDS500G3X0C-00SJG0, Graphics: EFI VGA, Audio: Realtek ALC887-VD, Network: Realtek RTL8111/8168/8411

OS: Debian 10, Kernel: 4.19.0-9-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

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Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie
--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes
--enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix
--host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new
--with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xcc
Java Notes: OpenJDK Runtime Environment (build 11.0.8+10-post-Debian-1deb10u1)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 11tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB
disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB:
conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected
```

Intel Core i5-8500T

Processor: Intel Core i5-8500T (6 Cores), Motherboard: QEMU Standard PC (i440FX + PIIX 1996) (rel-1.13.0-48-gd9c812dda519-prebuilt.qemu.org BIOS), Memory: 44GB, Disk: 1006GB, Graphics: bochs-drmdrmfb, Monitor: QEMU Monitor

OS: Ubuntu 20.04.1 LTS, Kernel: 5.8.0-45-generic (x86_64), Display Driver: bochs-drmdrmfb, Compiler: GCC 9.3.0, File-System: overlayfs, Screen Resolution: 1024x768, System Layer: Docker

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Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie
--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch
--enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/usr,hsa --enable-plugin
--enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686
--with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: CPU Microcode: 0x1
Java Notes: OpenJDK Runtime Environment (build 11.0.10+9-Ubuntu-0ubuntu1.20.04)
Python Notes: Python 3.8.5
Security Notes: itlb_multihit: Not affected + 11tf: Mitigation of PTE Inversion; VMX: flush not necessary SMT disabled + mds: Vulnerable: Clear buffers attempted no
microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of
usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: disabled RSB filling + srbds:
Unknown: Dependent on hypervisor status + tsx_async_abort: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown
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Raspberry Pi 4	Core i3 10100	Pentium Gold G6400	Celeron G5900	Intel Core i5-8500T
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LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	0.499	3.219	1.657	1.381	3.181
Normalized	15.5%	100%	51.48%	42.9%	98.82%
Standard Deviation	0.2%	0.4%	0.6%	0.7%	2.4%
DaCapo Benchmark - H2 (msec)	14385	3146	3375	3616	3719
Normalized	21.87%	100%	93.21%	87%	84.59%
Standard Deviation	3.9%	5.8%	9.7%	2.7%	4.1%
DaCapo Benchmark - Jython (msec)	34367	4151	5482	6084	5559
Normalized	12.08%	100%	75.72%	68.23%	74.67%
Standard Deviation	2%	1.4%	6%	1.8%	0.9%
DaCapo Benchmark - Tradebeans (msec)	21087		4135		4170
Normalized	19.61%		100%		99.16%
Standard Deviation	0.7%				2.5%
TSCP - A.C.P (Nodes/s)	350771	1376258	1268492	1078690	1051951
Normalized	25.49%	100%	92.17%	78.38%	76.44%
Standard Deviation	0.2%	0.1%	0.2%	0.2%	0.7%
GraphicsMagick - Swirl (Iterations/min)	34	187	94	65	172
Normalized	18.18%	100%	50.27%	34.76%	91.98%
Standard Deviation	1.7%	2.5%			
GraphicsMagick - Rotate (Iterations/min)	85	1134	1057	873	593
Normalized	7.5%	100%	93.21%	76.98%	52.29%
Standard Deviation		2.7%	0.1%	0.8%	3.3%
GraphicsMagick - Sharpen (Iterations/min)	15	60	30	25	65
Normalized	23.08%	92.31%	46.15%	38.46%	100%
Standard Deviation					0.9%
GraphicsMagick - Enhanced (Iterations/min)	16	92	45	37	97
Normalized	16.49%	94.85%	46.39%	38.14%	100%
Standard Deviation					0.6%
GraphicsMagick - Resizing (Iterations/min)	48	437	246	197	457
Normalized	10.5%	95.62%	53.83%	43.11%	100%
Standard Deviation		0.3%	0.4%		0.6%
GraphicsMagick - Noise-Gaussian (Iterations/min)	16	117	55	39	107
Normalized	13.68%	100%	47.01%	33.33%	91.45%
Standard Deviation	25.4%				
GraphicsMagick - HWB Color Space (Iterations/min)	83	933	519	419	632
Normalized	8.9%	100%	55.63%	44.91%	67.74%
Standard Deviation		0.2%	0.1%	0.1%	0.3%
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	25.4479	262.097	132.556	76.4398	223.237
Normalized	9.71%	100%	50.58%	29.16%	85.17%
Standard Deviation	0.7%	0.3%	0.9%	0.3%	1.2%

Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	33031	179882	88892	53412	143584
Normalized	18.36%	100%	49.42%	29.69%	79.82%
Standard Deviation	0%	1.1%	1.9%	0.1%	0.3%
7-Zip Compression - C.S.T	3466	27500	15033	7920	20671
Normalized	12.6%	100%	54.67%	28.8%	75.17%
Standard Deviation	0.1%	1.2%	0.2%	0.6%	0.4%
Timed GDB GNU Debugger Compilation - Time To Compile (sec)	970.537	118.874	178.803	274.528	190.939
Normalized	12.25%	100%	66.48%	43.3%	62.26%
Standard Deviation	0.5%	0.3%	0.1%	0.1%	0.8%
Timed MPlayer Compilation - Time To Compile (sec)	543.837	69.218	128.701	198.335	91.948
Normalized	12.73%	100%	53.78%	34.9%	75.28%
Standard Deviation	0%	0.1%	0%	0.1%	0.3%
Timed PHP Compilation - Time To Compile (sec)	638.584	88.578	143.935	220.076	123.775
Normalized	13.87%	100%	61.54%	40.25%	71.56%
Standard Deviation	0.2%	0.2%	0.1%	0.3%	1.6%
C-Ray - Total Time - 4.1.R.P.P (sec)	680.080	157.068	322.191	400.348	144.010
Normalized	21.18%	91.69%	44.7%	35.97%	100%
Standard Deviation	4.3%	0%	0%	0%	0.3%
Smallpt - G.I.R.1.S (sec)	130.180	22.802	46.453	74.585	27.772
Normalized	17.52%	100%	49.09%	30.57%	82.1%
Standard Deviation	1.4%	0.1%	0.1%	0.1%	0.1%
Numpy Benchmark (Score)	26.54	375.55	336.12	282.42	277.54
Normalized	7.07%	100%	89.5%	75.2%	73.9%
Standard Deviation	0.1%	0.2%	0.1%	0.4%	0.8%
XZ Compression - C.u.1.0.3.s.i.i.C.L.9 (sec)	416.907	42.488	69.307	123.883	66.370
Normalized	10.19%	100%	61.3%	34.3%	64.02%
Standard Deviation	2.8%	0.3%	0.4%	0.1%	0.2%
OpenSSL - R.4.b.P (Signs/sec)	97.6	1253	389.3	315.0	1336
Normalized	7.3%	93.8%	29.14%	23.58%	100%
Standard Deviation	0.1%	0.3%	0.1%	0.6%	0.5%
Aircrack-ng (k/s)	1162	15519	2813	2347	
Normalized	7.49%	100%	18.12%	15.12%	
Standard Deviation	0.6%	0.4%	0.3%	0%	
libjpeg-turbo tjbench - D.T (Megapixels/sec)	49.657148	205.777836	172.928584	147.209265	152.164424
Normalized	24.13%	100%	84.04%	71.54%	73.95%
Standard Deviation	0.4%	0.4%	0.5%	1%	0.5%
SQLite Speedtest - Timed Time - Size 1,000 (sec)	766.550	54.246	65.150	82.015	103.132
Normalized	7.08%	100%	83.26%	66.14%	52.6%
Standard Deviation	0.5%	0.6%	2.3%	0%	11.3%
GEGL - Crop (sec)	50.874	8.527	9.509	10.893	12.225
Normalized	16.76%	100%	89.67%	78.28%	69.75%
Standard Deviation	2.7%	0.9%	1.5%	1.1%	1.5%
GEGL - Scale (sec)	36.875	5.478	6.236	7.229	8.851
Normalized	14.86%	100%	87.84%	75.78%	61.89%
Standard Deviation	0.5%	1.1%	1.3%	0.1%	2.1%

Raspberry Pi 4 vs. Intel Comet Lake

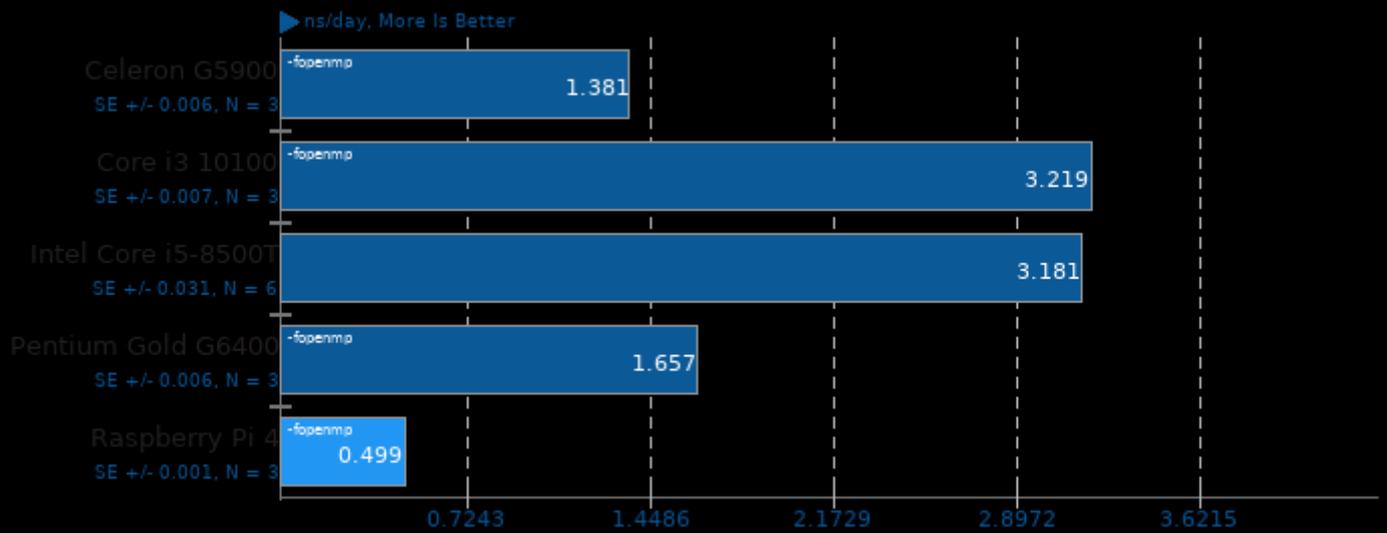
GEGL - Cartoon (sec)	647.548	105.900	117.134	137.544	136.407
Normalized	16.35%	100%	90.41%	76.99%	77.64%
Standard Deviation	0.8%	0.3%	0.3%	0.1%	0.2%
GEGL - Reflect (sec)	14.988	31.140	33.538	39.431	44.994
Normalized	100%	48.13%	44.69%	38.01%	33.31%
Standard Deviation	0.7%	0.4%	0.2%	0.3%	1.2%
GEGL - Antialias (sec)	214.859	40.701	47.341	56.741	57.425
Normalized	18.94%	100%	85.97%	71.73%	70.88%
Standard Deviation	0.5%	0.1%	0.5%	0.1%	0.1%
GEGL - Tile Glass (sec)	161.312	30.744	33.043	38.373	45.257
Normalized	19.06%	100%	93.04%	80.12%	67.93%
Standard Deviation	1.2%	0.2%	0.6%	0.1%	0.9%
GEGL - Wavelet Blur (sec)	326.606	62.372	68.478	79.504	93.352
Normalized	19.1%	100%	91.08%	78.45%	66.81%
Standard Deviation	0.7%	0.3%	0.3%	0%	1.3%
GEGL - Color Enhance (sec)	341.548	59.441	64.276	75.070	87.106
Normalized	17.4%	100%	92.48%	79.18%	68.24%
Standard Deviation	0.5%	0.1%	0.1%	0.1%	0.5%
GEGL - Rotate 90 Degrees (sec)	246.618	41.734	47.592	56.293	58.129
Normalized	16.92%	100%	87.69%	74.14%	71.8%
Standard Deviation	0.3%	0.2%	0.4%	0.1%	0.6%
GIMP - resize (sec)	4.576	8.728	10.648	13.147	
Normalized	100%	52.43%	42.98%	34.81%	
Standard Deviation	23.2%	0.5%	0.1%	1.7%	
GIMP - rotate (sec)	4.389	17.599	18.878	22.125	
Normalized	100%	24.94%	23.25%	19.84%	
Standard Deviation	8.9%	0%	0.2%	0.1%	
GIMP - auto-levels (sec)	4.291	20.780	23.198	27.685	
Normalized	100%	20.65%	18.5%	15.5%	
Standard Deviation	0.5%	0.5%	0.1%	0.1%	
GIMP - unsharp-mask (sec)	4.345	24.968	26.371	31.529	
Normalized	100%	17.4%	16.48%	13.78%	
Standard Deviation	1.9%	0.1%	0.1%	0.1%	
Hugin - P.P.A.S.T (sec)	471.413	68.367	96.509	140.394	79.575
Normalized	14.5%	100%	70.84%	48.7%	85.92%
Standard Deviation	0.4%	0.6%	0.5%	0.2%	0.9%
Inkscape - SVG Files To PNG (sec)	137.212	24.347	25.719	30.616	28.290
Normalized	17.74%	100%	94.67%	79.52%	86.06%
Standard Deviation	0.8%	0.1%	0.2%	0.2%	0.5%
OCRMyPDF - P.6.P.P.D (sec)	376.428	44.347	89.362	121.326	
Normalized	11.78%	100%	49.63%	36.55%	
Standard Deviation	0.3%	0.1%	0.1%	0.1%	
GNU Octave Benchmark (sec)	100.389	6.167	6.605	7.633	
Normalized	6.14%	100%	93.37%	80.79%	
Standard Deviation	0.5%	0.4%	1.1%	1%	
RawTherapee - T.B.T (sec)	748.022	104.108	147.977	213.383	102.677
Normalized	13.73%	98.63%	69.39%	48.12%	100%
Standard Deviation	0.3%	0%	0%	0.1%	0.6%
librsvg - SVG Files To PNG (sec)	77.222	13.551	13.878	16.452	26.898
Normalized	17.55%	100%	97.64%	82.37%	50.38%
Standard Deviation	2.2%	0.3%	0.1%	0.2%	1%
PyBench - T.F.A.T.T	5235	945	1020	1199	1835
Normalized	18.05%	100%	92.65%	78.82%	51.5%
Standard Deviation	0.2%		0.5%	0.5%	1.7%

PHPBench - P.B.S (Score)	102546	729845	668540	568837	476022
Normalized	14.05%	100%	91.6%	77.94%	65.22%
Standard Deviation	0.5%	0.1%	0.3%	0.1%	0.9%
Scikit-Learn (sec)	79.112	27.067	29.554	34.693	11.929
Normalized	15.08%	44.07%	40.36%	34.38%	100%
Standard Deviation	0.4%	0.3%	0.1%	0.1%	1.3%
Tesseract OCR - T.T.O.7.I (sec)	136.504	25.010	30.871	54.798	
Normalized	18.32%	100%	81.01%	45.64%	
Standard Deviation	0.1%	0.2%	0.1%	0%	
PolyBench-C - C.C (sec)	31.015			2.168	16.894
Normalized	6.99%			100%	12.83%
Standard Deviation	0.1%			0.3%	1.8%
PolyBench-C - C.C (sec)	31.021			2.170	16.805
Normalized	7%			100%	12.91%
Standard Deviation	0.1%			0.4%	1.1%
PolyBench-C - 3.M.M (sec)	24.910	3.338	3.832	4.446	4.851
Normalized	13.4%	100%	87.11%	75.08%	68.81%
Standard Deviation	0%	0.1%	0.1%	0.1%	7.2%
Timed HMMer Search - P.D.S (sec)	53.889	7.438	12.846	19.579	7.567
Normalized	13.8%	100%	57.9%	37.99%	98.3%
Standard Deviation	1.4%	1.5%	0.9%	0.2%	0.7%
Timed MAFFT Alignment - M.S.A (sec)	22.514	3.855	6.593	9.417	
Normalized	17.12%	100%	58.47%	40.94%	
Standard Deviation	3%	6.6%	1.2%	0.4%	
AOBench - 2048 x 2048 - Total Time (sec)	123.692	32.747	35.179	41.546	41.137
Normalized	26.47%	100%	93.09%	78.82%	79.6%
Standard Deviation	0%	0%	0%	2.7%	0.2%
FLAC Audio Encoding - WAV To FLAC (sec)	109.371	8.420	9.456	11.108	14.668
Normalized	7.7%	100%	89.04%	75.8%	57.4%
Standard Deviation	1.1%	0.2%	0.1%	0.1%	2.6%
LAME MP3 Encoding - WAV To MP3 (sec)	41.587	8.122	8.667	10.181	10.441
Normalized	19.53%	100%	93.71%	79.78%	77.79%
Standard Deviation	0.2%	0.1%	0%	0.2%	0.3%
Perl Benchmarks - Pod2html	0.61497660	0.10872912	0.11884498	0.14005805	0.16398129
Normalized	17.68%	100%	91.49%	77.63%	66.31%
Standard Deviation	0.5%	0.2%	0.4%	0.3%	0.8%
Perl Benchmarks - Interpreter	0.00714413	0.00108894	0.00075872	0.00101531	0.00151482
Normalized	10.62%	69.68%	100%	74.73%	50.09%
Standard Deviation	6%	22%	0.2%	0.4%	0.3%
LibreOffice - 2.D.T.P (sec)	5.751	7.510	8.064	9.739	
Normalized	100%	76.58%	71.32%	59.05%	
Standard Deviation		2.7%	1.4%	1.8%	
PyPerformance - 2to3 (Milliseconds)	1.79	304	328	397	505
Normalized	100%	0.59%	0.55%	0.45%	0.35%
Standard Deviation					
PyPerformance - float (Milliseconds)	629	95.7	104	123	179
Normalized	15.21%	100%	92.02%	77.8%	53.46%

Standard Deviation		0.1%			0.3%
PyPerformance - pathlib	142	17.9	19.5	23.6	31.6
(Milliseconds)					
Normalized	12.61%	100%	91.79%	75.85%	56.65%
Standard Deviation		0%	0.3%	0%	0.8%
PyPerformance - json_loads	144	23.6	25.5	30.1	29.9
(Milliseconds)					
Normalized	16.39%	100%	92.55%	78.41%	78.93%
Standard Deviation	0.7%	0.2%	0.2%	0.2%	0.3%
PyPerformance - regex_compile	962	167	180	212	266
(Milliseconds)					
Normalized	17.36%	100%	92.78%	78.77%	62.78%
Standard Deviation	0.1%				
PyPerformance - python_startup	42.5	7.49	7.96	9.8	12.2
(Milliseconds)					
Normalized	17.62%	100%	94.1%	76.43%	61.39%
Standard Deviation	0.1%	0.2%	0%	0%	0.5%
Timed Apache Compilation -	180.753	24.444	37.116	54.742	39.793
Time To Compile (sec)					
Normalized	13.52%	100%	65.86%	44.65%	61.43%
Standard Deviation	0.6%	0.2%	0.1%	0.1%	1.4%
GIMP - resize (sec)					12.901
Standard Deviation					2.3%
GIMP - rotate (sec)					17.485
Standard Deviation					0.5%
GIMP - auto-levels (sec)					19.807
Standard Deviation					2.8%
GIMP - unsharp-mask (sec)					20.822
Standard Deviation					2.1%
OCRMyPDF - P.6.P.P.D (sec)					51.069
Standard Deviation					0.3%
GNU Octave Benchmark (sec)					9.346
Standard Deviation					0.7%
Tesseract OCR - T.T.O.7.I (sec)					30.902
Standard Deviation					0.1%

LAMMPS Molecular Dynamics Simulator 9Jan2020

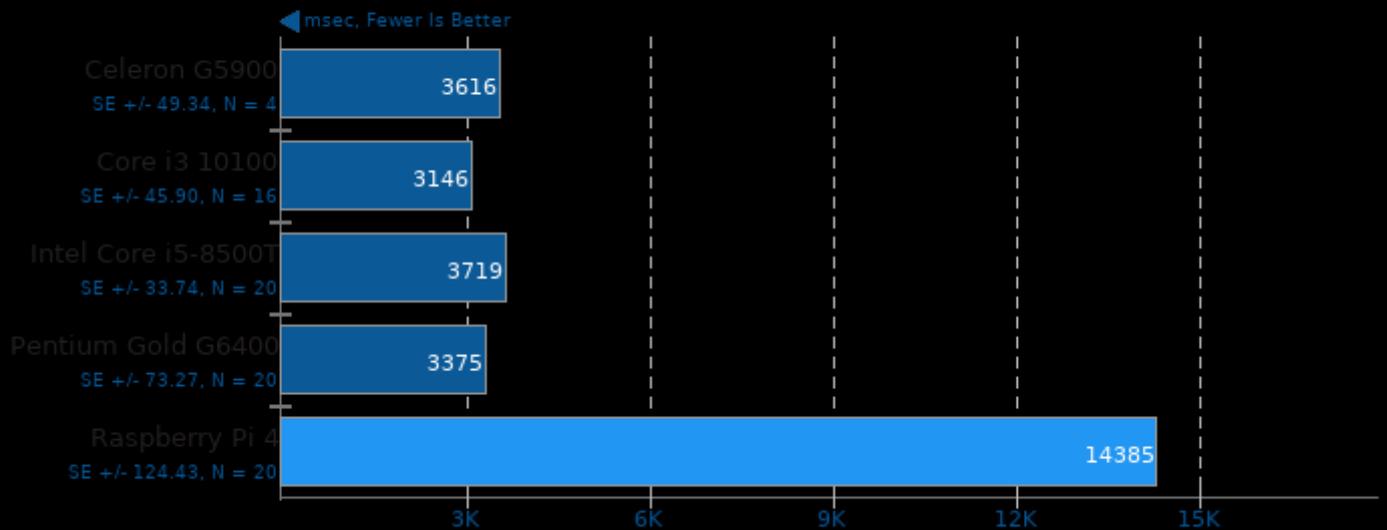
Model: Rhodopsin Protein



1. (CXX) g++ options: -O3 -rdynamic -ljpeg -lpng -lz -lfftw3 -lm

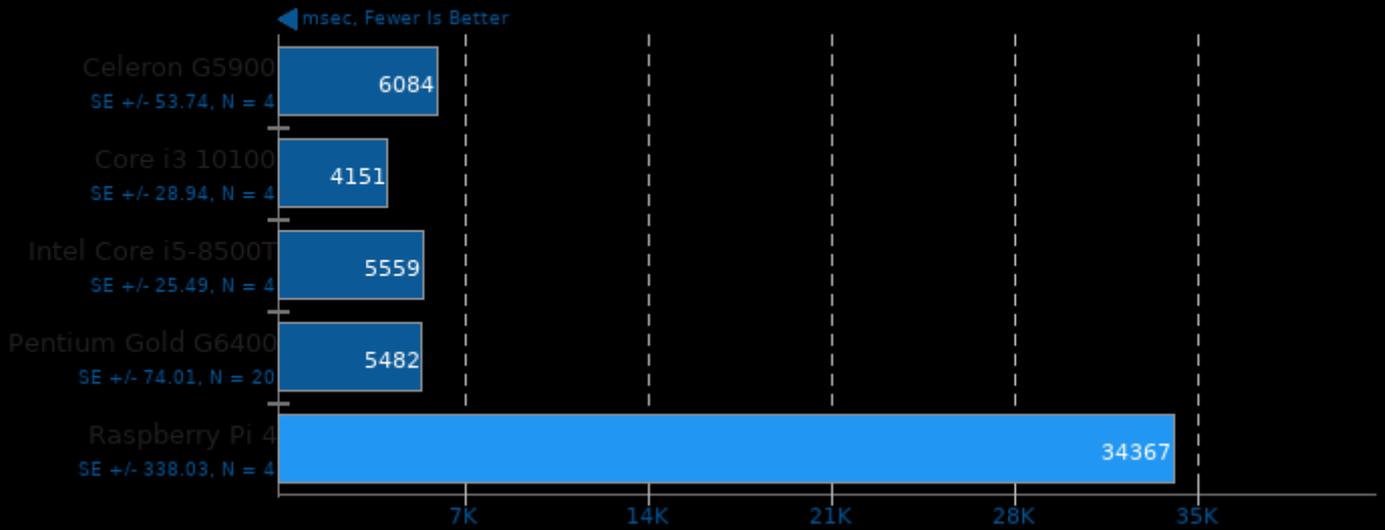
DaCapo Benchmark 9.12-MR1

Java Test: H2



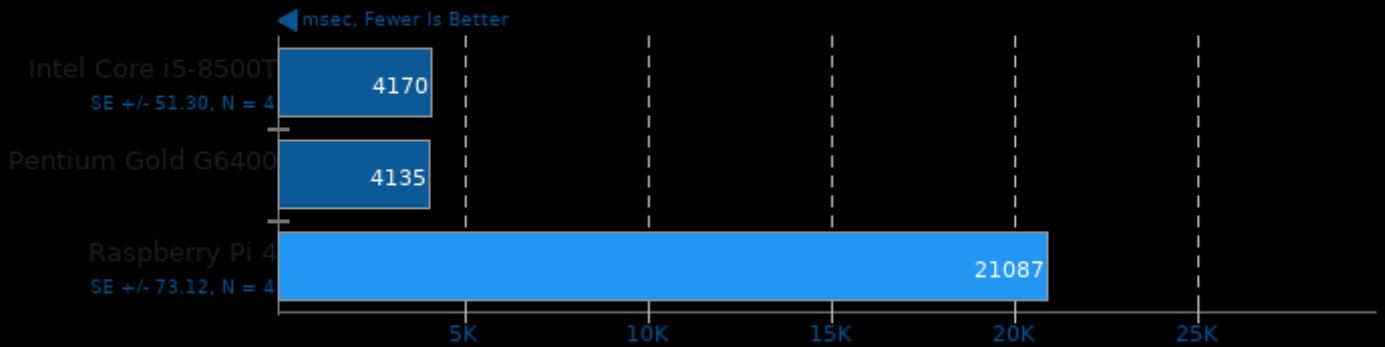
DaCapo Benchmark 9.12-MR1

Java Test: Jython



DaCapo Benchmark 9.12-MR1

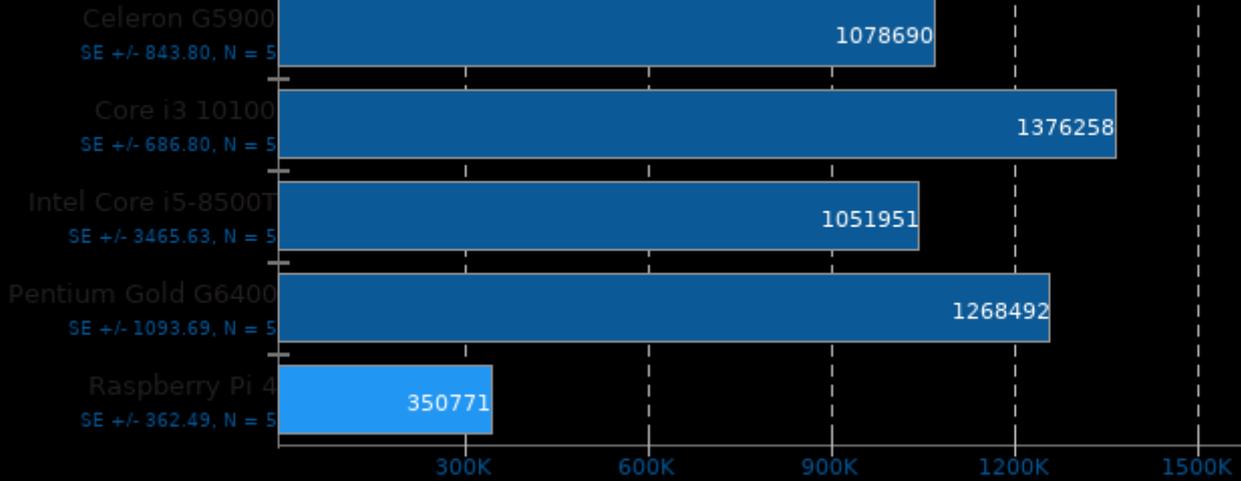
Java Test: Tradebeans



TSCP 1.81

AI Chess Performance

► Nodes Per Second, More Is Better

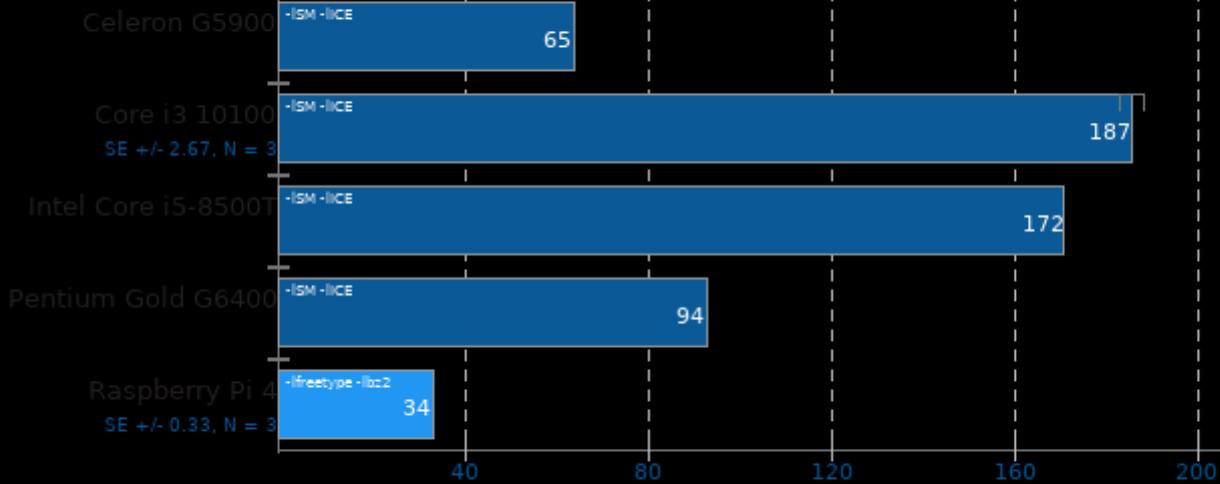


1. (CC) gcc options: -O3 -march=native

GraphicsMagick 1.3.33

Operation: Swirl

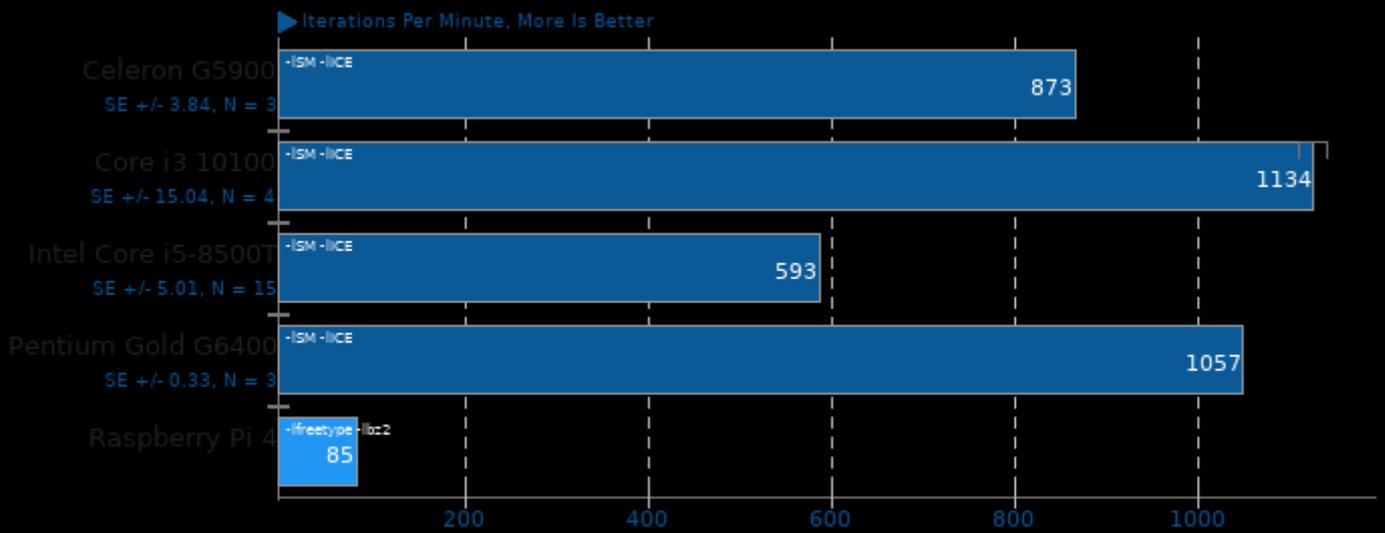
► Iterations Per Minute, More Is Better



1. (CC) gcc options: -fopenmp -O2 -pthread -ljpeg -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -llzma -lxml2 -lz -lm -lpthread

GraphicsMagick 1.3.33

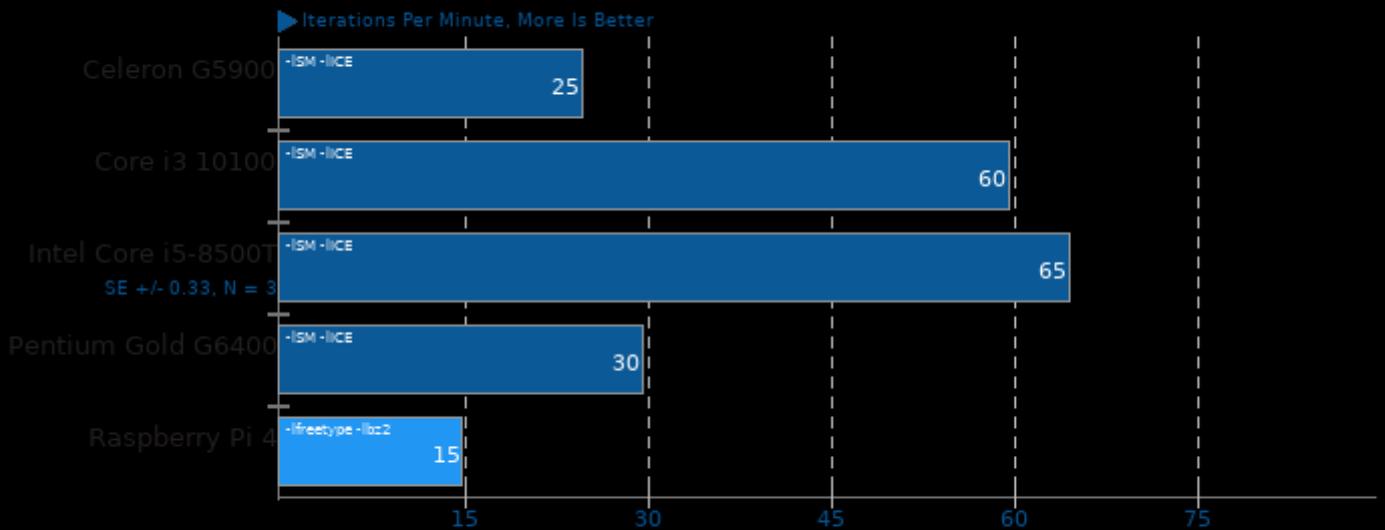
Operation: Rotate



1. (CC) gcc options: -fopenmp -O2 -pthread -ljpeg -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -lZ -lz -lm -lpthread

GraphicsMagick 1.3.33

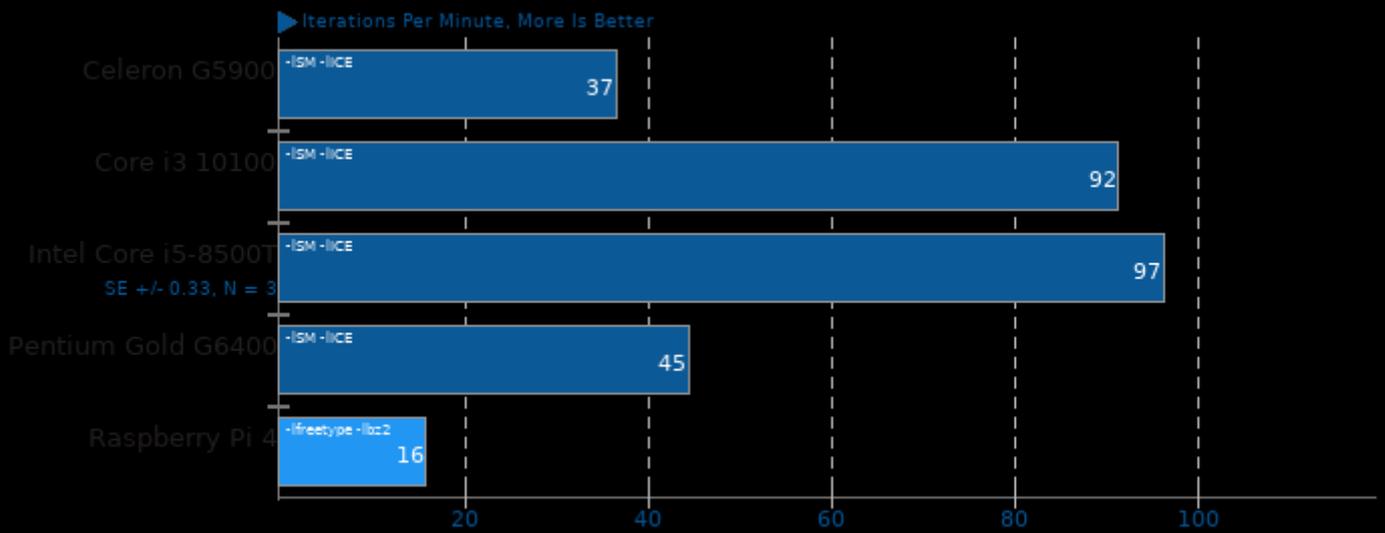
Operation: Sharpen



1. (CC) gcc options: -fopenmp -O2 -pthread -ljpeg -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -lZ -lz -lm -lpthread

GraphicsMagick 1.3.33

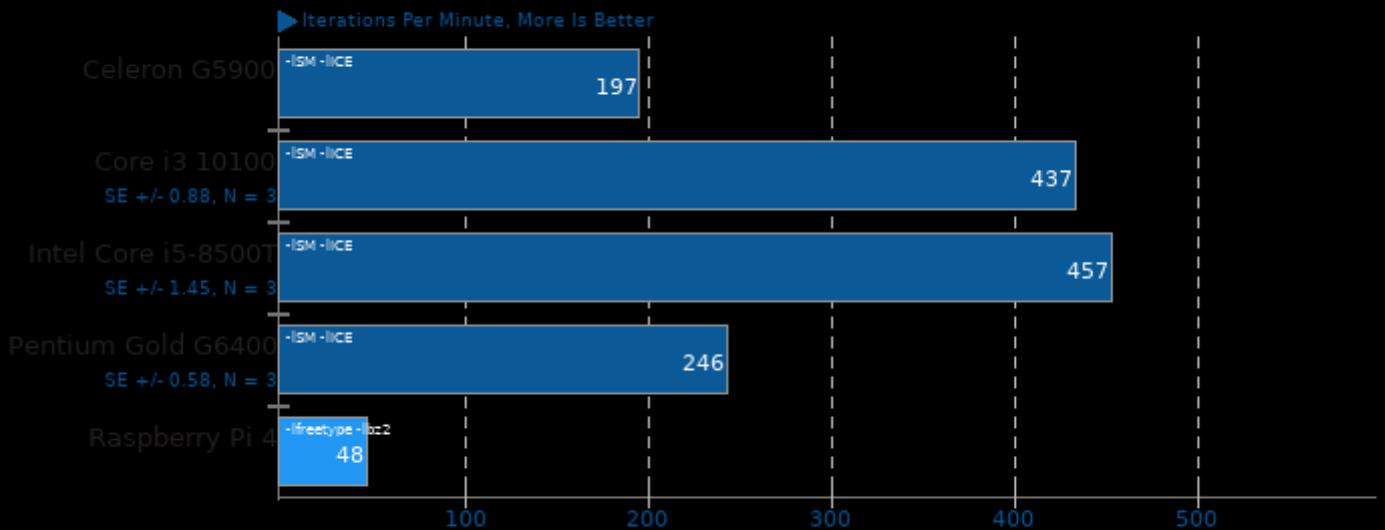
Operation: Enhanced



1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -llzma -lxml2 -lz -lm -lpthread

GraphicsMagick 1.3.33

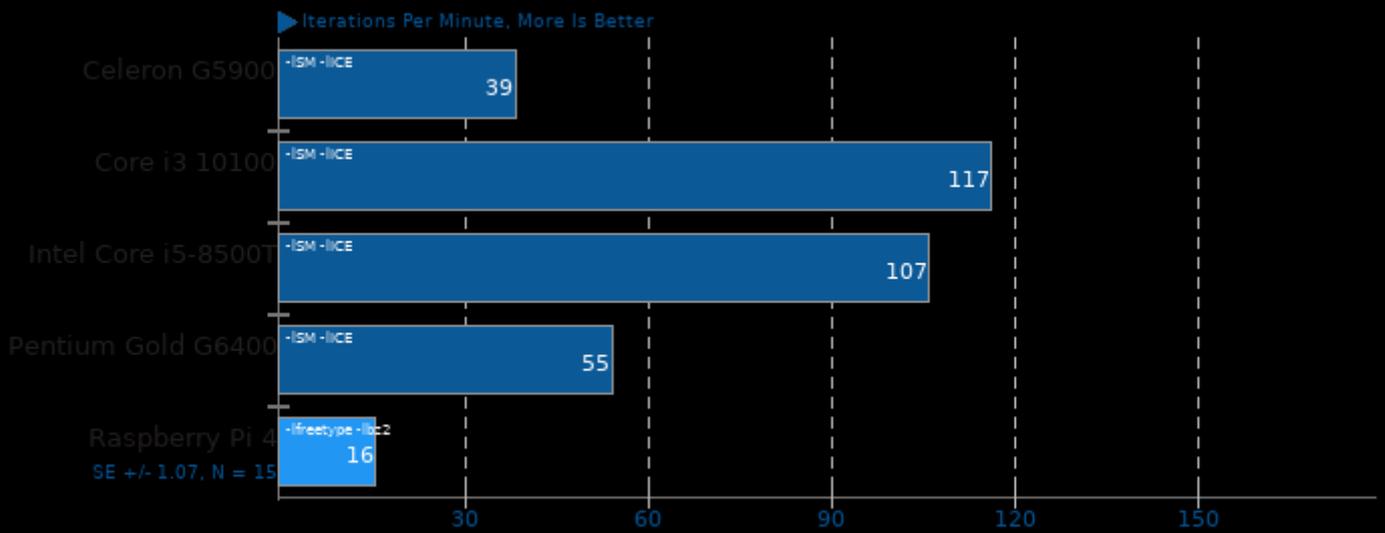
Operation: Resizing



1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -llzma -lxml2 -lz -lm -lpthread

GraphicsMagick 1.3.33

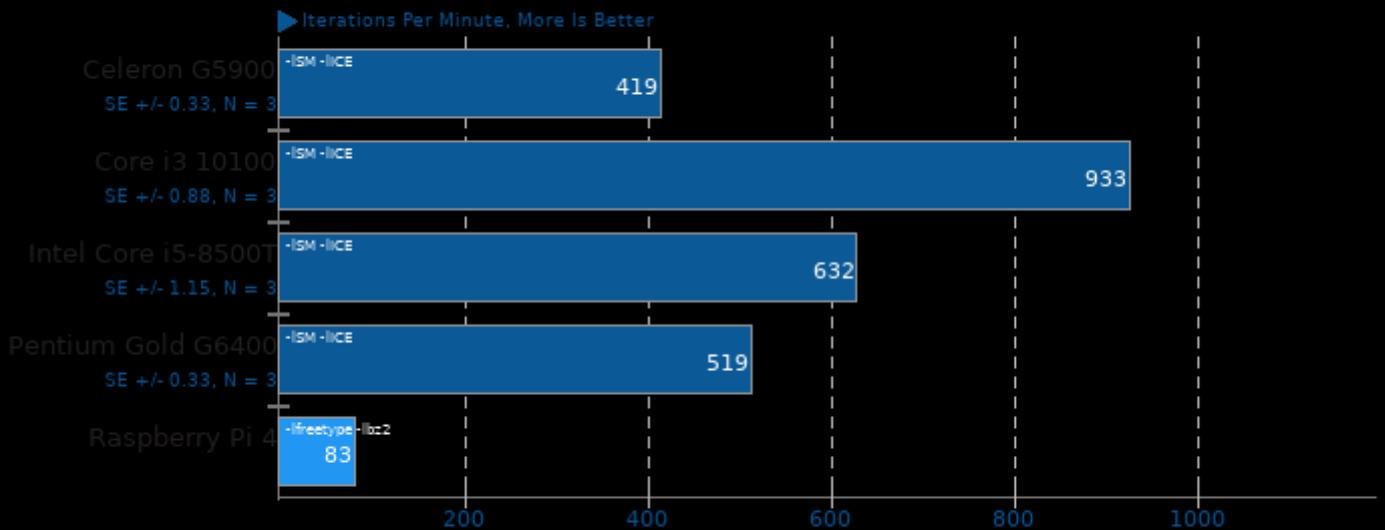
Operation: Noise-Gaussian



1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -lZma -lxml2 -lz -lm -lpthread

GraphicsMagick 1.3.33

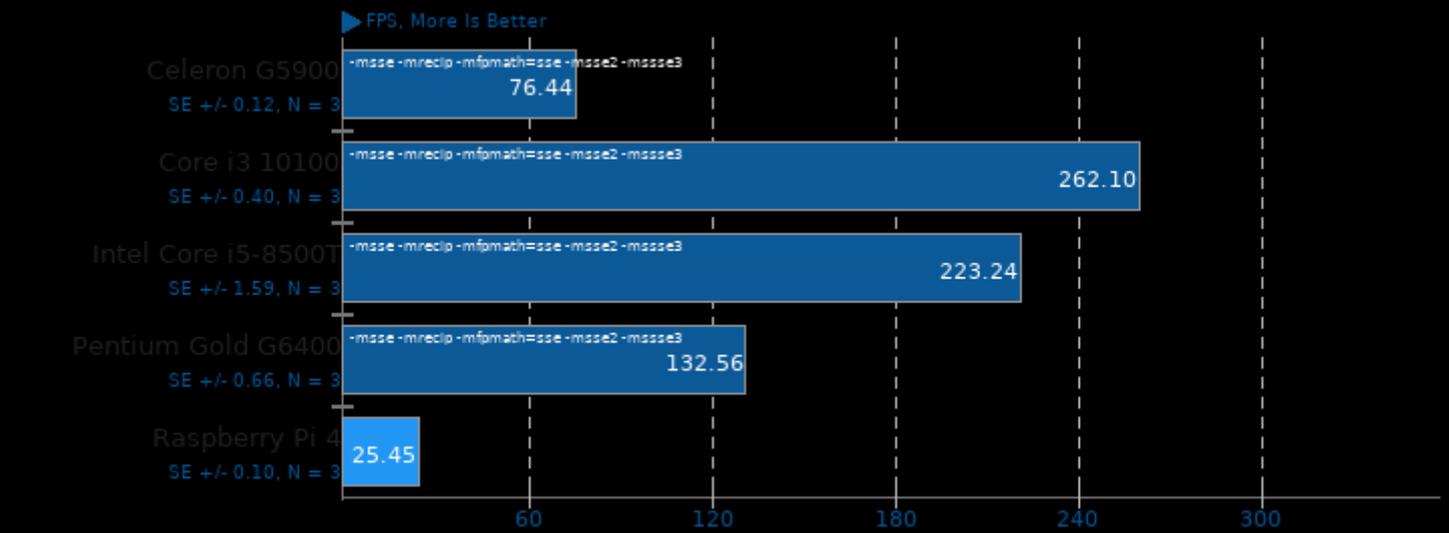
Operation: HWB Color Space



1. (CC) gcc options: -fopenmp -O2 -pthread -ljbig -lwebp -lwebpmux -ltiff -ljpeg -lXext -lX11 -lZma -lxml2 -lz -lm -lpthread

TTSIOD 3D Renderer 2.3b

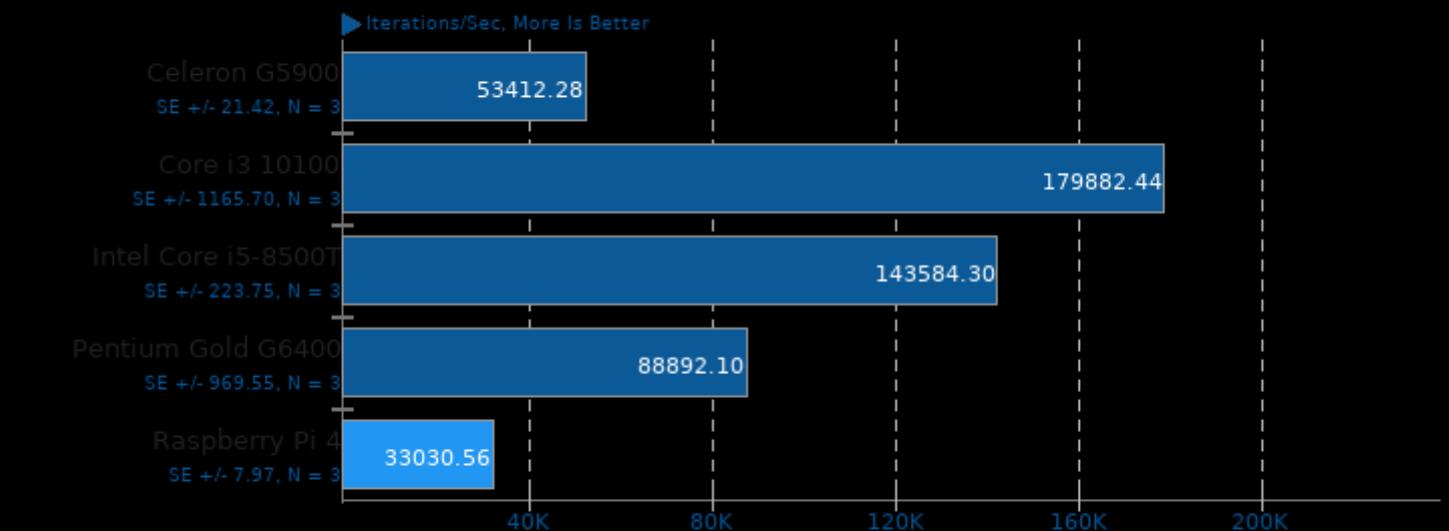
Phong Rendering With Soft-Shadow Mapping



1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -fno-unsafe -fopenmp -fwhole-program -lstdc++

Coremark 1.0

CoreMark Size 666 - Iterations Per Second

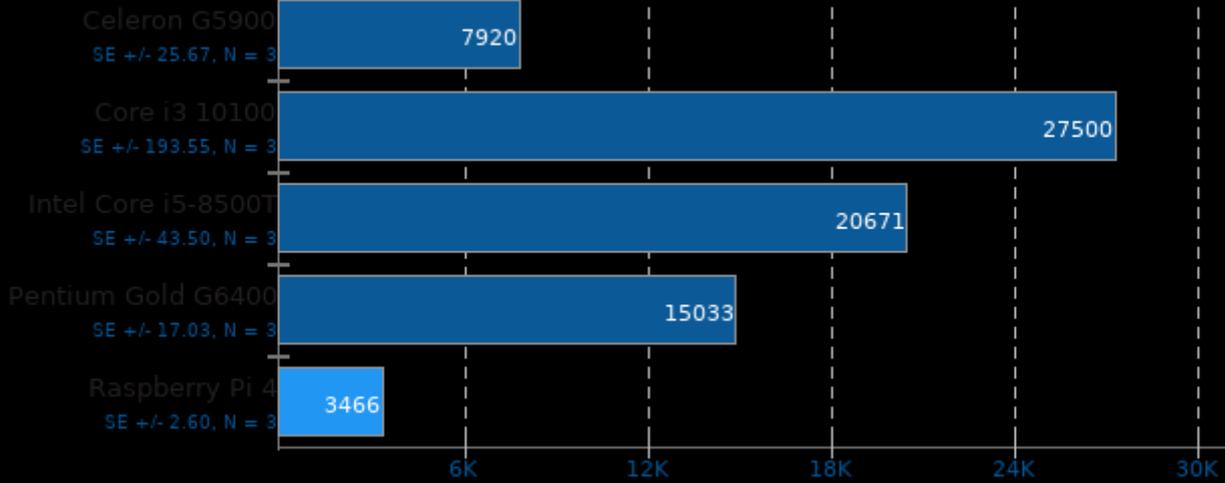


1. (CC) gcc options: -O2 -lrt -lrt

7-Zip Compression 16.02

Compress Speed Test

► MIPS, More Is Better

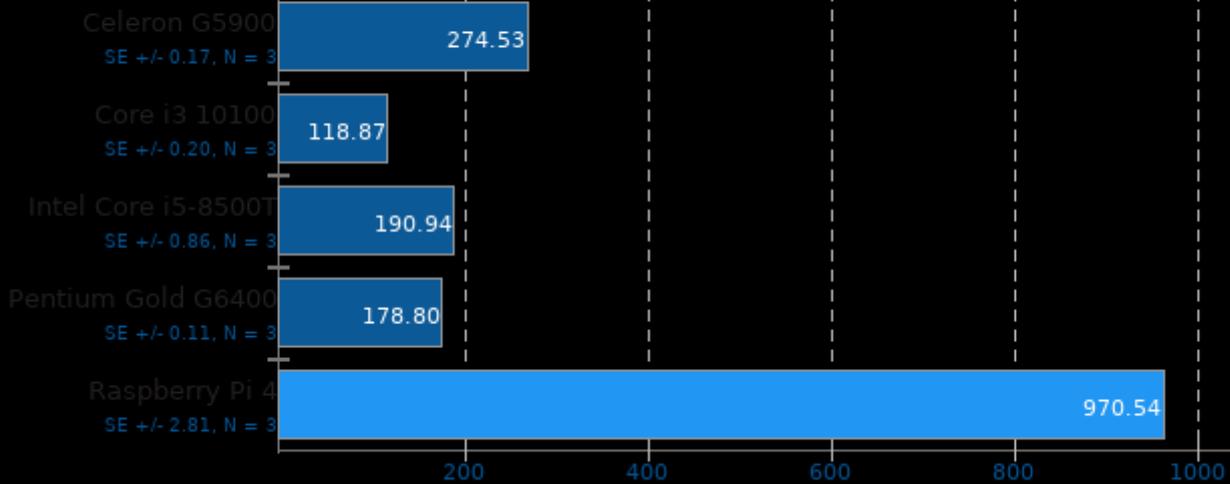


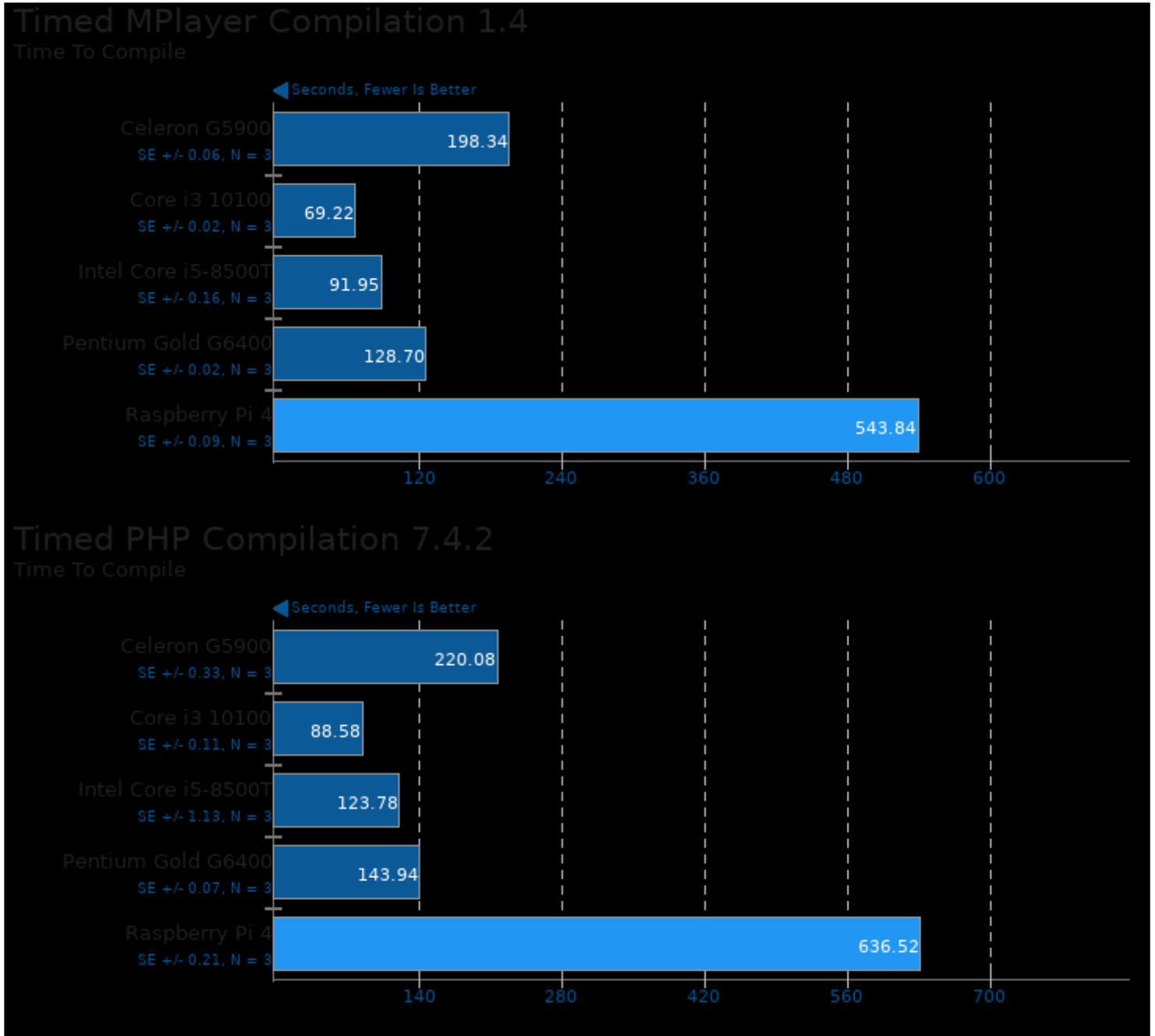
1. (CXX) g++ options: -pipe -pthread

Timed GDB GNU Debugger Compilation 9.1

Time To Compile

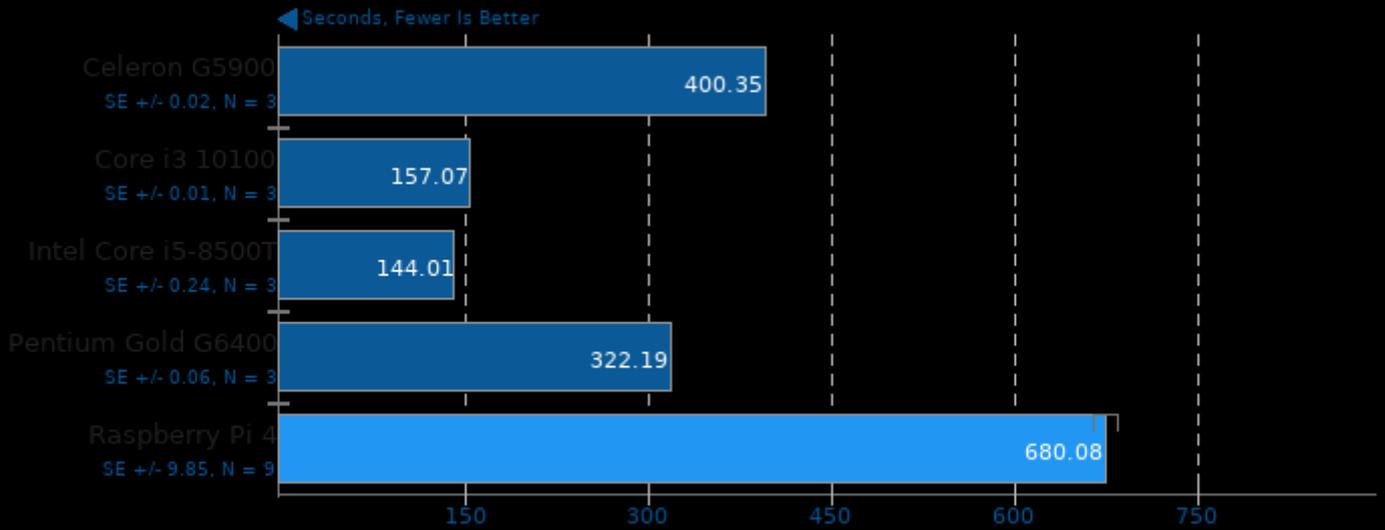
◀ Seconds, Fewer Is Better





C-Ray 1.1

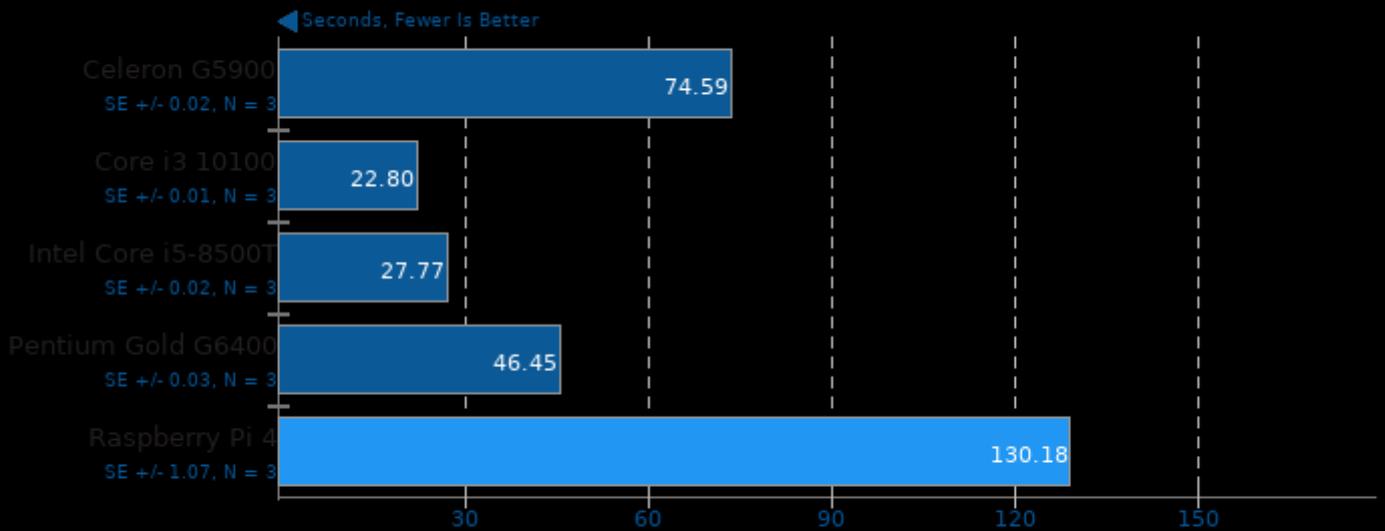
Total Time - 4K, 16 Rays Per Pixel



1. (GCC) gcc options: -lm -pthread -O3

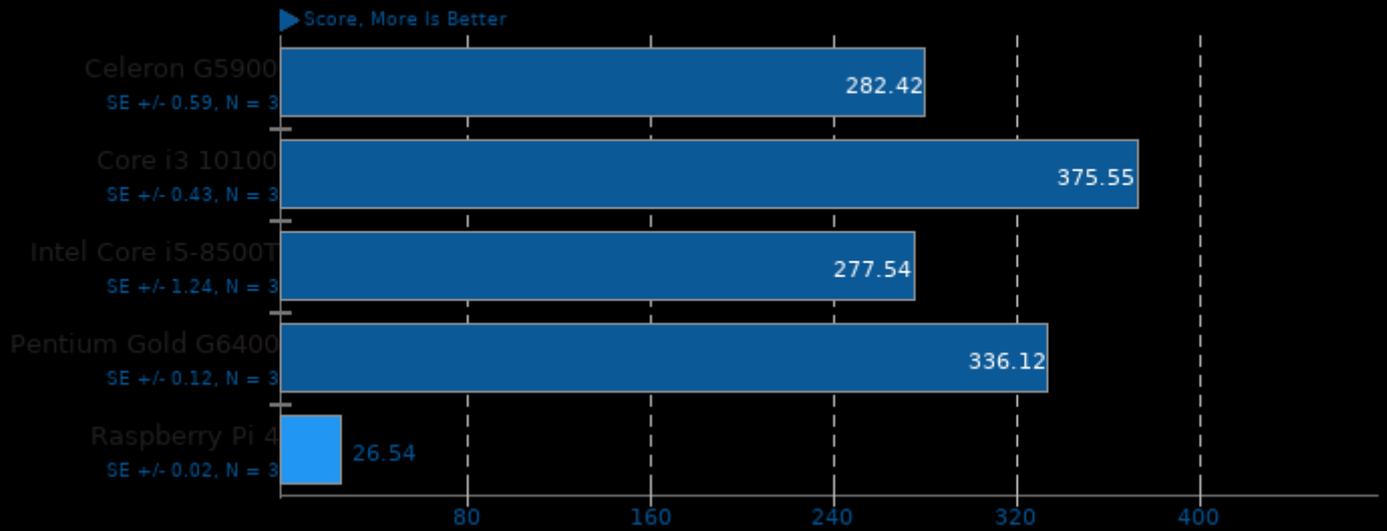
Smallpt 1.0

Global Illumination Renderer; 128 Samples



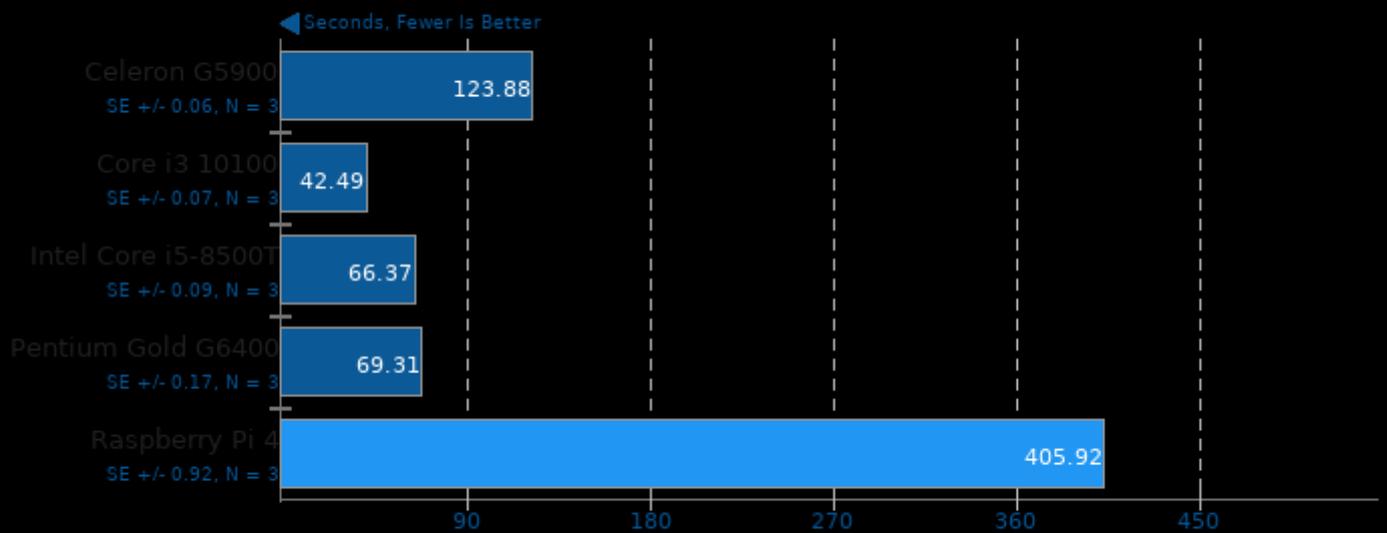
1. (CXX) g++ options: -fopenmp -O3

Numpy Benchmark



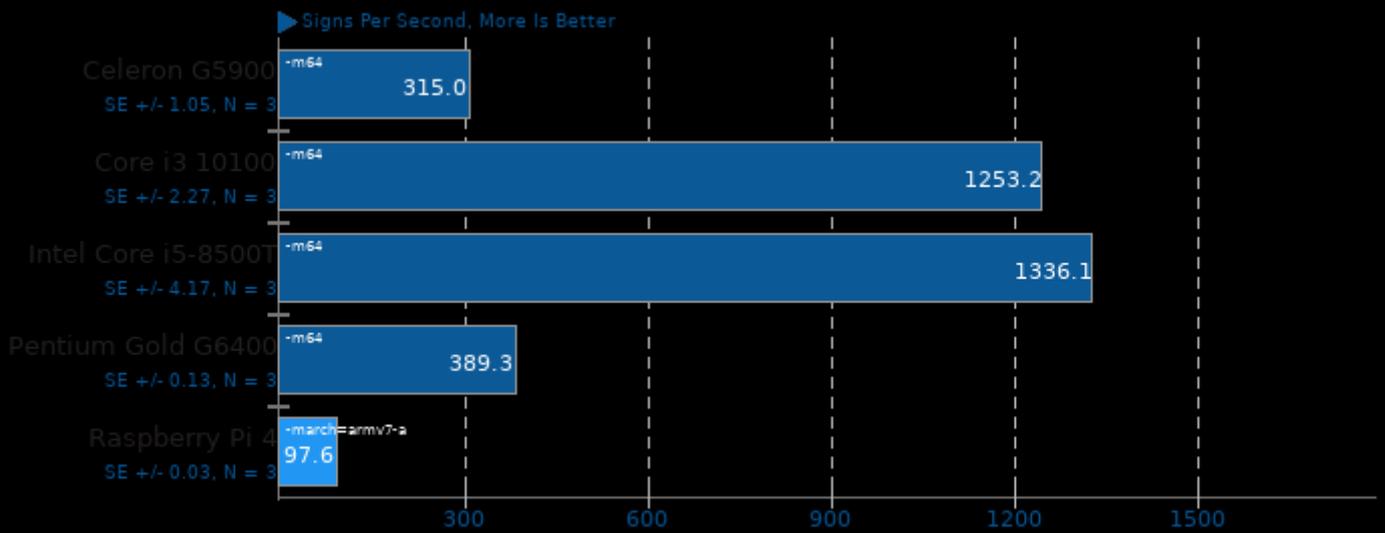
XZ Compression 5.2.4

Compressing ubuntu-16.04.3-server-i386.img, Compression Level 9



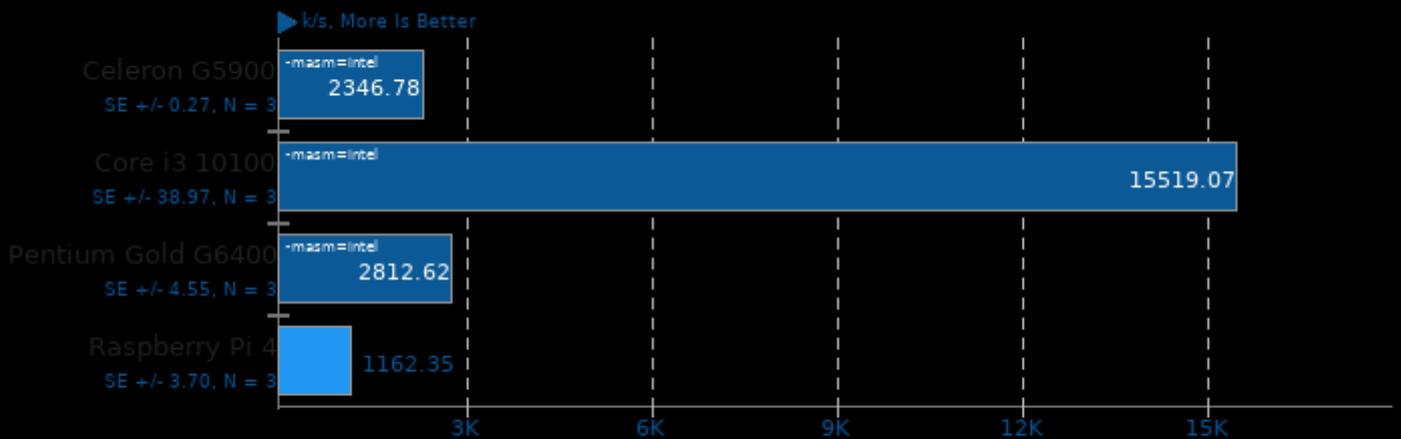
1. (CC) gcc options: -pthread -fvisibility=hidden -O2

OpenSSL 1.1.1 RSA 4096-bit Performance



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

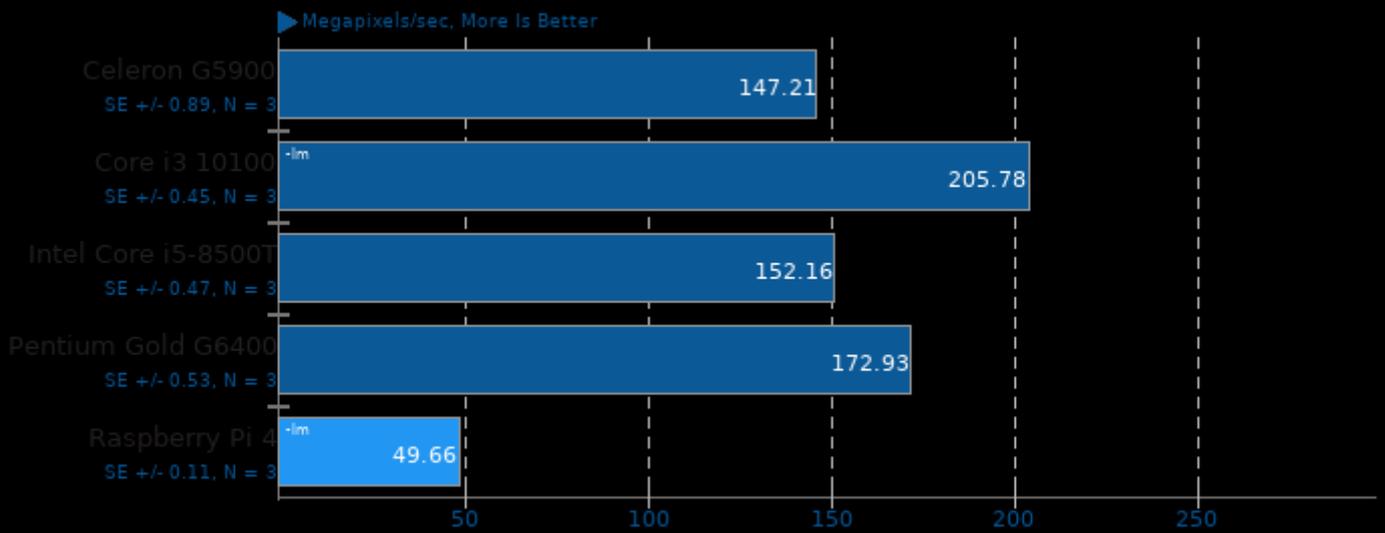
Aircrack-ng 1.5.2



1. (CXX) g++ options: -O3 -fvisibility=hidden -fcommon -rdynamic -lpthread -lz -lcrypto -lhwloc -ldl -lm -pthread

libjpeg-turbo tjbench 2.0.2

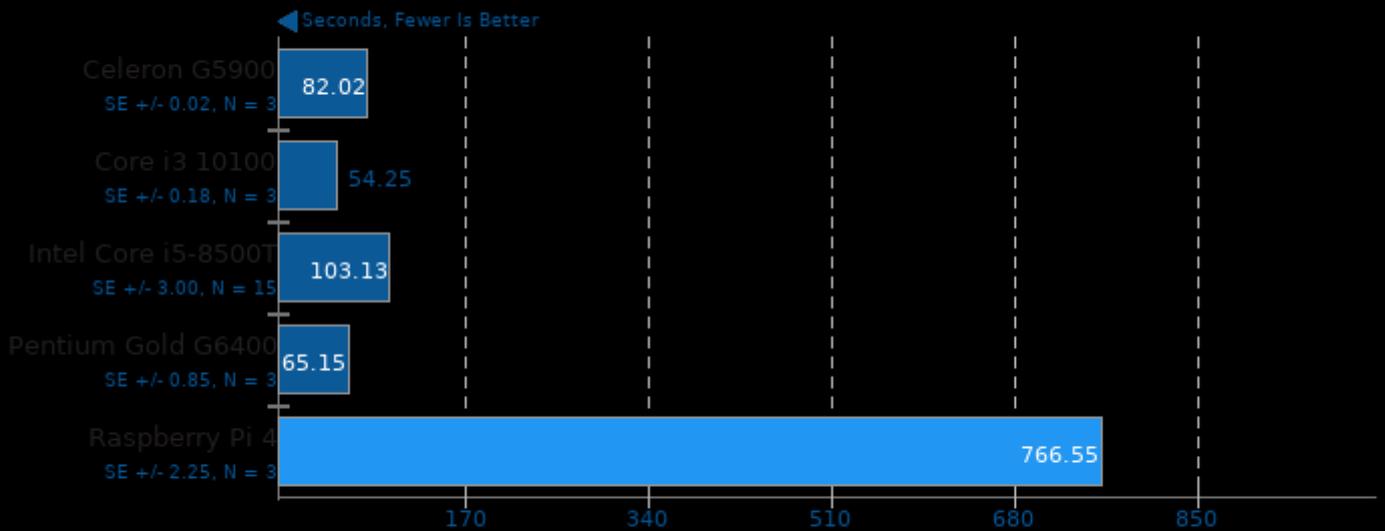
Test: Decompression Throughput



1, (CC) gcc options: -O3 -rdynamic

SQLite Speedtest 3.30

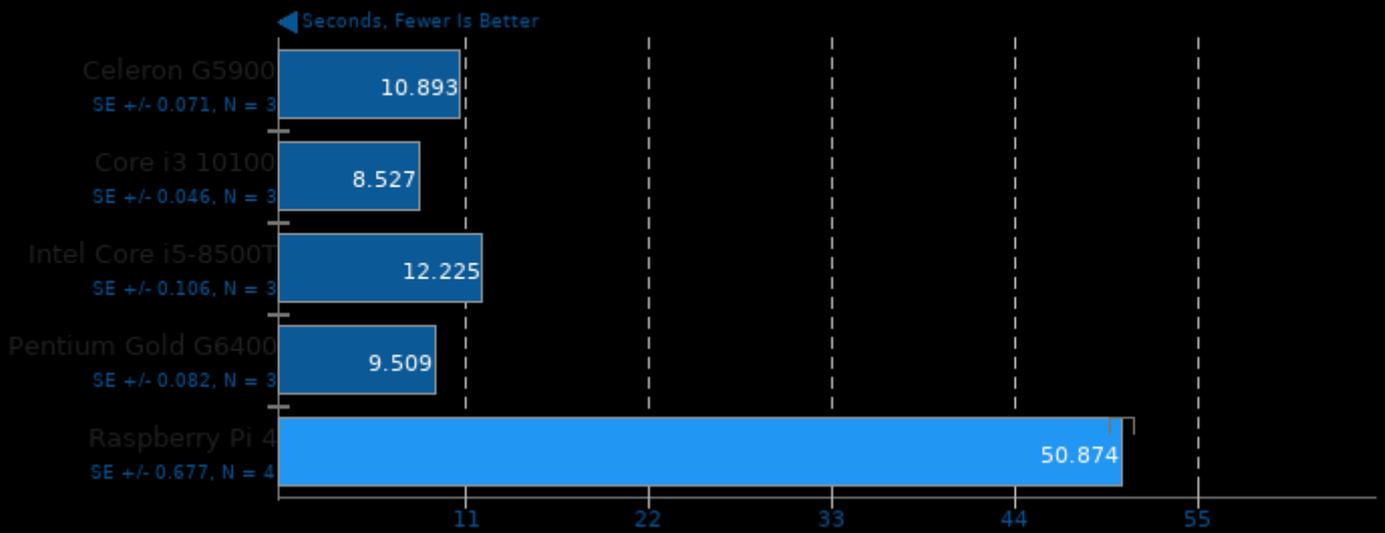
Timed Time - Size 1,000



1, (CC) gcc options: -O2 -ldl -lz -lpthread

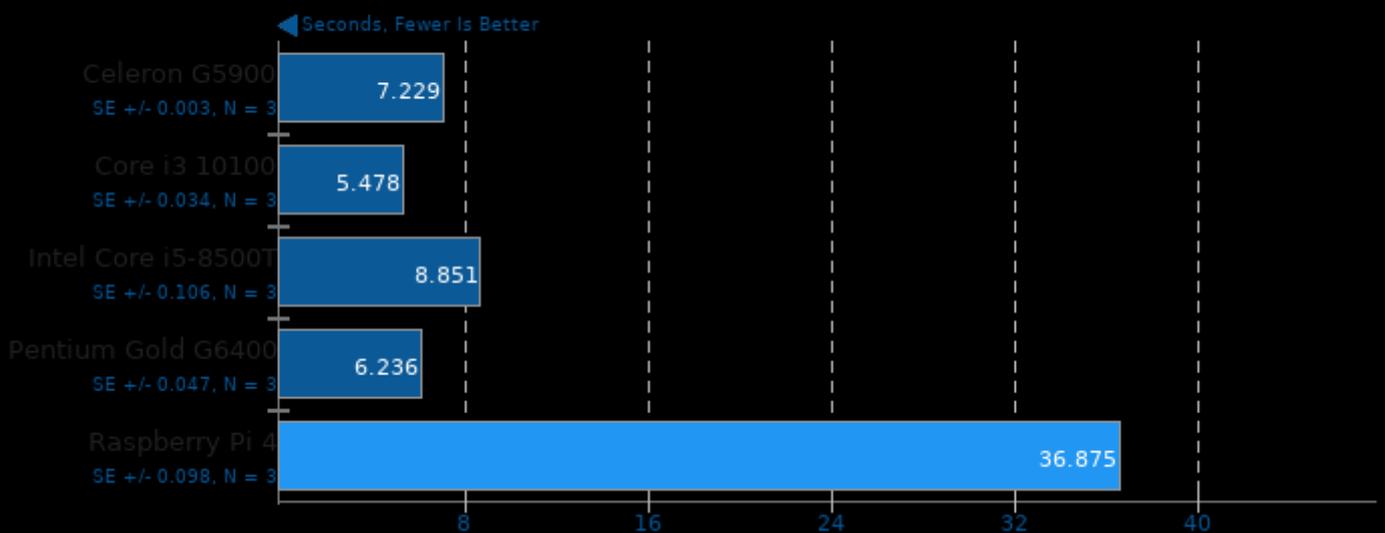
GEGL

Operation: Crop



GEGL

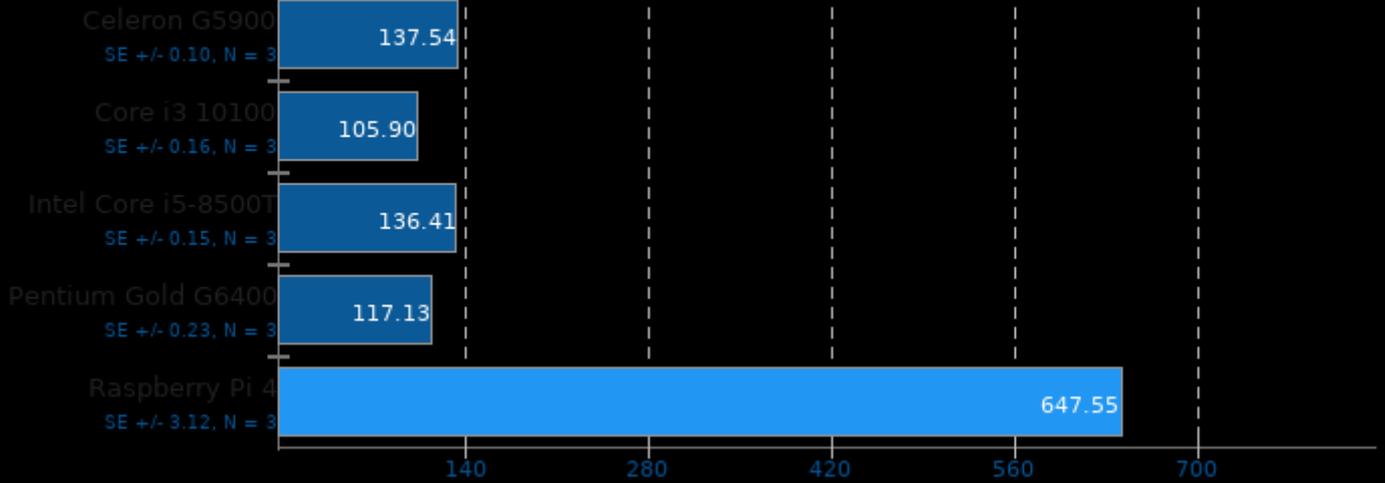
Operation: Scale



GEGL

Operation: Cartoon

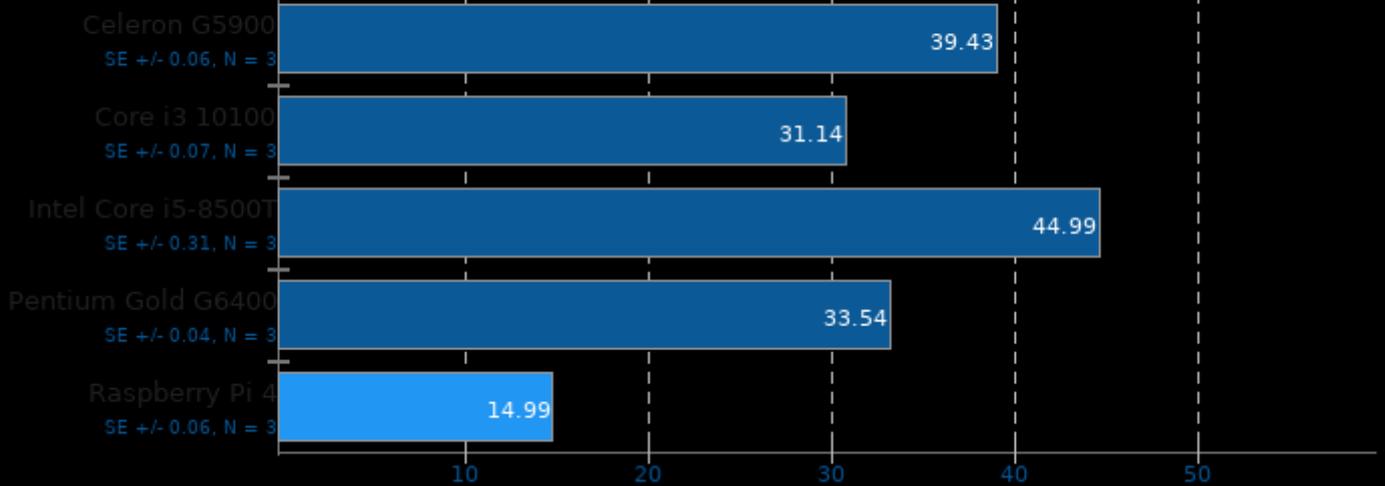
← Seconds, Fewer Is Better



GEGL

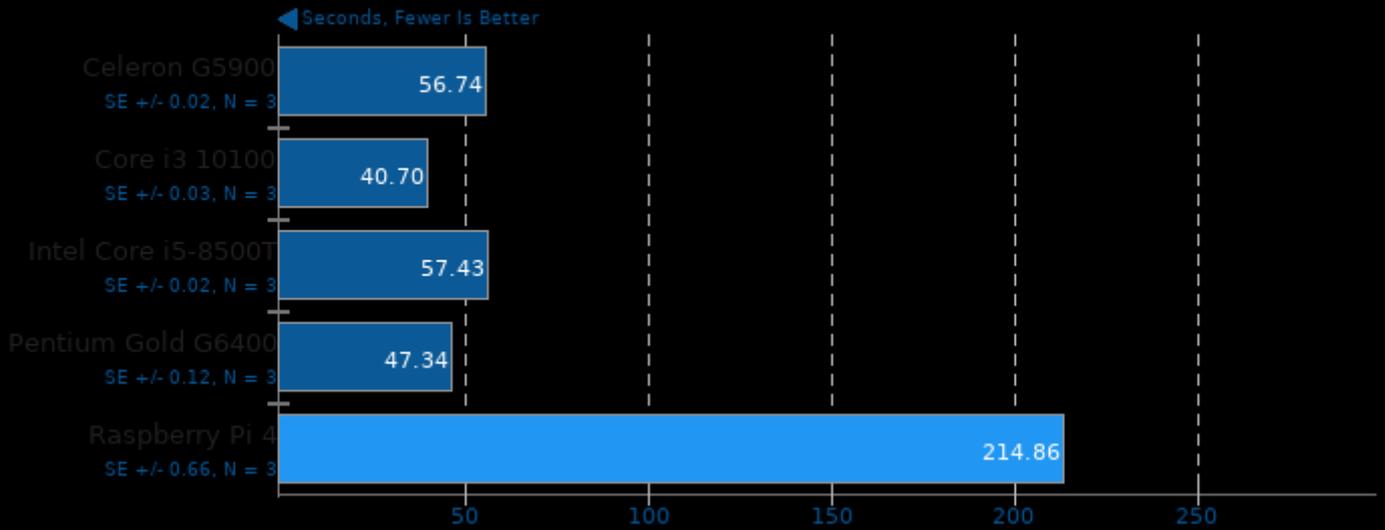
Operation: Reflect

← Seconds, Fewer Is Better



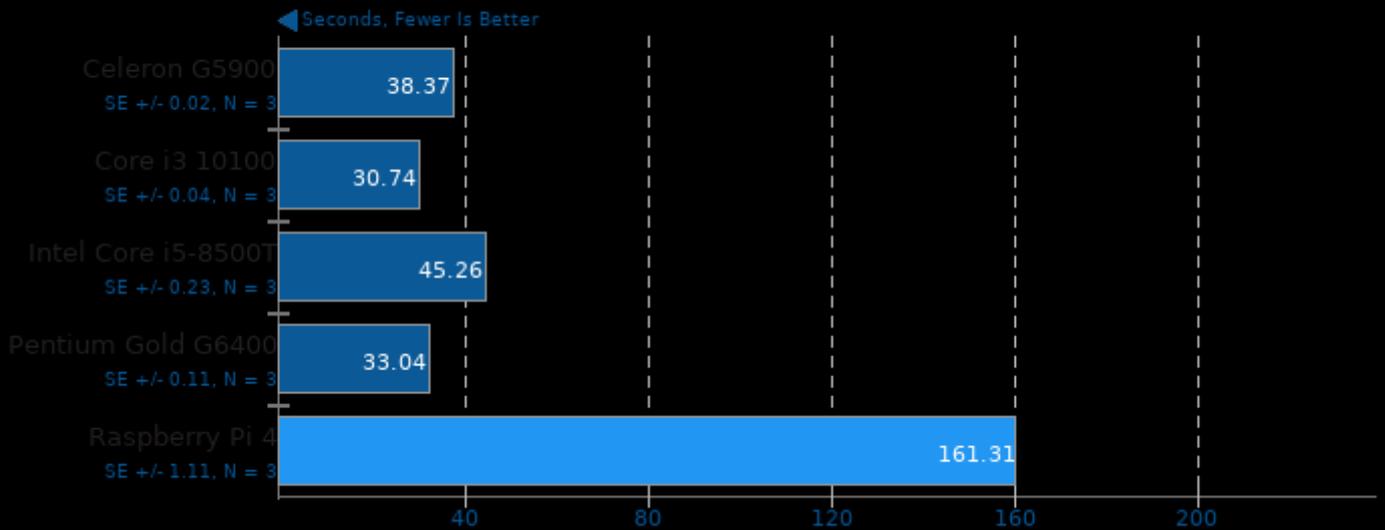
GEGL

Operation: Antialias



GEGL

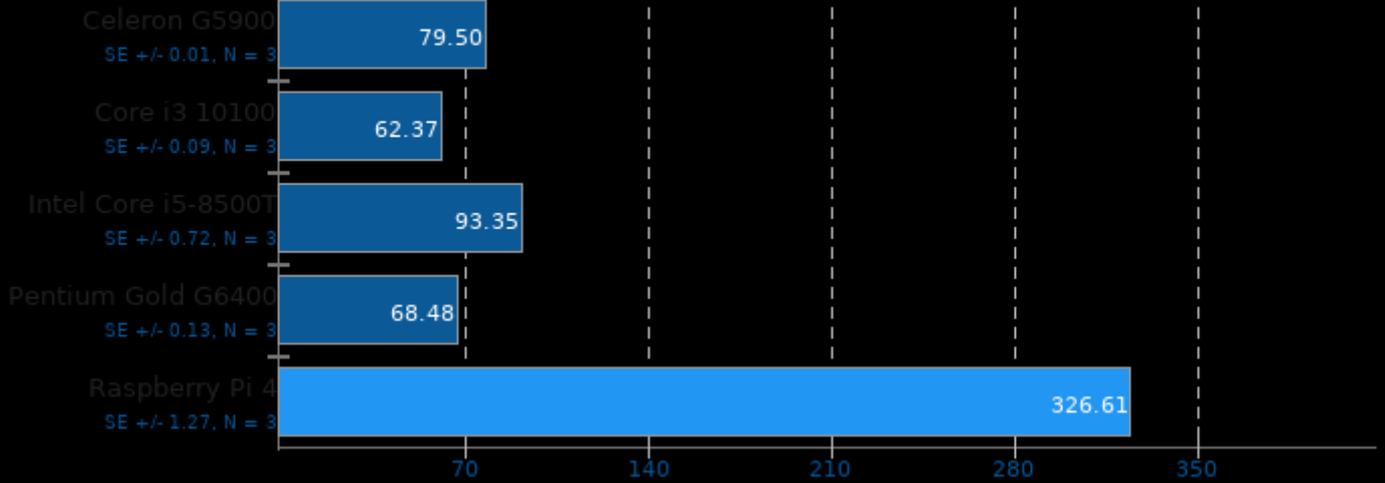
Operation: Tile Glass



GEGL

Operation: Wavelet Blur

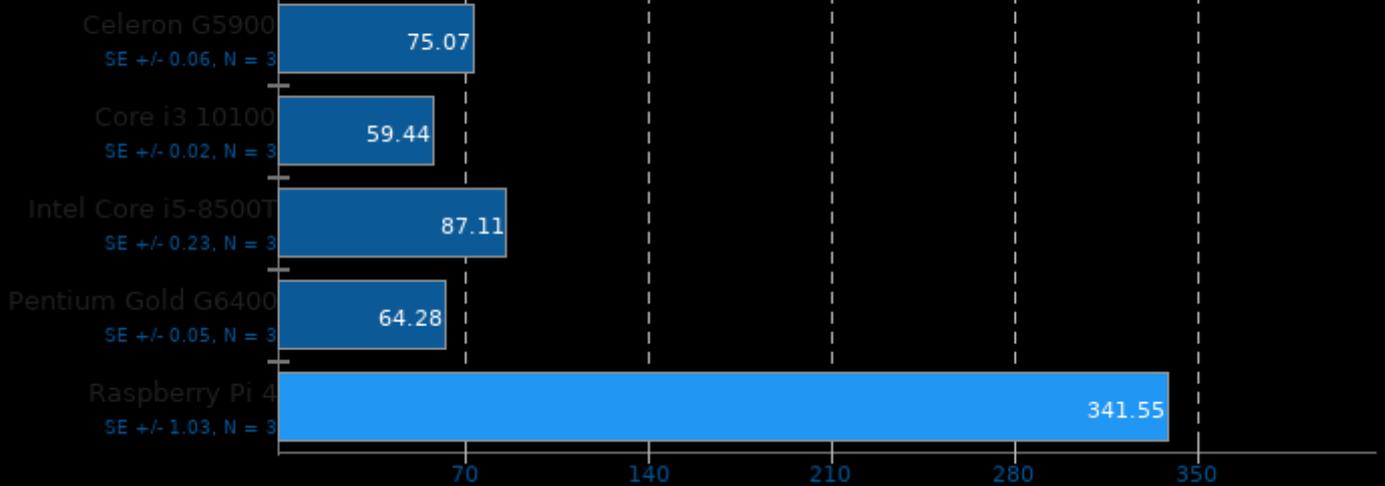
← Seconds, Fewer Is Better



GEGL

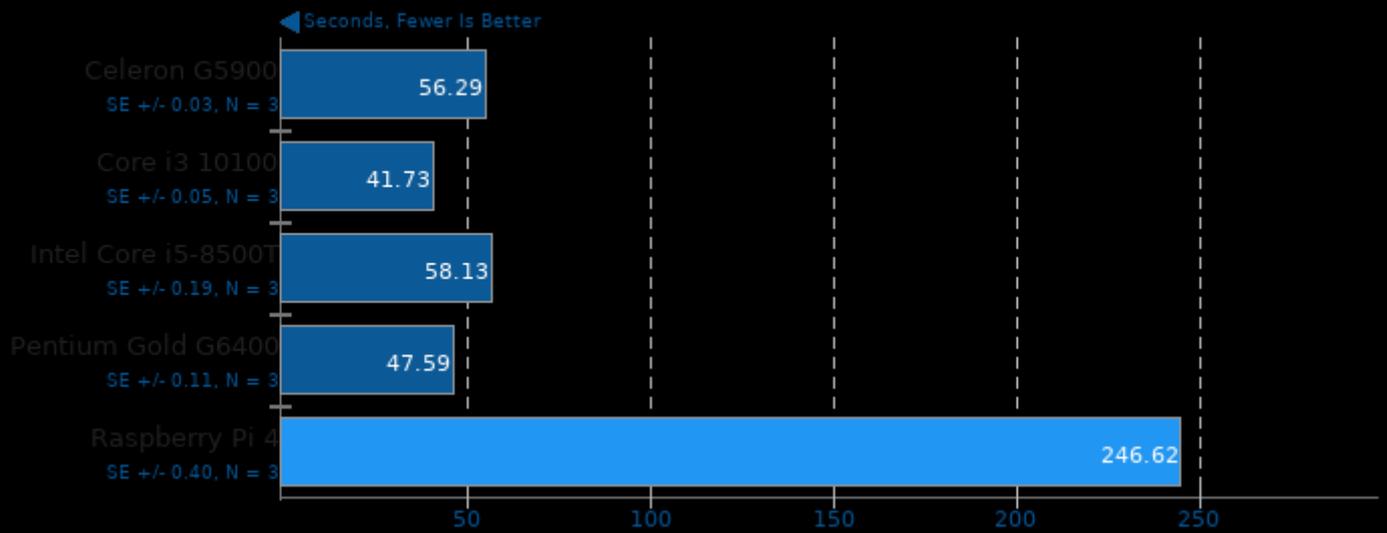
Operation: Color Enhance

← Seconds, Fewer Is Better



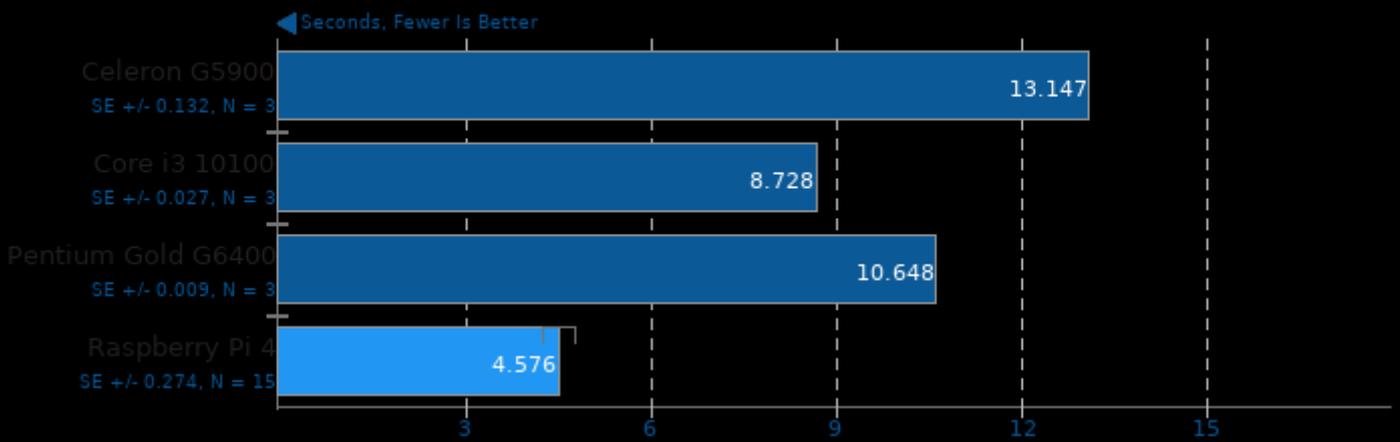
GEGL

Operation: Rotate 90 Degrees



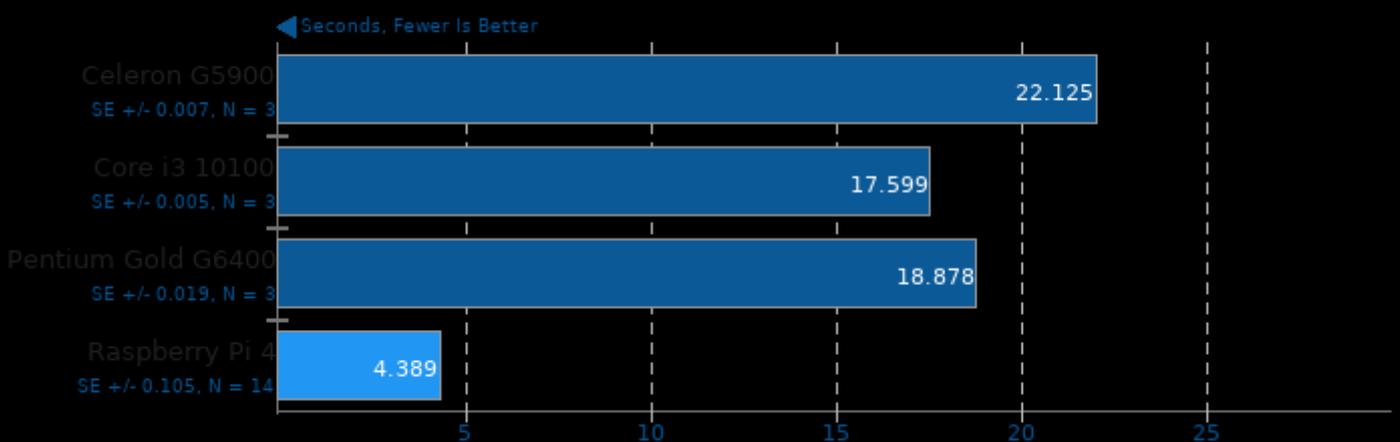
GIMP 2.10.8

Test: resize



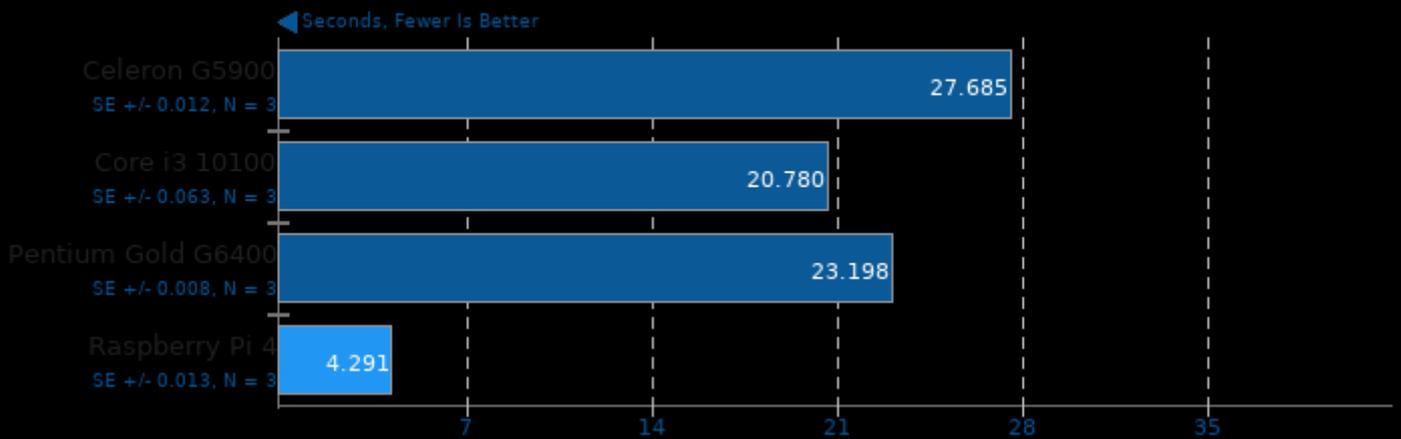
GIMP 2.10.8

Test: rotate



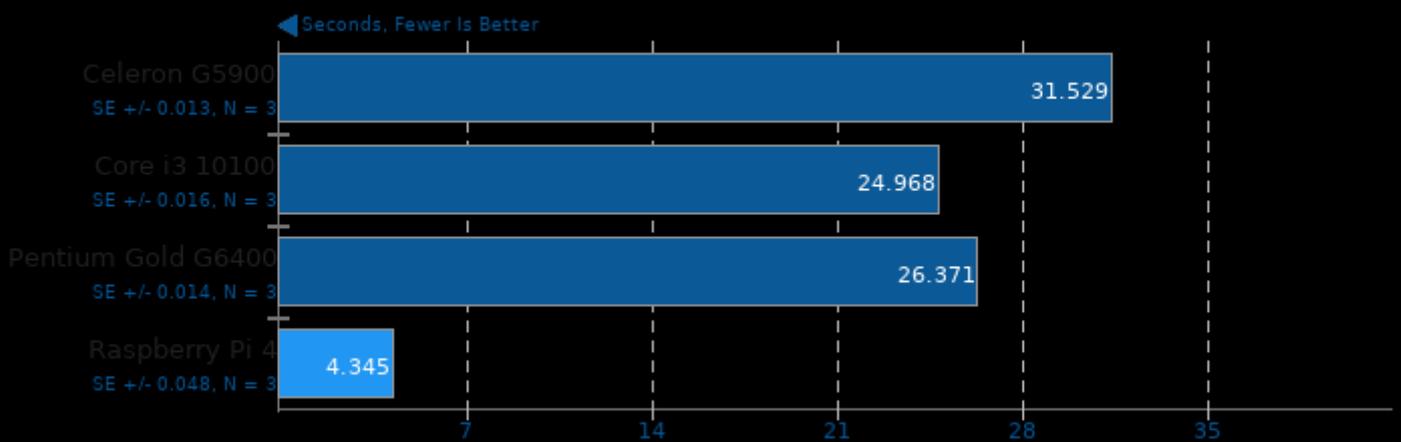
GIMP 2.10.8

Test: auto-levels



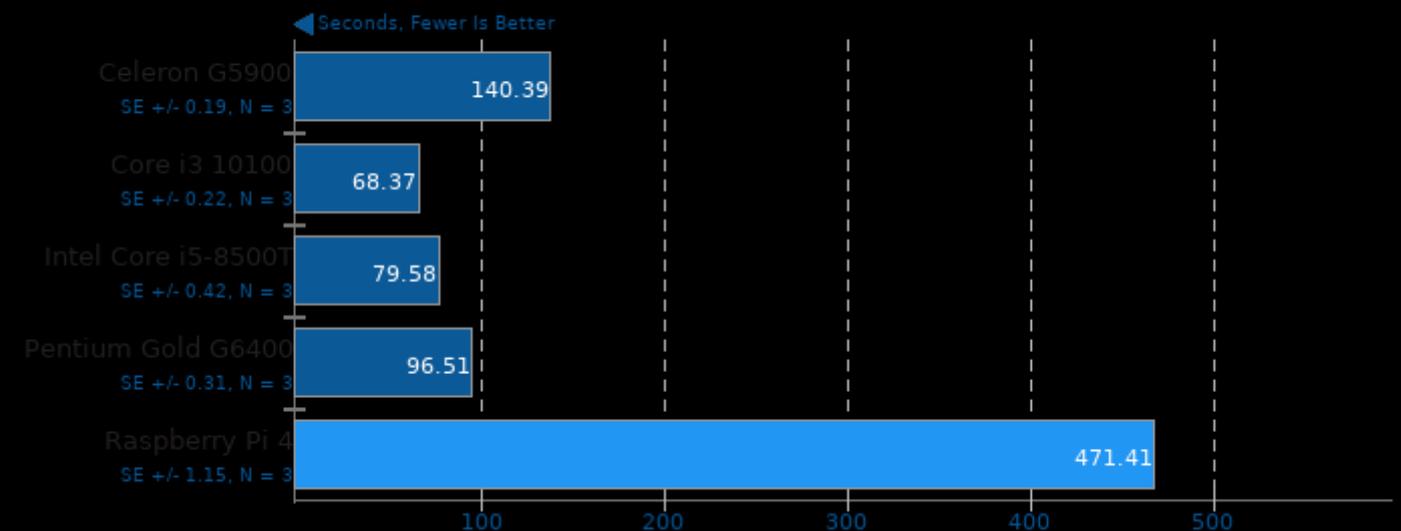
GIMP 2.10.8

Test: unsharp-mask



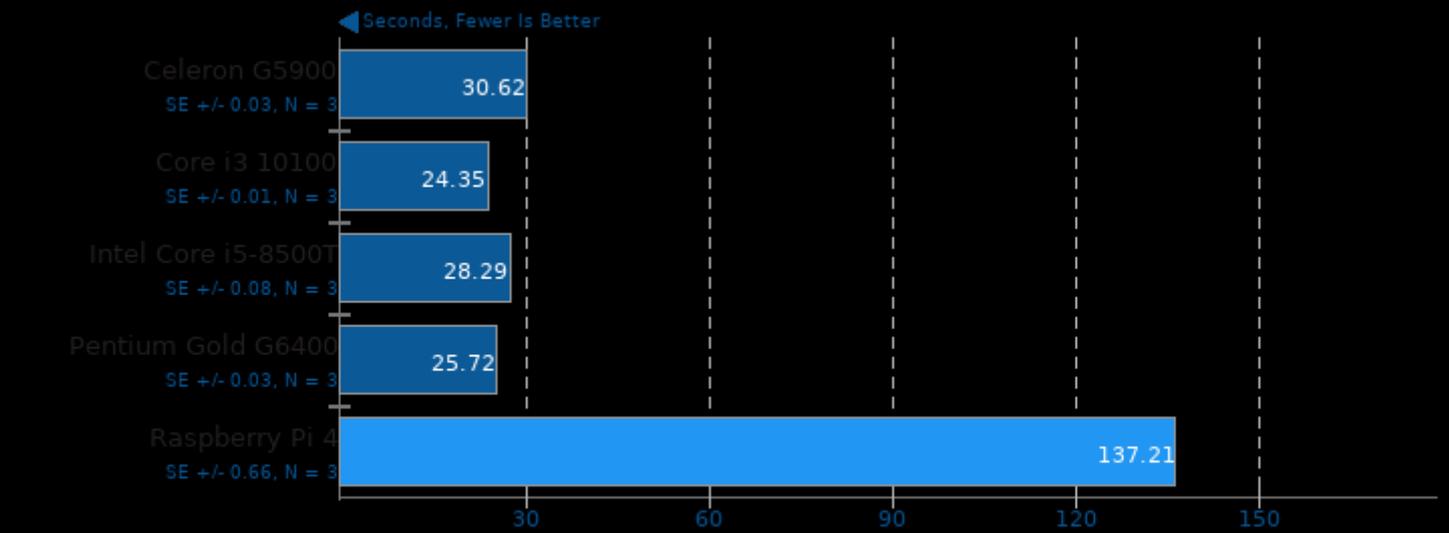
Hugin

Panorama Photo Assistant + Stitching Time



Inkscape

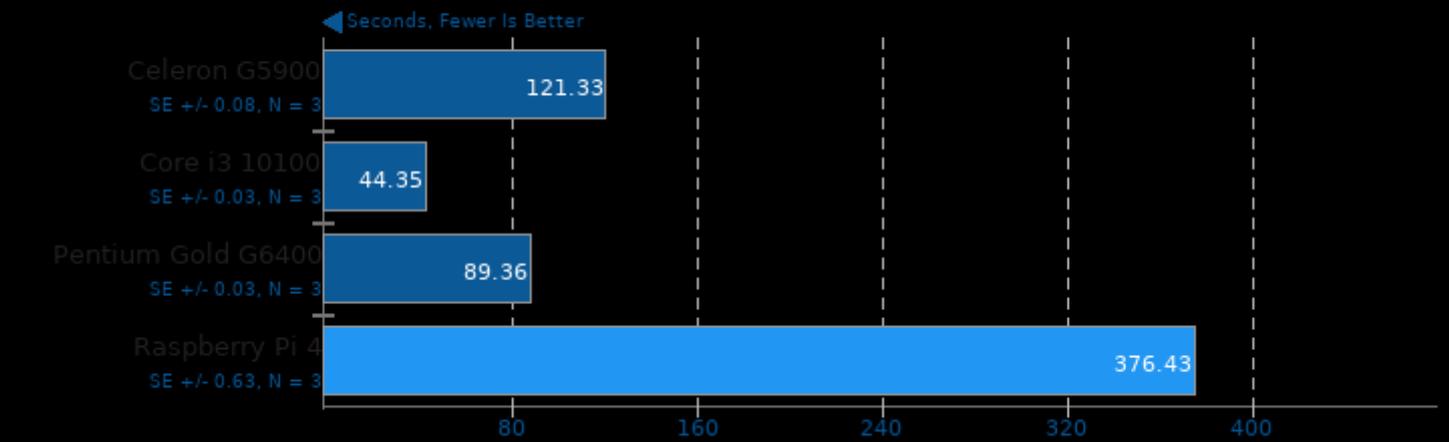
Operation: SVG Files To PNG

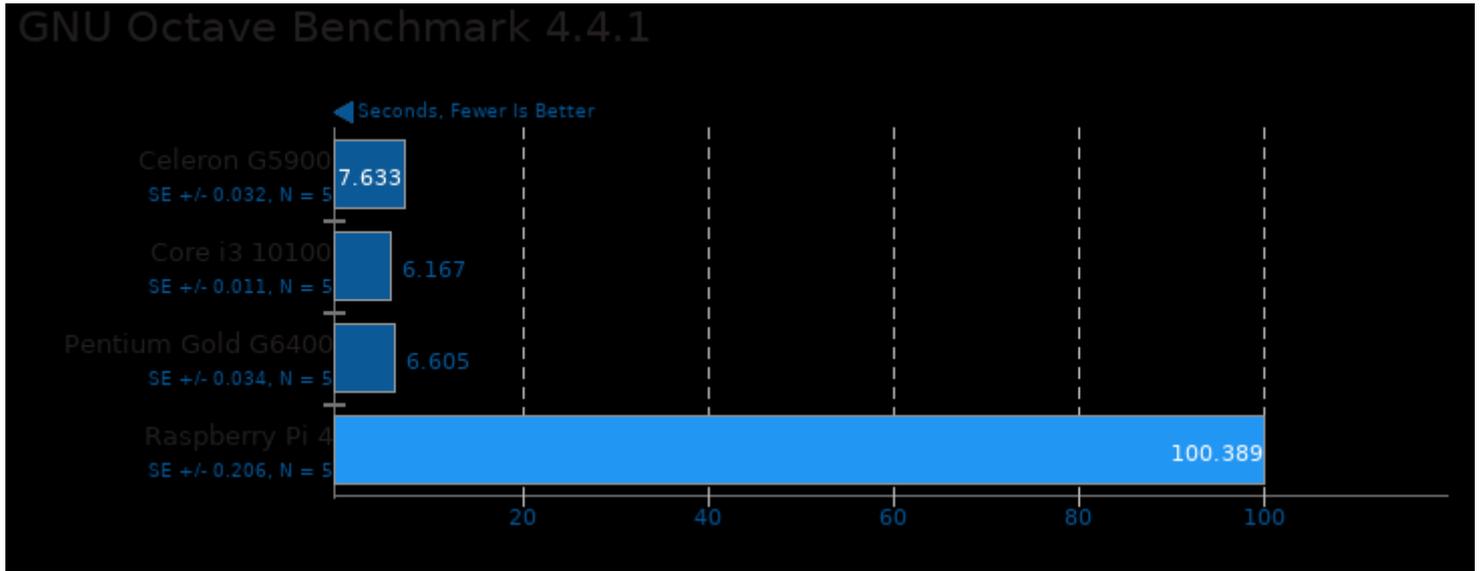


1. Celeron G5900: Inkscape 0.92.4 (5da689c313, 2019-01-14)
2. Core i3 10100: Inkscape 0.92.4 (5da689c313, 2019-01-14)
3. Intel Core i5-8500T: Inkscape 0.92.5 (2060ec1f9f, 2020-04-08)
4. Pentium Gold G6400: Inkscape 0.92.4 (5da689c313, 2019-01-14)
5. Raspberry Pi 4: Inkscape 0.92.4 (5da689c313, 2019-01-14)

OCRMyPDF 8.0.1+dfsg

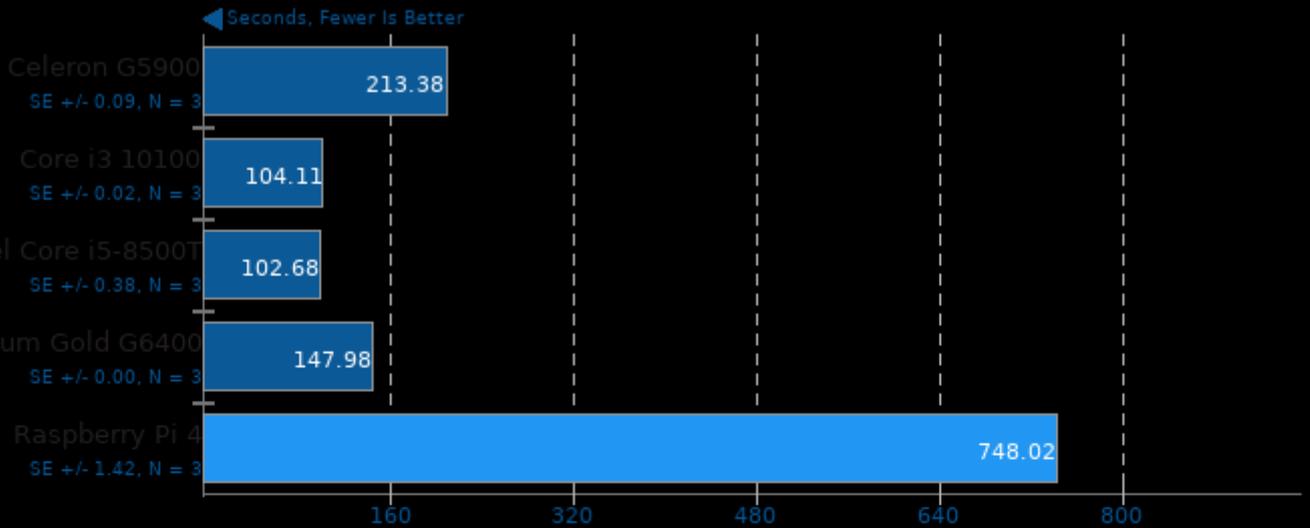
Processing 60 Page PDF Document





RawTherapee

Total Benchmark Time



1. Celeron G5900: RawTherapee, version 5.5, command line.
An advanced, cross-platform program for developing raw photos.

Website: <http://www.rawtherapee.com/>
Documentation: <http://rawpedia.rawtherapee.com/>
Forum: <https://discuss.pixls.us/c/software/rawtherapee>
Code and bug reports: <https://github.com/Beep6581/RawTherapee>

Symbols:

<Chevrons> indicate parameters you can change.
[Square brackets] mean the parameter is optional.
The pipe symbol | indicates a choice of one or the other.
The dash symbol - denotes a range of possible values from one to the other.

Usage:

rawtherapee-cli -c <dir>|<files> Convert files in batch with default parameters.
rawtherapee-cli <other options> -c <dir>|<files> Convert files in batch with your own settings.

Options:

rawtherapee-cli [-o <output>|-O <output>] [-q] [-a] [-s] [-S] [-p <one.pp3> [-p <two.pp3> ...]] [-d] [-j[1-100] -js<1-3> | -t[z] -b<8|16|16f|32> | -n -b<8

-c <files> Specify one or more input files or folders.
When specifying folders, Rawtherapee will look for image file types which comply with the selected extensions (see also '-a').
-c must be the last option.

-o <file>|<dir> Set output file or folder.
Saves output file alongside input file if -o is not specified.

2. Core i3 10100: RawTherapee, version 5.5, command line.

An advanced, cross-platform program for developing raw photos.
-q Quick-start mode. Does not load cached files to speedup start time.
Process all supported image file types when specifying a folder, even those not currently selected in Preferences > File Browser > Parsed Extensions.
Use the existing sidebar file to build the processing parameters.
Code and bug reports: <https://github.com/Beep6581/RawTherapee>
If the sidebar file does not exist, neutral values will be used.

Symbols:

<Chevrons> indicate parameters you can change.
[Square brackets] mean the parameter is optional.
The pipe symbol | indicates a choice of one or the other.
The dash symbol - denotes a range of possible values from one to the other.
Preferences > Image Processing > Default Processing Profile

Usage:

rawtherapee-cli -c <dir>|<files> Convert files in batch with default parameters.
rawtherapee-cli <other options> -c <dir>|<files> Convert files in batch with your own settings.

1 = Best compression: 2x2, 1x1, 1x1 (4:2:0)
2 = Balanced (default): 2x1, 1x1, 1x1 (4:2:2)
3 = Best quality: 1x1, 1x1, 1x1 (4:4:4)

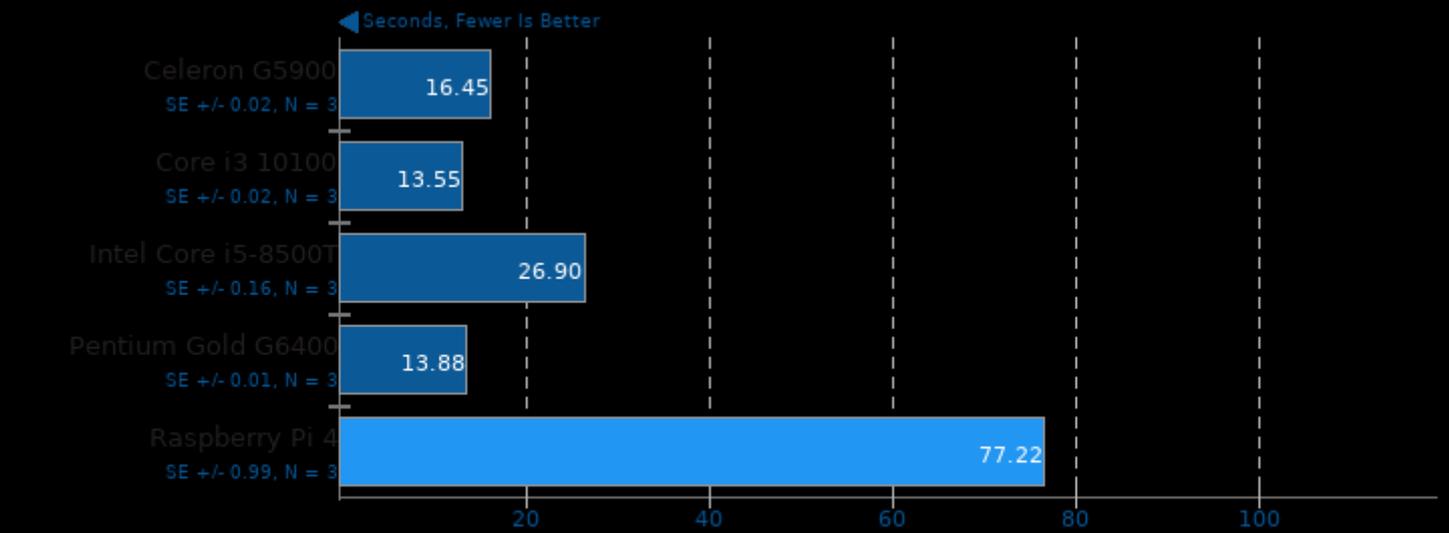
-c <files> Specify one or more input files or folders.
When specifying folders, Rawtherapee will look for image file types which comply with the selected extensions (see also '-a').
-c must be the first option.
-o <file>|<dir> Set output file or folder.
Saves output file alongside input file if -o is not specified.

3. Pentium Gold G6400: RawTherapee, version 5.5, command line.

An advanced, cross-platform program for developing raw photos.
-q Quick-start mode. Does not load cached files to speedup start time.
Process all supported image file types when specifying a folder, even those not currently selected in Preferences > File Browser > Parsed Extensions.
Use the existing sidebar file to build the processing parameters.
Code and bug reports: <https://github.com/Beep6581/RawTherapee>
If the sidebar file does not exist, neutral values will be used.

librsvg

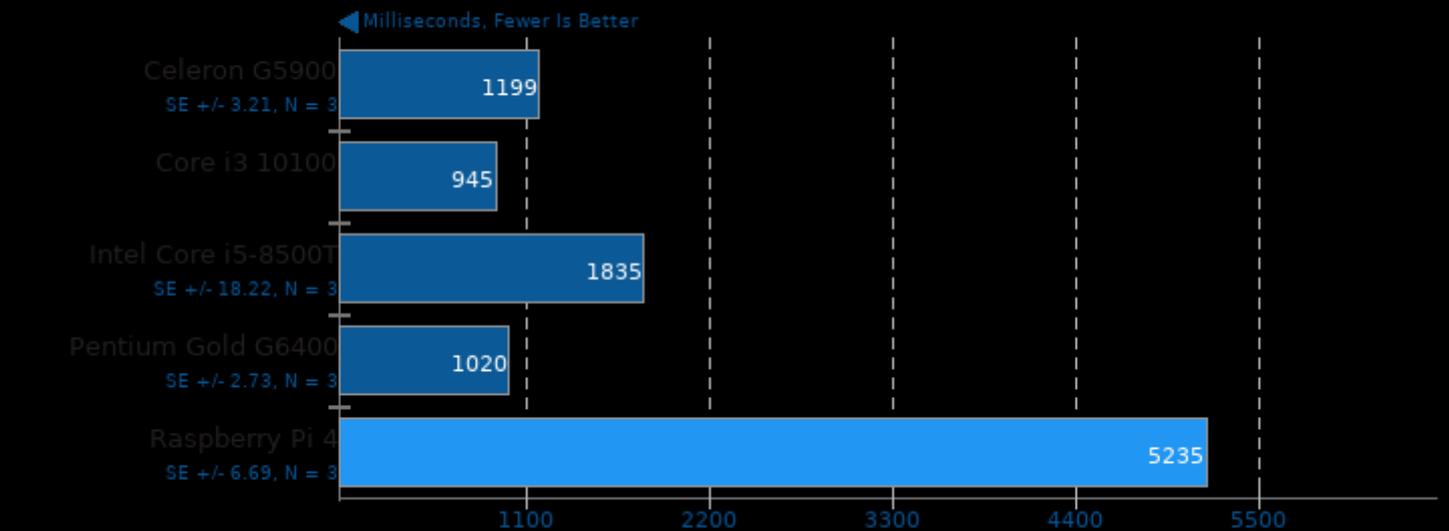
Operation: SVG Files To PNG



1. Celeron G5900: rsvg-convert version 2.44.10
2. Core i3 10100: rsvg-convert version 2.44.10
3. Intel Core i5-8500T: rsvg-convert version 2.48.9
4. Pentium Gold G6400: rsvg-convert version 2.44.10
5. Raspberry Pi 4: rsvg-convert version 2.44.10

PyBench 2018-02-16

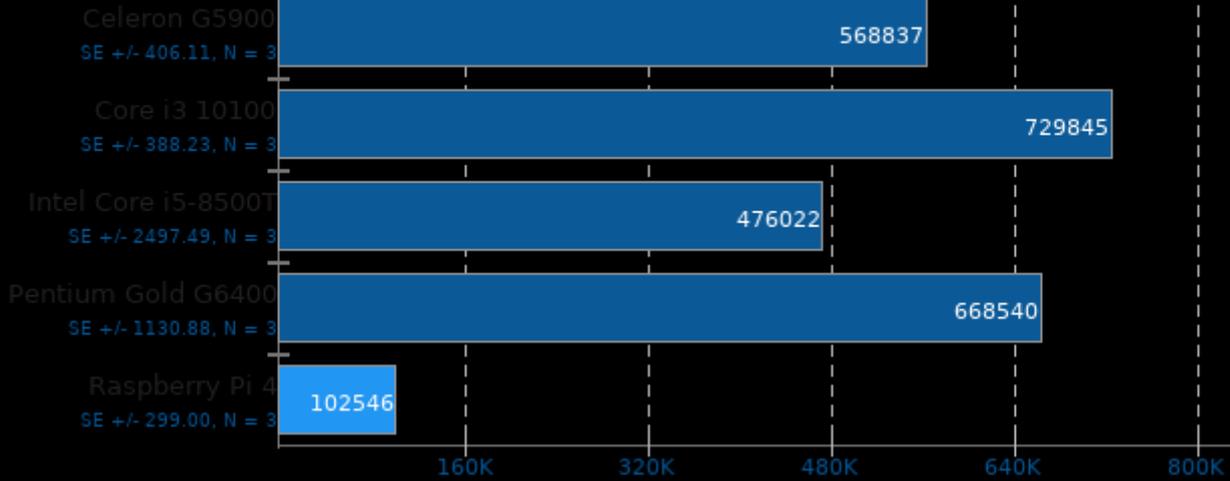
Total For Average Test Times



PHPBench 0.8.1

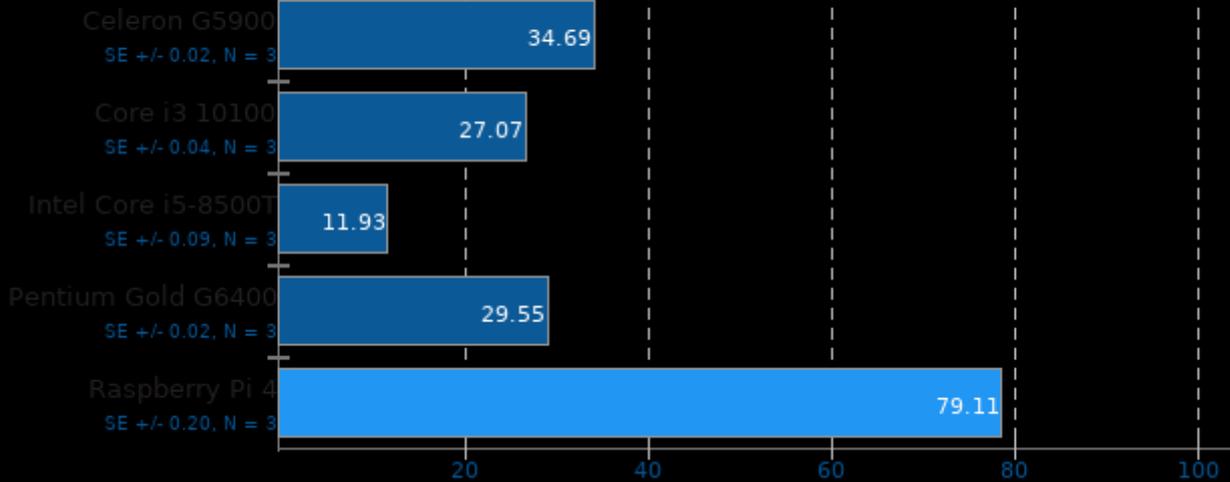
PHP Benchmark Suite

▶ Score, More Is Better



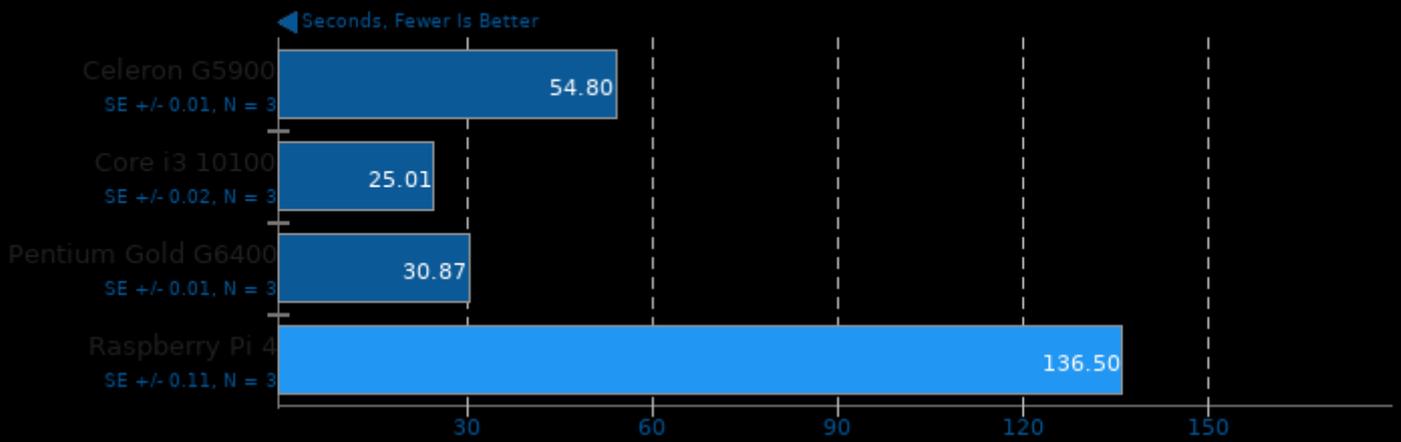
Scikit-Learn 0.22.1

◀ Seconds, Fewer Is Better



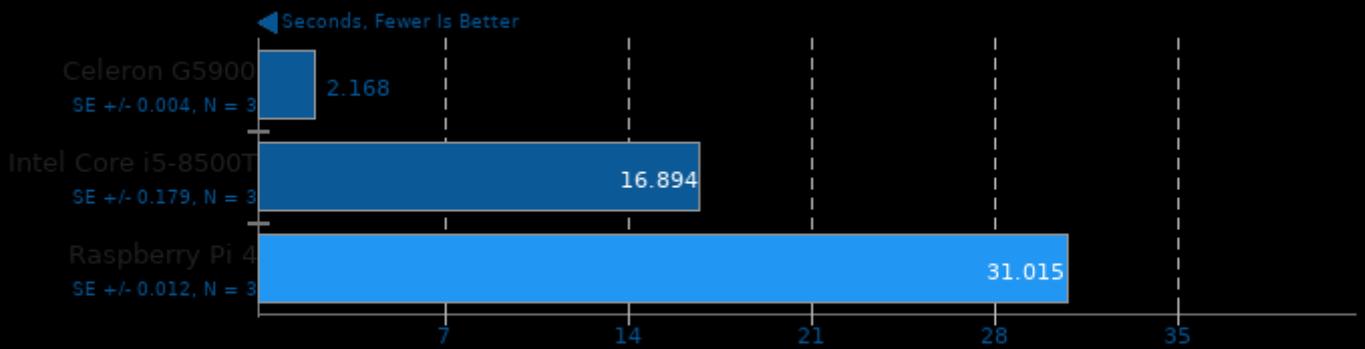
Tesseract OCR 4.0.0

Time To OCR 7 Images



PolyBench-C 4.2

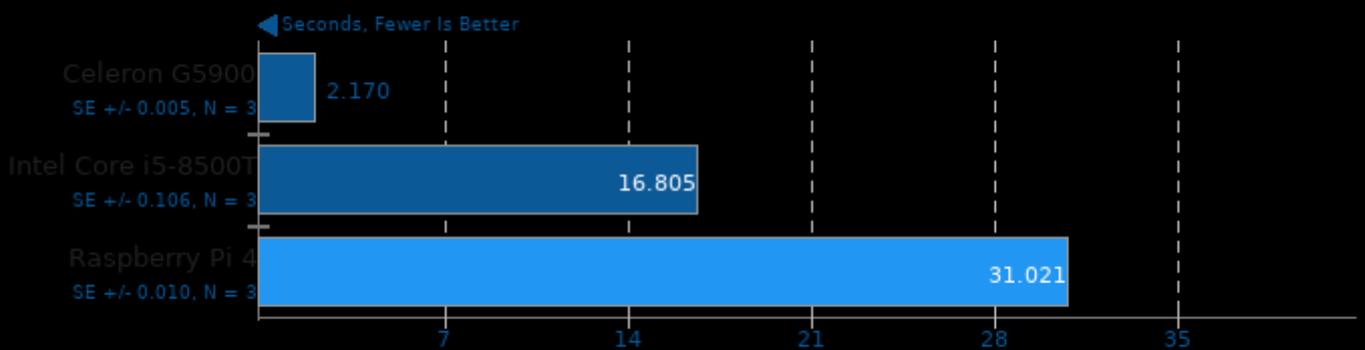
Test: Covariance Computation



1. (CC) gcc options: -O3 -march=native

PolyBench-C 4.2

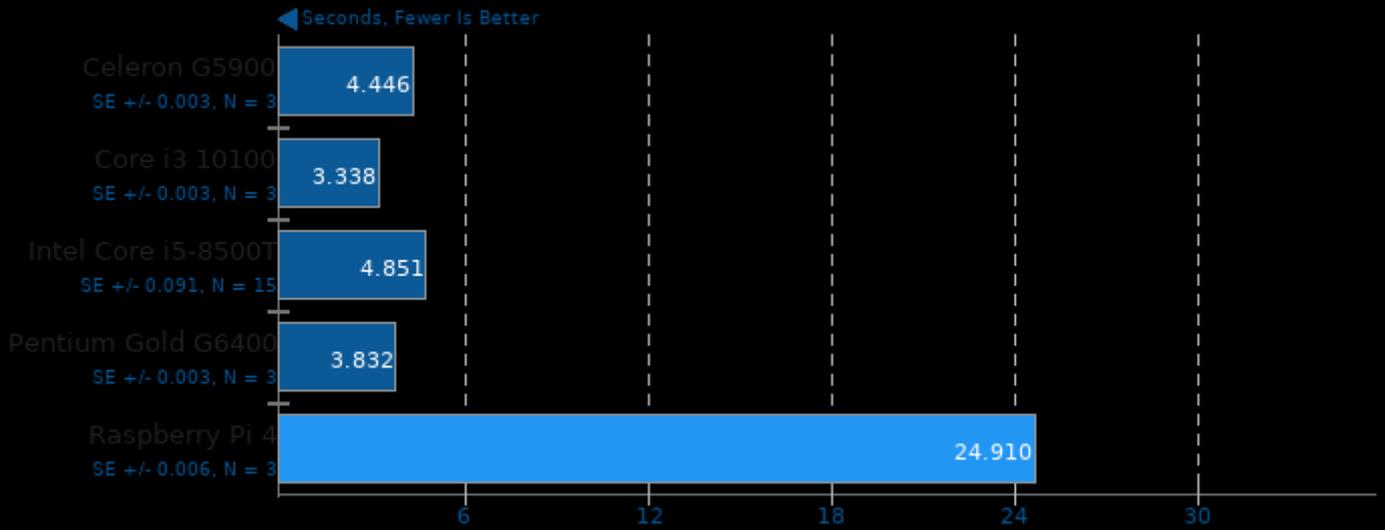
Test: Correlation Computation



1. (CC) gcc options: -O3 -march=native

PolyBench-C 4.2

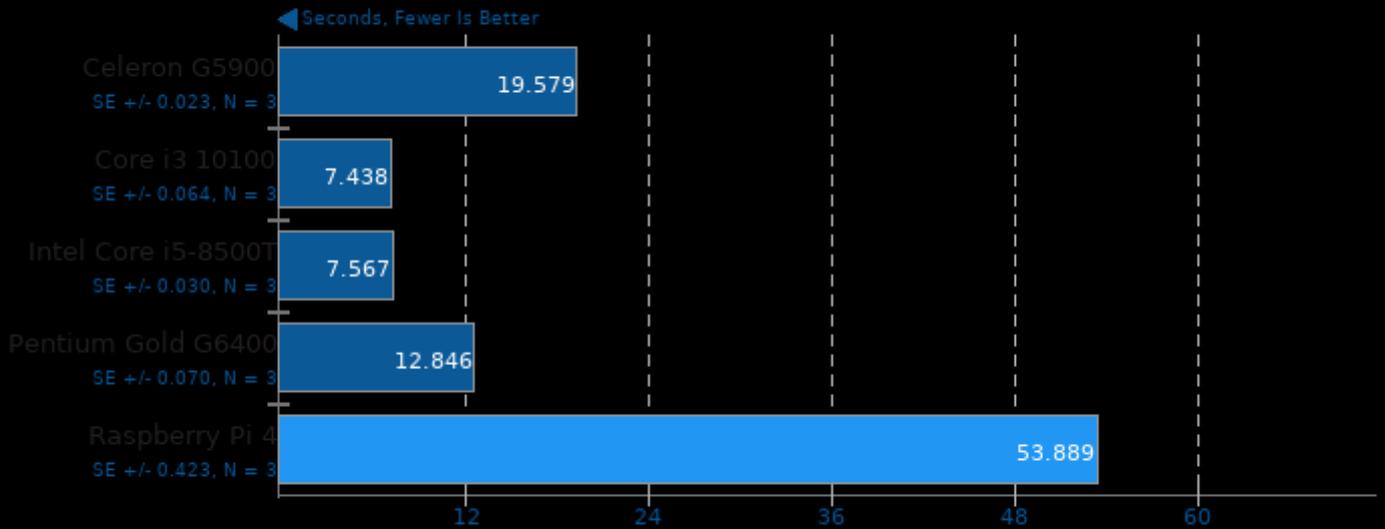
Test: 3 Matrix Multiplications



1, (CC) gcc options: -O3 -march=native

Timed HMMer Search 2.3.2

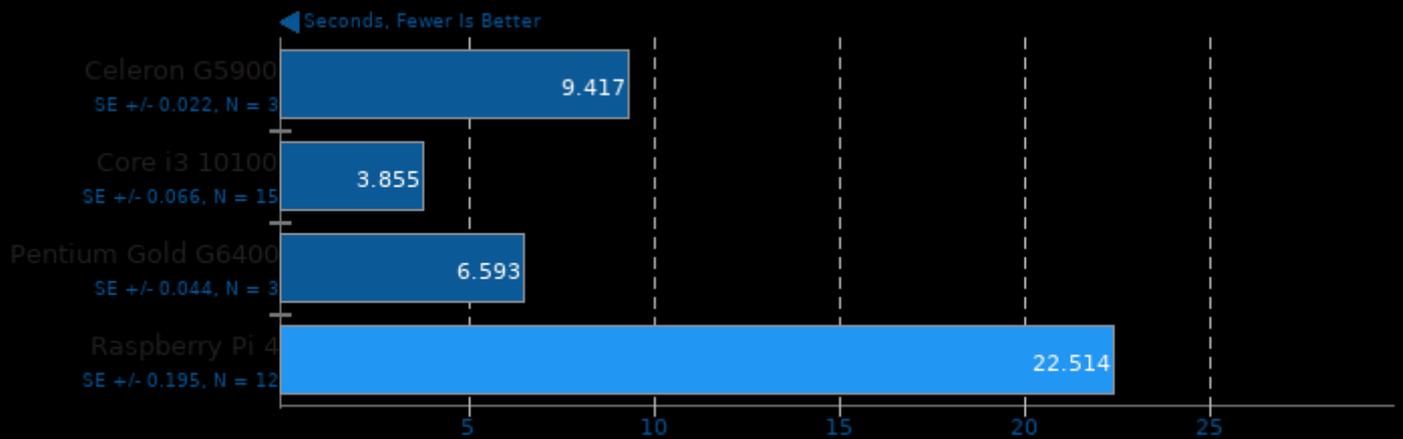
Pfam Database Search



1, (CC) gcc options: -O2 -pthread -lhmmmer -lsquid -lm

Timed MAFFT Alignment 7.392

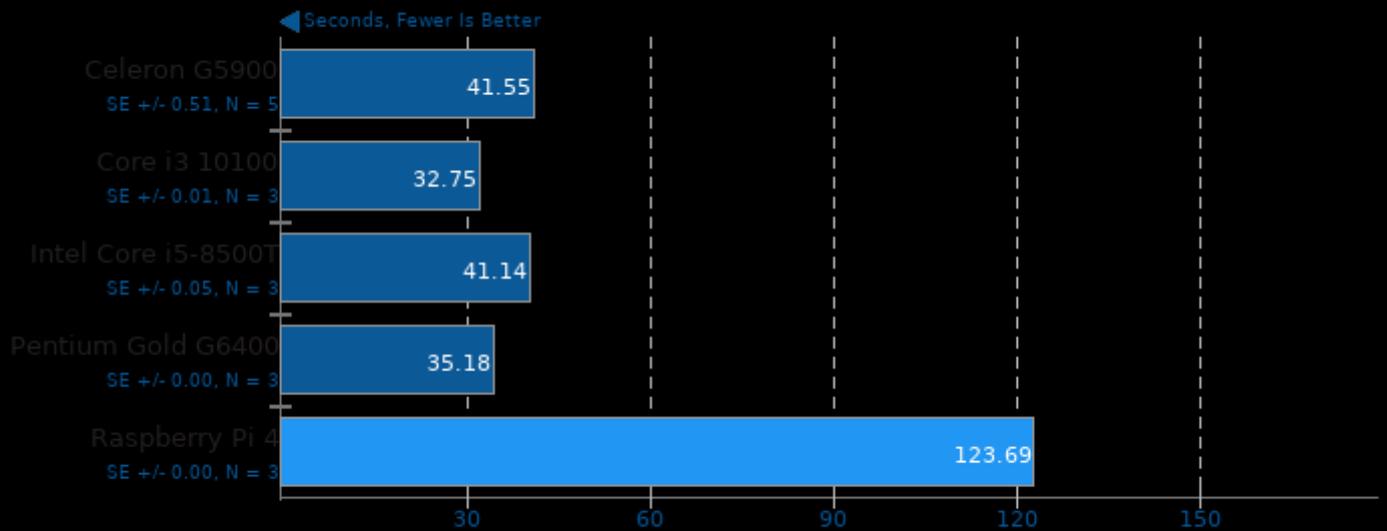
Multiple Sequence Alignment



1. (CC) gcc options: -std=c99 -O3 -lm -lpthread

AOBench

Size: 2048 x 2048 - Total Time

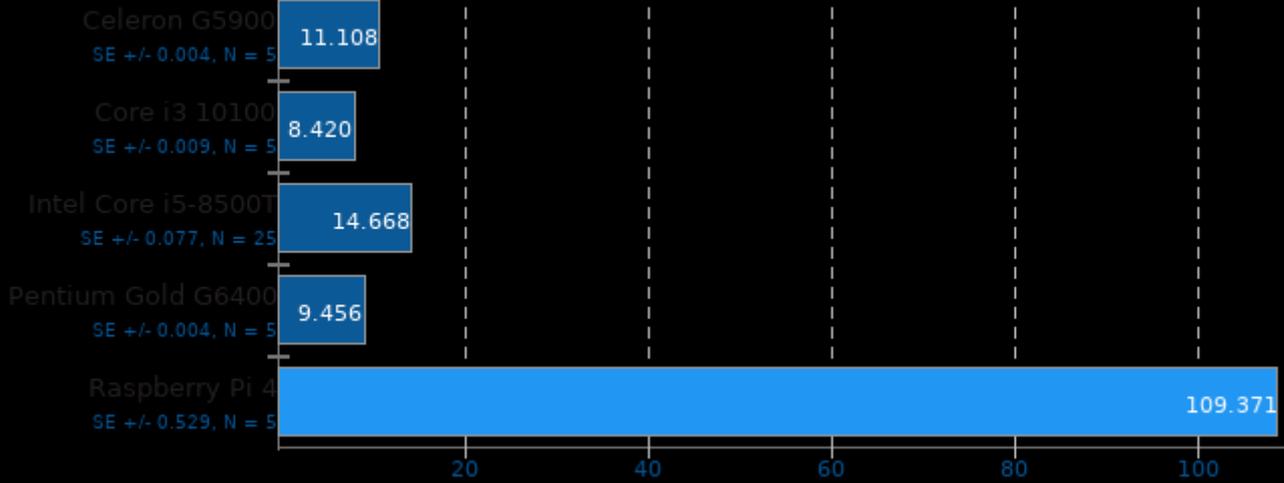


1. (CC) gcc options: -lm -O3

FLAC Audio Encoding 1.3.2

WAV To FLAC

Seconds, Fewer Is Better

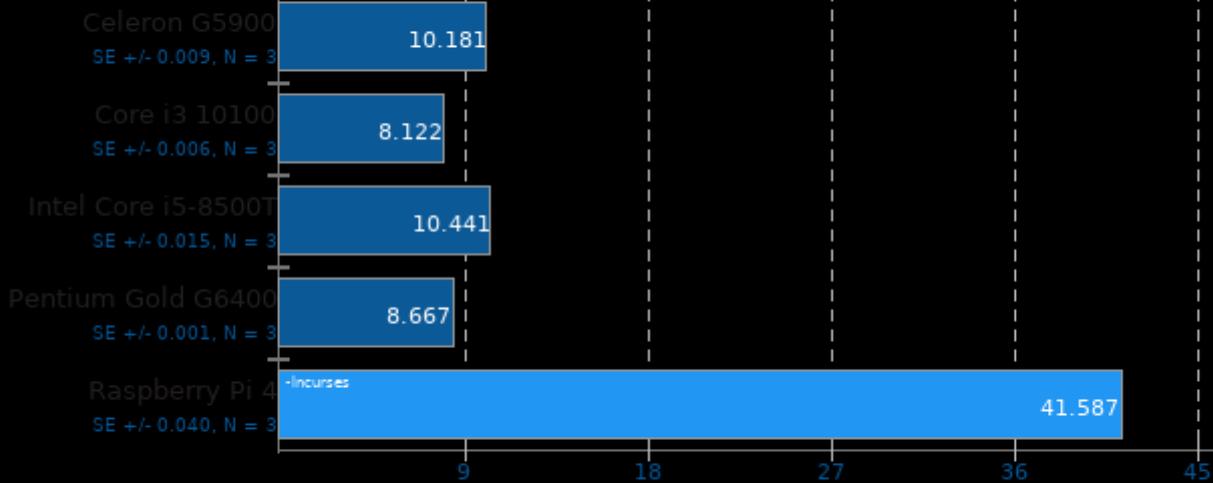


1. (CXX) g++ options: -O2 -fvisibility=hidden -logg -lm

LAME MP3 Encoding 3.100

WAV To MP3

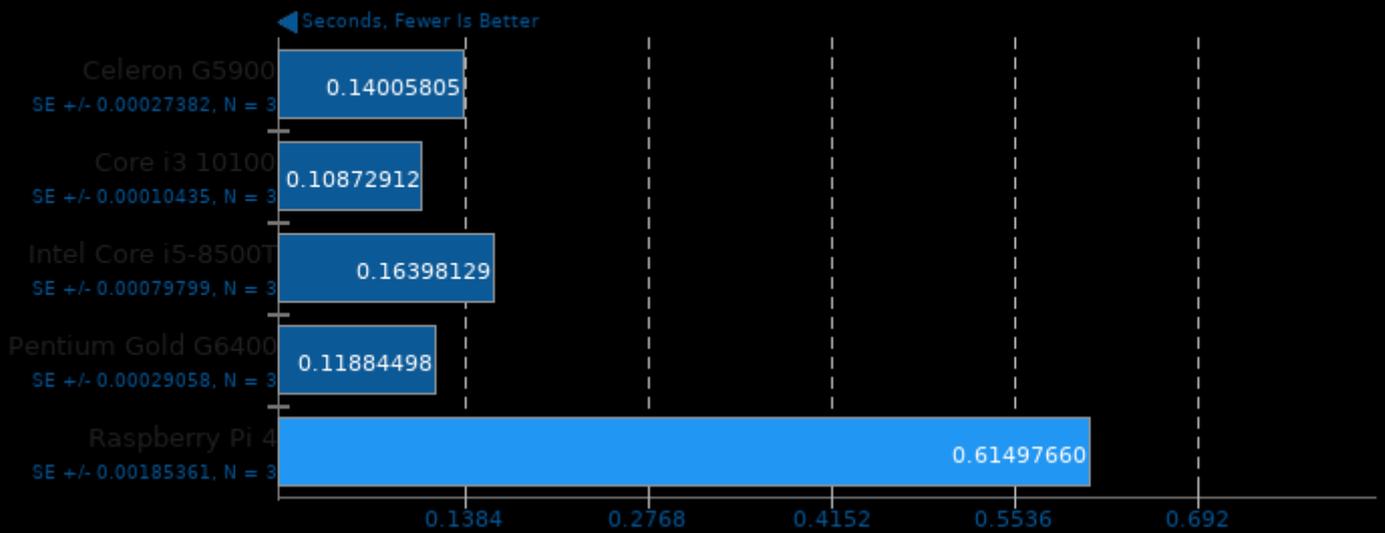
Seconds, Fewer Is Better



1. (C) gcc options: -O3 -ffast-math -funroll-loops -fschedule-insns2 -fbranch-count-reg -fforce-addr -pipe -lm

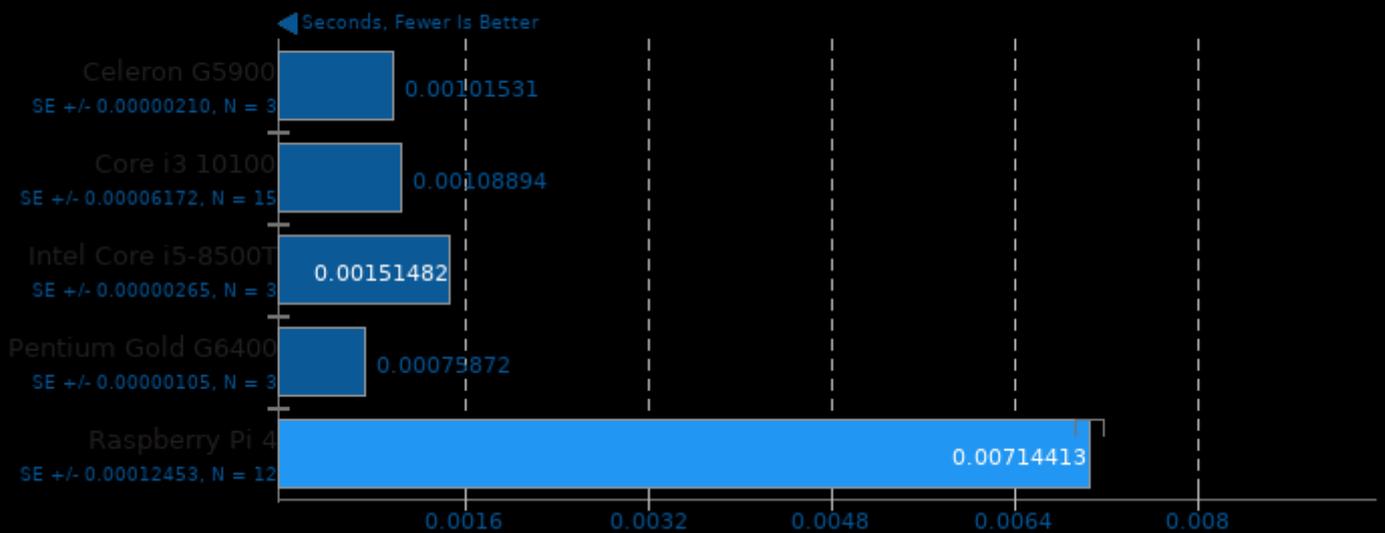
Perl Benchmarks

Test: Pod2html



Perl Benchmarks

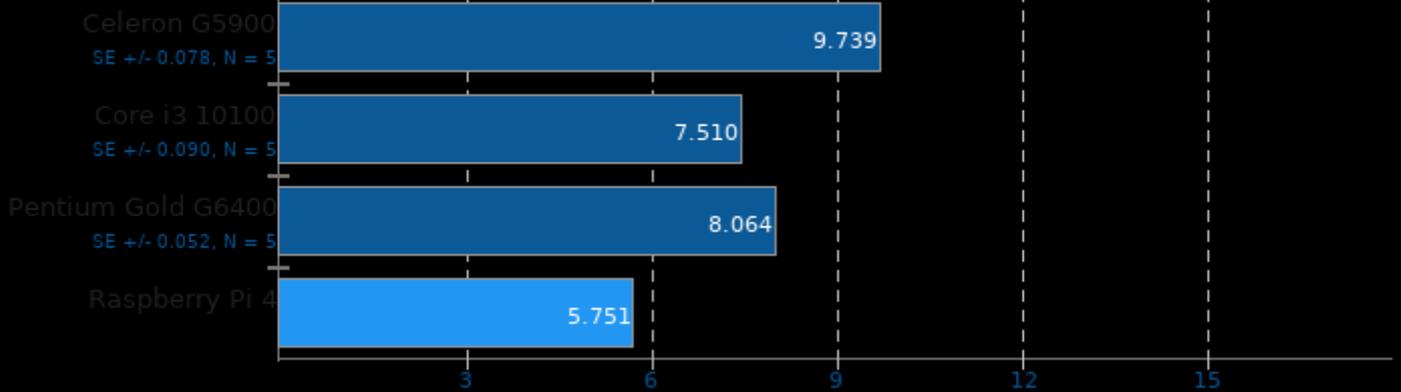
Test: Interpreter



LibreOffice

Test: 20 Documents To PDF

← Seconds, Fewer Is Better

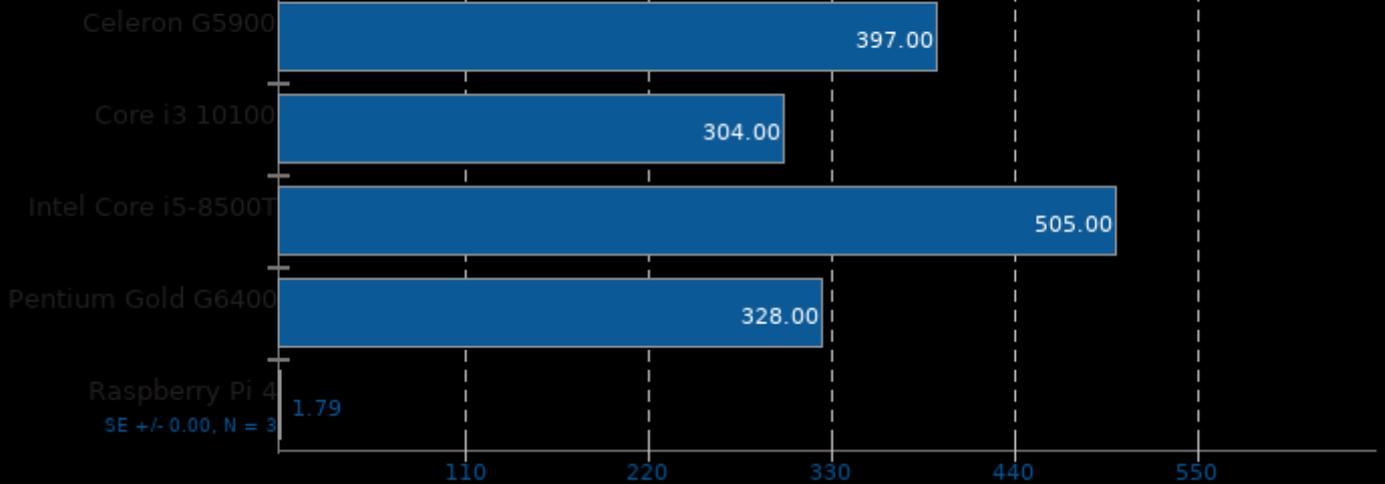


1. LibreOffice 6.1.5.2 10(Build:2)

PyPerformance 1.0.0

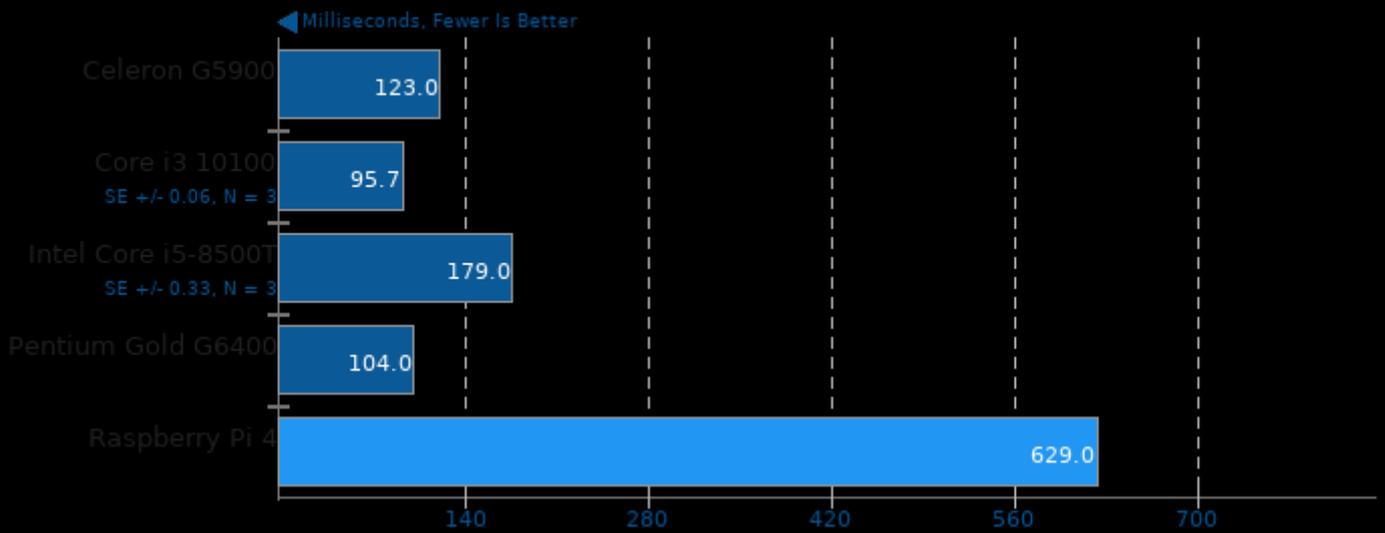
Benchmark: 2to3

← Milliseconds, Fewer Is Better



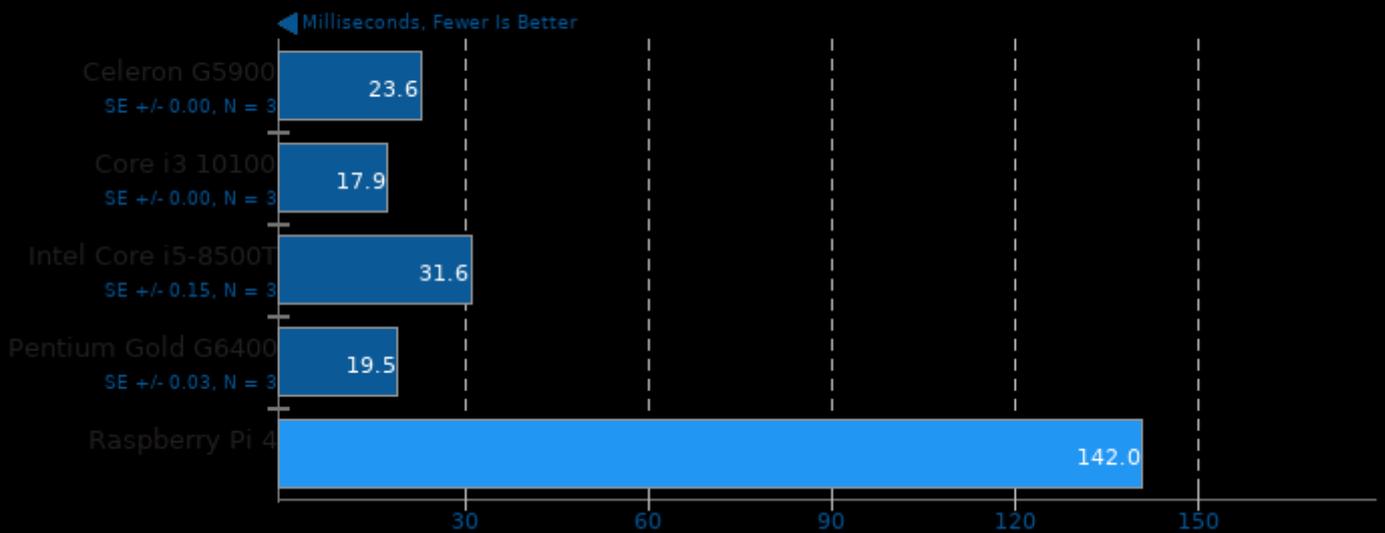
PyPerformance 1.0.0

Benchmark: float



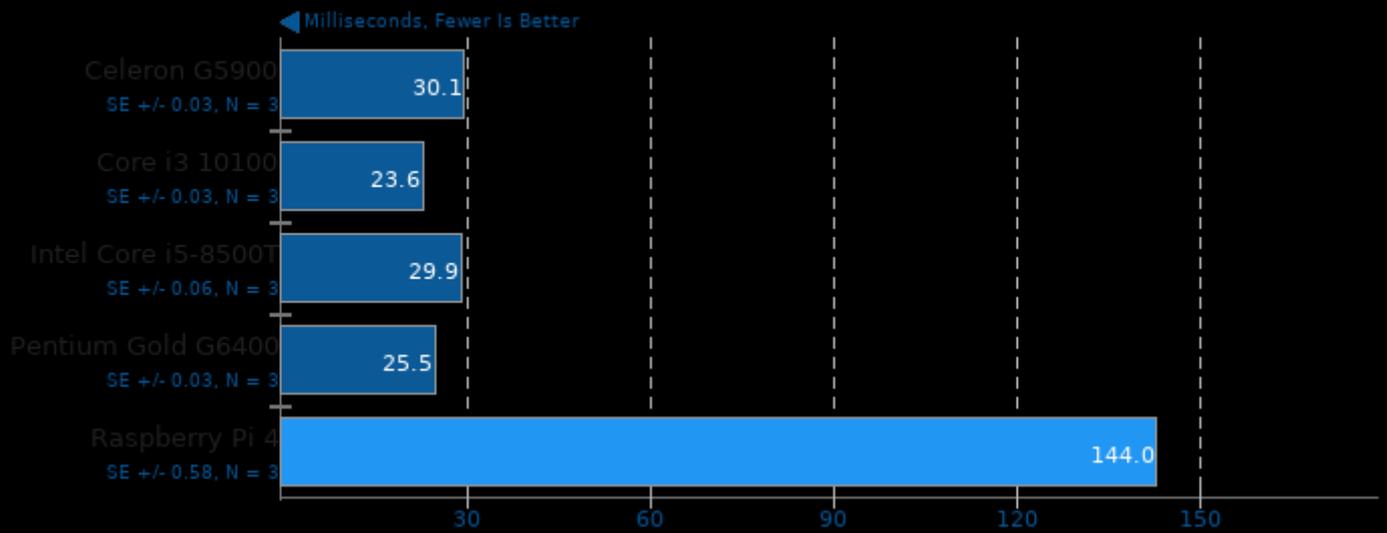
PyPerformance 1.0.0

Benchmark: pathlib



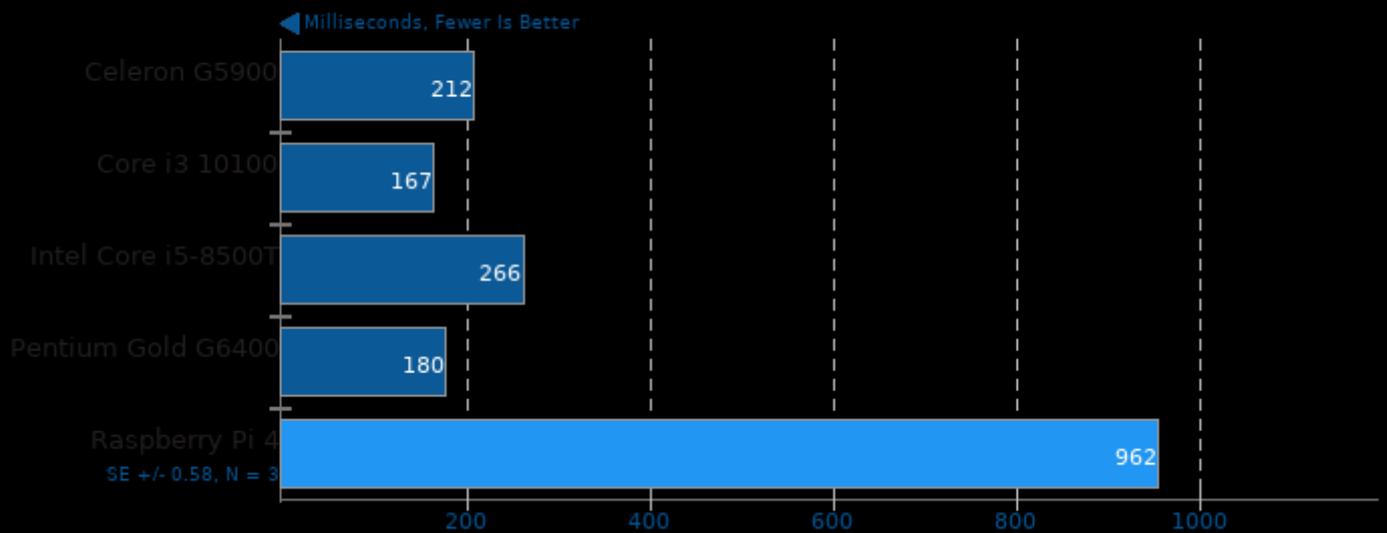
PyPerformance 1.0.0

Benchmark: json_loads



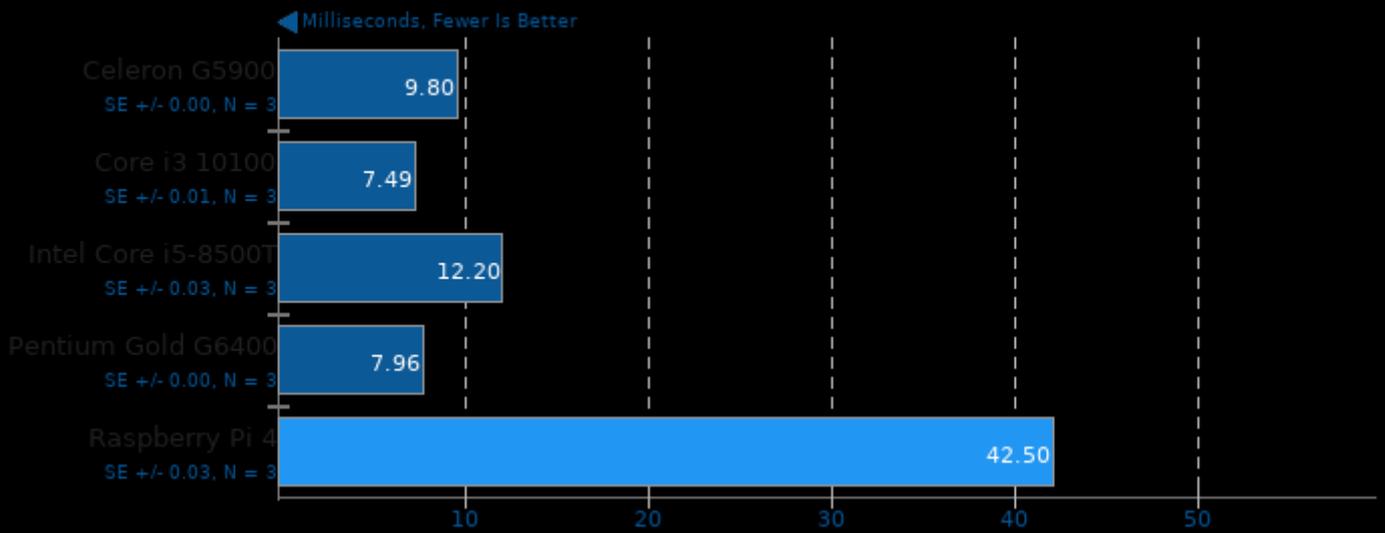
PyPerformance 1.0.0

Benchmark: regex_compile



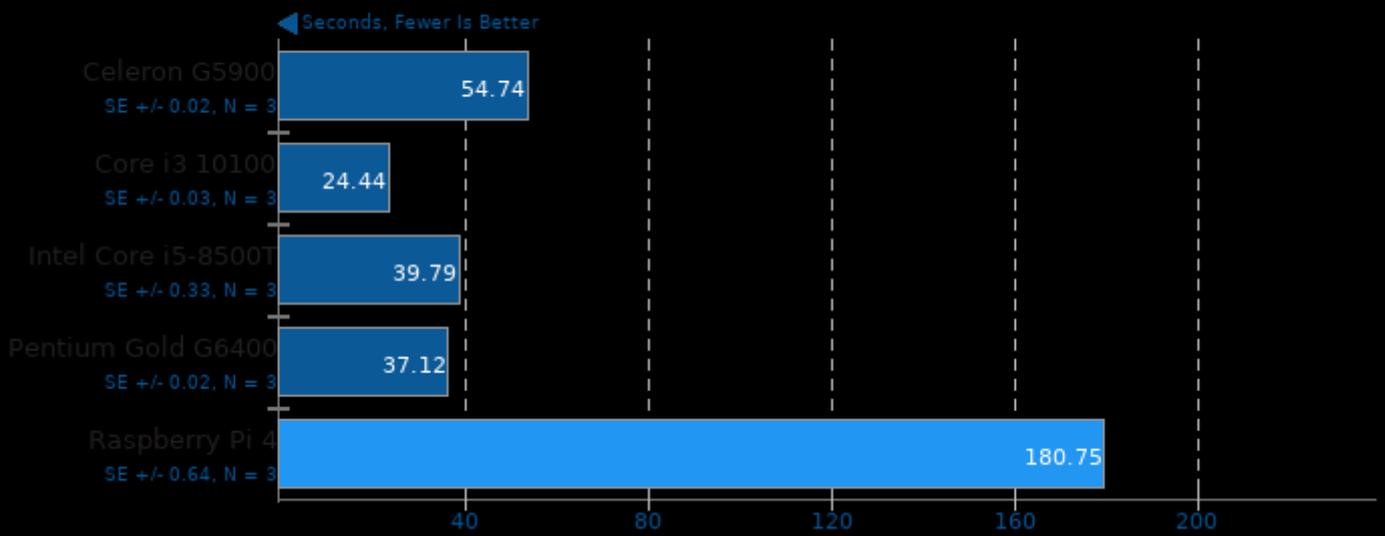
PyPerformance 1.0.0

Benchmark: python_startup



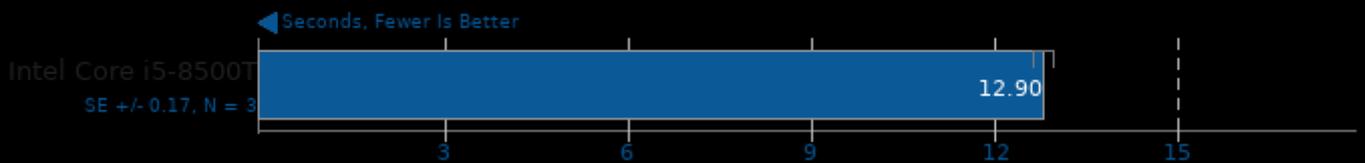
Timed Apache Compilation 2.4.41

Time To Compile



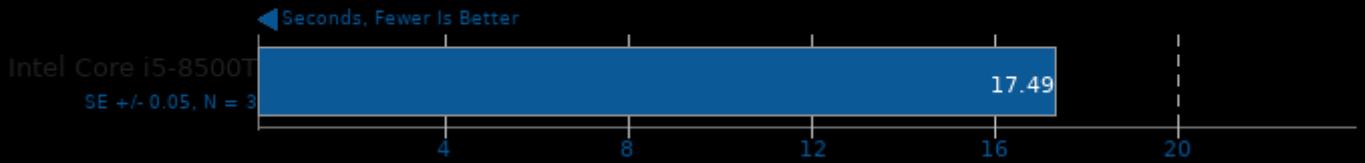
GIMP 2.10.18

Test: resize



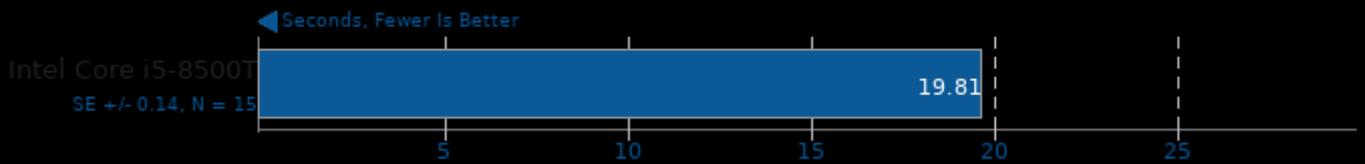
GIMP 2.10.18

Test: rotate



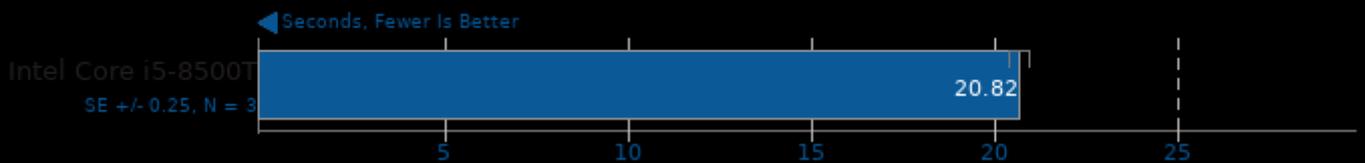
GIMP 2.10.18

Test: auto-levels



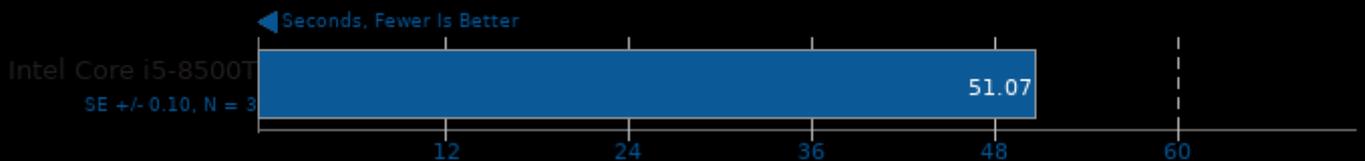
GIMP 2.10.18

Test: unsharp-mask

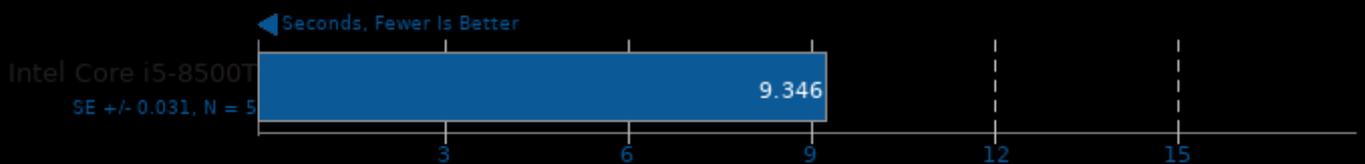


OCRMyPDF 9.6.0+dfsg

Processing 60 Page PDF Document

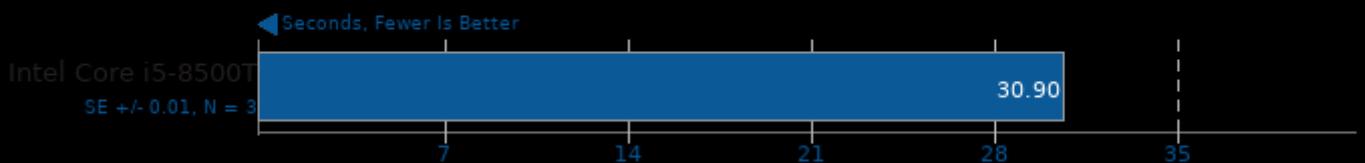


GNU Octave Benchmark 5.2.0

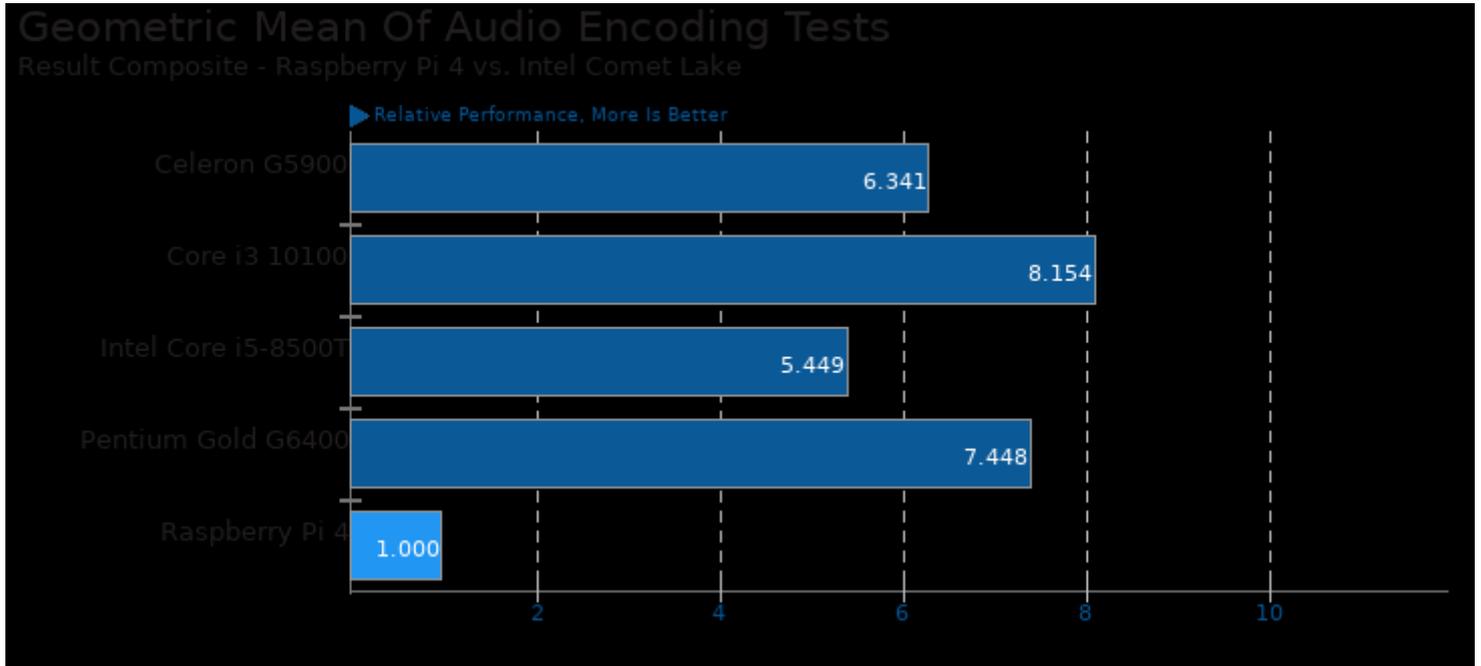


Tesseract OCR 4.1.1

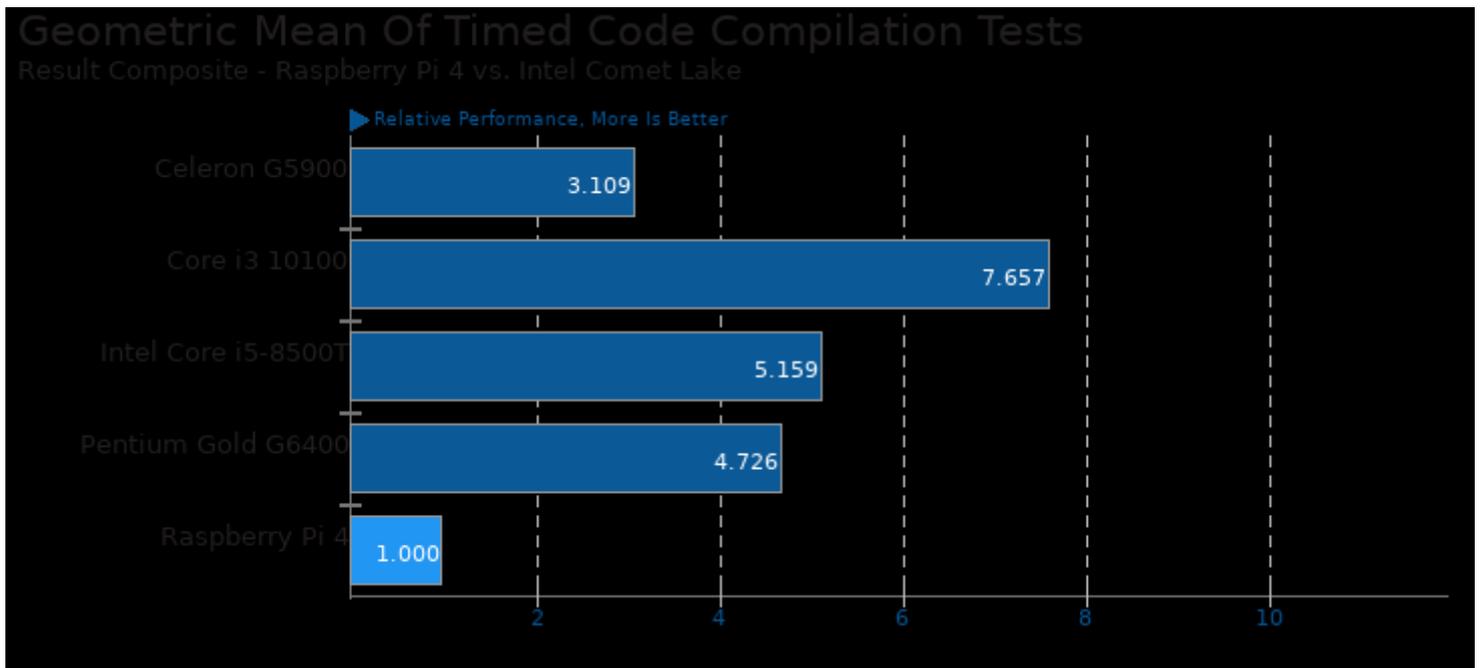
Time To OCR 7 Images



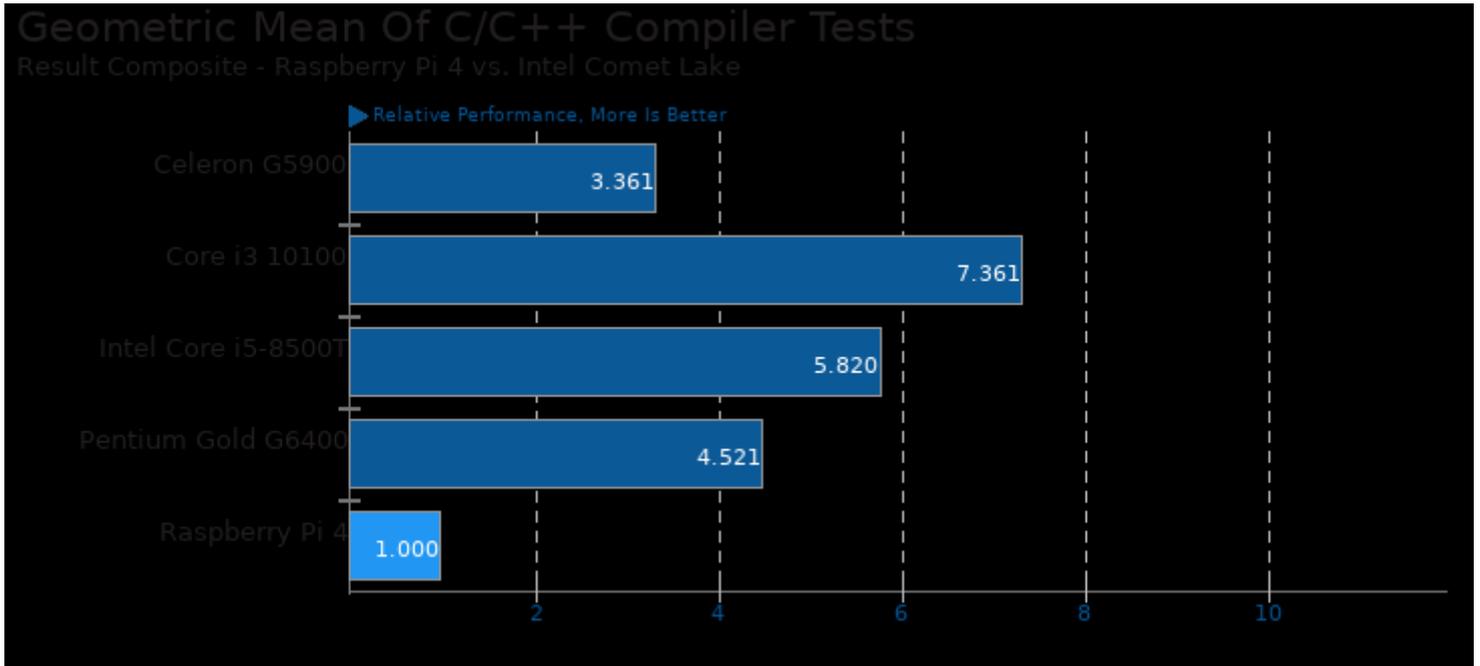
These geometric means are based upon test groupings / test suites for this result file.



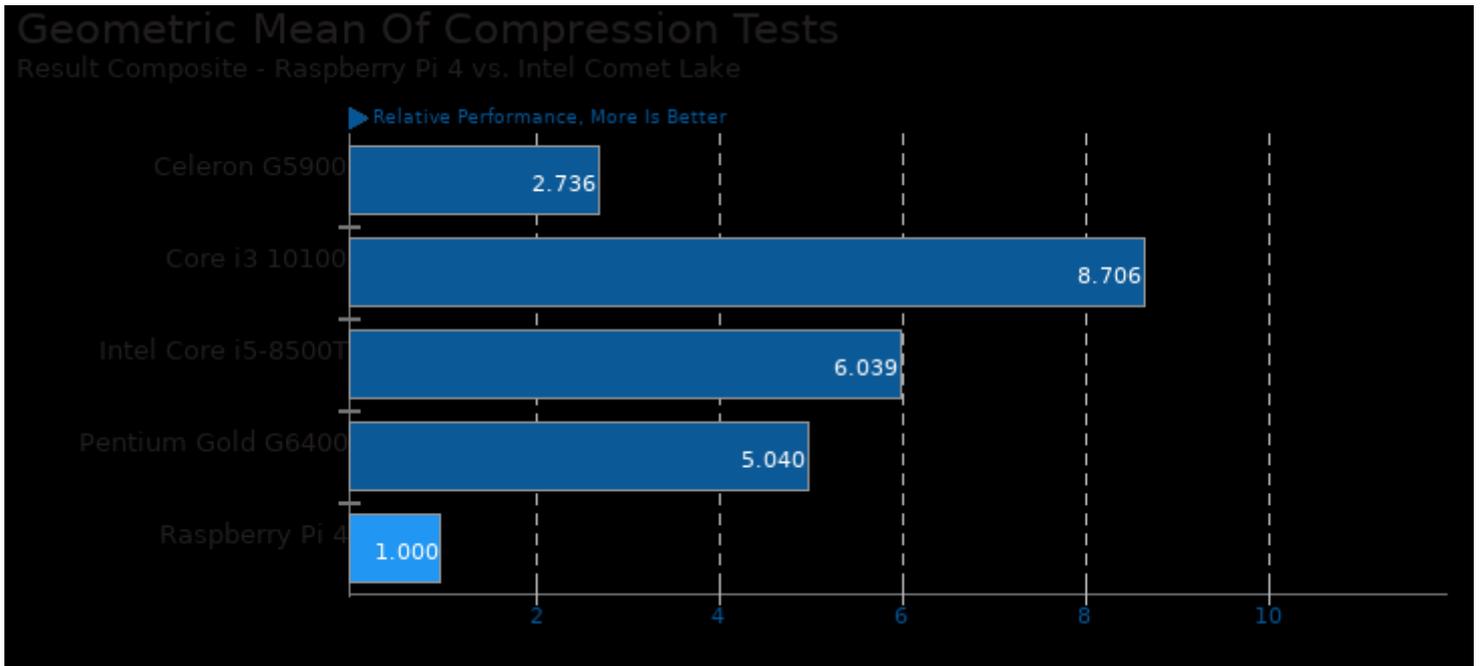
Geometric mean based upon tests: pts/encode-mp3 and pts/encode-flac



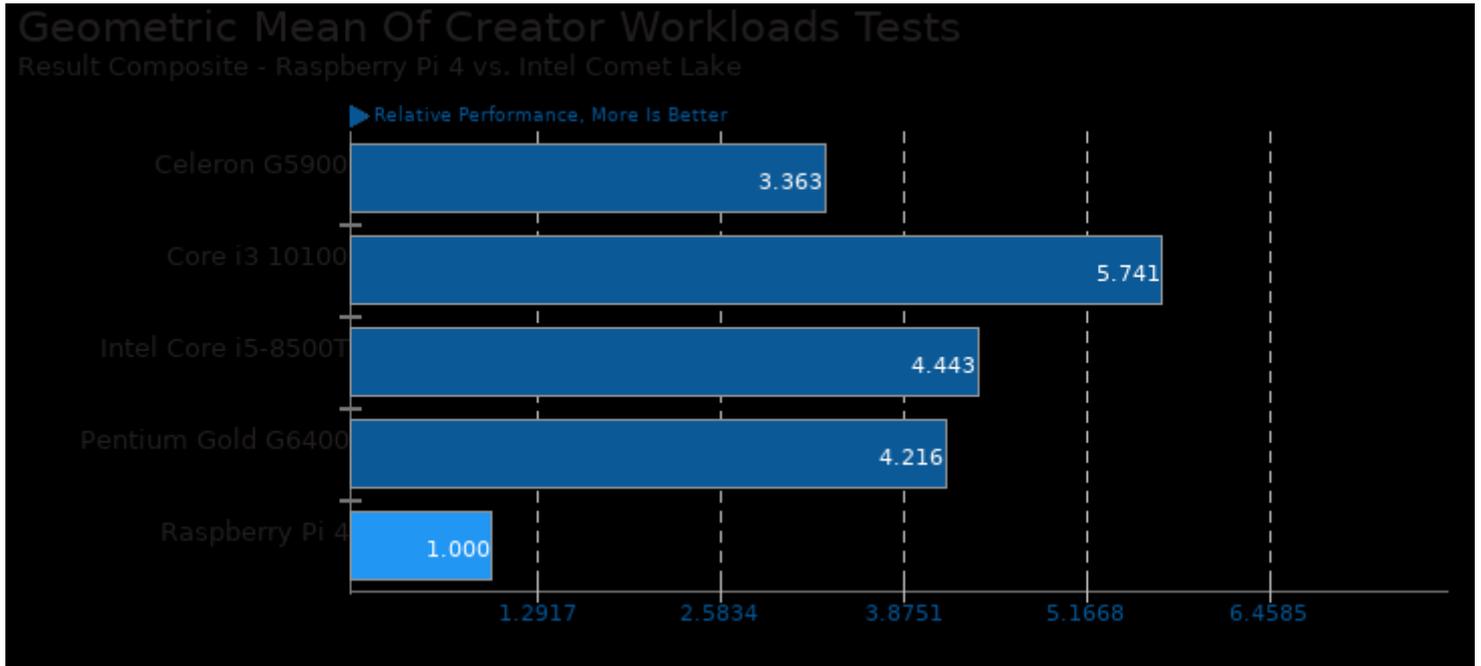
Geometric mean based upon tests: pts/build-apache, pts/build-php, pts/build-gdb and pts/build-mplayer



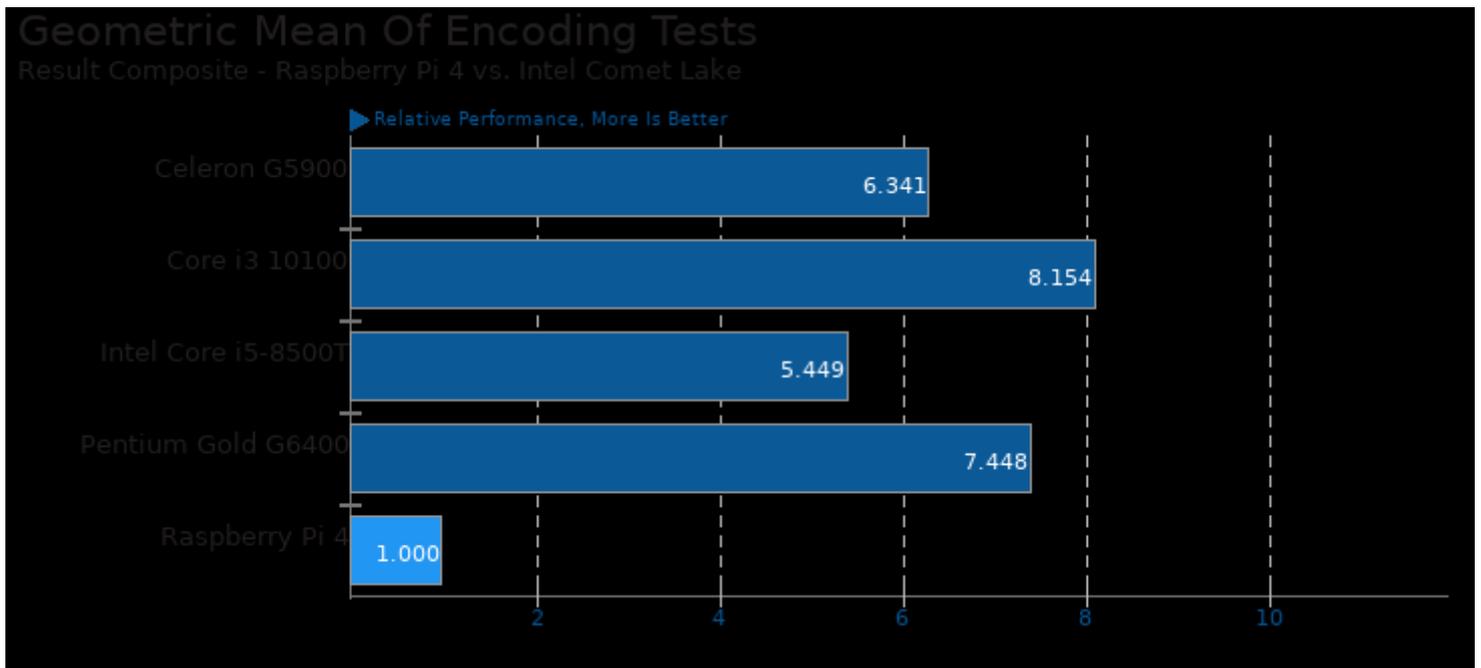
Geometric mean based upon tests: pts/mafft, pts/aobench, pts/tscp, pts/graphics-magick, pts/hmmer, pts/build-php, pts/c-ray, pts/compress-7zip, pts/encode-mp3, pts/encode-flac, pts/sqlite-speedtest, pts/compress-xz, pts/openssl, pts/lammps, pts/aircrack-ng, pts/build-gdb, pts/build-apache and pts/build-mplayer



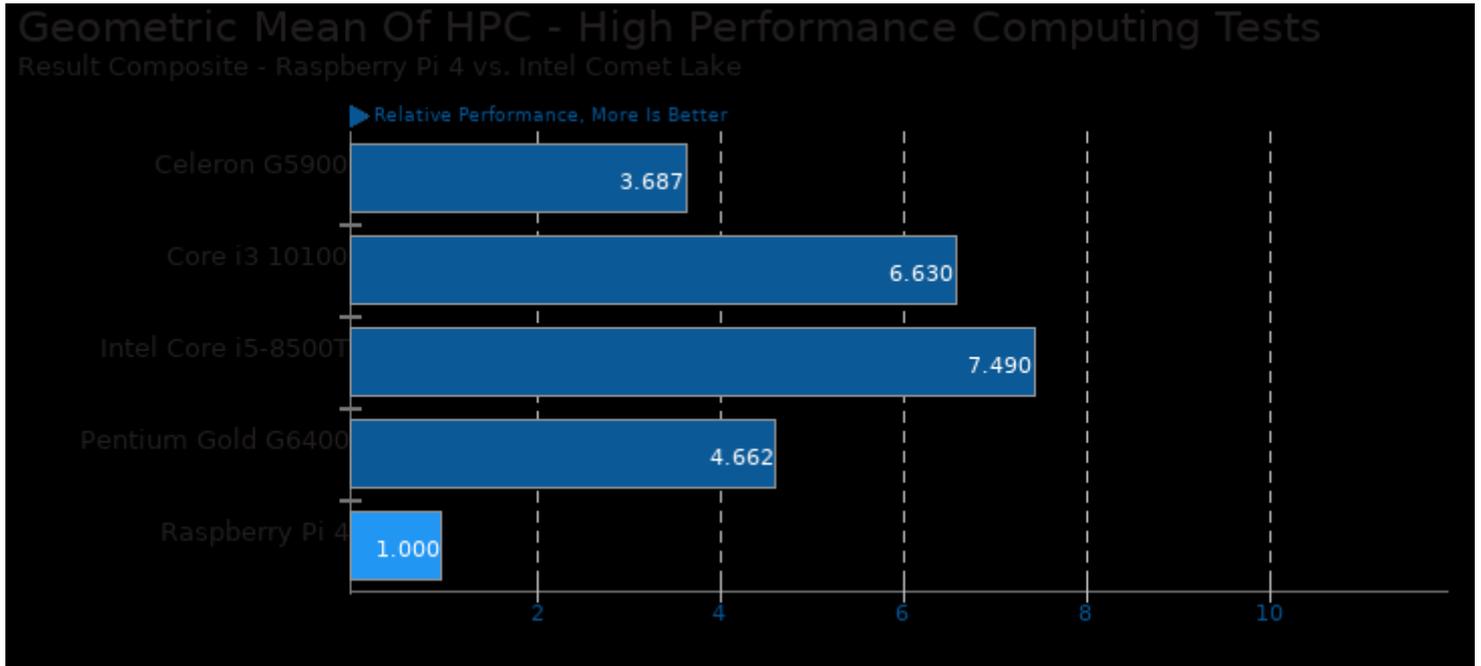
Geometric mean based upon tests: pts/compress-7zip and pts/compress-xz



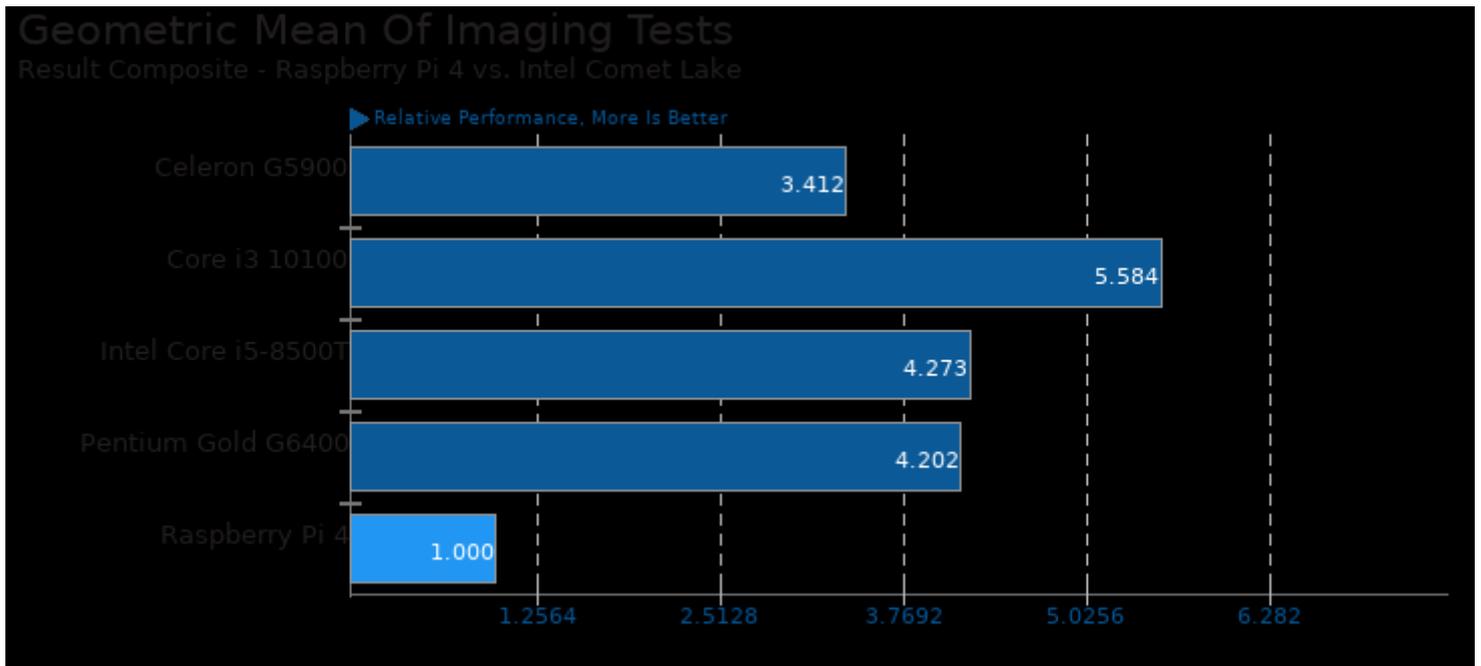
Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/smallpt, pts/ttsiod-renderer, system/tesseract-ocr, system/ocrmypdf, pts/encode-mp3, pts/encode-flac, pts/graphics-magick, system/inkscape, system/rawtherapee, pts/tjbench, system/gimp, system/hugin, system/rsvg and system/gegl



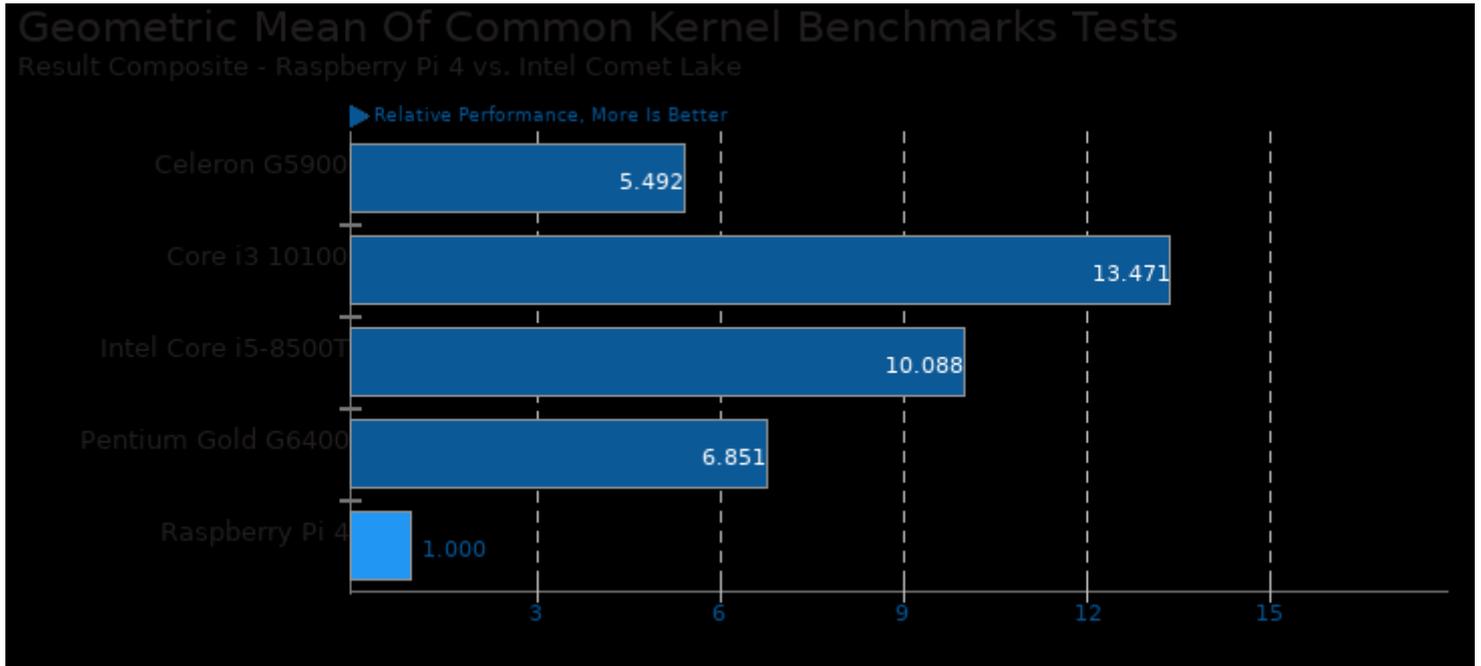
Geometric mean based upon tests: pts/encode-mp3 and pts/encode-flac



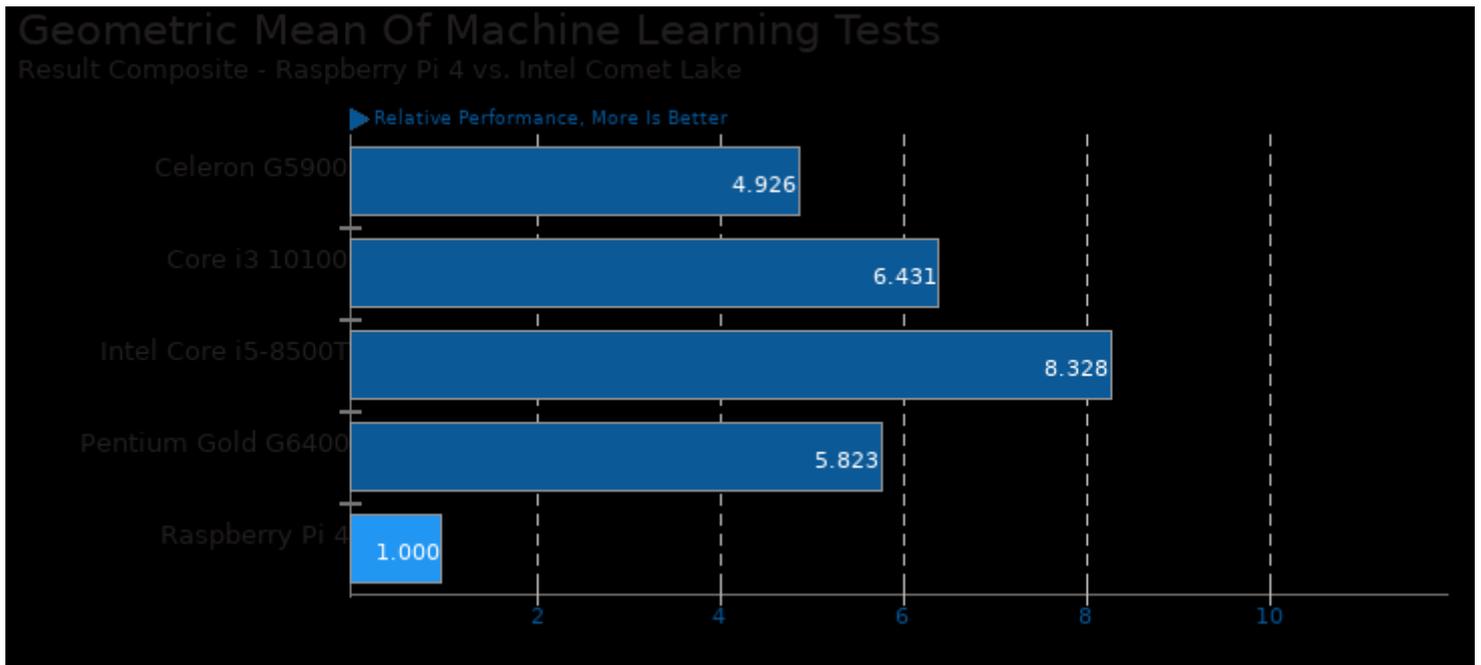
Geometric mean based upon tests: system/octave-benchmark, pts/lammps, pts/hmmer, pts/mafft, pts/numpy and pts/scikit-learn



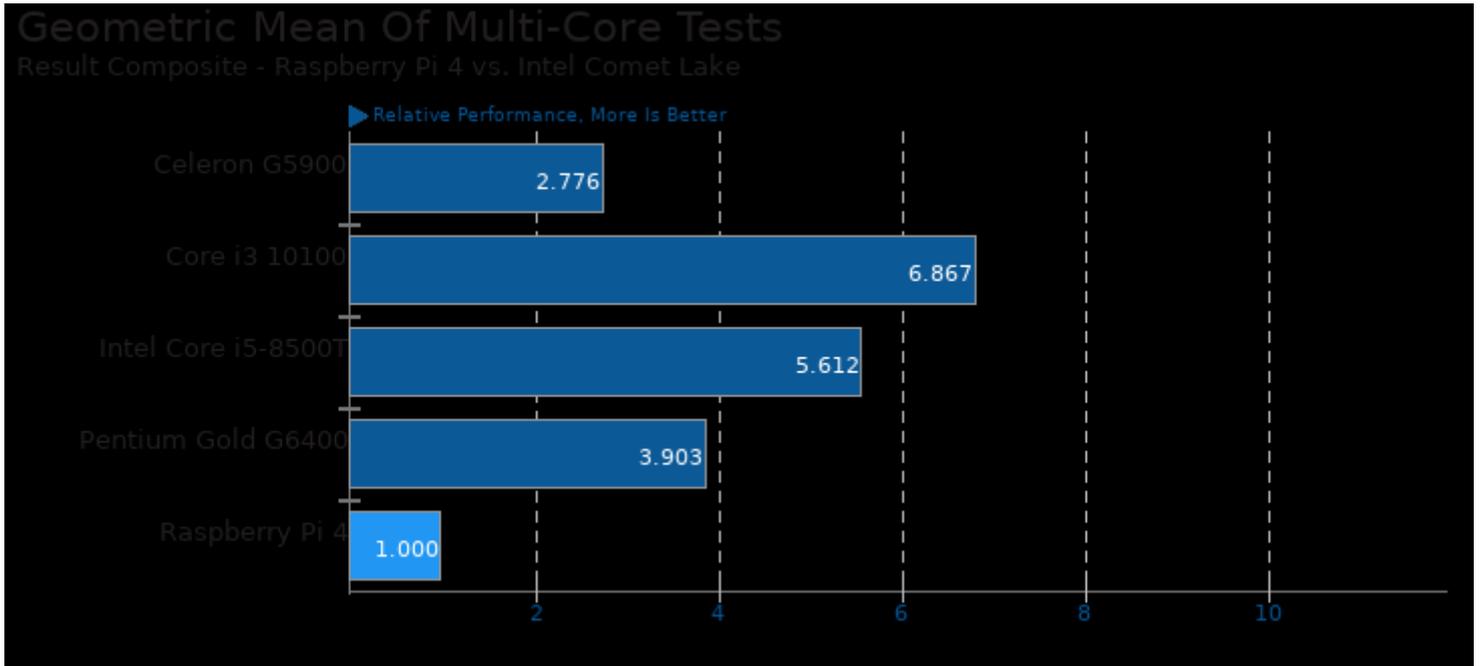
Geometric mean based upon tests: pts/graphics-magick, system/inkscape, system/rawtherapee, pts/tjbench, system/gimp, system/hugin, system/rsvg and system/gegl



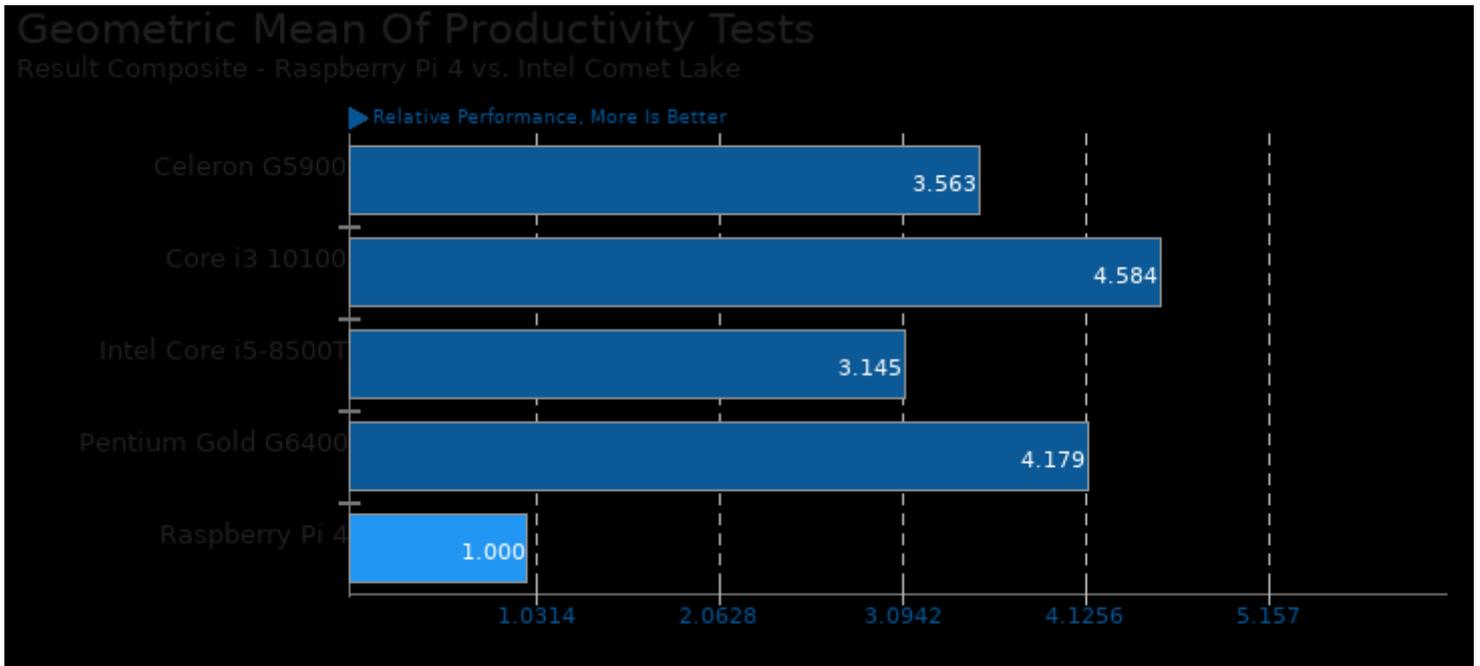
Geometric mean based upon tests: pts/sqlite-speedtest and pts/openssl



Geometric mean based upon tests: pts/numpy and pts/scikit-learn

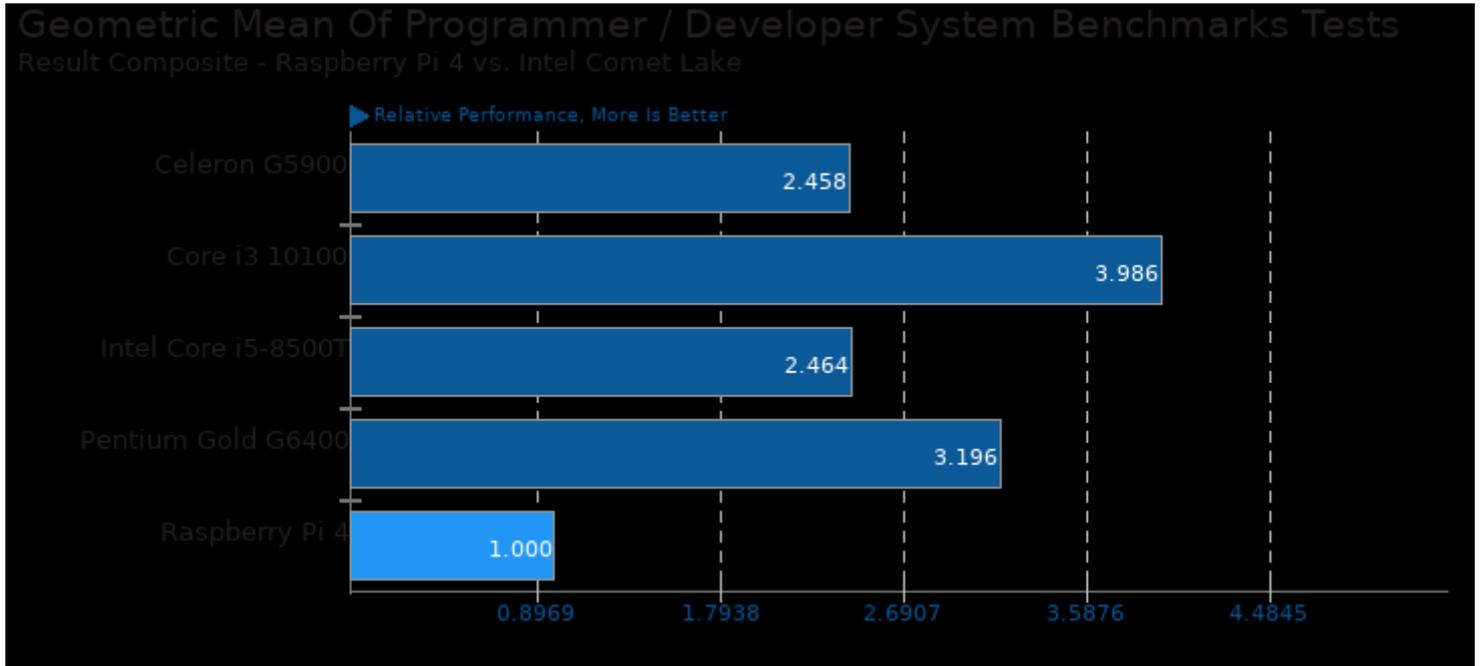


Geometric mean based upon tests: pts/c-ray, pts/coremark, pts/aircrack-ng, pts/smallpt, pts/graphics-magick, pts/lammps, pts/compress-7zip, pts/build-apache, pts/build-php, pts/build-gdb, pts/build-mplayer, pts/aobench and pts/ttsiod-renderer

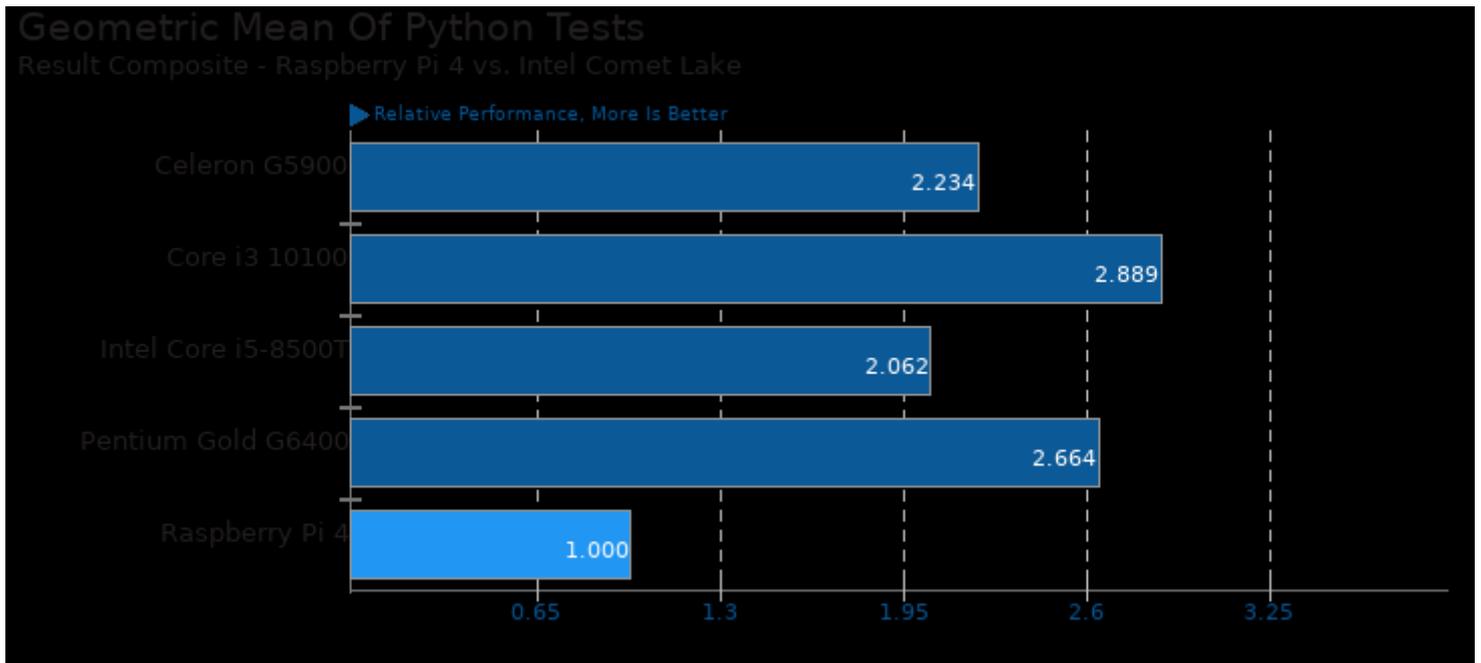


Geometric mean based upon tests: system/libreoffice, system/octave-benchmark, system/inkscape, system/gimp, system/gegl and system/rsvg

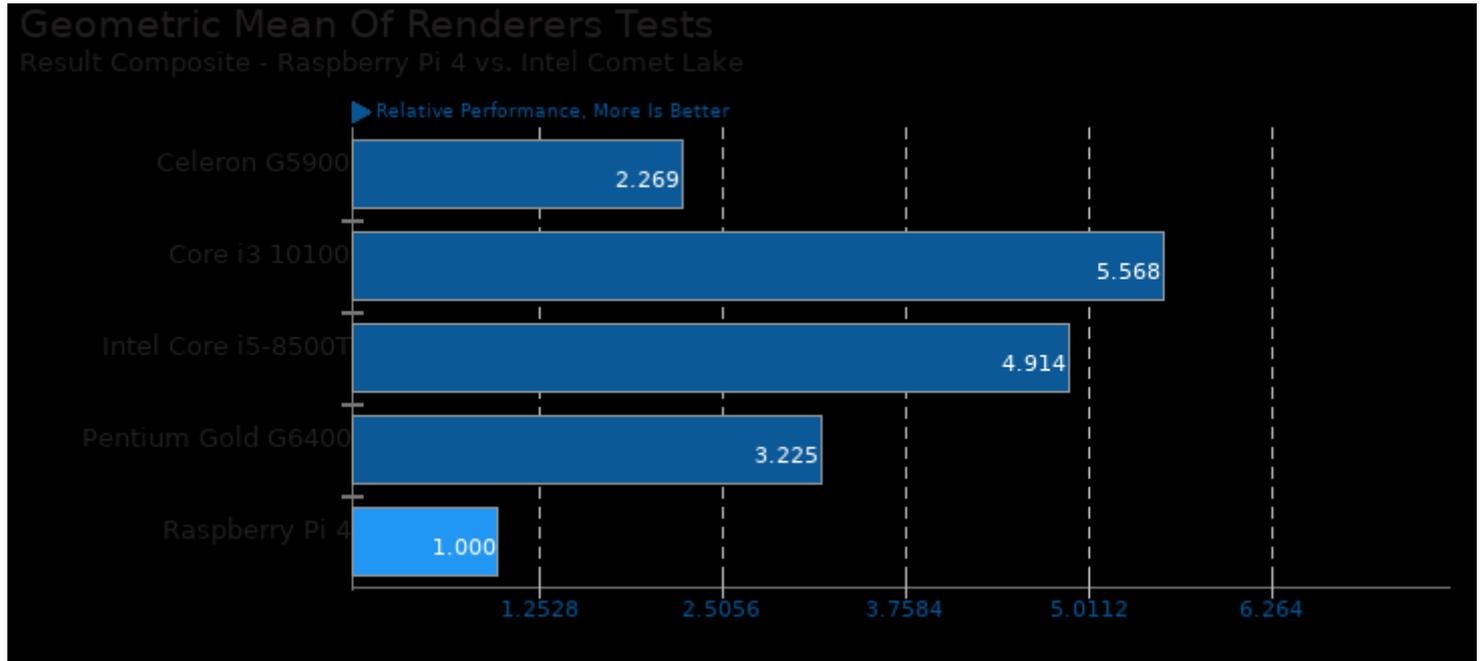
Raspberry Pi 4 vs. Intel Comet Lake



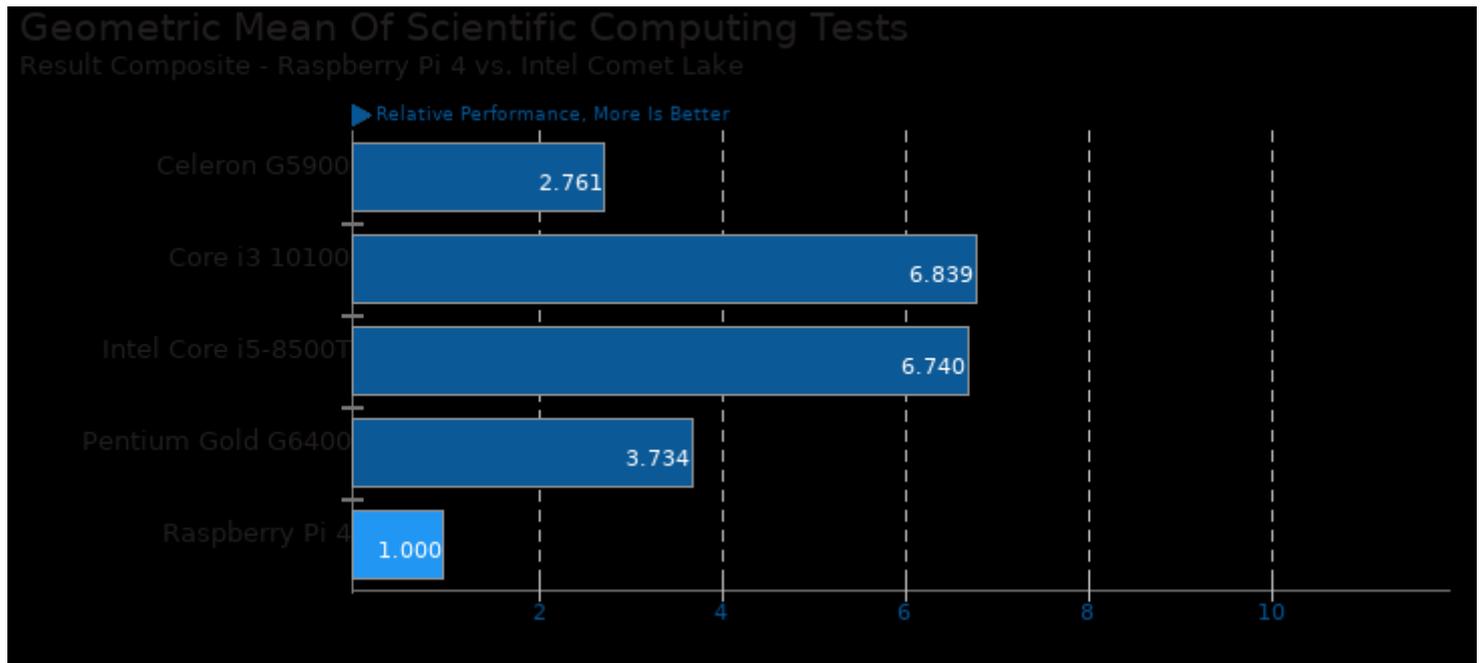
Geometric mean based upon tests: pts/sqlite-speedtest, pts/pyperformance, pts/pybench, pts/build-apache, pts/build-php, pts/build-gdb and pts/build-mplayer



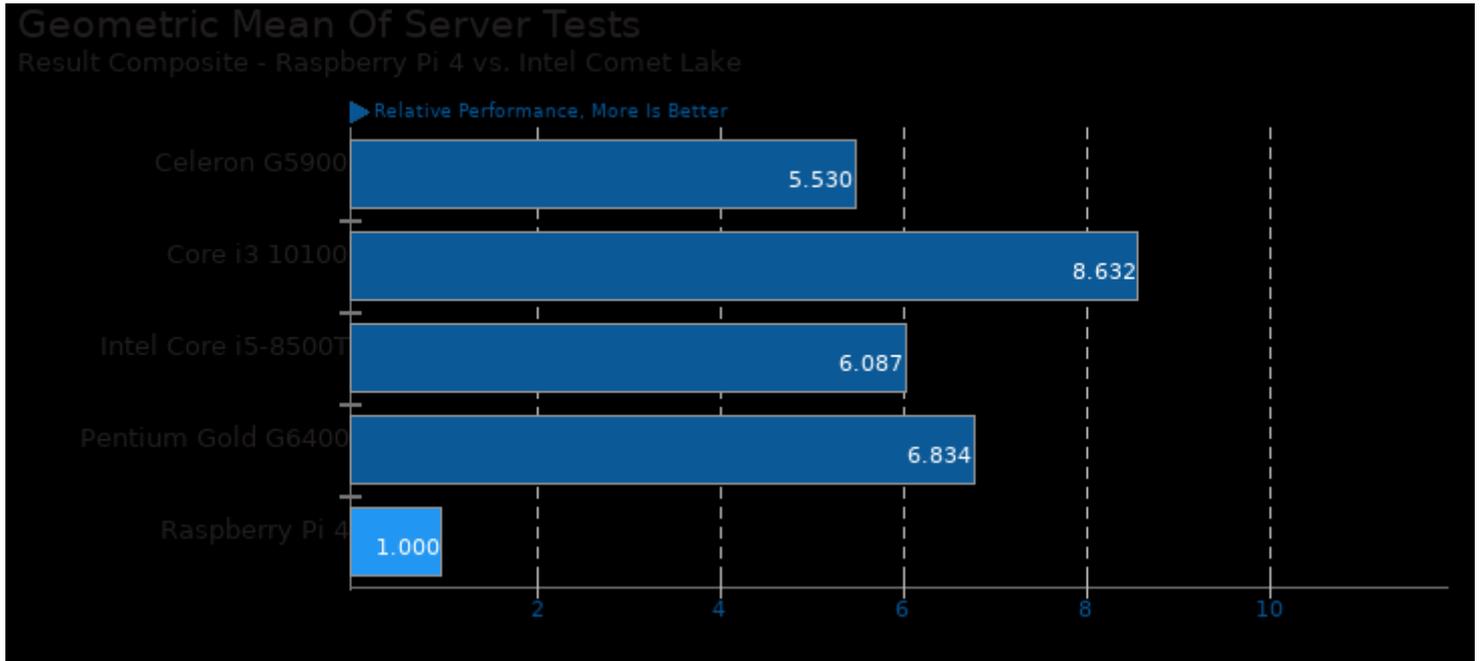
Geometric mean based upon tests: pts/pybench, pts/numpy, pts/scikit-learn and pts/pyperformance



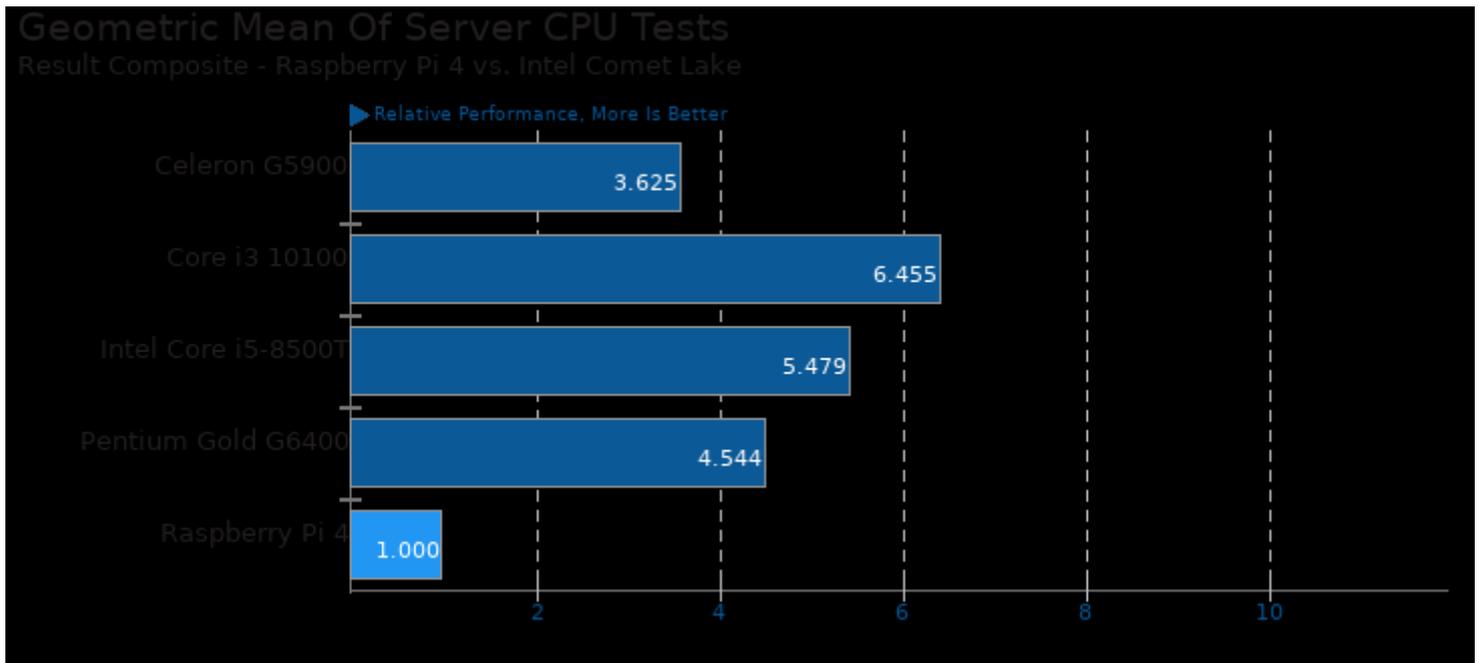
Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/smallpt and pts/ttsiod-renderer



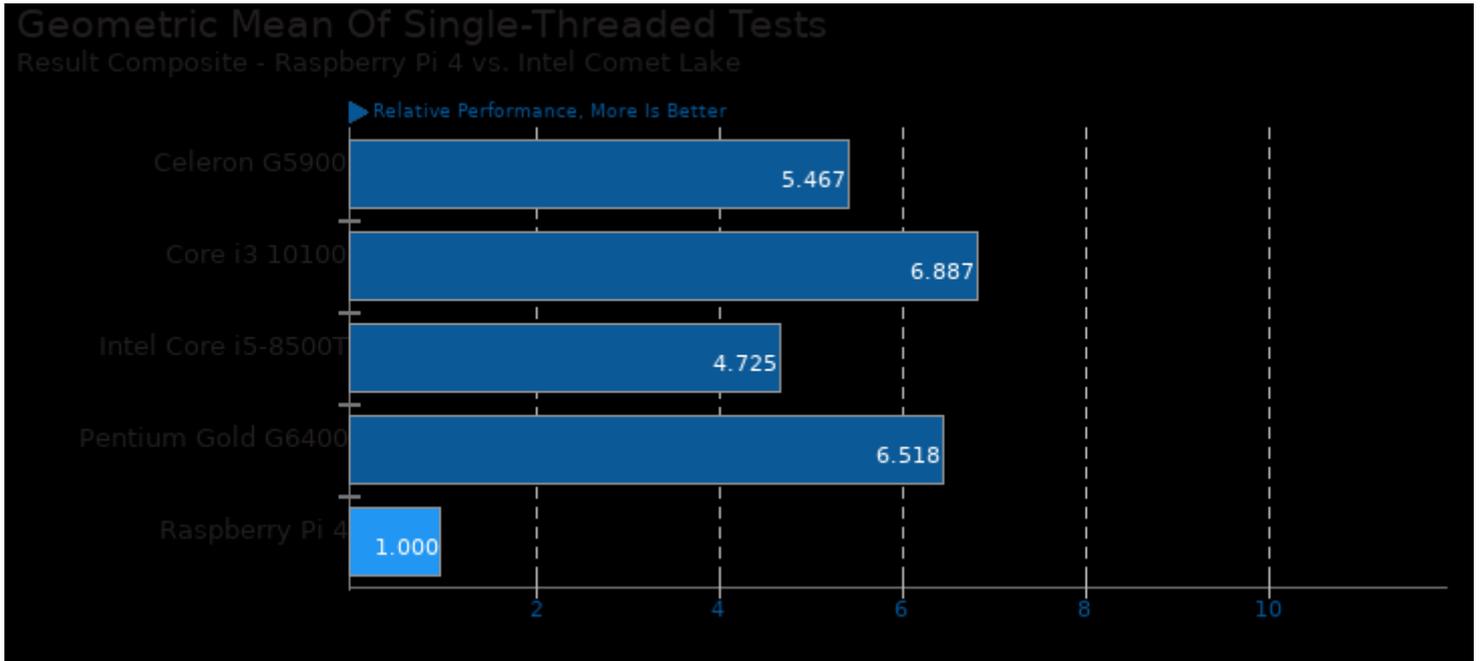
Geometric mean based upon tests: system/octave-benchmark, pts/lammps, pts/hmmer and pts/mafft



Geometric mean based upon tests: pts/phpbench, pts/openssl, pts/perl-benchmark and pts/sqlite-speedtest



Geometric mean based upon tests: pts/dacapobench, pts/compress-7zip, pts/build-php, pts/c-ray, pts/openssl, pts/tjbench, system/gimp, pts/pybench, pts/numpy, pts/phpbench, pts/scikit-learn and system/tesseract-ocr



Geometric mean based upon tests: pts/polybench-c, pts/numpy, pts/encode-flac, pts/encode-mp3, pts/perl-benchmark, pts/tjbench, system/inkscape, pts/pybench, pts/phpbench and system/tesseract-ocr

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 08:54.