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2 x Intel Xeon E5540 - Ubuntu 12.10 vs. Ubuntu 18.10

2 x Intel Xeon E5540 testing of Ubuntu Linux past and present for future article on Phoronix.com.

Automated Executive Summary

Ubuntu 12.10 had the most wins, coming in first place for 47% of the tests.

Based on the geometric mean of all complete results, the fastest (Ubuntu 18.10 - No Spec/Melt) was 1.095x the speed of the slowest (Ubuntu 12.10). Ubuntu 18.10 was 0.969x the speed of Ubuntu 18.10 - No Spec/Melt and Ubuntu 12.10 was 0.943x the speed of Ubuntu 18.10.

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

R Benchmark at 3.44x
PHPBench (PHP Benchmark Suite) at 2.929x
Stress-NG (Test: Semaphores) at 1.874x
Stress-NG (Test: Forking) at 1.422x
Compile Bench (Test: Read Compiled Tree) at 1.384x
Timed Linux Kernel Compilation (Time To Compile) at 1.281x
C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 1.255x
Compile Bench (Test: Compile) at 1.215x
PyBench (Total For Average Test Times) at 1.193x

PostgreSQL pgbench (Scaling: Buffer Test - Test: Normal Load - Mode: Read Only) at 1.171x.

Test Systems:

Ubuntu 12.10

Processor: 2 x Intel Xeon E5540 @ 2.53GHz (8 Cores / 16 Threads), Motherboard: SUN ASSY X4170 (07060310 BIOS), Chipset: Intel 5520 I/O + ICH10R, Memory: 36864MB, Disk: 8 x 300GB H106030SDSUN300G, Graphics: ASPEED ASPEED Family, Network: Intel 82575EB Gigabit Connection

OS: Ubuntu 12.10, Kernel: 3.5.0-17-generic (x86_64), Compiler: GCC 4.7.2, File-System: ext4, Screen Resolution: 1280x1024

Compiler Notes: --build=x86_64-linux-gnu --disable-werror --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-languages=c,c++,go,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --target=x86_64-linux-gnu --with-arch-32=i686 --with-tune=generic -v
Disk Notes: DEADLINE / data=ordered,errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
Python Notes: Python 2.7.3 + Python 3.2.3

Ubuntu 18.10

Ubuntu 18.10 - No Spec/Melt

Processor: 2 x Intel Xeon E5540 @ 2.53GHz (8 Cores / 16 Threads), Motherboard: SUN ASSY X4170 (07060310 BIOS), Chipset: Intel 5520 I/O + ICH10R, Memory: 36864MB, Disk: 8 x 300GB H106030SDSUN300G, Graphics: ASPEED ASPEED Family, Monitor: VE228, Network: Intel 82575EB Gigabit Connection

OS: Ubuntu 18.10, Kernel: 4.18.0-7-generic (x86_64), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 1600x1200

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++ --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
Disk Notes: CFQ / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
Python Notes: Python 2.7.15+ + Python 3.6.6+
Security Notes: __user pointer sanitization + PTE Inversion; VMX: vulnerable

	Ubuntu 12.10	Ubuntu 18.10	Ubuntu 18.10 - No Spec/Melt
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (MB/s)	**4.19**	**4.18**	**4.18**
Normalized	100%	99.76%	99.76%
Standard Deviation	0.2%	1.2%	0.3%

Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (MB/s)	**3.21**	**3.24**	3.22
Normalized	99.07%	100%	99.38%
Standard Deviation	0.3%	0.8%	0.6%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (MB/s)	**159**	**153**	**153**
Normalized	100%	96.23%	96.23%
Standard Deviation	0.4%	0.4%	
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (IOPS)	**40600**	**38867**	39267
Normalized	100%	95.73%	96.72%
Standard Deviation	0.4%	1.9%	0.1%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (MB/s)	**157**	151	**150**
Normalized	100%	96.18%	95.54%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (IOPS)	**40200**	38633	**38333**
Normalized	100%	96.1%	95.36%
Standard Deviation		0.3%	0.2%
FS-Mark - 1.F.1.S (Files/s)	**34.63**	34.13	**32.93**
Normalized	100%	98.56%	95.09%
Standard Deviation	2.9%	0.2%	2.7%
FS-Mark - 5.F.1.S.4.T (Files/s)	**82.27**	**82.80**	**82.27**
Normalized	99.36%	100%	99.36%
Standard Deviation	0.6%	0%	0.7%
Compile Bench - Compile (MB/s)	**915**	**753**	805
Normalized	100%	82.3%	87.98%
Standard Deviation	3.4%	0.3%	1.1%
Compile Bench - Initial Create (MB/s)	185	**178**	**203**
Normalized	91.13%	87.68%	100%
Standard Deviation	1.3%	1.4%	2.2%
Compile Bench - Read Compiled Tree (MB/s)	**1344**	**971**	1277
Normalized	100%	72.25%	95.01%
Standard Deviation	0.4%	0.2%	0.9%
Unpacking The Linux Kernel - linux-4.15.tar.xz (sec)	**9.34**	9.02	**8.95**
Normalized	95.82%	99.22%	100%
Standard Deviation	1.9%	2%	1.3%
TSCP - A.C.P (Nodes/s)	**629463**	**596088**	599997
Normalized	100%	94.7%	95.32%
Standard Deviation	0.2%	1.7%	1.8%
7-Zip Compression - C.S.T (MIPS)	**24354**	26016	**26024**
Normalized	93.58%	99.97%	100%
Standard Deviation	1.6%	0.4%	1.5%
Timed Apache Compilation - Time To Compile (sec)	**41.09**	**45.44**	44.13
Normalized	100%	90.43%	93.11%
Standard Deviation	0.3%	0.2%	0.7%
Timed Linux Kernel Compilation - Time To Compile (sec)	**139**	**178**	175
Normalized	100%	78.09%	79.43%
Standard Deviation	2.9%	1.7%	3.1%
C-Ray - Total Time - 4.1.R.P.P (sec)	**207**	**165**	**165**
Normalized	79.71%	100%	100%

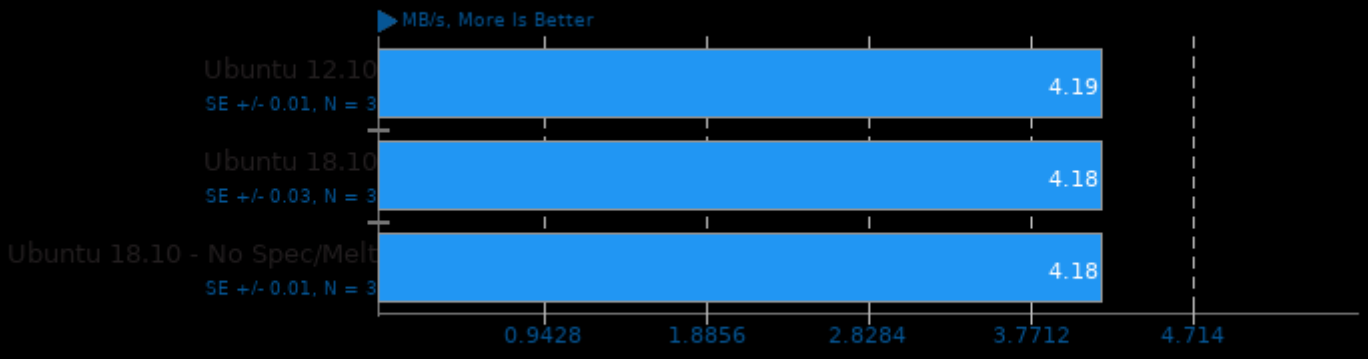
Standard Deviation	0%	0.1%	0%
Gzip Compression - L.S.T.A.T.t.g (sec)	**55.74**	56.14	**56.49**
Normalized	100%	99.29%	98.67%
Standard Deviation	3%	1.4%	1.1%
LAME MP3 Encoding - WAV To MP3 (sec)	**65.49**	**62.47**	**62.47**
Normalized	95.39%	100%	100%
Standard Deviation	0%	0%	0.1%
FFmpeg - H.2.H.T.N.D (sec)	**13.48**	13.86	**13.94**
Normalized	100%	97.26%	96.7%
Standard Deviation	0.4%	1.6%	3.4%
R Benchmark (sec)	**1.6604**	0.4880	**0.4827**
Normalized	29.07%	98.91%	100%
Standard Deviation	0.1%	0.5%	0.8%
OpenSSL - R.4.b.P (Signs/sec)	**535**	**536**	**535**
Normalized	99.81%	100%	99.81%
Standard Deviation	0%	0%	0%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	**97932**	**83625**	88449
Normalized	100%	85.39%	90.32%
Standard Deviation	0.1%	0.2%	0.2%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Write (TPS)	**574**	**1537**	1326
Normalized	37.35%	100%	86.27%
Standard Deviation	8.7%	14.7%	0.8%
Redis - GET (Reqs/sec)	**1533879**	1386033	**1363256**
Normalized	100%	90.36%	88.88%
Standard Deviation	1.2%	2%	1.6%
Redis - SET (Reqs/sec)	1002110	**954038**	**1083243**
Normalized	92.51%	88.07%	100%
Standard Deviation	2.5%	3.4%	3.4%
Stress-NG - Crypto (Bogo Ops/s)	**750**	**796**	**796**
Normalized	94.22%	100%	100%
Standard Deviation	0%	0.1%	0%
Stress-NG - Forking (Bogo Ops/s)	**45491**	**31986**	32419
Normalized	100%	70.31%	71.26%
Standard Deviation	1%	0.7%	0.6%
Stress-NG - Semaphores (Bogo Ops/s)	**1251544**	2267756	**2345606**
Normalized	53.36%	96.68%	100%
Standard Deviation	0.9%	2%	4.5%
Stress-NG - Socket Activity (Bogo Ops/s)	**5881**	**3203**	4177
Normalized	100%	54.46%	71.03%
Standard Deviation	0.6%	10.6%	2.9%
Stress-NG - Context Switching (Bogo Ops/s)	**3084123**	2807002	**2363084**
Normalized	100%	91.01%	76.62%
Standard Deviation	1.4%	33.6%	2.8%
Stress-NG - S.V.M.P (Bogo Ops/s)	4690479	**4266730**	**6590680**
Normalized	71.17%	64.74%	100%
Standard Deviation	4.9%	13.1%	2.6%
Sysbench - Memory (Events/sec)		**10303848**	**10203447**
Normalized		100%	99.03%
Standard Deviation		0.5%	0.7%
Sysbench - CPU (Events/sec)		**9581**	**9584**
Normalized		99.97%	100%
Standard Deviation		0.1%	0.1%
PyBench - T.F.A.T.T (Milliseconds)	**2745**	**2300**	2311

2 x Intel Xeon E5540 - Ubuntu 12.10 vs. Ubuntu 18.10

Normalized	83.79%	100%	99.52%
Standard Deviation	0.2%	0.3%	0.9%
Apache Benchmark - S.W.P.S (Reqs/sec)		**11377**	**12794**
Normalized		88.92%	100%
Standard Deviation		0.2%	0.5%
PHPBench - P.B.S (Score)	**104152**	**305106**	303864
Normalized	34.14%	100%	99.59%
Standard Deviation	0.8%	0.4%	0.2%
Git - T.T.C.C.G.C (sec)	**10.29**	10.52	**10.58**
Normalized	100%	97.81%	97.26%
Standard Deviation	0.4%	2.2%	1.4%

Flexible IO Tester 3.1

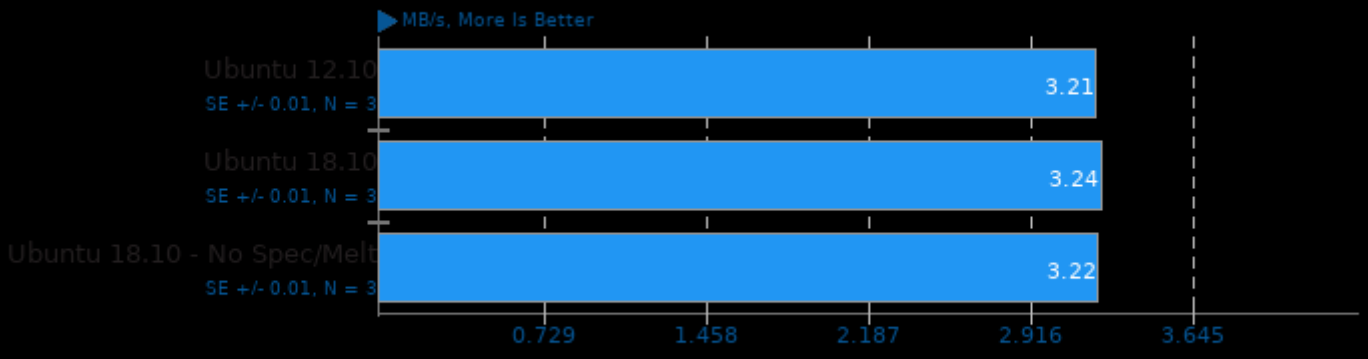
Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory



1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl

Flexible IO Tester 3.1

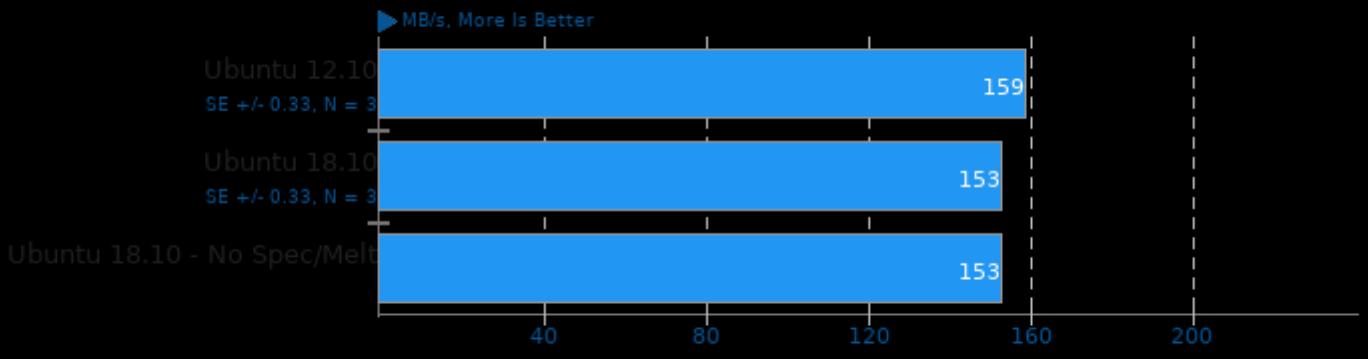
Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory



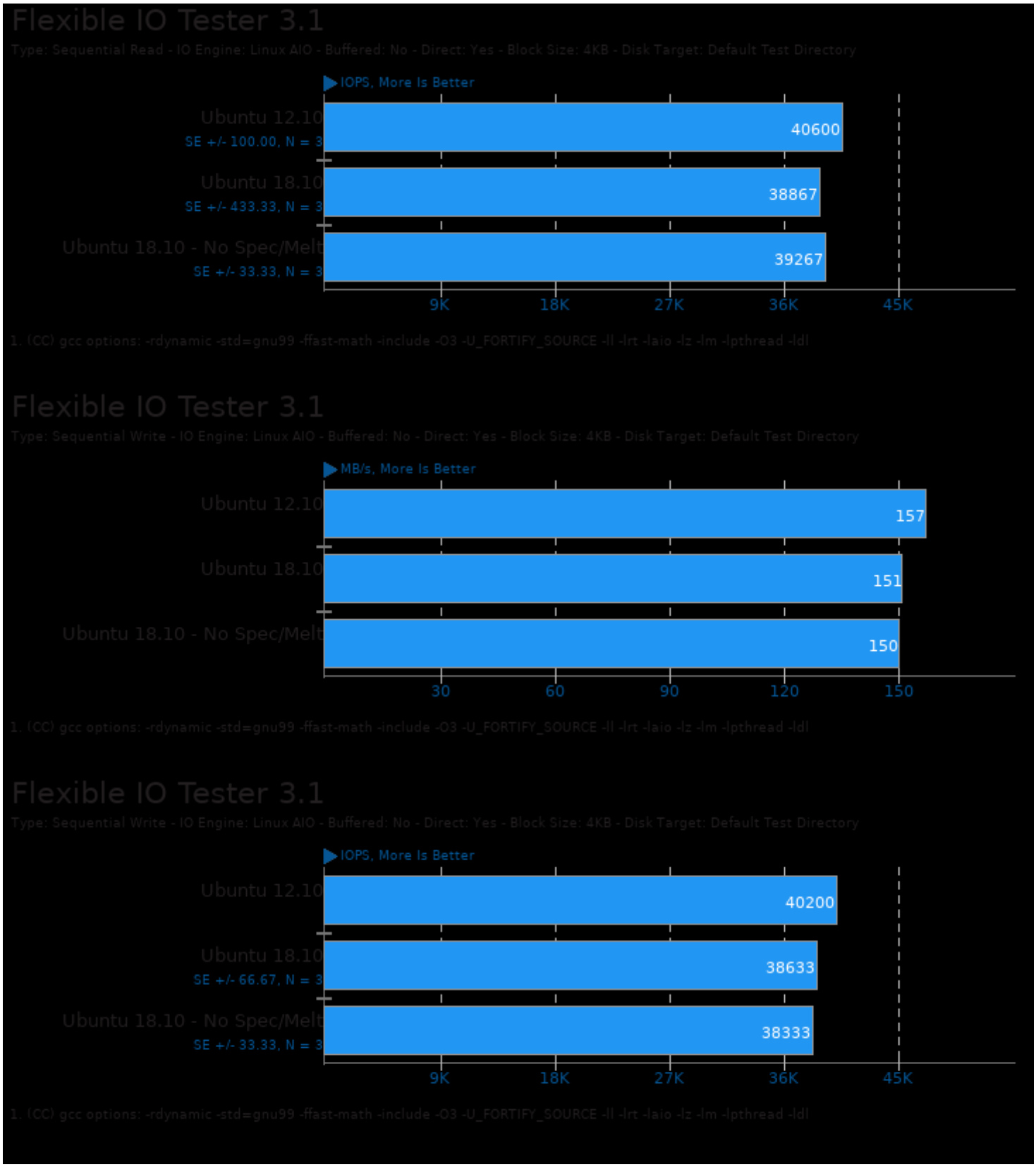
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl

Flexible IO Tester 3.1

Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory

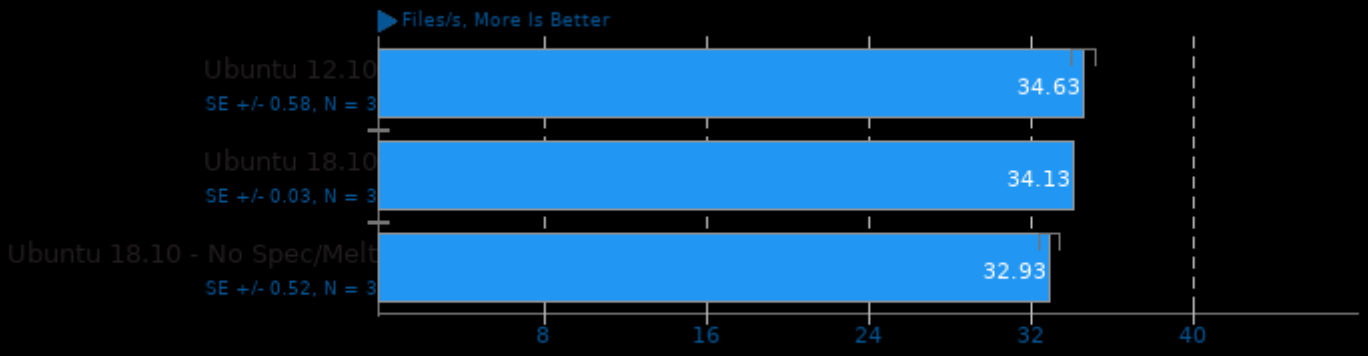


1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl


Flexible IO Tester 3.1
Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Ubuntu 12.10
SE +/- 100.00, N = 3
40600
Ubuntu 18.10
SE +/- 433.33, N = 3
38867
Ubuntu 18.10 - No Spec/Melt
SE +/- 33.33, N = 3
39267
9K
18K
27K
36K
45K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Ubuntu 12.10
157
Ubuntu 18.10
151
Ubuntu 18.10 - No Spec/Melt
150
30
60
90
120
150
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Ubuntu 12.10
40200
Ubuntu 18.10
SE +/- 66.67, N = 3
38633
Ubuntu 18.10 - No Spec/Melt
SE +/- 33.33, N = 3
38333
9K
18K
27K
36K
45K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -ll -lrt -laio -lz -lm -lpthread -ldl

FS-Mark 3.3

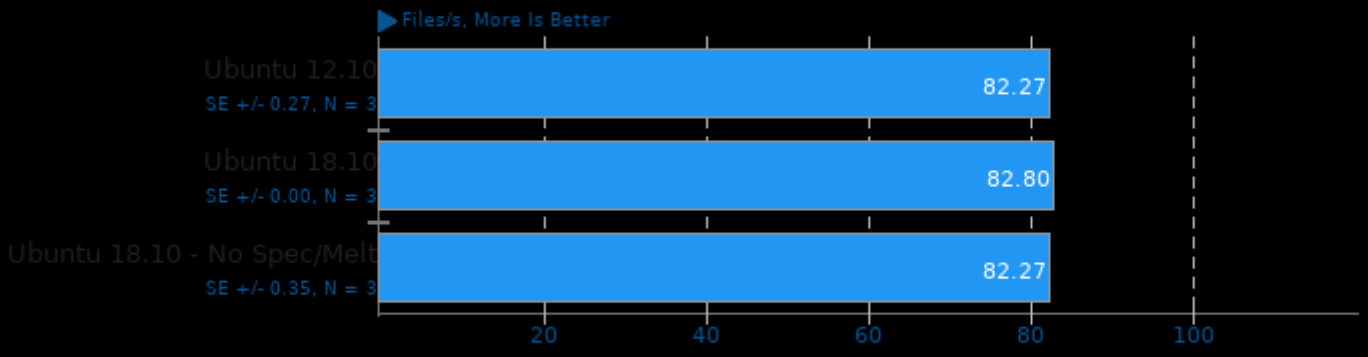
Test: 1000 Files, 1MB Size



1. (CC) gcc options: -static

FS-Mark 3.3

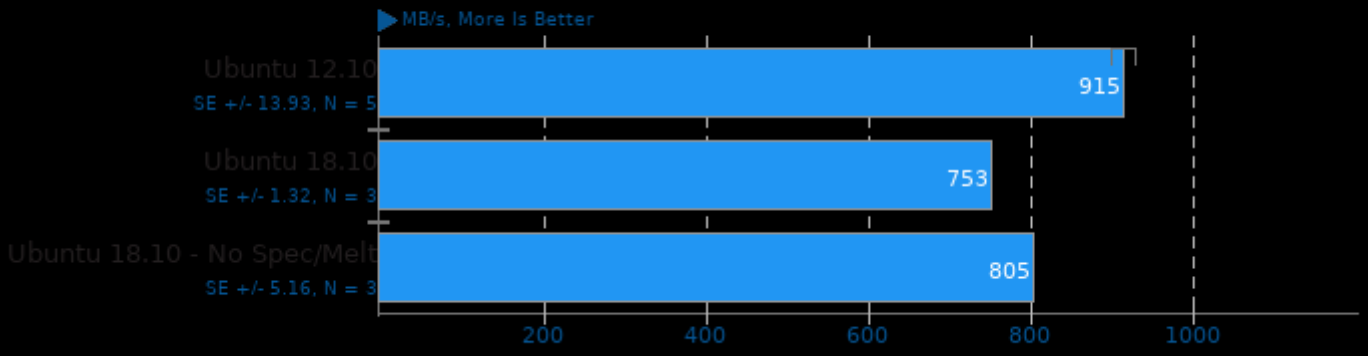
Test: 5000 Files, 1MB Size, 4 Threads

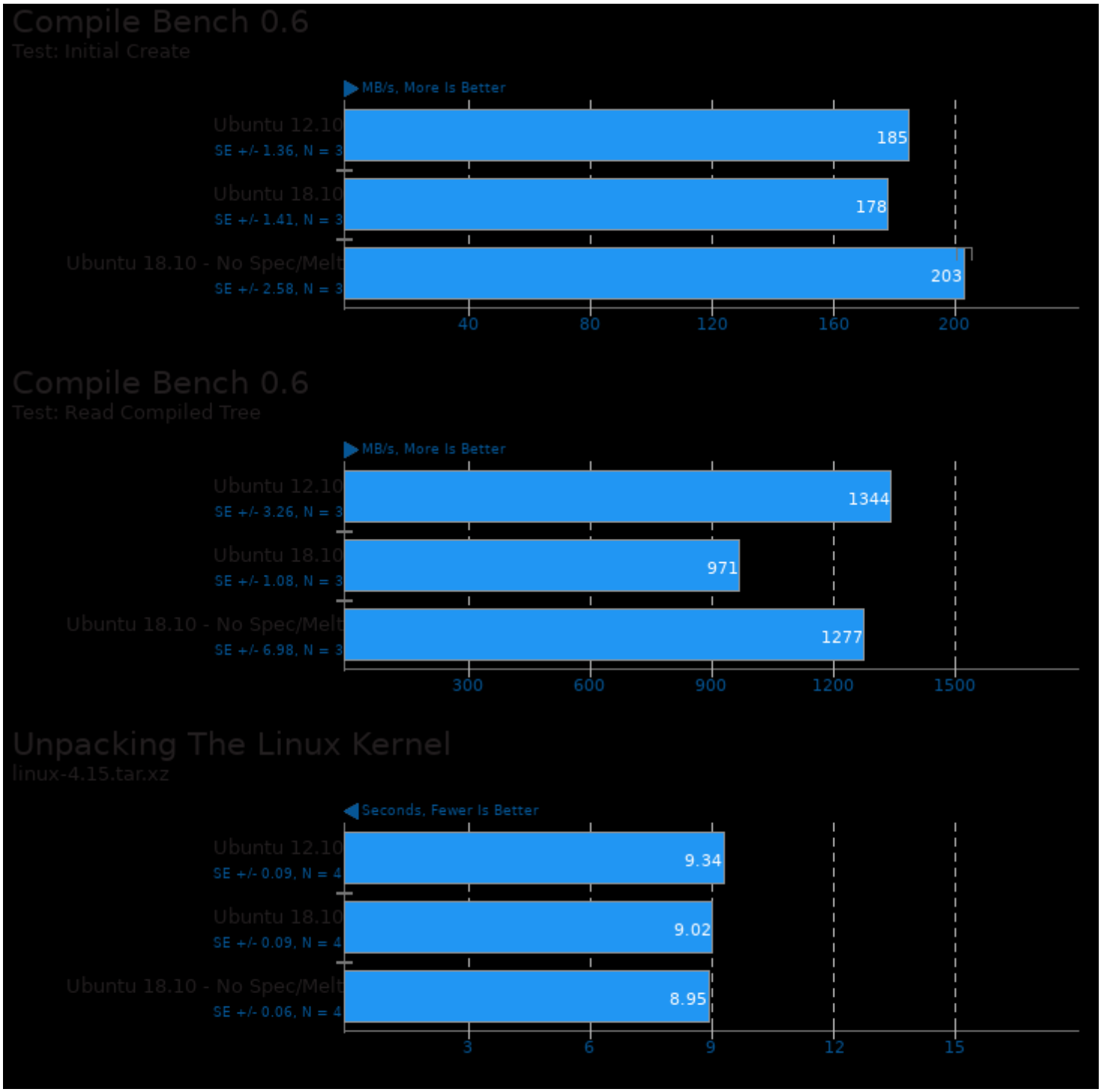


1. (CC) gcc options: -static

Compile Bench 0.6

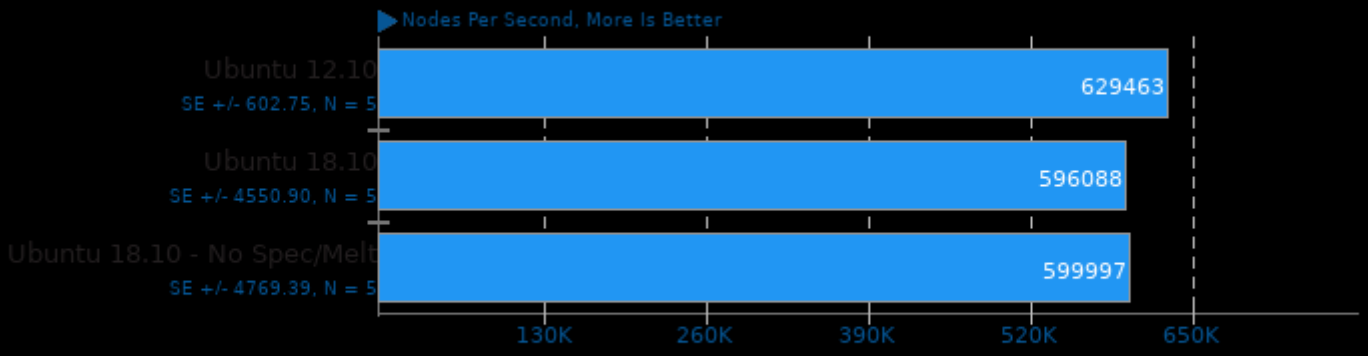
Test: Compile




Compile Bench 0.6
Test: Initial Create
MB/s, More Is Better
Ubuntu 12.10
SE +/- 1.36, N = 3
185
Ubuntu 18.10
SE +/- 1.41, N = 3
178
Ubuntu 18.10 - No Spec/Melt
SE +/- 2.58, N = 3
203
40
80
120
160
200
Compile Bench 0.6
Test: Read Compiled Tree
MB/s, More Is Better
Ubuntu 12.10
SE +/- 3.26, N = 3
1344
Ubuntu 18.10
SE +/- 1.08, N = 3
971
Ubuntu 18.10 - No Spec/Melt
SE +/- 6.98, N = 3
1277
300
600
900
1200
1500
Unpacking The Linux Kernel
linux-4.15.tar.xz
Seconds, Fewer Is Better
Ubuntu 12.10
SE +/- 0.09, N = 4
9.34
Ubuntu 18.10
SE +/- 0.09, N = 4
9.02
Ubuntu 18.10 - No Spec/Melt
SE +/- 0.06, N = 4
8.95
3
6
9
12
15

TSCP 1.81

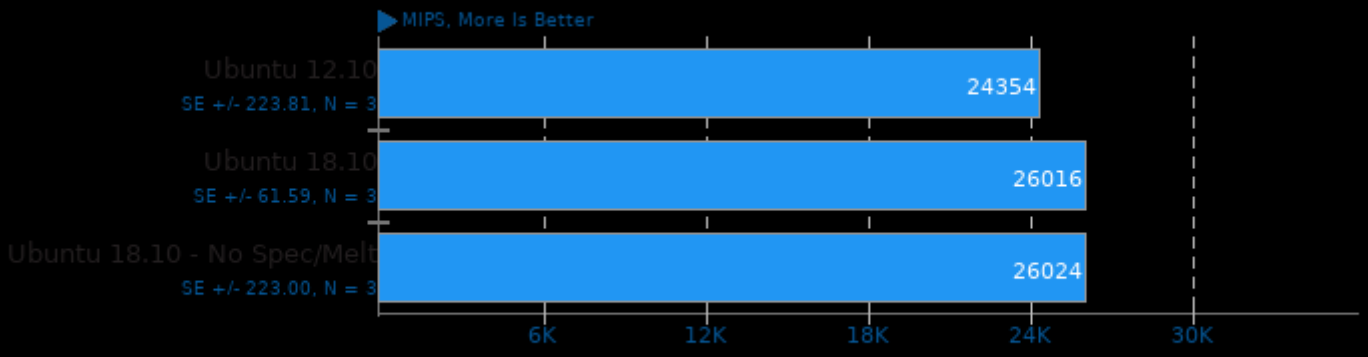
AI Chess Performance



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

7-Zip Compression 16.02

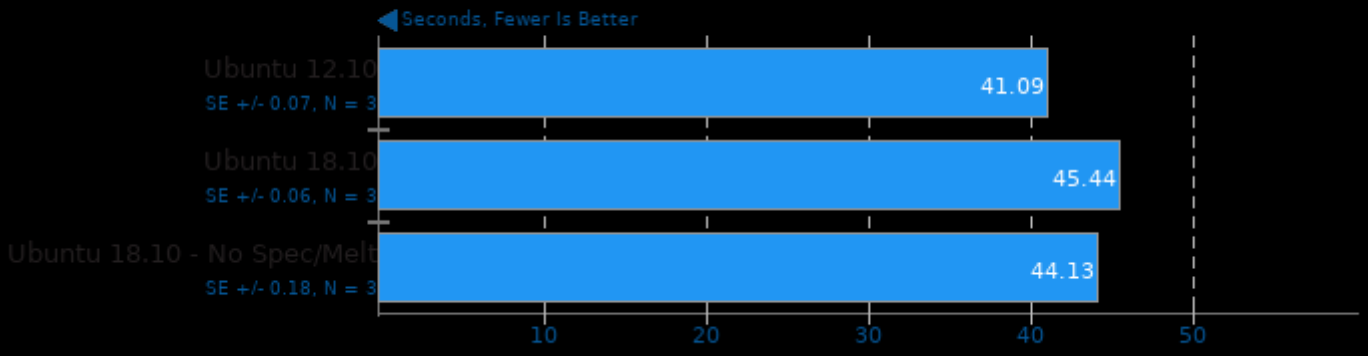
Compress Speed Test



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

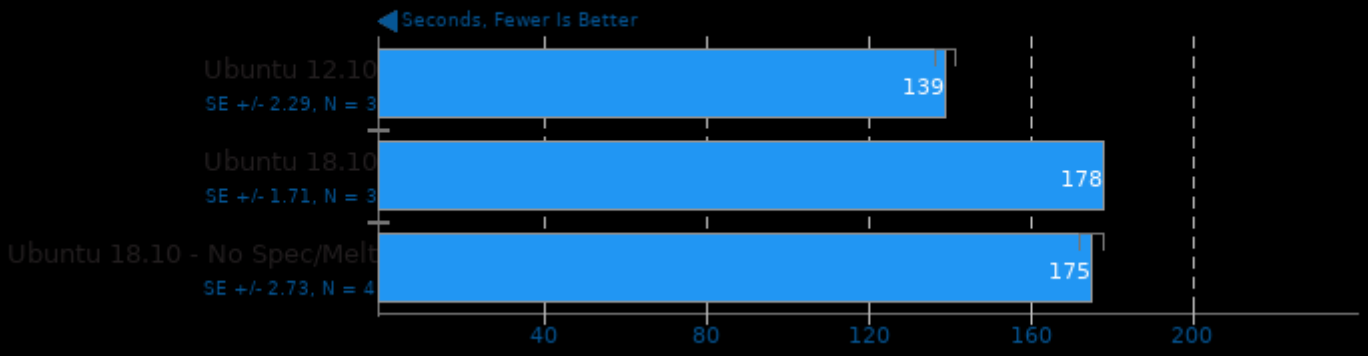
Timed Apache Compilation 2.4.7

Time To Compile



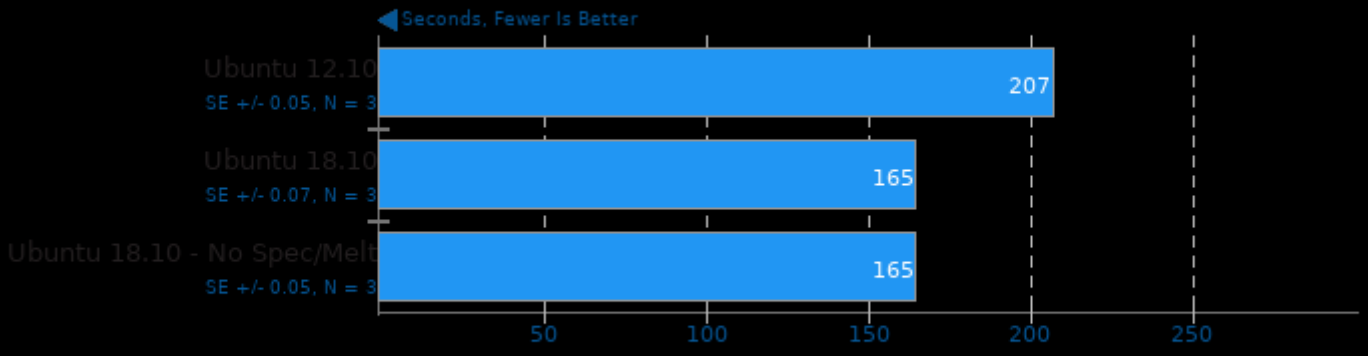
Timed Linux Kernel Compilation 4.18

Time To Compile



C-Ray 1.1

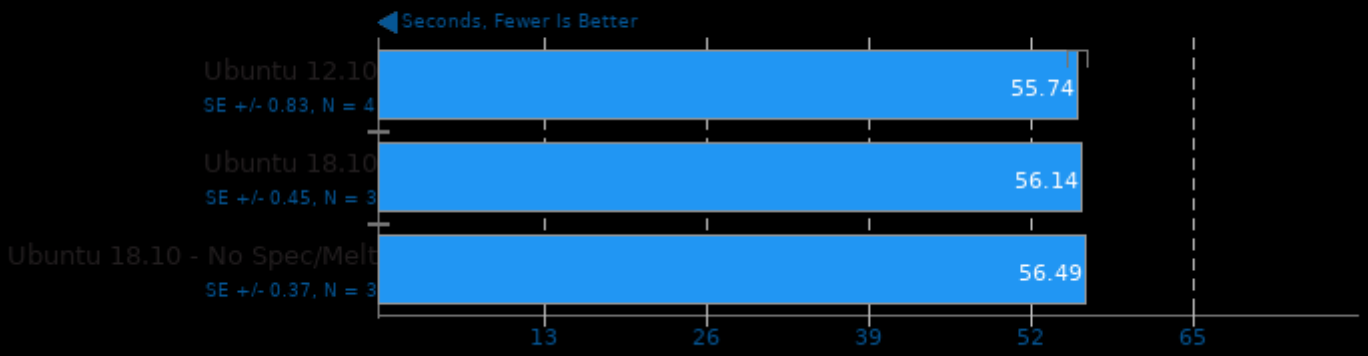
Total Time - 4K, 16 Rays Per Pixel



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

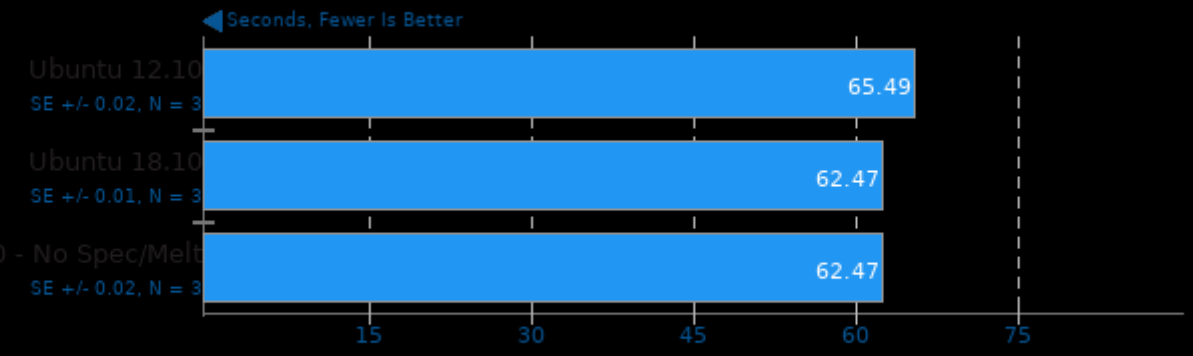
Gzip Compression

Linux Source Tree Archiving To .tar.gz



LAME MP3 Encoding 3.100

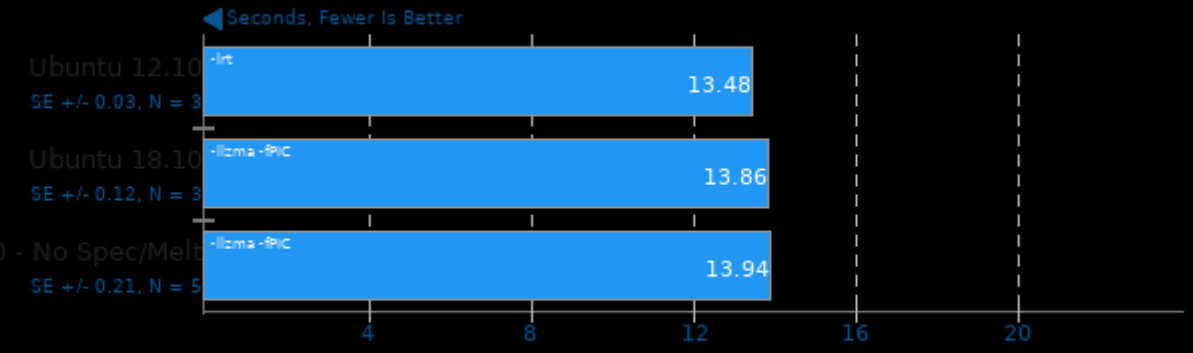
WAV To MP3



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

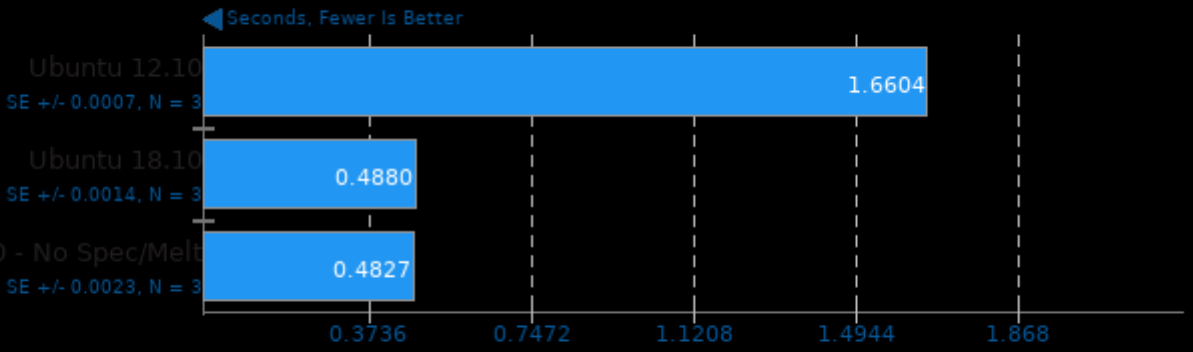
FFmpeg 4.0.2

H.264 HD To NTSC DV



1. (CC) gcc options: -lavdevice -lavfilter -lavformat -lavcodec -lswresample -lswscale -lavutil -lm -pthread -lbz2 -std=c11 -fomit-frame-pointer -O3 -fno-m

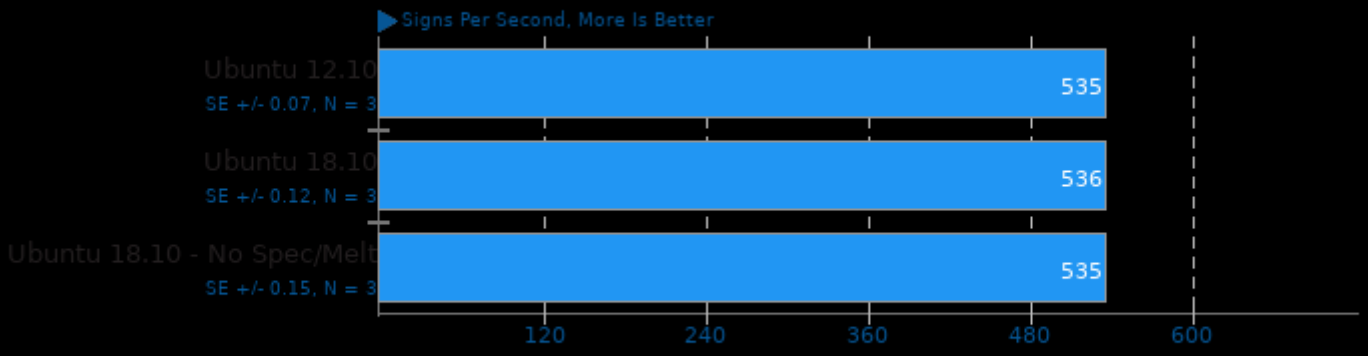
R Benchmark



1. Ubuntu 12.10: R scripting front-end version 2.15.1 (2012-06-22)
2. Ubuntu 18.10: R scripting front-end version 3.5.1 (2018-07-02)
3. Ubuntu 18.10 - No Spec/Melt: R scripting front-end version 3.5.1 (2018-07-02)

OpenSSL 1.1.1

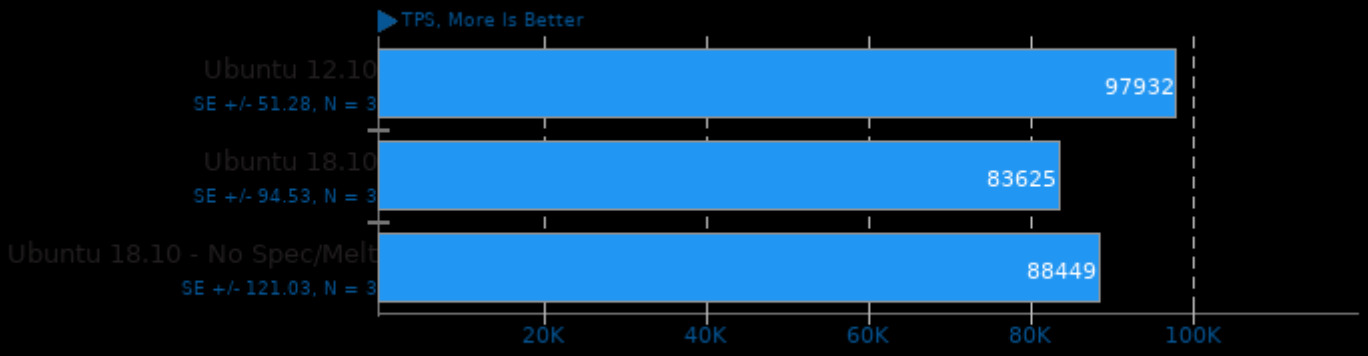
RSA 4096-bit Performance



1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl

PostgreSQL pgbench 10.3

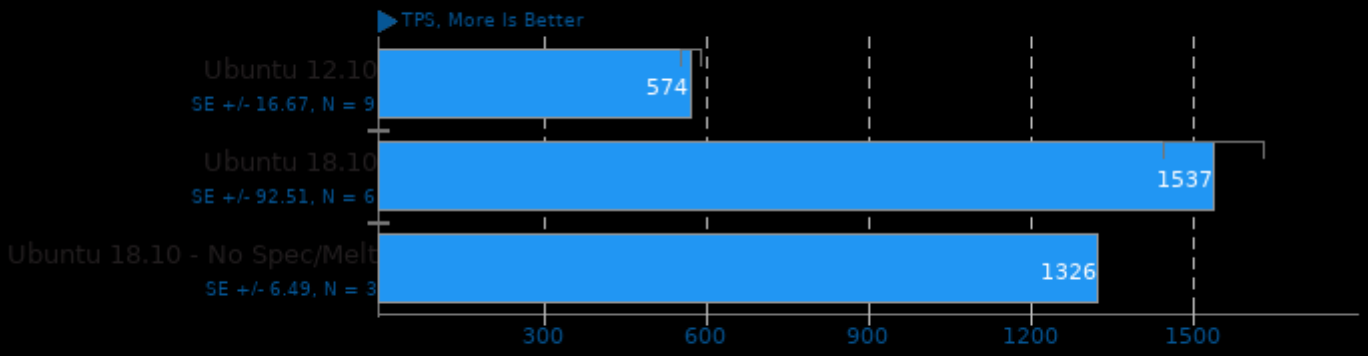
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

PostgreSQL pgbench 10.3

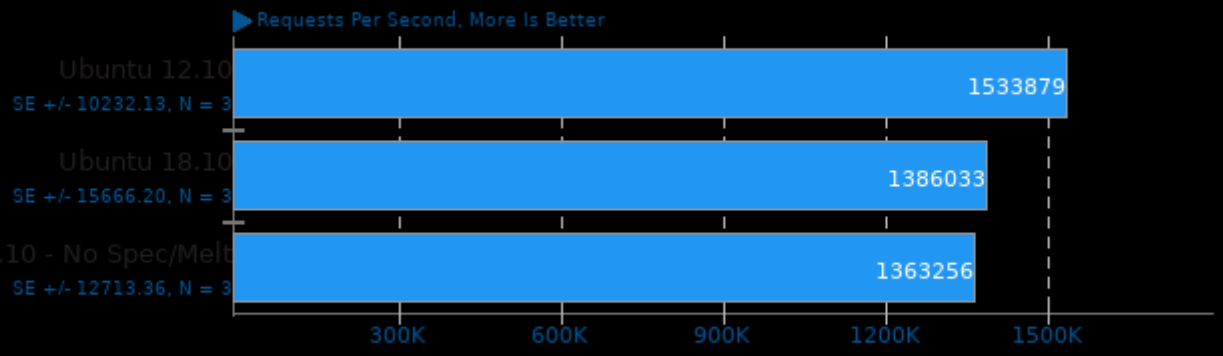
Scaling: Buffer Test - Test: Normal Load - Mode: Read Write



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

Redis 4.0.8

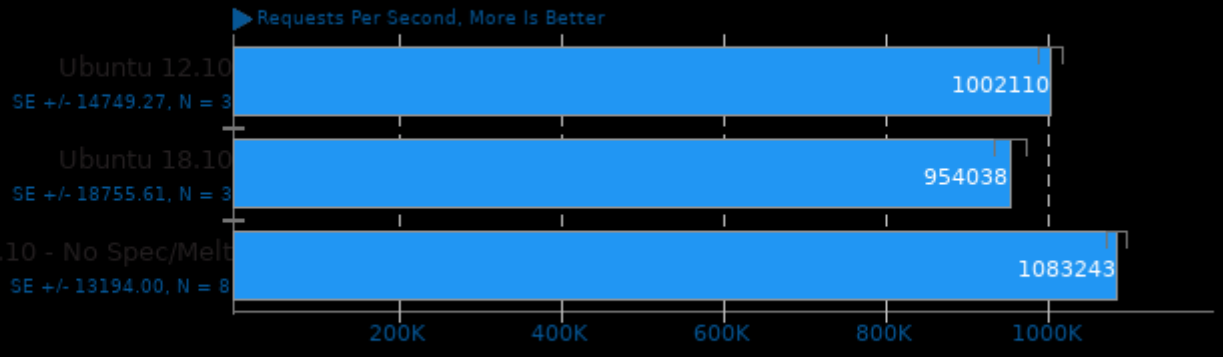
Test: GET



1. (CC) gcc options: -ggdb -rdynamic -lm -ldl -pthread

Redis 4.0.8

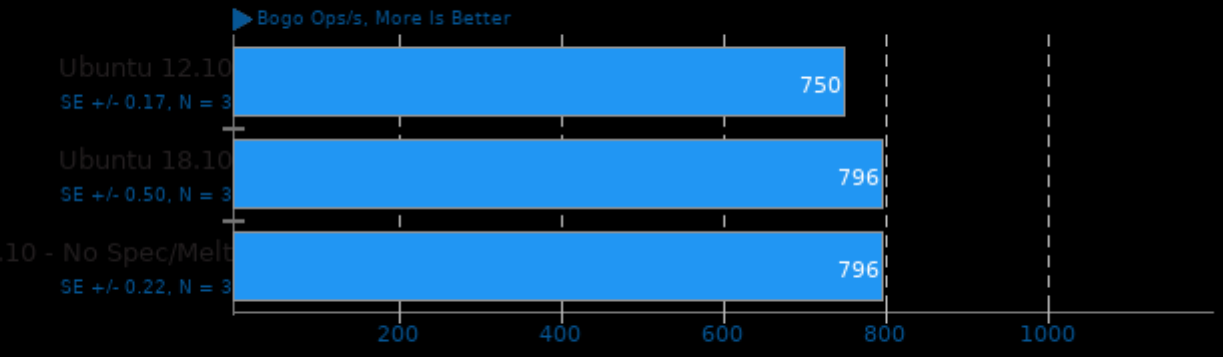
Test: SET



1. (CC) gcc options: -ggdb -rdynamic -lm -ldl -pthread

Stress-NG 0.07.26

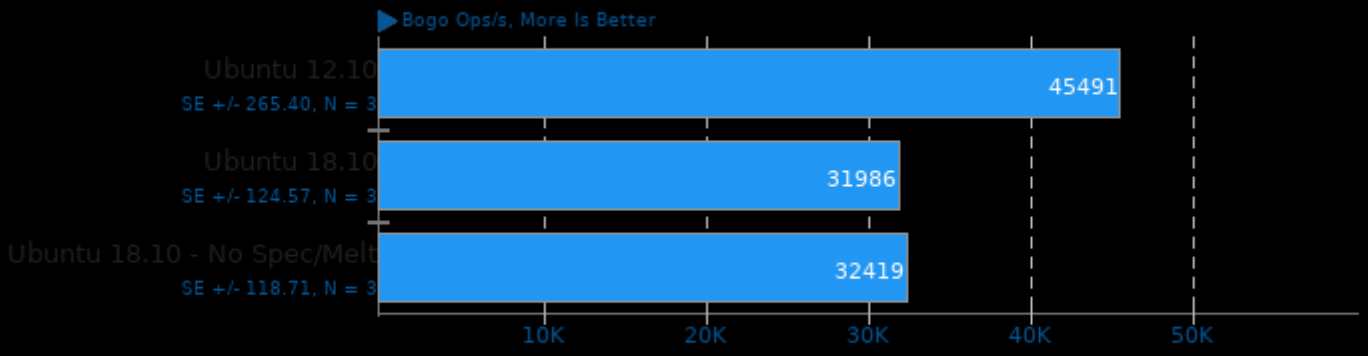
Test: Crypto



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Stress-NG 0.07.26

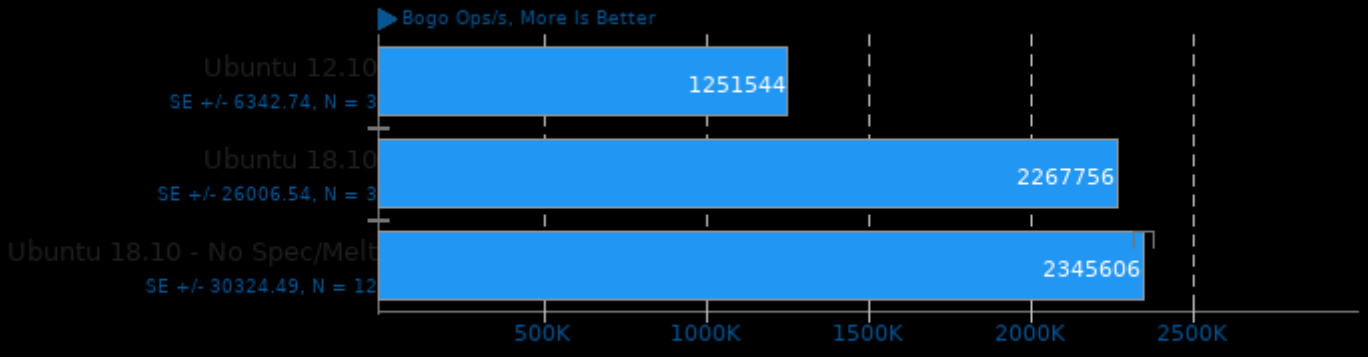
Test: Forking



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Stress-NG 0.07.26

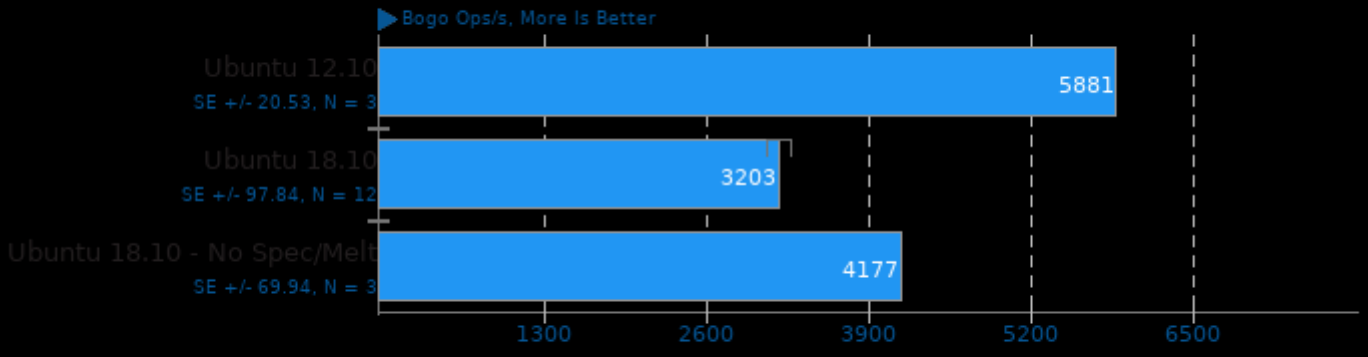
Test: Semaphores



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Stress-NG 0.07.26

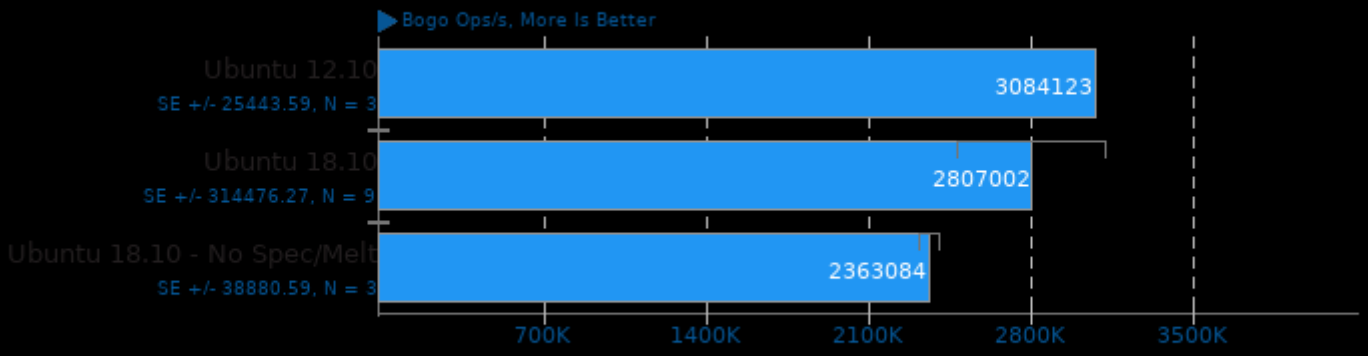
Test: Socket Activity



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Stress-NG 0.07.26

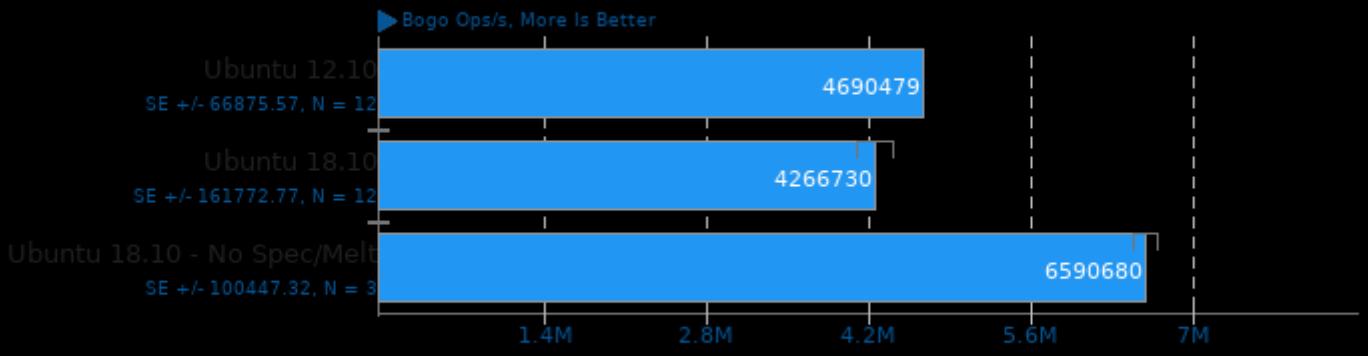
Test: Context Switching



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Stress-NG 0.07.26

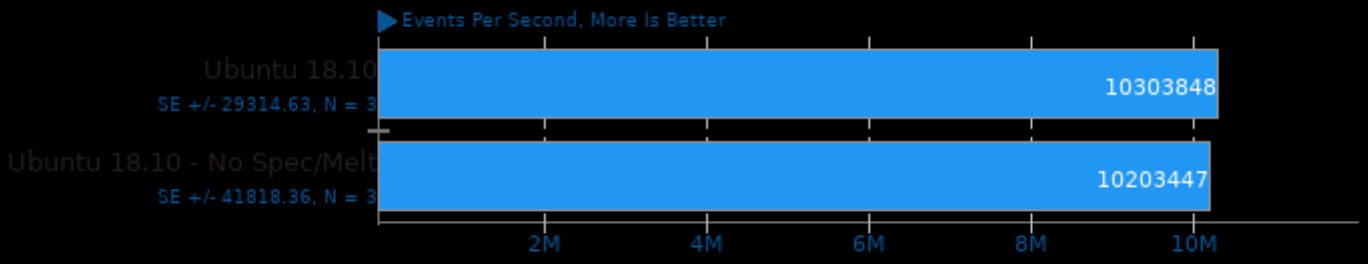
Test: System V Message Passing



1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Sysbench 2018-07-28

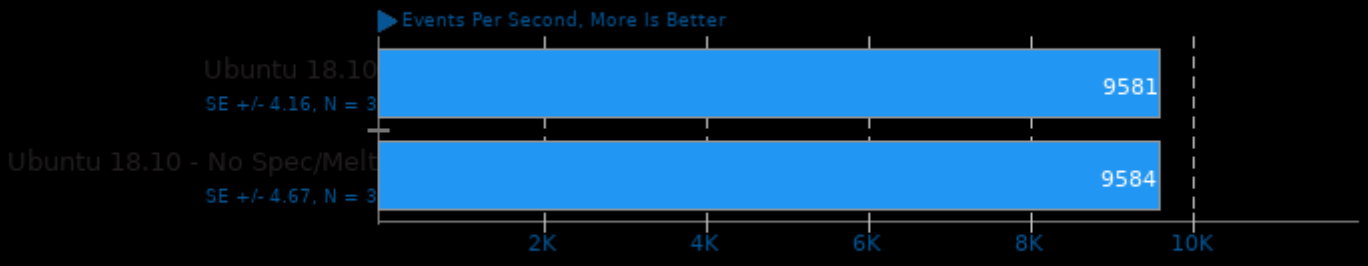
Test: Memory



1. (CC) gcc options: -pthread -O3 -funroll-loops -ggdb3 -march=nehalem -rdynamic -ldl -laio -lm

Sysbench 2018-07-28

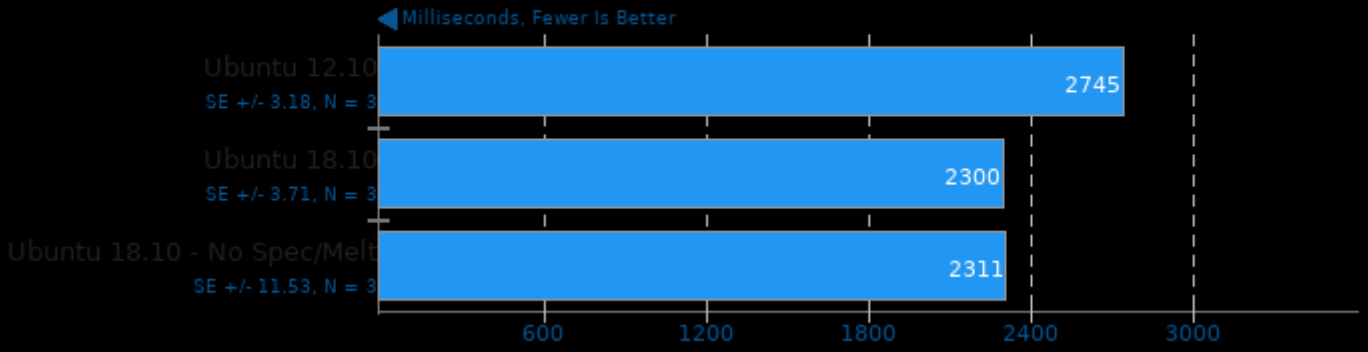
Test: CPU



1. (CC) gcc options: -pthread -O3 -funroll-loops -ggdb3 -march=nehalem -rdynamic -ldl -laio -lm

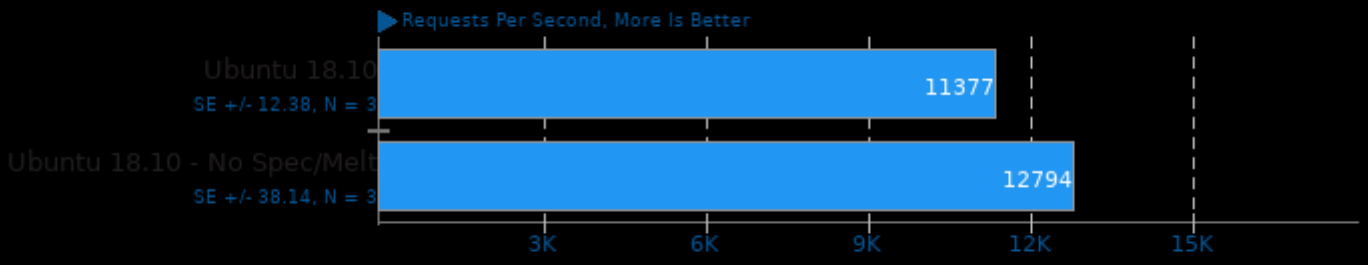
PyBench 2018-02-16

Total For Average Test Times

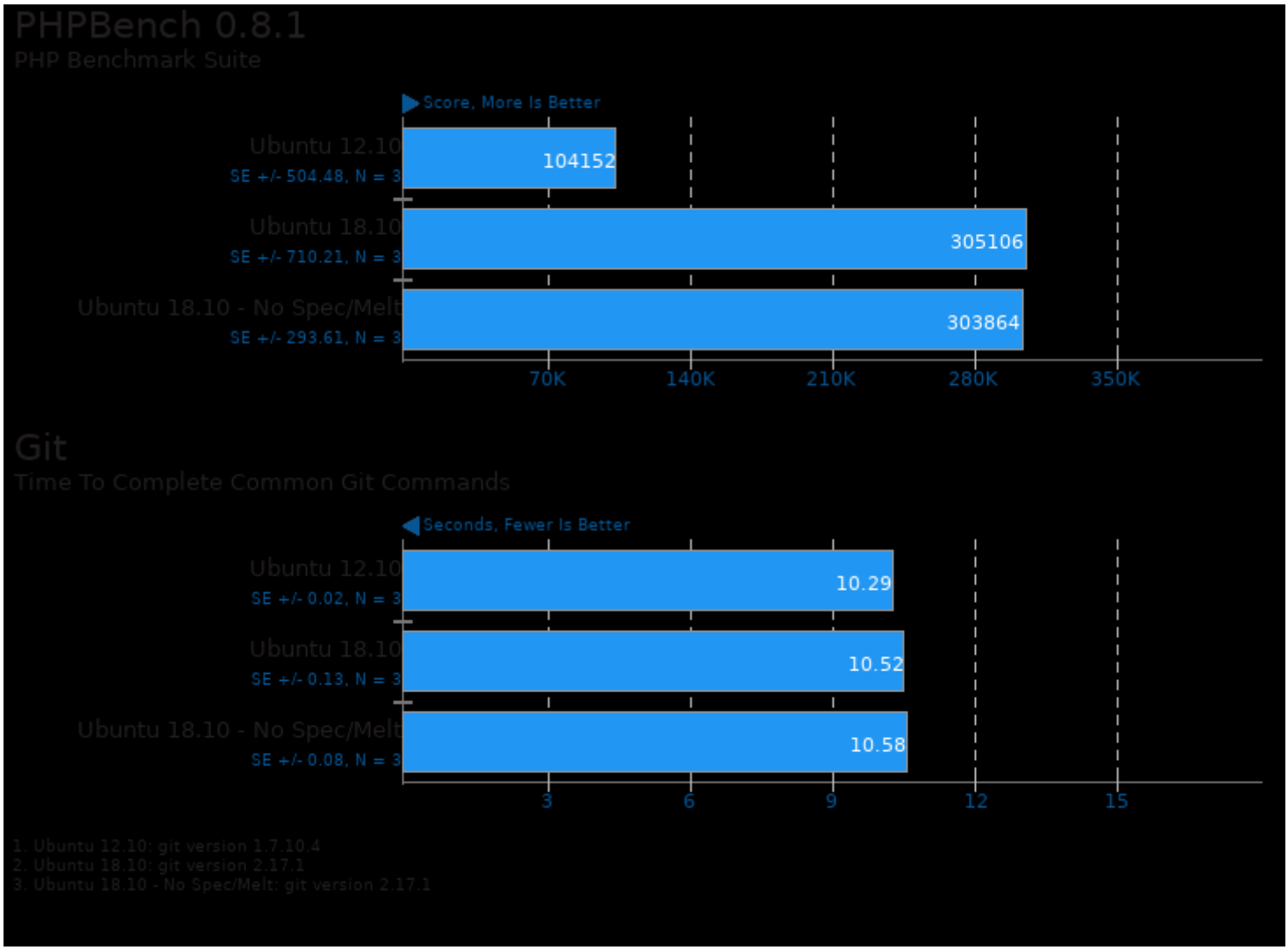


Apache Benchmark 2.4.29

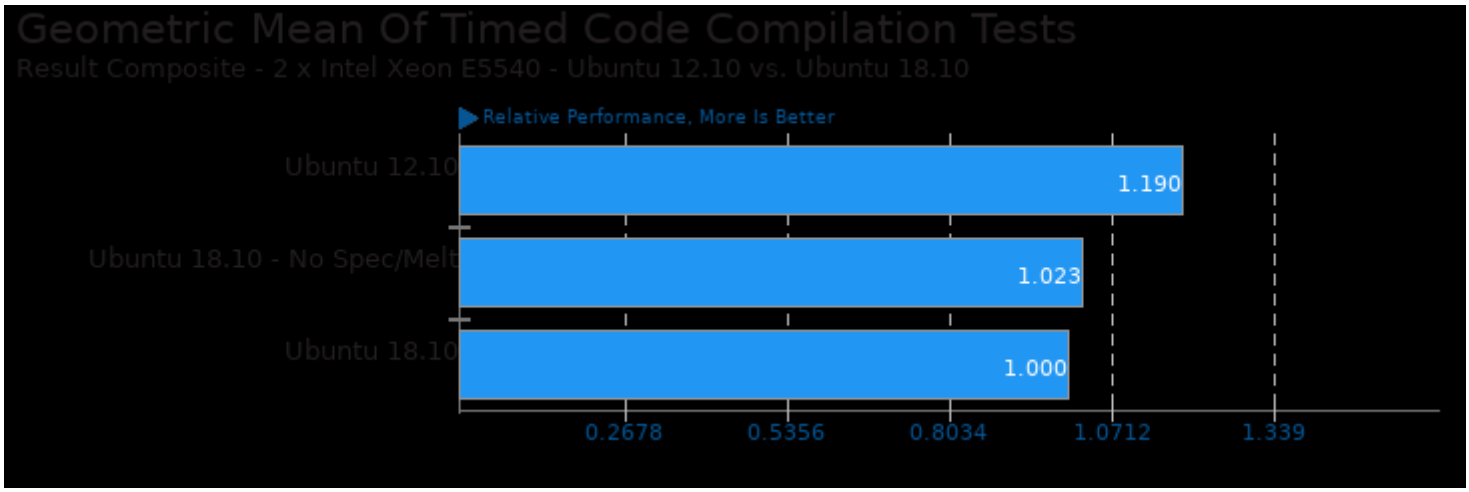
Static Web Page Serving



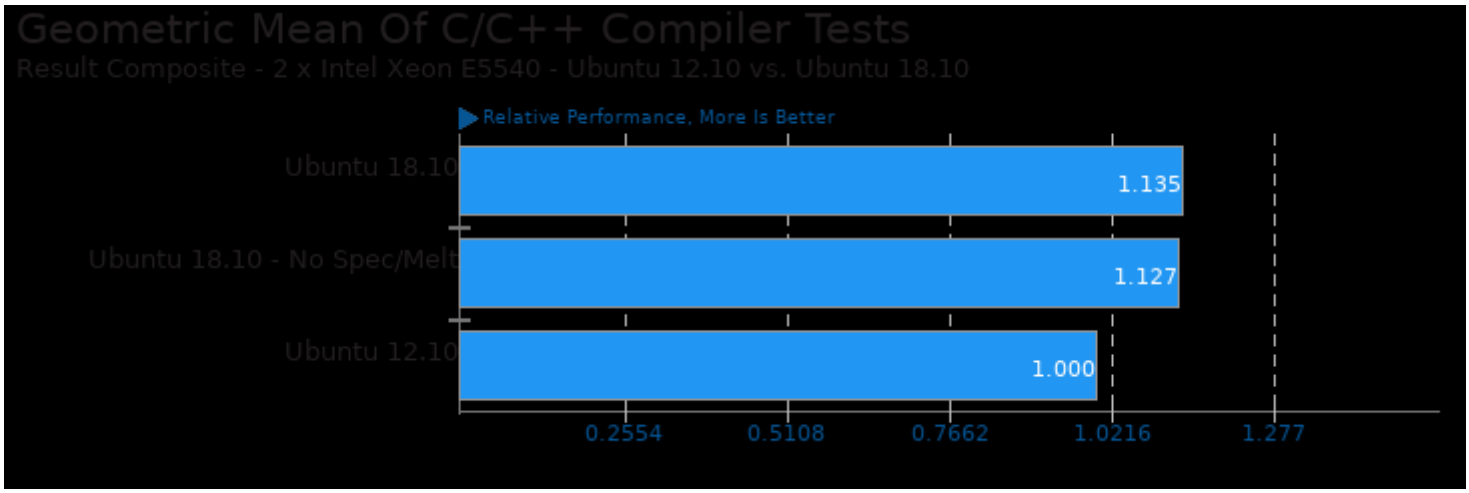
1. (CC) gcc options: -shared -fPIC -O2 -pthread


PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
Ubuntu 12.10
SE +/- 504.48, N = 3
104152
Ubuntu 18.10
SE +/- 710.21, N = 3
305106
Ubuntu 18.10 - No Spec/Melt
SE +/- 293.61, N = 3
303864
70K
140K
210K
280K
350K
Git
Time To Complete Common Git Commands
Seconds, Fewer Is Better
Ubuntu 12.10
SE +/- 0.02, N = 3
10.29
Ubuntu 18.10
SE +/- 0.13, N = 3
10.52
Ubuntu 18.10 - No Spec/Melt
SE +/- 0.08, N = 3
10.58
3
6
9
12
15
1. Ubuntu 12.10: git version 1.7.10.4
2. Ubuntu 18.10: git version 2.17.1
3. Ubuntu 18.10 - No Spec/Melt: git version 2.17.1

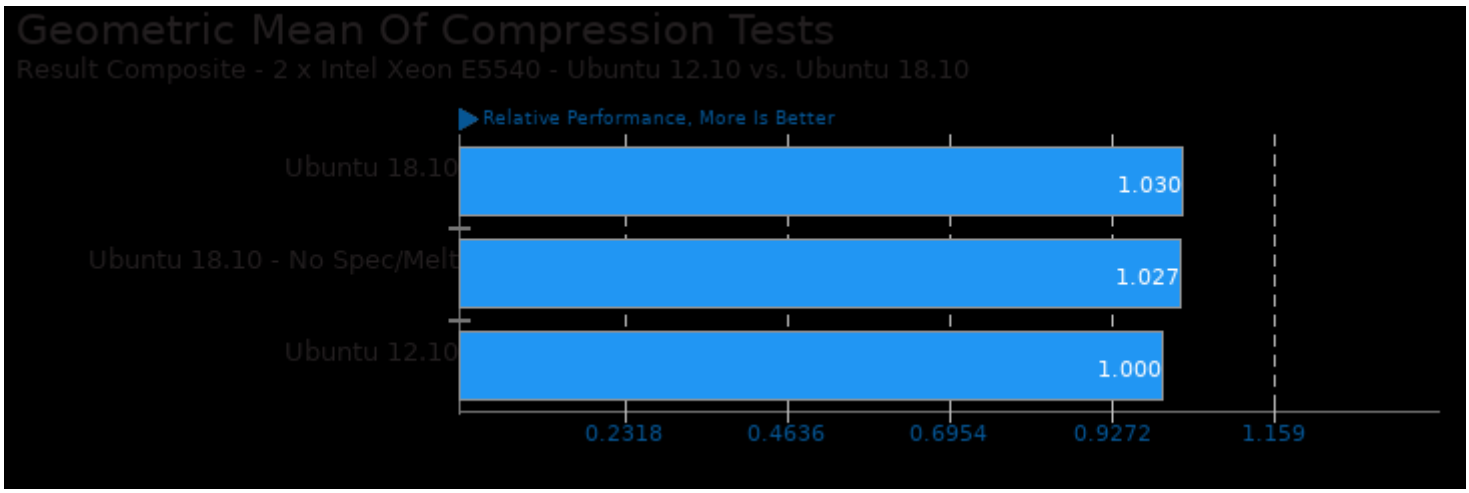
These geometric means are based upon test groupings / test suites for this result file.



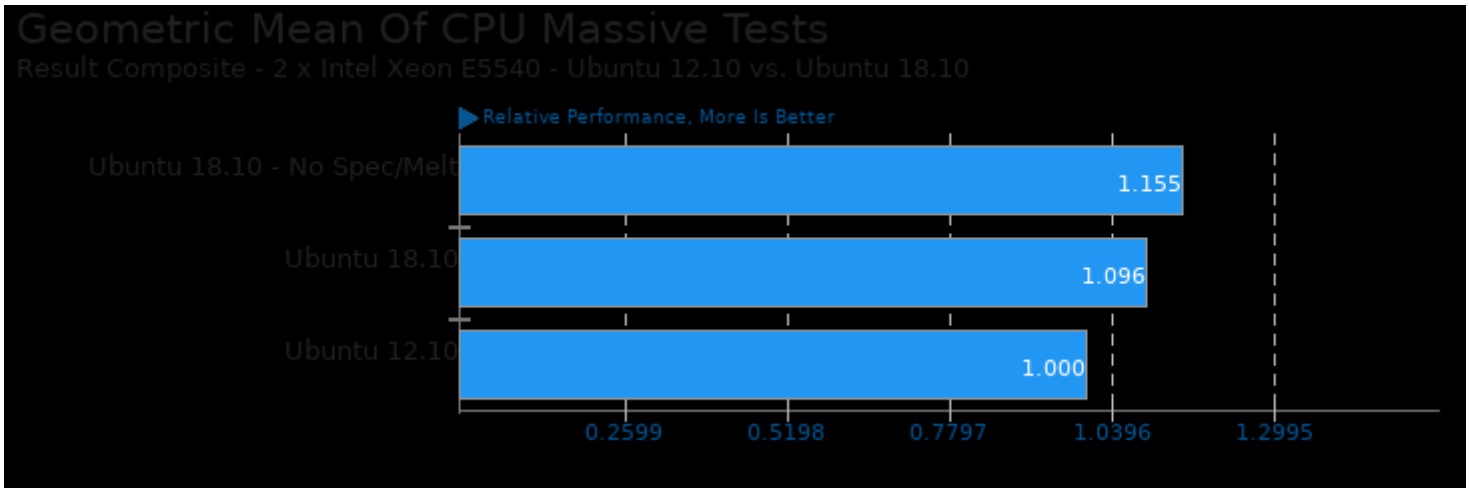
Geometric mean based upon tests: pts/build-apache and pts/build-linux-kernel



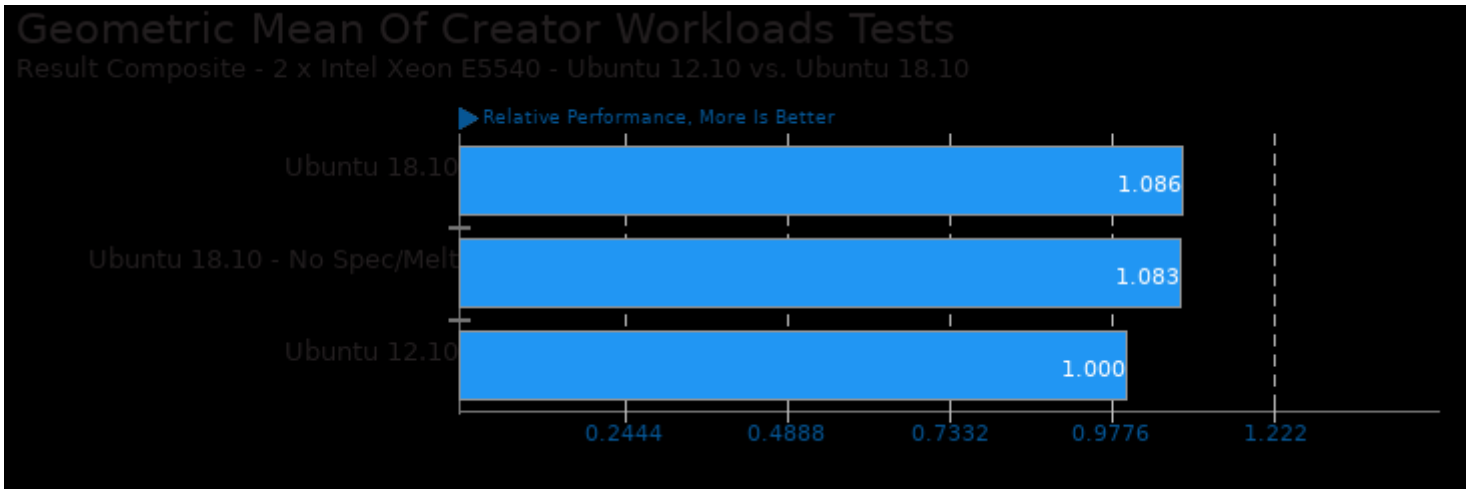
Geometric mean based upon tests: pts/tscp, pts/c-ray, pts/compress-7zip, pts/encode-mp3, pts/pgbench, pts/apache, pts/openssl and pts/build-apache



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



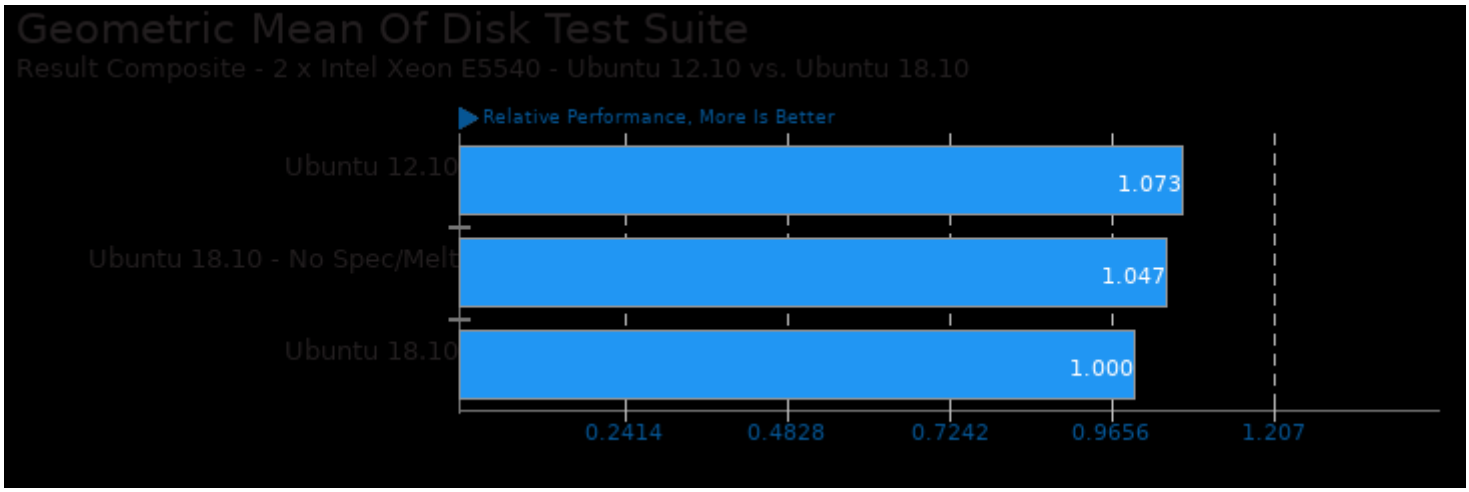
Geometric mean based upon tests: pts/apache, pts/build-apache, pts/build-linux-kernel, pts/c-ray, pts/compilebench, pts/compress-7zip, pts/encode-mp3, pts/openssl, pts/pgbench, pts/phpbench, pts/rbenchmark, pts/redis, pts/stress-ng and pts/sysbench



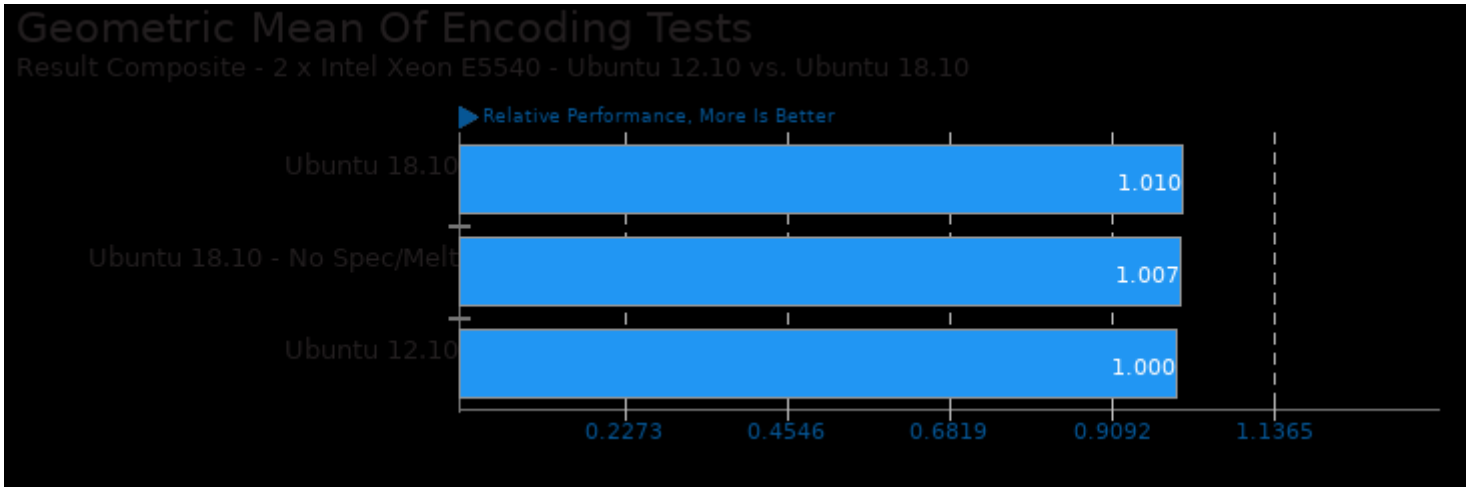
Geometric mean based upon tests: pts/c-ray, pts/ffmpeg and pts/encode-mp3



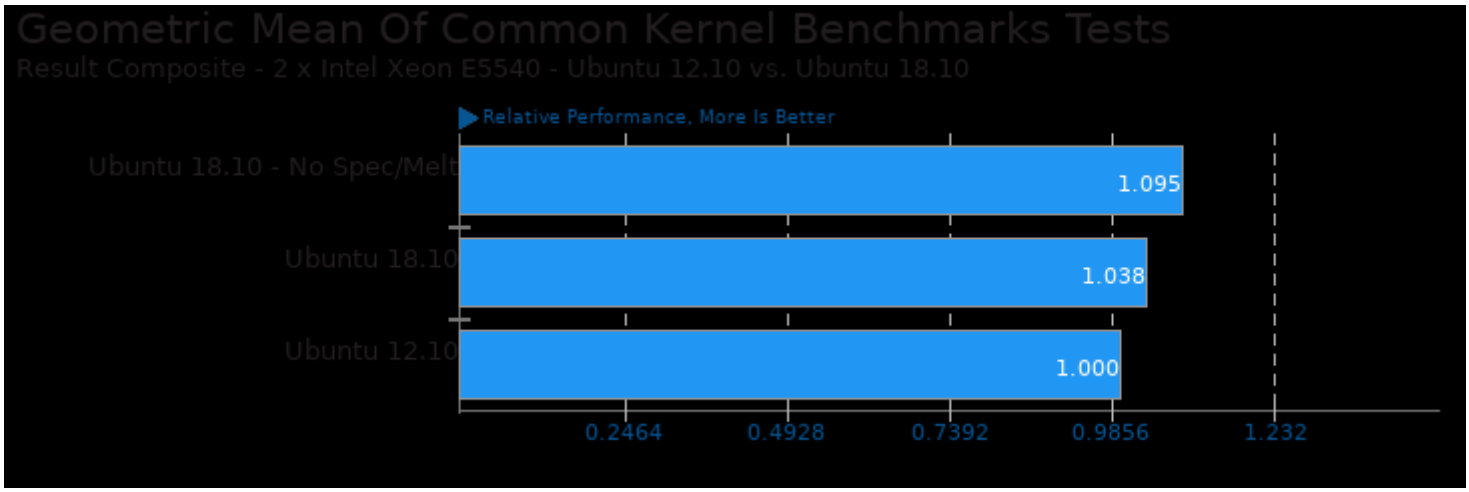
Geometric mean based upon tests: pts/redis and pts/pgbench



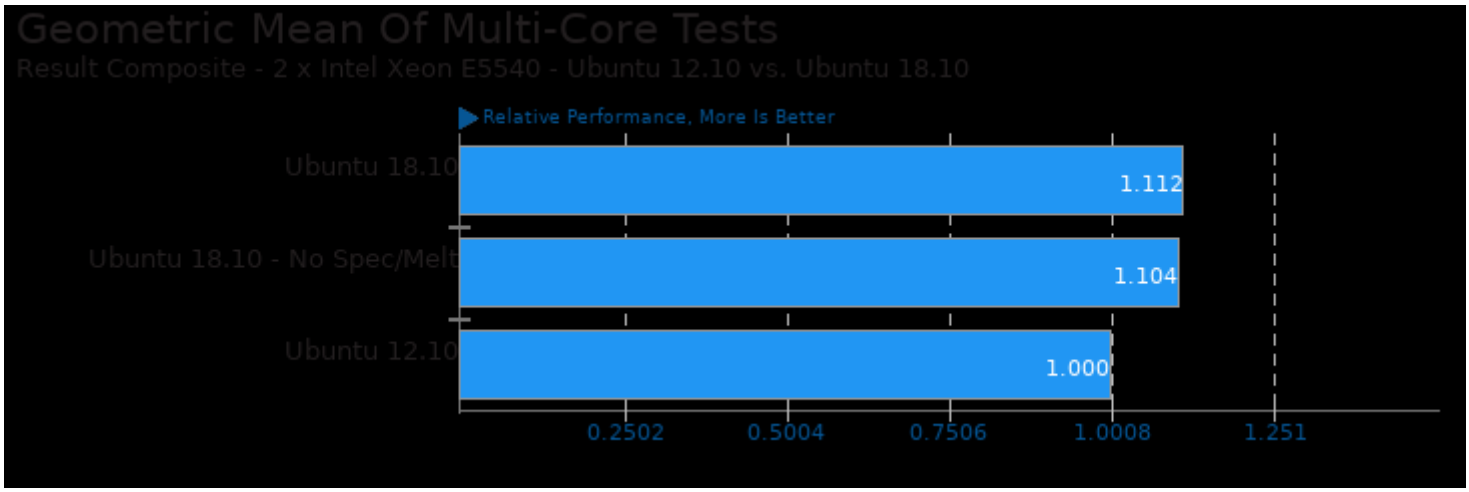
Geometric mean based upon tests: pts/fs-mark, pts/compilebench and pts/fio



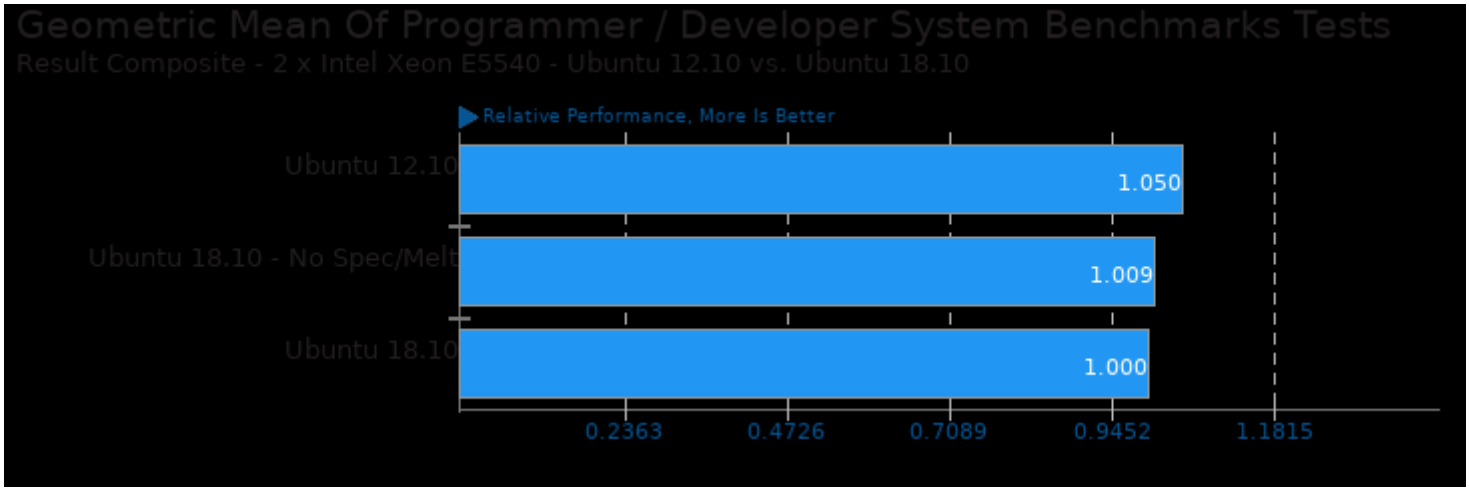
Geometric mean based upon tests: pts/encode-mp3 and pts/ffmpeg



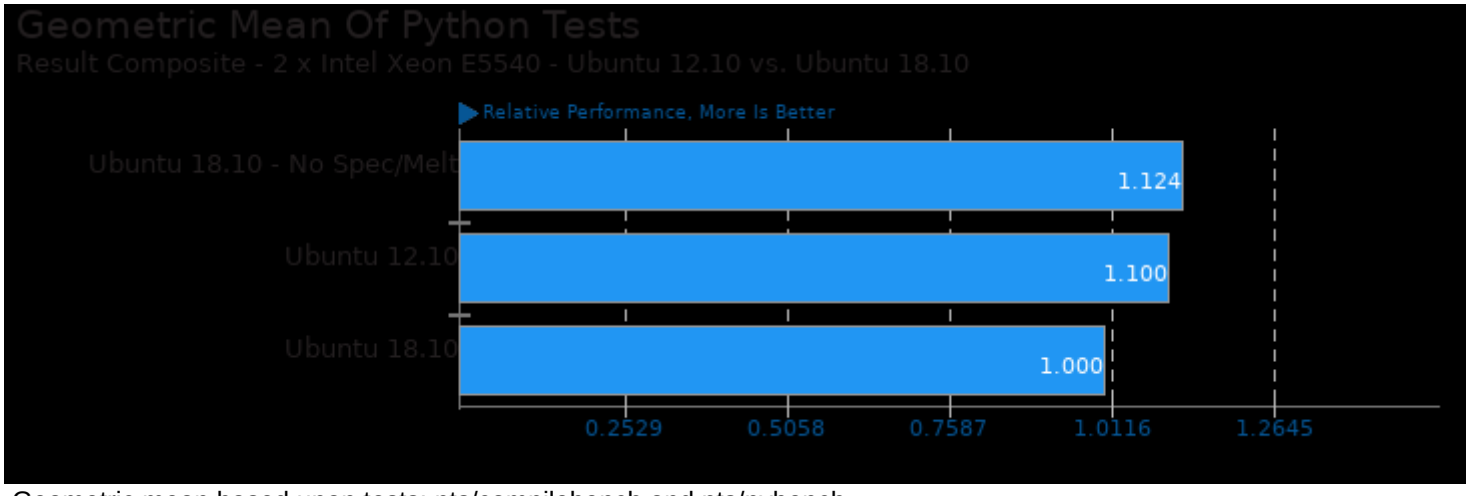
Geometric mean based upon tests: pts/apache, pts/pgbench, pts/openssl and pts/stress-ng



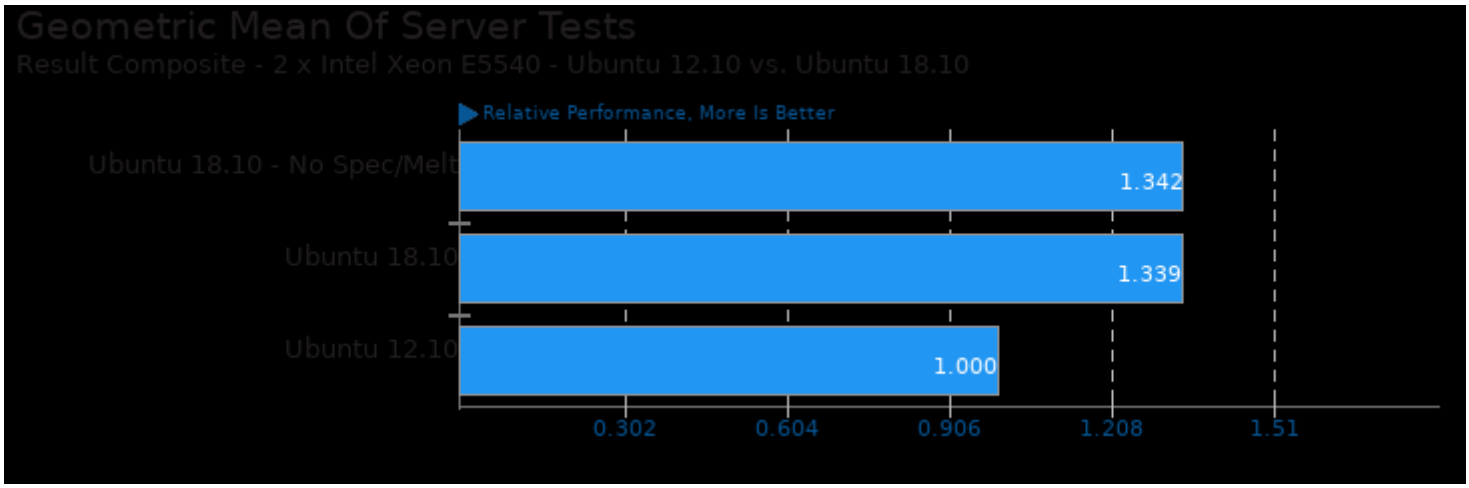
Geometric mean based upon tests: pts/sysbench, pts/c-ray, pts/ffmpeg, pts/compress-7zip, pts/build-apache, pts/build-linux-kernel and pts/pgbench



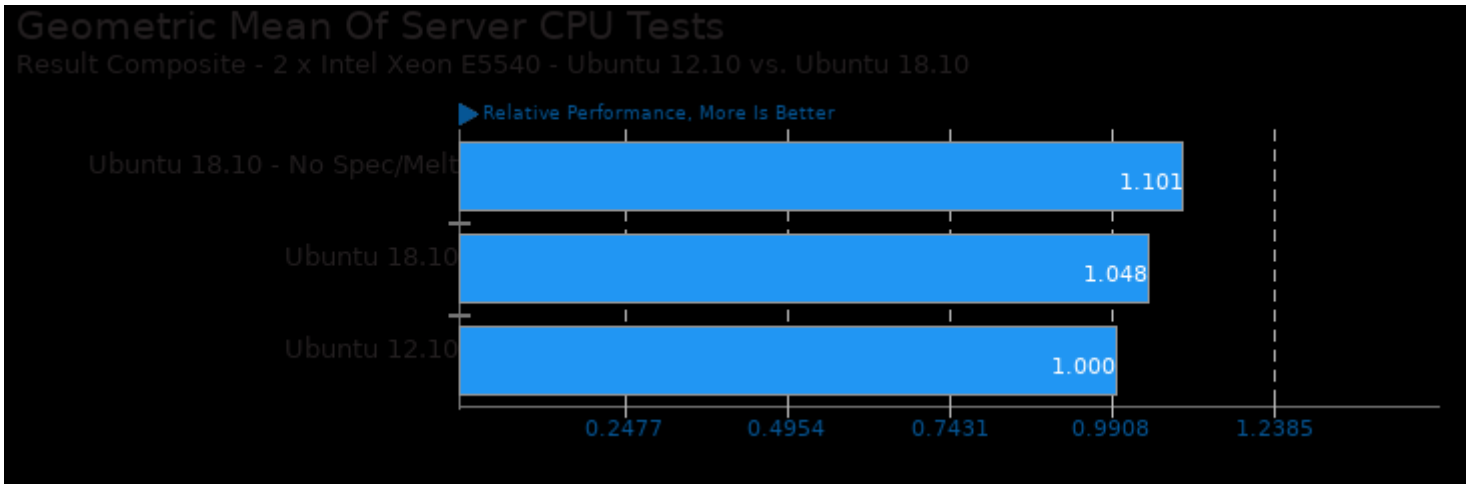
Geometric mean based upon tests: pts/git, pts/pybench, pts/build-apache and pts/build-linux-kernel



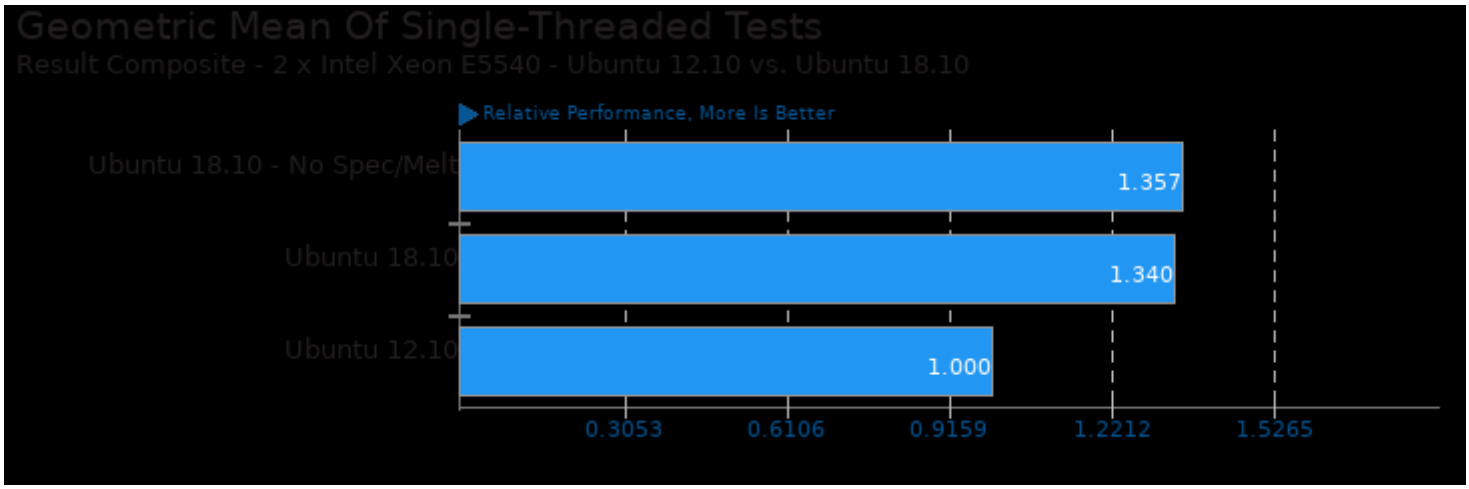
Geometric mean based upon tests: pts/compilebench and pts/pybench



Geometric mean based upon tests: pts/apache, pts/pgbench, pts/redis, pts/phpbench and pts/openssl



Geometric mean based upon tests: pts/compress-7zip, pts/build-linux-kernel, pts/c-ray, pts/openssl, pts/redis, pts/stress-ng, pts/sysbench, pts/pybench and pts/phpbench



Geometric mean based upon tests: pts/compress-gzip, pts/encode-mp3, pts/rbenchmark, pts/redis, pts/pybench, pts/phpbench and pts/git

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 18:19.