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Core i9 9900KS Intel Linux LKRG Testing

LKRG - Linux Kernel Runtime Guard benchmarks by Michael Larabel for a future article.

Automated Executive Summary

Linux 5.4 Ubuntu Build had the most wins, coming in first place for 74% of the tests.

Based on the geometric mean of all complete results, the fastest (Linux 5.4 Ubuntu Build) was 1.046x the speed of the slowest (LKRG Default).

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

Stress-NG (Test: Forking) at 5.592x
SQLite (Threads / Copies: 8) at 1.852x
PostMark (Disk Transaction Performance) at 1.247x
Timed GCC Compilation (Time To Compile) at 1.237x
Timed Apache Compilation (Time To Compile) at 1.205x
Inkscape (Operation: SVG Files To PNG) at 1.11x
Timed GDB GNU Debugger Compilation (Time To Compile) at 1.109x
Flexible IO Tester (Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory) at 1.097x
Flexible IO Tester (Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target:

Default Test Directory) at 1.097x
Flexible IO Tester (Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory) at 1.067x.

Test Systems:

Linux 5.4 Ubuntu Build

LKRG Default

Processor: Intel Core i9-9900KS @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (1302 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16GB, Disk: Samsung SSD 970 EVO 250GB, Graphics: ASUS Intel UHD 630 3GB (1200MHz), Audio: Realtek ALC1220, Monitor: ASUS MG28U, Network: Intel I219-V

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.34.3, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 4.6 Mesa 20.0.0, Vulkan: 1.2.131, Compiler: GCC 9.2.1 20200220, File-System: ext4, Screen Resolution: 1920x1080

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,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
Disk Notes: NONE / errors=remount-ro,relatime,rw
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xca
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-1ubuntu1)
Python Notes: + Python 3.8.2rc1
Security Notes: itlb_multihit: KVM: Vulnerable + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + tsx_async_abort: Mitigation of TSX disabled

	Linux 5.4 Ubuntu Build	LKRG Default
Selenium - Kraken - Firefox (ms)	**764.5**	**756.3**
Normalized	98.93%	100%
Standard Deviation	1.1%	0.7%
Selenium - StyleBench - Firefox (Runs / Minute)	**108**	**110**
Normalized	98.18%	100%
Standard Deviation	1.9%	0.5%
Selenium - Jetstream 2 - Firefox (Score)	**102.970**	**105.887**
Normalized	97.25%	100%
Standard Deviation	1.9%	1.1%
Selenium - Maze Solver - Firefox (sec)	5.4	5.4
Standard Deviation	1.1%	2.8%
Selenium - Speedometer - Firefox (Runs/min)	**104.5**	**104**
Normalized	100%	99.52%
Standard Deviation	0.4%	
Selenium - Kraken - Google Chrome (ms)	**870.6**	**847.0**

Core i9 9900KS Intel Linux LKRG Testing

Normalized	97.29%	100%
Standard Deviation	2.9%	1.8%
Selenium - PSPDFKit WASM - Firefox (Score)	**1191**	**1186**
Normalized	99.58%	100%
Standard Deviation	0.8%	
Selenium - StyleBench - Google Chrome (Runs /	**34.73**	**34.6**
Normalized	100%	99.63%
Standard Deviation	0.5%	0%
Selenium - Jetstream 2 - Google Chrome (Score)	**136.096**	**134.621**
Normalized	100%	98.92%
Standard Deviation	0.9%	1.2%
Selenium - Maze Solver - Google Chrome (sec)	**4.9**	**4.8**
Normalized	97.96%	100%
Standard Deviation	1.2%	2.9%
Selenium - Speedometer - Google Chrome (Runs/min)	**130**	**132**
Normalized	98.48%	100%
Standard Deviation		0.9%
Selenium - PSPDFKit WASM - Google Chrome (Score)	**1567**	**1585**
Normalized	100%	98.86%
Standard Deviation	2.3%	0.8%
Selenium - W.i - Firefox (ms)	30.4	30.4
Standard Deviation	0.5%	0%
Selenium - W.c - Firefox (ms)	**438.7**	**439.5**
Normalized	100%	99.82%
Standard Deviation	0%	0.2%
Selenium - W.i - Google Chrome (ms)	**38.4815**	**39.8516**
Normalized	100%	96.56%
Standard Deviation	0.3%	2.8%
Selenium - W.c - Google Chrome (ms)	**372.9043**	**372.7315**
Normalized	99.95%	100%
Standard Deviation	0.4%	0.4%
t-test1 - 1 (sec)	**12.958**	**13.597**
Normalized	100%	95.3%
Standard Deviation	0.2%	1%
t-test1 - 2 (sec)	**4.514**	**4.764**
Normalized	100%	94.75%
Standard Deviation	0.7%	0.3%
ctx_clock - C.S.T (Clocks)	**157**	**160**
Normalized	100%	98.13%
Standard Deviation	2.2%	0.7%
Stress-NG - Forking (Bogo Ops/s)	**89525**	**16010**
Normalized	100%	17.88%
Standard Deviation	0.9%	0.1%
Stress-NG - Semaphores (Bogo Ops/s)	**5107309**	**5065052**
Normalized	100%	99.17%
Standard Deviation	0.5%	3.6%
Stress-NG - Socket Activity (Bogo Ops/s)	**7830**	**7644**
Normalized	100%	97.61%
Standard Deviation	0.3%	0.3%
Stress-NG - Context Switching (Bogo Ops/s)	**4003948**	**4093128**
Normalized	97.82%	100%
Standard Deviation	1.9%	3%
Stress-NG - S.V.M.P (Bogo Ops/s)	**12907903**	**13341083**
Normalized	96.75%	100%
Standard Deviation	0.3%	0.2%

Core i9 9900KS Intel Linux LKRG Testing

Sockperf - Throughput (Messages/sec)	**531513**	**567697**
Normalized	93.63%	100%
Standard Deviation	6.9%	4.4%
Sockperf - Latency Ping Pong (usec)	**2.653**	**2.710**
Normalized	100%	97.9%
Standard Deviation	1.1%	1.9%
Sockperf - Latency Under Load (usec)	**19.569**	**18.289**
Normalized	93.46%	100%
Standard Deviation	12.8%	30.1%
Java SciMark - Composite (Mflops)	**2770**	**2754**
Normalized	100%	99.42%
Standard Deviation	0.4%	0.9%
RawTherapee - T.B.T (sec)	**59.348**	**59.629**
Normalized	100%	99.53%
Standard Deviation	0.2%	0.1%
Inkscape - SVG Files To PNG (sec)	**20.810**	**23.100**
Normalized	100%	90.09%
Standard Deviation	1.5%	1.2%
Flexible IO Tester - Rand Read - IO_uring - Yes - No - 2MB (MB/s)	**664**	**654**
Normalized	100%	98.49%
Standard Deviation	0.3%	0.8%
Flexible IO Tester - Rand Read - IO_uring - Yes - No - 2MB (IOPS)	**329**	**323**
Normalized	100%	98.18%
Standard Deviation	0.4%	0.8%
Flexible IO Tester - Rand Read - IO_uring - Yes - No - 4KB (MB/s)	491	491
Flexible IO Tester - Rand Read - IO_uring - Yes - No - 4KB (IOPS)	126000	126000
Flexible IO Tester - Rand Write - IO_uring - Yes - No - 2MB (MB/s)	**1522**	**1387**
Normalized	100%	91.13%
Standard Deviation	0.8%	1.3%
Flexible IO Tester - Rand Write - IO_uring - Yes - No - 2MB (IOPS)	**757**	**690**
Normalized	100%	91.15%
Standard Deviation	0.9%	1.2%
Flexible IO Tester - Rand Write - IO_uring - Yes - No - 4KB (MB/s)	**898**	**842**
Normalized	100%	93.76%
Standard Deviation	0.4%	0.9%
Flexible IO Tester - Rand Write - IO_uring - Yes - No - 4KB (IOPS)	**229667**	**215333**
Normalized	100%	93.76%
Standard Deviation	0.3%	0.7%
Flexible IO Tester - Seq Read - IO_uring - Yes - No - 2MB (MB/s)	**656**	**635**
Normalized	100%	96.8%
Standard Deviation	0.3%	0.6%
Flexible IO Tester - Seq Read - IO_uring - Yes - No - 2MB (IOPS)	**324**	**314**
Normalized	100%	96.91%

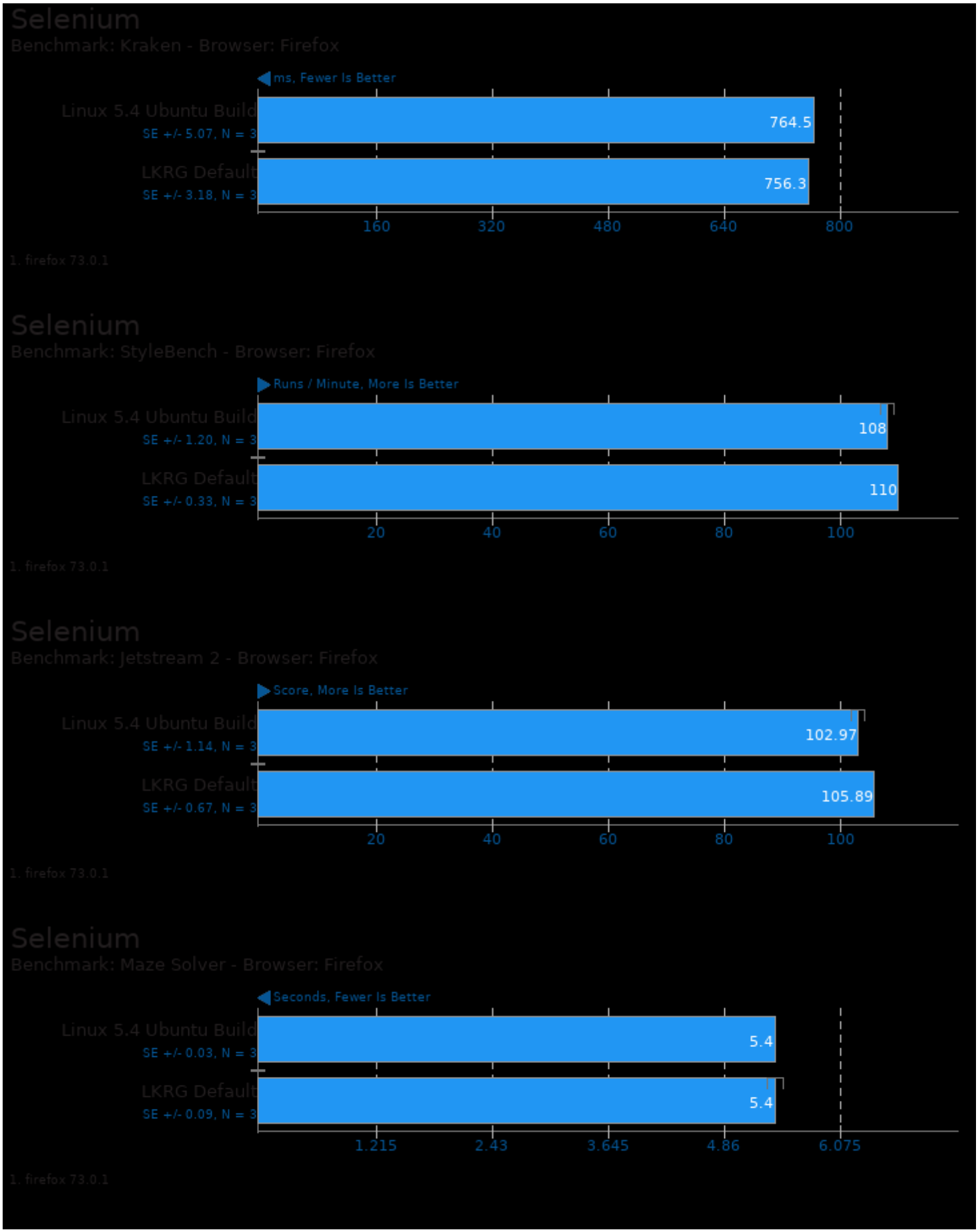
Standard Deviation	0.3%	0.6%
Flexible IO Tester - Seq Read - IO_uring - Yes - No - 4KB (MB/s)	2267	2266
Normalized	100%	99.96%
Standard Deviation	0.1%	0.7%
Flexible IO Tester - Seq Read - IO_uring - Yes - No - 4KB (IOPS)	580333	580000
Normalized	100%	99.94%
Standard Deviation	0.2%	0.6%
Numpy Benchmark (Score)	447.85	447.62
Normalized	100%	99.95%
Standard Deviation	0.3%	0.5%
DeepSpeech - CPU (sec)	72.33269	72.28385
Normalized	99.93%	100%
Standard Deviation	0.9%	1%
Mlpack Benchmark - scikit_ica (sec)	45.10	43.79
Normalized	97.1%	100%
Standard Deviation	2.9%	0.5%
Mlpack Benchmark - scikit_qda (sec)	63.72	62.42
Normalized	97.96%	100%
Standard Deviation	1.5%	0.6%
Mlpack Benchmark - scikit_svm (sec)	13.30	13.32
Normalized	100%	99.85%
Standard Deviation	0.2%	0.3%
Mlpack Benchmark - scikit_linearridgeregression	2.45	2.42
Normalized	98.78%	100%
Standard Deviation	5%	5.5%
Sunflow Rendering System - G.I.I.S (sec)	1.129	1.140
Normalized	100%	99.04%
Standard Deviation	1.7%	1.6%
pmbench - 1 - 100% Reads (us - Page Latency)	0.0241	0.0241
Standard Deviation	1.2%	0.6%
pmbench - 1 - 100% Writes (us - Page Latency)	0.0267	0.0270
Normalized	100%	98.89%
Standard Deviation	2.1%	0.6%
pmbench - 16 - 100% Reads (us - Page Latency)	0.0358	0.0379
Normalized	100%	94.46%
Standard Deviation	4.9%	1.2%
pmbench - 16 - 100% Writes (us - Page Latency)	0.0806	0.0837
Normalized	100%	96.3%
Standard Deviation	0.9%	0.4%
pmbench - 1 - 8.R.2.W (us - Page Latency)	0.0666	0.0664
Normalized	99.7%	100%
Standard Deviation	0.2%	0.6%
pmbench - 16 - 8.R.2.W (us - Page Latency)	0.0866	0.0879
Normalized	100%	98.52%
Standard Deviation	0.8%	0.6%
PostMark - D.T.P (TPS)	8825	7076
Normalized	100%	80.18%
Standard Deviation	2%	1.6%
Ethr - TCP - Latency - 1 (us)	8.05917	8.232917
Normalized	100%	97.89%
Standard Deviation	1.2%	2.1%
Ethr - HTTP - Bandwidth - 1 (Mbits/s)	196086875230	196320580634
Normalized	99.88%	100%

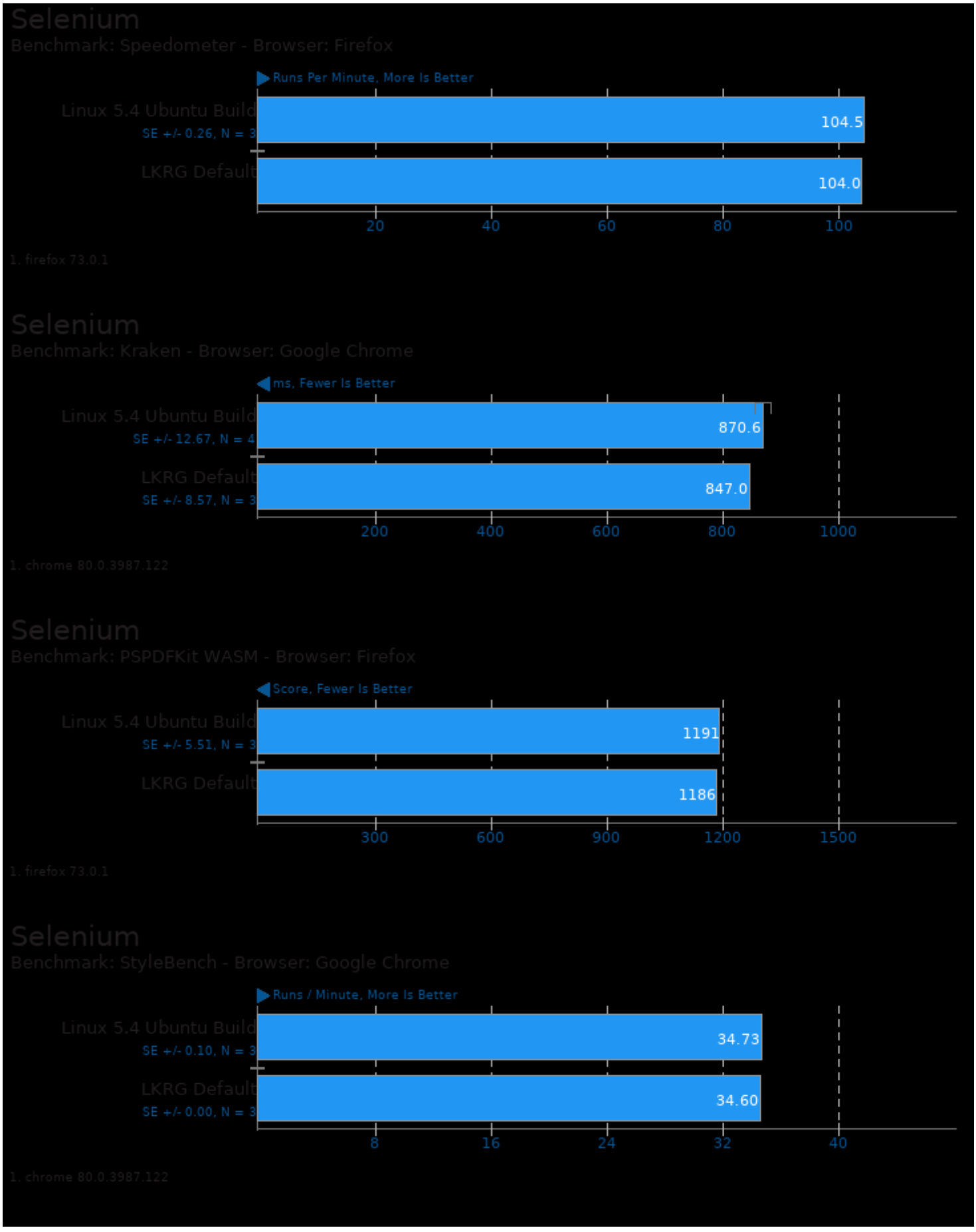
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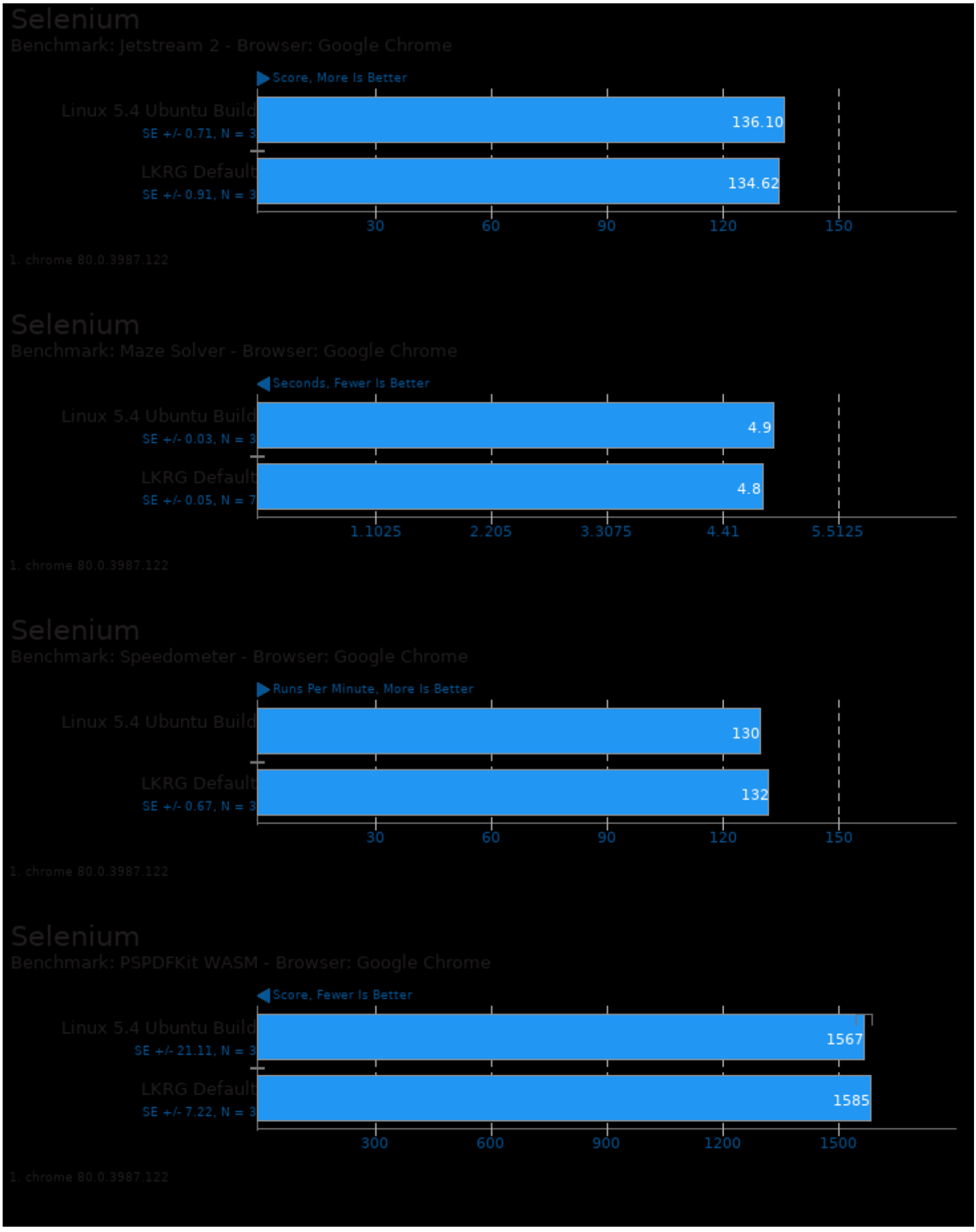
Standard Deviation	105.2%	104.4%
Ethr - TCP - Connections/s - 1 (Connections/sec)	**20190**	**18276**
Normalized	100%	90.52%
Standard Deviation	10.2%	12.8%
iPerf - 5201 - 10 Seconds - TCP - 1 (Mbits/s)	**72451**	**71743**
Normalized	100%	99.02%
Standard Deviation	2.5%	1.2%
iPerf - 5201 - 10 Seconds - UDP - 1 (Mbits/s)	1.05	1.05
Standard Deviation	0%	0%
iPerf - 5201 - 10 Seconds - TCP - 10 (Mbits/s)	**73447**	**74322**
Normalized	98.82%	100%
Standard Deviation	1.9%	1.6%
iPerf - 5201 - 10 Seconds - UDP - 10 (Mbits/s)	10.5	10.5
Standard Deviation	0%	0%
BenchmarkMutex - M.L.U.s (ns)	35.3	35.3
Standard Deviation	0.3%	0.3%
BenchmarkMutex - M.L.U.s.m (ns)	16	16
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	**397297**	**395375**
Normalized	100%	99.52%
Standard Deviation	1%	2.7%
Timed FFmpeg Compilation - Time To Compile (sec)	**58.030**	**59.592**
Normalized	100%	97.38%
Standard Deviation	2.1%	1.4%
Timed GDB GNU Debugger Compilation - Time To Compile (sec)	**96.002**	**106.437**
Normalized	100%	90.2%
Standard Deviation	0.5%	0.6%
Timed ImageMagick Compilation - Time To Compile	**30.121**	**31.206**
Normalized	100%	96.52%
Standard Deviation	0.4%	0.6%
Timed MPlayer Compilation - Time To Compile (sec)	**39.034**	**40.671**
Normalized	100%	95.98%
Standard Deviation	0.1%	0.1%
Timed Apache Compilation - Time To Compile (sec)	**19.965**	**24.054**
Normalized	100%	83%
Standard Deviation	0.5%	0.5%
Timed LLVM Compilation - Time To Compile (sec)	**435.829**	**434.97**
Normalized	99.8%	100%
Timed PHP Compilation - Time To Compile (sec)	**57.133**	**60.866**
Normalized	100%	93.87%
Standard Deviation	0.3%	0.2%
Timed GCC Compilation - Time To Compile (sec)	**797.985**	**986.835**
Normalized	100%	80.86%
Standard Deviation	0.1%	0.4%
Timed Linux Kernel Compilation - Time To Compile	**84.622**	**89.135**
Normalized	100%	94.94%
Standard Deviation	0.9%	1.8%
VP9 libvpx Encoding - Speed 5 (FPS)	**28.64**	**28.71**
Normalized	99.76%	100%
Standard Deviation	0.6%	0.2%
Tachyon - Total Time (sec)	**93.7215**	**93.8932**
Normalized	100%	99.82%
Standard Deviation	0.1%	0.1%
x264 - H.2.V.E (FPS)	**98.84**	**97.77**
Normalized	100%	98.92%

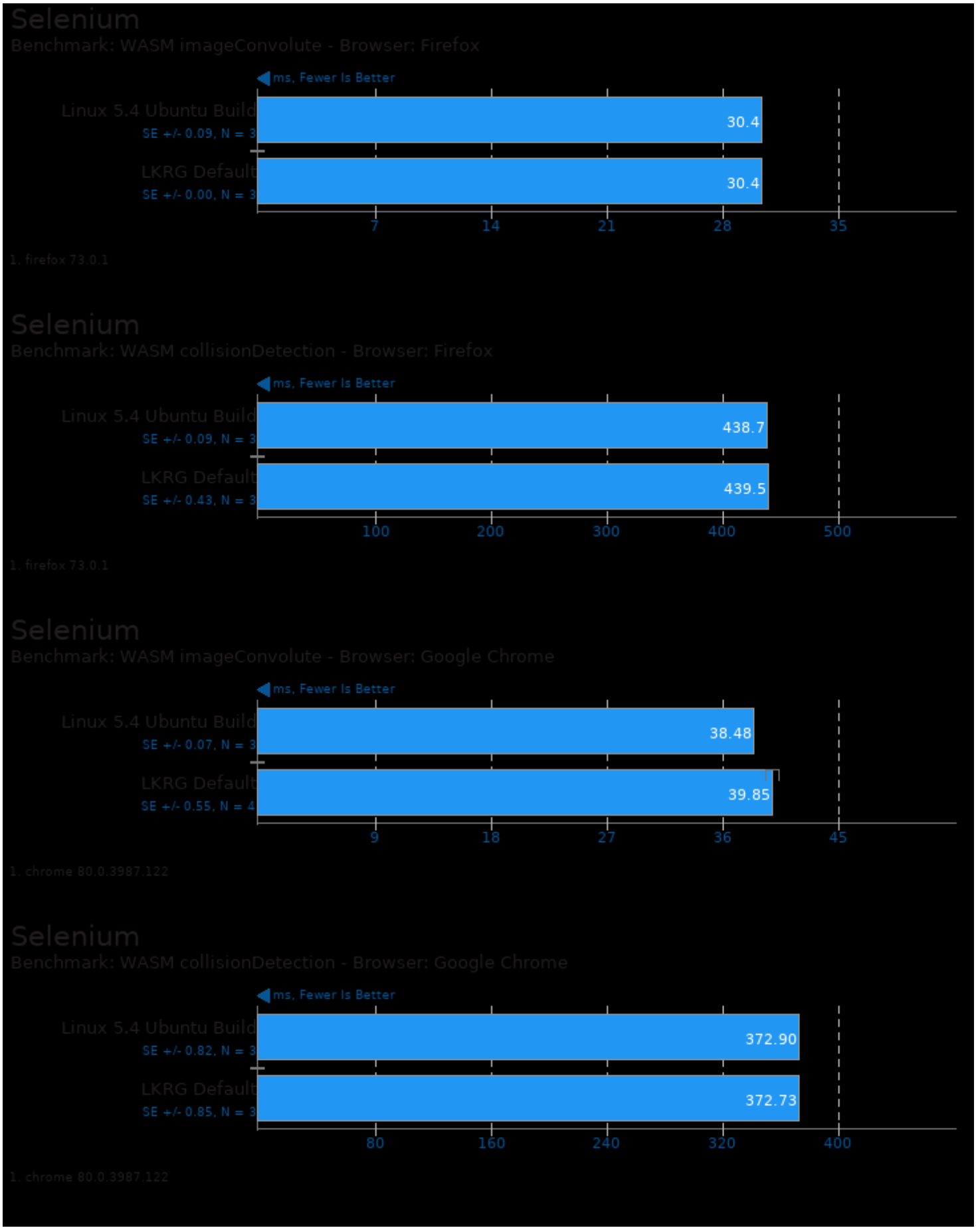
Core i9 9900KS Intel Linux LKRG Testing

Standard Deviation	1.8%	1.5%
SVT-AV1 - Enc Mode 8 - 1080p (FPS)	**30.549**	**30.534**
Normalized	100%	99.95%
Standard Deviation	0.4%	0.4%
Blender - BMW27 - CPU-Only (sec)	**169.16**	**169.09**
Normalized	99.96%	100%
Standard Deviation	0.3%	0.5%
rays1bench - Large Scene (mrays/s)	**54.73**	**54.70**
Normalized	100%	99.95%
Standard Deviation	0.1%	0.1%
Build2 - Time To Compile (sec)	**109.643**	**114.977**
Normalized	100%	95.36%
Standard Deviation	0.9%	0.2%
LibreOffice - 2.D.T.P (sec)	**6.613**	**6.652**
Normalized	100%	99.41%
Standard Deviation	3.5%	2.5%
PHPBench - P.B.S (Score)	**827204**	**826284**
Normalized	100%	99.89%
Standard Deviation	0.2%	0.4%
SQLite - 1 (sec)	**41.735**	**42.987**
Normalized	100%	97.09%
Standard Deviation	0.1%	0.6%
SQLite - 8 (sec)	**126.033**	**233.377**
Normalized	100%	54%
Standard Deviation	1.1%	1.1%
SQLite Speedtest - Timed Time - Size 1,000 (sec)	**48.061**	**48.816**
Normalized	100%	98.45%
Standard Deviation	0.3%	0.4%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	**229031**	**227085**
Normalized	100%	99.15%
Standard Deviation	0.1%	0.2%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Write (TPS)	**5536**	**5409**
Normalized	100%	97.71%
Standard Deviation	2.9%	2.4%
PyBench - T.F.A.T.T (Milliseconds)	**858**	**857**
Normalized	99.88%	100%
Standard Deviation		0.2%

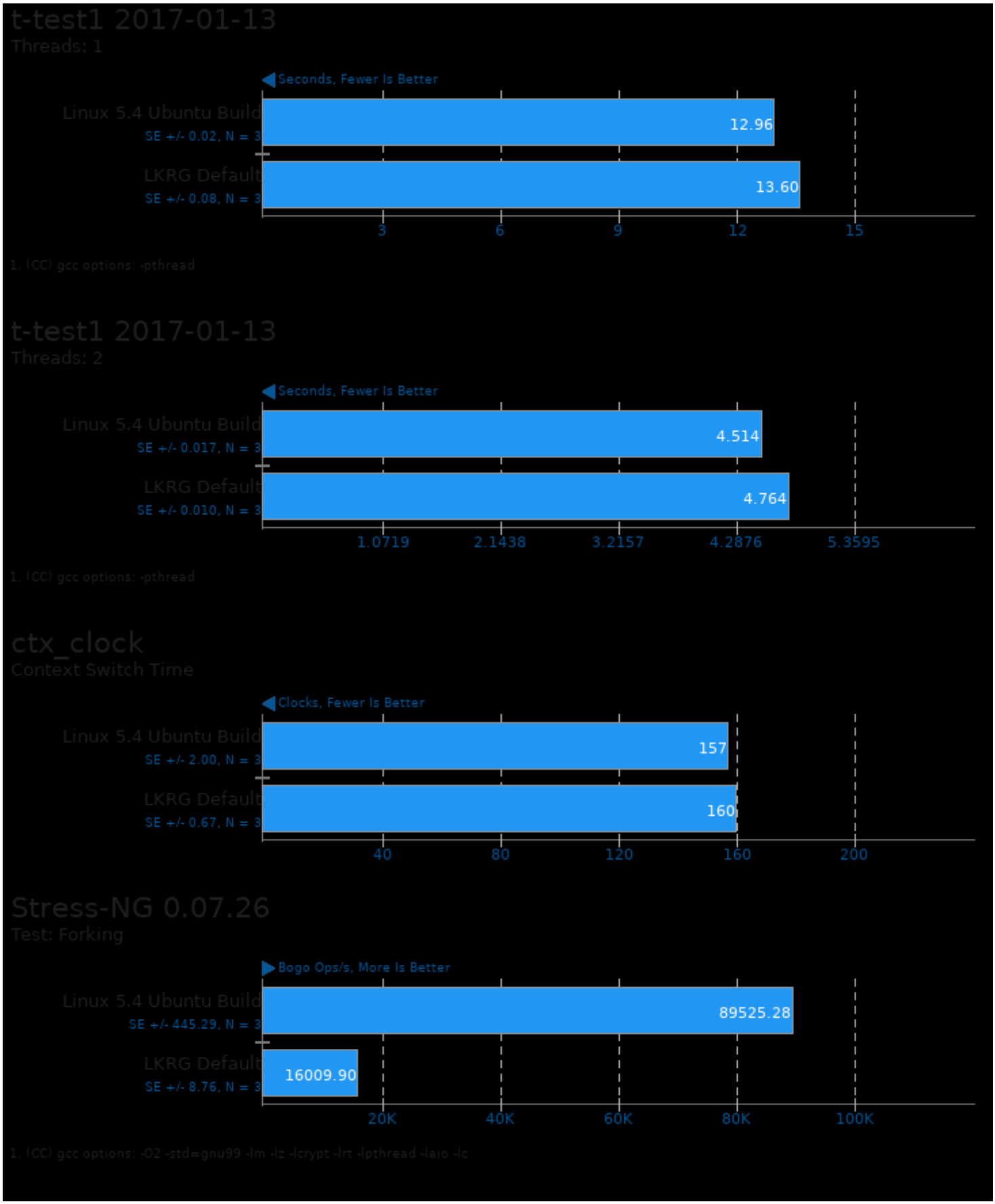

Selenium
Benchmark: Kraken - Browser: Firefox
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 5.07, N = 3
764.5
LKRG Default
SE +/- 3.18, N = 3
756.3
160
320
480
640
800
1. firefox 73.0.1
Selenium
Benchmark: StyleBench - Browser: Firefox
Runs / Minute, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 1.20, N = 3
108
LKRG Default
SE +/- 0.33, N = 3
110
20
40
60
80
100
1. firefox 73.0.1
Selenium
Benchmark: Jetstream 2 - Browser: Firefox
Score, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 1.14, N = 3
102.97
LKRG Default
SE +/- 0.67, N = 3
105.89
20
40
60
80
100
1. firefox 73.0.1
Selenium
Benchmark: Maze Solver - Browser: Firefox
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.03, N = 3
5.4
LKRG Default
SE +/- 0.09, N = 3
5.4
1.215
2.43
3.645
4.86
6.075
1. firefox 73.0.1

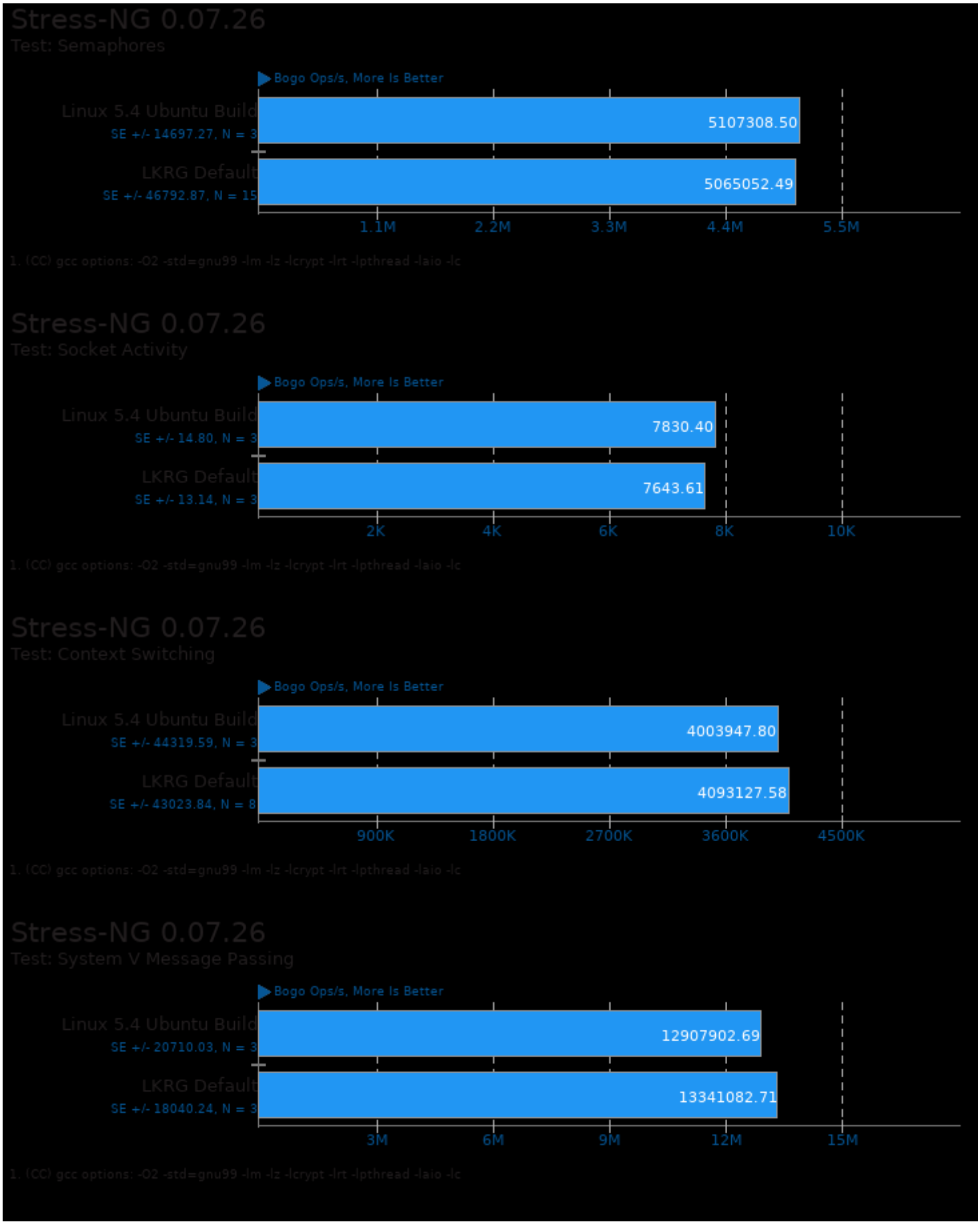

Selenium
Benchmark: Speedometer - Browser: Firefox
Runs Per Minute, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.26, N = 3
104.5
LKRG Default
104.0
20
40
60
80
100
1. firefox 73.0.1
Selenium
Benchmark: Kraken - Browser: Google Chrome
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 12.67, N = 4
870.6
LKRG Default
SE +/- 8.57, N = 3
847.0
200
400
600
800
1000
1. chrome 80.0.3987.122
Selenium
Benchmark: PSPDFKit WASM - Browser: Firefox
Score, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 5.51, N = 3
1191
LKRG Default
1186
300
600
900
1200
1500
1. firefox 73.0.1
Selenium
Benchmark: StyleBench - Browser: Google Chrome
Runs / Minute, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.10, N = 3
34.73
LKRG Default
SE +/- 0.00, N = 3
34.60
8
16
24
32
40
1. chrome 80.0.3987.122


Selenium
Benchmark: Jetstream 2 - Browser: Google Chrome
Score, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.71, N = 3
136.10
LKRG Default
SE +/- 0.91, N = 3
134.62
30
60
90
120
150
1. chrome 80.0.3987.122
Selenium
Benchmark: Maze Solver - Browser: Google Chrome
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.03, N = 3
4.9
LKRG Default
SE +/- 0.05, N = 7
4.8
1.1025
2.205
3.3075
4.41
5.5125
1. chrome 80.0.3987.122
Selenium
Benchmark: Speedometer - Browser: Google Chrome
Runs Per Minute, More Is Better
Linux 5.4 Ubuntu Build
130
LKRG Default
SE +/- 0.67, N = 3
132
30
60
90
120
150
1. chrome 80.0.3987.122
Selenium
Benchmark: PSPDFKit WASM - Browser: Google Chrome
Score, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 21.11, N = 3
1567
LKRG Default
SE +/- 7.22, N = 3
1585
300
600
900
1200
1500
1. chrome 80.0.3987.122


Selenium
Benchmark: WASM imageConvolute - Browser: Firefox
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.09, N = 3
30.4
LKRG Default
SE +/- 0.00, N = 3
30.4
7
14
21
28
35
1. firefox 73.0.1
Selenium
Benchmark: WASM collisionDetection - Browser: Firefox
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.09, N = 3
438.7
LKRG Default
SE +/- 0.43, N = 3
439.5
100
200
300
400
500
1. firefox 73.0.1
Selenium
Benchmark: WASM imageConvolute - Browser: Google Chrome
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.07, N = 3
38.48
LKRG Default
SE +/- 0.55, N = 4
39.85
9
18
27
36
45
1. chrome 80.0.3987.122
Selenium
Benchmark: WASM collisionDetection - Browser: Google Chrome
ms, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.82, N = 3
372.90
LKRG Default
SE +/- 0.85, N = 3
372.73
80
160
240
320
400
1. chrome 80.0.3987.122

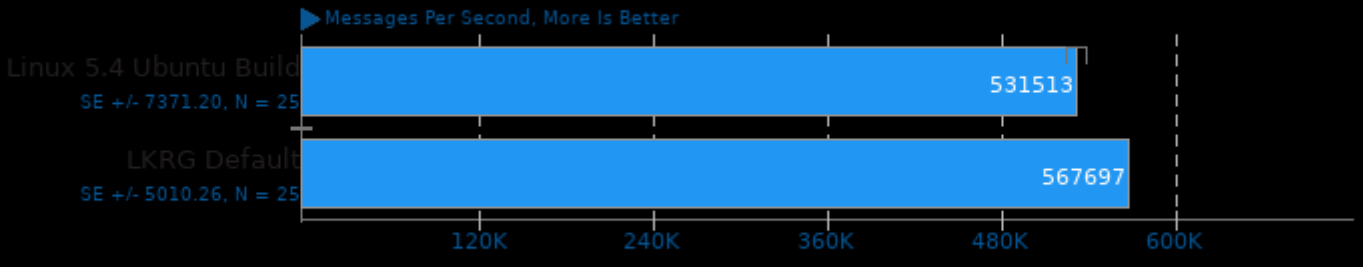
Core i9 9900KS Intel Linux LKRG Testing




Stress-NG 0.07.26
Test: Semaphores
Bogo Ops/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 14697.27, N = 3
5107308.50
LKRG Default
SE +/- 46792.87, N = 15
5065052.49
1.1M
2.2M
3.3M
4.4M
5.5M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc
Stress-NG 0.07.26
Test: Socket Activity
Bogo Ops/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 14.80, N = 3
7830.40
LKRG Default
SE +/- 13.14, N = 3
7643.61
2K
4K
6K
8K
10K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc
Stress-NG 0.07.26
Test: Context Switching
Bogo Ops/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 44319.59, N = 3
4003947.80
LKRG Default
SE +/- 43023.84, N = 8
4093127.58
900K
1800K
2700K
3600K
4500K
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc
Stress-NG 0.07.26
Test: System V Message Passing
Bogo Ops/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 20710.03, N = 3
12907902.69
LKRG Default
SE +/- 18040.24, N = 3
13341082.71
3M
6M
9M
12M
15M
1. (CC) gcc options: -O2 -std=gnu99 -lm -lz -lcrypt -lrt -lpthread -laio -lc

Sockperf 3.4

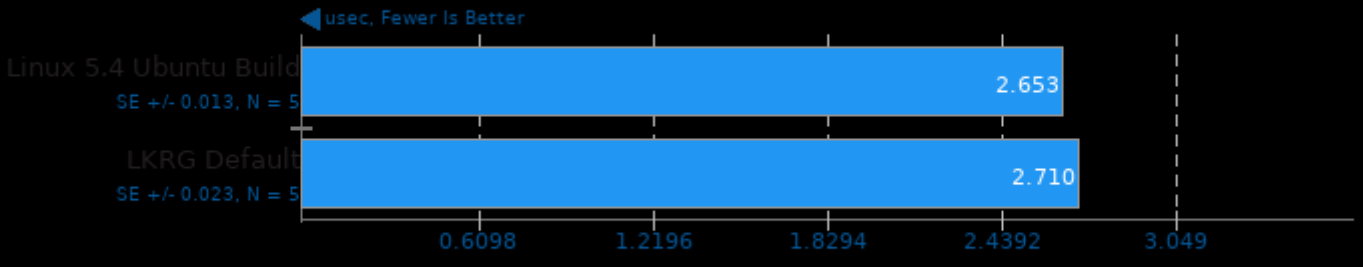
Test: Throughput



1. (CXX) g++ options: -param -O3 -rdynamic -ldl -lpthread

Sockperf 3.4

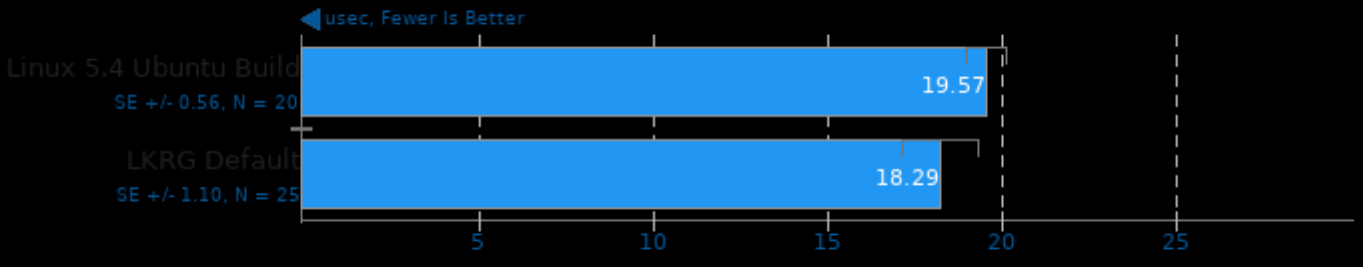
Test: Latency Ping Pong



1. (CXX) g++ options: -param -O3 -rdynamic -ldl -lpthread

Sockperf 3.4

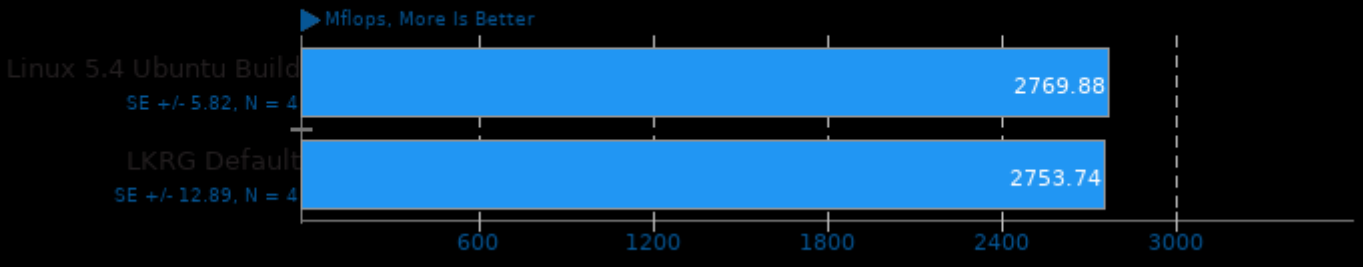
Test: Latency Under Load

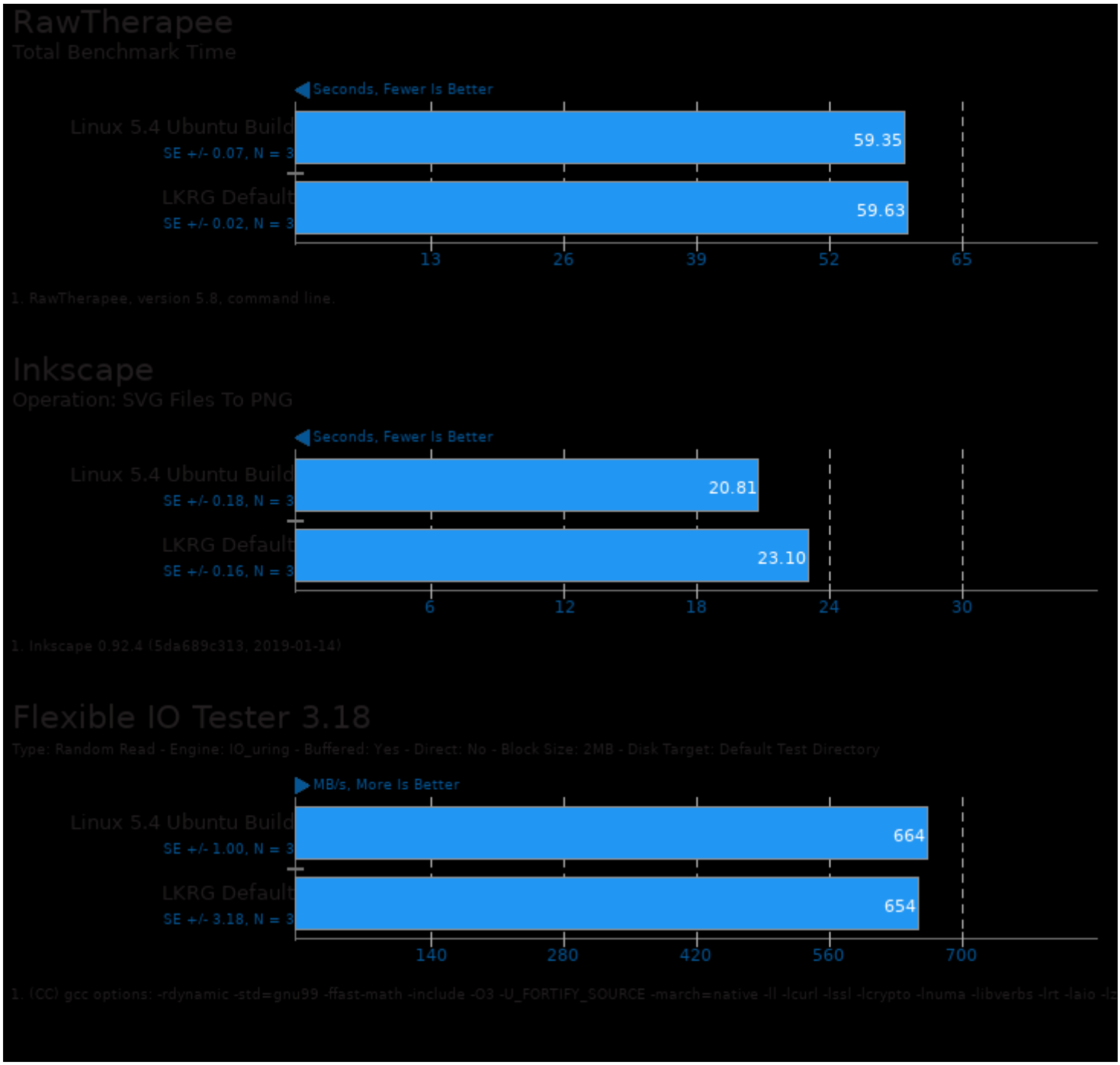


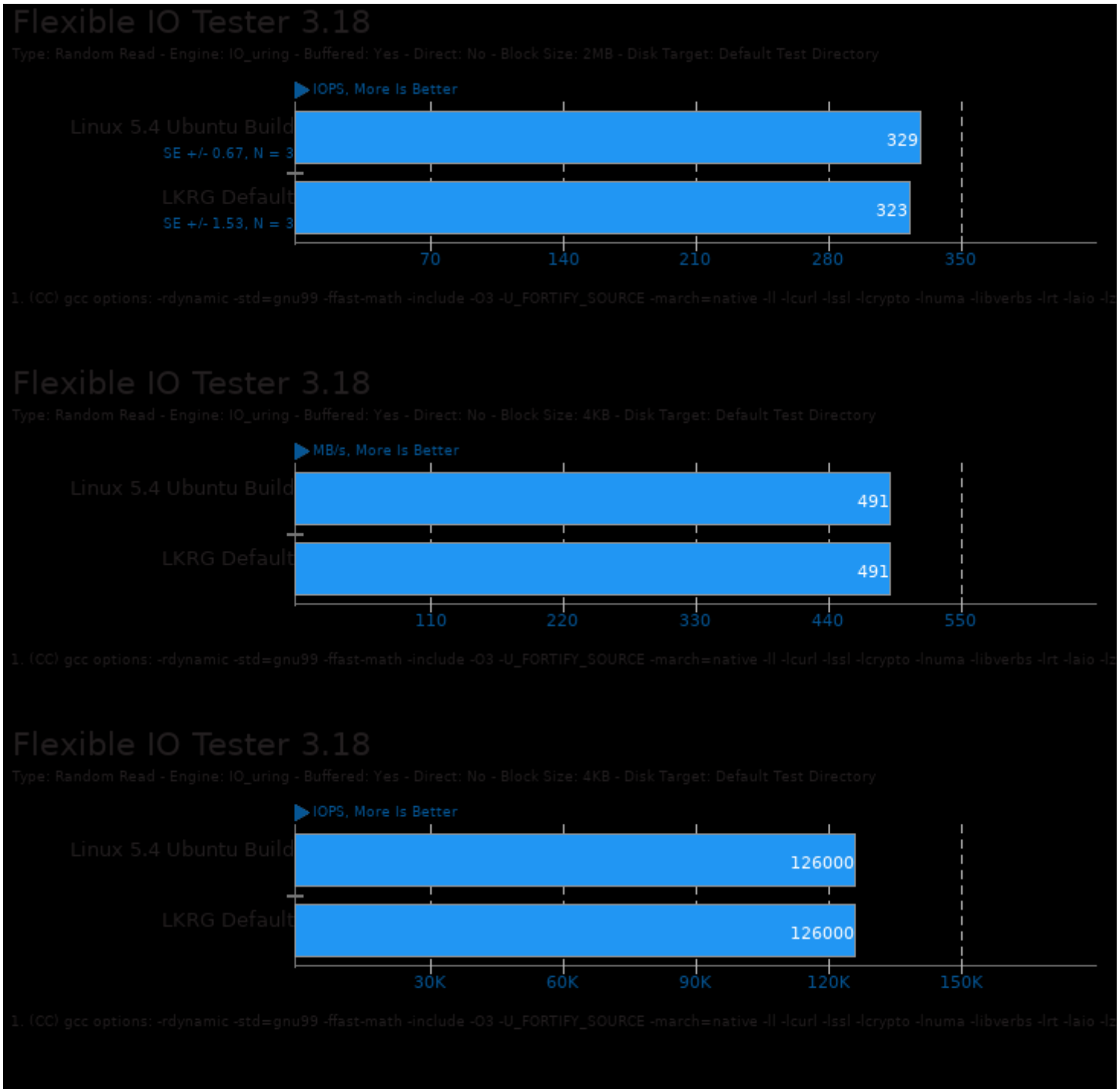
1. (CXX) g++ options: -param -O3 -rdynamic -ldl -lpthread

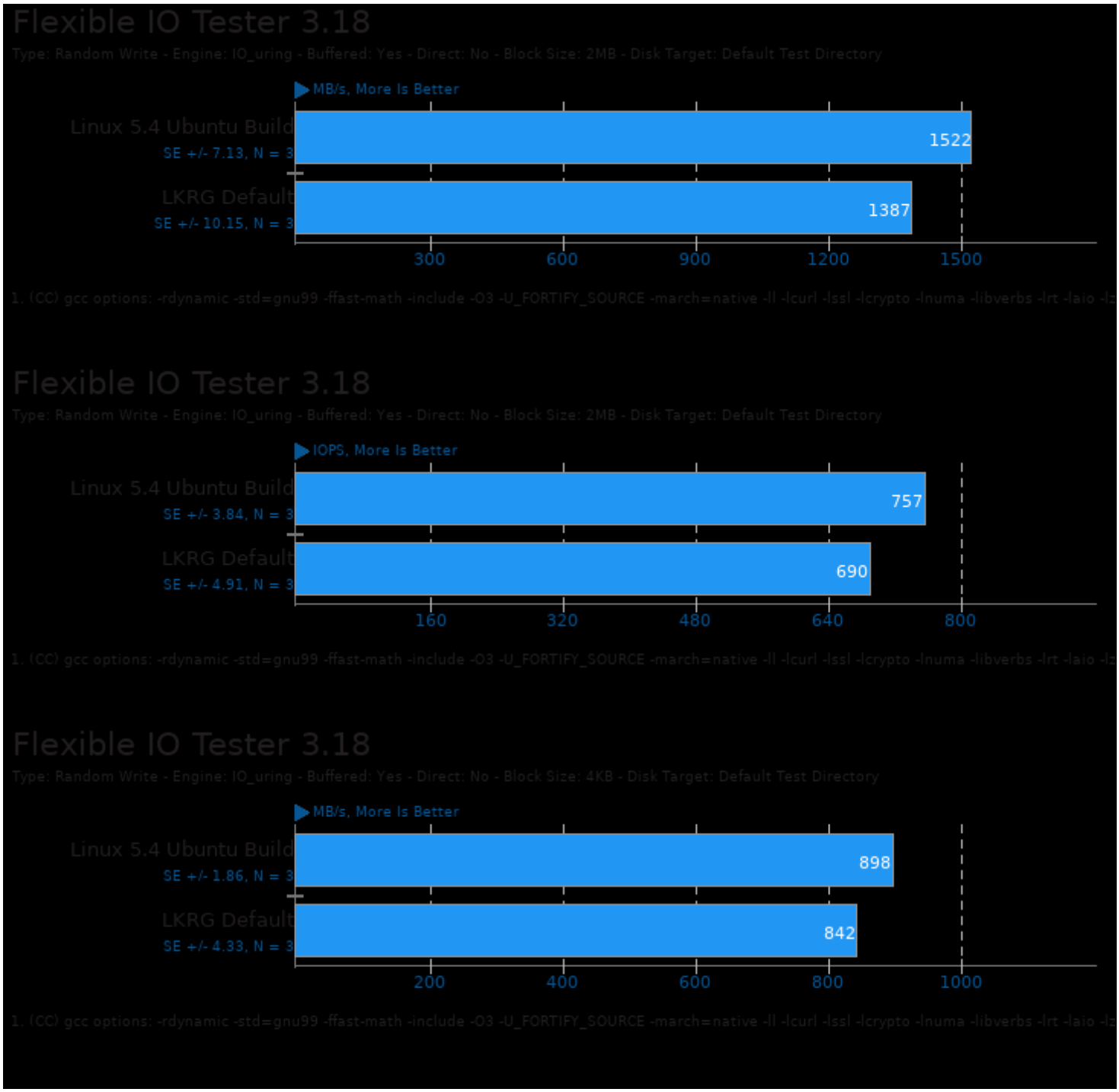
Java SciMark 2.0

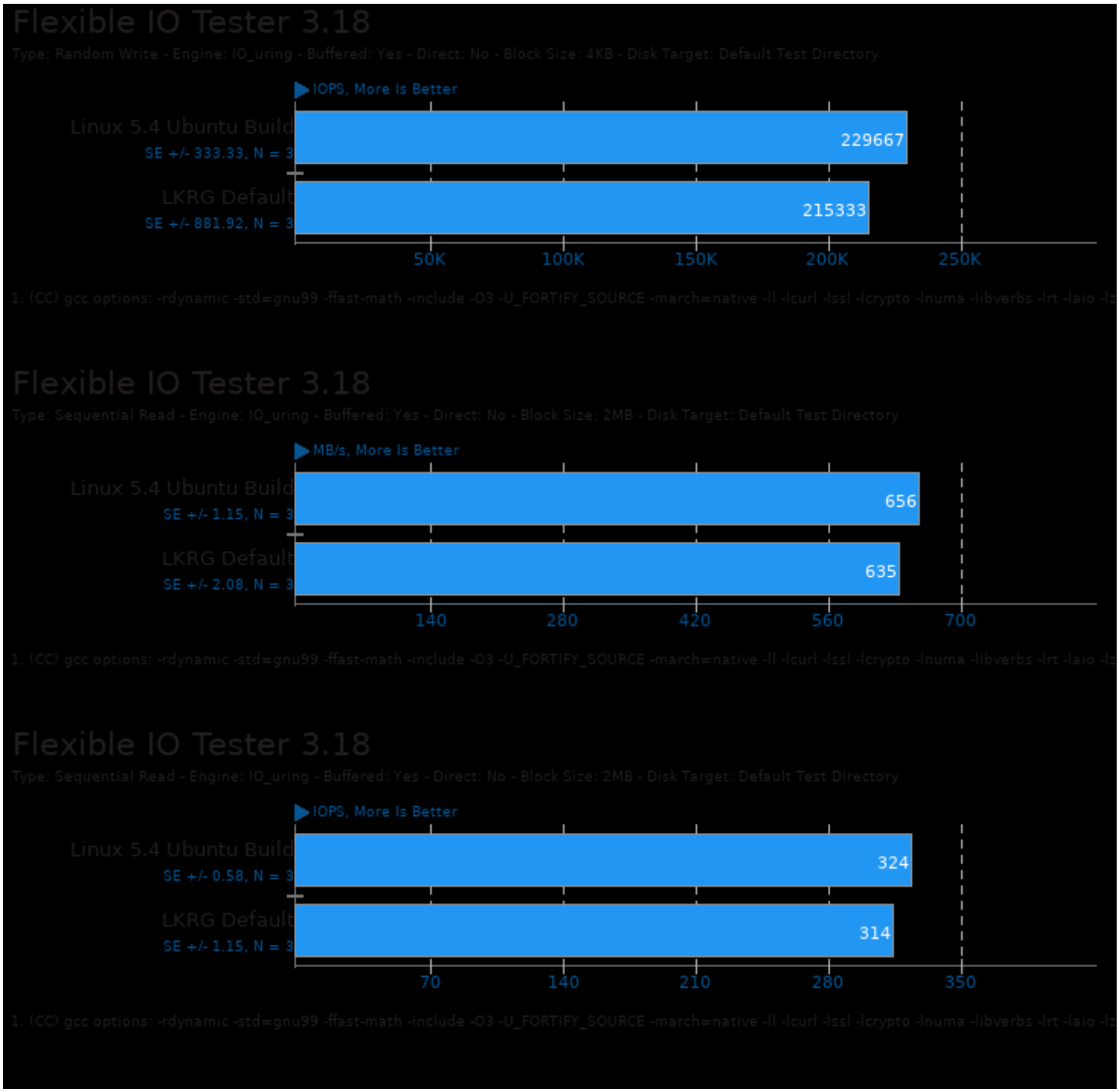
Computational Test: Composite




RawTherapee
Total Benchmark Time
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.07, N = 3
59.35
LKRG Default
SE +/- 0.02, N = 3
59.63
13
26
39
52
65
1. RawTherapee, version 5.8, command line.
Inkscape
Operation: SVG Files To PNG
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.18, N = 3
20.81
LKRG Default
SE +/- 0.16, N = 3
23.10
6
12
18
24
30
1. Inkscape 0.92.4 (5da689c313, 2019-01-14)
Flexible IO Tester 3.18
Type: Random Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 1.00, N = 3
664
LKRG Default
SE +/- 3.18, N = 3
654
140
280
420
560
700
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio

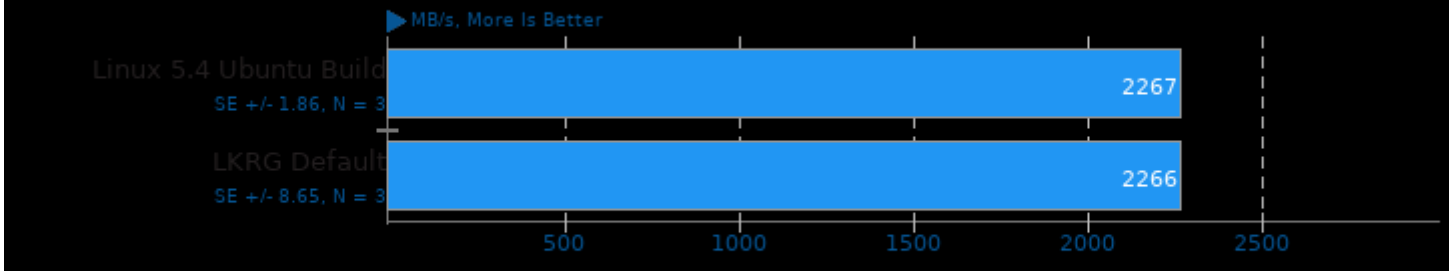

Flexible IO Tester 3.18
Type: Random Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
IOPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.67, N = 3
329
LKRG Default
SE +/- 1.53, N = 3
323
70
140
210
280
350
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Random Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.4 Ubuntu Build
491
LKRG Default
491
110
220
330
440
550
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Random Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Linux 5.4 Ubuntu Build
126000
LKRG Default
126000
30K
60K
90K
120K
150K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l


Flexible IO Tester 3.18
Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 7.13, N = 3
1522
LKRG Default
SE +/- 10.15, N = 3
1387
300
600
900
1200
1500
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
IOPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 3.84, N = 3
757
LKRG Default
SE +/- 4.91, N = 3
690
160
320
480
640
800
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 1.86, N = 3
898
LKRG Default
SE +/- 4.33, N = 3
842
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l


Flexible IO Tester 3.18
Type: Random Write - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 333.33, N = 3
229667
LKRG Default
SE +/- 881.92, N = 3
215333
50K
100K
150K
200K
250K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Sequential Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
MB/s, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 1.15, N = 3
656
LKRG Default
SE +/- 2.08, N = 3
635
140
280
420
560
700
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l
Flexible IO Tester 3.18
Type: Sequential Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 2MB - Disk Target: Default Test Directory
IOPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.58, N = 3
324
LKRG Default
SE +/- 1.15, N = 3
314
70
140
210
280
350
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l

Flexible IO Tester 3.18

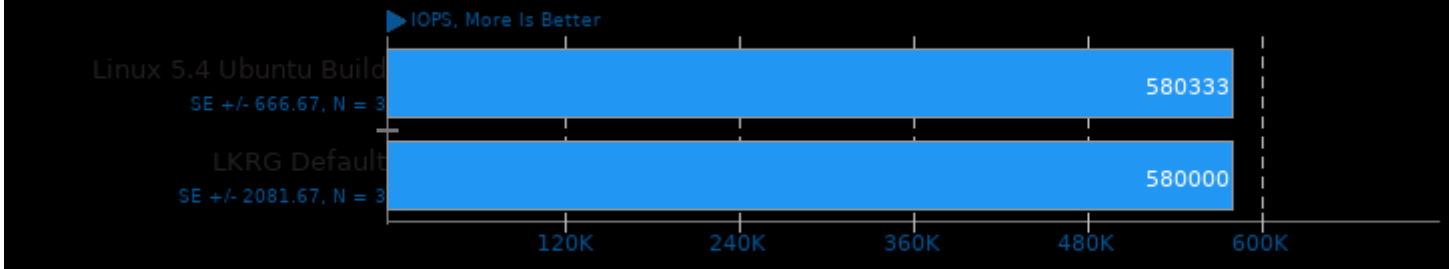
Type: Sequential Read - Engine: IO_uring - Buffered: Yes - Direct: No - Block Size: 4KB - Disk Target: Default Test Directory



1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l

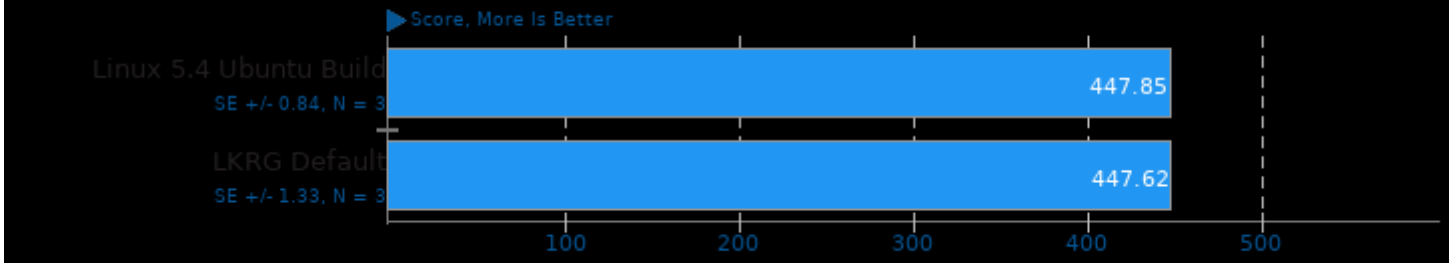
Flexible IO Tester 3.18

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



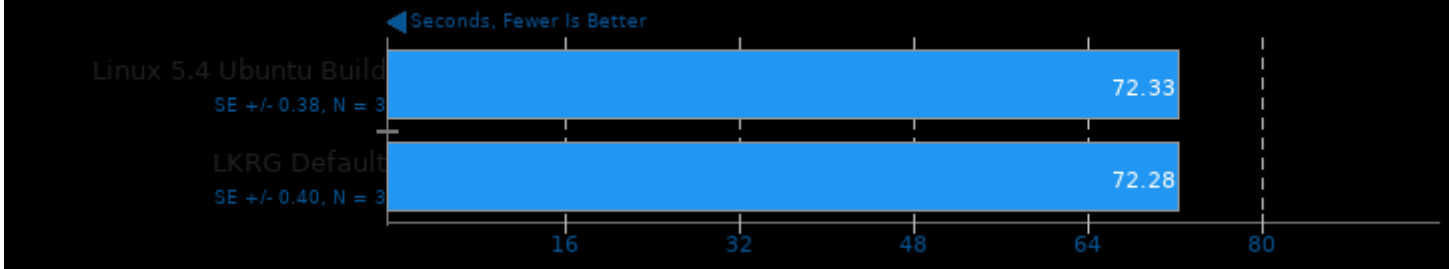
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -march=native -ll -lcurl -lssl -lcrypto -lnuma -libverbs -lrt -laio -l

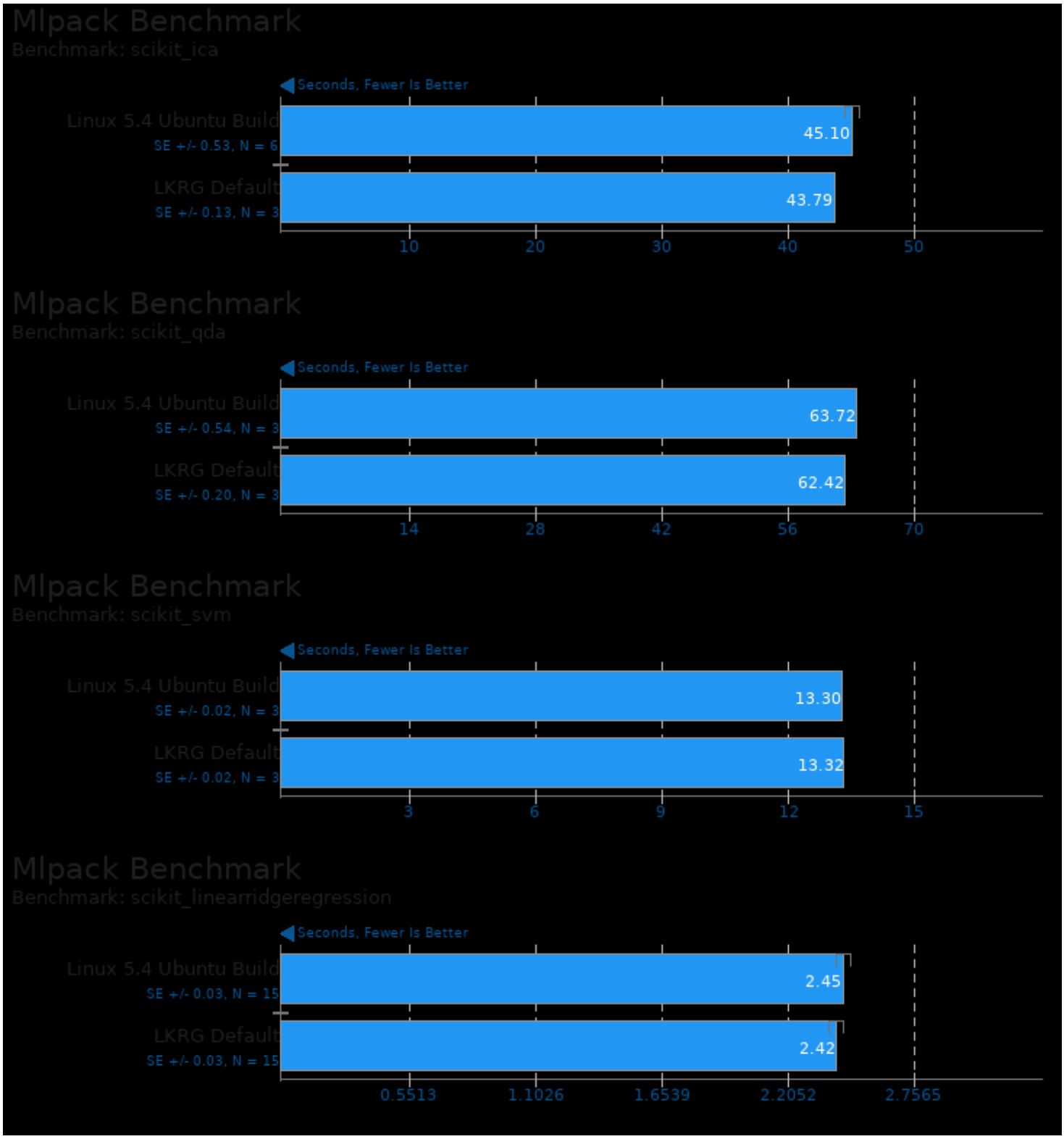
Numpy Benchmark

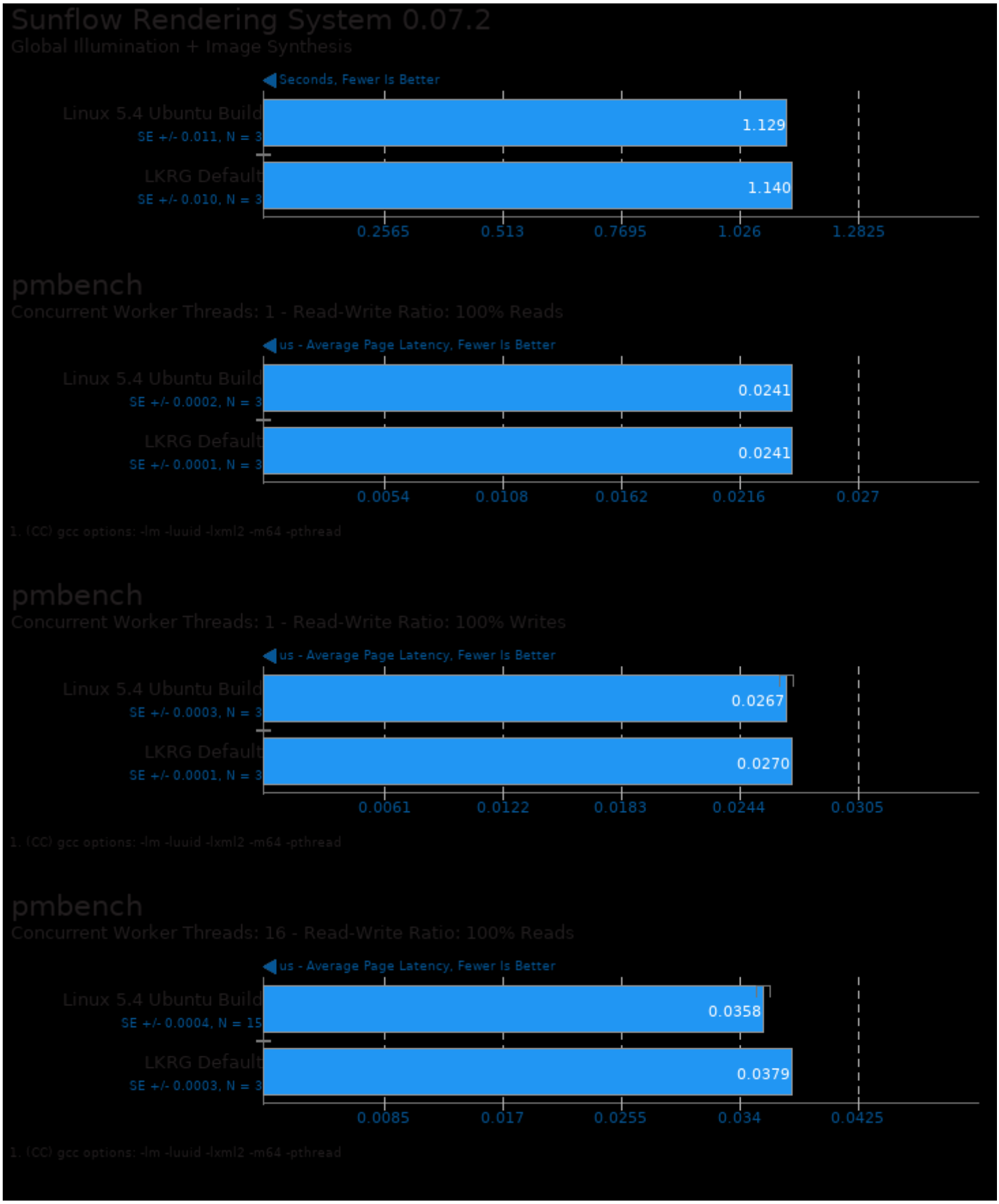


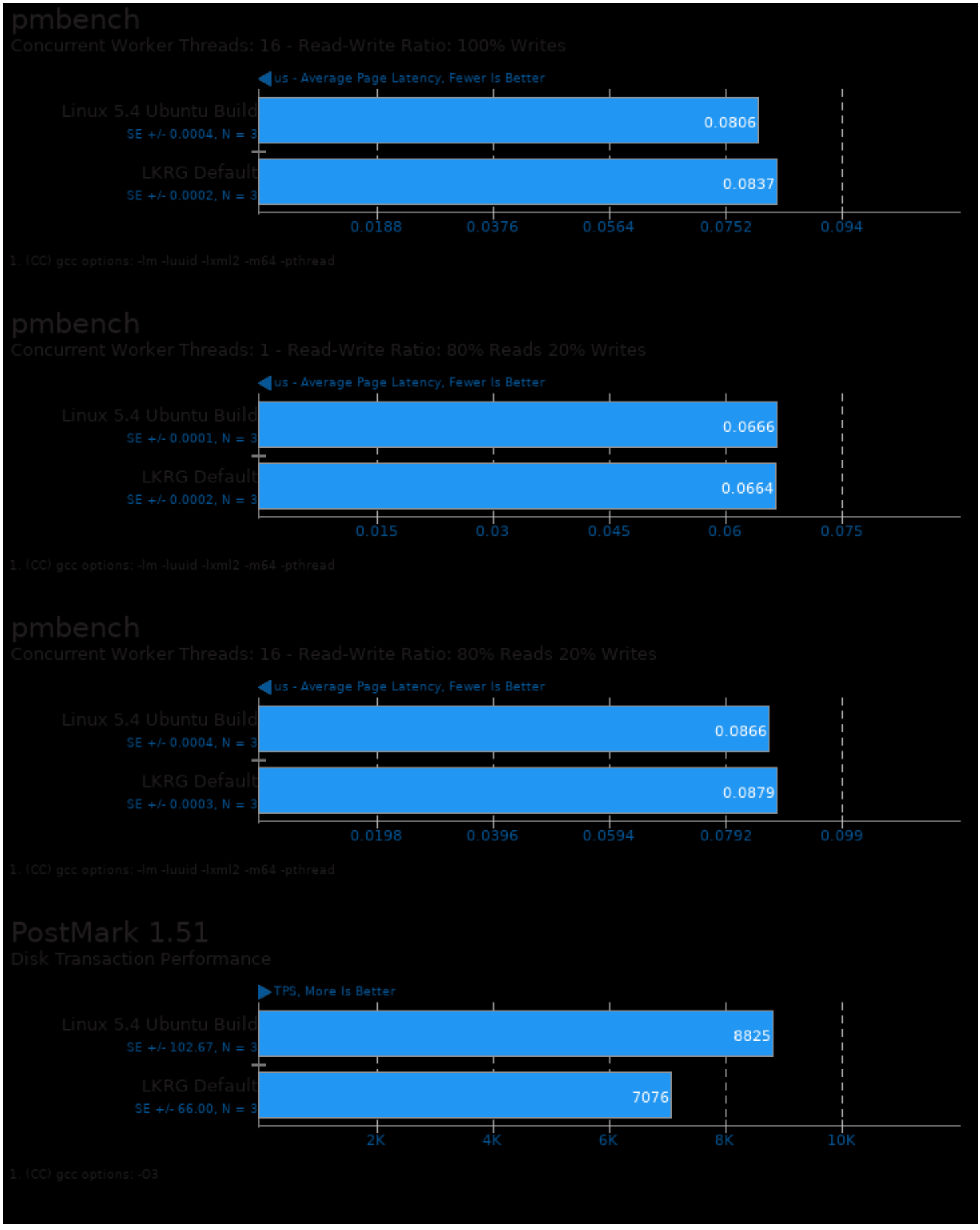
DeepSpeech 0.6

Acceleration: CPU

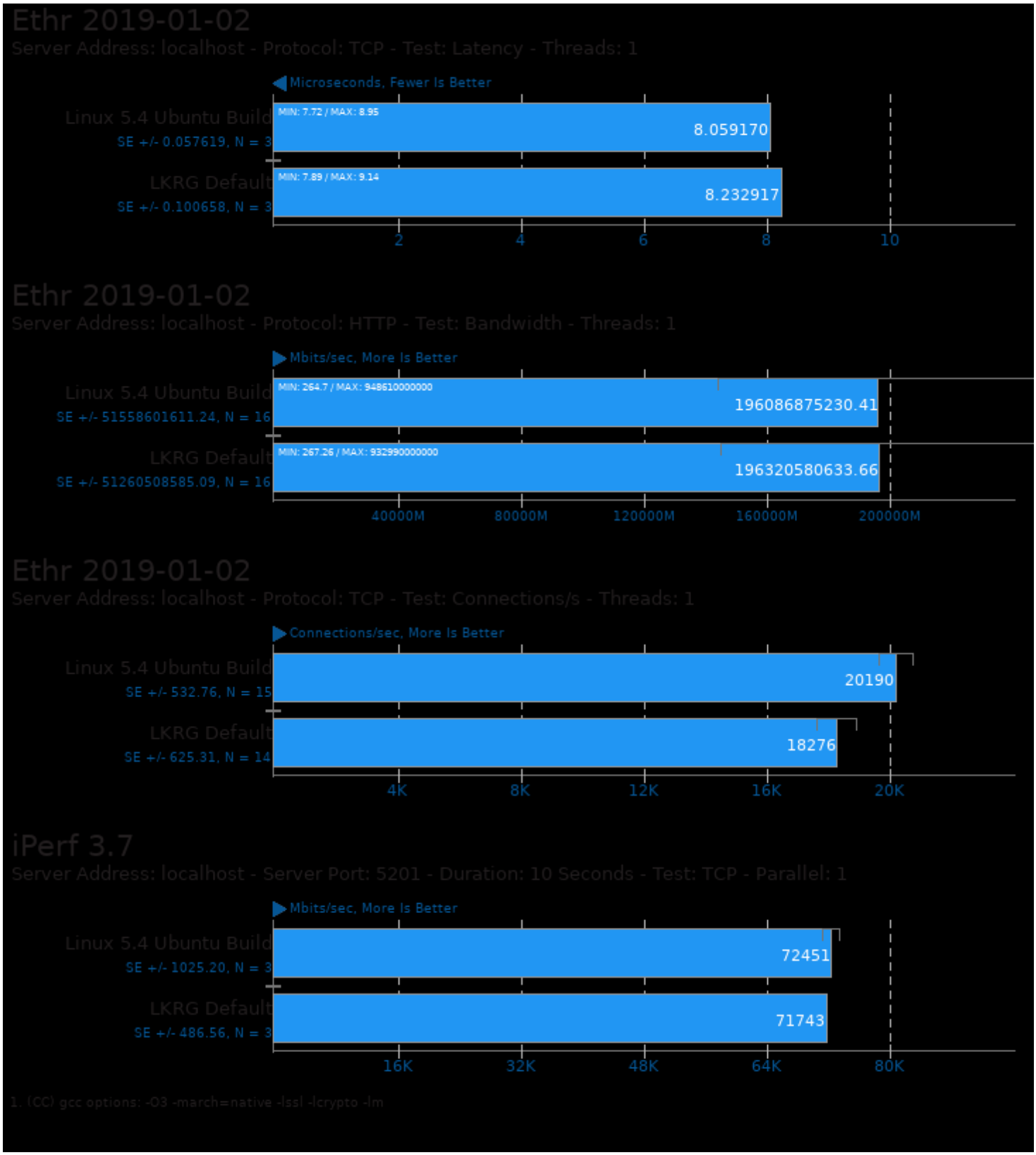


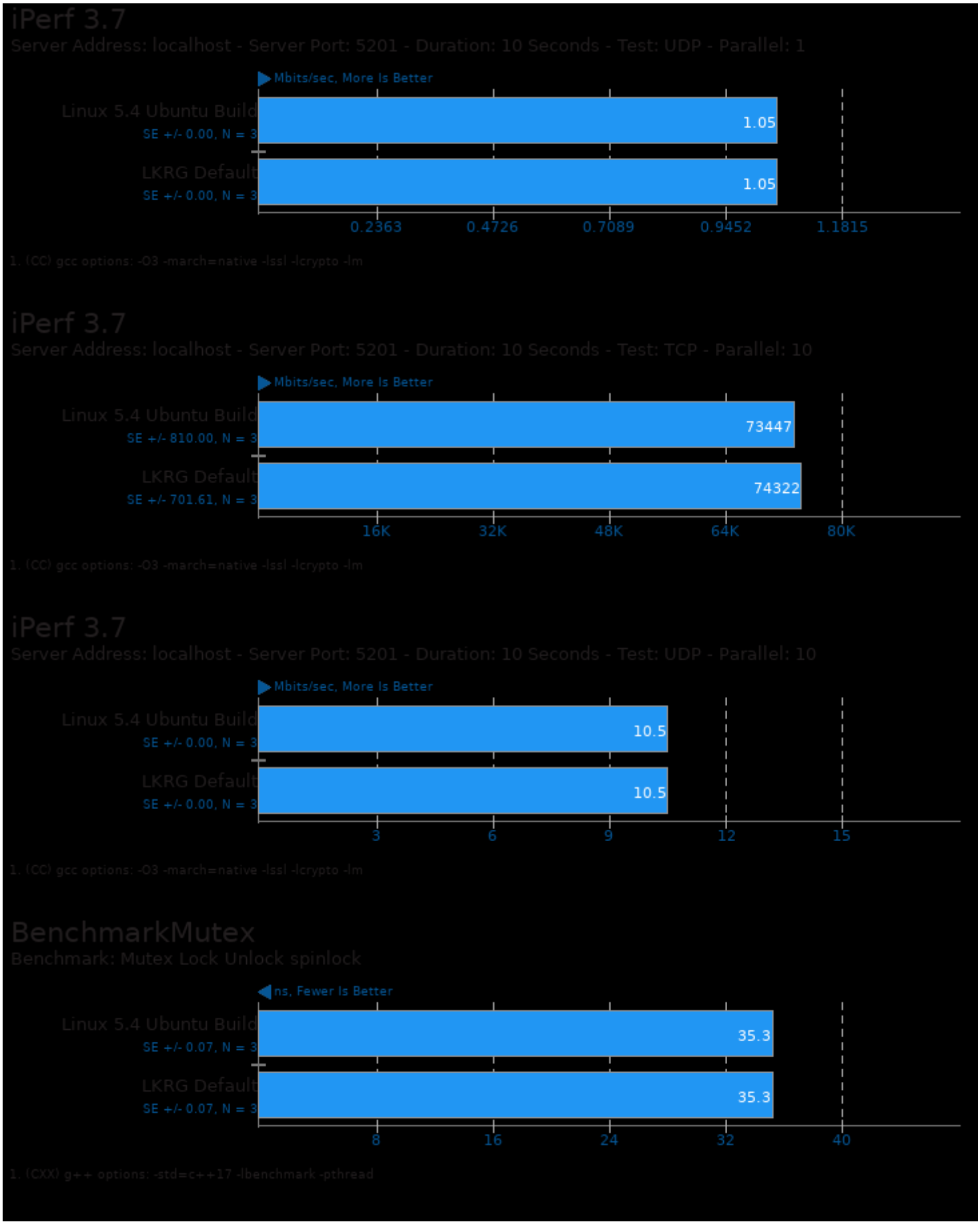

Mlpack Benchmark
Benchmark: scikit_ica
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.53, N = 6
45.10
LKRG Default
SE +/- 0.13, N = 3
43.79
10
20
30
40
50
Mlpack Benchmark
Benchmark: scikit_qda
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.54, N = 3
63.72
LKRG Default
SE +/- 0.20, N = 3
62.42
14
28
42
56
70
Mlpack Benchmark
Benchmark: scikit_svm
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.02, N = 3
13.30
LKRG Default
SE +/- 0.02, N = 3
13.32
3
6
9
12
15
Mlpack Benchmark
Benchmark: scikit_linearridgeregression
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.03, N = 15
2.45
LKRG Default
SE +/- 0.03, N = 15
2.42
0.5513
1.1026
1.6539
2.2052
2.7565


Sunflow Rendering System 0.07.2
Global Illumination + Image Synthesis
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.011, N = 3
1.129
LKRG Default
SE +/- 0.010, N = 3
1.140
0.2565
0.513
0.7695
1.026
1.2825
pmbench
Concurrent Worker Threads: 1 - Read-Write Ratio: 100% Reads
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0002, N = 3
0.0241
LKRG Default
SE +/- 0.0001, N = 3
0.0241
0.0054
0.0108
0.0162
0.0216
0.027
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread
pmbench
Concurrent Worker Threads: 1 - Read-Write Ratio: 100% Writes
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0003, N = 3
0.0267
LKRG Default
SE +/- 0.0001, N = 3
0.0270
0.0061
0.0122
0.0183
0.0244
0.0305
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread
pmbench
Concurrent Worker Threads: 16 - Read-Write Ratio: 100% Reads
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0004, N = 15
0.0358
LKRG Default
SE +/- 0.0003, N = 3
0.0379
0.0085
0.017
0.0255
0.034
0.0425
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread


pmbench
Concurrent Worker Threads: 16 - Read-Write Ratio: 100% Writes
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0004, N = 3
0.0806
LKRG Default
SE +/- 0.0002, N = 3
0.0837
0.0188
0.0376
0.0564
0.0752
0.094
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread
pmbench
Concurrent Worker Threads: 1 - Read-Write Ratio: 80% Reads 20% Writes
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0001, N = 3
0.0666
LKRG Default
SE +/- 0.0002, N = 3
0.0664
0.015
0.03
0.045
0.06
0.075
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread
pmbench
Concurrent Worker Threads: 16 - Read-Write Ratio: 80% Reads 20% Writes
us - Average Page Latency, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.0004, N = 3
0.0866
LKRG Default
SE +/- 0.0003, N = 3
0.0879
0.0198
0.0396
0.0594
0.0792
0.099
1. (CC) gcc options: -lm -luuid -lxml2 -m64 -pthread
PostMark 1.51
Disk Transaction Performance
TPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 102.67, N = 3
8825
LKRG Default
SE +/- 66.00, N = 3
7076
2K
4K
6K
8K
10K
1. (CC) gcc options: -O3

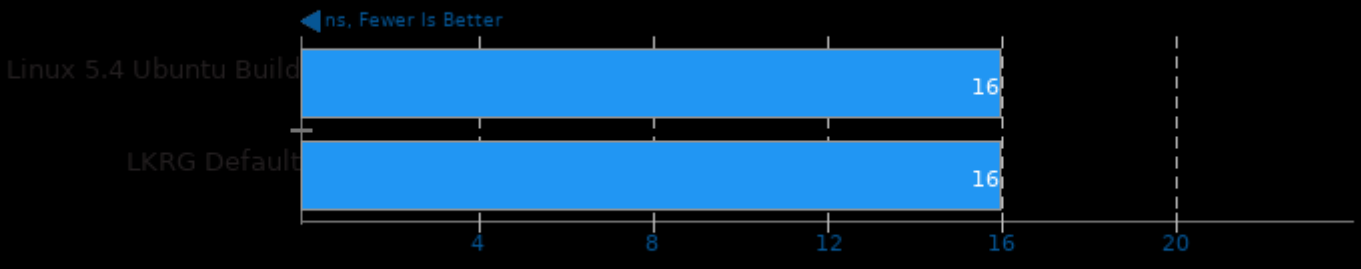
Core i9 9900KS Intel Linux LKRG Testing




iPerf 3.7
Server Address: localhost - Server Port: 5201 - Duration: 10 Seconds - Test: UDP - Parallel: 1
Mbits/sec, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.00, N = 3
1.05
LKRG Default
SE +/- 0.00, N = 3
1.05
0.2363
0.4726
0.7089
0.9452
1.1815
1. (CC) gcc options: -O3 -march=native -lssl -lcrypto -lm
iPerf 3.7
Server Address: localhost - Server Port: 5201 - Duration: 10 Seconds - Test: TCP - Parallel: 10
Mbits/sec, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 810.00, N = 3
73447
LKRG Default
SE +/- 701.61, N = 3
74322
16K
32K
48K
64K
80K
1. (CC) gcc options: -O3 -march=native -lssl -lcrypto -lm
iPerf 3.7
Server Address: localhost - Server Port: 5201 - Duration: 10 Seconds - Test: UDP - Parallel: 10
Mbits/sec, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.00, N = 3
10.5
LKRG Default
SE +/- 0.00, N = 3
10.5
3
6
9
12
15
1. (CC) gcc options: -O3 -march=native -lssl -lcrypto -lm
BenchmarkMutex
Benchmark: Mutex Lock Unlock spinlock
ns, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.07, N = 3
35.3
LKRG Default
SE +/- 0.07, N = 3
35.3
8
16
24
32
40
1. (CXX) g++ options: -std=c++17 -lbenchmark -pthread

BenchmarkMutex

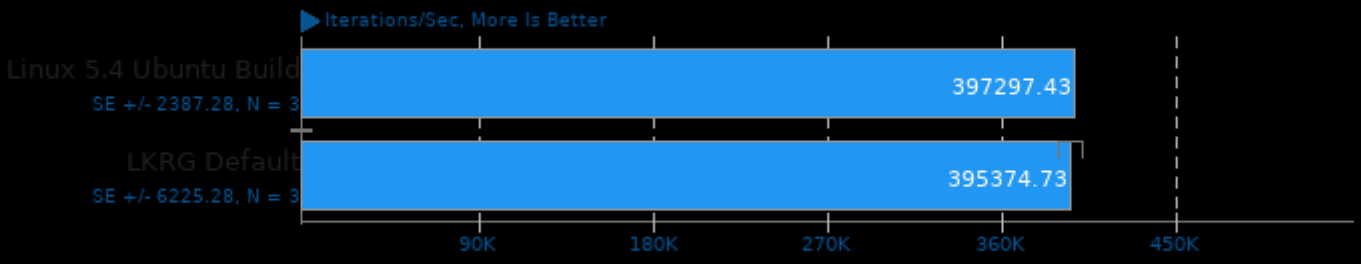
Benchmark: Mutex Lock Unlock std::mutex



1. (CXX) g++ options: -std=c++17 -lbenchmark -pthread

Coremark 1.0

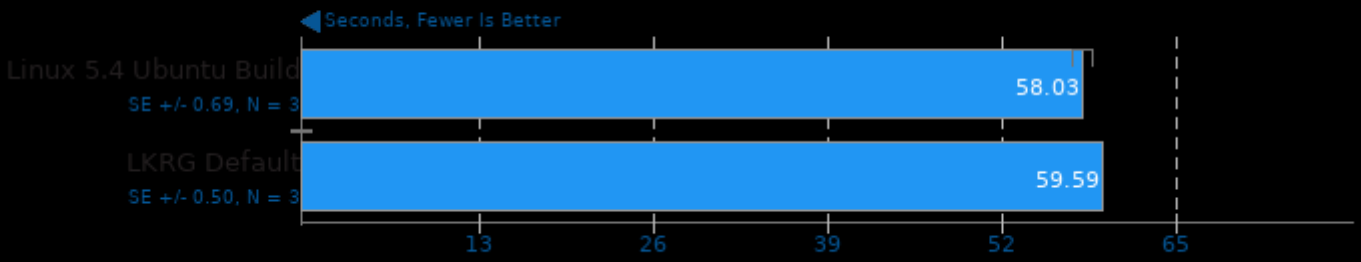
CoreMark Size 666 - Iterations Per Second



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

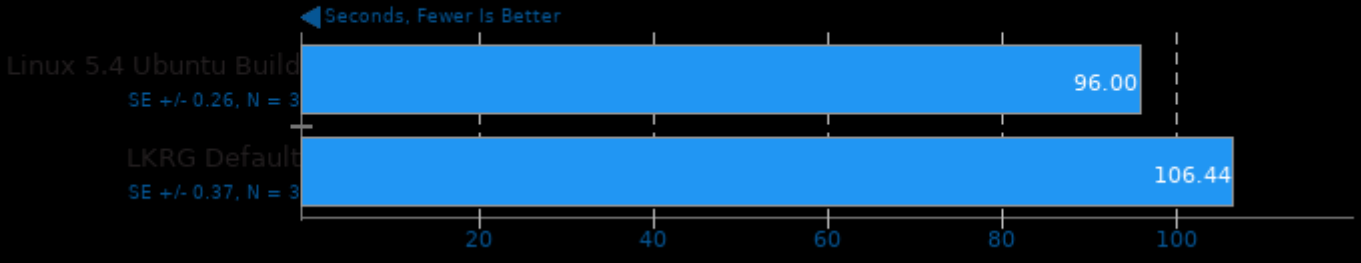
Timed FFmpeg Compilation 4.2.2

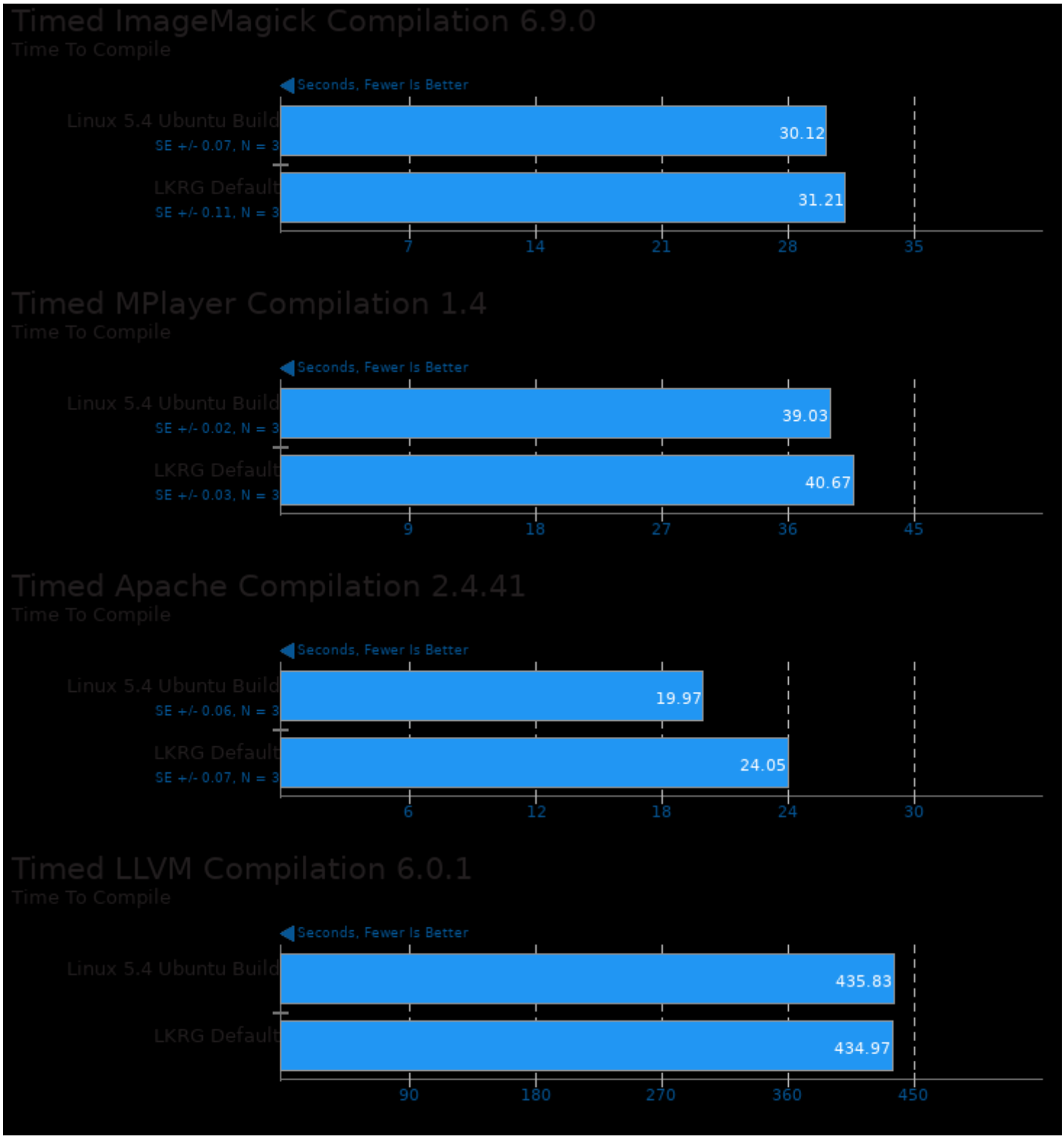
Time To Compile

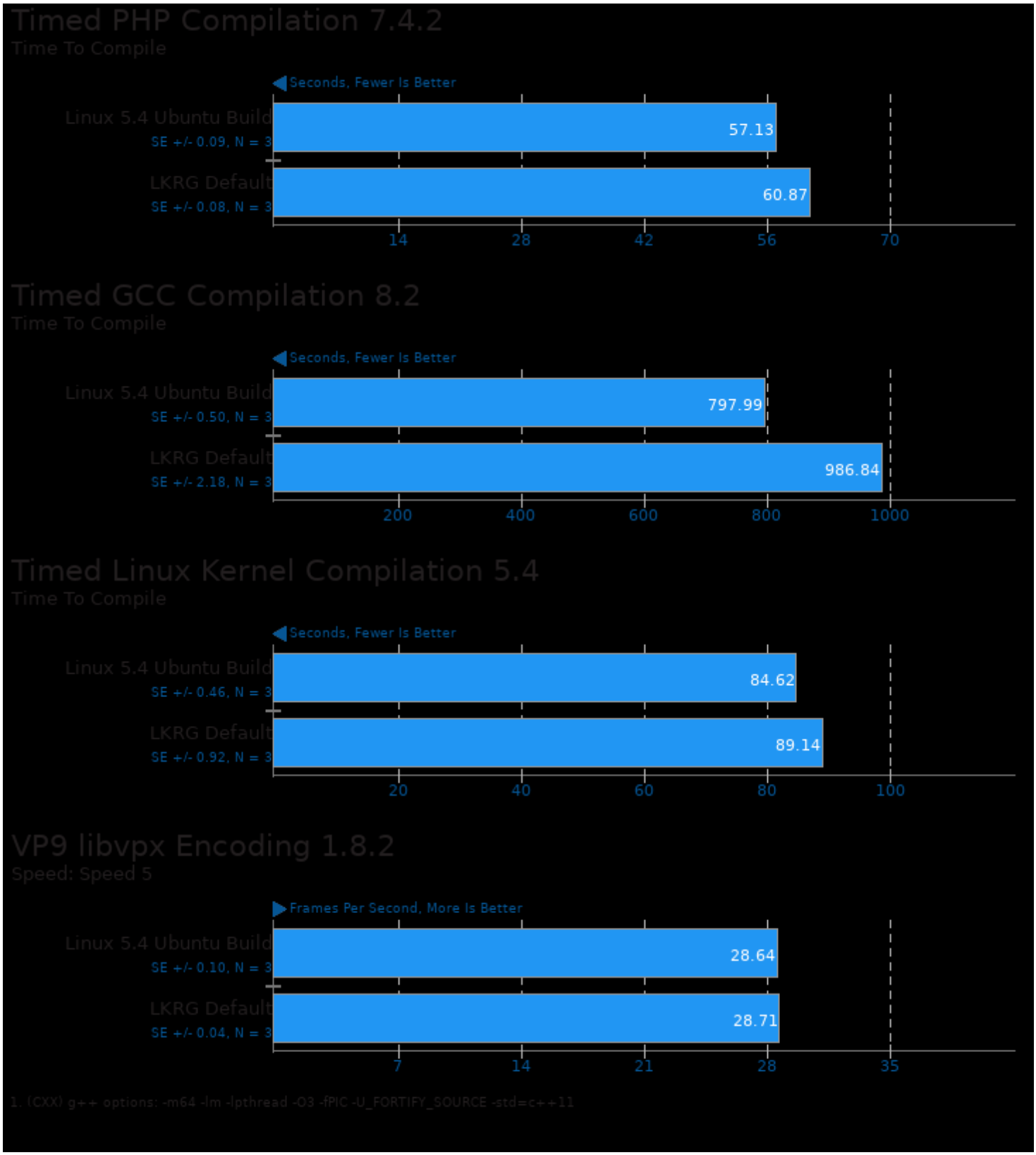


Timed GDB GNU Debugger Compilation 9.1

Time To Compile

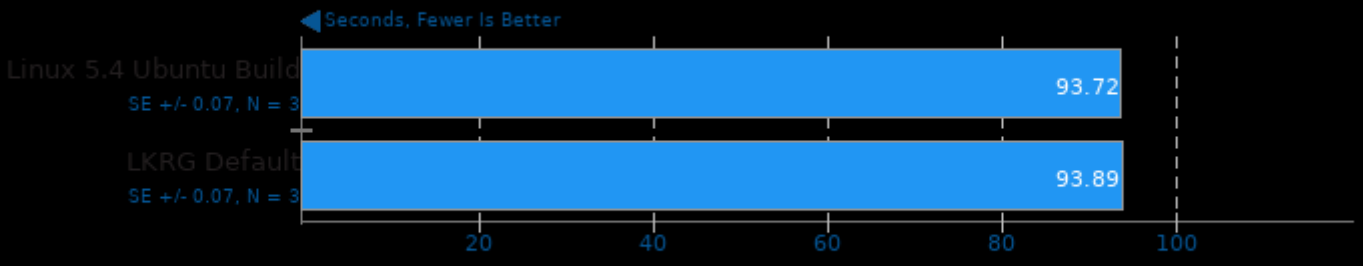



Timed ImageMagick Compilation 6.9.0
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.07, N = 3
30.12
LKRG Default
SE +/- 0.11, N = 3
31.21
7
14
21
28
35
Timed MPlayer Compilation 1.4
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.02, N = 3
39.03
LKRG Default
SE +/- 0.03, N = 3
40.67
9
18
27
36
45
Timed Apache Compilation 2.4.41
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.06, N = 3
19.97
LKRG Default
SE +/- 0.07, N = 3
24.05
6
12
18
24
30
Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
435.83
LKRG Default
434.97
90
180
270
360
450


Timed PHP Compilation 7.4.2
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.09, N = 3
57.13
LKRG Default
SE +/- 0.08, N = 3
60.87
14
28
42
56
70
Timed GCC Compilation 8.2
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.50, N = 3
797.99
LKRG Default
SE +/- 2.18, N = 3
986.84
200
400
600
800
1000
Timed Linux Kernel Compilation 5.4
Time To Compile
Seconds, Fewer Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.46, N = 3
84.62
LKRG Default
SE +/- 0.92, N = 3
89.14
20
40
60
80
100
VP9 libvpx Encoding 1.8.2
Speed: Speed 5
Frames Per Second, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 0.10, N = 3
28.64
LKRG Default
SE +/- 0.04, N = 3
28.71
7
14
21
28
35
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -U_FORTIFY_SOURCE -std=c++11

Tachyon 0.99b6

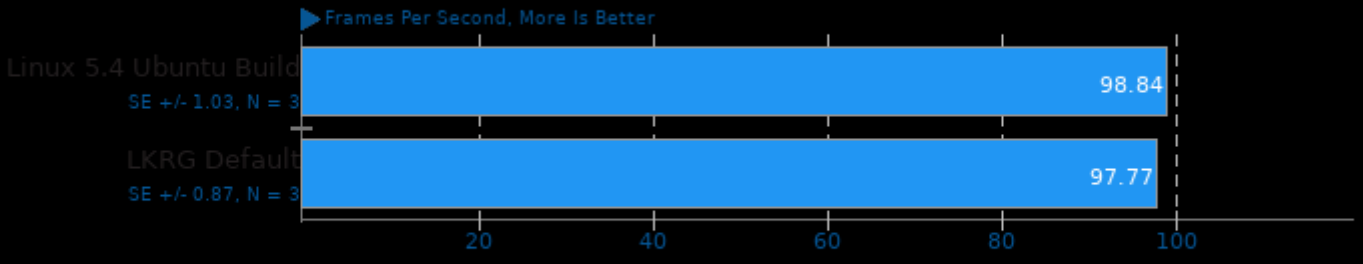
Total Time



1. (CC) gcc options: -m64 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread

x264 2019-12-17

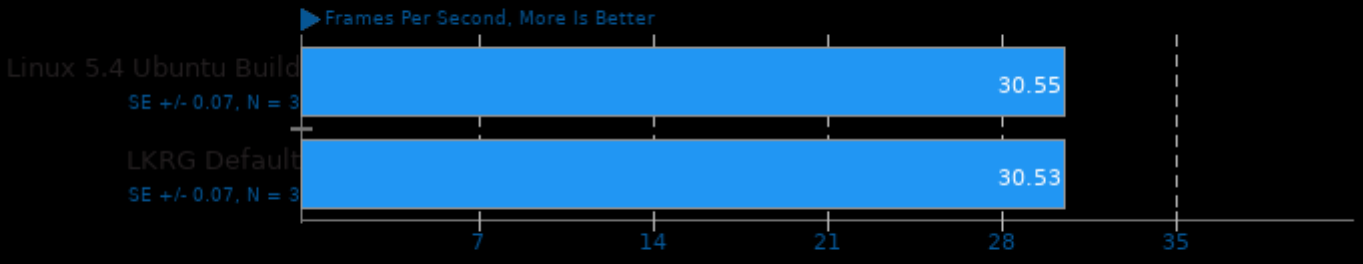
H.264 Video Encoding



1. (CC) gcc options: -ldl -lavformat -lavcodec -lavutil -lswscale -m64 -lm -lpthread -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectori

SVT-AV1 0.8

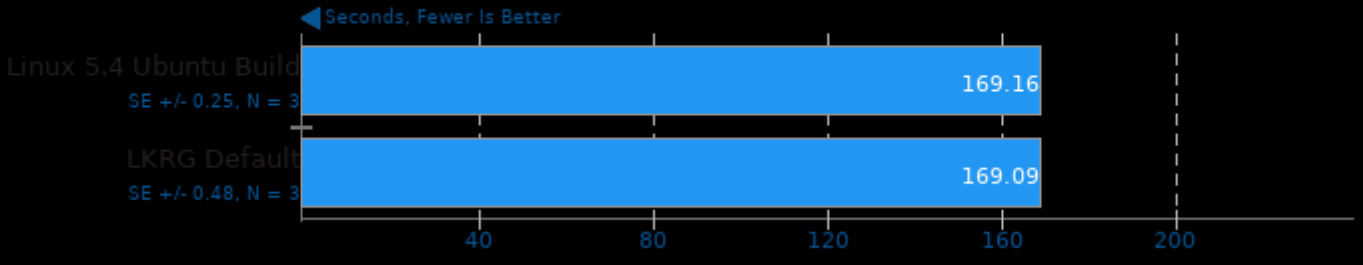
Encoder Mode: Enc Mode 8 - Input: 1080p



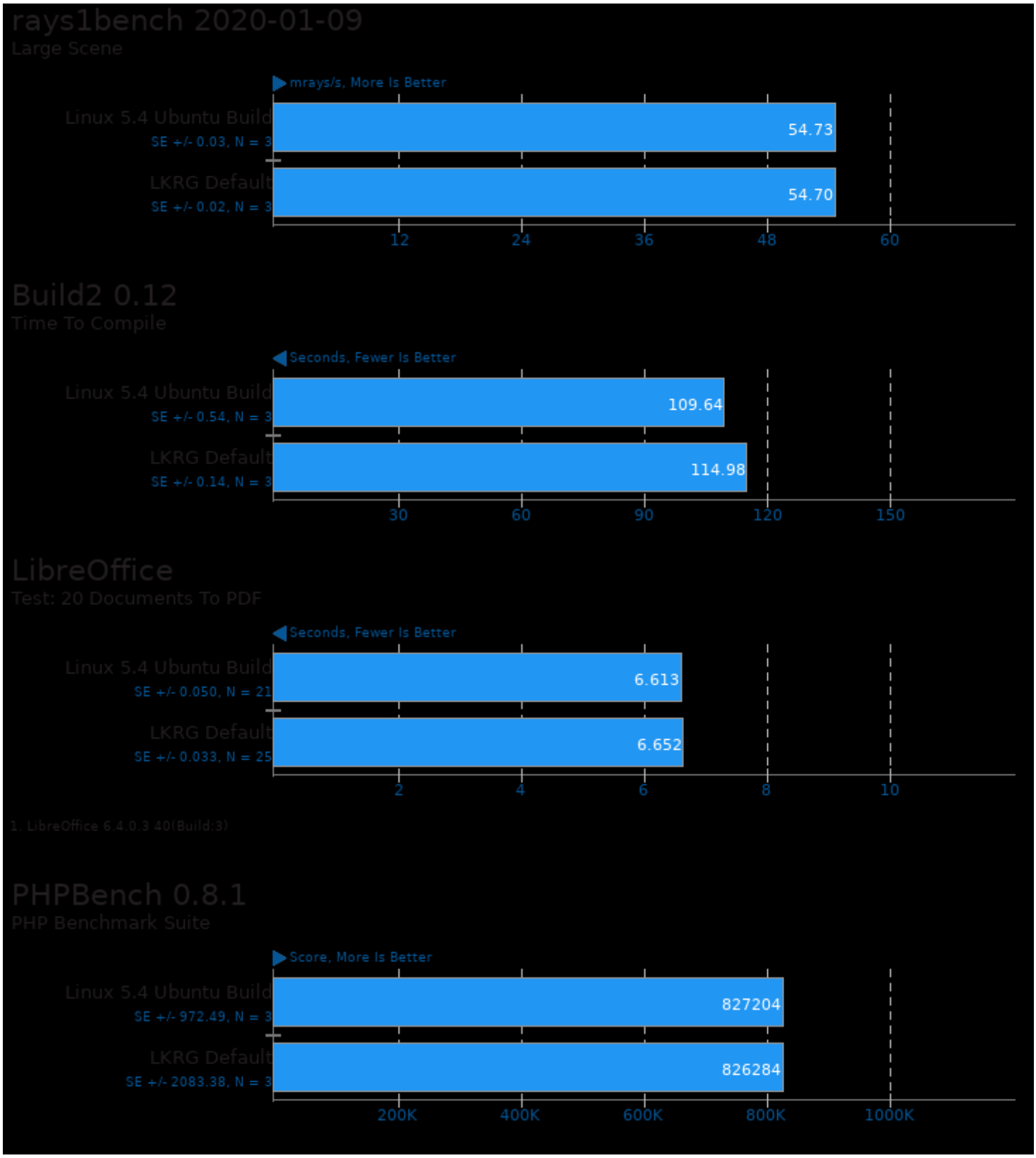
1. (CXX) g++ options: -fPIE -fPIC -pie

Blender 2.82

Blend File: BMW27 - Compute: CPU-Only

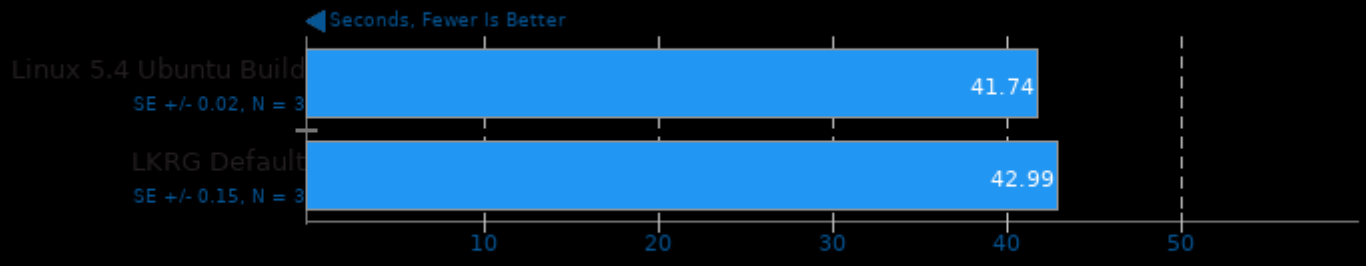


Core i9 9900KS Intel Linux LKRG Testing



SQLite 3.30.1

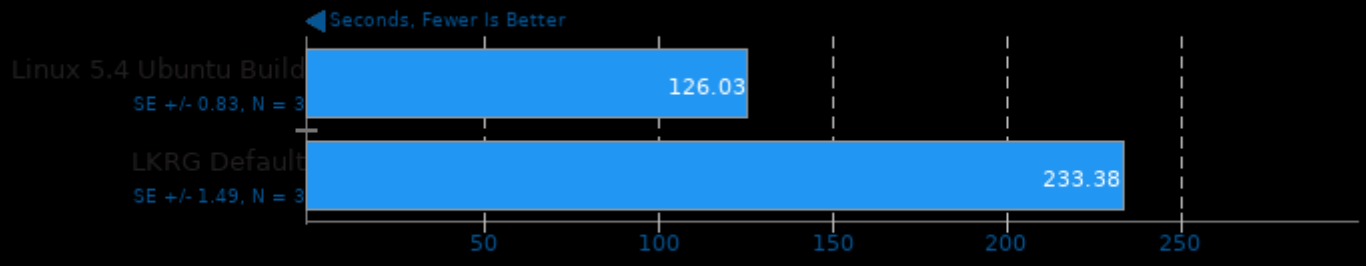
Threads / Copies: 1



1. (CC) gcc options: -O2 -lreadline -ltermcap -lz -lm -ldl -lpthread

SQLite 3.30.1

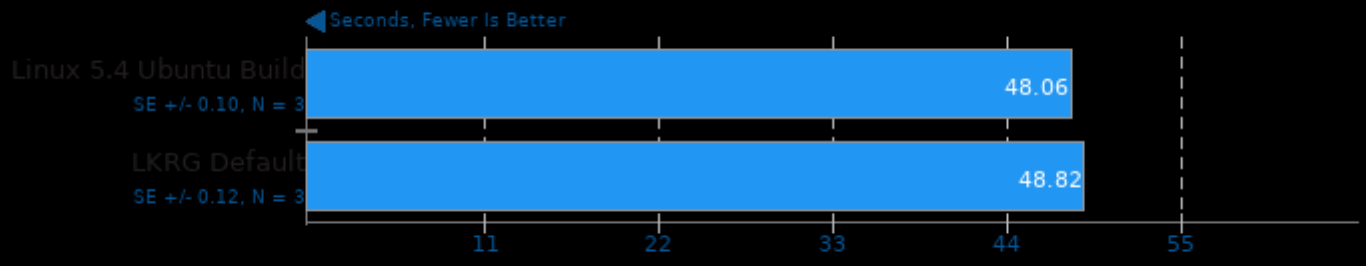
Threads / Copies: 8



1. (CC) gcc options: -O2 -lreadline -ltermcap -lz -lm -ldl -lpthread

SQLite Speedtest 3.30

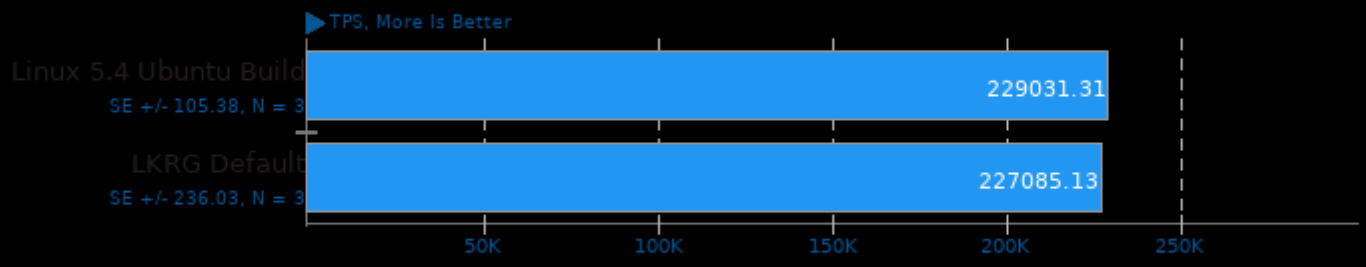
Timed Time - Size 1,000



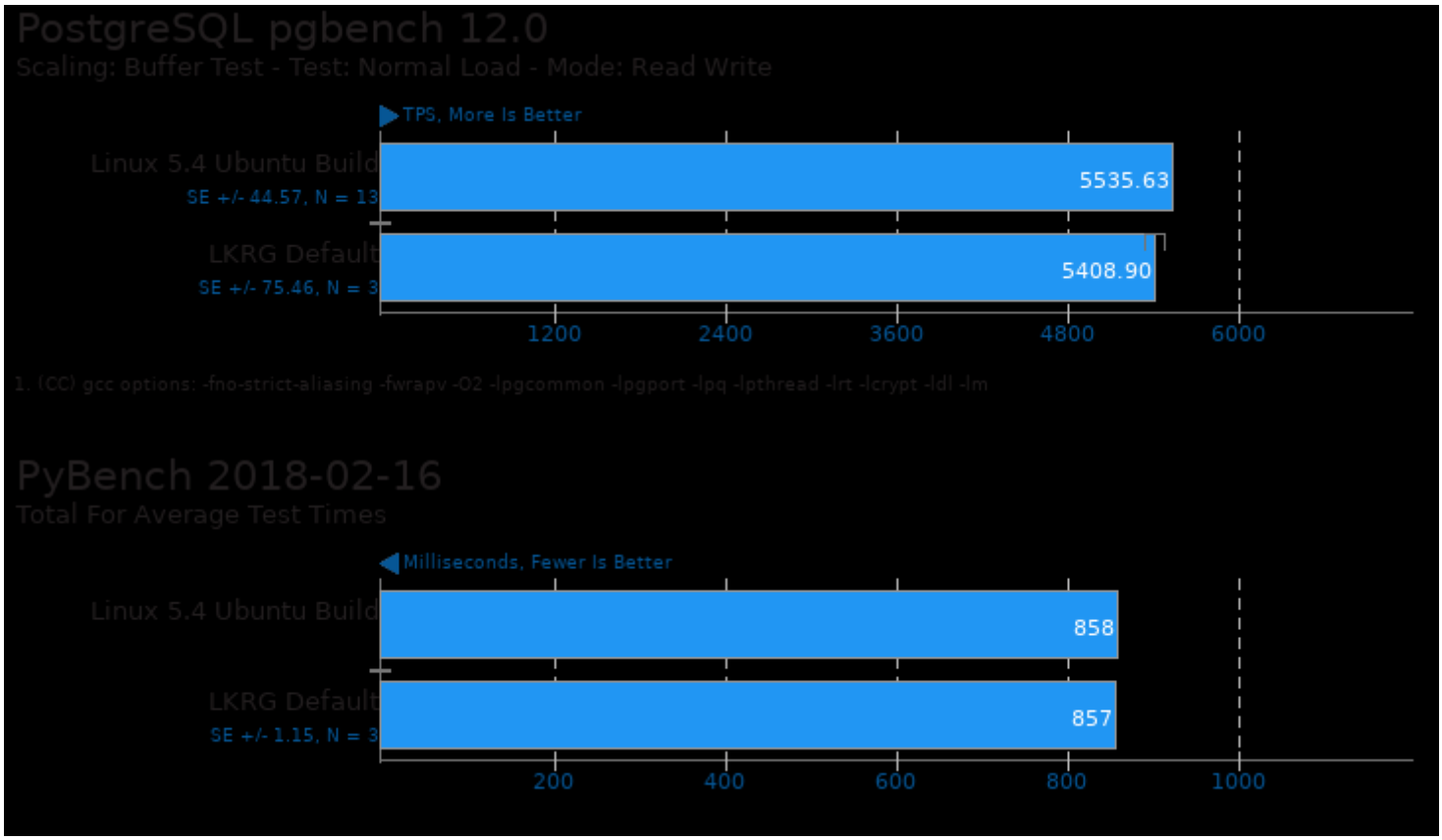
1. (CC) gcc options: -O2 -ldl -lz -lpthread

PostgreSQL pgbench 12.0

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

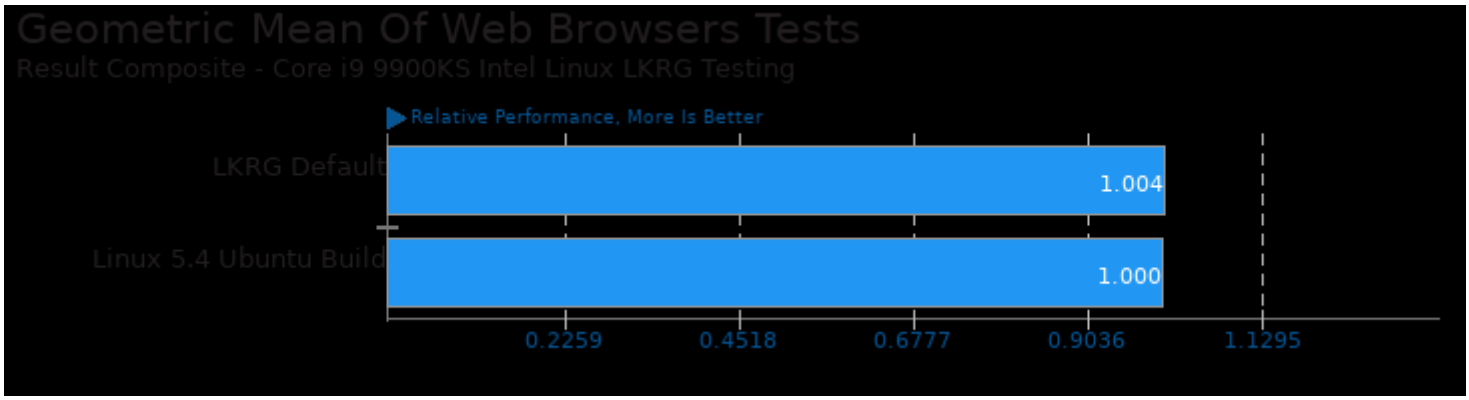


1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

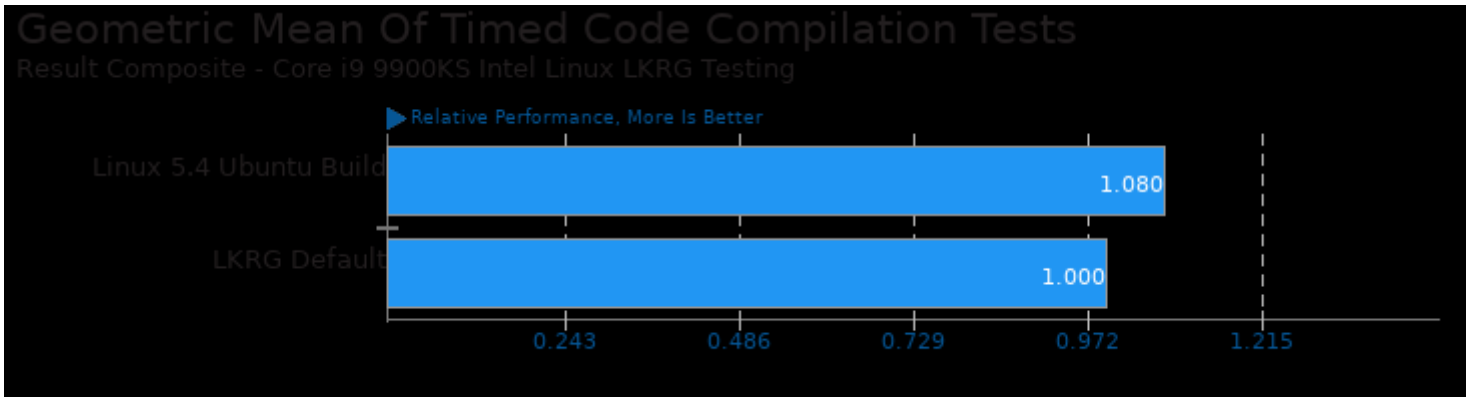

PostgreSQL pgbench 12.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Write
TPS, More Is Better
Linux 5.4 Ubuntu Build
SE +/- 44.57, N = 13
5535.63
LKRG Default
SE +/- 75.46, N = 3
5408.90
1200
2400
3600
4800
6000
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm
PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Linux 5.4 Ubuntu Build
858
LKRG Default
SE +/- 1.15, N = 3
857
200
400
600
800
1000

Core i9 9900KS Intel Linux LKRG Testing

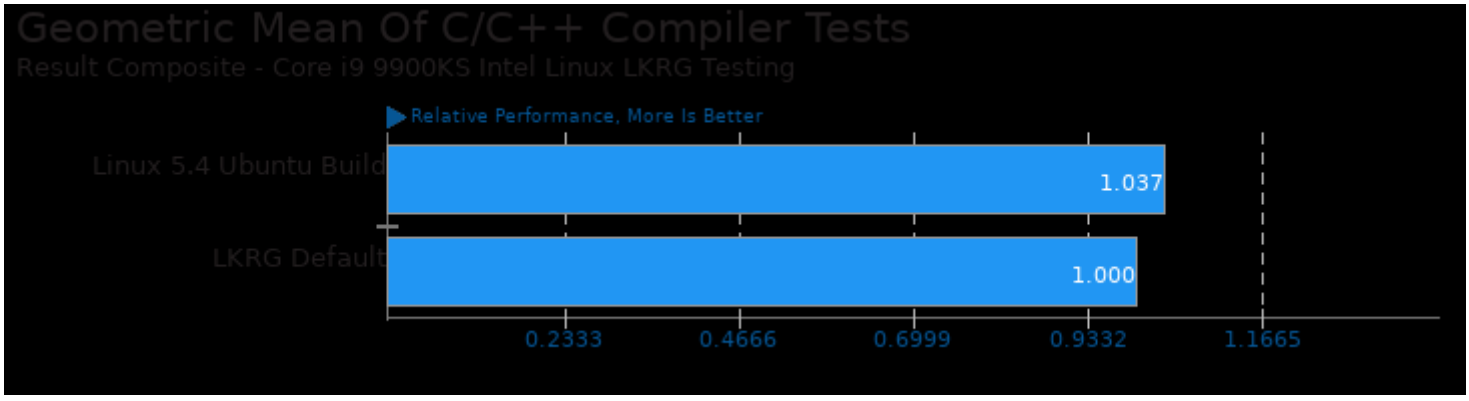
These geometric means are based upon test groupings / test suites for this result file.



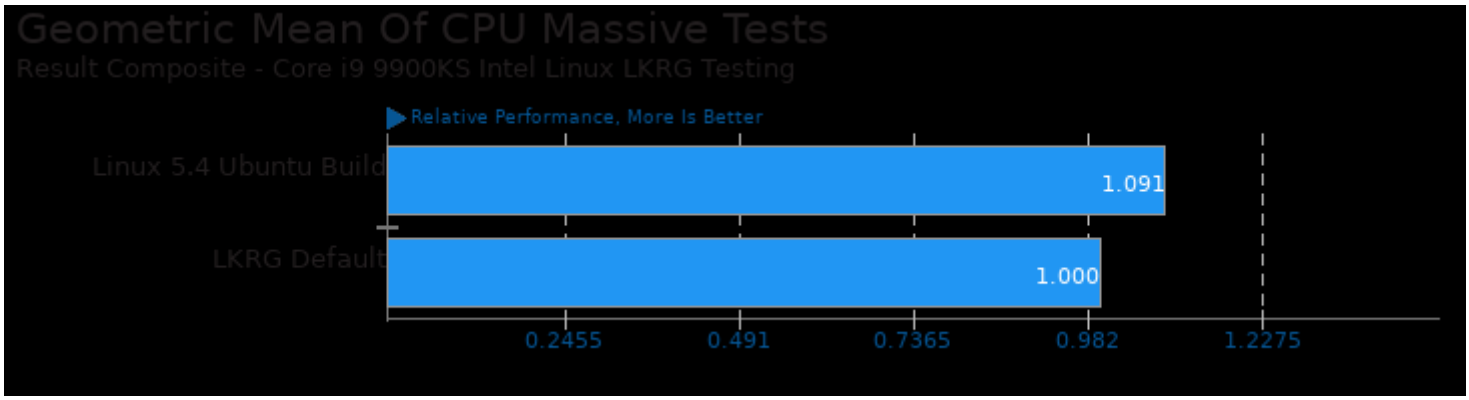
Geometric mean based upon tests: system/selenium



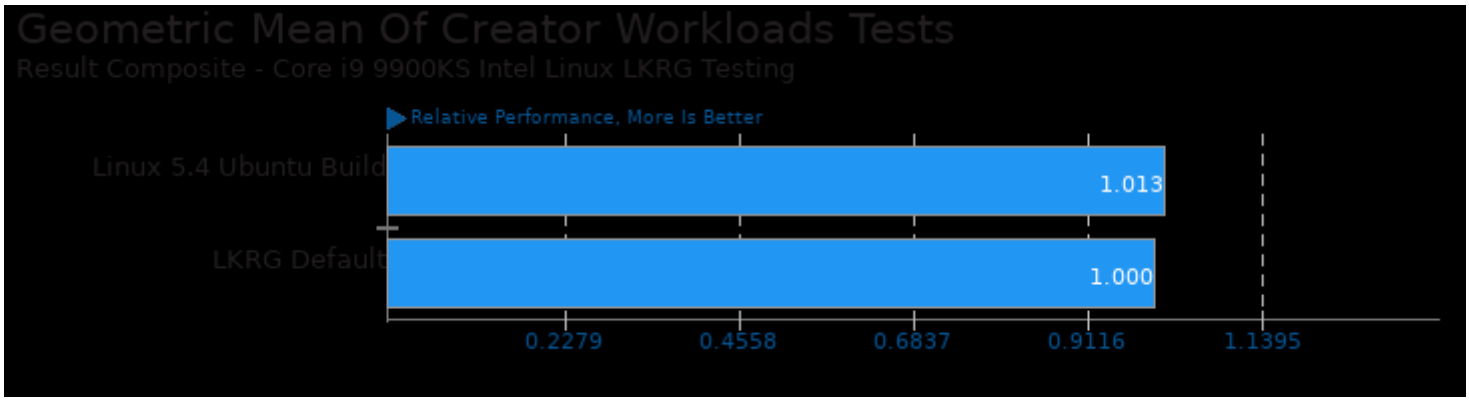
Geometric mean based upon tests: pts/build-apache, pts/build-php, pts/build-linux-kernel, pts/build-imagemagick, pts/build-gcc, pts/build-gdb, pts/build-llvm, pts/build-ffmpeg, pts/build-mplayer and pts/build2



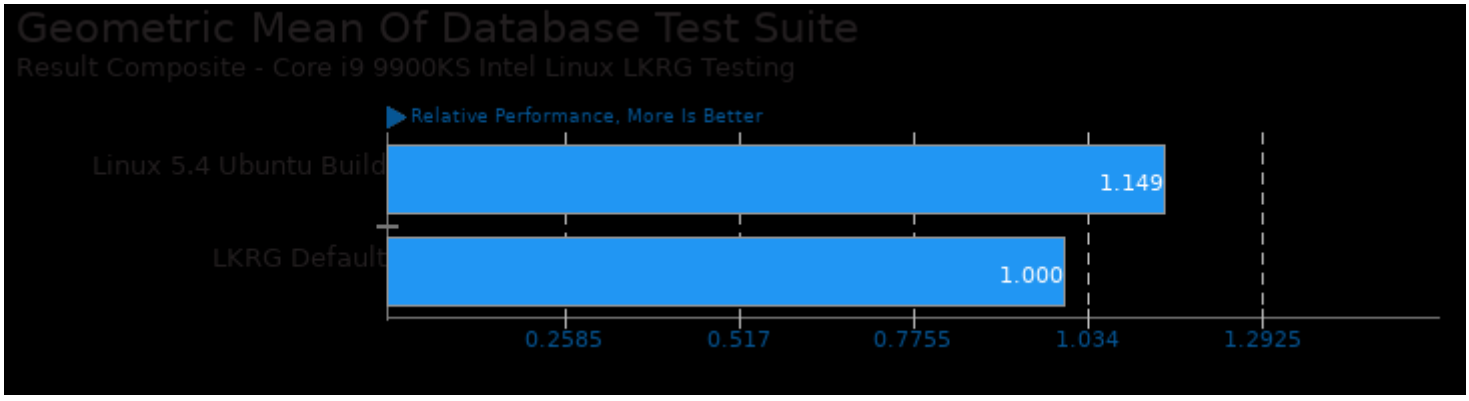
Geometric mean based upon tests: pts/vpxenc, pts/build-php, pts/build-imagemagick, pts/build-llvm, pts/pgbench, pts/sqlite-speedtest, pts/x264, pts/svt-av1, pts/build-gdb, pts/build-ffmpeg, pts/build-apache, pts/build-mplayer and pts/tachyon



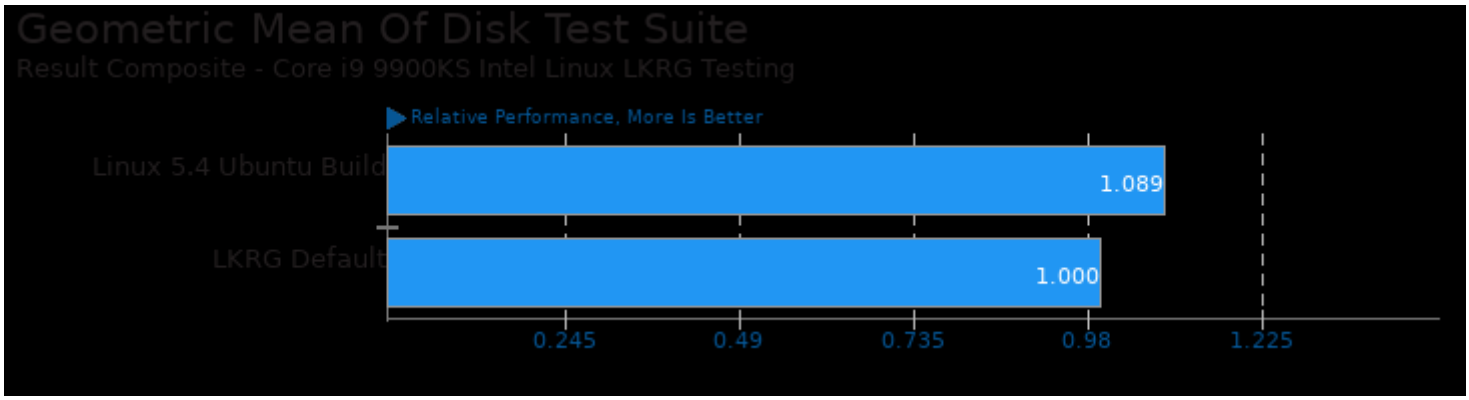
Geometric mean based upon tests: pts/build-apache, pts/build-gcc, pts/build-llvm, pts/build-linux-kernel, pts/build-php, pts/ctx-clock, pts/svt-av1, pts/vpxenc, pts/x264, pts/java-scimark2, pts/numpy, pts/pgbench, pts/phpbench, pts/sockperf, pts/stress-ng, pts/t-test1, pts/tachyon and pts/blender



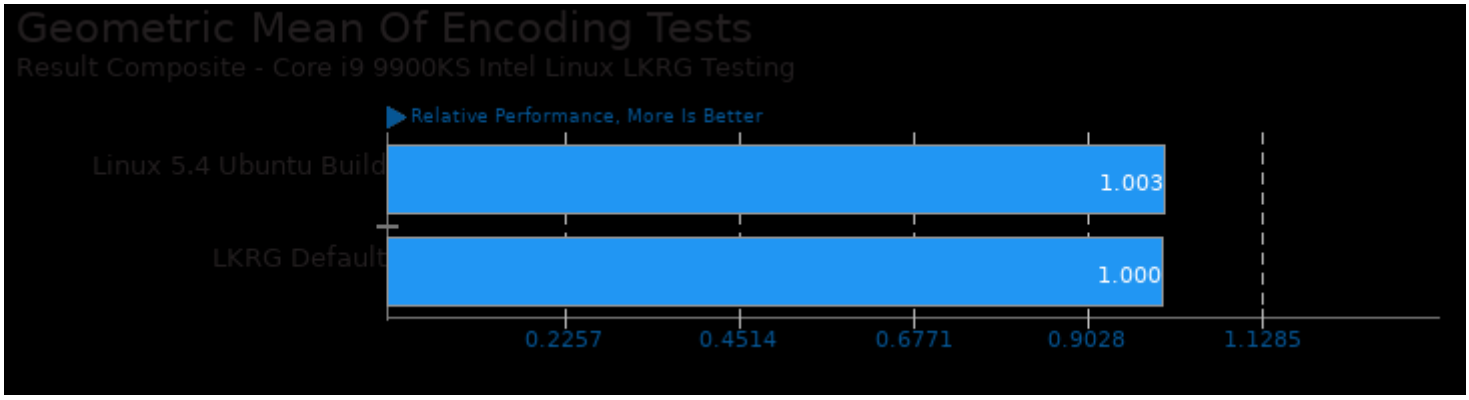
Geometric mean based upon tests: pts/tachyon, pts/rays1bench, pts/blender, pts/x264, pts/vpxenc, pts/svt-av1, system/inkscape, system/rawtherapee and pts/deepspeech



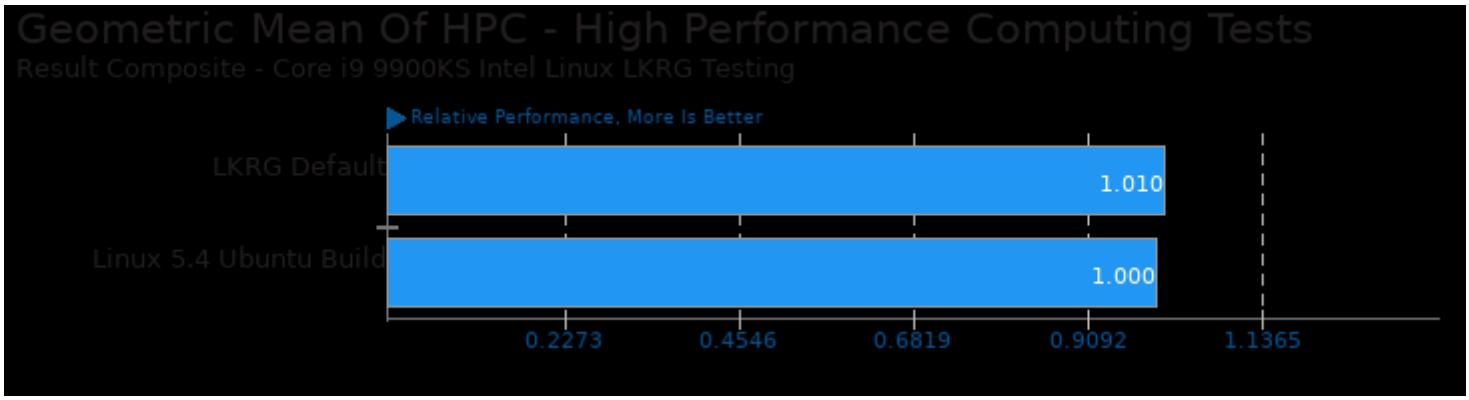
Geometric mean based upon tests: pts/sqlite, pts/sqlite-speedtest and pts/pgbench



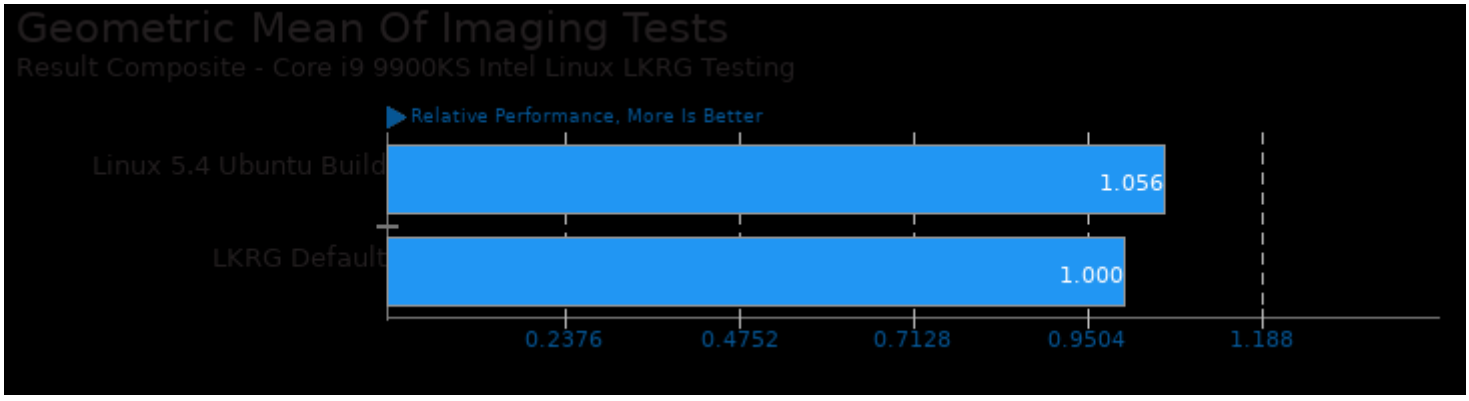
Geometric mean based upon tests: pts/sqlite, pts/postmark and pts/fio



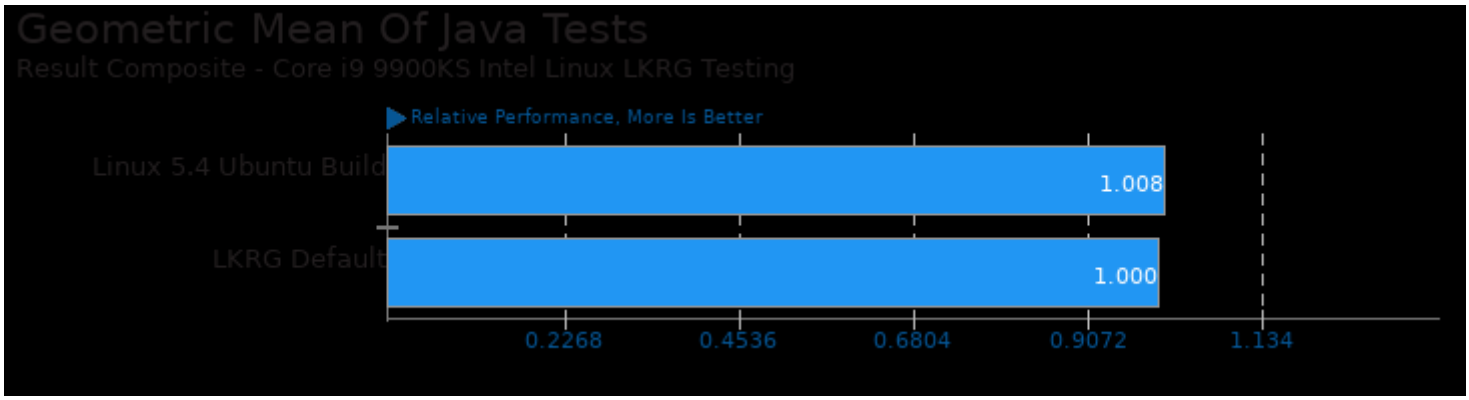
Geometric mean based upon tests: pts/x264, pts/vpxenc and pts/svt-av1



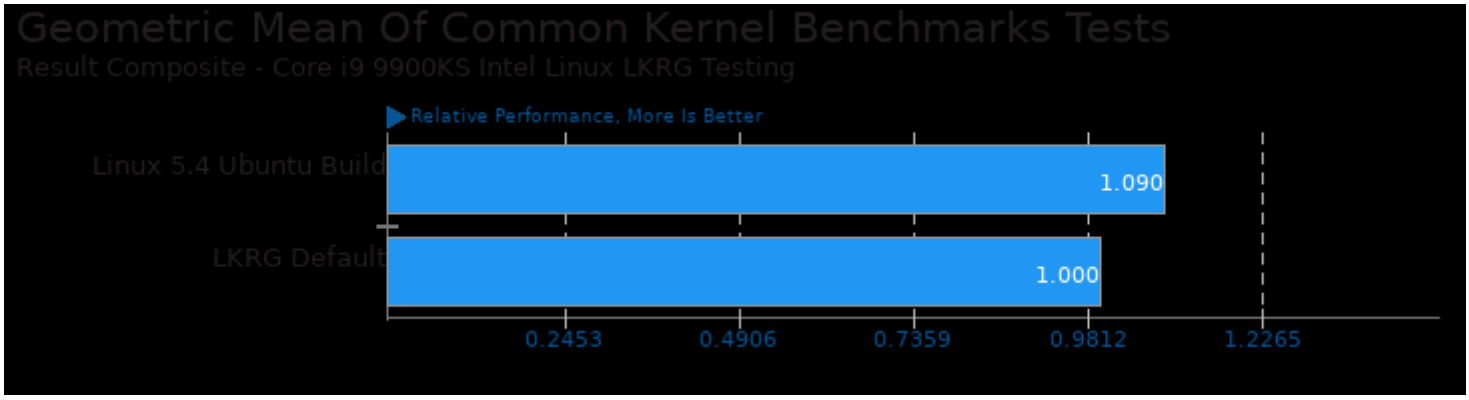
Geometric mean based upon tests: pts/numpy, pts/deepspeech and pts/mlpack



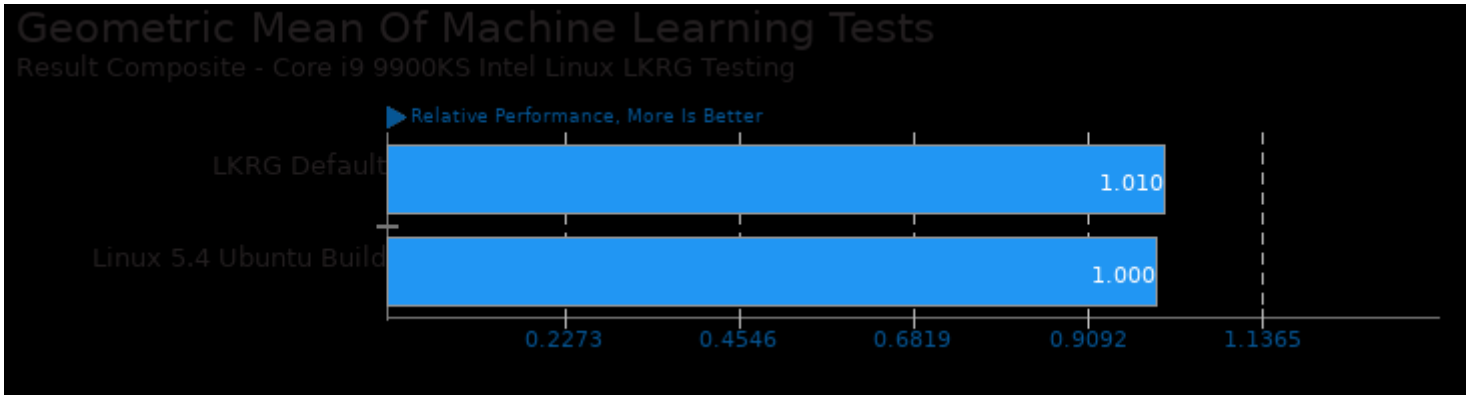
Geometric mean based upon tests: system/inkscape and system/rawtherapee



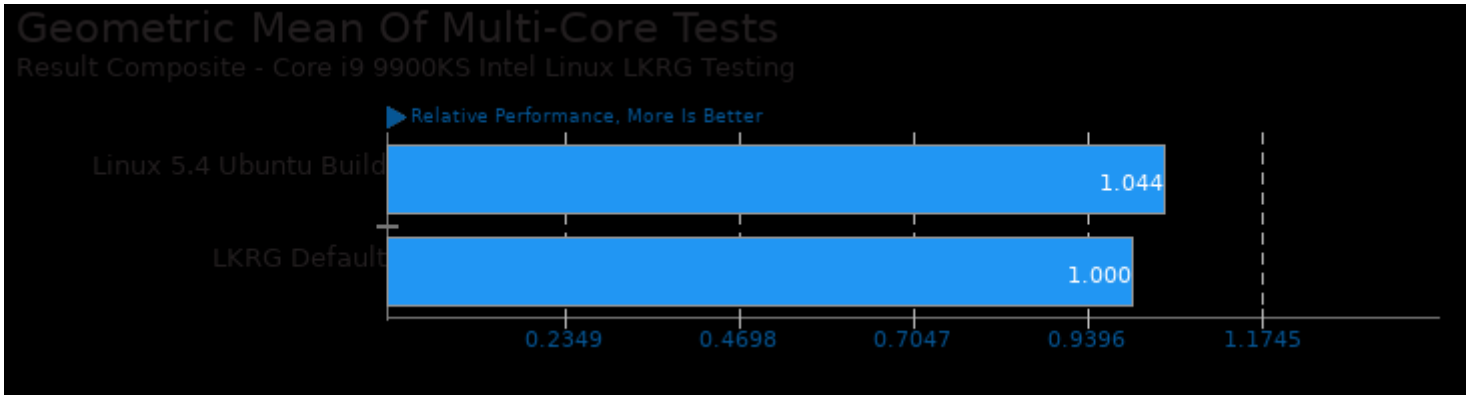
Geometric mean based upon tests: pts/sunflow and pts/java-scimark2



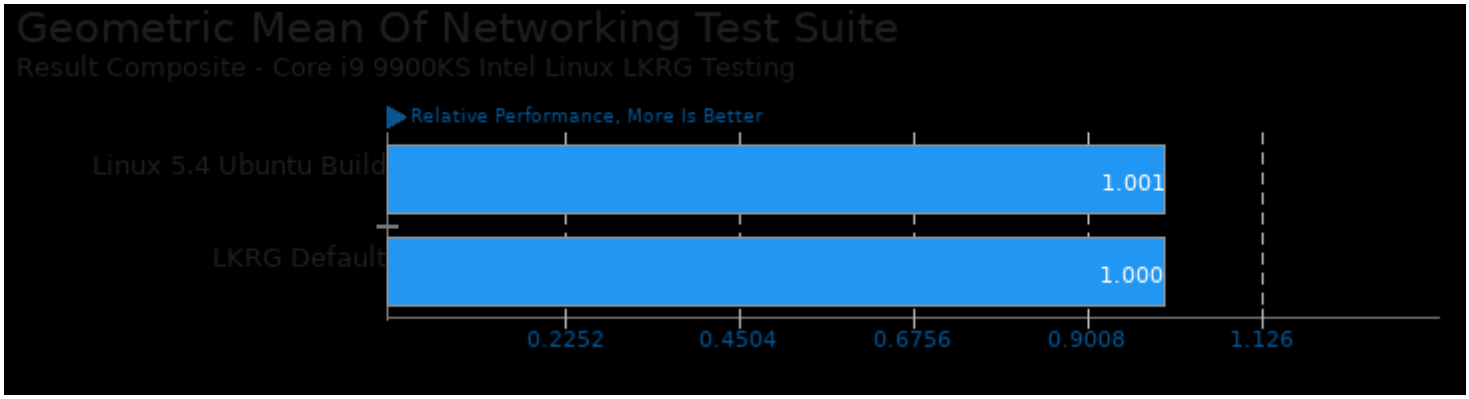
Geometric mean based upon tests: pts/postmark, pts/sqlite-speedtest, pts/pgbench, pts/pmbench, pts/t-test1, pts/ctx-clock, pts/mutex, pts/stress-ng, pts/ethr and pts/iperf



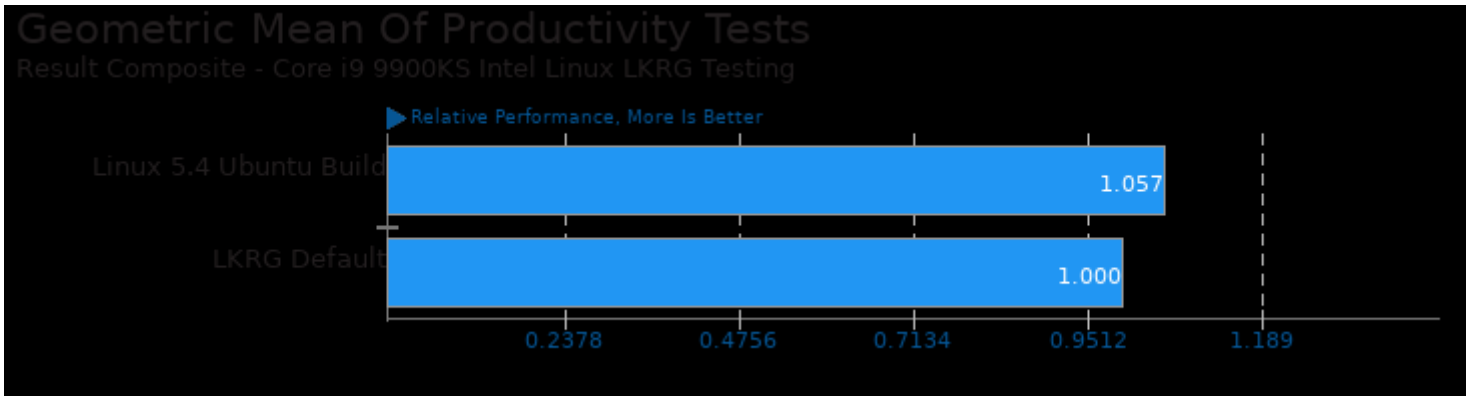
Geometric mean based upon tests: pts/numpy, pts/deepspeech and pts/mlpack



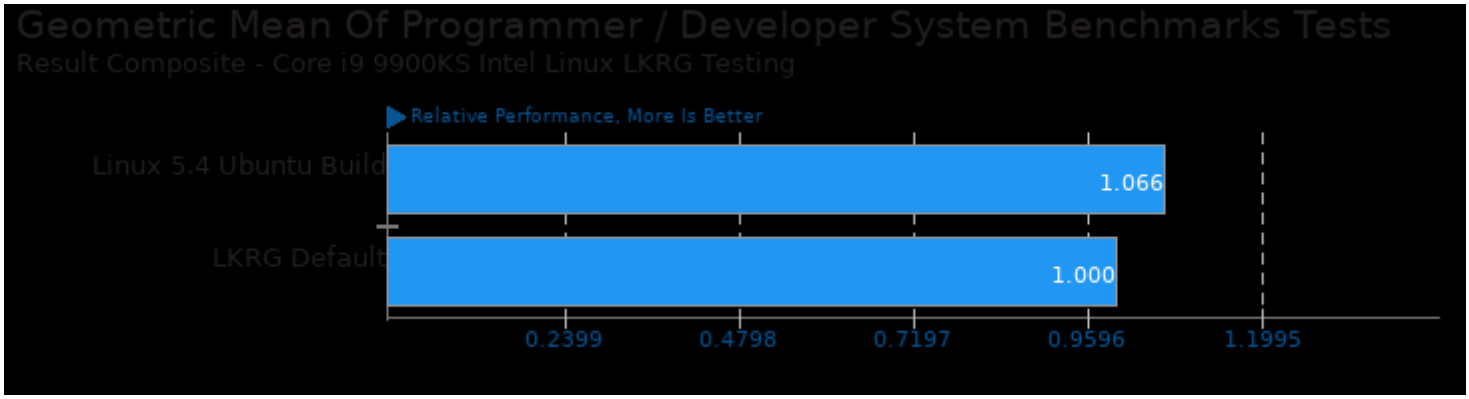
Geometric mean based upon tests: pts/blender, pts/tachyon, pts/rays1bench, pts/coremark, pts/x264, pts/vpxenc, pts/svt-av1, pts/build-apache, pts/build-php, pts/build-linux-kernel, pts/build-imagemagick, pts/build-gcc, pts/build-gdb, pts/build-llvm, pts/build-ffmpeg, pts/build-mplayer, pts/build2 and pts/pgbench



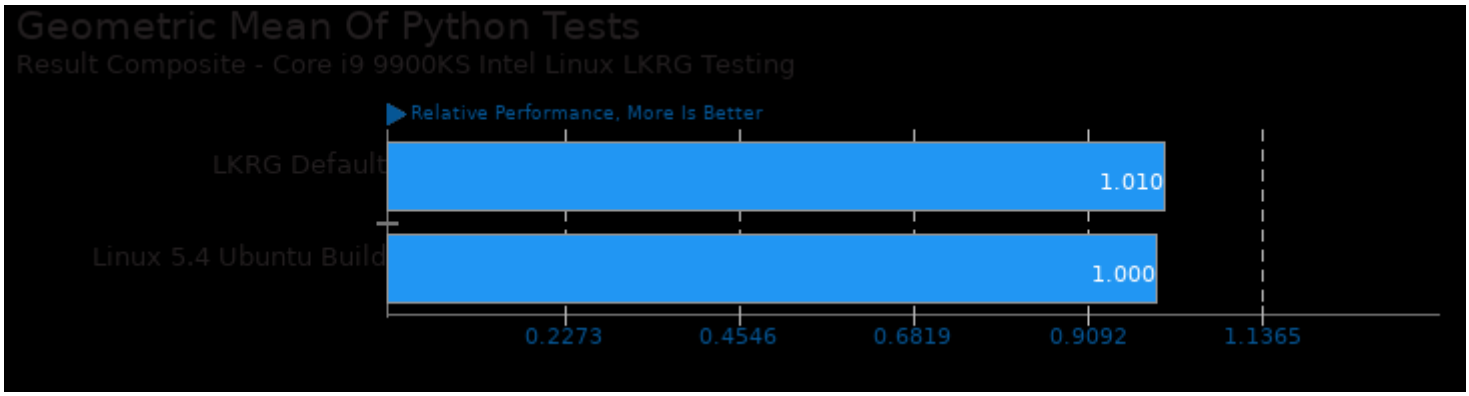
Geometric mean based upon tests: pts/sockperf, pts/ethr and pts/iperf



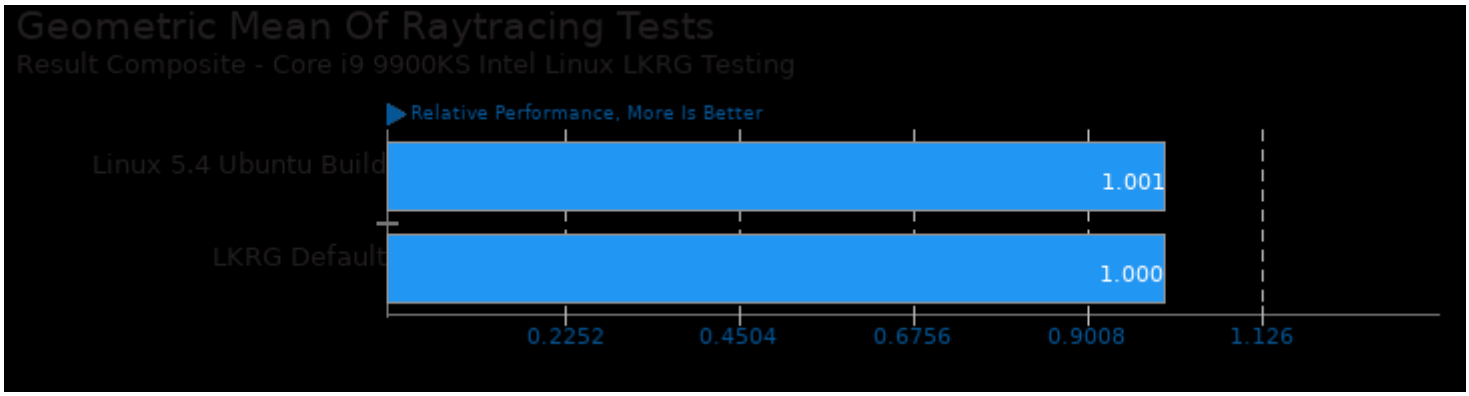
Geometric mean based upon tests: system/libreoffice and system/inkscape



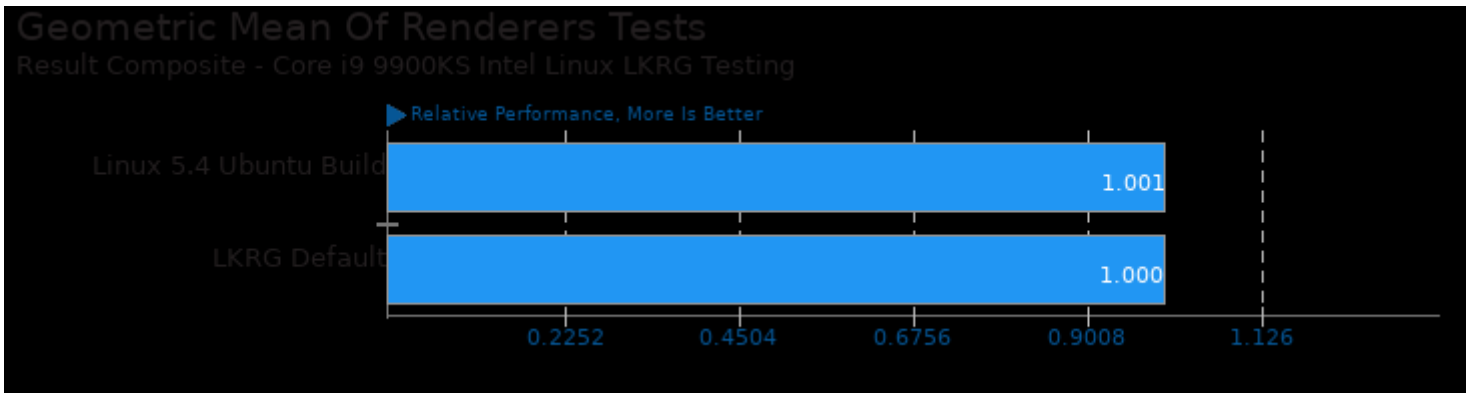
Geometric mean based upon tests: pts/sqlite-speedtest, pts/pybench, pts/build-apache, pts/build-php, pts/build-linux-kernel, pts/build-imagemagick, pts/build-gcc, pts/build-gdb, pts/build-llvm, pts/build-ffmpeg, pts/build-mplayer and pts/build2



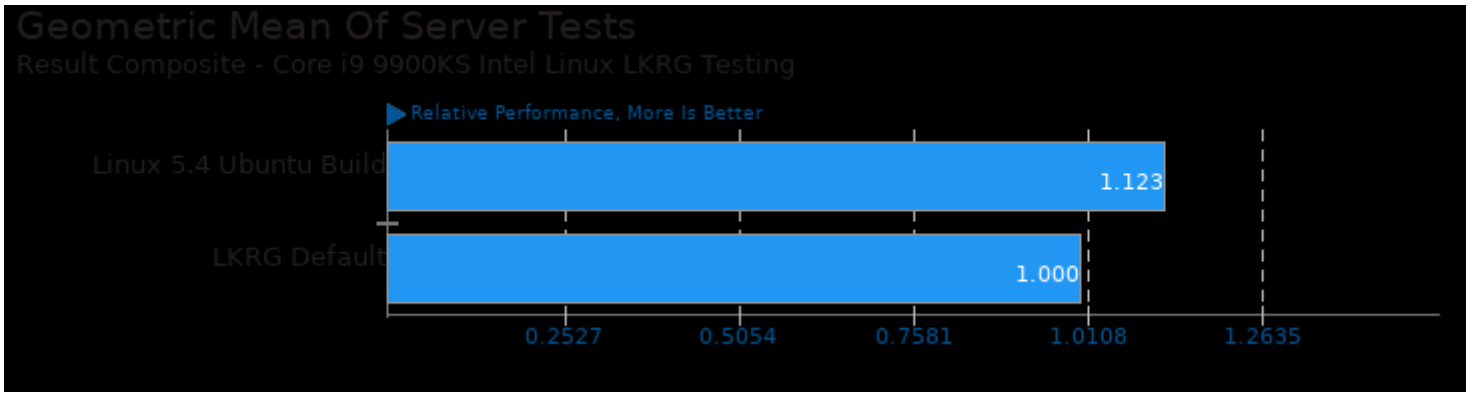
Geometric mean based upon tests: pts/pybench, pts/numpy and pts/mlpack



Geometric mean based upon tests: pts/tachyon and pts/rays1bench

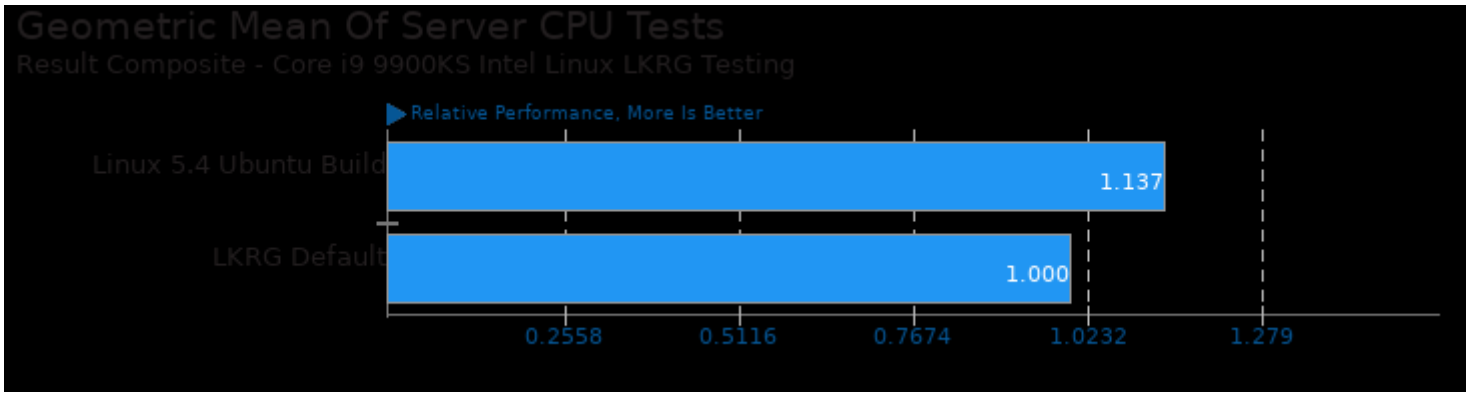


Geometric mean based upon tests: pts/tachyon, pts/rays1bench and pts/blender

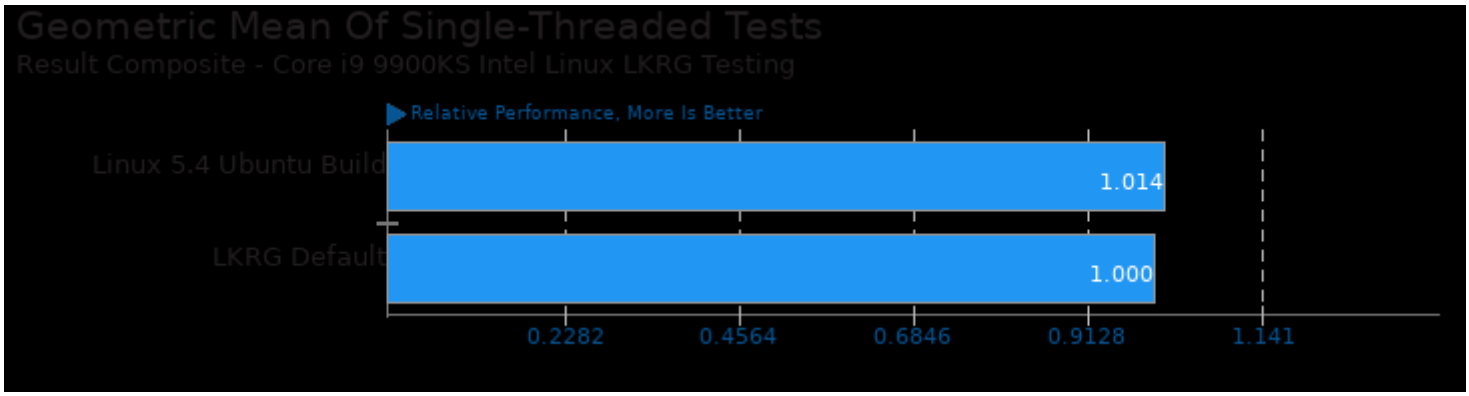


Geometric mean based upon tests: pts/pgbench, pts/phpbench, pts/sqlite and pts/sqlite-speedtest

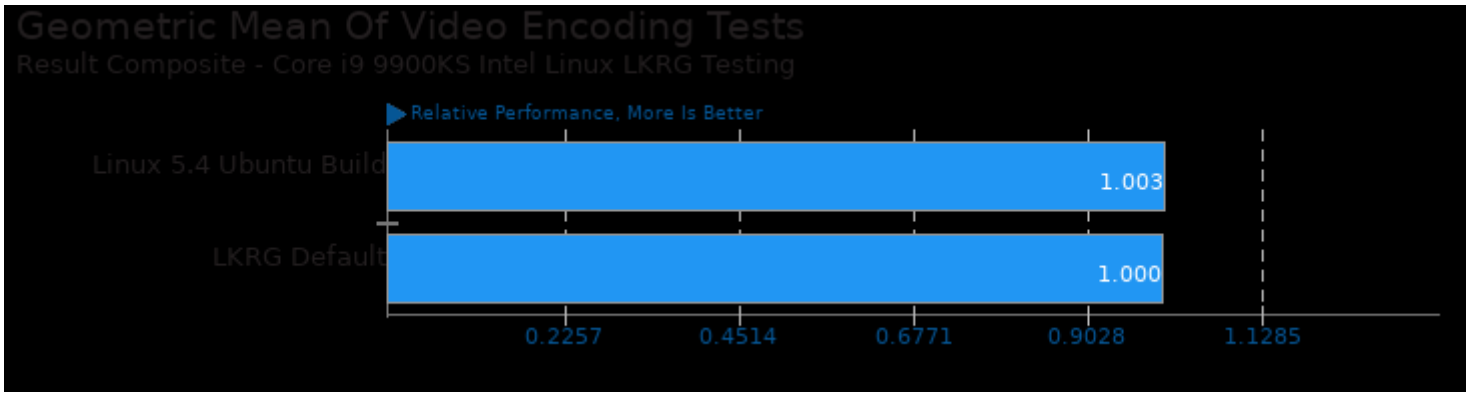
Core i9 9900KS Intel Linux LKRG Testing



Geometric mean based upon tests: pts/svt-av1, pts/x264, pts/build-gcc, pts/build-linux-kernel, pts/build-php, pts/build-llvm, pts/stress-ng, pts/ctx-clock, pts/blender, pts/pybench, pts/numpy and pts/phpbench



Geometric mean based upon tests: pts/java-scimark2, pts/numpy, pts/deepspeech, system/inkscape, pts/mutex, pts/pybench and pts/phpbench



Geometric mean based upon tests: pts/x264, pts/vpxenc and pts/svt-av1

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 11:22.