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10900K 2021

Intel Core i9-10900K testing with a Gigabyte Z490 AORUS MASTER (F3 BIOS) and Gigabyte AMD Radeon RX 5500/5500M / Pro 5500M 8GB on Ubuntu 20.10 via the Phoronix Test Suite.

Automated Executive Summary

2 had the most wins, coming in first place for 45% of the tests.

Based on the geometric mean of all complete results, the fastest (3) was 1.016x the speed of the slowest (1). 2 was 0.999x the speed of 3, 4 was 0.998x the speed of 2, 1 was 0.986x the speed of 4.

Test Systems:

1

2

3

4

Processor: Intel Core i9-10900K @ 5.30GHz (10 Cores / 20 Threads), Motherboard: Gigabyte Z490 AORUS MASTER (F3 BIOS), Chipset: Intel Comet Lake PCH, Memory: 16GB, Disk: Samsung SSD 970 EVO 250GB, Graphics: Gigabyte AMD Radeon RX 5500/5500M / Pro 5500M 8GB (1900/875MHz), Audio: Realtek ALC1220, Monitor: ASUS MG28U, Network: Intel + Intel Wi-Fi 6 AX201

OS: Ubuntu 20.10, Kernel: 5.11.0-051100rc2daily20210106-generic (x86_64) 20210105, Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, OpenGL: 4.6 Mesa 20.2.1 (LLVM 11.0.0), Vulkan: 1.2.131, Compiler: GCC 10.2.0, File-System: ext4, Screen Resolution: 3840x2160

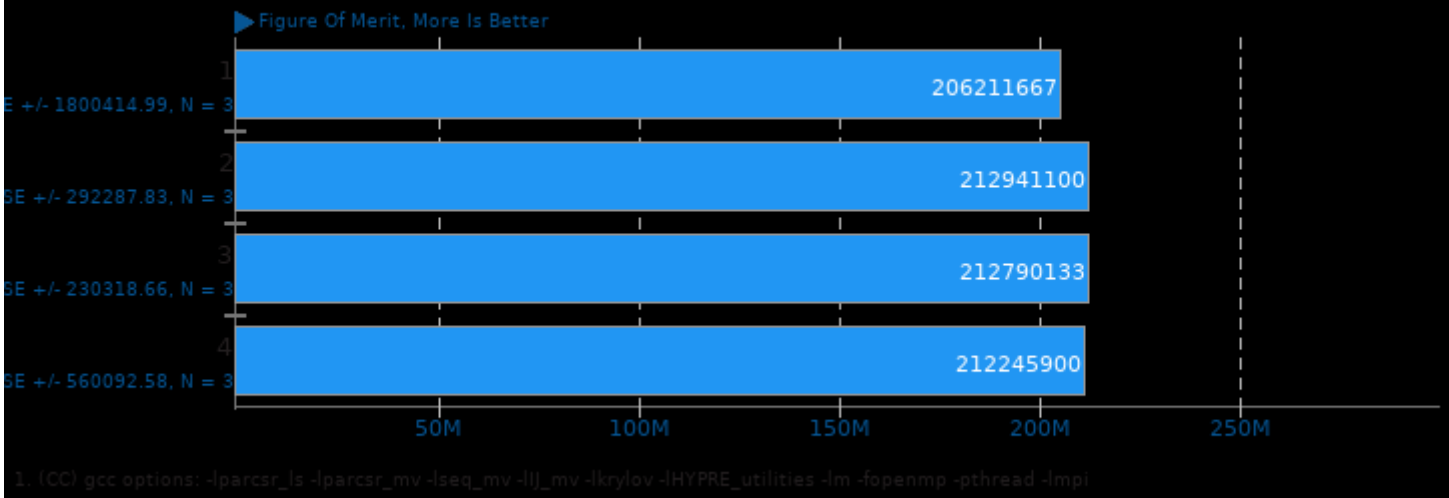
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/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: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xe0 - Thermald 2.3
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 + srbds: Not affected + tsx_async_abort: Not affected

	1	2	3	4
Algebraic Multi-Grid Benchmark (Figure Of Merit)	**206211667**	**212941100**	212790133	212245900
Normalized	96.84%	100%	99.93%	99.67%
Standard Deviation	1.5%	0.2%	0.2%	0.5%
CP2K Molecular Dynamics - Fayalite-FIST Data (sec)	**935.579**	926.986	**925.531**	930.486
Normalized	98.93%	99.84%	100%	99.47%
dav1d - Chimera 1080p (FPS)	803.19	**803.45**	**802.12**	
Normalized	99.97%	100%	99.83%	
Standard Deviation	0.6%	0.1%	0.3%	
dav1d - Summer Nature 4K (FPS)	190.09	**190.02**	**190.19**	
Normalized	99.95%	99.91%	100%	
Standard Deviation	0.1%	0.1%	0.1%	
dav1d - S.N.1 (FPS)	750.43	**750.48**	**748.66**	
Normalized	99.99%	100%	99.76%	
Standard Deviation	0.7%	0.3%	0.6%	
dav1d - C.1.1.b (FPS)	**133.03**	**133.29**	133.24	
Normalized	99.8%	100%	99.96%	
Standard Deviation	0.3%	0.4%	0.1%	
Kripke (Throughput FoM)	**34030970**	**33305827**	33737073	
Normalized	100%	97.87%	99.14%	
Standard Deviation	1.5%	1%	0.3%	
LULESH (z/s)	**448.83948**	**474.03626**	454.90310	
Normalized	94.68%	100%	95.96%	
Standard Deviation	1.1%	1.2%	2.7%	
OpenFOAM - Motorbike 30M (sec)	**246.09**	241.08	**240.93**	241.45
Normalized	97.9%	99.94%	100%	99.78%

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Standard Deviation	0.9%	0.1%	0.1%	0.1%
OpenFOAM - Motorbike 60M (sec)	**1310**	1309	1308	**1308**
Normalized	99.81%	99.9%	99.97%	100%
Standard Deviation	0.1%	0.1%	0.1%	0%
Quantum ESPRESSO - AUSURF112 (sec)	**1881**	1902	**1912**	
Normalized	100%	98.88%	98.34%	
Standard Deviation	3%	1.7%	2.1%	

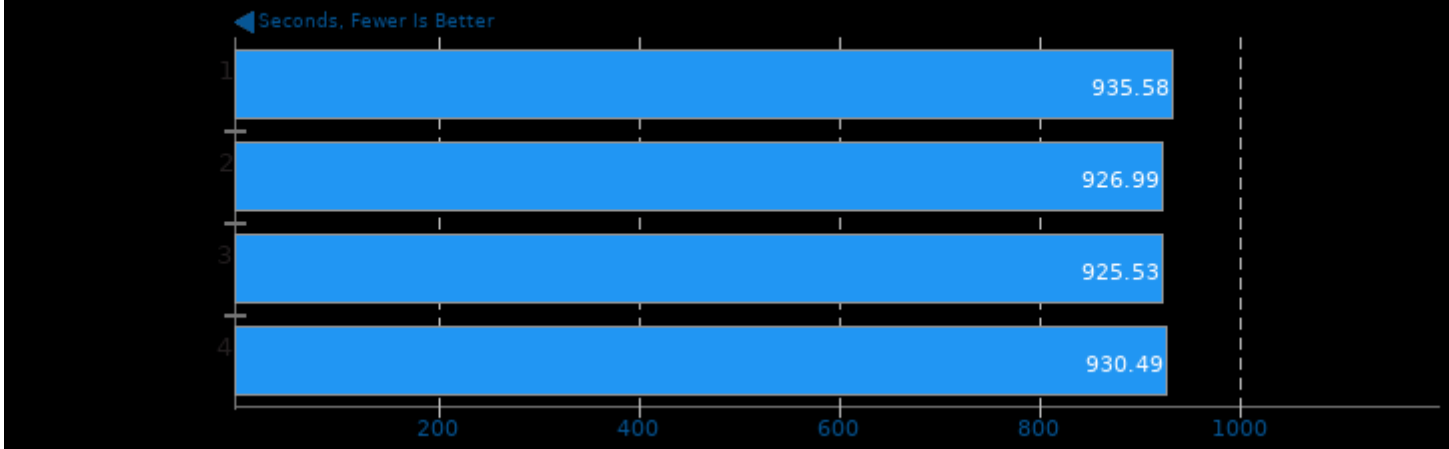
Algebraic Multi-Grid Benchmark 1.2



1. (CC) gcc options: -lparcsr_ls -lparcsr_mv -lseq_mv -lIJ_mv -lkrylov -lHYPRE_utilities -lm -fopenmp -pthread -lmpi

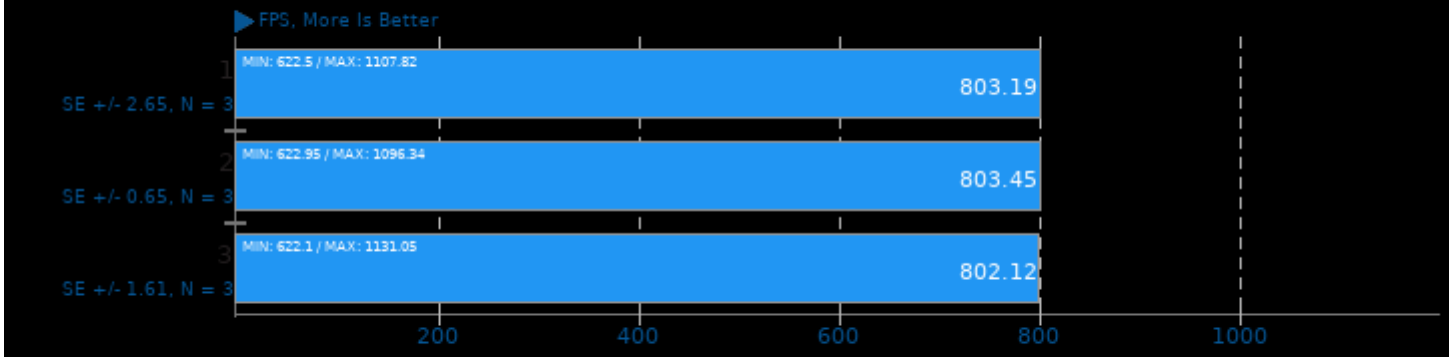
CP2K Molecular Dynamics 8.1

Fayalite-FIST Data

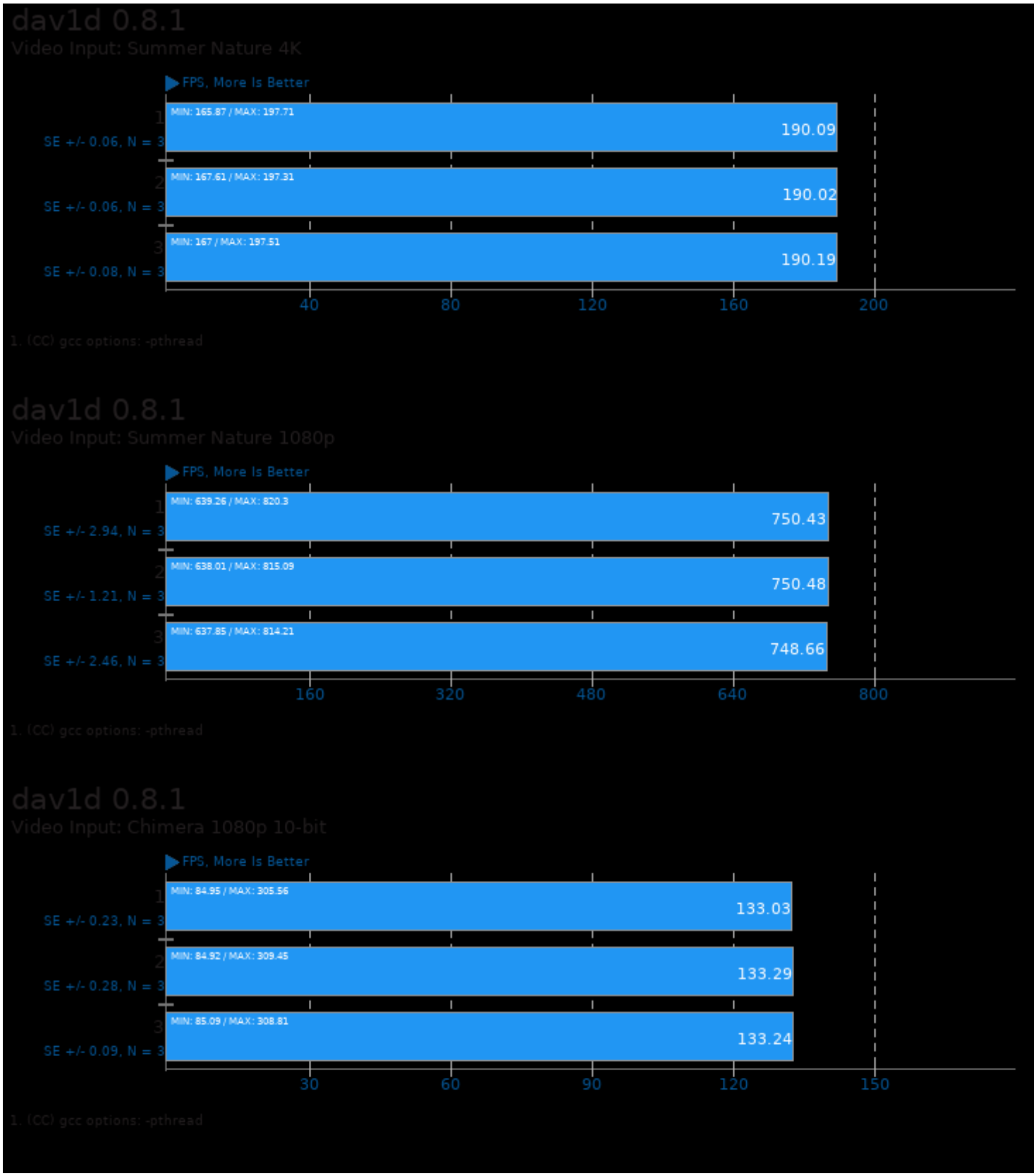


dav1d 0.8.1

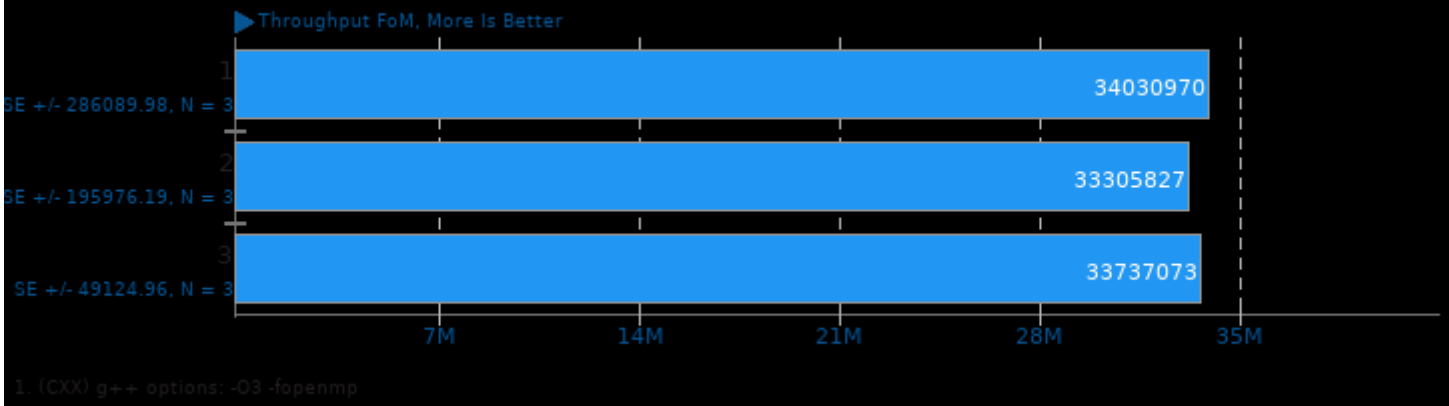
Video Input: Chimera 1080p



1. (CC) gcc options: -pthread

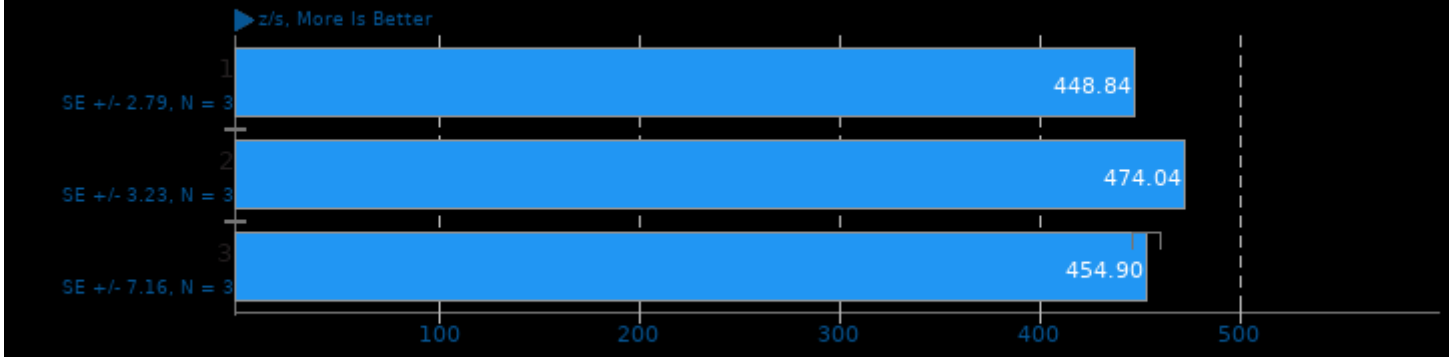

dav1d 0.8.1
Video Input: Summer Nature 4K
FPS, More Is Better
1
MIN: 165.87 / MAX: 197.71
190.09
SE +/- 0.06, N = 3
2
MIN: 167.61 / MAX: 197.31
190.02
SE +/- 0.06, N = 3
3
MIN: 167 / MAX: 197.51
190.19
SE +/- 0.08, N = 3
40
80
120
160
200
1. (CC) gcc options: -pthread
dav1d 0.8.1
Video Input: Summer Nature 1080p
FPS, More Is Better
1
MIN: 639.26 / MAX: 820.3
750.43
SE +/- 2.94, N = 3
2
MIN: 638.01 / MAX: 815.09
750.48
SE +/- 1.21, N = 3
3
MIN: 637.85 / MAX: 814.21
748.66
SE +/- 2.46, N = 3
160
320
480
640
800
1. (CC) gcc options: -pthread
dav1d 0.8.1
Video Input: Chimera 1080p 10-bit
FPS, More Is Better
1
MIN: 84.95 / MAX: 305.56
133.03
SE +/- 0.23, N = 3
2
MIN: 84.92 / MAX: 309.45
133.29
SE +/- 0.28, N = 3
3
MIN: 85.09 / MAX: 308.81
133.24
SE +/- 0.09, N = 3
30
60
90
120
150
1. (CC) gcc options: -pthread

Kripke 1.2.4



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

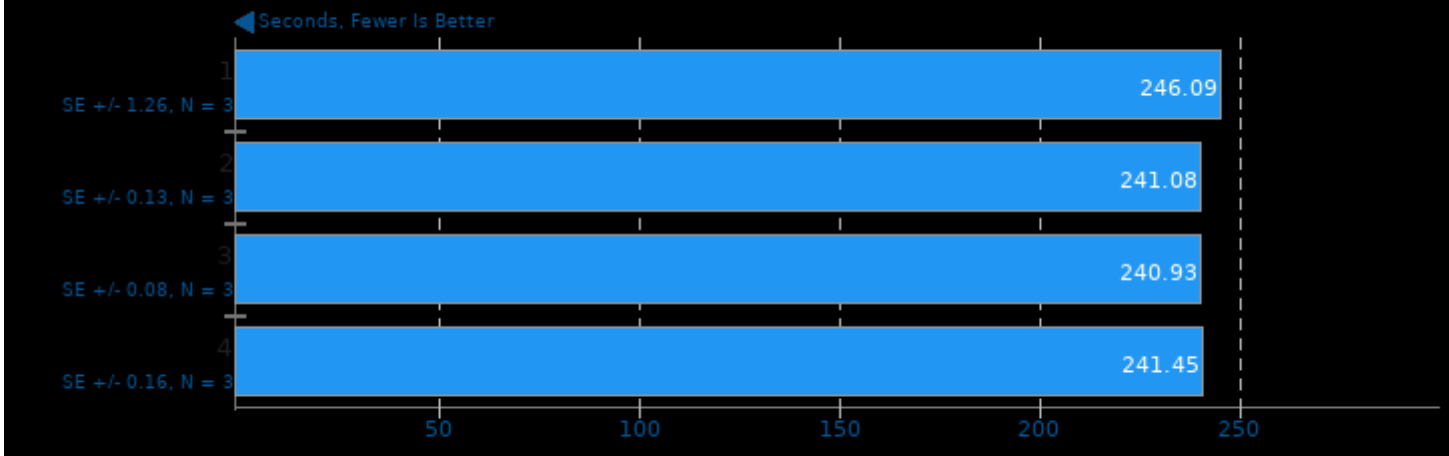
LULESH 2.0.3



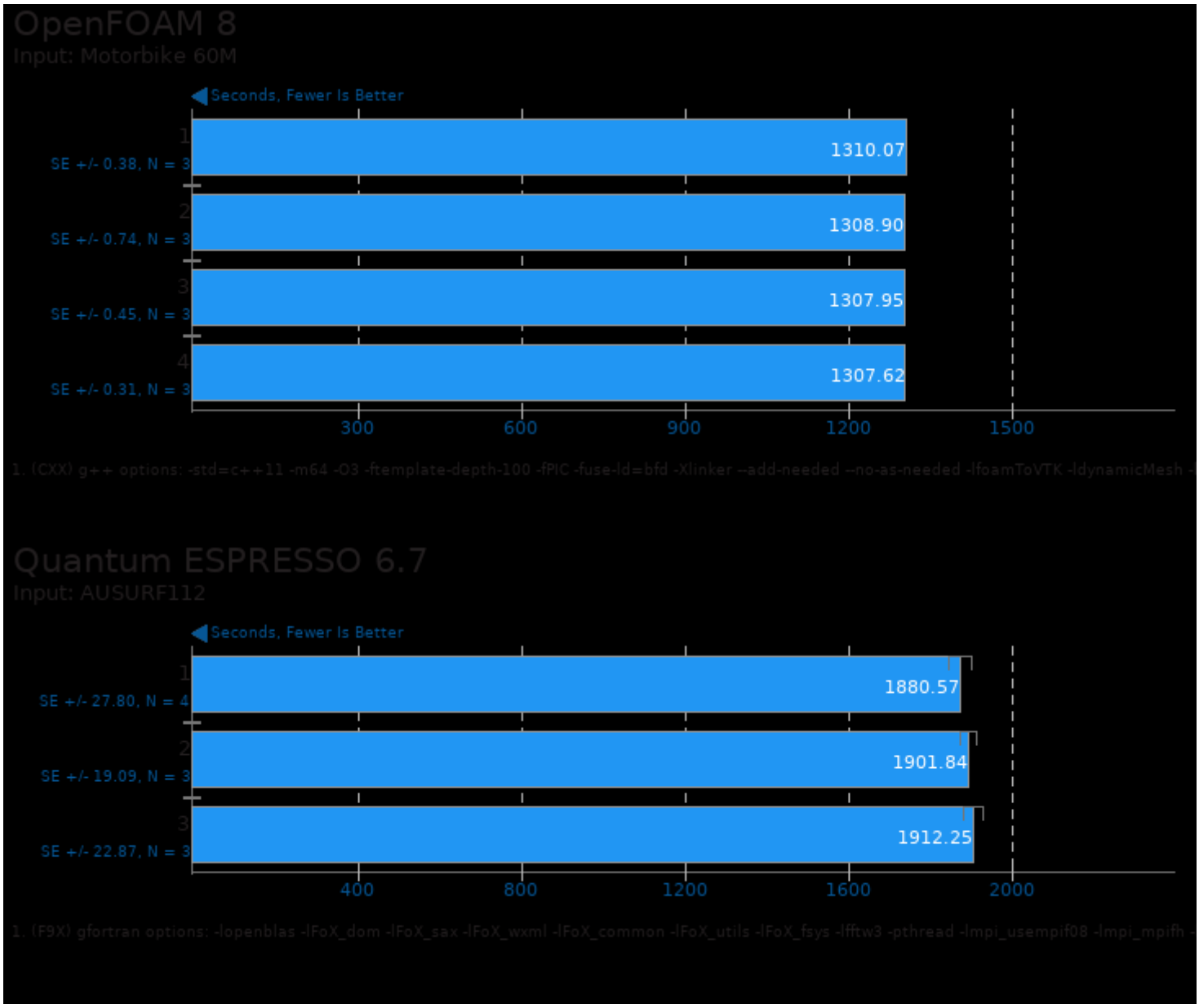
1. (CXX) g++ options: -O3 -fopenmp -lm -pthread -lmpi_cxx -lmpi

OpenFOAM 8

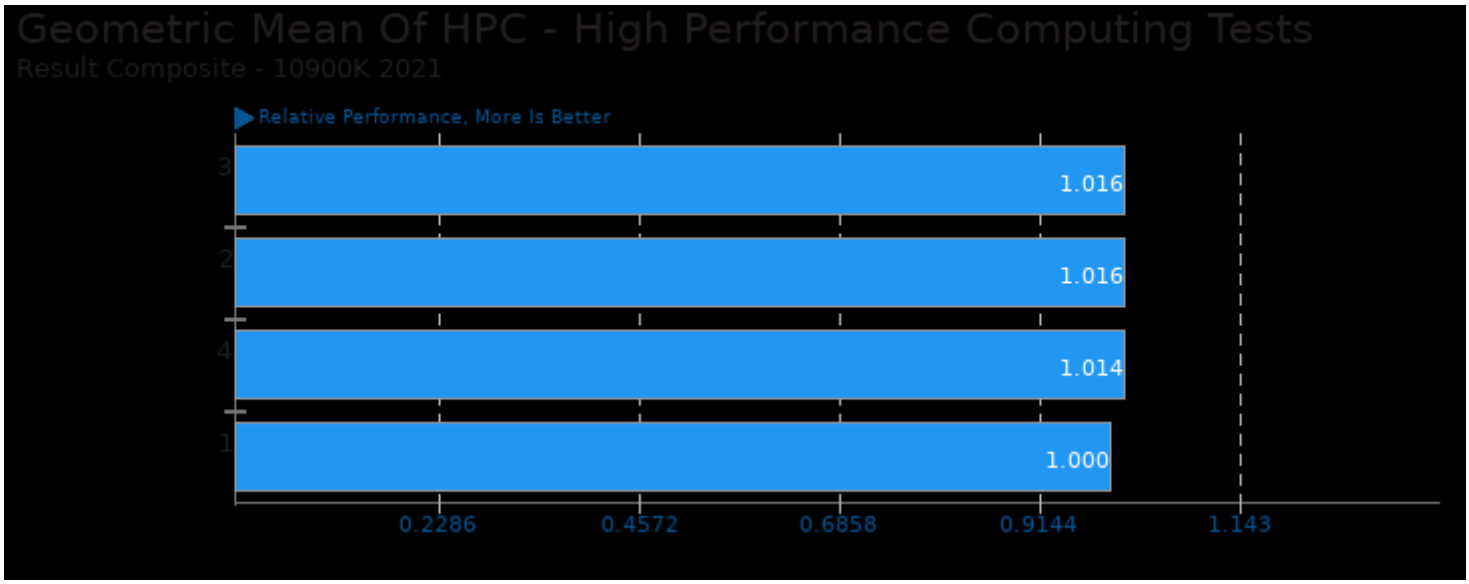
Input: Motorbike 30M



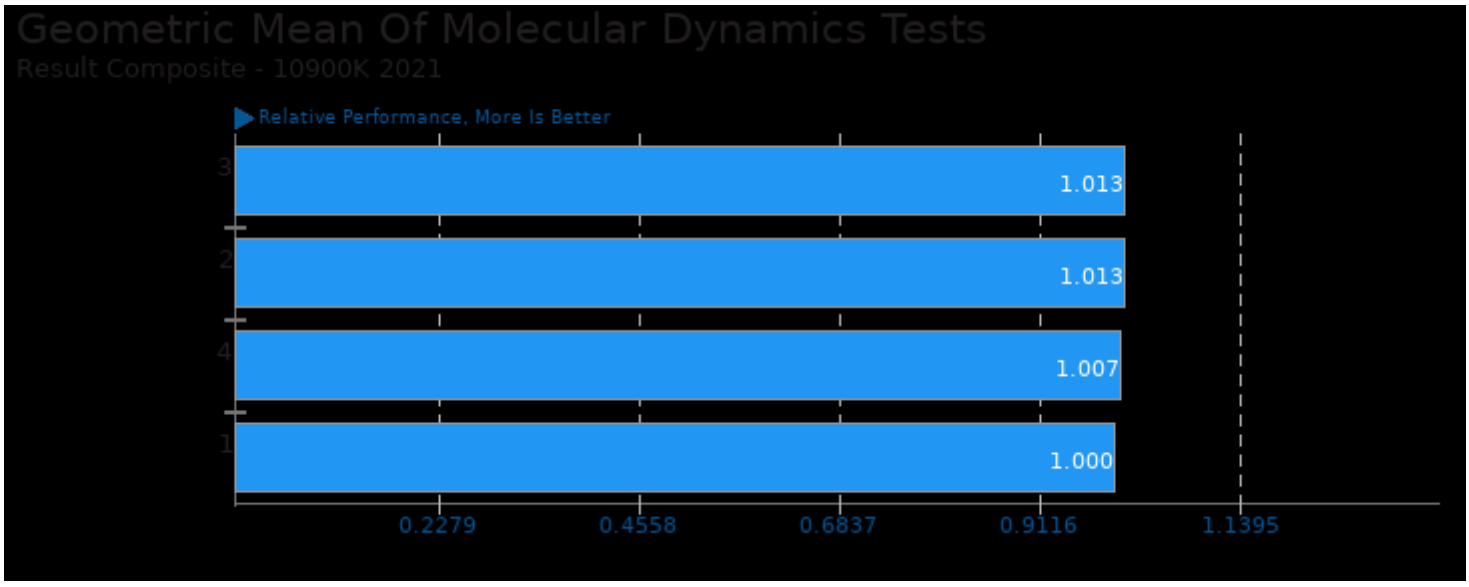
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -lfoamToVTK -ldynamicMesh -


OpenFOAM 8
Input: Motorbike 60M
Seconds, Fewer Is Better
1
SE +/- 0.38, N = 3
1310.07
2
SE +/- 0.74, N = 3
1308.90
3
SE +/- 0.45, N = 3
1307.95
4
SE +/- 0.31, N = 3
1307.62
300
600
900
1200
1500
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -lfoamToVTK -ldynamicMesh
Quantum ESPRESSO 6.7
Input: AUSURF112
Seconds, Fewer Is Better
1
SE +/- 27.80, N = 4
1880.57
2
SE +/- 19.09, N = 3
1901.84
3
SE +/- 22.87, N = 3
1912.25
400
800
1200
1600
2000
1. (F9X) gfortran options: -lopenblas -lFoX_dom -lFoX_sax -lFoX_wxml -lFoX_common -lFoX_utils -lFoX_fsys -lfftw3 -pthread -lmpi_usempif08 -lmpi_mpifh

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

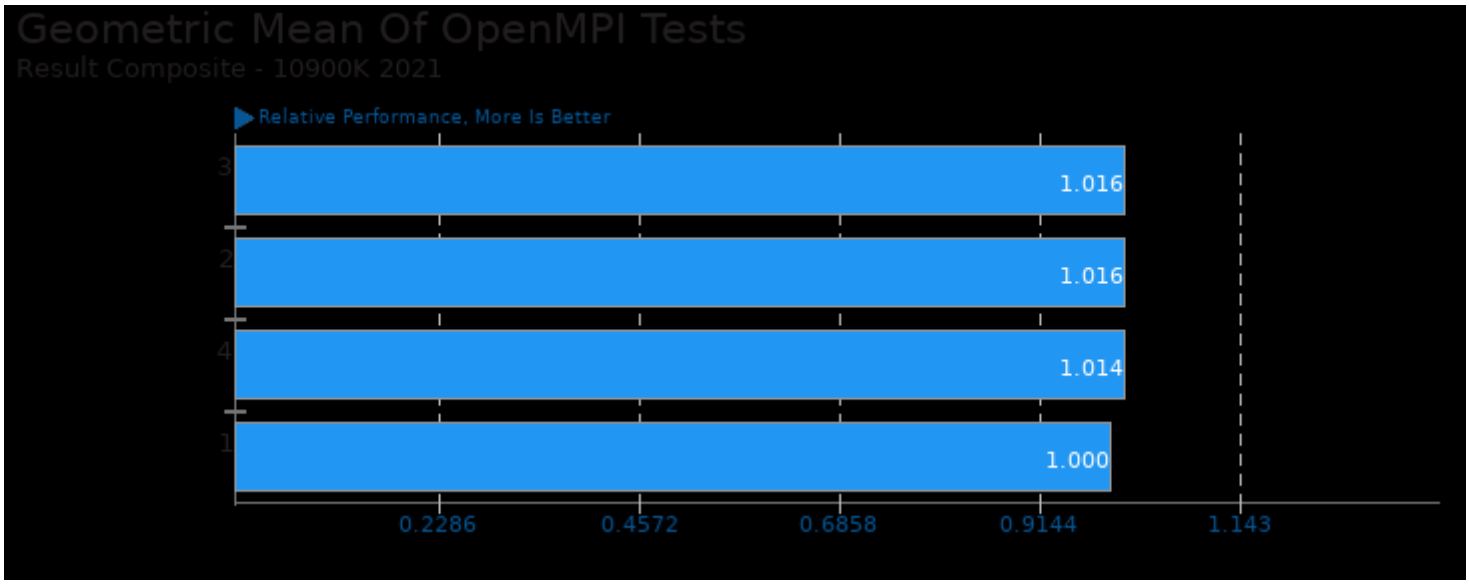


Geometric mean based upon tests: pts/qe, pts/amg, pts/cp2k, pts/lulesh, pts/openfoam and pts/kripke

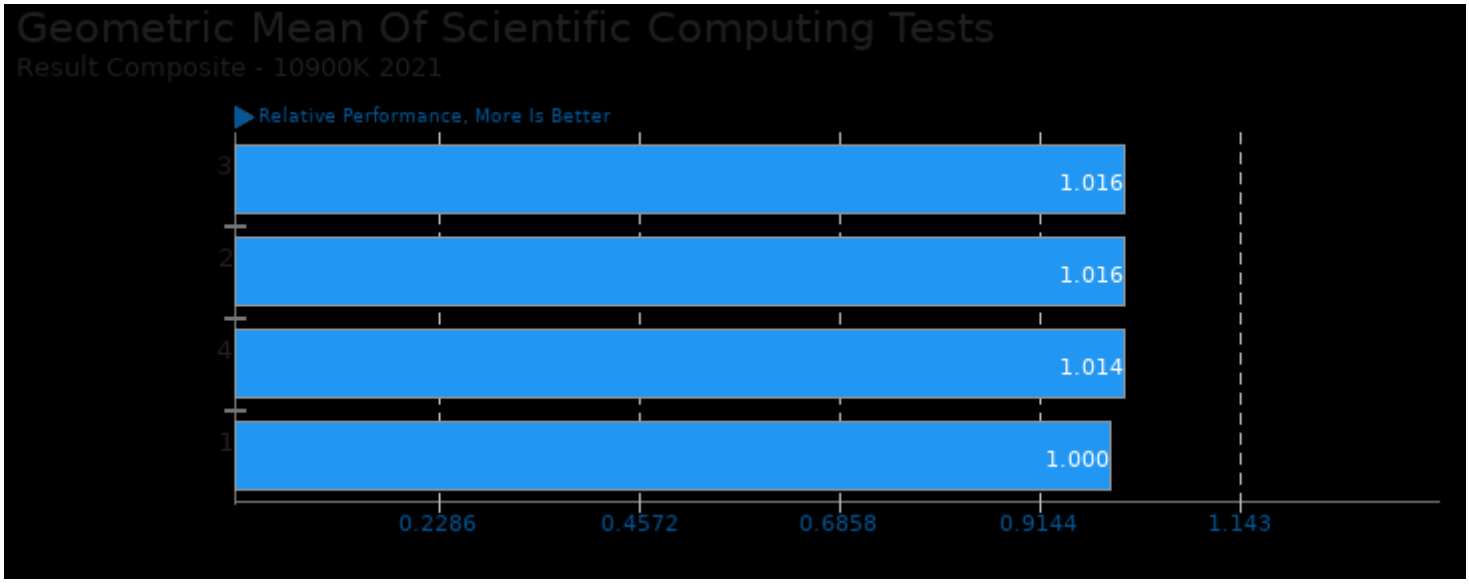


Geometric mean based upon tests: pts/cp2k, pts/lulesh and pts/openfoam

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Geometric mean based upon tests: pts/amg, pts/cp2k, pts/lulesh and pts/openfoam



Geometric mean based upon tests: pts/amg, pts/cp2k, pts/lulesh, pts/openfoam, pts/qe and pts/kripke

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