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ryzen 9 5900x compute

AMD Ryzen 9 5900X 12-Core testing with a ASUS ROG CROSSHAIR VIII HERO (3202 BIOS) and Sapphire AMD Radeon RX 5600 OEM/5600 XT / 5700/5700 6GB on Ubuntu 20.10 via the Phoronix Test Suite.

Automated Executive Summary

2 had the most wins, coming in first place for 55% of the tests.

Based on the geometric mean of all complete results, the fastest (3) was 1.006x the speed of the slowest (1). 2 was 0.996x the speed of 3 and 1 was 0.999x the speed of 2.

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

CloverLeaf (Lagrangian-Eulerian Hydrodynamics) at 1.028x
Dolfyn (Computational Fluid Dynamics) at 1.022x
CP2K Molecular Dynamics (Fayalite-FIST Data) at 1.02x
LAMMPS Molecular Dynamics Simulator (Model: Rhodopsin Protein) at 1.017x
Timed MAFFT Alignment (Multiple Sequence Alignment - LSU RNA) at 1.015x
NAS Parallel Benchmarks (Test / Class: LU.C) at 1.012x
NWChem (Input: C240 Buckyball) at 1.012x
LULESH at 1.01x
Himeno Benchmark (Poisson Pressure Solver) at 1.007x

OpenFOAM (Input: Motorbike 30M) at 1.006x.

Test Systems:

1

2

3

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3202 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Samsung SSD 980 PRO 1TB, Graphics: Sapphire AMD Radeon RX 5600 OEM/5600 XT / 5700/5700 6GB (1780/875MHz), Audio: AMD Navi 10 HDMI Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 20.10, Kernel: 5.8.0-38-generic (x86_64), 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

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++,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: acpi-cpufreq ondemand (Boost: Enabled) - CPU Microcode: 0xa201009
Security Notes: itlb_multihit: Not affected + 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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	1	2	3
NWChem - C240 Buckyball (sec)	11086	10958	
Normalized	98.85%	100%	
Pennant - sedovbig (Hydro Cycle Time - sec)	2997	2997	3000
Normalized	100%	100%	99.91%
Standard Deviation	0%	0%	0%
Pennant - leblancbig (Hydro Cycle Time -	2871	2873	
Normalized	100%	99.95%	
Standard Deviation	0%	0%	
OpenFOAM - Motorbike 60M (sec)	1273	1275	
Normalized	100%	99.88%	
Standard Deviation	0.1%	0.1%	
Quantum ESPRESSO - AUSURF112 (sec)	1264	1262	
Normalized	99.81%	100%	
Standard Deviation	0.2%	0.4%	

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LAMMPS Molecular Dynamics Simulator - 20k Atoms (ns/day)	10.613	10.552	
Normalized	100%	99.43%	
Standard Deviation	1%	0.1%	
Himeno Benchmark - P.P.S (MFLOPS)	5211	5245	
Normalized	99.34%	100%	
Standard Deviation	5.9%	5.6%	
Incompact3D - Cylinder (sec)	227.760890	226.847718	
Normalized	99.6%	100%	
Standard Deviation	2.1%	2.2%	
CP2K Molecular Dynamics - Fayalite-FIST Data (sec)	779.646	772.101	764.575
Normalized	98.07%	99.03%	100%
Rodinia - OpenMP HotSpot3D (sec)	67.111	67.630	62.020
Normalized	92.41%	91.7%	100%
Standard Deviation	9%	6.6%	1%
GROMACS - Water Benchmark (Ns/Day)	1.257	1.256	
Normalized	100%	99.92%	
Standard Deviation	0%	0.3%	
Rodinia - OpenMP LavaMD (sec)	129.657	129.805	129.632
Normalized	99.98%	99.87%	100%
Standard Deviation	0.2%	0.1%	0.1%
CloverLeaf - L.E.H (sec)	125.73	129.22	129.12
Normalized	100%	97.3%	97.37%
Standard Deviation	0.6%	0.3%	0.3%
OpenFOAM - Motorbike 30M (sec)	97.53	98.15	
Normalized	100%	99.37%	
Standard Deviation	0.2%	0.2%	
Timed HMMer Search - P.D.S (sec)	96.388	96.555	
Normalized	100%	99.83%	
Standard Deviation	0.2%	0.1%	
NAS Parallel Benchmarks - EP.D (Mop/s)	1460	1466	1459
Normalized	99.64%	100%	99.54%
Standard Deviation	0.5%	0.4%	1.2%
NAS Parallel Benchmarks - LU.C (Mop/s)	27079	27413	27321
Normalized	98.78%	100%	99.66%
Standard Deviation	0.3%	0.2%	0.3%
Rodinia - OpenMP Leukocyte (sec)	71.722	71.574	71.648
Normalized	99.79%	100%	99.9%
Standard Deviation	0.8%	0.5%	0.7%
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	1.29398	1.29027	1.29520
Normalized	99.71%	100%	99.62%
Standard Deviation	0.5%	0.1%	0.5%
miniFE - Small (CG Mflops)	4291	4298	4286
Normalized	99.83%	100%	99.71%
Standard Deviation	0.5%	0%	0.5%
Timed MrBayes Analysis - P.P.A (sec)	58.487	58.441	
Normalized	99.92%	100%	
Standard Deviation	0.4%	0.4%	
Rodinia - O.S (sec)	21.864	21.810	21.822
Normalized	99.75%	100%	99.95%
Standard Deviation	1.2%	0.2%	0%

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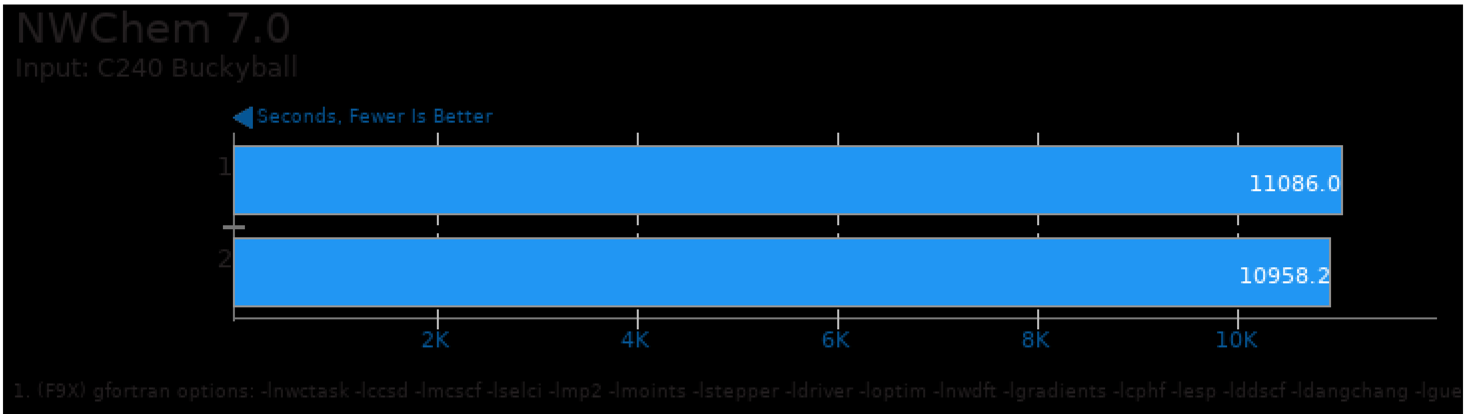
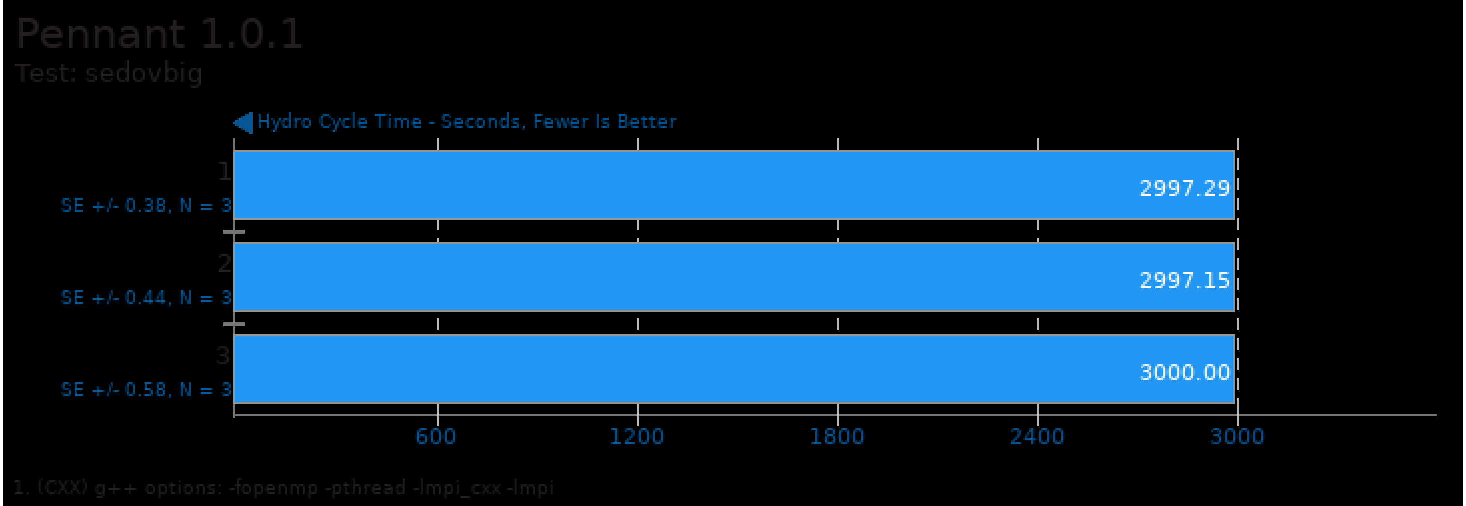
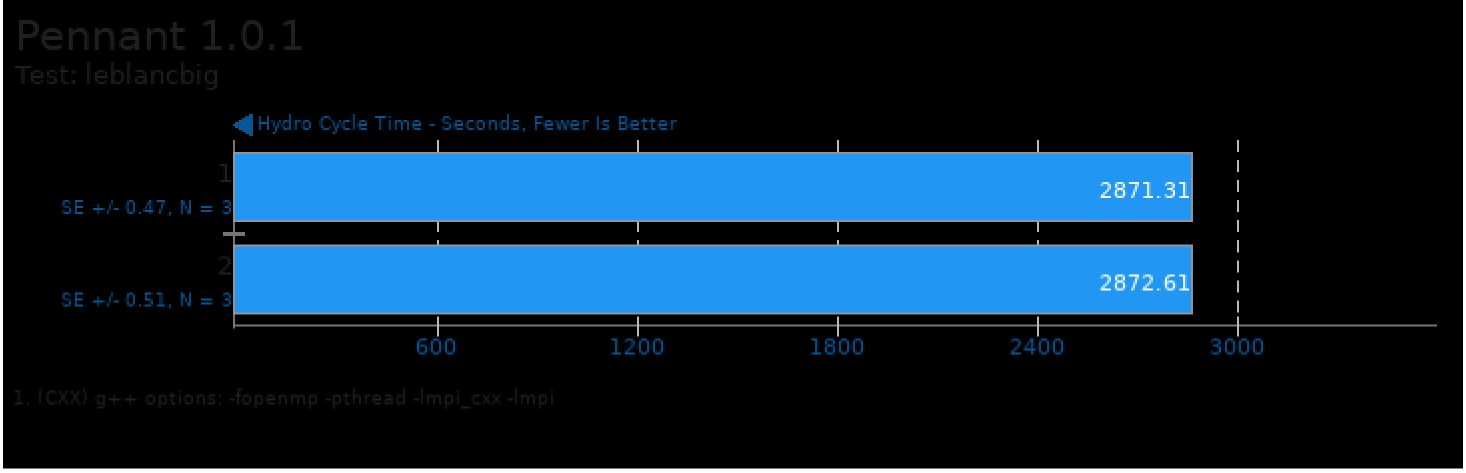
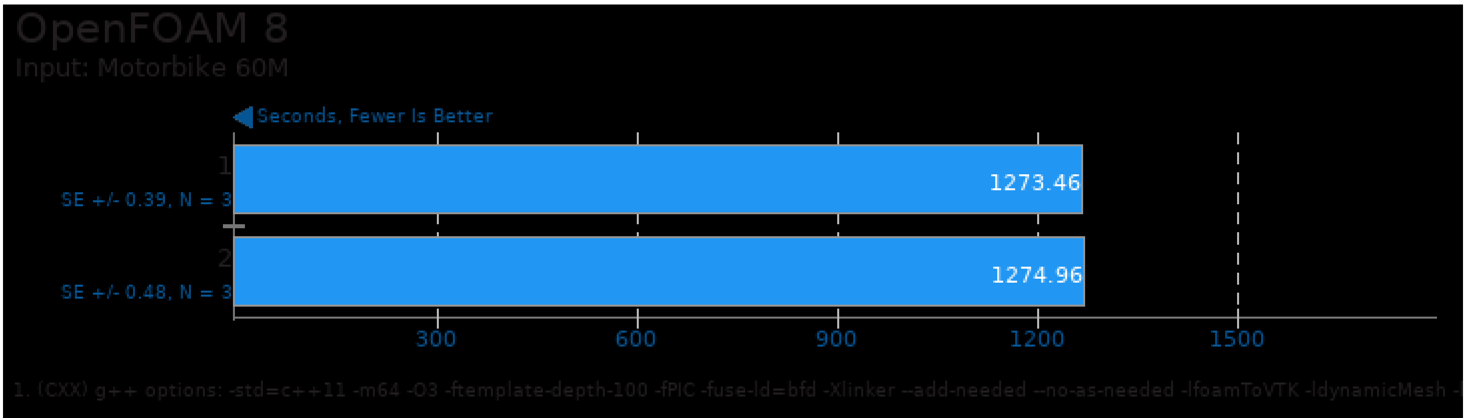
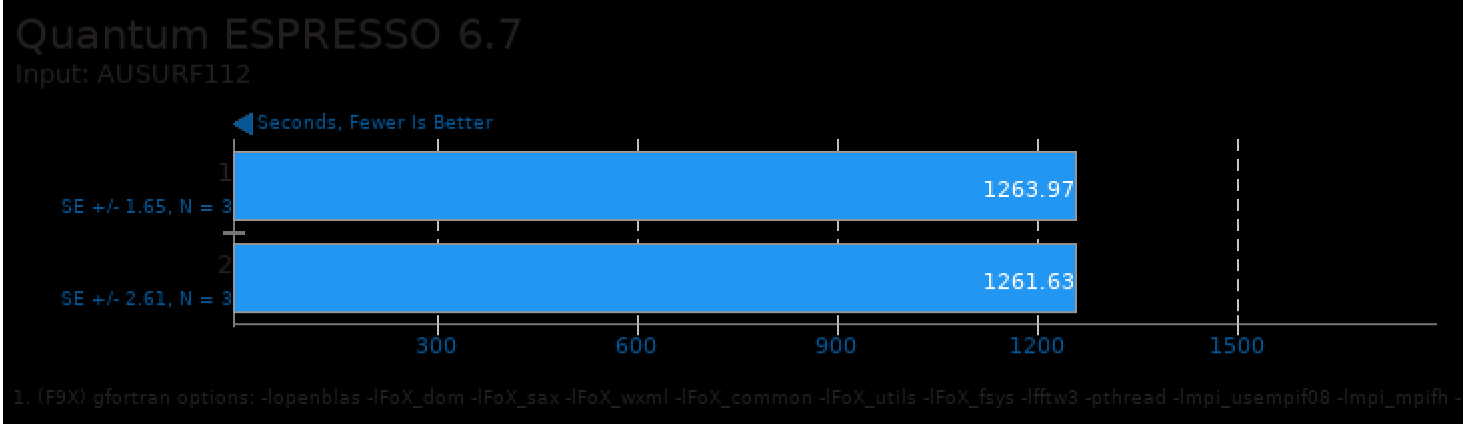
QMCPACK - simple-H2O (Execution Time - sec)	**21.255**	**21.266**	
Normalized	100%	99.95%	
Standard Deviation	1.4%	1%	
Dolfyn - C.F.D (sec)	13.439	**13.155**	**13.447**
Normalized	97.89%	100%	97.83%
Standard Deviation	0.6%	0.6%	2.1%
Rodinia - OpenMP CFD Solver (sec)	**12.811**	**12.811**	**12.790**
Normalized	99.84%	99.84%	100%
Standard Deviation	0.4%	0.4%	0.4%
LULESH (z/s)	**5197**	**5248**	
Normalized	99.03%	100%	
Standard Deviation	1.3%	0.8%	
Timed MAFFT Alignment - M.S.A - LSU RNA (sec)	**7.379**	**7.493**	
Normalized	100%	98.48%	
Standard Deviation	1.4%	0.6%	
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	**10.427**	**10.604**	
Normalized	98.33%	100%	
Standard Deviation	2.4%	2.3%	
NAS Parallel Benchmarks - EP.C (Mop/s)	1477	**1479**	**1475**
Normalized	99.9%	100%	99.77%
Standard Deviation	0.3%	0.4%	0.4%

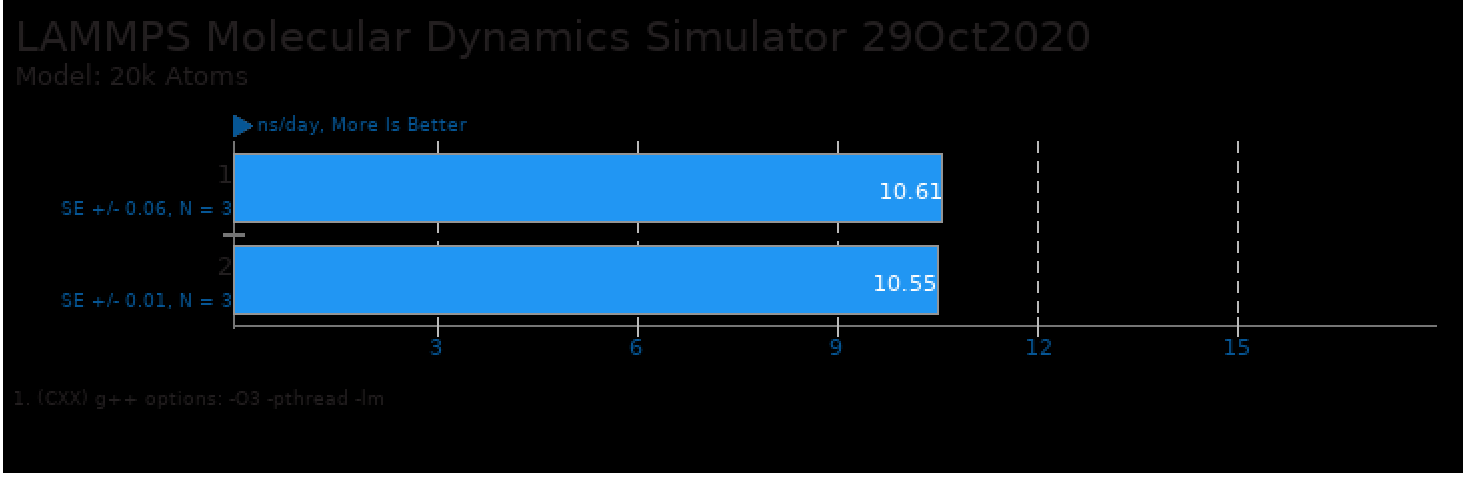

NWChem 7.0
Input: C240 Buckyball
Seconds, Fewer Is Better
1
11086.0
2
10958.2
2K
4K
6K
8K
10K
1. (F9X) gfortran options: -lnwctask -lccsd -lmcscf -lselci -lmp2 -lmoints -lstepper -ldriver -loptim -lnwdft -lgradients -lcphf -lesp -lddscf -ldangchang -lgue

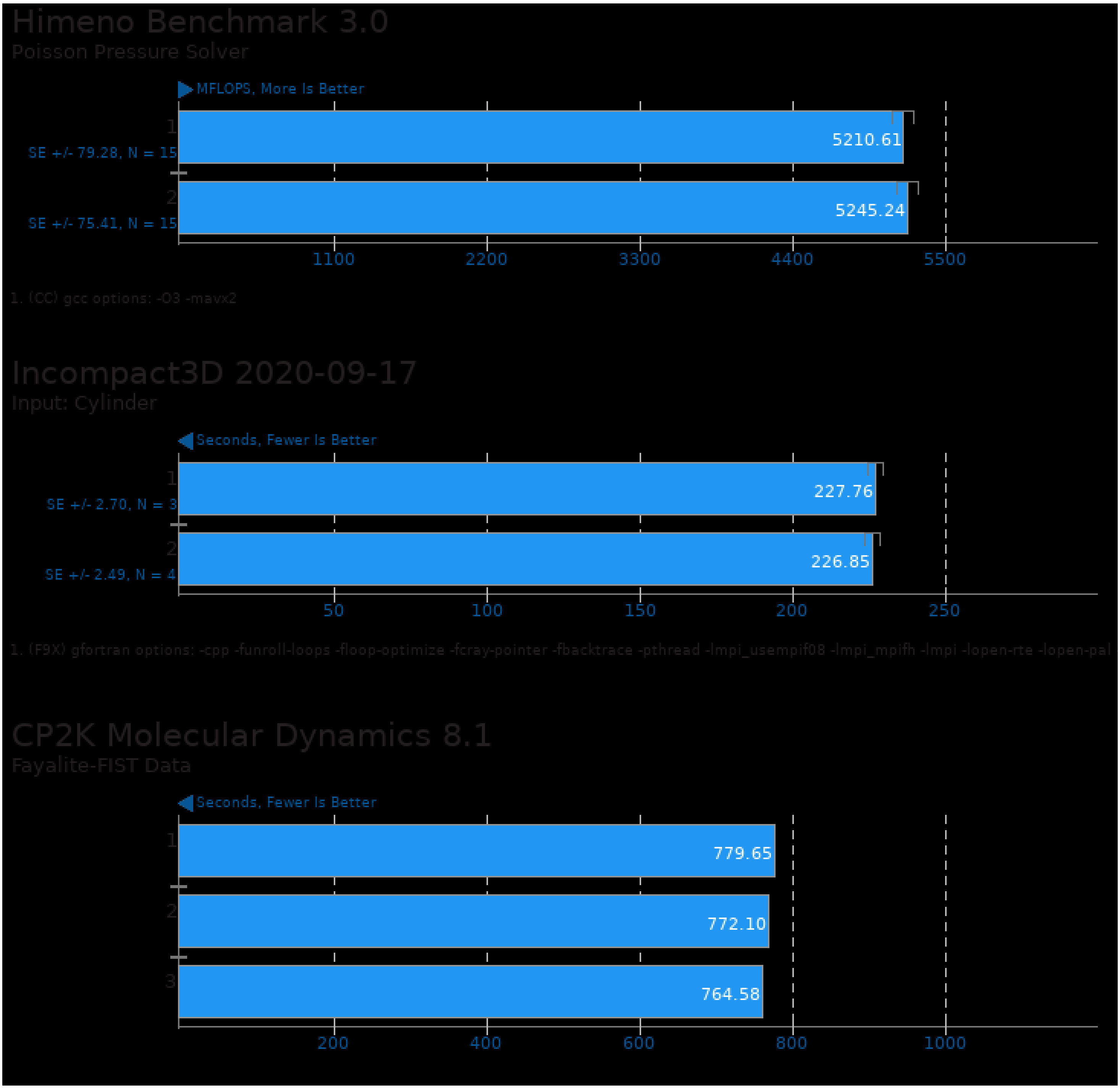

Pennant 1.0.1
Test: sedovbig
Hydro Cycle Time - Seconds, Fewer Is Better
1
SE +/- 0.38, N = 3
2997.29
2
SE +/- 0.44, N = 3
2997.15
3
SE +/- 0.58, N = 3
3000.00
600
1200
1800
2400
3000
1. (CXX) g++ options: -fopenmp -pthread -lmpi_cxx -lmpi

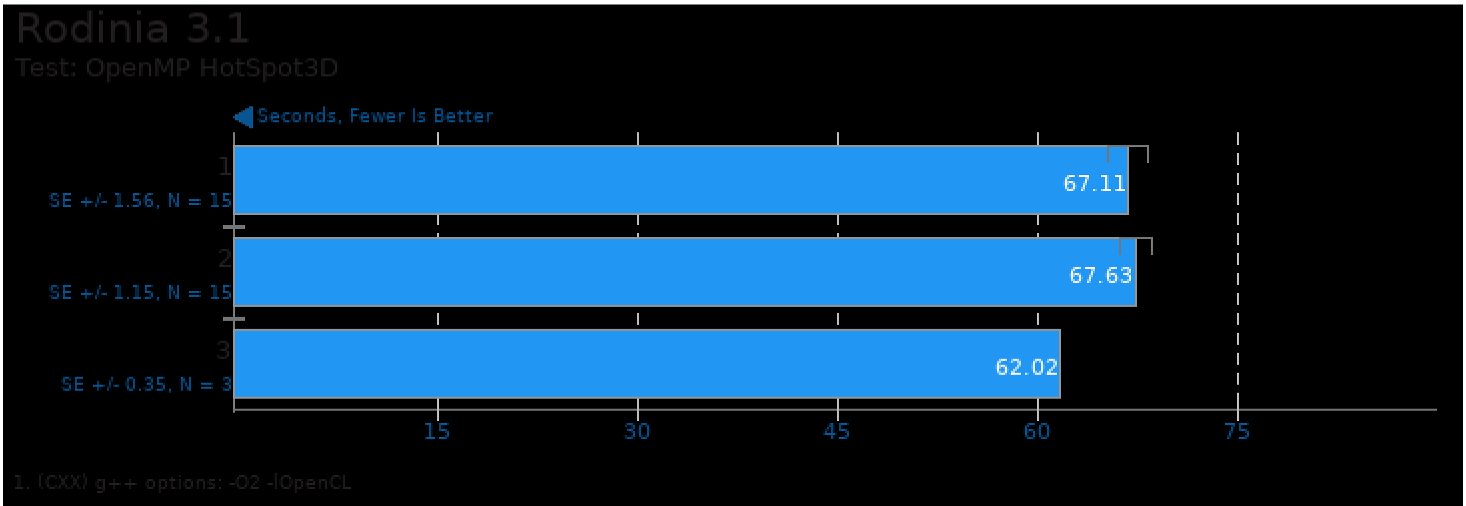

Pennant 1.0.1
Test: leblancbig
Hydro Cycle Time - Seconds, Fewer Is Better
1
SE +/- 0.47, N = 3
2871.31
2
SE +/- 0.51, N = 3
2872.61
600
1200
1800
2400
3000
1. (CXX) g++ options: -fopenmp -pthread -lmpi_cxx -lmpi

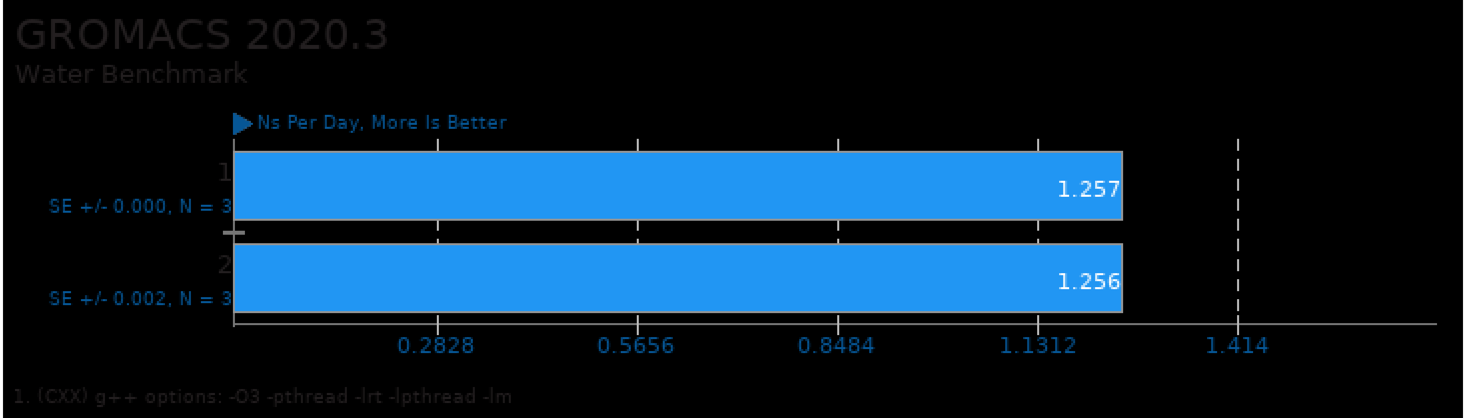

OpenFOAM 8
Input: Motorbike 60M
Seconds, Fewer Is Better
1
SE +/- 0.39, N = 3
1273.46
2
SE +/- 0.48, N = 3
1274.96
300
600
900
1200
1500
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -lfoamToVTK -ldynamicMesh -

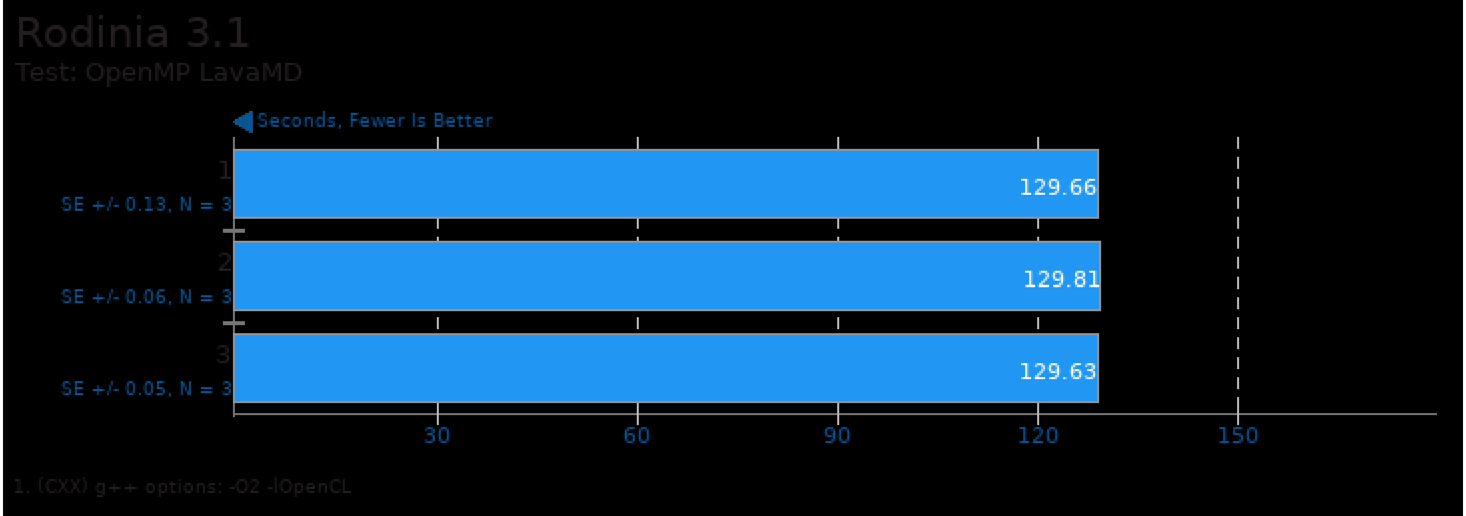

Quantum ESPRESSO 6.7
Input: AUSURF112
Seconds, Fewer Is Better
1
SE +/- 1.65, N = 3
1263.97
2
SE +/- 2.61, N = 3
1261.63
300
600
900
1200
1500
1. (F9X) gfortran options: -lopenblas -lFoX_dom -lFoX_sax -lFoX_wxml -lFoX_common -lFoX_utils -lFoX_fsys -lfftw3 -pthread -lmpi_usempif08 -lmpi_mpifh -


LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: 20k Atoms
ns/day, More Is Better
1
SE +/- 0.06, N = 3
10.61
2
SE +/- 0.01, N = 3
10.55
3
6
9
12
15
1. (CXX) g++ options: -O3 -pthread -lm


Himeno Benchmark 3.0
Poisson Pressure Solver
MFLOPS, More Is Better
1
SE +/- 79.28, N = 15
5210.61
2
SE +/- 75.41, N = 15
5245.24
1100
2200
3300
4400
5500
1. (CC) gcc options: -O3 -mavx2
Incompact3D 2020-09-17
Input: Cylinder
Seconds, Fewer Is Better
1
SE +/- 2.70, N = 3
227.76
2
SE +/- 2.49, N = 4
226.85
50
100
150
200
250
1. (F9X) gfortran options: -cpp -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal
CP2K Molecular Dynamics 8.1
Fayalite-FIST Data
Seconds, Fewer Is Better
1
779.65
2
772.10
3
764.58
200
400
600
800
1000


Rodinia 3.1
Test: OpenMP HotSpot3D
Seconds, Fewer Is Better
1
SE +/- 1.56, N = 15
67.11
2
SE +/- 1.15, N = 15
67.63
3
SE +/- 0.35, N = 3
62.02
15
30
45
60
75
1. (CXX) g++ options: -O2 -lOpenCL


GROMACS 2020.3
Water Benchmark
Ns Per Day, More Is Better
1
SE +/- 0.000, N = 3
1.257
2
SE +/- 0.002, N = 3
1.256
0.2828
0.5656
0.8484
1.1312
1.414
1. (CXX) g++ options: -O3 -pthread -lrt -lpthread -lm


Rodinia 3.1
Test: OpenMP LavaMD
Seconds, Fewer Is Better
1
SE +/- 0.13, N = 3
129.66
2
SE +/- 0.06, N = 3
129.81
3
SE +/- 0.05, N = 3
129.63
30
60
90
120
150
1. (CXX) g++ options: -O2 -lOpenCL

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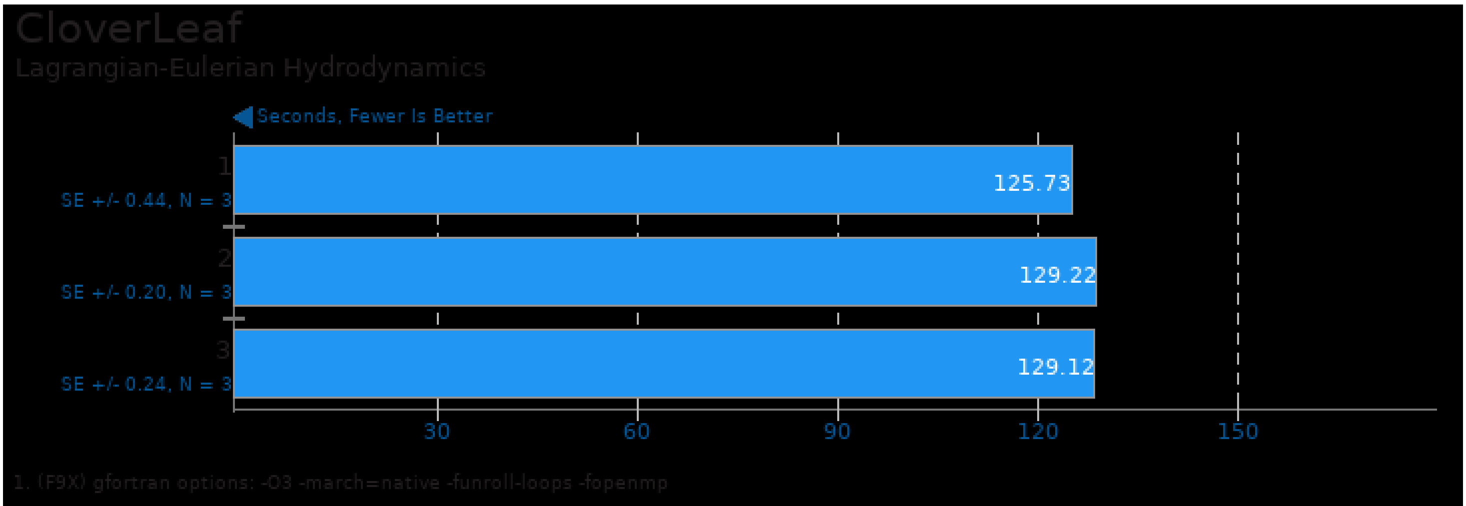
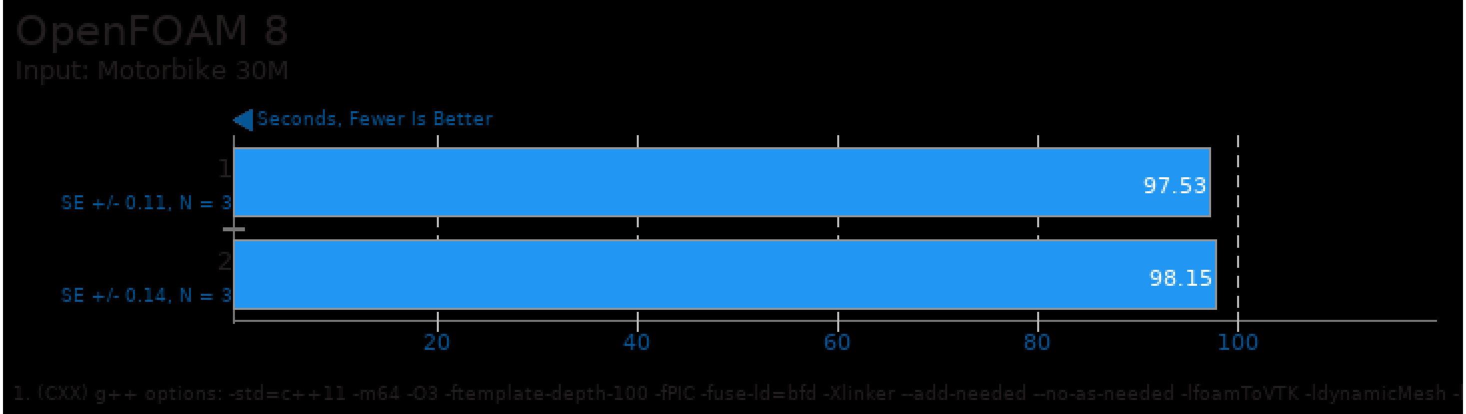
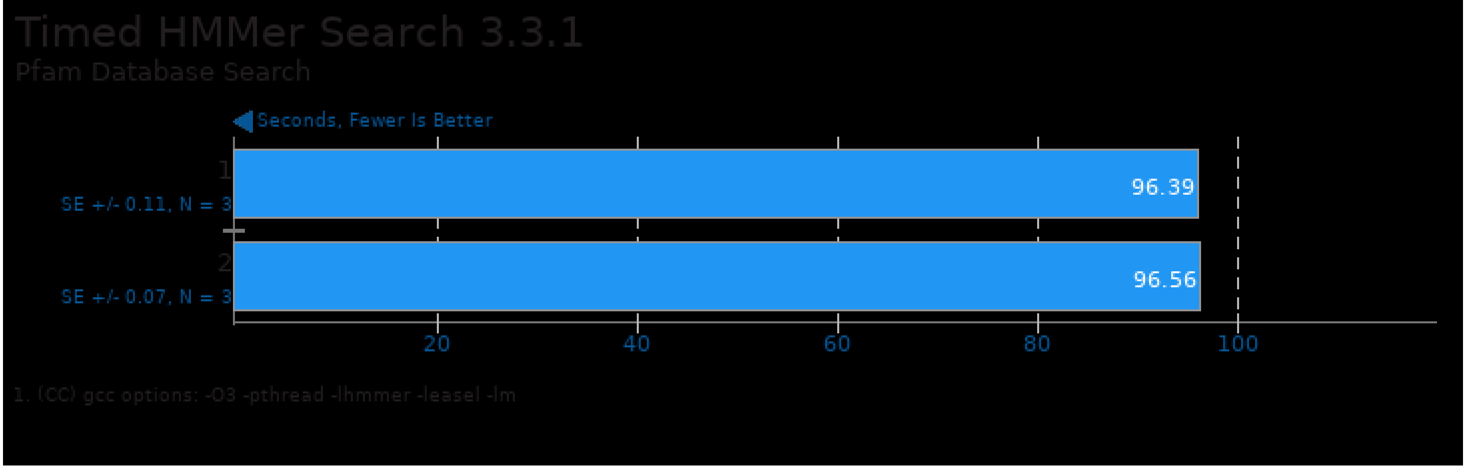
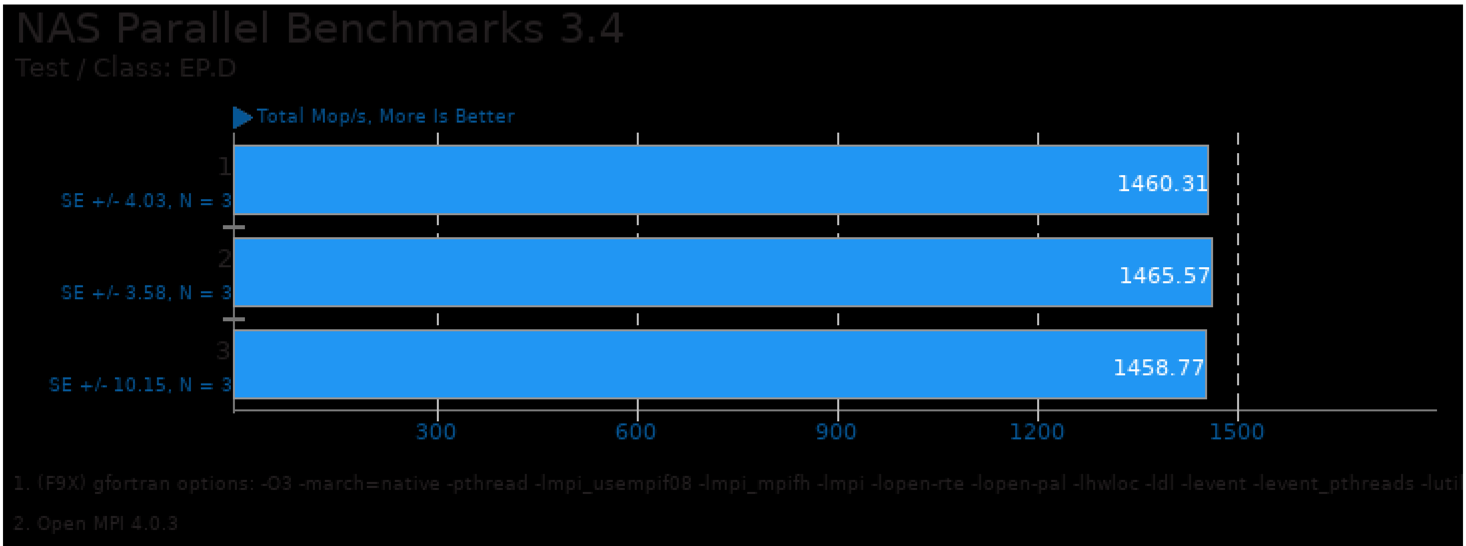
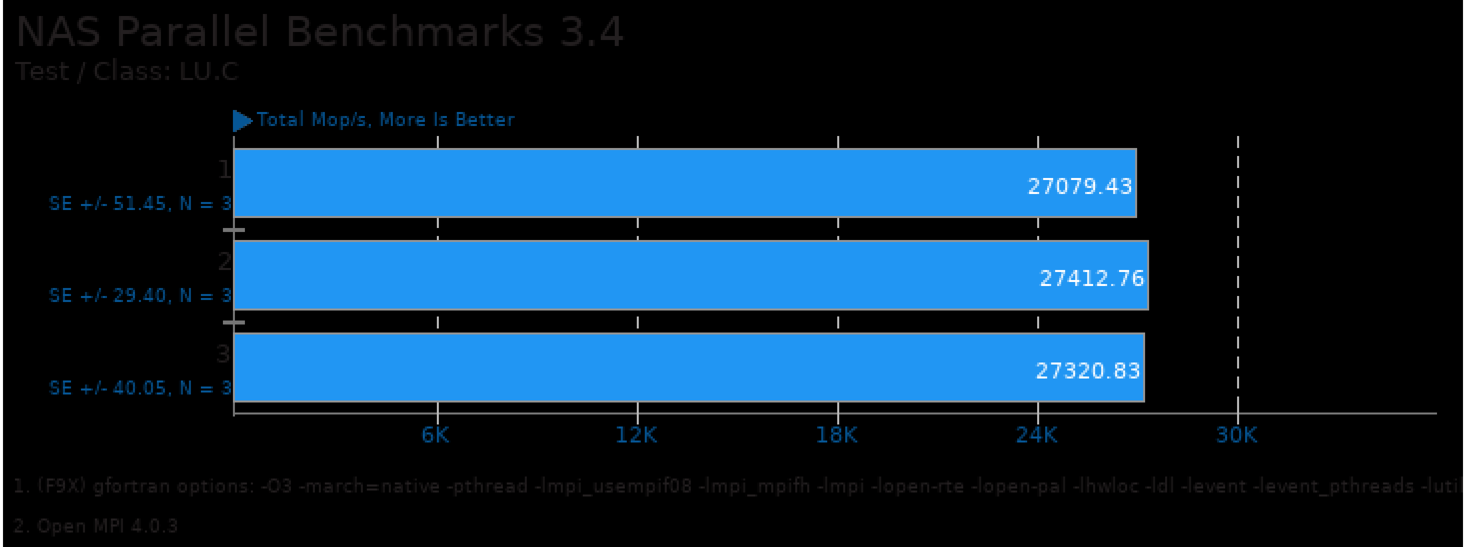
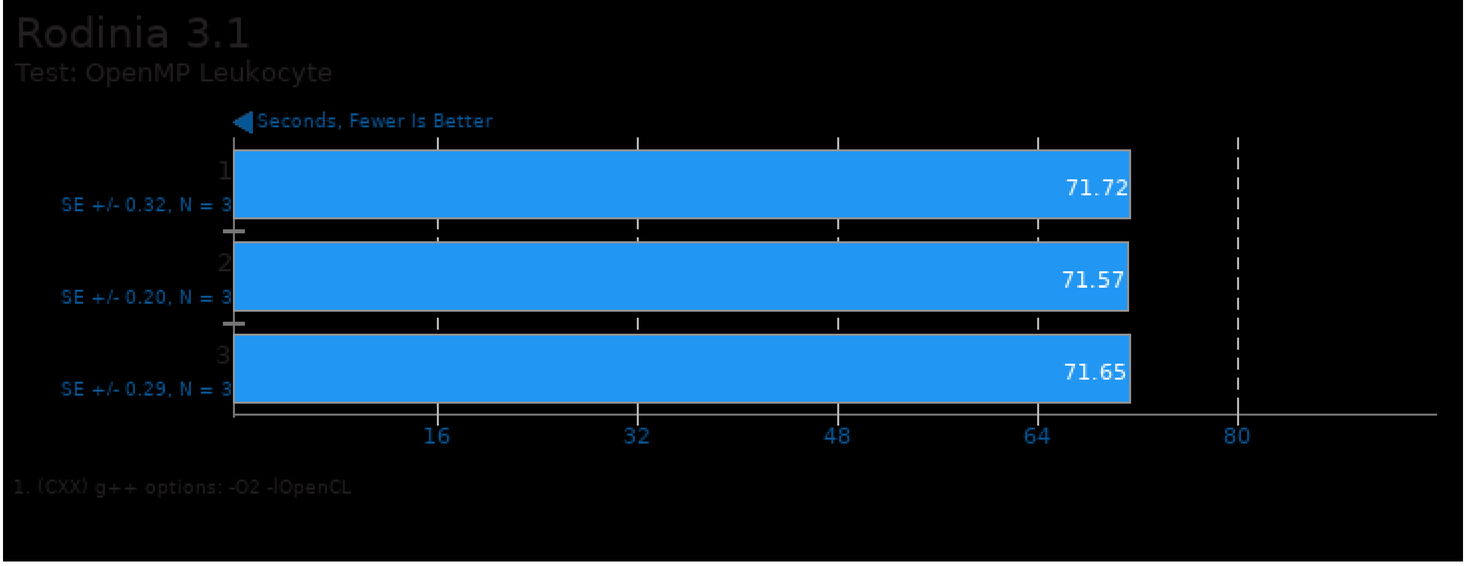







NAS Parallel Benchmarks 3.4
Test / Class: EP.D
Total Mop/s, More Is Better
1
SE +/- 4.03, N = 3
1460.31
2
SE +/- 3.58, N = 3
1465.57
3
SE +/- 10.15, N = 3
1458.77
300
600
900
1200
1500
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -ldl -levent -levent_pthreads -luti
2. Open MPI 4.0.3


NAS Parallel Benchmarks 3.4
Test / Class: LU.C
Total Mop/s, More Is Better
1
SE +/- 51.45, N = 3
27079.43
2
SE +/- 29.40, N = 3
27412.76
3
SE +/- 40.05, N = 3
27320.83
6K
12K
18K
24K
30K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -ldl -levent -levent_pthreads -luti
2. Open MPI 4.0.3


Rodinia 3.1
Test: OpenMP Leukocyte
Seconds, Fewer Is Better
1
SE +/- 0.32, N = 3
71.72
2
SE +/- 0.20, N = 3
71.57
3
SE +/- 0.29, N = 3
71.65
16
32
48
64
80
1. (CXX) g++ options: -O2 -lOpenCL

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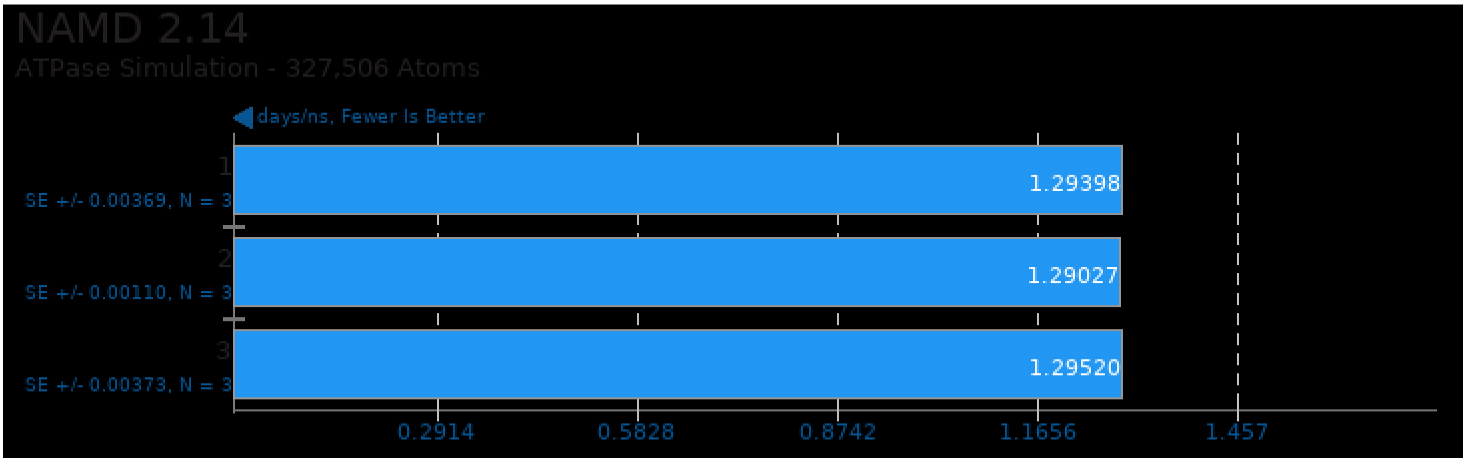

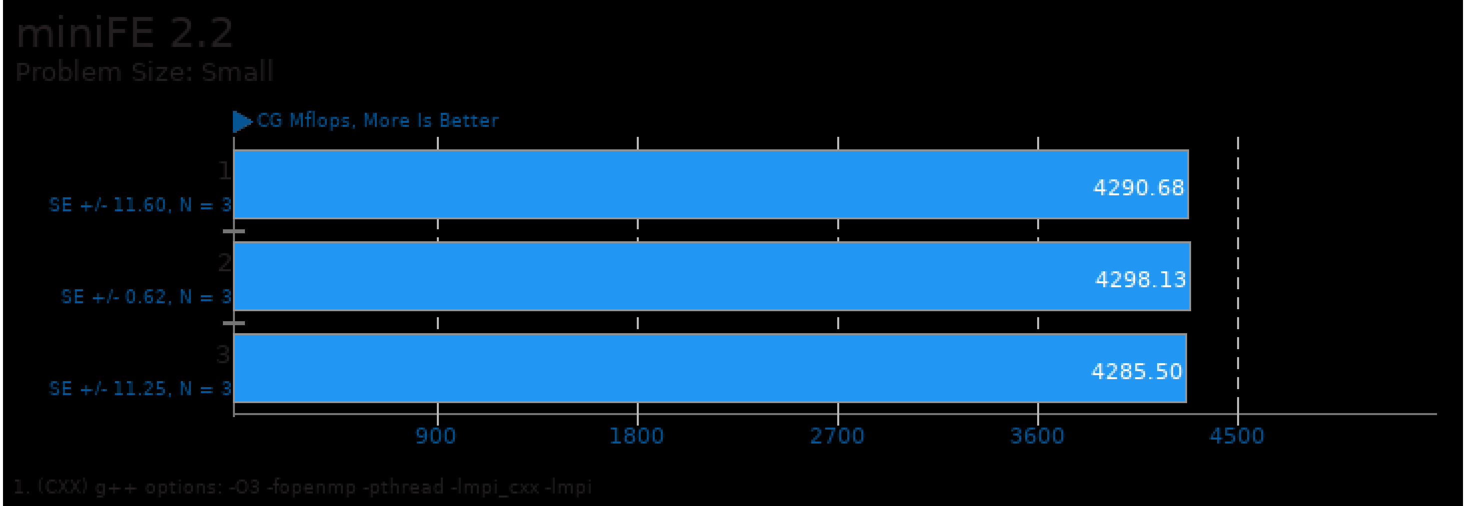

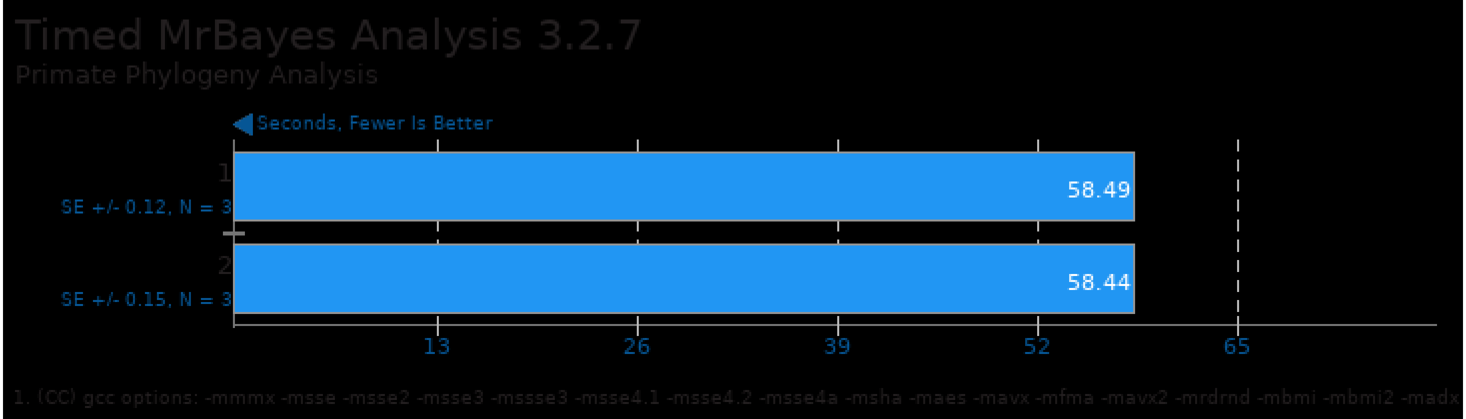

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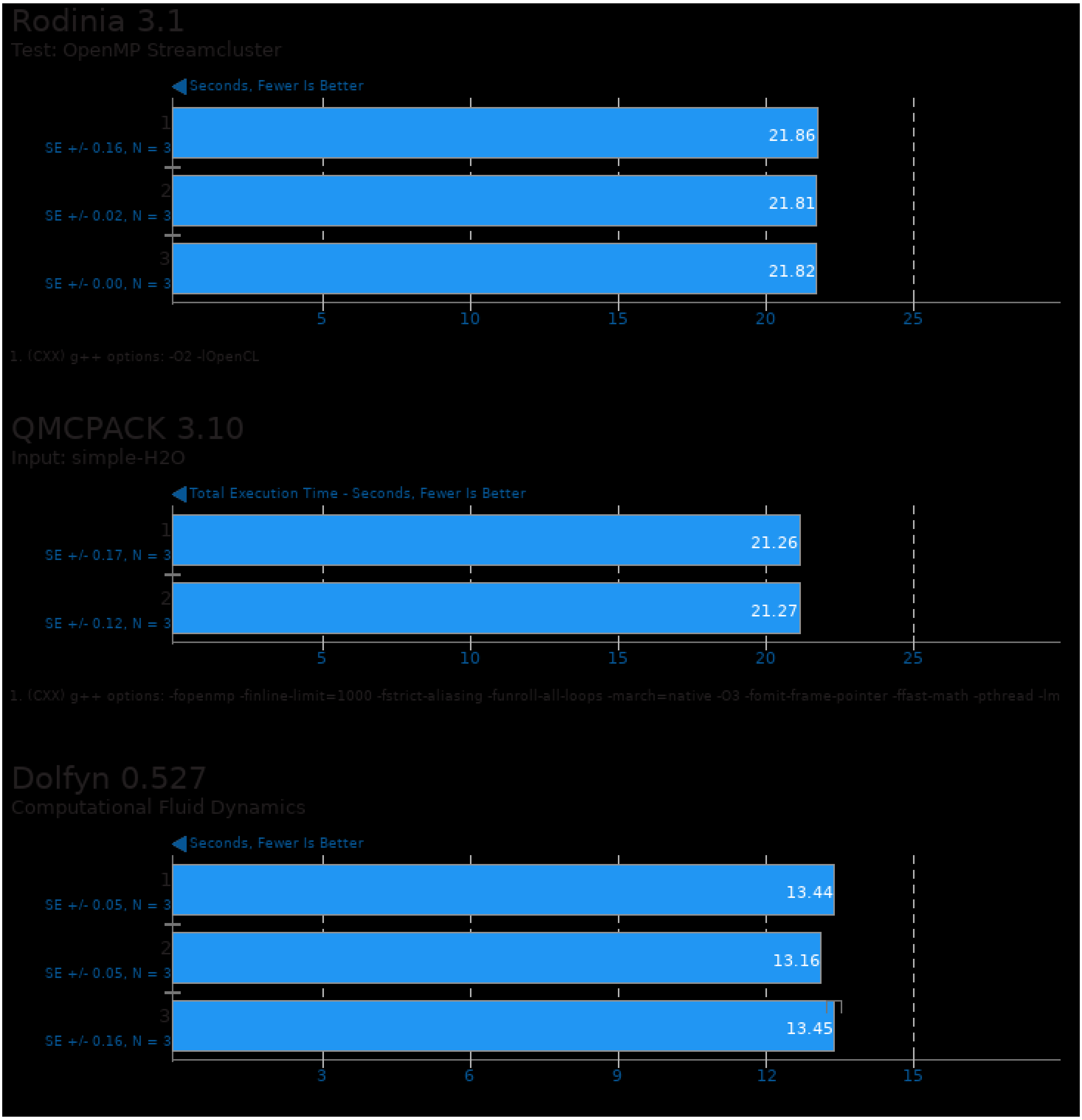

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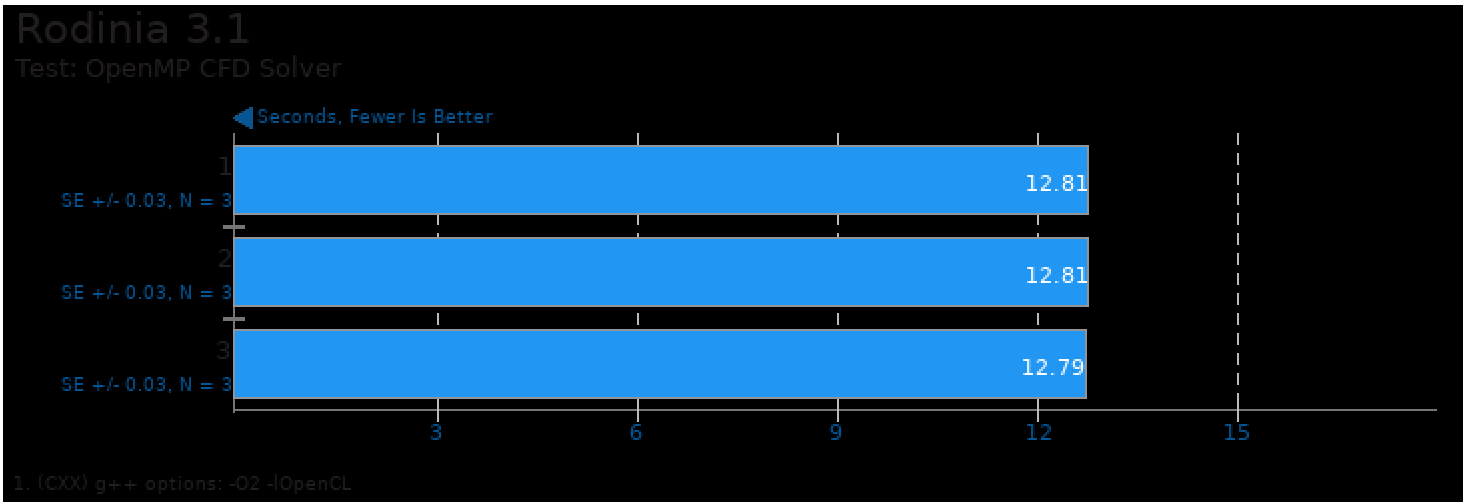

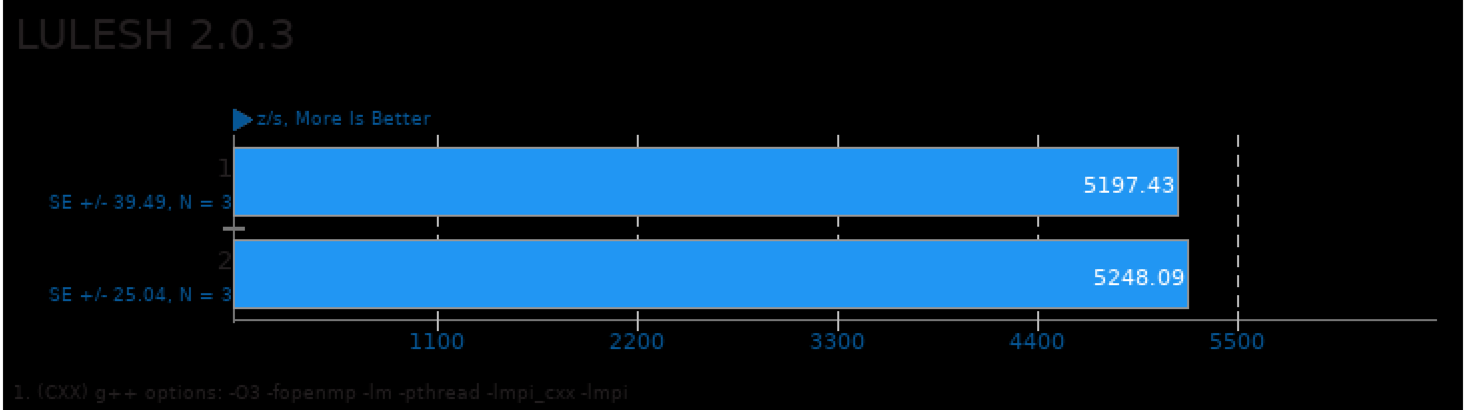

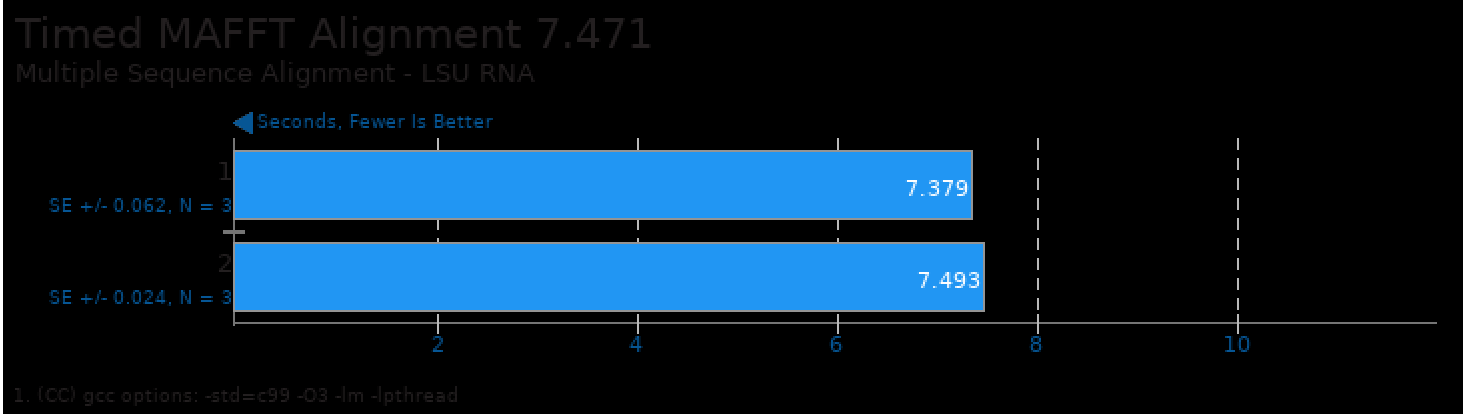

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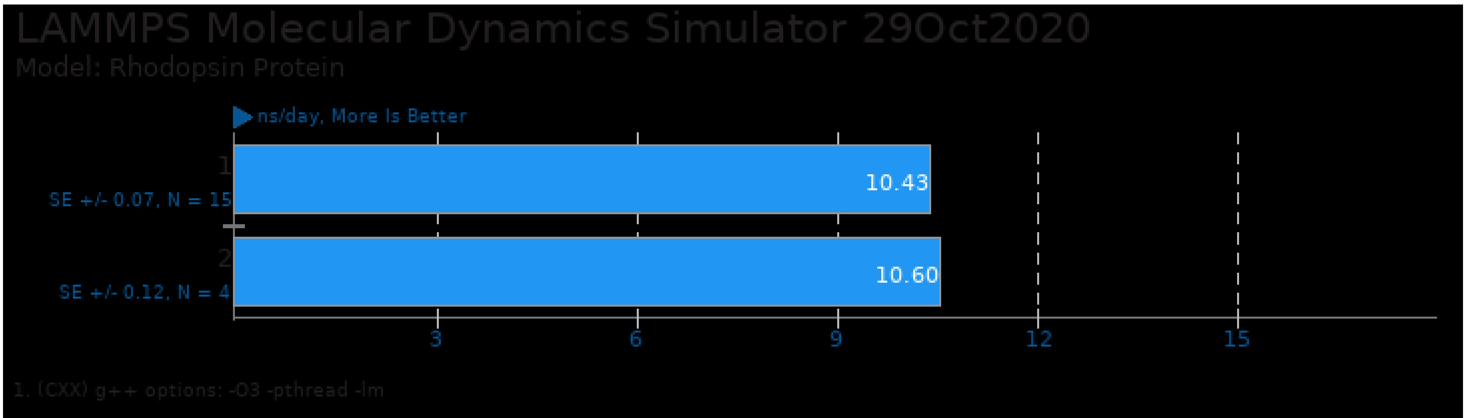

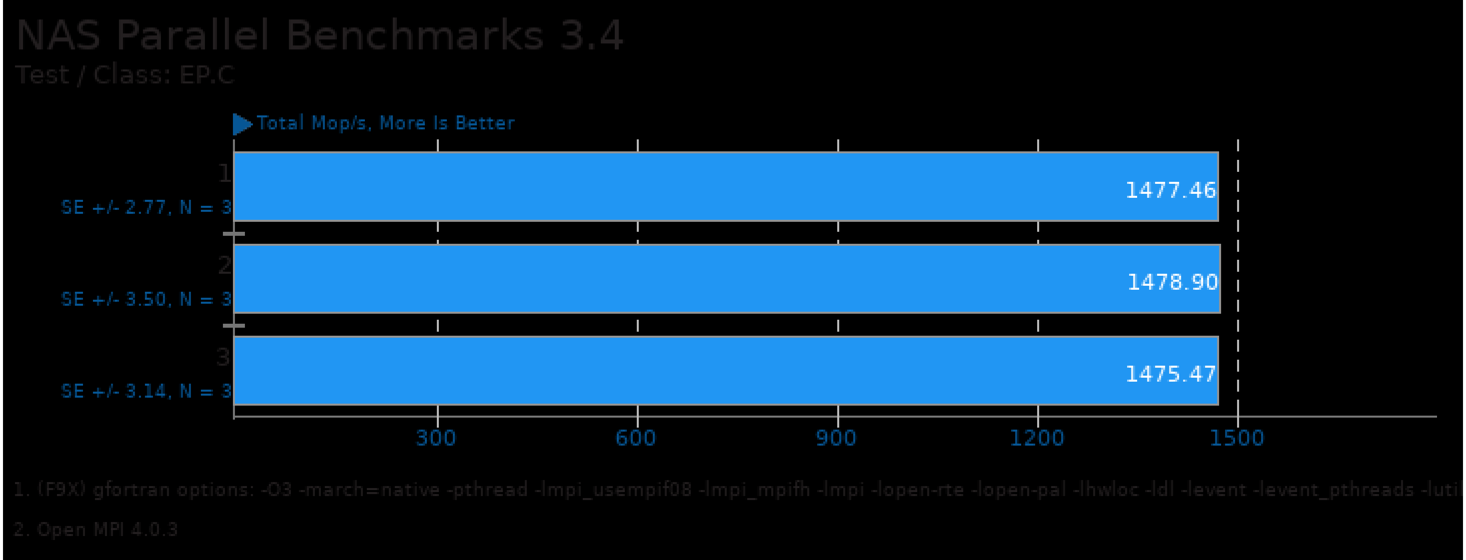

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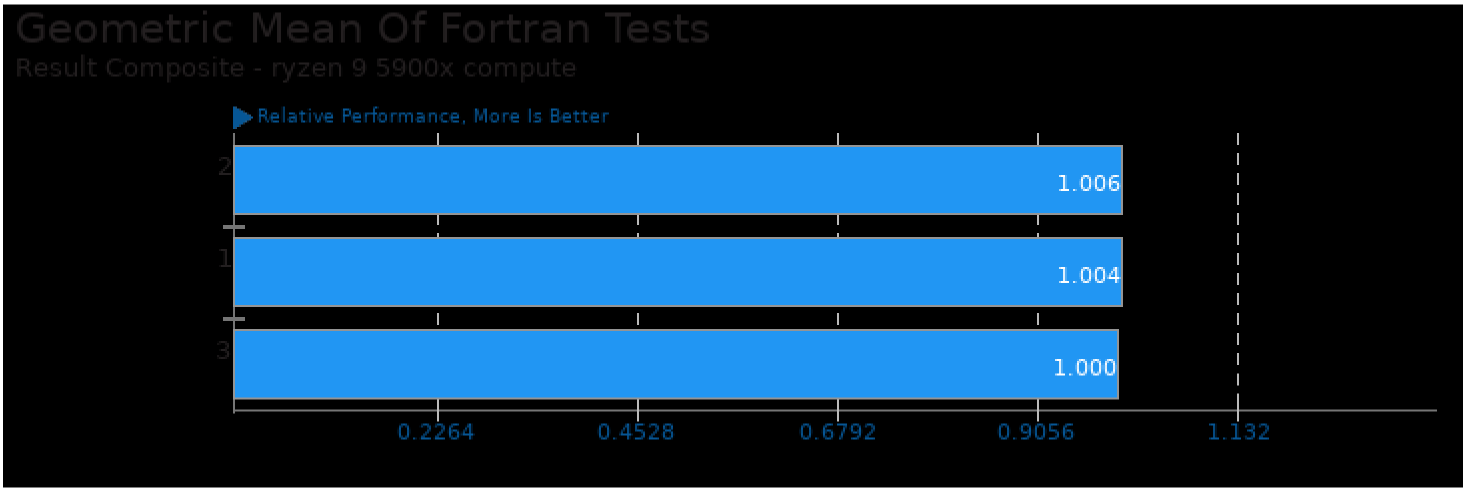
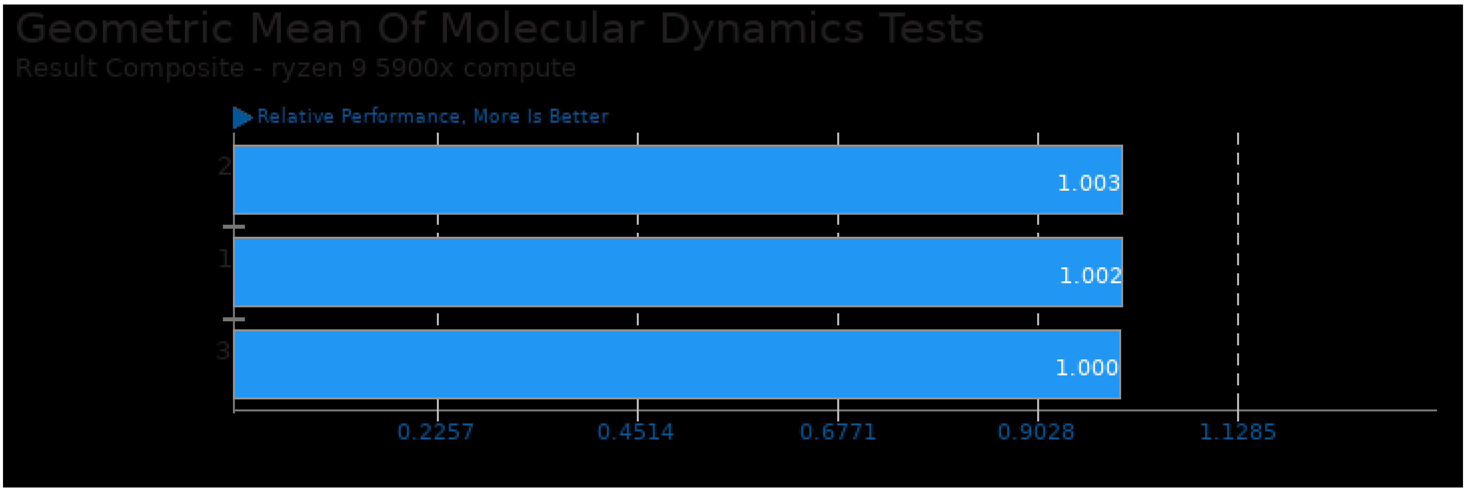
These geometric means are based upon test groupings / test suites for this result file.

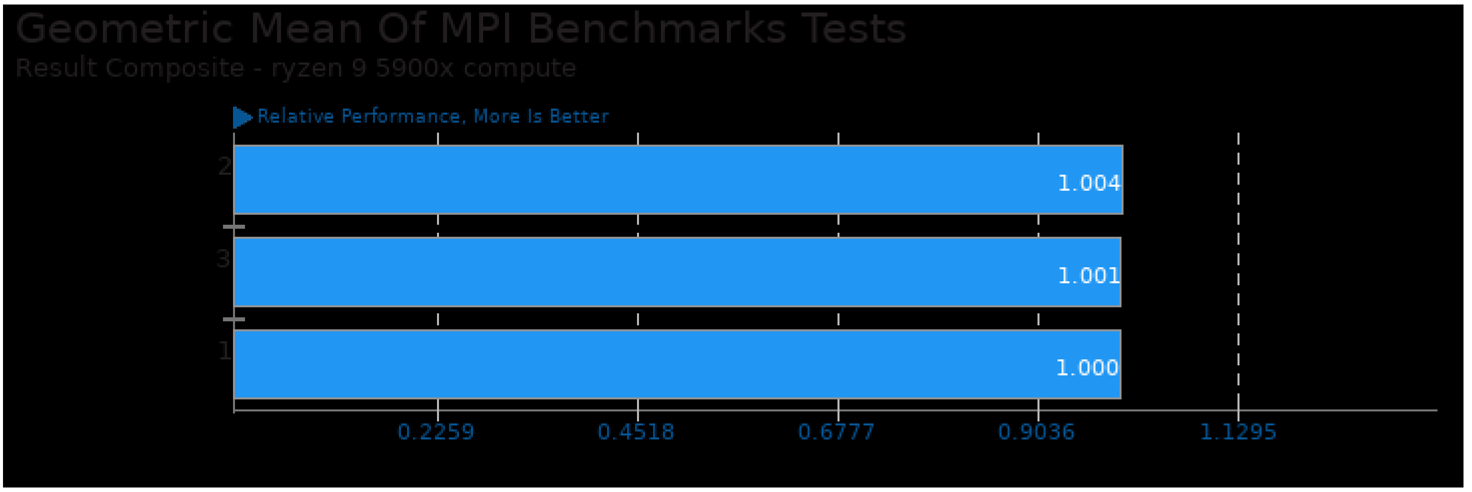
Geometric mean based upon tests: pts/cloverleaf, pts/dolfyn, pts/himeno, pts/hmmer, pts/lammps, pts/mafft, pts/mrbayes, pts/namd, pts/npb and pts/rodinia



Geometric mean based upon tests: pts/nwchem, pts/qe, pts/lammps, pts/incompact3d, pts/cloverleaf, pts/npb and pts/dolfyn

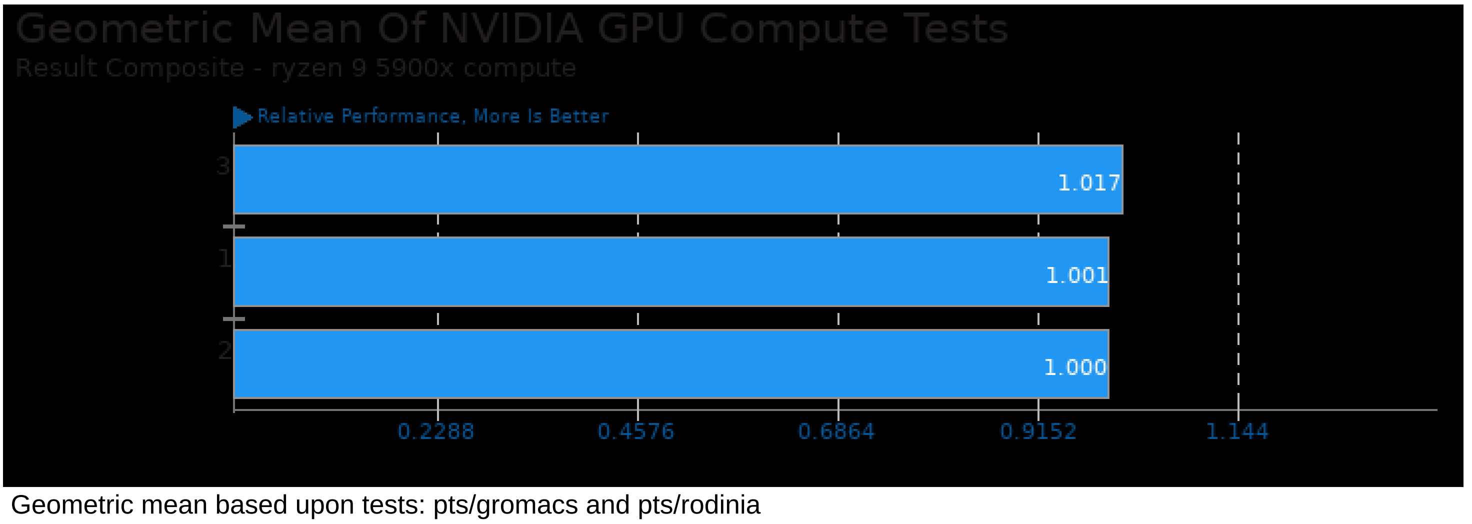


Geometric mean based upon tests: pts/namd, pts/gromacs, pts/cp2k, pts/nwchem, pts/dolfyn, pts/cloverleaf, pts/lammps, pts/minife, pts/lulesh, pts/pennant, pts/incompact3d and pts/openfoam

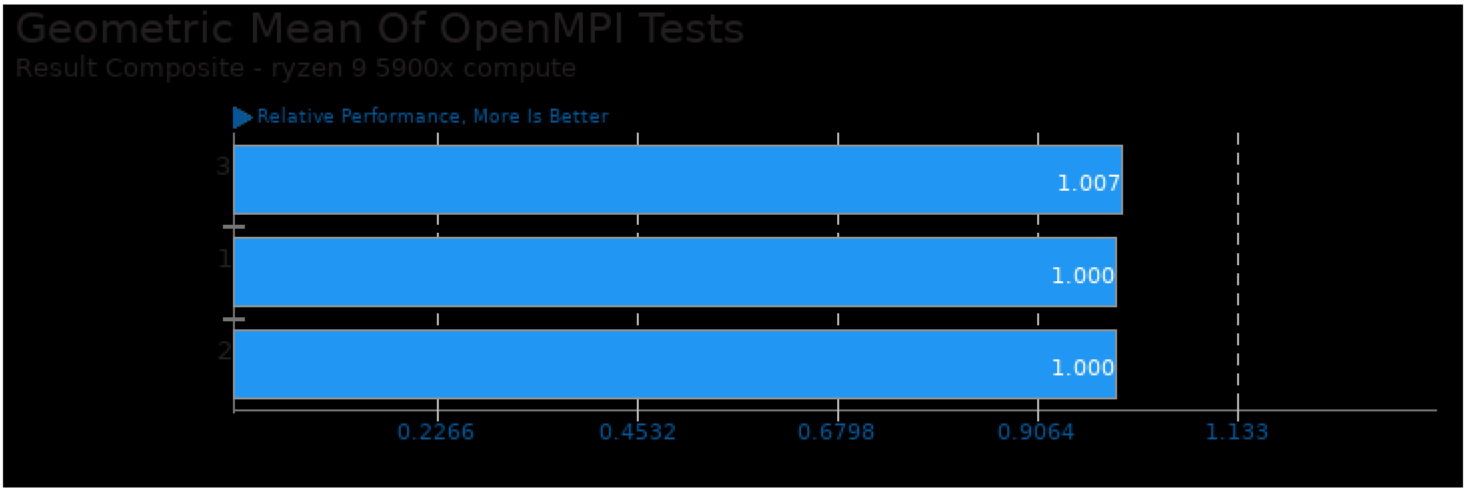


Geometric mean based upon tests: pts/lammps, pts/incompact3d, pts/gromacs, pts/qmcpack, pts/pennant, pts/mrbayes, pts/npb and pts/minife

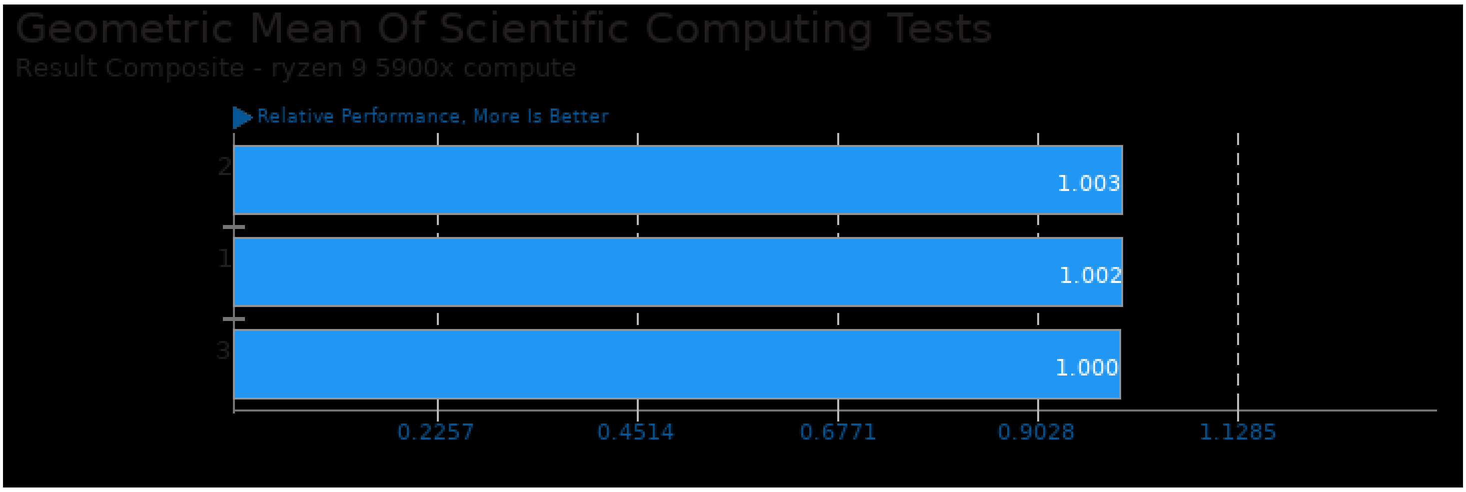
Geometric mean based upon tests: pts/rodinia, pts/npb, pts/pennant, pts/namd, pts/lammps and pts/gromacs



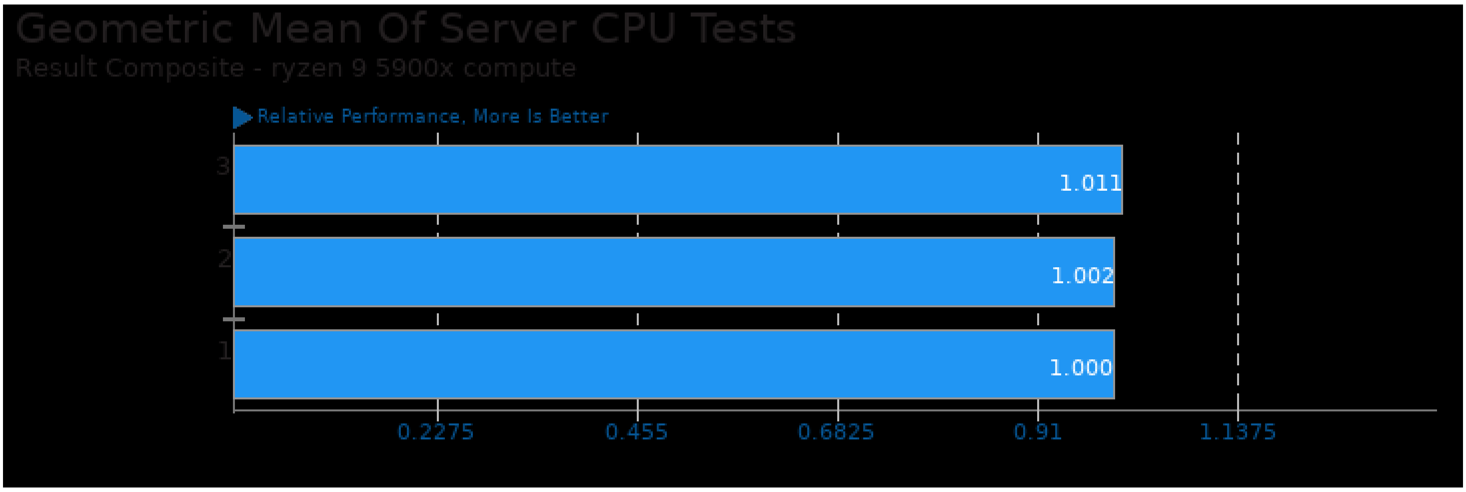
Geometric mean based upon tests: pts/gromacs and pts/rodinia



Geometric mean based upon tests: pts/nwchem, pts/pennant, pts/openfoam, pts/qe, pts/lammps, pts/incompact3d, pts/cp2k, pts/rodinia, pts/gromacs, pts/cloverleaf, pts/npb, pts/minife, pts/mrbayes, pts/qmcpack and pts/lulesh



Geometric mean based upon tests: pts/namd, pts/gromacs, pts/cp2k, pts/nwchem, pts/dolfyn, pts/cloverleaf, pts/lammps, pts/minife, pts/lulesh, pts/pennant, pts/incompact3d, pts/openfoam, pts/himeno, pts/mrbayes, pts/hmmer, pts/mafft, pts/qmcpack and pts/qe



Geometric mean based upon tests: pts/npb, pts/cp2k, pts/rodinia, pts/namd and pts/himeno

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Geometric mean based upon tests: pts/rodinia and pts/himeno

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