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Xeon E3 2021

Intel Xeon E3-1235L v5 testing with a ASRockRack C236M WS (P2.60 BIOS) and Intel HD 530 3GB on Ubuntu 20.04 via the Phoronix Test Suite.

Automated Executive Summary

1 had the most wins, coming in first place for 38% of the tests.

Based on the geometric mean of all complete results, the fastest (2) was 1.001x the speed of the slowest (1). 3 was 1x the speed of 2 and 1 was 0.999x the speed of 3.

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

CloverLeaf (Lagrangian-Eulerian Hydrodynamics) at 1.011x
Mobile Neural Network (Model: inception-v3) at 1.007x
ONNX Runtime (Model: super-resolution-10 - Device: OpenMP CPU) at 1.007x
CP2K Molecular Dynamics (Fayalite-FIST Data) at 1.007x
ONNX Runtime (Model: shufflenet-v2-10 - Device: OpenMP CPU) at 1.007x
dav1d (Video Input: Chimera 1080p) at 1.006x
Etcpak (Configuration: ETC1 + Dithering) at 1.006x
Kripke at 1.005x
OpenFOAM (Input: Motorbike 30M) at 1.004x

TNN (Target: CPU - Model: MobileNet v2) at 1.004x.

Test Systems:

1

2

3

Processor: Intel Xeon E3-1235L v5 @ 3.00GHz (4 Cores), Motherboard: ASRockRack C236M WS (P2.60 BIOS), Chipset: Intel Xeon E3-1200 v5/E3-1500, Memory: 8GB, Disk: Samsung SSD 960 EVO 500GB, Graphics: Intel HD 530 3GB (1000MHz), Audio: Realtek ALC1150, Monitor: DELL S2409W, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.04, Kernel: 5.8.0-050800-generic (x86_64), Desktop: GNOME Shell 3.36.4, Display Server: X Server 1.20.8, Display Driver: modesetting 1.20.8, OpenGL: 4.6 Mesa 20.0.8, Compiler: GCC 9.3.0, 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=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xe2 - Thermald 1.9.1
Python Notes: Python 3.8.5
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + 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 generic retpoline IBPB: conditional IBRS_FW STIBP: disabled RSB filling + srbds: Mitigation of Microcode + tsx_async_abort: Mitigation of Clear buffers; SMT disabled

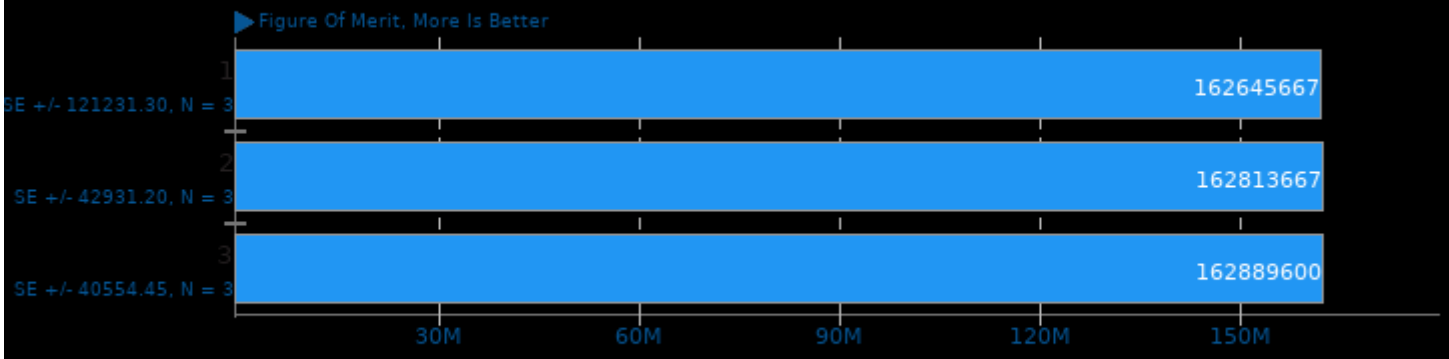
	1	2	3
Algebraic Multi-Grid Benchmark (Figure Of Merit)	**162645667**	162813667	**162889600**
Normalized	99.85%	99.95%	100%
Standard Deviation	0.1%	0%	0%
CloverLeaf - L.E.H (sec)	**213.77**	215.77	**216.12**
Normalized	100%	99.07%	98.91%
Standard Deviation	0.1%	0.1%	0%
CP2K Molecular Dynamics - Fayalite-FIST Data (sec)	**1665**	**1654**	1662
Normalized	99.32%	100%	99.51%
dav1d - Chimera 1080p (FPS)	194.48	**195.35**	**194.22**
Normalized	99.55%	100%	99.42%
Standard Deviation	0.5%	0.2%	0.4%
dav1d - Summer Nature 4K (FPS)	**53.27**	53.28	**53.29**
Normalized	99.96%	99.98%	100%

Standard Deviation	0.3%	0.2%	0.2%
dav1d - S.N.1 (FPS)	**179.17**	179.15	**178.88**
Normalized	100%	99.99%	99.84%
Standard Deviation	0.4%	0.1%	0.1%
dav1d - C.1.1.b (FPS)	**43.17**	**43.14**	43.15
Normalized	100%	99.93%	99.95%
Standard Deviation	0.1%	0.1%	0.1%
Etcpak - DXT1 (Mpx/s)	**899.056**	**896.618**	897.289
Normalized	100%	99.73%	99.8%
Standard Deviation	0%	0.2%	0.2%
Etcpak - ETC1 (Mpx/s)	**224.649**	**223.698**	224.361
Normalized	100%	99.58%	99.87%
Standard Deviation	0.2%	0.3%	0.2%
Etcpak - ETC2 (Mpx/s)	**127.934**	127.929	**127.885**
Normalized	100%	100%	99.96%
Standard Deviation	0%	0%	0%
Etcpak - ETC1 + Dithering (Mpx/s)	**214.200**	214.023	**213.008**
Normalized	100%	99.92%	99.44%
Standard Deviation	0%	0.1%	1%
Google SynthMark - VoiceMark_100 (Voices)	**474.733**	474.683	**474.626**
Normalized	100%	99.99%	99.98%
Standard Deviation	0.1%	0.1%	0.2%
Kripke (Throughput FoM)	**31957550**	31980450	**32127007**
Normalized	99.47%	99.54%	100%
Standard Deviation	0.5%	0.4%	0.5%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	**2.153**	2.154	**2.157**
Normalized	99.81%	99.86%	100%
Standard Deviation	0.4%	0.5%	0.9%
LULESH (z/s)	928.76330	**928.29792**	**929.02170**
Normalized	99.97%	99.92%	100%
Standard Deviation	0.2%	0.1%	0.2%
Mobile Neural Network - SqueezeNetV1.0	7.796	**7.804**	**7.783**
Normalized	99.83%	99.73%	100%
Standard Deviation	0.4%	0.4%	0.1%
Mobile Neural Network - resnet-v2-50 (ms)	**39.316**	**39.188**	39.283
Normalized	99.67%	100%	99.76%
Standard Deviation	0.1%	0.1%	0.1%
Mobile Neural Network - MobileNetV2_224	**4.838**	**4.831**	**4.831**
Normalized	99.86%	100%	100%
Standard Deviation	0.1%	0%	0.2%
Mobile Neural Network - mobilenet-v1-1.0	5.804	**5.800**	**5.812**
Normalized	99.93%	100%	99.79%
Standard Deviation	0.2%	0.1%	0.2%
Mobile Neural Network - inception-v3 (ms)	**53.804**	**53.423**	53.716
Normalized	99.29%	100%	99.45%
Standard Deviation	0.5%	0.3%	0.2%
ONNX Runtime - yolov4 - OpenMP CPU (Inferences/min)	**177**	181	**182**
Normalized	97.25%	99.45%	100%
Standard Deviation	7.6%	0.2%	0%
ONNX Runtime - bertsquad-10 - OpenMP CPU (Inferences/min)	279	279	279
Standard Deviation	0.4%	0.3%	0.3%

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ONNX Runtime - fcn-resnet101-11 - OpenMP CPU (Inferences/min)	29	29	29
Standard Deviation	2.9%	1%	
ONNX Runtime - shufflenet-v2-10 - OpenMP CPU (Inferences/min)	11684	**11737**	**11659**
Normalized	99.55%	100%	99.34%
Standard Deviation	0.2%	0.1%	0.2%
ONNX Runtime - super-resolution-10 - OpenMP CPU (Inferences/min)	**1877**	1889	**1890**
Normalized	99.31%	99.95%	100%
Standard Deviation	1.2%	1.1%	0.8%
OpenFOAM - Motorbike 30M (sec)	**400.94**	**399.17**	399.25
Normalized	99.56%	100%	99.98%
Standard Deviation	0.1%	0%	0.1%
rav1e - 1 (FPS)	0.280	0.280	0.280
Standard Deviation	0.2%	0.2%	0.2%
rav1e - 5 (FPS)	**0.803**	**0.802**	**0.802**
Normalized	100%	99.88%	99.88%
Standard Deviation	0.1%	0.2%	0.2%
rav1e - 6 (FPS)	1.064	1.064	1.064
Standard Deviation	0.1%	0.1%	0.2%
rav1e - 10 (FPS)	**2.397**	**2.398**	**2.397**
Normalized	99.96%	100%	99.96%
Standard Deviation	0.2%	0.1%	0.2%
RELION - Basic - CPU (sec)	7529	**7536**	**7524**
Normalized	99.93%	99.85%	100%
Standard Deviation	0.2%	0.1%	0.1%
Timed Godot Game Engine Compilation - Time To Compile (sec)	**492.025**	491.873	**491.791**
Normalized	99.95%	99.98%	100%
Standard Deviation	0.1%	0.1%	0.2%
TNN - CPU - MobileNet v2 (ms)	459.700	**460.482**	**458.470**
Normalized	99.73%	99.56%	100%
Standard Deviation	0.1%	0%	0.1%
TNN - CPU - SqueezeNet v1.1 (ms)	**454.355**	454.217	**453.980**
Normalized	99.92%	99.95%	100%
Standard Deviation	0%	0%	0.1%

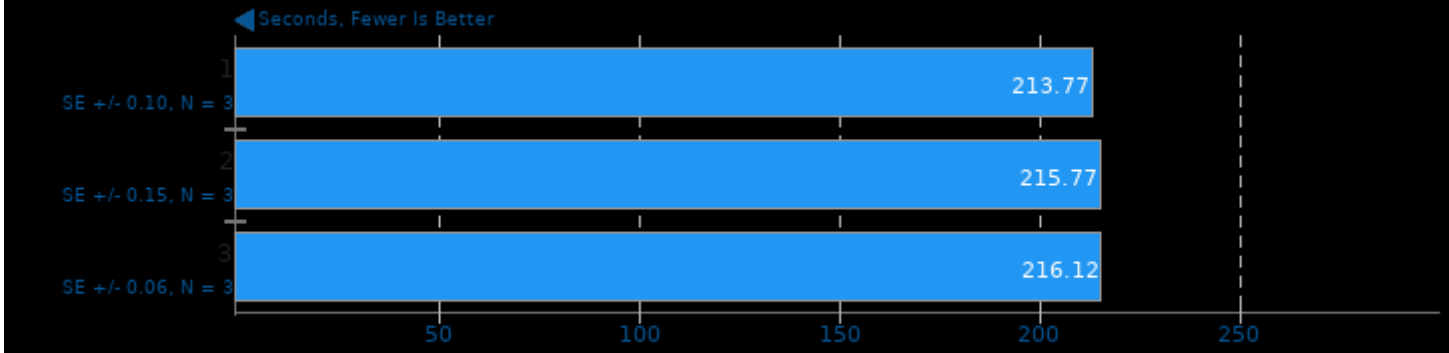
Algebraic Multi-Grid Benchmark 1.2



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

CloverLeaf

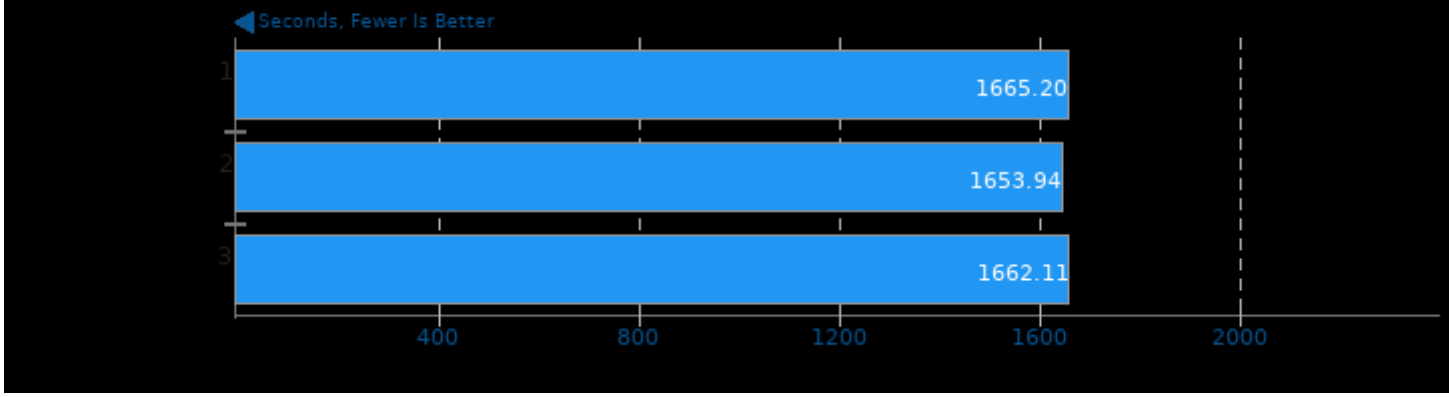
Lagrangian-Eulerian Hydrodynamics

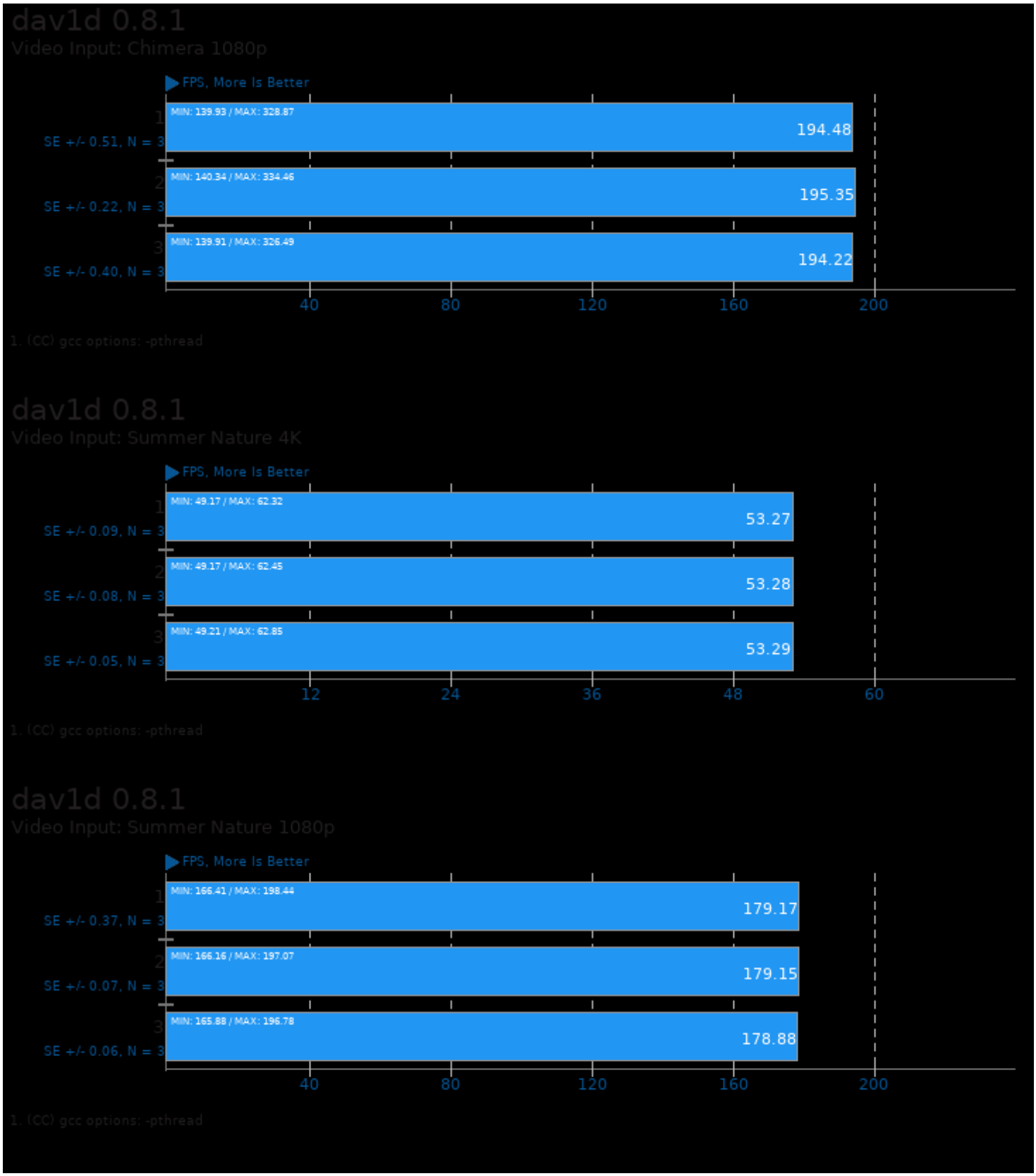


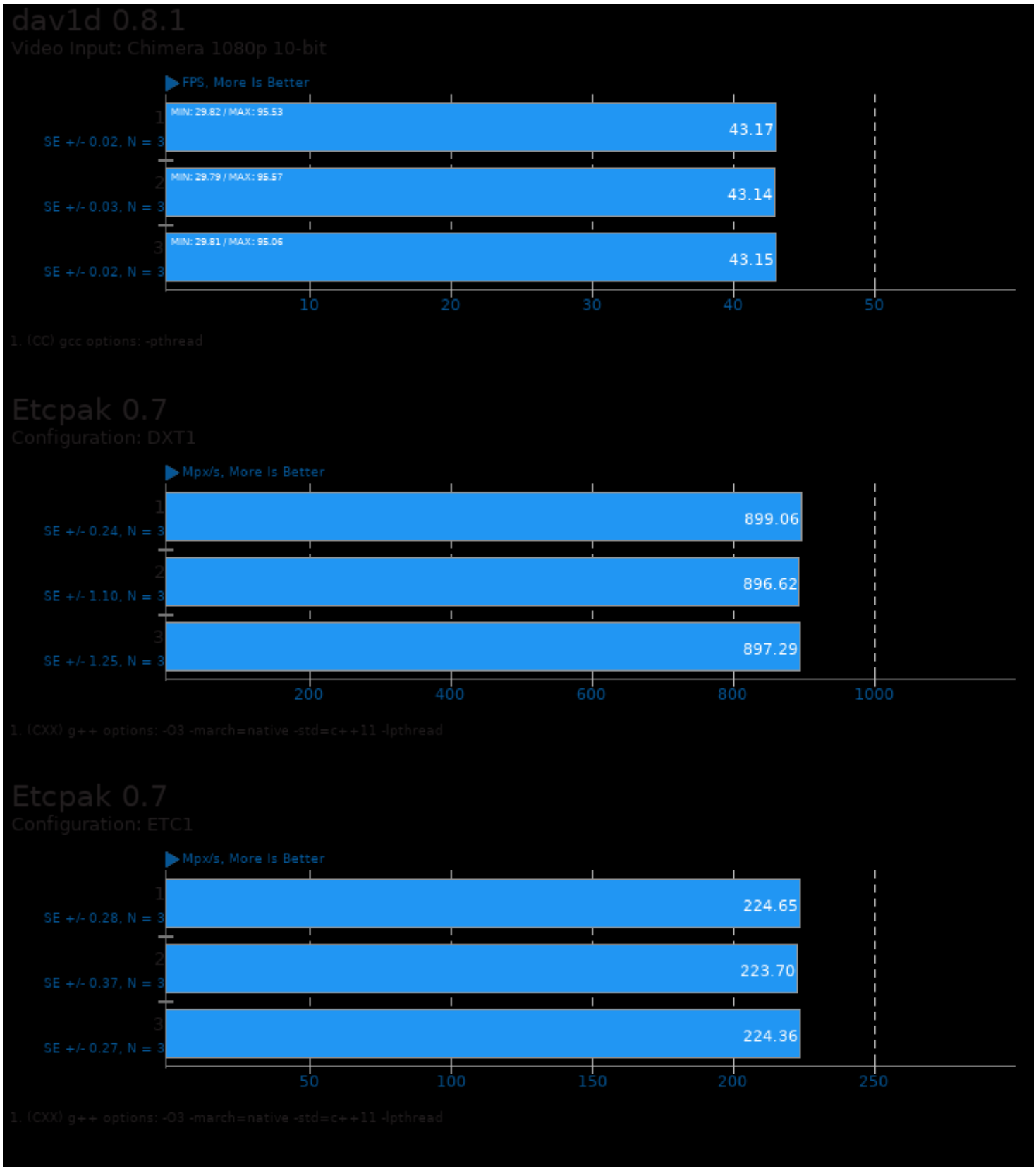
1. (F9X) gfortran options: -O3 -march=native -funroll-loops -fopenmp

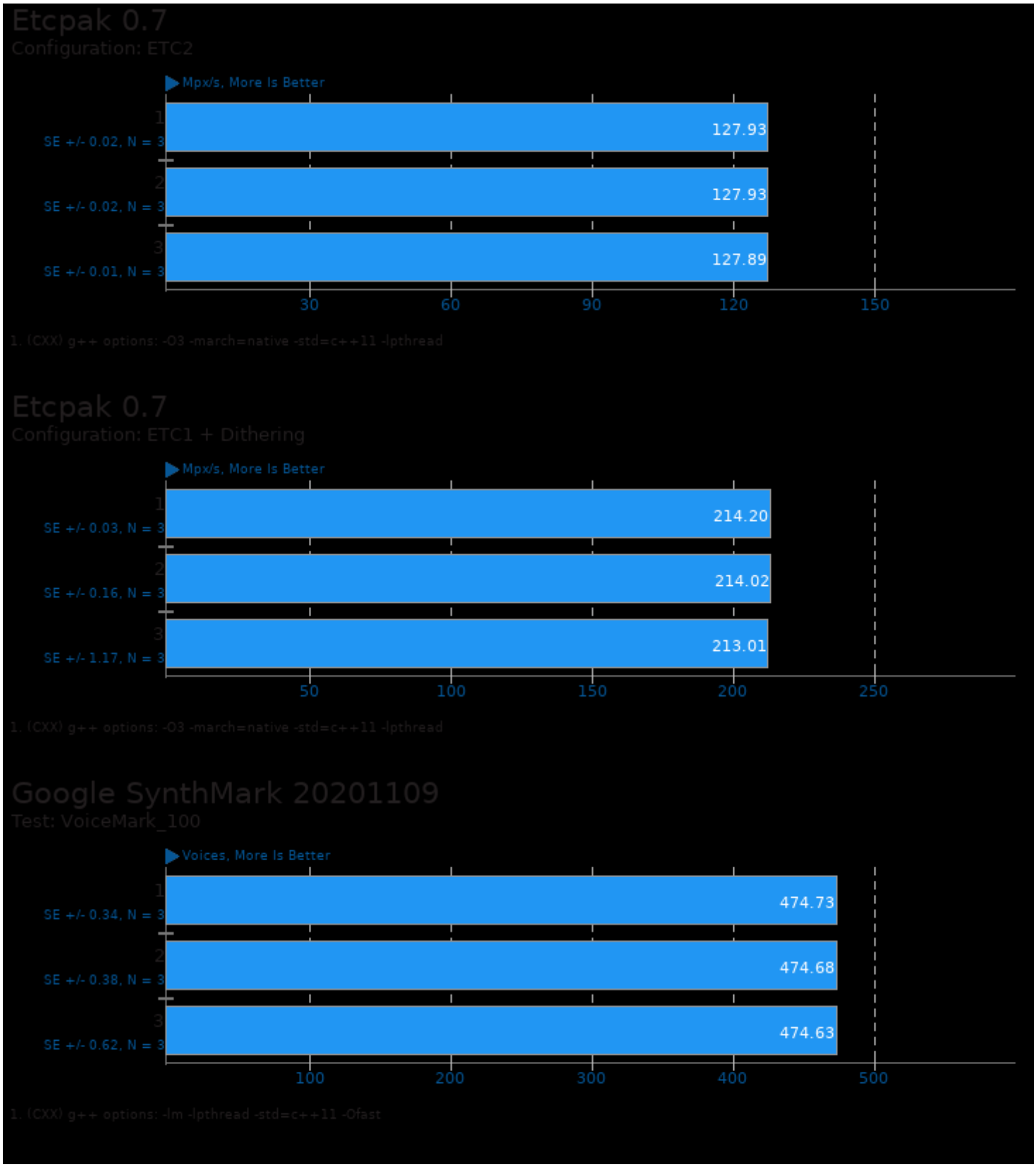
CP2K Molecular Dynamics 8.1

Fayalite-FIST Data

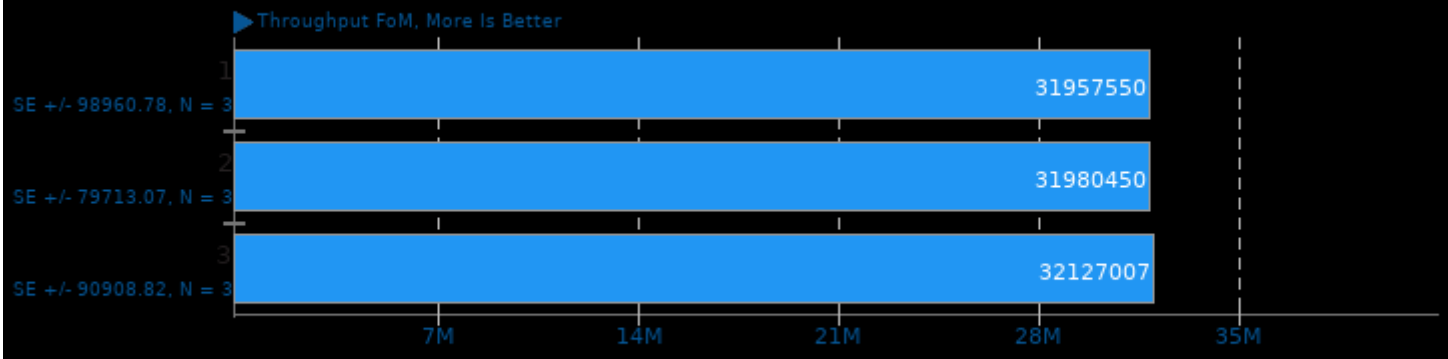



dav1d 0.8.1
Video Input: Chimera 1080p
FPS, More Is Better
1
MIN: 139.93 / MAX: 328.87
194.48
SE +/- 0.51, N = 3
2
MIN: 140.34 / MAX: 334.46
195.35
SE +/- 0.22, N = 3
3
MIN: 139.91 / MAX: 326.49
194.22
SE +/- 0.40, N = 3
40
80
120
160
200
1. (CC) gcc options: -pthread
dav1d 0.8.1
Video Input: Summer Nature 4K
FPS, More Is Better
1
MIN: 49.17 / MAX: 62.32
53.27
SE +/- 0.09, N = 3
2
MIN: 49.17 / MAX: 62.45
53.28
SE +/- 0.08, N = 3
3
MIN: 49.21 / MAX: 62.85
53.29
SE +/- 0.05, N = 3
12
24
36
48
60
1. (CC) gcc options: -pthread
dav1d 0.8.1
Video Input: Summer Nature 1080p
FPS, More Is Better
1
MIN: 166.41 / MAX: 198.44
179.17
SE +/- 0.37, N = 3
2
MIN: 166.16 / MAX: 197.07
179.15
SE +/- 0.07, N = 3
3
MIN: 165.88 / MAX: 196.78
178.88
SE +/- 0.06, N = 3
40
80
120
160
200
1. (CC) gcc options: -pthread


dav1d 0.8.1
Video Input: Chimera 1080p 10-bit
FPS, More Is Better
1
MIN: 29.82 / MAX: 95.53
43.17
SE +/- 0.02, N = 3
2
MIN: 29.79 / MAX: 95.57
43.14
SE +/- 0.03, N = 3
3
MIN: 29.81 / MAX: 95.06
43.15
SE +/- 0.02, N = 3
10
20
30
40
50
1. (CC) gcc options: -pthread
Etcpak 0.7
Configuration: DXT1
Mpx/s, More Is Better
1
899.06
SE +/- 0.24, N = 3
2
896.62
SE +/- 1.10, N = 3
3
897.29
SE +/- 1.25, N = 3
200
400
600
800
1000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Etcpak 0.7
Configuration: ETC1
Mpx/s, More Is Better
1
224.65
SE +/- 0.28, N = 3
2
223.70
SE +/- 0.37, N = 3
3
224.36
SE +/- 0.27, N = 3
50
100
150
200
250
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread


Etcpak 0.7
Configuration: ETC2
Mpx/s, More Is Better
1
SE +/- 0.02, N = 3
127.93
2
SE +/- 0.02, N = 3
127.93
3
SE +/- 0.01, N = 3
127.89
30
60
90
120
150
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Etcpak 0.7
Configuration: ETC1 + Dithering
Mpx/s, More Is Better
1
SE +/- 0.03, N = 3
214.20
2
SE +/- 0.16, N = 3
214.02
3
SE +/- 1.17, N = 3
213.01
50
100
150
200
250
1. (CXX) g++ options: -O3 -march=native -std=c++11 -lpthread
Google SynthMark 20201109
Test: VoiceMark_100
Voices, More Is Better
1
SE +/- 0.34, N = 3
474.73
2
SE +/- 0.38, N = 3
474.68
3
SE +/- 0.62, N = 3
474.63
100
200
300
400
500
1. (CXX) g++ options: -lm -lpthread -std=c++11 -Ofast

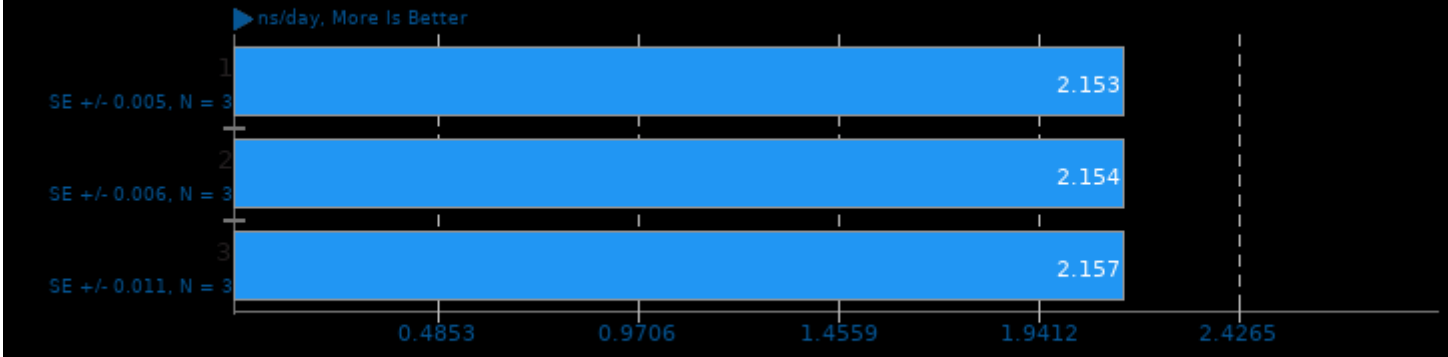
Kripke 1.2.4



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

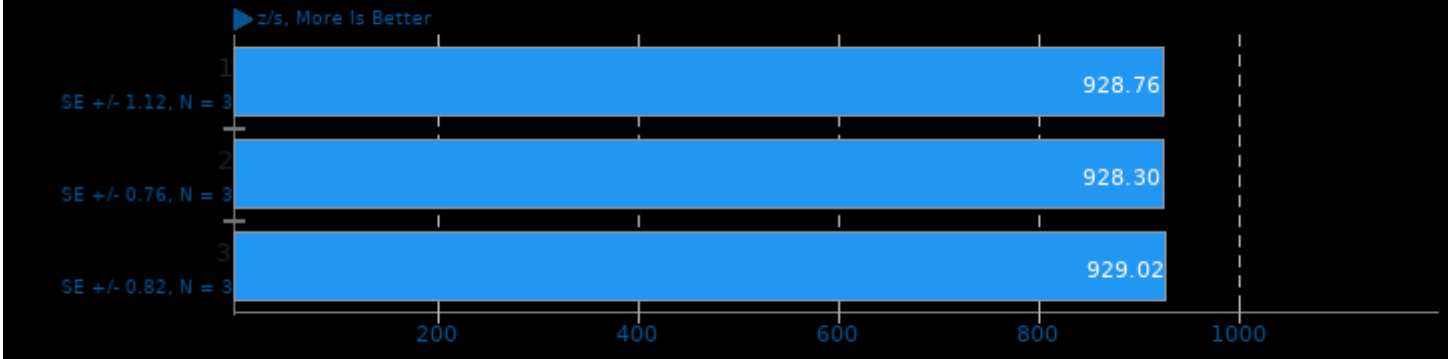
LAMMPS Molecular Dynamics Simulator 29Oct2020

Model: Rhodopsin Protein

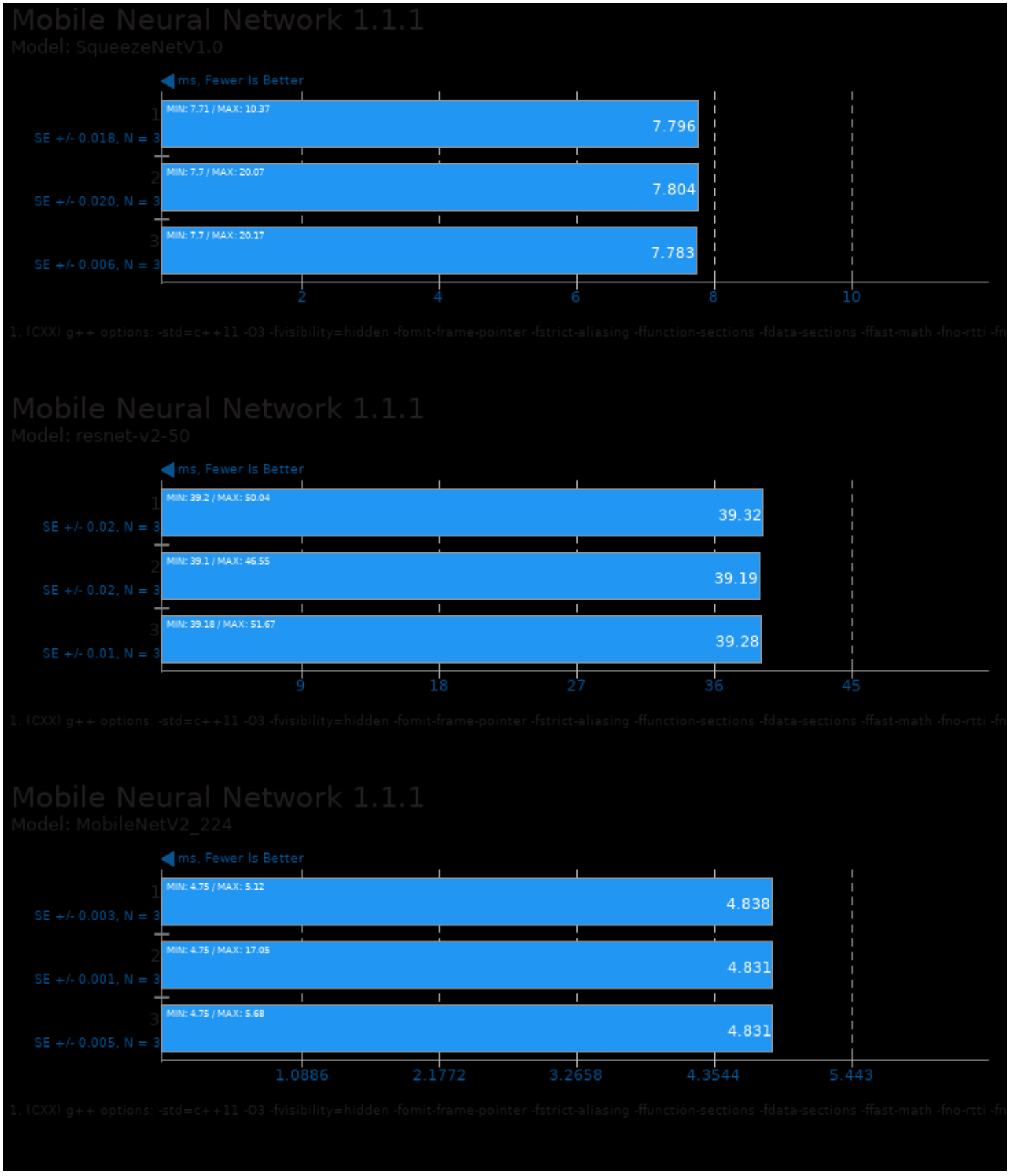


1. (CXX) g++ options: -O3 -pthread -lm

LULESH 2.0.3

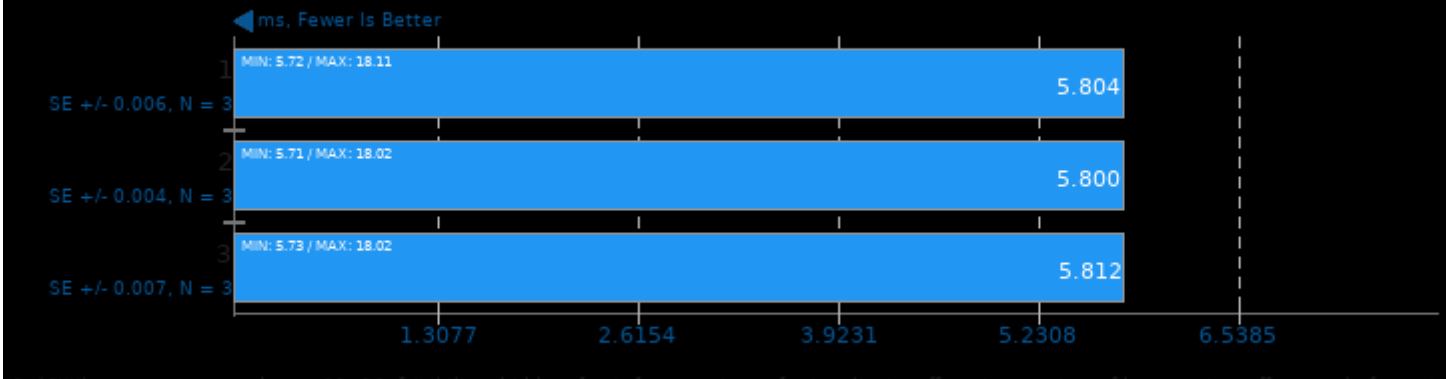


1. (CXX) g++ options: -O3 -fopenmp -lm -pthread -lmpi_cxx -lmpi


Mobile Neural Network 1.1.1
Model: SqueezeNetV1.0
ms, Fewer Is Better
MIN: 7.71 / MAX: 10.37
7.796
SE +/- 0.018, N = 3
MIN: 7.7 / MAX: 20.07
7.804
SE +/- 0.020, N = 3
MIN: 7.7 / MAX: 20.17
7.783
SE +/- 0.006, N = 3
2
4
6
8
10
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv
Mobile Neural Network 1.1.1
Model: resnet-v2-50
ms, Fewer Is Better
MIN: 39.2 / MAX: 50.04
39.32
SE +/- 0.02, N = 3
MIN: 39.1 / MAX: 46.55
39.19
SE +/- 0.02, N = 3
MIN: 39.18 / MAX: 51.67
39.28
SE +/- 0.01, N = 3
9
18
27
36
45
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv
Mobile Neural Network 1.1.1
Model: MobileNetV2_224
ms, Fewer Is Better
MIN: 4.75 / MAX: 5.12
4.838
SE +/- 0.003, N = 3
MIN: 4.75 / MAX: 17.05
4.831
SE +/- 0.001, N = 3
MIN: 4.75 / MAX: 5.68
4.831
SE +/- 0.005, N = 3
1.0886
2.1772
3.2658
4.3544
5.443
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

Mobile Neural Network 1.1.1

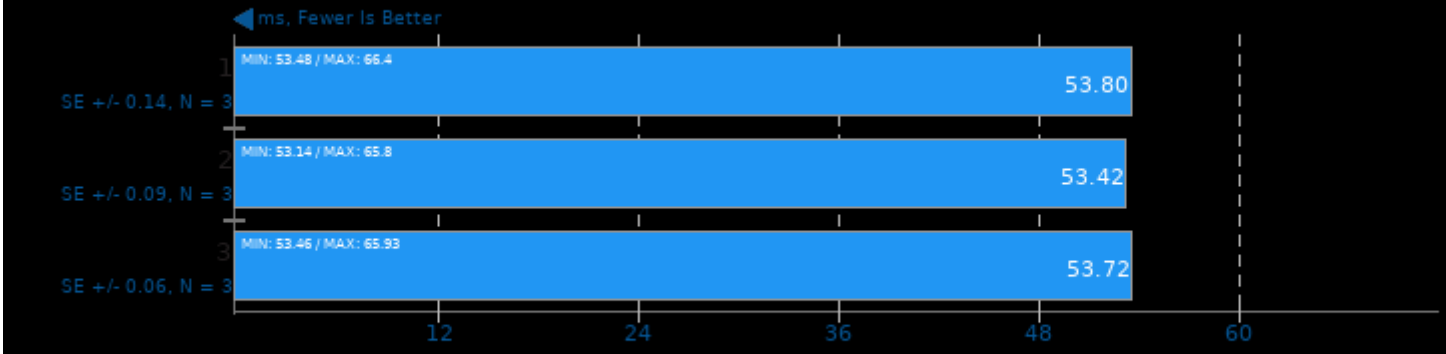
Model: mobilenet-v1-1.0



1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

Mobile Neural Network 1.1.1

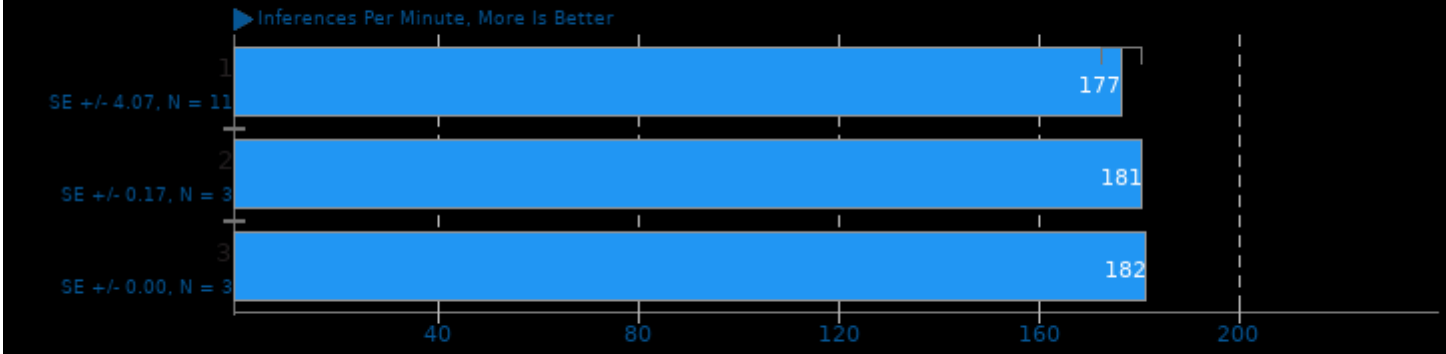
Model: inception-v3



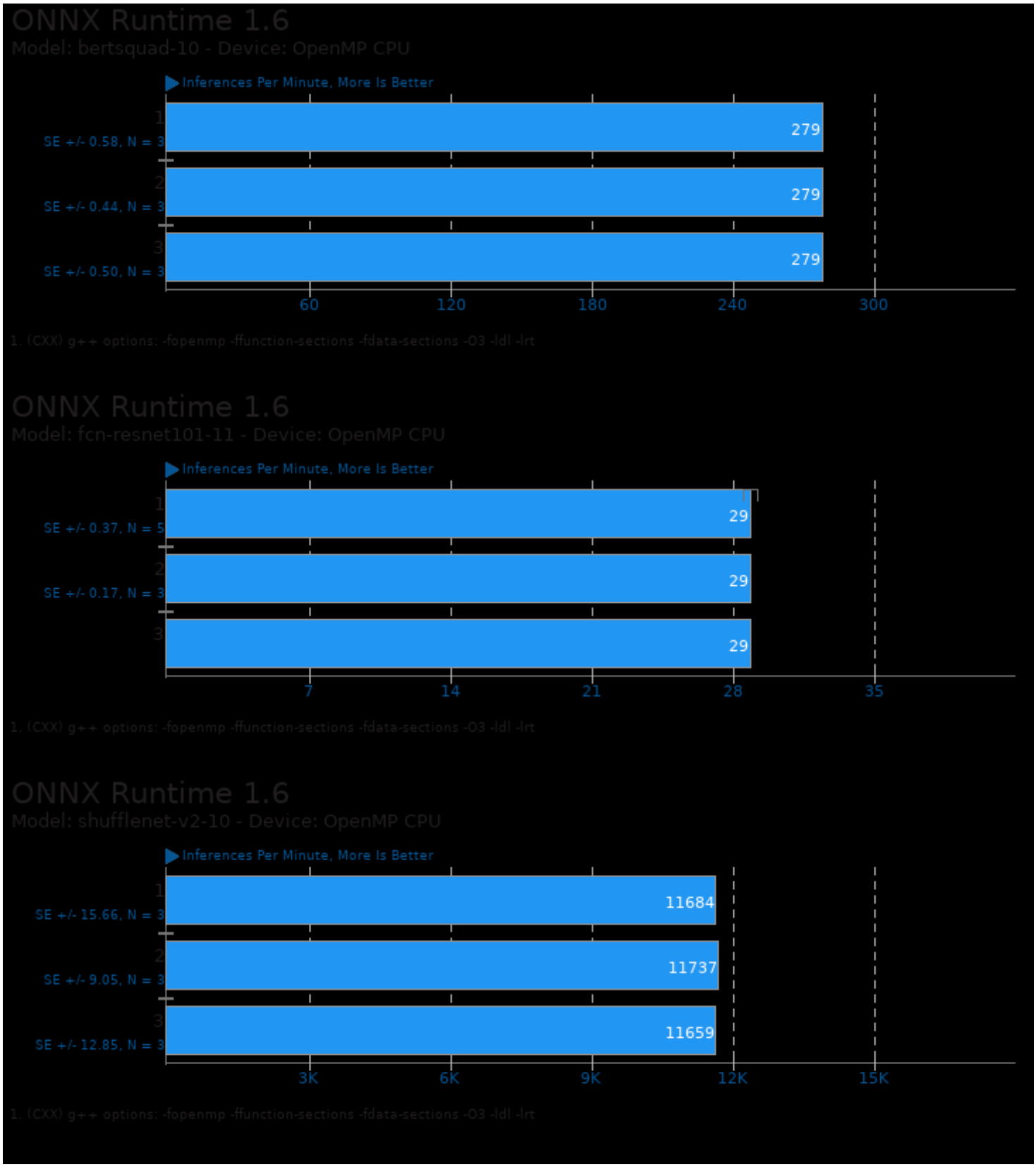
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

ONNX Runtime 1.6

Model: yolov4 - Device: OpenMP CPU

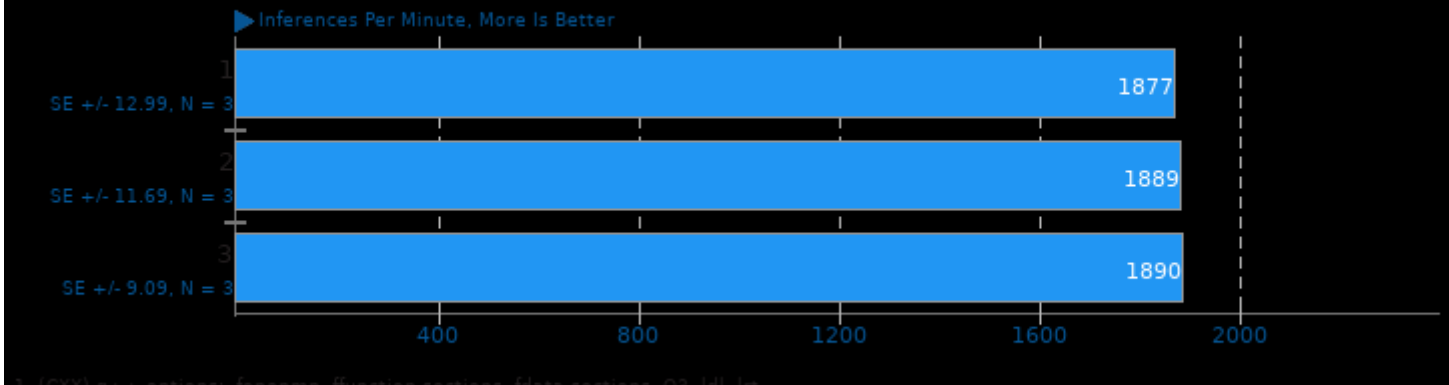


1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt


ONNX Runtime 1.6
Model: bertsquad-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
1
SE +/- 0.58, N = 3
279
2
SE +/- 0.44, N = 3
279
3
SE +/- 0.50, N = 3
279
60
120
180
240
300
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt
ONNX Runtime 1.6
Model: fcn-resnet101-11 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
1
SE +/- 0.37, N = 5
29
2
SE +/- 0.17, N = 3
29
3
29
7
14
21
28
35
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt
ONNX Runtime 1.6
Model: shufflenet-v2-10 - Device: OpenMP CPU
Inferences Per Minute, More Is Better
1
SE +/- 15.66, N = 3
11684
2
SE +/- 9.05, N = 3
11737
3
SE +/- 12.85, N = 3
11659
3K
6K
9K
12K
15K
1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt

ONNX Runtime 1.6

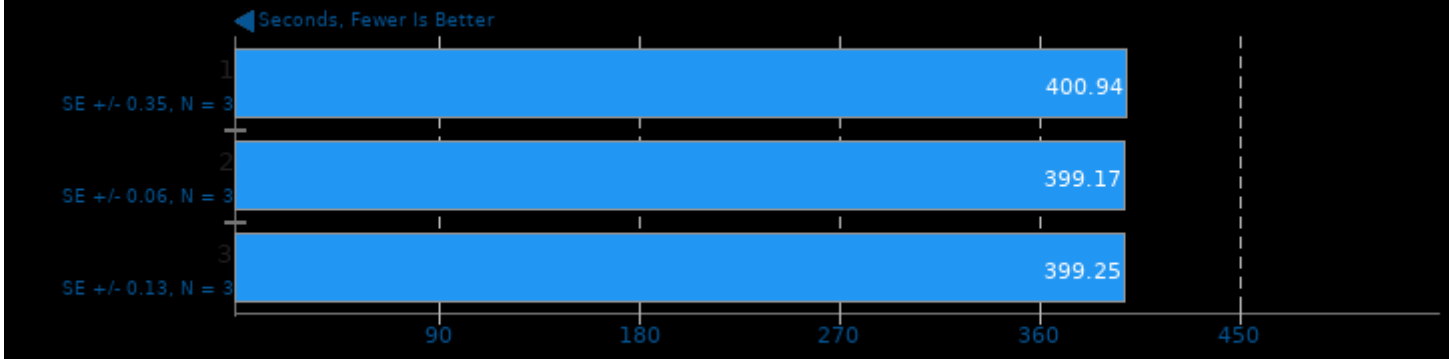
Model: super-resolution-10 - Device: OpenMP CPU



1. (CXX) g++ options: -fopenmp -ffunction-sections -fdata-sections -O3 -ldl -lrt

OpenFOAM 8

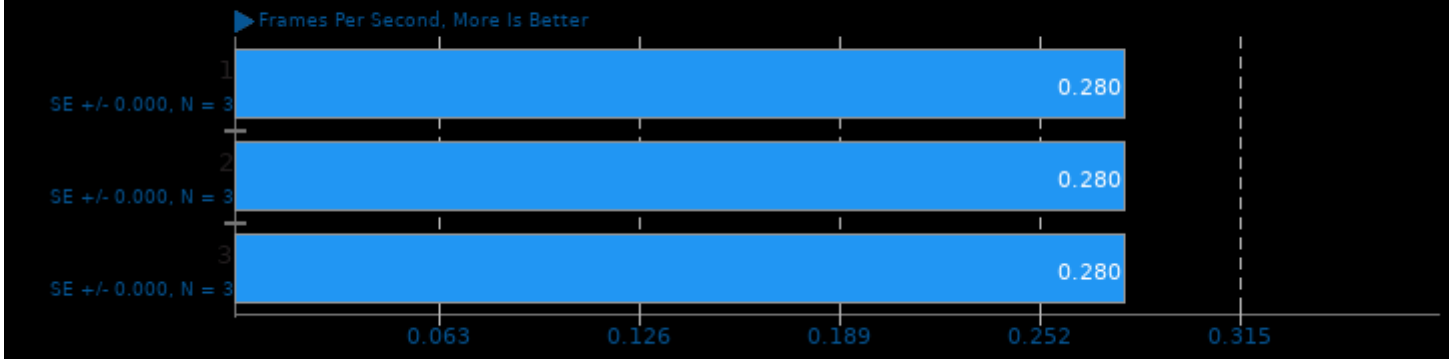
Input: Motorbike 30M

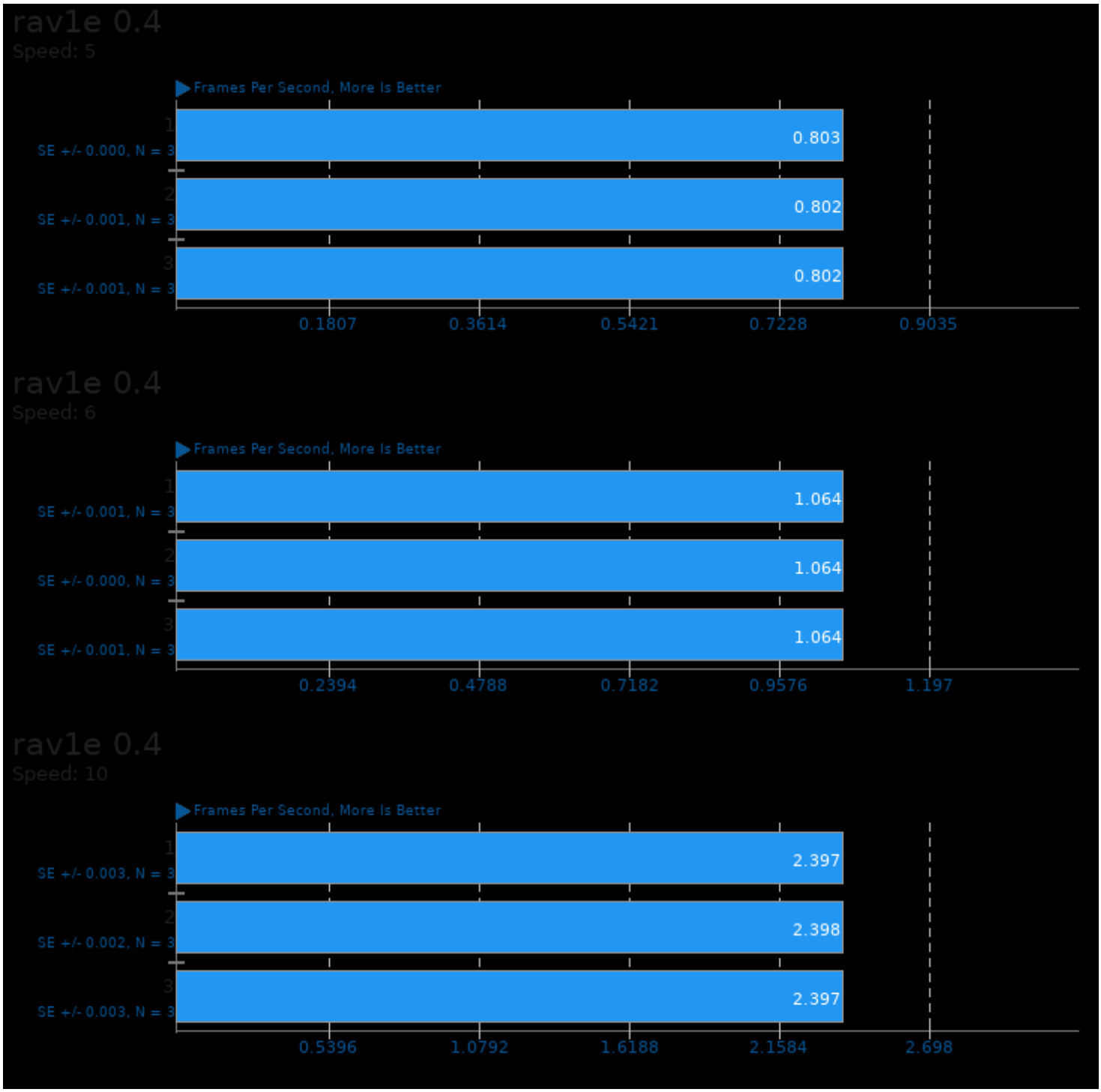


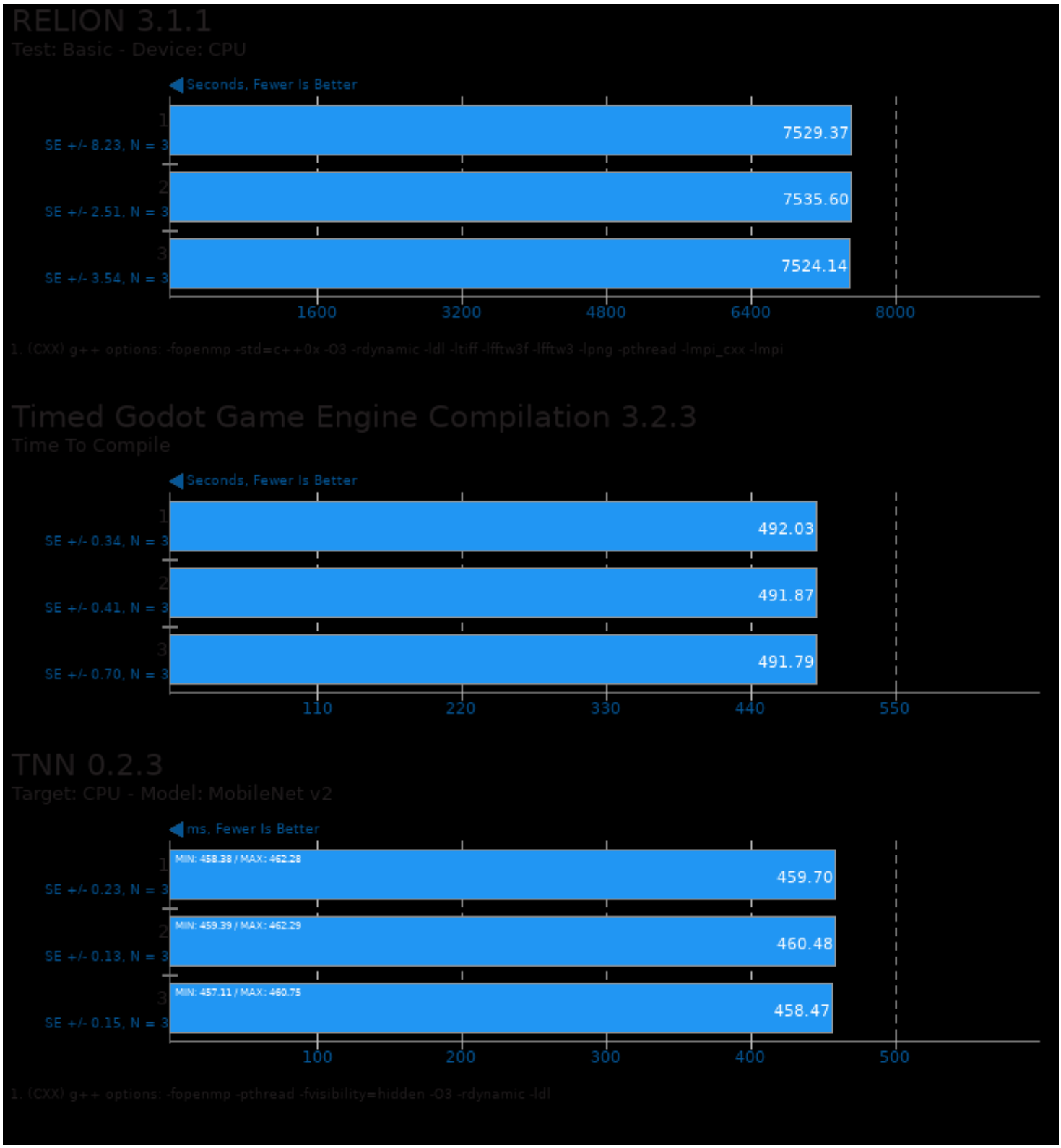
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -ldynamicMesh -lgenericPatch

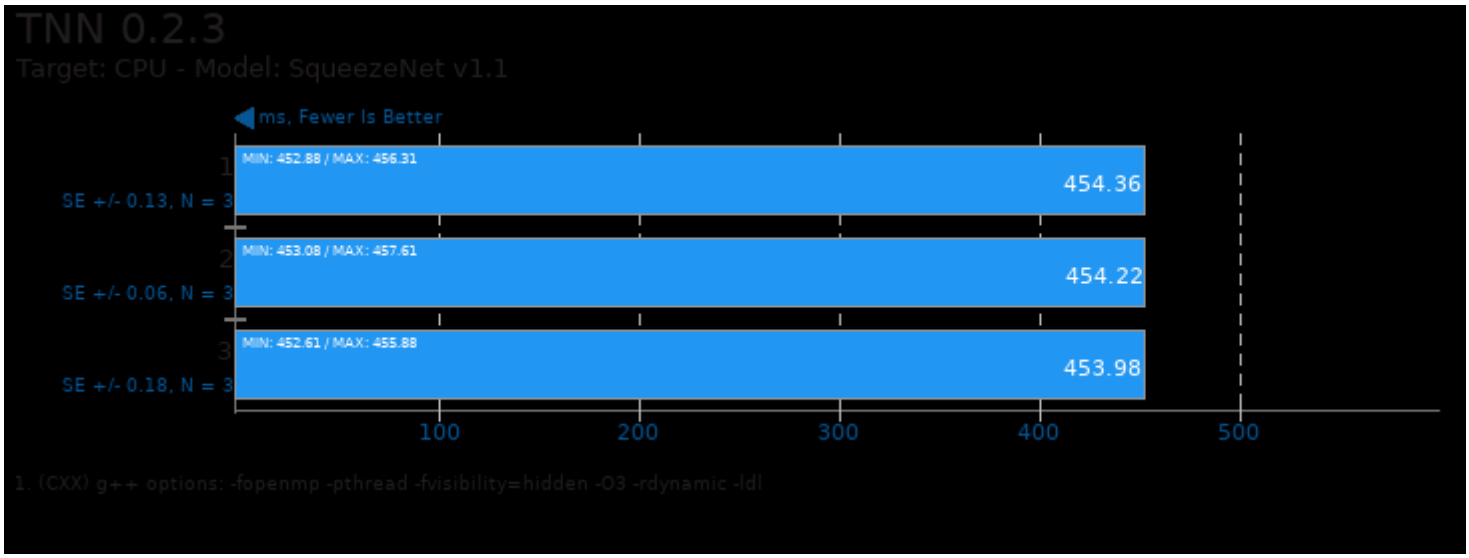
rav1e 0.4

Speed: 1

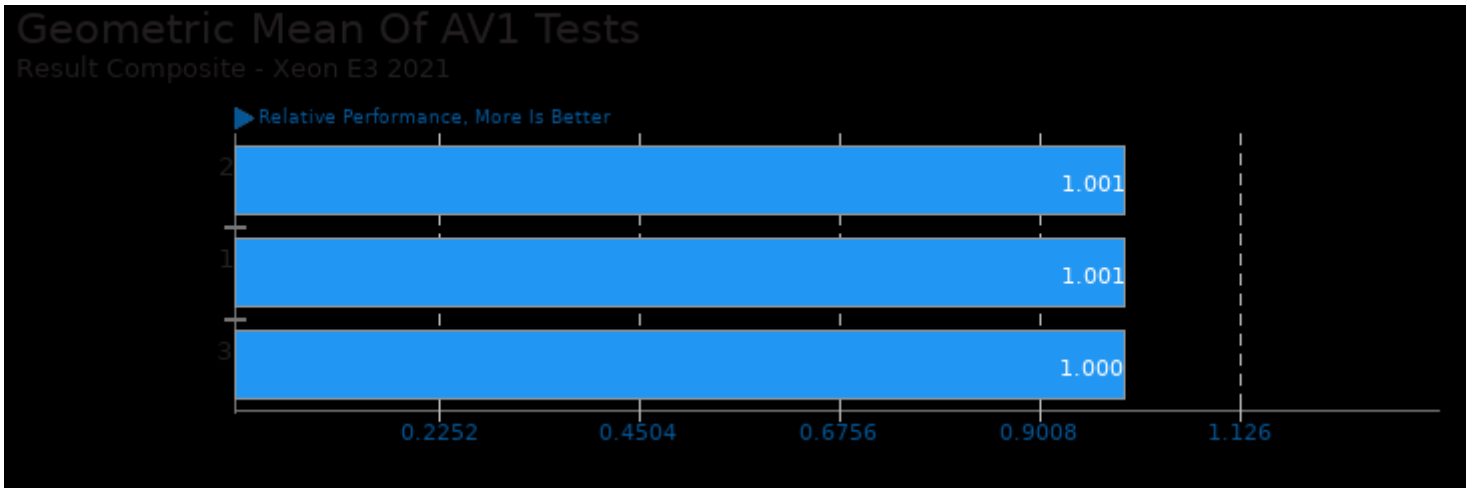



rav1e 0.4
Speed: 5
Frames Per Second, More Is Better
1
SE +/- 0.000, N = 3
0.803
2
SE +/- 0.001, N = 3
0.802
3
SE +/- 0.001, N = 3
0.802
0.1807
0.3614
0.5421
0.7228
0.9035
rav1e 0.4
Speed: 6
Frames Per Second, More Is Better
1
SE +/- 0.001, N = 3
1.064
2
SE +/- 0.000, N = 3
1.064
3
SE +/- 0.001, N = 3
1.064
0.2394
0.4788
0.7182
0.9576
1.197
rav1e 0.4
Speed: 10
Frames Per Second, More Is Better
1
SE +/- 0.003, N = 3
2.397
2
SE +/- 0.002, N = 3
2.398
3
SE +/- 0.003, N = 3
2.397
0.5396
1.0792
1.6188
2.1584
2.698

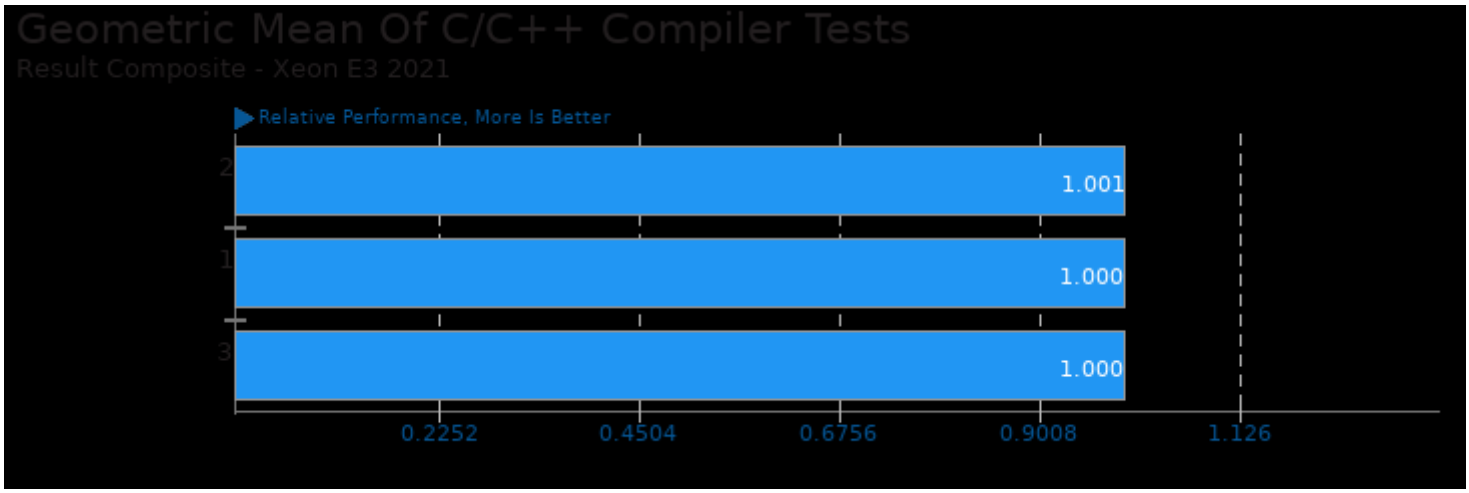

RELION 3.1.1
Test: Basic - Device: CPU
Seconds, Fewer Is Better
1
SE +/- 8.23, N = 3
7529.37
2
SE +/- 2.51, N = 3
7535.60
3
SE +/- 3.54, N = 3
7524.14
1600
3200
4800
6400
8000
1. (CXX) g++ options: -fopenmp -std=c++0x -O3 -rdynamic -ldl -ltiff -lfftw3f -lfftw3 -lpng -pthread -lmpi_cxx -lmpi
Timed Godot Game Engine Compilation 3.2.3
Time To Compile
Seconds, Fewer Is Better
1
SE +/- 0.34, N = 3
492.03
2
SE +/- 0.41, N = 3
491.87
3
SE +/- 0.70, N = 3
491.79
110
220
330
440
550
TNN 0.2.3
Target: CPU - Model: MobileNet v2
ms, Fewer Is Better
1
SE +/- 0.23, N = 3
MIN: 458.38 / MAX: 462.28
459.70
2
SE +/- 0.13, N = 3
MIN: 459.39 / MAX: 462.29
460.48
3
SE +/- 0.15, N = 3
MIN: 457.11 / MAX: 460.75
458.47
100
200
300
400
500
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl


TNN 0.2.3
Target: CPU - Model: SqueezeNet v1.1
ms, Fewer Is Better
1
MIN: 452.88 / MAX: 456.31
454.36
SE +/- 0.13, N = 3
2
MIN: 453.08 / MAX: 457.61
454.22
SE +/- 0.06, N = 3
3
MIN: 452.61 / MAX: 455.88
453.98
SE +/- 0.18, N = 3
100
200
300
400
500
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl

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



Geometric mean based upon tests: pts/dav1d and pts/rav1e



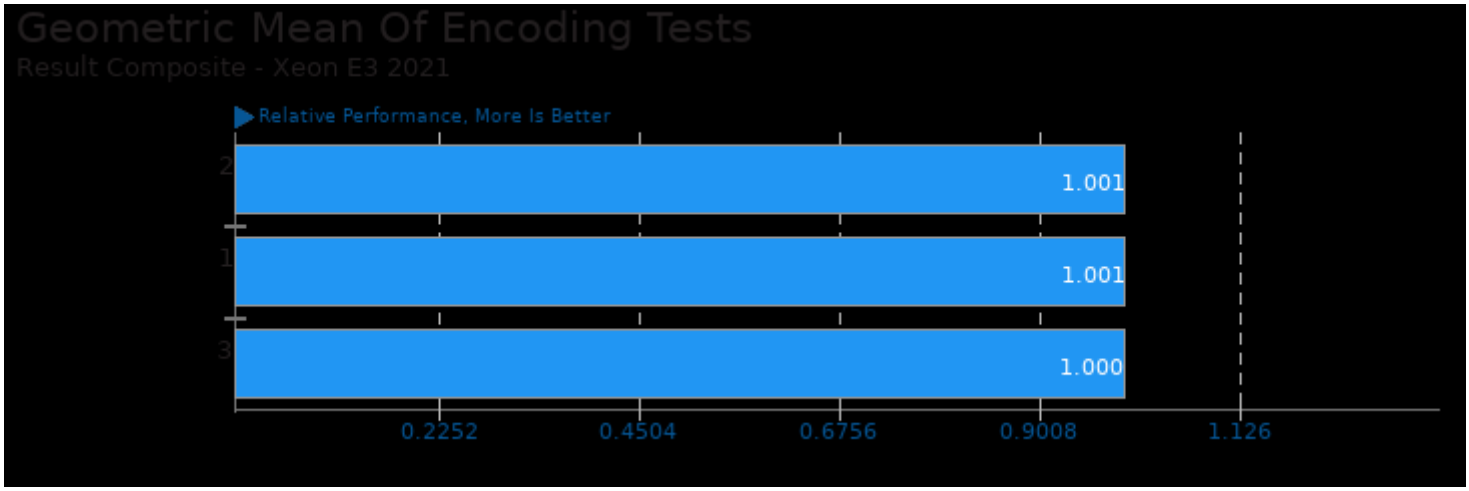
Geometric mean based upon tests: pts/dav1d and pts/lammps



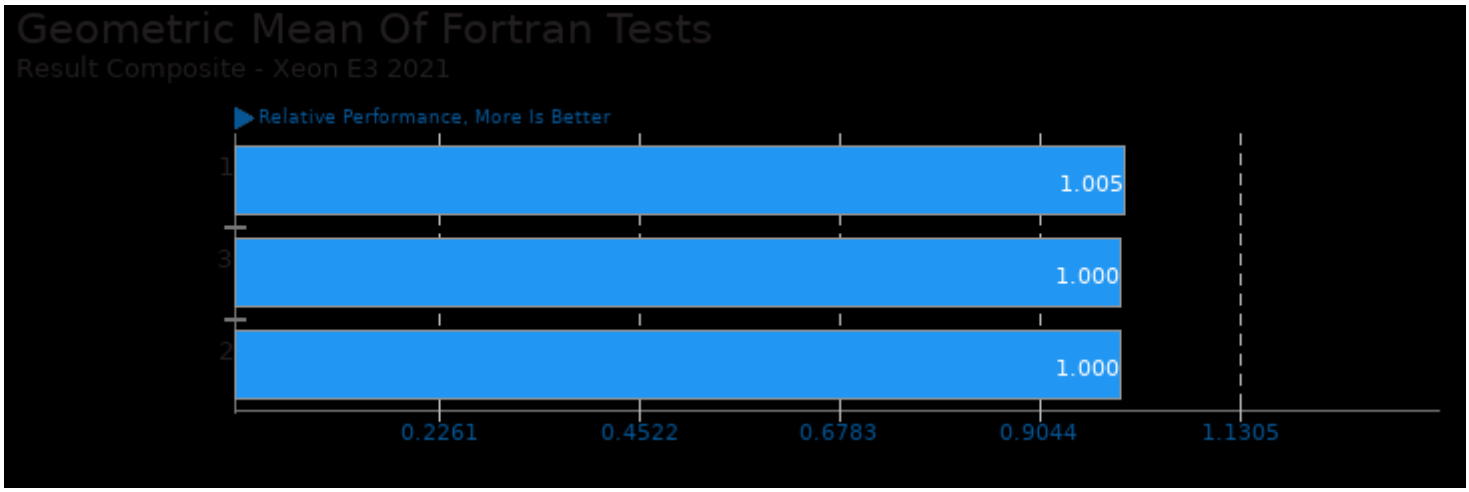
Geometric mean based upon tests: pts/cloverleaf, pts/dav1d and pts/lammps



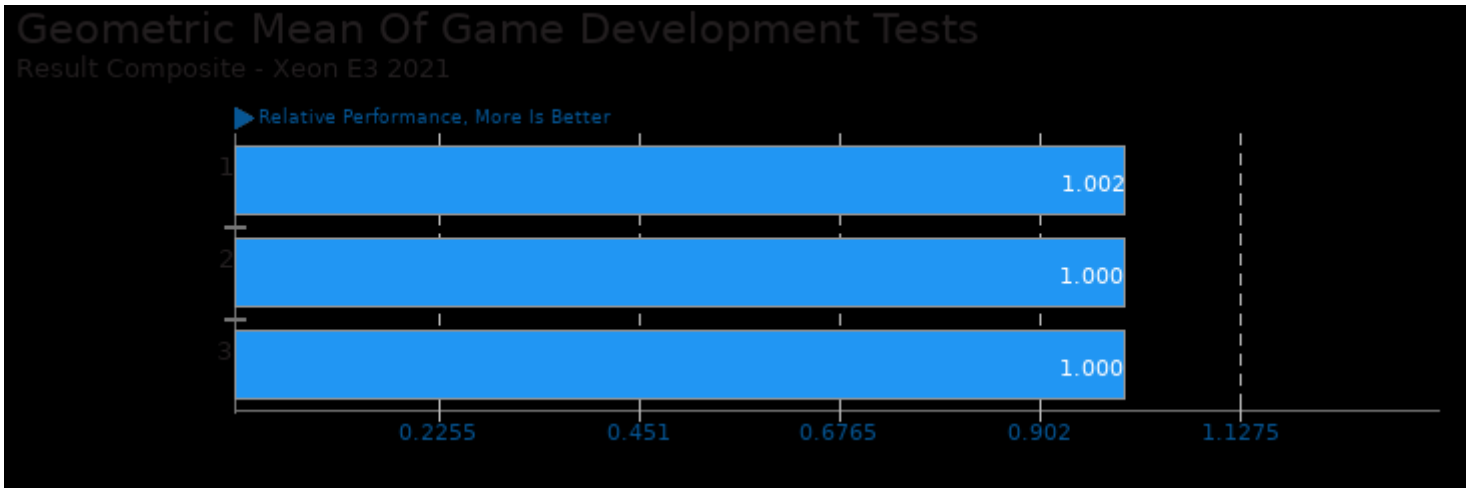
Geometric mean based upon tests: pts/dav1d, pts/rav1e, pts/etcpak, pts/build-godot and pts/synthmark



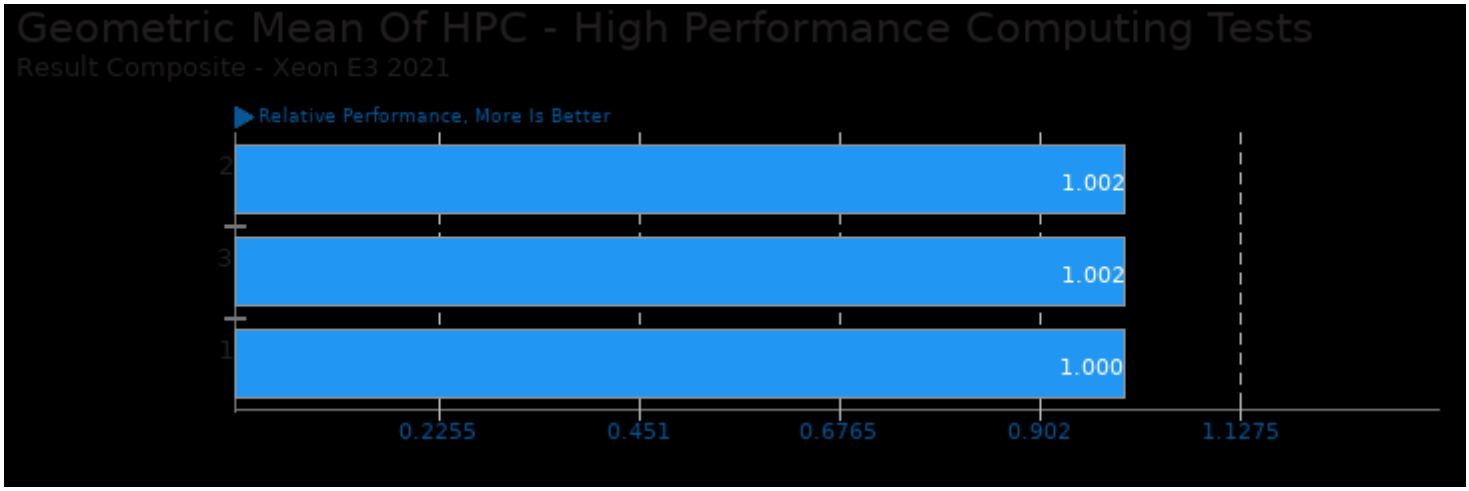
Geometric mean based upon tests: pts/dav1d and pts/rav1e



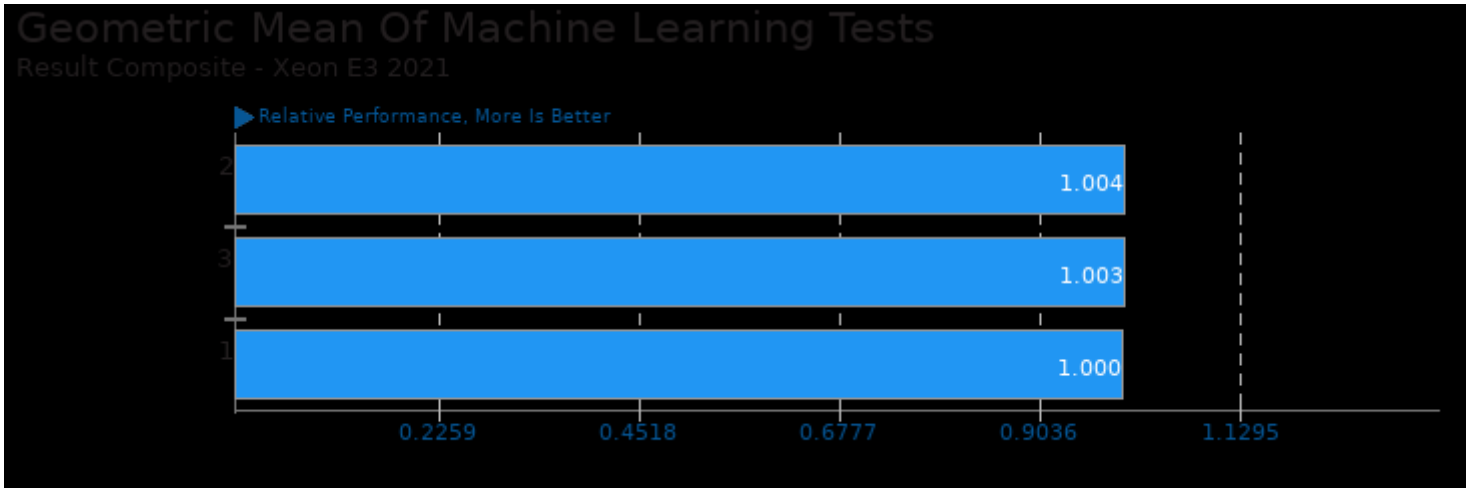
Geometric mean based upon tests: pts/cloverleaf and pts/lammps



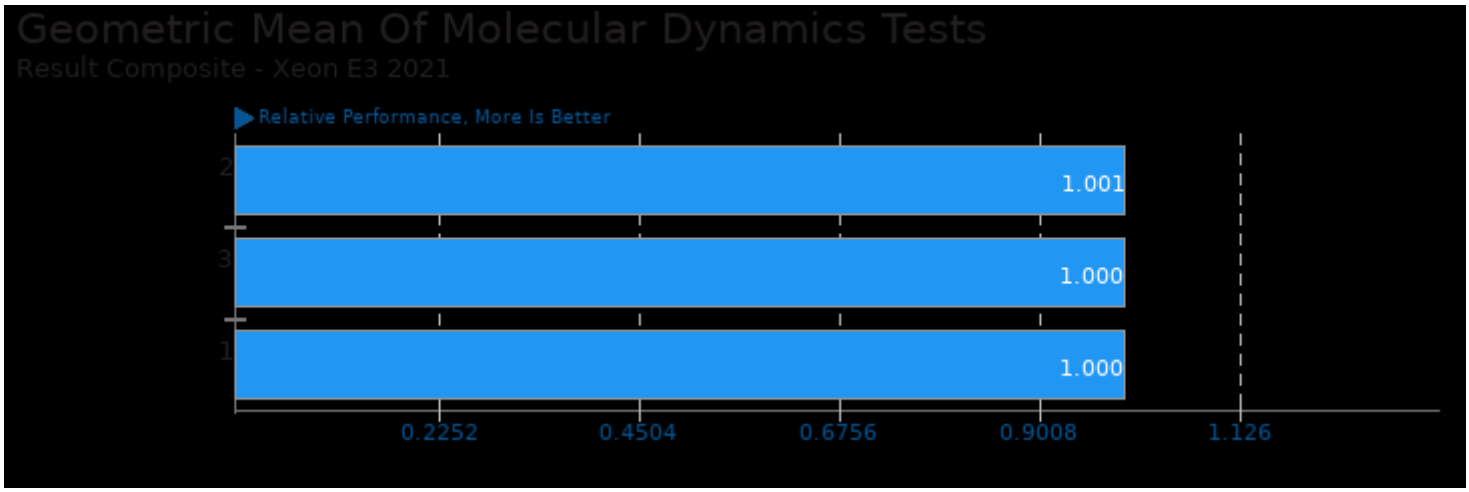
Geometric mean based upon tests: pts/etcpak and pts/build-godot



Geometric mean based upon tests: pts/amg, pts/cp2k, pts/cloverleaf, pts/lammps, pts/lulesh, pts/openfoam, pts/kripke, pts/relion, pts/mnn, pts/tnn and pts/onnx



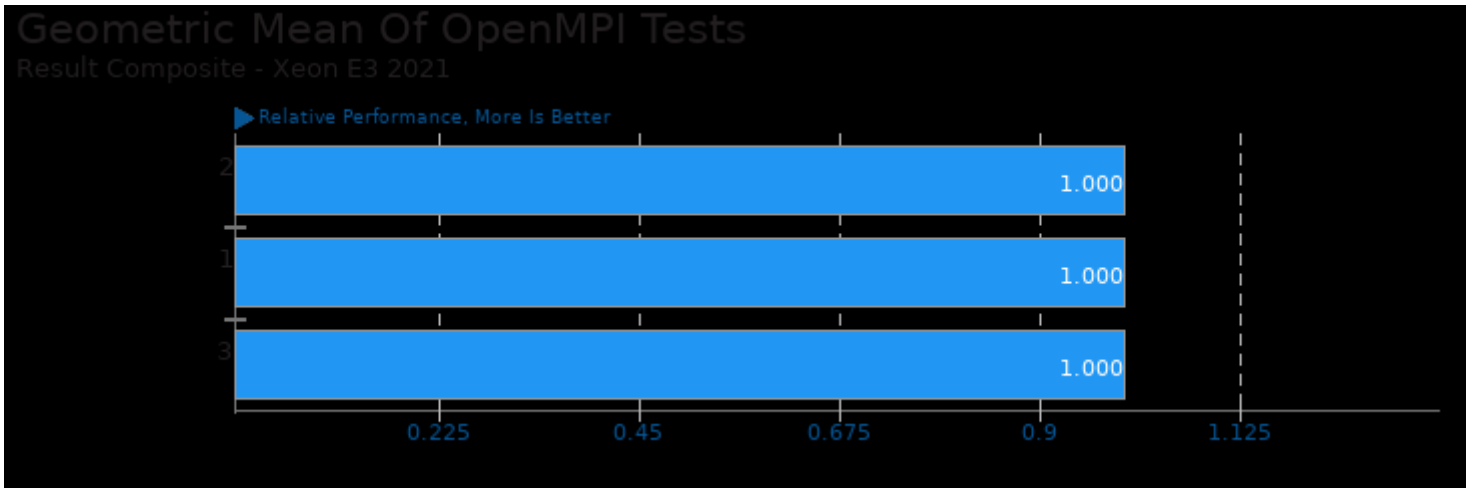
Geometric mean based upon tests: pts/mnn, pts/tnn and pts/onnx



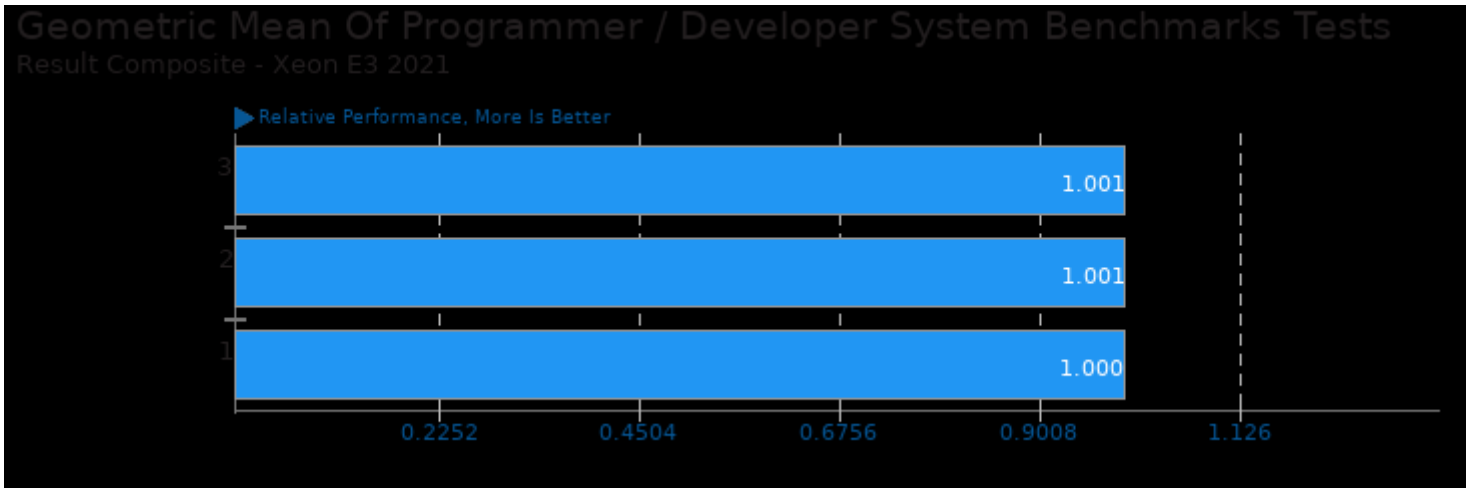
Geometric mean based upon tests: pts/cp2k, pts/cloverleaf, pts/lammps, pts/lulesh and pts/openfoam



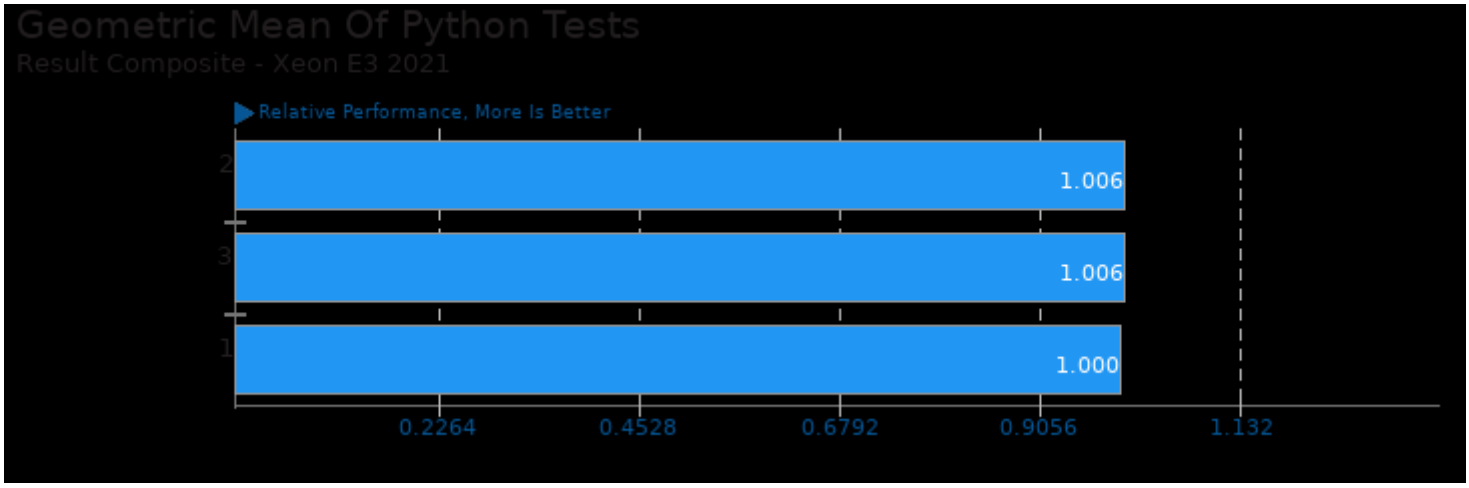
Geometric mean based upon tests: pts/dav1d, pts/rav1e, pts/lammps and pts/build-godot



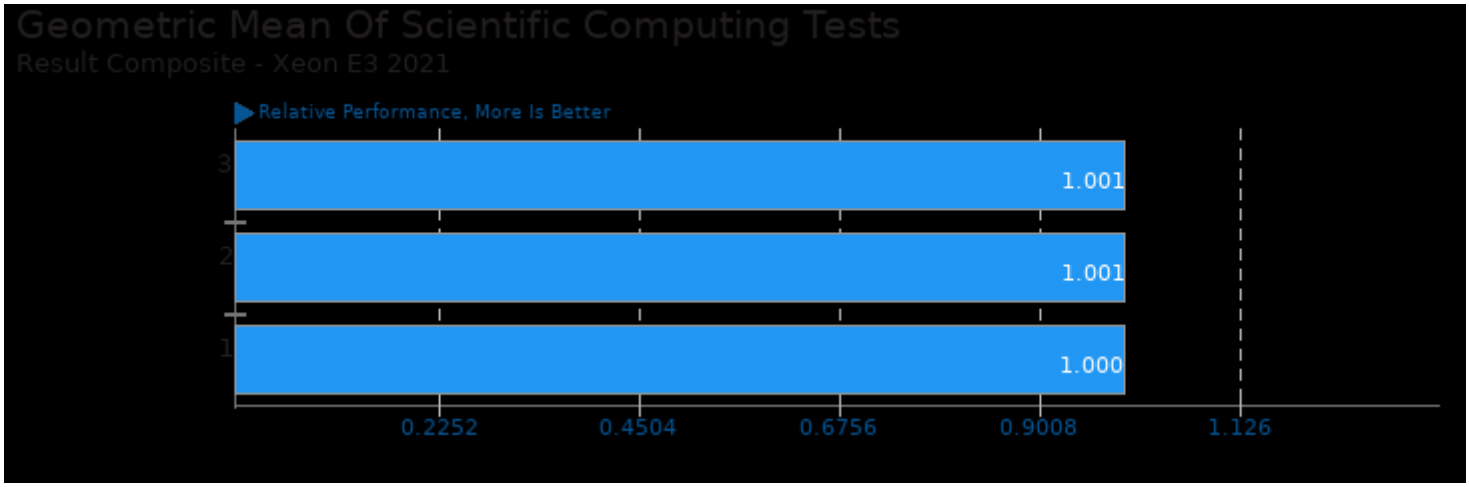
Geometric mean based upon tests: pts/amg, pts/cloverleaf, pts/cp2k, pts/lammps, pts/lulesh, pts/openfoam and pts/relion



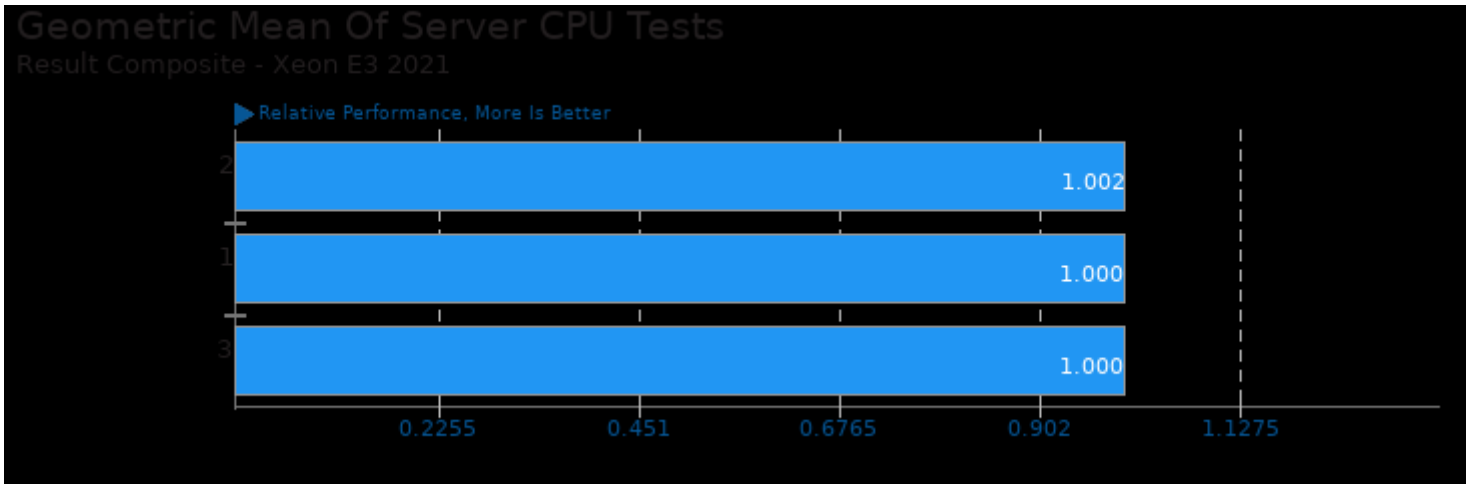
Geometric mean based upon tests: pts/build-godot and pts/amg



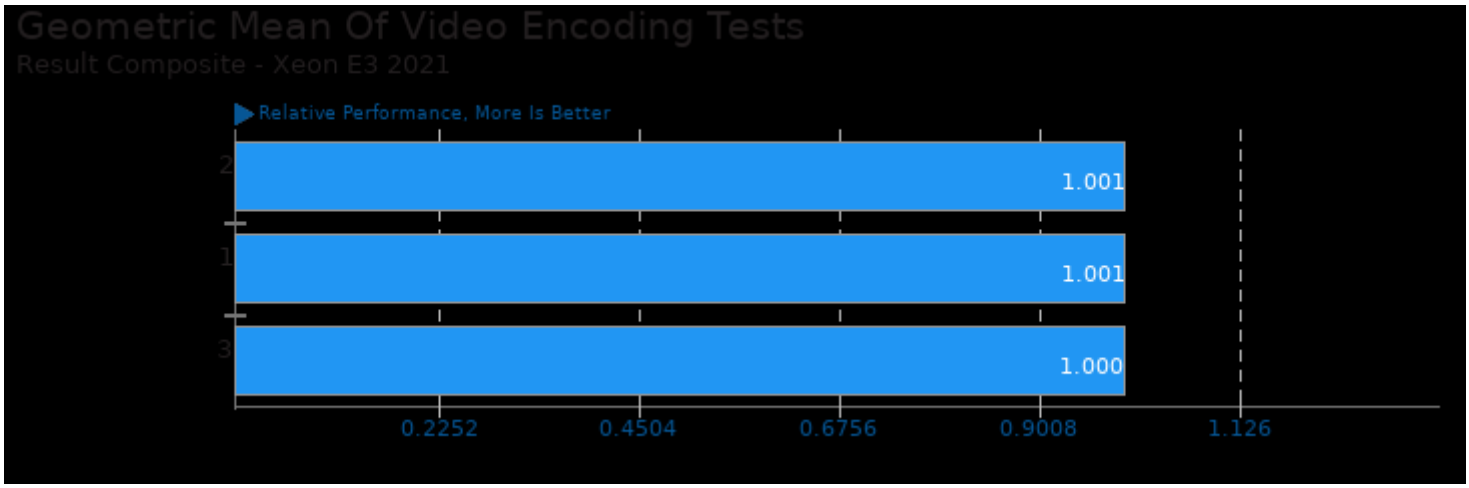
Geometric mean based upon tests: pts/onnx and pts/build-godot



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



Geometric mean based upon tests: pts/cp2k and pts/dav1d



Geometric mean based upon tests: pts/dav1d and pts/rav1e

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 09:51.