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5775C Broadwell 2021

Intel Core i7-5775C testing with a MSI Z97-G45 GAMING (MS-7821) v1.0 (V2.9 BIOS) and MSI Intel Iris Pro 6200 3GB on Ubuntu 18.10 via the Phoronix Test Suite.

Automated Executive Summary

3 had the most wins, coming in first place for 48% of the tests.

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

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

CloverLeaf (Lagrangian-Eulerian Hydrodynamics) at 1.059x
Mobile Neural Network (Model: MobileNetV2_224) at 1.02x
Mobile Neural Network (Model: SqueezeNetV1.0) at 1.019x
Kripke at 1.018x
Mobile Neural Network (Model: inception-v3) at 1.018x
rav1e (Speed: 10) at 1.015x
Mobile Neural Network (Model: resnet-v2-50) at 1.015x
QMCPACK (Input: simple-H2O) at 1.014x
Warsow (Resolution: 1920 x 1080) at 1.014x

OpenFOAM (Input: Motorbike 30M) at 1.013x.

Test Systems:

1

2

3

Processor: Intel Core i7-5775C @ 3.70GHz (4 Cores / 8 Threads), Motherboard: MSI Z97-G45 GAMING (MS-7821) v1.0 (V2.9 BIOS), Chipset: Intel Broadwell-U DMI, Memory: 16GB, Disk: 120GB CT120BX100SSD1, Graphics: MSI Intel Iris Pro 6200 3GB (1150MHz), Audio: Intel Broadwell-U Audio, Monitor: VA2431, Network: Qualcomm Atheros Killer E220x

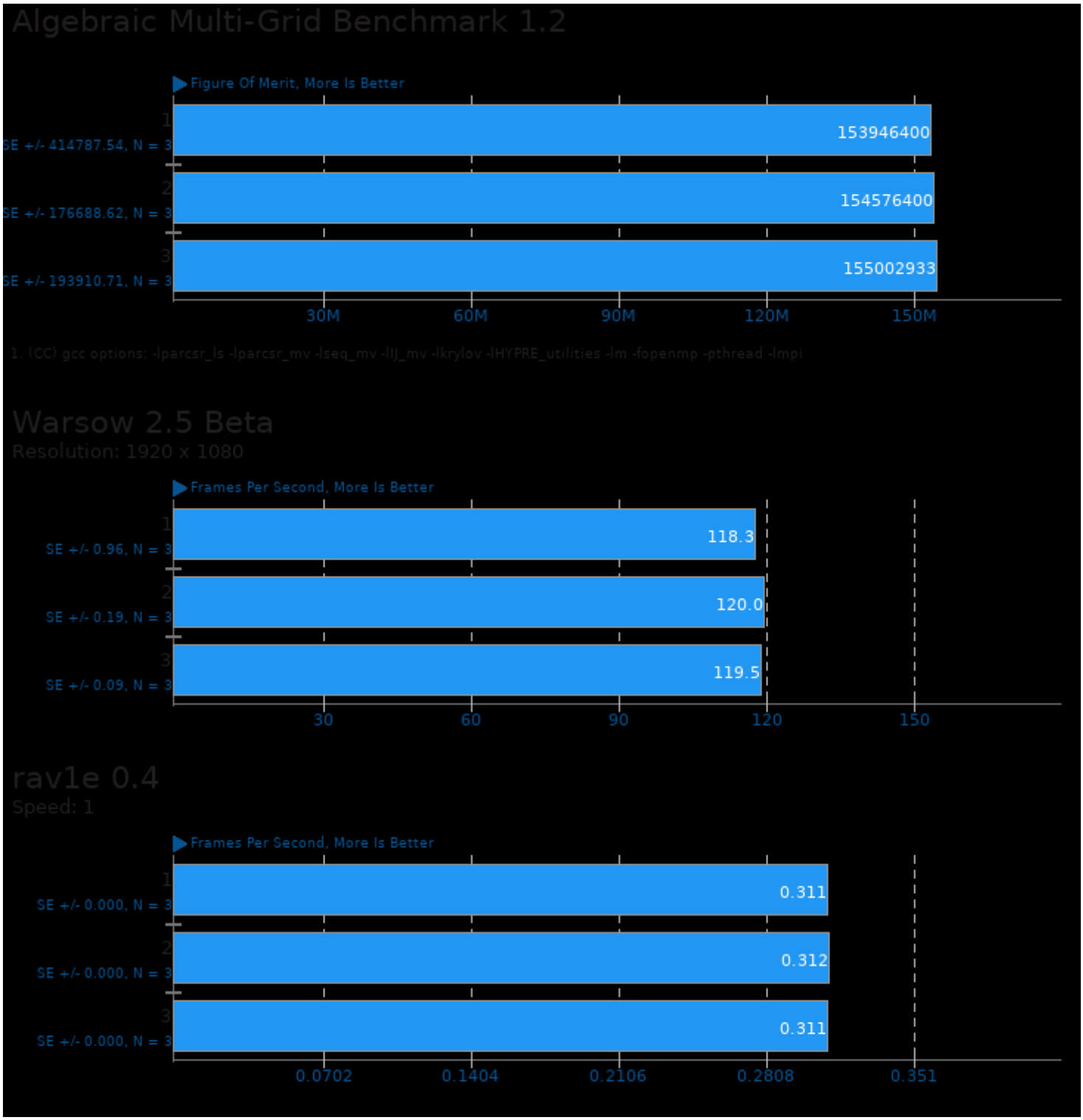
OS: Ubuntu 18.10, Kernel: 5.0.0-999-generic (x86_64) 20190223, Desktop: GNOME Shell 3.30.2, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.2.0-devel (git-2631fd3 2019-07-24 cosmic-oibaf-ppa), Vulkan: 1.1.102, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

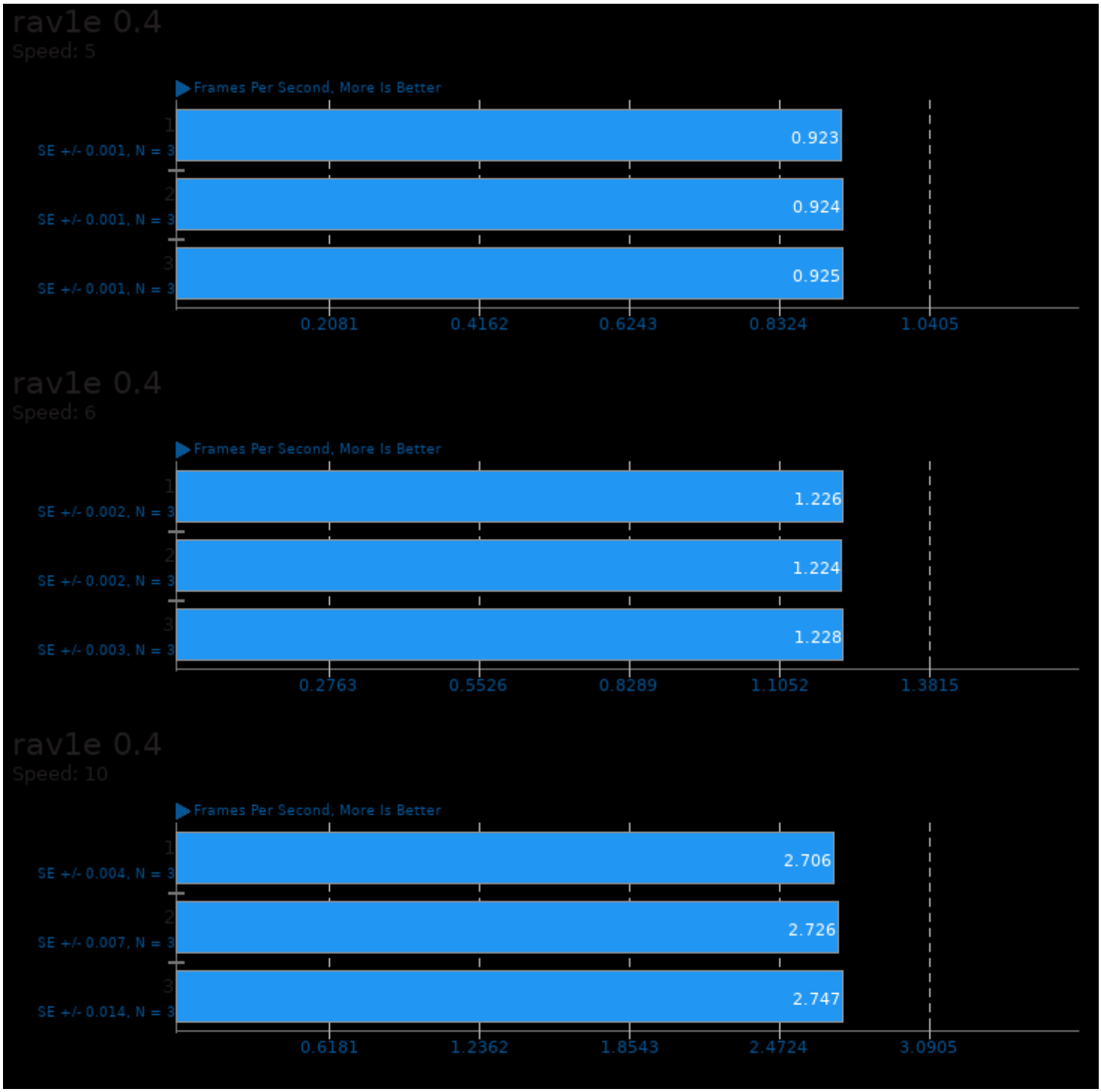
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x20 - Thermald 1.7
Python Notes: Python 2.7.16 + Python 3.6.8
Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling

	1	2	3
Algebraic Multi-Grid Benchmark (Figure Of Merit)	**153946400**	154576400	**155002933**
Normalized	99.32%	99.72%	100%
Standard Deviation	0.5%	0.2%	0.2%
Warsow - 1920 x 1080 (FPS)	**118.3**	**120.0**	119.5
Normalized	98.58%	100%	99.58%
Standard Deviation	1.4%	0.3%	0.1%
rav1e - 1 (FPS)	**0.311**	**0.312**	**0.311**
Normalized	99.68%	100%	99.68%
Standard Deviation	0.2%	0.2%	0%
rav1e - 5 (FPS)	**0.923**	0.924	**0.925**
Normalized	99.78%	99.89%	100%
Standard Deviation	0.2%	0.2%	0.2%
rav1e - 6 (FPS)	1.226	**1.224**	**1.228**
Normalized	99.84%	99.67%	100%

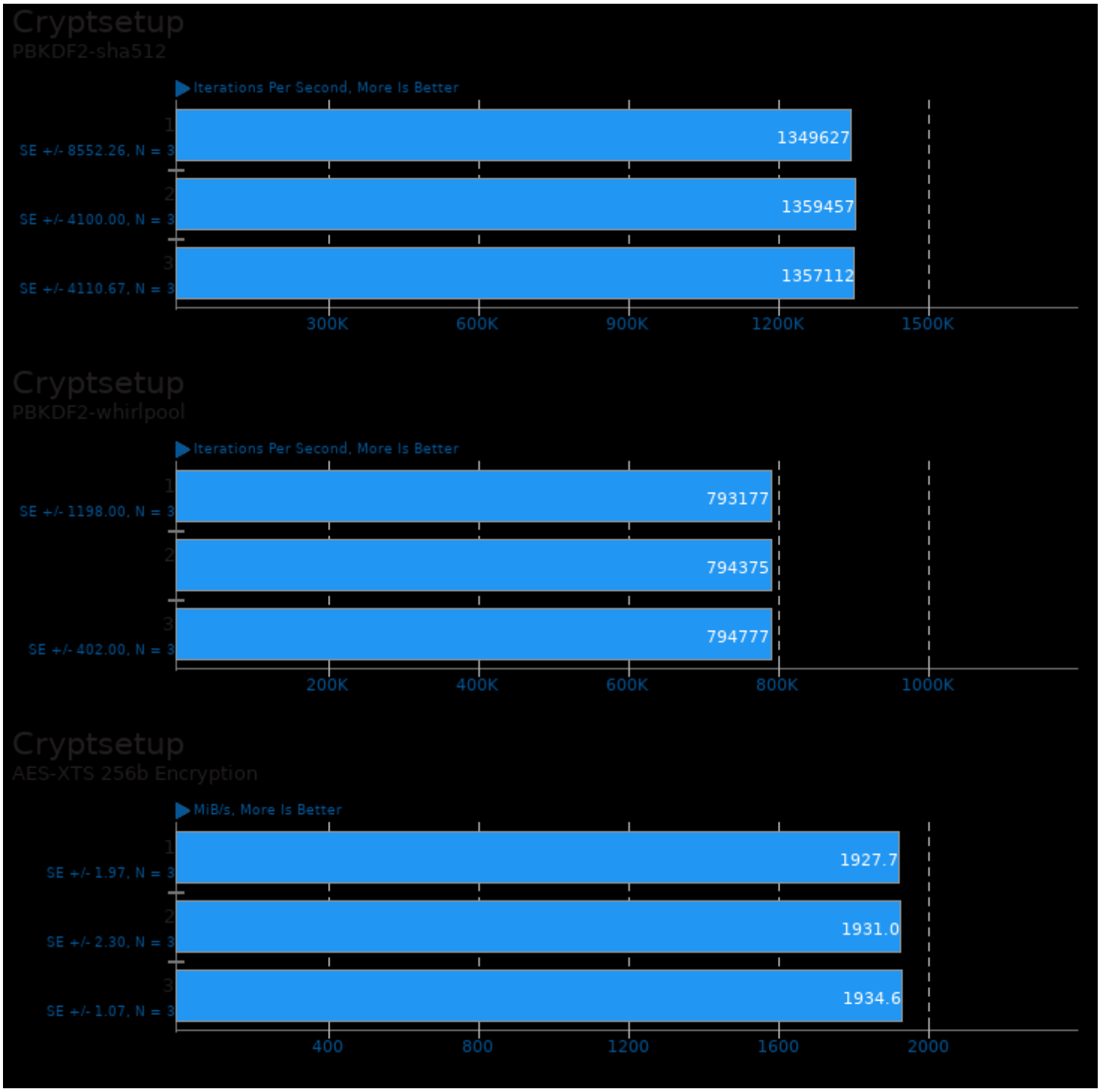
Standard Deviation	0.3%	0.3%	0.4%
rav1e - 10 (FPS)	**2.706**	2.726	**2.747**
Normalized	98.51%	99.24%	100%
Standard Deviation	0.3%	0.4%	0.9%
Cryptsetup - PBKDF2-sha512 (Iterations/sec)	**1349627**	**1359457**	1357112
Normalized	99.28%	100%	99.83%
Standard Deviation	1.1%	0.5%	0.5%
Cryptsetup - PBKDF2-whirlpool	**793177**	794375	**794777**
Normalized	99.8%	99.95%	100%
Standard Deviation	0.3%		0.1%
Cryptsetup - A.X.2.E (MiB/s)	**1928**	1931	**1935**
Normalized	99.64%	99.81%	100%
Standard Deviation	0.2%	0.2%	0.1%
Cryptsetup - A.X.2.D (MiB/s)	1933	**1932**	**1936**
Normalized	99.86%	99.82%	100%
Standard Deviation	0.2%	0.1%	0.2%
Cryptsetup - S.X.2.E (MiB/s)	**596.6**	598.1	**598.2**
Normalized	99.73%	99.98%	100%
Standard Deviation	0.3%	0%	0.1%
Cryptsetup - S.X.2.D (MiB/s)	**575.5**	575.6	**575.8**
Normalized	99.95%	99.97%	100%
Standard Deviation	0.1%	0.1%	0%
Cryptsetup - T.X.2.E (MiB/s)	**371.6**	**372.7**	372.5
Normalized	99.7%	100%	99.95%
Standard Deviation	0.2%	0%	0%
Cryptsetup - T.X.2.D (MiB/s)	**372.5**	**372.5**	**372.1**
Normalized	100%	100%	99.89%
Standard Deviation	0%	0%	
Cryptsetup - A.X.5.E (MiB/s)	1588	**1587**	**1592**
Normalized	99.78%	99.74%	100%
Standard Deviation	0.2%	0.3%	0.1%
Cryptsetup - A.X.5.D (MiB/s)	**1581**	**1572**	1575
Normalized	100%	99.38%	99.61%
Standard Deviation	0.3%	1.2%	1%
Cryptsetup - S.X.5.E (MiB/s)	**597.4**	598.4	**598.7**
Normalized	99.78%	99.95%	100%
Standard Deviation	0.1%	0%	0.1%
Cryptsetup - S.X.5.D (MiB/s)	575.5	**574.8**	**575.8**
Normalized	99.95%	99.83%	100%
Standard Deviation	0.1%	0.2%	0.1%
Cryptsetup - T.X.5.E (MiB/s)	372.3	**372.1**	**372.4**
Normalized	99.97%	99.92%	100%
Standard Deviation	0%	0.1%	0.1%
Cryptsetup - T.X.5.D (MiB/s)	**372.4**	**372**	**372.4**
Normalized	100%	99.89%	100%
Standard Deviation	0%		
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	2.857	**2.871**	**2.853**
Normalized	99.51%	100%	99.37%
Standard Deviation	0.9%	0.3%	0.7%
Kripke (Throughput FoM)	37143820	**37568160**	**36888883**
Normalized	98.87%	100%	98.19%
Standard Deviation	0.4%	0.7%	0.8%
Google SynthMark - VoiceMark_100 (Voices)	**638.142**	**638.804**	638.736
Normalized	99.9%	100%	99.99%

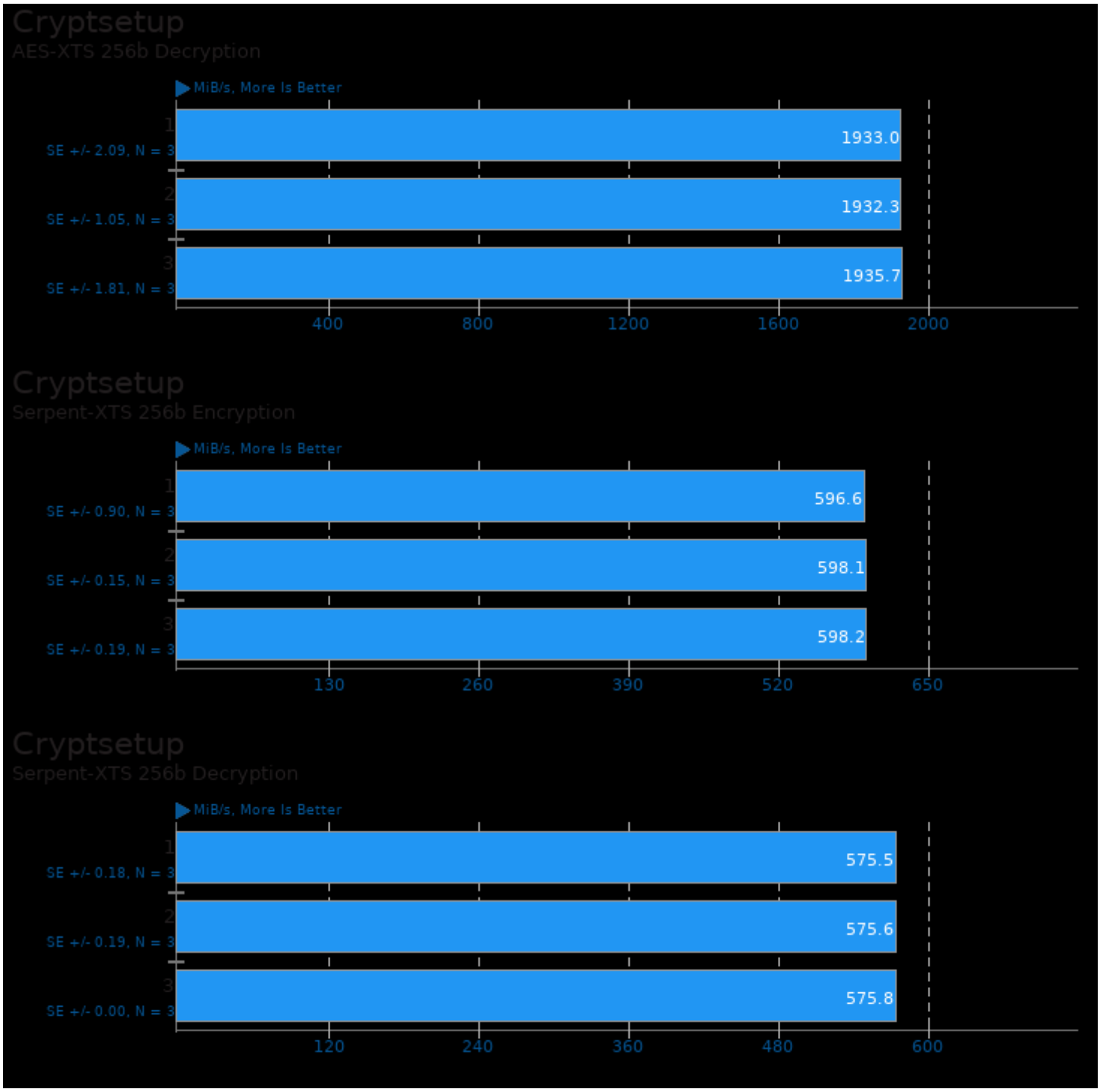
Standard Deviation	0.2%	0%	0%
LULESH (z/s)	**1123**	1129	**1130**
Normalized	99.4%	99.89%	100%
Standard Deviation	0.1%	0.3%	0.4%
Mobile Neural Network - SqueezeNetV1.0	6.676	**6.595**	**6.721**
Normalized	98.79%	100%	98.13%
Standard Deviation	1%	0.2%	1.6%
Mobile Neural Network - resnet-v2-50 (ms)	**36.956**	36.553	**36.412**
Normalized	98.53%	99.61%	100%
Standard Deviation	0.4%	1.1%	0.2%
Mobile Neural Network - MobileNetV2_224	**3.665**	**3.740**	3.679
Normalized	100%	97.99%	99.62%
Standard Deviation	0.2%	1.4%	1%
Mobile Neural Network - mobilenet-v1-1.0	**4.366**	**4.407**	4.370
Normalized	100%	99.07%	99.91%
Standard Deviation	0.3%	0.9%	1.5%
Mobile Neural Network - inception-v3 (ms)	49.686	**49.993**	**49.113**
Normalized	98.85%	98.24%	100%
Standard Deviation	0.4%	1.3%	1.2%
TNN - CPU - MobileNet v2 (ms)	**300.158**	**298.604**	298.644
Normalized	99.48%	100%	99.99%
Standard Deviation	0.7%	0.1%	0.1%
TNN - CPU - SqueezeNet v1.1 (ms)	288.149	**289.737**	**288.070**
Normalized	99.97%	99.42%	100%
Standard Deviation	0.1%	0.4%	0%
CloverLeaf - L.E.H (sec)	**133.01**	139.43	**140.82**
Normalized	100%	95.4%	94.45%
Standard Deviation	1.9%	0.7%	0.2%
CP2K Molecular Dynamics - Fayalite-FIST Data (sec)	**1233**	**1218**	1221
Normalized	98.83%	100%	99.76%
OpenFOAM - Motorbike 30M (sec)	**239.19**	240.86	**242.37**
Normalized	100%	99.31%	98.69%
Standard Deviation	2.3%	2.4%	2.2%
OpenFOAM - Motorbike 60M (sec)	**1666**	**1659**	1660
Normalized	99.59%	100%	99.9%
Standard Deviation	0.4%	0.1%	0.4%
Timed Godot Game Engine Compilation - Time To Compile (sec)	287.036	**287.164**	**287.035**
Normalized	100%	99.96%	100%
Standard Deviation	0.1%	0.1%	0%
QMCPACK - simple-H2O (Execution Time - sec)	**34.690**	34.924	**35.190**
Normalized	100%	99.33%	98.58%
Standard Deviation	0.5%	0.4%	0.1%

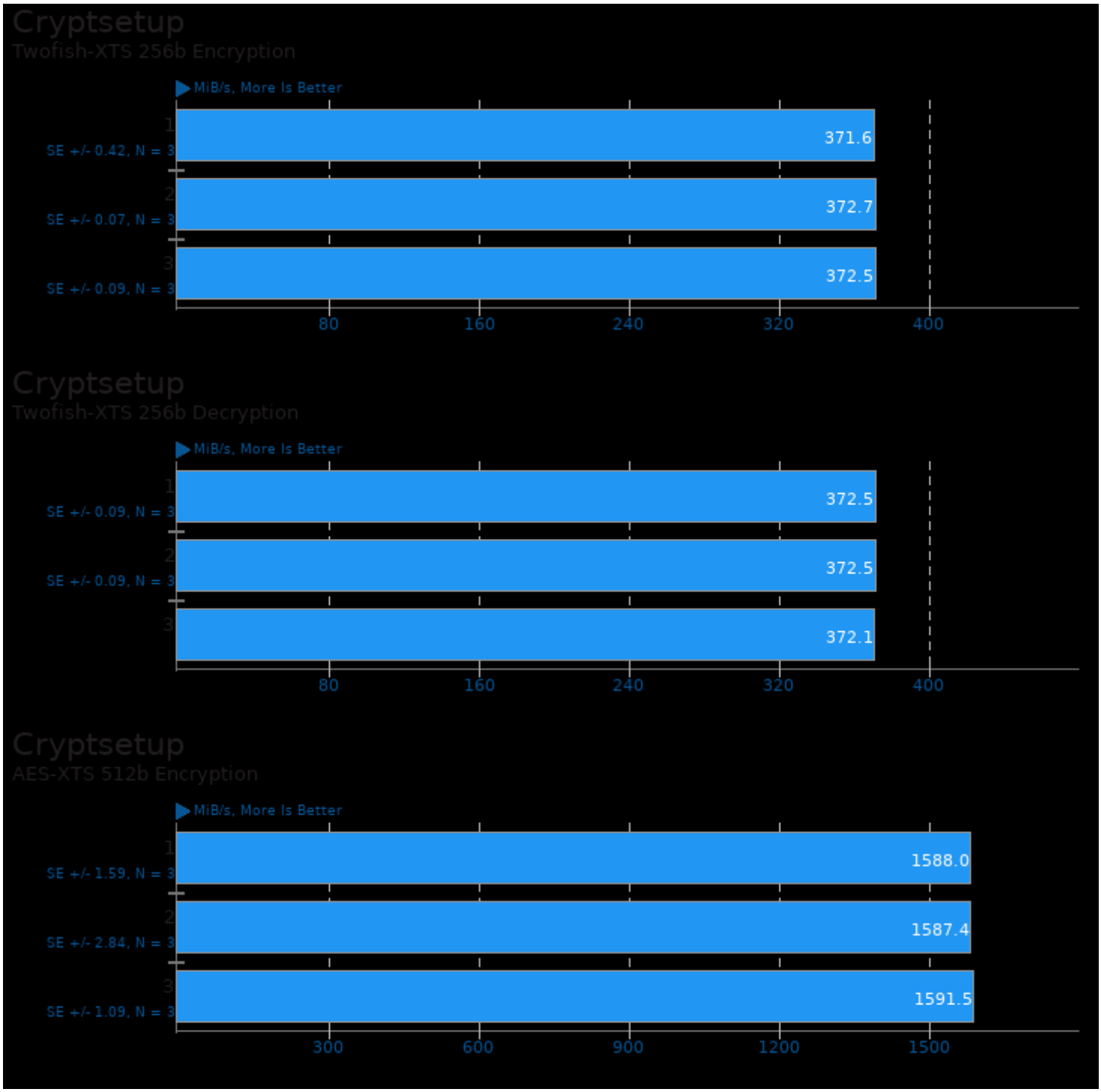

Algebraic Multi-Grid Benchmark 1.2
Figure Of Merit, More Is Better
1
SE +/- 414787.54, N = 3
153946400
2
SE +/- 176688.62, N = 3
154576400
3
SE +/- 193910.71, N = 3
155002933
30M
60M
90M
120M
150M
1. (CC) gcc options: -lparcsr_ls -lparcsr_mv -lseq_mv -lIJ_mv -lkrylov -lHYPRE_utilities -lm -fopenmp -pthread -lmpi
Warsow 2.5 Beta
Resolution: 1920 x 1080
Frames Per Second, More Is Better
1
SE +/- 0.96, N = 3
118.3
2
SE +/- 0.19, N = 3
120.0
3
SE +/- 0.09, N = 3
119.5
30
60
90
120
150
rav1e 0.4
Speed: 1
Frames Per Second, More Is Better
1
SE +/- 0.000, N = 3
0.311
2
SE +/- 0.000, N = 3
0.312
3
SE +/- 0.000, N = 3
0.311
0.0702
0.1404
0.2106
0.2808
0.351

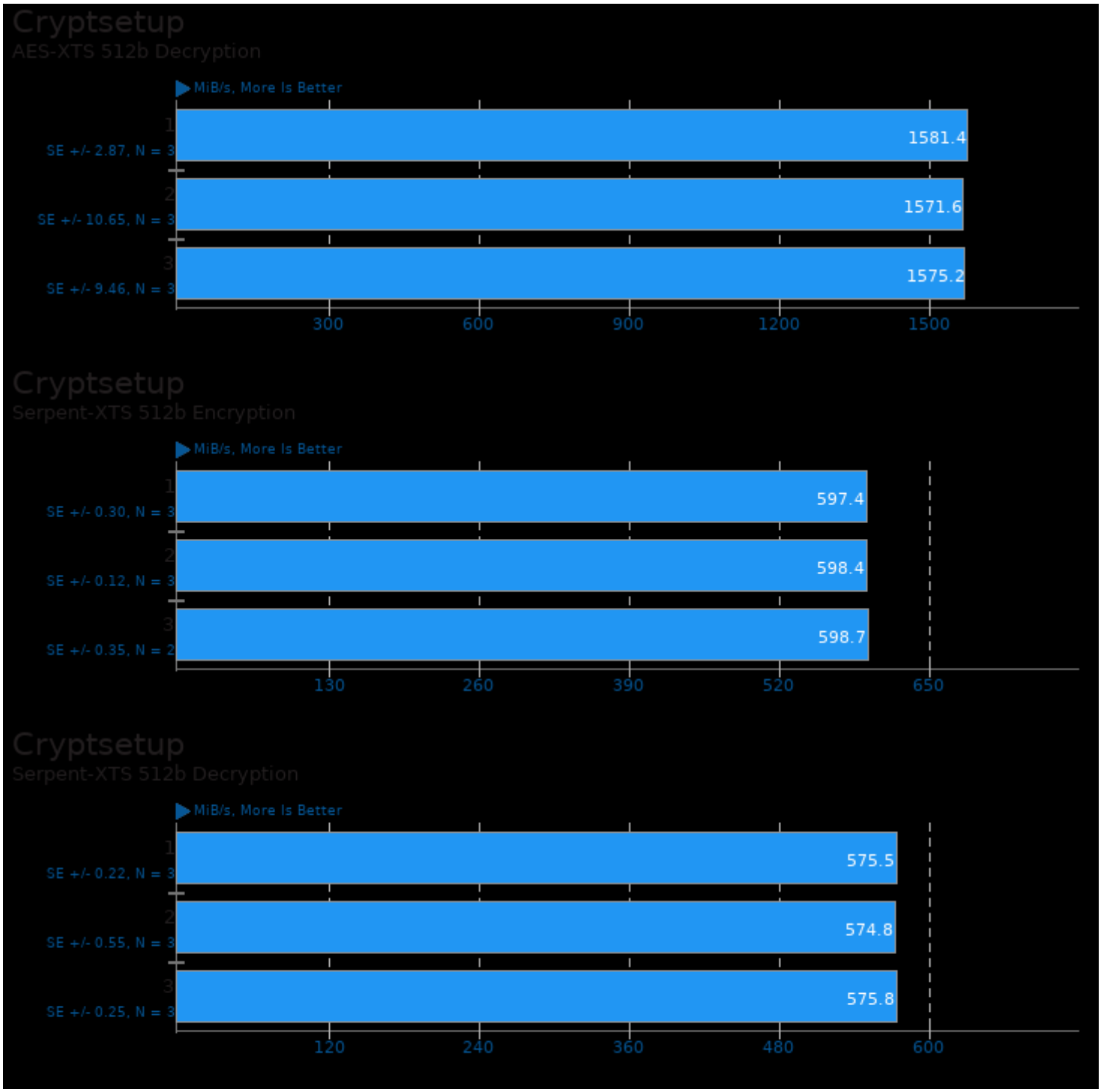

rav1e 0.4
Speed: 5
Frames Per Second, More Is Better
1
SE +/- 0.001, N = 3
0.923
2
SE +/- 0.001, N = 3
0.924
3
SE +/- 0.001, N = 3
0.925
0.2081
0.4162
0.6243
0.8324
1.0405
rav1e 0.4
Speed: 6
Frames Per Second, More Is Better
1
SE +/- 0.002, N = 3
1.226
2
SE +/- 0.002, N = 3
1.224
3
SE +/- 0.003, N = 3
1.228
0.2763
0.5526
0.8289
1.1052
1.3815
rav1e 0.4
Speed: 10
Frames Per Second, More Is Better
1
SE +/- 0.004, N = 3
2.706
2
SE +/- 0.007, N = 3
2.726
3
SE +/- 0.014, N = 3
2.747
0.6181
1.2362
1.8543
2.4724
3.0905

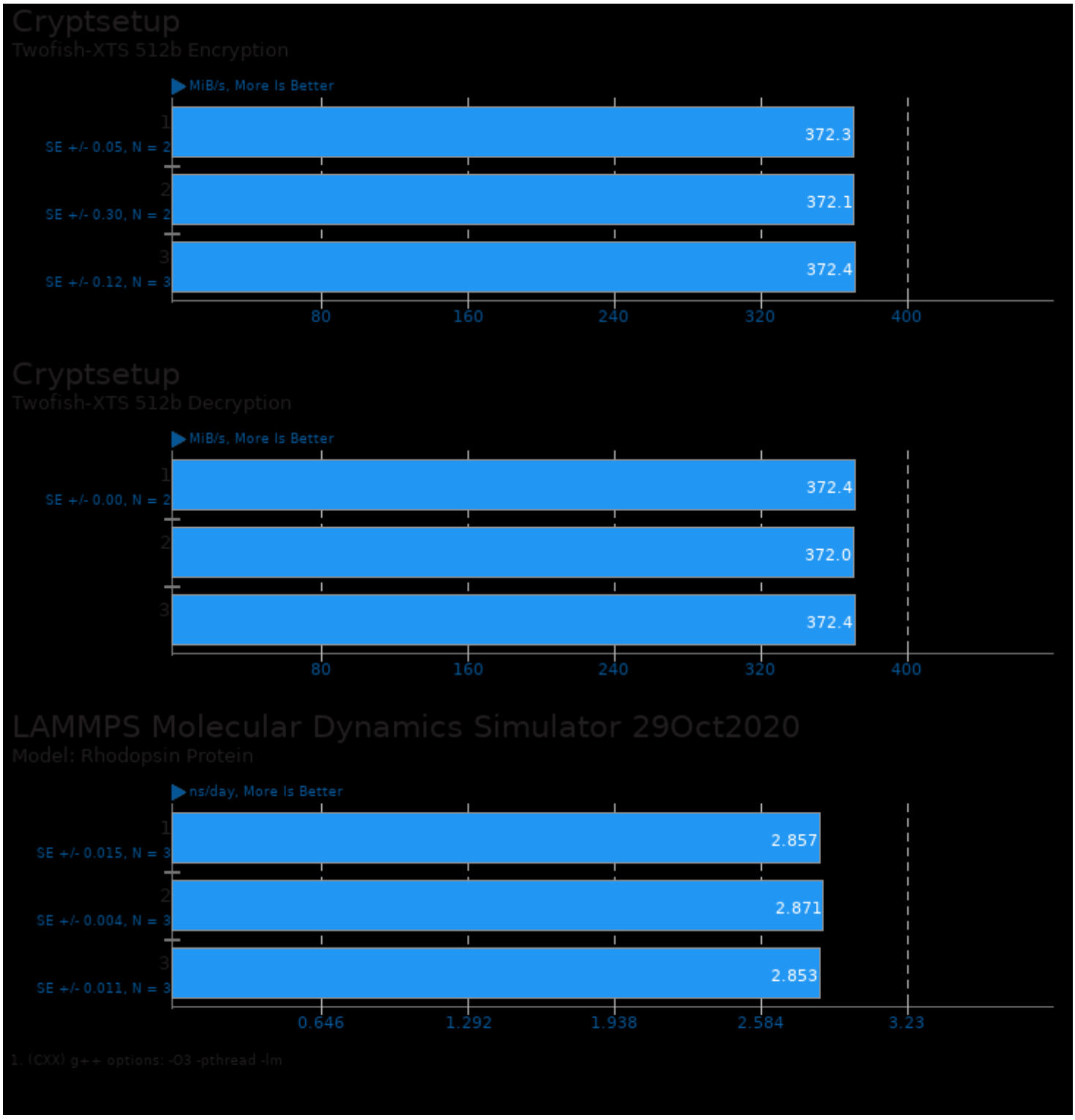
5775C Broadwell 2021



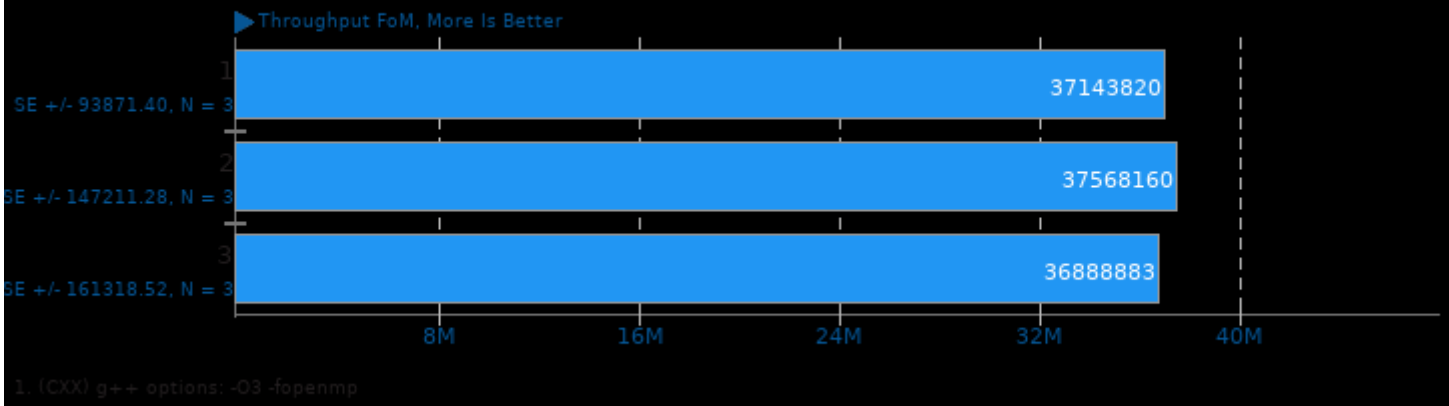

Cryptsetup
AES-XTS 256b Decryption
MiB/s, More Is Better
1
SE +/- 2.09, N = 3
1933.0
2
SE +/- 1.05, N = 3
1932.3
3
SE +/- 1.81, N = 3
1935.7
400
800
1200
1600
2000
Cryptsetup
Serpent-XTS 256b Encryption
MiB/s, More Is Better
1
SE +/- 0.90, N = 3
596.6
2
SE +/- 0.15, N = 3
598.1
3
SE +/- 0.19, N = 3
598.2
130
260
390
520
650
Cryptsetup
Serpent-XTS 256b Decryption
MiB/s, More Is Better
1
SE +/- 0.18, N = 3
575.5
2
SE +/- 0.19, N = 3
575.6
3
SE +/- 0.00, N = 3
575.8
120
240
360
480
600


Cryptsetup
Twofish-XTS 256b Encryption
MiB/s, More Is Better
1
SE +/- 0.42, N = 3
371.6
2
SE +/- 0.07, N = 3
372.7
3
SE +/- 0.09, N = 3
372.5
80
160
240
320
400
Cryptsetup
Twofish-XTS 256b Decryption
MiB/s, More Is Better
1
SE +/- 0.09, N = 3
372.5
2
SE +/- 0.09, N = 3
372.5
3
372.1
80
160
240
320
400
Cryptsetup
AES-XTS 512b Encryption
MiB/s, More Is Better
1
SE +/- 1.59, N = 3
1588.0
2
SE +/- 2.84, N = 3
1587.4
3
SE +/- 1.09, N = 3
1591.5
300
600
900
1200
1500


Cryptsetup
AES-XTS 512b Decryption
MiB/s, More Is Better
1
SE +/- 2.87, N = 3
1581.4
2
SE +/- 10.65, N = 3
1571.6
3
SE +/- 9.46, N = 3
1575.2
300
600
900
1200
1500
Cryptsetup
Serpent-XTS 512b Encryption
MiB/s, More Is Better
1
SE +/- 0.30, N = 3
597.4
2
SE +/- 0.12, N = 3
598.4
3
SE +/- 0.35, N = 2
598.7
130
260
390
520
650
Cryptsetup
Serpent-XTS 512b Decryption
MiB/s, More Is Better
1
SE +/- 0.22, N = 3
575.5
2
SE +/- 0.55, N = 3
574.8
3
SE +/- 0.25, N = 3
575.8
120
240
360
480
600


Cryptsetup
Twofish-XTS 512b Encryption
MiB/s, More Is Better
1
SE +/- 0.05, N = 2
372.3
2
SE +/- 0.30, N = 2
372.1
3
SE +/- 0.12, N = 3
372.4
80
160
240
320
400
Cryptsetup
Twofish-XTS 512b Decryption
MiB/s, More Is Better
1
SE +/- 0.00, N = 2
372.4
2
372.0
3
372.4
80
160
240
320
400
LAMMPS Molecular Dynamics Simulator 29Oct2020
Model: Rhodopsin Protein
ns/day, More Is Better
1
SE +/- 0.015, N = 3
2.857
2
SE +/- 0.004, N = 3
2.871
3
SE +/- 0.011, N = 3
2.853
0.646
1.292
1.938
2.584
3.23
1. (CXX) g++ options: -O3 -pthread -lm

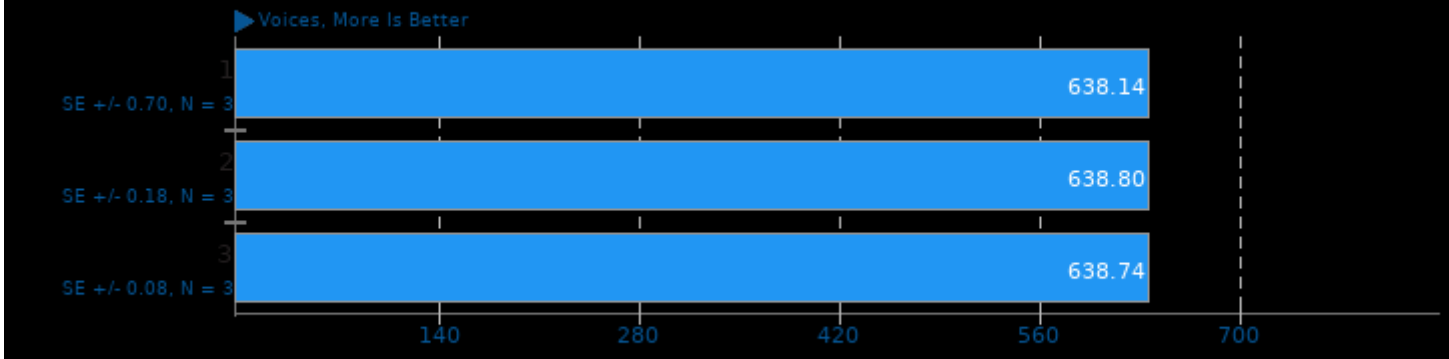
Kripke 1.2.4



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

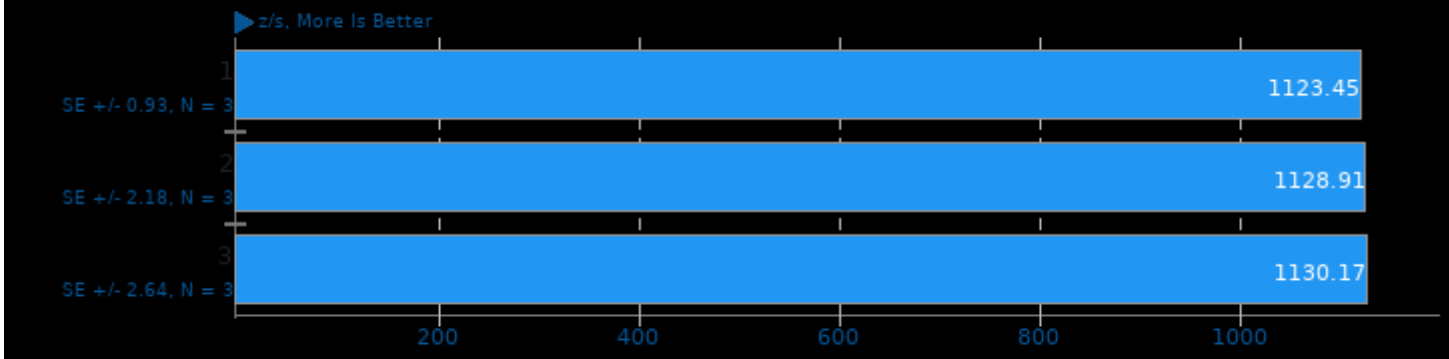
Google SynthMark 20201109

Test: VoiceMark_100

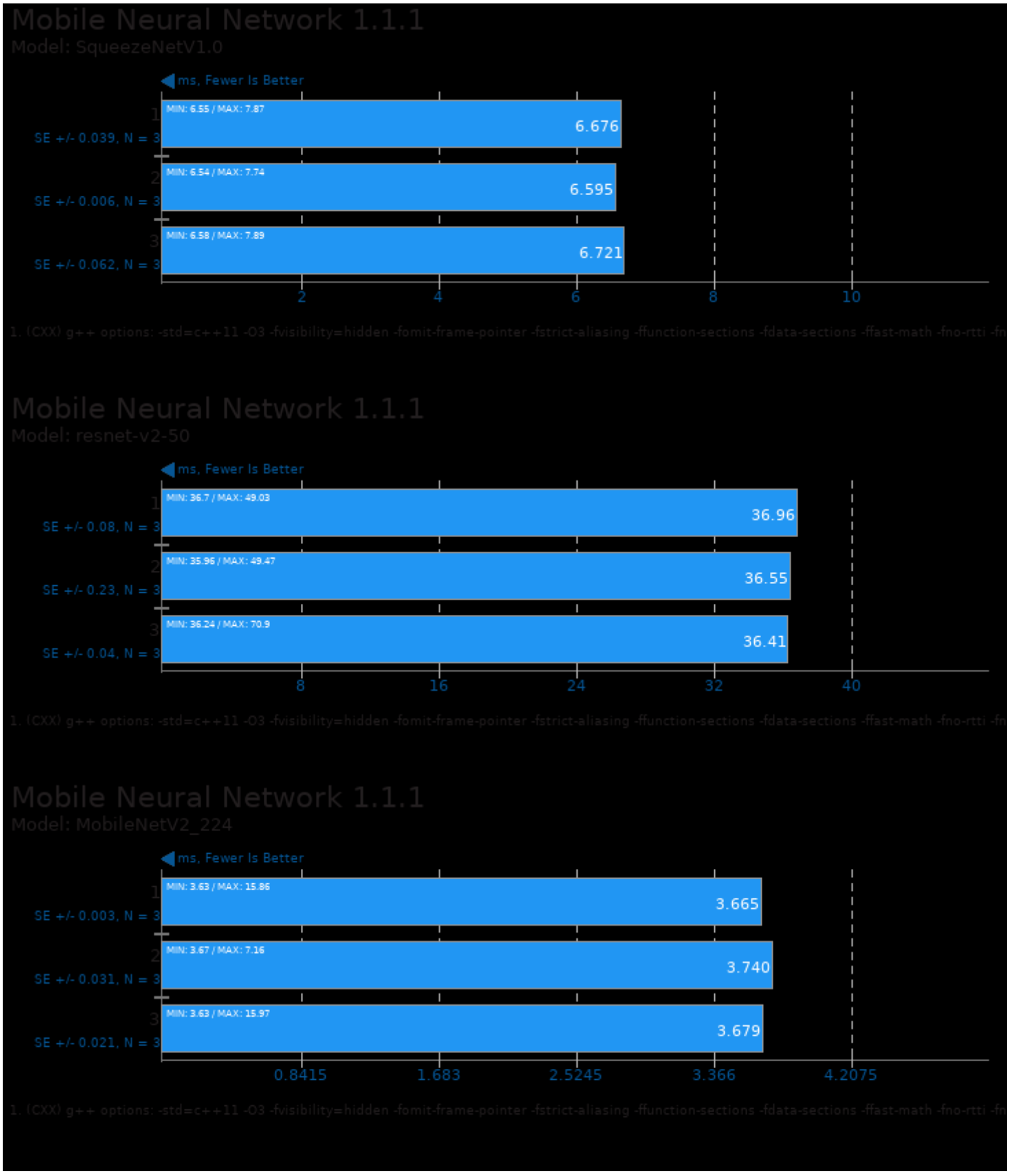


1. (CXX) g++ options: -lm -lpthread -std=c++11 -Ofast

LULESH 2.0.3

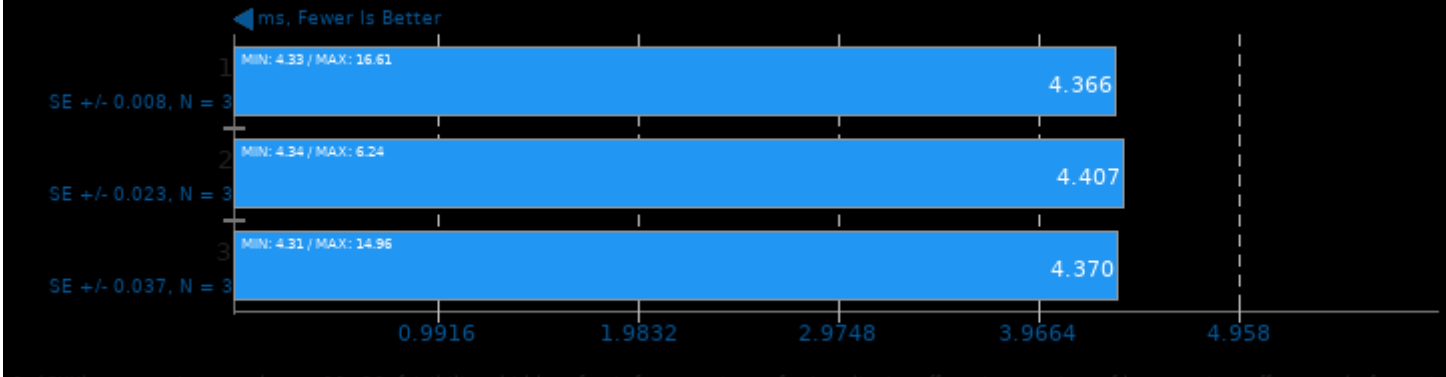


1. (CXX) g++ options: -O3 -fopenmp -lm -pthread -lmpi_cxx -lmpi


Mobile Neural Network 1.1.1
Model: SqueezeNetV1.0
ms, Fewer Is Better
1
MIN: 6.55 / MAX: 7.87
6.676
SE +/- 0.039, N = 3
2
MIN: 6.54 / MAX: 7.74
6.595
SE +/- 0.006, N = 3
3
MIN: 6.58 / MAX: 7.89
6.721
SE +/- 0.062, 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
1
MIN: 36.7 / MAX: 49.03
36.96
SE +/- 0.08, N = 3
2
MIN: 35.96 / MAX: 49.47
36.55
SE +/- 0.23, N = 3
3
MIN: 36.24 / MAX: 70.9
36.41
SE +/- 0.04, N = 3
8
16
24
32
40
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
1
MIN: 3.63 / MAX: 15.86
3.665
SE +/- 0.003, N = 3
2
MIN: 3.67 / MAX: 7.16
3.740
SE +/- 0.031, N = 3
3
MIN: 3.63 / MAX: 15.97
3.679
SE +/- 0.021, N = 3
0.8415
1.683
2.5245
3.366
4.2075
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

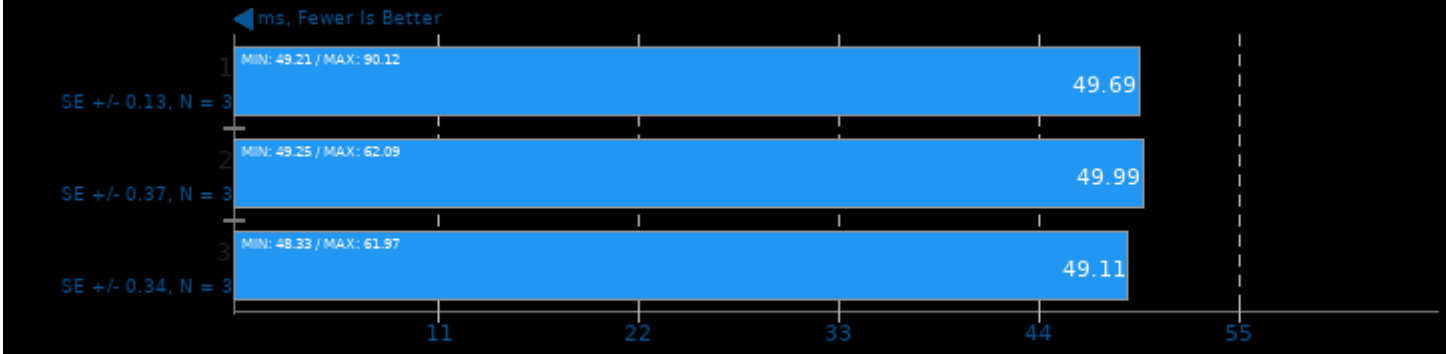
Model: mobilenet-v1-1.0



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

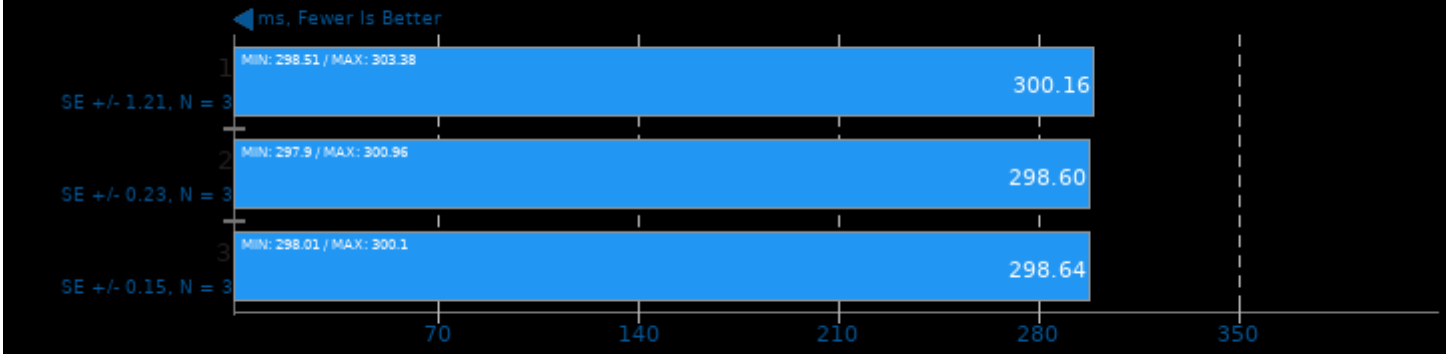
Model: inception-v3



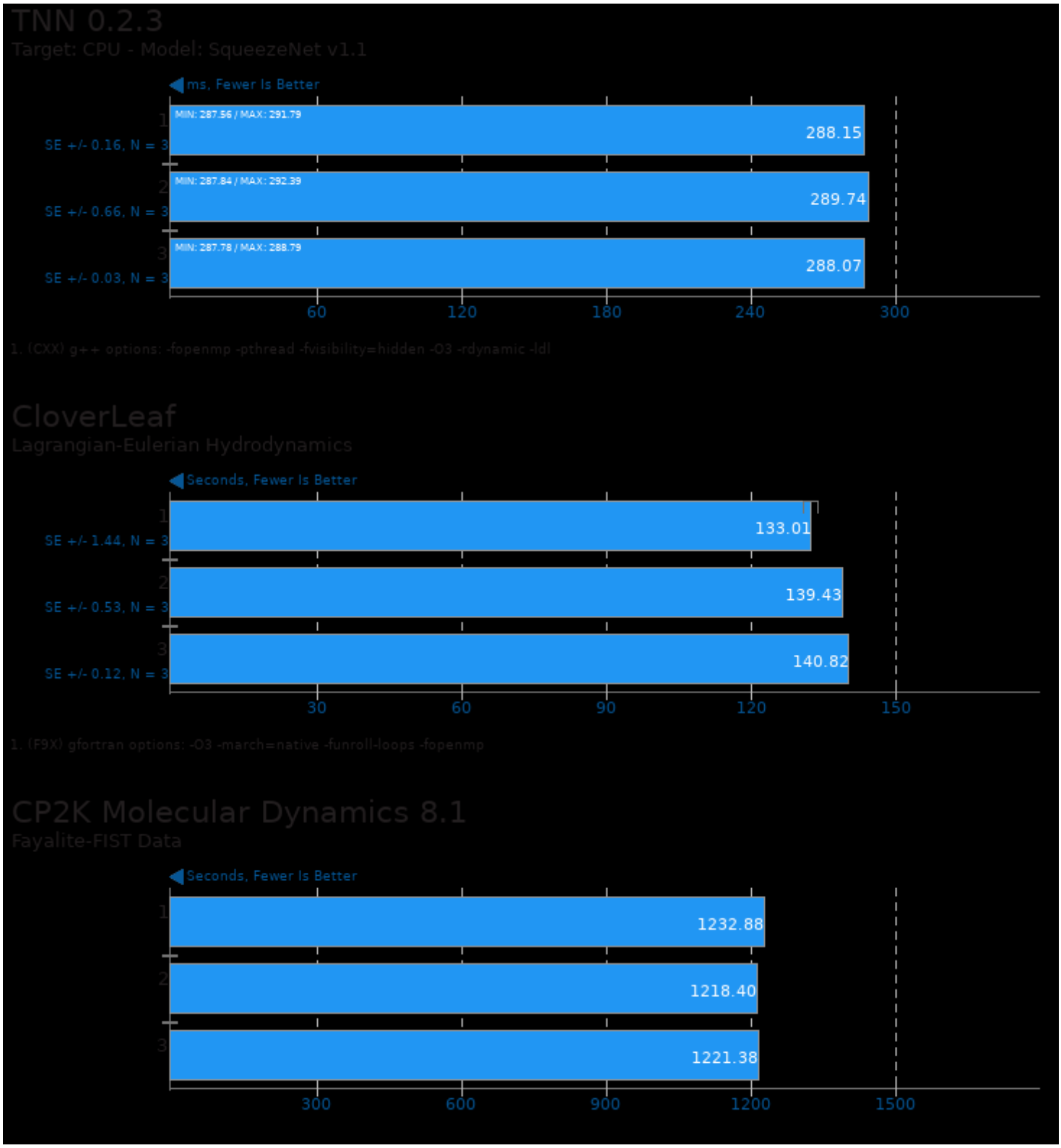
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

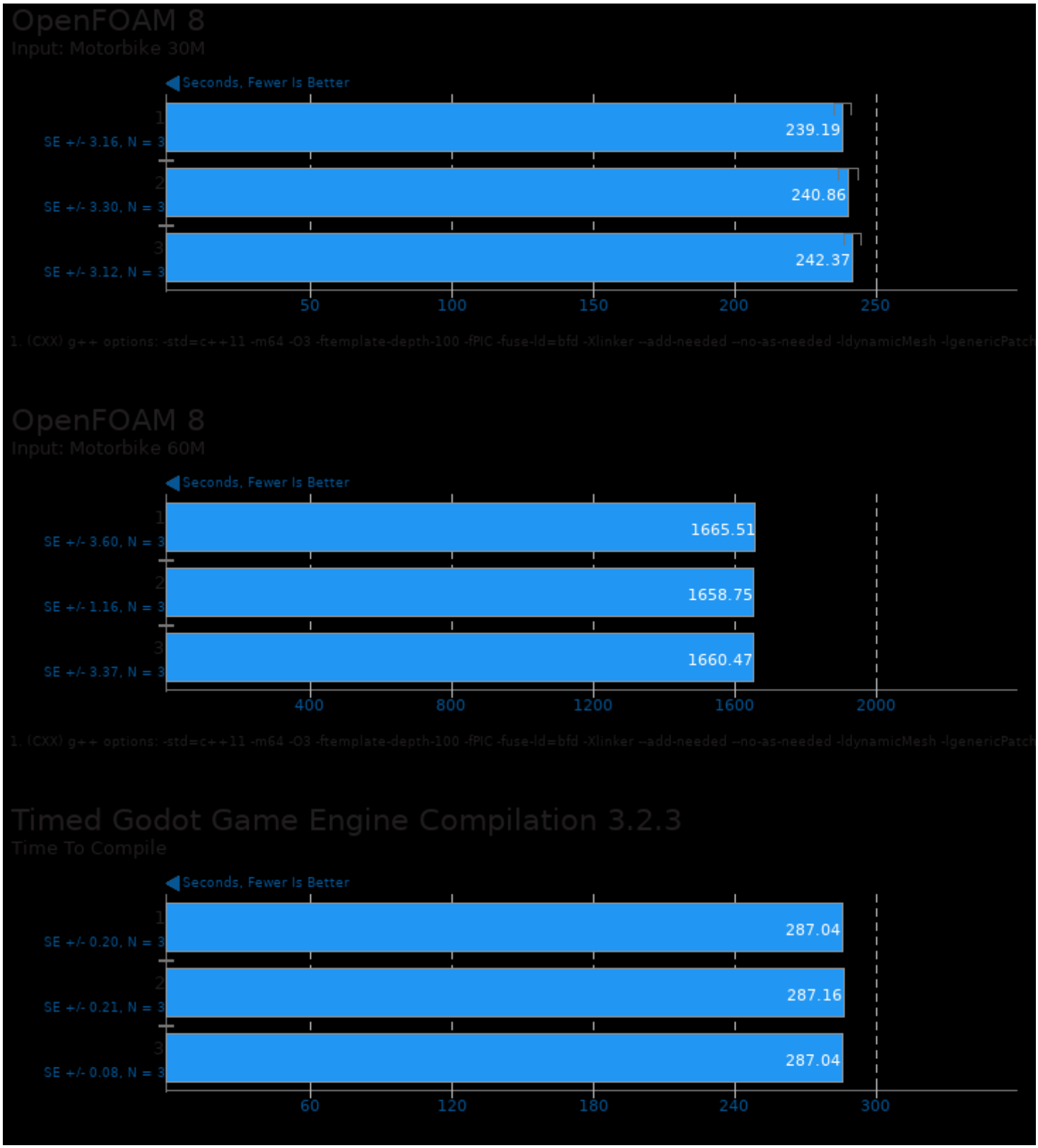
TNN 0.2.3

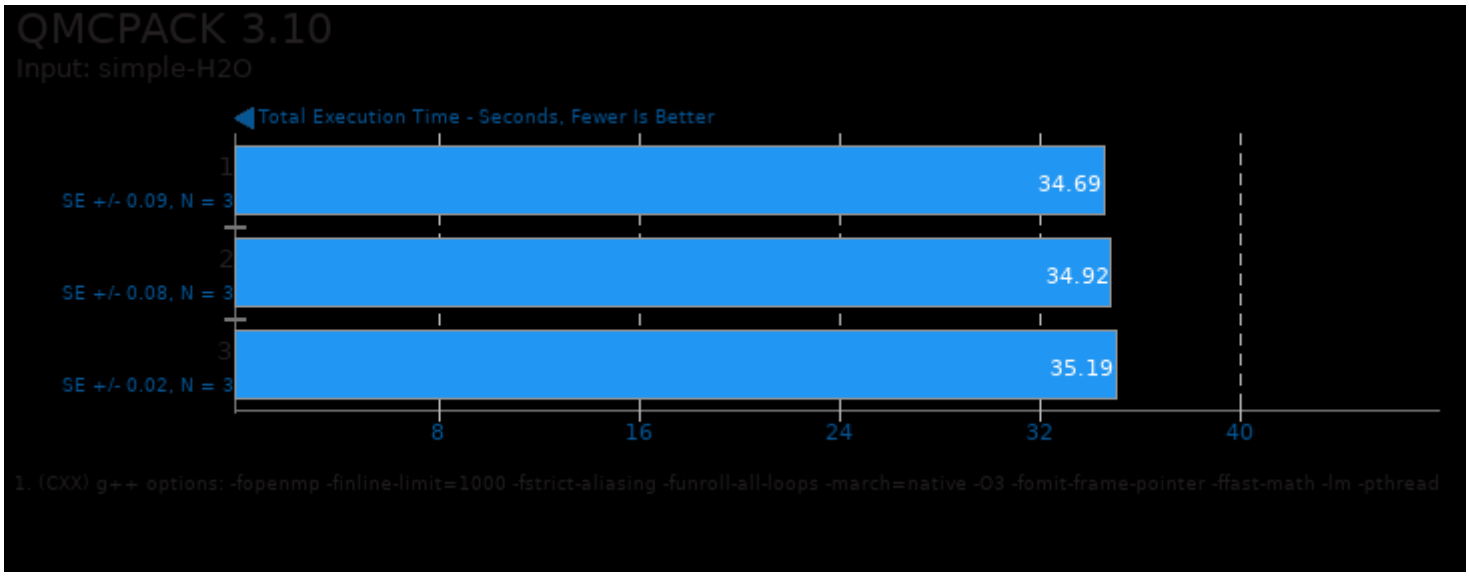
Target: CPU - Model: MobileNet v2



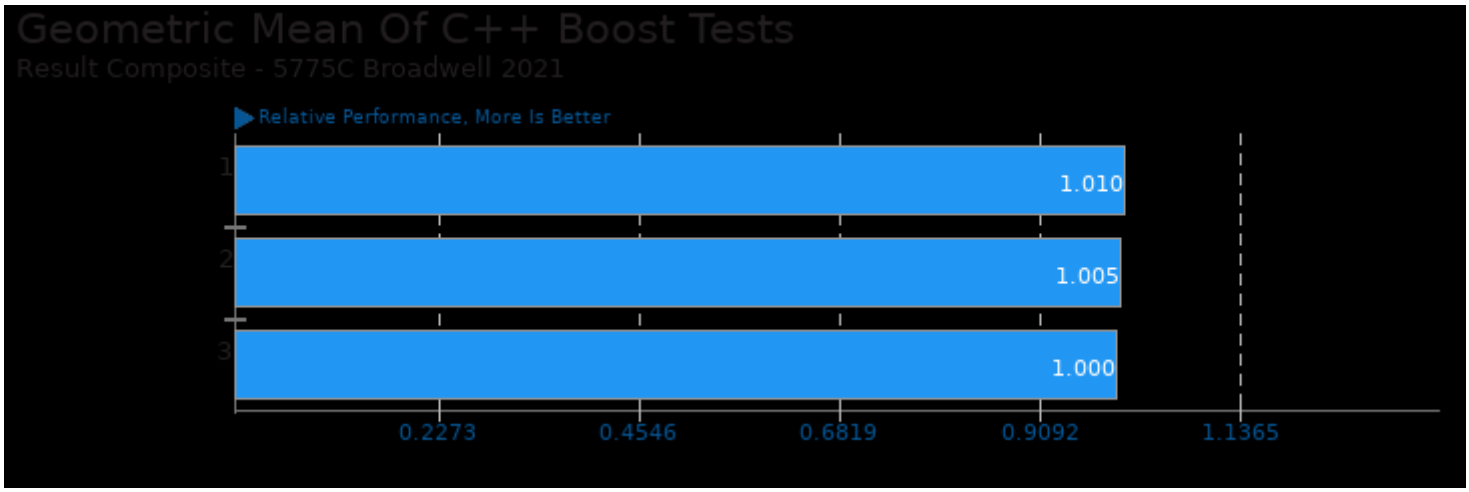
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl


TNN 0.2.3
Target: CPU - Model: SqueezeNet v1.1
ms, Fewer Is Better
MIN: 287.56 / MAX: 291.79
288.15
SE +/- 0.16, N = 3
MIN: 287.84 / MAX: 292.39
289.74
SE +/- 0.66, N = 3
MIN: 287.78 / MAX: 288.79
288.07
SE +/- 0.03, N = 3
60
120
180
240
300
1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl
CloverLeaf
Lagrangian-Eulerian Hydrodynamics
Seconds, Fewer Is Better
133.01
SE +/- 1.44, N = 3
139.43
SE +/- 0.53, N = 3
140.82
SE +/- 0.12, N = 3
30
60
90
120
150
1. (F9X) gfortran options: -O3 -march=native -funroll-loops -fopenmp
CP2K Molecular Dynamics 8.1
Fayalite-FIST Data
Seconds, Fewer Is Better
1232.88
1218.40
1221.38
300
600
900
1200
1500


OpenFOAM 8
Input: Motorbike 30M
Seconds, Fewer Is Better
1
SE +/- 3.16, N = 3
239.19
2
SE +/- 3.30, N = 3
240.86
3
SE +/- 3.12, N = 3
242.37
50
100
150
200
250
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -ldynamicMesh -lgenericPatch
OpenFOAM 8
Input: Motorbike 60M
Seconds, Fewer Is Better
1
SE +/- 3.60, N = 3
1665.51
2
SE +/- 1.16, N = 3
1658.75
3
SE +/- 3.37, N = 3
1660.47
400
800
1200
1600
2000
1. (CXX) g++ options: -std=c++11 -m64 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -ldynamicMesh -lgenericPatch
Timed Godot Game Engine Compilation 3.2.3
Time To Compile
Seconds, Fewer Is Better
1
SE +/- 0.20, N = 3
287.04
2
SE +/- 0.21, N = 3
287.16
3
SE +/- 0.08, N = 3
287.04
60
120
180
240
300


QMCPACK 3.10
Input: simple-H2O
Total Execution Time - Seconds, Fewer Is Better
1
SE +/- 0.09, N = 3
34.69
2
SE +/- 0.08, N = 3
34.92
3
SE +/- 0.02, N = 3
35.19
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -finline-limit=1000 -fstrict-aliasing -funroll-all-loops -march=native -O3 -fomit-frame-pointer -ffast-math -lm -pthread

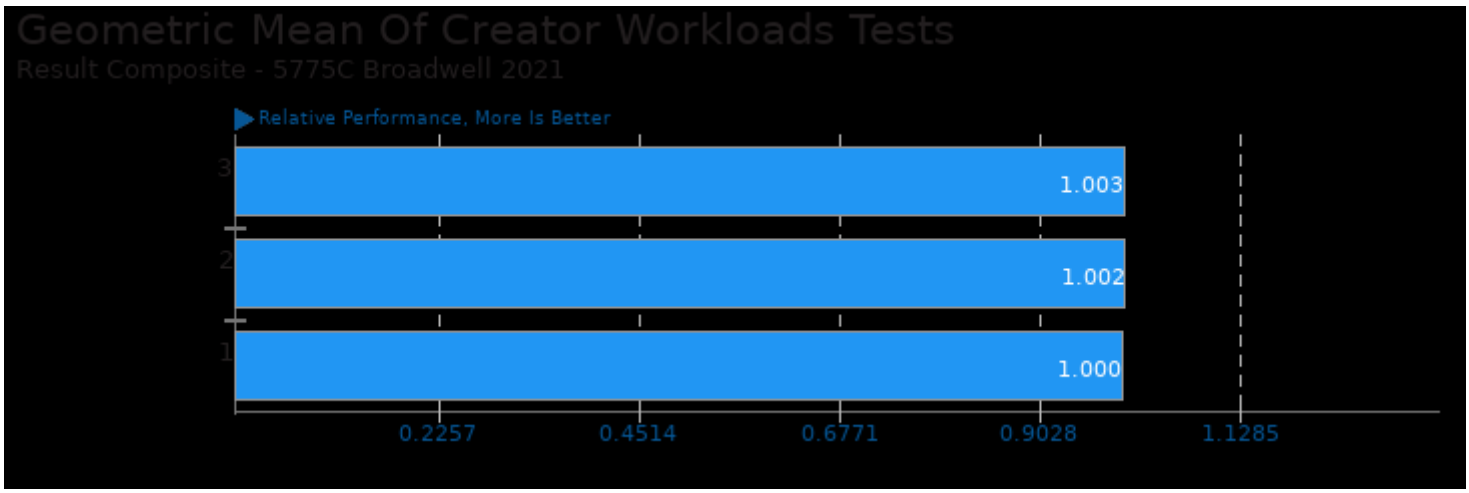
These geometric means are based upon test groupings / test suites for this result file.



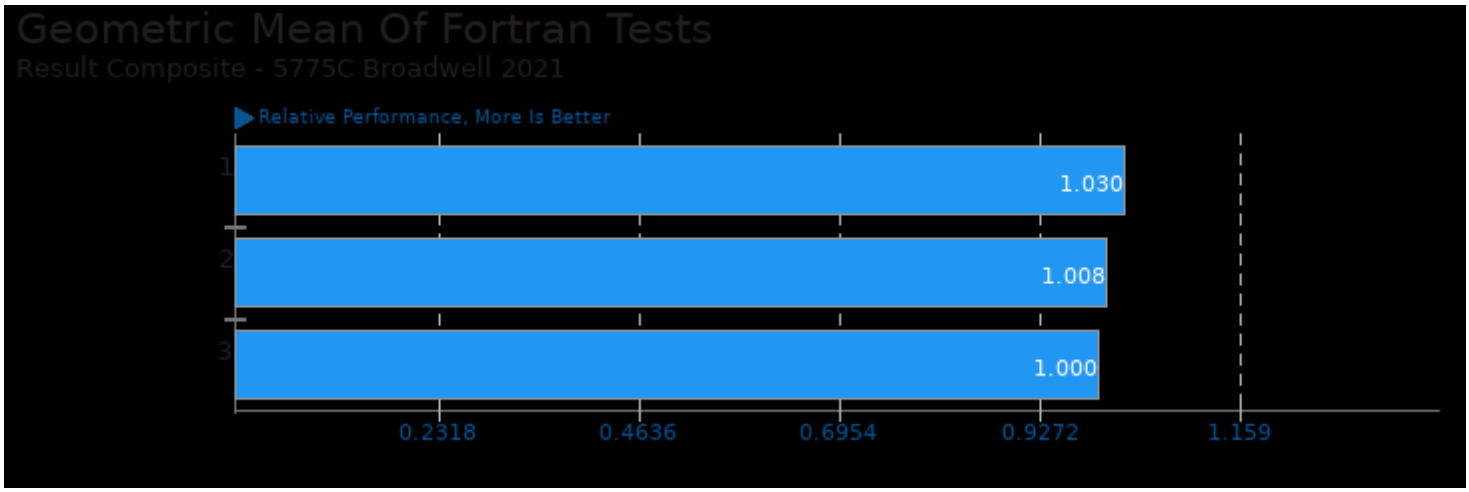
Geometric mean based upon tests: pts/openfoam and pts/qmcpack



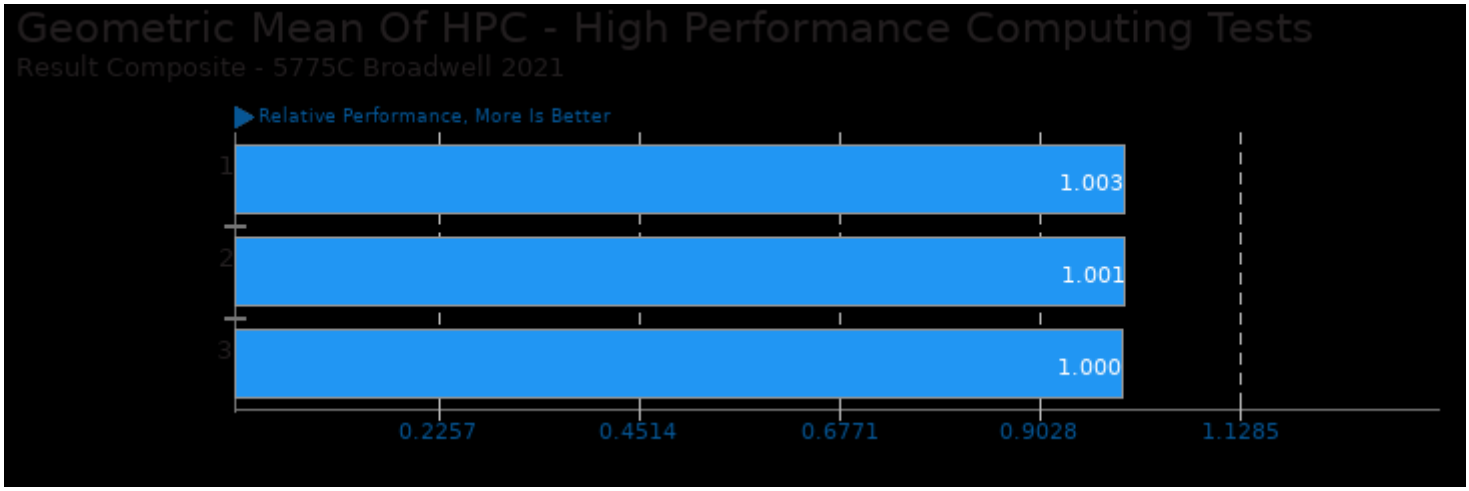
Geometric mean based upon tests: pts/cloverleaf, pts/lammps and system/cryptsetup



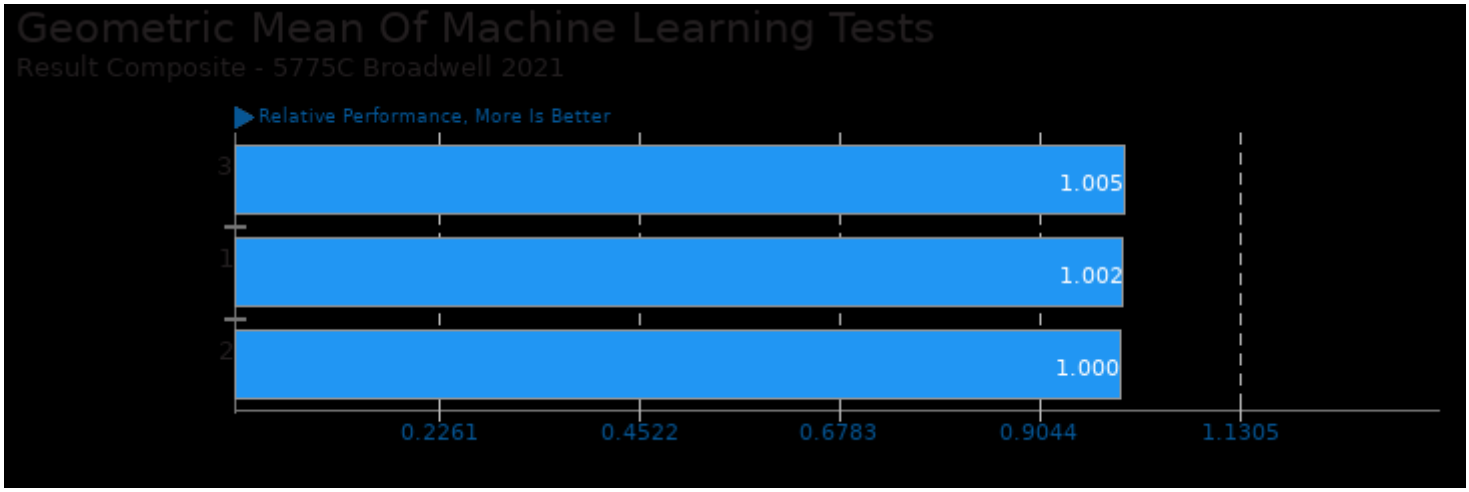
Geometric mean based upon tests: pts/rav1e, pts/build-godot and pts/synthmark



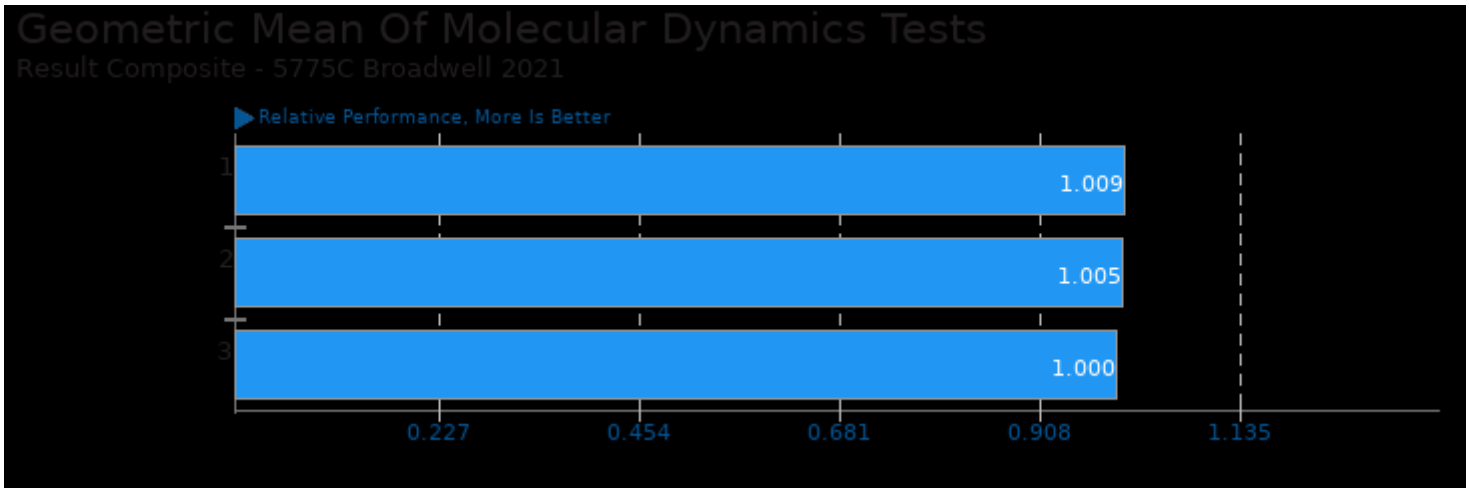
Geometric mean based upon tests: pts/lammps and pts/cloverleaf



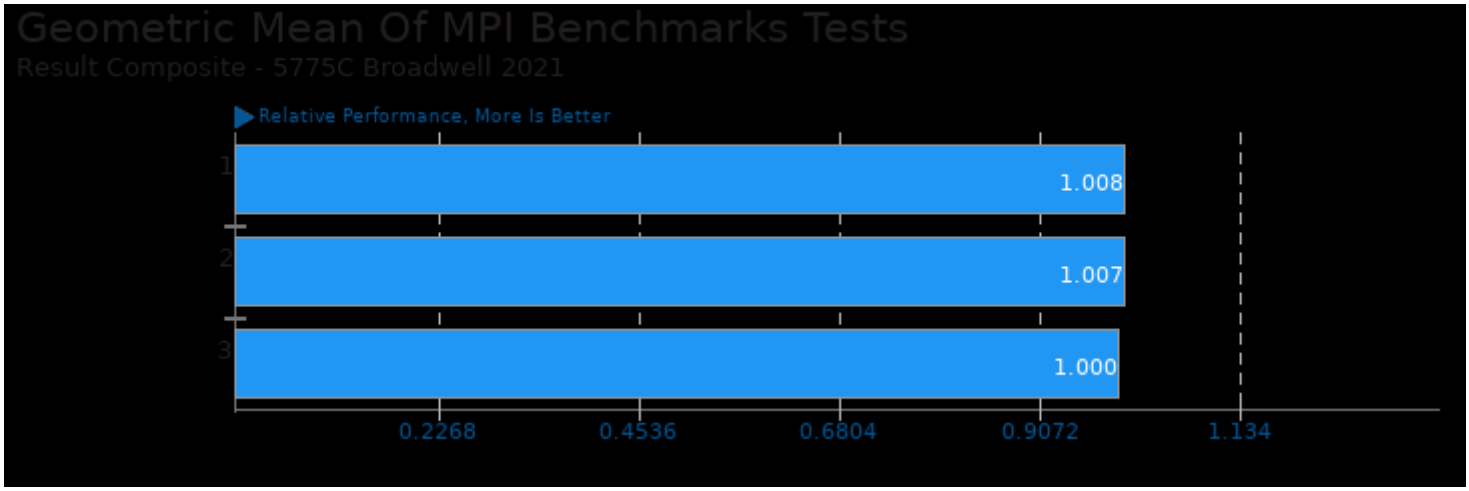
Geometric mean based upon tests: pts/amg, pts/cp2k, pts/cloverleaf, pts/lammps, pts/lulesh, pts/openfoam, pts/qmcpack, pts/kripke, pts/mnn and pts/tnn



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



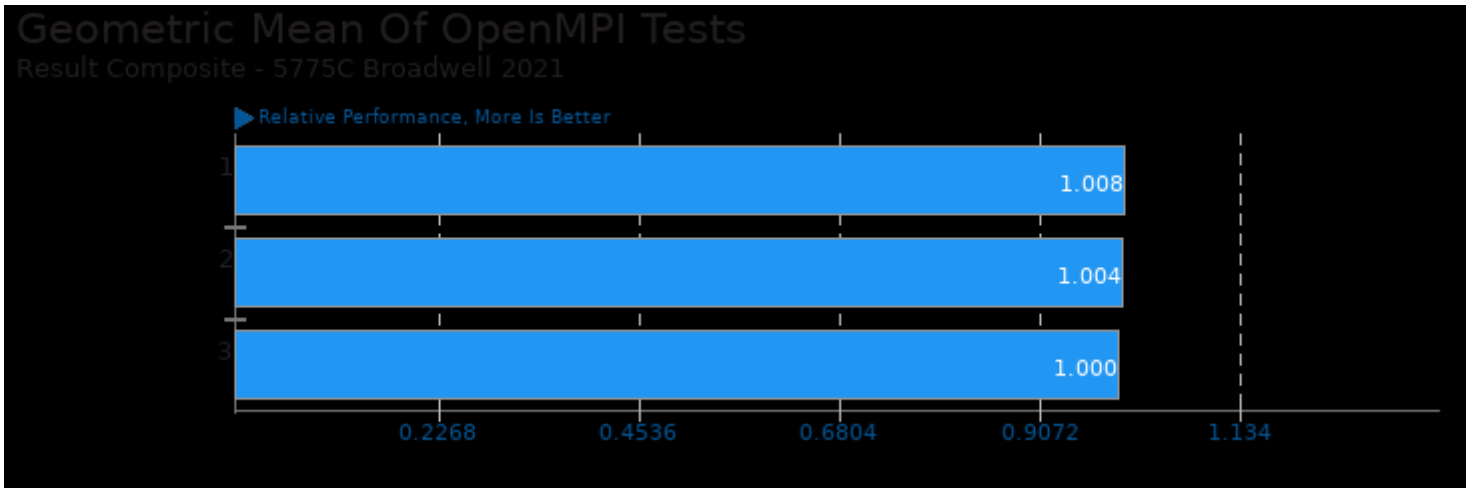
Geometric mean based upon tests: pts/cp2k, pts/cloverleaf, pts/lammps, pts/lulesh and pts/openfoam



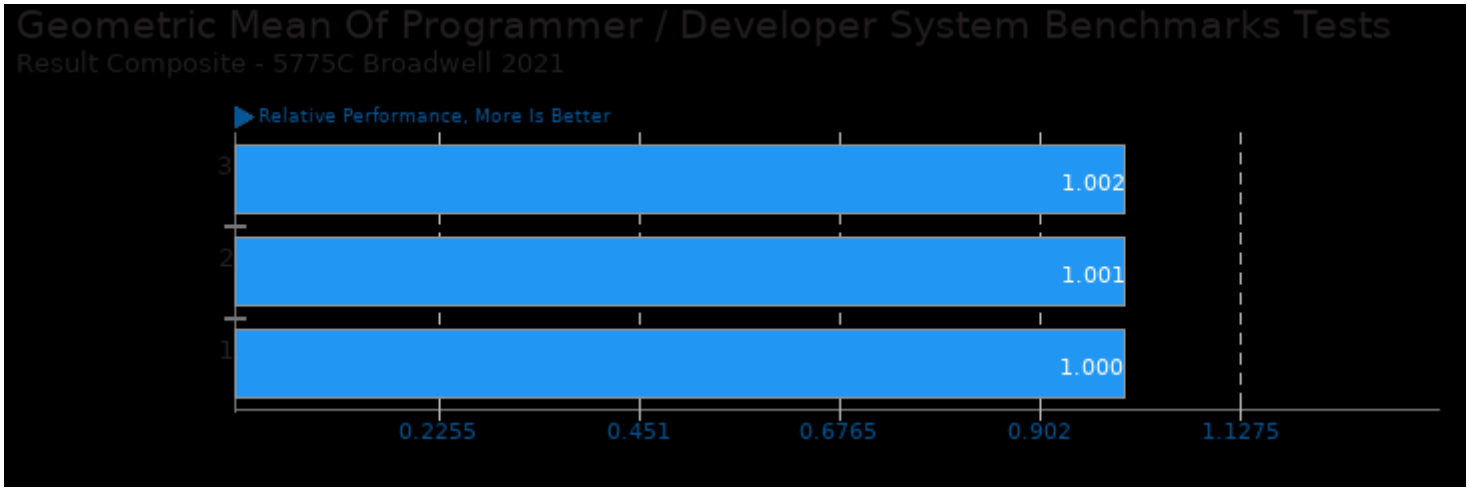
Geometric mean based upon tests: pts/lammps and pts/qmcpack



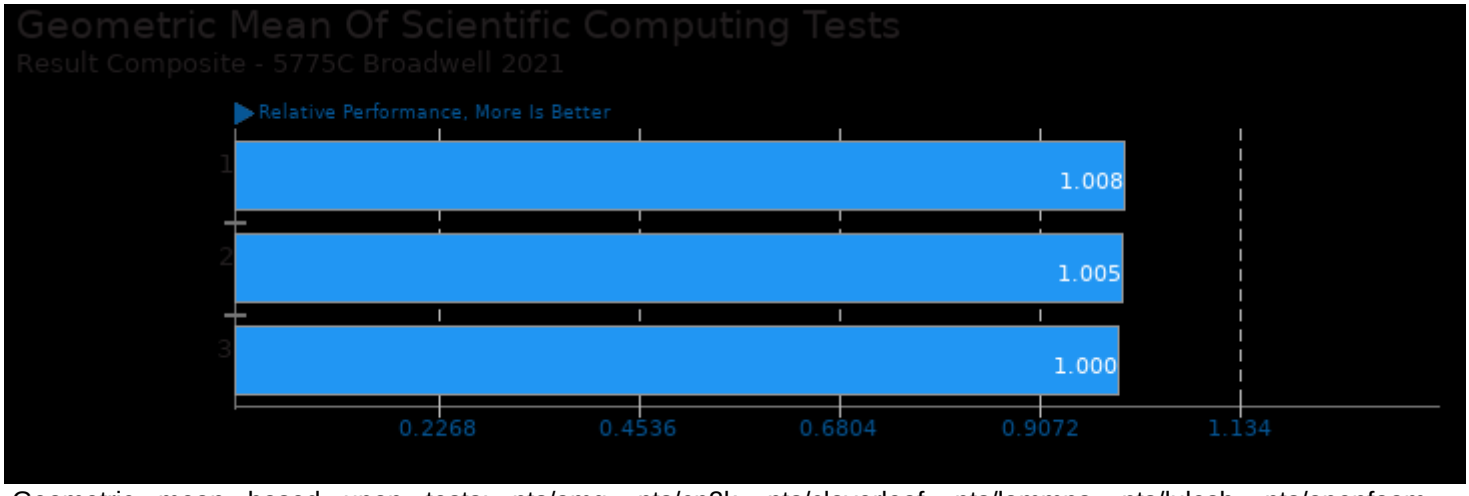
Geometric mean based upon tests: pts/rav1e, pts/lammps and pts/build-godot



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



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



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

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