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990KS March

Intel Core i9-9900KS testing with a ASUS PRIME Z390-A (1502 BIOS) and ASUS Intel UHD 630 CFL GT2 3GB on Ubuntu 20.04 via the Phoronix Test Suite.

Automated Executive Summary

1 had the most wins, coming in first place for 49% of the tests.

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

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

Zstd Compression (Compression Level: 8, Long Mode - Compression Speed) at 1.044x
AOM AV1 (Encoder Mode: Speed 8 Realtime - Input: Bosphorus 4K) at 1.042x
AOM AV1 (Encoder Mode: Speed 6 Two-Pass - Input: Bosphorus 1080p) at 1.03x
AOM AV1 (Encoder Mode: Speed 0 Two-Pass - Input: Bosphorus 1080p) at 1.027x
SHOC Scalable HeterOgeneous Computing (Target: OpenCL - Benchmark: Triad) at 1.024x
OpenSCAD (Render: Projector Mount Swivel) at 1.022x
dav1d (Video Input: Chimera 1080p 10-bit) at 1.022x
AOM AV1 (Encoder Mode: Speed 9 Realtime - Input: Bosphorus 4K) at 1.021x
AOM AV1 (Encoder Mode: Speed 8 Realtime - Input: Bosphorus 1080p) at 1.02x

Zstd Compression (Compression Level: 3, Long Mode - Compression Speed) at 1.017x.

Test Systems:

1

2

3

Processor: Intel Core i9-9900KS @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (1502 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 32GB, Disk: 240GB Corsair Force MP510, Graphics: ASUS Intel UHD 630 CFL GT2 3GB (1200MHz), Audio: Realtek ALC1220, Monitor: G237HL, Network: Intel I219-V

OS: Ubuntu 20.04, Kernel: 5.9.0-050900rc8daily20201005-generic (x86_64) 20201004, Desktop: GNOME Shell 3.36.2, Display Server: X Server 1.20.8, OpenGL: 4.6 Mesa 20.2.6, OpenCL: OpenCL 2.1, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

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++,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
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xcc - Thermald 1.9.1
Python Notes: Python 2.7.18rc1 + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of VMX unsupported + 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: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

	1	2	3
Timed Node.js Compilation - Time To Compile (sec)	477.097	**476.801**	**477.284**
Normalized	99.94%	100%	99.9%
Standard Deviation	0.1%	0.1%	0.1%
GNU Radio - Hilbert Transform (MiB/s)	**618.0**	618.3	**620.2**
Normalized	99.65%	99.69%	100%
Standard Deviation	0.3%	0.7%	0.3%
GNU Radio - F.D.F (MiB/s)	**836.7**	**837.7**	837.3
Normalized	99.88%	100%	99.95%
Standard Deviation	0.5%	0.4%	0.3%
GNU Radio - IIR Filter (MiB/s)	**666.1**	**664.9**	665.0
Normalized	100%	99.82%	99.83%
Standard Deviation	0.3%	0.3%	0.2%
GNU Radio - FIR Filter (MiB/s)	**822.3**	820.0	**818.3**
Normalized	100%	99.72%	99.51%
Standard Deviation	0.3%	0.8%	0.6%

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GNU Radio - S.S.C (MiB/s)	**3003**	**3011**	3011
Normalized	99.73%	100%	99.99%
Standard Deviation	0.2%	0.1%	0.2%
GNU Radio - F.B.t.B.F.F (MiB/s)	1190	**1196**	**1189**
Normalized	99.56%	100%	99.43%
Standard Deviation	1.8%	1.4%	2.2%
LuaRadio - Complex Phase (MiB/s)	**704.2**	700.2	**698.1**
Normalized	100%	99.43%	99.13%
Standard Deviation	1.5%	1.7%	2.8%
LuaRadio - Hilbert Transform (MiB/s)	87.2	**87.1**	**87.5**
Normalized	99.66%	99.54%	100%
Standard Deviation	0.1%	0.1%	0.6%
LuaRadio - F.D.F (MiB/s)	**486.8**	487.7	**489.5**
Normalized	99.45%	99.63%	100%
Standard Deviation	0.7%	0.7%	0.1%
LuaRadio - F.B.t.B.F.F (MiB/s)	**1298**	1292	**1292**
Normalized	100%	99.58%	99.53%
Standard Deviation	0.4%	0.4%	0.7%
AOM AV1 - Speed 4 Two-Pass - Bosphorus 4K (FPS)	**3.42**	3.41	**3.39**
Normalized	100%	99.71%	99.12%
Standard Deviation	0.9%	1.2%	0.5%
SHOC Scalable HeterOgeneous Computing - OpenCL - S3D (GFLOPS)	**20.9931**	20.8518	**20.8479**
Normalized	100%	99.33%	99.31%
Standard Deviation	0.3%	0.3%	0.2%
AOM AV1 - Speed 0 Two-Pass - Bosphorus 4K (FPS)	0.12	0.12	0.12
Standard Deviation	0%	0%	0%
GNU GMP GMPbench - Total Time (GMPbench Score)	**6250**	6222	**6218**
Normalized	100%	99.54%	99.48%
AOM AV1 - Speed 6 Two-Pass - Bosphorus 4K (FPS)	**6.34**	6.32	**6.30**
Normalized	100%	99.68%	99.37%
Standard Deviation	0.2%	0.5%	0.4%
Xcompact3d Incompact3d - i.i.1.C.P.D (sec)	**121.691170**	**121.826073**	121.742472
Normalized	100%	99.89%	99.96%
Standard Deviation	0%	0%	0.1%
ASTC Encoder - Exhaustive (sec)	113.8873	**113.7734**	**113.8933**
Normalized	99.9%	100%	99.89%
Standard Deviation	0.2%	0.2%	0.2%
Timed Erlang/OTP Compilation - Time To Compile (sec)	**113.000**	112.558	**112.484**
Normalized	99.54%	99.93%	100%
Standard Deviation	0.2%	0.6%	0.5%
OpenSCAD - Pistol (sec)	**100.767**	**100.978**	100.813
Normalized	100%	99.79%	99.95%
Standard Deviation	0.1%	0.4%	0.1%
AOM AV1 - Speed 4 Two-Pass - Bosphorus 1080p (FPS)	**6.76**	**6.73**	6.75
Normalized	100%	99.56%	99.85%
Standard Deviation	0.2%	0.6%	0.4%

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Timed Linux Kernel Compilation - Time To Compile (sec)	94.714	**94.569**	**94.768**
Normalized	99.85%	100%	99.79%
Standard Deviation	1.4%	1.1%	0.9%
OpenSCAD - P.M.S (sec)	**92.931**	93.908	**94.966**
Normalized	100%	98.96%	97.86%
Standard Deviation	0.4%	0.8%	0.1%
Sysbench - CPU (Events/sec)	19380	**19383**	**19367**
Normalized	99.99%	100%	99.92%
Standard Deviation	0.1%	0.2%	0.1%
SVT-HEVC - 1 - Bosphorus 1080p (FPS)	**6.85**	**6.84**	**6.84**
Normalized	100%	99.85%	99.85%
Standard Deviation	0.3%	0.1%	0.1%
dav1d - C.1.1.b (FPS)	**160.91**	**164.40**	163.76
Normalized	97.88%	100%	99.61%
Standard Deviation	0.1%	1.8%	1.5%
SHOC Scalable HeterOgeneous Computing - OpenCL - T.R.B (GB/s)	56.9099	**56.8932**	**56.9175**
Normalized	99.99%	99.96%	100%
Standard Deviation	0%	0%	0%
oneDNN - R.N.N.T - bf16bf16bf16 - CPU (ms)	**3414**	**3445**	3415
Normalized	100%	99.09%	99.96%
Standard Deviation	0.1%	1.3%	0%
oneDNN - R.N.N.T - u8s8f32 - CPU (ms)	**3415**	**3413**	3414
Normalized	99.96%	100%	99.97%
Standard Deviation	0.2%	0%	0%
oneDNN - R.N.N.T - f32 - CPU (ms)	**3408**	**3405**	3406
Normalized	99.92%	100%	99.98%
Standard Deviation	0.3%	0.2%	0.2%
SHOC Scalable HeterOgeneous Computing - OpenCL - Max SP Flops (GFLOPS)	1761	**1761**	**1761**
Normalized	99.98%	100%	99.97%
Standard Deviation	0.1%	0.1%	0.1%
oneDNN - R.N.N.I - bf16bf16bf16 - CPU (ms)	**1855**	**1851**	1854
Normalized	99.8%	100%	99.83%
Standard Deviation	0.3%	0.1%	0.1%
oneDNN - R.N.N.I - f32 - CPU (ms)	**1852**	**1851**	1852
Normalized	99.95%	100%	99.95%
Standard Deviation	0.1%	0.2%	0%
oneDNN - R.N.N.I - u8s8f32 - CPU (ms)	**1852**	**1851**	1851
Normalized	99.92%	100%	99.97%
Standard Deviation	0.1%	0%	0.1%
Mobile Neural Network - inception-v3 (ms)	**29.447**	29.670	**29.795**
Normalized	100%	99.25%	98.83%
Standard Deviation	0.4%	0.2%	1%
Mobile Neural Network - mobilenet-v1-1.0	**2.329**	2.333	**2.346**
Normalized	100%	99.83%	99.28%
Standard Deviation	0.5%	0.5%	0.7%
Mobile Neural Network - MobileNetV2_224	2.672	**2.655**	**2.683**
Normalized	99.36%	100%	98.96%
Standard Deviation	4.1%	3.3%	4.1%
Mobile Neural Network - resnet-v2-50 (ms)	25.308	**25.254**	**25.414**
Normalized	99.79%	100%	99.37%
Standard Deviation	0.3%	0.2%	0.3%

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Mobile Neural Network - SqueezeNetV1.0	4.899	**4.882**	**4.943**
Normalized	99.65%	100%	98.77%
Standard Deviation	1%	1.1%	1%
libavif avifenc - 0 (sec)	72.074	**72.258**	**71.799**
Normalized	99.62%	99.36%	100%
Standard Deviation	0.4%	0.6%	0.6%
simdjson - DistinctUserID (GB/s)	**4.53**	**4.55**	4.54
Normalized	99.56%	100%	99.78%
Standard Deviation	0.1%	0.3%	0.3%
simdjson - PartialTweets (GB/s)	**4.38**	**4.38**	**4.37**
Normalized	100%	100%	99.77%
Standard Deviation	0.1%	0.1%	0.1%
Basis Universal - UASTC Level 3 (sec)	**63.543**	63.560	**63.593**
Normalized	100%	99.97%	99.92%
Standard Deviation	0.1%	0.1%	0.1%
libavif avifenc - 6, Lossless (sec)	**62.674**	**62.389**	62.396
Normalized	99.55%	100%	99.99%
Standard Deviation	0.4%	0.3%	0.4%
simdjson - Kostya (GB/s)	**3.1**	**3.10**	**3.09**
Normalized	100%	100%	99.68%
Standard Deviation	0%	0.2%	0.6%
Timed Mesa Compilation - Time To Compile (sec)	**56.415**	56.468	**56.475**
Normalized	100%	99.91%	99.89%
Standard Deviation	0.1%	0.1%	0.1%
AOM AV1 - Speed 0 Two-Pass - Bosphorus 1080p (FPS)	**0.38**	**0.37**	**0.38**
Normalized	100%	97.37%	100%
Standard Deviation	1.5%	1.5%	0%
Zstd Compression - 19, Long Mode - D.S (MB/s)	3958	**3964**	**3939**
Normalized	99.84%	100%	99.38%
Standard Deviation	0.4%	0%	0.3%
Zstd Compression - 19, Long Mode - Compression Speed (MB/s)	**31.9**	31.8	**31.5**
Normalized	100%	99.69%	98.75%
Standard Deviation	0.7%	0.3%	0.4%
simdjson - LargeRand (GB/s)	1.07	1.07	1.07
Standard Deviation	0%	0%	0%
Zstd Compression - 19 - D.S (MB/s)	**3969**	**3983**	3982
Normalized	99.65%	100%	99.97%
Standard Deviation	0.5%	0.1%	0.2%
Zstd Compression - 19 - Compression Speed (MB/s)	**34.5**	**34.6**	**34.6**
Normalized	99.71%	100%	100%
Standard Deviation	0.6%	0.3%	0.3%
AOM AV1 - Speed 6 Realtime - Bosphorus 4K (FPS)	**13.16**	**13.12**	13.14
Normalized	100%	99.7%	99.85%
Standard Deviation	0.3%	0.2%	0.1%
toyBrot Fractal Generator - C++ Threads	**44854**	**44774**	44805
Normalized	99.82%	100%	99.93%
Standard Deviation	0.1%	0.1%	0.1%
toyBrot Fractal Generator - C++ Tasks (ms)	44756	**44842**	**44729**

Normalized	99.94%	99.75%	100%
Standard Deviation	0.1%	0.5%	0.1%
toyBrot Fractal Generator - TBB (ms)	**44058**	**44135**	44085
Normalized	100%	99.83%	99.94%
Standard Deviation	0.2%	0.3%	0.3%
SHOC Scalable HeterOgeneous Computing - OpenCL - MD5 Hash (GHash/s)	**0.3861**	**0.3861**	**0.386**
Normalized	100%	100%	99.97%
Standard Deviation	0%	0%	0%
toyBrot Fractal Generator - OpenMP (ms)	**43866**	43854	**43838**
Normalized	99.94%	99.96%	100%
Standard Deviation	0.1%	0.1%	0.1%
OpenSCAD - Mini-ITX Case (sec)	**41.908**	42.053	**42.084**
Normalized	100%	99.66%	99.58%
Standard Deviation	0.3%	0.5%	0.1%
Stockfish - Total Time (Nodes/s)	23777878	**23501591**	**23832208**
Normalized	99.77%	98.61%	100%
Standard Deviation	2.5%	2.2%	2.7%
srsLTE - PHY_DL_Test (UE Mb/s)	112.7	**112.2**	**113.4**
Normalized	99.38%	98.94%	100%
Standard Deviation	0.1%	0.2%	0.2%
srsLTE - PHY_DL_Test (eNb Mb/s)	293.2	**291.8**	**295.0**
Normalized	99.39%	98.92%	100%
Standard Deviation	0.1%	0.4%	0.5%
AOM AV1 - Speed 6 Two-Pass - Bosphorus 1080p (FPS)	**19.68**	**19.11**	19.21
Normalized	100%	97.1%	97.61%
Standard Deviation	1.5%	0.7%	0.1%
libavif avifenc - 2 (sec)	**37.253**	37.304	**37.326**
Normalized	100%	99.86%	99.8%
Standard Deviation	0.3%	0.5%	0.4%
srsLTE - OFDM_Test (Samples / Second)	**126700000**	128466667	**128500000**
Normalized	98.6%	99.97%	100%
Standard Deviation	0.6%	1.1%	0.9%
Zstd Compression - 8 - D.S (MB/s)	**4312**	4309	**4308**
Normalized	100%	99.92%	99.89%
Standard Deviation	0.5%	0.2%	0.2%
Zstd Compression - 8 - Compression Speed (MB/s)	**332.6**	327.6	**327.5**
Normalized	100%	98.5%	98.47%
Standard Deviation	0.9%	1.2%	0.5%
Zstd Compression - 8, Long Mode - D.S	**4610**	4601	**4575**
Normalized	100%	99.82%	99.24%
Standard Deviation	0.1%	0.1%	0.8%
Zstd Compression - 8, Long Mode - Compression Speed (MB/s)	**395.1**	**378.4**	387.2
Normalized	100%	95.77%	98%
Standard Deviation	2.1%	0.9%	1.3%
Xcompact3d Incompact3d - i.i.1.C.P.D (sec)	**34.3375969**	**34.4397227**	34.3846003
Normalized	100%	99.7%	99.86%
Standard Deviation	1.8%	1.7%	1.6%
Zstd Compression - 3, Long Mode - D.S	**4433**	4438	**4443**
Normalized	99.79%	99.89%	100%
Standard Deviation	0.3%	0.2%	0.1%

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Zstd Compression - 3, Long Mode - Compression Speed (MB/s)	1164	**1157**	**1177**
Normalized	98.89%	98.28%	100%
Standard Deviation	0.8%	1.6%	1%
ViennaCL - OpenCL BLAS - dGEMM-TT (GFLOPs/s)	15.7	15.7	15.7
Standard Deviation	0%	0%	0%
ViennaCL - OpenCL BLAS - dGEMM-TN (GFLOPs/s)	15.8	15.8	15.8
Standard Deviation	0.4%	0.4%	0.4%
ViennaCL - OpenCL BLAS - dGEMM-NT (GFLOPs/s)	**16.5**	**16.5**	**16.4**
Normalized	100%	100%	99.39%
Standard Deviation	0%	0.4%	0.4%
ViennaCL - OpenCL BLAS - dGEMM-NN (GFLOPs/s)	18.9	18.9	18.9
Standard Deviation	0%	0%	0%
ViennaCL - OpenCL BLAS - dGEMV-T (GB/s)	**34.8**	**34.7**	**34.8**
Normalized	100%	99.71%	100%
Standard Deviation	0%	0.2%	0.2%
ViennaCL - OpenCL BLAS - dGEMV-N (GB/s)	**37.9**	**38.1**	**37.9**
Normalized	99.48%	100%	99.48%
Standard Deviation	0%		
ViennaCL - OpenCL BLAS - dDOT (GB/s)	38	38	38
ViennaCL - OpenCL BLAS - dAXPY (GB/s)	**35.3**	**35.3**	**35.4**
Normalized	99.72%	99.72%	100%
Standard Deviation	0.2%	0%	0.2%
ViennaCL - OpenCL BLAS - dCOPY (GB/s)	**34.0**	34.1	**34.2**
Normalized	99.42%	99.71%	100%
Standard Deviation	0.2%	0.2%	0.2%
ViennaCL - OpenCL BLAS - sDOT (GB/s)	**37.7**	**37.6**	**37.6**
Normalized	100%	99.73%	99.73%
Standard Deviation	0%	0.2%	0.2%
ViennaCL - OpenCL BLAS - sAXPY (GB/s)	34.6	34.6	34.6
Standard Deviation	0%	0%	0%
ViennaCL - OpenCL BLAS - sCOPY (GB/s)	**32.9**	**33.3**	**33.3**
Normalized	98.8%	100%	100%
Standard Deviation	0.3%	0.5%	0.3%
Zstd Compression - 3 - D.S (MB/s)	**4187**	**4165**	4180
Normalized	100%	99.47%	99.85%
Standard Deviation	0.2%	0.8%	0.1%
Zstd Compression - 3 - Compression Speed (MB/s)	2379	**2375**	**2388**
Normalized	99.62%	99.42%	100%
Standard Deviation	0.9%	1.2%	0.9%
Basis Universal - UASTC Level 2 (sec)	**33.461**	**33.374**	33.387
Normalized	99.74%	100%	99.96%
Standard Deviation	0.1%	0.5%	0.6%
Botan - AES-256 - Decrypt (MiB/s)	**4806**	4811	**4812**
Normalized	99.87%	99.97%	100%
Standard Deviation	0.2%	0%	0%
Botan - AES-256 (MiB/s)	**4816**	**4815**	4816
Normalized	100%	99.98%	99.99%
Standard Deviation	0%	0%	0%

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AOM AV1 - Speed 9 Realtime - Bosphorus 4K (FPS)	**47.78**	48.72	**48.78**
Normalized	97.95%	99.88%	100%
Standard Deviation	4.3%	0.4%	0.2%
Botan - ChaCha20Poly1305 - Decrypt (MiB/s)	908.311	**907.952**	**908.474**
Normalized	99.98%	99.94%	100%
Standard Deviation	0.1%	0.2%	0.1%
Botan - ChaCha20Poly1305 (MiB/s)	**916.108**	**913.025**	914.454
Normalized	100%	99.66%	99.82%
Standard Deviation	0%	0.6%	0.3%
Botan - Blowfish - Decrypt (MiB/s)	539.238	**539.017**	**539.337**
Normalized	99.98%	99.94%	100%
Standard Deviation	0%	0.1%	0%
Botan - Blowfish (MiB/s)	543.597	**543.385**	**543.951**
Normalized	99.93%	99.9%	100%
Standard Deviation	0%	0.1%	0%
Botan - Twofish - Decrypt (MiB/s)	**437.297**	437.288	**436.744**
Normalized	100%	100%	99.87%
Standard Deviation	0.1%	0.1%	0.4%
Botan - Twofish (MiB/s)	436.078	**436.124**	**434.656**
Normalized	99.99%	100%	99.66%
Standard Deviation	0.1%	0%	0.7%
Botan - CAST-256 - Decrypt (MiB/s)	172.091	**172.076**	**172.150**
Normalized	99.97%	99.96%	100%
Standard Deviation	0%	0%	0%
Botan - CAST-256 (MiB/s)	171.954	**171.951**	**171.958**
Normalized	100%	100%	100%
Standard Deviation	0%	0%	0%
Botan - KASUMI - Decrypt (MiB/s)	107.861	**107.764**	**107.878**
Normalized	99.98%	99.89%	100%
Standard Deviation	0.1%	0.1%	0.1%
Botan - KASUMI (MiB/s)	112.980	**112.943**	**112.985**
Normalized	100%	99.96%	100%
Standard Deviation	0.1%	0.1%	0.1%
AOM AV1 - Speed 6 Realtime - Bosphorus 1080p (FPS)	25.06	**24.95**	**25.07**
Normalized	99.96%	99.52%	100%
Standard Deviation	1.6%	2.6%	1.5%
ViennaCL - CPU BLAS - dGEMM-TT (GFLOPs/s)	35.5	35.5	35.5
Standard Deviation	0.2%	0.2%	0.2%
ViennaCL - CPU BLAS - dGEMM-TN (GFLOPs/s)	**36.5**	**36.4**	**36.5**
Normalized	100%	99.73%	100%
Standard Deviation	0.2%	0.3%	0%
ViennaCL - CPU BLAS - dGEMM-NT (GFLOPs/s)	**34.1**	**34.2**	**34.1**
Normalized	99.71%	100%	99.71%
Standard Deviation	0.2%	0.3%	0.2%
ViennaCL - CPU BLAS - dGEMM-NN (GFLOPs/s)	34.8	34.8	34.8
Standard Deviation	0%	0%	0.2%
ViennaCL - CPU BLAS - dGEMV-T (GB/s)	46.5	46.5	46.5
Standard Deviation	0.1%	0%	0%

990KS March

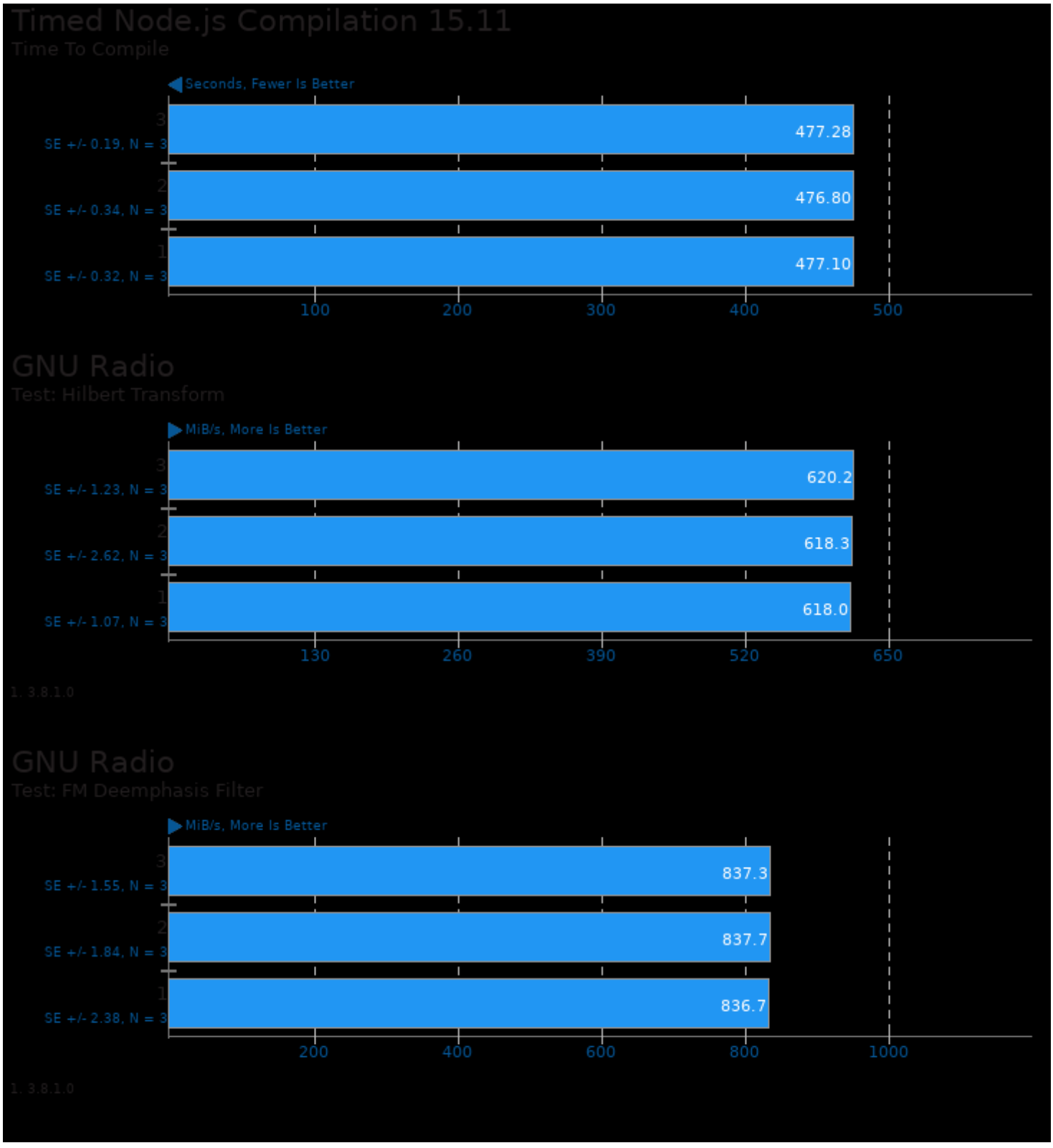
ViennaCL - CPU BLAS - dGEMV-N (GB/s)	**45.5**	**45.6**	**45.5**
Normalized	99.78%	100%	99.78%
Standard Deviation	0%	0.1%	0.1%
ViennaCL - CPU BLAS - dDOT (GB/s)	44.1	44.1	44.1
Standard Deviation	0.1%	0%	0%
ViennaCL - CPU BLAS - dAXPY (GB/s)	39.3	39.3	39.3
Standard Deviation	0%	0%	0%
ViennaCL - CPU BLAS - dCOPY (GB/s)	26.2	26.2	26.2
Standard Deviation	0.2%	0%	0%
ViennaCL - CPU BLAS - sDOT (GB/s)	47.9	47.9	47.9
Standard Deviation	0.2%	0.1%	0.1%
ViennaCL - CPU BLAS - sAXPY (GB/s)	**42.8**	**42.9**	**42.8**
Normalized	99.77%	100%	99.77%
Standard Deviation	0.1%	0.3%	0.4%
ViennaCL - CPU BLAS - sCOPY (GB/s)	**28.2**	**28.2**	**28.3**
Normalized	99.65%	99.65%	100%
Standard Deviation	0.2%	0.2%	0.2%
Basis Universal - ETC1S (sec)	**23.455**	23.390	**23.367**
Normalized	99.62%	99.9%	100%
Standard Deviation	0.2%	0.6%	0.3%
SHOC Scalable HeterOgeneous Computing - OpenCL - GEMM SGEMM_N (GFLOPS)	**245.920**	245.885	**245.783**
Normalized	100%	99.99%	99.94%
Standard Deviation	0%	0%	0%
oneDNN - D.B.s - f32 - CPU (ms)	**8.83898**	8.86501	**8.87618**
Normalized	100%	99.71%	99.58%
Standard Deviation	0.1%	0.3%	0.1%
oneDNN - D.B.s - u8s8f32 - CPU (ms)	**2.14490**	**2.14385**	2.14452
Normalized	99.95%	100%	99.97%
Standard Deviation	0.3%	0.2%	0.1%
dav1d - Summer Nature 4K (FPS)	**185.13**	184.25	**184.16**
Normalized	100%	99.52%	99.48%
Standard Deviation	0.1%	0.1%	0.2%
Liquid-DSP - 4 - 256 - 57 (samples/s)	**250856667**	**251576667**	251473333
Normalized	99.71%	100%	99.96%
Standard Deviation	0.2%	0.3%	0.2%
Liquid-DSP - 2 - 256 - 57 (samples/s)	130183333	**130046667**	**130663333**
Normalized	99.63%	99.53%	100%
Standard Deviation	0.1%	0.5%	0%
Liquid-DSP - 1 - 256 - 57 (samples/s)	67629667	**67632333**	**67599667**
Normalized	100%	100%	99.95%
Standard Deviation	0%	0%	0.1%
Liquid-DSP - 16 - 256 - 57 (samples/s)	**500333333**	500263333	**500016667**
Normalized	100%	99.99%	99.94%
Standard Deviation	0.1%	0.1%	0.1%
Liquid-DSP - 8 - 256 - 57 (samples/s)	452713333	**452073333**	**453086667**
Normalized	99.92%	99.78%	100%
Standard Deviation	0.6%	0.2%	0.8%
ASTC Encoder - Thorough (sec)	**14.9207**	**14.9059**	14.9103
Normalized	99.9%	100%	99.97%
Standard Deviation	0.2%	0.3%	0.2%
AOM AV1 - Speed 8 Realtime - Bosphorus 4K (FPS)	**38.68**	37.94	**37.12**
Normalized	100%	98.09%	95.97%
Standard Deviation	0.2%	0.3%	2.8%

990KS March

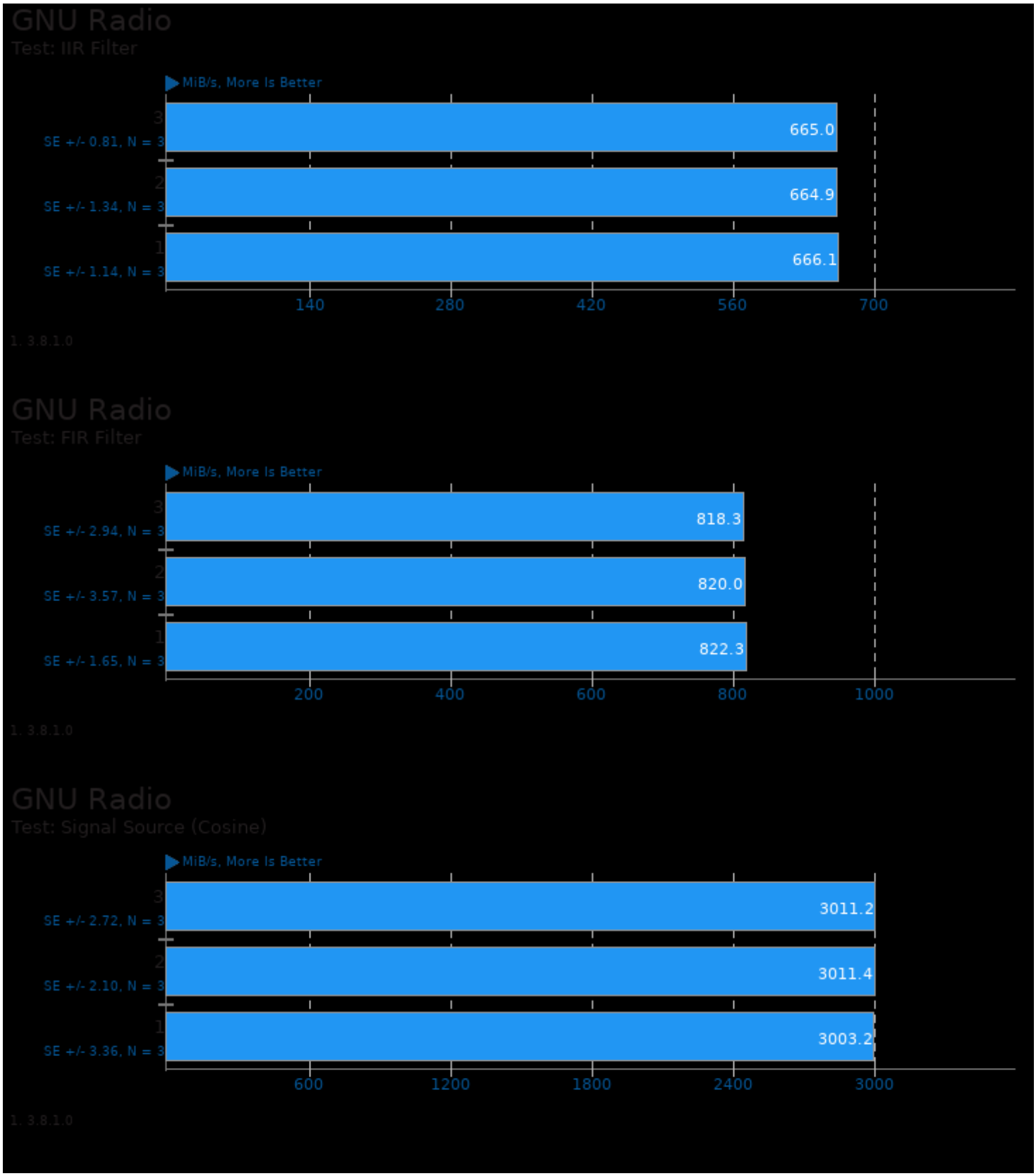
OpenSCAD - Retro Car (sec)	**17.259**	17.346	**17.367**
Normalized	100%	99.5%	99.38%
Standard Deviation	0.2%	1%	0.2%
OpenSCAD - L.P.C.S (sec)	16.975	**16.941**	**17.054**
Normalized	99.8%	100%	99.34%
Standard Deviation	0.1%	0.2%	0.1%
dav1d - Chimera 1080p (FPS)	**733.64**	**731.76**	732.83
Normalized	100%	99.74%	99.89%
Standard Deviation	0.2%	0.5%	0.2%
oneDNN - IP Shapes 1D - f32 - CPU (ms)	**3.57740**	3.57455	**3.56577**
Normalized	99.67%	99.75%	100%
Standard Deviation	0.6%	0.4%	0.1%
oneDNN - IP Shapes 1D - u8s8f32 - CPU (ms)	**1.66747**	1.66579	**1.6655**
Normalized	99.88%	99.98%	100%
Standard Deviation	0.2%	0.3%	0.1%
libavif avifenc - 6 (sec)	**12.952**	**13.005**	12.964
Normalized	100%	99.59%	99.91%
Standard Deviation	0.5%	0.6%	0.2%
oneDNN - M.M.B.S.T - f32 - CPU (ms)	**3.15433**	3.15157	**3.14943**
Normalized	99.84%	99.93%	100%
Standard Deviation	0.4%	0.2%	0.5%
oneDNN - M.M.B.S.T - u8s8f32 - CPU (ms)	**3.44003**	**3.43359**	3.43914
Normalized	99.81%	100%	99.84%
Standard Deviation	0.2%	0.1%	0.1%
SHOC Scalable HeterOgeneous Computing - OpenCL - Reduction (GB/s)	**36.7934**	**36.7270**	36.7633
Normalized	100%	99.82%	99.92%
Standard Deviation	0.2%	0.3%	0.1%
AOM AV1 - Speed 8 Realtime - Bosphorus 1080p (FPS)	**124.39**	122.64	**121.96**
Normalized	100%	98.59%	98.05%
Standard Deviation	0.6%	2.7%	3.7%
oneDNN - IP Shapes 3D - f32 - CPU (ms)	**8.26103**	**8.14695**	8.16788
Normalized	98.62%	100%	99.74%
Standard Deviation	0.1%	0.1%	0.3%
oneDNN - IP Shapes 3D - u8s8f32 - CPU (ms)	**1.83215**	1.82910	**1.82340**
Normalized	99.52%	99.69%	100%
Standard Deviation	0.3%	0.5%	0.2%
Basis Universal - UASTC Level 0 (sec)	**7.172**	7.091	**7.089**
Normalized	98.84%	99.97%	100%
Standard Deviation	0%	0.1%	0.1%
AOM AV1 - Speed 9 Realtime - Bosphorus 1080p (FPS)	**141.48**	140.39	**139.82**
Normalized	100%	99.23%	98.83%
Standard Deviation	2.8%	0.6%	2.9%
oneDNN - C.B.S.A - f32 - CPU (ms)	**14.2830**	**14.3031**	14.2936
Normalized	100%	99.86%	99.93%
Standard Deviation	0.2%	0.4%	0.2%
oneDNN - C.B.S.A - u8s8f32 - CPU (ms)	**14.0335**	**13.9988**	14.0106
Normalized	99.75%	100%	99.92%
Standard Deviation	0.3%	0.2%	0.3%
SHOC Scalable HeterOgeneous Computing - OpenCL - FFT SP (GFLOPS)	15.3682	**15.3757**	**15.3573**
Normalized	99.95%	100%	99.88%
Standard Deviation	0.1%	0.1%	0.2%

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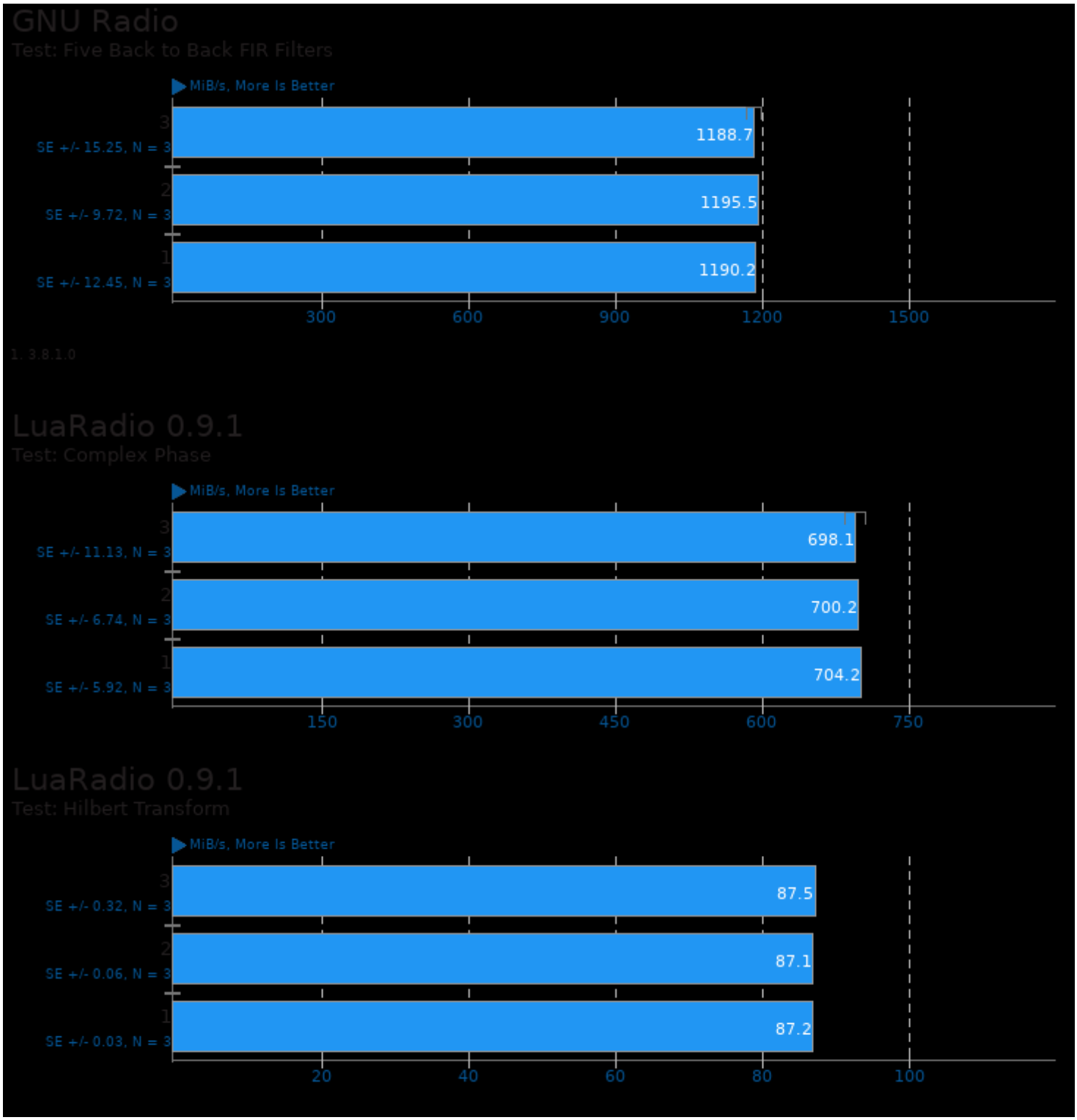
SVT-HEVC - 7 - Bosphorus 1080p (FPS)	**106.19**	105.90	**105.78**
Normalized	100%	99.73%	99.61%
Standard Deviation	0.2%	0.1%	0.2%
dav1d - S.N.1 (FPS)	648.26	**649.67**	**647.63**
Normalized	99.78%	100%	99.69%
Standard Deviation	0.4%	0.2%	0.1%
ASTC Encoder - Medium (sec)	**5.7949**	5.7757	**5.7737**
Normalized	99.63%	99.97%	100%
Standard Deviation	0.7%	0.2%	0.2%
libavif avifenc - 10, Lossless (sec)	5.778	**5.771**	**5.787**
Normalized	99.88%	100%	99.72%
Standard Deviation	0.4%	0.4%	0.4%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	**136.76**	136.22	**136.05**
Normalized	100%	99.61%	99.48%
Standard Deviation	0.3%	0.2%	0.4%
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS)	**173.31**	172.24	**172.10**
Normalized	100%	99.38%	99.3%
Standard Deviation	0.2%	0.4%	0.3%
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS)	**176.29**	175.27	**175.06**
Normalized	100%	99.42%	99.3%
Standard Deviation	0.3%	0.5%	0.1%
Sysbench - RAM / Memory (MiB/sec)	28391	**28492**	**28339**
Normalized	99.65%	100%	99.46%
Standard Deviation	0.6%	0.8%	0.3%
libavif avifenc - 10 (sec)	**3.154**	3.160	**3.170**
Normalized	100%	99.81%	99.5%
Standard Deviation	0.2%	0.5%	0.6%
oneDNN - D.B.s - f32 - CPU (ms)	6.63993	**6.64659**	**6.61557**
Normalized	99.63%	99.53%	100%
Standard Deviation	0.3%	0.4%	0.1%
oneDNN - D.B.s - u8s8f32 - CPU (ms)	**3.97706**	**3.93198**	3.93216
Normalized	98.87%	100%	100%
Standard Deviation	0.9%	0.5%	0.8%
SVT-HEVC - 10 - Bosphorus 1080p (FPS)	**230.27**	229.42	**229.36**
Normalized	100%	99.63%	99.6%
Standard Deviation	0.1%	0.1%	0.3%
SHOC Scalable HeterOgeneous Computing - OpenCL - Triad (GB/s)	**15.6053**	**15.2336**	15.2518
Normalized	100%	97.62%	97.73%
Standard Deviation	0.3%	0.1%	0.4%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Readback (GB/s)	**29.0495**	29.0520	**29.1531**
Normalized	99.64%	99.65%	100%
Standard Deviation	1.3%	0.6%	1.2%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Download (GB/s)	**29.2119**	**29.1641**	29.1766
Normalized	100%	99.84%	99.88%
Standard Deviation	0.6%	0.3%	0.9%
Systemd Total Boot Time - Userspace (ms)	22109	22109	22109
Systemd Total Boot Time - Firmware (ms)	15679	15679	15679
Systemd Total Boot Time - Loader (ms)	3555	3555	3555
Systemd Total Boot Time - Kernel (ms)	1941	1941	1941
Systemd Total Boot Time - Total (ms)	24050	24050	24050


Timed Node.js Compilation 15.11
Time To Compile
Seconds, Fewer Is Better
3
SE +/- 0.19, N = 3
477.28
2
SE +/- 0.34, N = 3
476.80
1
SE +/- 0.32, N = 3
477.10
100
200
300
400
500
GNU Radio
Test: Hilbert Transform
MiB/s, More Is Better
3
SE +/- 1.23, N = 3
620.2
2
SE +/- 2.62, N = 3
618.3
1
SE +/- 1.07, N = 3
618.0
130
260
390
520
650
1. 3.8.1.0
GNU Radio
Test: FM Deemphasis Filter
MiB/s, More Is Better
3
SE +/- 1.55, N = 3
837.3
2
SE +/- 1.84, N = 3
837.7
1
SE +/- 2.38, N = 3
836.7
200
400
600
800
1000
1. 3.8.1.0

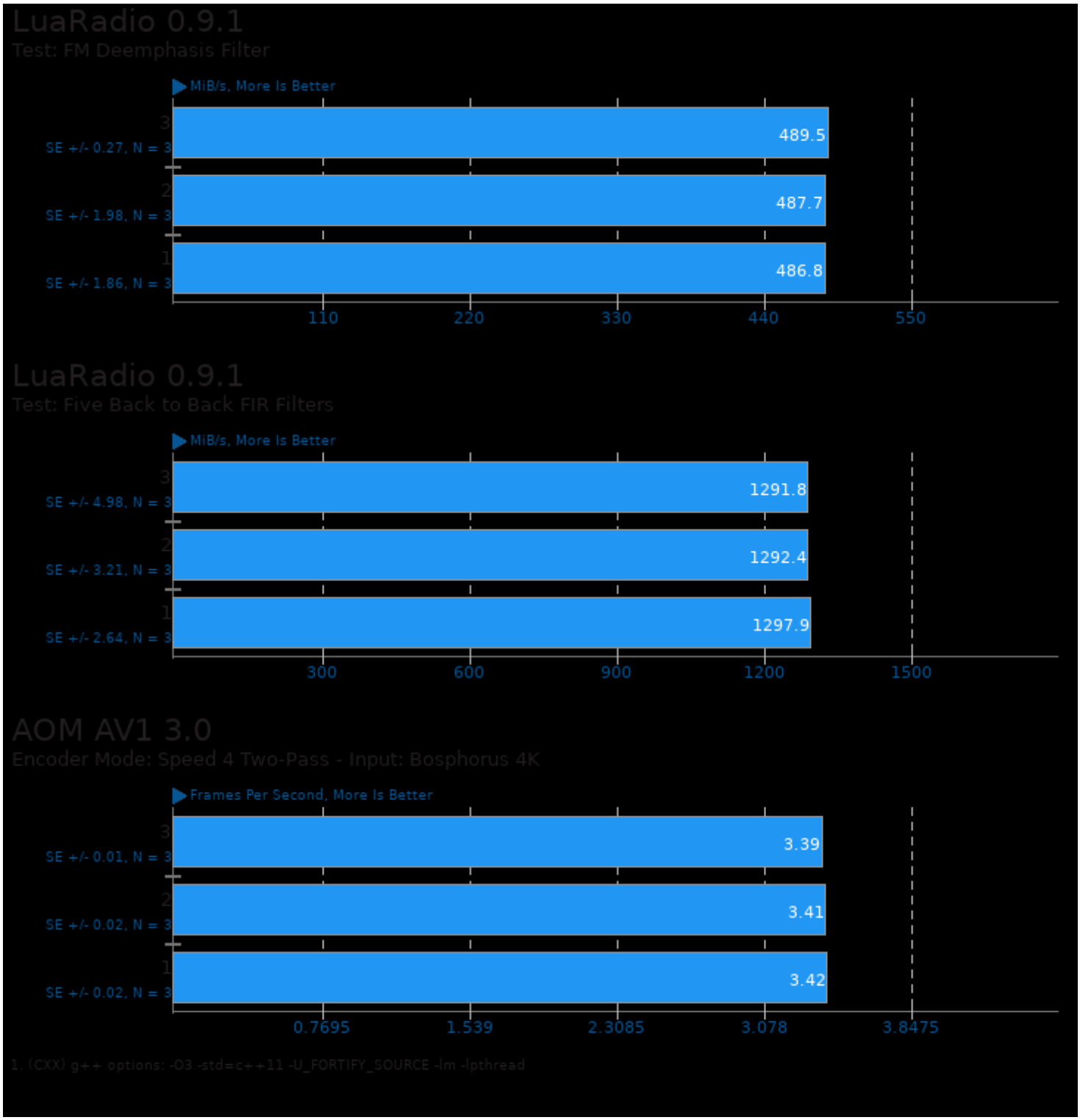
990KS March


GNU Radio
Test: IIR Filter
MiB/s, More Is Better
3
SE +/- 0.81, N = 3
665.0
2
SE +/- 1.34, N = 3
664.9
1
SE +/- 1.14, N = 3
666.1
140
280
420
560
700
1. 3.8.1.0
GNU Radio
Test: FIR Filter
MiB/s, More Is Better
3
SE +/- 2.94, N = 3
818.3
2
SE +/- 3.57, N = 3
820.0
1
SE +/- 1.65, N = 3
822.3
200
400
600
800
1000
1. 3.8.1.0
GNU Radio
Test: Signal Source (Cosine)
MiB/s, More Is Better
3
SE +/- 2.72, N = 3
3011.2
2
SE +/- 2.10, N = 3
3011.4
1
SE +/- 3.36, N = 3
3003.2
600
1200
1800
2400
3000
1. 3.8.1.0

990KS March

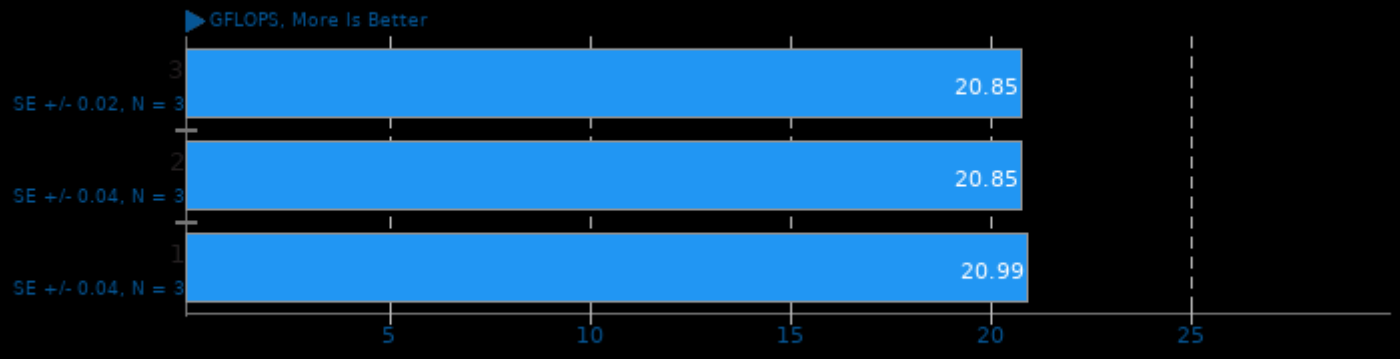

GNU Radio
Test: Five Back to Back FIR Filters
MiB/s, More Is Better
3
SE +/- 15.25, N = 3
1188.7
2
SE +/- 9.72, N = 3
1195.5
1
SE +/- 12.45, N = 3
1190.2
300
600
900
1200
1500
1. 3.8.1.0
LuaRadio 0.9.1
Test: Complex Phase
MiB/s, More Is Better
3
SE +/- 11.13, N = 3
698.1
2
SE +/- 6.74, N = 3
700.2
1
SE +/- 5.92, N = 3
704.2
150
300
450
600
750
LuaRadio 0.9.1
Test: Hilbert Transform
MiB/s, More Is Better
3
SE +/- 0.32, N = 3
87.5
2
SE +/- 0.06, N = 3
87.1
1
SE +/- 0.03, N = 3
87.2
20
40
60
80
100

990KS March


LuaRadio 0.9.1
Test: FM Deemphasis Filter
MiB/s, More Is Better
3
SE +/- 0.27, N = 3
489.5
2
SE +/- 1.98, N = 3
487.7
1
SE +/- 1.86, N = 3
486.8
110
220
330
440
550
LuaRadio 0.9.1
Test: Five Back to Back FIR Filters
MiB/s, More Is Better
3
SE +/- 4.98, N = 3
1291.8
2
SE +/- 3.21, N = 3
1292.4
1
SE +/- 2.64, N = 3
1297.9
300
600
900
1200
1500
AOM AV1 3.0
Encoder Mode: Speed 4 Two-Pass - Input: Bosphorus 4K
Frames Per Second, More Is Better
3
SE +/- 0.01, N = 3
3.39
2
SE +/- 0.02, N = 3
3.41
1
SE +/- 0.02, N = 3
3.42
0.7695
1.539
2.3085
3.078
3.8475
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

SHOC Scalable HeterOgeneous Computing 2020-04-17

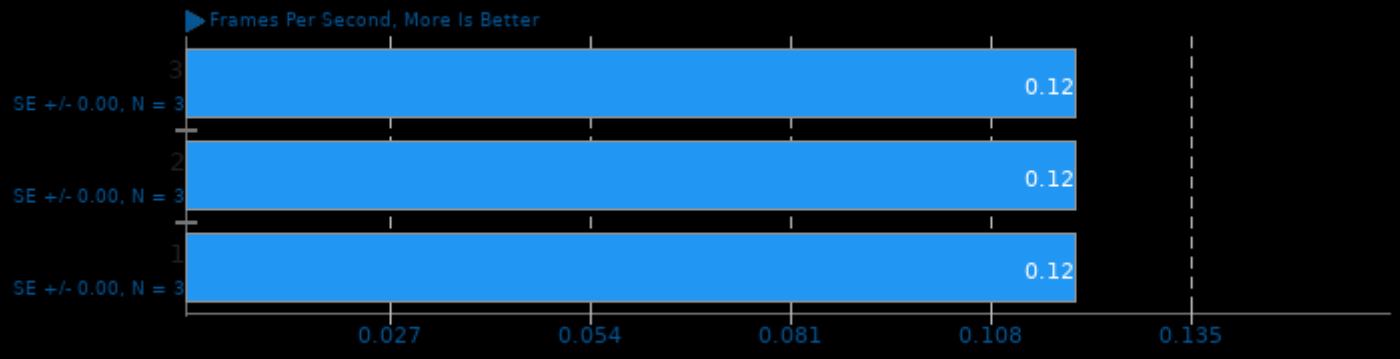
Target: OpenCL - Benchmark: S3D



1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

AOM AV1 3.0

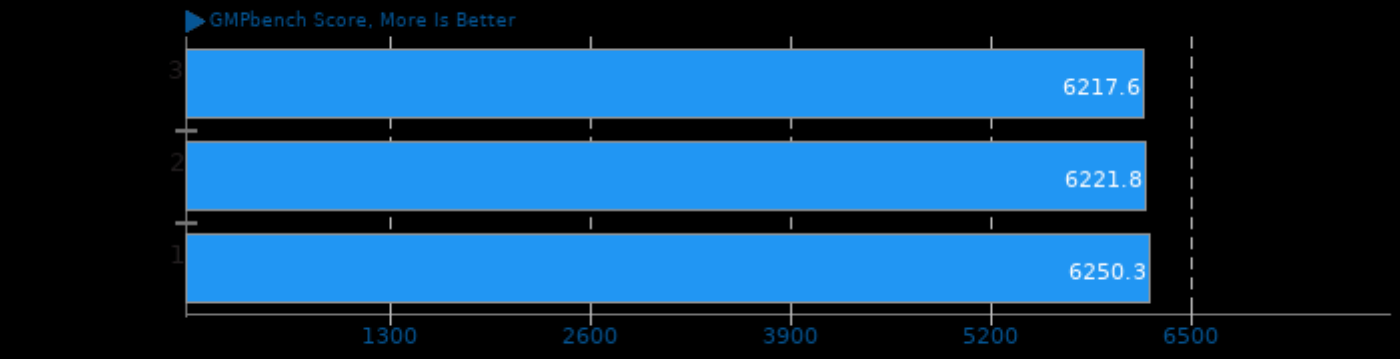
Encoder Mode: Speed 0 Two-Pass - Input: Bosphorus 4K



1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

GNU GMP GMPbench 6.2.1

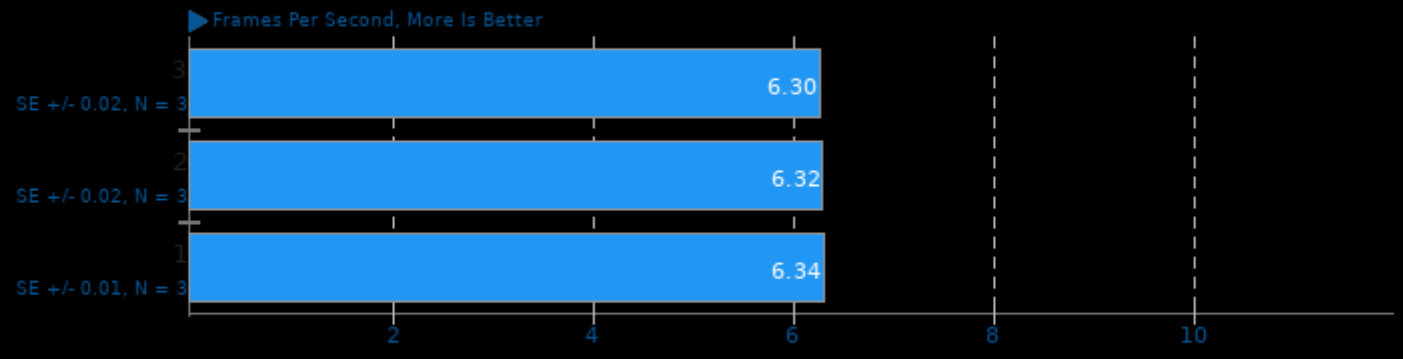
Total Time



1. (CC) gcc options: -O3 -fomit-frame-pointer -lm

AOM AV1 3.0

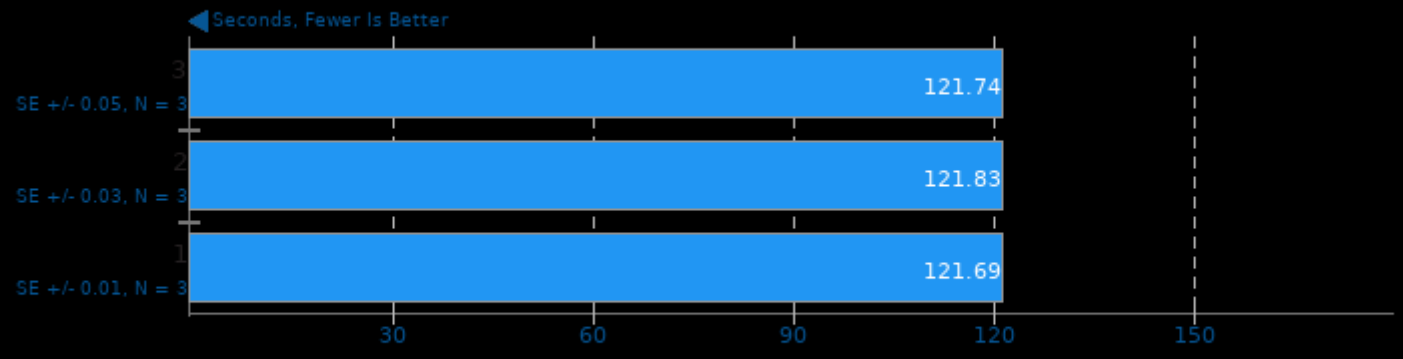
Encoder Mode: Speed 6 Two-Pass - Input: Bosphorus 4K



1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

Xcompact3d Incompact3d 2021-03-11

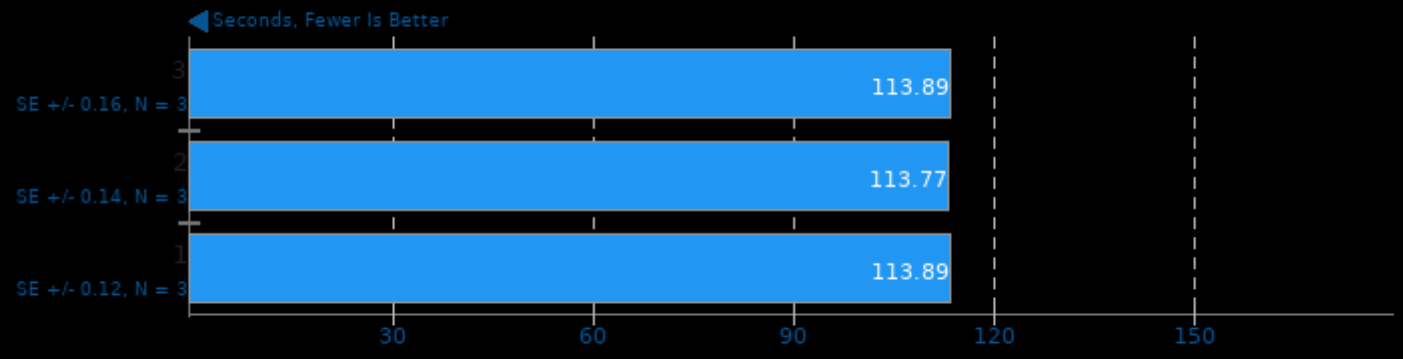
Input: input.i3d 193 Cells Per Direction



1. (F9X) gfortran options: -cpp -O2 -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi

ASTC Encoder 2.4

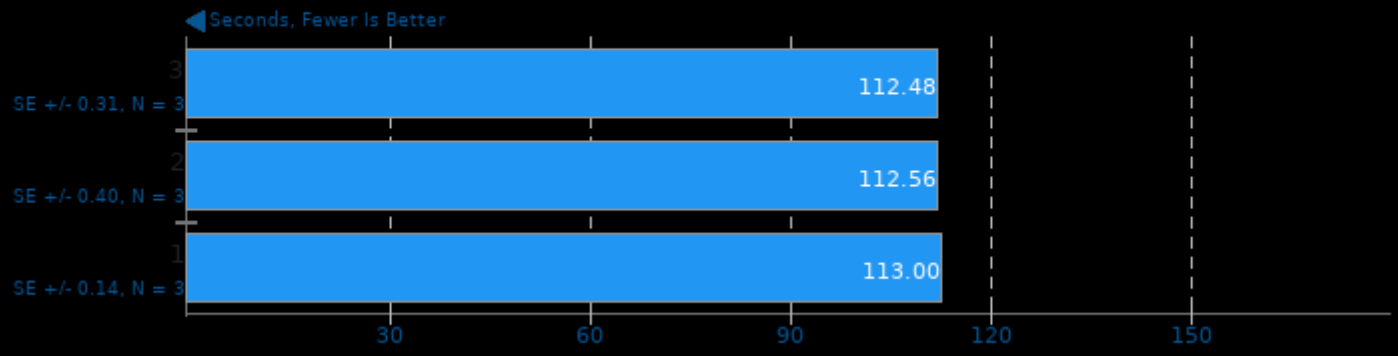
Preset: Exhaustive



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

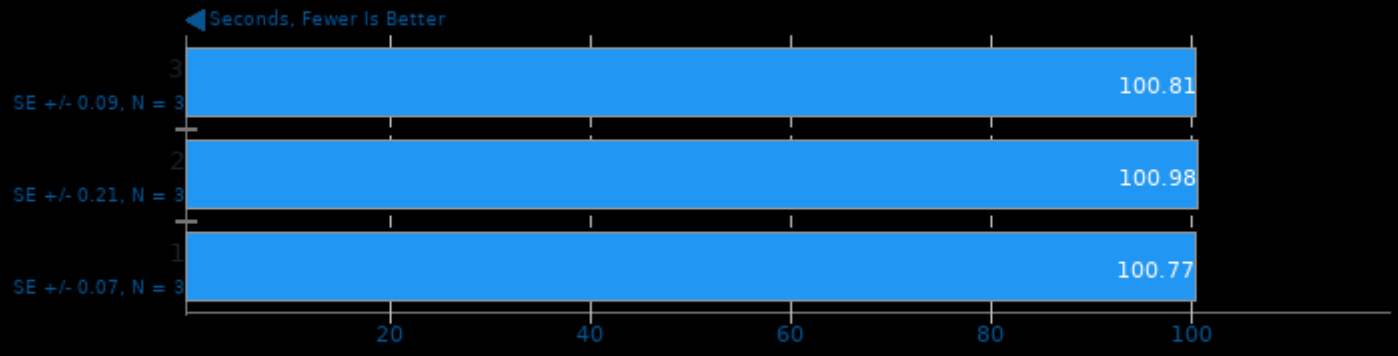
Timed Erlang/OTP Compilation 23.2

Time To Compile



OpenSCAD

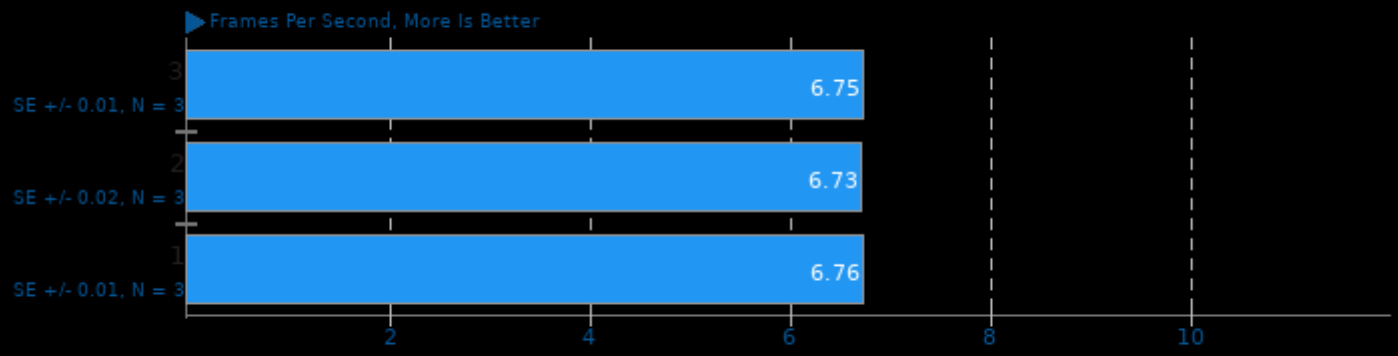
Render: Pistol



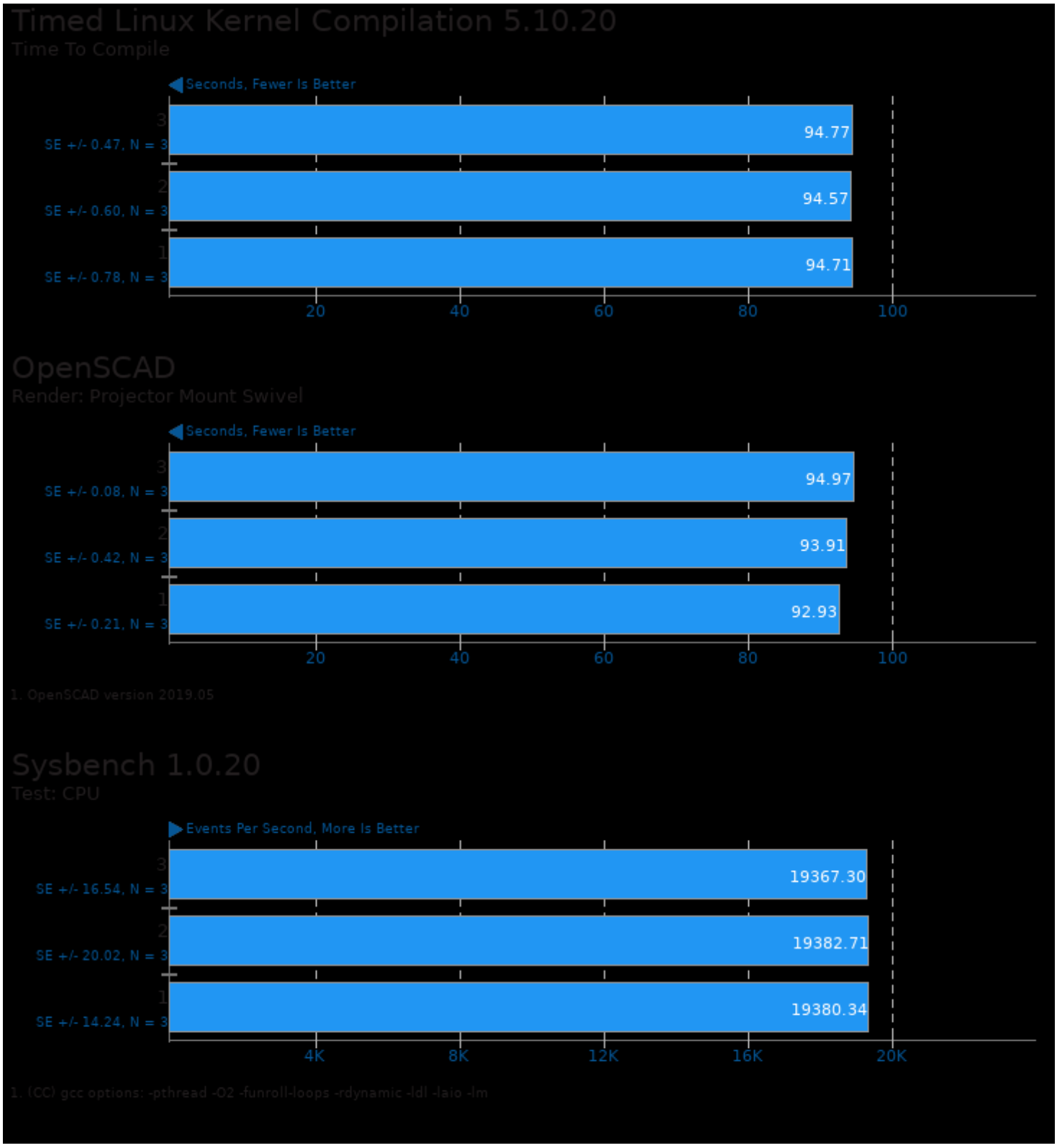
1. OpenSCAD version 2019.05

AOM AV1 3.0

Encoder Mode: Speed 4 Two-Pass - Input: Bosphorus 1080p

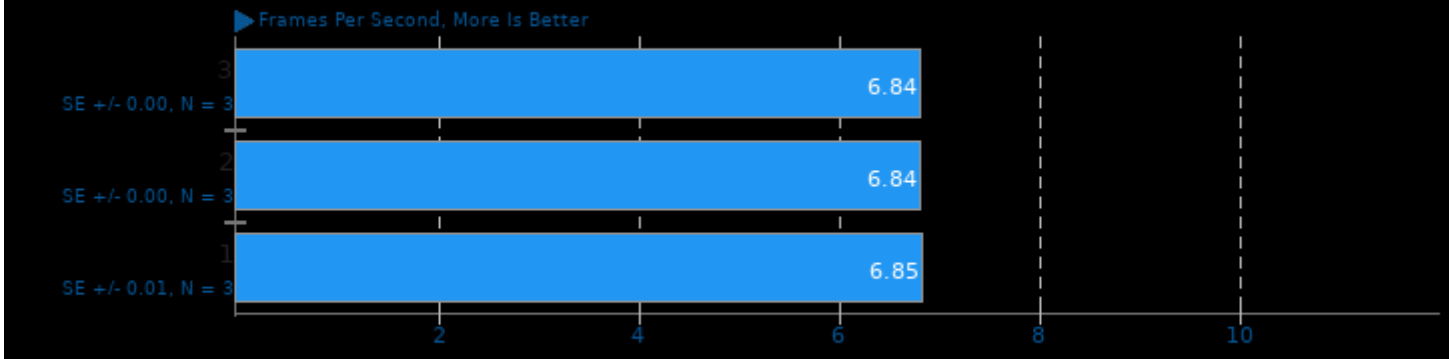


1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread


Timed Linux Kernel Compilation 5.10.20
Time To Compile
Seconds, Fewer Is Better
3
SE +/- 0.47, N = 3
94.77
2
SE +/- 0.60, N = 3
94.57
1
SE +/- 0.78, N = 3
94.71
20
40
60
80
100
OpenSCAD
Render: Projector Mount Swivel
Seconds, Fewer Is Better
3
SE +/- 0.08, N = 3
94.97
2
SE +/- 0.42, N = 3
93.91
1
SE +/- 0.21, N = 3
92.93
20
40
60
80
100
1. OpenSCAD version 2019.05
Sysbench 1.0.20
Test: CPU
Events Per Second, More Is Better
3
SE +/- 16.54, N = 3
19367.30
2
SE +/- 20.02, N = 3
19382.71
1
SE +/- 14.24, N = 3
19380.34
4K
8K
12K
16K
20K
1. (CC) gcc options: -pthread -O2 -funroll-loops -rdynamic -ldl -laio -lm

SVT-HEVC 1.5.0

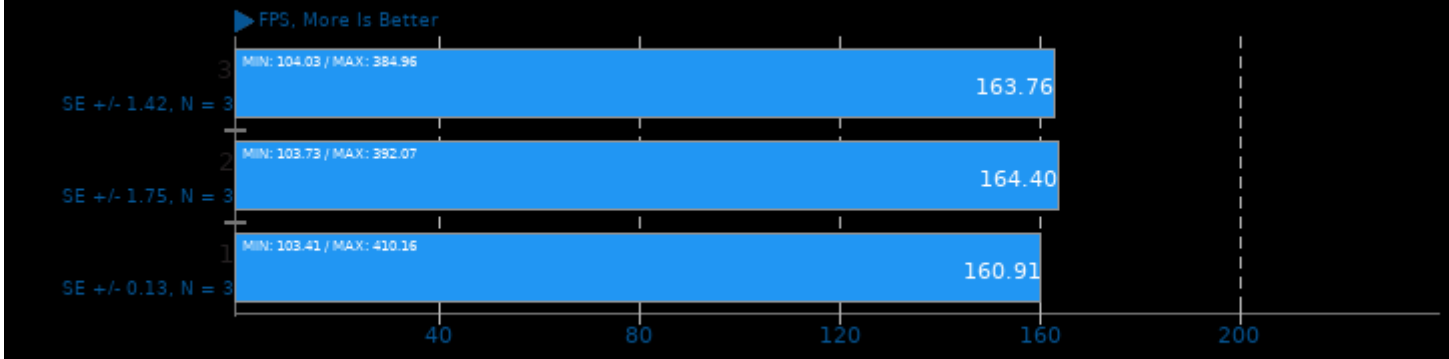
Tuning: 1 - Input: Bosphorus 1080p



1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

dav1d 0.8.2

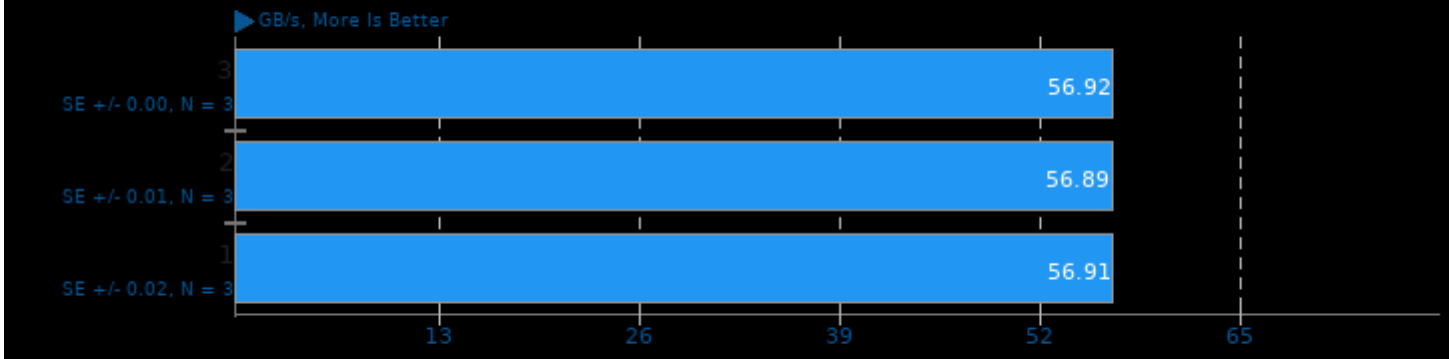
Video Input: Chimera 1080p 10-bit



1. (CC) gcc options: -pthread -lm

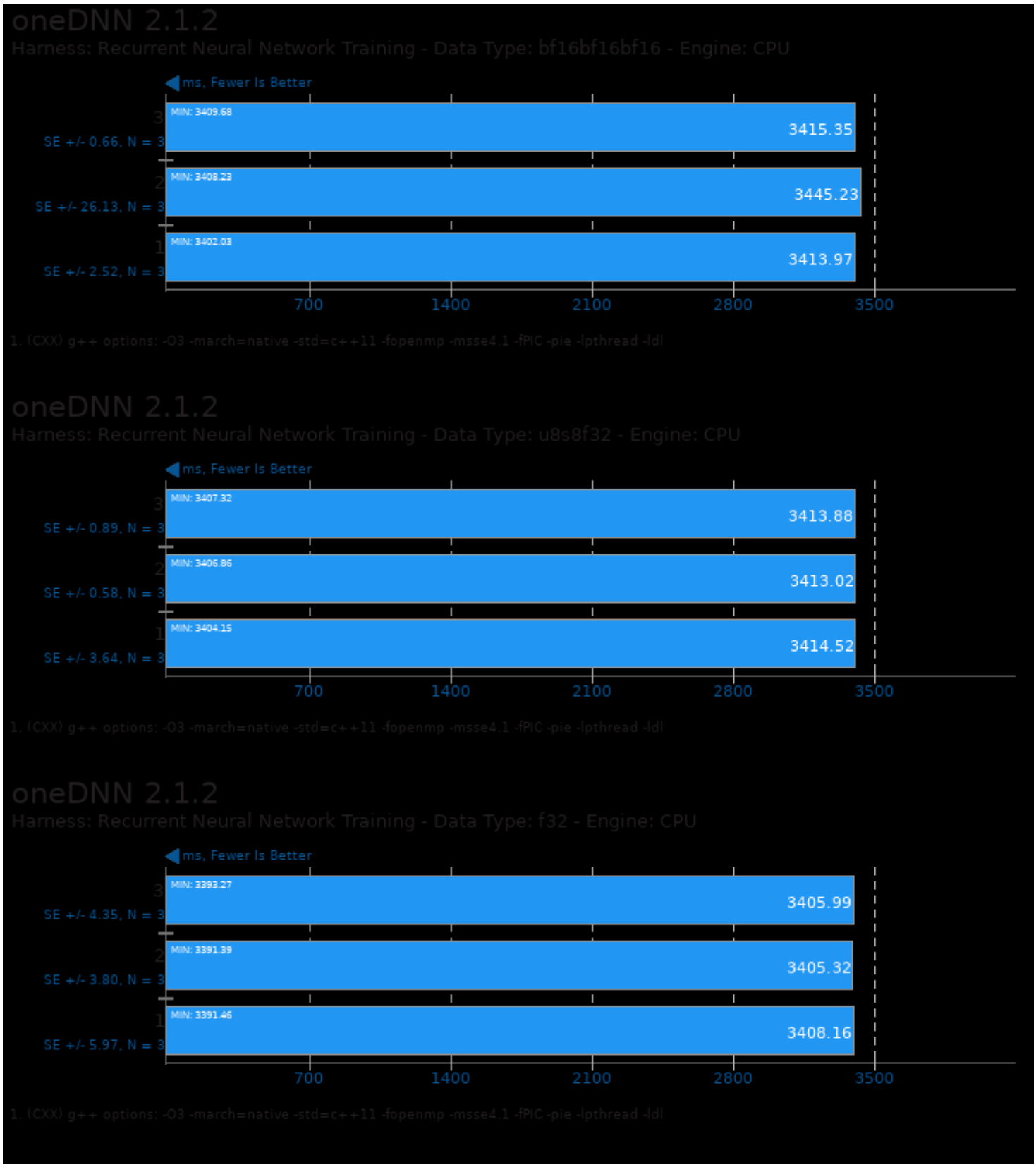
SHOC Scalable HeterOgeneous Computing 2020-04-17

Target: OpenCL - Benchmark: Texture Read Bandwidth

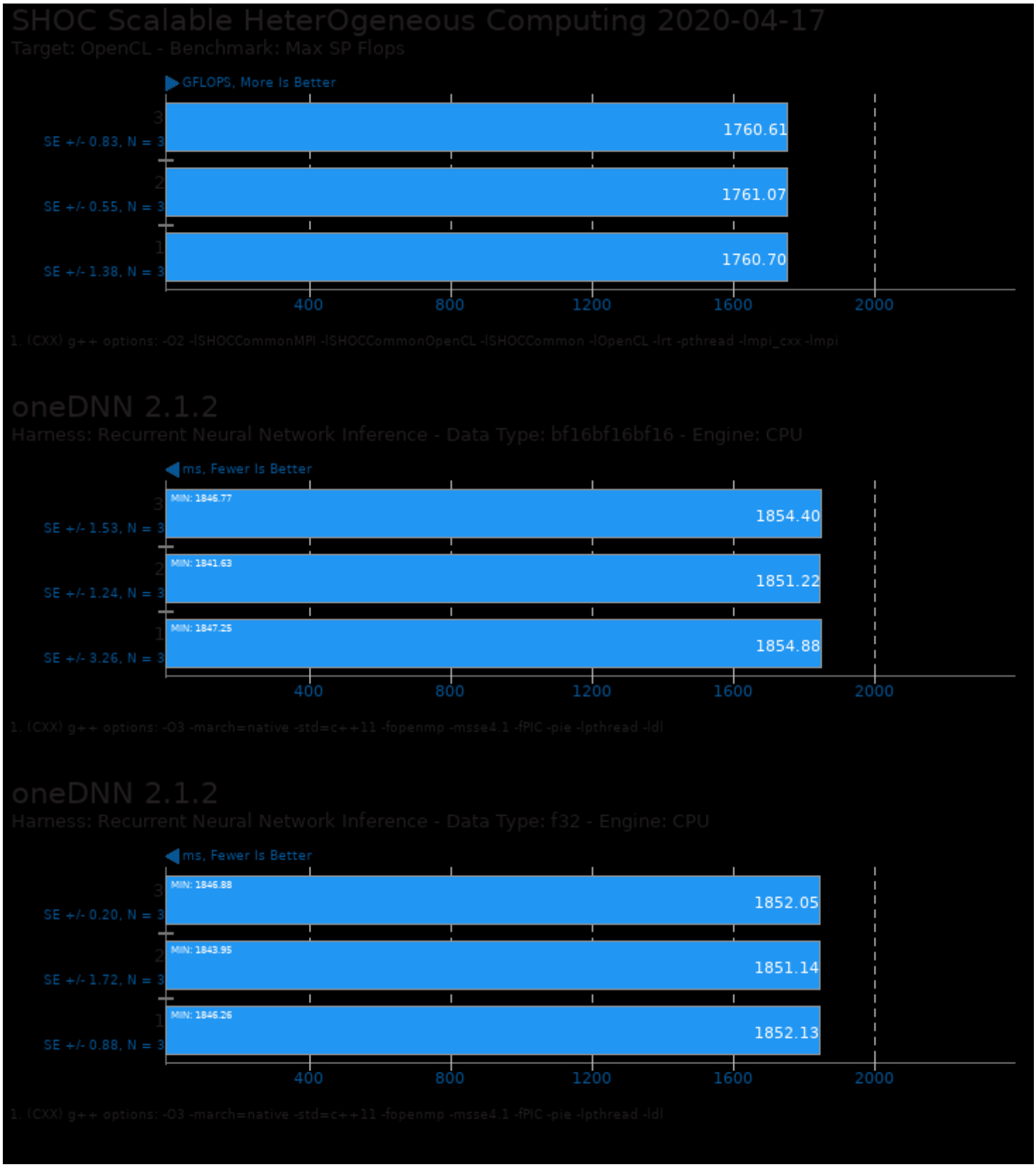


1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

990KS March

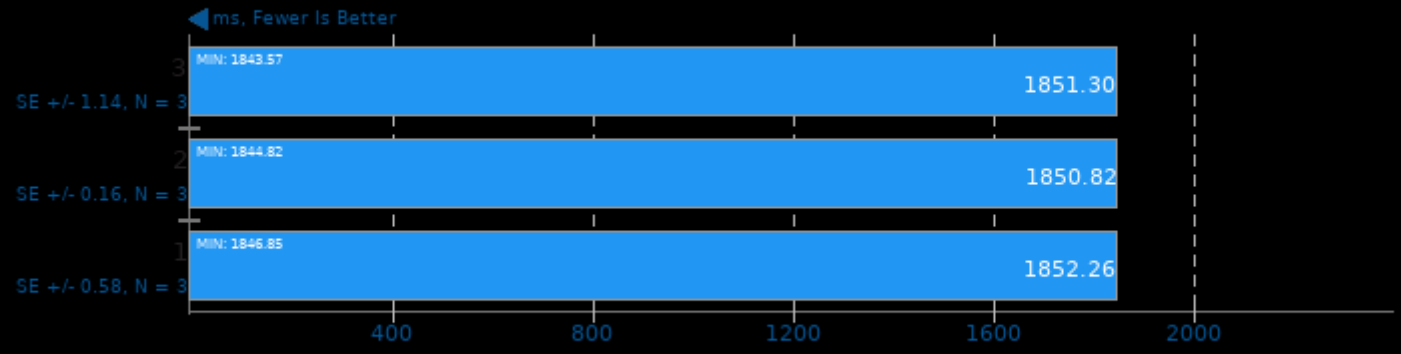

oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
3
SE +/- 0.66, N = 3
MIN: 3409.68
3415.35
2
SE +/- 26.13, N = 3
MIN: 3408.23
3445.23
1
SE +/- 2.52, N = 3
MIN: 3402.03
3413.97
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
3
SE +/- 0.89, N = 3
MIN: 3407.32
3413.88
2
SE +/- 0.58, N = 3
MIN: 3406.86
3413.02
1
SE +/- 3.64, N = 3
MIN: 3404.15
3414.52
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
3
SE +/- 4.35, N = 3
MIN: 3393.27
3405.99
2
SE +/- 3.80, N = 3
MIN: 3391.39
3405.32
1
SE +/- 5.97, N = 3
MIN: 3391.46
3408.16
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

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SHOC Scalable HeterOgeneous Computing 2020-04-17
Target: OpenCL - Benchmark: Max SP Flops
GFLOPS, More Is Better
1760.61
1761.07
1760.70
SE +/- 0.83, N = 3
SE +/- 0.55, N = 3
SE +/- 1.38, N = 3
400
800
1200
1600
2000
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
oneDNN 2.1.2
Harness: Recurrent Neural Network Inference - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
MIN: 1846.77
MIN: 1841.63
MIN: 1847.25
1854.40
1851.22
1854.88
SE +/- 1.53, N = 3
SE +/- 1.24, N = 3
SE +/- 3.26, N = 3
400
800
1200
1600
2000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Inference - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
MIN: 1846.88
MIN: 1843.95
MIN: 1846.26
1852.05
1851.14
1852.13
SE +/- 0.20, N = 3
SE +/- 1.72, N = 3
SE +/- 0.88, N = 3
400
800
1200
1600
2000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

oneDNN 2.1.2

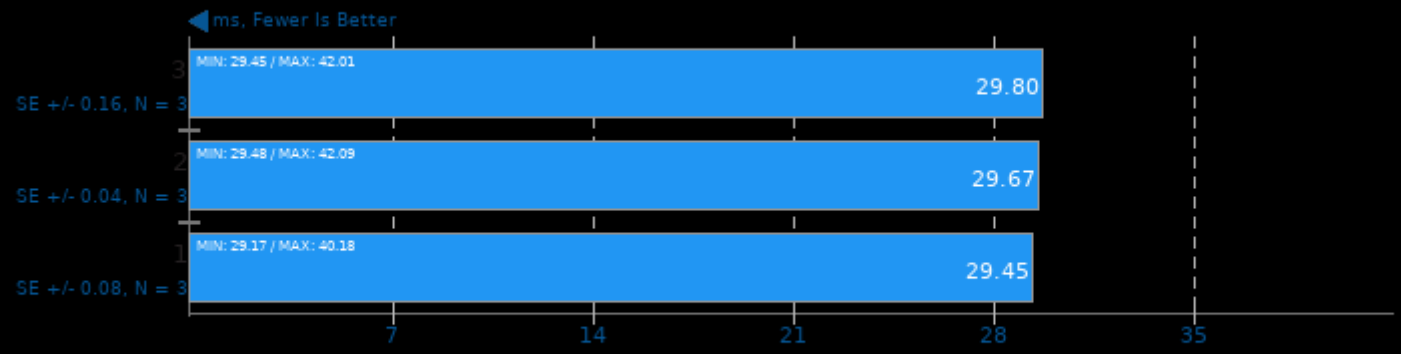
Harness: Recurrent Neural Network Inference - Data Type: u8s8f32 - Engine: CPU



1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

Mobile Neural Network 1.1.3

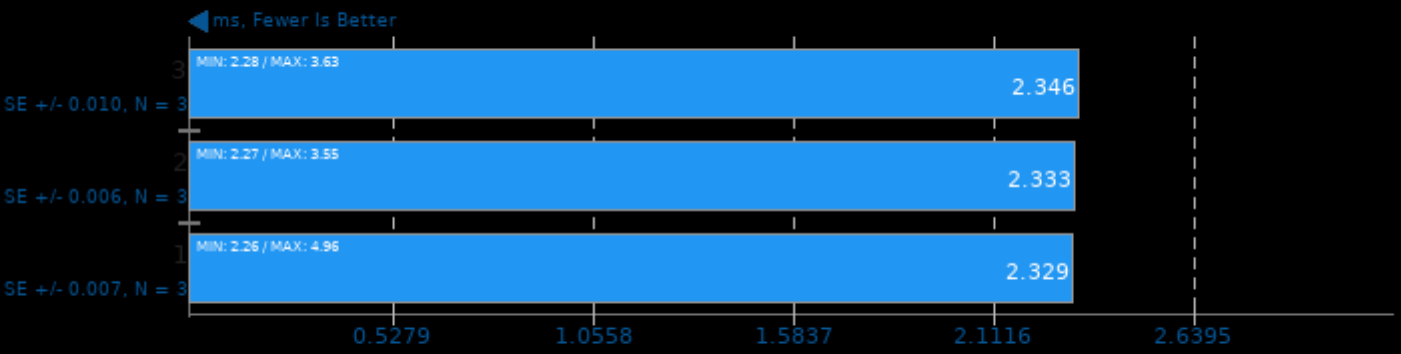
Model: inception-v3



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

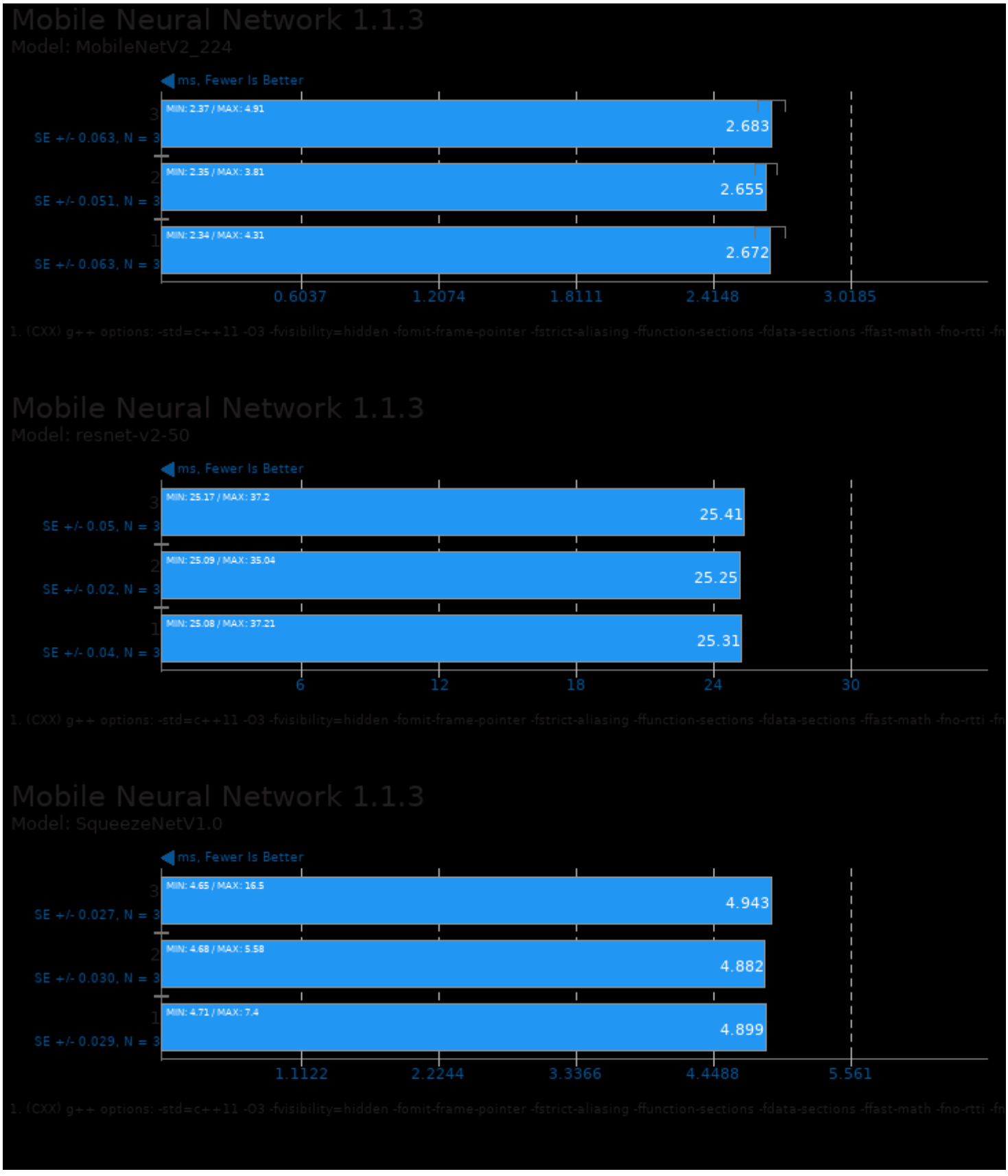
Mobile Neural Network 1.1.3

Model: mobilenet-v1-1.0

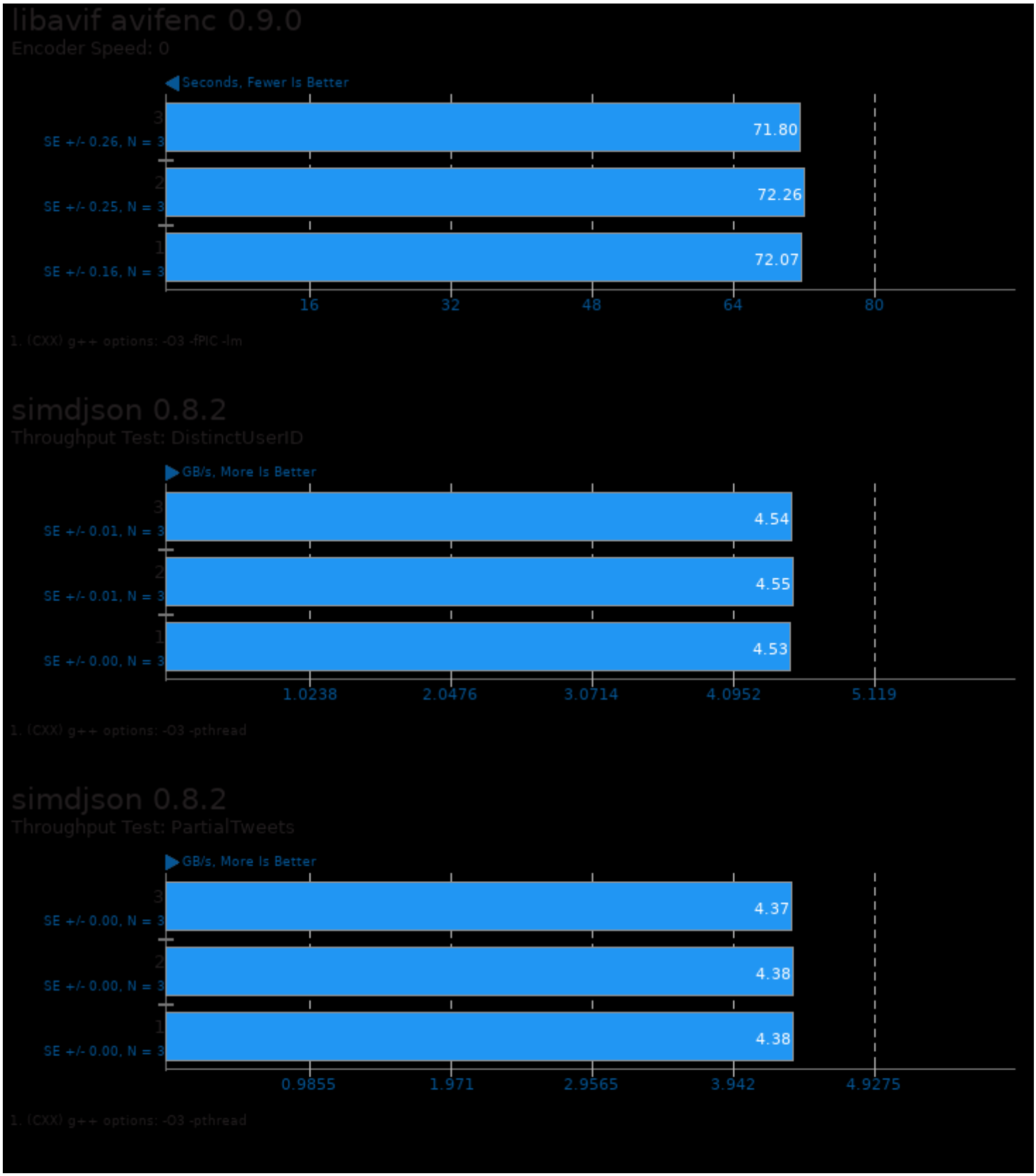


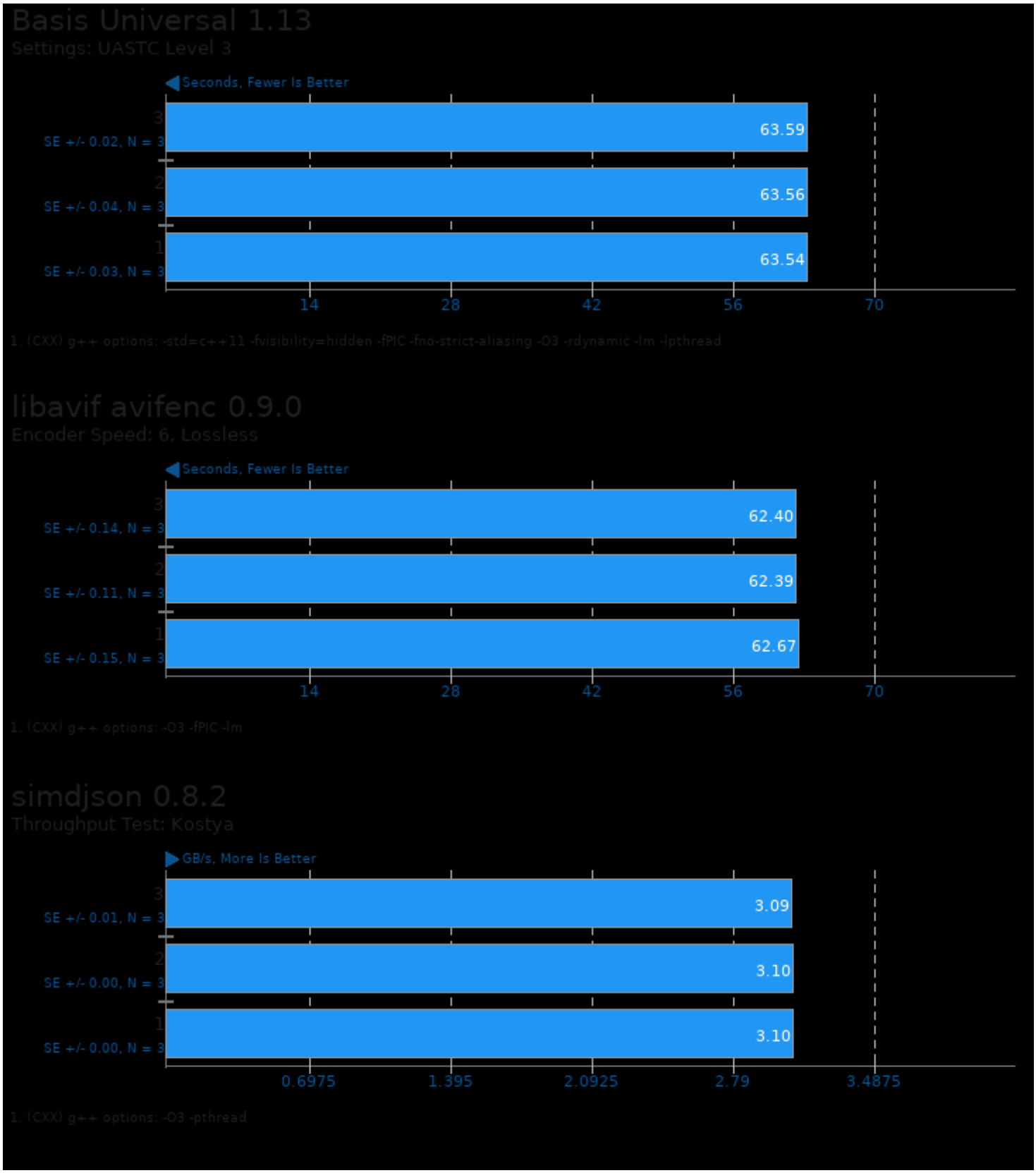
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

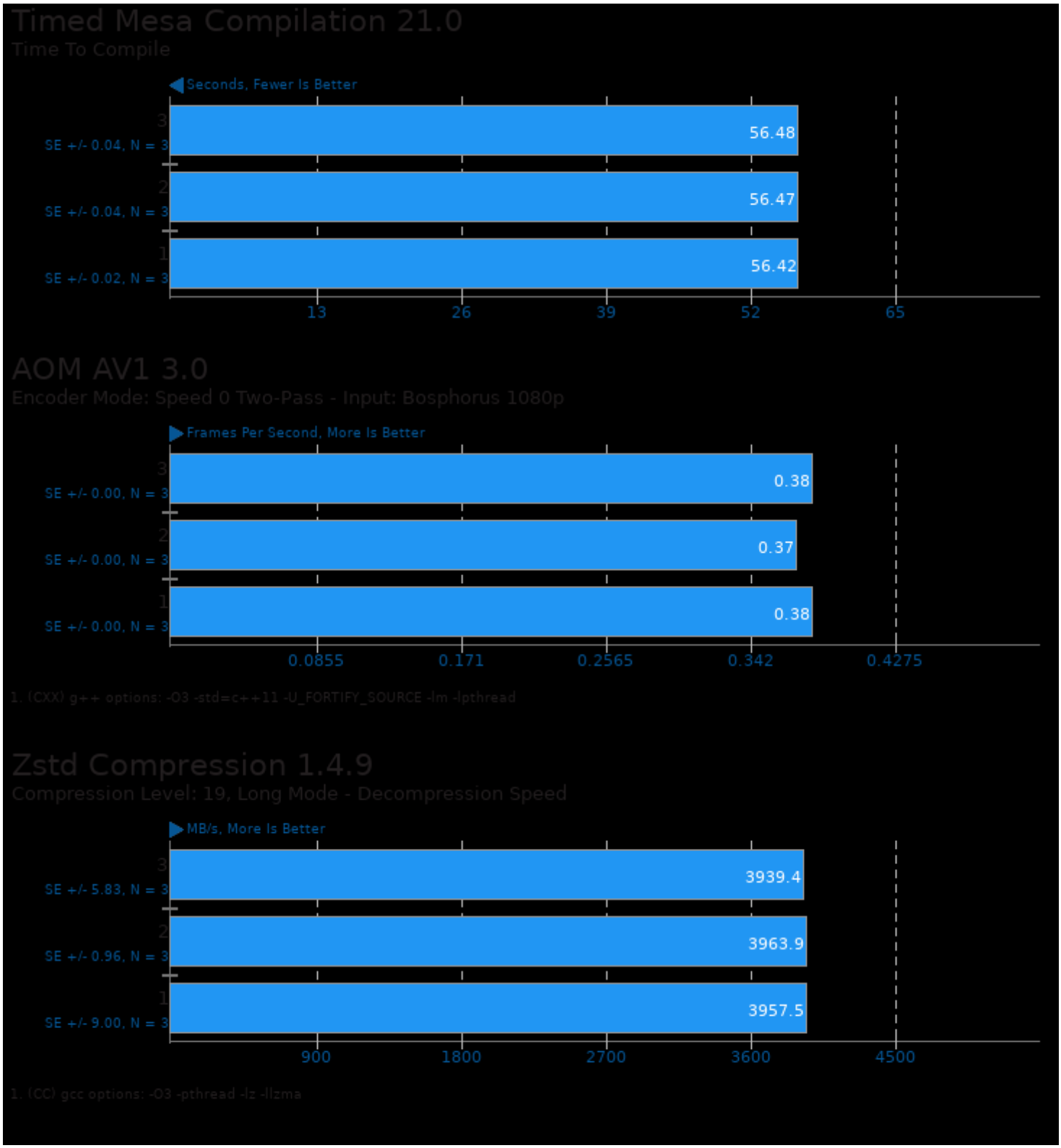
990KS March


Mobile Neural Network 1.1.3
Model: MobileNetV2_224
ms, Fewer Is Better
MIN: 2.37 / MAX: 4.91
2.683
SE +/- 0.063, N = 3
MIN: 2.35 / MAX: 3.81
2.655
SE +/- 0.051, N = 3
MIN: 2.34 / MAX: 4.31
2.672
SE +/- 0.063, N = 3
0.6037
1.2074
1.8111
2.4148
3.0185
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 1.1.3
Model: resnet-v2-50
ms, Fewer Is Better
MIN: 25.17 / MAX: 37.2
25.41
SE +/- 0.05, N = 3
MIN: 25.09 / MAX: 35.04
25.25
SE +/- 0.02, N = 3
MIN: 25.08 / MAX: 37.21
25.31
SE +/- 0.04, N = 3
6
12
18
24
30
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 1.1.3
Model: SqueezeNetV1.0
ms, Fewer Is Better
MIN: 4.65 / MAX: 16.5
4.943
SE +/- 0.027, N = 3
MIN: 4.68 / MAX: 5.58
4.882
SE +/- 0.030, N = 3
MIN: 4.71 / MAX: 7.4
4.899
SE +/- 0.029, N = 3
1.1122
2.2244
3.3366
4.4488
5.561
1. (CXX) g++ options: -std=c++11 -O3 -fvisibility=hidden -fomit-frame-pointer -fstrict-aliasing -ffunction-sections -fdata-sections -ffast-math -fno-rtti -fv

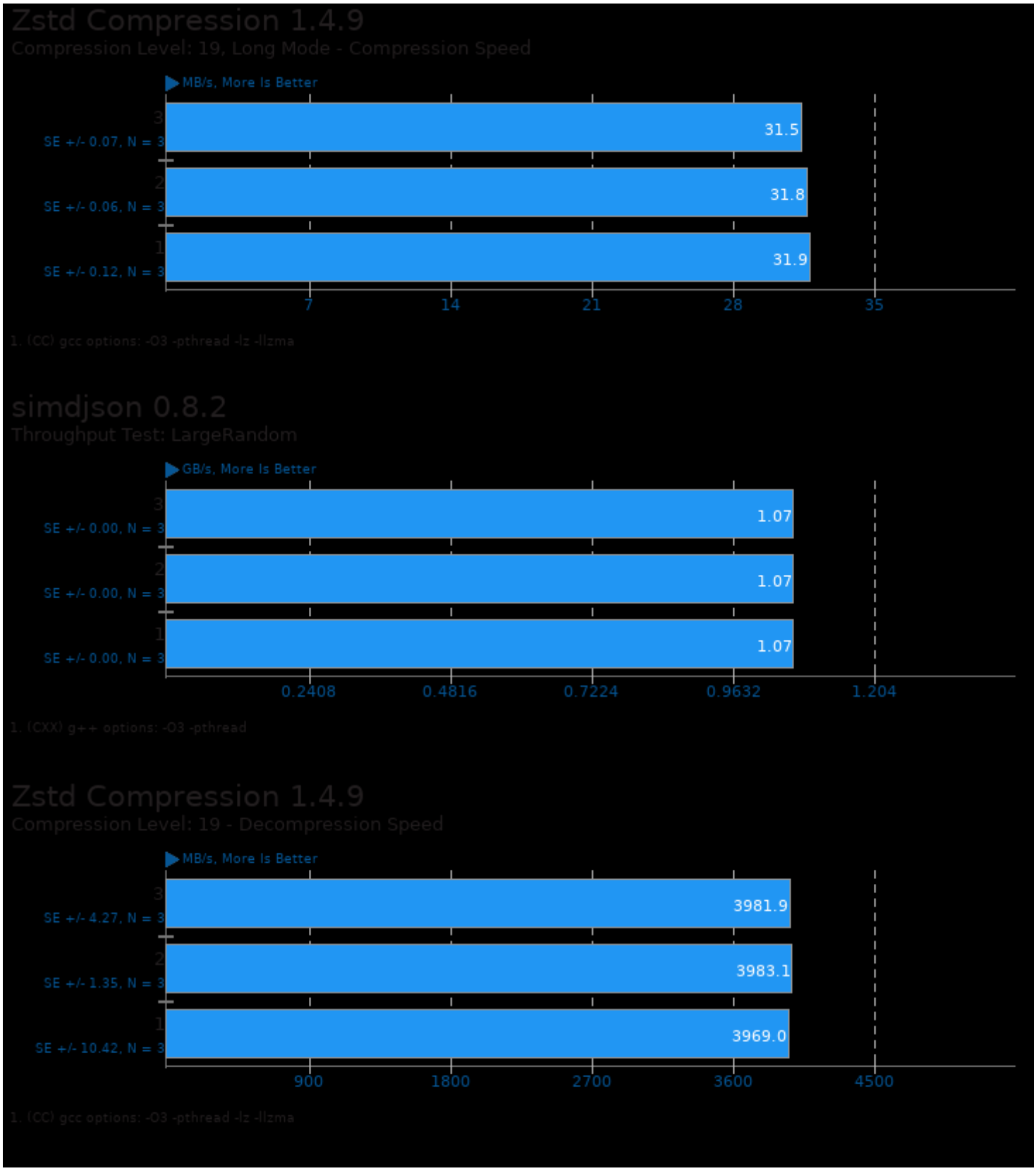
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libavif avifenc 0.9.0
Encoder Speed: 0
Seconds, Fewer Is Better
3
SE +/- 0.26, N = 3
71.80
2
SE +/- 0.25, N = 3
72.26
1
SE +/- 0.16, N = 3
72.07
16
32
48
64
80
1. (CXX) g++ options: -O3 -fPIC -lm
simdjson 0.8.2
Throughput Test: DistinctUserID
GB/s, More Is Better
3
SE +/- 0.01, N = 3
4.54
2
SE +/- 0.01, N = 3
4.55
1
SE +/- 0.00, N = 3
4.53
1.0238
2.0476
3.0714
4.0952
5.119
1. (CXX) g++ options: -O3 -pthread
simdjson 0.8.2
Throughput Test: PartialTweets
GB/s, More Is Better
3
SE +/- 0.00, N = 3
4.37
2
SE +/- 0.00, N = 3
4.38
1
SE +/- 0.00, N = 3
4.38
0.9855
1.971
2.9565
3.942
4.9275
1. (CXX) g++ options: -O3 -pthread


Basis Universal 1.13
Settings: UASTC Level 3
Seconds, Fewer Is Better
SE +/- 0.02, N = 3
63.59
SE +/- 0.04, N = 3
63.56
SE +/- 0.03, N = 3
63.54
14
28
42
56
70
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread
libavif avifenc 0.9.0
Encoder Speed: 6, Lossless
Seconds, Fewer Is Better
SE +/- 0.14, N = 3
62.40
SE +/- 0.11, N = 3
62.39
SE +/- 0.15, N = 3
62.67
14
28
42
56
70
1. (CXX) g++ options: -O3 -fPIC -lm
simdjson 0.8.2
Throughput Test: Kostya
GB/s, More Is Better
SE +/- 0.01, N = 3
3.09
SE +/- 0.00, N = 3
3.10
SE +/- 0.00, N = 3
3.10
0.6975
1.395
2.0925
2.79
3.4875
1. (CXX) g++ options: -O3 -pthread

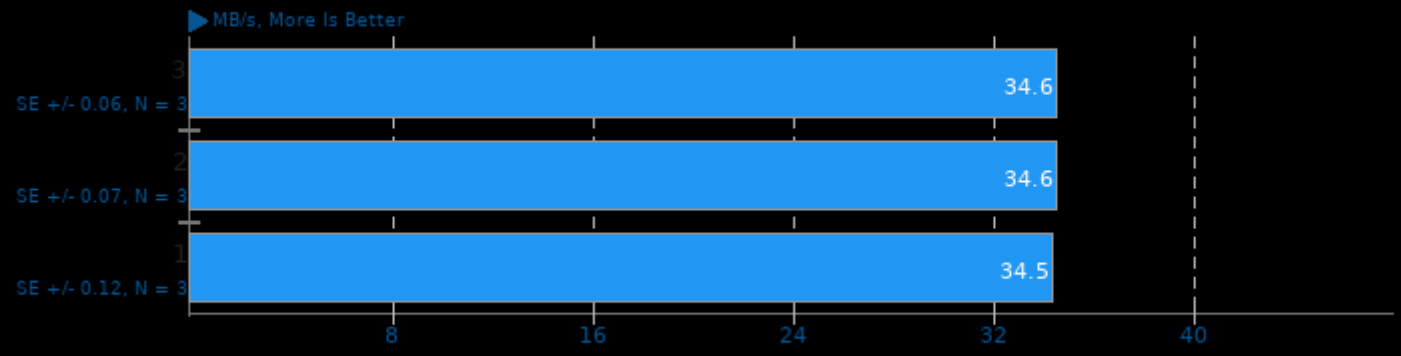

Timed Mesa Compilation 21.0
Time To Compile
Seconds, Fewer Is Better
SE +/- 0.04, N = 3
56.48
SE +/- 0.04, N = 3
56.47
SE +/- 0.02, N = 3
56.42
13
26
39
52
65
AOM AV1 3.0
Encoder Mode: Speed 0 Two-Pass - Input: Bosphorus 1080p
Frames Per Second, More Is Better
SE +/- 0.00, N = 3
0.38
SE +/- 0.00, N = 3
0.37
SE +/- 0.00, N = 3
0.38
0.0855
0.171
0.2565
0.342
0.4275
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread
Zstd Compression 1.4.9
Compression Level: 19, Long Mode - Decompression Speed
MB/s, More Is Better
SE +/- 5.83, N = 3
3939.4
SE +/- 0.96, N = 3
3963.9
SE +/- 9.00, N = 3
3957.5
900
1800
2700
3600
4500
1. (CC) gcc options: -O3 -pthread -lz -llzma

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Zstd Compression 1.4.9
Compression Level: 19, Long Mode - Compression Speed
MB/s, More Is Better
3
SE +/- 0.07, N = 3
31.5
2
SE +/- 0.06, N = 3
31.8
1
SE +/- 0.12, N = 3
31.9
7
14
21
28
35
1. (CC) gcc options: -O3 -pthread -lz -llzma
simdjson 0.8.2
Throughput Test: LargeRandom
GB/s, More Is Better
3
SE +/- 0.00, N = 3
1.07
2
SE +/- 0.00, N = 3
1.07
1
SE +/- 0.00, N = 3
1.07
0.2408
0.4816
0.7224
0.9632
1.204
1. (CXX) g++ options: -O3 -pthread
Zstd Compression 1.4.9
Compression Level: 19 - Decompression Speed
MB/s, More Is Better
3
SE +/- 4.27, N = 3
3981.9
2
SE +/- 1.35, N = 3
3983.1
1
SE +/- 10.42, N = 3
3969.0
900
1800
2700
3600
4500
1. (CC) gcc options: -O3 -pthread -lz -llzma

Zstd Compression 1.4.9

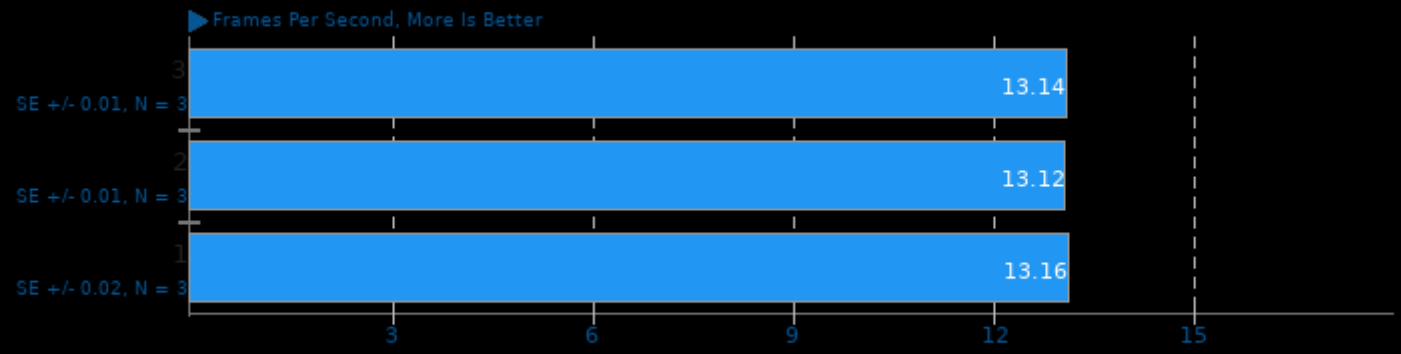
Compression Level: 19 - Compression Speed



1. (CC) gcc options: -O3 -pthread -lz -llzma

AOM AV1 3.0

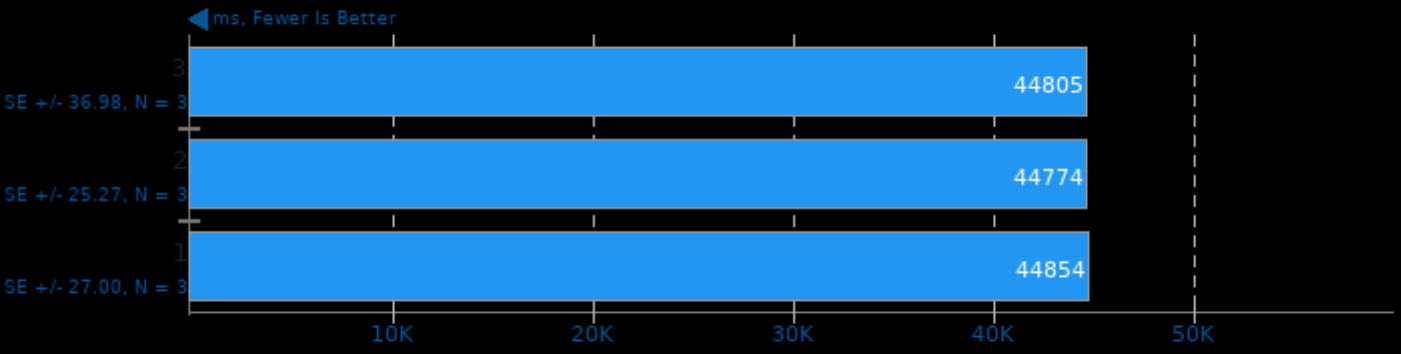
Encoder Mode: Speed 6 Realtime - Input: Bosphorus 4K



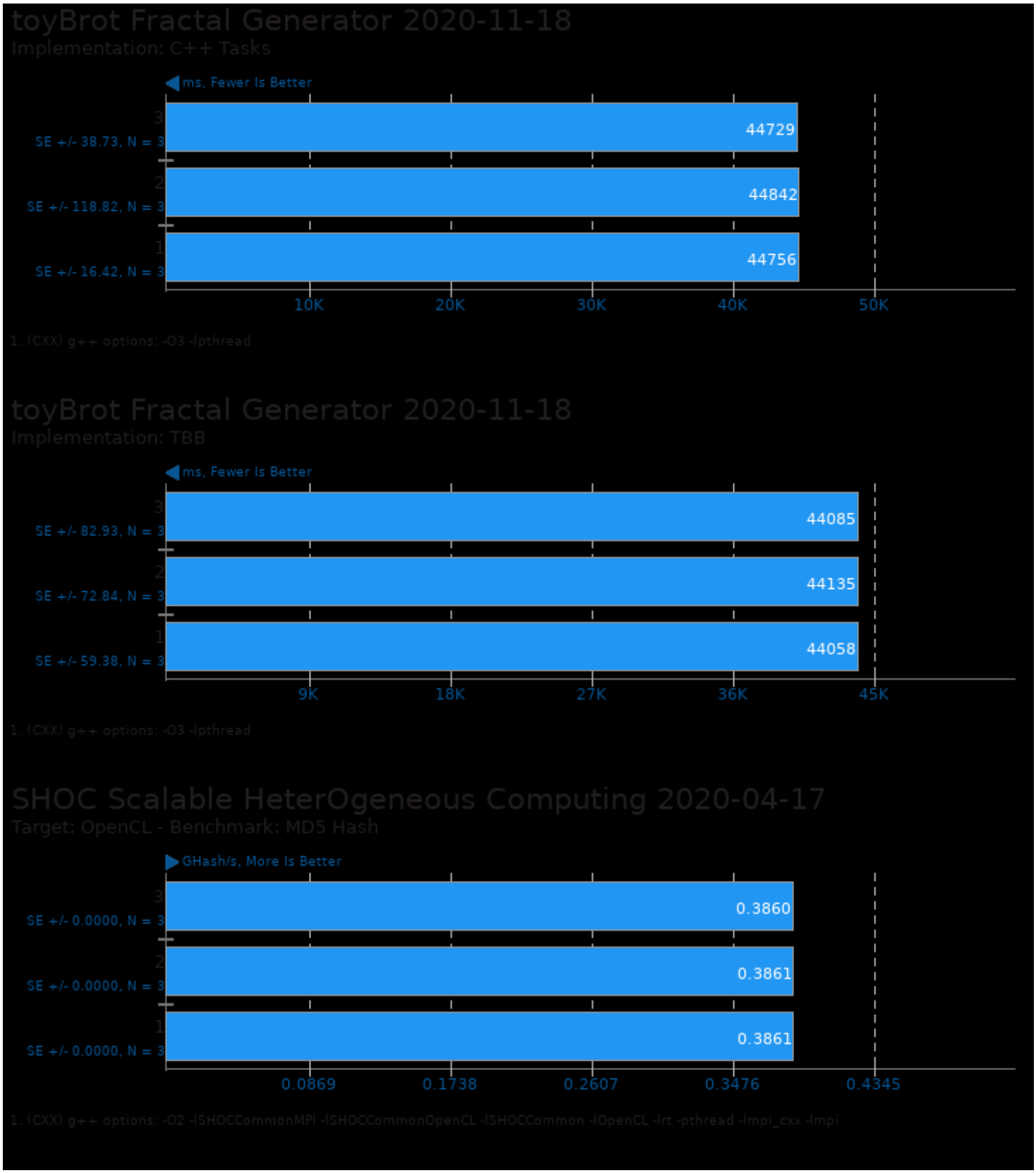
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

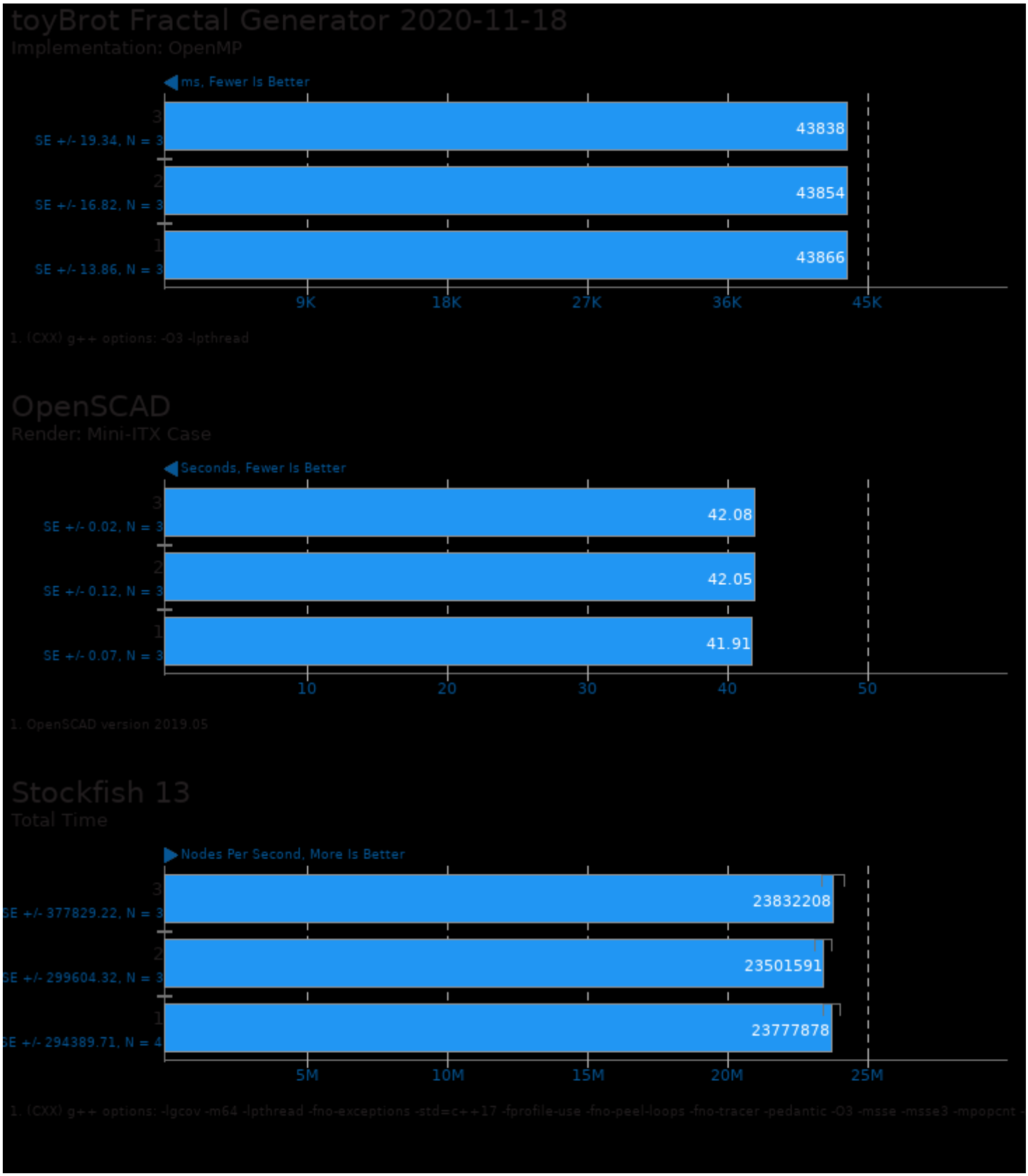
toyBrot Fractal Generator 2020-11-18

Implementation: C++ Threads



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

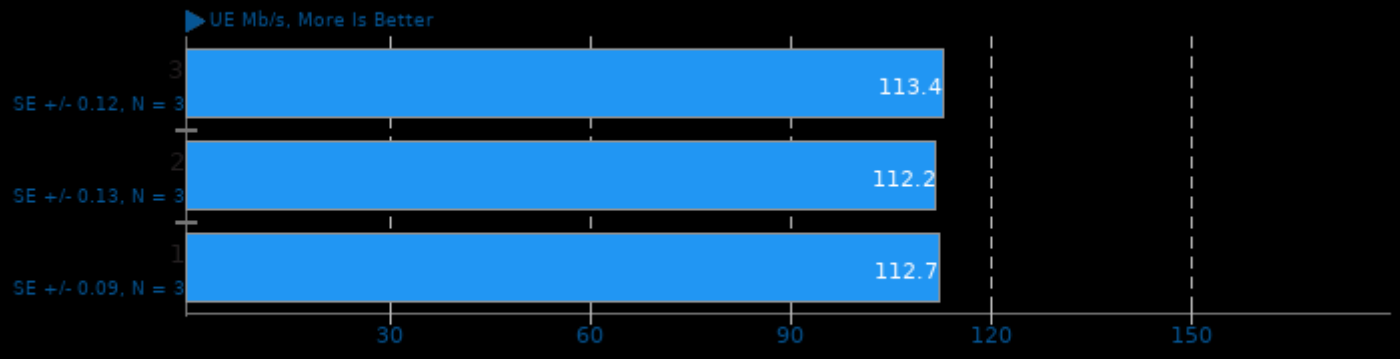

toyBrot Fractal Generator 2020-11-18
Implementation: C++ Tasks
ms, Fewer Is Better
SE +/- 38.73, N = 3
44729
SE +/- 118.82, N = 3
44842
SE +/- 16.42, N = 3
44756
10K
20K
30K
40K
50K
1. (CXX) g++ options: -O3 -lpthread
toyBrot Fractal Generator 2020-11-18
Implementation: TBB
ms, Fewer Is Better
SE +/- 82.93, N = 3
44085
SE +/- 72.84, N = 3
44135
SE +/- 59.38, N = 3
44058
9K
18K
27K
36K
45K
1. (CXX) g++ options: -O3 -lpthread
SHOC Scalable HeterOgeneous Computing 2020-04-17
Target: OpenCL - Benchmark: MD5 Hash
GHash/s, More Is Better
SE +/- 0.0000, N = 3
0.3860
SE +/- 0.0000, N = 3
0.3861
SE +/- 0.0000, N = 3
0.3861
0.0869
0.1738
0.2607
0.3476
0.4345
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi


toyBrot Fractal Generator 2020-11-18
Implementation: OpenMP
ms, Fewer Is Better
SE +/- 19.34, N = 3
43838
SE +/- 16.82, N = 3
43854
SE +/- 13.86, N = 3
43866
9K
18K
27K
36K
45K
1. (CXX) g++ options: -O3 -lpthread
OpenSCAD
Render: Mini-ITX Case
Seconds, Fewer Is Better
SE +/- 0.02, N = 3
42.08
SE +/- 0.12, N = 3
42.05
SE +/- 0.07, N = 3
41.91
10
20
30
40
50
1. OpenSCAD version 2019.05
Stockfish 13
Total Time
Nodes Per Second, More Is Better
SE +/- 377829.22, N = 3
23832208
SE +/- 299604.32, N = 3
23501591
SE +/- 294389.71, N = 4
23777878
5M
10M
15M
20M
25M
1. (CXX) g++ options: -lgcov -m64 -lpthread -fno-exceptions -std=c++17 -fprofile-use -fno-peel-loops -fno-tracer -pedantic -O3 -msse -msse3 -mpopcnt

990KS March

srsLTE 20.10.1

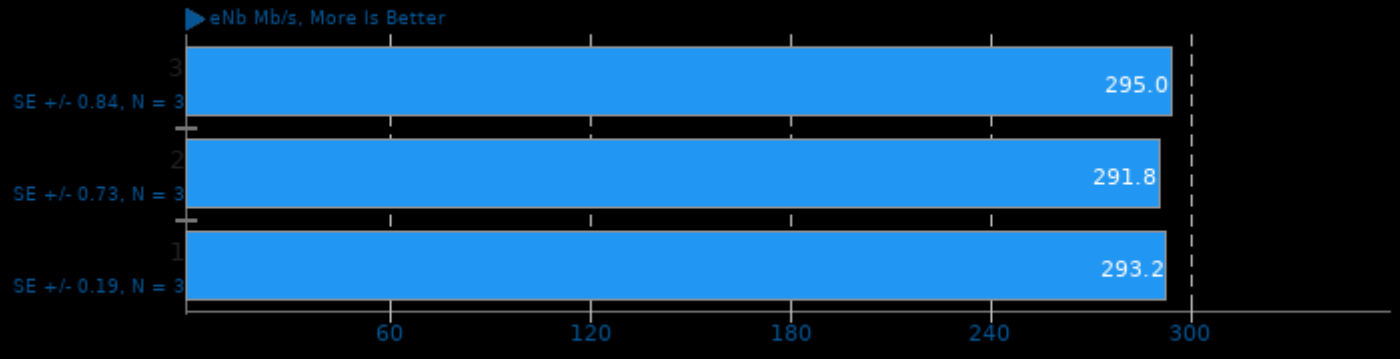
Test: PHY_DL_Test



1. (CXX) g++ options: -std=c++11 -fno-strict-aliasing -march=native -mfpmath=sse -mavx2 -fvisibility=hidden -O3 -fno-trapping-math -fno-math-errno

srsLTE 20.10.1

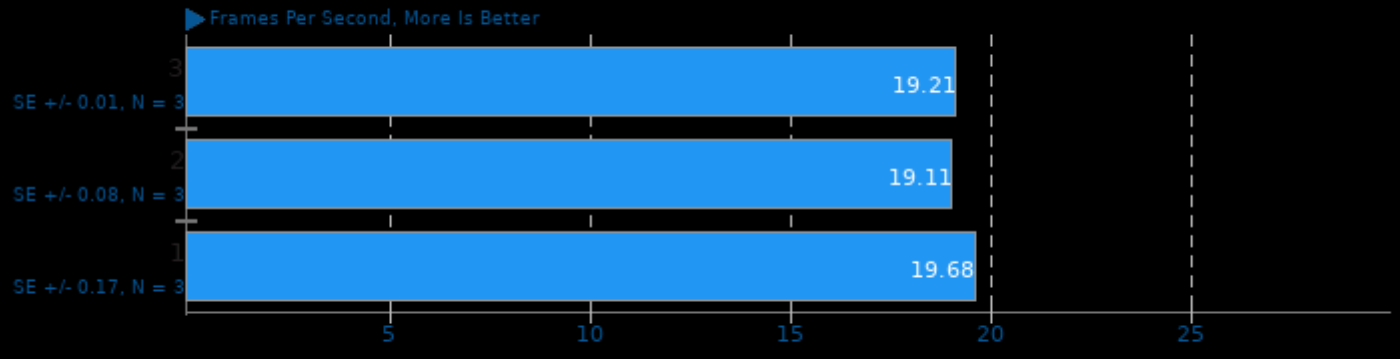
Test: PHY_DL_Test



1. (CXX) g++ options: -std=c++11 -fno-strict-aliasing -march=native -mfpmath=sse -mavx2 -fvisibility=hidden -O3 -fno-trapping-math -fno-math-errno

AOM AV1 3.0

Encoder Mode: Speed 6 Two-Pass - Input: Bosphorus 1080p

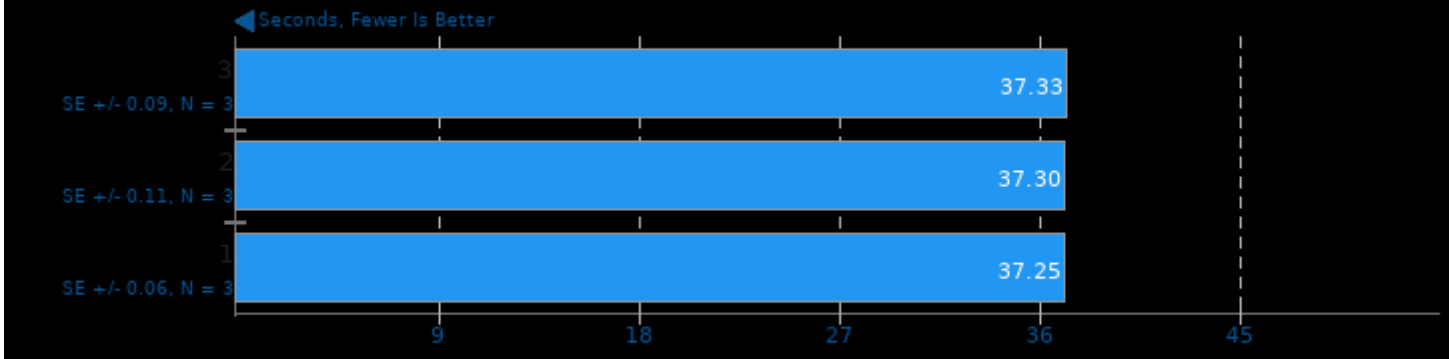


1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

990KS March

libavif avifenc 0.9.0

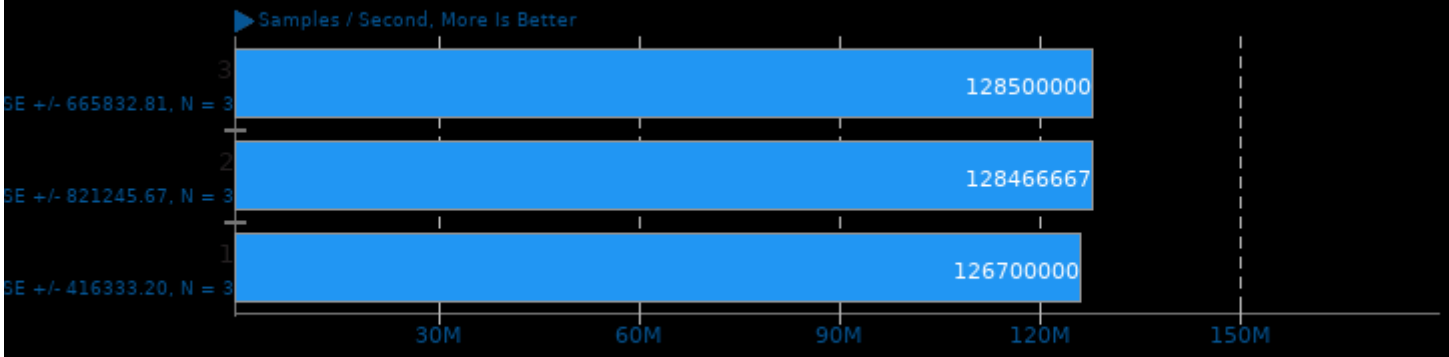
Encoder Speed: 2



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

srsLTE 20.10.1

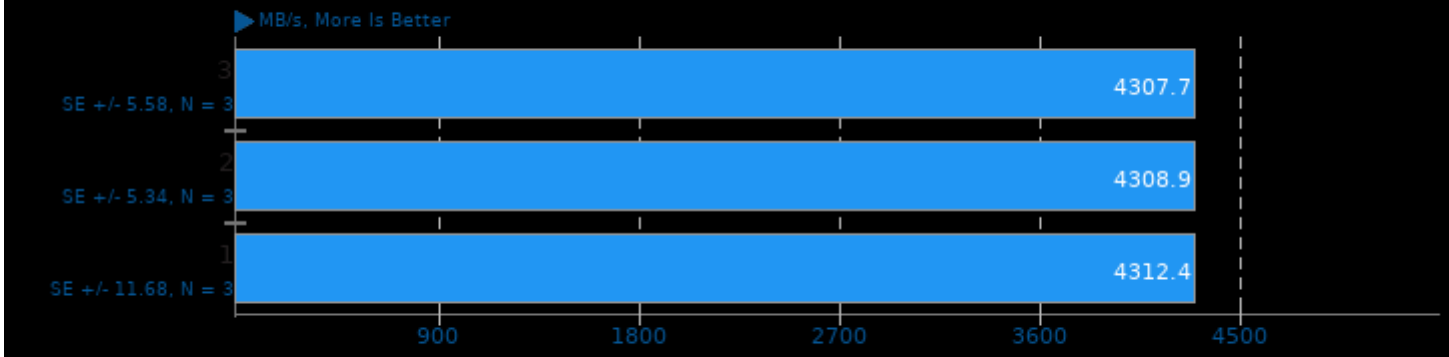
Test: OFDM_Test



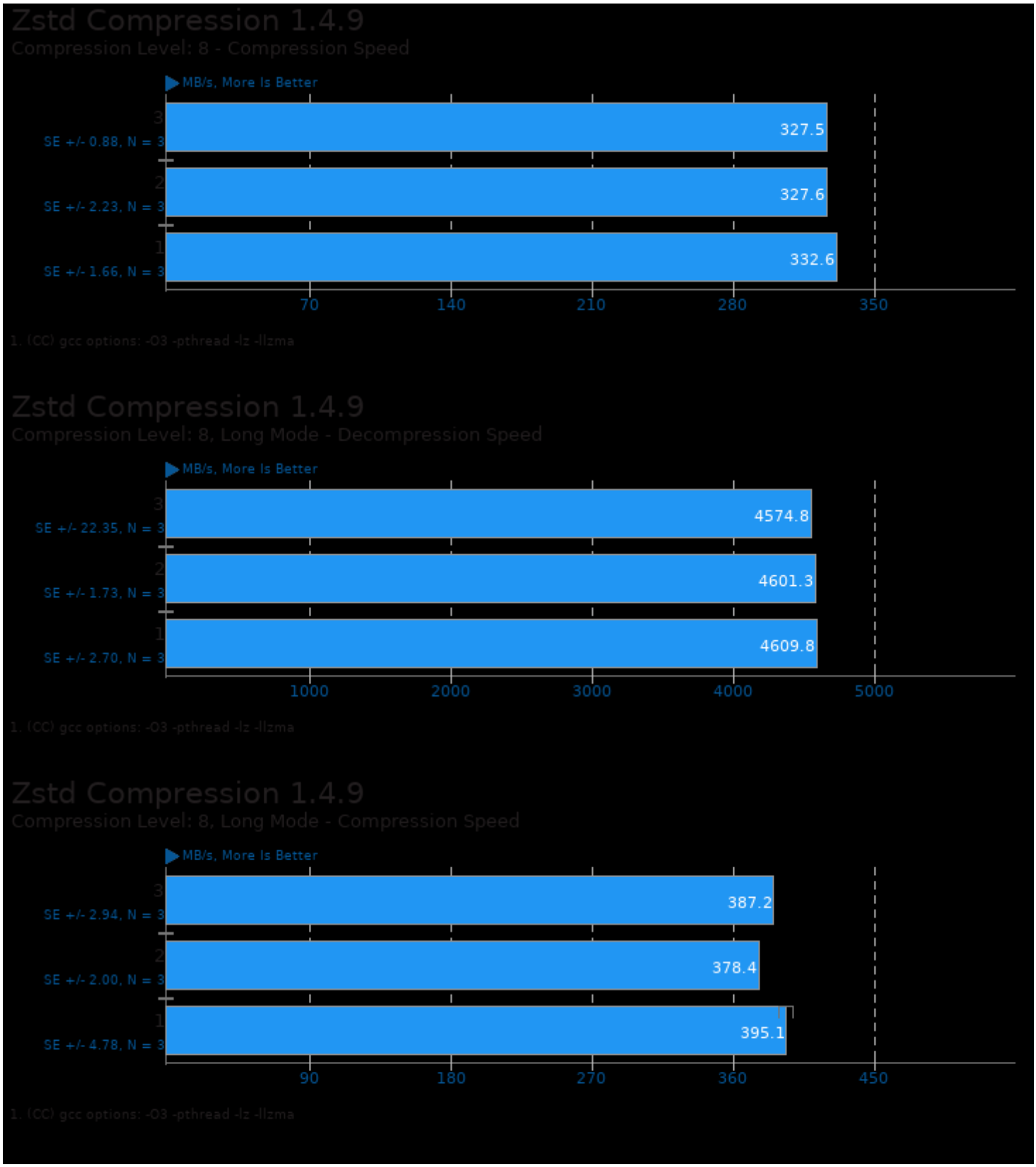
1. (CXX) g++ options: -std=c++11 -fno-strict-aliasing -march=native -mfpmath=sse -mavx2 -fvisibility=hidden -O3 -fno-trapping-math -fno-math-errno

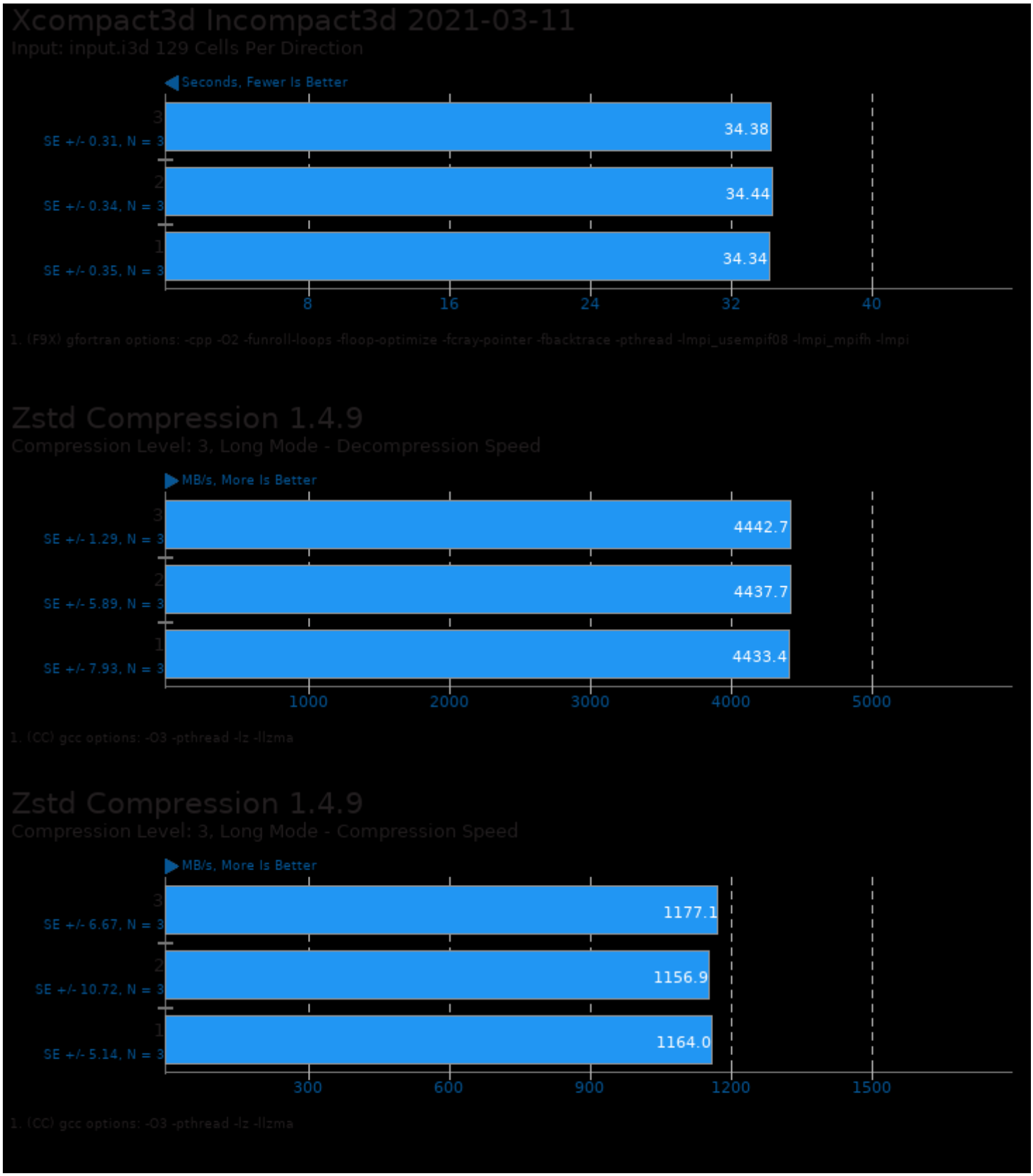
Zstd Compression 1.4.9

Compression Level: 8 - Decompression Speed

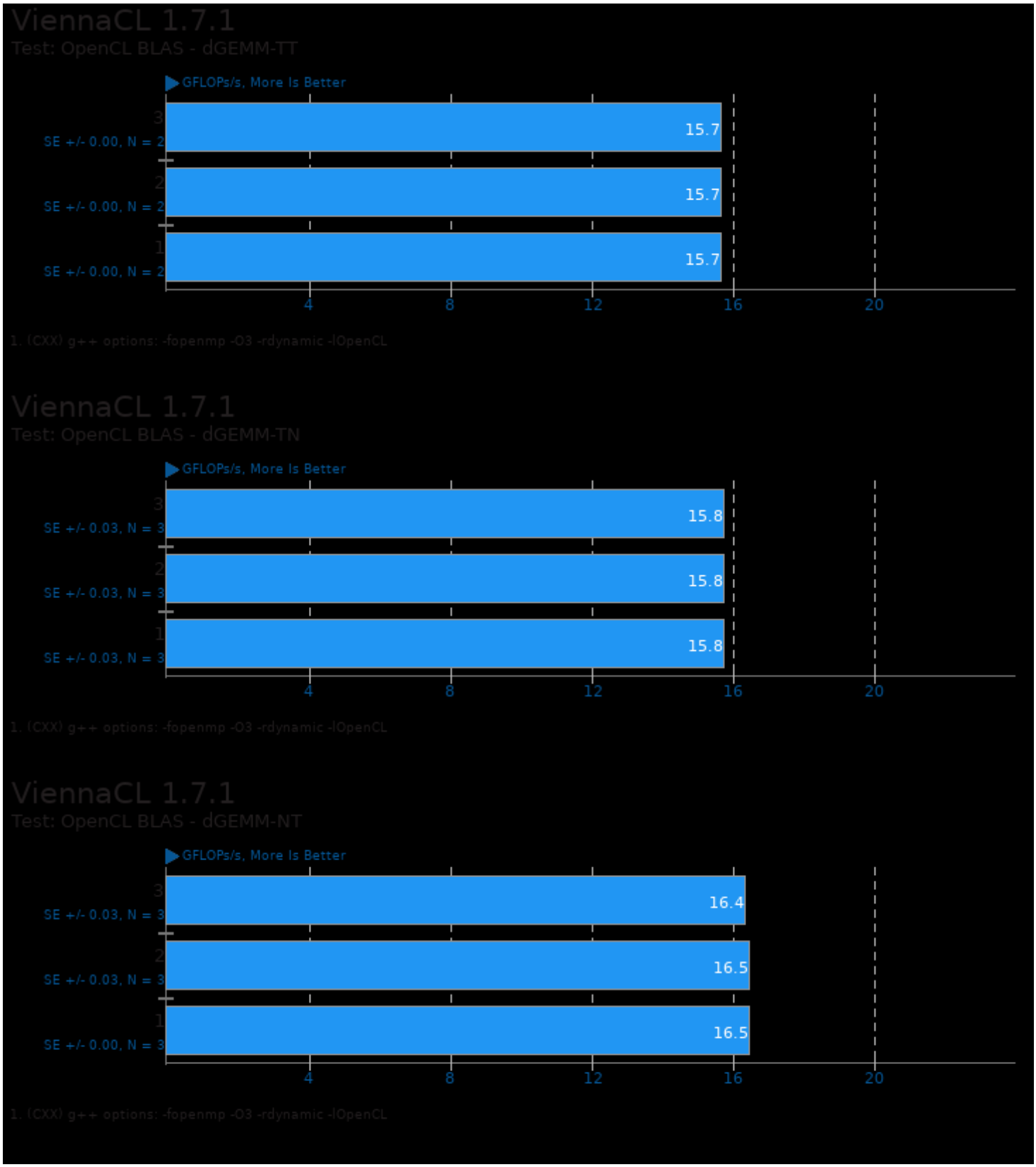


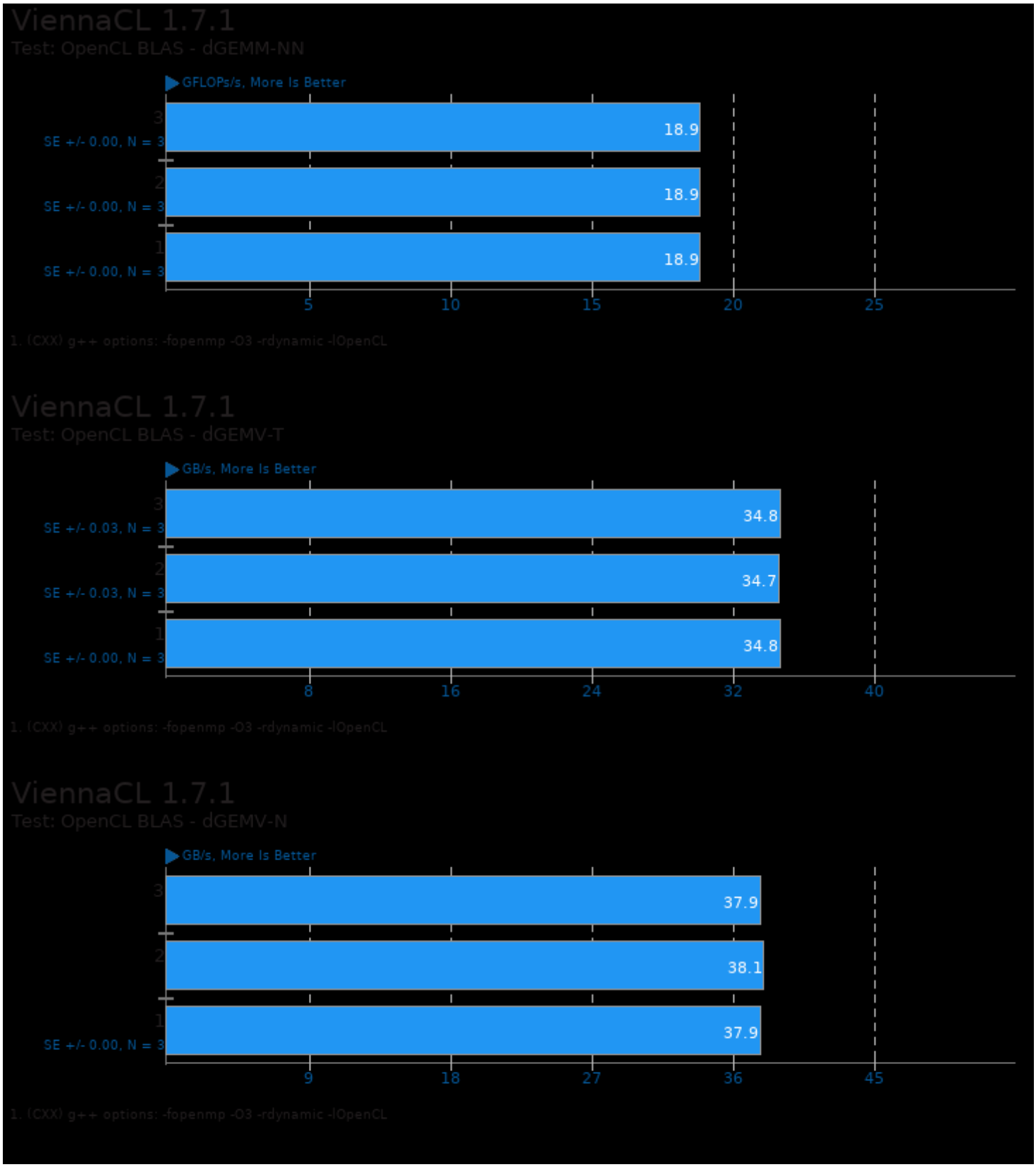
1. (CC) gcc options: -O3 -pthread -lz -llzma


Zstd Compression 1.4.9
Compression Level: 8 - Compression Speed
MB/s, More Is Better
3
SE +/- 0.88, N = 3
327.5
2
SE +/- 2.23, N = 3
327.6
1
SE +/- 1.66, N = 3
332.6
70
140
210
280
350
1. (CC) gcc options: -O3 -pthread -lz -llzma
Zstd Compression 1.4.9
Compression Level: 8, Long Mode - Decompression Speed
MB/s, More Is Better
3
SE +/- 22.35, N = 3
4574.8
2
SE +/- 1.73, N = 3
4601.3
1
SE +/- 2.70, N = 3
4609.8
1000
2000
3000
4000
5000
1. (CC) gcc options: -O3 -pthread -lz -llzma
Zstd Compression 1.4.9
Compression Level: 8, Long Mode - Compression Speed
MB/s, More Is Better
3
SE +/- 2.94, N = 3
387.2
2
SE +/- 2.00, N = 3
378.4
1
SE +/- 4.78, N = 3
395.1
90
180
270
360
450
1. (CC) gcc options: -O3 -pthread -lz -llzma

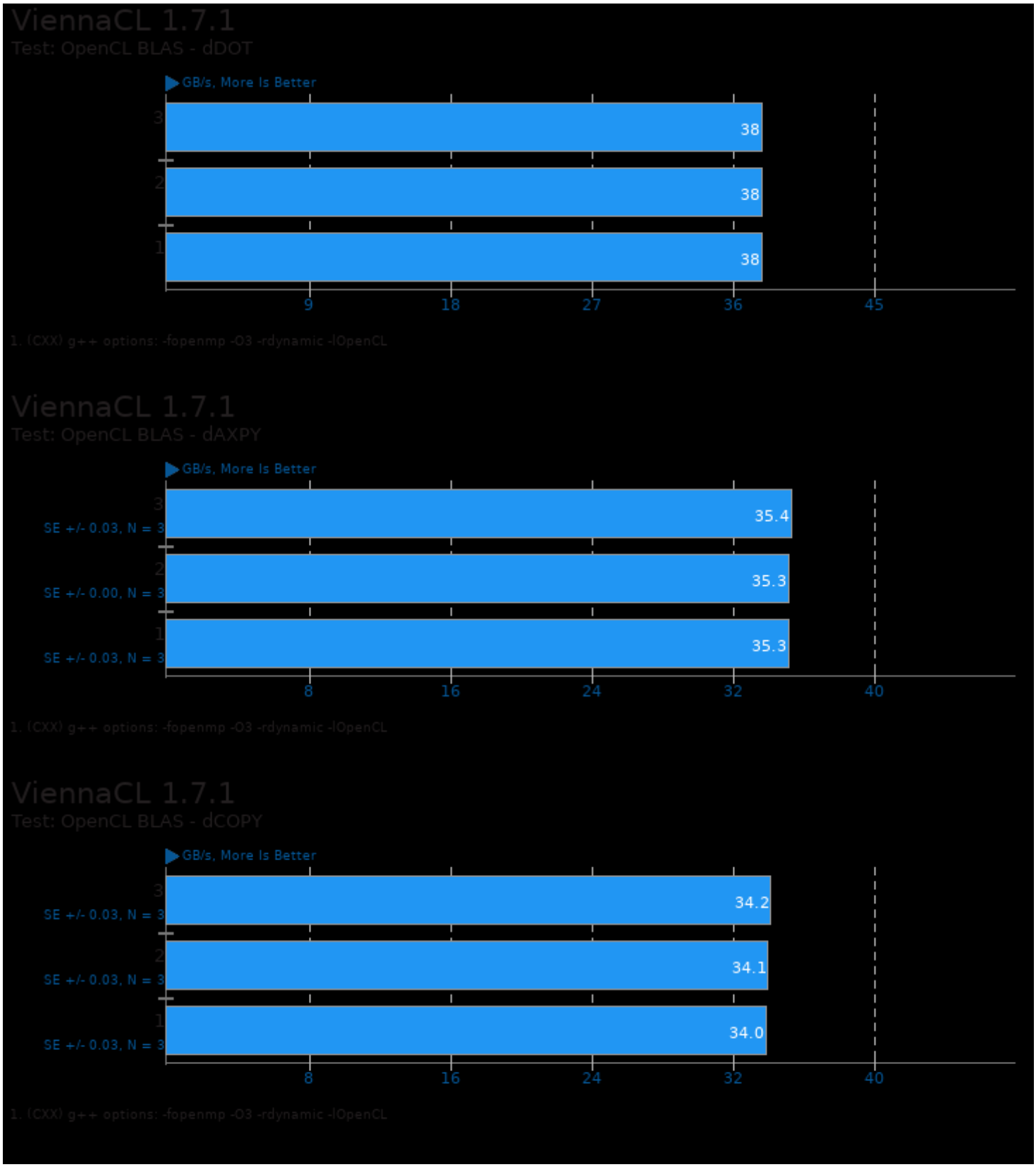

Xcompact3d Incompact3d 2021-03-11
Input: input.i3d 129 Cells Per Direction
Seconds, Fewer Is Better
3
SE +/- 0.31, N = 3
34.38
2
SE +/- 0.34, N = 3
34.44
1
SE +/- 0.35, N = 3
34.34
8
16
24
32
40
1. (F9X) gfortran options: -cpp -O2 -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
Zstd Compression 1.4.9
Compression Level: 3, Long Mode - Decompression Speed
MB/s, More Is Better
3
SE +/- 1.29, N = 3
4442.7
2
SE +/- 5.89, N = 3
4437.7
1
SE +/- 7.93, N = 3
4433.4
1000
2000
3000
4000
5000
1. (CC) gcc options: -O3 -pthread -lz -llzma
Zstd Compression 1.4.9
Compression Level: 3, Long Mode - Compression Speed
MB/s, More Is Better
3
SE +/- 6.67, N = 3
1177.1
2
SE +/- 10.72, N = 3
1156.9
1
SE +/- 5.14, N = 3
1164.0
300
600
900
1200
1500
1. (CC) gcc options: -O3 -pthread -lz -llzma

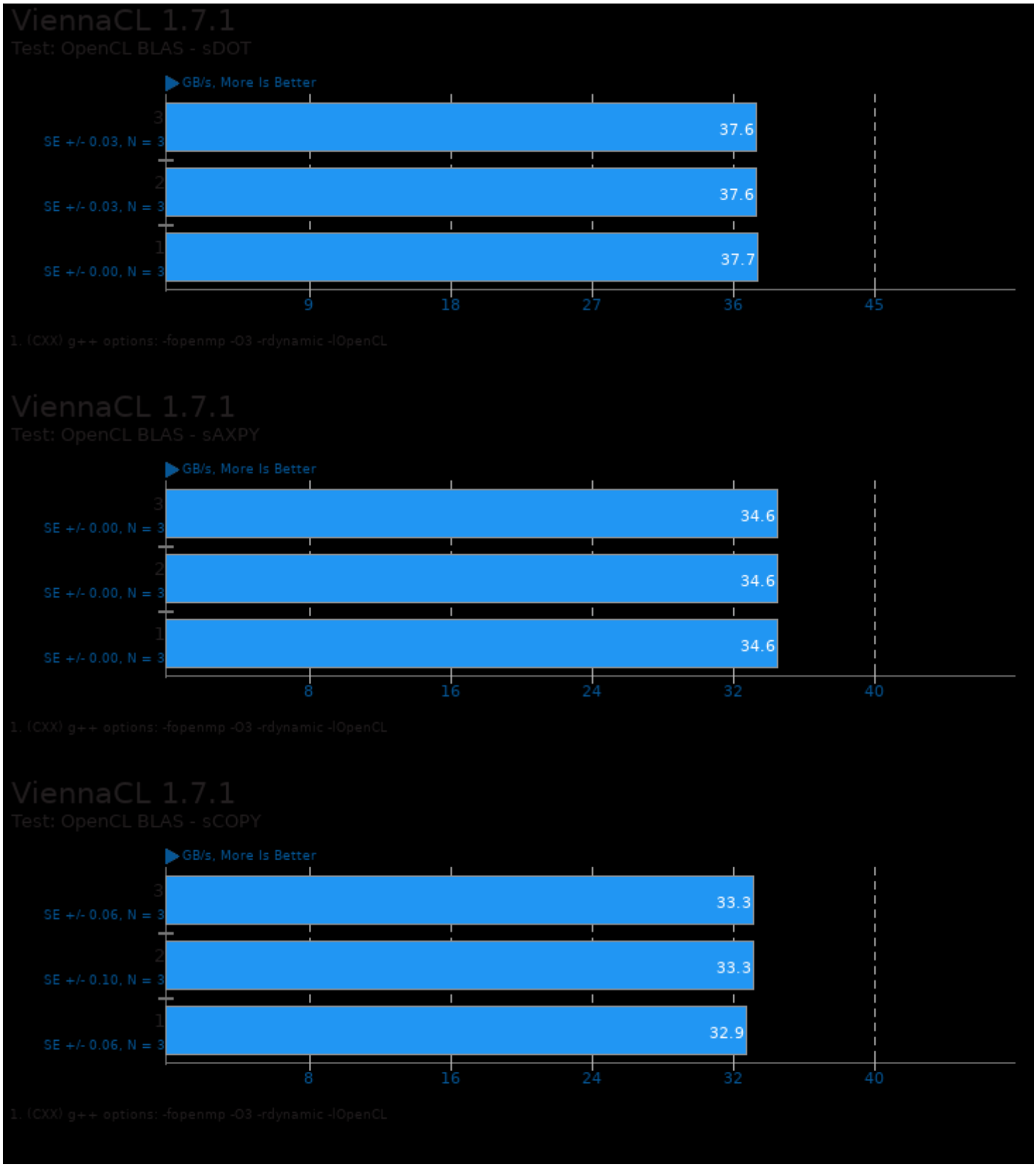
990KS March


ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMM-TT
GFLOPs/s, More Is Better
3
SE +/- 0.00, N = 2
15.7
2
SE +/- 0.00, N = 2
15.7
1
SE +/- 0.00, N = 2
15.7
4
8
12
16
20
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMM-TN
GFLOPs/s, More Is Better
3
SE +/- 0.03, N = 3
15.8
2
SE +/- 0.03, N = 3
15.8
1
SE +/- 0.03, N = 3
15.8
4
8
12
16
20
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMM-NT
GFLOPs/s, More Is Better
3
SE +/- 0.03, N = 3
16.4
2
SE +/- 0.03, N = 3
16.5
1
SE +/- 0.00, N = 3
16.5
4
8
12
16
20
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

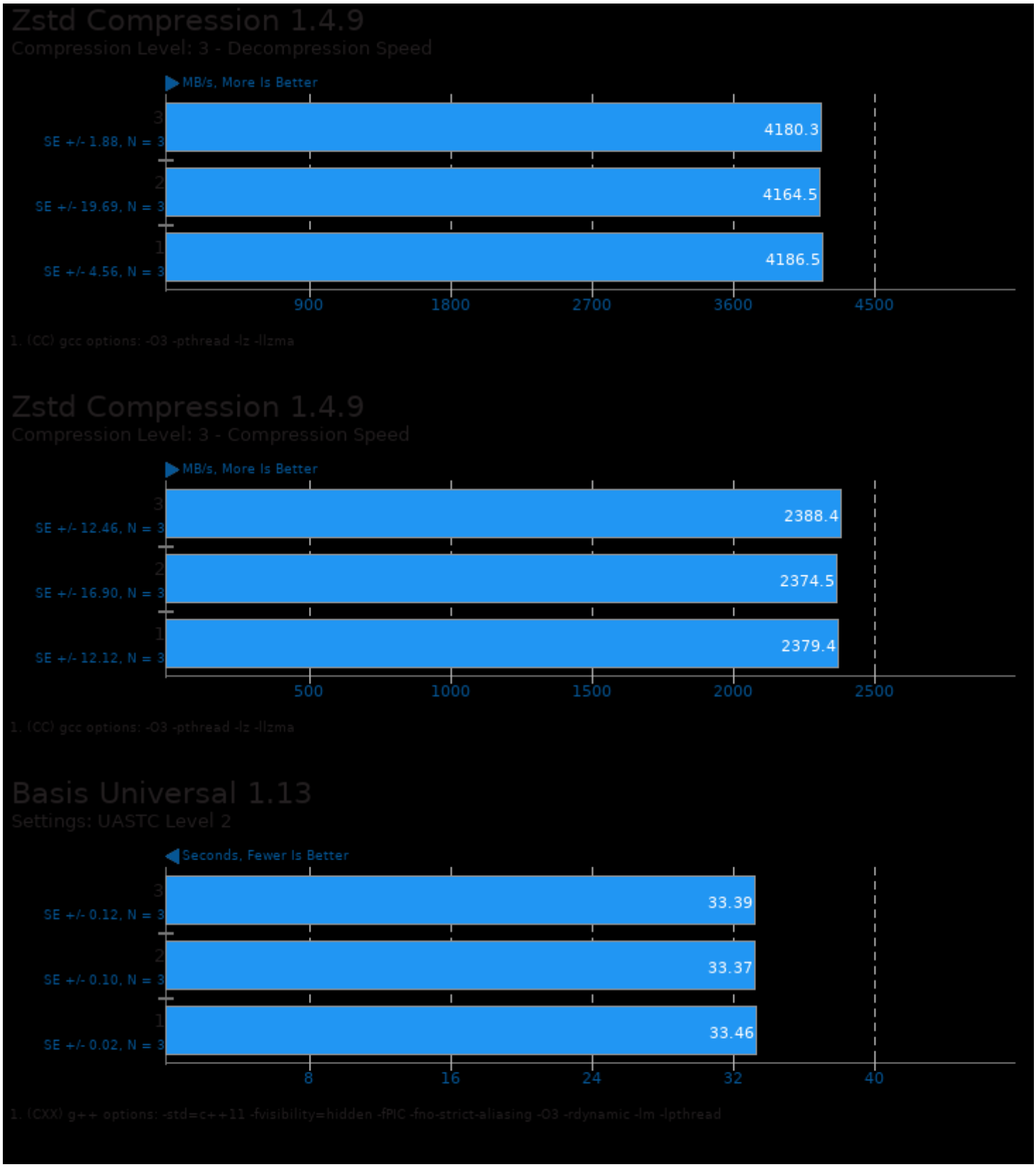

ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMM-NN
GFLOPs/s, More Is Better
3
SE +/- 0.00, N = 3
18.9
2
SE +/- 0.00, N = 3
18.9
1
SE +/- 0.00, N = 3
18.9
5
10
15
20
25
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMV-T
GB/s, More Is Better
3
SE +/- 0.03, N = 3
34.8
2
SE +/- 0.03, N = 3
34.7
1
SE +/- 0.00, N = 3
34.8
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dGEMV-N
GB/s, More Is Better
3
37.9
2
38.1
1
SE +/- 0.00, N = 3
37.9
9
18
27
36
45
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

990KS March


ViennaCL 1.7.1
Test: OpenCL BLAS - dDOT
GB/s, More Is Better
3
38
2
38
1
38
9
18
27
36
45
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dAXPY
GB/s, More Is Better
3
SE +/- 0.03, N = 3
35.4
2
SE +/- 0.00, N = 3
35.3
1
SE +/- 0.03, N = 3
35.3
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - dCOPY
GB/s, More Is Better
3
SE +/- 0.03, N = 3
34.2
2
SE +/- 0.03, N = 3
34.1
1
SE +/- 0.03, N = 3
34.0
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

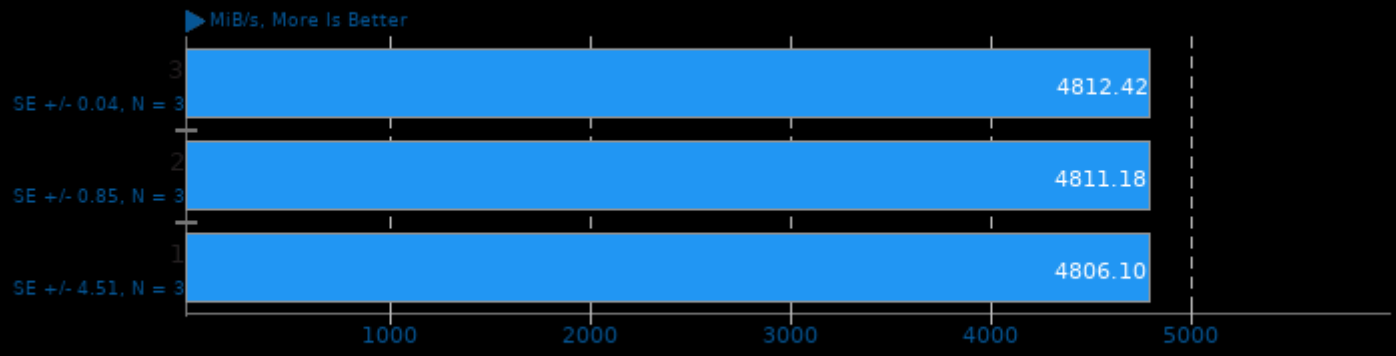

ViennaCL 1.7.1
Test: OpenCL BLAS - sDOT
GB/s, More Is Better
3
SE +/- 0.03, N = 3
37.6
2
SE +/- 0.03, N = 3
37.6
1
SE +/- 0.00, N = 3
37.7
9
18
27
36
45
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - sAXPY
GB/s, More Is Better
3
SE +/- 0.00, N = 3
34.6
2
SE +/- 0.00, N = 3
34.6
1
SE +/- 0.00, N = 3
34.6
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: OpenCL BLAS - sCOPY
GB/s, More Is Better
3
SE +/- 0.06, N = 3
33.3
2
SE +/- 0.10, N = 3
33.3
1
SE +/- 0.06, N = 3
32.9
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

990KS March


Zstd Compression 1.4.9
Compression Level: 3 - Decompression Speed
MB/s, More Is Better
3
SE +/- 1.88, N = 3
4180.3
2
SE +/- 19.69, N = 3
4164.5
1
SE +/- 4.56, N = 3
4186.5
900
1800
2700
3600
4500
1. (CC) gcc options: -O3 -pthread -lz -llzma
Zstd Compression 1.4.9
Compression Level: 3 - Compression Speed
MB/s, More Is Better
3
SE +/- 12.46, N = 3
2388.4
2
SE +/- 16.90, N = 3
2374.5
1
SE +/- 12.12, N = 3
2379.4
500
1000
1500
2000
2500
1. (CC) gcc options: -O3 -pthread -lz -llzma
Basis Universal 1.13
Settings: UASTC Level 2
Seconds, Fewer Is Better
3
SE +/- 0.12, N = 3
33.39
2
SE +/- 0.10, N = 3
33.37
1
SE +/- 0.02, N = 3
33.46
8
16
24
32
40
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

Botan 2.17.3

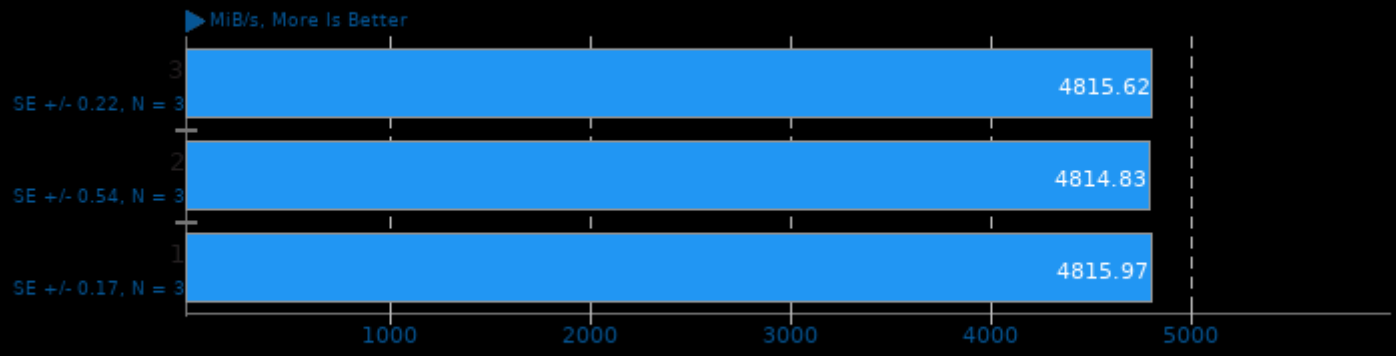
Test: AES-256 - Decrypt



1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

Botan 2.17.3

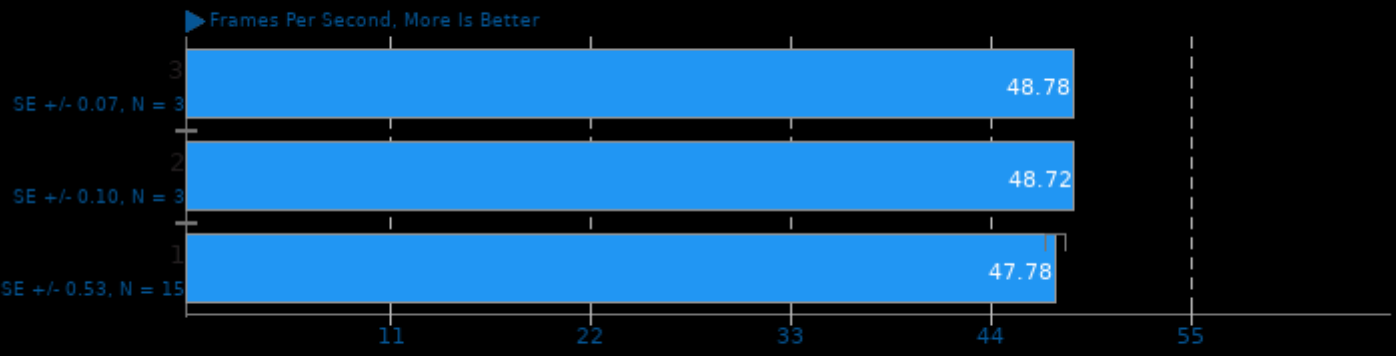
Test: AES-256



1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

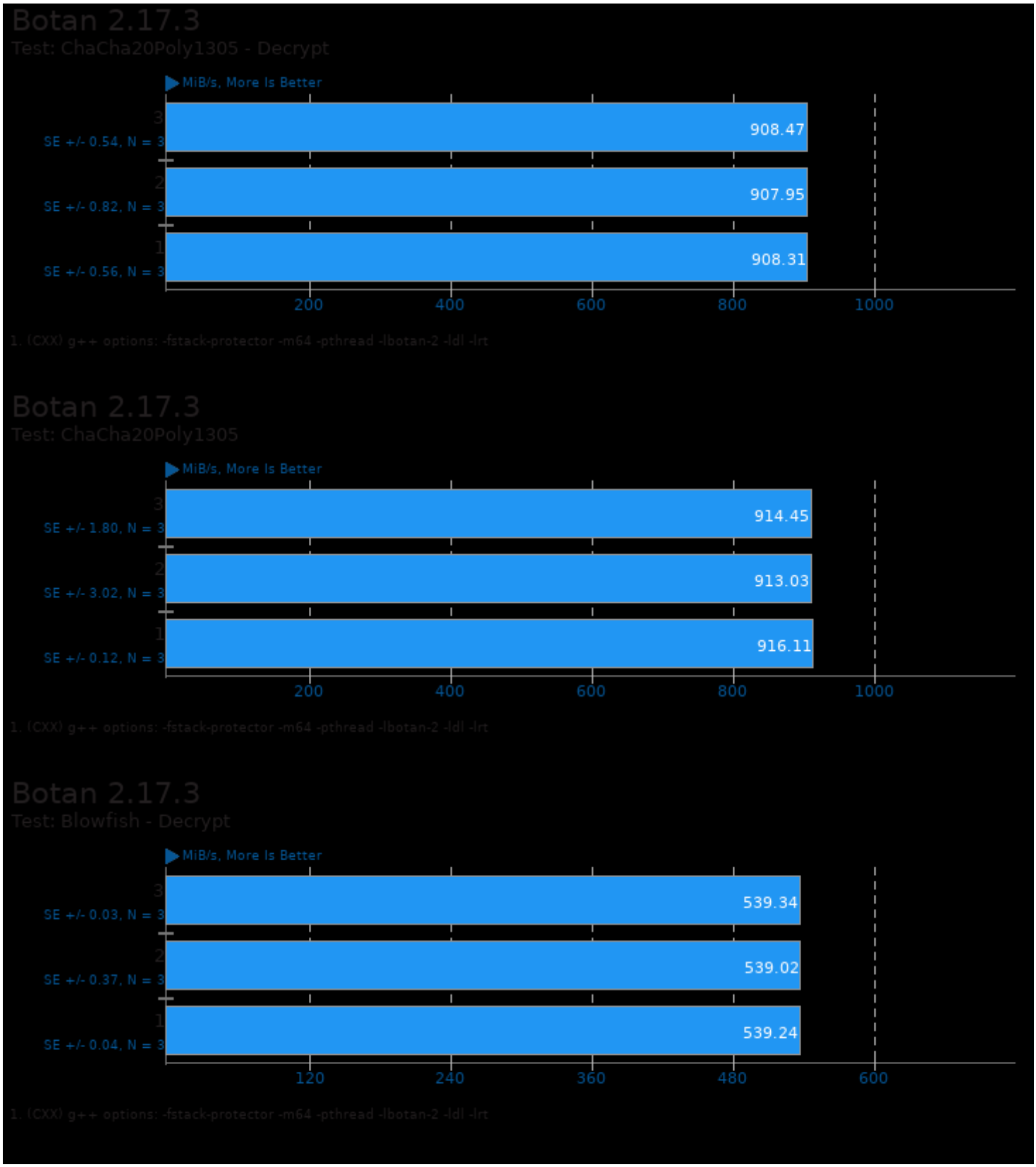
AOM AV1 3.0

Encoder Mode: Speed 9 Realtime - Input: Bosphorus 4K

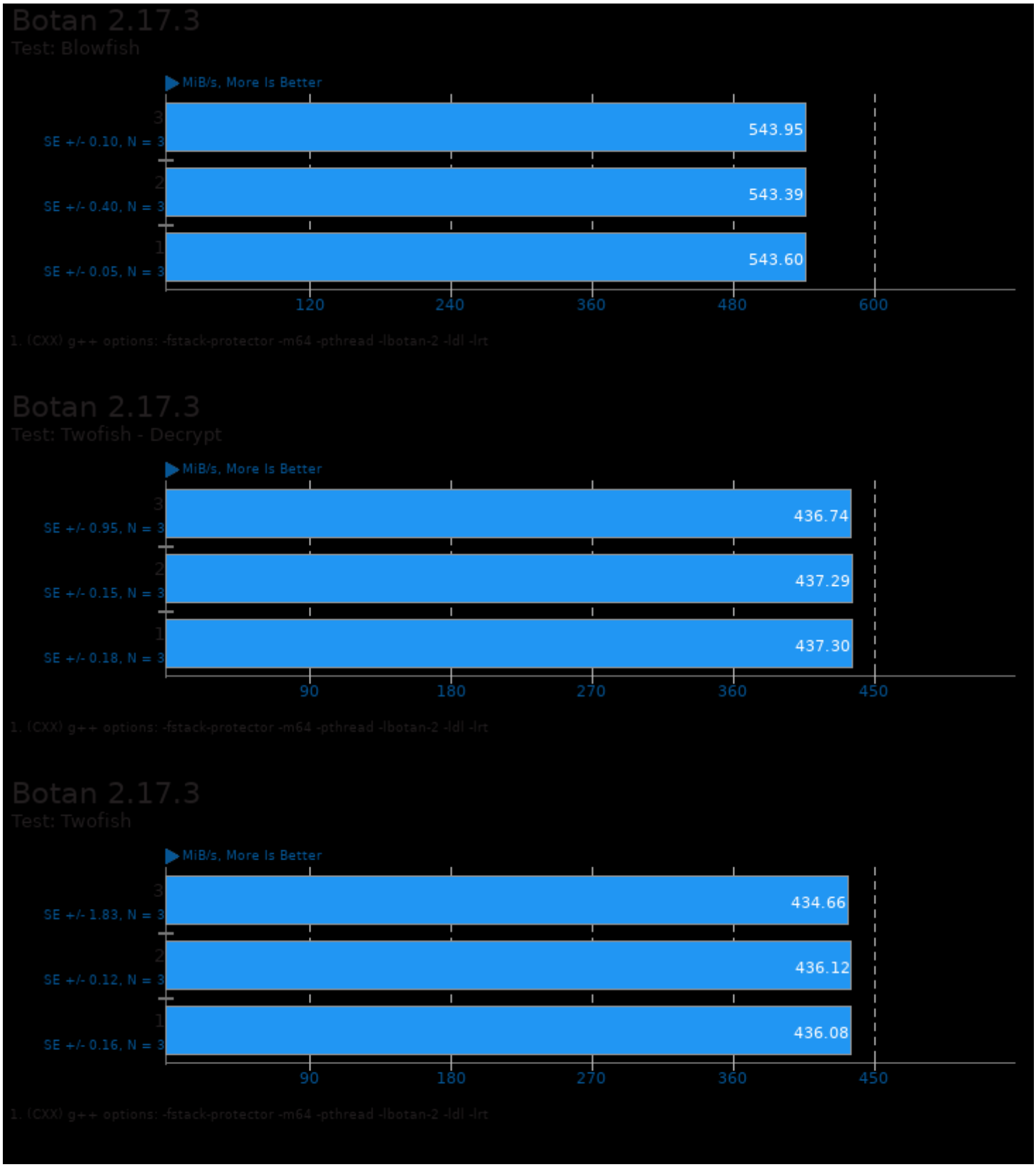


1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

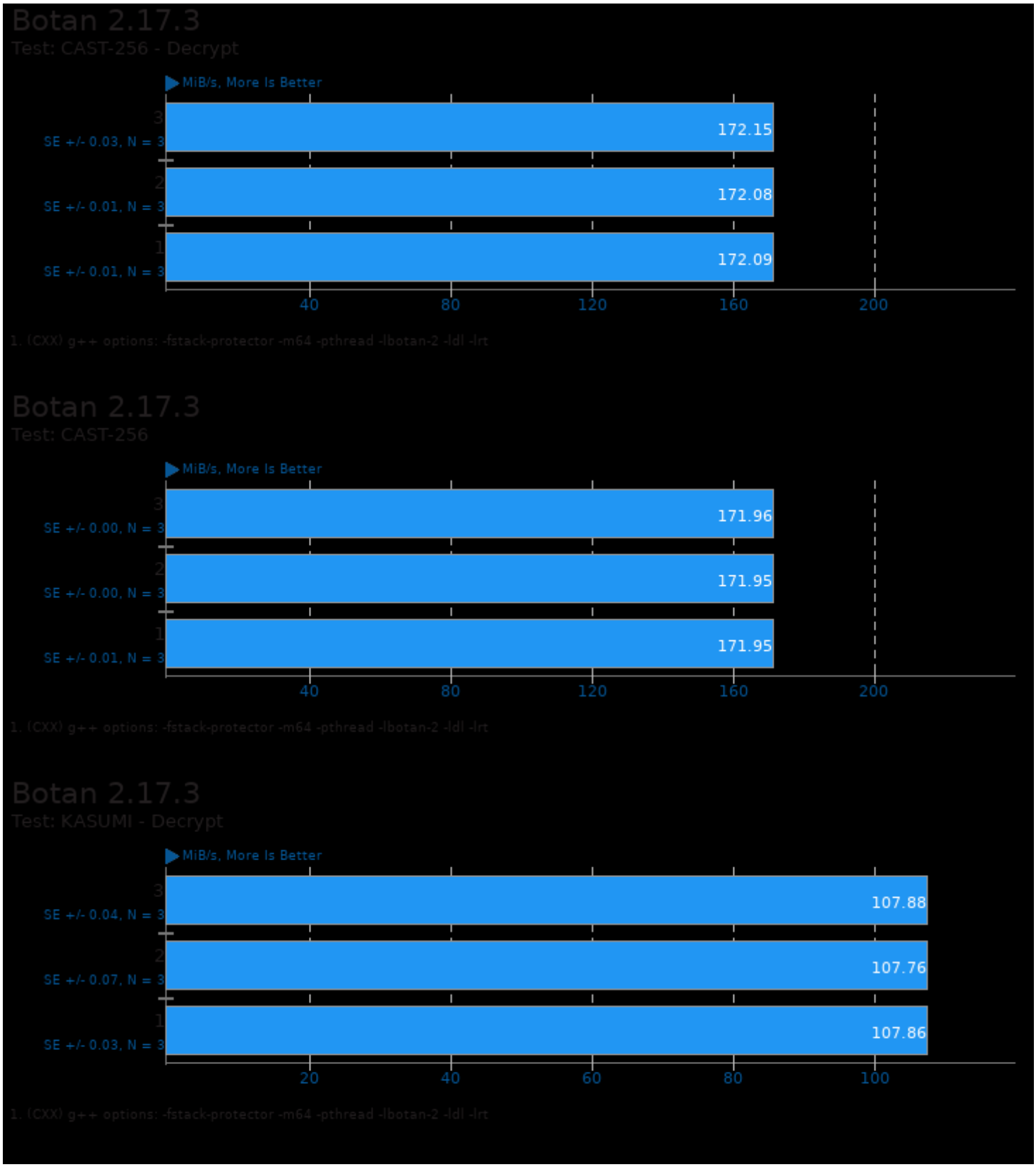
990KS March


Botan 2.17.3
Test: ChaCha20Poly1305 - Decrypt
MiB/s, More Is Better
3
SE +/- 0.54, N = 3
908.47
2
SE +/- 0.82, N = 3
907.95
1
SE +/- 0.56, N = 3
908.31
200
400
600
800
1000
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: ChaCha20Poly1305
MiB/s, More Is Better
3
SE +/- 1.80, N = 3
914.45
2
SE +/- 3.02, N = 3
913.03
1
SE +/- 0.12, N = 3
916.11
200
400
600
800
1000
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: Blowfish - Decrypt
MiB/s, More Is Better
3
SE +/- 0.03, N = 3
539.34
2
SE +/- 0.37, N = 3
539.02
1
SE +/- 0.04, N = 3
539.24
120
240
360
480
600
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

990KS March

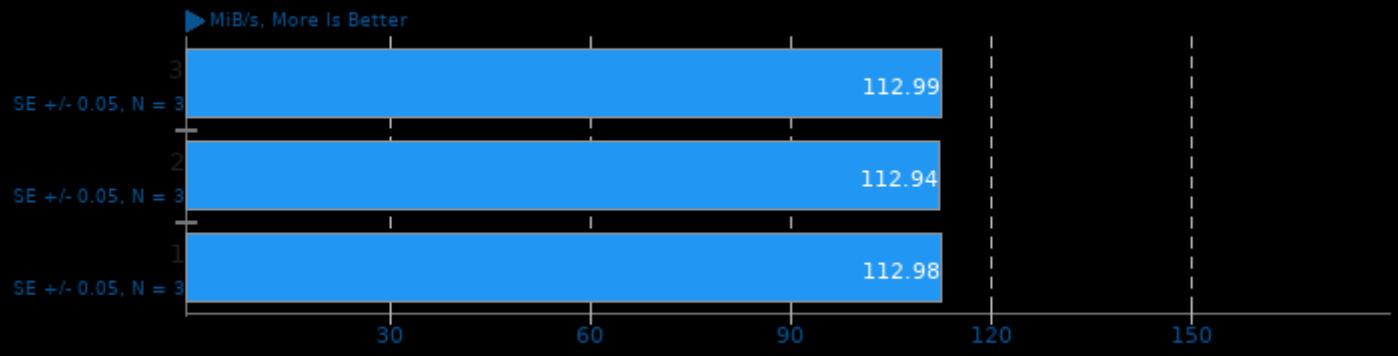

Botan 2.17.3
Test: Blowfish
MiB/s, More Is Better
3
SE +/- 0.10, N = 3
543.95
2
SE +/- 0.40, N = 3
543.39
1
SE +/- 0.05, N = 3
543.60
120
240
360
480
600
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: Twofish - Decrypt
MiB/s, More Is Better
3
SE +/- 0.95, N = 3
436.74
2
SE +/- 0.15, N = 3
437.29
1
SE +/- 0.18, N = 3
437.30
90
180
270
360
450
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: Twofish
MiB/s, More Is Better
3
SE +/- 1.83, N = 3
434.66
2
SE +/- 0.12, N = 3
436.12
1
SE +/- 0.16, N = 3
436.08
90
180
270
360
450
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

990KS March


Botan 2.17.3
Test: CAST-256 - Decrypt
MiB/s, More Is Better
3
SE +/- 0.03, N = 3
172.15
2
SE +/- 0.01, N = 3
172.08
1
SE +/- 0.01, N = 3
172.09
40
80
120
160
200
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: CAST-256
MiB/s, More Is Better
3
SE +/- 0.00, N = 3
171.96
2
SE +/- 0.00, N = 3
171.95
1
SE +/- 0.01, N = 3
171.95
40
80
120
160
200
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt
Botan 2.17.3
Test: KASUMI - Decrypt
MiB/s, More Is Better
3
SE +/- 0.04, N = 3
107.88
2
SE +/- 0.07, N = 3
107.76
1
SE +/- 0.03, N = 3
107.86
20
40
60
80
100
1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

Botan 2.17.3

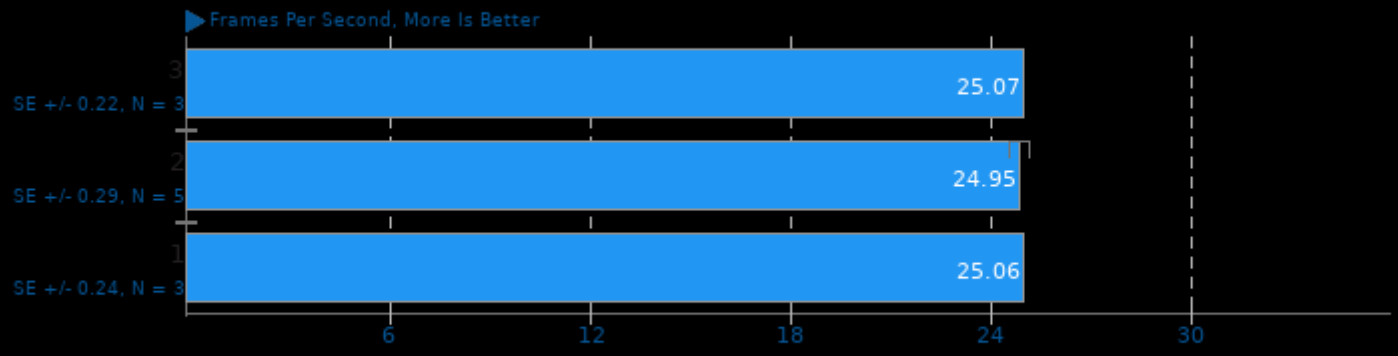
Test: KASUMI



1. (CXX) g++ options: -fstack-protector -m64 -pthread -lbotan-2 -ldl -lrt

AOM AV1 3.0

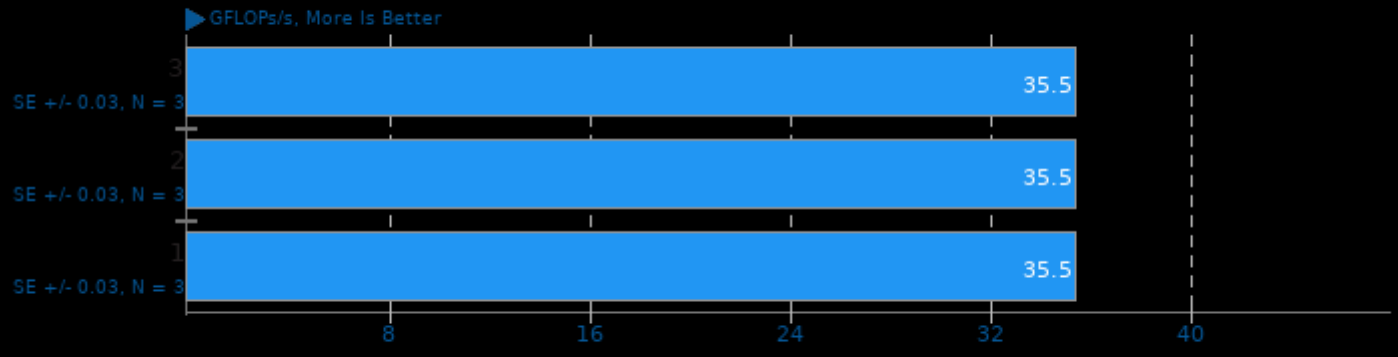
Encoder Mode: Speed 6 Realtime - Input: Bosphorus 1080p



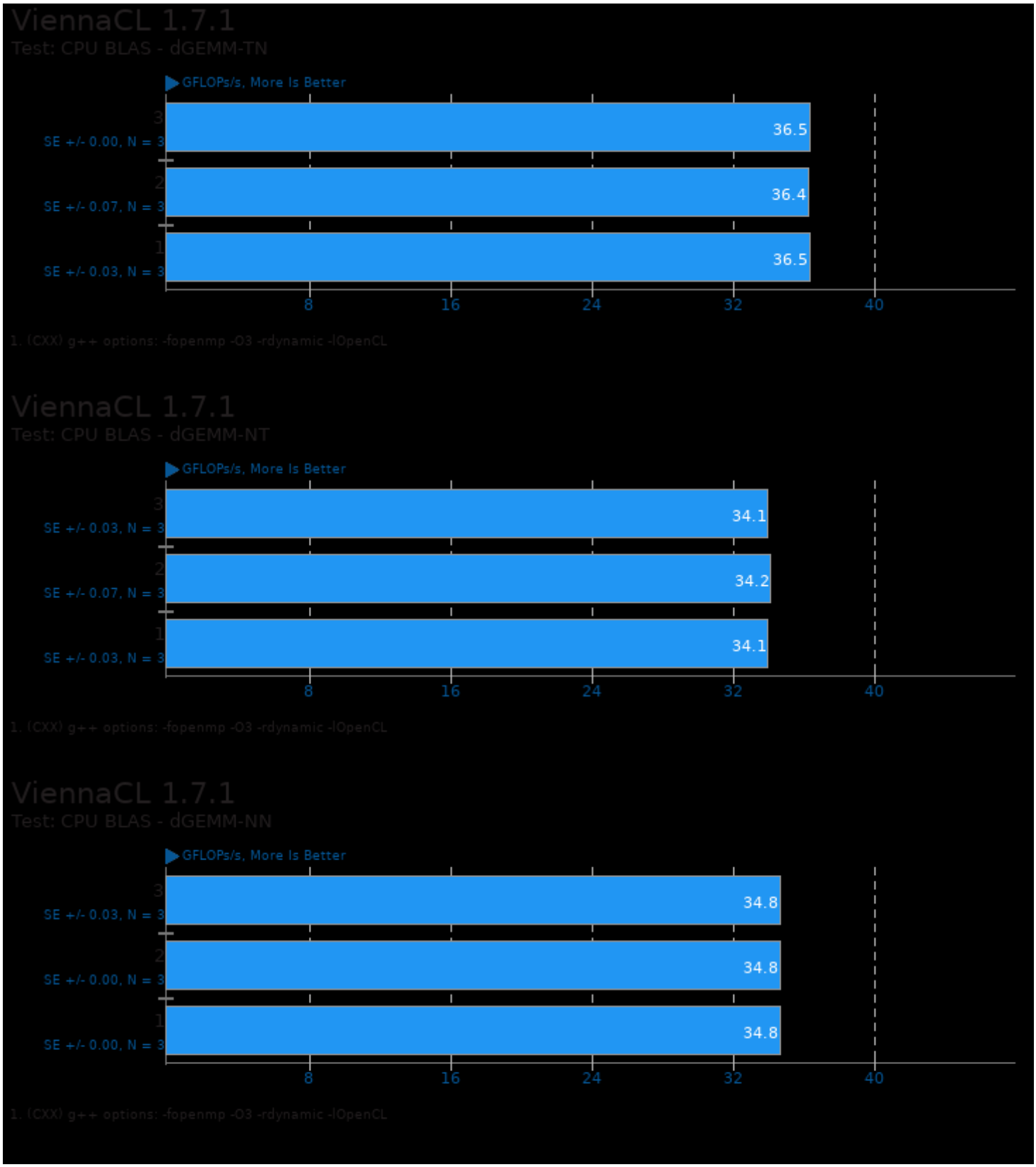
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

ViennaCL 1.7.1

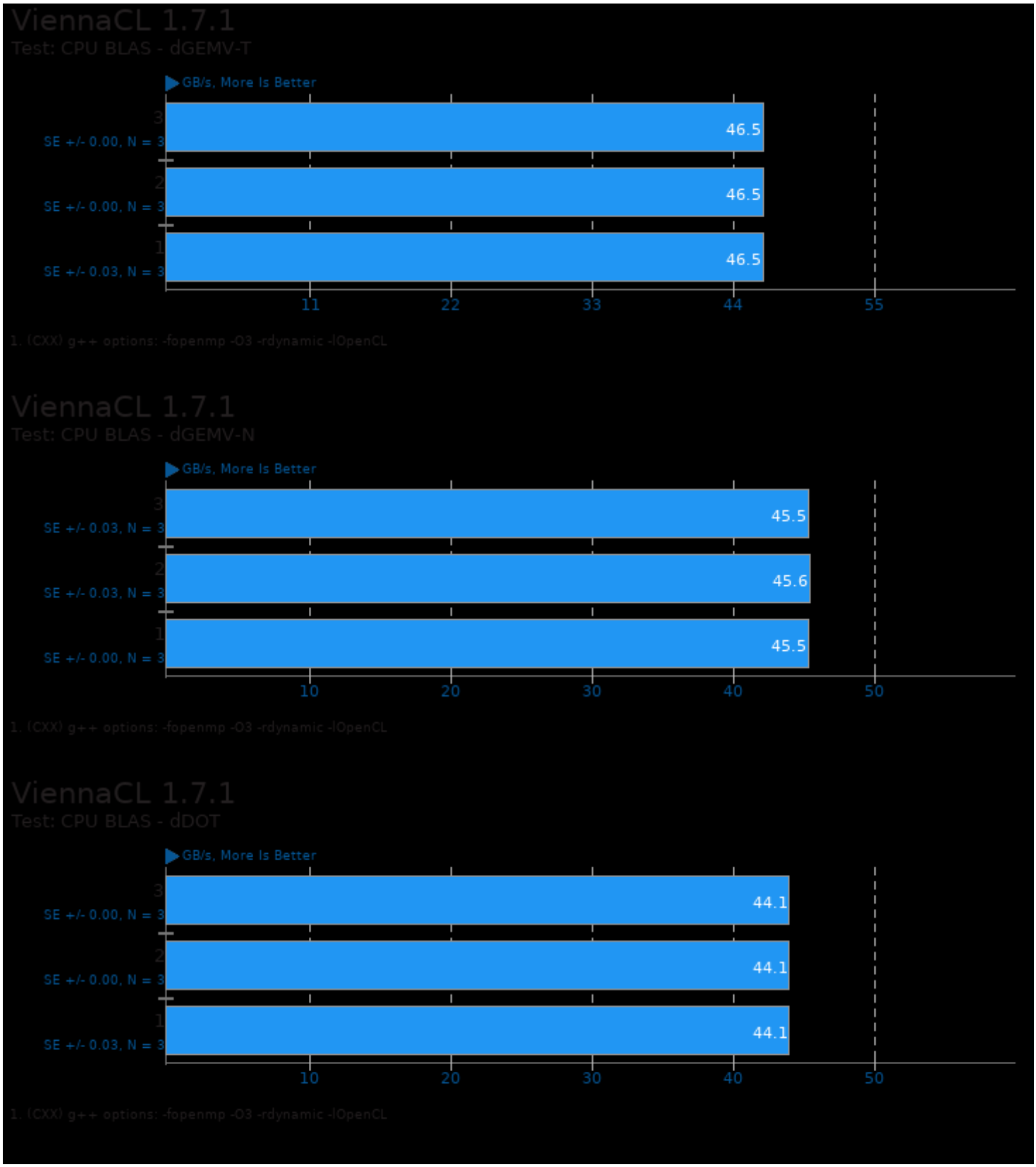
Test: CPU BLAS - dGEMM-TT



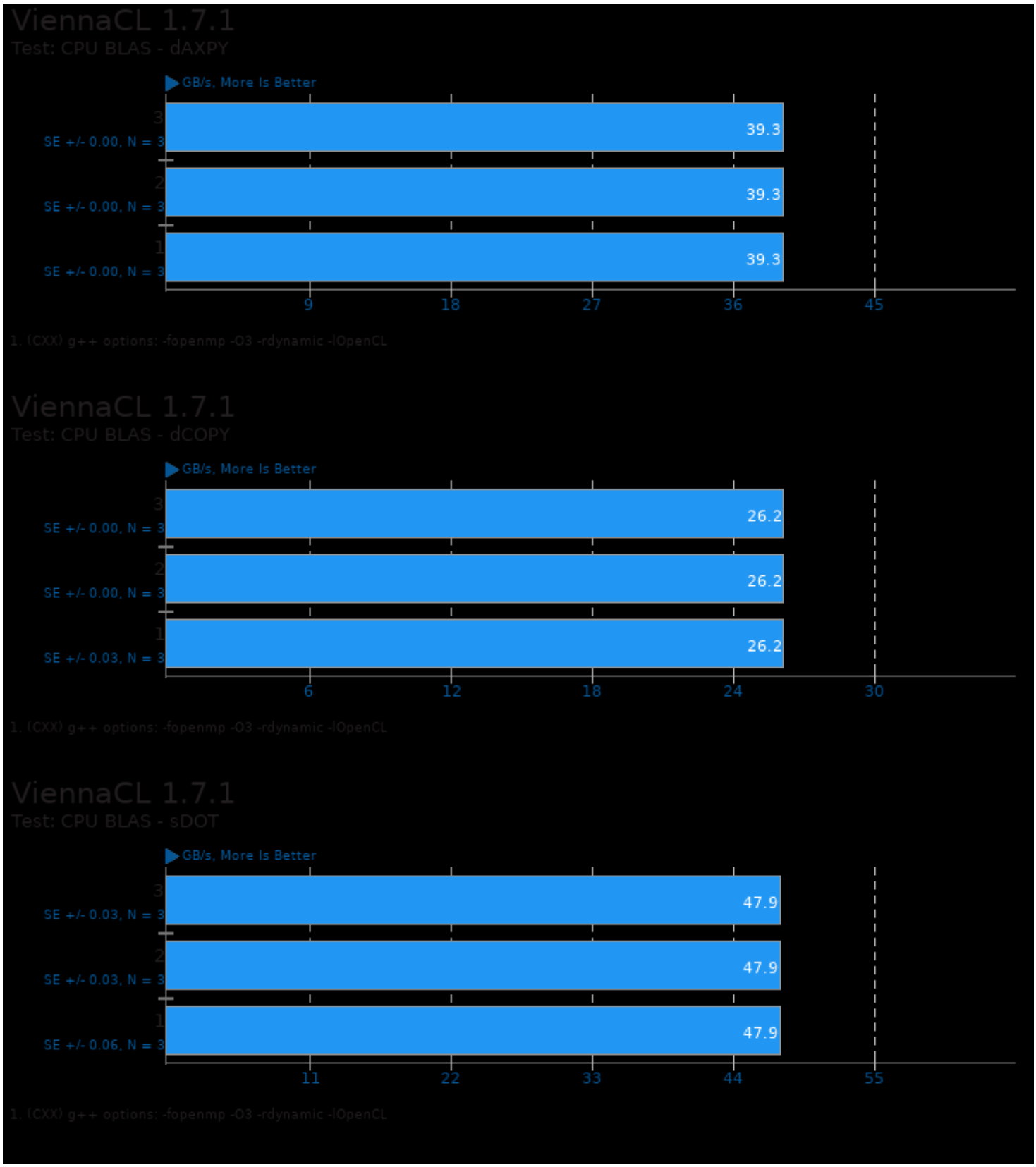
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

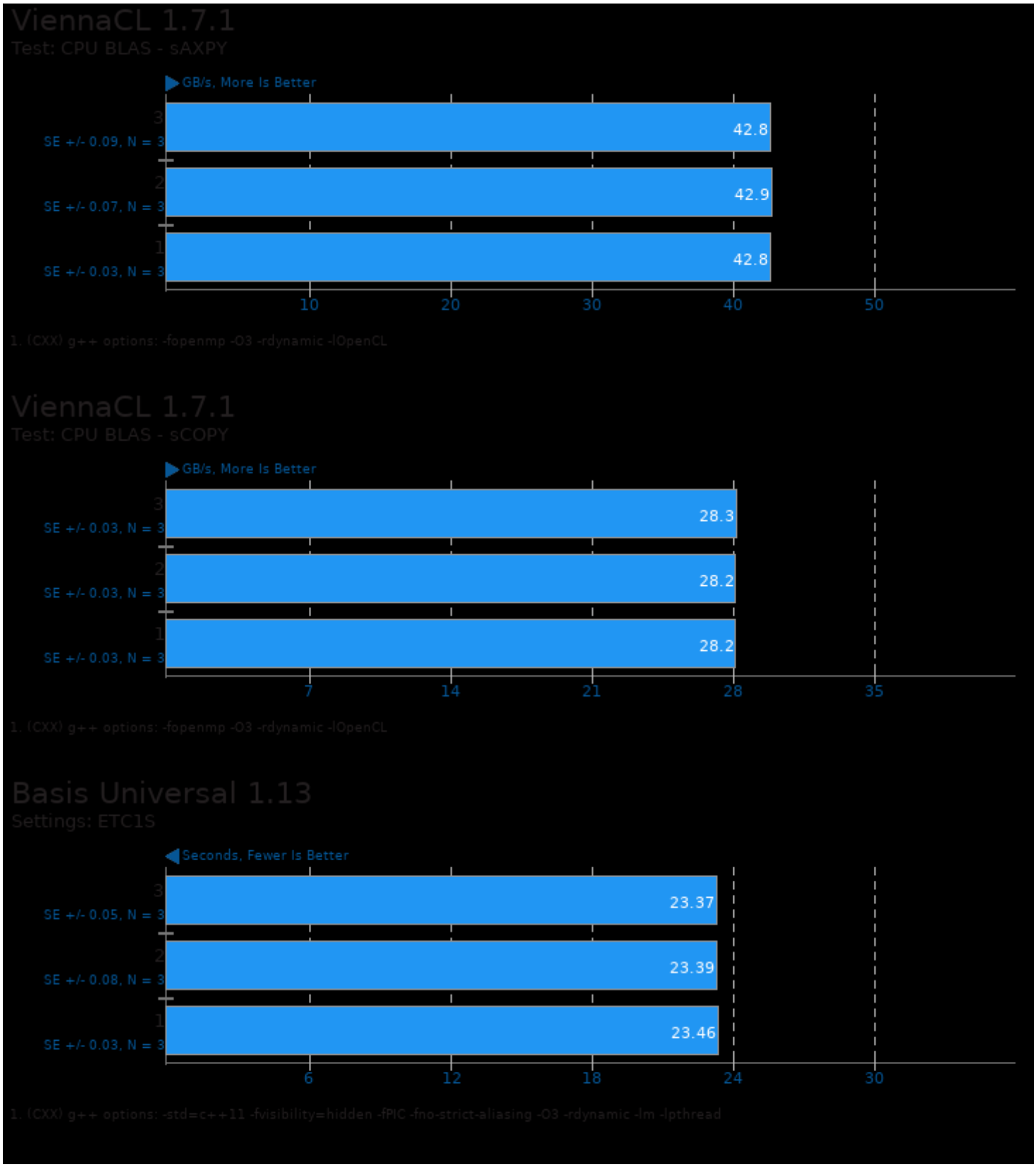

ViennaCL 1.7.1
Test: CPU BLAS - dGEMM-TN
GFLOPs/s, More Is Better
3
SE +/- 0.00, N = 3
36.5
2
SE +/- 0.07, N = 3
36.4
1
SE +/- 0.03, N = 3
36.5
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - dGEMM-NT
GFLOPs/s, More Is Better
3
SE +/- 0.03, N = 3
34.1
2
SE +/- 0.07, N = 3
34.2
1
SE +/- 0.03, N = 3
34.1
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - dGEMM-NN
GFLOPs/s, More Is Better
3
SE +/- 0.03, N = 3
34.8
2
SE +/- 0.00, N = 3
34.8
1
SE +/- 0.00, N = 3
34.8
8
16
24
32
40
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

990KS March

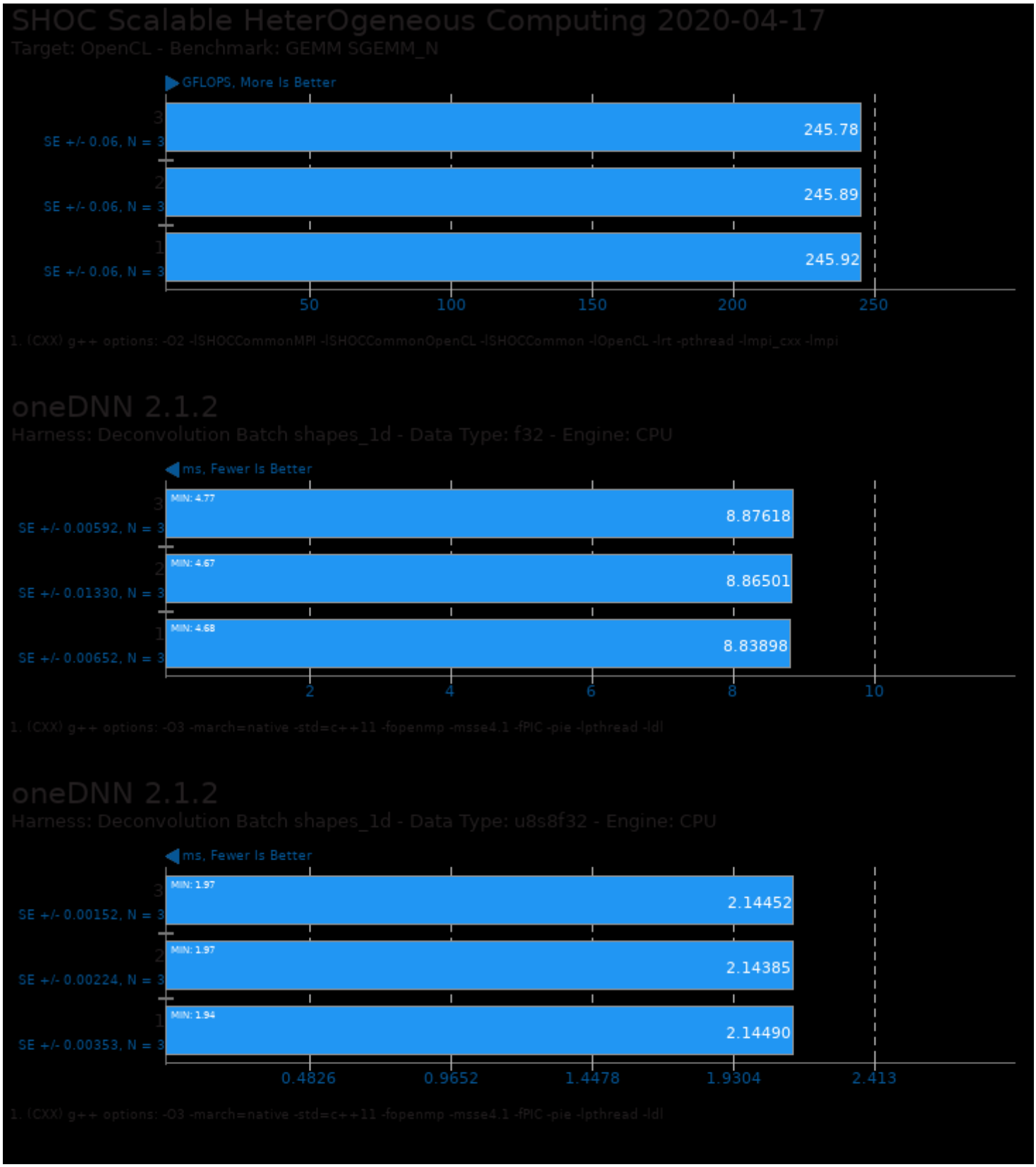

ViennaCL 1.7.1
Test: CPU BLAS - dGEMV-T
GB/s, More Is Better
3
SE +/- 0.00, N = 3
46.5
2
SE +/- 0.00, N = 3
46.5
1
SE +/- 0.03, N = 3
46.5
11
22
33
44
55
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - dGEMV-N
GB/s, More Is Better
3
SE +/- 0.03, N = 3
45.5
2
SE +/- 0.03, N = 3
45.6
1
SE +/- 0.00, N = 3
45.5
10
20
30
40
50
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - dDOT
GB/s, More Is Better
3
SE +/- 0.00, N = 3
44.1
2
SE +/- 0.00, N = 3
44.1
1
SE +/- 0.03, N = 3
44.1
10
20
30
40
50
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL

990KS March

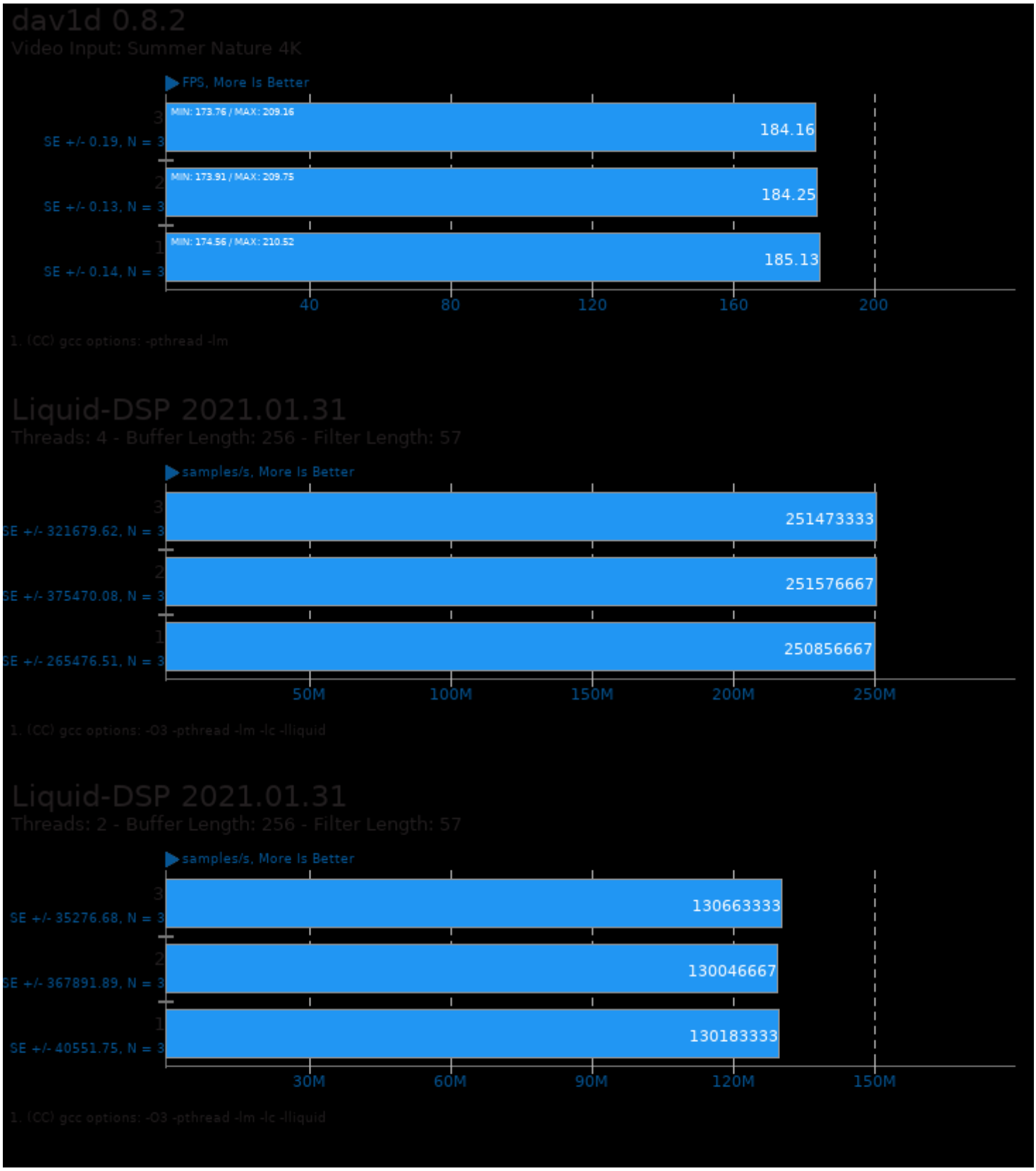

ViennaCL 1.7.1
Test: CPU BLAS - dAXPY
GB/s, More Is Better
3
SE +/- 0.00, N = 3
39.3
2
SE +/- 0.00, N = 3
39.3
1
SE +/- 0.00, N = 3
39.3
9
18
27
36
45
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - dCOPY
GB/s, More Is Better
3
SE +/- 0.00, N = 3
26.2
2
SE +/- 0.00, N = 3
26.2
1
SE +/- 0.03, N = 3
26.2
6
12
18
24
30
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - sDOT
GB/s, More Is Better
3
SE +/- 0.03, N = 3
47.9
2
SE +/- 0.03, N = 3
47.9
1
SE +/- 0.06, N = 3
47.9
11
22
33
44
55
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL


ViennaCL 1.7.1
Test: CPU BLAS - sAXPY
GB/s, More Is Better
3
SE +/- 0.09, N = 3
42.8
2
SE +/- 0.07, N = 3
42.9
1
SE +/- 0.03, N = 3
42.8
10
20
30
40
50
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
ViennaCL 1.7.1
Test: CPU BLAS - sCOPY
GB/s, More Is Better
3
SE +/- 0.03, N = 3
28.3
2
SE +/- 0.03, N = 3
28.2
1
SE +/- 0.03, N = 3
28.2
7
14
21
28
35
1. (CXX) g++ options: -fopenmp -O3 -rdynamic -lOpenCL
Basis Universal 1.13
Settings: ETC1S
Seconds, Fewer Is Better
3
SE +/- 0.05, N = 3
23.37
2
SE +/- 0.08, N = 3
23.39
1
SE +/- 0.03, N = 3
23.46
6
12
18
24
30
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

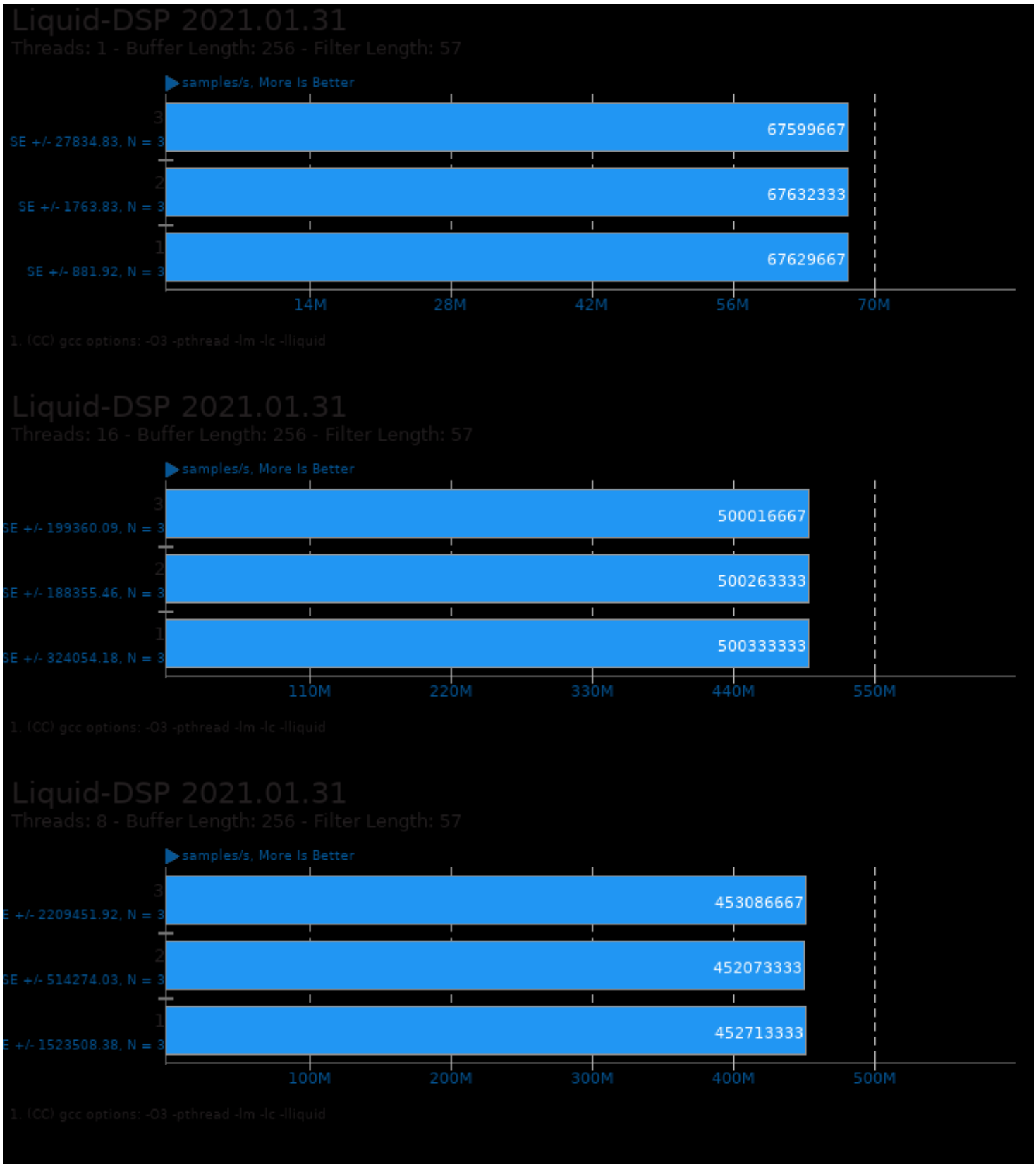
990KS March

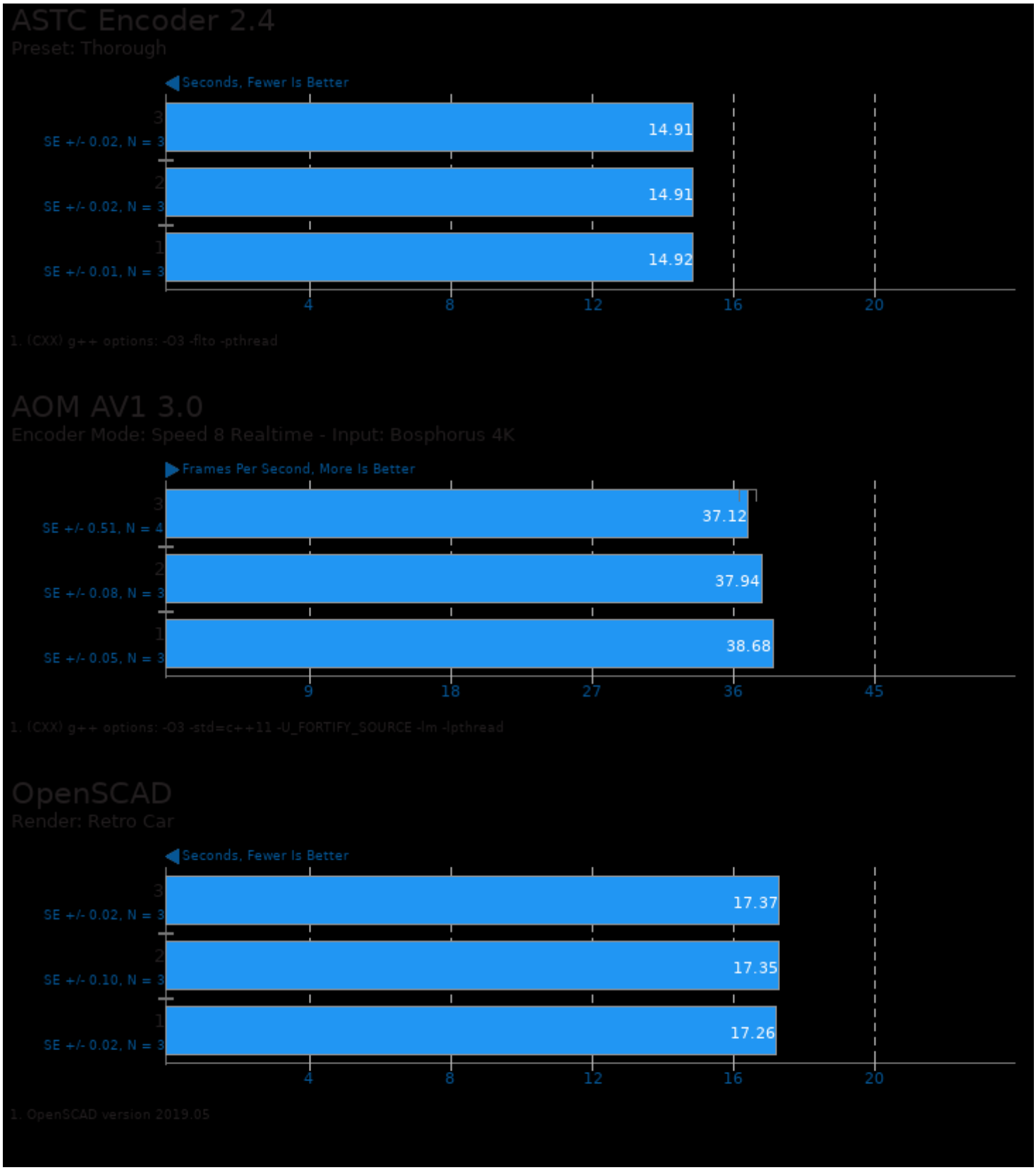

SHOC Scalable HeterOgeneous Computing 2020-04-17
Target: OpenCL - Benchmark: GEMM SGEMM_N
GFLOPS, More Is Better
3
SE +/- 0.06, N = 3
245.78
2
SE +/- 0.06, N = 3
245.89
1
SE +/- 0.06, N = 3
245.92
50
100
150
200
250
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_1d - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
3
MIN: 4.77
SE +/- 0.00592, N = 3
8.87618
2
MIN: 4.67
SE +/- 0.01330, N = 3
8.86501
1
MIN: 4.68
SE +/- 0.00652, N = 3
8.83898
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_1d - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
3
MIN: 1.97
SE +/- 0.00152, N = 3
2.14452
2
MIN: 1.97
SE +/- 0.00224, N = 3
2.14385
1
MIN: 1.94
SE +/- 0.00353, N = 3
2.14490
0.4826
0.9652
1.4478
1.9304
2.413
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

990KS March


dav1d 0.8.2
Video Input: Summer Nature 4K
FPS, More Is Better
MIN: 173.76 / MAX: 209.16
184.16
SE +/- 0.19, N = 3
MIN: 173.91 / MAX: 209.75
184.25
SE +/- 0.13, N = 3
MIN: 174.56 / MAX: 210.52
185.13
SE +/- 0.14, N = 3
40
80
120
160
200
1. (CC) gcc options: -pthread -lm
Liquid-DSP 2021.01.31
Threads: 4 - Buffer Length: 256 - Filter Length: 57
samples/s, More Is Better
251473333
SE +/- 321679.62, N = 3
251576667
SE +/- 375470.08, N = 3
250856667
SE +/- 265476.51, N = 3
50M
100M
150M
200M
250M
1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid
Liquid-DSP 2021.01.31
Threads: 2 - Buffer Length: 256 - Filter Length: 57
samples/s, More Is Better
130663333
SE +/- 35276.68, N = 3
130046667
SE +/- 367891.89, N = 3
130183333
SE +/- 40551.75, N = 3
30M
60M
90M
120M
150M
1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid

990KS March

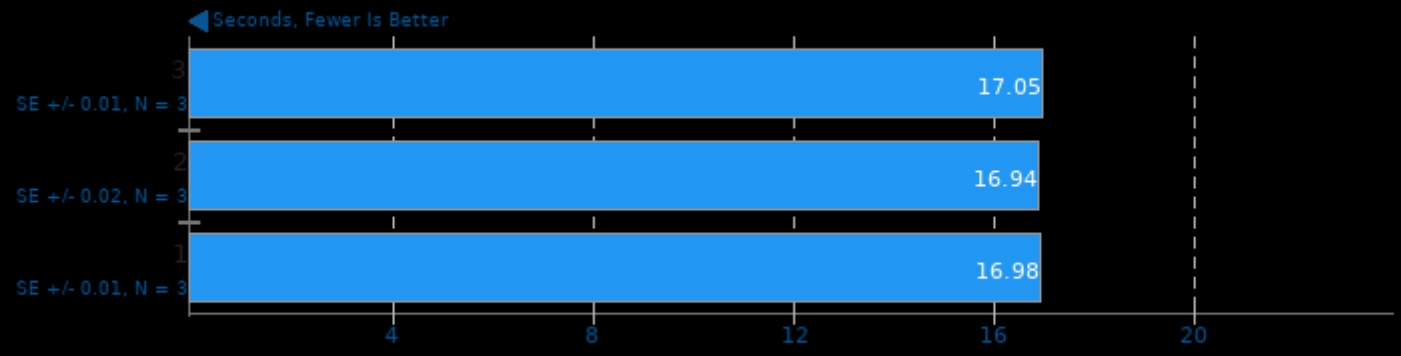

Liquid-DSP 2021.01.31
Threads: 1 - Buffer Length: 256 - Filter Length: 57
samples/s, More Is Better
3
SE +/- 27834.83, N = 3
67599667
2
SE +/- 1763.83, N = 3
67632333
1
SE +/- 881.92, N = 3
67629667
14M
28M
42M
56M
70M
1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid
Liquid-DSP 2021.01.31
Threads: 16 - Buffer Length: 256 - Filter Length: 57
samples/s, More Is Better
3
SE +/- 199360.09, N = 3
500016667
2
SE +/- 188355.46, N = 3
500263333
1
SE +/- 324054.18, N = 3
500333333
110M
220M
330M
440M
550M
1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid
Liquid-DSP 2021.01.31
Threads: 8 - Buffer Length: 256 - Filter Length: 57
samples/s, More Is Better
3
E +/- 2209451.92, N = 3
453086667
2
SE +/- 514274.03, N = 3
452073333
1
E +/- 1523508.38, N = 3
452713333
100M
200M
300M
400M
500M
1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid


ASTC Encoder 2.4
Preset: Thorough
Seconds, Fewer Is Better
3
SE +/- 0.02, N = 3
14.91
2
SE +/- 0.02, N = 3
14.91
1
SE +/- 0.01, N = 3
14.92
4
8
12
16
20
1. (CXX) g++ options: -O3 -flto -pthread
AOM AV1 3.0
Encoder Mode: Speed 8 Realtime - Input: Bosphorus 4K
Frames Per Second, More Is Better
3
SE +/- 0.51, N = 4
37.12
2
SE +/- 0.08, N = 3
37.94
1
SE +/- 0.05, N = 3
38.68
9
18
27
36
45
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread
OpenSCAD
Render: Retro Car
Seconds, Fewer Is Better
3
SE +/- 0.02, N = 3
17.37
2
SE +/- 0.10, N = 3
17.35
1
SE +/- 0.02, N = 3
17.26
4
8
12
16
20
1. OpenSCAD version 2019.05

990KS March

OpenSCAD

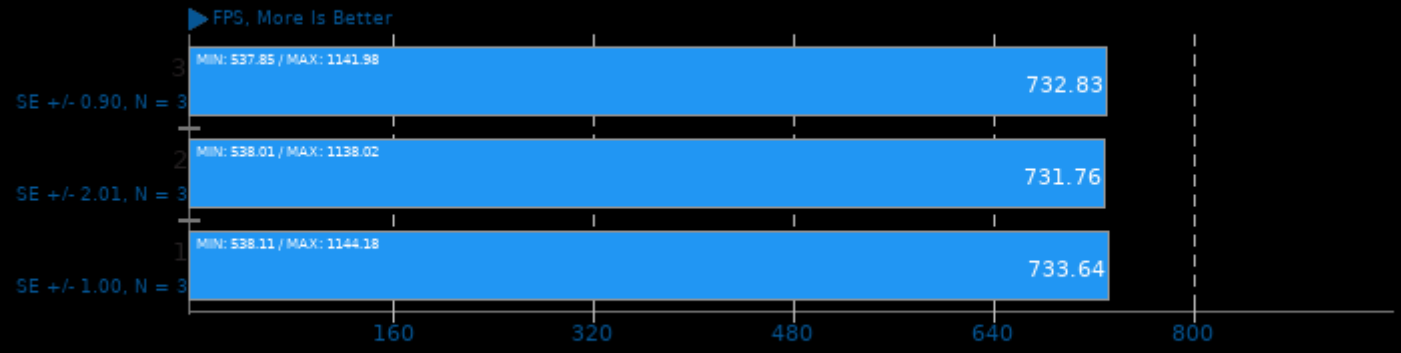
Render: Leonardo Phone Case Slim



1. OpenSCAD version 2019.05

dav1d 0.8.2

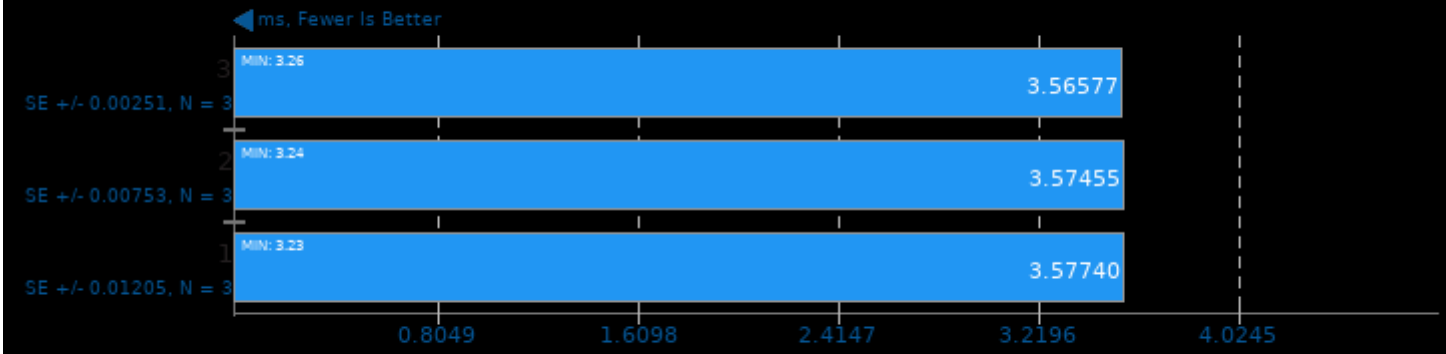
Video Input: Chimera 1080p



1. (CC) gcc options: -pthread -lm

oneDNN 2.1.2

Harness: IP Shapes 1D - Data Type: f32 - Engine: CPU

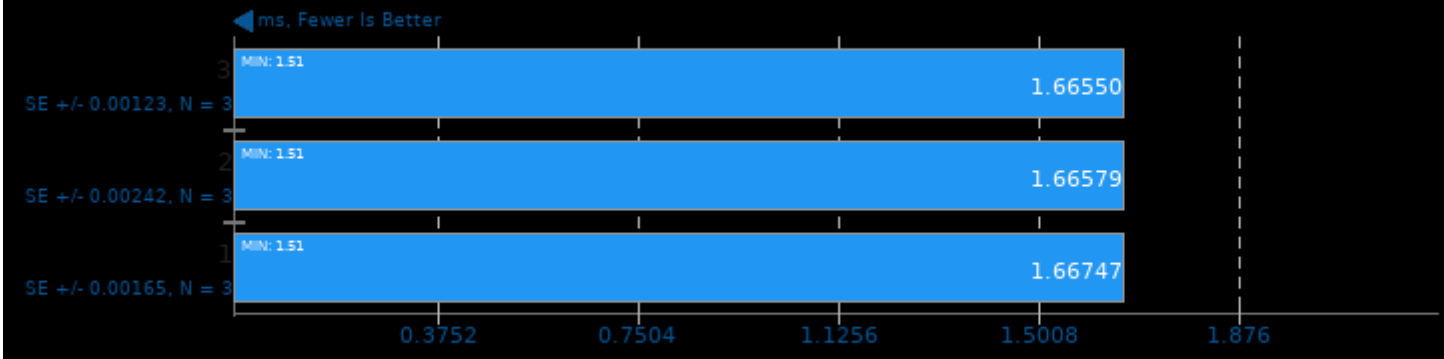


1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

990KS March

oneDNN 2.1.2

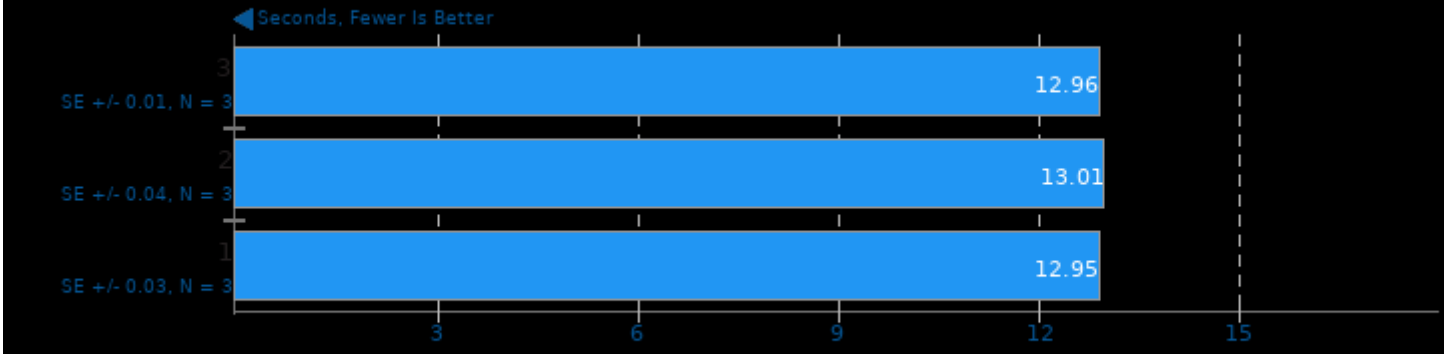
Harness: IP Shapes 1D - Data Type: u8s8f32 - Engine: CPU



1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

libavif avifenc 0.9.0

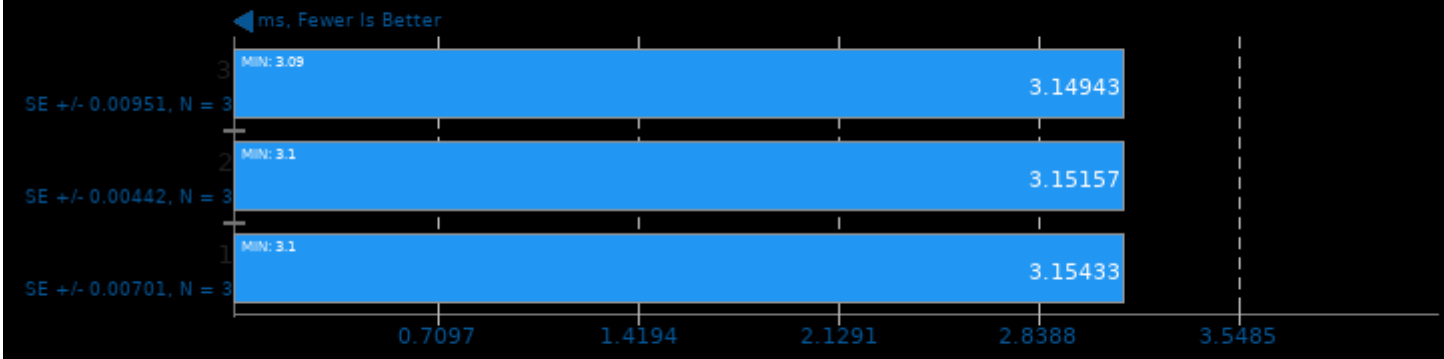
Encoder Speed: 6



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

oneDNN 2.1.2

Harness: Matrix Multiply Batch Shapes Transformer - Data Type: f32 - Engine: CPU

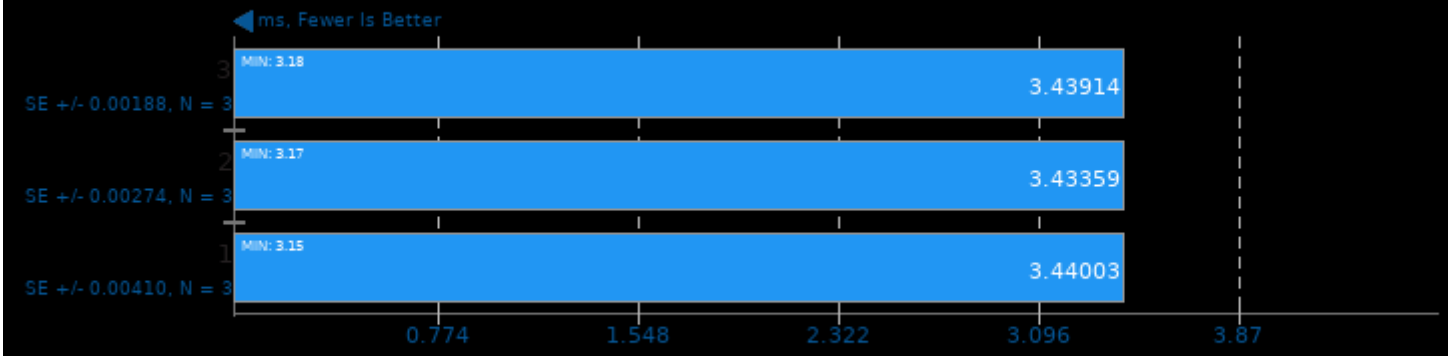


1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

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oneDNN 2.1.2

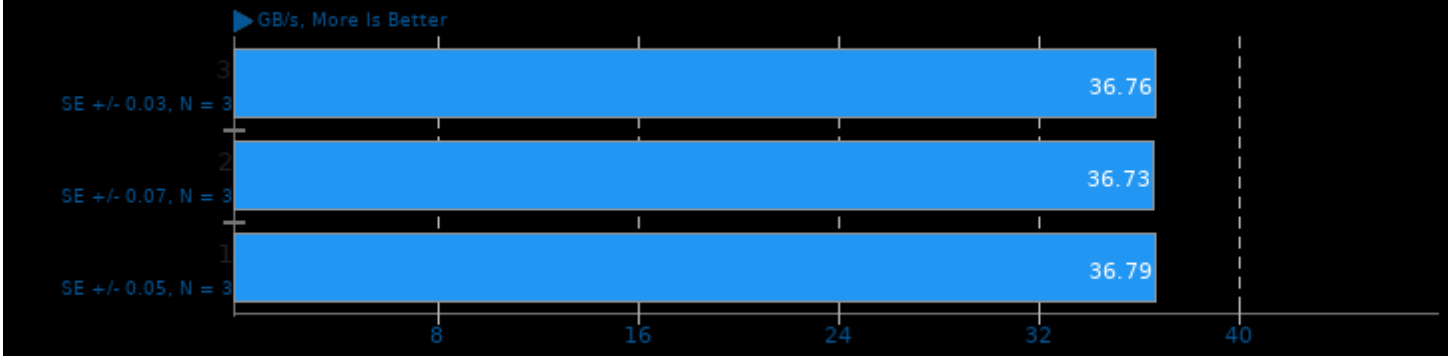
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: u8s8f32 - Engine: CPU



1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

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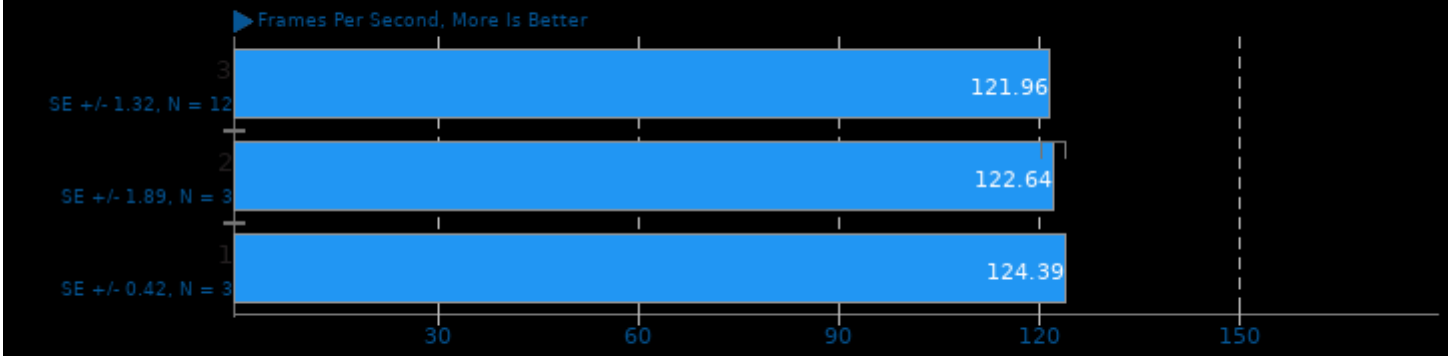
Target: OpenCL - Benchmark: Reduction



1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

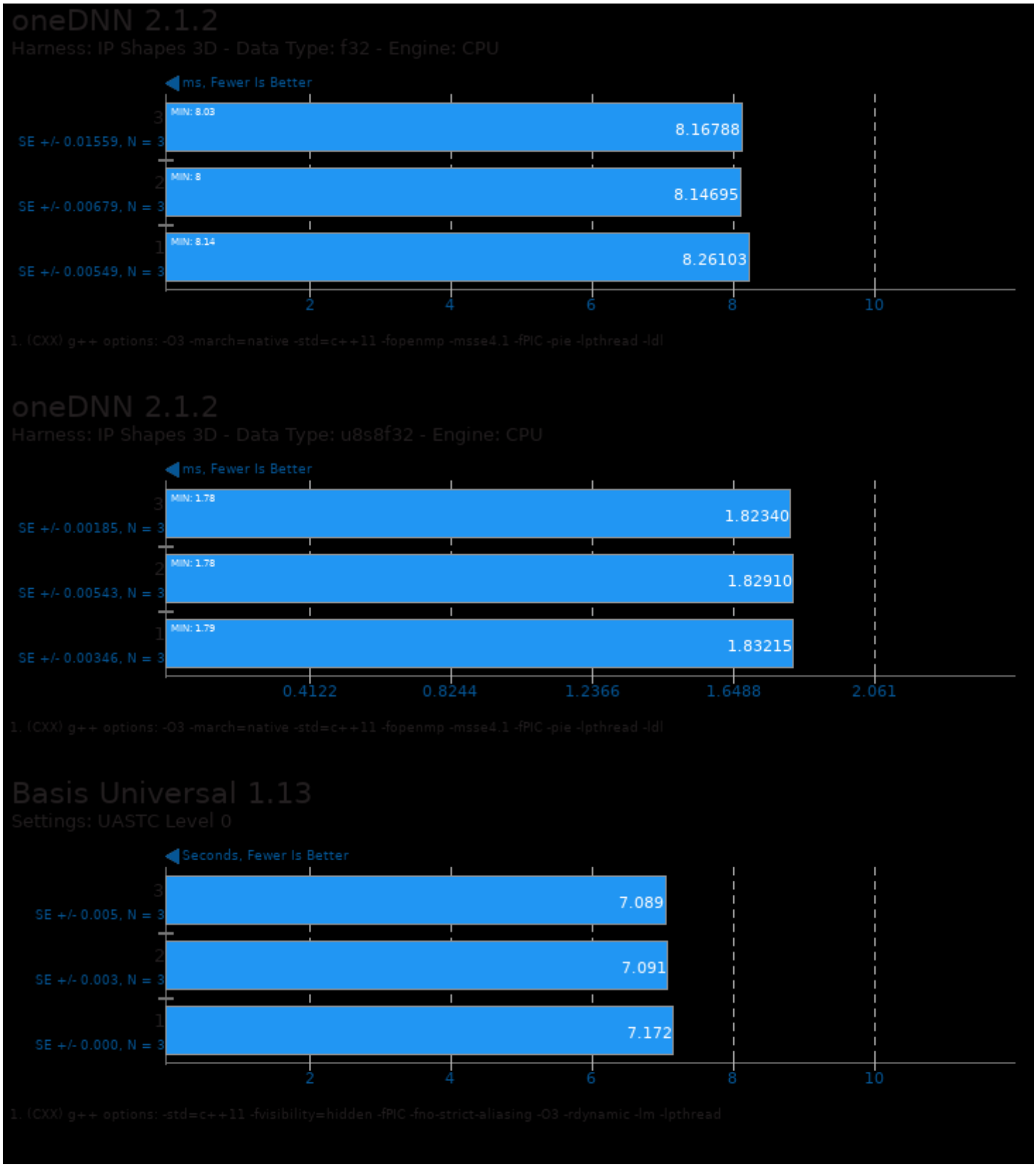
AOM AV1 3.0

Encoder Mode: Speed 8 Realtime - Input: Bosphorus 1080p



1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

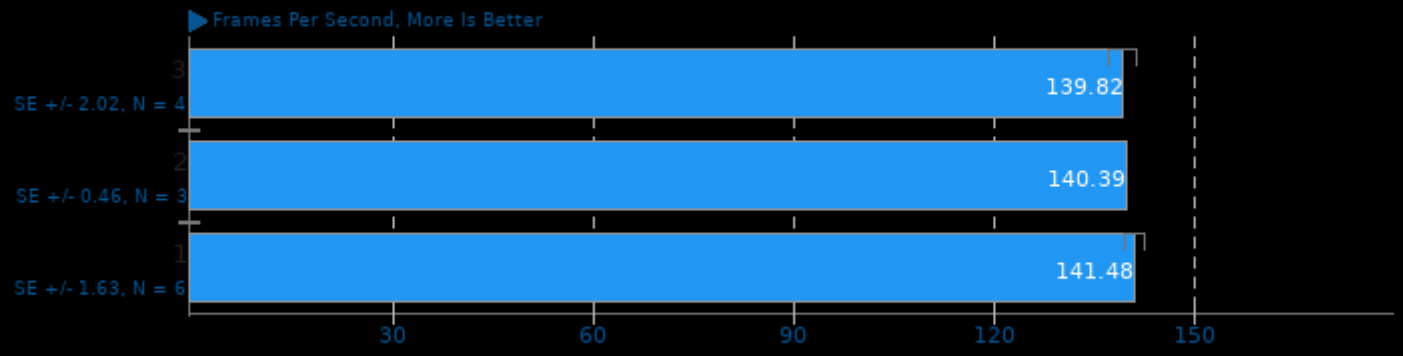
990KS March


oneDNN 2.1.2
Harness: IP Shapes 3D - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
MIN: 8.03
8.16788
SE +/- 0.01559, N = 3
MIN: 8
8.14695
SE +/- 0.00679, N = 3
MIN: 8.14
8.26103
SE +/- 0.00549, N = 3
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: IP Shapes 3D - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
MIN: 1.78
1.82340
SE +/- 0.00185, N = 3
MIN: 1.78
1.82910
SE +/- 0.00543, N = 3
MIN: 1.79
1.83215
SE +/- 0.00346, N = 3
0.4122
0.8244
1.2366
1.6488
2.061
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
Basis Universal 1.13
Settings: UASTC Level 0
Seconds, Fewer Is Better
7.089
SE +/- 0.005, N = 3
7.091
SE +/- 0.003, N = 3
7.172
SE +/- 0.000, N = 3
2
4
6
8
10
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

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AOM AV1 3.0

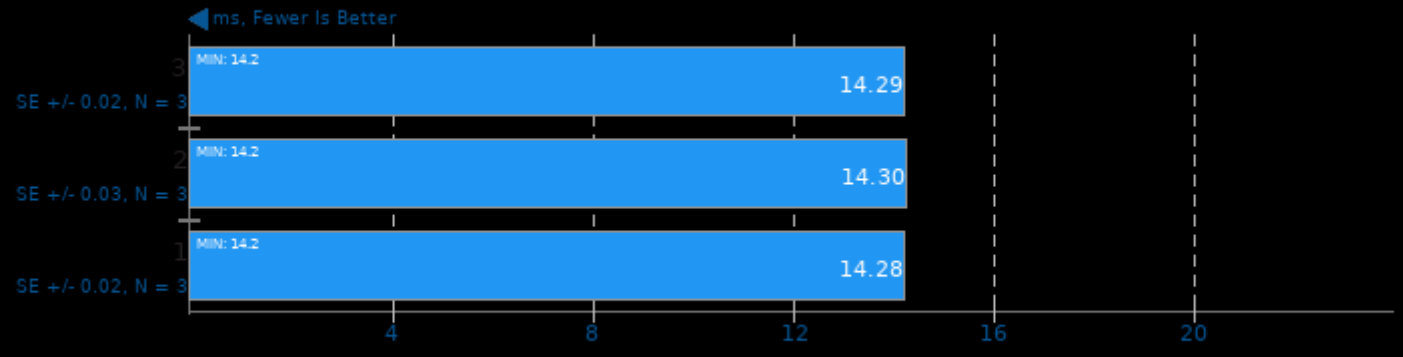
Encoder Mode: Speed 9 Realtime - Input: Bosphorus 1080p



1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

oneDNN 2.1.2

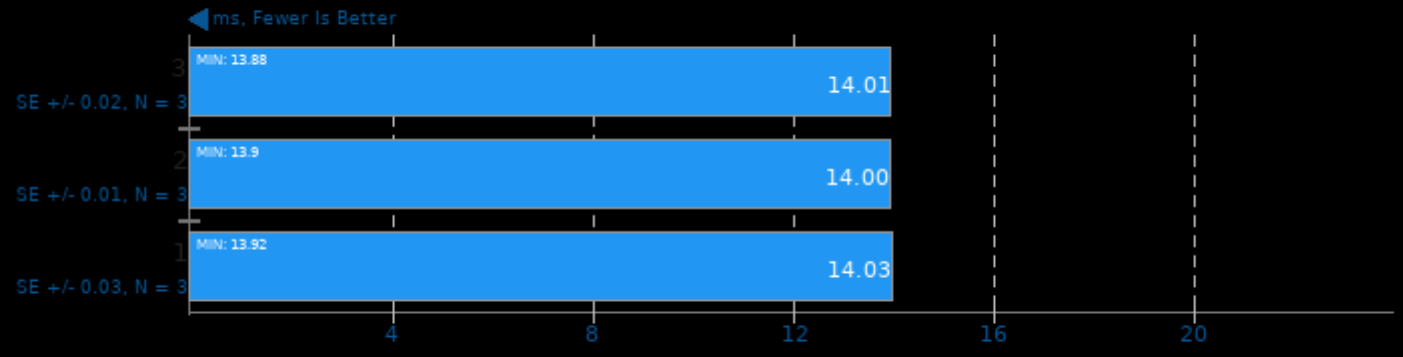
Harness: Convolution Batch Shapes Auto - Data Type: f32 - Engine: CPU



1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

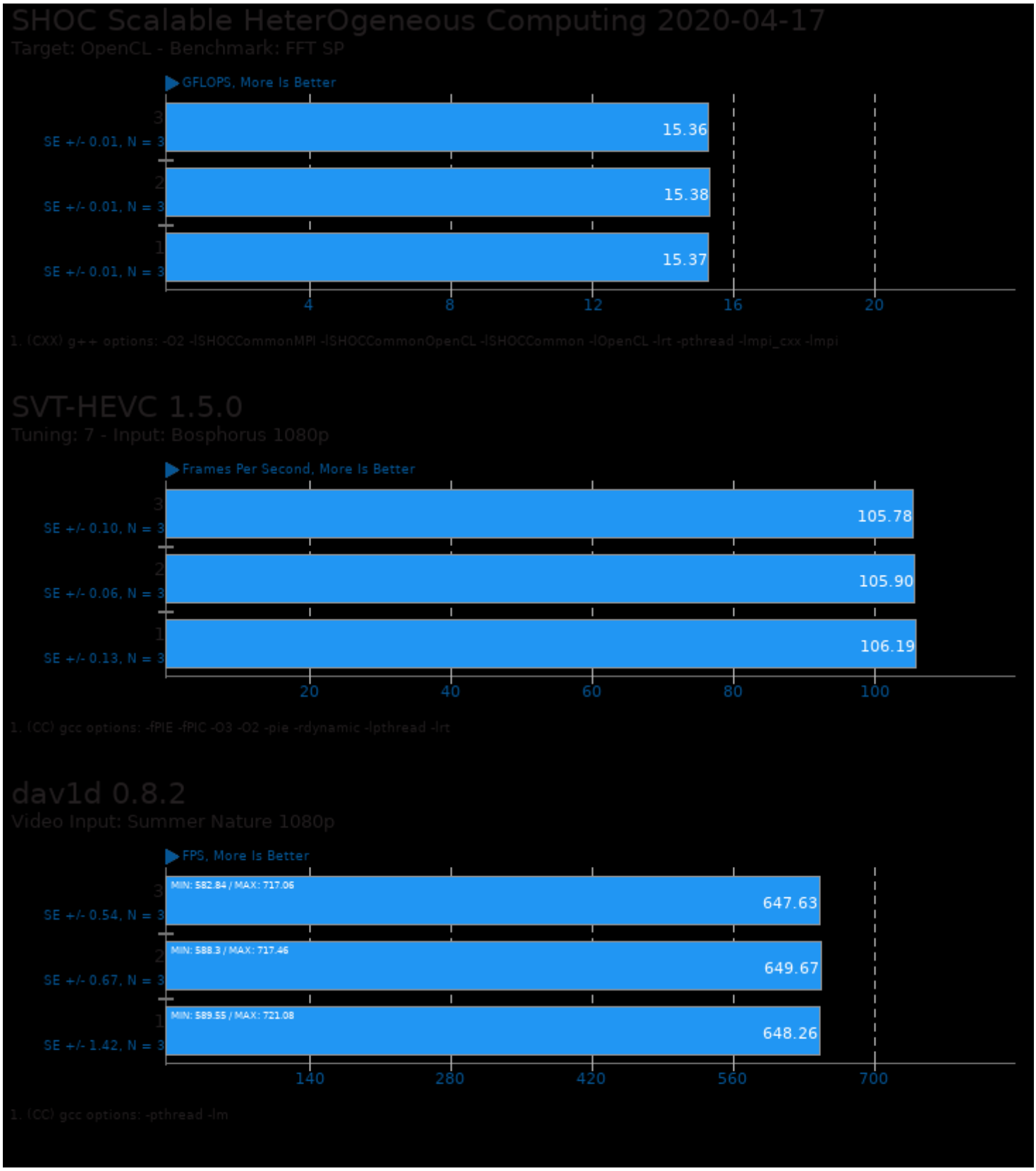
oneDNN 2.1.2

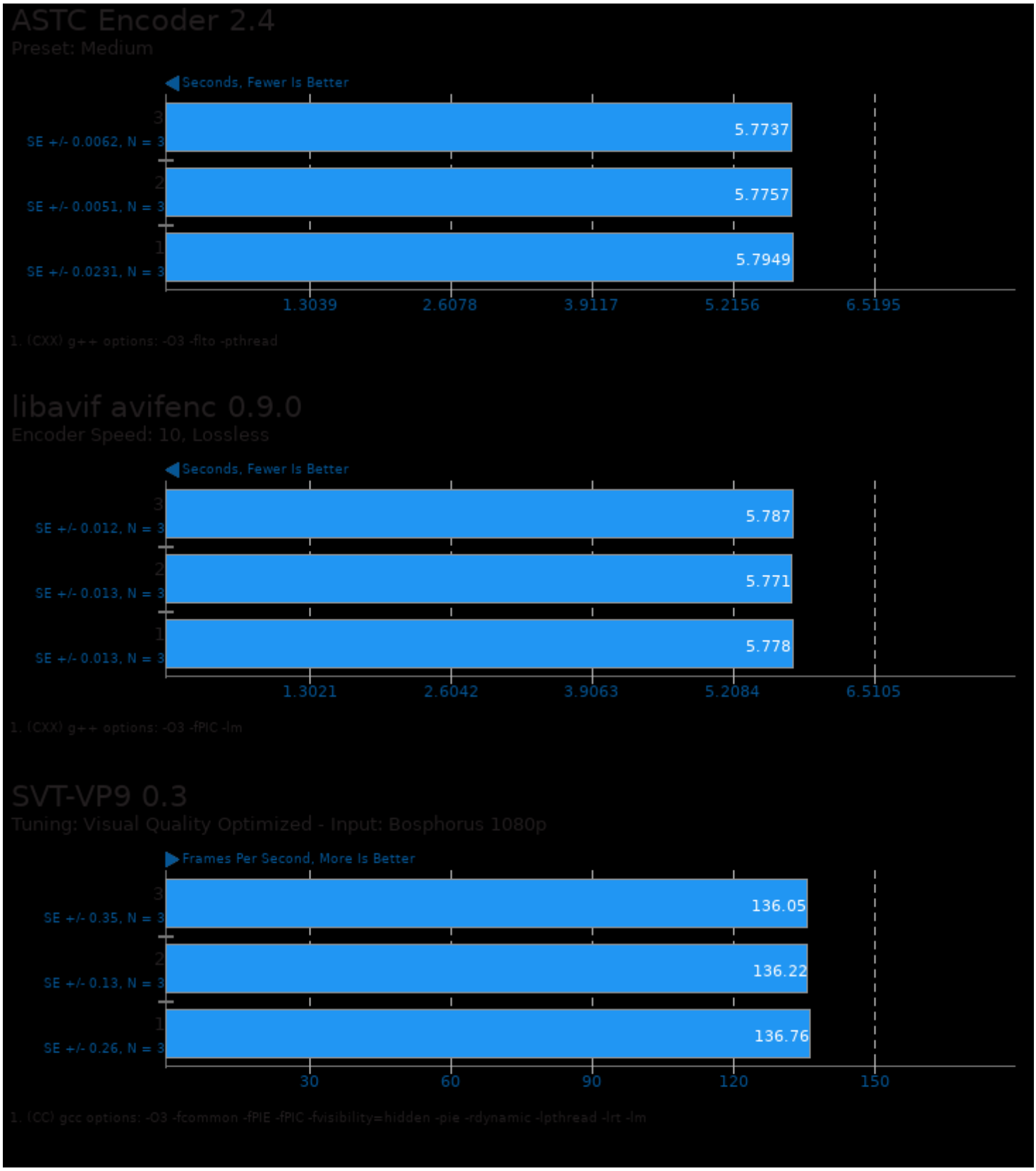
Harness: Convolution Batch Shapes Auto - Data Type: u8s8f32 - Engine: CPU



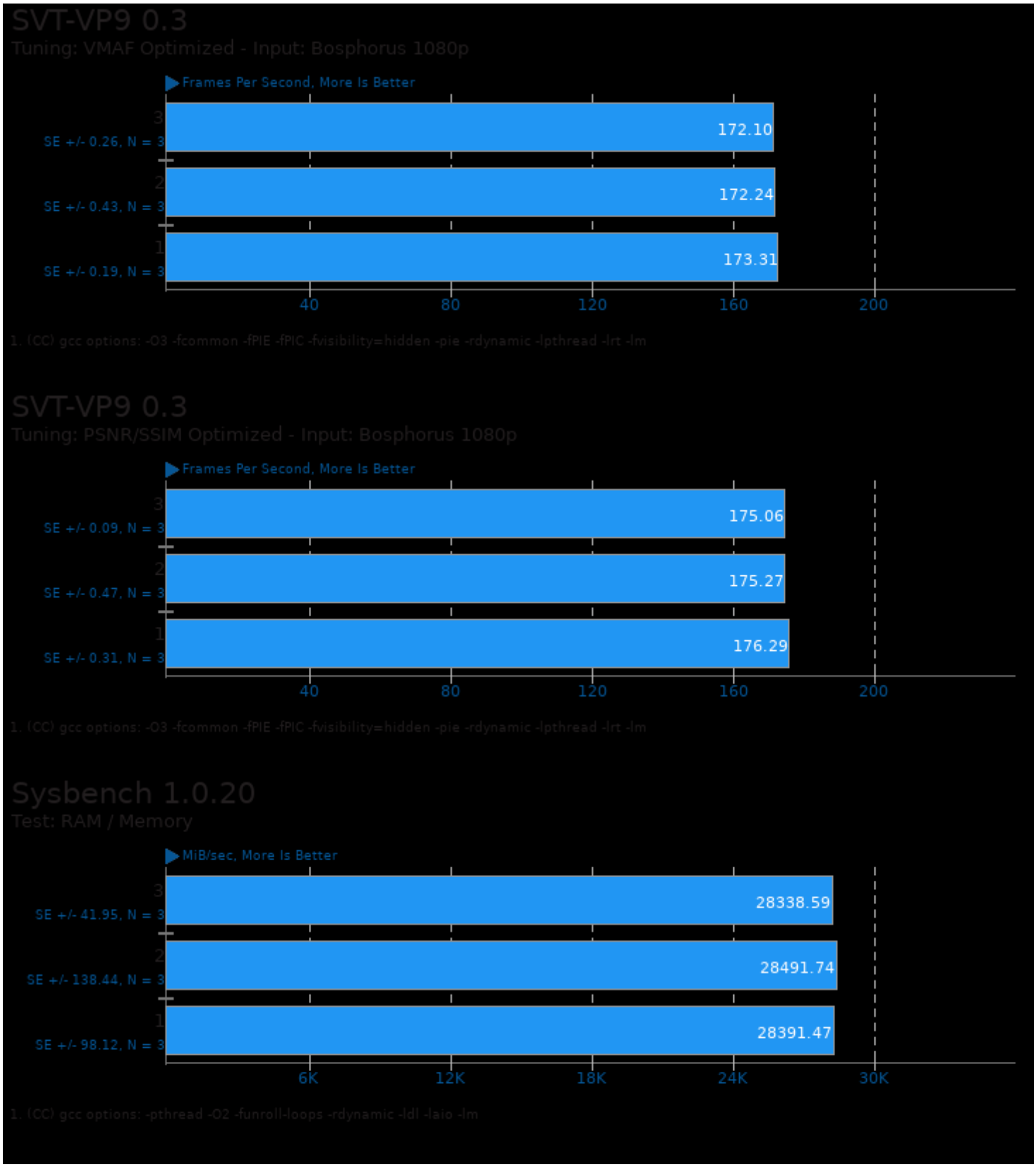
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

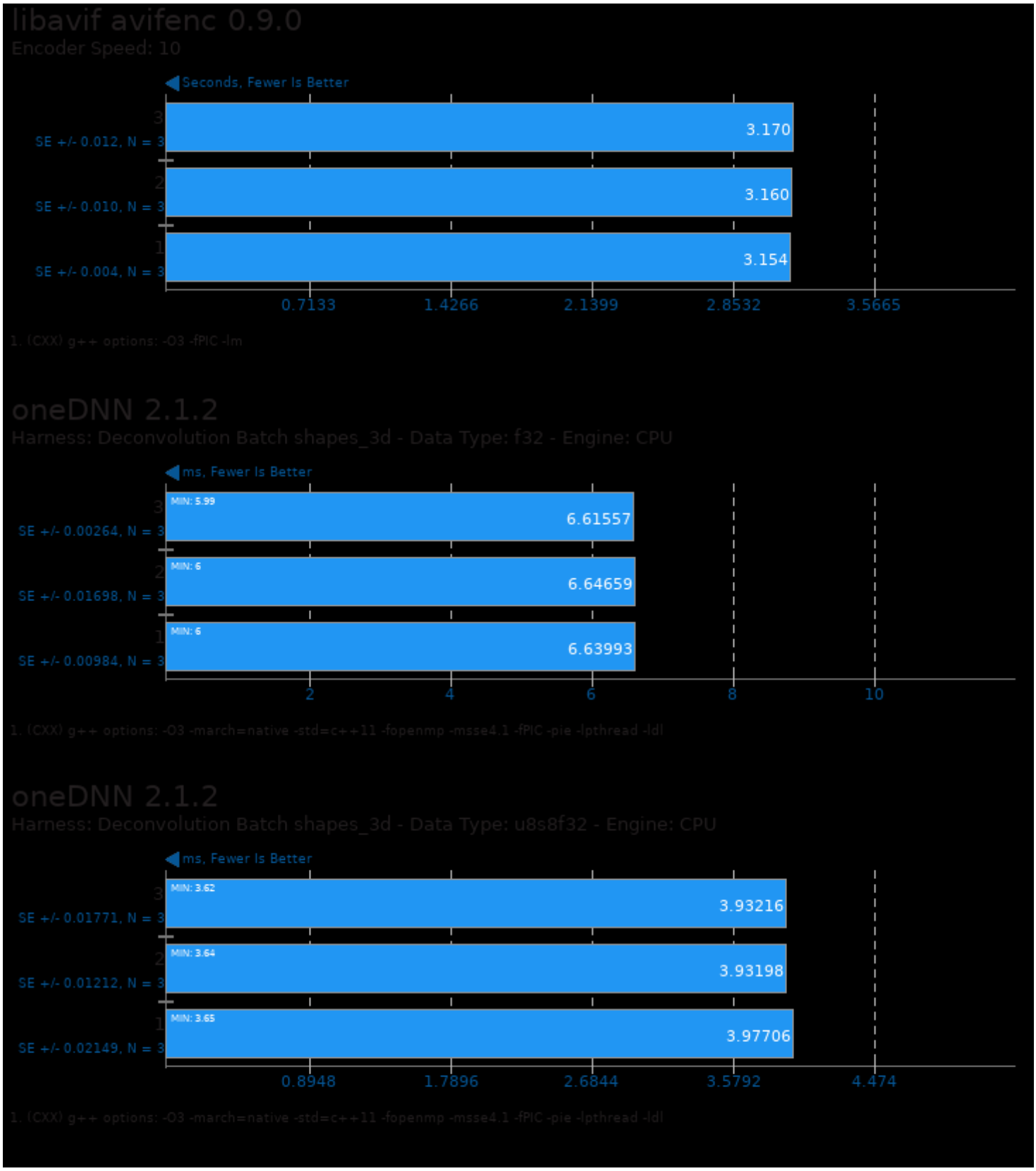
990KS March


SHOC Scalable HeterOgeneous Computing 2020-04-17
Target: OpenCL - Benchmark: FFT SP
GFLOPS, More Is Better
15.36
15.38
15.37
SE +/- 0.01, N = 3
4
8
12
16
20
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
SVT-HEVC 1.5.0
Tuning: 7 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
105.78
105.90
106.19
SE +/- 0.10, N = 3
SE +/- 0.06, N = 3
SE +/- 0.13, N = 3
20
40
60
80
100
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt
dav1d 0.8.2
Video Input: Summer Nature 1080p
FPS, More Is Better
MIN: 582.84 / MAX: 717.06
647.63
MIN: 588.3 / MAX: 717.46
649.67
MIN: 589.55 / MAX: 721.08
648.26
SE +/- 0.54, N = 3
SE +/- 0.67, N = 3
SE +/- 1.42, N = 3
140
280
420
560
700
1. (CC) gcc options: -pthread -lm


ASTC Encoder 2.4
Preset: Medium
Seconds, Fewer Is Better
SE +/- 0.0062, N = 3
SE +/- 0.0051, N = 3
SE +/- 0.0231, N = 3
5.7737
5.7757
5.7949
1.3039
2.6078
3.9117
5.2156
6.5195
1. (CXX) g++ options: -O3 -flto -pthread
libavif avifenc 0.9.0
Encoder Speed: 10, Lossless
Seconds, Fewer Is Better
SE +/- 0.012, N = 3
SE +/- 0.013, N = 3
SE +/- 0.013, N = 3
5.787
5.771
5.778
1.3021
2.6042
3.9063
5.2084
6.5105
1. (CXX) g++ options: -O3 -fPIC -lm
SVT-VP9 0.3
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
SE +/- 0.35, N = 3
SE +/- 0.13, N = 3
SE +/- 0.26, N = 3
136.05
136.22
136.76
30
60
90
120
150
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm

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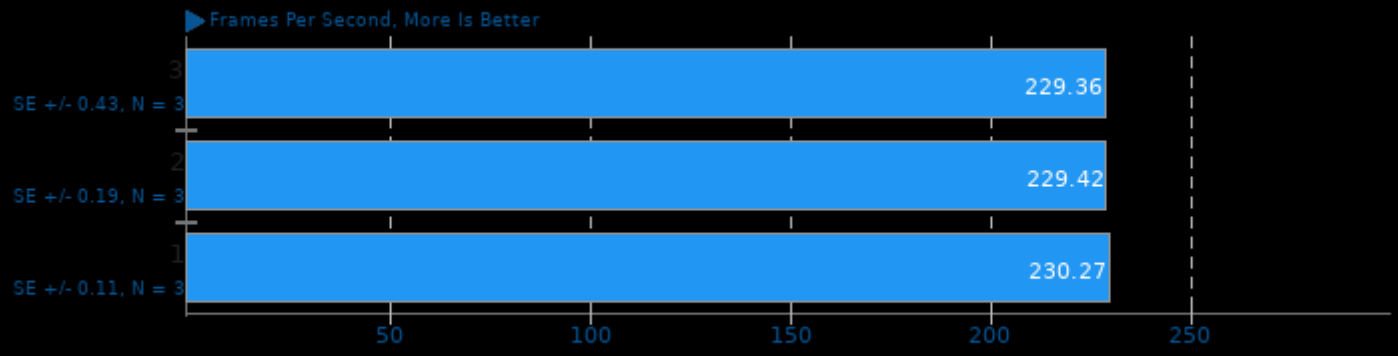

SVT-VP9 0.3
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
3
SE +/- 0.26, N = 3
172.10
2
SE +/- 0.43, N = 3
172.24
1
SE +/- 0.19, N = 3
173.31
40
80
120
160
200
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm
SVT-VP9 0.3
Tuning: PSNR/SSIM Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
3
SE +/- 0.09, N = 3
175.06
2
SE +/- 0.47, N = 3
175.27
1
SE +/- 0.31, N = 3
176.29
40
80
120
160
200
1. (CC) gcc options: -O3 -fcommon -fPIE -fPIC -fvisibility=hidden -pie -rdynamic -lpthread -lrt -lm
Sysbench 1.0.20
Test: RAM / Memory
MiB/sec, More Is Better
3
SE +/- 41.95, N = 3
28338.59
2
SE +/- 138.44, N = 3
28491.74
1
SE +/- 98.12, N = 3
28391.47
6K
12K
18K
24K
30K
1. (CC) gcc options: -pthread -O2 -funroll-loops -rdynamic -ldl -laio -lm


libavif avifenc 0.9.0
Encoder Speed: 10
Seconds, Fewer Is Better
SE +/- 0.012, N = 3
3.170
SE +/- 0.010, N = 3
3.160
SE +/- 0.004, N = 3
3.154
0.7133
1.4266
2.1399
2.8532
3.5665
1. (CXX) g++ options: -O3 -fPIC -lm
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_3d - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
SE +/- 0.00264, N = 3
MIN: 5.99
6.61557
SE +/- 0.01698, N = 3
MIN: 6
6.64659
SE +/- 0.00984, N = 3
MIN: 6
6.63993
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_3d - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
SE +/- 0.01771, N = 3
MIN: 3.62
3.93216
SE +/- 0.01212, N = 3
MIN: 3.64
3.93198
SE +/- 0.02149, N = 3
MIN: 3.65
3.97706
0.8948
1.7896
2.6844
3.5792
4.474
1. (CXX) g++ options: -O3 -march=native -std=c++11 -fopenmp -msse4.1 -fPIC -pie -lpthread -ldl

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SVT-HEVC 1.5.0

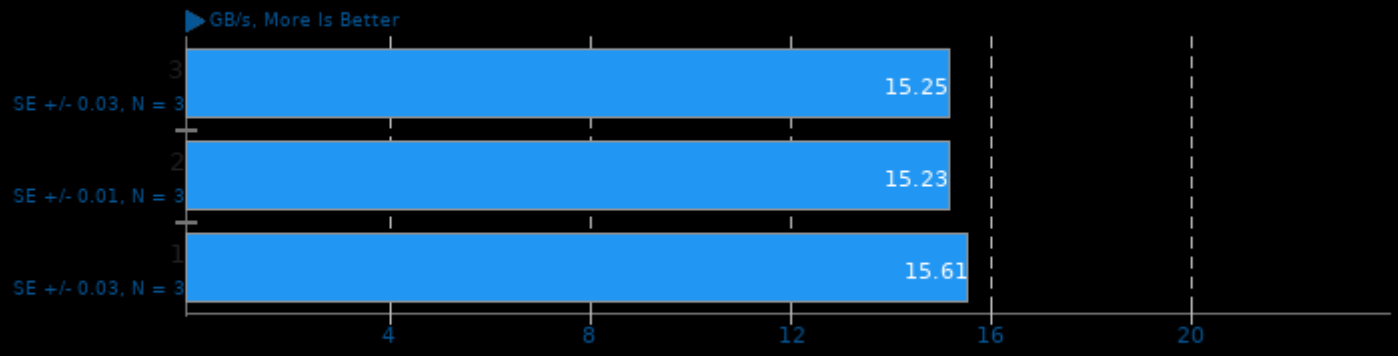
Tuning: 10 - Input: Bosphorus 1080p



1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

SHOC Scalable HeterOgeneous Computing 2020-04-17

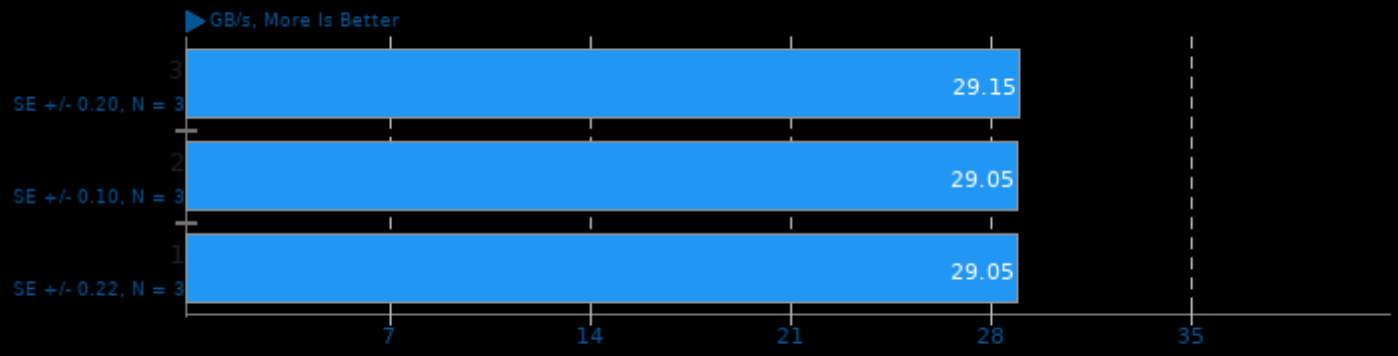
Target: OpenCL - Benchmark: Triad



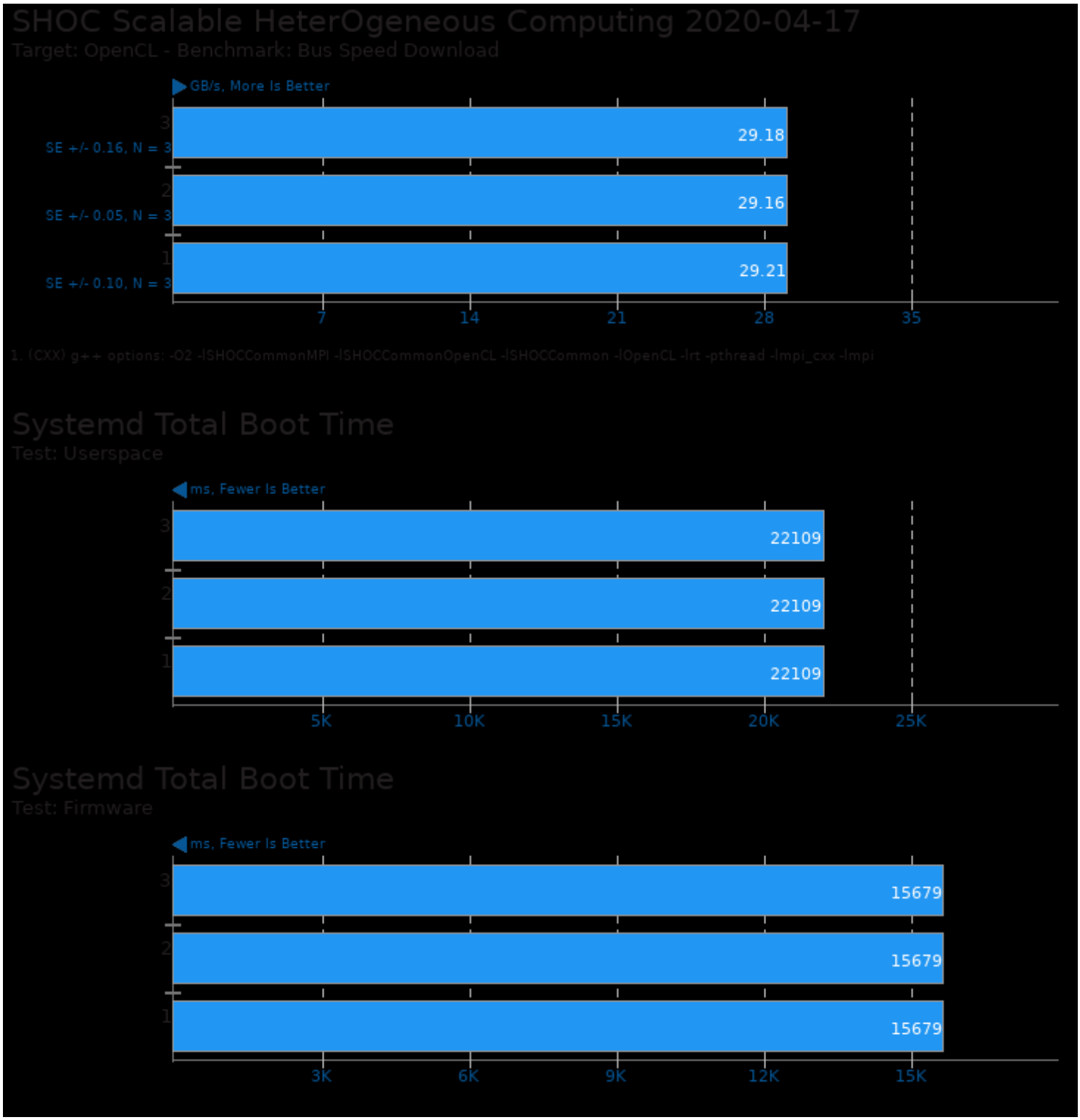
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

SHOC Scalable HeterOgeneous Computing 2020-04-17

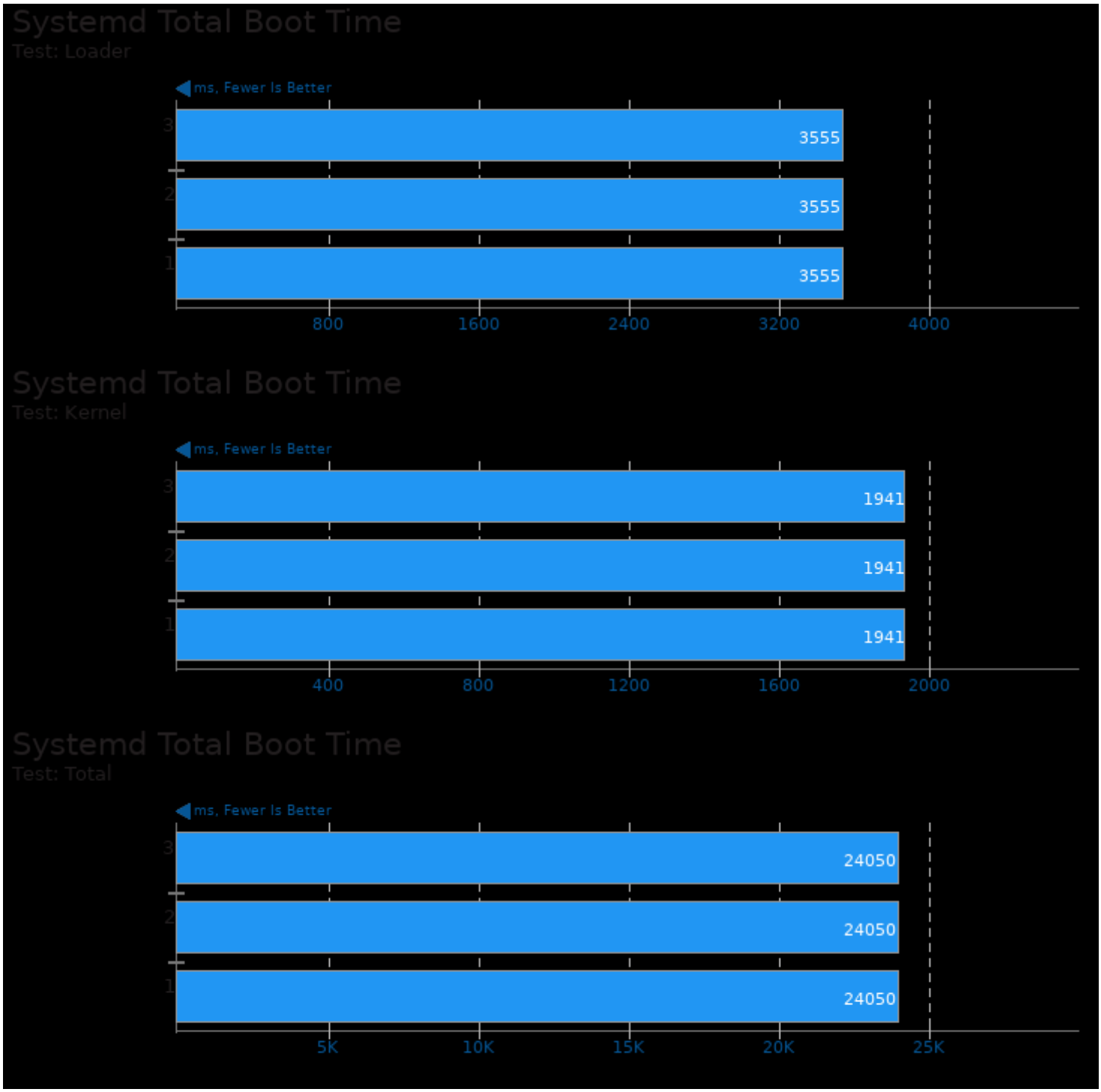
Target: OpenCL - Benchmark: Bus Speed Readback



1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

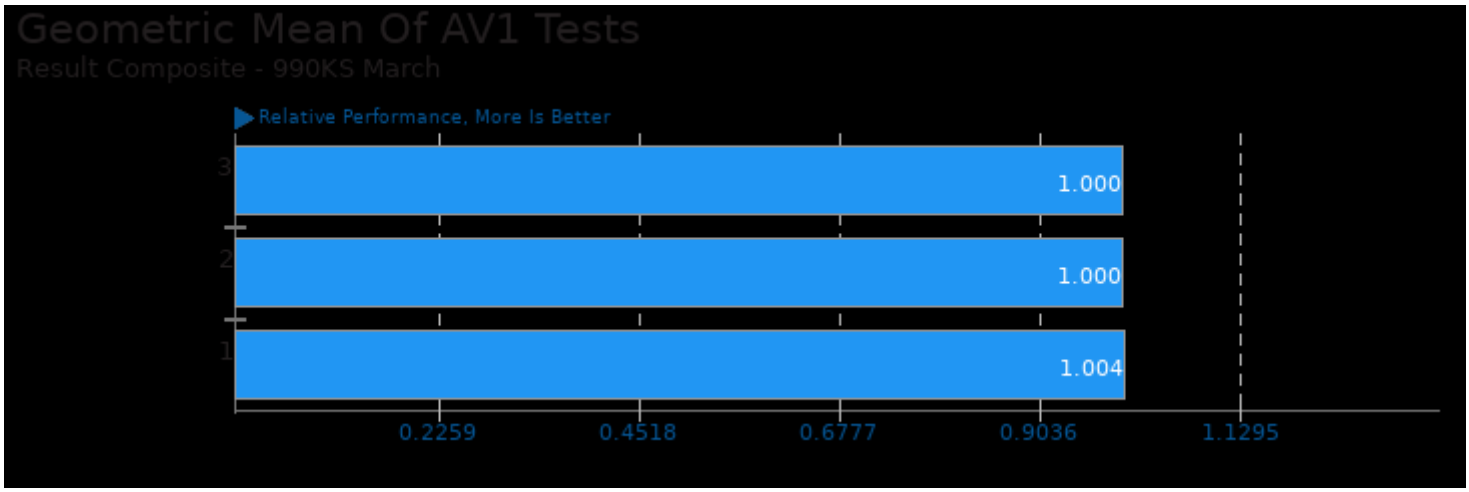

SHOC Scalable HeterOgeneous Computing 2020-04-17
Target: OpenCL - Benchmark: Bus Speed Download
GB/s, More Is Better
29.18
29.16
29.21
SE +/- 0.16, N = 3
SE +/- 0.05, N = 3
SE +/- 0.10, N = 3
7
14
21
28
35
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
Systemd Total Boot Time
Test: Userspace
ms, Fewer Is Better
22109
22109
22109
5K
10K
15K
20K
25K
Systemd Total Boot Time
Test: Firmware
ms, Fewer Is Better
15679
15679
15679
3K
6K
9K
12K
15K

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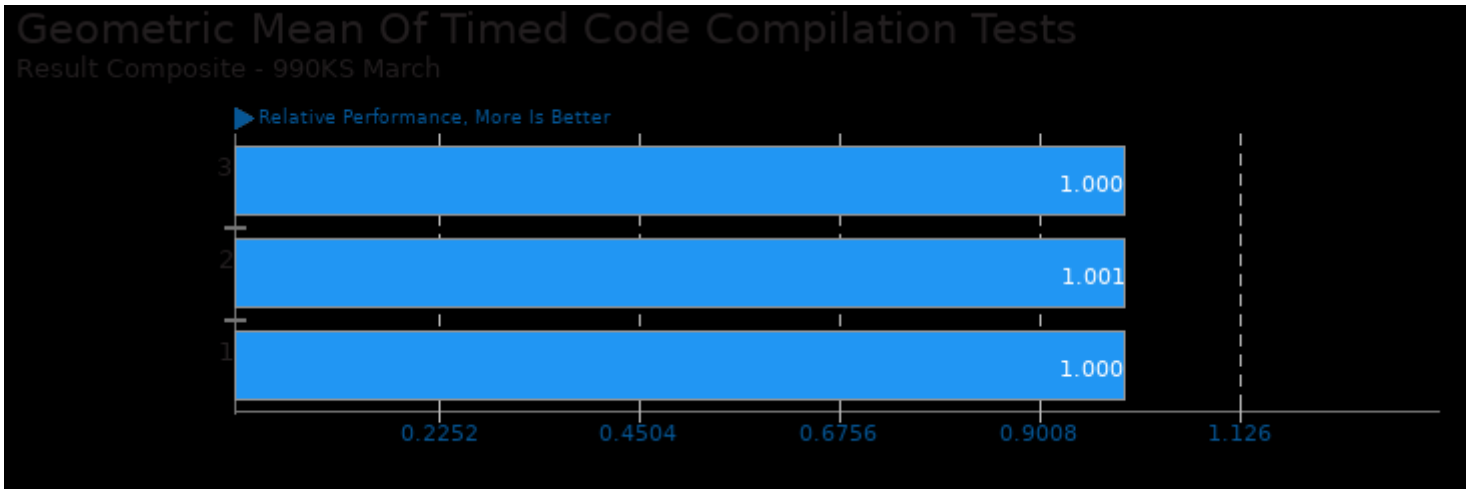

Systemd Total Boot Time
Test: Loader
ms, Fewer Is Better
3
2
1
3555
3555
3555
800
1600
2400
3200
4000
Systemd Total Boot Time
Test: Kernel
ms, Fewer Is Better
3
2
1
1941
1941
1941
400
800
1200
1600
2000
Systemd Total Boot Time
Test: Total
ms, Fewer Is Better
3
2
1
24050
24050
24050
5K
10K
15K
20K
25K

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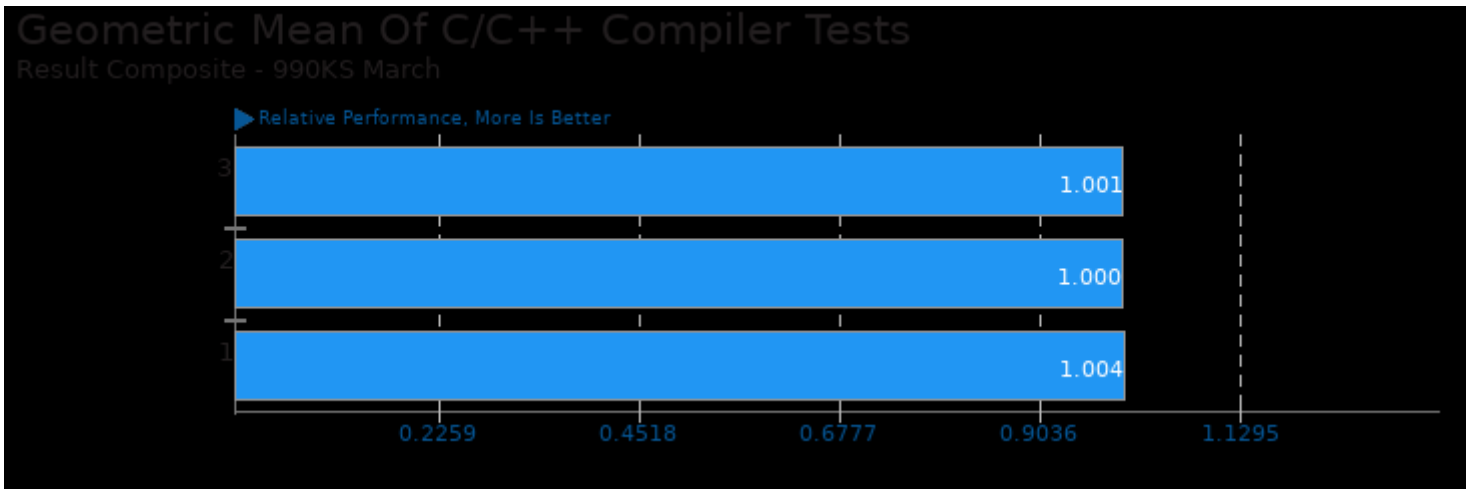
These geometric means are based upon test groupings / test suites for this result file.



Geometric mean based upon tests: pts/dav1d, pts/aom-av1 and pts/avifenc



Geometric mean based upon tests: pts/build-linux-kernel, pts/build-erlang, pts/build-nodejs and pts/build-mesa



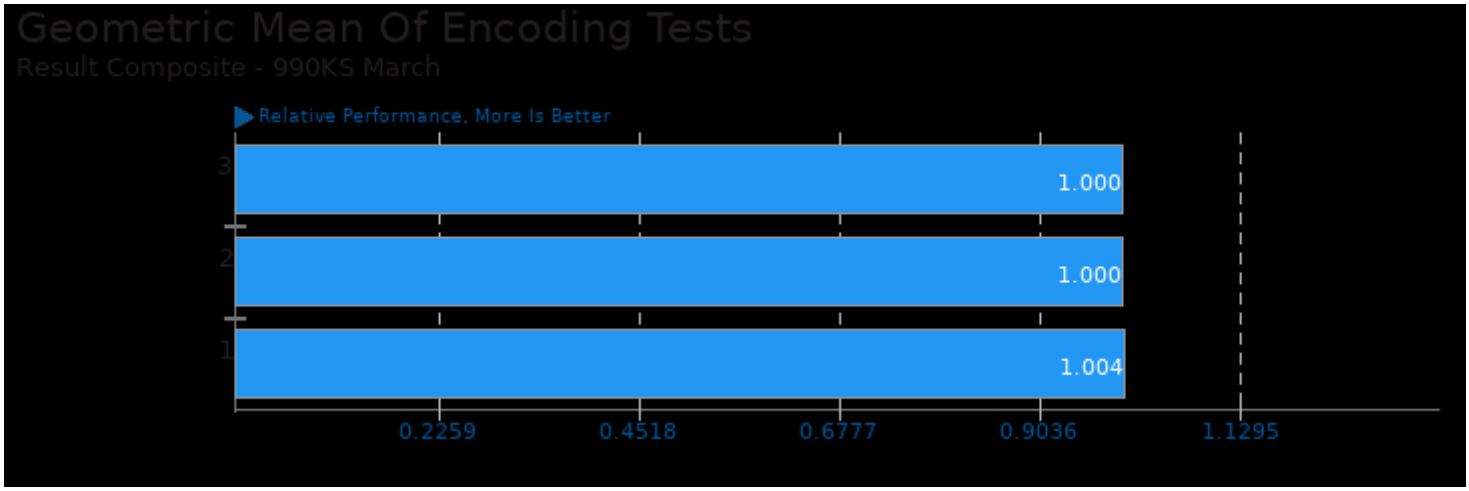
Geometric mean based upon tests: pts/stockfish, pts/dav1d, pts/compress-zstd, pts/aom-av1, pts/svt-vp9, pts/toybrot and pts/basis



Geometric mean based upon tests: pts/build-linux-kernel, pts/compress-zstd, pts/dav1d, pts/svt-hevc, pts/svt-vp9, pts/onednn, pts/stockfish, pts/sysbench and pts/botan

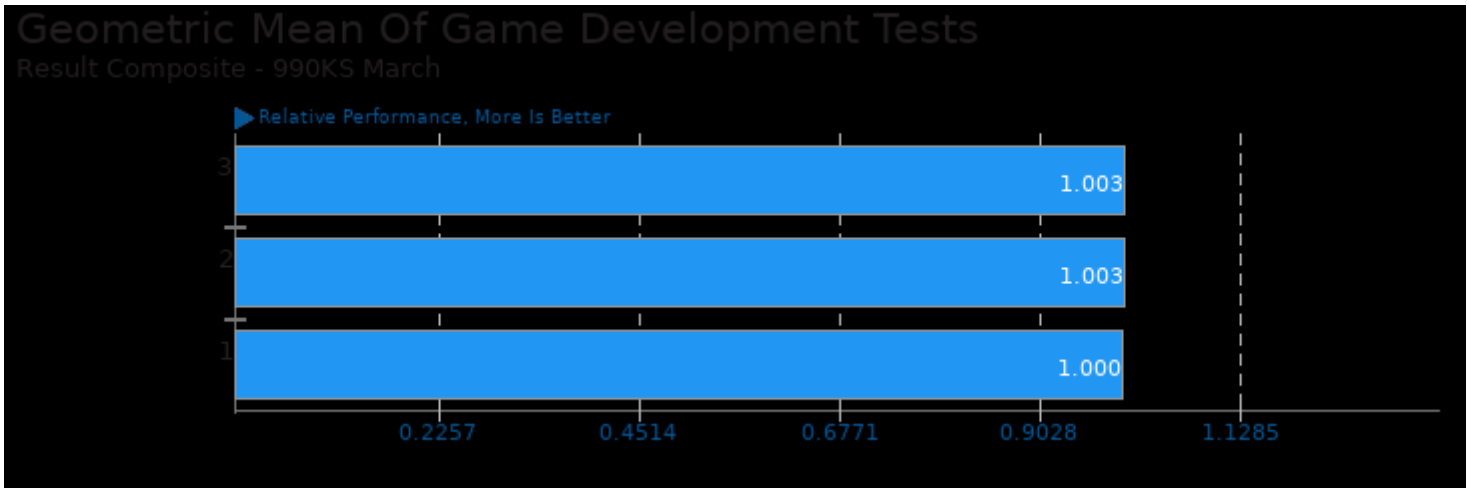


Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/dav1d, pts/aom-av1, pts/avifenc, pts/onednn, pts/basis, pts/astcenc and system/openscad

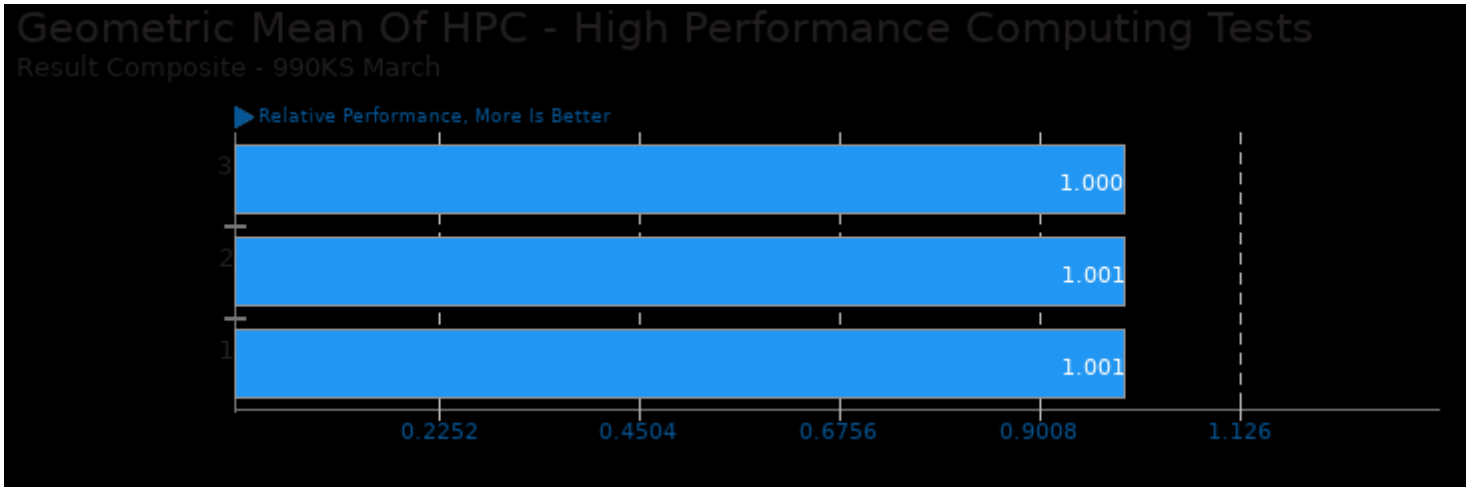


Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/dav1d, pts/aom-av1 and pts/avifenc

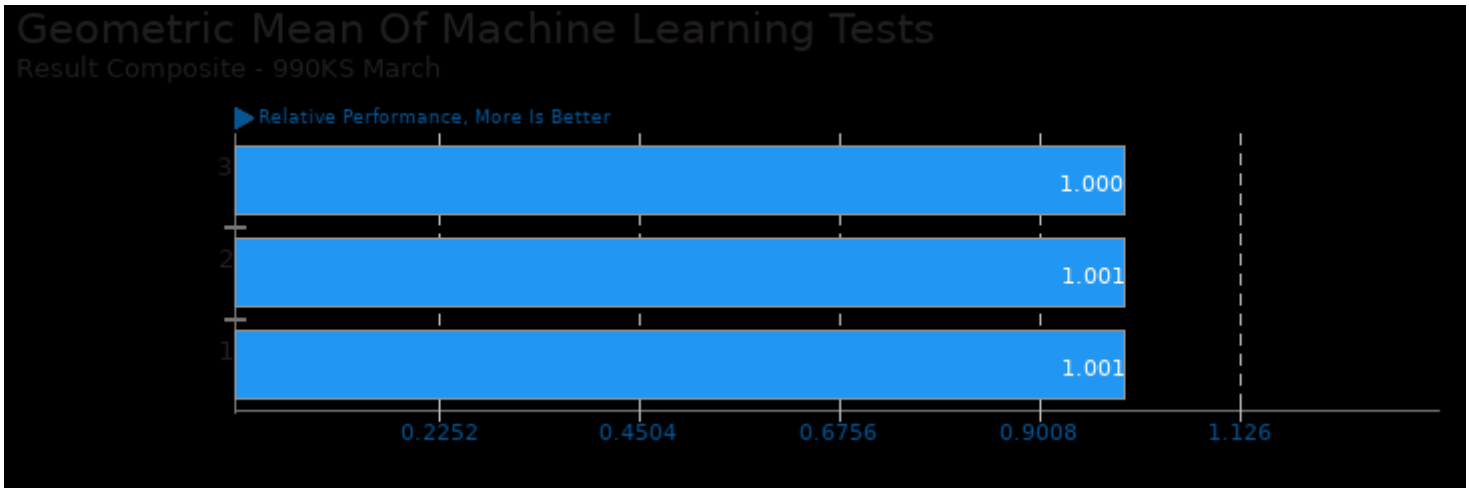
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Geometric mean based upon tests: pts/basis and pts/astcenc



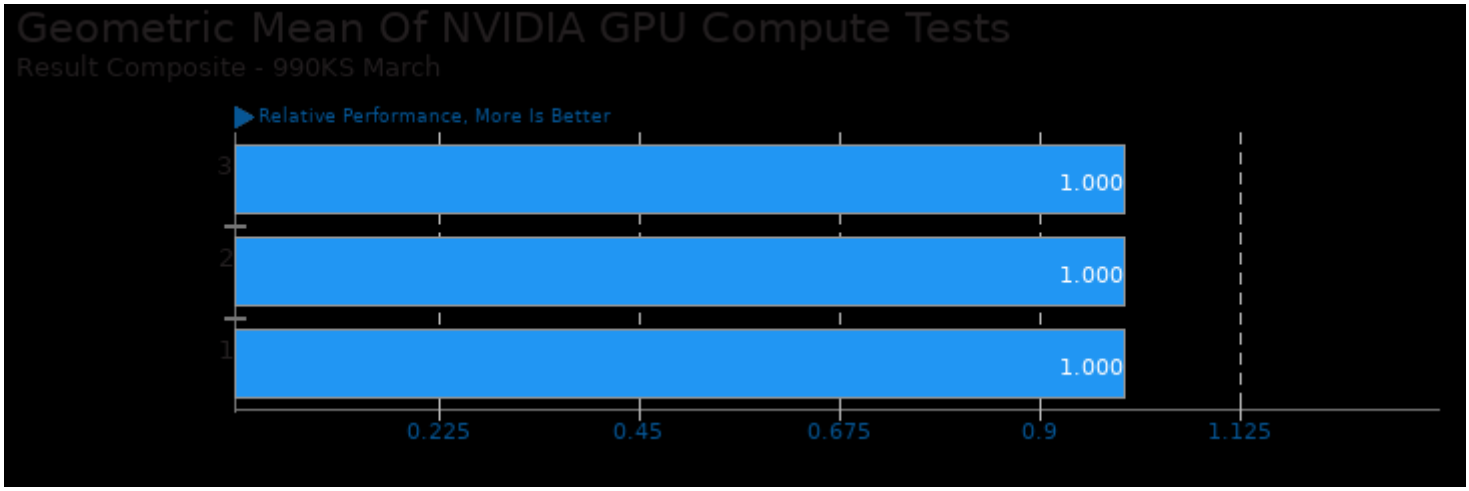
Geometric mean based upon tests: pts/incompact3d, pts/mnn, pts/shoc and pts/onednn



Geometric mean based upon tests: pts/mnn, pts/shoc and pts/onednn



Geometric mean based upon tests: pts/sysbench, pts/stockfish, pts/svt-vp9, pts/svt-hevc, pts/dav1d, pts/aom-av1, pts/avifenc, pts/onednn, pts/compress-zstd, pts/build-linux-kernel, pts/build-erlang, pts/build-nodejs and pts/build-mesa

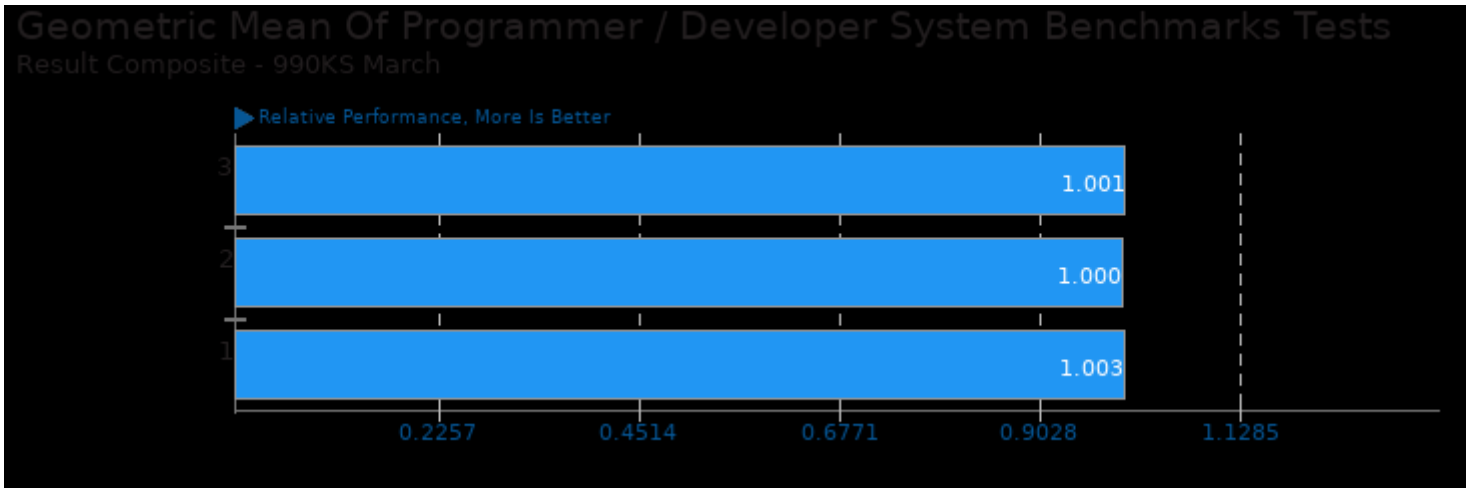


Geometric mean based upon tests: pts/viennacl and pts/shoc

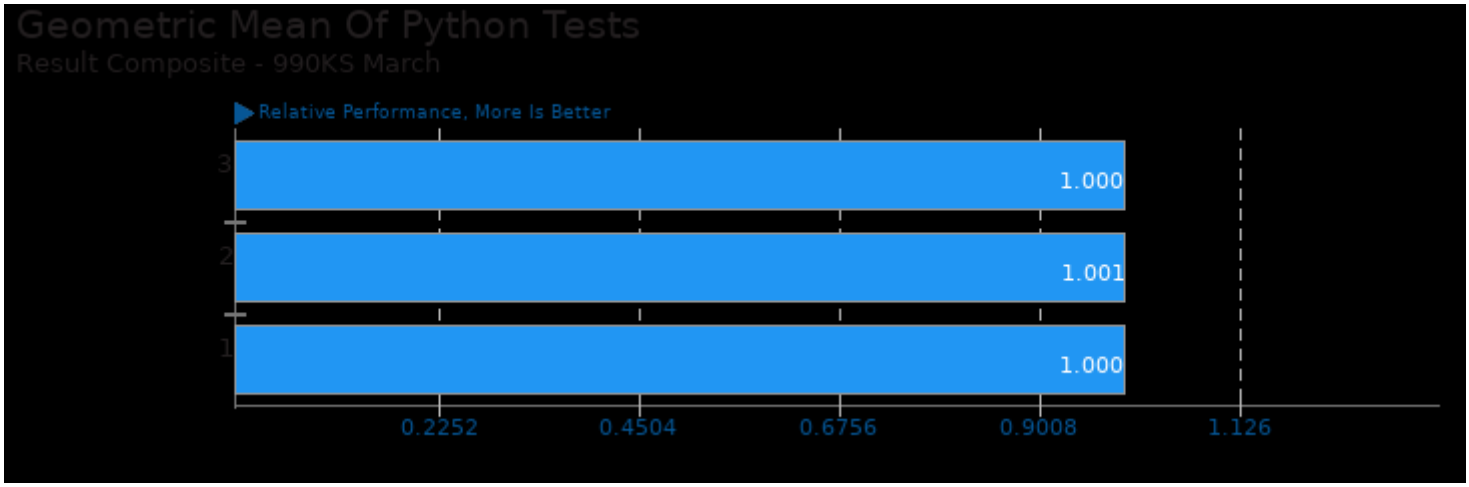


Geometric mean based upon tests: pts/shoc and pts/viennacl

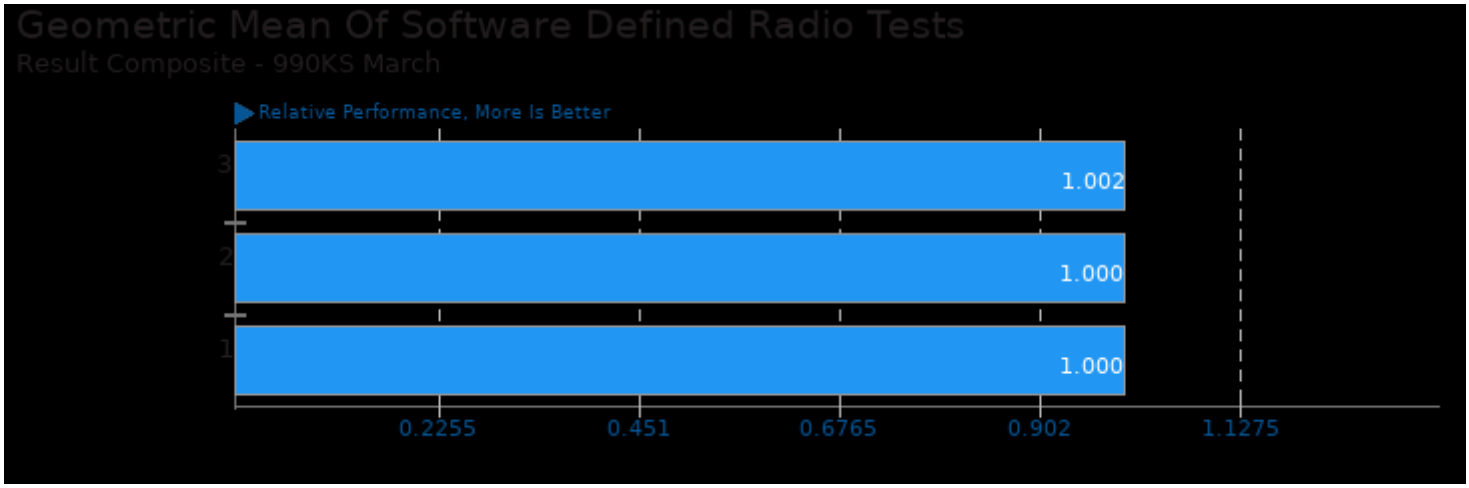
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Geometric mean based upon tests: pts/simdjson, pts/compress-zstd, pts/build-linux-kernel, pts/build-erlang, pts/build-nodejs and pts/build-mesa

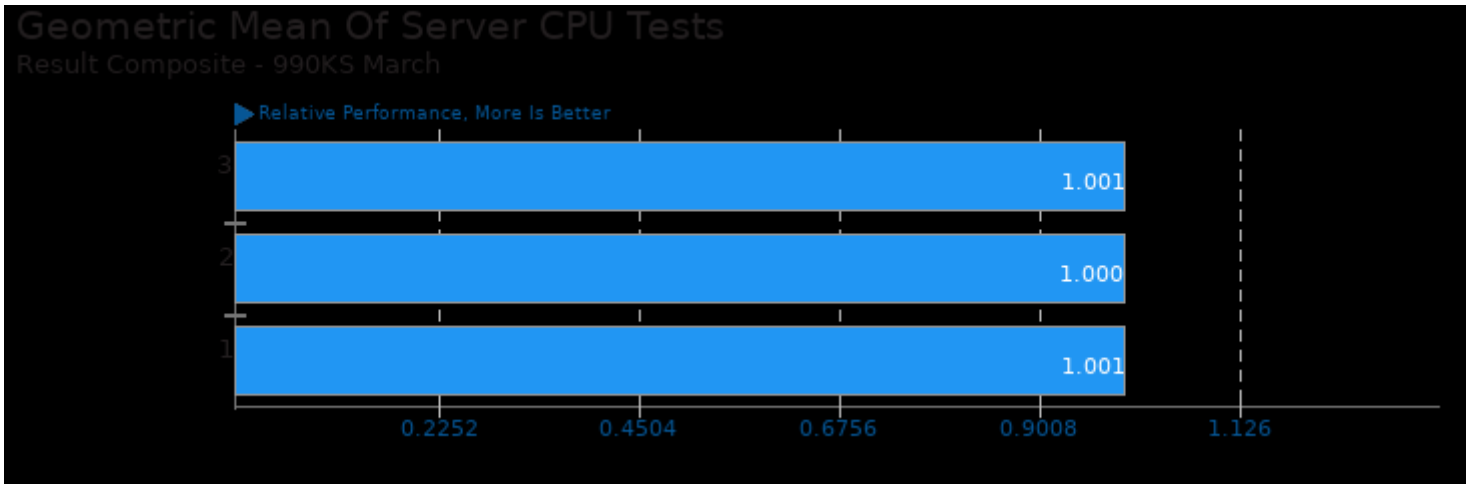


Geometric mean based upon tests: pts/build-nodejs, system/gnuradio, pts/build-mesa and pts/systemd-boot-total

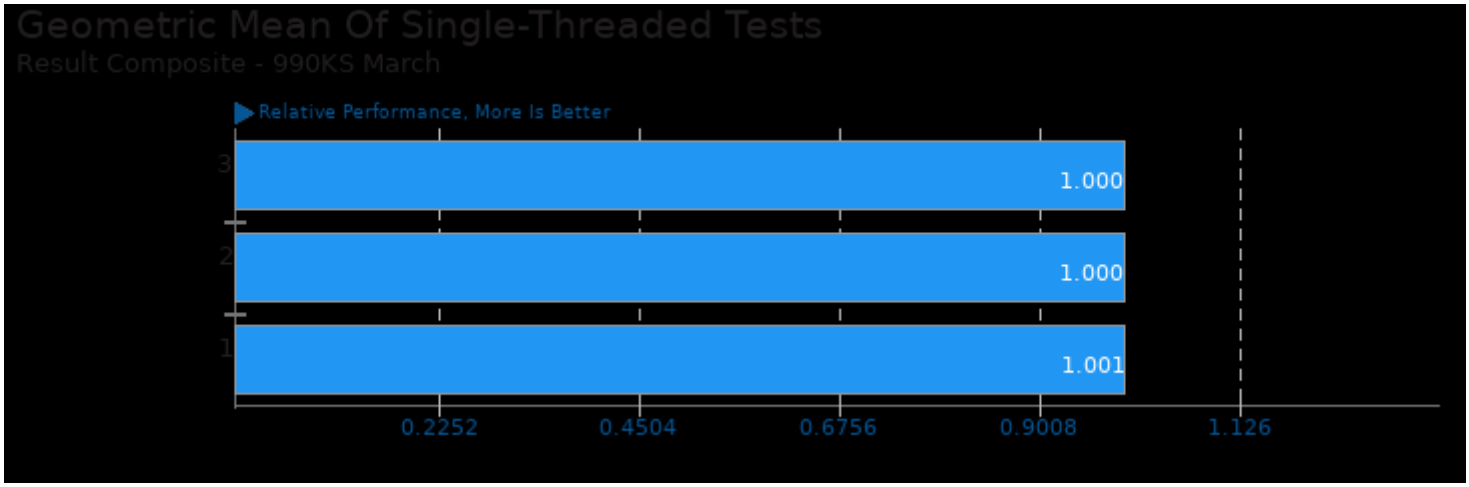


Geometric mean based upon tests: pts/liquid-dsp, pts/srslte, pts/luaradio and system/gnuradio

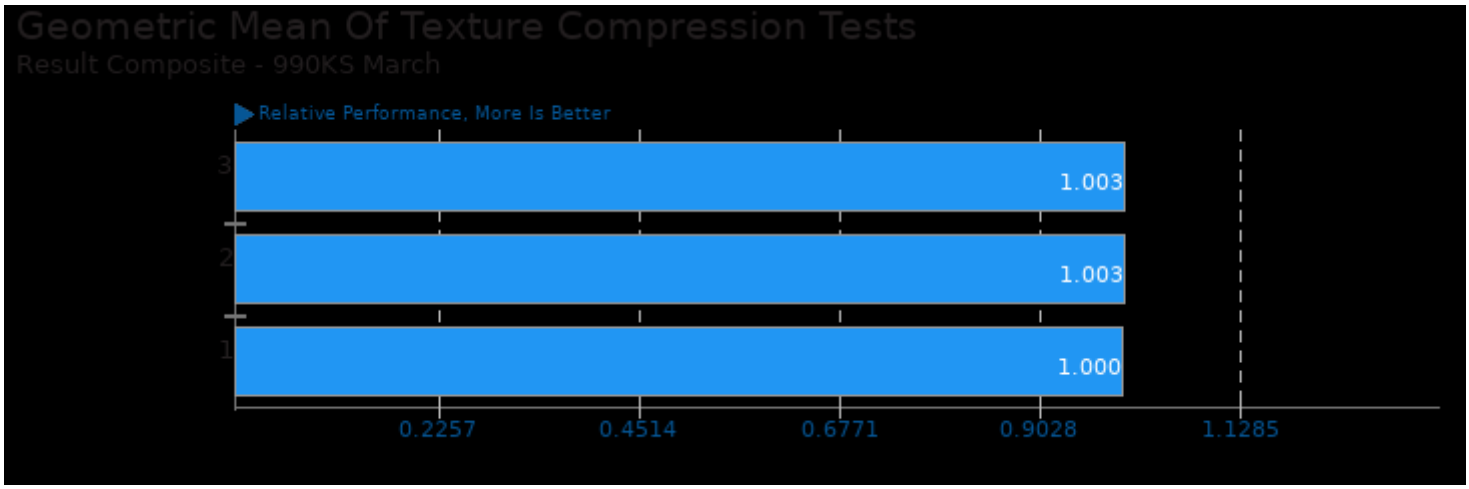
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Geometric mean based upon tests: pts/onednn, pts/svt-hevc, pts/svt-vp9, pts/dav1d, pts/stockfish, pts/build-linux-kernel, pts/compress-zstd and pts/sysbench

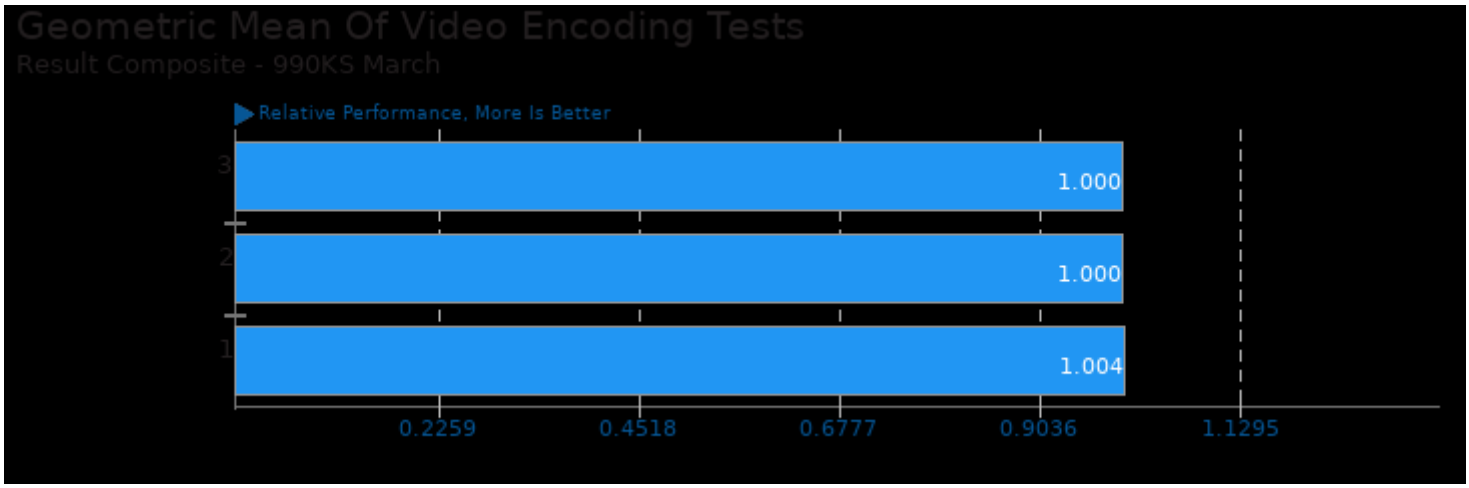


Geometric mean based upon tests: pts/gmpbench and pts/botan



Geometric mean based upon tests: pts/basis and pts/astcenc

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Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/dav1d, pts/aom-av1 and pts/avifenc

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