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GCC 11 vs. LLVM Clang 12 Benchmarks On Xeon Ice Lake

Xeon Platinum 8380 compiler benchmarks by Michael Larabel looking at GCC 11 against LLVM Clang 12 for some initial holiday weekend tests...

Automated Executive Summary

Clang 12.0 had the most wins, coming in first place for 63% of the tests.

Based on the geometric mean of all complete results, the fastest (Clang 12.0) was 1.088x the speed of the slowest (GCC 11.1).

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

NCNN (Target: CPU - Model: blazeface) at 2.584x
NCNN (Target: CPU-v3-v3 - Model: mobilenet-v3) at 2.265x
NCNN (Target: CPU-v2-v2 - Model: mobilenet-v2) at 1.98x
C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 1.97x
oneDNN (Harness: Matrix Multiply Batch Shapes Transformer - Data Type: u8s8f32 - Engine: CPU) at 1.826x
oneDNN (Harness: Deconvolution Batch shapes_1d - Data Type: u8s8f32 - Engine: CPU) at 1.8x
oneDNN (Harness: Matrix Multiply Batch Shapes Transformer - Data Type: f32 - Engine: CPU) at 1.547x
OpenSSL (RSA 4096-bit Performance) at 1.541x
TNN (Target: CPU - Model: MobileNet v2) at 1.465x

ASTC Encoder (Preset: Medium) at 1.424x.

Test Systems:

GCC 11.1

Processor: 2 x Intel Xeon Platinum 8380 @ 3.40GHz (80 Cores / 160 Threads), Motherboard: Intel M50CYP2SB2U (SE5C6200.86B.0022.D08.2103221623 BIOS), Chipset: Intel Device 0998, Memory: 16 x 32 GB DDR4-3200MT/s Hynix HMA84GR7CJR4N-XN, Disk: 800GB INTEL SSDPF21Q800GB, Graphics: ASPEED, Network: 2 x Intel X710 for 10GBASE-T + 2 x Intel E810-C for QSFP

OS: Fedora 34, Kernel: 5.12.6-300.fc34.x86_64 (x86_64), Compiler: GCC 11.1.1 20210428, File-System: xfs, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native -flto" CFLAGS="-O3 -march=native -flto"
Compiler Notes: --build=x86_64-redhat-linux --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,d,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=i686 --with-gcc-major-version-only --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0xd000270
Python Notes: Python 3.9.5
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Clang 12.0

Processor: 2 x Intel Xeon Platinum 8380 @ 3.40GHz (80 Cores / 160 Threads), Motherboard: Intel M50CYP2SB2U (SE5C6200.86B.0022.D08.2103221623 BIOS), Chipset: Intel Device 0998, Memory: 16 x 32 GB DDR4-3200MT/s Hynix HMA84GR7CJR4N-XN, Disk: 800GB INTEL SSDPF21Q800GB, Graphics: ASPEED, Network: 2 x Intel X710 for 10GBASE-T + 2 x Intel E810-C for QSFP

OS: Fedora 34, Kernel: 5.12.6-300.fc34.x86_64 (x86_64), Compiler: Clang 12.0.0, File-System: xfs, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native -flto" CFLAGS="-O3 -march=native -flto"
Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0xd000270
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Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	GCC 11.1	Clang 12.0
Kvazaar - Bosphorus 4K - Very Fast (FPS)	**42.31**	**44.72**
Normalized	94.61%	100%
Standard Deviation	1.4%	1.1%

Kvazaar - Bosphorus 4K - Ultra Fast (FPS)	**46.58**	**47.96**
Normalized	97.12%	100%
Standard Deviation	2%	1.2%
Kvazaar - Bosphorus 1080p - Very Fast (FPS)	**159.71**	**166.00**
Normalized	96.21%	100%
Standard Deviation	0.5%	0.8%
Kvazaar - Bosphorus 1080p - Ultra Fast (FPS)	**176.66**	**183.97**
Normalized	96.03%	100%
Standard Deviation	1.3%	1.6%
SVT-AV1 - Preset 4 - Bosphorus 4K (FPS)	**4.213**	**4.333**
Normalized	97.23%	100%
Standard Deviation	1.2%	0.2%
SVT-AV1 - Preset 8 - Bosphorus 4K (FPS)	**55.190**	**56.273**
Normalized	98.08%	100%
Standard Deviation	0.7%	1.3%
SVT-AV1 - Preset 4 - Bosphorus 1080p (FPS)	**8.996**	**9.418**
Normalized	95.52%	100%
Standard Deviation	0.8%	1.5%
SVT-AV1 - Preset 8 - Bosphorus 1080p (FPS)	**167.388**	**169.606**
Normalized	98.69%	100%
Standard Deviation	0.4%	1.2%
SVT-HEVC - 1 - Bosphorus 1080p (FPS)	**39.59**	**41.96**
Normalized	94.35%	100%
Standard Deviation	1.2%	0.9%
SVT-HEVC - 7 - Bosphorus 1080p (FPS)	**336.37**	**355.18**
Normalized	94.7%	100%
Standard Deviation	1.5%	0.6%
SVT-HEVC - 10 - Bosphorus 1080p (FPS)	**609.56**	**608.95**
Normalized	100%	99.9%
Standard Deviation	0.4%	0.6%
SVT-VP9 - VMAF Optimized - Bosphorus 1080p (FPS)	**476.85**	**467.57**
Normalized	100%	98.05%
Standard Deviation	1.1%	1.5%
SVT-VP9 - P.S.O - Bosphorus 1080p (FPS)	**477.90**	**466.06**
Normalized	100%	97.52%
Standard Deviation	1.2%	0.2%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	**393.17**	**379.93**
Normalized	100%	96.63%
Standard Deviation	0.4%	0.7%
x265 - Bosphorus 4K (FPS)	**26.92**	**29.13**
Normalized	92.41%	100%
Standard Deviation	1.7%	0.9%
x265 - Bosphorus 1080p (FPS)	**76.88**	**77.24**
Normalized	99.53%	100%
Standard Deviation	1.4%	0.6%
GNU GMP GMPbench - Total Time (GMPbench Score)	3872	
GraphicsMagick - Rotate (Iterations/min)	745	745
Standard Deviation	1.4%	
GraphicsMagick - Sharpen (Iterations/min)	**898**	**769**
Normalized	100%	85.63%
Standard Deviation	0.5%	0.6%
GraphicsMagick - Enhanced (Iterations/min)	**1315**	**1141**
Normalized	100%	86.77%
Standard Deviation	0.2%	0.6%
GraphicsMagick - Resizing (Iterations/min)	**380**	**614**

Normalized	61.89%	100%
Standard Deviation	2%	9.5%
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	**2522899**	**2130830**
Normalized	100%	84.46%
Standard Deviation	0.1%	0.4%
Zstd Compression - 8 - Compression Speed (MB/s)	**2611**	**2748**
Normalized	95.01%	100%
Standard Deviation	4.5%	2.5%
Zstd Compression - 8 - D.S (MB/s)	**2959**	**2997**
Normalized	98.75%	100%
Standard Deviation	0.4%	0.6%
Zstd Compression - 19 - Compression Speed (MB/s)	**83.8**	**81.5**
Normalized	100%	97.26%
Standard Deviation	0.8%	2.4%
Zstd Compression - 19 - D.S (MB/s)	**2537**	**2495**
Normalized	100%	98.34%
Standard Deviation	0%	1.2%
Zstd Compression - 8, Long Mode - Compression Speed (MB/s)	**1041**	**830.0**
Normalized	100%	79.76%
Standard Deviation	0.5%	2.1%
Zstd Compression - 8, Long Mode - D.S (MB/s)	**3168**	**3205**
Normalized	98.87%	100%
Standard Deviation	0.4%	0.3%
Zstd Compression - 19, Long Mode - Compression Speed (MB/s)	**47.9**	**46.2**
Normalized	100%	96.45%
Standard Deviation	3.9%	3.1%
Zstd Compression - 19, Long Mode - D.S (MB/s)	**2671**	**2632**
Normalized	100%	98.56%
Standard Deviation	0.3%	0.3%
libjpeg-turbo tjbench - D.T (Megapixels/sec)	**174.229617**	**180.596292**
Normalized	96.47%	100%
Standard Deviation	1.3%	0.5%
Himeno Benchmark - P.P.S (MFLOPS)	**4652**	**4162**
Normalized	100%	89.47%
Standard Deviation	0.1%	0%
Crypto++ - Unkeyed Algorithms (MiB/s)	**359.900917**	**388.572346**
Normalized	92.62%	100%
Standard Deviation	0%	0%
Liquid-DSP - 1 - 256 - 57 (samples/s)	**60985333**	**61840333**
Normalized	98.62%	100%
Standard Deviation	0.1%	0%
Liquid-DSP - 160 - 256 - 57 (samples/s)	**3182866667**	**3686466667**
Normalized	86.34%	100%
Standard Deviation	1.2%	1.6%
OpenSSL - R.4.b.P (Signs/sec)	**17804**	**11556**
Normalized	100%	64.9%
Standard Deviation	0.4%	0.2%
Darmstadt Automotive Parallel Heterogeneous Suite - OpenMP - NDT Mapping (Test Cases/min)	1047	
Standard Deviation	0.5%	

Darmstadt Automotive Parallel Heterogeneous Suite - OpenMP - Points2Image (Test Cases/min)	14508	
Standard Deviation	2.4%	
Darmstadt Automotive Parallel Heterogeneous Suite - OpenMP - Euclidean Cluster (Test Cases/min)	1014	
Standard Deviation	1.6%	
Kripke (Throughput FoM)	**177613600**	**160155675**
Normalized	100%	90.17%
Standard Deviation	2.5%	2.5%
PostgreSQL pgbench - 100 - 250 - Read Only (TPS)	**907401**	**943043**
Normalized	96.22%	100%
Standard Deviation	6.4%	1.6%
PostgreSQL pgbench - 100 - 250 - Read Write (TPS)	**89425**	**92576**
Normalized	96.6%	100%
Standard Deviation	0.2%	0.4%
WebP Image Encode - Default (Encode Time - sec)	**1.638**	**1.616**
Normalized	98.66%	100%
Standard Deviation	0%	0.3%
WebP Image Encode - Quality 100 (Encode Time - sec)	**2.645**	**2.692**
Normalized	100%	98.25%
Standard Deviation	0.1%	0.2%
WebP Image Encode - Q.1.L (Encode Time - sec)	**19.473**	**20.267**
Normalized	100%	96.08%
Standard Deviation	0.1%	0%
WebP Image Encode - Q.1.H.C (Encode Time - sec)	**8.026**	**7.422**
Normalized	92.47%	100%
Standard Deviation	0.1%	0.2%
WebP Image Encode - Q.1.L.H.C (Encode Time - sec)	**40.912**	**42.184**
Normalized	100%	96.98%
Standard Deviation	0.2%	0.1%
Caffe - AlexNet - CPU - 200 (ms)	**298291**	**297554**
Normalized	99.75%	100%
Standard Deviation	0%	0.1%
Caffe - GoogleNet - CPU - 200 (ms)	**662408**	**663282**
Normalized	100%	99.87%
Standard Deviation	0.1%	0%
oneDNN - IP Shapes 1D - f32 - CPU (ms)	**0.923876**	**0.665355**
Normalized	72.02%	100%
Standard Deviation	0.3%	0%
oneDNN - IP Shapes 3D - f32 - CPU (ms)	**1.40268**	**1.21726**
Normalized	86.78%	100%
Standard Deviation	0.3%	0.2%
oneDNN - IP Shapes 1D - u8s8f32 - CPU (ms)	**1.23707**	**1.00883**
Normalized	81.55%	100%
Standard Deviation	2.4%	0.2%
oneDNN - IP Shapes 3D - u8s8f32 - CPU (ms)	**0.439708**	**0.325027**
Normalized	73.92%	100%
Standard Deviation	0.4%	0.7%
oneDNN - IP Shapes 1D - bf16bf16bf16 - CPU (ms)	**3.00252**	**2.76681**
Normalized	92.15%	100%
Standard Deviation	0.2%	0.1%
oneDNN - IP Shapes 3D - bf16bf16bf16 - CPU (ms)	**1.81351**	**1.70567**
Normalized	94.05%	100%
Standard Deviation	0.1%	0.3%

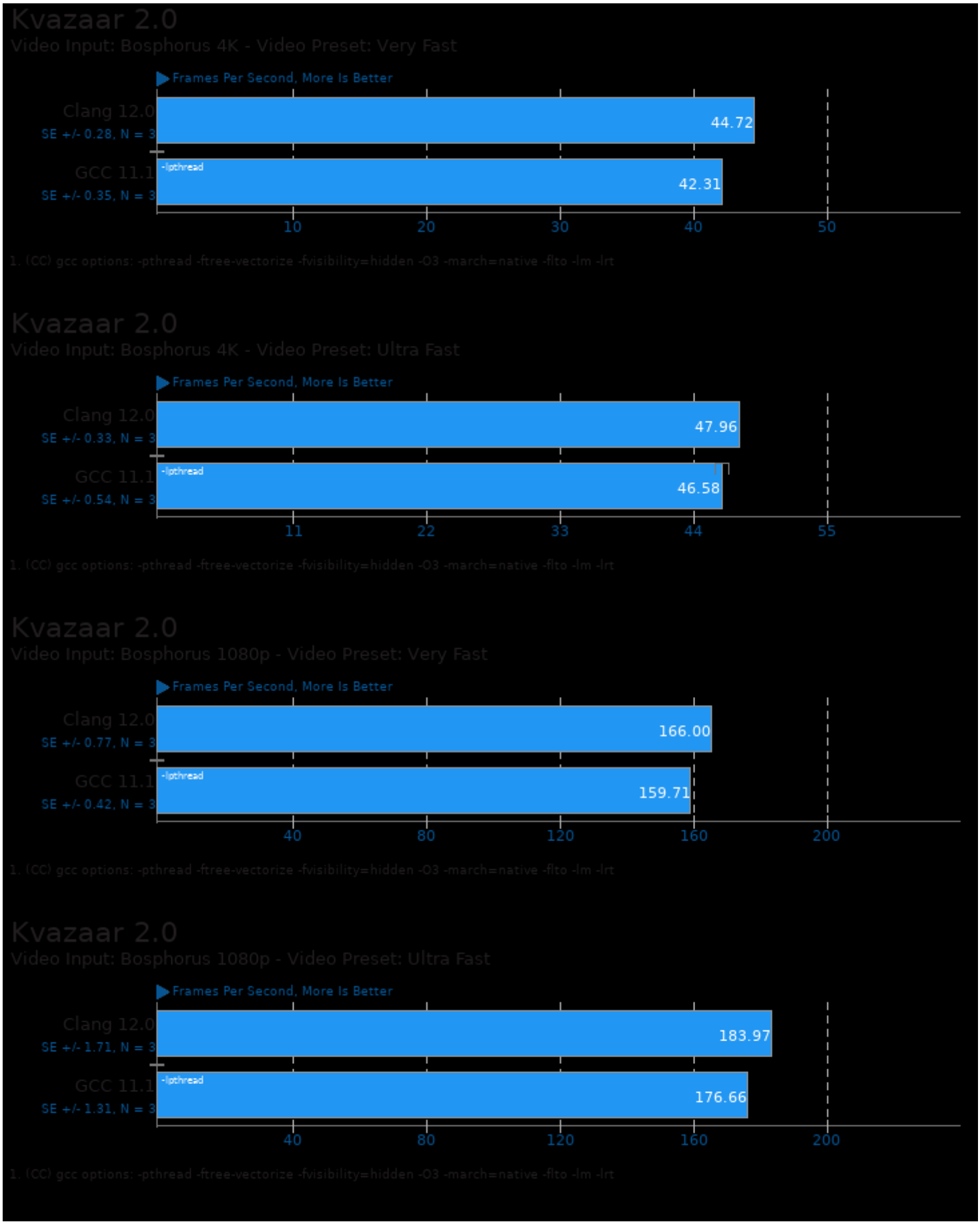
oneDNN - C.B.S.A - f32 - CPU (ms)	**1.45930**	**1.41167**
Normalized	96.74%	100%
Standard Deviation	0.9%	0.5%
oneDNN - D.B.s - f32 - CPU (ms)	**0.840383**	**0.842984**
Normalized	100%	99.69%
Standard Deviation	0.3%	0.2%
oneDNN - C.B.S.A - u8s8f32 - CPU (ms)	**0.969972**	**0.902213**
Normalized	93.01%	100%
Standard Deviation	1.3%	0.4%
oneDNN - D.B.s - u8s8f32 - CPU (ms)	**0.361691**	**0.200917**
Normalized	55.55%	100%
Standard Deviation	0.6%	0.3%
oneDNN - D.B.s - u8s8f32 - CPU (ms)	**0.194587**	**0.175060**
Normalized	89.96%	100%
Standard Deviation	0.6%	0.2%
oneDNN - R.N.N.T - f32 - CPU (ms)	**686.190**	**589.283**
Normalized	85.88%	100%
Standard Deviation	0.9%	0.6%
oneDNN - R.N.N.I - f32 - CPU (ms)	**448.247**	**352.474**
Normalized	78.63%	100%
Standard Deviation	1.2%	0.1%
oneDNN - R.N.N.T - u8s8f32 - CPU (ms)	**686.045**	**594.109**
Normalized	86.6%	100%
Standard Deviation	0.6%	2.3%
oneDNN - C.B.S.A - bf16bf16bf16 - CPU (ms)	**2.09246**	**2.06629**
Normalized	98.75%	100%
Standard Deviation	0.1%	0%
oneDNN - D.B.s - bf16bf16bf16 - CPU (ms)	**3.27829**	**2.86766**
Normalized	87.47%	100%
Standard Deviation	0.1%	0.1%
oneDNN - D.B.s - bf16bf16bf16 - CPU (ms)	**3.57127**	**3.57288**
Normalized	100%	99.95%
Standard Deviation	0.3%	0.1%
oneDNN - R.N.N.I - u8s8f32 - CPU (ms)	**445.263**	**352.588**
Normalized	79.19%	100%
Standard Deviation	0.4%	0.8%
oneDNN - M.M.B.S.T - f32 - CPU (ms)	**0.247554**	**0.160017**
Normalized	64.64%	100%
Standard Deviation	0.4%	1%
oneDNN - R.N.N.T - bf16bf16bf16 - CPU (ms)	**677.708**	**584.535**
Normalized	86.25%	100%
Standard Deviation	0.6%	0.3%
oneDNN - R.N.N.I - bf16bf16bf16 - CPU (ms)	**444.228**	**353.576**
Normalized	79.59%	100%
Standard Deviation	0.4%	1.2%
oneDNN - M.M.B.S.T - u8s8f32 - CPU (ms)	**0.219899**	**0.120406**
Normalized	54.76%	100%
Standard Deviation	0.4%	0.5%
oneDNN - M.M.B.S.T - bf16bf16bf16 - CPU (ms)	**0.601530**	**0.515284**
Normalized	85.66%	100%
Standard Deviation	0.1%	0.5%
PostgreSQL pgbench - 100 - 250 - Read Only - Average Latency (ms)	**0.277**	**0.265**
Normalized	95.67%	100%
Standard Deviation	6.7%	1.5%

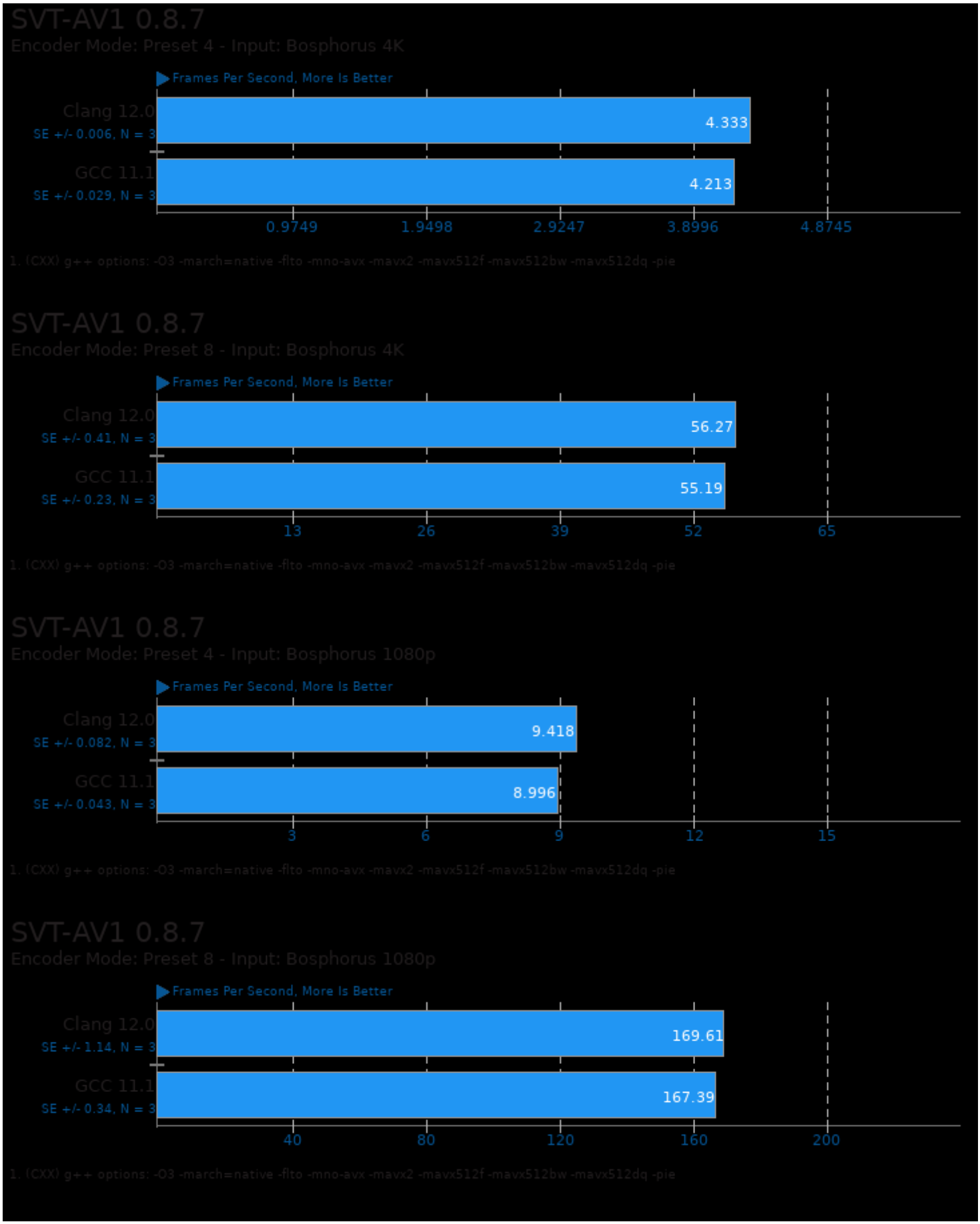
PostgreSQL pgbench - 100 - 250 - Read Write - Average Latency (ms)	**2.797**	**2.702**
Normalized	96.6%	100%
Standard Deviation	0.2%	0.5%
NCNN - CPU - mobilenet (ms)	**19.40**	**14.21**
Normalized	73.25%	100%
Standard Deviation	3.4%	10.4%
NCNN - CPU-v2-v2 - mobilenet-v2 (ms)	**9.80**	**4.95**
Normalized	50.51%	100%
Standard Deviation	1.8%	5%
NCNN - CPU-v3-v3 - mobilenet-v3 (ms)	**9.56**	**4.22**
Normalized	44.14%	100%
Standard Deviation	3.1%	3.2%
NCNN - CPU - shufflenet-v2 (ms)	**10.55**	**5.90**
Normalized	55.92%	100%
Standard Deviation	2.6%	22.6%
NCNN - CPU - mnasnet (ms)	**9.43**	**5.26**
Normalized	55.78%	100%
Standard Deviation	1.7%	33.1%
NCNN - CPU - efficientnet-b0 (ms)	**12.48**	**7.72**
Normalized	61.86%	100%
Standard Deviation	4.2%	33.8%
NCNN - CPU - blazeface (ms)	**6.15**	**2.38**
Normalized	38.7%	100%
Standard Deviation	2.9%	3.2%
NCNN - CPU - googlenet (ms)	**19.46**	**15.34**
Normalized	78.83%	100%
Standard Deviation	3.4%	18.4%
NCNN - CPU - vgg16 (ms)	**25.34**	**27.34**
Normalized	100%	92.68%
Standard Deviation	2.3%	6.7%
NCNN - CPU - resnet18 (ms)	**11.10**	**10.83**
Normalized	97.57%	100%
Standard Deviation	3.5%	16.4%
NCNN - CPU - yolov4-tiny (ms)	**23.12**	**25.28**
Normalized	100%	91.46%
Standard Deviation	2.8%	3.6%
NCNN - CPU - squeezenet_ssd (ms)	**21.18**	**17.96**
Normalized	84.8%	100%
Standard Deviation	1.7%	17.5%
NCNN - CPU - regnety_400m (ms)	**94.38**	**26.47**
Normalized	28.05%	100%
Standard Deviation	4%	24.7%
TNN - CPU - MobileNet v2 (ms)	**376.741**	**552.028**
Normalized	100%	68.25%
Standard Deviation	1.2%	0.4%
TNN - CPU - SqueezeNet v1.1 (ms)	**377.430**	**402.914**
Normalized	100%	93.68%
Standard Deviation	0%	0%
Timed MrBayes Analysis - P.P.A (sec)	**142.197**	**138.549**
Normalized	97.43%	100%
Standard Deviation	0.6%	1.1%
C-Ray - Total Time - 4.1.R.P.P (sec)	**7.794**	**15.352**
Normalized	100%	50.77%
Standard Deviation	0.1%	0.2%

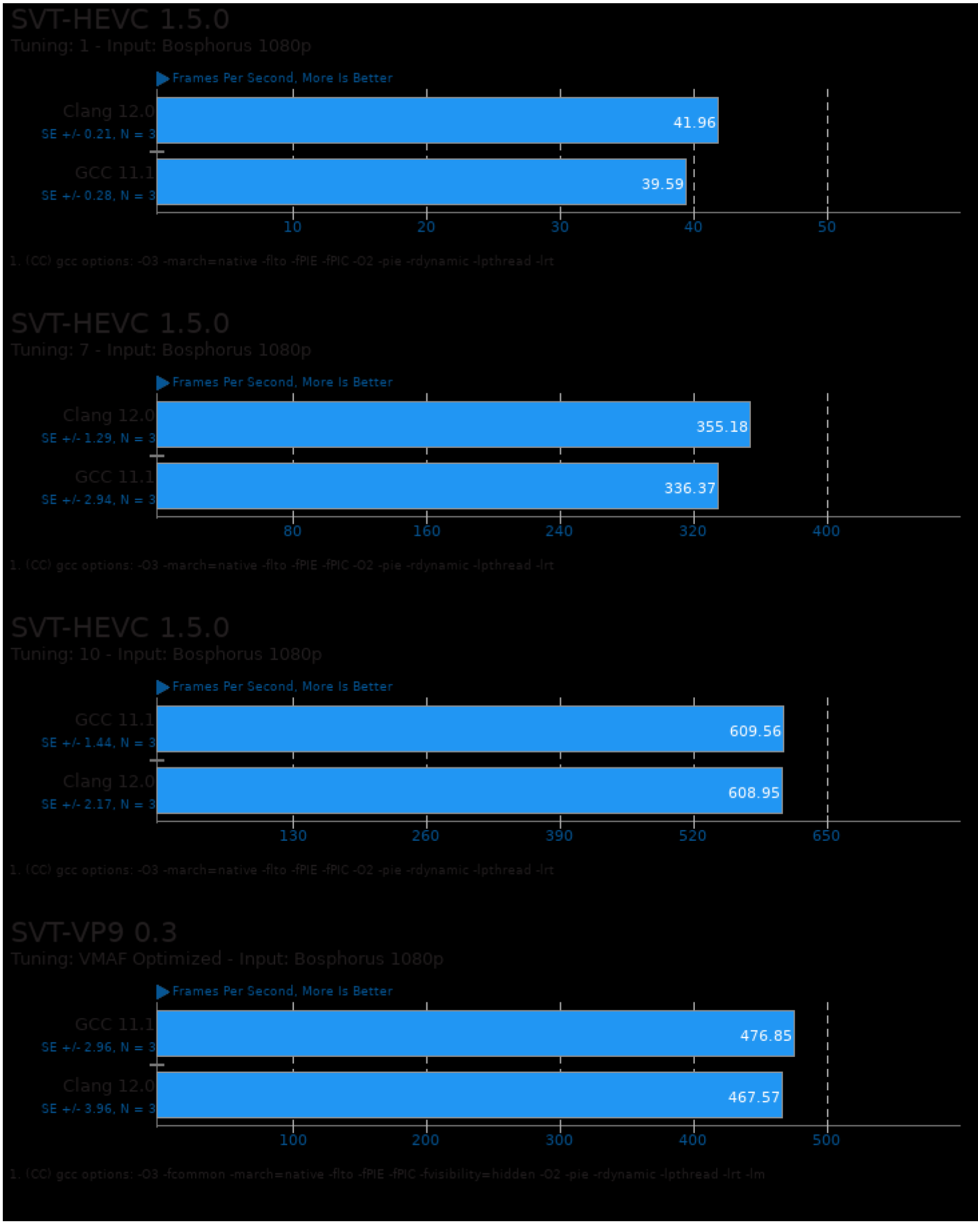
GCC 11 vs. LLVM Clang 12 Benchmarks On Xeon Ice Lake

Primesieve - 1.P.N.G (sec)	**3.780**	**3.830**
Normalized	100%	98.69%
Standard Deviation	0.3%	0.1%
AOBench - 2048 x 2048 - Total Time (sec)	**33.881**	**36.075**
Normalized	100%	93.92%
Standard Deviation	0.1%	0%
Bullet Physics Engine - 3000 Fall (sec)	**3.873060**	**4.301823**
Normalized	100%	90.03%
Standard Deviation	0.3%	0.2%
Bullet Physics Engine - 1000 Stack (sec)	**4.451765**	**5.410511**
Normalized	100%	82.28%
Standard Deviation	0.1%	0.1%
Bullet Physics Engine - 1000 Convex (sec)	**4.34060**	**4.741088**
Normalized	100%	91.55%
Standard Deviation	0.1%	0.1%
Bullet Physics Engine - 136 Ragdolls (sec)	**2.553303**	**2.798322**
Normalized	100%	91.24%
Standard Deviation	0.3%	0%
Bullet Physics Engine - Prim Trimesh (sec)	**0.86200**	**0.940903**
Normalized	100%	91.61%
Standard Deviation	0.4%	0%
Bullet Physics Engine - Convex Trimesh (sec)	**1.054273**	**1.148367**
Normalized	100%	91.81%
Standard Deviation	0.2%	0.2%
FLAC Audio Encoding - WAV To FLAC (sec)	**9.382**	**9.474**
Normalized	100%	99.03%
Standard Deviation	0.1%	0.1%
LAME MP3 Encoding - WAV To MP3 (sec)	**8.619**	**9.591**
Normalized	100%	89.87%
Standard Deviation	0.1%	0.1%
Opus Codec Encoding - WAV To Opus Encode (sec)	**8.768**	**9.788**
Normalized	100%	89.58%
Standard Deviation	0.1%	0.2%
eSpeak-NG Speech Engine - T.T.S.S (sec)	**30.511**	**29.806**
Normalized	97.69%	100%
Standard Deviation	0.6%	0.1%
Gcrypt Library (sec)	**265.172**	**253.856**
Normalized	95.73%	100%
Standard Deviation	0.6%	0.5%
WebP2 Image Encode - Default (sec)	**2.644**	**2.492**
Normalized	94.25%	100%
Standard Deviation	2.3%	0.6%
WebP2 Image Encode - Q.7.C.E.7 (sec)	**106.658**	**99.777**
Normalized	93.55%	100%
Standard Deviation	0%	0.1%
WebP2 Image Encode - Q.9.C.E.7 (sec)	**196.486**	**182.290**
Normalized	92.78%	100%
Standard Deviation	0%	0%
WebP2 Image Encode - Q.1.C.E.5 (sec)	**5.765**	**6.495**
Normalized	100%	88.76%
Standard Deviation	0.1%	0.3%
WebP2 Image Encode - Q.1.L.C (sec)	**389.070**	**400.617**
Normalized	100%	97.12%
Standard Deviation	0%	0.1%
ASTC Encoder - Medium (sec)	**6.4270**	**4.5120**

Normalized	70.2%	100%
Standard Deviation	0.1%	0.1%
ASTC Encoder - Thorough (sec)	**9.4219**	**6.9380**
Normalized	73.64%	100%
Standard Deviation	0.4%	0.3%
ASTC Encoder - Exhaustive (sec)	**16.3885**	**14.0133**
Normalized	85.51%	100%
Standard Deviation	0.1%	0.2%
WavPack Audio Encoding - WAV To WavPack (sec)	**17.360**	**17.343**
Normalized	99.9%	100%
Standard Deviation	0%	0%
Geometric Mean Of All Test Results - Result Composite - G.1.v.L.C.1.B.O.X.I.L (Geometric Mean)	**50.572**	**55.006**
Normalized	91.94%	100%

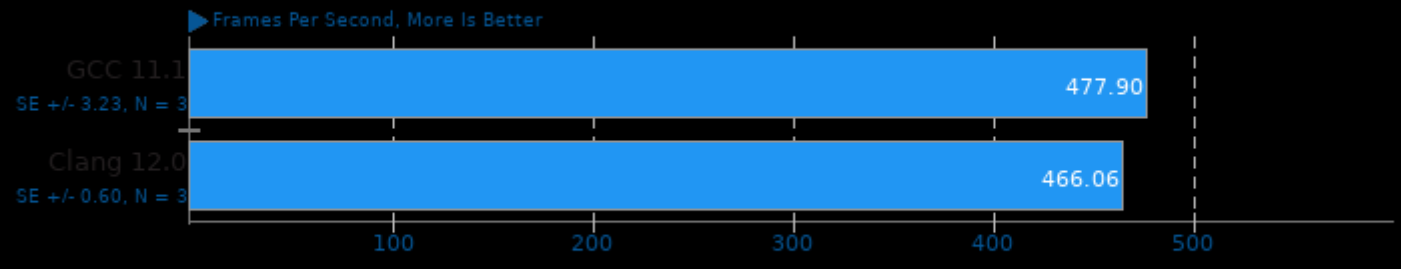

Kvazaar 2.0
Video Input: Bosphorus 4K - Video Preset: Very Fast
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.28, N = 3
44.72
GCC 11.1
-lpthread
SE +/- 0.35, N = 3
42.31
10
20
30
40
50
1. (CC) gcc options: -pthread -ftree-vectorize -fvisibility=hidden -O3 -march=native -flto -lm -lrt
Kvazaar 2.0
Video Input: Bosphorus 4K - Video Preset: Ultra Fast
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.33, N = 3
47.96
GCC 11.1
-lpthread
SE +/- 0.54, N = 3
46.58
11
22
33
44
55
1. (CC) gcc options: -pthread -ftree-vectorize -fvisibility=hidden -O3 -march=native -flto -lm -lrt
Kvazaar 2.0
Video Input: Bosphorus 1080p - Video Preset: Very Fast
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.77, N = 3
166.00
GCC 11.1
-lpthread
SE +/- 0.42, N = 3
159.71
40
80
120
160
200
1. (CC) gcc options: -pthread -ftree-vectorize -fvisibility=hidden -O3 -march=native -flto -lm -lrt
Kvazaar 2.0
Video Input: Bosphorus 1080p - Video Preset: Ultra Fast
Frames Per Second, More Is Better
Clang 12.0
SE +/- 1.71, N = 3
183.97
GCC 11.1
-lpthread
SE +/- 1.31, N = 3
176.66
40
80
120
160
200
1. (CC) gcc options: -pthread -ftree-vectorize -fvisibility=hidden -O3 -march=native -flto -lm -lrt


SVT-AV1 0.8.7
Encoder Mode: Preset 4 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.006, N = 3
4.333
GCC 11.1
SE +/- 0.029, N = 3
4.213
0.9749
1.9498
2.9247
3.8996
4.8745
1. (CXX) g++ options: -O3 -march=native -flto -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie
SVT-AV1 0.8.7
Encoder Mode: Preset 8 - Input: Bosphorus 4K
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.41, N = 3
56.27
GCC 11.1
SE +/- 0.23, N = 3
55.19
13
26
39
52
65
1. (CXX) g++ options: -O3 -march=native -flto -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie
SVT-AV1 0.8.7
Encoder Mode: Preset 4 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.082, N = 3
9.418
GCC 11.1
SE +/- 0.043, N = 3
8.996
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie
SVT-AV1 0.8.7
Encoder Mode: Preset 8 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Clang 12.0
SE +/- 1.14, N = 3
169.61
GCC 11.1
SE +/- 0.34, N = 3
167.39
40
80
120
160
200
1. (CXX) g++ options: -O3 -march=native -flto -mno-avx -mavx2 -mavx512f -mavx512bw -mavx512dq -pie


SVT-HEVC 1.5.0
Tuning: 1 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Clang 12.0
SE +/- 0.21, N = 3
41.96
GCC 11.1
SE +/- 0.28, N = 3
39.59
10
20
30
40
50
1. (CC) gcc options: -O3 -march=native -flto -fPIE -fPIC -O2 -pie -rdynamic -lpthread -lrt
SVT-HEVC 1.5.0
Tuning: 7 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
Clang 12.0
SE +/- 1.29, N = 3
355.18
GCC 11.1
SE +/- 2.94, N = 3
336.37
80
160
240
320
400
1. (CC) gcc options: -O3 -march=native -flto -fPIE -fPIC -O2 -pie -rdynamic -lpthread -lrt
SVT-HEVC 1.5.0
Tuning: 10 - Input: Bosphorus 1080p
Frames Per Second, More Is Better
GCC 11.1
SE +/- 1.44, N = 3
609.56
Clang 12.0
SE +/- 2.17, N = 3
608.95
130
260
390
520
650
1. (CC) gcc options: -O3 -march=native -flto -fPIE -fPIC -O2 -pie -rdynamic -lpthread -lrt
SVT-VP9 0.3
Tuning: VMAF Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
GCC 11.1
SE +/- 2.96, N = 3
476.85
Clang 12.0
SE +/- 3.96, N = 3
467.57
100
200
300
400
500
1. (CC) gcc options: -O3 -fcommon -march=native -flto -fPIE -fPIC -fvisibility=hidden -O2 -pie -rdynamic -lpthread -lrt -lm

SVT-VP9 0.3

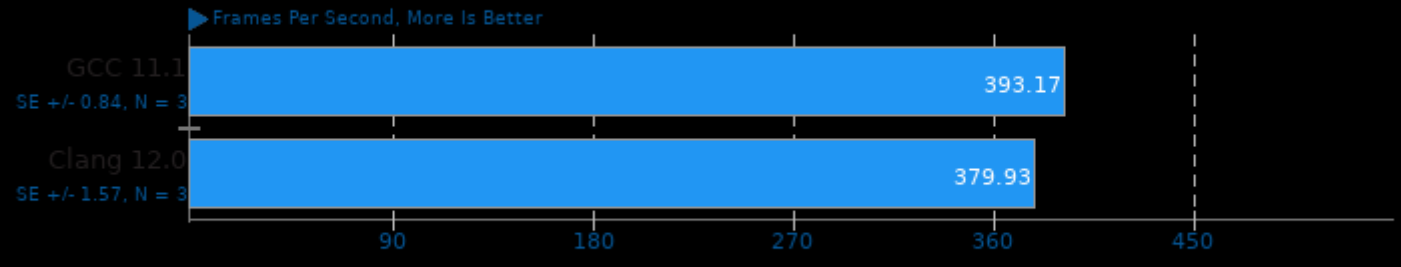
Tuning: PSNR/SSIM Optimized - Input: Bosphorus 1080p



1. (CC) gcc options: -O3 -fcommon -march=native -flto -fPIE -fPIC -fvisibility=hidden -O2 -pie -rdynamic -lpthread -lrt -lm

SVT-VP9 0.3

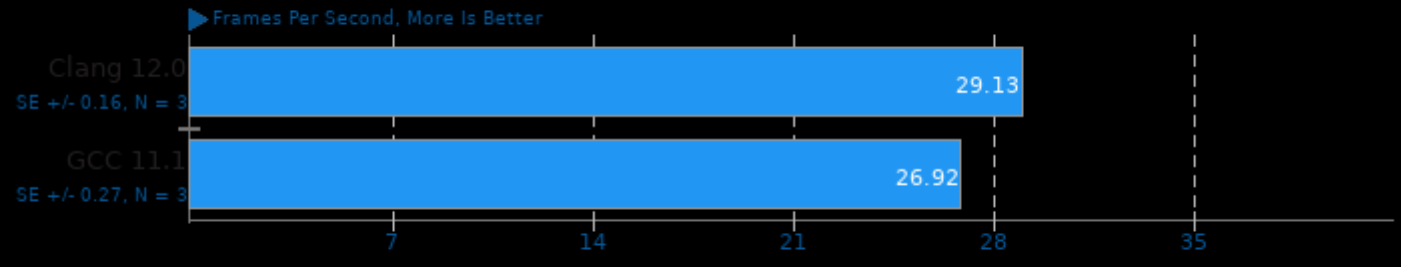
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p



1. (CC) gcc options: -O3 -fcommon -march=native -flto -fPIE -fPIC -fvisibility=hidden -O2 -pie -rdynamic -lpthread -lrt -lm

x265 3.4

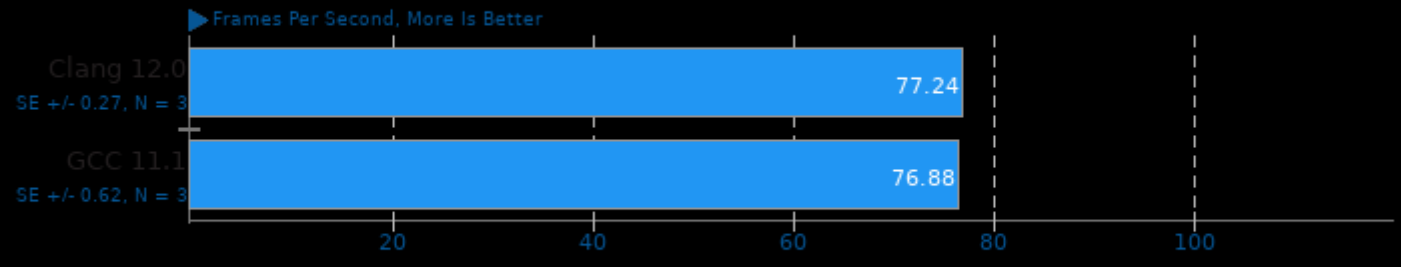
Video Input: Bosphorus 4K



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread -lrt -ldl

x265 3.4

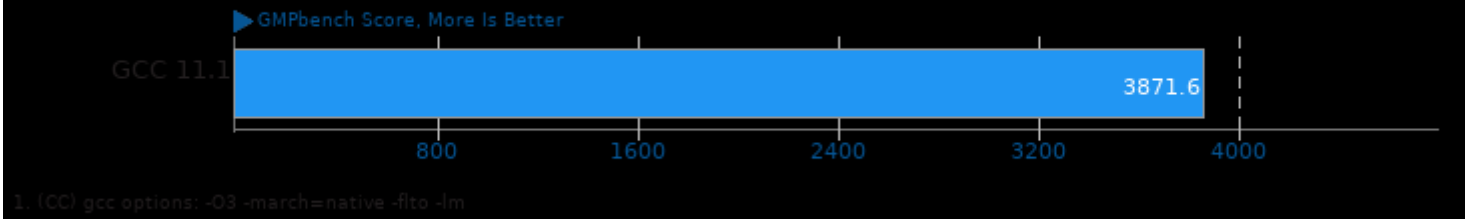
Video Input: Bosphorus 1080p



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread -lrt -ldl

GNU GMP GMPbench 6.2.1

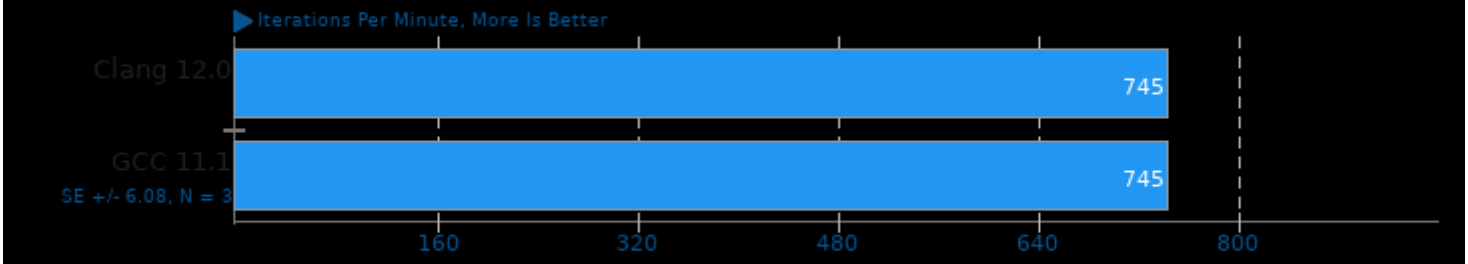
Total Time



1. (CC) gcc options: -O3 -march=native -flto -lm

GraphicsMagick 1.3.33

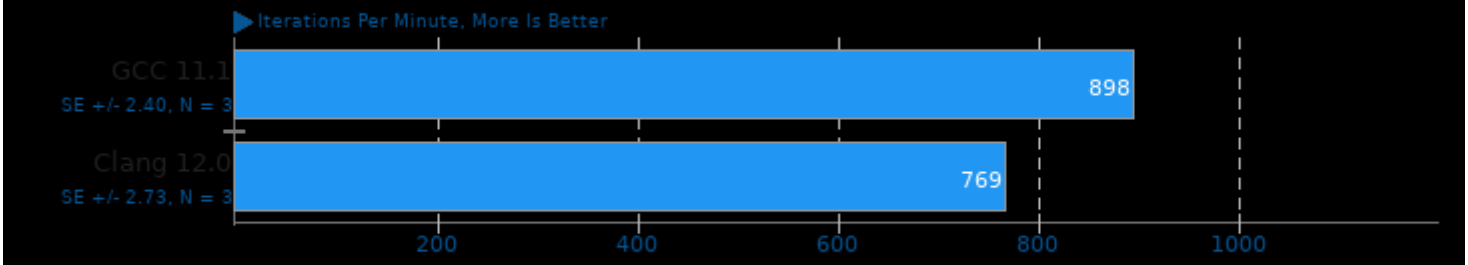
Operation: Rotate



1. (CC) gcc options: -fopenmp -O3 -march=native -flto -pthread -ljpeg -lX11 -lz -lm -lpthread

GraphicsMagick 1.3.33

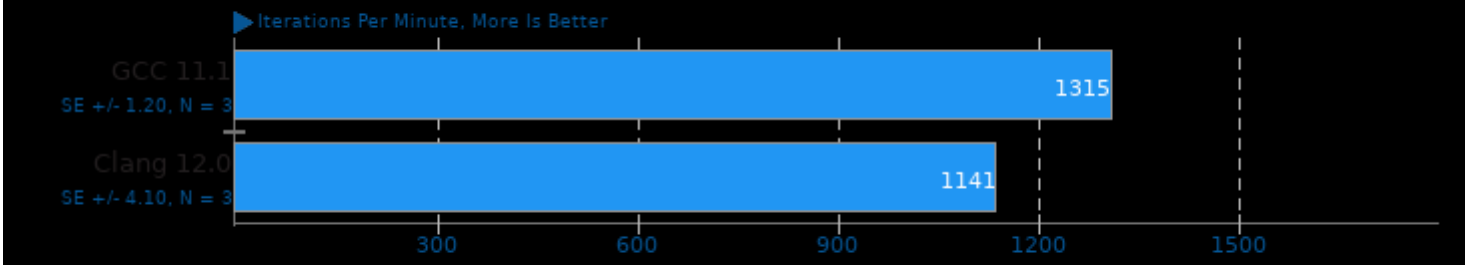
Operation: Sharpen



1. (CC) gcc options: -fopenmp -O3 -march=native -flto -pthread -ljpeg -lX11 -lz -lm -lpthread

GraphicsMagick 1.3.33

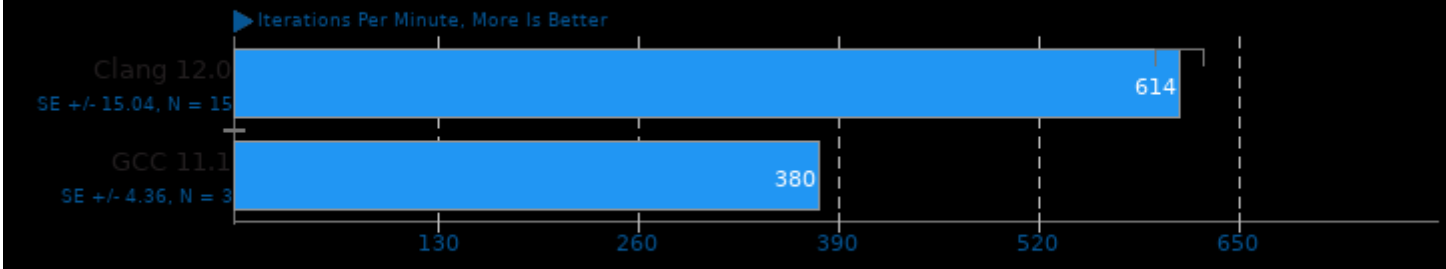
Operation: Enhanced



1. (CC) gcc options: -fopenmp -O3 -march=native -flto -pthread -ljpeg -lX11 -lz -lm -lpthread

GraphicsMagick 1.3.33

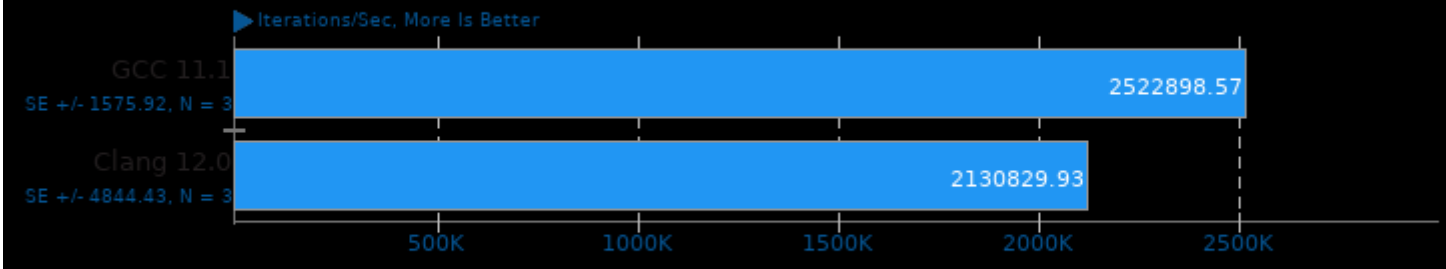
Operation: Resizing



1. (CC) gcc options: -fopenmp -O3 -march=native -flto -pthread -ljpeg -lX11 -lz -lm -lpthread

Coremark 1.0

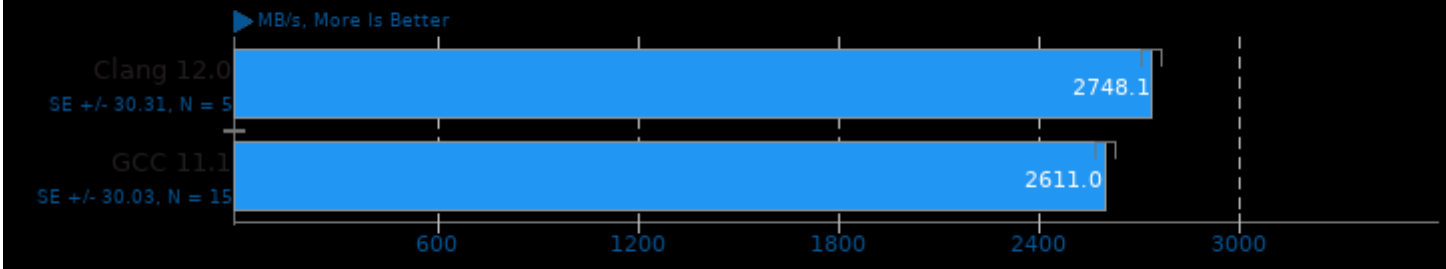
CoreMark Size 666 - Iterations Per Second



1. (CC) gcc options: -O2 -O3 -march=native -flto -lrt" -lrt

Zstd Compression 1.5.0

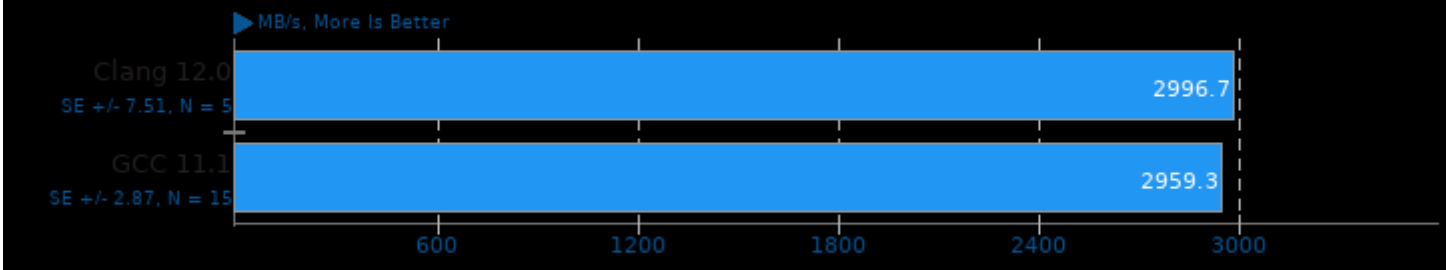
Compression Level: 8 - Compression Speed



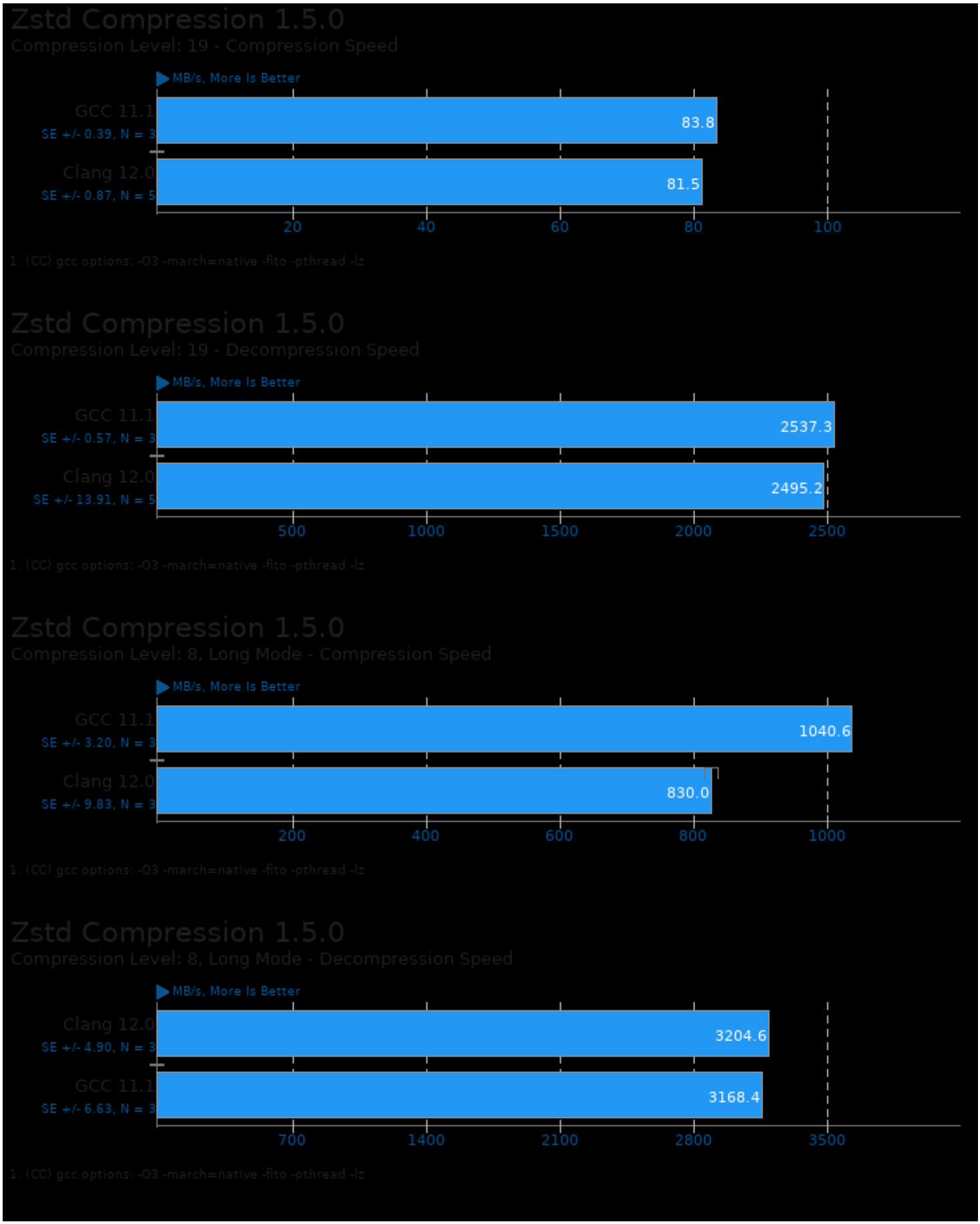
1. (CC) gcc options: -O3 -march=native -flto -pthread -lz

Zstd Compression 1.5.0

Compression Level: 8 - Decompression Speed

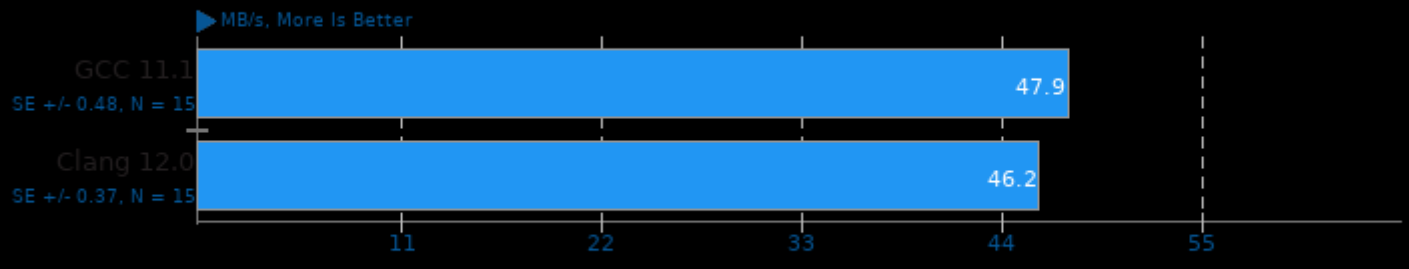


1. (CC) gcc options: -O3 -march=native -flto -pthread -lz


Zstd Compression 1.5.0
Compression Level: 19 - Compression Speed
MB/s, More Is Better
GCC 11.1
SE +/- 0.39, N = 3
83.8
Clang 12.0
SE +/- 0.87, N = 5
81.5
20
40
60
80
100
1. (CC) gcc options: -O3 -march=native -flto -pthread -lz
Zstd Compression 1.5.0
Compression Level: 19 - Decompression Speed
MB/s, More Is Better
GCC 11.1
SE +/- 0.57, N = 3
2537.3
Clang 12.0
SE +/- 13.91, N = 5
2495.2
500
1000
1500
2000
2500
1. (CC) gcc options: -O3 -march=native -flto -pthread -lz
Zstd Compression 1.5.0
Compression Level: 8, Long Mode - Compression Speed
MB/s, More Is Better
GCC 11.1
SE +/- 3.20, N = 3
1040.6
Clang 12.0
SE +/- 9.83, N = 3
830.0
200
400
600
800
1000
1. (CC) gcc options: -O3 -march=native -flto -pthread -lz
Zstd Compression 1.5.0
Compression Level: 8, Long Mode - Decompression Speed
MB/s, More Is Better
Clang 12.0
SE +/- 4.90, N = 3
3204.6
GCC 11.1
SE +/- 6.63, N = 3
3168.4
700
1400
2100
2800
3500
1. (CC) gcc options: -O3 -march=native -flto -pthread -lz

Zstd Compression 1.5.0

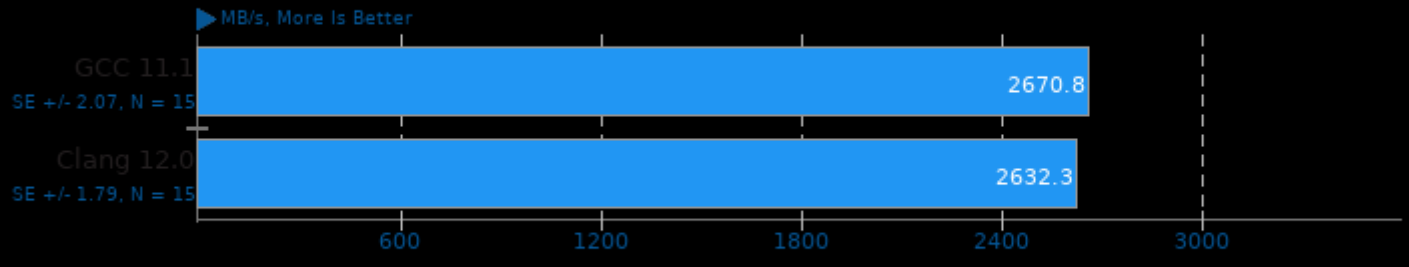
Compression Level: 19, Long Mode - Compression Speed



1. (CC) gcc options: -O3 -march=native -flto -pthread -lz

Zstd Compression 1.5.0

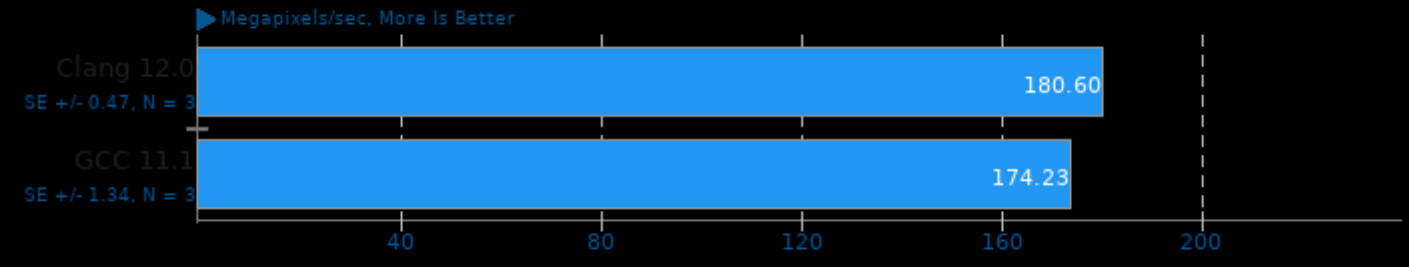
Compression Level: 19, Long Mode - Decompression Speed



1. (CC) gcc options: -O3 -march=native -flto -pthread -lz

libjpeg-turbo tjbench 2.1.0

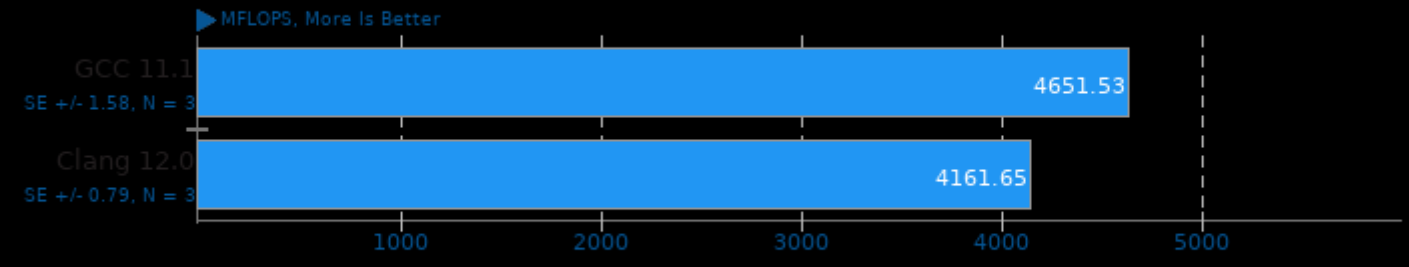
Test: Decompression Throughput



1. (CC) gcc options: -O3 -march=native -flto -rdynamic -lm

Himeno Benchmark 3.0

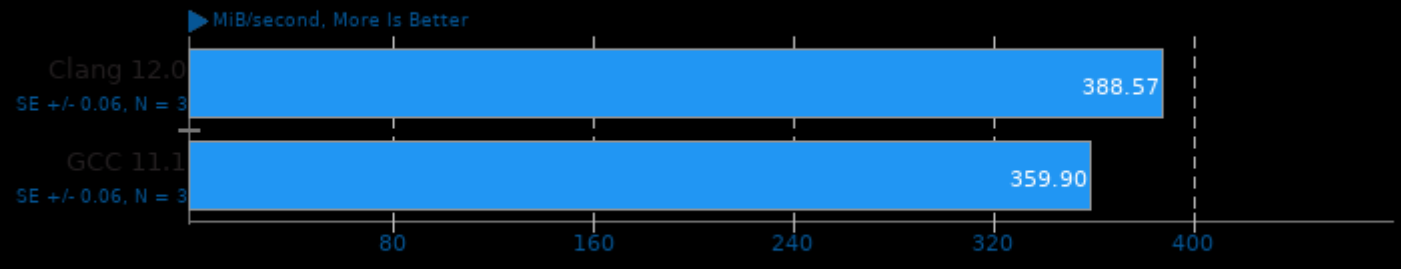
Poisson Pressure Solver



1. (CC) gcc options: -O3 -march=native -flto -mavx2

Crypto++ 8.2

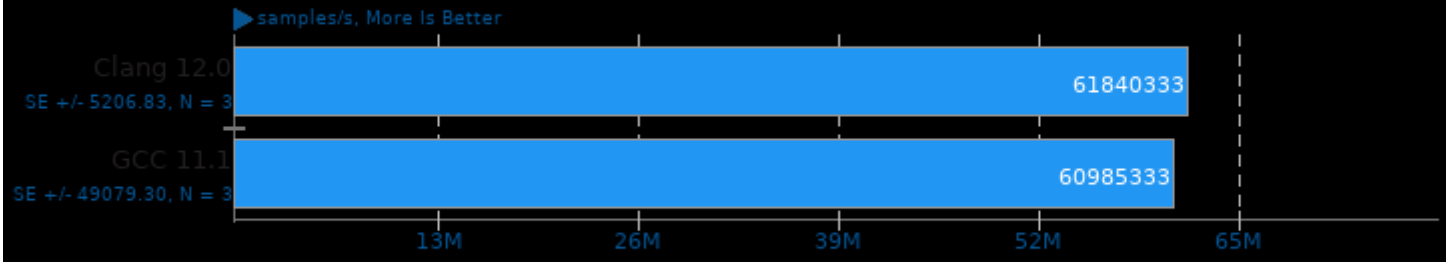
Test: Unkeyed Algorithms



1. (CXX) g++ options: -O3 -march=native -flto -fPIC -pthread -pipe

Liquid-DSP 2021.01.31

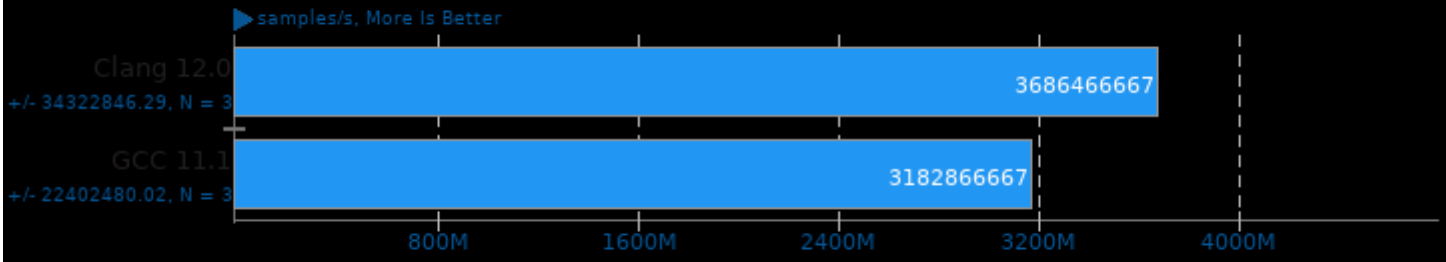
Threads: 1 - Buffer Length: 256 - Filter Length: 57



1. (CC) gcc options: -O3 -march=native -flto -pthread -lm -lc -lliquid

Liquid-DSP 2021.01.31

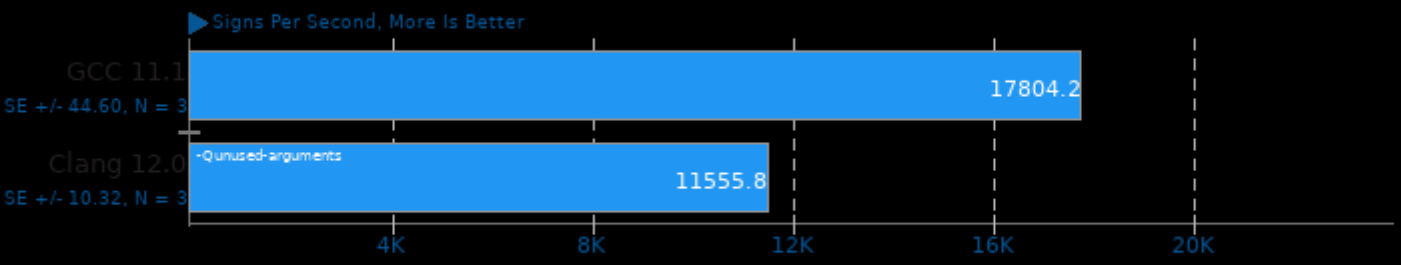
Threads: 160 - Buffer Length: 256 - Filter Length: 57



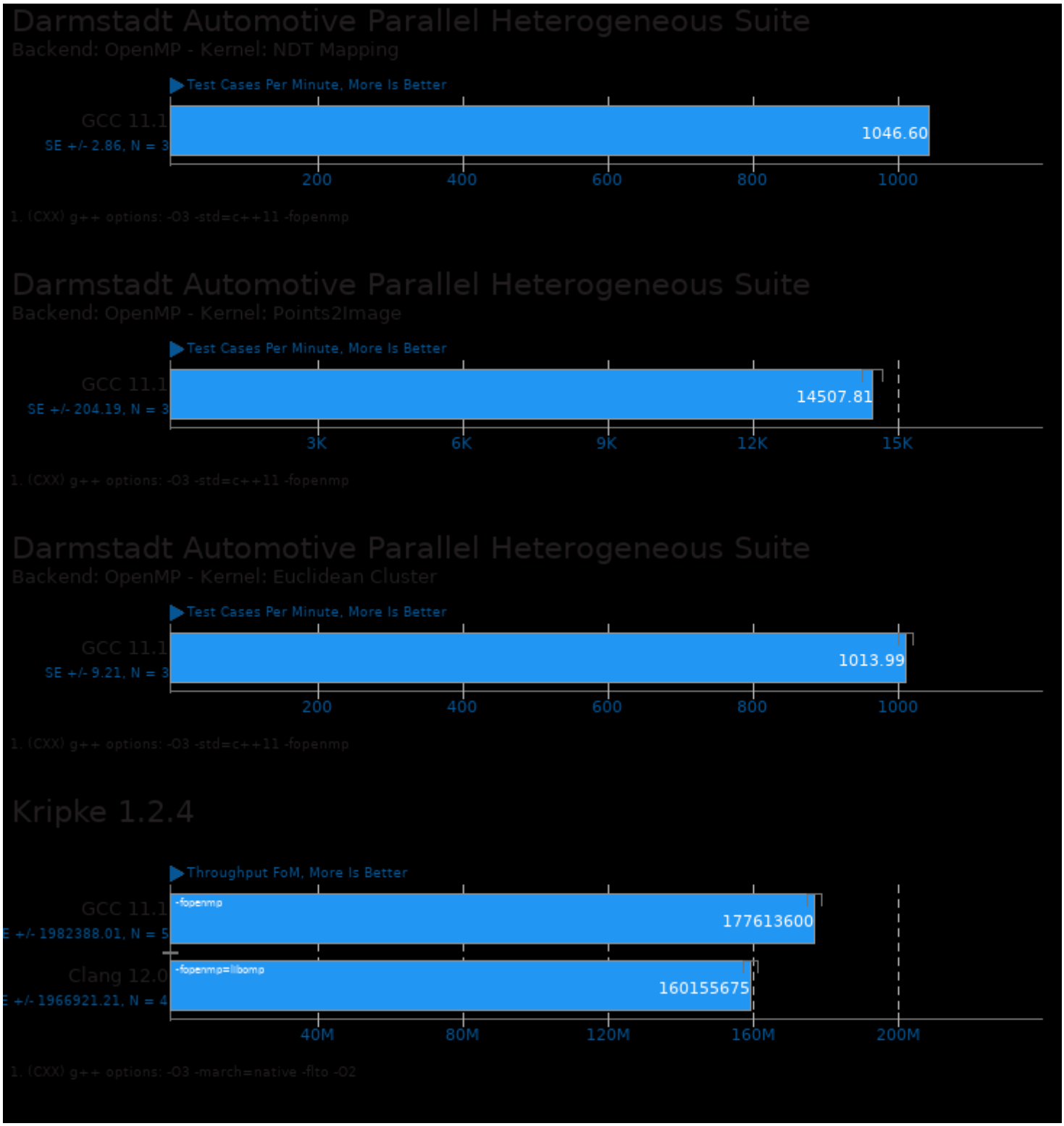
1. (CC) gcc options: -O3 -march=native -flto -pthread -lm -lc -lliquid

OpenSSL 1.1.1

RSA 4096-bit Performance

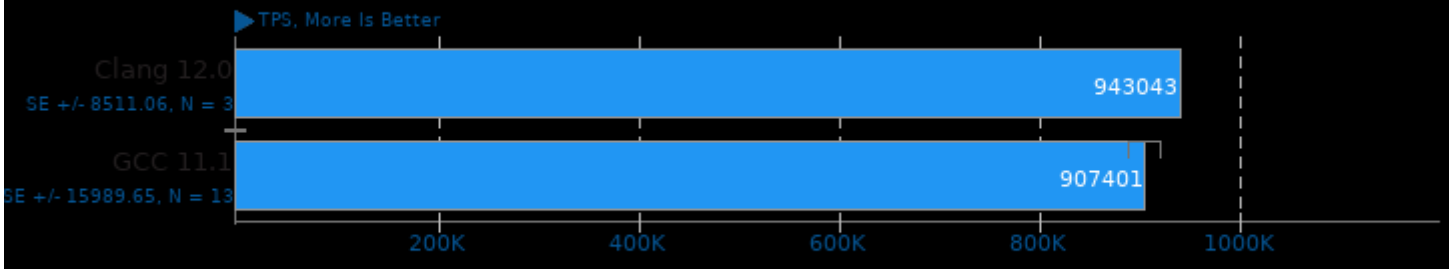


1. (CC) gcc options: -pthread -m64 -O3 -march=native -flto -lssl -lcrypto -ldl


Darmstadt Automotive Parallel Heterogeneous Suite
Backend: OpenMP - Kernel: NDT Mapping
Test Cases Per Minute, More Is Better
GCC 11.1
SE +/- 2.86, N = 3
1046.60
200
400
600
800
1000
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp
Darmstadt Automotive Parallel Heterogeneous Suite
Backend: OpenMP - Kernel: Points2Image
Test Cases Per Minute, More Is Better
GCC 11.1
SE +/- 204.19, N = 3
14507.81
3K
6K
9K
12K
15K
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp
Darmstadt Automotive Parallel Heterogeneous Suite
Backend: OpenMP - Kernel: Euclidean Cluster
Test Cases Per Minute, More Is Better
GCC 11.1
SE +/- 9.21, N = 3
1013.99
200
400
600
800
1000
1. (CXX) g++ options: -O3 -std=c++11 -fopenmp
Kripke 1.2.4
Throughput FoM, More Is Better
GCC 11.1
-fopenmp
E +/- 1982388.01, N = 5
177613600
Clang 12.0
-fopenmp=libomp
E +/- 1966921.21, N = 4
160155675
40M
80M
120M
160M
200M
1. (CXX) g++ options: -O3 -march=native -flto -O2

PostgreSQL pgbench 13.0

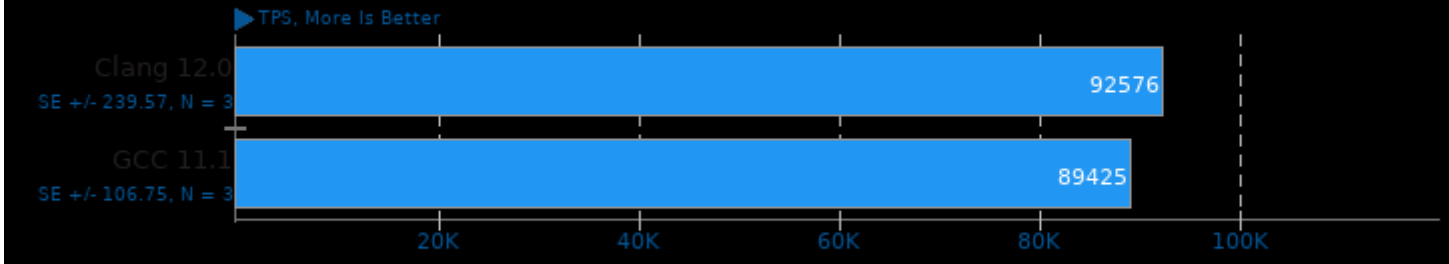
Scaling Factor: 100 - Clients: 250 - Mode: Read Only



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O3 -march=native -flto -lpgcommon -lpgport -lpq -lpthread -lrt -ldl -lm

PostgreSQL pgbench 13.0

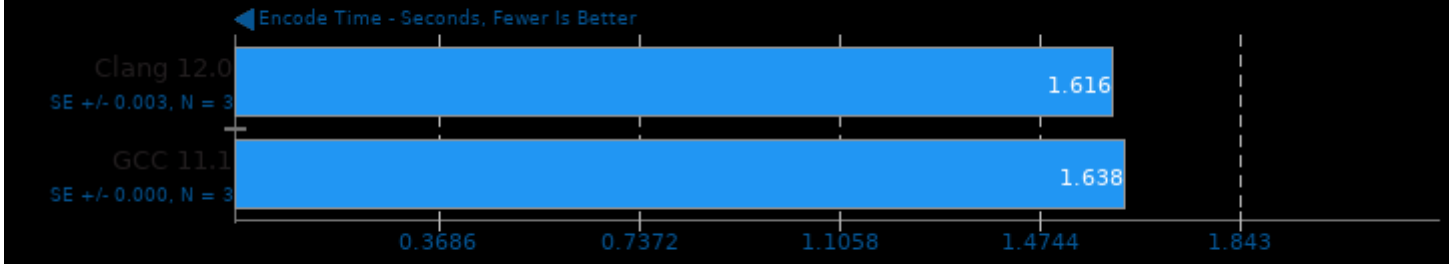
Scaling Factor: 100 - Clients: 250 - Mode: Read Write



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O3 -march=native -flto -lpgcommon -lpgport -lpq -lpthread -lrt -ldl -lm

WebP Image Encode 1.1

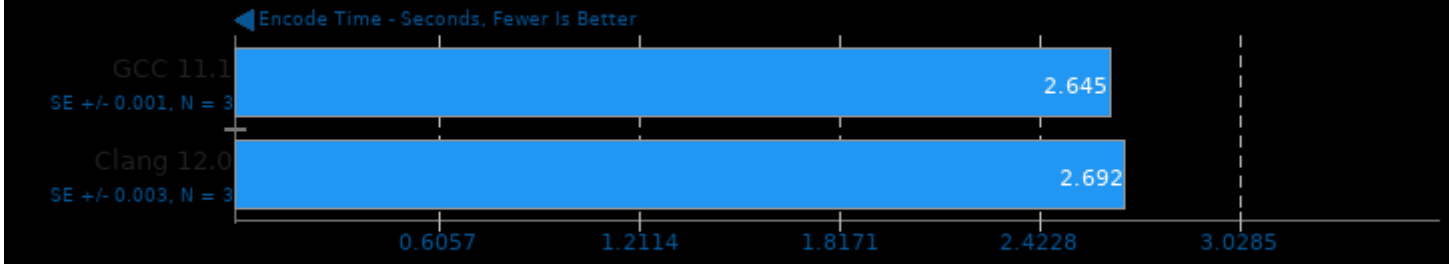
Encode Settings: Default



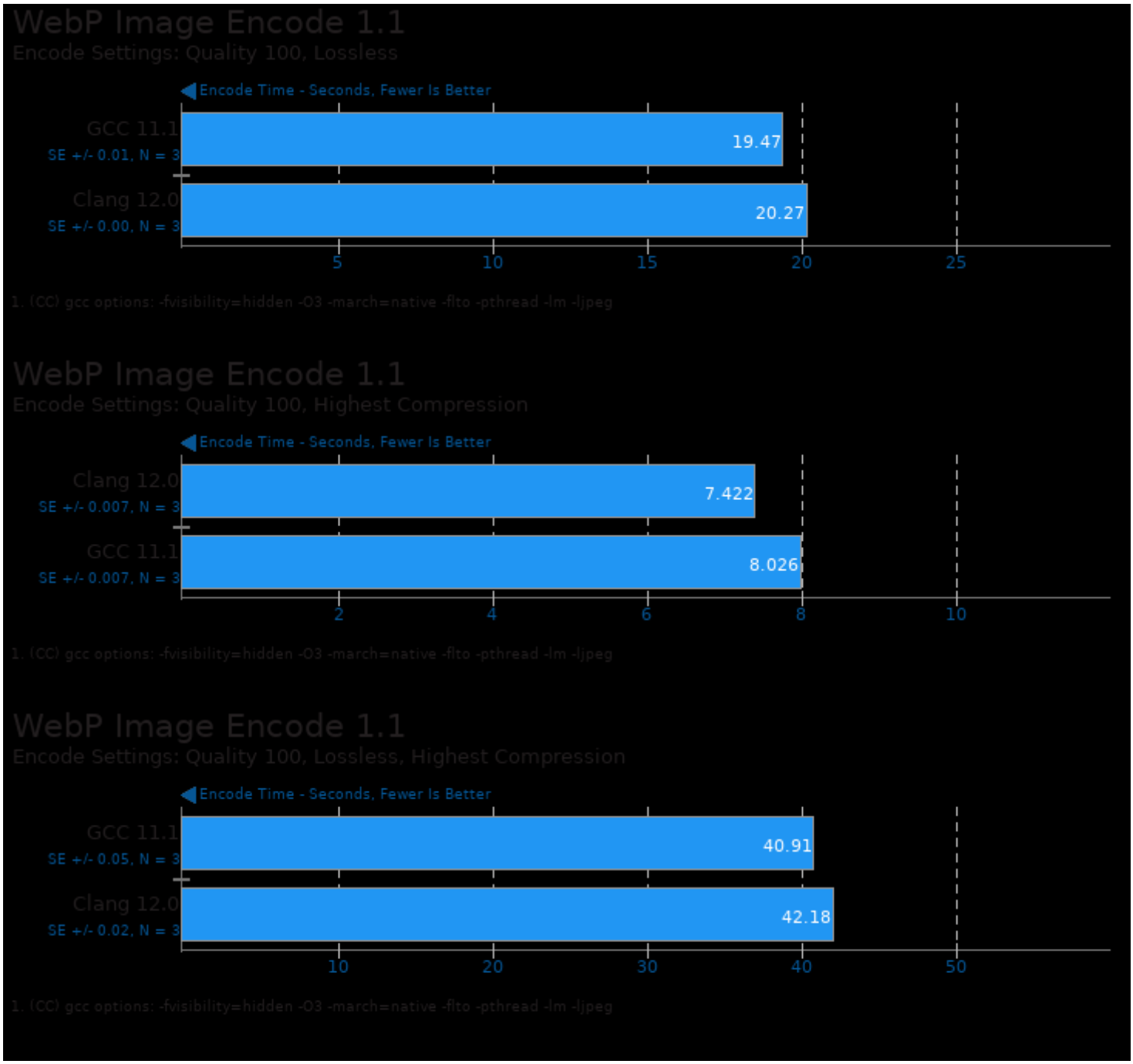
1. (CC) gcc options: -fvisibility=hidden -O3 -march=native -flto -pthread -lm -ljpeg

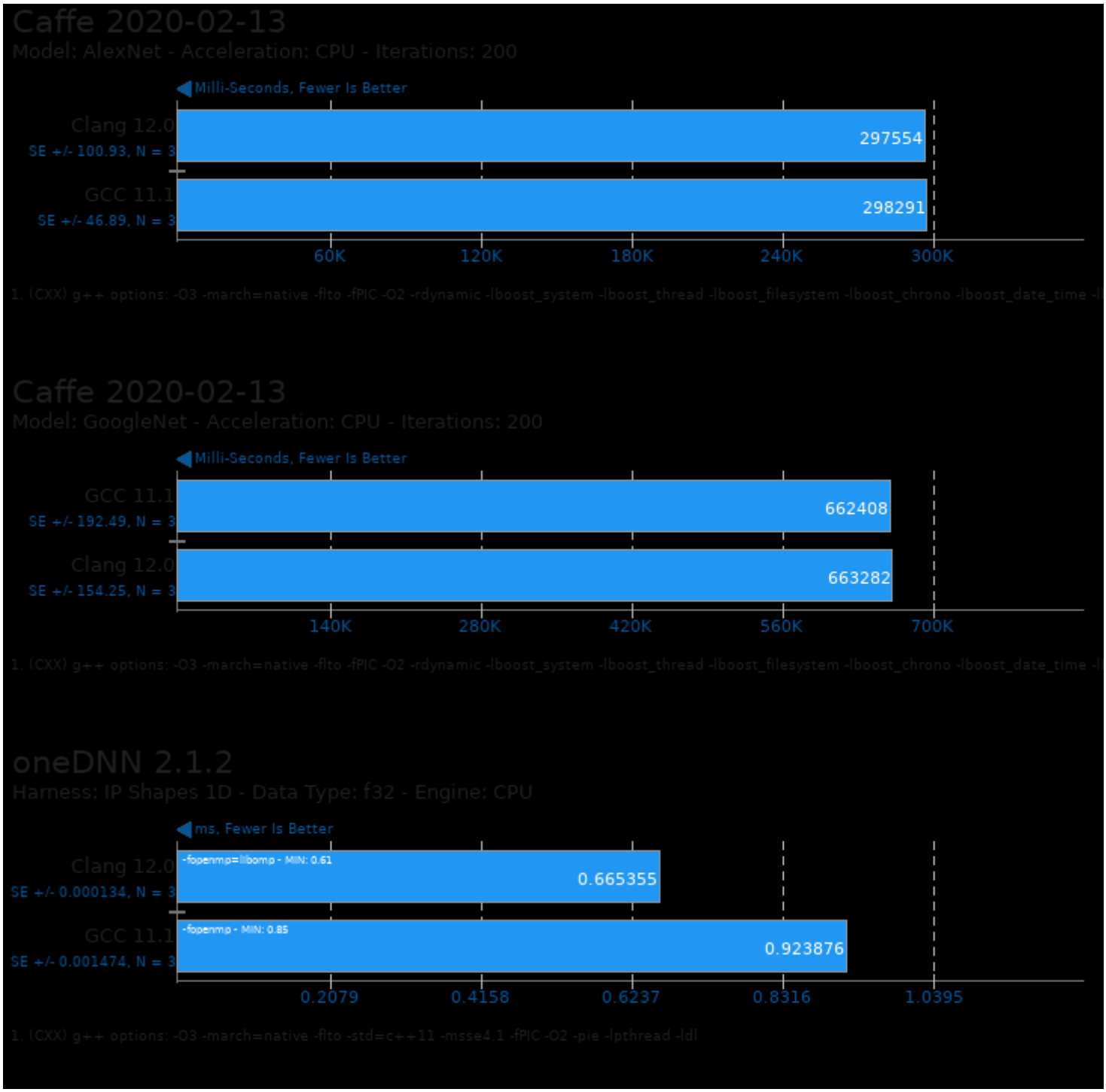
WebP Image Encode 1.1

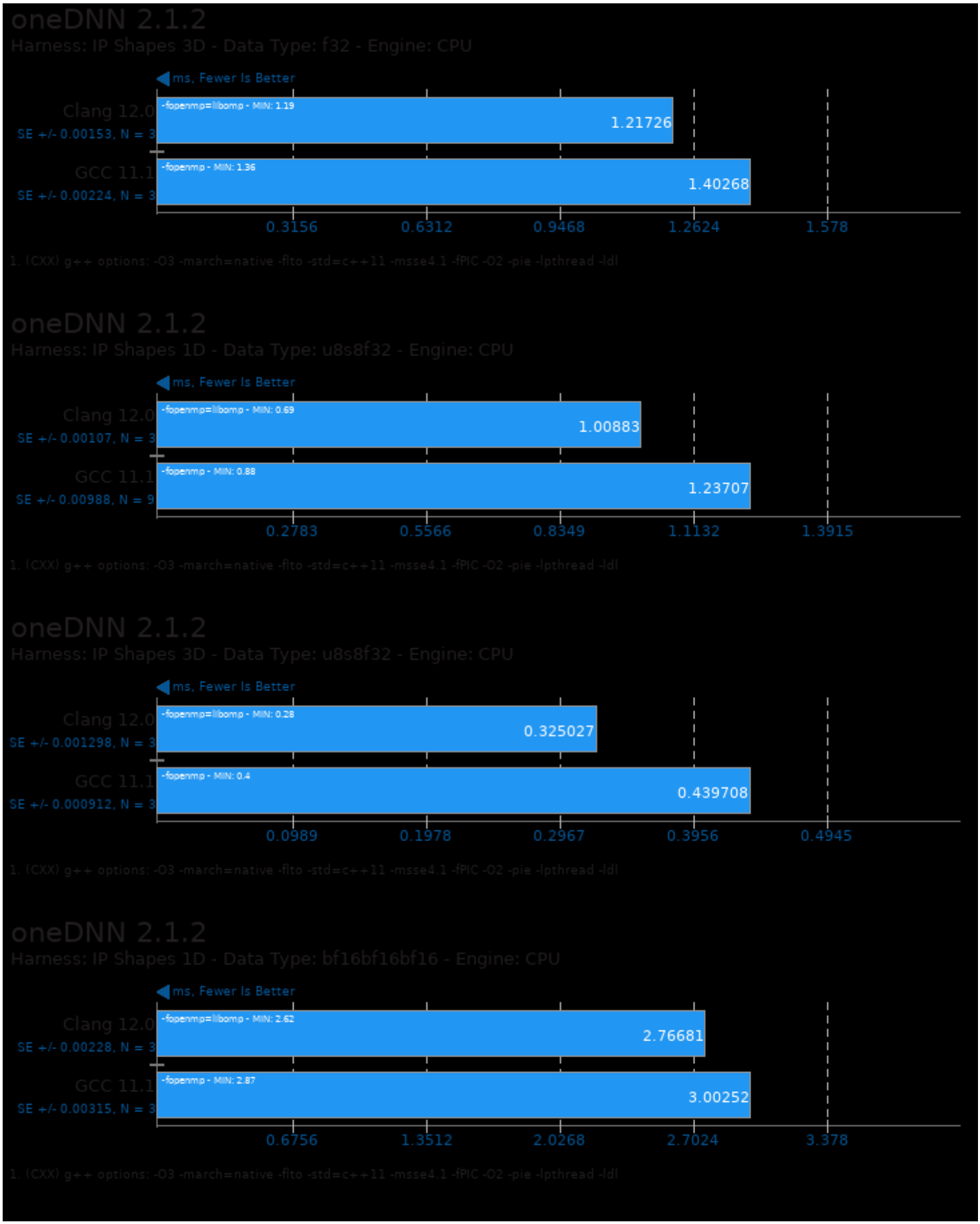
Encode Settings: Quality 100

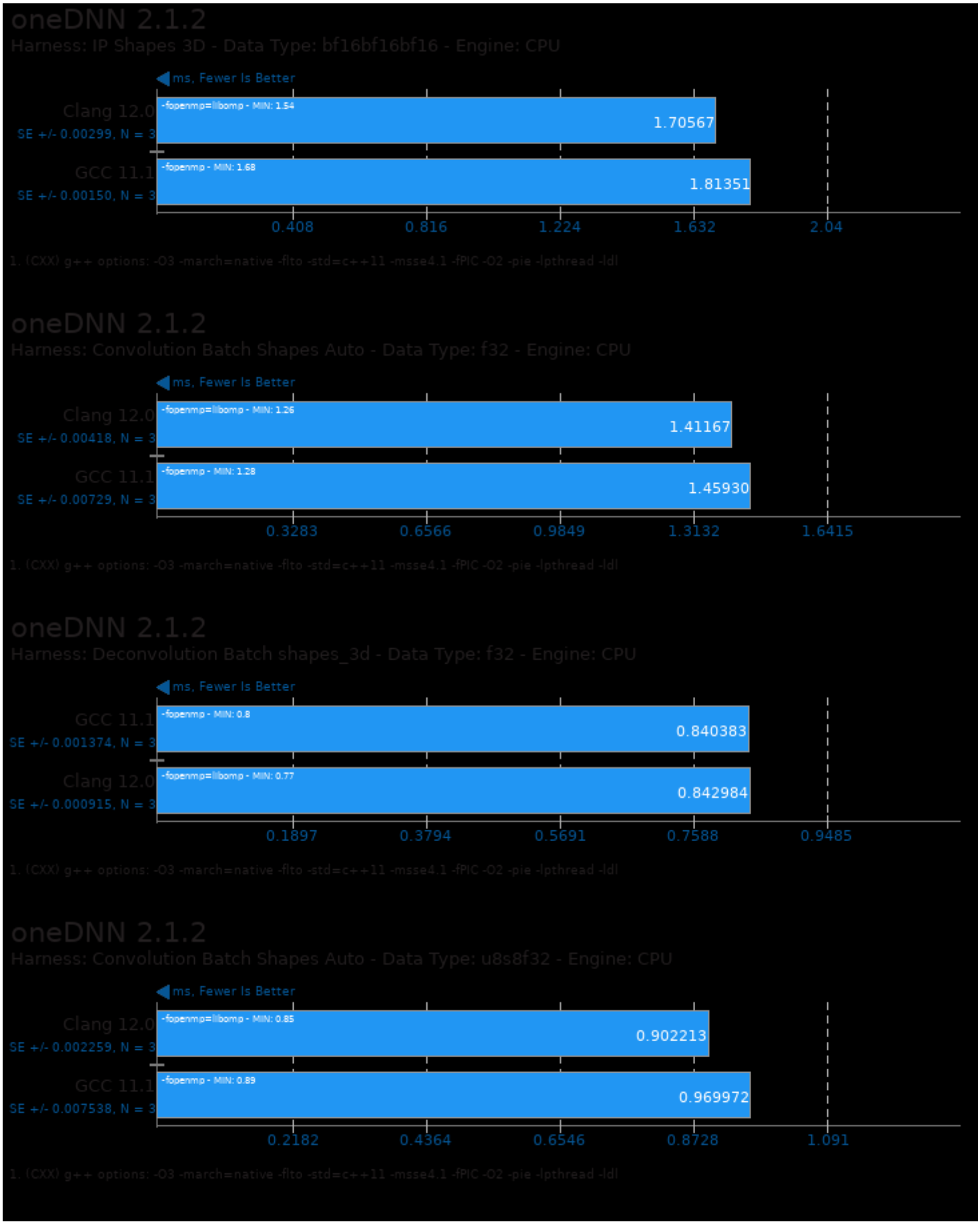


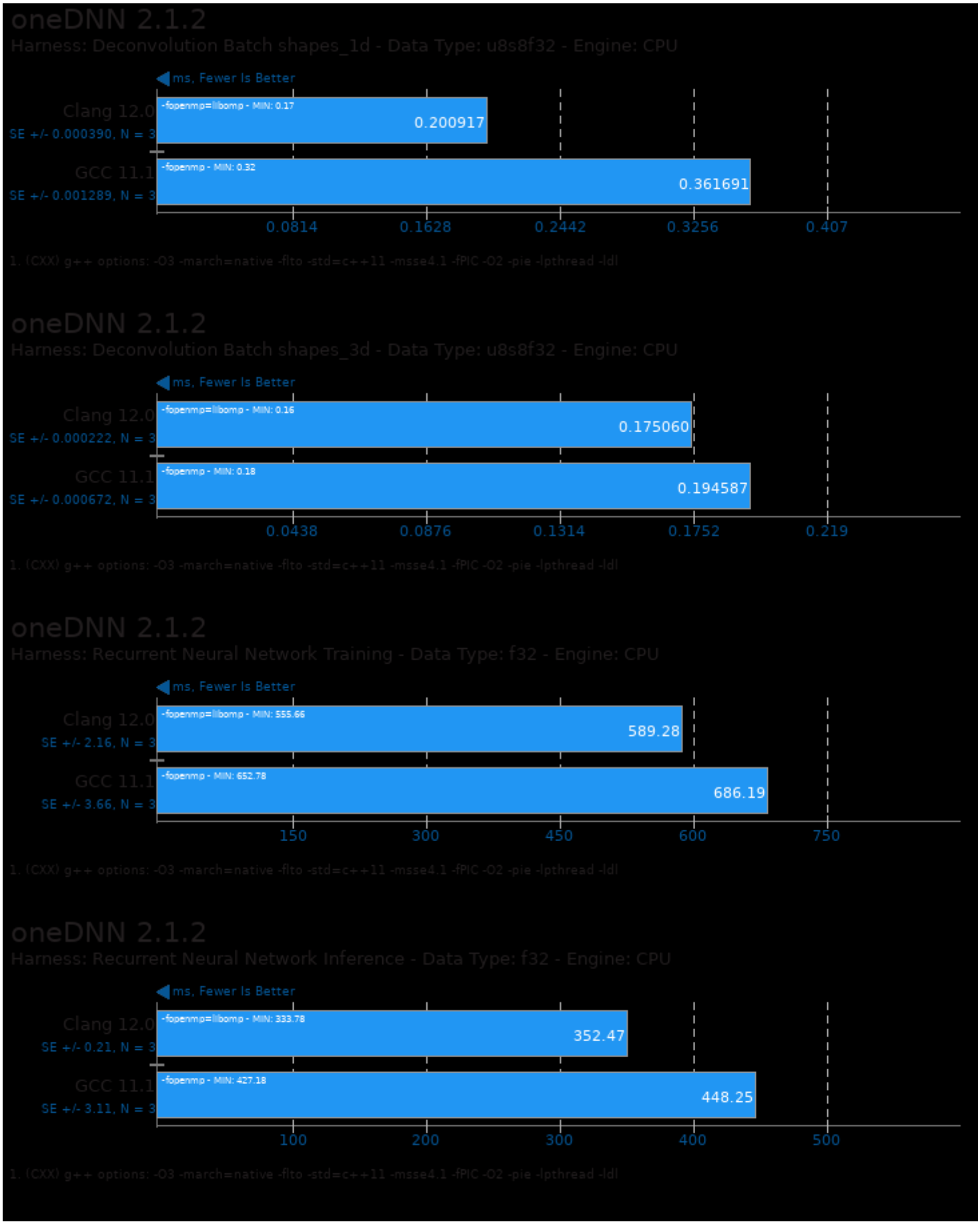
1. (CC) gcc options: -fvisibility=hidden -O3 -march=native -flto -pthread -lm -ljpeg

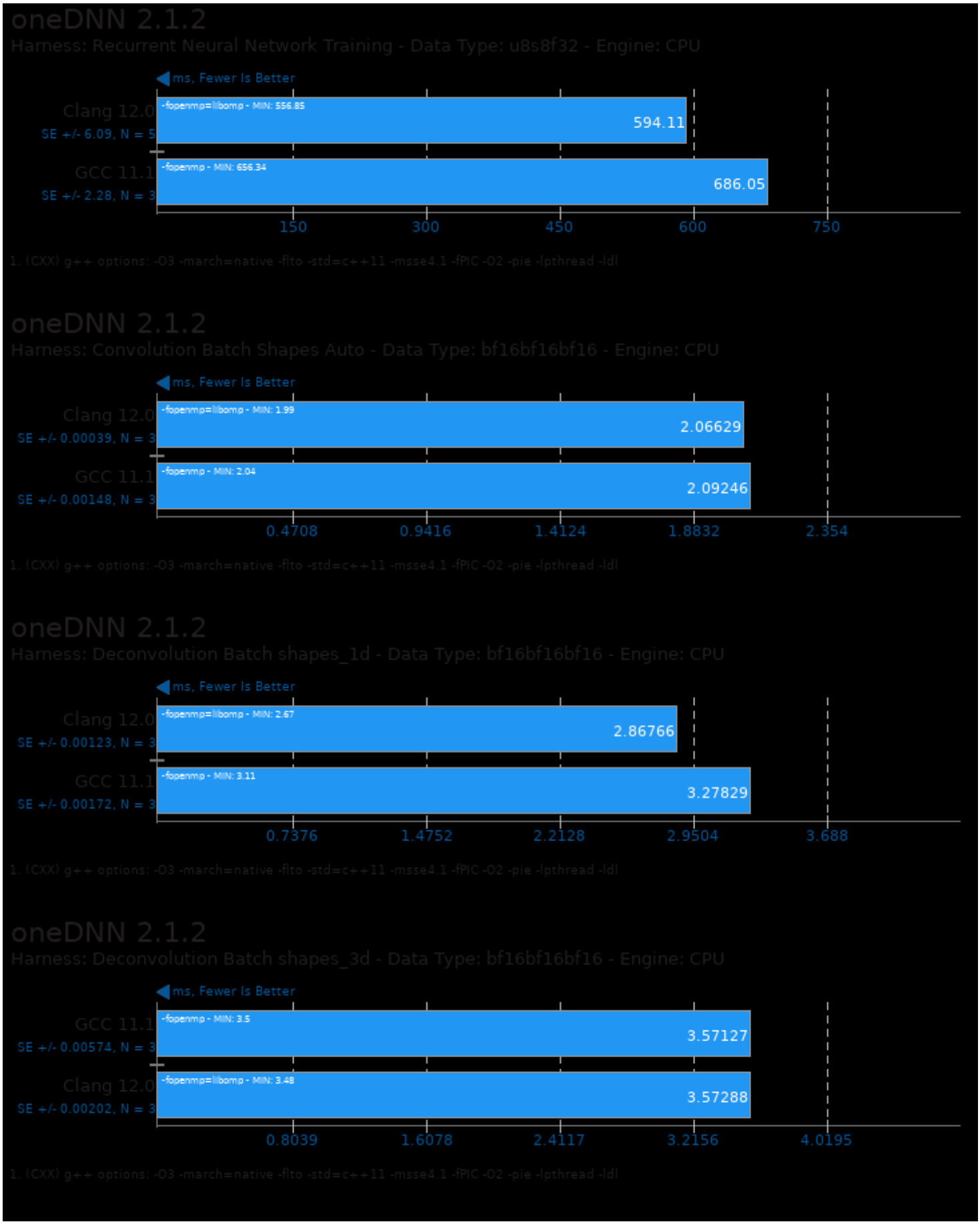

WebP Image Encode 1.1
Encode Settings: Quality 100, Lossless
Encode Time - Seconds, Fewer Is Better
GCC 11.1
SE +/- 0.01, N = 3
19.47
Clang 12.0
SE +/- 0.00, N = 3
20.27
5
10
15
20
25
1. (CC) gcc options: -fvisibility=hidden -O3 -march=native -flto -pthread -lm -ljpeg
WebP Image Encode 1.1
Encode Settings: Quality 100, Highest Compression
Encode Time - Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.007, N = 3
7.422
GCC 11.1
SE +/- 0.007, N = 3
8.026
2
4
6
8
10
1. (CC) gcc options: -fvisibility=hidden -O3 -march=native -flto -pthread -lm -ljpeg
WebP Image Encode 1.1
Encode Settings: Quality 100, Lossless, Highest Compression
Encode Time - Seconds, Fewer Is Better
GCC 11.1
SE +/- 0.05, N = 3
40.91
Clang 12.0
SE +/- 0.02, N = 3
42.18
10
20
30
40
50
1. (CC) gcc options: -fvisibility=hidden -O3 -march=native -flto -pthread -lm -ljpeg

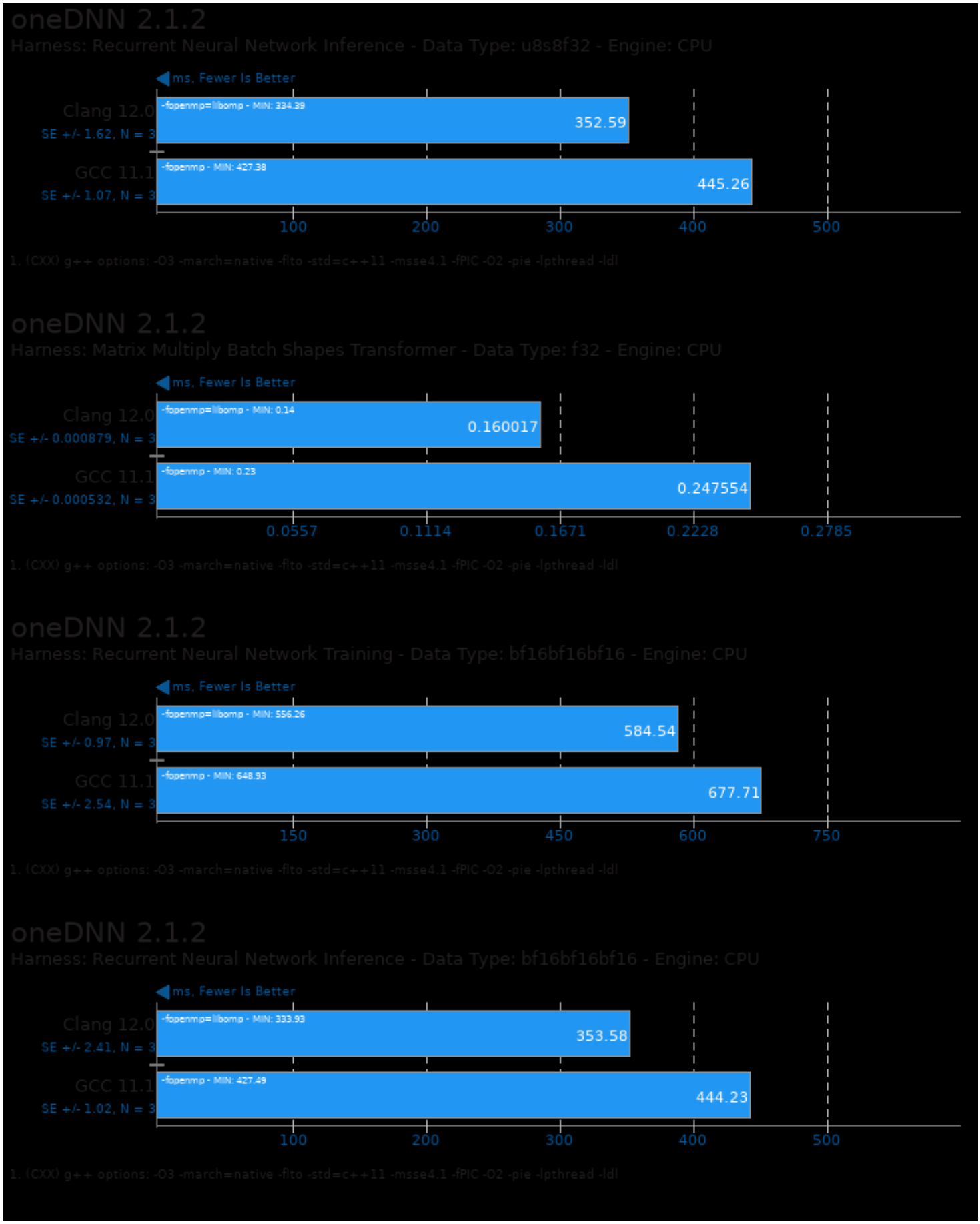

Caffe 2020-02-13
Model: AlexNet - Acceleration: CPU - Iterations: 200
Milli-Seconds, Fewer Is Better
Clang 12.0
SE +/- 100.93, N = 3
297554
GCC 11.1
SE +/- 46.89, N = 3
298291
60K
120K
180K
240K
300K
1. (CXX) g++ options: -O3 -march=native -flto -fPIC -O2 -rdynamic -lboost_system -lboost_thread -lboost_filesystem -lboost_chrono -lboost_date_time -l
Caffe 2020-02-13
Model: GoogleNet - Acceleration: CPU - Iterations: 200
Milli-Seconds, Fewer Is Better
GCC 11.1
SE +/- 192.49, N = 3
662408
Clang 12.0
SE +/- 154.25, N = 3
663282
140K
280K
420K
560K
700K
1. (CXX) g++ options: -O3 -march=native -flto -fPIC -O2 -rdynamic -lboost_system -lboost_thread -lboost_filesystem -lboost_chrono -lboost_date_time -l
oneDNN 2.1.2
Harness: IP Shapes 1D - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.000134, N = 3
-fopenmp=libomp - MIN: 0.61
0.665355
GCC 11.1
SE +/- 0.001474, N = 3
-fopenmp - MIN: 0.85
0.923876
0.2079
0.4158
0.6237
0.8316
1.0395
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

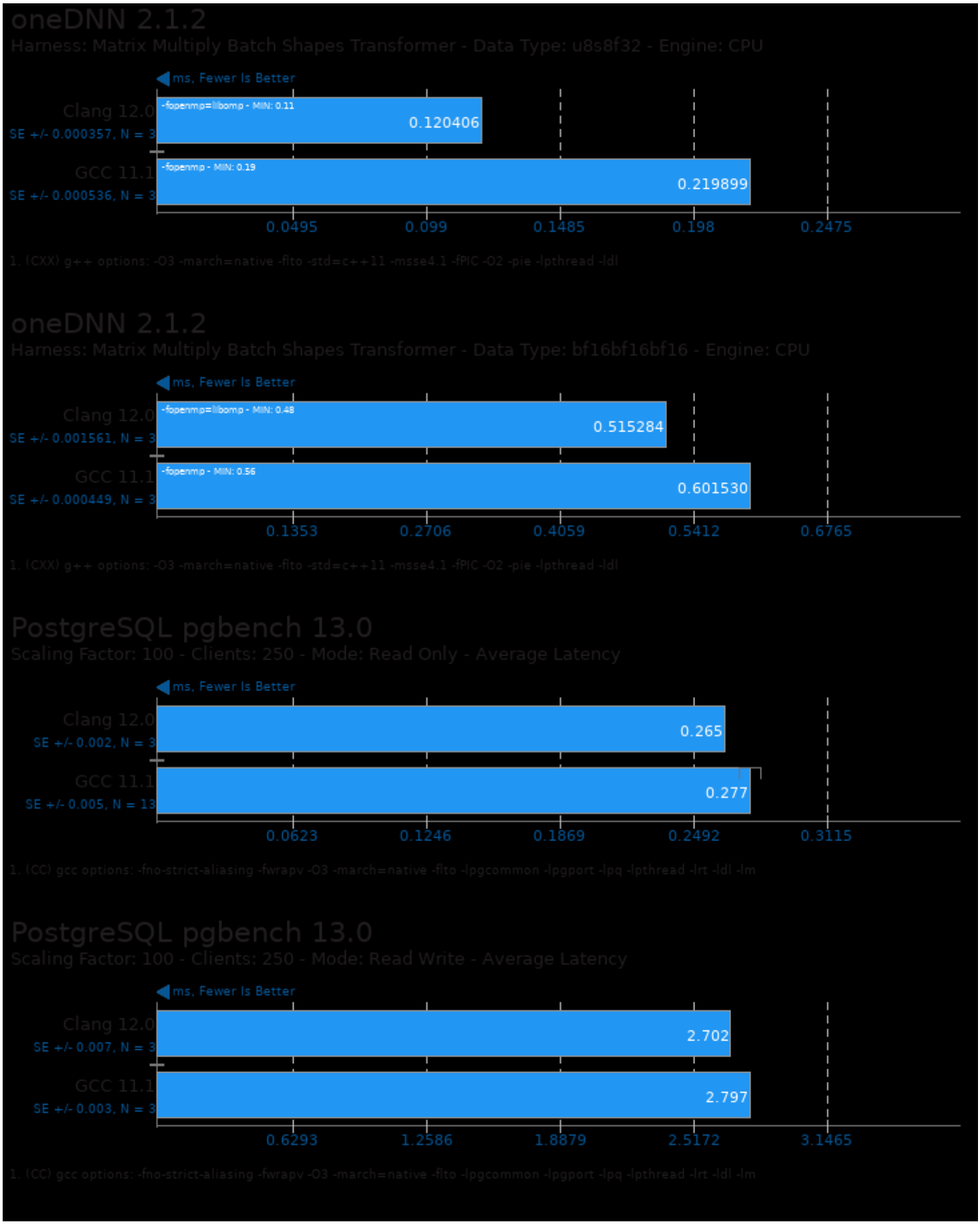

oneDNN 2.1.2
Harness: IP Shapes 3D - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00153, N = 3
-fopenmp=libomp - MIN: 1.19
1.21726
GCC 11.1
SE +/- 0.00224, N = 3
-fopenmp - MIN: 1.36
1.40268
0.3156
0.6312
0.9468
1.2624
1.578
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: IP Shapes 1D - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00107, N = 3
-fopenmp=libomp - MIN: 0.69
1.00883
GCC 11.1
SE +/- 0.00988, N = 9
-fopenmp - MIN: 0.88
1.23707
0.2783
0.5566
0.8349
1.1132
1.3915
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: IP Shapes 3D - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.001298, N = 3
-fopenmp=libomp - MIN: 0.28
0.325027
GCC 11.1
SE +/- 0.000912, N = 3
-fopenmp - MIN: 0.4
0.439708
0.0989
0.1978
0.2967
0.3956
0.4945
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: IP Shapes 1D - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00228, N = 3
-fopenmp=libomp - MIN: 2.62
2.76681
GCC 11.1
SE +/- 0.00315, N = 3
-fopenmp - MIN: 2.87
3.00252
0.6756
1.3512
2.0268
2.7024
3.378
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

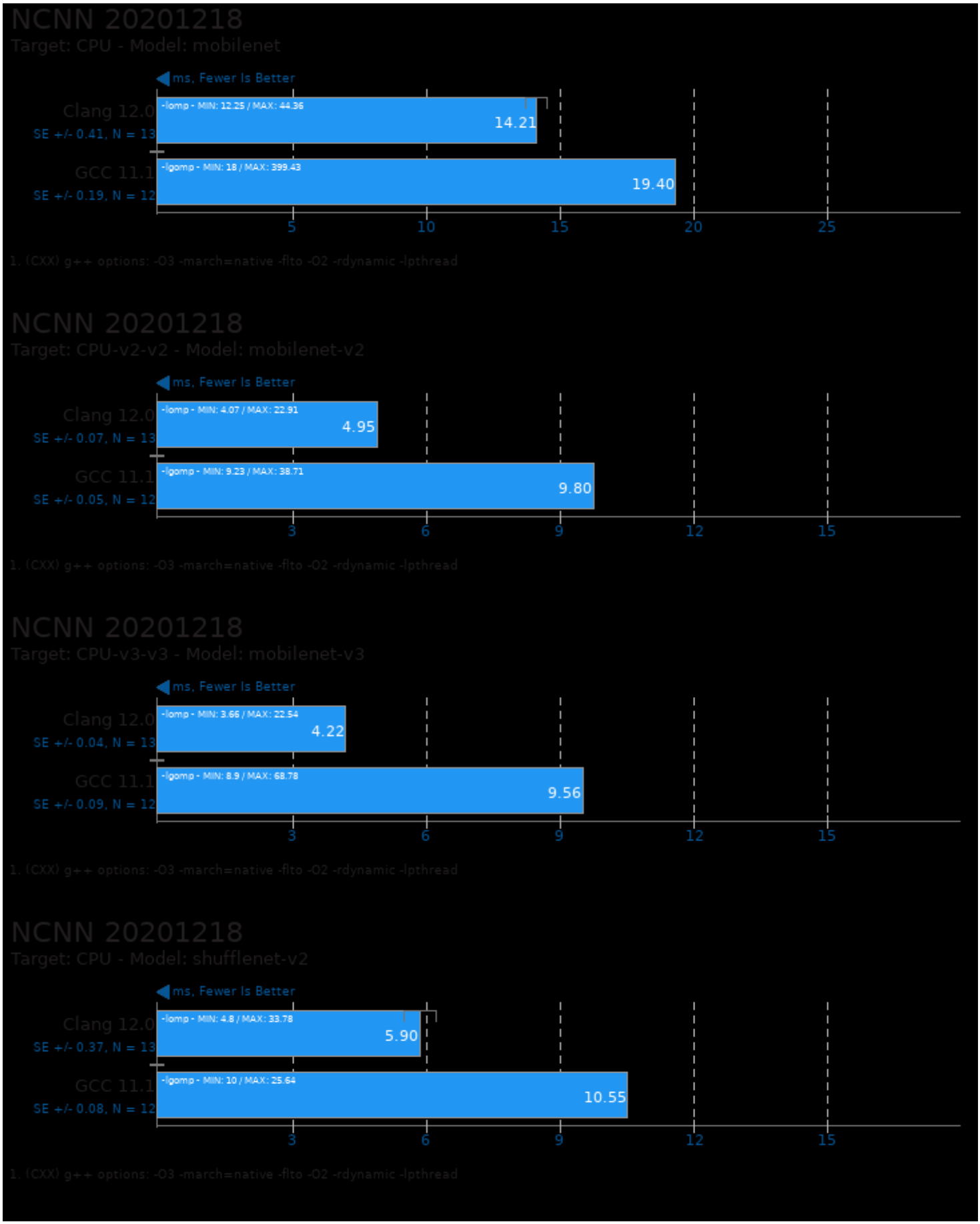

oneDNN 2.1.2
Harness: IP Shapes 3D - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00299, N = 3
-fopenmp=libomp - MIN: 1.54
1.70567
GCC 11.1
SE +/- 0.00150, N = 3
-fopenmp - MIN: 1.68
1.81351
0.408
0.816
1.224
1.632
2.04
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Convolution Batch Shapes Auto - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00418, N = 3
-fopenmp=libomp - MIN: 1.26
1.41167
GCC 11.1
SE +/- 0.00729, N = 3
-fopenmp - MIN: 1.28
1.45930
0.3283
0.6566
0.9849
1.3132
1.6415
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_3d - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
GCC 11.1
SE +/- 0.001374, N = 3
-fopenmp - MIN: 0.8
0.840383
Clang 12.0
SE +/- 0.000915, N = 3
-fopenmp=libomp - MIN: 0.77
0.842984
0.1897
0.3794
0.5691
0.7588
0.9485
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Convolution Batch Shapes Auto - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.002259, N = 3
-fopenmp=libomp - MIN: 0.85
0.902213
GCC 11.1
SE +/- 0.007538, N = 3
-fopenmp - MIN: 0.89
0.969972
0.2182
0.4364
0.6546
0.8728
1.091
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

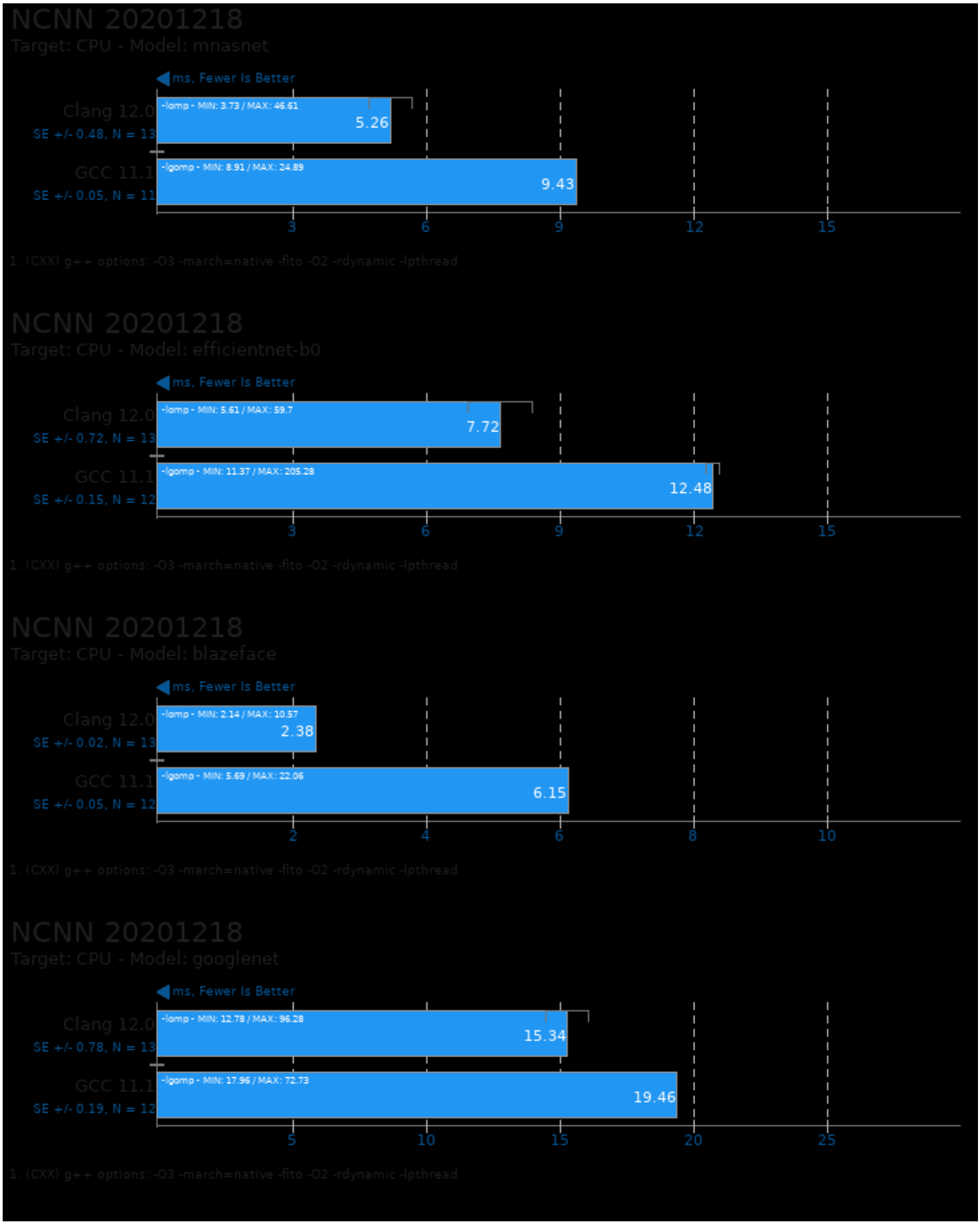

oneDNN 2.1.2
Harness: Deconvolution Batch shapes_1d - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 0.17
0.200917
SE +/- 0.000390, N = 3
GCC 11.1
-fopenmp - MIN: 0.32
0.361691
SE +/- 0.001289, N = 3
0.0814
0.1628
0.2442
0.3256
0.407
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_3d - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 0.16
0.175060
SE +/- 0.000222, N = 3
GCC 11.1
-fopenmp - MIN: 0.18
0.194587
SE +/- 0.000672, N = 3
0.0438
0.0876
0.1314
0.1752
0.219
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 555.66
589.28
SE +/- 2.16, N = 3
GCC 11.1
-fopenmp - MIN: 652.78
686.19
SE +/- 3.66, N = 3
150
300
450
600
750
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Inference - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 333.78
352.47
SE +/- 0.21, N = 3
GCC 11.1
-fopenmp - MIN: 427.18
448.25
SE +/- 3.11, N = 3
100
200
300
400
500
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

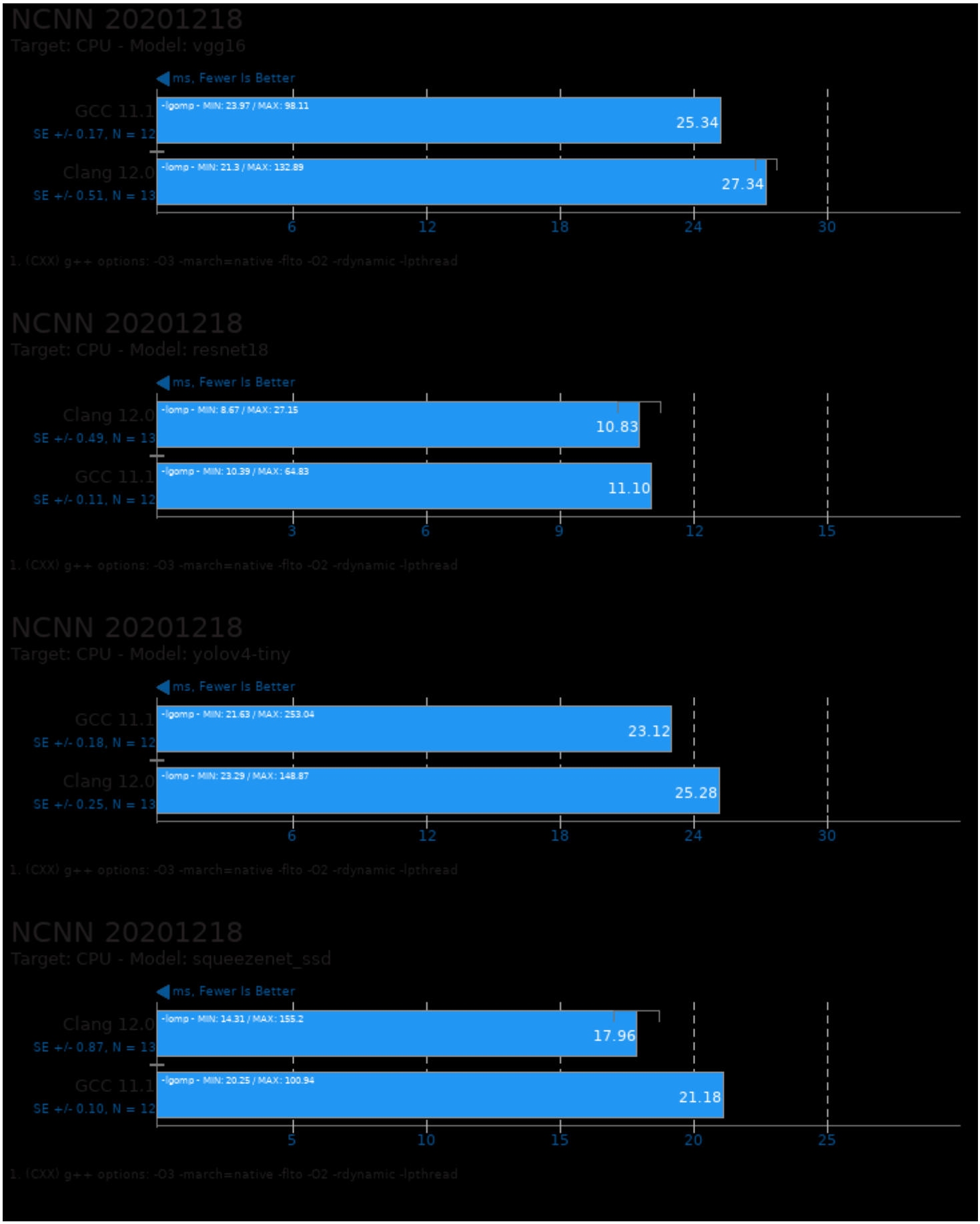

oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 6.09, N = 5
-fopenmp=libomp - MIN: 556.85
594.11
GCC 11.1
SE +/- 2.28, N = 3
-fopenmp - MIN: 656.34
686.05
150
300
450
600
750
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Convolution Batch Shapes Auto - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00039, N = 3
-fopenmp=libomp - MIN: 1.99
2.06629
GCC 11.1
SE +/- 0.00148, N = 3
-fopenmp - MIN: 2.04
2.09246
0.4708
0.9416
1.4124
1.8832
2.354
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_1d - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.00123, N = 3
-fopenmp=libomp - MIN: 2.67
2.86766
GCC 11.1
SE +/- 0.00172, N = 3
-fopenmp - MIN: 3.11
3.27829
0.7376
1.4752
2.2128
2.9504
3.688
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Deconvolution Batch shapes_3d - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
GCC 11.1
SE +/- 0.00574, N = 3
-fopenmp - MIN: 3.5
3.57127
Clang 12.0
SE +/- 0.00202, N = 3
-fopenmp=libomp - MIN: 3.48
3.57288
0.8039
1.6078
2.4117
3.2156
4.0195
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

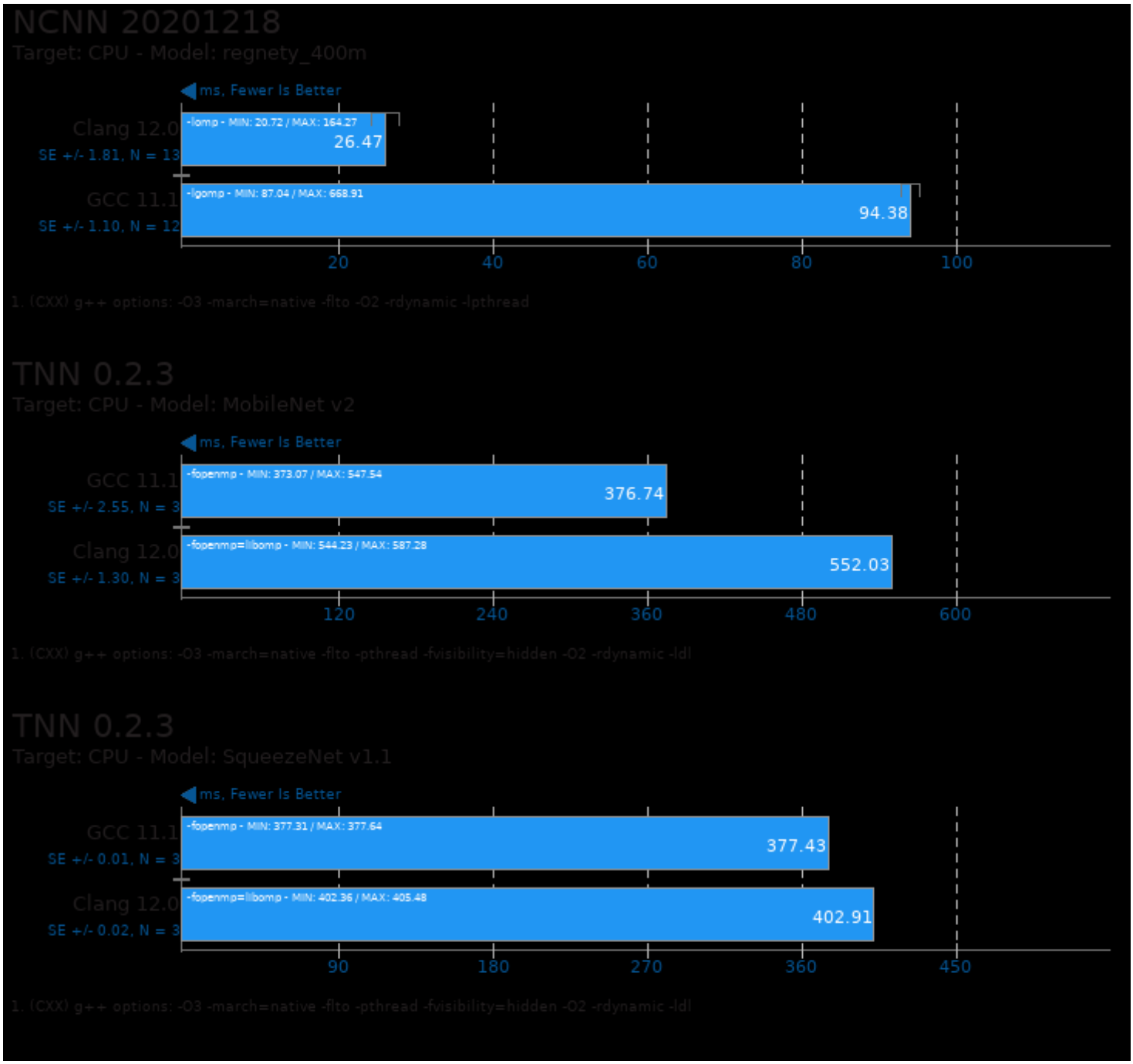

oneDNN 2.1.2
Harness: Recurrent Neural Network Inference - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 1.62, N = 3
-fopenmp=libomp - MIN: 334.39
352.59
GCC 11.1
SE +/- 1.07, N = 3
-fopenmp - MIN: 427.38
445.26
100
200
300
400
500
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.000879, N = 3
-fopenmp=libomp - MIN: 0.14
0.160017
GCC 11.1
SE +/- 0.000532, N = 3
-fopenmp - MIN: 0.23
0.247554
0.0557
0.1114
0.1671
0.2228
0.2785
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Training - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 0.97, N = 3
-fopenmp=libomp - MIN: 556.26
584.54
GCC 11.1
SE +/- 2.54, N = 3
-fopenmp - MIN: 648.93
677.71
150
300
450
600
750
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Recurrent Neural Network Inference - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
SE +/- 2.41, N = 3
-fopenmp=libomp - MIN: 333.93
353.58
GCC 11.1
SE +/- 1.02, N = 3
-fopenmp - MIN: 427.49
444.23
100
200
300
400
500
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl

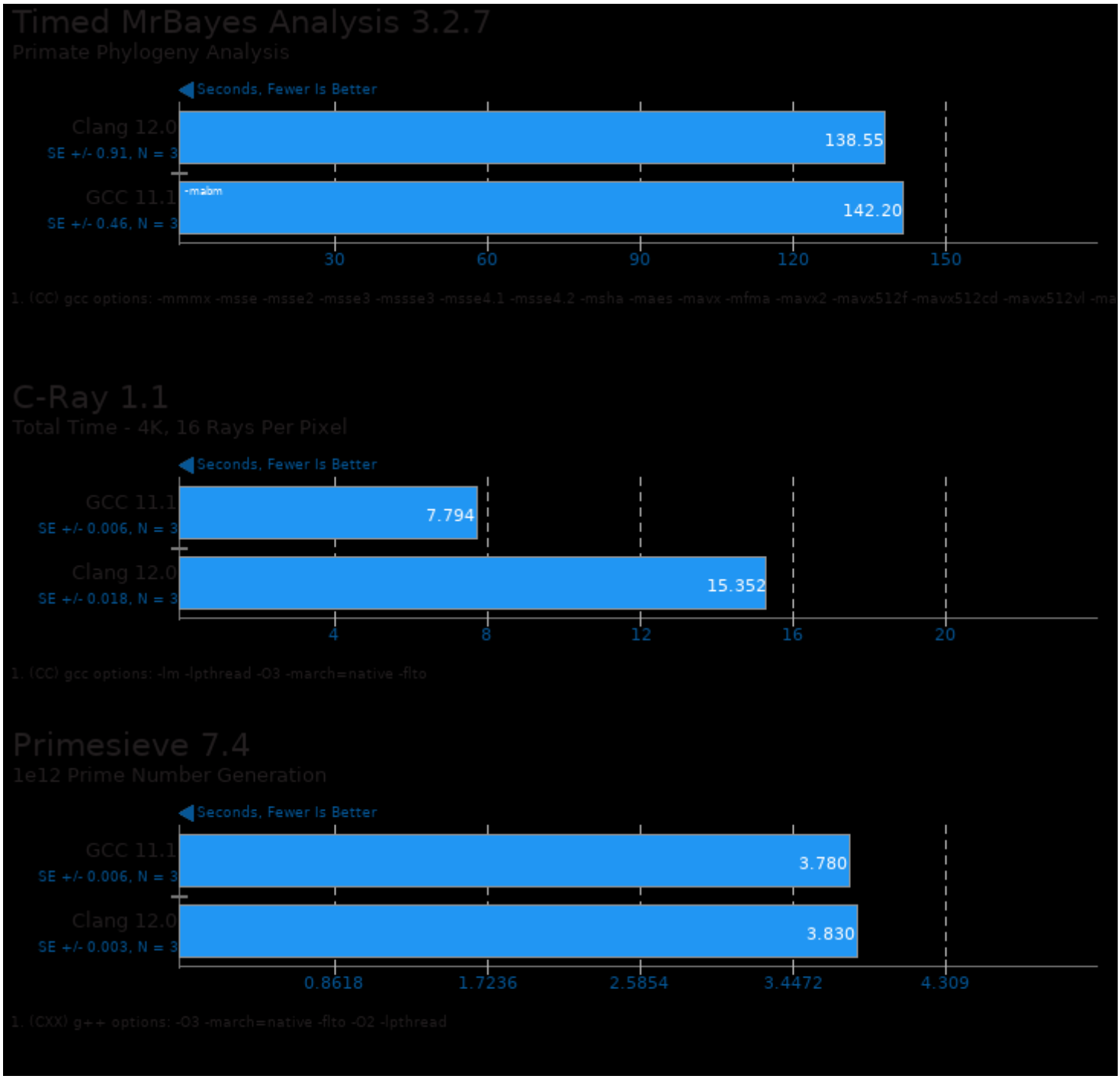

oneDNN 2.1.2
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: u8s8f32 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 0.11
0.120406
SE +/- 0.000357, N = 3
GCC 11.1
-fopenmp - MIN: 0.19
0.219899
SE +/- 0.000536, N = 3
0.0495
0.099
0.1485
0.198
0.2475
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
oneDNN 2.1.2
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: bf16bf16bf16 - Engine: CPU
ms, Fewer Is Better
Clang 12.0
-fopenmp=libomp - MIN: 0.48
0.515284
SE +/- 0.001561, N = 3
GCC 11.1
-fopenmp - MIN: 0.56
0.601530
SE +/- 0.000449, N = 3
0.1353
0.2706
0.4059
0.5412
0.6765
1. (CXX) g++ options: -O3 -march=native -flto -std=c++11 -msse4.1 -fPIC -O2 -pie -lpthread -ldl
PostgreSQL pgbench 13.0
Scaling Factor: 100 - Clients: 250 - Mode: Read Only - Average Latency
ms, Fewer Is Better
Clang 12.0
0.265
SE +/- 0.002, N = 3
GCC 11.1
0.277
SE +/- 0.005, N = 13
0.0623
0.1246
0.1869
0.2492
0.3115
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O3 -march=native -flto -lpgcommon -lpgport -lpq -lpthread -lrt -ldl -lm
PostgreSQL pgbench 13.0
Scaling Factor: 100 - Clients: 250 - Mode: Read Write - Average Latency
ms, Fewer Is Better
Clang 12.0
2.702
SE +/- 0.007, N = 3
GCC 11.1
2.797
SE +/- 0.003, N = 3
0.6293
1.2586
1.8879
2.5172
3.1465
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O3 -march=native -flto -lpgcommon -lpgport -lpq -lpthread -lrt -ldl -lm


NCNN 20201218
Target: CPU - Model: mobilenet
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 12.25 / MAX: 44.36
14.21
SE +/- 0.41, N = 13
GCC 11.1
-lgomp - MIN: 18 / MAX: 399.43
19.40
SE +/- 0.19, N = 12
5
10
15
20
25
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU-v2-v2 - Model: mobilenet-v2
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 4.07 / MAX: 22.91
4.95
SE +/- 0.07, N = 13
GCC 11.1
-lgomp - MIN: 9.23 / MAX: 38.71
9.80
SE +/- 0.05, N = 12
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU-v3-v3 - Model: mobilenet-v3
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 3.66 / MAX: 22.54
4.22
SE +/- 0.04, N = 13
GCC 11.1
-lgomp - MIN: 8.9 / MAX: 68.78
9.56
SE +/- 0.09, N = 12
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: shufflenet-v2
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 4.8 / MAX: 33.78
5.90
SE +/- 0.37, N = 13
GCC 11.1
-lgomp - MIN: 10 / MAX: 25.64
10.55
SE +/- 0.08, N = 12
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread


NCNN 20201218
Target: CPU - Model: mnasnet
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 3.73 / MAX: 46.61
5.26
SE +/- 0.48, N = 13
GCC 11.1
-lgomp - MIN: 8.91 / MAX: 24.89
9.43
SE +/- 0.05, N = 11
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: efficientnet-b0
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 5.61 / MAX: 59.7
7.72
SE +/- 0.72, N = 13
GCC 11.1
-lgomp - MIN: 11.37 / MAX: 205.28
12.48
SE +/- 0.15, N = 12
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: blazeface
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 2.14 / MAX: 10.57
2.38
SE +/- 0.02, N = 13
GCC 11.1
-lgomp - MIN: 5.69 / MAX: 22.06
6.15
SE +/- 0.05, N = 12
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: googlenet
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 12.78 / MAX: 96.28
15.34
SE +/- 0.78, N = 13
GCC 11.1
-lgomp - MIN: 17.96 / MAX: 72.73
19.46
SE +/- 0.19, N = 12
5
10
15
20
25
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread

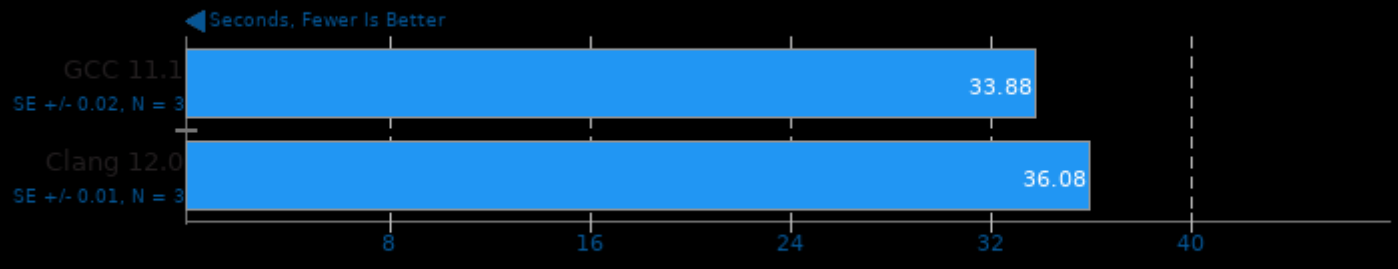

NCNN 20201218
Target: CPU - Model: vgg16
ms, Fewer Is Better
GCC 11.1
-lgomp - MIN: 23.97 / MAX: 98.11
25.34
SE +/- 0.17, N = 12
Clang 12.0
-lomp - MIN: 21.3 / MAX: 132.89
27.34
SE +/- 0.51, N = 13
6
12
18
24
30
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: resnet18
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 8.67 / MAX: 27.15
10.83
SE +/- 0.49, N = 13
GCC 11.1
-lgomp - MIN: 10.39 / MAX: 64.83
11.10
SE +/- 0.11, N = 12
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: yolov4-tiny
ms, Fewer Is Better
GCC 11.1
-lgomp - MIN: 21.63 / MAX: 253.04
23.12
SE +/- 0.18, N = 12
Clang 12.0
-lomp - MIN: 23.29 / MAX: 148.87
25.28
SE +/- 0.25, N = 13
6
12
18
24
30
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
NCNN 20201218
Target: CPU - Model: squeezenet_ssd
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 14.31 / MAX: 155.2
17.96
SE +/- 0.87, N = 13
GCC 11.1
-lgomp - MIN: 20.25 / MAX: 100.94
21.18
SE +/- 0.10, N = 12
5
10
15
20
25
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread


NCNN 20201218
Target: CPU - Model: regnety_400m
ms, Fewer Is Better
Clang 12.0
-lomp - MIN: 20.72 / MAX: 164.27
26.47
SE +/- 1.81, N = 13
GCC 11.1
-lgomp - MIN: 87.04 / MAX: 668.91
94.38
SE +/- 1.10, N = 12
20
40
60
80
100
1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic -lpthread
TNN 0.2.3
Target: CPU - Model: MobileNet v2
ms, Fewer Is Better
GCC 11.1
-fopenmp - MIN: 373.07 / MAX: 547.54
376.74
SE +/- 2.55, N = 3
Clang 12.0
-fopenmp=libomp - MIN: 544.23 / MAX: 587.28
552.03
SE +/- 1.30, N = 3
120
240
360
480
600
1. (CXX) g++ options: -O3 -march=native -flto -pthread -fvisibility=hidden -O2 -rdynamic -ldl
TNN 0.2.3
Target: CPU - Model: SqueezeNet v1.1
ms, Fewer Is Better
GCC 11.1
-fopenmp - MIN: 377.31 / MAX: 377.64
377.43
SE +/- 0.01, N = 3
Clang 12.0
-fopenmp=libomp - MIN: 402.36 / MAX: 405.48
402.91
SE +/- 0.02, N = 3
90
180
270
360
450
1. (CXX) g++ options: -O3 -march=native -flto -pthread -fvisibility=hidden -O2 -rdynamic -ldl


Timed MrBayes Analysis 3.2.7
Primate Phylogeny Analysis
Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.91, N = 3
138.55
GCC 11.1
-mabm
SE +/- 0.46, N = 3
142.20
30
60
90
120
150
1. (CC) gcc options: -mmmx -msse -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -msha -maes -mavx -mfma -mavx2 -mavx512f -mavx512cd -mavx512vl -ma
C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
GCC 11.1
SE +/- 0.006, N = 3
7.794
Clang 12.0
SE +/- 0.018, N = 3
15.352
4
8
12
16
20
1. (CC) gcc options: -lm -lpthread -O3 -march=native -flto
Primesieve 7.4
1e12 Prime Number Generation
Seconds, Fewer Is Better
GCC 11.1
SE +/- 0.006, N = 3
3.780
Clang 12.0
SE +/- 0.003, N = 3
3.830
0.8618
1.7236
2.5854
3.4472
4.309
1. (CXX) g++ options: -O3 -march=native -flto -O2 -lpthread

AOBench

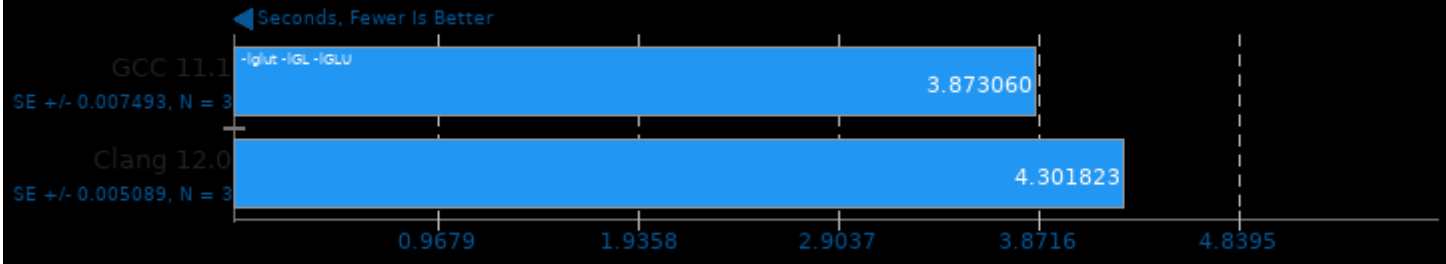
Size: 2048 x 2048 - Total Time



1. (CC) gcc options: -lm -O3 -march=native -flto

Bullet Physics Engine 2.81

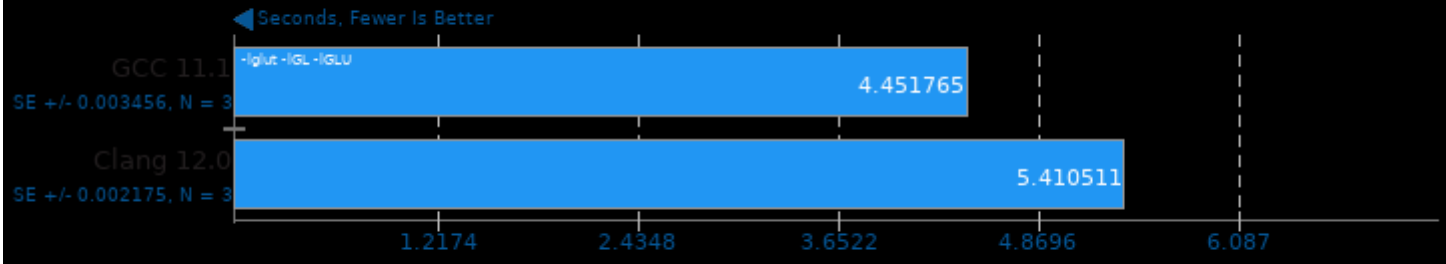
Test: 3000 Fall



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

Bullet Physics Engine 2.81

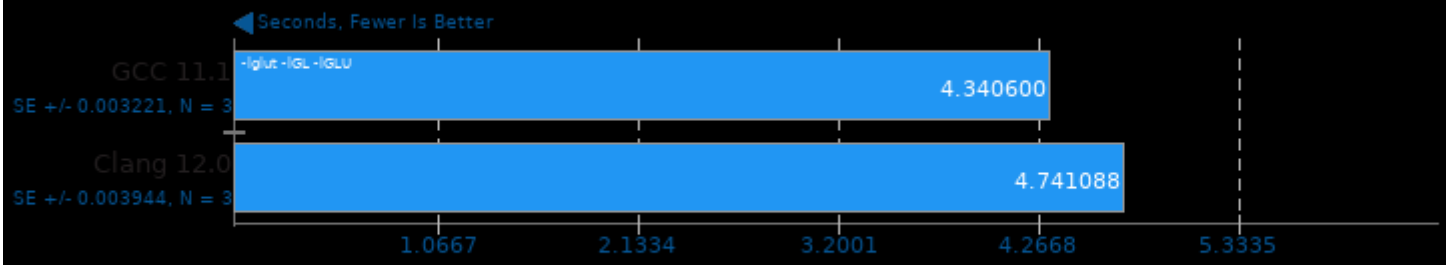
Test: 1000 Stack



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

Bullet Physics Engine 2.81

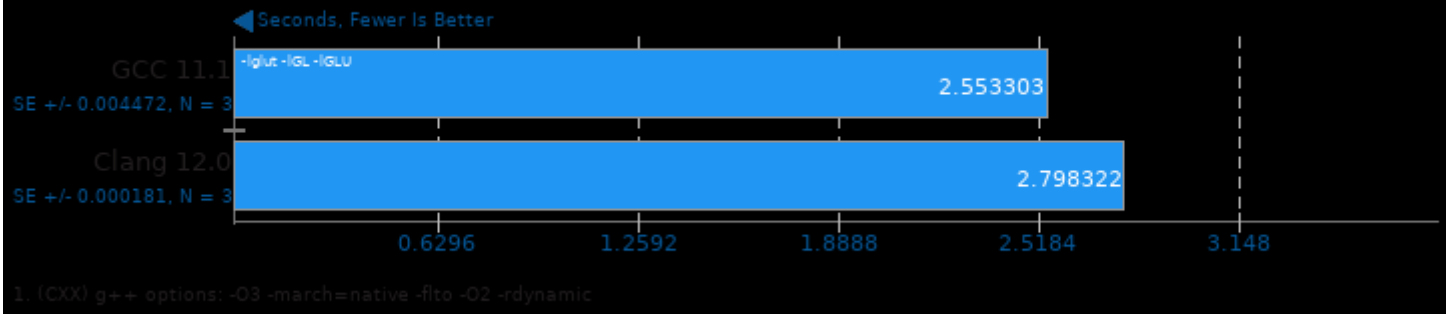
Test: 1000 Convex



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

Bullet Physics Engine 2.81

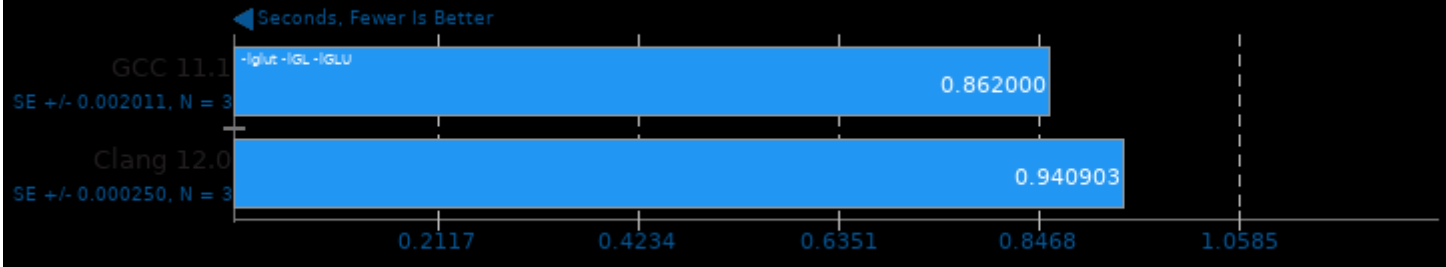
Test: 136 Ragdolls



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

Bullet Physics Engine 2.81

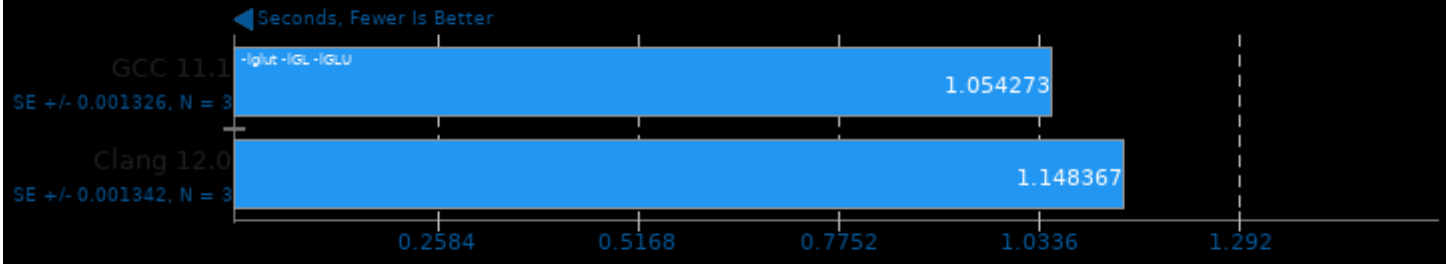
Test: Prim Trimesh



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

Bullet Physics Engine 2.81

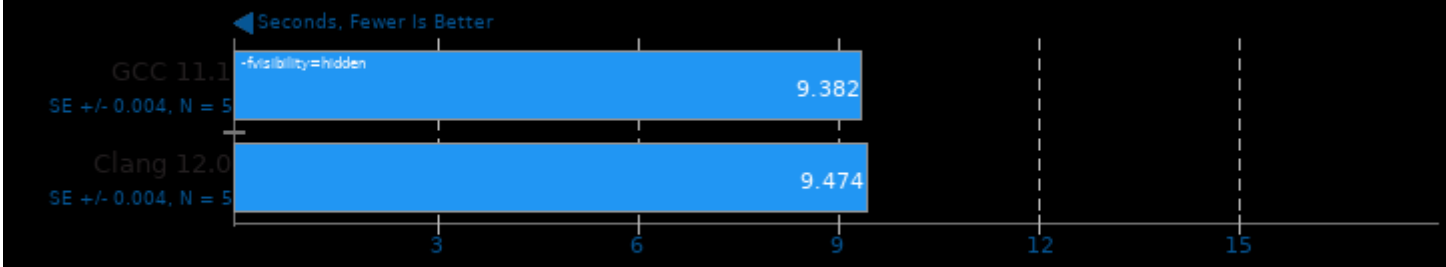
Test: Convex Trimesh



1. (CXX) g++ options: -O3 -march=native -flto -O2 -rdynamic

FLAC Audio Encoding 1.3.2

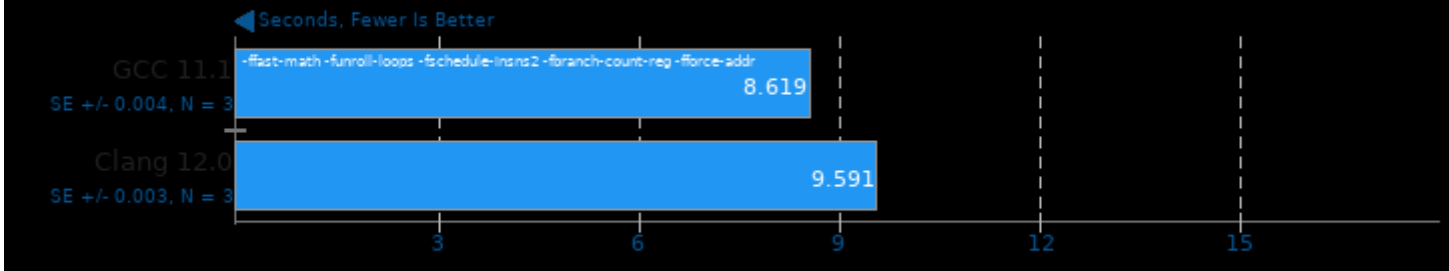
WAV To FLAC



1. (CXX) g++ options: -O3 -march=native -flto -logg -lm

LAME MP3 Encoding 3.100

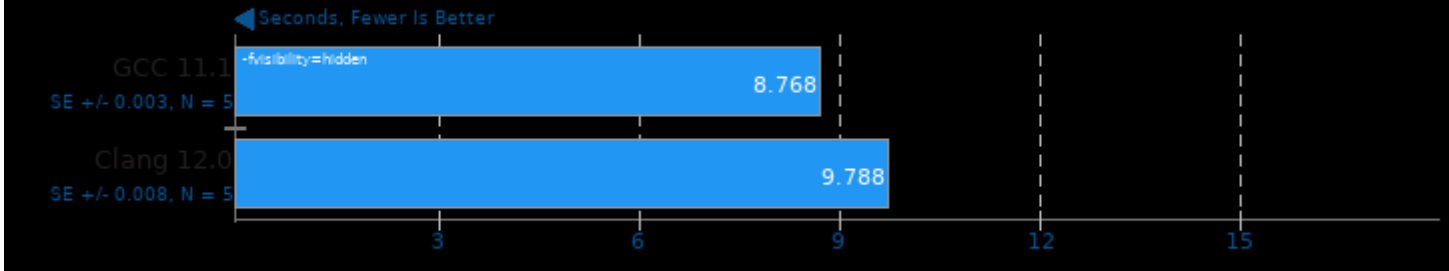
WAV To MP3



1. (CC) gcc options: -O3 -pipe -march=native -flto -lncurses -lm

Opus Codec Encoding 1.3.1

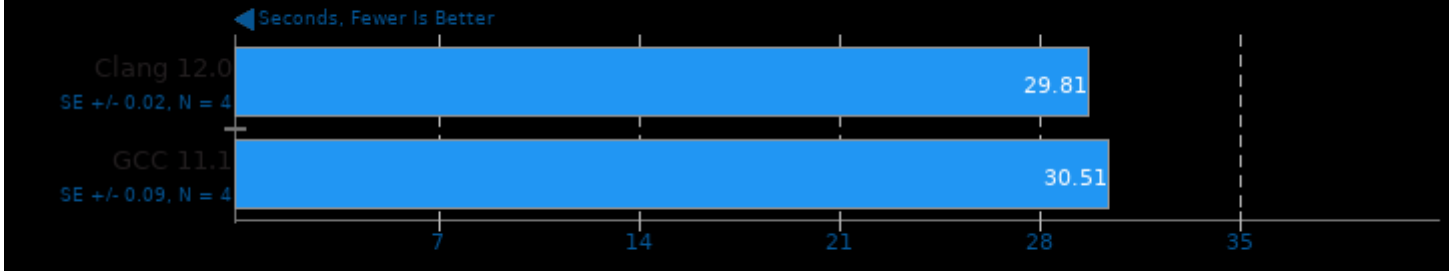
WAV To Opus Encode



1. (CXX) g++ options: -O3 -march=native -flto -logg -lm

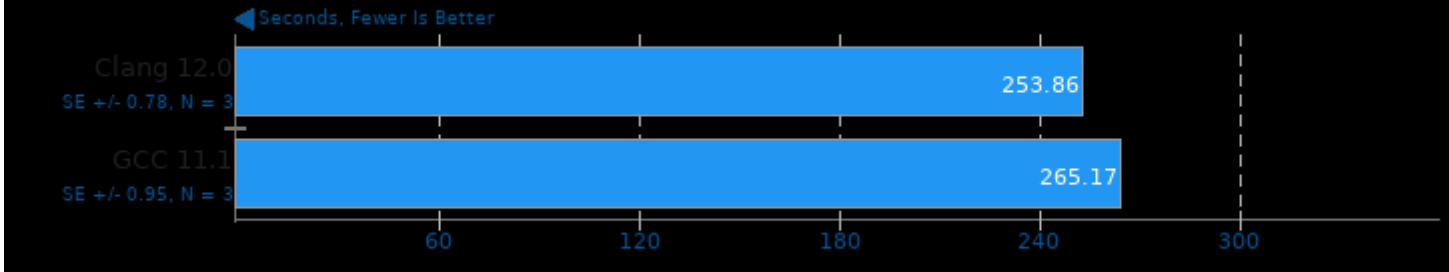
eSpeak-NG Speech Engine 20200907

Text-To-Speech Synthesis

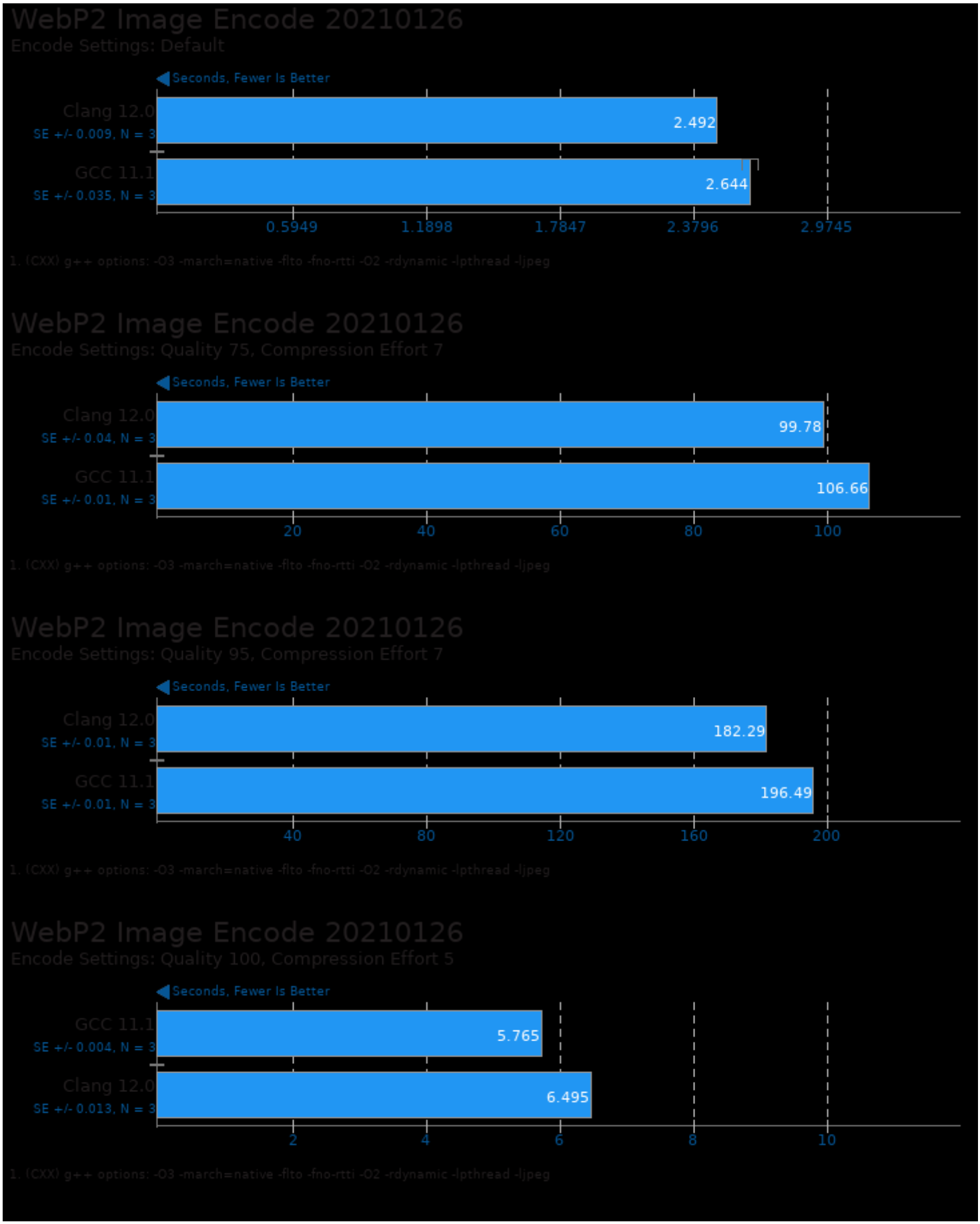


1. (CC) gcc options: -O3 -march=native -flto -std=c99 -lpthread -lm

Gcrypt Library 1.9

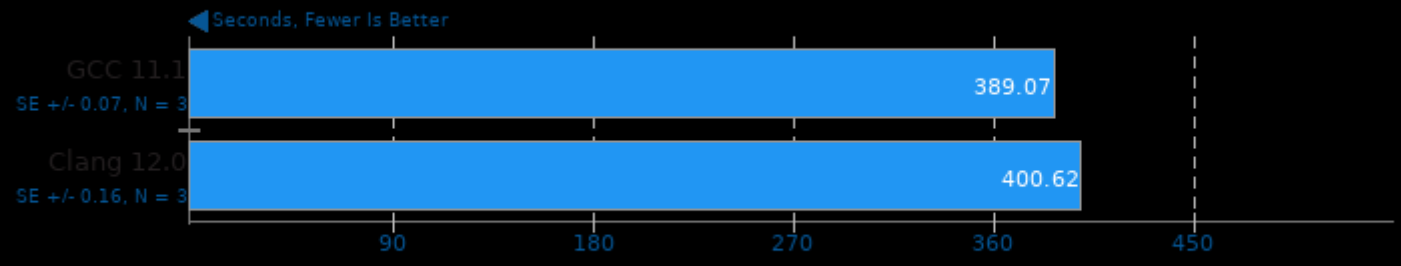


1. (CC) gcc options: -O3 -march=native -flto -fvisibility=hidden -lgpg-error


WebP2 Image Encode 20210126
Encode Settings: Default
Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.009, N = 3
2.492
GCC 11.1
SE +/- 0.035, N = 3
2.644
0.5949
1.1898
1.7847
2.3796
2.9745
1. (CXX) g++ options: -O3 -march=native -flto -fno-rtti -O2 -rdynamic -lpthread -ljpeg
WebP2 Image Encode 20210126
Encode Settings: Quality 75, Compression Effort 7
Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.04, N = 3
99.78
GCC 11.1
SE +/- 0.01, N = 3
106.66
20
40
60
80
100
1. (CXX) g++ options: -O3 -march=native -flto -fno-rtti -O2 -rdynamic -lpthread -ljpeg
WebP2 Image Encode 20210126
Encode Settings: Quality 95, Compression Effort 7
Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.01, N = 3
182.29
GCC 11.1
SE +/- 0.01, N = 3
196.49
40
80
120
160
200
1. (CXX) g++ options: -O3 -march=native -flto -fno-rtti -O2 -rdynamic -lpthread -ljpeg
WebP2 Image Encode 20210126
Encode Settings: Quality 100, Compression Effort 5
Seconds, Fewer Is Better
GCC 11.1
SE +/- 0.004, N = 3
5.765
Clang 12.0
SE +/- 0.013, N = 3
6.495
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -flto -fno-rtti -O2 -rdynamic -lpthread -ljpeg

WebP2 Image Encode 20210126

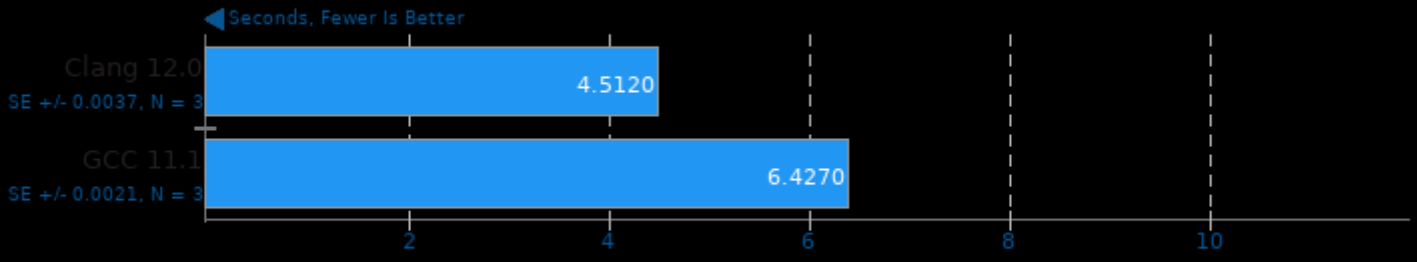
Encode Settings: Quality 100, Lossless Compression



1. (CXX) g++ options: -O3 -march=native -flto -fno-rtti -O2 -rdynamic -lpthread -ljpeg

ASTC Encoder 2.4

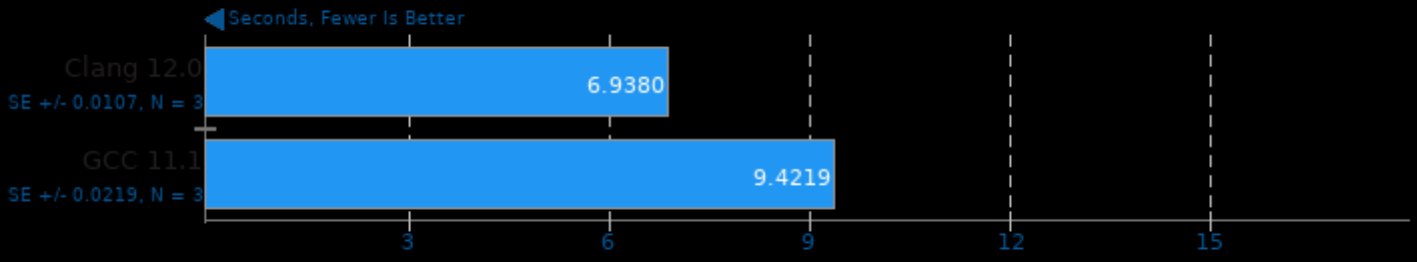
Preset: Medium



1. (CXX) g++ options: -O3 -march=native -flto -O2 -pthread

ASTC Encoder 2.4

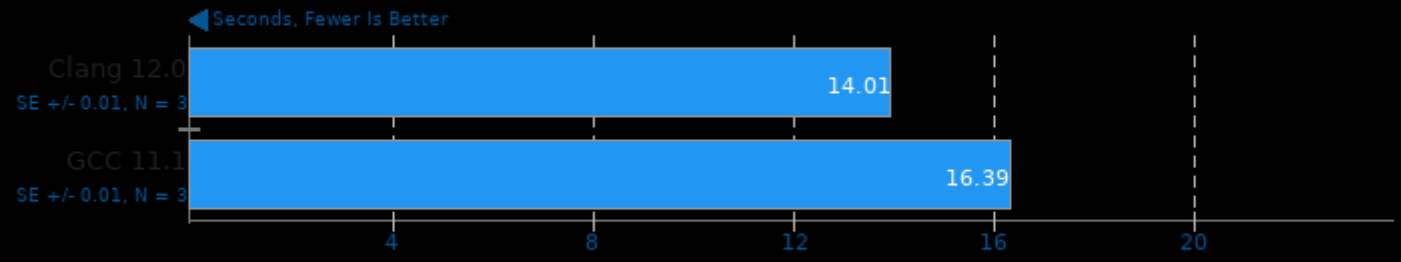
Preset: Thorough



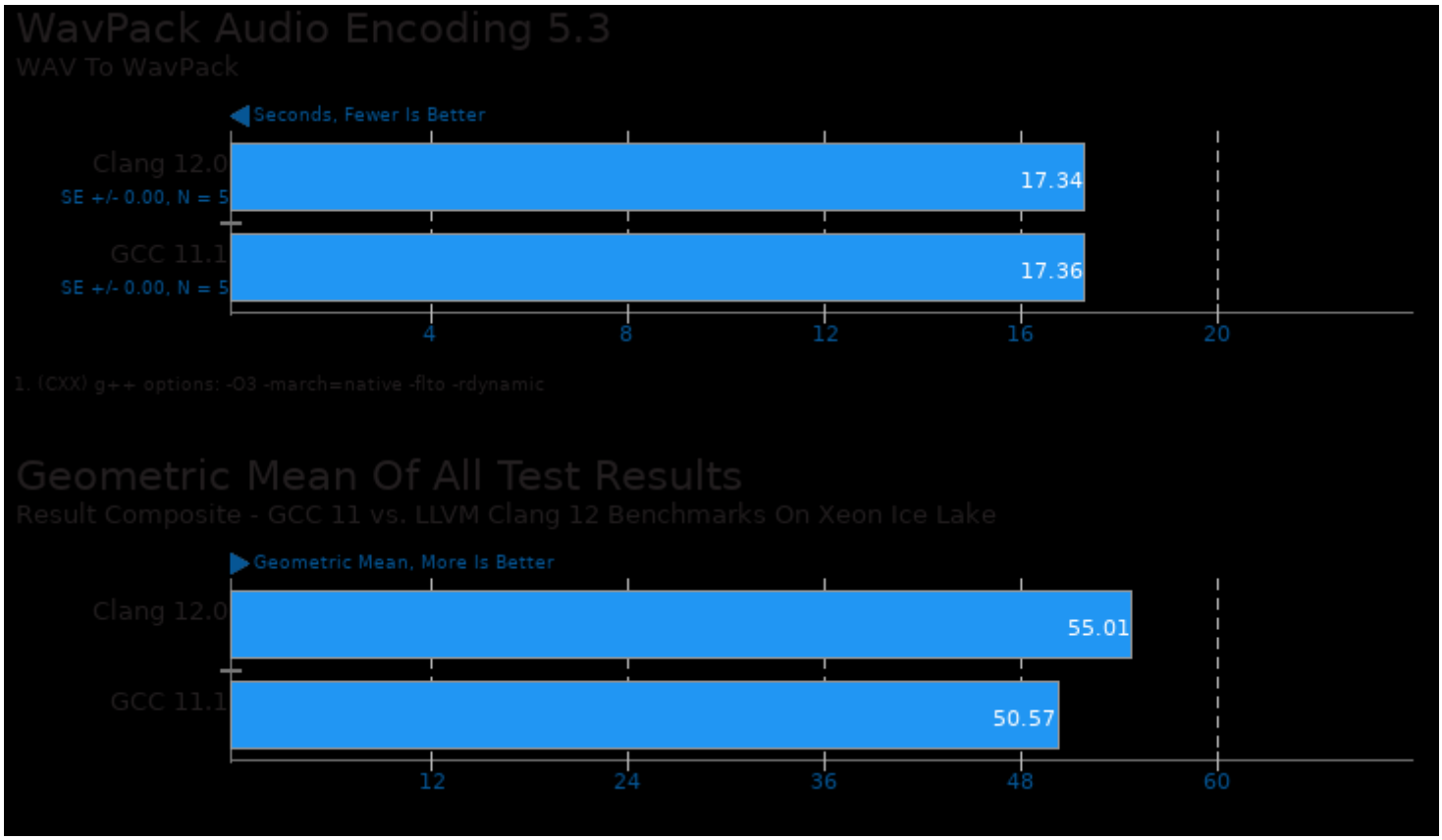
1. (CXX) g++ options: -O3 -march=native -flto -O2 -pthread

ASTC Encoder 2.4

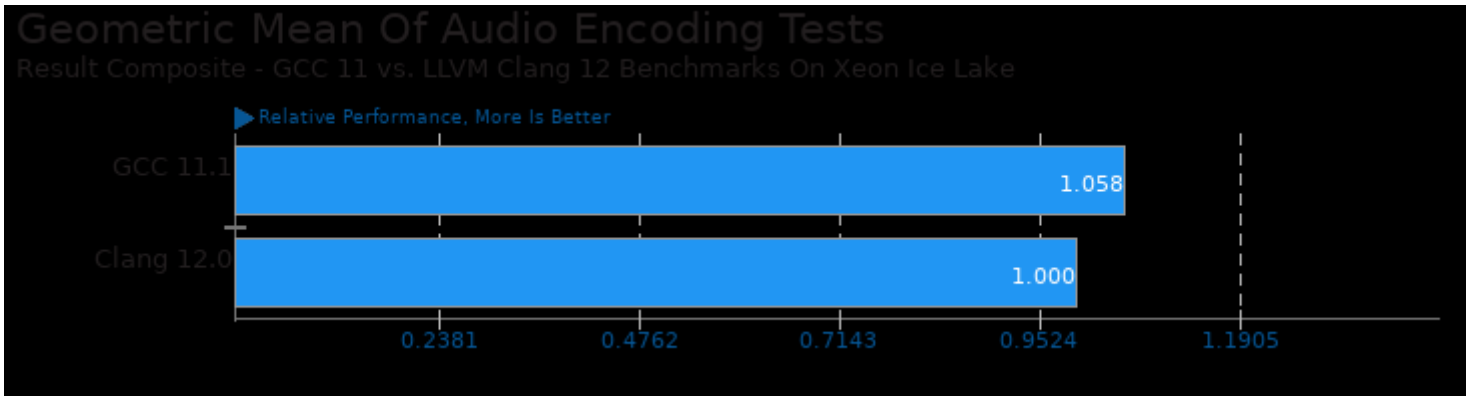
Preset: Exhaustive



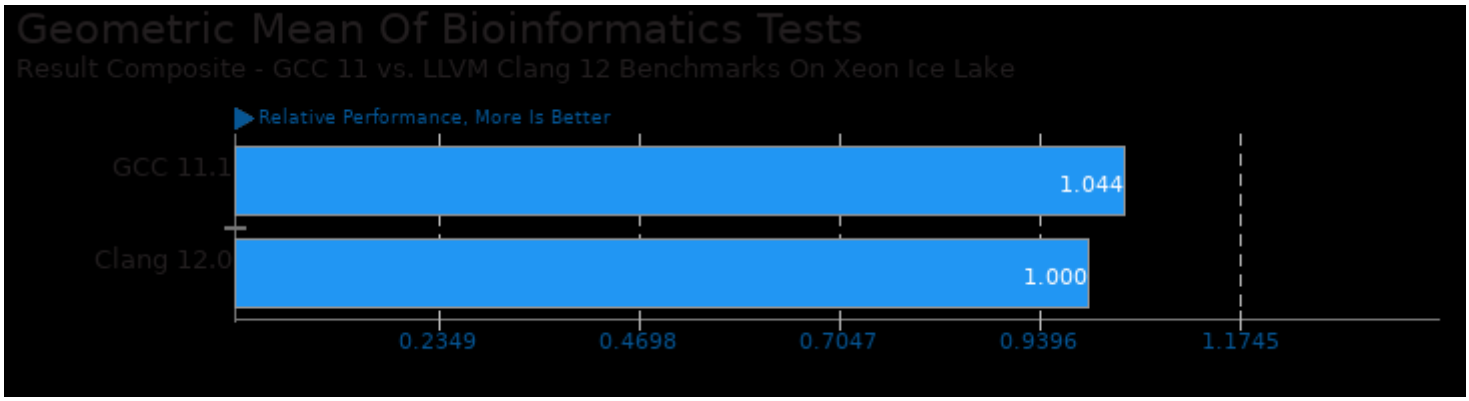
1. (CXX) g++ options: -O3 -march=native -flto -O2 -pthread


WavPack Audio Encoding 5.3
WAV To WavPack
Seconds, Fewer Is Better
Clang 12.0
SE +/- 0.00, N = 5
17.34
GCC 11.1
SE +/- 0.00, N = 5
17.36
4
8
12
16
20
1. (CXX) g++ options: -O3 -march=native -flto -rdynamic
Geometric Mean Of All Test Results
Result Composite - GCC 11 vs. LLVM Clang 12 Benchmarks On Xeon Ice Lake
Geometric Mean, More Is Better
Clang 12.0
55.01
GCC 11.1
50.57
12
24
36
48
60

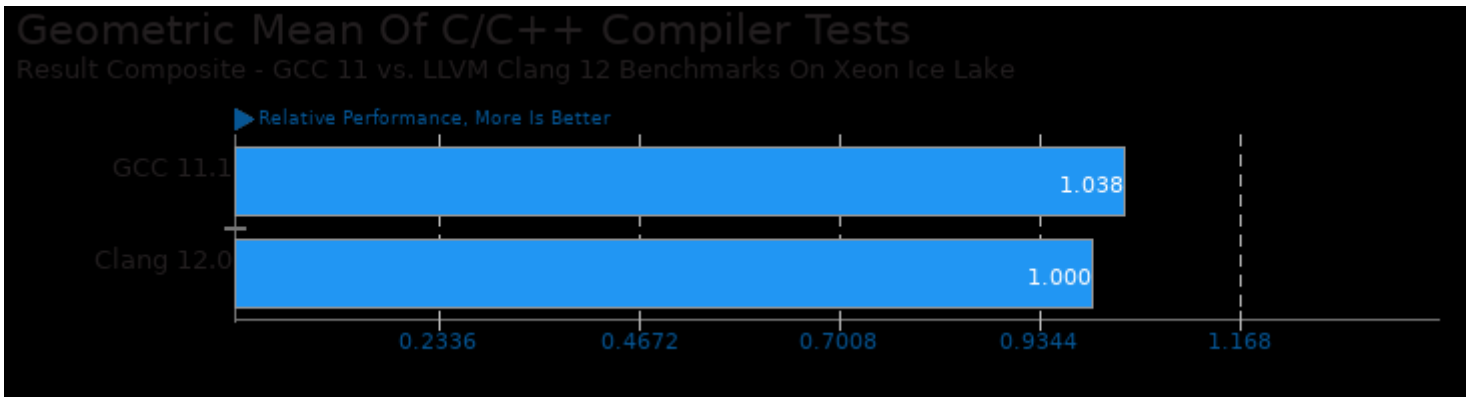
These geometric means are based upon test groupings / test suites for this result file.



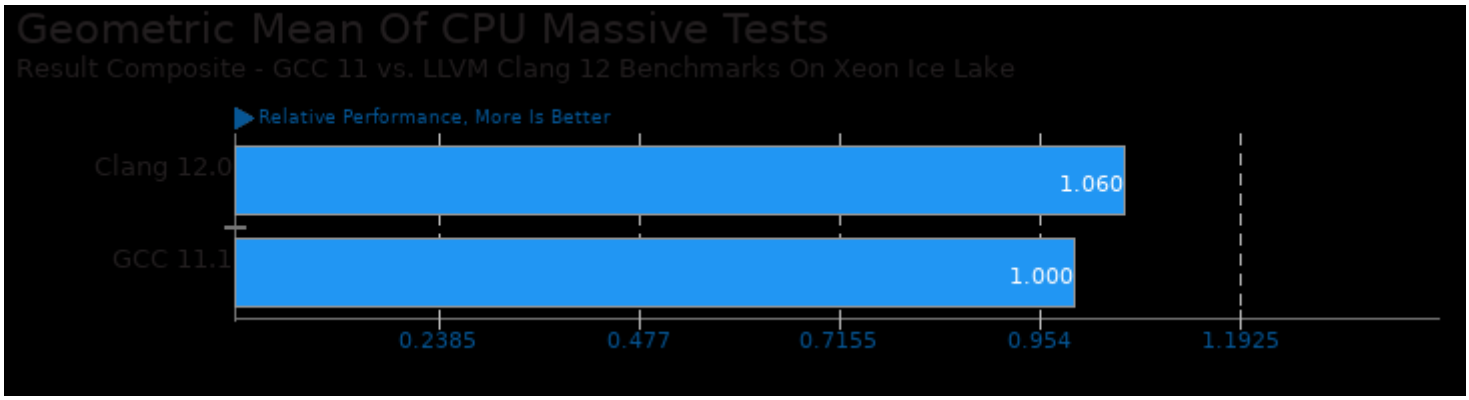
Geometric mean based upon tests: pts/encode-mp3, pts/encode-flac, pts/encode-wavpack and pts/encode-opus



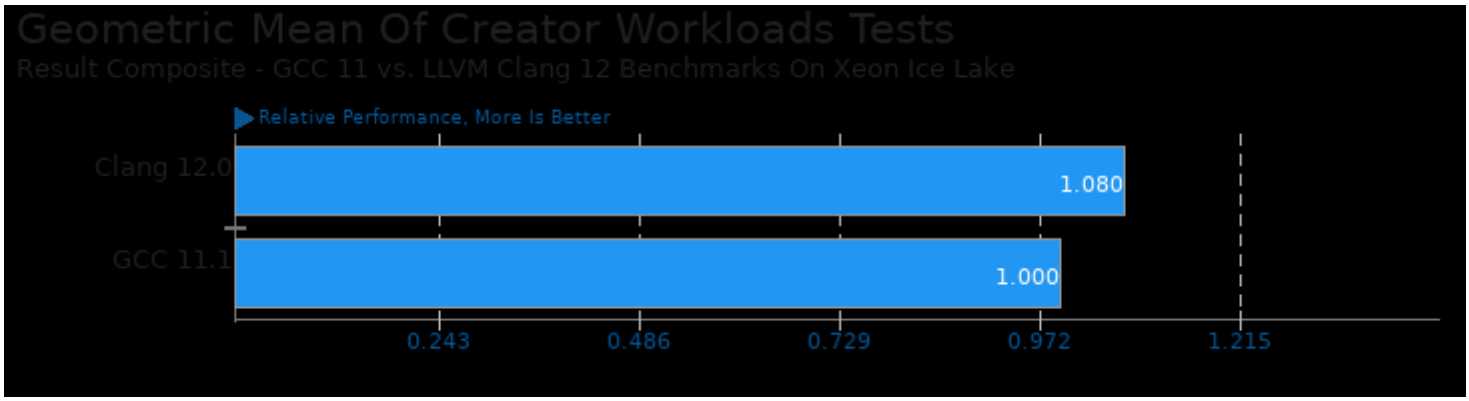
Geometric mean based upon tests: pts/himeno and pts/mrbayes



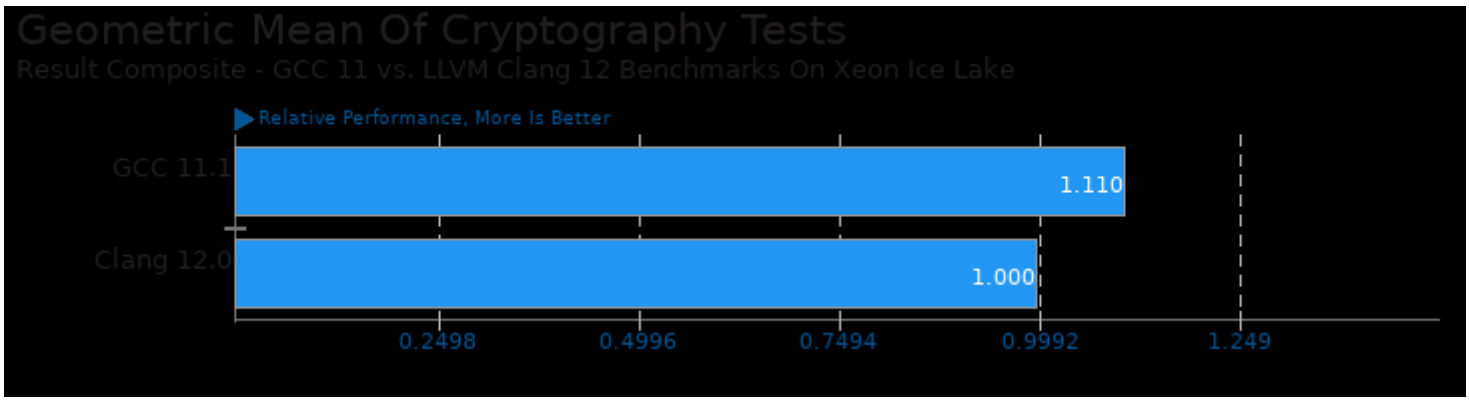
Geometric mean based upon tests: pts/aobench, pts/graphics-magick, pts/himeno, pts/c-ray, pts/bullet, pts/encode-mp3, pts/encode-flac, pts/pgbench, pts/mrbayes, pts/x265, pts/kvazaar, pts/compress-zstd, pts/openssl, pts/svt-av1, pts/svt-vp9 and pts/cryptopp



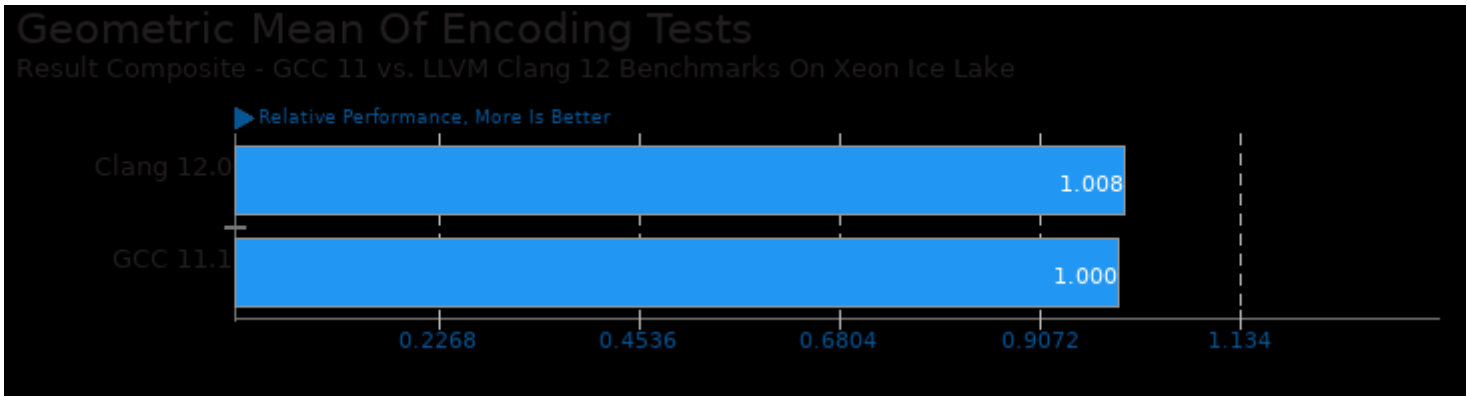
Geometric mean based upon tests: pts/c-ray, pts/compress-zstd, pts/svt-av1, pts/svt-hevc, pts/svt-vp9, pts/x265, pts/encode-flac, pts/encode-mp3, pts/graphics-magick, pts/himeno, pts/openssl, pts/onednn, pts/mrbayes, pts/pgbench, pts/primesieve and pts/tjbench



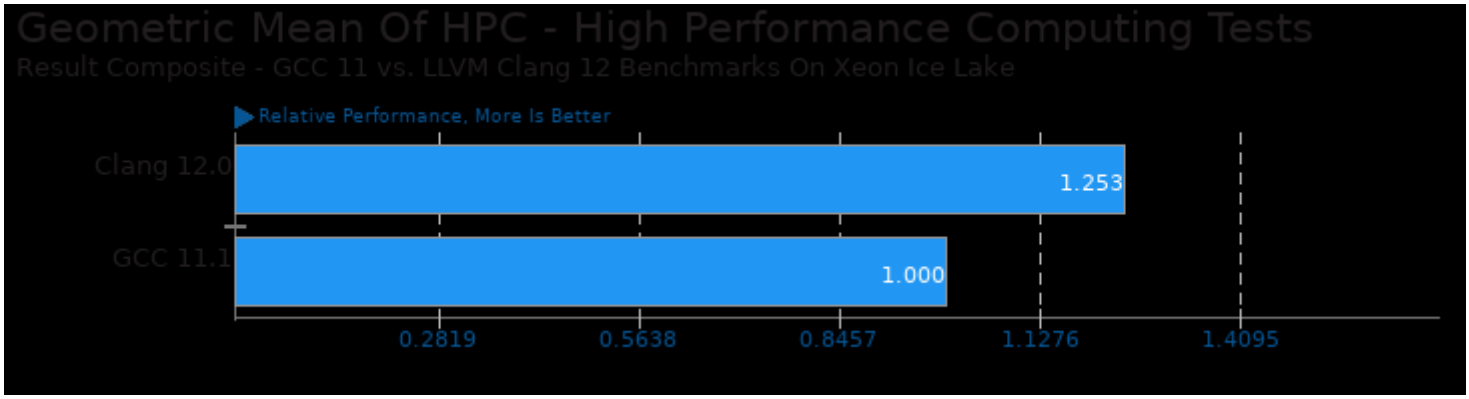
Geometric mean based upon tests: pts/c-ray, pts/aobench, pts/svt-vp9, pts/svt-hevc, pts/x265, pts/kvazaar, pts/svt-av1, pts/encode-mp3, pts/encode-flac, pts/encode-wavpack, pts/encode-opus, pts/graphics-magick, pts/webp, pts/webp2, pts/tjbench, pts/onednn, pts/astcenc and pts/espeak



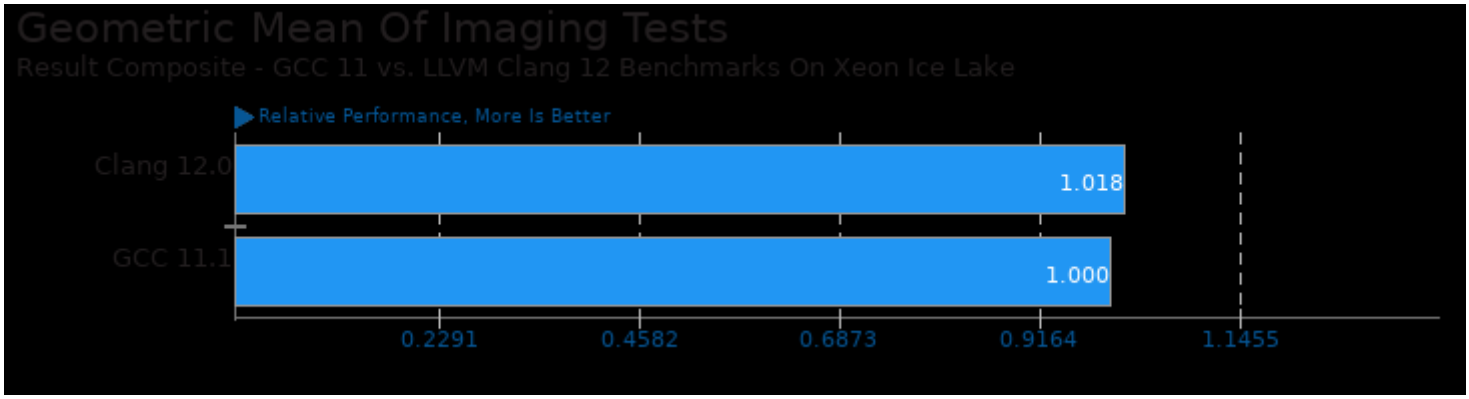
Geometric mean based upon tests: pts/openssl, pts/gcrypt and pts/cryptopp



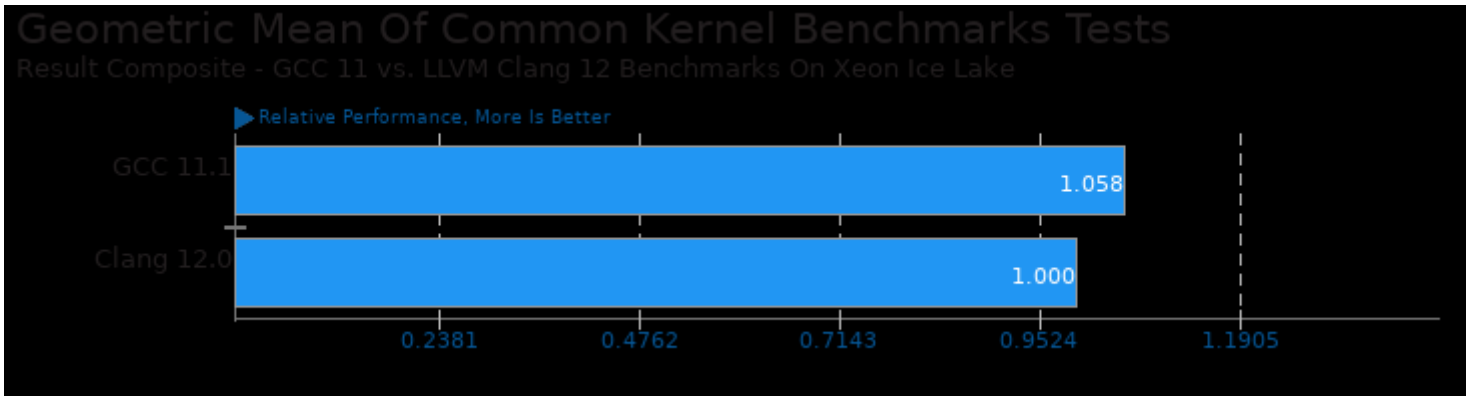
Geometric mean based upon tests: pts/encode-mp3, pts/encode-flac, pts/encode-wavpack, pts/encode-opus, pts/svt-vp9, pts/svt-hevc, pts/x265, pts/kvazaar and pts/svt-av1



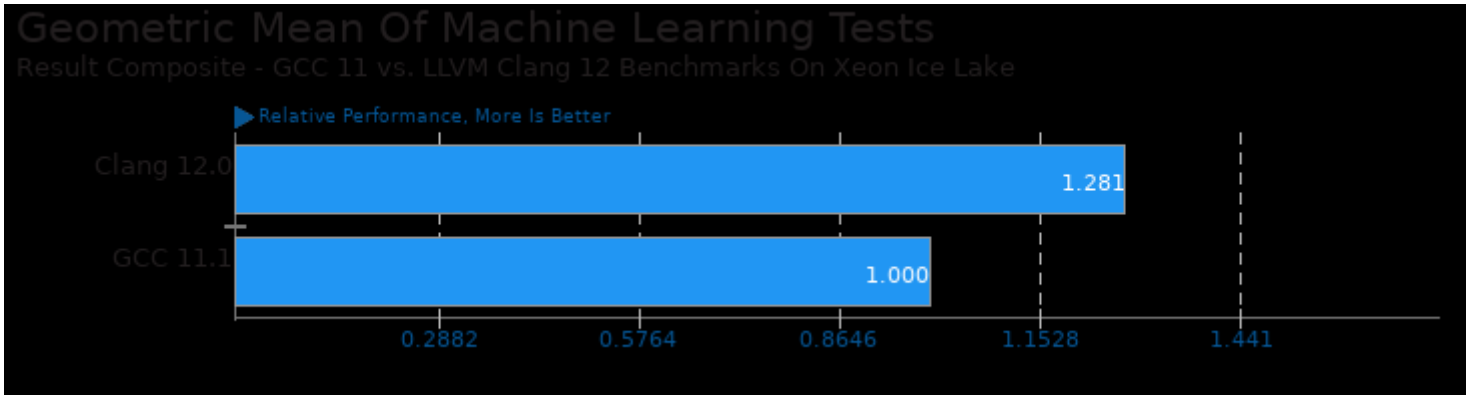
Geometric mean based upon tests: pts/daphne, pts/himeno, pts/mrbayes, pts/kripke, pts/ncnn, pts/tnn, pts/caffe and pts/onednn



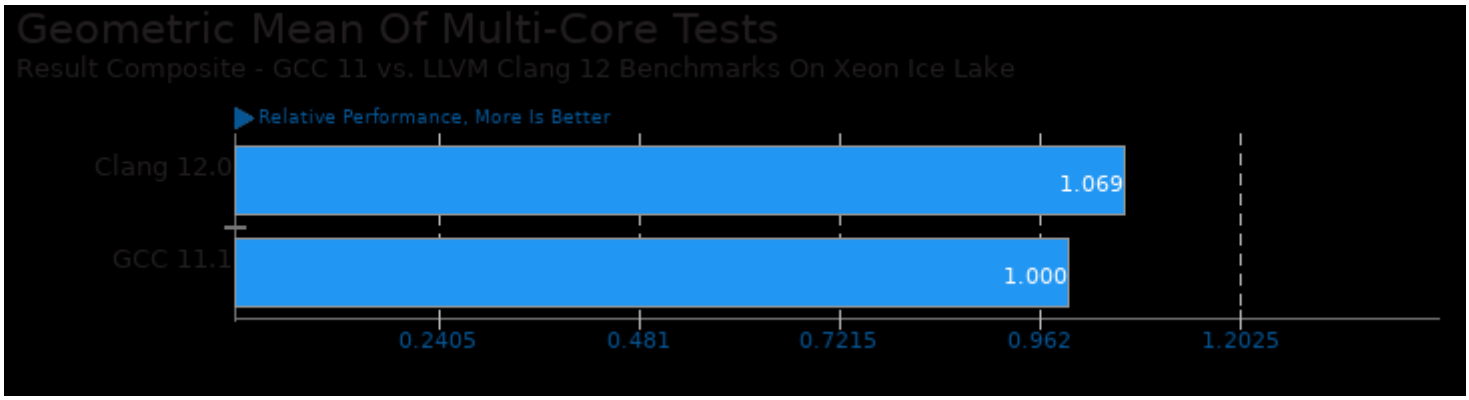
Geometric mean based upon tests: pts/graphics-magick, pts/webp, pts/webp2 and pts/tjbench



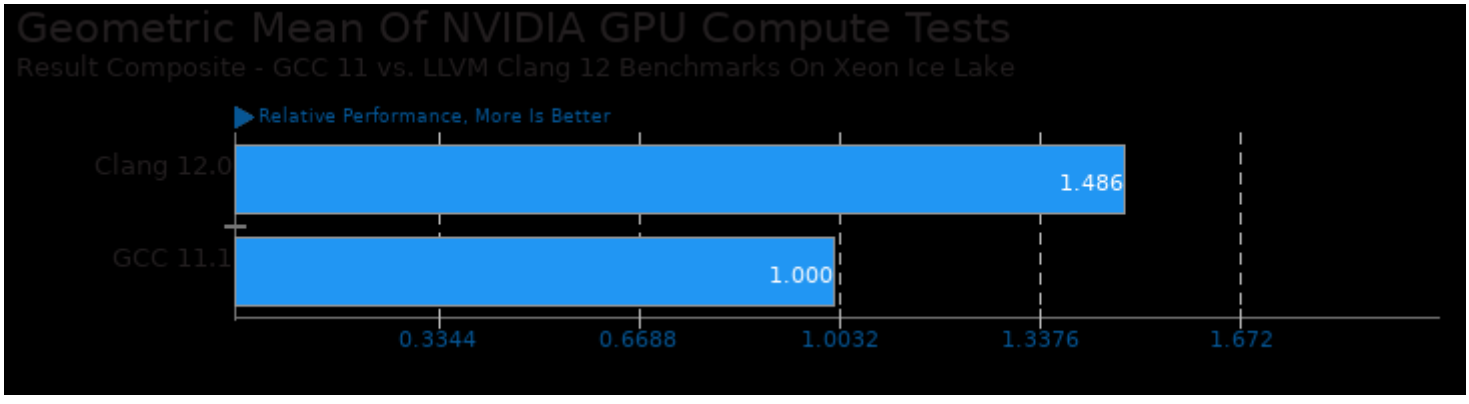
Geometric mean based upon tests: pts/pgbench and pts/openssl



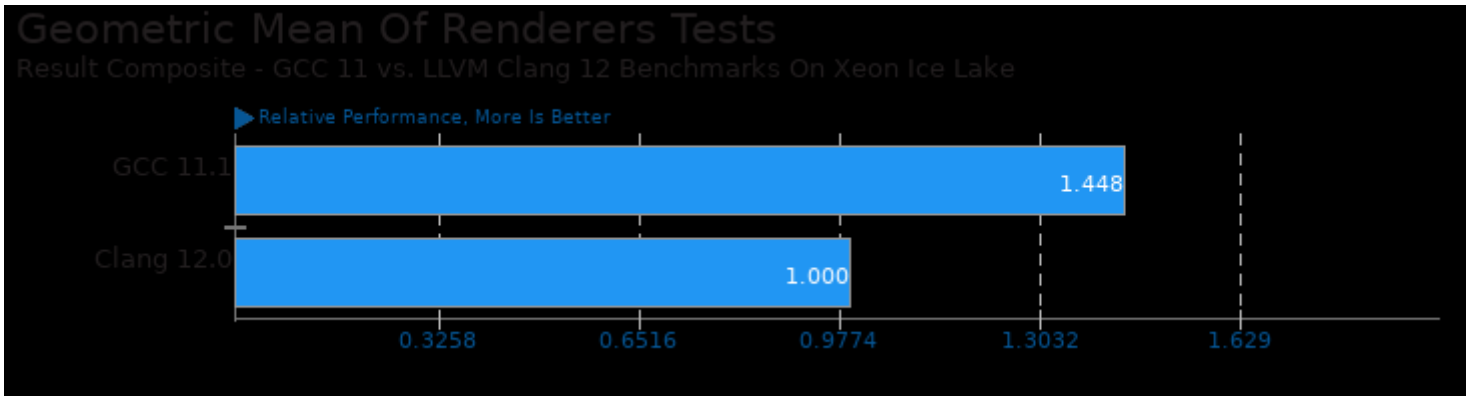
Geometric mean based upon tests: pts/ncnn, pts/tnn, pts/caffe and pts/onednn



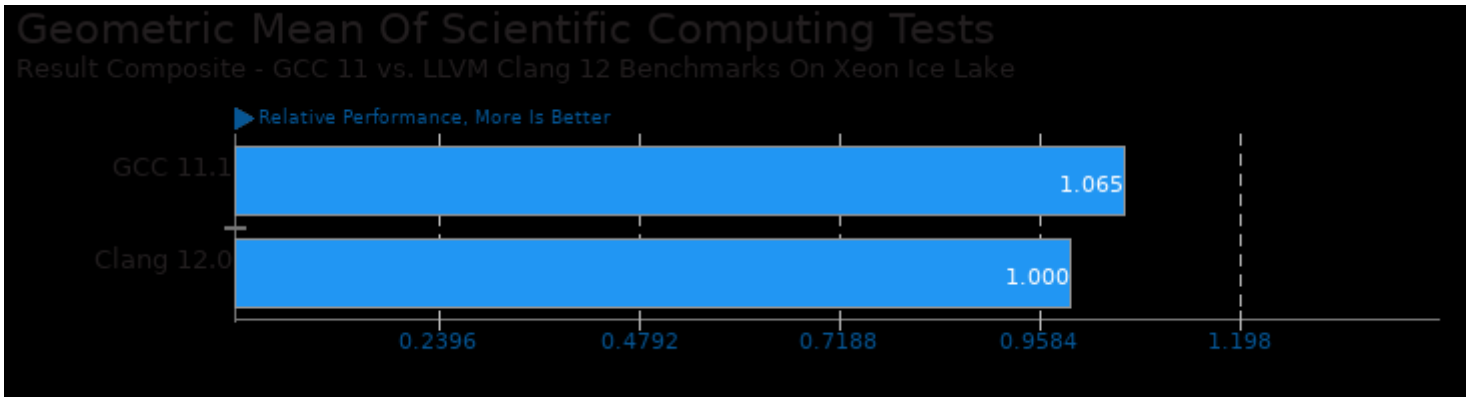
Geometric mean based upon tests: pts/c-ray, pts/coremark, pts/svt-vp9, pts/svt-hevc, pts/x265, pts/kvazaar, pts/svt-av1, pts/primesieve, pts/graphics-magick, pts/onednn, pts/compress-zstd, pts/aobench and pts/pgbench



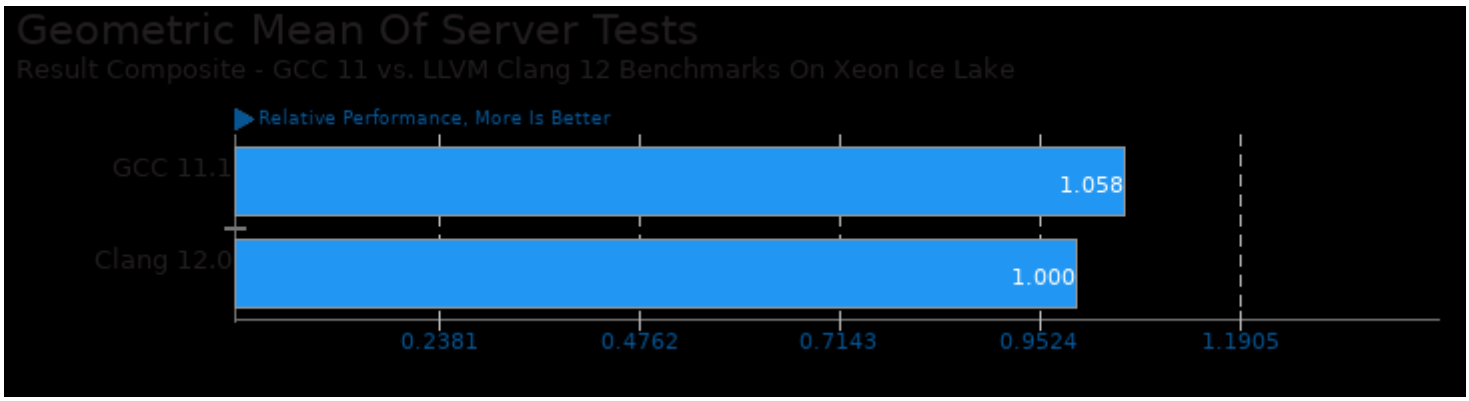
Geometric mean based upon tests: pts/caffe and pts/ncnn



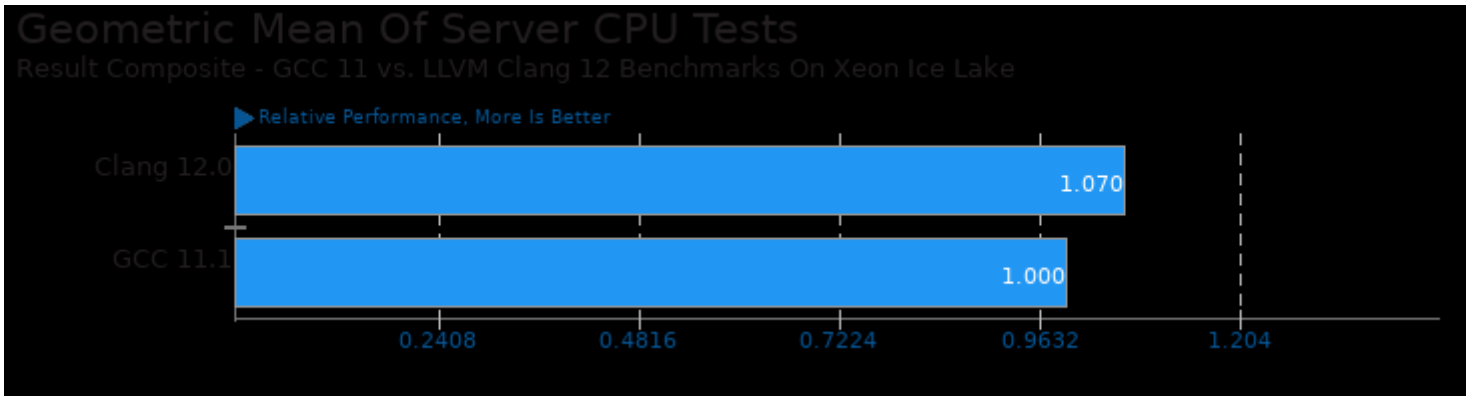
Geometric mean based upon tests: pts/c-ray and pts/aobench



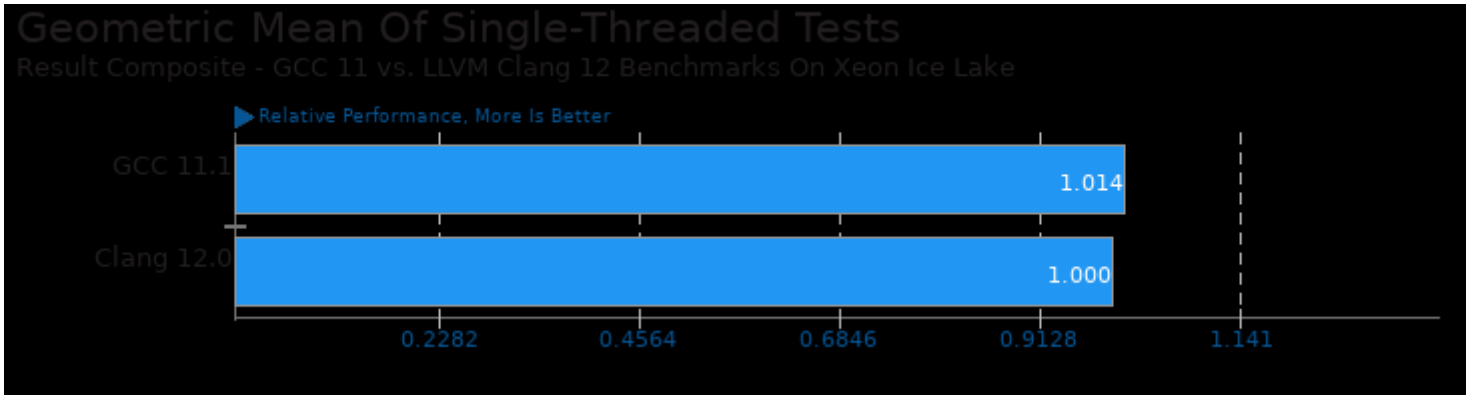
Geometric mean based upon tests: pts/himeno, pts/mrbayes and pts/kripke



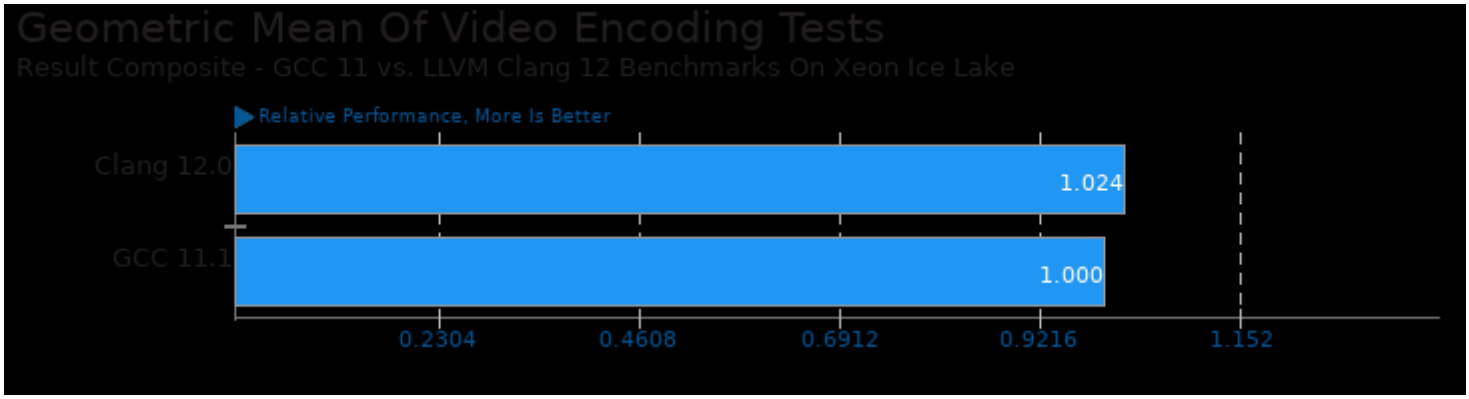
Geometric mean based upon tests: pts/pgbench and pts/openssl



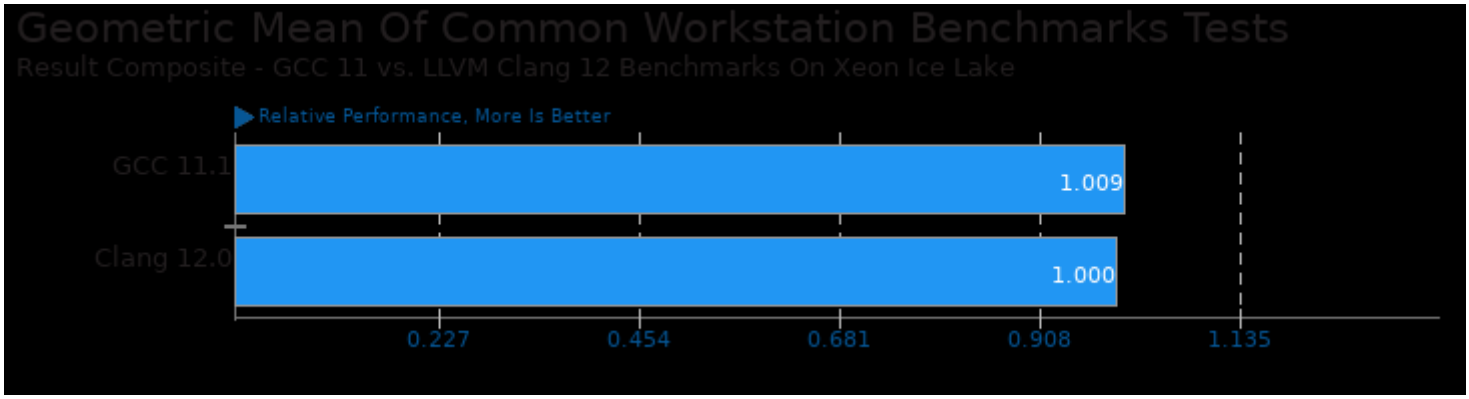
Geometric mean based upon tests: pts/onednn, pts/svt-av1, pts/svt-hevc, pts/svt-vp9, pts/x265, pts/himeno, pts/c-ray, pts/compress-zstd, pts/openssl and pts/tjbench



Geometric mean based upon tests: pts/gmpbench, pts/encode-flac, pts/encode-mp3, pts/espeak and pts/tjbench



Geometric mean based upon tests: pts/svt-vp9, pts/svt-hevc, pts/x265, pts/kvazaar and pts/svt-av1



Geometric mean based upon tests: pts/himeno and pts/x265

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 06:23.