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LLVM Clang 3.1 GCC 4.7 Intel Core i7 Benchmarks

Benchmarking of GCC 4.6.3, GCC 4.7.0, LLVM Clang 3.0, and LLVM Clang 3.1 SVN compilers for a future article on Phoronix.com. Compilers built all test binaries with CFLAGS/CXXFLAGS of -O3 -march=native from this Intel Core i7 Clarksfield notebook. Ubuntu 12.04 LTS x86_64 was used with the Linux 3.2 kernel.

Automated Executive Summary

GCC 4.6.3 had the most wins, coming in first place for 41% of the tests.

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

Smallpt (Global Illumination Renderer; 100 Samples) at 3.691x
John The Ripper (Test: Blowfish) at 3.346x
Timed HMMer Search (Pfam Database Search) at 1.245x
Timed MrBayes Analysis (Primate Phylogeny Analysis) at 1.238x
Parallel BZIP2 Compression (256MB File Compression) at 1.2x
Timed MAFFT Alignment (Multiple Sequence Alignment) at 1.187x
FLAC Audio Encoding (WAV To FLAC) at 1.164x
Timed PHP Compilation (Time To Compile) at 1.153x
Himeno Benchmark (Poisson Pressure Solver) at 1.14x
Minion (Benchmark: Graceful) at 1.112x.

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Test Systems:

GCC 4.6.3

Processor: Intel Core i7 720Q @ 1.60GHz (8 Cores), Motherboard: LENOVO 4318CTO, Chipset: Intel Core DMI, Memory: 4096MB, Disk: 160GB INTEL SSDSA2M160, Graphics: NVIDIA Quadro FX 880M 1024MB (405/324MHz), Audio: Conexant CX20585, Network: Intel 82577LM Gigabit Connection + Intel Centrino Ultimate-N 6300

OS: Ubuntu 12.04, Kernel: 3.4.0-999-generic (x86_64), Desktop: Unity 5.10.0, Display Server: X Server 1.11.3, Display Driver: nouveau 0.0.16, OpenGL: 2.1 Mesa 8.0.2 Gallium 0.4, Compiler: GCC 4.6.3, File-System: ext4, Screen Resolution: 1600x900

Compiler Notes: --enable-checking=release --enable-languages=c,c++ --enable-lto
Processor Notes: Scaling Governor: ondemand
System Notes: Compiz was running on this system.

GCC 4.7.0

Processor: Intel Core i7 720Q @ 1.60GHz (8 Cores), Motherboard: LENOVO 4318CTO, Chipset: Intel Core DMI, Memory: 4096MB, Disk: 160GB INTEL SSDSA2M160, Graphics: NVIDIA Quadro FX 880M 1024MB (405/324MHz), Audio: Conexant CX20585, Network: Intel 82577LM Gigabit Connection + Intel Centrino Ultimate-N 6300

OS: Ubuntu 12.04, Kernel: 3.4.0-999-generic (x86_64), Desktop: Unity 5.10.0, Display Server: X Server 1.11.3, Display Driver: nouveau 0.0.16, OpenGL: 2.1 Mesa 8.0.2 Gallium 0.4, Compiler: GCC 4.7.0, File-System: ext4, Screen Resolution: 1600x900

Compiler Notes: --enable-checking=release --enable-languages=c,c++ --enable-lto
Processor Notes: Scaling Governor: ondemand
System Notes: Compiz was running on this system.

LLVM-Clang 3.0

Processor: Intel Core i7 720Q @ 1.60GHz (8 Cores), Motherboard: LENOVO 4318CTO, Chipset: Intel Core DMI, Memory: 4096MB, Disk: 160GB INTEL SSDSA2M160, Graphics: NVIDIA Quadro FX 880M 1024MB (405/324MHz), Audio: Conexant CX20585, Network: Intel 82577LM Gigabit Connection + Intel Centrino Ultimate-N 6300

OS: Ubuntu 12.04, Kernel: 3.4.0-999-generic (x86_64), Desktop: Unity 5.10.0, Display Server: X Server 1.11.3, Display Driver: nouveau 0.0.16, OpenGL: 2.1 Mesa 8.0.2 Gallium 0.4, Compiler: Clang 3.0 + LLVM 3.0, File-System: ext4, Screen Resolution: 1600x900

Compiler Notes: Optimized build; Built Apr 21 2012 (12:40:14); Host: x86_64-unknown-linux-gnu; Host CPU: corei7
Processor Notes: Scaling Governor: ondemand
System Notes: Compiz was running on this system.

LLVM-Clang 3.1 SVN

Processor: Intel Core i7 720Q @ 1.60GHz (8 Cores), Motherboard: LENOVO 4318CTO, Chipset: Intel Core DMI, Memory: 4096MB, Disk: 160GB INTEL SSDSA2M160, Graphics: NVIDIA Quadro FX 880M 1024MB (405/324MHz), Audio: Conexant CX20585, Network: Intel 82577LM Gigabit Connection + Intel Centrino Ultimate-N 6300

OS: Ubuntu 12.04, Kernel: 3.4.0-999-generic (x86_64), Desktop: Unity 5.10.0, Display Server: X Server 1.11.3, Display Driver: nouveau 0.0.16, OpenGL: 2.1 Mesa 8.0.2 Gallium 0.4, Compiler: Clang 3.1 (SVN 155295) + LLVM 3.1svn, File-System: ext4, Screen Resolution: 1600x900

LLVM Clang 3.1 GCC 4.7 Intel Core i7 Benchmarks

Compiler Notes: Optimized build; Built Apr 21 2012 (14:54:30); Default target: x86_64-unknown-linux-gnu; Host CPU: corei7
Processor Notes: Scaling Governor: ondemand
System Notes: Compiz was running on this system.

Open64 5.0

Processor: Intel Core i7 720Q @ 1.60GHz (8 Cores), Motherboard: LENOVO 4318CTO, Chipset: Intel Core DMI, Memory: 4096MB, Disk: 160GB INTEL SSDSA2M160, Graphics: NVIDIA Quadro FX 880M 1024MB (405/324MHz), Audio: Conexant CX20585, Network: Intel 82577LM Gigabit Connection + Intel Centrino Ultimate-N 6300

OS: Ubuntu 12.04, Kernel: 3.4.0-999-generic (x86_64), Desktop: Unity 5.10.0, Display Server: X Server 1.11.3, Display Driver: nouveau 0.0.16, OpenGL: 2.1 Mesa 8.0.2 Gallium 0.4, Compiler: Open64 5.0, File-System: ext4, Screen Resolution: 1600x900

Processor Notes: Scaling Governor: ondemand
System Notes: Compiz was running on this system.

	GCC 4.6.3	GCC 4.7.0	LLVM-Clang 3.0	LLVM-Clang 3.1 SVN	Open64 5.0
FFTE - N.6.1.C.F.R (MFLOPS)	**3276**	**3157**	3270	3198	3268
Normalized	100%	96.36%	99.82%	97.6%	99.74%
Standard Deviation	0.6%	2.6%	0.4%	1.6%	0.4%
Timed HMMer Search - P.D.S (sec)	**26.52**	26.63	**33.02**	32.63	
Normalized	100%	99.59%	80.31%	81.27%	
Standard Deviation	0.2%	0.1%	0.2%	0.3%	
Timed MAFFT Alignment - M.S.A (sec)	13.73	**13.60**	**16.14**	14.73	
Normalized	99.05%	100%	84.26%	92.33%	
Standard Deviation	3.2%	0.5%	3.4%	0.8%	
Timed MrBayes Analysis - P.P.A (sec)	37.07	**32.38**		**40.09**	
Normalized	87.35%	100%		80.77%	
Standard Deviation	0.1%	0.5%		1.1%	
GMPbench - Total Time (GMPbench Score)	**1739**	**1751**			
Normalized	99.3%	100%			
Fhourstones - C.C.4.S (Kpos /	**8643**	8631		**8552**	
Normalized	100%	99.86%		98.94%	
Standard Deviation	0.4%	0.1%		0.1%	
BYTE Unix Benchmark - Dhrystone 2 (LPS)	**18737961**	**18075520**			
Normalized	100%	96.46%			
Standard Deviation	0.3%	0.1%			
John The Ripper - Blowfish (Real C/S)	**2215**	2211		**662**	
Normalized	100%	99.82%		29.89%	
Standard Deviation	0.1%	0.1%		0.4%	

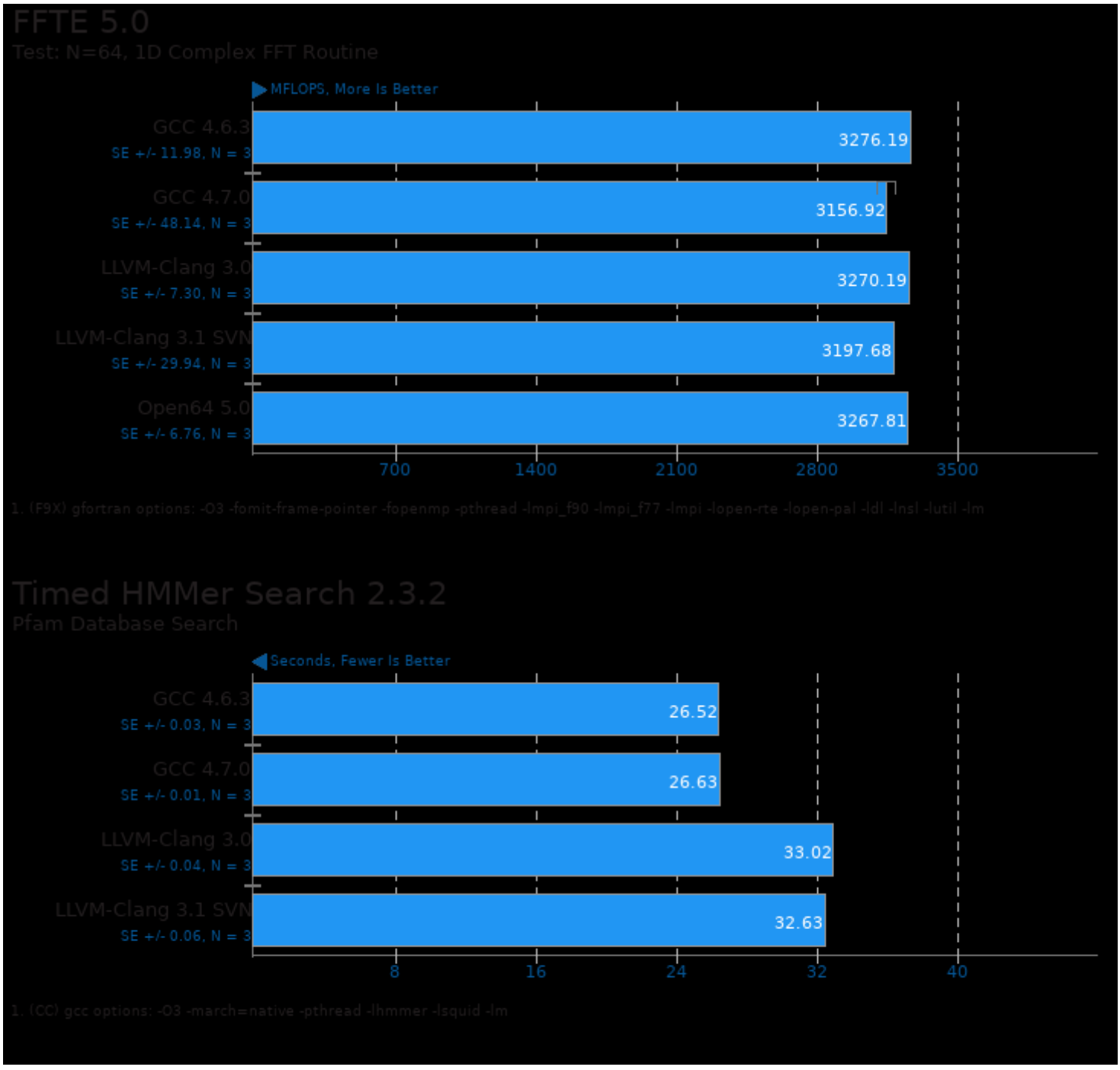
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TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**63.32**	**59.50**		
Normalized	100%	93.97%		
Standard Deviation	0.1%	0.3%		
VP8 libvpx Encoding - vpxenc (FPS)	**9.93**	9.76		**9.07**
Normalized	100%	98.29%		91.34%
Standard Deviation	1.6%	1.2%		1.1%
x264 - H.2.V.E (FPS)	**58.46**	**58.26**		
Normalized	100%	99.66%		
Standard Deviation	0.2%	0.4%		
Himeno Benchmark - P.P.S (MFLOPS)	1061	**1143**	**1003**	1053
Normalized	92.79%	100%	87.74%	92.15%
Standard Deviation	2.7%	0.3%	0.9%	1.5%
7-Zip Compression - C.S.T	**8849**	8890	9108	**9166**
Normalized	96.54%	96.99%	99.37%	100%
Standard Deviation	1.3%	0.8%	0.2%	0.1%
Timed PHP Compilation - Time To Compile (sec)	50.42	**54.74**		**47.49**
Normalized	94.19%	86.76%		100%
Standard Deviation	0.2%	0.1%		0.2%
C-Ray - Total Time (sec)	**139.01**	**91.18**	118.20	109.11
Normalized	65.59%	100%	77.14%	83.57%
Standard Deviation	22%	8.1%	7.5%	9.8%
Parallel BZIP2 Compression - 2.F.C (sec)	**19.34**	22.30		**23.21**
Normalized	100%	86.73%		83.33%
Standard Deviation	0.4%	0.3%		0.2%
Smallpt - G.I.R.1.S (sec)	69	**68**	234	**251**
Normalized	98.55%	100%	29.06%	27.09%
Standard Deviation	0%	0%	0.2%	0.5%
Crafty - Elapsed Time (sec)	**109.88**	108.29		**107.85**
Normalized	98.15%	99.59%		100%
Standard Deviation	0.2%	0.1%		0.1%
FLAC Audio Encoding - WAV To FLAC (sec)	9.97	**9.32**		**10.85**
Normalized	93.48%	100%		85.9%
Standard Deviation	0.2%	0.4%		0.4%
LAME MP3 Encoding - WAV To MP3 (sec)	23.58	**23.10**		**23.81**
Normalized	97.96%	100%		97.02%
Standard Deviation	0.3%	0.2%		0.3%
FFmpeg - AVI To NTSC VCD	15.87	**15.73**		**16.09**
Normalized	99.12%	100%		97.76%
Standard Deviation	0.2%	0.3%		0.1%
Minion - Bibd (sec)	**206.67**	217.34	**223.86**	219.58
Normalized	100%	95.09%	92.32%	94.12%
Standard Deviation	0.5%	0.2%	0.3%	0.3%
Minion - Graceful (sec)	111.35	**122.41**	110.30	**110.04**
Normalized	98.82%	89.89%	99.76%	100%
Standard Deviation	0.4%	0.5%	0.1%	0.5%
Minion - Solitaire (sec)	**203.00**	211.57	**224.90**	217.96
Normalized	100%	95.95%	90.26%	93.14%

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Standard Deviation	0.3%	0.2%	0.3%	0.3%
Minion - Quasigroup (sec)	255.83	**253.16**	**277.69**	262.50
Normalized	98.96%	100%	91.17%	96.44%
Standard Deviation	0.2%	0%	0.2%	0.1%
Open FMM Nero2D - Total Time (sec)	**640.17**	**638.60**		
Normalized	99.75%	100%		
Tachyon - Total Time (sec)	**36.05**	**37.21**		36.17
Normalized	100%	96.88%		99.67%
Standard Deviation	0.1%	0.1%		0.1%
OpenSSL - R.4.b.P (Signs/sec)	**42.23**	**42.08**		**42.08**
Normalized	100%	99.64%		99.64%
Standard Deviation	0.5%	0.1%		0.2%
PostgreSQL pgbench - T.B.T.P.S (TPS)	**2375**	2406		**2427**
Normalized	97.87%	99.13%		100%
Standard Deviation	0.9%	0.8%		1.2%
NGINX Benchmark - S.W.P.S (Reqs/sec)	15482	**14956**	15560	**15767**
Normalized	98.19%	94.86%	98.69%	100%
Standard Deviation	1%	0.6%	2%	1.5%
Apache Benchmark - S.W.P.S (Reqs/sec)	**14291**	14322	**14867**	14835
Normalized	96.12%	96.33%	100%	99.78%
Standard Deviation	0.2%	0.7%	0.7%	1.5%

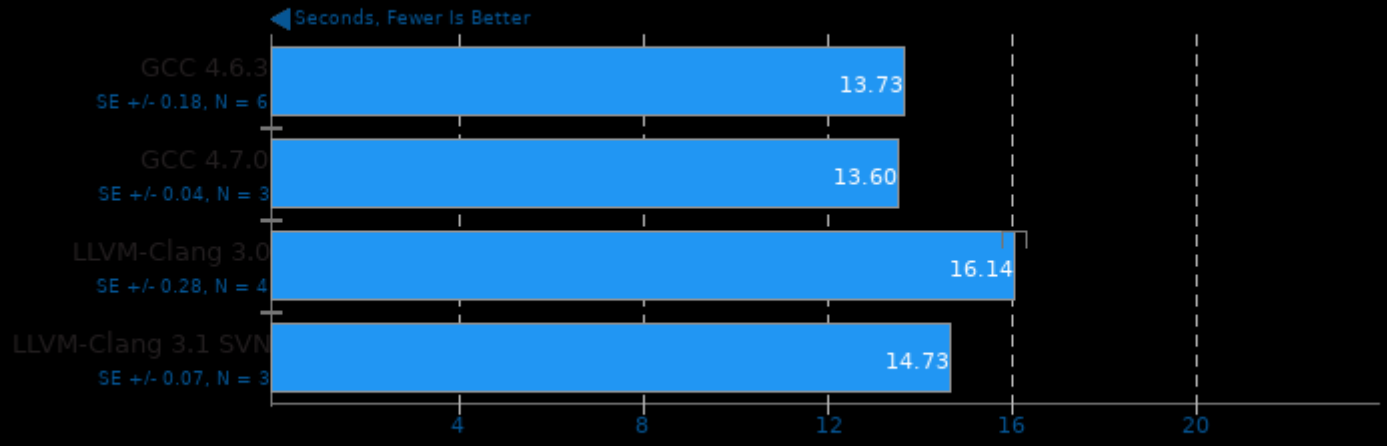
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Timed MAFFT Alignment 6.864

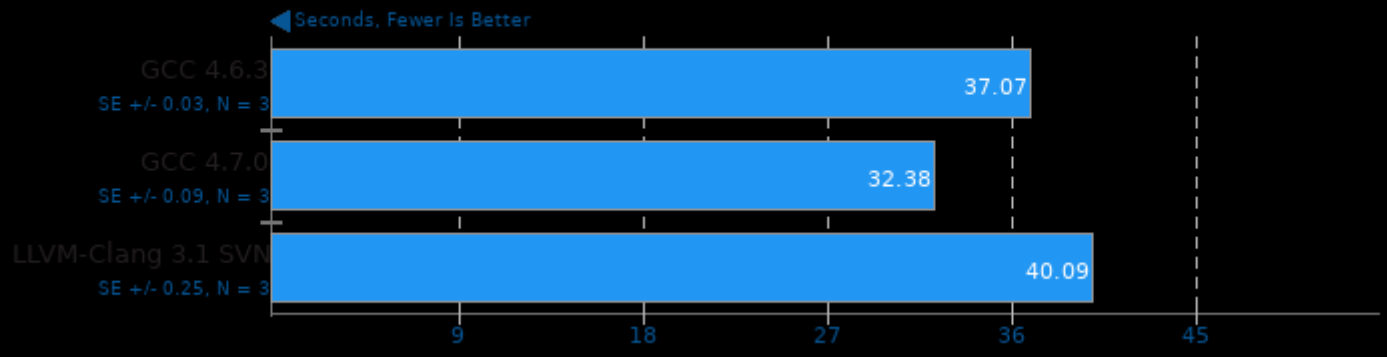
Multiple Sequence Alignment



1. (CC) gcc options: -O3 -lm -lpthread

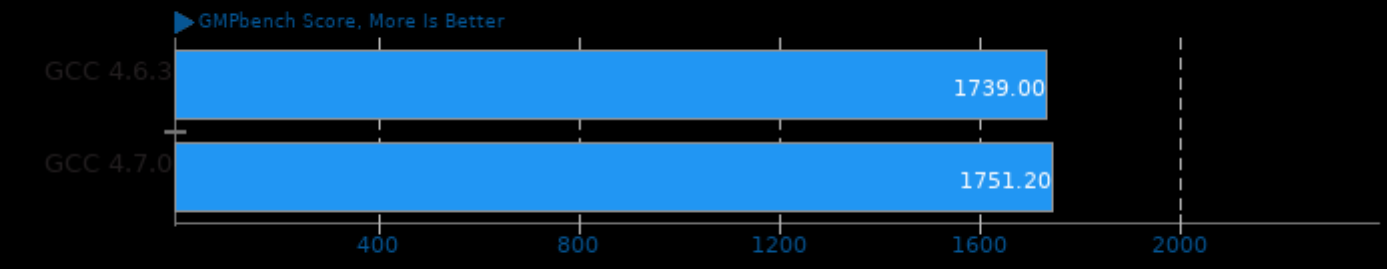
Timed MrBayes Analysis 3.1.2

Primate Phylogeny Analysis



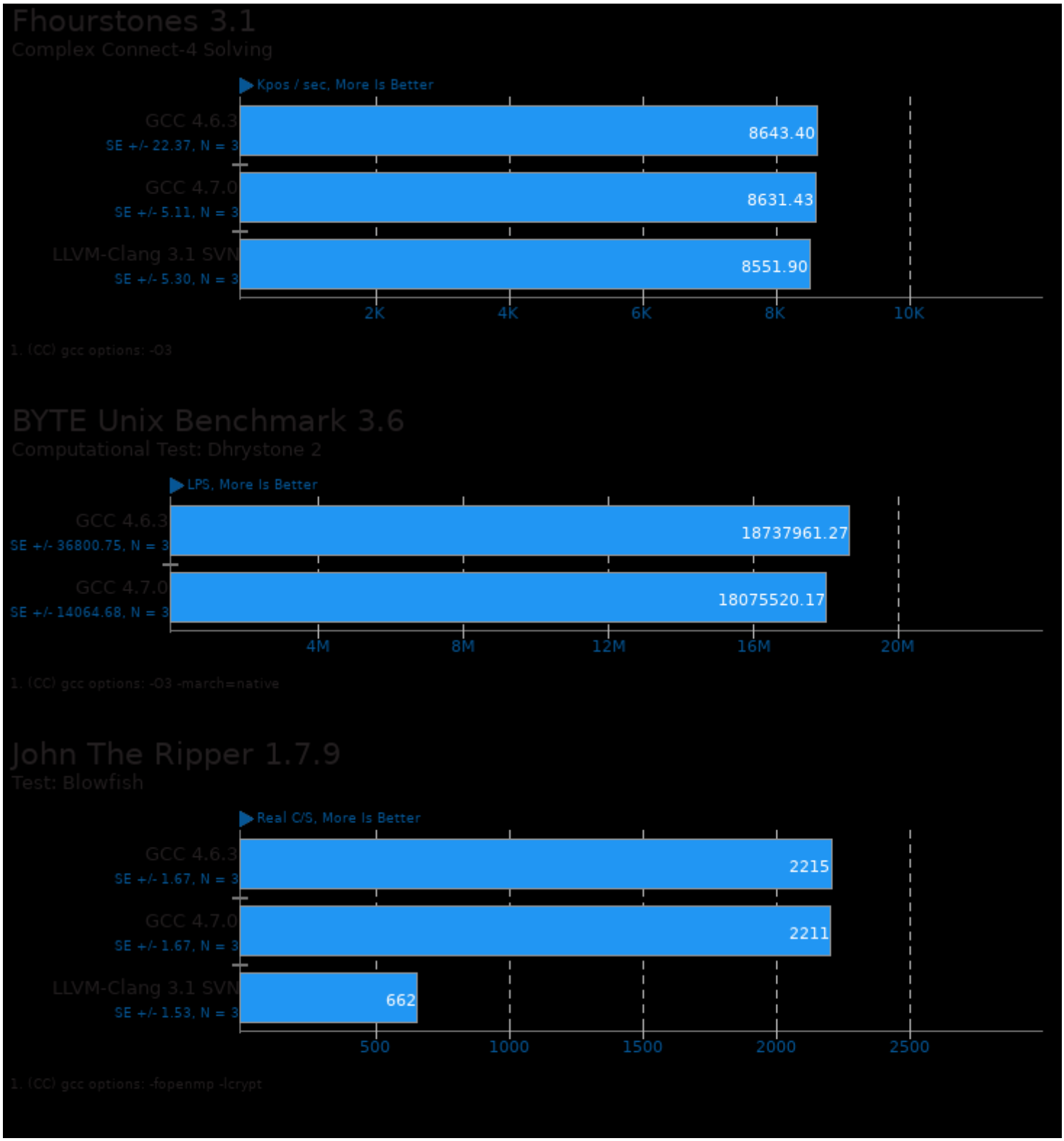
GMPbench 0.2

Total Time



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

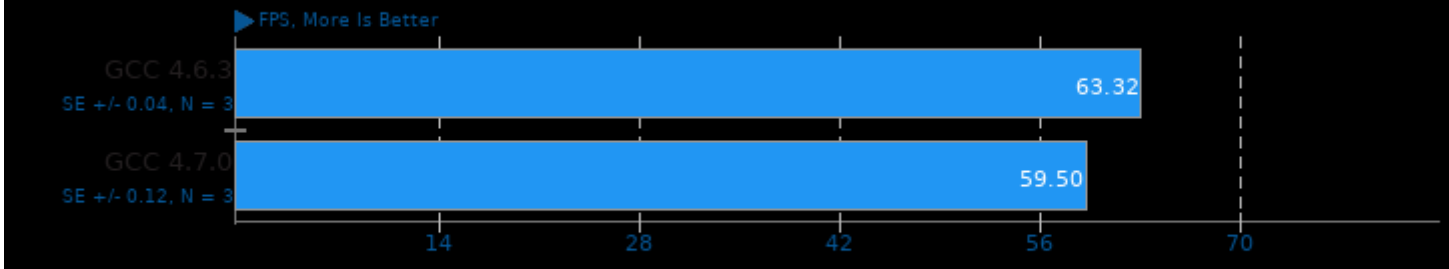
LLVM Clang 3.1 GCC 4.7 Intel Core i7 Benchmarks



LLVM Clang 3.1 GCC 4.7 Intel Core i7 Benchmarks

TTSIOD 3D Renderer 2.2w

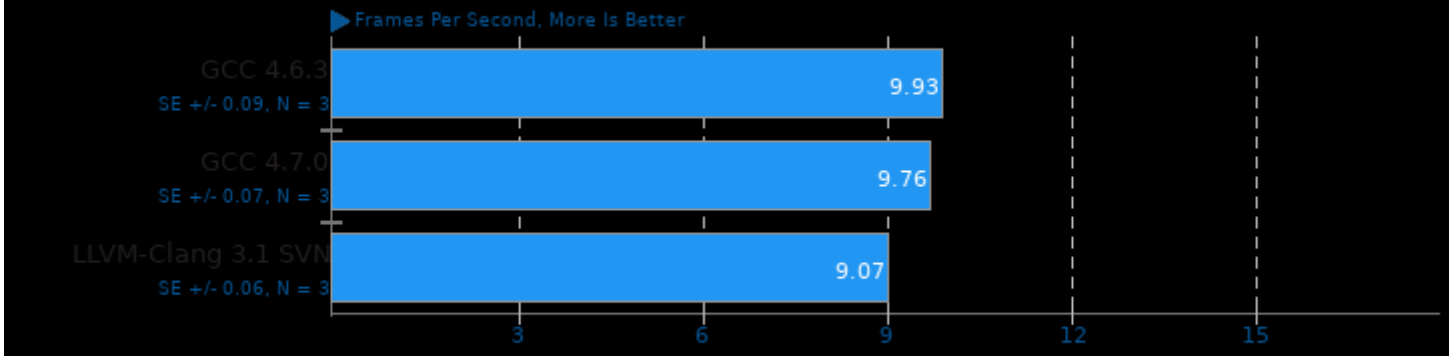
Phong Rendering With Soft-Shadow Mapping



1. (CXX) g++ options: -O3 -march=native -fomit-frame-pointer -ffast-math -mtune=native -flto -msse -mrecip -mfpmath=sse -msse2 -mssse3 -lSDL -lstd

VP8 libvpx Encoding 0.9.7-p1

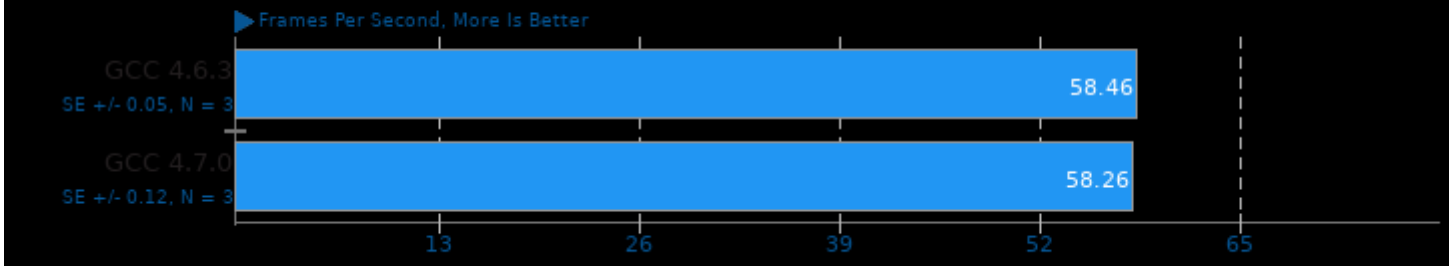
vpxenc



1. (CC) gcc options: -m64 -lvpx -lm -lpthread

x264 2011-12-06

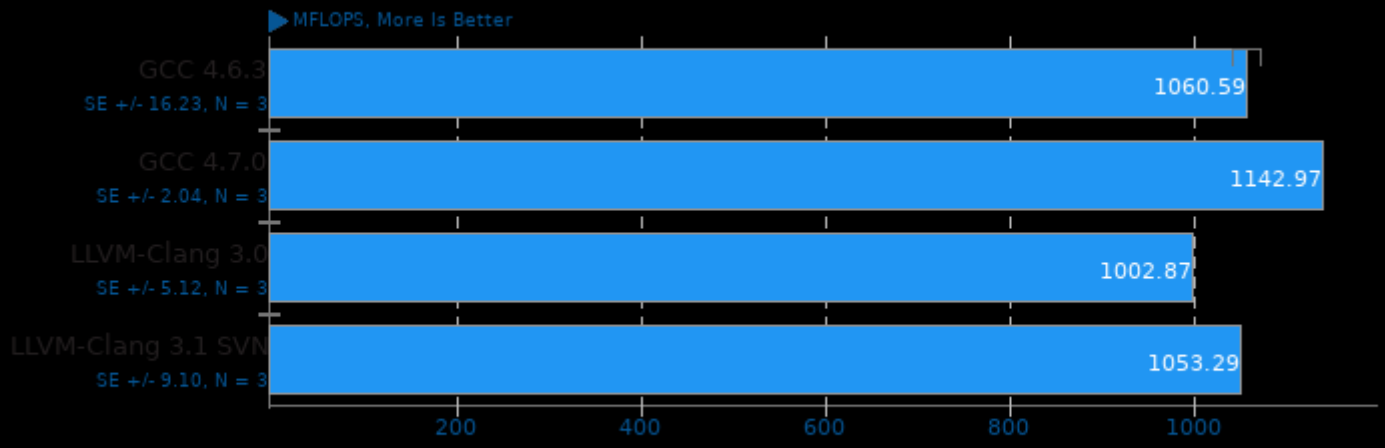
H.264 Video Encoding



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Himeno Benchmark 3.0

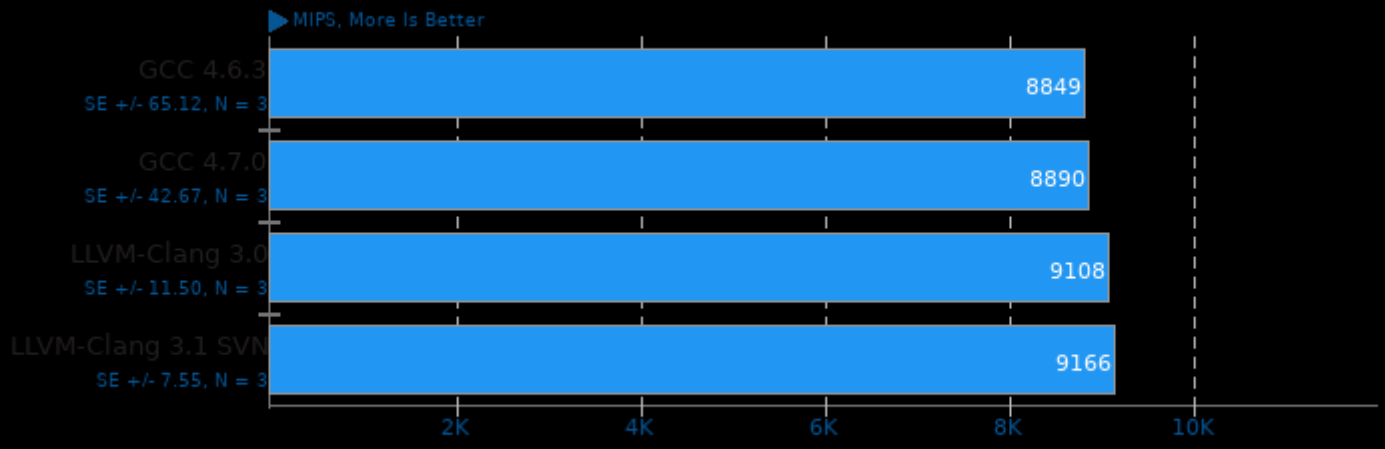
Poisson Pressure Solver



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

7-Zip Compression 9.20.1

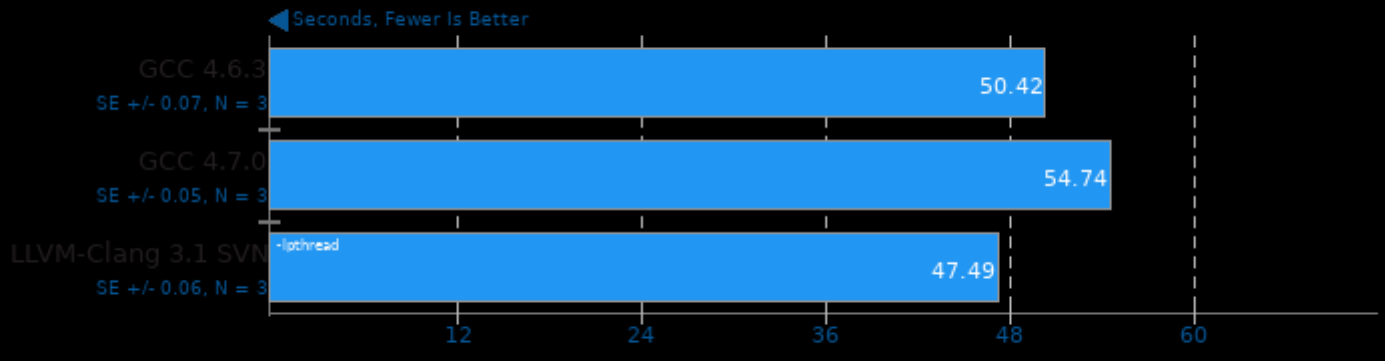
Compress Speed Test



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

Timed PHP Compilation 5.2.9

Time To Compile

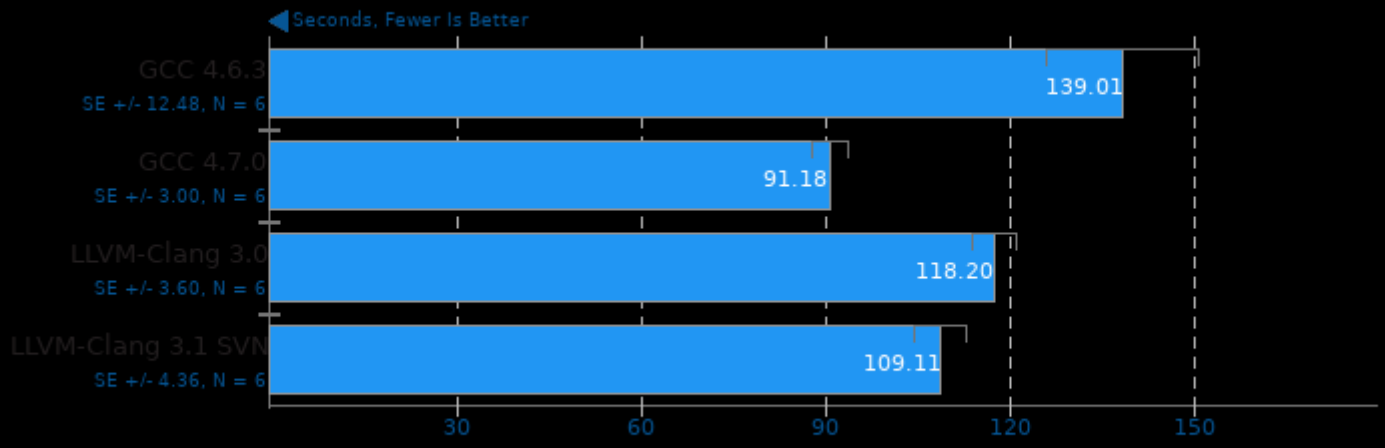


1. (CC) gcc options: -O3 -march=native -pedantic -ldl -lz -lm

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C-Ray 1.1

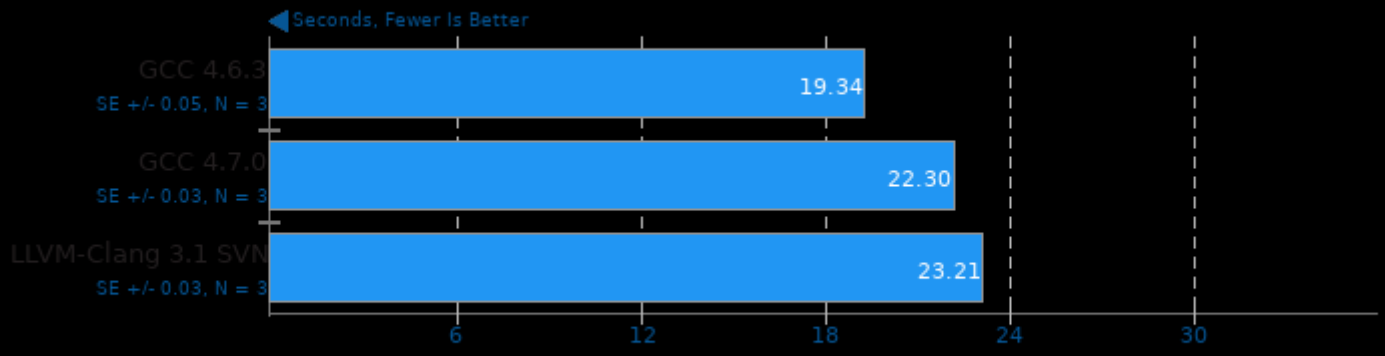
Total Time



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

Parallel BZIP2 Compression 1.0.5

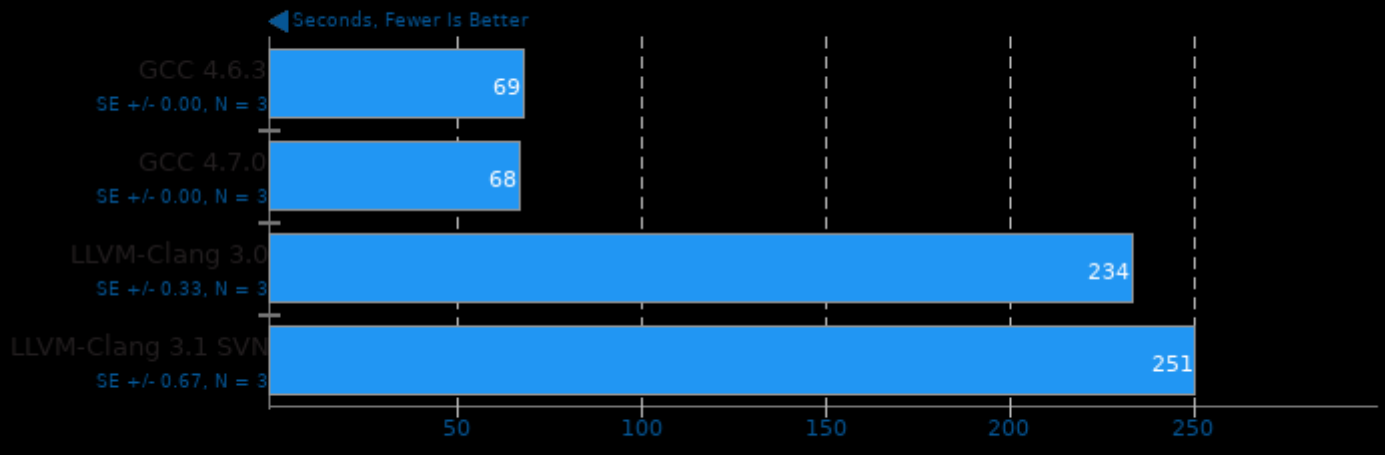
256MB File Compression



1. (CXX) g++ options: -O2 -pthread -lpthread -lbz2

Smallpt 1.0

Global Illumination Renderer; 100 Samples

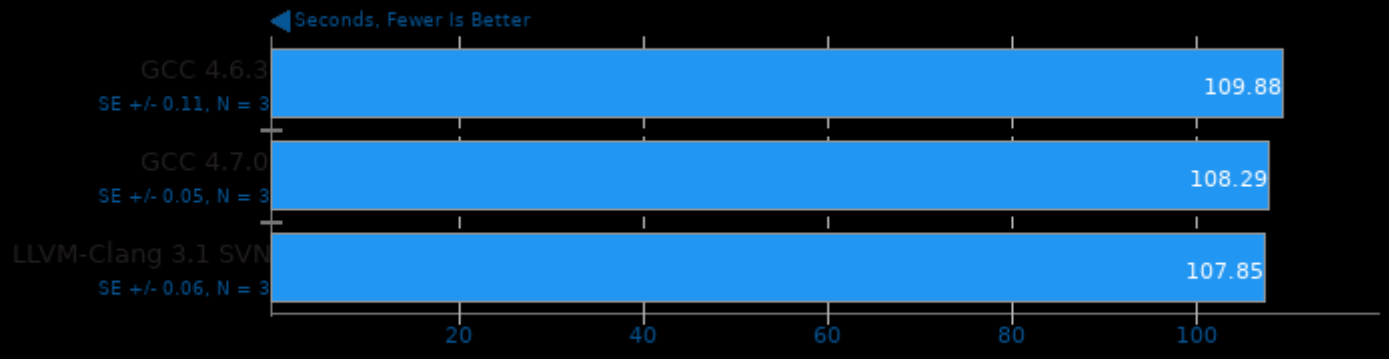


1. (CXX) g++ options: -fopenmp -O3 -march=native

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Crafty 23.4

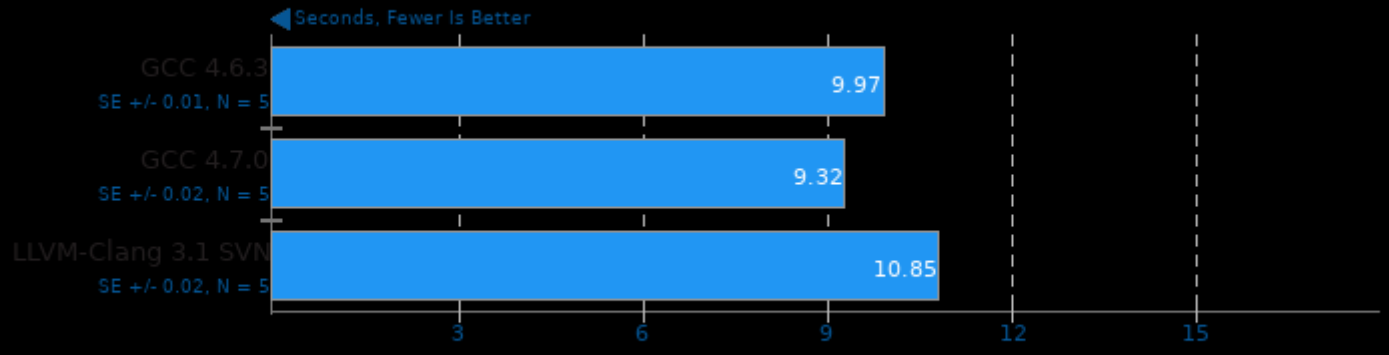
Elapsed Time



1. (CC) gcc options: -lstdc++ -lm

FLAC Audio Encoding 1.2.1

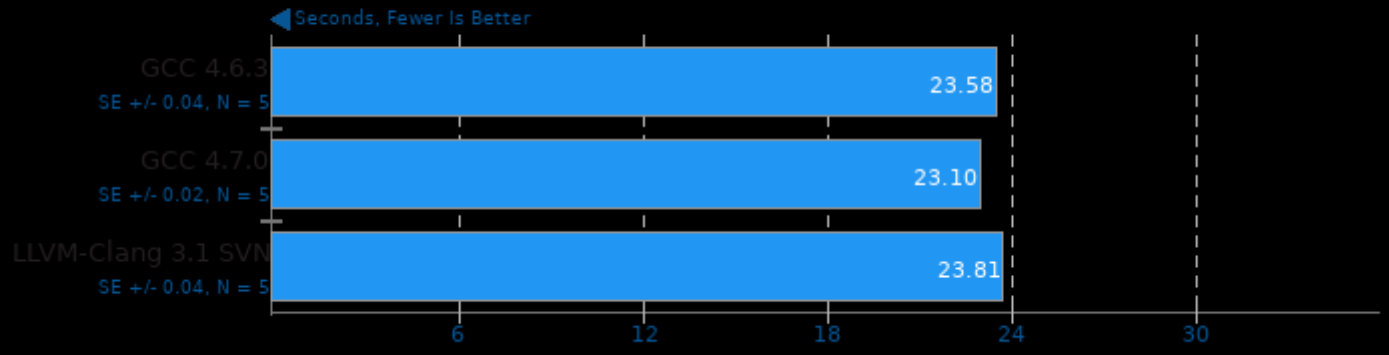
WAV To FLAC



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

LAME MP3 Encoding 3.99.3

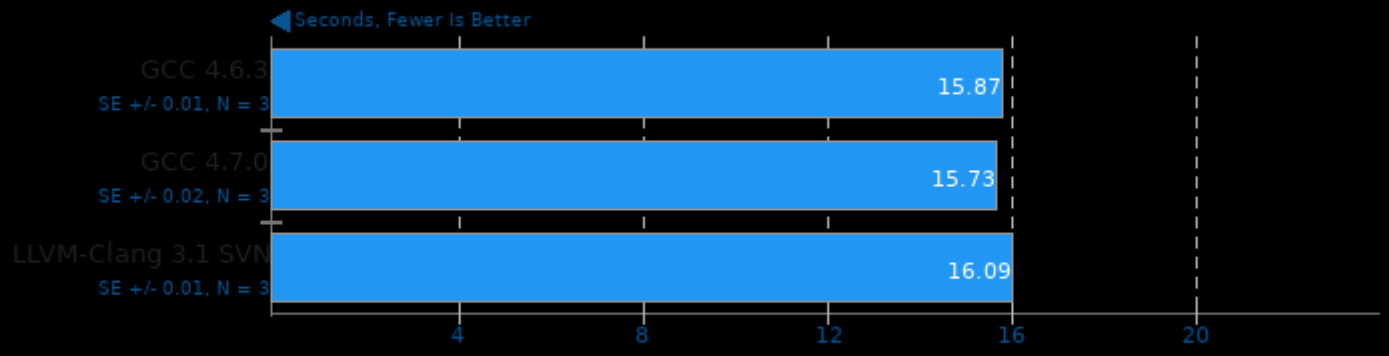
WAV To MP3



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FFmpeg 0.10

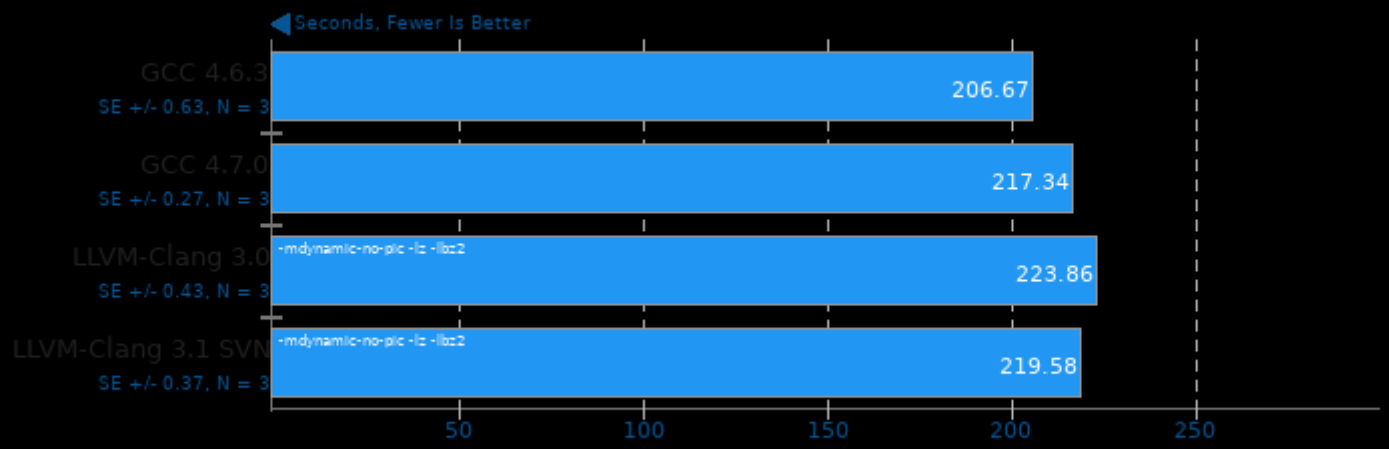
AVI To NTSC VCD



1. (CC) gcc options: -lavdevice -lavfilter -lavformat -lavcodec -lswresample -lswscale -lavutil -ldl -lasound -lSDL -lm -pthread -lbz2

Minion 0.12

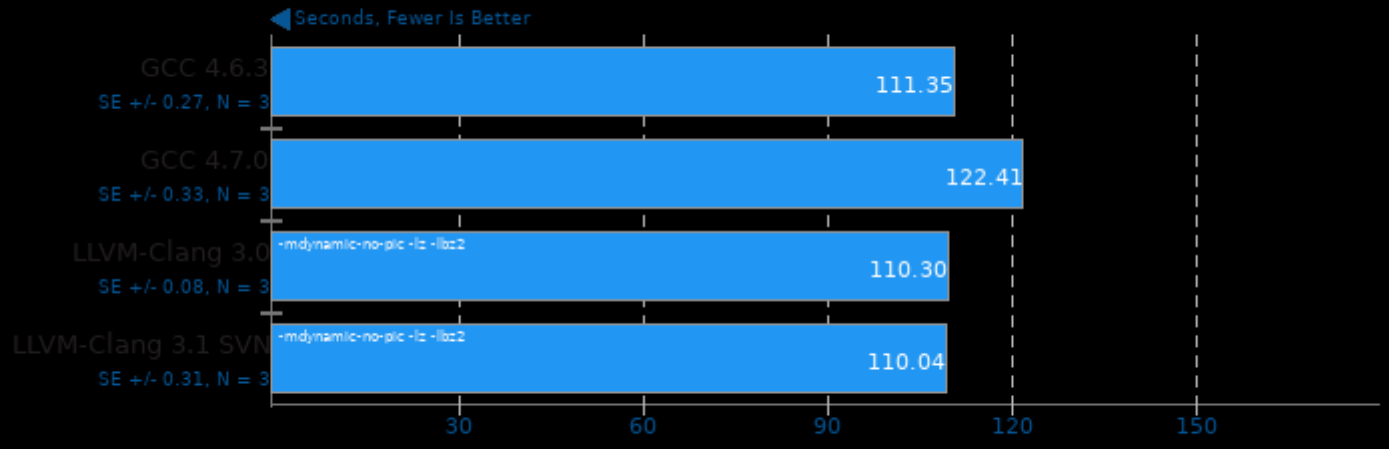
Benchmark: Bibd



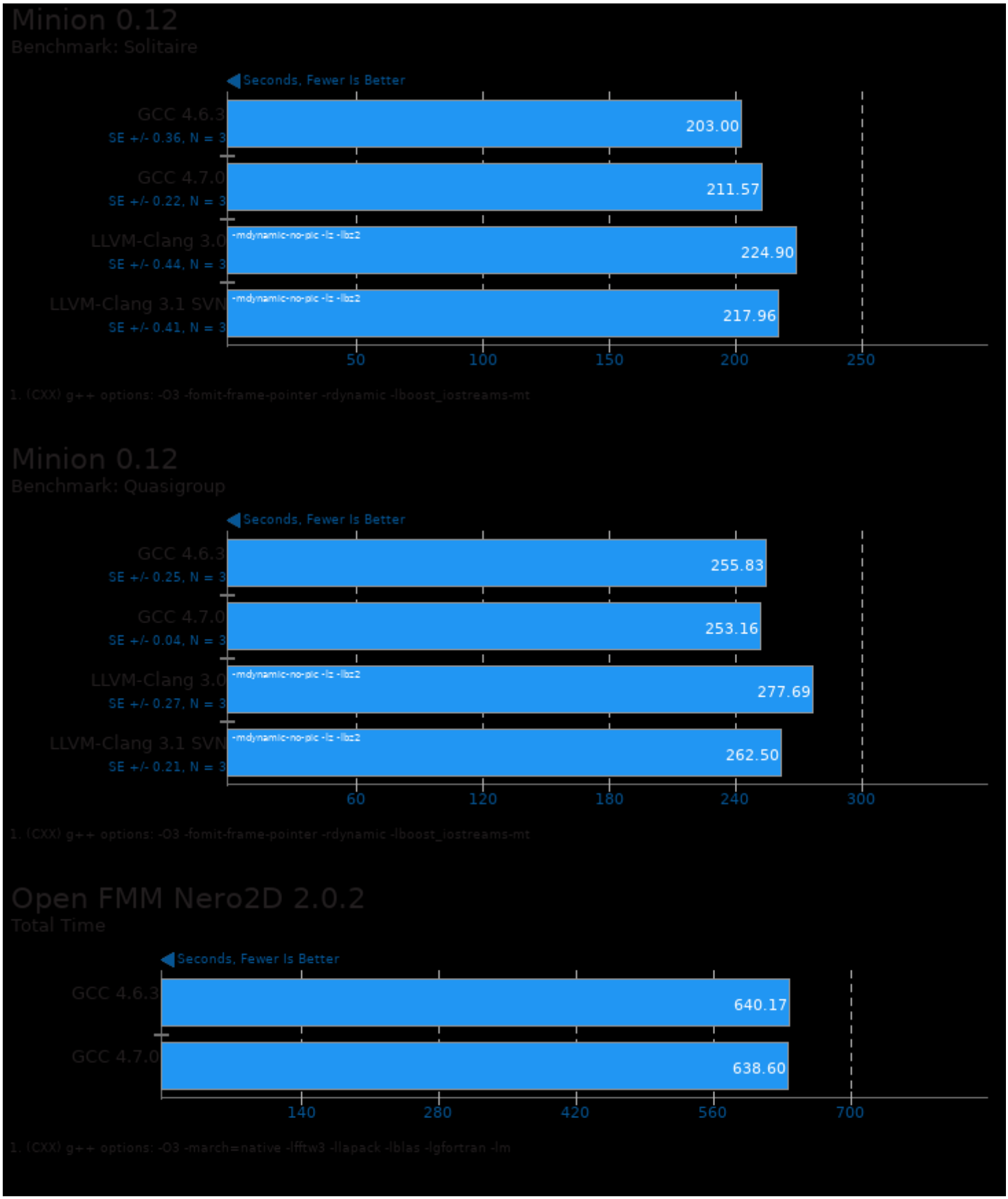
1. (CXX) g++ options: -O3 -fomit-frame-pointer -rdynamic -lboost_iostreams-mt

Minion 0.12

Benchmark: Graceful



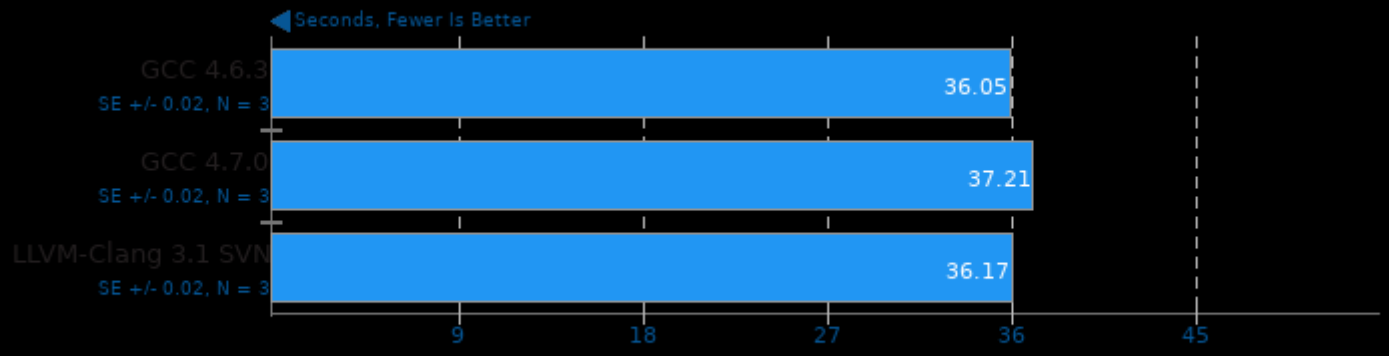
1. (CXX) g++ options: -O3 -fomit-frame-pointer -rdynamic -lboost_iostreams-mt


Minion 0.12
Benchmark: Solitaire
Seconds, Fewer Is Better
GCC 4.6.3
SE +/- 0.36, N = 3
203.00
GCC 4.7.0
SE +/- 0.22, N = 3
211.57
LLVM-Clang 3.0
SE +/- 0.44, N = 3
-mdynamic-no-pic -lz -lbz2
224.90
LLVM-Clang 3.1 SVN
SE +/- 0.41, N = 3
-mdynamic-no-pic -lz -lbz2
217.96
50
100
150
200
250
1. (CXX) g++ options: -O3 -fomit-frame-pointer -rdynamic -lboost_iostreams-mt
Minion 0.12
Benchmark: Quasigroup
Seconds, Fewer Is Better
GCC 4.6.3
SE +/- 0.25, N = 3
255.83
GCC 4.7.0
SE +/- 0.04, N = 3
253.16
LLVM-Clang 3.0
SE +/- 0.27, N = 3
-mdynamic-no-pic -lz -lbz2
277.69
LLVM-Clang 3.1 SVN
SE +/- 0.21, N = 3
-mdynamic-no-pic -lz -lbz2
262.50
60
120
180
240
300
1. (CXX) g++ options: -O3 -fomit-frame-pointer -rdynamic -lboost_iostreams-mt
Open FMM Nero2D 2.0.2
Total Time
Seconds, Fewer Is Better
GCC 4.6.3
640.17
GCC 4.7.0
638.60
140
280
420
560
700
1. (CXX) g++ options: -O3 -march=native -lfftw3 -llapack -lblas -lgfortran -lm

LLVM Clang 3.1 GCC 4.7 Intel Core i7 Benchmarks

Tachyon 0.98.9

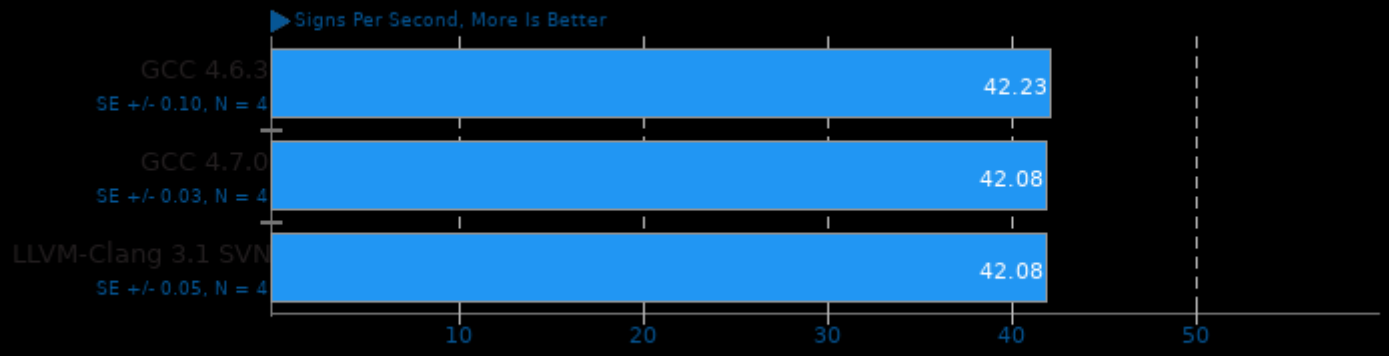
Total Time



1. (CC) gcc options: -m32 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread

OpenSSL 1.0.0e

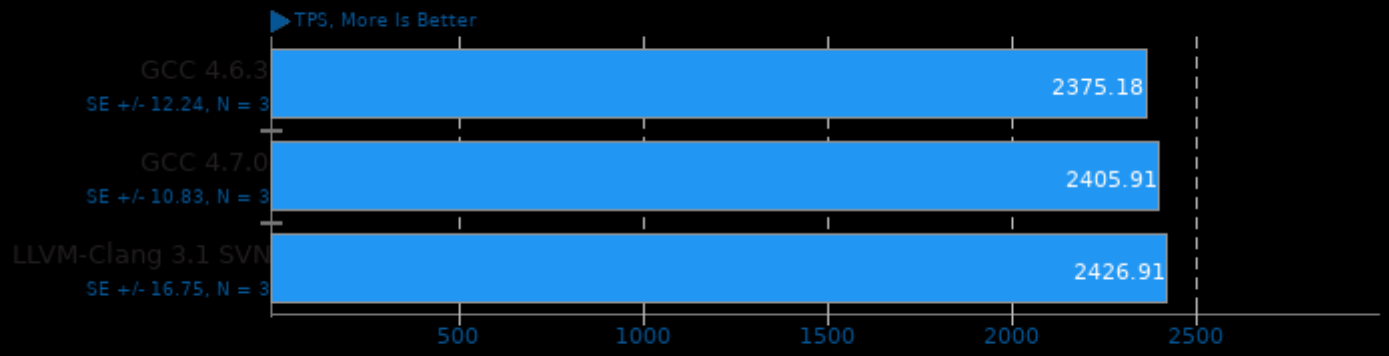
RSA 4096-bit Performance



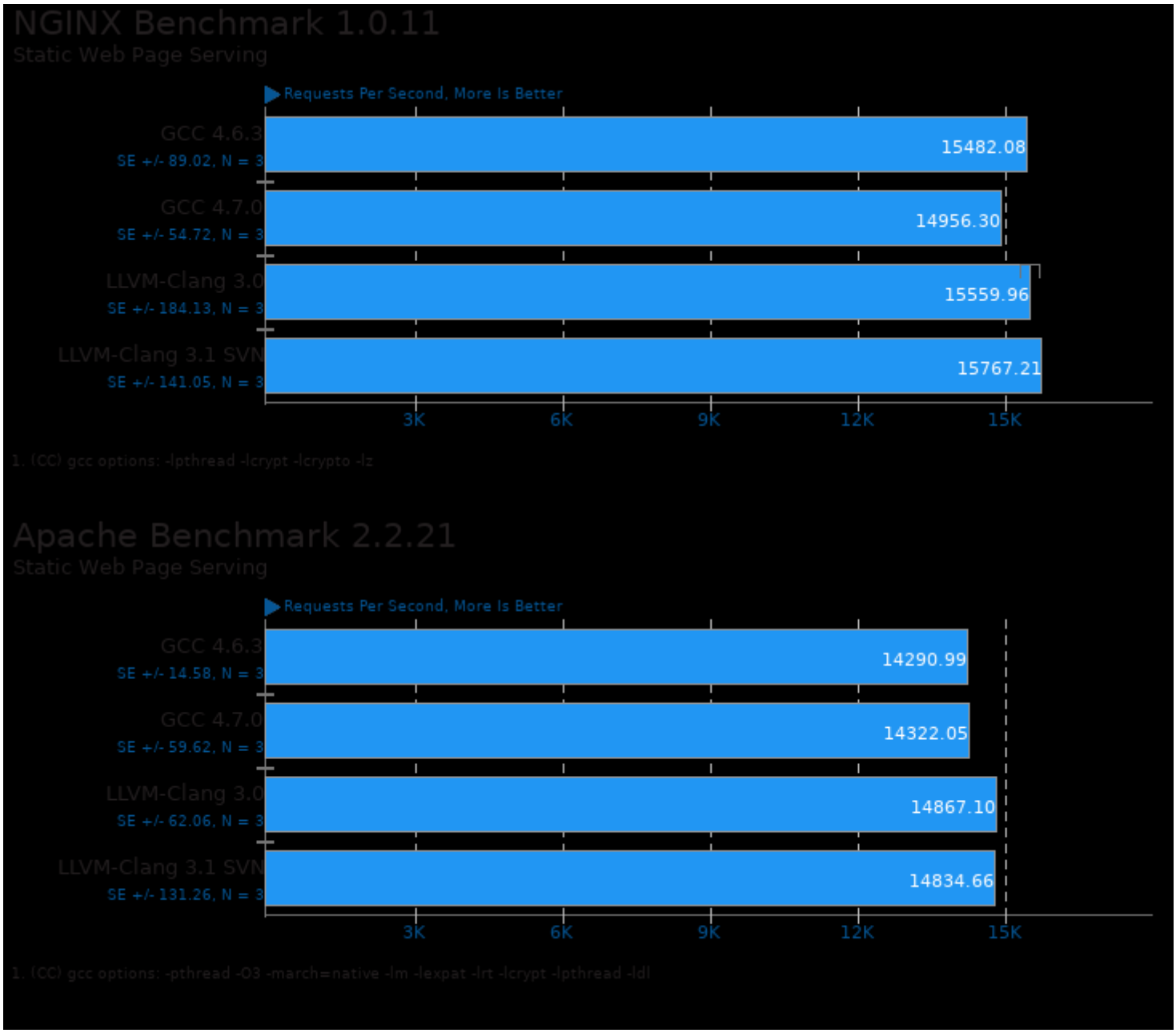
1. (CC) gcc options: -m64 -O3 -lssl -lcrypto -ldl

PostgreSQL pgbench 8.4.11

TPC-B Transactions Per Second



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



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