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EPYC 7262 Linux Ubuntu Benchmarks

EPYC and Xeon benchmarks for a future article.

Automated Executive Summary

EPYC 7262 had the most wins, coming in first place for 59% of the tests.

Based on the geometric mean of all complete results, the fastest (EPYC 7262) was 2.271x the speed of the slowest (Xeon E5-2609 v4). Xeon E5-2687W v3 was 0.857x the speed of EPYC 7262, Xeon E5-1680 v3 was 0.976x the speed of Xeon E5-2687W v3, EPYC 7251 was 0.823x the speed of Xeon E5-1680 v3, Xeon E3-1275 v6 was 0.967x the speed of EPYC 7251, Xeon E5-2609 v4 was 0.662x the speed of Xeon E3-1275 v6.

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

NAS Parallel Benchmarks (Test / Class: MG.C) at 5.351x
CloverLeaf (Lagrangian-Eulerian Hydrodynamics) at 4.876x
High Performance Conjugate Gradient at 3.821x
NAS Parallel Benchmarks (Test / Class: CG.C) at 3.256x
NAS Parallel Benchmarks (Test / Class: FT.C) at 3.108x
x264 (H.264 Video Encoding) at 3.089x
Tungsten Renderer (Scene: Hair) at 3.067x
rays1bench (Large Scene) at 3.057x

C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 2.973x
7-Zip Compression (Compress Speed Test) at 2.935x.

Test Systems:

EPYC 7262

Processor: AMD EPYC 7262 8-Core @ 3.20GHz (8 Cores / 16 Threads), Motherboard: ASRockRack EPYCD8 (P2.10 BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 16384 MB DDR4-3200MT/s 18ASF2G72PDZ-3G2E1, Disk: 525GB 2115, Graphics: llvmpipe 126GB, Audio: AMD Starship/Matisse, Monitor: 2 x VE228, Network: 2 x Intel I350

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 3.3 Mesa 20.0.0 (LLVM 9.0.1 128 bits), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x830101c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: 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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + tsx_async_abort: Not affected

EPYC 7251

Processor: AMD EPYC 7251 8-Core @ 2.10GHz (8 Cores / 16 Threads), Motherboard: ASRockRack EPYCD8 (P2.10 BIOS), Chipset: AMD 17h, Memory: 8 x 16384 MB DDR4-3200MT/s 18ASF2G72PDZ-3G2E1, Disk: 525GB 2115, Graphics: llvmpipe 126GB, Monitor: 3 x VE228, Network: 2 x Intel I350

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 3.3 Mesa 20.0.0 (LLVM 9.0.1 128 bits), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8001250
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: 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 Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + tsx_async_abort: Not affected

Xeon E5-1680 v3

Processor: Intel Xeon E5-1680 v3 @ 3.80GHz (8 Cores / 16 Threads), Motherboard: ASUS X99-A (3902 BIOS), Chipset: Intel Xeon E7 v3/Xeon, Memory: 4 x 4096 MB DDR4-2400MT/s CRUCIAL, Disk: PNY CS900 240GB + 525GB

2115, Graphics: eVGA NVIDIA NVE7 1GB, Audio: Realtek ALC1150, Monitor: 3 x VE228 + G237HL, Network: Intel I218-V

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 4.3 Mesa 20.0.0, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x43
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

Xeon E5-2609 v4

Processor: Intel Xeon E5-2609 v4 @ 1.70GHz (8 Cores), Motherboard: MSI X99A RAIDER (MS-7885) v5.0 (P.50 BIOS), Chipset: Intel Xeon E7 v4/Xeon, Memory: 4 x 4096 MB DDR4-2133MT/s, Disk: 525GB 2115 + 256GB CORSAIR FORCE LX, Graphics: eVGA NVIDIA NV117 1GB, Audio: Realtek ALC892, Monitor: 3 x VE228 + 2 x G237HL, Network: Intel I218-V

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 4.3 Mesa 20.0.0, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xb000038
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: disabled RSB filling + tsx_async_abort: Mitigation of Clear buffers; SMT disabled

Xeon E5-2687W v3

Processor: Intel Xeon E5-2687W v3 @ 3.50GHz (10 Cores / 20 Threads), Motherboard: MSI X99S SLI PLUS (MS-7885) v1.0 (1.E0 BIOS), Chipset: Intel Xeon E7 v3/Xeon, Memory: 4 x 8192 MB DDR4-2400MT/s, Disk: 525GB 2115 + 80GB INTEL SSDSCKGW08, Graphics: NVIDIA NVE4 2GB, Audio: Realtek ALC892, Monitor: 3 x VE228 + 3 x G237HL, Network: Intel I218-V

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 4.3 Mesa 20.0.0, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191

Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x43
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

Xeon E3-1275 v6

Processor: Intel Xeon E3-1275 v6 @ 4.20GHz (4 Cores / 8 Threads), Motherboard: ASUS P10S-M WS (4401 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 2 x 8192 MB DDR4-2400MT/s, Disk: Samsung SSD 970 EVO Plus 500GB + 525GB 2115, Graphics: Intel HD P630 3GB (1150MHz), Audio: Realtek ALC1150, Monitor: 3 x VE228 + 3 x G237HL + DELL S2409W, Network: 2 x Intel I210

OS: Ubuntu 20.04, Kernel: 5.4.0-14-generic (x86_64), Desktop: GNOME Shell 3.35.91, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, OpenGL: 4.6 Mesa 20.0.0, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,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
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xca
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Mitigation of Clear buffers; SMT vulnerable

	EPYC 7262	EPYC 7251	Xeon E5-1680 v3	Xeon E5-2609 v4	Xeon E5-2687W v3	Xeon E3-1275 v6
High Performance Conjugate Gradient (GFLOP/s)	**13.3331**	12.7723	6.39987	5.14029	5.92559	**3.48984**
Normalized	100%	95.79%	48%	38.55%	44.44%	26.17%
Standard Deviation	0.4%	1.3%	0.2%	0.1%	0.1%	0.1%
NAS Parallel Benchmarks - CG.C (Mop/s)	**11453**	10594	4722	**3517**		3682
Normalized	100%	92.5%	41.23%	30.71%		32.15%
Standard Deviation	4.3%	0.8%	0.1%	0.4%		0.4%
NAS Parallel Benchmarks - FT.C (Mop/s)	**25189**	18044	13246	**8104**	11112	9246
Normalized	100%	71.63%	52.59%	32.17%	44.11%	36.71%
Standard Deviation	1.1%	1.6%	0%	0.1%	0.2%	0.4%
NAS Parallel Benchmarks - LU.C (Mop/s)	**39012**	31901	25324	**16156**		17212
Normalized	100%	81.77%	64.91%	41.41%		44.12%
Standard Deviation	0%	2%	0.5%	0.5%		0.1%
NAS Parallel Benchmarks - MG.C (Mop/s)	**44251**	32104	16225	13023	15146	**8270**
Normalized	100%	72.55%	36.67%	29.43%	34.23%	18.69%
Standard Deviation	0.1%	0.2%	0.2%	0.3%	0.2%	0.1%

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NAS Parallel Benchmarks - SP.B (Mop/s)	**14162**	11054	7519	5415	8143	**5147**
Normalized	100%	78.06%	53.09%	38.24%	57.5%	36.34%
Standard Deviation	0.9%	0.3%	0.1%	0.1%	0.1%	0.1%
CloverLeaf - L.E.H (sec)	**1.05**	1.74	3.60	4.06	3.80	**5.12**
Normalized	100%	60.34%	29.17%	25.86%	27.63%	20.51%
Standard Deviation	0.6%	1.8%	0.6%	1.2%	0.7%	0%
Nebular Empirical Analysis Tool (sec)	**20.408**	30.791	24.047	**51.447**	23.788	31.117
Normalized	100%	66.28%	84.87%	39.67%	85.79%	65.58%
Standard Deviation	0.2%	2.4%	0.4%	0%	0.8%	0.4%
Timed MrBayes Analysis - P.P.A (sec)	82.288	120.143	107.586	**201.610**	114.839	**80.765**
Normalized	98.15%	67.22%	75.07%	40.06%	70.33%	100%
Standard Deviation	0.2%	0.2%	0.8%	0.5%	0.5%	0.5%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	**5.605**	4.467	5.091	**2.664**	5.521	3.046
Normalized	100%	79.7%	90.83%	47.53%	98.5%	54.34%
Standard Deviation	5%	0.7%	0.6%	1%	0.3%	0.5%
Renaissance - Scala Dotty (ms)	7060	12844	8311	**13619**	8659	**7015**
Normalized	99.36%	54.62%	84.4%	51.51%	81.01%	100%
Standard Deviation	2.2%	5.6%	5.9%	2.1%	1.9%	1.7%
Renaissance - Rand Forest (ms)	5313	9118	5326	**9162**	5669	**4828**
Normalized	90.88%	52.96%	90.66%	52.7%	85.18%	100%
Standard Deviation	3.6%	2.7%	1.4%	2.9%	1.9%	1.9%
Renaissance - Apache Spark ALS (ms)	6243	9425	6147	**11269**	6273	**5968**
Normalized	95.59%	63.33%	97.08%	52.96%	95.15%	100%
Standard Deviation	1.1%	3.3%	1.5%	2.6%	1.5%	0.7%
Renaissance - Apache Spark Bayes (ms)	**4632**	9855	5114	**10692**	5168	7471
Normalized	100%	47%	90.56%	43.32%	89.62%	62%
Standard Deviation	5.5%	15.1%	1.5%	3.9%	3%	4.2%
Renaissance - Savina Reactors.IO (ms)	25095	34074	25972	**48130**	27934	**22939**
Normalized	91.41%	67.32%	88.32%	47.66%	82.12%	100%
Standard Deviation	10.3%	10.8%	2.4%	1.3%	3%	1.2%
Renaissance - A.S.P (ms)	22862	35790	**22393**	**38366**	24311	23561
Normalized	97.95%	62.57%	100%	58.37%	92.11%	95.04%
Standard Deviation	1.1%	2.6%	1.8%	1.4%	0.5%	0.6%
Renaissance - I.M.D.S (ms)	7291	**12463**	6203	9337	7164	**5132**
Normalized	70.39%	41.18%	82.74%	54.96%	71.64%	100%
Standard Deviation	2.3%	2.7%	0.9%	3%	1.3%	3.9%
Renaissance - A.U.C.T (ms)	14224	**28643**	12345	16524	13811	**11062**
Normalized	77.77%	38.62%	89.61%	66.94%	80.09%	100%
Standard Deviation	8.2%	13.3%	3.1%	2.8%	5.1%	2.8%
John The Ripper - Blowfish (Real C/S)	11494	11435	12048	**5314**	**13773**	7700
Normalized	83.45%	83.02%	87.48%	38.58%	100%	55.91%
Standard Deviation	0%	0.5%	0.2%	0.4%	0.2%	0.1%

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John The Ripper - MD5 (Real C/S)	812680	418013	766549	**340428**	**874411**	438146
Normalized	92.94%	47.81%	87.66%	38.93%	100%	50.11%
Standard Deviation	0.1%	0.8%	0.2%	0.3%	0.1%	0.1%
dav1d - Summer Nature 4K (FPS)	130.91	79.81	119.13	**57.06**	**132.18**	84.94
Normalized	99.04%	60.38%	90.13%	43.17%	100%	64.26%
Standard Deviation	0.1%	0.2%	0.2%	0.3%	0.9%	0.2%
SVT-AV1 - Enc Mode 8 - 1080p (FPS)	**20.178**	13.185	18.854	**7.142**	19.970	13.596
Normalized	100%	65.34%	93.44%	35.39%	98.97%	67.38%
Standard Deviation	1%	1.6%	1.6%	1.2%	0.7%	0.9%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	93.51	55.55	80.26	**53.68**	**113.95**	80.43
Normalized	82.06%	48.75%	70.43%	47.11%	100%	70.58%
Standard Deviation	5.5%	0.6%	2.9%	3.1%	0.2%	6.8%
VP9 libvpx Encoding - Speed 5 (FPS)	19.46	12.53	17.25	**10.03**	16.81	**23.88**
Normalized	81.49%	52.47%	72.24%	42%	70.39%	100%
Standard Deviation	1%	0.6%	2.9%	0.3%	0.7%	0.1%
x264 - H.2.V.E (FPS)	**78.50**	56.01	61.55	**25.41**	74.66	44.60
Normalized	100%	71.35%	78.41%	32.37%	95.11%	56.82%
Standard Deviation	3%	0.2%	2.9%	2.6%	0.7%	2.8%
x265 - H.2.1.V.E (FPS)	**41.07**	25.17	36.40	**19.75**	38.35	34.44
Normalized	100%	61.29%	88.63%	48.09%	93.38%	83.86%
Standard Deviation	0.8%	0.5%	2.5%	1.1%	1.8%	0.7%
ACES DGEMM - S.F.P.R (GFLOP/s)	**2.776224**	1.496863	1.930410	2.441057	2.171859	**1.136336**
Normalized	100%	53.92%	69.53%	87.93%	78.23%	40.93%
Standard Deviation	3.3%	0.9%	3.6%	0.1%	4%	1.4%
LuxCoreRender - DLSC (M samples/sec)	1.39	1.09	1.21	**0.53**	**1.41**	0.75
Normalized	98.58%	77.3%	85.82%	37.59%	100%	53.19%
Standard Deviation	1.3%	0.2%	0.1%	0.1%	0.1%	1.1%
LuxCoreRender - R.C.a.P (M samples/sec)	1.49	1.15	1.32	**0.59**	**1.54**	0.82
Normalized	96.75%	74.68%	85.71%	38.31%	100%	53.25%
Standard Deviation	0.7%	1.7%	0.4%	1.2%	0.3%	0.7%
Himeno Benchmark - P.P.S (MFLOPS)	**3491**	3307	3346	**1721**	3142	3442
Normalized	100%	94.73%	95.85%	49.31%	90%	98.59%
Standard Deviation	1.5%	2.8%	0.1%	0.2%	0.2%	0.8%
7-Zip Compression - C.S.T (MIPS)	**49262**	29898	40732	**16785**	44670	25099
Normalized	100%	60.69%	82.68%	34.07%	90.68%	50.95%
Standard Deviation	0.7%	1.1%	1.3%	0.1%	2%	2.1%
Stockfish - Total Time (Nodes/s)	**21478056**	16111220	18973007	**8129774**	21398732	11692284
Normalized	100%	75.01%	88.34%	37.85%	99.63%	54.44%
Standard Deviation	2.1%	0.9%	1.2%	1.2%	0.8%	2.9%
Timed Apache Compilation - Time To Compile (sec)	**28.477**	40.075	31.730	**57.130**	32.613	29.957
Normalized	100%	71.06%	89.75%	49.85%	87.32%	95.06%

EPYC 7262 Linux Ubuntu Benchmarks

Standard Deviation	0.2%	0.2%	0.2%	0.1%	0.4%	0.1%
Timed GDB GNU Debugger Compilation - Time To Compile (sec)	129.296	175.909	161.784	248.797	161.055	142.175
Normalized	100%	73.5%	79.92%	51.97%	80.28%	90.94%
Standard Deviation	0.3%	0.2%	0.4%	0.1%	0.1%	0.4%
Timed Linux Kernel Compilation - Time To Compile (sec)	91.829	132.440	117.868	248.187	107.595	176.392
Normalized	100%	69.34%	77.91%	37%	85.35%	52.06%
Standard Deviation	1.4%	0.8%	1.7%	0.9%	2.3%	1%
Timed MPlayer Compilation - Time To Compile (sec)	39.755	59.251	52.349	112.458	48.142	80.616
Normalized	100%	67.1%	75.94%	35.35%	82.58%	49.31%
Standard Deviation	0.2%	0.4%	0.1%	0%	0.1%	0.1%
Timed PHP Compilation - Time To Compile (sec)	67.895	100.046	81.445	161.896	81.857	99.840
Normalized	100%	67.86%	83.36%	41.94%	82.94%	68%
Standard Deviation	0.1%	0.2%	0.1%	0.1%	0.3%	0.2%
Build2 - Time To Compile	115.888	170.426	149.805	307.181	144.055	223.033
Normalized	100%	68%	77.36%	37.73%	80.45%	51.96%
Standard Deviation	0.2%	1.1%	1.7%	0.3%	0.9%	0.4%
C-Ray - Total Time - 4.1.R.P.P (sec)	74.726	88.808	105.985	222.175	92.753	160.738
Normalized	100%	84.14%	70.51%	33.63%	80.56%	46.49%
Standard Deviation	0%	0%	0.1%	0.1%	0%	0%
Tungsten Renderer - Hair	30.4178	40.4617	39.5146	93.2794	34.1505	62.1026
Normalized	100%	75.18%	76.98%	32.61%	89.07%	48.98%
Standard Deviation	0.1%	0.4%	0.1%	0.1%	0.4%	0.6%
Tungsten Renderer - Water Caustic (sec)	32.7027	45.0738	30.4904	69.7170	31.4700	41.0356
Normalized	93.24%	67.65%	100%	43.73%	96.89%	74.3%
Standard Deviation	1%	0.4%	0.3%	0.3%	0.4%	0.1%
Tungsten Renderer - Non-Exponential (sec)	12.0766	16.6028	10.6467	25.6738	9.34031	15.4752
Normalized	77.34%	56.26%	87.73%	36.38%	100%	60.36%
Standard Deviation	0.5%	0.2%	0.1%	0.1%	0.1%	0.9%
Tungsten Renderer - Volumetric Caustic (sec)	14.7979	20.0427	13.3216	31.5028	11.6832	20.5889
Normalized	78.95%	58.29%	87.7%	37.09%	100%	56.75%
Standard Deviation	1%	0.5%	0.2%	0.2%	0.1%	0.3%
rays1bench - Large Scene (mrays/s)	50.80	27.03	38.98	16.62	45.33	27.17
Normalized	100%	53.21%	76.73%	32.72%	89.23%	53.48%
Standard Deviation	0.3%	2.9%	0.1%	0%	0%	0.2%
Numpy Benchmark (Score)	315.54	216.18	279.58	139.61	248.68	332.84
Normalized	94.8%	64.95%	84%	41.95%	74.71%	100%
Standard Deviation	1%	0.4%	0.2%	0.5%	1.4%	0.7%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	19.233	27.029	19.668	32.573	20.982	34.004
Normalized	100%	71.16%	97.79%	59.05%	91.66%	56.56%
Standard Deviation	1.2%	0.4%	1.9%	0.2%	0.5%	0.4%

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FLAC Audio Encoding - WAV To FLAC (sec)	10.425	13.601	11.386	**23.371**	12.413	**9.446**
Normalized	90.61%	69.45%	82.96%	40.42%	76.1%	100%
Standard Deviation	1.2%	0.5%	0.7%	0.1%	1.1%	0.4%
Radiance Benchmark - SMP Parallel (sec)	**212.634**	325.002	266.729	**518.858**	293.463	232.806
Normalized	100%	65.43%	79.72%	40.98%	72.46%	91.34%
Tachyon - Total Time (sec)	**106.1890**	140.9664	138.9936	**288.7028**	121.9891	202.2991
Normalized	100%	75.33%	76.4%	36.78%	87.05%	52.49%
Standard Deviation	0.4%	0.4%	0.2%	0.2%	0.2%	0.3%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	143429	115718	150771	**69134**	**162521**	106629
Normalized	88.25%	71.2%	92.77%	42.54%	100%	65.61%
Standard Deviation	0.7%	0.5%	0.3%	0.9%	0.4%	0.3%
RawTherapee - T.B.T (sec)	**70.579**	92.640	77.672	**153.857**	77.693	89.190
Normalized	100%	76.19%	90.87%	45.87%	90.84%	79.13%
Standard Deviation	0.4%	0.2%	0.1%	0%	0%	0.1%
Chaos Group V-RAY - CPU (Ksamples)	**12105**	7724	10382	**4711**	11702	6666
Normalized	100%	63.81%	85.77%	38.92%	96.67%	55.07%
Standard Deviation	0.2%	0.4%	0.3%	1.7%	0.3%	0.7%
Blender - BMW27 - CPU-Only (sec)	193.60	278.82	223.00	**535.02**	**190.87**	346.27
Normalized	98.59%	68.46%	85.59%	35.68%	100%	55.12%
Standard Deviation	1%	0.5%	0.5%	0.5%	0.2%	0.1%
PyBench - T.F.A.T.T (Milliseconds)	1133	1541	1142	**2523**	1238	**1013**
Normalized	89.41%	65.74%	88.7%	40.15%	81.83%	100%
Standard Deviation	0.4%		0.4%		0.1%	0.1%
Numenta Anomaly Benchmark - Relative	**21.941**	28.823	27.007	**54.183**	27.738	37.294
Normalized	100%	76.12%	81.24%	40.49%	79.1%	58.83%
Standard Deviation	1.1%	0.9%	1.6%	3%	2.3%	0.4%
Numenta Anomaly Benchmark - Windowed	**12.356**	15.586	14.575	**32.282**	13.504	23.218
Normalized	100%	79.28%	84.78%	38.28%	91.5%	53.22%
Standard Deviation	0.4%	0.3%	2.8%	0.8%	1.1%	0.3%
Numenta Anomaly Benchmark - Earthgecko	**112.913**	181.608	152.925	**286.081**	148.133	233.758
Normalized	100%	62.17%	73.84%	39.47%	76.22%	48.3%
Standard Deviation	0.8%	2.5%	0.7%	0.3%	2.2%	0.8%
Numenta Anomaly Benchmark - B.C (sec)	**38.927**	56.260	59.433	**93.060**	62.064	66.333
Normalized	100%	69.19%	65.5%	41.83%	62.72%	58.68%
Standard Deviation	1.6%	0.9%	1%	1.2%	3%	0.5%
Appleseed - Emily (sec)	**449.247685**	647.774496	566.079339	**1278**	506.481663	861.404113
Normalized	100%	69.35%	79.36%	35.17%	88.7%	52.15%
Appleseed - Disney Material (sec)	**278.630082**	342.773567	339.908405	**723.852332**	294.583946	509.434412
Normalized	100%	81.29%	81.97%	38.49%	94.58%	54.69%

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Appleseed - Material Tester (sec)	279.56946	404.679569	309.370548	**725.001612**	**273.959855**	472.936375
Normalized	97.99%	67.7%	88.55%	37.79%	100%	57.93%
PHPBench - P.B.S (Score)	519928	385702	606718	**274947**	562855	**692397**
Normalized	75.09%	55.71%	87.63%	39.71%	81.29%	100%
Standard Deviation	0.2%	0.9%	0.9%	0.3%	0.2%	0.2%
Mlpack Benchmark - scikit_ica (sec)	**60.30**	90.17	68.48	**104.26**	76.05	63.56
Normalized	100%	66.87%	88.05%	57.84%	79.29%	94.87%
Standard Deviation	1.4%	2.4%	1.2%	5.6%	2.5%	1.5%
Mlpack Benchmark - scikit_qda (sec)	**40.40**	74.14	61.66	**81.30**	64.79	77.37
Normalized	100%	54.49%	65.52%	49.69%	62.36%	52.22%
Standard Deviation	3%	1%	2%	1.1%	2.1%	0.7%
Mlpack Benchmark - scikit_svm (sec)	14.62	17.44	**13.45**	**28.80**	15.30	16.00
Normalized	92%	77.12%	100%	46.7%	87.91%	84.06%
Standard Deviation	0.3%	0.3%	0.1%	0.2%	0.1%	0.1%
Mlpack Benchmark - scikit_linearridgeregression (sec)	**2.69**	**4.97**	3.26	4.87	3.40	4.29
Normalized	100%	54.12%	82.52%	55.24%	79.12%	62.7%
Standard Deviation	0.2%	1.2%	1.4%	1.3%	0.4%	5.2%
Scikit-Learn (sec)	11.126	15.015	11.241	**21.518**	12.172	**10.080**
Normalized	90.6%	67.13%	89.67%	46.84%	82.81%	100%
Standard Deviation	2.9%	0.2%	0.1%	0.1%	0.3%	0.1%

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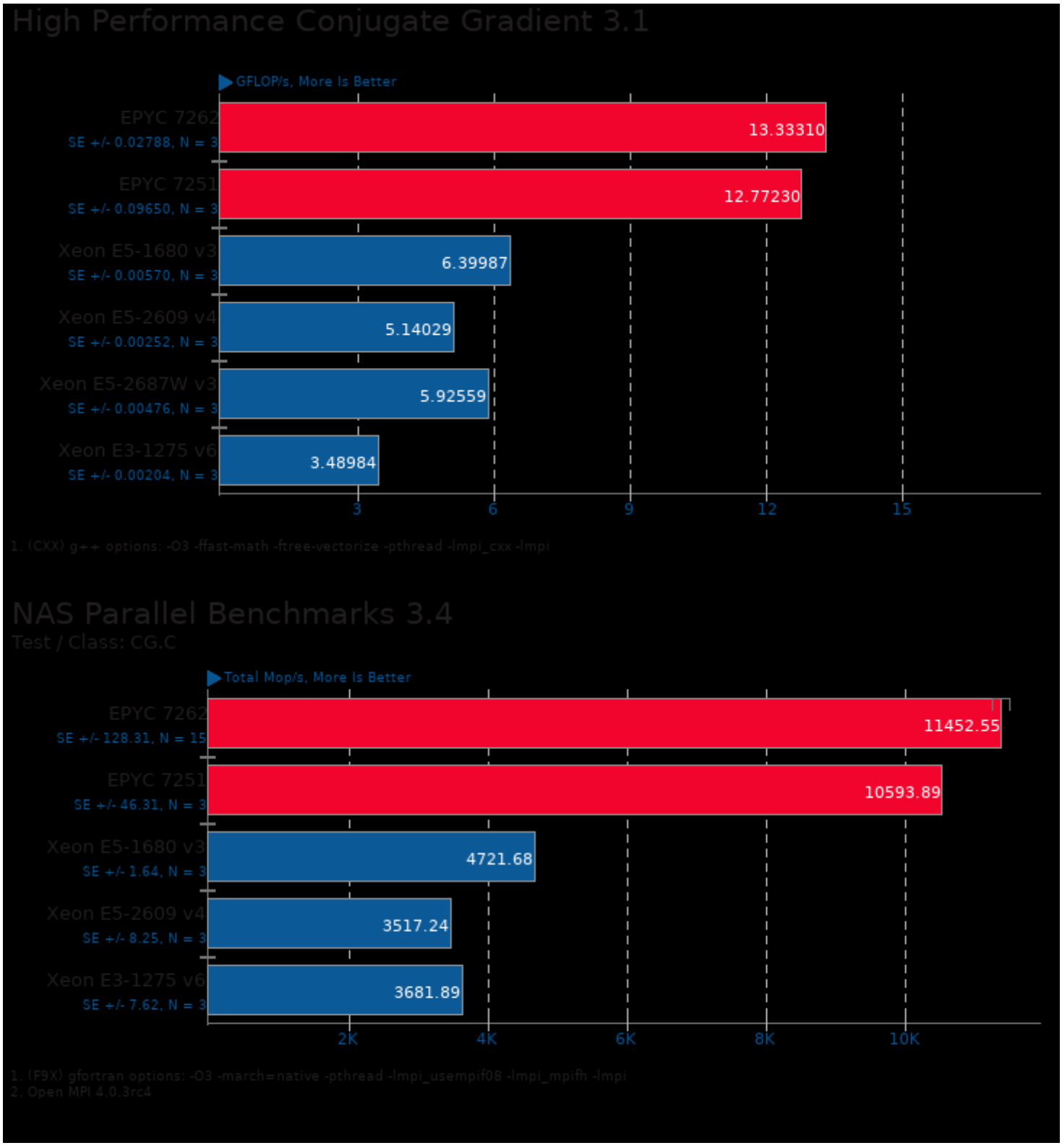
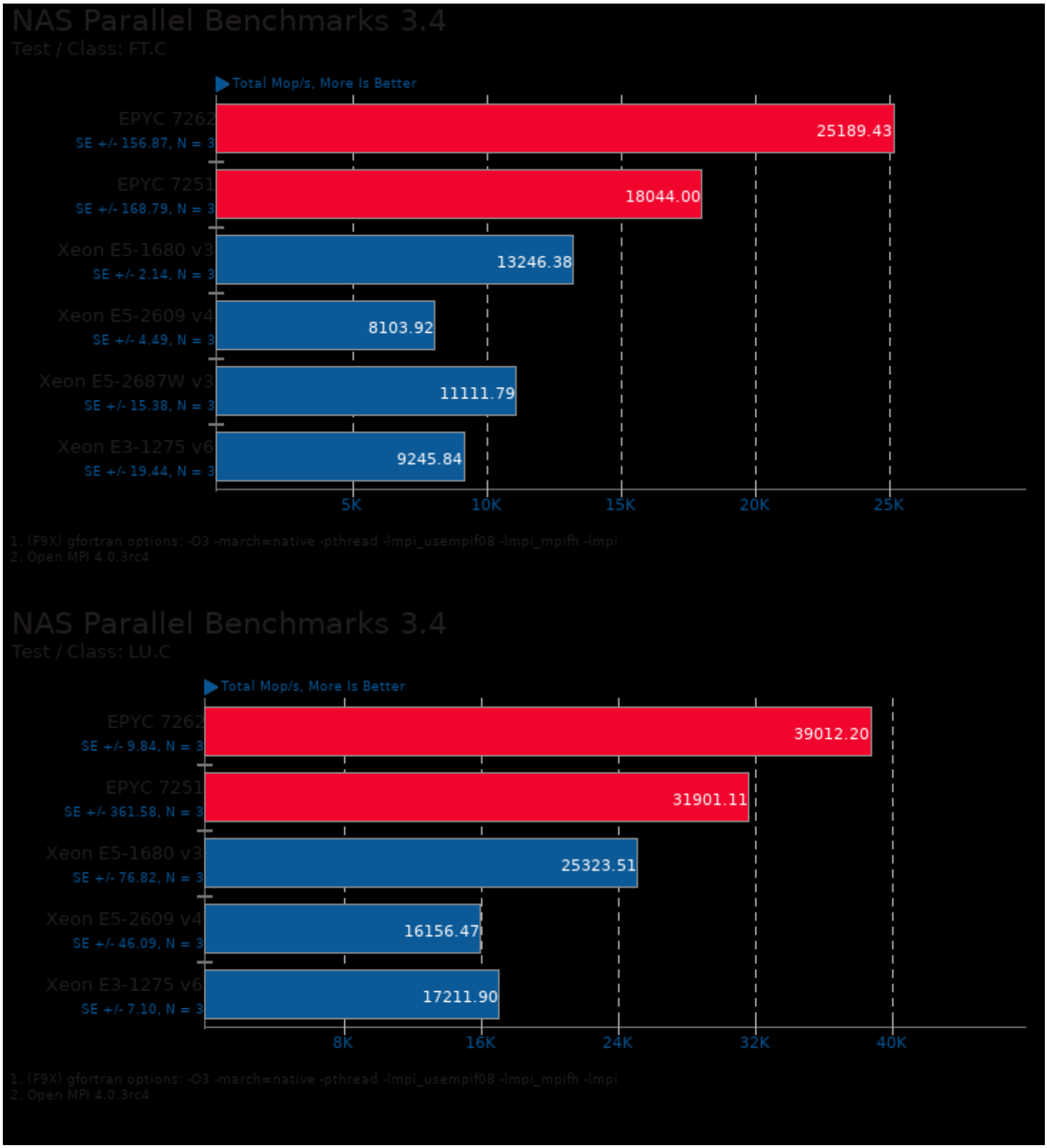
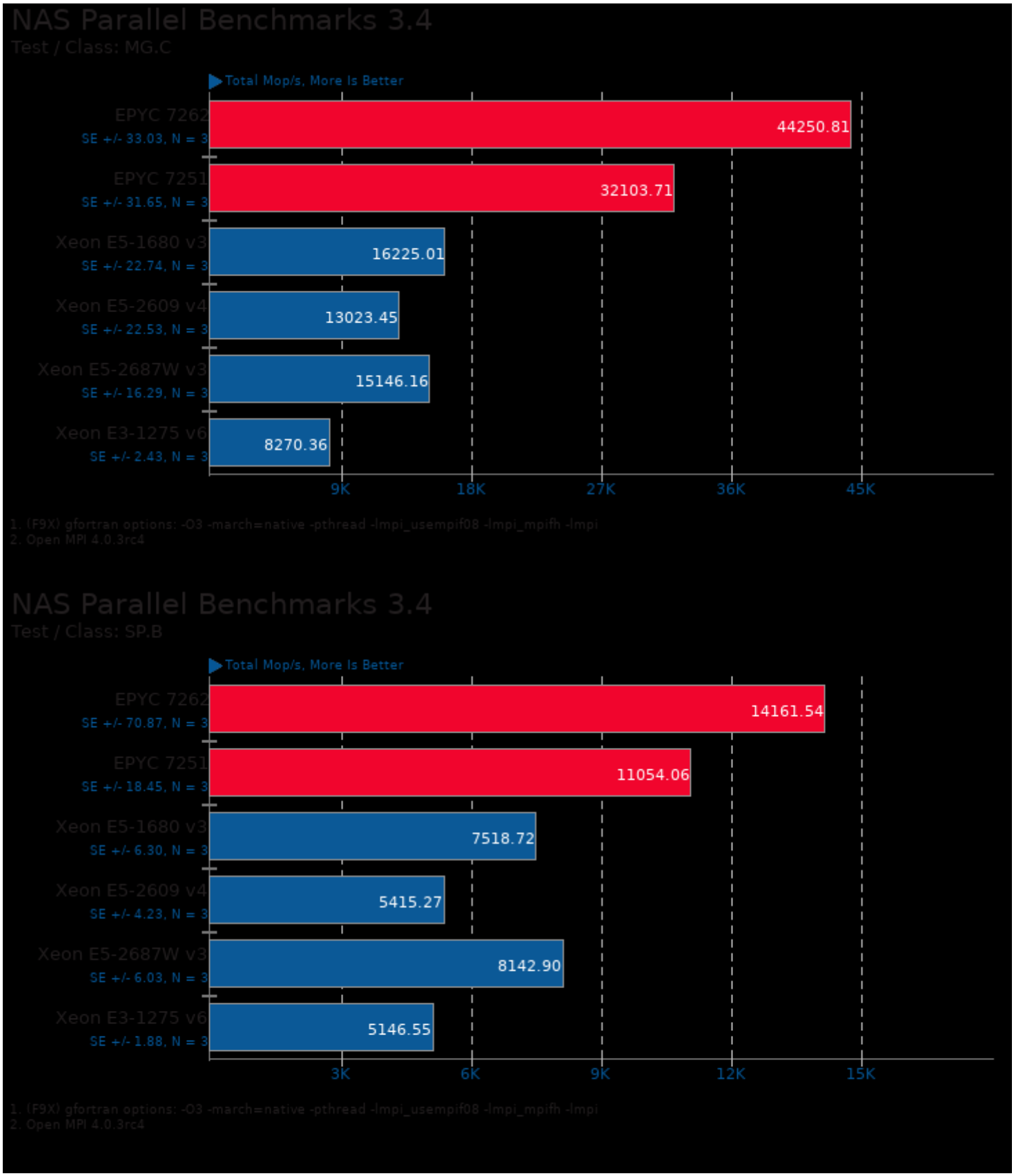
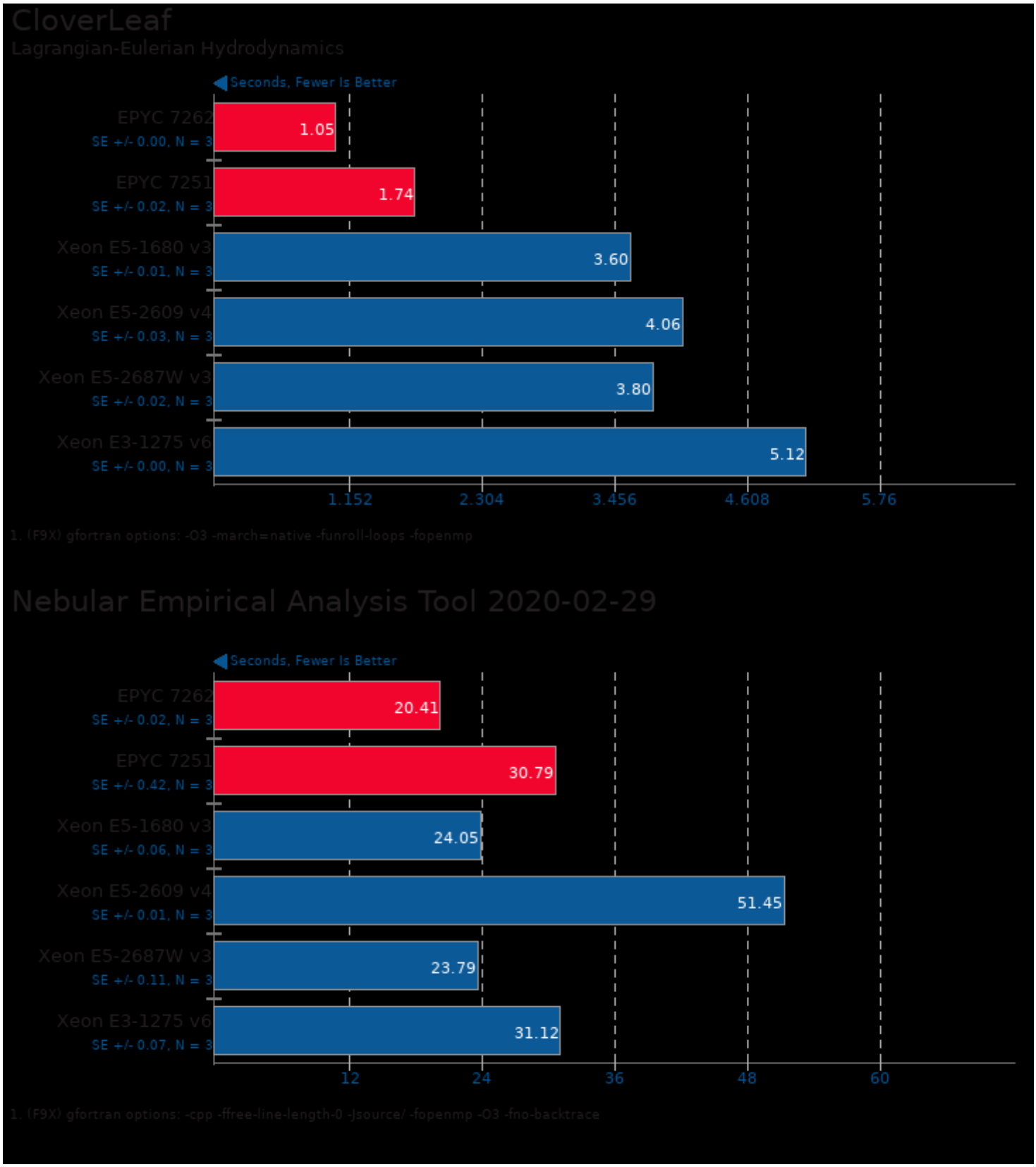
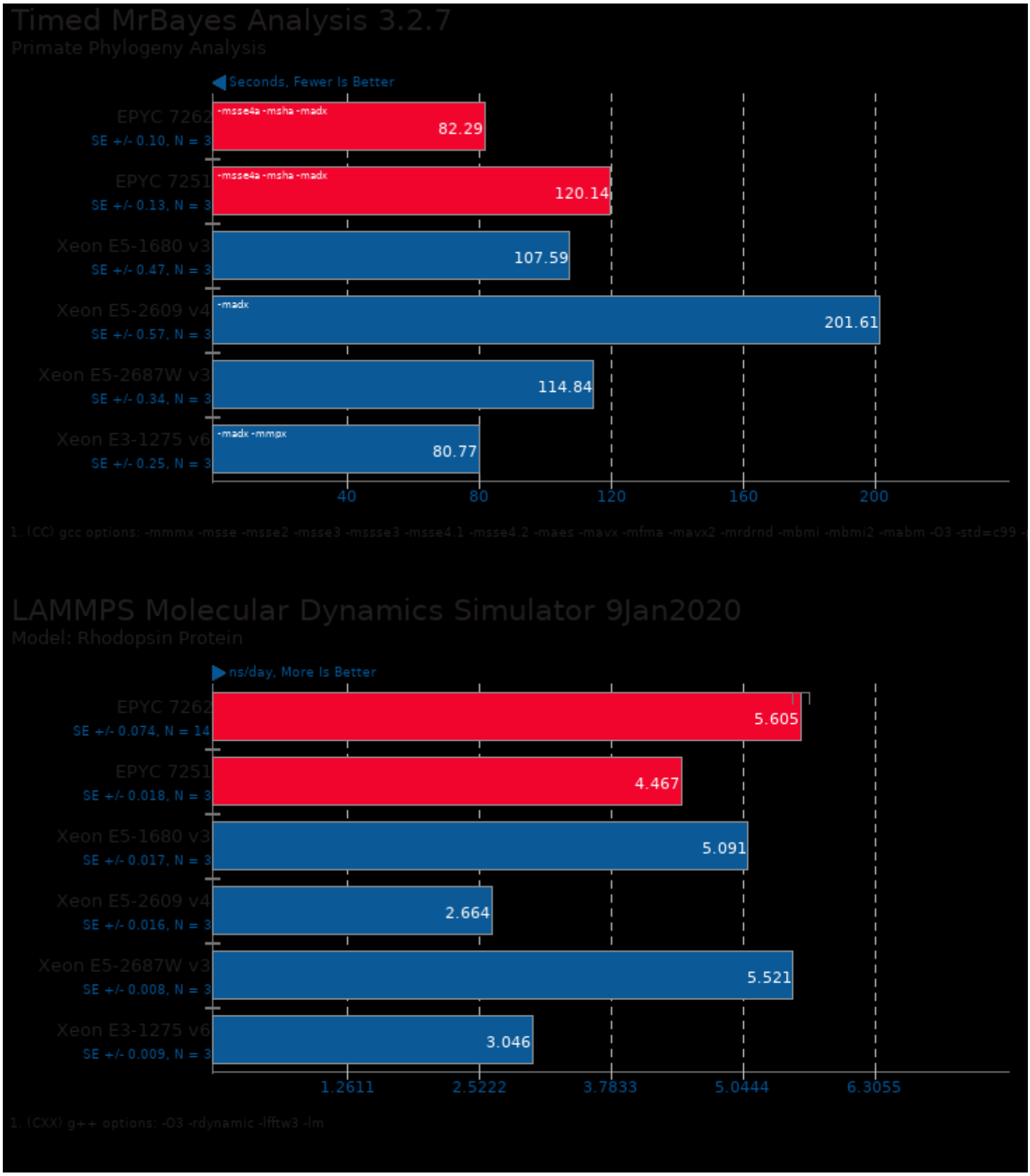


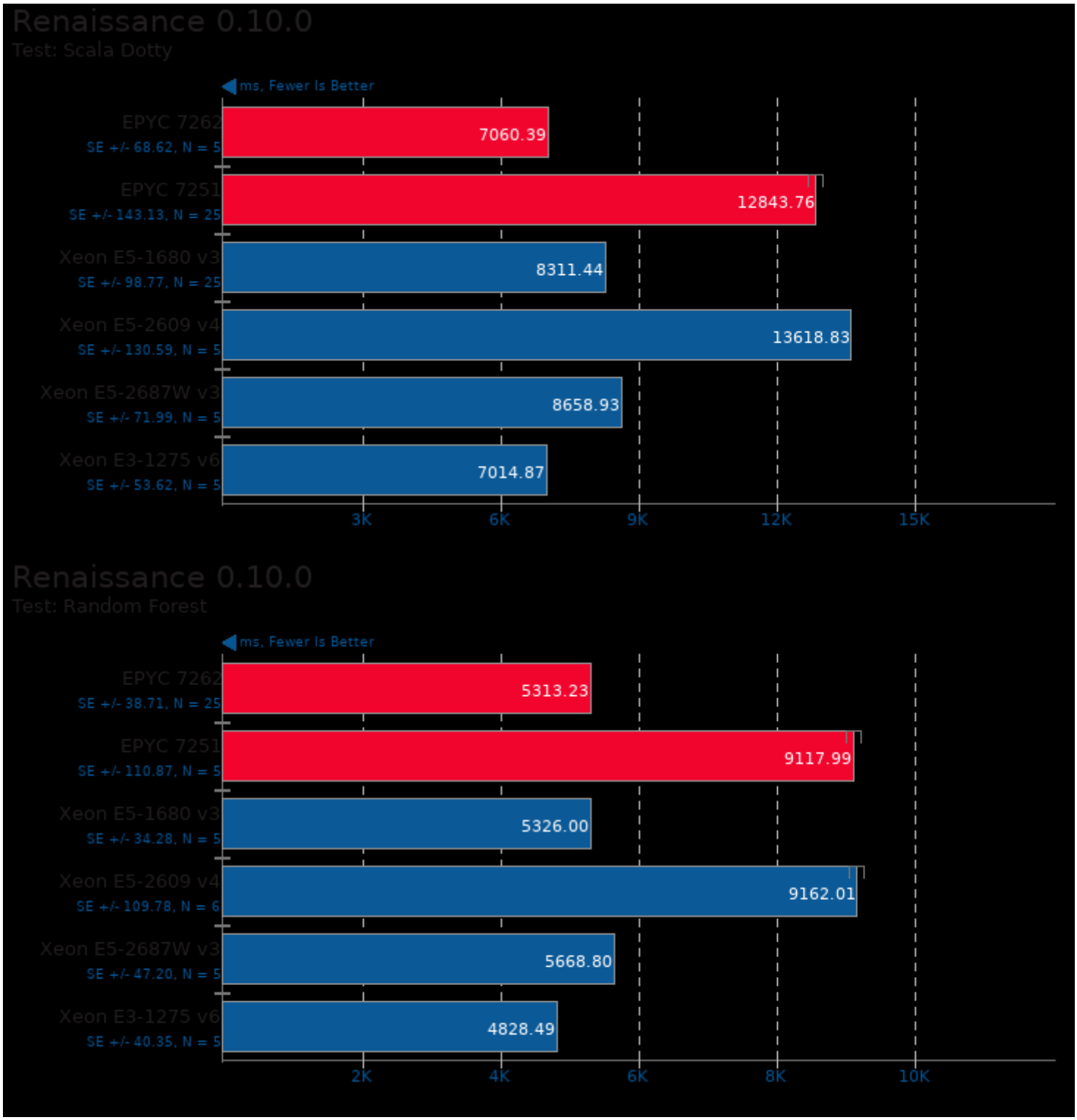

NAS Parallel Benchmarks 3.4
Test / Class: FT.C
Total Mop/s, More Is Better
EPYC 7262
SE +/- 156.87, N = 3
25189.43
EPYC 7251
SE +/- 168.79, N = 3
18044.00
Xeon E5-1680 v3
SE +/- 2.14, N = 3
13246.38
Xeon E5-2609 v4
SE +/- 4.49, N = 3
8103.92
Xeon E5-2687W v3
SE +/- 15.38, N = 3
11111.79
Xeon E3-1275 v6
SE +/- 19.44, N = 3
9245.84
5K
10K
15K
20K
25K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Open MPI 4.0.3rc4
NAS Parallel Benchmarks 3.4
Test / Class: LU.C
Total Mop/s, More Is Better
EPYC 7262
SE +/- 9.84, N = 3
39012.20
EPYC 7251
SE +/- 361.58, N = 3
31901.11
Xeon E5-1680 v3
SE +/- 76.82, N = 3
25323.51
Xeon E5-2609 v4
SE +/- 46.09, N = 3
16156.47
Xeon E3-1275 v6
SE +/- 7.10, N = 3
17211.90
8K
16K
24K
32K
40K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Open MPI 4.0.3rc4

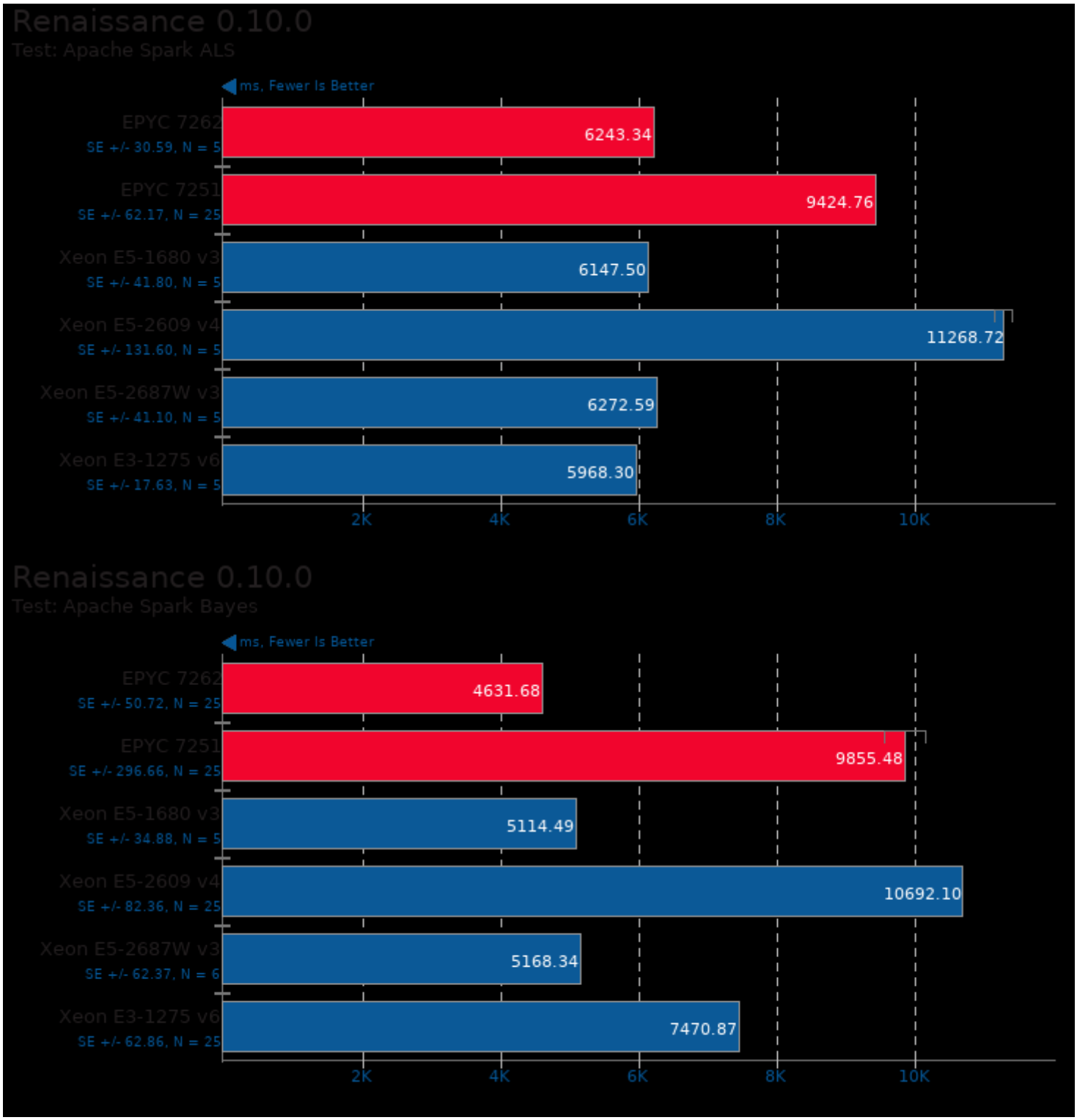

NAS Parallel Benchmarks 3.4
Test / Class: MG.C
Total Mop/s, More Is Better
EPYC 7262
SE +/- 33.03, N = 3
44250.81
EPYC 7251
SE +/- 31.65, N = 3
32103.71
Xeon E5-1680 v3
SE +/- 22.74, N = 3
16225.01
Xeon E5-2609 v4
SE +/- 22.53, N = 3
13023.45
Xeon E5-2687W v3
SE +/- 16.29, N = 3
15146.16
Xeon E3-1275 v6
SE +/- 2.43, N = 3
8270.36
9K
18K
27K
36K
45K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Open MPI 4.0.3rc4

NAS Parallel Benchmarks 3.4
Test / Class: SP.B
Total Mop/s, More Is Better
EPYC 7262
SE +/- 70.87, N = 3
14161.54
EPYC 7251
SE +/- 18.45, N = 3
11054.06
Xeon E5-1680 v3
SE +/- 6.30, N = 3
7518.72
Xeon E5-2609 v4
SE +/- 4.23, N = 3
5415.27
Xeon E5-2687W v3
SE +/- 6.03, N = 3
8142.90
Xeon E3-1275 v6
SE +/- 1.88, N = 3
5146.55
3K
6K
9K
12K
15K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Open MPI 4.0.3rc4

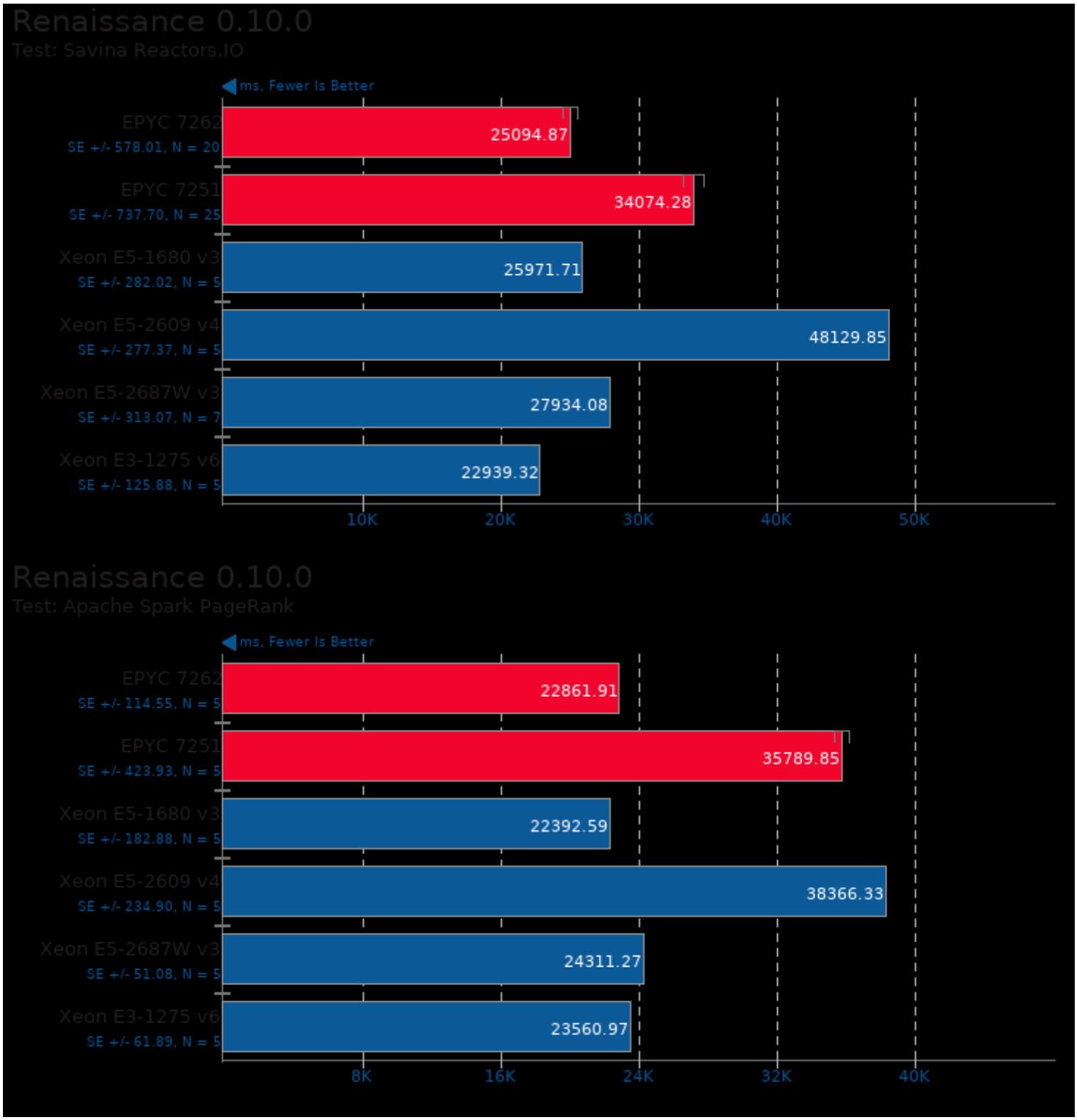

CloverLeaf
Lagrangian-Eulerian Hydrodynamics
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.00, N = 3
1.05
EPYC 7251
SE +/- 0.02, N = 3
1.74
Xeon E5-1680 v3
SE +/- 0.01, N = 3
3.60
Xeon E5-2609 v4
SE +/- 0.03, N = 3
4.06
Xeon E5-2687W v3
SE +/- 0.02, N = 3
3.80
Xeon E3-1275 v6
SE +/- 0.00, N = 3
5.12
1.152
2.304
3.456
4.608
5.76
1. (F9X) gfortran options: -O3 -march=native -funroll-loops -fopenmp
Nebular Empirical Analysis Tool 2020-02-29
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.02, N = 3
20.41
EPYC 7251
SE +/- 0.42, N = 3
30.79
Xeon E5-1680 v3
SE +/- 0.06, N = 3
24.05
Xeon E5-2609 v4
SE +/- 0.01, N = 3
51.45
Xeon E5-2687W v3
SE +/- 0.11, N = 3
23.79
Xeon E3-1275 v6
SE +/- 0.07, N = 3
31.12
12
24
36
48
60
1. (F9X) gfortran options: -cpp -ffree-line-length-0 -Jsource/ -fopenmp -O3 -fno-backtrace


Timed MrBayes Analysis 3.2.7
Primate Phylogeny Analysis
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.10, N = 3
-msse4a -msha -madx
82.29
EPYC 7251
SE +/- 0.13, N = 3
-msse4a -msha -madx
120.14
Xeon E5-1680 v3
SE +/- 0.47, N = 3
107.59
Xeon E5-2609 v4
SE +/- 0.57, N = 3
-madx
201.61
Xeon E5-2687W v3
SE +/- 0.34, N = 3
114.84
Xeon E3-1275 v6
SE +/- 0.25, N = 3
-madx -mmpx
80.77
40
80
120
160
200
1. (CC) gcc options: -mmmx -msse -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -maes -mavx -mfma -mavx2 -mrdrnd -mbmi -mbmi2 -mabm -O3 -std=c99
LAMMPS Molecular Dynamics Simulator 9Jan2020
Model: Rhodopsin Protein
ns/day, More Is Better
EPYC 7262
SE +/- 0.074, N = 14
5.605
EPYC 7251
SE +/- 0.018, N = 3
4.467
Xeon E5-1680 v3
SE +/- 0.017, N = 3
5.091
Xeon E5-2609 v4
SE +/- 0.016, N = 3
2.664
Xeon E5-2687W v3
SE +/- 0.008, N = 3
5.521
Xeon E3-1275 v6
SE +/- 0.009, N = 3
3.046
1.2611
2.5222
3.7833
5.0444
6.3055
1. (CXX) g++ options: -O3 -rdynamic -lfftw3 -lm

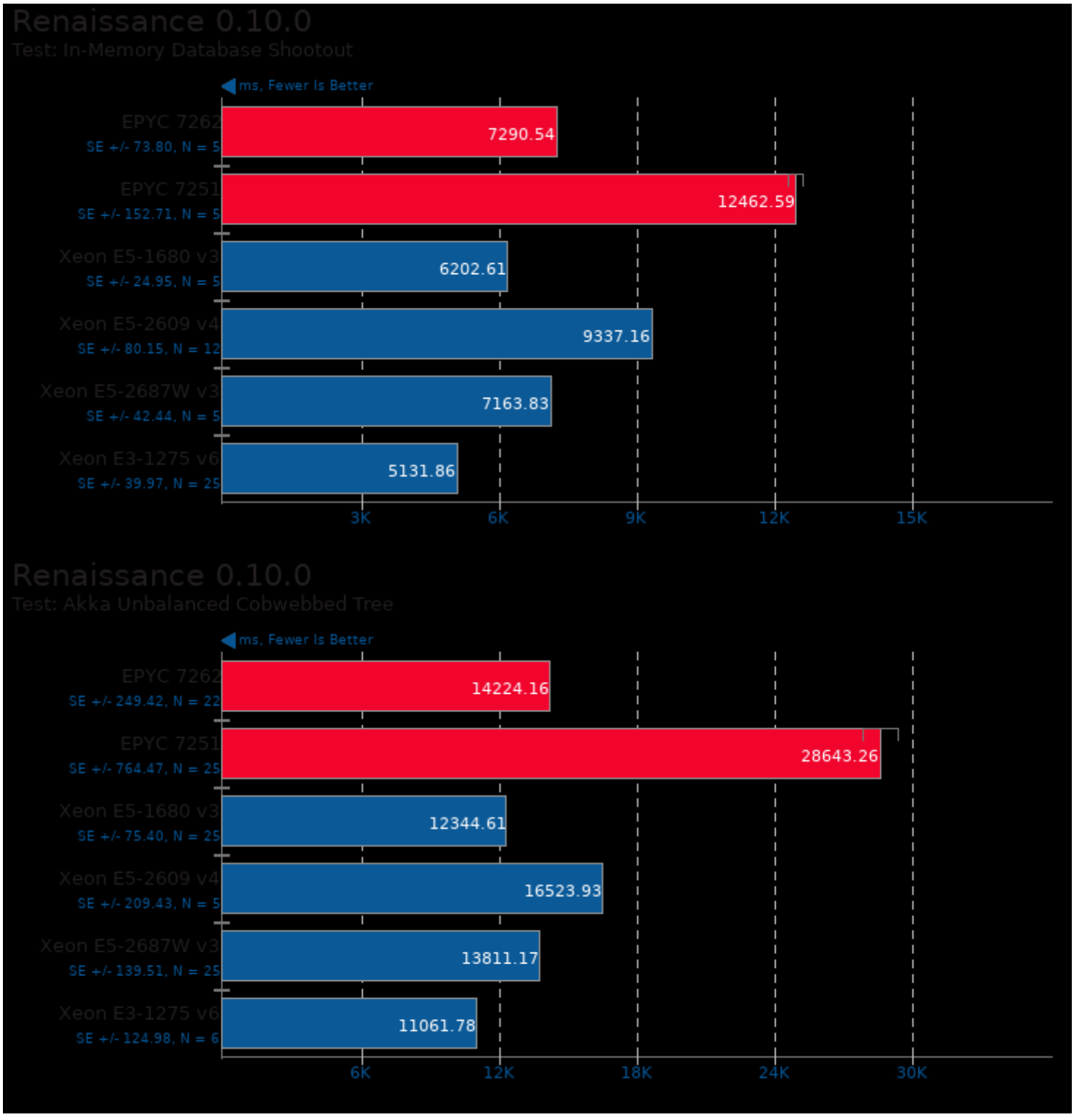

Renaissance 0.10.0
Test: Scala Dotty
ms, Fewer Is Better
EPYC 7262
SE +/- 68.62, N = 5
7060.39
EPYC 7251
SE +/- 143.13, N = 25
12843.76
Xeon E5-1680 v3
SE +/- 98.77, N = 25
8311.44
Xeon E5-2609 v4
SE +/- 130.59, N = 5
13618.83
Xeon E5-2687W v3
SE +/- 71.99, N = 5
8658.93
Xeon E3-1275 v6
SE +/- 53.62, N = 5
7014.87
3K
6K
9K
12K
15K
Renaissance 0.10.0
Test: Random Forest
ms, Fewer Is Better
EPYC 7262
SE +/- 38.71, N = 25
5313.23
EPYC 7251
SE +/- 110.87, N = 5
9117.99
Xeon E5-1680 v3
SE +/- 34.28, N = 5
5326.00
Xeon E5-2609 v4
SE +/- 109.78, N = 6
9162.01
Xeon E5-2687W v3
SE +/- 47.20, N = 5
5668.80
Xeon E3-1275 v6
SE +/- 40.35, N = 5
4828.49
2K
4K
6K
8K
10K

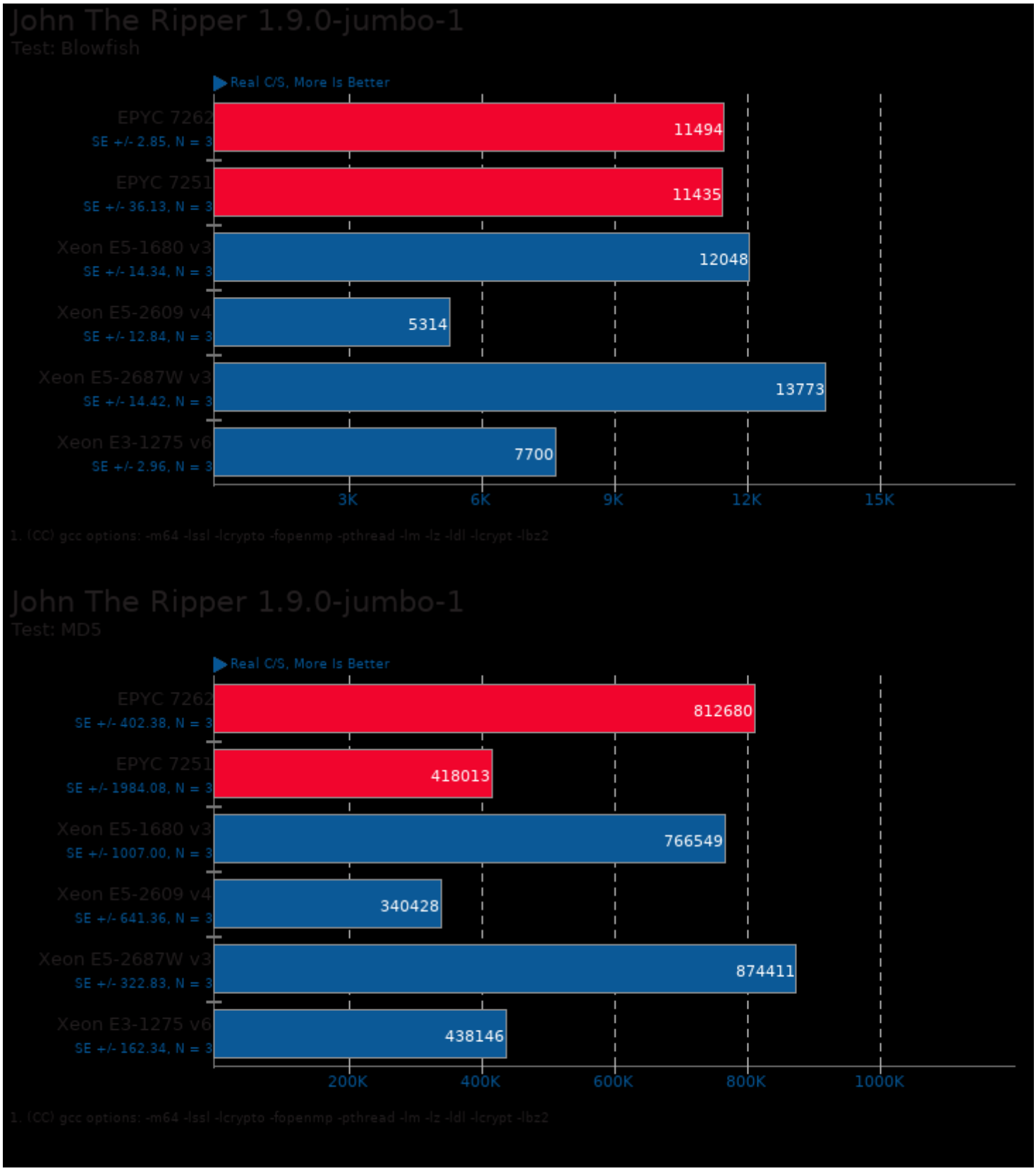

Renaissance 0.10.0
Test: Apache Spark ALS
ms, Fewer Is Better
EPYC 7262
SE +/- 30.59, N = 5
6243.34
EPYC 7251
SE +/- 62.17, N = 25
9424.76
Xeon E5-1680 v3
SE +/- 41.80, N = 5
6147.50
Xeon E5-2609 v4
SE +/- 131.60, N = 5
11268.72
Xeon E5-2687W v3
SE +/- 41.10, N = 5
6272.59
Xeon E3-1275 v6
SE +/- 17.63, N = 5
5968.30
2K
4K
6K
8K
10K
Renaissance 0.10.0
Test: Apache Spark Bayes
ms, Fewer Is Better
EPYC 7262
SE +/- 50.72, N = 25
4631.68
EPYC 7251
SE +/- 296.66, N = 25
9855.48
Xeon E5-1680 v3
SE +/- 34.88, N = 5
5114.49
Xeon E5-2609 v4
SE +/- 82.36, N = 25
10692.10
Xeon E5-2687W v3
SE +/- 62.37, N = 6
5168.34
Xeon E3-1275 v6
SE +/- 62.86, N = 25
7470.87
2K
4K
6K
8K
10K

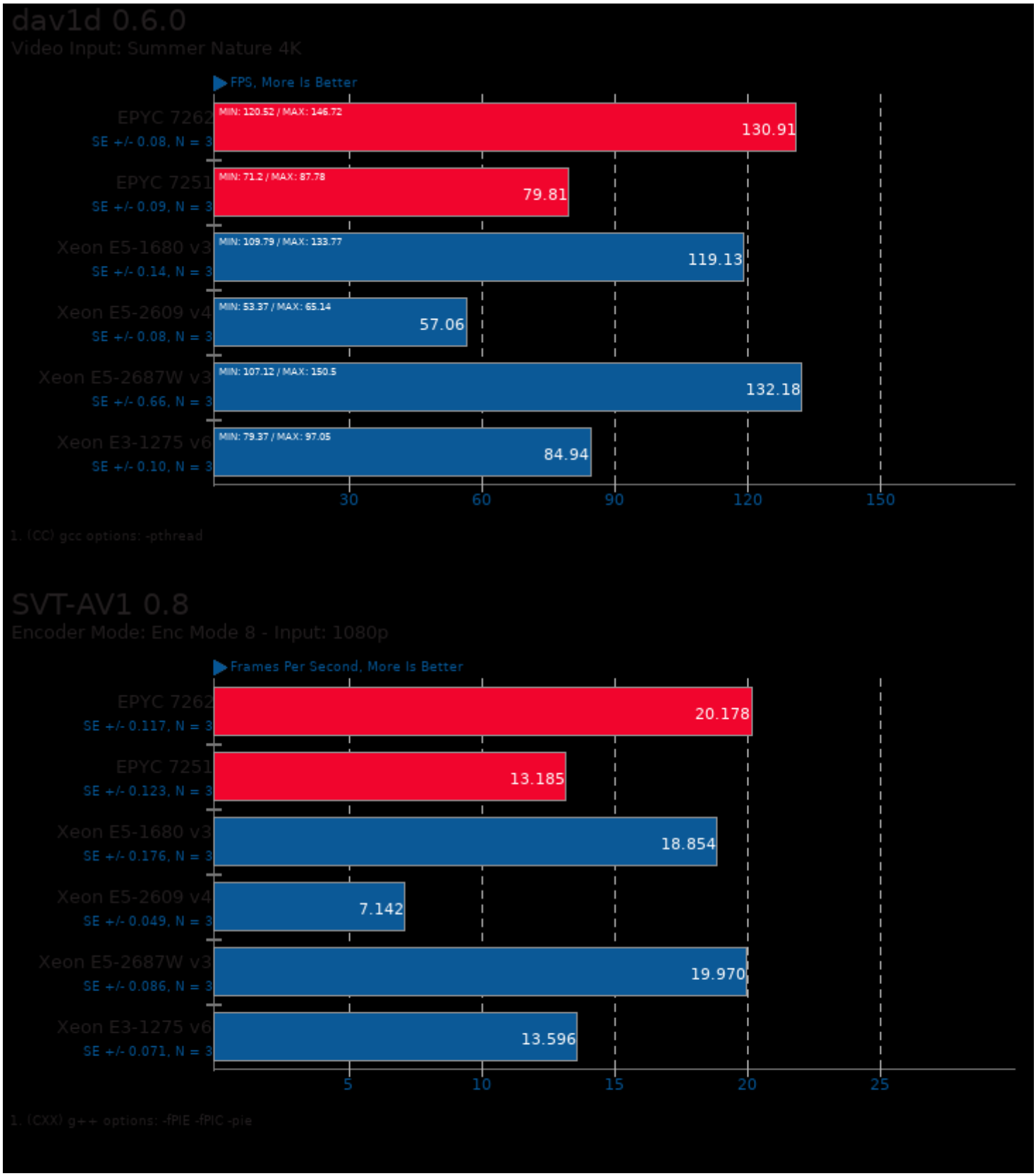
EPYC 7262 Linux Ubuntu Benchmarks

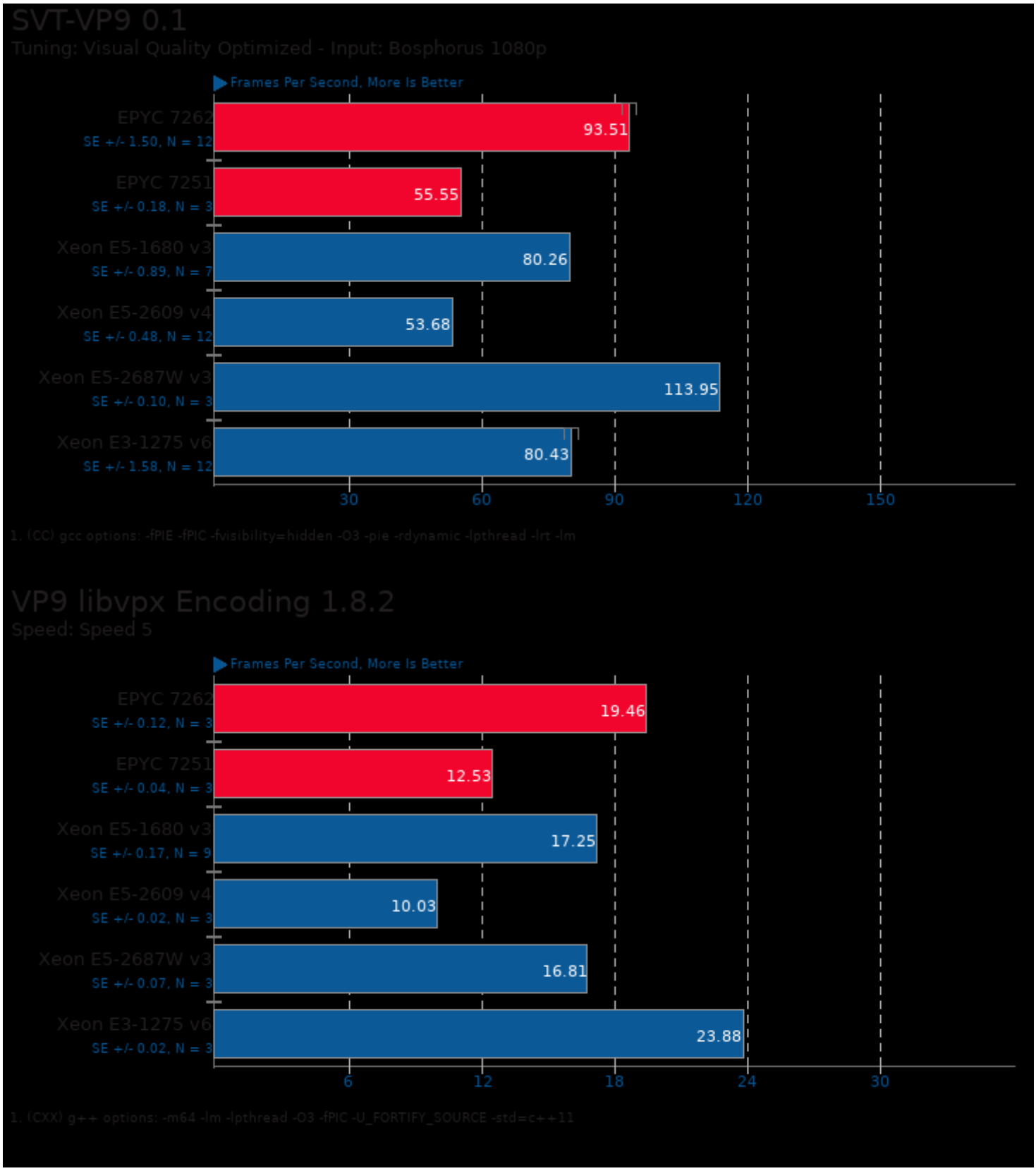


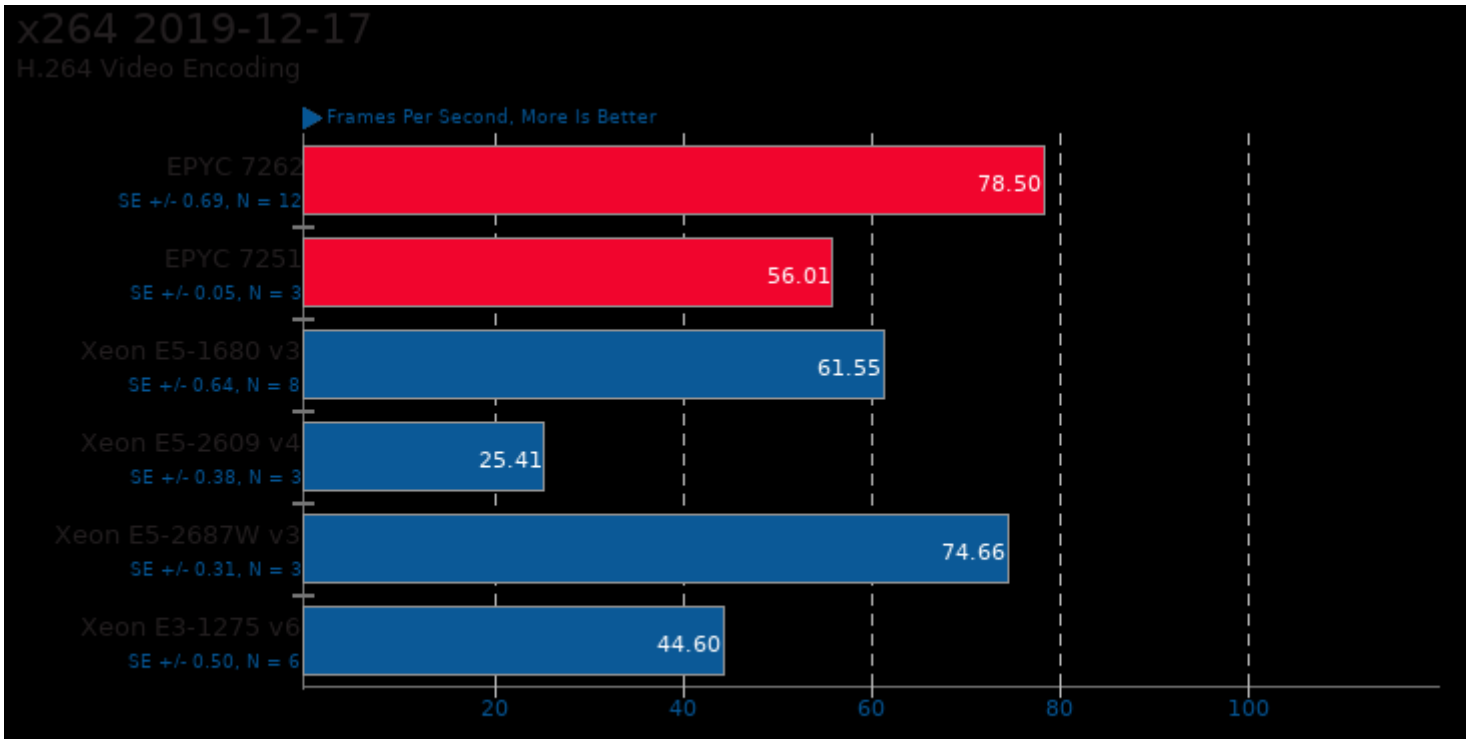
EPYC 7262 Linux Ubuntu Benchmarks

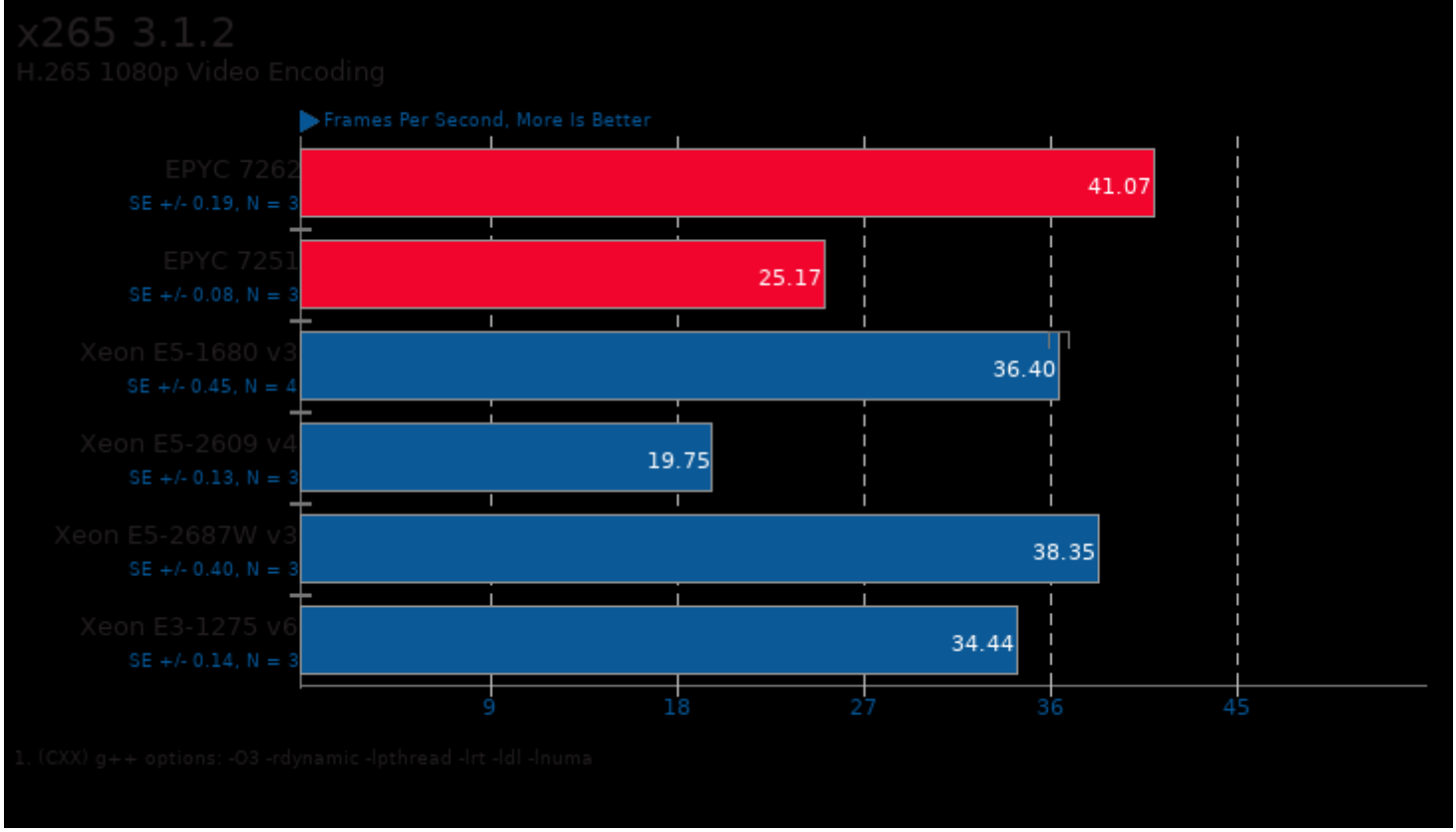


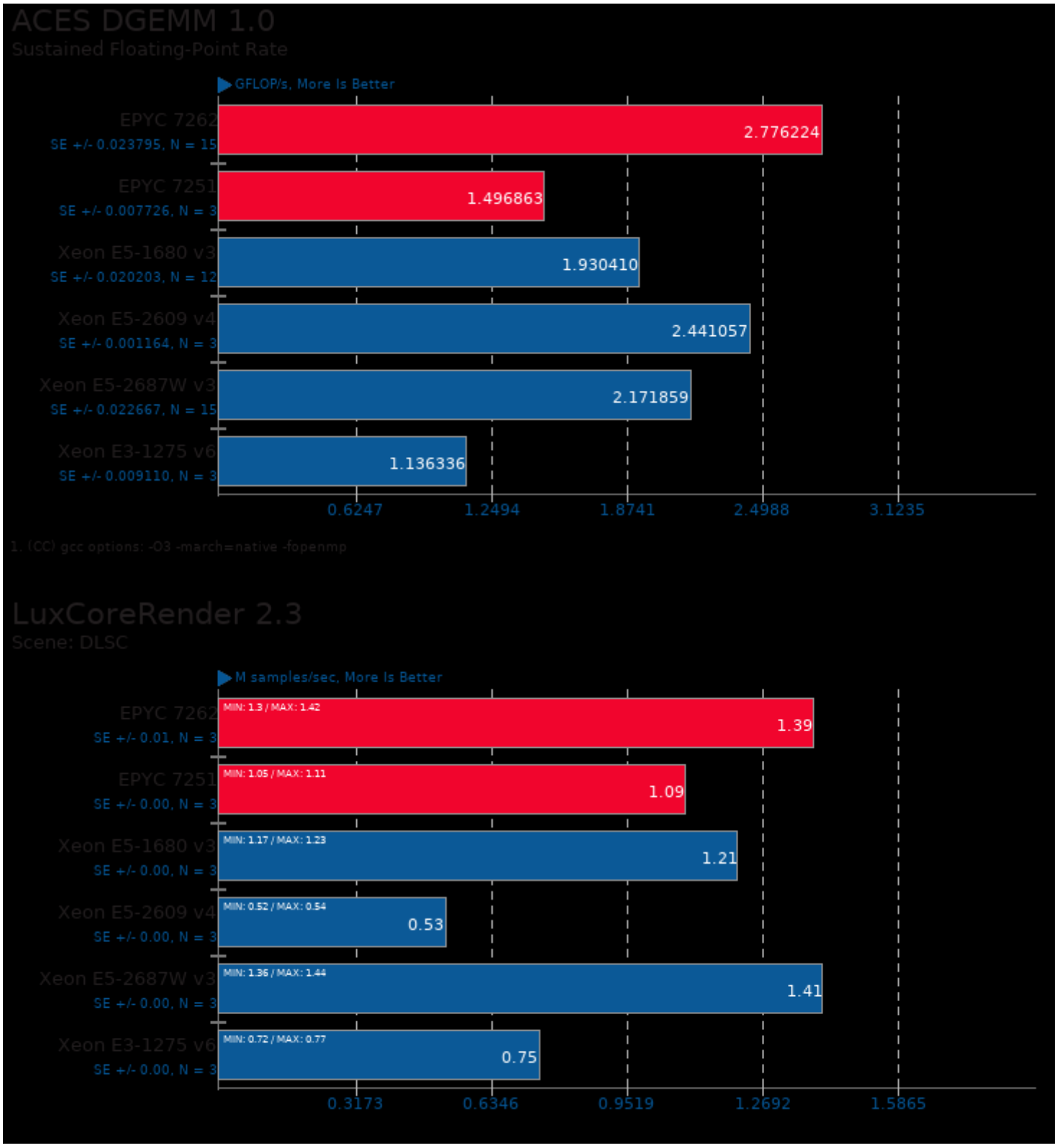

John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
EPYC 7262
SE +/- 2.85, N = 3
11494
EPYC 7251
SE +/- 36.13, N = 3
11435
Xeon E5-1680 v3
SE +/- 14.34, N = 3
12048
Xeon E5-2609 v4
SE +/- 12.84, N = 3
5314
Xeon E5-2687W v3
SE +/- 14.42, N = 3
13773
Xeon E3-1275 v6
SE +/- 2.96, N = 3
7700
3K
6K
9K
12K
15K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -pthread -lm -lz -ldl -lcrypt -lbz2
John The Ripper 1.9.0-jumbo-1
Test: MD5
Real C/S, More Is Better
EPYC 7262
SE +/- 402.38, N = 3
812680
EPYC 7251
SE +/- 1984.08, N = 3
418013
Xeon E5-1680 v3
SE +/- 1007.00, N = 3
766549
Xeon E5-2609 v4
SE +/- 641.36, N = 3
340428
Xeon E5-2687W v3
SE +/- 322.83, N = 3
874411
Xeon E3-1275 v6
SE +/- 162.34, N = 3
438146
200K
400K
600K
800K
1000K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -pthread -lm -lz -ldl -lcrypt -lbz2


dav1d 0.6.0
Video Input: Summer Nature 4K
FPS, More Is Better
EPYC 7262
SE +/- 0.08, N = 3
MIN: 120.52 / MAX: 146.72
130.91
EPYC 7251
SE +/- 0.09, N = 3
MIN: 71.2 / MAX: 87.78
79.81
Xeon E5-1680 v3
SE +/- 0.14, N = 3
MIN: 109.79 / MAX: 133.77
119.13
Xeon E5-2609 v4
SE +/- 0.08, N = 3
MIN: 53.37 / MAX: 65.14
57.06
Xeon E5-2687W v3
SE +/- 0.66, N = 3
MIN: 107.12 / MAX: 150.5
132.18
Xeon E3-1275 v6
SE +/- 0.10, N = 3
MIN: 79.37 / MAX: 97.05
84.94
30
60
90
120
150
1. (CC) gcc options: -pthread
SVT-AV1 0.8
Encoder Mode: Enc Mode 8 - Input: 1080p
Frames Per Second, More Is Better
EPYC 7262
SE +/- 0.117, N = 3
20.178
EPYC 7251
SE +/- 0.123, N = 3
13.185
Xeon E5-1680 v3
SE +/- 0.176, N = 3
18.854
Xeon E5-2609 v4
SE +/- 0.049, N = 3
7.142
Xeon E5-2687W v3
SE +/- 0.086, N = 3
19.970
Xeon E3-1275 v6
SE +/- 0.071, N = 3
13.596
5
10
15
20
25
1. (CXX) g++ options: -fPIE -fPIC -pie


SVT-VP9 0.1
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
EPYC 7262
SE +/- 1.50, N = 12
93.51
EPYC 7251
SE +/- 0.18, N = 3
55.55
Xeon E5-1680 v3
SE +/- 0.89, N = 7
80.26
Xeon E5-2609 v4
SE +/- 0.48, N = 12
53.68
Xeon E5-2687W v3
SE +/- 0.10, N = 3
113.95
Xeon E3-1275 v6
SE +/- 1.58, N = 12
80.43
30
60
90
120
150
1. (CC) gcc options: -fPIE -fPIC -fvisibility=hidden -O3 -pie -rdynamic -lpthread -lrt -lm
VP9 libvpx Encoding 1.8.2
Speed: Speed 5
Frames Per Second, More Is Better
EPYC 7262
SE +/- 0.12, N = 3
19.46
EPYC 7251
SE +/- 0.04, N = 3
12.53
Xeon E5-1680 v3
SE +/- 0.17, N = 9
17.25
Xeon E5-2609 v4
SE +/- 0.02, N = 3
10.03
Xeon E5-2687W v3
SE +/- 0.07, N = 3
16.81
Xeon E3-1275 v6
SE +/- 0.02, N = 3
23.88
6
12
18
24
30
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -U_FORTIFY_SOURCE -std=c++11


x264 2019-12-17
H.264 Video Encoding
Frames Per Second, More Is Better
EPYC 7262
SE +/- 0.69, N = 12
78.50
EPYC 7251
SE +/- 0.05, N = 3
56.01
Xeon E5-1680 v3
SE +/- 0.64, N = 8
61.55
Xeon E5-2609 v4
SE +/- 0.38, N = 3
25.41
Xeon E5-2687W v3
SE +/- 0.31, N = 3
74.66
Xeon E3-1275 v6
SE +/- 0.50, N = 6
44.60
20
40
60
80
100
1. (CC) gcc options: -ldl -m64 -lm -lpthread -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize


x265 3.1.2
H.265 1080p Video Encoding
Frames Per Second, More Is Better
EPYC 7262
SE +/- 0.19, N = 3
41.07
EPYC 7251
SE +/- 0.08, N = 3
25.17
Xeon E5-1680 v3
SE +/- 0.45, N = 4
36.40
Xeon E5-2609 v4
SE +/- 0.13, N = 3
19.75
Xeon E5-2687W v3
SE +/- 0.40, N = 3
38.35
Xeon E3-1275 v6
SE +/- 0.14, N = 3
34.44
9
18
27
36
45
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma


ACES DGEMM 1.0
Sustained Floating-Point Rate
GFLOP/s, More Is Better
EPYC 7262
SE +/- 0.023795, N = 15
2.776224
EPYC 7251
SE +/- 0.007726, N = 3
1.496863
Xeon E5-1680 v3
SE +/- 0.020203, N = 12
1.930410
Xeon E5-2609 v4
SE +/- 0.001164, N = 3
2.441057
Xeon E5-2687W v3
SE +/- 0.022667, N = 15
2.171859
Xeon E3-1275 v6
SE +/- 0.009110, N = 3
1.136336
0.6247
1.2494
1.8741
2.4988
3.1235
1. (CC) gcc options: -O3 -march=native -fopenmp
LuxCoreRender 2.3
Scene: DLSC
M samples/sec, More Is Better
EPYC 7262
SE +/- 0.01, N = 3
MIN: 1.3 / MAX: 1.42
1.39
EPYC 7251
SE +/- 0.00, N = 3
MIN: 1.05 / MAX: 1.11
1.09
Xeon E5-1680 v3
SE +/- 0.00, N = 3
MIN: 1.17 / MAX: 1.23
1.21
Xeon E5-2609 v4
SE +/- 0.00, N = 3
MIN: 0.52 / MAX: 0.54
0.53
Xeon E5-2687W v3
SE +/- 0.00, N = 3
MIN: 1.36 / MAX: 1.44
1.41
Xeon E3-1275 v6
SE +/- 0.00, N = 3
MIN: 0.72 / MAX: 0.77
0.75
0.3173
0.6346
0.9519
1.2692
1.5865

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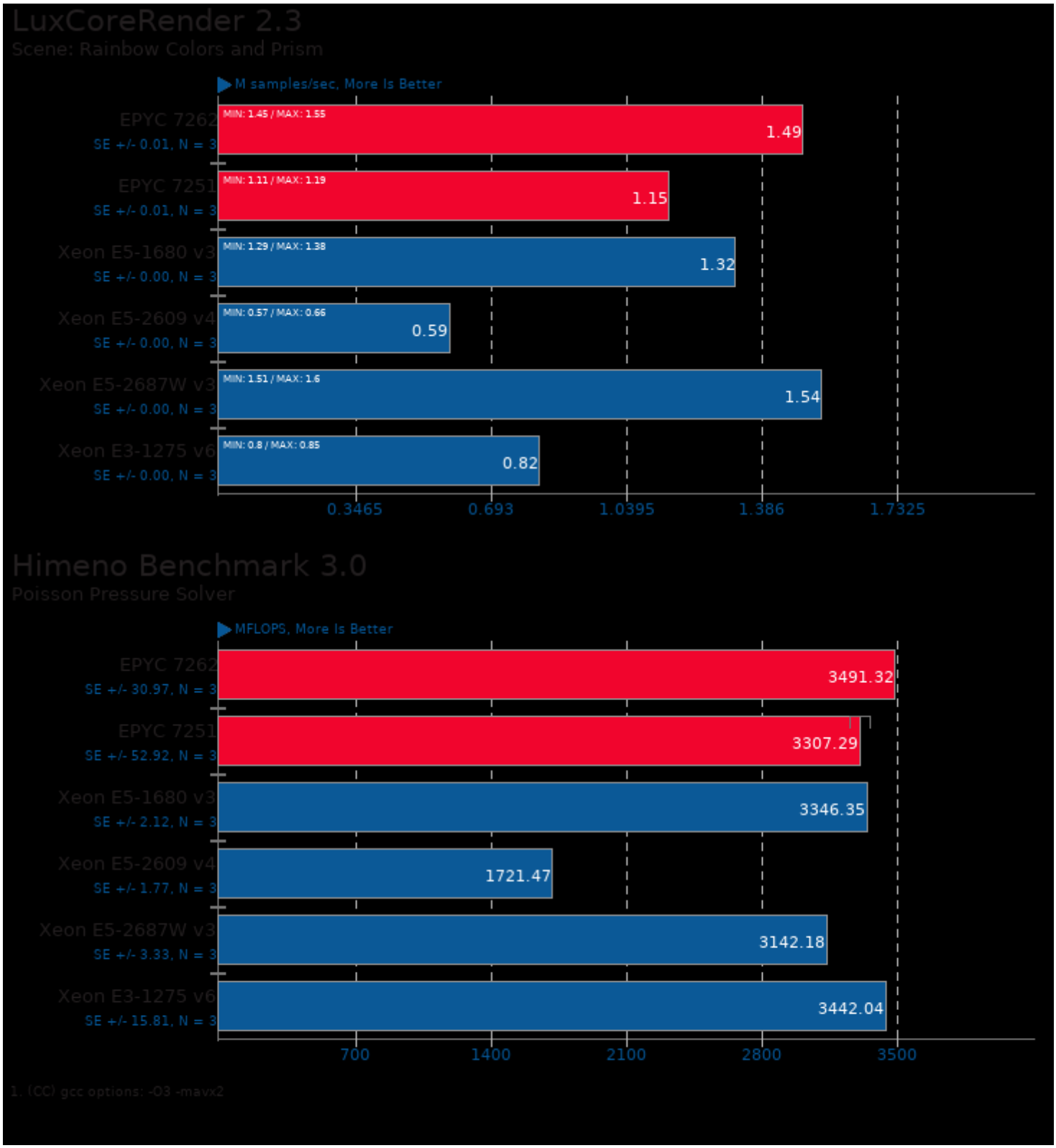
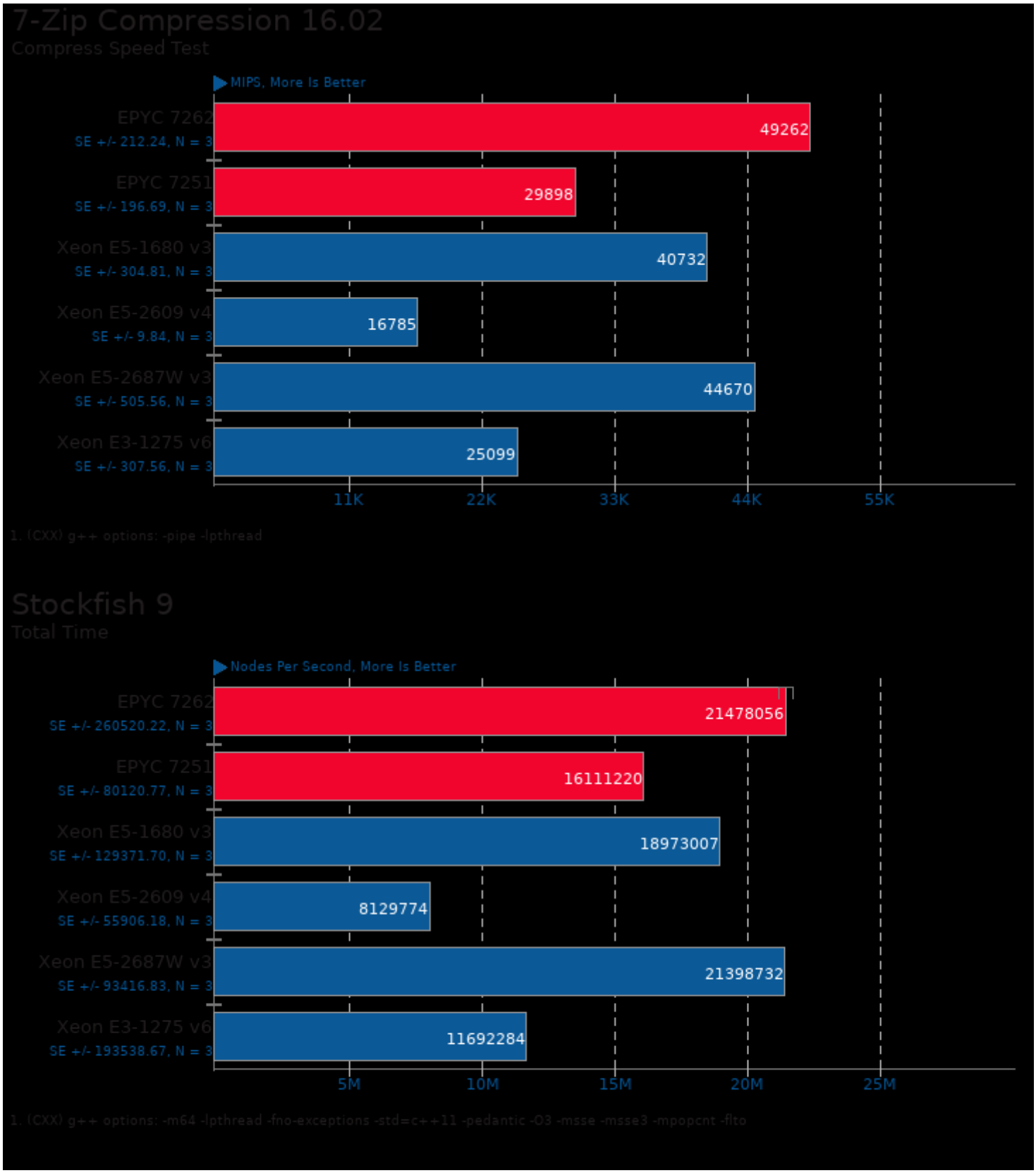
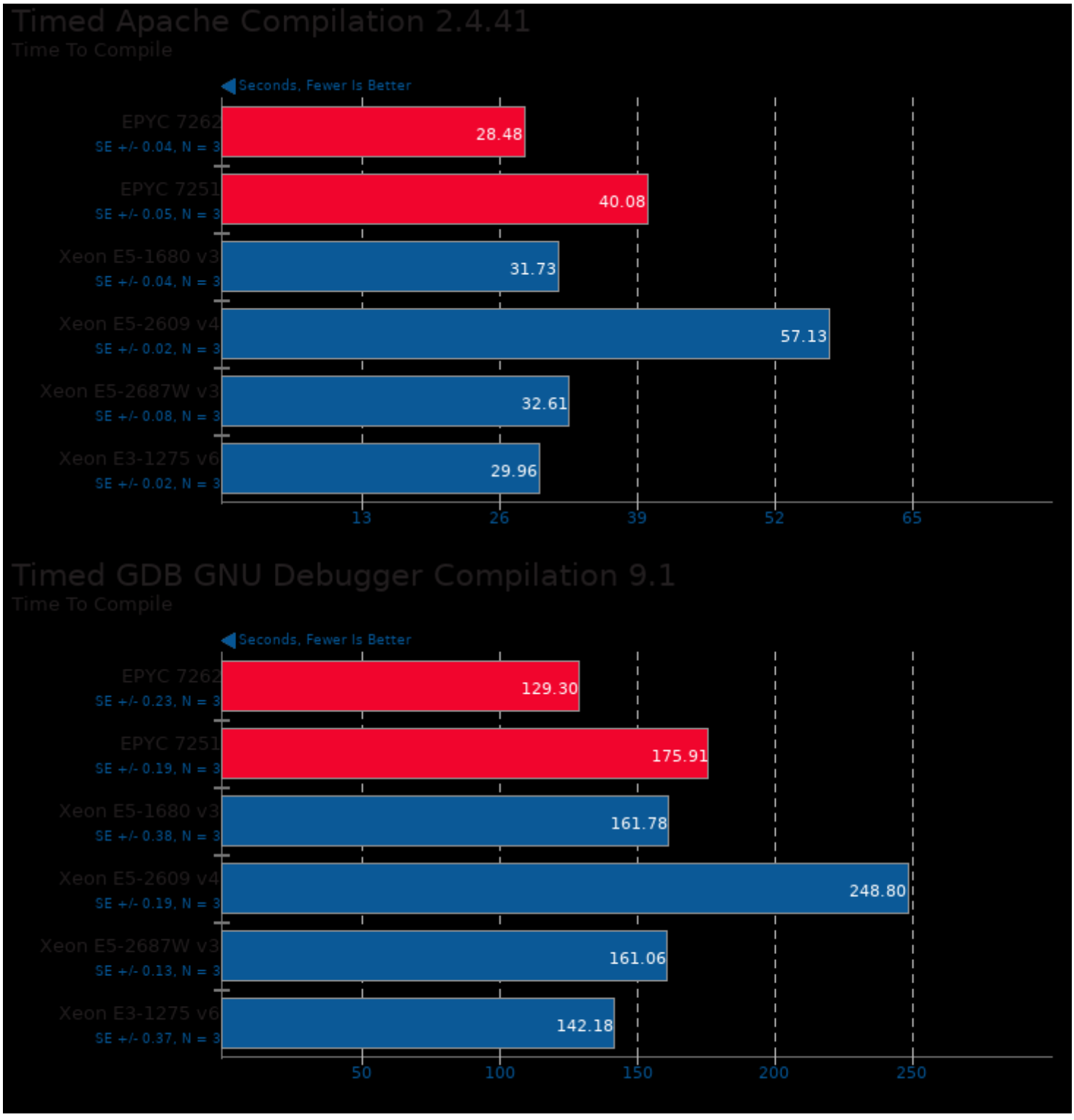


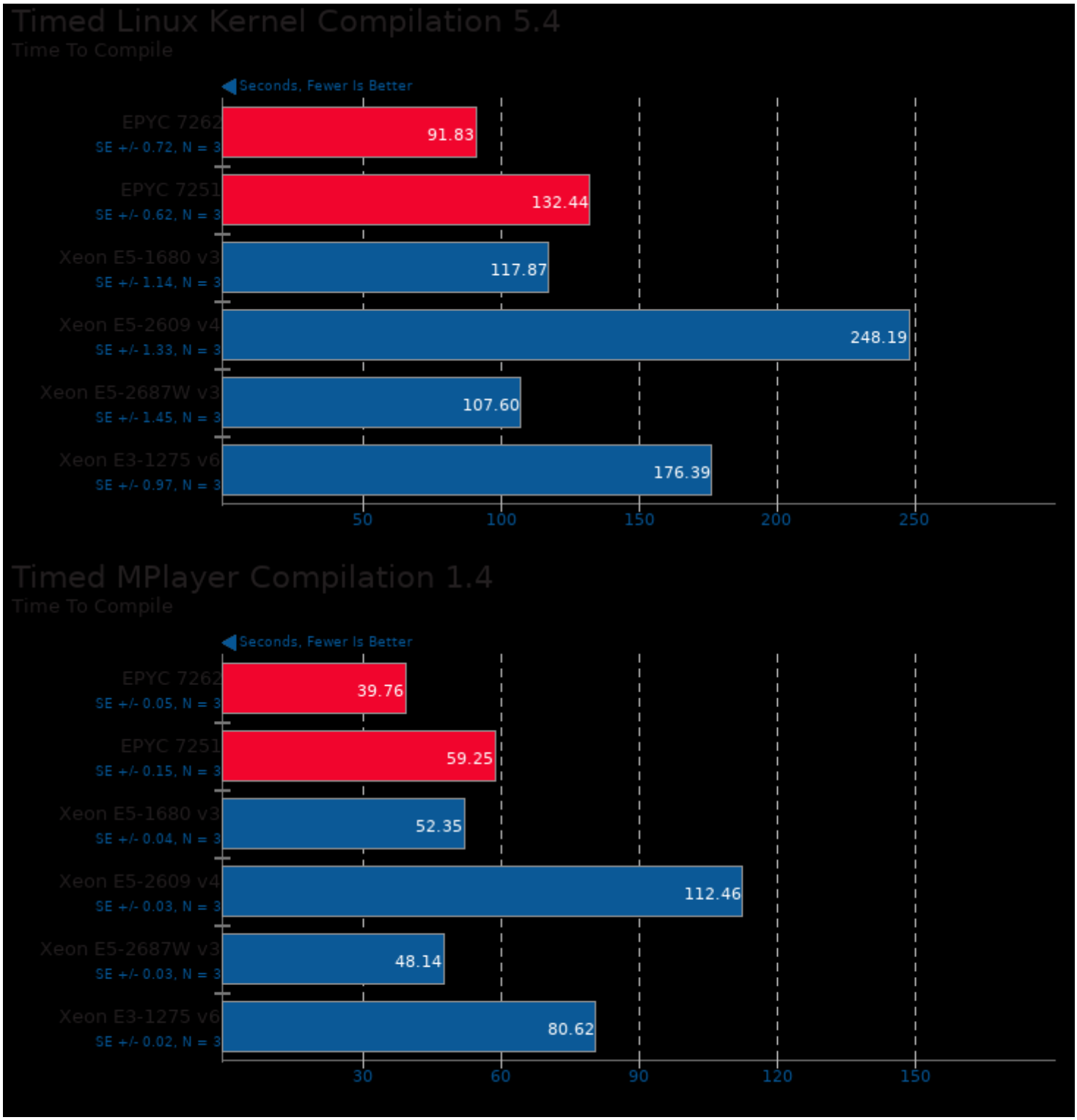
EPYC 7262 Linux Ubuntu Benchmarks



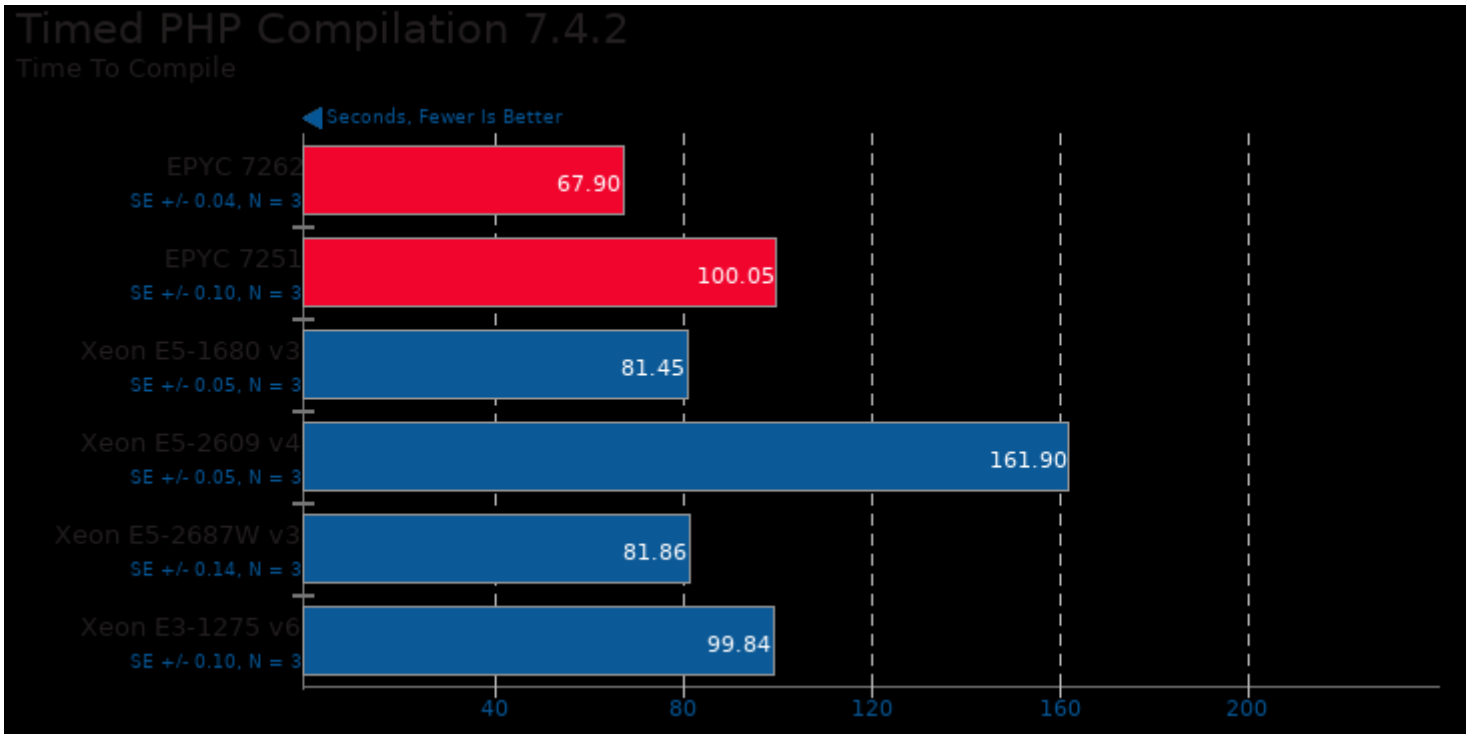
EPYC 7262 Linux Ubuntu Benchmarks

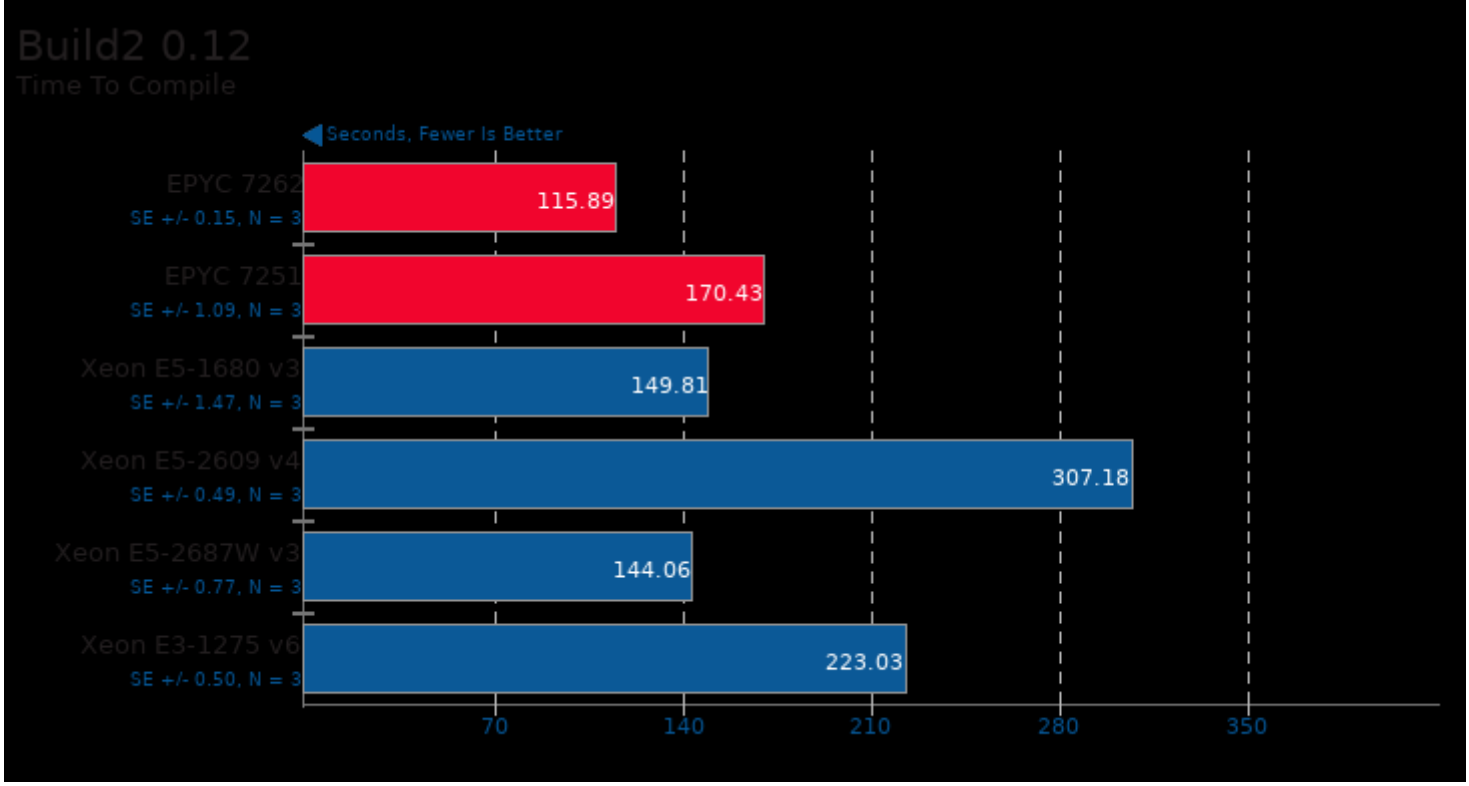


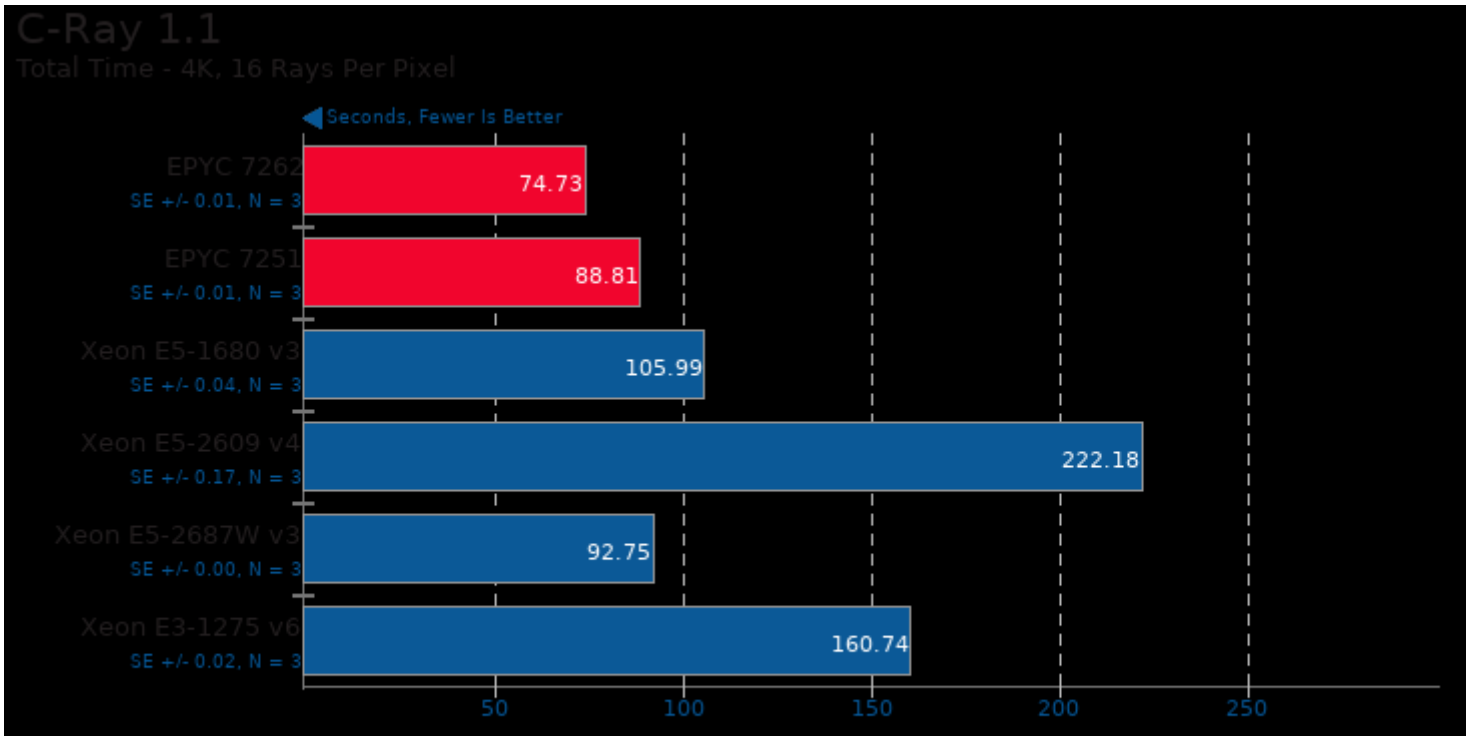
EPYC 7262 Linux Ubuntu Benchmarks

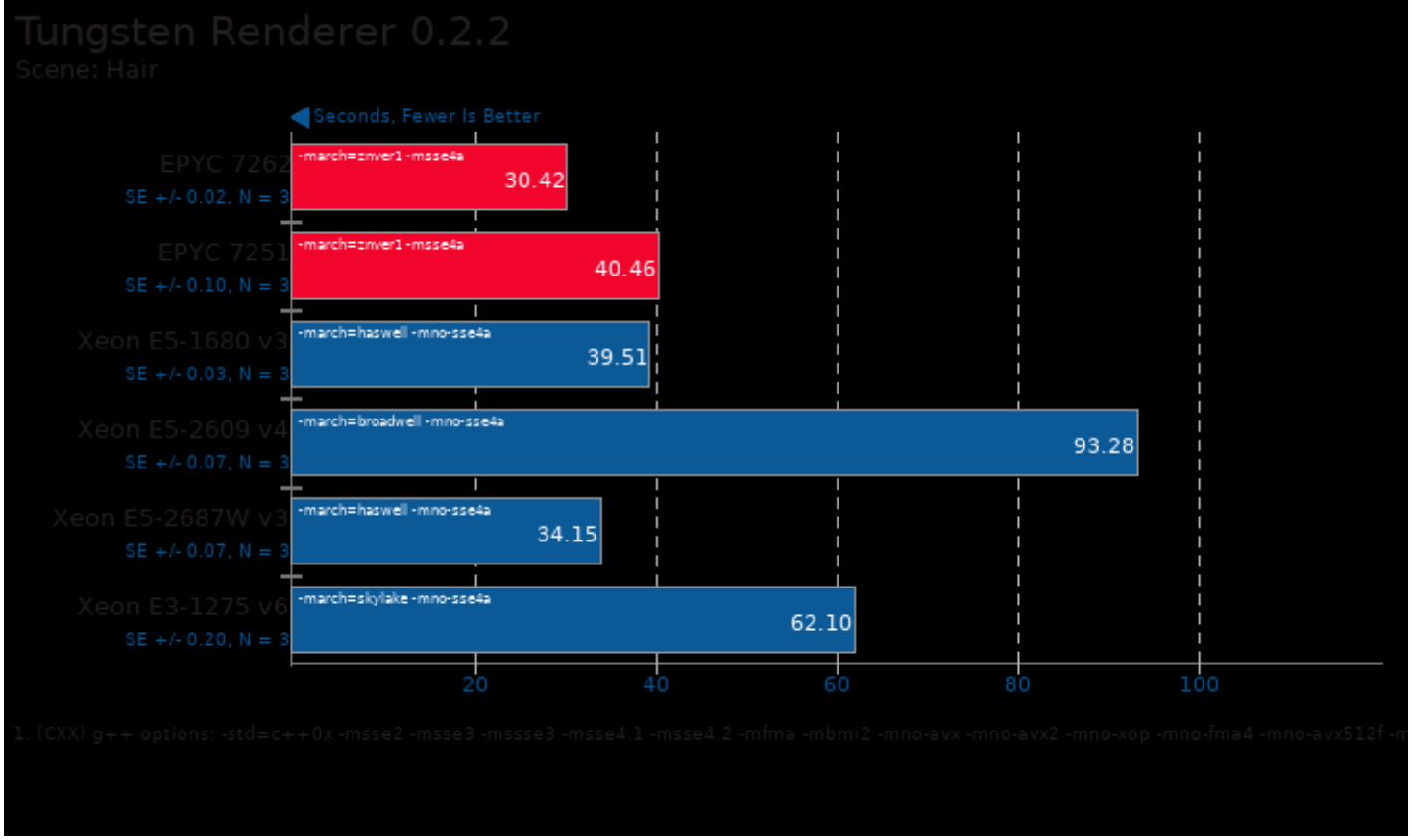


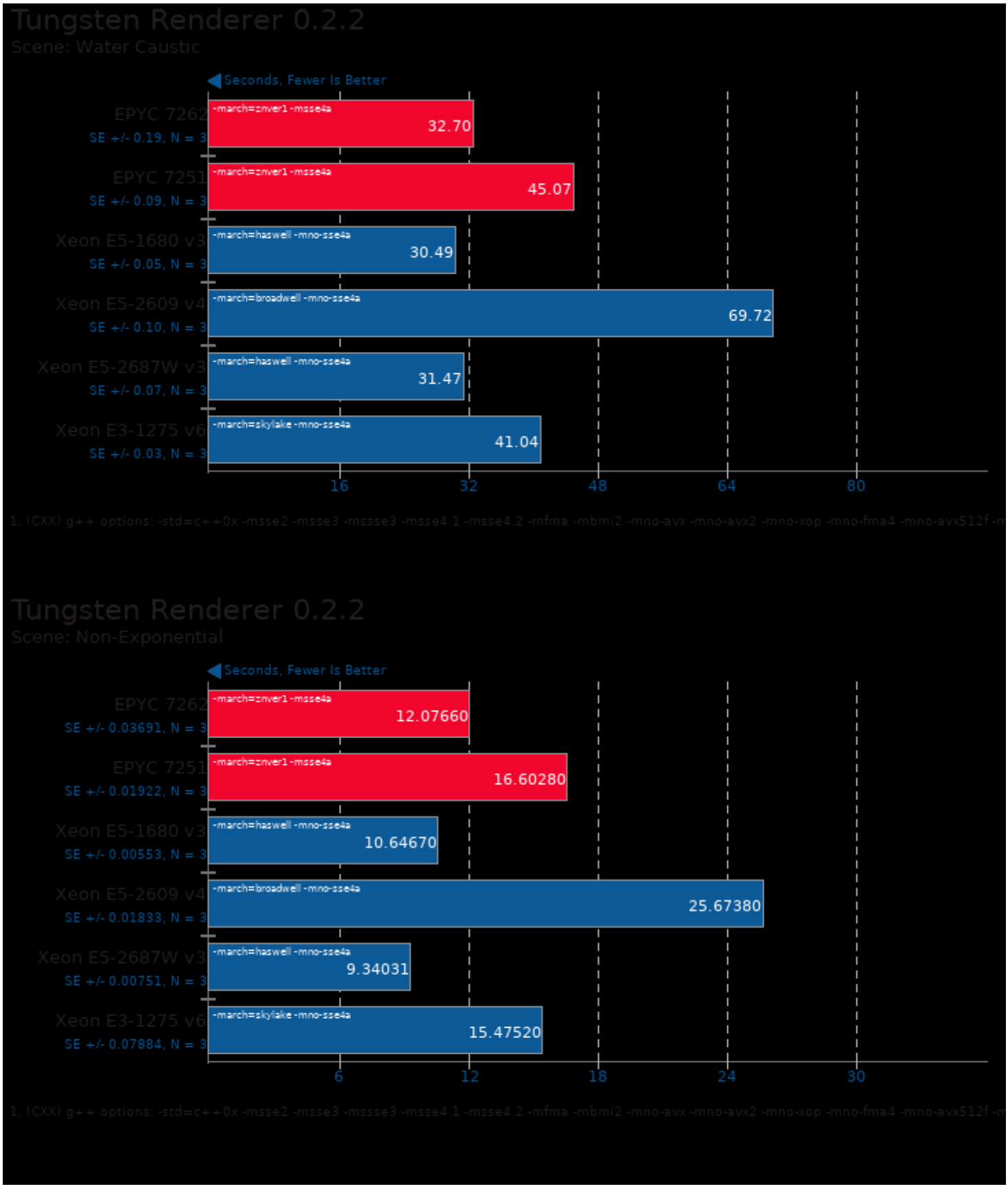
EPYC 7262 Linux Ubuntu Benchmarks

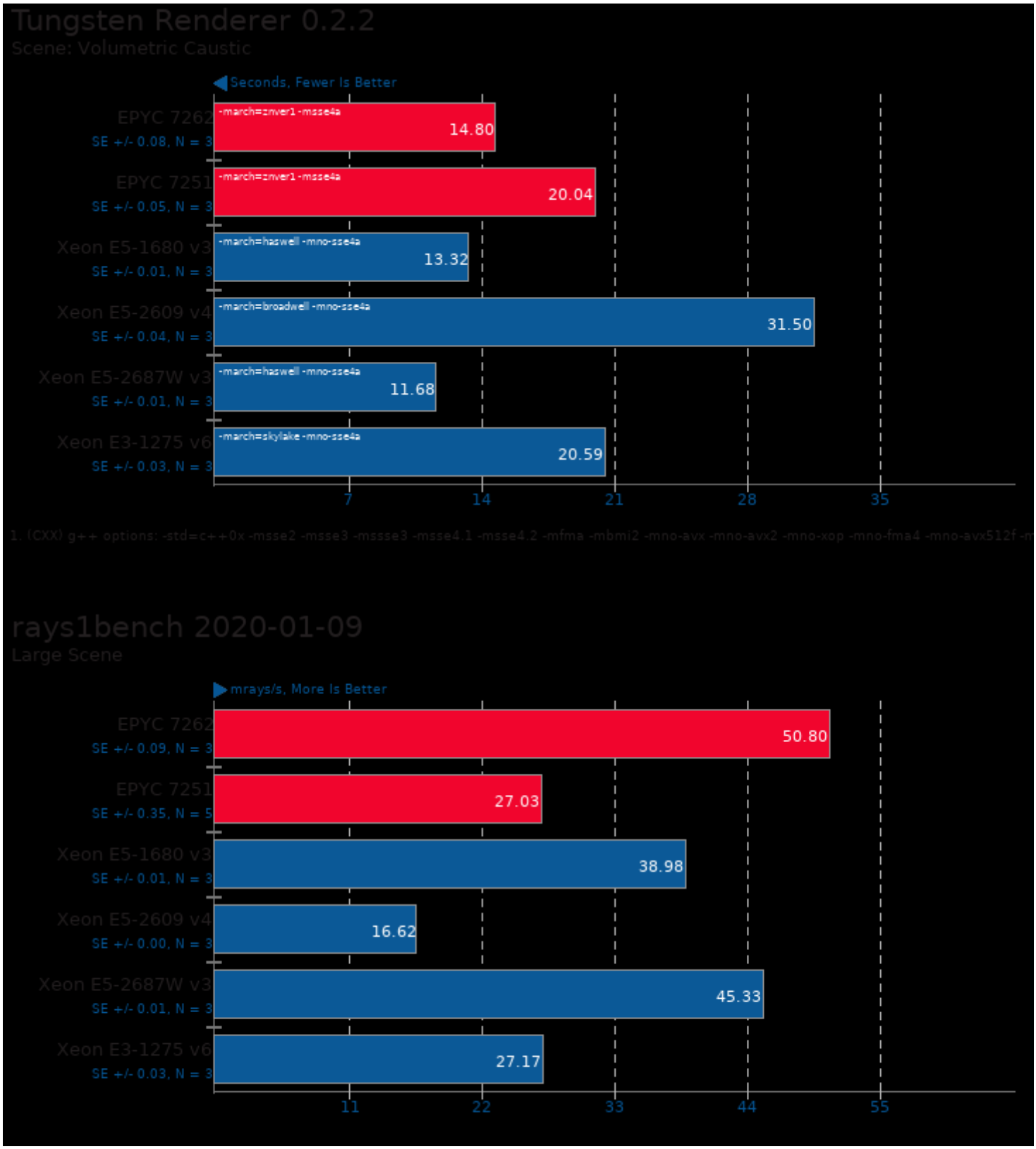





C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.01, N = 3
74.73
EPYC 7251
SE +/- 0.01, N = 3
88.81
Xeon E5-1680 v3
SE +/- 0.04, N = 3
105.99
Xeon E5-2609 v4
SE +/- 0.17, N = 3
222.18
Xeon E5-2687W v3
SE +/- 0.00, N = 3
92.75
Xeon E3-1275 v6
SE +/- 0.02, N = 3
160.74
50
100
150
200
250
1. (CC) gcc options: -lm -lpthread -O3


Tungsten Renderer 0.2.2
Scene: Hair
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.02, N = 3
-march=znver1 -msse4a
30.42
EPYC 7251
SE +/- 0.10, N = 3
-march=znver1 -msse4a
40.46
Xeon E5-1680 v3
SE +/- 0.03, N = 3
-march=haswell -mno-sse4a
39.51
Xeon E5-2609 v4
SE +/- 0.07, N = 3
-march=broadwell -mno-sse4a
93.28
Xeon E5-2687W v3
SE +/- 0.07, N = 3
-march=haswell -mno-sse4a
34.15
Xeon E3-1275 v6
SE +/- 0.20, N = 3
-march=skylake -mno-sse4a
62.10
20
40
60
80
100
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -m


Tungsten Renderer 0.2.2
Scene: Water Caustic
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.19, N = 3
-march=znver1 -msse4a
32.70
EPYC 7251
SE +/- 0.09, N = 3
-march=znver1 -msse4a
45.07
Xeon E5-1680 v3
SE +/- 0.05, N = 3
-march=haswell -mno-sse4a
30.49
Xeon E5-2609 v4
SE +/- 0.10, N = 3
-march=broadwell -mno-sse4a
69.72
Xeon E5-2687W v3
SE +/- 0.07, N = 3
-march=haswell -mno-sse4a
31.47
Xeon E3-1275 v6
SE +/- 0.03, N = 3
-march=skylake -mno-sse4a
41.04
16
32
48
64
80
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -m
Tungsten Renderer 0.2.2
Scene: Non-Exponential
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.03691, N = 3
-march=znver1 -msse4a
12.07660
EPYC 7251
SE +/- 0.01922, N = 3
-march=znver1 -msse4a
16.60280
Xeon E5-1680 v3
SE +/- 0.00553, N = 3
-march=haswell -mno-sse4a
10.64670
Xeon E5-2609 v4
SE +/- 0.01833, N = 3
-march=broadwell -mno-sse4a
25.67380
Xeon E5-2687W v3
SE +/- 0.00751, N = 3
-march=haswell -mno-sse4a
9.34031
Xeon E3-1275 v6
SE +/- 0.07884, N = 3
-march=skylake -mno-sse4a
15.47520
6
12
18
24
30
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -m


Tungsten Renderer 0.2.2
Scene: Volumetric Caustic
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.08, N = 3
-march=znver1 -msse4a
14.80
EPYC 7251
SE +/- 0.05, N = 3
-march=znver1 -msse4a
20.04
Xeon E5-1680 v3
SE +/- 0.01, N = 3
-march=haswell -mno-sse4a
13.32
Xeon E5-2609 v4
SE +/- 0.04, N = 3
-march=broadwell -mno-sse4a
31.50
Xeon E5-2687W v3
SE +/- 0.01, N = 3
-march=haswell -mno-sse4a
11.68
Xeon E3-1275 v6
SE +/- 0.03, N = 3
-march=skylake -mno-sse4a
20.59
7
14
21
28
35
1. (CXX) g++ options: -std=c++0x -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -mfma -mbmi2 -mno-avx -mno-avx2 -mno-xop -mno-fma4 -mno-avx512f -m
rays1bench 2020-01-09
Large Scene
mrays/s, More Is Better
EPYC 7262
SE +/- 0.09, N = 3
50.80
EPYC 7251
SE +/- 0.35, N = 5
27.03
Xeon E5-1680 v3
SE +/- 0.01, N = 3
38.98
Xeon E5-2609 v4
SE +/- 0.00, N = 3
16.62
Xeon E5-2687W v3
SE +/- 0.01, N = 3
45.33
Xeon E3-1275 v6
SE +/- 0.03, N = 3
27.17
11
22
33
44
55

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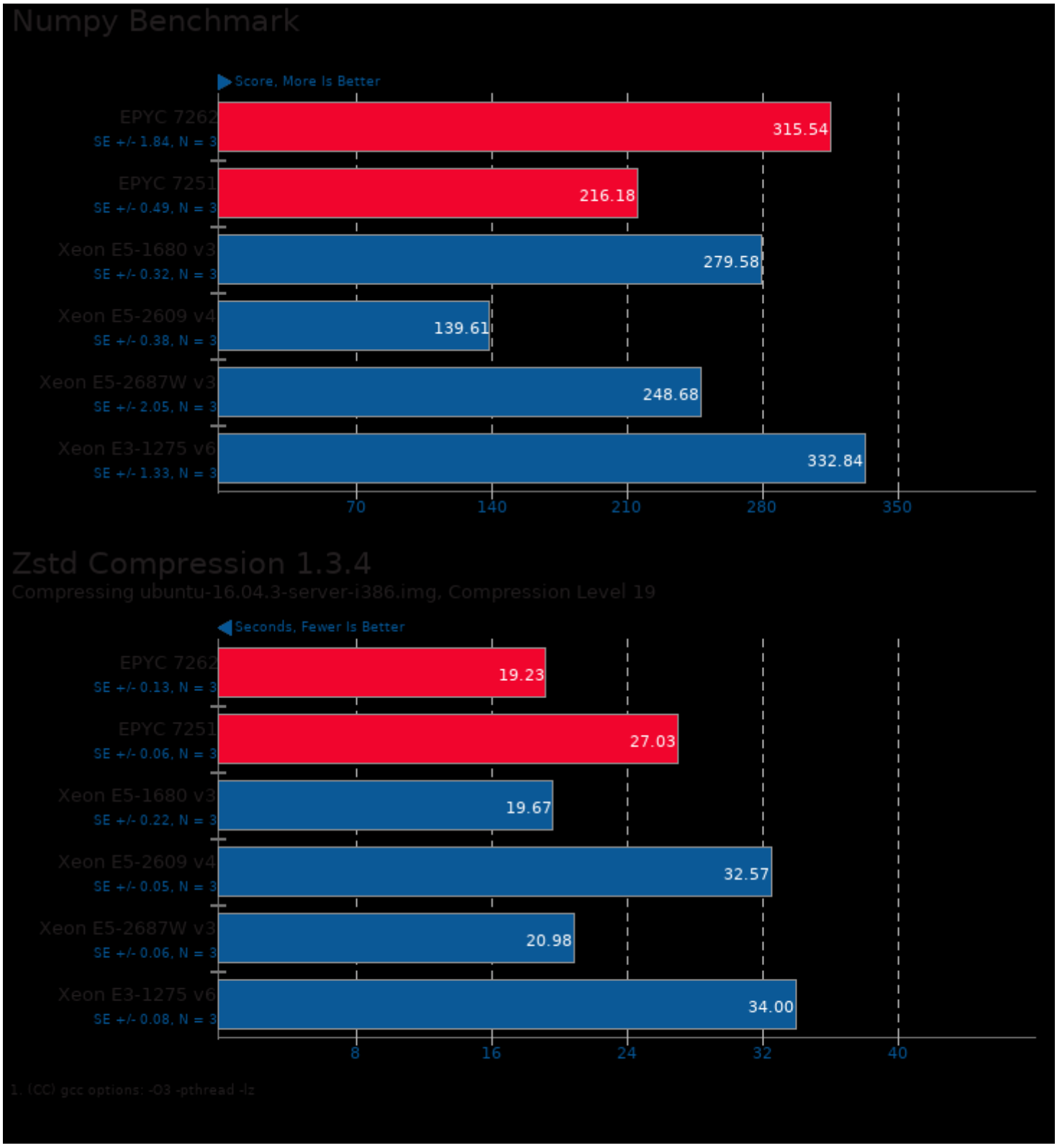

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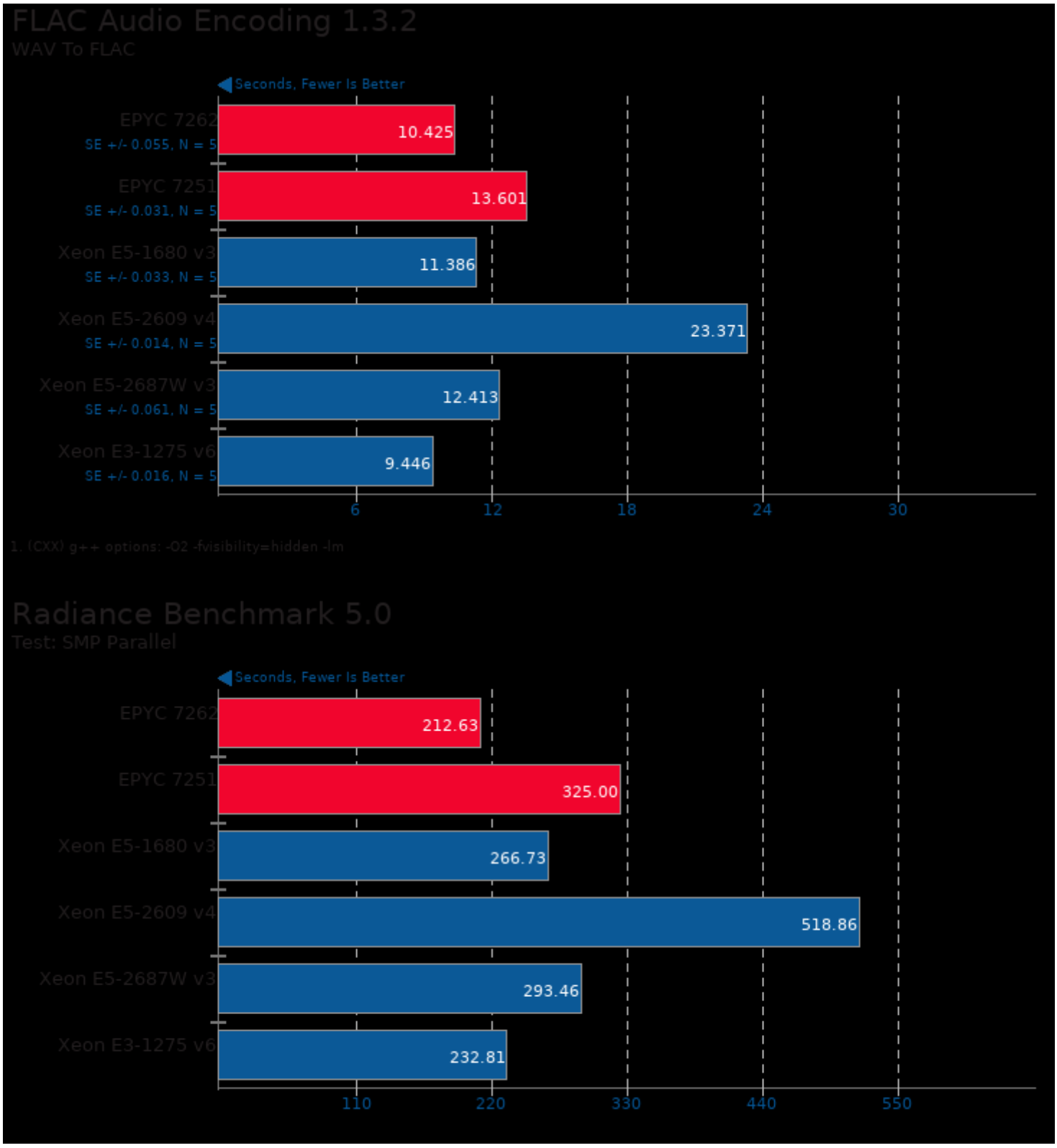
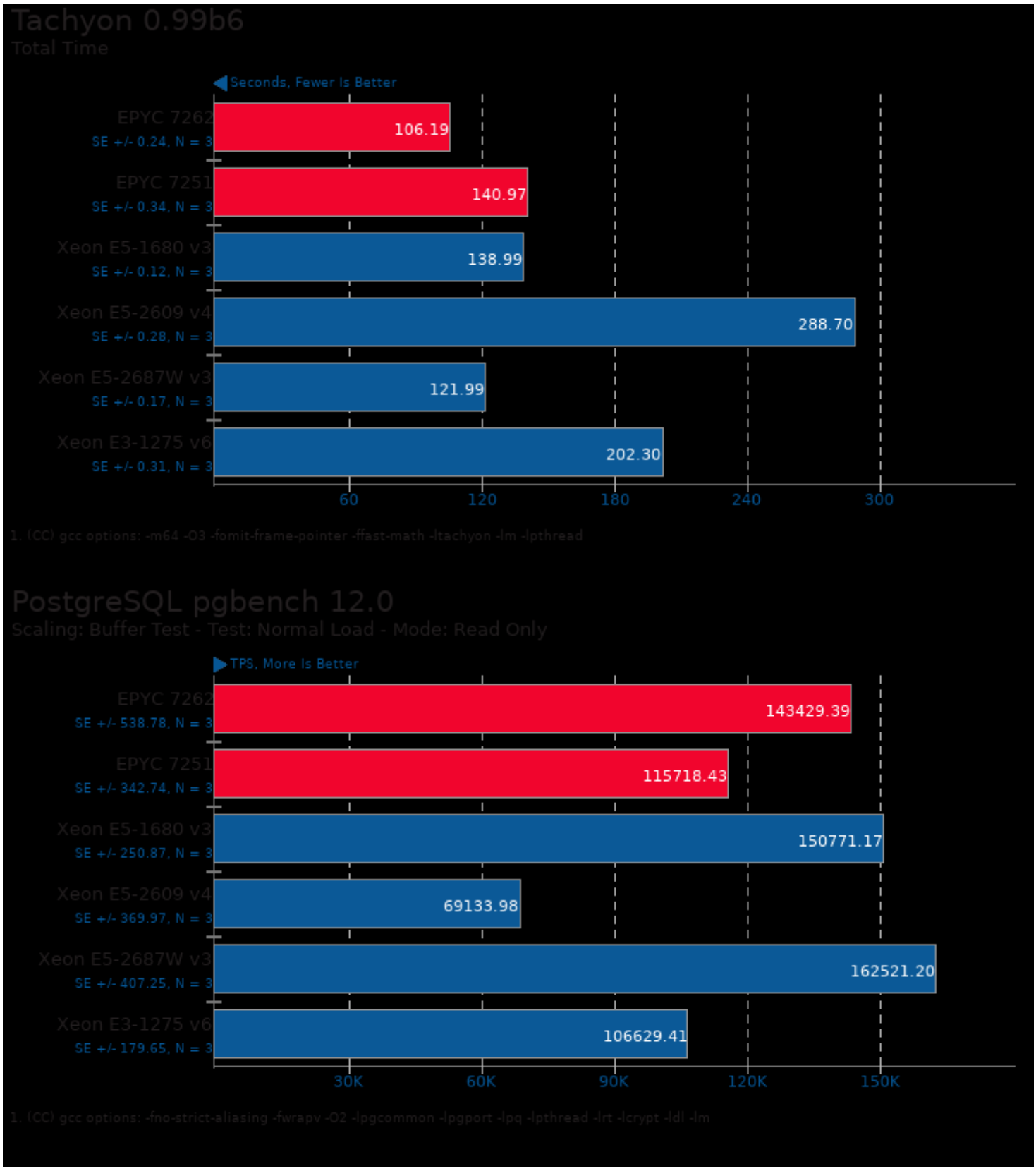
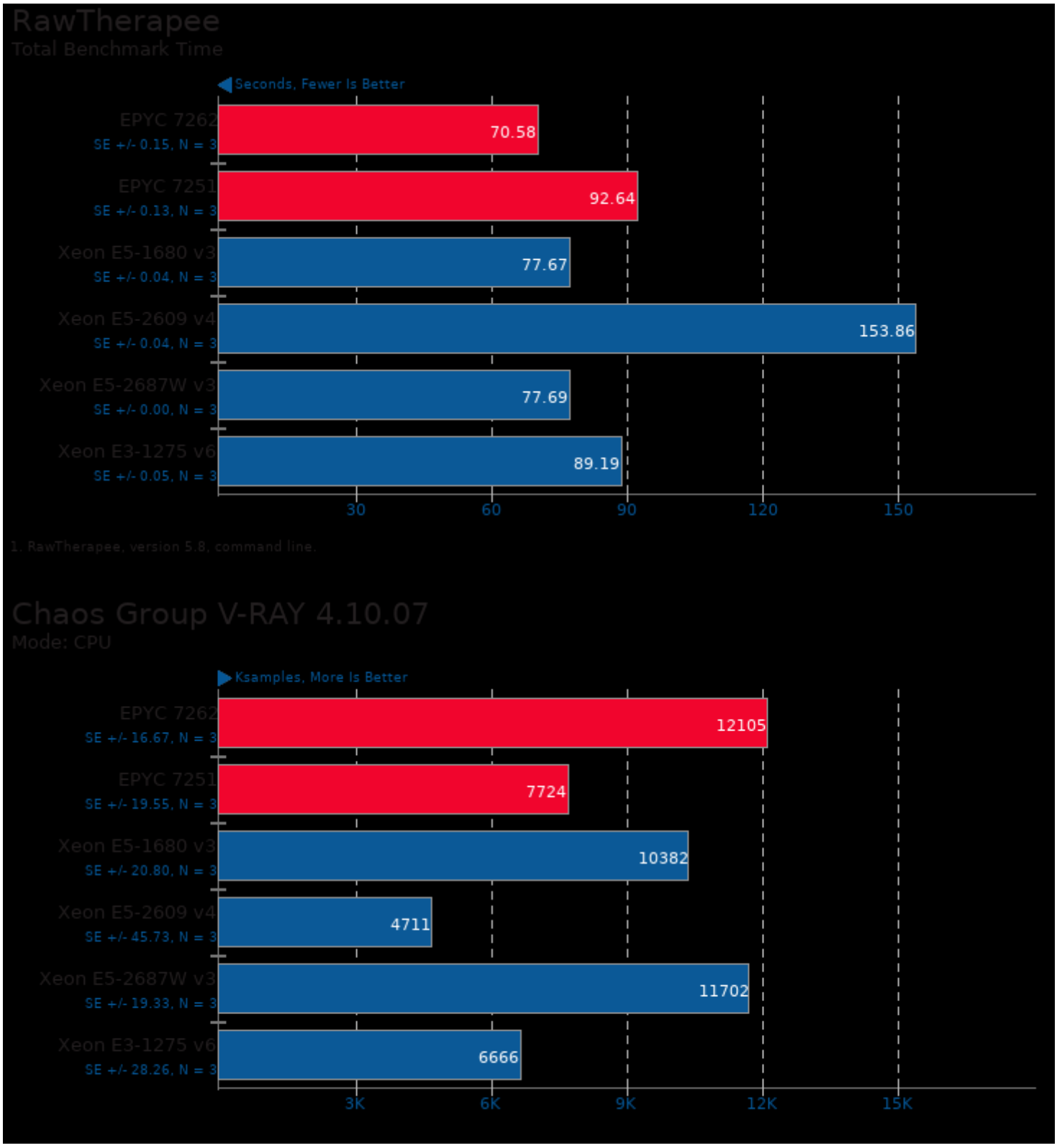
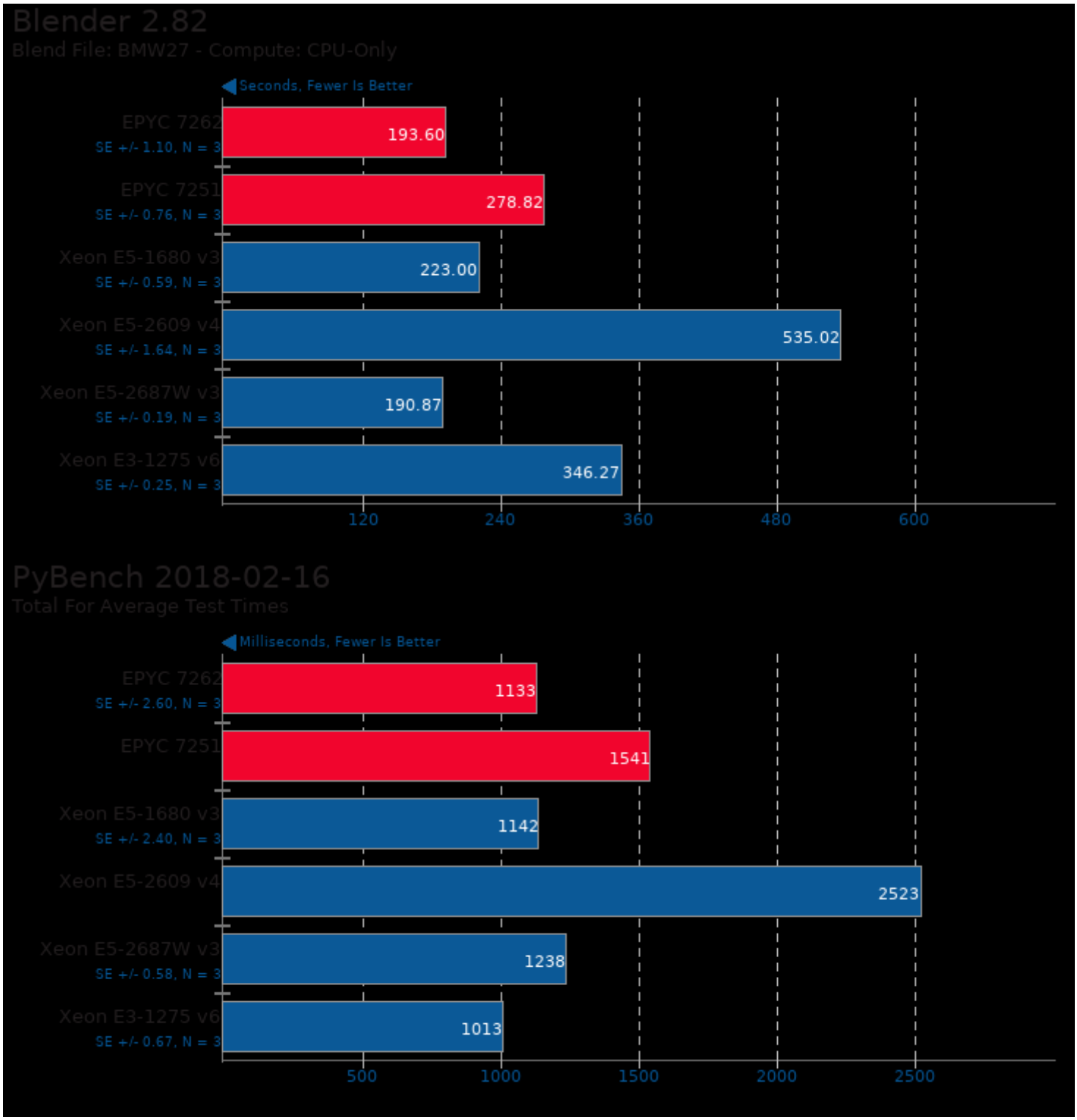


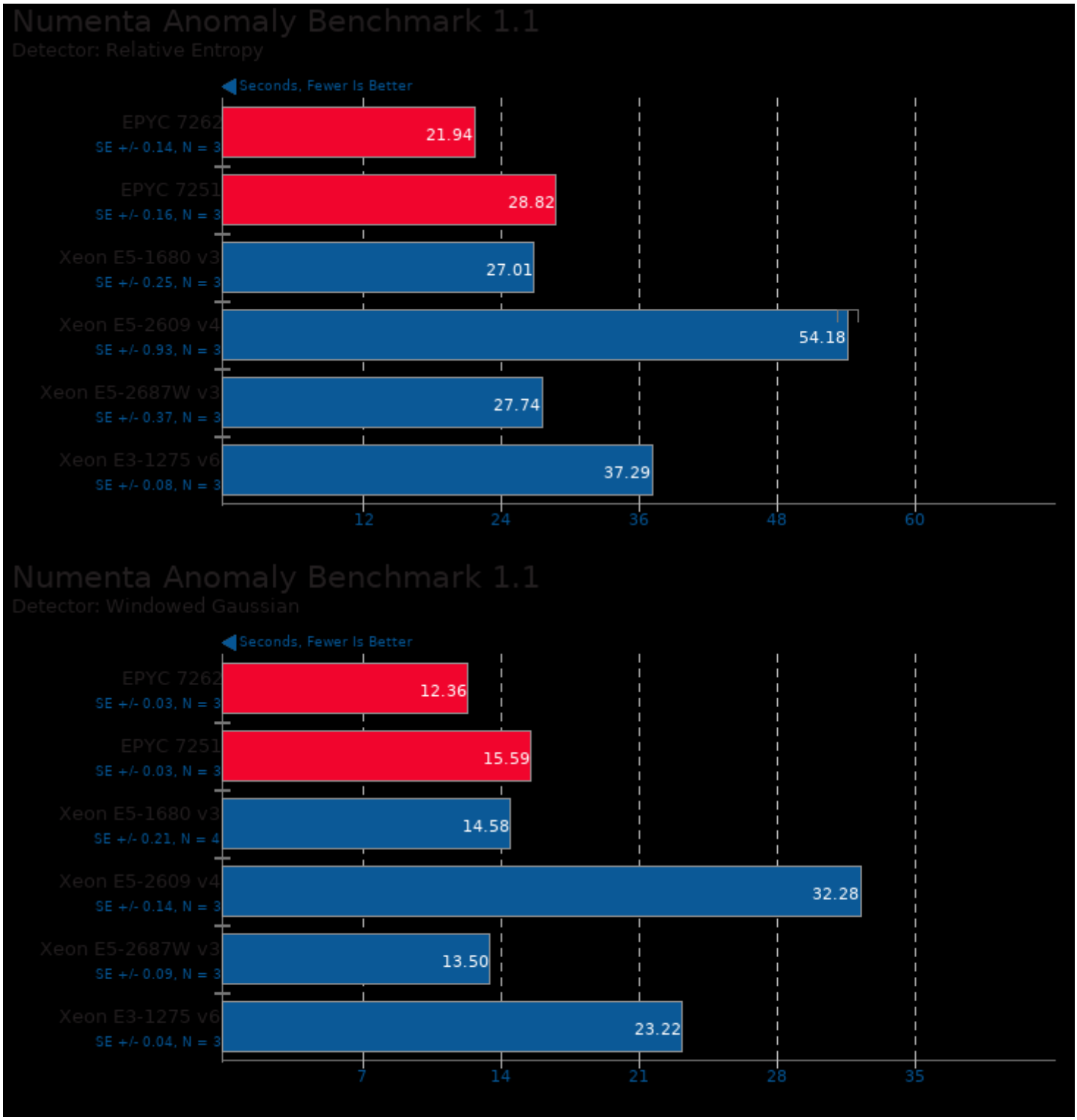

Tachyon 0.99b6
Total Time
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.24, N = 3
106.19
EPYC 7251
SE +/- 0.34, N = 3
140.97
Xeon E5-1680 v3
SE +/- 0.12, N = 3
138.99
Xeon E5-2609 v4
SE +/- 0.28, N = 3
288.70
Xeon E5-2687W v3
SE +/- 0.17, N = 3
121.99
Xeon E3-1275 v6
SE +/- 0.31, N = 3
202.30
60
120
180
240
300
1. (CC) gcc options: -m64 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread
PostgreSQL pgbench 12.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
EPYC 7262
SE +/- 538.78, N = 3
143429.39
EPYC 7251
SE +/- 342.74, N = 3
115718.43
Xeon E5-1680 v3
SE +/- 250.87, N = 3
150771.17
Xeon E5-2609 v4
SE +/- 369.97, N = 3
69133.98
Xeon E5-2687W v3
SE +/- 407.25, N = 3
162521.20
Xeon E3-1275 v6
SE +/- 179.65, N = 3
106629.41
30K
60K
90K
120K
150K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm


RawTherapee
Total Benchmark Time
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.15, N = 3
70.58
EPYC 7251
SE +/- 0.13, N = 3
92.64
Xeon E5-1680 v3
SE +/- 0.04, N = 3
77.67
Xeon E5-2609 v4
SE +/- 0.04, N = 3
153.86
Xeon E5-2687W v3
SE +/- 0.00, N = 3
77.69
Xeon E3-1275 v6
SE +/- 0.05, N = 3
89.19
30
60
90
120
150
1. RawTherapee, version 5.8, command line.
Chaos Group V-RAY 4.10.07
Mode: CPU
Ksamples, More Is Better
EPYC 7262
SE +/- 16.67, N = 3
12105
EPYC 7251
SE +/- 19.55, N = 3
7724
Xeon E5-1680 v3
SE +/- 20.80, N = 3
10382
Xeon E5-2609 v4
SE +/- 45.73, N = 3
4711
Xeon E5-2687W v3
SE +/- 19.33, N = 3
11702
Xeon E3-1275 v6
SE +/- 28.26, N = 3
6666
3K
6K
9K
12K
15K

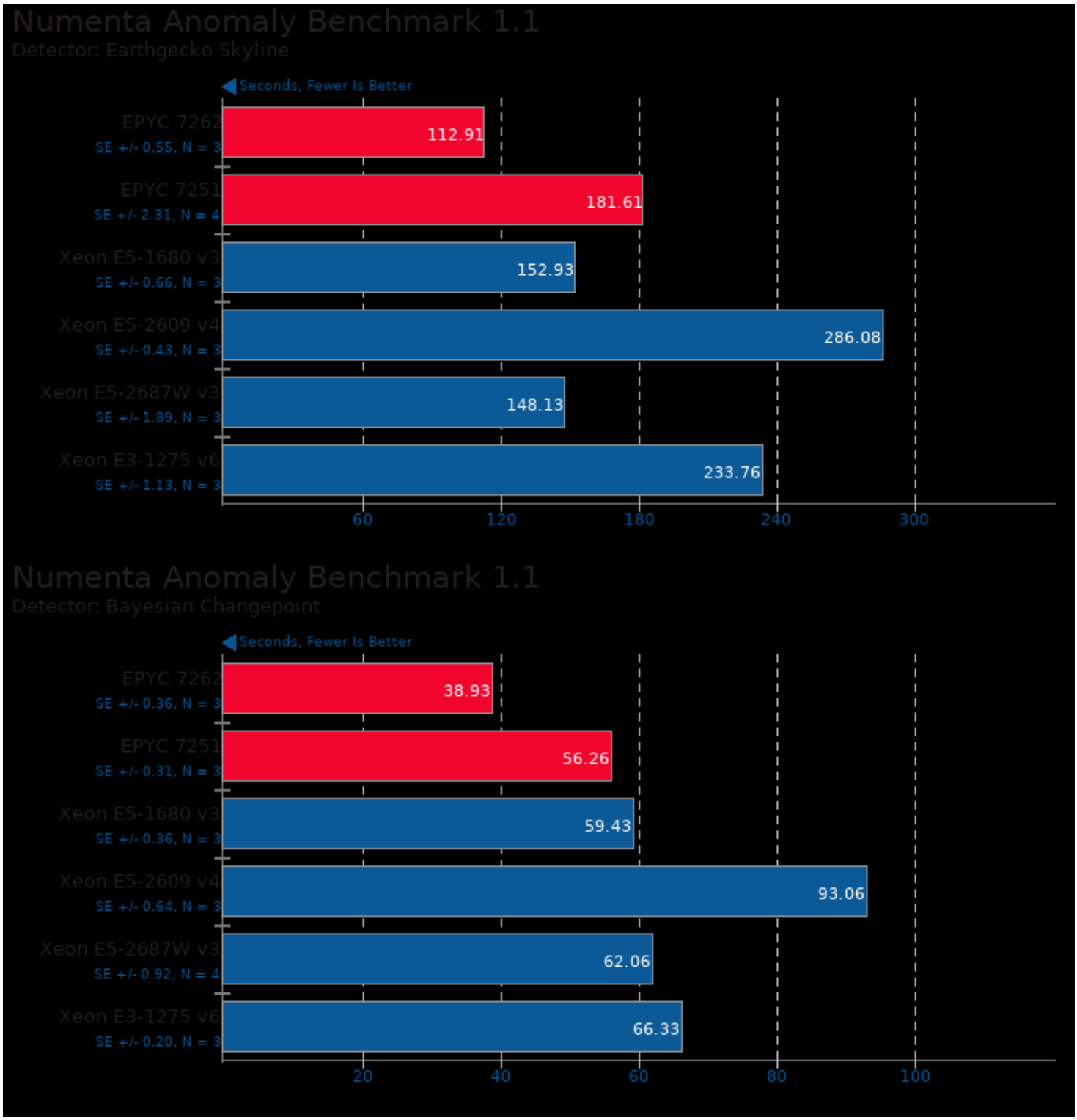
EPYC 7262 Linux Ubuntu Benchmarks



EPYC 7262 Linux Ubuntu Benchmarks



EPYC 7262 Linux Ubuntu Benchmarks



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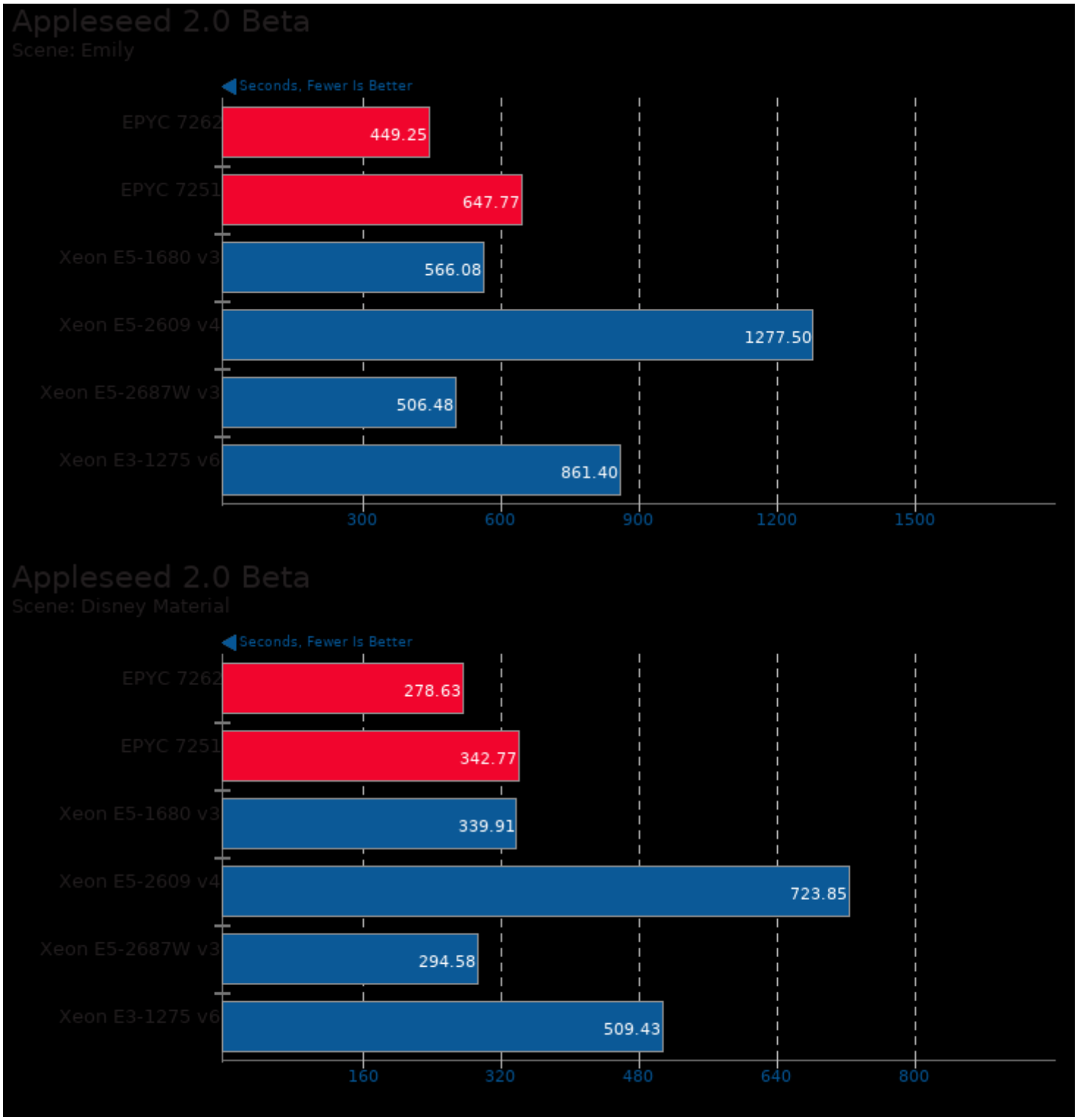

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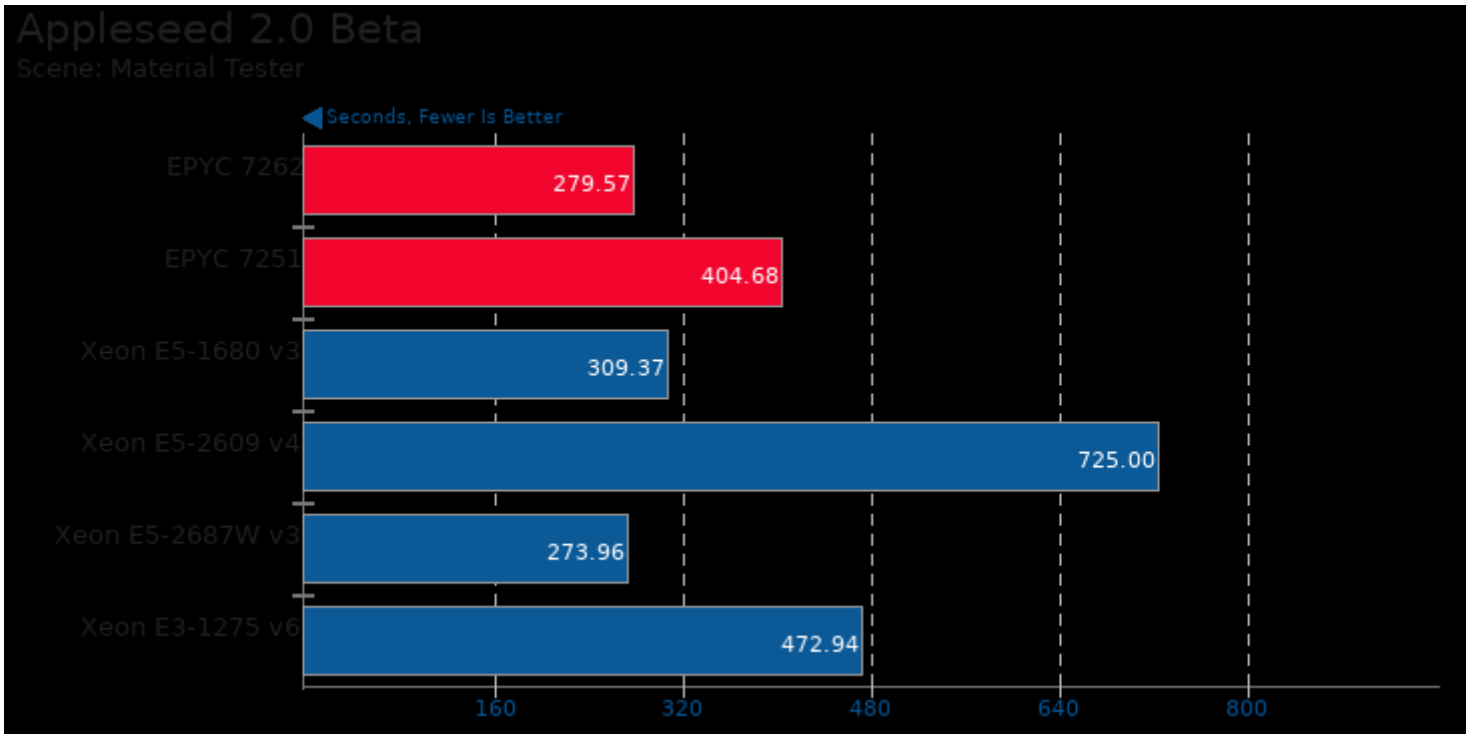

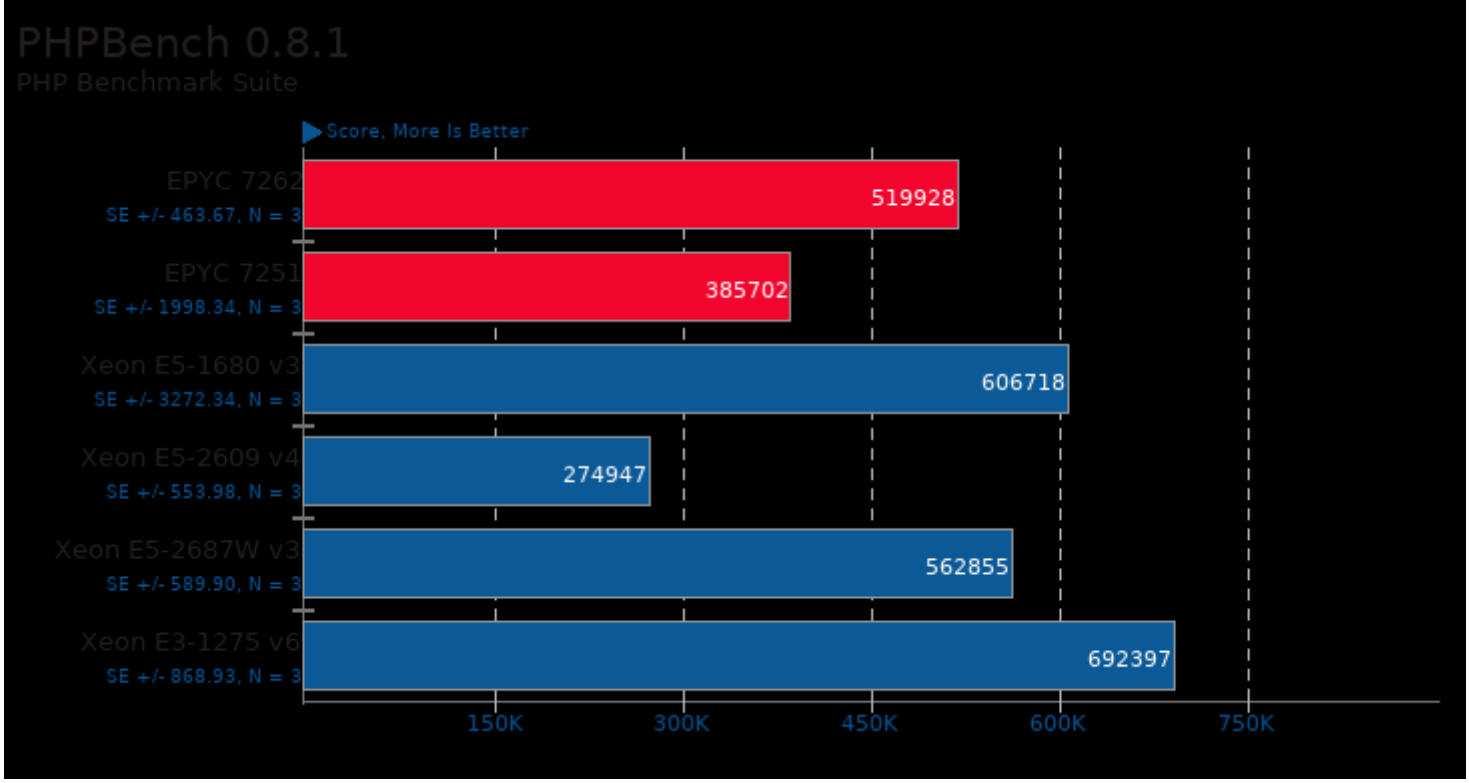

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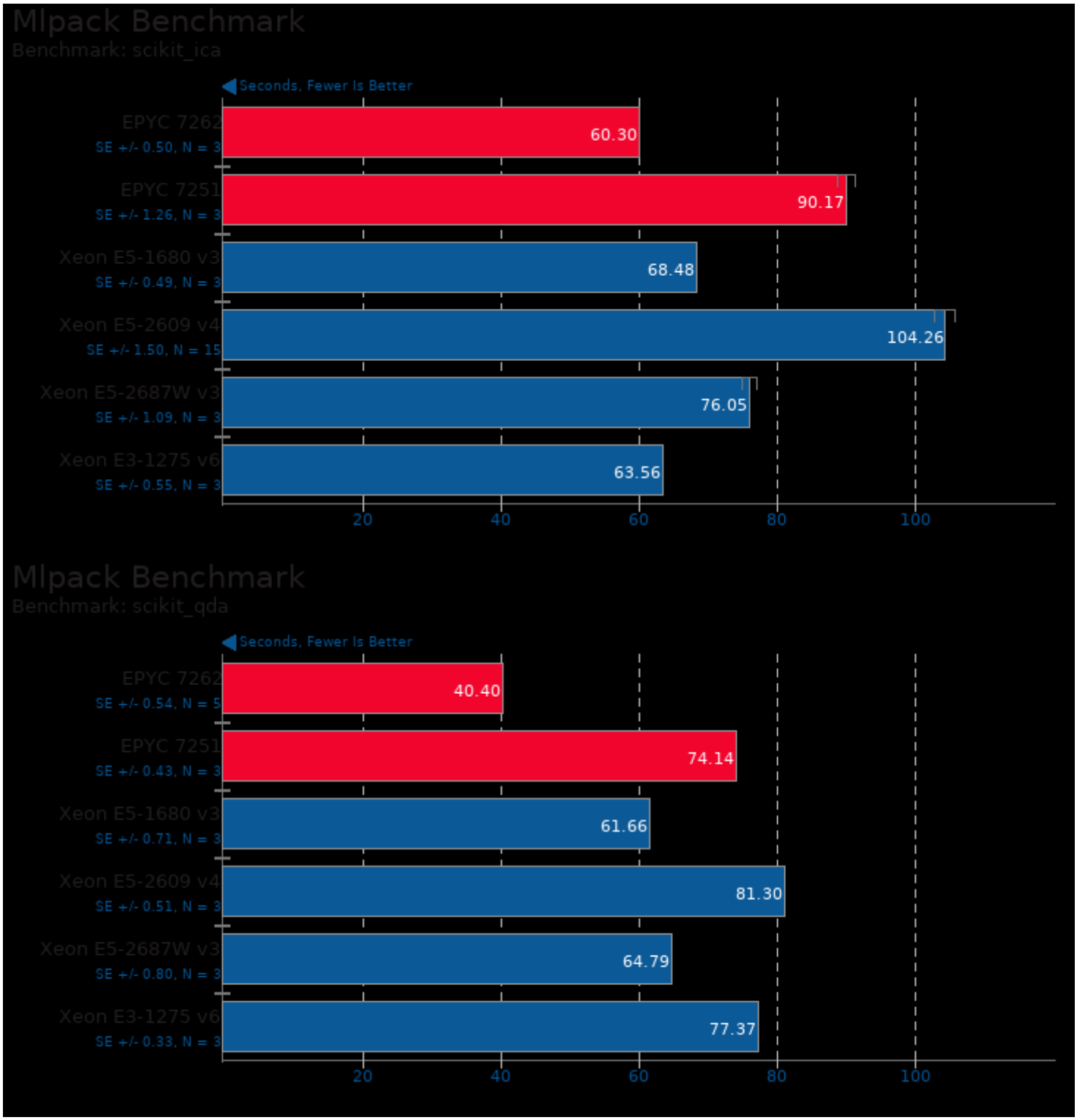

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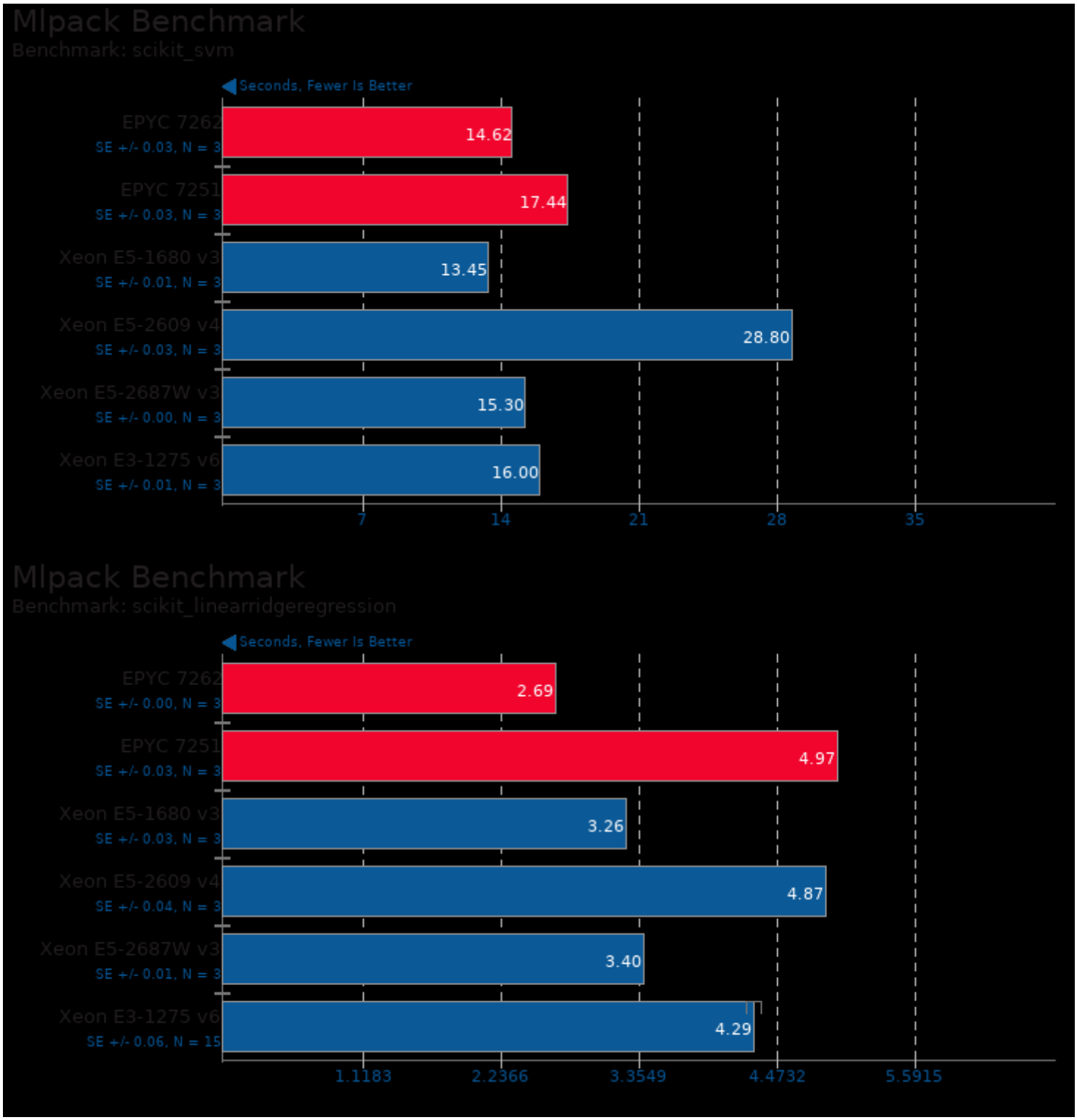
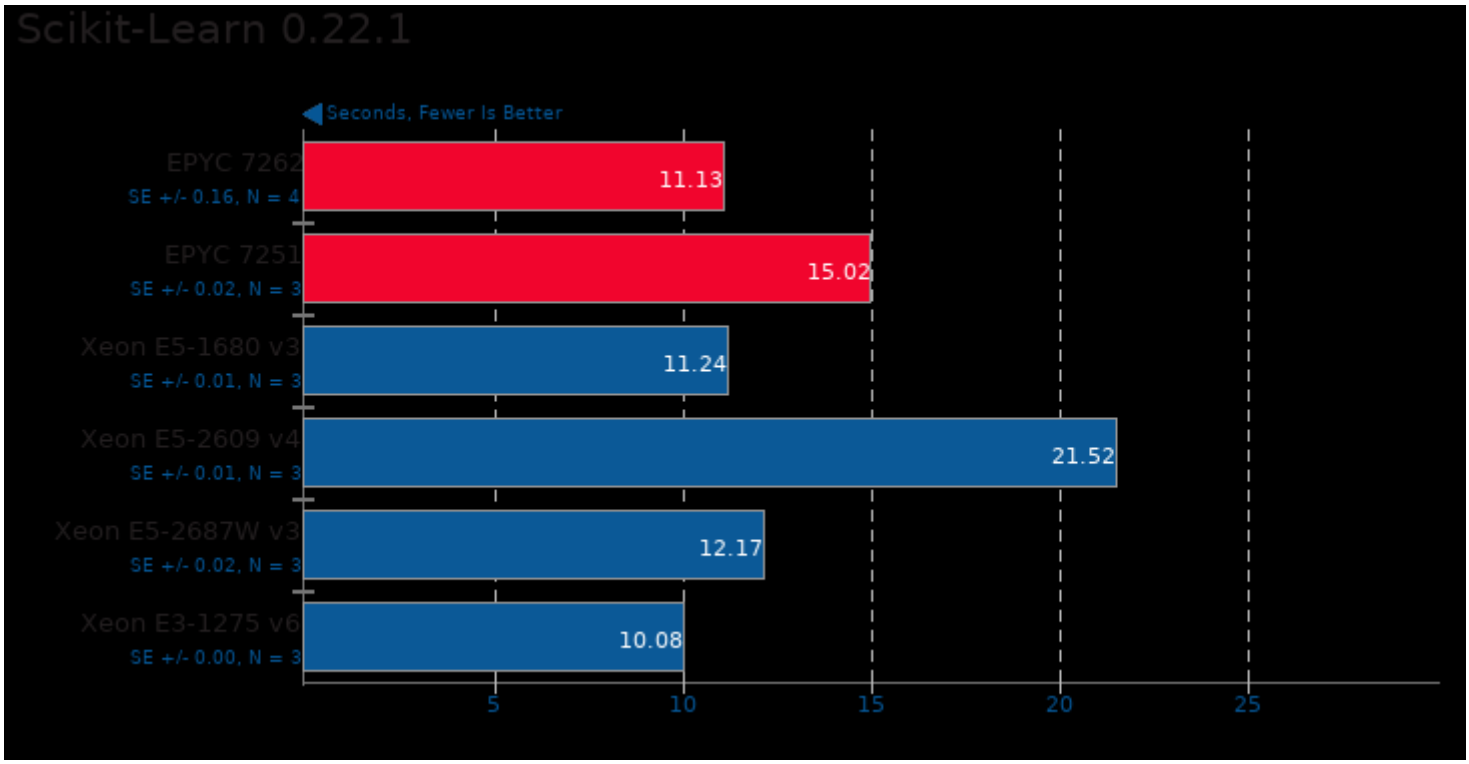
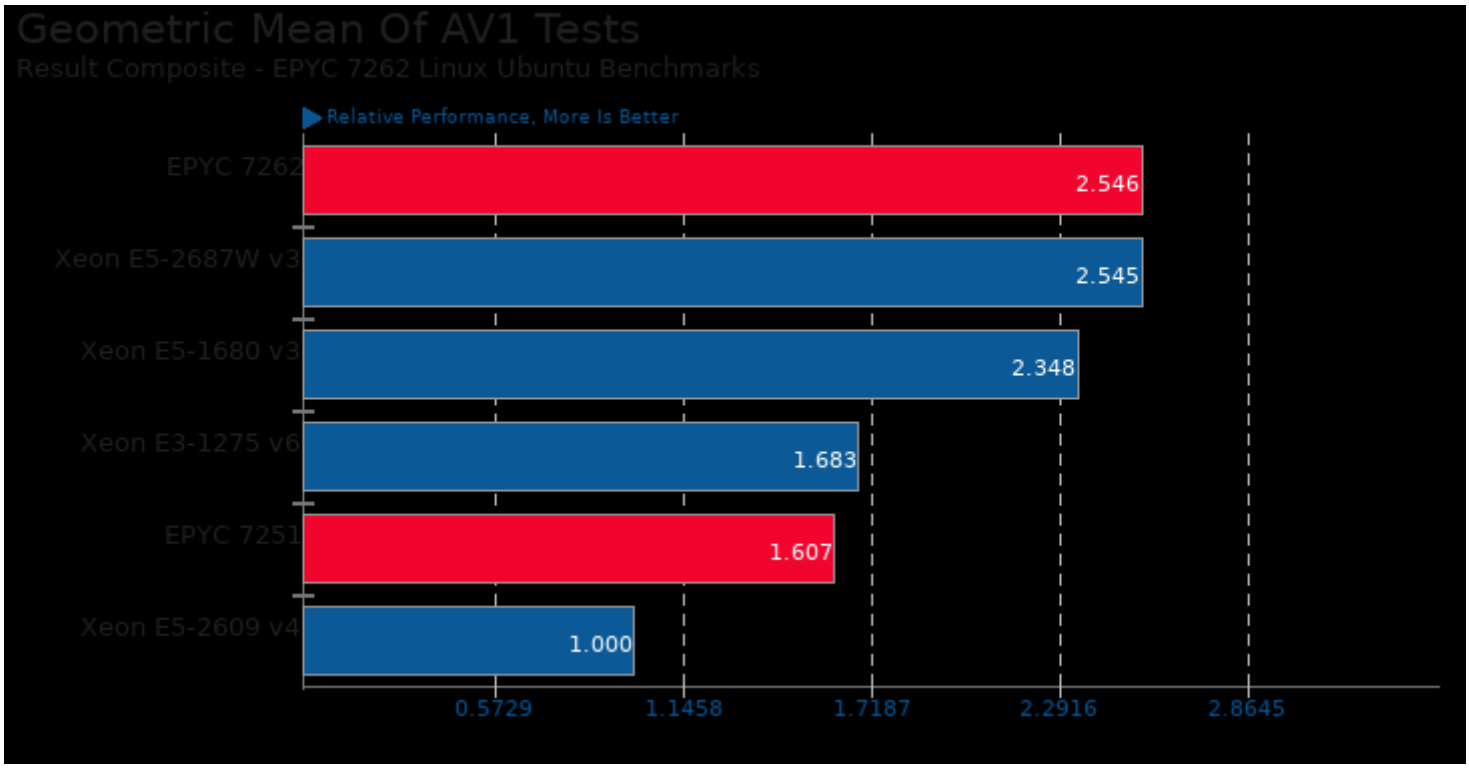


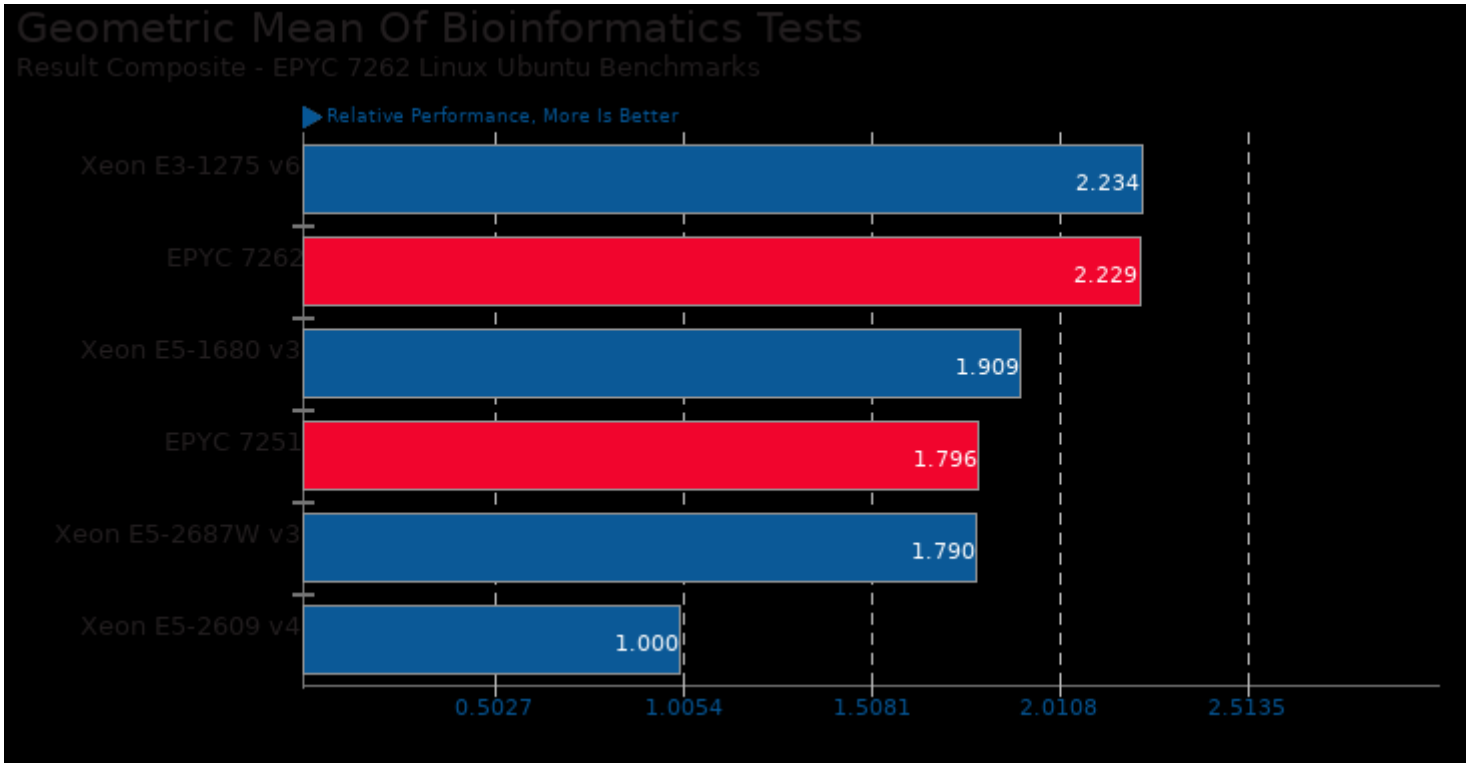
EPYC 7262 Linux Ubuntu Benchmarks



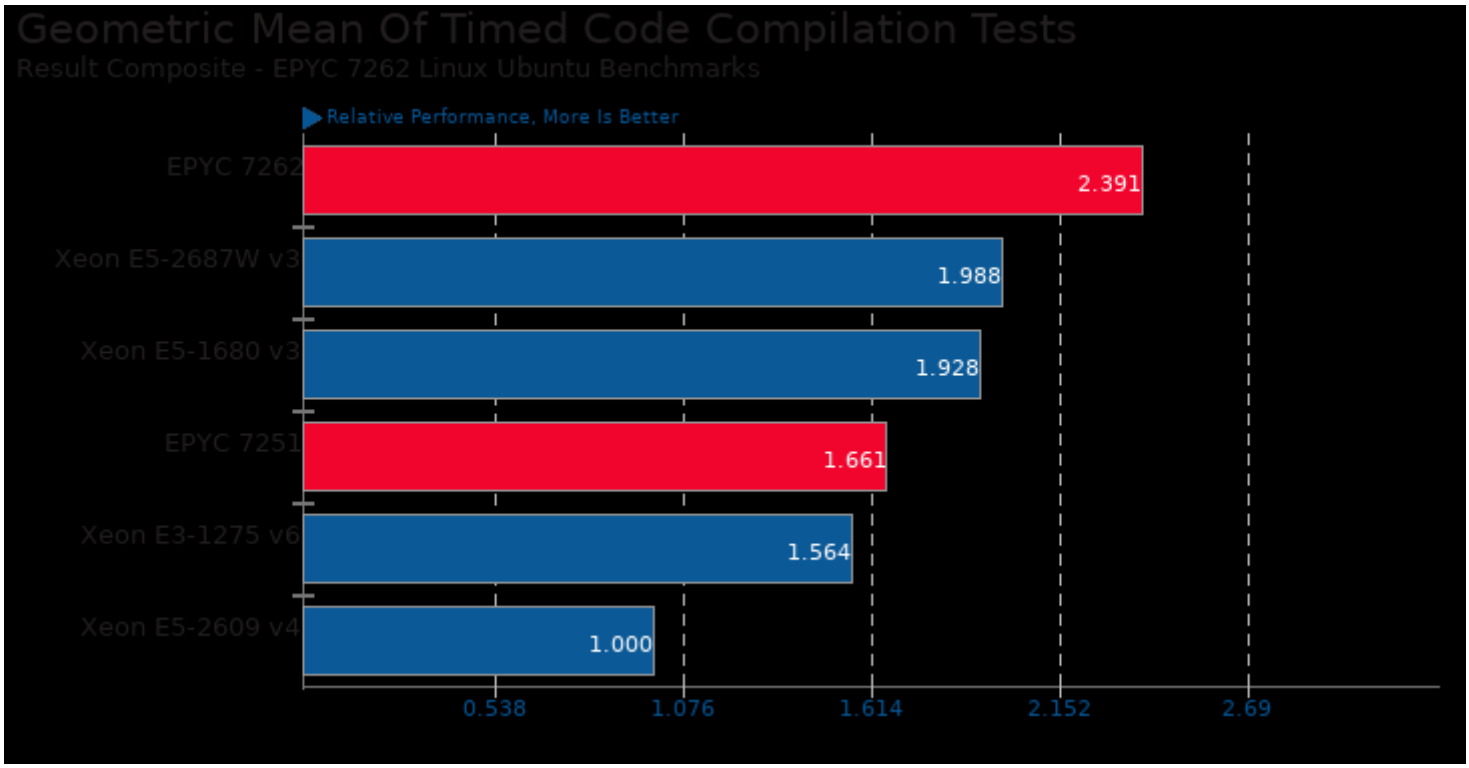
These geometric means are based upon test groupings / test suites for this result file.



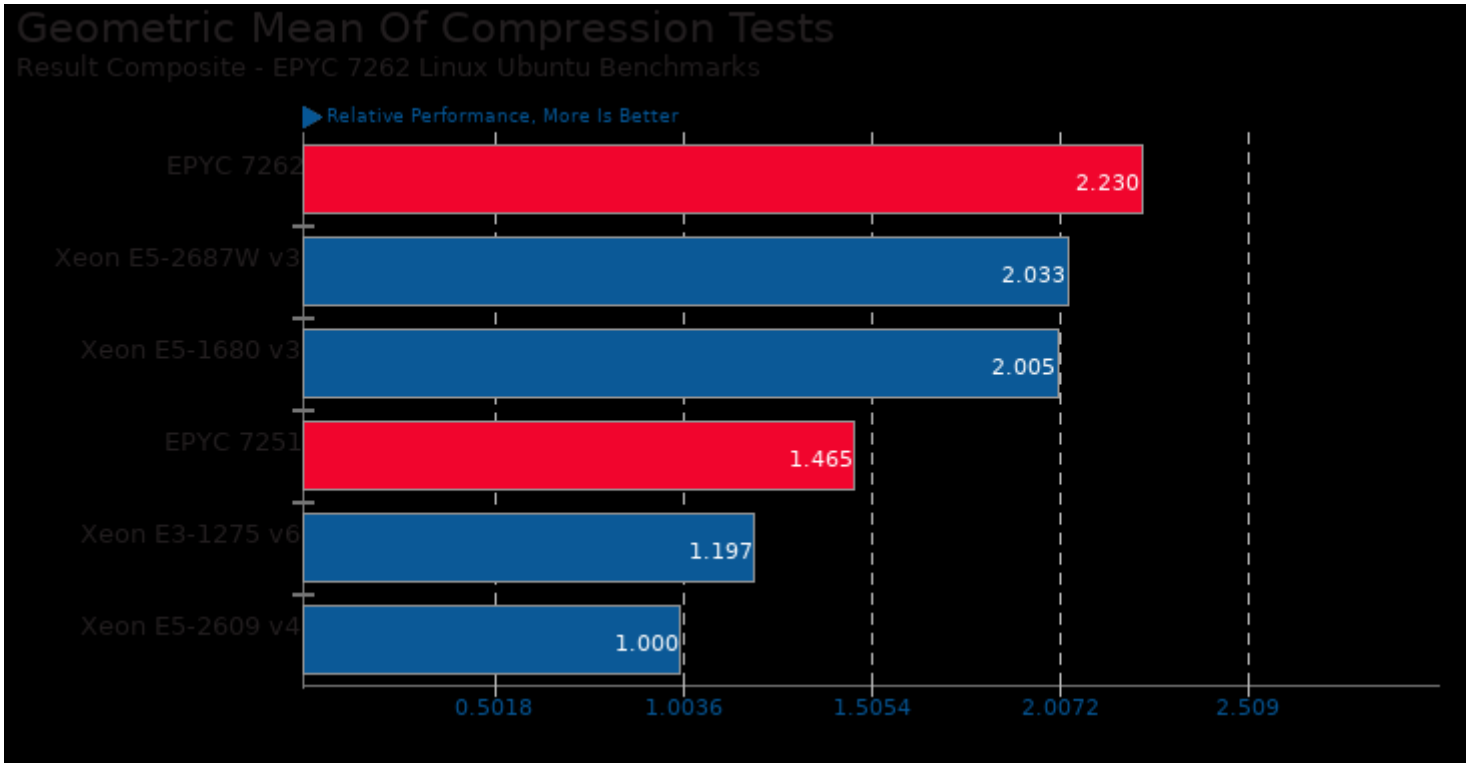
Geometric mean based upon tests: pts/dav1d and pts/svt-av1



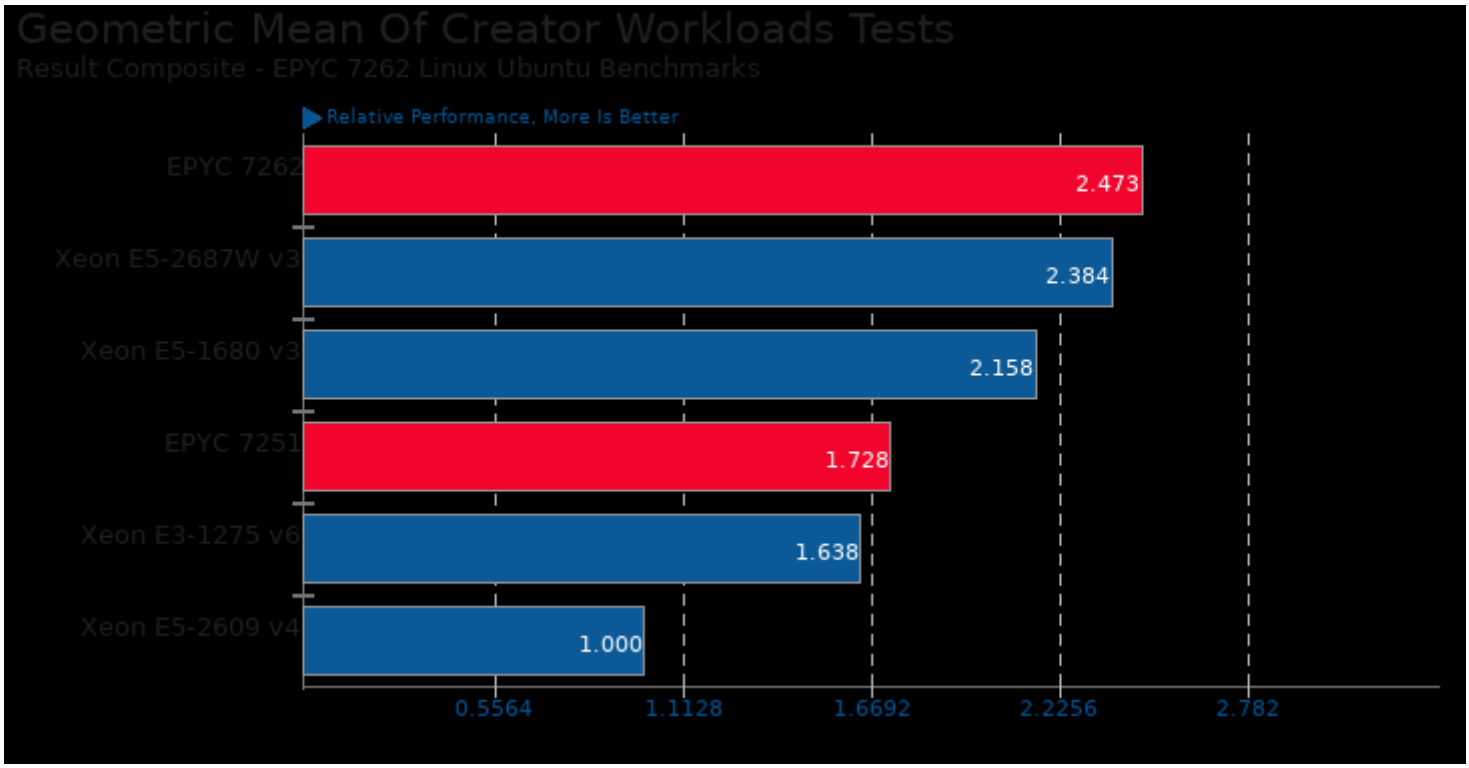
Geometric mean based upon tests: pts/himeno and pts/mrbayes



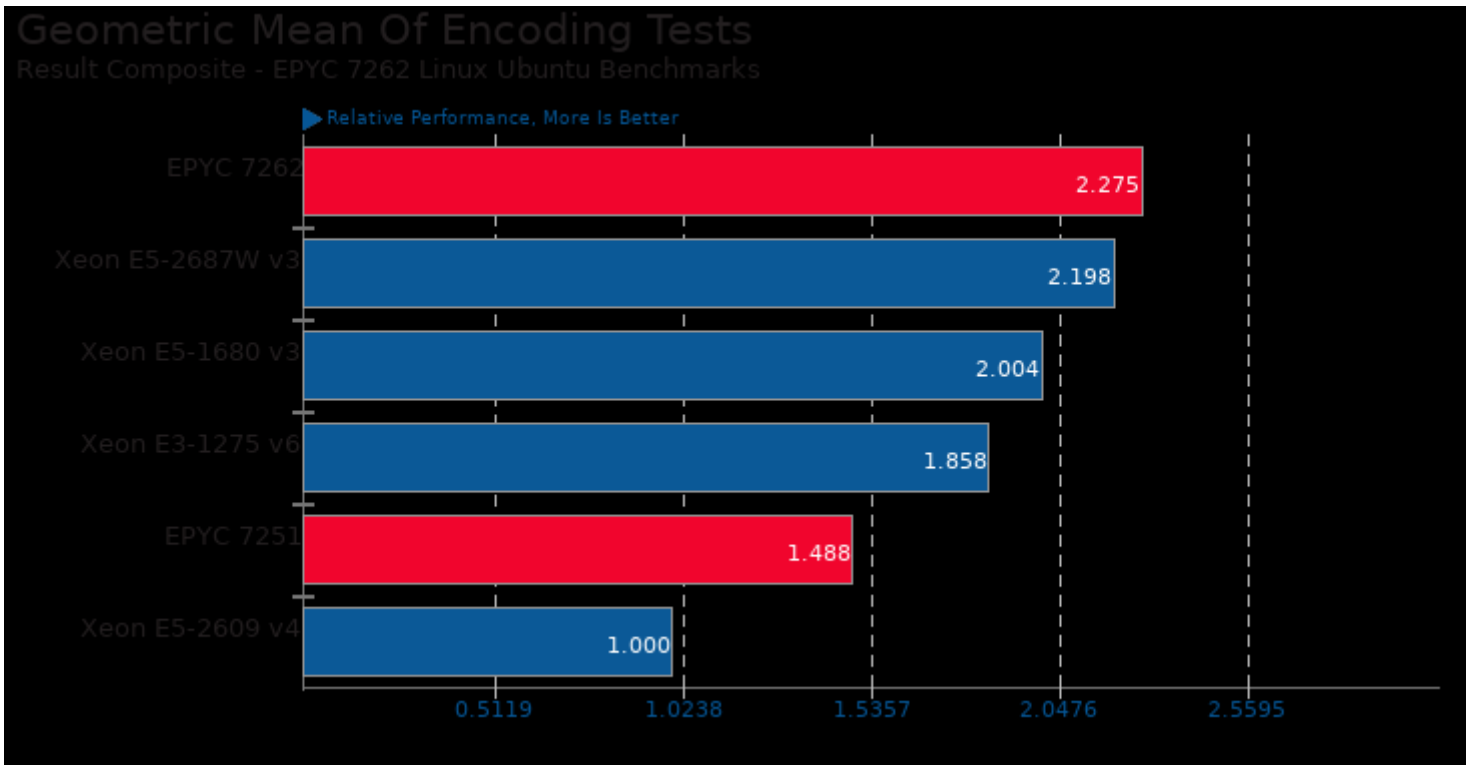
Geometric mean based upon tests: pts/build-apache, pts/build-php, pts/build-linux-kernel, pts/build-gdb, pts/build-mplayer and pts/build2



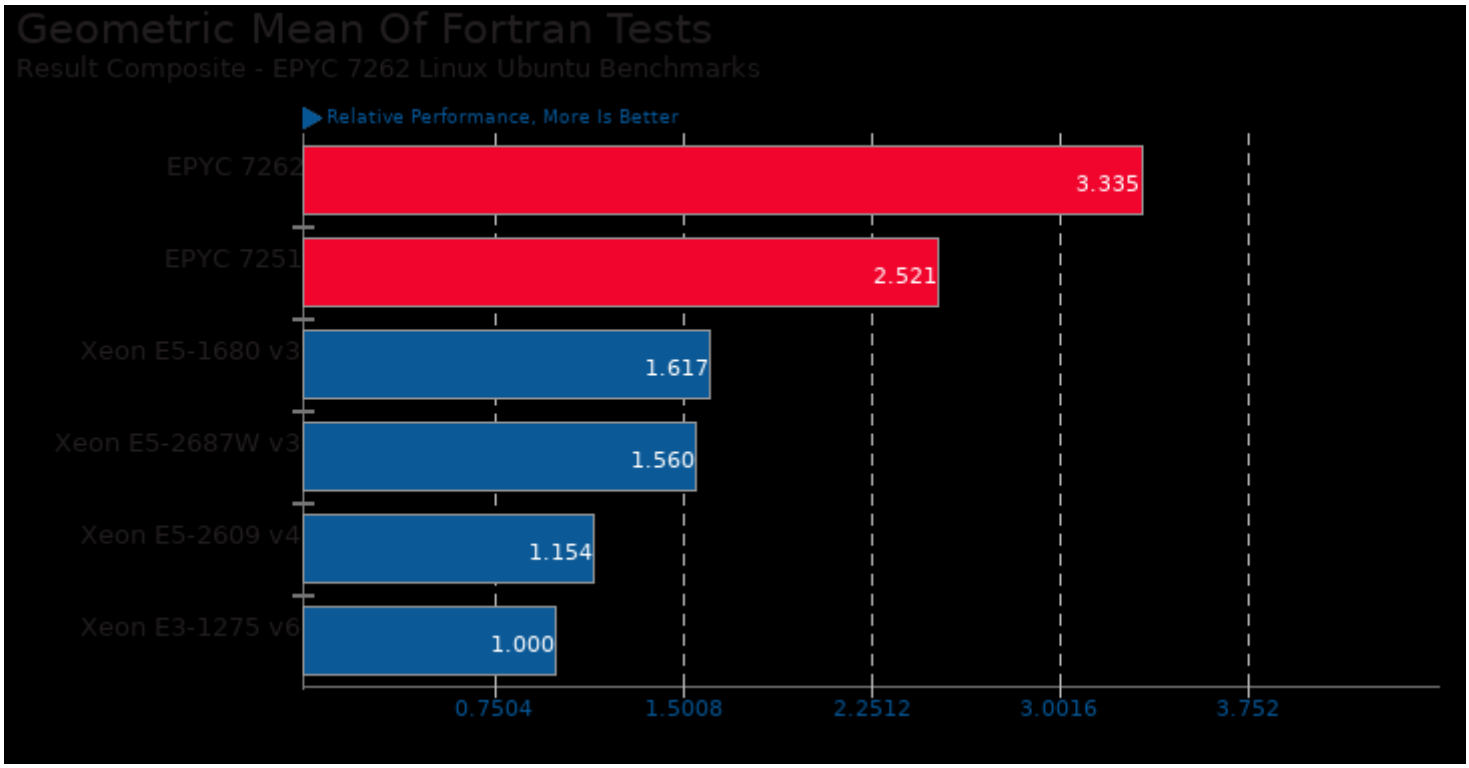
Geometric mean based upon tests: pts/compress-7zip and pts/compress-zstd



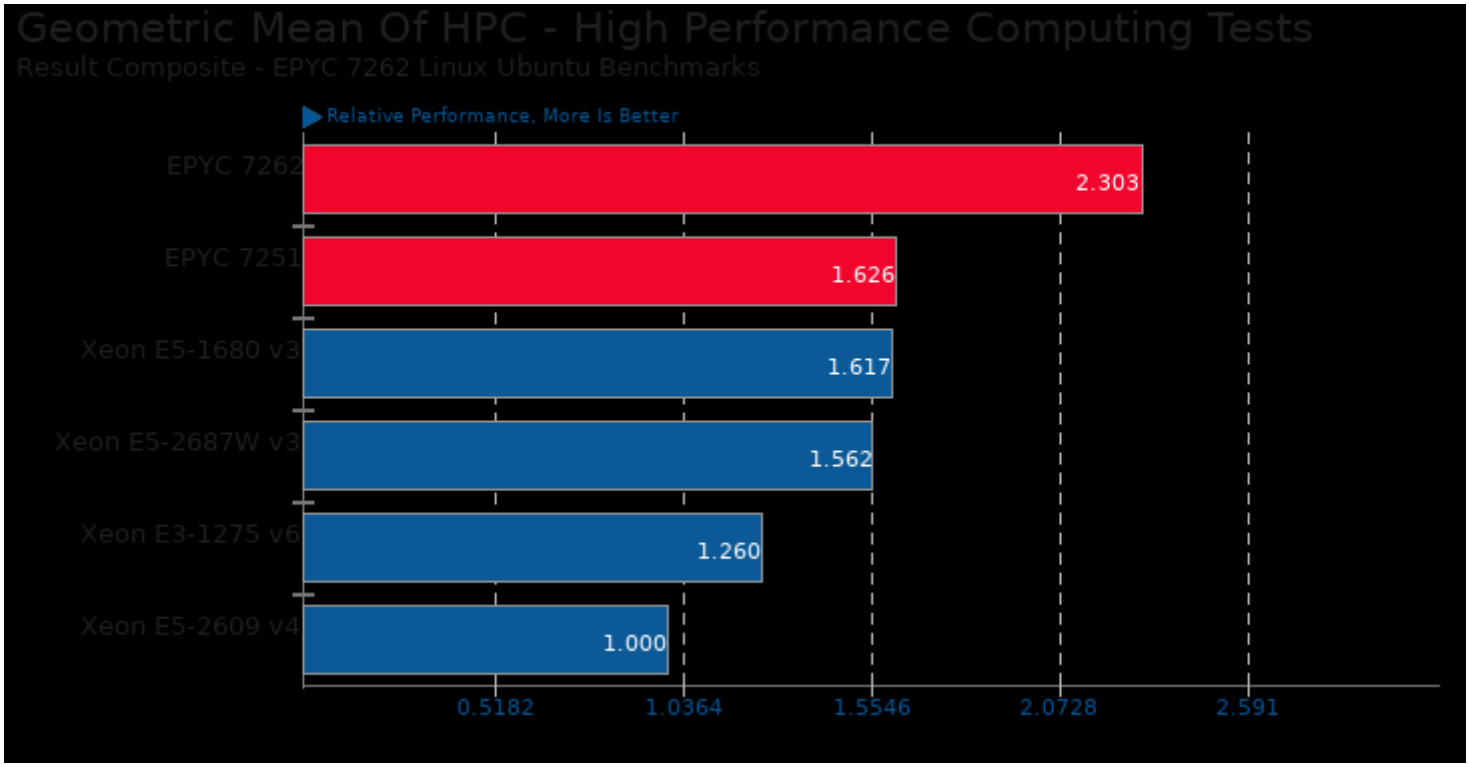
Geometric mean based upon tests: pts/c-ray, pts/tachyon, pts/rays1bench, pts/blender, pts/tungsten, pts/appleseed, pts/radiance, pts/luxcorerender, pts/v-ray, pts/svt-vp9, pts/x264, pts/x265, pts/vpxenc, pts/dav1d, pts/svt-av1, pts/encode-flac and system/rawtherapee



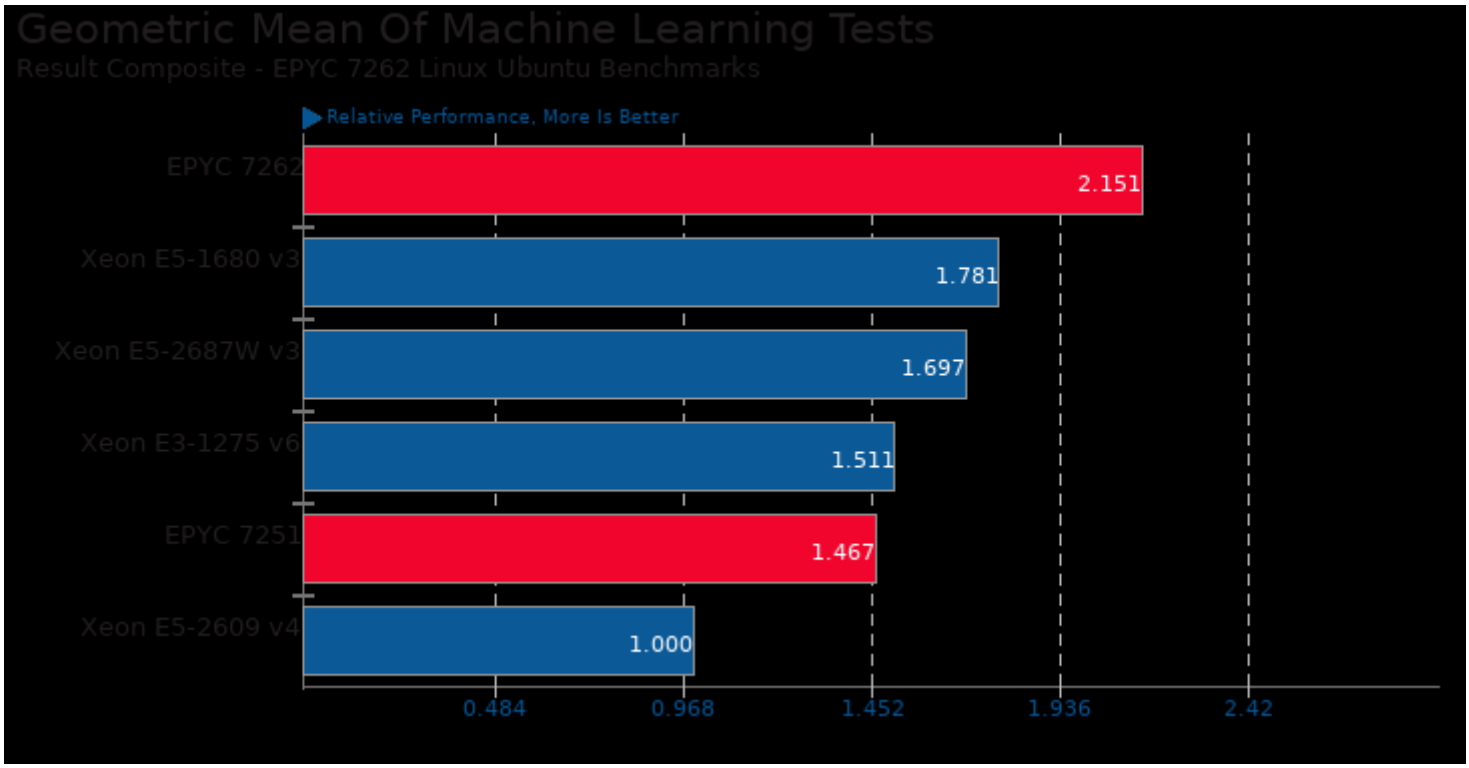
Geometric mean based upon tests: pts/encode-flac, pts/svt-vp9, pts/x264, pts/x265, pts/vpxenc, pts/dav1d and pts/svt-av1



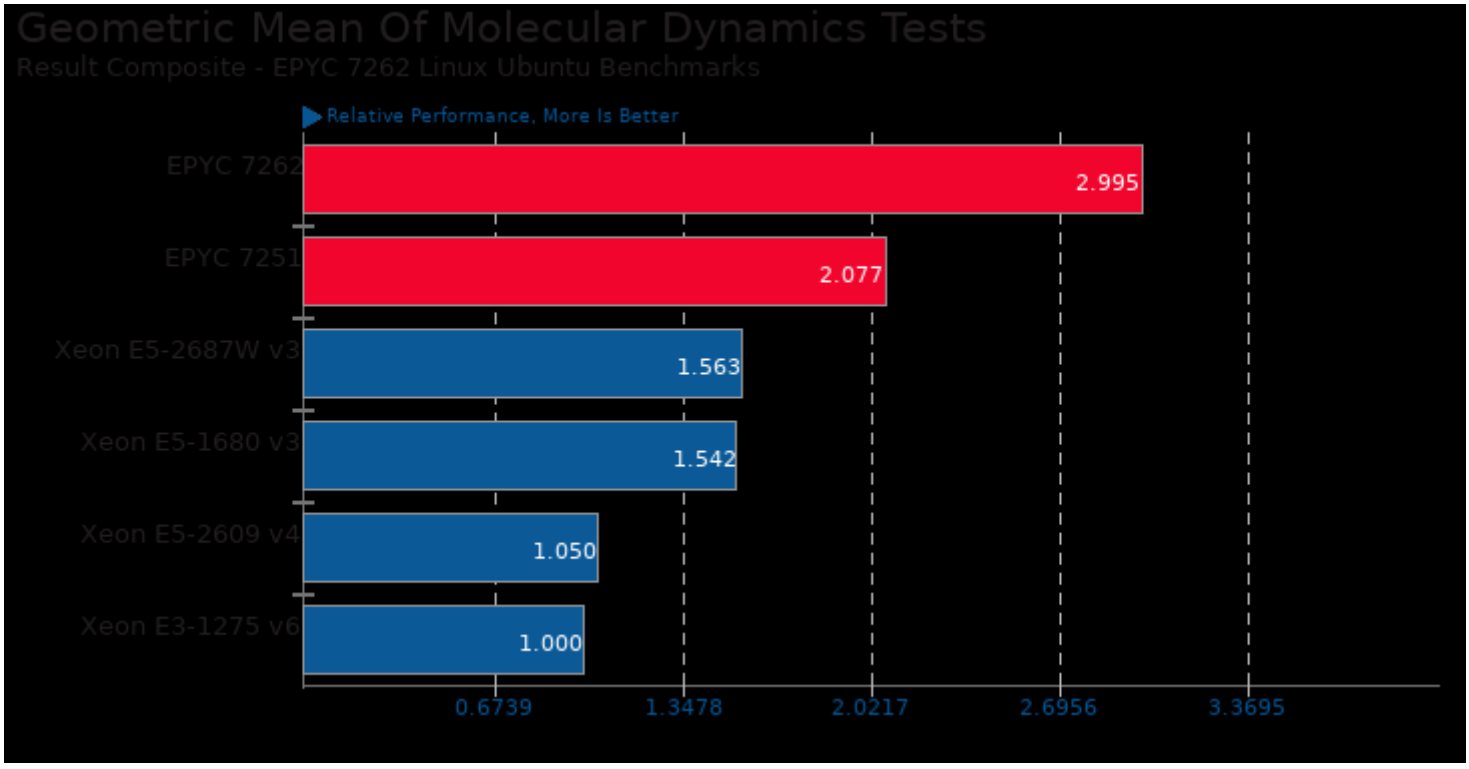
Geometric mean based upon tests: pts/hpcg, pts/npb, pts/cloverleaf and pts/lammps



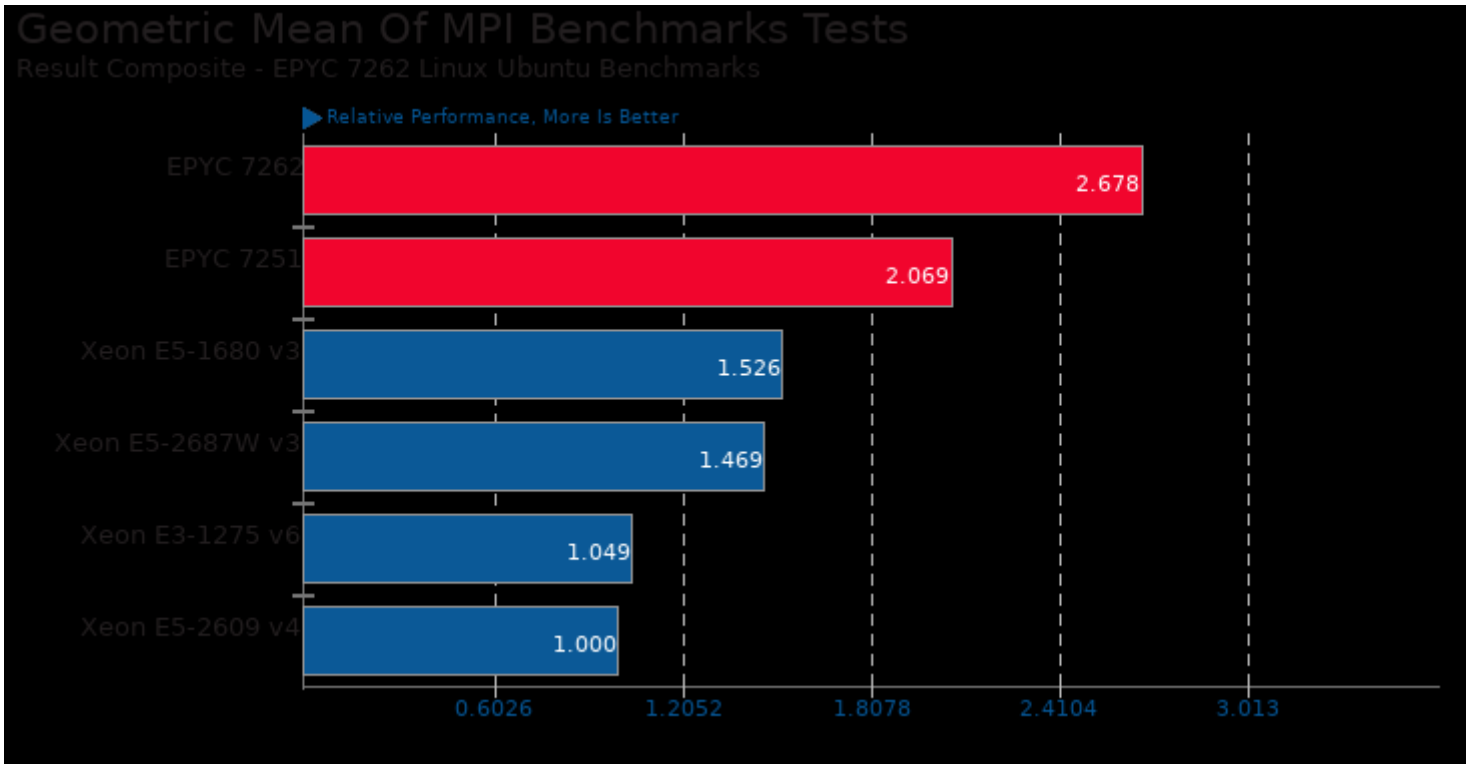
Geometric mean based upon tests: pts/npb, pts/hpcg, pts/neat, pts/mt-dgemm, pts/cloverleaf, pts/lammps, pts/himeno, pts/mrbayes, pts/numpy, pts/scikit-learn, pts/mlpack and pts/numenta-nab



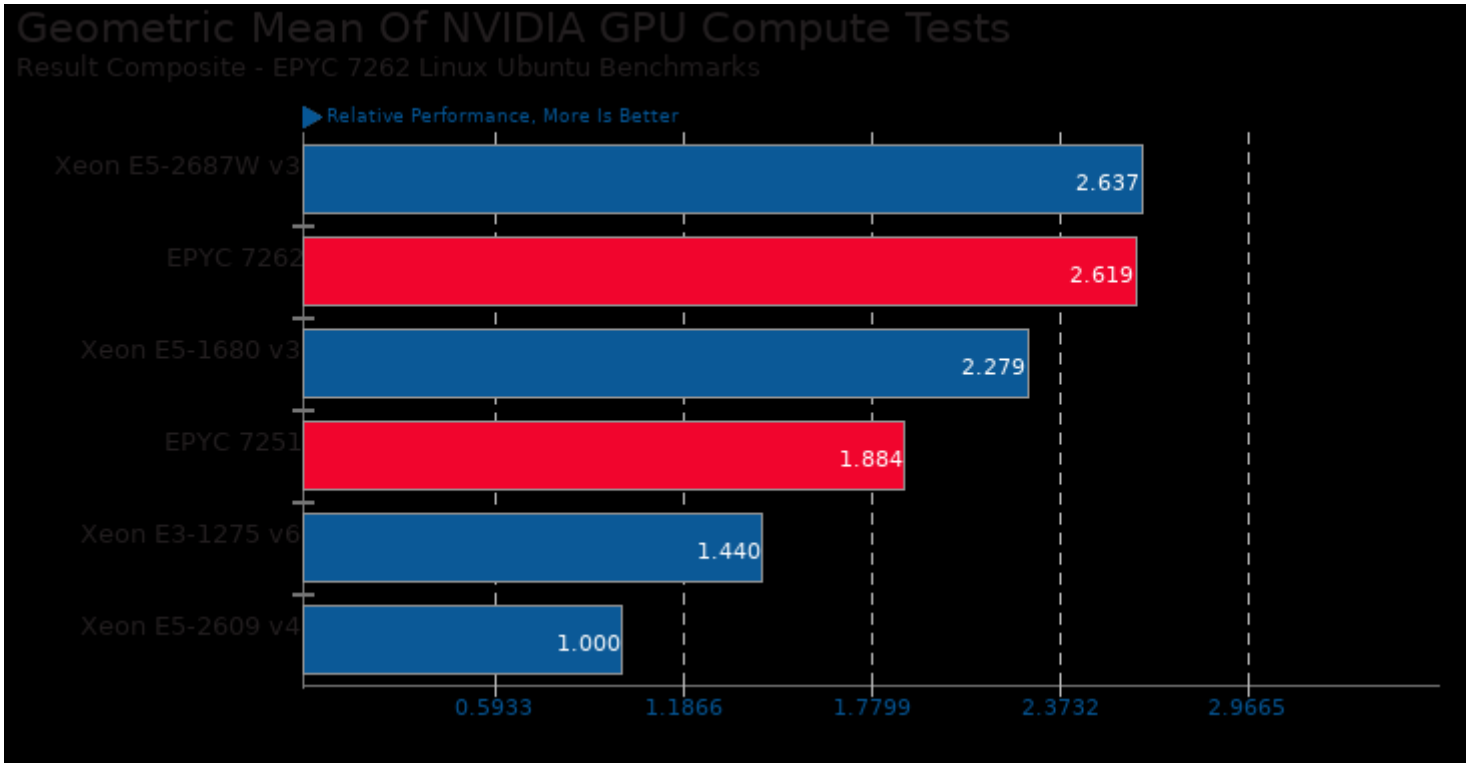
Geometric mean based upon tests: pts/numpy, pts/scikit-learn, pts/mlpack and pts/numenta-nab



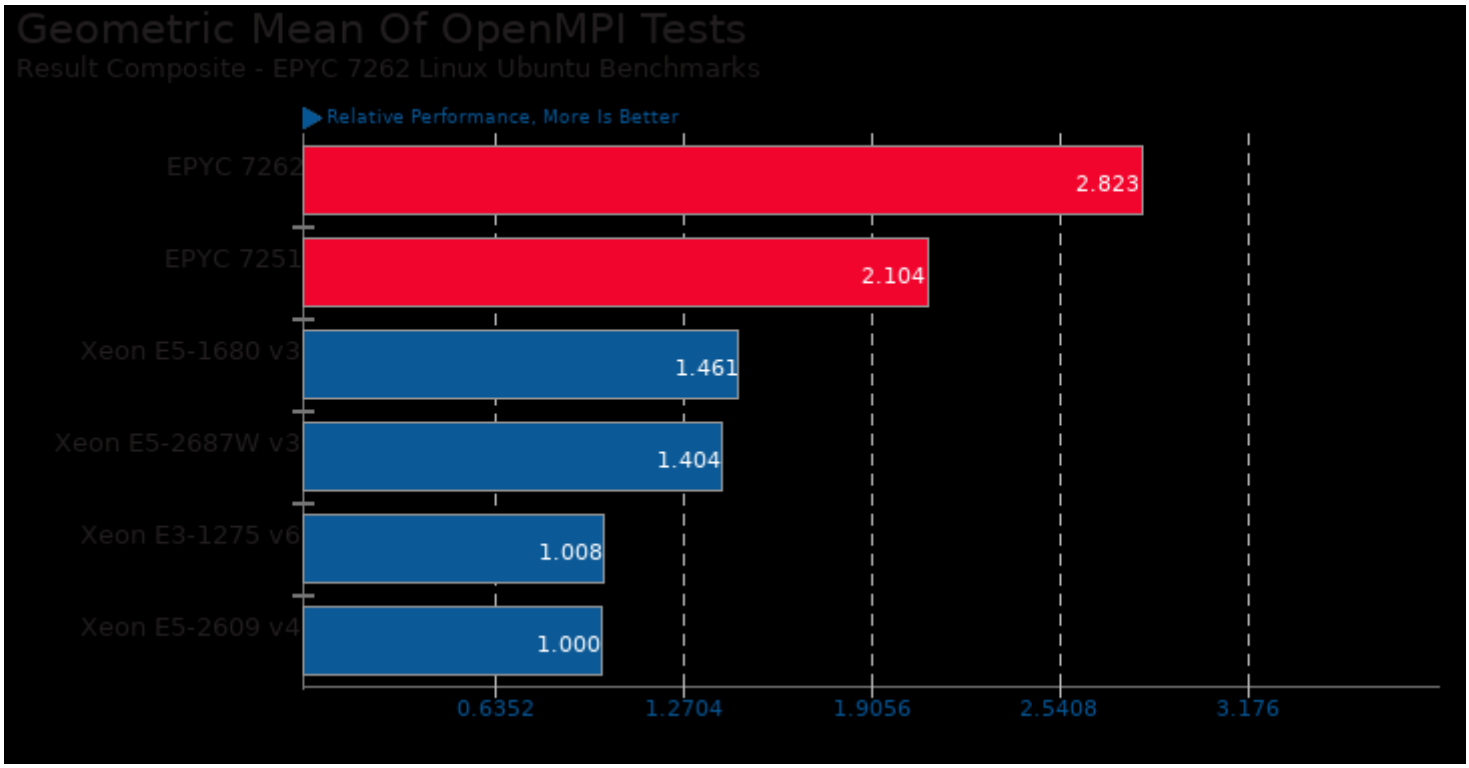
Geometric mean based upon tests: pts/cloverleaf and pts/lammps



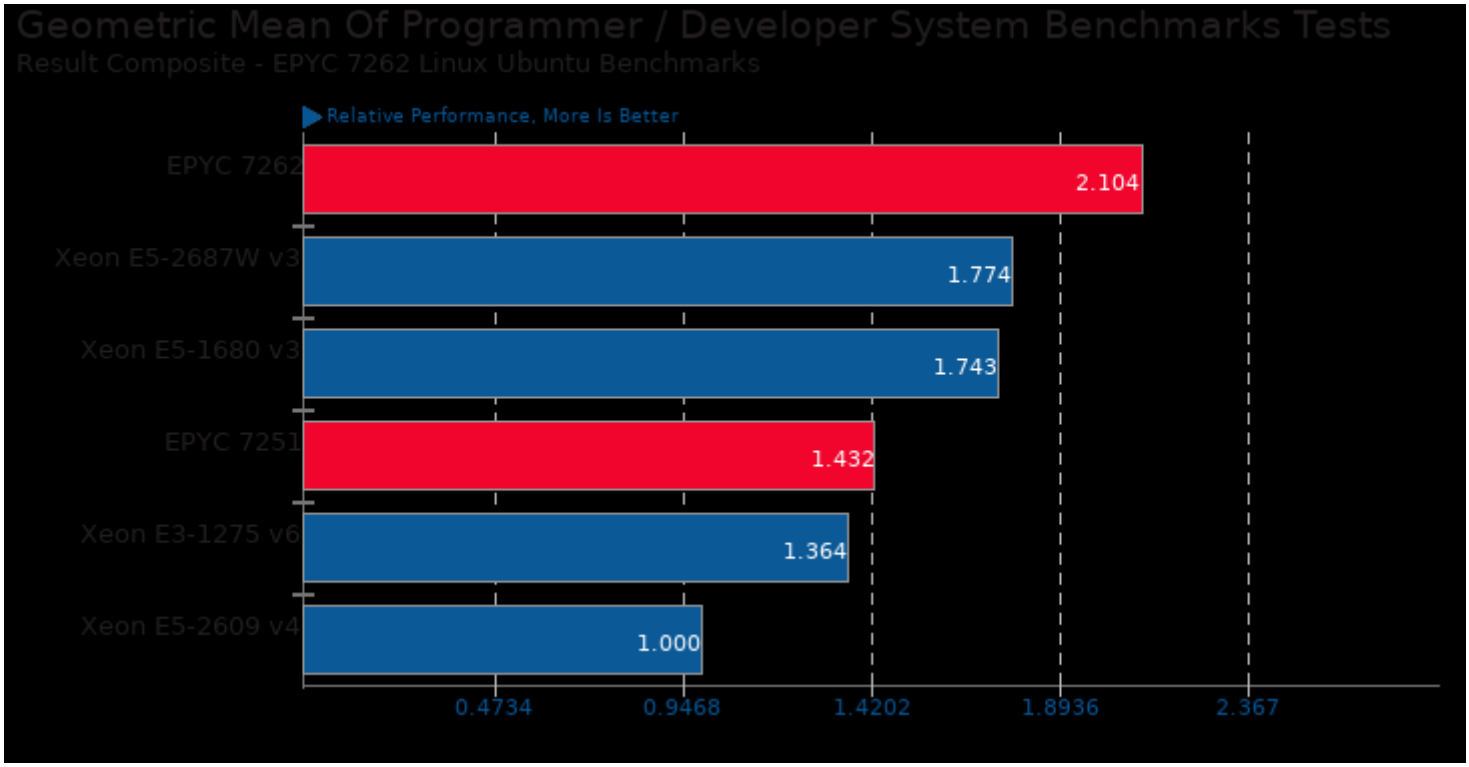
Geometric mean based upon tests: pts/lammps, pts/hpcg, pts/mrbayes and pts/npb



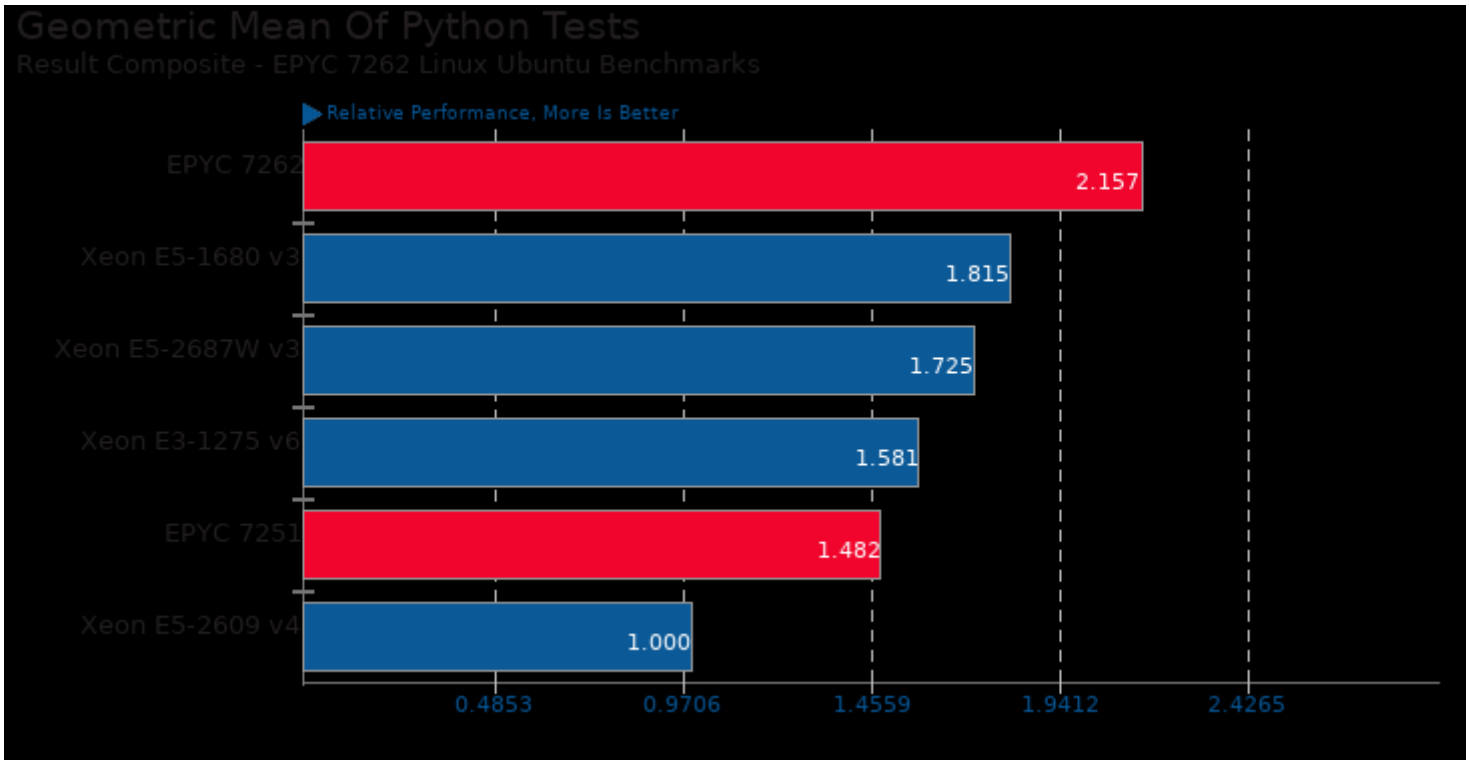
Geometric mean based upon tests: pts/luxcorerender, pts/v-ray and pts/blender



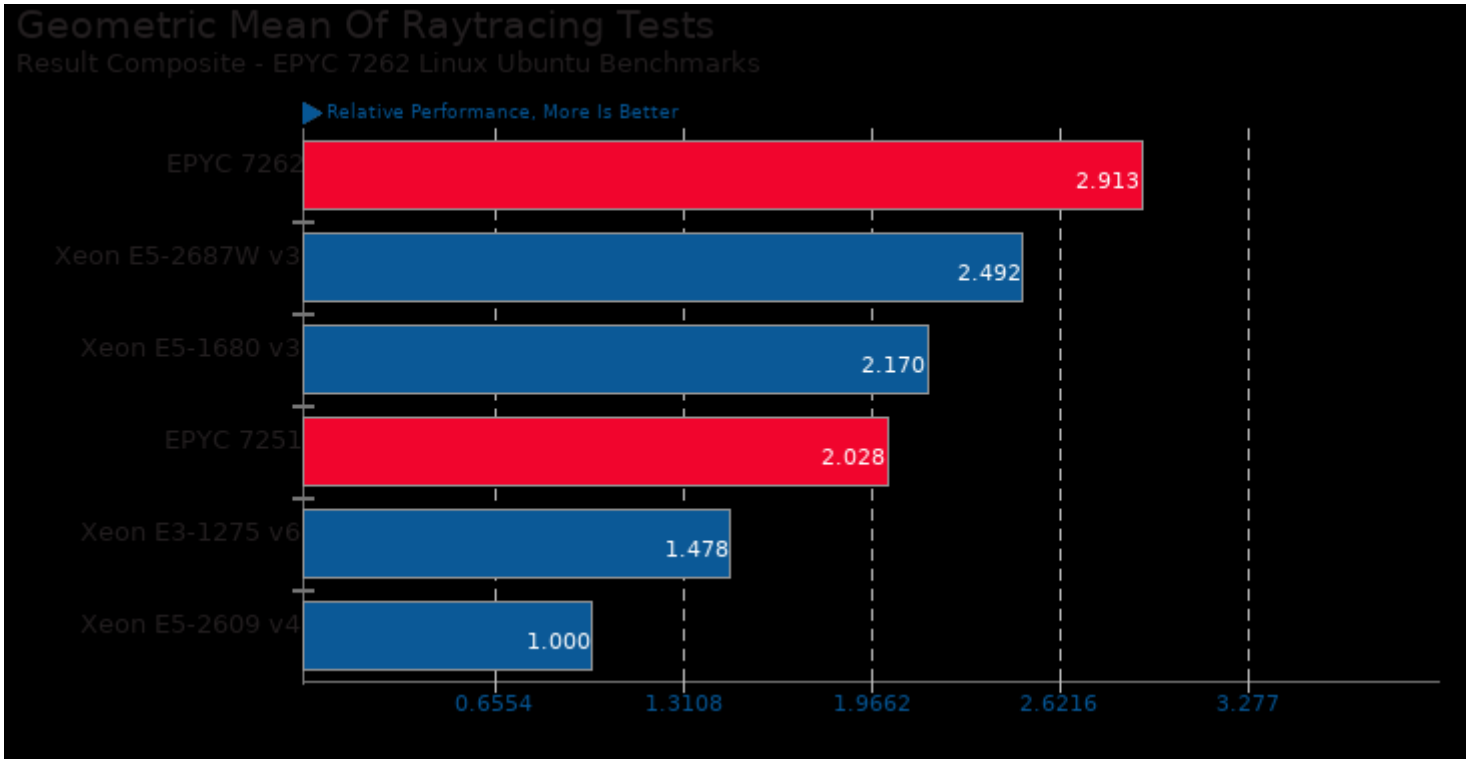
Geometric mean based upon tests: pts/hpcg, pts/npb, pts/cloverleaf, pts/mrbayes and pts/lammps



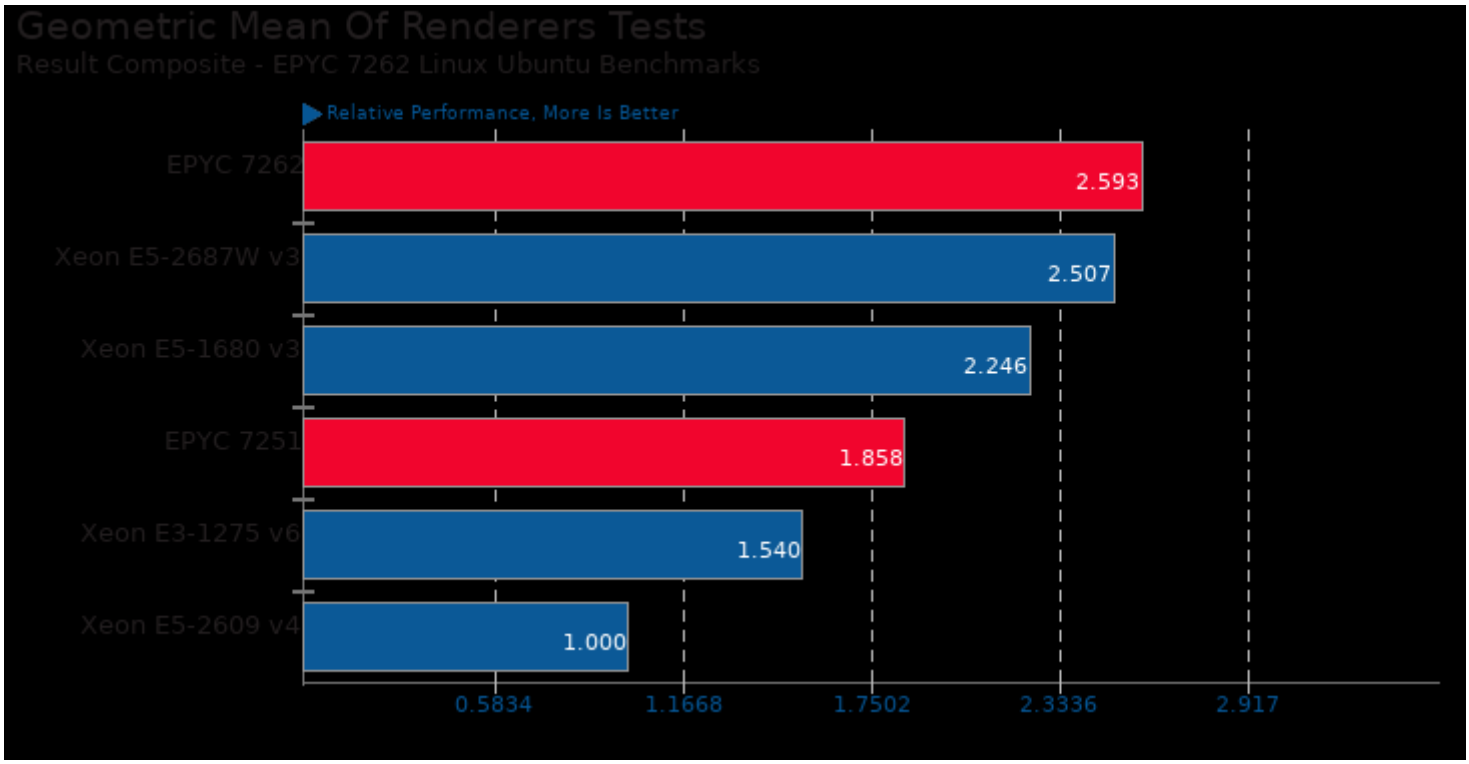
Geometric mean based upon tests: pts/compress-zstd, pts/pybench, pts/build-apache, pts/build-php, pts/build-linux-kernel, pts/build-gdb, pts/build-mplayer, pts/build2 and pts/mt-dgemm



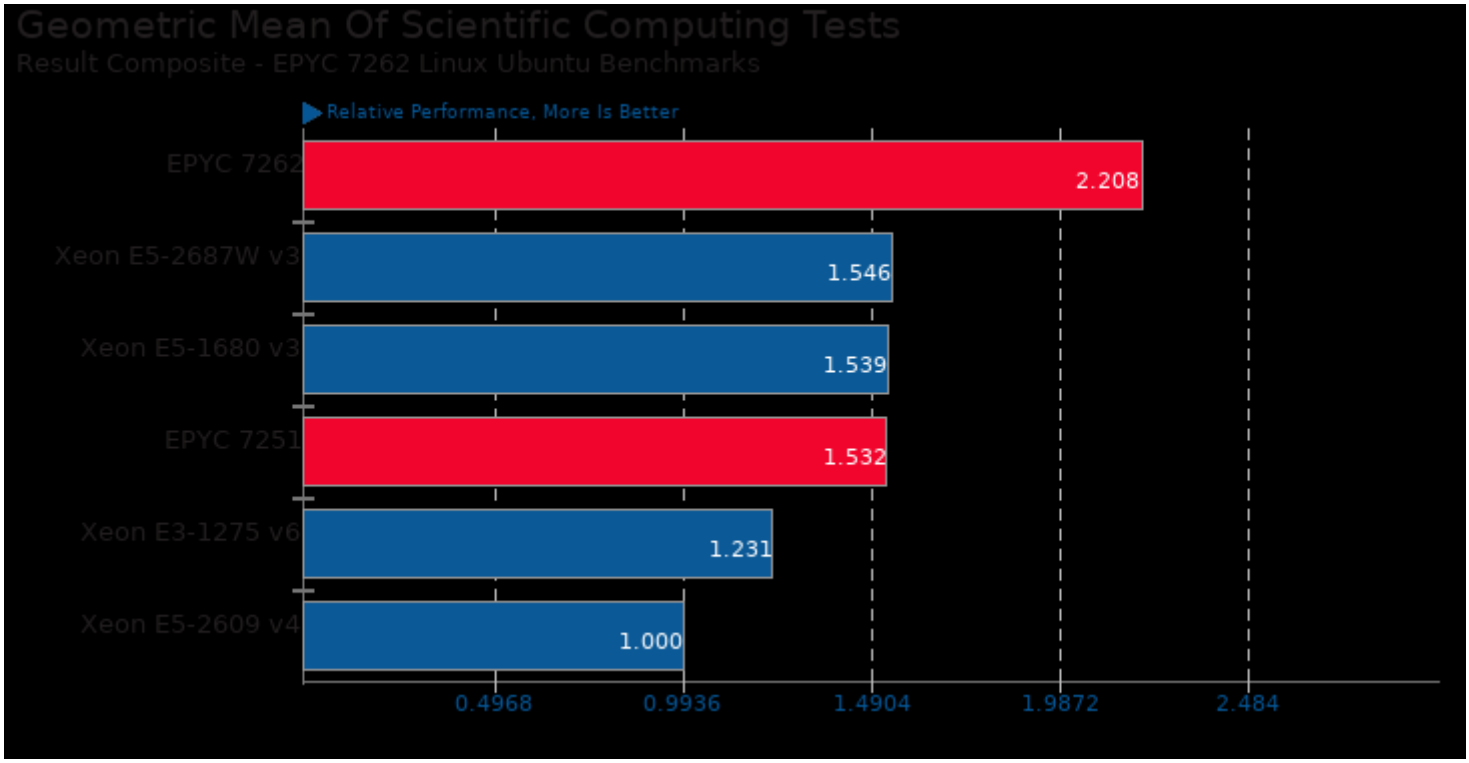
Geometric mean based upon tests: pts/pybench, pts/numenta-nab, pts/numpy, pts/mlpack and pts/scikit-learn



Geometric mean based upon tests: pts/c-ray, pts/tachyon and pts/rays1bench



Geometric mean based upon tests: pts/c-ray, pts/tachyon, pts/rays1bench, pts/blender, pts/tungsten, pts/appleseed, pts/radiance, pts/luxcorerender and pts/v-ray



Geometric mean based upon tests: pts/neat, pts/mt-dgemm, pts/cloverleaf, pts/lammps, pts/himeno and pts/mrbayes

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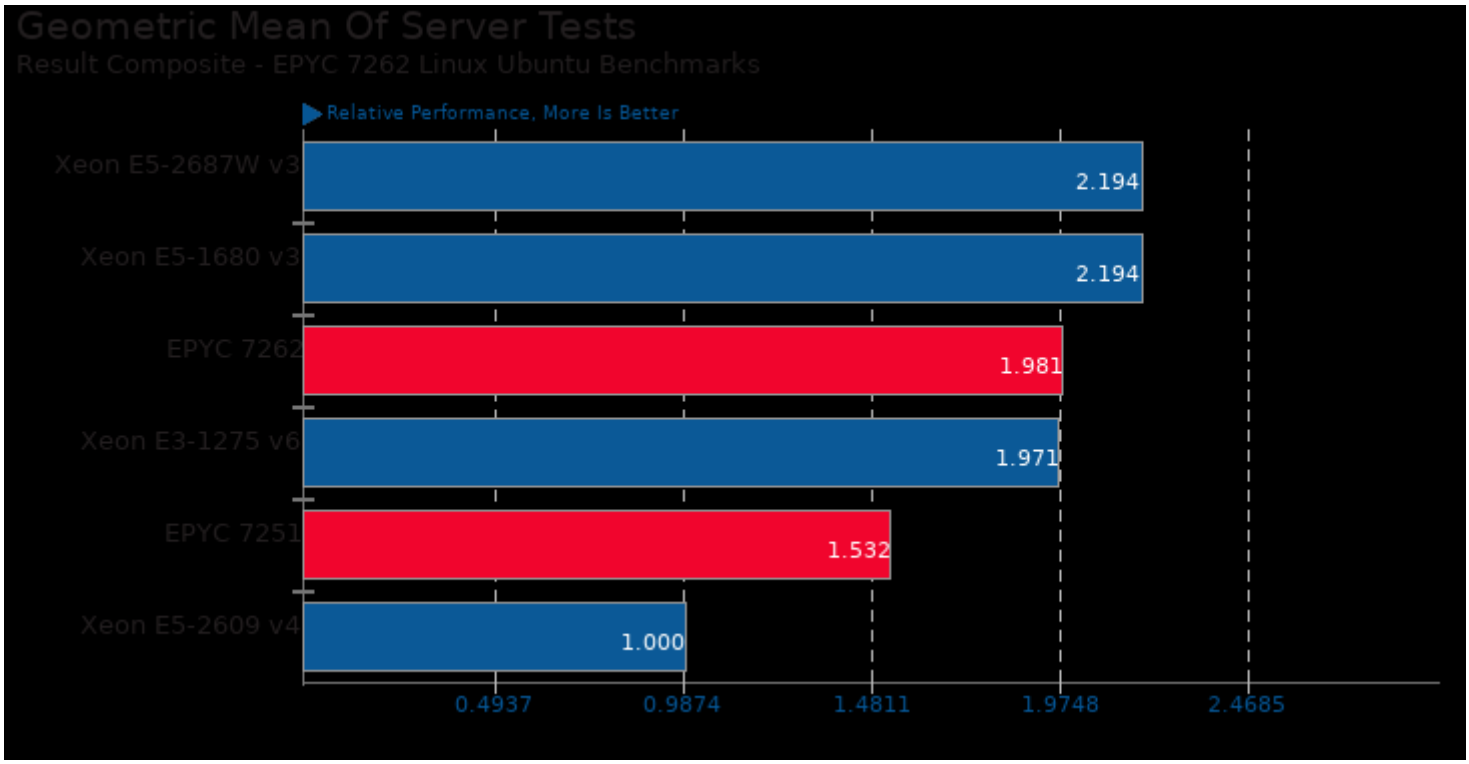
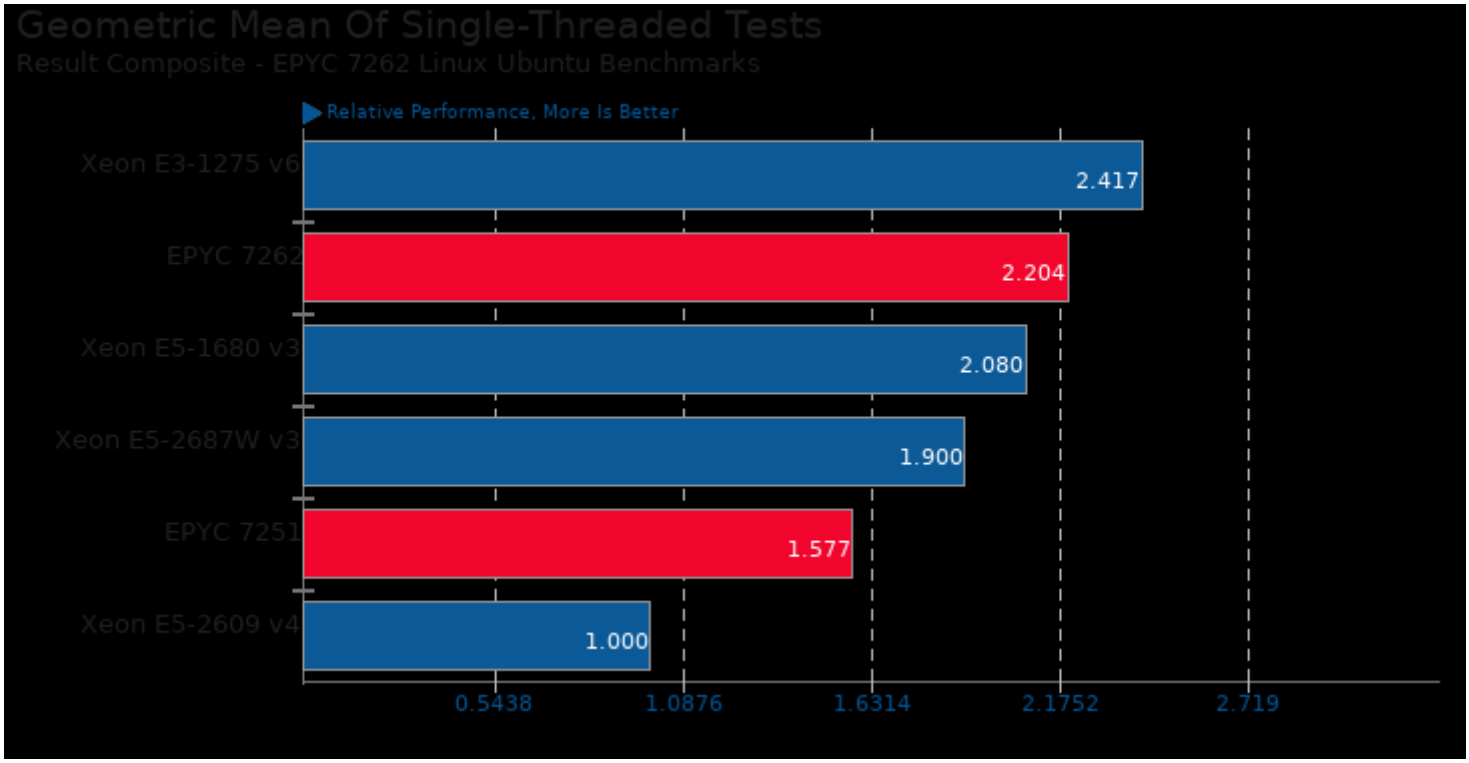


Geometric mean based upon tests: pts/pgbench and pts/phpbench



Geometric mean based upon tests: pts/numpy, pts/encode-flac, pts/radiance, pts/pybench and pts/phpbench

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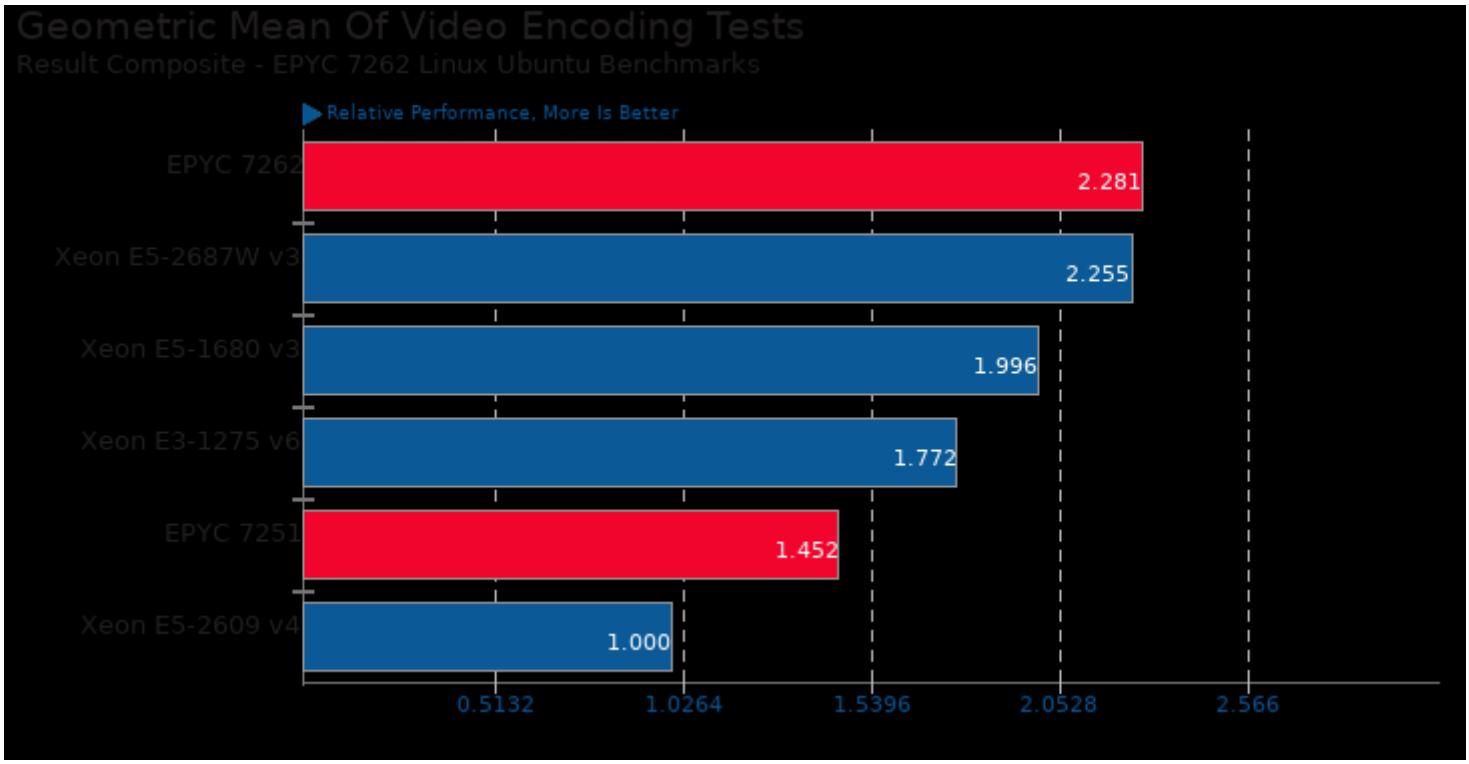
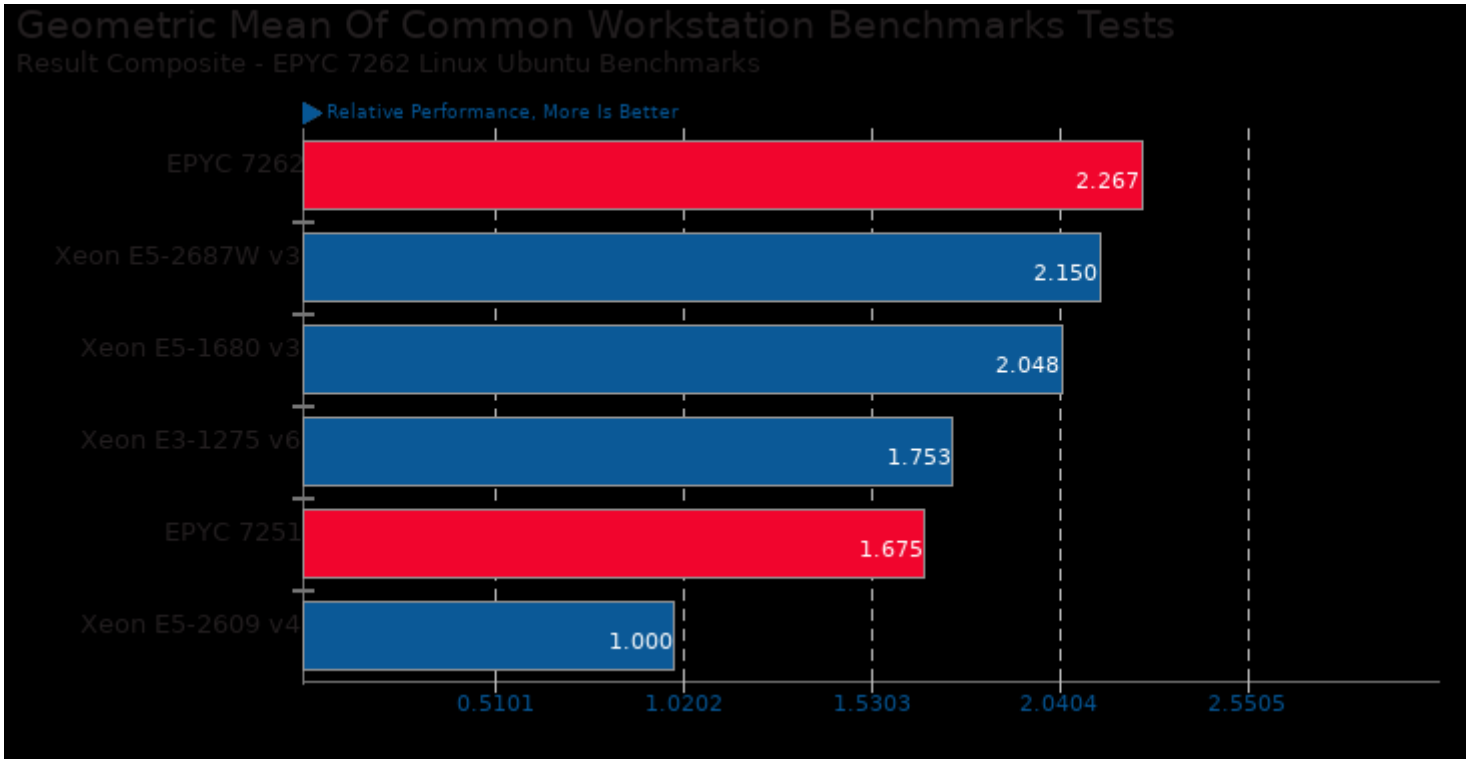


Geometric mean based upon tests: pts/svt-vp9, pts/x264, pts/x265, pts/vpxenc, pts/dav1d and pts/svt-av1



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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 07:41.