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AMD EPYC vs. Intel Xeon CPUs Linux Ubuntu Benchmarks

dell1

Automated Executive Summary

2 x Intel Xeon Gold 6138 had the most wins, coming in first place for 66% of the tests.

Based on the geometric mean of all complete results, the fastest (2 x Intel Xeon Gold 6138) was 5.832x the speed of the slowest (Intel Xeon E5-2609 v4).

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

Rodinia (Test: OpenMP LavaMD) at 14.629x
John The Ripper (Test: Blowfish) at 11.924x
ebizzy at 11.306x
NAS Parallel Benchmarks (Test / Class: EP.C) at 9.694x
Java JMH (Throughput) at 9.155x
Tachyon (Total Time) at 8.941x
OpenSSL (RSA 4096-bit Performance) at 8.636x
7-Zip Compression (Compress Speed Test) at 8.584x
asmFish (1024 Hash Memory, 26 Depth) at 8.53x
PostgreSQL pgbench (Scaling: Buffer Test - Test: Normal Load - Mode: Read Only) at 7.997x.

Test Systems:

AMD EPYC 7251

Processor: AMD EPYC 7251 8-Core @ 2.10GHz (8 Cores / 16 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance

AMD EPYC 7351P

Processor: AMD EPYC 7351P 16-Core @ 2.40GHz (16 Cores / 32 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance

AMD EPYC 7401P

Processor: AMD EPYC 7401P 24-Core @ 2.00GHz (24 Cores / 48 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance

AMD EPYC 7551

Processor: AMD EPYC 7551 32-Core @ 2.00GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 113664MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting

1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance

AMD EPYC 7601

Processor: AMD EPYC 7601 32-Core @ 2.20GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR, Chipset: AMD Device 1450, Memory: 129024MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance

Intel Xeon E3-1245 v5

Processor: Intel Xeon E3-1245 v5 @ 3.90GHz (4 Cores / 8 Threads), Motherboard: MSI C236A WORKSTATION (MS-7998) v1.0, Chipset: Intel Skylake, Memory: 32768MB, Disk: 256GB Samsung SSD 850, Graphics: Intel HD P530 3072MB (1150MHz), Audio: Realtek ALC1150, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel Xeon E3-1280 v5

Processor: Intel Xeon E3-1280 v5 @ 4.00GHz (4 Cores / 8 Threads), Motherboard: MSI C236A WORKSTATION (MS-7998) v1.0, Chipset: Intel Skylake, Memory: 16384MB, Disk: 256GB Samsung SSD 850, Graphics: Sapphire AMD Radeon 4096MB, Audio: Realtek ALC1150, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel Xeon E5-1680 v3

Processor: Intel Xeon E5-1680 v3 @ 3.80GHz (8 Cores / 16 Threads), Motherboard: ASUS X99-A, Chipset: Intel Xeon E7 v3/Xeon, Memory: 16384MB, Disk: 256GB Samsung SSD 850, Graphics: eVGA NVIDIA GeForce GT 740 1024MB, Audio: Realtek ALC1150, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel Xeon E5-2609 v4

Processor: Intel Xeon E5-2609 v4 @ 1.70GHz (8 Cores), Motherboard: MSI X99A RAIDER (MS-7885) v5.0, Chipset: Intel Xeon E7 v4/Xeon, Memory: 16384MB, Disk: 256GB Samsung SSD 850, Graphics: Sapphire AMD Radeon HD 6570/7570/8550 512MB, Audio: Realtek ALC892, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel 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, Chipset: Intel Xeon E7 v3/Xeon, Memory: 32768MB, Disk: 256GB Samsung SSD 850, Graphics: NVIDIA GeForce GTX 770 2048MB, Audio: Realtek ALC892, Network: Intel Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel Xeon Silver 4108

Processor: Intel Xeon Silver 4108 @ 3.00GHz (8 Cores / 16 Threads), Motherboard: TYAN S7100AG2NR, Chipset: Intel Device 2020, Memory: 23552MB, Disk: 256GB Samsung SSD 850, Graphics: llvmpipe 22784MB, Audio: Realtek ALC892, Network: Intel I350 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

Environment Notes: GJS_DEBUG_TOPICS=JS ERROR;JS LOG GJS_DEBUG_OUTPUT=stderr
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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix

--host=x86_64-linScreenux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

Intel Xeon Gold 6138

Processor: Intel Xeon Gold 6138 @ 3.70GHz (20 Cores / 40 Threads), Motherboard: TYAN S7106, Chipset: Intel Device 2020, Memory: 96256MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Intel I210 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

2 x Intel Xeon Gold 6138

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106, Chipset: Intel Device 2020, Memory: 96256MB, Disk: 256GB Samsung SSD 850, Graphics: ASPEED ASPEED Family, Network: Intel I210 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.13.6-041306-generic (x86_64), Desktop: GNOME Shell 3.26.1, Display Driver: modesetting 1.19.4, Compiler: GCC 7.2.0, File-System: ext4

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance

AMD EPYC DUAL 7401

Processor: 2 x AMD EPYC 7401 24-Core @ 2.00GHz (96 Cores), Motherboard: Supermicro H11DSU-iN, Chipset: AMD Device 1450, Memory: 7.875 x 32768 MB DDR4-2400MT/s, Disk: 4 x 800GB TOSHIBA THNSN880 + 2 x 63GB SuperMicro SSD, Graphics: ASPEED ASPEED Family, Network: Intel I350 Gigabit Connection

OS: Ubuntu 17.10, Kernel: 4.13.0-16-generic (x86_64), Desktop: GNOME Shell 3.26.1, Compiler: GCC 7.2.0, File-System: ext4, Screen Resolution: 1024x768

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand

dell1

Processor: 2 x Intel Xeon E5-2697 v3 @ 3.60GHz (28 Cores / 56 Threads), Motherboard: Dell 02C2CP (2.8.0 BIOS), Chipset: Intel Xeon E7 v3/Xeon, Memory: 16 x 32 GB DDR4-2133MT/s M386A4G40DM0-CPB, Disk: 2 x 3841GB INTEL SSDSC2KB03 + 239GB PERC H730 Mini, Graphics: Matrox G200eR2, Network: 2 x Intel 82599ES 10-Gigabit SFI/SFP+ + 2 x Intel I350

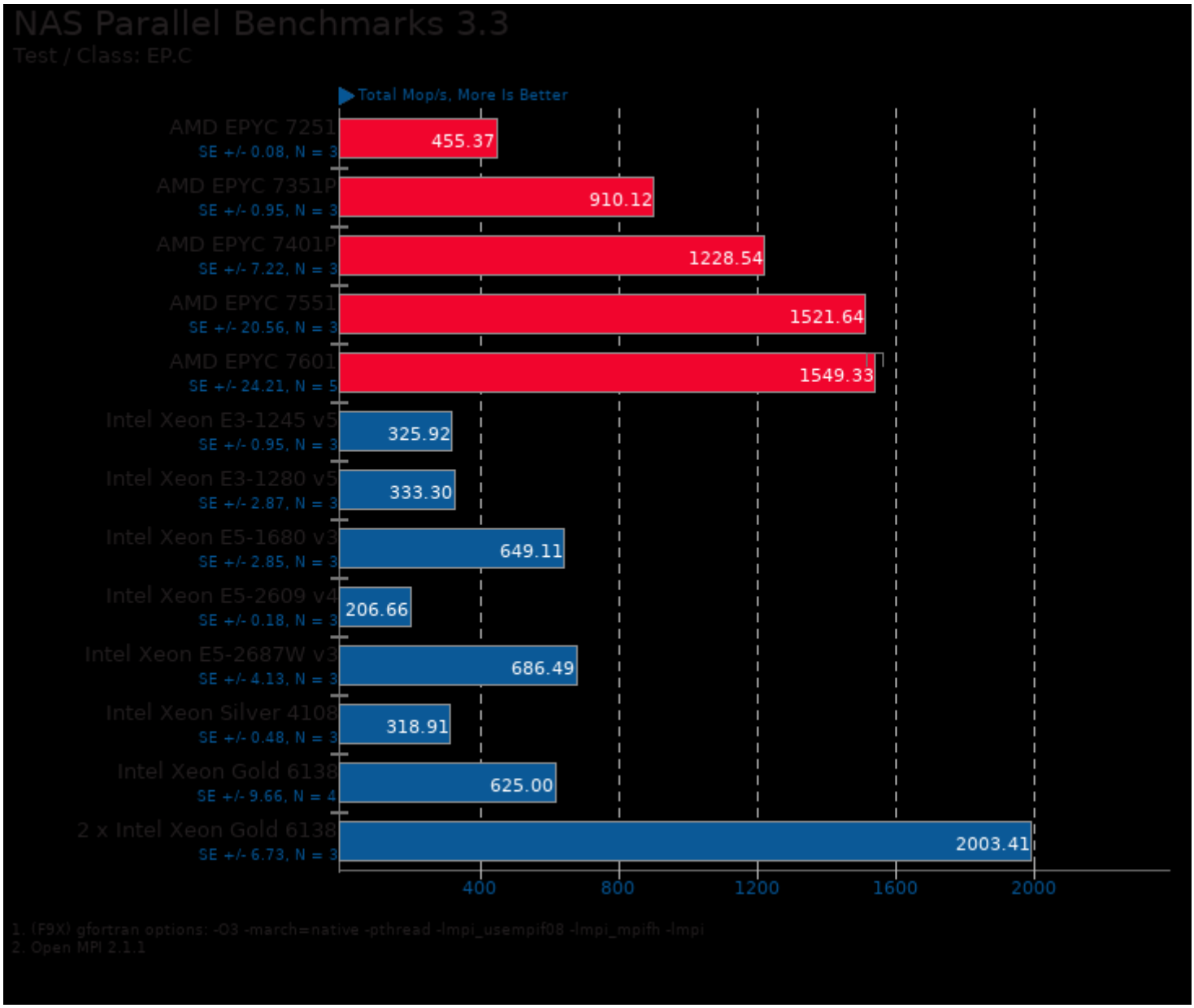
OS: Ubuntu 18.04, Kernel: 4.15.0-66-generic (x86_64), Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 1024x768

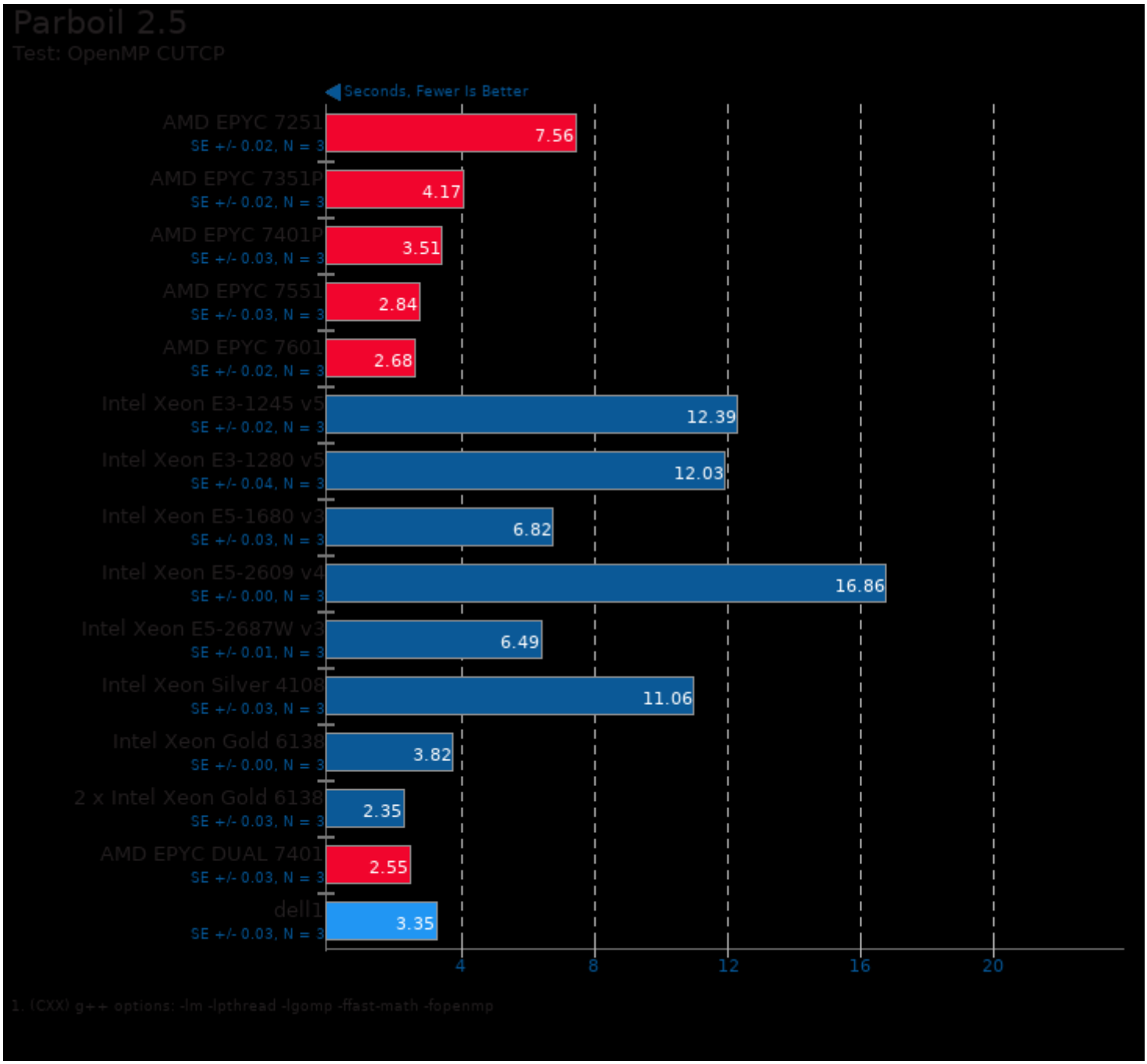
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu218.04.3)
Python Notes: Python 2.7.15+ + Python 3.6.8
Security Notes: 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

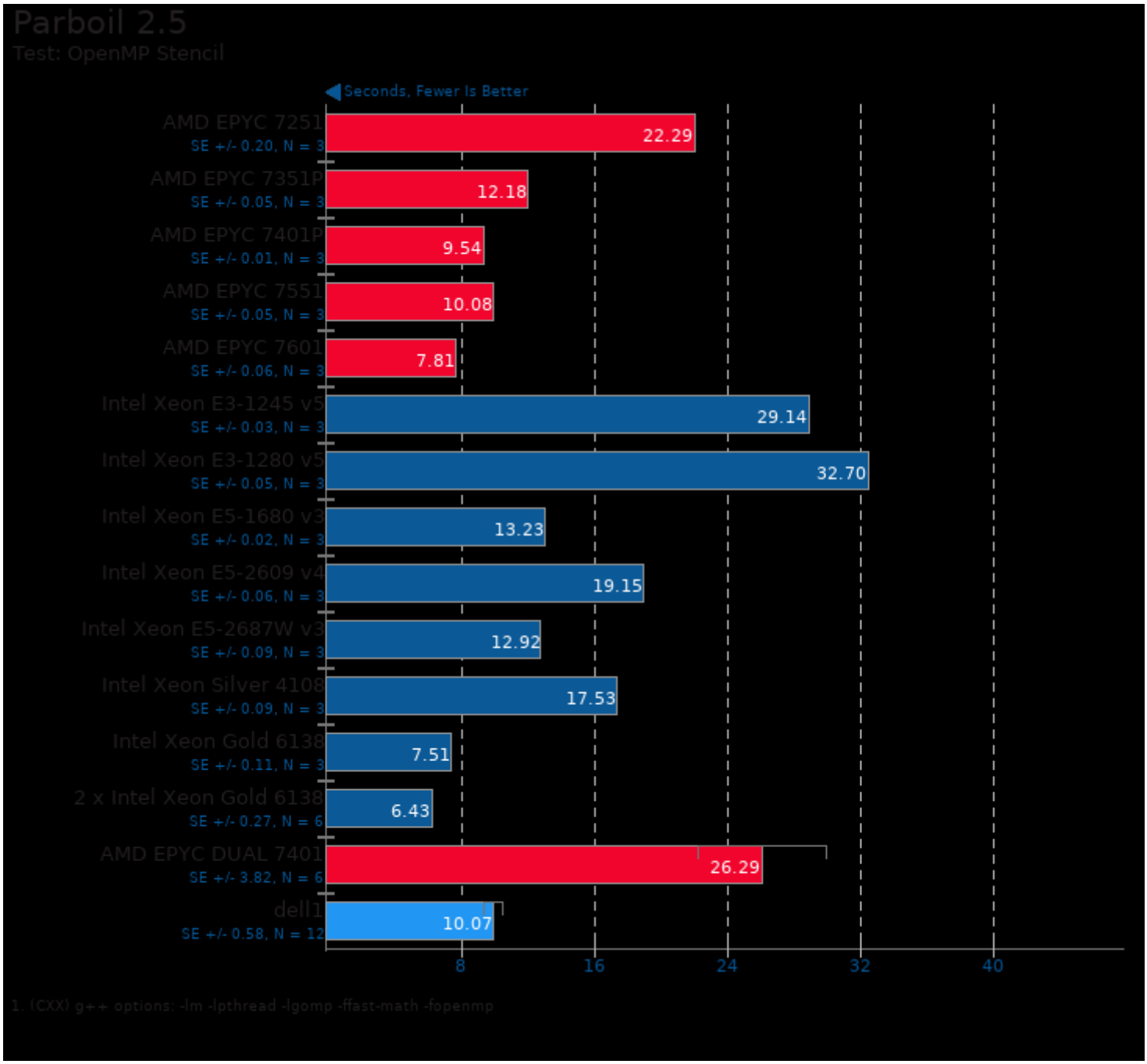
	AMD EPYC 7251	AMD EPYC 7351P	AMD EPYC 7401P	AMD EPYC 7551	AMD EPYC 7601	Intel Xeon E3-1245 v5	Intel Xeon E3-1280 v5	Intel Xeon E5-1680 v3	Intel Xeon E5-2609 v4	Intel Xeon E5-2687W v3	Intel Xeon Silver 4108	Intel Xeon Gold 6138	2 x Intel Xeon Gold 6138	AMD EPYC DUAL 7401	dell1
NAS Parallel Benchmarks - EP.C	455.37	910.12	1229	1522	1549	325.92	333.30	649.11	206.66	686.49	318.91	625.00	2003		
Normalized	22.73%	45.43%	61.32%	75.95%	77.33%	16.27%	16.64%	32.4%	10.32%	34.27%	15.92%	31.2%	100%		
Standard Deviation	0%	0.2%	1%	2.3%	3.5%	0.5%	1.5%	0.8%	0.2%	1%	0.3%	3.1%	0.6%		
Parboil - OpenMP CUTCP (sec)	7.56	4.17	3.51	2.84	2.68	12.39	12.03	6.82	16.86	6.49	11.06	3.82	2.35	2.55	3.35
Normalized	31.08%	56.35%	66.95%	82.75%	87.69%	18.97%	19.53%	34.46%	13.94%	36.21%	21.25%	61.52%	100%	92.16%	70.15%
Standard Deviation	0.4%	0.8%	1.2%	2.1%	1%	0.3%	0.5%	0.7%	0%	0.3%	0.5%	0.2%	2%	2.1%	1.8%
Parboil - OpenMP Stencil (sec)	22.29	12.18	9.54	10.08	7.81	29.14	32.70	13.23	19.15	12.92	17.53	7.51	6.43	26.29	10.07
Normalized	28.85%	52.79%	67.4%	63.79%	82.33%	22.07%	19.66%	48.6%	33.58%	49.77%	36.68%	85.62%	100%	24.46%	63.85%
Standard Deviation	1.5%	0.7%	0.2%	0.8%	1.4%	0.2%	0.3%	0.2%	0.6%	1.2%	0.8%	2.4%	10.2%	35.6%	19.8%
Rodinia - OpenMP LavaMD	106.02	53.84	41.69	32.67	31.91	192.00	186.76	99.38	321.70	94.73	169.59	62.24	28.77	21.99	36.73
Normalized	20.74%	40.84%	52.75%	67.31%	68.91%	11.45%	11.77%	22.13%	6.84%	23.21%	12.97%	35.33%	76.43%	100%	59.87%
Standard Deviation	0.2%	1.9%	2%	0.4%	0.5%	0.2%	0.2%	0.4%	0.1%	0.3%	0.8%	0.3%	0.6%	1.8%	1%
John The Ripper - Blowfish (Real C/S)	9689	19417	26710	31608	33081	7099	7299	13482	4166	14125	8264	25487	49677	31536	34897
Normalized	19.5%	39.09%	53.77%	63.63%	66.59%	14.29%	14.69%	27.14%	8.39%	28.43%	16.64%	51.31%	100%	63.48%	70.25%
Standard Deviation	0.8%	0.6%	0.5%	7%	7%	0.1%	0.1%	0.1%		0.8%	0.3%	3.2%	4.9%	22.9%	1.1%

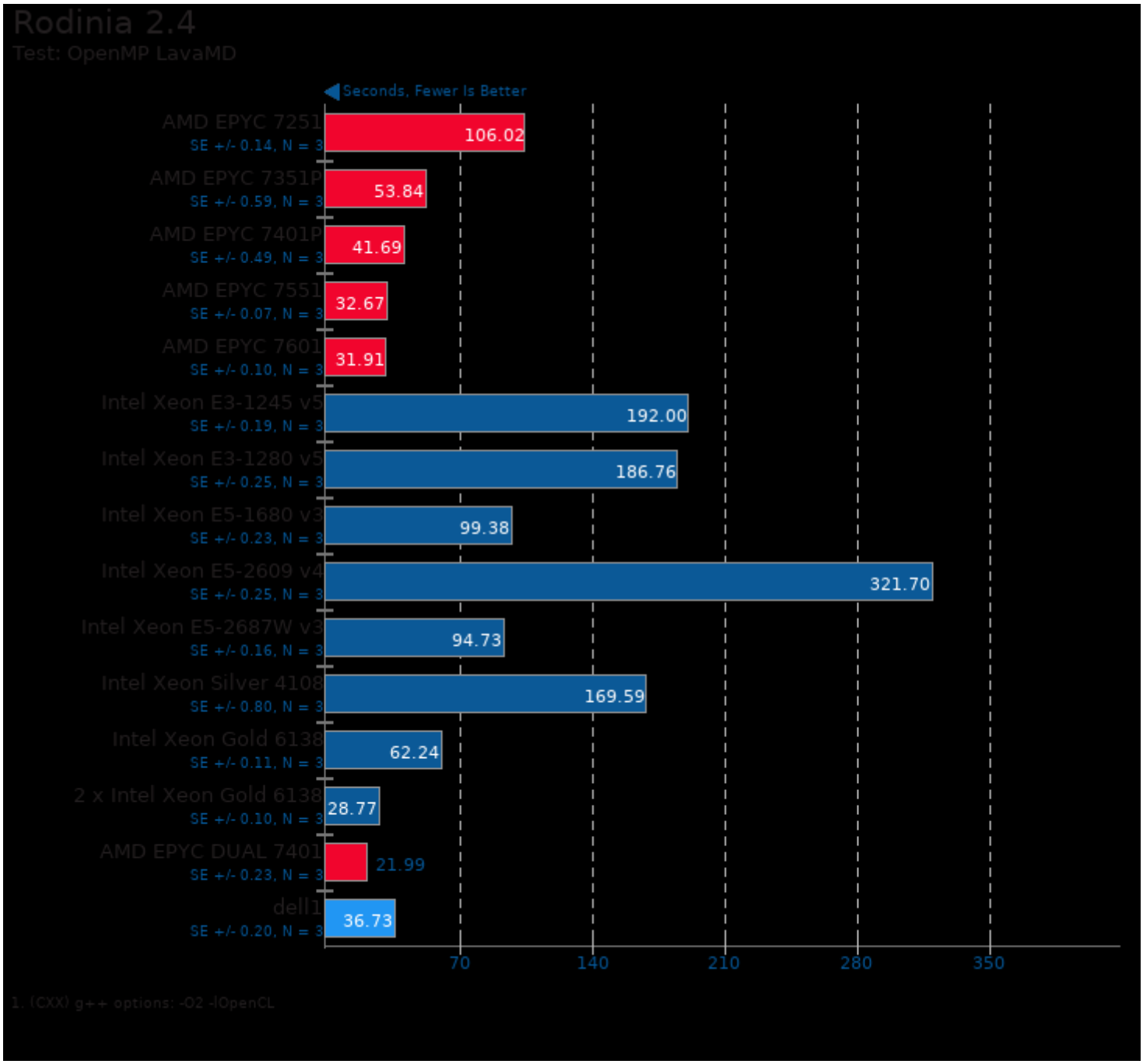
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	223.31	401.27	503.54	543.04	571.27	236.41	241.54	385.71	154.68	387.04	**128.43**	414.53	591.96	295.62	**667.25**
Normalized	33.47%	60.14%	75.46%	81.38%	85.62%	35.43%	36.2%	57.81%	23.18%	58.01%	19.25%	62.13%	88.72%	44.3%	100%
Standard Deviation	0.2%	0.1%	0.2%	0.5%	0.7%	0.2%	0.3%	0.2%	0.1%	0.4%	0.2%	0.3%	10.1%	8.4%	1.7%
x264 - H.2.V.E (FPS)	233.00	348.23	359.89	343.83	359.05	178.27	181.46	313.19	**119.80**	325.27	148.31	319.04	**390.65**	277.62	333.69
Normalized	59.64%	89.14%	92.13%	88.01%	91.91%	45.63%	46.45%	80.17%	30.67%	83.26%	37.96%	81.67%	100%	71.07%	85.42%
Standard Deviation	1.3%	1.1%	2.7%	0.9%	0.8%	2.6%	2.1%	1.4%	6.9%	3.3%	1.7%	4.2%	3.8%	1.9%	1%
7-Zip Compression - C.S.T (MIPS)	31385	60840	83272	89024	100817	22655	22799	42566	**16533**	45010	27907	81317	**141917**	94831	96240
Normalized	22.12%	42.87%	58.68%	62.73%	71.04%	15.96%	16.07%	29.99%	11.65%	31.72%	19.66%	57.3%	100%	66.82%	67.81%
Standard Deviation	1.8%	1.2%	1.2%	0.4%	0.9%	0.4%	1.8%	0.7%	0.2%	0.8%	0.5%	0.2%	1.7%	3.5%	2.6%
asmFish - 1.H.M.2.D (Nodes/s)	17473970	37192437	49109885	63280016	66596140	12920118	12936799	25225432	**9859939**	26665452	15086626	35850930	81148031	**84107041**	63745935
Normalized	20.78%	44.22%	58.39%	75.24%	79.18%	15.36%	15.38%	29.99%	11.72%	31.7%	17.94%	42.63%	96.48%	100%	75.79%
Standard Deviation	0.9%	1.6%	1.5%	1.8%	2.8%	1.2%	1.3%	1.2%	1.6%	2.9%	1.6%	1.5%	1.7%	0.7%	1.8%
ebizzy (Records/s)	399141	864714	999706	1058520	1164425	234891	238967	236792	**150019**	259701	216369	517002	960011	**1696104**	708592
Normalized	23.53%	50.98%	58.94%	62.41%	68.65%	13.85%	14.09%	13.96%	8.84%	15.31%	12.76%	30.48%	56.6%	100%	41.78%
Standard Deviation	7.2%	7.7%	5.3%	2.7%	0.9%	3.2%	3.4%	5.6%	3.1%	4.2%	5.8%	2.3%	4.8%	4.6%	5.2%
Timed Linux Kernel Compilation - Time To Compile	98.07	53.25	44.81	37.93	36.31	130.54	128.24	77.00	**173.24**	74.77	140.06	45.03	**27.60**	32.15	41.65
Normalized	28.14%	51.83%	61.59%	72.77%	76.01%	21.14%	21.52%	35.84%	15.93%	36.91%	19.71%	61.29%	100%	85.85%	66.27%
Standard Deviation	1.1%	2.8%	3.5%	3.3%	3.8%	0.6%	0.7%	2.2%	2.3%	1.7%	10.9%	2.4%	3.6%	6.2%	3.2%
Timed PHP Compilation - Time To Compile	89.23	72.64	71.31	72.86	67.33	83.48	82.75	65.96	**124.40**	71.52	106.74	57.03	**51.23**	67.50	59.45
Normalized	57.41%	70.53%	71.84%	70.31%	76.09%	61.37%	61.91%	77.67%	41.18%	71.63%	48%	89.83%	100%	75.9%	86.17%
Standard Deviation	1.1%	0.8%	1.5%	2.3%	4.1%	0.7%	0.3%	0.8%	0.4%	1.5%	27.4%	1.8%	1.1%	1.9%	1.2%
C-Ray - Total Time (sec)	10.61	5.34	3.81	3.72	3.50	16.88	16.44	9.44	22.75	8.97	**27.13**	10.31	8.17	**3.20**	4.63
Normalized	30.16%	59.93%	83.99%	86.02%	91.43%	18.96%	19.46%	33.9%	14.07%	35.67%	11.8%	31.04%	39.17%	100%	69.11%
Standard Deviation	0.2%	0.1%	2.2%	12.9%	16.9%	0.1%	0.1%	0%	0%	0.1%	1.8%	1.5%	46.2%	12.1%	1.1%

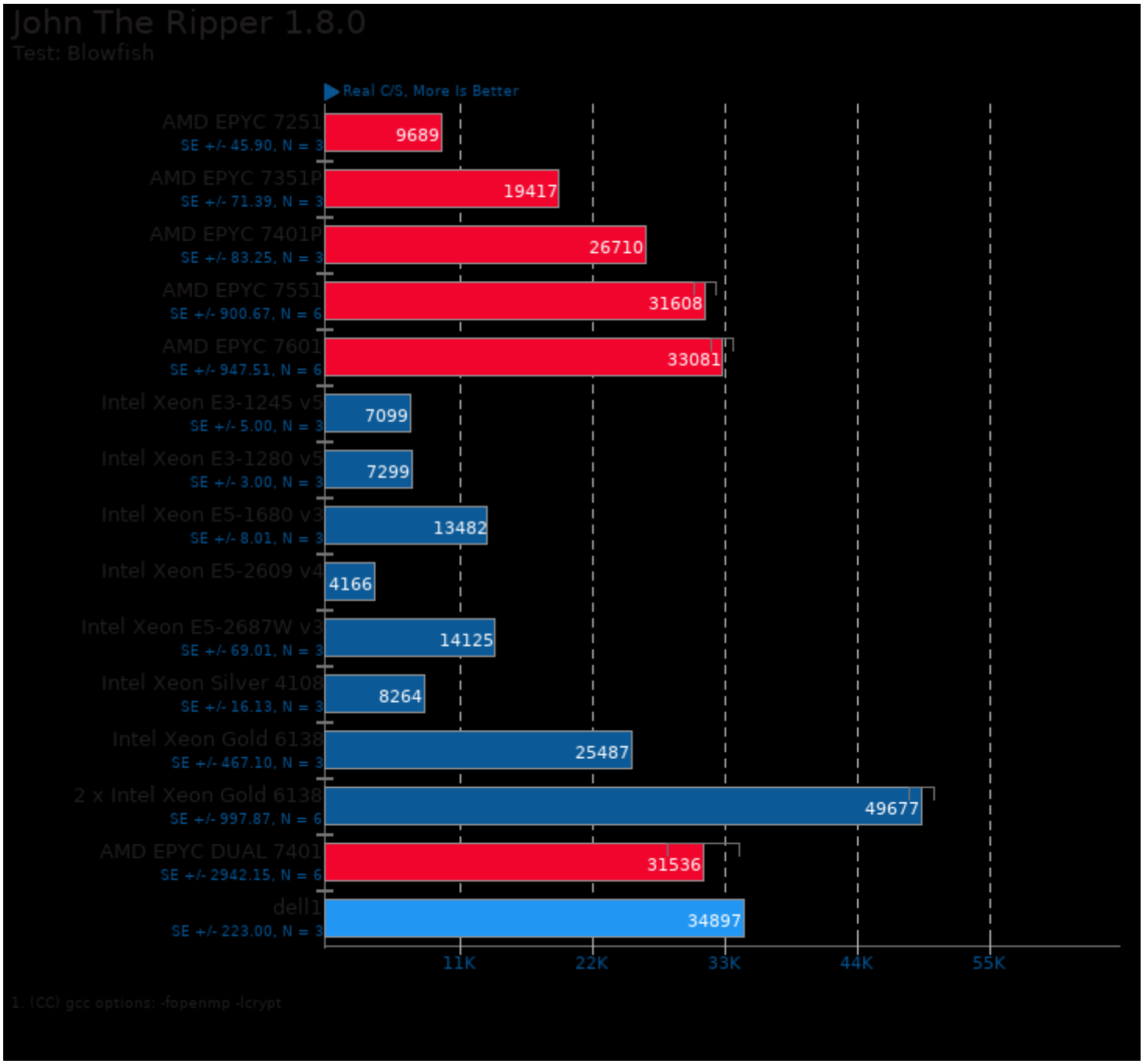
Tachyon - Total Time (sec)	7.56	3.86	2.90	2.35	2.38	11.28	10.99	6.36	**15.11**	6.04	9.92	3.75	**1.69**	1.95	2.73
Normalized	22.35%	43.78%	58.28%	71.91%	71.01%	14.98%	15.38%	26.57%	11.18%	27.98%	17.04%	45.07%	100%	86.67%	61.9%
Standard Deviation	0.1%	0.7%	0.5%	1.5%	3.1%	0.2%	0.1%	0.1%	0%	0.1%	0.8%	0.7%	3.3%	0.9%	6.4%
OpenSSL - R.4.b.P (Signs/sec)	893.73	1788	2458	3115	3230	677.87	696.63	1261	**571.83**	1328	787.77	2295	**4938**	4738	3465
Normalized	18.1%	36.2%	49.77%	63.08%	65.4%	13.73%	14.11%	25.54%	11.58%	26.9%	15.95%	46.47%	100%	95.95%	70.17%
Standard Deviation	0%	0%	1.2%	0.2%	0.8%	0%	0%	0%	0.4%	0%	0.3%	0.2%	2.4%	1.1%	0.8%
Java JMH - Throughput (Ops/s)	**115063871504**	231307284209	303497680929	401432261322	417140491900	143475342333	147473631138	302185373583	135773962233	317984670122	167423405233	534653052332	**105346608933**	603596320638	
Normalized	10.92%	21.96%	28.81%	38.11%	39.6%	13.62%	14%	28.68%	12.89%	30.18%	15.89%	50.75%	100%	57.3%	
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	102832	174727	214938	241209	249260	118688	123753	170265	**735024**	176011	139263	369869	**587794**	327193	
Normalized	17.49%	29.73%	36.57%	41.04%	42.41%	20.19%	21.05%	28.97%	12.5%	29.94%	23.69%	62.92%	100%	55.66%	
Standard Deviation	0.8%	1.1%	1.5%	0.8%	0.3%	0.1%	0.3%	0.4%	0.7%	0.2%	0.7%	0.6%	0.1%	1.8%	
Primesieve - 1.P.N.G (sec)	**40.03**	19.56	15.45	12.04	11.89								**8.31**	14.92	
Normalized	20.76%	42.48%	53.79%	69.02%	69.89%								100%	55.7%	
Standard Deviation	1%	0.6%	0.9%	1%	0.7%								0.2%	0.9%	

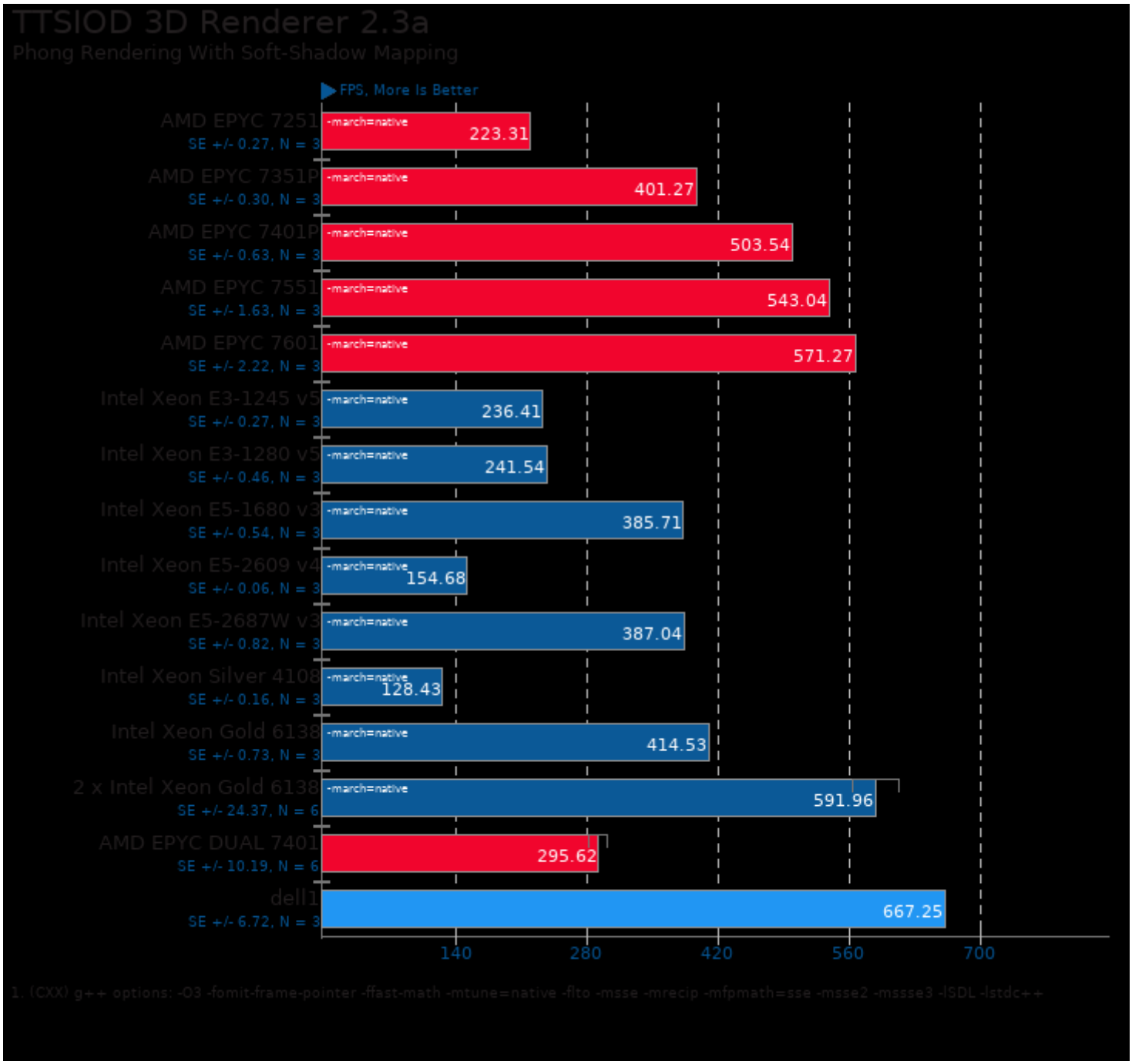

NAS Parallel Benchmarks 3.3
Test / Class: EP.C
Total Mop/s, More Is Better
AMD EPYC 7251
SE +/- 0.08, N = 3
455.37
AMD EPYC 7351P
SE +/- 0.95, N = 3
910.12
AMD EPYC 7401P
SE +/- 7.22, N = 3
1228.54
AMD EPYC 7551
SE +/- 20.56, N = 3
1521.64
AMD EPYC 7601
SE +/- 24.21, N = 5
1549.33
Intel Xeon E3-1245 v5
SE +/- 0.95, N = 3
325.92
Intel Xeon E3-1280 v5
SE +/- 2.87, N = 3
333.30
Intel Xeon E5-1680 v3
SE +/- 2.85, N = 3
649.11
Intel Xeon E5-2609 v4
SE +/- 0.18, N = 3
206.66
Intel Xeon E5-2687W v3
SE +/- 4.13, N = 3
686.49
Intel Xeon Silver 4108
SE +/- 0.48, N = 3
318.91
Intel Xeon Gold 6138
SE +/- 9.66, N = 4
625.00
2 x Intel Xeon Gold 6138
SE +/- 6.73, N = 3
2003.41
400
800
1200
1600
2000
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. Open MPI 2.1.1

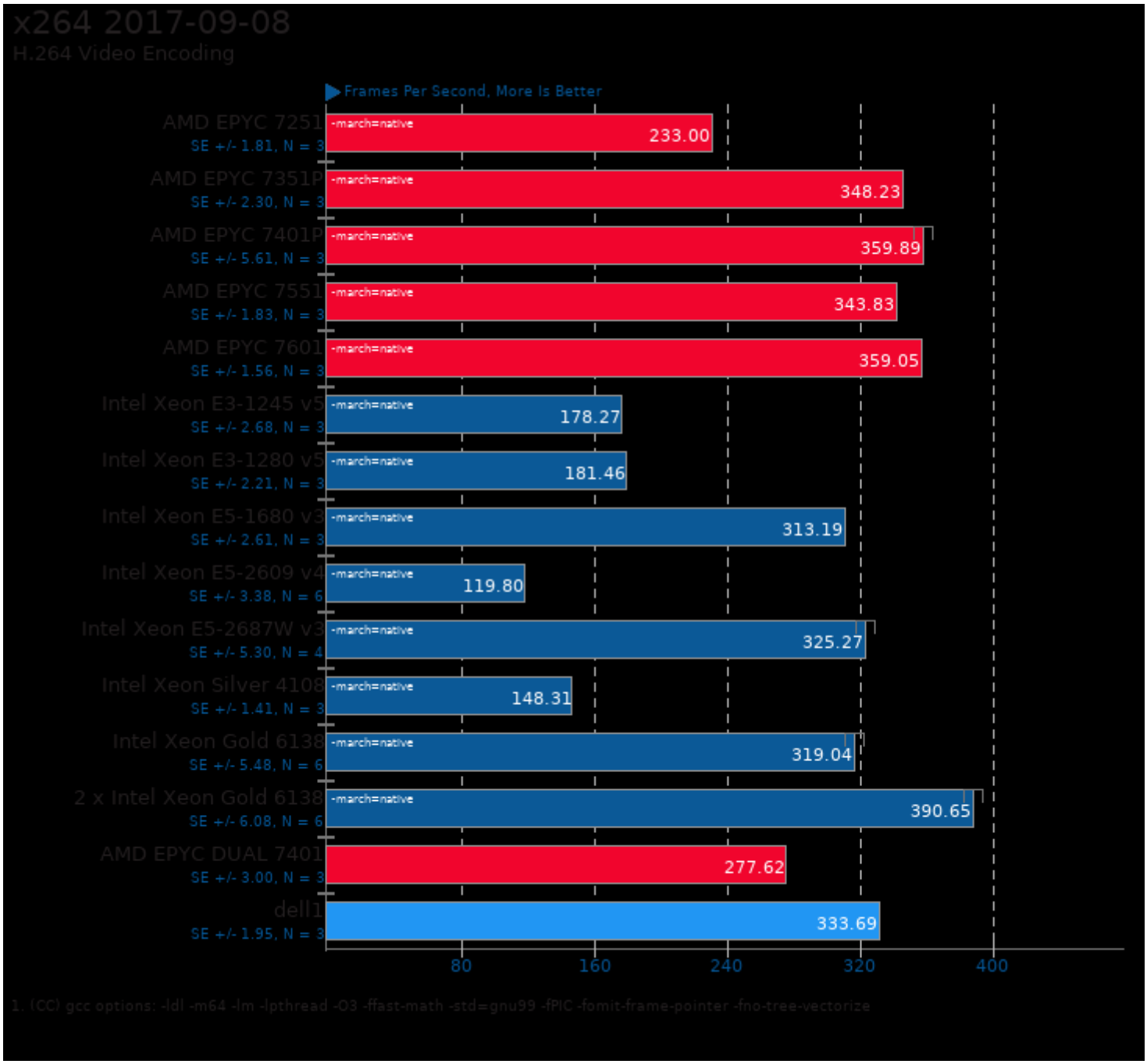

Parboil 2.5
Test: OpenMP CUTCP
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.02, N = 3
7.56
AMD EPYC 7351P
SE +/- 0.02, N = 3
4.17
AMD EPYC 7401P
SE +/- 0.03, N = 3
3.51
AMD EPYC 7551
SE +/- 0.03, N = 3
2.84
AMD EPYC 7601
SE +/- 0.02, N = 3
2.68
Intel Xeon E3-1245 v5
SE +/- 0.02, N = 3
12.39
Intel Xeon E3-1280 v5
SE +/- 0.04, N = 3
12.03
Intel Xeon E5-1680 v3
SE +/- 0.03, N = 3
6.82
Intel Xeon E5-2609 v4
SE +/- 0.00, N = 3
16.86
Intel Xeon E5-2687W v3
SE +/- 0.01, N = 3
6.49
Intel Xeon Silver 4108
SE +/- 0.03, N = 3
11.06
Intel Xeon Gold 6138
SE +/- 0.00, N = 3
3.82
2 x Intel Xeon Gold 6138
SE +/- 0.03, N = 3
2.35
AMD EPYC DUAL 7401
SE +/- 0.03, N = 3
2.55
dell1
SE +/- 0.03, N = 3
3.35
4
8
12
16
20
1. (CXX) g++ options: -lm -lpthread -lgomp -ffast-math -fopenmp

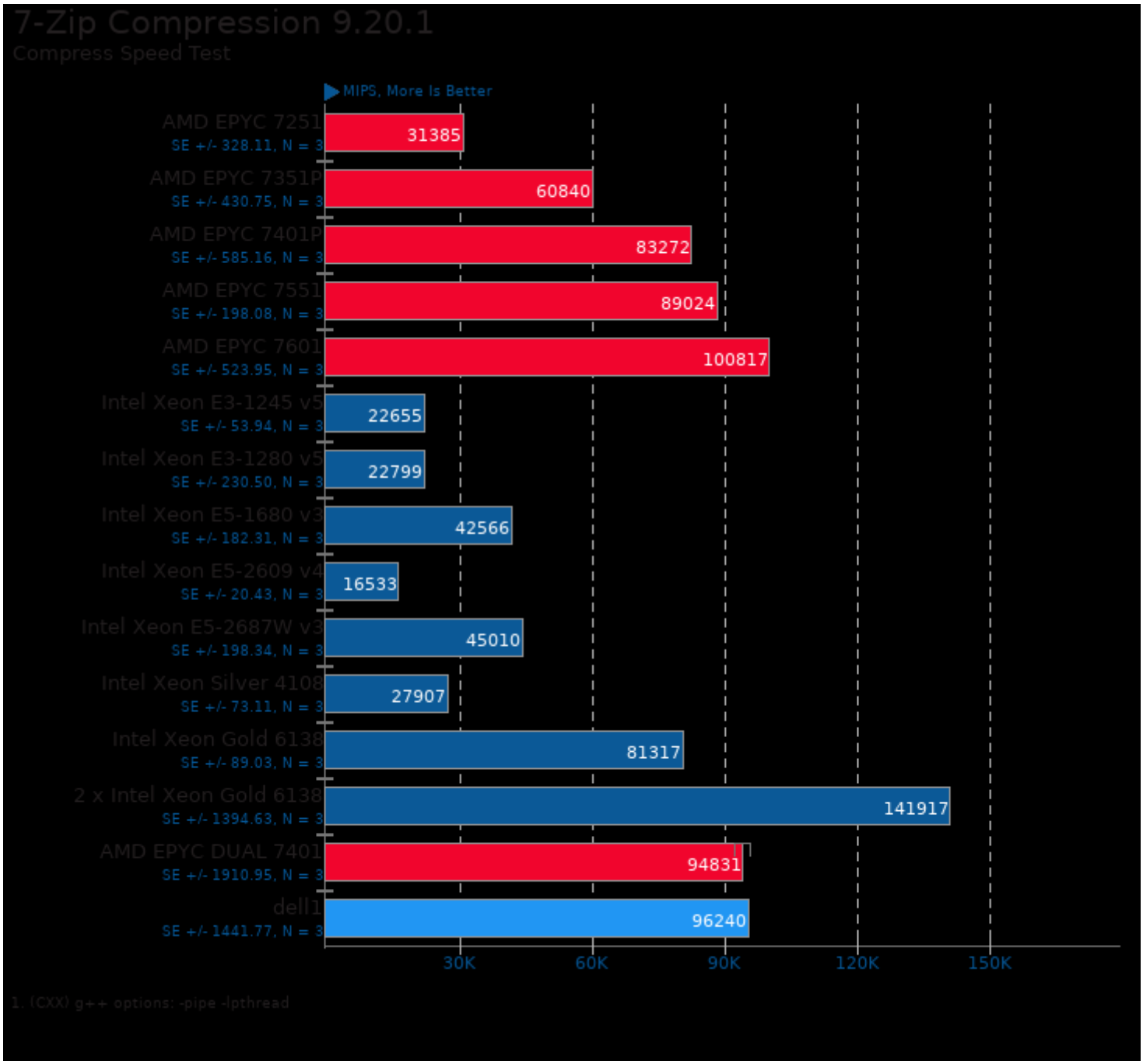

Parboil 2.5
Test: OpenMP Stencil
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.20, N = 3
22.29
AMD EPYC 7351P
SE +/- 0.05, N = 3
12.18
AMD EPYC 7401P
SE +/- 0.01, N = 3
9.54
AMD EPYC 7551
SE +/- 0.05, N = 3
10.08
AMD EPYC 7601
SE +/- 0.06, N = 3
7.81
Intel Xeon E3-1245 v5
SE +/- 0.03, N = 3
29.14
Intel Xeon E3-1280 v5
SE +/- 0.05, N = 3
32.70
Intel Xeon E5-1680 v3
SE +/- 0.02, N = 3
13.23
Intel Xeon E5-2609 v4
SE +/- 0.06, N = 3
19.15
Intel Xeon E5-2687W v3
SE +/- 0.09, N = 3
12.92
Intel Xeon Silver 4108
SE +/- 0.09, N = 3
17.53
Intel Xeon Gold 6138
SE +/- 0.11, N = 3
7.51
2 x Intel Xeon Gold 6138
SE +/- 0.27, N = 6
6.43
AMD EPYC DUAL 7401
SE +/- 3.82, N = 6
26.29
dell1
SE +/- 0.58, N = 12
10.07
8
16
24
32
40
1. (CXX) g++ options: -lm -lpthread -lgomp -ffast-math -fopenmp

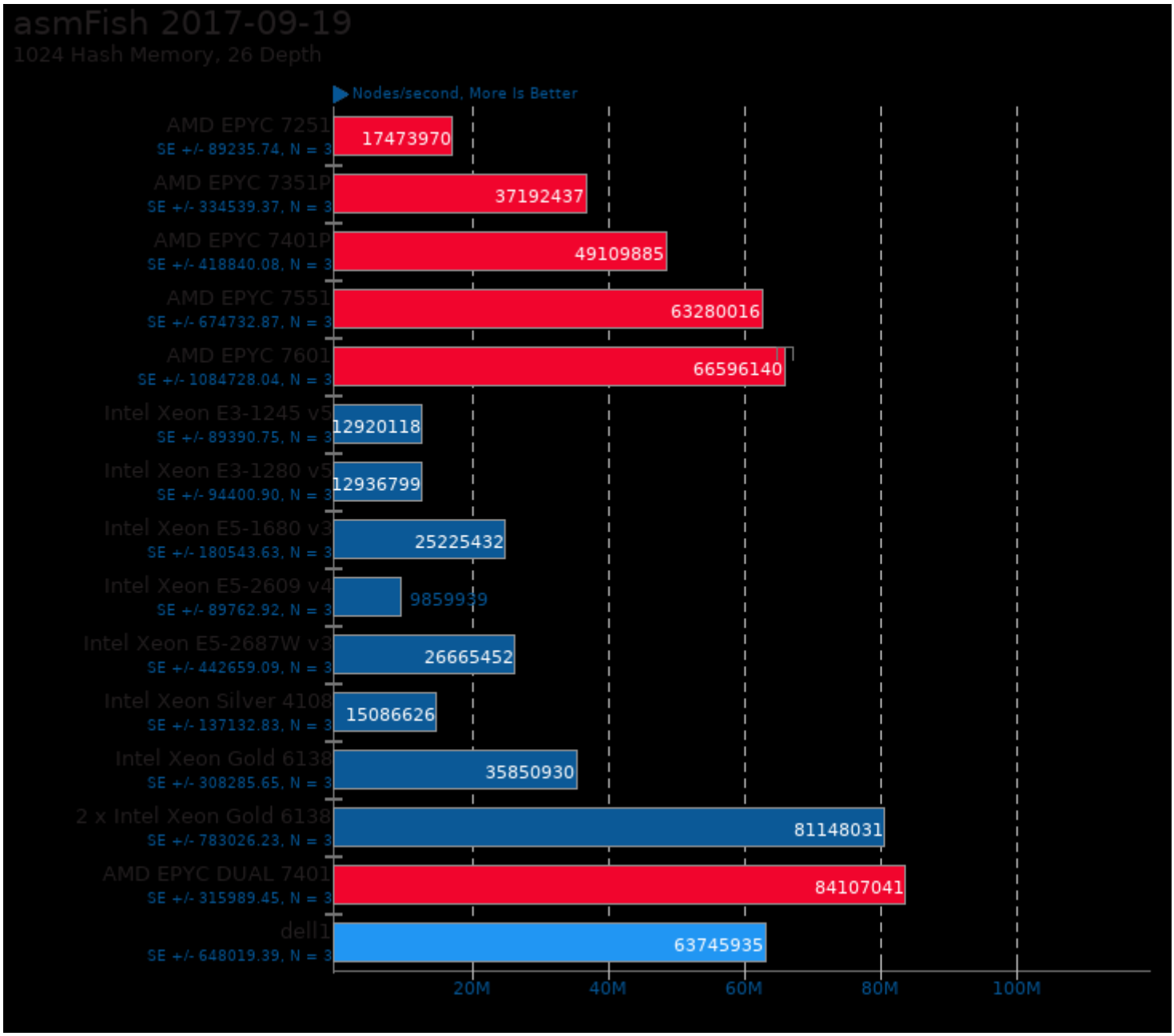

Rodinia 2.4
Test: OpenMP LavaMD
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.14, N = 3
106.02
AMD EPYC 7351P
SE +/- 0.59, N = 3
53.84
AMD EPYC 7401P
SE +/- 0.49, N = 3
41.69
AMD EPYC 7551
SE +/- 0.07, N = 3
32.67
AMD EPYC 7601
SE +/- 0.10, N = 3
31.91
Intel Xeon E3-1245 v5
SE +/- 0.19, N = 3
192.00
Intel Xeon E3-1280 v5
SE +/- 0.25, N = 3
186.76
Intel Xeon E5-1680 v3
SE +/- 0.23, N = 3
99.38
Intel Xeon E5-2609 v4
SE +/- 0.25, N = 3
321.70
Intel Xeon E5-2687W v3
SE +/- 0.16, N = 3
94.73
Intel Xeon Silver 4108
SE +/- 0.80, N = 3
169.59
Intel Xeon Gold 6138
SE +/- 0.11, N = 3
62.24
2 x Intel Xeon Gold 6138
SE +/- 0.10, N = 3
28.77
AMD EPYC DUAL 7401
SE +/- 0.23, N = 3
21.99
dell1
SE +/- 0.20, N = 3
36.73
70
140
210
280
350
1. (CXX) g++ options: -O2 -lOpenCL

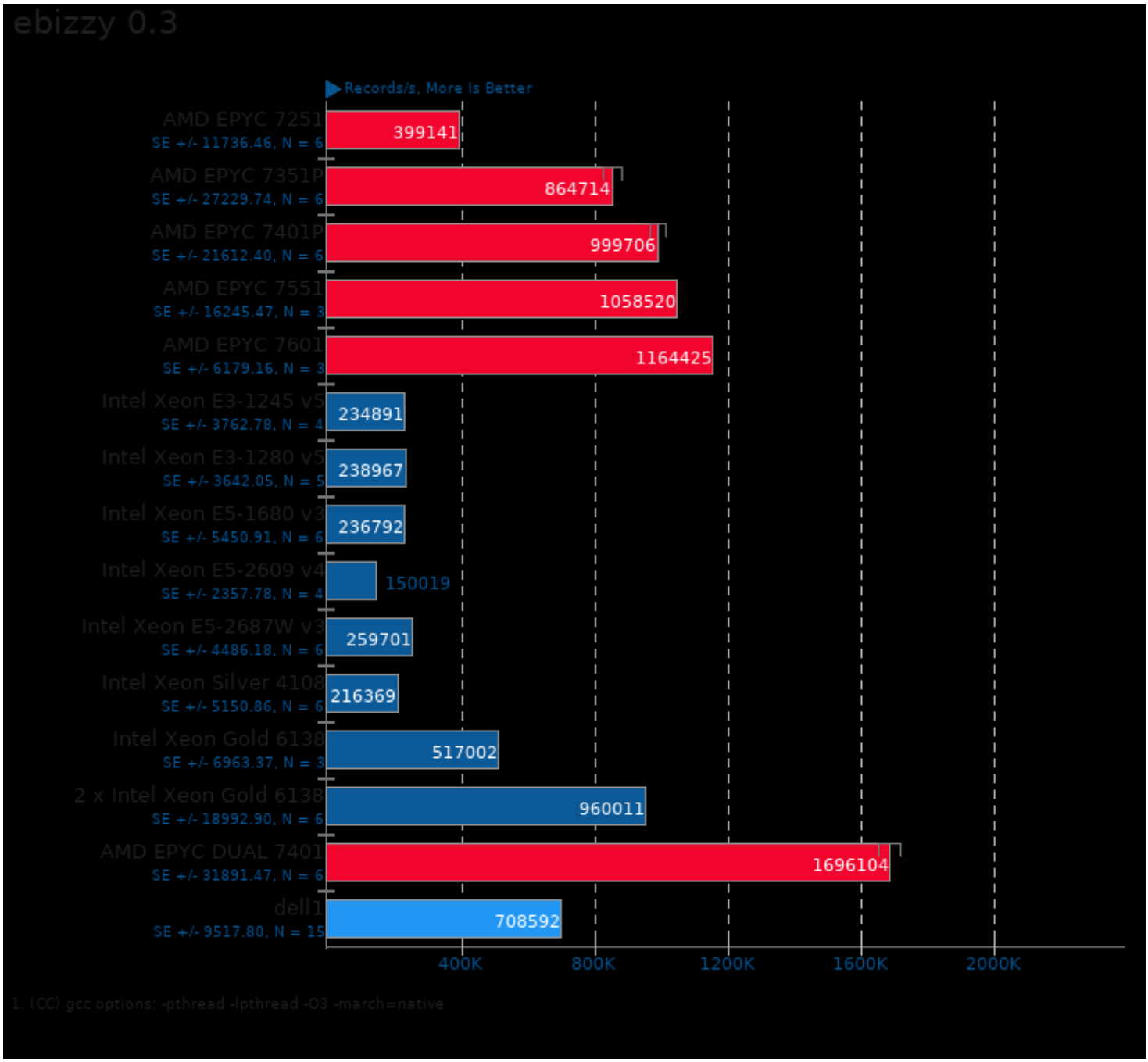

John The Ripper 1.8.0
Test: Blowfish
Real C/S, More Is Better
AMD EPYC 7251
SE +/- 45.90, N = 3
9689
AMD EPYC 7351P
SE +/- 71.39, N = 3
19417
AMD EPYC 7401P
SE +/- 83.25, N = 3
26710
AMD EPYC 7551
SE +/- 900.67, N = 6
31608
AMD EPYC 7601
SE +/- 947.51, N = 6
33081
Intel Xeon E3-1245 v5
SE +/- 5.00, N = 3
7099
Intel Xeon E3-1280 v5
SE +/- 3.00, N = 3
7299
Intel Xeon E5-1680 v3
SE +/- 8.01, N = 3
13482
Intel Xeon E5-2609 v4
4166
Intel Xeon E5-2687W v3
SE +/- 69.01, N = 3
14125
Intel Xeon Silver 4108
SE +/- 16.13, N = 3
8264
Intel Xeon Gold 6138
SE +/- 467.10, N = 3
25487
2 x Intel Xeon Gold 6138
SE +/- 997.87, N = 6
49677
AMD EPYC DUAL 7401
SE +/- 2942.15, N = 6
31536
dell1
SE +/- 223.00, N = 3
34897
11K
22K
33K
44K
55K
1. (CC) gcc options: -fopenmp -lcrypt

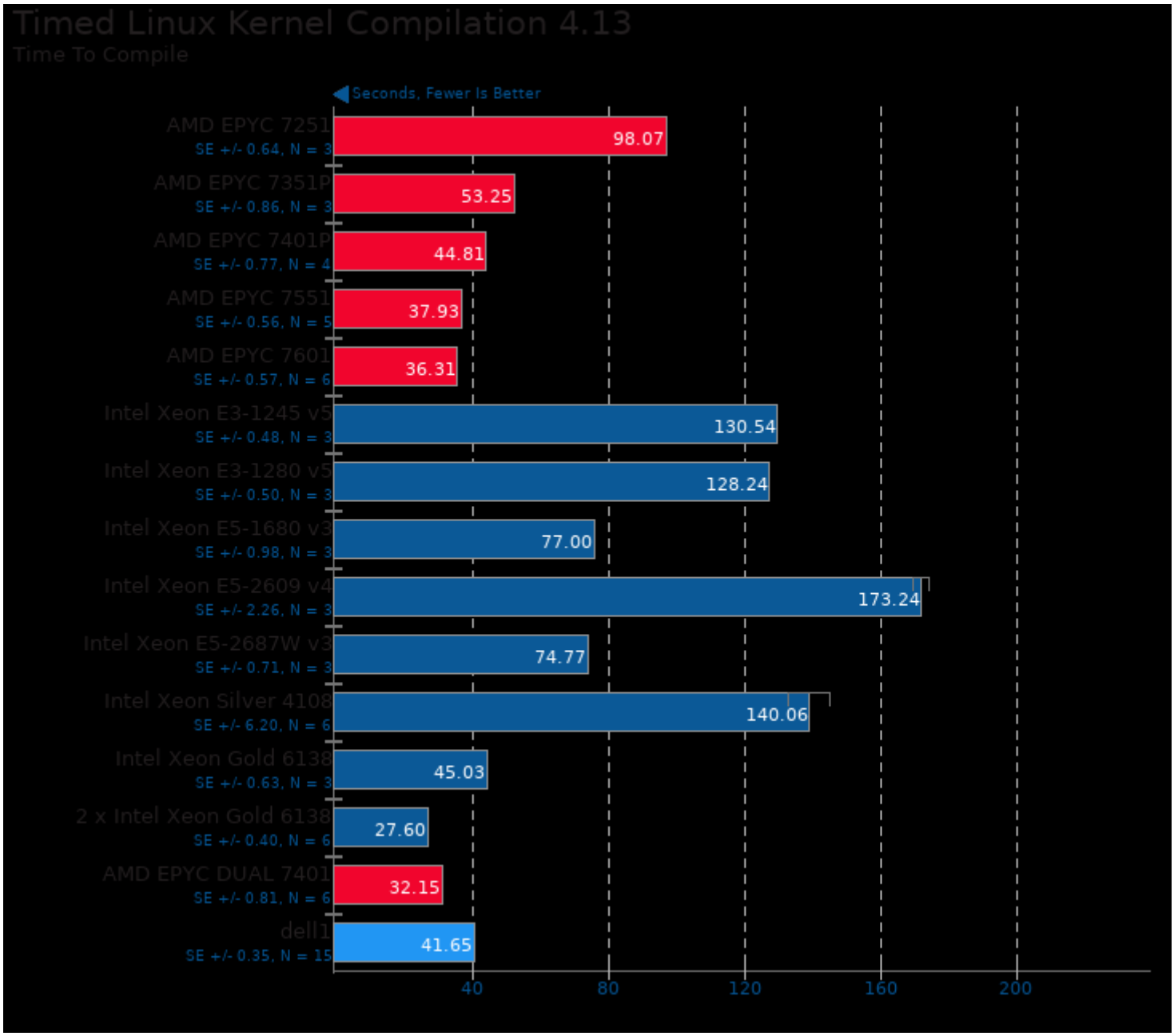

TTSIOD 3D Renderer 2.3a
Phong Rendering With Soft-Shadow Mapping
FPS, More Is Better
AMD EPYC 7251
SE +/- 0.27, N = 3
-march=native
223.31
AMD EPYC 7351P
SE +/- 0.30, N = 3
-march=native
401.27
AMD EPYC 7401P
SE +/- 0.63, N = 3
-march=native
503.54
AMD EPYC 7551
SE +/- 1.63, N = 3
-march=native
543.04
AMD EPYC 7601
SE +/- 2.22, N = 3
-march=native
571.27
Intel Xeon E3-1245 v5
SE +/- 0.27, N = 3
-march=native
236.41
Intel Xeon E3-1280 v5
SE +/- 0.46, N = 3
-march=native
241.54
Intel Xeon E5-1680 v3
SE +/- 0.54, N = 3
-march=native
385.71
Intel Xeon E5-2609 v4
SE +/- 0.06, N = 3
-march=native
154.68
Intel Xeon E5-2687W v3
SE +/- 0.82, N = 3
-march=native
387.04
Intel Xeon Silver 4108
SE +/- 0.16, N = 3
-march=native
128.43
Intel Xeon Gold 6138
SE +/- 0.73, N = 3
-march=native
414.53
2 x Intel Xeon Gold 6138
SE +/- 24.37, N = 6
-march=native
591.96
AMD EPYC DUAL 7401
SE +/- 10.19, N = 6
295.62
dell1
SE +/- 6.72, N = 3
667.25
140
280
420
560
700
1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -msse -mrecip -mfpmath=sse -msse2 -mssse3 -lSDL -lstdc++

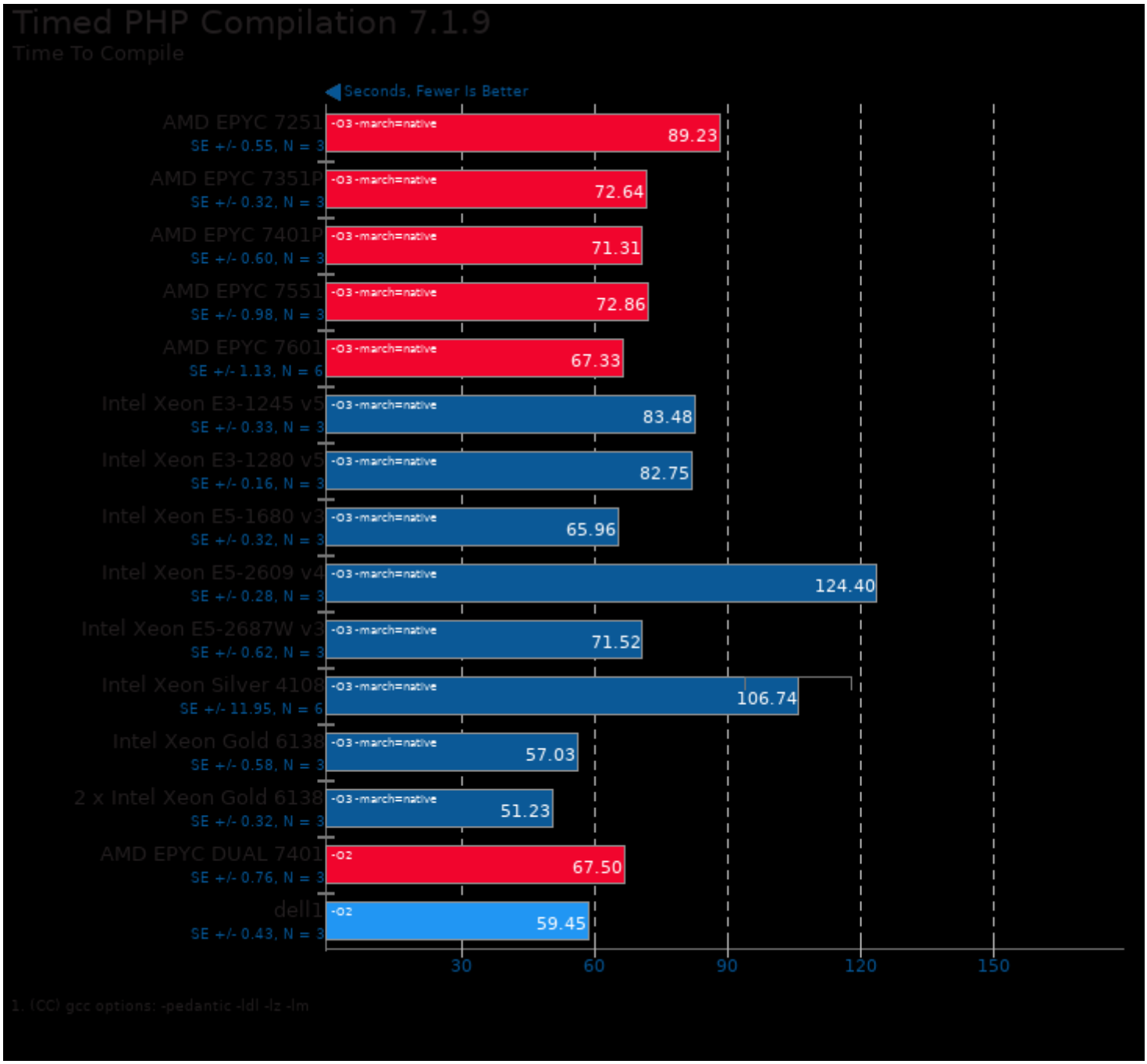

x264 2017-09-08
H.264 Video Encoding
Frames Per Second, More Is Better
AMD EPYC 7251
SE +/- 1.81, N = 3
-march=native
233.00
AMD EPYC 7351P
SE +/- 2.30, N = 3
-march=native
348.23
AMD EPYC 7401P
SE +/- 5.61, N = 3
-march=native
359.89
AMD EPYC 7551
SE +/- 1.83, N = 3
-march=native
343.83
AMD EPYC 7601
SE +/- 1.56, N = 3
-march=native
359.05
Intel Xeon E3-1245 v5
SE +/- 2.68, N = 3
-march=native
178.27
Intel Xeon E3-1280 v5
SE +/- 2.21, N = 3
-march=native
181.46
Intel Xeon E5-1680 v3
SE +/- 2.61, N = 3
-march=native
313.19
Intel Xeon E5-2609 v4
SE +/- 3.38, N = 6
-march=native
119.80
Intel Xeon E5-2687W v3
SE +/- 5.30, N = 4
-march=native
325.27
Intel Xeon Silver 4108
SE +/- 1.41, N = 3
-march=native
148.31
Intel Xeon Gold 6138
SE +/- 5.48, N = 6
-march=native
319.04
2 x Intel Xeon Gold 6138
SE +/- 6.08, N = 6
-march=native
390.65
AMD EPYC DUAL 7401
SE +/- 3.00, N = 3
277.62
dell1
SE +/- 1.95, N = 3
333.69
80
160
240
320
400
1. (CC) gcc options: -ldl -m64 -lm -lpthread -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize

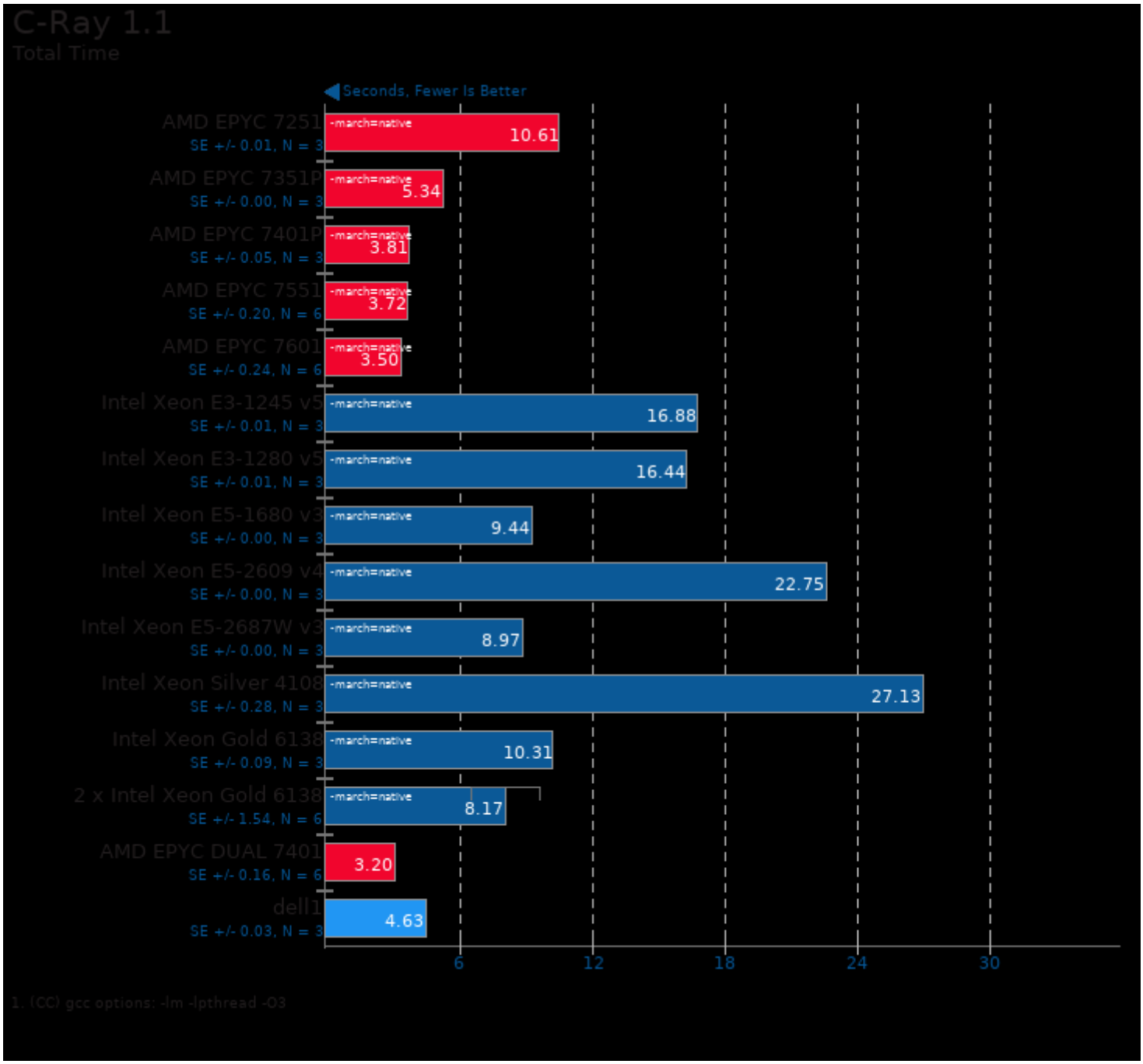

7-Zip Compression 9.20.1
Compress Speed Test
MIPS, More Is Better
AMD EPYC 7251
SE +/- 328.11, N = 3
31385
AMD EPYC 7351P
SE +/- 430.75, N = 3
60840
AMD EPYC 7401P
SE +/- 585.16, N = 3
83272
AMD EPYC 7551
SE +/- 198.08, N = 3
89024
AMD EPYC 7601
SE +/- 523.95, N = 3
100817
Intel Xeon E3-1245 v5
SE +/- 53.94, N = 3
22655
Intel Xeon E3-1280 v5
SE +/- 230.50, N = 3
22799
Intel Xeon E5-1680 v3
SE +/- 182.31, N = 3
42566
Intel Xeon E5-2609 v4
SE +/- 20.43, N = 3
16533
Intel Xeon E5-2687W v3
SE +/- 198.34, N = 3
45010
Intel Xeon Silver 4108
SE +/- 73.11, N = 3
27907
Intel Xeon Gold 6138
SE +/- 89.03, N = 3
81317
2 x Intel Xeon Gold 6138
SE +/- 1394.63, N = 3
141917
AMD EPYC DUAL 7401
SE +/- 1910.95, N = 3
94831
dell1
SE +/- 1441.77, N = 3
96240
30K
60K
90K
120K
150K
1. (CXX) g++ options: -pipe -lpthread

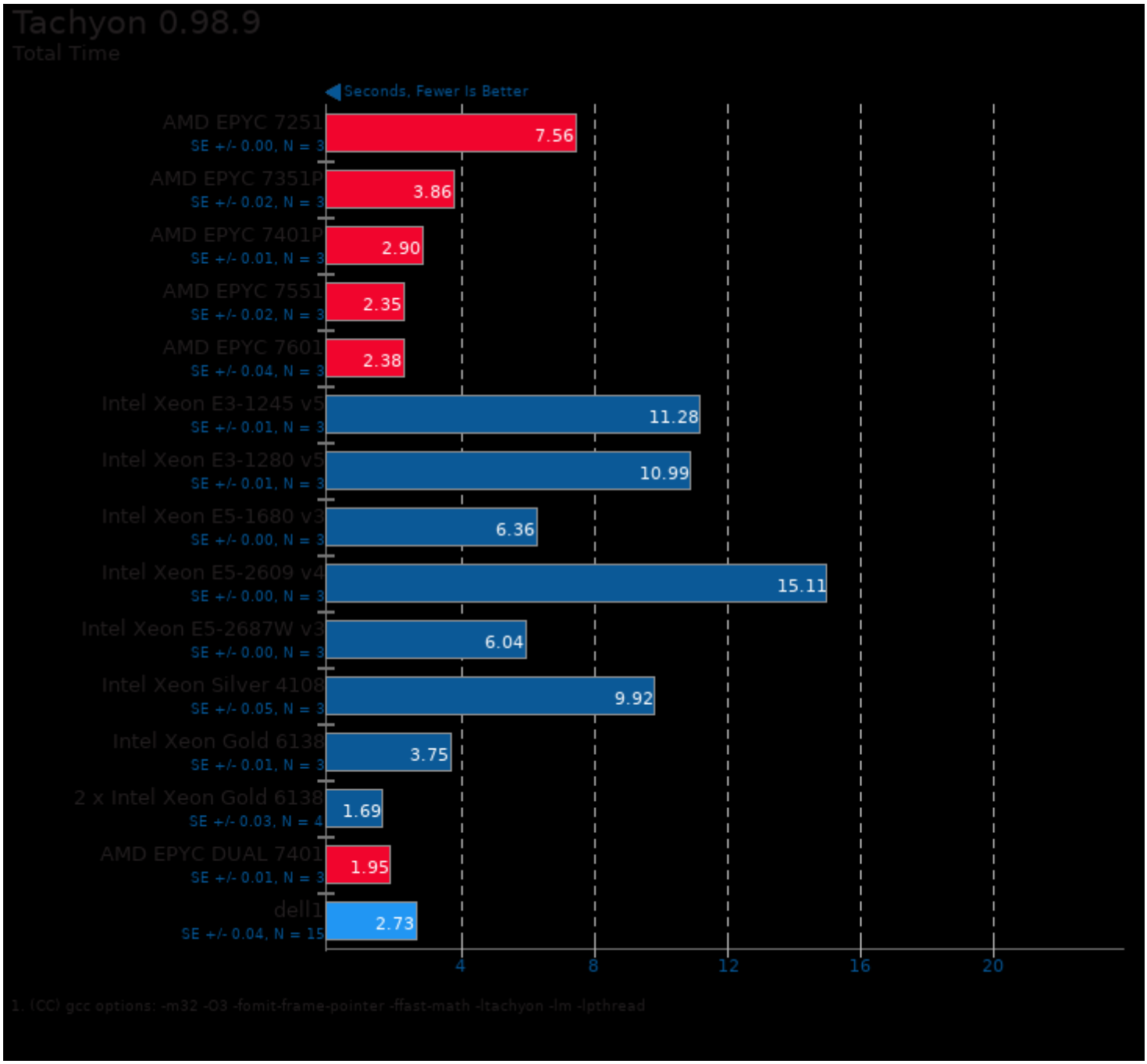

asmFish 2017-09-19
1024 Hash Memory, 26 Depth
Nodes/second, More Is Better
AMD EPYC 7251
SE +/- 89235.74, N = 3
17473970
AMD EPYC 7351P
SE +/- 334539.37, N = 3
37192437
AMD EPYC 7401P
SE +/- 418840.08, N = 3
49109885
AMD EPYC 7551
SE +/- 674732.87, N = 3
63280016
AMD EPYC 7601
SE +/- 1084728.04, N = 3
66596140
Intel Xeon E3-1245 v5
SE +/- 89390.75, N = 3
12920118
Intel Xeon E3-1280 v5
SE +/- 94400.90, N = 3
12936799
Intel Xeon E5-1680 v3
SE +/- 180543.63, N = 3
25225432
Intel Xeon E5-2609 v4
SE +/- 89762.92, N = 3
9859939
Intel Xeon E5-2687W v3
SE +/- 442659.09, N = 3
26665452
Intel Xeon Silver 4108
SE +/- 137132.83, N = 3
15086626
Intel Xeon Gold 6138
SE +/- 308285.65, N = 3
35850930
2 x Intel Xeon Gold 6138
SE +/- 783026.23, N = 3
81148031
AMD EPYC DUAL 7401
SE +/- 315989.45, N = 3
84107041
dell1
SE +/- 648019.39, N = 3
63745935
20M
40M
60M
80M
100M

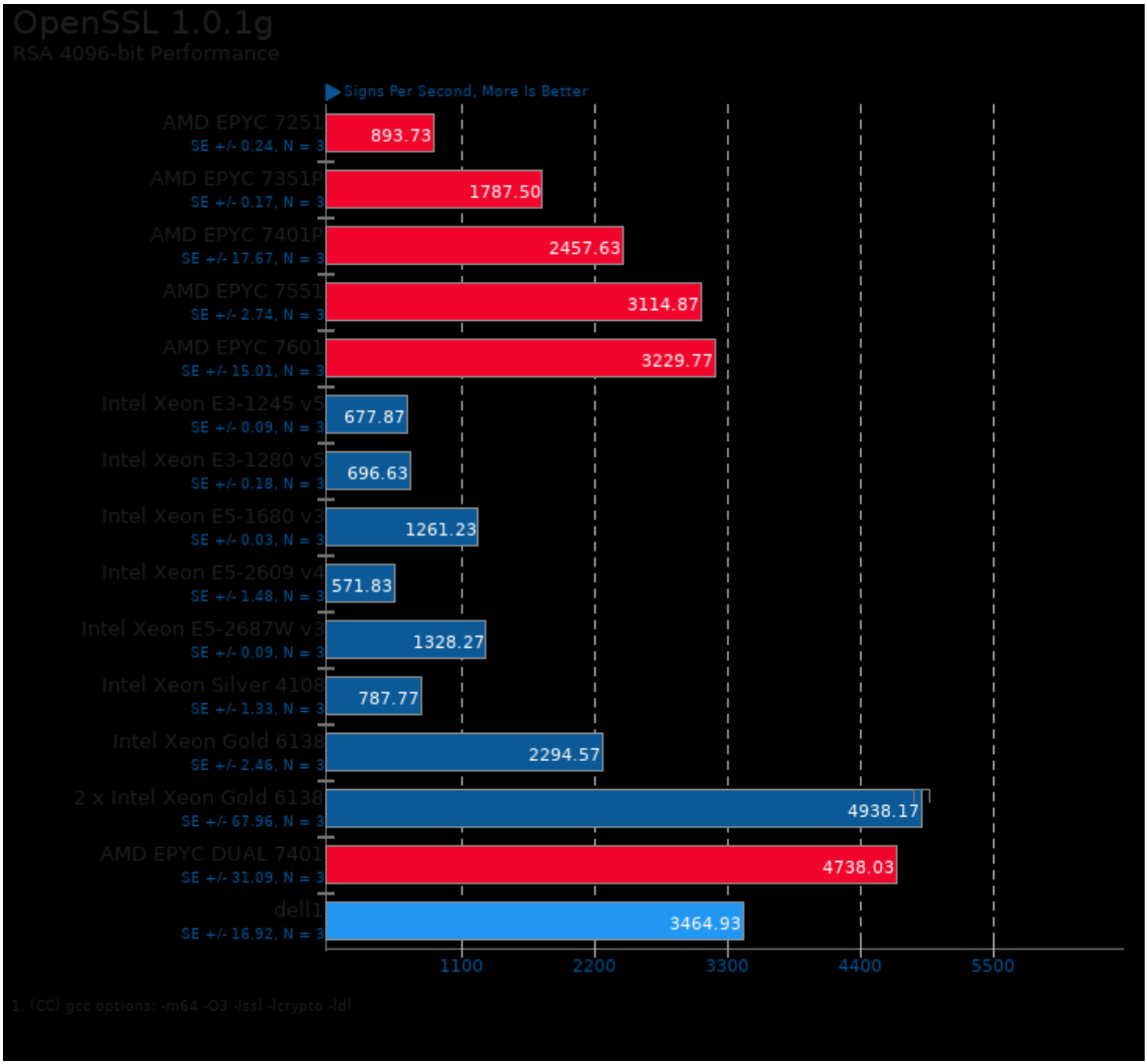

ebizzy 0.3
Records/s, More Is Better
AMD EPYC 7251
SE +/- 11736.46, N = 6
399141
AMD EPYC 7351P
SE +/- 27229.74, N = 6
864714
AMD EPYC 7401P
SE +/- 21612.40, N = 6
999706
AMD EPYC 7551
SE +/- 16245.47, N = 3
1058520
AMD EPYC 7601
SE +/- 6179.16, N = 3
1164425
Intel Xeon E3-1245 v5
SE +/- 3762.78, N = 4
234891
Intel Xeon E3-1280 v5
SE +/- 3642.05, N = 5
238967
Intel Xeon E5-1680 v3
SE +/- 5450.91, N = 6
236792
Intel Xeon E5-2609 v4
SE +/- 2357.78, N = 4
150019
Intel Xeon E5-2687W v3
SE +/- 4486.18, N = 6
259701
Intel Xeon Silver 4108
SE +/- 5150.86, N = 6
216369
Intel Xeon Gold 6138
SE +/- 6963.37, N = 3
517002
2 x Intel Xeon Gold 6138
SE +/- 18992.90, N = 6
960011
AMD EPYC DUAL 7401
SE +/- 31891.47, N = 6
1696104
dell1
SE +/- 9517.80, N = 15
708592
400K
800K
1200K
1600K
2000K
1. (CC) gcc options: -pthread -lpthread -O3 -march=native

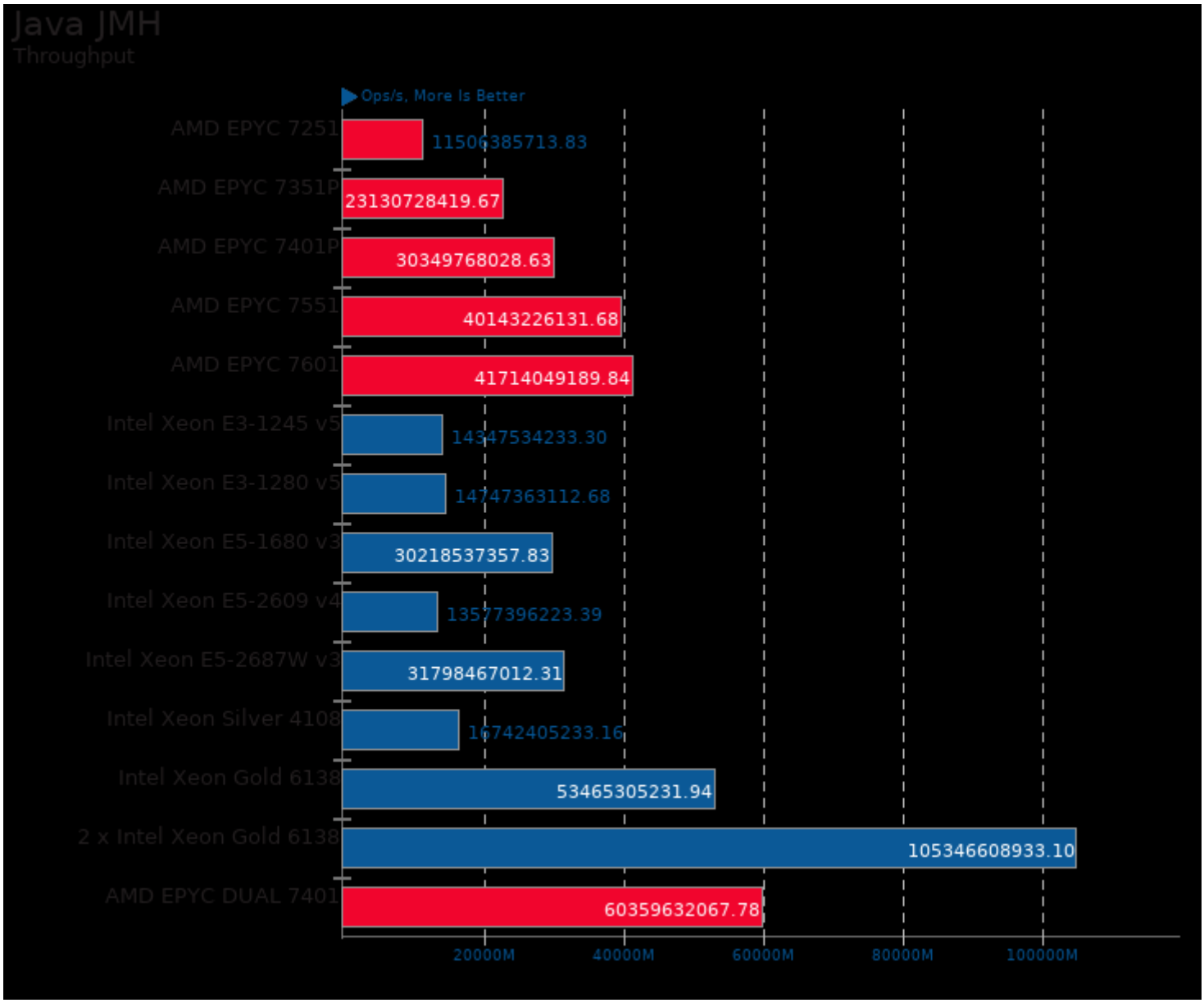

Timed Linux Kernel Compilation 4.13
Time To Compile
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.64, N = 3
98.07
AMD EPYC 7351P
SE +/- 0.86, N = 3
53.25
AMD EPYC 7401P
SE +/- 0.77, N = 4
44.81
AMD EPYC 7551
SE +/- 0.56, N = 5
37.93
AMD EPYC 7601
SE +/- 0.57, N = 6
36.31
Intel Xeon E3-1245 v5
SE +/- 0.48, N = 3
130.54
Intel Xeon E3-1280 v5
SE +/- 0.50, N = 3
128.24
Intel Xeon E5-1680 v3
SE +/- 0.98, N = 3
77.00
Intel Xeon E5-2609 v4
SE +/- 2.26, N = 3
173.24
Intel Xeon E5-2687W v3
SE +/- 0.71, N = 3
74.77
Intel Xeon Silver 4108
SE +/- 6.20, N = 6
140.06
Intel Xeon Gold 6138
SE +/- 0.63, N = 3
45.03
2 x Intel Xeon Gold 6138
SE +/- 0.40, N = 6
27.60
AMD EPYC DUAL 7401
SE +/- 0.81, N = 6
32.15
dell1
SE +/- 0.35, N = 15
41.65
40
80
120
160
200

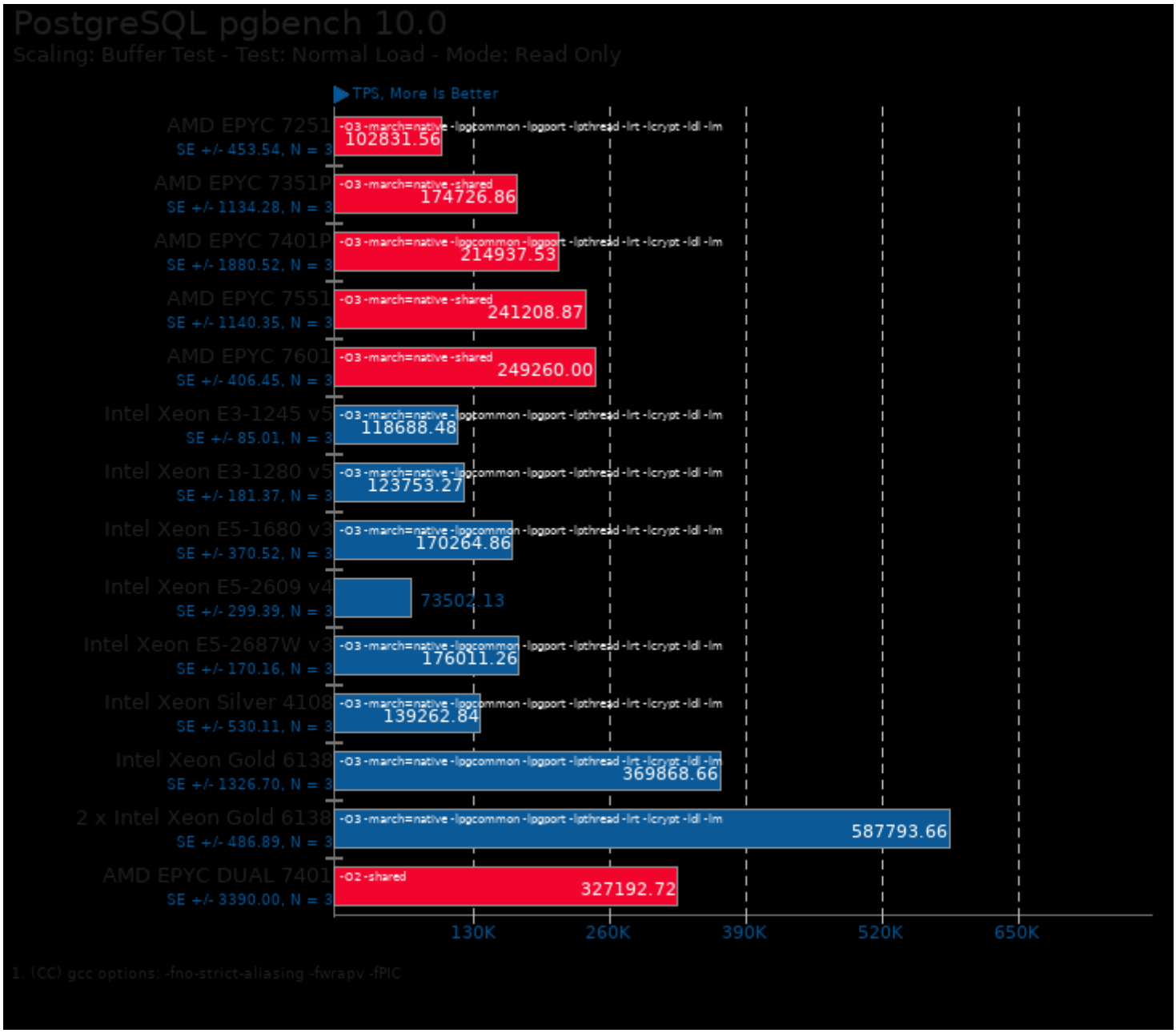

Timed PHP Compilation 7.1.9
Time To Compile
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.55, N = 3
-O3 -march=native
89.23
AMD EPYC 7351P
SE +/- 0.32, N = 3
-O3 -march=native
72.64
AMD EPYC 7401P
SE +/- 0.60, N = 3
-O3 -march=native
71.31
AMD EPYC 7551
SE +/- 0.98, N = 3
-O3 -march=native
72.86
AMD EPYC 7601
SE +/- 1.13, N = 6
-O3 -march=native
67.33
Intel Xeon E3-1245 v5
SE +/- 0.33, N = 3
-O3 -march=native
83.48
Intel Xeon E3-1280 v5
SE +/- 0.16, N = 3
-O3 -march=native
82.75
Intel Xeon E5-1680 v3
SE +/- 0.32, N = 3
-O3 -march=native
65.96
Intel Xeon E5-2609 v4
SE +/- 0.28, N = 3
-O3 -march=native
124.40
Intel Xeon E5-2687W v3
SE +/- 0.62, N = 3
-O3 -march=native
71.52
Intel Xeon Silver 4108
SE +/- 11.95, N = 6
-O3 -march=native
106.74
Intel Xeon Gold 6138
SE +/- 0.58, N = 3
-O3 -march=native
57.03
2 x Intel Xeon Gold 6138
SE +/- 0.32, N = 3
-O3 -march=native
51.23
AMD EPYC DUAL 7401
SE +/- 0.76, N = 3
-O2
67.50
dell1
SE +/- 0.43, N = 3
-O2
59.45
30
60
90
120
150
1. (CC) gcc options: -pedantic -ldl -lz -lm

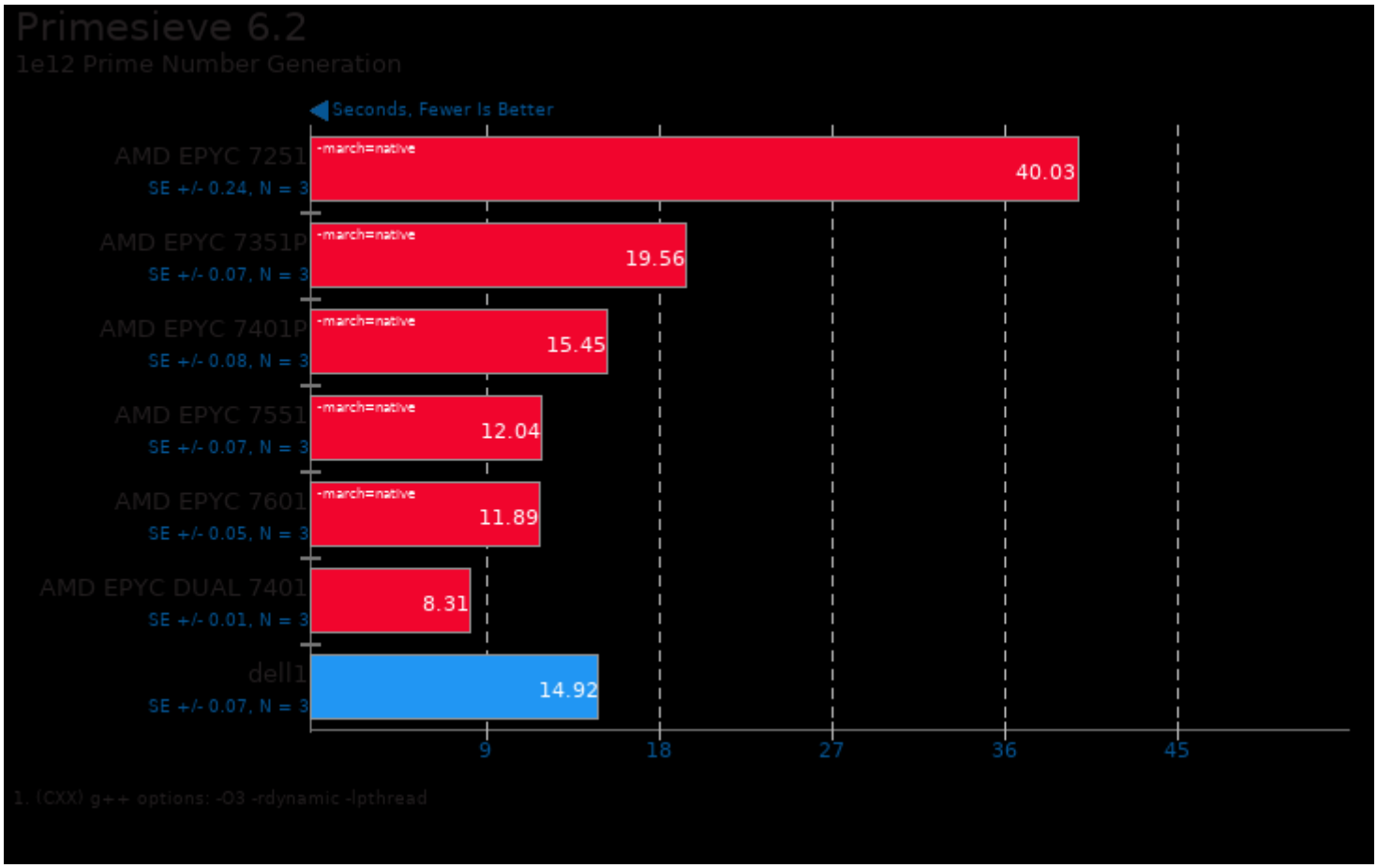

C-Ray 1.1
Total Time
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.01, N = 3
-march=native
10.61
AMD EPYC 7351P
SE +/- 0.00, N = 3
-march=native
5.34
AMD EPYC 7401P
SE +/- 0.05, N = 3
-march=native
3.81
AMD EPYC 7551
SE +/- 0.20, N = 6
-march=native
3.72
AMD EPYC 7601
SE +/- 0.24, N = 6
-march=native
3.50
Intel Xeon E3-1245 v5
SE +/- 0.01, N = 3
-march=native
16.88
Intel Xeon E3-1280 v5
SE +/- 0.01, N = 3
-march=native
16.44
Intel Xeon E5-1680 v3
SE +/- 0.00, N = 3
-march=native
9.44
Intel Xeon E5-2609 v4
SE +/- 0.00, N = 3
-march=native
22.75
Intel Xeon E5-2687W v3
SE +/- 0.00, N = 3
-march=native
8.97
Intel Xeon Silver 4108
SE +/- 0.28, N = 3
-march=native
27.13
Intel Xeon Gold 6138
SE +/- 0.09, N = 3
-march=native
10.31
2 x Intel Xeon Gold 6138
SE +/- 1.54, N = 6
-march=native
8.17
AMD EPYC DUAL 7401
SE +/- 0.16, N = 6
3.20
dell1
SE +/- 0.03, N = 3
4.63
6
12
18
24
30
1. (CC) gcc options: -lm -lpthread -O3


Tachyon 0.98.9
Total Time
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.00, N = 3
7.56
AMD EPYC 7351P
SE +/- 0.02, N = 3
3.86
AMD EPYC 7401P
SE +/- 0.01, N = 3
2.90
AMD EPYC 7551
SE +/- 0.02, N = 3
2.35
AMD EPYC 7601
SE +/- 0.04, N = 3
2.38
Intel Xeon E3-1245 v5
SE +/- 0.01, N = 3
11.28
Intel Xeon E3-1280 v5
SE +/- 0.01, N = 3
10.99
Intel Xeon E5-1680 v3
SE +/- 0.00, N = 3
6.36
Intel Xeon E5-2609 v4
SE +/- 0.00, N = 3
15.11
Intel Xeon E5-2687W v3
SE +/- 0.00, N = 3
6.04
Intel Xeon Silver 4108
SE +/- 0.05, N = 3
9.92
Intel Xeon Gold 6138
SE +/- 0.01, N = 3
3.75
2 x Intel Xeon Gold 6138
SE +/- 0.03, N = 4
1.69
AMD EPYC DUAL 7401
SE +/- 0.01, N = 3
1.95
dell1
SE +/- 0.04, N = 15
2.73
4
8
12
16
20
1. (CC) gcc options: -m32 -O3 -fomit-frame-pointer -ffast-math -ltachyon -lm -lpthread

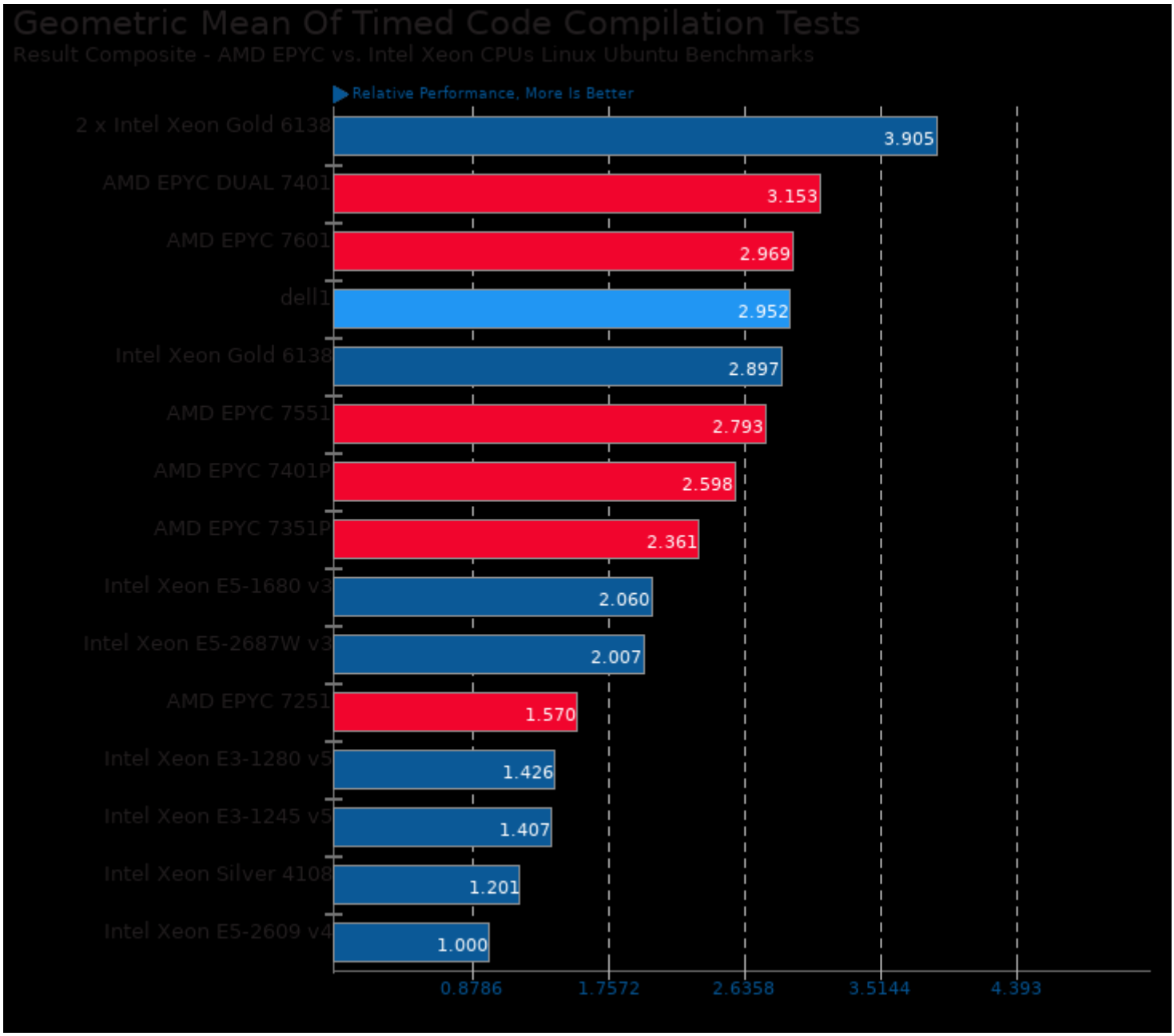

OpenSSL 1.0.1g
RSA 4096-bit Performance
Signs Per Second, More Is Better
AMD EPYC 7251
SE +/- 0.24, N = 3
893.73
AMD EPYC 7351P
SE +/- 0.17, N = 3
1787.50
AMD EPYC 7401P
SE +/- 17.67, N = 3
2457.63
AMD EPYC 7551
SE +/- 2.74, N = 3
3114.87
AMD EPYC 7601
SE +/- 15.01, N = 3
3229.77
Intel Xeon E3-1245 v5
SE +/- 0.09, N = 3
677.87
Intel Xeon E3-1280 v5
SE +/- 0.18, N = 3
696.63
Intel Xeon E5-1680 v3
SE +/- 0.03, N = 3
1261.23
Intel Xeon E5-2609 v4
SE +/- 1.48, N = 3
571.83
Intel Xeon E5-2687W v3
SE +/- 0.09, N = 3
1328.27
Intel Xeon Silver 4108
SE +/- 1.33, N = 3
787.77
Intel Xeon Gold 6138
SE +/- 2.46, N = 3
2294.57
2 x Intel Xeon Gold 6138
SE +/- 67.96, N = 3
4938.17
AMD EPYC DUAL 7401
SE +/- 31.09, N = 3
4738.03
dell1
SE +/- 16.92, N = 3
3464.93
1100
2200
3300
4400
5500
1. (CC) gcc options: -m64 -O3 -lssl -lcrypto -ldl


Java JMH
Throughput
Ops/s, More Is Better
AMD EPYC 7251
11506385713.83
AMD EPYC 7351P
23130728419.67
AMD EPYC 7401P
30349768028.63
AMD EPYC 7551
40143226131.68
AMD EPYC 7601
41714049189.84
Intel Xeon E3-1245 v5
14347534233.30
Intel Xeon E3-1280 v5
14747363112.68
Intel Xeon E5-1680 v3
30218537357.83
Intel Xeon E5-2609 v4
13577396223.39
Intel Xeon E5-2687W v3
31798467012.31
Intel Xeon Silver 4108
16742405233.16
Intel Xeon Gold 6138
53465305231.94
2 x Intel Xeon Gold 6138
105346608933.10
AMD EPYC DUAL 7401
60359632067.78
20000M
40000M
60000M
80000M
100000M

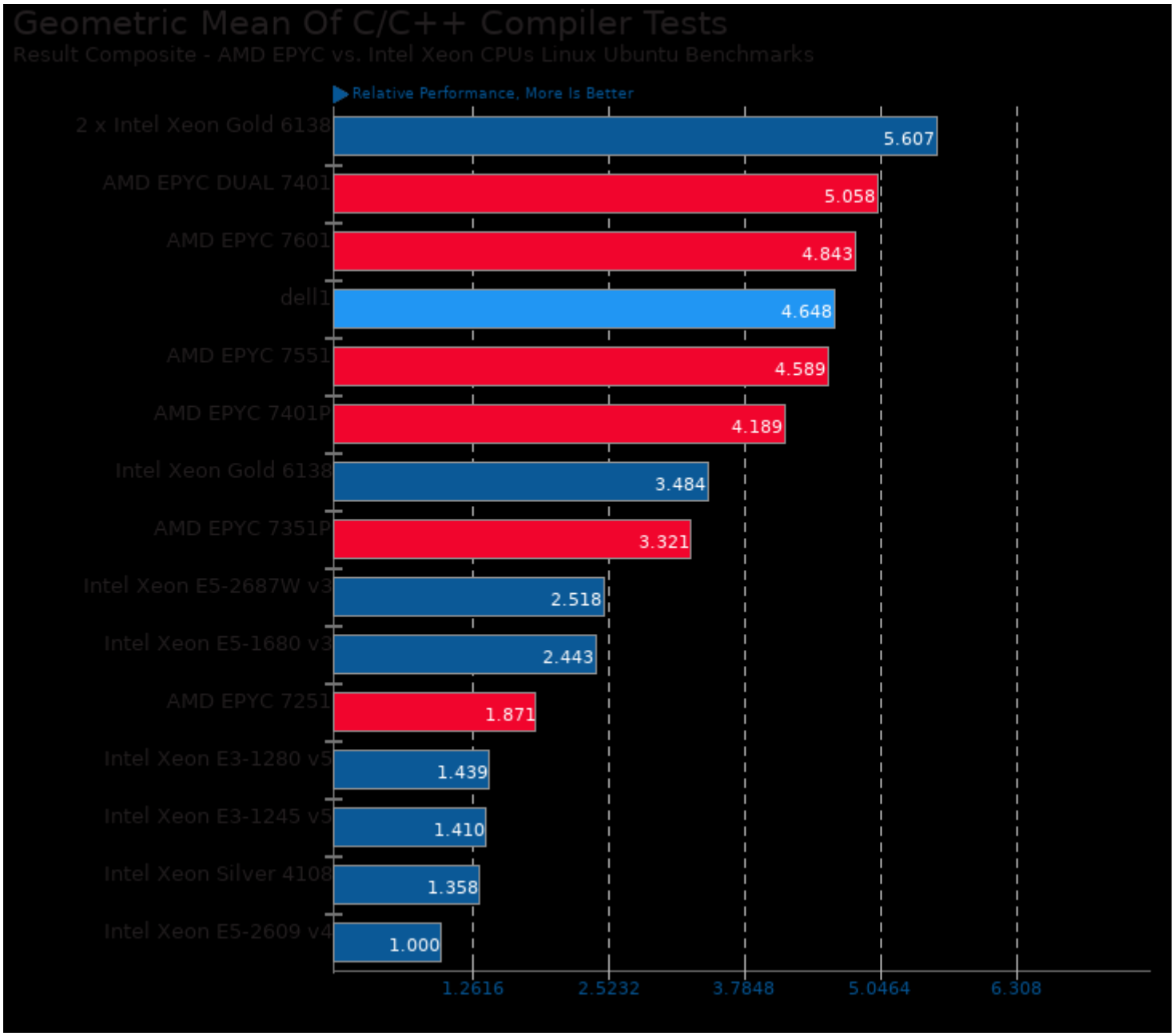

PostgreSQL pgbench 10.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
AMD EPYC 7251
SE +/- 453.54, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
102831.56
AMD EPYC 7351P
SE +/- 1134.28, N = 3
-O3 -march=native -shared
174726.86
AMD EPYC 7401P
SE +/- 1880.52, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
214937.53
AMD EPYC 7551
SE +/- 1140.35, N = 3
-O3 -march=native -shared
241208.87
AMD EPYC 7601
SE +/- 406.45, N = 3
-O3 -march=native -shared
249260.00
Intel Xeon E3-1245 v5
SE +/- 85.01, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
118688.48
Intel Xeon E3-1280 v5
SE +/- 181.37, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
123753.27
Intel Xeon E5-1680 v3
SE +/- 370.52, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
170264.86
Intel Xeon E5-2609 v4
SE +/- 299.39, N = 3
73502.13
Intel Xeon E5-2687W v3
SE +/- 170.16, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
176011.26
Intel Xeon Silver 4108
SE +/- 530.11, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
139262.84
Intel Xeon Gold 6138
SE +/- 1326.70, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
369868.66
2 x Intel Xeon Gold 6138
SE +/- 486.89, N = 3
-O3 -march=native -lpgcommon -lpgport -lpthread -lrt -lcrypt -ldl -lm
587793.66
AMD EPYC DUAL 7401
SE +/- 3390.00, N = 3
-O2 -shared
327192.72
130K
260K
390K
520K
650K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -fPIC


Primesieve 6.2
1e12 Prime Number Generation
Seconds, Fewer Is Better
AMD EPYC 7251
SE +/- 0.24, N = 3
-march=native
40.03
AMD EPYC 7351P
SE +/- 0.07, N = 3
-march=native
19.56
AMD EPYC 7401P
SE +/- 0.08, N = 3
-march=native
15.45
AMD EPYC 7551
SE +/- 0.07, N = 3
-march=native
12.04
AMD EPYC 7601
SE +/- 0.05, N = 3
-march=native
11.89
AMD EPYC DUAL 7401
SE +/- 0.01, N = 3
8.31
dell1
SE +/- 0.07, N = 3
14.92
9
18
27
36
45
1. (CXX) g++ options: -O3 -rdynamic -lpthread

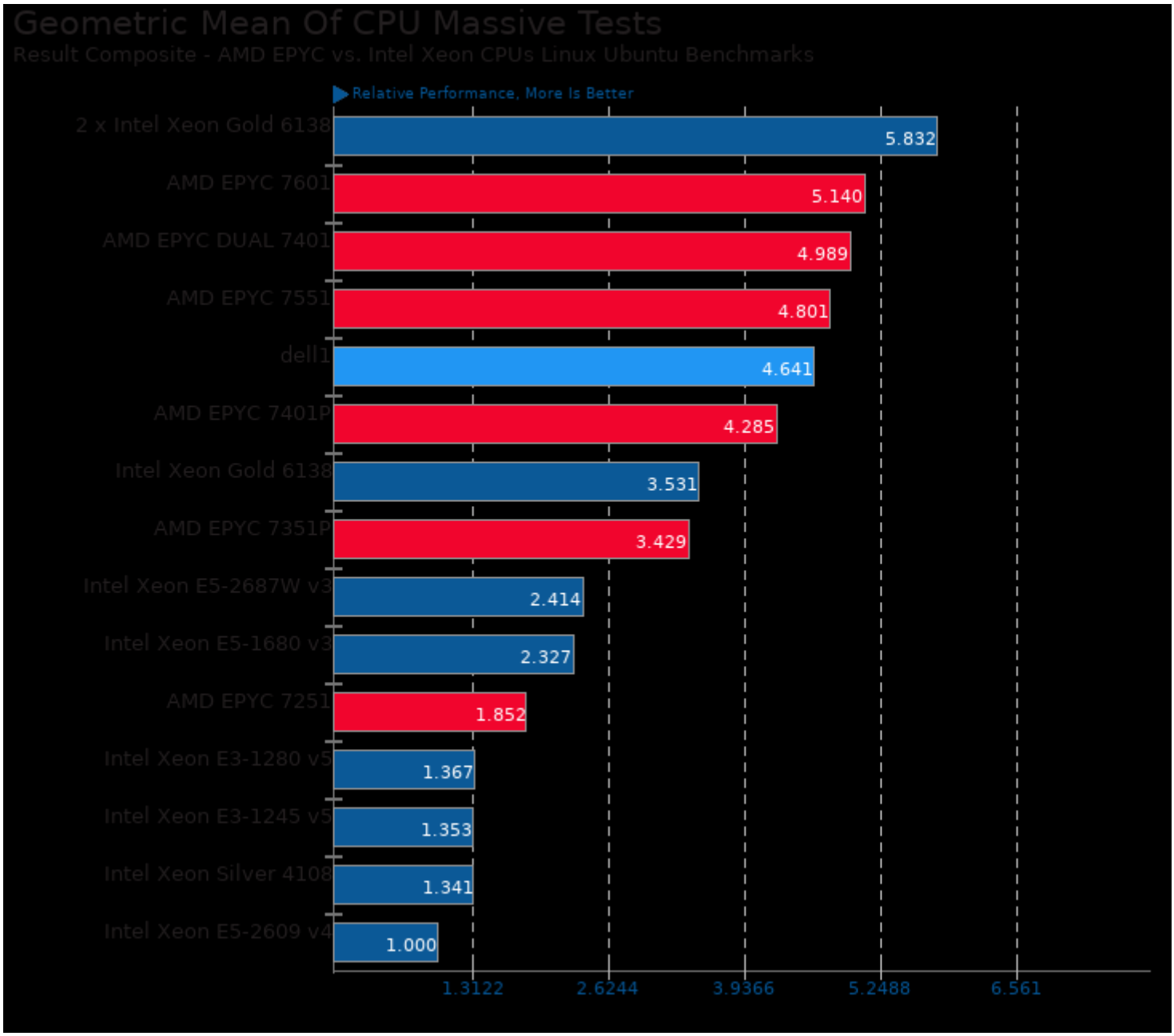
These geometric means are based upon test groupings / test suites for this result file.



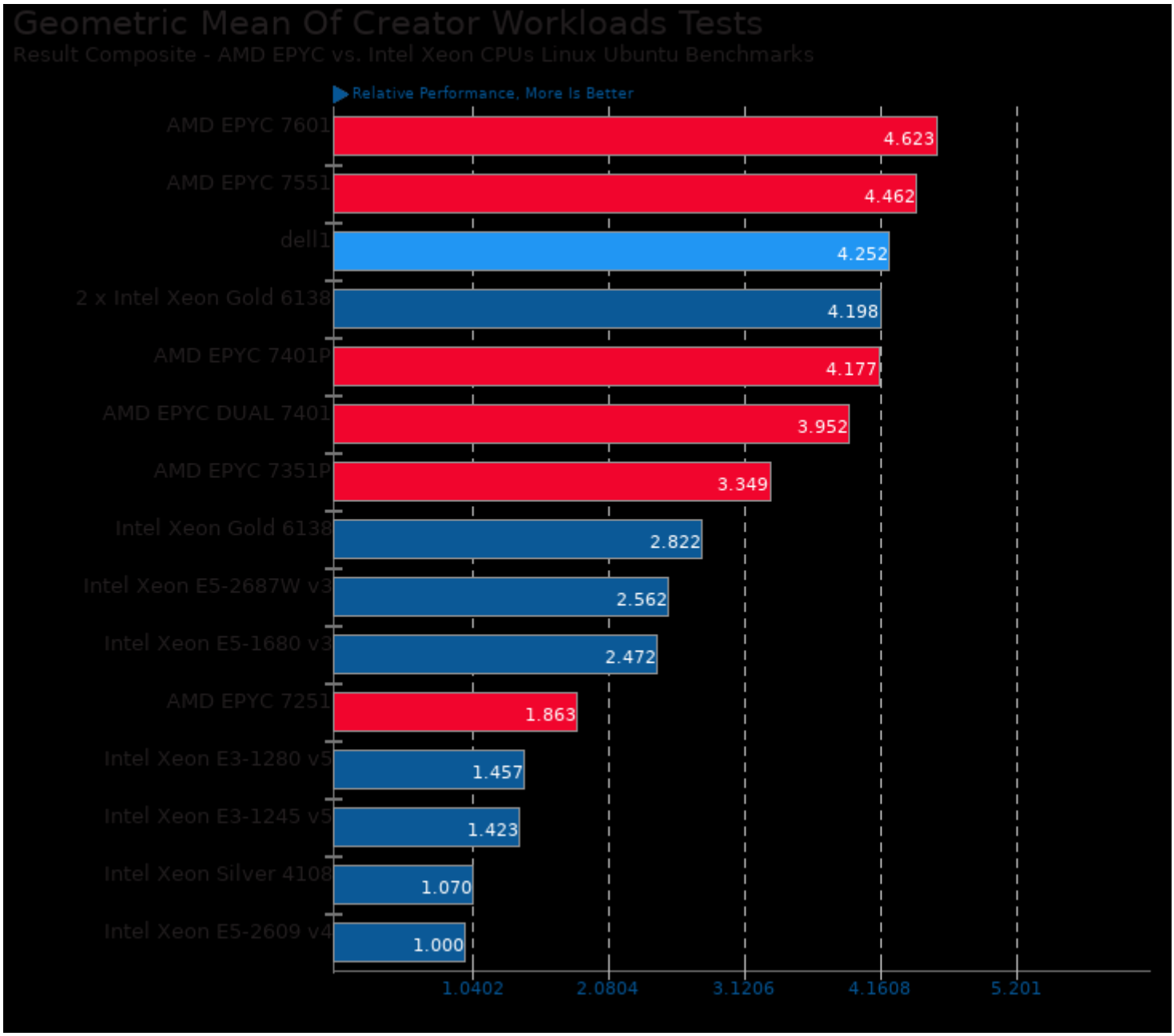
Geometric mean based upon tests: pts/build-php and pts/build-linux-kernel



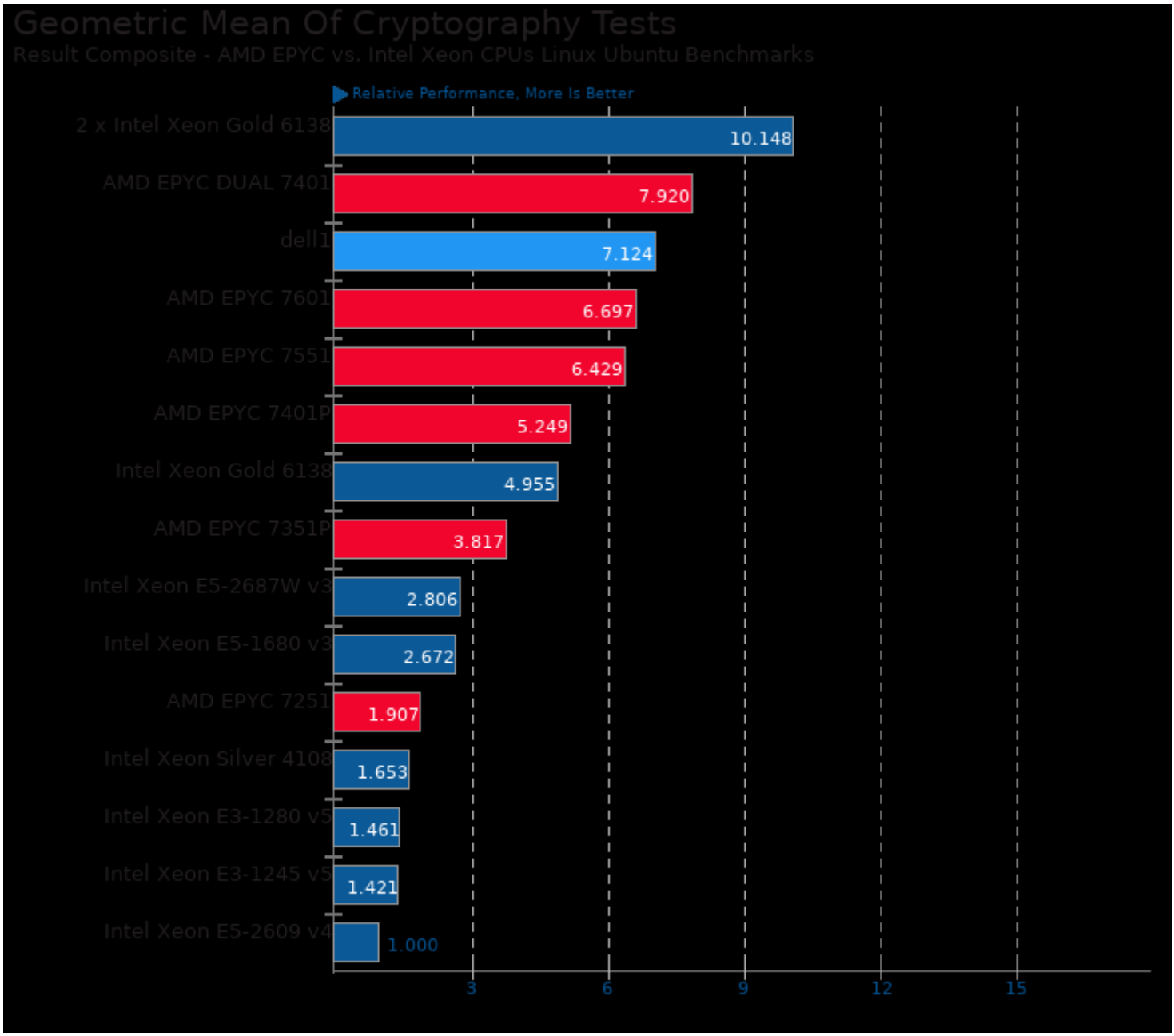
Geometric mean based upon tests: pts/build-php, pts/c-ray, pts/compress-7zip, pts/pgbench, pts/john-the-ripper, pts/x264, pts/openssl and pts/tachyon



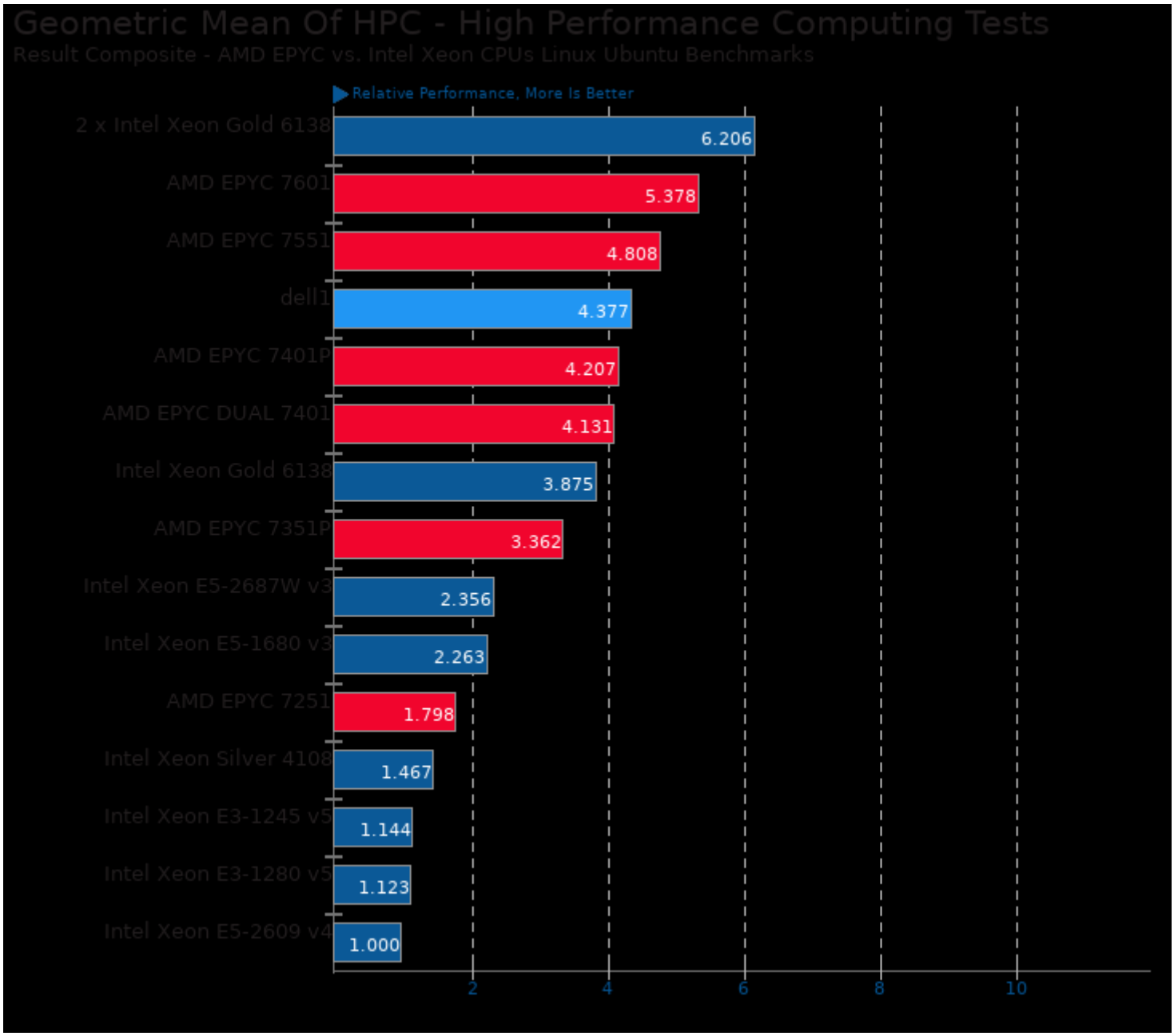
Geometric mean based upon tests: pts/asmfish, pts/build-linux-kernel, pts/build-php, pts/c-ray, pts/compress-7zip, pts/x264, pts/ebizzy, pts/john-the-ripper, pts/openssl, pts/npb, pts/parboil, pts/pgbench, pts/primesieve, pts/rodinia, pts/tachyon and pts/ttsiod-renderer



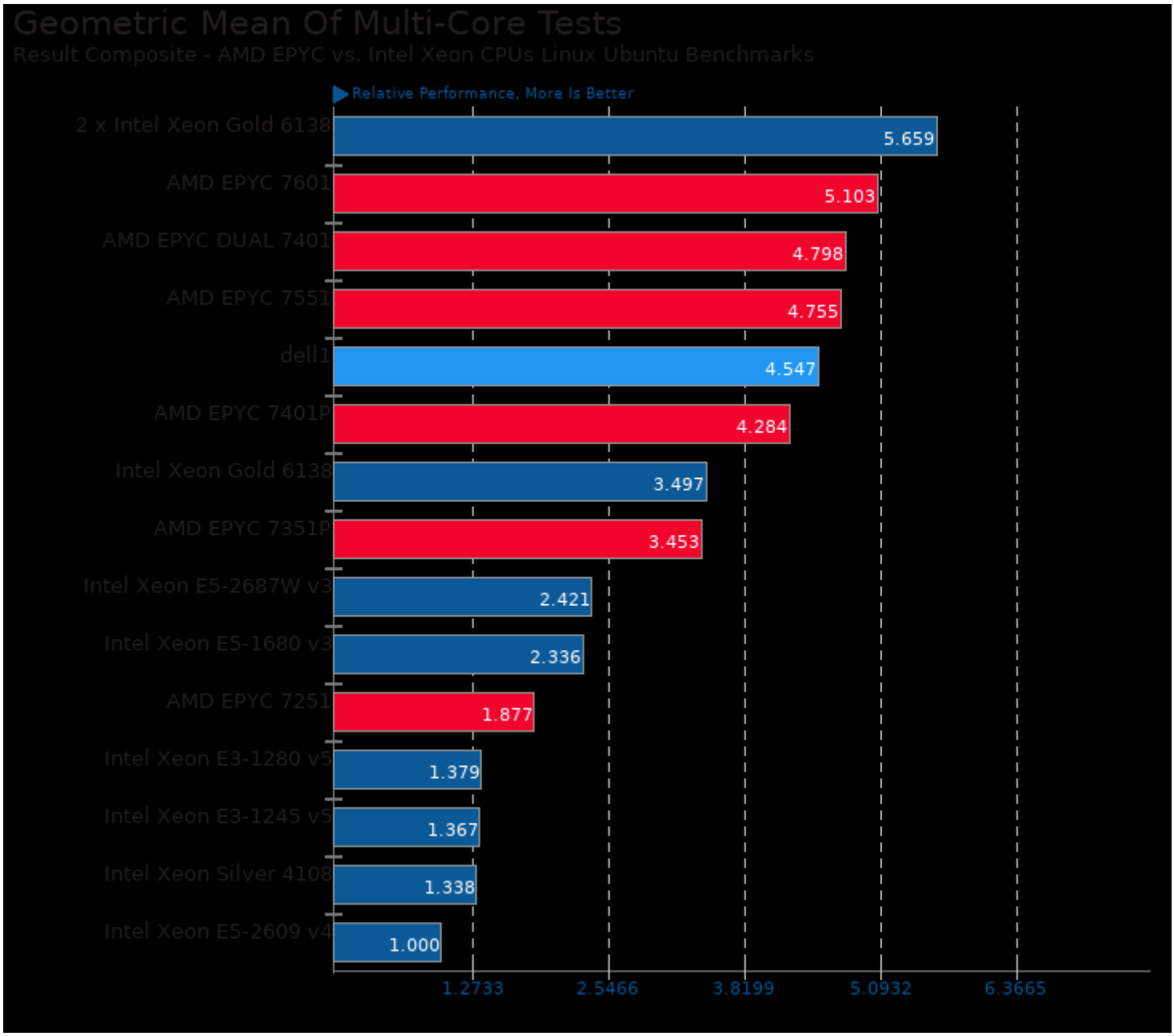
Geometric mean based upon tests: pts/c-ray, pts/tachyon, pts/ttsiod-renderer and pts/x264



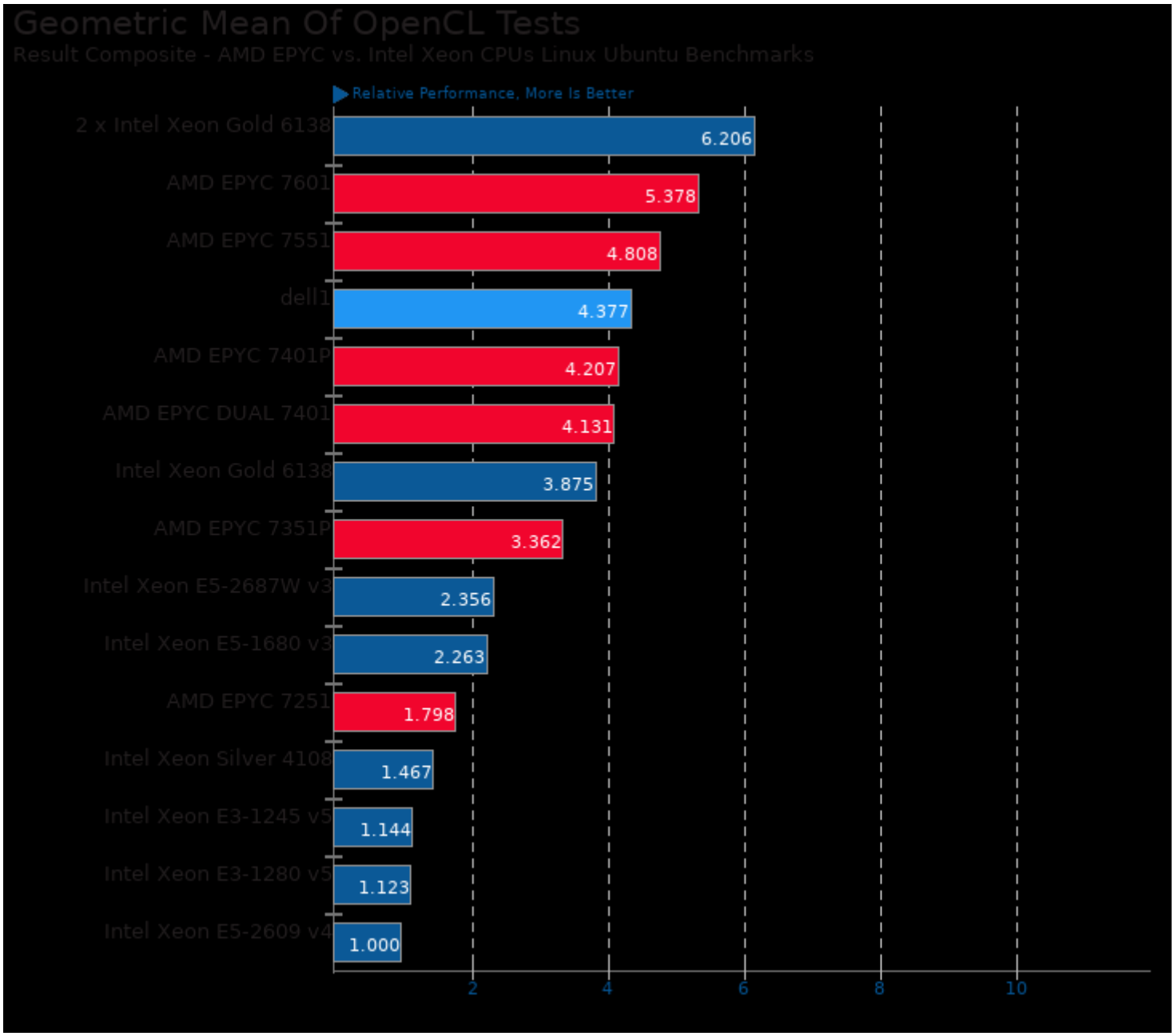
Geometric mean based upon tests: pts/openssl and pts/john-the-ripper



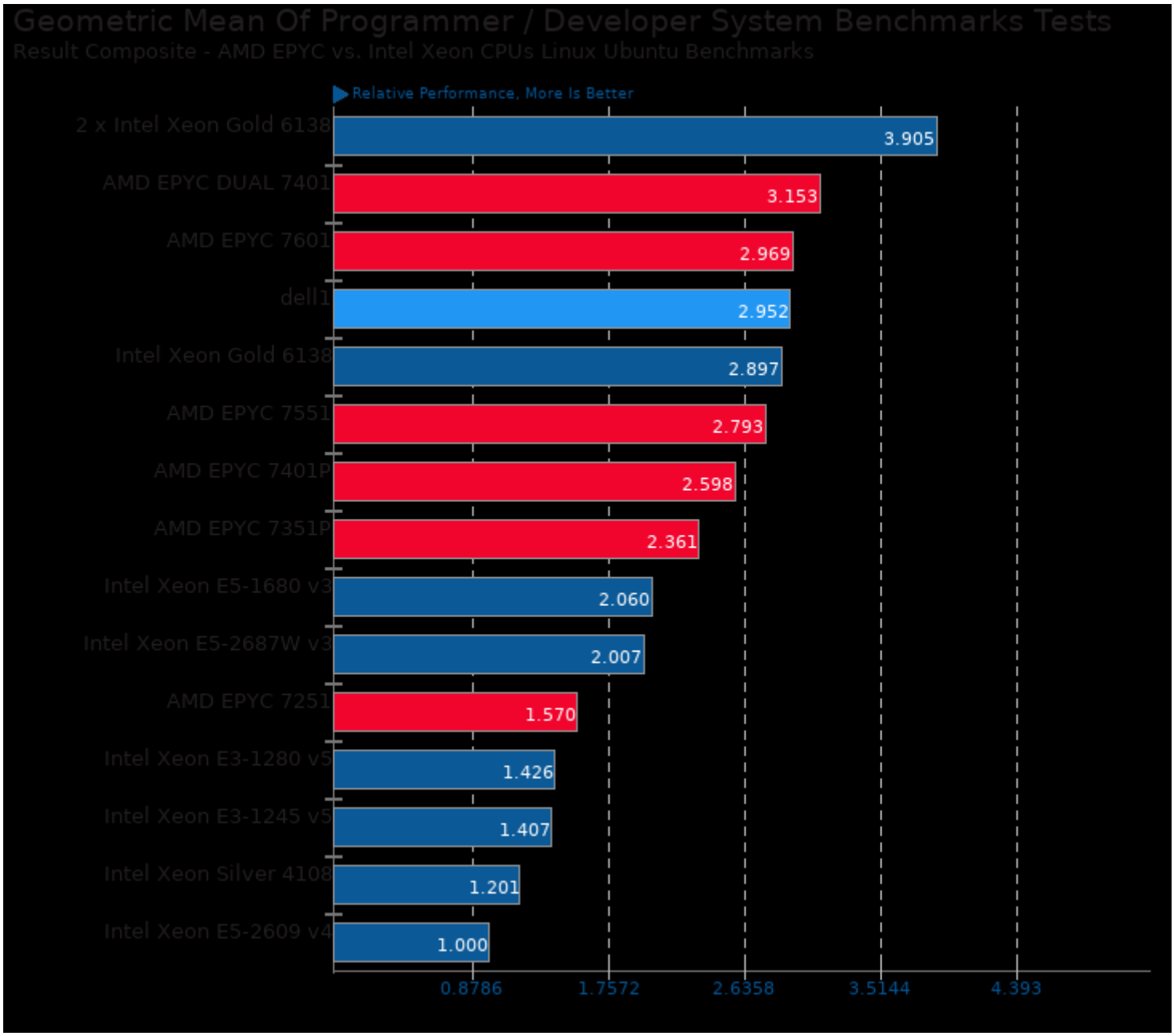
Geometric mean based upon tests: pts/npb, pts/rodinia and pts/parboil



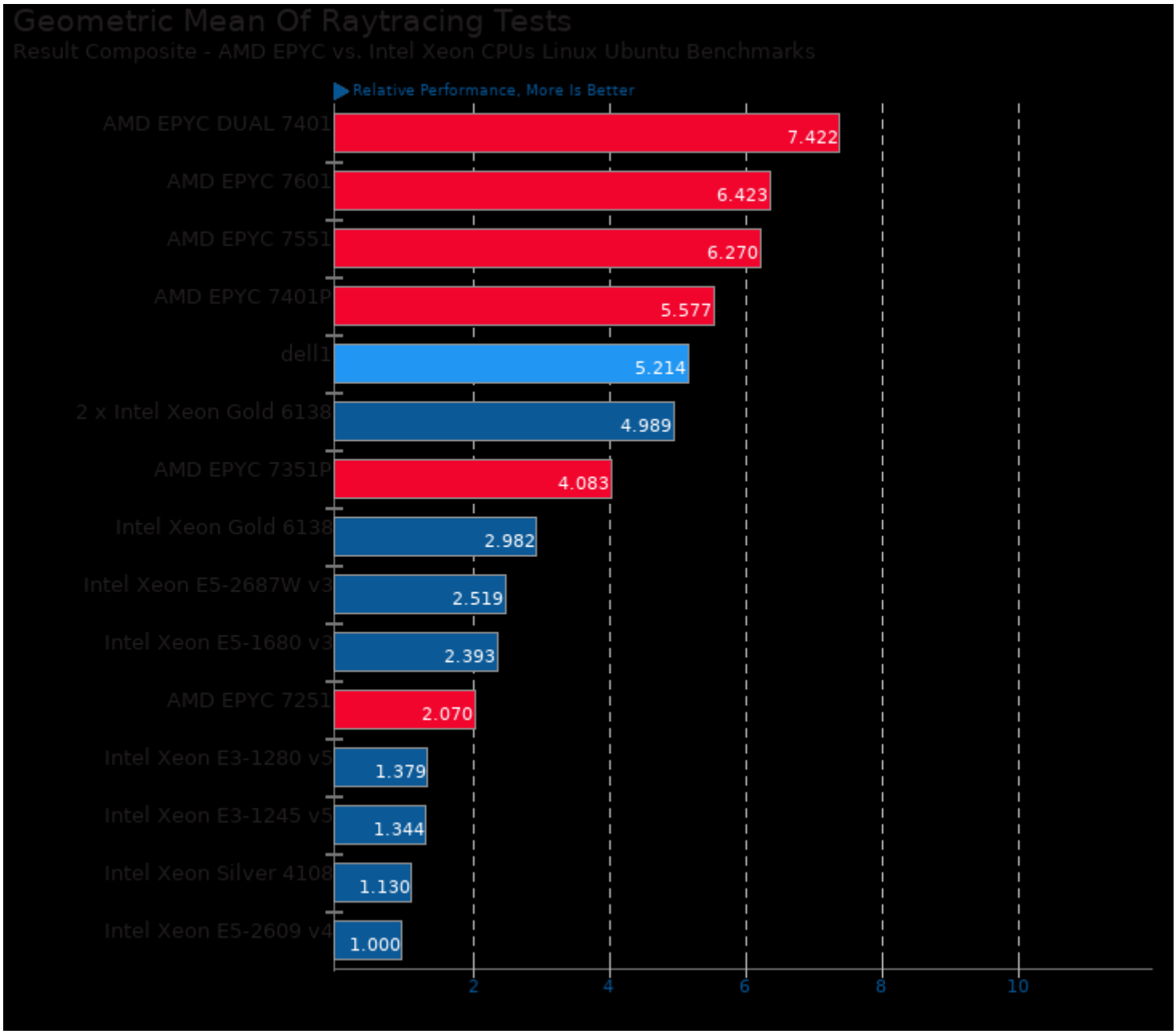
Geometric mean based upon tests: pts/c-ray, pts/tachyon, pts/x264, pts/primesieve, pts/rodinia, pts/parboil, pts/npb, pts/john-the-ripper, pts/asmfish, pts/ebizzy, pts/compress-7zip, pts/build-php, pts/build-linux-kernel, pts/ttsiod-renderer and pts/pgbench



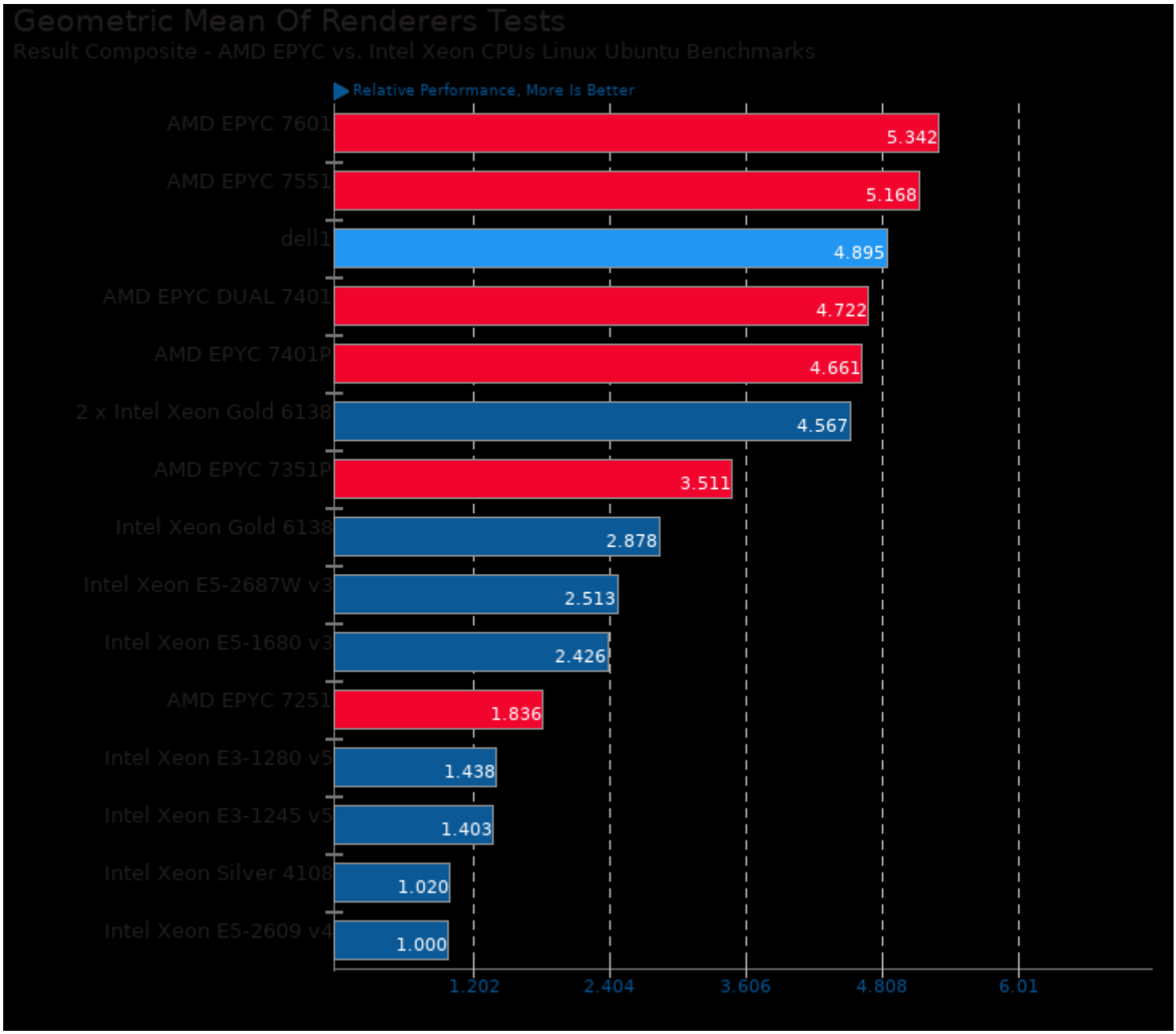
Geometric mean based upon tests: pts/rodinia and pts/parboil



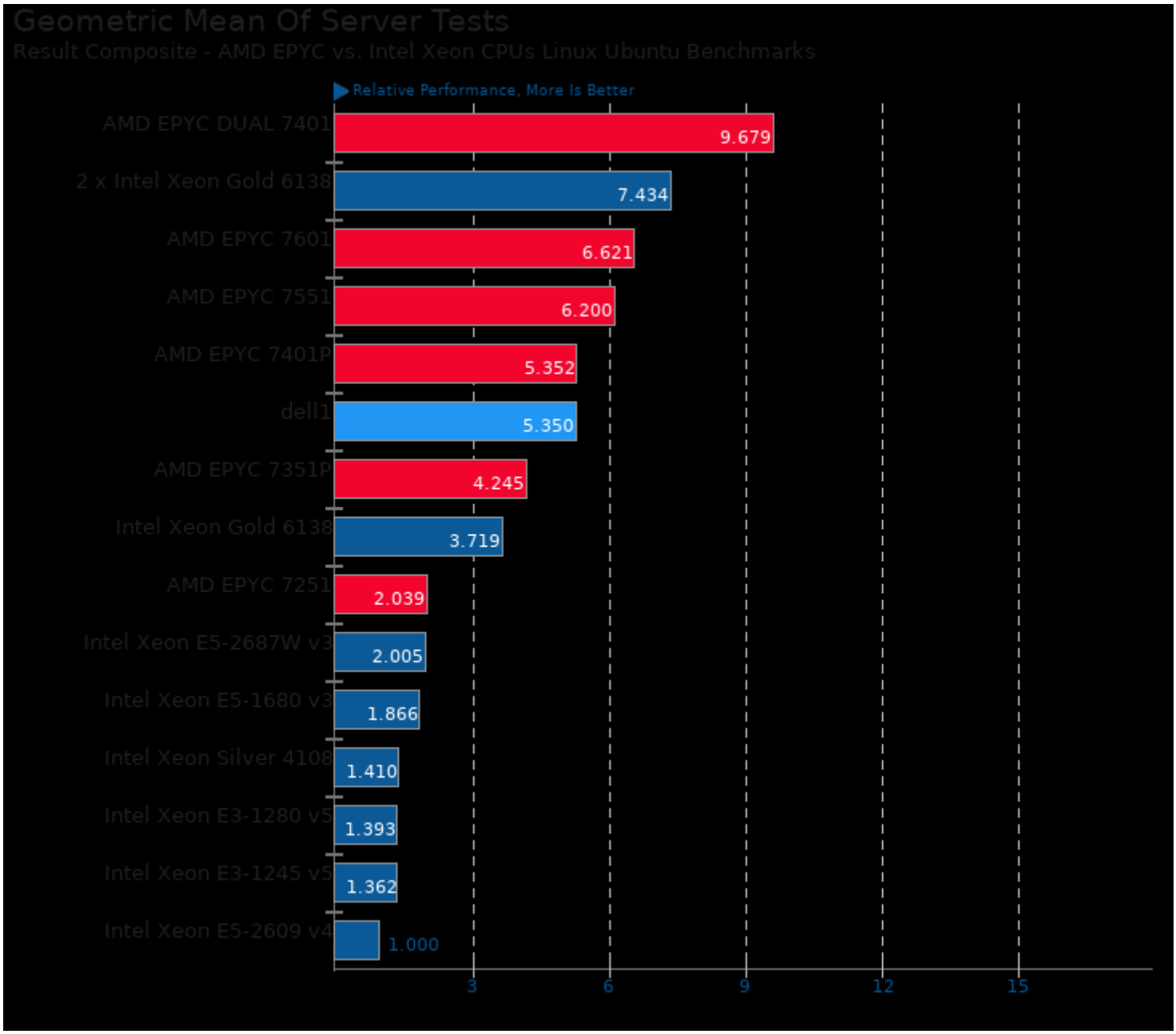
Geometric mean based upon tests: pts/build-php and pts/build-linux-kernel



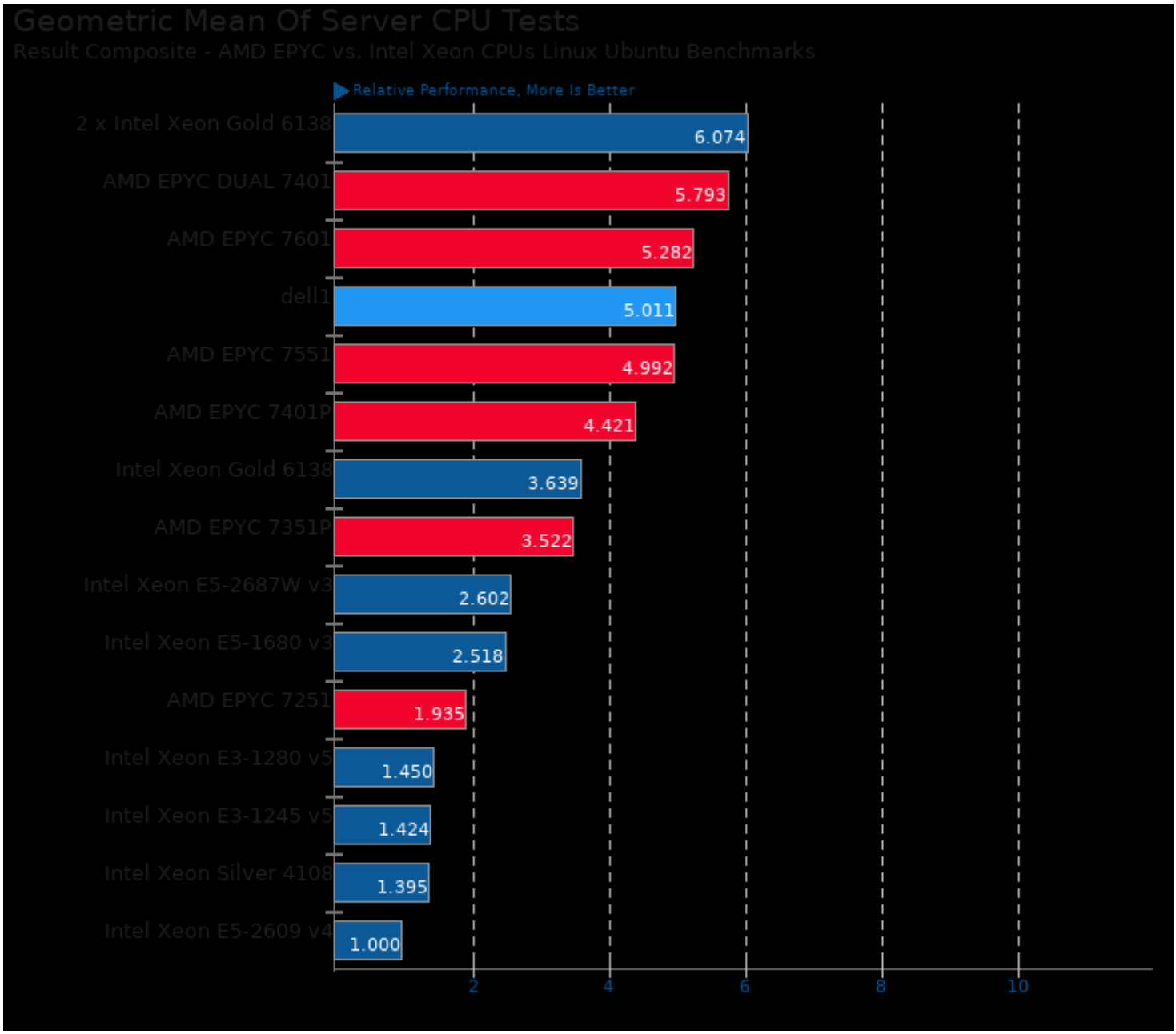
Geometric mean based upon tests: pts/c-ray and pts/tachyon



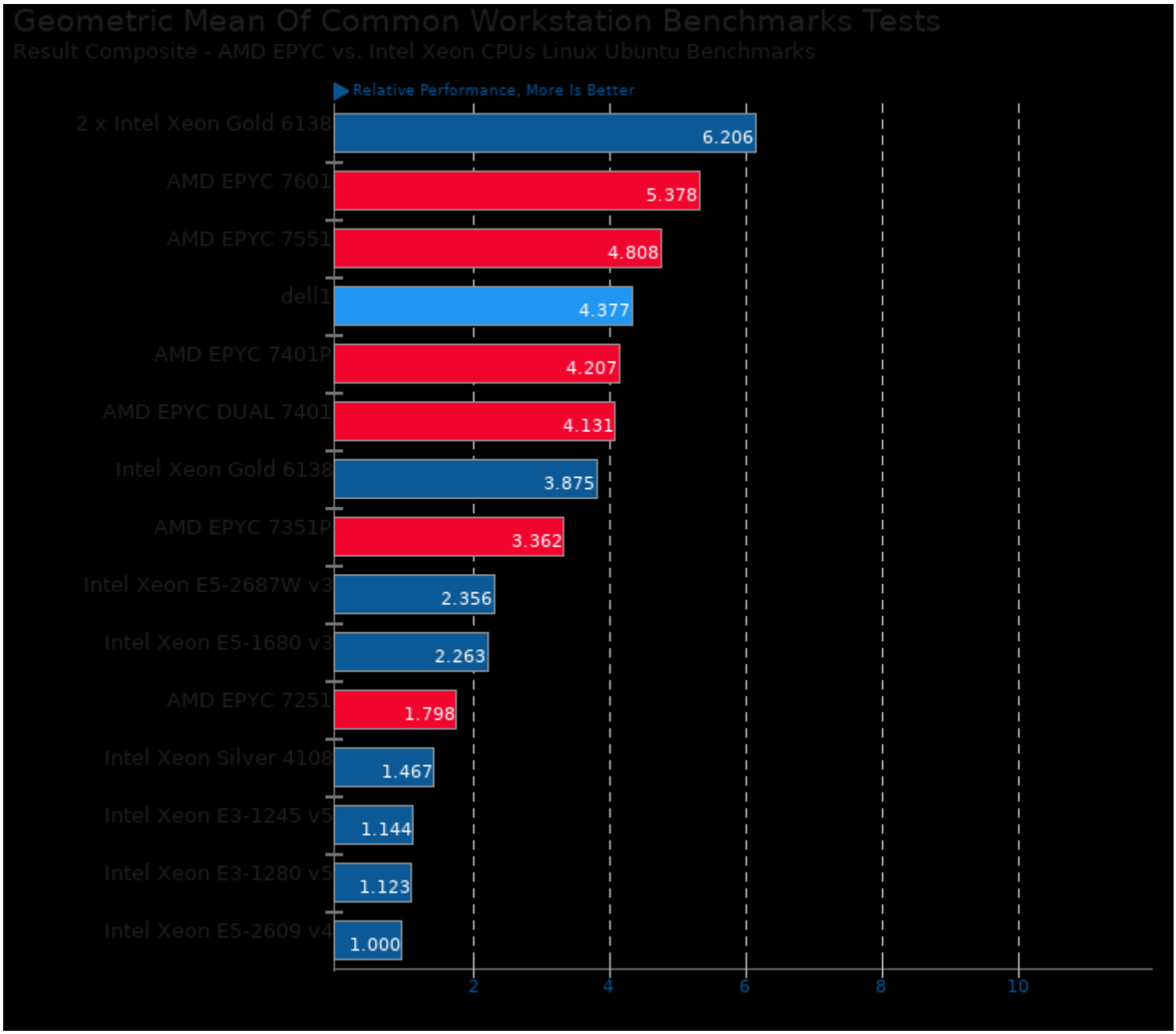
Geometric mean based upon tests: pts/c-ray, pts/tachyon and pts/ttsiod-renderer



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



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/john-the-ripper, pts/x264, pts/compress-7zip, pts/asmfish, pts/build-linux-kernel, pts/build-php, pts/c-ray and pts/openssl



Geometric mean based upon tests: pts/rodinia and pts/parboil

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