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AMD EPYC 7302 / 7402 / 7502 / 7742 2P vs. Xeon Benchmarks

EL7 running kernel-lt 5.4

Automated Executive Summary

EPYC 7742 2P had the most wins, coming in first place for 74% of the tests.

Based on the geometric mean of all complete results, the fastest (EPYC 7742 2P) was 20.226x the speed of the slowest (6272 ES 2P - 20200209).

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

MKL-DNN (Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32) at 326.769x
MKL-DNN (Harness: Convolution Batch conv_all - Data Type: f32) at 311.708x
MKL-DNN (Harness: Convolution Batch conv_alexnet - Data Type: f32) at 299.053x
MKL-DNN (Harness: Convolution Batch conv_3d - Data Type: f32) at 289.809x
MKL-DNN (Performance / Cost - Harness: IP Batch All - Data Type: f32) at 53.725x
SVT-HEVC (1080p 8-bit YUV To HEVC Video Encode) at 42.976x
MKL-DNN (Harness: IP Batch All - Data Type: f32) at 35.622x
SVT-VP9 (Performance / Cost - 1080p 8-bit YUV To VP9 Video Encode) at 26x
SVT-HEVC (Performance / Cost - 1080p 8-bit YUV To HEVC Video Encode) at 24x
PyBench (Performance / Cost - Total For Average Test Times) at 22.453x.

Test Systems:

EPYC 7251

Processor: AMD EPYC 7251 8-Core @ 2.10GHz (8 Cores / 16 Threads), Motherboard: TYAN B8026T70AE24HR (V1.02.B10 BIOS), Chipset: AMD 17h, Memory: 129024MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 126GB, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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

EPYC 7401P

Processor: AMD EPYC 7401P 24-Core @ 2.00GHz (24 Cores / 48 Threads), Motherboard: TYAN B8026T70AE24HR (V1.02.B10 BIOS), Chipset: AMD 17h, Memory: 129024MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 126GB, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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

EPYC 7601

Processor: AMD EPYC 7601 32-Core @ 2.20GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR (V1.02.B10 BIOS), Chipset: AMD 17h, Memory: 129024MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 126GB, Monitor: VE228, Network: 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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

Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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

EPYC 7601 2P

Processor: 2 x AMD EPYC 7601 32-Core (64 Cores / 128 Threads), Motherboard: Dell 02MJ3T (1.2.5 BIOS), Chipset: AMD 17h, Memory: 516096MB, Disk: 280GB INTEL SSDPED1D280GA + 17 x 500GB Samsung SSD 860 + 120GB SSDSCKJB120G7R, Graphics: llvmpipe 504GB, Monitor: VE228, Network: 2 x Broadcom BCM57416 NetXtreme-E Dual-Media 10G RDMA + 2 x Broadcom NetXtreme BCM5720 PCIe

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.1, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.2 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1600x1200

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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

EPYC 7302

Processor: AMD EPYC 7302 16-Core @ 3.00GHz (16 Cores / 32 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 258048MB, Disk: 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 252GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7302 2P

Processor: 2 x AMD EPYC 7302 16-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 516096MB, Disk: 280GB INTEL SSDPED1D280GA + 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 504GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7402

Processor: AMD EPYC 7402 24-Core @ 2.80GHz (24 Cores / 48 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 258048MB, Disk: 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 252GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7402 2P

Processor: 2 x AMD EPYC 7402 24-Core @ 2.80GHz (48 Cores / 96 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 516096MB, Disk: 280GB INTEL SSDPED1D280GA + 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 504GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7502

Processor: AMD EPYC 7502 32-Core @ 2.50GHz (32 Cores / 64 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 258048MB, Disk: 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 252GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X

Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7502 2P

Processor: 2 x AMD EPYC 7502 32-Core @ 2.50GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 516096MB, Disk: 280GB INTEL SSDPE21D280GA + 280GB INTEL SSDPED1D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 504GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7742

Processor: AMD EPYC 7742 64-Core @ 2.25GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 258048MB, Disk: 280GB INTEL SSDPE21D280GA + 256GB Micron_1100_MTFD, Graphics: llvmpipe 252GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

EPYC 7742 2P

Processor: 2 x AMD EPYC 7742 64-Core @ 2.25GHz (128 Cores / 256 Threads), Motherboard: AMD DAYTONA_X

(RDY1001C BIOS), Chipset: AMD Device 1480, Memory: 516096MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 504GB, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Java Notes: OpenJDK Runtime Environment (build 11.0.4+11-post-Ubuntu-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: 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: conditional RSB filling

Xeon Gold 6138

Processor: Intel Xeon Gold 6138 @ 3.70GHz (20 Cores / 40 Threads), Motherboard: TYAN S7106 (V2.00.B20 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 47104MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 46GB, Monitor: VE228, Network: 2 x Intel I210 + 2 x QLogic cLOM8214 1/10GbE

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 256 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Python Notes: Python 2.7.16 + Python 3.7.3
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

2 x Xeon Gold 6138

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V2.00.B20 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 96256MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 93GB, Monitor: VE228, Network: 2 x Intel I210 + 2 x QLogic cLOM8214 1/10GbE

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 256 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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
Python Notes: Python 2.7.16 + Python 3.7.3
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

Xeon Platinum 8280

Processor: Intel Xeon Platinum 8280 @ 4.00GHz (28 Cores / 56 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 192512MB, Disk: 280GB INTEL SSDPED1D280GA, Graphics: llvmpipe 188GB, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 256 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling

2 x Xeon Platinum 8280

Processor: 2 x Intel Xeon Platinum 8280 @ 4.00GHz (56 Cores / 112 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 386048MB, Disk: 280GB INTEL SSDPED1D280GA, Graphics: llvmpipe 377GB, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86_64) 20190907, Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 3.3 Mesa 19.0.8 (LLVM 8.0 256 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-1ubuntu219.04)
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling

W3175X 3.4ghz lock

Processor: Intel Xeon W-3175X @ 3.40GHz (28 Cores / 56 Threads), Motherboard: ASUS ROG DOMINUS EXTREME (0509 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 97280MB, Disk: 4 x 400GB KXG50ZNV512G TOSHIBA, Graphics: AMD Radeon RX 470/480/570/570X/580/580X/590 8GB (1380/2000MHz), Audio: Realtek ALC1220, Monitor: 289K, Network: Intel I219-LM

OS: Fedora 30, Kernel: 5.2.6-200.fc30.x86_64 (x86_64), Desktop: GNOME Shell 3.32.2, Display Server: X Server + Wayland, OpenGL: 4.5 Mesa 19.1.3 (LLVM 8.0.0), Compiler: GCC 9.2.1 20190827, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-redhat-linux --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,objc,obj-c++,ada,go,d,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=i686 --with-gcc-major-version-only --with-isl --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.16 + Python 3.7.4
Security Notes: SELinux + KPTI + __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp + PTE Inversion

6272 ES 2P - 20200209

Processor: 2 x AMD Eng Sample ZS222445TGG44_32/22/2_2/16 (16 Cores / 32 Threads), Motherboard: Supermicro H8DG6/H8DGi v1.0 (3.5c BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 120GB, Disk: 40008GB Seagate ST8000NM-VOL#001 + 256GB SSD RAID 1, Graphics: NVIDIA GeForce GTX 1080 8GB (1708/5005MHz), Audio: NVIDIA GP104 HD Audio, Network: 2 x Intel 82576

OS: Gentoo/Linux, Kernel: 4.19.66-gentoo (x86_64), Desktop: KDE Plasma 5.17.4, Display Server: X Server 1.20.6, Display Driver: NVIDIA 440.44, OpenGL: 4.6.0, Compiler: GCC 9.2.0, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --bindir=/usr/x86_64-pc-linux-gnu/gcc-bin/9.2.0 --build=x86_64-pc-linux-gnu --datadir=/usr/share/gcc-data/x86_64-pc-linux-gnu/9.2.0 --disable-altivec --disable-esp --disable-fixed-point --disable-libmudflap --disable-libssp --disable-systemtap --disable-werror --enable-__cxa_atexit --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-languages=c,c++,fortran --enable-libgomp --enable-libstdcxx-time --enable-lto --enable-multilib --enable-nls --enable-obsolete --enable-secureplt --enable-shared --enable-targets=all --enable-threads=posix --enable-vtable-verify --host=x86_64-pc-linux-gnu --includedir=/usr/lib/gcc/x86_64-pc-linux-gnu/9.2.0/include --mandir=/usr/share/gcc-data/x86_64-pc-linux-gnu/9.2.0/man --with-multilib-list=m32,m64 --with-python-dir=/share/gcc-data/x86_64-pc-linux-gnu/9.2.0/python --without-isl
Processor Notes: CPU Microcode: 0x6000425
OpenCL Notes: GPU Compute Cores: 2560
Python Notes: Python 3.6.9
Security Notes: 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 STIBP: disabled RSB filling

Threadripper 3960x

Processor: AMD Ryzen Threadripper 3960X 24-Core @ 3.80GHz (24 Cores / 48 Threads), Motherboard: Gigabyte TRX40 AORUS XTREME (F2 BIOS), Chipset: AMD Device 1480, Memory: 129024MB, Disk: 1000GB Sabrent Rocket 4.0 1TB + 380GB INTEL SSDPEL1D380GA, Graphics: AMD Radeon Frontier Edition 16GB (1600/945MHz), Audio: AMD Device aaf8, Monitor: U32J59x, Network: 2 x Intel 10G X550T + Intel Device 2723

OS: Ubuntu 18.04, Kernel: 5.3.0-28-generic (x86_64), Desktop: GNOME Shell 3.28.4, Display Server: X Server 1.20.5, Display Driver: amdgpu 19.0.1, OpenGL: 4.5 Mesa 19.2.8 (LLVM 9.0.0), Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 3840x2160

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 - CPU Microcode: 0x8301025
Python Notes: Python 2.7.17 + Python 3.6.9
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: conditional RSB filling + tsx_async_abort: Not affected

g36 5.6 EPYC 7302 2P

Processor: 2 x AMD EPYC 7302 16-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: Supermicro H11DSi-NT v2.00 (2.1 BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s Samsung M393A4K40DB3-CWE, Disk: 1920GB SAMSUNG MZ1LB1T9HALS-00007, Graphics: ASPEED, Network: 2 x Intel 10G X550T

OS: CentOS 7.9.2009, Kernel: 5.6.14-1.el7.elrepo.x86_64 (x86_64), Compiler: GCC 4.8.5 20150623, File-System: ext4

Compiler Notes: --build=x86_64-redhat-linux --disable-libgcj --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,objc,obj-c++,java,fortran,ada,go,lto --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=x86-64 --with-linker-hash-style=gnu --with-tune=generic
Processor Notes: Scaling Governor: acpi-cpufreq conservative - CPU Microcode: 0x8301034
Python Notes: Python 2.7.5 + Python 3.6.8
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: conditional RSB filling + tsx_async_abort: Not affected

g39 5.4 EPYC 7713P

Processor: AMD EPYC 7713P 64-Core @ 2.00GHz (64 Cores / 128 Threads), Motherboard: Supermicro H12SSW-AN6 v1.01 (2.4 BIOS), Chipset: AMD Starship/Matisse, Memory: 512GB, Disk: 3841GB SAMSUNG MZ1LB3T8HMLA-00007, Graphics: ASPEED, Network: 2 x Intel 10G X550T

OS: CentOS 7.9.2009, Kernel: 5.14.15-1.el7.elrepo.x86_64 (x86_64), Display Server: X Server 1.19.2, Compiler: GCC 4.8.5 20150623, File-System: ext4, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=x86_64-redhat-linux --disable-libgcj --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,objc,obj-c++,java,fortran,ada,go,lto --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=x86-64 --with-linker-hash-style=gnu --with-tune=generic
Processor Notes: Scaling Governor: acpi-cpufreq conservative (Boost: Enabled) - CPU Microcode: 0xa00115d
Python Notes: Python 2.7.5 + Python 3.6.8
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 + srbds: Not affected + tsx_async_abort: Not affected

	EPYC 7251	EPYC 7401P	EPYC 7601	EPYC 7601 2P	EPYC 7302	EPYC 7302 2P	EPYC 7402	EPYC 7402 2P	EPYC 7502	EPYC 7502 2P	EPYC 7742	EPYC 7742 2P	Xeon Gold 6138	2 x Xeon Gold 6138	Xeon Platinum 8280	2 x Xeon Platinum 8280	W3175X 3.4ghz lock	6272 ES 2P - 20200209	Threadripper 3960x	g365.6 EPYC 7302 2P	g395.4 EPYC 7713P
7-Zip Compression - C.S.T (MIPS)	30676	78308	90342	134090	96539	150914	140234	218425	171119	255034	280575	350308	83345	139242	139773	241149	142956	42586	157195	80777	307056
Normalized	8.76%	22.35%	25.79%	38.28%	27.56%	43.08%	40.03%	62.35%	48.85%	72.80%	80.09%	100%	23.79%	39.75%	39.91%	68.84%	40.81%	12.16%	44.87%	23.06%	87.63%
Standard Deviation	1.7%	0.5%	2.4%	4.4%	0.1%	2.4%	0.4%	0.3%	0.3%	1.2%	0.2%	1.7%	0.3%	1.8%	0.9%	2.7%	0.2%	1.9%	1.4%	1.9%	0.1%

7-Zip Compression - Performance / Cost - C.S.T (MIPS/Dollar)	54.58	76.40	16.84	12.50	**90.82**	70.98	72.55	56.50	60.75	45.27	36.58	22.82	31.11	25.99	13.96	**12.05**					
Normalized	60.1%	84.1%	18.5%	13.7%	100%	78.1%	79.8%	62.2%	66.8%	49.8%	40.2%	25.1%	34.2%	28.6%	15.3%	13.2%					
AOM AV1 - AV1 Video Encoding (FPS)													0.10								
Standard Deviation													0%								
Apple seed - Disney Material (sec)	**336.89**	144.50	108.53	69.44	148.04	81.28	109.30	63.45	86.34	59.83	63.50	**57.99**	162.72	96.10	97.09	65.95	86.33	325.13	83.615		
Normalized	17.2%	40.1%	53.4%	83.5%	39.1%	71.3%	53.0%	91.3%	67.1%	96.9%	91.3%	100%	35.6%	60.3%	59.7%	87.9%	67.1%	17.8%	69.3%		
Apple seed - Performance / Cost - Disney Material (sec x Dollar)	189332	**148113**	582263	745091	157367	172801	211277	245298	243220	337082	487045	890089	435927	514904	971774	**1320187**					
Normalized	78.2%	100%	25.4%	19.8%	94.1%	85.7%	70.1%	60.3%	60.9%	43.9%	30.4%	16.6%	33.9%	28.7%	15.2%	11.2%					
asmFish - 1.H.M.2.D	**162199**	460188	622419	114981	429098	757833	629628	112672	784674	135474	131710	**239606**	407964	746814	701368	134205	747711	292032	748195	736510	142246
Normalized	6.77%	19.2%	25.9%	47.9%	17.9%	31.6%	26.2%	47.0%	32.7%	56.5%	54.9%	100%	17.0%	31.1%	29.2%	56.0%	31.2%	12.1%	31.2%	30.7%	59.3%
Standard Deviation	2.7%	0.9%	0.6%	1.5%	1%	1.7%	0.3%	3%	1%	0.3%	0.8%	0.7%	2.9%	1%	0.9%	2.1%	1.8%	0.7%	0.6%	0.9%	0.7%

asmFish - Performance / Cost - 1.H.M.2.D (Nodes/s	288 61	**448 96**	116 01	107 16	403 67	356 46	325 73	291 44	278 55	240 46	171 72	156 11	152 28	139 38	700 7	**670 4**				
Normalized	64.2 8%	100 %	25.8 4%	23.8 7%	89.9 1%	79.4 %	72.5 5%	64.9 1%	62.0 4%	53.5 6%	38.2 5%	34.7 7%	33.9 2%	31.0 5%	15.6 1%	14.9 3%				
Blender - BMW27 - CPU-Only (sec)	**277 .45**	109 .37	83. 46	47. 93	101 .34	54. 63	70. 54	40. 52	60. 95	35. 41	37. 39	**26. 84**	117 .74	63. 61	68. 31	37. 84	59. 14	239 .25	56. 13	54. 15
Normalized	9.67 %	24.5 4%	32.1 6%	56%	26.4 9%	49.1 3%	38.0 5%	66.2 4%	44.0 4%	75.8 %	71.7 8%	100 %	22.8 %	42.1 9%	39.2 9%	70.9 3%	45.3 8%	11.2 2%	47.8 2%	49.5 7%
Standard Deviation	0.4%	0.9%	0.7%	0.4%	0.5%	0.2%	0.2%	0.5%	0%	1.1%	0.6%	0.9%	0%	0.4%	0.2%	0.7%	0.5%	3%	0.6%	0.7%
Blender - Classroom - CPU-Only (sec)	**704 .46**	275 .15	204 .36	98. 92	264 .66	136 .31	181 .58	94. 41	152 .52	78. 17	86. 25	**46. 33**	321 .10	163 .61	188 .04	95. 00	156 .48	653 .78	140 .34	138 .28
Normalized	6.58 %	16.8 4%	22.6 7%	46.8 4%	17.5 1%	33.9 9%	25.5 1%	49.0 7%	30.3 8%	59.2 7%	53.7 2%	100 %	14.4 3%	28.3 2%	24.6 4%	48.7 7%	29.6 1%	7.09 %	33.0 1%	33.5 %
Standard Deviation	0.3%	0.3%	0.2%	0.4%	0.1%	0.9%	0%	0.5%	0.4%	0.4%	0.4%	0.7%	0.1%	0.5%	0.3%	0.1%	0.1%	0.2%	0.1%	1.1%
Blender - Fishy Cat - CPU-Only (sec)	**410 .78**	160 .03	125 .29	76. 73	143 .59	82. 88	101 .69	64. 75	88. 34	57. 60	59. 38	**43. 71**	177 .35	100 .07	104 .70	62. 53	92. 38	350 .85	80. 30	81. 14
Normalized	10.6 4%	27.3 1%	34.8 9%	56.9 7%	30.4 4%	52.7 4%	42.9 8%	67.5 1%	49.4 8%	75.8 9%	73.6 1%	100 %	24.6 5%	43.6 8%	41.7 5%	69.9 %	47.3 2%	12.4 6%	54.4 3%	53.8 7%
Standard Deviation	0.3%	0.2%	0.4%	0.7%	0.1%	0.4%	0.3%	0.6%	0.1%	0.2%	0.3%	0.2%	0%	0.4%	0.1%	0.1%	0.1%	0.2%	0.2%	0.6%
Blender - Barbershop - CPU-Only (sec)	**119 0**	453	347	220	400	238	284	180	243	164	169	**142**	455	266	279	181	236	866 .38	230 .28	245 .41
Normalized	11.9 3%	31.3 5%	40.9 2%	64.5 5%	35.5 %	59.6 6%	50%	78.8 9%	58.4 4%	86.5 9%	84.0 2%	100 %	31.2 1%	53.3 8%	50.9 %	78.4 5%	60.1 7%	16.3 9%	61.6 6%	57.8 6%
Standard Deviation	0.1%	0.3%	0.3%	0.6%	0.1%	0.2%	0.1%	0.3%	0.3%	0.4%	0.2%	0.3%	0.1%	0.1%	0.1%	0.3%	0.2%	0.5%	0.1%	2.4%

Blender - Pabellon Barcelona - CPU-Only (sec)	**1067**	390.84	294.28	159.74	341.22	180.38	234.19	128.52	199.29	109.24	116.92	**74.19**	414.35	214.82	237.50	124.87	203.60	828.53	183.36	176.73
Normalized	6.95%	18.9%	25.2%	46.4%	21.7%	41.1%	31.6%	57.7%	37.2%	67.9%	63.4%	100%	17.9%	34.5%	31.2%	59.4%	36.4%	8.95%	40.4%	41.9%
Standard Deviation	0.1%	0.1%	0.3%	0.1%	0.2%	0.9%	0.6%	0.9%	0.7%	0.6%	0.8%	0.5%	0.1%	0.1%	0.1%	0.2%	0.1%	0.3%	0.1%	0.2%
Blender - Performance / Cost - BMW27 - CPU-Only (sec x Dollar)	155927	112104	447763	514289	**107724**	116143	136354	156650	171696	199500	286781	411967	315425	340822	683715	**757481**				
Normalized	69.09%	96.09%	24.06%	20.95%	100%	92.75%	79%	68.77%	62.74%	54%	37.56%	26.15%	34.15%	31.61%	15.76%	14.22%				
Blender - Performance / Cost - Classroom - CPU-Only (sec x Dollar)	395907	282029	1096391	1061412	**281334**	289795	350994	364989	429649	440410	661538	711119	860227	876622	1882092	**190171**				
Normalized	71.06%	99.75%	25.66%	26.51%	100%	97.08%	80.15%	77.08%	65.48%	63.84%	42.53%	39.56%	32.79%	32.09%	14.95%	14.79%				
Blender - Performance / Cost - Fishy Cat - CPU-Only (sec x Dollar)	230858	164031	672181	823313	**152636**	176203	196567	250324	248854	324518	455445	670905	475121	536175	1047942	**125172**				
Normalized	66.12%	93.05%	22.71%	18.54%	100%	86.63%	77.65%	60.98%	61.34%	47.03%	33.51%	22.75%	32.13%	28.47%	14.57%	12.19%				

Blender - Performance / Cost - Barbershop - CPU-Only (sec x Dollar)	668842	464756	186160 1	236006 4	**425508**	506201	549359	694991	683996	926511	129584 7	217541 4	121824 8	142469 2	279641 5	**363186 6**				
Normalized	63.6%	91.5%	22.8%	18.0%	100%	84.0%	77.4%	61.2%	62.2%	45.9%	32.8%	19.5%	34.9%	29.8%	15.2%	11.7%				
Blender - Performance / Cost - Pabellon Barcelona - CPU-Only (sec x Dollar)	599783	400611	157881 2	171401 0	**362717**	383488	452689	496858	561400	615458	896776	113874 2	111004 4	115100 6	237713 8	**249964 8**				
Normalized	60.4%	90.5%	22.9%	21.1%	100%	94.5%	80.1%	73%	64.6%	58.9%	40.4%	31.8%	32.6%	31.5%	15.2%	14.5%				
C-Ray - Total Time - 4.1.R.P.P (sec)	**88.08**	32.36	24.45	12.28	38.23	19.35	25.62	13.02	20.80	10.86	11.85	**6.29**	49.00	27.42	27.88	14.31	27.16	75.941	25.692	20.106	12.894
Normalized	7.14%	19.4%	25.7%	51.2%	16.4%	32.5%	24.5%	48.3%	30.2%	57.9%	53.0%	100%	12.8%	22.9%	22.5%	43.9%	23.1%	8.28%	24.4%	31.2%	48.7%
Standard Deviation	0.1%	0.8%	1%	0.3%	0.1%	0.3%	0.2%	0%	0.1%	0.8%	0.2%	2.6%	0.1%	2.9%	0.1%	0.2%	0.1%	0.6%	0.2%	0.1%	0.5%
C-Ray - Performance / Cost - Total Time - 4.1.R.P.P (sec x Dollar)	49501	**33169**	131174	131764	40638	41138	49523	50335	58594	61185	90890	96545	131271	146916	279051	**286458**				
Normalized	67.0%	100%	25.2%	25.1%	81.6%	80.6%	66.9%	65.9%	56.6%	54.2%	36.4%	34.3%	25.2%	22.5%	11.8%	11.5%				

Coremark - CoreMark Size 666 - I.P.S (Iteration	234690	61829941	82041455	16557	58863	11340957	88032	16558	11094	21187	19621	371999	58975	11431	96733	18836	97245	25042	10617	83123	14158
Normalized	6.31%	16.62%	22.05%	44.54%	15.82%	30.47%	23.66%	44.51%	29.85%	56.94%	52.81%	100%	15.85%	30.71%	26%	50.69%	26.16%	6.73%	28.51%	22.35%	38.06%
Standard Deviation	0.1%	1%	1.1%	1.6%	0.2%	0.6%	0.8%	1.2%	0.1%	0.9%	0.2%	0.2%	2.8%	1.5%	0.6%	2%	0.5%	3.5%	1.8%	0.7%	0%
Coremark - Performance / Cost - CoreMark Size 666 - I.P.S (Iterations/Sec/Do	417.60	603.22	152.92	154.29	553.75	533.44	455.42	428.32	393.85	376.07	256.35	242.36	220.14	213.35	96.65	94.10					
Normalized	69.23%	100%	25.35%	25.58%	91.89%	88.43%	75.51%	71.01%	65.29%	62.34%	42.51%	40.18%	36.49%	35.37%	16.02%	15.61%					
dav1d - Summer Nature 4K (sec)	51.83	26.44	24.97	18.67	21.89	17.47	16.78	14.47	15.98	13.04	12.01	11.41	26.92	28.15	21.65	18.09	13.99	70.666			
Normalized	22.01%	43.15%	45.69%	61.11%	52.16%	65.31%	68%	78.85%	71.45%	87.52%	95%	100%	42.38%	40.53%	52.71%	63.07%	81.56%	16.15%			
Standard Deviation	0.4%	0.4%	0.5%	0.6%	0.3%	0.4%	0.2%	0.5%	0.1%	1%	0.2%	2.8%	0.4%	41.4%	0.6%	1.9%	0.2%	0.8%			
dav1d - Performance / Cost - Summer Nature 4K (sec x Dollar)	29128	27101	13364	20329	23269	37141	32436	55941	45016	73467	92117	17532	72119	15828	21695	36226					
Normalized	79.88%	85.66%	17.37%	11.62%	100%	62.75%	71.74%	41.66%	51.69%	31.67%	25.26%	13.29%	32.26%	15.43%	10.74%	6.43%					

Geekbench - CPU Multi Core (Score)	**6571**	14576	17829	28438	17312	28823	23514	37477	27437	43436	42067	**59066**	14386	19626	23734	36165
Normalized	11.12%	24.68%	30.18%	48.15%	29.31%	48.81%	39.82%	63.45%	46.45%	73.51%	71.22%	100%	24.36%	33.23%	40.18%	61.23%
Standard Deviation	2%	1.7%	2.8%	2.6%	0.5%	0.7%	0.2%	1.4%	0%	1.4%	0.9%	1.7%	0.6%	0.8%	0.6%	1.3%
Geekbench - CPU Multi Core - Face Detection (images/	**56.47**	155.13	195.67	363.70	148.30	290.47	219.67	415.53	266.73	501.20	465.80	**792.37**	130.90	194.57	225.17	396.27
Normalized	7.13%	19.58%	24.69%	45.92%	18.73%	36.68%	27.76%	52.47%	33.68%	63.29%	58.80%	100%	16.54%	24.57%	28.42%	50.01%
Standard Deviation	1.5%	1.3%	6.2%	3.9%	0.8%	1.8%	0.8%	1.6%	1.2%	6.4%	3%	4.5%	1.1%	3.7%	2.6%	8.5%
Geekbench - CPU Single Core (Score)	**770**	820	869	873	1005	991	1026	1006	1026	999	1041	1033	1073	1046	**1143**	1135
Normalized	67.37%	71.74%	76.03%	76.38%	87.97%	86.78%	89.76%	88.01%	89.76%	87.41%	91.08%	90.38%	93.88%	91.51%	100%	99.39%
Standard Deviation	0.4%	0.4%	0.3%	0.1%	0.7%	0.6%	0.4%	0.7%	0.1%	0.5%	0.5%		0.1%			0.1%
Geekbench - CPU Single Core - Gaussian Blur (Mpixels/sec)	55.27	56.63	60.53	60.97	63.17	62.60	64.33	63.47	64.40	63.73	**65.67**	64.43	40.80	**40.03**	42.53	42.13
Normalized	84.16%	86.23%	92.17%	92.83%	96.19%	95.33%	97.96%	96.66%	98.07%	97.05%	100%	98.13%	62.13%	60.95%	64.75%	64.15%
Standard Deviation	0.3%	0.2%	0.2%	0.4%	0.2%	0.5%	0.5%	0.6%	0.7%	0.2%	0.6%	0.2%	0%	0.1%	1%	0.1%

Geekbench - CPU Single Core - Face Detection (images/	6.04	6.25	6.68	6.68	8.18	8.19	8.31	8.28	8.31	8.31	8.45	8.28	7.70	7.70	8.33	8.31
Normalized	71.48%	73.96%	79.05%	79.05%	96.82%	96.92%	98.34%	97.99%	98.34%	98.34%	100%	97.99%	91.12%	91.12%	98.58%	98.34%
Standard Deviation	0.3%	0.2%	0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.1%	0.1%	0.5%	0.4%
Geekbench - CPU Single Core - Horizon Detection (Gpixels/	17.70	18.03	18.77	18.40	23.50	22.83	23.80	23.10	23.83	23.30	24.10	24	23.53	23.10	25.40	25.10
Normalized	69.69%	70.98%	73.96%	72.44%	92.52%	89.88%	93.74%	90.94%	93.82%	91.73%	94.88%	94.49%	92.67%	90.94%	100%	98.82%
Standard Deviation	10.9%	7.6%	4%	2.2%	0%	0.3%	1.1%	1.1%	0.5%	0.7%	0%		0.2%	0%	0%	0.4%
Geekbench - Performance / Cost - CPU Multi Core (Score/Dollar)	11.69	14.22	3.32	2.65	16.29	13.56	12.16	9.69	9.74	7.71	5.48	3.85	5.37	3.66	2.37	1.81
Normalized	71.76%	87.29%	20.38%	16.25%	100%	83.24%	74.65%	59.48%	59.79%	47.36%	33.68%	23.63%	32.97%	22.47%	14.55%	11.11%
John The Ripper - Blowfish (Real	129 39	277 46	333 99	819 20	313 05	623 98	467 56	922 16	575 23	110 992	973 45	183 465	249 68	489 33	429 24	849 68	443 30	101 00	458 24	563 01	908 31
Normalized	7.05%	15.12%	18.20%	44.65%	17.05%	34.01%	25.46%	50.22%	31.31%	60.53%	53.01%	100%	13.61%	26.66%	23.41%	46.31%	24.15%	5.51%	24.98%	30.67%	49.51%
Standard Deviation	0.6%	7%	0.7%	7.4%	0%	0%	0.1%	0.2%	0.1%	3.9%	0.1%	2.2%	0.3%	0.8%	0.4%	0.7%	0.1%	0.4%	2.8%	5.8%	0.3%

John The Ripper - Performance / Cost - Blowfish (Real C/S/Dolla	23.02	27.07	6.23	7.63	29.45	29.35	24.19	23.85	20.42	19.70	12.69	11.95	9.32	9.13	4.29	4.24				
Normalized	78.17%	91.92%	21.15%	25.91%	100%	99.66%	82.14%	80.98%	69.34%	66.89%	43.09%	40.58%	31.65%	31%	14.57%	14.47%				
MKL-DNN - IP Batch All - f32	523.85	152.73	112.65	783.83	200.24	123.29	148.29	99.98	124.81	81.21	89.75	89.65	115.62	122.60	94.88	97.37	261.42	289.3	121.392	265.8	257.4
Normalized	15.53%	53.17%	72.09%	10.36%	40.56%	65.85%	54.77%	81.23%	65.07%	100%	90.48%	90.51%	70.27%	66.23%	85.57%	83.46%	31.06%	2.81%	66.93%	3.05%	3.15%
Standard Deviation	0.6%	0.2%	0.9%	2.4%	0.4%	1.8%	0.3%	2.4%	0.2%	1.4%	1.6%	1.5%	0.7%	2.4%	1%	1.1%	0.1%	3.5%	0.3%	8.7%	5.1%
MKL-DNN - C.B.c - f32	39.47	16.54	12.88	6.48	9.62	5.48	6.91	3.86	5.80	3.42	3.62	2.72	12.62	4.82	8.14	3.30	89.26	788.281	7.7727	181.138	170.336
Normalized	6.89%	16.54%	21.12%	41.98%	28.27%	49.66%	39.31%	70.46%	46.90%	79.53%	75.14%	100%	21.55%	56.42%	33.41%	82.40%	3.05%	0.35%	34.99%	1.51%	1.61%
Standard Deviation	2%	0.6%	1.2%	2.7%	1.8%	5.8%	2.9%	8.9%	0.5%	10.6%	2.7%	6.6%	0.1%	0.3%	0.1%	0.4%	0.3%	1.4%	2.9%	1.5%	0.5%
MKL-DNN - C.B.c - f32	7772	3096	2278	1205	1805	974	1285	687	1087	583	688	412	1324	674	766	383	14051	119384	1039	272.76	251.95
Normalized	4.93%	12.37%	16.81%	31.78%	21.22%	39.32%	29.81%	55.71%	35.23%	65.69%	55.61%	92.96%	28.93%	56.81%	50%	100%	2.73%	0.32%	36.85%	1.41%	1.52%
Standard Deviation	1.4%	0.5%	0.8%	2.6%	0.2%	1.9%	0.8%	1.8%	0.8%	2.2%	1.8%	3.2%	0%	0.3%	2.1%	1.6%	0%	0.3%	1.2%	0.2%	0.7%
MKL-DNN - C.B.c - f32	1002	404.57	300.45	157.10	243.03	131.15	173.43	97.71	141.76	76.91	88.95	50.66	165.95	85.32	94.33	48.56	1886	14522	157.245	341.3	318.6
Normalized	4.85%	12%	16.1%	30.9%	19.9%	37.0%	28%	49.7%	34.2%	63.1%	54.5%	95.8%	29.2%	56.9%	51.4%	100%	2.57%	0.33%	30.8%	1.42%	1.52%
Standard Deviation	1%	0.9%	0.9%	2.7%	1.6%	1.8%	2.2%	2.9%	1.1%	1.8%	1.8%	2.7%	0%	0.3%	0%	0.1%	0.1%	0.2%	3.6%	0.9%	1.2%
MKL-DNN - C.B.c - f32	428.94	175.29	130.93	70.10	101.56	60.16	70.94	41.01	59.54	34.31	37.98	23.75	73.17	36.89	41.74	21.18	780.42	6921	63.1845	167.3	157.1
Normalized	4.94%	12.0%	16.1%	30.2%	20.8%	35.2%	29.8%	51.6%	35.5%	61.7%	55.7%	89.1%	28.9%	57.4%	50.7%	100%	2.71%	0.31%	33.5%	1.27%	1.35%
Standard Deviation	0.6%	1.4%	1.4%	1.5%	0.8%	2.9%	2%	5.4%	0.2%	5.3%	1.4%	2.9%	0.1%	0.6%	0.1%	0.4%	0.1%	0.6%	2.7%	0.5%	0.7%

MKL-DNN - Performance / Cost - IP Batch All - f32 (ms x Dollar)	294 404 855	156 548	604 367	841 049 6	212	262 115	286 645	386 523	351 590	457 537	688 383	137 603 8	309 746	656 891	949 654	194 915 3
Normalized	53.1 7%	100 %	25.9 %	1.86 %	73.5 5%	59.7 3%	54.6 1%	40.5 %	44.5 3%	34.2 2%	22.7 4%	11.3 8%	50.5 4%	23.8 3%	16.4 8%	8.03 %
MKL-DNN - Performance / Cost - C.B.c - f32 (ms x Dollar)	221 82	169 54	691 01	695 30	102 26	116 50	133 57	149 23	163 39	192 68	277 65	417 49	338 09	258 26	814 73	660 59
Normalized	46.1 %	60.3 2%	14.8 %	14.7 1%	100 %	87.7 7%	76.5 6%	68.5 3%	62.5 9%	53.0 7%	36.8 3%	24.4 9%	30.2 5%	39.6 %	12.5 5%	15.4 8%
MKL-DNN - Performance / Cost - C.B.c - f32 (ms x Dollar)	436 759 4	317 303 1	122 198 61	129 325 47	191 867 2	207 057 5	248 334 4	265 748 8	306 179 7	328 270 6	527 634 6	632 440 2	354 777 3	361 365 0	767 109 8	767 430 1
Normalized	43.9 3%	60.4 7%	15.7 %	14.8 4%	100 %	92.6 6%	77.2 6%	72.2 %	62.6 6%	58.4 5%	36.3 6%	30.3 4%	54.0 8%	53.1 %	25.0 1%	25%
MKL-DNN - Performance / Cost - C.B.c - f32 (ms x Dollar)	563 231	414 684	161 191 4	168 568 3	258 341	278 825	335 240	377 747	399 338	433 311	682 247	777 580	444 580	457 145	944 149	972 074
Normalized	45.8 7%	62.3 %	16.0 3%	15.3 3%	100 %	92.6 5%	77.0 6%	68.3 9%	64.6 9%	59.6 2%	37.8 7%	33.2 2%	58.1 1%	56.5 1%	27.3 6%	26.5 8%

MKL-DNN - Performance / Cost - C.B.c - f32 (ms x Dollar)	241 064	179 672	702 439	**752 173**	**107 958**	127 900	137 127	158 545	167 724	193 303	291 307	364 539	196 022	197 657	417 776	423 981					
Normalized	44.7	60.0	15.3	14.3	100	84.4	78.7	68.0	64.3	55.8	37.0	29.6	55.0	54.6	25.8	25.4					
	8%	9%	7%	5%	%	1%	3%	9%	7%	5%	6%	2%	7%	2%	4%	6%					
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	**3.0 753 6**	1.2 063 5	0.9 104 8	0.4 469 3	1.2 658 0	0.6 615 6	0.8 914 8	0.4 706 1	0.7 387 2	0.3 905 4	0.4 287 9	**0.2 639 3**	1.2 383 6	0.6 656 2	0.7 006 9	0.3 590 6	0.6 106 5	2.0 837 4	0.7 501 9	0.7 595 5	0.4 420 9
Normalized	8.58	21.8	28.9	59.0	20.8	39.9	29.6	56.0	35.7	67.5	61.5	100	21.3	39.6	37.6	73.5	43.2	12.6	35.1	34.7	59.7
	%	8%	9%	5%	5%	%	1%	8%	3%	8%	5%	%	1%	5%	7%	1%	2%	7%	8%	5%	%
Standard Deviation	0.2%	0.6%	0.3%	0.3%	0.3%	0.2%	0.1%	0.2%	0.2%	0.2%	0.4%	0.7%	0.9%	1.5%	0.2%	0.2%	1.8%	0.6%	6.9%	1.1%	0.3%
NAMD - Performance / Cost - ATPase Simulation - 327,506 Atoms (days/ns x Dollar)	172 8	**123 7**	488 5	479 6	134 6	140 6	172 3	181 9	208 1	220 0	328 9	405 1	331 8	356 6	701 3	**718 8**					
Normalized	71.5	100	25.3	25.7	91.9	87.9	71.7	67.9	59.4	56.2	37.6	30.5	37.2	34.6	17.6	17.2					
	4%	%	1%	8%	%	2%	6%	6%	2%	%	%	2%	7%	7%	3%	%					
NeatBench - CPU (FPS)	**10. 37**	13. 05	11. 57	10. 38	28. 97	27. 40	32. 93	31. 63	33. 70	31. 57	**34. 43**	32. 53	24. 80	22. 97	34. 30	31. 71					
Normalized	30.1	37.9	33.6	30.1	84.1	79.5	95.6	91.8	97.8	91.6	100	94.4	72.0	66.7	99.6	92.1					
	2%	%	%	5%	4%	8%	4%	7%	8%	9%	%	8%	3%	2%	2%	%					
Standard Deviation	0.6%	2.7%	5.7%	2.9%	0.9%	1.3%	2.2%	1.9%	2.2%	1%	3%	0.2%	2%	1.8%	2.9%	3.5%					
PHPBench - P.B.S	359 687	373 155	397 124	395 581	489 637	489 367	495 293	496 430	495 466	495 916	502 052	501 770	595 163	598 887	637 497	**645 629**	574 890	224 645	619 602	**160 532**	224 766
Normalized	55.7	57.8	61.5	61.2	75.8	75.8	76.7	76.8	76.7	76.8	77.7	77.7	92.1	92.7	98.7	100	89.0	34.7	95.9	24.8	34.8
	1%	%	1%	7%	4%	%	1%	9%	4%	1%	6%	2%	8%	6%	4%	%	4%	9%	7%	6%	1%
Standard Deviation	0.3%	0.3%	0.2%	0.5%	0.5%	0.7%	0.8%	0.3%	0.5%	0.3%	0.6%	0.3%	0.9%	0.3%	1.4%	0.3%	0.1%	1.1%	0.6%	0.4%	1.2%

PHPBench - Performance / Cost - P.B.S (Score/Dollar)	**640.01**	364.05	74.02	36.87	460.62	230.18	256.23	128.41	175.88	88.02	65.46	32.69	222.16	111.77	63.69	**32.25**					
Normalized	100%	56.8%	11.5%	5.76%	71.9%	35.9%	40.0%	20.0%	27.4%	13.7%	10.2%	5.11%	34.7%	17.4%	9.95%	5.04%					
POV-Ray - Trace Time (sec)	**71.32**	29.15	22.35	12.57	28.88	16.36	20.65	12.15	17.34	10.32	10.86	**8.41**	35.53	19.74	20.70	11.82	23.71	51.327	15.710	16.405	10.411
Normalized	11.7%	28.8%	37.6%	66.9%	29.1%	51.4%	40.7%	69.2%	48.5%	81.4%	77.4%	100%	23.6%	42.6%	40.6%	71.1%	35.4%	16.3%	53.5%	51.2%	80.7%
Standard Deviation	0.2%	0.3%	0.4%	0.1%	0.3%	1%	0.3%	0.9%	0.4%	1.1%	0.5%	3.4%	0.5%	0.1%	0.2%	2.7%	3.1%	1.4%	0.6%	0.7%	0.3%
POV-Ray - Performance / Cost - Trace Time (sec x	40082	**29879**	11908	13876	30699	34781	39916	46972	48847	58143	83296	12985	95185	10767	20786	**23613**					
Normalized	74.5%	100%	24.9%	22.1%	97.3%	85.9%	74.8%	63.6%	61.1%	51.3%	35.8%	23.1%	31.3%	28.2%	14.4%	12.6%					
PyBench - T.F.A.T.T (Milliseconds)	1607	1551	1457	1462	1221	1225	1207	1211	1212	1211	1202	1206	1084	1075	1017	1013	1516	**3402**	**975**	1796	1239
Normalized	60.6%	62.8%	66.9%	66.6%	79.8%	79.5%	80.7%	80.5%	80.4%	80.5%	81.1%	80.8%	89.9%	90.7%	95.8%	96.2%	64.3%	28.6%	100%	54.2%	78.6%
Standard Deviation		0.6%	0.3%	1.2%	0.6%	0.2%	0.4%	0.3%	0.9%	0.3%	0.2%	0.3%	0.3%	0.2%	0.2%	0.1%		0.5%	1.3%	0.8%	0.2%

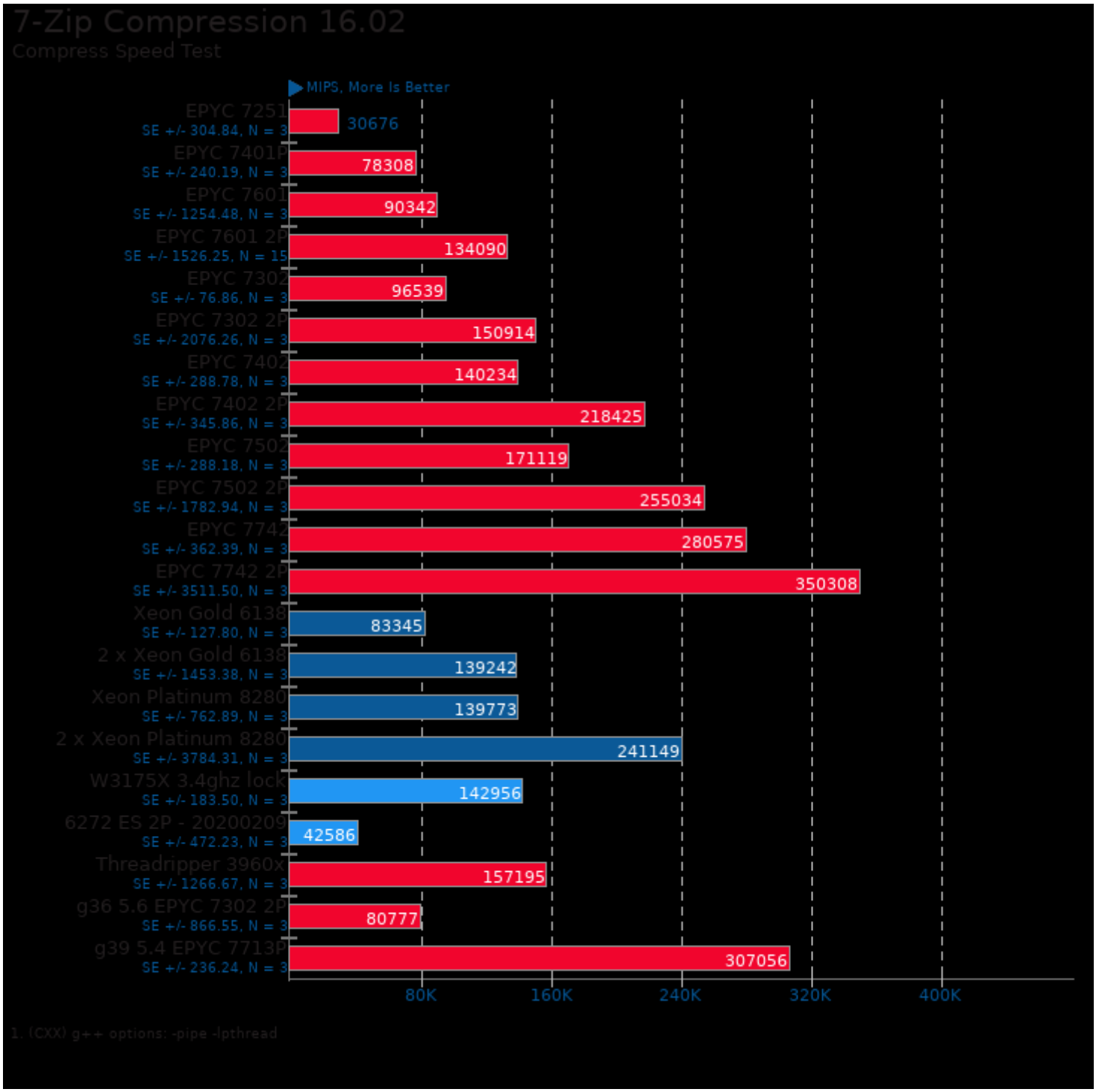
PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)	**903**	158	781	156	129	260	233	468	341	682	921	185	290	575	101	**202**					
	134	977	680	872	792	435	313	172	420	277	934	108	403	985	791	**782**					
		5	5	60	3	0	1	6	4	4	0	94	6	0	53	**34**					
Normalized	100%	56.8%	11.5%	5.76%	69.5%	34.6%	38.7%	19.2%	26.4%	13.2%	9.8%	4.88%	31.1%	15.6%	8.87%	4.45%					
Stockfish - Total Time (Nodes/s	**163**	429	582	103	425	766	620	113	759	139	133	**241**	374	679	651	124	716	286	775	776	145
	188	450	168	330	541	025	208	901	035	070	120	**185**	235	281	506	044	284	446	853	606	114
	08	65	60	585	64	12	68	411	28	880	860	**105**	61	61	65	462	59	59	76	43	663
Normalized	6.77%	17.8%	24.1%	42.8%	17.6%	31.7%	25.7%	47.2%	31.4%	57.6%	55.1%	100%	15.5%	28.1%	27.0%	51.4%	29.7%	11.8%	32.1%	32.2%	60.1%
Standard Deviation	2%	1.4%	1.6%	1.8%	0.3%	1.3%	0.2%	0.5%	2.3%	1.3%	1%	0.5%	1.1%	0.8%	0.7%	2.7%	1.1%	2.1%	0.8%	1.1%	0.6%
Stockfish - Performance / Cost - Total Time (Nodes/s /Dollar)	290	**418**	108	963	400	360	320	294	269	246	173	157	139	126	650	**619**					
	37	**98**	51	0	32	31	85	62	45	84	56	13	69	78	9	**7**					
Normalized	69.3%	100%	25.9%	22.9%	95.5%	86%	76.5%	70.3%	64.3%	58.9%	41.4%	37.5%	33.3%	30.2%	15.5%	14.7%					
SVT-AV1 - 1.8.b.Y.T. A.V.E (FPS)	16.65	35.05	37.11	38.65	44.76	60.68	62.78	71.72	67.00	96.82	98.77	**101.52**	36.13	49.35	55.38	63.05		**5.790**	76.559		
Normalized	16.4%	34.5%	36.5%	38.0%	44.0%	59.7%	61.8%	70.6%	66%	95.3%	97.2%	100%	35.5%	48.6%	54.5%	62.1%		5.7%	75.4%		
Standard Deviation	0.8%	1.3%	1.2%	3.7%	0.7%	2.9%	0.4%	1.7%	0.8%	2.8%	1%	0.5%	0.8%	2.8%	1.4%	2.2%		2.1%	1.9%		
SVT-AV1 - Enc Mode 0 - 1080p (FPS)													0.05	0.05							
Standard Deviation													0%	0%							

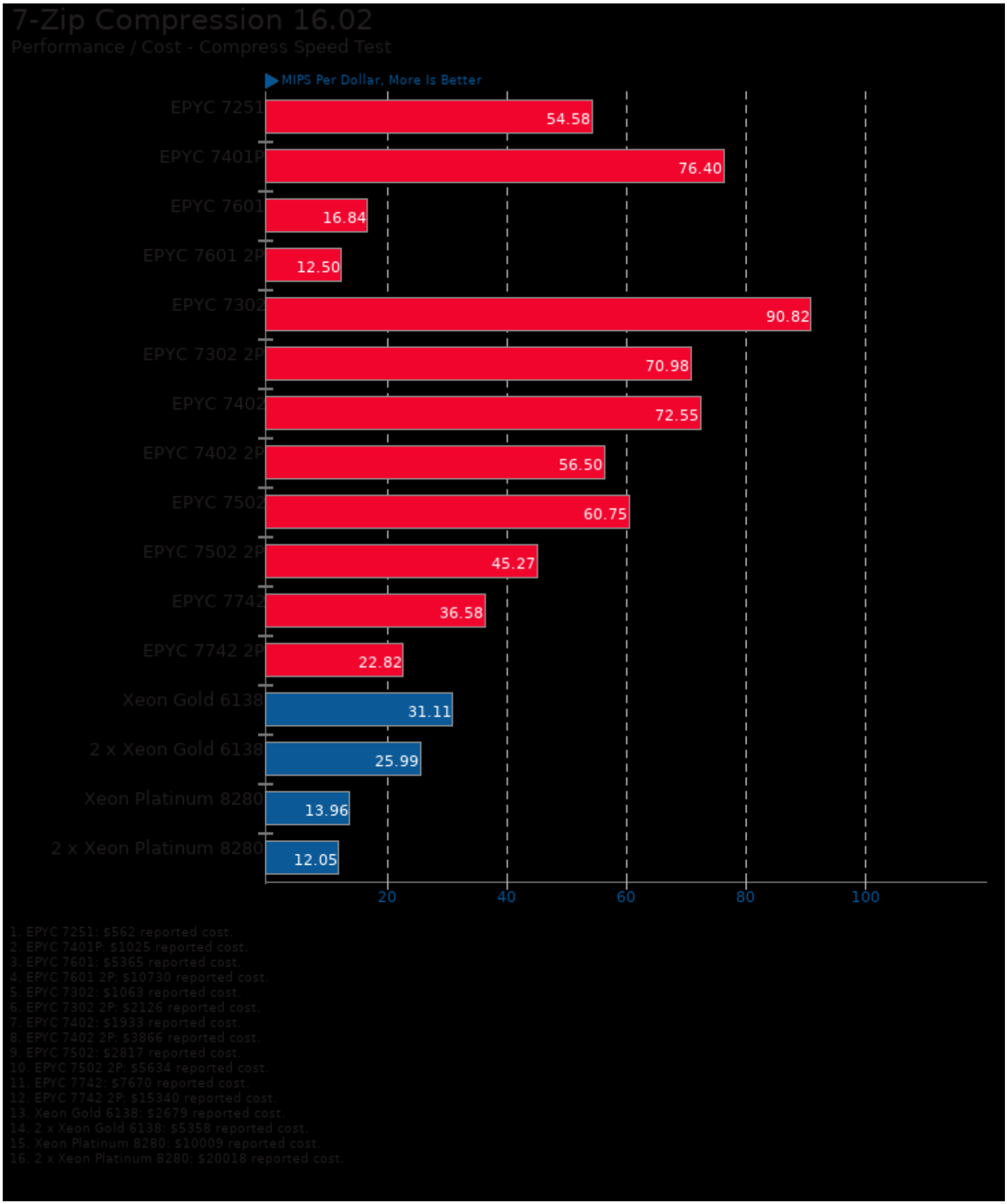
SVT-AV1 - Enc Mode 4 - 1080p (FPS)														**4.75**	**6.59**			
Normalized														72.08%	100%			
Standard Deviation														0.5%	0.2%			
SVT-AV1 - Enc Mode 8 - 1080p (FPS)														**34.91**	**50.14**			
Normalized														69.63%	100%			
Standard Deviation														0.1%	1.7%			
SVT-HEVC - 1.8.b.Y.T. H.V.E (FPS)														**71.29**	**109.36**			
Normalized														65.19%	100%			
Standard Deviation														0%	2.8%			
SVT-HEVC - 1.8.b.Y.T. H.V.E (FPS)	89.22	179.31	186.05	164.10	258.45	328.76	343.93	338.31	360.14	335.96	367.52	329.82	243.27	235.59	319.41	269.00	**9.74**	**418.59**
Normalized	21.31%	42.84%	44.45%	39.21%	61.74%	78.54%	82.16%	80.82%	86.04%	80.26%	87.85%	78.79%	58.12%	56.28%	76.31%	64.26%	2.33%	100%
Standard Deviation	0.6%	4.3%	7.7%	6.8%	1%	2.3%	1.1%	1.2%	2.4%	2.5%	0.9%	2.9%	11.7%	11.8%	3.7%	0.9%	0.3%	1.7%

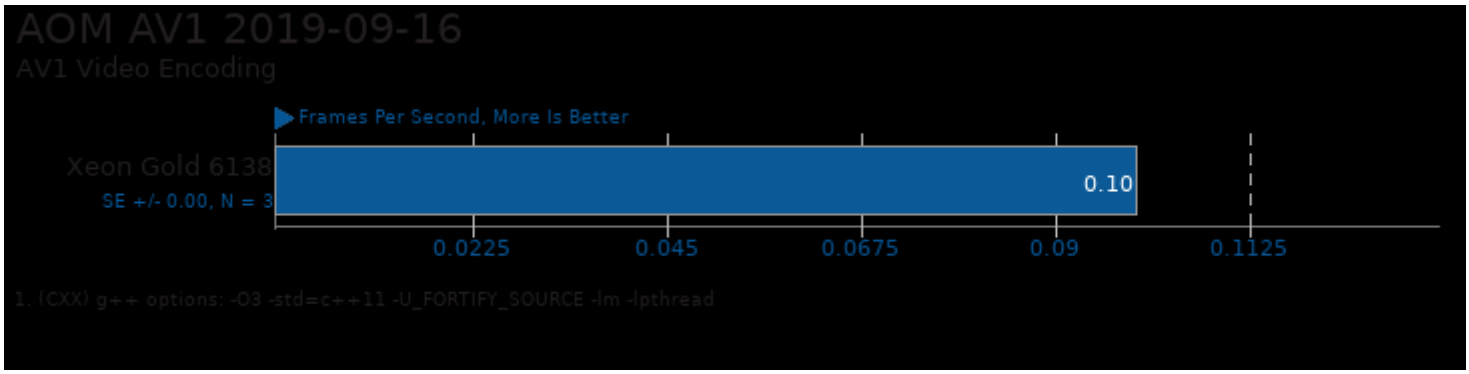
SVT-HEVC - Performance / Cost - 1.8.b.Y.T.H.V.E (FPS/Dollar)	0.16	0.17	0.03	0.02	**0.24**	0.15	0.18	0.09	0.13	0.06	0.05	0.02	0.09	0.04	0.03	**0.01**					
Normalized	66.67%	70.83%	12.5%	8.33%	100%	62.5%	75%	37.5%	54.17%	25%	20.83%	8.33%	37.5%	16.67%	12.5%	4.17%					
SVT-VP9 - 1.8.b.Y.T.V.V.E (FPS)	**66.76**	160.83	158.54	133.45	272.54	319.09	358.66	347.87	374.60	345.47	**393.10**	344.13	262.13	249.49	370.05	279.16					
Normalized	16.98%	40.91%	40.33%	33.95%	69.33%	81.17%	91.24%	88.47%	95.29%	87.85%	100%	87.64%	66.68%	63.47%	94.15%	71.02%					
Standard Deviation	1.7%	0.8%	4.2%	2.7%	0.9%	2.7%	2.6%	3%	1.7%	1.5%	2.9%	4.9%	13.3%	13.8%	2.3%	2.9%					
SVT-VP9 - Performance / Cost - 1.8.b.Y.T.V.V.E (FPS/Dollar)	0.12	0.16	0.03	**0.01**	**0.26**	0.15	0.19	0.09	0.13	0.06	0.05	0.02	0.10	0.05	0.04	**0.01**					
Normalized	46.15%	61.54%	11.54%	3.85%	100%	57.69%	73.08%	34.62%	50%	23.08%	19.23%	7.69%	38.46%	19.23%	15.38%	3.85%					
Timed Linux Kernel Compilation - Time To Compile (sec)	**102.34**	47.49	39.30	23.45	41.67	27.40	32.73	22.62	29.01	20.83	22.36	**16.07**	48.69	31.89	31.22	21.31	30.41	99.080	27.028	28.992	21.562
Normalized	15.7%	33.8%	40.8%	68.5%	38.5%	58.6%	49.1%	71.0%	55.3%	77.1%	71.8%	100%	33%	50.3%	51.4%	75.4%	52.8%	16.2%	59.4%	55.4%	74.5%
Standard Deviation	2.2%	2.9%	2.7%	3.7%	3%	3.5%	2.7%	3.8%	3.3%	4.4%	4.1%	6.2%	2.7%	3.3%	3.9%	5.7%	3.4%	4%	2.7%	3.2%	3.5%

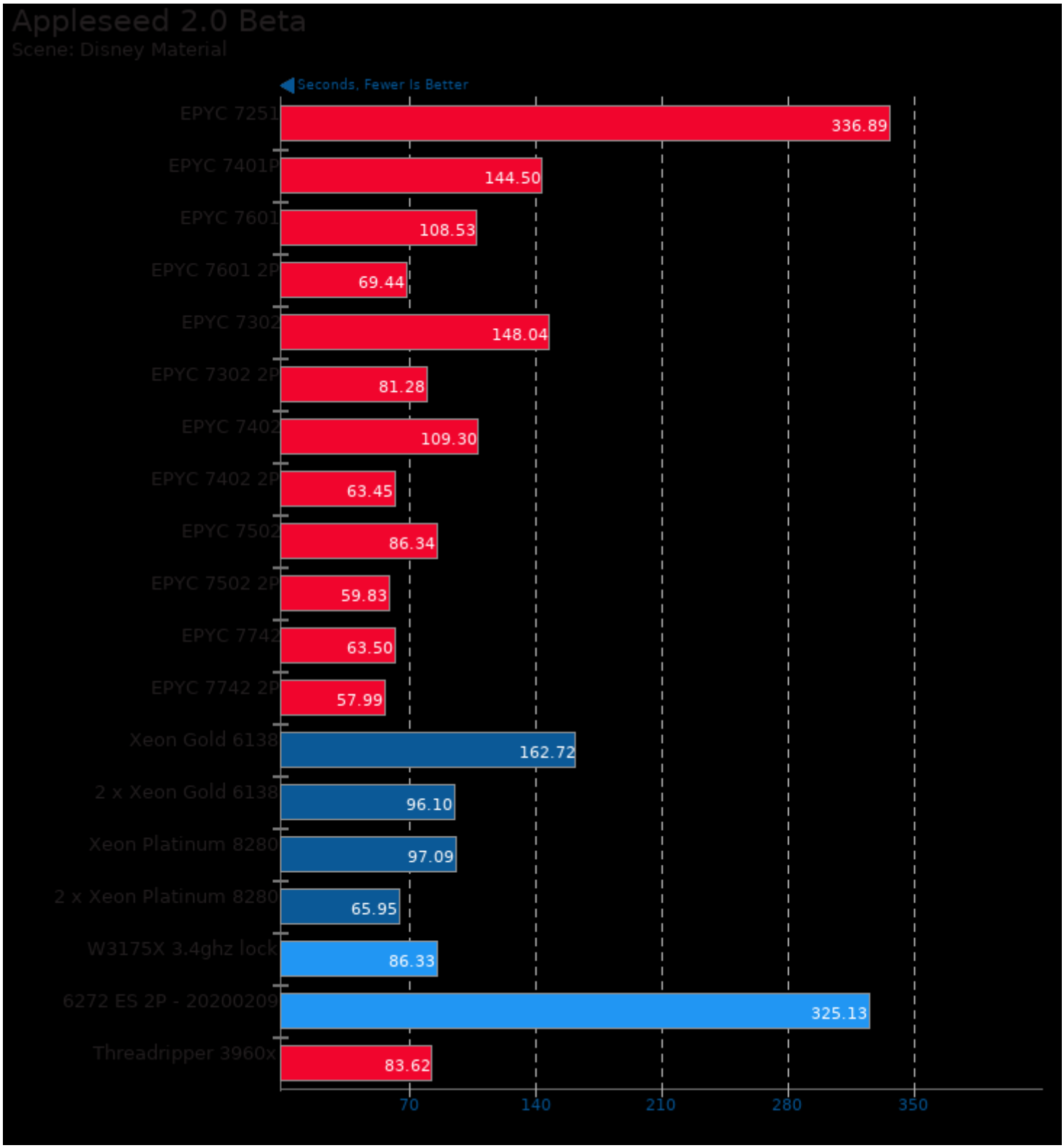
Timed Linux Kernel Compilation - Performance / Cost - Time To Compile (sec x Dollar)	575 15	486 77	210 845	251 619	**442 95**	582 52	632 67	874 49	817 21	117 356	171 501	246 658	130 441	170 867	312 481	**426 584**			
Normalized	77.0 1%	91%	21.0 1%	17.6 %	100 %	76.0 4%	70.0 1%	50.6 5%	54.2 %	37.7 4%	25.8 3%	17.9 6%	33.9 6%	25.9 2%	14.1 8%	10.3 8%			
Timed LLVM Compilation - Time To Compile (sec)	**538 .02**	233 .69	203 .14	133 .00	203 .24	134 .26	158 .54	105 .84	143 .43	99. 96	102 .14	**78. 81**	242 .85	156 .28	158 .80	104 .91	167 .01	484 .42 1	154 .13 8
Normalized	14.6 5%	33.7 2%	38.8 %	59.2 6%	38.7 8%	58.7 %	49.7 1%	74.4 6%	54.9 5%	78.8 4%	77.1 6%	100 %	32.4 5%	50.4 3%	49.6 3%	75.1 2%	47.1 9%	16.2 7%	51.1 3%
Timed LLVM Compilation - Performance / Cost - Time To Compile (sec x Dollar)	302 367	239 532	108 984 6	142 709 0	**216 044**	285 437	306 458	409 177	404 042	563 175	783 414	120 965 5	650 595	837 348	158 942 9	**210 008 8**			
Normalized	71.4 5%	90.1 9%	19.8 2%	15.1 4%	100 %	75.6 9%	70.5 %	52.8 %	53.4 7%	38.3 6%	27.5 8%	17.8 6%	33.2 1%	25.8 %	13.5 9%	10.2 9%			
Tungsten Renderer - Hair	**39. 49**	16. 26	13. 07	8.1 0	16. 26	9.6 7	12. 00	7.5 5	10. 34	6.5 7	6.9 7	**5.3 2**	19. 19	11. 17	11. 86	7.0 7	13. 81	30. 459 8	9.9 282 0
Normalized	13.4 7%	32.7 2%	40.7 %	65.6 8%	32.7 2%	55.0 2%	44.3 3%	70.4 6%	51.4 5%	80.9 7%	76.3 3%	100 %	27.7 2%	47.6 3%	44.8 6%	75.2 5%	38.5 2%	17.4 7%	53.5 8%
Standard Deviation	0.4%	0%	0.4%	0.8%	0.9%	0.4%	0.3%	1.3%	0.4%	0.6%	0.2%	1.2%	0.3%	1.3%	0.4%	1.4%	0.3%	3.8%	0.8%

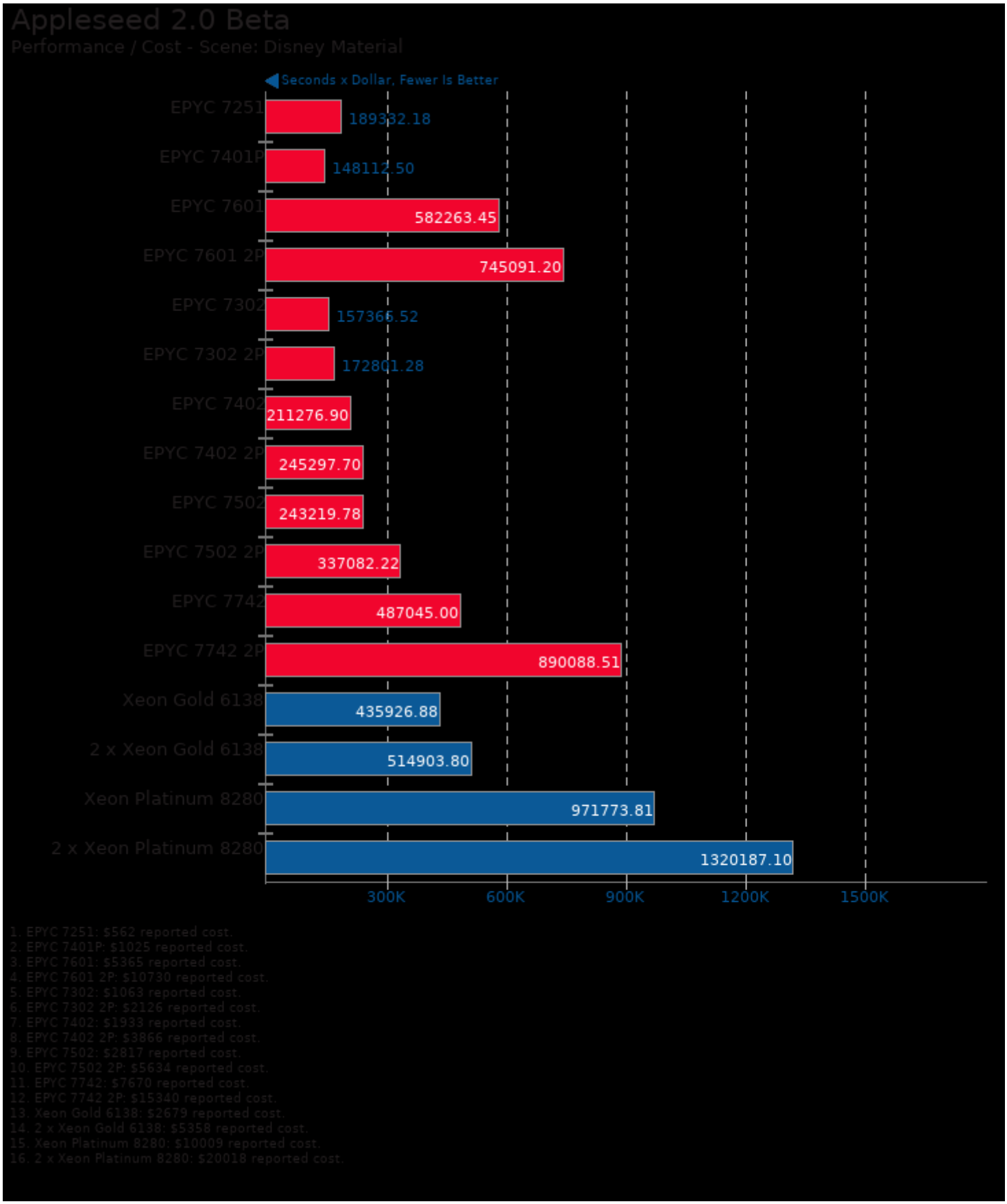
Tungsten Renderer - Performance / Cost - Hair (sec	221.93	166.67	701.21	869.13	172.84	205.58	231.96	291.88	291.28	370.15	534.60	816.57	514.10	598.49	118.707	141.527
Normalized	75.1%	100%	23.7%	19.1%	96.4%	81.0%	71.8%	57.1%	57.2%	45.0%	31.1%	20.4%	32.4%	27.8%	14.0%	11.7%
VP9 libvpx Encoding - v.V.1.V.E (FPS)													82.57	79.27		
Normalized													100%	96%		
Standard Deviation													1.7%	0.8%		
x265 - H.2.1.V.E (FPS)	25.01	32.90	33.44	39.34	50.55	49.20	50.81	49.41	48.93	47.86	48.95	48.45	36.02	34.68	35.44	34.88
Normalized	49.2%	64.7%	65.8%	77.4%	99.4%	96.8%	100%	97.2%	96.3%	94.1%	96.3%	95.3%	70.8%	68.2%	69.7%	68.6%
Standard Deviation	0.9%	0.4%	0.5%	0.7%	0.4%	0.2%	0.4%	1.7%	0.4%	0.1%	0.8%	2.4%	0.2%	1%	0.3%	0.7%

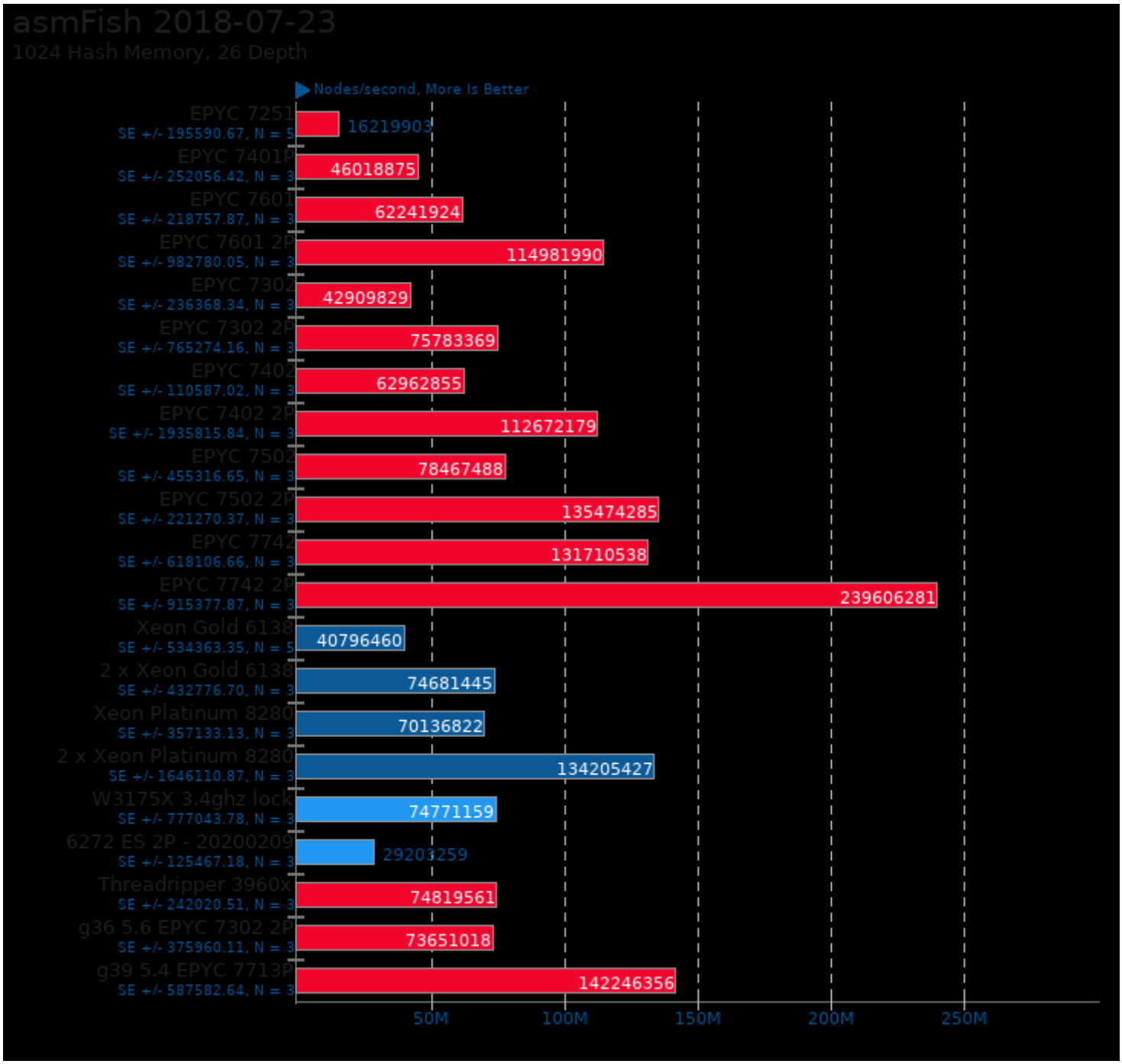

7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
EPYC 7251
SE +/- 304.84, N = 3
30676
EPYC 7401P
SE +/- 240.19, N = 3
78308
EPYC 7601
SE +/- 1254.48, N = 3
90342
EPYC 7601 2P
SE +/- 1526.25, N = 15
134090
EPYC 7302
SE +/- 76.86, N = 3
96539
EPYC 7302 2P
SE +/- 2076.26, N = 3
150914
EPYC 7402
SE +/- 288.78, N = 3
140234
EPYC 7402 2P
SE +/- 345.86, N = 3
218425
EPYC 7502
SE +/- 288.18, N = 3
171119
EPYC 7502 2P
SE +/- 1782.94, N = 3
255034
EPYC 7742
SE +/- 362.39, N = 3
280575
EPYC 7742 2P
SE +/- 3511.50, N = 3
350308
Xeon Gold 6138
SE +/- 127.80, N = 3
83345
2 x Xeon Gold 6138
SE +/- 1453.38, N = 3
139242
Xeon Platinum 8280
SE +/- 762.89, N = 3
139773
2 x Xeon Platinum 8280
SE +/- 3784.31, N = 3
241149
W3175X 3.4ghz lock
SE +/- 183.50, N = 3
142956
6272 ES 2P - 20200209
SE +/- 472.23, N = 3
42586
Threadripper 3960X
SE +/- 1266.67, N = 3
157195
g36 5.6 EPYC 7302 2P
SE +/- 866.55, N = 3
80777
g39 5.4 EPYC 7713P
SE +/- 236.24, N = 3
307056
80K
160K
240K
320K
400K
1. (CXX) g++ options: -pipe -lpthread

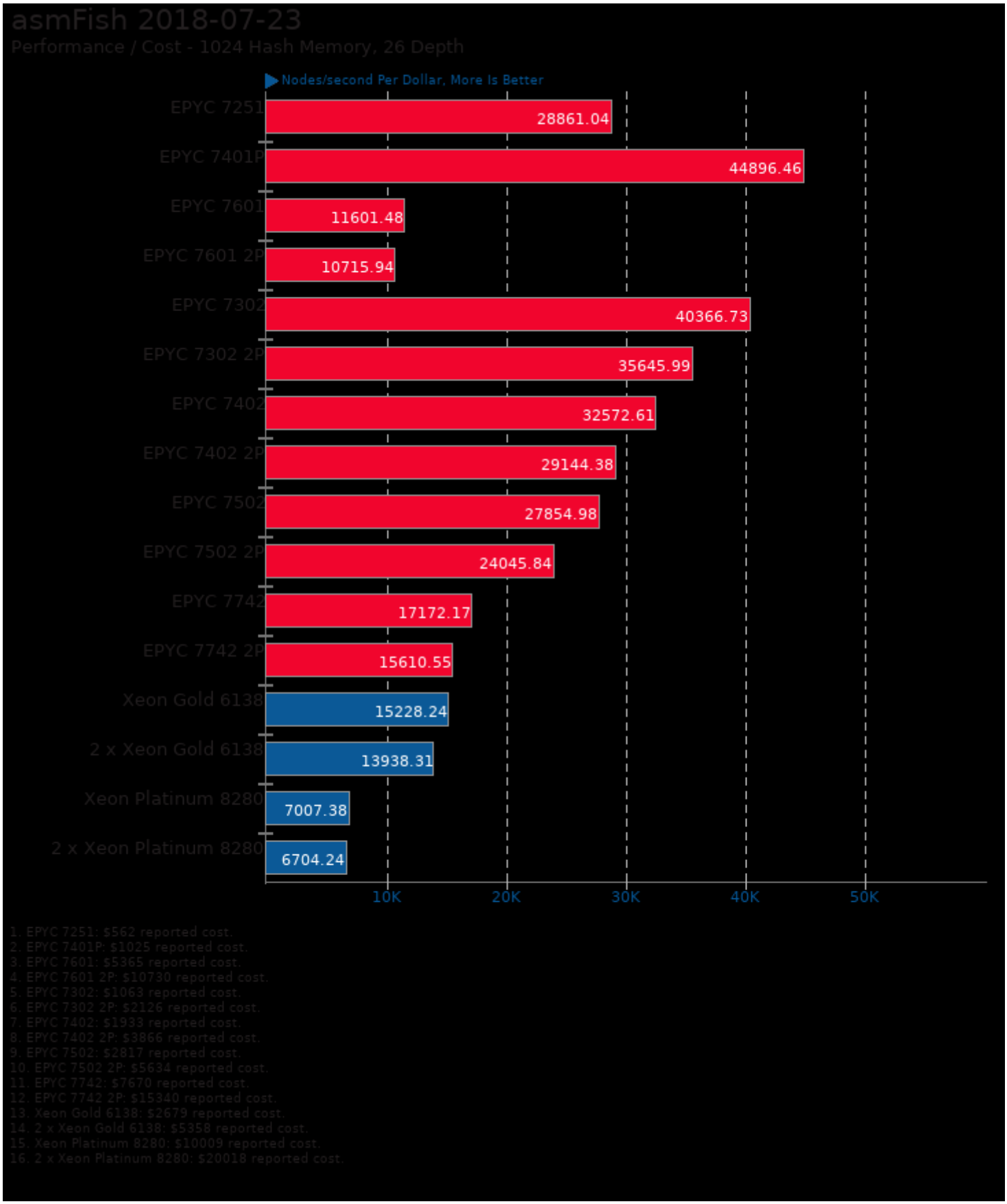

7-Zip Compression 16.02
Performance / Cost - Compress Speed Test
MIPS Per Dollar, More Is Better
EPYC 7251
54.58
EPYC 7401P
76.40
EPYC 7601
16.84
EPYC 7601 2P
12.50
EPYC 7302
90.82
EPYC 7302 2P
70.98
EPYC 7402
72.55
EPYC 7402 2P
56.50
EPYC 7502
60.75
EPYC 7502 2P
45.27
EPYC 7742
36.58
EPYC 7742 2P
22.82
Xeon Gold 6138
31.11
2 x Xeon Gold 6138
25.99
Xeon Platinum 8280
13.96
2 x Xeon Platinum 8280
12.05
20
40
60
80
100
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

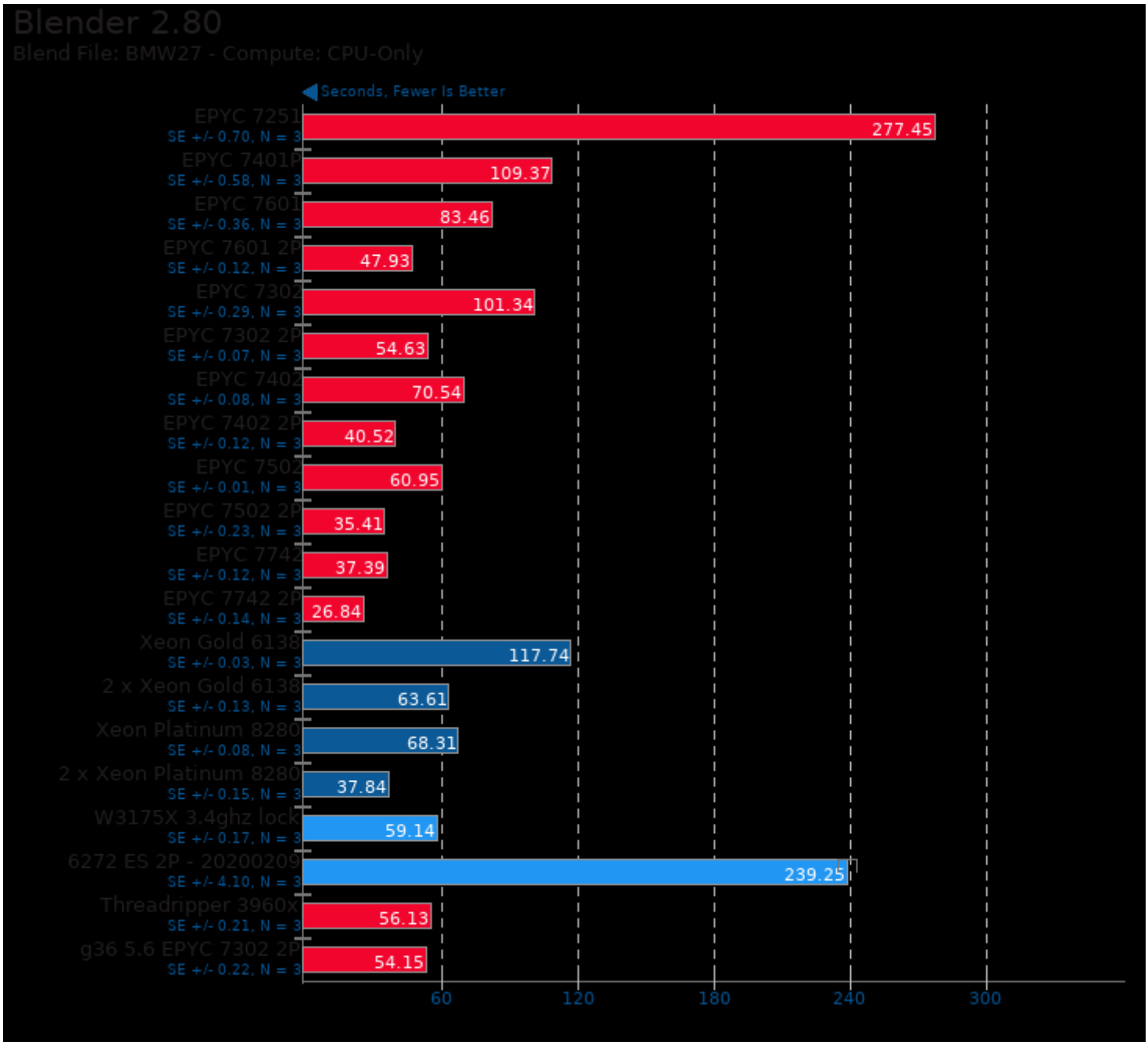

AOM AV1 2019-09-16
AV1 Video Encoding
Frames Per Second, More Is Better
Xeon Gold 6138
SE +/- 0.00, N = 3
0.10
0.0225
0.045
0.0675
0.09
0.1125
1. (CXX) g++ options: -O3 -std=c++11 -U_FORTIFY_SOURCE -lm -lpthread

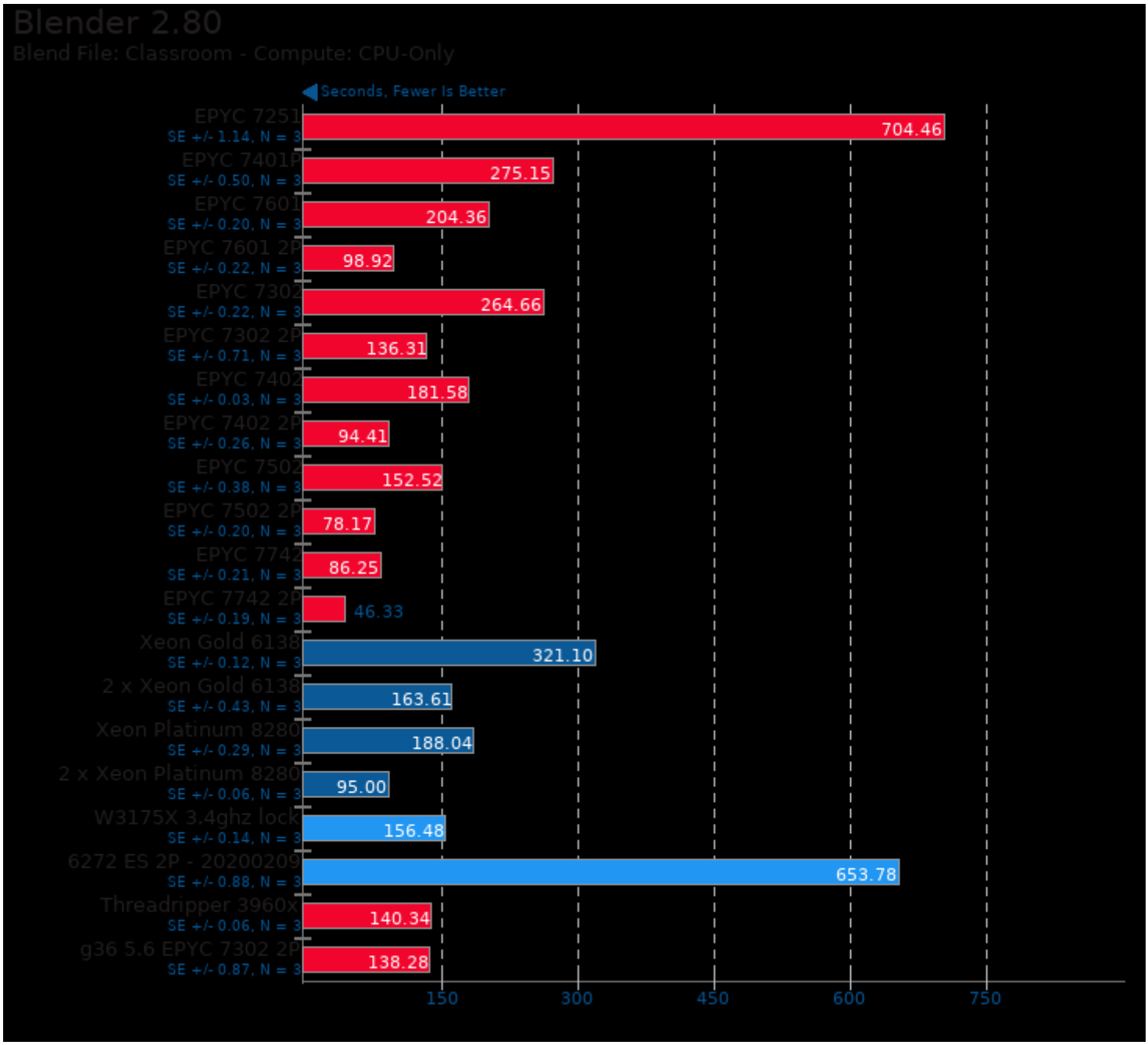

Appleseed 2.0 Beta
Scene: Disney Material
Seconds, Fewer Is Better
EPYC 7251
336.89
EPYC 7401P
144.50
EPYC 7601
108.53
EPYC 7601 2P
69.44
EPYC 7302
148.04
EPYC 7302 2P
81.28
EPYC 7402
109.30
EPYC 7402 2P
63.45
EPYC 7502
86.34
EPYC 7502 2P
59.83
EPYC 7742
63.50
EPYC 7742 2P
57.99
Xeon Gold 6138
162.72
2 x Xeon Gold 6138
96.10
Xeon Platinum 8280
97.09
2 x Xeon Platinum 8280
65.95
W3175X 3.4ghz lock
86.33
6272 ES 2P - 20200209
325.13
Threadripper 3960x
83.62
70
140
210
280
350

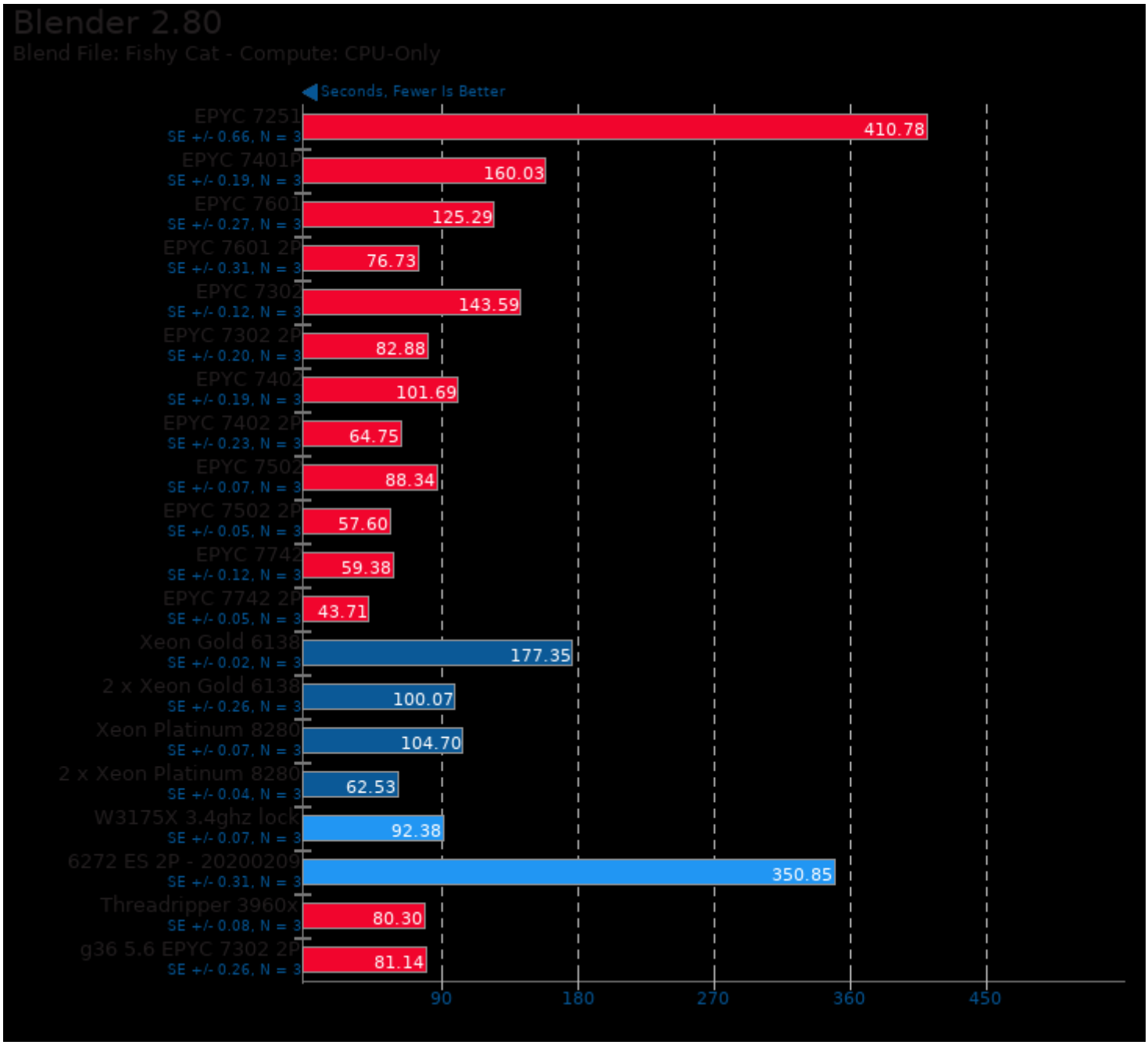

Appleseed 2.0 Beta
Performance / Cost - Scene: Disney Material
Seconds x Dollar, Fewer Is Better
EPYC 7251
189332.18
EPYC 7401P
148112.50
EPYC 7601
582263.45
EPYC 7601 2P
745091.20
EPYC 7302
157366.52
EPYC 7302 2P
172801.28
EPYC 7402
211276.90
EPYC 7402 2P
245297.70
EPYC 7502
243219.78
EPYC 7502 2P
337082.22
EPYC 7742
487045.00
EPYC 7742 2P
890088.51
Xeon Gold 6138
435926.88
2 x Xeon Gold 6138
514903.80
Xeon Platinum 8280
971773.81
2 x Xeon Platinum 8280
1320187.10
300K
600K
900K
1200K
1500K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

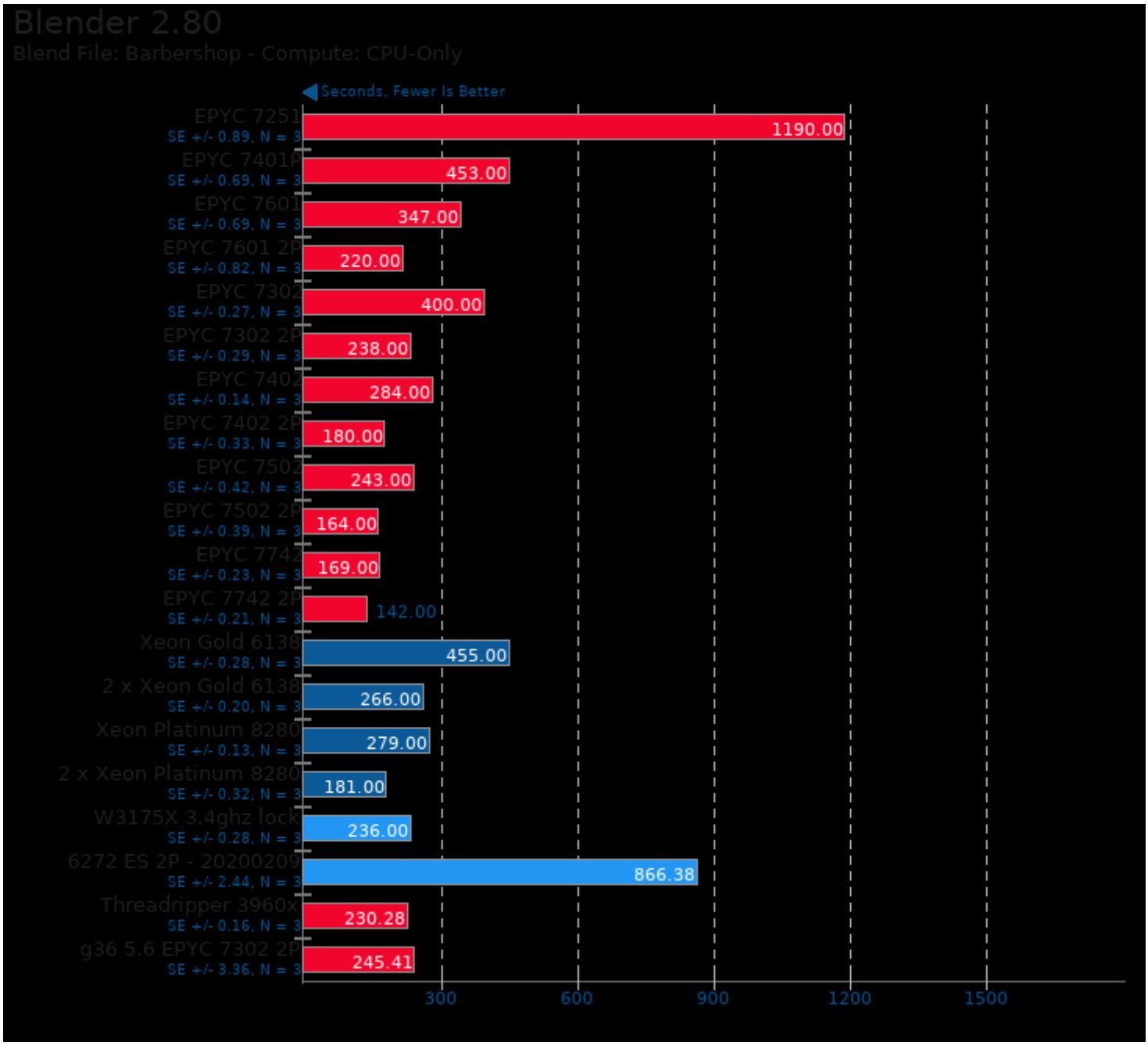

asmFish 2018-07-23
1024 Hash Memory, 26 Depth
Nodes/second, More Is Better
EPYC 7251
SE +/- 195590.67, N = 5
16219903
EPYC 7401P
SE +/- 252056.42, N = 3
46018875
EPYC 7601
SE +/- 218757.87, N = 3
62241924
EPYC 7601 2P
SE +/- 982780.05, N = 3
114981990
EPYC 7302
SE +/- 236368.34, N = 3
42909829
EPYC 7302 2P
SE +/- 765274.16, N = 3
75783369
EPYC 7402
SE +/- 110587.02, N = 3
62962855
EPYC 7402 2P
SE +/- 1935815.84, N = 3
112672179
EPYC 7502
SE +/- 455316.65, N = 3
78467488
EPYC 7502 2P
SE +/- 221270.37, N = 3
135474285
EPYC 7742
SE +/- 618106.66, N = 3
131710538
EPYC 7742 2P
SE +/- 915377.87, N = 3
239606281
Xeon Gold 6138
SE +/- 534363.35, N = 5
40796460
2 x Xeon Gold 6138
SE +/- 432776.70, N = 3
74681445
Xeon Platinum 8280
SE +/- 357133.13, N = 3
70136822
2 x Xeon Platinum 8280
SE +/- 1646110.87, N = 3
134205427
W3175X 3.4ghz lock
SE +/- 777043.78, N = 3
74771159
6272 ES 2P - 20200209
SE +/- 125467.18, N = 3
29203259
Threadripper 3960X
SE +/- 242020.51, N = 3
74819561
g36 5.6 EPYC 7302 2P
SE +/- 375960.11, N = 3
73651018
g39 5.4 EPYC 7713P
SE +/- 587582.64, N = 3
142246356
50M
100M
150M
200M
250M

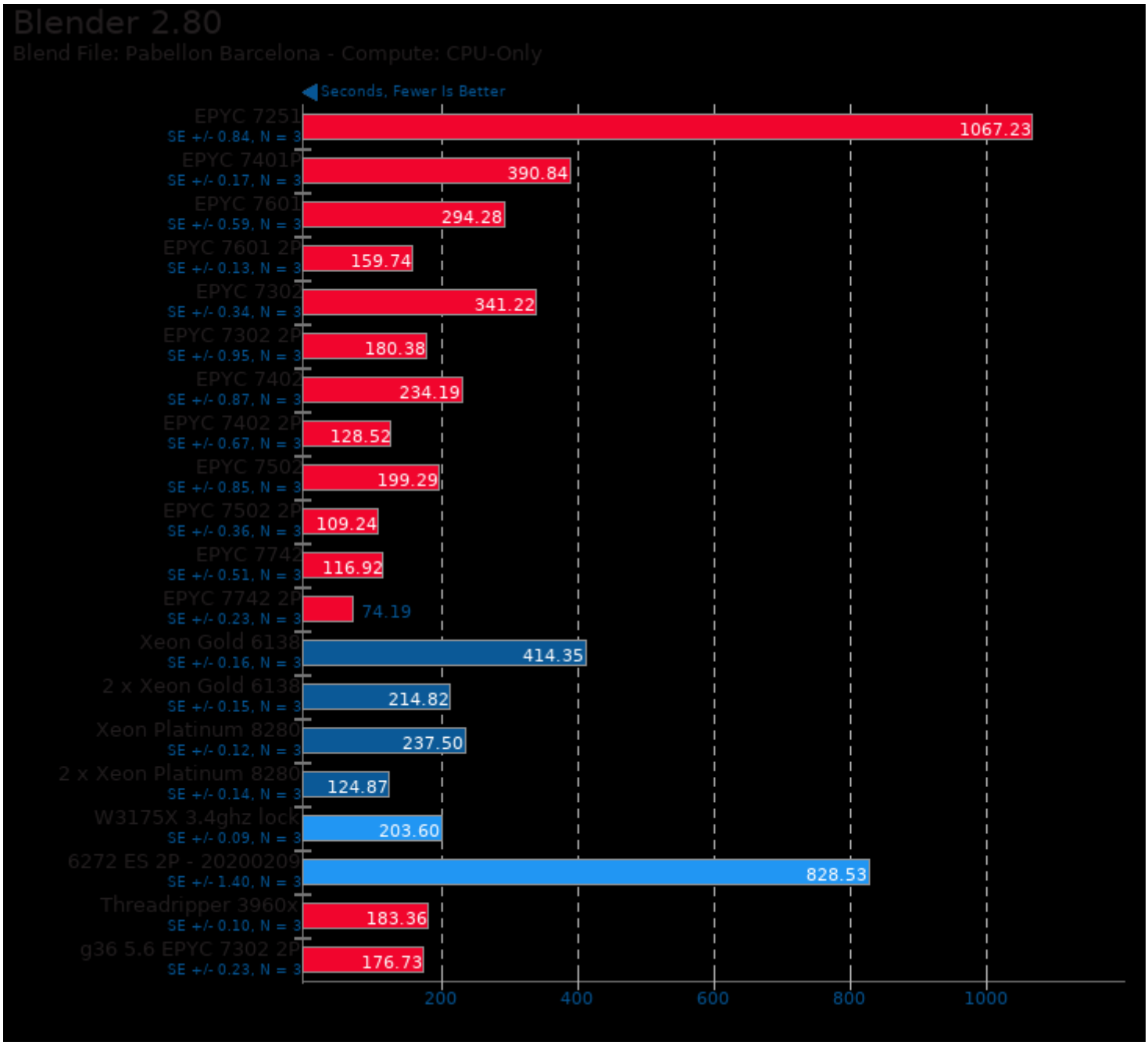

asmFish 2018-07-23
Performance / Cost - 1024 Hash Memory, 26 Depth
Nodes/second Per Dollar, More Is Better
EPYC 7251
28861.04
EPYC 7401P
44896.46
EPYC 7601
11601.48
EPYC 7601 2P
10715.94
EPYC 7302
40366.73
EPYC 7302 2P
35645.99
EPYC 7402
32572.61
EPYC 7402 2P
29144.38
EPYC 7502
27854.98
EPYC 7502 2P
24045.84
EPYC 7742
17172.17
EPYC 7742 2P
15610.55
Xeon Gold 6138
15228.24
2 x Xeon Gold 6138
13938.31
Xeon Platinum 8280
7007.38
2 x Xeon Platinum 8280
6704.24
10K
20K
30K
40K
50K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

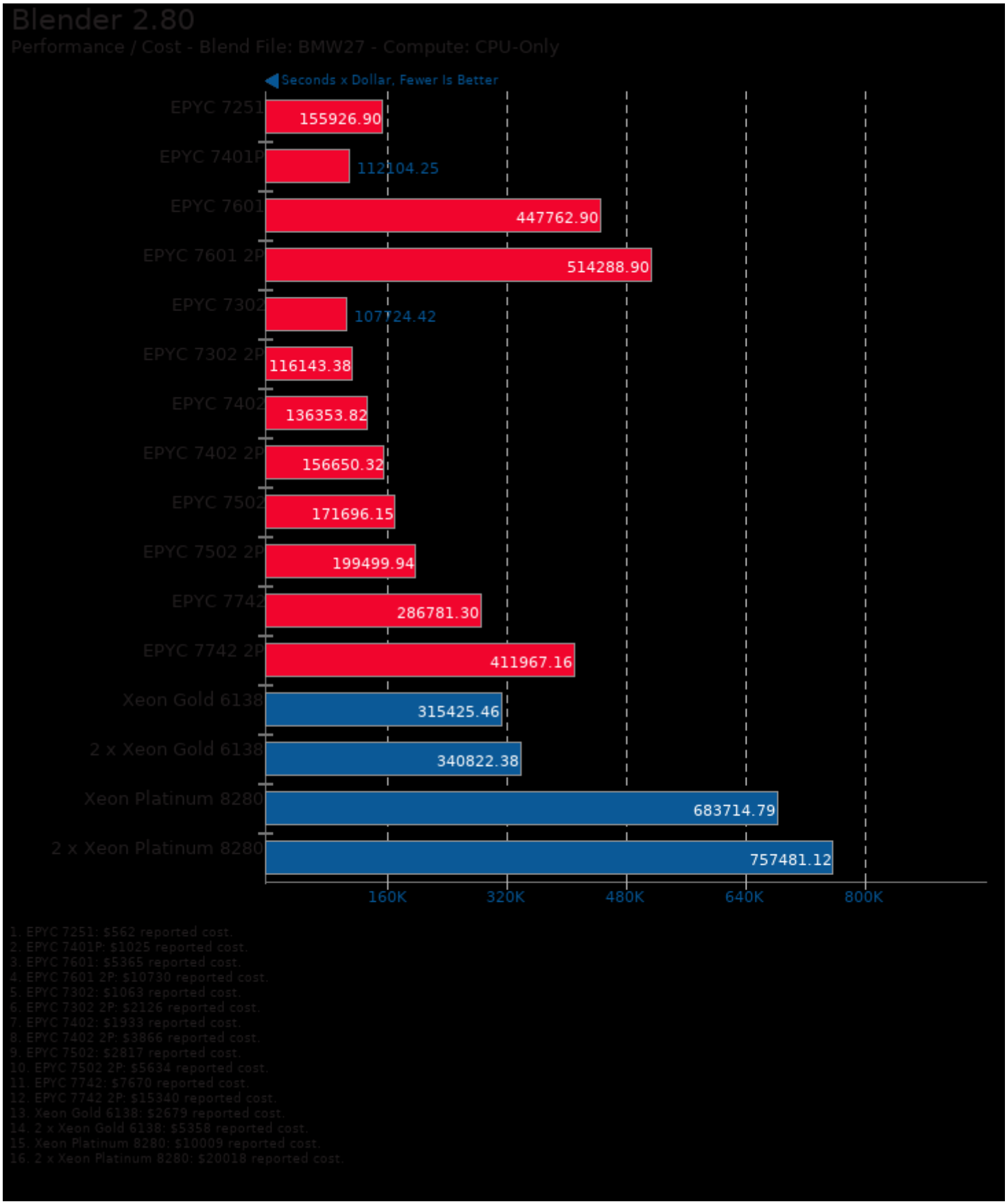

Blender 2.80
Blend File: BMW27 - Compute: CPU-Only
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.70, N = 3
277.45
EPYC 7401P
SE +/- 0.58, N = 3
109.37
EPYC 7601
SE +/- 0.36, N = 3
83.46
EPYC 7601 2P
SE +/- 0.12, N = 3
47.93
EPYC 7302
SE +/- 0.29, N = 3
101.34
EPYC 7302 2P
SE +/- 0.07, N = 3
54.63
EPYC 7402
SE +/- 0.08, N = 3
70.54
EPYC 7402 2P
SE +/- 0.12, N = 3
40.52
EPYC 7502
SE +/- 0.01, N = 3
60.95
EPYC 7502 2P
SE +/- 0.23, N = 3
35.41
EPYC 7742
SE +/- 0.12, N = 3
37.39
EPYC 7742 2P
SE +/- 0.14, N = 3
26.84
Xeon Gold 6138
SE +/- 0.03, N = 3
117.74
2 x Xeon Gold 6138
SE +/- 0.13, N = 3
63.61
Xeon Platinum 8280
SE +/- 0.08, N = 3
68.31
2 x Xeon Platinum 8280
SE +/- 0.15, N = 3
37.84
W3175X 3.4ghz lock
SE +/- 0.17, N = 3
59.14
6272 ES 2P - 20200209
SE +/- 4.10, N = 3
239.25
Threadripper 3960X
SE +/- 0.21, N = 3
56.13
g36 5.6 EPYC 7302 2P
SE +/- 0.22, N = 3
54.15
60
120
180
240
300

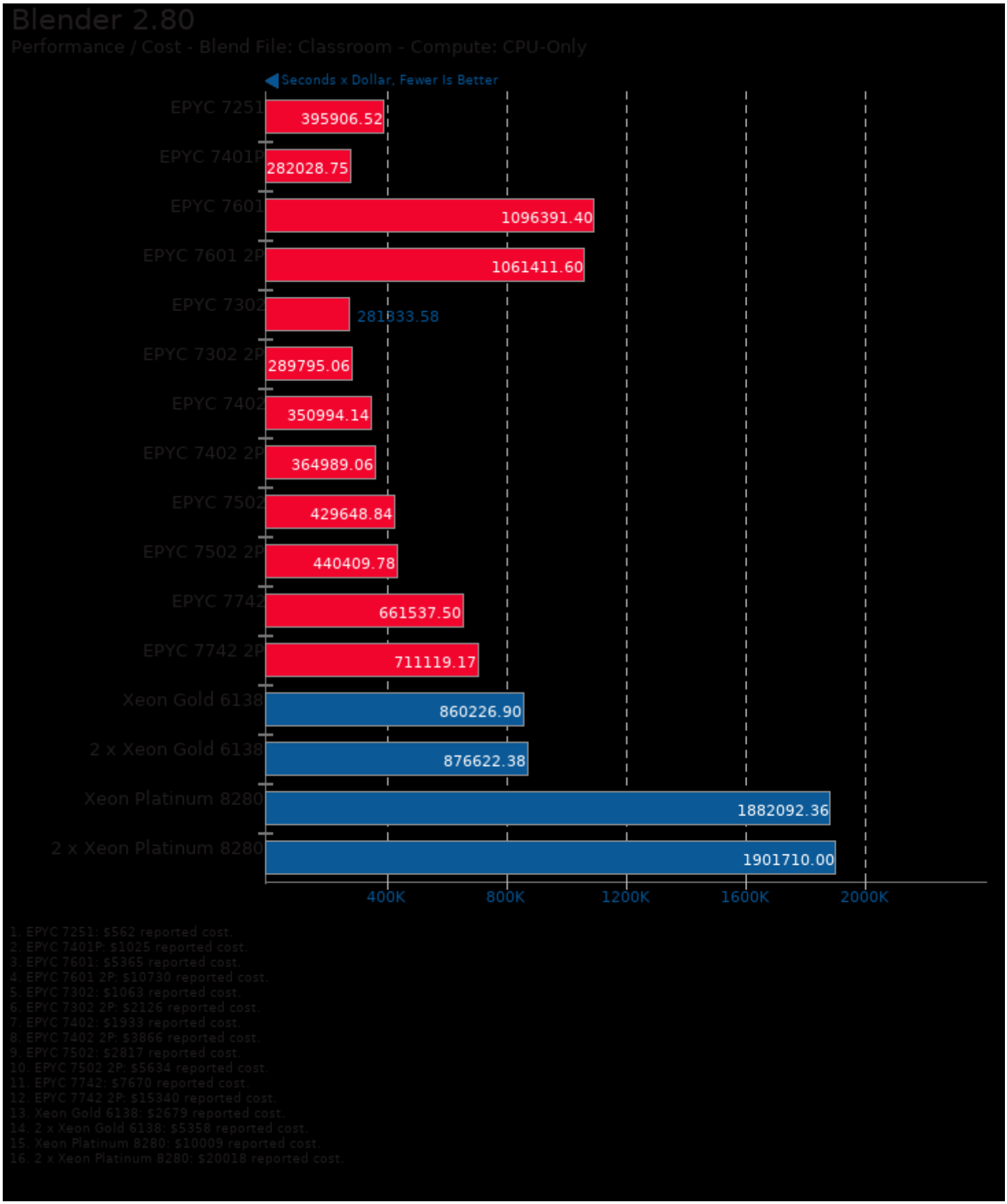

Blender 2.80
Blend File: Classroom - Compute: CPU-Only
Seconds, Fewer Is Better
EPYC 7251
SE +/- 1.14, N = 3
704.46
EPYC 7401P
SE +/- 0.50, N = 3
275.15
EPYC 7601
SE +/- 0.20, N = 3
204.36
EPYC 7601 2P
SE +/- 0.22, N = 3
98.92
EPYC 7302
SE +/- 0.22, N = 3
264.66
EPYC 7302 2P
SE +/- 0.71, N = 3
136.31
EPYC 7402
SE +/- 0.03, N = 3
181.58
EPYC 7402 2P
SE +/- 0.26, N = 3
94.41
EPYC 7502
SE +/- 0.38, N = 3
152.52
EPYC 7502 2P
SE +/- 0.20, N = 3
78.17
EPYC 7742
SE +/- 0.21, N = 3
86.25
EPYC 7742 2P
SE +/- 0.19, N = 3
46.33
Xeon Gold 6138
SE +/- 0.12, N = 3
321.10
2 x Xeon Gold 6138
SE +/- 0.43, N = 3
163.61
Xeon Platinum 8280
SE +/- 0.29, N = 3
188.04
2 x Xeon Platinum 8280
SE +/- 0.06, N = 3
95.00
W3175X 3.4ghz lock
SE +/- 0.14, N = 3
156.48
6272 ES 2P - 20200209
SE +/- 0.88, N = 3
653.78
Threadripper 3960X
SE +/- 0.06, N = 3
140.34
g36 5.6 EPYC 7302 2P
SE +/- 0.87, N = 3
138.28
150
300
450
600
750

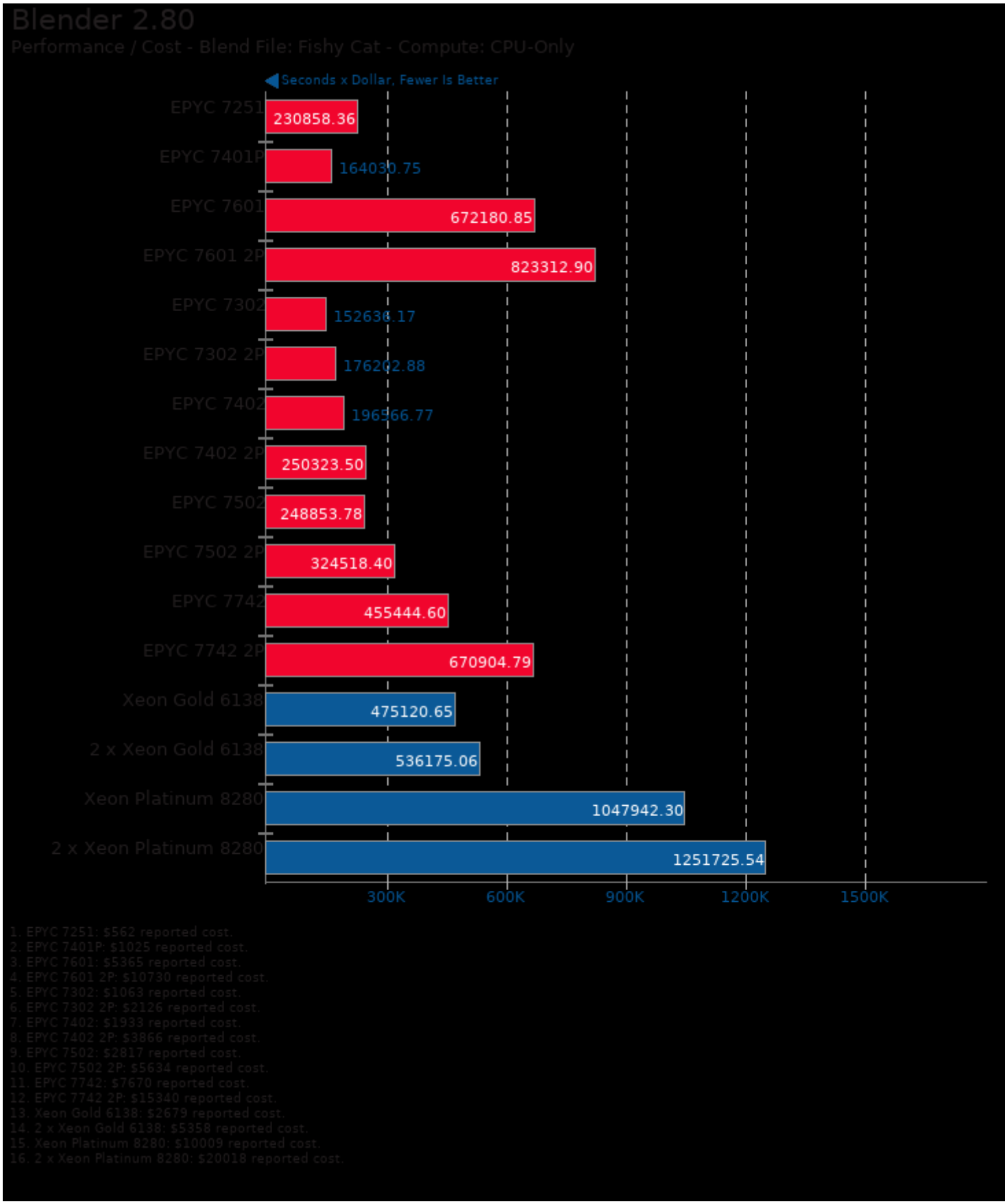

Blender 2.80
Blend File: Fishy Cat - Compute: CPU-Only
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.66, N = 3
410.78
EPYC 7401P
SE +/- 0.19, N = 3
160.03
EPYC 7601
SE +/- 0.27, N = 3
125.29
EPYC 7601 2P
SE +/- 0.31, N = 3
76.73
EPYC 7302
SE +/- 0.12, N = 3
143.59
EPYC 7302 2P
SE +/- 0.20, N = 3
82.88
EPYC 7402
SE +/- 0.19, N = 3
101.69
EPYC 7402 2P
SE +/- 0.23, N = 3
64.75
EPYC 7502
SE +/- 0.07, N = 3
88.34
EPYC 7502 2P
SE +/- 0.05, N = 3
57.60
EPYC 7742
SE +/- 0.12, N = 3
59.38
EPYC 7742 2P
SE +/- 0.05, N = 3
43.71
Xeon Gold 6138
SE +/- 0.02, N = 3
177.35
2 x Xeon Gold 6138
SE +/- 0.26, N = 3
100.07
Xeon Platinum 8280
SE +/- 0.07, N = 3
104.70
2 x Xeon Platinum 8280
SE +/- 0.04, N = 3
62.53
W3175X 3.4ghz lock
SE +/- 0.07, N = 3
92.38
6272 ES 2P - 20200209
SE +/- 0.31, N = 3
350.85
Threadripper 3960X
SE +/- 0.08, N = 3
80.30
g36 5.6 EPYC 7302 2P
SE +/- 0.26, N = 3
81.14
90
180
270
360
450

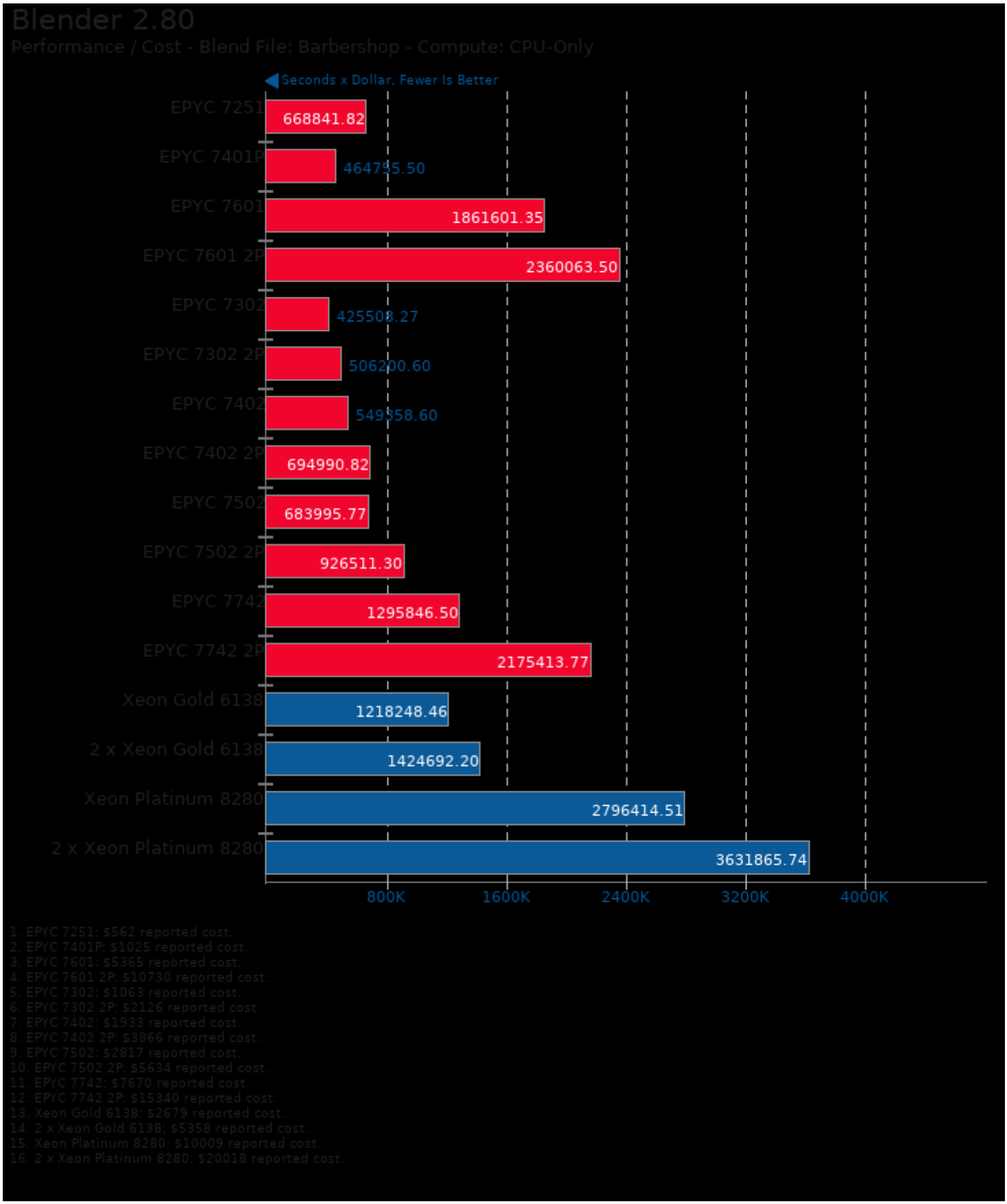

Blender 2.80
Blend File: Barbershop - Compute: CPU-Only
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.89, N = 3
1190.00
EPYC 7401P
SE +/- 0.69, N = 3
453.00
EPYC 7601
SE +/- 0.69, N = 3
347.00
EPYC 7601 2P
SE +/- 0.82, N = 3
220.00
EPYC 7302
SE +/- 0.27, N = 3
400.00
EPYC 7302 2P
SE +/- 0.29, N = 3
238.00
EPYC 7402
SE +/- 0.14, N = 3
284.00
EPYC 7402 2P
SE +/- 0.33, N = 3
180.00
EPYC 7502
SE +/- 0.42, N = 3
243.00
EPYC 7502 2P
SE +/- 0.39, N = 3
164.00
EPYC 7742
SE +/- 0.23, N = 3
169.00
EPYC 7742 2P
SE +/- 0.21, N = 3
142.00
Xeon Gold 6138
SE +/- 0.28, N = 3
455.00
2 x Xeon Gold 6138
SE +/- 0.20, N = 3
266.00
Xeon Platinum 8280
SE +/- 0.13, N = 3
279.00
2 x Xeon Platinum 8280
SE +/- 0.32, N = 3
181.00
W3175X 3.4ghz lock
SE +/- 0.28, N = 3
236.00
6272 ES 2P - 20200209
SE +/- 2.44, N = 3
866.38
Threadripper 3960X
SE +/- 0.16, N = 3
230.28
g36 5.6 EPYC 7302 2P
SE +/- 3.36, N = 3
245.41
300
600
900
1200
1500

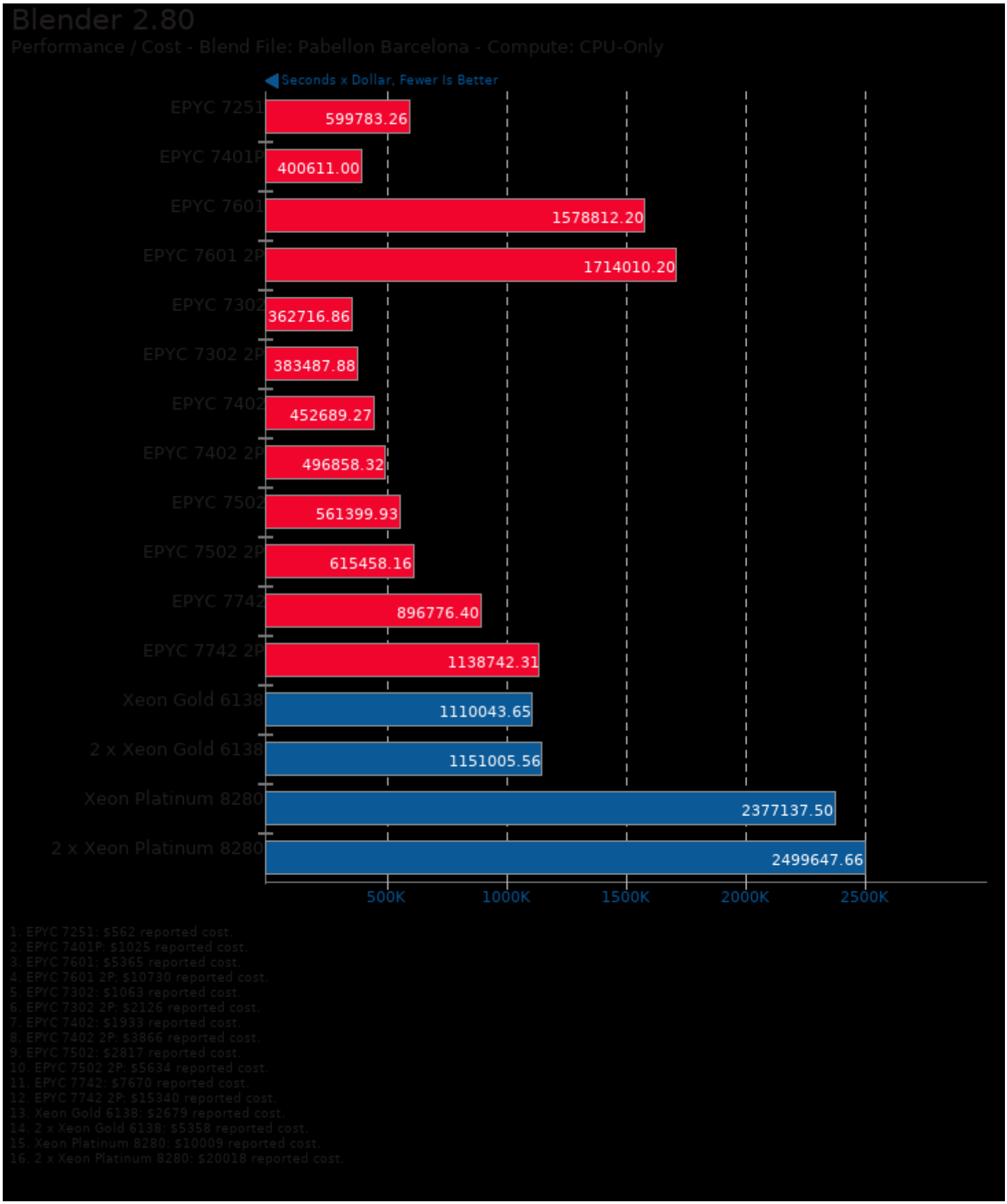

Blender 2.80
Blend File: Pabellon Barcelona - Compute: CPU-Only
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.84, N = 3
1067.23
EPYC 7401P
SE +/- 0.17, N = 3
390.84
EPYC 7601
SE +/- 0.59, N = 3
294.28
EPYC 7601 2P
SE +/- 0.13, N = 3
159.74
EPYC 7302
SE +/- 0.34, N = 3
341.22
EPYC 7302 2P
SE +/- 0.95, N = 3
180.38
EPYC 7402
SE +/- 0.87, N = 3
234.19
EPYC 7402 2P
SE +/- 0.67, N = 3
128.52
EPYC 7502
SE +/- 0.85, N = 3
199.29
EPYC 7502 2P
SE +/- 0.36, N = 3
109.24
EPYC 7742
SE +/- 0.51, N = 3
116.92
EPYC 7742 2P
SE +/- 0.23, N = 3
74.19
Xeon Gold 6138
SE +/- 0.16, N = 3
414.35
2 x Xeon Gold 6138
SE +/- 0.15, N = 3
214.82
Xeon Platinum 8280
SE +/- 0.12, N = 3
237.50
2 x Xeon Platinum 8280
SE +/- 0.14, N = 3
124.87
W3175X 3.4ghz lock
SE +/- 0.09, N = 3
203.60
6272 ES 2P - 20200209
SE +/- 1.40, N = 3
828.53
Threadripper 3960X
SE +/- 0.10, N = 3
183.36
g36 5.6 EPYC 7302 2P
SE +/- 0.23, N = 3
176.73
200
400
600
800
1000

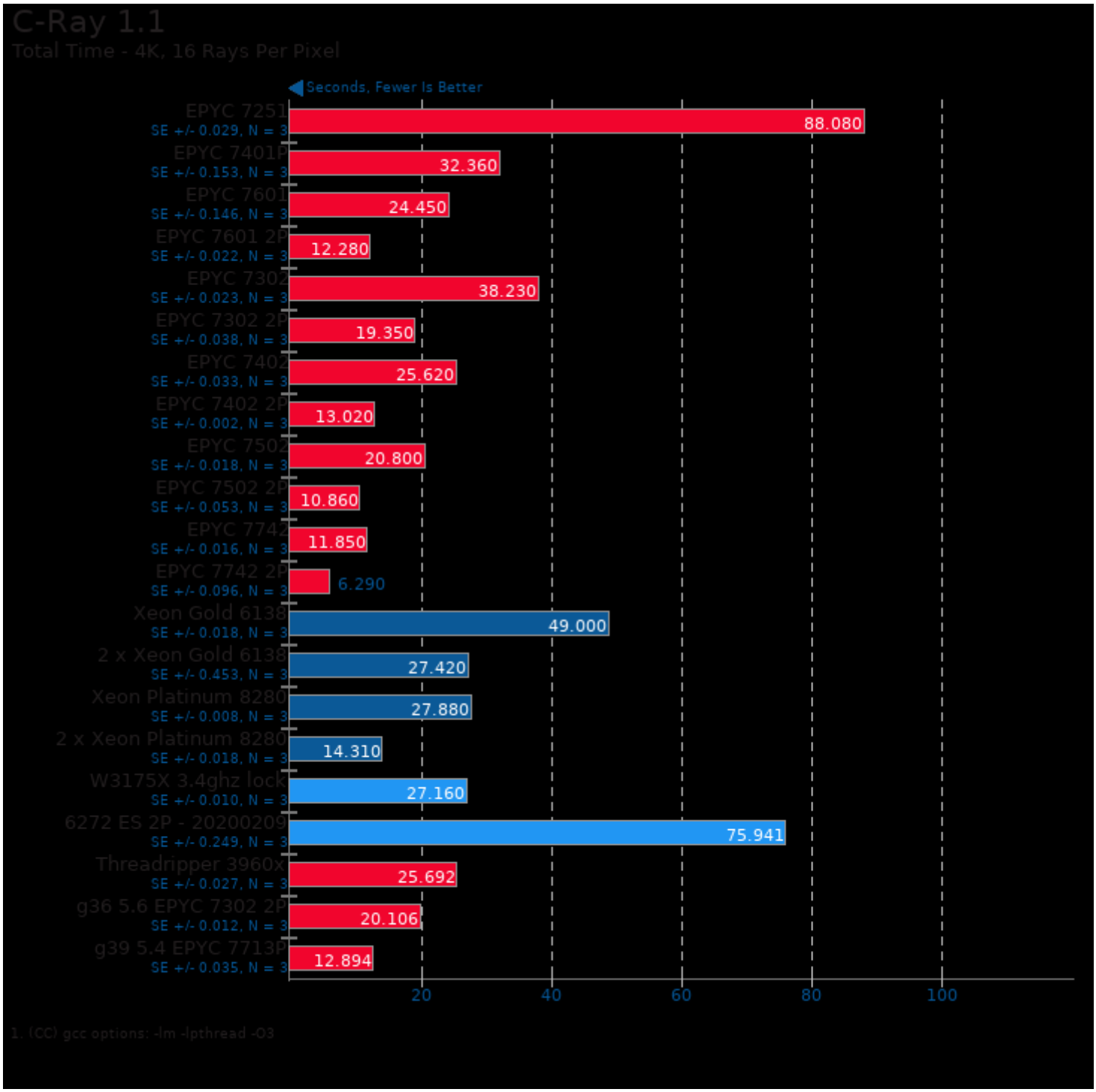

Blender 2.80
Performance / Cost - Blend File: BMW27 - Compute: CPU-Only
Seconds x Dollar, Fewer Is Better
EPYC 7251
155926.90
EPYC 7401P
112104.25
EPYC 7601
447762.90
EPYC 7601 2P
514288.90
EPYC 7302
107724.42
EPYC 7302 2P
116143.38
EPYC 7402
136353.82
EPYC 7402 2P
156650.32
EPYC 7502
171696.15
EPYC 7502 2P
199499.94
EPYC 7742
286781.30
EPYC 7742 2P
411967.16
Xeon Gold 6138
315425.46
2 x Xeon Gold 6138
340822.38
Xeon Platinum 8280
683714.79
2 x Xeon Platinum 8280
757481.12
160K
320K
480K
640K
800K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

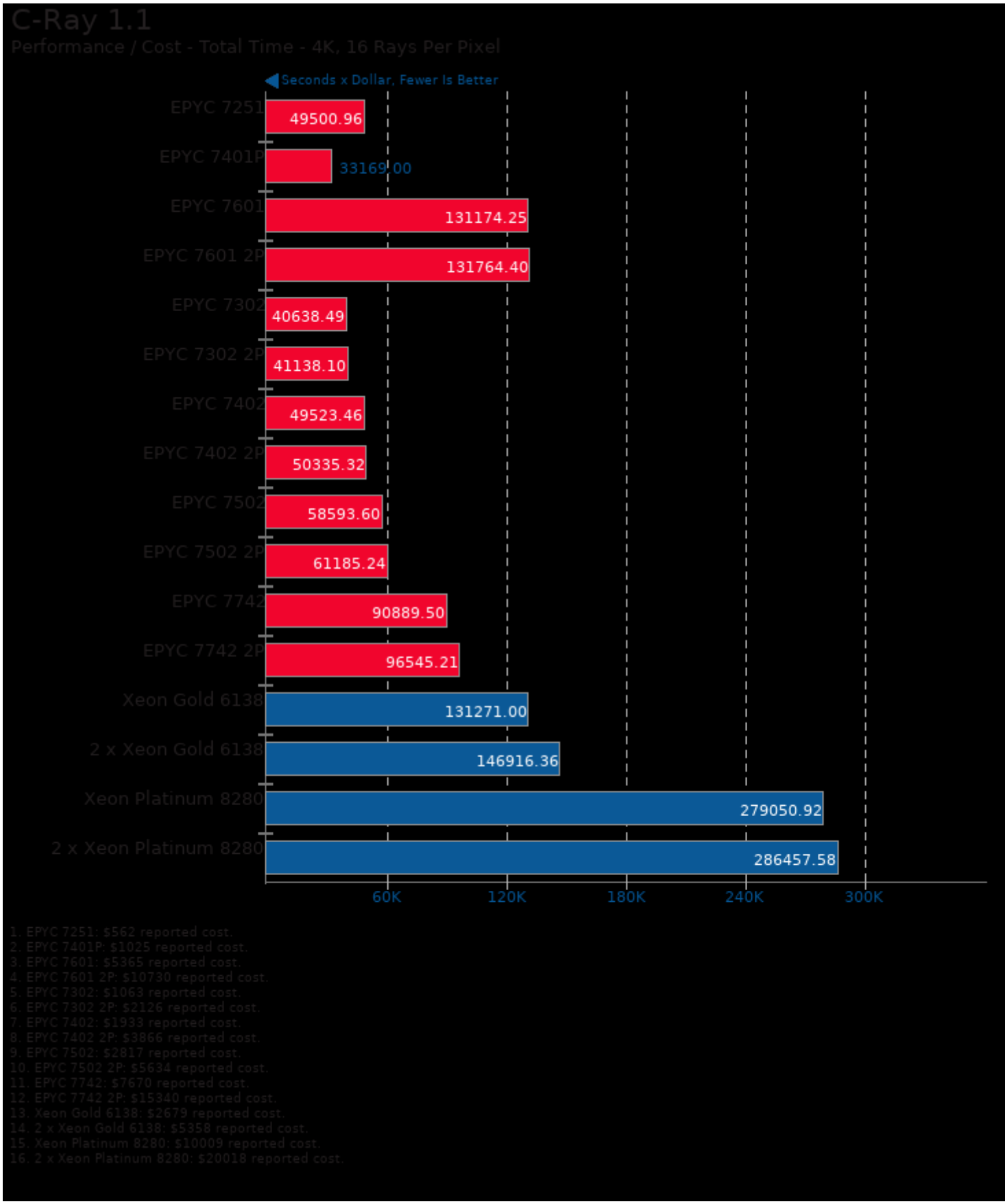

Blender 2.80
Performance / Cost - Blend File: Classroom - Compute: CPU-Only
Seconds x Dollar, Fewer Is Better
EPYC 7251
395906.52
EPYC 7401P
282028.75
EPYC 7601
1096391.40
EPYC 7601 2P
1061411.60
EPYC 7302
281833.58
EPYC 7302 2P
289795.06
EPYC 7402
350994.14
EPYC 7402 2P
364989.06
EPYC 7502
429648.84
EPYC 7502 2P
440409.78
EPYC 7742
661537.50
EPYC 7742 2P
711119.17
Xeon Gold 6138
860226.90
2 x Xeon Gold 6138
876622.38
Xeon Platinum 8280
1882092.36
2 x Xeon Platinum 8280
1901710.00
400K
800K
1200K
1600K
2000K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

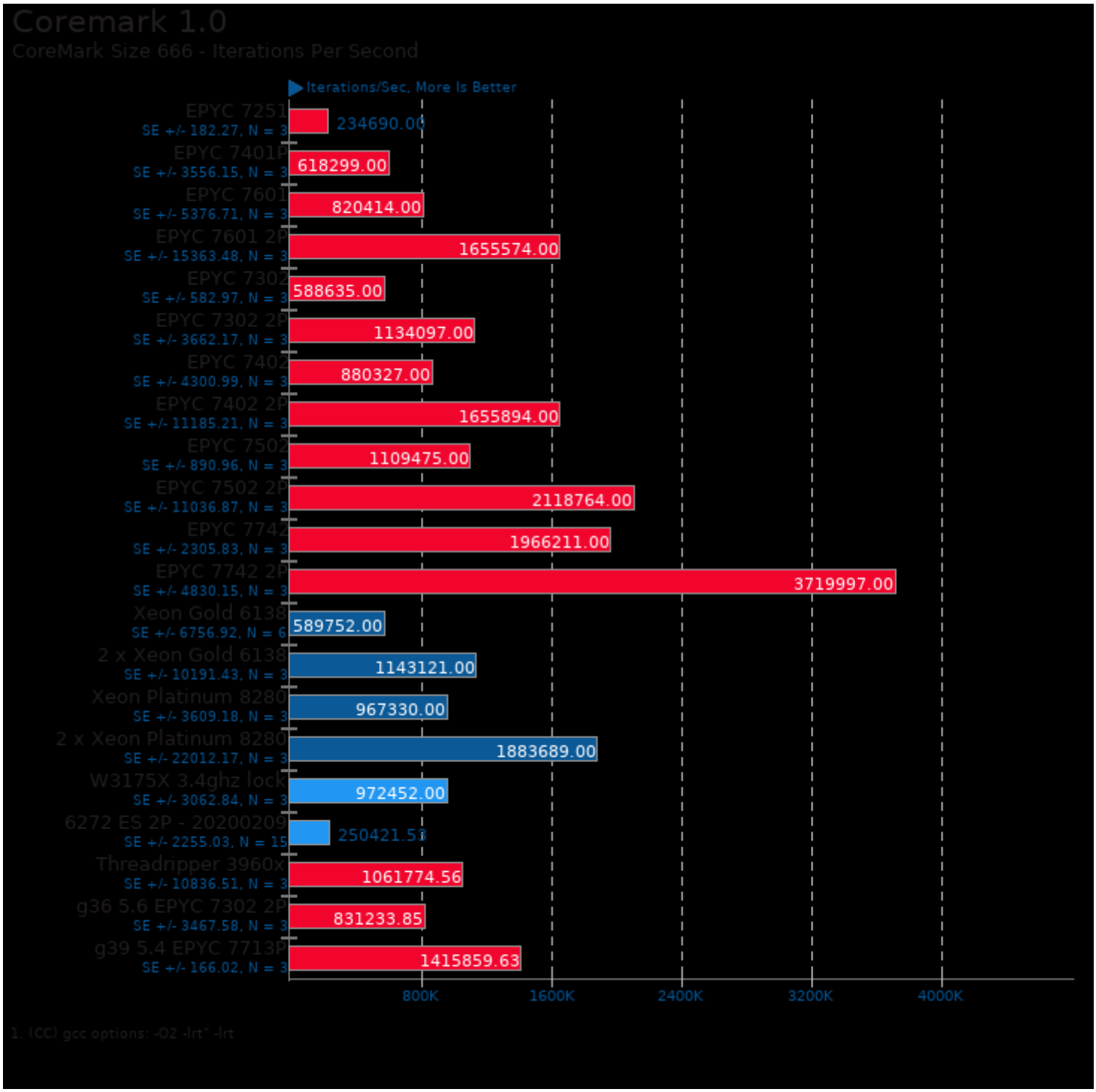

Blender 2.80
Performance / Cost - Blend File: Fishy Cat - Compute: CPU-Only
Seconds x Dollar, Fewer Is Better
EPYC 7251
230858.36
EPYC 7401P
164030.75
EPYC 7601
672180.85
EPYC 7601 2P
823312.90
EPYC 7302
152638.17
EPYC 7302 2P
176202.88
EPYC 7402
196566.77
EPYC 7402 2P
250323.50
EPYC 7502
248853.78
EPYC 7502 2P
324518.40
EPYC 7742
455444.60
EPYC 7742 2P
670904.79
Xeon Gold 6138
475120.65
2 x Xeon Gold 6138
536175.06
Xeon Platinum 8280
1047942.30
2 x Xeon Platinum 8280
1251725.54
300K
600K
900K
1200K
1500K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

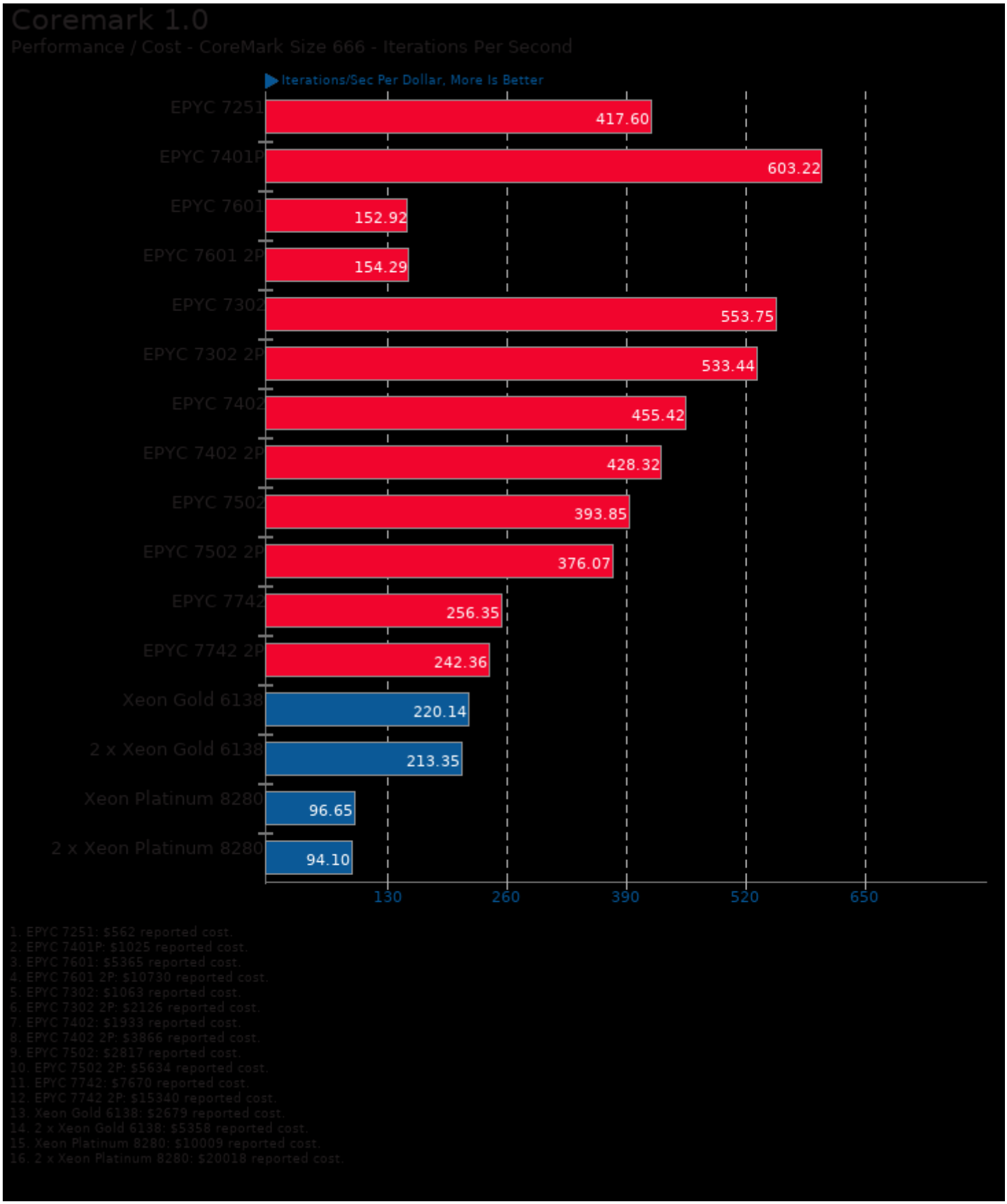

Blender 2.80
Performance / Cost - Blend File: Barbershop - Compute: CPU-Only
Seconds x Dollar, Fewer Is Better
EPYC 7251
668841.82
EPYC 7401P
464755.50
EPYC 7601
1861601.35
EPYC 7601 2P
2360063.50
EPYC 7302
425508.27
EPYC 7302 2P
506200.60
EPYC 7402
549358.60
EPYC 7402 2P
694990.82
EPYC 7502
683995.77
EPYC 7502 2P
926511.30
EPYC 7742
1295846.50
EPYC 7742 2P
2175413.77
Xeon Gold 6138
1218248.46
2 x Xeon Gold 6138
1424692.20
Xeon Platinum 8280
2796414.51
2 x Xeon Platinum 8280
3631865.74
800K
1600K
2400K
3200K
4000K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

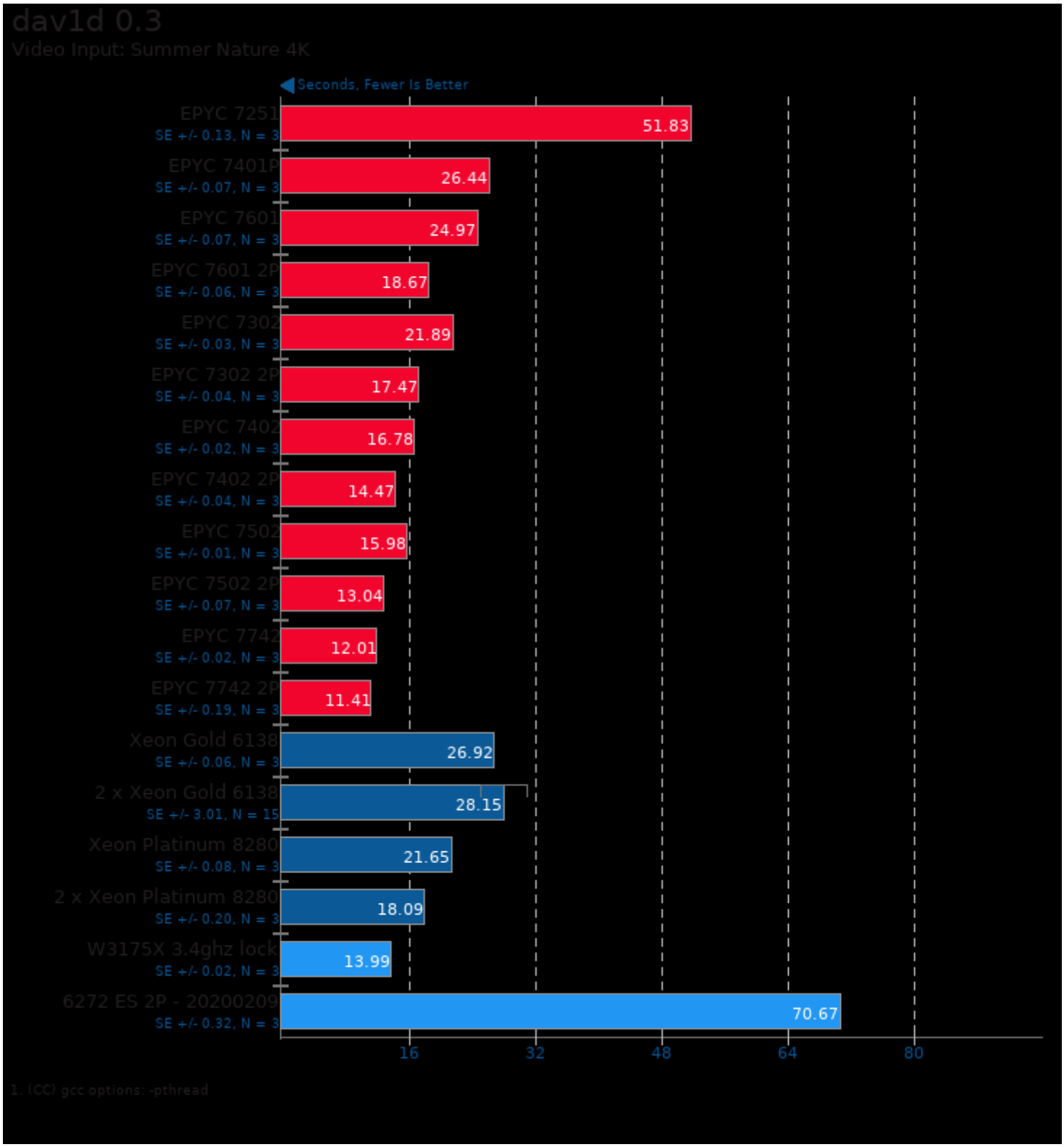

Blender 2.80
Performance / Cost - Blend File: Pabellon Barcelona - Compute: CPU-Only
Seconds x Dollar, Fewer Is Better
EPYC 7251
599783.26
EPYC 7401P
400611.00
EPYC 7601
1578812.20
EPYC 7601 2P
1714010.20
EPYC 7302
362716.86
EPYC 7302 2P
383487.88
EPYC 7402
452689.27
EPYC 7402 2P
496858.32
EPYC 7502
561399.93
EPYC 7502 2P
615458.16
EPYC 7742
896776.40
EPYC 7742 2P
1138742.31
Xeon Gold 6138
1110043.65
2 x Xeon Gold 6138
1151005.56
Xeon Platinum 8280
2377137.50
2 x Xeon Platinum 8280
2499647.66
500K
1000K
1500K
2000K
2500K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

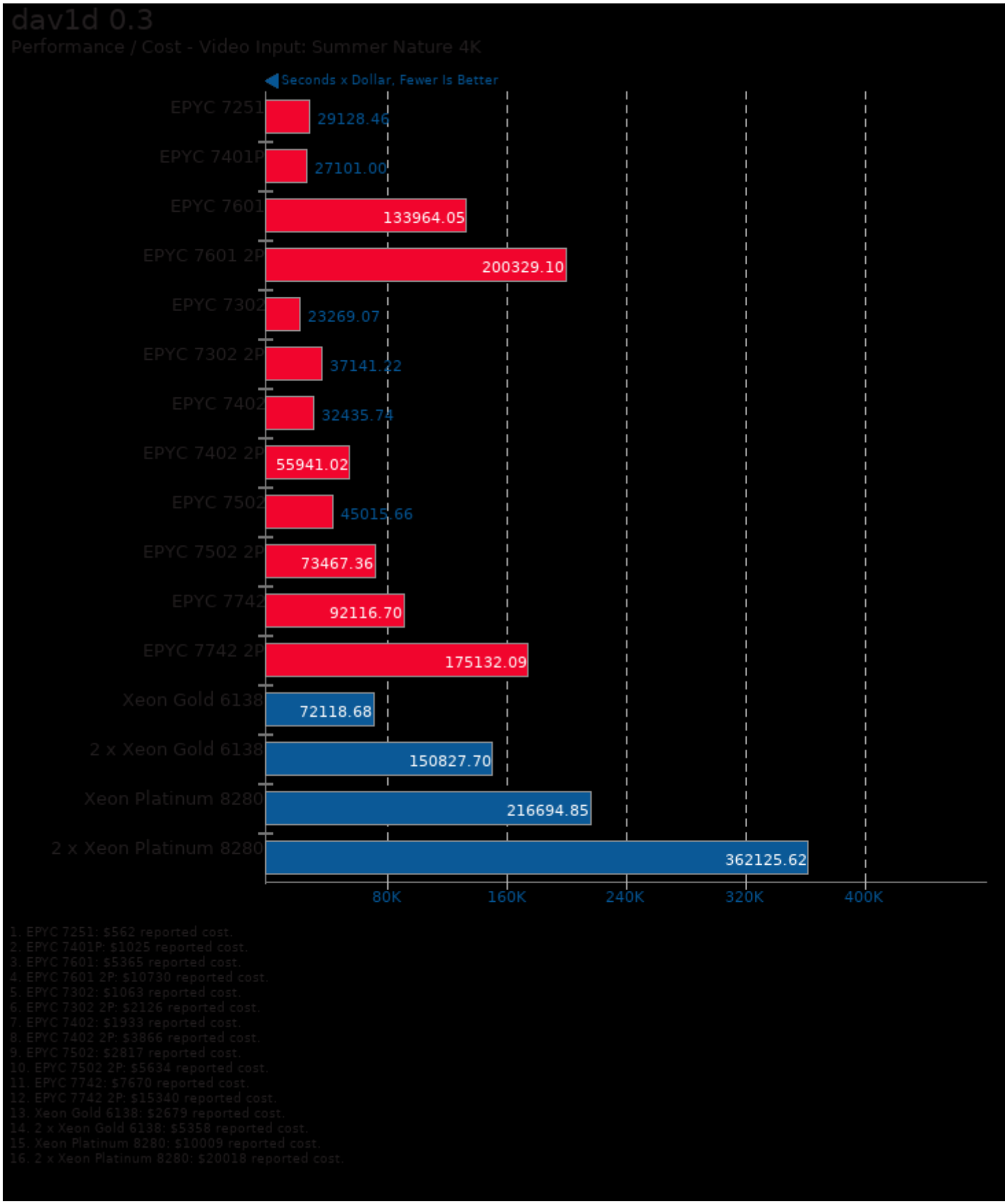

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.029, N = 3
88.080
EPYC 7401P
SE +/- 0.153, N = 3
32.360
EPYC 7601
SE +/- 0.146, N = 3
24.450
EPYC 7601 2P
SE +/- 0.022, N = 3
12.280
EPYC 7302
SE +/- 0.023, N = 3
38.230
EPYC 7302 2P
SE +/- 0.038, N = 3
19.350
EPYC 7402
SE +/- 0.033, N = 3
25.620
EPYC 7402 2P
SE +/- 0.002, N = 3
13.020
EPYC 7502
SE +/- 0.018, N = 3
20.800
EPYC 7502 2P
SE +/- 0.053, N = 3
10.860
EPYC 7742
SE +/- 0.016, N = 3
11.850
EPYC 7742 2P
SE +/- 0.096, N = 3
6.290
Xeon Gold 6138
SE +/- 0.018, N = 3
49.000
2 x Xeon Gold 6138
SE +/- 0.453, N = 3
27.420
Xeon Platinum 8280
SE +/- 0.008, N = 3
27.880
2 x Xeon Platinum 8280
SE +/- 0.018, N = 3
14.310
W3175X 3.4ghz lock
SE +/- 0.010, N = 3
27.160
6272 ES 2P - 20200209
SE +/- 0.249, N = 3
75.941
Threadripper 3960X
SE +/- 0.027, N = 3
25.692
g36 5.6 EPYC 7302 2P
SE +/- 0.012, N = 3
20.106
g39 5.4 EPYC 7713P
SE +/- 0.035, N = 3
12.894
20
40
60
80
100
1. (CC) gcc options: -lm -lpthread -O3

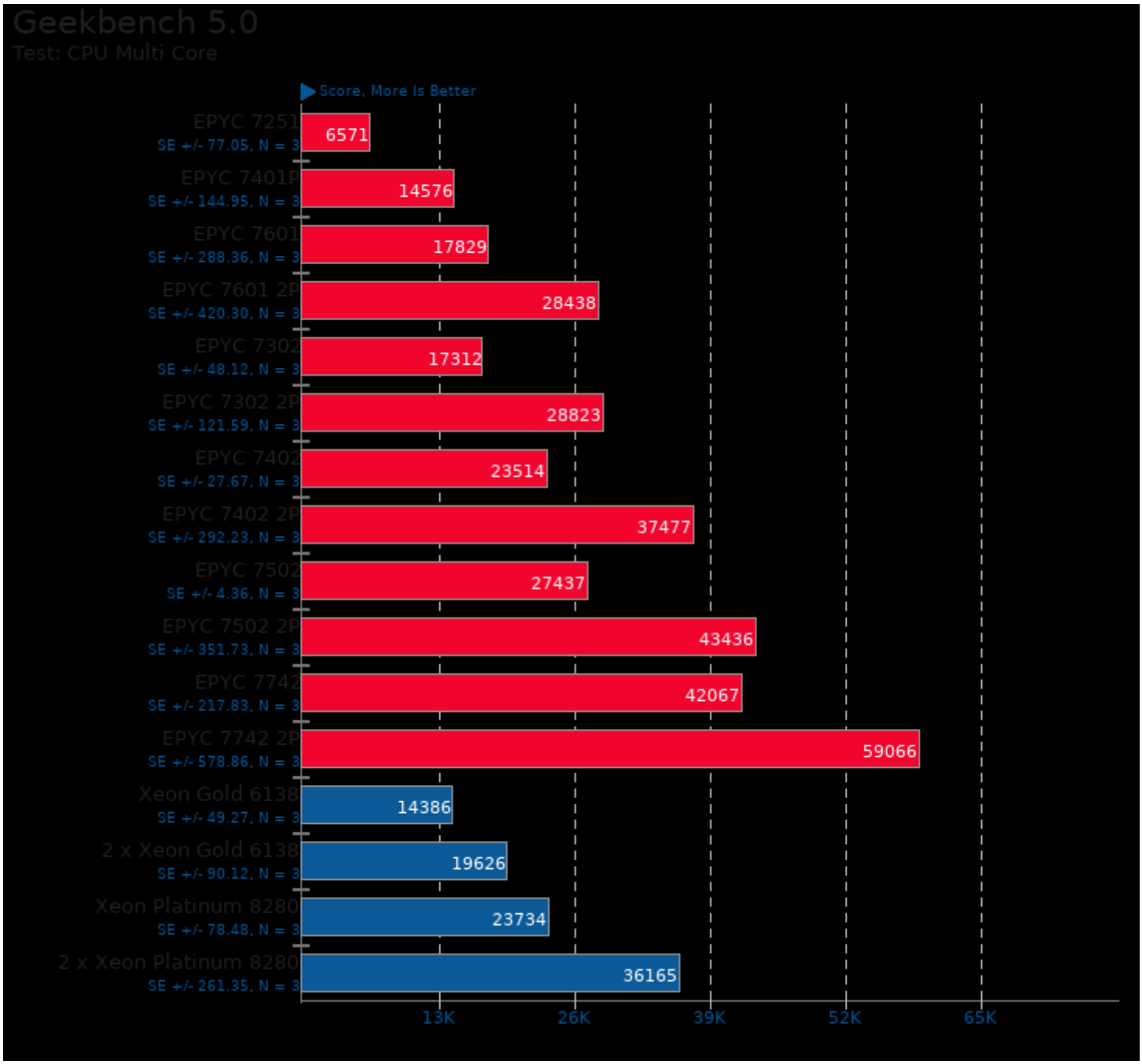

C-Ray 1.1
Performance / Cost - Total Time - 4K, 16 Rays Per Pixel
Seconds x Dollar, Fewer Is Better
EPYC 7251
49500.96
EPYC 7401P
33169.00
EPYC 7601
131174.25
EPYC 7601 2P
131764.40
EPYC 7302
40638.49
EPYC 7302 2P
41138.10
EPYC 7402
49523.46
EPYC 7402 2P
50335.32
EPYC 7502
58593.60
EPYC 7502 2P
61185.24
EPYC 7742
90889.50
EPYC 7742 2P
96545.21
Xeon Gold 6138
131271.00
2 x Xeon Gold 6138
146916.36
Xeon Platinum 8280
279050.92
2 x Xeon Platinum 8280
286457.58
60K
120K
180K
240K
300K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

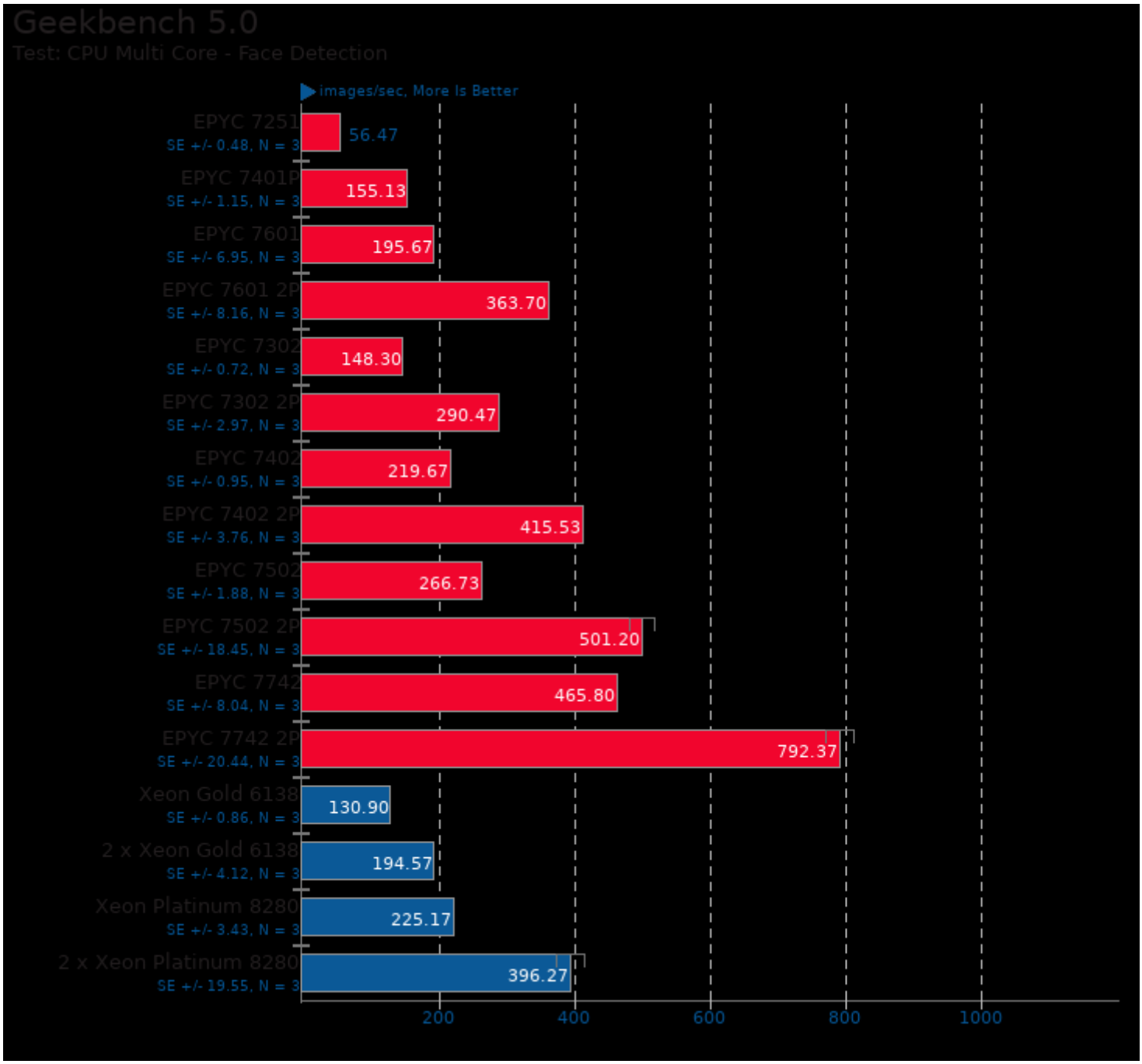

Coremark 1.0
CoreMark Size 666 - Iterations Per Second
Iterations/Sec, More Is Better
EPYC 7251
SE +/- 182.27, N = 3
234690.00
EPYC 7401P
SE +/- 3556.15, N = 3
618299.00
EPYC 7601
SE +/- 5376.71, N = 3
820414.00
EPYC 7601 2P
SE +/- 15363.48, N = 3
1655574.00
EPYC 7302
SE +/- 582.97, N = 3
588635.00
EPYC 7302 2P
SE +/- 3662.17, N = 3
1134097.00
EPYC 7402
SE +/- 4300.99, N = 3
880327.00
EPYC 7402 2P
SE +/- 11185.21, N = 3
1655894.00
EPYC 7502
SE +/- 890.96, N = 3
1109475.00
EPYC 7502 2P
SE +/- 11036.87, N = 3
2118764.00
EPYC 7742
SE +/- 2305.83, N = 3
1966211.00
EPYC 7742 2P
SE +/- 4830.15, N = 3
3719997.00
Xeon Gold 6138
SE +/- 6756.92, N = 6
589752.00
2 x Xeon Gold 6138
SE +/- 10191.43, N = 3
1143121.00
Xeon Platinum 8280
SE +/- 3609.18, N = 3
967330.00
2 x Xeon Platinum 8280
SE +/- 22012.17, N = 3
1883689.00
W3175X 3.4ghz lock
SE +/- 3062.84, N = 3
972452.00
6272 ES 2P - 20200209
SE +/- 2255.03, N = 15
250421.53
Threadripper 3960X
SE +/- 10836.51, N = 3
1061774.56
g36 5.6 EPYC 7302 2P
SE +/- 3467.58, N = 3
831233.85
g39 5.4 EPYC 7713P
SE +/- 166.02, N = 3
1415859.63
800K
1600K
2400K
3200K
4000K
1. (CC) gcc options: -O2 -lrt" -lrt

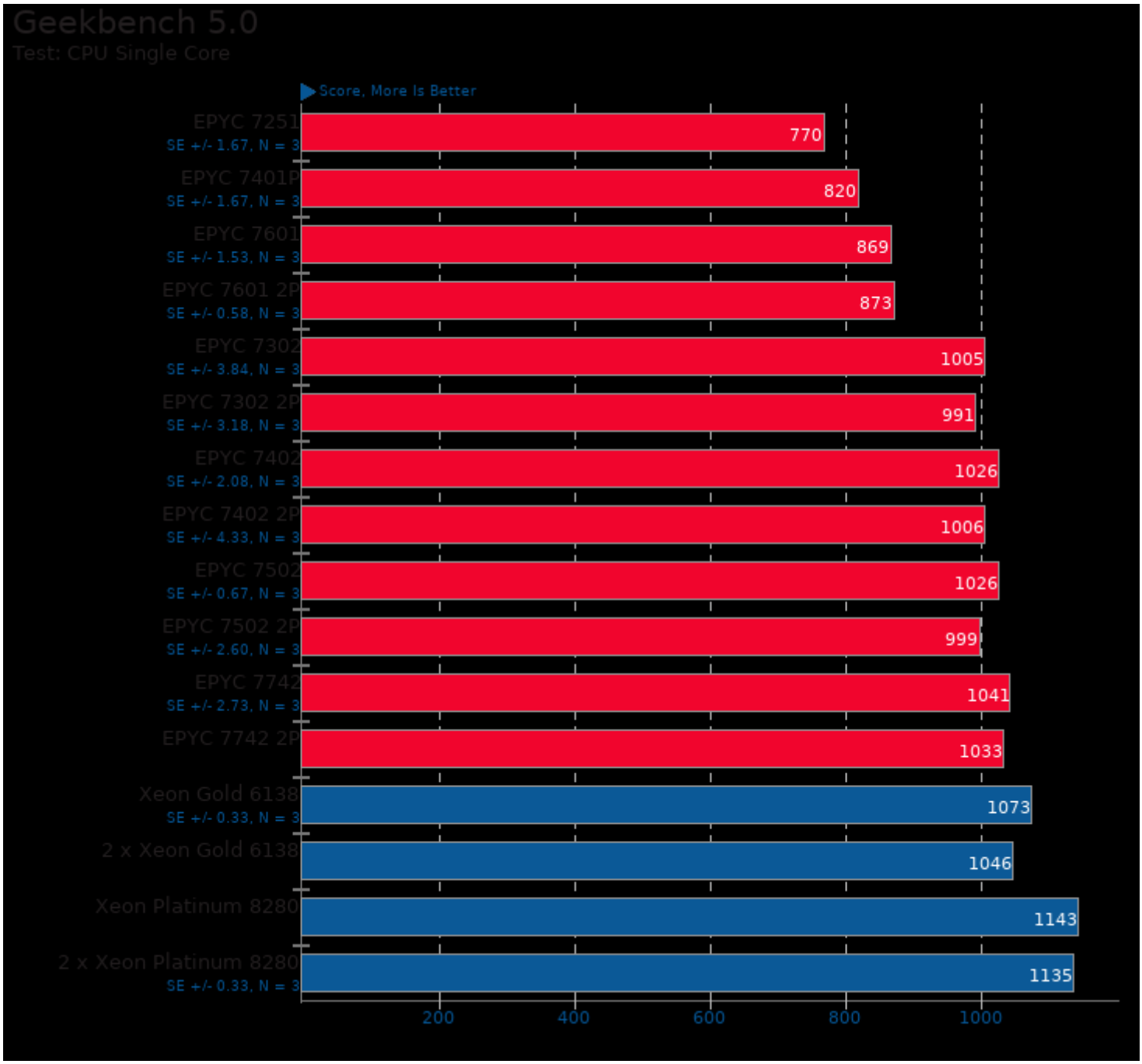

Coremark 1.0
Performance / Cost - CoreMark Size 666 - Iterations Per Second
Iterations/Sec Per Dollar, More Is Better
EPYC 7251
417.60
EPYC 7401P
603.22
EPYC 7601
152.92
EPYC 7601 2P
154.29
EPYC 7302
553.75
EPYC 7302 2P
533.44
EPYC 7402
455.42
EPYC 7402 2P
428.32
EPYC 7502
393.85
EPYC 7502 2P
376.07
EPYC 7742
256.35
EPYC 7742 2P
242.36
Xeon Gold 6138
220.14
2 x Xeon Gold 6138
213.35
Xeon Platinum 8280
96.65
2 x Xeon Platinum 8280
94.10
130
260
390
520
650
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

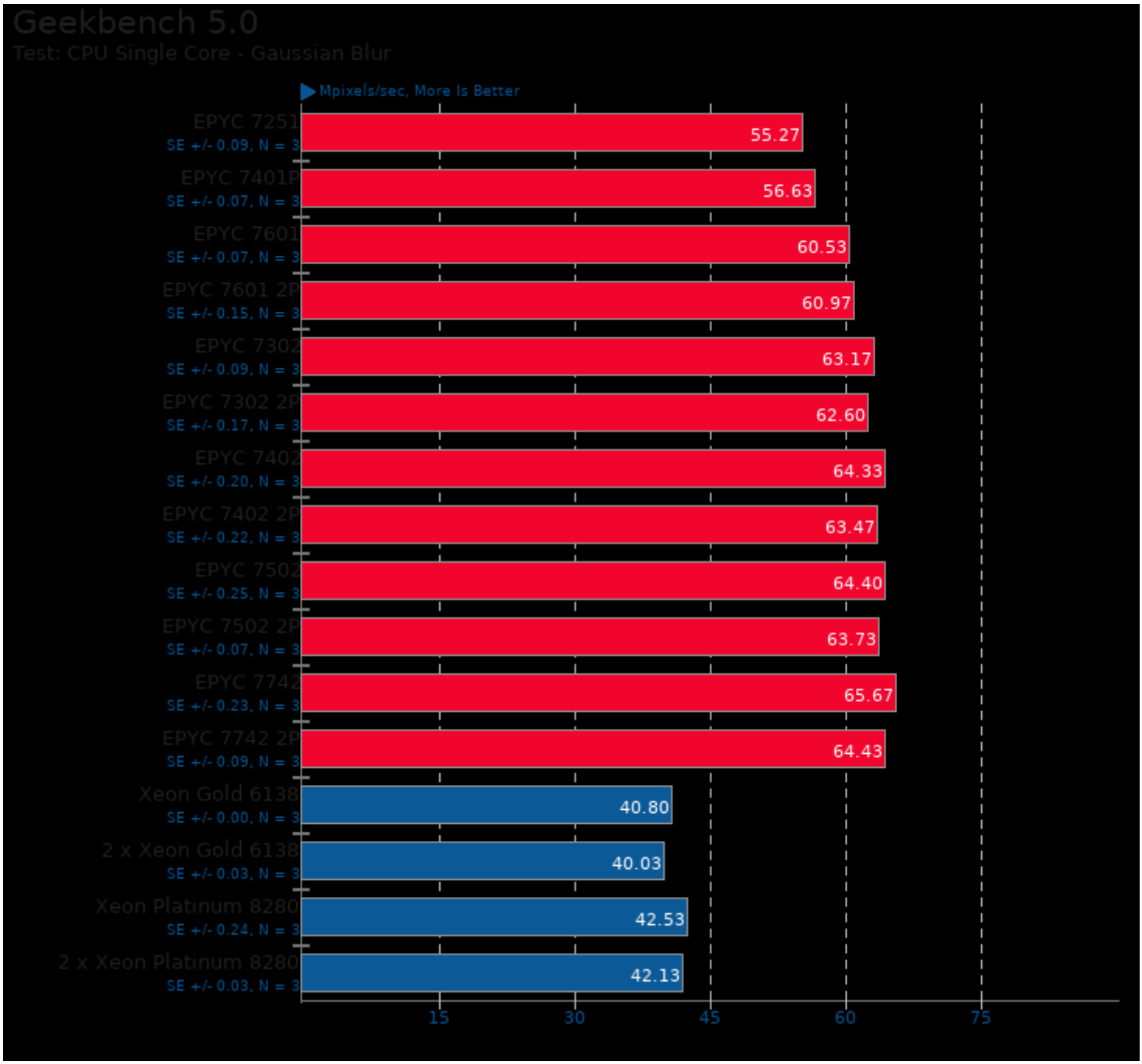

dav1d 0.3
Video Input: Summer Nature 4K
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.13, N = 3
51.83
EPYC 7401P
SE +/- 0.07, N = 3
26.44
EPYC 7601
SE +/- 0.07, N = 3
24.97
EPYC 7601 2P
SE +/- 0.06, N = 3
18.67
EPYC 7302
SE +/- 0.03, N = 3
21.89
EPYC 7302 2P
SE +/- 0.04, N = 3
17.47
EPYC 7402
SE +/- 0.02, N = 3
16.78
EPYC 7402 2P
SE +/- 0.04, N = 3
14.47
EPYC 7502
SE +/- 0.01, N = 3
15.98
EPYC 7502 2P
SE +/- 0.07, N = 3
13.04
EPYC 7742
SE +/- 0.02, N = 3
12.01
EPYC 7742 2P
SE +/- 0.19, N = 3
11.41
Xeon Gold 6138
SE +/- 0.06, N = 3
26.92
2 x Xeon Gold 6138
SE +/- 3.01, N = 15
28.15
Xeon Platinum 8280
SE +/- 0.08, N = 3
21.65
2 x Xeon Platinum 8280
SE +/- 0.20, N = 3
18.09
W3175X 3.4ghz lock
SE +/- 0.02, N = 3
13.99
6272 ES 2P - 20200209
SE +/- 0.32, N = 3
70.67
16
32
48
64
80
1. (CC) gcc options: -pthread

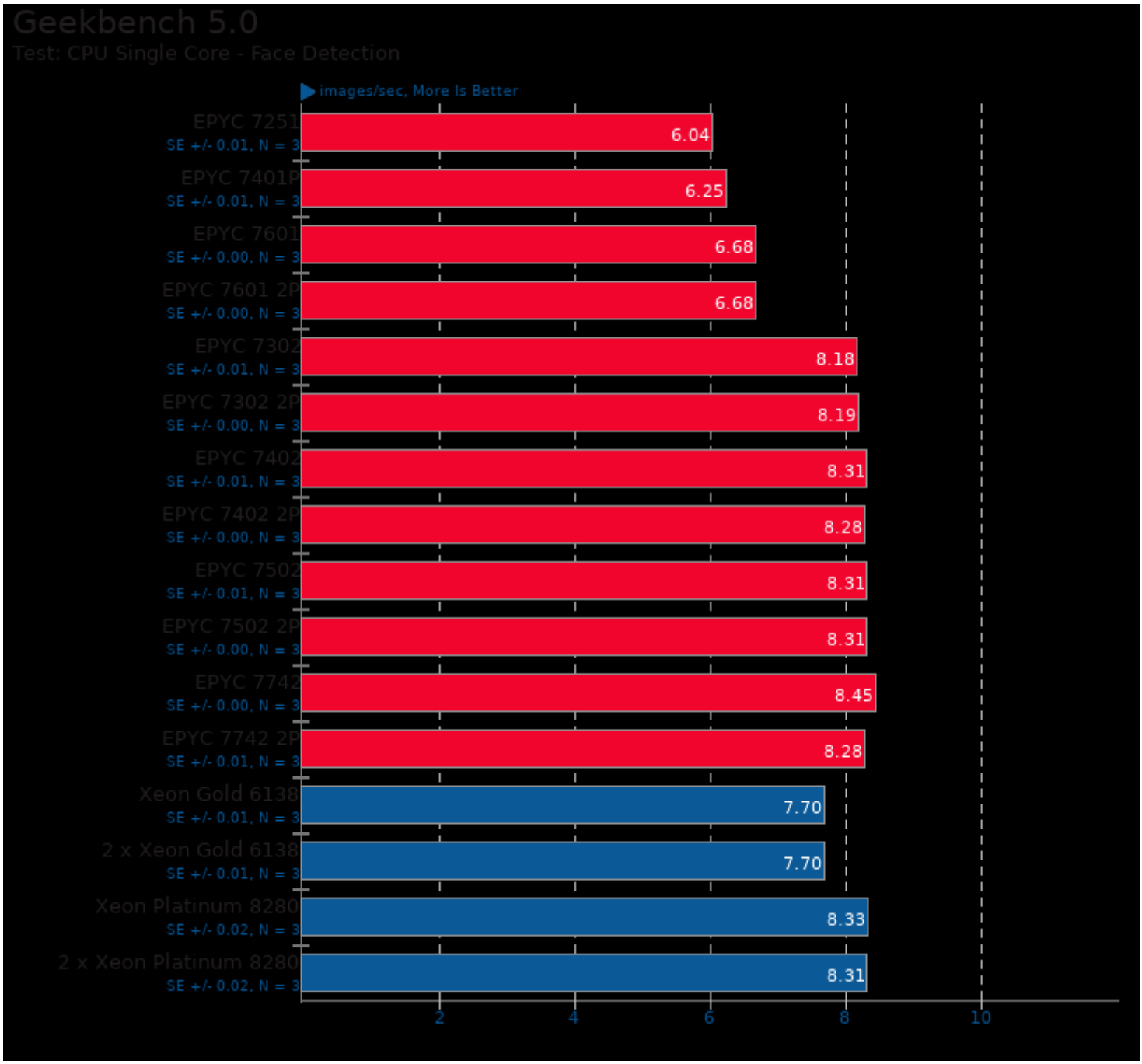

dav1d 0.3
Performance / Cost - Video Input: Summer Nature 4K
Seconds x Dollar, Fewer Is Better
EPYC 7251
29128.46
EPYC 7401P
27101.00
EPYC 7601
133964.05
EPYC 7601 2P
200329.10
EPYC 7302
23269.07
EPYC 7302 2P
37141.22
EPYC 7402
32435.74
EPYC 7402 2P
55941.02
EPYC 7502
45015.66
EPYC 7502 2P
73467.36
EPYC 7742
92116.70
EPYC 7742 2P
175132.09
Xeon Gold 6138
72118.68
2 x Xeon Gold 6138
150827.70
Xeon Platinum 8280
216694.85
2 x Xeon Platinum 8280
362125.62
80K
160K
240K
320K
400K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

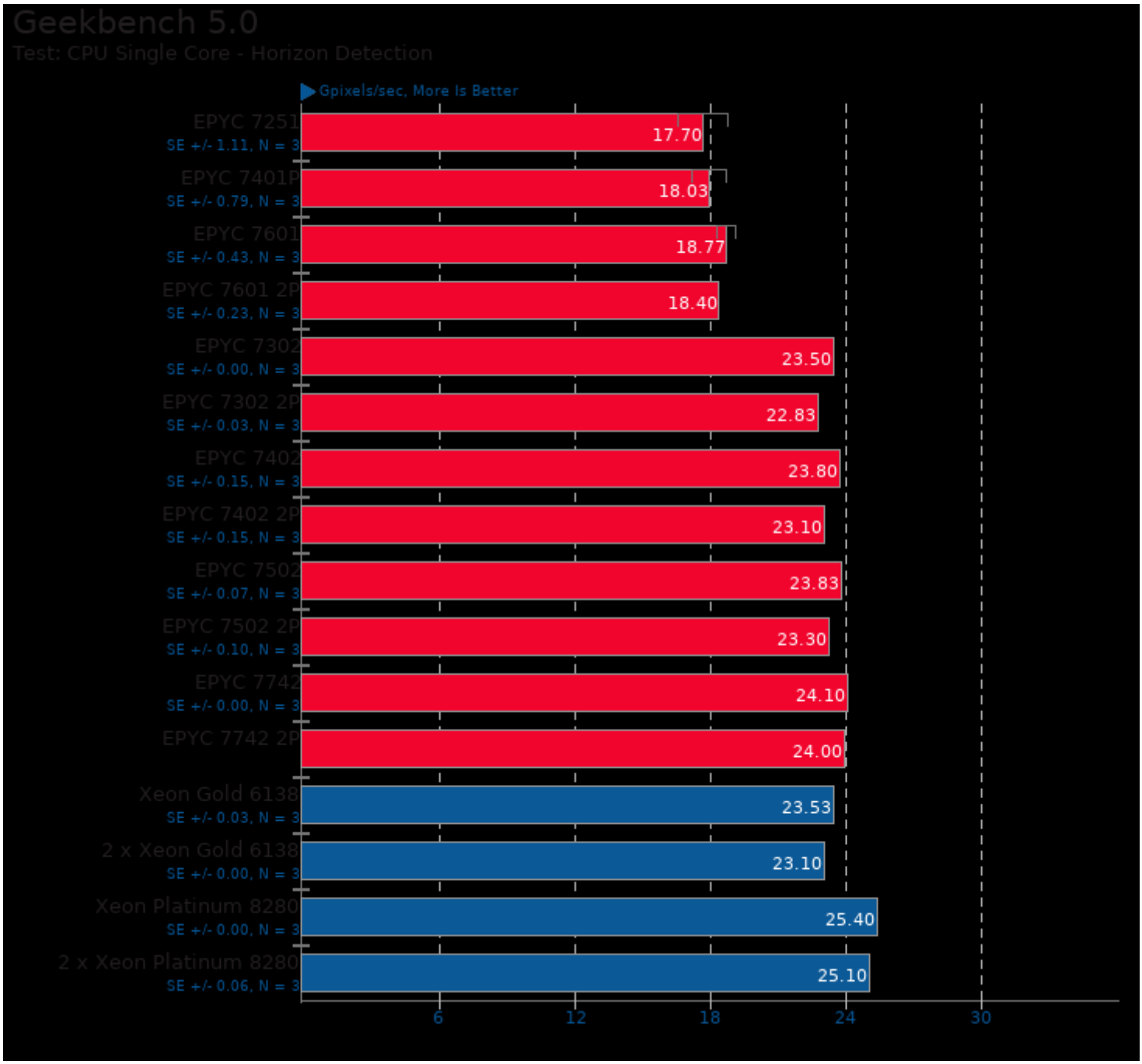

Geekbench 5.0
Test: CPU Multi Core
Score, More Is Better
EPYC 7251
SE +/- 77.05, N = 3
6571
EPYC 7401P
SE +/- 144.95, N = 3
14576
EPYC 7601
SE +/- 288.36, N = 3
17829
EPYC 7601 2P
SE +/- 420.30, N = 3
28438
EPYC 7302
SE +/- 48.12, N = 3
17312
EPYC 7302 2P
SE +/- 121.59, N = 3
28823
EPYC 7402
SE +/- 27.67, N = 3
23514
EPYC 7402 2P
SE +/- 292.23, N = 3
37477
EPYC 7502
SE +/- 4.36, N = 3
27437
EPYC 7502 2P
SE +/- 351.73, N = 3
43436
EPYC 7742
SE +/- 217.83, N = 3
42067
EPYC 7742 2P
SE +/- 578.86, N = 3
59066
Xeon Gold 6138
SE +/- 49.27, N = 3
14386
2 x Xeon Gold 6138
SE +/- 90.12, N = 3
19626
Xeon Platinum 8280
SE +/- 78.48, N = 3
23734
2 x Xeon Platinum 8280
SE +/- 261.35, N = 3
36165
13K
26K
39K
52K
65K

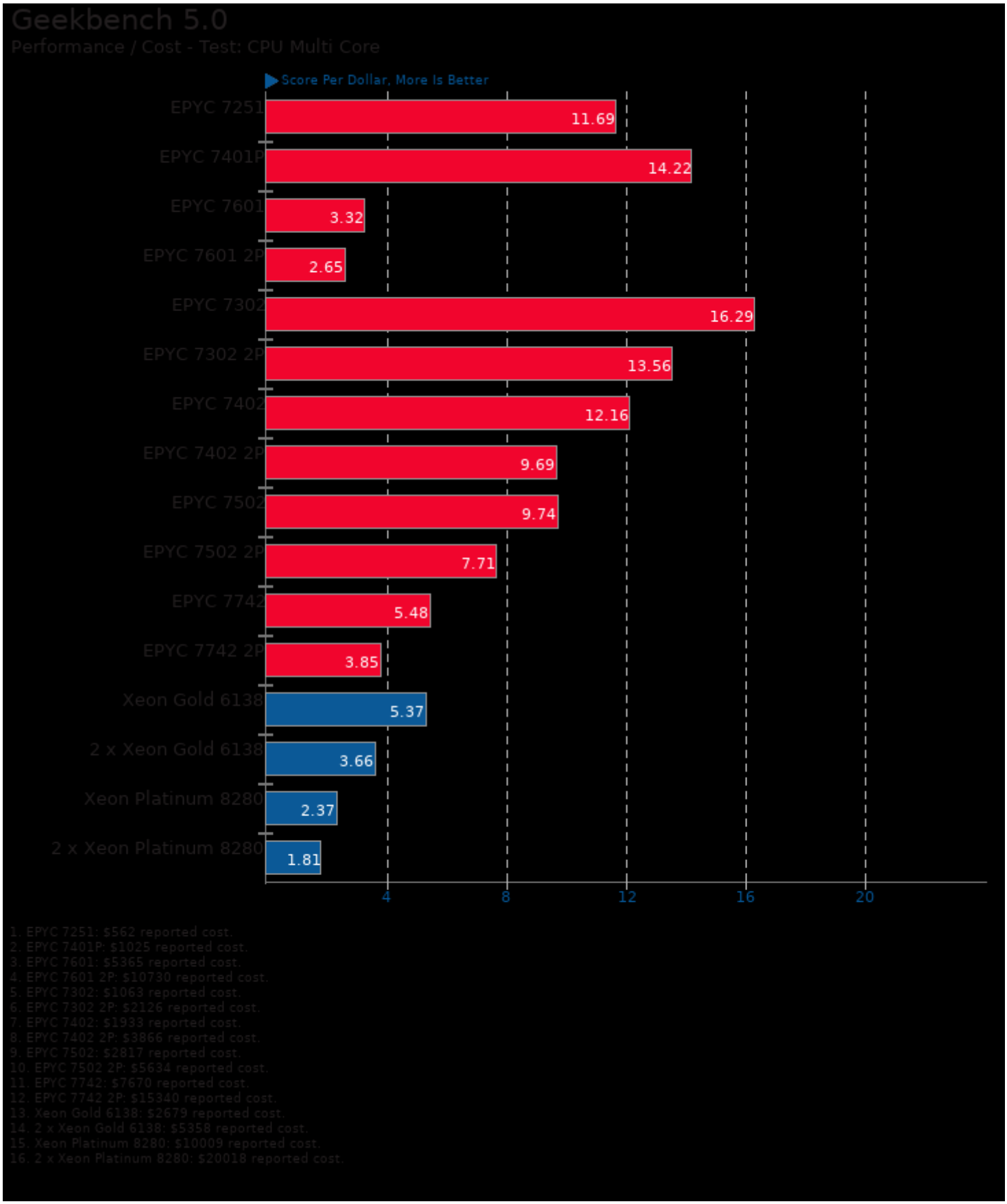

Geekbench 5.0
Test: CPU Multi Core - Face Detection
images/sec, More Is Better
EPYC 7251
SE +/- 0.48, N = 3
56.47
EPYC 7401P
SE +/- 1.15, N = 3
155.13
EPYC 7601
SE +/- 6.95, N = 3
195.67
EPYC 7601 2P
SE +/- 8.16, N = 3
363.70
EPYC 7302
SE +/- 0.72, N = 3
148.30
EPYC 7302 2P
SE +/- 2.97, N = 3
290.47
EPYC 7402
SE +/- 0.95, N = 3
219.67
EPYC 7402 2P
SE +/- 3.76, N = 3
415.53
EPYC 7502
SE +/- 1.88, N = 3
266.73
EPYC 7502 2P
SE +/- 18.45, N = 3
501.20
EPYC 7742
SE +/- 8.04, N = 3
465.80
EPYC 7742 2P
SE +/- 20.44, N = 3
792.37
Xeon Gold 6138
SE +/- 0.86, N = 3
130.90
2 x Xeon Gold 6138
SE +/- 4.12, N = 3
194.57
Xeon Platinum 8280
SE +/- 3.43, N = 3
225.17
2 x Xeon Platinum 8280
SE +/- 19.55, N = 3
396.27
200
400
600
800
1000

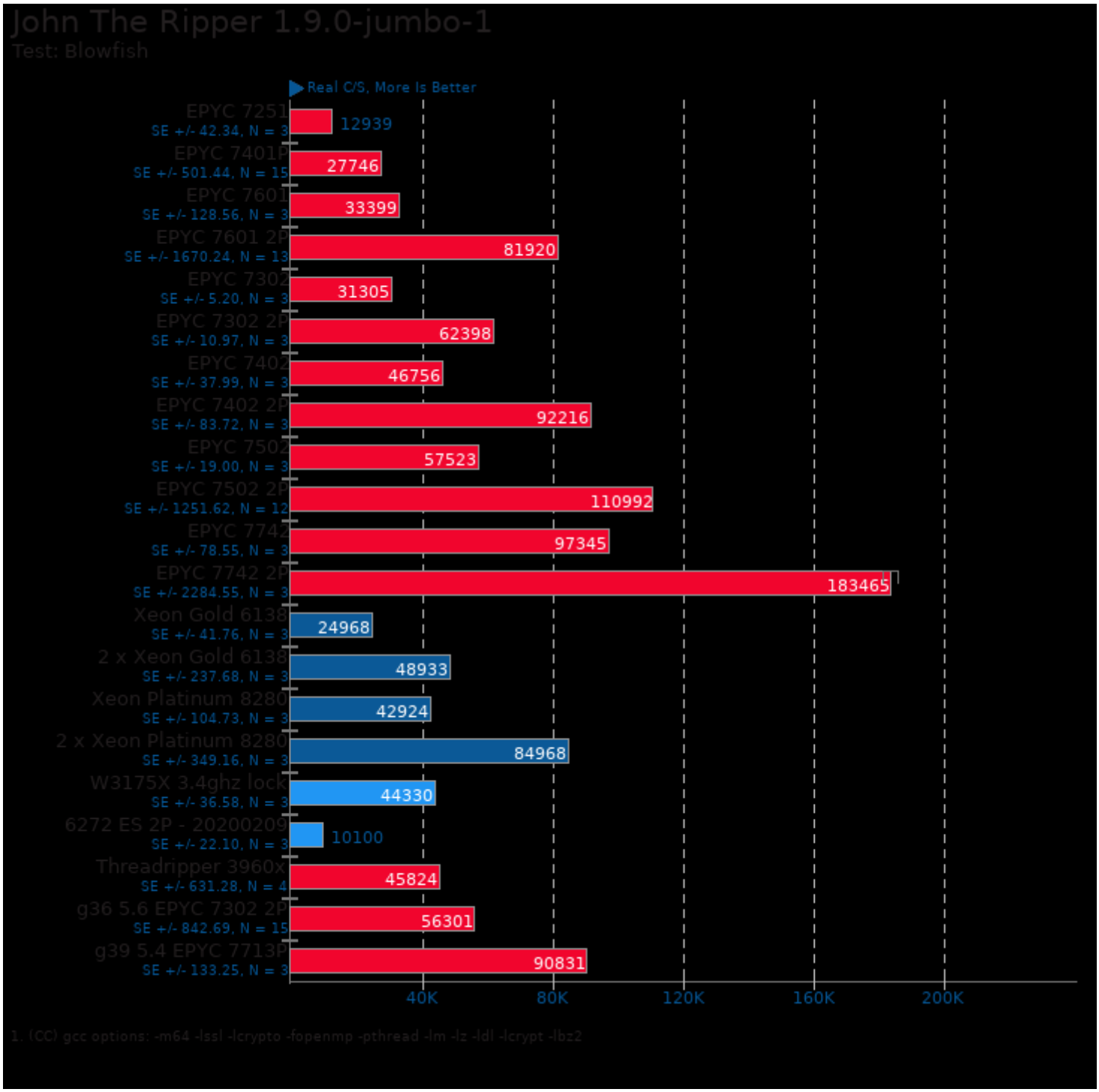

Geekbench 5.0
Test: CPU Single Core
Score, More Is Better
EPYC 7251
SE +/- 1.67, N = 3
770
EPYC 7401P
SE +/- 1.67, N = 3
820
EPYC 7601
SE +/- 1.53, N = 3
869
EPYC 7601 2P
SE +/- 0.58, N = 3
873
EPYC 7302
SE +/- 3.84, N = 3
1005
EPYC 7302 2P
SE +/- 3.18, N = 3
991
EPYC 7402
SE +/- 2.08, N = 3
1026
EPYC 7402 2P
SE +/- 4.33, N = 3
1006
EPYC 7502
SE +/- 0.67, N = 3
1026
EPYC 7502 2P
SE +/- 2.60, N = 3
999
EPYC 7742
SE +/- 2.73, N = 3
1041
EPYC 7742 2P
1033
Xeon Gold 6138
SE +/- 0.33, N = 3
1073
2 x Xeon Gold 6138
1046
Xeon Platinum 8280
1143
2 x Xeon Platinum 8280
SE +/- 0.33, N = 3
1135
200
400
600
800
1000

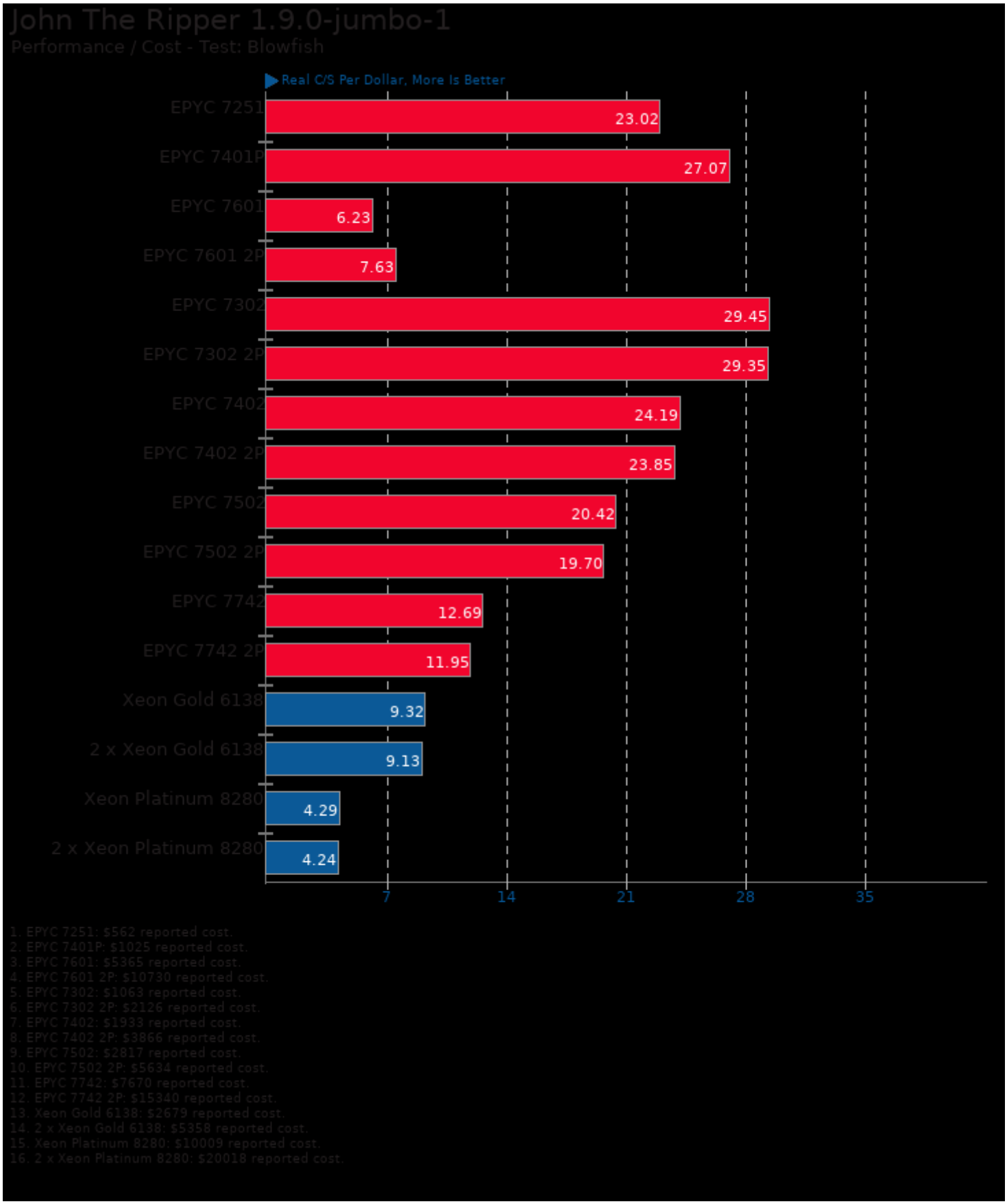

Geekbench 5.0
Test: CPU Single Core - Gaussian Blur
Mpixels/sec, More Is Better
EPYC 7251
SE +/- 0.09, N = 3
55.27
EPYC 7401P
SE +/- 0.07, N = 3
56.63
EPYC 7601
SE +/- 0.07, N = 3
60.53
EPYC 7601 2P
SE +/- 0.15, N = 3
60.97
EPYC 7302
SE +/- 0.09, N = 3
63.17
EPYC 7302 2P
SE +/- 0.17, N = 3
62.60
EPYC 7402
SE +/- 0.20, N = 3
64.33
EPYC 7402 2P
SE +/- 0.22, N = 3
63.47
EPYC 7502
SE +/- 0.25, N = 3
64.40
EPYC 7502 2P
SE +/- 0.07, N = 3
63.73
EPYC 7742
SE +/- 0.23, N = 3
65.67
EPYC 7742 2P
SE +/- 0.09, N = 3
64.43
Xeon Gold 6138
SE +/- 0.00, N = 3
40.80
2 x Xeon Gold 6138
SE +/- 0.03, N = 3
40.03
Xeon Platinum 8280
SE +/- 0.24, N = 3
42.53
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
42.13
15
30
45
60
75

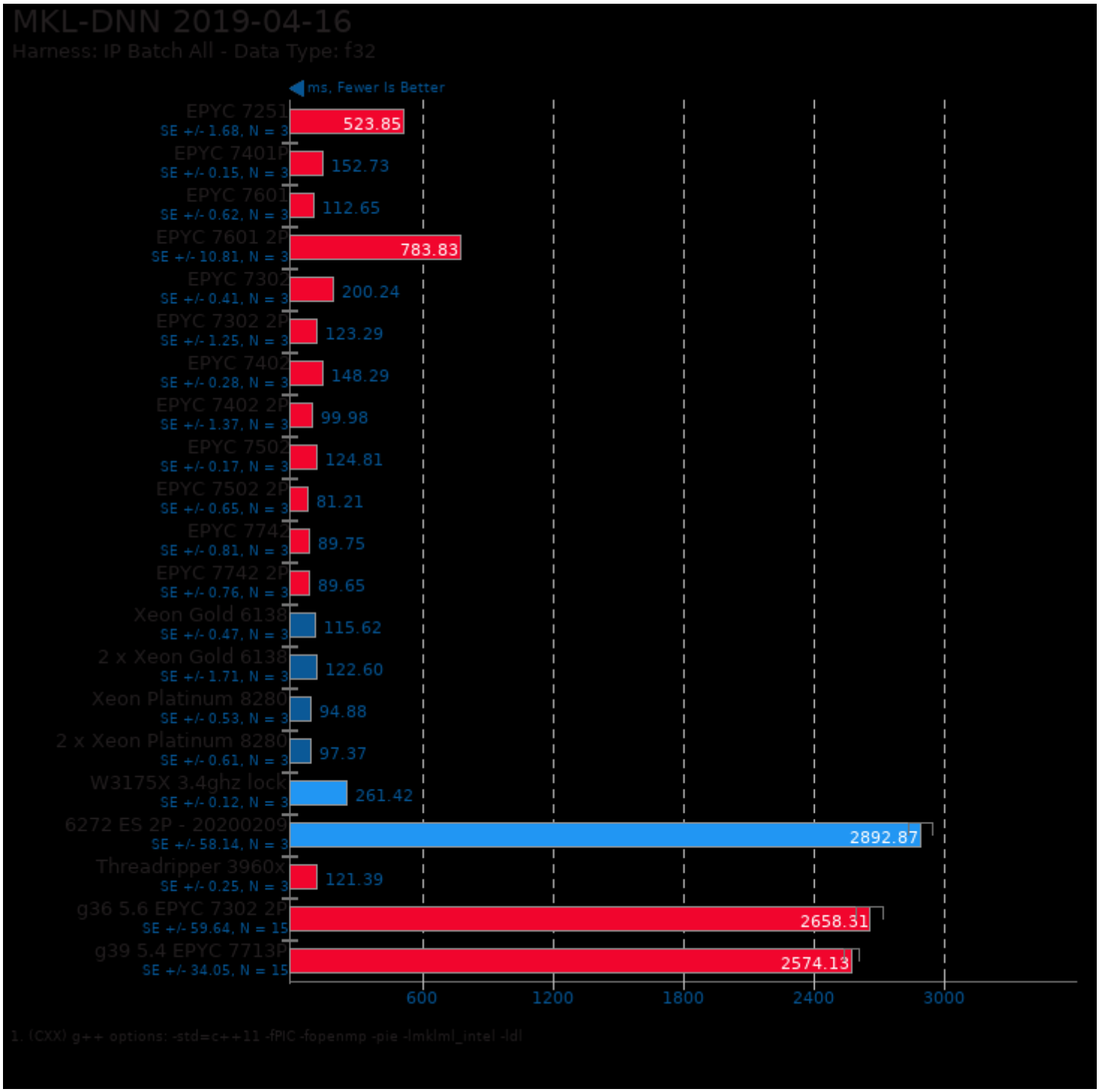

Geekbench 5.0
Test: CPU Single Core - Face Detection
images/sec, More Is Better
EPYC 7251
SE +/- 0.01, N = 3
6.04
EPYC 7401P
SE +/- 0.01, N = 3
6.25
EPYC 7601
SE +/- 0.00, N = 3
6.68
EPYC 7601 2P
SE +/- 0.00, N = 3
6.68
EPYC 7302
SE +/- 0.01, N = 3
8.18
EPYC 7302 2P
SE +/- 0.00, N = 3
8.19
EPYC 7402
SE +/- 0.01, N = 3
8.31
EPYC 7402 2P
SE +/- 0.00, N = 3
8.28
EPYC 7502
SE +/- 0.01, N = 3
8.31
EPYC 7502 2P
SE +/- 0.00, N = 3
8.31
EPYC 7742
SE +/- 0.00, N = 3
8.45
EPYC 7742 2P
SE +/- 0.01, N = 3
8.28
Xeon Gold 6138
SE +/- 0.01, N = 3
7.70
2 x Xeon Gold 6138
SE +/- 0.01, N = 3
7.70
Xeon Platinum 8280
SE +/- 0.02, N = 3
8.33
2 x Xeon Platinum 8280
SE +/- 0.02, N = 3
8.31
2
4
6
8
10

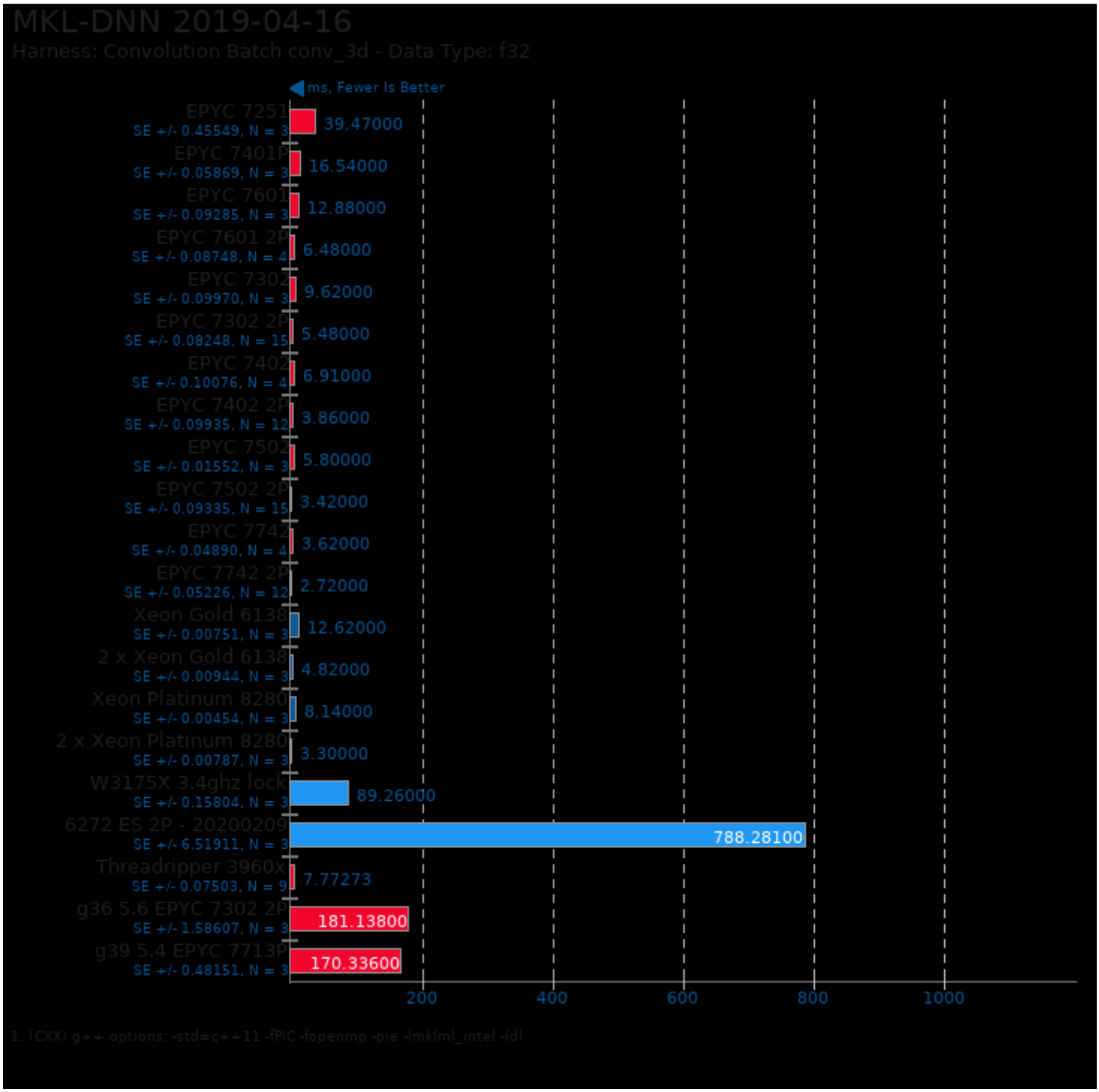

Geekbench 5.0
Test: CPU Single Core - Horizon Detection
Gpixels/sec, More Is Better
EPYC 7251
SE +/- 1.11, N = 3
17.70
EPYC 7401P
SE +/- 0.79, N = 3
18.03
EPYC 7601
SE +/- 0.43, N = 3
18.77
EPYC 7601 2P
SE +/- 0.23, N = 3
18.40
EPYC 7302
SE +/- 0.00, N = 3
23.50
EPYC 7302 2P
SE +/- 0.03, N = 3
22.83
EPYC 7402
SE +/- 0.15, N = 3
23.80
EPYC 7402 2P
SE +/- 0.15, N = 3
23.10
EPYC 7502
SE +/- 0.07, N = 3
23.83
EPYC 7502 2P
SE +/- 0.10, N = 3
23.30
EPYC 7742
SE +/- 0.00, N = 3
24.10
EPYC 7742 2P
24.00
Xeon Gold 6138
SE +/- 0.03, N = 3
23.53
2 x Xeon Gold 6138
SE +/- 0.00, N = 3
23.10
Xeon Platinum 8280
SE +/- 0.00, N = 3
25.40
2 x Xeon Platinum 8280
SE +/- 0.06, N = 3
25.10
6
12
18
24
30

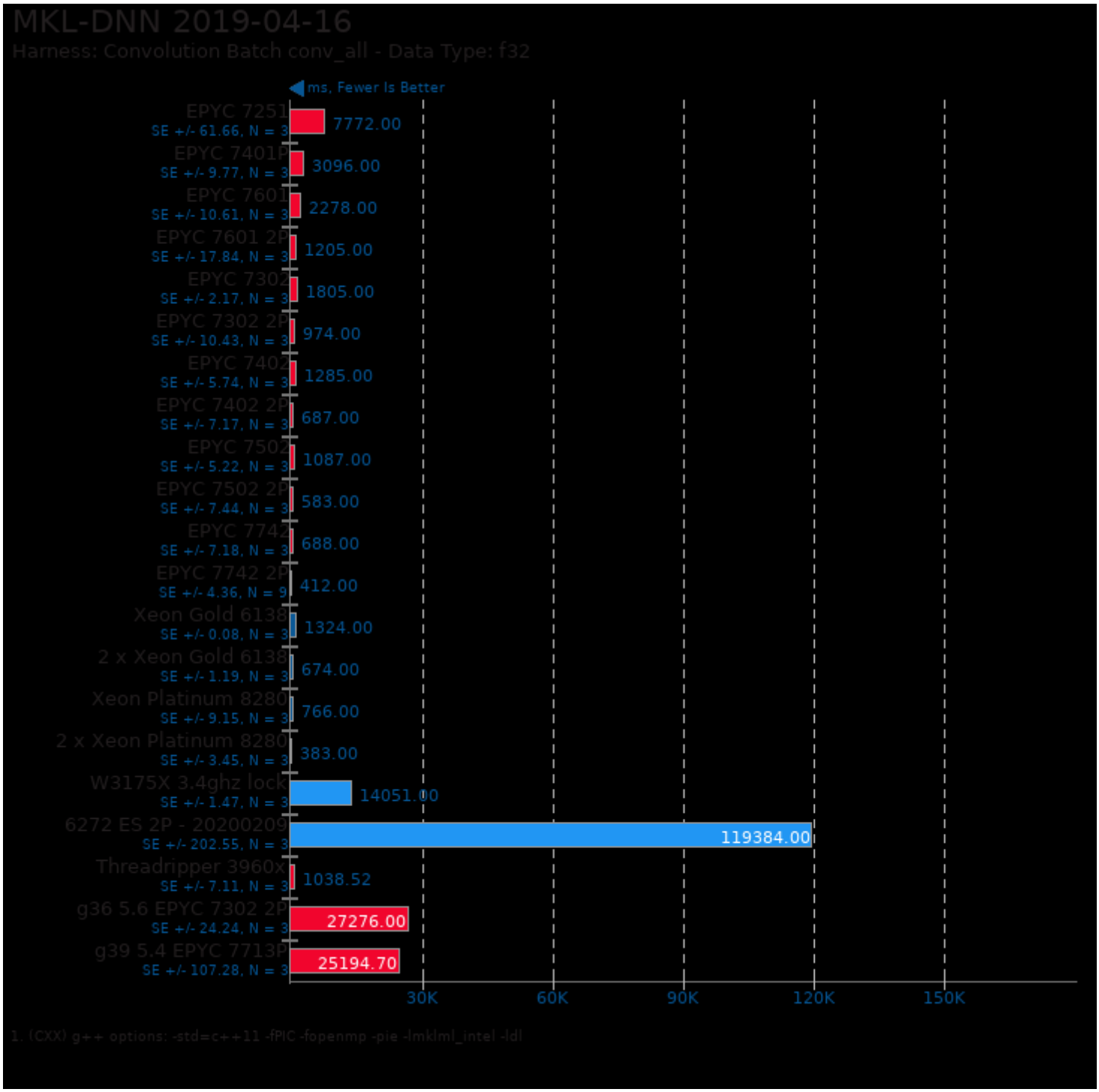

Geekbench 5.0
Performance / Cost - Test: CPU Multi Core
Score Per Dollar, More Is Better
EPYC 7251
11.69
EPYC 7401P
14.22
EPYC 7601
3.32
EPYC 7601 2P
2.65
EPYC 7302
16.29
EPYC 7302 2P
13.56
EPYC 7402
12.16
EPYC 7402 2P
9.69
EPYC 7502
9.74
EPYC 7502 2P
7.71
EPYC 7742
5.48
EPYC 7742 2P
3.85
Xeon Gold 6138
5.37
2 x Xeon Gold 6138
3.66
Xeon Platinum 8280
2.37
2 x Xeon Platinum 8280
1.81
4
8
12
16
20
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

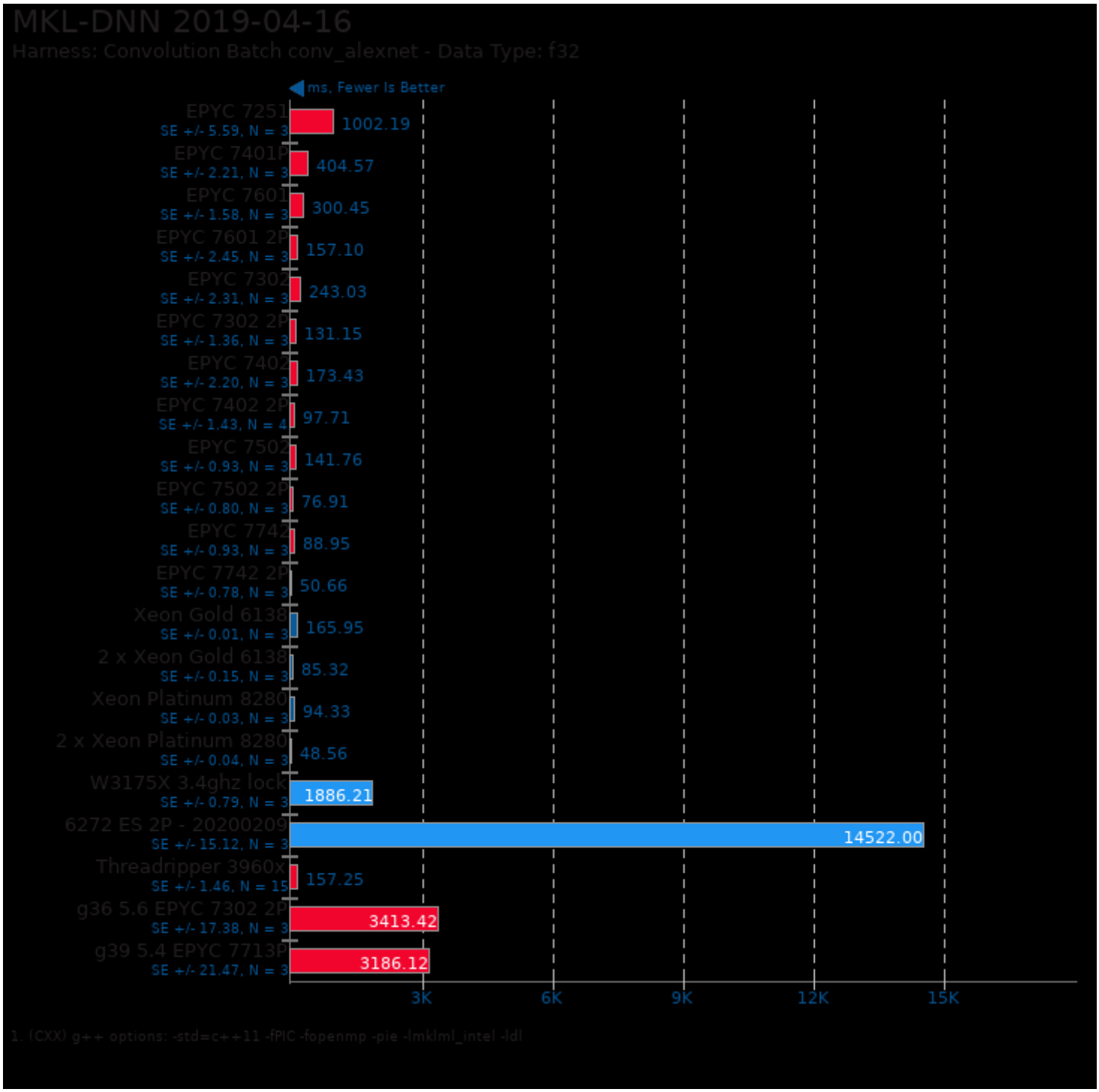

John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
EPYC 7251
SE +/- 42.34, N = 3
12939
EPYC 7401P
SE +/- 501.44, N = 15
27746
EPYC 7601
SE +/- 128.56, N = 3
33399
EPYC 7601 2P
SE +/- 1670.24, N = 13
81920
EPYC 7302
SE +/- 5.20, N = 3
31305
EPYC 7302 2P
SE +/- 10.97, N = 3
62398
EPYC 7402
SE +/- 37.99, N = 3
46756
EPYC 7402 2P
SE +/- 83.72, N = 3
92216
EPYC 7502
SE +/- 19.00, N = 3
57523
EPYC 7502 2P
SE +/- 1251.62, N = 12
110992
EPYC 7742
SE +/- 78.55, N = 3
97345
EPYC 7742 2P
SE +/- 2284.55, N = 3
183465
Xeon Gold 6138
SE +/- 41.76, N = 3
24968
2 x Xeon Gold 6138
SE +/- 237.68, N = 3
48933
Xeon Platinum 8280
SE +/- 104.73, N = 3
42924
2 x Xeon Platinum 8280
SE +/- 349.16, N = 3
84968
W3175X 3.4ghz lock
SE +/- 36.58, N = 3
44330
6272 ES 2P - 20200209
SE +/- 22.10, N = 3
10100
Threadripper 3960X
SE +/- 631.28, N = 4
45824
g36 5.6 EPYC 7302 2P
SE +/- 842.69, N = 15
56301
g39 5.4 EPYC 7713P
SE +/- 133.25, N = 3
90831
40K
80K
120K
160K
200K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -pthread -lm -lz -ldl -lcrypt -lbz2

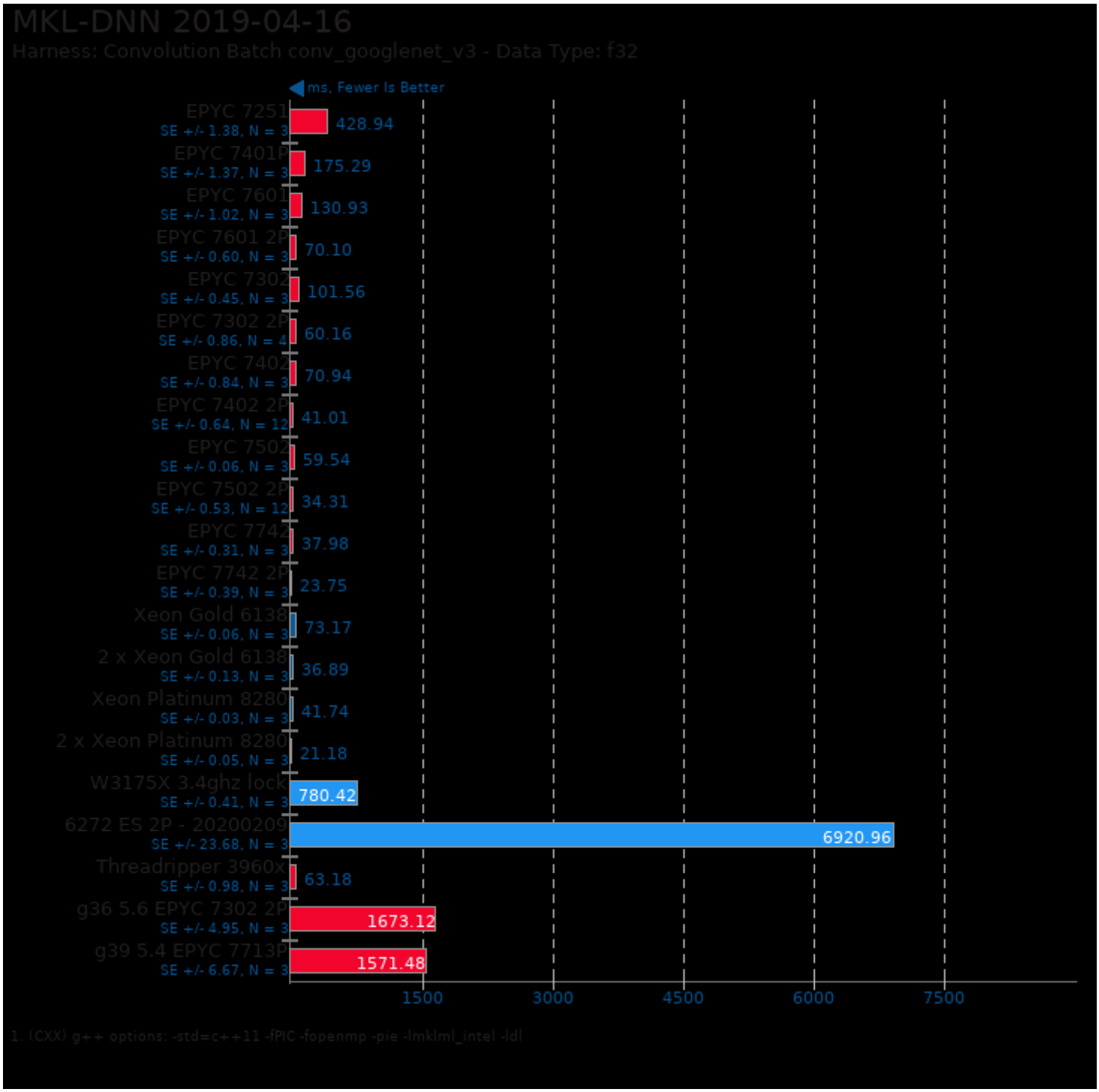

John The Ripper 1.9.0-jumbo-1
Performance / Cost - Test: Blowfish
Real C/S Per Dollar, More Is Better
EPYC 7251
23.02
EPYC 7401P
27.07
EPYC 7601
6.23
EPYC 7601 2P
7.63
EPYC 7302
29.45
EPYC 7302 2P
29.35
EPYC 7402
24.19
EPYC 7402 2P
23.85
EPYC 7502
20.42
EPYC 7502 2P
19.70
EPYC 7742
12.69
EPYC 7742 2P
11.95
Xeon Gold 6138
9.32
2 x Xeon Gold 6138
9.13
Xeon Platinum 8280
4.29
2 x Xeon Platinum 8280
4.24
7
14
21
28
35
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

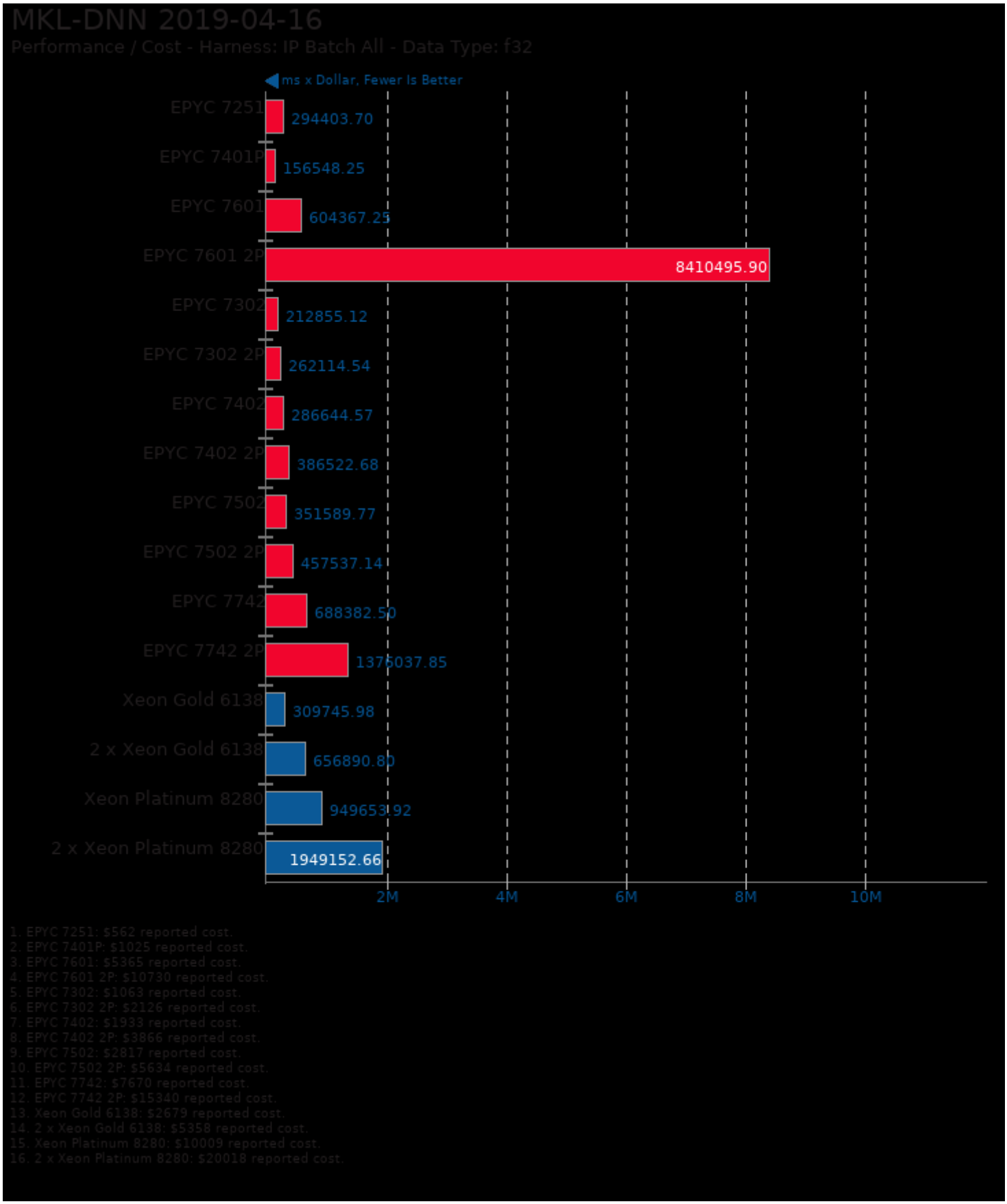

MKL-DNN 2019-04-16
Harness: IP Batch All - Data Type: f32
ms, Fewer Is Better
EPYC 7251
SE +/- 1.68, N = 3
523.85
EPYC 7401P
SE +/- 0.15, N = 3
152.73
EPYC 7601
SE +/- 0.62, N = 3
112.65
EPYC 7601 2P
SE +/- 10.81, N = 3
783.83
EPYC 7302
SE +/- 0.41, N = 3
200.24
EPYC 7302 2P
SE +/- 1.25, N = 3
123.29
EPYC 7402
SE +/- 0.28, N = 3
148.29
EPYC 7402 2P
SE +/- 1.37, N = 3
99.98
EPYC 7502
SE +/- 0.17, N = 3
124.81
EPYC 7502 2P
SE +/- 0.65, N = 3
81.21
EPYC 7742
SE +/- 0.81, N = 3
89.75
EPYC 7742 2P
SE +/- 0.76, N = 3
89.65
Xeon Gold 6138
SE +/- 0.47, N = 3
115.62
2 x Xeon Gold 6138
SE +/- 1.71, N = 3
122.60
Xeon Platinum 8280
SE +/- 0.53, N = 3
94.88
2 x Xeon Platinum 8280
SE +/- 0.61, N = 3
97.37
W3175X 3.4ghz lock
SE +/- 0.12, N = 3
261.42
6272 ES 2P - 20200209
SE +/- 58.14, N = 3
2892.87
Threadripper 3960X
SE +/- 0.25, N = 3
121.39
g36 5.6 EPYC 7302 2P
SE +/- 59.64, N = 15
2658.31
g39 5.4 EPYC 7713P
SE +/- 34.05, N = 15
2574.13
600
1200
1800
2400
3000
1. (CXX) g++ options: -std=c++11 -fPIC -fopenmp -pie -lmklml_intel -ldl

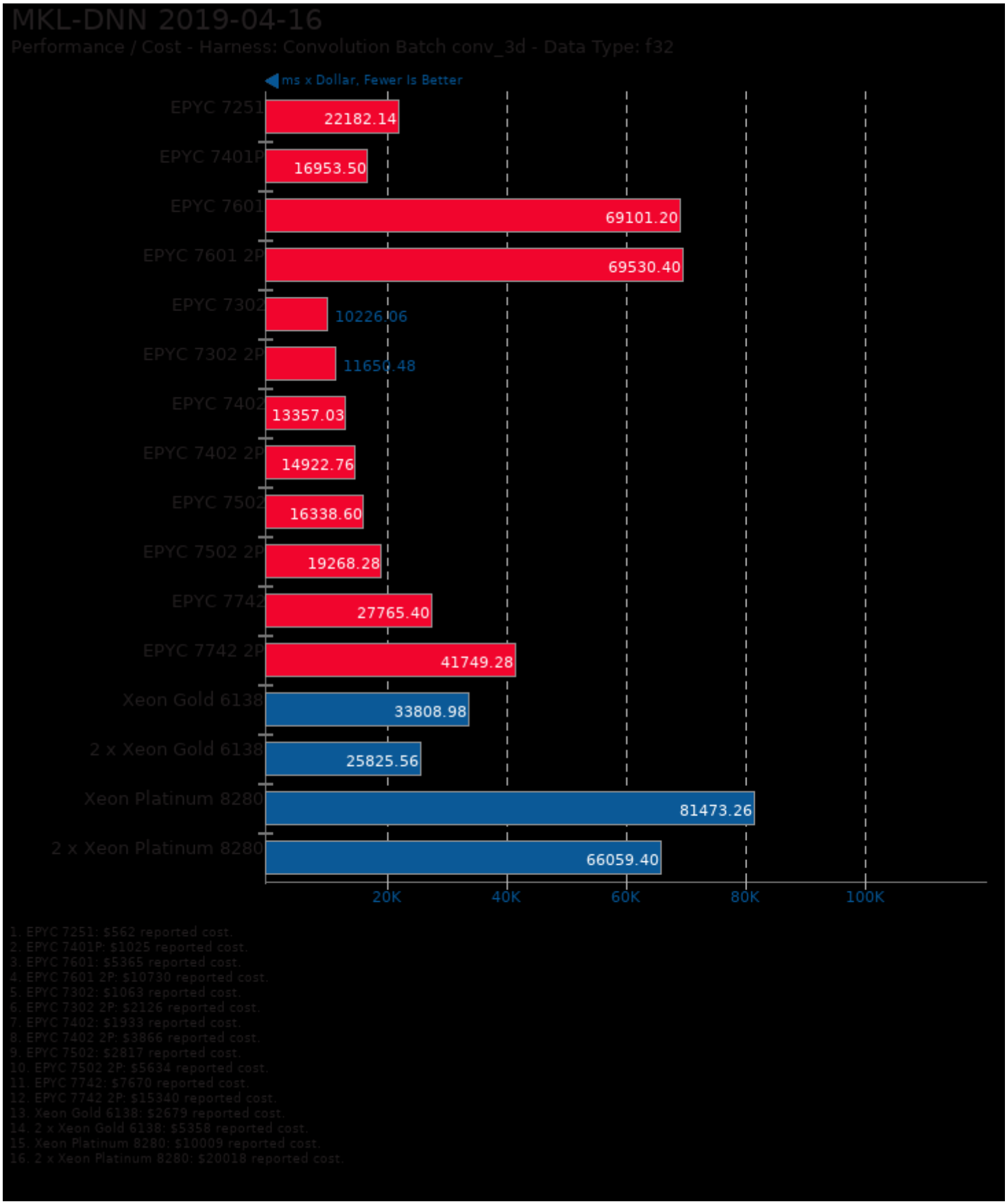

MKL-DNN 2019-04-16
Harness: Convolution Batch conv_3d - Data Type: f32
ms, Fewer Is Better
EPYC 7251
SE +/- 0.45549, N = 3
39.47000
EPYC 7401P
SE +/- 0.05869, N = 3
16.54000
EPYC 7601
SE +/- 0.09285, N = 3
12.88000
EPYC 7601 2P
SE +/- 0.08748, N = 4
6.48000
EPYC 7302
SE +/- 0.09970, N = 3
9.62000
EPYC 7302 2P
SE +/- 0.08248, N = 15
5.48000
EPYC 7402
SE +/- 0.10076, N = 4
6.91000
EPYC 7402 2P
SE +/- 0.09935, N = 12
3.86000
EPYC 7502
SE +/- 0.01552, N = 3
5.80000
EPYC 7502 2P
SE +/- 0.09335, N = 15
3.42000
EPYC 7742
SE +/- 0.04890, N = 4
3.62000
EPYC 7742 2P
SE +/- 0.05226, N = 12
2.72000
Xeon Gold 6138
SE +/- 0.00751, N = 3
12.62000
2 x Xeon Gold 6138
SE +/- 0.00944, N = 3
4.82000
Xeon Platinum 8280
SE +/- 0.00454, N = 3
8.14000
2 x Xeon Platinum 8280
SE +/- 0.00787, N = 3
3.30000
W3175X 3.4ghz lock
SE +/- 0.15804, N = 3
89.26000
6272 ES 2P - 20200209
SE +/- 6.51911, N = 3
788.28100
Threadripper 3960X
SE +/- 0.07503, N = 9
7.77273
g36 5.6 EPYC 7302 2P
SE +/- 1.58607, N = 3
181.13800
g39 5.4 EPYC 7713P
SE +/- 0.48151, N = 3
170.33600
200
400
600
800
1000
1. (CXX) g++ options: -std=c++11 -fPIC -fopenmp -pie -lmklml_intel -ldl

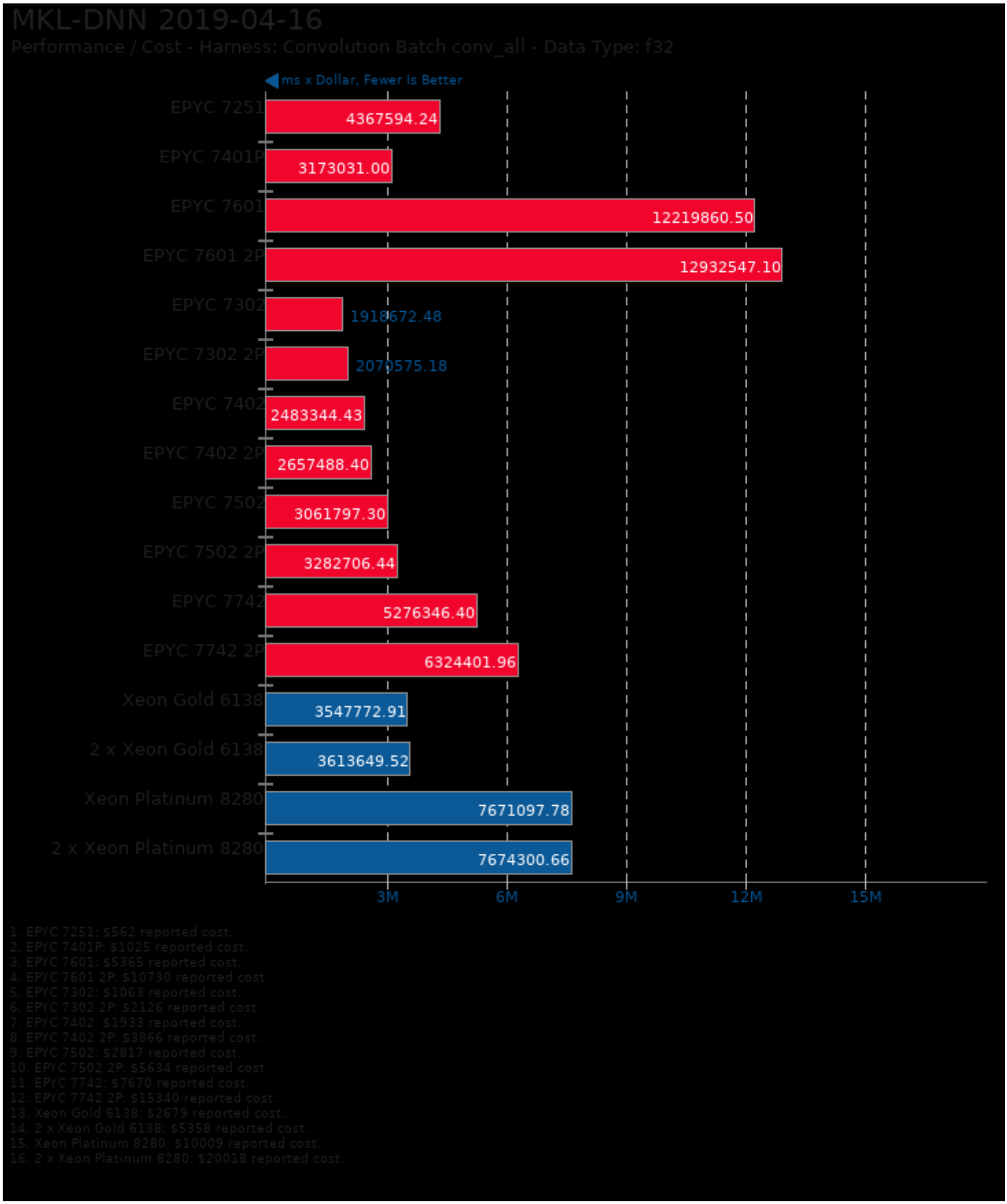

MKL-DNN 2019-04-16
Harness: Convolution Batch conv_all - Data Type: f32
ms, Fewer Is Better
EPYC 7251
SE +/- 61.66, N = 3
7772.00
EPYC 7401P
SE +/- 9.77, N = 3
3096.00
EPYC 7601
SE +/- 10.61, N = 3
2278.00
EPYC 7601 2P
SE +/- 17.84, N = 3
1205.00
EPYC 7302
SE +/- 2.17, N = 3
1805.00
EPYC 7302 2P
SE +/- 10.43, N = 3
974.00
EPYC 7402
SE +/- 5.74, N = 3
1285.00
EPYC 7402 2P
SE +/- 7.17, N = 3
687.00
EPYC 7502
SE +/- 5.22, N = 3
1087.00
EPYC 7502 2P
SE +/- 7.44, N = 3
583.00
EPYC 7742
SE +/- 7.18, N = 3
688.00
EPYC 7742 2P
SE +/- 4.36, N = 9
412.00
Xeon Gold 6138
SE +/- 0.08, N = 3
1324.00
2 x Xeon Gold 6138
SE +/- 1.19, N = 3
674.00
Xeon Platinum 8280
SE +/- 9.15, N = 3
766.00
2 x Xeon Platinum 8280
SE +/- 3.45, N = 3
383.00
W3175X 3.4ghz lock
SE +/- 1.47, N = 3
14051.00
6272 ES 2P - 20200209
SE +/- 202.55, N = 3
119384.00
Threadripper 3960X
SE +/- 7.11, N = 3
1038.52
g36 5.6 EPYC 7302 2P
SE +/- 24.24, N = 3
27276.00
g39 5.4 EPYC 7713P
SE +/- 107.28, N = 3
25194.70
30K
60K
90K
120K
150K
1. (CXX) g++ options: -std=c++11 -fPIC -fopenmp -pie -lmklml_intel -ldl

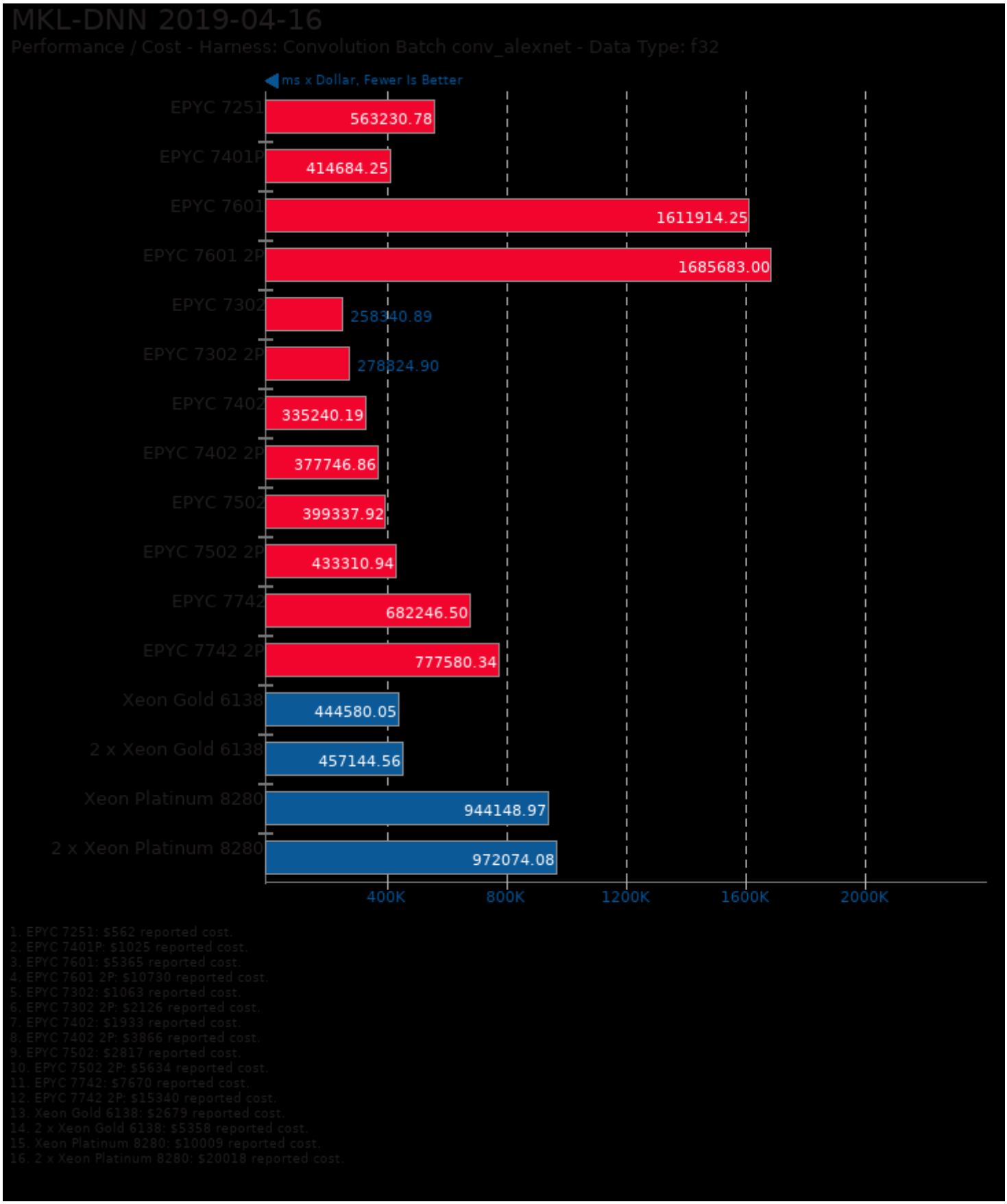

MKL-DNN 2019-04-16
Harness: Convolution Batch conv_alexnet - Data Type: f32
ms, Fewer Is Better
EPYC 7251
SE +/- 5.59, N = 3
1002.19
EPYC 7401P
SE +/- 2.21, N = 3
404.57
EPYC 7601
SE +/- 1.58, N = 3
300.45
EPYC 7601 2P
SE +/- 2.45, N = 3
157.10
EPYC 7302
SE +/- 2.31, N = 3
243.03
EPYC 7302 2P
SE +/- 1.36, N = 3
131.15
EPYC 7402
SE +/- 2.20, N = 3
173.43
EPYC 7402 2P
SE +/- 1.43, N = 4
97.71
EPYC 7502
SE +/- 0.93, N = 3
141.76
EPYC 7502 2P
SE +/- 0.80, N = 3
76.91
EPYC 7742
SE +/- 0.93, N = 3
88.95
EPYC 7742 2P
SE +/- 0.78, N = 3
50.66
Xeon Gold 6138
SE +/- 0.01, N = 3
165.95
2 x Xeon Gold 6138
SE +/- 0.15, N = 3
85.32
Xeon Platinum 8280
SE +/- 0.03, N = 3
94.33
2 x Xeon Platinum 8280
SE +/- 0.04, N = 3
48.56
W3175X 3.4ghz lock
SE +/- 0.79, N = 3
1886.21
6272 ES 2P - 20200209
SE +/- 15.12, N = 3
14522.00
Threadripper 3960X
SE +/- 1.46, N = 15
157.25
g36 5.6 EPYC 7302 2P
SE +/- 17.38, N = 3
3413.42
g39 5.4 EPYC 7713P
SE +/- 21.47, N = 3
3186.12
3K
6K
9K
12K
15K
1. (CXX) g++ options: -std=c++11 -fPIC -fopenmp -pie -lmklml_intel -ldl

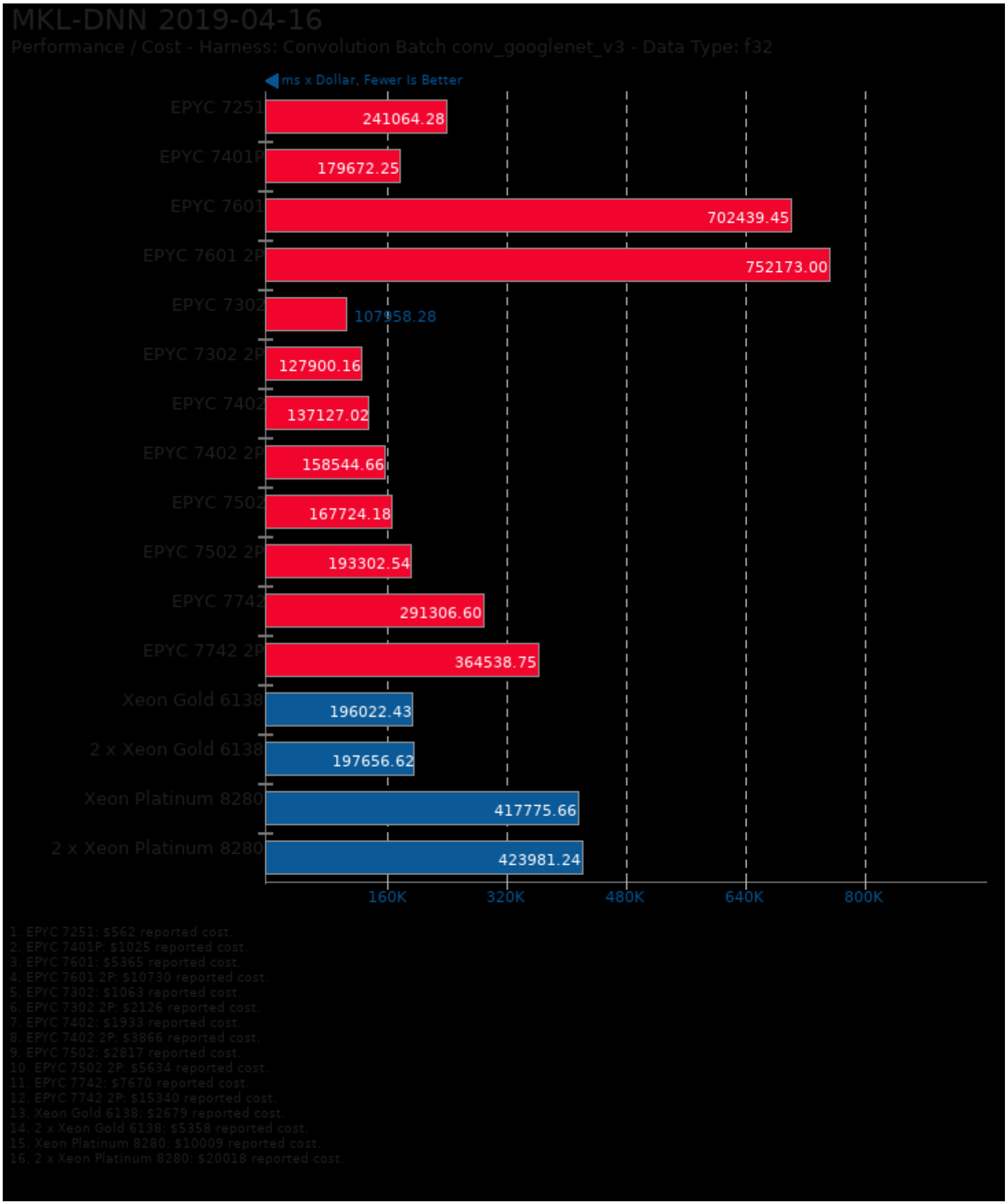

MKL-DNN 2019-04-16
Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32
ms, Fewer Is Better
EPYC 7251
SE +/- 1.38, N = 3
428.94
EPYC 7401P
SE +/- 1.37, N = 3
175.29
EPYC 7601
SE +/- 1.02, N = 3
130.93
EPYC 7601 2P
SE +/- 0.60, N = 3
70.10
EPYC 7302
SE +/- 0.45, N = 3
101.56
EPYC 7302 2P
SE +/- 0.86, N = 4
60.16
EPYC 7402
SE +/- 0.84, N = 3
70.94
EPYC 7402 2P
SE +/- 0.64, N = 12
41.01
EPYC 7502
SE +/- 0.06, N = 3
59.54
EPYC 7502 2P
SE +/- 0.53, N = 12
34.31
EPYC 7742
SE +/- 0.31, N = 3
37.98
EPYC 7742 2P
SE +/- 0.39, N = 3
23.75
Xeon Gold 6138
SE +/- 0.06, N = 3
73.17
2 x Xeon Gold 6138
SE +/- 0.13, N = 3
36.89
Xeon Platinum 8280
SE +/- 0.03, N = 3
41.74
2 x Xeon Platinum 8280
SE +/- 0.05, N = 3
21.18
W3175X 3.4ghz lock
SE +/- 0.41, N = 3
780.42
6272 ES 2P - 20200209
SE +/- 23.68, N = 3
6920.96
Threadripper 3960X
SE +/- 0.98, N = 3
63.18
g36 5.6 EPYC 7302 2P
SE +/- 4.95, N = 3
1673.12
g39 5.4 EPYC 7713P
SE +/- 6.67, N = 3
1571.48
1500
3000
4500
6000
7500
1. (CXX) g++ options: -std=c++11 -fPIC -fopenmp -pie -lmklml_intel -ldl

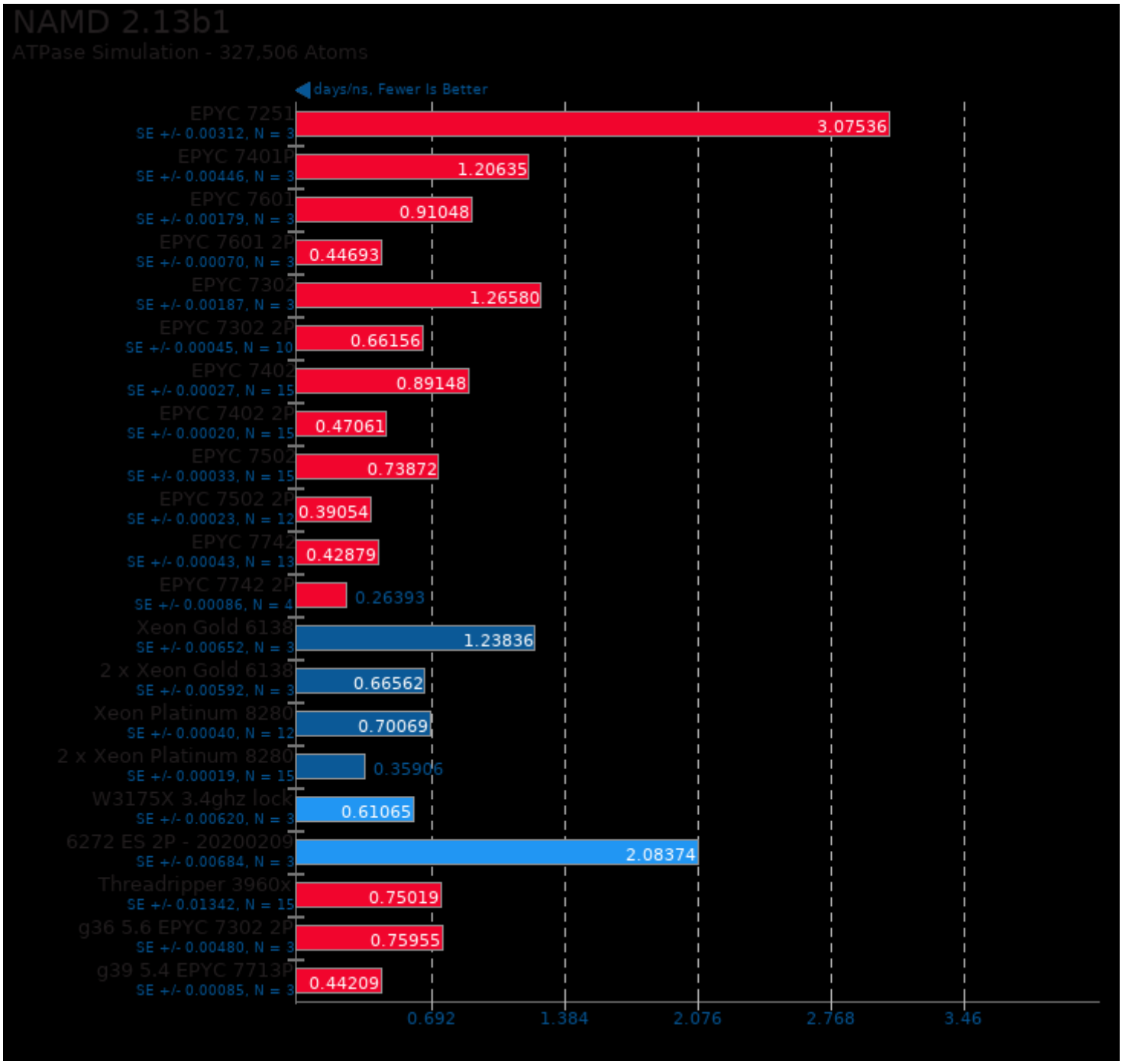

MKL-DNN 2019-04-16
Performance / Cost - Harness: IP Batch All - Data Type: f32
ms x Dollar, Fewer Is Better
EPYC 7251
294403.70
EPYC 7401P
156548.25
EPYC 7601
604367.25
EPYC 7601 2P
8410495.90
EPYC 7302
212855.12
EPYC 7302 2P
262114.54
EPYC 7402
286644.57
EPYC 7402 2P
386522.68
EPYC 7502
351589.77
EPYC 7502 2P
457537.14
EPYC 7742
688382.50
EPYC 7742 2P
1376037.85
Xeon Gold 6138
309745.98
2 x Xeon Gold 6138
656890.80
Xeon Platinum 8280
949653.92
2 x Xeon Platinum 8280
1949152.66
2M
4M
6M
8M
10M
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

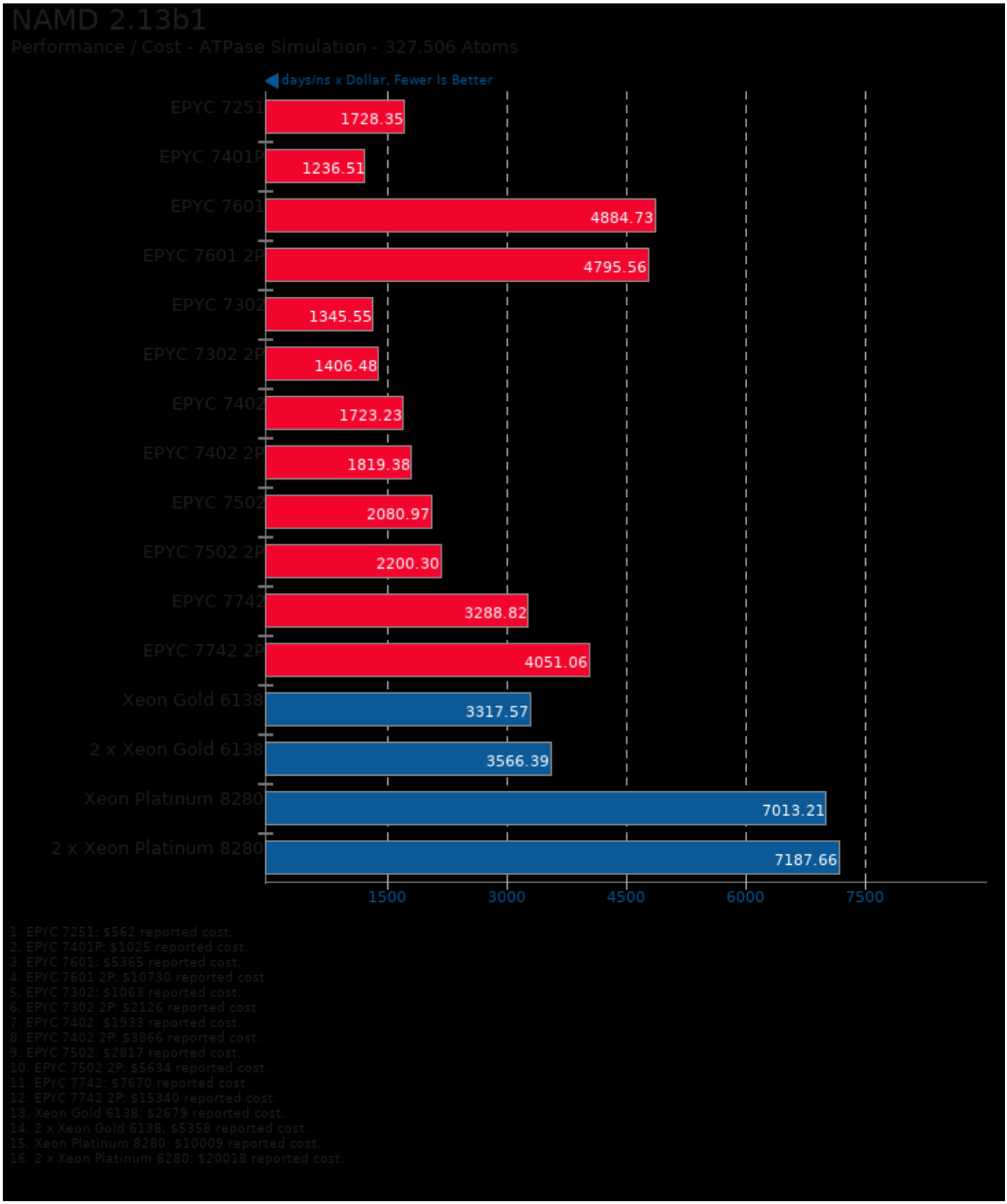

MKL-DNN 2019-04-16
Performance / Cost - Harness: Convolution Batch conv_3d - Data Type: f32
ms x Dollar, Fewer Is Better
EPYC 7251
22182.14
EPYC 7401P
16953.50
EPYC 7601
69101.20
EPYC 7601 2P
69530.40
EPYC 7302
10226.06
EPYC 7302 2P
11650.48
EPYC 7402
13357.03
EPYC 7402 2P
14922.76
EPYC 7502
16338.60
EPYC 7502 2P
19268.28
EPYC 7742
27765.40
EPYC 7742 2P
41749.28
Xeon Gold 6138
33808.98
2 x Xeon Gold 6138
25825.56
Xeon Platinum 8280
81473.26
2 x Xeon Platinum 8280
66059.40
20K
40K
60K
80K
100K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

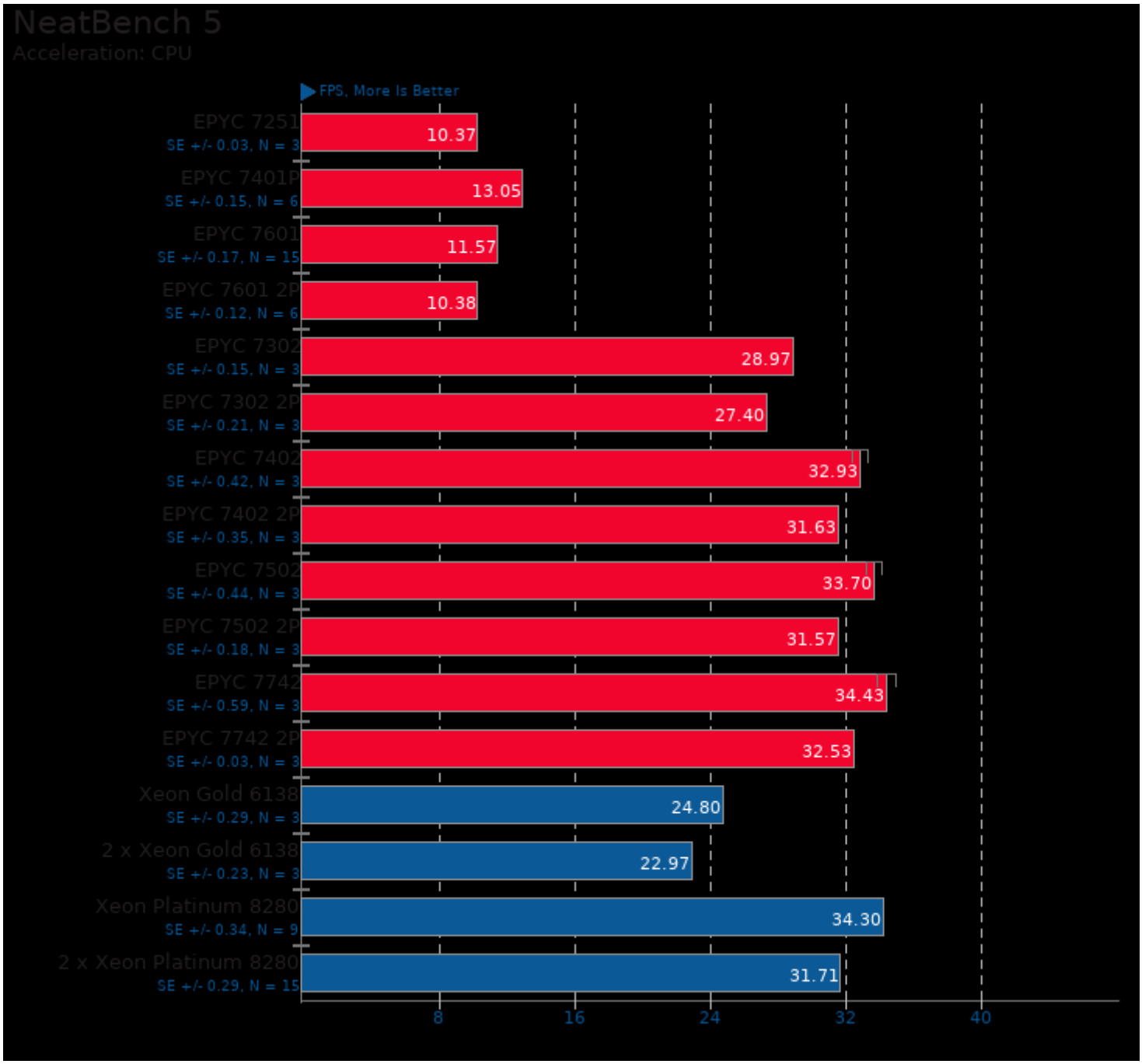

MKL-DNN 2019-04-16
Performance / Cost - Harness: Convolution Batch conv_all - Data Type: f32
ms x Dollar, Fewer Is Better
EPYC 7251
4367594.24
EPYC 7401P
3173031.00
EPYC 7601
12219860.50
EPYC 7601 2P
12932547.10
EPYC 7302
1918672.48
EPYC 7302 2P
2070575.18
EPYC 7402
2483344.43
EPYC 7402 2P
2657488.40
EPYC 7502
3061797.30
EPYC 7502 2P
3282706.44
EPYC 7742
5276346.40
EPYC 7742 2P
6324401.96
Xeon Gold 6138
3547772.91
2 x Xeon Gold 6138
3613649.52
Xeon Platinum 8280
7671097.78
2 x Xeon Platinum 8280
7674300.66
3M
6M
9M
12M
15M
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

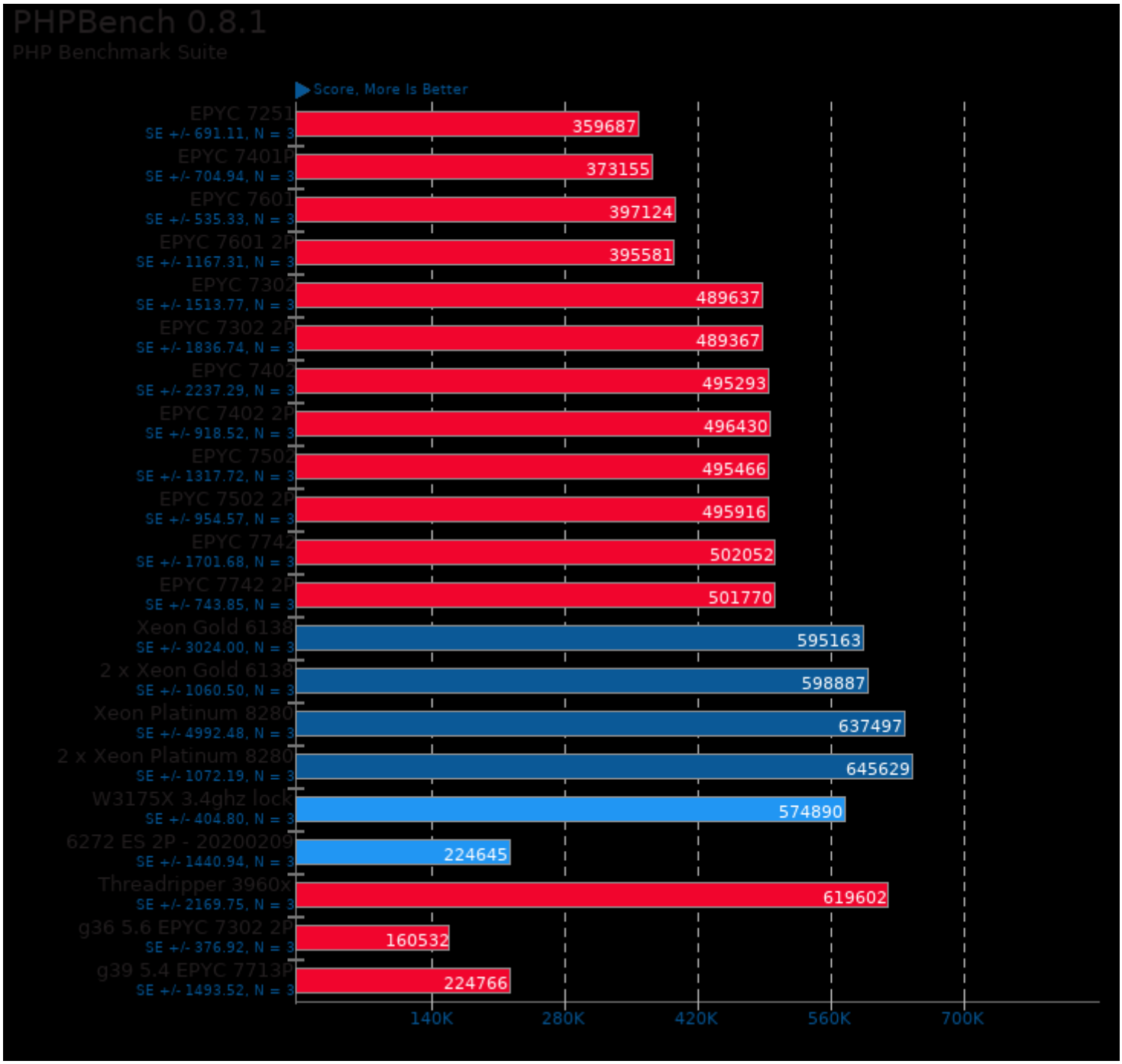

MKL-DNN 2019-04-16
Performance / Cost - Harness: Convolution Batch conv_alexnet - Data Type: f32
ms x Dollar, Fewer Is Better
EPYC 7251
563230.78
EPYC 7401P
414684.25
EPYC 7601
1611914.25
EPYC 7601 2P
1685683.00
EPYC 7302
258340.89
EPYC 7302 2P
278324.90
EPYC 7402
335240.19
EPYC 7402 2P
377746.86
EPYC 7502
399337.92
EPYC 7502 2P
433310.94
EPYC 7742
682246.50
EPYC 7742 2P
777580.34
Xeon Gold 6138
444580.05
2 x Xeon Gold 6138
457144.56
Xeon Platinum 8280
944148.97
2 x Xeon Platinum 8280
972074.08
400K
800K
1200K
1600K
2000K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

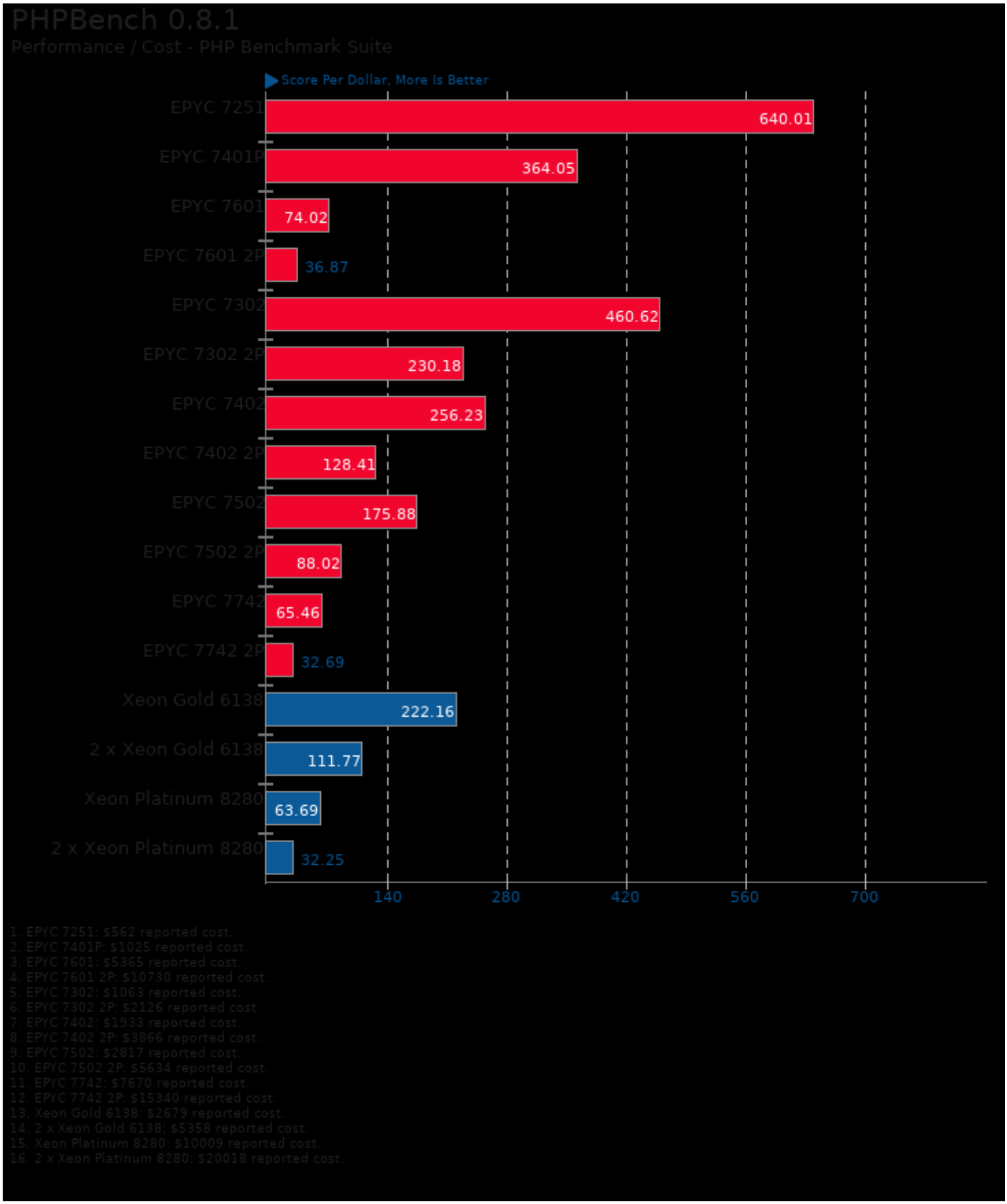

MKL-DNN 2019-04-16
Performance / Cost - Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32
ms x Dollar, Fewer Is Better
EPYC 7251
241064.28
EPYC 7401P
179672.25
EPYC 7601
702439.45
EPYC 7601 2P
752173.00
EPYC 7302
107958.28
EPYC 7302 2P
127900.16
EPYC 7402
137127.02
EPYC 7402 2P
158544.66
EPYC 7502
167724.18
EPYC 7502 2P
193302.54
EPYC 7742
291306.60
EPYC 7742 2P
364538.75
Xeon Gold 6138
196022.43
2 x Xeon Gold 6138
197656.62
Xeon Platinum 8280
417775.66
2 x Xeon Platinum 8280
423981.24
160K
320K
480K
640K
800K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

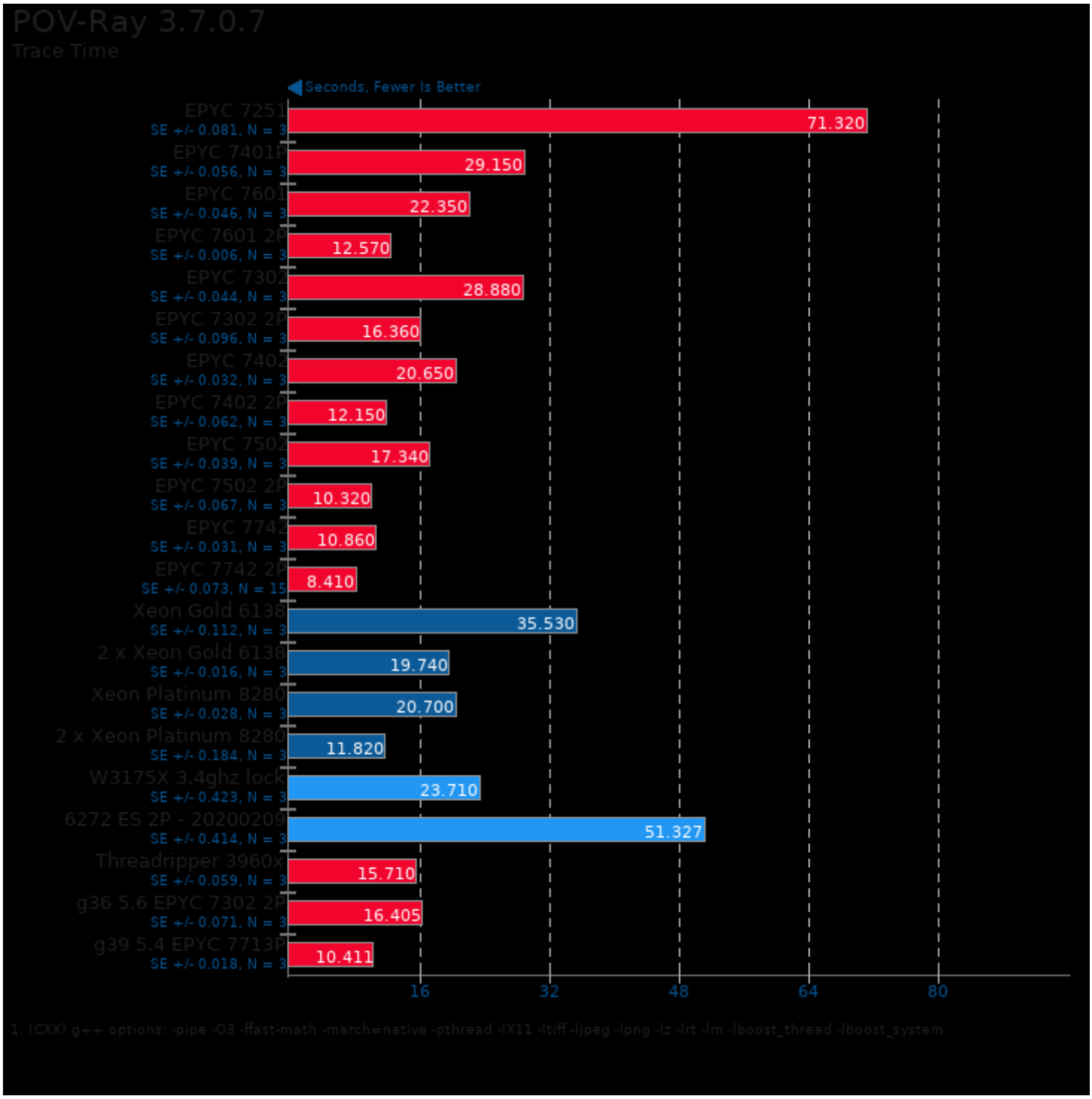

NAMD 2.13b1
ATPase Simulation - 327,506 Atoms
days/ns, Fewer Is Better
EPYC 7251
SE +/- 0.00312, N = 3
3.07536
EPYC 7401P
SE +/- 0.00446, N = 3
1.20635
EPYC 7601
SE +/- 0.00179, N = 3
0.91048
EPYC 7601 2P
SE +/- 0.00070, N = 3
0.44693
EPYC 7302
SE +/- 0.00187, N = 3
1.26580
EPYC 7302 2P
SE +/- 0.00045, N = 10
0.66156
EPYC 7402
SE +/- 0.00027, N = 15
0.89148
EPYC 7402 2P
SE +/- 0.00020, N = 15
0.47061
EPYC 7502
SE +/- 0.00033, N = 15
0.73872
EPYC 7502 2P
SE +/- 0.00023, N = 12
0.39054
EPYC 7742
SE +/- 0.00043, N = 13
0.42879
EPYC 7742 2P
SE +/- 0.00086, N = 4
0.26393
Xeon Gold 6138
SE +/- 0.00652, N = 3
1.23836
2 x Xeon Gold 6138
SE +/- 0.00592, N = 3
0.66562
Xeon Platinum 8280
SE +/- 0.00040, N = 12
0.70069
2 x Xeon Platinum 8280
SE +/- 0.00019, N = 15
0.35906
W3175X 3.4ghz lock
SE +/- 0.00620, N = 3
0.61065
6272 ES 2P - 20200209
SE +/- 0.00684, N = 3
2.08374
Threadripper 3960x
SE +/- 0.01342, N = 15
0.75019
g36 5.6 EPYC 7302 2P
SE +/- 0.00480, N = 3
0.75955
g39 5.4 EPYC 7713P
SE +/- 0.00085, N = 3
0.44209
0.692
1.384
2.076
2.768
3.46

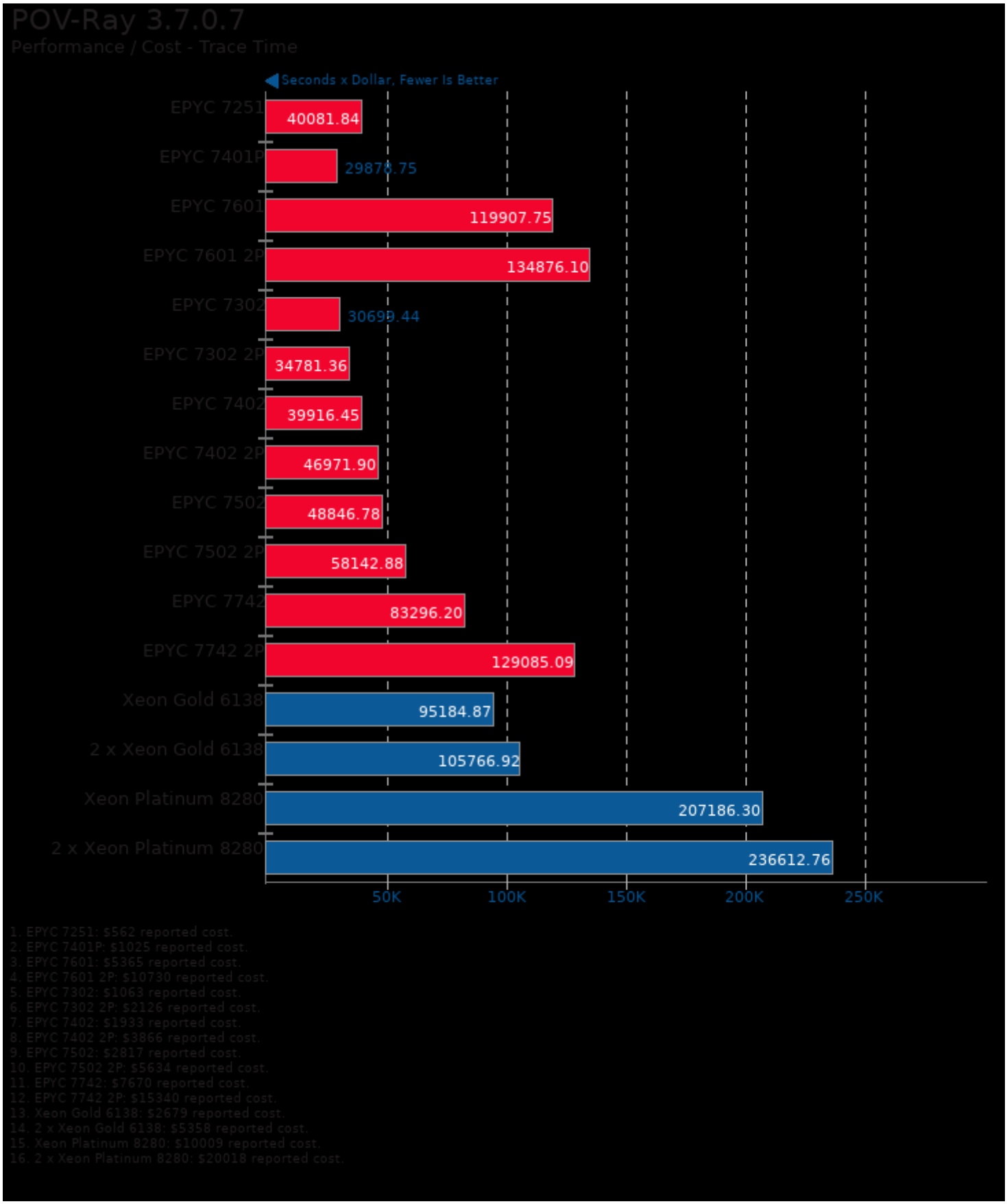

NAMD 2.13b1
Performance / Cost - ATPase Simulation - 327,506 Atoms
days/ns x Dollar, Fewer Is Better
EPYC 7251
1728.35
EPYC 7401P
1236.51
EPYC 7601
4884.73
EPYC 7601 2P
4795.56
EPYC 7302
1345.55
EPYC 7302 2P
1406.48
EPYC 7402
1723.23
EPYC 7402 2P
1819.38
EPYC 7502
2080.97
EPYC 7502 2P
2200.30
EPYC 7742
3288.82
EPYC 7742 2P
4051.06
Xeon Gold 6138
3317.57
2 x Xeon Gold 6138
3566.39
Xeon Platinum 8280
7013.21
2 x Xeon Platinum 8280
7187.66
1500
3000
4500
6000
7500
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
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10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

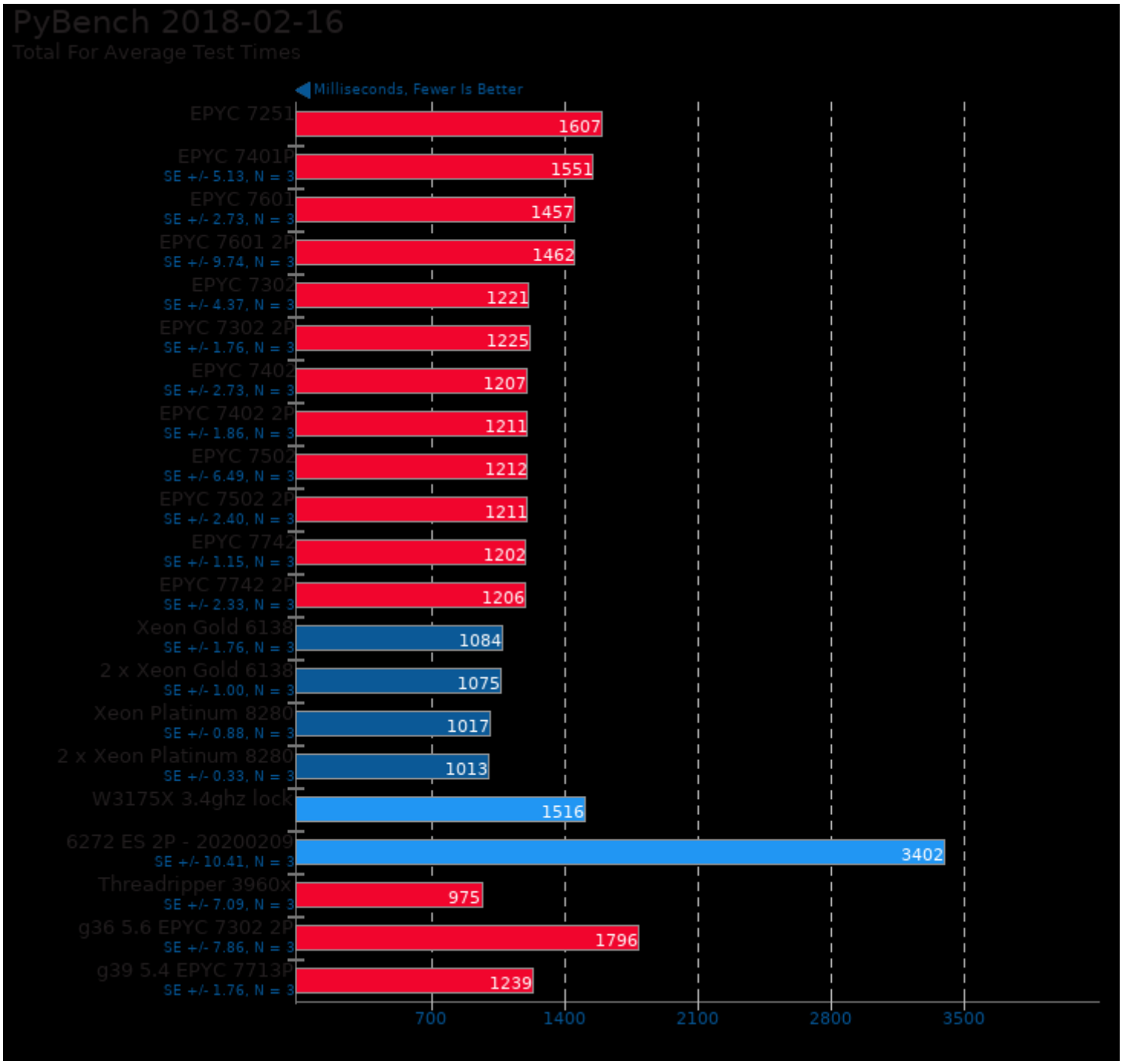

NeatBench 5
Acceleration: CPU
FPS, More Is Better
EPYC 7251
SE +/- 0.03, N = 3
10.37
EPYC 7401P
SE +/- 0.15, N = 6
13.05
EPYC 7601
SE +/- 0.17, N = 15
11.57
EPYC 7601 2P
SE +/- 0.12, N = 6
10.38
EPYC 7302
SE +/- 0.15, N = 3
28.97
EPYC 7302 2P
SE +/- 0.21, N = 3
27.40
EPYC 7402
SE +/- 0.42, N = 3
32.93
EPYC 7402 2P
SE +/- 0.35, N = 3
31.63
EPYC 7502
SE +/- 0.44, N = 3
33.70
EPYC 7502 2P
SE +/- 0.18, N = 3
31.57
EPYC 7742
SE +/- 0.59, N = 3
34.43
EPYC 7742 2P
SE +/- 0.03, N = 3
32.53
Xeon Gold 6138
SE +/- 0.29, N = 3
24.80
2 x Xeon Gold 6138
SE +/- 0.23, N = 3
22.97
Xeon Platinum 8280
SE +/- 0.34, N = 9
34.30
2 x Xeon Platinum 8280
SE +/- 0.29, N = 15
31.71
8
16
24
32
40

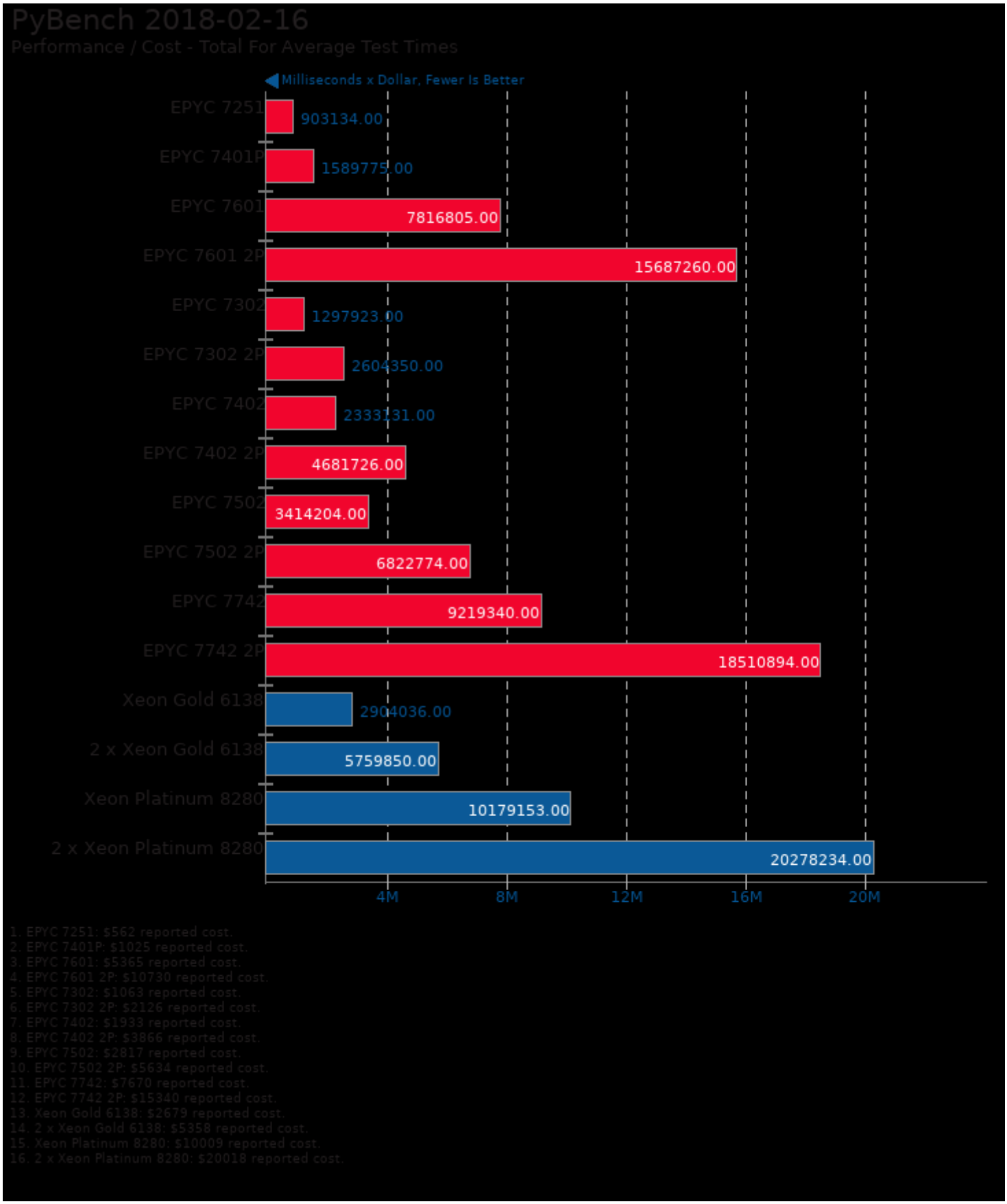

PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
EPYC 7251
SE +/- 691.11, N = 3
359687
EPYC 7401P
SE +/- 704.94, N = 3
373155
EPYC 7601
SE +/- 535.33, N = 3
397124
EPYC 7601 2P
SE +/- 1167.31, N = 3
395581
EPYC 7302
SE +/- 1513.77, N = 3
489637
EPYC 7302 2P
SE +/- 1836.74, N = 3
489367
EPYC 7402
SE +/- 2237.29, N = 3
495293
EPYC 7402 2P
SE +/- 918.52, N = 3
496430
EPYC 7502
SE +/- 1317.72, N = 3
495466
EPYC 7502 2P
SE +/- 954.57, N = 3
495916
EPYC 7742
SE +/- 1701.68, N = 3
502052
EPYC 7742 2P
SE +/- 743.85, N = 3
501770
Xeon Gold 6138
SE +/- 3024.00, N = 3
595163
2 x Xeon Gold 6138
SE +/- 1060.50, N = 3
598887
Xeon Platinum 8280
SE +/- 4992.48, N = 3
637497
2 x Xeon Platinum 8280
SE +/- 1072.19, N = 3
645629
W3175X 3.4ghz lock
SE +/- 404.80, N = 3
574890
6272 ES 2P - 20200209
SE +/- 1440.94, N = 3
224645
Threadripper 3960x
SE +/- 2169.75, N = 3
619602
g36 5.6 EPYC 7302 2P
SE +/- 376.92, N = 3
160532
g39 5.4 EPYC 7713P
SE +/- 1493.52, N = 3
224766
140K
280K
420K
560K
700K

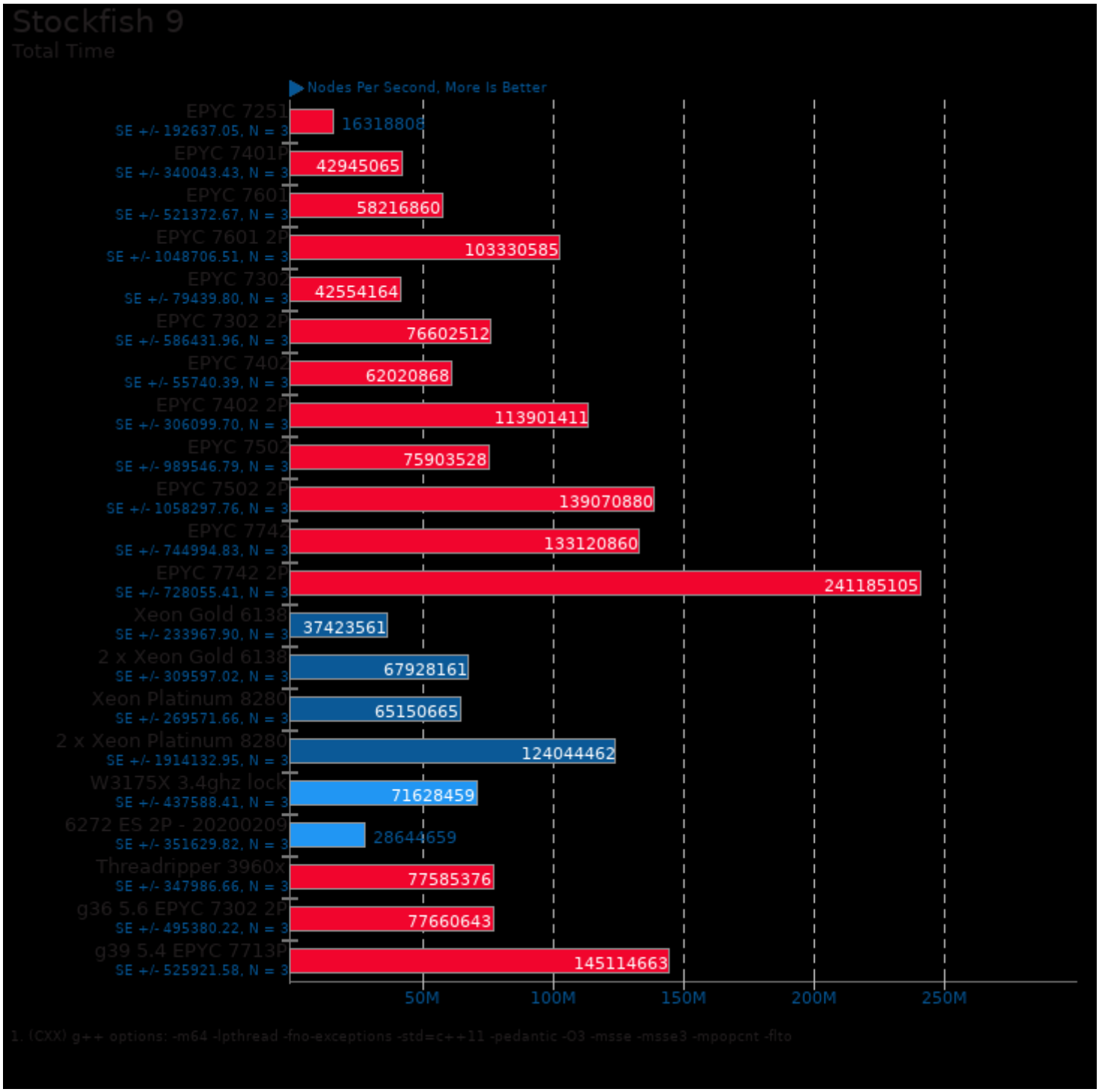

PHPBench 0.8.1
Performance / Cost - PHP Benchmark Suite
Score Per Dollar, More Is Better
EPYC 7251
640.01
EPYC 7401P
364.05
EPYC 7601
74.02
EPYC 7601 2P
36.87
EPYC 7302
460.62
EPYC 7302 2P
230.18
EPYC 7402
256.23
EPYC 7402 2P
128.41
EPYC 7502
175.88
EPYC 7502 2P
88.02
EPYC 7742
65.46
EPYC 7742 2P
32.69
Xeon Gold 6138
222.16
2 x Xeon Gold 6138
111.77
Xeon Platinum 8280
63.69
2 x Xeon Platinum 8280
32.25
140
280
420
560
700
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

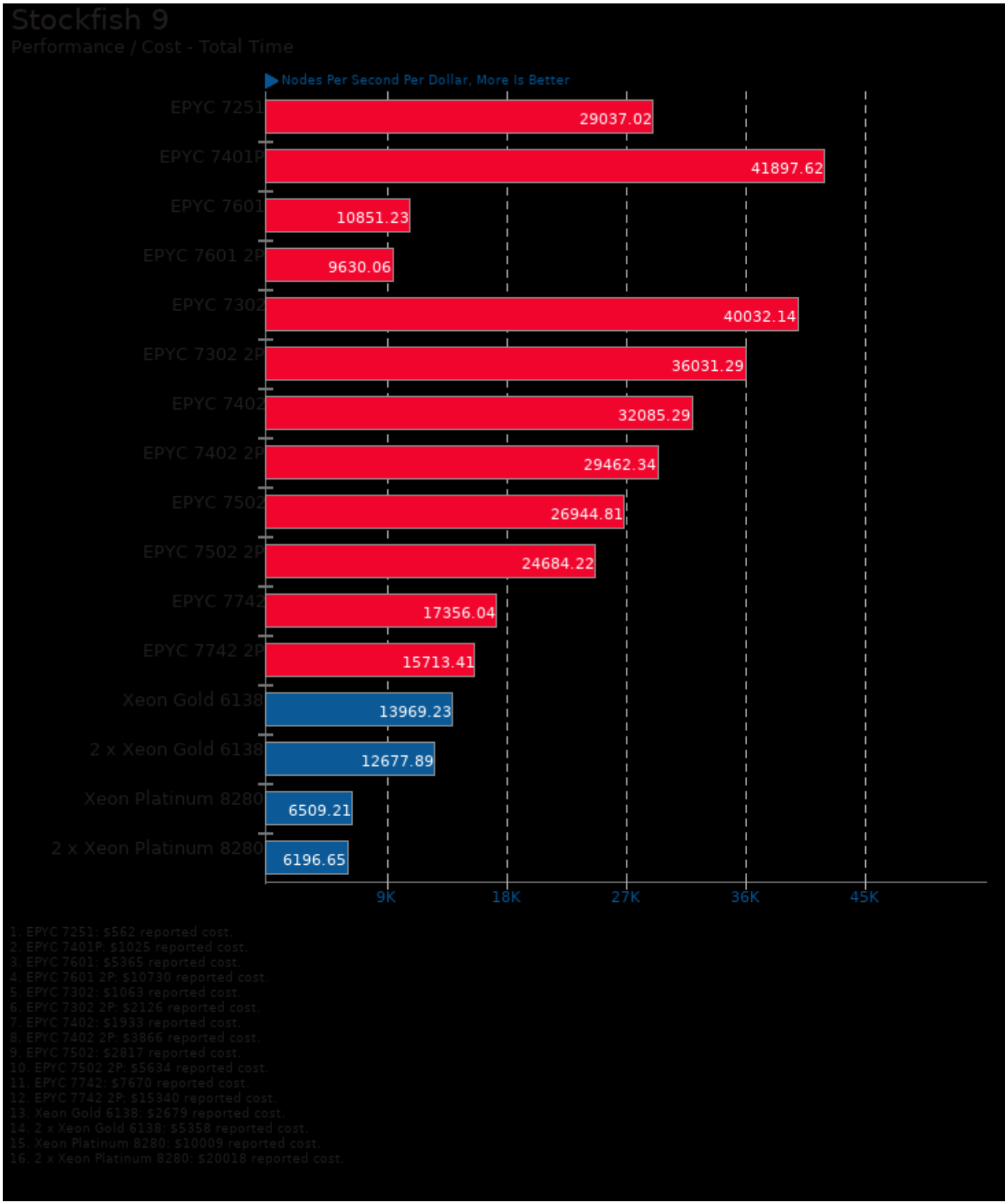

POV-Ray 3.7.0.7
Trace Time
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.081, N = 3
71.320
EPYC 7401P
SE +/- 0.056, N = 3
29.150
EPYC 7601
SE +/- 0.046, N = 3
22.350
EPYC 7601 2P
SE +/- 0.006, N = 3
12.570
EPYC 7302
SE +/- 0.044, N = 3
28.880
EPYC 7302 2P
SE +/- 0.096, N = 3
16.360
EPYC 7402
SE +/- 0.032, N = 3
20.650
EPYC 7402 2P
SE +/- 0.062, N = 3
12.150
EPYC 7502
SE +/- 0.039, N = 3
17.340
EPYC 7502 2P
SE +/- 0.067, N = 3
10.320
EPYC 7742
SE +/- 0.031, N = 3
10.860
EPYC 7742 2P
SE +/- 0.073, N = 15
8.410
Xeon Gold 6138
SE +/- 0.112, N = 3
35.530
2 x Xeon Gold 6138
SE +/- 0.016, N = 3
19.740
Xeon Platinum 8280
SE +/- 0.028, N = 3
20.700
2 x Xeon Platinum 8280
SE +/- 0.184, N = 3
11.820
W3175X 3.4ghz lock
SE +/- 0.423, N = 3
23.710
6272 ES 2P - 20200209
SE +/- 0.414, N = 3
51.327
Threadripper 3960x
SE +/- 0.059, N = 3
15.710
g36 5.6 EPYC 7302 2P
SE +/- 0.071, N = 3
16.405
g39 5.4 EPYC 7713P
SE +/- 0.018, N = 3
10.411
16
32
48
64
80
1. (CXX) g++ options: -pipe -O3 -ffast-math -march=native -pthread -lX11 -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system

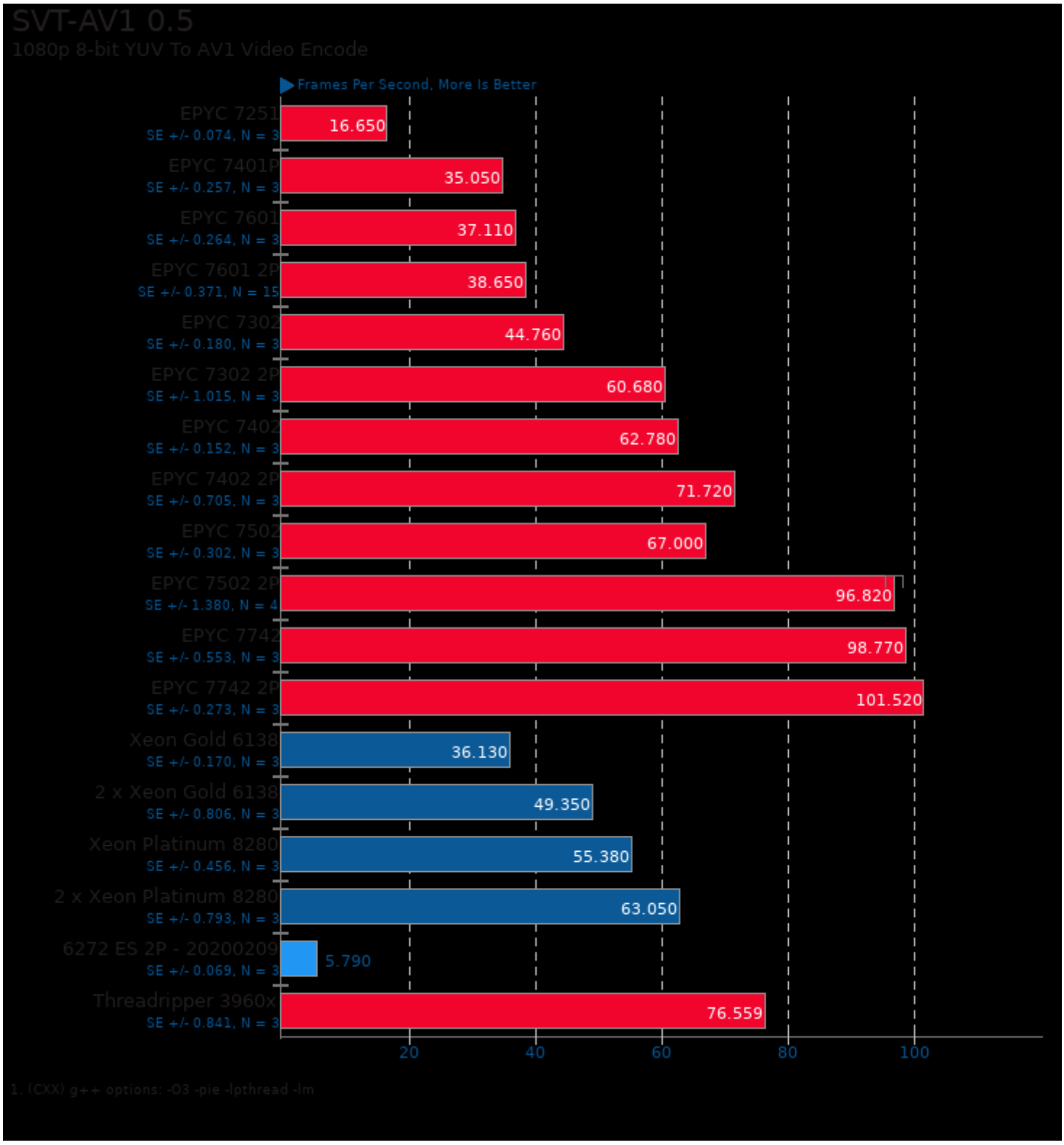

POV-Ray 3.7.0.7
Performance / Cost - Trace Time
Seconds x Dollar, Fewer Is Better
EPYC 7251
40081.84
EPYC 7401P
29878.75
EPYC 7601
119907.75
EPYC 7601 2P
134876.10
EPYC 7302
30699.44
EPYC 7302 2P
34781.36
EPYC 7402
39916.45
EPYC 7402 2P
46971.90
EPYC 7502
48846.78
EPYC 7502 2P
58142.88
EPYC 7742
83296.20
EPYC 7742 2P
129085.09
Xeon Gold 6138
95184.87
2 x Xeon Gold 6138
105766.92
Xeon Platinum 8280
207186.30
2 x Xeon Platinum 8280
236612.76
50K
100K
150K
200K
250K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.


PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
EPYC 7251
1607
EPYC 7401P
SE +/- 5.13, N = 3
1551
EPYC 7601
SE +/- 2.73, N = 3
1457
EPYC 7601 2P
SE +/- 9.74, N = 3
1462
EPYC 7302
SE +/- 4.37, N = 3
1221
EPYC 7302 2P
SE +/- 1.76, N = 3
1225
EPYC 7402
SE +/- 2.73, N = 3
1207
EPYC 7402 2P
SE +/- 1.86, N = 3
1211
EPYC 7502
SE +/- 6.49, N = 3
1212
EPYC 7502 2P
SE +/- 2.40, N = 3
1211
EPYC 7742
SE +/- 1.15, N = 3
1202
EPYC 7742 2P
SE +/- 2.33, N = 3
1206
Xeon Gold 6138
SE +/- 1.76, N = 3
1084
2 x Xeon Gold 6138
SE +/- 1.00, N = 3
1075
Xeon Platinum 8280
SE +/- 0.88, N = 3
1017
2 x Xeon Platinum 8280
SE +/- 0.33, N = 3
1013
W3175X 3.4ghz lock
1516
6272 ES 2P - 20200209
SE +/- 10.41, N = 3
3402
Threadripper 3960x
SE +/- 7.09, N = 3
975
g36 5.6 EPYC 7302 2P
SE +/- 7.86, N = 3
1796
g39 5.4 EPYC 7713P
SE +/- 1.76, N = 3
1239
700
1400
2100
2800
3500


PyBench 2018-02-16
Performance / Cost - Total For Average Test Times
Milliseconds x Dollar, Fewer Is Better
EPYC 7251
903134.00
EPYC 7401P
1589775.00
EPYC 7601
7816805.00
EPYC 7601 2P
15687260.00
EPYC 7302
1297923.00
EPYC 7302 2P
2604350.00
EPYC 7402
2333131.00
EPYC 7402 2P
4681726.00
EPYC 7502
3414204.00
EPYC 7502 2P
6822774.00
EPYC 7742
9219340.00
EPYC 7742 2P
18510894.00
Xeon Gold 6138
2904036.00
2 x Xeon Gold 6138
5759850.00
Xeon Platinum 8280
10179153.00
2 x Xeon Platinum 8280
20278234.00
4M
8M
12M
16M
20M
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

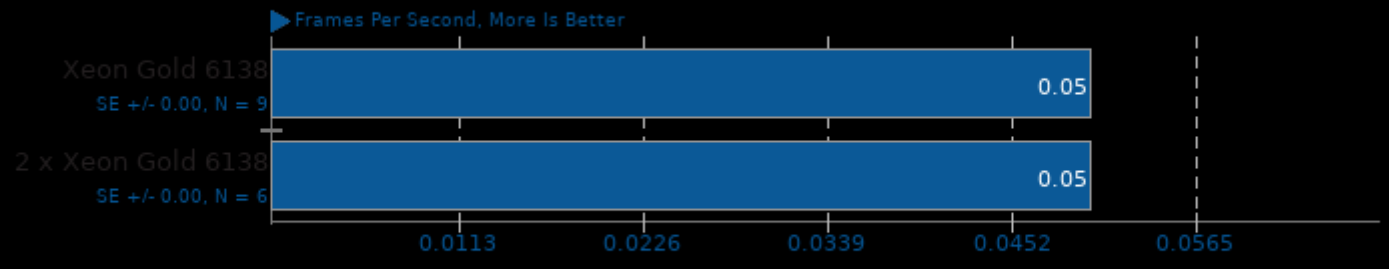

Stockfish 9
Total Time
Nodes Per Second, More Is Better
EPYC 7251
SE +/- 192637.05, N = 3
16318808
EPYC 7401P
SE +/- 340043.43, N = 3
42945065
EPYC 7601
SE +/- 521372.67, N = 3
58216860
EPYC 7601 2P
SE +/- 1048706.51, N = 3
103330585
EPYC 7302
SE +/- 79439.80, N = 3
42554164
EPYC 7302 2P
SE +/- 586431.96, N = 3
76602512
EPYC 7402
SE +/- 55740.39, N = 3
62020868
EPYC 7402 2P
SE +/- 306099.70, N = 3
113901411
EPYC 7502
SE +/- 989546.79, N = 3
75903528
EPYC 7502 2P
SE +/- 1058297.76, N = 3
139070880
EPYC 7742
SE +/- 744994.83, N = 3
133120860
EPYC 7742 2P
SE +/- 728055.41, N = 3
241185105
Xeon Gold 6138
SE +/- 233967.90, N = 3
37423561
2 x Xeon Gold 6138
SE +/- 309597.02, N = 3
67928161
Xeon Platinum 8280
SE +/- 269571.66, N = 3
65150665
2 x Xeon Platinum 8280
SE +/- 1914132.95, N = 3
124044462
W3175X 3.4ghz lock
SE +/- 437588.41, N = 3
71628459
6272 ES 2P - 20200209
SE +/- 351629.82, N = 3
28644659
Threadripper 3960X
SE +/- 347986.66, N = 3
77585376
g36 5.6 EPYC 7302 2P
SE +/- 495380.22, N = 3
77660643
g39 5.4 EPYC 7713P
SE +/- 525921.58, N = 3
145114663
50M
100M
150M
200M
250M
1. (CXX) g++ options: -m64 -lpthread -fno-exceptions -std=c++11 -pedantic -O3 -msse -msse3 -mpopcnt -flto


Stockfish 9
Performance / Cost - Total Time
Nodes Per Second Per Dollar, More Is Better
EPYC 7251
29037.02
EPYC 7401P
41897.62
EPYC 7601
10851.23
EPYC 7601 2P
9630.06
EPYC 7302
40032.14
EPYC 7302 2P
36031.29
EPYC 7402
32085.29
EPYC 7402 2P
29462.34
EPYC 7502
26944.81
EPYC 7502 2P
24684.22
EPYC 7742
17356.04
EPYC 7742 2P
15713.41
Xeon Gold 6138
13969.23
2 x Xeon Gold 6138
12677.89
Xeon Platinum 8280
6509.21
2 x Xeon Platinum 8280
6196.65
9K
18K
27K
36K
45K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.


SVT-AV1 0.5
1080p 8-bit YUV To AV1 Video Encode
Frames Per Second, More Is Better
EPYC 7251
SE +/- 0.074, N = 3
16.650
EPYC 7401P
SE +/- 0.257, N = 3
35.050
EPYC 7601
SE +/- 0.264, N = 3
37.110
EPYC 7601 2P
SE +/- 0.371, N = 15
38.650
EPYC 7302
SE +/- 0.180, N = 3
44.760
EPYC 7302 2P
SE +/- 1.015, N = 3
60.680
EPYC 7402
SE +/- 0.152, N = 3
62.780
EPYC 7402 2P
SE +/- 0.705, N = 3
71.720
EPYC 7502
SE +/- 0.302, N = 3
67.000
EPYC 7502 2P
SE +/- 1.380, N = 4
96.820
EPYC 7742
SE +/- 0.553, N = 3
98.770
EPYC 7742 2P
SE +/- 0.273, N = 3
101.520
Xeon Gold 6138
SE +/- 0.170, N = 3
36.130
2 x Xeon Gold 6138
SE +/- 0.806, N = 3
49.350
Xeon Platinum 8280
SE +/- 0.456, N = 3
55.380
2 x Xeon Platinum 8280
SE +/- 0.793, N = 3
63.050
6272 ES 2P - 20200209
SE +/- 0.069, N = 3
5.790
Threadripper 3960X
SE +/- 0.841, N = 3
76.559
20
40
60
80
100
1. (CXX) g++ options: -O3 -pie -lpthread -lm

SVT-AV1 0.6

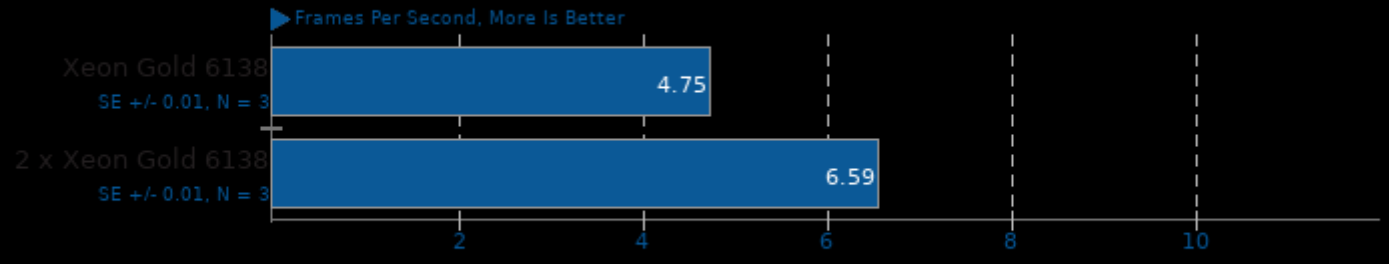
Encoder Mode: Enc Mode 0 - Input: 1080p



1. (CXX) g++ options: -fPIE -fPIC -march=native -pie

SVT-AV1 0.6

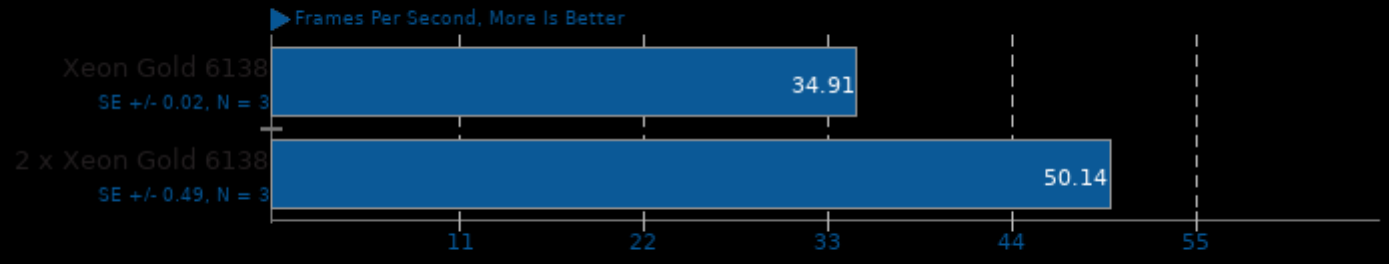
Encoder Mode: Enc Mode 4 - Input: 1080p



1. (CXX) g++ options: -fPIE -fPIC -march=native -pie

SVT-AV1 0.6

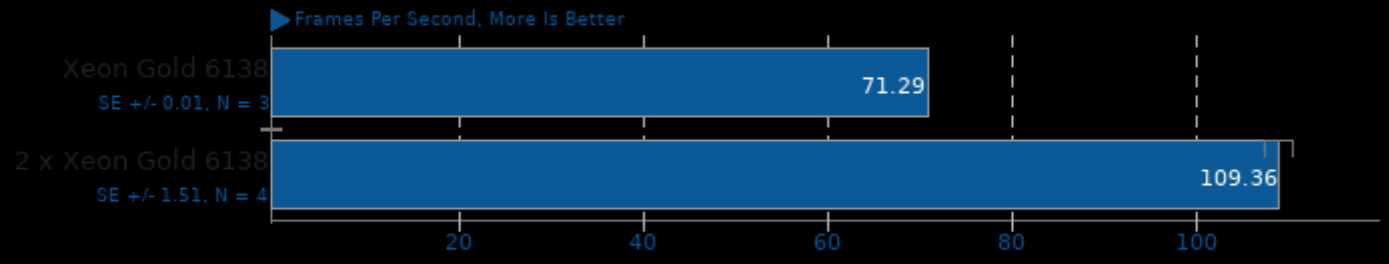
Encoder Mode: Enc Mode 8 - Input: 1080p



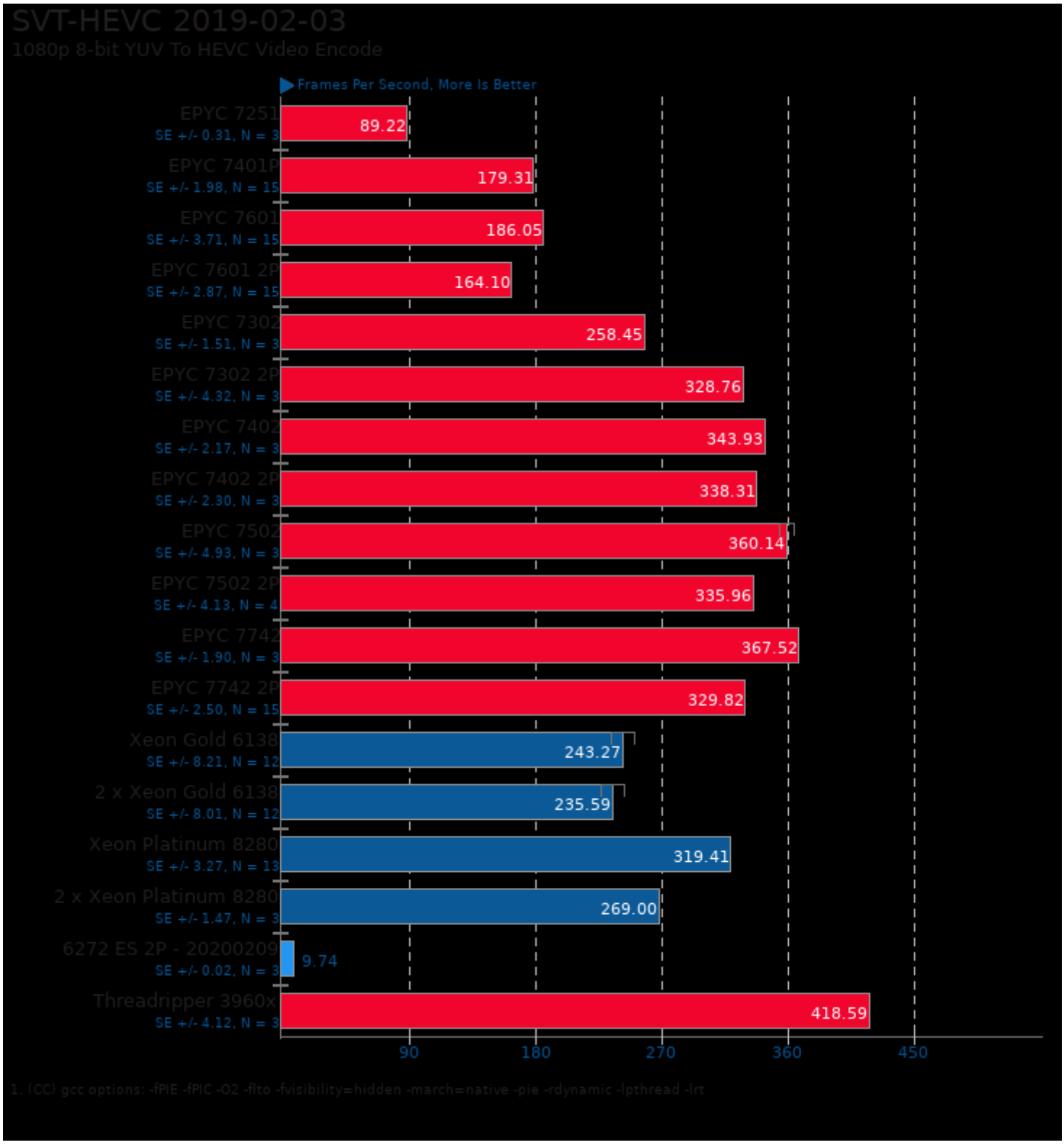
1. (CXX) g++ options: -fPIE -fPIC -march=native -pie

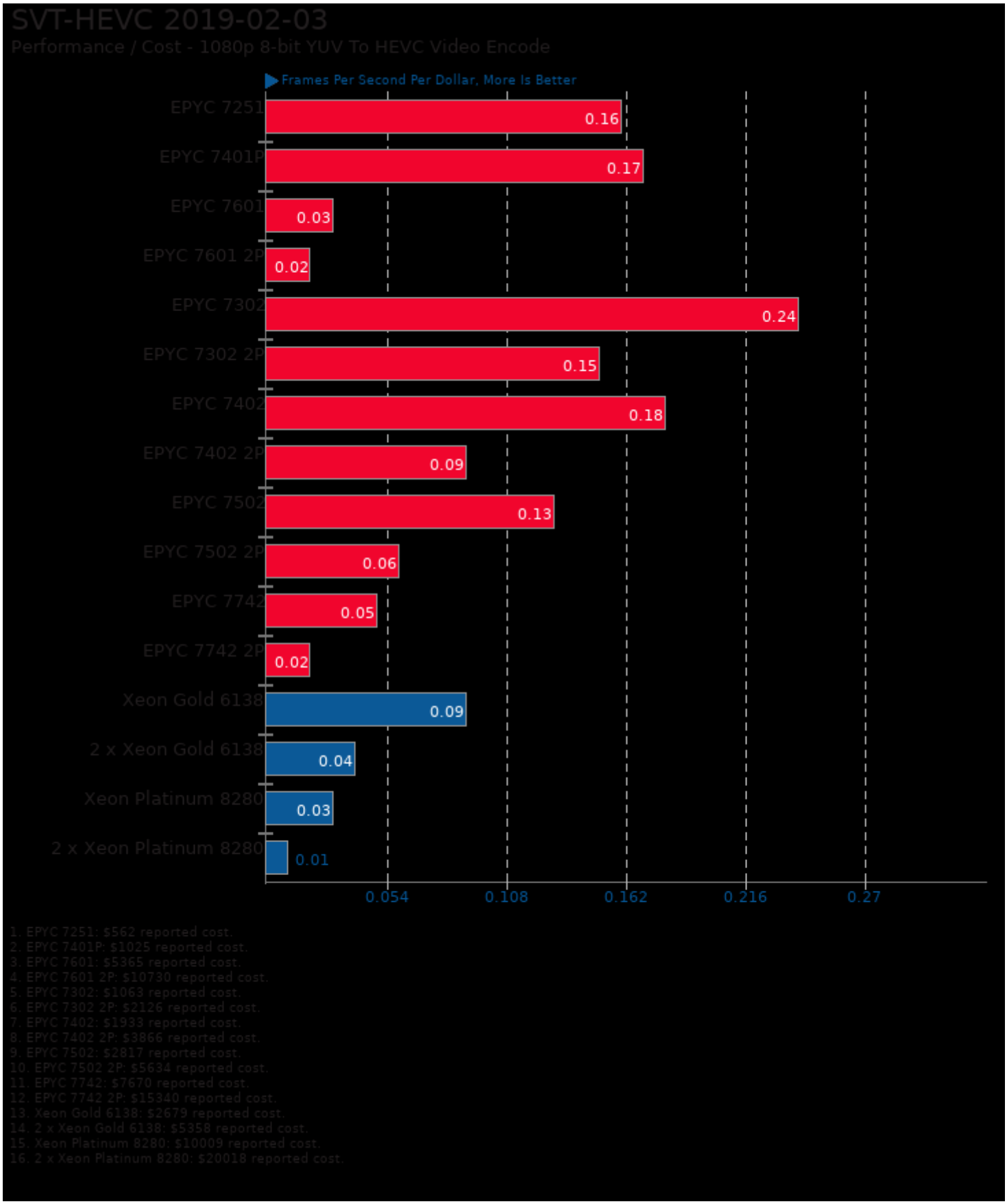
SVT-HEVC 1.4.1

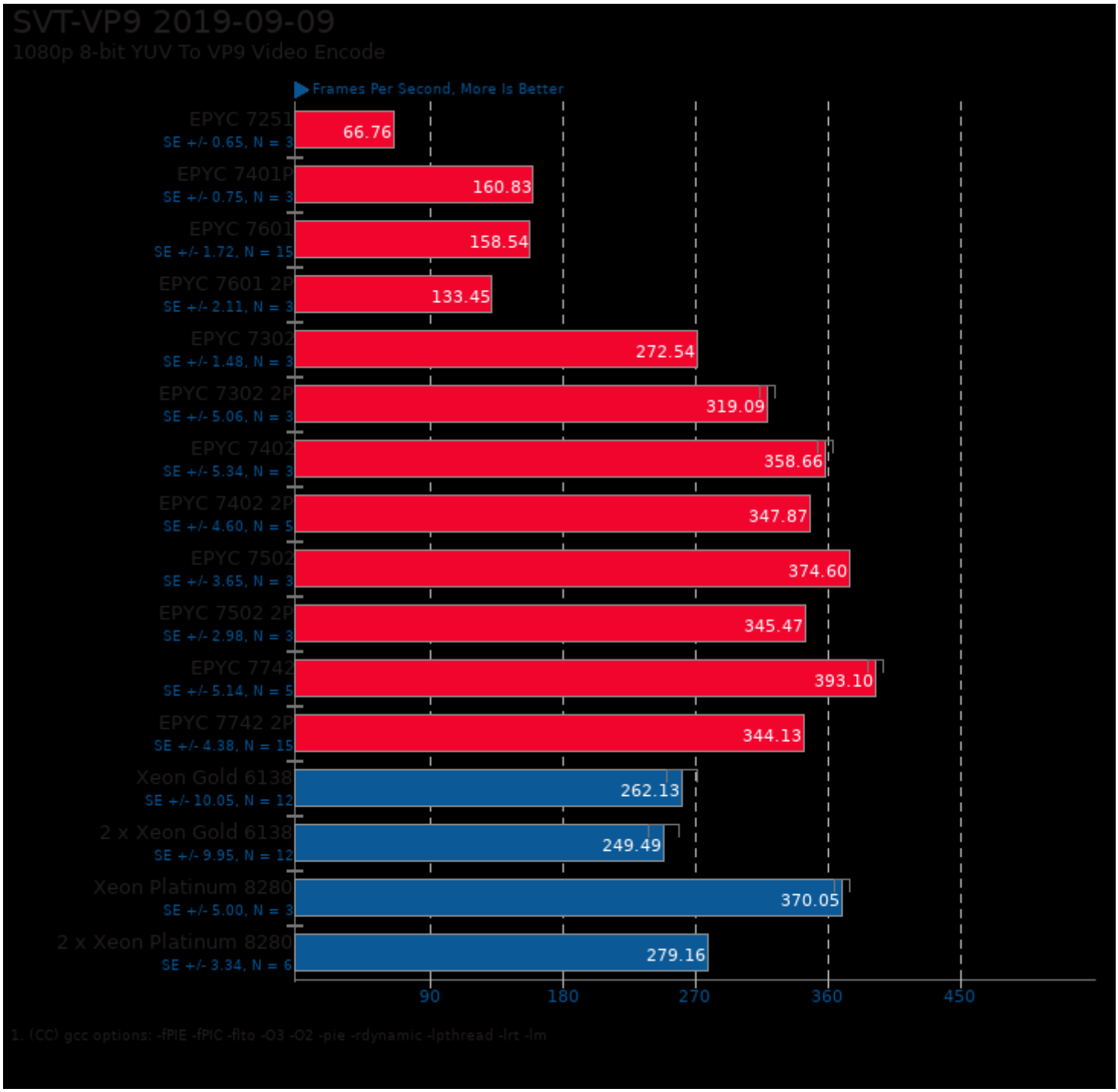
1080p 8-bit YUV To HEVC Video Encode

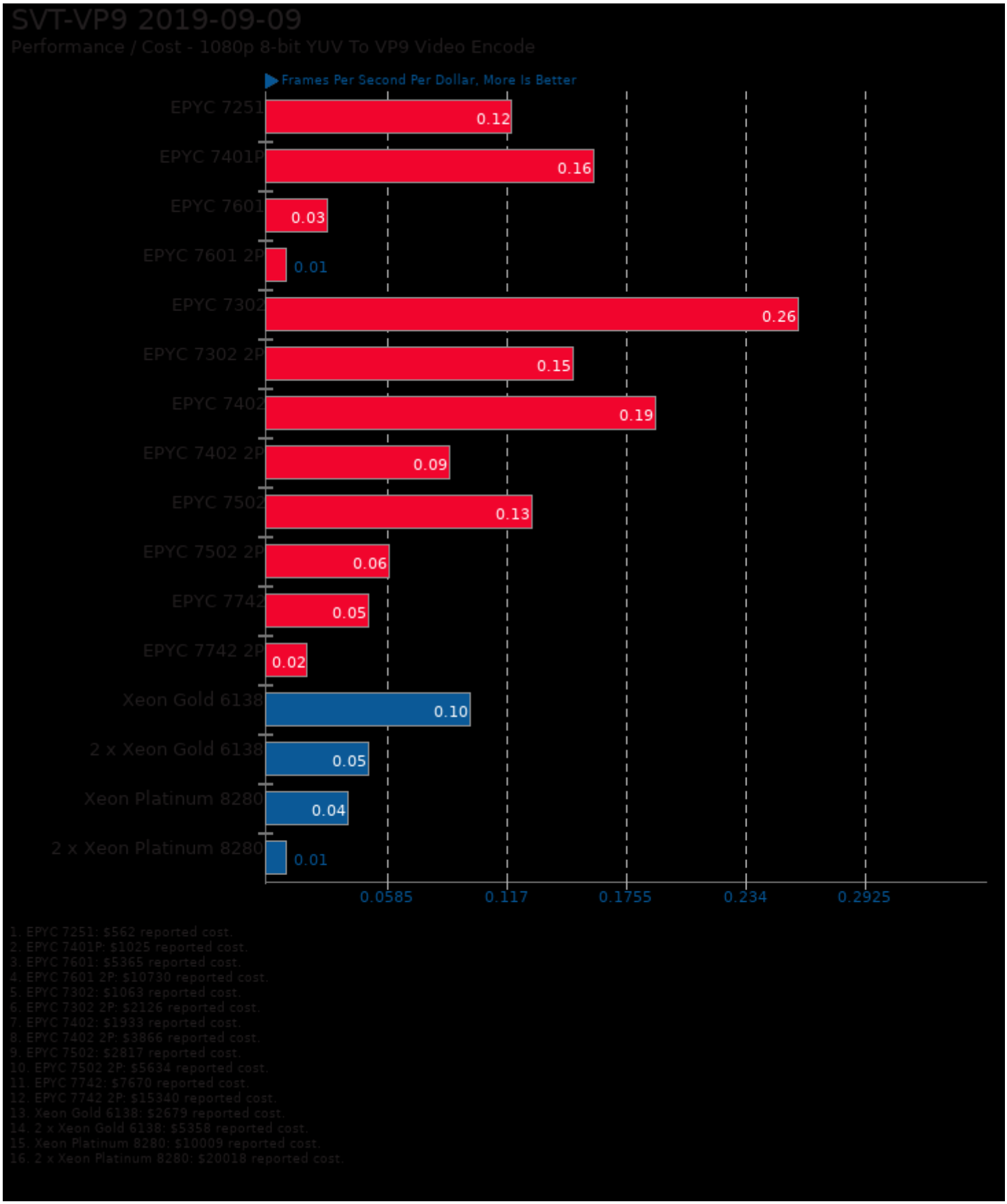


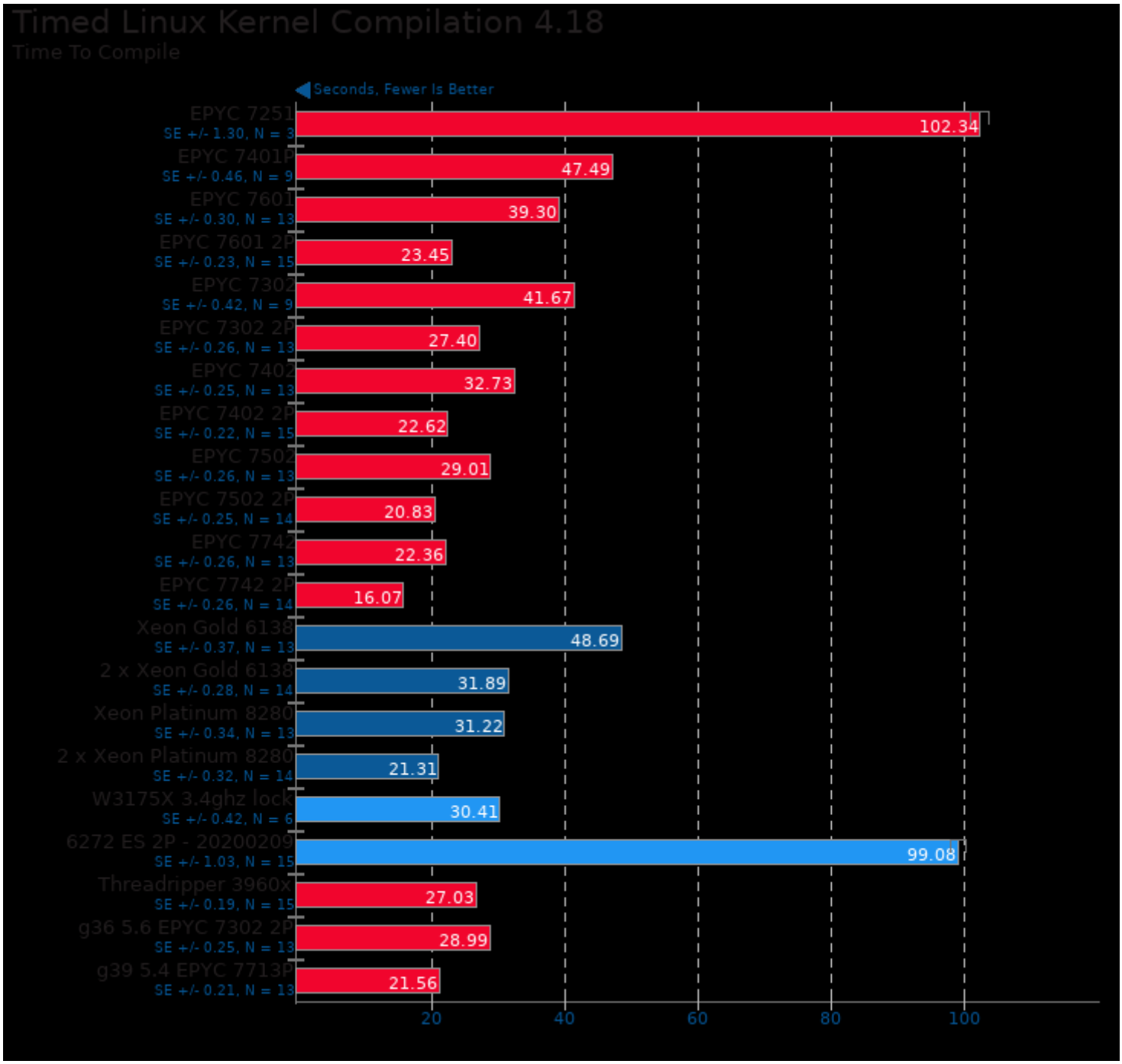
1. (CC) gcc options: -fPIE -fPIC -O3 -O2 -pie -rdynamic -lpthread -lrt

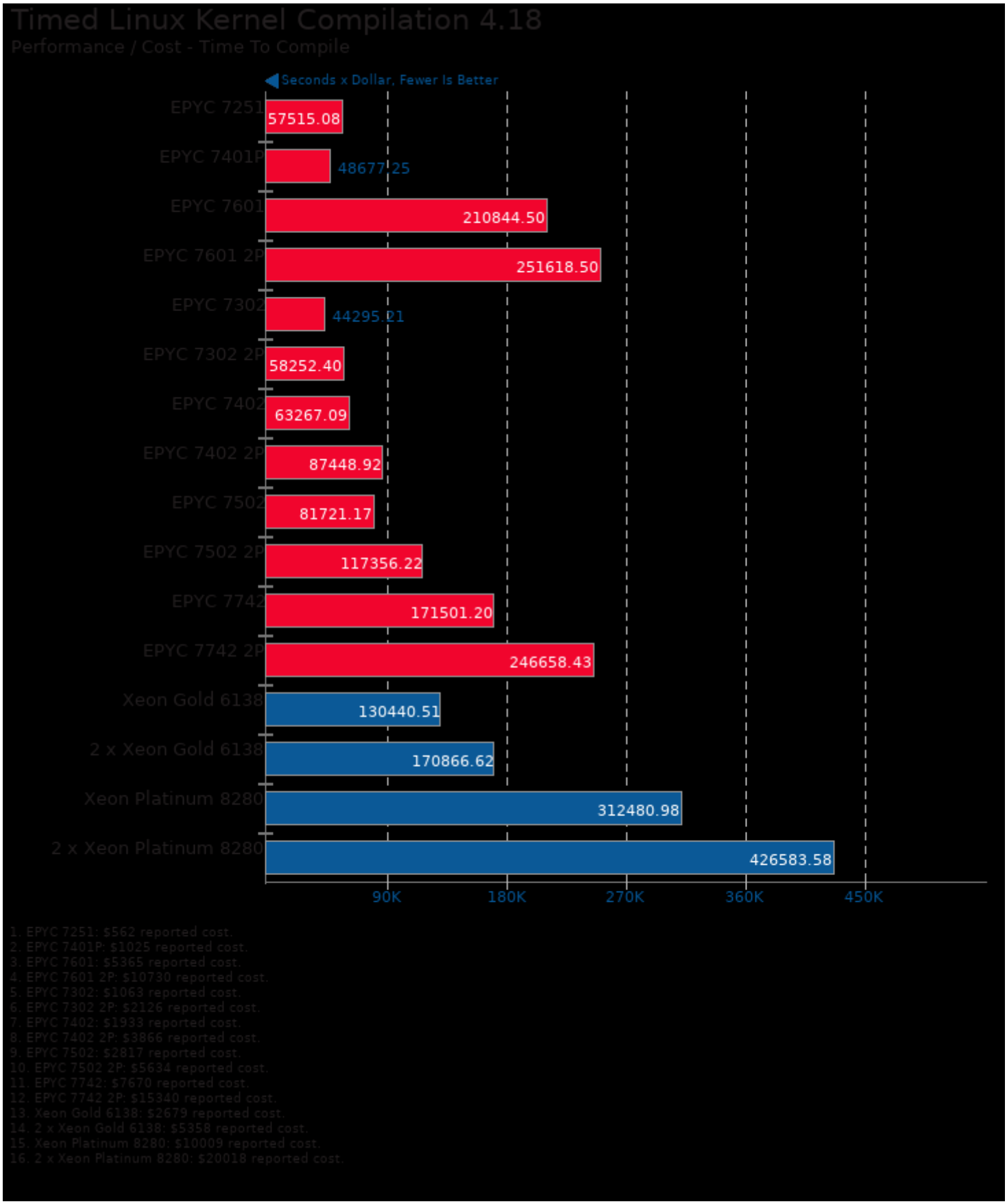

SVT-HEVC 2019-02-03
1080p 8-bit YUV To HEVC Video Encode
Frames Per Second, More Is Better
EPYC 7251
SE +/- 0.31, N = 3
89.22
EPYC 7401P
SE +/- 1.98, N = 15
179.31
EPYC 7601
SE +/- 3.71, N = 15
186.05
EPYC 7601 2P
SE +/- 2.87, N = 15
164.10
EPYC 7302
SE +/- 1.51, N = 3
258.45
EPYC 7302 2P
SE +/- 4.32, N = 3
328.76
EPYC 7402
SE +/- 2.17, N = 3
343.93
EPYC 7402 2P
SE +/- 2.30, N = 3
338.31
EPYC 7502
SE +/- 4.93, N = 3
360.14
EPYC 7502 2P
SE +/- 4.13, N = 4
335.96
EPYC 7742
SE +/- 1.90, N = 3
367.52
EPYC 7742 2P
SE +/- 2.50, N = 15
329.82
Xeon Gold 6138
SE +/- 8.21, N = 12
243.27
2 x Xeon Gold 6138
SE +/- 8.01, N = 12
235.59
Xeon Platinum 8280
SE +/- 3.27, N = 13
319.41
2 x Xeon Platinum 8280
SE +/- 1.47, N = 3
269.00
6272 ES 2P - 20200209
SE +/- 0.02, N = 3
9.74
Threadripper 3960X
SE +/- 4.12, N = 3
418.59
90
180
270
360
450
1. (CC) gcc options: -fPIE -fPIC -O2 -flto -fvisibility=hidden -march=native -pie -rdynamic -lpthread -lrt

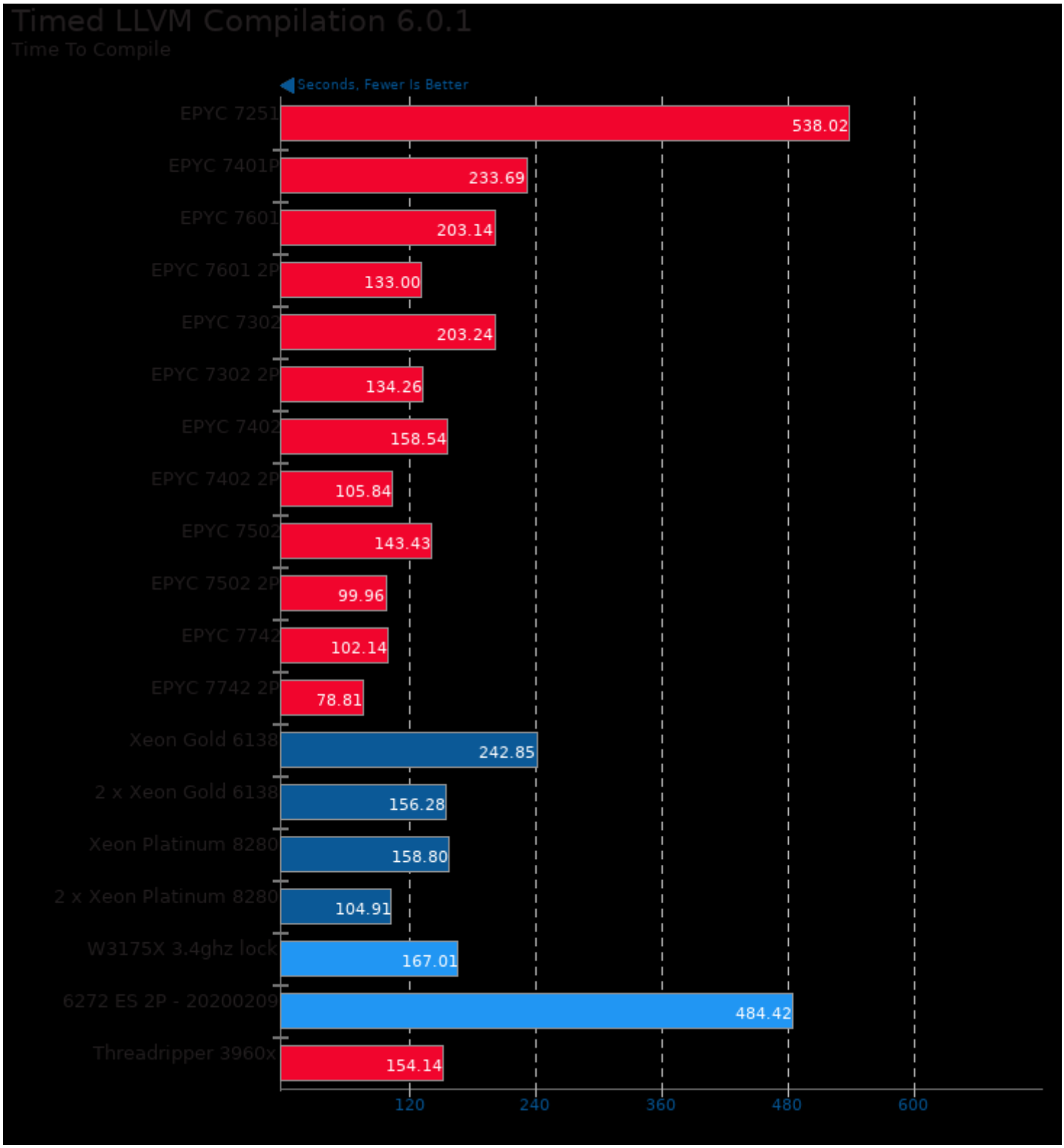

SVT-HEVC 2019-02-03
Performance / Cost - 1080p 8-bit YUV To HEVC Video Encode
Frames Per Second Per Dollar, More Is Better
EPYC 7251
0.16
EPYC 7401P
0.17
EPYC 7601
0.03
EPYC 7601 2P
0.02
EPYC 7302
0.24
EPYC 7302 2P
0.15
EPYC 7402
0.18
EPYC 7402 2P
0.09
EPYC 7502
0.13
EPYC 7502 2P
0.06
EPYC 7742
0.05
EPYC 7742 2P
0.02
Xeon Gold 6138
0.09
2 x Xeon Gold 6138
0.04
Xeon Platinum 8280
0.03
2 x Xeon Platinum 8280
0.01
0.054
0.108
0.162
0.216
0.27
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

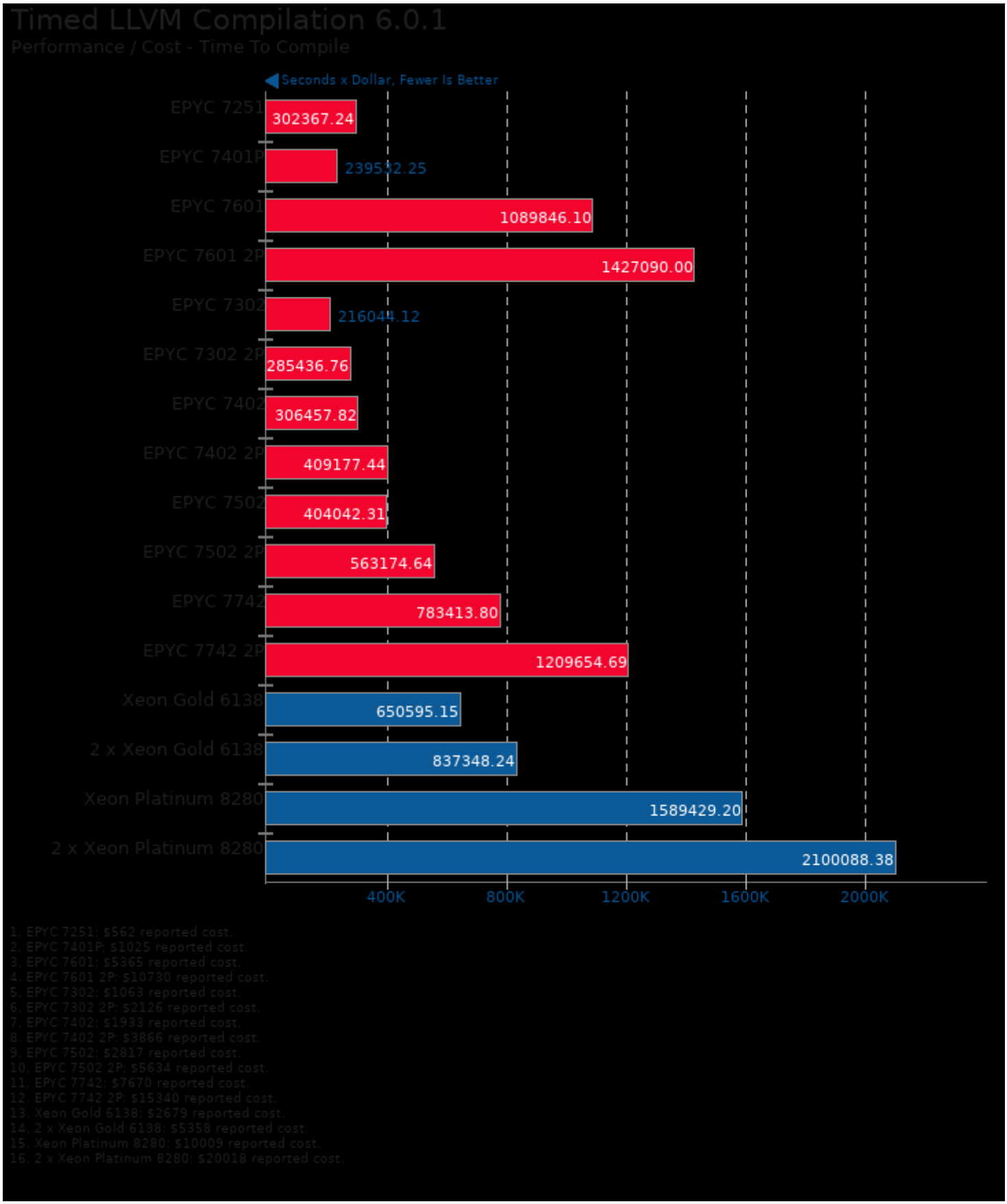

SVT-VP9 2019-09-09
1080p 8-bit YUV To VP9 Video Encode
Frames Per Second, More Is Better
EPYC 7251
SE +/- 0.65, N = 3
66.76
EPYC 7401P
SE +/- 0.75, N = 3
160.83
EPYC 7601
SE +/- 1.72, N = 15
158.54
EPYC 7601 2P
SE +/- 2.11, N = 3
133.45
EPYC 7302
SE +/- 1.48, N = 3
272.54
EPYC 7302 2P
SE +/- 5.06, N = 3
319.09
EPYC 7402
SE +/- 5.34, N = 3
358.66
EPYC 7402 2P
SE +/- 4.60, N = 5
347.87
EPYC 7502
SE +/- 3.65, N = 3
374.60
EPYC 7502 2P
SE +/- 2.98, N = 3
345.47
EPYC 7742
SE +/- 5.14, N = 5
393.10
EPYC 7742 2P
SE +/- 4.38, N = 15
344.13
Xeon Gold 6138
SE +/- 10.05, N = 12
262.13
2 x Xeon Gold 6138
SE +/- 9.95, N = 12
249.49
Xeon Platinum 8280
SE +/- 5.00, N = 3
370.05
2 x Xeon Platinum 8280
SE +/- 3.34, N = 6
279.16
90
180
270
360
450
1. (CC) gcc options: -fPIE -fPIC -flto -O3 -O2 -pie -rdynamic -lpthread -lrt -lm

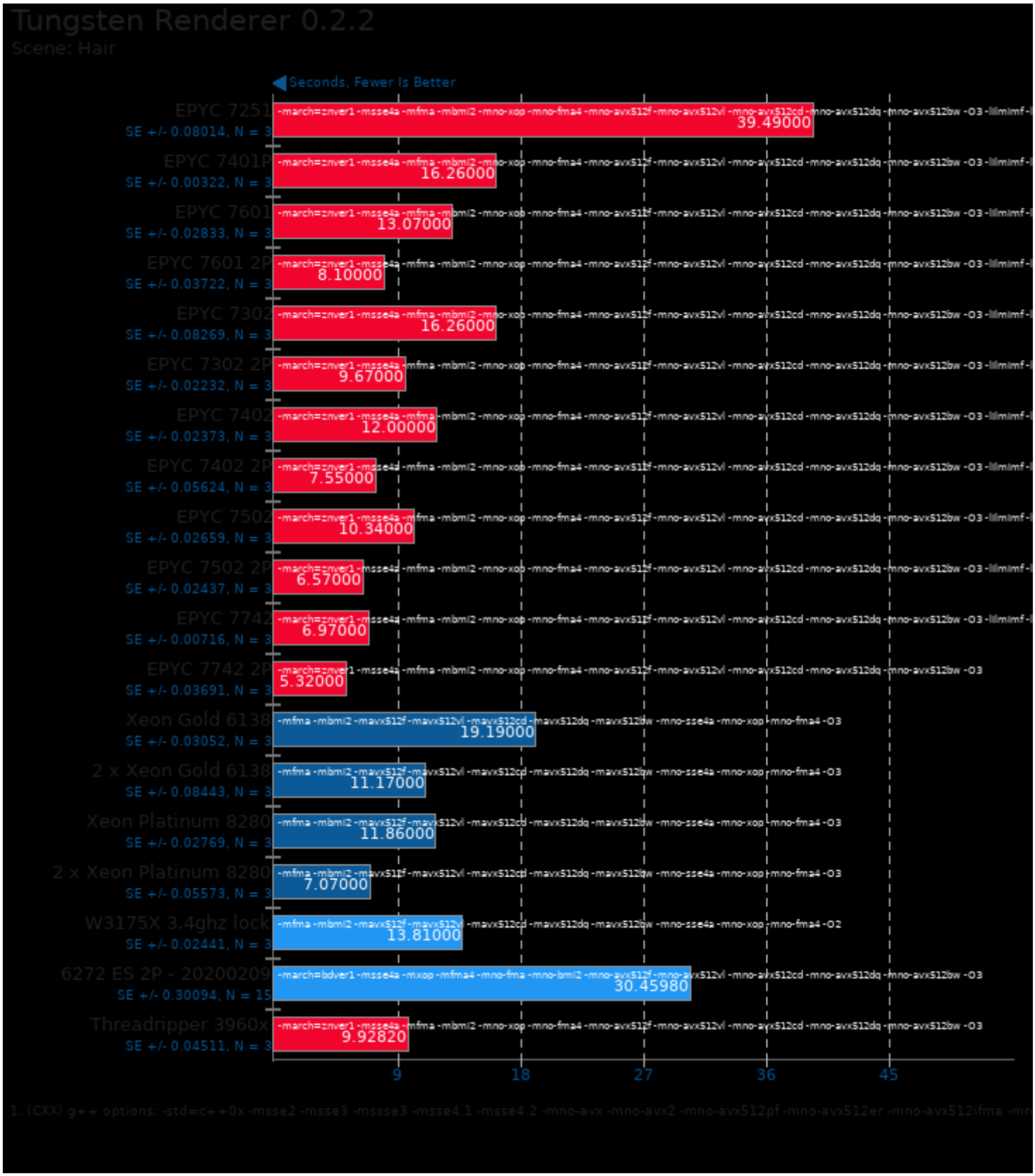

SVT-VP9 2019-09-09
Performance / Cost - 1080p 8-bit YUV To VP9 Video Encode
Frames Per Second Per Dollar, More Is Better
EPYC 7251
0.12
EPYC 7401P
0.16
EPYC 7601
0.03
EPYC 7601 2P
0.01
EPYC 7302
0.26
EPYC 7302 2P
0.15
EPYC 7402
0.19
EPYC 7402 2P
0.09
EPYC 7502
0.13
EPYC 7502 2P
0.06
EPYC 7742
0.05
EPYC 7742 2P
0.02
Xeon Gold 6138
0.10
2 x Xeon Gold 6138
0.05
Xeon Platinum 8280
0.04
2 x Xeon Platinum 8280
0.01
0.0585
0.117
0.1755
0.234
0.2925
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

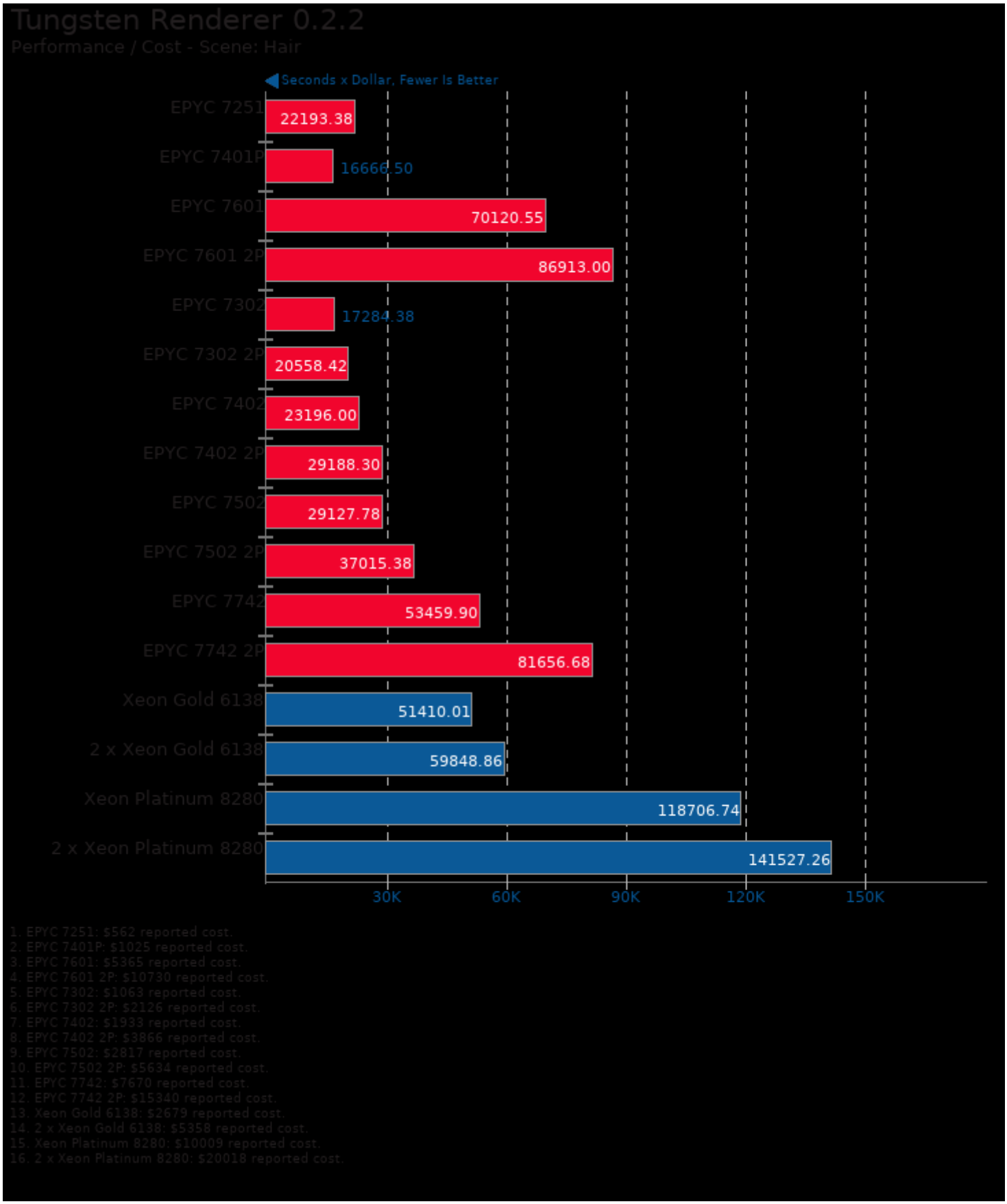

Timed Linux Kernel Compilation 4.18
Time To Compile
Seconds, Fewer Is Better
EPYC 7251
SE +/- 1.30, N = 3
102.34
EPYC 7401P
SE +/- 0.46, N = 9
47.49
EPYC 7601
SE +/- 0.30, N = 13
39.30
EPYC 7601 2P
SE +/- 0.23, N = 15
23.45
EPYC 7302
SE +/- 0.42, N = 9
41.67
EPYC 7302 2P
SE +/- 0.26, N = 13
27.40
EPYC 7402
SE +/- 0.25, N = 13
32.73
EPYC 7402 2P
SE +/- 0.22, N = 15
22.62
EPYC 7502
SE +/- 0.26, N = 13
29.01
EPYC 7502 2P
SE +/- 0.25, N = 14
20.83
EPYC 7742
SE +/- 0.26, N = 13
22.36
EPYC 7742 2P
SE +/- 0.26, N = 14
16.07
Xeon Gold 6138
SE +/- 0.37, N = 13
48.69
2 x Xeon Gold 6138
SE +/- 0.28, N = 14
31.89
Xeon Platinum 8280
SE +/- 0.34, N = 13
31.22
2 x Xeon Platinum 8280
SE +/- 0.32, N = 14
21.31
W3175X 3.4ghz lock
SE +/- 0.42, N = 6
30.41
6272 ES 2P - 20200209
SE +/- 1.03, N = 15
99.08
Threadripper 3960x
SE +/- 0.19, N = 15
27.03
g36 5.6 EPYC 7302 2P
SE +/- 0.25, N = 13
28.99
g39 5.4 EPYC 7713P
SE +/- 0.21, N = 13
21.56
20
40
60
80
100

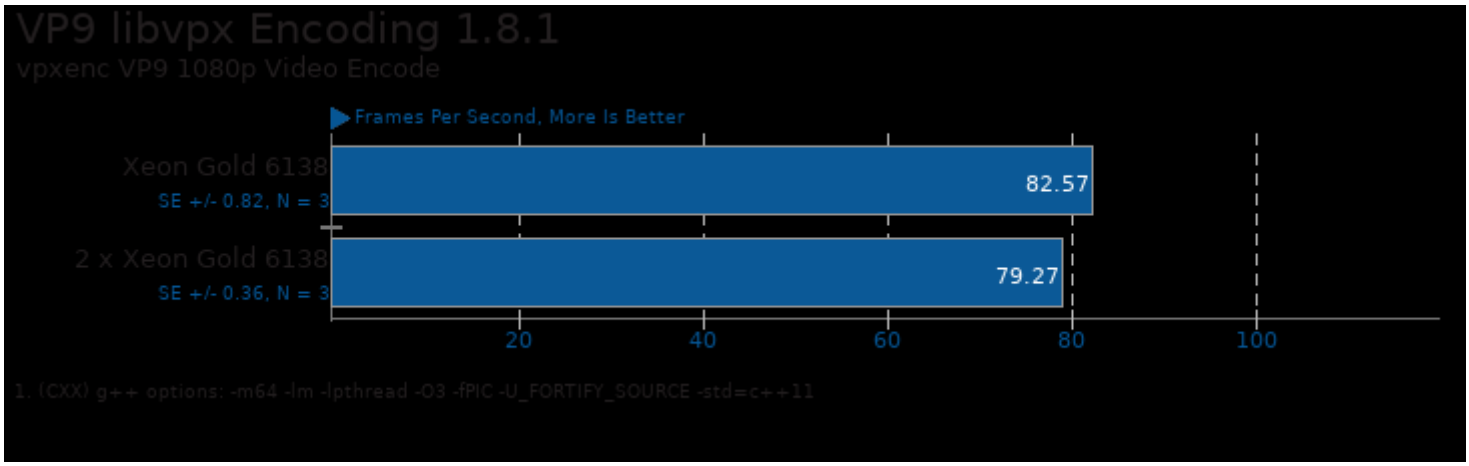

Timed Linux Kernel Compilation 4.18
Performance / Cost - Time To Compile
Seconds x Dollar, Fewer Is Better
EPYC 7251
57515.08
EPYC 7401P
48677.25
EPYC 7601
210844.50
EPYC 7601 2P
251618.50
EPYC 7302
44295.21
EPYC 7302 2P
58252.40
EPYC 7402
63267.09
EPYC 7402 2P
87448.92
EPYC 7502
81721.17
EPYC 7502 2P
117356.22
EPYC 7742
171501.20
EPYC 7742 2P
246658.43
Xeon Gold 6138
130440.51
2 x Xeon Gold 6138
170866.62
Xeon Platinum 8280
312480.98
2 x Xeon Platinum 8280
426583.58
90K
180K
270K
360K
450K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

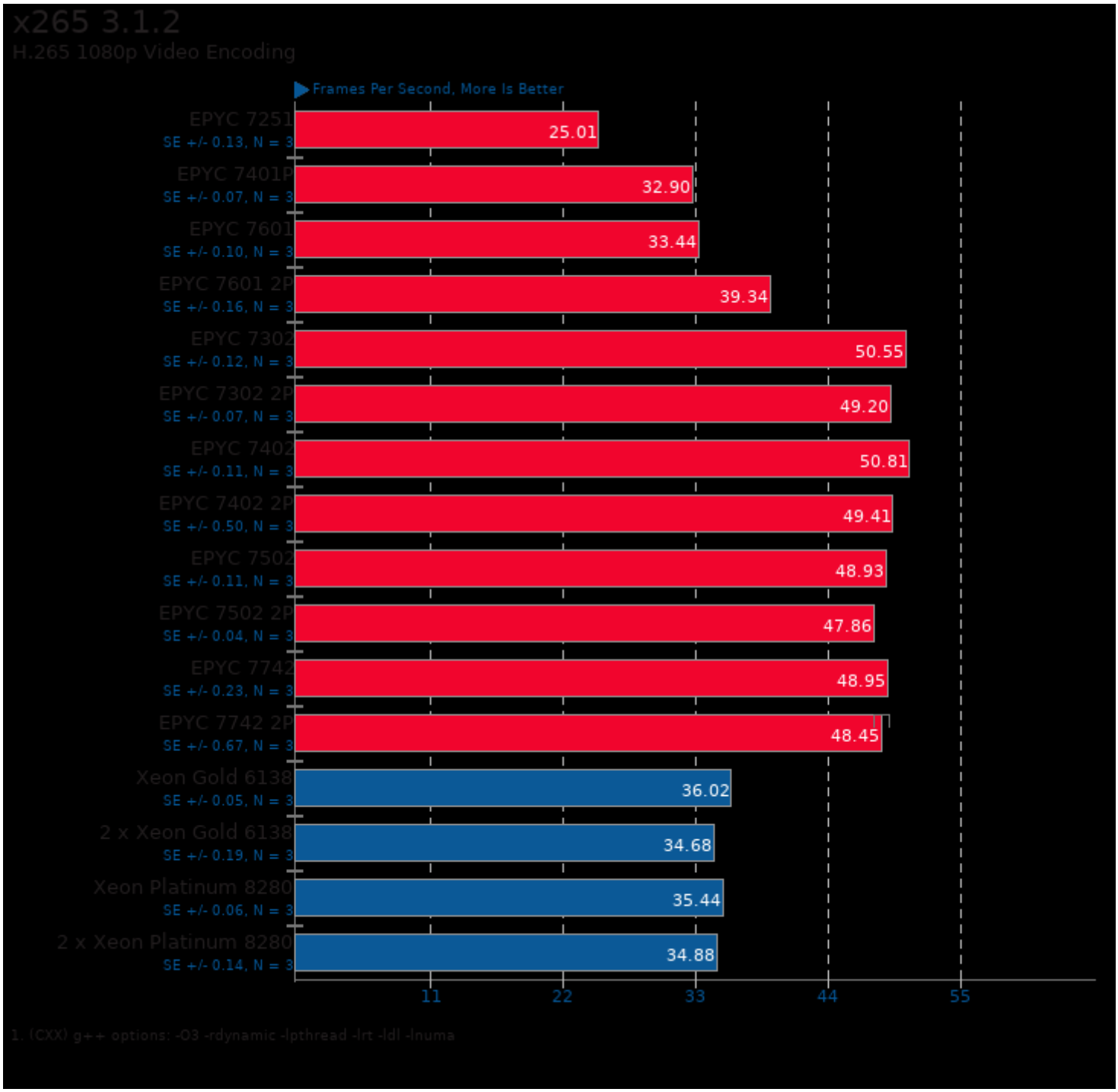

Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
EPYC 7251
538.02
EPYC 7401P
233.69
EPYC 7601
203.14
EPYC 7601 2P
133.00
EPYC 7302
203.24
EPYC 7302 2P
134.26
EPYC 7402
158.54
EPYC 7402 2P
105.84
EPYC 7502
143.43
EPYC 7502 2P
99.96
EPYC 7742
102.14
EPYC 7742 2P
78.81
Xeon Gold 6138
242.85
2 x Xeon Gold 6138
156.28
Xeon Platinum 8280
158.80
2 x Xeon Platinum 8280
104.91
W3175X 3.4ghz lock
167.01
6272 ES 2P - 20200209
484.42
Threadripper 3960x
154.14
120
240
360
480
600


Timed LLVM Compilation 6.0.1
Performance / Cost - Time To Compile
Seconds x Dollar, Fewer Is Better
EPYC 7251
302367.24
EPYC 7401P
239532.25
EPYC 7601
1089846.10
EPYC 7601 2P
1427090.00
EPYC 7302
216044.12
EPYC 7302 2P
285436.76
EPYC 7402
306457.82
EPYC 7402 2P
409177.44
EPYC 7502
404042.31
EPYC 7502 2P
563174.64
EPYC 7742
783413.80
EPYC 7742 2P
1209654.69
Xeon Gold 6138
650595.15
2 x Xeon Gold 6138
837348.24
Xeon Platinum 8280
1589429.20
2 x Xeon Platinum 8280
2100088.38
400K
800K
1200K
1600K
2000K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

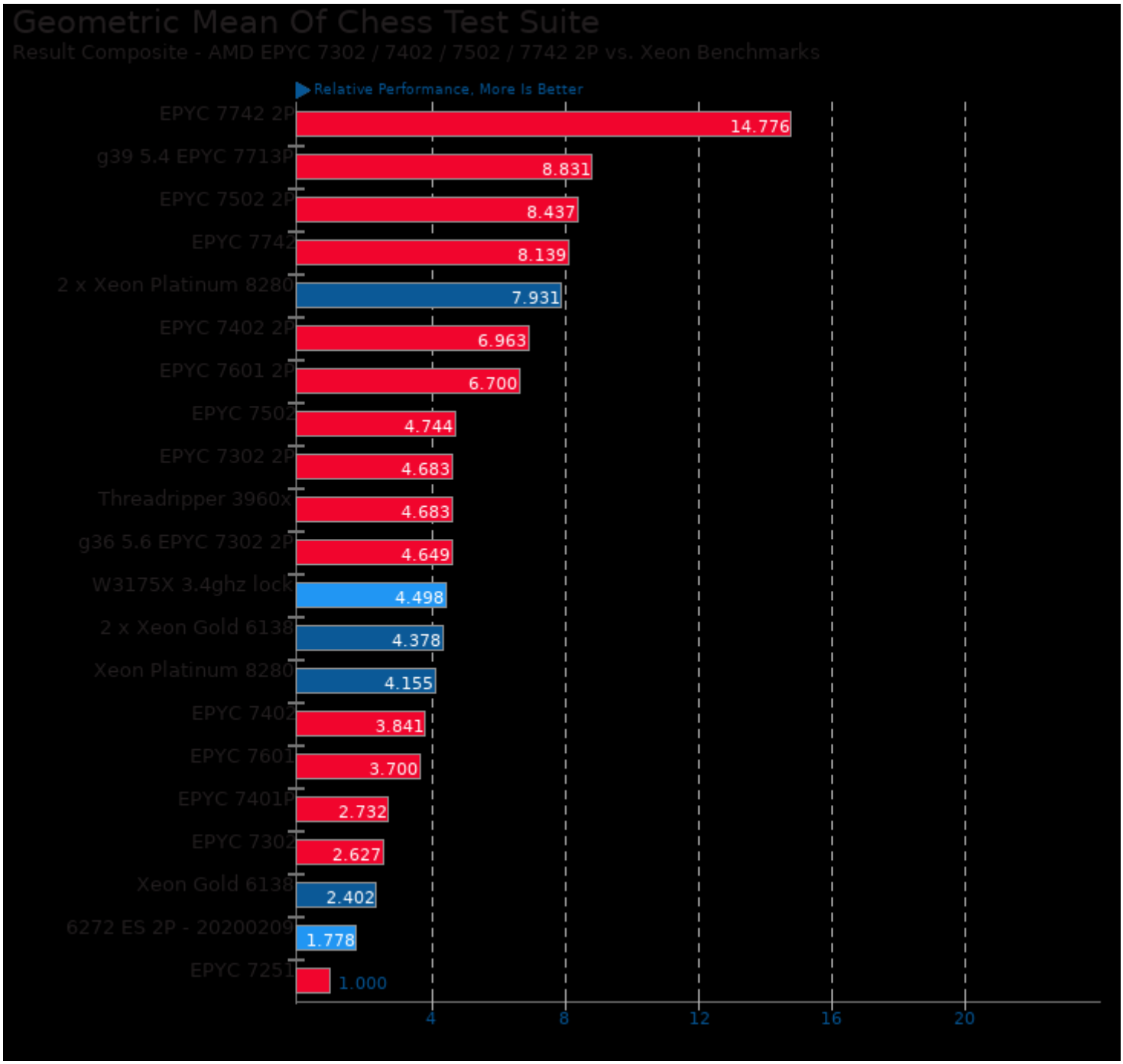

Tungsten Renderer 0.2.2
Scene: Hair
Seconds, Fewer Is Better
EPYC 7251
SE +/- 0.08014, N = 3
39.49000
EPYC 7401P
SE +/- 0.00322, N = 3
16.26000
EPYC 7601
SE +/- 0.02833, N = 3
13.07000
EPYC 7601 2P
SE +/- 0.03722, N = 3
8.10000
EPYC 7302
SE +/- 0.08269, N = 3
16.26000
EPYC 7302 2P
SE +/- 0.02232, N = 3
9.67000
EPYC 7402
SE +/- 0.02373, N = 3
12.00000
EPYC 7402 2P
SE +/- 0.05624, N = 3
7.55000
EPYC 7502
SE +/- 0.02659, N = 3
10.34000
EPYC 7502 2P
SE +/- 0.02437, N = 3
6.57000
EPYC 7742
SE +/- 0.00716, N = 3
6.97000
EPYC 7742 2P
SE +/- 0.03691, N = 3
5.32000
Xeon Gold 6138
SE +/- 0.03052, N = 3
19.19000
2 x Xeon Gold 6138
SE +/- 0.08443, N = 3
11.17000
Xeon Platinum 8280
SE +/- 0.02769, N = 3
11.86000
2 x Xeon Platinum 8280
SE +/- 0.05573, N = 3
7.07000
W3175X 3.4ghz lock
SE +/- 0.02441, N = 3
13.81000
6272 ES 2P - 20200209
SE +/- 0.30094, N = 15
30.45980
Threadripper 3960X
SE +/- 0.04511, N = 3
9.92820
9
18
27
36
45


Tungsten Renderer 0.2.2
Performance / Cost - Scene: Hair
Seconds x Dollar, Fewer Is Better
EPYC 7251
22193.38
EPYC 7401P
16666.50
EPYC 7601
70120.55
EPYC 7601 2P
86913.00
EPYC 7302
17284.38
EPYC 7302 2P
20558.42
EPYC 7402
23196.00
EPYC 7402 2P
29188.30
EPYC 7502
29127.78
EPYC 7502 2P
37015.38
EPYC 7742
53459.90
EPYC 7742 2P
81656.68
Xeon Gold 6138
51410.01
2 x Xeon Gold 6138
59848.86
Xeon Platinum 8280
118706.74
2 x Xeon Platinum 8280
141527.26
30K
60K
90K
120K
150K
1. EPYC 7251: $562 reported cost.
2. EPYC 7401P: $1025 reported cost.
3. EPYC 7601: $5365 reported cost.
4. EPYC 7601 2P: $10730 reported cost.
5. EPYC 7302: $1063 reported cost.
6. EPYC 7302 2P: $2126 reported cost.
7. EPYC 7402: $1933 reported cost.
8. EPYC 7402 2P: $3866 reported cost.
9. EPYC 7502: $2817 reported cost.
10. EPYC 7502 2P: $5634 reported cost.
11. EPYC 7742: $7670 reported cost.
12. EPYC 7742 2P: $15340 reported cost.
13. Xeon Gold 6138: $2679 reported cost.
14. 2 x Xeon Gold 6138: $5358 reported cost.
15. Xeon Platinum 8280: $10009 reported cost.
16. 2 x Xeon Platinum 8280: $20018 reported cost.

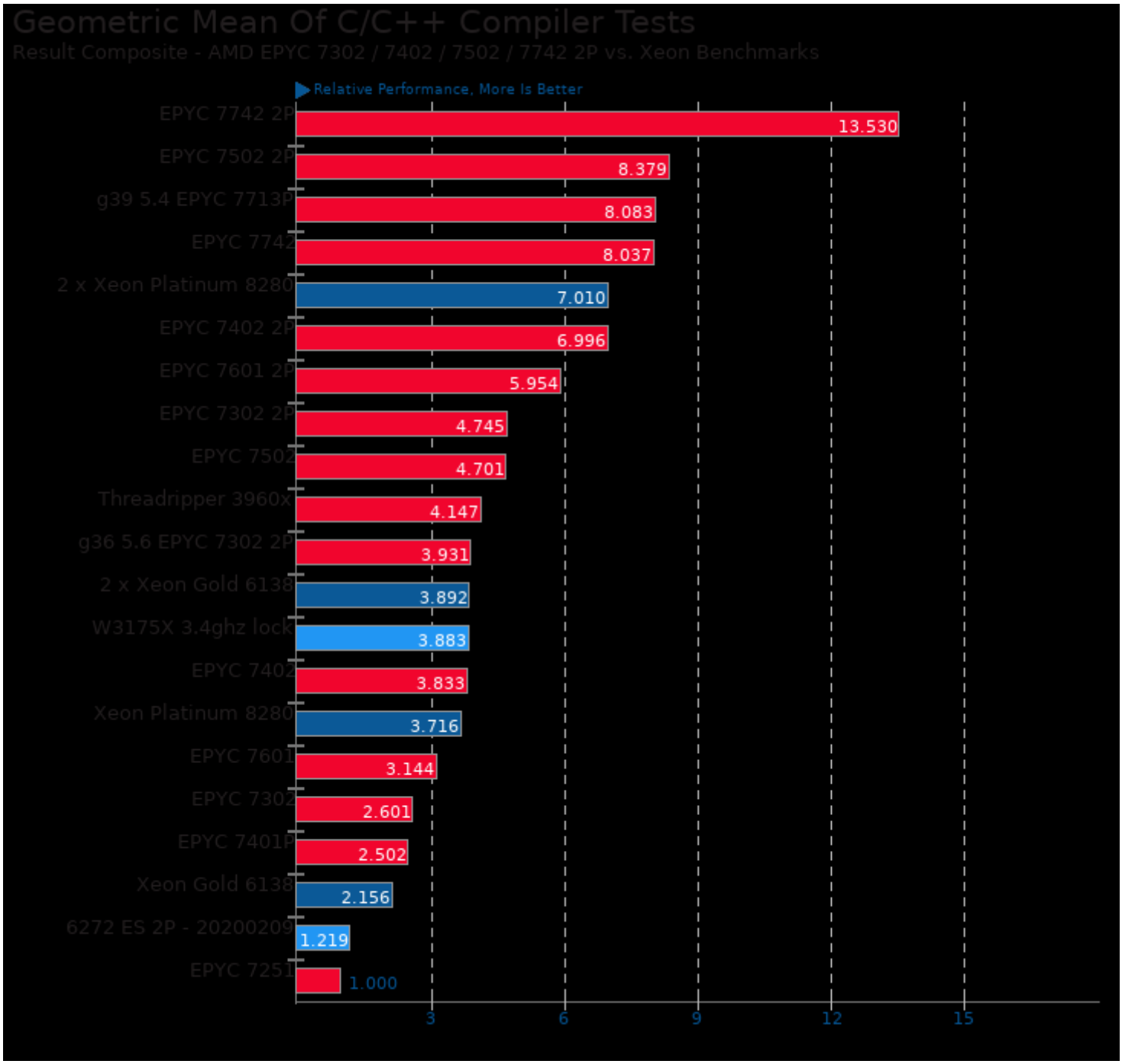

VP9 libvpx Encoding 1.8.1
vpxenc VP9 1080p Video Encode
Frames Per Second, More Is Better
Xeon Gold 6138
SE +/- 0.82, N = 3
82.57
2 x Xeon Gold 6138
SE +/- 0.36, N = 3
79.27
20
40
60
80
100
1. (CXX) g++ options: -m64 -lm -lpthread -O3 -fPIC -U_FORTIFY_SOURCE -std=c++11


x265 3.1.2
H.265 1080p Video Encoding
Frames Per Second, More Is Better
EPYC 7251
SE +/- 0.13, N = 3
25.01
EPYC 7401P
SE +/- 0.07, N = 3
32.90
EPYC 7601
SE +/- 0.10, N = 3
33.44
EPYC 7601 2P
SE +/- 0.16, N = 3
39.34
EPYC 7302
SE +/- 0.12, N = 3
50.55
EPYC 7302 2P
SE +/- 0.07, N = 3
49.20
EPYC 7402
SE +/- 0.11, N = 3
50.81
EPYC 7402 2P
SE +/- 0.50, N = 3
49.41
EPYC 7502
SE +/- 0.11, N = 3
48.93
EPYC 7502 2P
SE +/- 0.04, N = 3
47.86
EPYC 7742
SE +/- 0.23, N = 3
48.95
EPYC 7742 2P
SE +/- 0.67, N = 3
48.45
Xeon Gold 6138
SE +/- 0.05, N = 3
36.02
2 x Xeon Gold 6138
SE +/- 0.19, N = 3
34.68
Xeon Platinum 8280
SE +/- 0.06, N = 3
35.44
2 x Xeon Platinum 8280
SE +/- 0.14, N = 3
34.88
11
22
33
44
55
1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

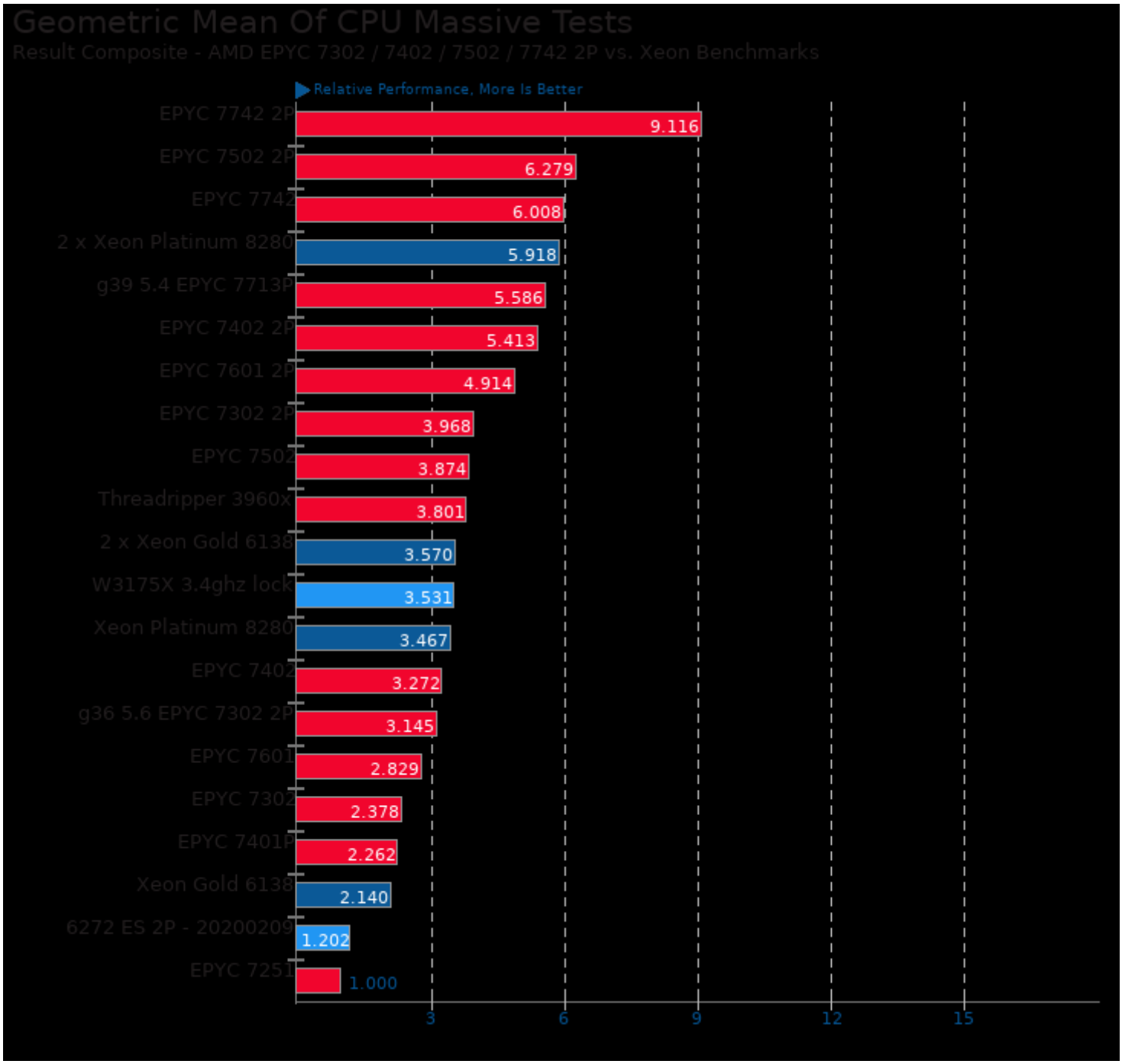
These geometric means are based upon test groupings / test suites for this result file.



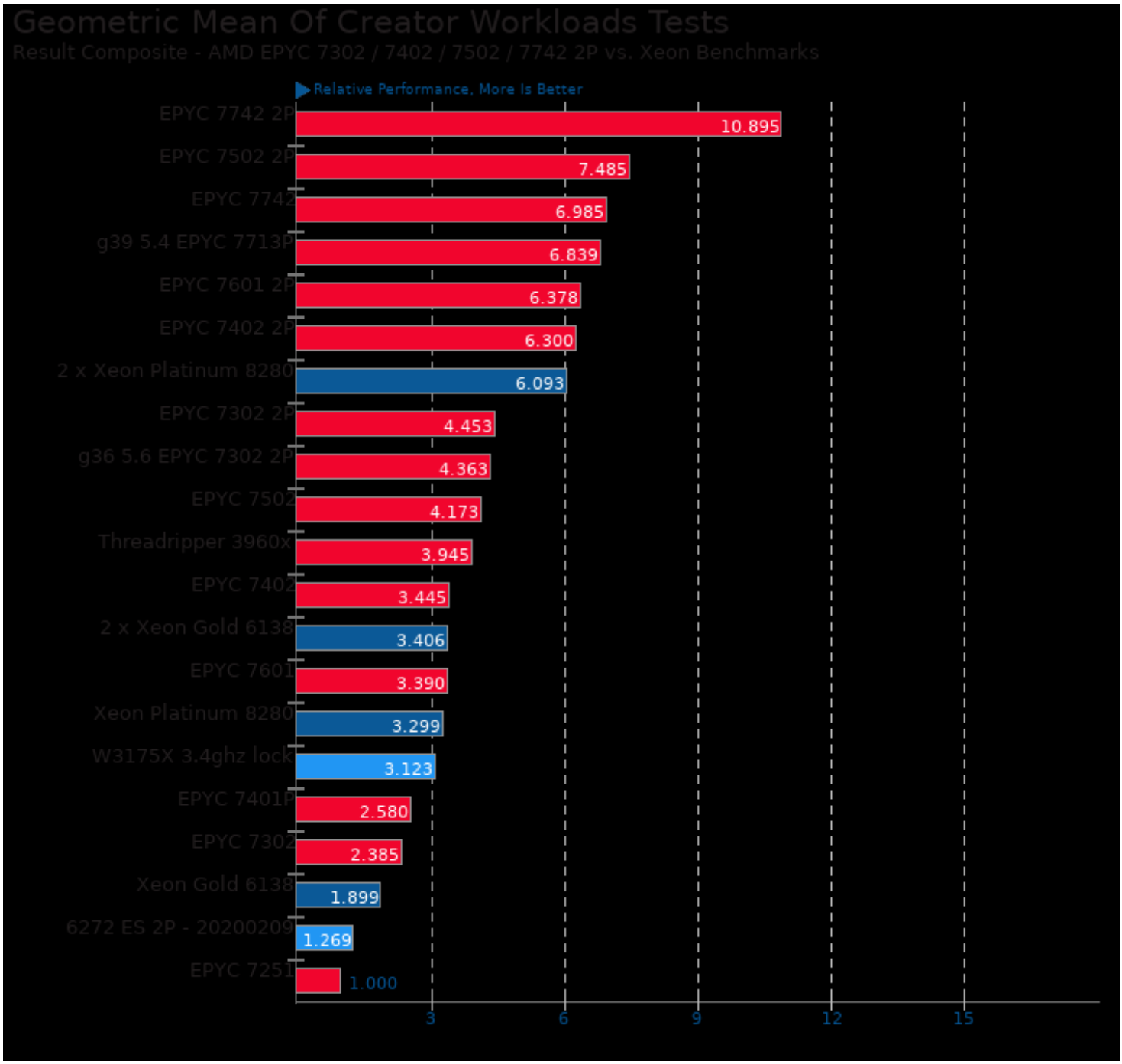
Geometric mean based upon tests: pts/stockfish and pts/asmfish



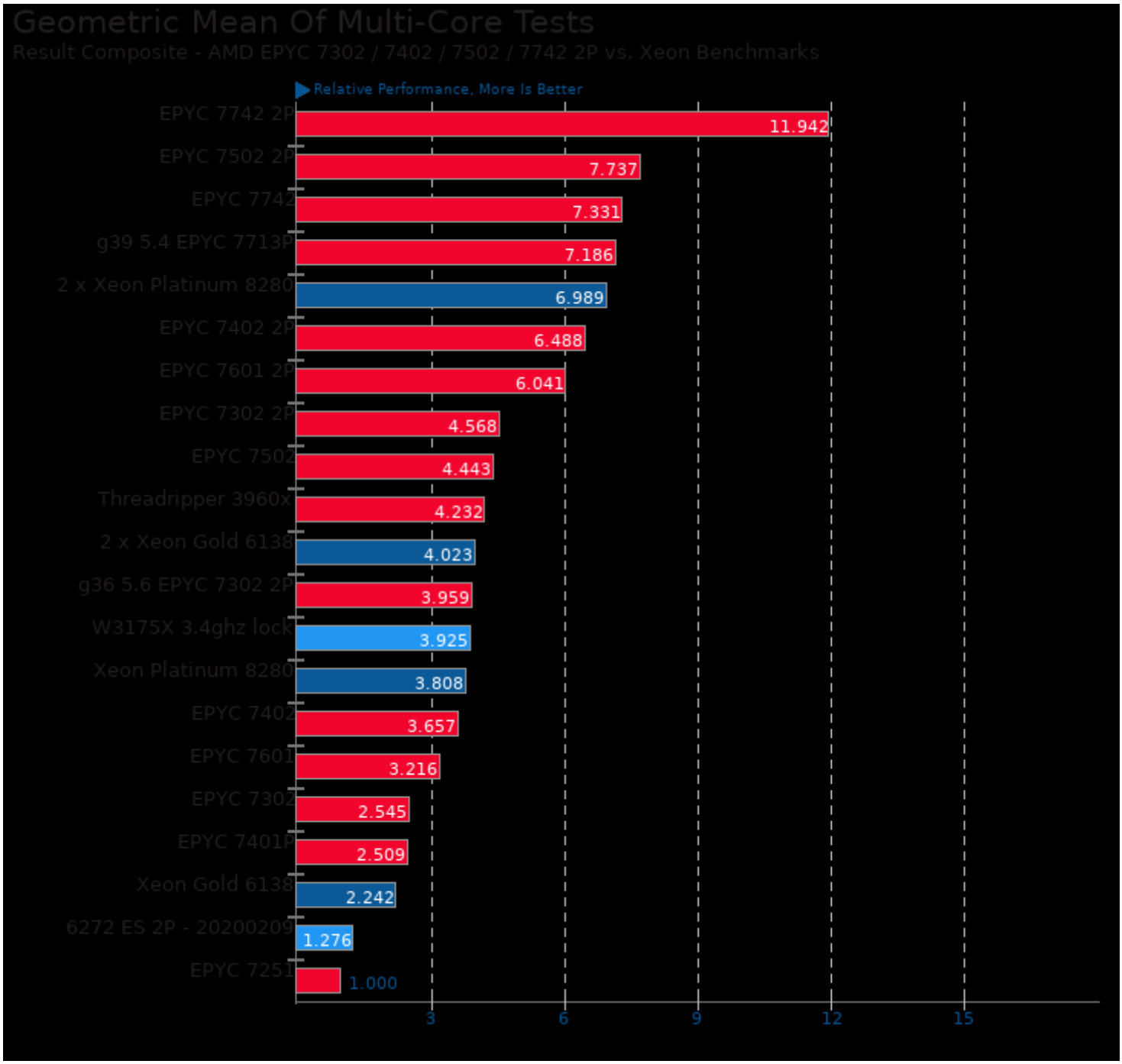
Geometric mean based upon tests: pts/stockfish, pts/build-llvm, pts/c-ray, pts/compress-7zip, pts/john-the-ripper, pts/dav1d, pts/tungsten and pts/svt-av1



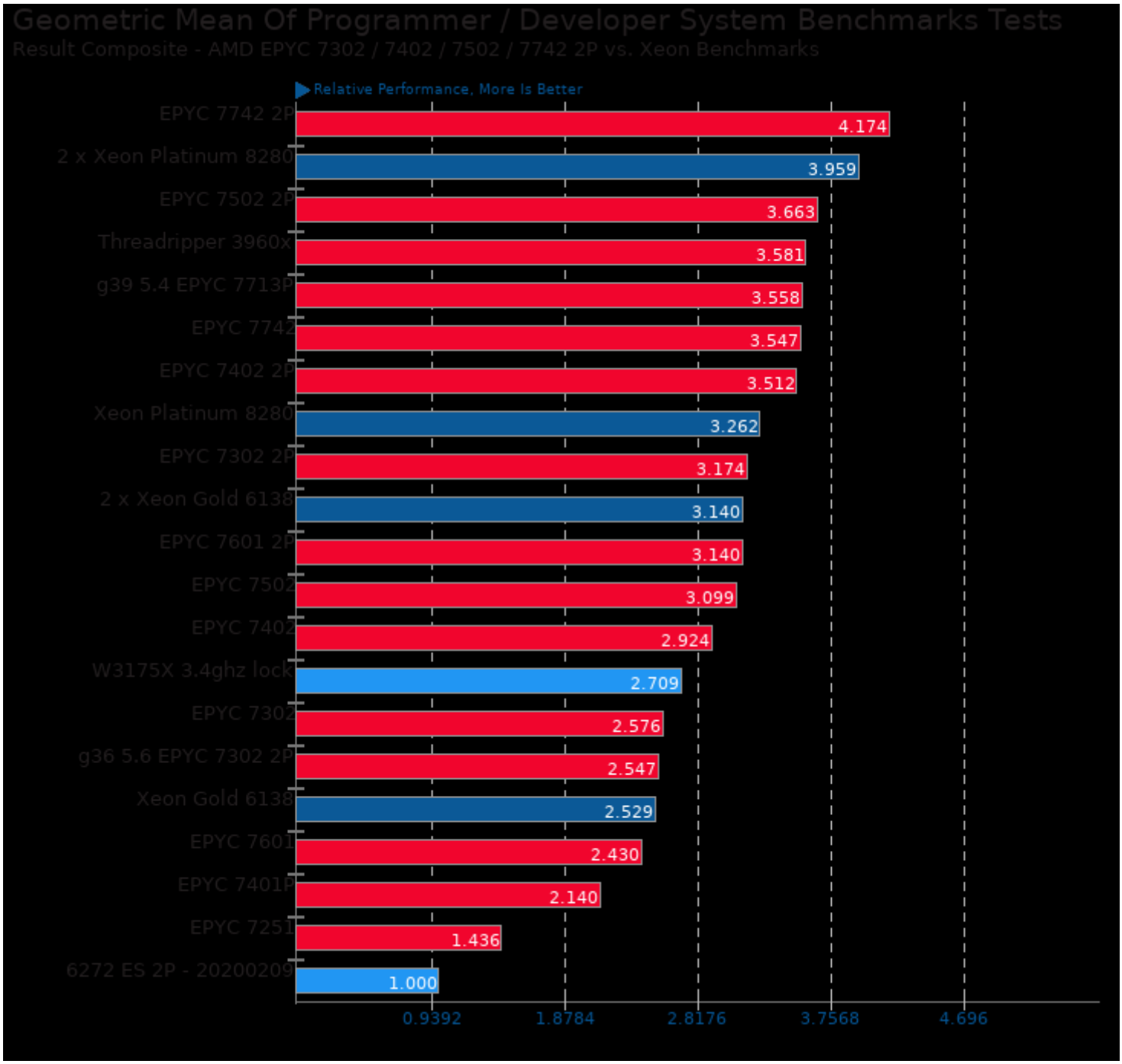
Geometric mean based upon tests: pts/asmfish, pts/build-llvm, pts/build-linux-kernel, pts/c-ray, pts/compress-7zip, pts/dav1d, pts/svt-av1, pts/svt-hevc, pts/john-the-ripper, pts/namd, pts/phpbench, pts/povray, pts/stockfish and pts/blender



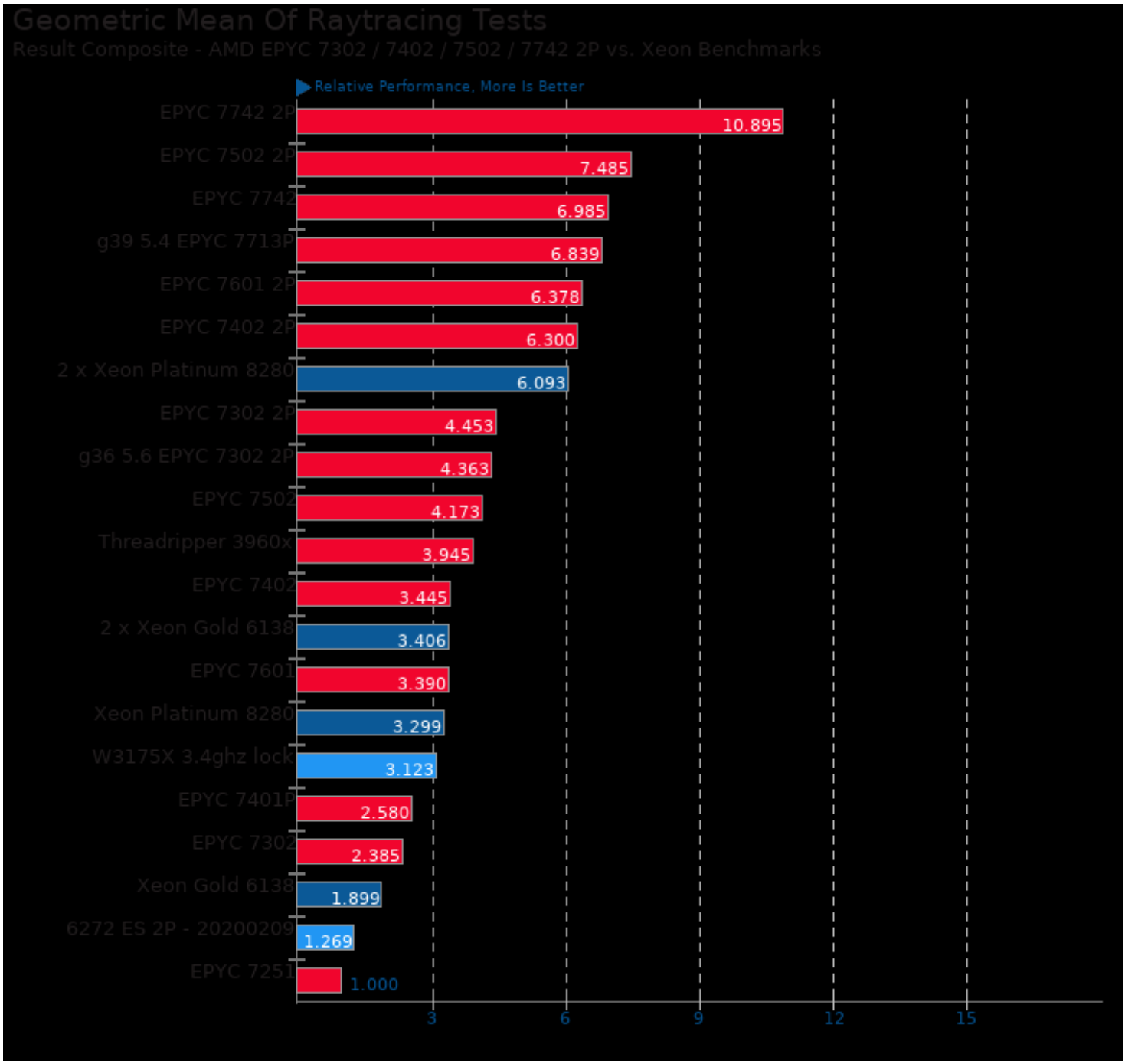
Geometric mean based upon tests: pts/c-ray, pts/povray, pts/blender, pts/tungsten, pts/appleseed, pts/svt-hevc, pts/dav1d and pts/svt-av1



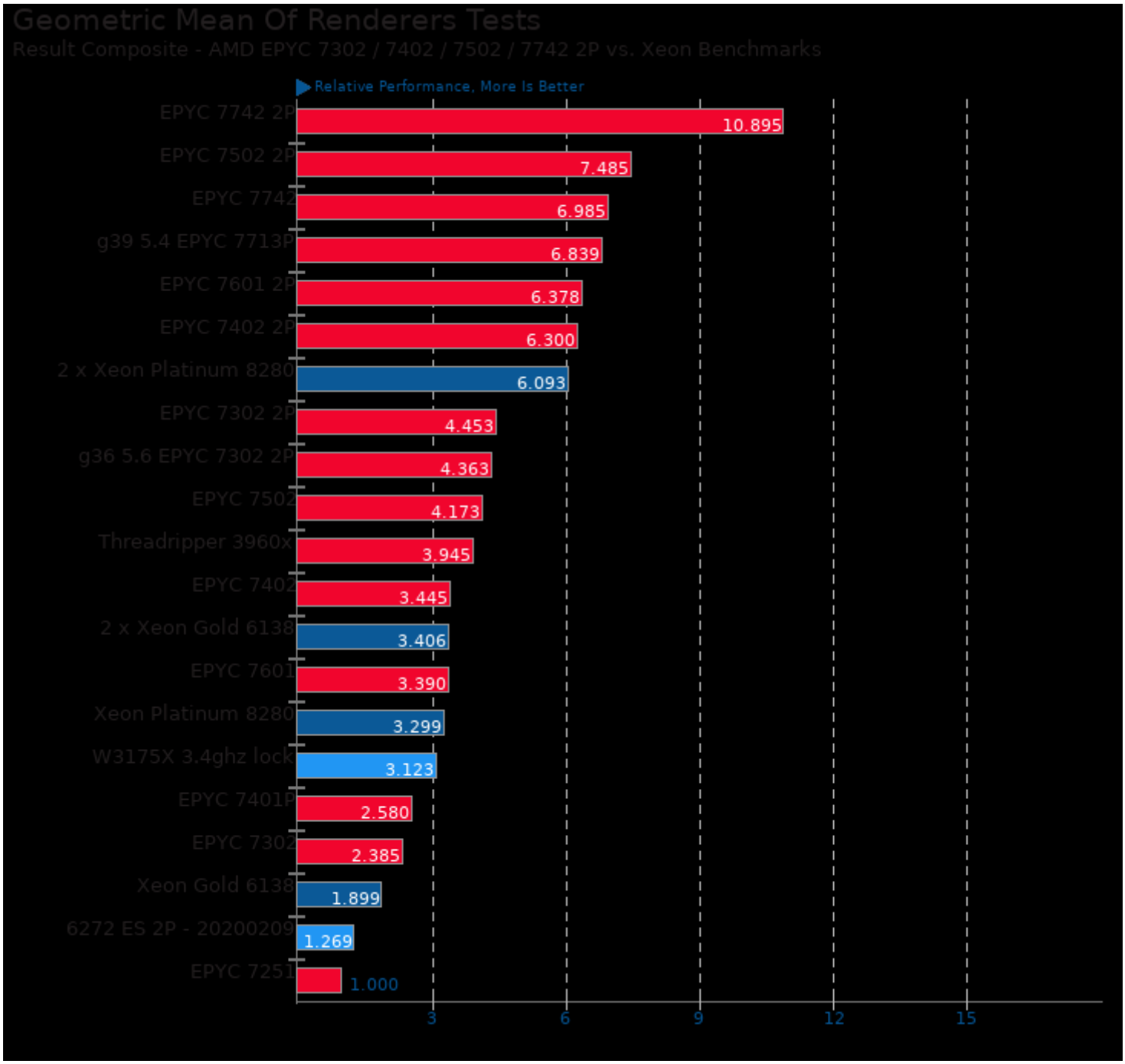
Geometric mean based upon tests: pts/blender, pts/c-ray, pts/povray, pts/stockfish, pts/coremark, pts/svt-hevc, pts/dav1d, pts/svt-av1, pts/john-the-ripper, pts/namd, pts/asmfish, pts/compress-7zip, pts/build-linux-kernel, pts/build-llvm, pts/tungsten and pts/appleseed



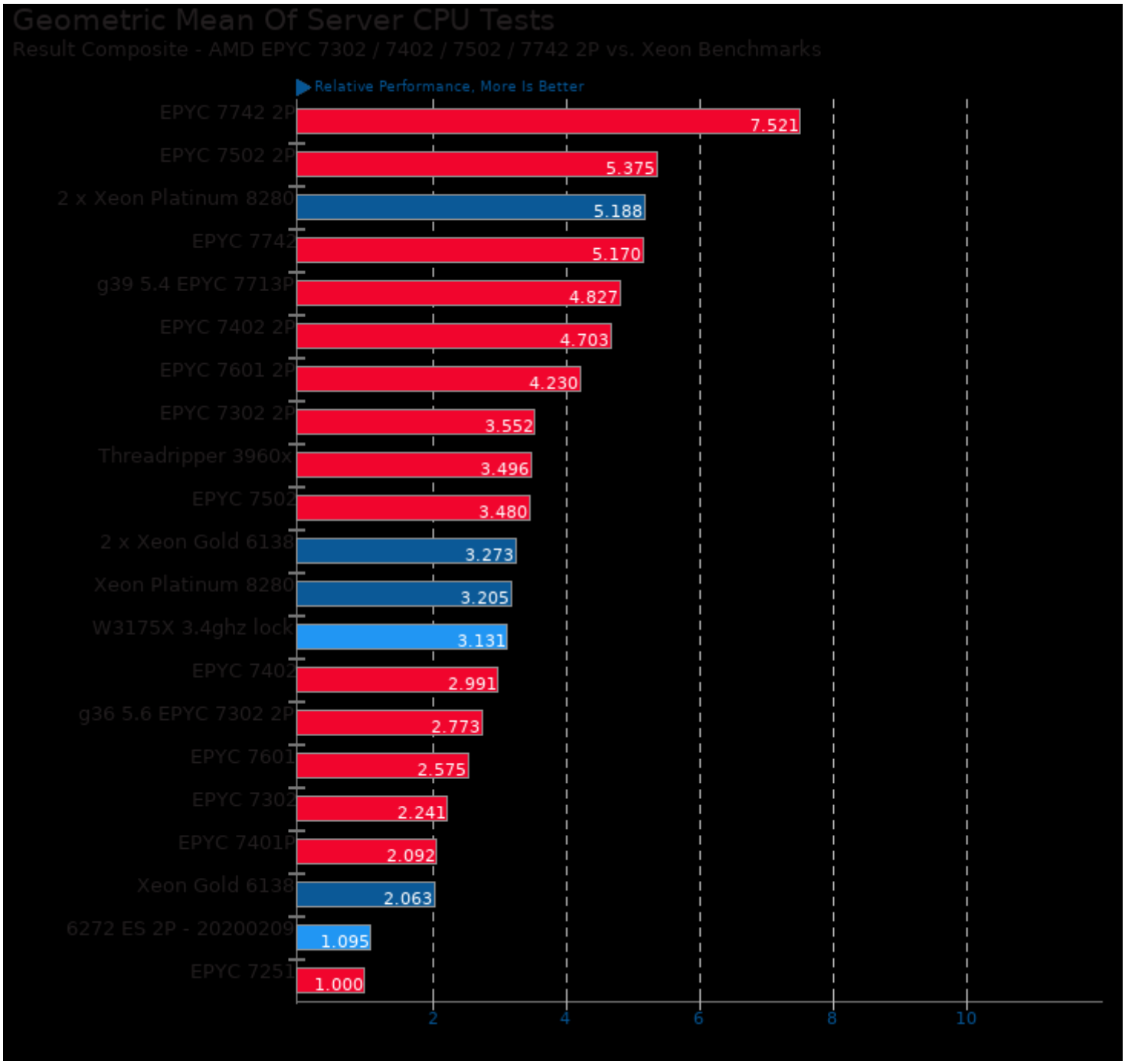
Geometric mean based upon tests: pts/pybench, pts/build-linux-kernel and pts/build-llvm



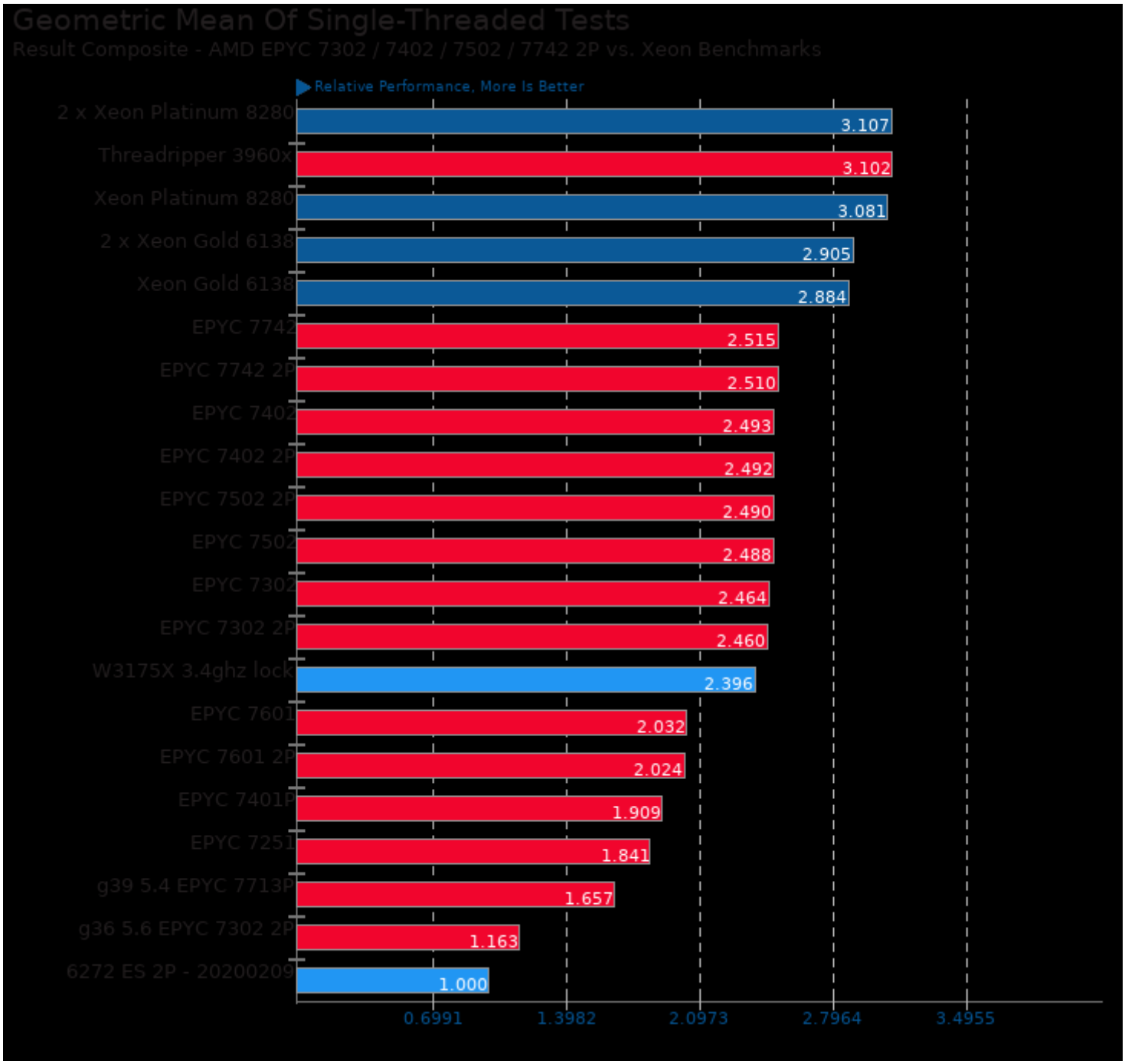
Geometric mean based upon tests: pts/c-ray and pts/povray



Geometric mean based upon tests: pts/c-ray, pts/povray, pts/blender, pts/tungsten and pts/appleseed



Geometric mean based upon tests: pts/namd, pts/john-the-ripper, pts/svt-av1, pts/svt-hevc, pts/dav1d, pts/compress-7zip, pts/stockfish, pts/asmfish, pts/build-linux-kernel, pts/build-llvm, pts/c-ray, pts/povray, pts/blender, pts/appleseed, pts/pybench and pts/phpbench



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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 07:06.