

www.phoronix-test-suite.com

Xeon & EPYC Tests

Various Server CPU benchmarks

Automated Executive Summary

2 x Xeon Platinum 8280 had the most wins, coming in first place for 38% of the tests.

Based on the geometric mean of all complete results, the fastest (2 x Xeon Platinum 8280) was 2.277x the speed of the slowest (Xeon Silver 4216).

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

MKL-DNN DNNL (Harness: Deconvolution Batch deconv_1d - Data Type: u8s8f32) at 3188.851x
MKL-DNN DNNL (Harness: Convolution Batch conv_googlenet_v3 - Data Type: u8s8f32) at 97.89x
MKL-DNN DNNL (Harness: Convolution Batch conv_alexnet - Data Type: u8s8f32) at 67.176x
MKL-DNN DNNL (Harness: IP Batch All - Data Type: u8s8f32) at 53.682x
PostgreSQL pgbench (Scaling: Buffer Test - Test: Normal Load - Mode: Read Write) at 16.77x
ArrayFire (Test: BLAS CPU) at 8.263x
MKL-DNN DNNL (Harness: Convolution Batch conv_alexnet - Data Type: f32) at 7.934x
MKL-DNN DNNL (Harness: Convolution Batch conv_all - Data Type: u8s8f32) at 7.729x
MKL-DNN DNNL (Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32) at 7.396x
MKL-DNN DNNL (Harness: Convolution Batch conv_all - Data Type: f32) at 6.776x.

Test Systems:

2 x Xeon Gold 5220R

Processor: 2 x Intel Xeon Gold 5220R @ 3.90GHz (36 Cores / 72 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

Xeon Gold 5220R

Processor: Intel Xeon Gold 5220R @ 3.90GHz (18 Cores / 36 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 6 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

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: 6 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new

--with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

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: 12 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

Xeon Gold 5218

Processor: Intel Xeon Gold 5218 @ 3.90GHz (16 Cores / 32 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 6 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: 2 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

Xeon Silver 4216

Processor: Intel Xeon Silver 4216 @ 3.20GHz (16 Cores / 32 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 6 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: 3 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

Xeon Gold 6226R

Processor: Intel Xeon Gold 6226R @ 3.90GHz (16 Cores / 32 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 6 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: 4 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

2 x Xeon Gold 6226R

Processor: 2 x Intel Xeon Gold 6226R @ 3.90GHz (32 Cores / 64 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: 5 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

2 x Xeon Silver 4216

Processor: 2 x Intel Xeon Silver 4216 @ 3.20GHz (32 Cores / 64 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 32 GB DDR4-2933MT/s HMA84GR7CJR4N-WM, Disk: 280GB INTEL SSDPED1D280GA, Graphics: ASPEED, Monitor: 6 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-18-generic (x86_64), Desktop: GNOME Shell 3.36.0, Display Server: X Server 1.20.7, Display Driver: modesetting 1.20.7, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-2ubuntu2)
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: 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 + tsx_async_abort: Mitigation of TSX disabled

Xeon W-3275M

Processor: Intel Xeon W-3275M @ 4.60GHz (28 Cores / 56 Threads), Motherboard: Supermicro X11SPA-T v1.01 (3.1 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 188GB, Disk: 2 x 1024GB Samsung SSD 970 PRO 1TB, Graphics: eVGA NVIDIA GeForce RTX 2080 Ti 11GB (1350/7000MHz), Audio: Realtek ALC888-VD, Monitor: BenQ SW271, Network: Intel I210 + Aquantia AQC107 NBase-T/IEEE

OS: Ubuntu 19.10, Kernel: 5.3.0-46-generic (x86_64), Desktop: GNOME Shell 3.34.3, Display Server: X Server 1.20.5, Display Driver: NVIDIA 430.50, OpenGL: 4.6.0, Compiler: GCC 9.2.1 20191008 + CUDA 10.1, File-System: ext4, Screen Resolution: 3840x2160

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
OpenCL Notes: GPU Compute Cores: 4352
Java Notes: OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-1ubuntu119.10.1)
Python Notes: Python 2.7.17 + Python 3.7.5
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 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 + tsx_async_abort: Mitigation of TSX disabled

2 x Xeon Platinum 8275CL

Processor: 2 x Intel Xeon Platinum 8275CL @ 3.90GHz (48 Cores / 96 Threads), Motherboard: ASRockRack EP2C621D12 WS (P2.10 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32 GB + 32 GB + 16384 MB + 32 GB + 16384 MB + 32 GB + 32 GB + 32 GB DDR4-3200MT/s, Disk: 256GB TOSHIBA THNSNJ25 + 600GB INTEL SSDSC2BB60 + 6001GB HGST HUS726060AL, Graphics: llvmpipe 220GB, Audio: Creative Labs EMU20k2, Monitor: DELL UP2516D, Network: 4 x Intel X722 for 1GbE

OS: Ubuntu 19.10, Kernel: 5.3.0-55-generic (x86_64), Desktop: GNOME Shell 3.34.1, Display Server: X Server, OpenGL: 3.3 Mesa 19.2.1 (LLVM 9.0 256 bits), Compiler: GCC 9.2.1 20191008, File-System: ext4, Screen Resolution: 2560x1440

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002b
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-2ubuntu219.10)
Python Notes: Python 2.7.17 + Python 3.7.5
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 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 + tsx_async_abort: Mitigation of TSX disabled

2 x Xeon Platinum 8275CL NUMA off

Processor: 2 x Intel Xeon Platinum 8275CL @ 3.90GHz (48 Cores / 96 Threads), Motherboard: ASRockRack EP2C621D12 WS (P2.10 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32 GB + 32 GB + 16384 MB + 32 GB + 16384 MB + 32 GB + 32 GB + 32 GB DDR4-3200MT/s, Disk: 256GB TOSHIBA THNSNJ25 + 600GB INTEL SSDSC2BB60 + 6001GB HGST HUS726060AL, Graphics: llvmpipe 220GB, Audio: Creative Labs EMU20k2, Monitor: DELL UP2516D, Network: 4 x Intel X722 for 1GbE

OS: Ubuntu 19.10, Kernel: 5.3.0-55-generic (x86_64), Desktop: GNOME Shell 3.34.1, Display Server: X Server, OpenGL: 3.3 Mesa 19.2.8 (LLVM 9.0 256 bits), Compiler: GCC 9.2.1 20191008, File-System: ext4, Screen Resolution: 2560x1440

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x500002c
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-2ubuntu219.10)
Python Notes: Python 2.7.17 + Python 3.7.5
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + 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 + tsx_async_abort: Mitigation of TSX disabled

EPYC 2 7R32

Processor: AMD EPYC 7R32 48-Core @ 2.80GHz (48 Cores / 96 Threads), Motherboard: Supermicro H11SSL-i v2.00 (2.1 BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 16384 MB DDR4-3200MT/s HMA82GR7CJR8N-XN, Disk: 32GB Mass Storage + 256GB TOSHIBA THNSNJ25 + 600GB INTEL SSDSC2BB60 + 6001GB HGST HUS726060AL, Graphics: llvmpipe 126GB, Monitor: Crystal View, Network: 2 x Intel I210

OS: Ubuntu 19.10, Kernel: 5.3.0-64-generic (x86_64), Desktop: GNOME Shell 3.34.1, Display Server: X Server, OpenGL: 3.3 Mesa 19.2.8 (LLVM 9.0 128 bits), Compiler: GCC 9.2.1 20191008, File-System: ext4, Screen Resolution: 800x600

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-2ubuntu219.10)
Python Notes: Python 2.7.17 + Python 3.7.5
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 + srbds: Not affected + tsx_async_abort: Not affected

2 x Xeon Platinum 8259CL

2 x Xeon Platinum 8259CL NUMA off

Processor: 2 x Intel Xeon Platinum 8259L @ 3.50GHz (48 Cores / 96 Threads), Motherboard: ASRockRack EP2C621D16-4LP (P2.20 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 12 x 16384 MB DDR4-3200MT/s Hynix HMA82GR7CJR8N-XN, Disk: 256GB TOSHIBA THNSNJ25, Graphics: llvmpipe 188GB, Audio: NVIDIA Device 10f8, Monitor: DELL UP2516D, Network: 4 x Intel X722 for 1GbE

OS: Ubuntu 19.10, Kernel: 5.3.0-64-generic (x86_64), Desktop: GNOME Shell 3.34.1, Display Server: X Server, OpenGL: 3.3 Mesa 19.2.8 (LLVM 9.0 256 bits), Compiler: GCC 9.2.1 20191008, File-System: ext4, Screen Resolution: 2560x1440

Xeon & EPYC Tests

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x4002f01
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-2ubuntu219.10)
Python Notes: Python 2.7.17 + Python 3.7.5
Security Notes: itlb_multihit: KVM: Mitigation of Split huge pages + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Mitigation of TSX disabled

	2 x Xeon Gold 5220 R	Xeon Gold 5220 R	Xeon Platinum 8280	2 x Xeon Platinum 8280	Xeon Gold 5218	Xeon Silver 4216	Xeon Gold 6226 R	2 x Xeon Gold 6226 R	2 x Xeon Silver 4216	Xeon W-3275M	2 x Xeon Platinum 8275 CL	2 x Xeon Platinum 8275 CL NUMA off	EPYC 2 7R32	2 x Xeon Platinum 8259 CL	2 x Xeon Platinum 8259 CL NUMA off
Appleseed - Emily (sec)	180.645797	284.27974	197.649505	154.980752	328.139133	345.389961	276.768654	177.661148	222.968514	196.929786	152.902049	152.093681	147.685856	161.846314	163.707232
Normalized	81.75%	51.95%	74.72%	95.29%	45.01%	42.76%	53.36%	83.13%	66.24%	74.99%	96.59%	97.1%	100%	91.25%	90.21%
Appleseed - Disney Material	88.856634	158.77238	103.833099	68.618272	182.557972	194.401843	155.228014	84.844108	107.498089	106.643392	68.606542	68.202167	62.431047	73.581913	73.216224
Normalized	70.26%	39.32%	60.13%	90.98%	34.2%	32.11%	40.22%	73.58%	58.08%	58.54%	91%	91.54%	100%	84.85%	85.27%
Appleseed - Material Tester (sec)	189.459653	162.860353	123.979103	193.464241	179.751505	188.776756	156.605614	185.357154	197.740442	124.147301	189.296166	194.846861	175.193708	185.229734	197.293774
Normalized	65.44%	76.13%	100%	64.09%	68.97%	65.67%	79.17%	66.89%	62.7%	99.86%	65.49%	63.63%	70.77%	66.93%	62.84%
ArrayFire - BLAS CPU (GFLOPS)	2359	1202	3432	3430	1002	765.491	2137	3912	1498	3128	6259	6325	990.798	5320	5651
Normalized	37.3%	19%	54.26%	54.23%	15.84%	12.1%	33.79%	61.85%	23.68%	49.46%	98.96%	100%	15.66%	84.1%	89.34%
Standard Deviation	0.3%	0.1%	1.3%	1%	0.1%	0.3%	0.3%	1.4%	0.1%	1.7%	1.7%	0.1%	1.1%	8%	0.4%
ArrayFire - C.G.C (ms)	9.898	6.409	4.115	7.481	7.042	7.819	6.451	7.155	16.92	4.423	13.22	9.654	35.13	8.430	7.604
Normalized	41.57%	64.21%	100%	55.01%	58.44%	52.63%	63.79%	57.51%	24.32%	93.04%	31.13%	42.62%	11.71%	48.81%	54.12%
Standard Deviation	3.9%	2.5%	2.8%	2.8%	2.9%	1%	0.7%	3.9%	8.5%	6.6%	2.9%	10.9%	1.1%	4.2%	12.4%
asmFish - 1.H.M.2.D (Nodes/s)	85501851	43217939	68762075	133839896	36561817	35085496	44614925	83894514	66895810	66225641	11954 9901	10303 3955	11327 8977	11991 2357	10507 0606
Normalized	63.88%	32.29%	51.38%	100%	27.32%	26.21%	33.33%	62.68%	49.98%	49.48%	89.32%	76.98%	84.64%	89.59%	78.5%
Standard Deviation	0.2%	1.5%	1.1%	0.6%	1.3%	1.4%	2.4%	2%	0.1%	2.6%	2.2%	1.1%	0.9%	2.5%	2.5%

Xeon & EPYC Tests

Basis Universal - ETC1S (sec)	54.554	56.018	51.446	52.694	58.473	**67.461**	54.790	54.947	65.644	**47.653**	52.608	53.135	54.310	57.826	58.280
Normalized	87.35%	85.07%	92.63%	90.43%	81.5%	70.64%	86.97%	86.73%	72.59%	100%	90.58%	89.68%	87.74%	82.41%	81.77%
Standard Deviation	0.7%	0.7%	0.4%	0.4%	0.9%	0.2%	0.1%	0.6%	0.4%	1.7%	0.5%	0.1%	0.1%	0.3%	0.2%
Basis Universal - UASTC Level 3 (sec)	27.981	46.708	30.689	19.885	55.209	**58.246**	44.943	27.226	34.632	30.634	21.060	20.994	**19.193**	23.088	23.147
Normalized	68.59%	41.09%	62.54%	96.52%	34.76%	32.95%	42.71%	70.5%	55.42%	62.65%	91.13%	91.42%	100%	83.13%	82.92%
Standard Deviation	0.2%	0%	0.1%	0.2%	0.1%	0%	0.1%	0.3%	0%	0.1%	1.5%	0%	0.5%	0.6%	0.1%
Blender - BMW27 - CPU-Only (sec)	60.67	113.30	69.80	**38.79**	**149.39**	149.02	111.82	59.45	78.72	74.96	41.68	41.72	41.76	47.63	48.00
Normalized	63.94%	34.24%	55.57%	100%	25.97%	26.03%	34.69%	65.25%	49.28%	51.75%	93.07%	92.98%	92.89%	81.44%	80.81%
Standard Deviation	0.4%	0.3%	0.2%	0.4%	0.3%	0.3%	0.3%	0.1%	0.3%	0.3%	0.6%	0.3%	0.4%	0.4%	0.2%
Blender - Classroom - CPU-Only (sec)	165.96	328.81	198.25	**100.47**	**433.42**	432.11	321.53	163.32	218.06	213.36	108.97	108.94	101.34	124.59	124.67
Normalized	60.54%	30.56%	50.68%	100%	23.18%	23.25%	31.25%	61.52%	46.07%	47.09%	92.2%	92.23%	99.14%	80.64%	80.59%
Standard Deviation	0.2%	0.2%	0.3%	0.4%	0.1%	0.1%	0.1%	0.5%	0.2%	0.3%	0.2%	0.5%	0.7%	0.1%	0.2%
Blender - Fishy Cat - CPU-Only (sec)	98.24	175.95	110.67	66.39	229.28	**229.71**	173.95	96.41	125.35	118.09	69.93	70.04	**65.67**	79.00	79.22
Normalized	66.85%	37.32%	59.34%	98.92%	28.64%	28.59%	37.75%	68.12%	52.39%	55.61%	93.91%	93.76%	100%	83.13%	82.9%
Standard Deviation	0.1%	0.1%	0.3%	0.1%	0%	0.1%	0%	0.4%	0.3%	0.1%	0.1%	0.3%	0.1%	0.2%	0.3%
Blender - Barbershop - CPU-Only (sec)	260.56	456.47	287.80	187.33	589.07	**593.13**	453.22	257.01	333.40	304.79	189.55	190.01	**177.79**	211.33	211.37
Normalized	68.23%	38.95%	61.78%	94.91%	30.18%	29.97%	39.23%	69.18%	53.33%	58.33%	93.8%	93.57%	100%	84.13%	84.11%
Standard Deviation	0.2%	0.1%	0.1%	0.4%	0.1%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.5%	0.1%	0.1%
Blender - Pabellon Barcelona - CPU-Only (sec)	208.30	404.78	246.31	**129.01**	**531.98**	531.39	400.96	207.41	272.72	265.41	139.11	139.00	132.04	158.13	157.99
Normalized	61.93%	31.87%	52.38%	100%	24.25%	24.28%	32.18%	62.2%	47.3%	48.61%	92.74%	92.81%	97.71%	81.58%	81.66%
Standard Deviation	0.1%	0%	0%	0.3%	0.1%	0.1%	0.1%	0.1%	0.3%	0.5%	0.2%	0.1%	0.7%	0.1%	0.1%

Xeon & EPYC Tests

Build2 - Time To Compile (sec)	72.151	91.641	74.118	62.776	101.716	109.699	88.977	70.608	86.325	66.415	64.503	64.421	59.956	66.667	69.195
Normalized	83.1%	65.42%	80.89%	95.51%	58.94%	54.66%	67.38%	84.91%	69.45%	90.27%	92.95%	93.07%	100%	89.93%	86.65%
Standard Deviation	0.3%	0.3%	0.3%	0.2%	0.1%	0.2%	0.1%	0.2%	0.2%	0.4%	2.9%	0.2%	1.2%	1.3%	0.5%
Chaos Group V-RAY - CPU	40270	21886	34710	64331	16981	17105	22074	34749	27592	33014	58326	58525	62897	51803	53051
Normalized	62.6%	34.02%	53.96%	100%	26.4%	26.59%	34.31%	54.02%	42.89%	51.32%	90.67%	90.97%	97.77%	80.53%	82.47%
Standard Deviation	0.8%	0.4%	1.5%	1.3%	0.7%	0.3%	0.5%	1.8%	1.4%	2.1%	0.7%	1.2%	0.5%	1.1%	0.2%
CloverLeaf - L.E.H (sec)	1.06	1.28	0.96	0.69	1.37	1.49	1.27	0.93	1.00	1.14			0.36	0.78	0.63
Normalized	33.96%	28.13%	37.5%	52.17%	26.28%	24.16%	28.35%	38.71%	36%	31.58%			100%	46.15%	57.14%
Standard Deviation	1.3%	0.9%	0.1%	9.2%	0.6%	1.2%	0.5%	15.4%	15.7%	6.1%			0.2%	14.8%	0.3%
DaCapo Benchmark - Jython	4877	4834	4547	4711	5096	5768	4609	4806	5802	4321	4685	4759	5246	5172	5161
Normalized	88.6%	89.39%	95.03%	91.72%	84.79%	74.91%	93.75%	89.91%	74.47%	100%	92.23%	90.8%	82.37%	83.55%	83.72%
Standard Deviation	1%		0.7%	0.8%	1%	0.4%	0.5%	1.5%	1.3%	0.5%	0.9%	0.6%	0.4%	2.2%	0.4%
dav1d - Summer Nature 4K (FPS)	177.89	160.59	199.08	221.31	136.86	132.46	170.07	203.10	159.60	256.60	218.14	216.86	321.17	215.64	212.99
Normalized	55.39%	50%	61.99%	68.91%	42.61%	41.24%	52.95%	63.24%	49.69%	79.9%	67.92%	67.52%	100%	67.14%	66.32%
Standard Deviation	0.8%	0.8%	1%	2.9%	0.4%	0.2%	1.2%	1.4%	2%	0.8%	0.9%	0.5%	0.5%	1.4%	1.4%
dav1d - S.N.1 (FPS)	321.84	274.98	323.20	409.88	265.46	232.35	307.75	358.62	272.55	537.84	422.89	406.66	676.16	431.76	400.24
Normalized	47.6%	40.67%	47.8%	60.62%	39.26%	34.36%	45.51%	53.04%	40.31%	79.54%	62.54%	60.14%	100%	63.85%	59.19%
Standard Deviation	2.9%	1.5%	0.3%	3.5%	0.8%	1.5%	0.5%	0.9%	2.9%	0.7%	2%	1.5%	0.6%	1.5%	3.6%
dav1d - C.1.1.b (FPS)	70.81	58.05	65.40	85.14	55.88	50.10	62.32	73.95	59.51	81.60	90.28	90.78	140.14	89.55	88.66
Normalized	50.53%	41.42%	46.67%	60.75%	39.87%	35.75%	44.47%	52.77%	42.46%	58.23%	64.42%	64.78%	100%	63.9%	63.27%
Standard Deviation	1.1%	0.4%	0.3%	0.1%	0.1%	0.2%	0.7%	0.4%	0.5%	0.1%	0.8%	0.6%	0.7%	0.1%	1.1%
DeepSpeech - CPU (sec)	125.11863	126.07801	118.09377	122.22468	128.40692	135.99744	119.78717	123.38702	133.01160	123.85252	113.14396	138.25629	72.81599	117.72613	135.05100
Normalized	58.2%	57.75%	61.66%	59.58%	56.71%	53.54%	60.79%	59.01%	54.74%	58.79%	64.36%	52.67%	100%	61.85%	53.92%
Standard Deviation	0.6%	1.5%	2.3%	1.6%	1%	1.6%	2.7%	1.3%	0.9%	0.2%	1.6%	3%	0.2%	1%	1.3%
Embree - Pathtracer - Crown (FPS)	29.5153	16.0514	26.2800	45.6121	12.3882	12.4316	15.9943	28.9602	23.2674	24.5503	41.7899	41.3944	47.6464	38.1222	38.1033
Normalized	61.95%	33.69%	55.16%	95.73%	26%	26.09%	33.57%	60.78%	48.83%	51.53%	87.71%	86.88%	100%	80.01%	79.97%
Standard Deviation	0.3%	0.2%	0.3%	0.3%	0.1%	0.2%	0%	0.5%	0.2%	0.2%	0.5%	0.7%	0.3%	0.8%	0.7%

Xeon & EPYC Tests

Embree - Pathtracer ISPC - Crown (FPS)	33.44 69	17.66 04	28.77 30	**53.23 04**	14.41 63	**11.38 27**	16.80 99	31.73 18	21.74 68	26.40 10	49.04 61	49.95 59	45.18 69	46.17 57	46.41 84
Normalized	62.83%	33.18%	54.05%	100%	27.08%	21.38%	31.58%	59.61%	40.85%	49.6%	92.14%	93.85%	84.89%	86.75%	87.2%
Standard Deviation	0.1%	0.1%	0.1%	0.2%	0.1%	0%	0.2%	0.2%	0.1%	0.2%	3.4%	0.1%	0.3%	1.4%	0.2%
Embree - Pathtracer - Asian Dragon	35.87 57	19.61 05	32.24 74	**57.48 70**	15.31 04	**15.27 96**	19.34 72	34.69 19	28.20 32	30.10 57	40.07 87	45.76 74	52.95 32	46.79 20	46.90 84
Normalized	62.41%	34.11%	56.1%	100%	26.63%	26.58%	33.65%	60.35%	49.06%	52.37%	69.72%	79.61%	92.11%	81.4%	81.6%
Standard Deviation	0.3%	0.3%	0.2%	0.5%	0.2%	0.4%	0.1%	0.1%	0.3%	0.3%	1.4%	0.7%	0.2%	1.4%	0.3%
Embree - Pathtracer - Asian Dragon Obj	32.33 01	17.79 57	29.20 61	**51.78 53**	**13.85 26**	13.88 27	17.42 23	31.31 17	25.49 71	27.19 52	35.66 76	40.85 02	47.58 06	42.76 13	42.49 46
Normalized	62.43%	34.36%	56.4%	100%	26.75%	26.81%	33.64%	60.46%	49.24%	52.52%	68.88%	78.88%	91.88%	82.57%	82.06%
Standard Deviation	0.3%	0.3%	0.3%	0.4%	0.3%	0.1%	0.3%	0.1%	0.3%	0.1%	1.6%	0.4%	0.1%	0.2%	0.2%
Embree - Pathtracer ISPC - Asian Dragon	43.09 83	23.60 42	38.31 00	**68.42 41**	19.43 21	**15.59 11**	22.45 98	40.43 25	28.97 32	35.14 95	38.76 58	51.87 41	52.35 41	59.05 63	59.05 02
Normalized	62.99%	34.5%	55.99%	100%	28.4%	22.79%	32.82%	59.09%	42.34%	51.37%	56.66%	75.81%	76.51%	86.31%	86.3%
Standard Deviation	0.1%	0.2%	0.3%	0.1%	0.1%	0.1%	0.1%	0.3%	0.1%	0.4%	2.7%	0.1%	0.1%	0.2%	0.3%
Embree - Pathtracer ISPC - Asian Dragon Obj (FPS)	37.14 98	20.34 18	33.04 90	**58.69 45**	16.76 85	**13.49 18**	19.32 28	34.80 30	25.06 78	30.34 58	36.66 52	44.71 51	45.43 30	50.97 69	50.86 48
Normalized	63.29%	34.66%	56.31%	100%	28.57%	22.99%	32.92%	59.3%	42.71%	51.7%	62.47%	76.18%	77.41%	86.85%	86.66%
Standard Deviation	0.2%	0.1%	0.1%	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	3%	0%	0.1%	0%	0%
High Performance Conjugate Gradient (GFLOP/s)	25.63 03	13.35 29	14.90 97	**28.85 42**	13.01 38	11.88 83	13.95 81	26.59 10	23.15 74	14.16 23	8.414 05	**6.329 71**	17.06 08	27.10 60	16.51 71
Normalized	88.83%	46.28%	51.67%	100%	45.1%	41.2%	48.37%	92.16%	80.26%	49.08%	29.16%	21.94%	59.13%	93.94%	57.24%
Standard Deviation	1%	1.1%	0.5%	1.5%	0.2%	0.5%	0.3%	0.8%	0.1%	1.9%	21.5%	2.9%	0%	0.8%	0%
Himeno Benchmark - P.P.S (MFLOPS)	3405	3398	3510	3515	3405	2824	3401	3410	**2818**	**3866**	3441	3431	3770	3148	3131
Normalized	88.07%	87.9%	90.79%	90.91%	88.07%	73.03%	87.97%	88.21%	72.88%	100%	88.99%	88.74%	97.51%	81.42%	80.98%
Standard Deviation	0.3%	0.1%	0.2%	0.3%	0.1%	0.1%	0.1%	0%	0.1%	0.2%	0%	0.1%	1%	0.1%	0.2%

Xeon & EPYC Tests

Intel MPI Benchmarks - IMB-P2P PingPong (Msg/sec)	19650424	10276850	16653865	31821691	9066471	**8923780**	10620969	20467430	17176231	20246605	**35954425**	35888908	20348261	31988149	32444647
Normalized	54.65%	28.58%	46.32%	88.51%	25.22%	24.82%	29.54%	56.93%	47.77%	56.31%	100%	99.82%	56.59%	88.97%	90.24%
Standard Deviation	0.1%	0.4%	0.4%	0.4%	0.2%	0.1%	0.3%	0.3%	0.2%	0.5%	0.1%	0.6%	0.3%	0.4%	0.6%
Intel Open Image Denoise - Memorial (Images / Sec)	27.97	18.41	31.10	**34.49**	15.80	**12.85**	22.01	33.06	20.43	27.35	15.06	19.55	28.71	33.89	33.10
Normalized	81.1%	53.38%	90.17%	100%	45.81%	37.26%	63.82%	95.85%	59.23%	79.3%	43.66%	56.68%	83.24%	98.26%	95.97%
Standard Deviation	0.3%	0.1%	0.1%	0.8%	0.1%	0.2%	0.2%	1.9%	0.8%	1.9%	1.5%	0.4%	0.2%	0.6%	1.1%
John The Ripper - Blowfish (Real C/S)	51324	25547	42864	**84084**	21403	**20424**	27126	53485	41021	40326	77771	78327	66475	70888	70955
Normalized	61.04%	30.38%	50.98%	100%	25.45%	24.29%	32.26%	63.61%	48.79%	47.96%	92.49%	93.15%	79.06%	84.31%	84.39%
Standard Deviation	0%	0.5%	0.4%	1.4%	0%	0.2%	0.4%	0.4%	0.4%	0.6%	1%	0.2%	0.5%	0.3%	0.1%
John The Ripper - MD5 (Real C/S)	4821000	2506000	4090000	**7880000**	1912667	**1893333**	2583000	4977667	3764000	3654000	7388333	7350667	3972000	6554667	6608333
Normalized	61.18%	31.8%	51.9%	100%	24.27%	24.03%	32.78%	63.17%	47.77%	46.37%	93.76%	93.28%	50.41%	83.18%	83.86%
Standard Deviation	0.3%	0.5%	0.6%	1.5%	0.7%	0.1%	0.7%	0.6%	0.2%	0.7%	0.1%	0.9%	1.3%	1.1%	0.3%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein (ns/day)	17.378	9.535	15.314	**24.788**	8.158	**7.810**	10.325	18.150	14.161	14.562	22.301	20.984	20.821	22.535	21.887
Normalized	70.11%	38.47%	61.78%	100%	32.91%	31.51%	41.65%	73.22%	57.13%	58.75%	89.97%	84.65%	84%	90.91%	88.3%
Standard Deviation	0.5%	0.3%	2.2%	3.8%	0.1%	0.5%	0.4%	0.5%	0.2%	3.4%	1.2%	1.5%	6.9%	2.6%	2.6%
LuxCoreRender - DLSC (M	4.44	2.32	3.79	7.19	**1.74**	1.77	2.35	4.5183	3.43	3.53	6.73	6.75	**7.28**	5.88	5.86
Normalized	60.99%	31.87%	52.06%	98.76%	23.9%	24.31%	32.28%	62.06%	47.12%	48.49%	92.45%	92.72%	100%	80.77%	80.49%
Standard Deviation	0.5%	1.8%	0.1%	2.3%	0.3%	1.6%	1.1%	0.1%	1.3%	0.2%	0.7%	0.4%	2.3%	1%	0.8%

Xeon & EPYC Tests

LuxCoreRender - R.C.a.P (M samples/sec)	4.46	2.48	4.11	7.15	1.88	1.88	2.51	4.32	3.65	3.79	7.09	7.31	8.12	6.40	5.52
Normalized	54.93%	30.54%	50.62%	88.05%	23.15%	23.15%	30.91%	53.2%	44.95%	46.67%	87.32%	90.02%	100%	78.82%	67.98%
Standard Deviation	23.1%	1.1%	1.7%	21.6%	0%	0.5%	0.9%	11.9%	0.2%	3%	6%	1.3%	1.2%	1%	25.6%
lzbench - Zstd 1 - Compression (MB/s)	437	444	457	449	446	365	445	437	359	508	439	443	418	399	407
Normalized	86.02%	87.4%	89.96%	88.39%	87.8%	71.85%	87.6%	86.02%	70.67%	100%	86.42%	87.2%	82.28%	78.54%	80.12%
Standard Deviation			0.2%							0.3%				1%	1%
lzbench - Zstd 1 - Decompression (MB/s)	1147	1180	1212	1168	1184	973	1182	1141	943	1299	1099	1090	1148	1027	1032
Normalized	88.3%	90.84%	93.3%	89.92%	91.15%	74.9%	90.99%	87.84%	72.59%	100%	84.6%	83.91%	88.38%	79.06%	79.45%
Standard Deviation	0.1%			0.3%	0%			0.1%	0.2%	0.4%	0.1%			0.1%	0.1%
lzbench - Zstd 8 - Compression (MB/s)	74	76	77	75	74	64	74	72	63	84	73	75	83	69	71
Normalized	88.1%	90.48%	91.67%	89.29%	88.1%	76.19%	88.1%	85.71%	75%	100%	86.9%	89.29%	98.81%	82.14%	84.52%
lzbench - Zstd 8 - Decompression (MB/s)	1101	1194	1224	1124	1195	998	1193	1100	930	1298	1053	999	1266	1011	966
Normalized	84.82%	91.99%	94.3%	86.59%	92.06%	76.89%	91.91%	84.75%	71.65%	100%	81.12%	76.96%	97.53%	77.89%	74.42%
Standard Deviation	0.2%	0%	0.1%	0.2%	0.2%	0.3%			0.3%	0.2%		0.1%		0.3%	2.1%
lzbench - Crush 0 - Compression (MB/s)	93	98	101	96	96	82	95	91	80	109	94	95	81	88	86
Normalized	85.32%	89.91%	92.66%	88.07%	88.07%	75.23%	87.16%	83.49%	73.39%	100%	86.24%	87.16%	74.31%	80.73%	78.9%
Standard Deviation	0.6%	0.6%	0.6%		0.6%					1.6%			1.2%	0.7%	
lzbench - Crush 0 - Decompression (MB/s)	419	428	440	428	430	353	429	418	344	509	434	432	380	394	396
Normalized	82.32%	84.09%	86.44%	84.09%	84.48%	69.35%	84.28%	82.12%	67.58%	100%	85.27%	84.87%	74.66%	77.41%	77.8%
Standard Deviation				0.1%											

lzbench - Brotli 2 - Compression (MB/s)	172	176	181	176	176	146	176	172	142	196	170	172	165	157	159
Normalized	87.76%	89.8%	92.35%	89.8%	89.8%	74.49%	89.8%	87.76%	72.45%	100%	86.73%	87.76%	84.18%	80.1%	81.12%
Standard Deviation		0.3%							0.7%	0.3%		0.3%	0.7%	1.5%	
lzbench - Brotli 2 - Decompression (MB/s)	613	651	673	623	655	542	653	608	509	721	592	582	564	551	543
Normalized	85.02%	90.29%	93.34%	86.41%	90.85%	75.17%	90.57%	84.33%	70.6%	100%	82.11%	80.72%	78.22%	76.42%	75.31%
Standard Deviation		1.3%	0.2%	0.4%	0.2%	0.2%	0.2%			0.3%	0.4%	0.3%	0.3%	0.1%	0.1%
MKL-DNN DNNL - IP Batch 1D - f32 (ms)	2.23009	4.49985	2.39451	1.63986	4.75696	5.16658	4.41366	2.18975	2.66699	2.86715	1.95992	1.63599	1.67560	1.57687	1.53729
Normalized	68.93%	34.16%	64.2%	93.75%	32.32%	29.75%	34.83%	70.2%	57.64%	53.62%	78.44%	93.97%	91.75%	97.49%	100%
Standard Deviation	3.8%	0.4%	0.8%	3.4%	0.8%	0.5%	0.3%	1%	0.8%	0.3%	5.3%	0.6%	0.7%	3.6%	2.2%
MKL-DNN DNNL - IP Batch All - f32 (ms)	10.6348	8.90795	6.79509	9.52466	9.30959	10.1930	8.84233	10.5239	11.4215	7.54439	19.1030	12.6820	8.88390	9.97669	6.65842
Normalized	62.61%	74.75%	97.99%	69.91%	71.52%	65.32%	75.3%	63.27%	58.3%	88.26%	34.86%	52.5%	74.95%	66.74%	100%
Standard Deviation	0.4%	0.2%	0.2%	0.3%	0.5%	0.2%	0.3%	1%	0.8%	2.3%	0.6%	0.1%	0.2%	0.6%	0.2%
MKL-DNN DNNL - IP Batch All - u8s8f32 (ms)	4.08605	4.61054	3.23121	3.11002	4.83875	5.59275	4.53821	4.11779	4.82603	3.59218	5.36708	3.84746	149.339	3.04866	2.78193
Normalized	68.08%	60.34%	86.1%	89.45%	57.49%	49.74%	61.3%	67.56%	57.64%	77.44%	51.83%	72.31%	1.86%	91.25%	100%
Standard Deviation	1.6%	0.9%	0.2%	2.7%	0.3%	1%	0.4%	1.7%	1.4%	1.6%	2%	0.8%	0.3%	0.8%	0.6%
MKL-DNN DNNL - IP Batch 1D - bf16bf16bf16 (ms)	5.72791	8.68590	4.83170	3.65964	8.8271	10.9014	5.71439	3.21281	5.56500	5.56304	4.10369	4.06041		4.48918	4.46440
Normalized	56.09%	36.99%	66.49%	87.79%	36.4%	29.47%	56.22%	100%	57.73%	57.75%	78.29%	79.13%		71.57%	71.97%
Standard Deviation	0.6%	0.4%	0.1%	0.6%	0%	0.4%	0.1%	0.3%	0.5%	0.8%	0.4%	0.2%		0.2%	0.4%
MKL-DNN DNNL - C.B.c - f32 (ms)	999.544	1949	765.745	496.816	2363	3130	1227	694.324	1578	878.390	1206	650.981	710.140	559.468	461.935
Normalized	46.21%	23.7%	60.32%	92.98%	19.55%	14.76%	37.65%	66.53%	29.27%	52.59%	38.3%	70.96%	65.05%	82.57%	100%
Standard Deviation	0%	0.1%	0.1%	0.3%	0%	0.1%	0.1%	0.2%	0.2%	0.1%	1%	1.6%	0.5%	0.1%	0.1%

MKL-DNN DNNL - C.B.c - u8s8f32 (ms)	4896	9697	5920	**3005**	11821	**12300**	9375	4821	6330	6183	3251	3252	3077	3551	3549
Normalized	61.38%	30.99%	50.77%	100%	25.42%	24.43%	32.06%	62.34%	47.48%	48.61%	92.45%	92.41%	97.68%	84.63%	84.69%
Standard Deviation	0.1%	0.2%	0.3%	0.5%	0%	0.2%	0.2%	0.4%	3%	1.1%	0.3%	0%	1.5%	0.4%	0.6%
MKL-DNN DNNL - D.B.d - f32 (ms)	2.126 80	3.364 32	1.462 32	1.240 29	3.994 88	**5.310 87**	2.231 26	1.497 24	3.065 90	1.745 15	1.331 09	1.251 16	2.225 40	1.257 95	**1.225 89**
Normalized	57.64%	36.44%	83.83%	98.84%	30.69%	23.08%	54.94%	81.88%	39.98%	70.25%	92.1%	97.98%	55.09%	97.45%	100%
Standard Deviation	0.1%	0.3%	0.2%	0.4%	0.2%	0.4%	0.2%	0.5%	0.3%	1.3%	1.3%	0%	1.5%	1%	0.1%
MKL-DNN DNNL - D.B.d - f32 (ms)	2.697 00	4.889 66	1.962 79	**1.136 08**	5.804 20	**7.636 46**	3.130 06	1.707 49	3.855 12	2.275 26	1.173 85	1.172 78	2.204 71	1.266 49	1.263 95
Normalized	42.12%	23.23%	57.88%	100%	19.57%	14.88%	36.3%	66.54%	29.47%	49.93%	96.78%	96.87%	51.53%	89.7%	89.88%
Standard Deviation	0.1%	0.7%	0%	0.6%	0.5%	0.3%	0.4%	0.2%	0.3%	1.4%	0.2%	0.2%	0.5%	0.2%	0.5%
MKL-DNN DNNL - C.B.c - f32 (ms)	122.7 61	244.7 45	94.19 37	**49.84 37**	298.3 00	**395.4 41**	155.3 68	81.14 00	197.9 14	108.5 68	79.11 09	57.51 11	96.68 81	56.64 65	55.35 65
Normalized	40.6%	20.37%	52.92%	100%	16.71%	12.6%	32.08%	61.43%	25.18%	45.91%	63%	86.67%	51.55%	87.99%	90.04%
Standard Deviation	0%	0.1%	0.1%	0.3%	0.1%	0.4%	0.1%	0.1%	0%	0.2%	1.9%	2.4%	2%	0.7%	0.6%
MKL-DNN DNNL - C.B.c - u8s8f32 (ms)	2479	4827	2846	**1517**	5840	6241	4479	2378	3215	2968	2023	1708	**11729**	1794	1734
Normalized	61.2%	31.44%	53.32%	100%	25.98%	24.31%	33.88%	63.81%	47.2%	51.13%	74.99%	88.84%	12.94%	84.6%	87.5%
Standard Deviation	0.1%	0.2%	0.1%	0.4%	0%	0.1%	0.3%	0.8%	1.3%	0.9%	0.3%	0%	0.3%	0.1%	0.1%
MKL-DNN DNNL - D.B.d - f32 (ms)	1278	1921	1114	881.7 83	1700	**2201**	983.9 13	**711.3 89**	1364	1293	981.0 58	910.1 42	1485	739.1 63	743.6 95
Normalized	55.65%	37.04%	63.89%	80.68%	41.85%	32.32%	72.3%	100%	52.14%	55.03%	72.51%	78.16%	47.89%	96.24%	95.66%
Standard Deviation	0.2%	0.1%	0.1%	0.1%	0%	0.6%	0.1%	0.2%	0%	2.8%	0.4%	0%	0.2%	0.2%	0.2%
MKL-DNN DNNL - D.B.d - u8s8f32 (ms)	0.560 890	0.843 709	0.371 036	0.394 455	0.976 730	1.273 75	0.528 632	0.369 060	0.770 300	0.458 422	0.355 362	**0.354 714**	**1131**	0.376 222	0.361 414
Normalized	63.24%	42.04%	95.6%	89.93%	36.32%	27.85%	67.1%	96.11%	46.05%	77.38%	99.82%	100%	0.03%	94.28%	98.15%
Standard Deviation	0.9%	0.2%	0.2%	3%	0.3%	0.2%	0.1%	0.9%	0.8%	0.5%	0.6%	0.8%	0.6%	0.4%	0.5%
MKL-DNN DNNL - D.B.d - u8s8f32 (ms)	3112	6073	3717	**1894**	7189	**7458**	5864	2987	3849	3852	2059	2058	1899	2238	2253
Normalized	60.85%	31.18%	50.95%	100%	26.34%	25.39%	32.29%	63.4%	49.2%	49.16%	91.97%	92.02%	99.71%	84.61%	84.07%
Standard Deviation	0.2%	0.2%	0.1%	0.5%	0.1%	0%	0.1%	0.1%	0.1%	2.2%	0%	0.2%	0.3%	0.2%	1.7%

Xeon & EPYC Tests

MKL-DNN DNNL - C.B.c - bf16bf16bf16 (ms)	15.21 77	29.91 73	14.07 80	**7.929 12**	39.99 85	**40.01 92**	22.42 43	11.60 76	20.51 63	16.59 06	8.712 34	8.647 07		9.206 65	9.187 51
Normalized	52.1%	26.5%	56.32%	100%	19.82%	19.81%	35.36%	68.31%	38.65%	47.79%	91.01%	91.7%		86.12%	86.3%
Standard Deviation	0%	0.1%	0%	0.1%	0%	0%	0%	0.1%	0%	2.9%	0.2%	0.1%		0%	0.2%
MKL-DNN DNNL - C.B.c - u8s8f32 (ms)	35.97 78	66.73 52	26.83 91	19.81 43	81.07 05	105.8 26	42.22 02	26.53 63	55.33 61	31.98 93	59.90 40	30.64 27	**1301**	22.38 30	**19.37 23**
Normalized	53.85%	29.03%	72.18%	97.77%	23.9%	18.31%	45.88%	73%	35.01%	60.56%	32.34%	63.22%	1.49%	86.55%	100%
Standard Deviation	0.1%	0.2%	0.1%	0.2%	0.1%	0.1%	0%	1.6%	0.4%	0.2%	2.1%	0.2%	0.4%	1.8%	0.1%
MKL-DNN DNNL - C.B.c - bf16bf16bf16 (ms)	3918	7840	3497	**1766**	10255	**10258**	5709	2871	5157	3880	1920	1918		2198	2198
Normalized	45.09%	22.53%	50.5%	100%	17.22%	17.22%	30.94%	61.52%	34.25%	45.52%	92.02%	92.08%		80.37%	80.36%
Standard Deviation	0.2%	0.1%	0%	0.1%	0%	0%	0%	0.2%	0.2%	0%	0%	0%		0%	0%
MKL-DNN DNNL - C.B.c - f32 (ms)	54.81 90	108.1 61	42.07 58	**23.17 72**	131.0 88	**171.4 28**	69.14 31	36.37 16	87.54 34	49.87 44	33.63 05	25.05 33	42.54 13	25.77 22	25.06 72
Normalized	42.28%	21.43%	55.08%	100%	17.68%	13.52%	33.52%	63.72%	26.48%	46.47%	68.92%	92.51%	54.48%	89.93%	92.46%
Standard Deviation	0.2%	0.4%	0.1%	0.7%	0%	0.1%	0.2%	0.1%	0.1%	0.2%	0.9%	0.1%	0.8%	0.7%	0.1%
MKL-DNN DNNL - D.B.d - bf16bf16bf16 (ms)	7.229 75	13.14 28	6.553 74	4.068 47	16.54 84	**16.55 16**	9.903 62	5.384 02	8.869 13	7.615 95	3.969 06	**3.965 10**		4.490 39	4.465 23
Normalized	54.84%	30.17%	60.5%	97.46%	23.96%	23.96%	40.04%	73.65%	44.71%	52.06%	99.9%	100%		88.3%	88.8%
Standard Deviation	0.2%	0.6%	0%	0.3%	0%	0.1%	0.1%	0.2%	0.2%	0.9%	0.4%	0.2%		0.2%	0.1%
MKL-DNN DNNL - D.B.d - bf16bf16bf16 (ms)	9.425 91	16.82 53	7.696 05	**4.358 17**	21.42 90	**21.47 55**	12.32 71	6.296 47	10.93 79	8.462 73	4.379 52	4.360 02		4.871 94	4.856 89
Normalized	46.24%	25.9%	56.63%	100%	20.34%	20.29%	35.35%	69.22%	39.84%	51.5%	99.51%	99.96%		89.45%	89.73%
Standard Deviation	0.3%	0%	0.1%	0.1%	0.4%	0.2%	0%	0%	0.1%	0.8%	0.6%	0.1%		0.3%	0.2%

Xeon & EPYC Tests

MKL-DNN DNNL - C.B.c - bf16bf16bf16 (ms)	712.201	1433	637.374	**320.060**	1874	**1875**	1042	527.017	938.910	702.065	348.243	348.326		399.298	399.308
Normalized	44.94%	22.33%	50.22%	100%	17.07%	17.07%	30.71%	60.73%	34.09%	45.59%	91.91%	91.89%		80.16%	80.15%
Standard Deviation	0%	0.2%	0%	0%	0%	0%	0%	1.4%	0%	0.3%	0%	0.2%		0.1%	0%
MKL-DNN DNNL - C.B.c - u8s8f32 (ms)	15.7542	28.4532	11.2900	**7.46050**	34.6031	45.0502	17.9735	11.3282	23.7028	13.4504	17.7549	10.4841	**730.306**	8.74794	7.63651
Normalized	47.36%	26.22%	66.08%	100%	21.56%	16.56%	41.51%	65.86%	31.48%	55.47%	42.02%	71.16%	1.02%	85.28%	97.7%
Standard Deviation	0.1%	0.1%	0.2%	0.8%	0.1%	0.1%	0.2%	0.2%	0.1%	0.2%	2.9%	0.4%	1.7%	0.5%	0.4%
MKL-DNN DNNL - D.B.d - bf16bf16bf16 (ms)	3152	5696	2936	1779	6721	**6722**	3967	2170	3601	3294	1731	**1705**		1904	1904
Normalized	54.1%	29.94%	58.08%	95.85%	25.37%	25.37%	42.99%	78.59%	47.36%	51.77%	98.53%	100%		89.55%	89.55%
Standard Deviation	0.2%	0.1%	0.3%	0.1%	0%	0%	0%	0.4%	0.2%	0.2%	1.6%	0.4%		0%	0%
MKL-DNN DNNL - C.B.c - bf16bf16bf16 (ms)	187.168	369.287	166.984	**86.5391**	484.594	**484.895**	269.991	137.734	246.446	188.611	93.3596	93.2842		106.893	106.714
Normalized	46.24%	23.43%	51.82%	100%	17.86%	17.85%	32.05%	62.83%	35.11%	45.88%	92.69%	92.77%		80.96%	81.09%
Standard Deviation	0%	0.2%	0%	0%	0%	0%	0.1%	0%	0%	0.2%	0%	0.1%		0%	0%
Mlpack Benchmark - scikit_ica (sec)	77.41	68.19	67.36	63.35	68.78	81.36	61.82	74.63	**94.45**	54.91	53.50	53.66	**49.47**	58.48	57.69
Normalized	63.91%	72.55%	73.44%	78.09%	71.92%	60.8%	80.02%	66.29%	52.38%	90.09%	92.47%	92.19%	100%	84.59%	85.75%
Standard Deviation	2.8%	0.6%	0.5%	1.6%	1.1%	1.7%	1.3%	0.7%	2.4%	0.3%	3.7%	0.8%	3.8%	2.4%	1.1%
Mlpack Benchmark - scikit_qda (sec)	42.69	34.24	**30.45**	38.35	37.41	40.75	31.96	44.53	50.10	32.65	**62.02**	57.25	39.54	42.88	41.29
Normalized	71.33%	88.93%	100%	79.4%	81.4%	74.72%	95.28%	68.38%	60.78%	93.26%	49.1%	53.19%	77.01%	71.01%	73.75%
Standard Deviation	2.6%	2.9%	1.6%	1.5%	2.8%	1.7%	2.5%	0.8%	3.5%	1%	5.6%	1.6%	1.2%	4.4%	0.8%

Xeon & EPYC Tests

Mlpack Benchmark - scikit_svm (sec)	17.92	17.82	17.19	17.19	17.98	20.89	17.92	17.77	21.09	15.78	16.87	18.42	15.16	18.76	19.62
Normalized	84.6%	85.07%	88.19%	88.19%	84.32%	72.57%	84.6%	85.31%	71.88%	96.07%	89.86%	82.3%	100%	80.81%	77.27%
Standard Deviation	0.4%	0.9%	0.7%	0.9%	0.2%	0.3%	0%	1.3%	0.5%	2.1%	0.6%	0.1%	1%	0.3%	0.2%
Mlpack Benchmark - scikit_linearridgeregression (sec)	2.39	2.25	1.67	1.82	2.46	2.97	1.93	2.08	2.99	1.99	2.36	2.46	1.79	2.30	2.42
Normalized	69.87%	74.22%	100%	91.76%	67.89%	56.23%	86.53%	80.29%	55.85%	83.92%	70.76%	67.89%	93.3%	72.61%	69.01%
Standard Deviation	8.1%	2.3%	2%	2.6%	2.9%	2.4%	2.4%	7.9%	1.1%	1.6%	6%	4.2%	2.1%	4%	2.9%
NAMD - ATPase Simulation - 327,506 Atoms (days/ns)	0.60333	1.15745	0.70709	0.36226	1.51168	1.51721	1.13586	0.58237	0.76982	0.81434			0.48614	0.44551	0.45422
Normalized	60.04%	31.3%	51.23%	100%	23.96%	23.88%	31.89%	62.2%	47.06%	44.49%			74.52%	81.31%	79.75%
Standard Deviation	1.8%	0.2%	0.1%	0.6%	0.1%	0.2%	0.2%	0.3%	0.4%	3.7%			0.3%	0.1%	0%
NAS Parallel Benchmarks - BT.C	100761	50788	71842	136047	48617	46390	56576	77471	65510	69348			106416	104108	84766
Normalized	74.06%	37.33%	52.81%	100%	35.74%	34.1%	41.59%	56.94%	48.15%	50.97%			78.22%	76.52%	62.31%
Standard Deviation	0.1%	0.2%	0.1%	0.1%	0.2%	0%	0.1%	0.2%	0.3%	0.3%			0.8%	0.2%	0.1%
NAS Parallel Benchmarks - EP.C	3769	1863	3194	6105	1621	1546	2044	4005	2984	3025			3486	5053	5059
Normalized	61.73%	30.52%	52.32%	100%	26.56%	25.32%	33.49%	65.61%	48.88%	49.55%			57.1%	82.76%	82.87%
Standard Deviation	1.5%	0.3%	2.4%	2.5%	0.3%	2.8%	3%	1.7%	2.6%	2.3%			1.5%	2.7%	1.2%
NAS Parallel Benchmarks - EP.D	3781	1967	3283	6285	1636	1571	2095	3970	3145	3211			3570	5310	5284
Normalized	60.16%	31.29%	52.24%	100%	26.03%	25.01%	33.33%	63.16%	50.04%	51.09%			56.81%	84.49%	84.08%
Standard Deviation	2.9%	0.6%	2.8%	8.2%	0.5%	0.7%	0.7%	10.8%	0.2%	0.2%			0.3%	2.9%	2.8%
NAS Parallel Benchmarks - LU.C	108883	56745	74256	140090	48143	46723	58595	106268	85607	69607			99822	120962	94643
Normalized	77.72%	40.51%	53.01%	100%	34.37%	33.35%	41.83%	75.86%	61.11%	49.69%			71.26%	86.35%	67.56%
Standard Deviation	0.2%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%			0.2%	0.1%	0.1%

Xeon & EPYC Tests

NAS Parallel Benchmarks - MG.C	58984	31197	37089	**69175**	30329	**28301**	31634	58681	52832	35376			49330	63393	43490
Normalized	85.27%	45.1%	53.62%	100%	43.84%	40.91%	45.73%	84.83%	76.37%	51.14%			71.31%	91.64%	62.87%
Standard Deviation	1.4%	0.6%	0.6%	2.8%	0.2%	0.4%	0.2%	0.6%	0.5%	0.2%			2.8%	0.8%	1.7%
NAS Parallel Benchmarks - SP.B	50933	23347	32682	**70893**	22329	**21150**	23860	49232	42221	31427			51225	53979	38494
Normalized	71.84%	32.93%	46.1%	100%	31.5%	29.83%	33.66%	69.45%	59.56%	44.33%			72.26%	76.14%	54.3%
Standard Deviation	0.1%	0.4%	0.8%	0.3%	0.1%	0.5%	0.2%	0.7%	0.6%	0.8%			3.9%	0.2%	0.2%
Nettle - aes256 (Mbyte/s)	6159	6134	6313	6320	6165	5024	6161	6157	5062	**7071**	6173	6184	**4665**	5513	5523
Normalized	87.11%	86.75%	89.29%	89.38%	87.19%	71.06%	87.14%	87.09%	71.59%	100%	87.3%	87.46%	65.98%	77.97%	78.12%
Standard Deviation	0.1%	0.1%	0.2%	0.1%	0%	0.4%	0.2%	0.2%	0.1%	1%	0.1%	0%	0%	0.8%	0.2%
Nettle - chacha (Mbyte/s)	1025	1020	1051	1052	1024	837.612	1025	1025	841.649	**1172**	1026	1028	**750.357**	917.750	917.505
Normalized	87.44%	87.03%	89.67%	89.74%	87.4%	71.46%	87.45%	87.48%	71.8%	100%	87.5%	87.67%	64.02%	78.3%	78.28%
Standard Deviation	0.1%	0.2%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0%	0.9%	0.2%	0.1%	0%	0.8%	0.8%
Nettle - sha512 (Mbyte/s)	489.15	485.86	501.98	500.98	489.51	**399.99**	488.81	489.42	401.13	**550.93**	487.55	490.26	478.09	437.62	438.23
Normalized	88.79%	88.19%	91.12%	90.93%	88.85%	72.6%	88.72%	88.84%	72.81%	100%	88.5%	88.99%	86.78%	79.43%	79.54%
Standard Deviation	0.1%	0.4%	0.1%	0.3%	0.1%	0.2%	0.3%	0%	0.1%	0.9%	1%	0.2%	0.1%	1%	0.7%
Nettle - poly1305-aes (Mbyte/s)	2797	2780	2867	2869	2799	2292	2795	2797	2295	**3208**	2786	2804	**2046**	2498	2517
Normalized	87.2%	86.65%	89.39%	89.42%	87.24%	71.44%	87.14%	87.2%	71.53%	100%	86.85%	87.39%	63.79%	77.86%	78.46%
Standard Deviation	0.1%	0.4%	0.1%	0.1%	0%	0.3%	0.2%	0%	0.1%	1.3%	1.1%	0.1%	0.1%	1.1%	0%
Numpy Benchmark (Score)	300.73	313.76	330.33	321.82	315.14	272.12	318.87	304.16	**262.78**	**367.56**	338.44	315.66	323.58	310.40	293.53
Normalized	81.82%	85.36%	89.87%	87.56%	85.74%	74.03%	86.75%	82.75%	71.49%	100%	92.08%	85.88%	88.03%	84.45%	79.86%
Standard Deviation	0.4%	1.8%	1.3%	1.6%	1.1%	0.6%	0.3%	0.8%	1.3%	1.3%	1.2%	2.3%	0.6%	0.4%	2%
OSPray - San Miguel - SciVis (FPS)	43.48	23.26	38.46	**69.52**	18.87	**14.71**	22.69	42.27	27.84	34.48	63.54	66.67	58.82	62.5	61.58
Normalized	62.54%	33.46%	55.32%	100%	27.14%	21.16%	32.64%	60.8%	40.05%	49.6%	91.4%	95.9%	84.61%	89.9%	88.58%
Standard Deviation	0%	0%	0%	3.5%	0%	0%	0.6%	2.5%	0.8%	0%	3%	0%	0%	0%	3%

Xeon & EPYC Tests

OSPray - XFrog Forest - SciVis	7.19	3.70	6.25	**12.05**	3.01	**2.34**	3.68	7.09	4.57	5.72	11.36	11.36	11.03	10.42	10.32
Normalized	59.67%	30.71%	51.87%	100%	24.98%	19.42%	30.54%	58.84%	37.93%	47.47%	94.27%	94.27%	91.54%	86.47%	85.64%
Standard Deviation	0%	0.2%	0%	0%	0%	0%	0%	0%	0%	0.2%	0%	0%	0.6%	0%	0.4%
OSPray - San Miguel - Path Tracer	3.95	2.14	3.52	**6.53**	1.75	**1.40**	2.02	3.71	2.63	3.25	5.82	5.87	4.73	5.58	5.54
Normalized	60.49%	32.77%	53.91%	100%	26.8%	21.44%	30.93%	56.81%	40.28%	49.77%	89.13%	89.89%	72.43%	85.45%	84.84%
Standard Deviation	0.1%	0.1%	0.2%	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%
OSPray - NASA Streamlines - SciVis (FPS)	55.56	28.57	50	**90.91**	23.26	**18.18**	29.41	55.56	34.48	45.45	82.62	83.33	76.92	76.92	76.92
Normalized	61.12%	31.43%	55%	100%	25.59%	20%	32.35%	61.12%	37.93%	49.99%	90.88%	91.66%	84.61%	84.61%	84.61%
Standard Deviation	0%	0%		0%	0%	0%	0%	0%	0%	0%	2.6%	0%	0%	0%	0%
OSPray - XFrog Forest - Path Tracer (FPS)	3.98	2.06	3.46	**6.67**	1.68	**1.31**	2.02	3.88	2.55	3.17	6.25	6.24	5.85	5.71	5.71
Normalized	59.67%	30.88%	51.87%	100%	25.19%	19.64%	30.28%	58.17%	38.23%	47.53%	93.7%	93.55%	87.71%	85.61%	85.61%
Standard Deviation	0%	0.1%	0.2%	0%	0.1%	0.1%	0.1%	0%	0.1%	0.1%	0%	0.4%	0.6%	0%	0.2%
OSPray - M.R - SciVis	47.62	27.03	42.87	**71.43**	22.22	**17.94**	25.48	45.45	32.53	40	50.88	58.82	40	62.5	62.5
Normalized	66.67%	37.84%	60.02%	100%	31.11%	25.12%	35.67%	63.63%	45.54%	56%	71.23%	82.35%	56%	87.5%	87.5%
Standard Deviation	0%	0%	2.4%	0%	0%	0.9%	1.3%	0%	1.7%		3%	0%		0%	0%
OSPray - NASA Streamlines - Path Tracer (FPS)	10.42	5.38	9.49	**18.18**	4.37	**3.41**	5.52	10.56	6.62	8.69	17.02	16.95	16.60	15.625	15.54
Normalized	57.32%	29.59%	52.2%	100%	24.04%	18.76%	30.36%	58.09%	36.41%	47.8%	93.62%	93.23%	91.31%	85.95%	85.48%
Standard Deviation	0%	0%	0.5%	0%	0.3%	0%	0.3%	0.6%	0%	0.2%	0.9%	0%	0.8%	0%	0.9%
PHPBench - P.B.S	631283	629690	649164	649693	632455	515697	632431	632601	519964	**734339**	640173	639026	**500524**	573483	574348
Normalized	85.97%	85.75%	88.4%	88.47%	86.13%	70.23%	86.12%	86.15%	70.81%	100%	87.18%	87.02%	68.16%	78.1%	78.21%
Standard Deviation	0.3%	0.2%	0.1%	0.2%	0.2%	0.6%	0.2%	0%	0.1%	0.2%	0%	0.1%	0.4%	0.3%	0.1%

Xeon & EPYC Tests

PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	598799	383121	560888	**909916**	322052	**313377**	376860	587882	501697	567697	629985	725741	891303	795715	790828
Normalized	65.81%	42.11%	61.64%	100%	35.39%	34.44%	41.42%	64.61%	55.14%	62.39%	69.24%	79.76%	97.95%	87.45%	86.91%
Standard Deviation	0.6%	0.2%	0.5%	2%	0.1%	0.3%	0.2%	0.1%	0.2%	1.1%	6.5%	0.4%	0.2%	0.5%	0.3%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Write (TPS)	34228	45519	**53139**	24467	40895	40373	46503	37715	34916	11704	3891	3198	6106	4009	**3169**
Normalized	64.41%	85.66%	100%	46.04%	76.96%	75.98%	87.51%	70.97%	65.71%	22.03%	7.32%	6.02%	11.49%	7.55%	5.96%
Standard Deviation	0.8%	0.2%	1.2%	0.1%	0%	0.6%	0.2%	0.5%	1.1%	1.3%	8.9%	2.1%	18.1%	2.4%	31.6%
PyBench - T.F.A.T.T (Millisecond	1100	1114	1076	1073	1101	1342	1103	1104	**1343**	**951**	1133	1123	1226	1252	1253
Normalized	86.45%	85.37%	88.38%	88.63%	86.38%	70.86%	86.22%	86.14%	70.81%	100%	83.94%	84.68%	77.57%	75.96%	75.9%
Standard Deviation	0.2%	1.9%	0.2%	0.2%		0.1%	0.5%	0.1%	0.1%	0.3%	0.7%	0.1%	0.4%	0.1%	0.2%
PyPerformance - float (Millisecond	113	114	109	109	114	**137**	115	113	**137**	**94.5**				123	123
Normalized	83.63%	82.89%	86.7%	86.7%	82.89%	68.98%	82.17%	83.63%	68.98%	100%				76.83%	76.83%
Standard Deviation	0.5%									0.2%					0.5%
PyPerformance - regex_compile (Millisecond	167	168	164	164	167	204	168	167	204	**157**			**213**	200	200
Normalized	94.01%	93.45%	95.73%	95.73%	94.01%	76.96%	93.45%	94.01%	76.96%	100%			73.71%	78.5%	78.5%
Standard Deviation										1.3%			0.3%		
PyPerformance - python_startup (Millisecond	11.2	11.3	11.2	11.2	11.1	15.4	11.0	**10.9**	15.4	17.7			16.3	11.3	**22.6**
Normalized	97.32%	96.46%	97.32%	97.32%	98.2%	70.78%	99.09%	100%	70.78%	61.58%			66.87%	96.46%	48.23%
Standard Deviation	0%	0%	1%	0.5%	0.9%	0.4%	1.4%	0.5%	0.4%	0.9%			0%	0.5%	0.3%

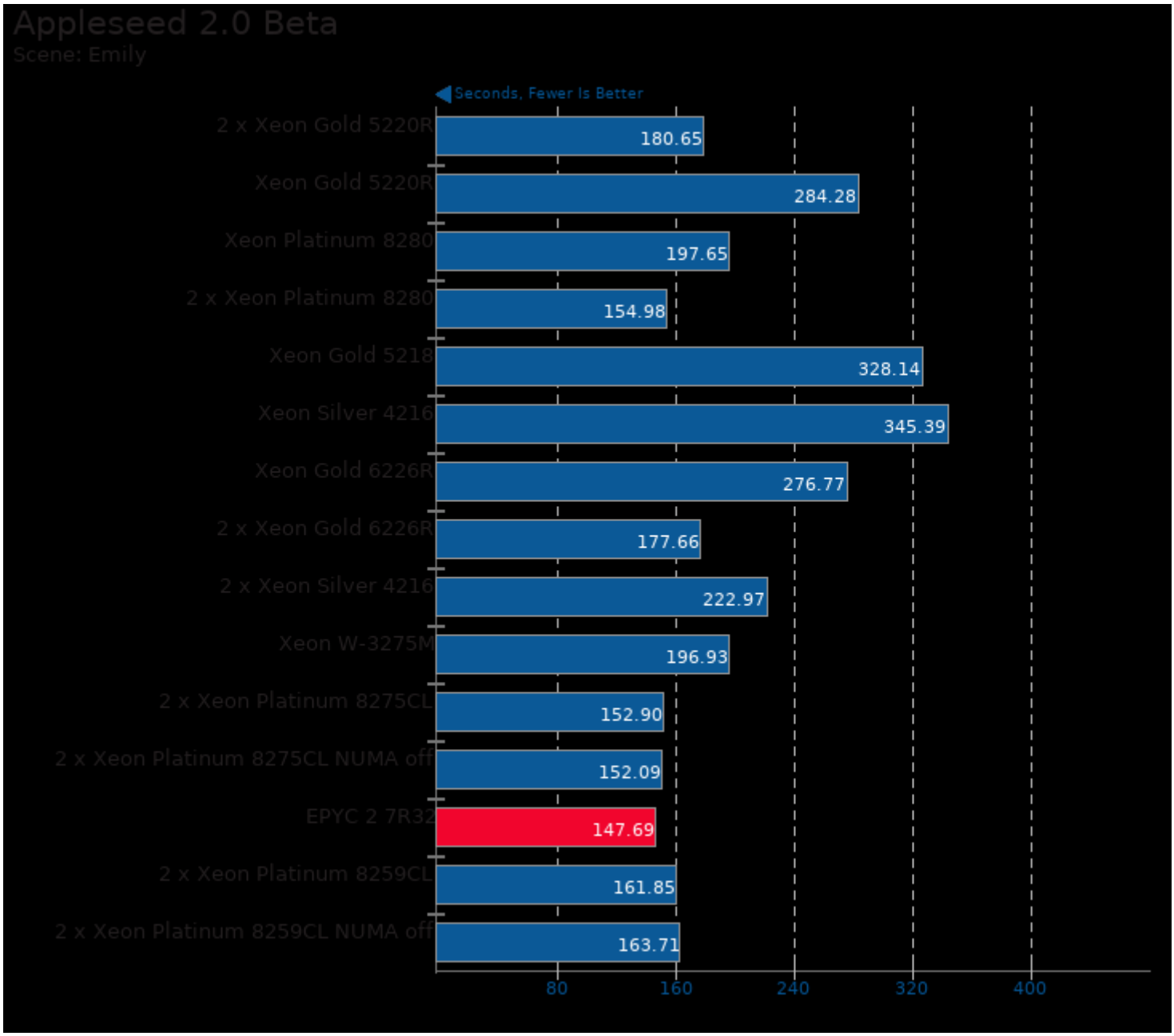
Xeon & EPYC Tests

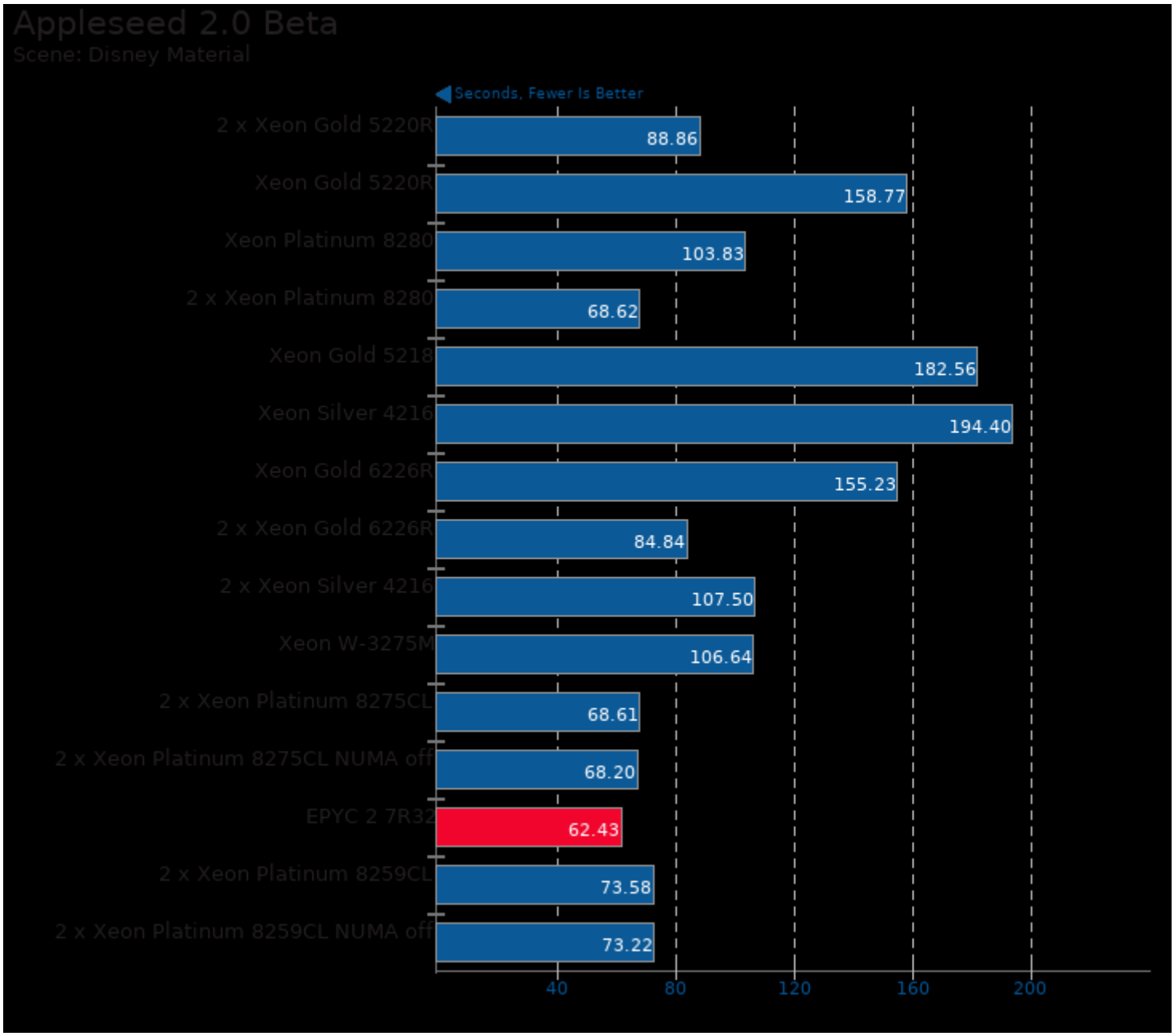
PyPerformance - django_template (Millisecond	47.3	47.1	46.2	**45.9**	47.2	57.5	47.3	47.1	57.5	49.9			**66.4**	64.2	64.1
Normalized	97.04%	97.45%	99.35%	100%	97.25%	79.83%	97.04%	97.45%	79.83%	91.98%			69.13%	71.5%	71.61%
Standard Deviation	0.1%	0.2%	0.2%	0.3%	0%	0%	0.1%	0.1%	0.2%	2.3%			0.2%	0.2%	0.2%
Radiance Benchmark - Serial (sec)	746.918	749.923	728.361	728.246	747.844	**909.318**	746.687	745.686	907.757	**665.7**	753.635	753.433	730.7	841.647	841.323
Normalized	89.13%	88.77%	91.4%	91.41%	89.02%	73.21%	89.15%	89.27%	73.33%	100%	88.33%	88.36%	91.1%	79.09%	79.13%
Radiance Benchmark - SMP Parallel (sec)	230.561	242.515	235	226.076	241.897	**299.739**	242.002	233.042	281.251	219.836	232.695	227.159	**219.652**	258.343	255.588
Normalized	95.27%	90.57%	93.47%	97.16%	90.8%	73.28%	90.76%	94.25%	78.1%	99.92%	94.39%	96.7%	100%	85.02%	85.94%
Renaissance - Scala Dotty (ms)	7415	7556	6664	6891	8286	**8635**	6999	7231	8583	6971	6733	7042	**6577**	7257	7566
Normalized	88.71%	87.04%	98.7%	95.45%	79.38%	76.17%	93.97%	90.96%	76.63%	94.35%	97.69%	93.4%	100%	90.64%	86.93%
Standard Deviation	1.9%	1.5%	0.6%	3%	1.1%	0.5%	1.5%	2.4%	2.9%	1%	0.7%	0.6%	1%	0.6%	1.6%
Renaissance - Apache Spark Bayes (ms)	3663	3150	**2674**	3229	3477	3589	2857	3405	4199	2744	**5186**	4511	3057	3496	3814
Normalized	73.01%	84.89%	100%	82.83%	76.9%	74.52%	93.61%	78.53%	63.68%	97.47%	51.57%	59.28%	87.48%	76.5%	70.12%
Standard Deviation	5.9%	2.7%	1.6%	5.6%	3.7%	5.2%	4.9%	5.7%	7.8%	2.9%	8.8%	6.4%	4.3%	6.8%	7.3%
Renaissance - Savina Reactors.IO (ms)	26257	22776	21975	26765	27198	22798	27199	27973	**28596**	25187	26907	27362	**19304**	28107	28252
Normalized	73.52%	84.75%	87.84%	72.12%	70.97%	84.67%	70.97%	69.01%	67.5%	76.64%	71.74%	70.55%	100%	68.68%	68.33%
Standard Deviation	9.5%	8.5%	13.5%	8.9%	9.5%	5.5%	7.8%	11.3%	7.6%	11.9%	10.6%	9.2%	8.5%	8.6%	8.9%
Renaissance - A.S.P (ms)	24541	21704	**20621**	23588	23703	25271	21743	24522	**28046**	21016	24506	24666	21642	25275	25637
Normalized	84.03%	95.01%	100%	87.42%	87%	81.6%	94.84%	84.09%	73.53%	98.12%	84.15%	83.6%	95.28%	81.59%	80.44%
Standard Deviation	2.3%	2.2%	1.8%	3%	1.6%	1.7%	0.3%	1.5%	3%	1.8%	3.7%	2.6%	2.1%	2.5%	2%
Scikit-Learn (sec)	10.458	10.112	**9.127**	9.392	10.286	12.030	9.924	10.449	12.549	9.661	11.065	11.490	10.419	12.459	**12.954**
Normalized	87.27%	90.26%	100%	97.18%	88.73%	75.87%	91.97%	87.35%	72.73%	94.47%	82.49%	79.43%	87.6%	73.26%	70.46%
Standard Deviation	0.4%	0.6%	0.8%	2.2%	0.7%	0.4%	0.5%	0.9%	0.5%	0.6%	0.8%	0.5%	0.6%	0.5%	0.6%
SMHasher - wyhash (cycles/hash	18.806	18.815	22.678	22.677	19.806	22.131	25.134	25.129	22.129	**18.508**	26.086	**26.129**		24.151	24.154
Normalized	98.42%	98.37%	81.61%	81.62%	93.45%	83.63%	73.64%	73.65%	83.64%	100%	70.95%	70.83%		76.63%	76.62%

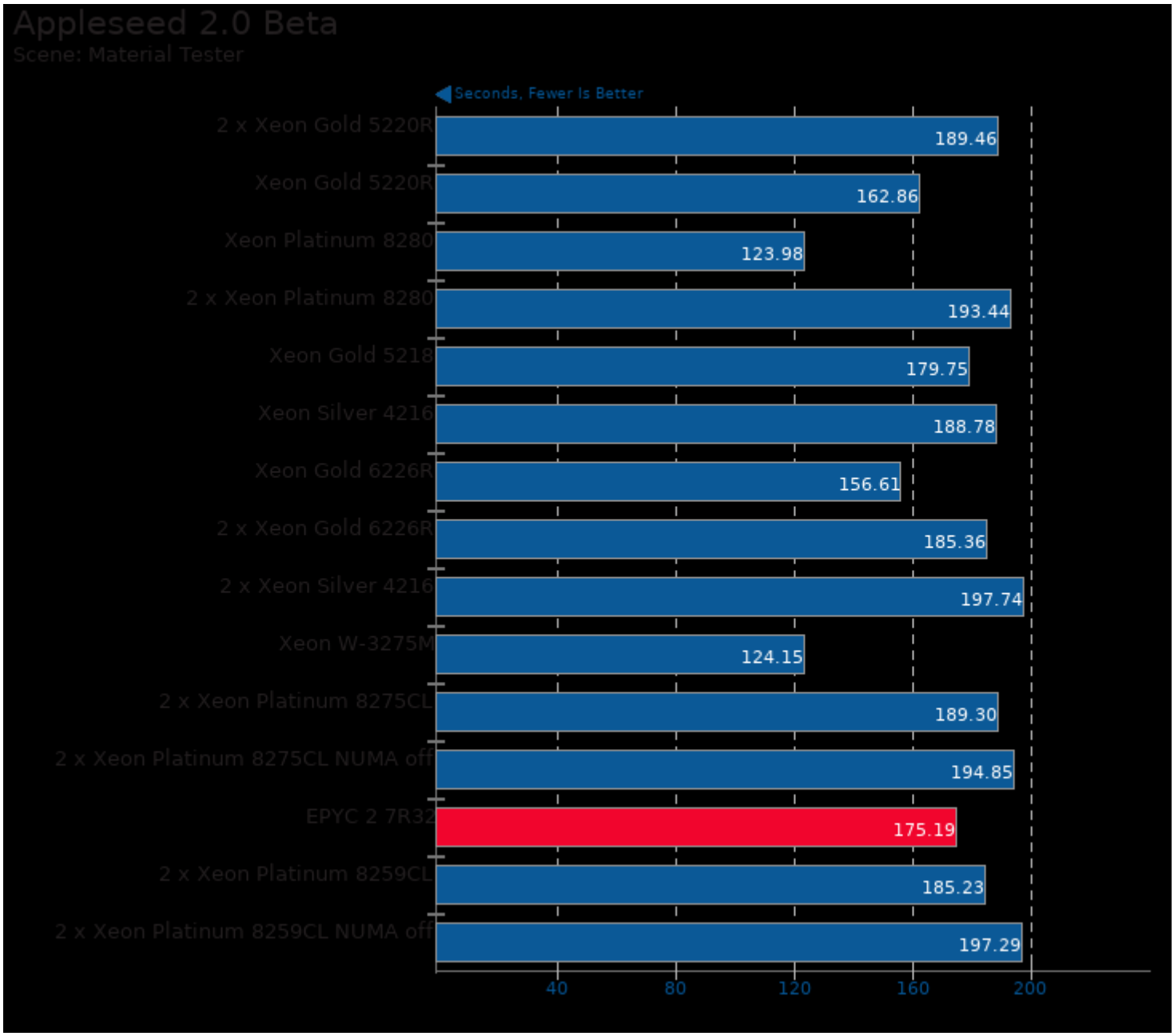
Standard Deviation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.3%	0%	0.1%		0%	0%
SMHasher - wyhash (MiB/sec)						22004	19430	19424	22011	26299	18770	18776		20225	20232
Normalized						83.67%	73.88%	73.86%	83.7%	100%	71.37%	71.39%		76.91%	76.93%
Standard Deviation						0%	0.1%	0%	0%	0.7%	0%	0%		0.1%	0%
Stockfish - Total Time (Nodes/s)	74235829	38167326	62891312	119715795	32424332	31174576	39776292	75203729	60569696	61170651	10987 4307	10841 2514	11676 5028	10351 3853	10410 6676
Normalized	62.01%	31.88%	52.53%	100%	27.08%	26.04%	33.23%	62.82%	50.59%	51.1%	91.78%	90.56%	97.54%	86.47%	86.96%
Standard Deviation	0.7%	0.8%	2.3%	1.3%	1%	2.3%	1.4%	2.2%	1.6%	2%	1.2%	1.6%	1.8%	0.6%	0.2%
SVT-AV1 - Enc Mode 4 - 1080p (FPS)	5.302	4.285	6.030	7.033	3.339	3.309	4.340	5.431	4.216	6.389	5.243	5.942	5.714	5.955	5.996
Normalized	75.39%	60.93%	85.74%	100%	47.48%	47.05%	61.71%	77.22%	59.95%	90.84%	74.55%	84.49%	81.25%	84.67%	85.26%
Standard Deviation	0.6%	0.6%	0.9%	1.6%	0.2%	1.1%	0.7%	0.3%	0.4%	0.6%	1.3%	1.3%	2.8%	0.1%	2.5%
SVT-AV1 - Enc Mode 8 - 1080p (FPS)	49.209	33.088	51.917	56.982	27.193	26.460	34.636	51.710	40.548	53.819	55.374	56.122	54.472	53.040	52.314
Normalized	86.36%	58.07%	91.11%	100%	47.72%	46.44%	60.78%	90.75%	71.16%	94.45%	97.18%	98.49%	95.6%	93.08%	91.81%
Standard Deviation	0.6%	0.7%	0.2%	2%	0.4%	0.5%	0.5%	0.8%	0.4%	1.5%	0.5%	1.5%	2.4%	0.4%	0.9%
SVT-VP9 - V.Q.O - Bosphorus 1080p (FPS)	237.57	224.01	265.40	233.17	172.82	173.18	221.95	256.91	206.42	282.18	191.66	228.38	291.17	229.91	229.53
Normalized	81.59%	76.93%	91.15%	80.08%	59.35%	59.48%	76.23%	88.23%	70.89%	96.91%	65.82%	78.44%	100%	78.96%	78.83%
Standard Deviation	1.6%	0.9%	2.7%	2.5%	1.8%	2.4%	2.4%	2.9%	1.3%	0.6%	9.4%	12.5%	1.5%	12.1%	12.3%
Timed GCC Compilation - Time To Compile	1061	1168	1064	1006	1219	1398	1093	996.904	1269	994.583	966.599	1033	849.192	1012	1074
Normalized	80.07%	72.72%	79.83%	84.45%	69.67%	60.74%	77.72%	85.18%	66.93%	85.38%	87.85%	82.21%	100%	83.91%	79.09%
Standard Deviation	0.2%	0%	0%	0%	0%	0.1%	0.1%	0.1%	0.1%	0.1%	1.1%	0.2%	0.1%	0.1%	0.2%
Timed GDB GNU Debugger Compilation - Time To Compile	146.439	151.909	144.643	142.695	156.299	177.772	139.120	133.444	169.704	134.824	128.950	145.510	108.675	129.689	146.435
Normalized	74.21%	71.54%	75.13%	76.16%	69.53%	61.13%	78.12%	81.44%	64.04%	80.61%	84.28%	74.69%	100%	83.8%	74.21%
Standard Deviation	0.1%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.2%	0.1%	0.5%	0.3%	0.1%	0.6%	0.3%

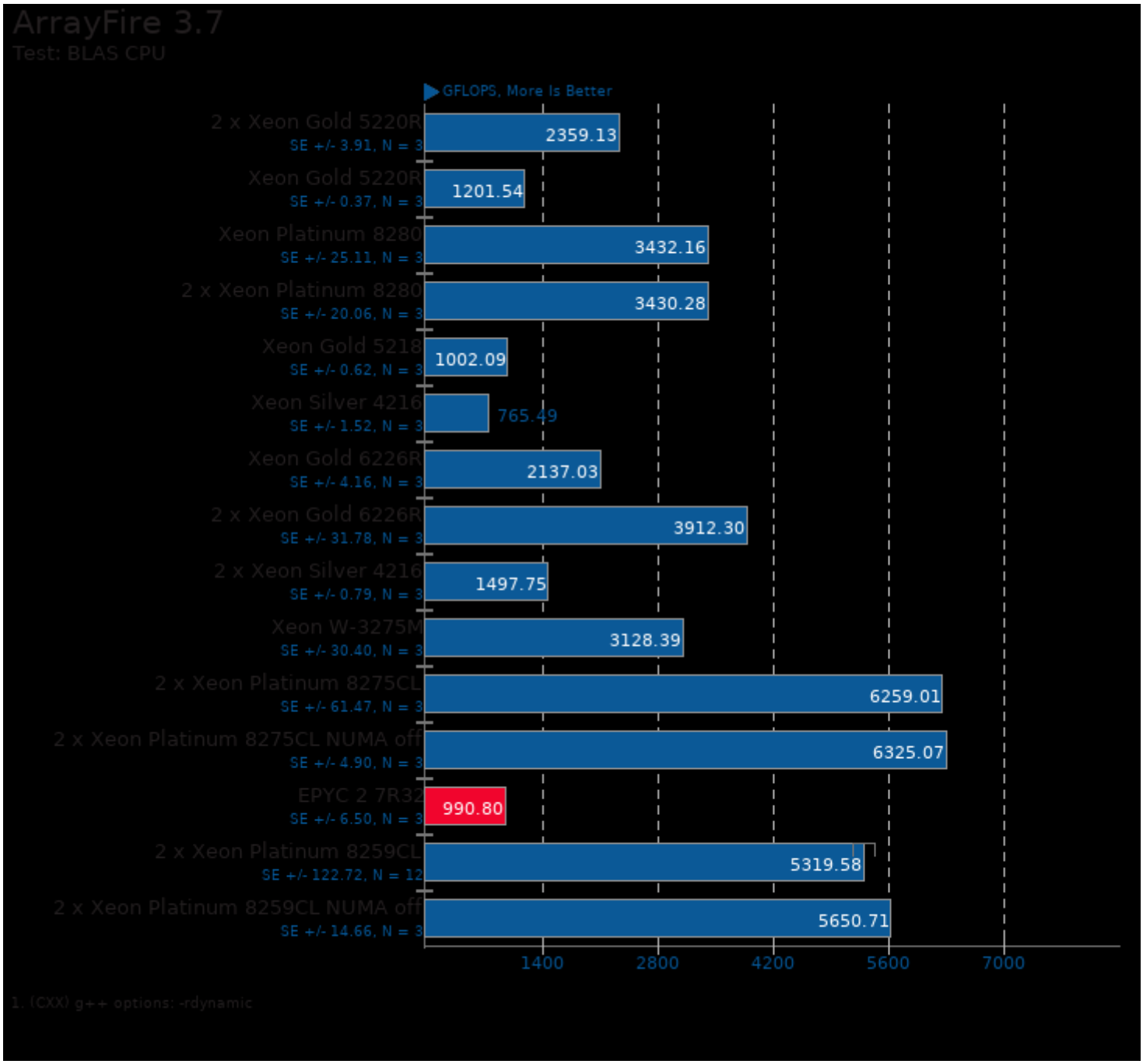
Xeon & EPYC Tests

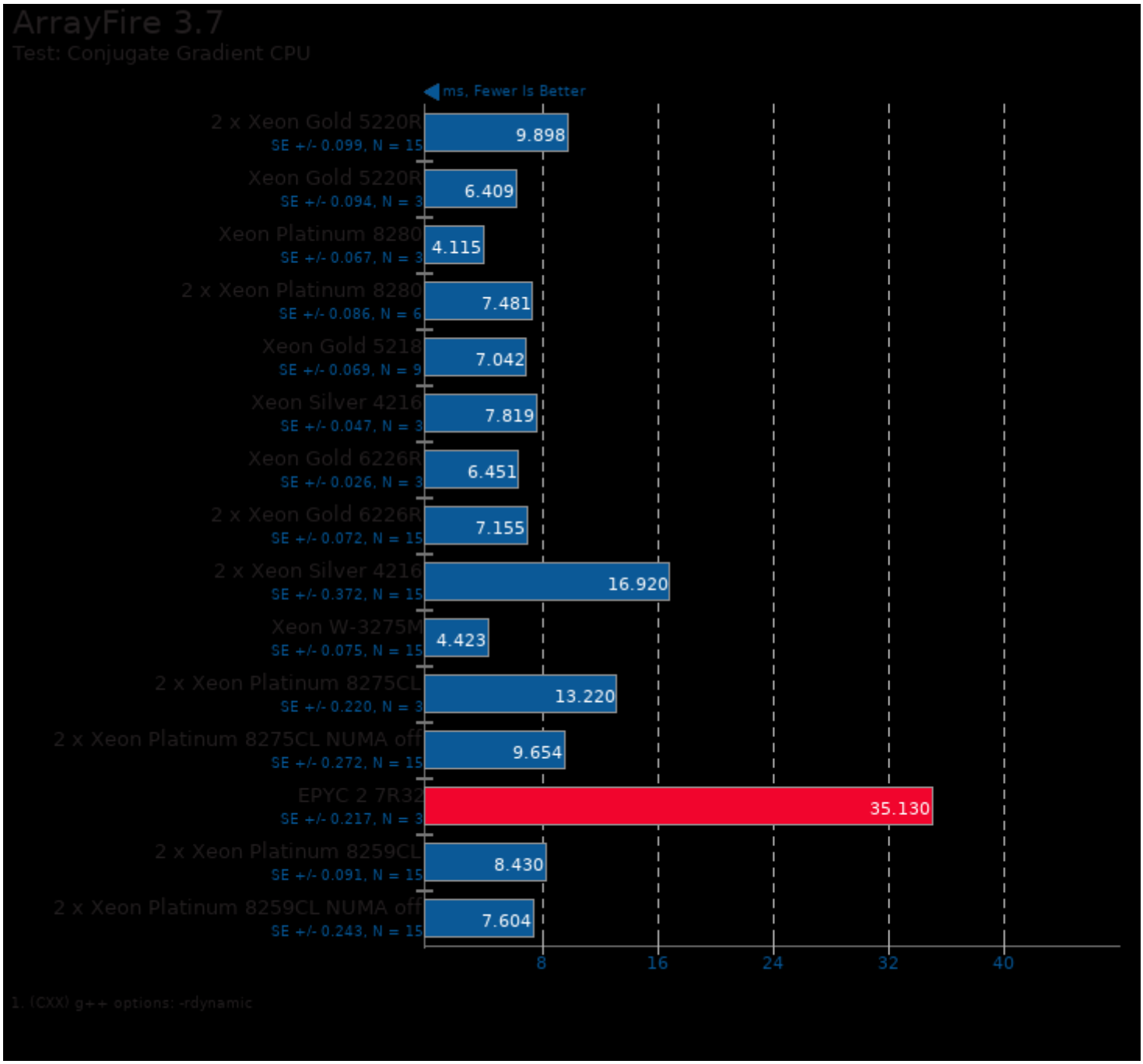
Timed Linux Kernel Compilation - Time To Compile	36.699	59.012	40.898	27.309	67.156	71.770	57.772	36.595	45.315	36.367	27.100	29.258	24.005	27.581	29.276
Normalized	65.41%	40.68%	58.69%	87.9%	35.75%	33.45%	41.55%	65.6%	52.97%	66.01%	88.58%	82.05%	100%	87.03%	82%
Standard Deviation	3%	3%	2.9%	3.4%	2.6%	2.8%	2.7%	2.9%	2.9%	2.9%	3.2%	4.8%	2.8%	3.2%	4.7%
Timed LLVM Compilation - Time To Compile	286.782	430.426	308.741	221.515	501.218	531.152	433.191	279.682	347.827	281.678	218.050	244.910	200.039	232.053	244.940
Normalized	69.75%	46.47%	64.79%	90.3%	39.91%	37.66%	46.18%	71.52%	57.51%	71.02%	91.74%	81.68%	100%	86.2%	81.67%
Standard Deviation	1.2%	0.7%	2.7%	0.8%	1.2%	0.8%	0.9%	2.2%	0.9%	1.6%	1.3%	2.5%	0.6%	0.8%	1%
Timed MrBayes Analysis - P.P.A (sec)	134.928	134.483	128.848	129.986	147.734	193.466	123.702	124.258	194.504	143.348	125.867	124.297	92.361	139.750	141.898
Normalized	68.45%	68.68%	71.68%	71.05%	62.52%	47.74%	74.66%	74.33%	47.49%	64.43%	73.38%	74.31%	100%	66.09%	65.09%
Standard Deviation	0.3%	0%	0%	0.5%	0.5%	0.1%	0.1%	0.4%	0.6%	0.2%	2.9%	0%	1.3%	0.4%	2.3%
Tungsten Renderer - Hair (sec)	11.0726	18.9840	12.6863	7.82706	22.4866	23.6129	18.6129	10.6653	13.6031	12.7104	8.29067	8.19337	7.67455	9.26217	9.09073
Normalized	69.31%	40.43%	60.49%	98.05%	34.13%	32.5%	41.23%	71.96%	56.42%	60.38%	92.57%	93.67%	100%	82.86%	84.42%
Standard Deviation	0.6%	0.3%	0.5%	2.5%	0.2%	0.9%	0.6%	0.9%	0.8%	0.7%	0.8%	0.8%	1.2%	1.1%	1%
Tungsten Renderer - Water Caustic (sec)	23.3367	25.0080	22.0167	21.5896	25.9635	28.8979	24.0874	23.1916	27.3948	21.5517	22.7599	22.7088	22.3247	24.5437	24.7792
Normalized	92.35%	86.18%	97.89%	99.82%	83.01%	74.58%	89.47%	92.93%	78.67%	100%	94.69%	94.9%	96.54%	87.81%	86.97%
Standard Deviation	0.3%	0.5%	0.6%	0.5%	0.1%	0.7%	0.5%	0.4%	0.2%	0.8%	0.9%	0.5%	0.2%	0.6%	1.2%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	10.449	10.355	8.203	9.137	11.122	11.430	10.330	10.206	10.978	8.380	10.945	10.289	9.230	9.949	10.294
Normalized	78.51%	79.22%	100%	89.78%	73.75%	71.77%	79.41%	80.37%	74.72%	97.89%	74.95%	79.73%	88.87%	82.45%	79.69%
Standard Deviation	1.9%	0.4%	0.3%	2.8%	0.5%	1.1%	0.9%	1.6%	3.7%	0.5%	4%	3%	2.6%	3.7%	2.8%

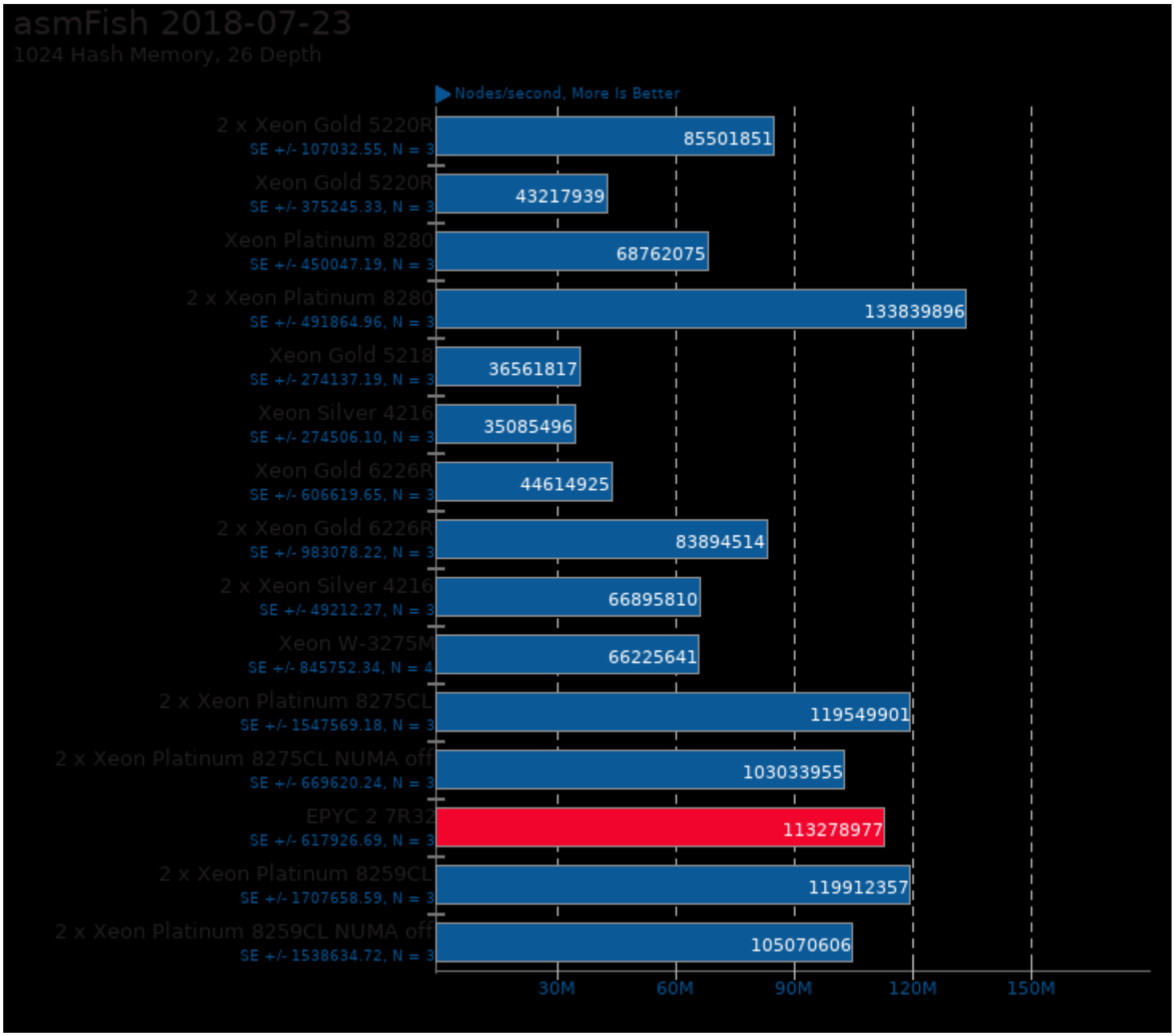

Appleseed 2.0 Beta
Scene: Emily
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
180.65
Xeon Gold 5220R
284.28
Xeon Platinum 8280
197.65
2 x Xeon Platinum 8280
154.98
Xeon Gold 5218
328.14
Xeon Silver 4216
345.39
Xeon Gold 6226R
276.77
2 x Xeon Gold 6226R
177.66
2 x Xeon Silver 4216
222.97
Xeon W-3275M
196.93
2 x Xeon Platinum 8275CL
152.90
2 x Xeon Platinum 8275CL NUMA off
152.09
EPYC 2 7R32
147.69
2 x Xeon Platinum 8259CL
161.85
2 x Xeon Platinum 8259CL NUMA off
163.71
80
160
240
320
400

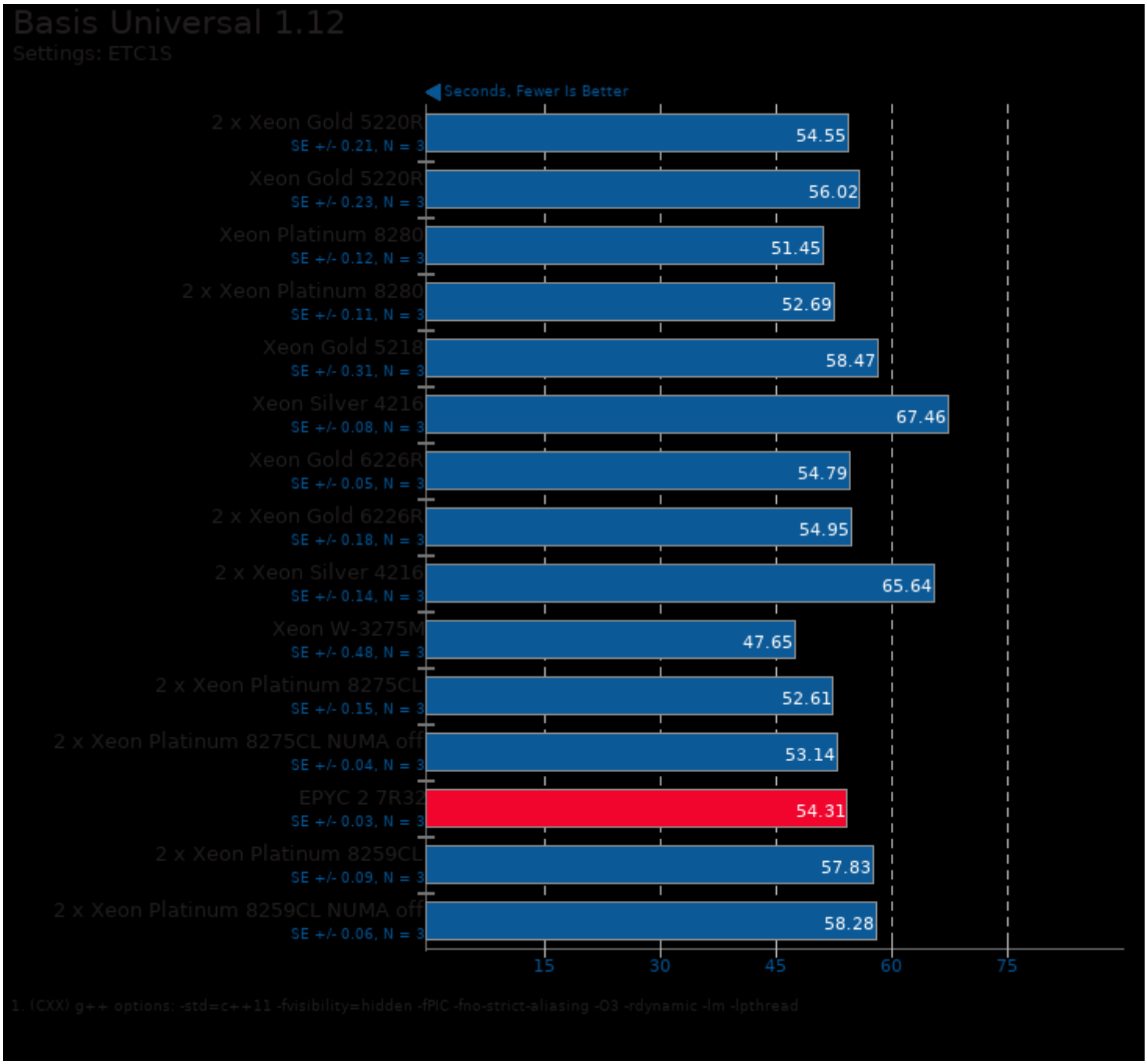

Appleseed 2.0 Beta
Scene: Disney Material
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
88.86
Xeon Gold 5220R
158.77
Xeon Platinum 8280
103.83
2 x Xeon Platinum 8280
68.62
Xeon Gold 5218
182.56
Xeon Silver 4216
194.40
Xeon Gold 6226R
155.23
2 x Xeon Gold 6226R
84.84
2 x Xeon Silver 4216
107.50
Xeon W-3275M
106.64
2 x Xeon Platinum 8275CL
68.61
2 x Xeon Platinum 8275CL NUMA off
68.20
EPYC 2 7R32
62.43
2 x Xeon Platinum 8259CL
73.58
2 x Xeon Platinum 8259CL NUMA off
73.22
40
80
120
160
200

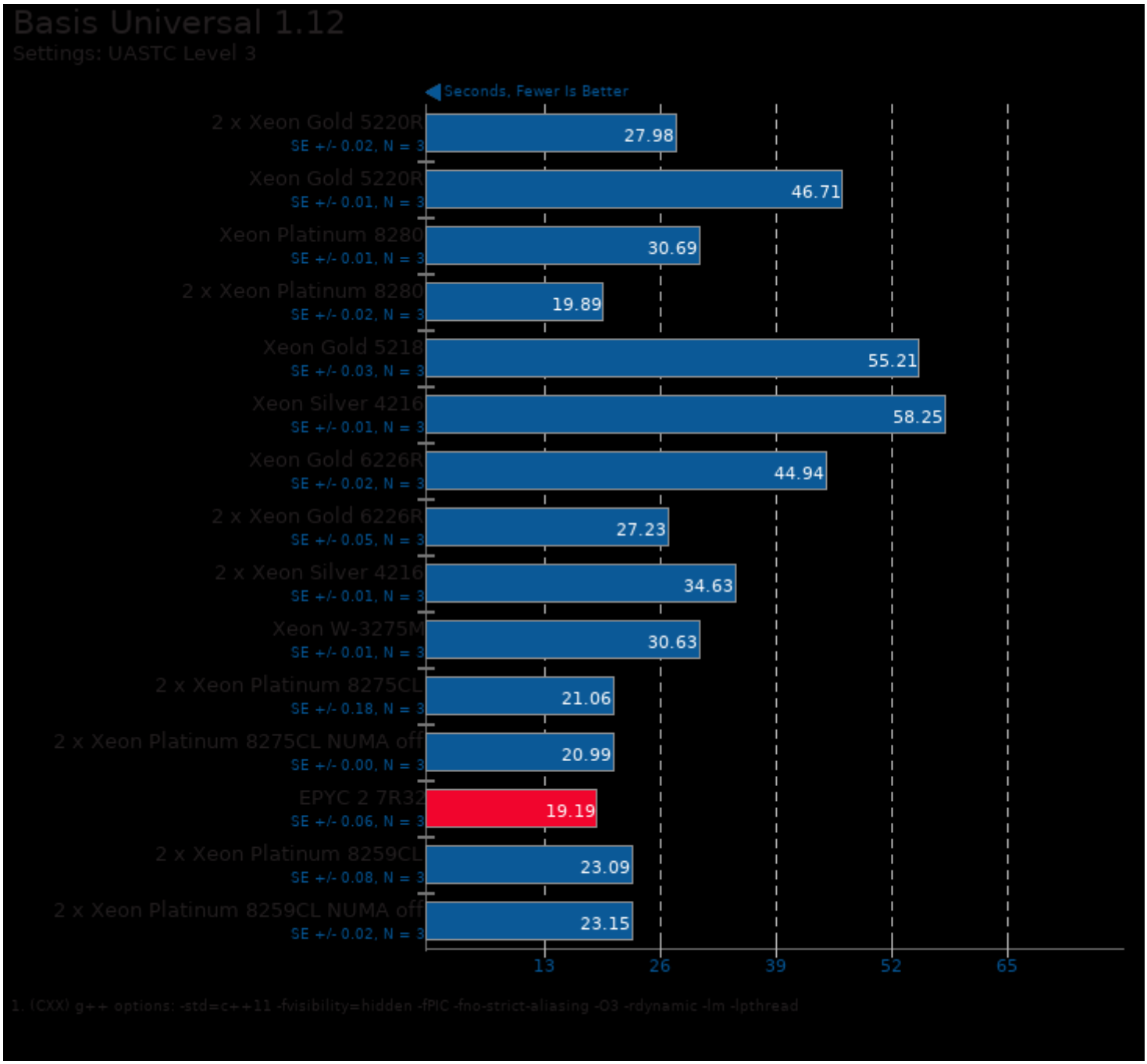

Appleseed 2.0 Beta
Scene: Material Tester
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
189.46
Xeon Gold 5220R
162.86
Xeon Platinum 8280
123.98
2 x Xeon Platinum 8280
193.44
Xeon Gold 5218
179.75
Xeon Silver 4216
188.78
Xeon Gold 6226R
156.61
2 x Xeon Gold 6226R
185.36
2 x Xeon Silver 4216
197.74
Xeon W-3275M
124.15
2 x Xeon Platinum 8275CL
189.30
2 x Xeon Platinum 8275CL NUMA off
194.85
EPYC 2 7R32
175.19
2 x Xeon Platinum 8259CL
185.23
2 x Xeon Platinum 8259CL NUMA off
197.29
40
80
120
160
200

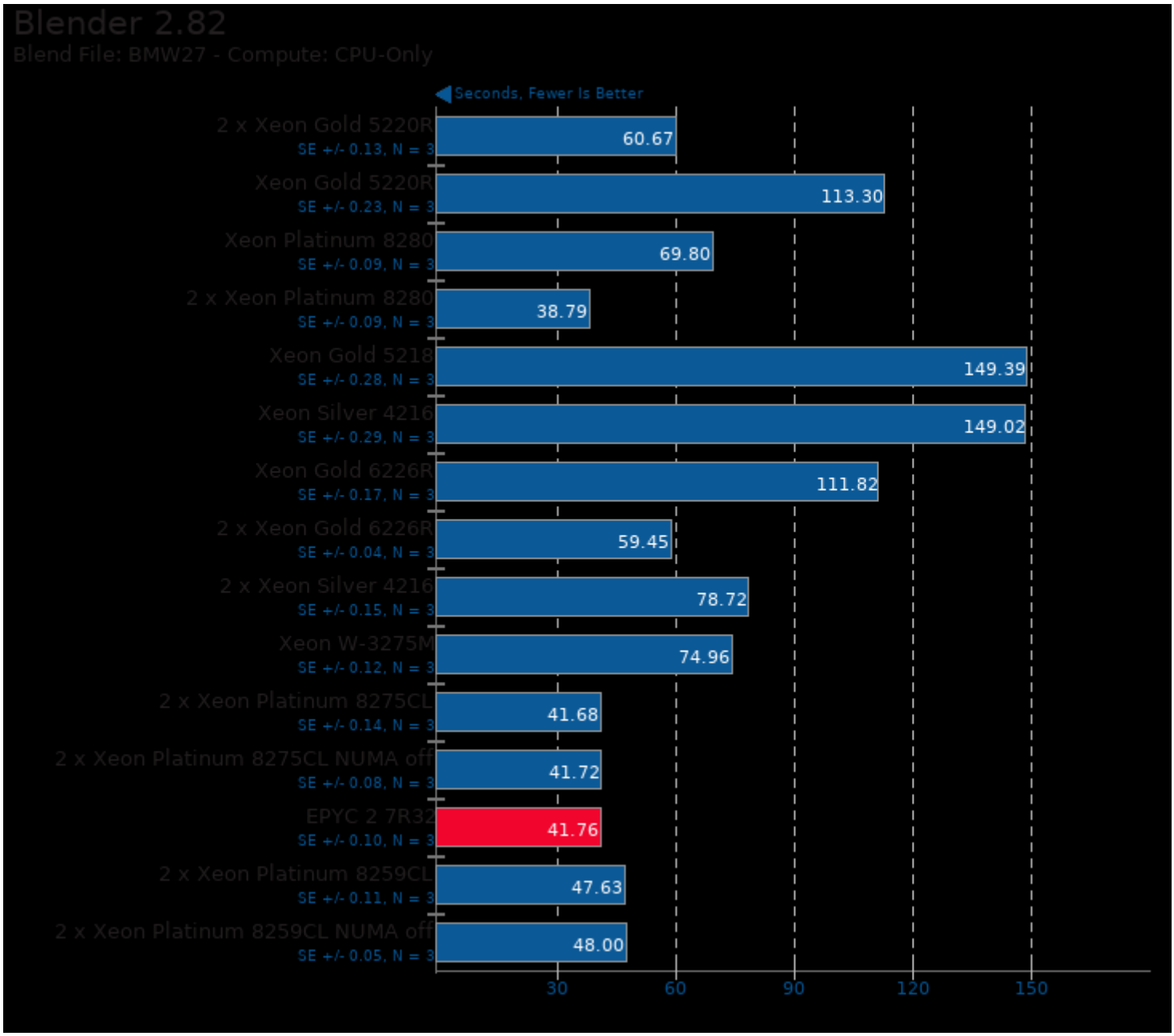

ArrayFire 3.7
Test: BLAS CPU
GFLOPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 3.91, N = 3
2359.13
Xeon Gold 5220R
SE +/- 0.37, N = 3
1201.54
Xeon Platinum 8280
SE +/- 25.11, N = 3
3432.16
2 x Xeon Platinum 8280
SE +/- 20.06, N = 3
3430.28
Xeon Gold 5218
SE +/- 0.62, N = 3
1002.09
Xeon Silver 4216
SE +/- 1.52, N = 3
765.49
Xeon Gold 6226R
SE +/- 4.16, N = 3
2137.03
2 x Xeon Gold 6226R
SE +/- 31.78, N = 3
3912.30
2 x Xeon Silver 4216
SE +/- 0.79, N = 3
1497.75
Xeon W-3275M
SE +/- 30.40, N = 3
3128.39
2 x Xeon Platinum 8275CL
SE +/- 61.47, N = 3
6259.01
2 x Xeon Platinum 8275CL NUMA off
SE +/- 4.90, N = 3
6325.07
EPYC 2 7R32
SE +/- 6.50, N = 3
990.80
2 x Xeon Platinum 8259CL
SE +/- 122.72, N = 12
5319.58
2 x Xeon Platinum 8259CL NUMA off
SE +/- 14.66, N = 3
5650.71
1400
2800
4200
5600
7000
1. (CXX) g++ options: -rdynamic

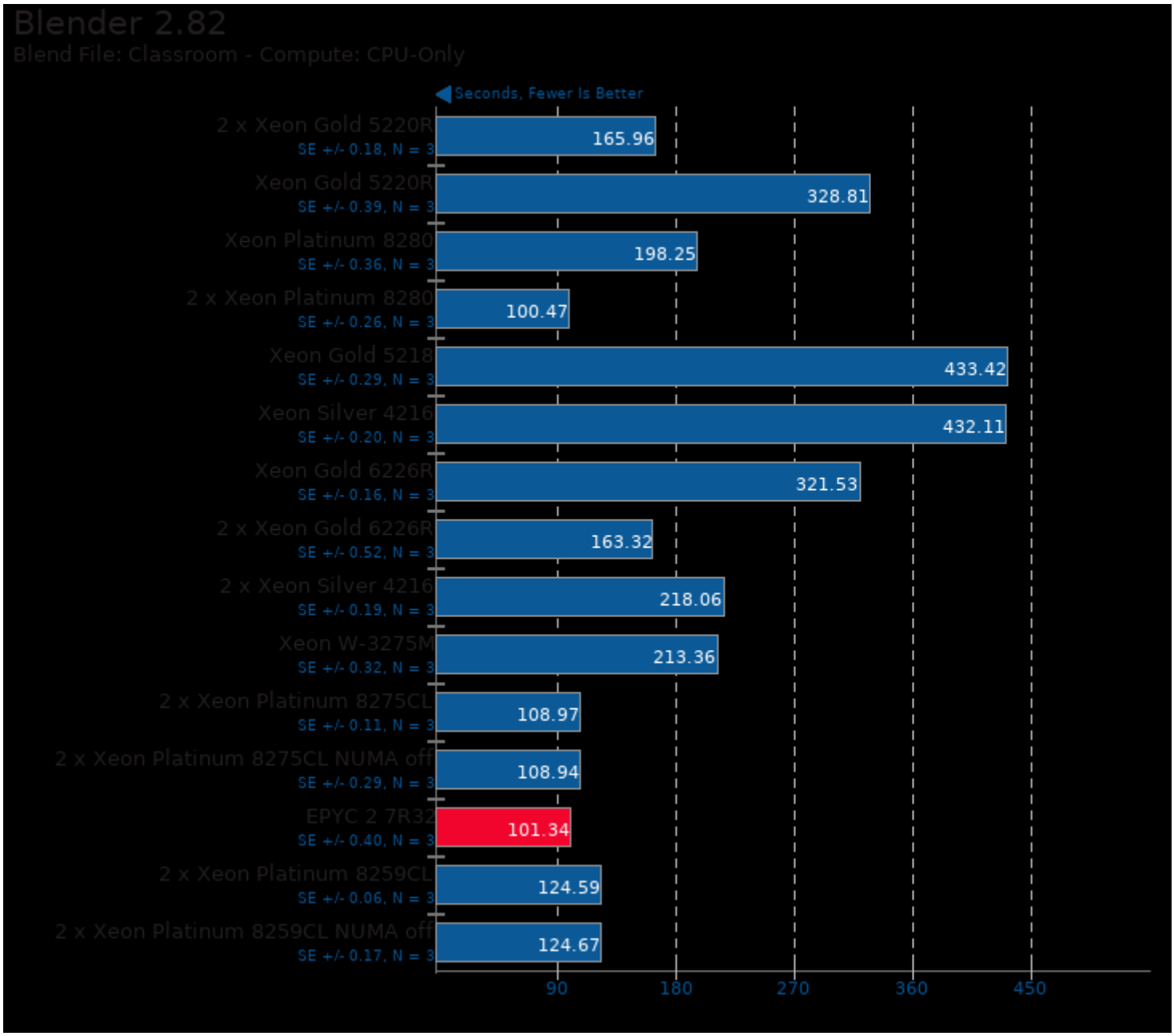

ArrayFire 3.7
Test: Conjugate Gradient CPU
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.099, N = 15
9.898
Xeon Gold 5220R
SE +/- 0.094, N = 3
6.409
Xeon Platinum 8280
SE +/- 0.067, N = 3
4.115
2 x Xeon Platinum 8280
SE +/- 0.086, N = 6
7.481
Xeon Gold 5218
SE +/- 0.069, N = 9
7.042
Xeon Silver 4216
SE +/- 0.047, N = 3
7.819
Xeon Gold 6226R
SE +/- 0.026, N = 3
6.451
2 x Xeon Gold 6226R
SE +/- 0.072, N = 15
7.155
2 x Xeon Silver 4216
SE +/- 0.372, N = 15
16.920
Xeon W-3275M
SE +/- 0.075, N = 15
4.423
2 x Xeon Platinum 8275CL
SE +/- 0.220, N = 3
13.220
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.272, N = 15
9.654
EPYC 2 7R32
SE +/- 0.217, N = 3
35.130
2 x Xeon Platinum 8259CL
SE +/- 0.091, N = 15
8.430
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.243, N = 15
7.604
8
16
24
32
40
1. (CXX) g++ options: -rdynamic

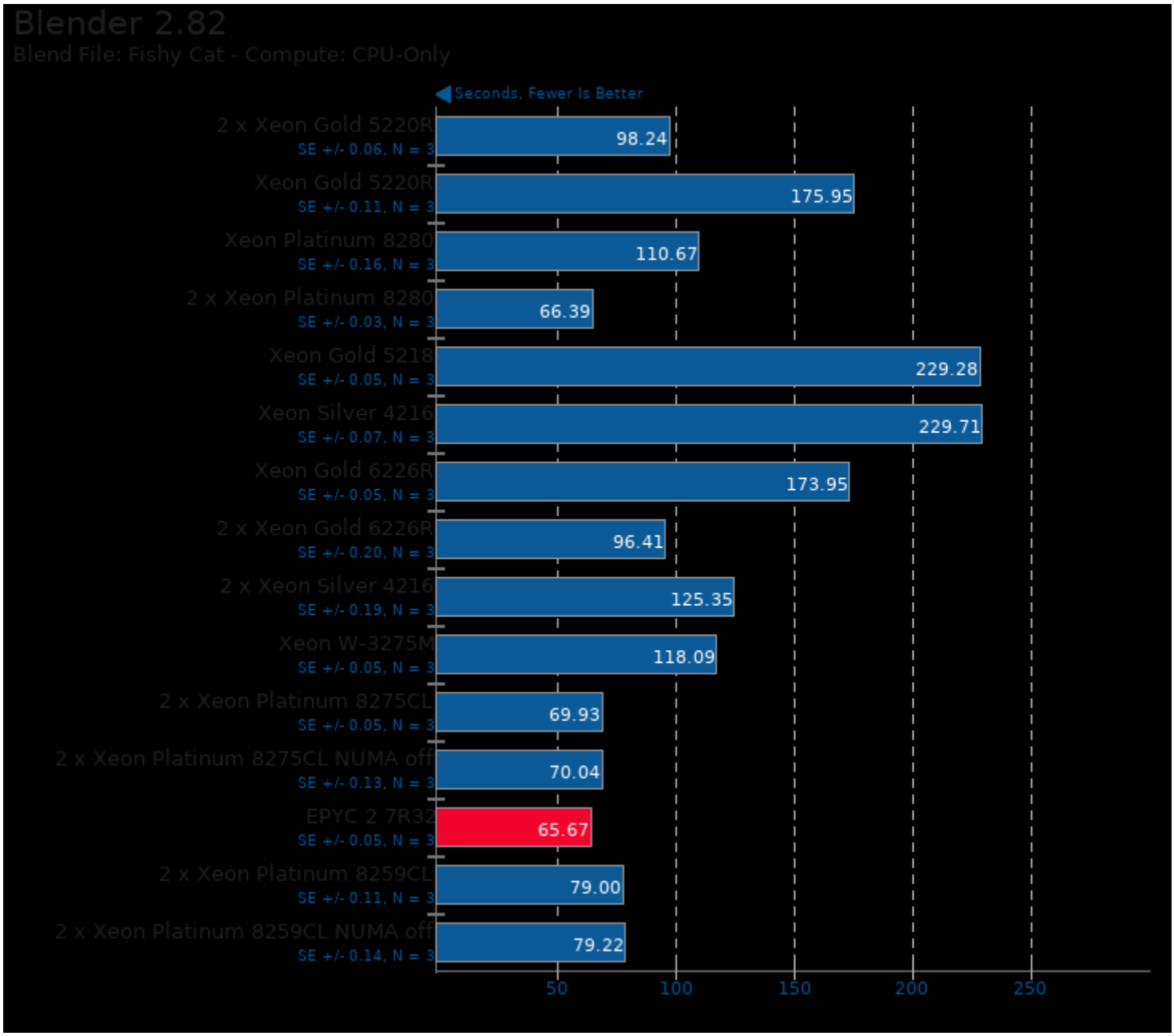

asmFish 2018-07-23
1024 Hash Memory, 26 Depth
Nodes/second, More Is Better
2 x Xeon Gold 5220R
SE +/- 107032.55, N = 3
85501851
Xeon Gold 5220R
SE +/- 375245.33, N = 3
43217939
Xeon Platinum 8280
SE +/- 450047.19, N = 3
68762075
2 x Xeon Platinum 8280
SE +/- 491864.96, N = 3
133839896
Xeon Gold 5218
SE +/- 274137.19, N = 3
36561817
Xeon Silver 4216
SE +/- 274506.10, N = 3
35085496
Xeon Gold 6226R
SE +/- 606619.65, N = 3
44614925
2 x Xeon Gold 6226R
SE +/- 983078.22, N = 3
83894514
2 x Xeon Silver 4216
SE +/- 49212.27, N = 3
66895810
Xeon W-3275M
SE +/- 845752.34, N = 4
66225641
2 x Xeon Platinum 8275CL
SE +/- 1547569.18, N = 3
119549901
2 x Xeon Platinum 8275CL NUMA off
SE +/- 669620.24, N = 3
103033955
EPYC 2 7R32
SE +/- 617926.69, N = 3
113278977
2 x Xeon Platinum 8259CL
SE +/- 1707658.59, N = 3
119912357
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1538634.72, N = 3
105070606
30M
60M
90M
120M
150M

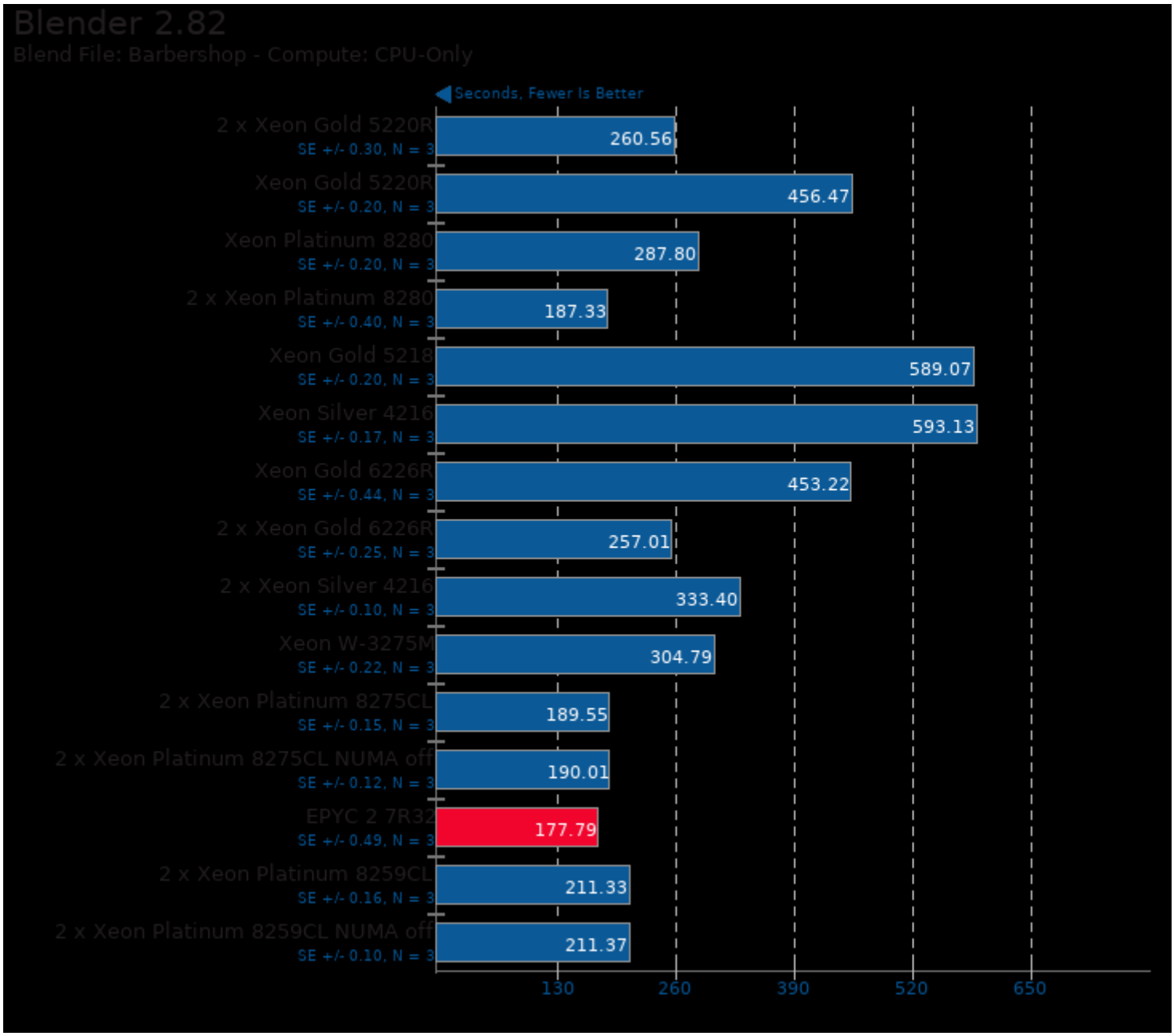

Basis Universal 1.12
Settings: ETC1S
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.21, N = 3
54.55
Xeon Gold 5220R
SE +/- 0.23, N = 3
56.02
Xeon Platinum 8280
SE +/- 0.12, N = 3
51.45
2 x Xeon Platinum 8280
SE +/- 0.11, N = 3
52.69
Xeon Gold 5218
SE +/- 0.31, N = 3
58.47
Xeon Silver 4216
SE +/- 0.08, N = 3
67.46
Xeon Gold 6226R
SE +/- 0.05, N = 3
54.79
2 x Xeon Gold 6226R
SE +/- 0.18, N = 3
54.95
2 x Xeon Silver 4216
SE +/- 0.14, N = 3
65.64
Xeon W-3275M
SE +/- 0.48, N = 3
47.65
2 x Xeon Platinum 8275CL
SE +/- 0.15, N = 3
52.61
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.04, N = 3
53.14
EPYC 2 7R32
SE +/- 0.03, N = 3
54.31
2 x Xeon Platinum 8259CL
SE +/- 0.09, N = 3
57.83
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.06, N = 3
58.28
15
30
45
60
75
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

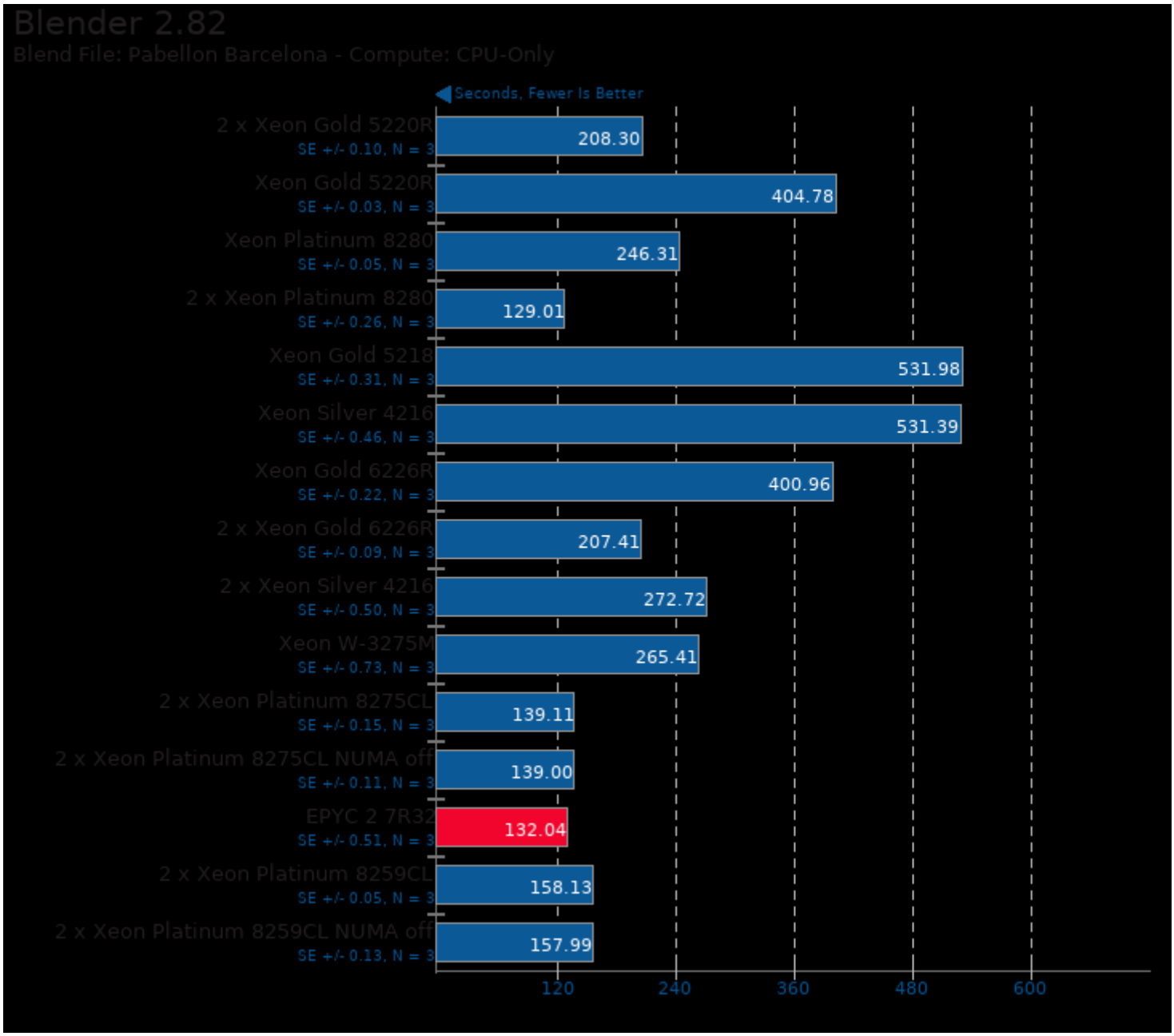

Basis Universal 1.12
Settings: UASTC Level 3
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.02, N = 3
27.98
Xeon Gold 5220R
SE +/- 0.01, N = 3
46.71
Xeon Platinum 8280
SE +/- 0.01, N = 3
30.69
2 x Xeon Platinum 8280
SE +/- 0.02, N = 3
19.89
Xeon Gold 5218
SE +/- 0.03, N = 3
55.21
Xeon Silver 4216
SE +/- 0.01, N = 3
58.25
Xeon Gold 6226R
SE +/- 0.02, N = 3
44.94
2 x Xeon Gold 6226R
SE +/- 0.05, N = 3
27.23
2 x Xeon Silver 4216
SE +/- 0.01, N = 3
34.63
Xeon W-3275M
SE +/- 0.01, N = 3
30.63
2 x Xeon Platinum 8275CL
SE +/- 0.18, N = 3
21.06
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00, N = 3
20.99
EPYC 2 7R32
SE +/- 0.06, N = 3
19.19
2 x Xeon Platinum 8259CL
SE +/- 0.08, N = 3
23.09
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.02, N = 3
23.15
13
26
39
52
65
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

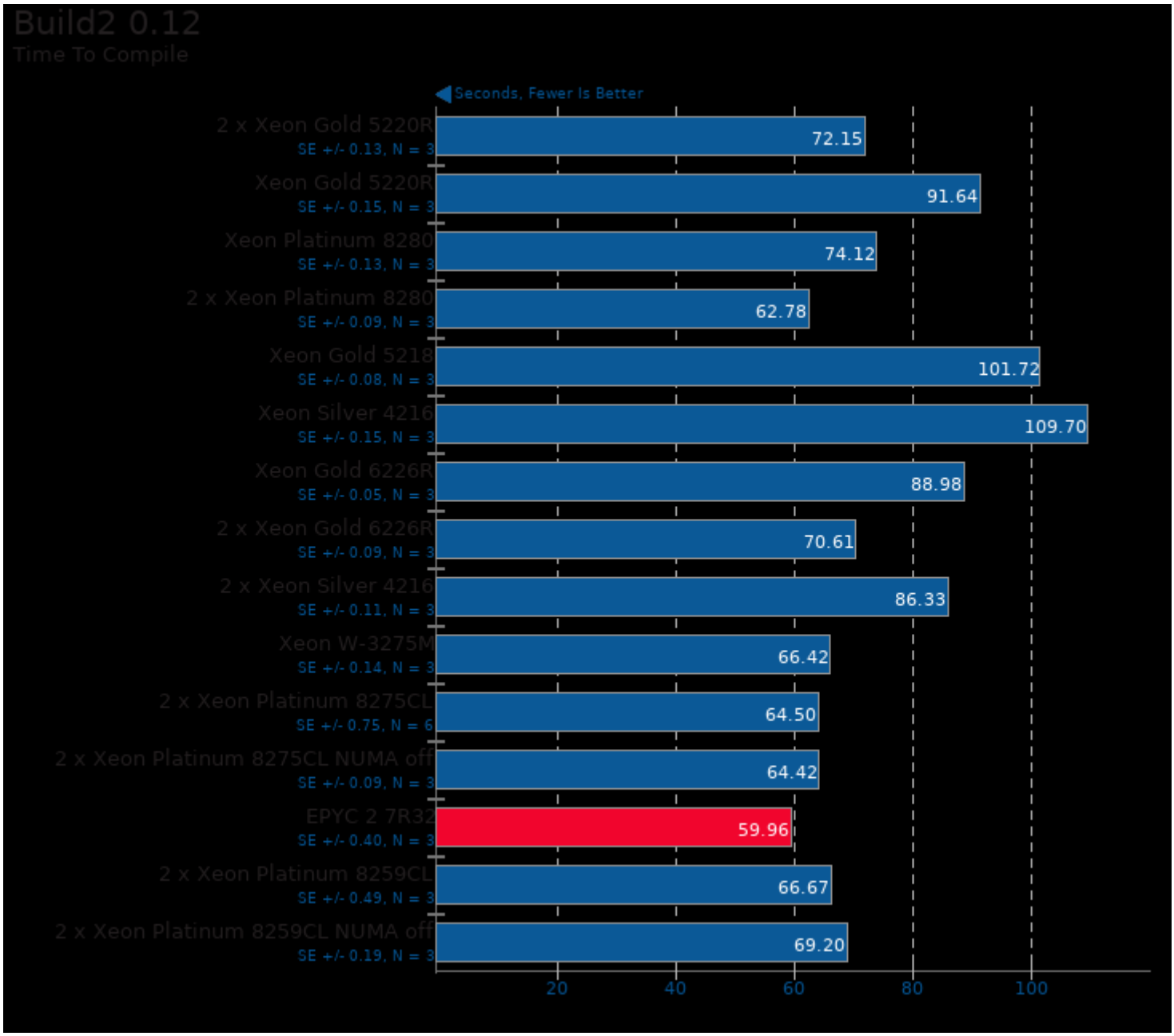

Blender 2.82
Blend File: BMW27 - Compute: CPU-Only
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.13, N = 3
60.67
Xeon Gold 5220R
SE +/- 0.23, N = 3
113.30
Xeon Platinum 8280
SE +/- 0.09, N = 3
69.80
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
38.79
Xeon Gold 5218
SE +/- 0.28, N = 3
149.39
Xeon Silver 4216
SE +/- 0.29, N = 3
149.02
Xeon Gold 6226R
SE +/- 0.17, N = 3
111.82
2 x Xeon Gold 6226R
SE +/- 0.04, N = 3
59.45
2 x Xeon Silver 4216
SE +/- 0.15, N = 3
78.72
Xeon W-3275M
SE +/- 0.12, N = 3
74.96
2 x Xeon Platinum 8275CL
SE +/- 0.14, N = 3
41.68
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.08, N = 3
41.72
EPYC 2 7R32
SE +/- 0.10, N = 3
41.76
2 x Xeon Platinum 8259CL
SE +/- 0.11, N = 3
47.63
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.05, N = 3
48.00
30
60
90
120
150

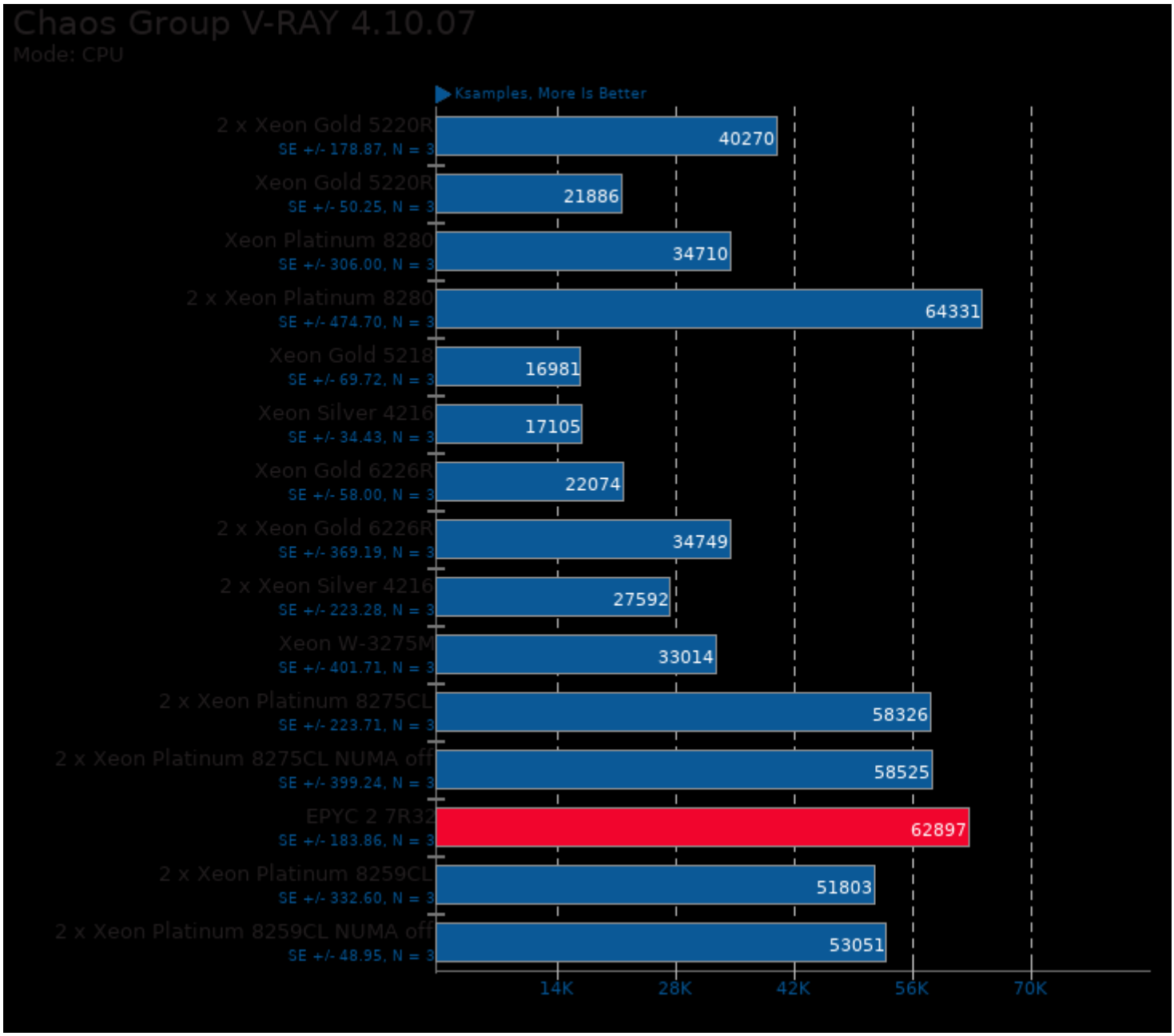

Blender 2.82
Blend File: Classroom - Compute: CPU-Only
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.18, N = 3
165.96
Xeon Gold 5220R
SE +/- 0.39, N = 3
328.81
Xeon Platinum 8280
SE +/- 0.36, N = 3
198.25
2 x Xeon Platinum 8280
SE +/- 0.26, N = 3
100.47
Xeon Gold 5218
SE +/- 0.29, N = 3
433.42
Xeon Silver 4216
SE +/- 0.20, N = 3
432.11
Xeon Gold 6226R
SE +/- 0.16, N = 3
321.53
2 x Xeon Gold 6226R
SE +/- 0.52, N = 3
163.32
2 x Xeon Silver 4216
SE +/- 0.19, N = 3
218.06
Xeon W-3275M
SE +/- 0.32, N = 3
213.36
2 x Xeon Platinum 8275CL
SE +/- 0.11, N = 3
108.97
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.29, N = 3
108.94
EPYC 2 7R32
SE +/- 0.40, N = 3
101.34
2 x Xeon Platinum 8259CL
SE +/- 0.06, N = 3
124.59
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.17, N = 3
124.67
90
180
270
360
450

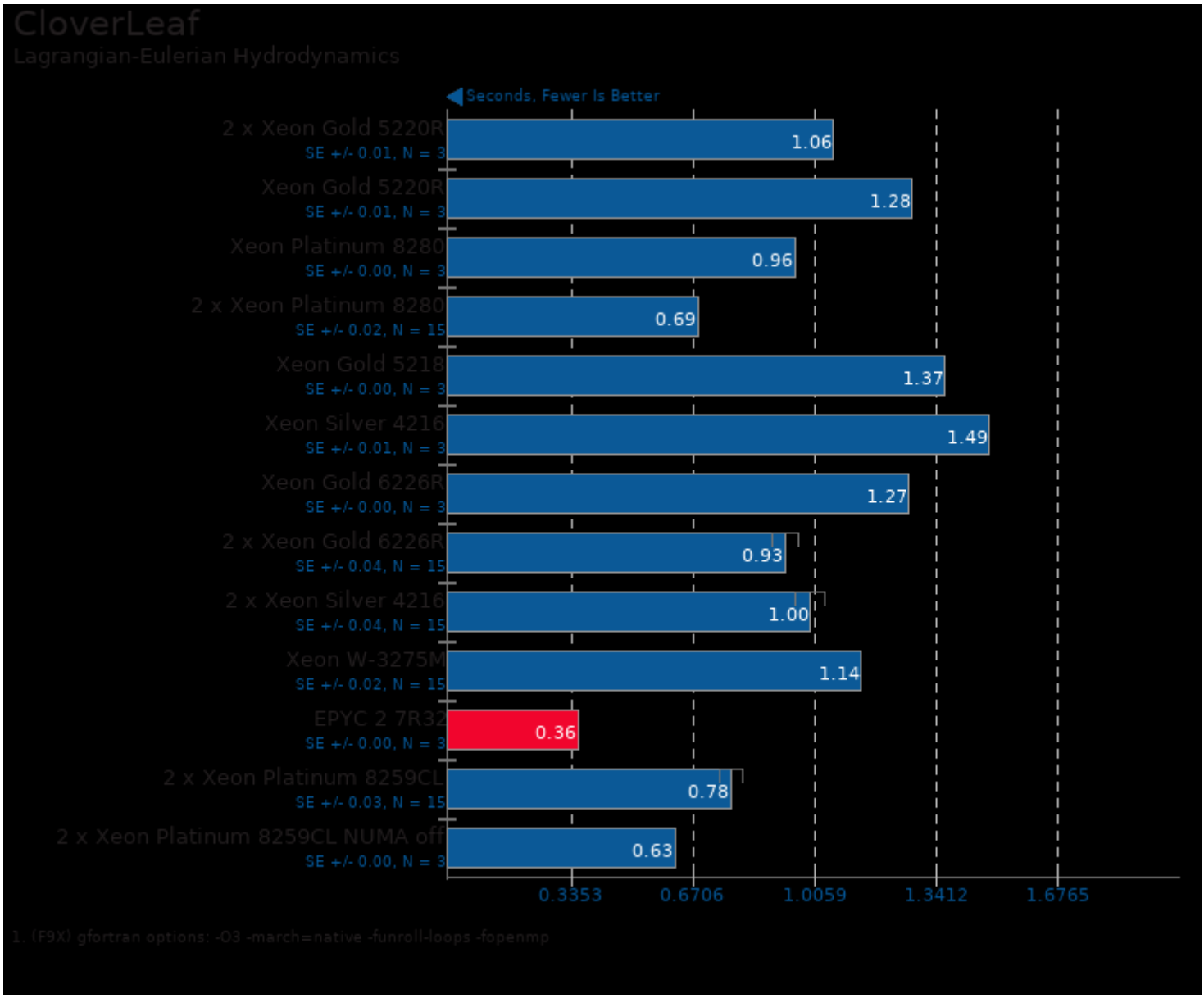

Blender 2.82
Blend File: Fishy Cat - Compute: CPU-Only
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.06, N = 3
98.24
Xeon Gold 5220R
SE +/- 0.11, N = 3
175.95
Xeon Platinum 8280
SE +/- 0.16, N = 3
110.67
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
66.39
Xeon Gold 5218
SE +/- 0.05, N = 3
229.28
Xeon Silver 4216
SE +/- 0.07, N = 3
229.71
Xeon Gold 6226R
SE +/- 0.05, N = 3
173.95
2 x Xeon Gold 6226R
SE +/- 0.20, N = 3
96.41
2 x Xeon Silver 4216
SE +/- 0.19, N = 3
125.35
Xeon W-3275M
SE +/- 0.05, N = 3
118.09
2 x Xeon Platinum 8275CL
SE +/- 0.05, N = 3
69.93
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.13, N = 3
70.04
EPYC 2 7R32
SE +/- 0.05, N = 3
65.67
2 x Xeon Platinum 8259CL
SE +/- 0.11, N = 3
79.00
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.14, N = 3
79.22
50
100
150
200
250

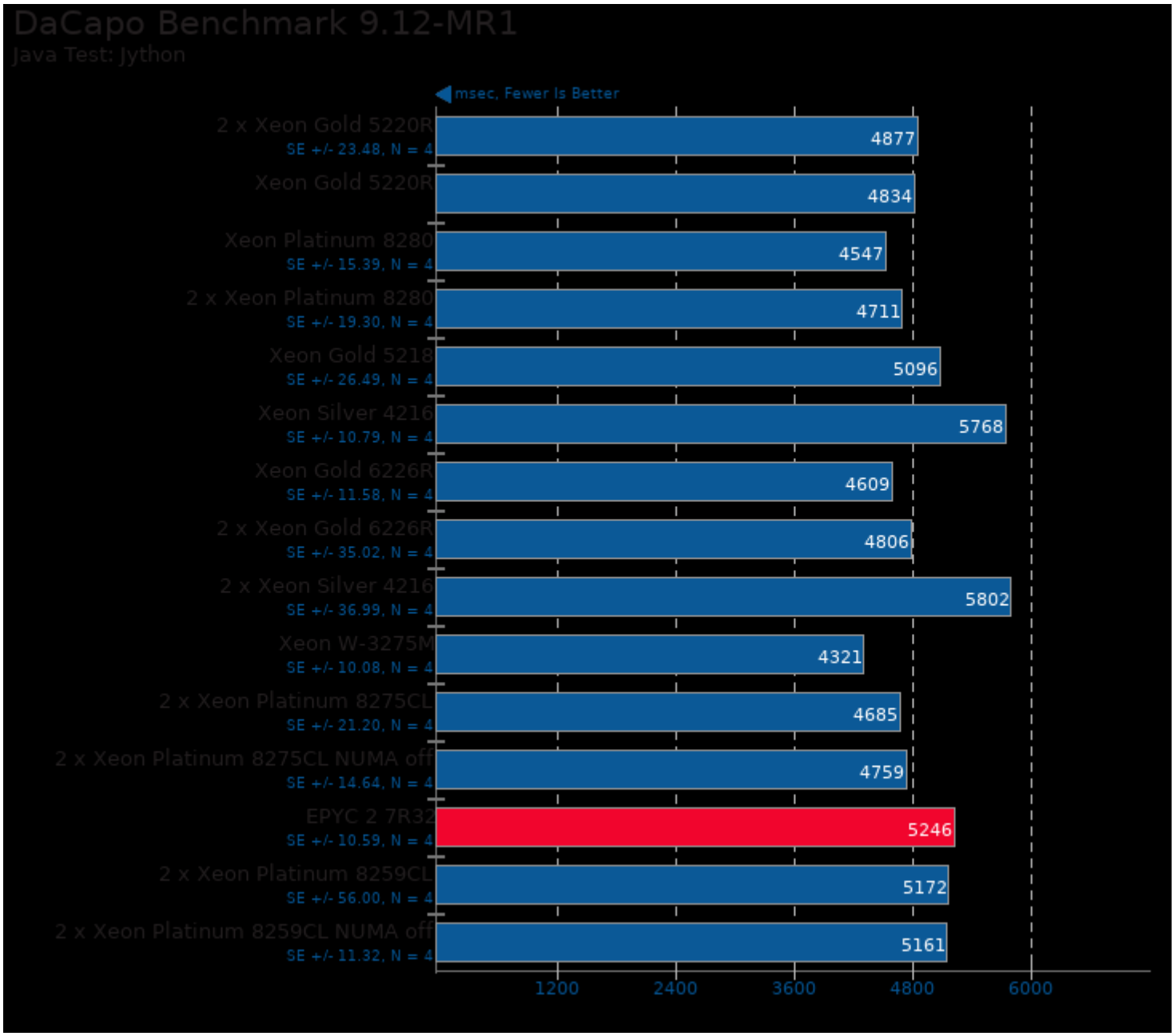

Blender 2.82
Blend File: Barbershop - Compute: CPU-Only
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.30, N = 3
260.56
Xeon Gold 5220R
SE +/- 0.20, N = 3
456.47
Xeon Platinum 8280
SE +/- 0.20, N = 3
287.80
2 x Xeon Platinum 8280
SE +/- 0.40, N = 3
187.33
Xeon Gold 5218
SE +/- 0.20, N = 3
589.07
Xeon Silver 4216
SE +/- 0.17, N = 3
593.13
Xeon Gold 6226R
SE +/- 0.44, N = 3
453.22
2 x Xeon Gold 6226R
SE +/- 0.25, N = 3
257.01
2 x Xeon Silver 4216
SE +/- 0.10, N = 3
333.40
Xeon W-3275M
SE +/- 0.22, N = 3
304.79
2 x Xeon Platinum 8275CL
SE +/- 0.15, N = 3
189.55
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.12, N = 3
190.01
EPYC 2 7R32
SE +/- 0.49, N = 3
177.79
2 x Xeon Platinum 8259CL
SE +/- 0.16, N = 3
211.33
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.10, N = 3
211.37
130
260
390
520
650

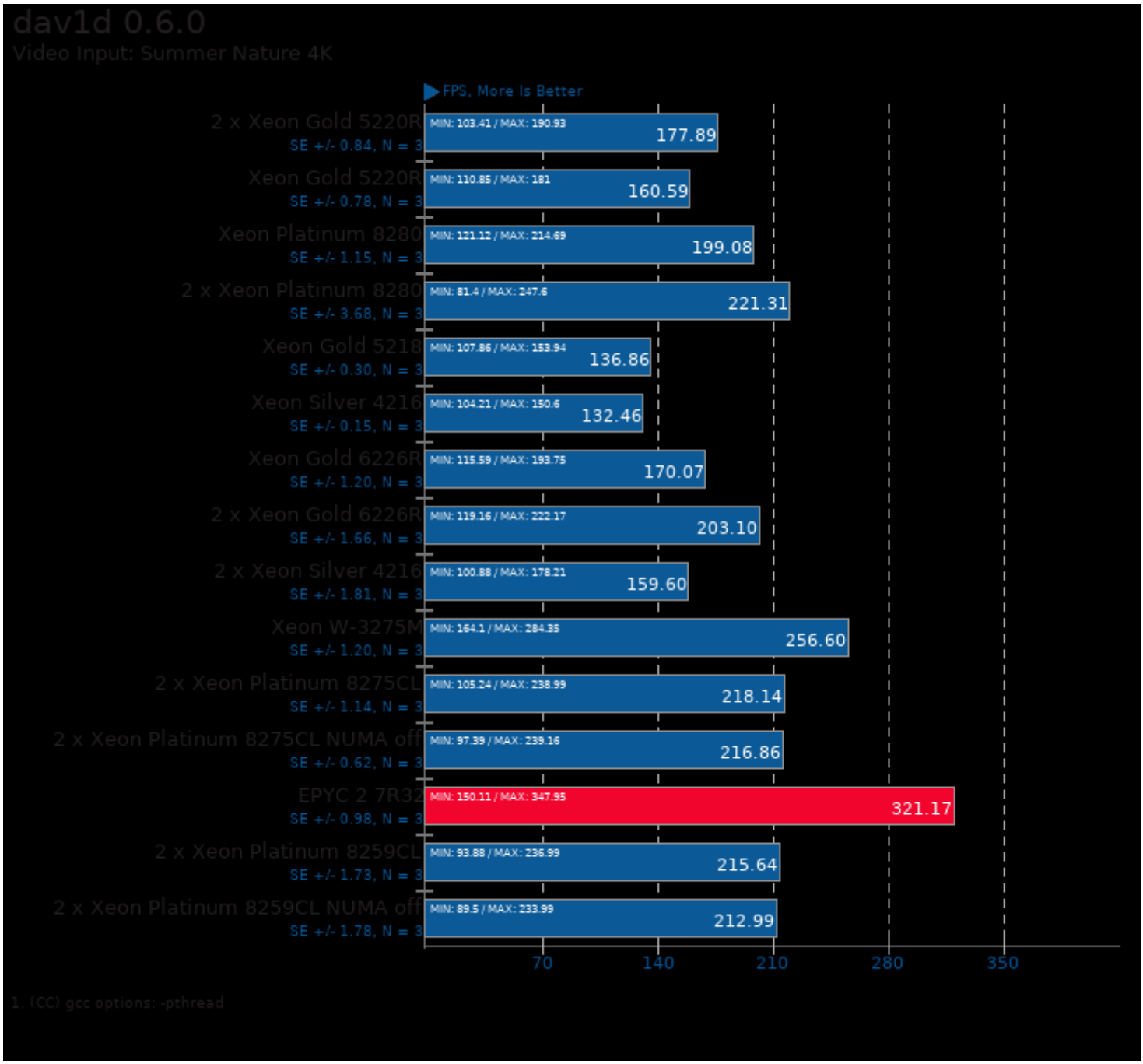

Blender 2.82
Blend File: Pabellon Barcelona - Compute: CPU-Only
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.10, N = 3
208.30
Xeon Gold 5220R
SE +/- 0.03, N = 3
404.78
Xeon Platinum 8280
SE +/- 0.05, N = 3
246.31
2 x Xeon Platinum 8280
SE +/- 0.26, N = 3
129.01
Xeon Gold 5218
SE +/- 0.31, N = 3
531.98
Xeon Silver 4216
SE +/- 0.46, N = 3
531.39
Xeon Gold 6226R
SE +/- 0.22, N = 3
400.96
2 x Xeon Gold 6226R
SE +/- 0.09, N = 3
207.41
2 x Xeon Silver 4216
SE +/- 0.50, N = 3
272.72
Xeon W-3275M
SE +/- 0.73, N = 3
265.41
2 x Xeon Platinum 8275CL
SE +/- 0.15, N = 3
139.11
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.11, N = 3
139.00
EPYC 2 7R32
SE +/- 0.51, N = 3
132.04
2 x Xeon Platinum 8259CL
SE +/- 0.05, N = 3
158.13
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.13, N = 3
157.99
120
240
360
480
600

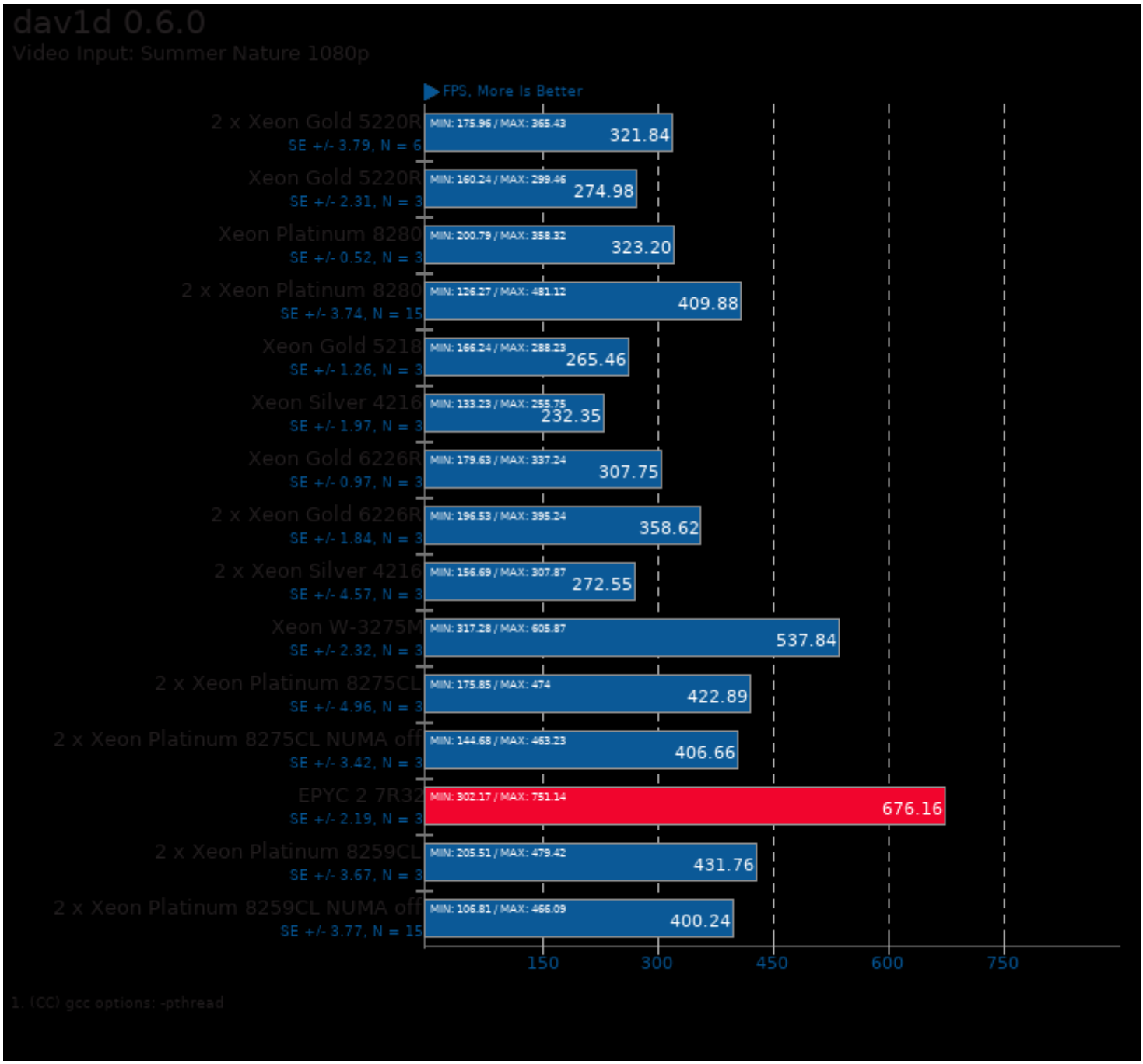

Build2 0.12
Time To Compile
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.13, N = 3
72.15
Xeon Gold 5220R
SE +/- 0.15, N = 3
91.64
Xeon Platinum 8280
SE +/- 0.13, N = 3
74.12
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
62.78
Xeon Gold 5218
SE +/- 0.08, N = 3
101.72
Xeon Silver 4216
SE +/- 0.15, N = 3
109.70
Xeon Gold 6226R
SE +/- 0.05, N = 3
88.98
2 x Xeon Gold 6226R
SE +/- 0.09, N = 3
70.61
2 x Xeon Silver 4216
SE +/- 0.11, N = 3
86.33
Xeon W-3275M
SE +/- 0.14, N = 3
66.42
2 x Xeon Platinum 8275CL
SE +/- 0.75, N = 6
64.50
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.09, N = 3
64.42
EPYC 2 7R32
SE +/- 0.40, N = 3
59.96
2 x Xeon Platinum 8259CL
SE +/- 0.49, N = 3
66.67
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.19, N = 3
69.20
20
40
60
80
100

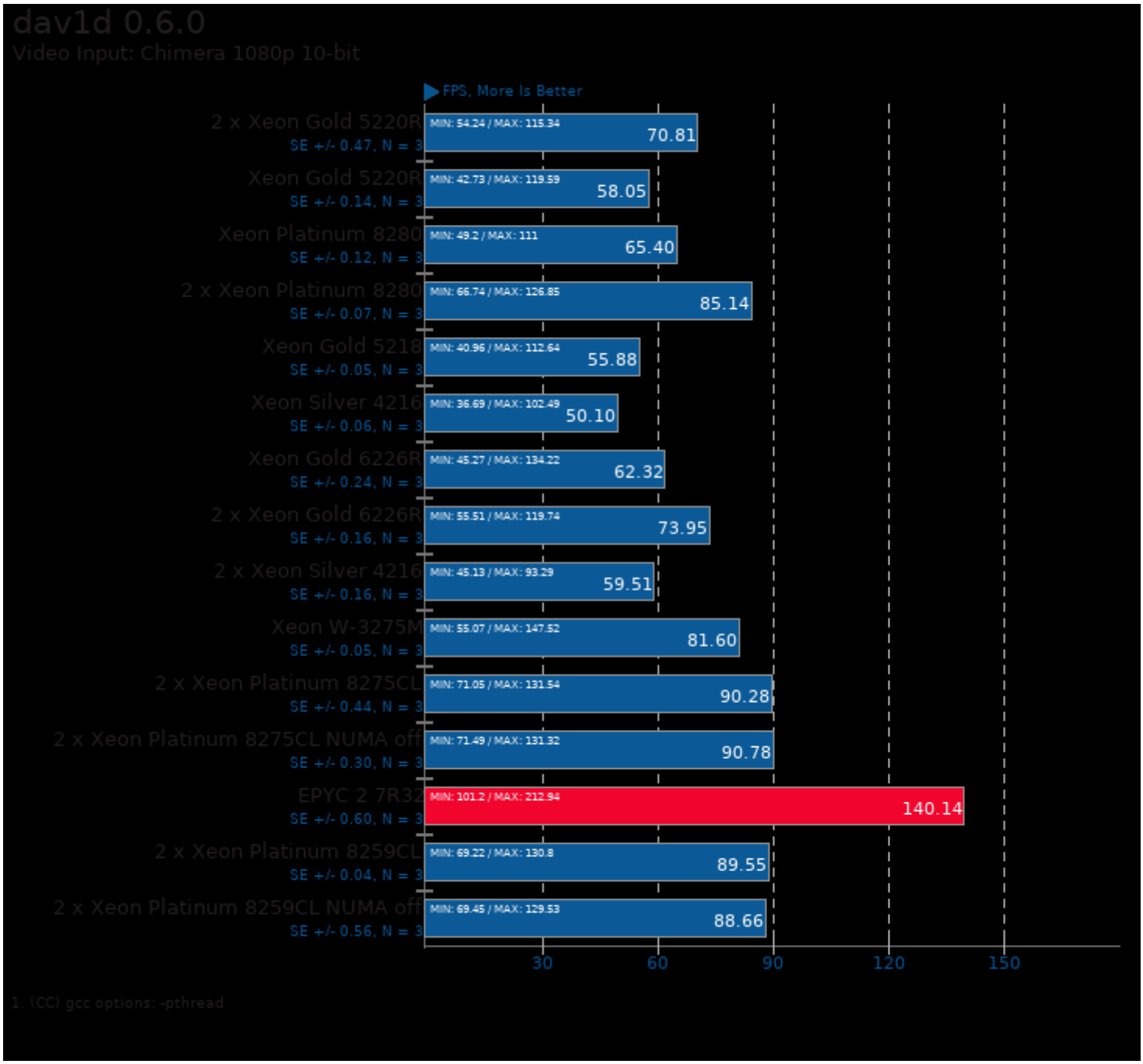

Chaos Group V-RAY 4.10.07
Mode: CPU
Ksamples, More Is Better
2 x Xeon Gold 5220R
SE +/- 178.87, N = 3
40270
Xeon Gold 5220R
SE +/- 50.25, N = 3
21886
Xeon Platinum 8280
SE +/- 306.00, N = 3
34710
2 x Xeon Platinum 8280
SE +/- 474.70, N = 3
64331
Xeon Gold 5218
SE +/- 69.72, N = 3
16981
Xeon Silver 4216
SE +/- 34.43, N = 3
17105
Xeon Gold 6226R
SE +/- 58.00, N = 3
22074
2 x Xeon Gold 6226R
SE +/- 369.19, N = 3
34749
2 x Xeon Silver 4216
SE +/- 223.28, N = 3
27592
Xeon W-3275M
SE +/- 401.71, N = 3
33014
2 x Xeon Platinum 8275CL
SE +/- 223.71, N = 3
58326
2 x Xeon Platinum 8275CL NUMA off
SE +/- 399.24, N = 3
58525
EPYC 2 7R32
SE +/- 183.86, N = 3
62897
2 x Xeon Platinum 8259CL
SE +/- 332.60, N = 3
51803
2 x Xeon Platinum 8259CL NUMA off
SE +/- 48.95, N = 3
53051
14K
28K
42K
56K
70K

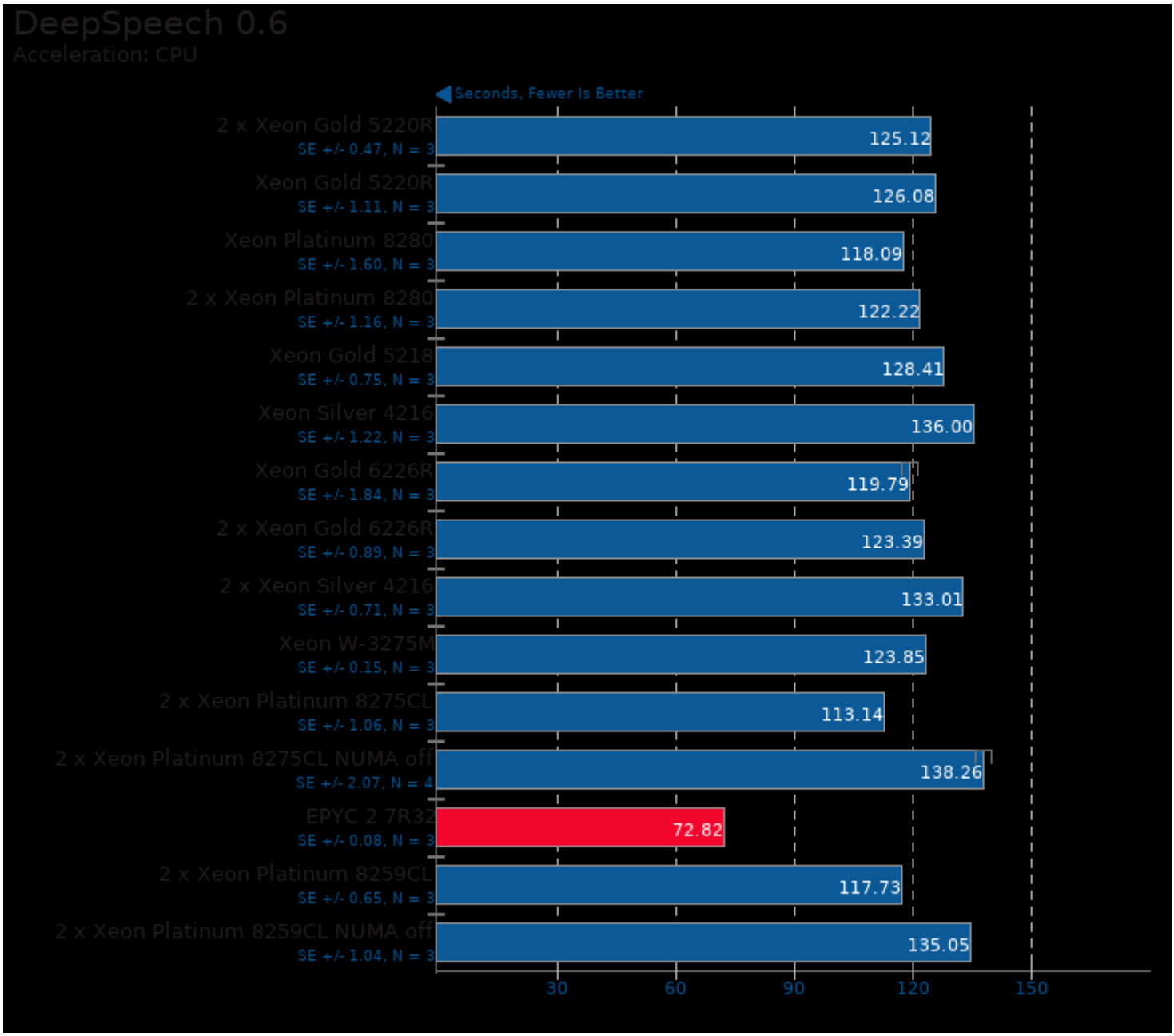

CloverLeaf
Lagrangian-Eulerian Hydrodynamics
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.01, N = 3
1.06
Xeon Gold 5220R
SE +/- 0.01, N = 3
1.28
Xeon Platinum 8280
SE +/- 0.00, N = 3
0.96
2 x Xeon Platinum 8280
SE +/- 0.02, N = 15
0.69
Xeon Gold 5218
SE +/- 0.00, N = 3
1.37
Xeon Silver 4216
SE +/- 0.01, N = 3
1.49
Xeon Gold 6226R
SE +/- 0.00, N = 3
1.27
2 x Xeon Gold 6226R
SE +/- 0.04, N = 15
0.93
2 x Xeon Silver 4216
SE +/- 0.04, N = 15
1.00
Xeon W-3275M
SE +/- 0.02, N = 15
1.14
EPYC 2 7R32
SE +/- 0.00, N = 3
0.36
2 x Xeon Platinum 8259CL
SE +/- 0.03, N = 15
0.78
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00, N = 3
0.63
0.3353
0.6706
1.0059
1.3412
1.6765
1. (F9X) gfortran options: -O3 -march=native -funroll-loops -fopenmp

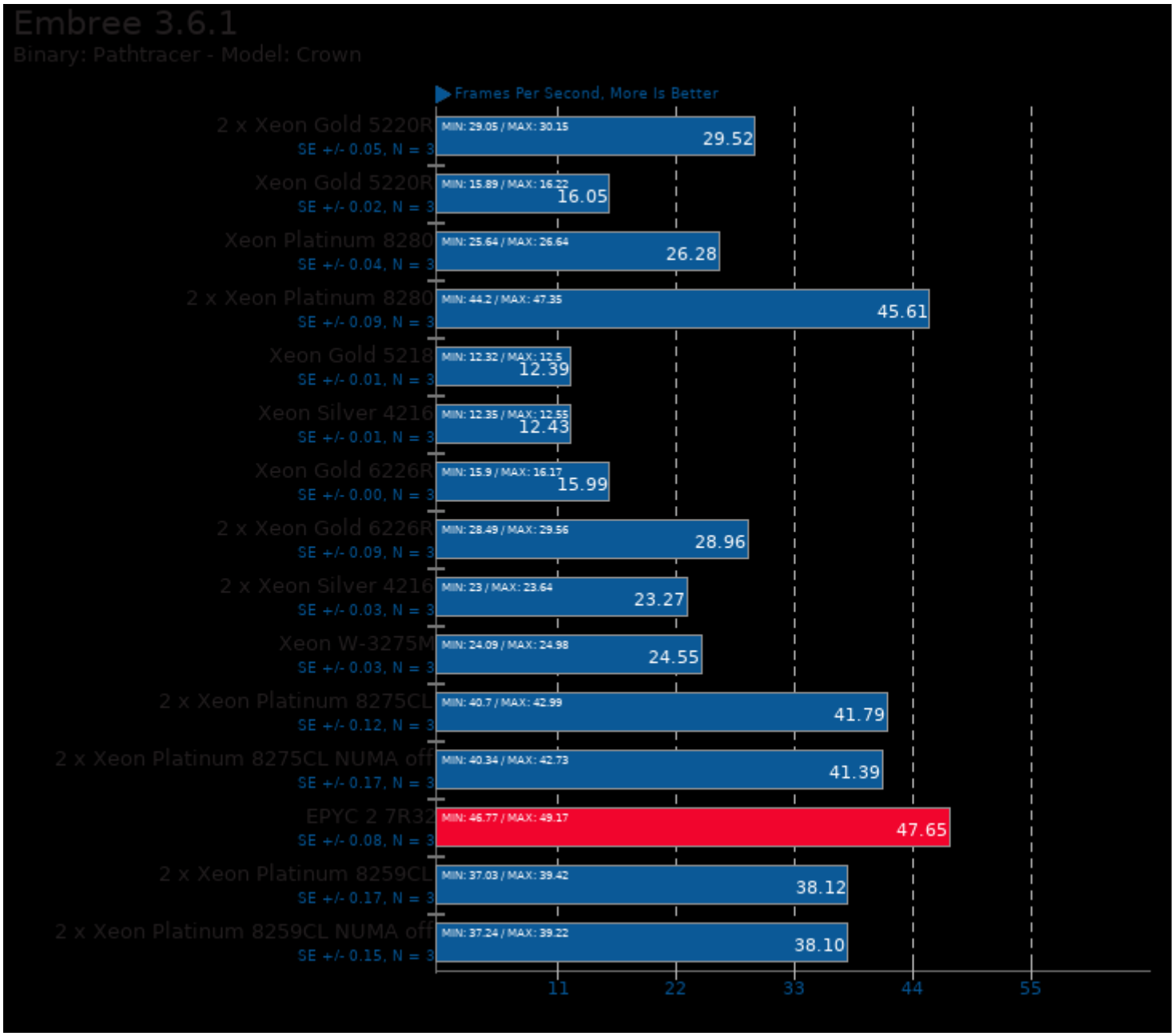

DaCapo Benchmark 9.12-MR1
Java Test: Jython
msec, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 23.48, N = 4
4877
Xeon Gold 5220R
4834
Xeon Platinum 8280
SE +/- 15.39, N = 4
4547
2 x Xeon Platinum 8280
SE +/- 19.30, N = 4
4711
Xeon Gold 5218
SE +/- 26.49, N = 4
5096
Xeon Silver 4216
SE +/- 10.79, N = 4
5768
Xeon Gold 6226R
SE +/- 11.58, N = 4
4609
2 x Xeon Gold 6226R
SE +/- 35.02, N = 4
4806
2 x Xeon Silver 4216
SE +/- 36.99, N = 4
5802
Xeon W-3275M
SE +/- 10.08, N = 4
4321
2 x Xeon Platinum 8275CL
SE +/- 21.20, N = 4
4685
2 x Xeon Platinum 8275CL NUMA off
SE +/- 14.64, N = 4
4759
EPYC 2 7R32
SE +/- 10.59, N = 4
5246
2 x Xeon Platinum 8259CL
SE +/- 56.00, N = 4
5172
2 x Xeon Platinum 8259CL NUMA off
SE +/- 11.32, N = 4
5161
1200
2400
3600
4800
6000

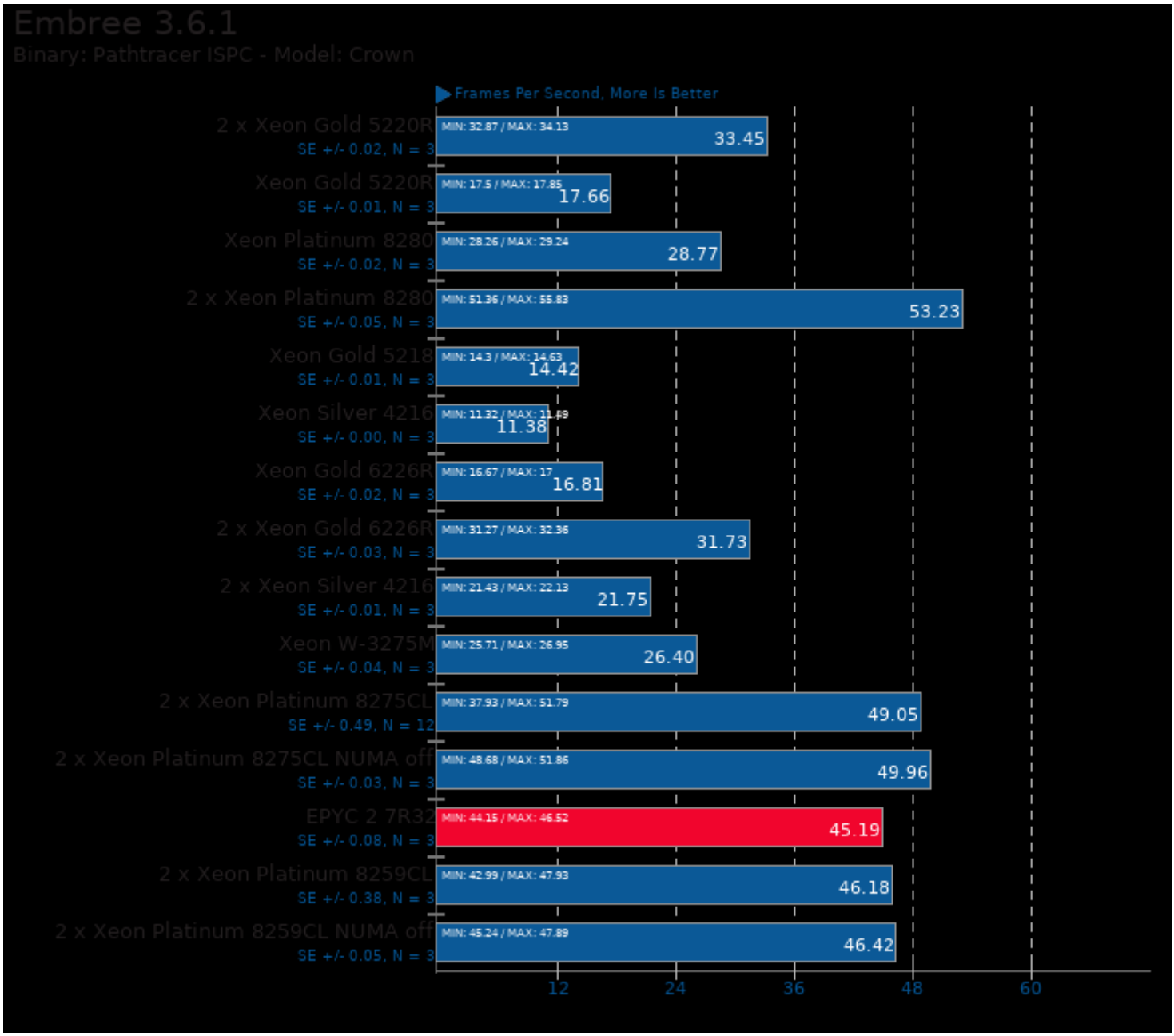

dav1d 0.6.0
Video Input: Summer Nature 4K
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.84, N = 3
MIN: 103.41 / MAX: 190.93
177.89
Xeon Gold 5220R
SE +/- 0.78, N = 3
MIN: 110.85 / MAX: 181
160.59
Xeon Platinum 8280
SE +/- 1.15, N = 3
MIN: 121.12 / MAX: 214.69
199.08
2 x Xeon Platinum 8280
SE +/- 3.68, N = 3
MIN: 81.4 / MAX: 247.6
221.31
Xeon Gold 5218
SE +/- 0.30, N = 3
MIN: 107.86 / MAX: 153.94
136.86
Xeon Silver 4216
SE +/- 0.15, N = 3
MIN: 104.21 / MAX: 150.6
132.46
Xeon Gold 6226R
SE +/- 1.20, N = 3
MIN: 115.59 / MAX: 193.75
170.07
2 x Xeon Gold 6226R
SE +/- 1.66, N = 3
MIN: 119.16 / MAX: 222.17
203.10
2 x Xeon Silver 4216
SE +/- 1.81, N = 3
MIN: 100.88 / MAX: 178.21
159.60
Xeon W-3275M
SE +/- 1.20, N = 3
MIN: 164.1 / MAX: 284.35
256.60
2 x Xeon Platinum 8275CL
SE +/- 1.14, N = 3
MIN: 105.24 / MAX: 238.99
218.14
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.62, N = 3
MIN: 97.39 / MAX: 239.16
216.86
EPYC 2 7R32
SE +/- 0.98, N = 3
MIN: 150.11 / MAX: 347.95
321.17
2 x Xeon Platinum 8259CL
SE +/- 1.73, N = 3
MIN: 93.88 / MAX: 236.99
215.64
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.78, N = 3
MIN: 89.5 / MAX: 233.99
212.99
70
140
210
280
350
1. (CC) gcc options: -pthread

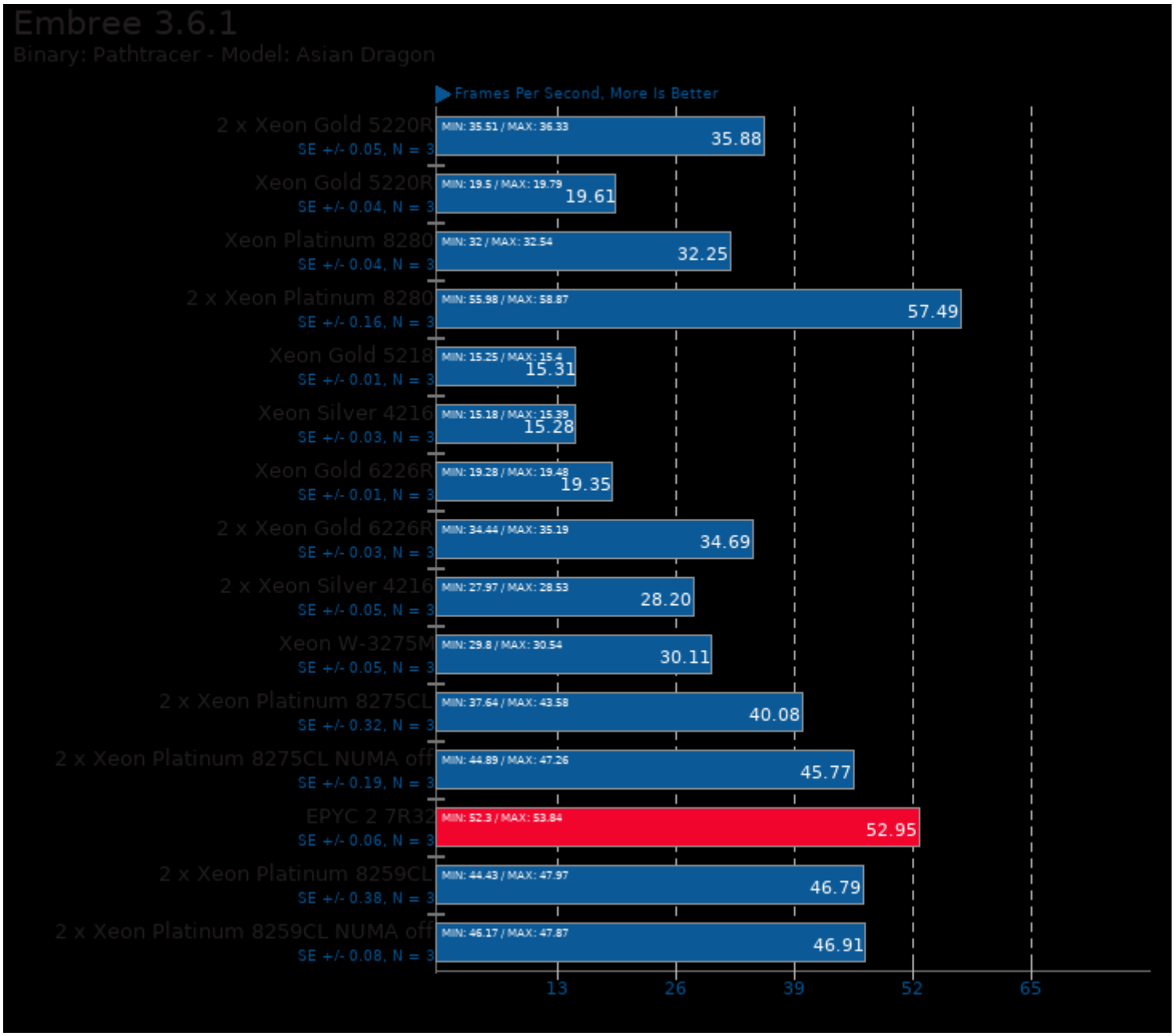

dav1d 0.6.0
Video Input: Summer Nature 1080p
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 3.79, N = 6
MIN: 175.96 / MAX: 365.43
321.84
Xeon Gold 5220R
SE +/- 2.31, N = 3
MIN: 160.24 / MAX: 299.46
274.98
Xeon Platinum 8280
SE +/- 0.52, N = 3
MIN: 200.79 / MAX: 358.32
323.20
2 x Xeon Platinum 8280
SE +/- 3.74, N = 15
MIN: 126.27 / MAX: 481.12
409.88
Xeon Gold 5218
SE +/- 1.26, N = 3
MIN: 166.24 / MAX: 288.23
265.46
Xeon Silver 4216
SE +/- 1.97, N = 3
MIN: 133.23 / MAX: 255.75
232.35
Xeon Gold 6226R
SE +/- 0.97, N = 3
MIN: 179.63 / MAX: 337.24
307.75
2 x Xeon Gold 6226R
SE +/- 1.84, N = 3
MIN: 196.53 / MAX: 395.24
358.62
2 x Xeon Silver 4216
SE +/- 4.57, N = 3
MIN: 156.69 / MAX: 307.87
272.55
Xeon W-3275M
SE +/- 2.32, N = 3
MIN: 317.28 / MAX: 605.87
537.84
2 x Xeon Platinum 8275CL
SE +/- 4.96, N = 3
MIN: 175.85 / MAX: 474
422.89
2 x Xeon Platinum 8275CL NUMA off
SE +/- 3.42, N = 3
MIN: 144.68 / MAX: 463.23
406.66
EPYC 2 7R32
SE +/- 2.19, N = 3
MIN: 302.17 / MAX: 751.14
676.16
2 x Xeon Platinum 8259CL
SE +/- 3.67, N = 3
MIN: 205.51 / MAX: 479.42
431.76
2 x Xeon Platinum 8259CL NUMA off
SE +/- 3.77, N = 15
MIN: 106.81 / MAX: 466.09
400.24
150
300
450
600
750
1. (CC) gcc options: -pthread

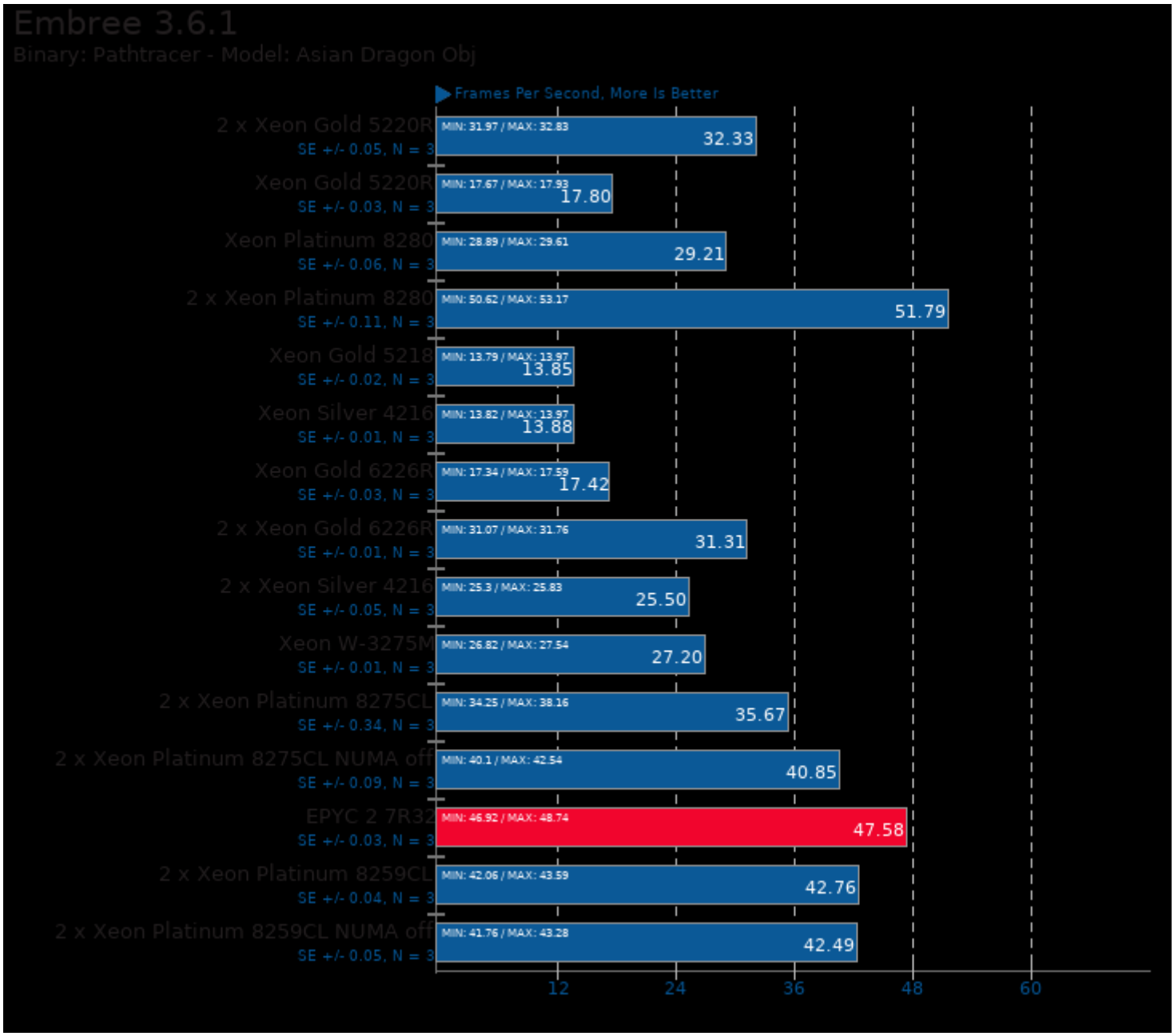

dav1d 0.6.0
Video Input: Chimera 1080p 10-bit
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.47, N = 3
MIN: 54.24 / MAX: 115.34
70.81
Xeon Gold 5220R
SE +/- 0.14, N = 3
MIN: 42.73 / MAX: 119.59
58.05
Xeon Platinum 8280
SE +/- 0.12, N = 3
MIN: 49.2 / MAX: 111
65.40
2 x Xeon Platinum 8280
SE +/- 0.07, N = 3
MIN: 66.74 / MAX: 126.85
85.14
Xeon Gold 5218
SE +/- 0.05, N = 3
MIN: 40.96 / MAX: 112.64
55.88
Xeon Silver 4216
SE +/- 0.06, N = 3
MIN: 36.69 / MAX: 102.49
50.10
Xeon Gold 6226R
SE +/- 0.24, N = 3
MIN: 45.27 / MAX: 134.22
62.32
2 x Xeon Gold 6226R
SE +/- 0.16, N = 3
MIN: 55.51 / MAX: 119.74
73.95
2 x Xeon Silver 4216
SE +/- 0.16, N = 3
MIN: 45.13 / MAX: 93.29
59.51
Xeon W-3275M
SE +/- 0.05, N = 3
MIN: 55.07 / MAX: 147.52
81.60
2 x Xeon Platinum 8275CL
SE +/- 0.44, N = 3
MIN: 71.05 / MAX: 131.54
90.28
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.30, N = 3
MIN: 71.49 / MAX: 131.32
90.78
EPYC 2 7R32
SE +/- 0.60, N = 3
MIN: 101.2 / MAX: 212.94
140.14
2 x Xeon Platinum 8259CL
SE +/- 0.04, N = 3
MIN: 69.22 / MAX: 130.8
89.55
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.56, N = 3
MIN: 69.45 / MAX: 129.53
88.66
30
60
90
120
150
1. (CC) gcc options: -pthread

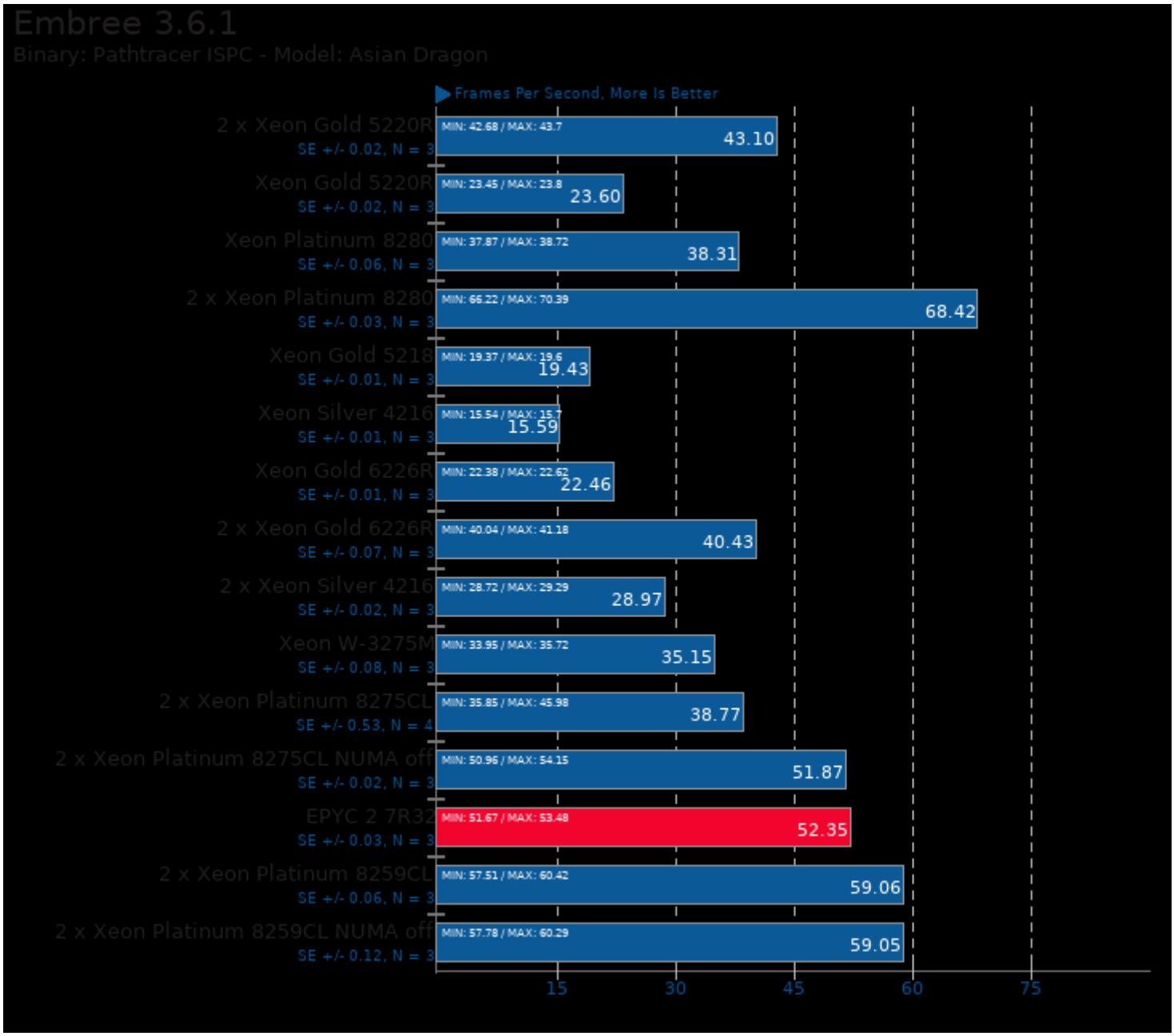

DeepSpeech 0.6
Acceleration: CPU
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.47, N = 3
125.12
Xeon Gold 5220R
SE +/- 1.11, N = 3
126.08
Xeon Platinum 8280
SE +/- 1.60, N = 3
118.09
2 x Xeon Platinum 8280
SE +/- 1.16, N = 3
122.22
Xeon Gold 5218
SE +/- 0.75, N = 3
128.41
Xeon Silver 4216
SE +/- 1.22, N = 3
136.00
Xeon Gold 6226R
SE +/- 1.84, N = 3
119.79
2 x Xeon Gold 6226R
SE +/- 0.89, N = 3
123.39
2 x Xeon Silver 4216
SE +/- 0.71, N = 3
133.01
Xeon W-3275M
SE +/- 0.15, N = 3
123.85
2 x Xeon Platinum 8275CL
SE +/- 1.06, N = 3
113.14
2 x Xeon Platinum 8275CL NUMA off
SE +/- 2.07, N = 4
138.26
EPYC 2 7R32
SE +/- 0.08, N = 3
72.82
2 x Xeon Platinum 8259CL
SE +/- 0.65, N = 3
117.73
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.04, N = 3
135.05
30
60
90
120
150

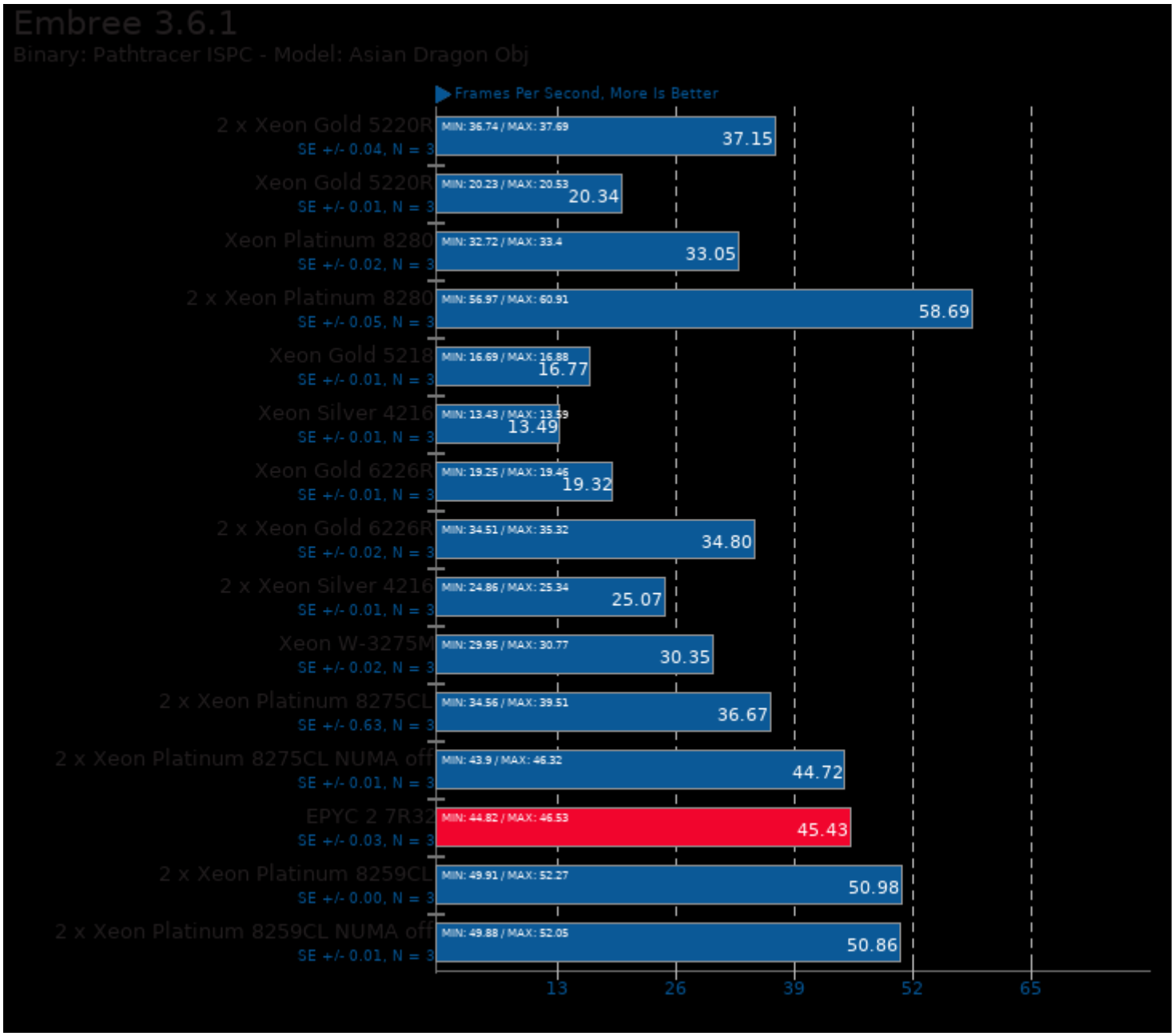

Embree 3.6.1
Binary: Pathtracer - Model: Crown
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.05, N = 3
MIN: 29.05 / MAX: 30.15
29.52
Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 15.89 / MAX: 16.22
16.05
Xeon Platinum 8280
SE +/- 0.04, N = 3
MIN: 25.64 / MAX: 26.64
26.28
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
MIN: 44.2 / MAX: 47.35
45.61
Xeon Gold 5218
SE +/- 0.01, N = 3
MIN: 12.32 / MAX: 12.5
12.39
Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 12.35 / MAX: 12.55
12.43
Xeon Gold 6226R
SE +/- 0.00, N = 3
MIN: 15.9 / MAX: 16.17
15.99
2 x Xeon Gold 6226R
SE +/- 0.09, N = 3
MIN: 28.49 / MAX: 29.56
28.96
2 x Xeon Silver 4216
SE +/- 0.03, N = 3
MIN: 23 / MAX: 23.64
23.27
Xeon W-3275M
SE +/- 0.03, N = 3
MIN: 24.09 / MAX: 24.98
24.55
2 x Xeon Platinum 8275CL
SE +/- 0.12, N = 3
MIN: 40.7 / MAX: 42.99
41.79
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.17, N = 3
MIN: 40.34 / MAX: 42.73
41.39
EPYC 2 7R32
SE +/- 0.08, N = 3
MIN: 46.77 / MAX: 49.17
47.65
2 x Xeon Platinum 8259CL
SE +/- 0.17, N = 3
MIN: 37.03 / MAX: 39.42
38.12
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.15, N = 3
MIN: 37.24 / MAX: 39.22
38.10
11
22
33
44
55

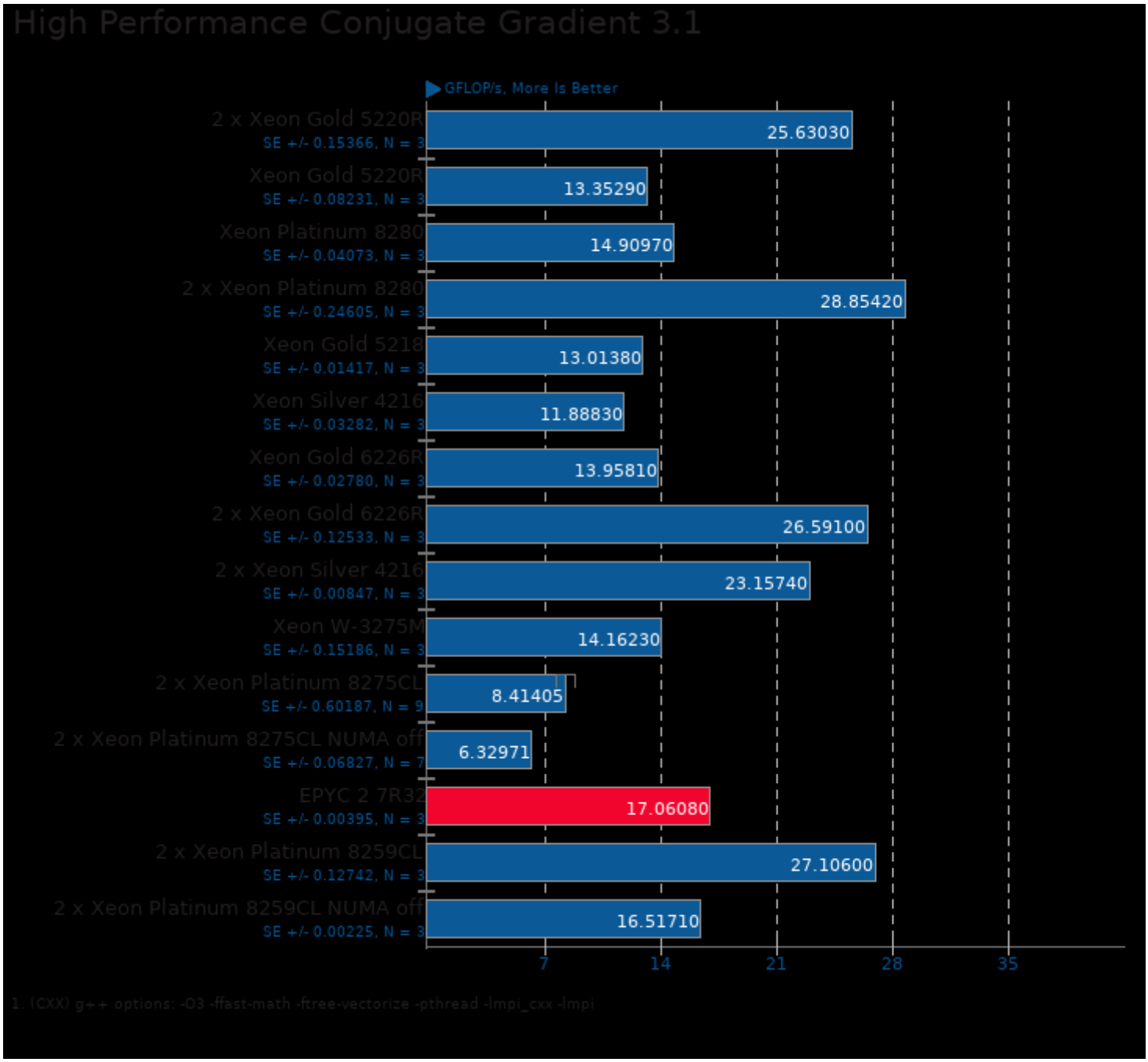

Embree 3.6.1
Binary: Pathtracer ISPC - Model: Crown
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 32.87 / MAX: 34.13
33.45
Xeon Gold 5220R
SE +/- 0.01, N = 3
MIN: 17.5 / MAX: 17.85
17.66
Xeon Platinum 8280
SE +/- 0.02, N = 3
MIN: 28.26 / MAX: 29.24
28.77
2 x Xeon Platinum 8280
SE +/- 0.05, N = 3
MIN: 51.36 / MAX: 55.83
53.23
Xeon Gold 5218
SE +/- 0.01, N = 3
MIN: 14.3 / MAX: 14.63
14.42
Xeon Silver 4216
SE +/- 0.00, N = 3
MIN: 11.32 / MAX: 11.49
11.38
Xeon Gold 6226R
SE +/- 0.02, N = 3
MIN: 16.67 / MAX: 17
16.81
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
MIN: 31.27 / MAX: 32.36
31.73
2 x Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 21.43 / MAX: 22.13
21.75
Xeon W-3275M
SE +/- 0.04, N = 3
MIN: 25.71 / MAX: 26.95
26.40
2 x Xeon Platinum 8275CL
SE +/- 0.49, N = 12
MIN: 37.93 / MAX: 51.79
49.05
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03, N = 3
MIN: 48.68 / MAX: 51.86
49.96
EPYC 2 7R32
SE +/- 0.08, N = 3
MIN: 44.15 / MAX: 46.52
45.19
2 x Xeon Platinum 8259CL
SE +/- 0.38, N = 3
MIN: 42.99 / MAX: 47.93
46.18
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.05, N = 3
MIN: 45.24 / MAX: 47.89
46.42
12
24
36
48
60

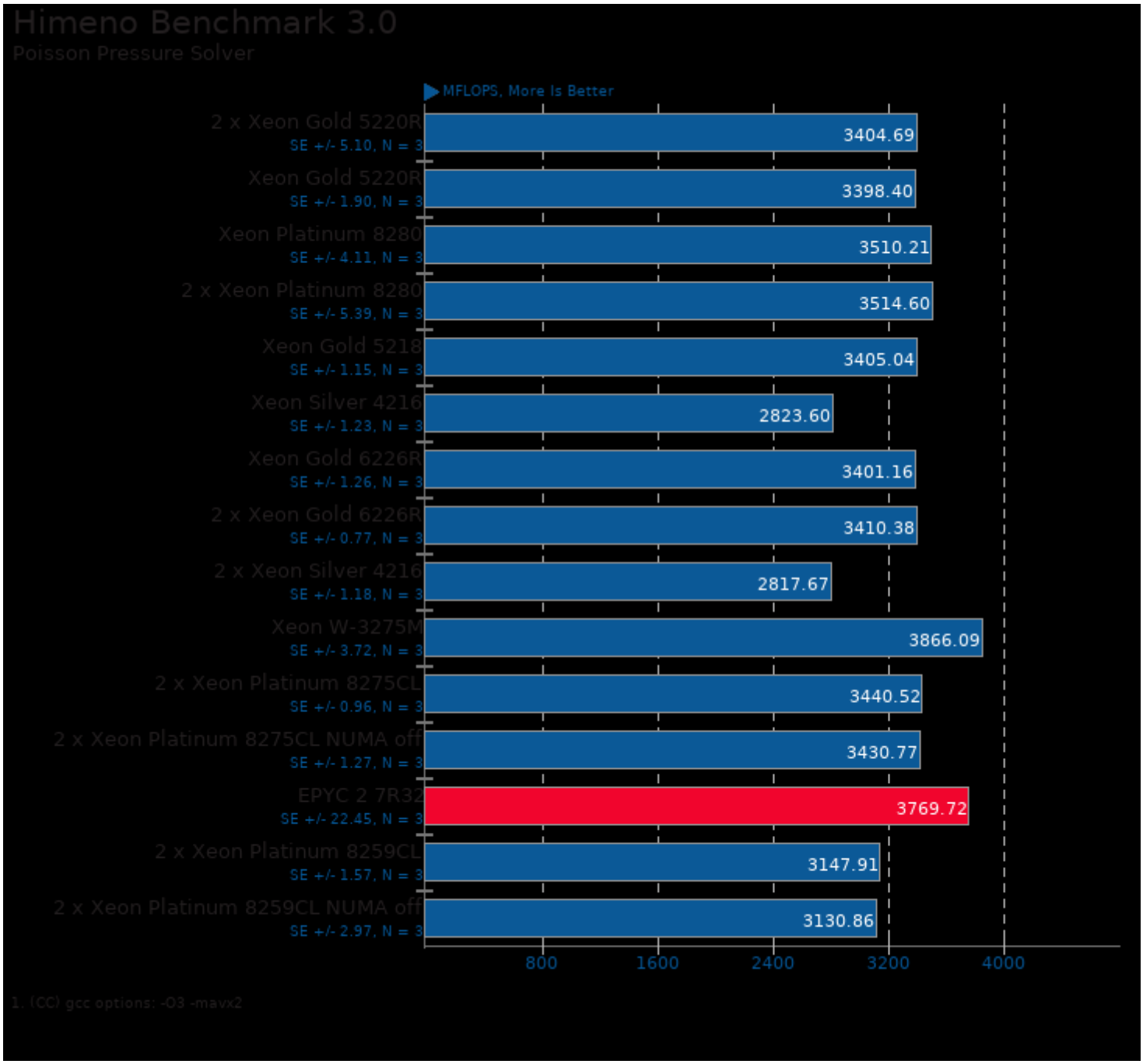

Embree 3.6.1
Binary: Pathtracer - Model: Asian Dragon
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.05, N = 3
MIN: 35.51 / MAX: 36.33
35.88
Xeon Gold 5220R
SE +/- 0.04, N = 3
MIN: 19.5 / MAX: 19.79
19.61
Xeon Platinum 8280
SE +/- 0.04, N = 3
MIN: 32 / MAX: 32.54
32.25
2 x Xeon Platinum 8280
SE +/- 0.16, N = 3
MIN: 55.98 / MAX: 58.87
57.49
Xeon Gold 5218
SE +/- 0.01, N = 3
MIN: 15.25 / MAX: 15.4
15.31
Xeon Silver 4216
SE +/- 0.03, N = 3
MIN: 15.18 / MAX: 15.39
15.28
Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 19.28 / MAX: 19.48
19.35
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
MIN: 34.44 / MAX: 35.19
34.69
2 x Xeon Silver 4216
SE +/- 0.05, N = 3
MIN: 27.97 / MAX: 28.53
28.20
Xeon W-3275M
SE +/- 0.05, N = 3
MIN: 29.8 / MAX: 30.54
30.11
2 x Xeon Platinum 8275CL
SE +/- 0.32, N = 3
MIN: 37.64 / MAX: 43.58
40.08
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.19, N = 3
MIN: 44.89 / MAX: 47.26
45.77
EPYC 2 7R32
SE +/- 0.06, N = 3
MIN: 52.3 / MAX: 53.84
52.95
2 x Xeon Platinum 8259CL
SE +/- 0.38, N = 3
MIN: 44.43 / MAX: 47.97
46.79
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.08, N = 3
MIN: 46.17 / MAX: 47.87
46.91
13
26
39
52
65

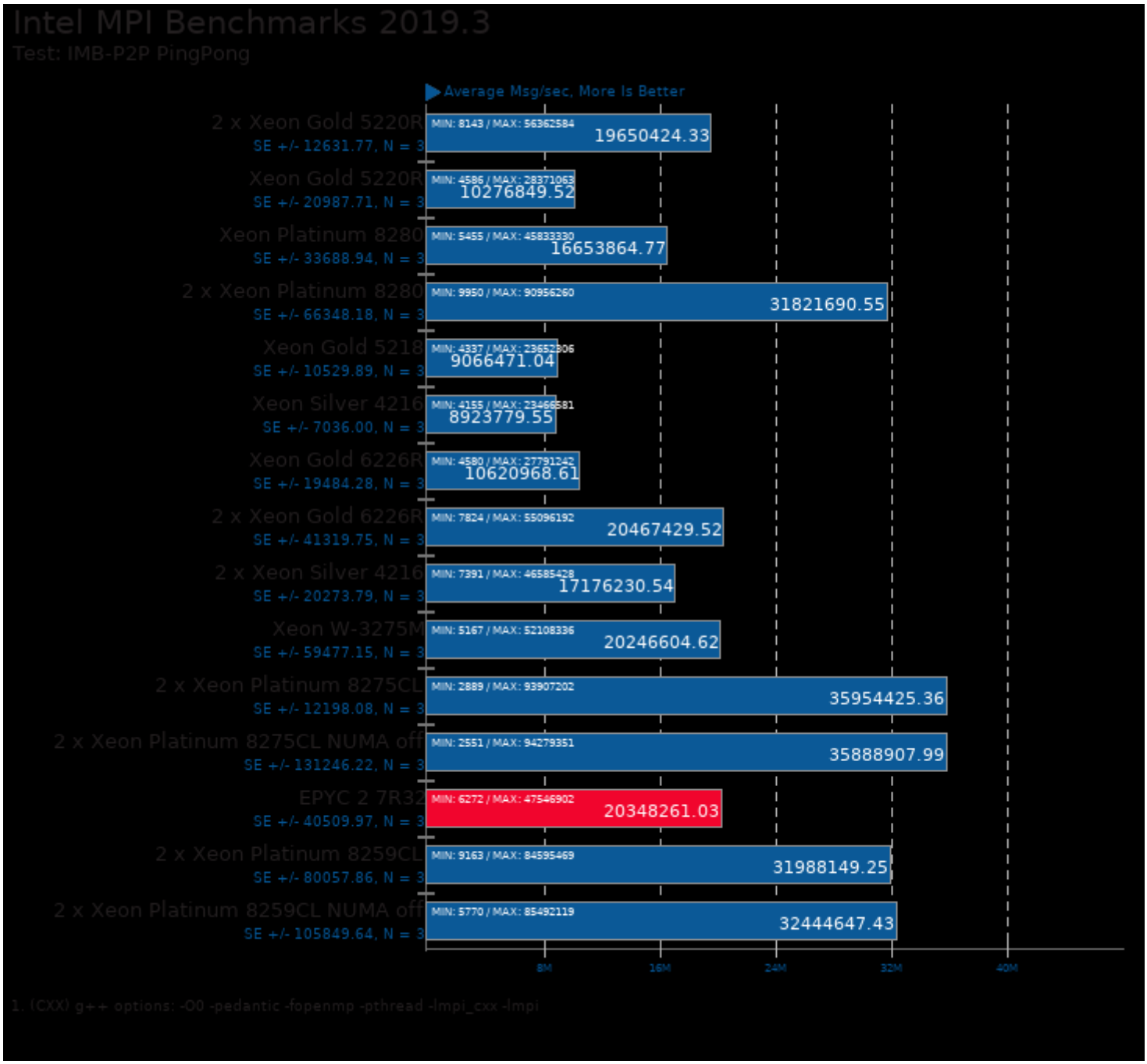

Embree 3.6.1
Binary: Pathtracer - Model: Asian Dragon Obj
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.05, N = 3
MIN: 31.97 / MAX: 32.83
32.33
Xeon Gold 5220R
SE +/- 0.03, N = 3
MIN: 17.67 / MAX: 17.93
17.80
Xeon Platinum 8280
SE +/- 0.06, N = 3
MIN: 28.89 / MAX: 29.61
29.21
2 x Xeon Platinum 8280
SE +/- 0.11, N = 3
MIN: 50.62 / MAX: 53.17
51.79
Xeon Gold 5218
SE +/- 0.02, N = 3
MIN: 13.79 / MAX: 13.97
13.85
Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 13.82 / MAX: 13.97
13.88
Xeon Gold 6226R
SE +/- 0.03, N = 3
MIN: 17.34 / MAX: 17.59
17.42
2 x Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 31.07 / MAX: 31.76
31.31
2 x Xeon Silver 4216
SE +/- 0.05, N = 3
MIN: 25.3 / MAX: 25.83
25.50
Xeon W-3275M
SE +/- 0.01, N = 3
MIN: 26.82 / MAX: 27.54
27.20
2 x Xeon Platinum 8275CL
SE +/- 0.34, N = 3
MIN: 34.25 / MAX: 38.16
35.67
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.09, N = 3
MIN: 40.1 / MAX: 42.54
40.85
EPYC 2 7R32
SE +/- 0.03, N = 3
MIN: 46.92 / MAX: 48.74
47.58
2 x Xeon Platinum 8259CL
SE +/- 0.04, N = 3
MIN: 42.06 / MAX: 43.59
42.76
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.05, N = 3
MIN: 41.76 / MAX: 43.28
42.49
12
24
36
48
60

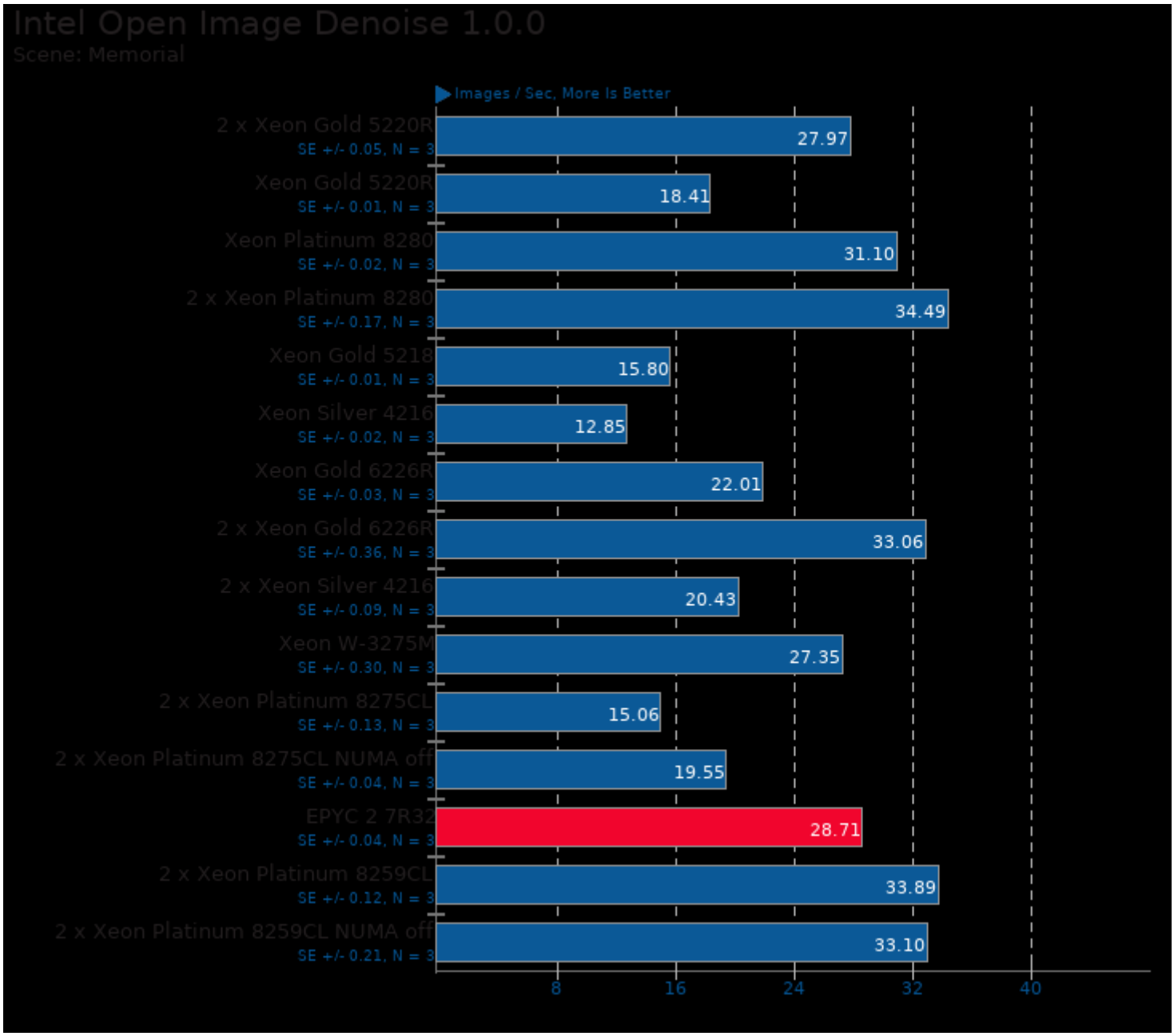

Embree 3.6.1
Binary: Pathtracer ISPC - Model: Asian Dragon
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 42.68 / MAX: 43.7
43.10
Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 23.45 / MAX: 23.8
23.60
Xeon Platinum 8280
SE +/- 0.06, N = 3
MIN: 37.87 / MAX: 38.72
38.31
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
MIN: 66.22 / MAX: 70.39
68.42
Xeon Gold 5218
SE +/- 0.01, N = 3
MIN: 19.37 / MAX: 19.6
19.43
Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 15.54 / MAX: 15.7
15.59
Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 22.38 / MAX: 22.62
22.46
2 x Xeon Gold 6226R
SE +/- 0.07, N = 3
MIN: 40.04 / MAX: 41.18
40.43
2 x Xeon Silver 4216
SE +/- 0.02, N = 3
MIN: 28.72 / MAX: 29.29
28.97
Xeon W-3275M
SE +/- 0.08, N = 3
MIN: 33.95 / MAX: 35.72
35.15
2 x Xeon Platinum 8275CL
SE +/- 0.53, N = 4
MIN: 35.85 / MAX: 45.98
38.77
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.02, N = 3
MIN: 50.96 / MAX: 54.15
51.87
EPYC 2 7R32
SE +/- 0.03, N = 3
MIN: 51.67 / MAX: 53.48
52.35
2 x Xeon Platinum 8259CL
SE +/- 0.06, N = 3
MIN: 57.51 / MAX: 60.42
59.06
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.12, N = 3
MIN: 57.78 / MAX: 60.29
59.05
15
30
45
60
75

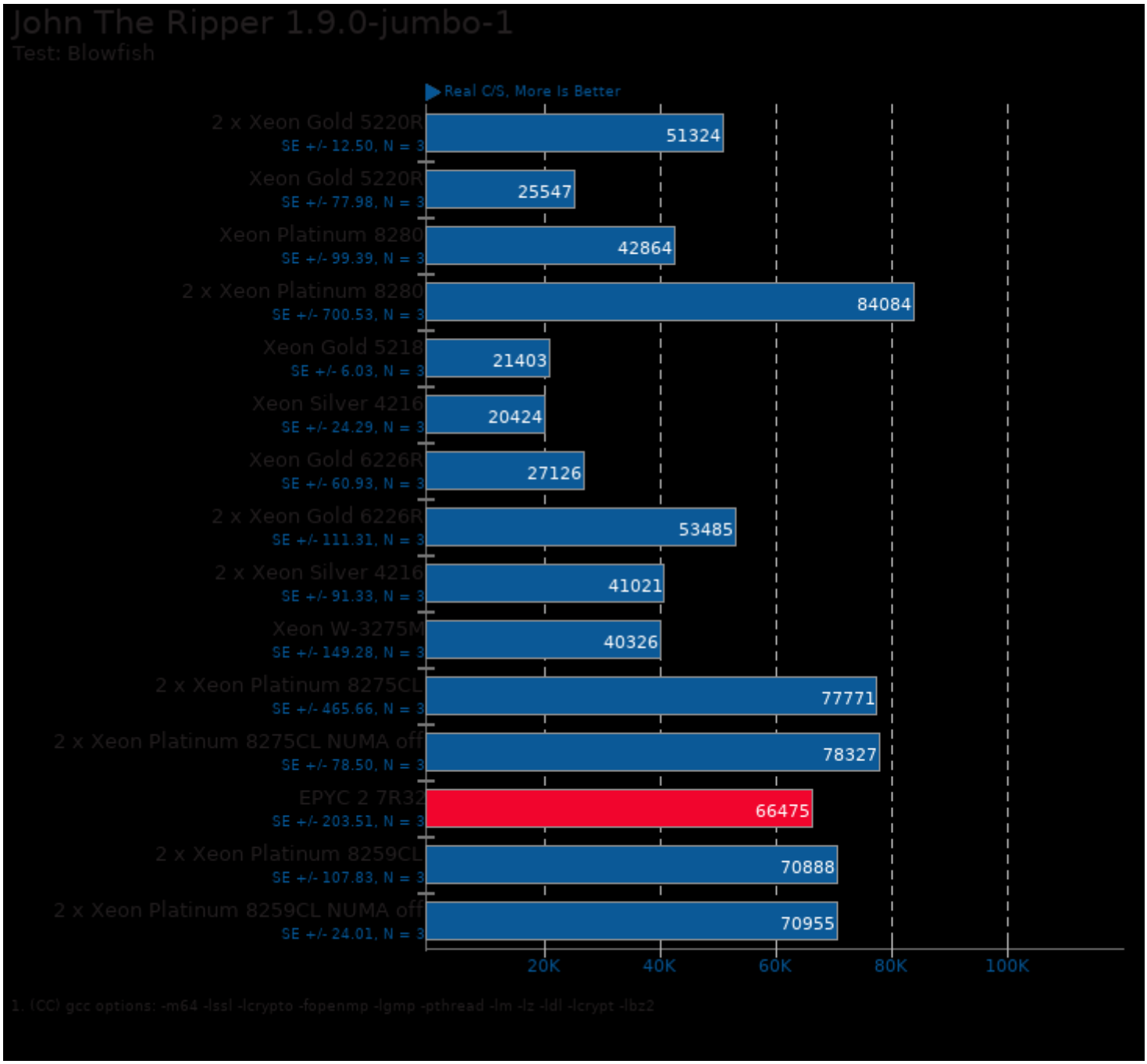

Embree 3.6.1
Binary: Pathtracer ISPC - Model: Asian Dragon Obj
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.04, N = 3
MIN: 36.74 / MAX: 37.69
37.15
Xeon Gold 5220R
SE +/- 0.01, N = 3
MIN: 20.23 / MAX: 20.53
20.34
Xeon Platinum 8280
SE +/- 0.02, N = 3
MIN: 32.72 / MAX: 33.4
33.05
2 x Xeon Platinum 8280
SE +/- 0.05, N = 3
MIN: 56.97 / MAX: 60.91
58.69
Xeon Gold 5218
SE +/- 0.01, N = 3
MIN: 16.69 / MAX: 16.88
16.77
Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 13.43 / MAX: 13.59
13.49
Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 19.25 / MAX: 19.46
19.32
2 x Xeon Gold 6226R
SE +/- 0.02, N = 3
MIN: 34.51 / MAX: 35.32
34.80
2 x Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 24.86 / MAX: 25.34
25.07
Xeon W-3275M
SE +/- 0.02, N = 3
MIN: 29.95 / MAX: 30.77
30.35
2 x Xeon Platinum 8275CL
SE +/- 0.63, N = 3
MIN: 34.56 / MAX: 39.51
36.67
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 3
MIN: 43.9 / MAX: 46.32
44.72
EPYC 2 7R32
SE +/- 0.03, N = 3
MIN: 44.82 / MAX: 46.53
45.43
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 3
MIN: 49.91 / MAX: 52.27
50.98
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01, N = 3
MIN: 49.88 / MAX: 52.05
50.86
13
26
39
52
65

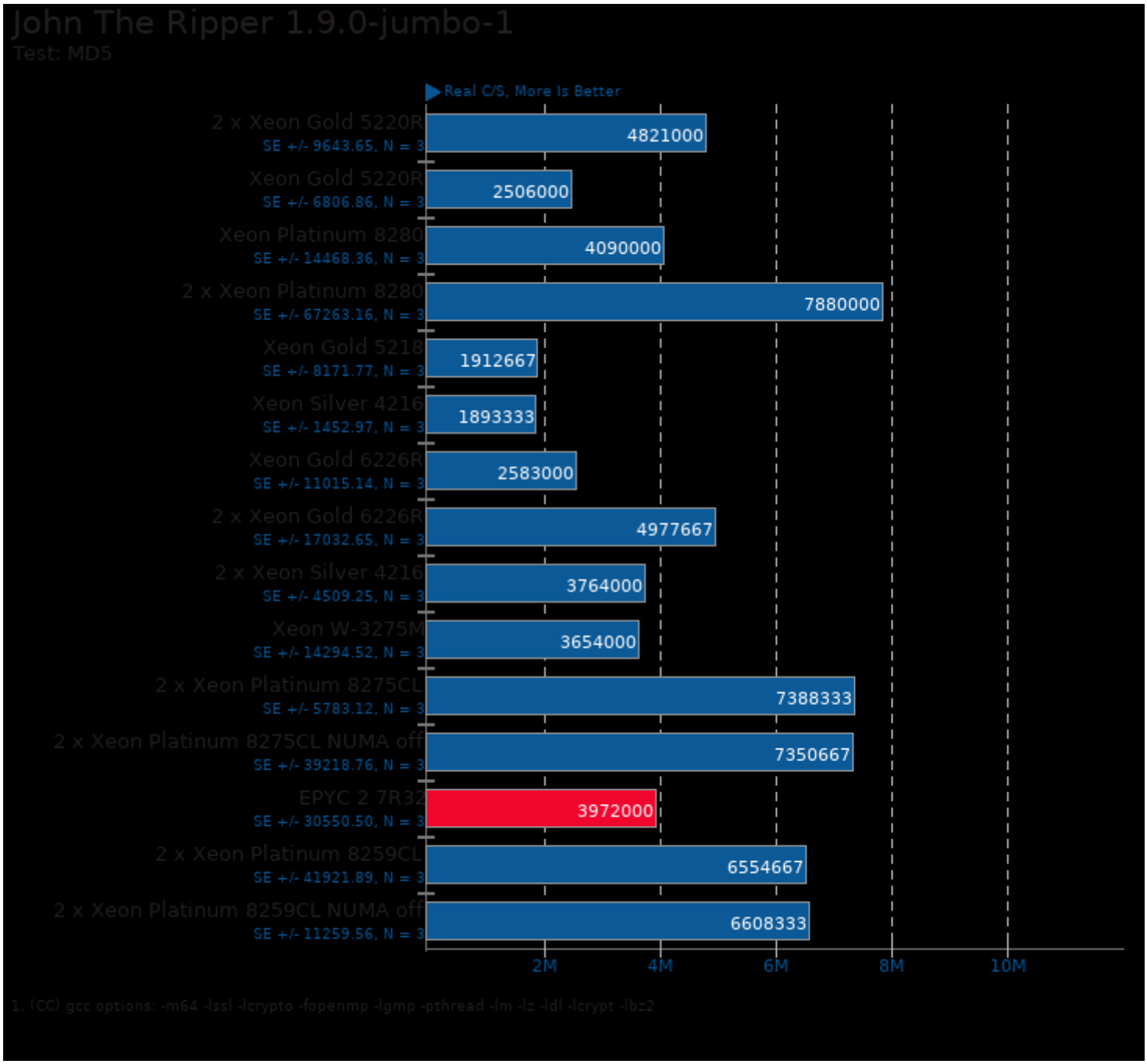

High Performance Conjugate Gradient 3.1
GFLOP/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.15366, N = 3
25.63030
Xeon Gold 5220R
SE +/- 0.08231, N = 3
13.35290
Xeon Platinum 8280
SE +/- 0.04073, N = 3
14.90970
2 x Xeon Platinum 8280
SE +/- 0.24605, N = 3
28.85420
Xeon Gold 5218
SE +/- 0.01417, N = 3
13.01380
Xeon Silver 4216
SE +/- 0.03282, N = 3
11.88830
Xeon Gold 6226R
SE +/- 0.02780, N = 3
13.95810
2 x Xeon Gold 6226R
SE +/- 0.12533, N = 3
26.59100
2 x Xeon Silver 4216
SE +/- 0.00847, N = 3
23.15740
Xeon W-3275M
SE +/- 0.15186, N = 3
14.16230
2 x Xeon Platinum 8275CL
SE +/- 0.60187, N = 9
8.41405
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.06827, N = 7
6.32971
EPYC 2 7R32
SE +/- 0.00395, N = 3
17.06080
2 x Xeon Platinum 8259CL
SE +/- 0.12742, N = 3
27.10600
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00225, N = 3
16.51710
7
14
21
28
35
1. (CXX) g++ options: -O3 -ffast-math -ftree-vectorize -pthread -lmpi_cxx -lmpi

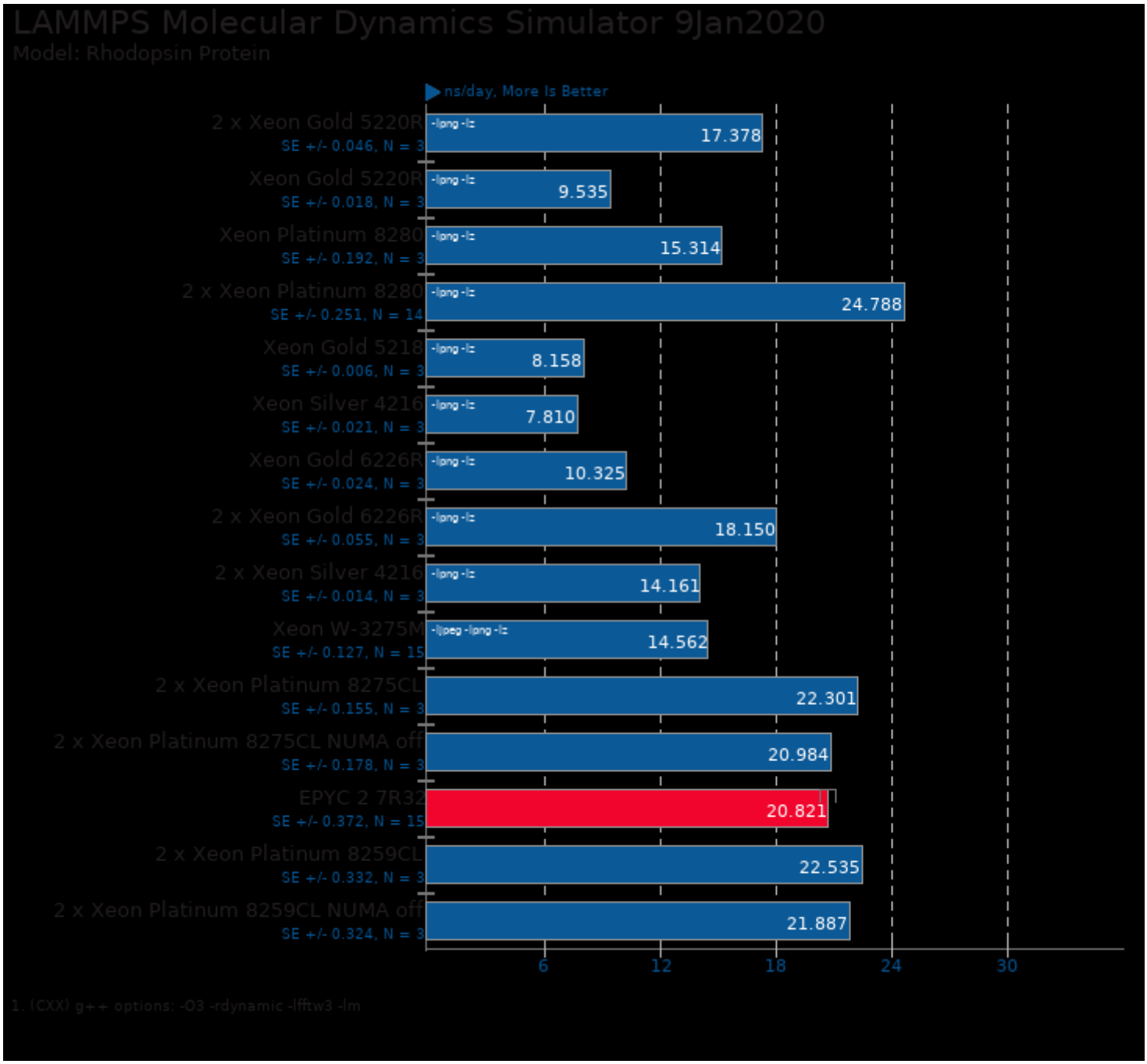

Himeno Benchmark 3.0
Poisson Pressure Solver
MFLOPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 5.10, N = 3
3404.69
Xeon Gold 5220R
SE +/- 1.90, N = 3
3398.40
Xeon Platinum 8280
SE +/- 4.11, N = 3
3510.21
2 x Xeon Platinum 8280
SE +/- 5.39, N = 3
3514.60
Xeon Gold 5218
SE +/- 1.15, N = 3
3405.04
Xeon Silver 4216
SE +/- 1.23, N = 3
2823.60
Xeon Gold 6226R
SE +/- 1.26, N = 3
3401.16
2 x Xeon Gold 6226R
SE +/- 0.77, N = 3
3410.38
2 x Xeon Silver 4216
SE +/- 1.18, N = 3
2817.67
Xeon W-3275M
SE +/- 3.72, N = 3
3866.09
2 x Xeon Platinum 8275CL
SE +/- 0.96, N = 3
3440.52
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1.27, N = 3
3430.77
EPYC 2 7R32
SE +/- 22.45, N = 3
3769.72
2 x Xeon Platinum 8259CL
SE +/- 1.57, N = 3
3147.91
2 x Xeon Platinum 8259CL NUMA off
SE +/- 2.97, N = 3
3130.86
800
1600
2400
3200
4000
1. (CC) gcc options: -O3 -mavx2

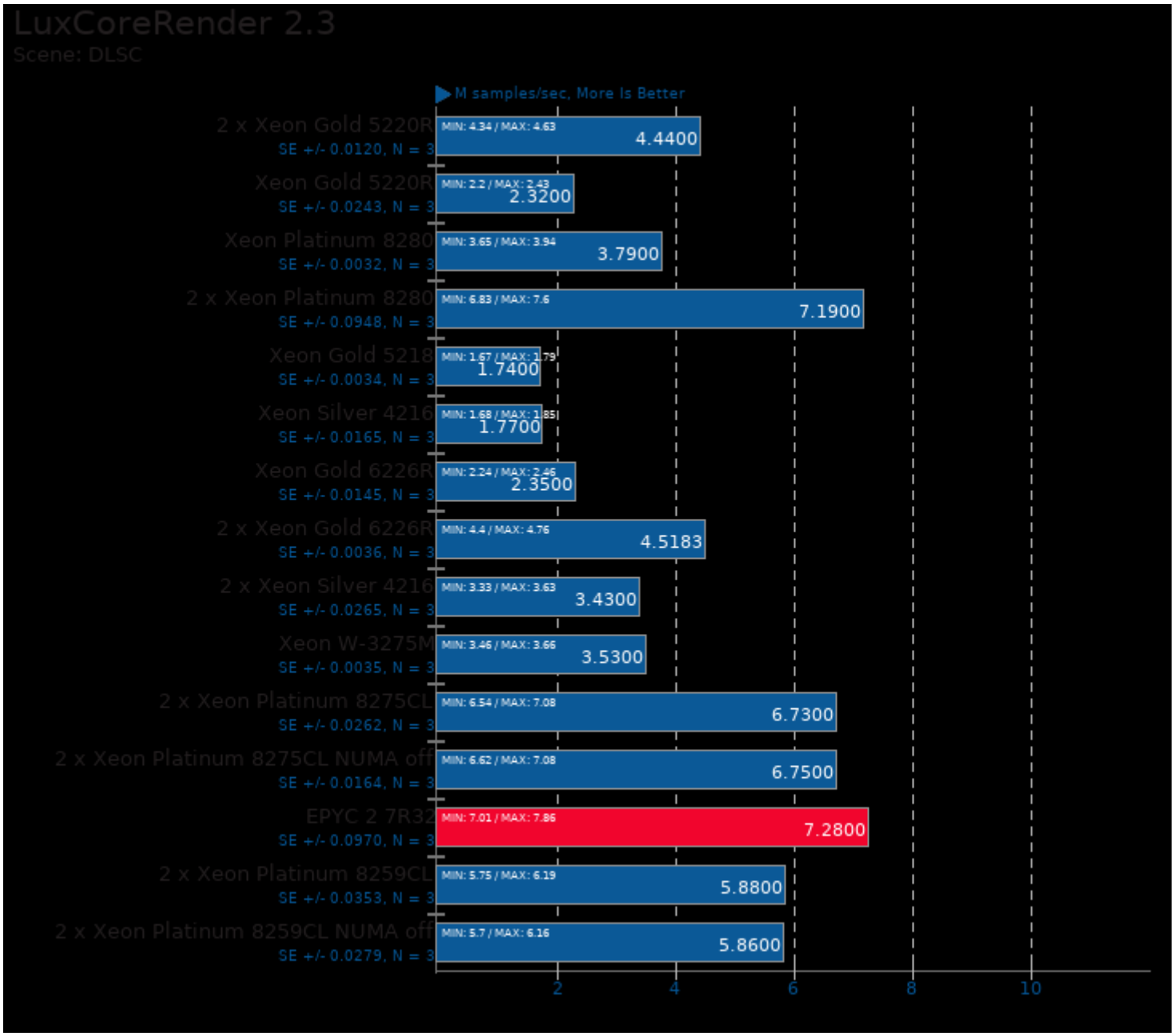

Intel MPI Benchmarks 2019.3
Test: IMB-P2P PingPong
Average Msg/sec, More Is Better
2 x Xeon Gold 5220R
SE +/- 12631.77, N = 3
MIN: 8143 / MAX: 56362584
19650424.33
Xeon Gold 5220R
SE +/- 20987.71, N = 3
MIN: 4586 / MAX: 28371063
10276849.52
Xeon Platinum 8280
SE +/- 33688.94, N = 3
MIN: 5455 / MAX: 45833330
16653864.77
2 x Xeon Platinum 8280
SE +/- 66348.18, N = 3
MIN: 9950 / MAX: 90956260
31821690.55
Xeon Gold 5218
SE +/- 10529.89, N = 3
MIN: 4337 / MAX: 23652806
9066471.04
Xeon Silver 4216
SE +/- 7036.00, N = 3
MIN: 4155 / MAX: 23466581
8923779.55
Xeon Gold 6226R
SE +/- 19484.28, N = 3
MIN: 4580 / MAX: 27791242
10620968.61
2 x Xeon Gold 6226R
SE +/- 41319.75, N = 3
MIN: 7824 / MAX: 55096192
20467429.52
2 x Xeon Silver 4216
SE +/- 20273.79, N = 3
MIN: 7391 / MAX: 46585428
17176230.54
Xeon W-3275M
SE +/- 59477.15, N = 3
MIN: 5167 / MAX: 52108336
20246604.62
2 x Xeon Platinum 8275CL
SE +/- 12198.08, N = 3
MIN: 2889 / MAX: 93907202
35954425.36
2 x Xeon Platinum 8275CL NUMA off
SE +/- 131246.22, N = 3
MIN: 2551 / MAX: 94279351
35888907.99
EPYC 2 7R32
SE +/- 40509.97, N = 3
MIN: 6272 / MAX: 47546902
20348261.03
2 x Xeon Platinum 8259CL
SE +/- 80057.86, N = 3
MIN: 9163 / MAX: 84595469
31988149.25
2 x Xeon Platinum 8259CL NUMA off
SE +/- 105849.64, N = 3
MIN: 5770 / MAX: 85492119
32444647.43
8M
16M
24M
32M
40M
1. (CXX) g++ options: -O0 -pedantic -fopenmp -pthread -lmpi_cxx -lmpi

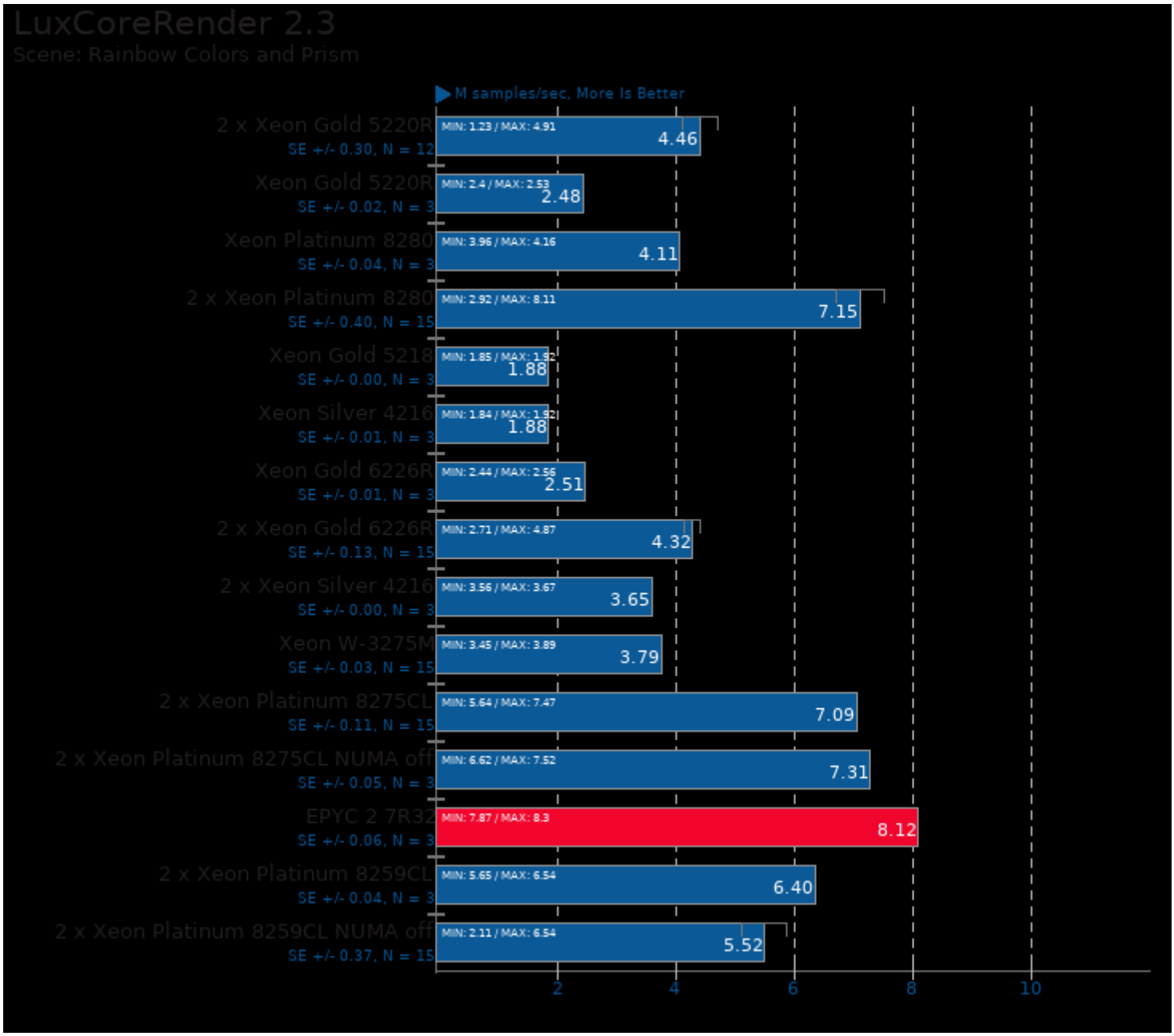

Intel Open Image Denoise 1.0.0
Scene: Memorial
Images / Sec, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.05, N = 3
27.97
Xeon Gold 5220R
SE +/- 0.01, N = 3
18.41
Xeon Platinum 8280
SE +/- 0.02, N = 3
31.10
2 x Xeon Platinum 8280
SE +/- 0.17, N = 3
34.49
Xeon Gold 5218
SE +/- 0.01, N = 3
15.80
Xeon Silver 4216
SE +/- 0.02, N = 3
12.85
Xeon Gold 6226R
SE +/- 0.03, N = 3
22.01
2 x Xeon Gold 6226R
SE +/- 0.36, N = 3
33.06
2 x Xeon Silver 4216
SE +/- 0.09, N = 3
20.43
Xeon W-3275M
SE +/- 0.30, N = 3
27.35
2 x Xeon Platinum 8275CL
SE +/- 0.13, N = 3
15.06
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.04, N = 3
19.55
EPYC 2 7R32
SE +/- 0.04, N = 3
28.71
2 x Xeon Platinum 8259CL
SE +/- 0.12, N = 3
33.89
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.21, N = 3
33.10
8
16
24
32
40

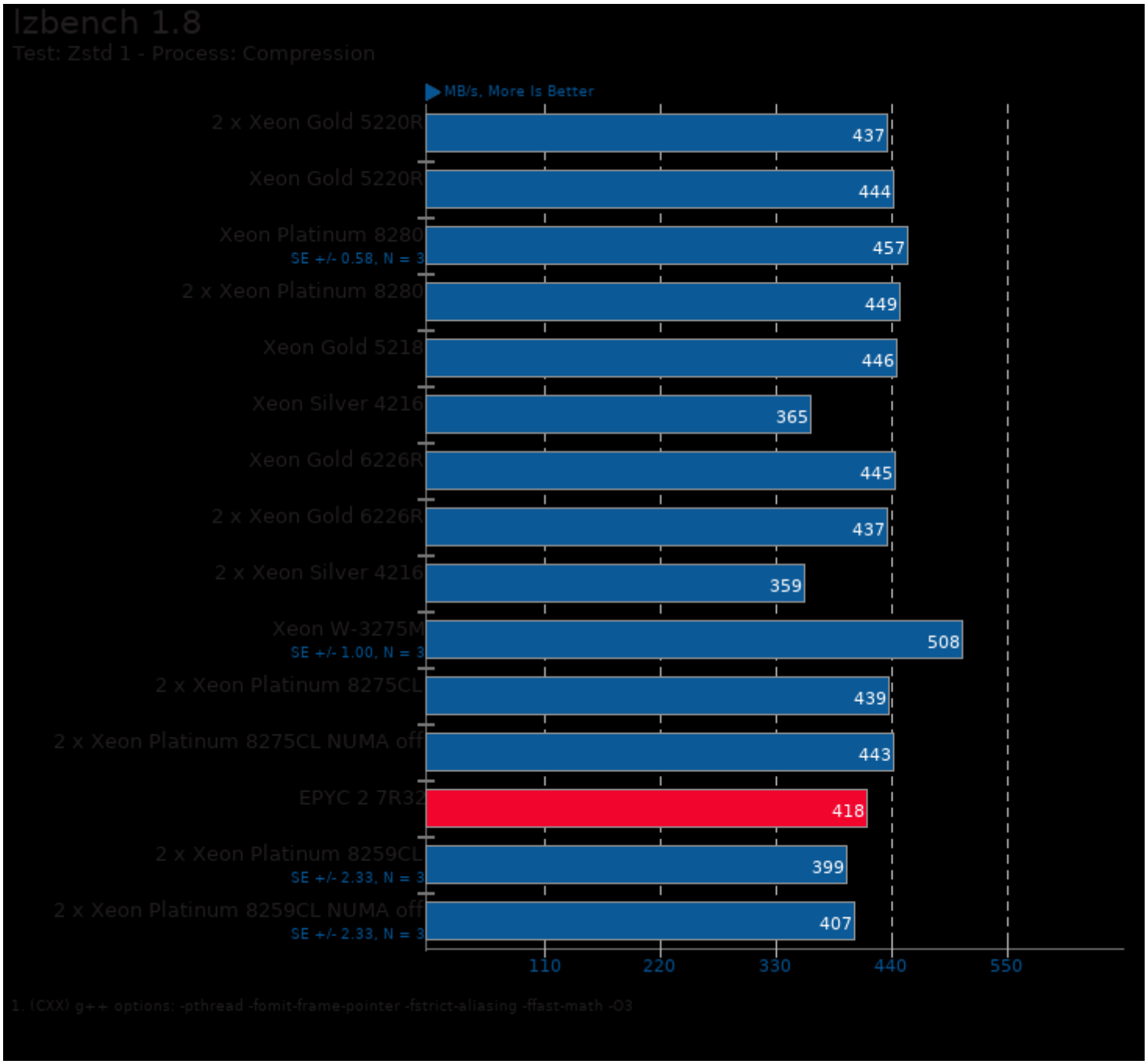

John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
2 x Xeon Gold 5220R
SE +/- 12.50, N = 3
51324
Xeon Gold 5220R
SE +/- 77.98, N = 3
25547
Xeon Platinum 8280
SE +/- 99.39, N = 3
42864
2 x Xeon Platinum 8280
SE +/- 700.53, N = 3
84084
Xeon Gold 5218
SE +/- 6.03, N = 3
21403
Xeon Silver 4216
SE +/- 24.29, N = 3
20424
Xeon Gold 6226R
SE +/- 60.93, N = 3
27126
2 x Xeon Gold 6226R
SE +/- 111.31, N = 3
53485
2 x Xeon Silver 4216
SE +/- 91.33, N = 3
41021
Xeon W-3275M
SE +/- 149.28, N = 3
40326
2 x Xeon Platinum 8275CL
SE +/- 465.66, N = 3
77771
2 x Xeon Platinum 8275CL NUMA off
SE +/- 78.50, N = 3
78327
EPYC 2 7R32
SE +/- 203.51, N = 3
66475
2 x Xeon Platinum 8259CL
SE +/- 107.83, N = 3
70888
2 x Xeon Platinum 8259CL NUMA off
SE +/- 24.01, N = 3
70955
20K
40K
60K
80K
100K
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2

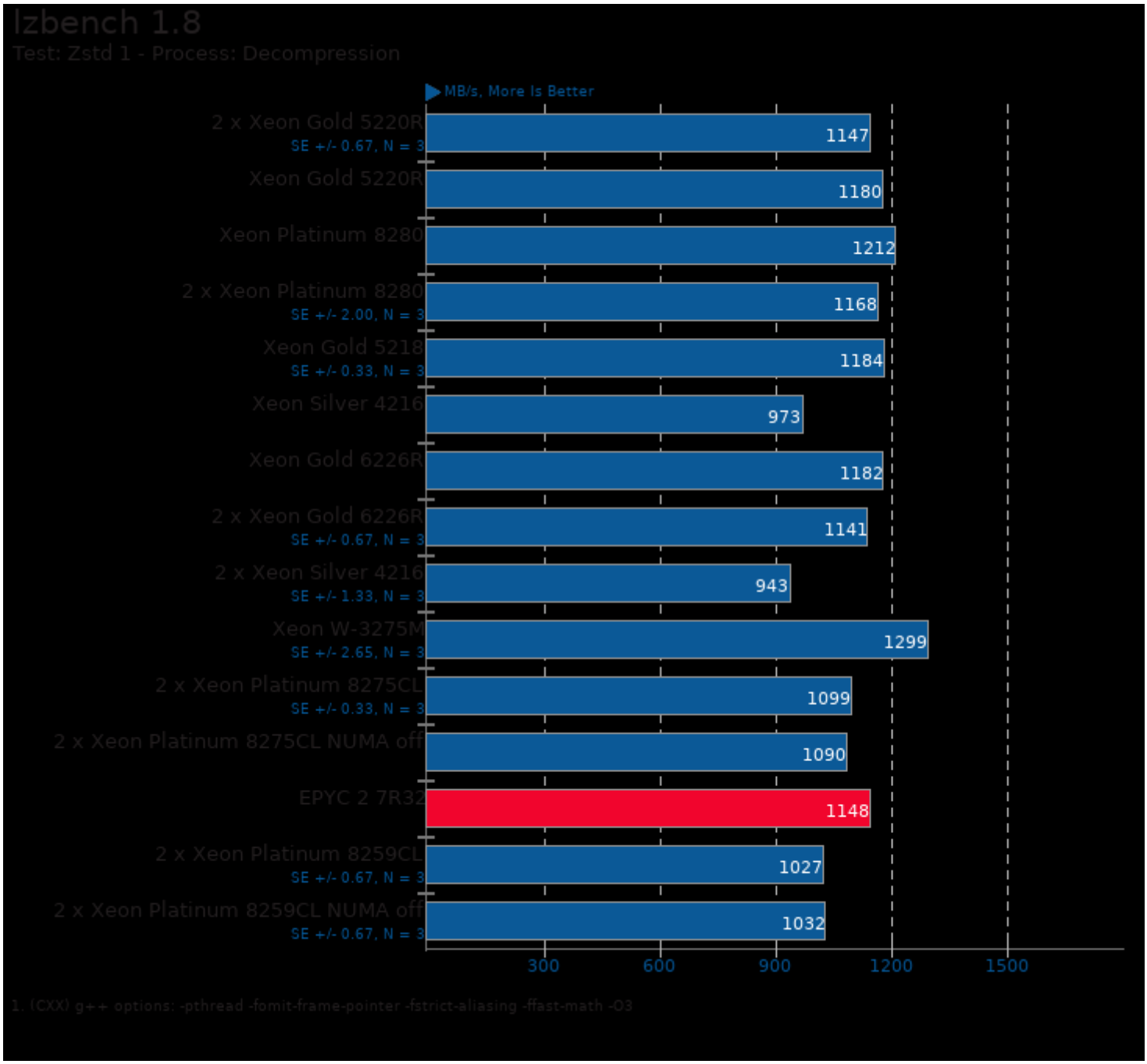

John The Ripper 1.9.0-jumbo-1
Test: MD5
Real C/S, More Is Better
2 x Xeon Gold 5220R
SE +/- 9643.65, N = 3
4821000
Xeon Gold 5220R
SE +/- 6806.86, N = 3
2506000
Xeon Platinum 8280
SE +/- 14468.36, N = 3
4090000
2 x Xeon Platinum 8280
SE +/- 67263.16, N = 3
7880000
Xeon Gold 5218
SE +/- 8171.77, N = 3
1912667
Xeon Silver 4216
SE +/- 1452.97, N = 3
1893333
Xeon Gold 6226R
SE +/- 11015.14, N = 3
2583000
2 x Xeon Gold 6226R
SE +/- 17032.65, N = 3
4977667
2 x Xeon Silver 4216
SE +/- 4509.25, N = 3
3764000
Xeon W-3275M
SE +/- 14294.52, N = 3
3654000
2 x Xeon Platinum 8275CL
SE +/- 5783.12, N = 3
7388333
2 x Xeon Platinum 8275CL NUMA off
SE +/- 39218.76, N = 3
7350667
EPYC 2 7R32
SE +/- 30550.50, N = 3
3972000
2 x Xeon Platinum 8259CL
SE +/- 41921.89, N = 3
6554667
2 x Xeon Platinum 8259CL NUMA off
SE +/- 11259.56, N = 3
6608333
2M
4M
6M
8M
10M
1. (CC) gcc options: -m64 -lssl -lcrypto -fopenmp -lgmp -pthread -lm -lz -ldl -lcrypt -lbz2

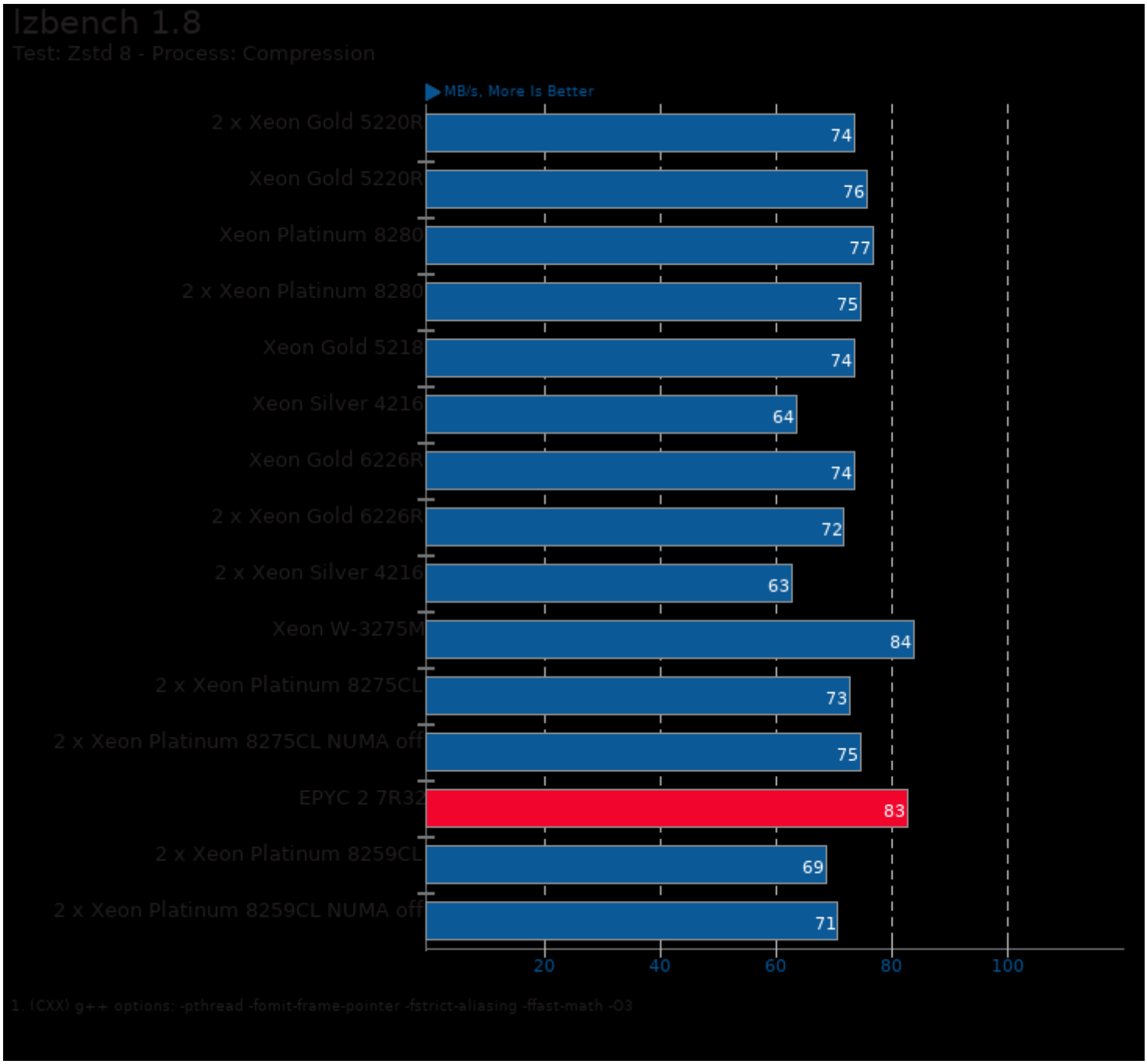

LAMMPS Molecular Dynamics Simulator 9Jan2020
Model: Rhodopsin Protein
ns/day, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.046, N = 3
17.378
Xeon Gold 5220R
SE +/- 0.018, N = 3
9.535
Xeon Platinum 8280
SE +/- 0.192, N = 3
15.314
2 x Xeon Platinum 8280
SE +/- 0.251, N = 14
24.788
Xeon Gold 5218
SE +/- 0.006, N = 3
8.158
Xeon Silver 4216
SE +/- 0.021, N = 3
7.810
Xeon Gold 6226R
SE +/- 0.024, N = 3
10.325
2 x Xeon Gold 6226R
SE +/- 0.055, N = 3
18.150
2 x Xeon Silver 4216
SE +/- 0.014, N = 3
14.161
Xeon W-3275M
SE +/- 0.127, N = 15
14.562
2 x Xeon Platinum 8275CL
SE +/- 0.155, N = 3
22.301
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.178, N = 3
20.984
EPYC 2 7R32
SE +/- 0.372, N = 15
20.821
2 x Xeon Platinum 8259CL
SE +/- 0.332, N = 3
22.535
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.324, N = 3
21.887
6
12
18
24
30
1. (CXX) g++ options: -O3 -rdynamic -lfftw3 -lm

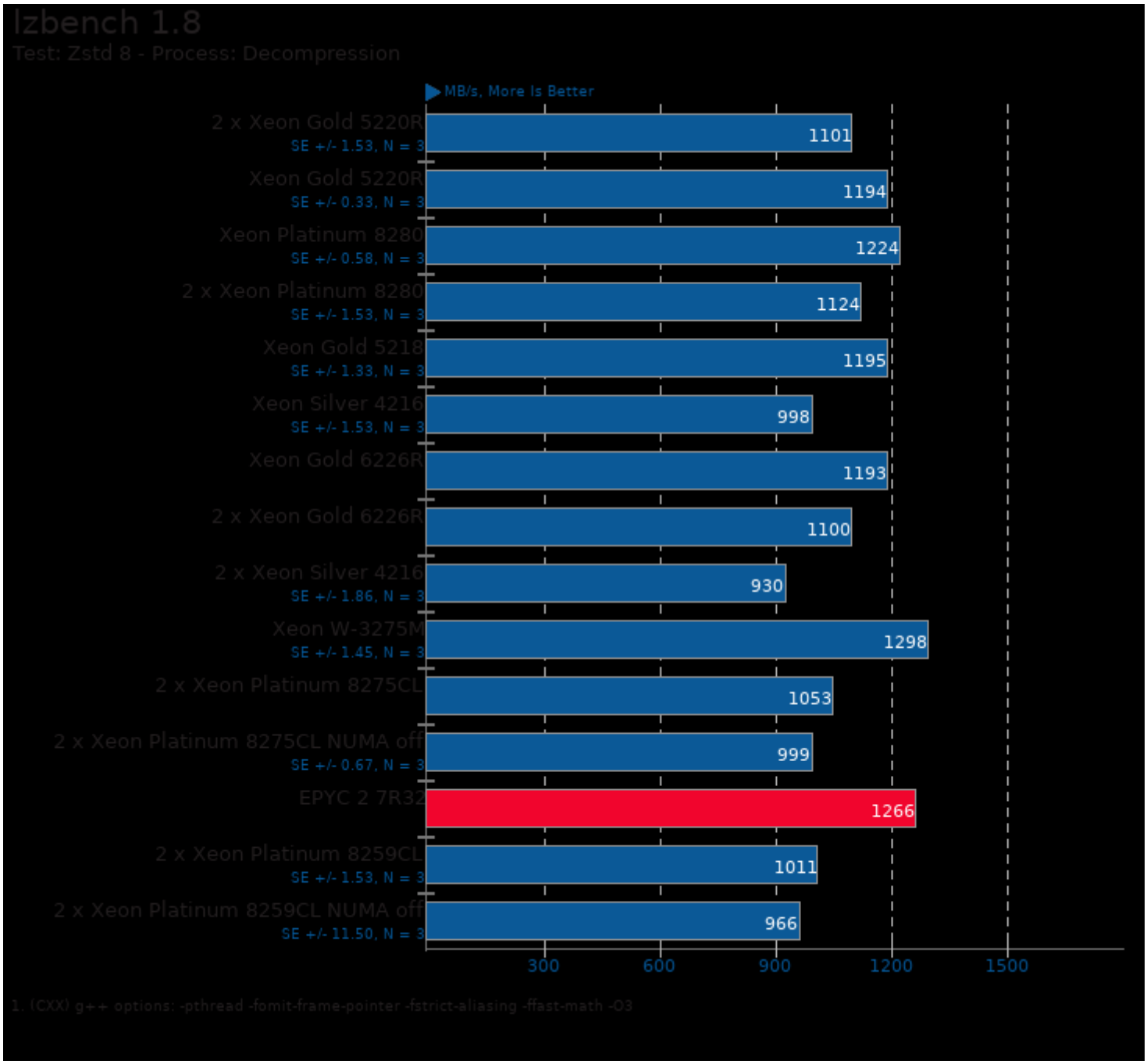

LuxCoreRender 2.3
Scene: DLSC
M samples/sec, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.0120, N = 3
MIN: 4.34 / MAX: 4.63
4.4400
Xeon Gold 5220R
SE +/- 0.0243, N = 3
MIN: 2.2 / MAX: 2.43
2.3200
Xeon Platinum 8280
SE +/- 0.0032, N = 3
MIN: 3.65 / MAX: 3.94
3.7900
2 x Xeon Platinum 8280
SE +/- 0.0948, N = 3
MIN: 6.83 / MAX: 7.6
7.1900
Xeon Gold 5218
SE +/- 0.0034, N = 3
MIN: 1.67 / MAX: 1.79
1.7400
Xeon Silver 4216
SE +/- 0.0165, N = 3
MIN: 1.68 / MAX: 1.85
1.7700
Xeon Gold 6226R
SE +/- 0.0145, N = 3
MIN: 2.24 / MAX: 2.46
2.3500
2 x Xeon Gold 6226R
SE +/- 0.0036, N = 3
MIN: 4.4 / MAX: 4.76
4.5183
2 x Xeon Silver 4216
SE +/- 0.0265, N = 3
MIN: 3.33 / MAX: 3.63
3.4300
Xeon W-3275M
SE +/- 0.0035, N = 3
MIN: 3.46 / MAX: 3.66
3.5300
2 x Xeon Platinum 8275CL
SE +/- 0.0262, N = 3
MIN: 6.54 / MAX: 7.08
6.7300
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.0164, N = 3
MIN: 6.62 / MAX: 7.08
6.7500
EPYC 2 7R32
SE +/- 0.0970, N = 3
MIN: 7.01 / MAX: 7.86
7.2800
2 x Xeon Platinum 8259CL
SE +/- 0.0353, N = 3
MIN: 5.75 / MAX: 6.19
5.8800
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.0279, N = 3
MIN: 5.7 / MAX: 6.16
5.8600
2
4
6
8
10

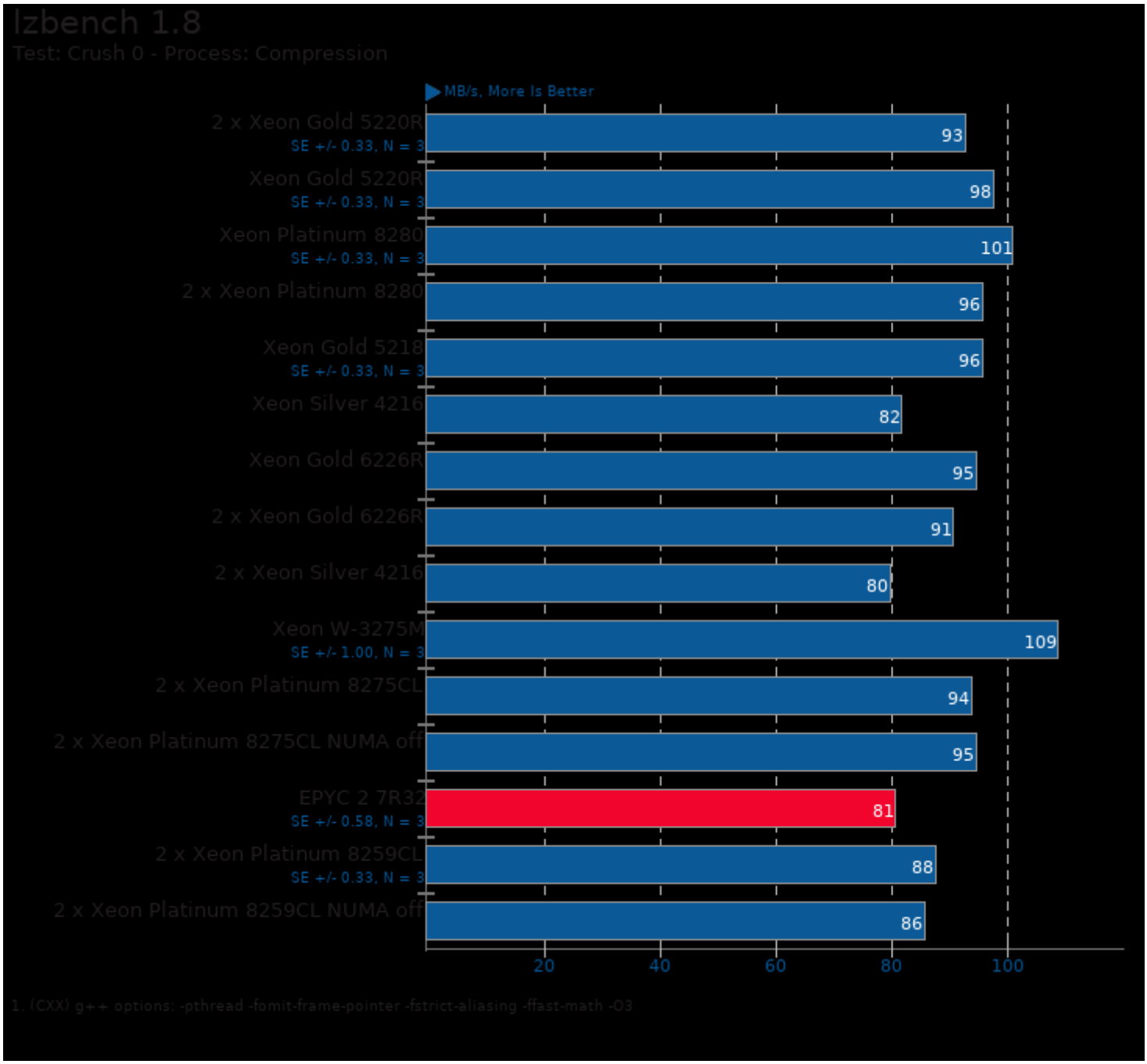

LuxCoreRender 2.3
Scene: Rainbow Colors and Prism
M samples/sec, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.30, N = 12
MIN: 1.23 / MAX: 4.91
4.46
Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 2.4 / MAX: 2.53
2.48
Xeon Platinum 8280
SE +/- 0.04, N = 3
MIN: 3.96 / MAX: 4.16
4.11
2 x Xeon Platinum 8280
SE +/- 0.40, N = 15
MIN: 2.92 / MAX: 8.11
7.15
Xeon Gold 5218
SE +/- 0.00, N = 3
MIN: 1.85 / MAX: 1.92
1.88
Xeon Silver 4216
SE +/- 0.01, N = 3
MIN: 1.84 / MAX: 1.92
1.88
Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 2.44 / MAX: 2.56
2.51
2 x Xeon Gold 6226R
SE +/- 0.13, N = 15
MIN: 2.71 / MAX: 4.87
4.32
2 x Xeon Silver 4216
SE +/- 0.00, N = 3
MIN: 3.56 / MAX: 3.67
3.65
Xeon W-3275M
SE +/- 0.03, N = 15
MIN: 3.45 / MAX: 3.89
3.79
2 x Xeon Platinum 8275CL
SE +/- 0.11, N = 15
MIN: 5.64 / MAX: 7.47
7.09
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.05, N = 3
MIN: 6.62 / MAX: 7.52
7.31
EPYC 2 7R32
SE +/- 0.06, N = 3
MIN: 7.87 / MAX: 8.3
8.12
2 x Xeon Platinum 8259CL
SE +/- 0.04, N = 3
MIN: 5.65 / MAX: 6.54
6.40
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.37, N = 15
MIN: 2.11 / MAX: 6.54
5.52
2
4
6
8
10

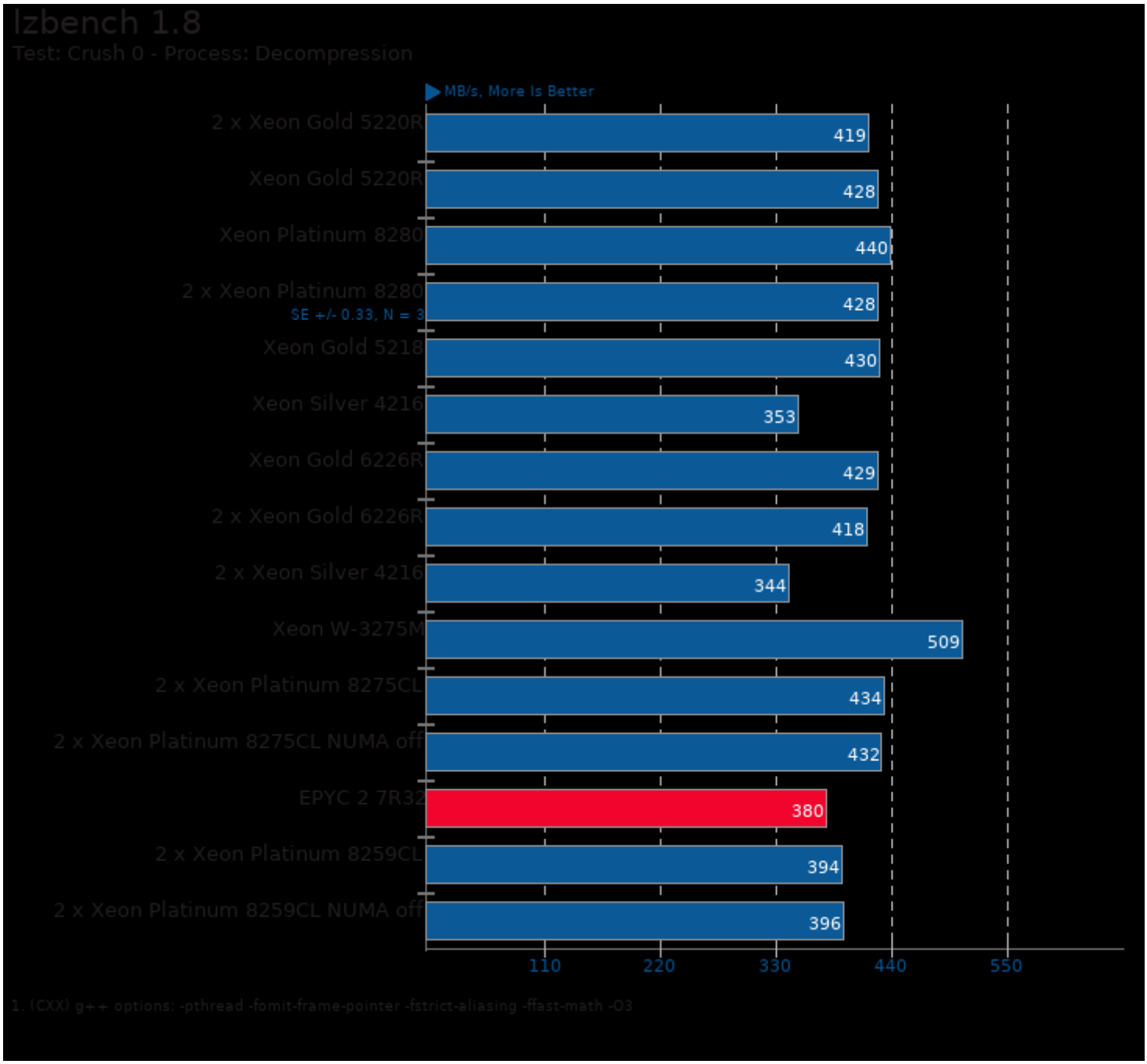

lzbench 1.8
Test: Zstd 1 - Process: Compression
MB/s, More Is Better
2 x Xeon Gold 5220R
437
Xeon Gold 5220R
444
Xeon Platinum 8280
SE +/- 0.58, N = 3
457
2 x Xeon Platinum 8280
449
Xeon Gold 5218
446
Xeon Silver 4216
365
Xeon Gold 6226R
445
2 x Xeon Gold 6226R
437
2 x Xeon Silver 4216
359
Xeon W-3275M
SE +/- 1.00, N = 3
508
2 x Xeon Platinum 8275CL
439
2 x Xeon Platinum 8275CL NUMA off
443
EPYC 2 7R32
418
2 x Xeon Platinum 8259CL
SE +/- 2.33, N = 3
399
2 x Xeon Platinum 8259CL NUMA off
SE +/- 2.33, N = 3
407
110
220
330
440
550
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

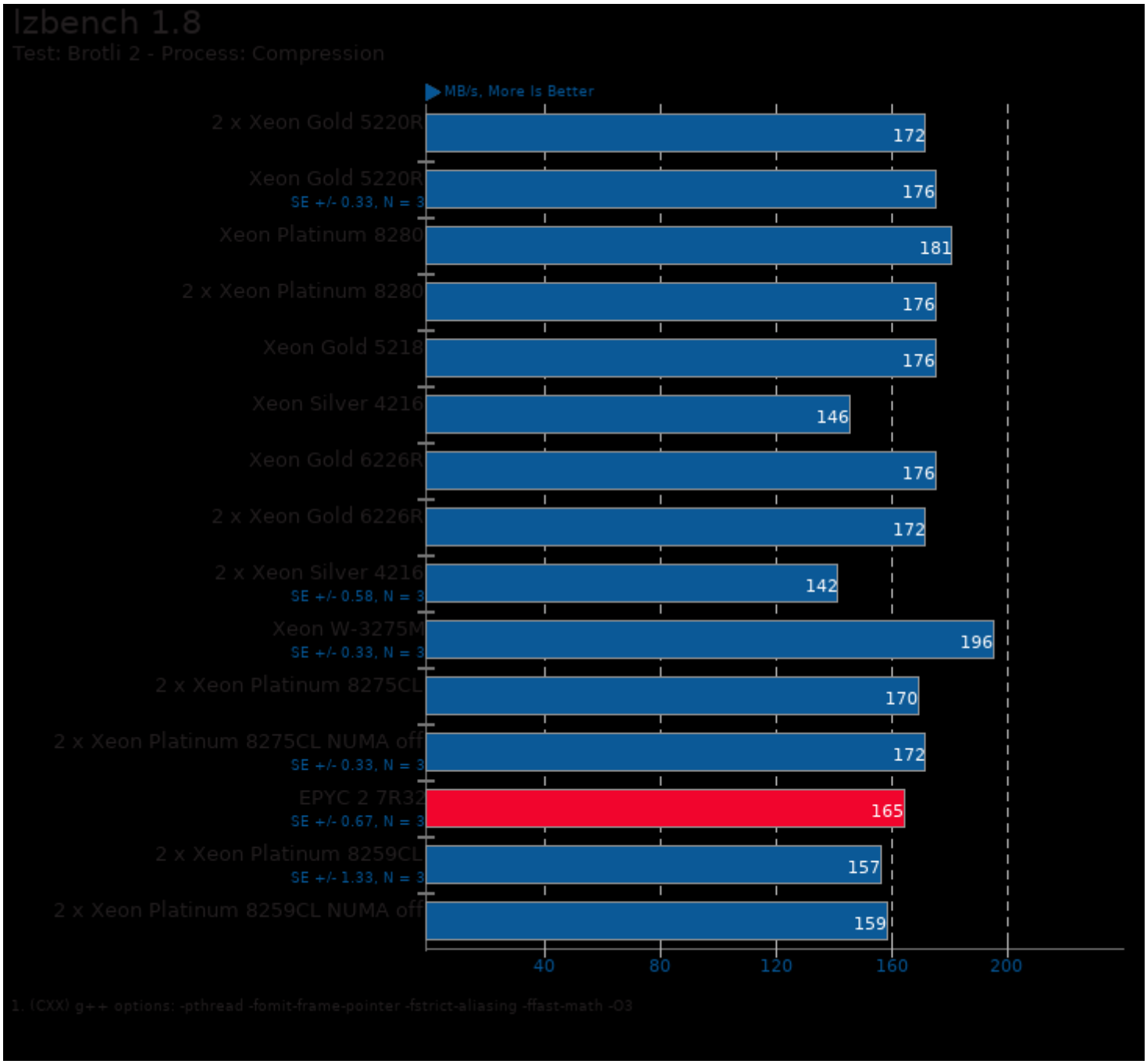

lzbench 1.8
Test: Zstd 1 - Process: Decompression
MB/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.67, N = 3
1147
Xeon Gold 5220R
1180
Xeon Platinum 8280
1212
2 x Xeon Platinum 8280
SE +/- 2.00, N = 3
1168
Xeon Gold 5218
SE +/- 0.33, N = 3
1184
Xeon Silver 4216
973
Xeon Gold 6226R
1182
2 x Xeon Gold 6226R
SE +/- 0.67, N = 3
1141
2 x Xeon Silver 4216
SE +/- 1.33, N = 3
943
Xeon W-3275M
SE +/- 2.65, N = 3
1299
2 x Xeon Platinum 8275CL
SE +/- 0.33, N = 3
1099
2 x Xeon Platinum 8275CL NUMA off
1090
EPYC 2 7R32
1148
2 x Xeon Platinum 8259CL
SE +/- 0.67, N = 3
1027
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.67, N = 3
1032
300
600
900
1200
1500
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

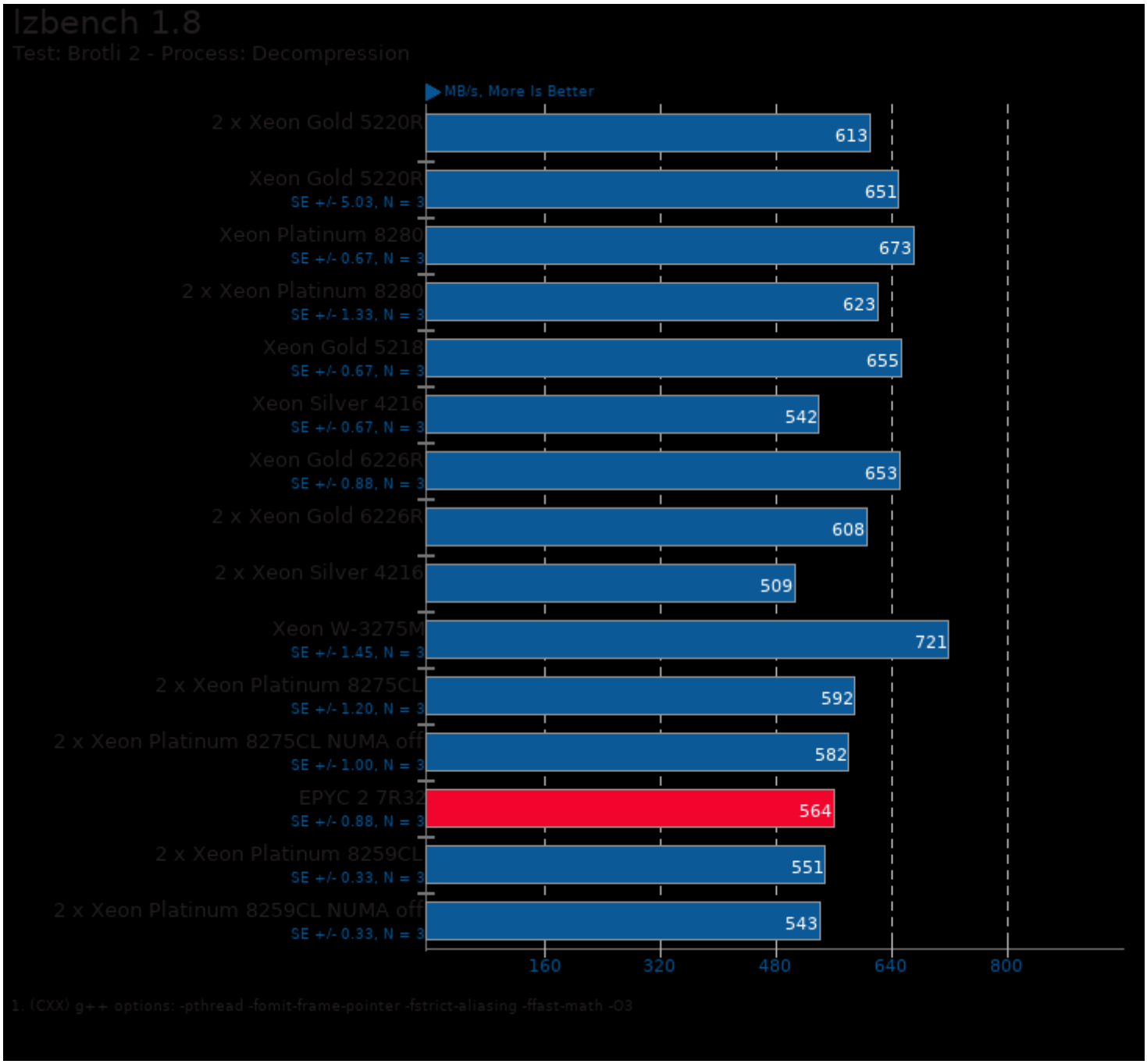

lzbench 1.8
Test: Zstd 8 - Process: Compression
MB/s, More Is Better
2 x Xeon Gold 5220R
74
Xeon Gold 5220R
76
Xeon Platinum 8280
77
2 x Xeon Platinum 8280
75
Xeon Gold 5218
74
Xeon Silver 4216
64
Xeon Gold 6226R
74
2 x Xeon Gold 6226R
72
2 x Xeon Silver 4216
63
Xeon W-3275M
84
2 x Xeon Platinum 8275CL
73
2 x Xeon Platinum 8275CL NUMA off
75
EPYC 2 7R32
83
2 x Xeon Platinum 8259CL
69
2 x Xeon Platinum 8259CL NUMA off
71
20
40
60
80
100
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

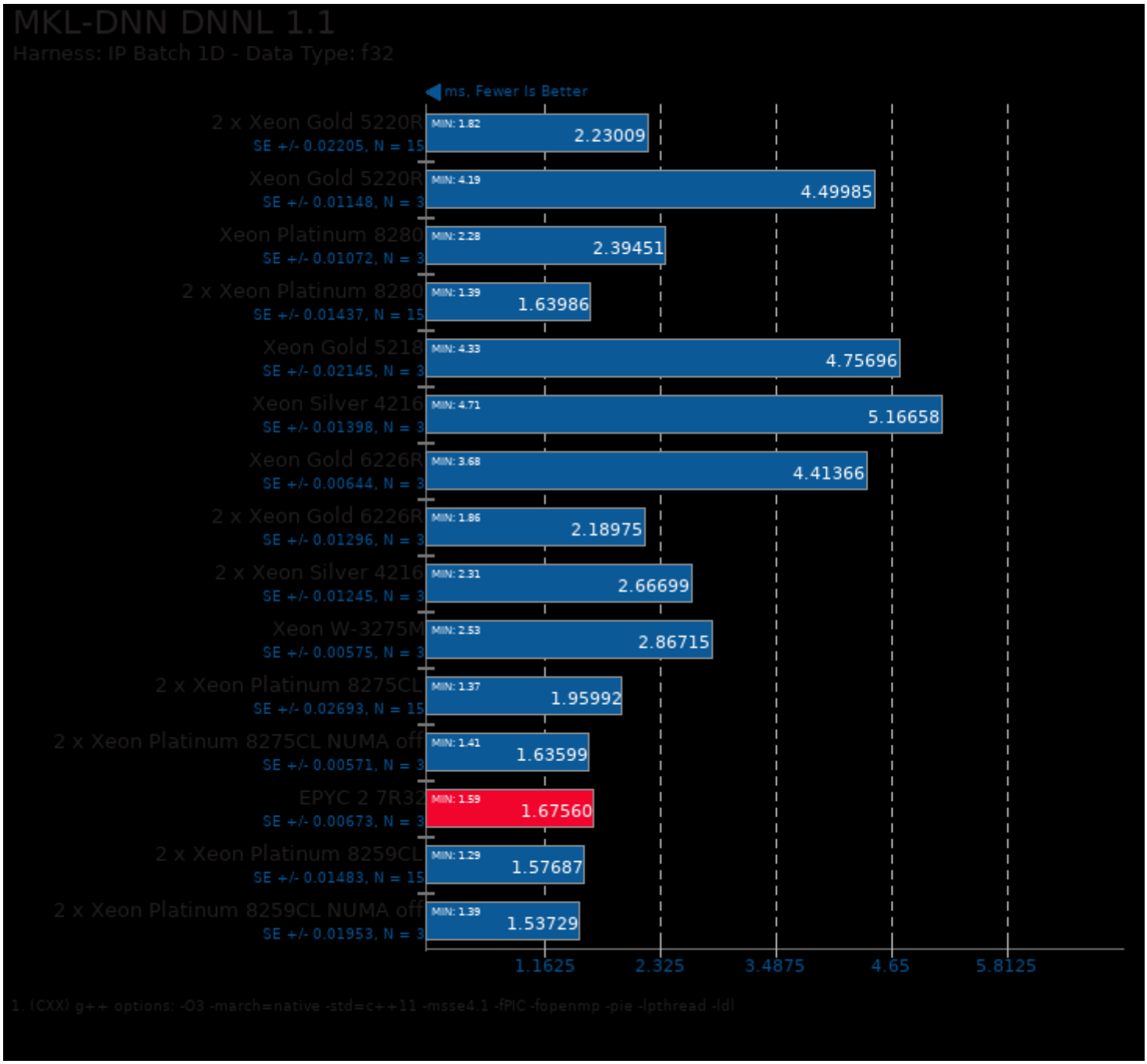

lzbench 1.8
Test: Zstd 8 - Process: Decompression
MB/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 1.53, N = 3
1101
Xeon Gold 5220R
SE +/- 0.33, N = 3
1194
Xeon Platinum 8280
SE +/- 0.58, N = 3
1224
2 x Xeon Platinum 8280
SE +/- 1.53, N = 3
1124
Xeon Gold 5218
SE +/- 1.33, N = 3
1195
Xeon Silver 4216
SE +/- 1.53, N = 3
998
Xeon Gold 6226R
1193
2 x Xeon Gold 6226R
1100
2 x Xeon Silver 4216
SE +/- 1.86, N = 3
930
Xeon W-3275M
SE +/- 1.45, N = 3
1298
2 x Xeon Platinum 8275CL
1053
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.67, N = 3
999
EPYC 2 7R32
1266
2 x Xeon Platinum 8259CL
SE +/- 1.53, N = 3
1011
2 x Xeon Platinum 8259CL NUMA off
SE +/- 11.50, N = 3
966
300
600
900
1200
1500
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

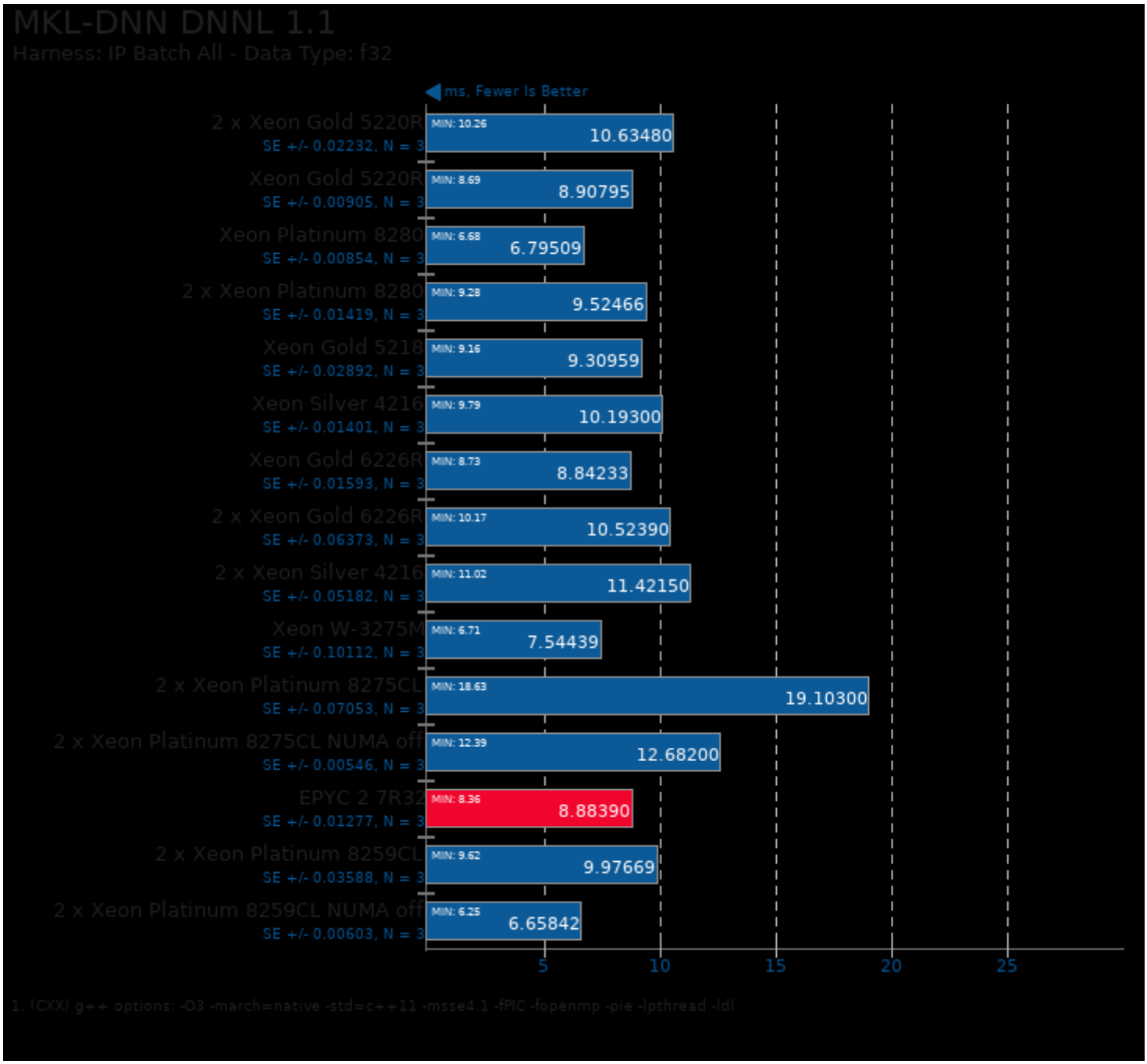

lzbench 1.8
Test: Crush 0 - Process: Compression
MB/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.33, N = 3
93
Xeon Gold 5220R
SE +/- 0.33, N = 3
98
Xeon Platinum 8280
SE +/- 0.33, N = 3
101
2 x Xeon Platinum 8280
96
Xeon Gold 5218
SE +/- 0.33, N = 3
96
Xeon Silver 4216
82
Xeon Gold 6226R
95
2 x Xeon Gold 6226R
91
2 x Xeon Silver 4216
80
Xeon W-3275M
SE +/- 1.00, N = 3
109
2 x Xeon Platinum 8275CL
94
2 x Xeon Platinum 8275CL NUMA off
95
EPYC 2 7R32
SE +/- 0.58, N = 3
81
2 x Xeon Platinum 8259CL
SE +/- 0.33, N = 3
88
2 x Xeon Platinum 8259CL NUMA off
86
20
40
60
80
100
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

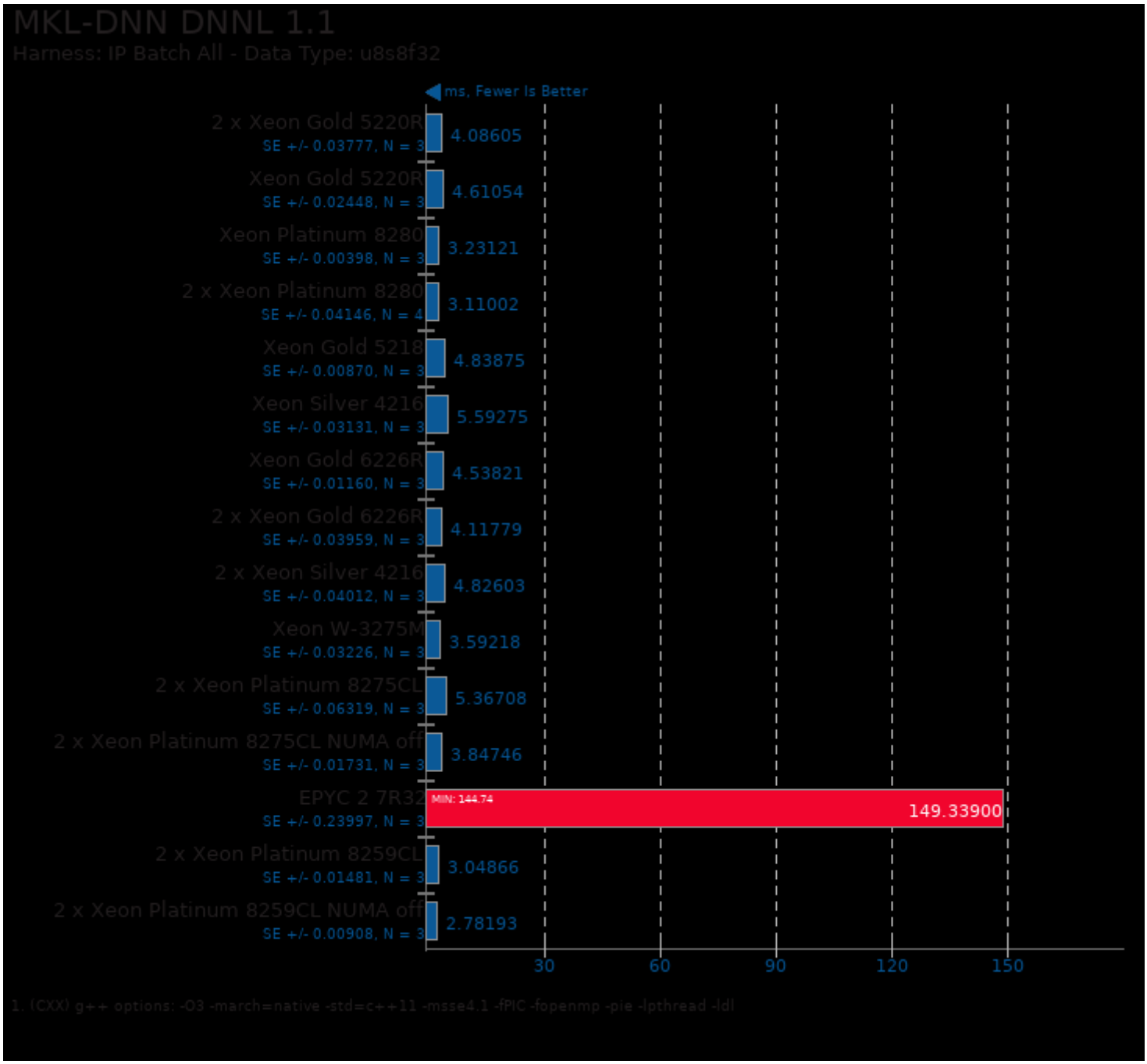

lzbench 1.8
Test: Crush 0 - Process: Decompression
MB/s, More Is Better
2 x Xeon Gold 5220R
419
Xeon Gold 5220R
428
Xeon Platinum 8280
440
2 x Xeon Platinum 8280
428
SE +/- 0.33, N = 3
Xeon Gold 5218
430
Xeon Silver 4216
353
Xeon Gold 6226R
429
2 x Xeon Gold 6226R
418
2 x Xeon Silver 4216
344
Xeon W-3275M
509
2 x Xeon Platinum 8275CL
434
2 x Xeon Platinum 8275CL NUMA off
432
EPYC 2 7R32
380
2 x Xeon Platinum 8259CL
394
2 x Xeon Platinum 8259CL NUMA off
396
110
220
330
440
550
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

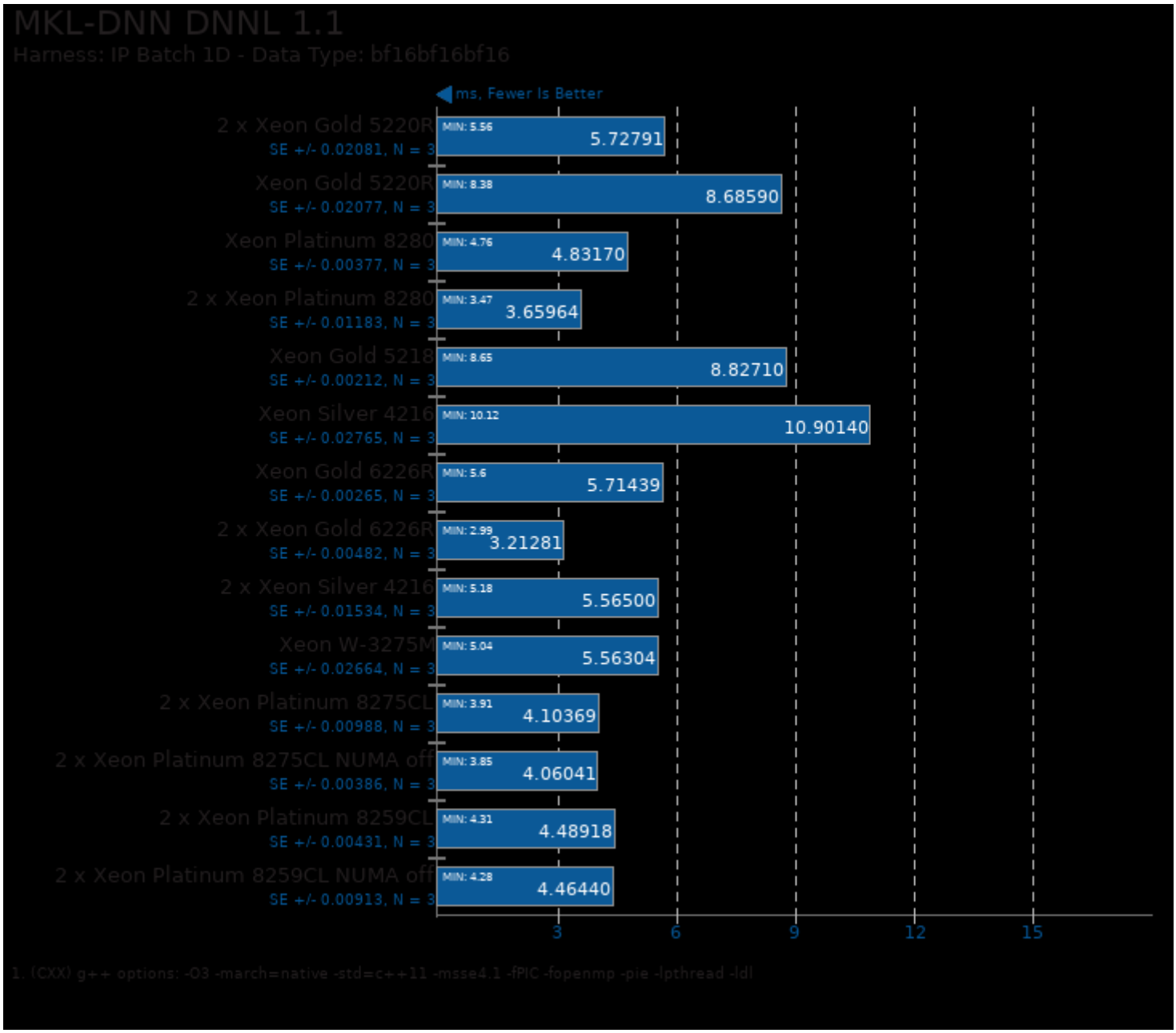

lzbench 1.8
Test: Brotli 2 - Process: Compression
MB/s, More Is Better
2 x Xeon Gold 5220R
172
Xeon Gold 5220R
SE +/- 0.33, N = 3
176
Xeon Platinum 8280
181
2 x Xeon Platinum 8280
176
Xeon Gold 5218
176
Xeon Silver 4216
146
Xeon Gold 6226R
176
2 x Xeon Gold 6226R
172
2 x Xeon Silver 4216
SE +/- 0.58, N = 3
142
Xeon W-3275M
SE +/- 0.33, N = 3
196
2 x Xeon Platinum 8275CL
170
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.33, N = 3
172
EPYC 2 7R32
SE +/- 0.67, N = 3
165
2 x Xeon Platinum 8259CL
SE +/- 1.33, N = 3
157
2 x Xeon Platinum 8259CL NUMA off
159
40
80
120
160
200
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

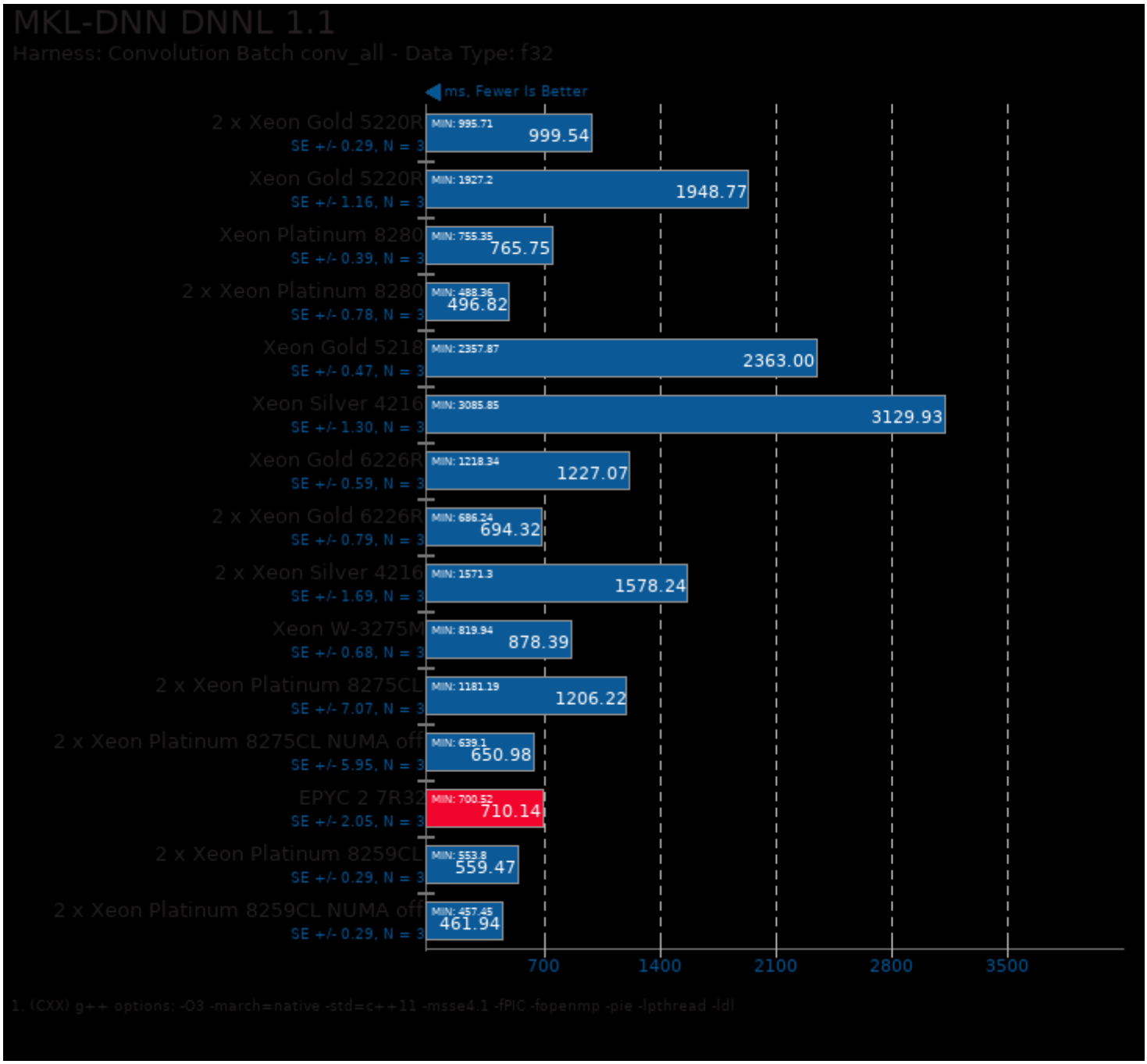

lzbench 1.8
Test: Brotli 2 - Process: Decompression
MB/s, More Is Better
2 x Xeon Gold 5220R
613
Xeon Gold 5220R
SE +/- 5.03, N = 3
651
Xeon Platinum 8280
SE +/- 0.67, N = 3
673
2 x Xeon Platinum 8280
SE +/- 1.33, N = 3
623
Xeon Gold 5218
SE +/- 0.67, N = 3
655
Xeon Silver 4216
SE +/- 0.67, N = 3
542
Xeon Gold 6226R
SE +/- 0.88, N = 3
653
2 x Xeon Gold 6226R
608
2 x Xeon Silver 4216
509
Xeon W-3275M
SE +/- 1.45, N = 3
721
2 x Xeon Platinum 8275CL
SE +/- 1.20, N = 3
592
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1.00, N = 3
582
EPYC 2 7R32
SE +/- 0.88, N = 3
564
2 x Xeon Platinum 8259CL
SE +/- 0.33, N = 3
551
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.33, N = 3
543
160
320
480
640
800
1. (CXX) g++ options: -pthread -fomit-frame-pointer -fstrict-aliasing -ffast-math -O3

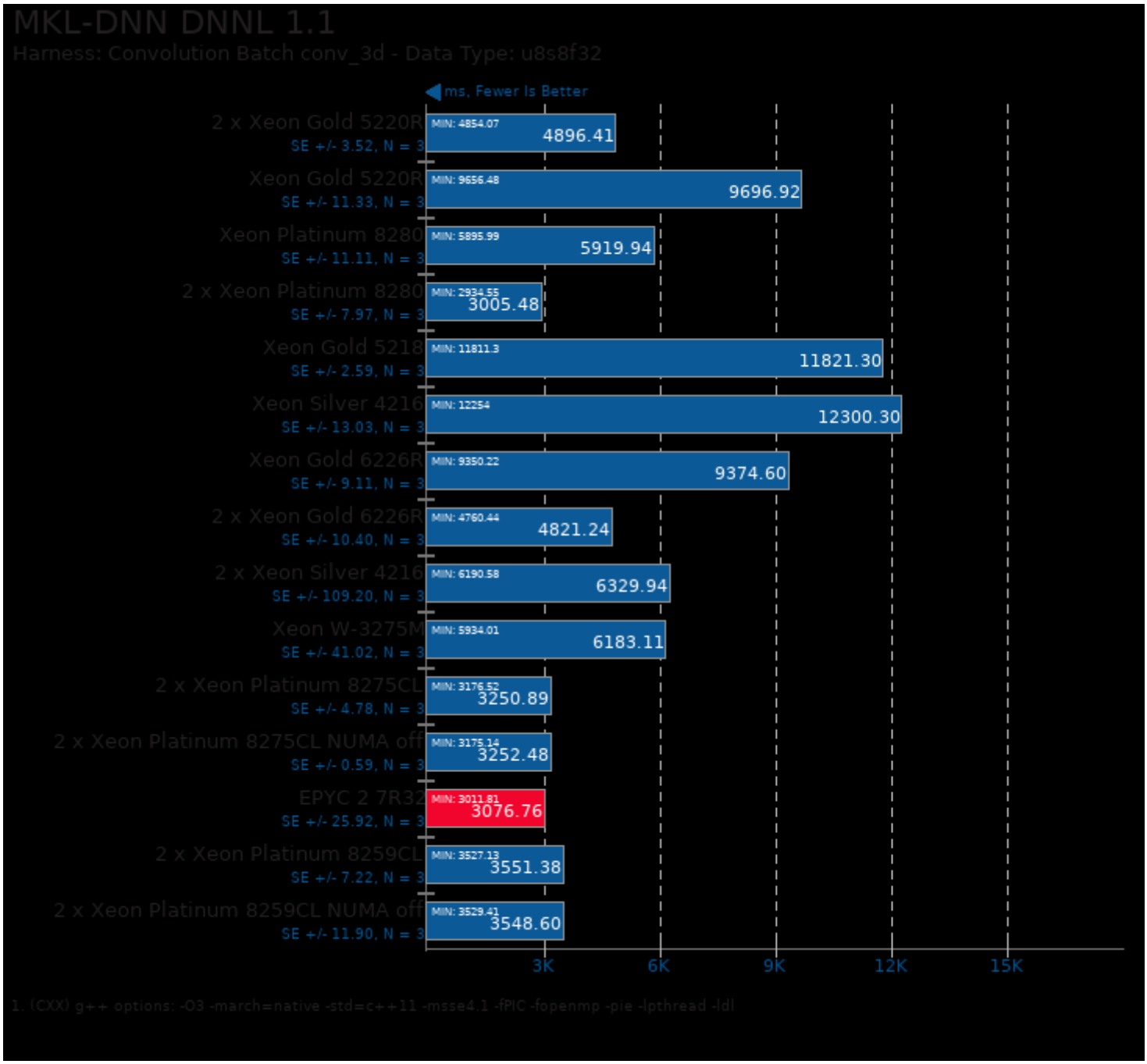

MKL-DNN DNNL 1.1
Harness: IP Batch 1D - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.02205, N = 15
MIN: 1.82
2.23009
Xeon Gold 5220R
SE +/- 0.01148, N = 3
MIN: 4.19
4.49985
Xeon Platinum 8280
SE +/- 0.01072, N = 3
MIN: 2.28
2.39451
2 x Xeon Platinum 8280
SE +/- 0.01437, N = 15
MIN: 1.39
1.63986
Xeon Gold 5218
SE +/- 0.02145, N = 3
MIN: 4.33
4.75696
Xeon Silver 4216
SE +/- 0.01398, N = 3
MIN: 4.71
5.16658
Xeon Gold 6226R
SE +/- 0.00644, N = 3
MIN: 3.68
4.41366
2 x Xeon Gold 6226R
SE +/- 0.01296, N = 3
MIN: 1.86
2.18975
2 x Xeon Silver 4216
SE +/- 0.01245, N = 3
MIN: 2.31
2.66699
Xeon W-3275M
SE +/- 0.00575, N = 3
MIN: 2.53
2.86715
2 x Xeon Platinum 8275CL
SE +/- 0.02693, N = 15
MIN: 1.37
1.95992
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00571, N = 3
MIN: 1.41
1.63599
EPYC 2 7R32
SE +/- 0.00673, N = 3
MIN: 1.59
1.67560
2 x Xeon Platinum 8259CL
SE +/- 0.01483, N = 15
MIN: 1.29
1.57687
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01953, N = 3
MIN: 1.39
1.53729
1.1625
2.325
3.4875
4.65
5.8125
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

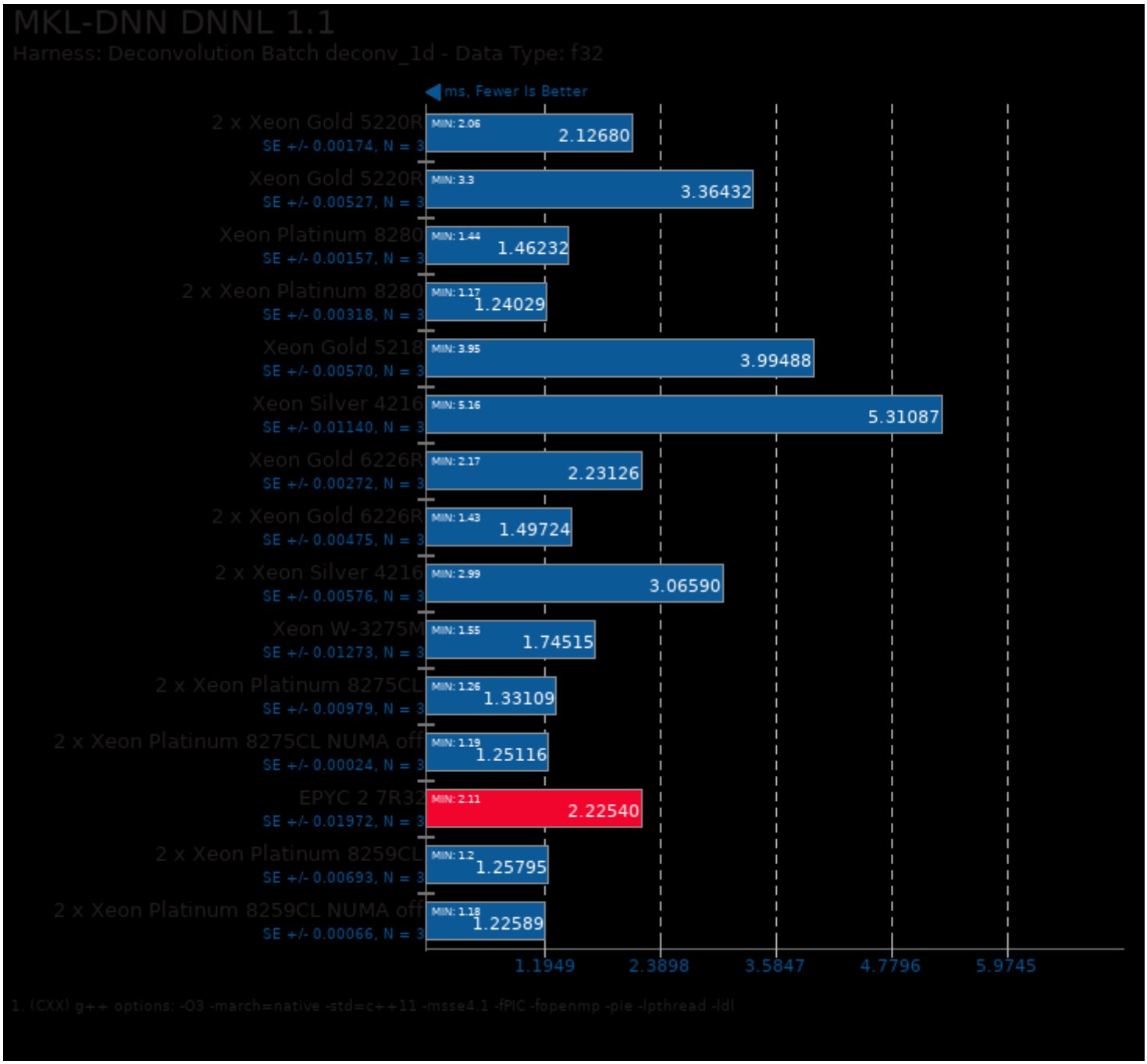

MKL-DNN DNNL 1.1
Harness: IP Batch All - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.02232, N = 3
MIN: 10.26
10.63480
Xeon Gold 5220R
SE +/- 0.00905, N = 3
MIN: 8.69
8.90795
Xeon Platinum 8280
SE +/- 0.00854, N = 3
MIN: 6.68
6.79509
2 x Xeon Platinum 8280
SE +/- 0.01419, N = 3
MIN: 9.28
9.52466
Xeon Gold 5218
SE +/- 0.02892, N = 3
MIN: 9.16
9.30959
Xeon Silver 4216
SE +/- 0.01401, N = 3
MIN: 9.79
10.19300
Xeon Gold 6226R
SE +/- 0.01593, N = 3
MIN: 8.73
8.84233
2 x Xeon Gold 6226R
SE +/- 0.06373, N = 3
MIN: 10.17
10.52390
2 x Xeon Silver 4216
SE +/- 0.05182, N = 3
MIN: 11.02
11.42150
Xeon W-3275M
SE +/- 0.10112, N = 3
MIN: 6.71
7.54439
2 x Xeon Platinum 8275CL
SE +/- 0.07053, N = 3
MIN: 18.63
19.10300
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00546, N = 3
MIN: 12.39
12.68200
EPYC 2 7R32
SE +/- 0.01277, N = 3
MIN: 8.36
8.88390
2 x Xeon Platinum 8259CL
SE +/- 0.03588, N = 3
MIN: 9.62
9.97669
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00603, N = 3
MIN: 6.25
6.65842
5
10
15
20
25
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

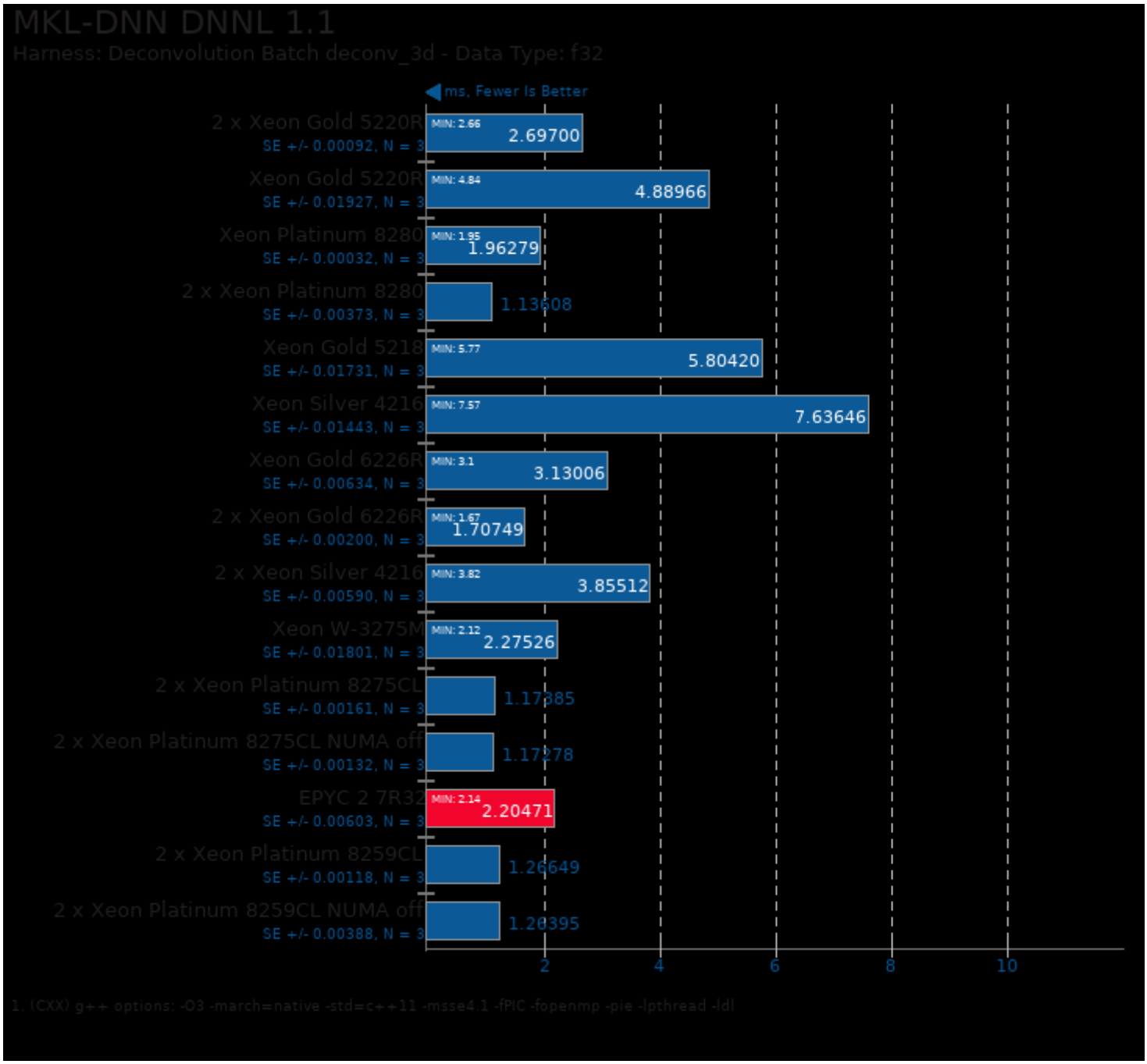

MKL-DNN DNNL 1.1
Harness: IP Batch All - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.03777, N = 3
4.08605
Xeon Gold 5220R
SE +/- 0.02448, N = 3
4.61054
Xeon Platinum 8280
SE +/- 0.00398, N = 3
3.23121
2 x Xeon Platinum 8280
SE +/- 0.04146, N = 4
3.11002
Xeon Gold 5218
SE +/- 0.00870, N = 3
4.83875
Xeon Silver 4216
SE +/- 0.03131, N = 3
5.59275
Xeon Gold 6226R
SE +/- 0.01160, N = 3
4.53821
2 x Xeon Gold 6226R
SE +/- 0.03959, N = 3
4.11779
2 x Xeon Silver 4216
SE +/- 0.04012, N = 3
4.82603
Xeon W-3275M
SE +/- 0.03226, N = 3
3.59218
2 x Xeon Platinum 8275CL
SE +/- 0.06319, N = 3
5.36708
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01731, N = 3
3.84746
EPYC 2 7R32
SE +/- 0.23997, N = 3
MIN: 144.74
149.33900
2 x Xeon Platinum 8259CL
SE +/- 0.01481, N = 3
3.04866
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00908, N = 3
2.78193
30
60
90
120
150
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

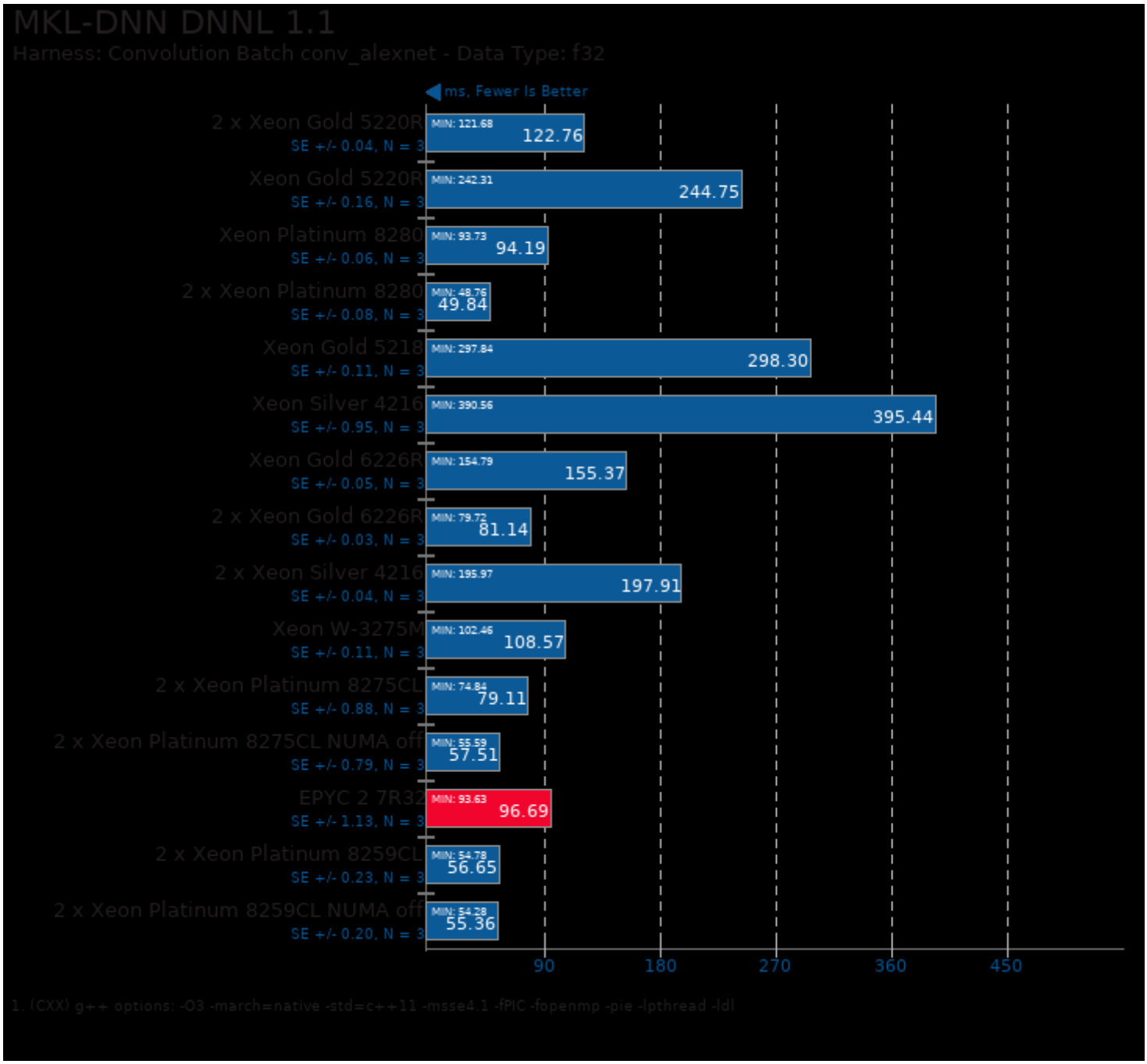

MKL-DNN DNNL 1.1
Harness: IP Batch 1D - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.02081, N = 3
MIN: 5.56
5.72791
Xeon Gold 5220R
SE +/- 0.02077, N = 3
MIN: 8.38
8.68590
Xeon Platinum 8280
SE +/- 0.00377, N = 3
MIN: 4.76
4.83170
2 x Xeon Platinum 8280
SE +/- 0.01183, N = 3
MIN: 3.47
3.65964
Xeon Gold 5218
SE +/- 0.00212, N = 3
MIN: 8.65
8.82710
Xeon Silver 4216
SE +/- 0.02765, N = 3
MIN: 10.12
10.90140
Xeon Gold 6226R
SE +/- 0.00265, N = 3
MIN: 5.6
5.71439
2 x Xeon Gold 6226R
SE +/- 0.00482, N = 3
MIN: 2.99
3.21281
2 x Xeon Silver 4216
SE +/- 0.01534, N = 3
MIN: 5.18
5.56500
Xeon W-3275M
SE +/- 0.02664, N = 3
MIN: 5.04
5.56304
2 x Xeon Platinum 8275CL
SE +/- 0.00988, N = 3
MIN: 3.91
4.10369
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00386, N = 3
MIN: 3.85
4.06041
2 x Xeon Platinum 8259CL
SE +/- 0.00431, N = 3
MIN: 4.31
4.48918
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00913, N = 3
MIN: 4.28
4.46440
3
6
9
12
15
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

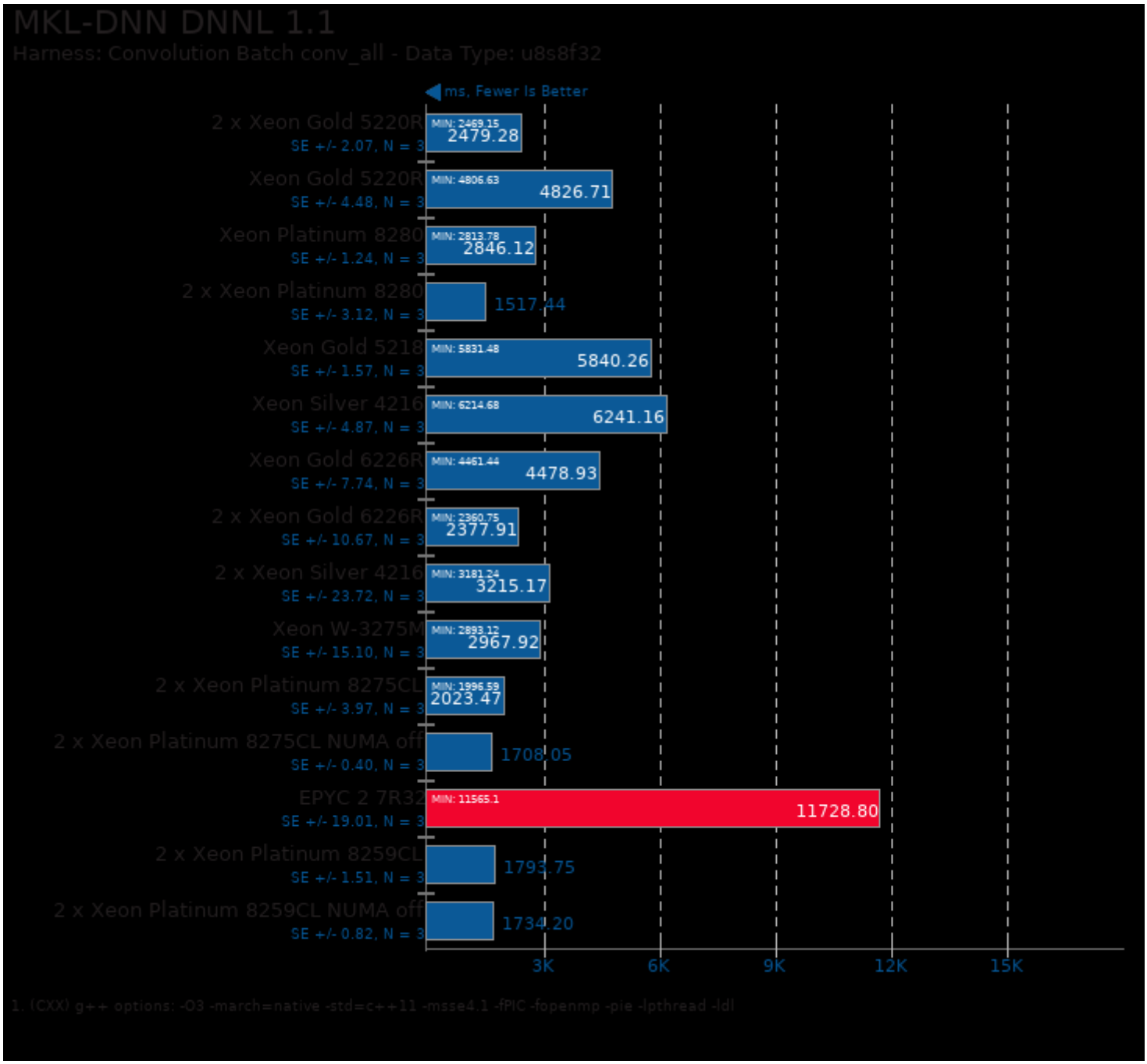

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_all - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.29, N = 3
MIN: 995.71
999.54
Xeon Gold 5220R
SE +/- 1.16, N = 3
MIN: 1927.2
1948.77
Xeon Platinum 8280
SE +/- 0.39, N = 3
MIN: 755.35
765.75
2 x Xeon Platinum 8280
SE +/- 0.78, N = 3
MIN: 488.36
496.82
Xeon Gold 5218
SE +/- 0.47, N = 3
MIN: 2357.87
2363.00
Xeon Silver 4216
SE +/- 1.30, N = 3
MIN: 3085.85
3129.93
Xeon Gold 6226R
SE +/- 0.59, N = 3
MIN: 1218.34
1227.07
2 x Xeon Gold 6226R
SE +/- 0.79, N = 3
MIN: 686.24
694.32
2 x Xeon Silver 4216
SE +/- 1.69, N = 3
MIN: 1571.3
1578.24
Xeon W-3275M
SE +/- 0.68, N = 3
MIN: 819.94
878.39
2 x Xeon Platinum 8275CL
SE +/- 7.07, N = 3
MIN: 1181.19
1206.22
2 x Xeon Platinum 8275CL NUMA off
SE +/- 5.95, N = 3
MIN: 639.1
650.98
EPYC 2 7R32
SE +/- 2.05, N = 3
MIN: 700.52
710.14
2 x Xeon Platinum 8259CL
SE +/- 0.29, N = 3
MIN: 553.8
559.47
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.29, N = 3
MIN: 457.45
461.94
700
1400
2100
2800
3500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

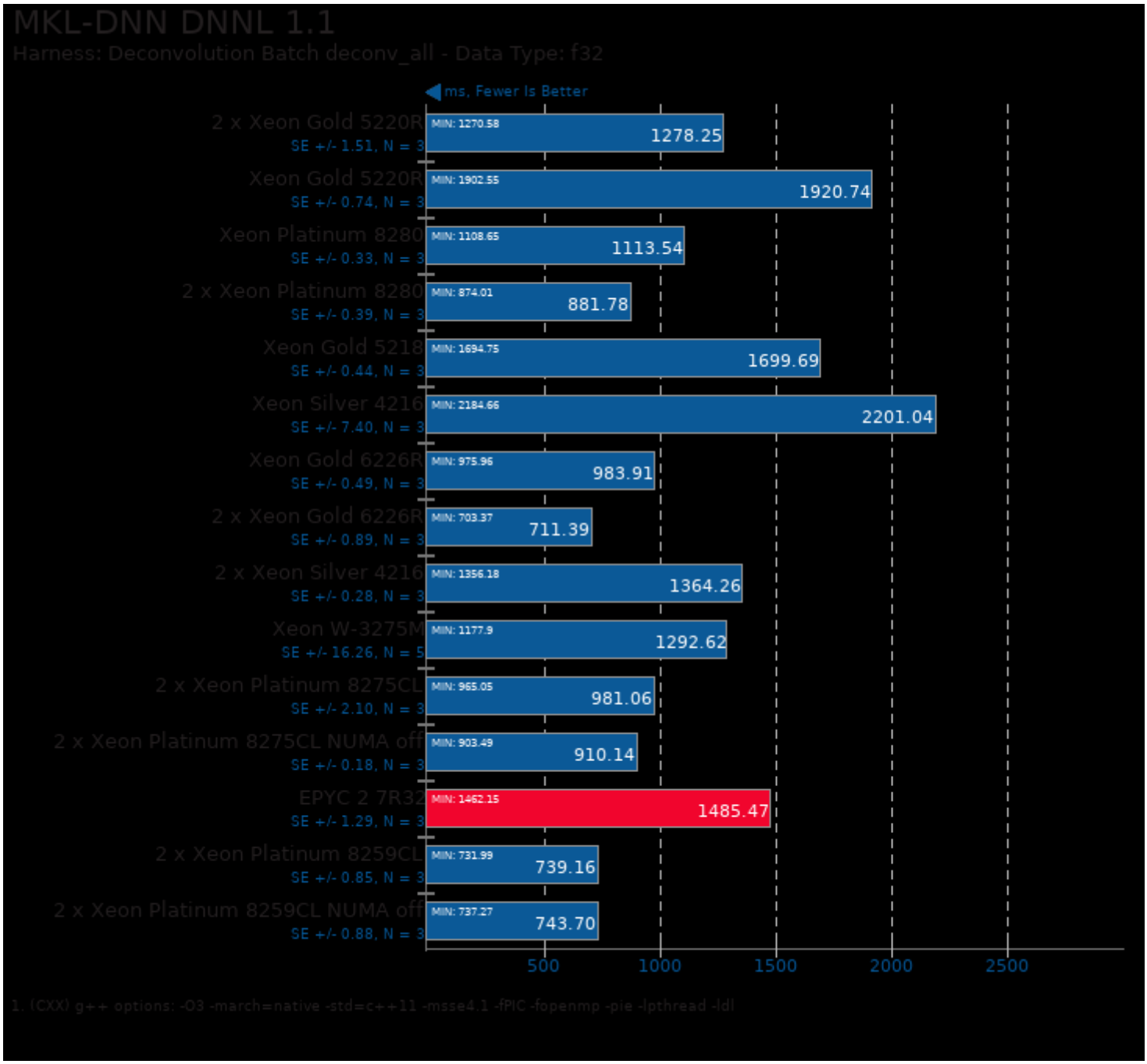

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_3d - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 3.52, N = 3
MIN: 4854.07
4896.41
Xeon Gold 5220R
SE +/- 11.33, N = 3
MIN: 9656.48
9696.92
Xeon Platinum 8280
SE +/- 11.11, N = 3
MIN: 5895.99
5919.94
2 x Xeon Platinum 8280
SE +/- 7.97, N = 3
MIN: 2934.55
3005.48
Xeon Gold 5218
SE +/- 2.59, N = 3
MIN: 11811.3
11821.30
Xeon Silver 4216
SE +/- 13.03, N = 3
MIN: 12254
12300.30
Xeon Gold 6226R
SE +/- 9.11, N = 3
MIN: 9350.22
9374.60
2 x Xeon Gold 6226R
SE +/- 10.40, N = 3
MIN: 4760.44
4821.24
2 x Xeon Silver 4216
SE +/- 109.20, N = 3
MIN: 6190.58
6329.94
Xeon W-3275M
SE +/- 41.02, N = 3
MIN: 5934.01
6183.11
2 x Xeon Platinum 8275CL
SE +/- 4.78, N = 3
MIN: 3176.52
3250.89
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.59, N = 3
MIN: 3175.14
3252.48
EPYC 2 7R32
SE +/- 25.92, N = 3
MIN: 3011.81
3076.76
2 x Xeon Platinum 8259CL
SE +/- 7.22, N = 3
MIN: 3527.13
3551.38
2 x Xeon Platinum 8259CL NUMA off
SE +/- 11.90, N = 3
MIN: 3529.41
3548.60
3K
6K
9K
12K
15K
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

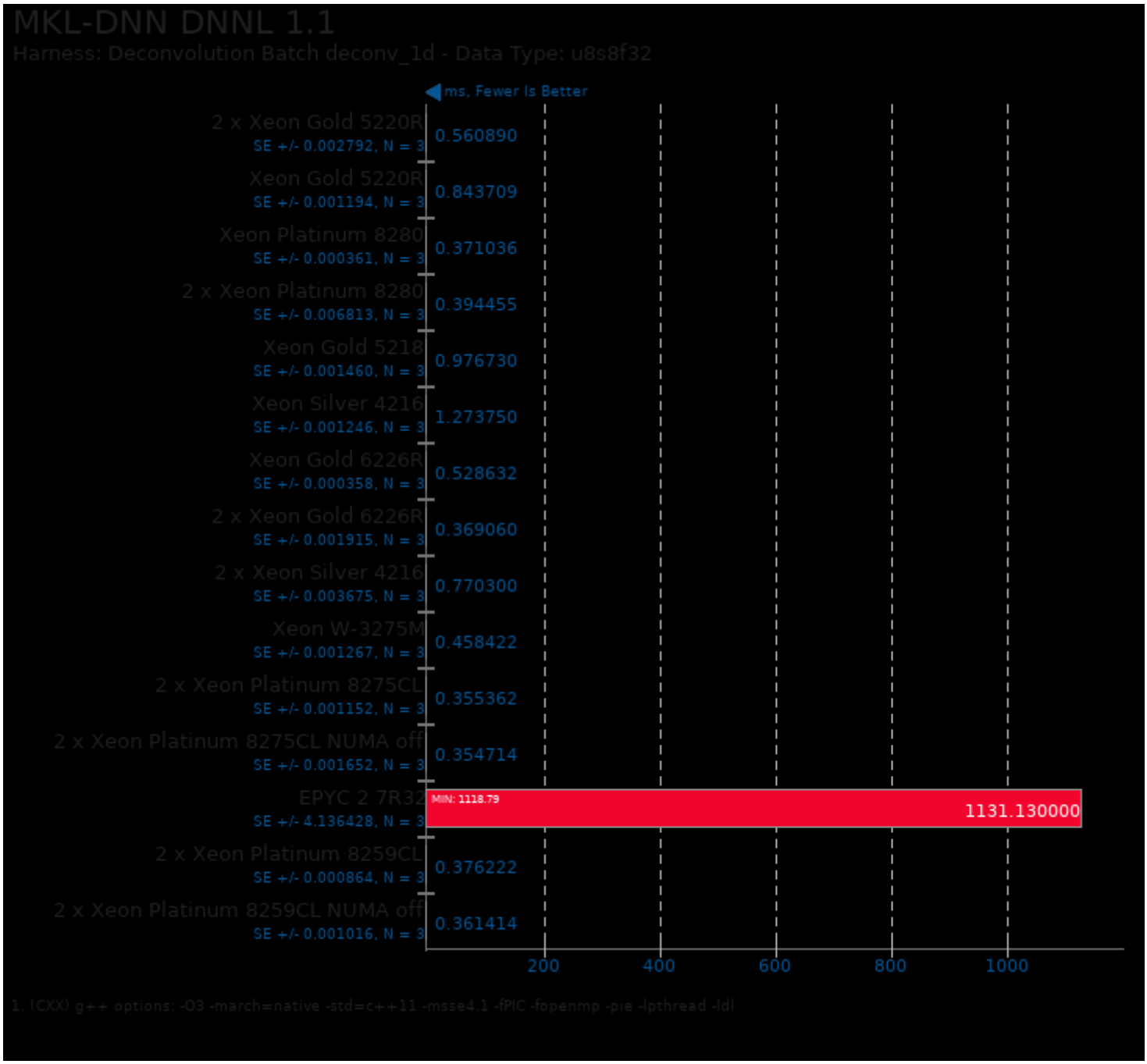

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_1d - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00174, N = 3
MIN: 2.06
2.12680
Xeon Gold 5220R
SE +/- 0.00527, N = 3
MIN: 3.3
3.36432
Xeon Platinum 8280
SE +/- 0.00157, N = 3
MIN: 1.44
1.46232
2 x Xeon Platinum 8280
SE +/- 0.00318, N = 3
MIN: 1.17
1.24029
Xeon Gold 5218
SE +/- 0.00570, N = 3
MIN: 3.95
3.99488
Xeon Silver 4216
SE +/- 0.01140, N = 3
MIN: 5.16
5.31087
Xeon Gold 6226R
SE +/- 0.00272, N = 3
MIN: 2.17
2.23126
2 x Xeon Gold 6226R
SE +/- 0.00475, N = 3
MIN: 1.43
1.49724
2 x Xeon Silver 4216
SE +/- 0.00576, N = 3
MIN: 2.99
3.06590
Xeon W-3275M
SE +/- 0.01273, N = 3
MIN: 1.55
1.74515
2 x Xeon Platinum 8275CL
SE +/- 0.00979, N = 3
MIN: 1.26
1.33109
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00024, N = 3
MIN: 1.19
1.25116
EPYC 2 7R32
SE +/- 0.01972, N = 3
MIN: 2.11
2.22540
2 x Xeon Platinum 8259CL
SE +/- 0.00693, N = 3
MIN: 1.2
1.25795
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00066, N = 3
MIN: 1.18
1.22589
1.1949
2.3898
3.5847
4.7796
5.9745
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

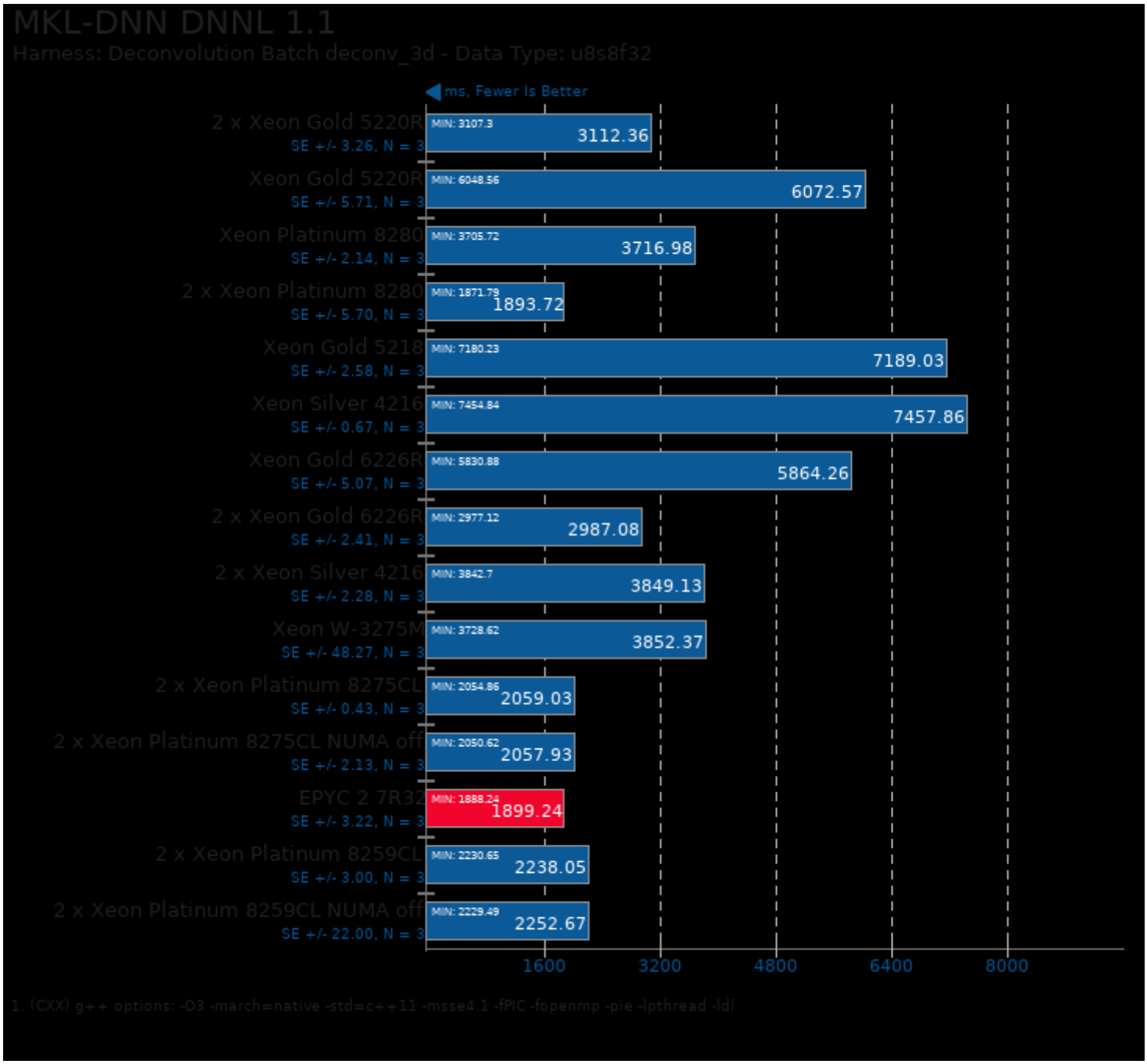

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_3d - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00092, N = 3
MIN: 2.66
2.69700
Xeon Gold 5220R
SE +/- 0.01927, N = 3
MIN: 4.84
4.88966
Xeon Platinum 8280
SE +/- 0.00032, N = 3
MIN: 1.95
1.96279
2 x Xeon Platinum 8280
SE +/- 0.00373, N = 3
1.13608
Xeon Gold 5218
SE +/- 0.01731, N = 3
MIN: 5.77
5.80420
Xeon Silver 4216
SE +/- 0.01443, N = 3
MIN: 7.57
7.63646
Xeon Gold 6226R
SE +/- 0.00634, N = 3
MIN: 3.1
3.13006
2 x Xeon Gold 6226R
SE +/- 0.00200, N = 3
MIN: 1.67
1.70749
2 x Xeon Silver 4216
SE +/- 0.00590, N = 3
MIN: 3.82
3.85512
Xeon W-3275M
SE +/- 0.01801, N = 3
MIN: 2.12
2.27526
2 x Xeon Platinum 8275CL
SE +/- 0.00161, N = 3
1.17385
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00132, N = 3
1.17278
EPYC 2 7R32
SE +/- 0.00603, N = 3
MIN: 2.14
2.20471
2 x Xeon Platinum 8259CL
SE +/- 0.00118, N = 3
1.26649
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00388, N = 3
1.20395
2
4
6
8
10
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

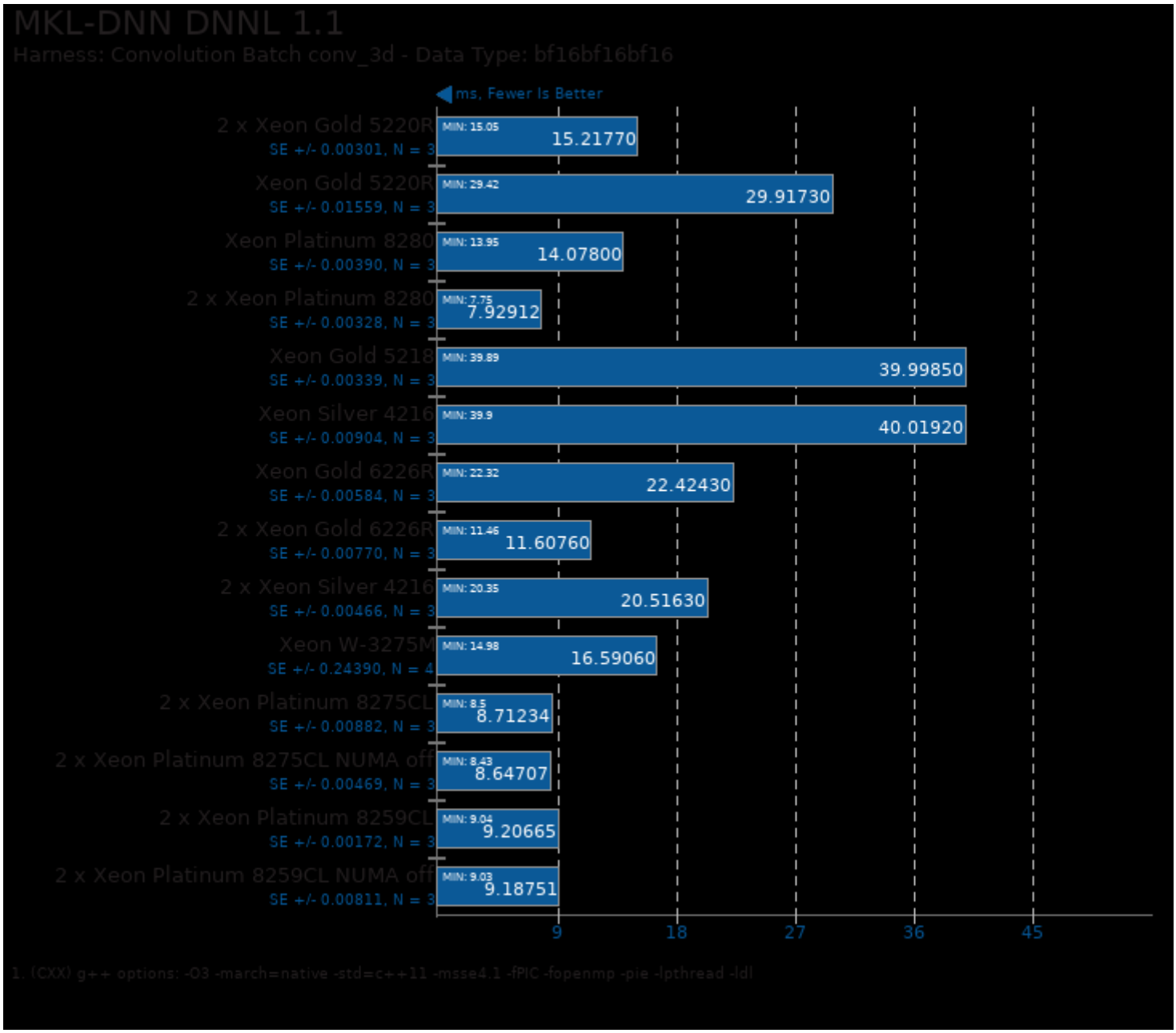

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_alexnet - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.04, N = 3
MIN: 121.68
122.76
Xeon Gold 5220R
SE +/- 0.16, N = 3
MIN: 242.31
244.75
Xeon Platinum 8280
SE +/- 0.06, N = 3
MIN: 93.73
94.19
2 x Xeon Platinum 8280
SE +/- 0.08, N = 3
MIN: 48.76
49.84
Xeon Gold 5218
SE +/- 0.11, N = 3
MIN: 297.84
298.30
Xeon Silver 4216
SE +/- 0.95, N = 3
MIN: 390.56
395.44
Xeon Gold 6226R
SE +/- 0.05, N = 3
MIN: 154.79
155.37
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
MIN: 79.72
81.14
2 x Xeon Silver 4216
SE +/- 0.04, N = 3
MIN: 195.97
197.91
Xeon W-3275M
SE +/- 0.11, N = 3
MIN: 102.46
108.57
2 x Xeon Platinum 8275CL
SE +/- 0.88, N = 3
MIN: 74.84
79.11
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.79, N = 3
MIN: 55.59
57.51
EPYC 2 7R32
SE +/- 1.13, N = 3
MIN: 93.63
96.69
2 x Xeon Platinum 8259CL
SE +/- 0.23, N = 3
MIN: 54.78
56.65
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.20, N = 3
MIN: 54.28
55.36
90
180
270
360
450
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

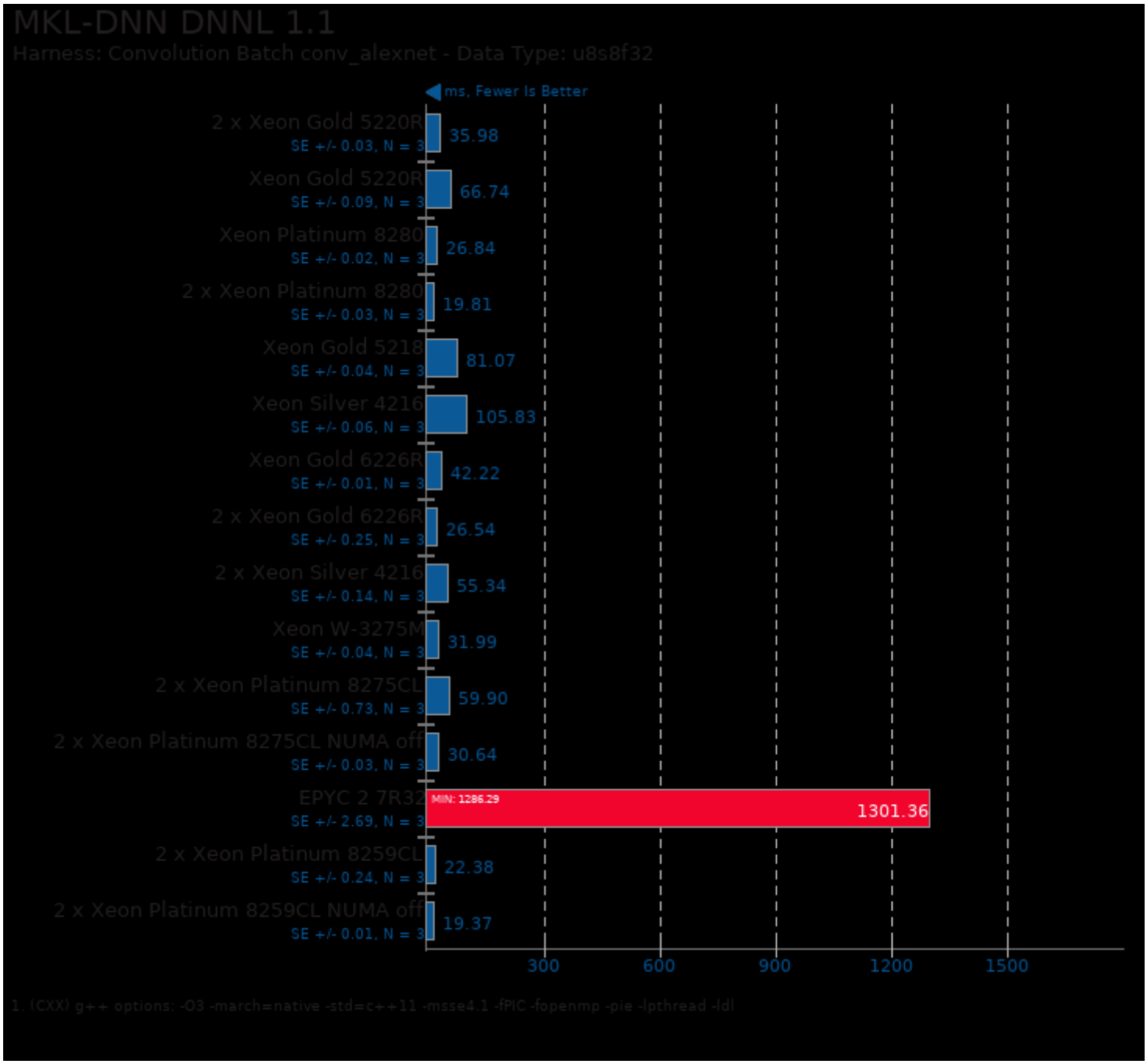

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_all - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 2.07, N = 3
MIN: 2469.15
2479.28
Xeon Gold 5220R
SE +/- 4.48, N = 3
MIN: 4806.63
4826.71
Xeon Platinum 8280
SE +/- 1.24, N = 3
MIN: 2813.78
2846.12
2 x Xeon Platinum 8280
SE +/- 3.12, N = 3
1517.44
Xeon Gold 5218
SE +/- 1.57, N = 3
MIN: 5831.48
5840.26
Xeon Silver 4216
SE +/- 4.87, N = 3
MIN: 6214.68
6241.16
Xeon Gold 6226R
SE +/- 7.74, N = 3
MIN: 4461.44
4478.93
2 x Xeon Gold 6226R
SE +/- 10.67, N = 3
MIN: 2360.75
2377.91
2 x Xeon Silver 4216
SE +/- 23.72, N = 3
MIN: 3181.24
3215.17
Xeon W-3275M
SE +/- 15.10, N = 3
MIN: 2893.12
2967.92
2 x Xeon Platinum 8275CL
SE +/- 3.97, N = 3
MIN: 1996.59
2023.47
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.40, N = 3
1708.05
EPYC 2 7R32
SE +/- 19.01, N = 3
MIN: 11565.1
11728.80
2 x Xeon Platinum 8259CL
SE +/- 1.51, N = 3
1795.75
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.82, N = 3
1734.20
3K
6K
9K
12K
15K
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

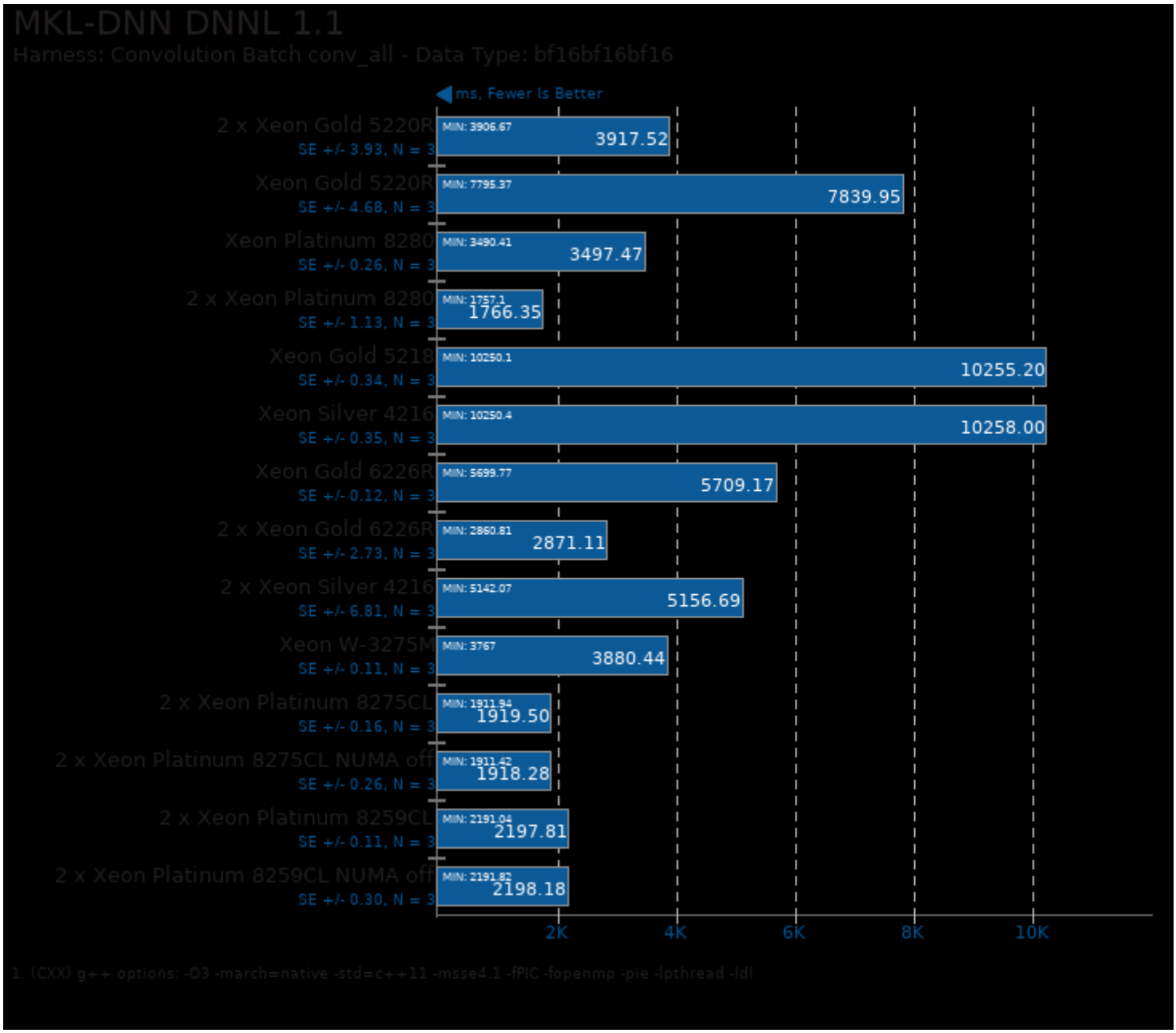

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_all - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 1.51, N = 3
MIN: 1270.58
1278.25
Xeon Gold 5220R
SE +/- 0.74, N = 3
MIN: 1902.55
1920.74
Xeon Platinum 8280
SE +/- 0.33, N = 3
MIN: 1108.65
1113.54
2 x Xeon Platinum 8280
SE +/- 0.39, N = 3
MIN: 874.01
881.78
Xeon Gold 5218
SE +/- 0.44, N = 3
MIN: 1694.75
1699.69
Xeon Silver 4216
SE +/- 7.40, N = 3
MIN: 2184.66
2201.04
Xeon Gold 6226R
SE +/- 0.49, N = 3
MIN: 975.96
983.91
2 x Xeon Gold 6226R
SE +/- 0.89, N = 3
MIN: 703.37
711.39
2 x Xeon Silver 4216
SE +/- 0.28, N = 3
MIN: 1356.18
1364.26
Xeon W-3275M
SE +/- 16.26, N = 5
MIN: 1177.9
1292.62
2 x Xeon Platinum 8275CL
SE +/- 2.10, N = 3
MIN: 965.05
981.06
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.18, N = 3
MIN: 903.49
910.14
EPYC 2 7R32
SE +/- 1.29, N = 3
MIN: 1462.15
1485.47
2 x Xeon Platinum 8259CL
SE +/- 0.85, N = 3
MIN: 731.99
739.16
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.88, N = 3
MIN: 737.27
743.70
500
1000
1500
2000
2500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

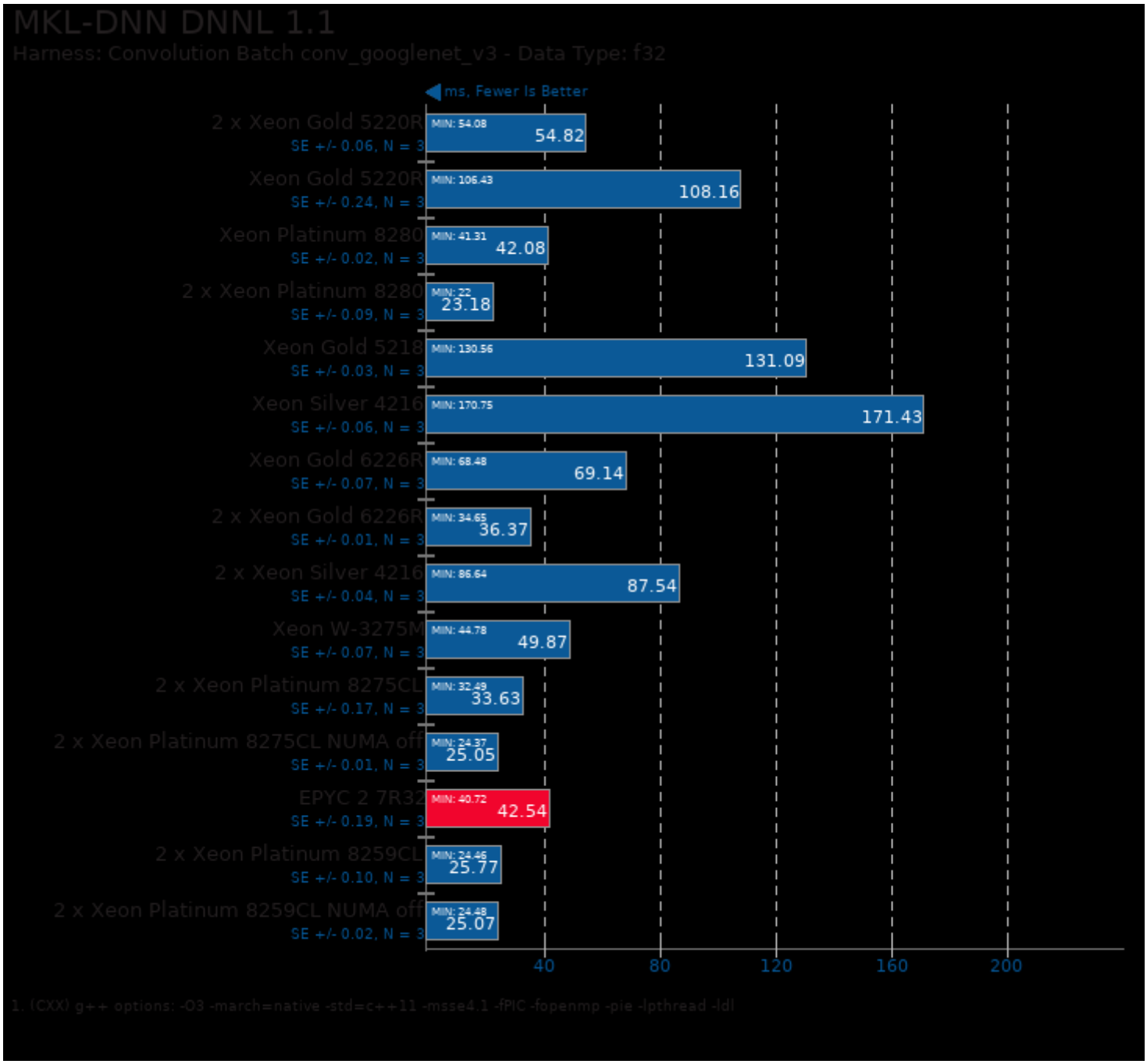

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_1d - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.002792, N = 3
0.560890
Xeon Gold 5220R
SE +/- 0.001194, N = 3
0.843709
Xeon Platinum 8280
SE +/- 0.000361, N = 3
0.371036
2 x Xeon Platinum 8280
SE +/- 0.006813, N = 3
0.394455
Xeon Gold 5218
SE +/- 0.001460, N = 3
0.976730
Xeon Silver 4216
SE +/- 0.001246, N = 3
1.273750
Xeon Gold 6226R
SE +/- 0.000358, N = 3
0.528632
2 x Xeon Gold 6226R
SE +/- 0.001915, N = 3
0.369060
2 x Xeon Silver 4216
SE +/- 0.003675, N = 3
0.770300
Xeon W-3275M
SE +/- 0.001267, N = 3
0.458422
2 x Xeon Platinum 8275CL
SE +/- 0.001152, N = 3
0.355362
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.001652, N = 3
0.354714
EPYC 2 7R32
SE +/- 4.136428, N = 3
MIN: 1118.79
1131.130000
2 x Xeon Platinum 8259CL
SE +/- 0.000864, N = 3
0.376222
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.001016, N = 3
0.361414
200
400
600
800
1000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

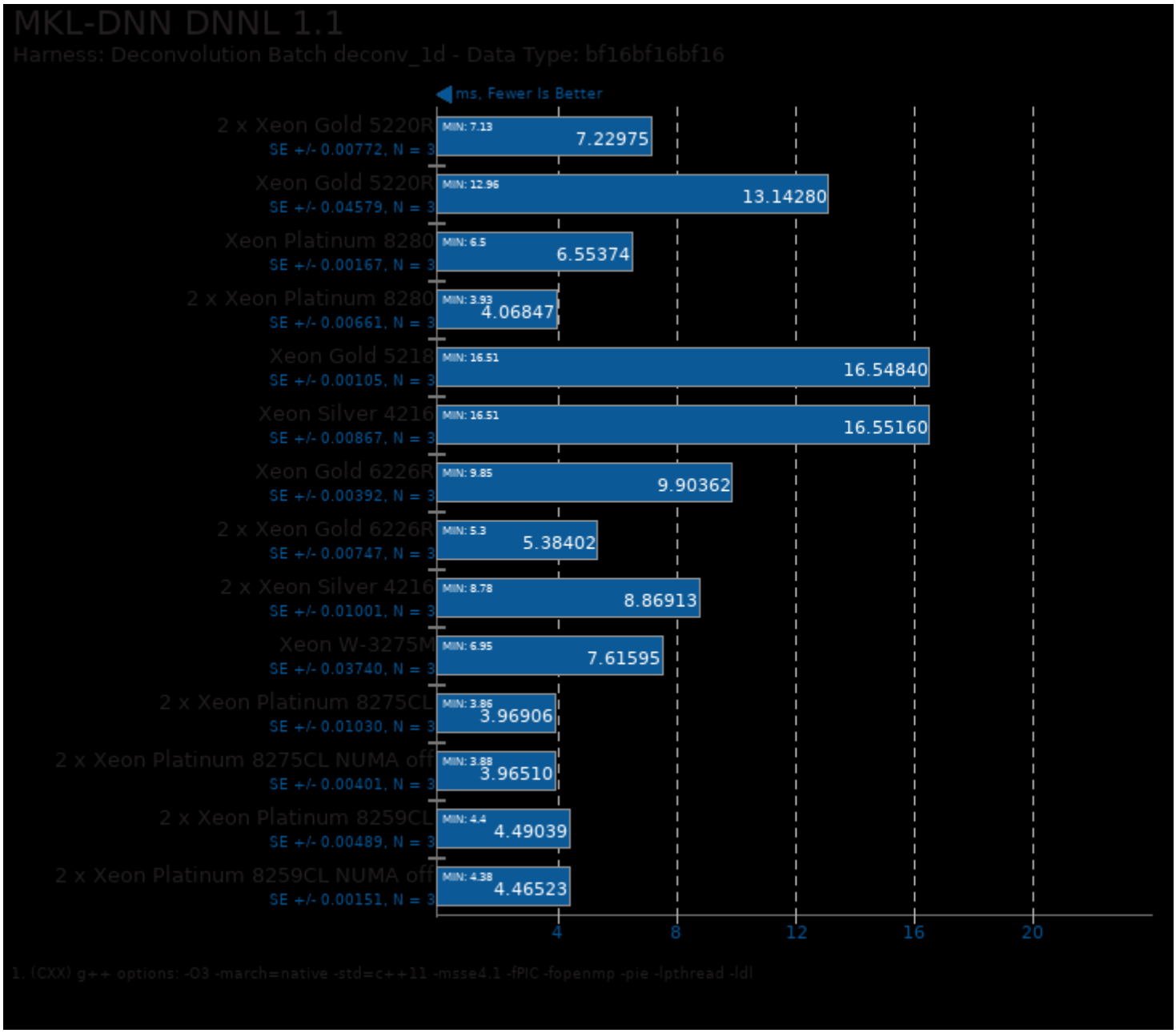

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_3d - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 3.26, N = 3
MIN: 3107.3
3112.36
Xeon Gold 5220R
SE +/- 5.71, N = 3
MIN: 6048.56
6072.57
Xeon Platinum 8280
SE +/- 2.14, N = 3
MIN: 3705.72
3716.98
2 x Xeon Platinum 8280
SE +/- 5.70, N = 3
MIN: 1871.79
1893.72
Xeon Gold 5218
SE +/- 2.58, N = 3
MIN: 7180.23
7189.03
Xeon Silver 4216
SE +/- 0.67, N = 3
MIN: 7454.84
7457.86
Xeon Gold 6226R
SE +/- 5.07, N = 3
MIN: 5830.88
5864.26
2 x Xeon Gold 6226R
SE +/- 2.41, N = 3
MIN: 2977.12
2987.08
2 x Xeon Silver 4216
SE +/- 2.28, N = 3
MIN: 3842.7
3849.13
Xeon W-3275M
SE +/- 48.27, N = 3
MIN: 3728.62
3852.37
2 x Xeon Platinum 8275CL
SE +/- 0.43, N = 3
MIN: 2054.86
2059.03
2 x Xeon Platinum 8275CL NUMA off
SE +/- 2.13, N = 3
MIN: 2050.62
2057.93
EPYC 2 7R32
SE +/- 3.22, N = 3
MIN: 1888.24
1899.24
2 x Xeon Platinum 8259CL
SE +/- 3.00, N = 3
MIN: 2230.65
2238.05
2 x Xeon Platinum 8259CL NUMA off
SE +/- 22.00, N = 3
MIN: 2229.49
2252.67
1600
3200
4800
6400
8000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

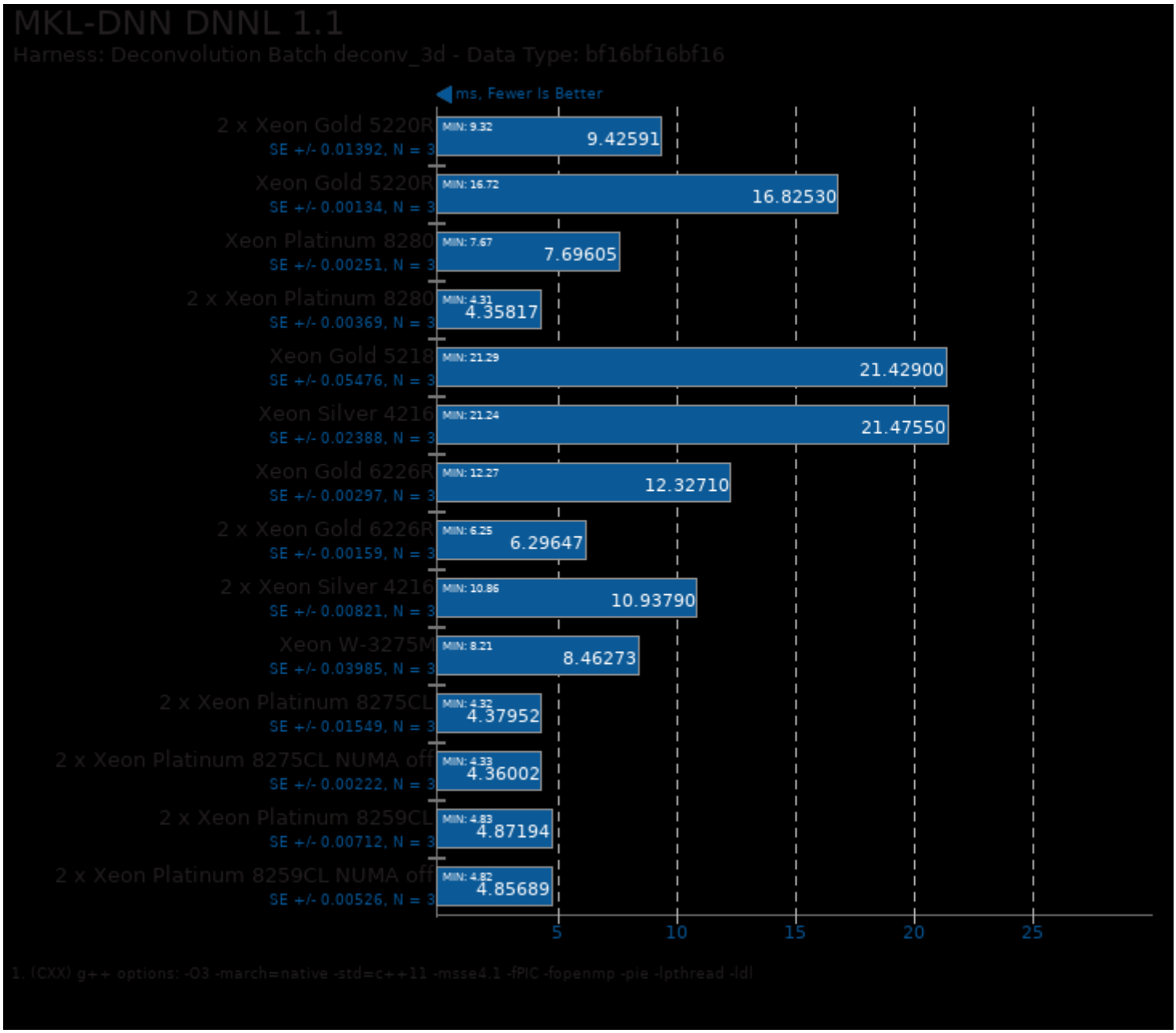

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_3d - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00301, N = 3
MIN: 15.05
15.21770
Xeon Gold 5220R
SE +/- 0.01559, N = 3
MIN: 29.42
29.91730
Xeon Platinum 8280
SE +/- 0.00390, N = 3
MIN: 13.95
14.07800
2 x Xeon Platinum 8280
SE +/- 0.00328, N = 3
MIN: 7.75
7.92912
Xeon Gold 5218
SE +/- 0.00339, N = 3
MIN: 39.89
39.99850
Xeon Silver 4216
SE +/- 0.00904, N = 3
MIN: 39.9
40.01920
Xeon Gold 6226R
SE +/- 0.00584, N = 3
MIN: 22.32
22.42430
2 x Xeon Gold 6226R
SE +/- 0.00770, N = 3
MIN: 11.46
11.60760
2 x Xeon Silver 4216
SE +/- 0.00466, N = 3
MIN: 20.35
20.51630
Xeon W-3275M
SE +/- 0.24390, N = 4
MIN: 14.98
16.59060
2 x Xeon Platinum 8275CL
SE +/- 0.00882, N = 3
MIN: 8.5
8.71234
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00469, N = 3
MIN: 8.43
8.64707
2 x Xeon Platinum 8259CL
SE +/- 0.00172, N = 3
MIN: 9.04
9.20665
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00811, N = 3
MIN: 9.03
9.18751
9
18
27
36
45
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

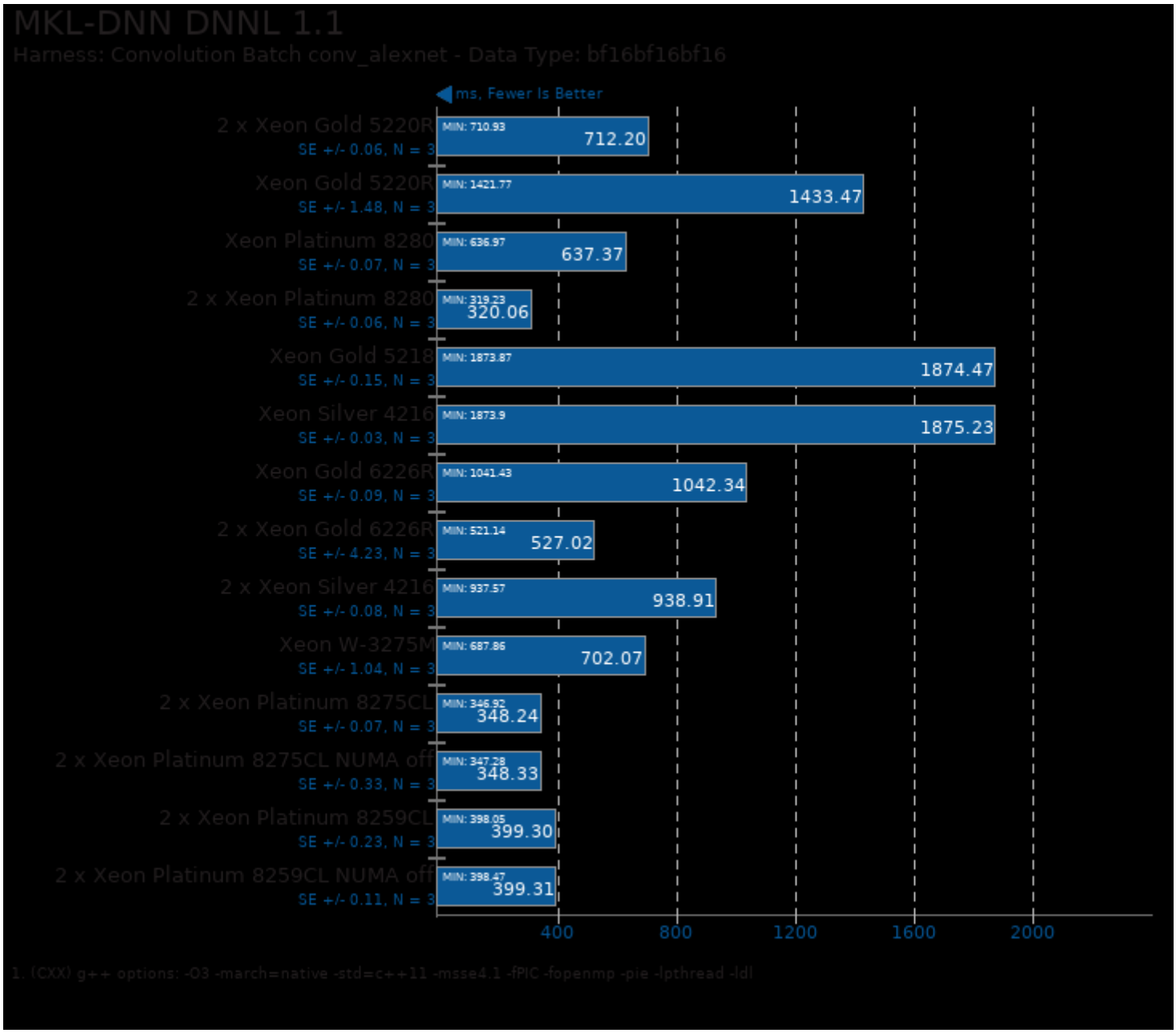

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_alexnet - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.03, N = 3
35.98
Xeon Gold 5220R
SE +/- 0.09, N = 3
66.74
Xeon Platinum 8280
SE +/- 0.02, N = 3
26.84
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
19.81
Xeon Gold 5218
SE +/- 0.04, N = 3
81.07
Xeon Silver 4216
SE +/- 0.06, N = 3
105.83
Xeon Gold 6226R
SE +/- 0.01, N = 3
42.22
2 x Xeon Gold 6226R
SE +/- 0.25, N = 3
26.54
2 x Xeon Silver 4216
SE +/- 0.14, N = 3
55.34
Xeon W-3275M
SE +/- 0.04, N = 3
31.99
2 x Xeon Platinum 8275CL
SE +/- 0.73, N = 3
59.90
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03, N = 3
30.64
EPYC 2 7R32
SE +/- 2.69, N = 3
MIN: 1286.29
1301.36
2 x Xeon Platinum 8259CL
SE +/- 0.24, N = 3
22.38
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01, N = 3
19.37
300
600
900
1200
1500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

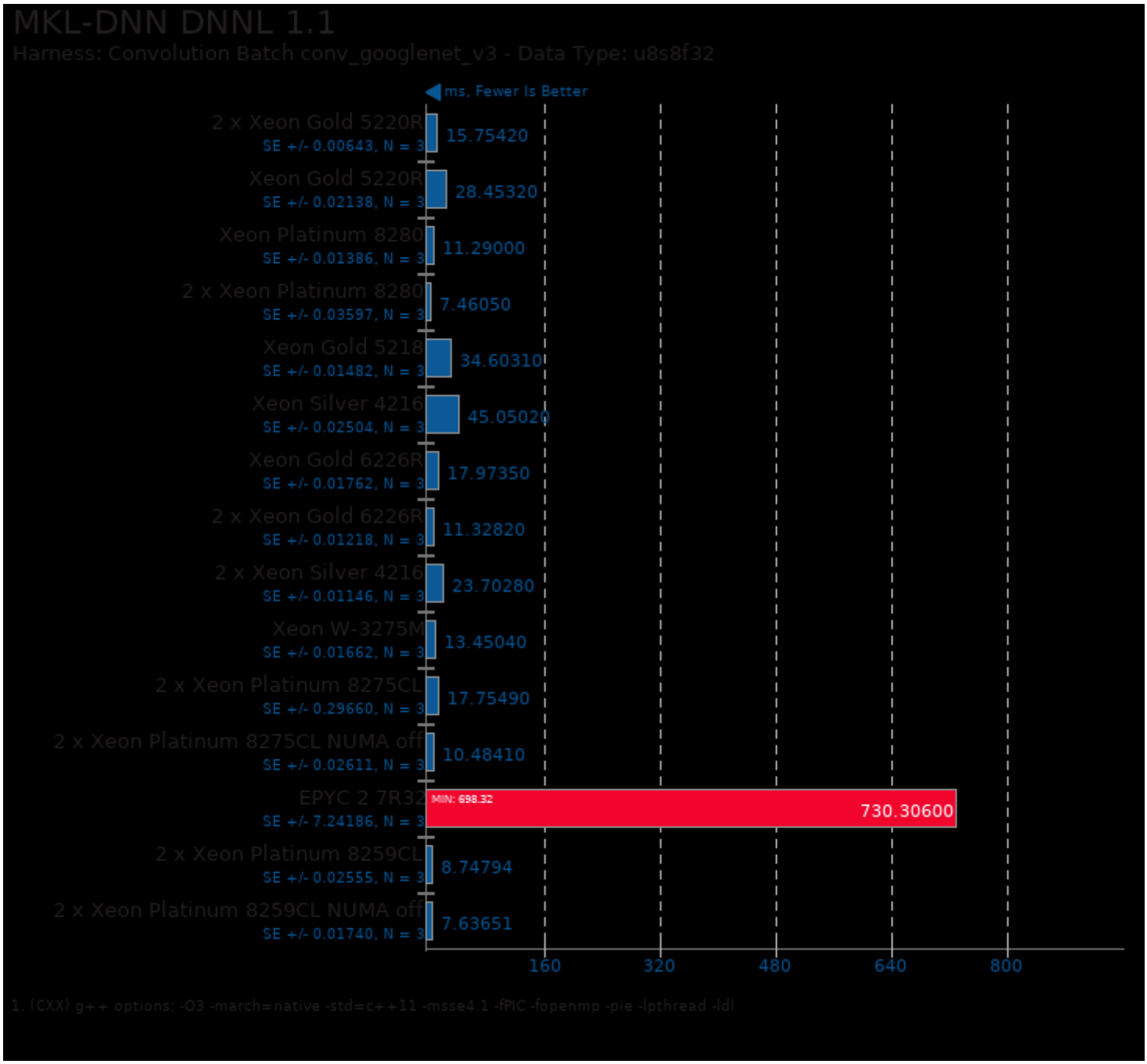

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_all - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 3.93, N = 3
MIN: 3906.67
3917.52
Xeon Gold 5220R
SE +/- 4.68, N = 3
MIN: 7795.37
7839.95
Xeon Platinum 8280
SE +/- 0.26, N = 3
MIN: 3490.41
3497.47
2 x Xeon Platinum 8280
SE +/- 1.13, N = 3
MIN: 1757.1
1766.35
Xeon Gold 5218
SE +/- 0.34, N = 3
MIN: 10250.1
10255.20
Xeon Silver 4216
SE +/- 0.35, N = 3
MIN: 10250.4
10258.00
Xeon Gold 6226R
SE +/- 0.12, N = 3
MIN: 5699.77
5709.17
2 x Xeon Gold 6226R
SE +/- 2.73, N = 3
MIN: 2860.81
2871.11
2 x Xeon Silver 4216
SE +/- 6.81, N = 3
MIN: 5142.07
5156.69
Xeon W-3275M
SE +/- 0.11, N = 3
MIN: 3767
3880.44
2 x Xeon Platinum 8275CL
SE +/- 0.16, N = 3
MIN: 1911.94
1919.50
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.26, N = 3
MIN: 1911.42
1918.28
2 x Xeon Platinum 8259CL
SE +/- 0.11, N = 3
MIN: 2191.04
2197.81
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.30, N = 3
MIN: 2191.82
2198.18
2K
4K
6K
8K
10K
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

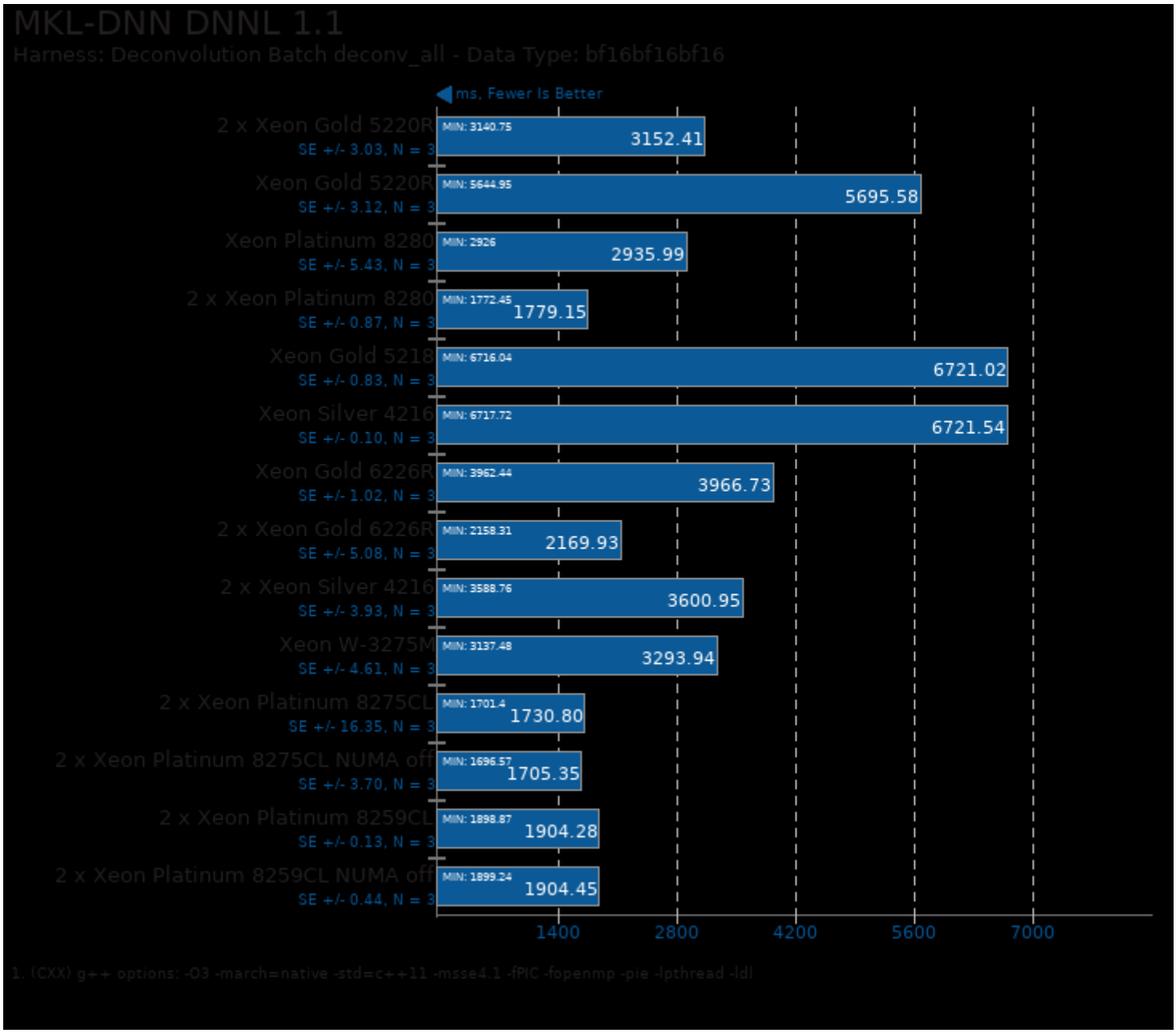

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_googlenet_v3 - Data Type: f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.06, N = 3
MIN: 54.08
54.82
Xeon Gold 5220R
SE +/- 0.24, N = 3
MIN: 106.43
108.16
Xeon Platinum 8280
SE +/- 0.02, N = 3
MIN: 41.31
42.08
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
MIN: 22
23.18
Xeon Gold 5218
SE +/- 0.03, N = 3
MIN: 130.56
131.09
Xeon Silver 4216
SE +/- 0.06, N = 3
MIN: 170.75
171.43
Xeon Gold 6226R
SE +/- 0.07, N = 3
MIN: 68.48
69.14
2 x Xeon Gold 6226R
SE +/- 0.01, N = 3
MIN: 34.65
36.37
2 x Xeon Silver 4216
SE +/- 0.04, N = 3
MIN: 86.64
87.54
Xeon W-3275M
SE +/- 0.07, N = 3
MIN: 44.78
49.87
2 x Xeon Platinum 8275CL
SE +/- 0.17, N = 3
MIN: 32.49
33.63
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 3
MIN: 24.37
25.05
EPYC 2 7R32
SE +/- 0.19, N = 3
MIN: 40.72
42.54
2 x Xeon Platinum 8259CL
SE +/- 0.10, N = 3
MIN: 24.46
25.77
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.02, N = 3
MIN: 24.48
25.07
40
80
120
160
200
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

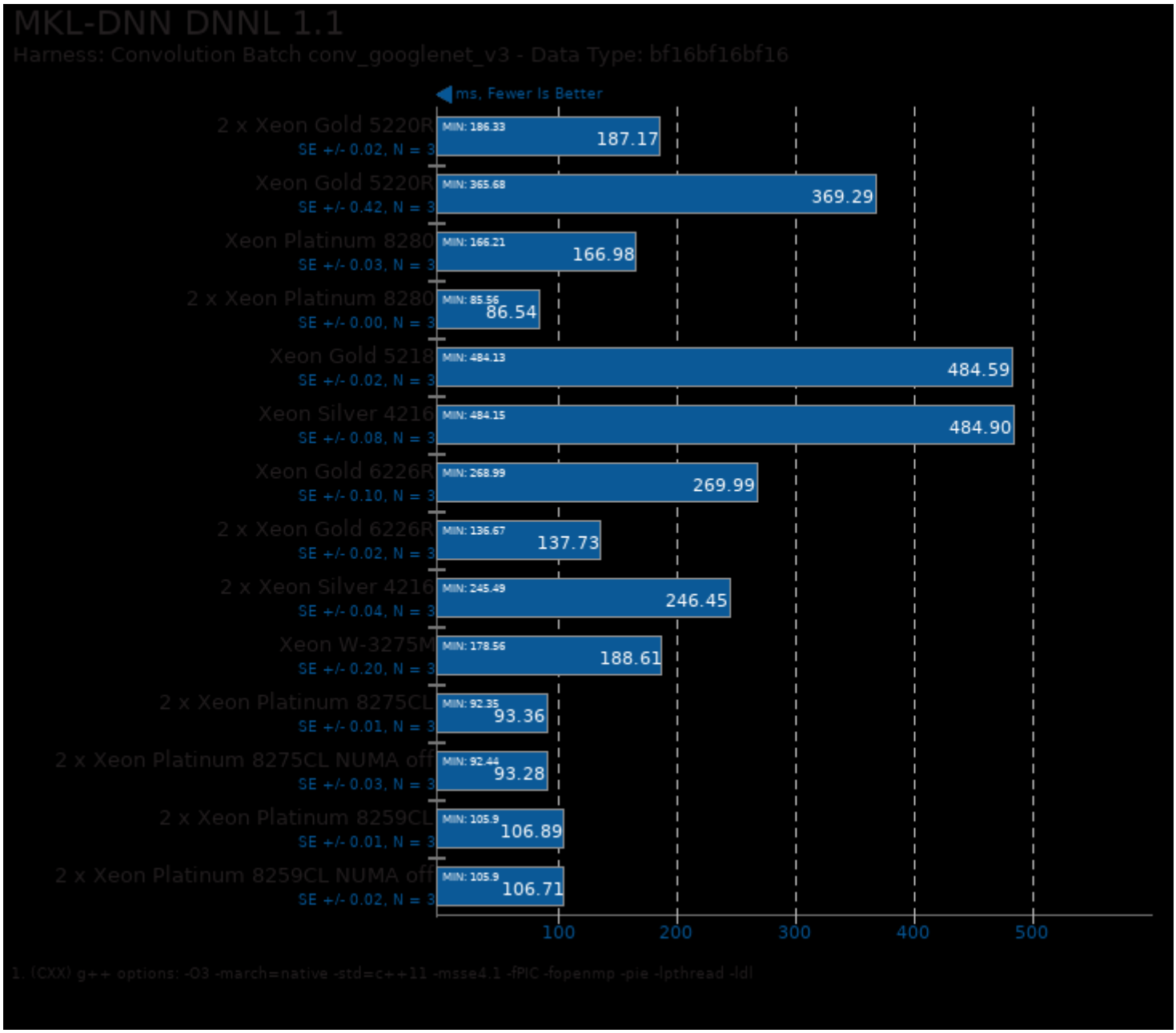

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_1d - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00772, N = 3
MIN: 7.13
7.22975
Xeon Gold 5220R
SE +/- 0.04579, N = 3
MIN: 12.96
13.14280
Xeon Platinum 8280
SE +/- 0.00167, N = 3
MIN: 6.5
6.55374
2 x Xeon Platinum 8280
SE +/- 0.00661, N = 3
MIN: 3.93
4.06847
Xeon Gold 5218
SE +/- 0.00105, N = 3
MIN: 16.51
16.54840
Xeon Silver 4216
SE +/- 0.00867, N = 3
MIN: 16.51
16.55160
Xeon Gold 6226R
SE +/- 0.00392, N = 3
MIN: 9.85
9.90362
2 x Xeon Gold 6226R
SE +/- 0.00747, N = 3
MIN: 5.3
5.38402
2 x Xeon Silver 4216
SE +/- 0.01001, N = 3
MIN: 8.78
8.86913
Xeon W-3275M
SE +/- 0.03740, N = 3
MIN: 6.95
7.61595
2 x Xeon Platinum 8275CL
SE +/- 0.01030, N = 3
MIN: 3.86
3.96906
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00401, N = 3
MIN: 3.88
3.96510
2 x Xeon Platinum 8259CL
SE +/- 0.00489, N = 3
MIN: 4.4
4.49039
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00151, N = 3
MIN: 4.38
4.46523
4
8
12
16
20
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

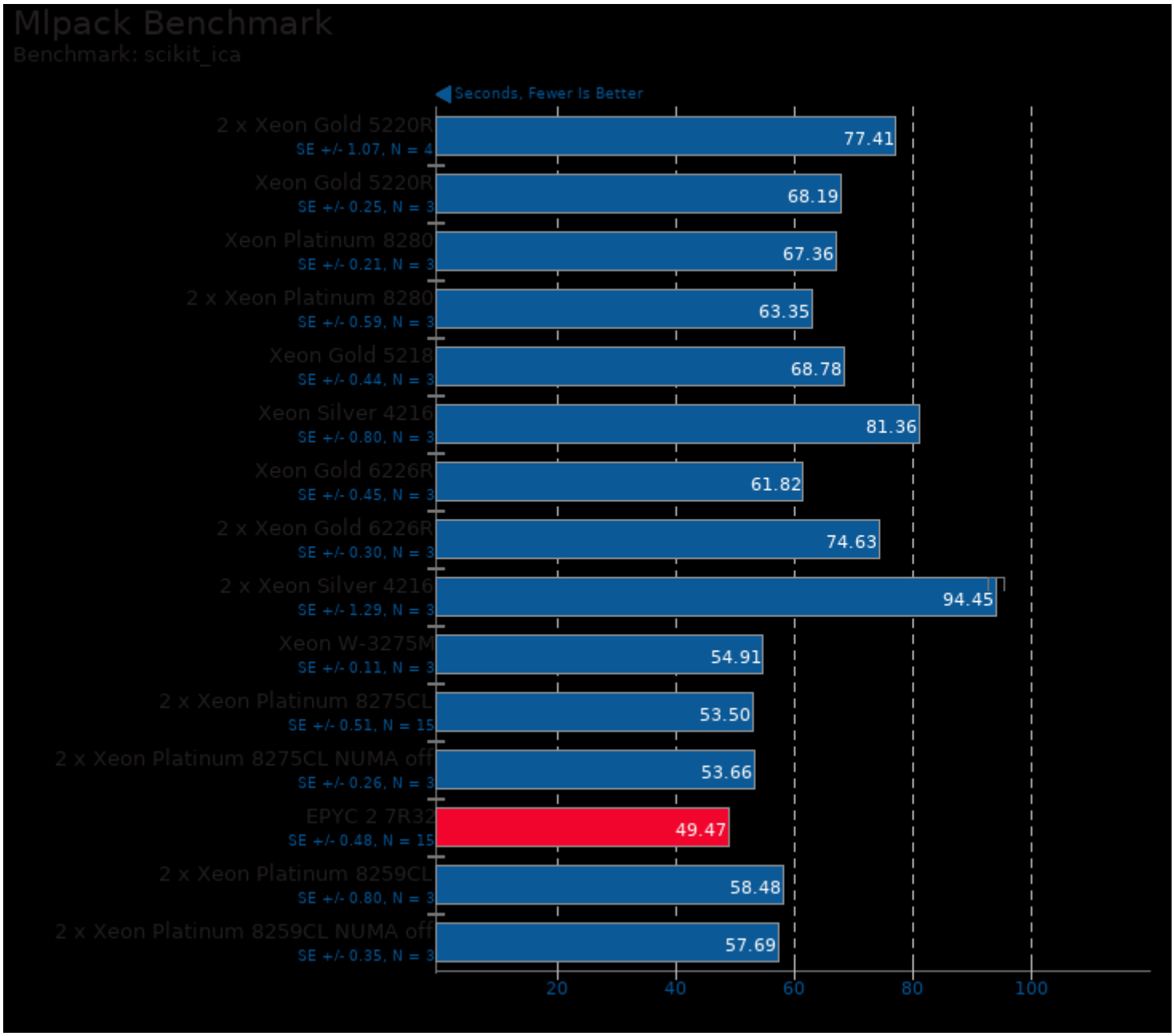

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_3d - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.01392, N = 3
MIN: 9.32
9.42591
Xeon Gold 5220R
SE +/- 0.00134, N = 3
MIN: 16.72
16.82530
Xeon Platinum 8280
SE +/- 0.00251, N = 3
MIN: 7.67
7.69605
2 x Xeon Platinum 8280
SE +/- 0.00369, N = 3
MIN: 4.31
4.35817
Xeon Gold 5218
SE +/- 0.05476, N = 3
MIN: 21.29
21.42900
Xeon Silver 4216
SE +/- 0.02388, N = 3
MIN: 21.24
21.47550
Xeon Gold 6226R
SE +/- 0.00297, N = 3
MIN: 12.27
12.32710
2 x Xeon Gold 6226R
SE +/- 0.00159, N = 3
MIN: 6.25
6.29647
2 x Xeon Silver 4216
SE +/- 0.00821, N = 3
MIN: 10.86
10.93790
Xeon W-3275M
SE +/- 0.03985, N = 3
MIN: 8.21
8.46273
2 x Xeon Platinum 8275CL
SE +/- 0.01549, N = 3
MIN: 4.32
4.37952
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00222, N = 3
MIN: 4.33
4.36002
2 x Xeon Platinum 8259CL
SE +/- 0.00712, N = 3
MIN: 4.83
4.87194
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00526, N = 3
MIN: 4.82
4.85689
5
10
15
20
25
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

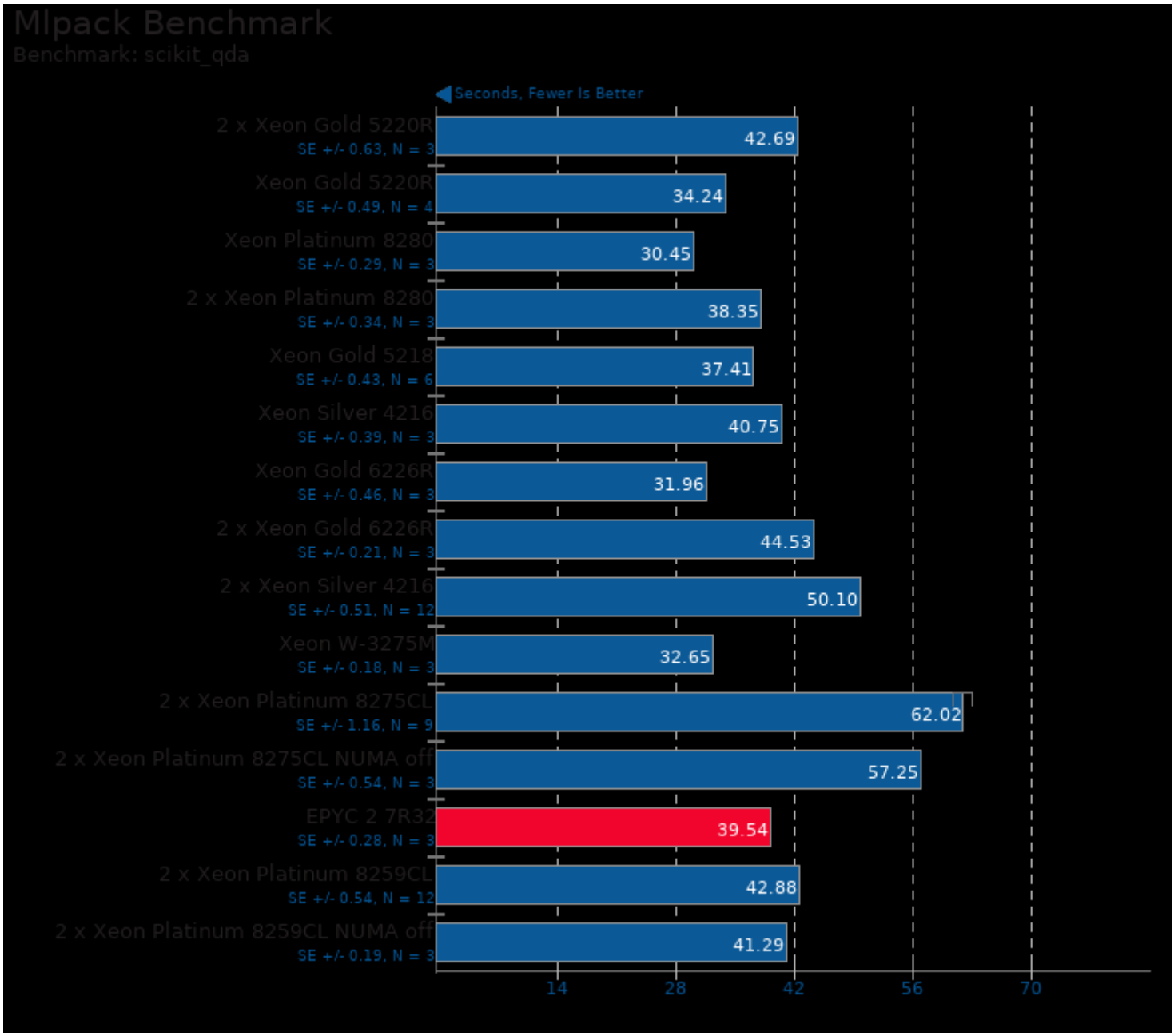

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_alexnet - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.06, N = 3
MIN: 710.93
712.20
Xeon Gold 5220R
SE +/- 1.48, N = 3
MIN: 1421.77
1433.47
Xeon Platinum 8280
SE +/- 0.07, N = 3
MIN: 636.97
637.37
2 x Xeon Platinum 8280
SE +/- 0.06, N = 3
MIN: 319.23
320.06
Xeon Gold 5218
SE +/- 0.15, N = 3
MIN: 1873.87
1874.47
Xeon Silver 4216
SE +/- 0.03, N = 3
MIN: 1873.9
1875.23
Xeon Gold 6226R
SE +/- 0.09, N = 3
MIN: 1041.43
1042.34
2 x Xeon Gold 6226R
SE +/- 4.23, N = 3
MIN: 521.14
527.02
2 x Xeon Silver 4216
SE +/- 0.08, N = 3
MIN: 937.57
938.91
Xeon W-3275M
SE +/- 1.04, N = 3
MIN: 687.86
702.07
2 x Xeon Platinum 8275CL
SE +/- 0.07, N = 3
MIN: 346.92
348.24
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.33, N = 3
MIN: 347.28
348.33
2 x Xeon Platinum 8259CL
SE +/- 0.23, N = 3
MIN: 398.05
399.30
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.11, N = 3
MIN: 398.47
399.31
400
800
1200
1600
2000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

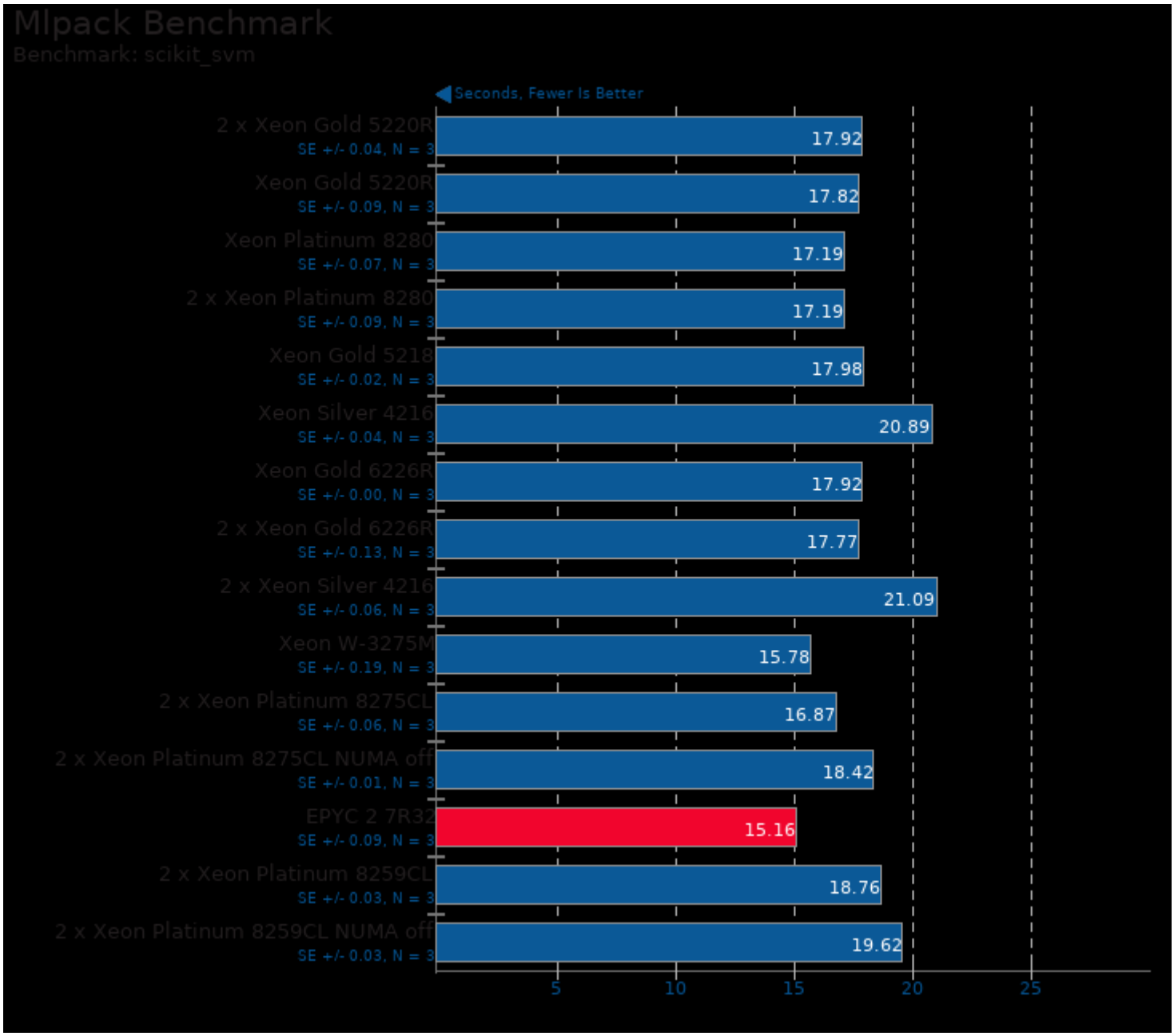

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_googlenet_v3 - Data Type: u8s8f32
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00643, N = 3
15.75420
Xeon Gold 5220R
SE +/- 0.02138, N = 3
28.45320
Xeon Platinum 8280
SE +/- 0.01386, N = 3
11.29000
2 x Xeon Platinum 8280
SE +/- 0.03597, N = 3
7.46050
Xeon Gold 5218
SE +/- 0.01482, N = 3
34.60310
Xeon Silver 4216
SE +/- 0.02504, N = 3
45.05020
Xeon Gold 6226R
SE +/- 0.01762, N = 3
17.97350
2 x Xeon Gold 6226R
SE +/- 0.01218, N = 3
11.32820
2 x Xeon Silver 4216
SE +/- 0.01146, N = 3
23.70280
Xeon W-3275M
SE +/- 0.01662, N = 3
13.45040
2 x Xeon Platinum 8275CL
SE +/- 0.29660, N = 3
17.75490
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.02611, N = 3
10.48410
EPYC 2 7R32
SE +/- 7.24186, N = 3
MIN: 698.32
730.30600
2 x Xeon Platinum 8259CL
SE +/- 0.02555, N = 3
8.74794
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01740, N = 3
7.63651
160
320
480
640
800
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

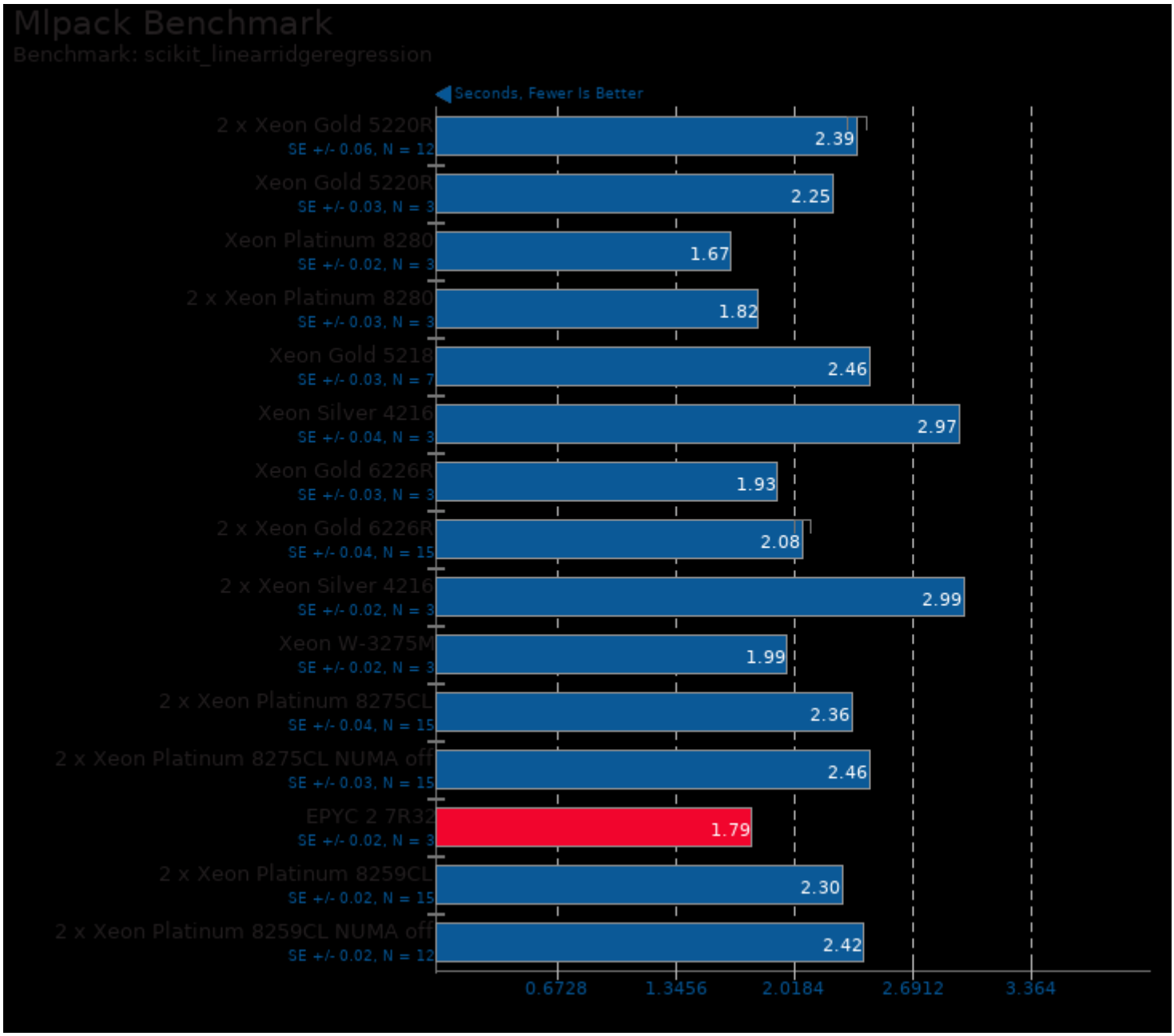

MKL-DNN DNNL 1.1
Harness: Deconvolution Batch deconv_all - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 3.03, N = 3
MIN: 3140.75
3152.41
Xeon Gold 5220R
SE +/- 3.12, N = 3
MIN: 5644.95
5695.58
Xeon Platinum 8280
SE +/- 5.43, N = 3
MIN: 2926
2935.99
2 x Xeon Platinum 8280
SE +/- 0.87, N = 3
MIN: 1772.45
1779.15
Xeon Gold 5218
SE +/- 0.83, N = 3
MIN: 6716.04
6721.02
Xeon Silver 4216
SE +/- 0.10, N = 3
MIN: 6717.72
6721.54
Xeon Gold 6226R
SE +/- 1.02, N = 3
MIN: 3962.44
3966.73
2 x Xeon Gold 6226R
SE +/- 5.08, N = 3
MIN: 2158.31
2169.93
2 x Xeon Silver 4216
SE +/- 3.93, N = 3
MIN: 3588.76
3600.95
Xeon W-3275M
SE +/- 4.61, N = 3
MIN: 3137.48
3293.94
2 x Xeon Platinum 8275CL
SE +/- 16.35, N = 3
MIN: 1701.4
1730.80
2 x Xeon Platinum 8275CL NUMA off
SE +/- 3.70, N = 3
MIN: 1696.57
1705.35
2 x Xeon Platinum 8259CL
SE +/- 0.13, N = 3
MIN: 1898.87
1904.28
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.44, N = 3
MIN: 1899.24
1904.45
1400
2800
4200
5600
7000
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

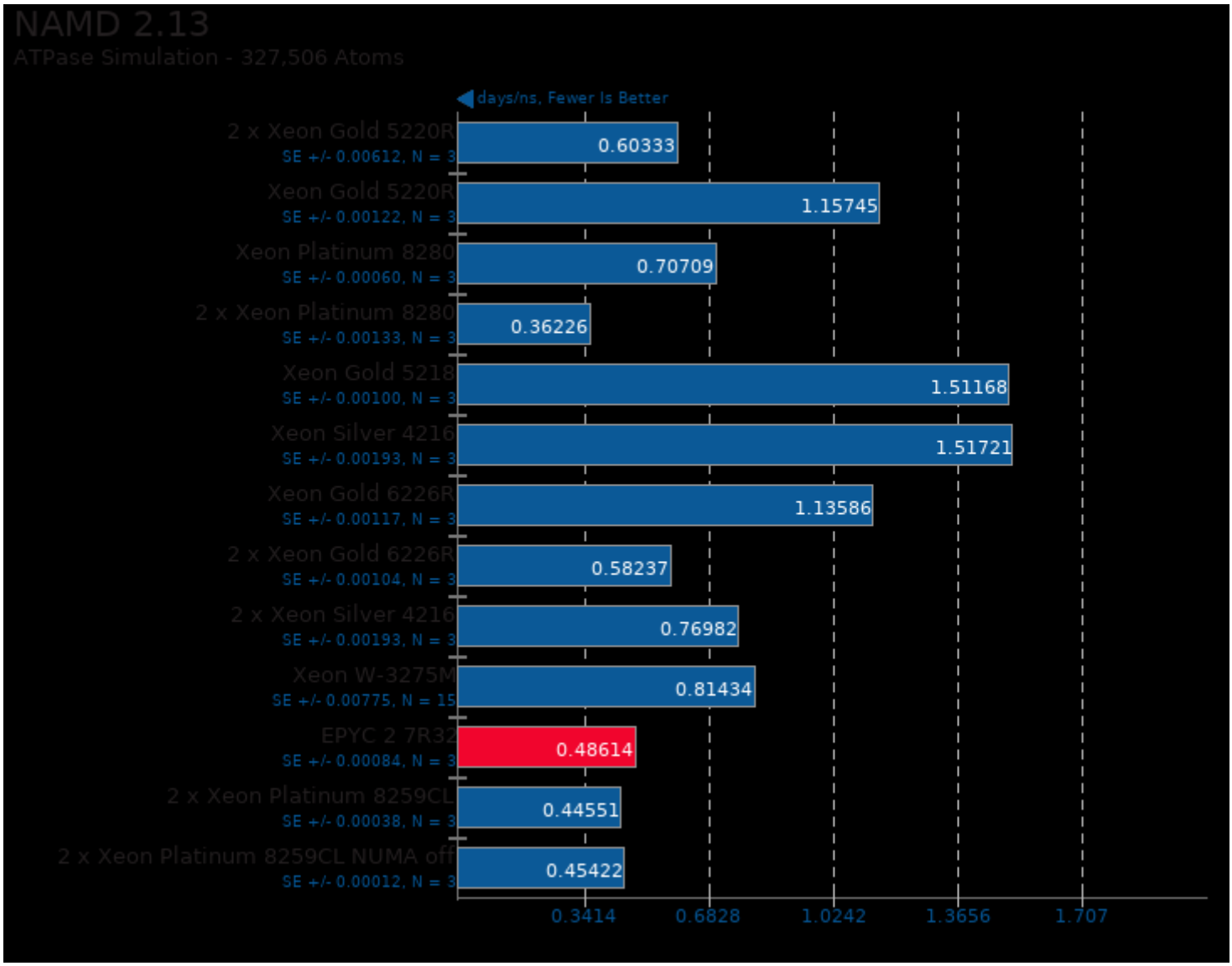

MKL-DNN DNNL 1.1
Harness: Convolution Batch conv_googlenet_v3 - Data Type: bf16bf16bf16
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.02, N = 3
MIN: 186.33
187.17
Xeon Gold 5220R
SE +/- 0.42, N = 3
MIN: 365.68
369.29
Xeon Platinum 8280
SE +/- 0.03, N = 3
MIN: 166.21
166.98
2 x Xeon Platinum 8280
SE +/- 0.00, N = 3
MIN: 85.56
86.54
Xeon Gold 5218
SE +/- 0.02, N = 3
MIN: 484.13
484.59
Xeon Silver 4216
SE +/- 0.08, N = 3
MIN: 484.15
484.90
Xeon Gold 6226R
SE +/- 0.10, N = 3
MIN: 268.99
269.99
2 x Xeon Gold 6226R
SE +/- 0.02, N = 3
MIN: 136.67
137.73
2 x Xeon Silver 4216
SE +/- 0.04, N = 3
MIN: 245.49
246.45
Xeon W-3275M
SE +/- 0.20, N = 3
MIN: 178.56
188.61
2 x Xeon Platinum 8275CL
SE +/- 0.01, N = 3
MIN: 92.35
93.36
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03, N = 3
MIN: 92.44
93.28
2 x Xeon Platinum 8259CL
SE +/- 0.01, N = 3
MIN: 105.9
106.89
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.02, N = 3
MIN: 105.9
106.71
100
200
300
400
500
1. (CXX) g++ options: -O3 -march=native -std=c++11 -msse4.1 -fPIC -fopenmp -pie -lpthread -ldl

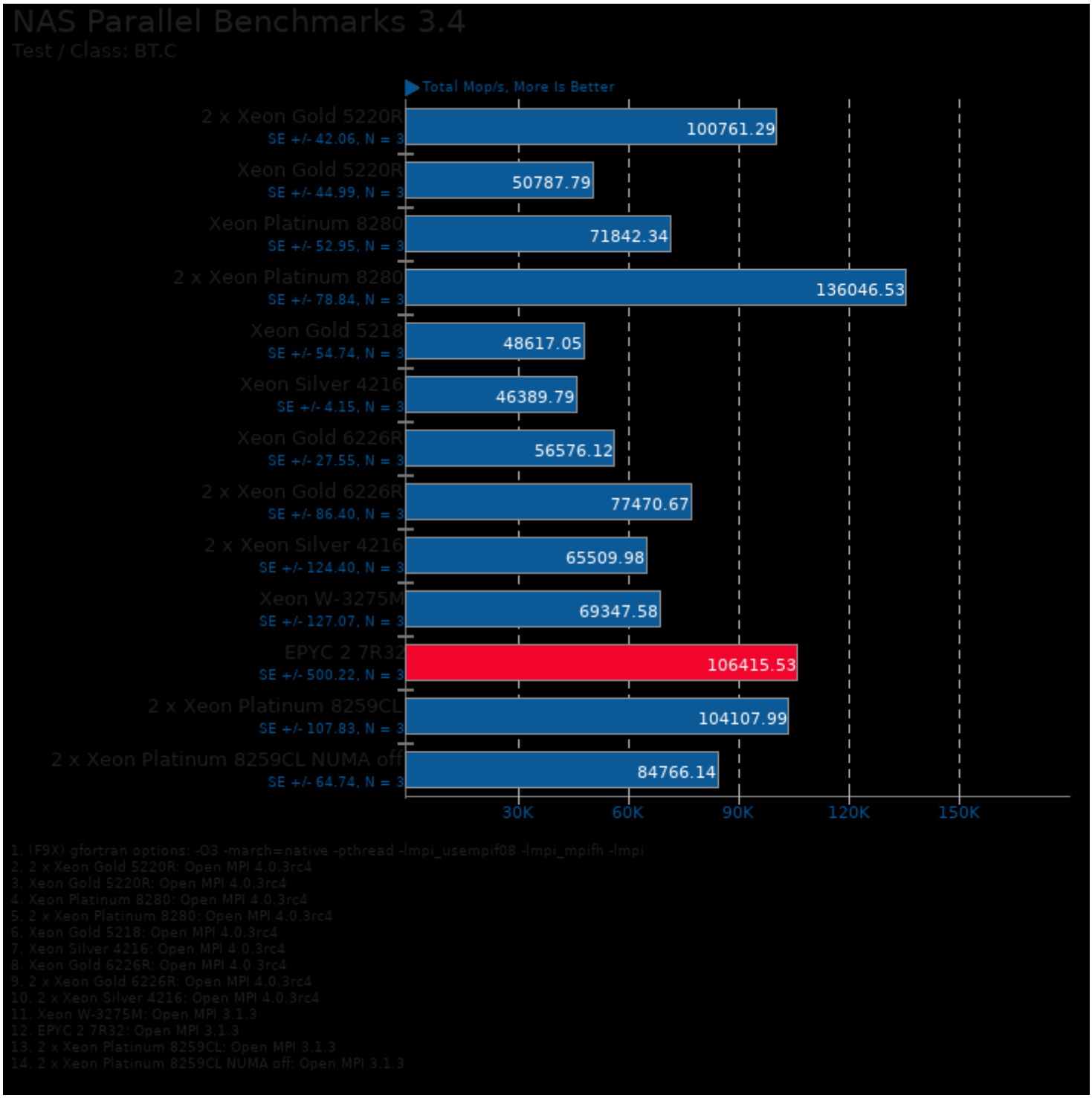

Mlpack Benchmark
Benchmark: scikit_ica
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 1.07, N = 4
77.41
Xeon Gold 5220R
SE +/- 0.25, N = 3
68.19
Xeon Platinum 8280
SE +/- 0.21, N = 3
67.36
2 x Xeon Platinum 8280
SE +/- 0.59, N = 3
63.35
Xeon Gold 5218
SE +/- 0.44, N = 3
68.78
Xeon Silver 4216
SE +/- 0.80, N = 3
81.36
Xeon Gold 6226R
SE +/- 0.45, N = 3
61.82
2 x Xeon Gold 6226R
SE +/- 0.30, N = 3
74.63
2 x Xeon Silver 4216
SE +/- 1.29, N = 3
94.45
Xeon W-3275M
SE +/- 0.11, N = 3
54.91
2 x Xeon Platinum 8275CL
SE +/- 0.51, N = 15
53.50
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.26, N = 3
53.66
EPYC 2 7R32
SE +/- 0.48, N = 15
49.47
2 x Xeon Platinum 8259CL
SE +/- 0.80, N = 3
58.48
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.35, N = 3
57.69
20
40
60
80
100

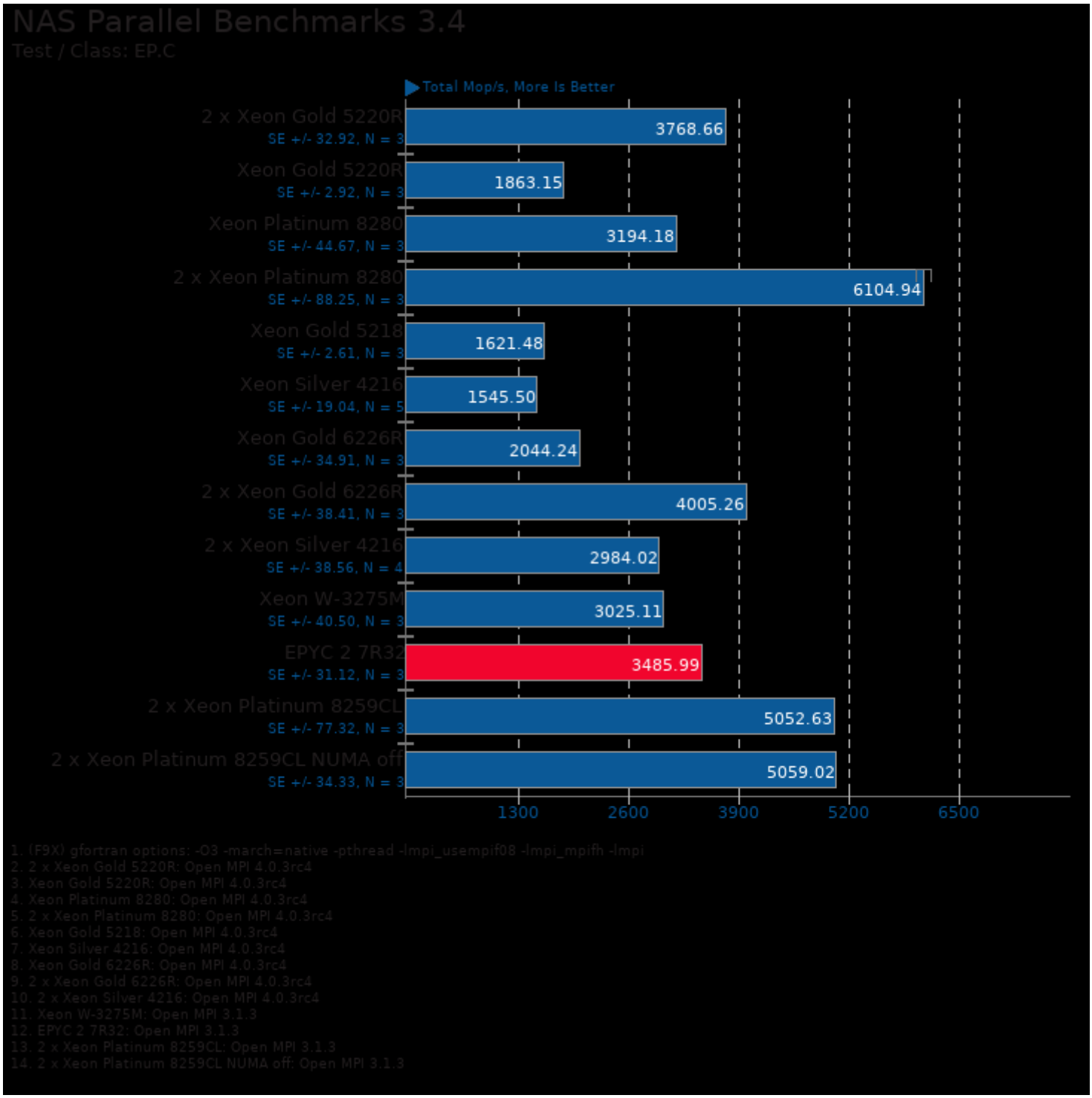

Mlpack Benchmark
Benchmark: scikit_qda
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.63, N = 3
42.69
Xeon Gold 5220R
SE +/- 0.49, N = 4
34.24
Xeon Platinum 8280
SE +/- 0.29, N = 3
30.45
2 x Xeon Platinum 8280
SE +/- 0.34, N = 3
38.35
Xeon Gold 5218
SE +/- 0.43, N = 6
37.41
Xeon Silver 4216
SE +/- 0.39, N = 3
40.75
Xeon Gold 6226R
SE +/- 0.46, N = 3
31.96
2 x Xeon Gold 6226R
SE +/- 0.21, N = 3
44.53
2 x Xeon Silver 4216
SE +/- 0.51, N = 12
50.10
Xeon W-3275M
SE +/- 0.18, N = 3
32.65
2 x Xeon Platinum 8275CL
SE +/- 1.16, N = 9
62.02
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.54, N = 3
57.25
EPYC 2 7R32
SE +/- 0.28, N = 3
39.54
2 x Xeon Platinum 8259CL
SE +/- 0.54, N = 12
42.88
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.19, N = 3
41.29
14
28
42
56
70

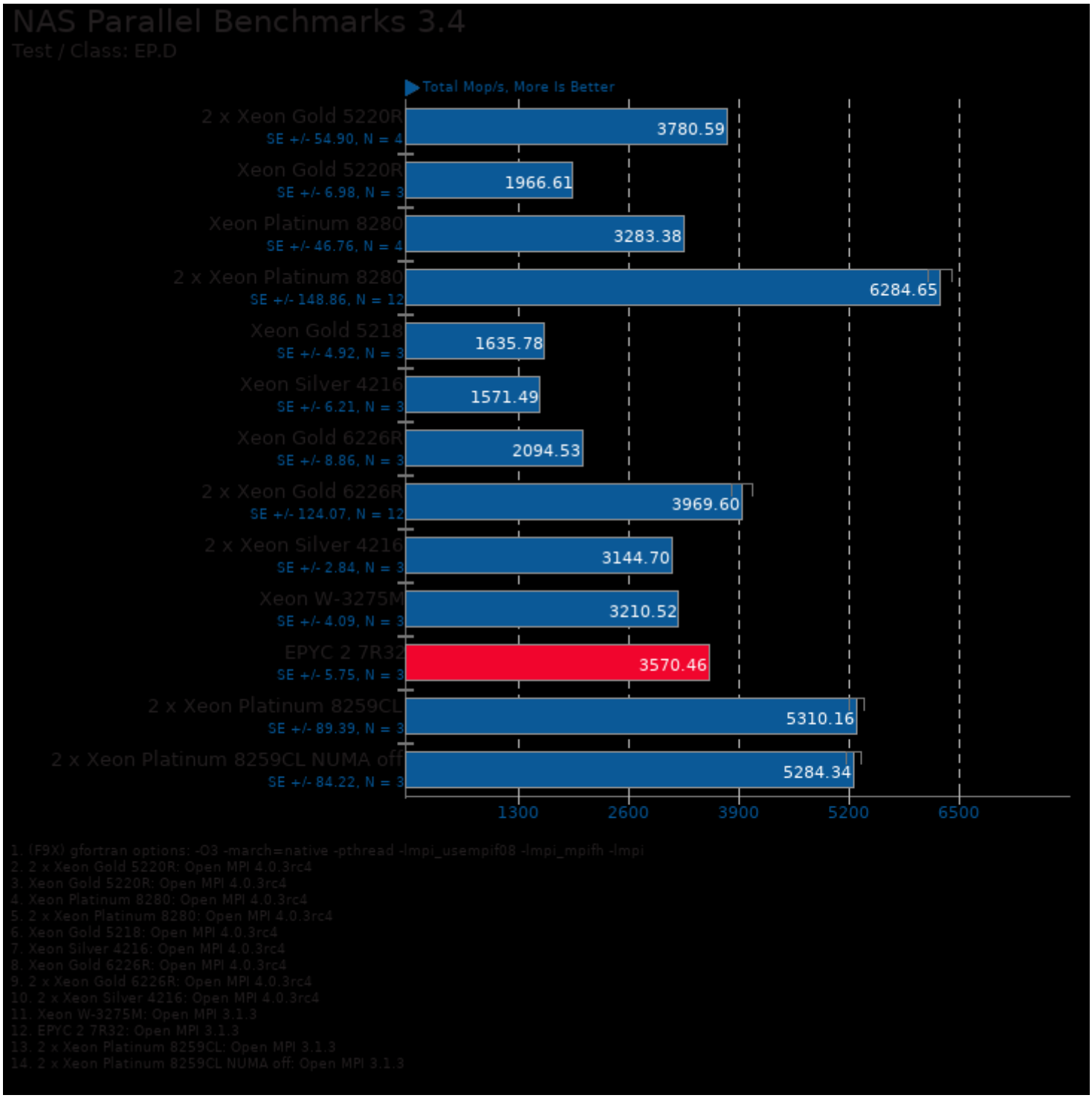

Mlpack Benchmark
Benchmark: scikit_svm
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.04, N = 3
17.92
Xeon Gold 5220R
SE +/- 0.09, N = 3
17.82
Xeon Platinum 8280
SE +/- 0.07, N = 3
17.19
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
17.19
Xeon Gold 5218
SE +/- 0.02, N = 3
17.98
Xeon Silver 4216
SE +/- 0.04, N = 3
20.89
Xeon Gold 6226R
SE +/- 0.00, N = 3
17.92
2 x Xeon Gold 6226R
SE +/- 0.13, N = 3
17.77
2 x Xeon Silver 4216
SE +/- 0.06, N = 3
21.09
Xeon W-3275M
SE +/- 0.19, N = 3
15.78
2 x Xeon Platinum 8275CL
SE +/- 0.06, N = 3
16.87
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 3
18.42
EPYC 2 7R32
SE +/- 0.09, N = 3
15.16
2 x Xeon Platinum 8259CL
SE +/- 0.03, N = 3
18.76
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.03, N = 3
19.62
5
10
15
20
25

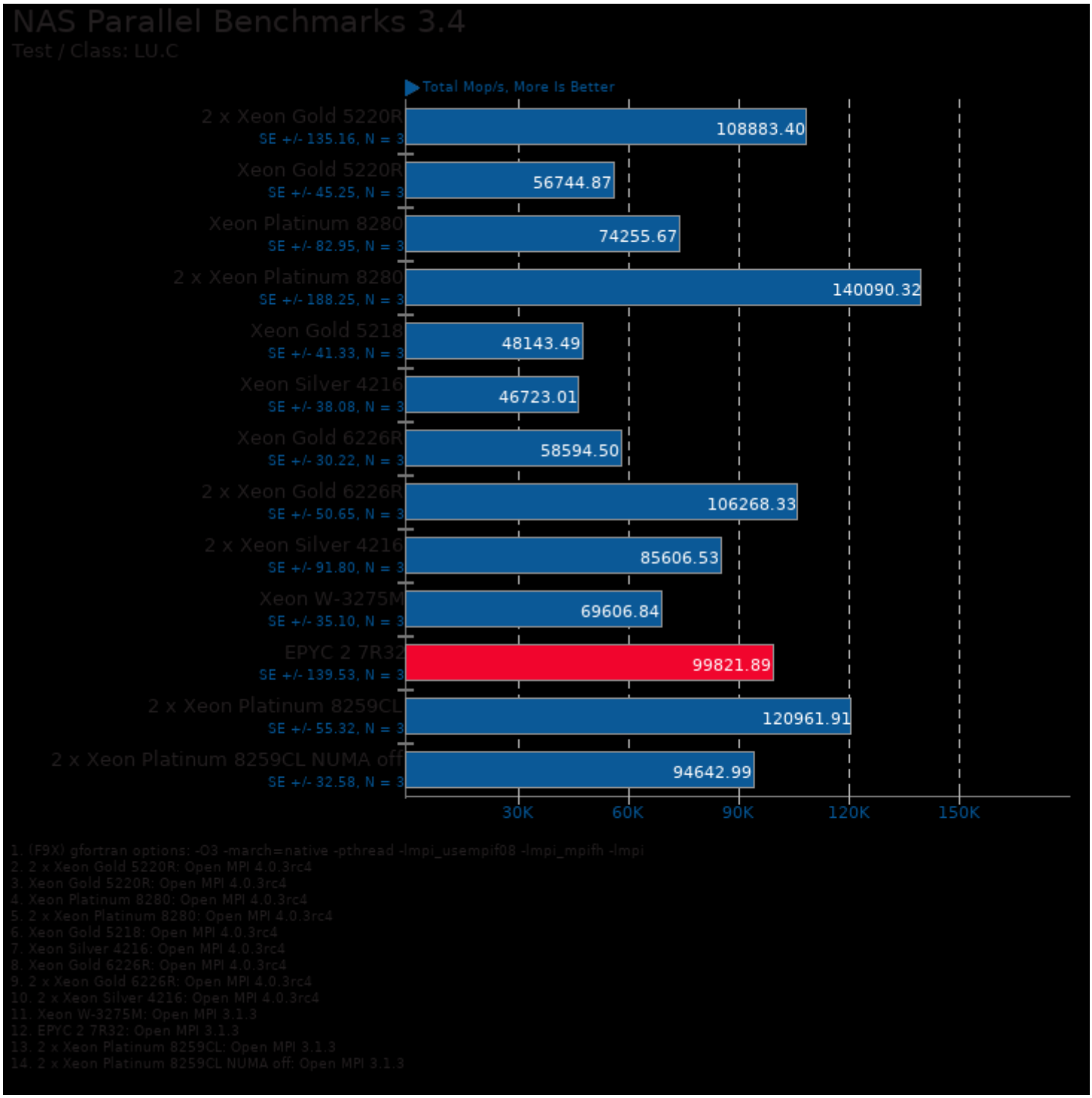

Mlpack Benchmark
Benchmark: scikit_linearridgeregression
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.06, N = 12
2.39
Xeon Gold 5220R
SE +/- 0.03, N = 3
2.25
Xeon Platinum 8280
SE +/- 0.02, N = 3
1.67
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
1.82
Xeon Gold 5218
SE +/- 0.03, N = 7
2.46
Xeon Silver 4216
SE +/- 0.04, N = 3
2.97
Xeon Gold 6226R
SE +/- 0.03, N = 3
1.93
2 x Xeon Gold 6226R
SE +/- 0.04, N = 15
2.08
2 x Xeon Silver 4216
SE +/- 0.02, N = 3
2.99
Xeon W-3275M
SE +/- 0.02, N = 3
1.99
2 x Xeon Platinum 8275CL
SE +/- 0.04, N = 15
2.36
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03, N = 15
2.46
EPYC 2 7R32
SE +/- 0.02, N = 3
1.79
2 x Xeon Platinum 8259CL
SE +/- 0.02, N = 15
2.30
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.02, N = 12
2.42
0.6728
1.3456
2.0184
2.6912
3.364

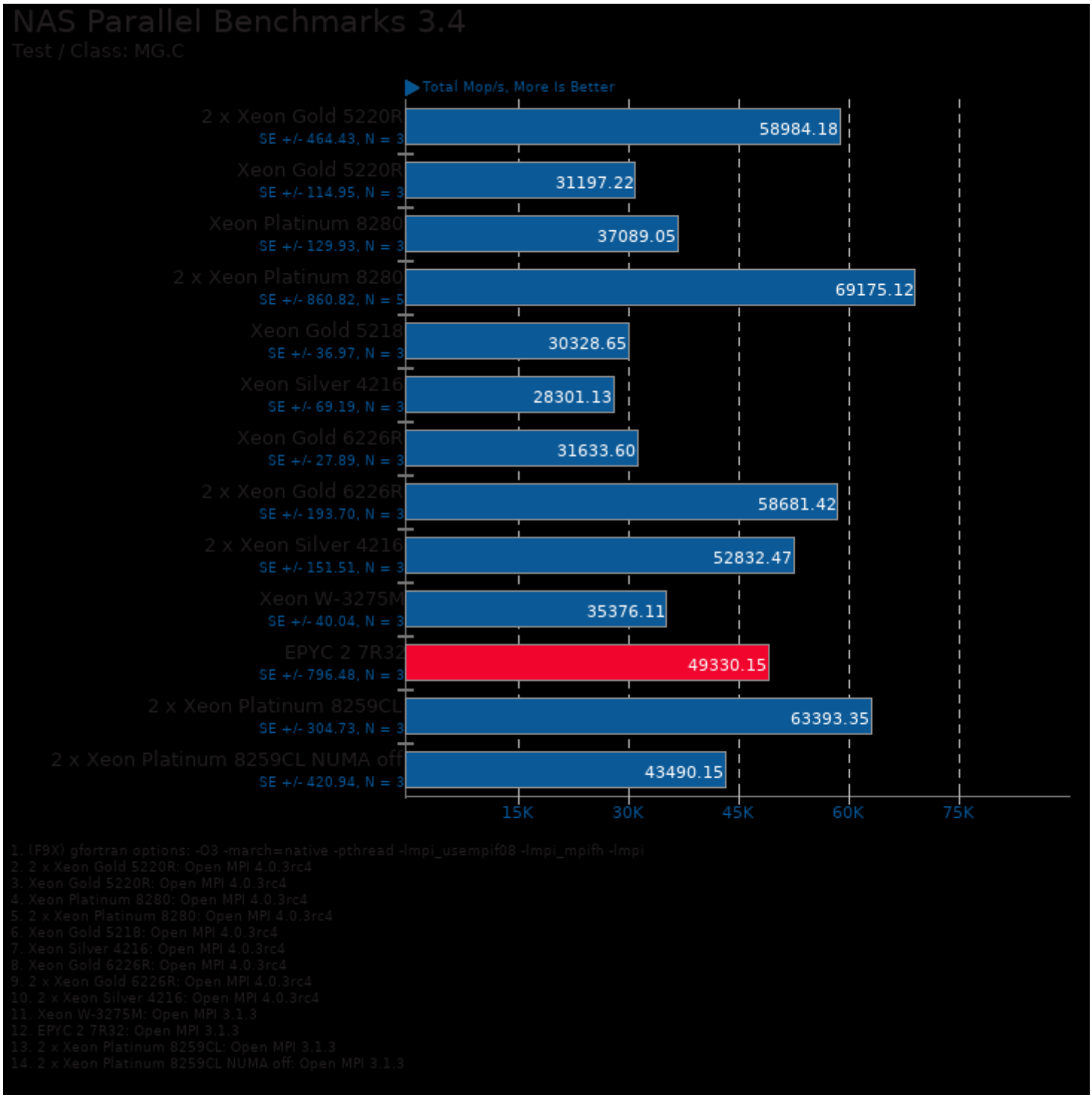

NAMD 2.13
ATPase Simulation - 327,506 Atoms
days/ns, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00612, N = 3
0.60333
Xeon Gold 5220R
SE +/- 0.00122, N = 3
1.15745
Xeon Platinum 8280
SE +/- 0.00060, N = 3
0.70709
2 x Xeon Platinum 8280
SE +/- 0.00133, N = 3
0.36226
Xeon Gold 5218
SE +/- 0.00100, N = 3
1.51168
Xeon Silver 4216
SE +/- 0.00193, N = 3
1.51721
Xeon Gold 6226R
SE +/- 0.00117, N = 3
1.13586
2 x Xeon Gold 6226R
SE +/- 0.00104, N = 3
0.58237
2 x Xeon Silver 4216
SE +/- 0.00193, N = 3
0.76982
Xeon W-3275M
SE +/- 0.00775, N = 15
0.81434
EPYC 2 7R32
SE +/- 0.00084, N = 3
0.48614
2 x Xeon Platinum 8259CL
SE +/- 0.00038, N = 3
0.44551
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00012, N = 3
0.45422
0.3414
0.6828
1.0242
1.3656
1.707

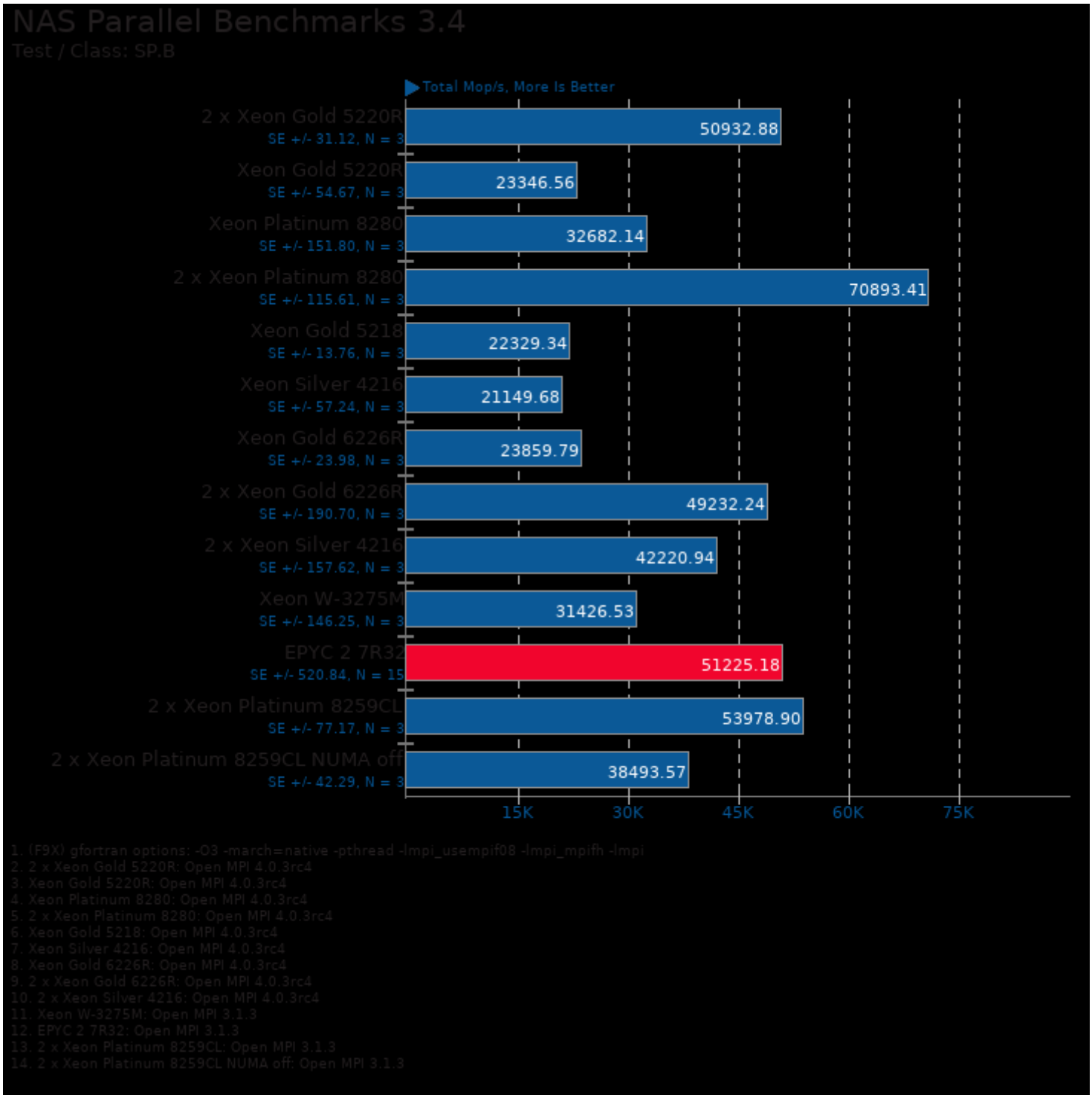

NAS Parallel Benchmarks 3.4
Test / Class: BT.C
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 42.06, N = 3
100761.29
Xeon Gold 5220R
SE +/- 44.99, N = 3
50787.79
Xeon Platinum 8280
SE +/- 52.95, N = 3
71842.34
2 x Xeon Platinum 8280
SE +/- 78.84, N = 3
136046.53
Xeon Gold 5218
SE +/- 54.74, N = 3
48617.05
Xeon Silver 4216
SE +/- 4.15, N = 3
46389.79
Xeon Gold 6226R
SE +/- 27.55, N = 3
56576.12
2 x Xeon Gold 6226R
SE +/- 86.40, N = 3
77470.67
2 x Xeon Silver 4216
SE +/- 124.40, N = 3
65509.98
Xeon W-3275M
SE +/- 127.07, N = 3
69347.58
EPYC 2 7R32
SE +/- 500.22, N = 3
106415.53
2 x Xeon Platinum 8259CL
SE +/- 107.83, N = 3
104107.99
2 x Xeon Platinum 8259CL NUMA off
SE +/- 64.74, N = 3
84766.14
30K
60K
90K
120K
150K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

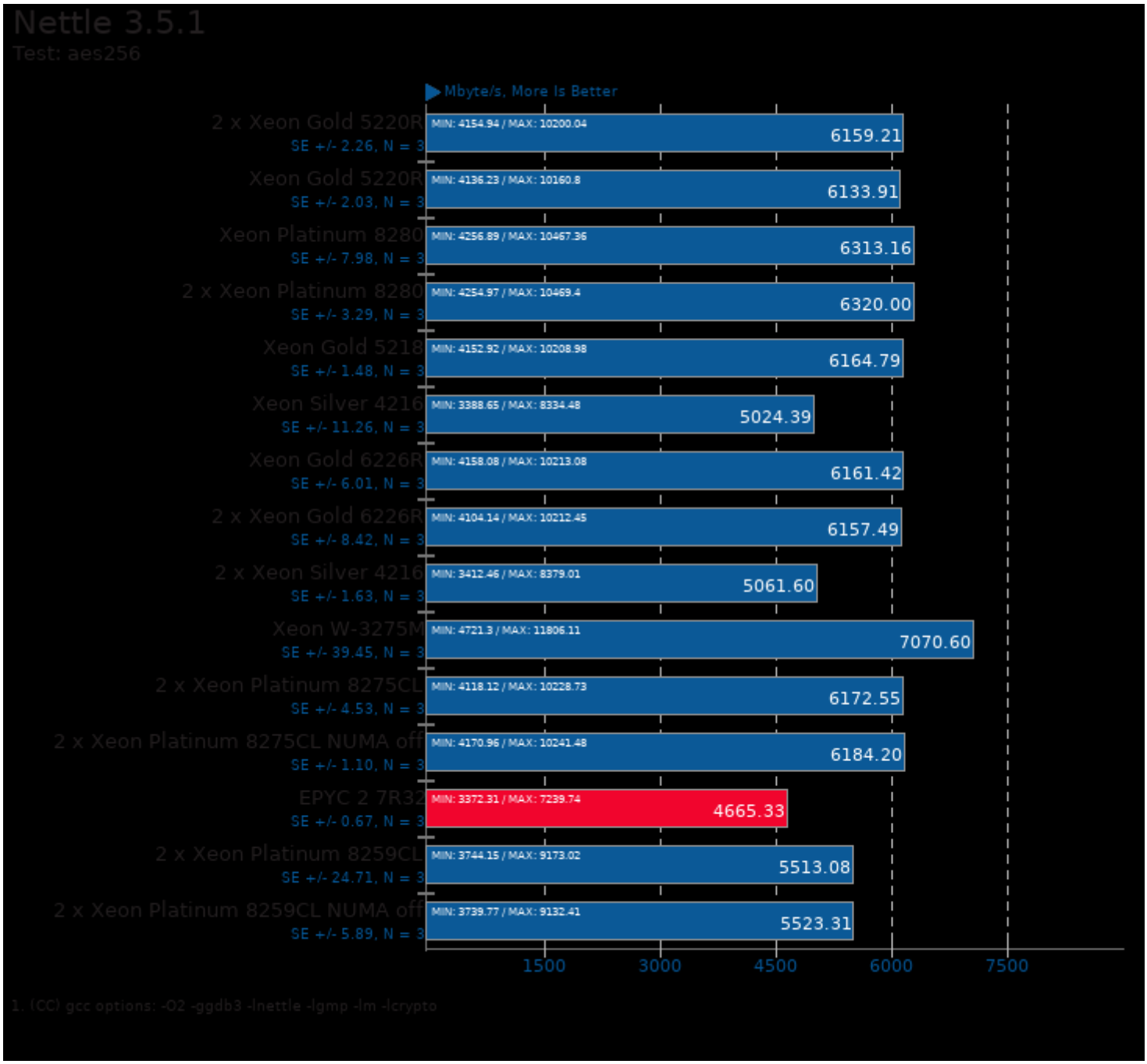

NAS Parallel Benchmarks 3.4
Test / Class: EP.C
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 32.92, N = 3
3768.66
Xeon Gold 5220R
SE +/- 2.92, N = 3
1863.15
Xeon Platinum 8280
SE +/- 44.67, N = 3
3194.18
2 x Xeon Platinum 8280
SE +/- 88.25, N = 3
6104.94
Xeon Gold 5218
SE +/- 2.61, N = 3
1621.48
Xeon Silver 4216
SE +/- 19.04, N = 5
1545.50
Xeon Gold 6226R
SE +/- 34.91, N = 3
2044.24
2 x Xeon Gold 6226R
SE +/- 38.41, N = 3
4005.26
2 x Xeon Silver 4216
SE +/- 38.56, N = 4
2984.02
Xeon W-3275M
SE +/- 40.50, N = 3
3025.11
EPYC 2 7R32
SE +/- 31.12, N = 3
3485.99
2 x Xeon Platinum 8259CL
SE +/- 77.32, N = 3
5052.63
2 x Xeon Platinum 8259CL NUMA off
SE +/- 34.33, N = 3
5059.02
1300
2600
3900
5200
6500
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

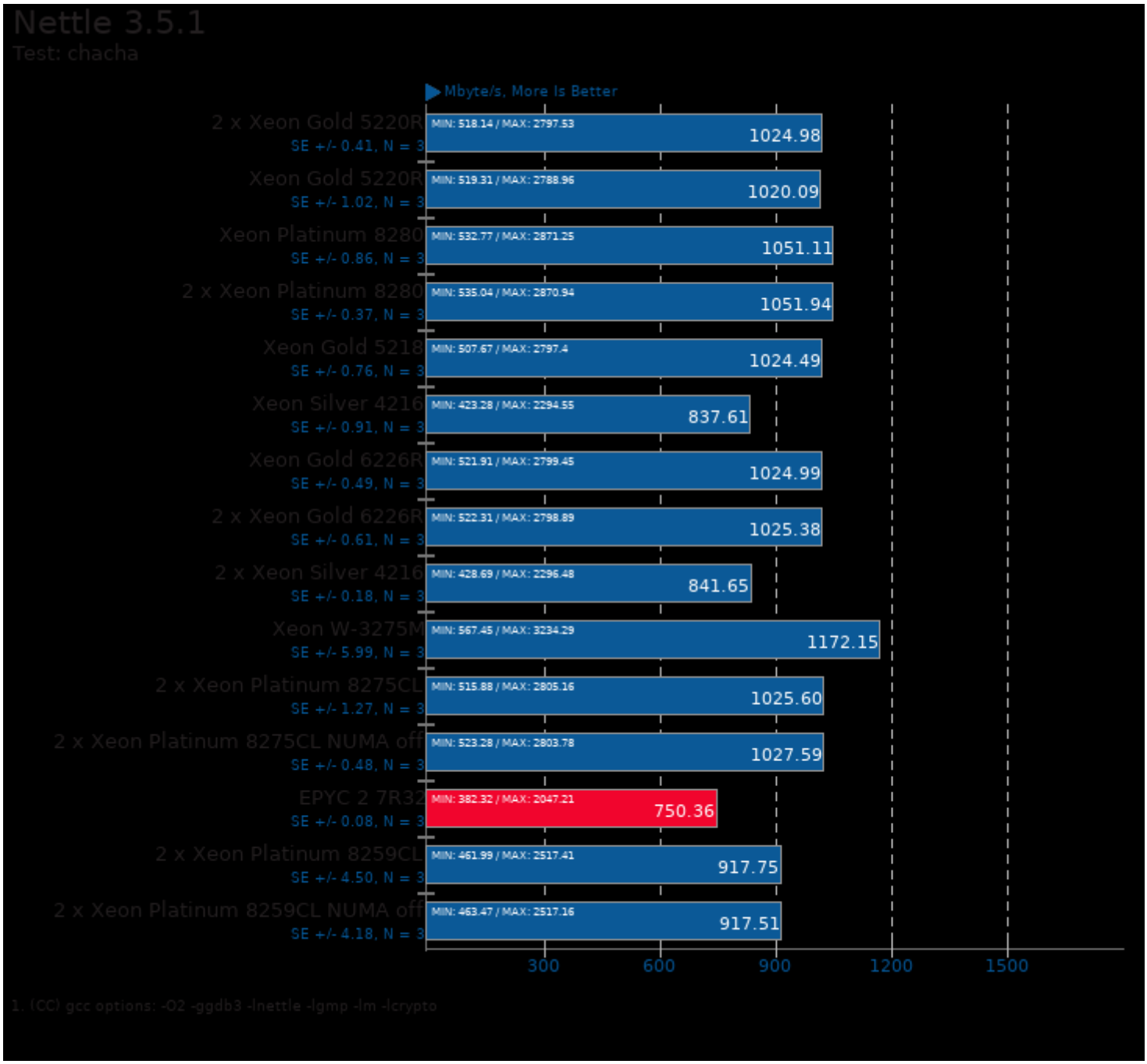

NAS Parallel Benchmarks 3.4
Test / Class: EP.D
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 54.90, N = 4
3780.59
Xeon Gold 5220R
SE +/- 6.98, N = 3
1966.61
Xeon Platinum 8280
SE +/- 46.76, N = 4
3283.38
2 x Xeon Platinum 8280
SE +/- 148.86, N = 12
6284.65
Xeon Gold 5218
SE +/- 4.92, N = 3
1635.78
Xeon Silver 4216
SE +/- 6.21, N = 3
1571.49
Xeon Gold 6226R
SE +/- 8.86, N = 3
2094.53
2 x Xeon Gold 6226R
SE +/- 124.07, N = 12
3969.60
2 x Xeon Silver 4216
SE +/- 2.84, N = 3
3144.70
Xeon W-3275M
SE +/- 4.09, N = 3
3210.52
EPYC 2 7R32
SE +/- 5.75, N = 3
3570.46
2 x Xeon Platinum 8259CL
SE +/- 89.39, N = 3
5310.16
2 x Xeon Platinum 8259CL NUMA off
SE +/- 84.22, N = 3
5284.34
1300
2600
3900
5200
6500
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

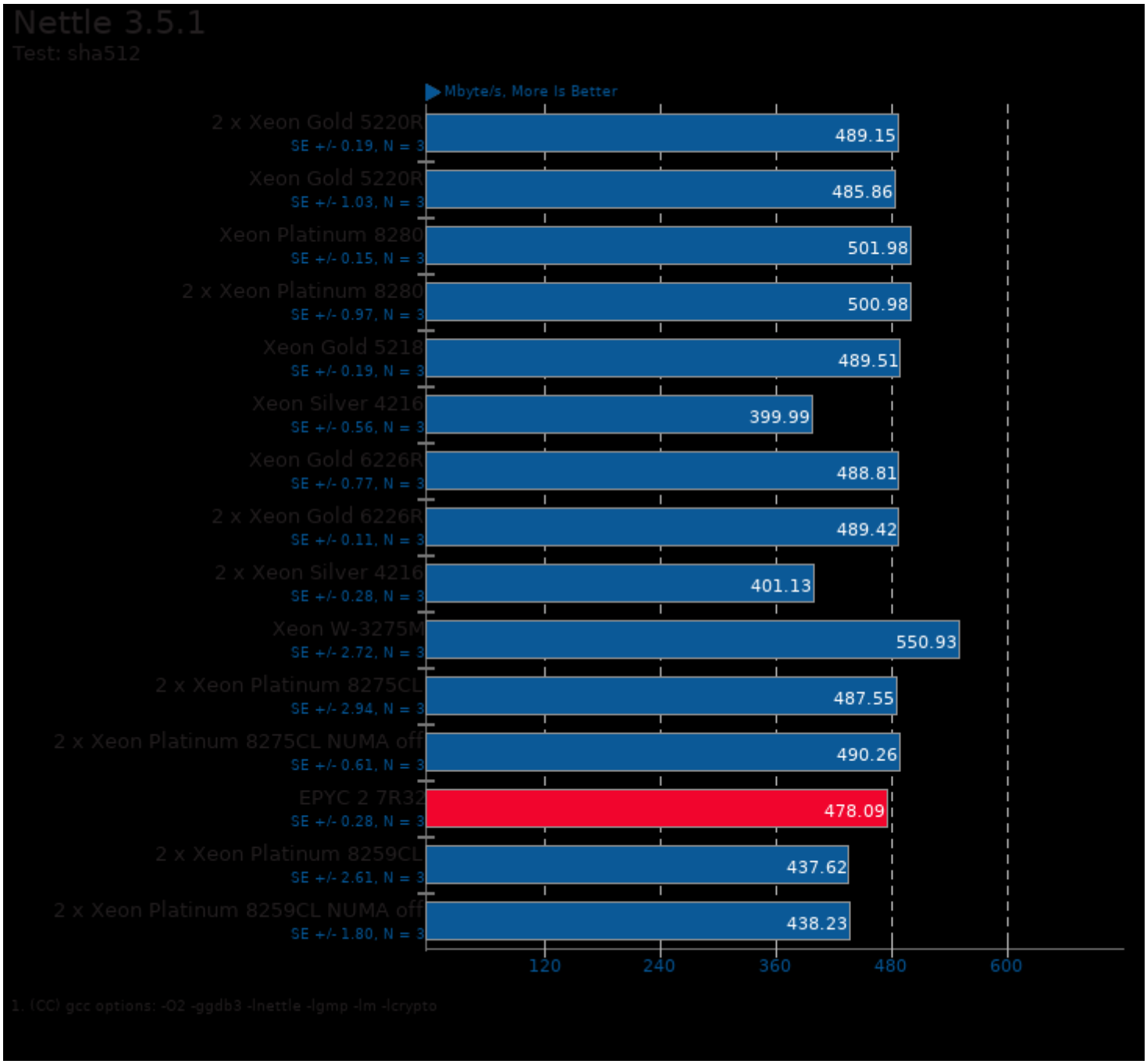

NAS Parallel Benchmarks 3.4
Test / Class: LU.C
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 135.16, N = 3
108883.40
Xeon Gold 5220R
SE +/- 45.25, N = 3
56744.87
Xeon Platinum 8280
SE +/- 82.95, N = 3
74255.67
2 x Xeon Platinum 8280
SE +/- 188.25, N = 3
140090.32
Xeon Gold 5218
SE +/- 41.33, N = 3
48143.49
Xeon Silver 4216
SE +/- 38.08, N = 3
46723.01
Xeon Gold 6226R
SE +/- 30.22, N = 3
58594.50
2 x Xeon Gold 6226R
SE +/- 50.65, N = 3
106268.33
2 x Xeon Silver 4216
SE +/- 91.80, N = 3
85606.53
Xeon W-3275M
SE +/- 35.10, N = 3
69606.84
EPYC 2 7R32
SE +/- 139.53, N = 3
99821.89
2 x Xeon Platinum 8259CL
SE +/- 55.32, N = 3
120961.91
2 x Xeon Platinum 8259CL NUMA off
SE +/- 32.58, N = 3
94642.99
30K
60K
90K
120K
150K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

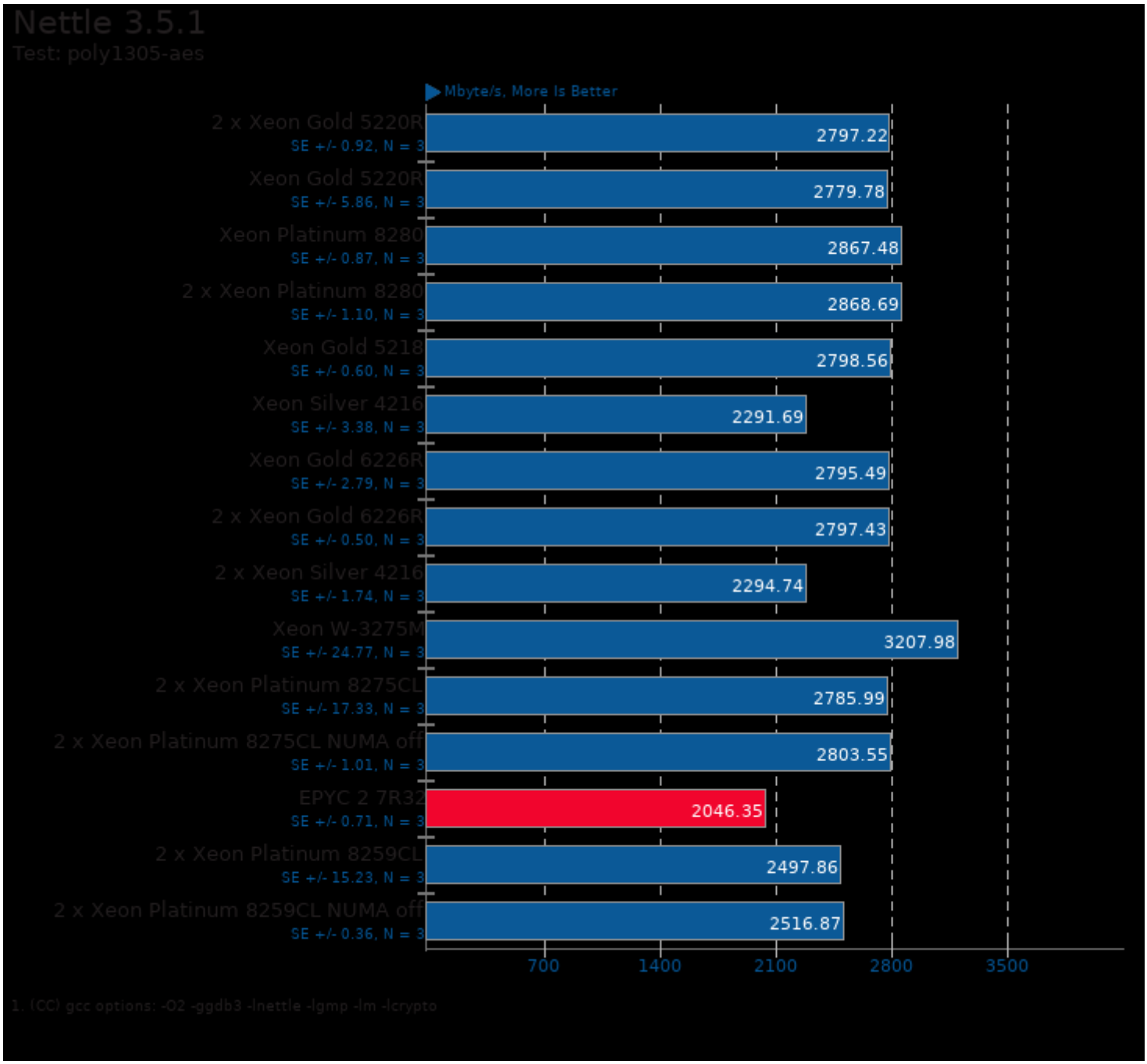

NAS Parallel Benchmarks 3.4
Test / Class: MG.C
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 464.43, N = 3
58984.18
Xeon Gold 5220R
SE +/- 114.95, N = 3
31197.22
Xeon Platinum 8280
SE +/- 129.93, N = 3
37089.05
2 x Xeon Platinum 8280
SE +/- 860.82, N = 5
69175.12
Xeon Gold 5218
SE +/- 36.97, N = 3
30328.65
Xeon Silver 4216
SE +/- 69.19, N = 3
28301.13
Xeon Gold 6226R
SE +/- 27.89, N = 3
31633.60
2 x Xeon Gold 6226R
SE +/- 193.70, N = 3
58681.42
2 x Xeon Silver 4216
SE +/- 151.51, N = 3
52832.47
Xeon W-3275M
SE +/- 40.04, N = 3
35376.11
EPYC 2 7R32
SE +/- 796.48, N = 3
49330.15
2 x Xeon Platinum 8259CL
SE +/- 304.73, N = 3
63393.35
2 x Xeon Platinum 8259CL NUMA off
SE +/- 420.94, N = 3
43490.15
15K
30K
45K
60K
75K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

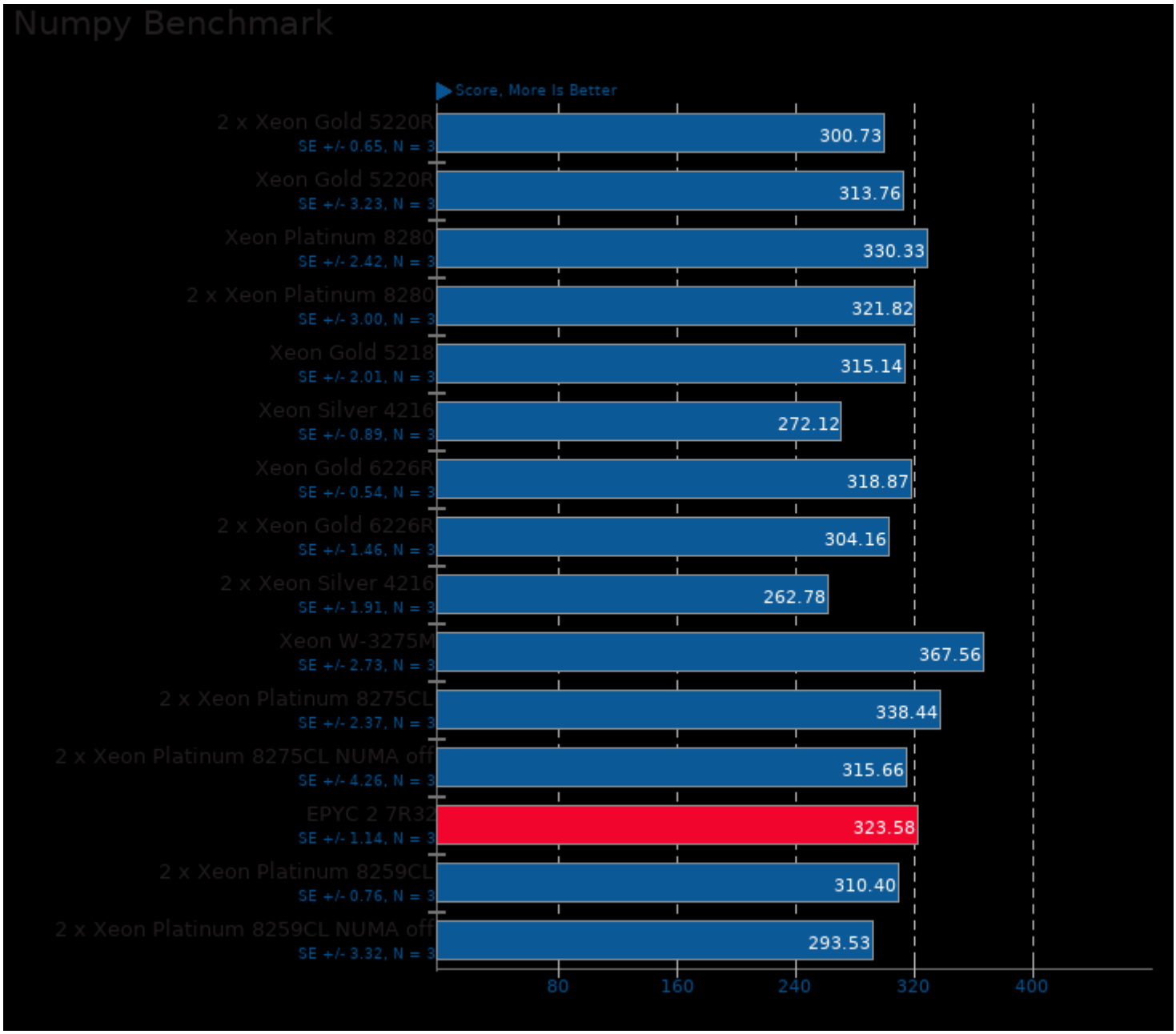

NAS Parallel Benchmarks 3.4
Test / Class: SP.B
Total Mop/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 31.12, N = 3
50932.88
Xeon Gold 5220R
SE +/- 54.67, N = 3
23346.56
Xeon Platinum 8280
SE +/- 151.80, N = 3
32682.14
2 x Xeon Platinum 8280
SE +/- 115.61, N = 3
70893.41
Xeon Gold 5218
SE +/- 13.76, N = 3
22329.34
Xeon Silver 4216
SE +/- 57.24, N = 3
21149.68
Xeon Gold 6226R
SE +/- 23.98, N = 3
23859.79
2 x Xeon Gold 6226R
SE +/- 190.70, N = 3
49232.24
2 x Xeon Silver 4216
SE +/- 157.62, N = 3
42220.94
Xeon W-3275M
SE +/- 146.25, N = 3
31426.53
EPYC 2 7R32
SE +/- 520.84, N = 15
51225.18
2 x Xeon Platinum 8259CL
SE +/- 77.17, N = 3
53978.90
2 x Xeon Platinum 8259CL NUMA off
SE +/- 42.29, N = 3
38493.57
15K
30K
45K
60K
75K
1. (F9X) gfortran options: -O3 -march=native -pthread -lmpi_usempif08 -lmpi_mpifh -lmpi
2. 2 x Xeon Gold 5220R: Open MPI 4.0.3rc4
3. Xeon Gold 5220R: Open MPI 4.0.3rc4
4. Xeon Platinum 8280: Open MPI 4.0.3rc4
5. 2 x Xeon Platinum 8280: Open MPI 4.0.3rc4
6. Xeon Gold 5218: Open MPI 4.0.3rc4
7. Xeon Silver 4216: Open MPI 4.0.3rc4
8. Xeon Gold 6226R: Open MPI 4.0.3rc4
9. 2 x Xeon Gold 6226R: Open MPI 4.0.3rc4
10. 2 x Xeon Silver 4216: Open MPI 4.0.3rc4
11. Xeon W-3275M: Open MPI 3.1.3
12. EPYC 2 7R32: Open MPI 3.1.3
13. 2 x Xeon Platinum 8259CL: Open MPI 3.1.3
14. 2 x Xeon Platinum 8259CL NUMA off: Open MPI 3.1.3

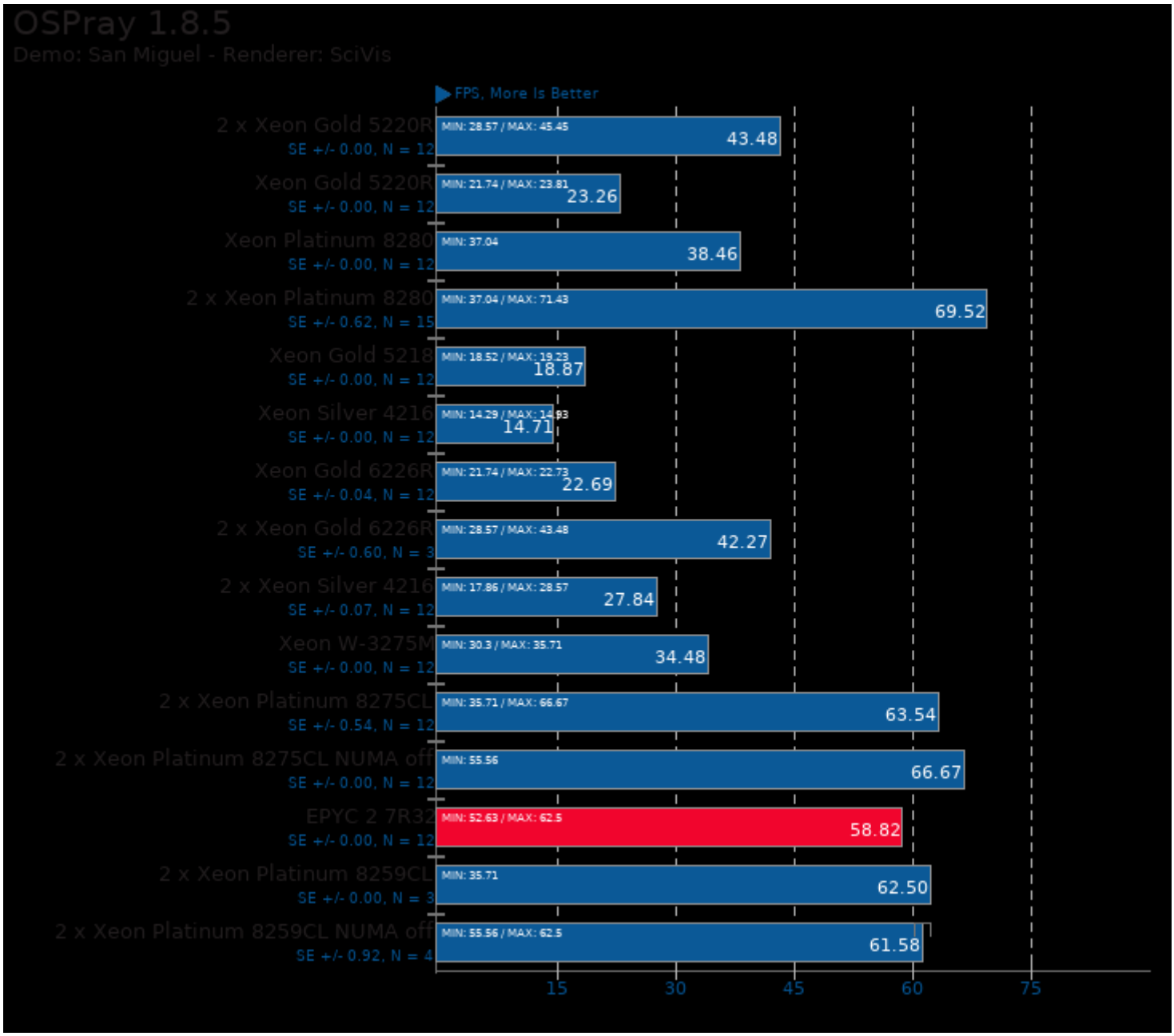

Nettle 3.5.1
Test: aes256
Mbyte/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 2.26, N = 3
MIN: 4154.94 / MAX: 10200.04
6159.21
Xeon Gold 5220R
SE +/- 2.03, N = 3
MIN: 4136.23 / MAX: 10160.8
6133.91
Xeon Platinum 8280
SE +/- 7.98, N = 3
MIN: 4256.89 / MAX: 10467.36
6313.16
2 x Xeon Platinum 8280
SE +/- 3.29, N = 3
MIN: 4254.97 / MAX: 10469.4
6320.00
Xeon Gold 5218
SE +/- 1.48, N = 3
MIN: 4152.92 / MAX: 10208.98
6164.79
Xeon Silver 4216
SE +/- 11.26, N = 3
MIN: 3388.65 / MAX: 8334.48
5024.39
Xeon Gold 6226R
SE +/- 6.01, N = 3
MIN: 4158.08 / MAX: 10213.08
6161.42
2 x Xeon Gold 6226R
SE +/- 8.42, N = 3
MIN: 4104.14 / MAX: 10212.45
6157.49
2 x Xeon Silver 4216
SE +/- 1.63, N = 3
MIN: 3412.46 / MAX: 8379.01
5061.60
Xeon W-3275M
SE +/- 39.45, N = 3
MIN: 4721.3 / MAX: 11806.11
7070.60
2 x Xeon Platinum 8275CL
SE +/- 4.53, N = 3
MIN: 4118.12 / MAX: 10228.73
6172.55
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1.10, N = 3
MIN: 4170.96 / MAX: 10241.48
6184.20
EPYC 2 7R32
SE +/- 0.67, N = 3
MIN: 3372.31 / MAX: 7239.74
4665.33
2 x Xeon Platinum 8259CL
SE +/- 24.71, N = 3
MIN: 3744.15 / MAX: 9173.02
5513.08
2 x Xeon Platinum 8259CL NUMA off
SE +/- 5.89, N = 3
MIN: 3739.77 / MAX: 9132.41
5523.31
1500
3000
4500
6000
7500
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lgmp -lm -lcrypto

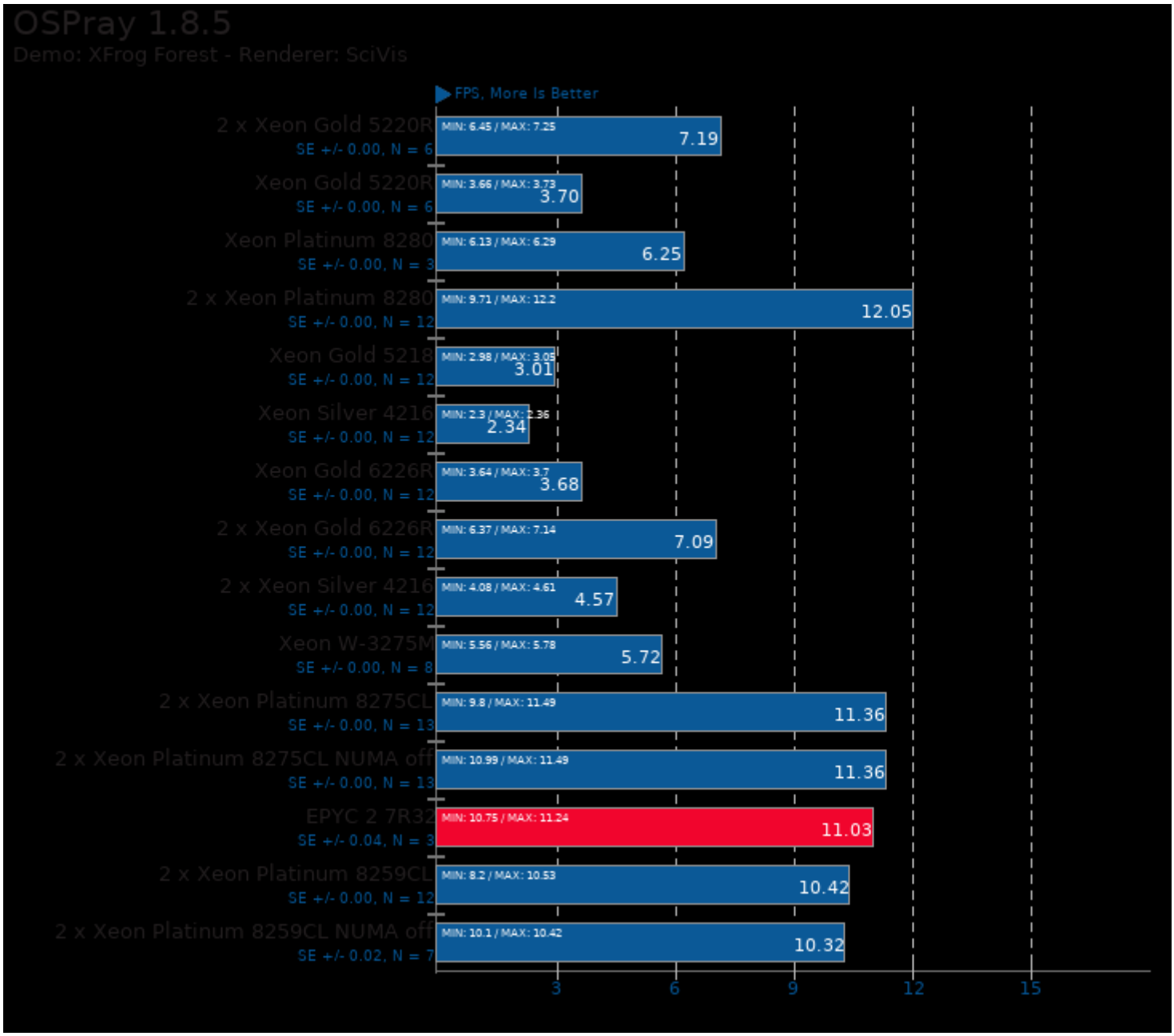

Nettle 3.5.1
Test: chacha
Mbyte/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.41, N = 3
MIN: 518.14 / MAX: 2797.53
1024.98
Xeon Gold 5220R
SE +/- 1.02, N = 3
MIN: 519.31 / MAX: 2788.96
1020.09
Xeon Platinum 8280
SE +/- 0.86, N = 3
MIN: 532.77 / MAX: 2871.25
1051.11
2 x Xeon Platinum 8280
SE +/- 0.37, N = 3
MIN: 535.04 / MAX: 2870.94
1051.94
Xeon Gold 5218
SE +/- 0.76, N = 3
MIN: 507.67 / MAX: 2797.4
1024.49
Xeon Silver 4216
SE +/- 0.91, N = 3
MIN: 423.28 / MAX: 2294.55
837.61
Xeon Gold 6226R
SE +/- 0.49, N = 3
MIN: 521.91 / MAX: 2799.45
1024.99
2 x Xeon Gold 6226R
SE +/- 0.61, N = 3
MIN: 522.31 / MAX: 2798.89
1025.38
2 x Xeon Silver 4216
SE +/- 0.18, N = 3
MIN: 428.69 / MAX: 2296.48
841.65
Xeon W-3275M
SE +/- 5.99, N = 3
MIN: 567.45 / MAX: 3234.29
1172.15
2 x Xeon Platinum 8275CL
SE +/- 1.27, N = 3
MIN: 515.88 / MAX: 2805.16
1025.60
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.48, N = 3
MIN: 523.28 / MAX: 2803.78
1027.59
EPYC 2 7R32
SE +/- 0.08, N = 3
MIN: 382.32 / MAX: 2047.21
750.36
2 x Xeon Platinum 8259CL
SE +/- 4.50, N = 3
MIN: 461.99 / MAX: 2517.41
917.75
2 x Xeon Platinum 8259CL NUMA off
SE +/- 4.18, N = 3
MIN: 463.47 / MAX: 2517.16
917.51
300
600
900
1200
1500
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lgmp -lm -lcrypto

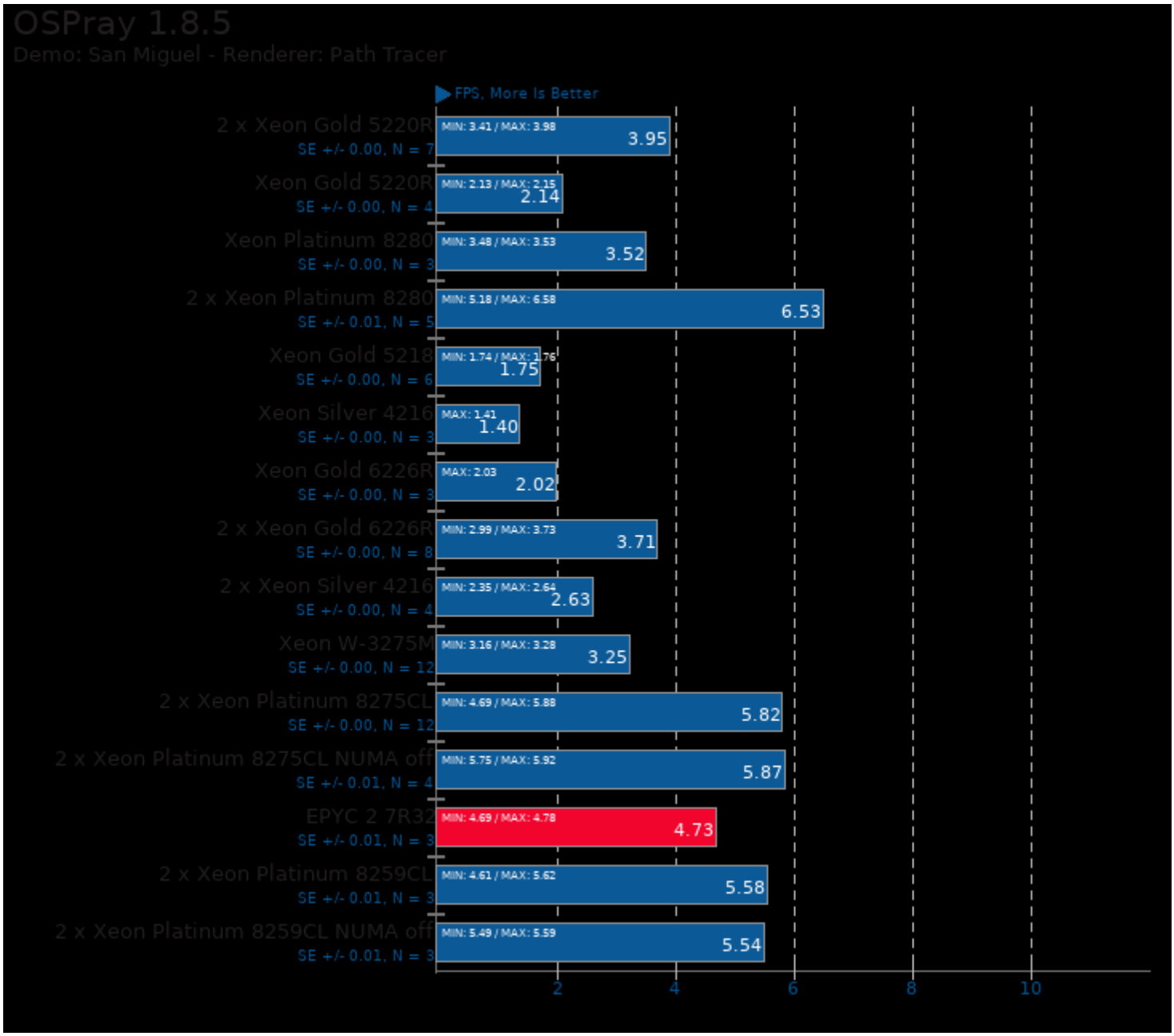

Nettle 3.5.1
Test: sha512
Mbyte/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.19, N = 3
489.15
Xeon Gold 5220R
SE +/- 1.03, N = 3
485.86
Xeon Platinum 8280
SE +/- 0.15, N = 3
501.98
2 x Xeon Platinum 8280
SE +/- 0.97, N = 3
500.98
Xeon Gold 5218
SE +/- 0.19, N = 3
489.51
Xeon Silver 4216
SE +/- 0.56, N = 3
399.99
Xeon Gold 6226R
SE +/- 0.77, N = 3
488.81
2 x Xeon Gold 6226R
SE +/- 0.11, N = 3
489.42
2 x Xeon Silver 4216
SE +/- 0.28, N = 3
401.13
Xeon W-3275M
SE +/- 2.72, N = 3
550.93
2 x Xeon Platinum 8275CL
SE +/- 2.94, N = 3
487.55
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.61, N = 3
490.26
EPYC 2 7R32
SE +/- 0.28, N = 3
478.09
2 x Xeon Platinum 8259CL
SE +/- 2.61, N = 3
437.62
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.80, N = 3
438.23
120
240
360
480
600
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lgmp -lm -lcrypto

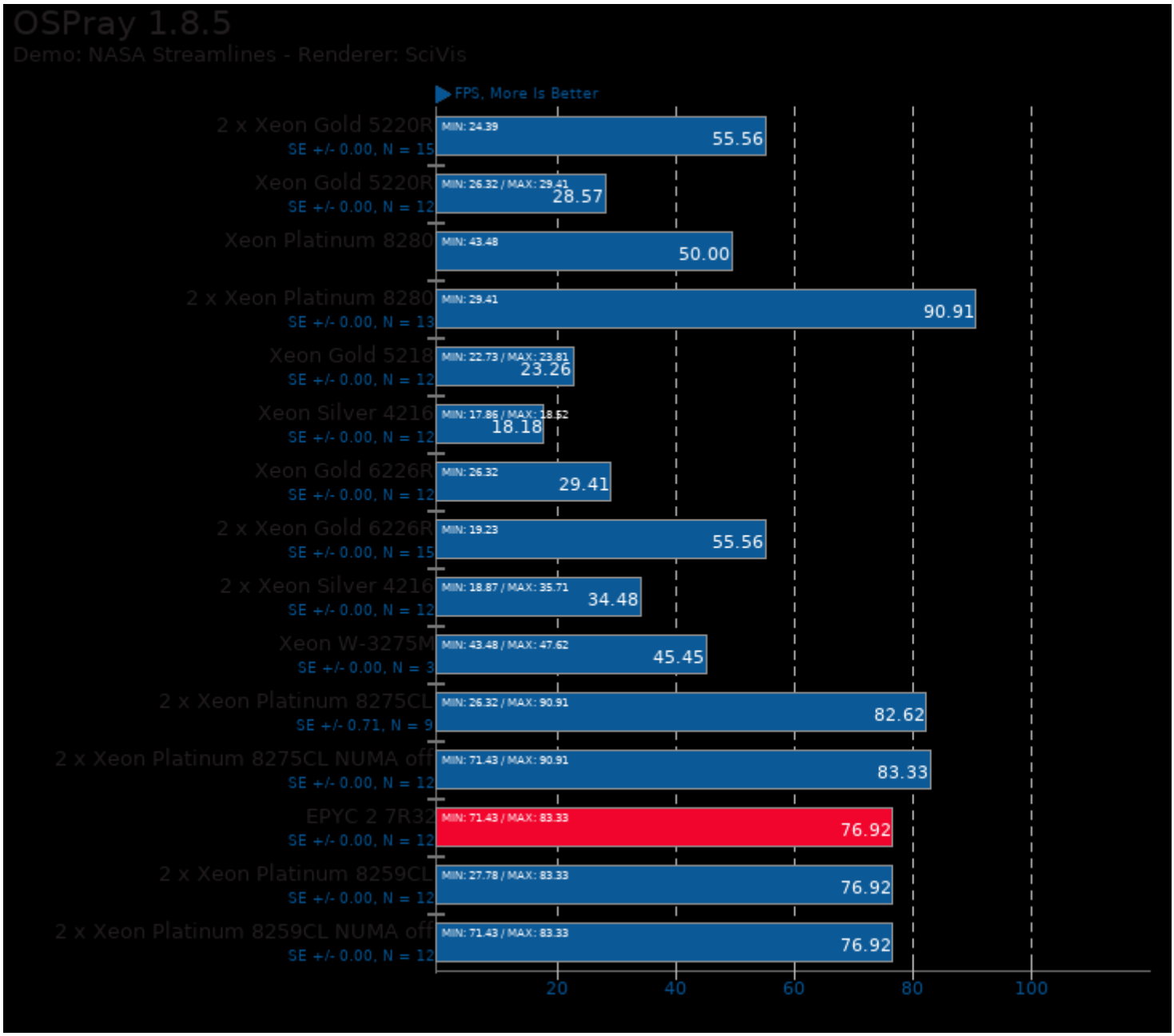

Nettle 3.5.1
Test: poly1305-aes
Mbyte/s, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.92, N = 3
2797.22
Xeon Gold 5220R
SE +/- 5.86, N = 3
2779.78
Xeon Platinum 8280
SE +/- 0.87, N = 3
2867.48
2 x Xeon Platinum 8280
SE +/- 1.10, N = 3
2868.69
Xeon Gold 5218
SE +/- 0.60, N = 3
2798.56
Xeon Silver 4216
SE +/- 3.38, N = 3
2291.69
Xeon Gold 6226R
SE +/- 2.79, N = 3
2795.49
2 x Xeon Gold 6226R
SE +/- 0.50, N = 3
2797.43
2 x Xeon Silver 4216
SE +/- 1.74, N = 3
2294.74
Xeon W-3275M
SE +/- 24.77, N = 3
3207.98
2 x Xeon Platinum 8275CL
SE +/- 17.33, N = 3
2785.99
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1.01, N = 3
2803.55
EPYC 2 7R32
SE +/- 0.71, N = 3
2046.35
2 x Xeon Platinum 8259CL
SE +/- 15.23, N = 3
2497.86
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.36, N = 3
2516.87
700
1400
2100
2800
3500
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lgmp -lm -lcrypto

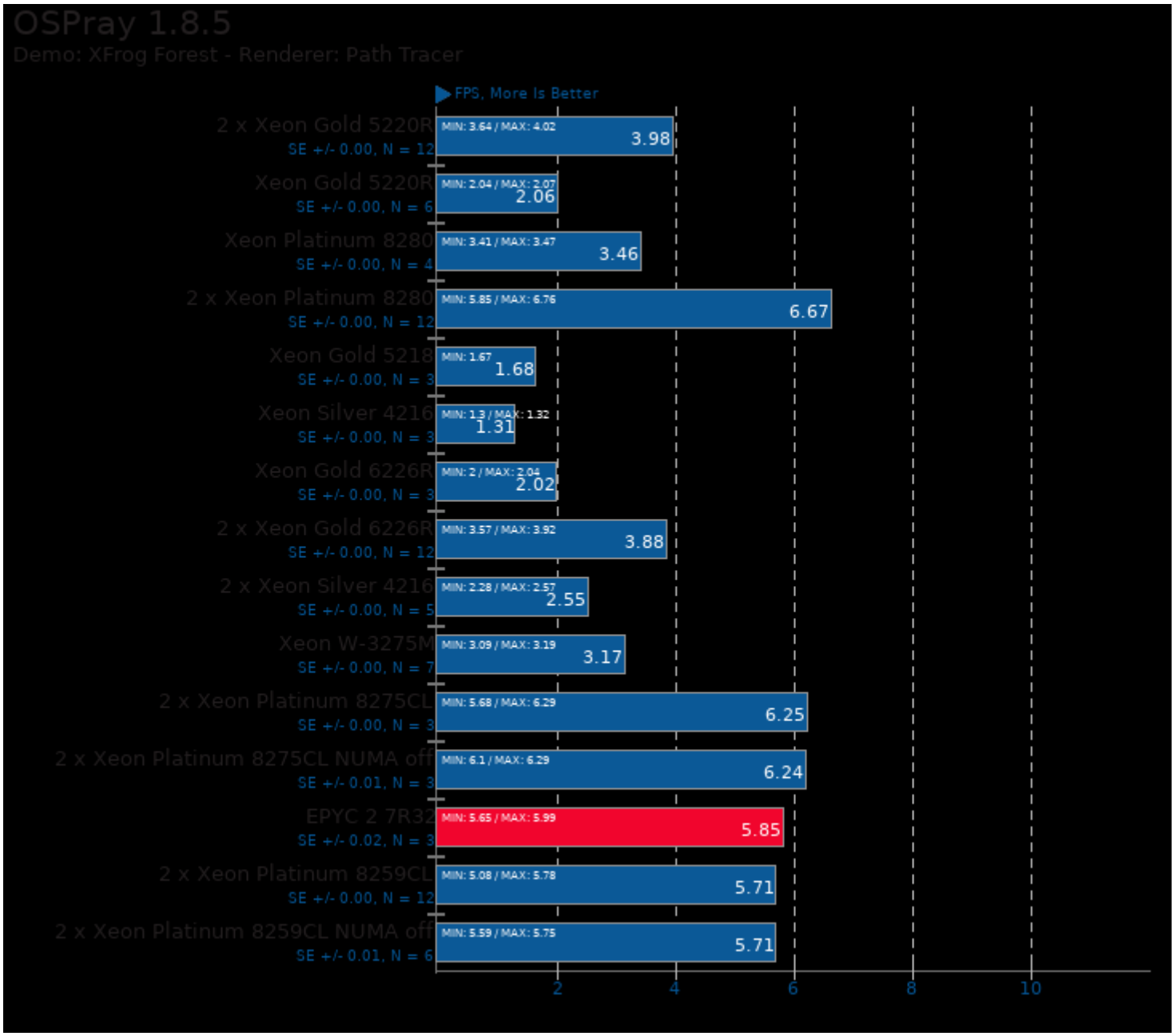

Numpy Benchmark
Score, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.65, N = 3
300.73
Xeon Gold 5220R
SE +/- 3.23, N = 3
313.76
Xeon Platinum 8280
SE +/- 2.42, N = 3
330.33
2 x Xeon Platinum 8280
SE +/- 3.00, N = 3
321.82
Xeon Gold 5218
SE +/- 2.01, N = 3
315.14
Xeon Silver 4216
SE +/- 0.89, N = 3
272.12
Xeon Gold 6226R
SE +/- 0.54, N = 3
318.87
2 x Xeon Gold 6226R
SE +/- 1.46, N = 3
304.16
2 x Xeon Silver 4216
SE +/- 1.91, N = 3
262.78
Xeon W-3275M
SE +/- 2.73, N = 3
367.56
2 x Xeon Platinum 8275CL
SE +/- 2.37, N = 3
338.44
2 x Xeon Platinum 8275CL NUMA off
SE +/- 4.26, N = 3
315.66
EPYC 2 7R32
SE +/- 1.14, N = 3
323.58
2 x Xeon Platinum 8259CL
SE +/- 0.76, N = 3
310.40
2 x Xeon Platinum 8259CL NUMA off
SE +/- 3.32, N = 3
293.53
80
160
240
320
400

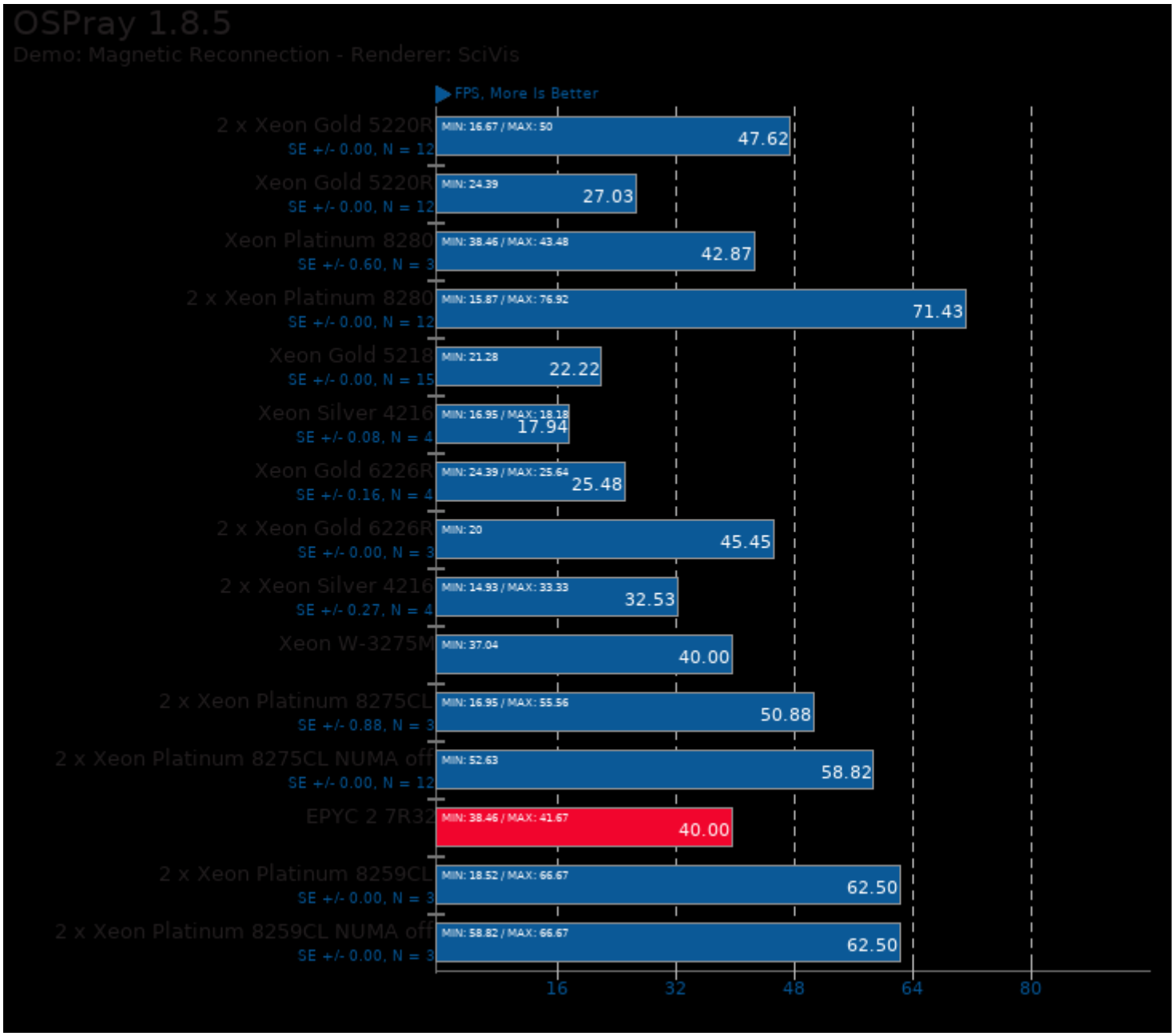

OSPray 1.8.5
Demo: San Miguel - Renderer: SciVis
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 28.57 / MAX: 45.45
43.48
Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 21.74 / MAX: 23.81
23.26
Xeon Platinum 8280
SE +/- 0.00, N = 12
MIN: 37.04
38.46
2 x Xeon Platinum 8280
SE +/- 0.62, N = 15
MIN: 37.04 / MAX: 71.43
69.52
Xeon Gold 5218
SE +/- 0.00, N = 12
MIN: 18.52 / MAX: 18.23
18.87
Xeon Silver 4216
SE +/- 0.00, N = 12
MIN: 14.29 / MAX: 14.93
14.71
Xeon Gold 6226R
SE +/- 0.04, N = 12
MIN: 21.74 / MAX: 22.73
22.69
2 x Xeon Gold 6226R
SE +/- 0.60, N = 3
MIN: 28.57 / MAX: 43.48
42.27
2 x Xeon Silver 4216
SE +/- 0.07, N = 12
MIN: 17.86 / MAX: 28.57
27.84
Xeon W-3275M
SE +/- 0.00, N = 12
MIN: 30.3 / MAX: 35.71
34.48
2 x Xeon Platinum 8275CL
SE +/- 0.54, N = 12
MIN: 35.71 / MAX: 66.67
63.54
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00, N = 12
MIN: 55.56
66.67
EPYC 2 7R32
SE +/- 0.00, N = 12
MIN: 52.63 / MAX: 62.5
58.82
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 3
MIN: 35.71
62.50
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.92, N = 4
MIN: 55.56 / MAX: 62.5
61.58
15
30
45
60
75

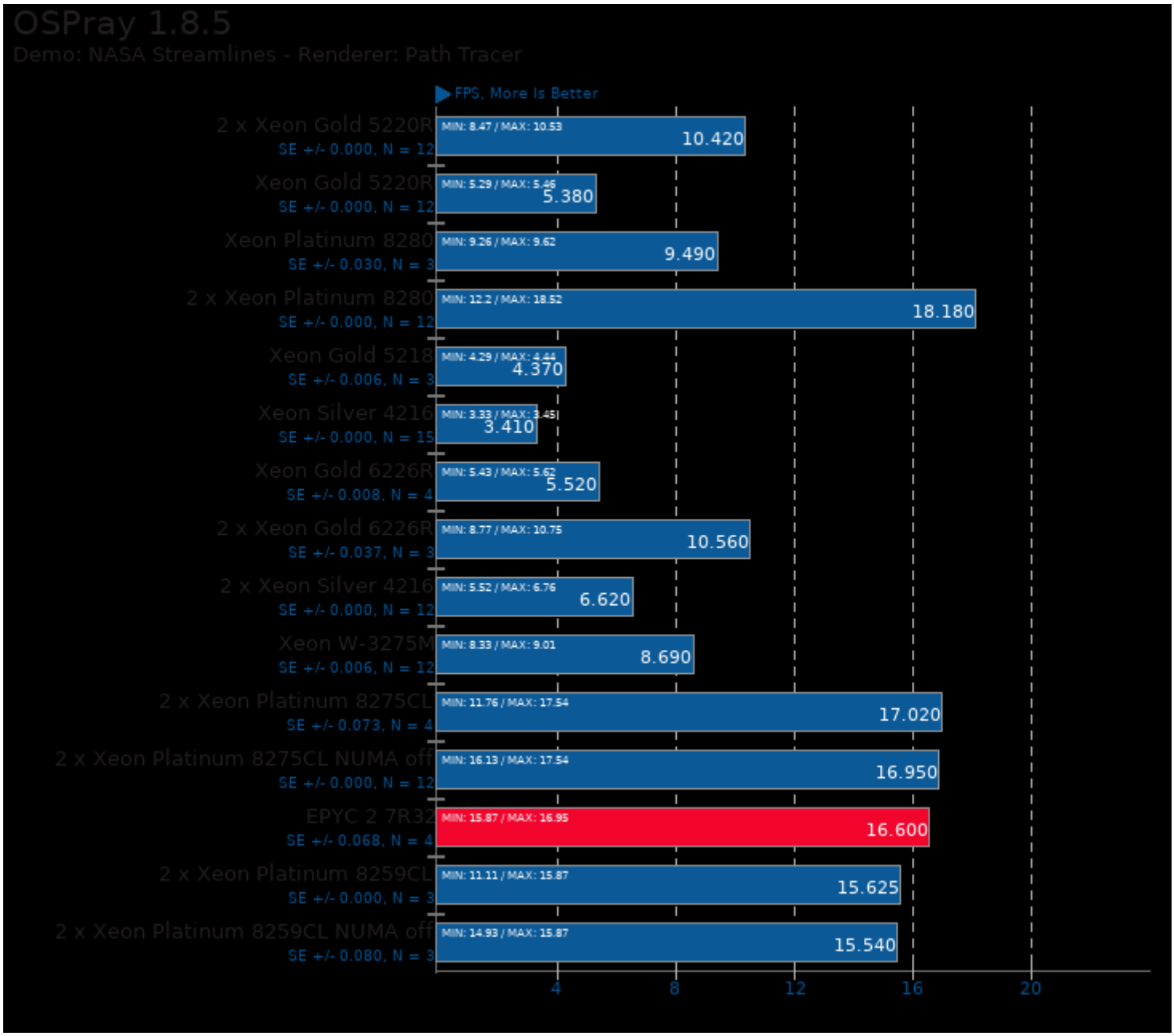

OSPray 1.8.5
Demo: XFrog Forest - Renderer: SciVis
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 6
MIN: 6.45 / MAX: 7.25
7.19
Xeon Gold 5220R
SE +/- 0.00, N = 6
MIN: 3.66 / MAX: 3.73
3.70
Xeon Platinum 8280
SE +/- 0.00, N = 3
MIN: 6.13 / MAX: 6.29
6.25
2 x Xeon Platinum 8280
SE +/- 0.00, N = 12
MIN: 9.71 / MAX: 12.2
12.05
Xeon Gold 5218
SE +/- 0.00, N = 12
MIN: 2.98 / MAX: 3.05
3.01
Xeon Silver 4216
SE +/- 0.00, N = 12
MIN: 2.3 / MAX: 2.36
2.34
Xeon Gold 6226R
SE +/- 0.00, N = 12
MIN: 3.64 / MAX: 3.7
3.68
2 x Xeon Gold 6226R
SE +/- 0.00, N = 12
MIN: 6.37 / MAX: 7.14
7.09
2 x Xeon Silver 4216
SE +/- 0.00, N = 12
MIN: 4.08 / MAX: 4.61
4.57
Xeon W-3275M
SE +/- 0.00, N = 8
MIN: 5.56 / MAX: 5.78
5.72
2 x Xeon Platinum 8275CL
SE +/- 0.00, N = 13
MIN: 9.8 / MAX: 11.49
11.36
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00, N = 13
MIN: 10.99 / MAX: 11.49
11.36
EPYC 2 7R32
SE +/- 0.04, N = 3
MIN: 10.75 / MAX: 11.24
11.03
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 12
MIN: 8.2 / MAX: 10.53
10.42
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.02, N = 7
MIN: 10.1 / MAX: 10.42
10.32
3
6
9
12
15

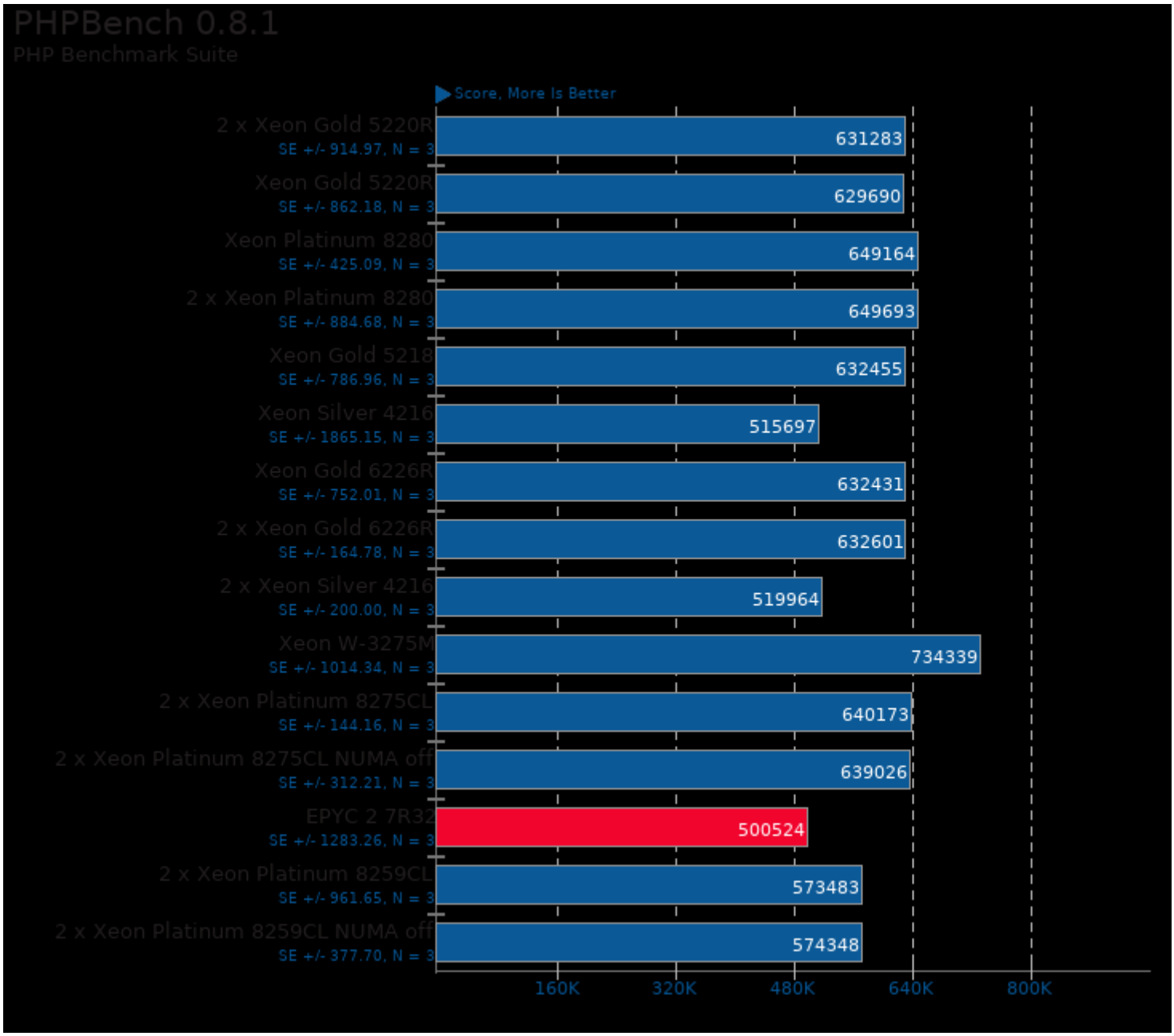

OSPray 1.8.5
Demo: San Miguel - Renderer: Path Tracer
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 7
MIN: 3.41 / MAX: 3.98
3.95
Xeon Gold 5220R
SE +/- 0.00, N = 4
MIN: 2.13 / MAX: 2.15
2.14
Xeon Platinum 8280
SE +/- 0.00, N = 3
MIN: 3.48 / MAX: 3.53
3.52
2 x Xeon Platinum 8280
SE +/- 0.01, N = 5
MIN: 5.18 / MAX: 6.58
6.53
Xeon Gold 5218
SE +/- 0.00, N = 6
MIN: 1.74 / MAX: 1.76
1.75
Xeon Silver 4216
SE +/- 0.00, N = 3
MAX: 1.41
1.40
Xeon Gold 6226R
SE +/- 0.00, N = 3
MAX: 2.03
2.02
2 x Xeon Gold 6226R
SE +/- 0.00, N = 8
MIN: 2.99 / MAX: 3.73
3.71
2 x Xeon Silver 4216
SE +/- 0.00, N = 4
MIN: 2.35 / MAX: 2.64
2.63
Xeon W-3275M
SE +/- 0.00, N = 12
MIN: 3.16 / MAX: 3.28
3.25
2 x Xeon Platinum 8275CL
SE +/- 0.00, N = 12
MIN: 4.69 / MAX: 5.88
5.82
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 4
MIN: 5.75 / MAX: 5.92
5.87
EPYC 2 7R32
SE +/- 0.01, N = 3
MIN: 4.69 / MAX: 4.78
4.73
2 x Xeon Platinum 8259CL
SE +/- 0.01, N = 3
MIN: 4.61 / MAX: 5.62
5.58
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01, N = 3
MIN: 5.49 / MAX: 5.59
5.54
2
4
6
8
10

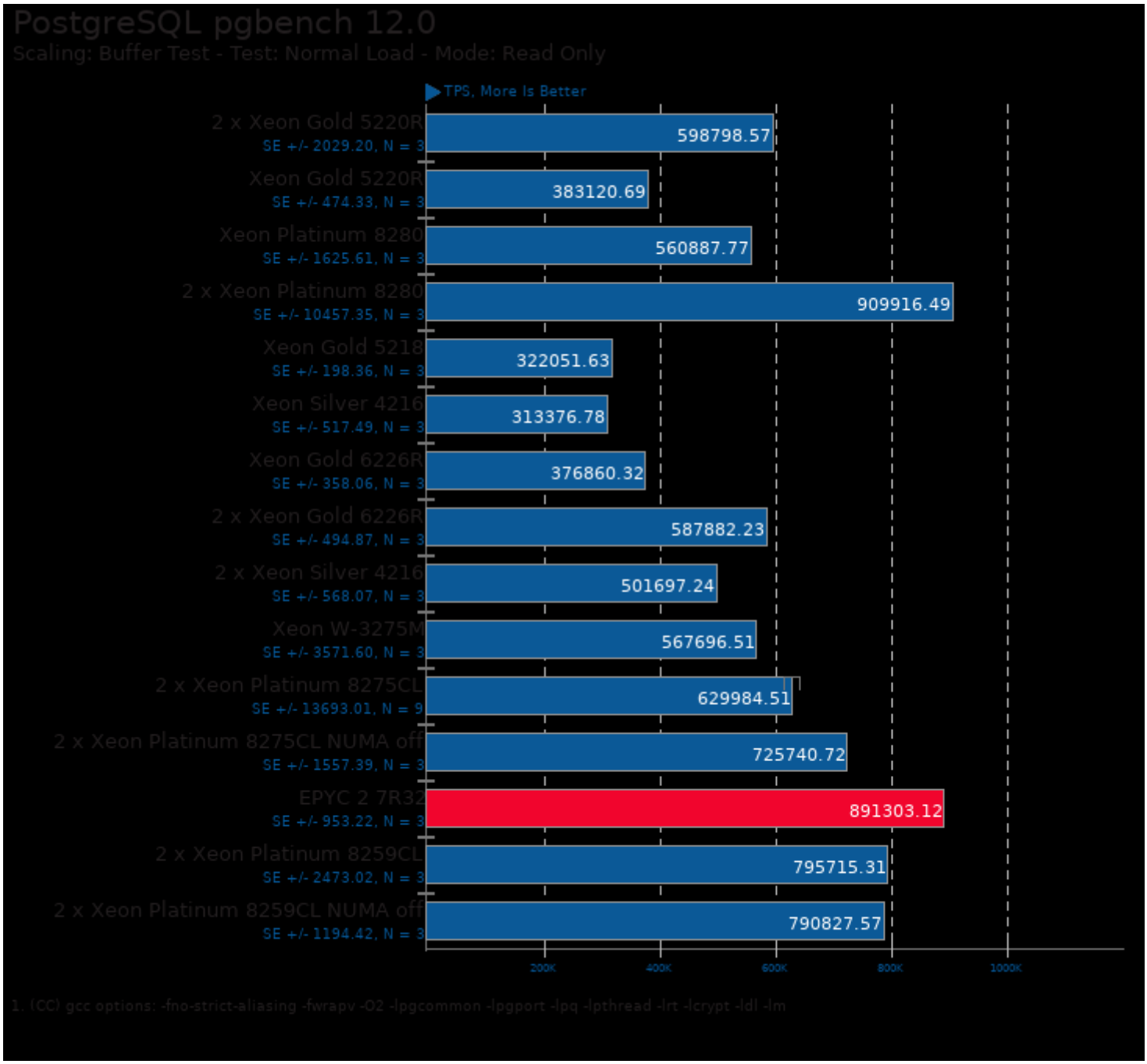

OSPray 1.8.5
Demo: NASA Streamlines - Renderer: SciVis
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 15
MIN: 24.39
55.56
Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 26.32 / MAX: 29.41
28.57
Xeon Platinum 8280
MIN: 43.48
50.00
2 x Xeon Platinum 8280
SE +/- 0.00, N = 13
MIN: 29.41
90.91
Xeon Gold 5218
SE +/- 0.00, N = 12
MIN: 22.73 / MAX: 23.81
23.26
Xeon Silver 4216
SE +/- 0.00, N = 12
MIN: 17.86 / MAX: 18.52
18.18
Xeon Gold 6226R
SE +/- 0.00, N = 12
MIN: 26.32
29.41
2 x Xeon Gold 6226R
SE +/- 0.00, N = 15
MIN: 19.23
55.56
2 x Xeon Silver 4216
SE +/- 0.00, N = 12
MIN: 18.87 / MAX: 35.71
34.48
Xeon W-3275M
SE +/- 0.00, N = 3
MIN: 43.48 / MAX: 47.62
45.45
2 x Xeon Platinum 8275CL
SE +/- 0.71, N = 9
MIN: 26.32 / MAX: 90.91
82.62
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00, N = 12
MIN: 71.43 / MAX: 90.91
83.33
EPYC 2 7R32
SE +/- 0.00, N = 12
MIN: 71.43 / MAX: 83.33
76.92
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 12
MIN: 27.78 / MAX: 83.33
76.92
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00, N = 12
MIN: 71.43 / MAX: 83.33
76.92
20
40
60
80
100

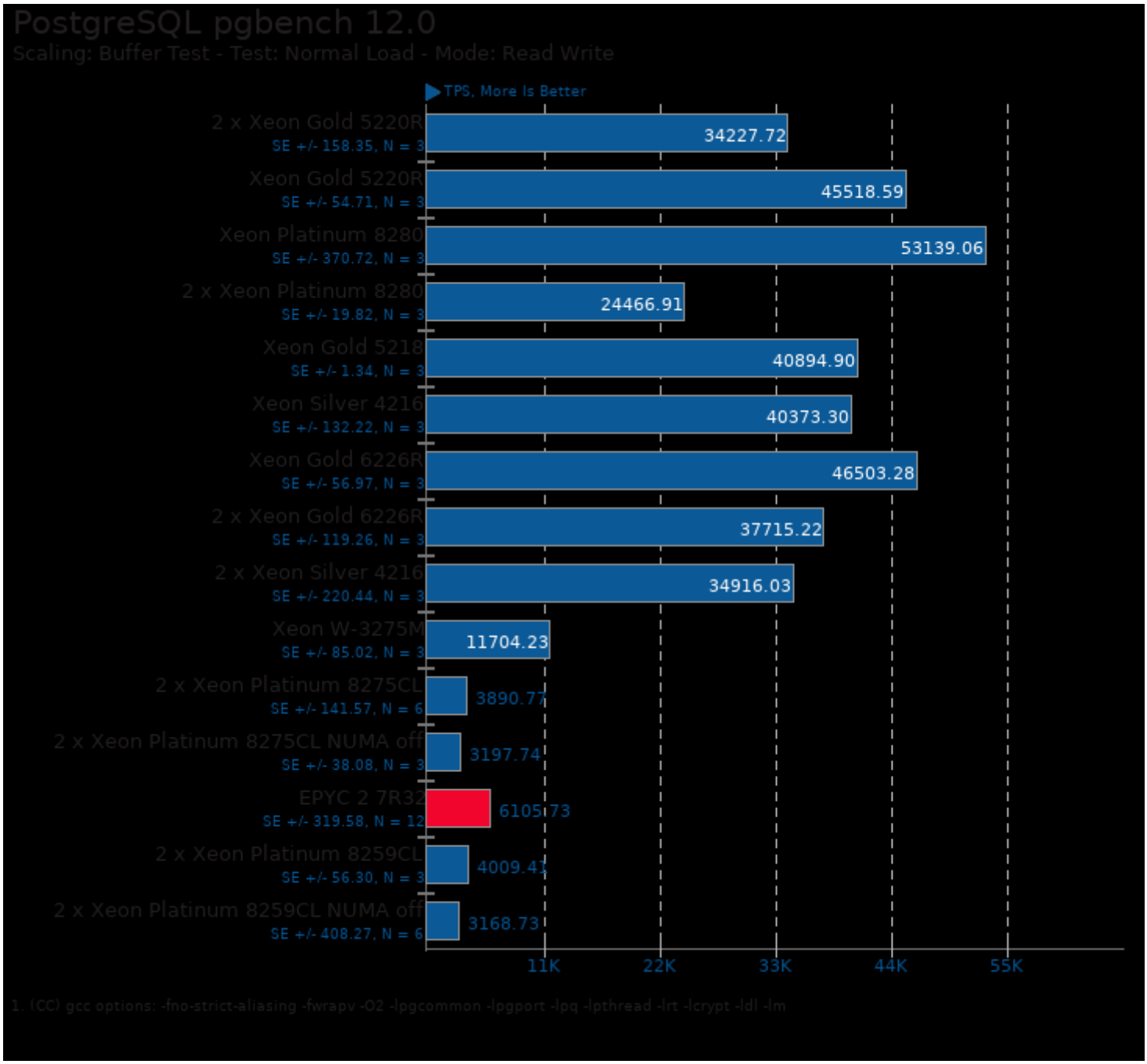

OSPray 1.8.5
Demo: XFrog Forest - Renderer: Path Tracer
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 3.64 / MAX: 4.02
3.98
Xeon Gold 5220R
SE +/- 0.00, N = 6
MIN: 2.04 / MAX: 2.07
2.06
Xeon Platinum 8280
SE +/- 0.00, N = 4
MIN: 3.41 / MAX: 3.47
3.46
2 x Xeon Platinum 8280
SE +/- 0.00, N = 12
MIN: 5.85 / MAX: 6.76
6.67
Xeon Gold 5218
SE +/- 0.00, N = 3
MIN: 1.67
1.68
Xeon Silver 4216
SE +/- 0.00, N = 3
MIN: 1.3 / MAX: 1.32
1.31
Xeon Gold 6226R
SE +/- 0.00, N = 3
MIN: 2 / MAX: 2.04
2.02
2 x Xeon Gold 6226R
SE +/- 0.00, N = 12
MIN: 3.57 / MAX: 3.92
3.88
2 x Xeon Silver 4216
SE +/- 0.00, N = 5
MIN: 2.28 / MAX: 2.57
2.55
Xeon W-3275M
SE +/- 0.00, N = 7
MIN: 3.09 / MAX: 3.19
3.17
2 x Xeon Platinum 8275CL
SE +/- 0.00, N = 3
MIN: 5.68 / MAX: 6.29
6.25
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 3
MIN: 6.1 / MAX: 6.29
6.24
EPYC 2 7R32
SE +/- 0.02, N = 3
MIN: 5.65 / MAX: 5.99
5.85
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 12
MIN: 5.08 / MAX: 5.78
5.71
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.01, N = 6
MIN: 5.59 / MAX: 5.75
5.71
2
4
6
8
10

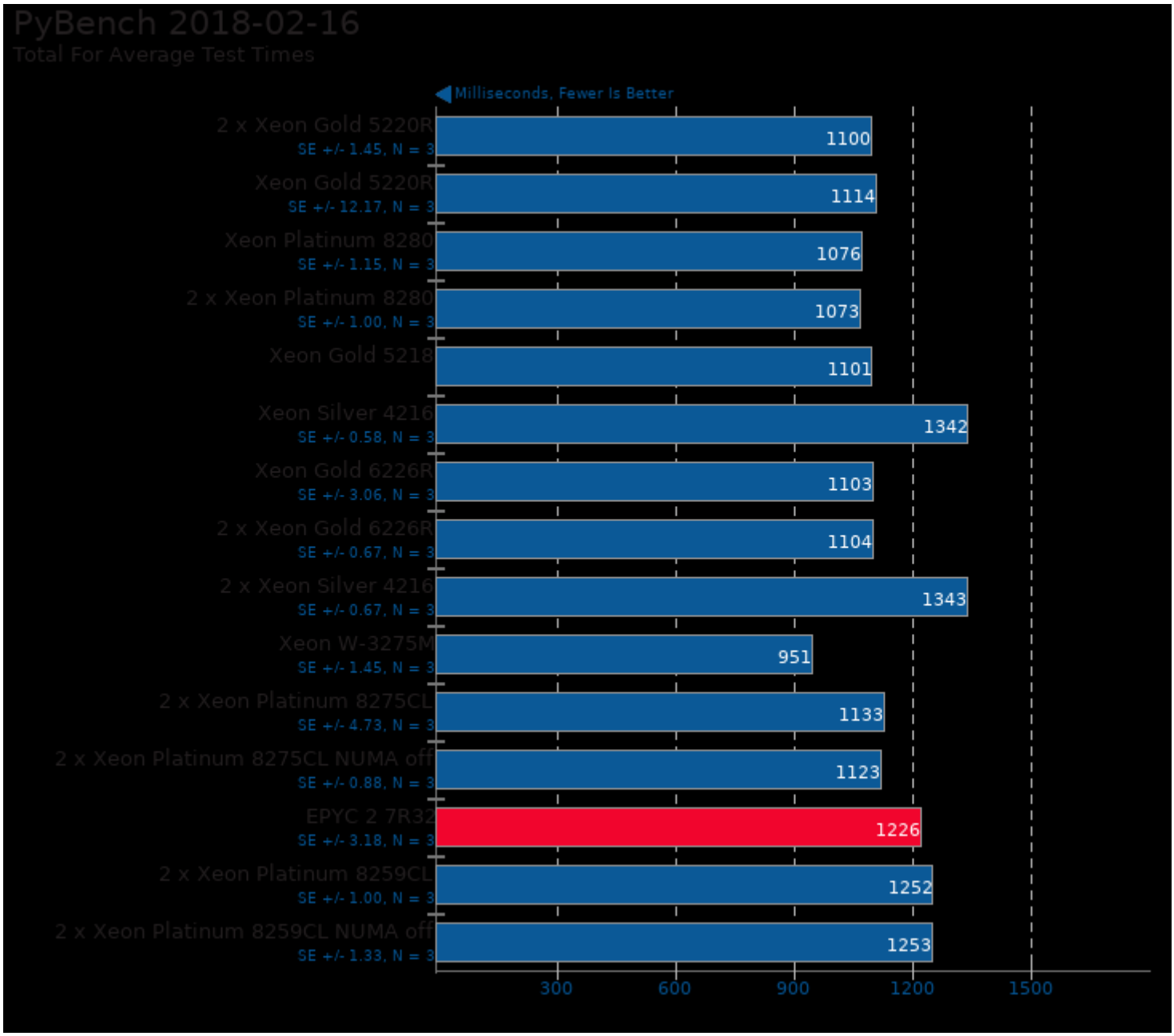

OSPray 1.8.5
Demo: Magnetic Reconnection - Renderer: SciVis
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 16.67 / MAX: 50
47.62
Xeon Gold 5220R
SE +/- 0.00, N = 12
MIN: 24.39
27.03
Xeon Platinum 8280
SE +/- 0.60, N = 3
MIN: 38.46 / MAX: 43.48
42.87
2 x Xeon Platinum 8280
SE +/- 0.00, N = 12
MIN: 15.87 / MAX: 76.92
71.43
Xeon Gold 5218
SE +/- 0.00, N = 15
MIN: 21.28
22.22
Xeon Silver 4216
SE +/- 0.08, N = 4
MIN: 16.95 / MAX: 18.18
17.94
Xeon Gold 6226R
SE +/- 0.16, N = 4
MIN: 24.39 / MAX: 25.64
25.48
2 x Xeon Gold 6226R
SE +/- 0.00, N = 3
MIN: 20
45.45
2 x Xeon Silver 4216
SE +/- 0.27, N = 4
MIN: 14.93 / MAX: 33.33
32.53
Xeon W-3275M
MIN: 37.04
40.00
2 x Xeon Platinum 8275CL
SE +/- 0.88, N = 3
MIN: 16.95 / MAX: 55.56
50.88
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.00, N = 12
MIN: 52.63
58.82
EPYC 2 7R32
MIN: 38.46 / MAX: 41.67
40.00
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 3
MIN: 18.52 / MAX: 66.67
62.50
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00, N = 3
MIN: 58.82 / MAX: 66.67
62.50
16
32
48
64
80

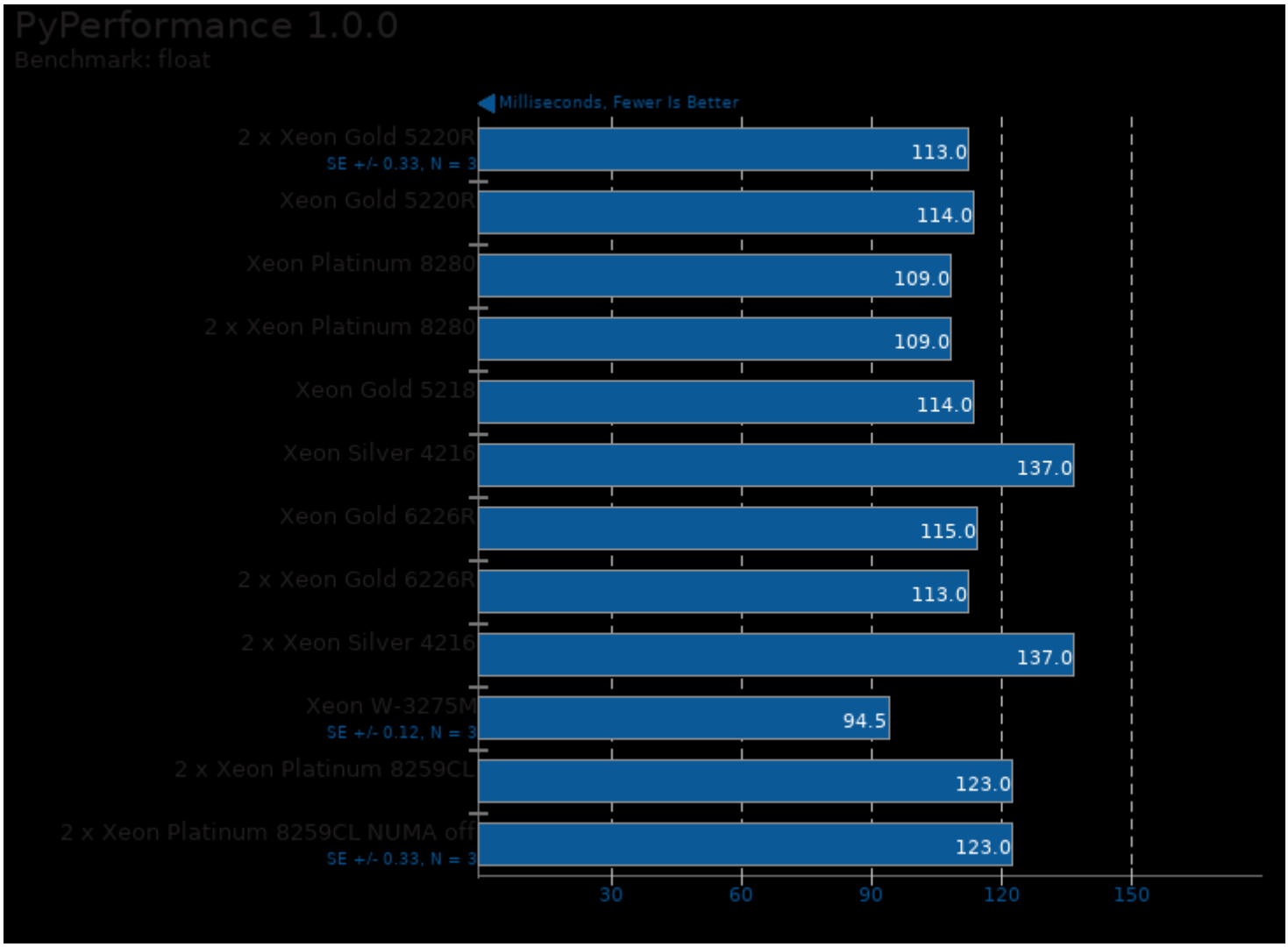

OSPray 1.8.5
Demo: NASA Streamlines - Renderer: Path Tracer
FPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.000, N = 12
MIN: 8.47 / MAX: 10.53
10.420
Xeon Gold 5220R
SE +/- 0.000, N = 12
MIN: 5.29 / MAX: 5.46
5.380
Xeon Platinum 8280
SE +/- 0.030, N = 3
MIN: 9.26 / MAX: 9.62
9.490
2 x Xeon Platinum 8280
SE +/- 0.000, N = 12
MIN: 12.2 / MAX: 18.52
18.180
Xeon Gold 5218
SE +/- 0.006, N = 3
MIN: 4.29 / MAX: 4.44
4.370
Xeon Silver 4216
SE +/- 0.000, N = 15
MIN: 3.33 / MAX: 3.45
3.410
Xeon Gold 6226R
SE +/- 0.008, N = 4
MIN: 5.43 / MAX: 5.62
5.520
2 x Xeon Gold 6226R
SE +/- 0.037, N = 3
MIN: 8.77 / MAX: 10.75
10.560
2 x Xeon Silver 4216
SE +/- 0.000, N = 12
MIN: 5.52 / MAX: 6.76
6.620
Xeon W-3275M
SE +/- 0.006, N = 12
MIN: 8.33 / MAX: 9.01
8.690
2 x Xeon Platinum 8275CL
SE +/- 0.073, N = 4
MIN: 11.76 / MAX: 17.54
17.020
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.000, N = 12
MIN: 16.13 / MAX: 17.54
16.950
EPYC 2 7R32
SE +/- 0.068, N = 4
MIN: 15.87 / MAX: 16.95
16.600
2 x Xeon Platinum 8259CL
SE +/- 0.000, N = 3
MIN: 11.11 / MAX: 15.87
15.625
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.080, N = 3
MIN: 14.93 / MAX: 15.87
15.540
4
8
12
16
20

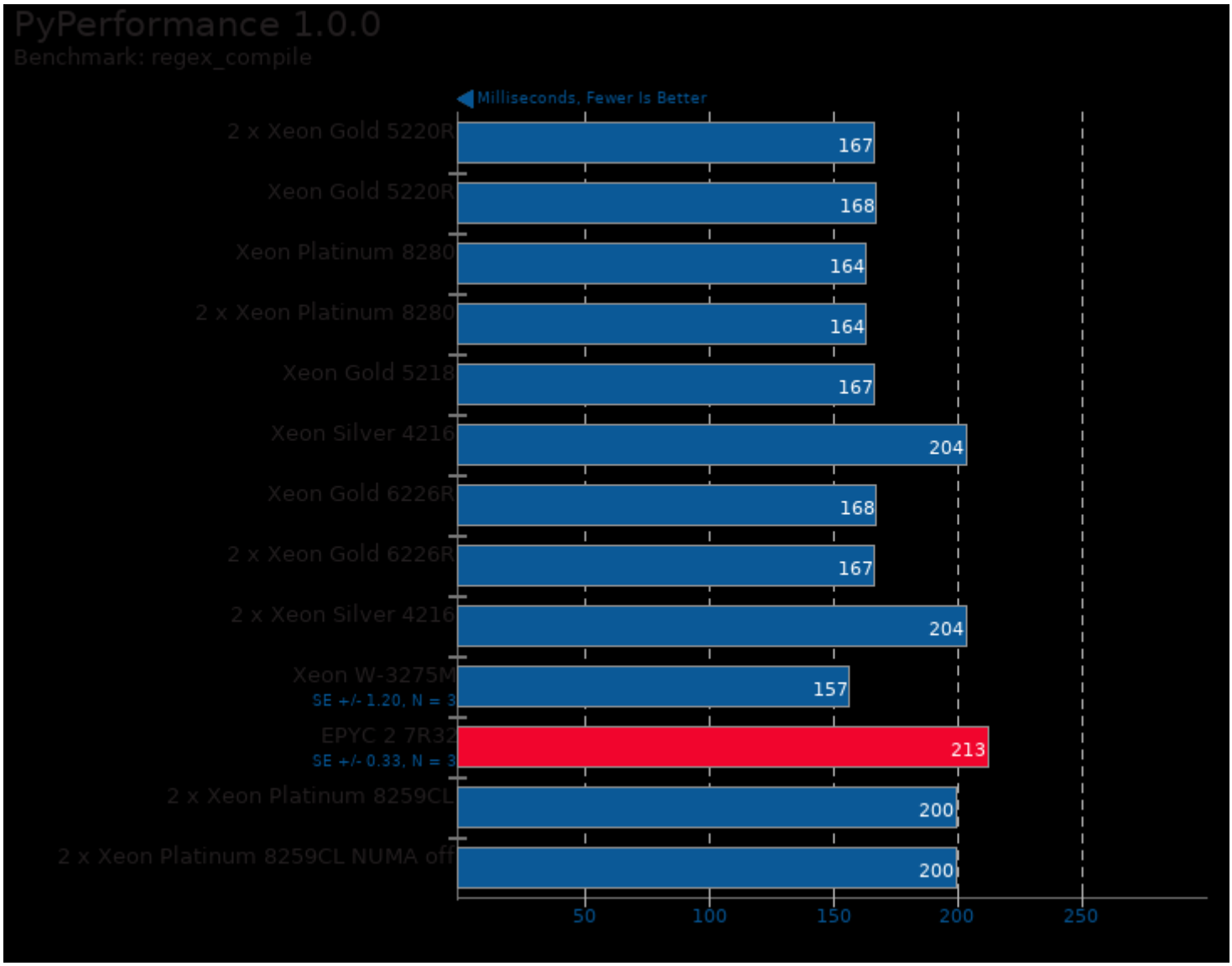

PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
2 x Xeon Gold 5220R
SE +/- 914.97, N = 3
631283
Xeon Gold 5220R
SE +/- 862.18, N = 3
629690
Xeon Platinum 8280
SE +/- 425.09, N = 3
649164
2 x Xeon Platinum 8280
SE +/- 884.68, N = 3
649693
Xeon Gold 5218
SE +/- 786.96, N = 3
632455
Xeon Silver 4216
SE +/- 1865.15, N = 3
515697
Xeon Gold 6226R
SE +/- 752.01, N = 3
632431
2 x Xeon Gold 6226R
SE +/- 164.78, N = 3
632601
2 x Xeon Silver 4216
SE +/- 200.00, N = 3
519964
Xeon W-3275M
SE +/- 1014.34, N = 3
734339
2 x Xeon Platinum 8275CL
SE +/- 144.16, N = 3
640173
2 x Xeon Platinum 8275CL NUMA off
SE +/- 312.21, N = 3
639026
EPYC 2 7R32
SE +/- 1283.26, N = 3
500524
2 x Xeon Platinum 8259CL
SE +/- 961.65, N = 3
573483
2 x Xeon Platinum 8259CL NUMA off
SE +/- 377.70, N = 3
574348
160K
320K
480K
640K
800K

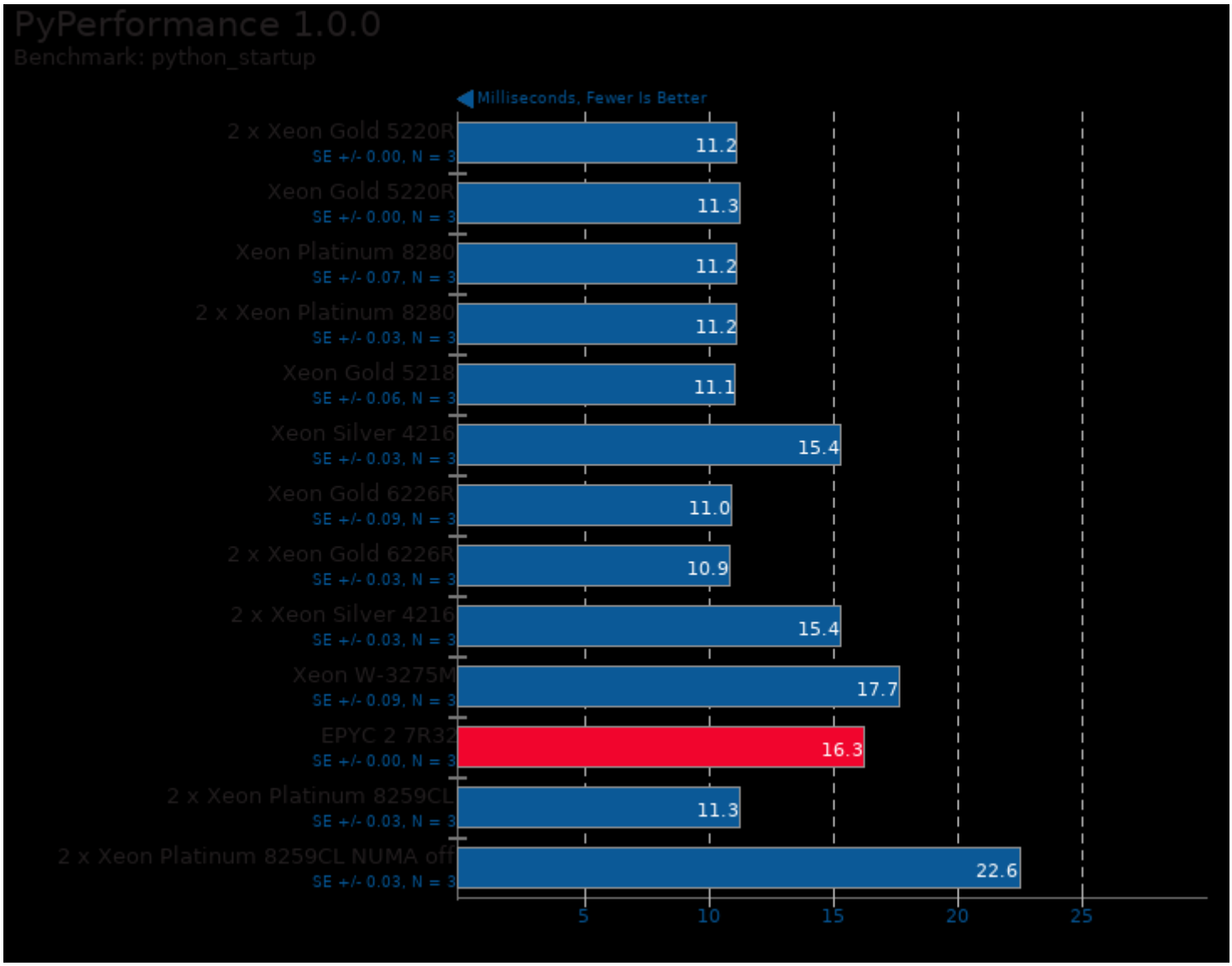

PostgreSQL pgbench 12.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 2029.20, N = 3
598798.57
Xeon Gold 5220R
SE +/- 474.33, N = 3
383120.69
Xeon Platinum 8280
SE +/- 1625.61, N = 3
560887.77
2 x Xeon Platinum 8280
SE +/- 10457.35, N = 3
909916.49
Xeon Gold 5218
SE +/- 198.36, N = 3
322051.63
Xeon Silver 4216
SE +/- 517.49, N = 3
313376.78
Xeon Gold 6226R
SE +/- 358.06, N = 3
376860.32
2 x Xeon Gold 6226R
SE +/- 494.87, N = 3
587882.23
2 x Xeon Silver 4216
SE +/- 568.07, N = 3
501697.24
Xeon W-3275M
SE +/- 3571.60, N = 3
567696.51
2 x Xeon Platinum 8275CL
SE +/- 13693.01, N = 9
629984.51
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1557.39, N = 3
725740.72
EPYC 2 7R32
SE +/- 953.22, N = 3
891303.12
2 x Xeon Platinum 8259CL
SE +/- 2473.02, N = 3
795715.31
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1194.42, N = 3
790827.57
200K
400K
600K
800K
1000K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

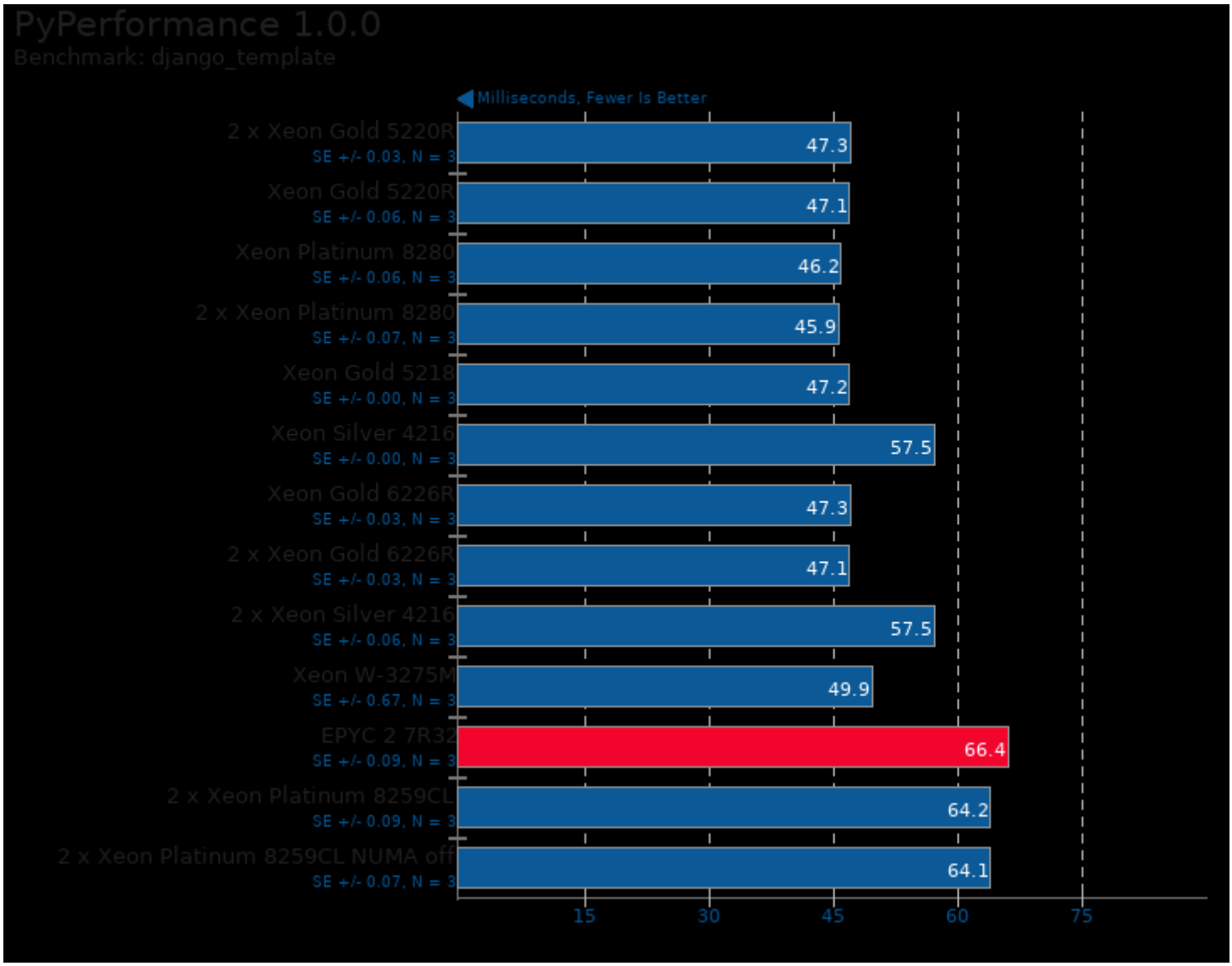

PostgreSQL pgbench 12.0
Scaling: Buffer Test - Test: Normal Load - Mode: Read Write
TPS, More Is Better
2 x Xeon Gold 5220R
SE +/- 158.35, N = 3
34227.72
Xeon Gold 5220R
SE +/- 54.71, N = 3
45518.59
Xeon Platinum 8280
SE +/- 370.72, N = 3
53139.06
2 x Xeon Platinum 8280
SE +/- 19.82, N = 3
24466.91
Xeon Gold 5218
SE +/- 1.34, N = 3
40894.90
Xeon Silver 4216
SE +/- 132.22, N = 3
40373.30
Xeon Gold 6226R
SE +/- 56.97, N = 3
46503.28
2 x Xeon Gold 6226R
SE +/- 119.26, N = 3
37715.22
2 x Xeon Silver 4216
SE +/- 220.44, N = 3
34916.03
Xeon W-3275M
SE +/- 85.02, N = 3
11704.23
2 x Xeon Platinum 8275CL
SE +/- 141.57, N = 6
3890.77
2 x Xeon Platinum 8275CL NUMA off
SE +/- 38.08, N = 3
3197.74
EPYC 2 7R32
SE +/- 319.58, N = 12
6105.73
2 x Xeon Platinum 8259CL
SE +/- 56.30, N = 3
4009.41
2 x Xeon Platinum 8259CL NUMA off
SE +/- 408.27, N = 6
3168.73
11K
22K
33K
44K
55K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

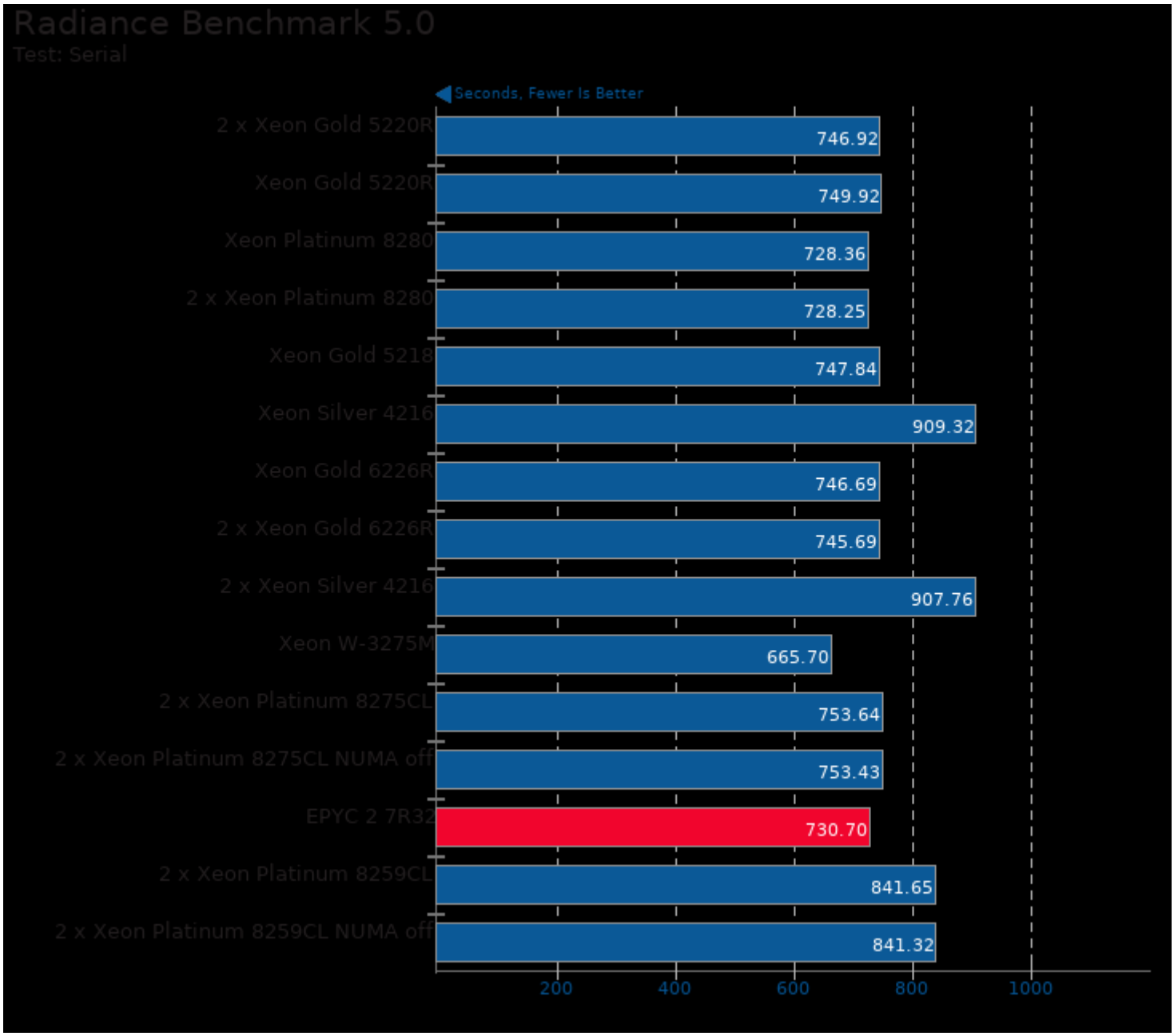

PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 1.45, N = 3
1100
Xeon Gold 5220R
SE +/- 12.17, N = 3
1114
Xeon Platinum 8280
SE +/- 1.15, N = 3
1076
2 x Xeon Platinum 8280
SE +/- 1.00, N = 3
1073
Xeon Gold 5218
1101
Xeon Silver 4216
SE +/- 0.58, N = 3
1342
Xeon Gold 6226R
SE +/- 3.06, N = 3
1103
2 x Xeon Gold 6226R
SE +/- 0.67, N = 3
1104
2 x Xeon Silver 4216
SE +/- 0.67, N = 3
1343
Xeon W-3275M
SE +/- 1.45, N = 3
951
2 x Xeon Platinum 8275CL
SE +/- 4.73, N = 3
1133
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.88, N = 3
1123
EPYC 2 7R32
SE +/- 3.18, N = 3
1226
2 x Xeon Platinum 8259CL
SE +/- 1.00, N = 3
1252
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.33, N = 3
1253
300
600
900
1200
1500

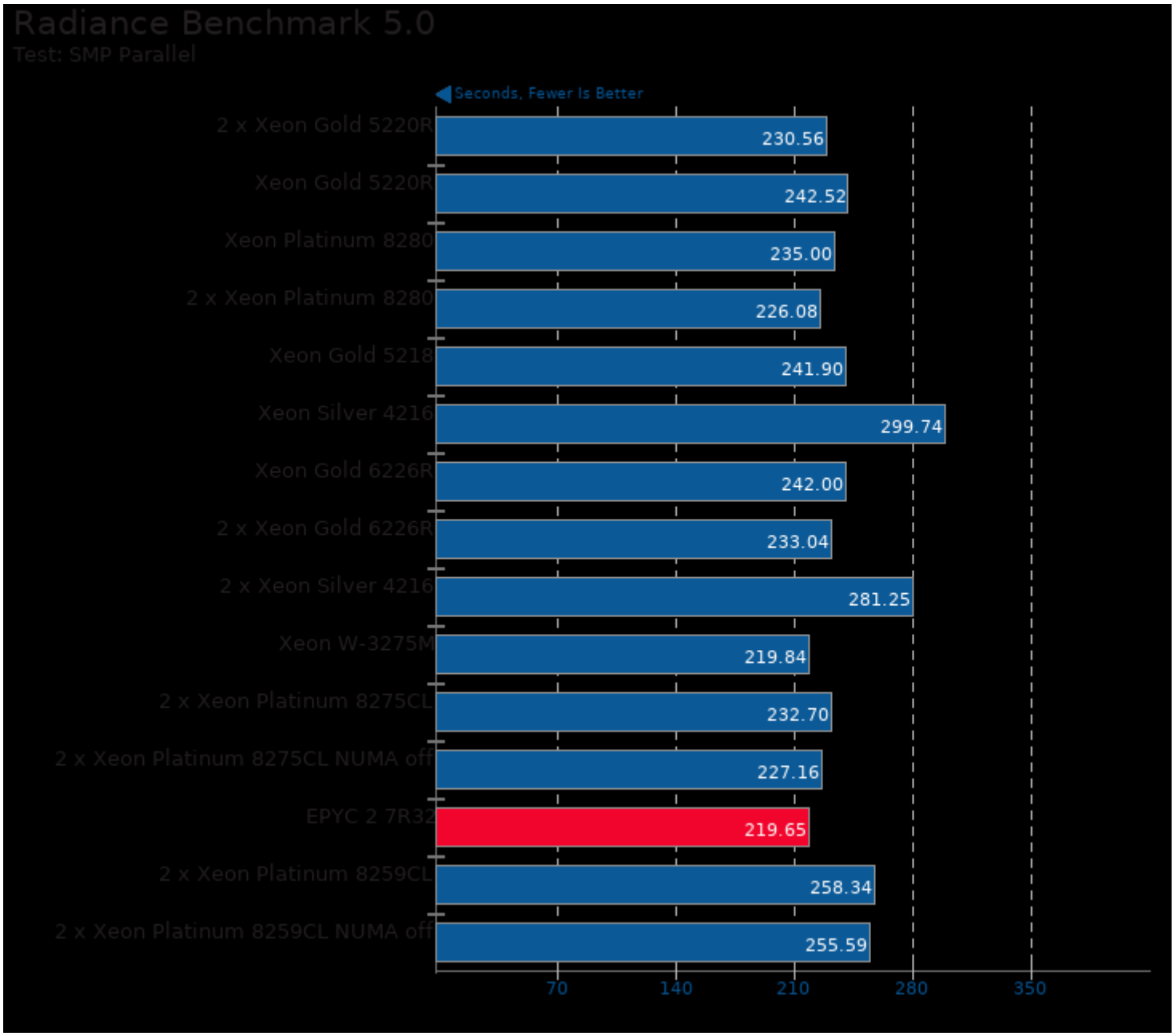

PyPerformance 1.0.0
Benchmark: float
Milliseconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.33, N = 3
113.0
Xeon Gold 5220R
114.0
Xeon Platinum 8280
109.0
2 x Xeon Platinum 8280
109.0
Xeon Gold 5218
114.0
Xeon Silver 4216
137.0
Xeon Gold 6226R
115.0
2 x Xeon Gold 6226R
113.0
2 x Xeon Silver 4216
137.0
Xeon W-3275M
SE +/- 0.12, N = 3
94.5
2 x Xeon Platinum 8259CL
123.0
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.33, N = 3
123.0
30
60
90
120
150

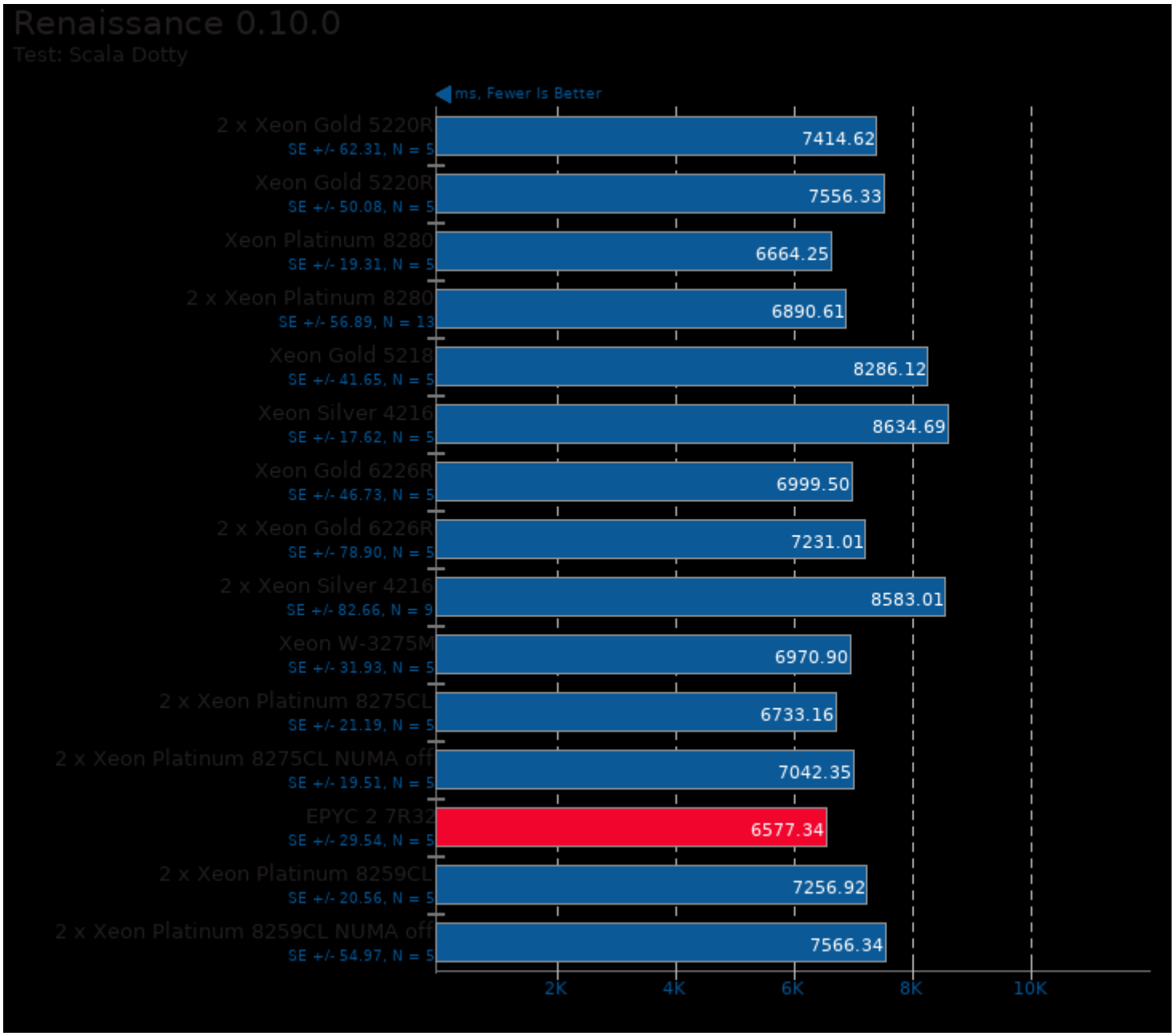

PyPerformance 1.0.0
Benchmark: regex_compile
Milliseconds, Fewer Is Better
2 x Xeon Gold 5220R
167
Xeon Gold 5220R
168
Xeon Platinum 8280
164
2 x Xeon Platinum 8280
164
Xeon Gold 5218
167
Xeon Silver 4216
204
Xeon Gold 6226R
168
2 x Xeon Gold 6226R
167
2 x Xeon Silver 4216
204
Xeon W-3275M
SE +/- 1.20, N = 3
157
EPYC 2 7R32
SE +/- 0.33, N = 3
213
2 x Xeon Platinum 8259CL
200
2 x Xeon Platinum 8259CL NUMA off
200
50
100
150
200
250

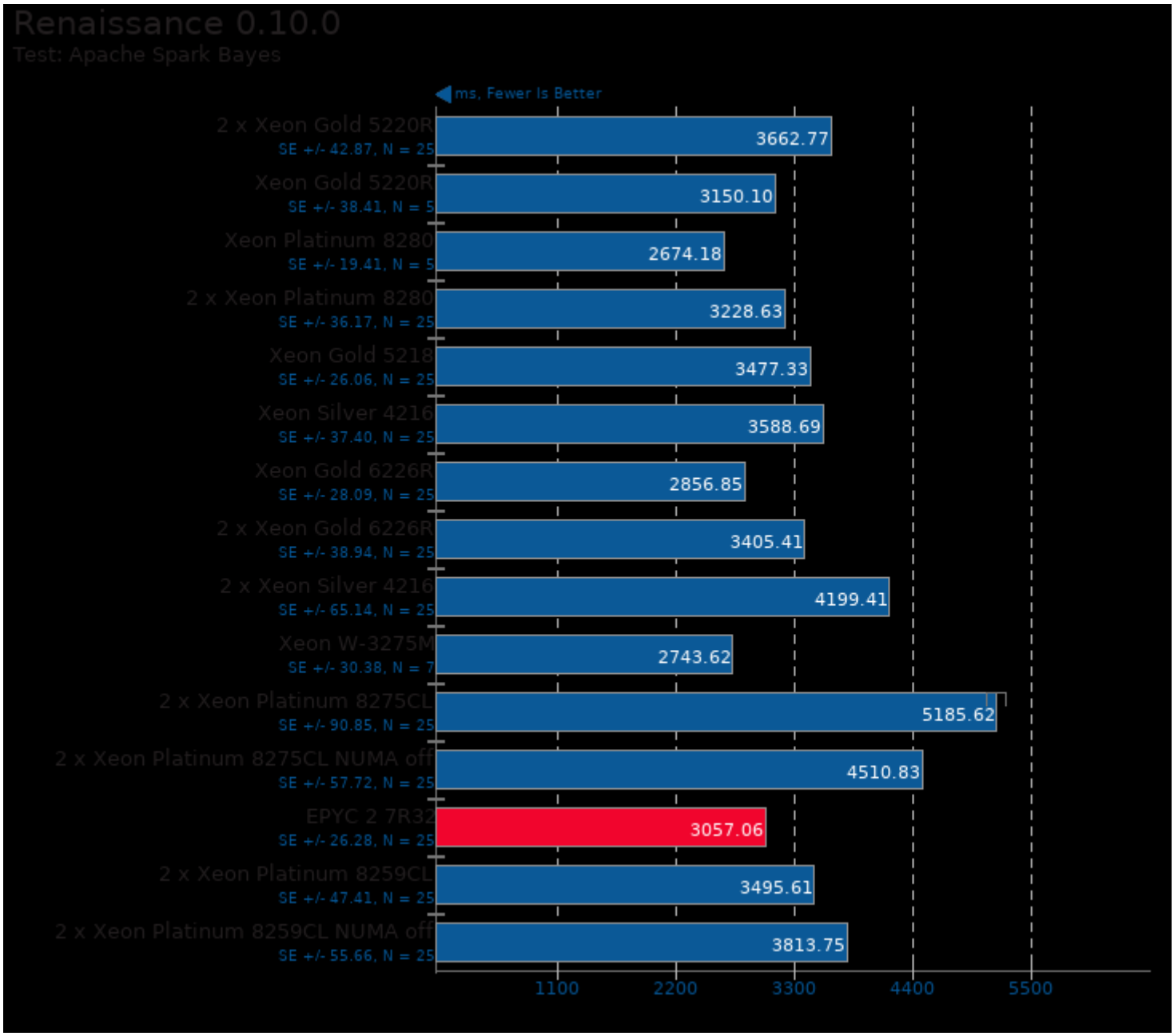

PyPerformance 1.0.0
Benchmark: python_startup
Milliseconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 3
11.2
Xeon Gold 5220R
SE +/- 0.00, N = 3
11.3
Xeon Platinum 8280
SE +/- 0.07, N = 3
11.2
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
11.2
Xeon Gold 5218
SE +/- 0.06, N = 3
11.1
Xeon Silver 4216
SE +/- 0.03, N = 3
15.4
Xeon Gold 6226R
SE +/- 0.09, N = 3
11.0
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
10.9
2 x Xeon Silver 4216
SE +/- 0.03, N = 3
15.4
Xeon W-3275M
SE +/- 0.09, N = 3
17.7
EPYC 2 7R32
SE +/- 0.00, N = 3
16.3
2 x Xeon Platinum 8259CL
SE +/- 0.03, N = 3
11.3
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.03, N = 3
22.6
5
10
15
20
25

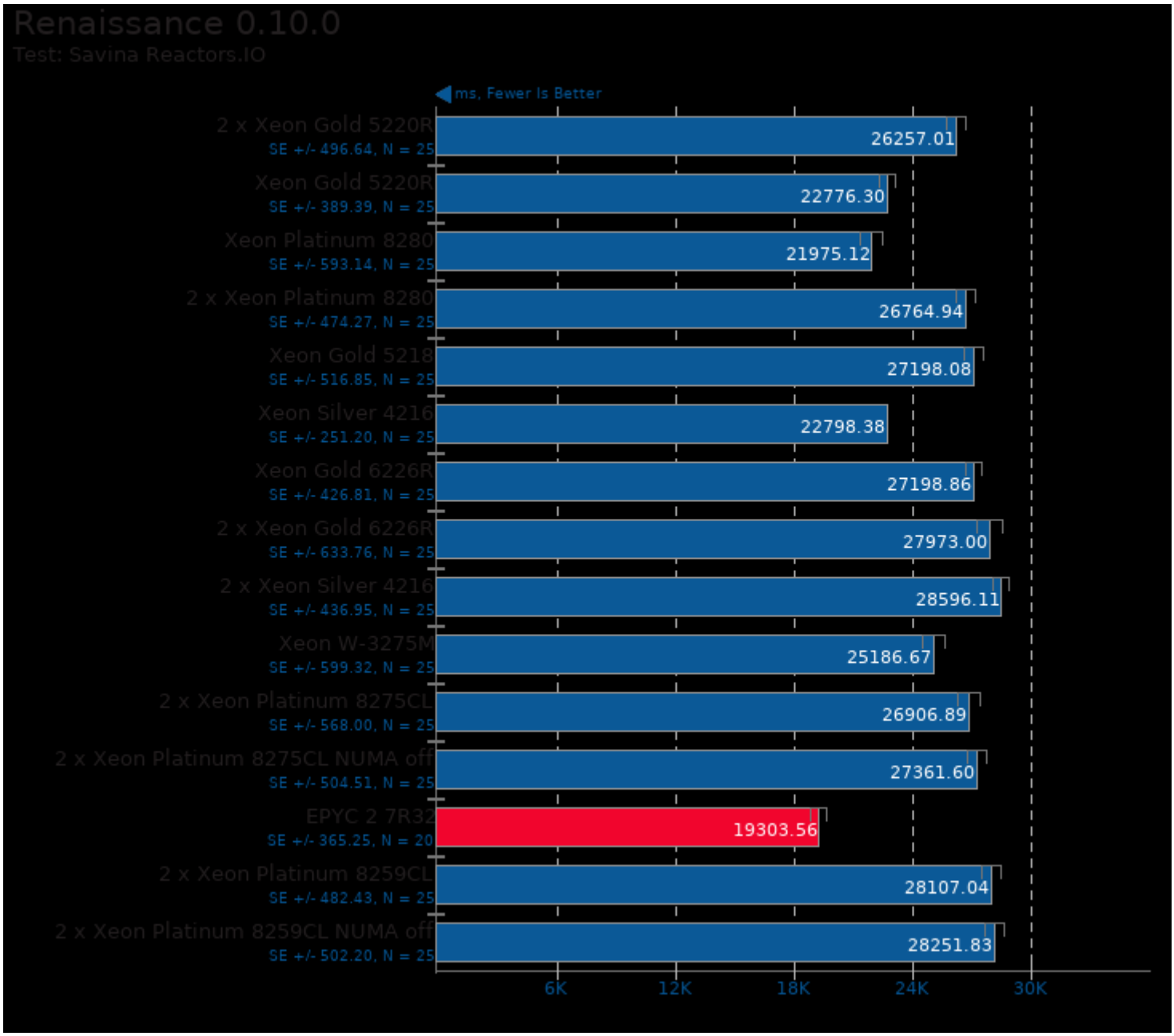

PyPerformance 1.0.0
Benchmark: django_template
Milliseconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.03, N = 3
47.3
Xeon Gold 5220R
SE +/- 0.06, N = 3
47.1
Xeon Platinum 8280
SE +/- 0.06, N = 3
46.2
2 x Xeon Platinum 8280
SE +/- 0.07, N = 3
45.9
Xeon Gold 5218
SE +/- 0.00, N = 3
47.2
Xeon Silver 4216
SE +/- 0.00, N = 3
57.5
Xeon Gold 6226R
SE +/- 0.03, N = 3
47.3
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
47.1
2 x Xeon Silver 4216
SE +/- 0.06, N = 3
57.5
Xeon W-3275M
SE +/- 0.67, N = 3
49.9
EPYC 2 7R32
SE +/- 0.09, N = 3
66.4
2 x Xeon Platinum 8259CL
SE +/- 0.09, N = 3
64.2
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.07, N = 3
64.1
15
30
45
60
75

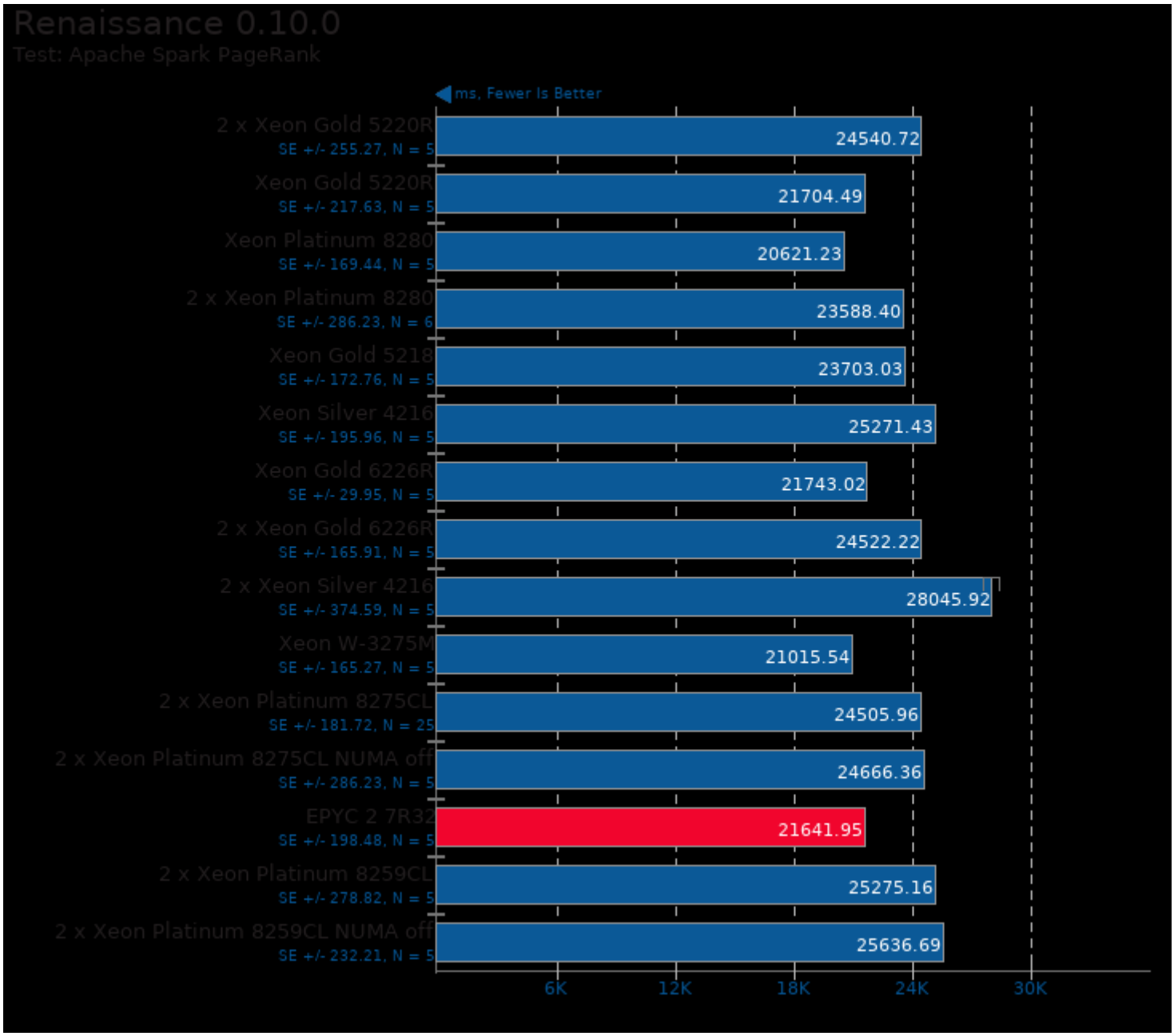

Radiance Benchmark 5.0
Test: Serial
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
746.92
Xeon Gold 5220R
749.92
Xeon Platinum 8280
728.36
2 x Xeon Platinum 8280
728.25
Xeon Gold 5218
747.84
Xeon Silver 4216
909.32
Xeon Gold 6226R
746.69
2 x Xeon Gold 6226R
745.69
2 x Xeon Silver 4216
907.76
Xeon W-3275M
665.70
2 x Xeon Platinum 8275CL
753.64
2 x Xeon Platinum 8275CL NUMA off
753.43
EPYC 2 7R32
730.70
2 x Xeon Platinum 8259CL
841.65
2 x Xeon Platinum 8259CL NUMA off
841.32
200
400
600
800
1000

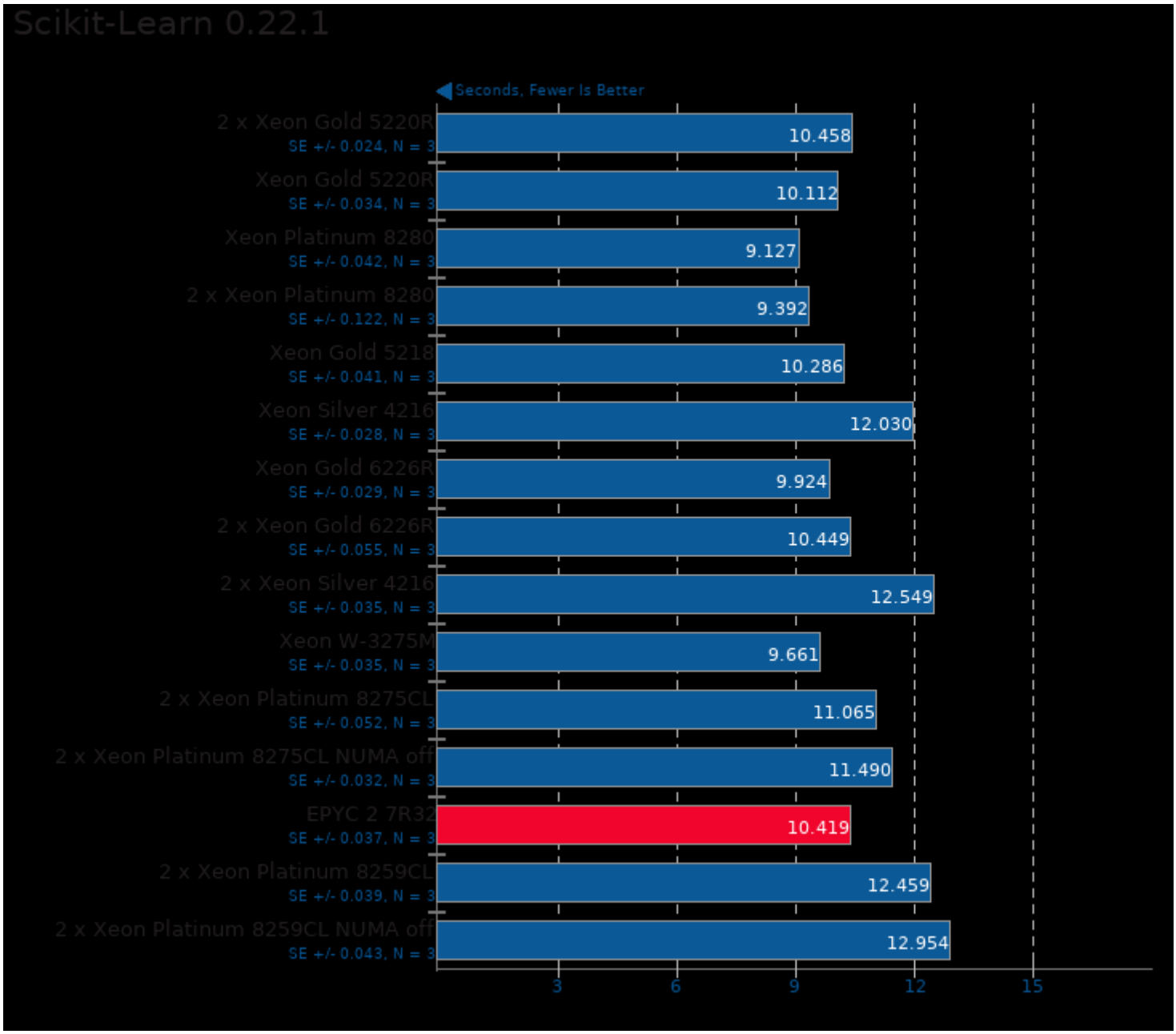

Radiance Benchmark 5.0
Test: SMP Parallel
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
230.56
Xeon Gold 5220R
242.52
Xeon Platinum 8280
235.00
2 x Xeon Platinum 8280
226.08
Xeon Gold 5218
241.90
Xeon Silver 4216
299.74
Xeon Gold 6226R
242.00
2 x Xeon Gold 6226R
233.04
2 x Xeon Silver 4216
281.25
Xeon W-3275M
219.84
2 x Xeon Platinum 8275CL
232.70
2 x Xeon Platinum 8275CL NUMA off
227.16
EPYC 2 7R32
219.65
2 x Xeon Platinum 8259CL
258.34
2 x Xeon Platinum 8259CL NUMA off
255.59
70
140
210
280
350

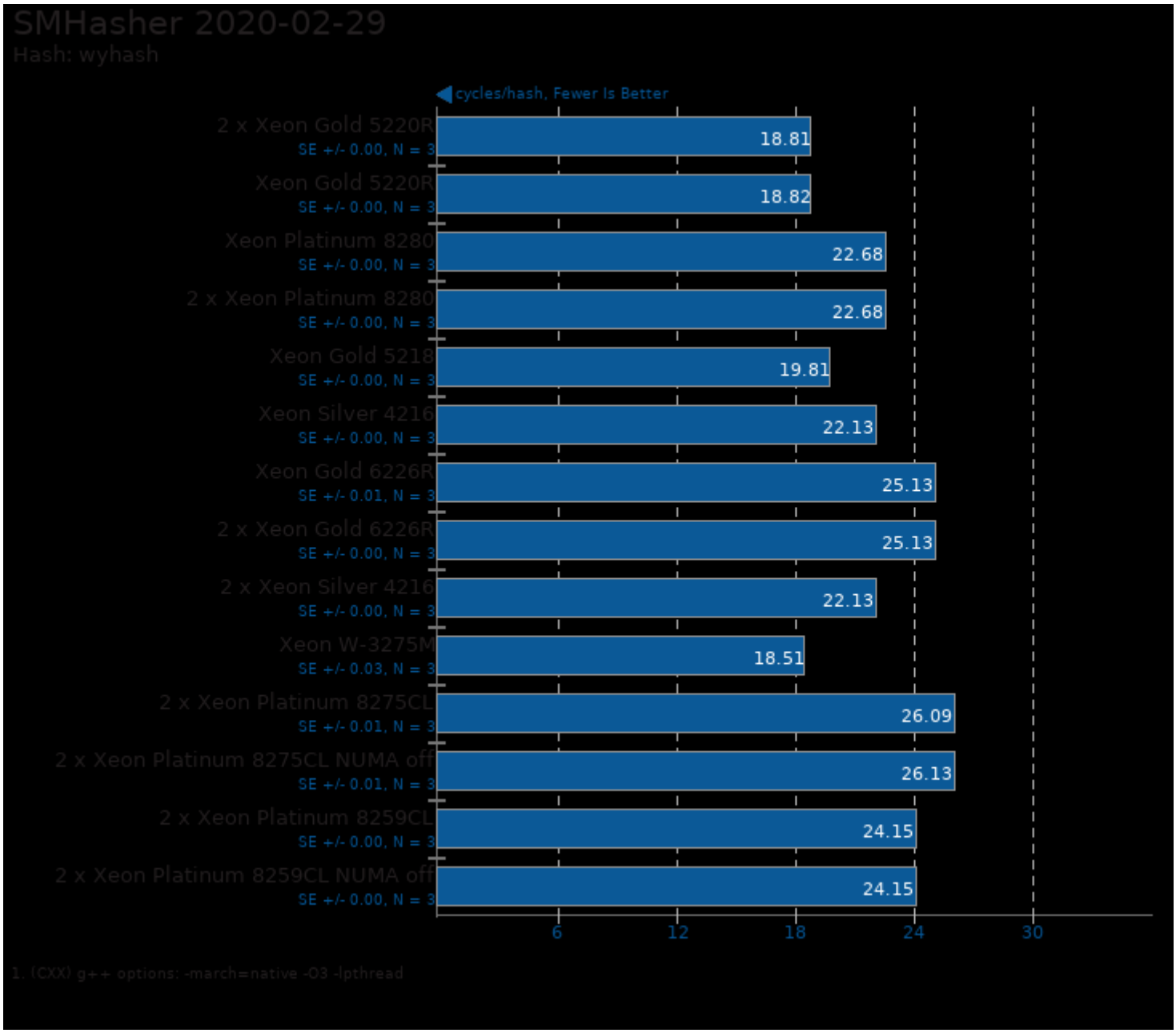

Renaissance 0.10.0
Test: Scala Dotty
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 62.31, N = 5
7414.62
Xeon Gold 5220R
SE +/- 50.08, N = 5
7556.33
Xeon Platinum 8280
SE +/- 19.31, N = 5
6664.25
2 x Xeon Platinum 8280
SE +/- 56.89, N = 13
6890.61
Xeon Gold 5218
SE +/- 41.65, N = 5
8286.12
Xeon Silver 4216
SE +/- 17.62, N = 5
8634.69
Xeon Gold 6226R
SE +/- 46.73, N = 5
6999.50
2 x Xeon Gold 6226R
SE +/- 78.90, N = 5
7231.01
2 x Xeon Silver 4216
SE +/- 82.66, N = 9
8583.01
Xeon W-3275M
SE +/- 31.93, N = 5
6970.90
2 x Xeon Platinum 8275CL
SE +/- 21.19, N = 5
6733.16
2 x Xeon Platinum 8275CL NUMA off
SE +/- 19.51, N = 5
7042.35
EPYC 2 7R32
SE +/- 29.54, N = 5
6577.34
2 x Xeon Platinum 8259CL
SE +/- 20.56, N = 5
7256.92
2 x Xeon Platinum 8259CL NUMA off
SE +/- 54.97, N = 5
7566.34
2K
4K
6K
8K
10K

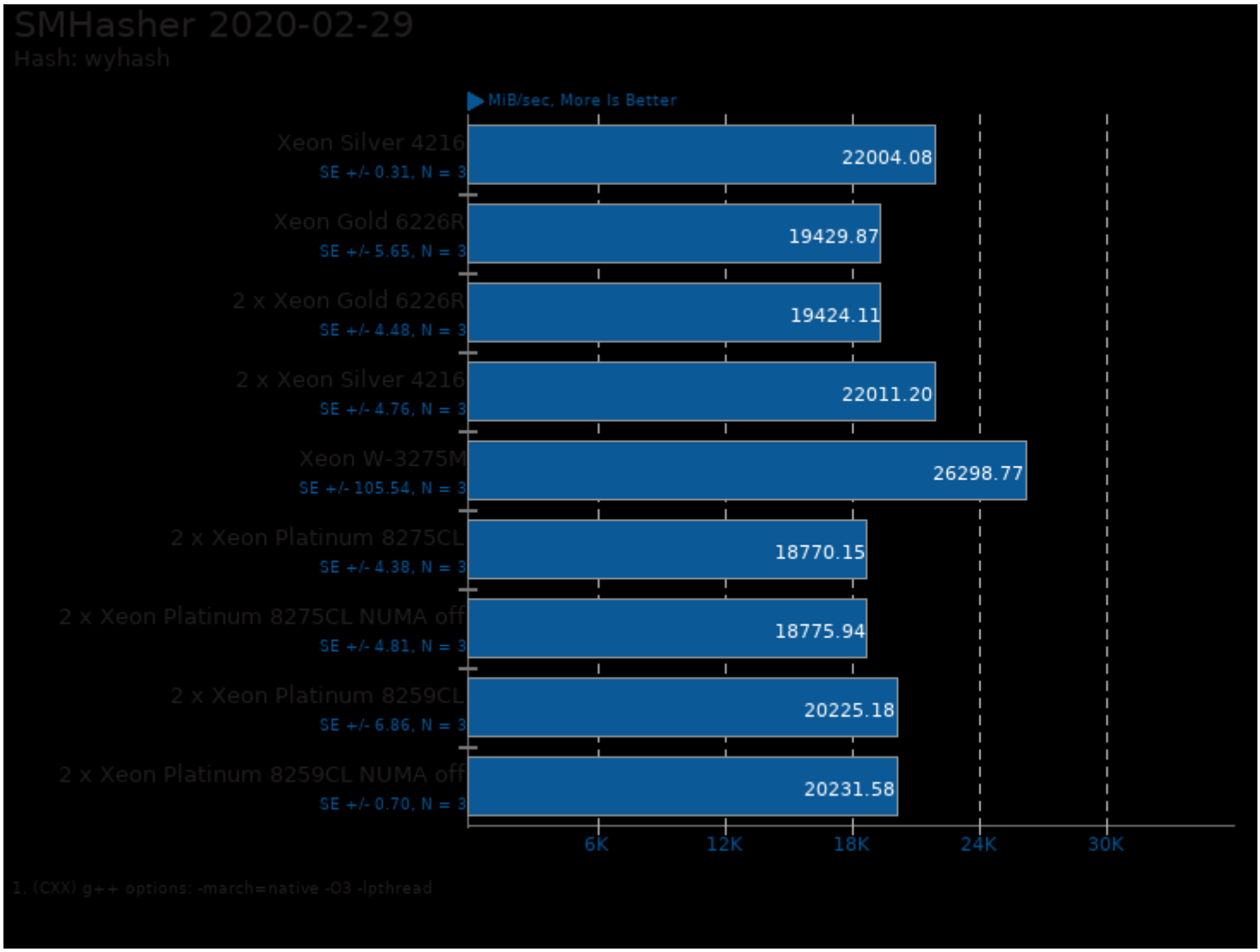

Renaissance 0.10.0
Test: Apache Spark Bayes
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 42.87, N = 25
3662.77
Xeon Gold 5220R
SE +/- 38.41, N = 5
3150.10
Xeon Platinum 8280
SE +/- 19.41, N = 5
2674.18
2 x Xeon Platinum 8280
SE +/- 36.17, N = 25
3228.63
Xeon Gold 5218
SE +/- 26.06, N = 25
3477.33
Xeon Silver 4216
SE +/- 37.40, N = 25
3588.69
Xeon Gold 6226R
SE +/- 28.09, N = 25
2856.85
2 x Xeon Gold 6226R
SE +/- 38.94, N = 25
3405.41
2 x Xeon Silver 4216
SE +/- 65.14, N = 25
4199.41
Xeon W-3275M
SE +/- 30.38, N = 7
2743.62
2 x Xeon Platinum 8275CL
SE +/- 90.85, N = 25
5185.62
2 x Xeon Platinum 8275CL NUMA off
SE +/- 57.72, N = 25
4510.83
EPYC 2 7R32
SE +/- 26.28, N = 25
3057.06
2 x Xeon Platinum 8259CL
SE +/- 47.41, N = 25
3495.61
2 x Xeon Platinum 8259CL NUMA off
SE +/- 55.66, N = 25
3813.75
1100
2200
3300
4400
5500

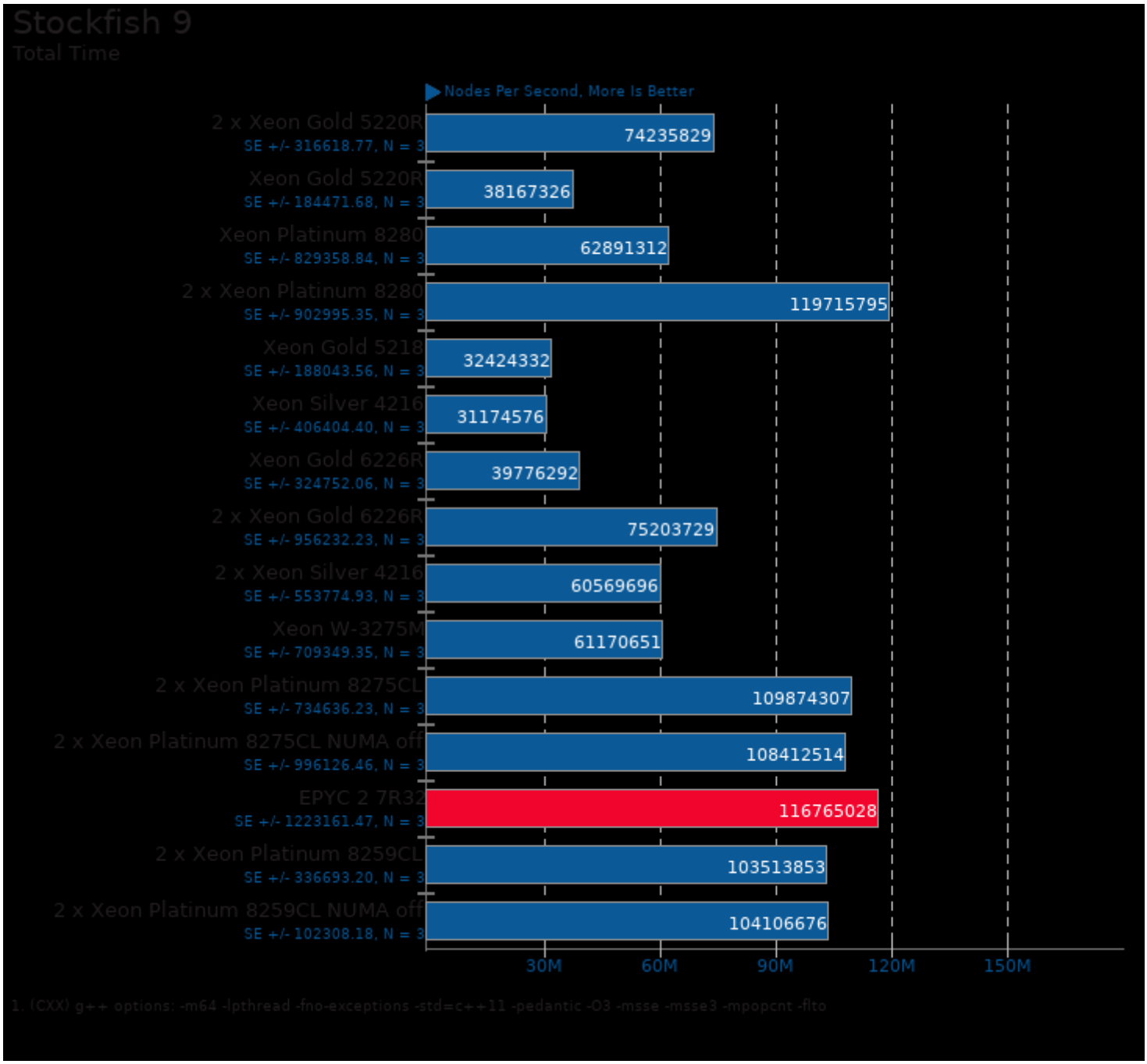

Renaissance 0.10.0
Test: Savina Reactors.IO
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 496.64, N = 25
26257.01
Xeon Gold 5220R
SE +/- 389.39, N = 25
22776.30
Xeon Platinum 8280
SE +/- 593.14, N = 25
21975.12
2 x Xeon Platinum 8280
SE +/- 474.27, N = 25
26764.94
Xeon Gold 5218
SE +/- 516.85, N = 25
27198.08
Xeon Silver 4216
SE +/- 251.20, N = 25
22798.38
Xeon Gold 6226R
SE +/- 426.81, N = 25
27198.86
2 x Xeon Gold 6226R
SE +/- 633.76, N = 25
27973.00
2 x Xeon Silver 4216
SE +/- 436.95, N = 25
28596.11
Xeon W-3275M
SE +/- 599.32, N = 25
25186.67
2 x Xeon Platinum 8275CL
SE +/- 568.00, N = 25
26906.89
2 x Xeon Platinum 8275CL NUMA off
SE +/- 504.51, N = 25
27361.60
EPYC 2 7R32
SE +/- 365.25, N = 20
19303.56
2 x Xeon Platinum 8259CL
SE +/- 482.43, N = 25
28107.04
2 x Xeon Platinum 8259CL NUMA off
SE +/- 502.20, N = 25
28251.83
6K
12K
18K
24K
30K

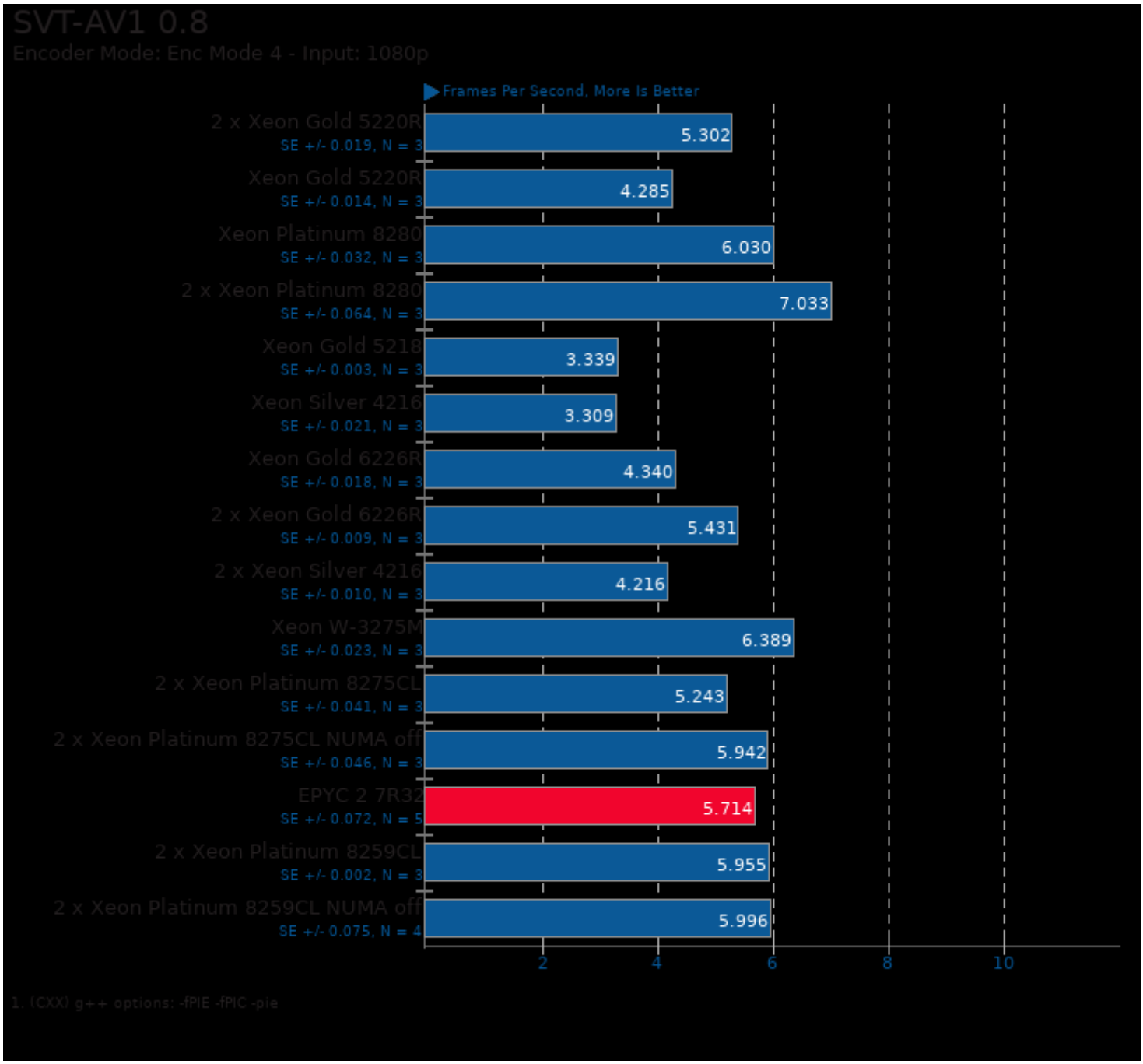

Renaissance 0.10.0
Test: Apache Spark PageRank
ms, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 255.27, N = 5
24540.72
Xeon Gold 5220R
SE +/- 217.63, N = 5
21704.49
Xeon Platinum 8280
SE +/- 169.44, N = 5
20621.23
2 x Xeon Platinum 8280
SE +/- 286.23, N = 6
23588.40
Xeon Gold 5218
SE +/- 172.76, N = 5
23703.03
Xeon Silver 4216
SE +/- 195.96, N = 5
25271.43
Xeon Gold 6226R
SE +/- 29.95, N = 5
21743.02
2 x Xeon Gold 6226R
SE +/- 165.91, N = 5
24522.22
2 x Xeon Silver 4216
SE +/- 374.59, N = 5
28045.92
Xeon W-3275M
SE +/- 165.27, N = 5
21015.54
2 x Xeon Platinum 8275CL
SE +/- 181.72, N = 25
24505.96
2 x Xeon Platinum 8275CL NUMA off
SE +/- 286.23, N = 5
24666.36
EPYC 2 7R32
SE +/- 198.48, N = 5
21641.95
2 x Xeon Platinum 8259CL
SE +/- 278.82, N = 5
25275.16
2 x Xeon Platinum 8259CL NUMA off
SE +/- 232.21, N = 5
25636.69
6K
12K
18K
24K
30K

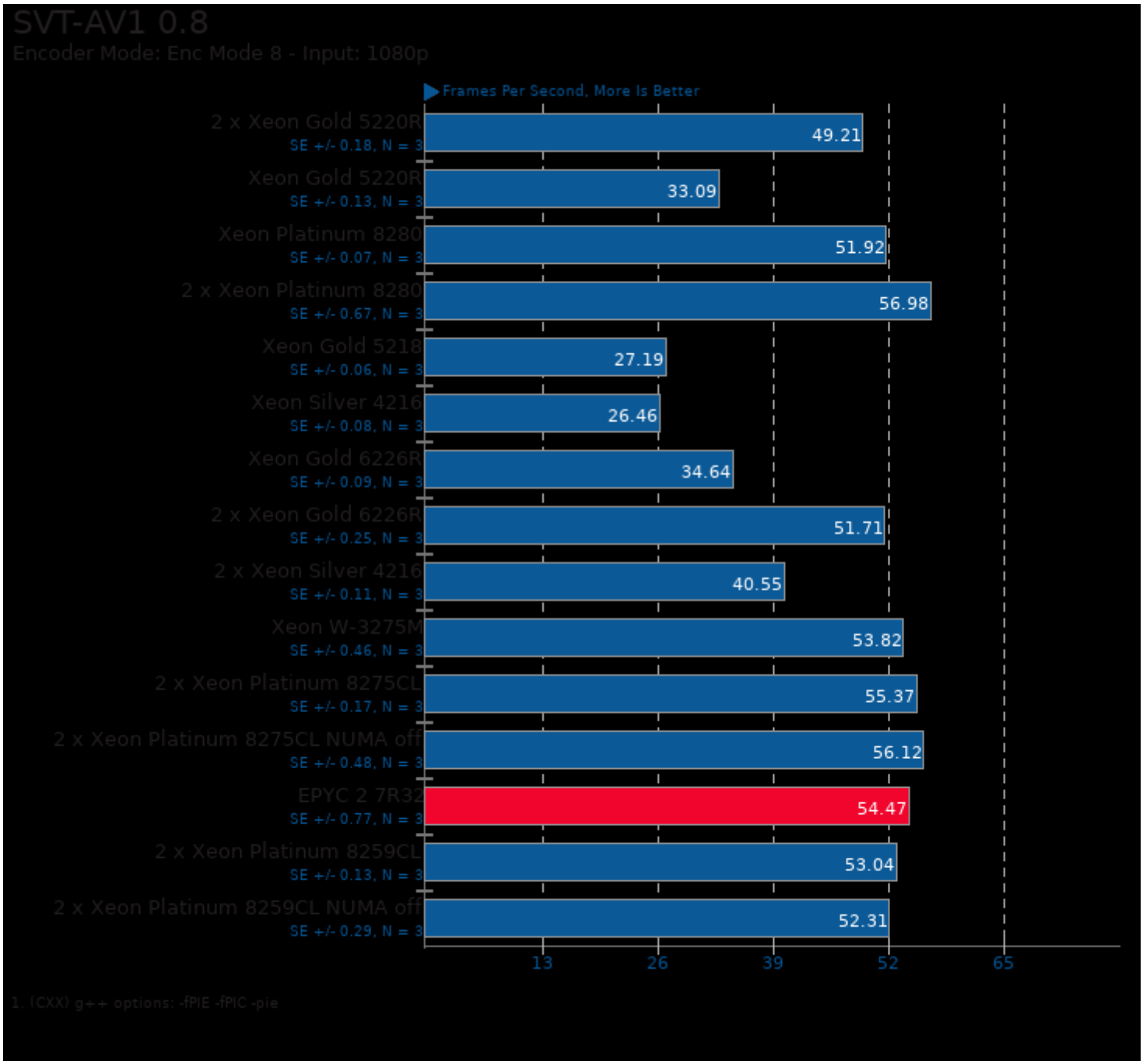

Scikit-Learn 0.22.1
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.024, N = 3
10.458
Xeon Gold 5220R
SE +/- 0.034, N = 3
10.112
Xeon Platinum 8280
SE +/- 0.042, N = 3
9.127
2 x Xeon Platinum 8280
SE +/- 0.122, N = 3
9.392
Xeon Gold 5218
SE +/- 0.041, N = 3
10.286
Xeon Silver 4216
SE +/- 0.028, N = 3
12.030
Xeon Gold 6226R
SE +/- 0.029, N = 3
9.924
2 x Xeon Gold 6226R
SE +/- 0.055, N = 3
10.449
2 x Xeon Silver 4216
SE +/- 0.035, N = 3
12.549
Xeon W-3275M
SE +/- 0.035, N = 3
9.661
2 x Xeon Platinum 8275CL
SE +/- 0.052, N = 3
11.065
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.032, N = 3
11.490
EPYC 2 7R32
SE +/- 0.037, N = 3
10.419
2 x Xeon Platinum 8259CL
SE +/- 0.039, N = 3
12.459
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.043, N = 3
12.954
3
6
9
12
15

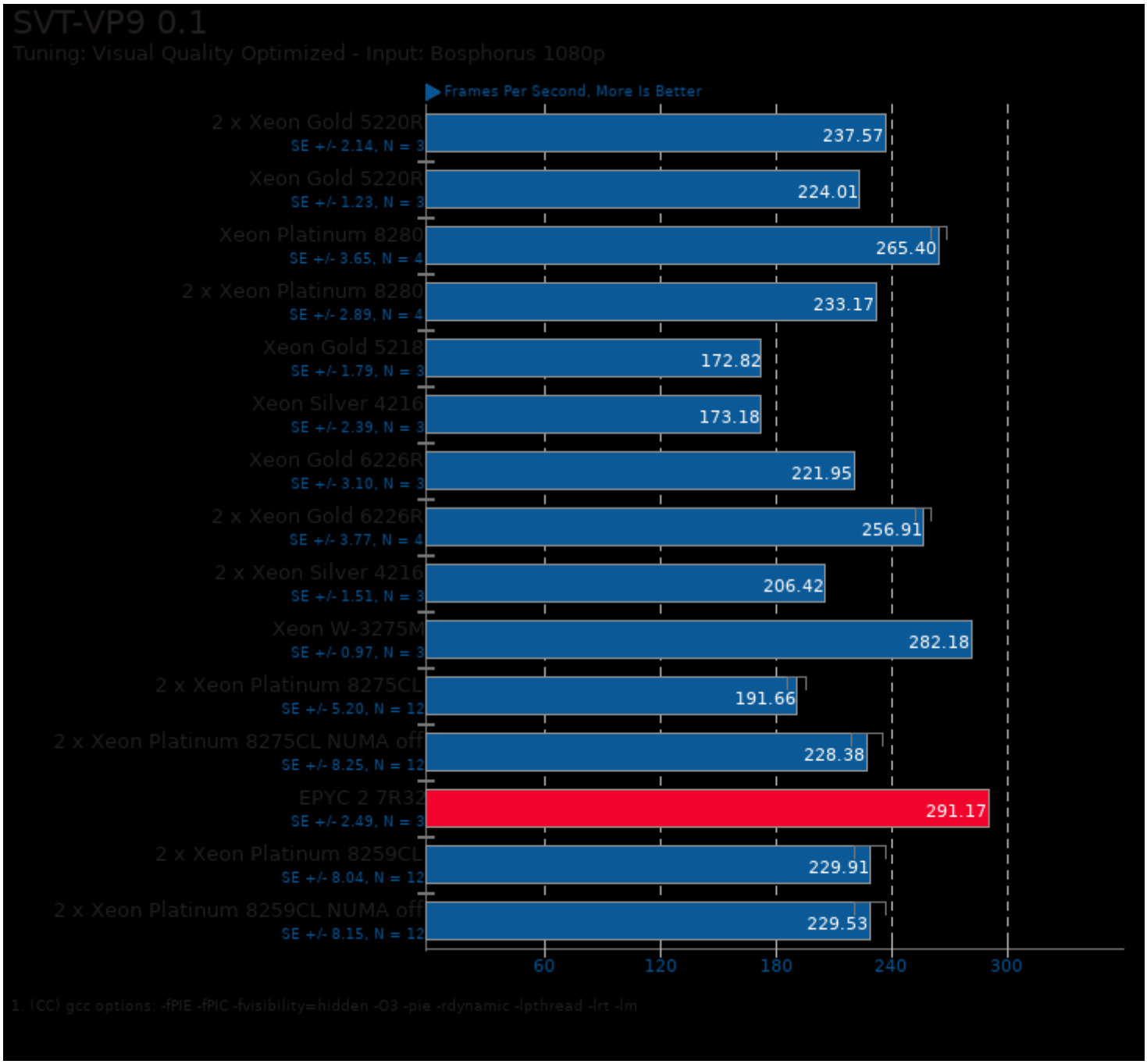

SMHasher 2020-02-29
Hash: wyhash
cycles/hash, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.00, N = 3
18.81
Xeon Gold 5220R
SE +/- 0.00, N = 3
18.82
Xeon Platinum 8280
SE +/- 0.00, N = 3
22.68
2 x Xeon Platinum 8280
SE +/- 0.00, N = 3
22.68
Xeon Gold 5218
SE +/- 0.00, N = 3
19.81
Xeon Silver 4216
SE +/- 0.00, N = 3
22.13
Xeon Gold 6226R
SE +/- 0.01, N = 3
25.13
2 x Xeon Gold 6226R
SE +/- 0.00, N = 3
25.13
2 x Xeon Silver 4216
SE +/- 0.00, N = 3
22.13
Xeon W-3275M
SE +/- 0.03, N = 3
18.51
2 x Xeon Platinum 8275CL
SE +/- 0.01, N = 3
26.09
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.01, N = 3
26.13
2 x Xeon Platinum 8259CL
SE +/- 0.00, N = 3
24.15
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.00, N = 3
24.15
6
12
18
24
30
1. (CXX) g++ options: -march=native -O3 -lpthread

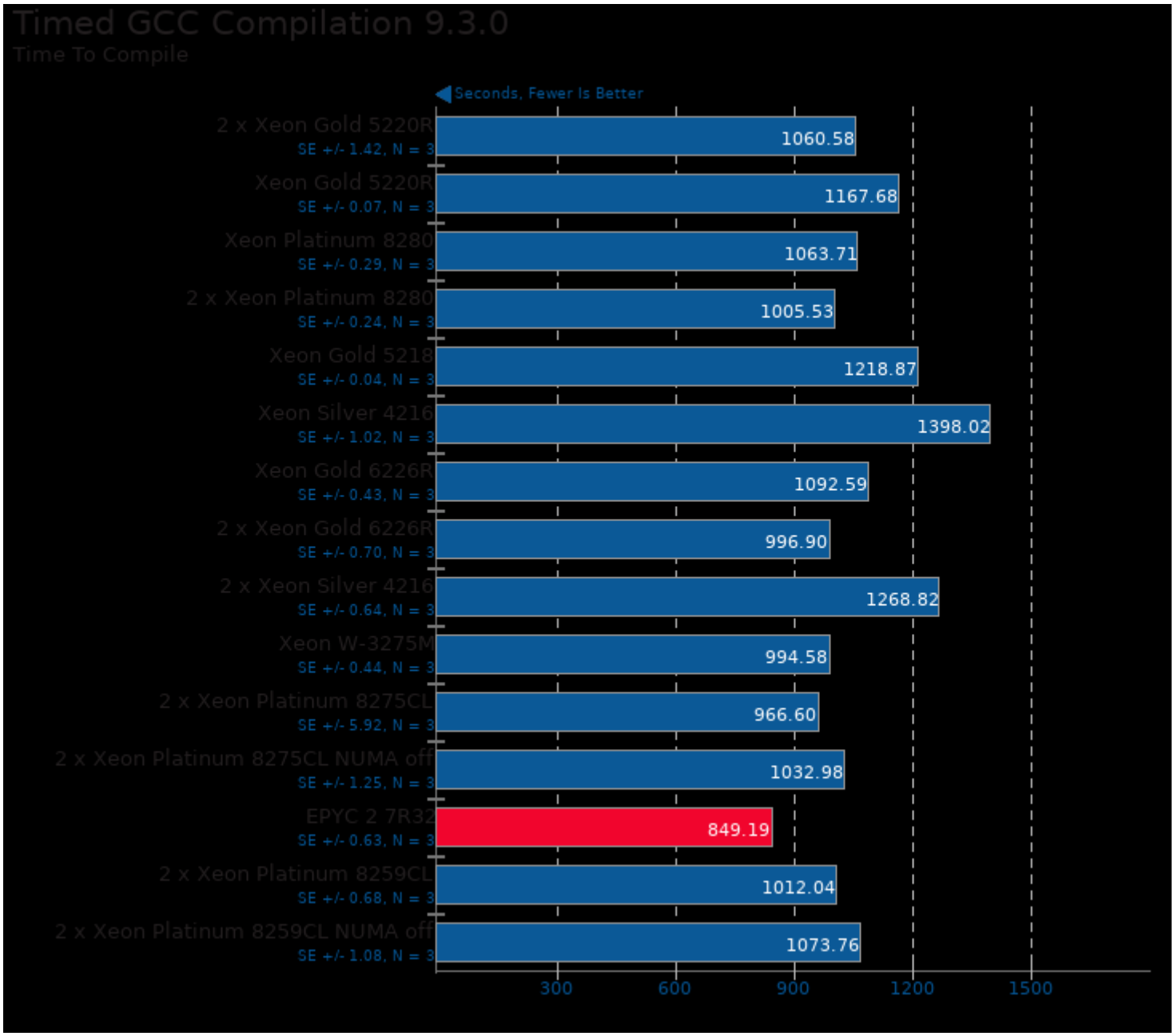

SMHasher 2020-02-29
Hash: wyhash
MiB/sec, More Is Better
Xeon Silver 4216
SE +/- 0.31, N = 3
22004.08
Xeon Gold 6226R
SE +/- 5.65, N = 3
19429.87
2 x Xeon Gold 6226R
SE +/- 4.48, N = 3
19424.11
2 x Xeon Silver 4216
SE +/- 4.76, N = 3
22011.20
Xeon W-3275M
SE +/- 105.54, N = 3
26298.77
2 x Xeon Platinum 8275CL
SE +/- 4.38, N = 3
18770.15
2 x Xeon Platinum 8275CL NUMA off
SE +/- 4.81, N = 3
18775.94
2 x Xeon Platinum 8259CL
SE +/- 6.86, N = 3
20225.18
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.70, N = 3
20231.58
6K
12K
18K
24K
30K
1. (CXX) g++ options: -march=native -O3 -lpthread

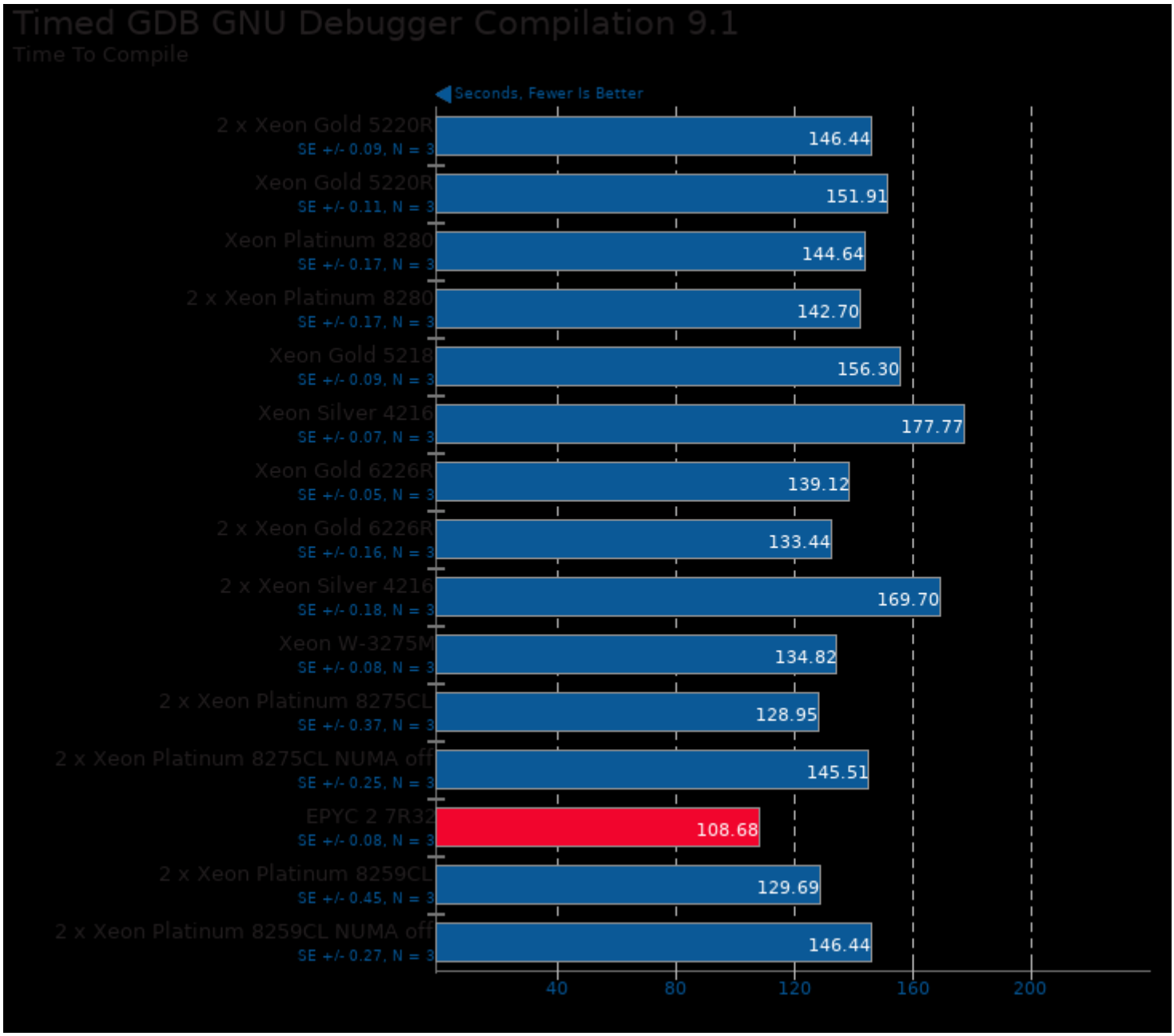

Stockfish 9
Total Time
Nodes Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 316618.77, N = 3
74235829
Xeon Gold 5220R
SE +/- 184471.68, N = 3
38167326
Xeon Platinum 8280
SE +/- 829358.84, N = 3
62891312
2 x Xeon Platinum 8280
SE +/- 902995.35, N = 3
119715795
Xeon Gold 5218
SE +/- 188043.56, N = 3
32424332
Xeon Silver 4216
SE +/- 406404.40, N = 3
31174576
Xeon Gold 6226R
SE +/- 324752.06, N = 3
39776292
2 x Xeon Gold 6226R
SE +/- 956232.23, N = 3
75203729
2 x Xeon Silver 4216
SE +/- 553774.93, N = 3
60569696
Xeon W-3275M
SE +/- 709349.35, N = 3
61170651
2 x Xeon Platinum 8275CL
SE +/- 734636.23, N = 3
109874307
2 x Xeon Platinum 8275CL NUMA off
SE +/- 996126.46, N = 3
108412514
EPYC 2 7R32
SE +/- 1223161.47, N = 3
116765028
2 x Xeon Platinum 8259CL
SE +/- 336693.20, N = 3
103513853
2 x Xeon Platinum 8259CL NUMA off
SE +/- 102308.18, N = 3
104106676
30M
60M
90M
120M
150M
1. (CXX) g++ options: -m64 -lpthread -fno-exceptions -std=c++11 -pedantic -O3 -msse -msse3 -mpopcnt -flto

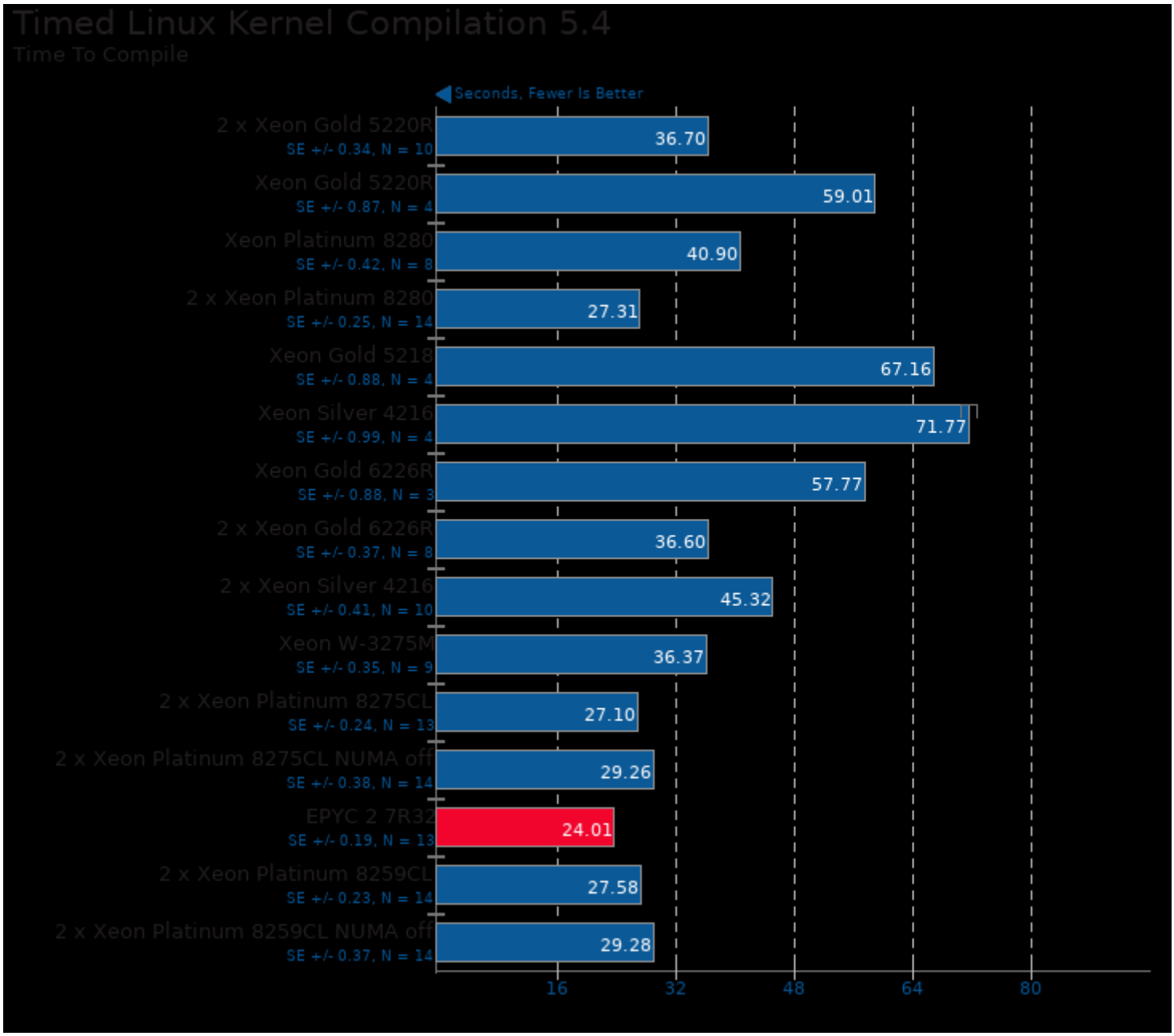

SVT-AV1 0.8
Encoder Mode: Enc Mode 4 - Input: 1080p
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.019, N = 3
5.302
Xeon Gold 5220R
SE +/- 0.014, N = 3
4.285
Xeon Platinum 8280
SE +/- 0.032, N = 3
6.030
2 x Xeon Platinum 8280
SE +/- 0.064, N = 3
7.033
Xeon Gold 5218
SE +/- 0.003, N = 3
3.339
Xeon Silver 4216
SE +/- 0.021, N = 3
3.309
Xeon Gold 6226R
SE +/- 0.018, N = 3
4.340
2 x Xeon Gold 6226R
SE +/- 0.009, N = 3
5.431
2 x Xeon Silver 4216
SE +/- 0.010, N = 3
4.216
Xeon W-3275M
SE +/- 0.023, N = 3
6.389
2 x Xeon Platinum 8275CL
SE +/- 0.041, N = 3
5.243
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.046, N = 3
5.942
EPYC 2 7R32
SE +/- 0.072, N = 5
5.714
2 x Xeon Platinum 8259CL
SE +/- 0.002, N = 3
5.955
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.075, N = 4
5.996
2
4
6
8
10
1. (CXX) g++ options: -fPIE -fPIC -pie

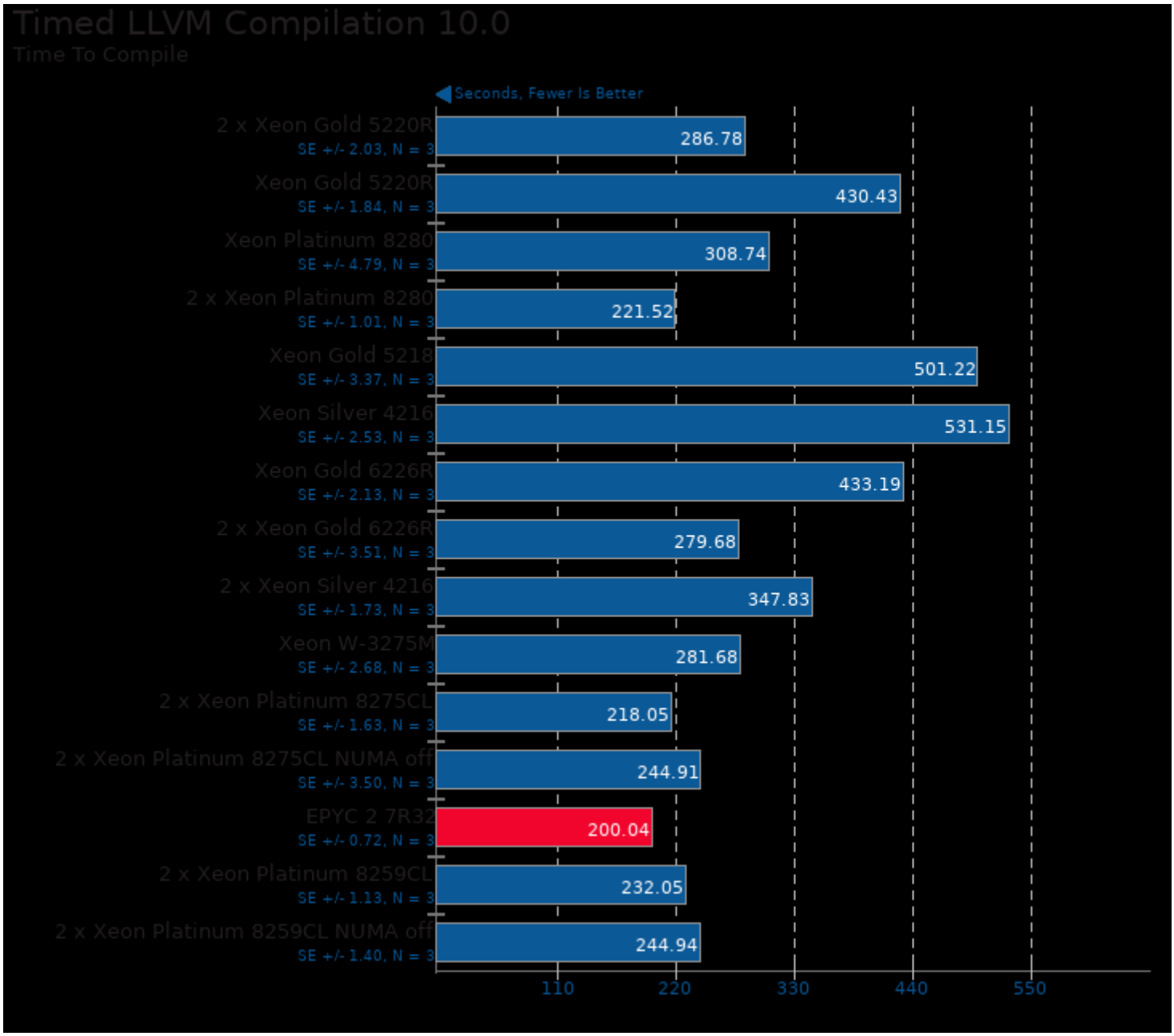

SVT-AV1 0.8
Encoder Mode: Enc Mode 8 - Input: 1080p
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 0.18, N = 3
49.21
Xeon Gold 5220R
SE +/- 0.13, N = 3
33.09
Xeon Platinum 8280
SE +/- 0.07, N = 3
51.92
2 x Xeon Platinum 8280
SE +/- 0.67, N = 3
56.98
Xeon Gold 5218
SE +/- 0.06, N = 3
27.19
Xeon Silver 4216
SE +/- 0.08, N = 3
26.46
Xeon Gold 6226R
SE +/- 0.09, N = 3
34.64
2 x Xeon Gold 6226R
SE +/- 0.25, N = 3
51.71
2 x Xeon Silver 4216
SE +/- 0.11, N = 3
40.55
Xeon W-3275M
SE +/- 0.46, N = 3
53.82
2 x Xeon Platinum 8275CL
SE +/- 0.17, N = 3
55.37
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.48, N = 3
56.12
EPYC 2 7R32
SE +/- 0.77, N = 3
54.47
2 x Xeon Platinum 8259CL
SE +/- 0.13, N = 3
53.04
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.29, N = 3
52.31
13
26
39
52
65
1. (CXX) g++ options: -fPIE -fPIC -pie

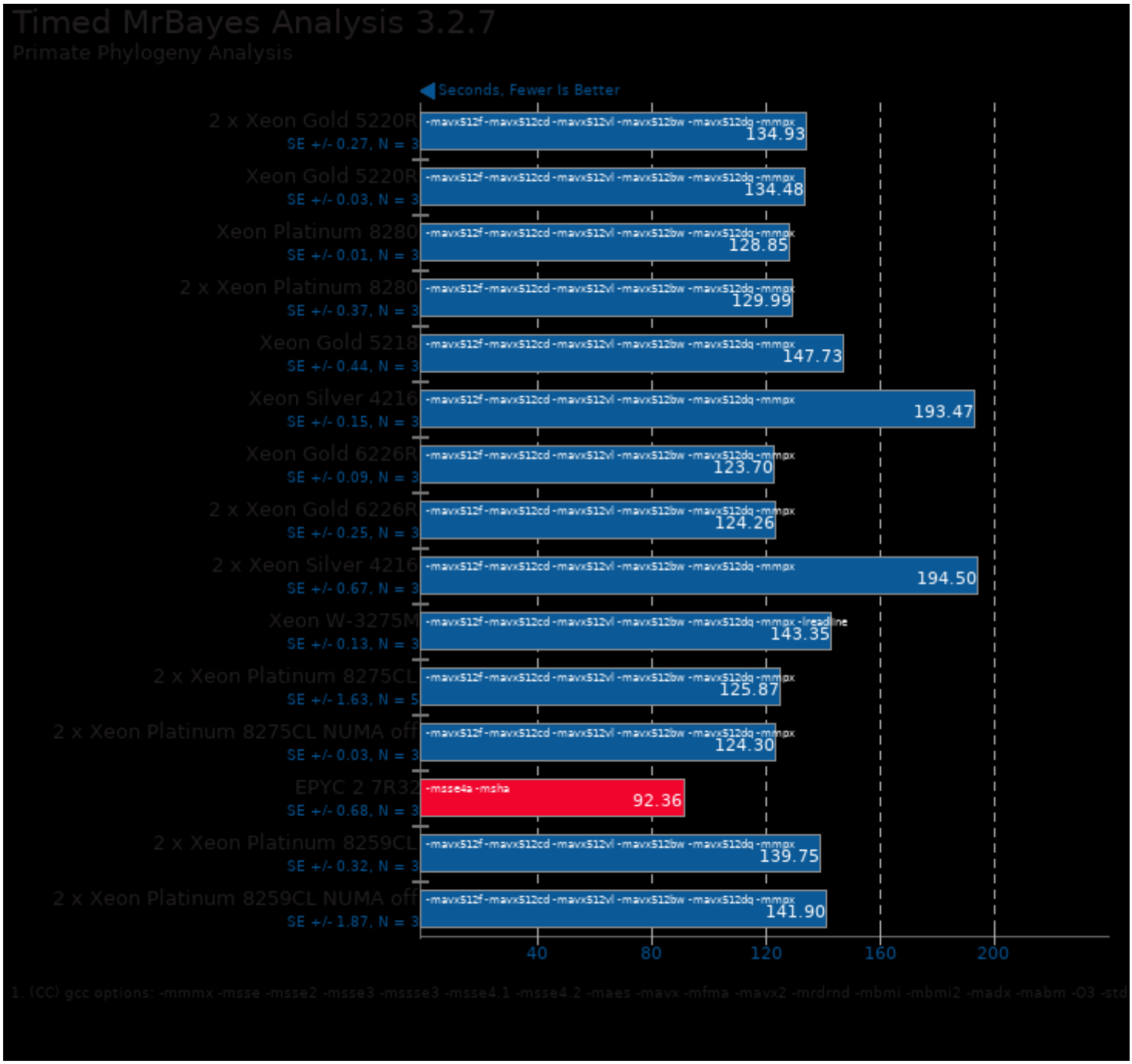

SVT-VP9 0.1
Tuning: Visual Quality Optimized - Input: Bosphorus 1080p
Frames Per Second, More Is Better
2 x Xeon Gold 5220R
SE +/- 2.14, N = 3
237.57
Xeon Gold 5220R
SE +/- 1.23, N = 3
224.01
Xeon Platinum 8280
SE +/- 3.65, N = 4
265.40
2 x Xeon Platinum 8280
SE +/- 2.89, N = 4
233.17
Xeon Gold 5218
SE +/- 1.79, N = 3
172.82
Xeon Silver 4216
SE +/- 2.39, N = 3
173.18
Xeon Gold 6226R
SE +/- 3.10, N = 3
221.95
2 x Xeon Gold 6226R
SE +/- 3.77, N = 4
256.91
2 x Xeon Silver 4216
SE +/- 1.51, N = 3
206.42
Xeon W-3275M
SE +/- 0.97, N = 3
282.18
2 x Xeon Platinum 8275CL
SE +/- 5.20, N = 12
191.66
2 x Xeon Platinum 8275CL NUMA off
SE +/- 8.25, N = 12
228.38
EPYC 2 7R32
SE +/- 2.49, N = 3
291.17
2 x Xeon Platinum 8259CL
SE +/- 8.04, N = 12
229.91
2 x Xeon Platinum 8259CL NUMA off
SE +/- 8.15, N = 12
229.53
60
120
180
240
300
1. (CC) gcc options: -fPIE -fPIC -fvisibility=hidden -O3 -pie -rdynamic -lpthread -lrt -lm

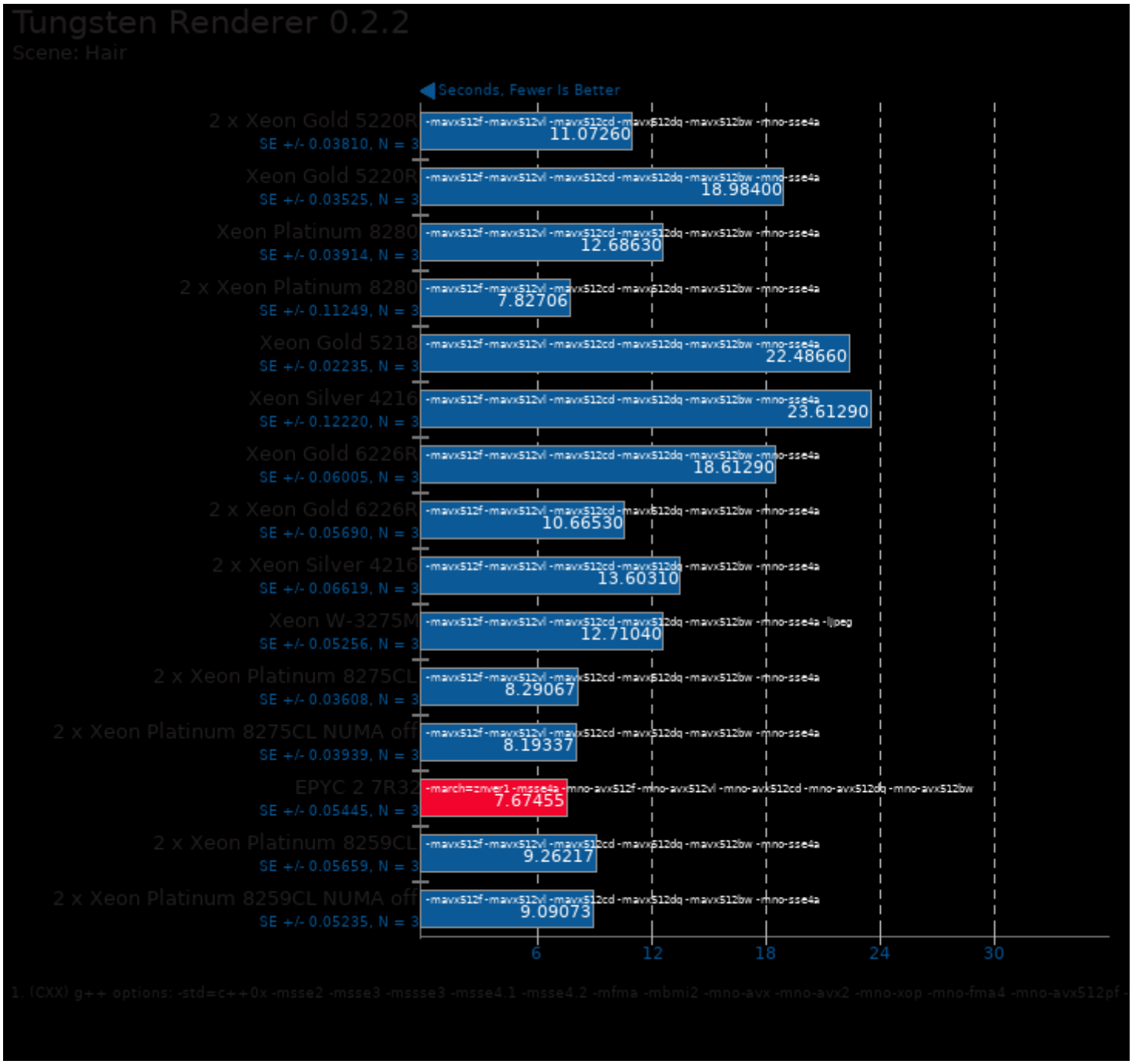

Timed GCC Compilation 9.3.0
Time To Compile
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 1.42, N = 3
1060.58
Xeon Gold 5220R
SE +/- 0.07, N = 3
1167.68
Xeon Platinum 8280
SE +/- 0.29, N = 3
1063.71
2 x Xeon Platinum 8280
SE +/- 0.24, N = 3
1005.53
Xeon Gold 5218
SE +/- 0.04, N = 3
1218.87
Xeon Silver 4216
SE +/- 1.02, N = 3
1398.02
Xeon Gold 6226R
SE +/- 0.43, N = 3
1092.59
2 x Xeon Gold 6226R
SE +/- 0.70, N = 3
996.90
2 x Xeon Silver 4216
SE +/- 0.64, N = 3
1268.82
Xeon W-3275M
SE +/- 0.44, N = 3
994.58
2 x Xeon Platinum 8275CL
SE +/- 5.92, N = 3
966.60
2 x Xeon Platinum 8275CL NUMA off
SE +/- 1.25, N = 3
1032.98
EPYC 2 7R32
SE +/- 0.63, N = 3
849.19
2 x Xeon Platinum 8259CL
SE +/- 0.68, N = 3
1012.04
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.08, N = 3
1073.76
300
600
900
1200
1500

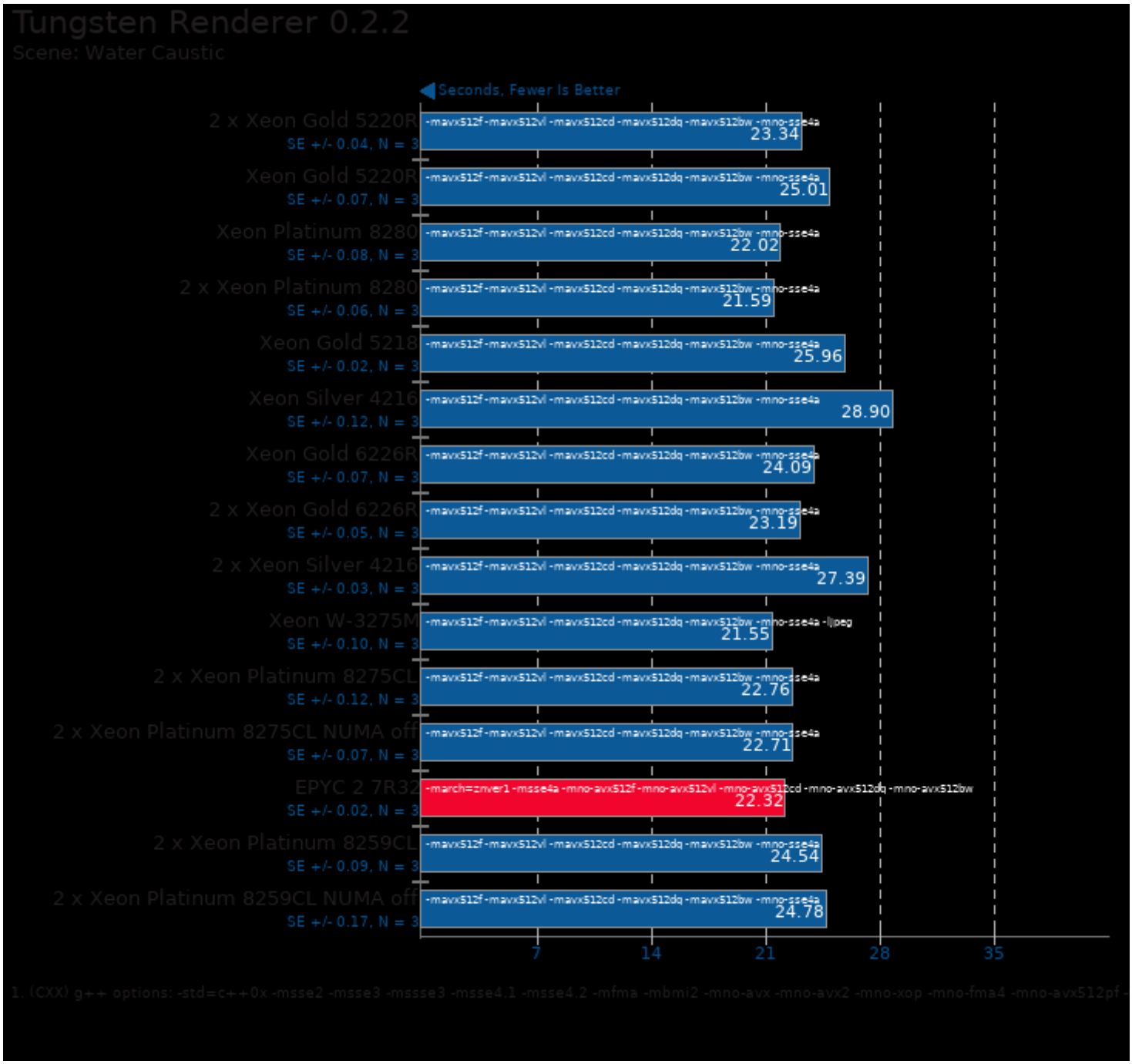

Timed GDB GNU Debugger Compilation 9.1
Time To Compile
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.09, N = 3
146.44
Xeon Gold 5220R
SE +/- 0.11, N = 3
151.91
Xeon Platinum 8280
SE +/- 0.17, N = 3
144.64
2 x Xeon Platinum 8280
SE +/- 0.17, N = 3
142.70
Xeon Gold 5218
SE +/- 0.09, N = 3
156.30
Xeon Silver 4216
SE +/- 0.07, N = 3
177.77
Xeon Gold 6226R
SE +/- 0.05, N = 3
139.12
2 x Xeon Gold 6226R
SE +/- 0.16, N = 3
133.44
2 x Xeon Silver 4216
SE +/- 0.18, N = 3
169.70
Xeon W-3275M
SE +/- 0.08, N = 3
134.82
2 x Xeon Platinum 8275CL
SE +/- 0.37, N = 3
128.95
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.25, N = 3
145.51
EPYC 2 7R32
SE +/- 0.08, N = 3
108.68
2 x Xeon Platinum 8259CL
SE +/- 0.45, N = 3
129.69
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.27, N = 3
146.44
40
80
120
160
200

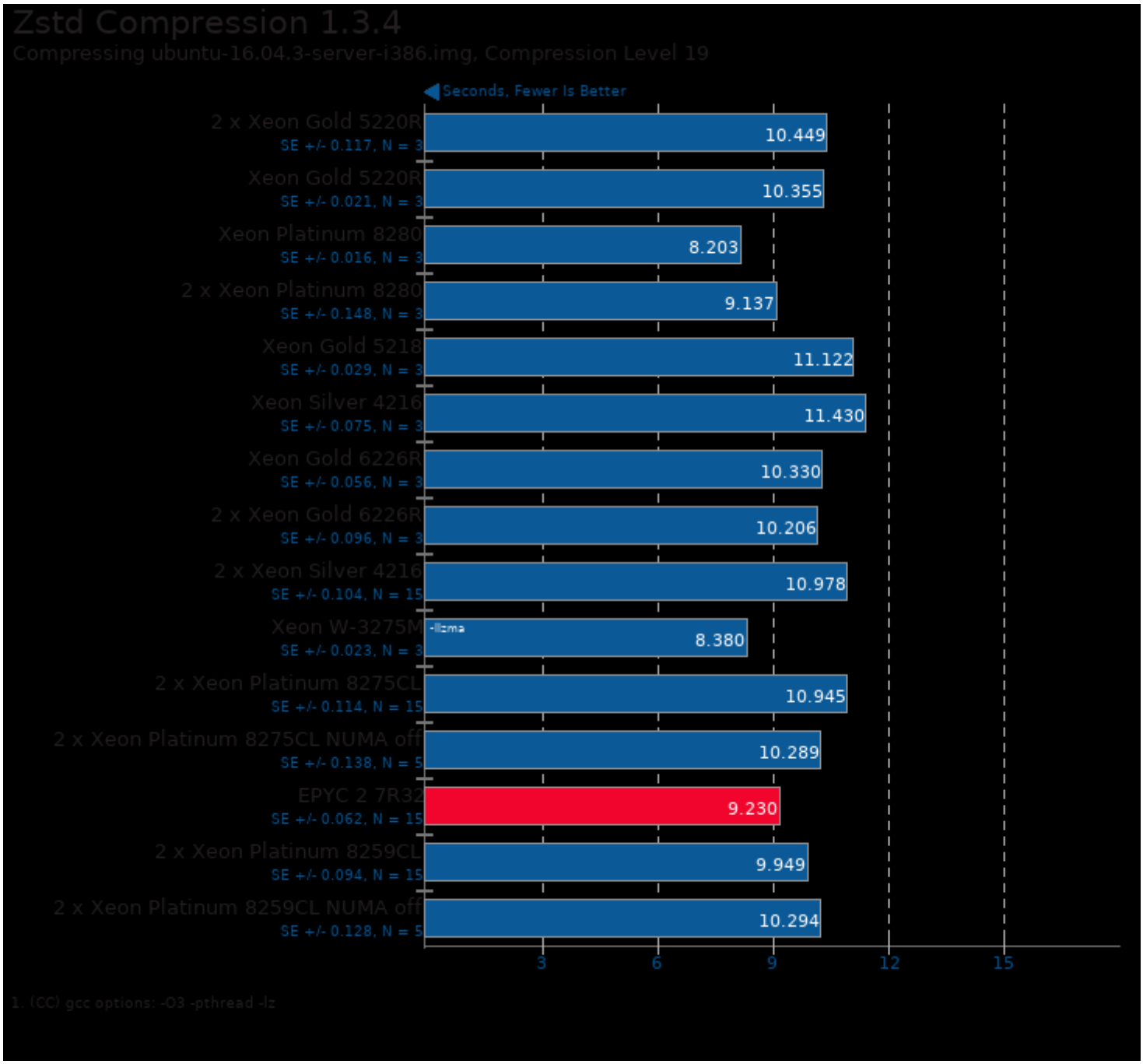

Timed Linux Kernel Compilation 5.4
Time To Compile
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.34, N = 10
36.70
Xeon Gold 5220R
SE +/- 0.87, N = 4
59.01
Xeon Platinum 8280
SE +/- 0.42, N = 8
40.90
2 x Xeon Platinum 8280
SE +/- 0.25, N = 14
27.31
Xeon Gold 5218
SE +/- 0.88, N = 4
67.16
Xeon Silver 4216
SE +/- 0.99, N = 4
71.77
Xeon Gold 6226R
SE +/- 0.88, N = 3
57.77
2 x Xeon Gold 6226R
SE +/- 0.37, N = 8
36.60
2 x Xeon Silver 4216
SE +/- 0.41, N = 10
45.32
Xeon W-3275M
SE +/- 0.35, N = 9
36.37
2 x Xeon Platinum 8275CL
SE +/- 0.24, N = 13
27.10
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.38, N = 14
29.26
EPYC 2 7R32
SE +/- 0.19, N = 13
24.01
2 x Xeon Platinum 8259CL
SE +/- 0.23, N = 14
27.58
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.37, N = 14
29.28
16
32
48
64
80


Timed LLVM Compilation 10.0
Time To Compile
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 2.03, N = 3
286.78
Xeon Gold 5220R
SE +/- 1.84, N = 3
430.43
Xeon Platinum 8280
SE +/- 4.79, N = 3
308.74
2 x Xeon Platinum 8280
SE +/- 1.01, N = 3
221.52
Xeon Gold 5218
SE +/- 3.37, N = 3
501.22
Xeon Silver 4216
SE +/- 2.53, N = 3
531.15
Xeon Gold 6226R
SE +/- 2.13, N = 3
433.19
2 x Xeon Gold 6226R
SE +/- 3.51, N = 3
279.68
2 x Xeon Silver 4216
SE +/- 1.73, N = 3
347.83
Xeon W-3275M
SE +/- 2.68, N = 3
281.68
2 x Xeon Platinum 8275CL
SE +/- 1.63, N = 3
218.05
2 x Xeon Platinum 8275CL NUMA off
SE +/- 3.50, N = 3
244.91
EPYC 2 7R32
SE +/- 0.72, N = 3
200.04
2 x Xeon Platinum 8259CL
SE +/- 1.13, N = 3
232.05
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.40, N = 3
244.94
110
220
330
440
550

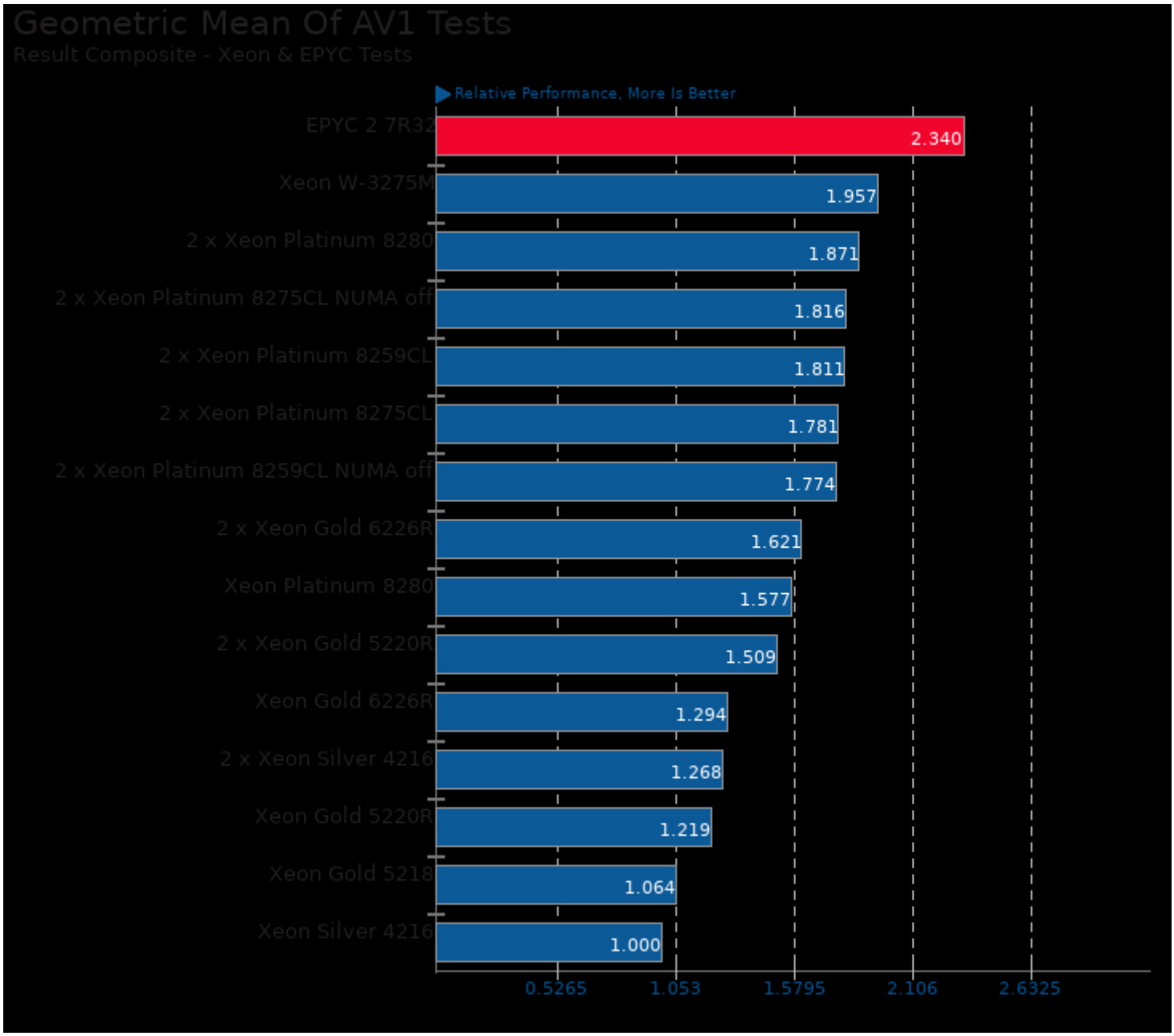

Timed MrBayes Analysis 3.2.7
Primate Phylogeny Analysis
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.27, N = 3
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -mmpx
134.93
Xeon Gold 5220R
SE +/- 0.03, N = 3
134.48
Xeon Platinum 8280
SE +/- 0.01, N = 3
128.85
2 x Xeon Platinum 8280
SE +/- 0.37, N = 3
129.99
Xeon Gold 5218
SE +/- 0.44, N = 3
147.73
Xeon Silver 4216
SE +/- 0.15, N = 3
193.47
Xeon Gold 6226R
SE +/- 0.09, N = 3
123.70
2 x Xeon Gold 6226R
SE +/- 0.25, N = 3
124.26
2 x Xeon Silver 4216
SE +/- 0.67, N = 3
194.50
Xeon W-3275M
SE +/- 0.13, N = 3
-mavx512f -mavx512cd -mavx512vl -mavx512bw -mavx512dq -mmpx -lreadline
143.35
2 x Xeon Platinum 8275CL
SE +/- 1.63, N = 5
125.87
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03, N = 3
124.30
EPYC 2 7R32
SE +/- 0.68, N = 3
-msse4a -msha
92.36
2 x Xeon Platinum 8259CL
SE +/- 0.32, N = 3
139.75
2 x Xeon Platinum 8259CL NUMA off
SE +/- 1.87, N = 3
141.90
40
80
120
160
200
1. (CC) gcc options: -mmmx -msse -msse2 -msse3 -mssse3 -msse4.1 -msse4.2 -maes -mavx -mfma -mavx2 -mrdrnd -mbmi -mbmi2 -madx -mabm -O3 -std


Tungsten Renderer 0.2.2
Scene: Hair
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.03810, N = 3
11.07260
Xeon Gold 5220R
SE +/- 0.03525, N = 3
18.98400
Xeon Platinum 8280
SE +/- 0.03914, N = 3
12.68630
2 x Xeon Platinum 8280
SE +/- 0.11249, N = 3
7.82706
Xeon Gold 5218
SE +/- 0.02235, N = 3
22.48660
Xeon Silver 4216
SE +/- 0.12220, N = 3
23.61290
Xeon Gold 6226R
SE +/- 0.06005, N = 3
18.61290
2 x Xeon Gold 6226R
SE +/- 0.05690, N = 3
10.66530
2 x Xeon Silver 4216
SE +/- 0.06619, N = 3
13.60310
Xeon W-3275M
SE +/- 0.05256, N = 3
12.71040
2 x Xeon Platinum 8275CL
SE +/- 0.03608, N = 3
8.29067
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.03939, N = 3
8.19337
EPYC 2 7R32
SE +/- 0.05445, N = 3
7.67455
2 x Xeon Platinum 8259CL
SE +/- 0.05659, N = 3
9.26217
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.05235, N = 3
9.09073
6
12
18
24
30

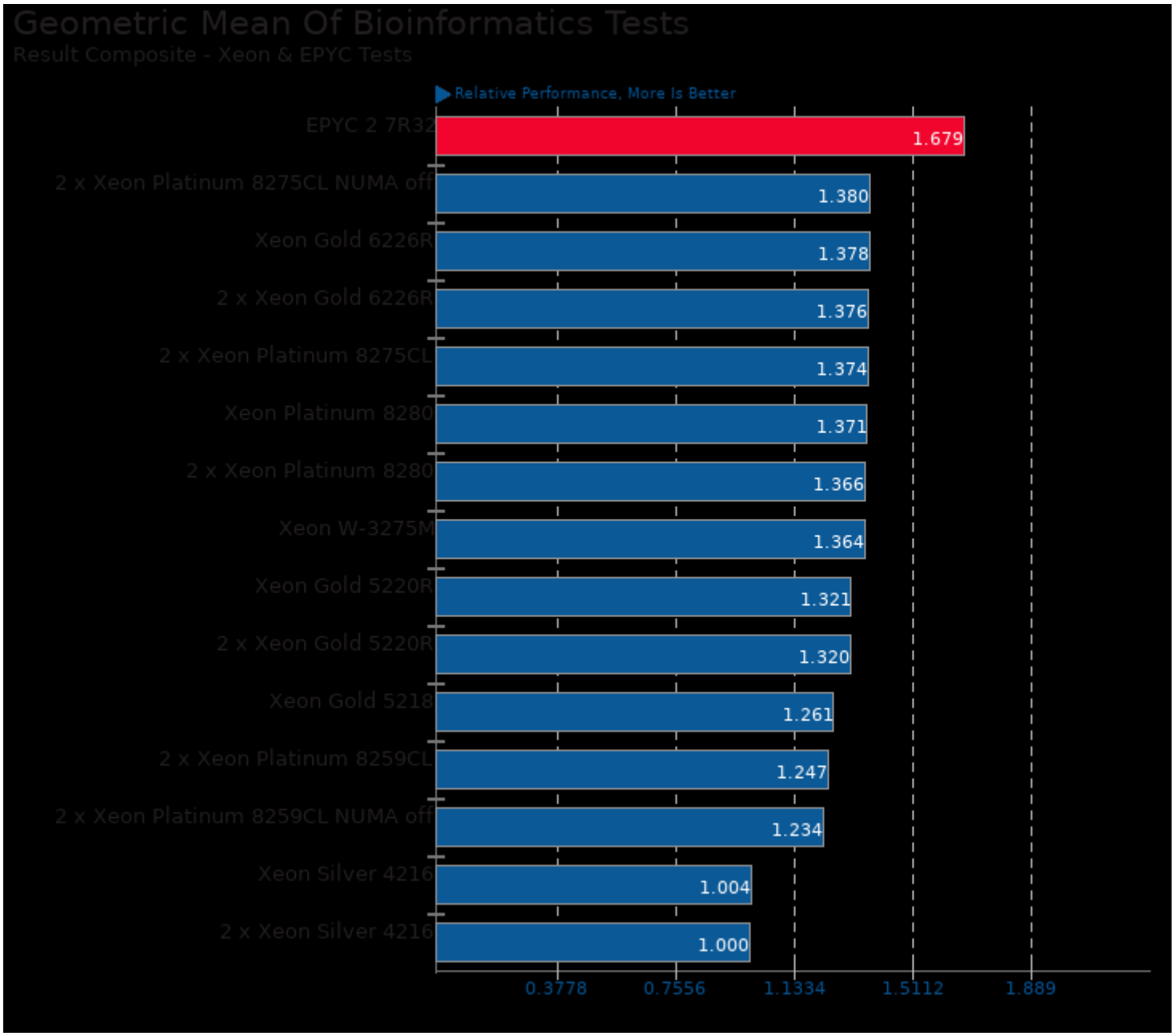

Tungsten Renderer 0.2.2
Scene: Water Caustic
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.04, N = 3
23.34
Xeon Gold 5220R
SE +/- 0.07, N = 3
25.01
Xeon Platinum 8280
SE +/- 0.08, N = 3
22.02
2 x Xeon Platinum 8280
SE +/- 0.06, N = 3
21.59
Xeon Gold 5218
SE +/- 0.02, N = 3
25.96
Xeon Silver 4216
SE +/- 0.12, N = 3
28.90
Xeon Gold 6226R
SE +/- 0.07, N = 3
24.09
2 x Xeon Gold 6226R
SE +/- 0.05, N = 3
23.19
2 x Xeon Silver 4216
SE +/- 0.03, N = 3
27.39
Xeon W-3275M
SE +/- 0.10, N = 3
21.55
2 x Xeon Platinum 8275CL
SE +/- 0.12, N = 3
22.76
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.07, N = 3
22.71
EPYC 2 7R32
SE +/- 0.02, N = 3
22.32
2 x Xeon Platinum 8259CL
SE +/- 0.09, N = 3
24.54
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.17, N = 3
24.78
7
14
21
28
35


Zstd Compression 1.3.4
Compressing ubuntu-16.04.3-server-i386.img, Compression Level 19
Seconds, Fewer Is Better
2 x Xeon Gold 5220R
SE +/- 0.117, N = 3
10.449
Xeon Gold 5220R
SE +/- 0.021, N = 3
10.355
Xeon Platinum 8280
SE +/- 0.016, N = 3
8.203
2 x Xeon Platinum 8280
SE +/- 0.148, N = 3
9.137
Xeon Gold 5218
SE +/- 0.029, N = 3
11.122
Xeon Silver 4216
SE +/- 0.075, N = 3
11.430
Xeon Gold 6226R
SE +/- 0.056, N = 3
10.330
2 x Xeon Gold 6226R
SE +/- 0.096, N = 3
10.206
2 x Xeon Silver 4216
SE +/- 0.104, N = 15
10.978
Xeon W-3275M
SE +/- 0.023, N = 3
-llzma
8.380
2 x Xeon Platinum 8275CL
SE +/- 0.114, N = 15
10.945
2 x Xeon Platinum 8275CL NUMA off
SE +/- 0.138, N = 5
10.289
EPYC 2 7R32
SE +/- 0.062, N = 15
9.230
2 x Xeon Platinum 8259CL
SE +/- 0.094, N = 15
9.949
2 x Xeon Platinum 8259CL NUMA off
SE +/- 0.128, N = 5
10.294
3
6
9
12
15
1. (CC) gcc options: -O3 -pthread -lz

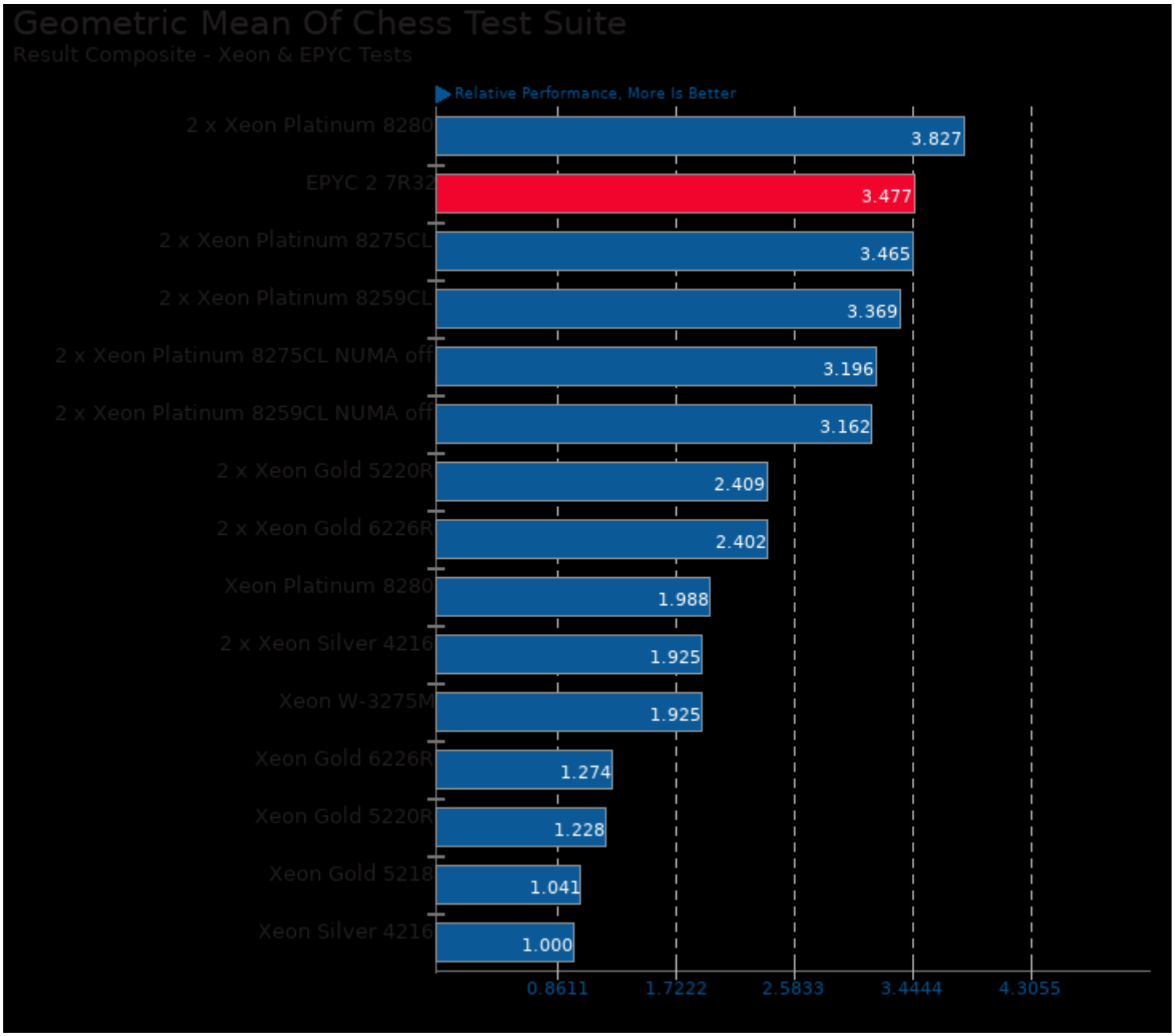
These geometric means are based upon test groupings / test suites for this result file.



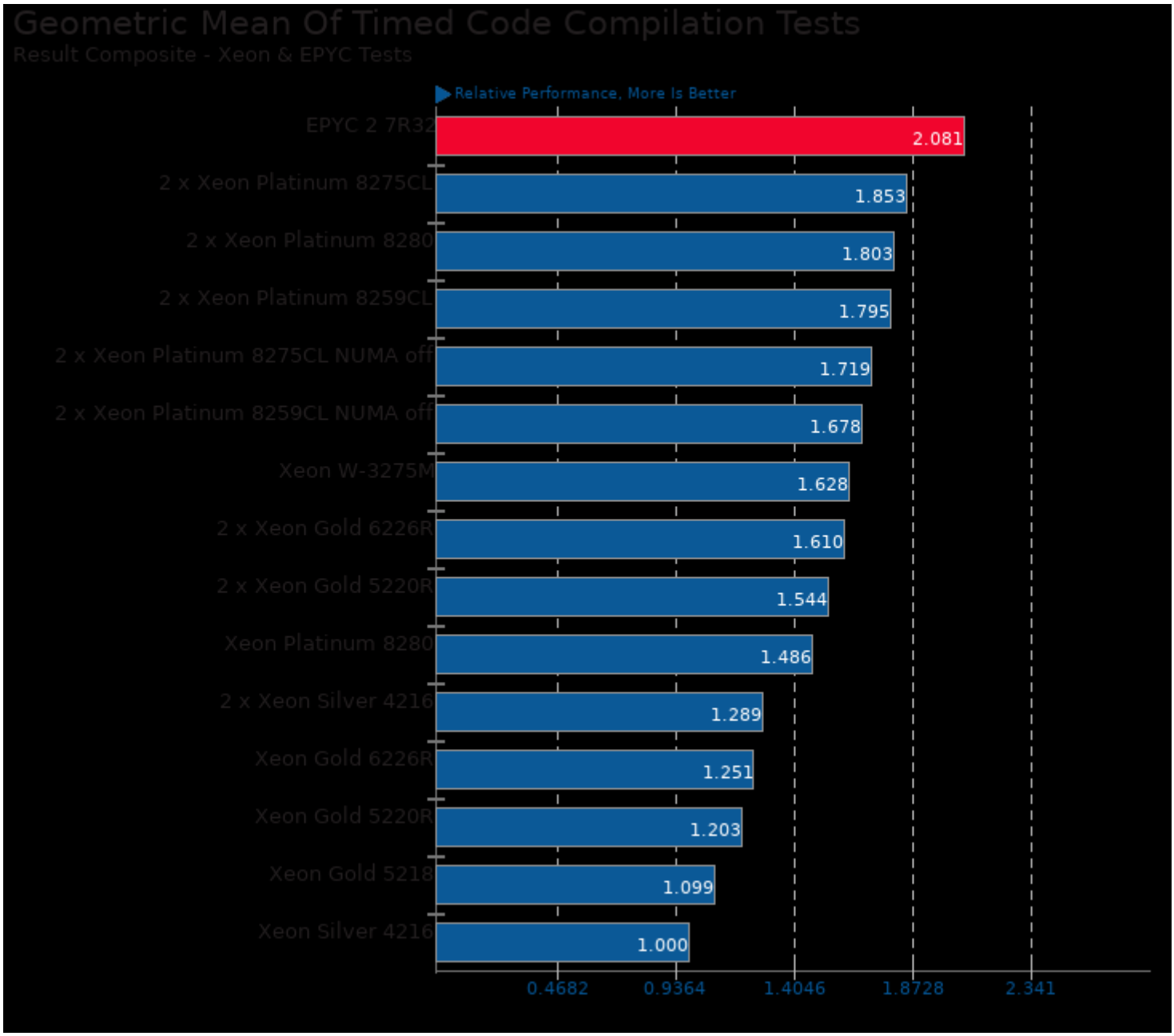
Geometric mean based upon tests: pts/dav1d and pts/svt-av1



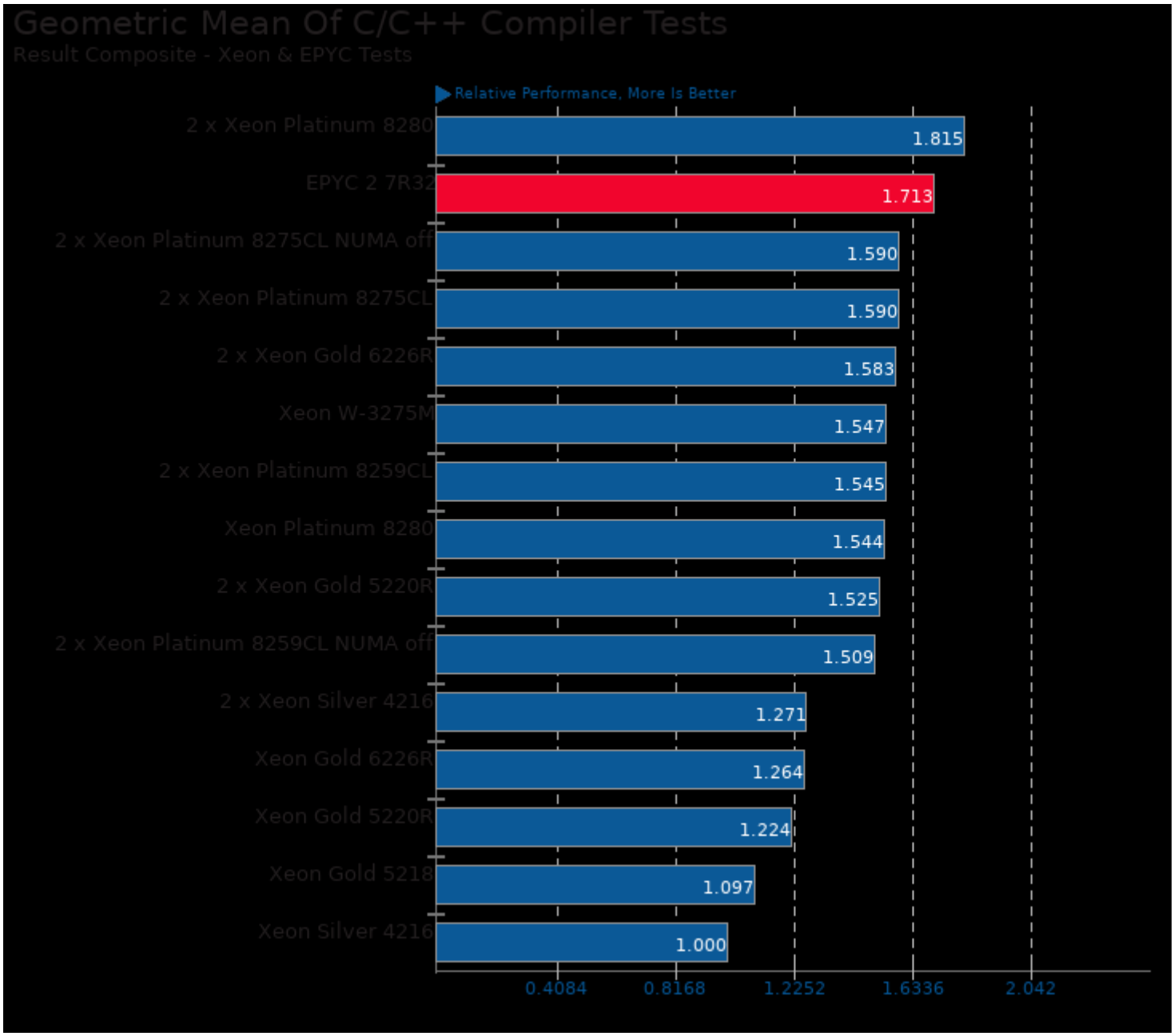
Geometric mean based upon tests: pts/himeno and pts/mrbayes



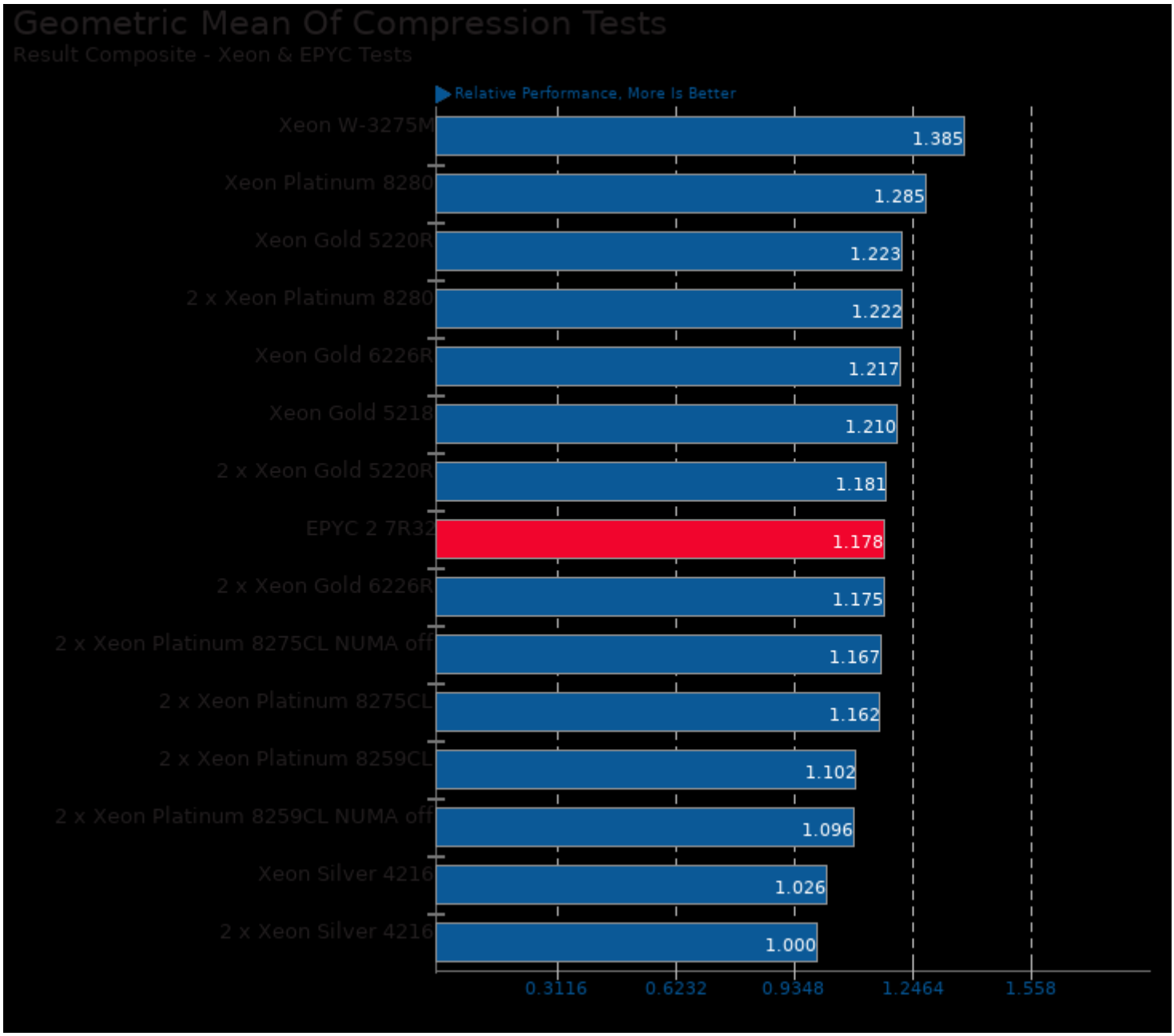
Geometric mean based upon tests: pts/stockfish and pts/asmfish



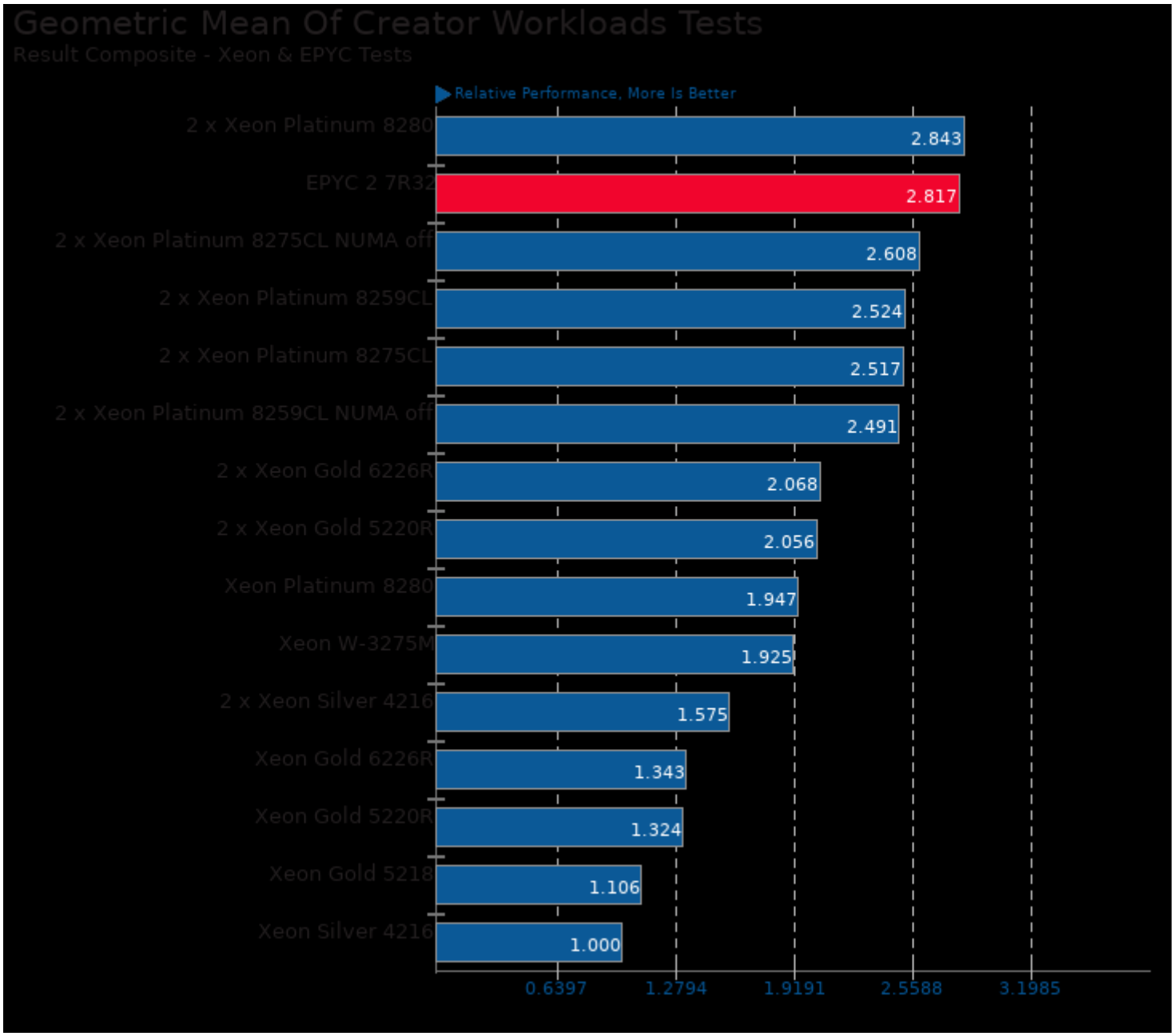
Geometric mean based upon tests: pts/build-linux-kernel, pts/build-gcc, pts/build-gdb, pts/build-llvm and pts/build2



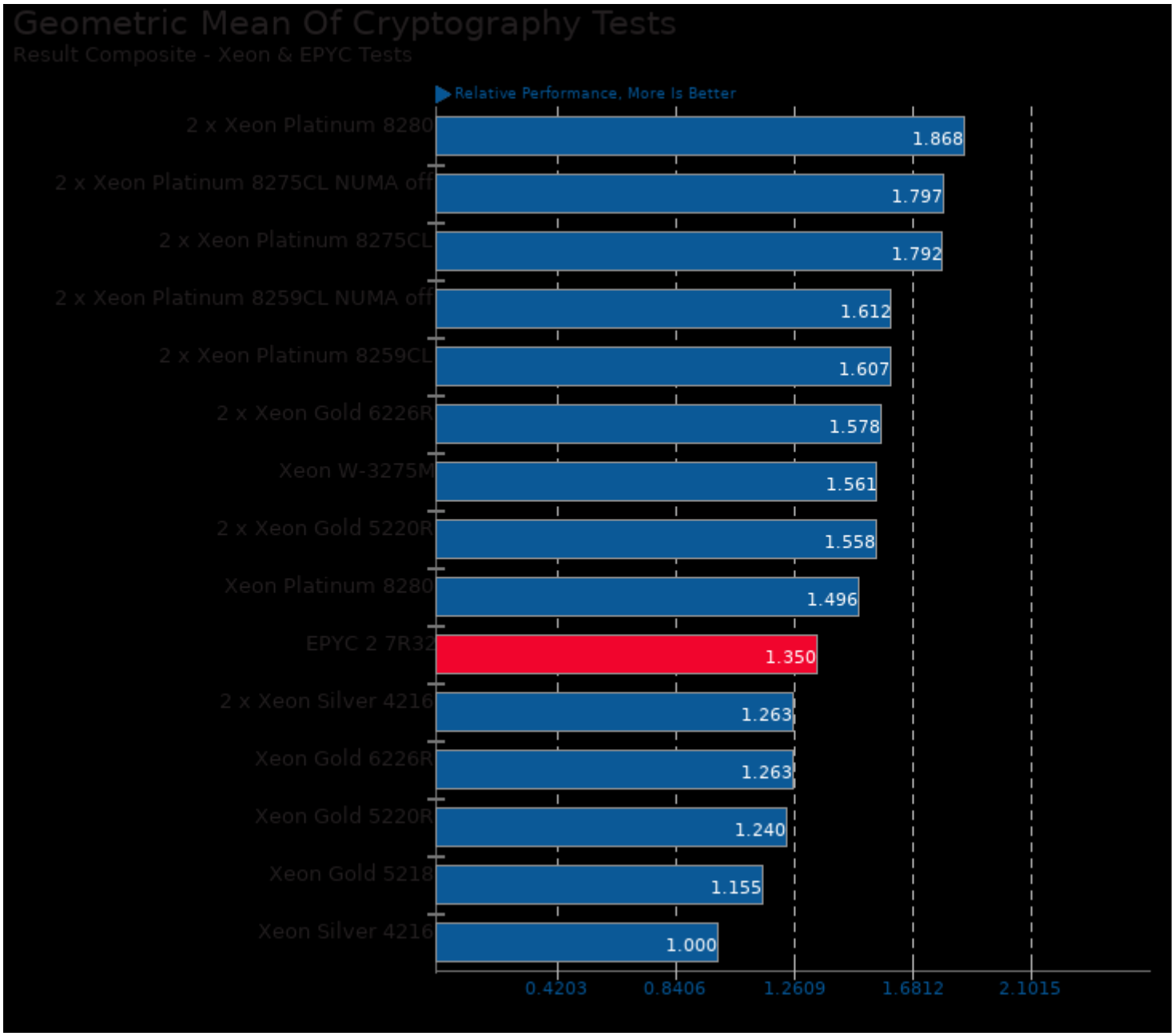
Geometric mean based upon tests: pts/himeno, pts/stockfish, pts/build-llvm, pts/pgbench, pts/mrbayes, pts/john-the-ripper, pts/dav1d, pts/tungsten, pts/compress-zstd, pts/lammps, pts/svt-av1, pts/svt-vp9, pts/build-gdb, pts/smhasher, pts/basis and pts/nettle



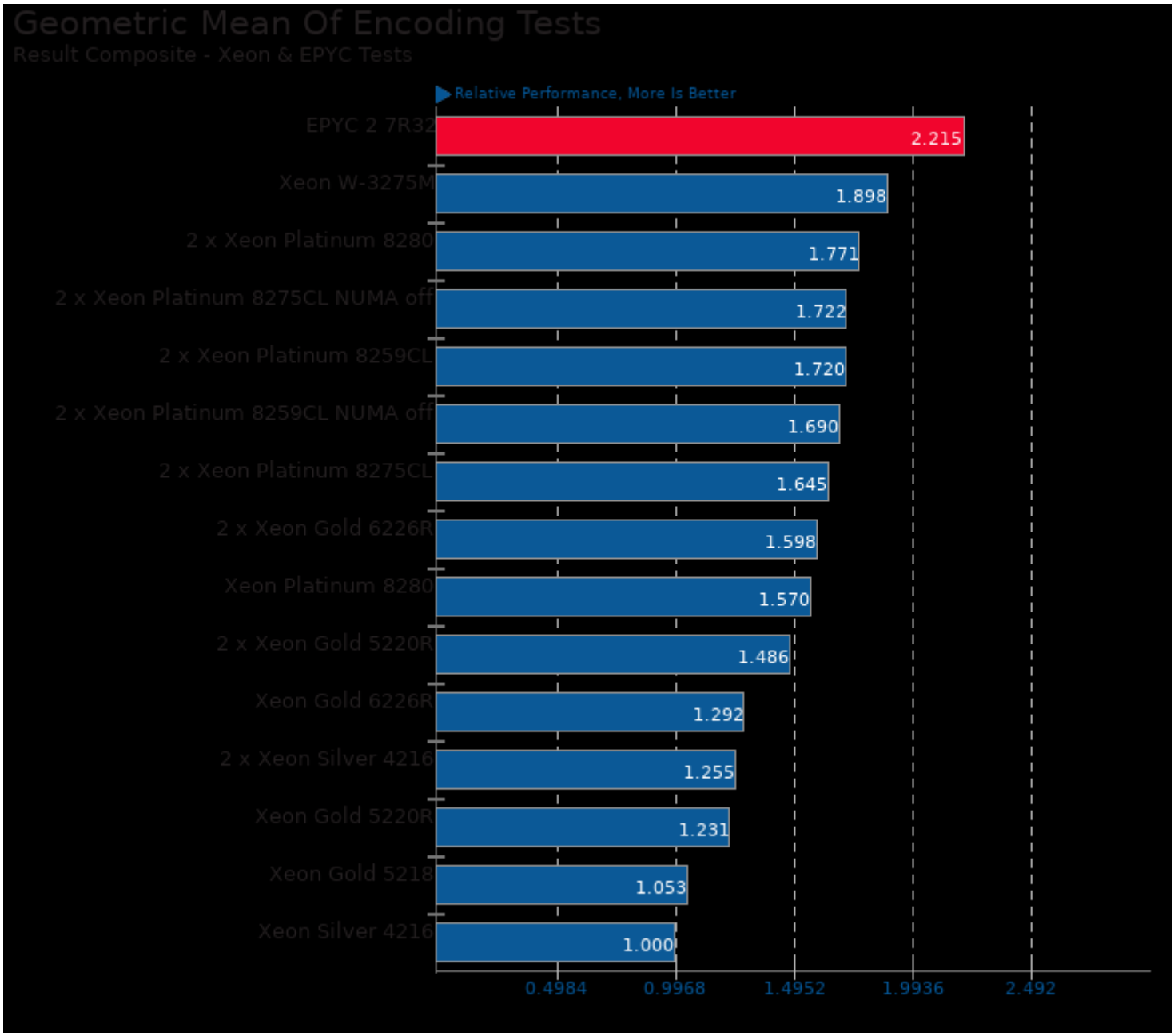
Geometric mean based upon tests: pts/compress-zstd and pts/lzbench



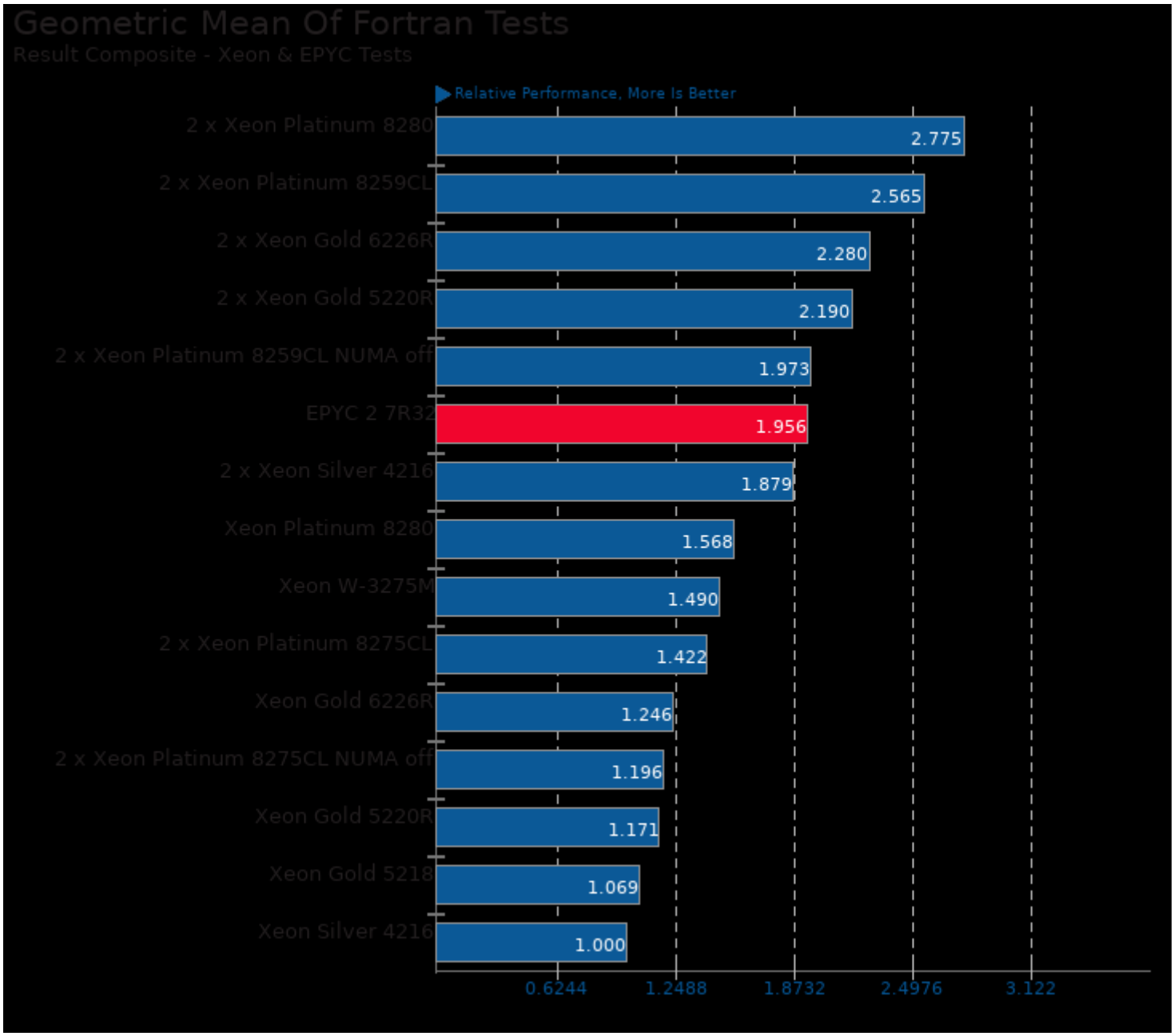
Geometric mean based upon tests: pts/ospray, pts/blender, pts/tungsten, pts/appleseed, pts/radiance, pts/luxcorerender, pts/v-ray, pts/svt-vp9, pts/dav1d, pts/svt-av1, pts/embree, pts/oidn, pts/basis and pts/deepspeech



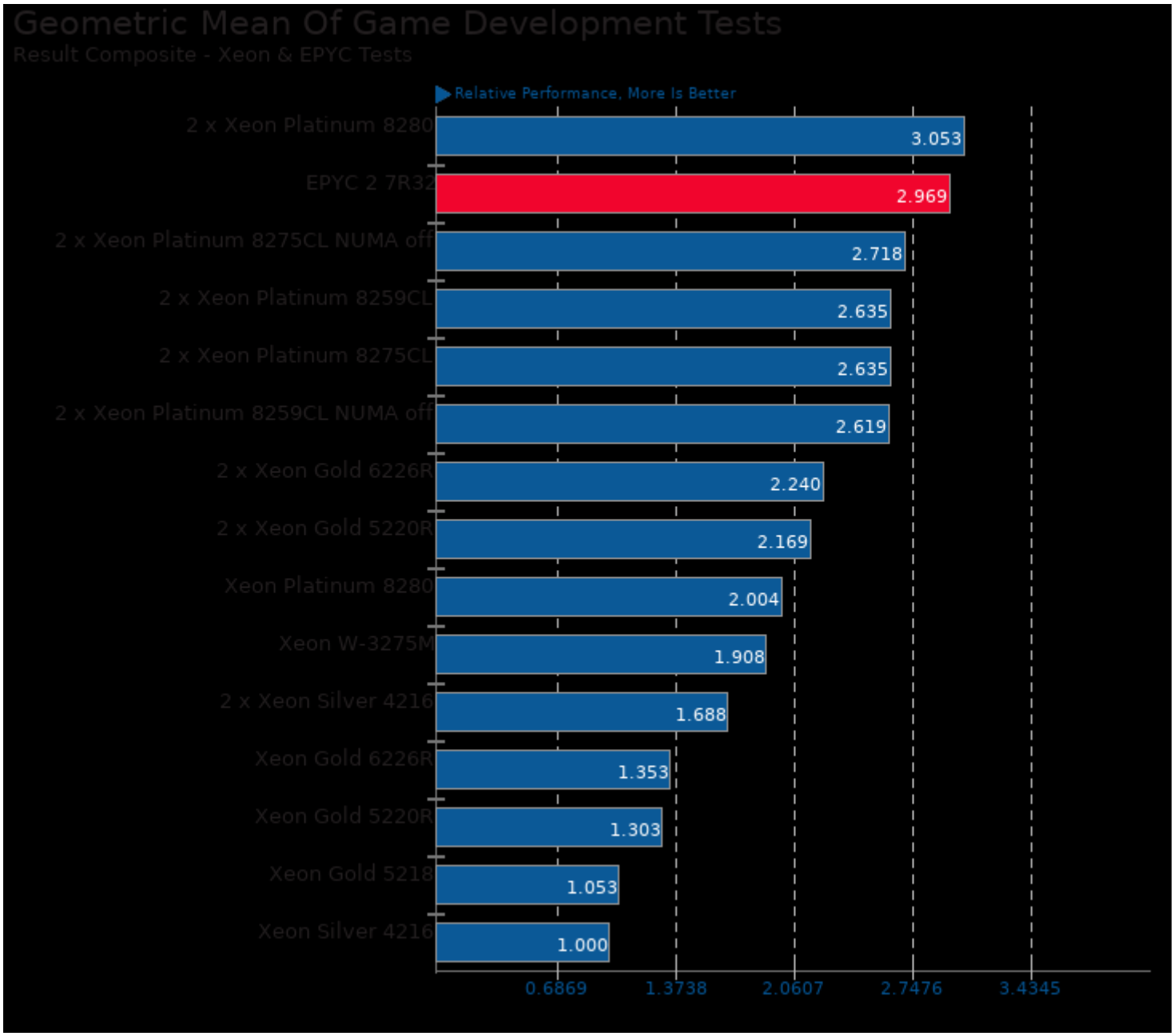
Geometric mean based upon tests: pts/john-the-ripper, pts/smhasher and pts/nettle



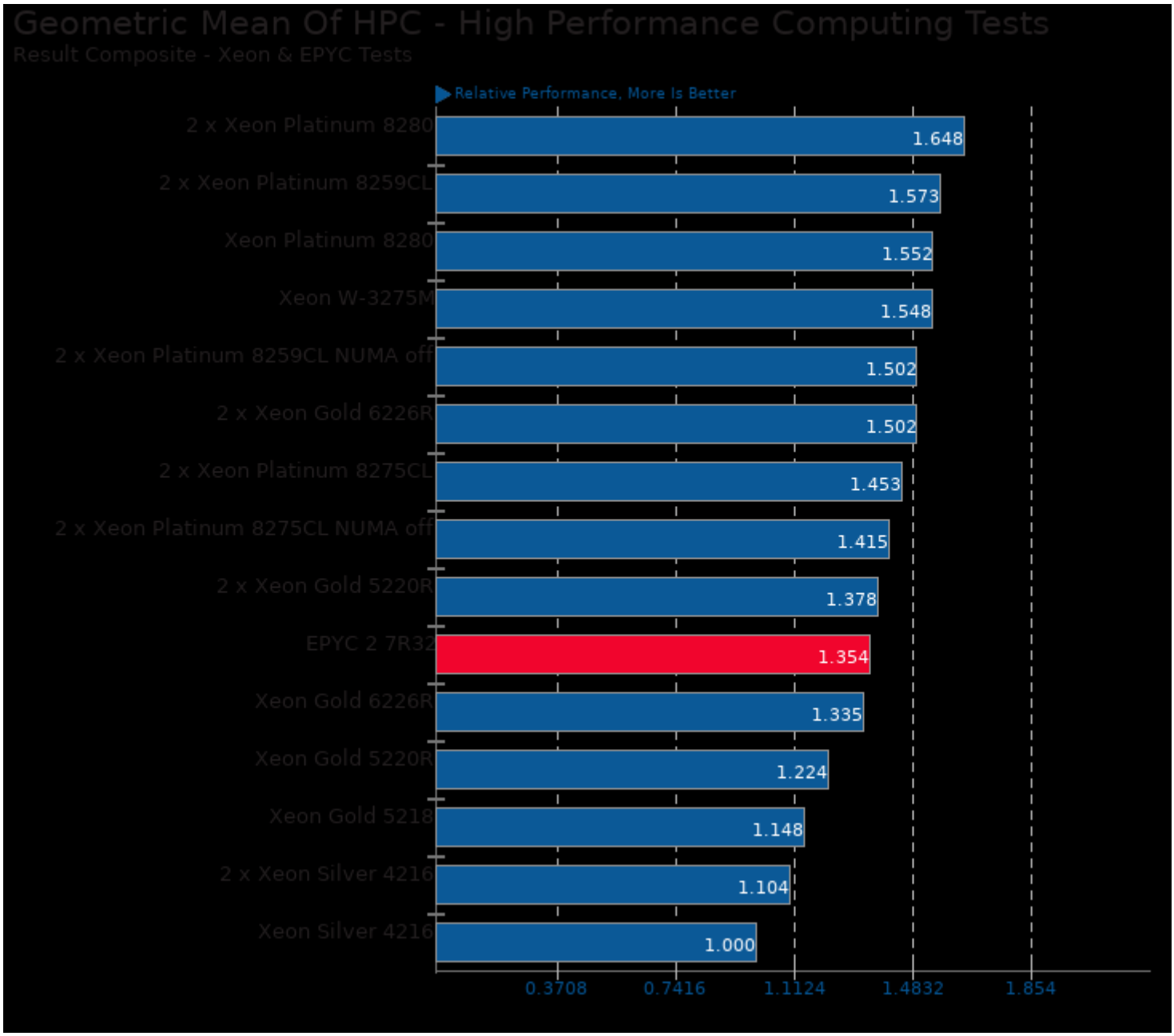
Geometric mean based upon tests: pts/svt-vp9, pts/dav1d and pts/svt-av1



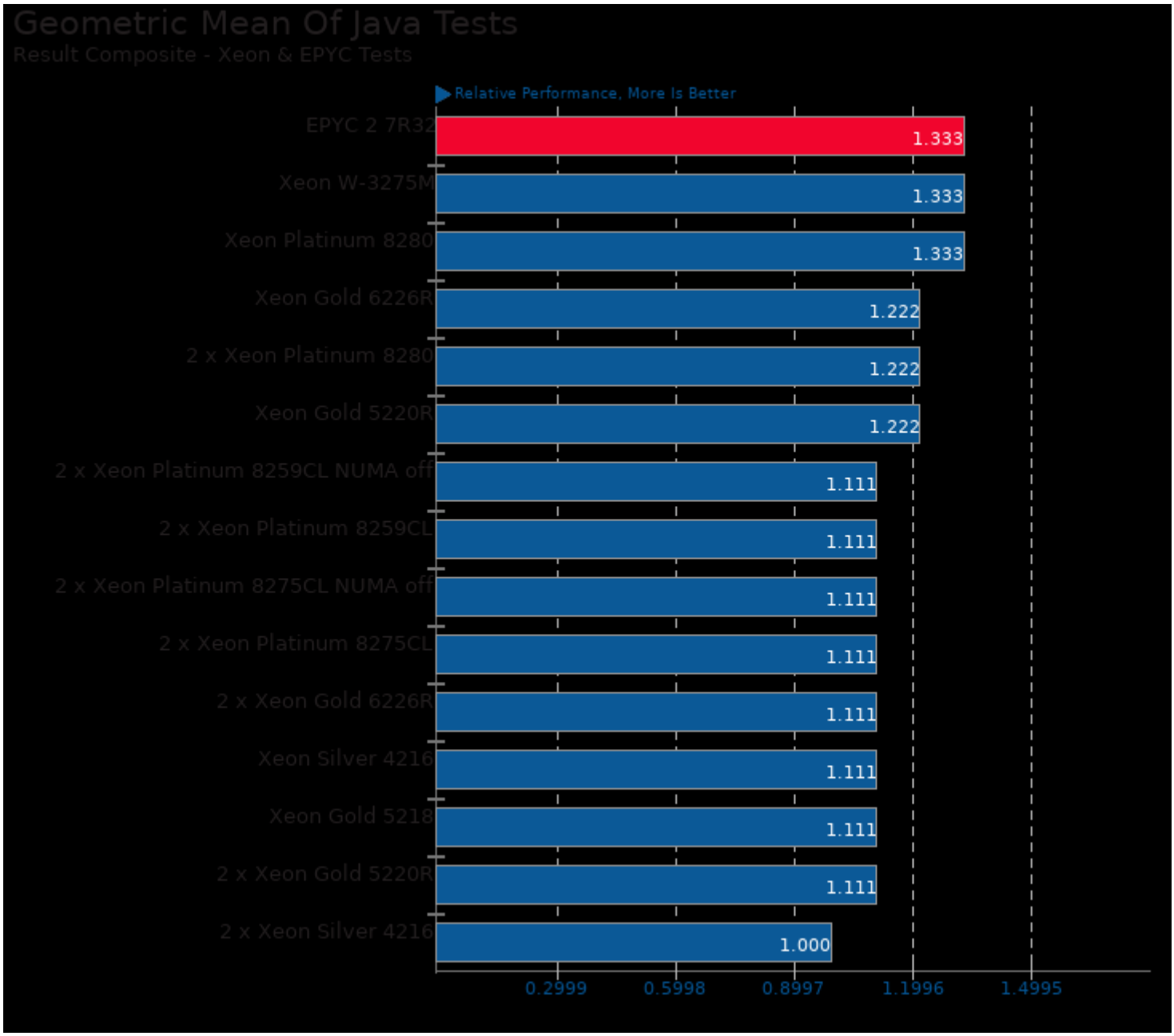
Geometric mean based upon tests: pts/cloverleaf, pts/hpcg, pts/lammps and pts/npb



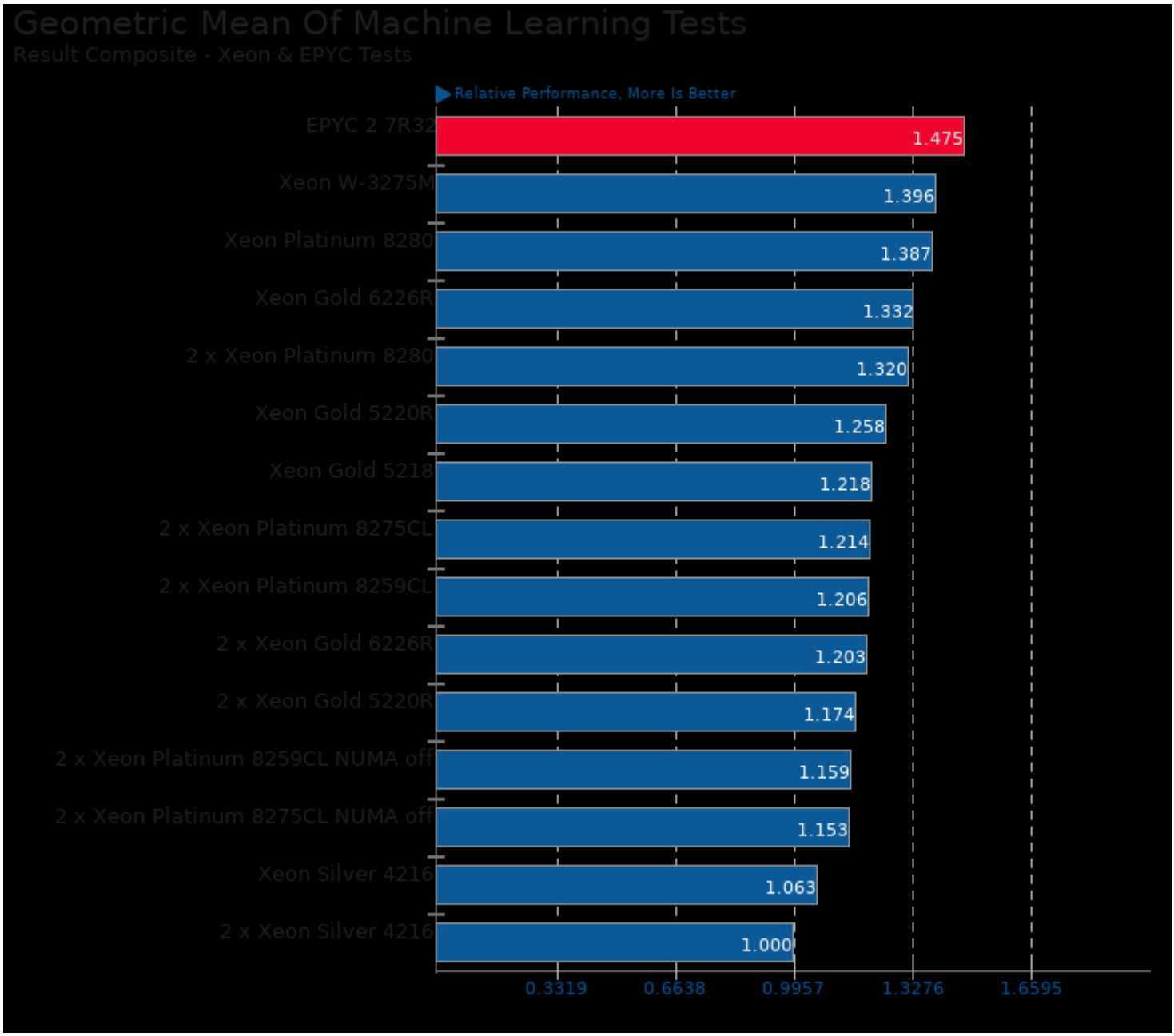
Geometric mean based upon tests: pts/basis, pts/blender and pts/oidn



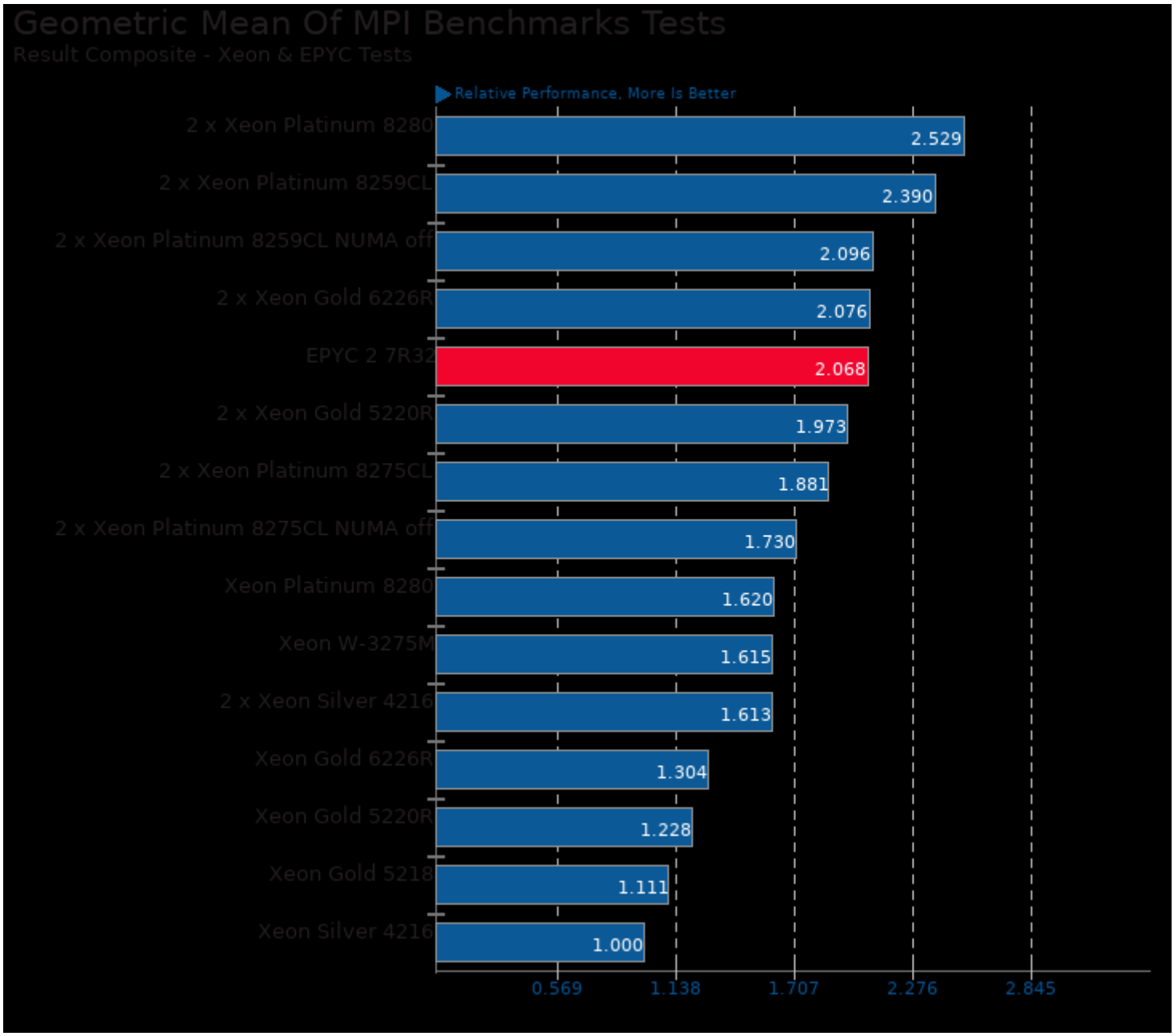
Geometric mean based upon tests: pts/npb, pts/hpcg, pts/intel-mpi, pts/arrayfire, pts/namd, pts/cloverleaf, pts/lammps, pts/himeno, pts/mrbayes, pts/numpy, pts/deepspeech, pts/scikit-learn and pts/mlpack



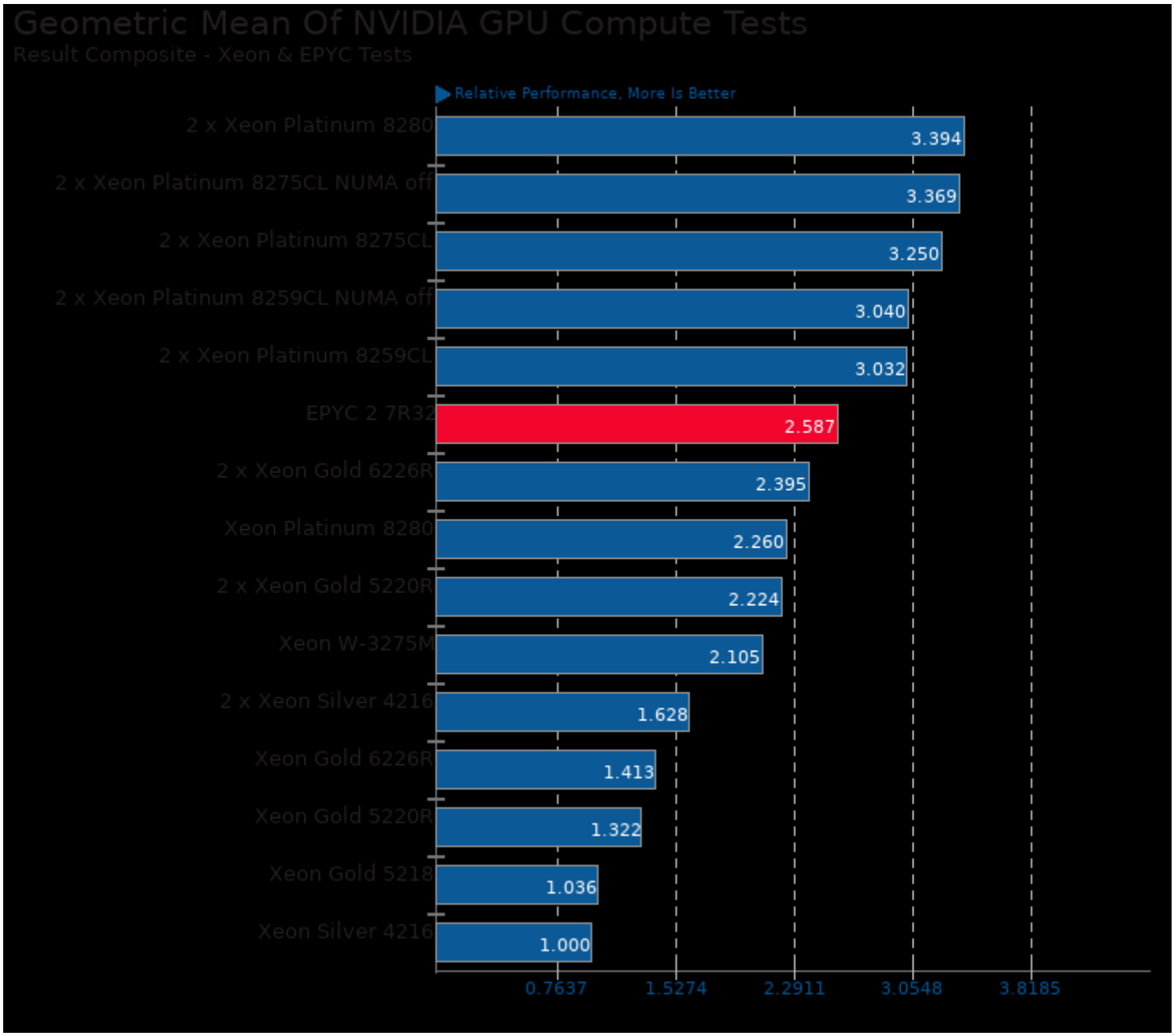
Geometric mean based upon tests: pts/dacapobench and pts/renaissance



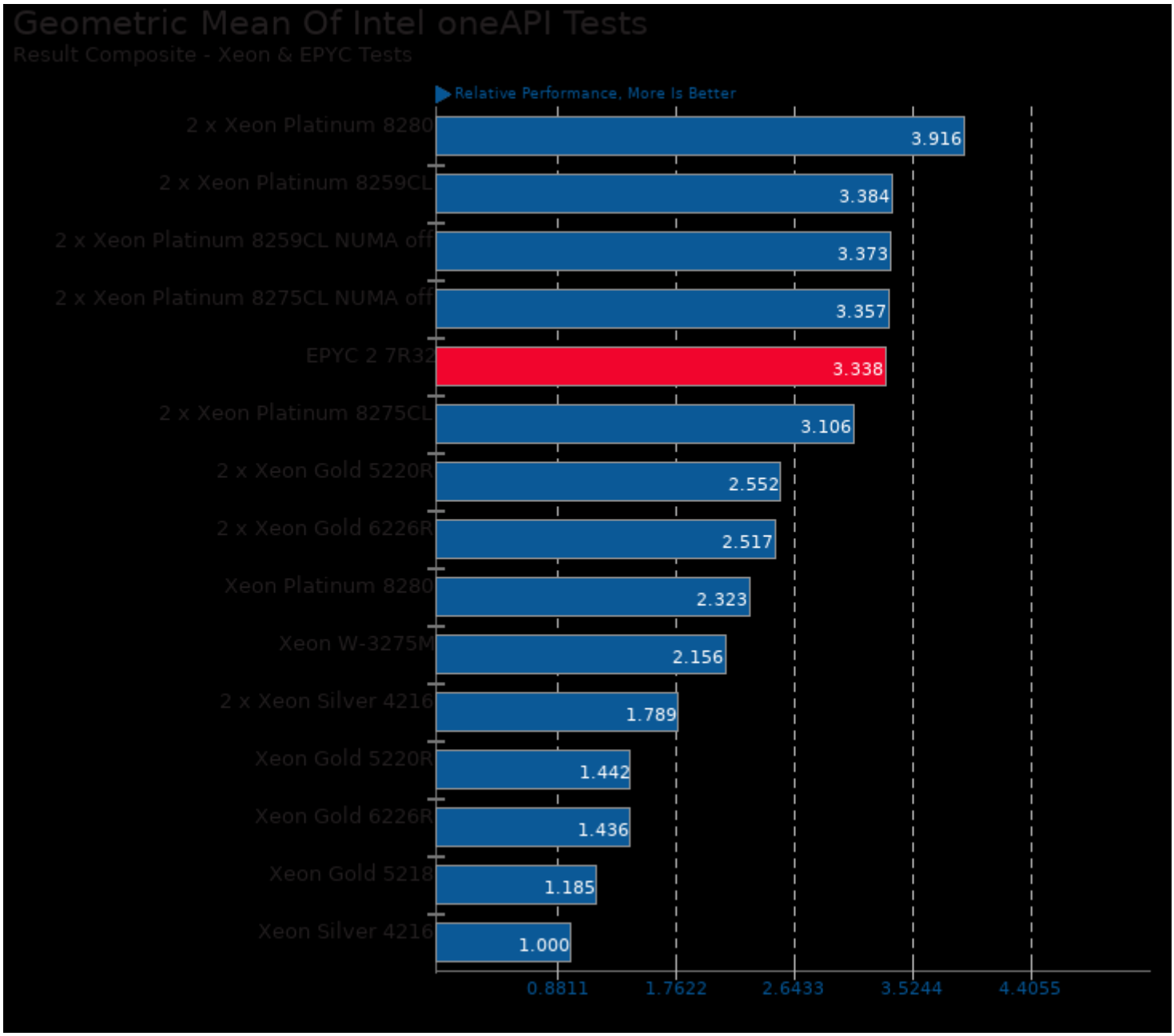
Geometric mean based upon tests: pts/numpy, pts/deepspeech, pts/scikit-learn and pts/mlpack



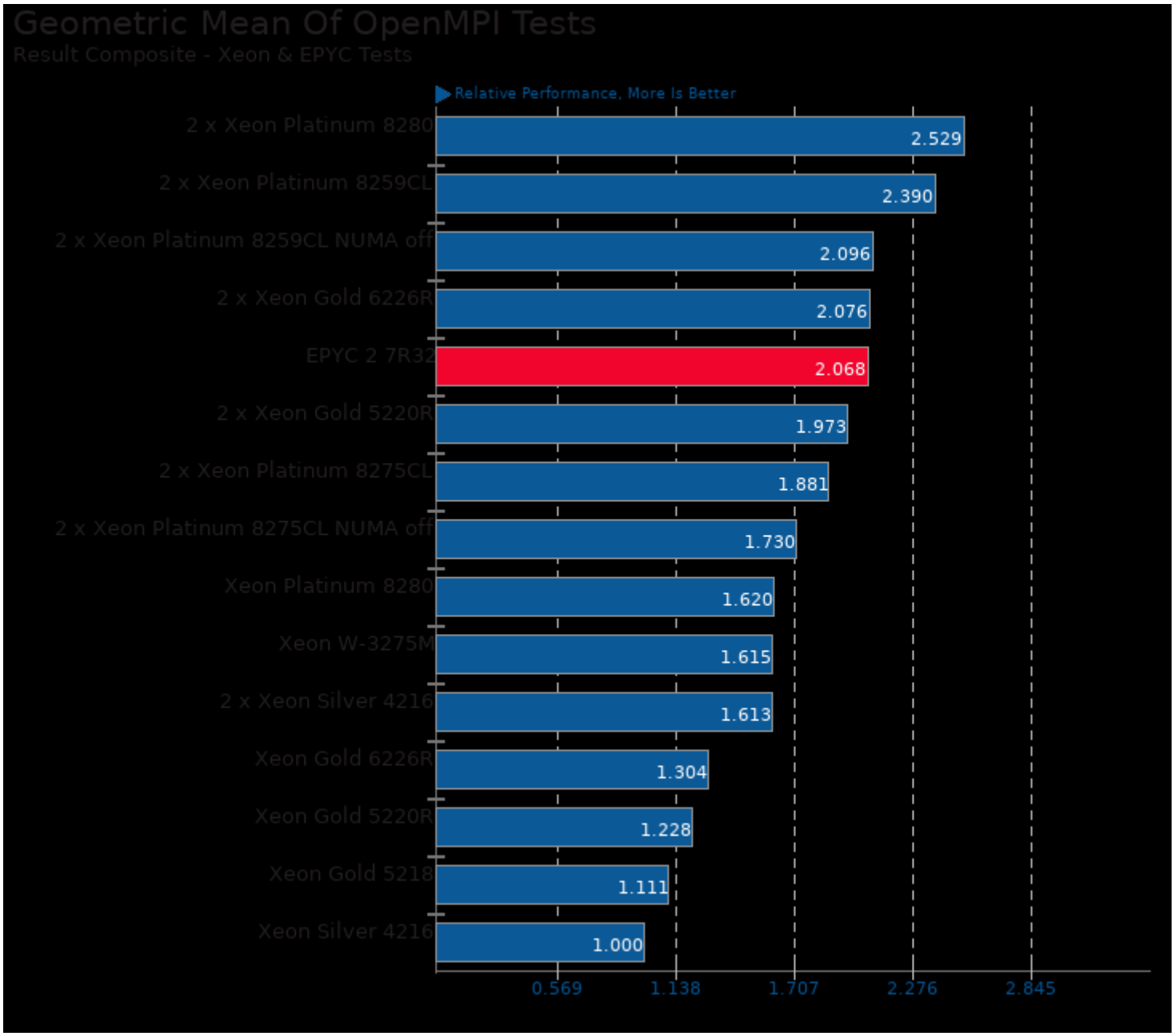
Geometric mean based upon tests: pts/lammps, pts/intel-mpi, pts/hpcg, pts/mrbayes and pts/npb



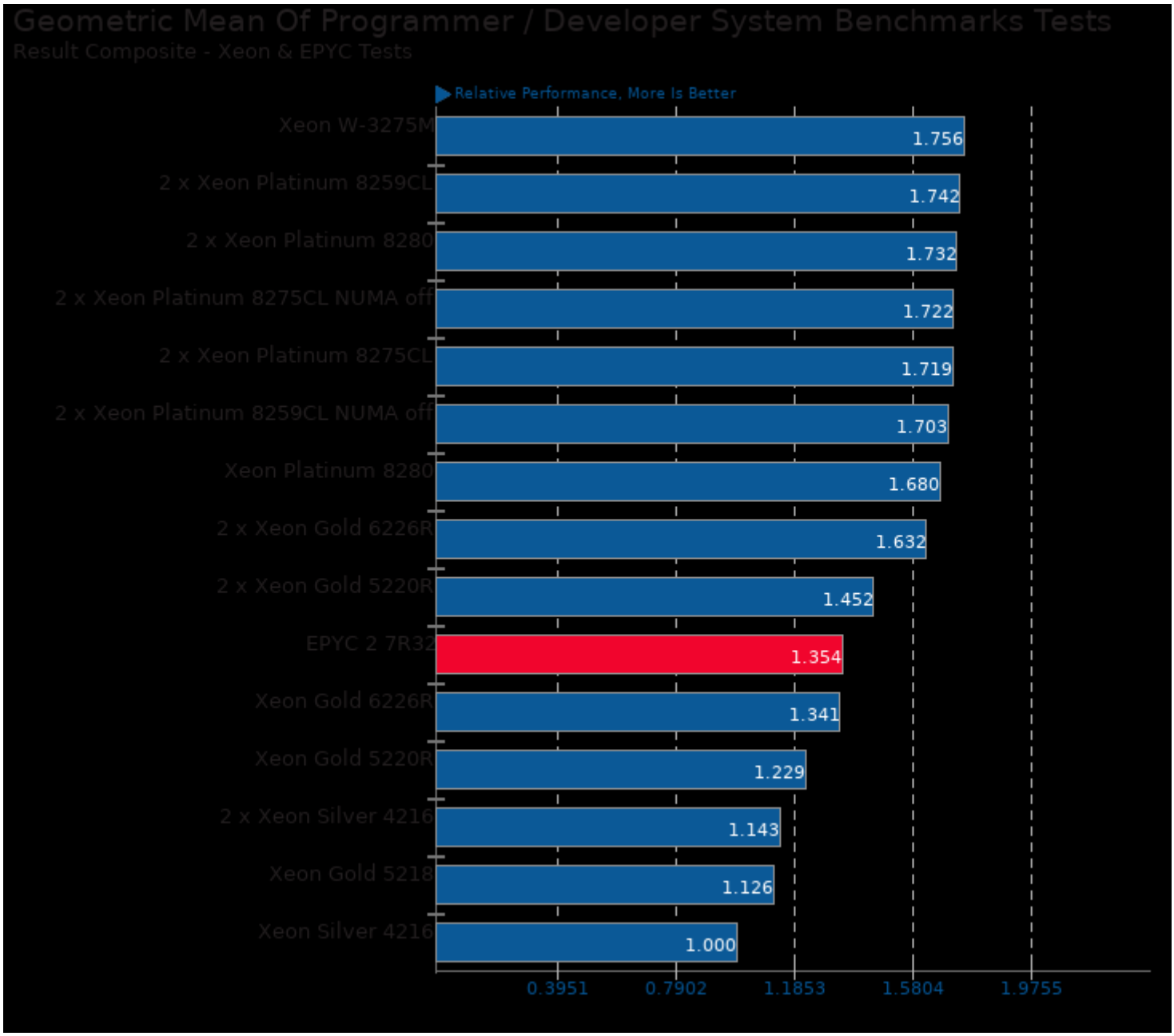
Geometric mean based upon tests: pts/luxcorerender, pts/arrayfire, pts/v-ray and pts/blender



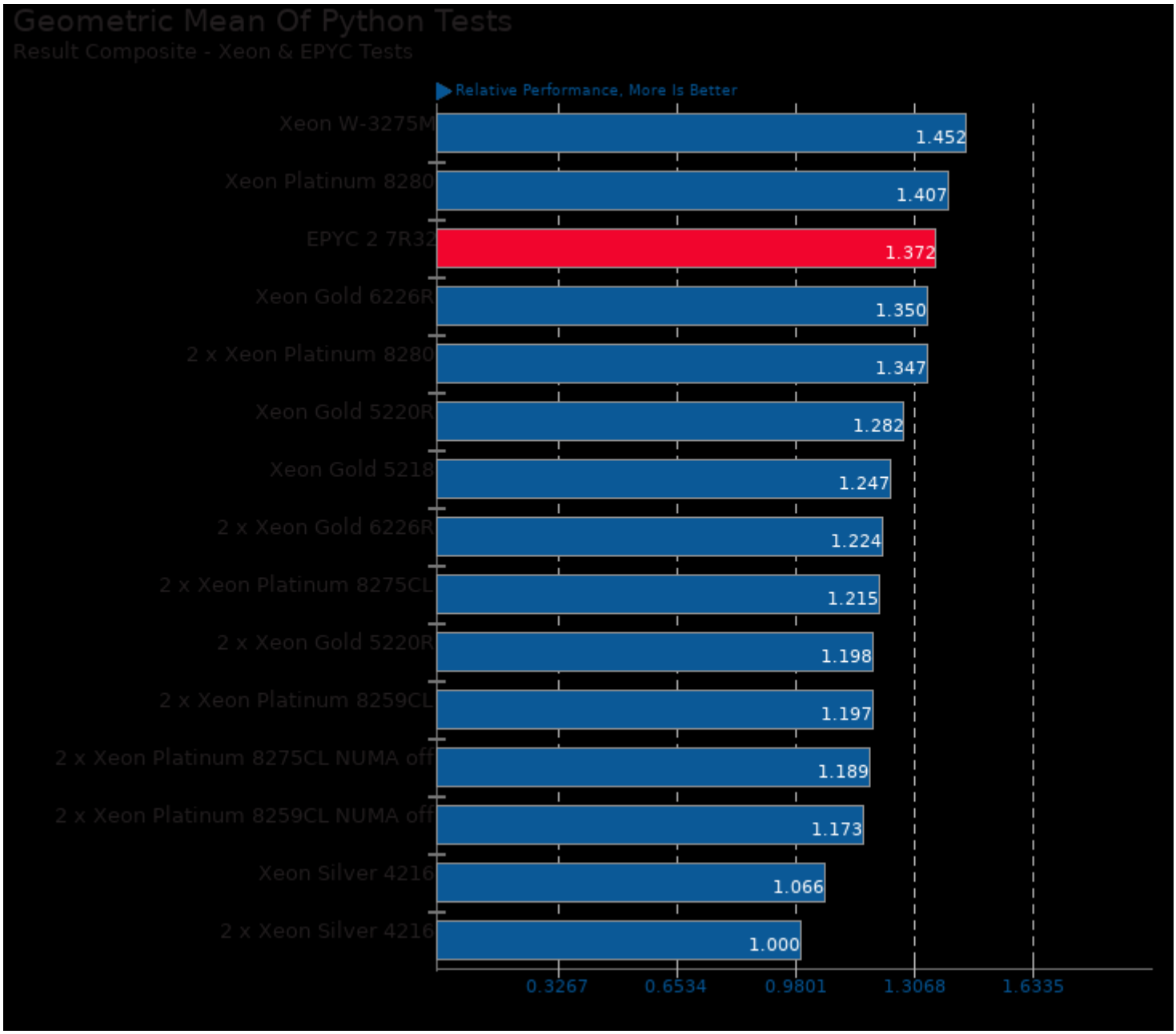
Geometric mean based upon tests: pts/embree, pts/oidn, pts/ospray and pts/tungsten



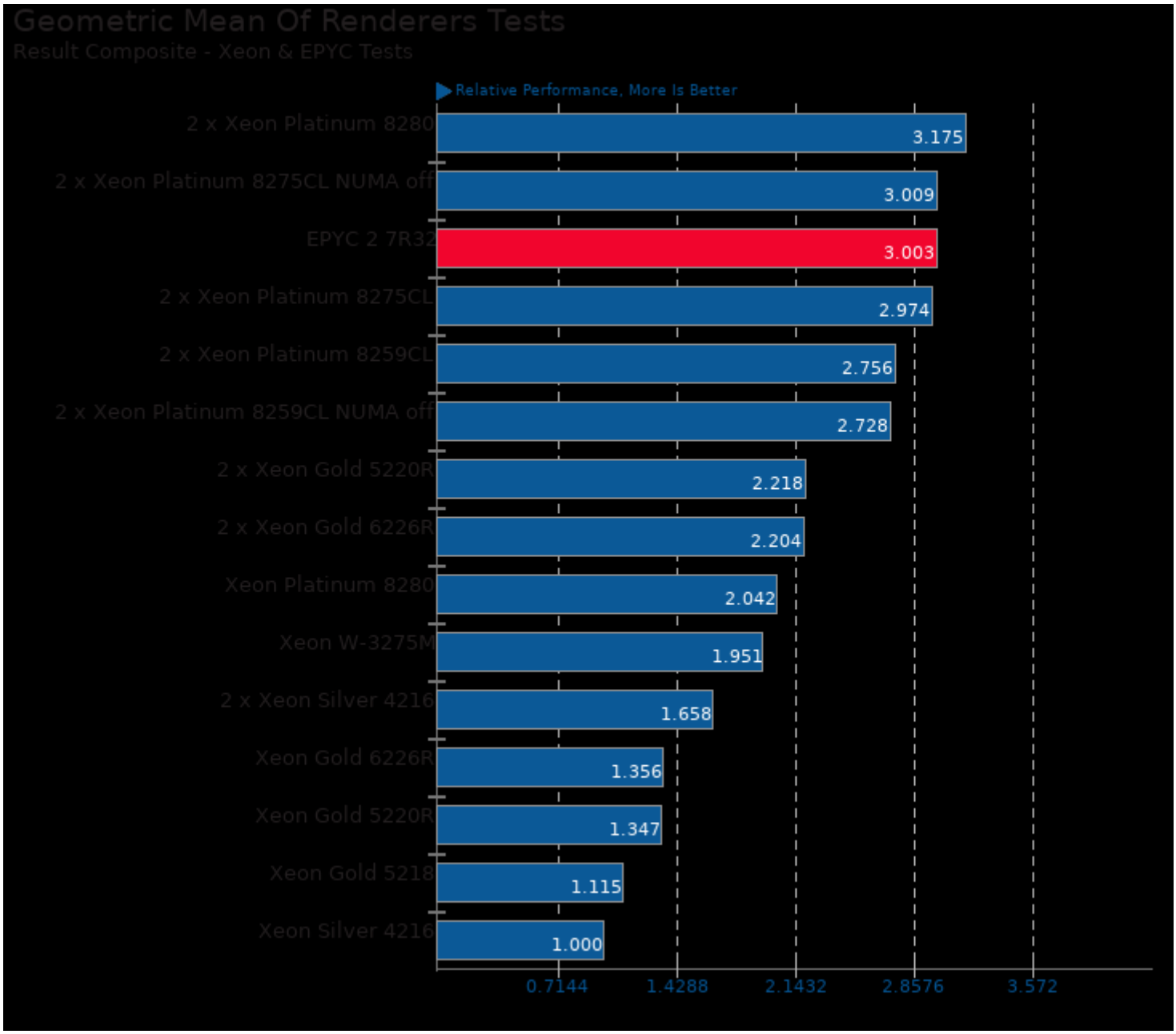
Geometric mean based upon tests: pts/cloverleaf, pts/hpcg, pts/intel-mpi, pts/lammps, pts/npb and pts/mrbayes



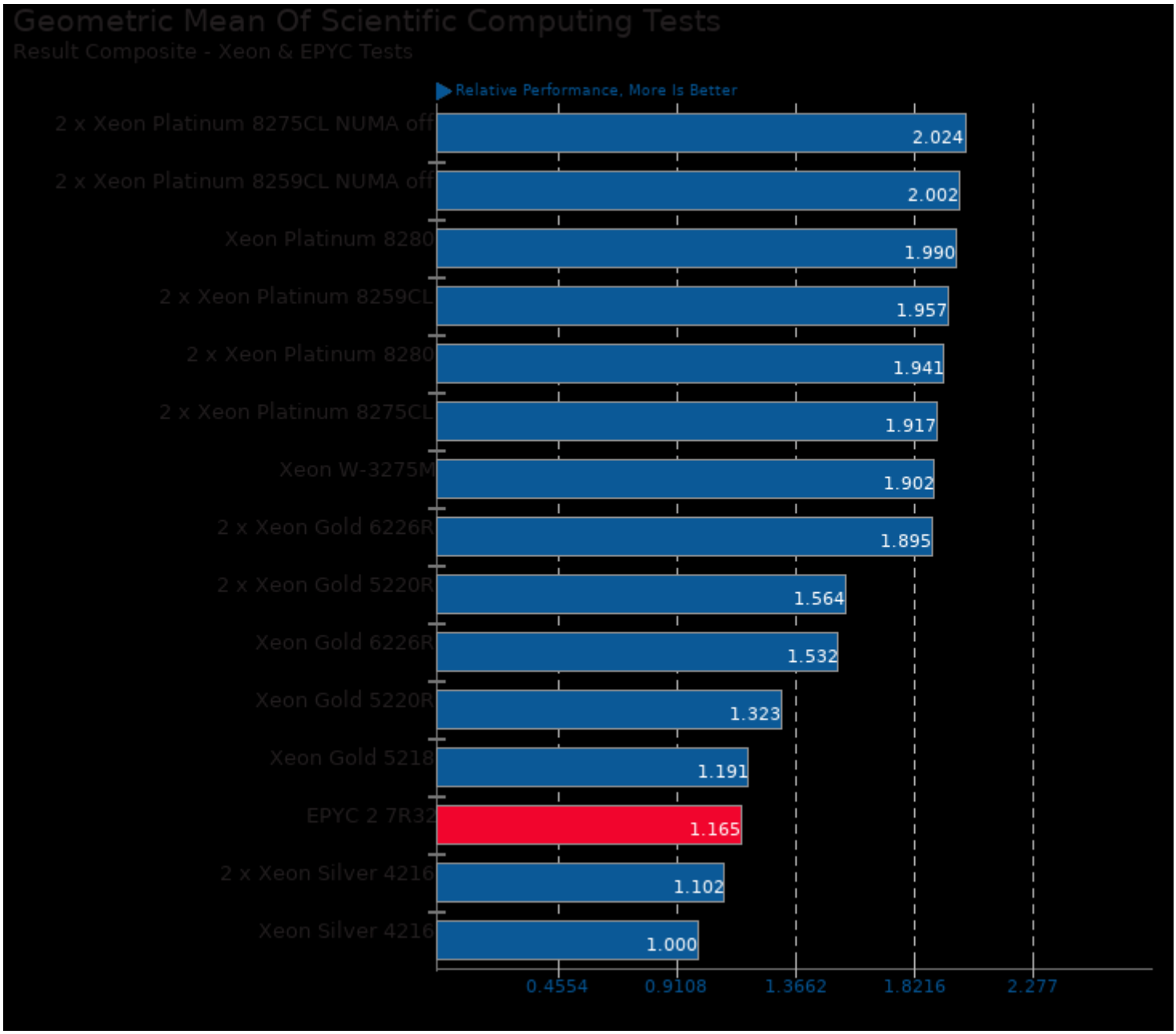
Geometric mean based upon tests: pts/compress-zstd, pts/pyperformance, pts/pybench, pts/build-linux-kernel, pts/build-gcc, pts/build-gdb, pts/build-llvm, pts/build2 and pts/arrayfire



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

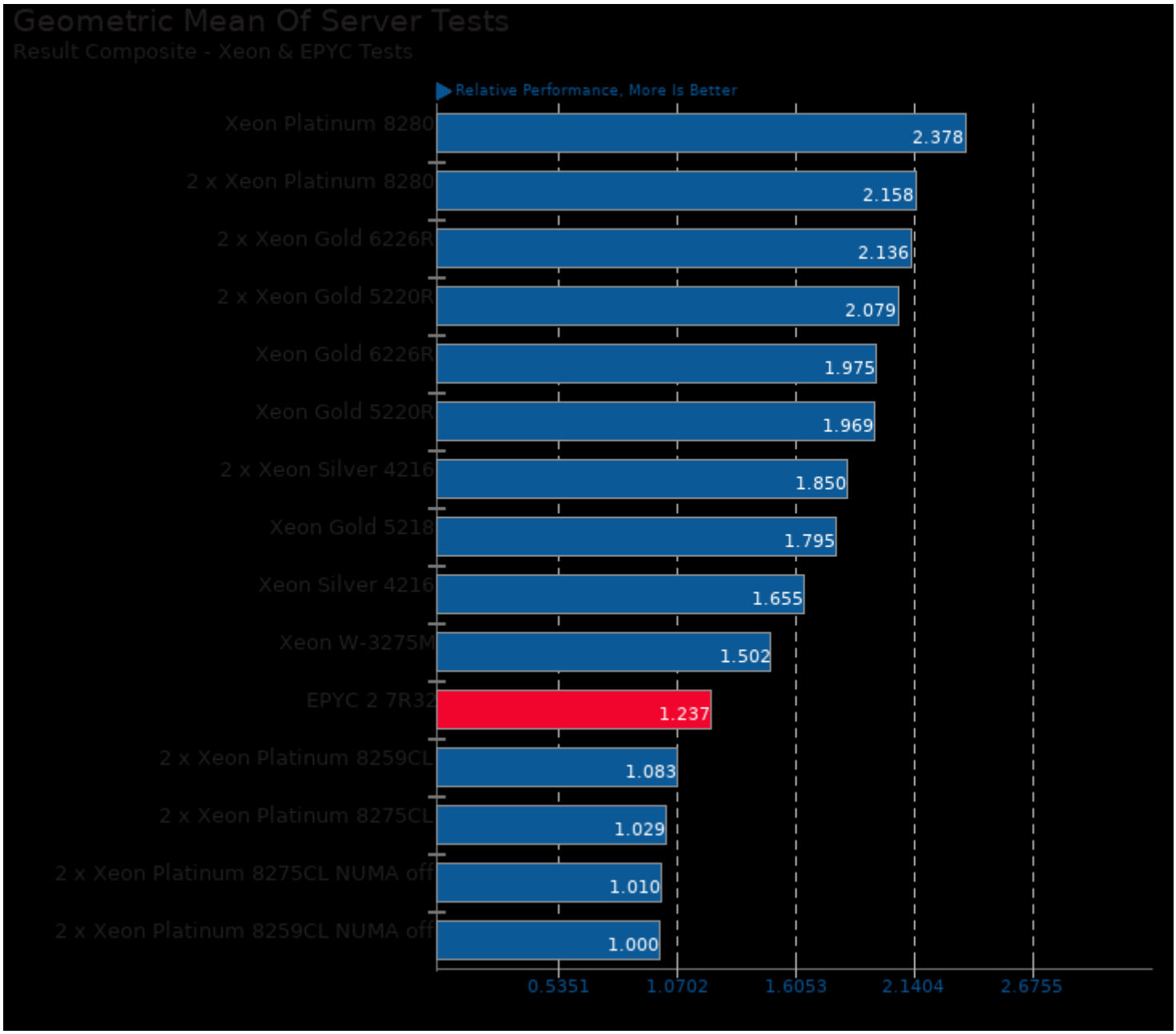


Geometric mean based upon tests: pts/ospray, pts/blender, pts/tungsten, pts/appleseed, pts/radiance, pts/luxcorerender and pts/v-ray

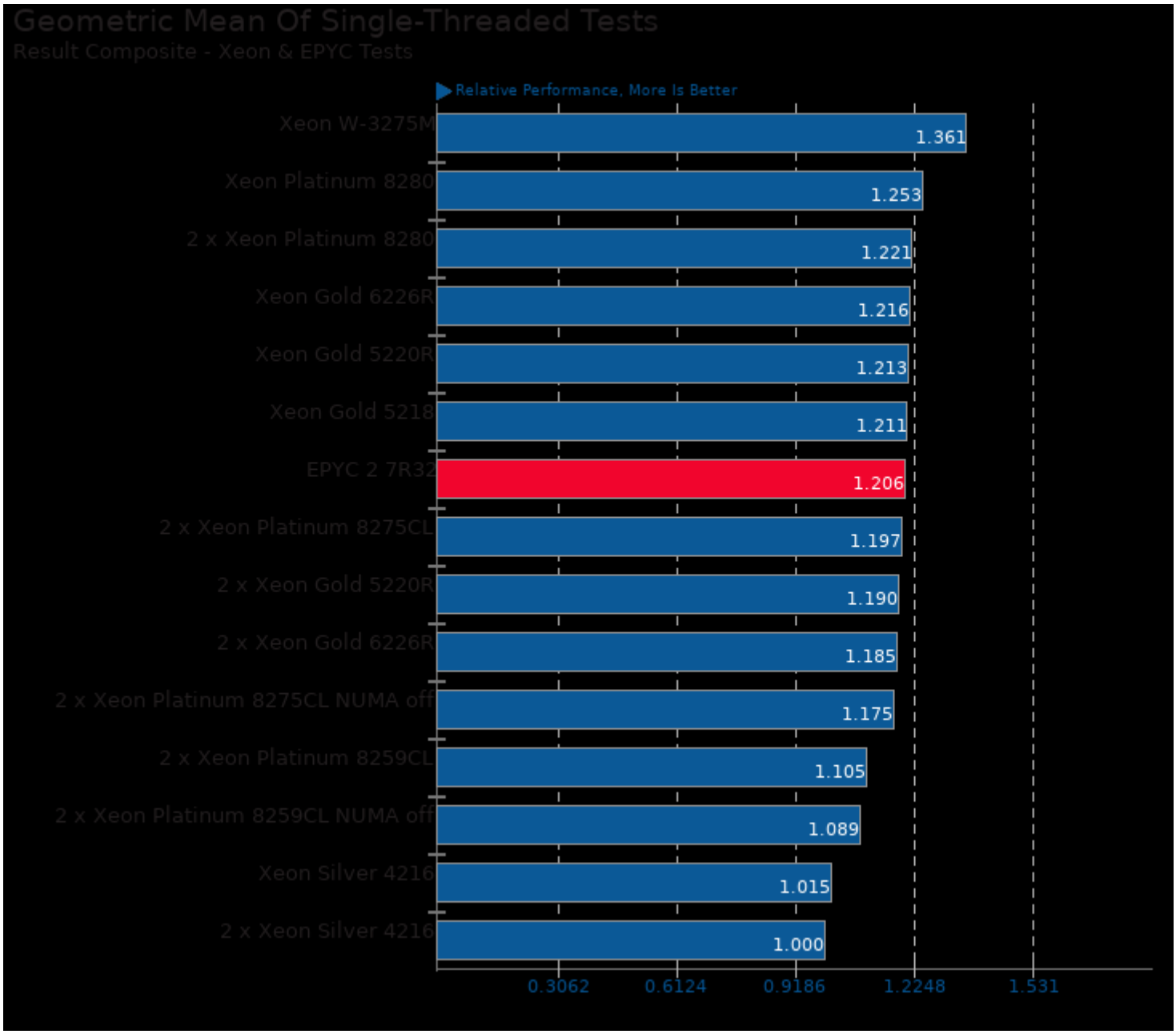


Geometric mean based upon tests: pts/arrayfire, pts/namd, pts/cloverleaf, pts/lammps, pts/himeno and pts/mrbayes

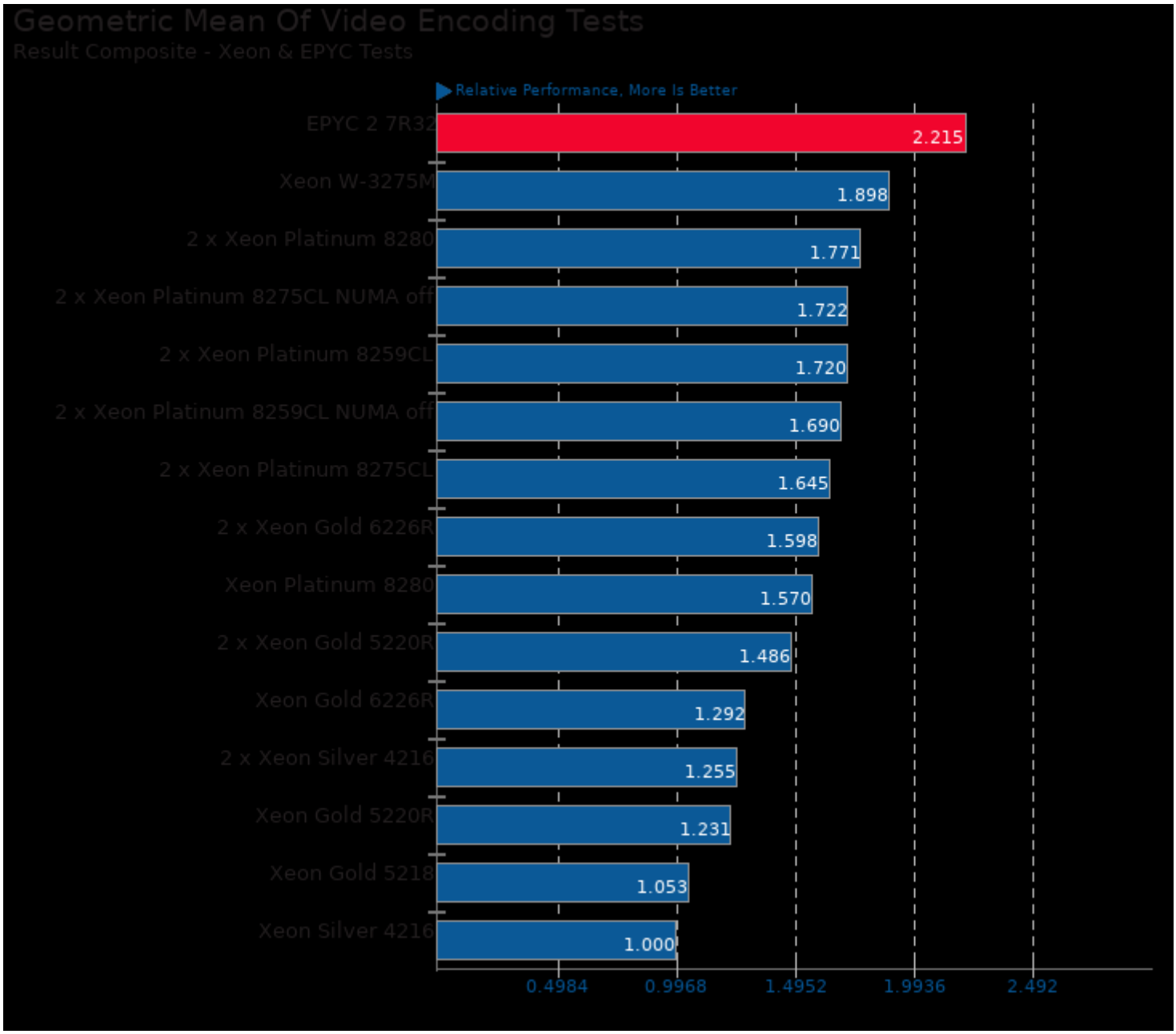
Xeon & EPYC Tests



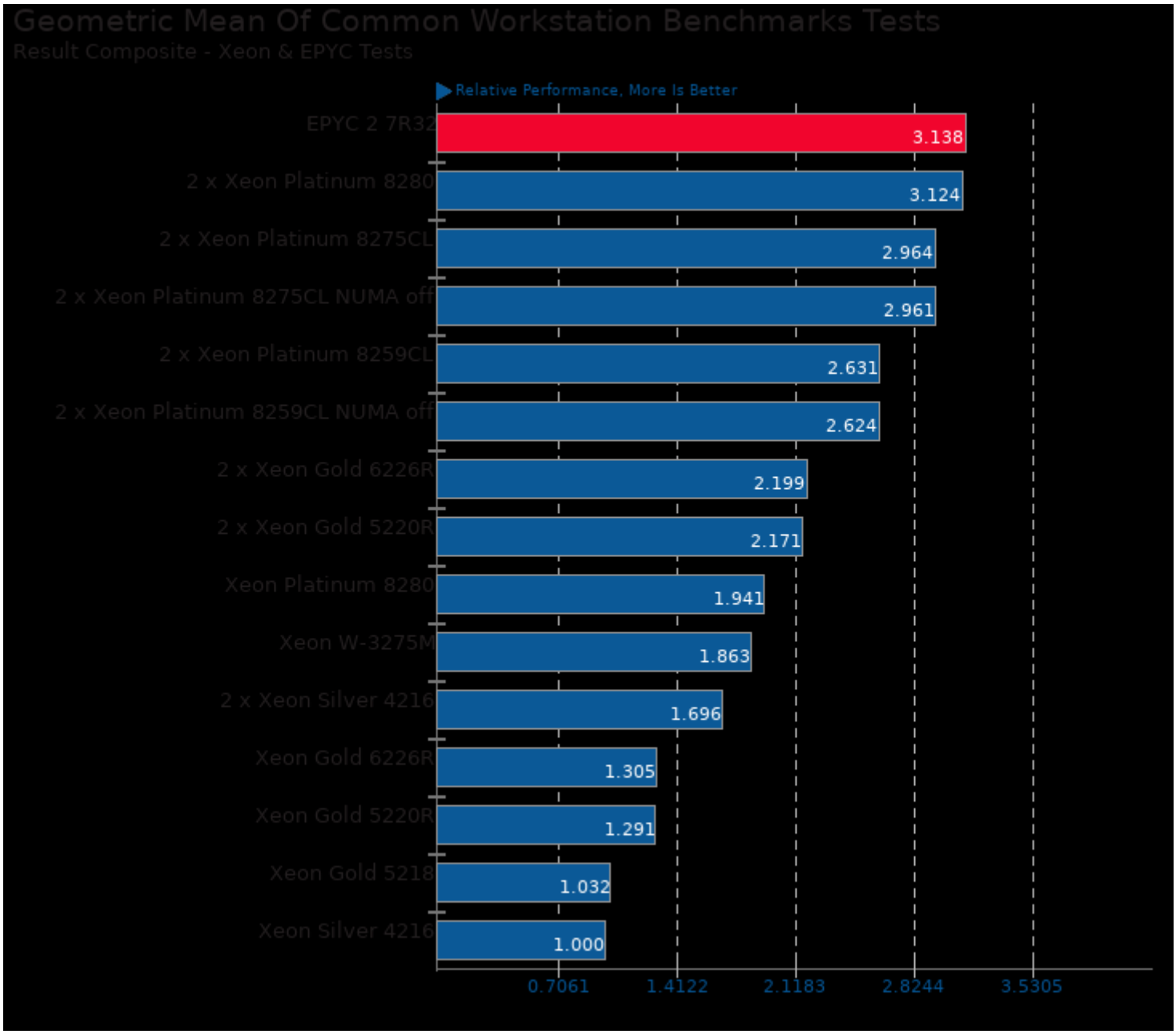
Geometric mean based upon tests: pts/pgbench and pts/phpbench



Geometric mean based upon tests: pts/lzbench, pts/numpy, pts/deepspeech, pts/radiance, pts/pybench and pts/phpbench



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



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

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 03:52.