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azon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchma

Benchmarks for a future article.

Automated Executive Summary

2 x EPYC 7742 had the most wins, coming in first place for 24% of the tests.

Based on the geometric mean of all complete results, the fastest (2 x EPYC 7742) was 4.465x the speed of the slowest (Graviton).

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

GROMACS (Water Benchmark) at 22.424x
John The Ripper (Test: Blowfish) at 19.332x
High Performance Conjugate Gradient at 8.871x
Timed MrBayes Analysis (Primate Phylogeny Analysis) at 6.075x
dav1d (Video Input: Chimera 1080p 10-bit) at 5.721x
dav1d (Video Input: Summer Nature 4K) at 5.335x
Basis Universal (Settings: UASTC Level 3) at 5.248x
Timed Linux Kernel Compilation (Time To Compile) at 4.343x
Nettle (Test: aes256) at 4.143x
dav1d (Video Input: Summer Nature 1080p) at 3.956x.

Test Systems:

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
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 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
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

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
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
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
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

EPYC 7502P

Processor: AMD EPYC 7502P 32-Core @ 2.50GHz (32 Cores / 64 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7352

Processor: 2 x AMD EPYC 7352 24-Core @ 2.30GHz (48 Cores / 96 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 8 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7532

Processor: 2 x AMD EPYC 7532 32-Core @ 2.40GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 504GB, Monitor: 7 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034

Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

EPYC 7F52

Processor: AMD EPYC 7F52 16-Core @ 3.50GHz (16 Cores / 32 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 12 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7F52

Processor: 2 x AMD EPYC 7F52 16-Core @ 3.50GHz (32 Cores / 64 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 16 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7452

Processor: AMD EPYC 7452 32-Core @ 2.35GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 252GB, Monitor: 17 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW

STIBP: conditional RSB filling + tsx_async_abort: Not affected

EPYC 7742

Processor: AMD EPYC 7742 64-Core @ 2.25GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 20 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

EPYC 7262

Processor: AMD EPYC 7262 8-Core @ 3.20GHz (8 Cores / 16 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 23 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7262

Processor: 2 x AMD EPYC 7262 8-Core @ 3.20GHz (16 Cores / 32 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 504GB, Monitor: 24 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

EPYC 7F32

Processor: AMD EPYC 7F32 8-Core @ 3.70GHz (8 Cores / 16 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 25 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7F32

Processor: 2 x AMD EPYC 7F32 8-Core @ 3.70GHz (16 Cores / 32 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 504GB, Monitor: 26 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

EPYC 7F72

Processor: AMD EPYC 7F72 24-Core @ 3.20GHz (24 Cores / 48 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 8 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 27 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7F72

Processor: 2 x AMD EPYC 7F72 24-Core @ 3.20GHz (48 Cores / 96 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 28 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

2 x EPYC 7742

Processor: 2 x AMD EPYC 7742 64-Core @ 2.25GHz (128 Cores / 256 Threads), Motherboard: AMD DAYTONA_X (RDY1006G BIOS), Chipset: AMD Starship/Matisse, Memory: 16 x 32 GB DDR4-3200MT/s 36ASF4G72PZ-3G2E2, Disk: 280GB INTEL SSDPE21D280GA, Graphics: ASPEED, Monitor: 30 x VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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: acpi-cpufreq ondemand - CPU Microcode: 0x8301034
Python Notes: + Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + tsx_async_abort: Not affected

Xeon Gold 6250

Processor: Intel Xeon Gold 6250 @ 4.50GHz (8 Cores / 16 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 SSDPE21D280GA, Graphics: ASPEED, Monitor: 31 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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
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 6250

Processor: 2 x Intel Xeon Gold 6250 @ 4.50GHz (16 Cores / 32 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 SSDPE21D280GA, Graphics: ASPEED, Monitor: 32 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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
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 6258R

Processor: Intel Xeon Gold 6258R @ 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 SSDPE21D280GA, Graphics: ASPEED, Monitor: 33 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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
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 6258R

Processor: 2 x Intel Xeon Gold 6258R @ 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 SSDPE21D280GA, Graphics: ASPEED, Monitor: 34 x VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 20.04, Kernel: 5.4.0-21-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
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

Graviton2

Processor: ARMv8 Neoverse-N1 (64 Cores), Motherboard: Amazon EC2 m6g.metal v1.0, Memory: 252GB, Disk: 137GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 20.04, Kernel: 5.4.0-1009-aws (aarch64), Compiler: GCC 9.3.0, File-System: ext4

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Java Notes: OpenJDK Runtime Environment (build 11.0.7+10-post-Ubuntu-3ubuntu1)
Python Notes: Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + tsx_async_abort: Not affected

Graviton

Processor: ARMv8 Cortex-A72 (16 Cores), Motherboard: Amazon EC2 a1.metal v1.0, Memory: 32GB, Disk: 94GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 20.04, Kernel: 5.4.0-1009-aws (aarch64), Compiler: GCC 9.3.0, File-System: ext4

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Python Notes: Python 3.8.2
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of Branch predictor hardening + tsx_async_abort: Not affected

	Xeon Gold 5220R	2 x Xeon Gold 5220R	Xeon Gold 6226R	2 x Xeon Gold 6226R	Xeon Platinum 8280	2 x Xeon Platinum 8280	EPYC 7502P	2 x EPYC 7352	2 x EPYC 7532	EPYC 7F52	2 x EPYC 7F52	2 x EPYC 7452	EPYC 7742	EPYC 7262	2 x EPYC 7262	EPYC 7F32	2 x EPYC 7F32	EPYC 7F72	2 x EPYC 7F72	2 x EPYC 7742	Xeon Gold 6250	2 x Xeon Gold 6250	Xeon Gold 6258R	2 x Xeon Gold 6258R	Graviton2	Graviton
Basis Universal - UASTC Level 3 (sec)	46.708	27.981	44.943	27.226	30.689	19.885	25.142	21.058	17.340	33.531	20.483	17.696	17.760	**69.080**	38.594	60.115	33.737	26.076	17.169	**13.164**	66.381	37.234	30.446	19.714	21.189	
Normalized	28.1%	47.0%	29.2%	48.3%	42.8%	66.2%	52.3%	62.5%	75.9%	39.2%	64.2%	74.3%	74.1%	19.0%	34.1%	21.9%	39.0%	49.6%	76.6%	100%	19.8%	35.3%	43.2%	66.7%	62.1%	
Standard Deviation	0%	0.2%	0.1%	0.3%	0.1%	0.2%	0.1%	0.2%	0.2%	0%	0.1%	0.4%	0.2%	0%	0.1%	0%	0%	0.1%	0.1%	0.2%	0%	0.2%	0.1%	0.2%	0.3%	

Basis Universal - Performance / Cost - UASTC Level 3 (sec x Dollar)	80	96	65	79			62	63																		
	61	59	21	01			32	51																		
	8	0	2	0			7	1																		
Normalized	77.3	64.5	95.5	78.8			100	98.1																		
d	1%	3%	8%	9%			%	4%																		
Build2 - Time To Compil	91.	72.	88.	70.	74.	62.	71.	70.	64.	69.	58.	64.	63.	11	80.	98.	70.	66.	58.	60.	10	73.	73.	63.	86.	
	64	15	97	60	11	77	55	28	69	54	18	68	78	3.8	65	78	67	24	28	90	5.5	35	55	04	15	
	1	1	7	8	8	6	8	7	3	2	5	2	6	47	7	0	6	8	4	9	98	3	9	8	4	
Normalized	63.4	80.6	65.3	82.4	78.5	92.6	81.3	82.7	89.9	83.6	100	89.9	91.2	51.1	72.1	58.9	82.3	87.8	99.8	95.5	55.1	79.3	79.1	92.2	67.5	
d	9%	4%	9%	1%	%	9%	1%	8%	4%	7%	%	6%	2%	1%	4%	%	3%	3%	3%	3%	%	2%	%	9%	4%	
Standard Deviation	0.3	0.3	0.1	0.2	0.3	0.2	0.4	0.4	0.8	0.2	0.4	0.2	0.7	1.2	0.1	1%	0.5	0.2	0.6	1.5	1.9	0.7	0.3	1%	0.5	
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		%	%	%	%	%	%	%		%	
Build2 - Performance / Cost - Time To Compile (sec x	15	24	12	20			17	21																		
	81	90	91	49			73	19																		
	72	65	06	04			92	86																		
Normalized	81.6	51.8	100	63.0			72.7	60.9																		
d	2%	4%	%	1%			8%	%																		
dav1d - Summer Nature 4K	16	17	17	20	19	22	26	26	29	22	26	30	33	13	16	15	19	28	31	32	14	18	19	22	23	63.
	0.5	7.8	0.0	3.1	9.0	1.3	0.5	1.1	6.0	2.2	3.7	2.3	6.0	2.8	7.3	2.0	3.9	7.4	4.8	2.3	9.9	4.9	9.3	3.1	9.0	00
	9	9	7	0	8	1	2	2	6	3	7	5	8	6	6	2	4	1	0	5	0	9	8	7	7	
Normalized	47.7	52.9	50.6	60.4	59.2	65.8	77.5	77.7	88.0	66.1	78.4	89.9	100	39.5	49.8	45.2	57.7	85.5	93.6	95.9	44.6	55.0	59.3	66.4	71.1	18.7
d	8%	3%	%	3%	4%	5%	2%	%	9%	2%	8%	6%	%	3%	%	3%	1%	2%	7%	1%	%	4%	3%	%	3%	5%
Standard Deviation	0.8	0.8	1.2	1.4	1%	2.9	0%	0.4	0.8	0.3	0.8	0.4	0.9	0.4	0.3	0.3	0.4	0.6	0.3	0.5	0.3	1%	2.2	0.6	0.1	0.1
	%	%	%	%		%		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		%	%	%
dav1d - S.N.1 (FPS)	27	32	30	35	32	40	54	56	64	50	61	65	69	32	38	37	46	66	75	76	36	31	32	40	65	19
	4.9	1.8	7.7	8.6	3.2	9.8	7.0	6.8	9.4	1.2	8.8	8.0	1.0	0.9	8.4	3.2	7.4	0.5	2.0	7.9	9.4	0.8	5.1	2.9	2.8	4.1
	8	4	5	2	0	8	8	5	5	1	7	9	2	1	6	8	4	4	2	2	8	4	0	7	4	1
Normalized	35.8	41.9	40.0	46.7	42.0	53.3	71.2	73.8	84.5	65.2	80.5	85.7	89.9	41.7	50.5	48.6	60.8	86.0	97.9	100	48.1	40.4	42.3	52.4	85.0	25.2
d	1%	1%	8%	%	9%	8%	4%	2%	7%	7%	9%	%	9%	9%	9%	1%	7%	2%	3%	%	1%	8%	4%	8%	1%	8%
Standard Deviation	1.5	2.9	0.5	0.9	0.3	3.5	0.1	0.4	0.5	0.2	0.4	1.7	1.2	0.6	0.1	0.2	0.6	0.6	0.7	1%	3%	0.3	0.5	3.7	0.7	0.2
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%			%	%	%	%	%
dav1d - C.1.1.b (FPS)	58.	70.	62.	73.	65.	85.	11	12	13	11	13	13	14	79.	87.	95.	10	12	15	18	68.	62.	65.	85.	33	
	05	81	32	95	40	14	0.7	5.0	7.1	0.8	1.6	9.8	2.9	80	77	14	5.1	1.9	8.2	3.9	55	16	28	20	2.1	
							1	3	2	8	6	7	8				8	5	1	6					1	
Normalized	17.4	21.3	18.7	22.2	19.6	25.6	33.3	37.6	41.2	33.3	39.6	42.1	43.0	24.0	26.4	28.6	31.6	36.7	47.6	55.3	20.6	18.7	19.6	25.6	100	
d	8%	2%	6%	7%	9%	4%	4%	5%	9%	9%	4%	2%	5%	3%	3%	5%	7%	2%	4%	9%	4%	2%	6%	5%	%	

Standard Deviation	0.4 %	1.1 %	0.7 %	0.4 %	0.3 %	0.1 %	0.3 %	0.3 %	0.5 %	0.4 %	0.3 %	0.1 %	0.2 %	0.2 %	0.1 %	0.2 %	0.3 %	0.1 %	0.4 %	0.4 %	0.7 %	0.3 %	0.4 %	0.5 %	0%
dav1d - Performance / Cost - Summer Nature 4K (FPS/Dollar)	0.0 93	0.0 52	0.1 17	0.0 70			0.1 05	0.0 87																	
Normalized	79.4 9%	44.4 4%	100 %	59.8 3%			89.7 4%	74.3 6%																	
dav1d - Performance / Cost - S.N.1 (FPS/Dollar)	0.1 59	0.0 93	0.2 12	0.1 24			0.2 21	0.1 88																	
Normalized	71.9 5%	42.0 8%	95.9 3%	56.1 1%			100 %	85.0 7%																	
dav1d - Performance / Cost - C.1.1.b (FPS/Dollar)	0.0 34	0.0 21	0.0 43	0.0 25			0.0 45	0.0 41																	
Normalized	75.5 6%	46.6 7%	95.5 6%	55.5 6%			100 %	91.1 1%																	
GROMACS - Water Benchmark (Ns/Day)													1.0 73	1.1 13	1.6 76	1.2 44	1.7 62	2.1 67	2.0 28	0.2 43	1.2 45	2.4 41	2.7 82	5.4 49	2.7 61
Normalized													19.6 9%	20.4 3%	30.7 6%	22.8 3%	32.3 4%	39.7 7%	37.2 2%	4.46 %	22.8 5%	44.8 %	51.0 6%	100 %	50.6 7%
Standard Deviation													22%	0%	0.4 %	0.7 %	1.4 %	1.6 %	1%	9.1 %	0.2 %	0.4 %	0.3 %	0.2 %	0.1 %

High Performance Conjugate Gradient (GFLOP/s)	13.35	25.63	13.95	26.59	14.90	28.85	15.10	28.40	33.92	17.74	33.51	28.79	17.16	12.70	23.06	13.22	24.86	16.93	32.36	34.04	10.33	19.97	14.78	28.87	21.43	3.837
Normalized	39.2%	75.2%	40.9%	78.1%	43.7%	84.7%	44.3%	83.4%	99.6%	52.1%	98.4%	84.5%	50.4%	37.3%	67.7%	38.8%	73.0%	49.7%	95.0%	100%	30.3%	58.6%	43.4%	84.8%	62.9%	11.2%
Standard Deviation	2.1%	1.1%	8.1%	0.3%	9.0%	0.8%	9.0%	0.5%	6.4%	1.5%	2.0%	0.2%	2.0%	0.4%	8.8%	0.9%	4.4%	0.8%	4.4%	2.1%	4.4%	0.5%	4.4%	0.2%	4.4%	0.2%
High Performance Conjugate Gradient - Performance / Cost - (GFLOP/s/Dollar)	0.008	0.007	0.010	0.009			0.006	0.009																		
Normalized	80%	70%	100%	90%			60%	90%																		
Himeno Benchmark - P.P.S (MFLOPS)	33.98	34.05	34.01	34.10	35.10	35.15	38.83	36.47	37.83	43.70	43.04	37.78	38.21	38.65	37.12	42.45	42.26	42.13	41.18	38.61	38.91	39.35	35.16	35.27	29.05	
Normalized	77.7%	77.9%	77.8%	78.0%	80.3%	80.4%	88.8%	83.4%	86.5%	100%	98.4%	86.4%	87.4%	88.4%	84.9%	97.1%	96.7%	96.4%	94.2%	88.3%	89.0%	90.0%	80.4%	80.7%	66.4%	
Standard Deviation	6.1%	1.3%	3.1%	4.0%	2.2%	2.3%	6.1%	6.1%	7.8%	2.8%	8.2%	4.1%	3.7%	3.4%	4.2%	3.6%	3.9%	3.2%	6.2%	3.4%	3.4%	5.0%	3.9%	3.7%	7.0%	

Himeno Benchmark - Performance / Cost - P.P.S (MFLOPS/Dollar)	1.9	0.9	2.3	1.1			1.5	1.2																			
Normalized	84%	42.0%	100%	50.1%			66.8%	51.5%																			
John The Ripper - Blowfish (Real C/S)	25 54 7	51 32 4	27 12 6	53 48 5	42 86 4	84 08 4	43 59 3	60 14 6	83 73 7	26 34 9	52 52 5	79 27 3	74 94 4	11 49 3	22 95 7	13 17 9	26 31 4	36 83 1	73 09 5	14 51 29	16 75 1	33 26 9	42 95 2	84 24 0	43 34 9	75 07	
Normalized	17.6%	35.3%	18.6%	36.8%	29.5%	57.9%	30.0%	41.4%	57.7%	18.1%	36.1%	54.6%	51.6%	7.92%	15.8%	9.08%	18.1%	25.3%	50.3%	100%	11.5%	22.9%	29.6%	58.0%	29.8%	5.17%	
Standard Deviation	0.5%	0%	0.4%	0.4%	0.4%	1.4%	0%	0.7%	0.2%	0%	0.1%	0.1%	0%	0%	0%	0%		0.2%	0.2%	0.8%	0.4%	0.3%	0.2%	0.8%	0.1%	0.1%	
John The Ripper - Performance / Cost - Blowfish (Real C/S/Dollar)	14. 80 1	14. 86 8	18. 69 5	18. 43 0			17. 58 5	19. 94 2																			
Normalized	74.2%	74.5%	93.7%	92.4%			88.1%	100%																			
Mlpack Benchmark - scikit_ica (sec)	68. 19	77. 41	61. 82	74. 63	67. 36	63. 35	68. 91	70. 28	65. 60	53. 26	67. 48	64. 27	57. 69	57. 61	68. 62	53. 13	60. 75	61. 93	61. 54	55. 18	50. 09	55. 54	67. 36	63. 38	11 1.9 0		
Normalized	73.4%	64.7%	81.0%	67.1%	74.3%	79.0%	72.6%	71.2%	76.3%	94.0%	74.2%	77.9%	86.8%	86.9%	73%	94.2%	82.4%	80.8%	81.3%	90.7%	100%	90.1%	74.3%	79.0%	44.7%		
Standard Deviation	0.6%	2.8%	1.3%	0.7%	0.5%	1.6%	1.2%	0.3%	0.8%	1.6%	1.4%	1.2%	0.7%	2%	2.5%	2%	2.3%	2%	1.8%	1.2%	1%	2.5%	0.3%	0.4%	2%		

Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks

Mlpack Benchmark - scikit_svm	17.82	17.92	17.92	17.77	17.19	17.19	14.76	16.50	17.23	**12.86**	12.99	16.39	14.58	14.66	16.42	12.94	13.10	13.54	13.70	15.95	15.72	15.47	17.11	17.33	**23.71**
Normalized	72.1%	71.7%	71.7%	72.3%	74.8%	74.8%	87.1%	77.9%	74.6%	100%	99%	78.4%	88.2%	87.7%	78.3%	99.3%	98.1%	94.9%	93.8%	80.6%	81.8%	83.1%	75.1%	74.2%	54.2%
Standard Deviation	0.9%	0.4%	0%	1.3%	0.7%	0.9%	0.1%	7.5%	2%	0.5%	0.7	7.4%	0.6%	0.3%	6%	0.1%	1%	0.9%	0.5%	8.1%	0.5%	0.7%	0.4%	1.1%	0.1%
Mlpack Benchmark - scikit_linearridgeregression	2.25	2.39	1.93	2.08	1.67	1.82	1.81	2.29	1.95	1.78	1.95	1.97	**1.66**	**2.58**	2.23	2.25	1.99	1.61	1.84	1.74	2.07	1.76	**1.66**	1.78	1.76
Normalized	73.7%	69.4%	86.0%	79.8%	99.4%	91.2%	91.7%	72.4%	85.1%	93.2%	85.1%	84.2%	100%	64.3%	74.4%	73.7%	83.4%	98.2%	90.2%	94.3%	80.1%	95.4%	100%	93.2%	94.3%
Standard Deviation	2.3%	8.1%	2.4%	7.9%	2%	2.6%	1.3%	9.9%	5%	0.7%	2.8%	2.7%	1.9%	1%	2.8%	1.3%	3.9%	1%	2.6%	8.4%	3.6%	2.4%	1.6%	3%	1.4%
Mlpack Benchmark - Performance / Cost - scikit_ica (secx	11.76	**26.72**	**89.70**	21.65			17.08	21.19																	
Normalized	76.2%	33.5%	100%	41.4%			52.5%	42.3%																	
Mlpack Benchmark - Performance / Cost - scikit_svm (secx	30.75	**61.86**	**26.00**	51.56			36.59	49.76																	
Normalized	84.5%	42.0%	100%	50.4%			71.0%	52.2%																	

Mlpack Benchmark - Performance / Cost - scikit_linearridgeregression (sec x	38 84	**82 50**	**28 00**	60 36			44 87	69 07
Normalized	72.1	33.9	100	46.3			62.4	40.5
d	1%	4%	%	9%			1%	5%
Nettle - aes256 (Mbyte/s)	61 34	61 59	61 61	61 57	63 13	63 20	47 28	44 46
Normalized	86.2	86.6	86.6	86.5	88.7	88.8	66.4	62.5
d	6%	1%	4%	9%	8%	7%	8%	2%
Standard Deviation	0.1 %	0.1 %	0.2 %	0.2 %	0.2 %	0.1 %	0.1 %	0%
Nettle - chacha (Mbyte/s)	10 20	10 25	10 25	10 25	10 51	10 52	76 0.2 12	71 4.4 61
Normalized	86.2	86.6	86.6	86.6	88.8	88.9	64.2	60.3
d	2%	3%	3%	7%	4%	1%	5%	9%
Standard Deviation	0.2 %	0.1 %	0.1 %	0.1 %	0.1 %	0.1 %	0%	0%
Nettle - sha512 (Mbyte/s)	48 5.8 6	48 9.1 5	48 8.8 1	48 9.4 2	50 1.9 8	50 0.9 8	48 4.2 4	45 5.3 6
Normalized	86.0	86.6	86.5	86.6	88.9	88.7	85.7	80.6
d	6%	5%	9%	9%	2%	4%	8%	6%
Standard Deviation	0.4 %	0.1 %	0.3 %	0%	0.1 %	0.3 %	0%	0.1 %
Nettle - Performance / Cost - aes256 (Mbyte/s/Dollar	3.5 54	1.7 84	**4.2 46**	2.1 22			1.9 07	**1.4 74**
Normalized	83.7	42.0	100	49.9			44.9	34.7
d	%	2%	%	8%			1%	2%

Mlpack Benchmark - Performance / Cost - scikit_linearridgeregression (sec x																								
Normalized																								
d																								
Nettle - aes256 (Mbyte/s)	55 06	47 24	47 99	48 01	47 91	54 98	55 00	52 15	52 21	47 96	71 00	**71 11**	63 06	63 22	27 84	**17 17**
Normalized	77.4	66.4	67.4	67.5	67.3	77.3	77.3	73.3	73.4	67.4	99.8	100	88.6	88.9	39.1	24.1
d	2%	4%	8%	2%	8%	2%	4%	3%	2%	4%	5%	%	7%	1%	5%	4%
Standard Deviation	0%	0.1 %	0.1 %	0%	0.2 %	0%	0.1 %	0%	0.1 %	0.1 %	0.1 %	0%	0.1 %	0.1 %	0%	0.4 %
Nettle - chacha (Mbyte/s)	88 4.5 91	76 0.0 62	77 1.4 2	77 1.5 43	77 1.7 33	88 4.7 14	88 4.4 34	83 9.5 77	83 9.4 87	77 1.4 23	**11 83**	11 82	10 43	10 45	45 0.2 11	**32 7.1 07**
Normalized	74.7	64.2	65.2	65.2	65.2	74.7	74.7	70.9	70.9	65.2	100	99.9	88.1	88.3	38.0	27.6
d	7%	4%	%	1%	3%	8%	5%	6%	5%	%	%	%	3%	1%	5%	5%
Standard Deviation	0%	0%	0%	0%	0%	0%	0.1 %	0%	0%	0%	0%	0.1 %	0.2 %	0.9 %	0.2 %	0.2 %
Nettle - sha512 (Mbyte/s)	99.8 3.8 2	85.7 1.5 4	87.0 0.2 9	86.8 0.2 5	86.9 1.0 4	99.8 3.4 5	99.8 3.5 9	94.6 4.1 8	94.7 4.8 6	87.0 1.4 7	99.8 3.8 2	100 **4.5 4**	88.3 8.9 9	88.7 0.7 5	67.3 0.0 6	50.6 **5.9 3**
Normalized	99.7	85.7	87.0	86.8	86.9	99.8	99.8	94.6	94.7	87.0	99.8	100	88.3	88.7	67.3	50.6
d	4%	1%	7%	5%	8%	1%	3%	2%	4%	6%	7%	%	9%	%	2%	5%
Standard Deviation	0.2 %	0.1 %	0%	0.2 %	0%	0.1 %	0%	0.2 %	0%	0.1 %	0.2 %	0.2 %	0.4 %	0.1 %	0%	0.3 %
Nettle - Performance / Cost - aes256 (Mbyte/s/Dollar																
Normalized																
d																

Nettle - Performance / Cost - chacha (Mbyte/s/Dollar	0.5	0.2	0.7	0.3			0.3	0.2																	
	91	97	06	53			07	37																	
Normalized	83.7	42.0	100	50%			43.4	33.5																	
	1%	7%	%				8%	7%																	
Nettle - Performance / Cost - sha512 (Mbyte/s/Dollar	0.2	0.1	0.3	0.1			0.1	0.1																	
	81	42	37	69			95	51																	
Normalized	83.3	42.1	100	50.1			57.8	44.8																	
	8%	4%	%	5%			6%	1%																	
Numpy Benchmark (Score)	31	30	31	30	33	32	31	29	30	36	36	31	31	32	32	36	37	34	34	32	36	36	33	32	19
	3.7	0.7	8.8	4.1	0.3	1.8	4.2	6.1	7.6	6.1	4.8	0.5	7.3	9.1	6.7	8.0	0.1	8.7	7.1	3.7	7.4	0.0	7.4	5.6	4.3
	6	3	7	6	3	2	8	4	9	6	6	4	9	4	2	8	4	1	2	0	4	1	6	9	6
Normalized	84.7	81.2	86.1	82.1	89.2	86.9	84.9	80.0	83.1	98.9	98.5	83.9	85.7	88.9	88.2	99.4	100	94.2	93.7	87.4	99.2	97.2	91.1	87.9	52.5
	7%	5%	5%	7%	4%	5%	1%	1%	3%	2%	7%	%	5%	2%	7%	4%	%	1%	8%	5%	7%	6%	7%	9%	1%
Standard Deviation	1.8	0.4	0.3	0.8	1.3	1.6	1%	0.7	0.8	0.4	0.2	0.6	0.6	0.3	0.6	0.4	0.6	1.1	0.6	1.9	0.1	1%	0.5	0.2	0.7
	%	%	%	%	%	%		%	%	%	%	%	%	%	%	%	%	%	%	%	%		%	%	%
Numpy Benchmark - Performance / Cost - (Score/Dollar)	0.1	0.0	0.2	0.1			0.1	0.0																	
	82	87	20	05			27	98																	
Normalized	82.7	39.5	100	47.7			57.7	44.5																	
	3%	5%	%	3%			3%	5%																	
PHPBench - P.B.S (Score)	62	63	63	63	64	64	52	48	51	60	60	51	52	52	52	60	60	57	56	52	72	73	64	64	39
	96	12	24	26	91	96	65	52	57	46	69	69	71	72	99	23	96	21	09	72	98	19	37	78	64
	90	83	31	01	64	93	37	43	58	27	70	02	73	59	81	28	73	34	90	08	19	52	37	32	10
Normalized	86.0	86.2	86.4	86.4	88.6	88.7	71.9	66.2	70.4	82.6	82.9	70.6	72.0	72.0	72.4	82.2	83.2	78.1	76.6	72.0	99.7	100	87.9	88.5	54.1
	3%	5%	%	3%	9%	6%	4%	9%	6%	%	2%	2%	2%	3%	1%	9%	9%	7%	4%	3%	1%	%	5%	1%	6%
Standard Deviation	0.2	0.3	0.2	0%	0.1	0.2	1.1	0.5	0.2	0.2	0.6	0.6	0.8	0.8	1.1	0.2	0.9	0.4	0.2	0.2	0.3	0.2	1.2	0.5	0.7
	%	%	%		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%

PHPBench - Performance / Cost - P.B.S (Score/ Dollar)	36	18	43	21			21	16																	
	4.8	2.8	5.8	7.9			2.3	0.8																	
	26	75	59	88			99	90																	
Normalized	83.7%	41.9%	100%	50.0%			48.7%	36.9%																	
PyBench - T.F.A.T.T (Milliseconds)	11	11	11	11	10	10	11	12	11	98	99	11	11	11	11	99	99	10	10	11	95	95	10	10	17
	14	00	03	04	76	73	55	30	70	7	7	55	35	35	38	4	4	65	45	53	5	6	76	73	02
Normalized	85.7%	86.8%	86.5%	86.5%	88.7%	89%	82.6%	77.6%	81.6%	96.7%	95.7%	82.6%	84.1%	84.1%	83.9%	96.0%	96.0%	89.6%	91.3%	82.8%	100%	99.9%	88.7%	89%	56.1%
Standard Deviation	1.9%	0.2%	0.5%	0.1%	0.2%	0.2%	1.1%	0.4%		0.3%	0.6%		0.2%		0.5%	0.4%	0.9%	0.2%	1.1%	1.2%	0.2%		0.2%	0.3%	0.3%
PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)	19	37	16	32			28	37																	
	22	97	00	03			63	09																	
	76	20	45	80			24	68																	
	4	0	3	8			5	0																	
Normalized	83.2%	42.1%	100%	49.9%			55.9%	43.1%																	
PyPerformance - float (Milliseconds)	11	11	11	11	10	10	13	14	13	11	11	13	13	13	13	11	11	12	12	13	96.6	96.5	10	10	17
	4	3	5	3	9	9	7	6	9	8	9	7	5	5	5	9	9	5	5	5			9	9	5
Normalized	84.6%	85.4%	83.9%	85.4%	88.5%	88.5%	70.4%	66.1%	69.4%	81.7%	81.0%	70.4%	71.4%	71.4%	71.4%	81.0%	81.0%	77.2%	77.2%	71.4%	99.9%	100%	88.5%	88.5%	55.1%
Standard Deviation		0.5%					0.4%														0%	0.2%			

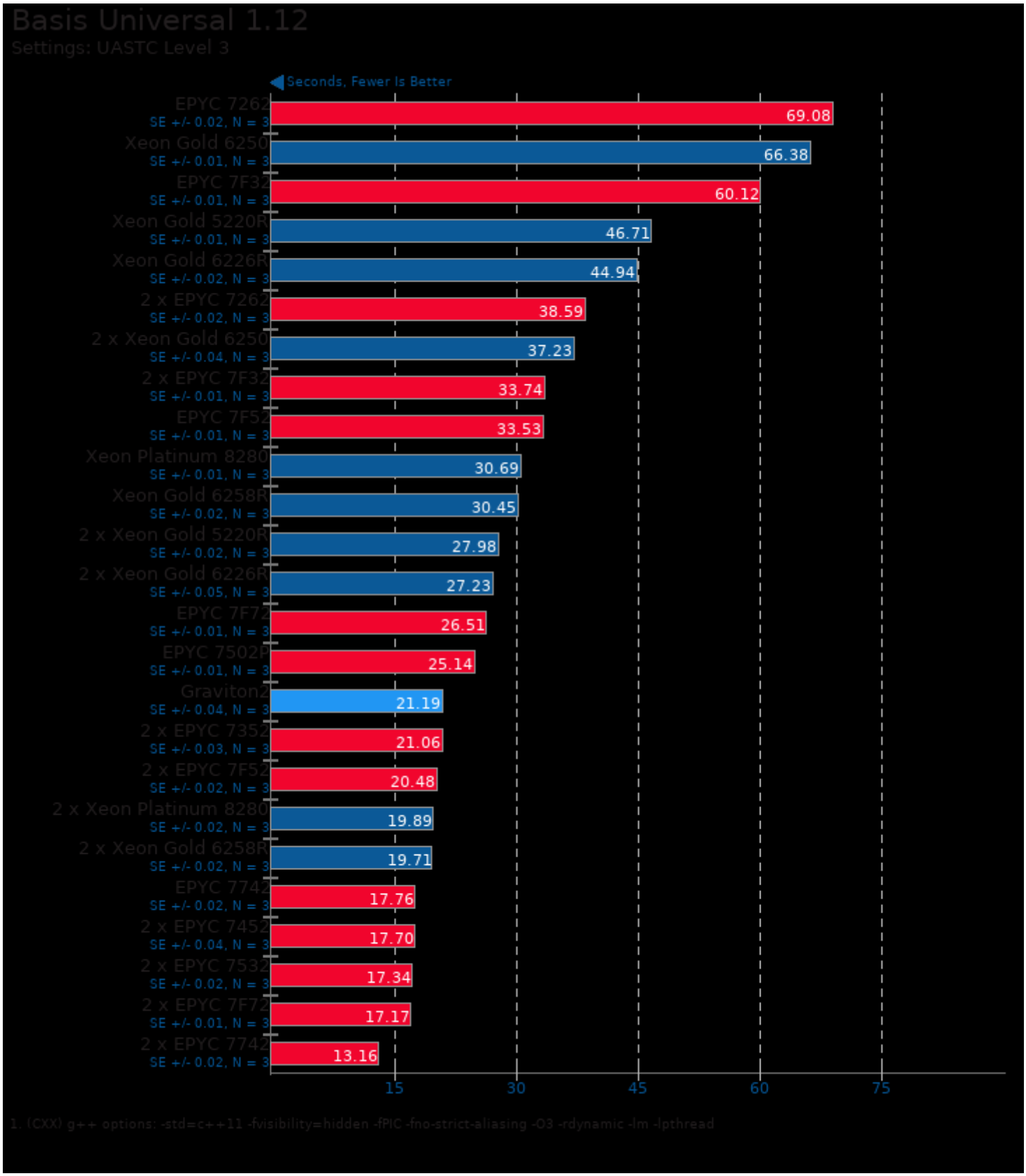
PyPerformance - regex_compile (Milliseconds)	168	167	168	167	164	164	203	**216**	210	173	175	204	199	202	202	176	177	185	184	204	**145**	**145**	164	163	213
Normalized	86.3%	86.8%	86.3%	86.8%	88.4%	88.4%	71.4%	67.1%	69.0%	83.8%	82.8%	71.0%	72.8%	71.7%	71.7%	82.3%	81.9%	78.3%	78.8%	71.0%	100%	100%	88.4%	88.9%	68.0%
Standard Deviation										0.3%			0.3%	0.6%			0.7%			0.3%					
PyPerformance - django_template (Milliseconds)	47.1	47.3	47.3	47.1	46.2	45.9	59.3	63.4	60.8	49.1	50.0	60.1	57.6	56.5	56.7	49.0	49.7	53.3	53.2	58.4	40.9	**40.7**	46.0	46.1	**73.6**
Normalized	86.4%	86.0%	86.0%	86.4%	88.1%	88.6%	68.6%	64.2%	66.9%	82.8%	81.4%	67.7%	70.6%	72.0%	71.7%	83.0%	81.8%	76.3%	76.5%	69.6%	99.5%	100%	88.4%	88.2%	55.3%
Standard Deviation	0.2%	0.1%	0.1%	0.1%	0.2%	0.3%	0.4%	0.4%	0.5%	0.7%	0.2%	0.2%	0.9%	0.7%	1.6%	0.3%	0.8%	0.7%	0.9%	0.9%	0.1%	0%	0.1%	0.1%	0%
PyPerformance - Performance / Cost - float (Milliseconds x Dollar)	1967 64	3900 76	**1668 65**	3279 26			3396 23	**4403 36**																	
Normalized	84.8%	42.7%	100%	50.8%			49.1%	37.8%																	

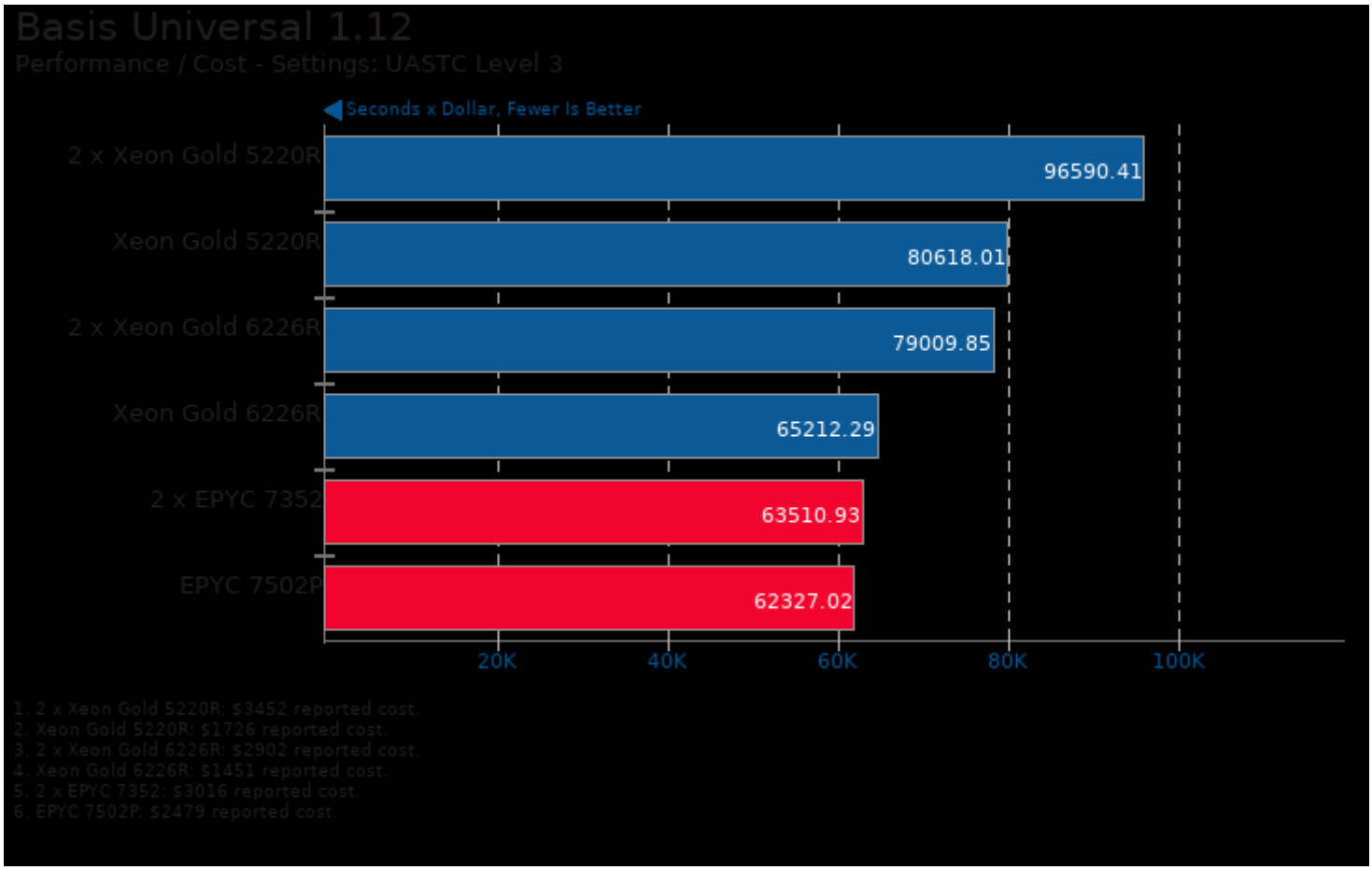
PyPerformance - Performance / Cost - regex_compile (Milliseconds x Dollar)	28	57	24	48		50	65
	99	64	37	46		32	14
	68	84	68	34		37	56
Normalized	84.07%	42.29%	100%	50.31%		48.44%	37.42%
PyPerformance - Performance / Cost - django_template (Milliseconds x Dollar)	81	16	68	13		14	19
	29	32	63	66		70	12
	5	80	2	84		05	14
Normalized	84.42%	42.03%	100%	50.21%		46.69%	35.89%

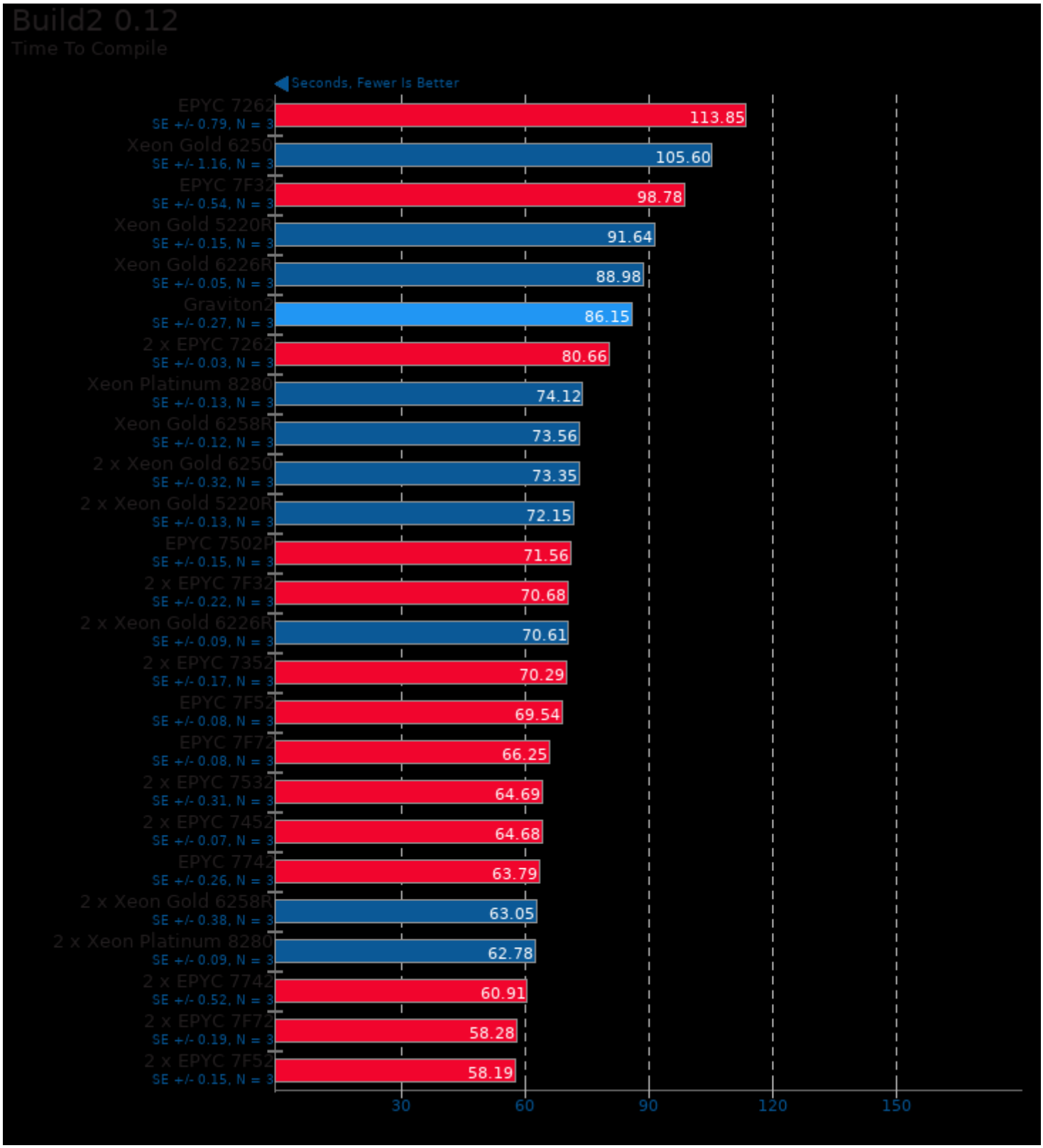
Scikit-Learn (sec)	10.112	10.458	9.924	10.449	9.127	9.392	10.618	11.531	10.913	9.571	9.888	10.788	10.463	10.894	10.823	9.742	9.735	9.912	10.125	10.533	8.525	8.819	9.283	9.452	14.035
Normalized	84.31%	81.52%	85.91%	81.52%	93.47%	90.77%	80.29%	73.91%	78.12%	89.07%	86.22%	79.08%	81.46%	78.24%	78.77%	87.51%	87.57%	85.81%	84.25%	80.91%	100%	96.67%	91.82%	90.16%	60.74%
Standard Deviation	0.61%	0.44%	0.59%	0.92%	0.82%	2.27%	0.29%	2.99%	0.83%	0.37%	0.57%	0.85%	0.12%	0.25%	1.07%	0.15%	0.27%	0.27%	1.17%	0.24%	0.73%	1.47%	1.79%	2.29%	2.35%
Scikit-Learn - Performance / Cost - (sec x Dollar)	17	36	14	30		26	34
	45	10	40	32		32	77
	3	1	0	3		2	7
Normalized	82.59%	39.89%	100%	47.49%		54.71%	41.41%

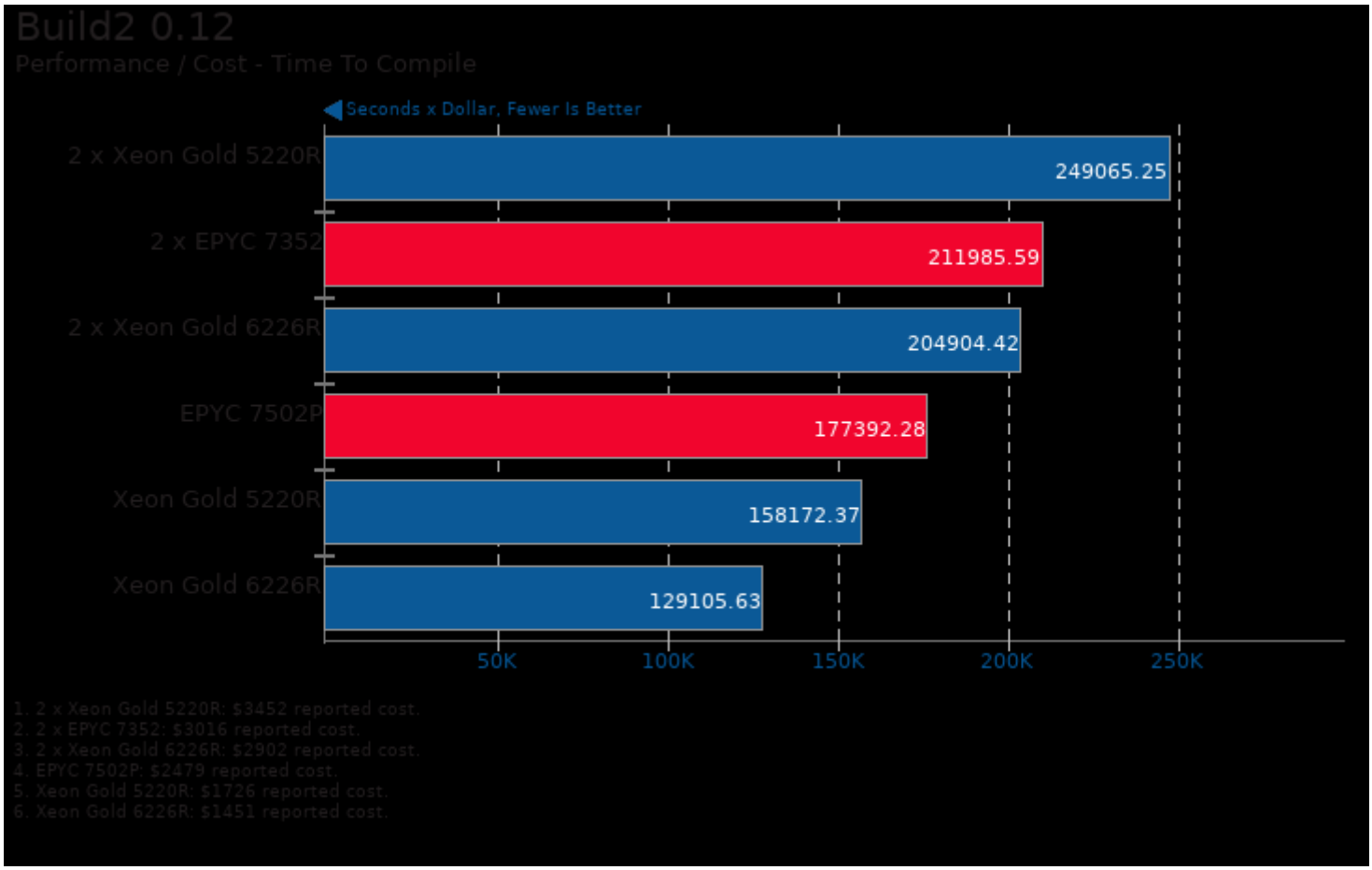
Timed Linux Kernel Compilation - Time To Compil	59.01	36.69	57.77	36.59	40.89	27.30	37.01	30.87	25.98	43.90	28.06	26.61	26.50	87.74	49.96	76.78	43.74	37.00	24.60	20.20	80.48	46.93	40.62	27.17	86.66
Normalized	34.2 4%	55.0 5%	34.9 7%	55.2 1%	49.4 %	73.9 8%	54.5 8%	65.4 3%	77.7 5%	46.0 1%	71.9 9%	75.9 %	76.2 4%	23.0 2%	40.4 4%	26.3 1%	46.1 9%	54.6 %	82.1 2%	100 %	25.1 %	43.0 4%	49.7 3%	74.3 4%	23.3 1%
Standard Deviation	3%	3%	2.7 %	2.9 %	2.9 %	3.4 %	3%	2.9 %	2.8 %	2.9 %	2%	2.8 %	3%	1.3 %	2.8 %	1.2 %	2.8 %	2.8 %	2.8 %	3.6 %	2.8 %	2.8 %	3%	3.5 %	1.6 %
Timed Linux Kernel Compilation - Performance / Cost - Time To Compile (sec x	10 18 55	12 66 85	83 82 7	10 61 99			91 75 8	93 12 2																	
Normalized	82.3 %	66.1 7%	100 %	78.9 3%			91.3 6%	90.0 2%																	
Timed LLVM Compilation - Time To Compil	43	28	43	27	30	22	28	24	21	32	21	22	22	64	36	57	33	28	20	19	60	35	30	21	31
	0.4 26	6.7 82	3.1 91	9.6 82	8.7 41	1.5 15	7.1 27	8.5 68	7.7 43	8.7 64	7.8 26	4.5 63	3.8 76	7.2 99	8.9 90	0.9 72	2.0 09	2.5 64	2.1 33	5.8 80	9.8 62	3.7 56	6.9 90	9.9 82	1.0 80
Normalized	45.5 1%	68.3 %	45.2 2%	70.0 4%	63.4 4%	88.4 3%	68.2 2%	78.8 %	89.9 6%	59.5 8%	89.9 2%	87.2 3%	87.4 9%	30.2 6%	53.0 9%	34.3 1%	59%	69.3 2%	96.9 1%	100 %	32.1 2%	55.3 7%	63.8 1%	89.0 4%	62.9 7%
Standard Deviation	0.7 %	1.2 %	0.9 %	2.2 %	2.7 %	0.8 %	0.9 %	1.4 %	1.2 %	2.7 %	0.8 %	0.6 %	0.1 %	0.6 %	0.4 %	0.3 %	1%	1.8 %	1.1 %	0.4 %	0.8 %	0.5 %	2.2 %	0.8 %	1%

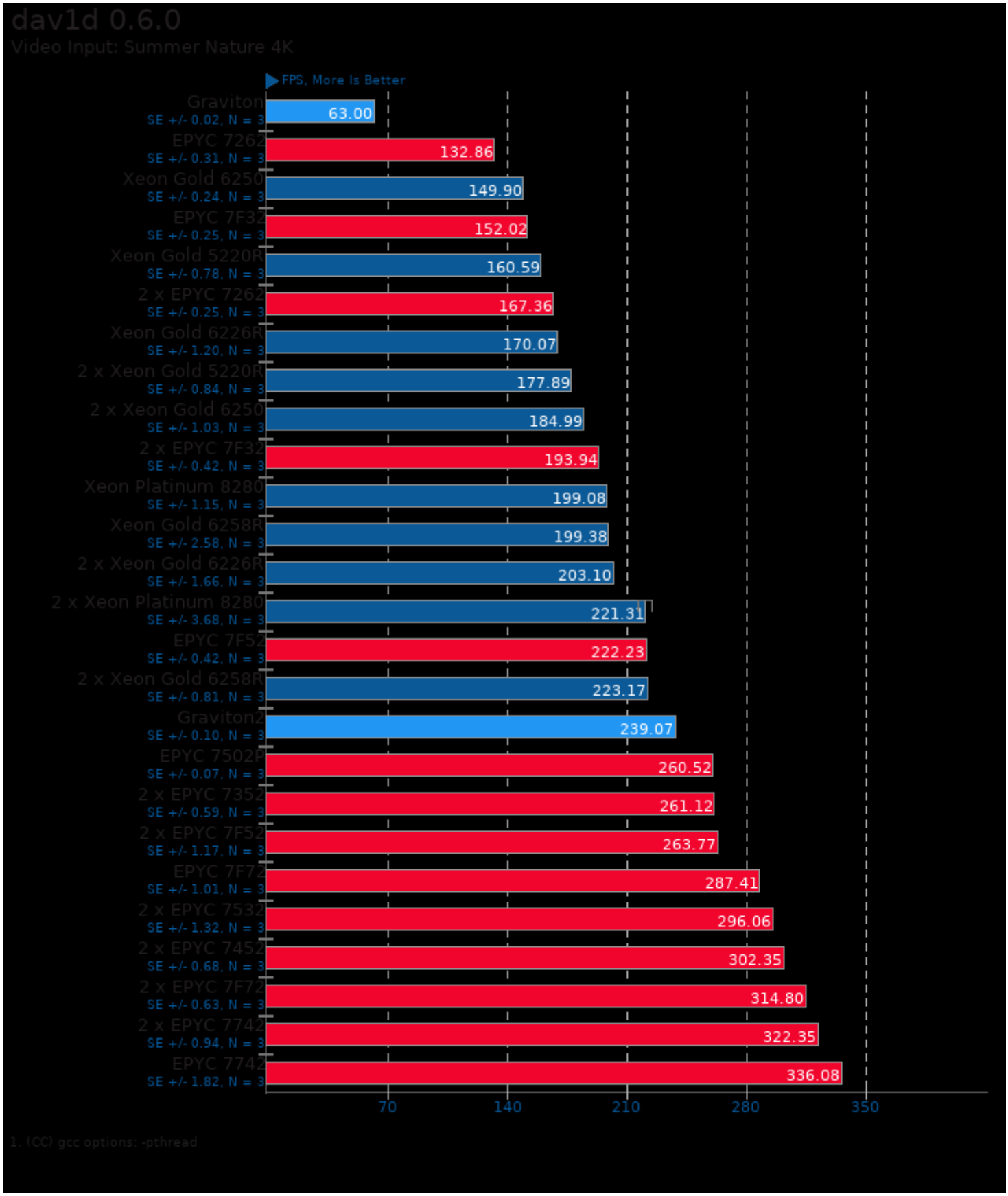
Timed LLVM Compilation - Performance / Cost - Time To Compile (sec x	74	98	62	81			71	74																		
	29	99	85	16			17	96																		
	15	71	60	37			88	81																		
Normalized	84.6 1%	63.4 9%	100 %	77.4 4%			88.3 1%	83.8 4%																		
Timed MrBayes Analysis - P.P.A	13 4.4 83	13 4.9 28	12 3.7 02	12 4.2 58	12 8.8 48	12 9.9 86	93. 63 9	10 2.2 91	97. 78 0	72. 14 6	72. 09 3	10 3.9 14	10 6.5 87	82. 18 4	82. 66 6	72. 18 5	**72. 01 8**	79. 65 0	79. 37 3	10 8.8 72	79. 60 5	79. 44 5	10 9.1 11	11 1.1 57	25 6.9 79	**43 7.4 81**
Normalized	53.5 5%	53.3 8%	58.2 2%	57.9 6%	55.8 9%	55.4 %	76.9 1%	70.4 1%	73.6 5%	99.8 2%	99.9 %	69.3 1%	67.5 7%	87.6 3%	87.1 2%	99.7 7%	100 %	90.4 2%	90.7 3%	66.1 5%	90.4 7%	90.6 5%	66%	64.7 9%	28.0 2%	16.4 6%
Standard Deviation	0%	0.3 %	0.1 %	0.4 %	0%	0.5 %	0.2 %	2.5 %	0.1 %	0.2 %	0.3 %	0.2 %	0.5 %	0%	0.2 %	0.3 %	0.3 %	1.8 %	0.1 %	0.3 %	0.9 %	0.5 %	0.4 %	2.7 %	0.1 %	0.4 %
Timed MrBayes Analysis - Performance / Cost - P.P.A (sec x Dollar)	23	46	17	36			23	30																		
	21	57	94	05			21	85																		
	18	71	92	97			31	10																		
Normalized	77.3 3%	38.5 4%	100 %	49.7 8%			77.3 2%	58.1 8%																		

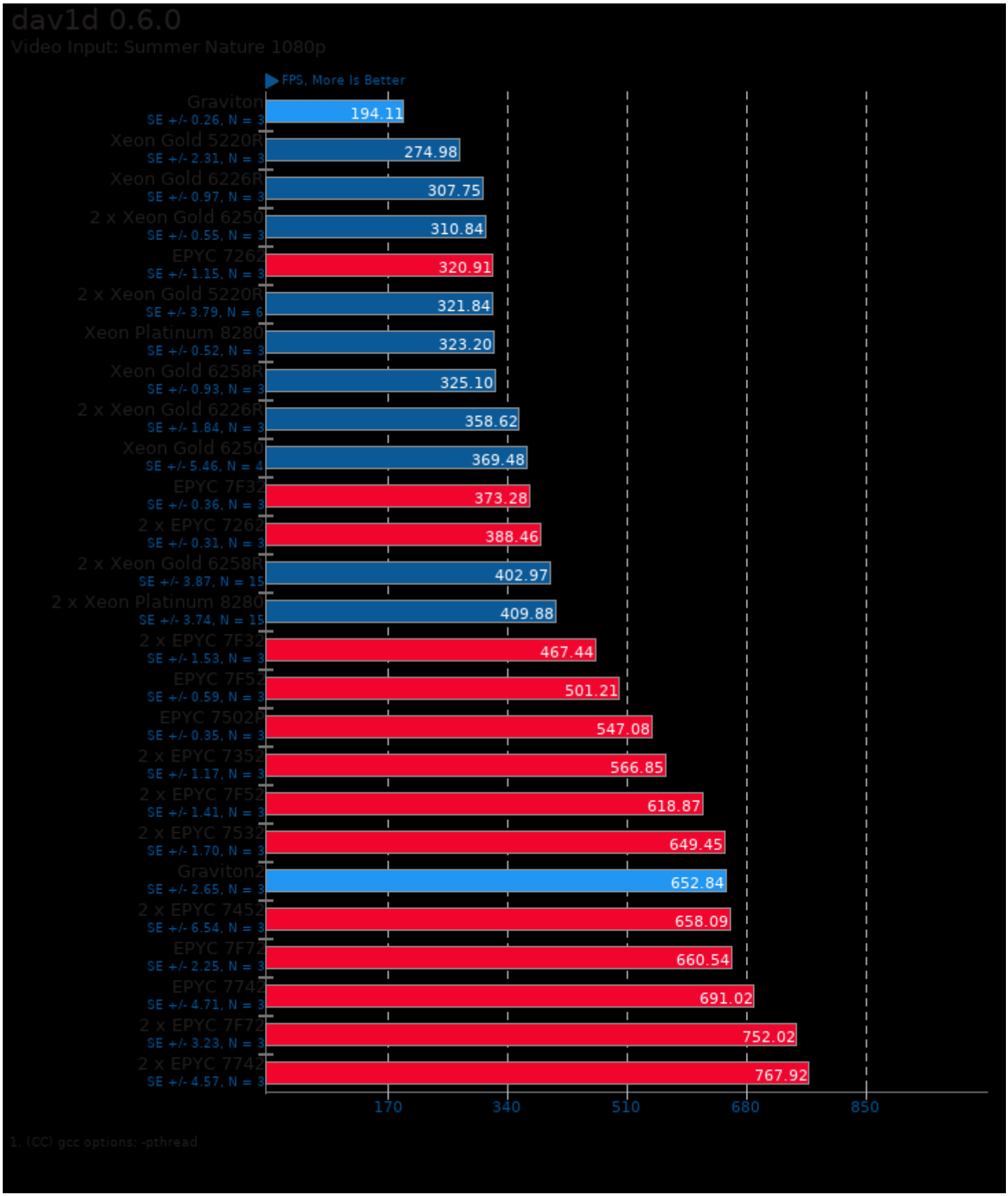

Basis Universal 1.12
Settings: UASTC Level 3
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.02, N = 3
69.08
Xeon Gold 6250
SE +/- 0.01, N = 3
66.38
EPYC 7F32
SE +/- 0.01, N = 3
60.12
Xeon Gold 5220R
SE +/- 0.01, N = 3
46.71
Xeon Gold 6226R
SE +/- 0.02, N = 3
44.94
2 x EPYC 7262
SE +/- 0.02, N = 3
38.59
2 x Xeon Gold 6250
SE +/- 0.04, N = 3
37.23
2 x EPYC 7F32
SE +/- 0.01, N = 3
33.74
EPYC 7F52
SE +/- 0.01, N = 3
33.53
Xeon Platinum 8280
SE +/- 0.01, N = 3
30.69
Xeon Gold 6258R
SE +/- 0.02, N = 3
30.45
2 x Xeon Gold 5220R
SE +/- 0.02, N = 3
27.98
2 x Xeon Gold 6226R
SE +/- 0.05, N = 3
27.23
EPYC 7F72
SE +/- 0.01, N = 3
26.51
EPYC 7502P
SE +/- 0.01, N = 3
25.14
Graviton2
SE +/- 0.04, N = 3
21.19
2 x EPYC 7352
SE +/- 0.03, N = 3
21.06
2 x EPYC 7F52
SE +/- 0.02, N = 3
20.48
2 x Xeon Platinum 8280
SE +/- 0.02, N = 3
19.89
2 x Xeon Gold 6258R
SE +/- 0.02, N = 3
19.71
EPYC 7742
SE +/- 0.02, N = 3
17.76
2 x EPYC 7452
SE +/- 0.04, N = 3
17.70
2 x EPYC 7532
SE +/- 0.02, N = 3
17.34
2 x EPYC 7F72
SE +/- 0.01, N = 3
17.17
2 x EPYC 7742
SE +/- 0.02, N = 3
13.16
15
30
45
60
75
1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

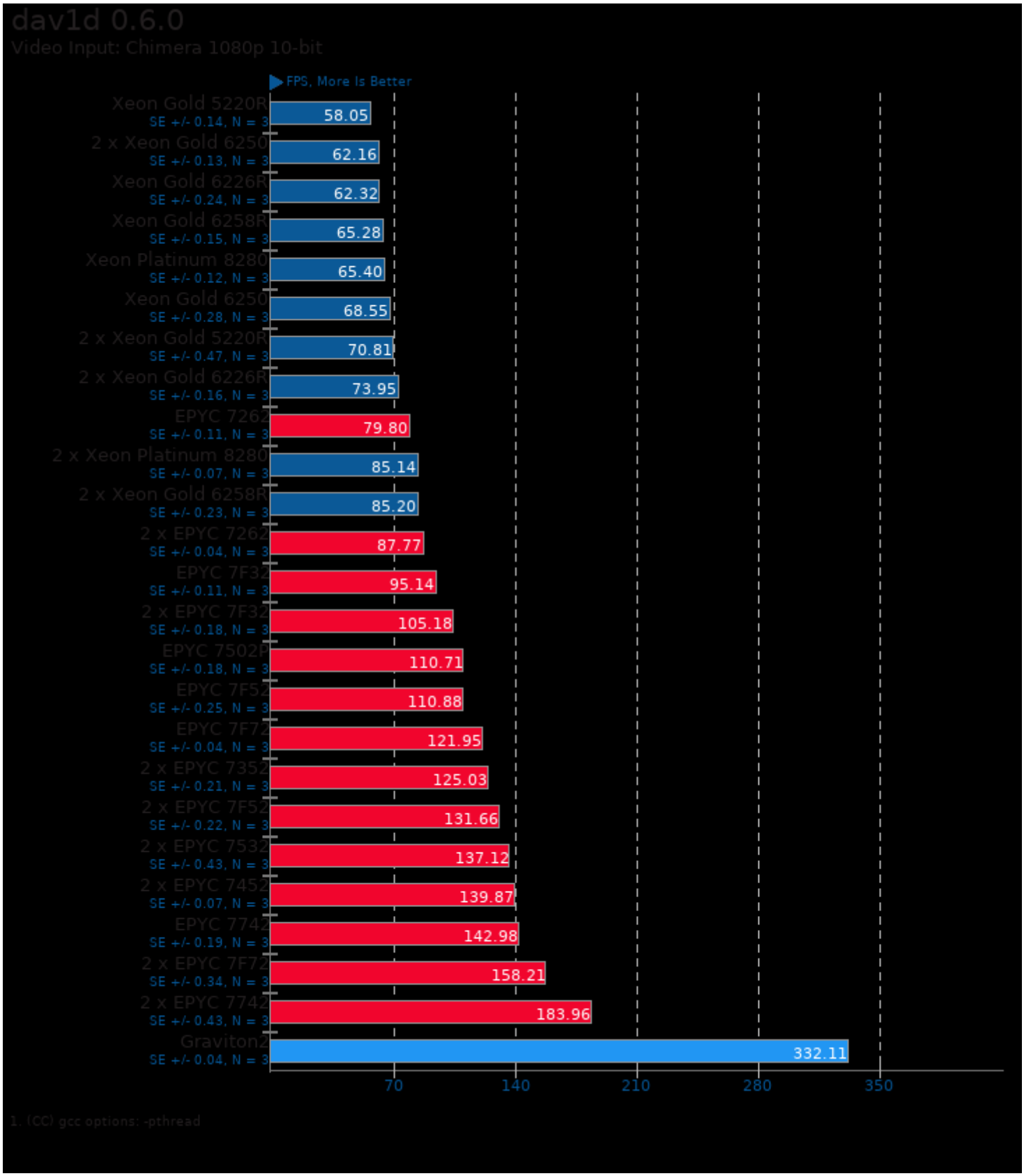

Basis Universal 1.12
Performance / Cost - Settings: UASTC Level 3
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
96590.41
Xeon Gold 5220R
80618.01
2 x Xeon Gold 6226R
79009.85
Xeon Gold 6226R
65212.29
2 x EPYC 7352
63510.93
EPYC 7502P
62327.02
20K
40K
60K
80K
100K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. Xeon Gold 5220R: $1726 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. Xeon Gold 6226R: $1451 reported cost.
5. 2 x EPYC 7352: $3016 reported cost.
6. EPYC 7502P: $2479 reported cost.

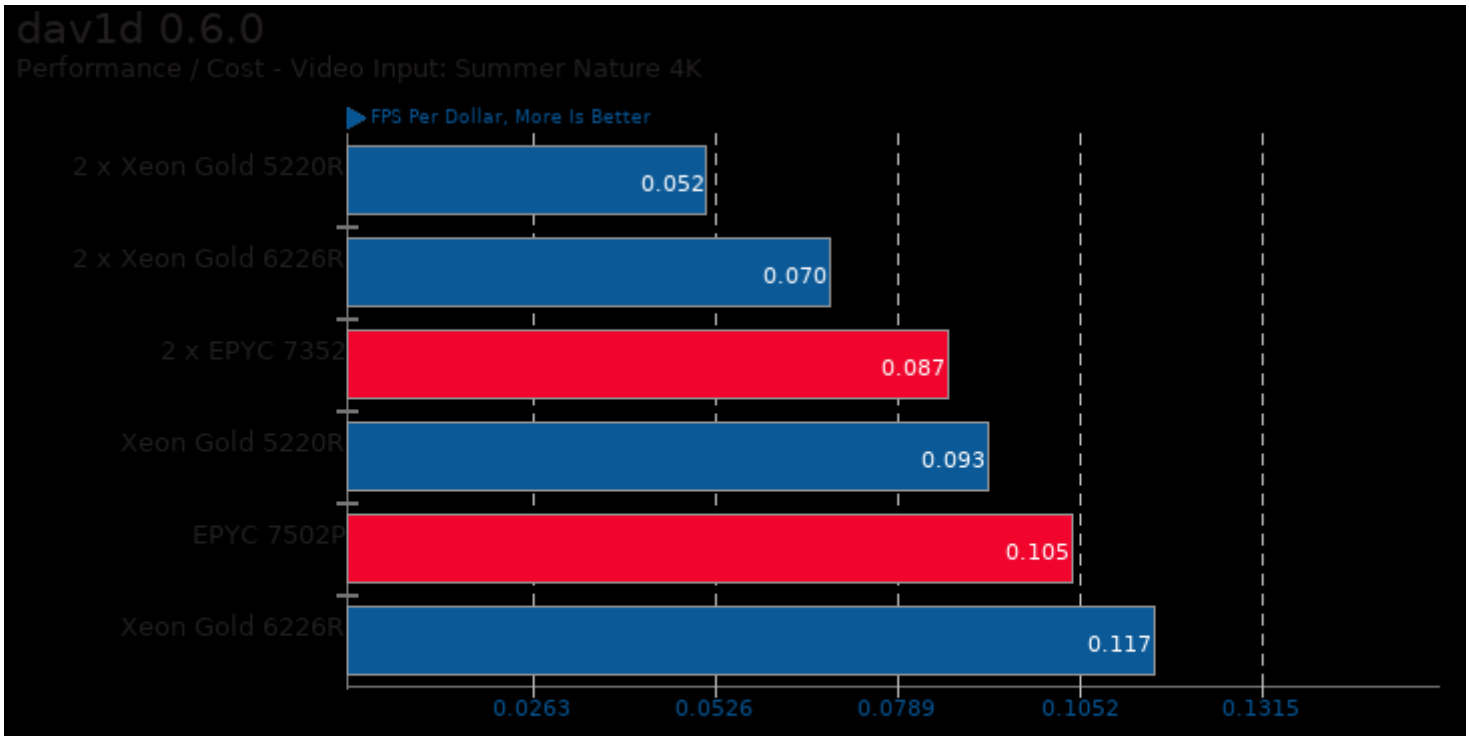

Build2 0.12
Time To Compile
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.79, N = 3
113.85
Xeon Gold 6250
SE +/- 1.16, N = 3
105.60
EPYC 7F32
SE +/- 0.54, N = 3
98.78
Xeon Gold 5220R
SE +/- 0.15, N = 3
91.64
Xeon Gold 6226R
SE +/- 0.05, N = 3
88.98
Graviton2
SE +/- 0.27, N = 3
86.15
2 x EPYC 7262
SE +/- 0.03, N = 3
80.66
Xeon Platinum 8280
SE +/- 0.13, N = 3
74.12
Xeon Gold 6258R
SE +/- 0.12, N = 3
73.56
2 x Xeon Gold 6250
SE +/- 0.32, N = 3
73.35
2 x Xeon Gold 5220R
SE +/- 0.13, N = 3
72.15
EPYC 7502P
SE +/- 0.15, N = 3
71.56
2 x EPYC 7F32
SE +/- 0.22, N = 3
70.68
2 x Xeon Gold 6226R
SE +/- 0.09, N = 3
70.61
2 x EPYC 7352
SE +/- 0.17, N = 3
70.29
EPYC 7F52
SE +/- 0.08, N = 3
69.54
EPYC 7F72
SE +/- 0.08, N = 3
66.25
2 x EPYC 7532
SE +/- 0.31, N = 3
64.69
2 x EPYC 7452
SE +/- 0.07, N = 3
64.68
EPYC 7742
SE +/- 0.26, N = 3
63.79
2 x Xeon Gold 6258R
SE +/- 0.38, N = 3
63.05
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
62.78
2 x EPYC 7742
SE +/- 0.52, N = 3
60.91
2 x EPYC 7F72
SE +/- 0.19, N = 3
58.28
2 x EPYC 7F52
SE +/- 0.15, N = 3
58.19
30
60
90
120
150


Build2 0.12
Performance / Cost - Time To Compile
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
249065.25
2 x EPYC 7352
211985.59
2 x Xeon Gold 6226R
204904.42
EPYC 7502P
177392.28
Xeon Gold 5220R
158172.37
Xeon Gold 6226R
129105.63
50K
100K
150K
200K
250K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

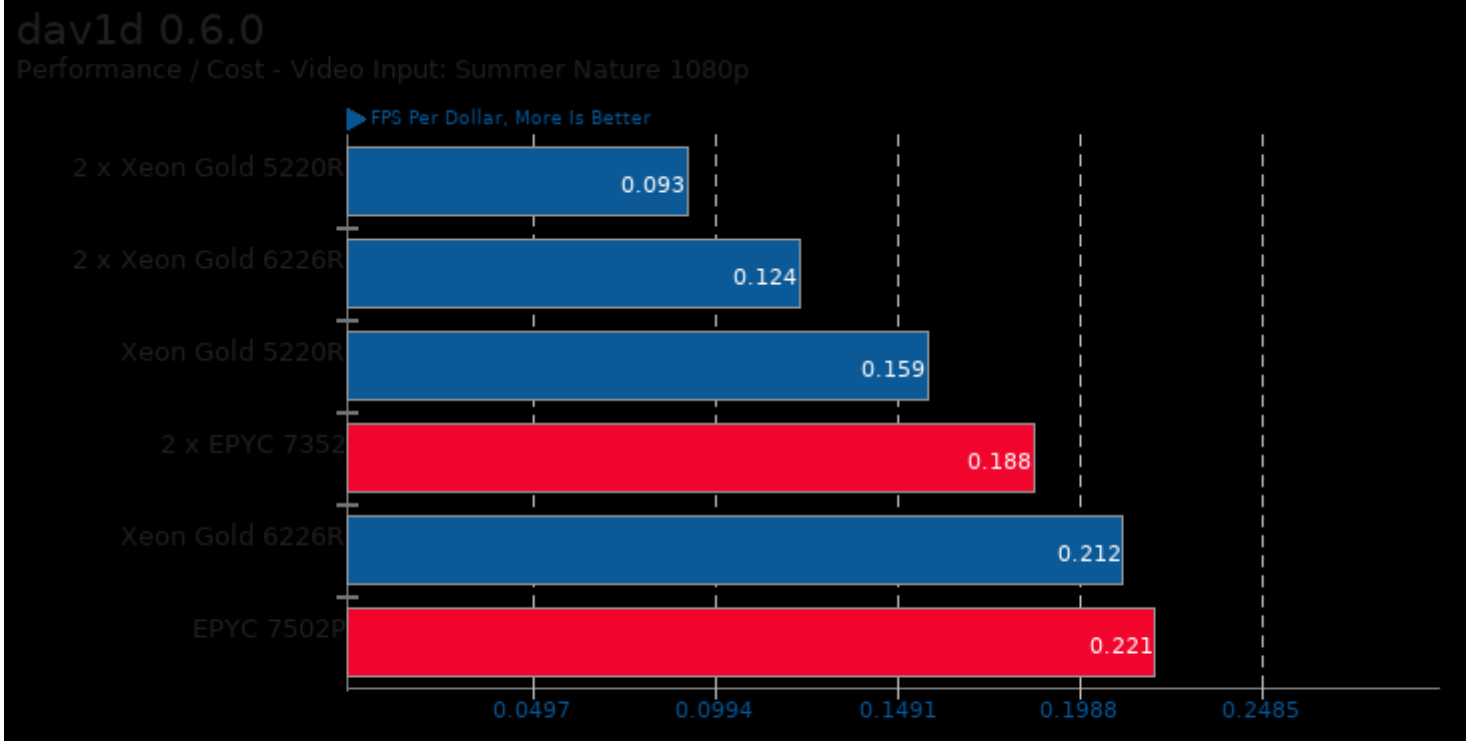

dav1d 0.6.0
Video Input: Summer Nature 4K
FPS, More Is Better
Graviton
SE +/- 0.02, N = 3
63.00
EPYC 726
SE +/- 0.31, N = 3
132.86
Xeon Gold 625
SE +/- 0.24, N = 3
149.90
EPYC 7F3
SE +/- 0.25, N = 3
152.02
Xeon Gold 5220R
SE +/- 0.78, N = 3
160.59
2 x EPYC 726
SE +/- 0.25, N = 3
167.36
Xeon Gold 6226R
SE +/- 1.20, N = 3
170.07
2 x Xeon Gold 5220R
SE +/- 0.84, N = 3
177.89
2 x Xeon Gold 625
SE +/- 1.03, N = 3
184.99
2 x EPYC 7F3
SE +/- 0.42, N = 3
193.94
Xeon Platinum 828
SE +/- 1.15, N = 3
199.08
Xeon Gold 6258R
SE +/- 2.58, N = 3
199.38
2 x Xeon Gold 6226R
SE +/- 1.66, N = 3
203.10
2 x Xeon Platinum 828
SE +/- 3.68, N = 3
221.31
EPYC 7F5
SE +/- 0.42, N = 3
222.23
2 x Xeon Gold 6258R
SE +/- 0.81, N = 3
223.17
Graviton2
SE +/- 0.10, N = 3
239.07
EPYC 7502P
SE +/- 0.07, N = 3
260.52
2 x EPYC 735
SE +/- 0.59, N = 3
261.12
2 x EPYC 7F5
SE +/- 1.17, N = 3
263.77
EPYC 7F7
SE +/- 1.01, N = 3
287.41
2 x EPYC 753
SE +/- 1.32, N = 3
296.06
2 x EPYC 745
SE +/- 0.68, N = 3
302.35
2 x EPYC 7F7
SE +/- 0.63, N = 3
314.80
2 x EPYC 774
SE +/- 0.94, N = 3
322.35
EPYC 774
SE +/- 1.82, N = 3
336.08
70
140
210
280
350
1. (CC) gcc options: -pthread


dav1d 0.6.0
Video Input: Summer Nature 1080p
FPS, More Is Better
Graviton
SE +/- 0.26, N = 3
194.11
Xeon Gold 5220R
SE +/- 2.31, N = 3
274.98
Xeon Gold 6226R
SE +/- 0.97, N = 3
307.75
2 x Xeon Gold 6250
SE +/- 0.55, N = 3
310.84
EPYC 7262
SE +/- 1.15, N = 3
320.91
2 x Xeon Gold 5220R
SE +/- 3.79, N = 6
321.84
Xeon Platinum 8280
SE +/- 0.52, N = 3
323.20
Xeon Gold 6258R
SE +/- 0.93, N = 3
325.10
2 x Xeon Gold 6226R
SE +/- 1.84, N = 3
358.62
Xeon Gold 6250
SE +/- 5.46, N = 4
369.48
EPYC 7F32
SE +/- 0.36, N = 3
373.28
2 x EPYC 7262
SE +/- 0.31, N = 3
388.46
2 x Xeon Gold 6258R
SE +/- 3.87, N = 15
402.97
2 x Xeon Platinum 8280
SE +/- 3.74, N = 15
409.88
2 x EPYC 7F32
SE +/- 1.53, N = 3
467.44
EPYC 7F52
SE +/- 0.59, N = 3
501.21
EPYC 7502P
SE +/- 0.35, N = 3
547.08
2 x EPYC 7352
SE +/- 1.17, N = 3
566.85
2 x EPYC 7F52
SE +/- 1.41, N = 3
618.87
2 x EPYC 7532
SE +/- 1.70, N = 3
649.45
Graviton2
SE +/- 2.65, N = 3
652.84
2 x EPYC 7452
SE +/- 6.54, N = 3
658.09
EPYC 7F72
SE +/- 2.25, N = 3
660.54
EPYC 7742
SE +/- 4.71, N = 3
691.02
2 x EPYC 7F72
SE +/- 3.23, N = 3
752.02
2 x EPYC 7742
SE +/- 4.57, N = 3
767.92
170
340
510
680
850
1. (CC) gcc options: -pthread

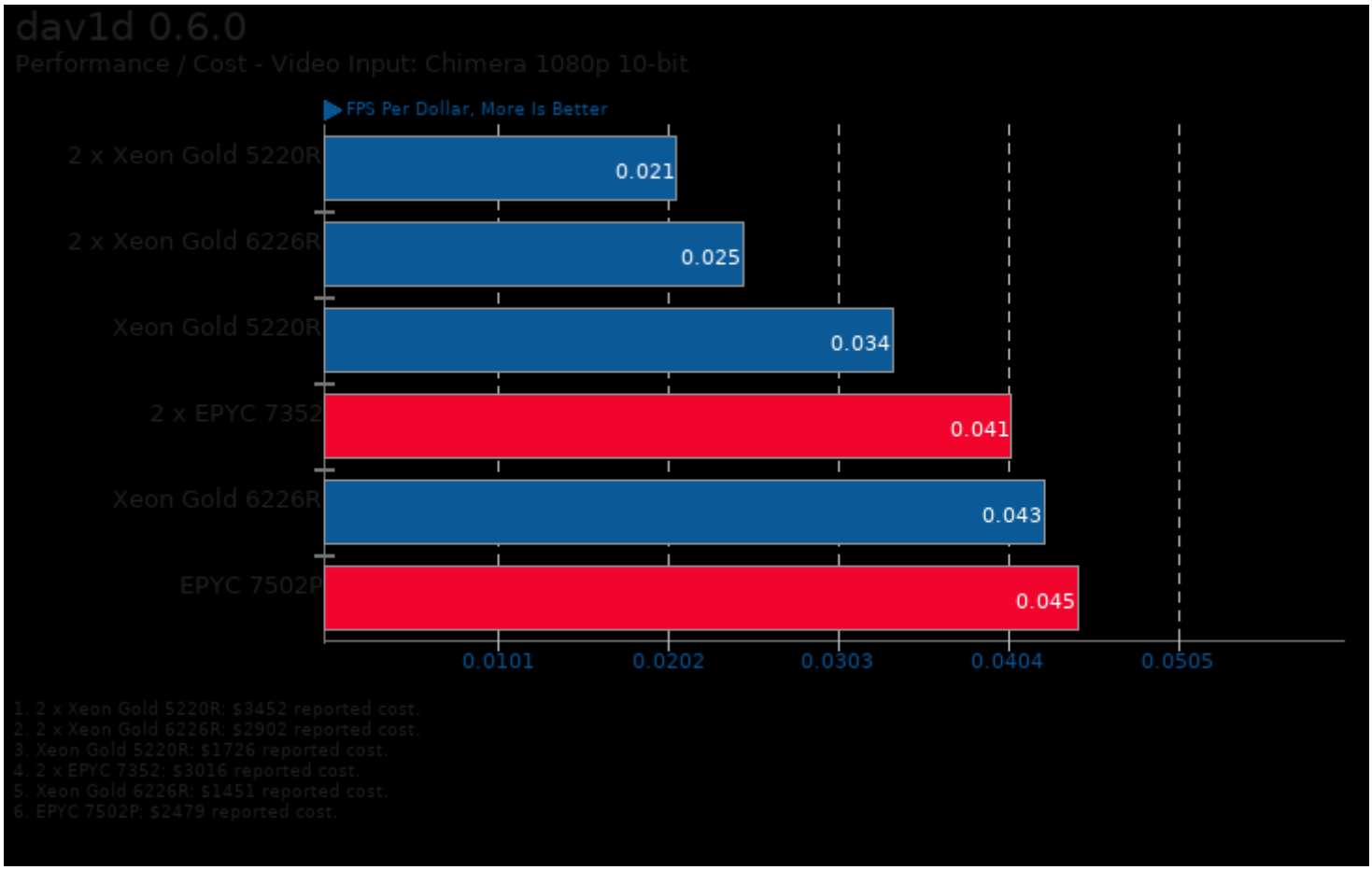

dav1d 0.6.0
Video Input: Chimera 1080p 10-bit
FPS, More Is Better
Xeon Gold 5220R
SE +/- 0.14, N = 3
58.05
2 x Xeon Gold 6250
SE +/- 0.13, N = 3
62.16
Xeon Gold 6226R
SE +/- 0.24, N = 3
62.32
Xeon Gold 6258R
SE +/- 0.15, N = 3
65.28
Xeon Platinum 8280
SE +/- 0.12, N = 3
65.40
Xeon Gold 6250
SE +/- 0.28, N = 3
68.55
2 x Xeon Gold 5220R
SE +/- 0.47, N = 3
70.81
2 x Xeon Gold 6226R
SE +/- 0.16, N = 3
73.95
EPYC 7262
SE +/- 0.11, N = 3
79.80
2 x Xeon Platinum 8280
SE +/- 0.07, N = 3
85.14
2 x Xeon Gold 6258R
SE +/- 0.23, N = 3
85.20
2 x EPYC 7262
SE +/- 0.04, N = 3
87.77
EPYC 7F32
SE +/- 0.11, N = 3
95.14
2 x EPYC 7F32
SE +/- 0.18, N = 3
105.18
EPYC 7502P
SE +/- 0.18, N = 3
110.71
EPYC 7F52
SE +/- 0.25, N = 3
110.88
EPYC 7F72
SE +/- 0.04, N = 3
121.95
2 x EPYC 7352
SE +/- 0.21, N = 3
125.03
2 x EPYC 7F52
SE +/- 0.22, N = 3
131.66
2 x EPYC 7532
SE +/- 0.43, N = 3
137.12
2 x EPYC 7452
SE +/- 0.07, N = 3
139.87
EPYC 7742
SE +/- 0.19, N = 3
142.98
2 x EPYC 7F72
SE +/- 0.34, N = 3
158.21
2 x EPYC 7742
SE +/- 0.43, N = 3
183.96
Graviton2
SE +/- 0.04, N = 3
332.11
70
140
210
280
350
1. (CC) gcc options: -pthread

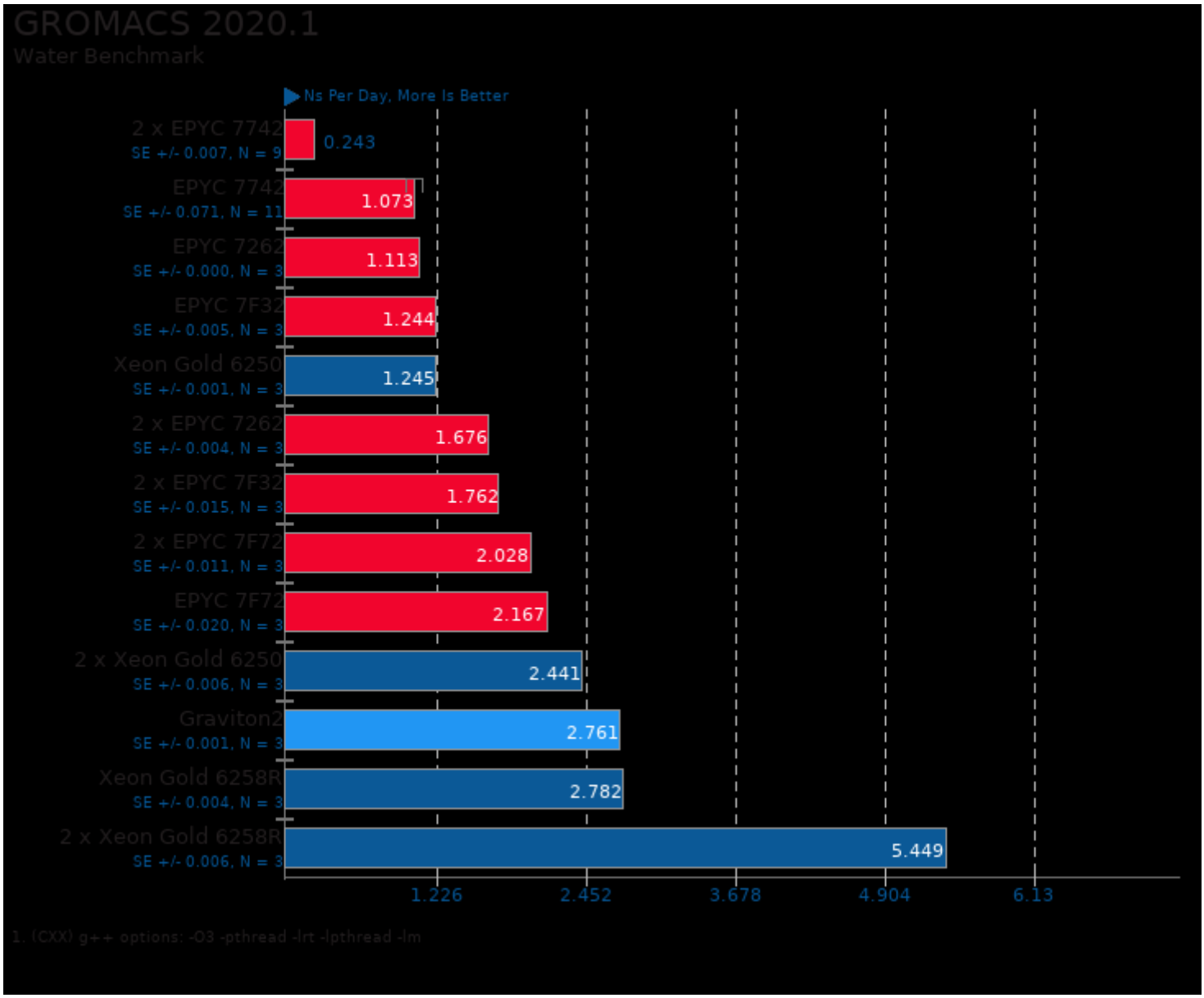


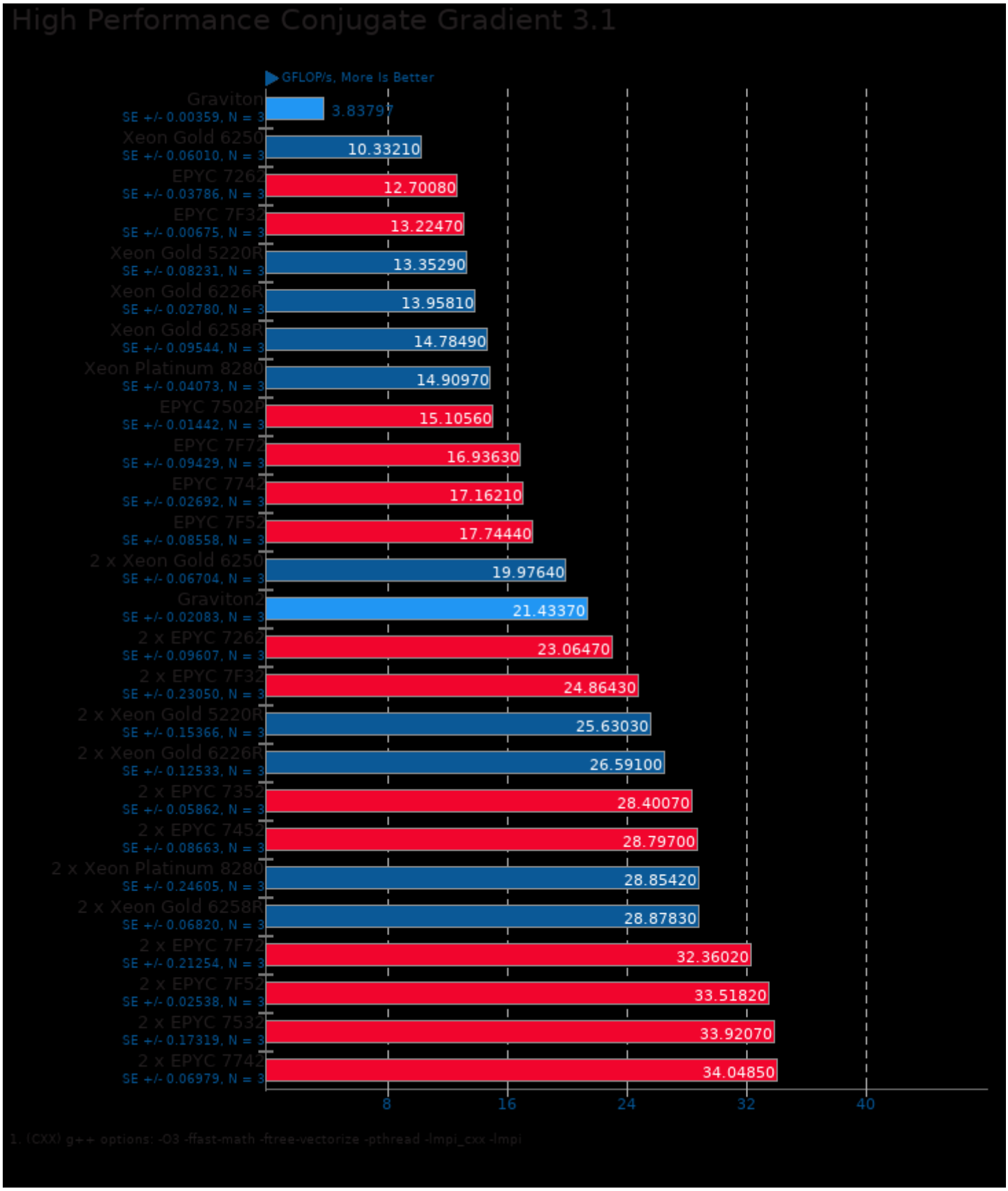
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. Xeon Gold 5220R: $1726 reported cost.
5. EPYC 7502P: $2479 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

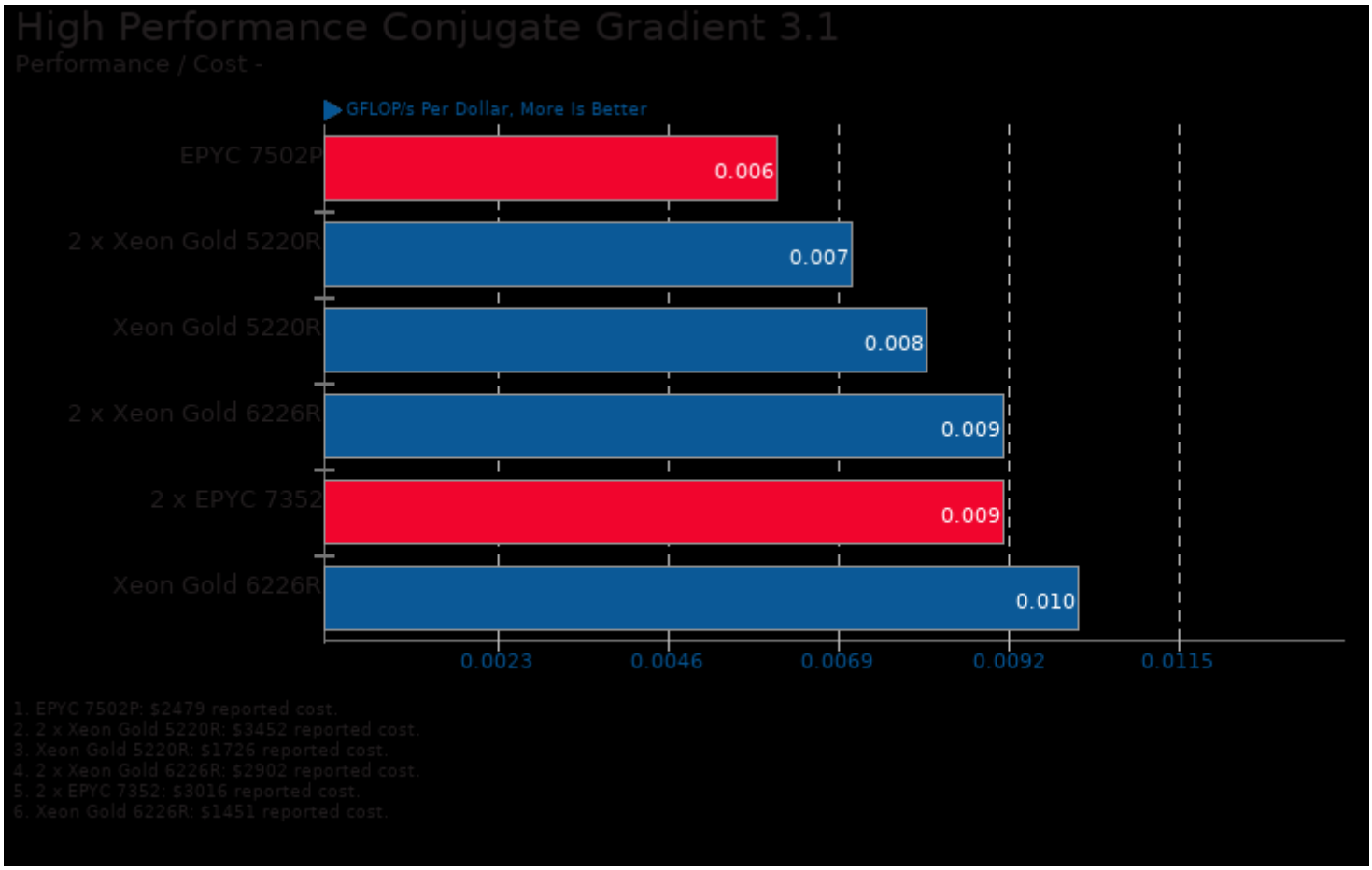


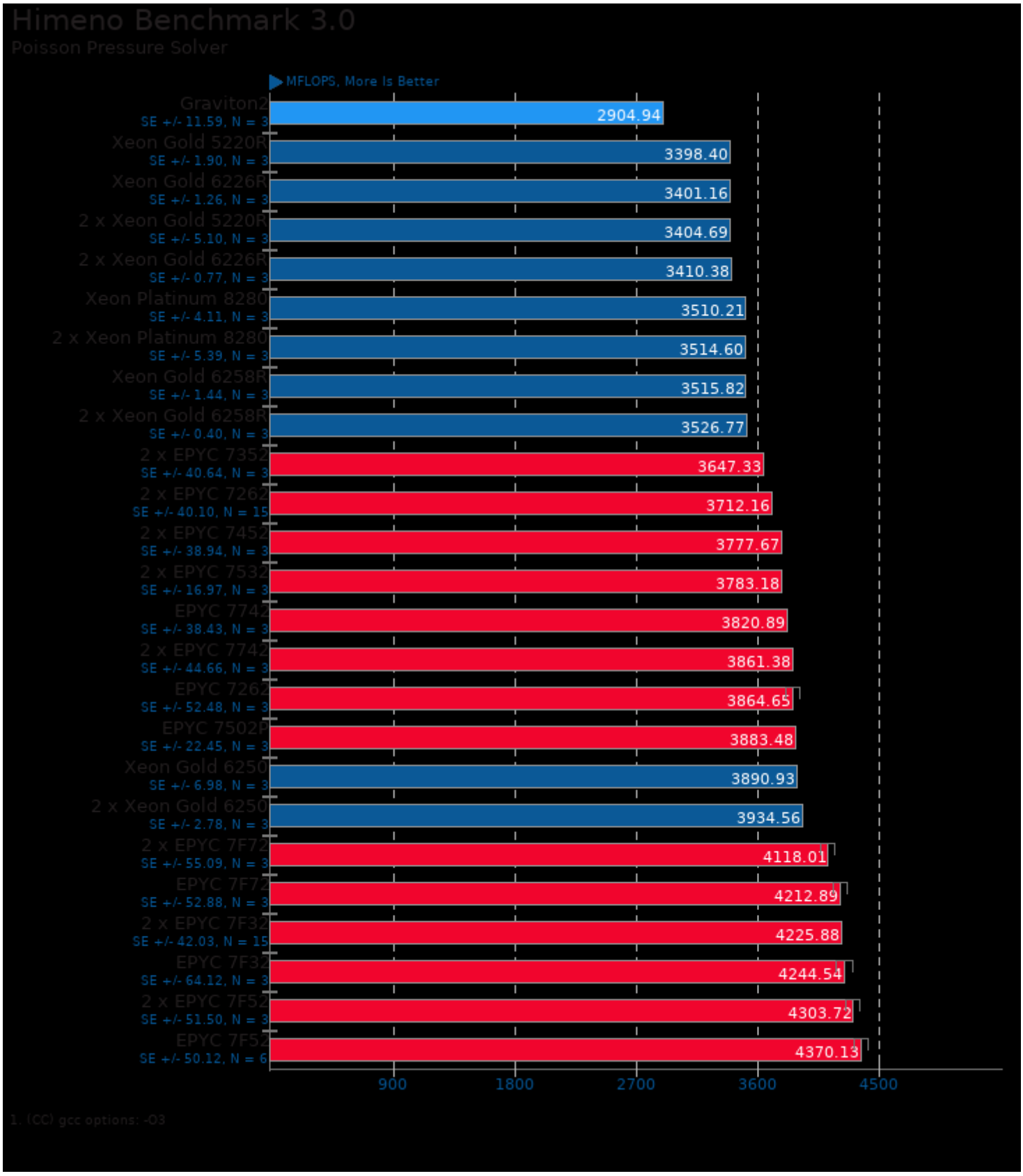
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. Xeon Gold 5220R: $1726 reported cost.
4. 2 x EPYC 7352: $3016 reported cost.
5. Xeon Gold 6226R: $1451 reported cost.
6. EPYC 7502P: $2479 reported cost.

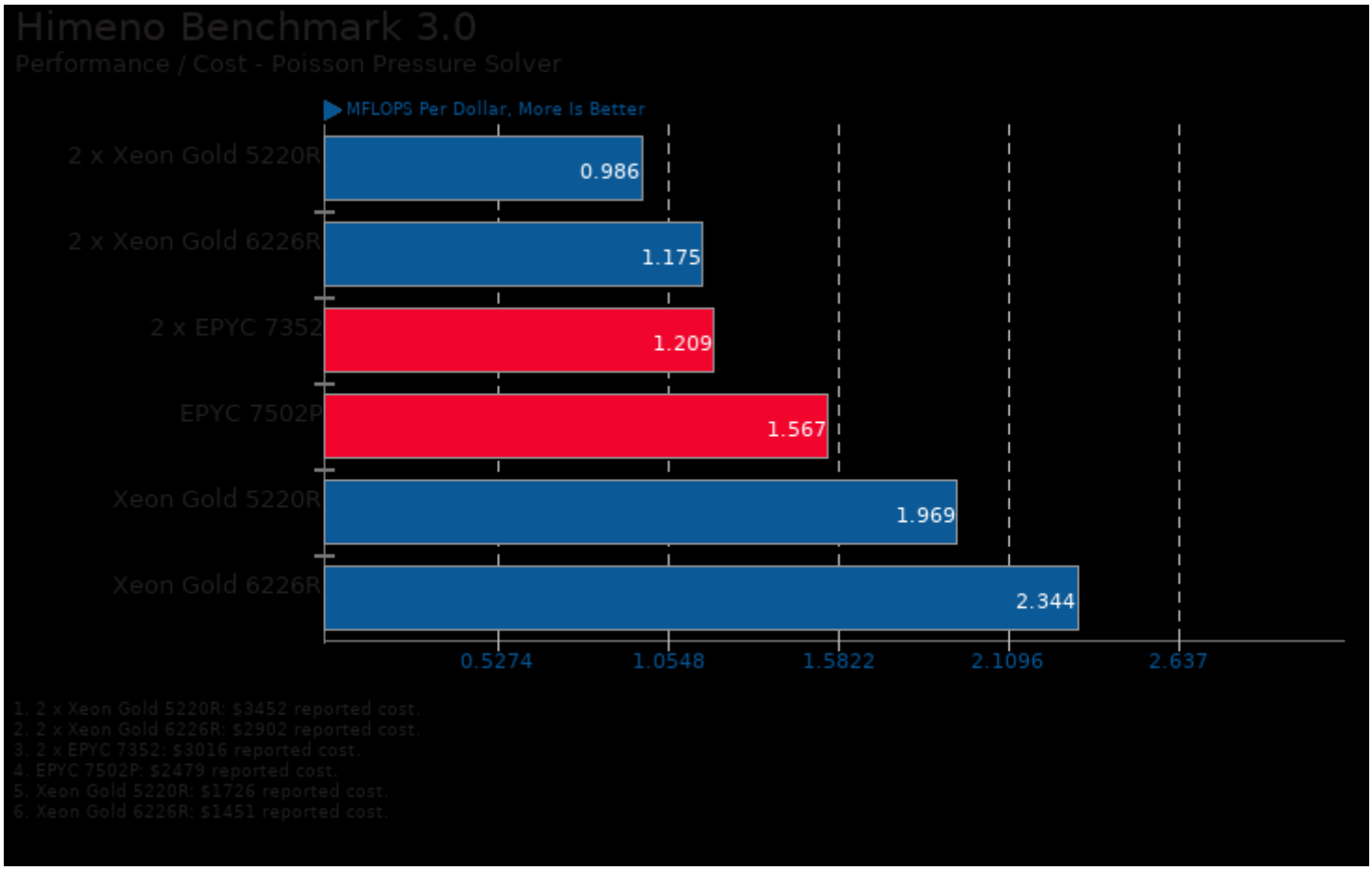

dav1d 0.6.0
Performance / Cost - Video Input: Chimera 1080p 10-bit
FPS Per Dollar, More Is Better
2 x Xeon Gold 5220R
0.021
2 x Xeon Gold 6226R
0.025
Xeon Gold 5220R
0.034
2 x EPYC 7352
0.041
Xeon Gold 6226R
0.043
EPYC 7502P
0.045
0.0101
0.0202
0.0303
0.0404
0.0505
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. Xeon Gold 5220R: $1726 reported cost.
4. 2 x EPYC 7352: $3016 reported cost.
5. Xeon Gold 6226R: $1451 reported cost.
6. EPYC 7502P: $2479 reported cost.

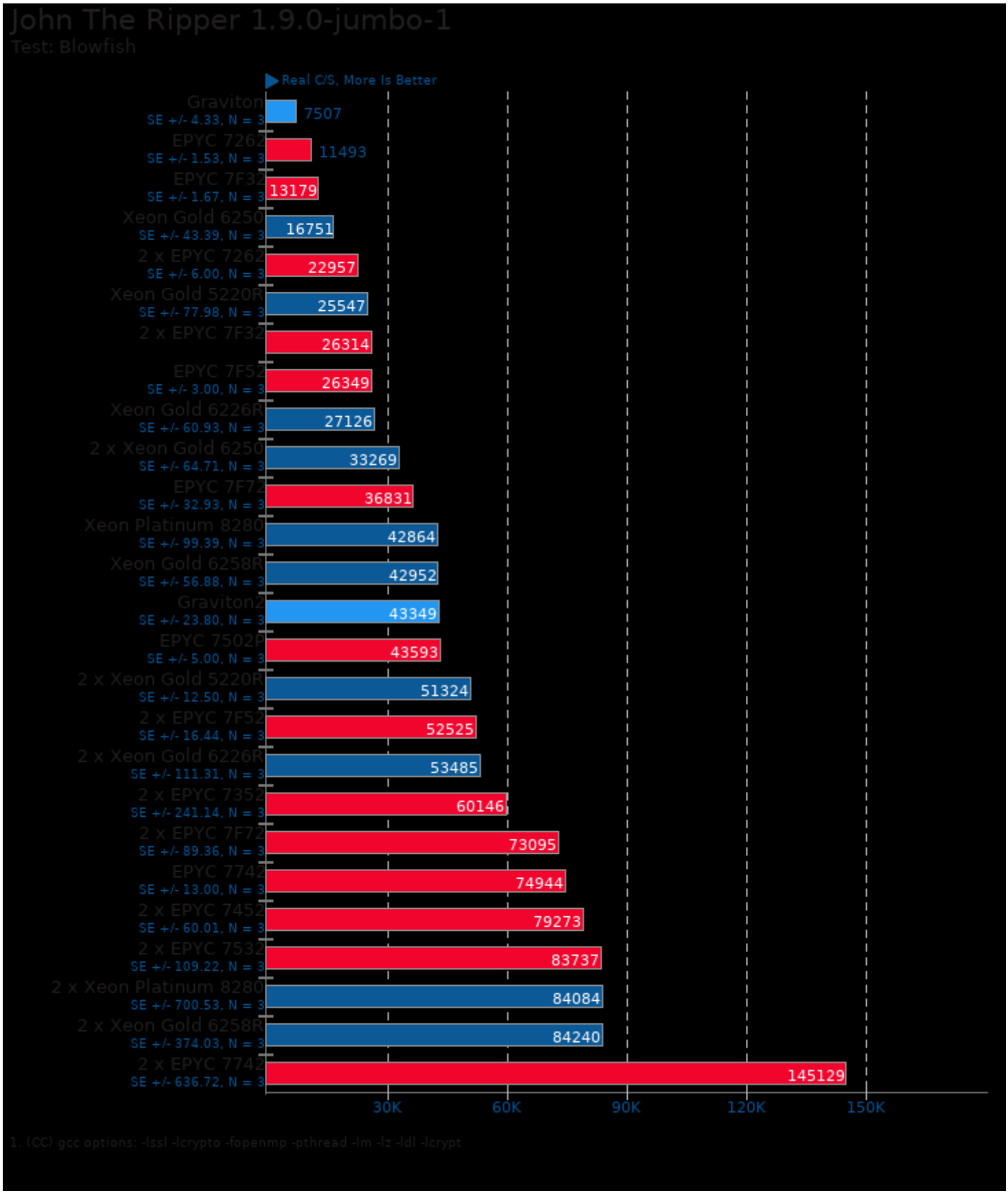

GROMACS 2020.1
Water Benchmark
Ns Per Day, More Is Better
2 x EPYC 7742
SE +/- 0.007, N = 9
0.243
EPYC 7742
SE +/- 0.071, N = 11
1.073
EPYC 7262
SE +/- 0.000, N = 3
1.113
EPYC 7F32
SE +/- 0.005, N = 3
1.244
Xeon Gold 6250
SE +/- 0.001, N = 3
1.245
2 x EPYC 7262
SE +/- 0.004, N = 3
1.676
2 x EPYC 7F32
SE +/- 0.015, N = 3
1.762
2 x EPYC 7F72
SE +/- 0.011, N = 3
2.028
EPYC 7F72
SE +/- 0.020, N = 3
2.167
2 x Xeon Gold 6250
SE +/- 0.006, N = 3
2.441
Graviton2
SE +/- 0.001, N = 3
2.761
Xeon Gold 6258R
SE +/- 0.004, N = 3
2.782
2 x Xeon Gold 6258R
SE +/- 0.006, N = 3
5.449
1.226
2.452
3.678
4.904
6.13
1. (CXX) g++ options: -O3 -pthread -lrt -lpthread -lm

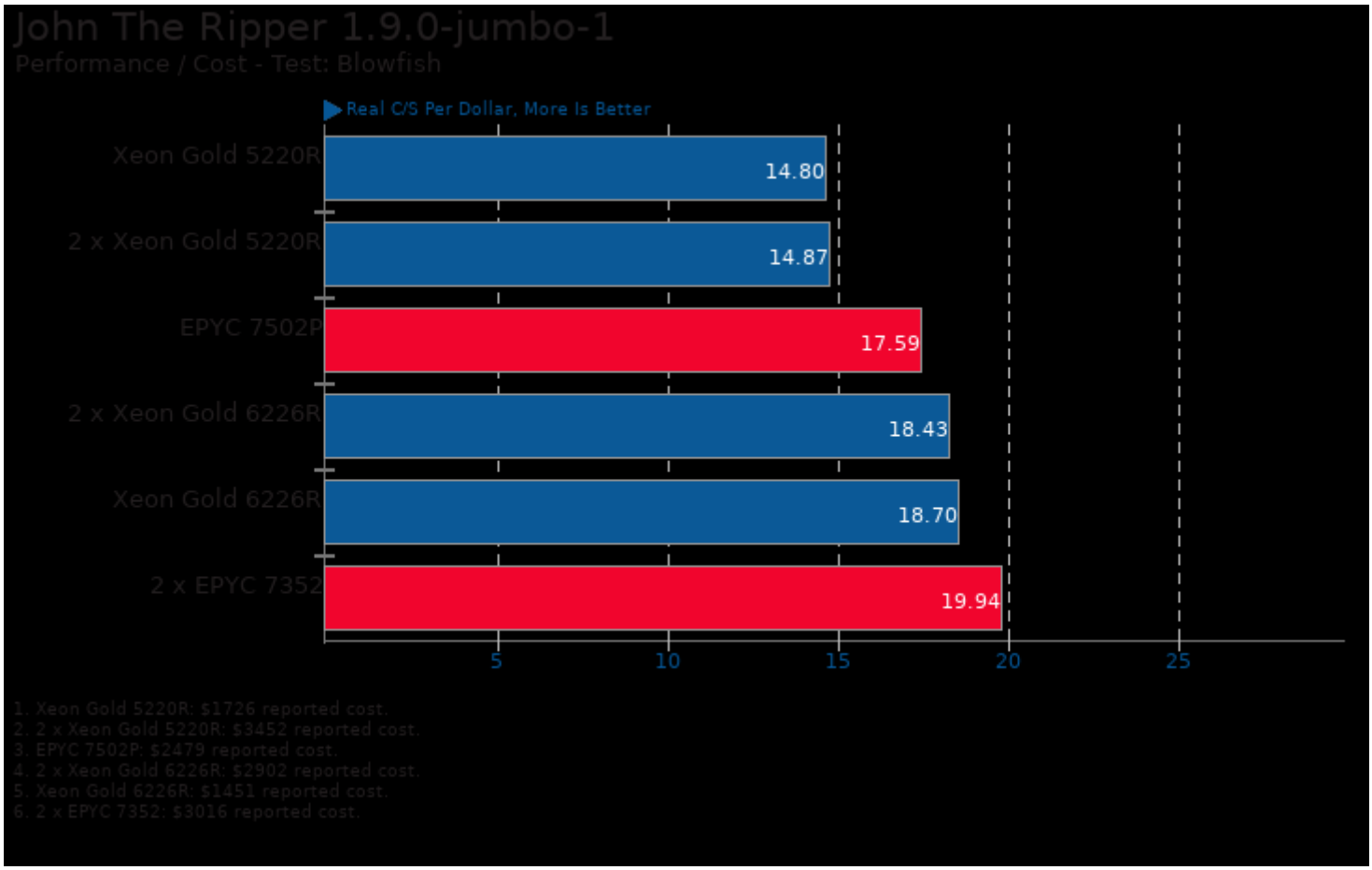

High Performance Conjugate Gradient 3.1
GFLOP/s, More Is Better
Graviton
SE +/- 0.00359, N = 3
3.83797
Xeon Gold 6250
SE +/- 0.06010, N = 3
10.33210
EPYC 7262
SE +/- 0.03786, N = 3
12.70080
EPYC 7F32
SE +/- 0.00675, N = 3
13.22470
Xeon Gold 5220R
SE +/- 0.08231, N = 3
13.35290
Xeon Gold 6226R
SE +/- 0.02780, N = 3
13.95810
Xeon Gold 6258R
SE +/- 0.09544, N = 3
14.78490
Xeon Platinum 8280
SE +/- 0.04073, N = 3
14.90970
EPYC 7502P
SE +/- 0.01442, N = 3
15.10560
EPYC 7F72
SE +/- 0.09429, N = 3
16.93630
EPYC 7742
SE +/- 0.02692, N = 3
17.16210
EPYC 7F52
SE +/- 0.08558, N = 3
17.74440
2 x Xeon Gold 6250
SE +/- 0.06704, N = 3
19.97640
Graviton2
SE +/- 0.02083, N = 3
21.43370
2 x EPYC 7262
SE +/- 0.09607, N = 3
23.06470
2 x EPYC 7F32
SE +/- 0.23050, N = 3
24.86430
2 x Xeon Gold 5220R
SE +/- 0.15366, N = 3
25.63030
2 x Xeon Gold 6226R
SE +/- 0.12533, N = 3
26.59100
2 x EPYC 7352
SE +/- 0.05862, N = 3
28.40070
2 x EPYC 7452
SE +/- 0.08663, N = 3
28.79700
2 x Xeon Platinum 8280
SE +/- 0.24605, N = 3
28.85420
2 x Xeon Gold 6258R
SE +/- 0.06820, N = 3
28.87830
2 x EPYC 7F72
SE +/- 0.21254, N = 3
32.36020
2 x EPYC 7F52
SE +/- 0.02538, N = 3
33.51820
2 x EPYC 7532
SE +/- 0.17319, N = 3
33.92070
2 x EPYC 7742
SE +/- 0.06979, N = 3
34.04850
8
16
24
32
40
1. (CXX) g++ options: -O3 -ffast-math -ftree-vectorize -pthread -lmpi_cxx -lmpi

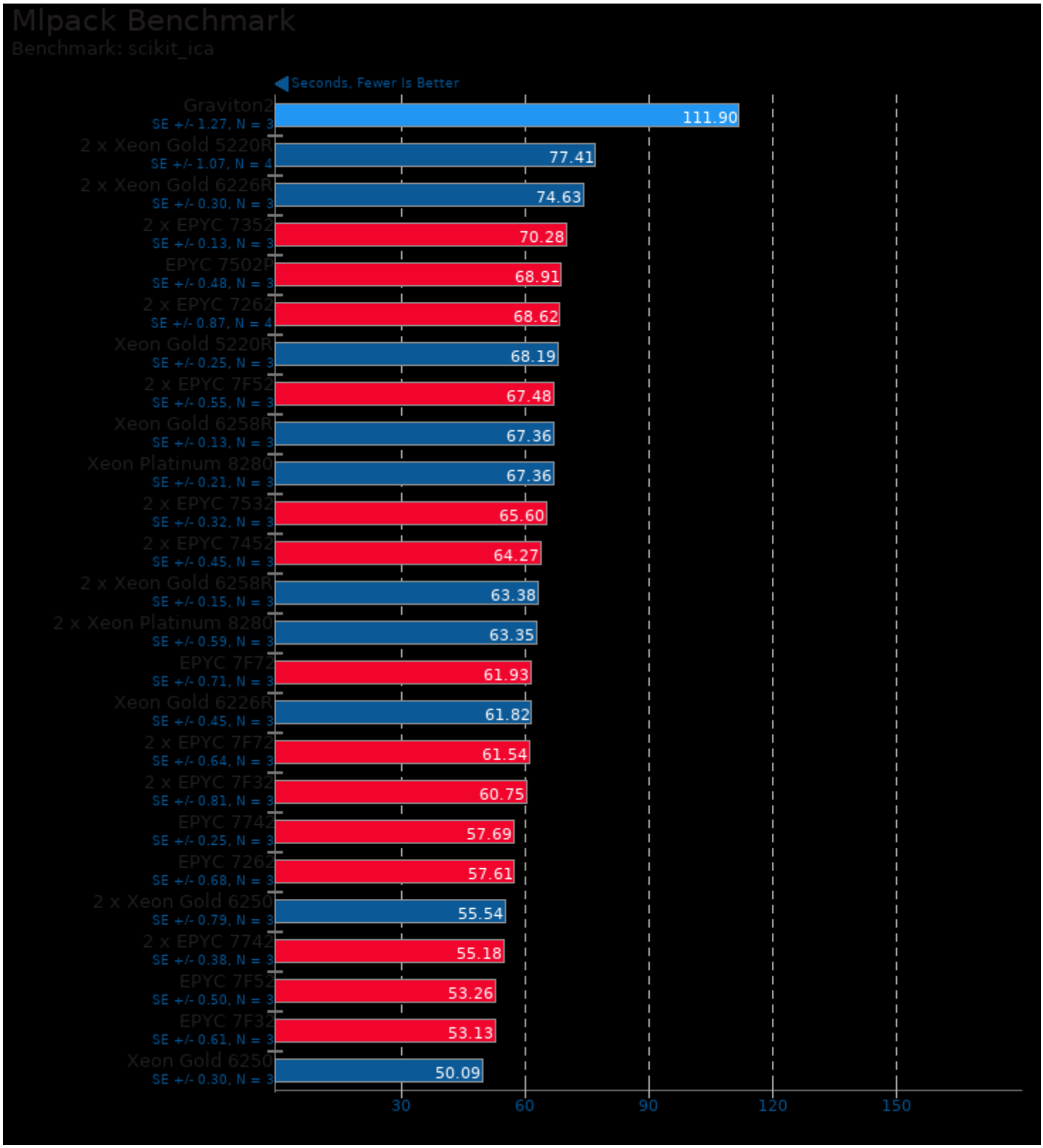

High Performance Conjugate Gradient 3.1
Performance / Cost -
GFLOP/s Per Dollar, More Is Better
EPYC 7502P
2 x Xeon Gold 5220R
Xeon Gold 5220R
2 x Xeon Gold 6226R
2 x EPYC 7352
Xeon Gold 6226R
0.006
0.007
0.008
0.009
0.009
0.010
0.0023
0.0046
0.0069
0.0092
0.0115
1. EPYC 7502P: $2479 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. Xeon Gold 5220R: $1726 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. 2 x EPYC 7352: $3016 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

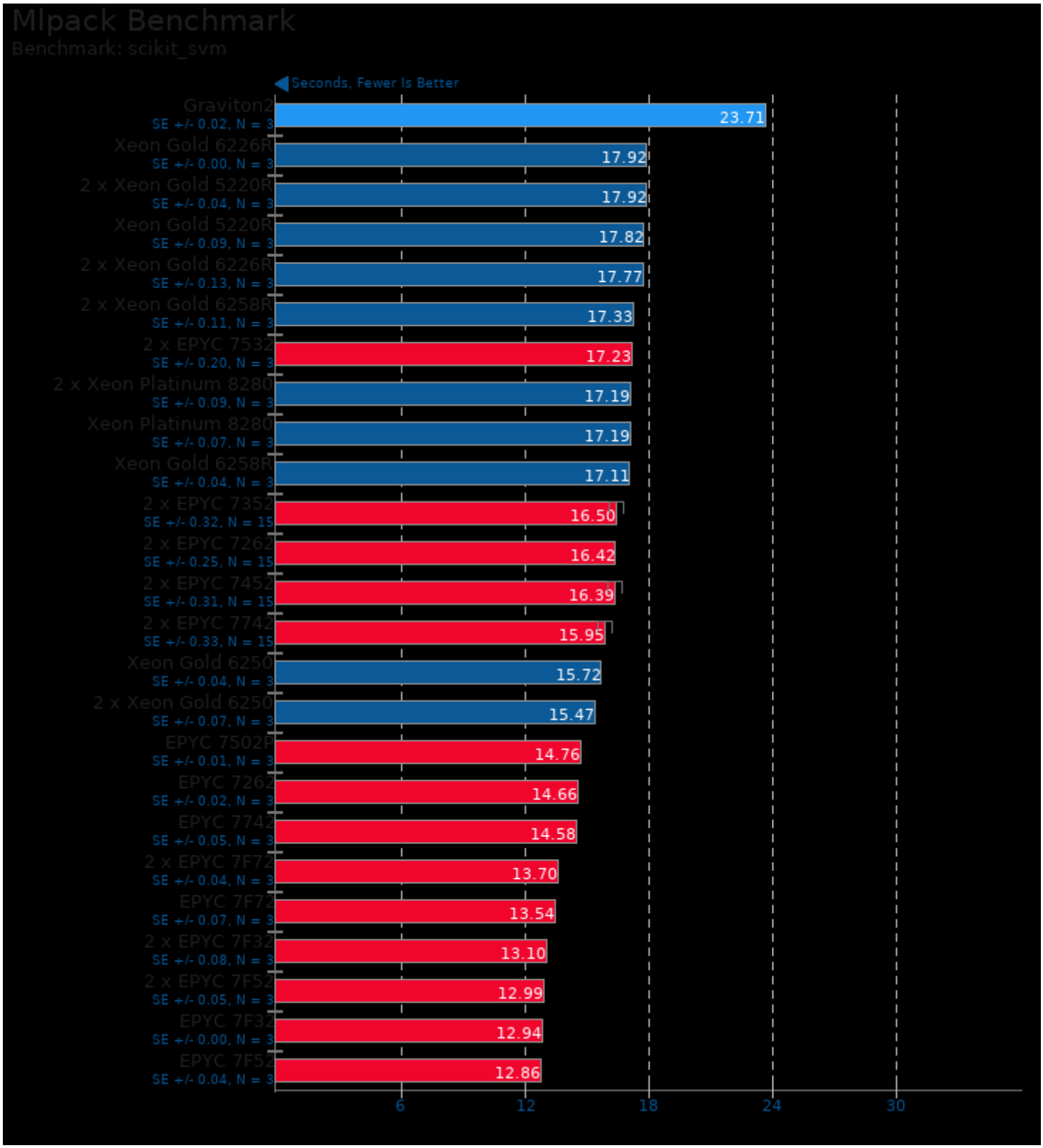

Himeno Benchmark 3.0
Poisson Pressure Solver
MFLOPS, More Is Better
Graviton2
SE +/- 11.59, N = 3
2904.94
Xeon Gold 5220R
SE +/- 1.90, N = 3
3398.40
Xeon Gold 6226R
SE +/- 1.26, N = 3
3401.16
2 x Xeon Gold 5220R
SE +/- 5.10, N = 3
3404.69
2 x Xeon Gold 6226R
SE +/- 0.77, N = 3
3410.38
Xeon Platinum 8280
SE +/- 4.11, N = 3
3510.21
2 x Xeon Platinum 8280
SE +/- 5.39, N = 3
3514.60
Xeon Gold 6258R
SE +/- 1.44, N = 3
3515.82
2 x Xeon Gold 6258R
SE +/- 0.40, N = 3
3526.77
2 x EPYC 7352
SE +/- 40.64, N = 3
3647.33
2 x EPYC 7262
SE +/- 40.10, N = 15
3712.16
2 x EPYC 7452
SE +/- 38.94, N = 3
3777.67
2 x EPYC 7532
SE +/- 16.97, N = 3
3783.18
EPYC 7742
SE +/- 38.43, N = 3
3820.89
2 x EPYC 7742
SE +/- 44.66, N = 3
3861.38
EPYC 7262
SE +/- 52.48, N = 3
3864.65
EPYC 7502P
SE +/- 22.45, N = 3
3883.48
Xeon Gold 6250
SE +/- 6.98, N = 3
3890.93
2 x Xeon Gold 6250
SE +/- 2.78, N = 3
3934.56
2 x EPYC 7F72
SE +/- 55.09, N = 3
4118.01
EPYC 7F72
SE +/- 52.88, N = 3
4212.89
2 x EPYC 7F32
SE +/- 42.03, N = 15
4225.88
EPYC 7F32
SE +/- 64.12, N = 3
4244.54
2 x EPYC 7F52
SE +/- 51.50, N = 3
4303.72
EPYC 7F52
SE +/- 50.12, N = 6
4370.13
900
1800
2700
3600
4500
1. (CC) gcc options: -O3

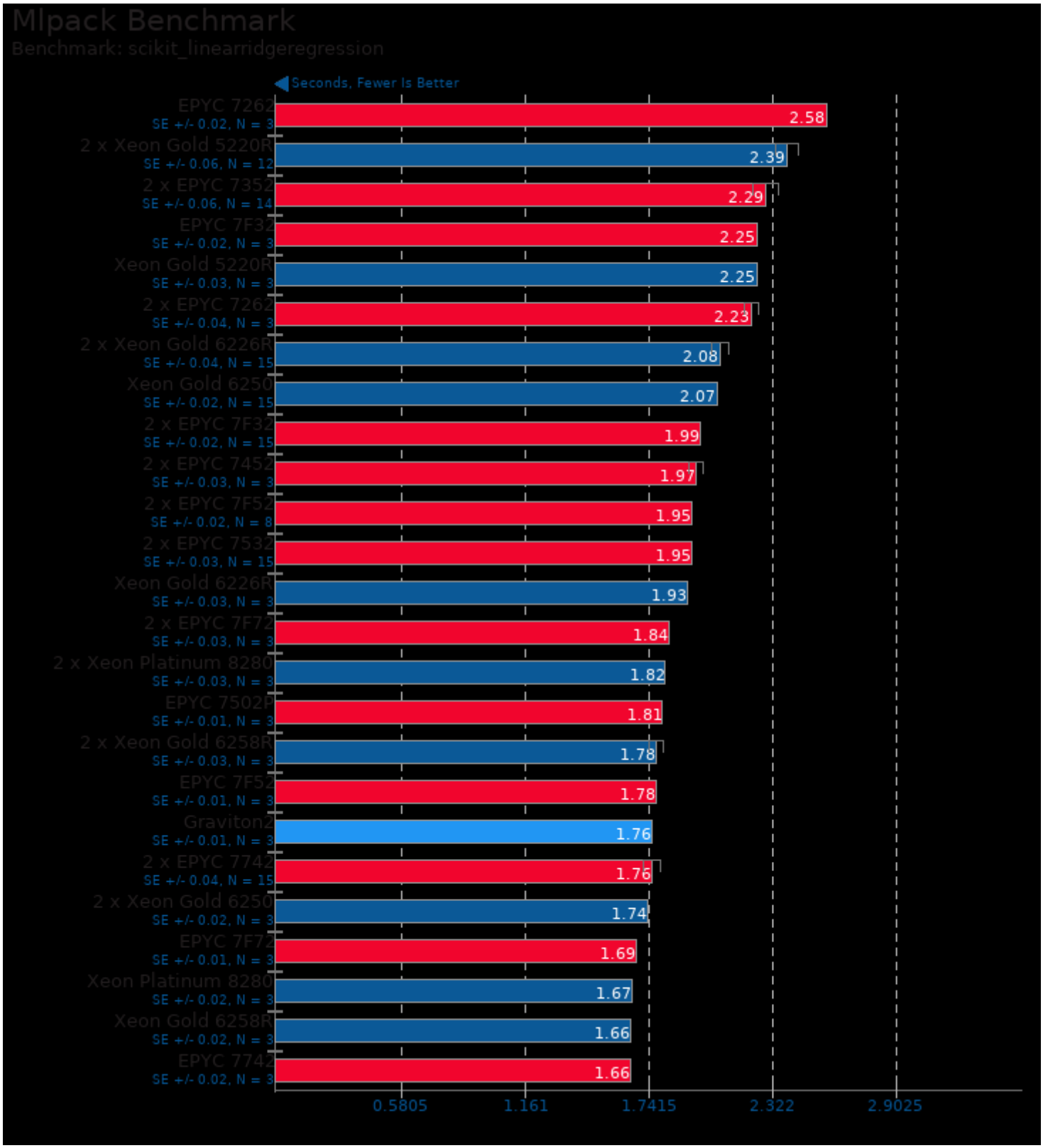

Himeno Benchmark 3.0
Performance / Cost - Poisson Pressure Solver
MFLOPS Per Dollar, More Is Better
2 x Xeon Gold 5220R
0.986
2 x Xeon Gold 6226R
1.175
2 x EPYC 7352
1.209
EPYC 7502P
1.567
Xeon Gold 5220R
1.969
Xeon Gold 6226R
2.344
0.5274
1.0548
1.5822
2.1096
2.637
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

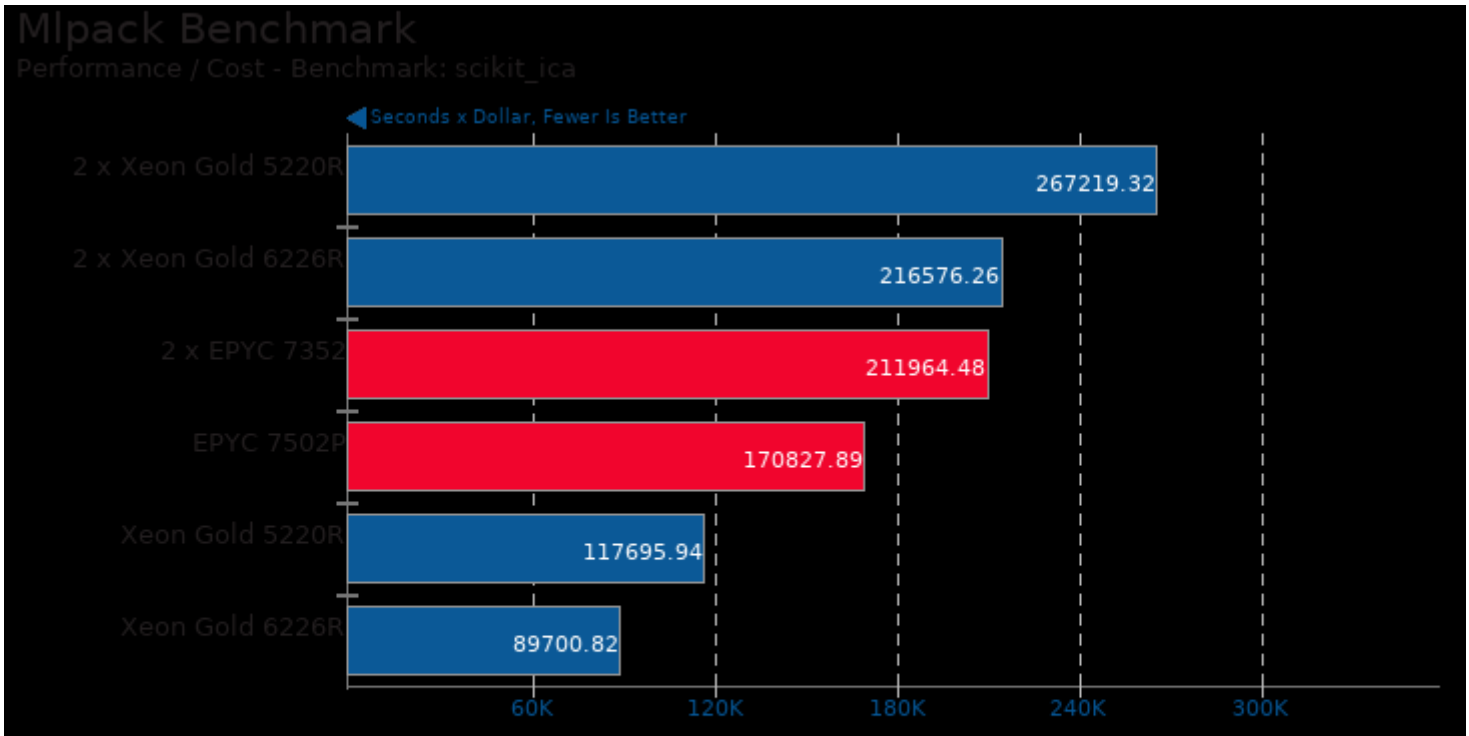

John The Ripper 1.9.0-jumbo-1
Test: Blowfish
Real C/S, More Is Better
Graviton
SE +/- 4.33, N = 3
7507
EPYC 7262
SE +/- 1.53, N = 3
11493
EPYC 7F32
SE +/- 1.67, N = 3
13179
Xeon Gold 6250
SE +/- 43.39, N = 3
16751
2 x EPYC 7262
SE +/- 6.00, N = 3
22957
Xeon Gold 5220R
SE +/- 77.98, N = 3
25547
2 x EPYC 7F32
26314
EPYC 7F52
SE +/- 3.00, N = 3
26349
Xeon Gold 6226R
SE +/- 60.93, N = 3
27126
2 x Xeon Gold 6250
SE +/- 64.71, N = 3
33269
EPYC 7F72
SE +/- 32.93, N = 3
36831
Xeon Platinum 8280
SE +/- 99.39, N = 3
42864
Xeon Gold 6258R
SE +/- 56.88, N = 3
42952
Graviton2
SE +/- 23.80, N = 3
43349
EPYC 7502P
SE +/- 5.00, N = 3
43593
2 x Xeon Gold 5220R
SE +/- 12.50, N = 3
51324
2 x EPYC 7F52
SE +/- 16.44, N = 3
52525
2 x Xeon Gold 6226R
SE +/- 111.31, N = 3
53485
2 x EPYC 7352
SE +/- 241.14, N = 3
60146
2 x EPYC 7F72
SE +/- 89.36, N = 3
73095
EPYC 7742
SE +/- 13.00, N = 3
74944
2 x EPYC 7452
SE +/- 60.01, N = 3
79273
2 x EPYC 7532
SE +/- 109.22, N = 3
83737
2 x Xeon Platinum 8280
SE +/- 700.53, N = 3
84084
2 x Xeon Gold 6258R
SE +/- 374.03, N = 3
84240
2 x EPYC 7742
SE +/- 636.72, N = 3
145129
30K
60K
90K
120K
150K
1. (CC) gcc options: -lssl -lcrypto -fopenmp -pthread -lm -lz -ldl -lcrypt

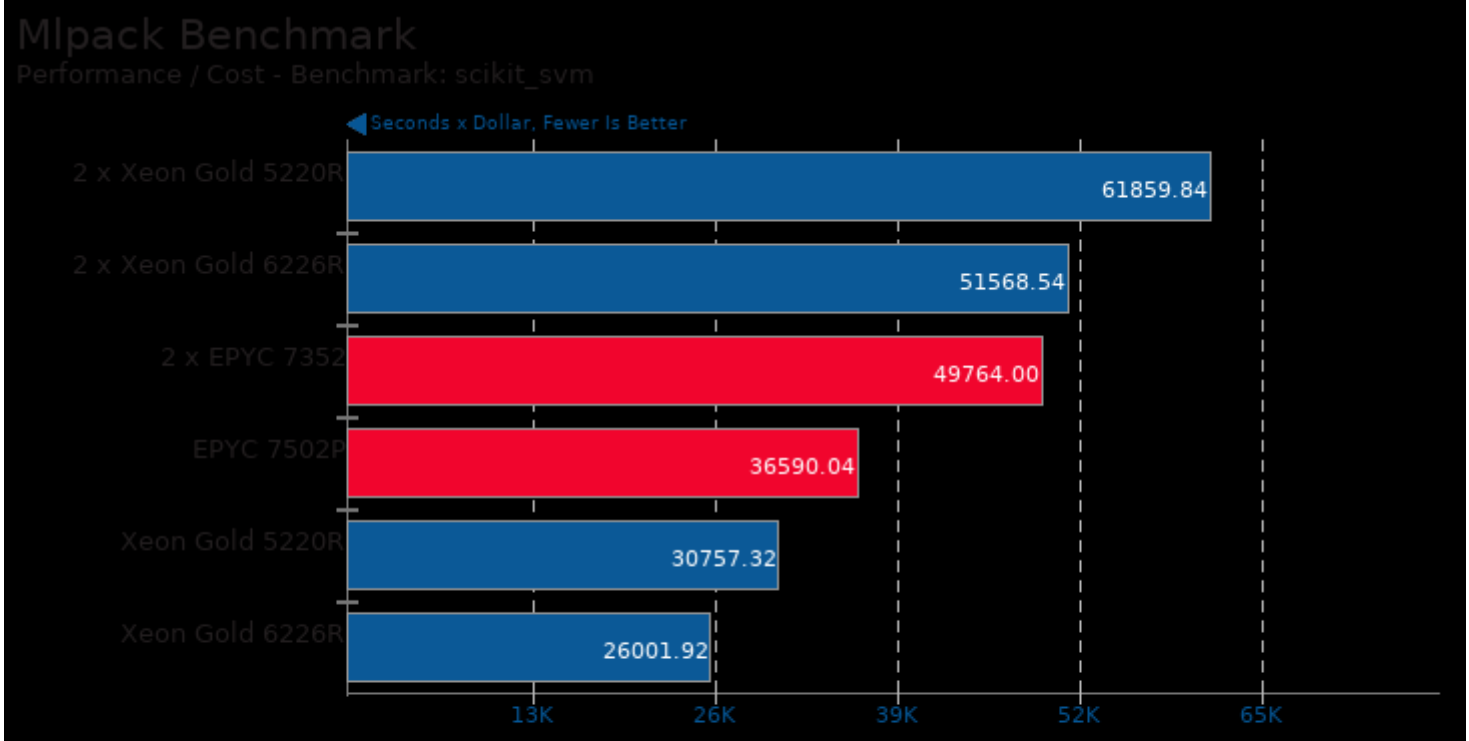

John The Ripper 1.9.0-jumbo-1
Performance / Cost - Test: Blowfish
Real C/S Per Dollar, More Is Better
Xeon Gold 5220R
14.80
2 x Xeon Gold 5220R
14.87
EPYC 7502P
17.59
2 x Xeon Gold 6226R
18.43
Xeon Gold 6226R
18.70
2 x EPYC 7352
19.94
5
10
15
20
25
1. Xeon Gold 5220R: $1726 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 6226R: $1451 reported cost.
6. 2 x EPYC 7352: $3016 reported cost.

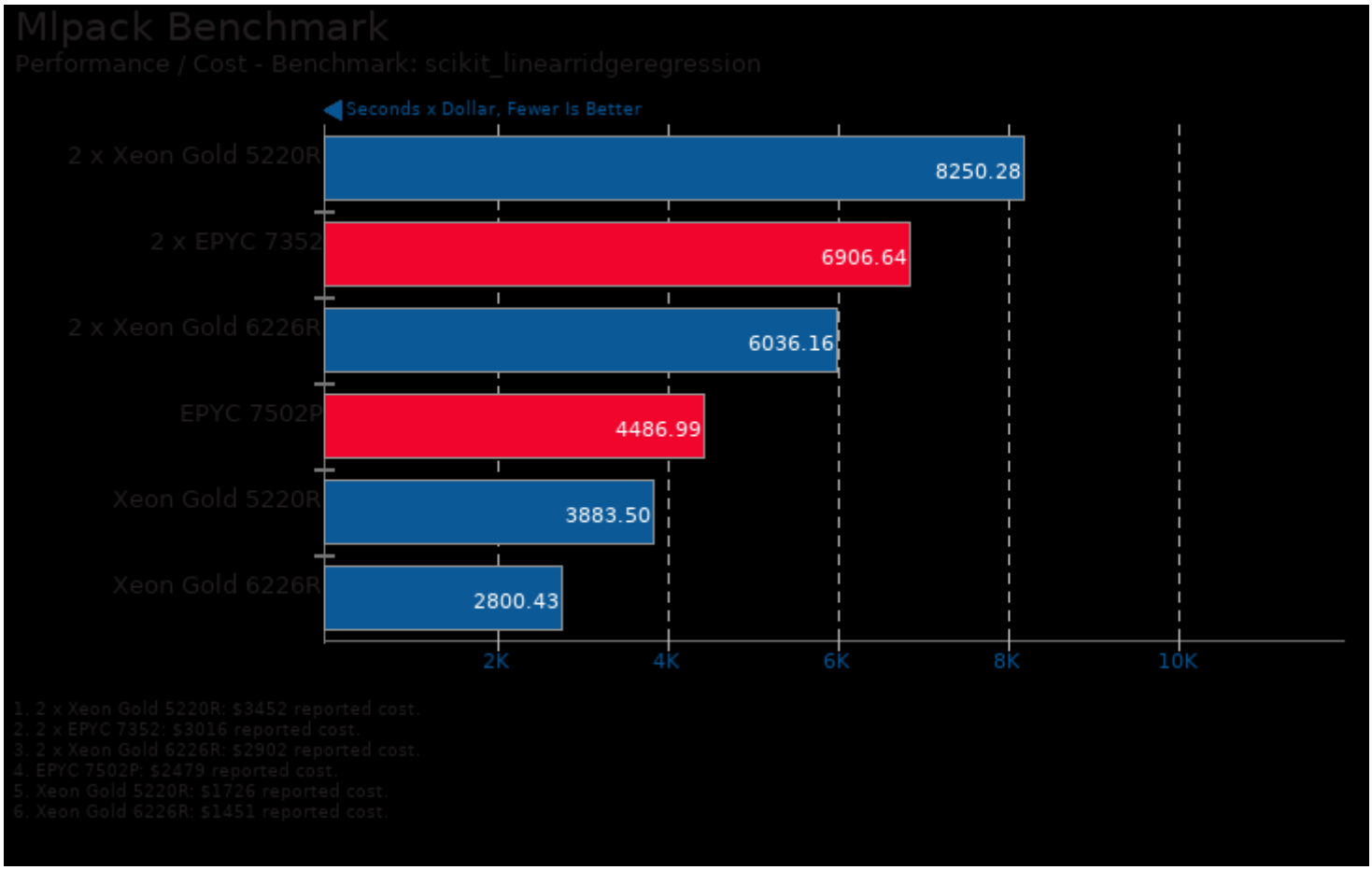

Mlpack Benchmark
Benchmark: scikit_ica
Seconds, Fewer Is Better
Graviton2
SE +/- 1.27, N = 3
111.90
2 x Xeon Gold 5220R
SE +/- 1.07, N = 4
77.41
2 x Xeon Gold 6226R
SE +/- 0.30, N = 3
74.63
2 x EPYC 7352
SE +/- 0.13, N = 3
70.28
EPYC 7502P
SE +/- 0.48, N = 3
68.91
2 x EPYC 7262
SE +/- 0.87, N = 4
68.62
Xeon Gold 5220R
SE +/- 0.25, N = 3
68.19
2 x EPYC 7F52
SE +/- 0.55, N = 3
67.48
Xeon Gold 6258R
SE +/- 0.13, N = 3
67.36
Xeon Platinum 8280
SE +/- 0.21, N = 3
67.36
2 x EPYC 7532
SE +/- 0.32, N = 3
65.60
2 x EPYC 7452
SE +/- 0.45, N = 3
64.27
2 x Xeon Gold 6258R
SE +/- 0.15, N = 3
63.38
2 x Xeon Platinum 8280
SE +/- 0.59, N = 3
63.35
EPYC 7F72
SE +/- 0.71, N = 3
61.93
Xeon Gold 6226R
SE +/- 0.45, N = 3
61.82
2 x EPYC 7F72
SE +/- 0.64, N = 3
61.54
2 x EPYC 7F32
SE +/- 0.81, N = 3
60.75
EPYC 7742
SE +/- 0.25, N = 3
57.69
EPYC 7262
SE +/- 0.68, N = 3
57.61
2 x Xeon Gold 6250
SE +/- 0.79, N = 3
55.54
2 x EPYC 7742
SE +/- 0.38, N = 3
55.18
EPYC 7F52
SE +/- 0.50, N = 3
53.26
EPYC 7F32
SE +/- 0.61, N = 3
53.13
Xeon Gold 6250
SE +/- 0.30, N = 3
50.09
30
60
90
120
150

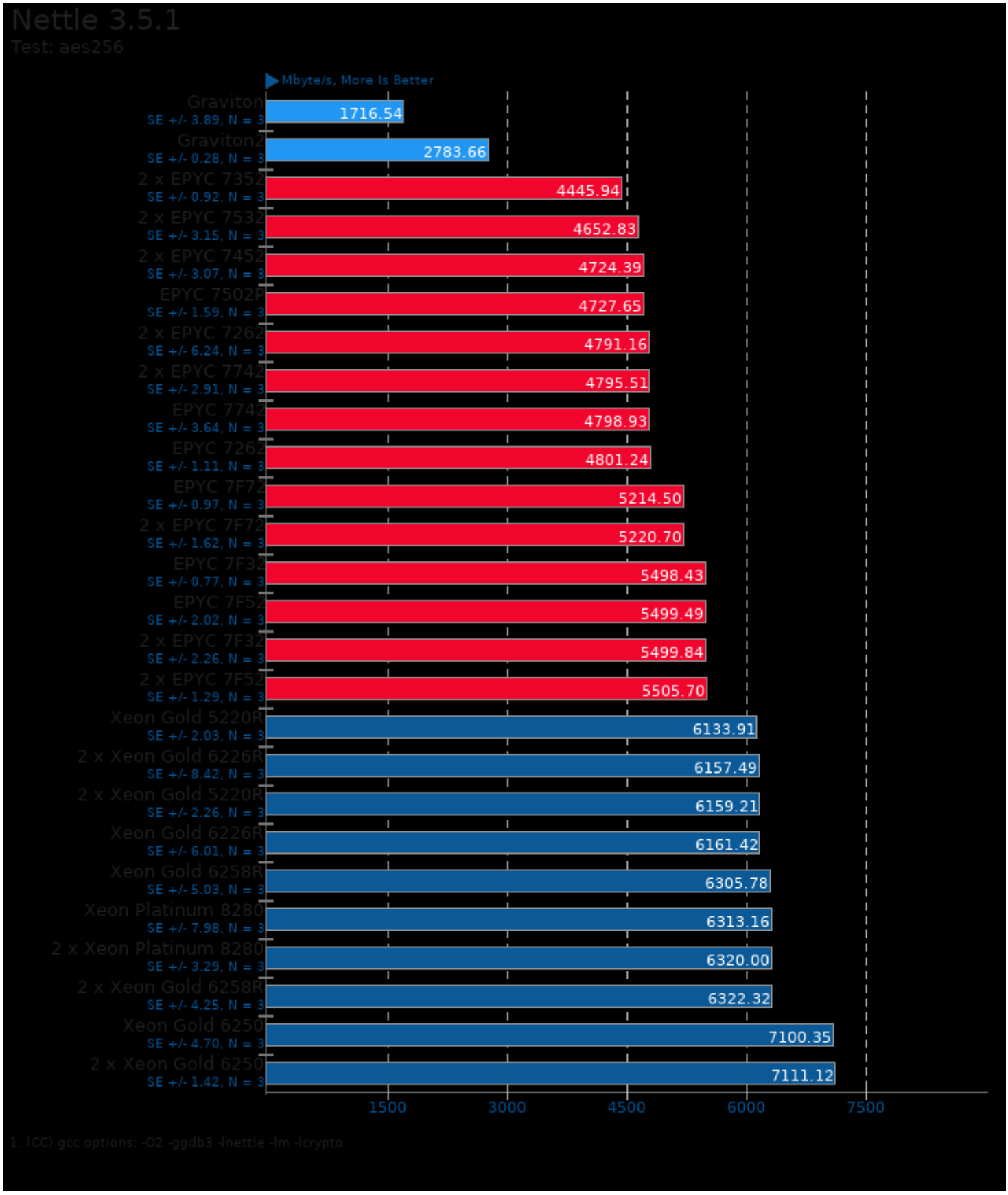

Mlpack Benchmark
Benchmark: scikit_svm
Seconds, Fewer Is Better
Graviton2
SE +/- 0.02, N = 3
23.71
Xeon Gold 6226R
SE +/- 0.00, N = 3
17.92
2 x Xeon Gold 5220R
SE +/- 0.04, N = 3
17.92
Xeon Gold 5220R
SE +/- 0.09, N = 3
17.82
2 x Xeon Gold 6226R
SE +/- 0.13, N = 3
17.77
2 x Xeon Gold 6258R
SE +/- 0.11, N = 3
17.33
2 x EPYC 7532
SE +/- 0.20, N = 3
17.23
2 x Xeon Platinum 8280
SE +/- 0.09, N = 3
17.19
Xeon Platinum 8280
SE +/- 0.07, N = 3
17.19
Xeon Gold 6258R
SE +/- 0.04, N = 3
17.11
2 x EPYC 7352
SE +/- 0.32, N = 15
16.50
2 x EPYC 7262
SE +/- 0.25, N = 15
16.42
2 x EPYC 7452
SE +/- 0.31, N = 15
16.39
2 x EPYC 7742
SE +/- 0.33, N = 15
15.95
Xeon Gold 6250
SE +/- 0.04, N = 3
15.72
2 x Xeon Gold 6250
SE +/- 0.07, N = 3
15.47
EPYC 7502P
SE +/- 0.01, N = 3
14.76
EPYC 7262
SE +/- 0.02, N = 3
14.66
EPYC 7742
SE +/- 0.05, N = 3
14.58
2 x EPYC 7F72
SE +/- 0.04, N = 3
13.70
EPYC 7F72
SE +/- 0.07, N = 3
13.54
2 x EPYC 7F32
SE +/- 0.08, N = 3
13.10
2 x EPYC 7F52
SE +/- 0.05, N = 3
12.99
EPYC 7F32
SE +/- 0.00, N = 3
12.94
EPYC 7F52
SE +/- 0.04, N = 3
12.86
6
12
18
24
30

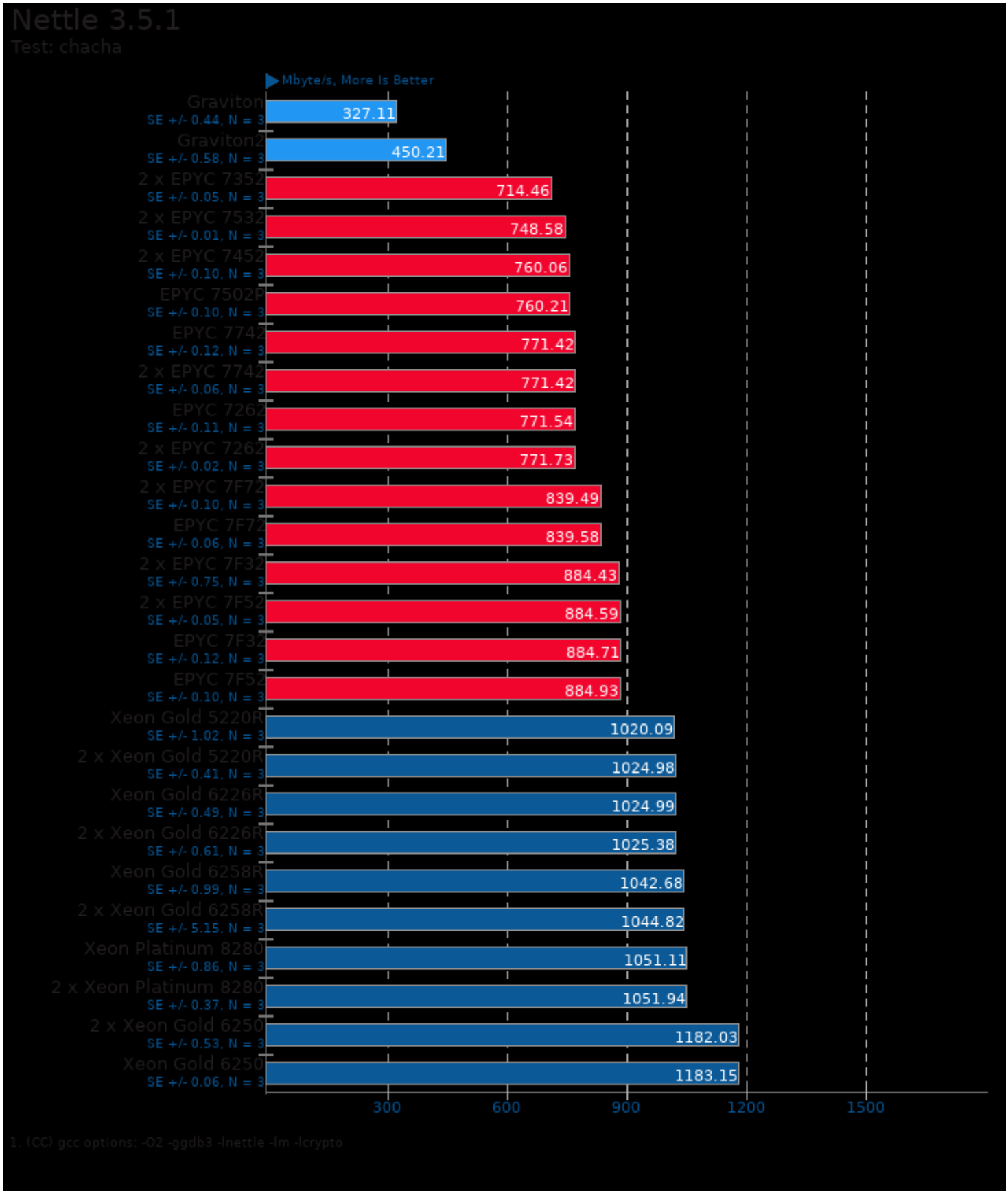

Mlpack Benchmark
Benchmark: scikit_linearridgeregression
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.02, N = 3
2.58
2 x Xeon Gold 5220R
SE +/- 0.06, N = 12
2.39
2 x EPYC 7352
SE +/- 0.06, N = 14
2.29
EPYC 7F32
SE +/- 0.02, N = 3
2.25
Xeon Gold 5220R
SE +/- 0.03, N = 3
2.25
2 x EPYC 7262
SE +/- 0.04, N = 3
2.23
2 x Xeon Gold 6226R
SE +/- 0.04, N = 15
2.08
Xeon Gold 6250
SE +/- 0.02, N = 15
2.07
2 x EPYC 7F32
SE +/- 0.02, N = 15
1.99
2 x EPYC 7452
SE +/- 0.03, N = 3
1.97
2 x EPYC 7F52
SE +/- 0.02, N = 8
1.95
2 x EPYC 7532
SE +/- 0.03, N = 15
1.95
Xeon Gold 6226R
SE +/- 0.03, N = 3
1.93
2 x EPYC 7F72
SE +/- 0.03, N = 3
1.84
2 x Xeon Platinum 8280
SE +/- 0.03, N = 3
1.82
EPYC 7502P
SE +/- 0.01, N = 3
1.81
2 x Xeon Gold 6258R
SE +/- 0.03, N = 3
1.78
EPYC 7F52
SE +/- 0.01, N = 3
1.78
Graviton2
SE +/- 0.01, N = 3
1.76
2 x EPYC 7742
SE +/- 0.04, N = 15
1.76
2 x Xeon Gold 6250
SE +/- 0.02, N = 3
1.74
EPYC 7F72
SE +/- 0.01, N = 3
1.69
Xeon Platinum 8280
SE +/- 0.02, N = 3
1.67
Xeon Gold 6258R
SE +/- 0.02, N = 3
1.66
EPYC 7742
SE +/- 0.02, N = 3
1.66
0.5805
1.161
1.7415
2.322
2.9025

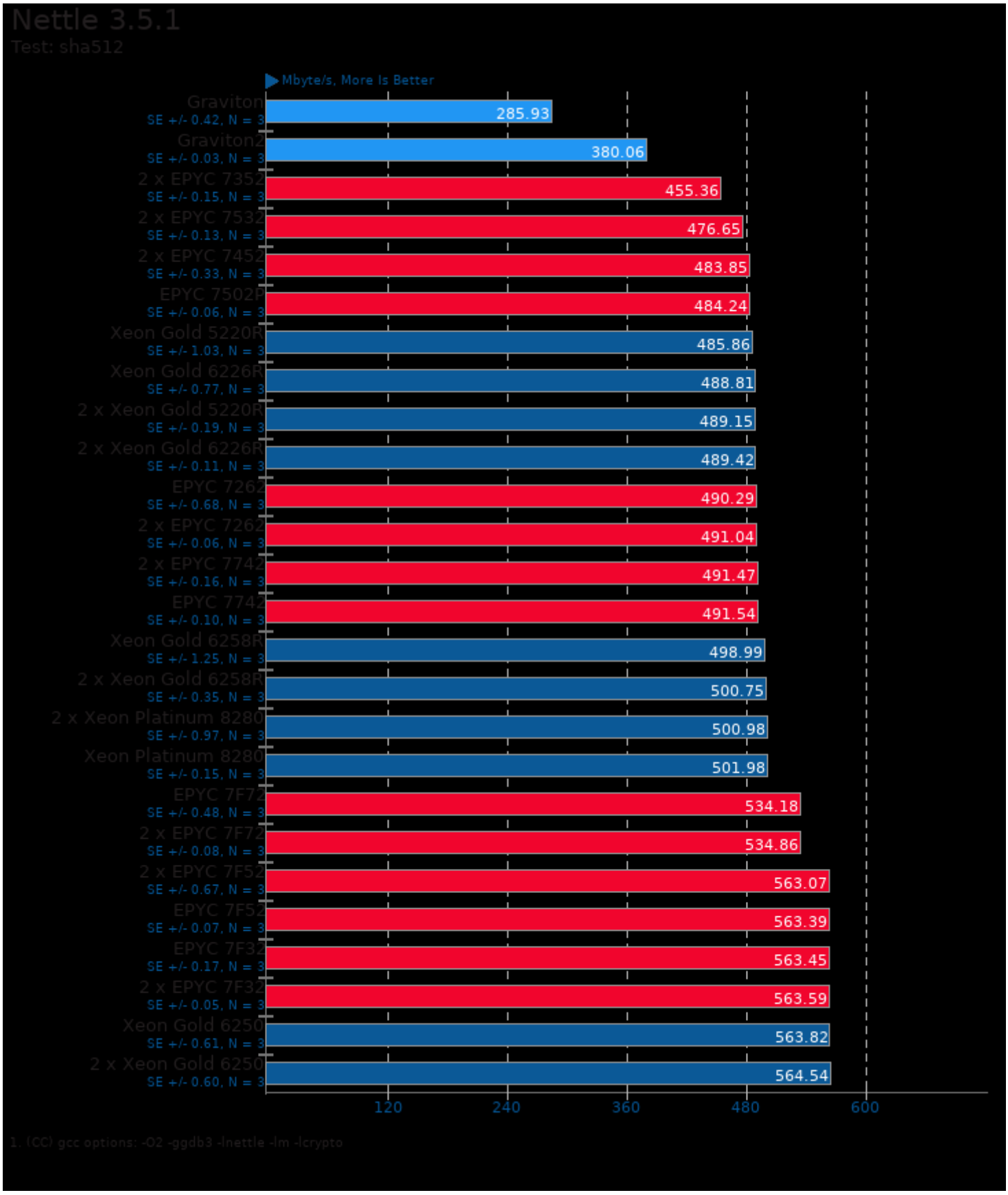

Mlpack Benchmark
Performance / Cost - Benchmark: scikit_ica
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
267219.32
2 x Xeon Gold 6226R
216576.26
2 x EPYC 7352
211964.48
EPYC 7502P
170827.89
Xeon Gold 5220R
117695.94
Xeon Gold 6226R
89700.82
60K
120K
180K
240K
300K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

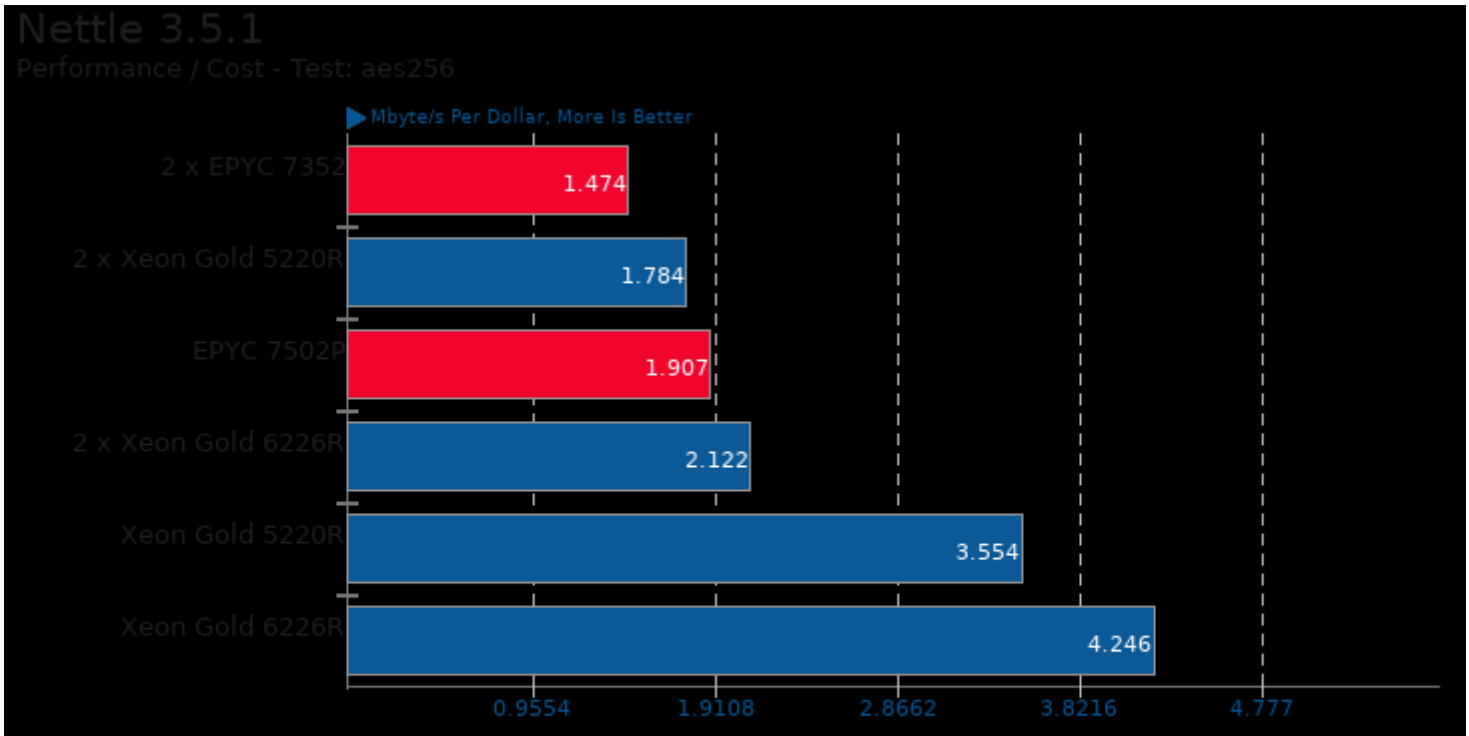

Mlpack Benchmark
Performance / Cost - Benchmark: scikit_svm
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
61859.84
2 x Xeon Gold 6226R
51568.54
2 x EPYC 7352
49764.00
EPYC 7502P
36590.04
Xeon Gold 5220R
30757.32
Xeon Gold 6226R
26001.92
13K
26K
39K
52K
65K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

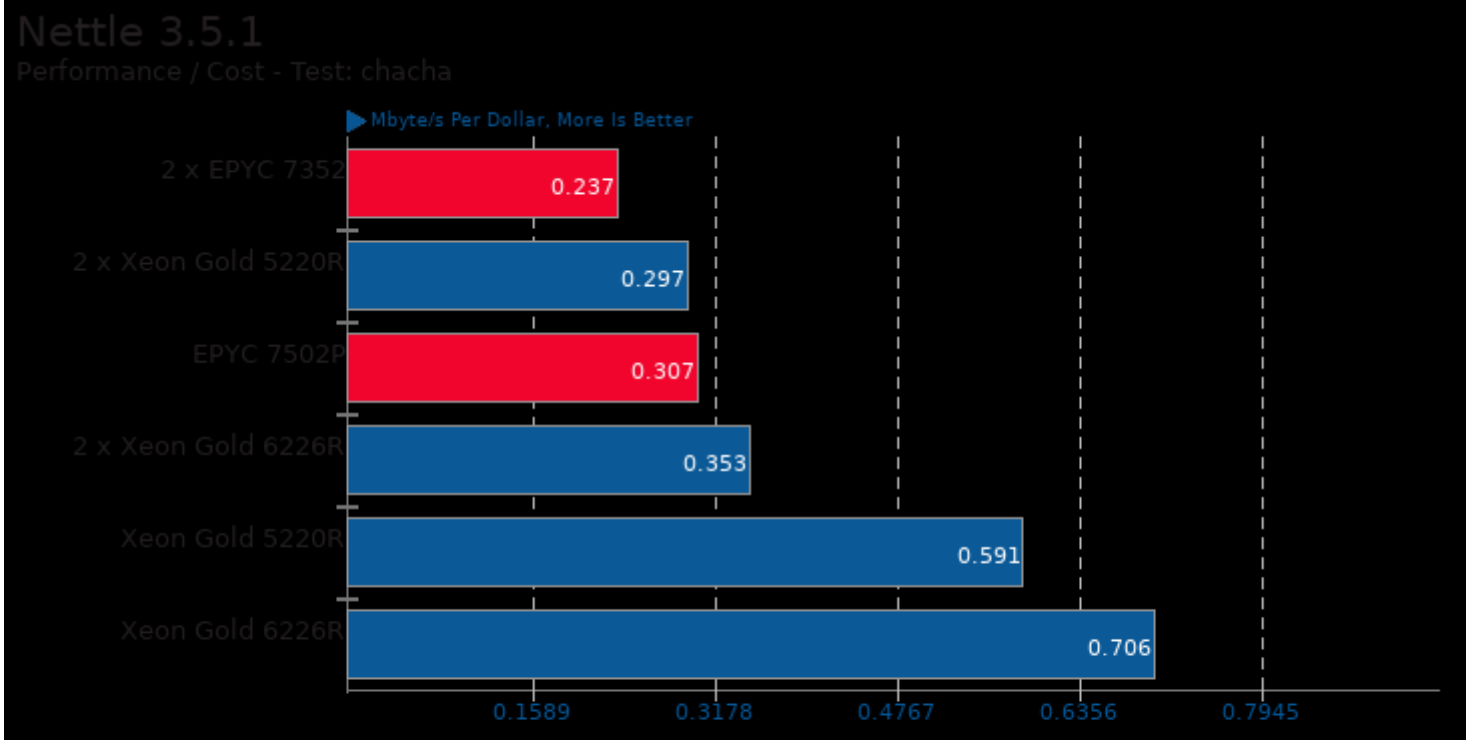

Mlpack Benchmark
Performance / Cost - Benchmark: scikit_linearridgeregression
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
8250.28
2 x EPYC 7352
6906.64
2 x Xeon Gold 6226R
6036.16
EPYC 7502P
4486.99
Xeon Gold 5220R
3883.50
Xeon Gold 6226R
2800.43
2K
4K
6K
8K
10K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

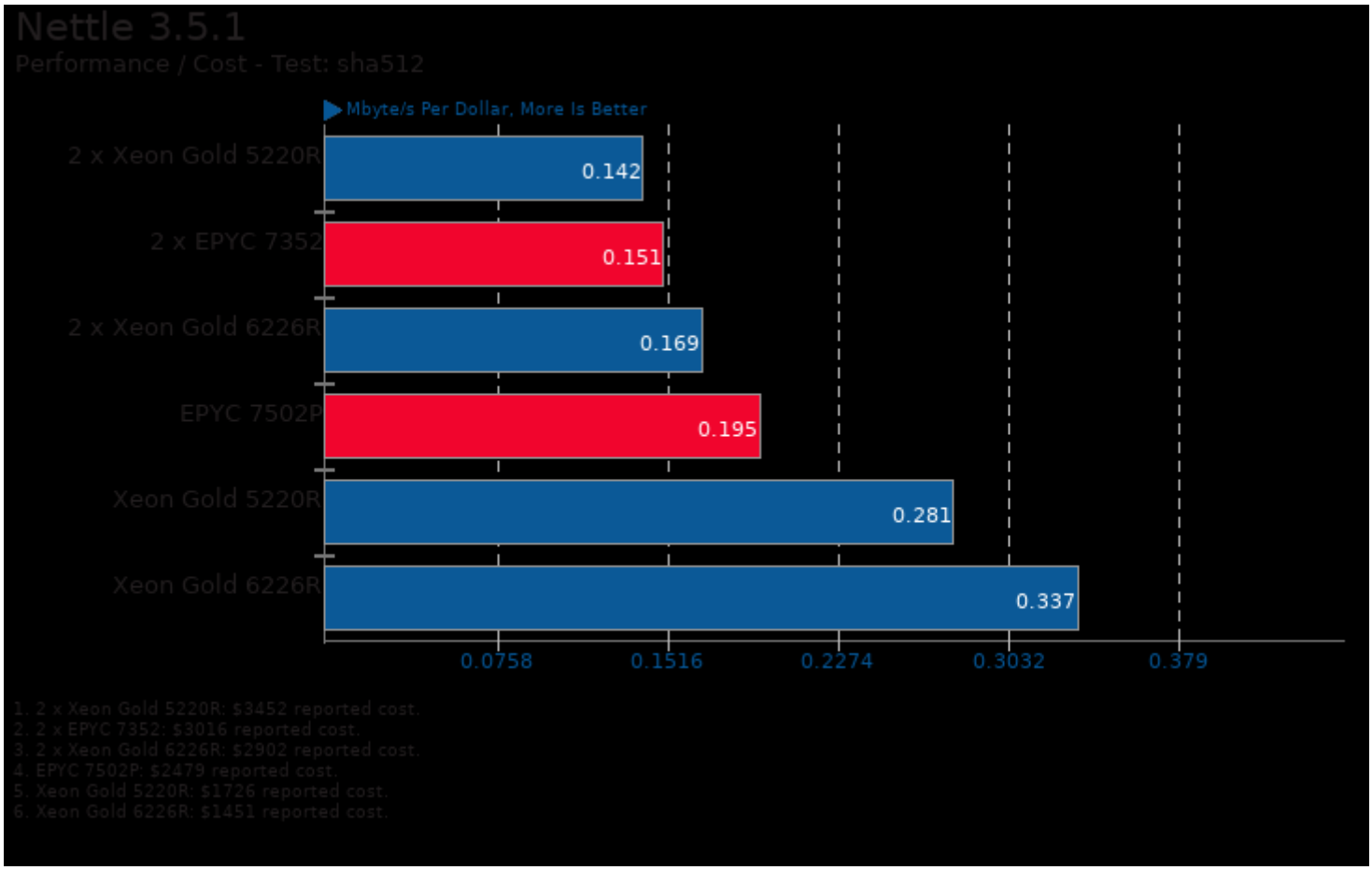

Nettle 3.5.1
Test: aes256
Mbyte/s, More Is Better
Graviton
SE +/- 3.89, N = 3
1716.54
Graviton2
SE +/- 0.28, N = 3
2783.66
2 x EPYC 7352
SE +/- 0.92, N = 3
4445.94
2 x EPYC 7532
SE +/- 3.15, N = 3
4652.83
2 x EPYC 7452
SE +/- 3.07, N = 3
4724.39
EPYC 7502P
SE +/- 1.59, N = 3
4727.65
2 x EPYC 7262
SE +/- 6.24, N = 3
4791.16
2 x EPYC 7742
SE +/- 2.91, N = 3
4795.51
EPYC 7742
SE +/- 3.64, N = 3
4798.93
EPYC 7262
SE +/- 1.11, N = 3
4801.24
EPYC 7F72
SE +/- 0.97, N = 3
5214.50
2 x EPYC 7F72
SE +/- 1.62, N = 3
5220.70
EPYC 7F32
SE +/- 0.77, N = 3
5498.43
EPYC 7F52
SE +/- 2.02, N = 3
5499.49
2 x EPYC 7F32
SE +/- 2.26, N = 3
5499.84
2 x EPYC 7F52
SE +/- 1.29, N = 3
5505.70
Xeon Gold 5220R
SE +/- 2.03, N = 3
6133.91
2 x Xeon Gold 6226R
SE +/- 8.42, N = 3
6157.49
2 x Xeon Gold 5220R
SE +/- 2.26, N = 3
6159.21
Xeon Gold 6226R
SE +/- 6.01, N = 3
6161.42
Xeon Gold 6258R
SE +/- 5.03, N = 3
6305.78
Xeon Platinum 8280
SE +/- 7.98, N = 3
6313.16
2 x Xeon Platinum 8280
SE +/- 3.29, N = 3
6320.00
2 x Xeon Gold 6258R
SE +/- 4.25, N = 3
6322.32
Xeon Gold 6250
SE +/- 4.70, N = 3
7100.35
2 x Xeon Gold 6250
SE +/- 1.42, N = 3
7111.12
1500
3000
4500
6000
7500
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

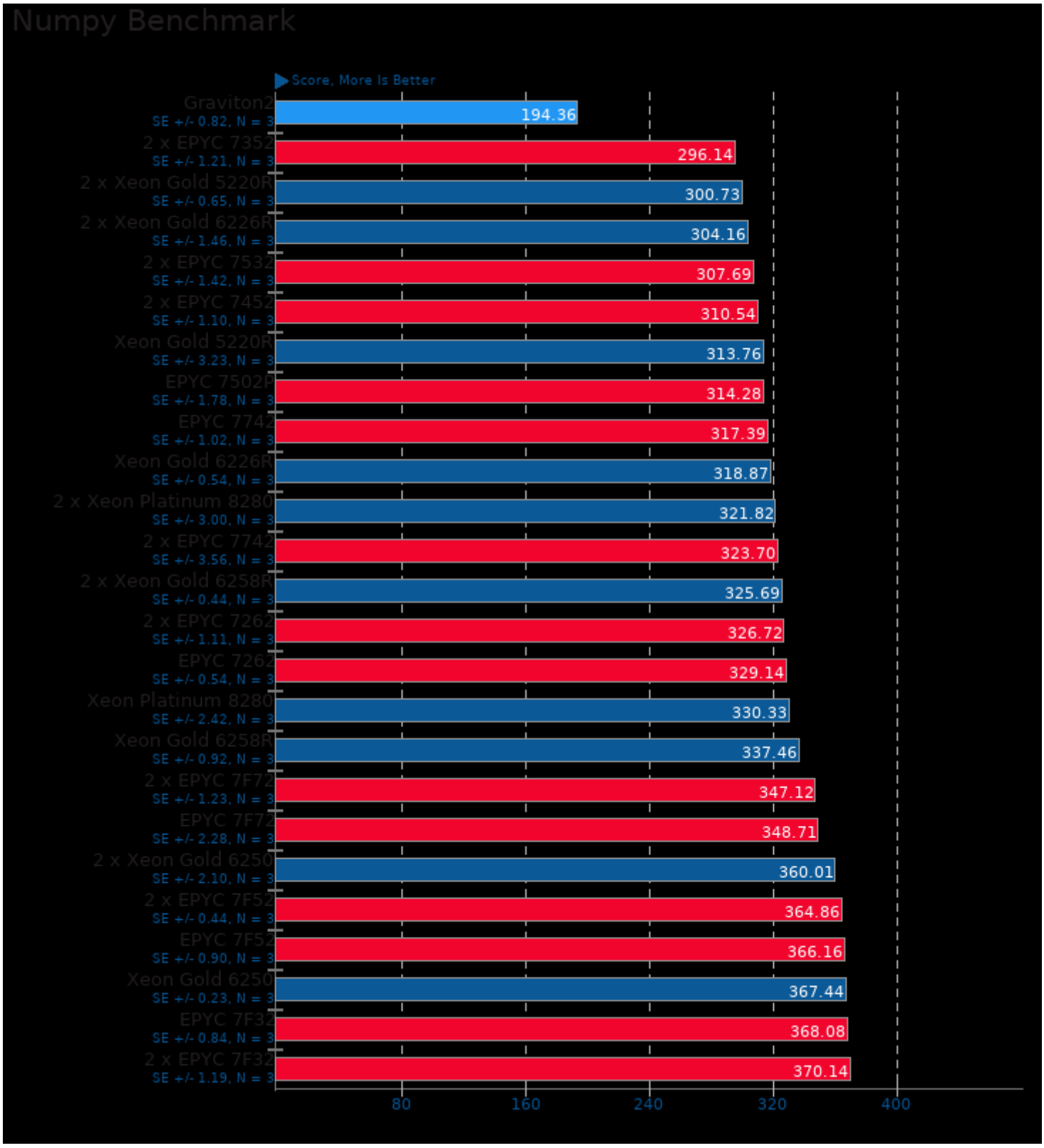

Nettle 3.5.1
Test: chacha
Mbyte/s, More Is Better
Graviton
SE +/- 0.44, N = 3
327.11
Graviton2
SE +/- 0.58, N = 3
450.21
2 x EPYC 7352
SE +/- 0.05, N = 3
714.46
2 x EPYC 7532
SE +/- 0.01, N = 3
748.58
2 x EPYC 7452
SE +/- 0.10, N = 3
760.06
EPYC 7502P
SE +/- 0.10, N = 3
760.21
EPYC 7742
SE +/- 0.12, N = 3
771.42
2 x EPYC 7742
SE +/- 0.06, N = 3
771.42
EPYC 7262
SE +/- 0.11, N = 3
771.54
2 x EPYC 7262
SE +/- 0.02, N = 3
771.73
2 x EPYC 7F72
SE +/- 0.10, N = 3
839.49
EPYC 7F72
SE +/- 0.06, N = 3
839.58
2 x EPYC 7F32
SE +/- 0.75, N = 3
884.43
2 x EPYC 7F52
SE +/- 0.05, N = 3
884.59
EPYC 7F32
SE +/- 0.12, N = 3
884.71
EPYC 7F52
SE +/- 0.10, N = 3
884.93
Xeon Gold 5220R
SE +/- 1.02, N = 3
1020.09
2 x Xeon Gold 5220R
SE +/- 0.41, N = 3
1024.98
Xeon Gold 6226R
SE +/- 0.49, N = 3
1024.99
2 x Xeon Gold 6226R
SE +/- 0.61, N = 3
1025.38
Xeon Gold 6258R
SE +/- 0.99, N = 3
1042.68
2 x Xeon Gold 6258R
SE +/- 5.15, N = 3
1044.82
Xeon Platinum 8280
SE +/- 0.86, N = 3
1051.11
2 x Xeon Platinum 8280
SE +/- 0.37, N = 3
1051.94
2 x Xeon Gold 6250
SE +/- 0.53, N = 3
1182.03
Xeon Gold 6250
SE +/- 0.06, N = 3
1183.15
300
600
900
1200
1500
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

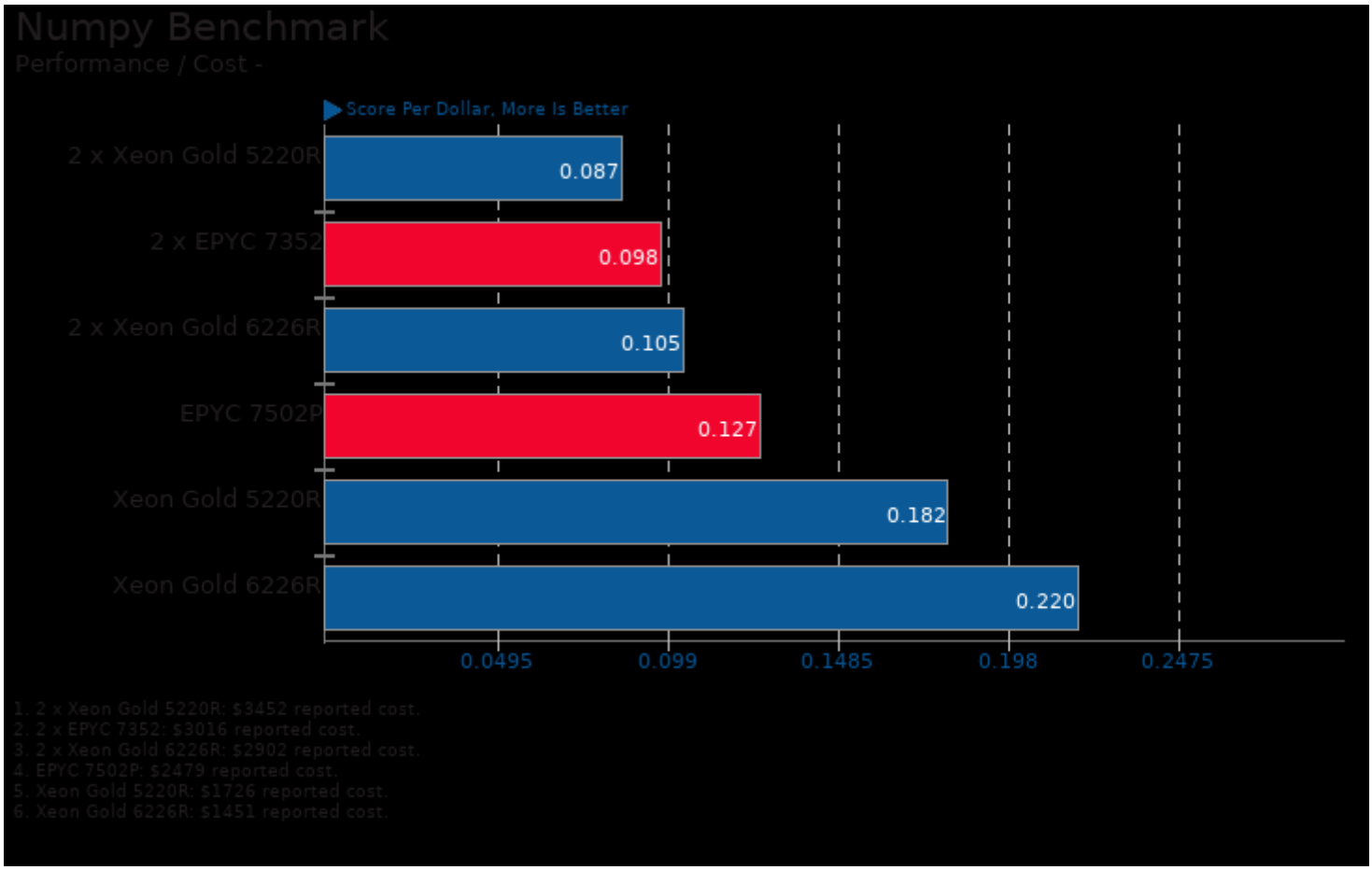

Nettle 3.5.1
Test: sha512
Mbyte/s, More Is Better
Graviton
SE +/- 0.42, N = 3
285.93
Graviton2
SE +/- 0.03, N = 3
380.06
2 x EPYC 7352
SE +/- 0.15, N = 3
455.36
2 x EPYC 7532
SE +/- 0.13, N = 3
476.65
2 x EPYC 7452
SE +/- 0.33, N = 3
483.85
EPYC 7502P
SE +/- 0.06, N = 3
484.24
Xeon Gold 5220R
SE +/- 1.03, N = 3
485.86
Xeon Gold 6226R
SE +/- 0.77, N = 3
488.81
2 x Xeon Gold 5220R
SE +/- 0.19, N = 3
489.15
2 x Xeon Gold 6226R
SE +/- 0.11, N = 3
489.42
EPYC 7262
SE +/- 0.68, N = 3
490.29
2 x EPYC 7262
SE +/- 0.06, N = 3
491.04
2 x EPYC 7742
SE +/- 0.16, N = 3
491.47
EPYC 7742
SE +/- 0.10, N = 3
491.54
Xeon Gold 6258R
SE +/- 1.25, N = 3
498.99
2 x Xeon Gold 6258R
SE +/- 0.35, N = 3
500.75
2 x Xeon Platinum 8280
SE +/- 0.97, N = 3
500.98
Xeon Platinum 8280
SE +/- 0.15, N = 3
501.98
EPYC 7F72
SE +/- 0.48, N = 3
534.18
2 x EPYC 7F72
SE +/- 0.08, N = 3
534.86
2 x EPYC 7F52
SE +/- 0.67, N = 3
563.07
EPYC 7F52
SE +/- 0.07, N = 3
563.39
EPYC 7F32
SE +/- 0.17, N = 3
563.45
2 x EPYC 7F32
SE +/- 0.05, N = 3
563.59
Xeon Gold 6250
SE +/- 0.61, N = 3
563.82
2 x Xeon Gold 6250
SE +/- 0.60, N = 3
564.54
120
240
360
480
600
1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

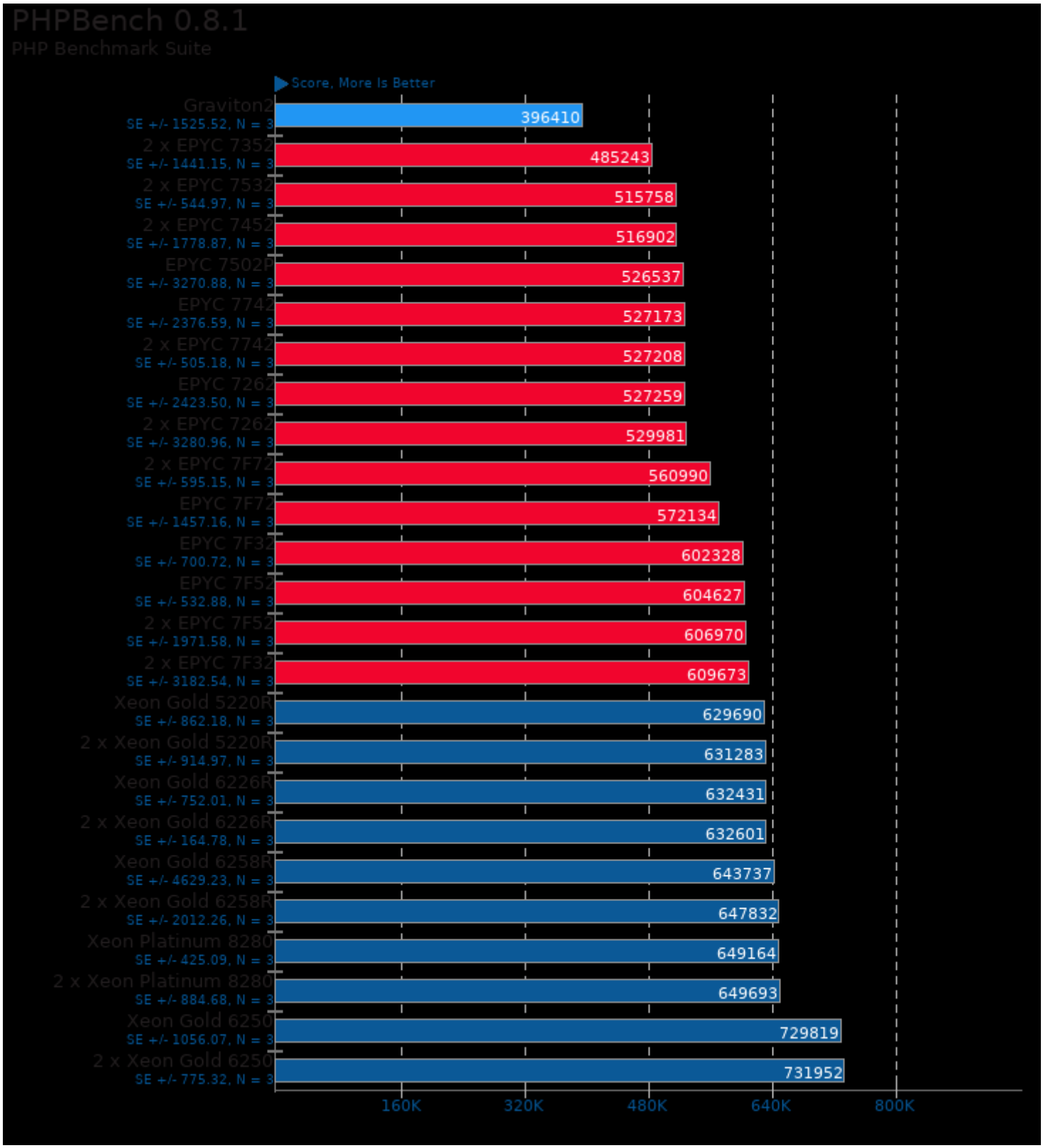

Nettle 3.5.1
Performance / Cost - Test: aes256
Mbyte/s Per Dollar, More Is Better
2 x EPYC 7352
1.474
2 x Xeon Gold 5220R
1.784
EPYC 7502P
1.907
2 x Xeon Gold 6226R
2.122
Xeon Gold 5220R
3.554
Xeon Gold 6226R
4.246
0.9554
1.9108
2.8662
3.8216
4.777
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

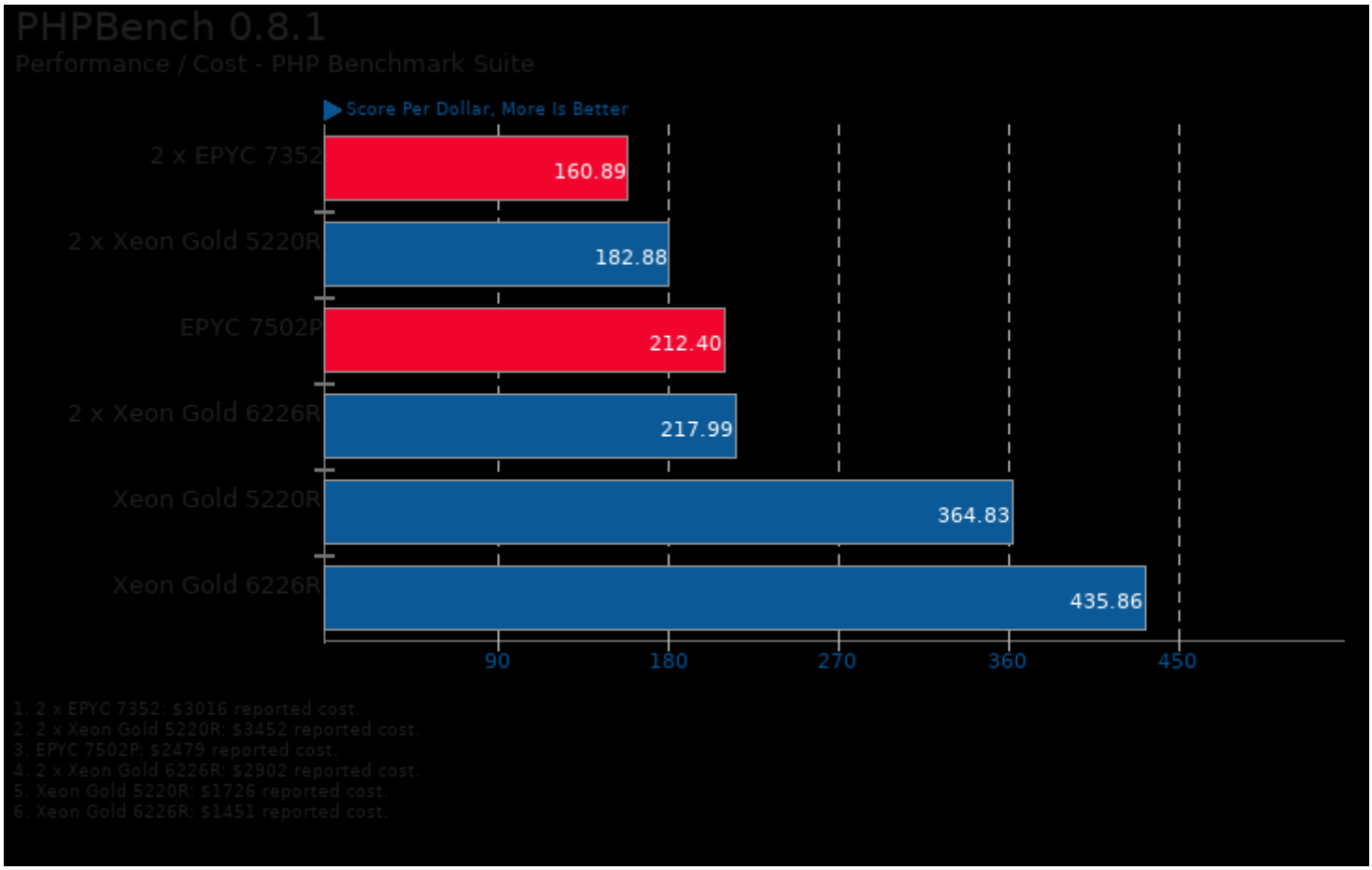

Nettle 3.5.1
Performance / Cost - Test: chacha
Mbyte/s Per Dollar, More Is Better
2 x EPYC 7352
0.237
2 x Xeon Gold 5220R
0.297
EPYC 7502P
0.307
2 x Xeon Gold 6226R
0.353
Xeon Gold 5220R
0.591
Xeon Gold 6226R
0.706
0.1589
0.3178
0.4767
0.6356
0.7945
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

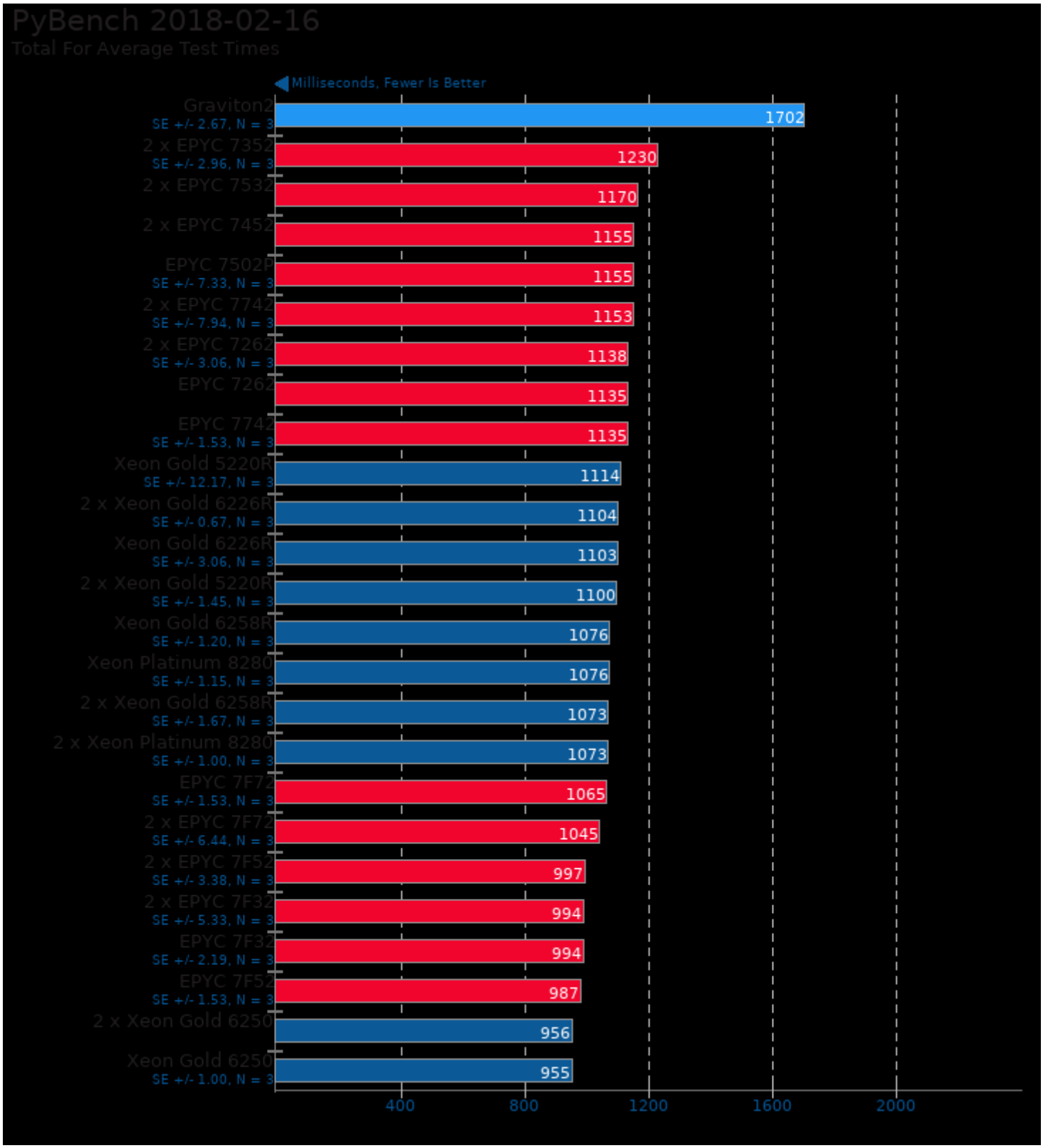

Nettle 3.5.1
Performance / Cost - Test: sha512
Mbyte/s Per Dollar, More Is Better
2 x Xeon Gold 5220R
0.142
2 x EPYC 7352
0.151
2 x Xeon Gold 6226R
0.169
EPYC 7502P
0.195
Xeon Gold 5220R
0.281
Xeon Gold 6226R
0.337
0.0758
0.1516
0.2274
0.3032
0.379
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

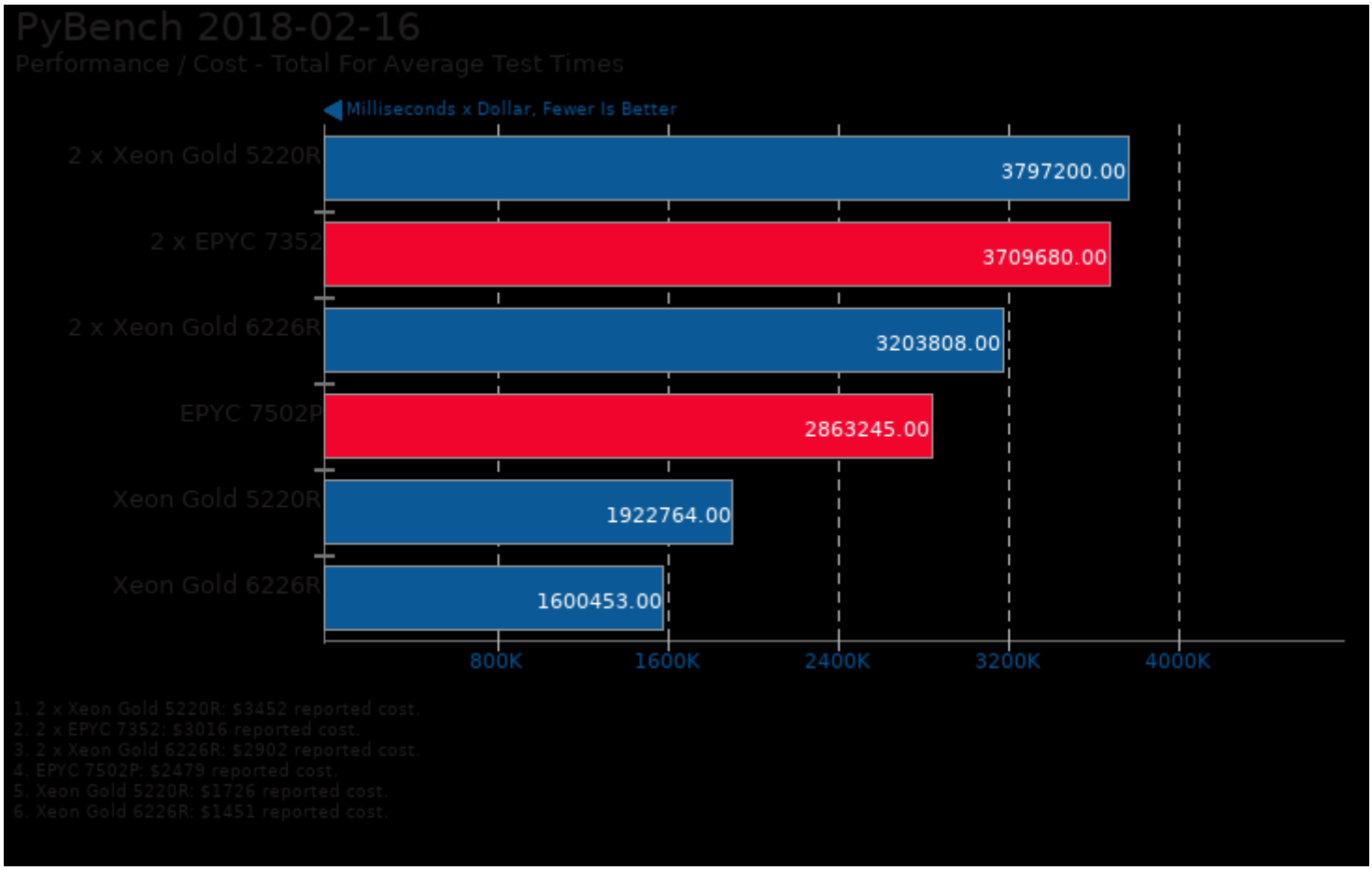

Numpy Benchmark
Score, More Is Better
Graviton2
SE +/- 0.82, N = 3
194.36
2 x EPYC 7352
SE +/- 1.21, N = 3
296.14
2 x Xeon Gold 5220R
SE +/- 0.65, N = 3
300.73
2 x Xeon Gold 6226R
SE +/- 1.46, N = 3
304.16
2 x EPYC 7532
SE +/- 1.42, N = 3
307.69
2 x EPYC 7452
SE +/- 1.10, N = 3
310.54
Xeon Gold 5220R
SE +/- 3.23, N = 3
313.76
EPYC 7502P
SE +/- 1.78, N = 3
314.28
EPYC 7742
SE +/- 1.02, N = 3
317.39
Xeon Gold 6226R
SE +/- 0.54, N = 3
318.87
2 x Xeon Platinum 8280
SE +/- 3.00, N = 3
321.82
2 x EPYC 7742
SE +/- 3.56, N = 3
323.70
2 x Xeon Gold 6258R
SE +/- 0.44, N = 3
325.69
2 x EPYC 7262
SE +/- 1.11, N = 3
326.72
EPYC 7262
SE +/- 0.54, N = 3
329.14
Xeon Platinum 8280
SE +/- 2.42, N = 3
330.33
Xeon Gold 6258R
SE +/- 0.92, N = 3
337.46
2 x EPYC 7F72
SE +/- 1.23, N = 3
347.12
EPYC 7F72
SE +/- 2.28, N = 3
348.71
2 x Xeon Gold 6250
SE +/- 2.10, N = 3
360.01
2 x EPYC 7F52
SE +/- 0.44, N = 3
364.86
EPYC 7F52
SE +/- 0.90, N = 3
366.16
Xeon Gold 6250
SE +/- 0.23, N = 3
367.44
EPYC 7F32
SE +/- 0.84, N = 3
368.08
2 x EPYC 7F32
SE +/- 1.19, N = 3
370.14
80
160
240
320
400

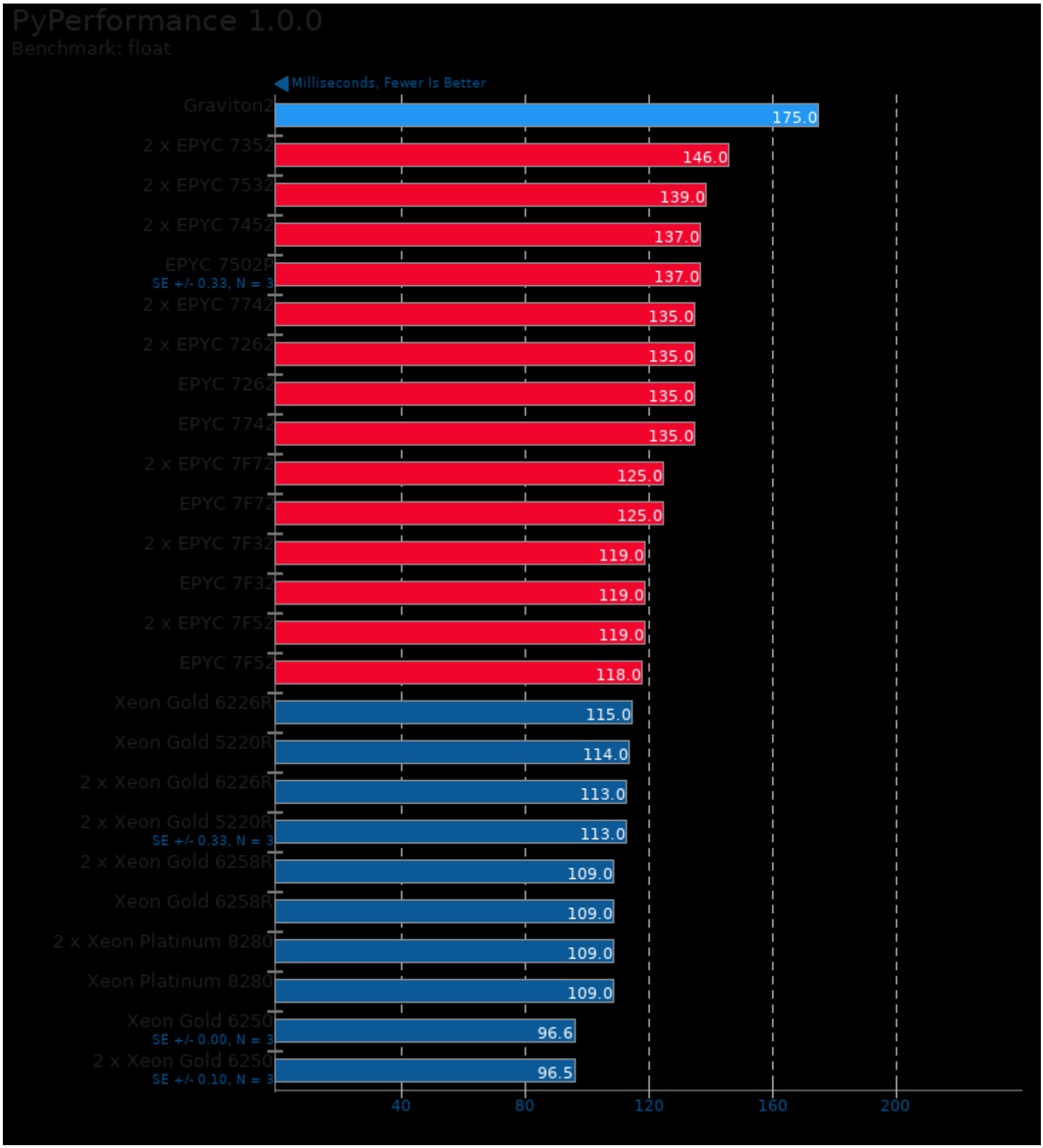

Numpy Benchmark
Performance / Cost -
Score Per Dollar, More Is Better
2 x Xeon Gold 5220R
0.087
2 x EPYC 7352
0.098
2 x Xeon Gold 6226R
0.105
EPYC 7502P
0.127
Xeon Gold 5220R
0.182
Xeon Gold 6226R
0.220
0.0495
0.099
0.1485
0.198
0.2475
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

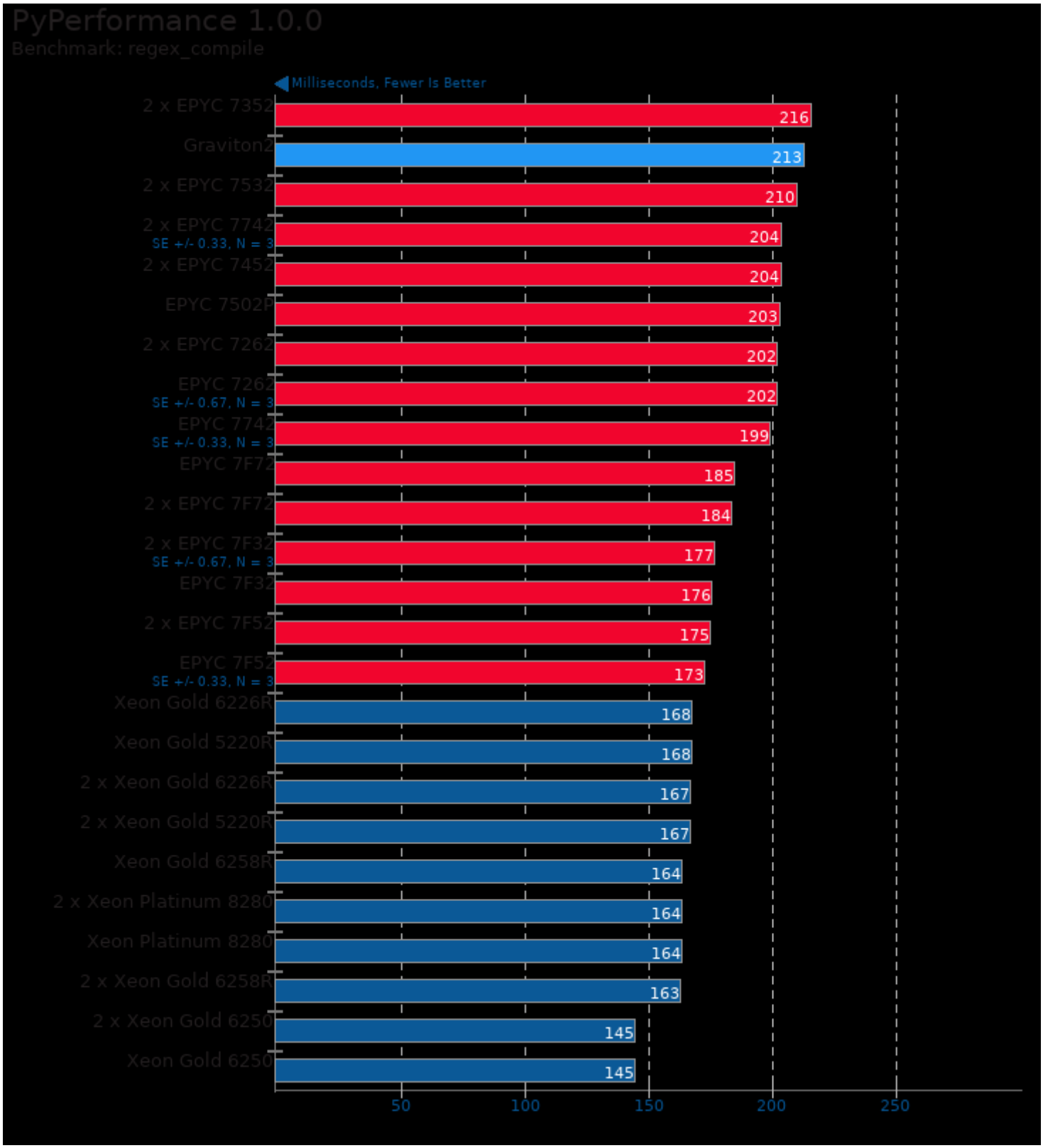

PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
Graviton2
SE +/- 1525.52, N = 3
396410
2 x EPYC 7352
SE +/- 1441.15, N = 3
485243
2 x EPYC 7532
SE +/- 544.97, N = 3
515758
2 x EPYC 7452
SE +/- 1778.87, N = 3
516902
EPYC 7502P
SE +/- 3270.88, N = 3
526537
EPYC 7742
SE +/- 2376.59, N = 3
527173
2 x EPYC 7742
SE +/- 505.18, N = 3
527208
EPYC 7262
SE +/- 2423.50, N = 3
527259
2 x EPYC 7262
SE +/- 3280.96, N = 3
529981
2 x EPYC 7F72
SE +/- 595.15, N = 3
560990
EPYC 7F72
SE +/- 1457.16, N = 3
572134
EPYC 7F32
SE +/- 700.72, N = 3
602328
EPYC 7F52
SE +/- 532.88, N = 3
604627
2 x EPYC 7F52
SE +/- 1971.58, N = 3
606970
2 x EPYC 7F32
SE +/- 3182.54, N = 3
609673
Xeon Gold 5220R
SE +/- 862.18, N = 3
629690
2 x Xeon Gold 5220R
SE +/- 914.97, N = 3
631283
Xeon Gold 6226R
SE +/- 752.01, N = 3
632431
2 x Xeon Gold 6226R
SE +/- 164.78, N = 3
632601
Xeon Gold 6258R
SE +/- 4629.23, N = 3
643737
2 x Xeon Gold 6258R
SE +/- 2012.26, N = 3
647832
Xeon Platinum 8280
SE +/- 425.09, N = 3
649164
2 x Xeon Platinum 8280
SE +/- 884.68, N = 3
649693
Xeon Gold 6250
SE +/- 1056.07, N = 3
729819
2 x Xeon Gold 6250
SE +/- 775.32, N = 3
731952
160K
320K
480K
640K
800K

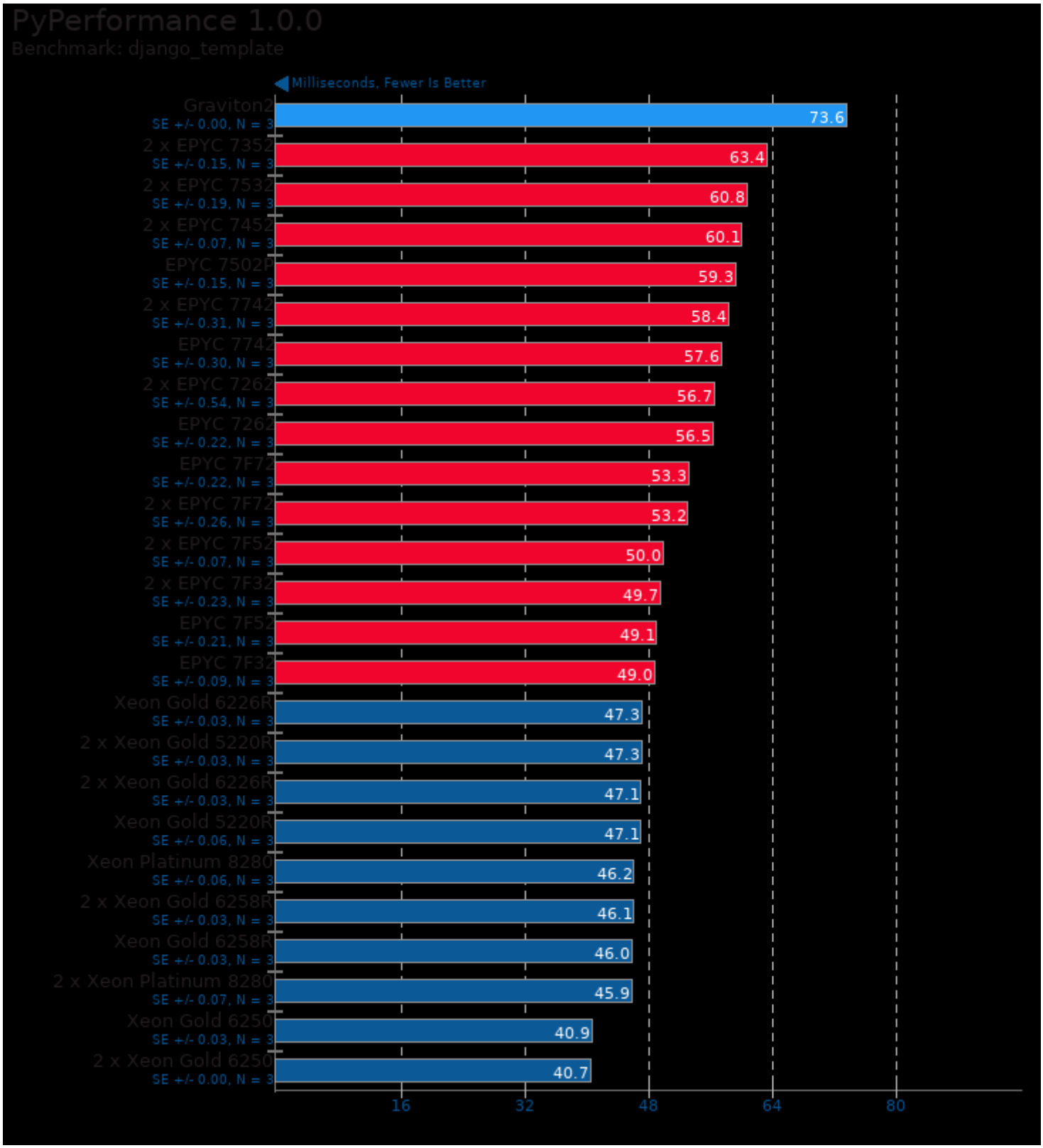

PHPBench 0.8.1
Performance / Cost - PHP Benchmark Suite
Score Per Dollar, More Is Better
2 x EPYC 7352
160.89
2 x Xeon Gold 5220R
182.88
EPYC 7502P
212.40
2 x Xeon Gold 6226R
217.99
Xeon Gold 5220R
364.83
Xeon Gold 6226R
435.86
90
180
270
360
450
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

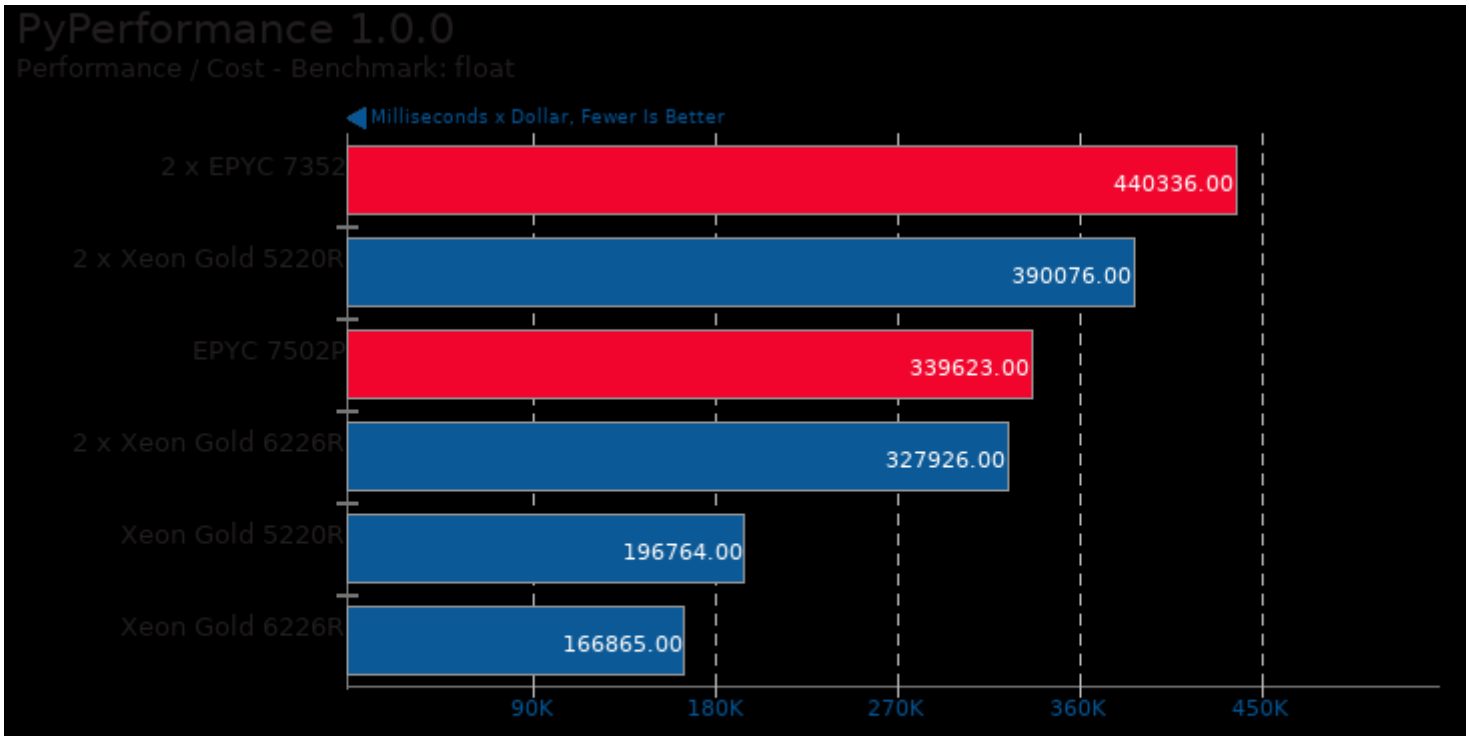

PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Graviton2
SE +/- 2.67, N = 3
1702
2 x EPYC 7352
SE +/- 2.96, N = 3
1230
2 x EPYC 7532
1170
2 x EPYC 7452
1155
EPYC 7502P
SE +/- 7.33, N = 3
1155
2 x EPYC 7742
SE +/- 7.94, N = 3
1153
2 x EPYC 7262
SE +/- 3.06, N = 3
1138
EPYC 7262
1135
EPYC 7742
SE +/- 1.53, N = 3
1135
Xeon Gold 5220R
SE +/- 12.17, N = 3
1114
2 x Xeon Gold 6226R
SE +/- 0.67, N = 3
1104
Xeon Gold 6226R
SE +/- 3.06, N = 3
1103
2 x Xeon Gold 5220R
SE +/- 1.45, N = 3
1100
Xeon Gold 6258R
SE +/- 1.20, N = 3
1076
Xeon Platinum 8280
SE +/- 1.15, N = 3
1076
2 x Xeon Gold 6258R
SE +/- 1.67, N = 3
1073
2 x Xeon Platinum 8280
SE +/- 1.00, N = 3
1073
EPYC 7F72
SE +/- 1.53, N = 3
1065
2 x EPYC 7F72
SE +/- 6.44, N = 3
1045
2 x EPYC 7F52
SE +/- 3.38, N = 3
997
2 x EPYC 7F32
SE +/- 5.33, N = 3
994
EPYC 7F32
SE +/- 2.19, N = 3
994
EPYC 7F52
SE +/- 1.53, N = 3
987
2 x Xeon Gold 6250
956
Xeon Gold 6250
SE +/- 1.00, N = 3
955
400
800
1200
1600
2000

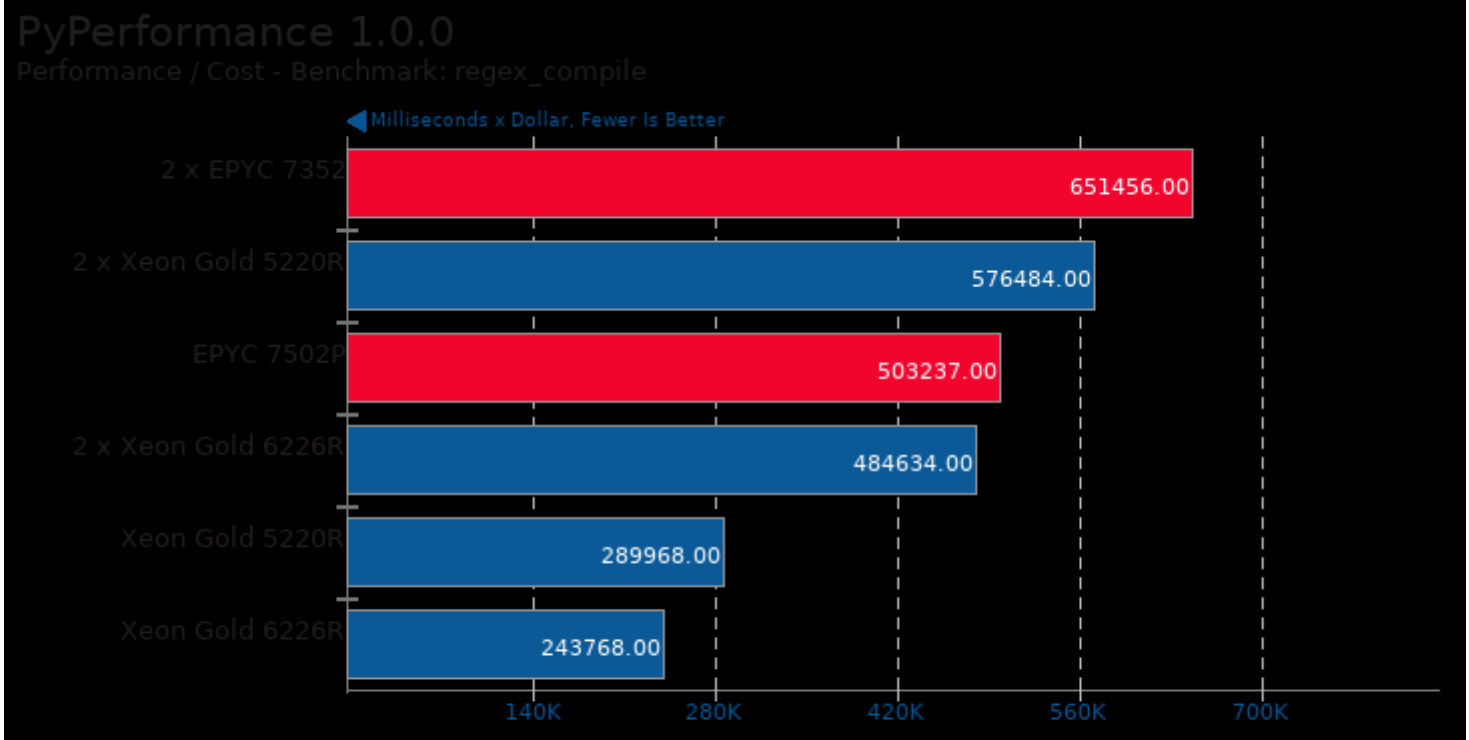

PyBench 2018-02-16
Performance / Cost - Total For Average Test Times
Milliseconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
3797200.00
2 x EPYC 7352
3709680.00
2 x Xeon Gold 6226R
3203808.00
EPYC 7502P
2863245.00
Xeon Gold 5220R
1922764.00
Xeon Gold 6226R
1600453.00
800K
1600K
2400K
3200K
4000K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

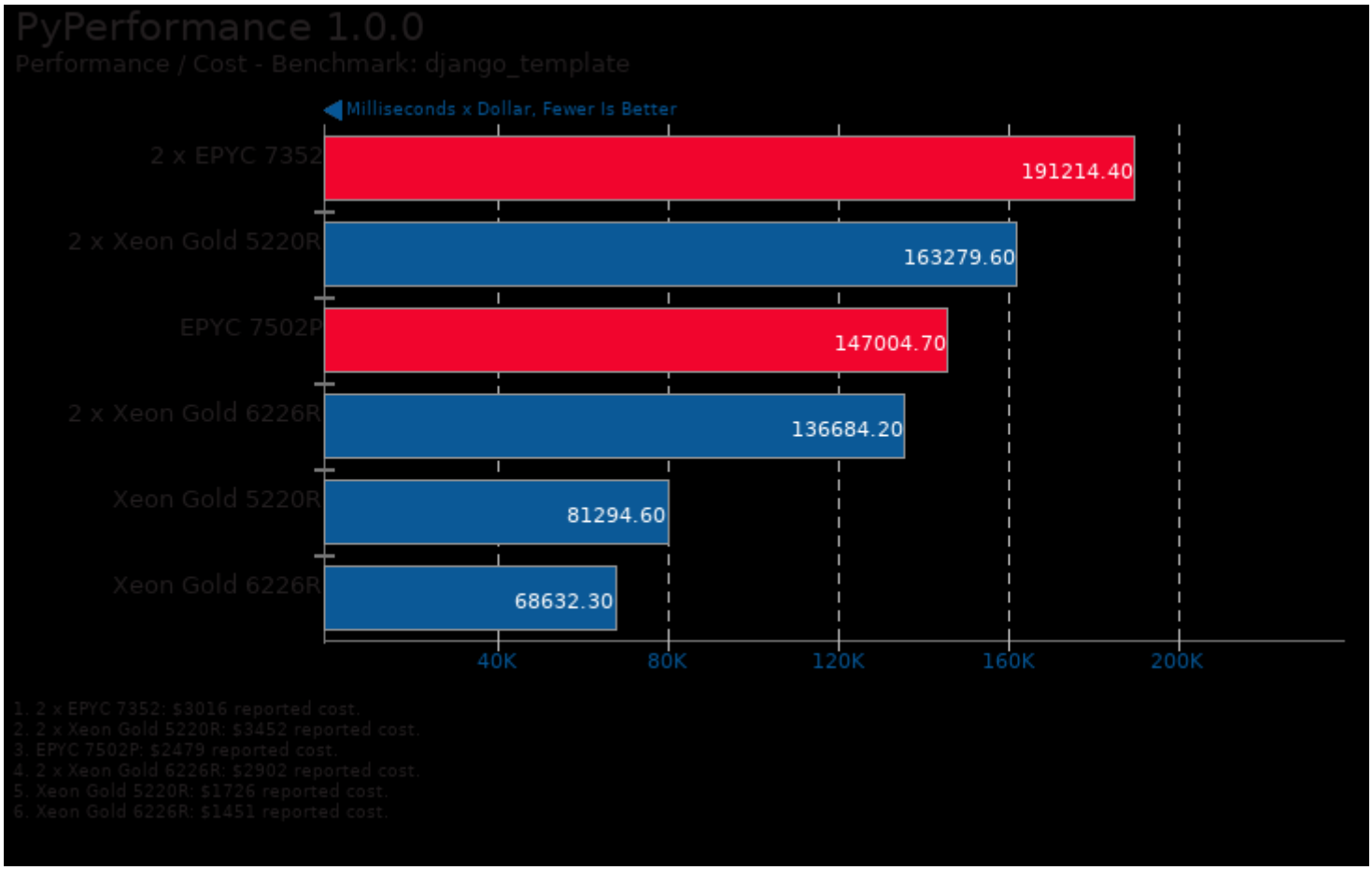

PyPerformance 1.0.0
Benchmark: float
Milliseconds, Fewer Is Better
Graviton2
175.0
2 x EPYC 7352
146.0
2 x EPYC 7532
139.0
2 x EPYC 7452
137.0
EPYC 7502P
SE +/- 0.33, N = 3
137.0
2 x EPYC 7742
135.0
2 x EPYC 7262
135.0
EPYC 7262
135.0
EPYC 7742
135.0
2 x EPYC 7F72
125.0
EPYC 7F72
125.0
2 x EPYC 7F32
119.0
EPYC 7F32
119.0
2 x EPYC 7F52
119.0
EPYC 7F52
118.0
Xeon Gold 6226R
115.0
Xeon Gold 5220R
114.0
2 x Xeon Gold 6226R
113.0
2 x Xeon Gold 5220R
SE +/- 0.33, N = 3
113.0
2 x Xeon Gold 6258R
109.0
Xeon Gold 6258R
109.0
2 x Xeon Platinum 8280
109.0
Xeon Platinum 8280
109.0
Xeon Gold 6250
SE +/- 0.00, N = 3
96.6
2 x Xeon Gold 6250
SE +/- 0.10, N = 3
96.5
40
80
120
160
200

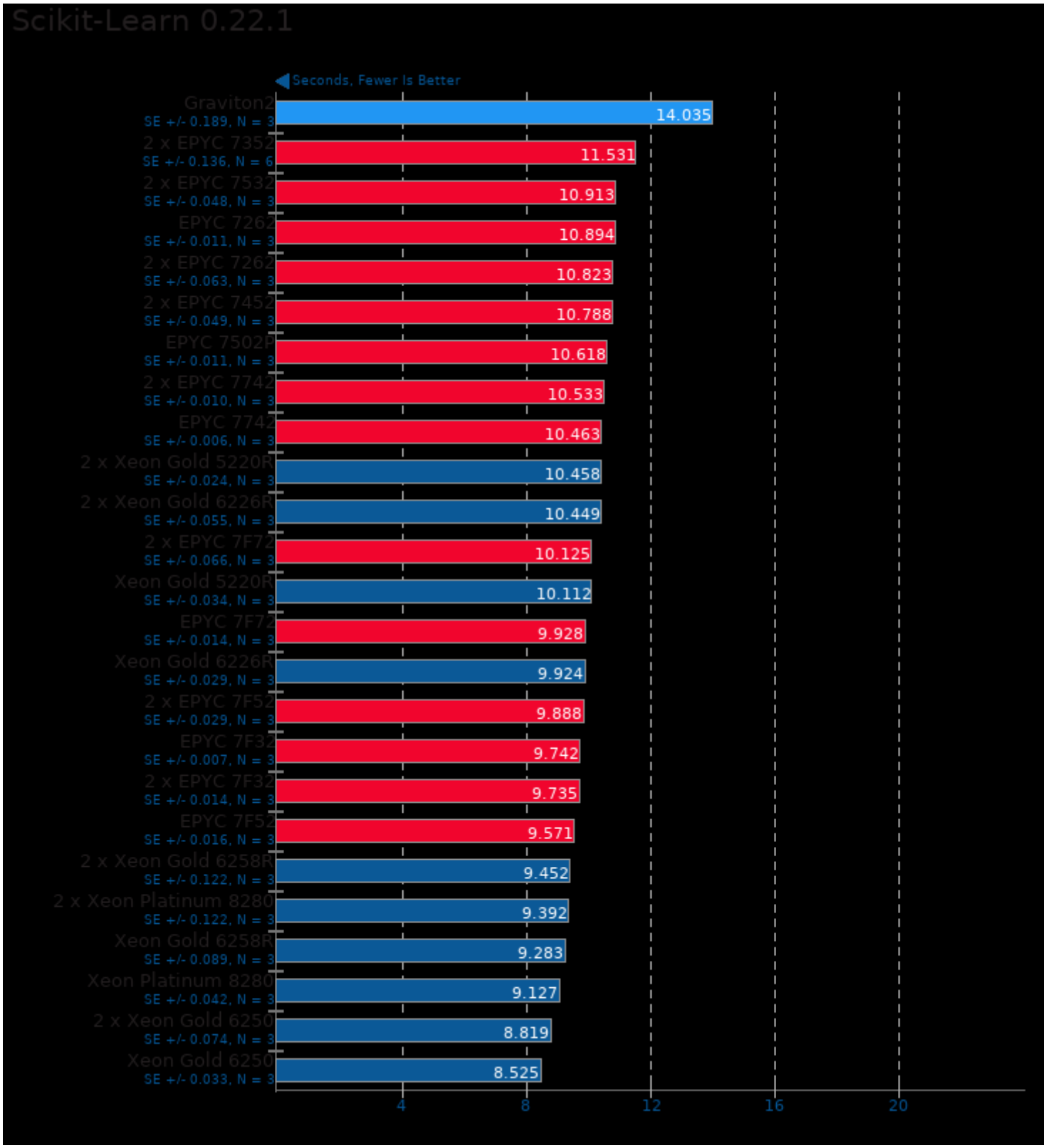

PyPerformance 1.0.0
Benchmark: regex_compile
Milliseconds, Fewer Is Better
2 x EPYC 7352
216
Graviton2
213
2 x EPYC 7532
210
2 x EPYC 7742
SE +/- 0.33, N = 3
204
2 x EPYC 7452
204
EPYC 7502P
203
2 x EPYC 7262
202
EPYC 7262
SE +/- 0.67, N = 3
202
EPYC 7742
SE +/- 0.33, N = 3
199
EPYC 7F72
185
2 x EPYC 7F72
184
2 x EPYC 7F32
SE +/- 0.67, N = 3
177
EPYC 7F32
176
2 x EPYC 7F52
175
EPYC 7F52
SE +/- 0.33, N = 3
173
Xeon Gold 6226R
168
Xeon Gold 5220R
168
2 x Xeon Gold 6226R
167
2 x Xeon Gold 5220R
167
Xeon Gold 6258R
164
2 x Xeon Platinum 8280
164
Xeon Platinum 8280
164
2 x Xeon Gold 6258R
163
2 x Xeon Gold 6250
145
Xeon Gold 6250
145
50
100
150
200
250

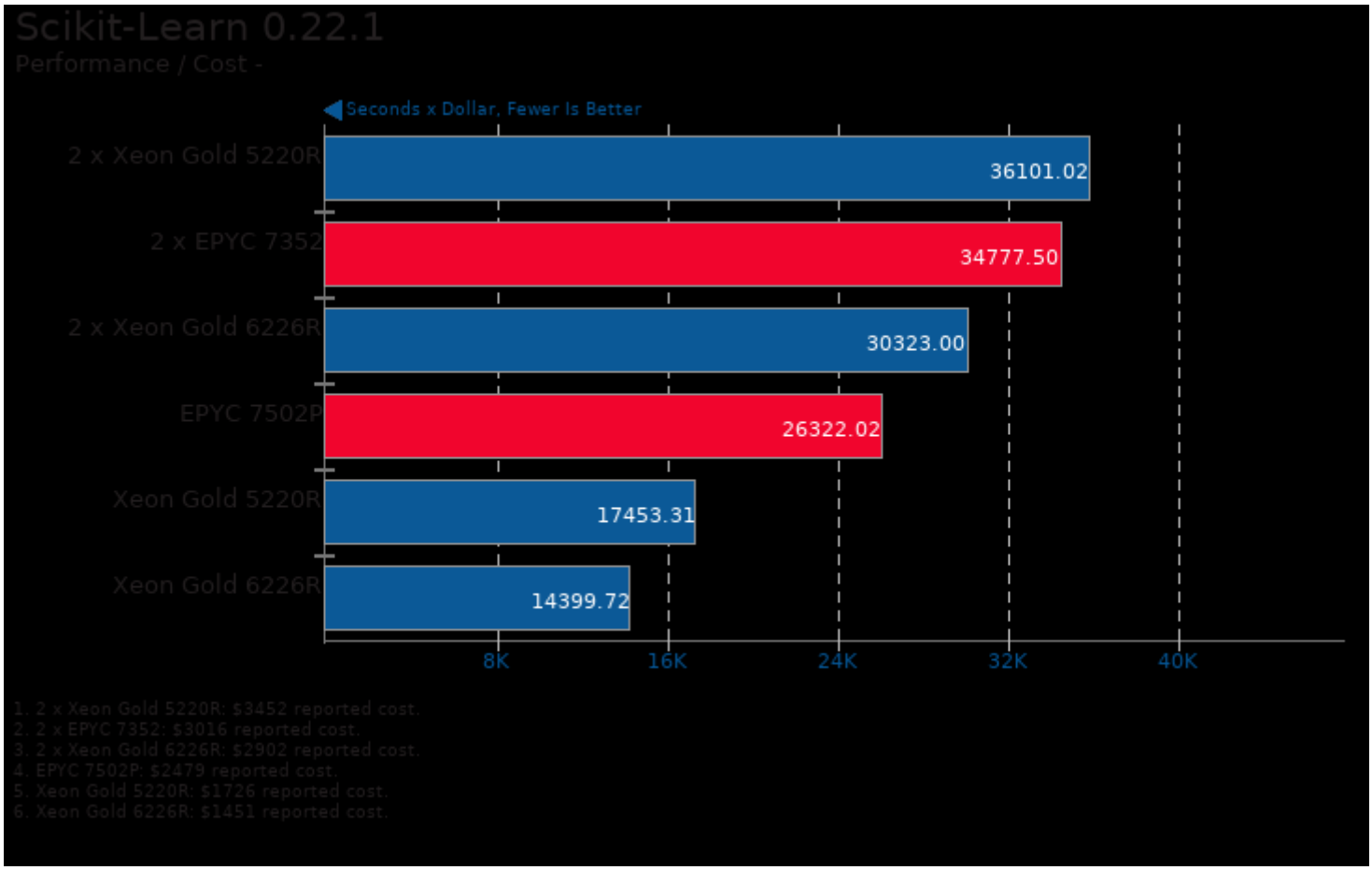

PyPerformance 1.0.0
Benchmark: django_template
Milliseconds, Fewer Is Better
Graviton2
SE +/- 0.00, N = 3
73.6
2 x EPYC 7352
SE +/- 0.15, N = 3
63.4
2 x EPYC 7532
SE +/- 0.19, N = 3
60.8
2 x EPYC 7452
SE +/- 0.07, N = 3
60.1
EPYC 7502P
SE +/- 0.15, N = 3
59.3
2 x EPYC 7742
SE +/- 0.31, N = 3
58.4
EPYC 7742
SE +/- 0.30, N = 3
57.6
2 x EPYC 7262
SE +/- 0.54, N = 3
56.7
EPYC 7262
SE +/- 0.22, N = 3
56.5
EPYC 7F72
SE +/- 0.22, N = 3
53.3
2 x EPYC 7F72
SE +/- 0.26, N = 3
53.2
2 x EPYC 7F52
SE +/- 0.07, N = 3
50.0
2 x EPYC 7F32
SE +/- 0.23, N = 3
49.7
EPYC 7F52
SE +/- 0.21, N = 3
49.1
EPYC 7F32
SE +/- 0.09, N = 3
49.0
Xeon Gold 6226R
SE +/- 0.03, N = 3
47.3
2 x Xeon Gold 5220R
SE +/- 0.03, N = 3
47.3
2 x Xeon Gold 6226R
SE +/- 0.03, N = 3
47.1
Xeon Gold 5220R
SE +/- 0.06, N = 3
47.1
Xeon Platinum 8280
SE +/- 0.06, N = 3
46.2
2 x Xeon Gold 6258R
SE +/- 0.03, N = 3
46.1
Xeon Gold 6258R
SE +/- 0.03, N = 3
46.0
2 x Xeon Platinum 8280
SE +/- 0.07, N = 3
45.9
Xeon Gold 6250
SE +/- 0.03, N = 3
40.9
2 x Xeon Gold 6250
SE +/- 0.00, N = 3
40.7
16
32
48
64
80

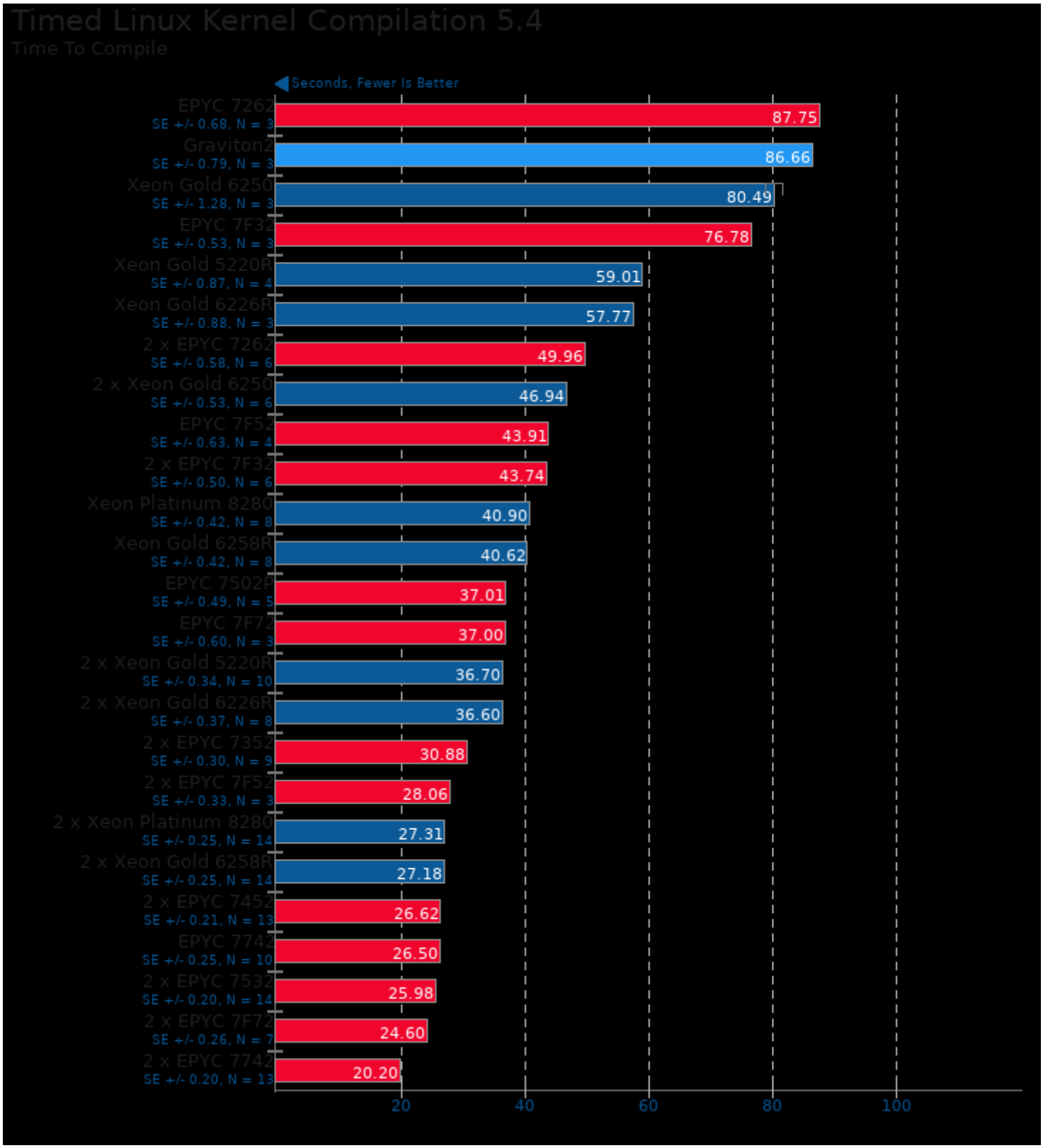

PyPerformance 1.0.0
Performance / Cost - Benchmark: float
Milliseconds x Dollar, Fewer Is Better
2 x EPYC 7352
440336.00
2 x Xeon Gold 5220R
390076.00
EPYC 7502P
339623.00
2 x Xeon Gold 6226R
327926.00
Xeon Gold 5220R
196764.00
Xeon Gold 6226R
166865.00
90K
180K
270K
360K
450K
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

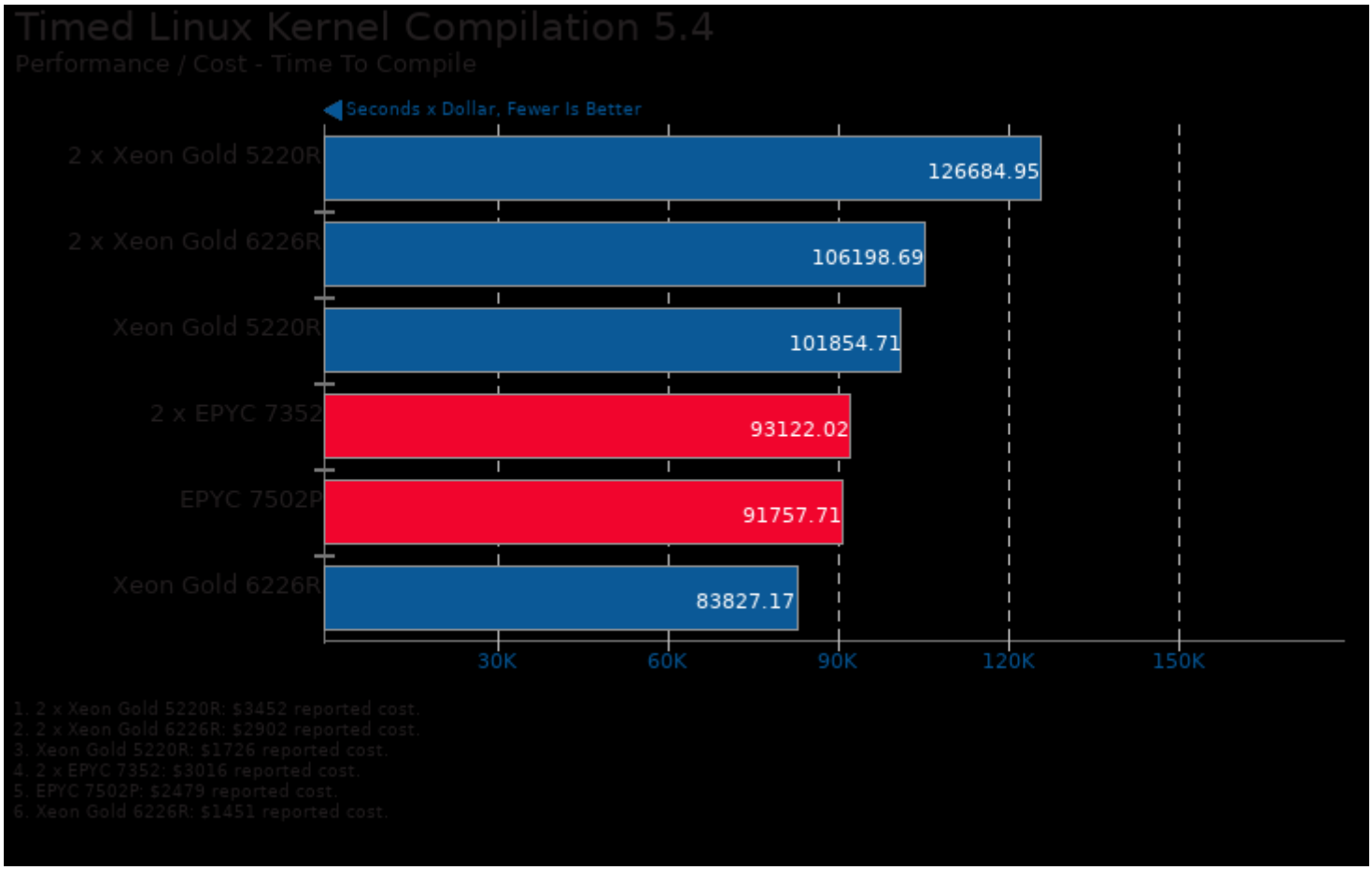

PyPerformance 1.0.0
Performance / Cost - Benchmark: regex_compile
Milliseconds x Dollar, Fewer Is Better
2 x EPYC 7352
651456.00
2 x Xeon Gold 5220R
576484.00
EPYC 7502P
503237.00
2 x Xeon Gold 6226R
484634.00
Xeon Gold 5220R
289968.00
Xeon Gold 6226R
243768.00
140K
280K
420K
560K
700K
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

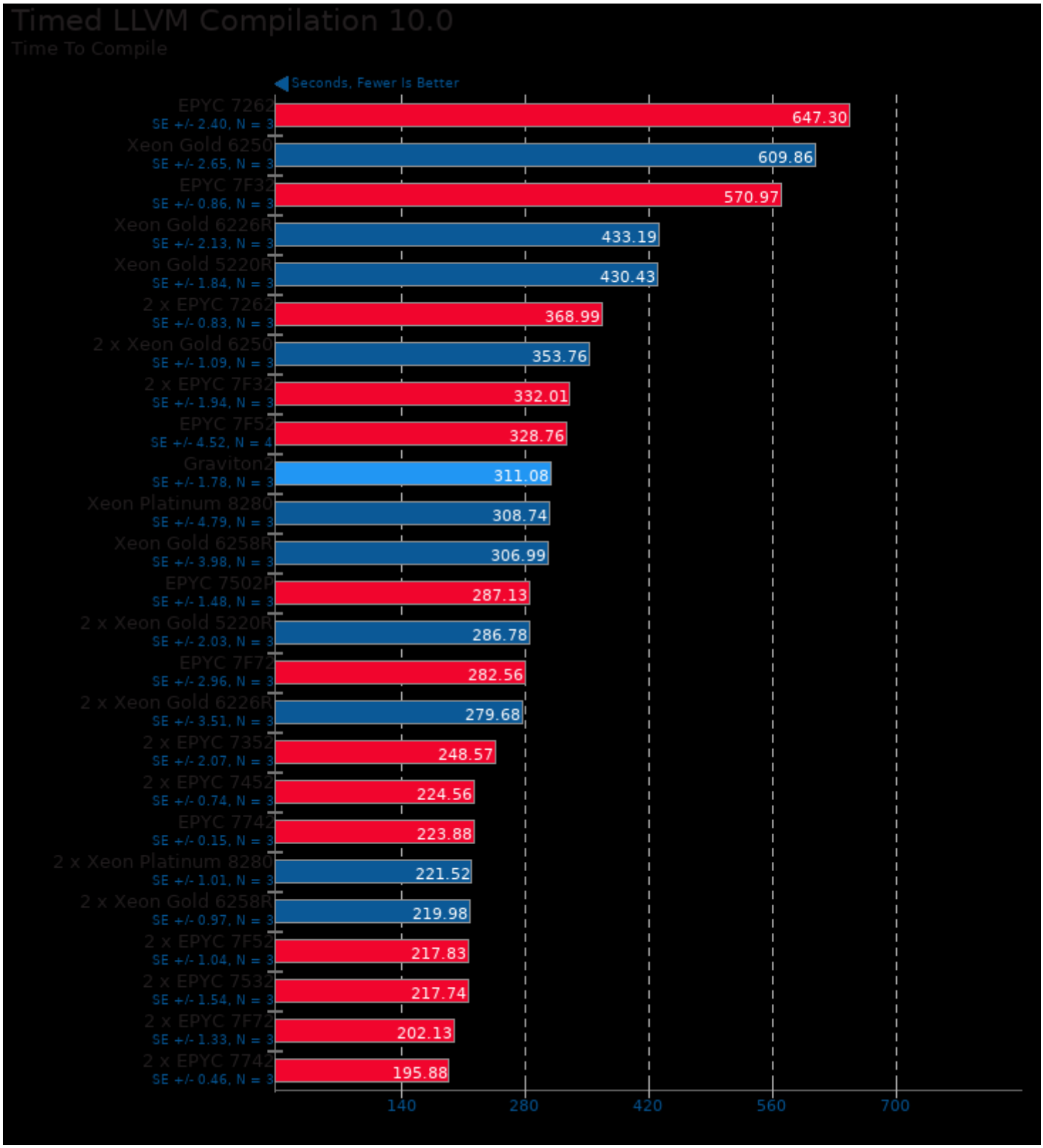

PyPerformance 1.0.0
Performance / Cost - Benchmark: django_template
Milliseconds x Dollar, Fewer Is Better
2 x EPYC 7352
191214.40
2 x Xeon Gold 5220R
163279.60
EPYC 7502P
147004.70
2 x Xeon Gold 6226R
136684.20
Xeon Gold 5220R
81294.60
Xeon Gold 6226R
68632.30
40K
80K
120K
160K
200K
1. 2 x EPYC 7352: $3016 reported cost.
2. 2 x Xeon Gold 5220R: $3452 reported cost.
3. EPYC 7502P: $2479 reported cost.
4. 2 x Xeon Gold 6226R: $2902 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

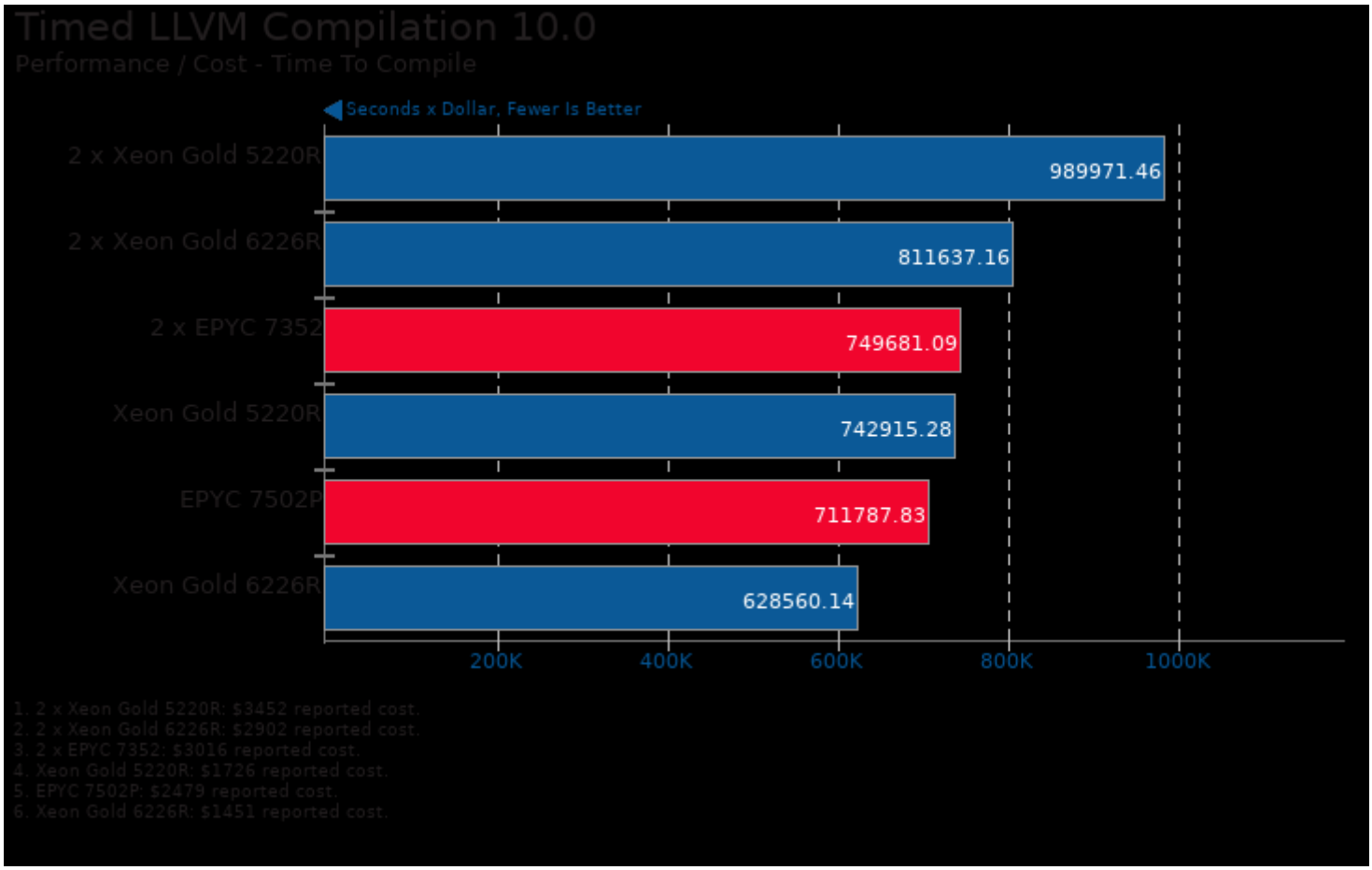

Scikit-Learn 0.22.1
Seconds, Fewer Is Better
Graviton2
SE +/- 0.189, N = 3
14.035
2 x EPYC 7352
SE +/- 0.136, N = 6
11.531
2 x EPYC 7532
SE +/- 0.048, N = 3
10.913
EPYC 7262
SE +/- 0.011, N = 3
10.894
2 x EPYC 7262
SE +/- 0.063, N = 3
10.823
2 x EPYC 7452
SE +/- 0.049, N = 3
10.788
EPYC 7502P
SE +/- 0.011, N = 3
10.618
2 x EPYC 7742
SE +/- 0.010, N = 3
10.533
EPYC 7742
SE +/- 0.006, N = 3
10.463
2 x Xeon Gold 5220R
SE +/- 0.024, N = 3
10.458
2 x Xeon Gold 6226R
SE +/- 0.055, N = 3
10.449
2 x EPYC 7F72
SE +/- 0.066, N = 3
10.125
Xeon Gold 5220R
SE +/- 0.034, N = 3
10.112
EPYC 7F72
SE +/- 0.014, N = 3
9.928
Xeon Gold 6226R
SE +/- 0.029, N = 3
9.924
2 x EPYC 7F52
SE +/- 0.029, N = 3
9.888
EPYC 7F32
SE +/- 0.007, N = 3
9.742
2 x EPYC 7F32
SE +/- 0.014, N = 3
9.735
EPYC 7F52
SE +/- 0.016, N = 3
9.571
2 x Xeon Gold 6258R
SE +/- 0.122, N = 3
9.452
2 x Xeon Platinum 8280
SE +/- 0.122, N = 3
9.392
Xeon Gold 6258R
SE +/- 0.089, N = 3
9.283
Xeon Platinum 8280
SE +/- 0.042, N = 3
9.127
2 x Xeon Gold 6250
SE +/- 0.074, N = 3
8.819
Xeon Gold 6250
SE +/- 0.033, N = 3
8.525
4
8
12
16
20

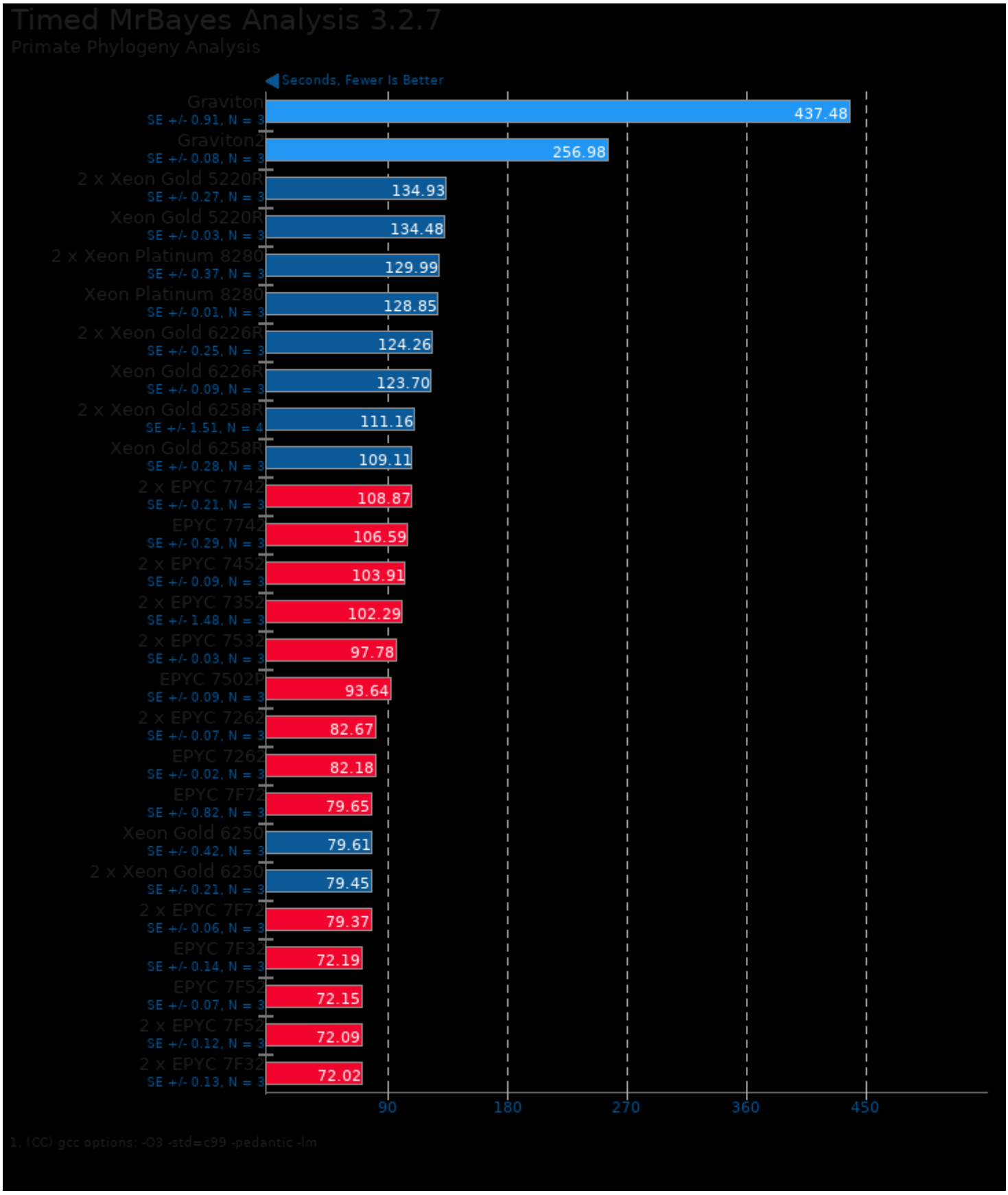

Scikit-Learn 0.22.1
Performance / Cost -
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
36101.02
2 x EPYC 7352
34777.50
2 x Xeon Gold 6226R
30323.00
EPYC 7502P
26322.02
Xeon Gold 5220R
17453.31
Xeon Gold 6226R
14399.72
8K
16K
24K
32K
40K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x EPYC 7352: $3016 reported cost.
3. 2 x Xeon Gold 6226R: $2902 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

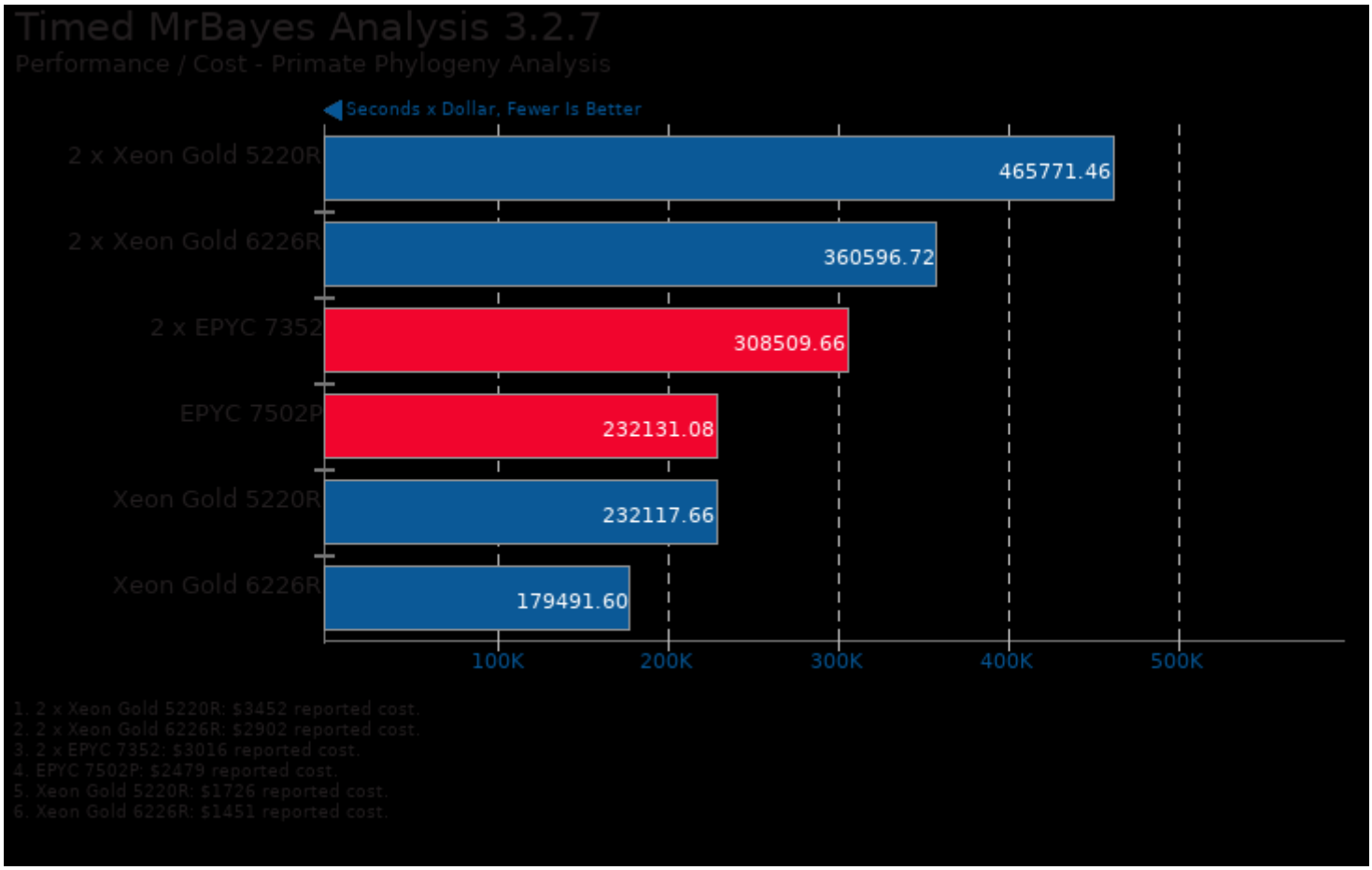

Timed Linux Kernel Compilation 5.4
Time To Compile
Seconds, Fewer Is Better
EPYC 7262
SE +/- 0.68, N = 3
87.75
Graviton2
SE +/- 0.79, N = 3
86.66
Xeon Gold 6250
SE +/- 1.28, N = 3
80.49
EPYC 7F32
SE +/- 0.53, N = 3
76.78
Xeon Gold 5220R
SE +/- 0.87, N = 4
59.01
Xeon Gold 6226R
SE +/- 0.88, N = 3
57.77
2 x EPYC 7262
SE +/- 0.58, N = 6
49.96
2 x Xeon Gold 6250
SE +/- 0.53, N = 6
46.94
EPYC 7F52
SE +/- 0.63, N = 4
43.91
2 x EPYC 7F32
SE +/- 0.50, N = 6
43.74
Xeon Platinum 8280
SE +/- 0.42, N = 8
40.90
Xeon Gold 6258R
SE +/- 0.42, N = 8
40.62
EPYC 7502P
SE +/- 0.49, N = 5
37.01
EPYC 7F72
SE +/- 0.60, N = 3
37.00
2 x Xeon Gold 5220R
SE +/- 0.34, N = 10
36.70
2 x Xeon Gold 6226R
SE +/- 0.37, N = 8
36.60
2 x EPYC 7352
SE +/- 0.30, N = 9
30.88
2 x EPYC 7F52
SE +/- 0.33, N = 3
28.06
2 x Xeon Platinum 8280
SE +/- 0.25, N = 14
27.31
2 x Xeon Gold 6258R
SE +/- 0.25, N = 14
27.18
2 x EPYC 7452
SE +/- 0.21, N = 13
26.62
EPYC 7742
SE +/- 0.25, N = 10
26.50
2 x EPYC 7532
SE +/- 0.20, N = 14
25.98
2 x EPYC 7F72
SE +/- 0.26, N = 7
24.60
2 x EPYC 7742
SE +/- 0.20, N = 13
20.20
20
40
60
80
100


Timed Linux Kernel Compilation 5.4
Performance / Cost - Time To Compile
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
126684.95
2 x Xeon Gold 6226R
106198.69
Xeon Gold 5220R
101854.71
2 x EPYC 7352
93122.02
EPYC 7502P
91757.71
Xeon Gold 6226R
83827.17
30K
60K
90K
120K
150K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. Xeon Gold 5220R: $1726 reported cost.
4. 2 x EPYC 7352: $3016 reported cost.
5. EPYC 7502P: $2479 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

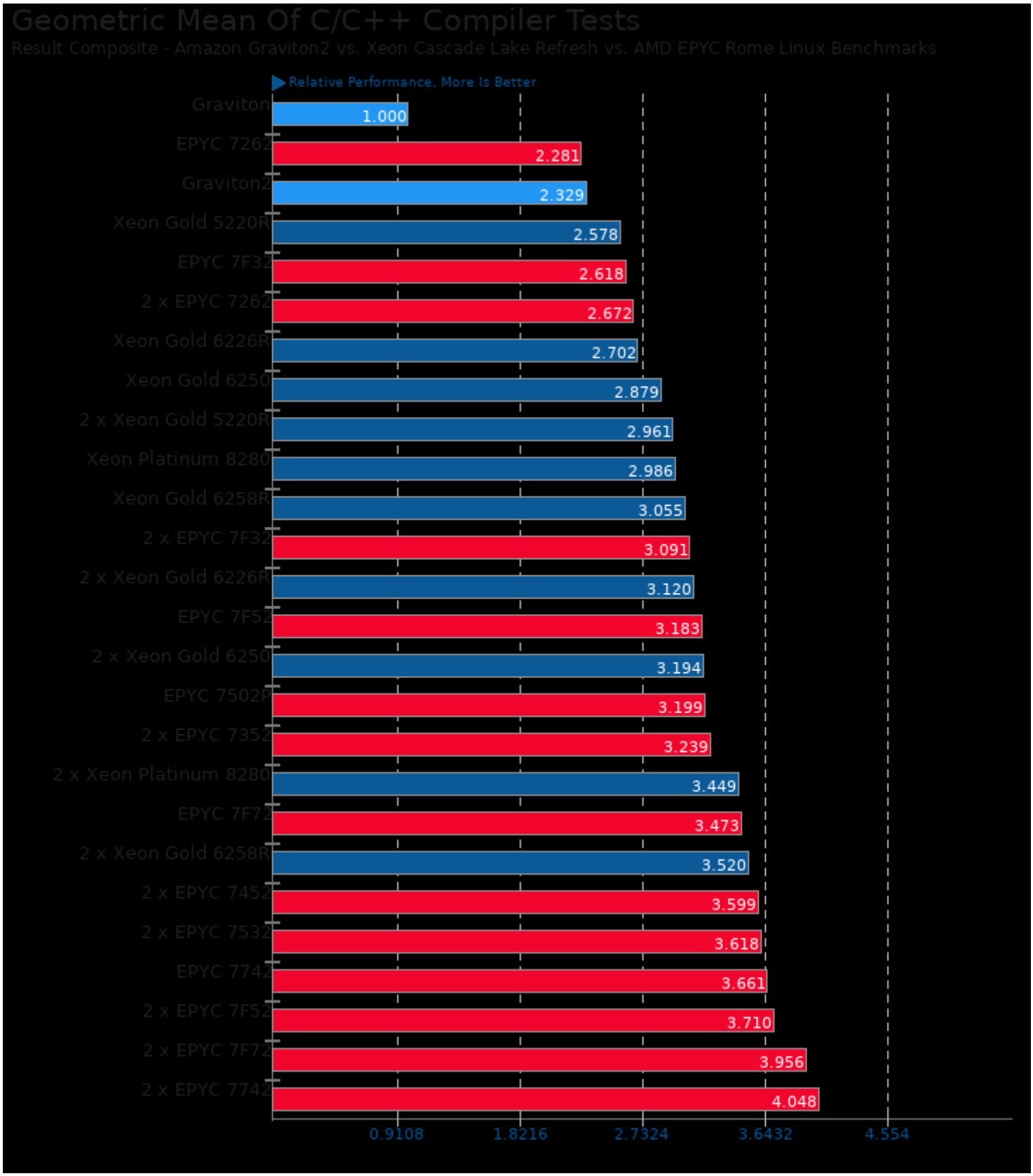

Timed LLVM Compilation 10.0
Time To Compile
Seconds, Fewer Is Better
EPYC 7262
SE +/- 2.40, N = 3
647.30
Xeon Gold 6250
SE +/- 2.65, N = 3
609.86
EPYC 7F32
SE +/- 0.86, N = 3
570.97
Xeon Gold 6226R
SE +/- 2.13, N = 3
433.19
Xeon Gold 5220R
SE +/- 1.84, N = 3
430.43
2 x EPYC 7262
SE +/- 0.83, N = 3
368.99
2 x Xeon Gold 6250
SE +/- 1.09, N = 3
353.76
2 x EPYC 7F32
SE +/- 1.94, N = 3
332.01
EPYC 7F52
SE +/- 4.52, N = 4
328.76
Graviton2
SE +/- 1.78, N = 3
311.08
Xeon Platinum 8280
SE +/- 4.79, N = 3
308.74
Xeon Gold 6258R
SE +/- 3.98, N = 3
306.99
EPYC 7502P
SE +/- 1.48, N = 3
287.13
2 x Xeon Gold 5220R
SE +/- 2.03, N = 3
286.78
EPYC 7F72
SE +/- 2.96, N = 3
282.56
2 x Xeon Gold 6226R
SE +/- 3.51, N = 3
279.68
2 x EPYC 7352
SE +/- 2.07, N = 3
248.57
2 x EPYC 7452
SE +/- 0.74, N = 3
224.56
EPYC 7742
SE +/- 0.15, N = 3
223.88
2 x Xeon Platinum 8280
SE +/- 1.01, N = 3
221.52
2 x Xeon Gold 6258R
SE +/- 0.97, N = 3
219.98
2 x EPYC 7F52
SE +/- 1.04, N = 3
217.83
2 x EPYC 7532
SE +/- 1.54, N = 3
217.74
2 x EPYC 7F72
SE +/- 1.33, N = 3
202.13
2 x EPYC 7742
SE +/- 0.46, N = 3
195.88
140
280
420
560
700


Timed LLVM Compilation 10.0
Performance / Cost - Time To Compile
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
989971.46
2 x Xeon Gold 6226R
811637.16
2 x EPYC 7352
749681.09
Xeon Gold 5220R
742915.28
EPYC 7502P
711787.83
Xeon Gold 6226R
628560.14
200K
400K
600K
800K
1000K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. Xeon Gold 5220R: $1726 reported cost.
5. EPYC 7502P: $2479 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

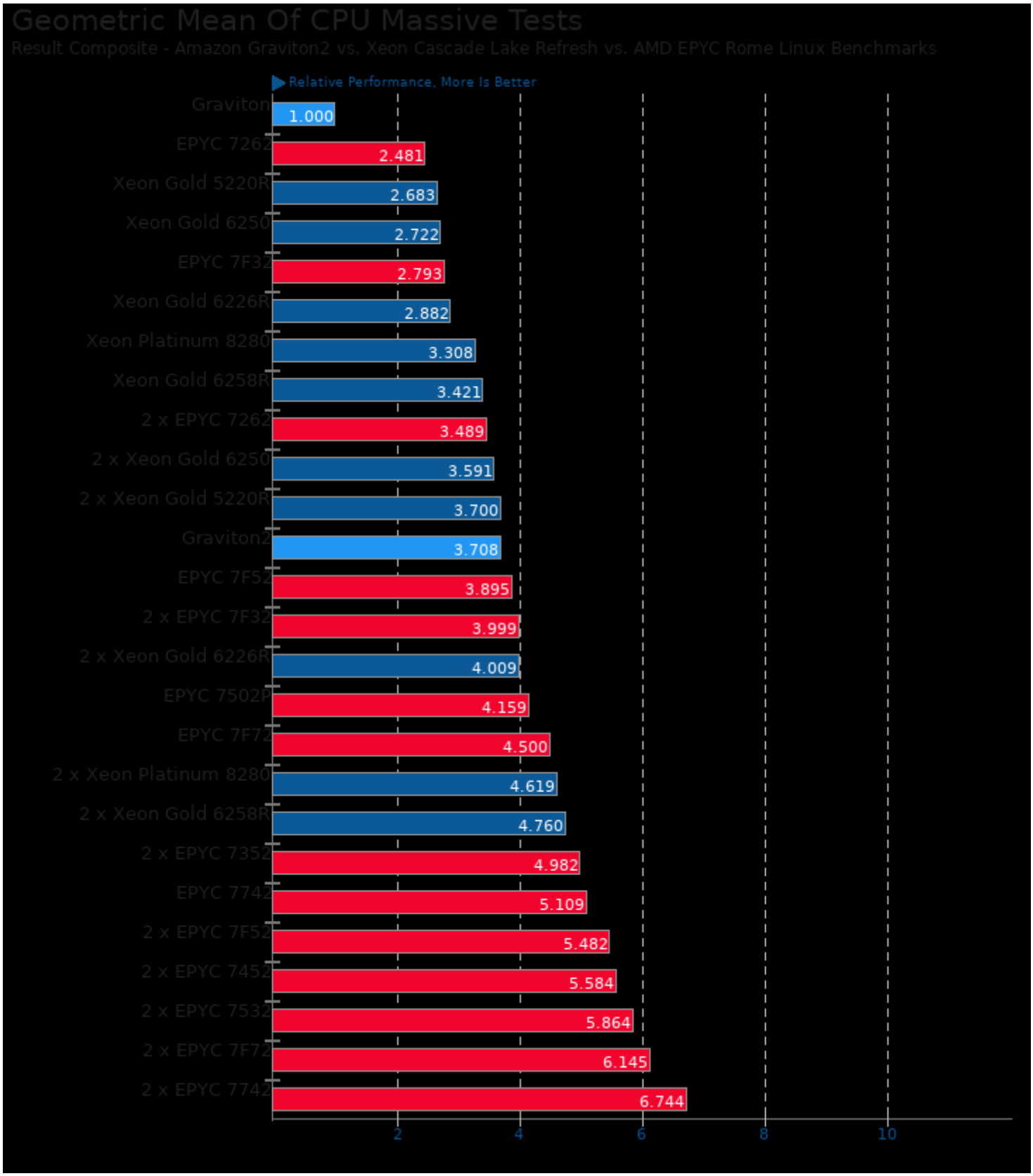

Timed MrBayes Analysis 3.2.7
Primate Phylogeny Analysis
Seconds, Fewer Is Better
Graviton
SE +/- 0.91, N = 3
437.48
Graviton2
SE +/- 0.08, N = 3
256.98
2 x Xeon Gold 5220R
SE +/- 0.27, N = 3
134.93
Xeon Gold 5220R
SE +/- 0.03, N = 3
134.48
2 x Xeon Platinum 8280
SE +/- 0.37, N = 3
129.99
Xeon Platinum 8280
SE +/- 0.01, N = 3
128.85
2 x Xeon Gold 6226R
SE +/- 0.25, N = 3
124.26
Xeon Gold 6226R
SE +/- 0.09, N = 3
123.70
2 x Xeon Gold 6258R
SE +/- 1.51, N = 4
111.16
Xeon Gold 6258R
SE +/- 0.28, N = 3
109.11
2 x EPYC 7742
SE +/- 0.21, N = 3
108.87
EPYC 7742
SE +/- 0.29, N = 3
106.59
2 x EPYC 7452
SE +/- 0.09, N = 3
103.91
2 x EPYC 7352
SE +/- 1.48, N = 3
102.29
2 x EPYC 7532
SE +/- 0.03, N = 3
97.78
EPYC 7502P
SE +/- 0.09, N = 3
93.64
2 x EPYC 7262
SE +/- 0.07, N = 3
82.67
EPYC 7262
SE +/- 0.02, N = 3
82.18
EPYC 7F72
SE +/- 0.82, N = 3
79.65
Xeon Gold 6250
SE +/- 0.42, N = 3
79.61
2 x Xeon Gold 6250
SE +/- 0.21, N = 3
79.45
2 x EPYC 7F72
SE +/- 0.06, N = 3
79.37
EPYC 7F32
SE +/- 0.14, N = 3
72.19
EPYC 7F52
SE +/- 0.07, N = 3
72.15
2 x EPYC 7F52
SE +/- 0.12, N = 3
72.09
2 x EPYC 7F32
SE +/- 0.13, N = 3
72.02
90
180
270
360
450
1. (CC) gcc options: -O3 -std=c99 -pedantic -lm


Timed MrBayes Analysis 3.2.7
Performance / Cost - Primate Phylogeny Analysis
Seconds x Dollar, Fewer Is Better
2 x Xeon Gold 5220R
465771.46
2 x Xeon Gold 6226R
360596.72
2 x EPYC 7352
308509.66
EPYC 7502P
232131.08
Xeon Gold 5220R
232117.66
Xeon Gold 6226R
179491.60
100K
200K
300K
400K
500K
1. 2 x Xeon Gold 5220R: $3452 reported cost.
2. 2 x Xeon Gold 6226R: $2902 reported cost.
3. 2 x EPYC 7352: $3016 reported cost.
4. EPYC 7502P: $2479 reported cost.
5. Xeon Gold 5220R: $1726 reported cost.
6. Xeon Gold 6226R: $1451 reported cost.

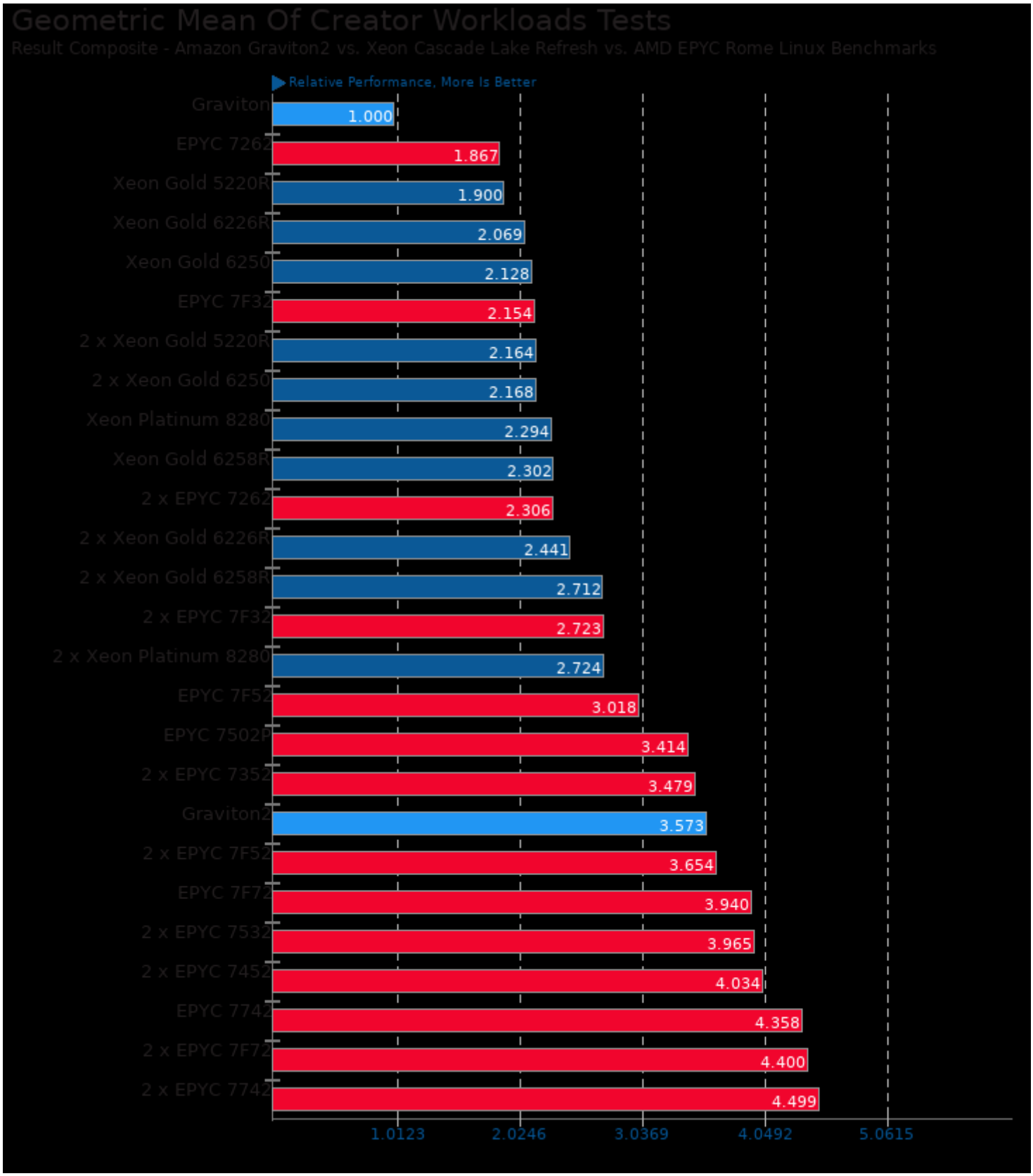
These geometric means are based upon test groupings / test suites for this result file.



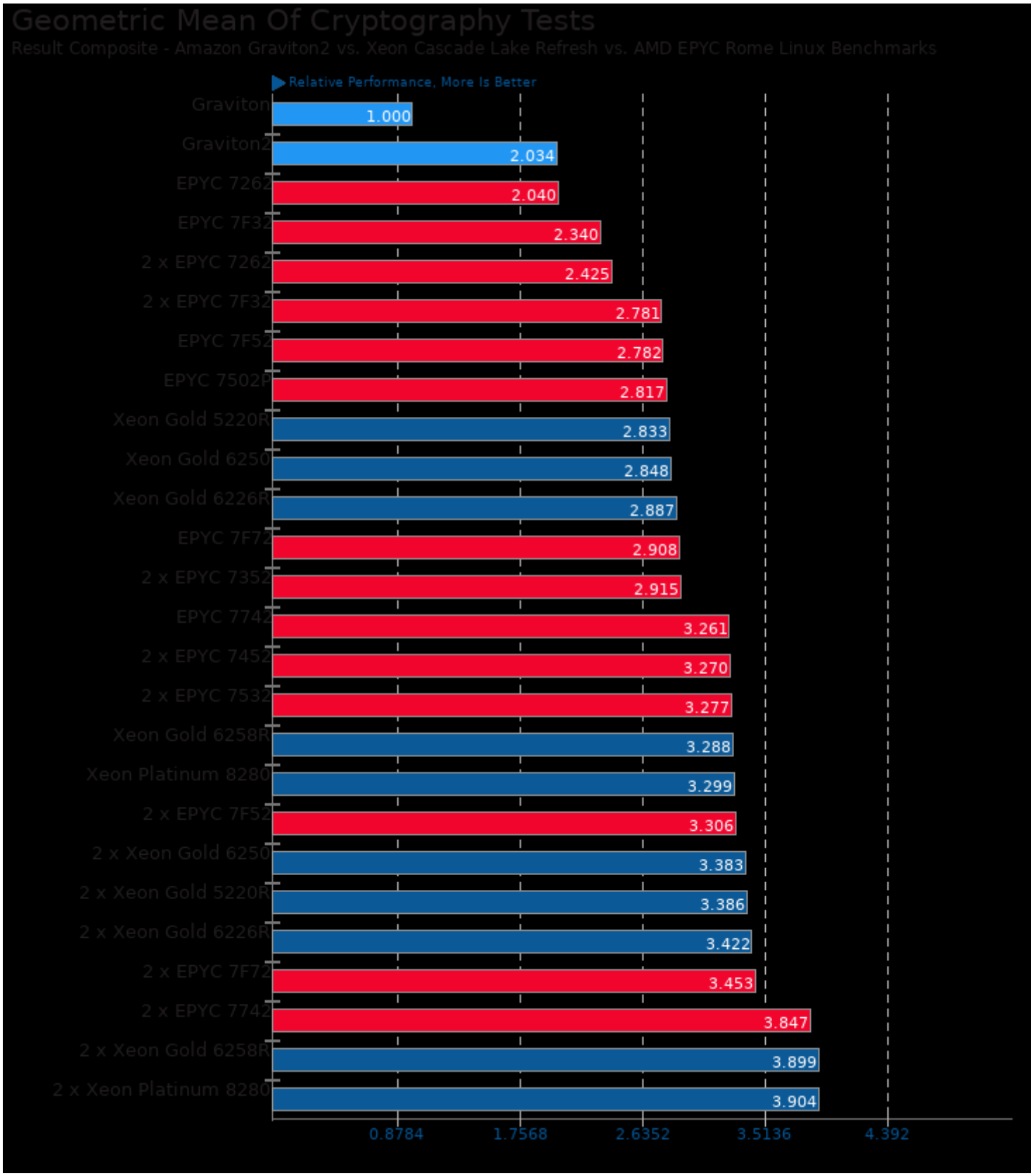
Geometric mean based upon tests: pts/himeno, pts/build-llvm, pts/mrbayes, pts/john-the-ripper, pts/dav1d, pts/gromacs, pts/basis and pts/nettle



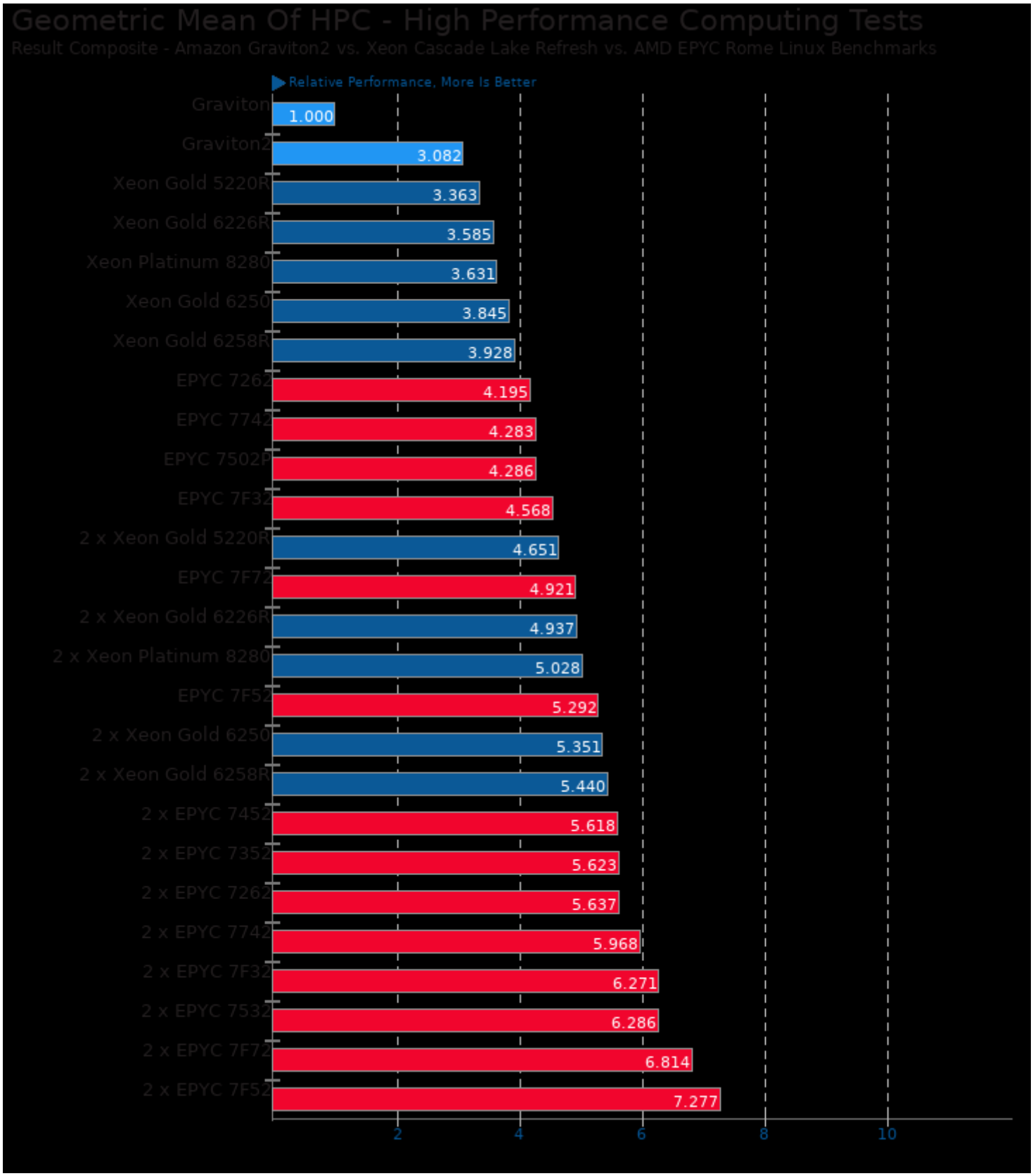
Geometric mean based upon tests: pts/build-llvm, pts/build-linux-kernel, pts/dav1d, pts/himeno, pts/hpcg, pts/john-the-ripper, pts/mrbayes, pts/numpy, pts/phpbench and pts/scikit-learn



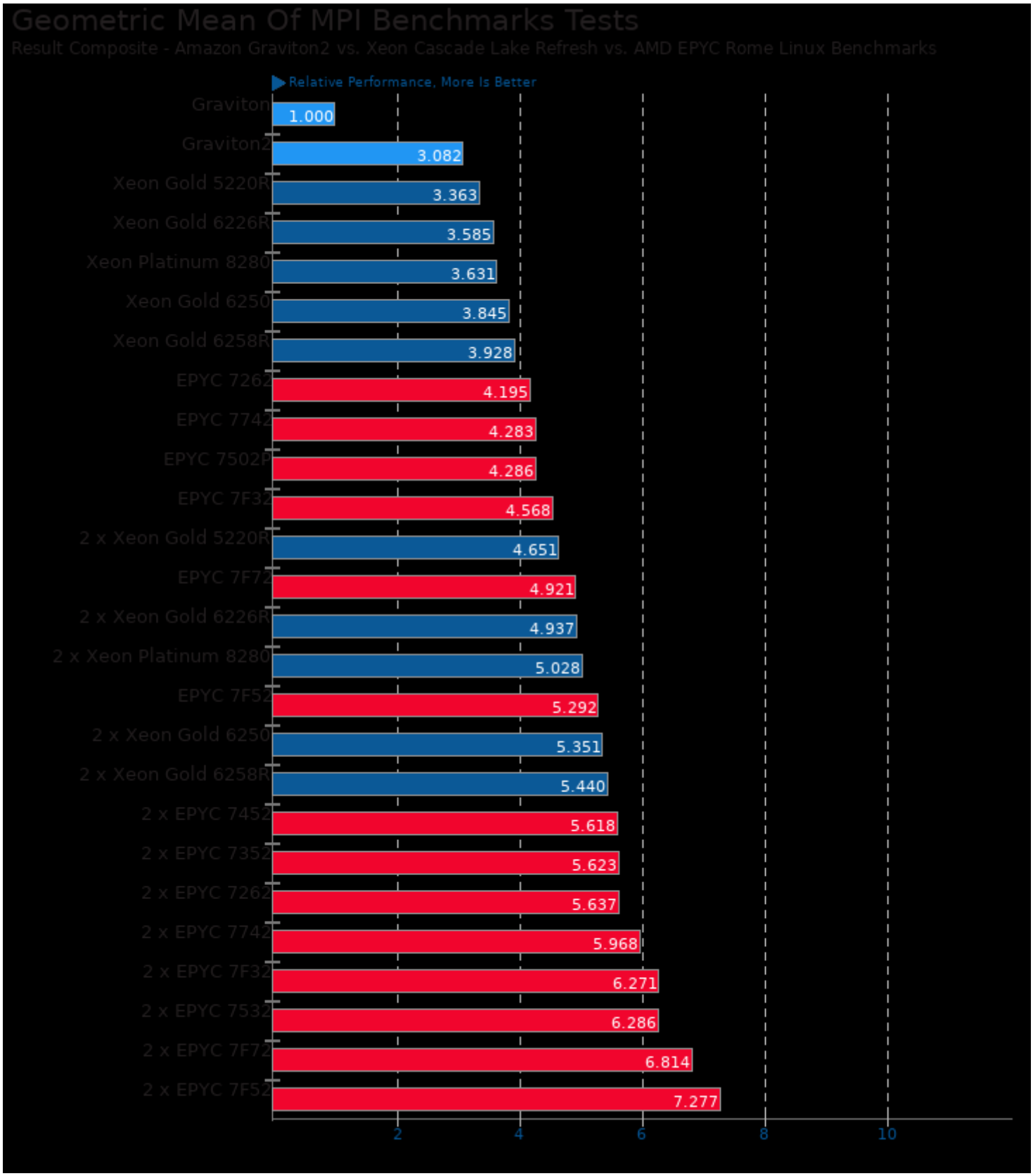
Geometric mean based upon tests: pts/dav1d and pts/basis



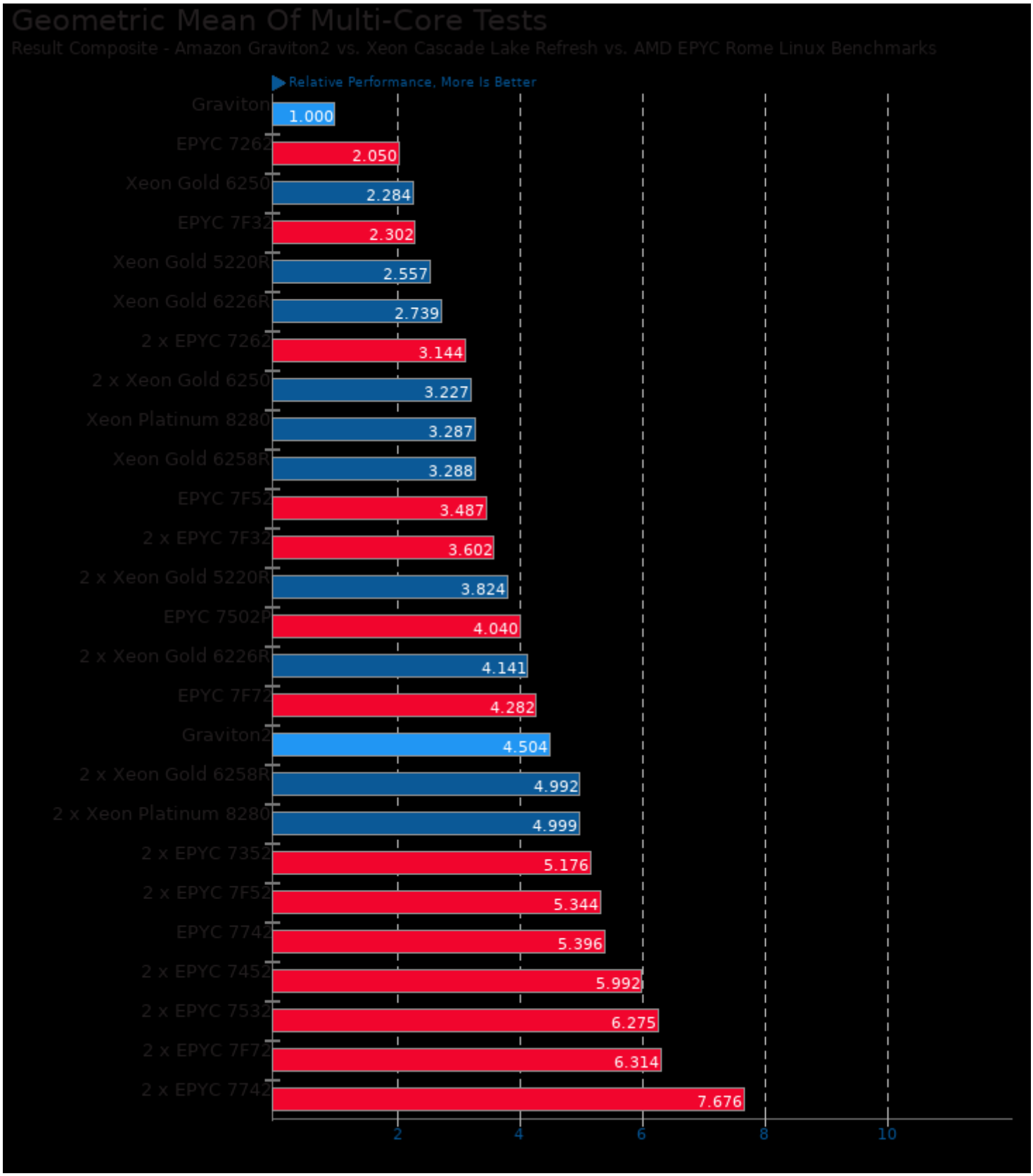
Geometric mean based upon tests: pts/john-the-ripper and pts/nettle



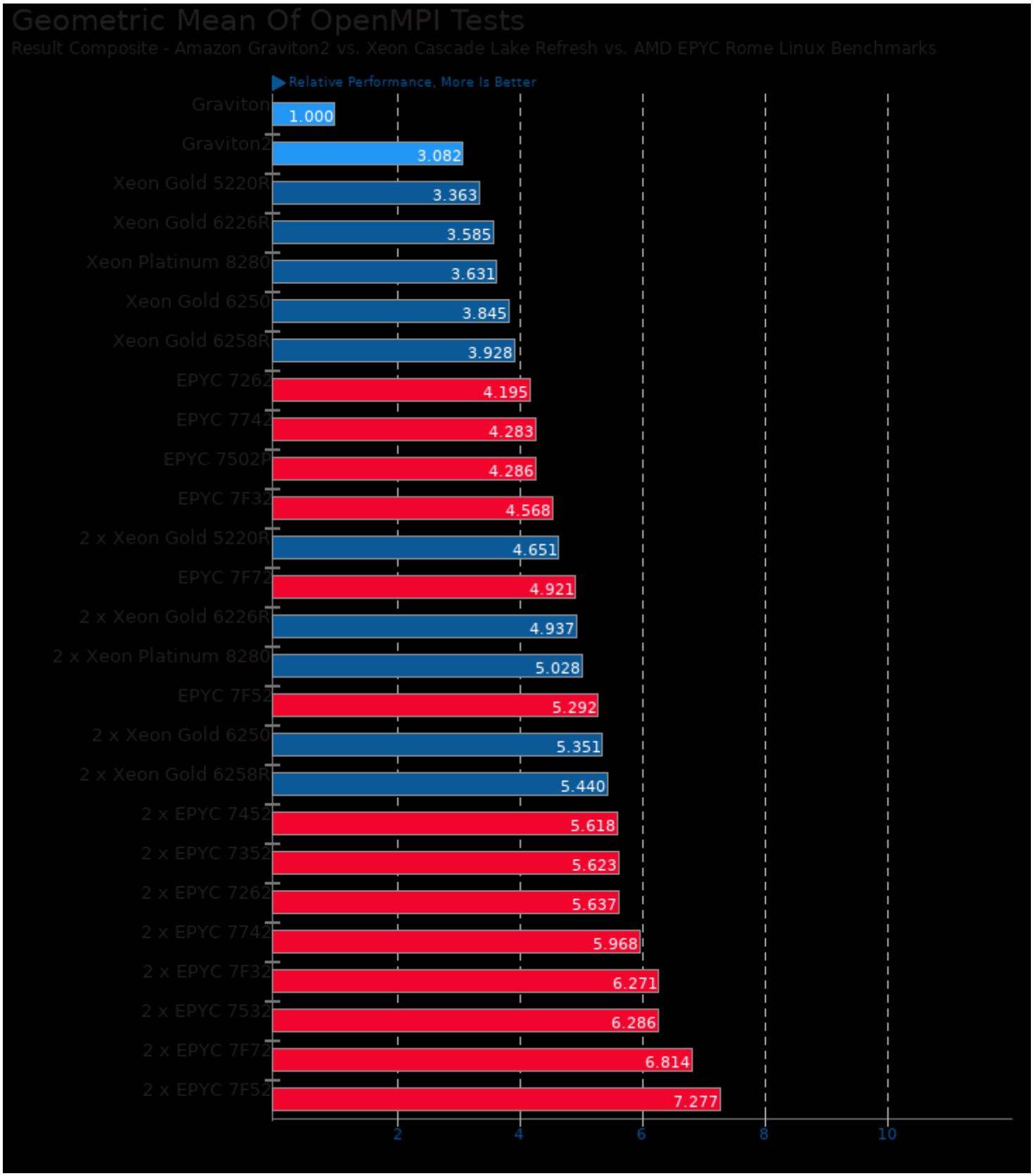
Geometric mean based upon tests: pts/hpcg, pts/gromacs, pts/himeno, pts/mrbayes, pts/numpy, pts/scikit-learn and pts/mlpack



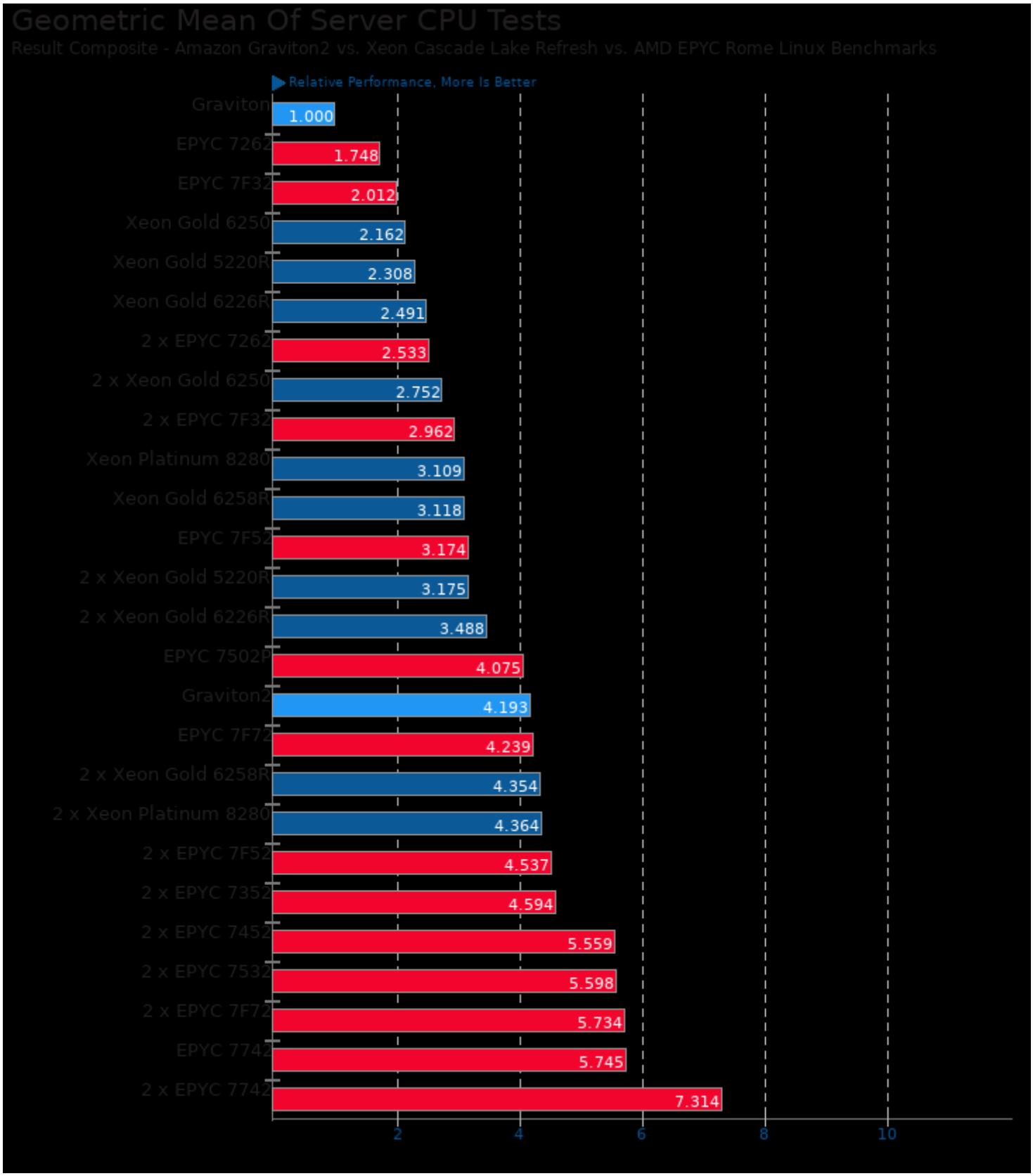
Geometric mean based upon tests: pts/gromacs, pts/hpcg and pts/mrbayes



Geometric mean based upon tests: pts/dav1d, pts/john-the-ripper, pts/gromacs, pts/build-linux-kernel, pts/build-llvm, pts/build2 and pts/hpcg



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



Geometric mean based upon tests: pts/john-the-ripper, pts/dav1d, pts/himeno, pts/build-linux-kernel, pts/build-llvm, pts/pybench, pts/numpy, pts/phpbench and pts/scikit-learn

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 11:51.