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

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-VM, 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: 0x5000002c  
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/swaps 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-VM, 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: 0x5000002c  
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/swaps 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-VM, 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: 0x5000002c

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/swaps barriers and `__user` pointer sanitization + `spectre_v2`: Mitigation of Enhanced IBRS IPBP: 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: 0x5000002c

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/swaps barriers and `__user` pointer sanitization + `spectre_v2`: Mitigation of Enhanced IBRS IPBP: 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: 0x5000002c

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/swaps barriers and `__user` pointer sanitization + `spectre_v2`: Mitigation of Enhanced IBRS IPBP: 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 + I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Enhanced IBRS IPB: 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 + I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retpoline IPB: 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 + I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retpoline IPB: 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 retroline 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 -

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 retroline 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 -

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 retroline 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 -

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 retroline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + tsx\_async\_abort: Not affected

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/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retroline 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/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retroline 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/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retroline 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,objc++,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,objc++,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,objc++,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,objc++,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\_multithit: 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 retrpoline 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,objc++,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\_multithit: 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 retrpoline 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,objc++,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: 0x5000002c

Python Notes: + Python 3.8.2

Security Notes: itlb\_multithit: 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-VM, 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: 0x5000002c

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/swaps 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-VM, 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: 0x5000002c

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/swaps 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-VM, 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: 0x5000002c

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/swaps 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

Xe	2x	Xe	2x	Xe	2x	EP	2x	2x	EP	2x	2x	EP	EP	2x	EP	2x	EP	2x	2x	Xe	2x	Xe	2x	Gr	Gr		
on	Xe	on	Xe	on	Xe	YC	EP	EP	YC	EP	EP	YC	YC	EP	YC	EP	YC	EP	YC	EP	on	Xe	on	Xe	avi	avi	
Go	on	Go	on	Pla	on	75	YC	YC	7F	YC	YC	77	72	YC	7F	YC	7F	YC	YC	Go	on	Go	on	ton	ton		
Id	Go	Id	Go	tin	Pla	02	73	75	52	7F	74	42	62	72	32	7F	72	7F	77	Id	Go	Id	Go	2	2		
52	Id	62	Id	um	tin	P	52	32		52	52			62		32		72	42	62	Id	62	Id	62	Id	Id	
20	52	26	62	82	um																			50	62	58	62
R	20	R	26	80	82																			50	R	58	
	R		R		80																				R		



<b>Standard</b>	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%		
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
<b>High</b>	0.0	0.0	<b>0.0</b>	0.0			<b>0.0</b>	0.0																			
<b>Performance / Cost - (GFLOP/s/Dollar)</b>	08	07	<b>10</b>	09			<b>06</b>	09																			
<b>Conjugate Gradient</b>																											
<b>Normalizations</b>	80%	70%	100	90%			60%	90%																			
<b>High Performance</b>	13.	25.	13.	26.	14.	28.	15.	28.	33.	17.	33.	28.	17.	12.	23.	13.	24.	16.	32.	<b>34.</b>	10.	19.	14.	28.	21.	<b>3.8</b>	
<b>Performance / Cost - (GFLOP/s/Dollar)</b>	35	63	95	59	90	85	10	40	92	74	51	79	16	70	06	22	86	93	36	<b>04</b>	33	97	78	87	43	<b>37</b>	
<b>Conjugate Gradient</b>	29	03	81	10	97	42	56	07	07	44	82	70	21	08	47	47	43	63	02	<b>85</b>	21	64	49	83	37	<b>97</b>	
<b>Normalizations</b>	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	
<b>Standard Deviations</b>	2%	8%	9%	%	9%	4%	6%	1%	2%	2%	4%	8%	%	%	4%	4%	3%	4%	4%	%	5%	7%	2%	5%	7%		
<b>Standard</b>	1.1	1%	0.3	0.8	0.5	1.5	0.2	0.4	0.9	0.8	0.1	0.5	0.3	0.5	0.7	0.1	1.6	1.1	0.4	1%	0.6	1.1	0.4	0.2	0.2		
<b>Deviation Nettle - chacha (Mbyte/s/Dollar)</b>	0.5	0.2	<b>0.7</b>	0.3			<b>0.3</b>	<b>0.2</b>																			
<b>Performance / Cost - chacha (Mbyte/s/Dollar)</b>	91	97	<b>06</b>	53			07	<b>37</b>																			
<b>Normalizations</b>	83.7	42.0	100	50%			43.4	33.5																			
<b>Nettle - aes256 (Mbyte/s)</b>	61	61	61	61	63	63	47	44	46	54	55	47	47	48	47	54	55	52	52	47	71	<b>71</b>	63	63	27	<b>17</b>	
<b>Normalizations</b>	34	59	61	57	13	20	28	46	53	99	06	24	99	01	91	98	00	15	21	96	00	<b>11</b>	06	22	84	<b>17</b>	
<b>Standard Deviations</b>	6%	1%	4%	9%	8%	7%	8%	2%	3%	4%	2%	4%	8%	2%	8%	2%	4%	3%	2%	4%	5%	%	7%	1%	5%	4%	
<b>Standard</b>	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0%	0.1	0.1	0%	0.1	0.1	0%	0.1	0.1	0%	0.1	0.1	0.1	0.1	0%	0.1	0.1	0%	0.4	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	

<b>Nettle - chacha (Mbyte/s)</b>	10	10	10	10	10	10	76	71	74	88	88	76	77	77	88	88	83	83	77	11	11	10	10	45	32			
<b>Normalize Standard</b>	86.2	86.6	86.6	86.6	88.8	88.9	64.2	60.3	63.2	74.7	74.7	64.2	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			
<b>Deviation Nettle - sha512 (Mbyte/s)</b>	48	48	48	48	50	50	48	45	47	56	56	48	49	49	56	56	53	53	49	56	56	49	50	38	28			
<b>Normalize Standard</b>	5.8	9.1	8.8	9.4	1.9	0.9	4.2	5.3	6.6	3.3	3.0	3.8	1.5	0.2	1.0	3.4	3.5	4.1	4.8	1.4	3.8	4.5	8.9	0.7	0.0	5.9		
<b>Deviation Nettle - sha512 (Mbyte/s)</b>	3.5	1.7	4.2	2.1			1.9	1.4													4	9	5	6	3			
<b>mance / Cost - aes256 (Mbyte/s/Dollar)</b>	86.0	86.6	86.5	86.6	88.9	88.7	85.7	80.6	84.4	99.8	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		
<b>Normalize Standard</b>	0.4	0.1	0.3	0%	0.1	0.3	0%	0.1	0%	0%	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		
<b>Deviation Nettle - sha512 (Mbyte/s/Dollar)</b>	Perfor	54	84	46	22		07	74																				
<b>mance / Cost - sha512 (Mbyte/s/Dollar)</b>	83.7	42.0	100	49.9			44.9	34.7																				
<b>Normalize Standard</b>	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
<b>Deviation Nettle - sha512 (Mbyte/s/Dollar)</b>	Perfor	81	42	37	69		95	51																				
<b>mance / Cost - sha512 (Mbyte/s/Dollar)</b>	83.3	42.1	100	50.1			57.8	44.8																				
<b>Normalize Standard</b>	33	34	34	34	35	35	35	38	36	37	43	43	37	38	38	37	42	42	42	42	41	38	38	39	35	35	29	
<b>Deviation Nettle - sha512 (Mbyte/s/Dollar)</b>	Himeno	98	05	01	10	10	15	83	47	83	70	04	78	21	65	12	45	26	13	18	61	91	35	16	27	05		
<b>mance / P.P.S (MFLO PS)</b>	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			
<b>Normalize Standard</b>	0.1	0.3	0.1	0%	0.2	0.3	1%	1.9	0.8	2.8	2.1	1.8	1.7	2.4	4.2	2.6	3.9	2.2	2.3	2.3	2.2	0.3	0.1	0.1	0%	0.7		
<b>Deviation Nettle - sha512 (Mbyte/s/Dollar)</b>	Perfmark	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		





<b>PyBenc</b>	11	11	11	11	10	10	11	12	11	98	99	11	11	11	11	99	99	10	10	11	<b>95</b>	95	10	10	<b>17</b>	
<b>h -</b>	14	00	03	04	76	73	55	30	70	7	7	55	35	35	38	4	4	65	45	53	<b>5</b>	6	76	73	<b>02</b>	
<b>T.F.A.T.</b>																										
<b>T</b>																										
<b>(Milliseconds)</b>																										
<b>Normalize</b>	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	
<b>d</b>	3%	2%	8%	%	5%		8%	4%	2%	6%	9%	8%	4%	4%	2%	8%	8%	7%	9%	3%	%	%	5%	1%		
<b>Standard</b>	1.9	0.2	0.5	0.1	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	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>PyPerfo</b>	11	11	11	11	10	10	13	14	13	11	11	13	13	13	13	11	11	12	12	13	<b>96.</b>	10	10	<b>17</b>		
<b>rmane</b>	4	3	5	3	9	9	7	6	9	8	9	7	5	5	5	9	9	5	5	5	6	<b>5</b>	9	9	<b>5</b>	
<b>- float</b>																										
<b>(Milliseconds)</b>																										
<b>Normalize</b>	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	
<b>d</b>	5%	%	1%	%	3%	3%	4%	%	2%	8%	9%	4%	8%	8%	8%	9%	9%	%	%	8%	%	%	3%	3%	4%	
<b>Standard</b>	0.5						0.4															0%	0.2			
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>PyPerfo</b>	16	16	16	16	16	16	20	<b>21</b>	21	17	17	20	19	20	20	17	17	18	18	20	<b>14</b>	<b>14</b>	16	16	21	
<b>rmane</b>	8	7	8	7	4	4	3	<b>6</b>	0	3	5	4	9	2	2	6	7	5	4	4	<b>5</b>	<b>5</b>	4	3	3	
<b>-</b>																										
<b>regex_compile</b>																										
<b>(Milliseconds)</b>																										
<b>Normalize</b>	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	
<b>d</b>	1%	3%	1%	3%	1%	1%	3%	3%	5%	2%	6%	8%	6%	8%	8%	9%	2%	8%	8%	8%	%	%	1%	6%	8%	
<b>Standard</b>	0.2								0.3				0.3	0.6			0.7					0.3				
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>PyPerfo</b>	47.	47.	47.	47.	46.	45.	59.	63.	60.	49.	50.	60.	57.	56.	56.	49.	49.	53.	53.	58.	40.	<b>40.</b>	46.	46.	<b>73.</b>	
<b>rmane</b>	1	3	3	1	2	9	3	4	8	1	0	1	6	5	7	0	7	3	2	4	9	<b>7</b>	0	1	<b>6</b>	
<b>-</b>																										
<b>django_template</b>																										
<b>(Milliseconds)</b>																										
<b>Normalize</b>	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	
<b>d</b>	1%	5%	5%	1%	%	7%	3%	%	4%	9%	%	2%	6%	4%	8%	6%	9%	6%	9%	1%	%	8%	9%	%		
<b>Standard</b>	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%	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	

<b>PyBenc</b>	19	37	16	32	28	37
h -	22	97	00	03	63	09
<b>Perfor</b>	76	20	45	80	24	68
mance /	4	0	3	8	5	0
Cost -						
T.F.A.T.						
T						
(Millise						
conds x						
Dollar)						
Normalize	83.2	42.1	100	49.9	55.9	43.1
d %	4%	5%	%	5%	%	4%
<b>PyPerfo</b>	19	39	16	32	33	44
rmane	67	00	68	79	96	03
- 64	76	65	26	23	36	
Perfor						
mance /						
Cost -						
float						
(Millise						
conds x						
Dollar)						
Normalize	84.8	42.7	100	50.8	49.1	37.8
d %	8%	8%	%	8%	3%	9%
<b>PyPerfo</b>	28	57	24	48	50	65
rmane	99	64	37	46	32	14
- 68	84	68	34	37	56	
Perfor						
mance /						
Cost -						
regex_						
compile						
(Millise						
conds x						
Dollar)						
Normalize	84.0	42.2	100	50.3	48.4	37.4
d %	7%	9%	%	%	4%	2%



<b>Build2 - Time</b>	91.	72.	88.	70.	74.	62.	71.	70.	64.	69.	<b>58.</b>	64.	63.	<b>11</b>	80.	98.	70.	66.	58.	60.	10	73.	73.	63.	86.	
<b>To 1</b>	64	15	97	60	11	77	55	28	69	54	<b>18</b>	68	78	<b>3.8</b>	65	78	67	24	28	90	5.5	35	55	04	15	
<b>Compil</b>											<b>5</b>	2	6	<b>47</b>	7	0	6	8	4	9	98	3	9	8	4	
<b>UASTC</b>																										
<b>Level 3</b>																										
<b>(sec)</b>																										
<b>Normalize</b>	63.4	80.6	65.3	82.4	78.5	92.6	81.3	82.7	89.9	83.6	<b>100</b>	89.9	91.2	<b>51.1</b>	72.1	58.9	82.3	87.8	99.8	95.5	55.1	79.3	79.1	92.2	67.5	
<b>d</b>	9%	4%	9%	1%	%	9%	1%	8%	4%	7%	%	6%	2%	1%	4%	%	3%	3%	3%	3%	%	2%	%	9%	4%	
<b>Standard</b>	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	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>Basis</b>	46.	27.	44.	27.	30.	19.	25.	21.	17.	33.	20.	17.	17.	<b>69.</b>	38.	60.	33.	26.	17.	<b>13.</b>	66.	37.	30.	19.	21.	
<b>Univers</b>	70	98	94	22	68	88	14	05	34	53	48	69	76	<b>08</b>	59	11	73	50	16	<b>16</b>	38	23	44	71	18	
<b>al -</b>	8	1	3	6	9	5	2	8	0	1	3	6	0	<b>0</b>	4	5	7	6	9	<b>4</b>	1	4	6	4	9	
<b>mark -</b>																										
<b>scikit_i</b>																										
<b>ca (sec)</b>																										
<b>Normalize</b>	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	
<b>d</b>	6%	1%	3%	2%	6%	7%	9%	7%	6%	5%	3%	4%	3%	5%	8%	5%	8%	9%	8%	%	9%	6%	3%	6%		
<b>Standard</b>	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%	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>Mlpack</b>	68.	77.	61.	74.	67.	63.	68.	70.	65.	53.	67.	64.	57.	57.	68.	53.	60.	61.	61.	55.	<b>50.</b>	55.	67.	63.	<b>11</b>	
<b>Bench</b>	19	41	82	63	36	35	91	28	60	26	48	27	69	61	62	13	75	93	54	18	<b>09</b>	54	36	38	<b>1.9</b>	
<b>mark -</b>																										
<b>scikit_s</b>																										
<b>vm</b>																										
<b>Normalize</b>	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	
<b>d</b>	7%	6%	6%	7%	1%	1%	3%	4%	4%	%	6%	%	2%	2%	8%	5%	8%	9%	8%	%	9%	6%	3%	6%	4%	
<b>Standard</b>	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	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>Mlpack</b>	2.2	2.3	1.9	2.0	1.6	1.8	1.8	2.2	1.9	1.7	1.9	1.9	1.6	<b>1.6</b>	<b>2.5</b>	2.2	2.2	1.9	1.6	1.8	1.7	2.0	1.7	<b>1.6</b>	1.7	1.7
<b>Bench</b>	5	9	3	8	7	2	1	9	5	8	5	7	<b>6</b>	<b>8</b>	3	5	9	9	4	6	7	4	<b>6</b>	8	6	
<b>mark -</b>																										
<b>scikit_li</b>																										
<b>nearrid</b>																										
<b>geregre</b>																										
<b>ssion</b>																										
<b>Normalize</b>	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	
<b>d</b>	8%	6%	1%	1%	%	1%	1%	9%	3%	6%	3%	6%	%	4%	4%	8%	2%	2%	2%	9%	%	6%	2%			
<b>Standard</b>	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	
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
<b>Scikit-L</b>	10.	10.	9.9	10.	9.1	9.3	10.	11.	10.	9.5	9.8	10.	10.	10.	9.7	9.7	9.9	10.	10.	<b>8.5</b>	8.8	9.2	9.4	<b>14.</b>		
<b>earn</b>	11	45	24	44	27	92	61	53	91	71	88	78	46	89	82	42	35	28	12	53	<b>25</b>	19	83	52	<b>03</b>	
<b>(sec)</b>	2	8	9	8	1	3																			<b>5</b>	

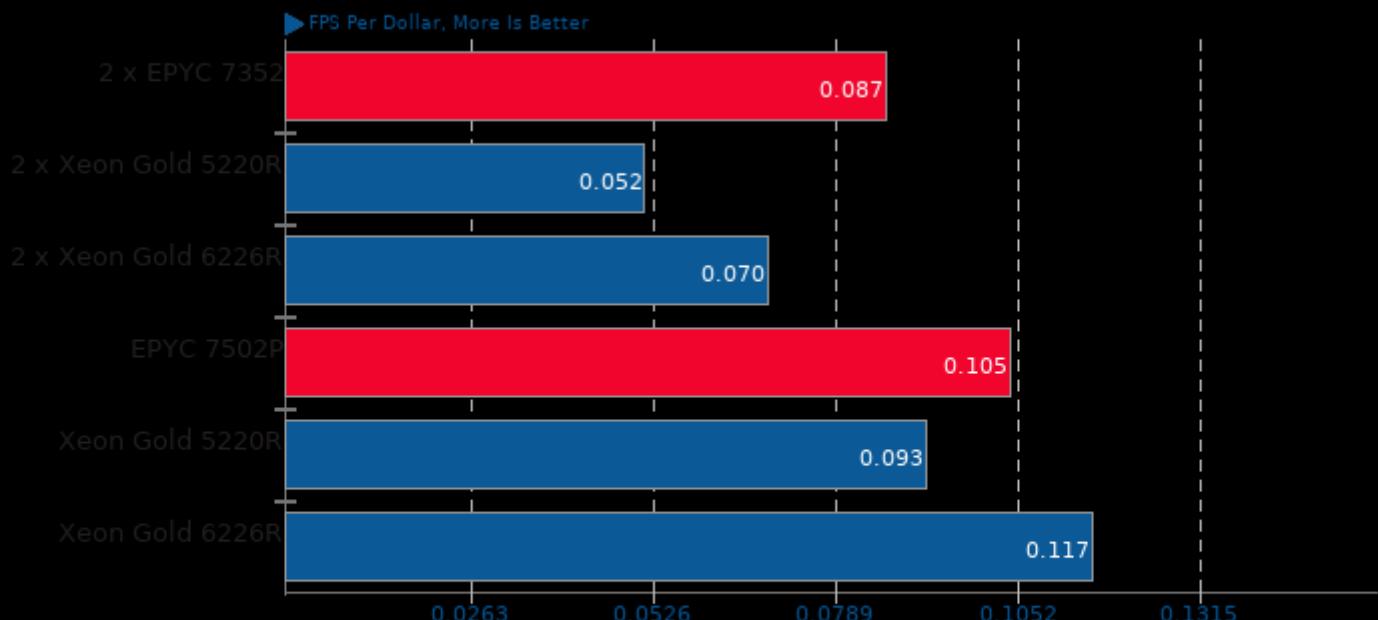
<b>Normalize</b>	84.3	81.5	85.9	81.5	93.4	90.7	80.2	73.9	78.1	89.0	86.2	79.0	81.4	78.2	78.7	87.5	87.5	85.8	84.2	80.9	100	96.6	91.8	90.1	60.7		
d	1%	2%	%	9%	%	7%	9%	3%	2%	7%	2%	2%	8%	5%	7%	1%	7%	7%	%	4%	%	7%	3%	9%	4%		
<b>Standard</b>	0.6	0.4	0.5	0.9	0.8	2.2	0.2	2.9	0.8	0.3	0.5	0.8	0.1	0.2	1%	0.1	0.2	0.2	1.1	0.2	0.7	1.4	1.7	2.2	2.3		
<b>Deviation</b>	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
<b>Timed</b>	23	<b>46</b>	<b>17</b>	36			23	30																			
<b>MrBaye</b>	21	<b>57</b>	<b>94</b>	05			21	85																			
s	18	<b>71</b>	<b>92</b>	97			31	10																			
<b>Analysis</b>																											
s -																											
<b>Performance /</b>																											
<b>Cost -</b>																											
<b>P.P.A</b>																											
<b>(sec x</b>																											
<b>Dollar)</b>																											
<b>Normalize</b>	77.3	38.5	100	49.7																							
d	3%	4%	%	8%																							
<b>Timed</b>	10	<b>12</b>	<b>83</b>	10																							
<b>Linux</b>	18	<b>66</b>	<b>82</b>	61																							
<b>Kernel</b>	55	<b>85</b>	<b>7</b>	99																							
<b>Compilation -</b>																											
<b>Performance /</b>																											
<b>Cost -</b>																											
<b>Time</b>																											
<b>To</b>																											
<b>Compilation</b>																											
<b>e (sec x</b>																											
<b>Normalize</b>	82.3	66.1	100	78.9																							
d	%	7%	%	3%																							
					</																						

<b>Timed</b>	74	98	62	81	71	74
<b>LLVM</b>	29	99	85	16	17	96
<b>Compil</b>	15	71	60	37	88	81
<b>ation -</b>						
<b>Perfor</b>						
<b>mance /</b>						
<b>Cost -</b>						
<b>Time</b>						
<b>To</b>						
<b>Compil</b>						
<b>e (sec x</b>						
Normalize	84.6	63.4	100	77.4	88.3	83.8
d 1%	9%	%	4%		1%	4%
<b>Build2 -</b>	15	24	12	20	17	21
<b>Perfor</b>	81	90	91	49	73	19
<b>mance /</b>	72	65	06	04	92	86
<b>Cost -</b>						
<b>Time</b>						
<b>To</b>						
<b>Compil</b>						
<b>e (sec x</b>						
Normalize	81.6	51.8	100	63.0	72.7	60.9
d 2%	4%	%	1%		8%	%
<b>Basis</b>	80	96	65	79	62	63
<b>Univers</b>	61	59	21	01	32	51
<b>al -</b>	8	0	2	0	7	1
<b>Perfor</b>						
<b>mance /</b>						
<b>Cost -</b>						
<b>UASTC</b>						
<b>Level 3</b>						
<b>(sec x</b>						
<b>Dollar)</b>						
Normalize	77.3	64.5	95.5	78.8	100	98.1
d 1%	3%	8%	9%		%	4%

Mpack	11	26	89	21	17	21
Bench	76	72	70	65	08	19
mark -	96	19	1	76	28	64
Performance / Cost -						
scikit_i						
ca (sec)						
x						
Normalize	76.2	33.5	100	41.4	52.5	42.3
d	1%	7%	%	2%	1%	2%
Mpack	30	61	26	51	36	49
Bench	75	86	00	56	59	76
mark -	7	0	2	9	0	4
Performance / Cost -						
scikit_s						
vm (sec)						
x						
Normalize	84.5	42.0	100	50.4	71.0	52.2
d	4%	3%	%	2%	6%	5%
Mpack	38	82	28	60	44	69
Bench	84	50	00	36	87	07
mark -						
Performance / Cost -						
scikit_li						
nearrid						
geregre						
ssion						
(sec x)						
Normalize	72.1	33.9	100	46.3	62.4	40.5
d	1%	4%	%	9%	1%	5%
Scikit-L	17	36	14	30	26	34
earn -	45	10	40	32	32	77
Perfor	3	1	0	3	2	7
mance / Cost -						
(sec x Dollar)						
Normalize	82.5	39.8	100	47.4	54.7	41.4
d %	9%	%	9%	1%	1%	

## dav1d 0.6.0

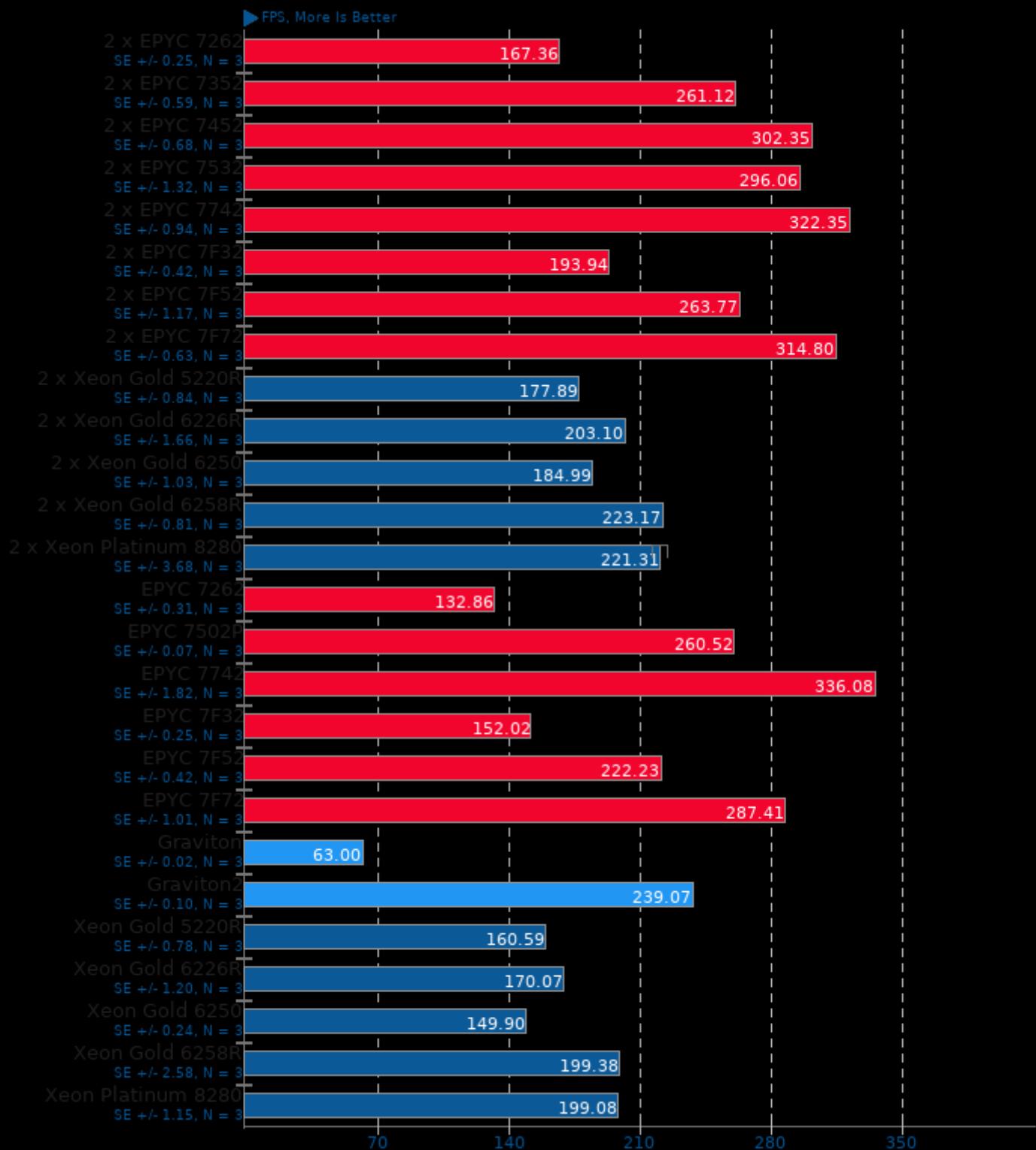
Performance / Cost - Video Input: Summer Nature 4K



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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

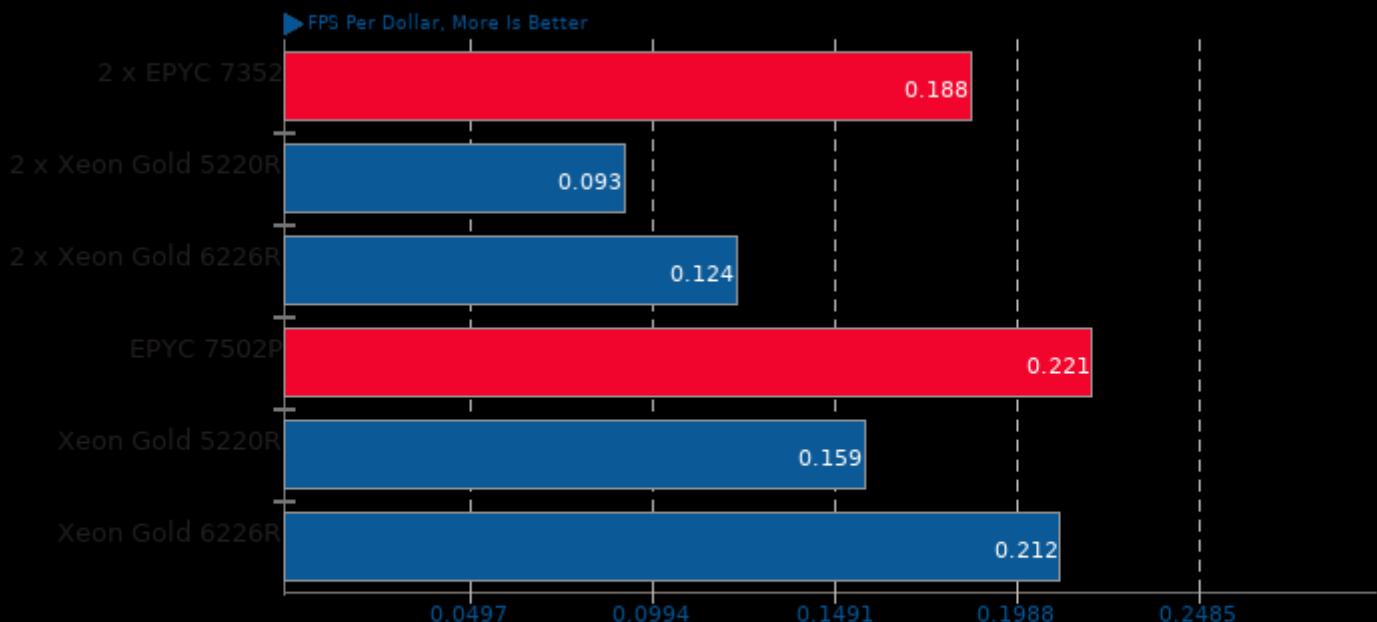
Video Input: Summer Nature 4K



1. (CC) gcc options: -pthread

## dav1d 0.6.0

Performance / Cost - Video Input: Summer Nature 1080p



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

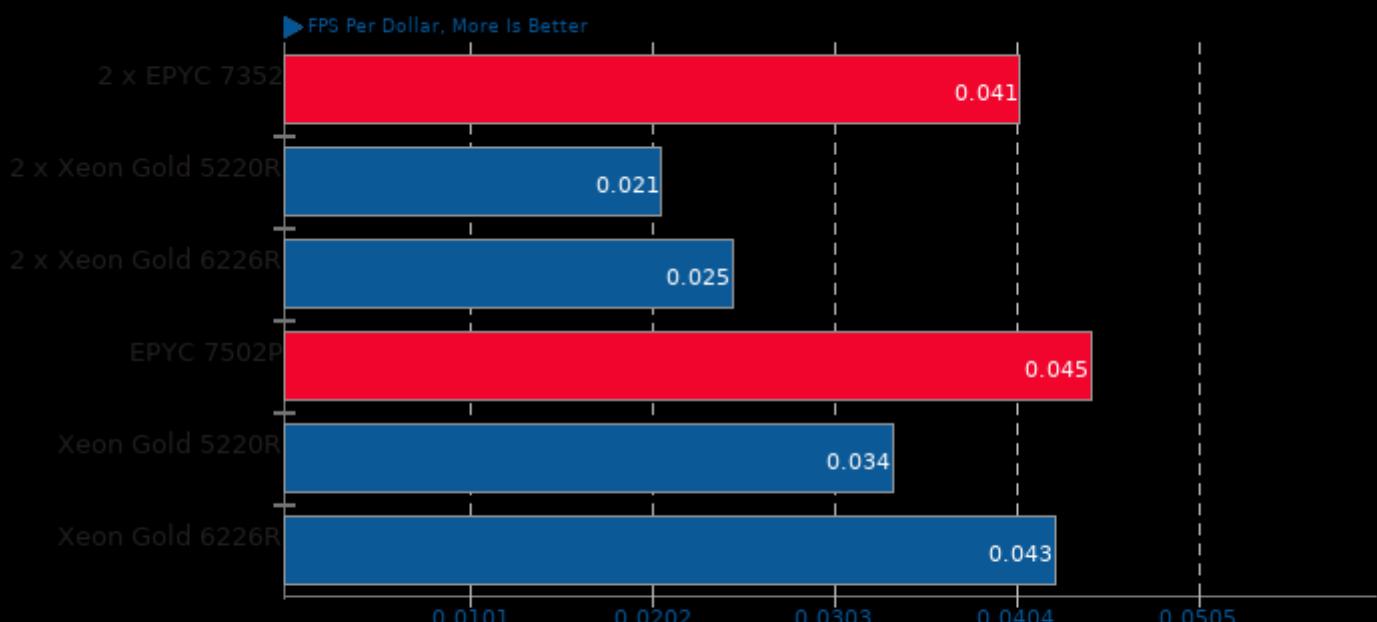
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## dav1d 0.6.0

Performance / Cost - Video Input: Chimera 1080p 10-bit



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

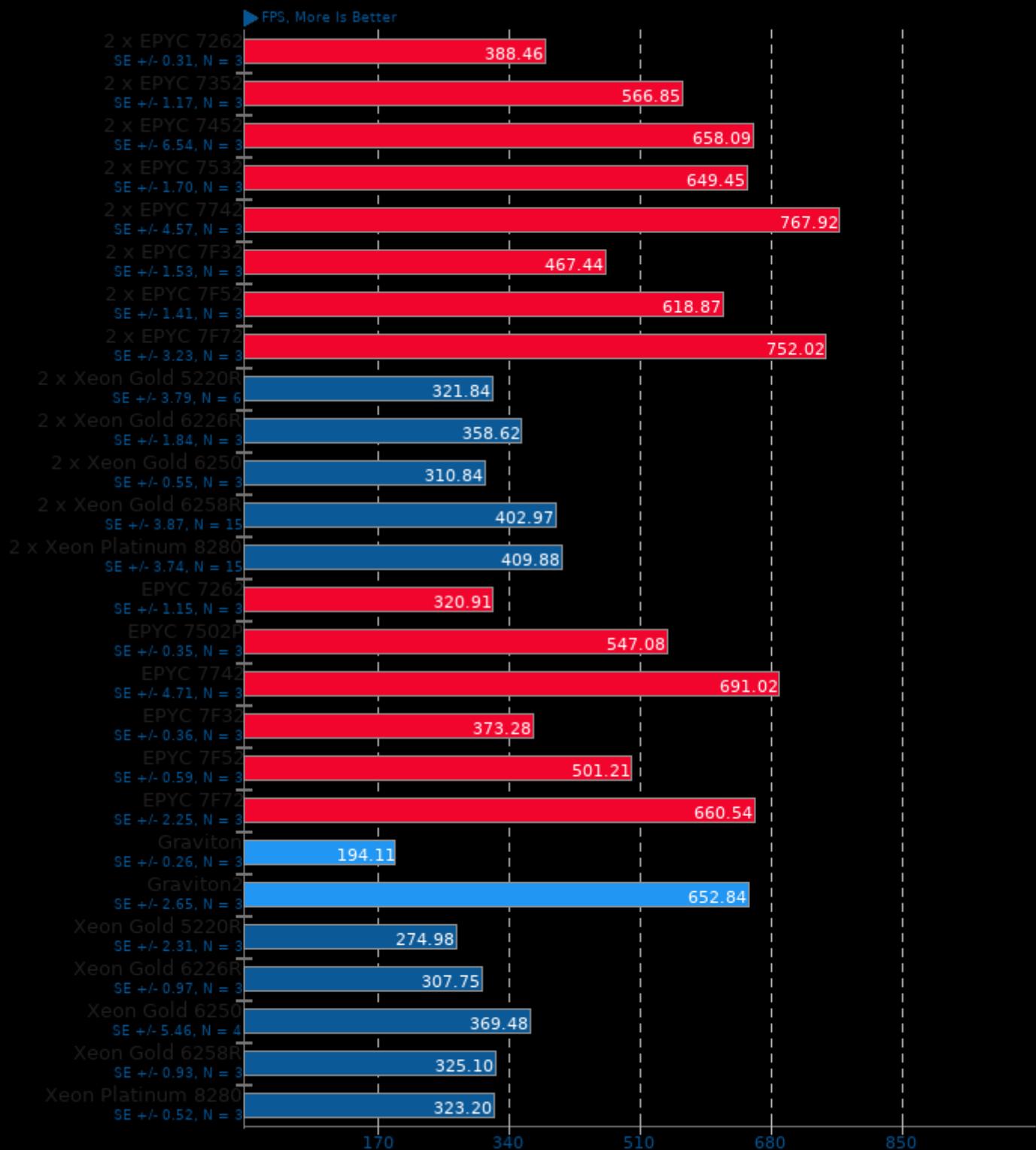
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## dav1d 0.6.0

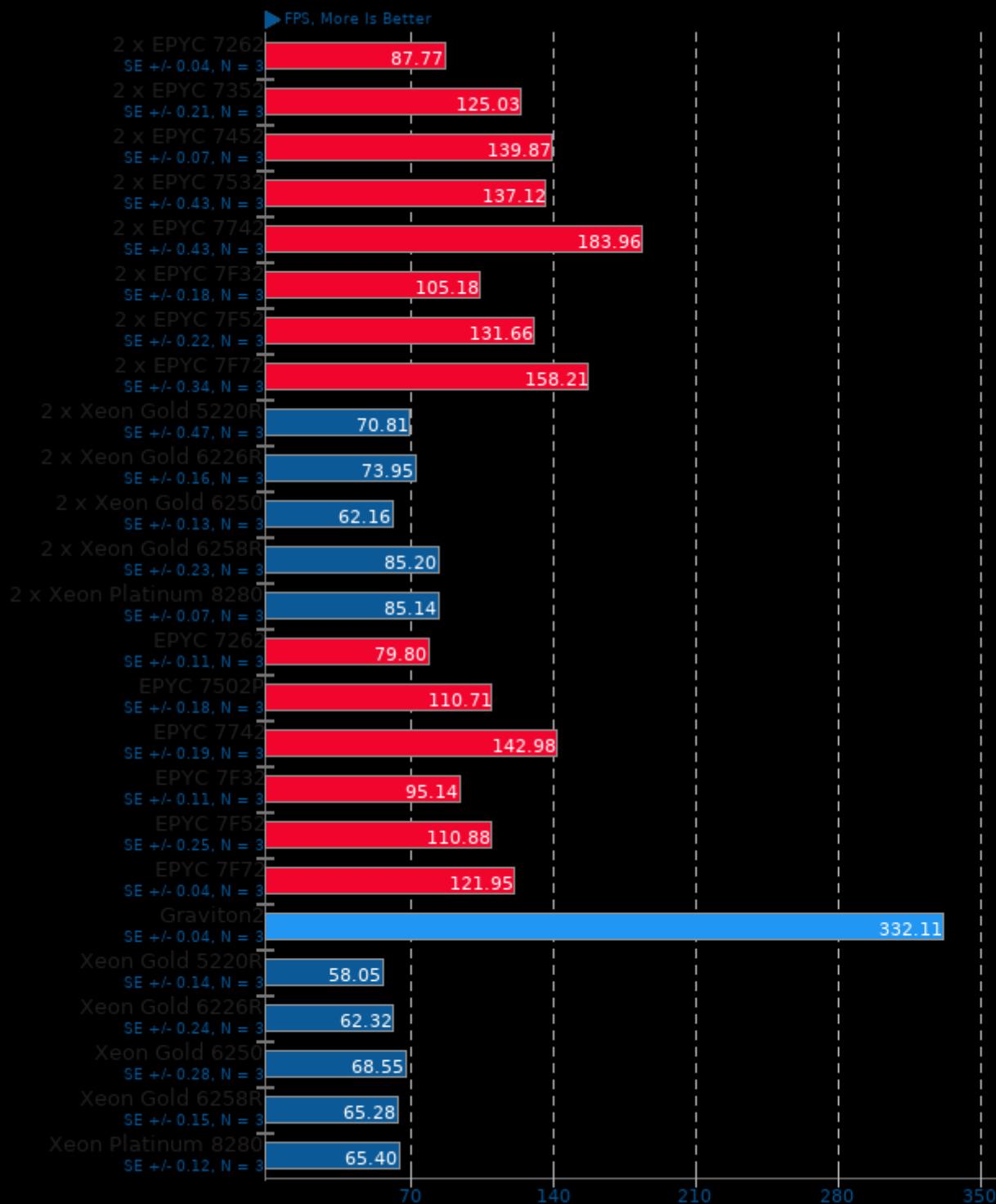
Video Input: Summer Nature 1080p



1. (CC) gcc options: -pthread

## dav1d 0.6.0

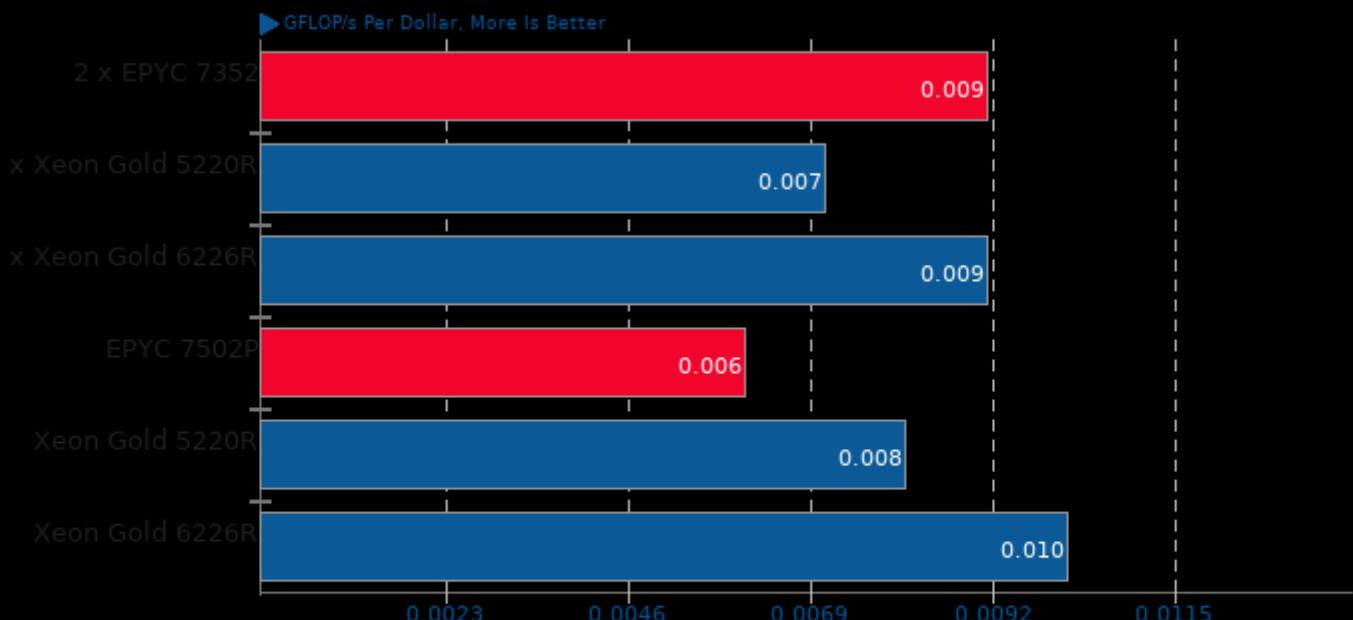
Video Input: Chimera 1080p 10-bit



1. (CC) gcc options: -pthread

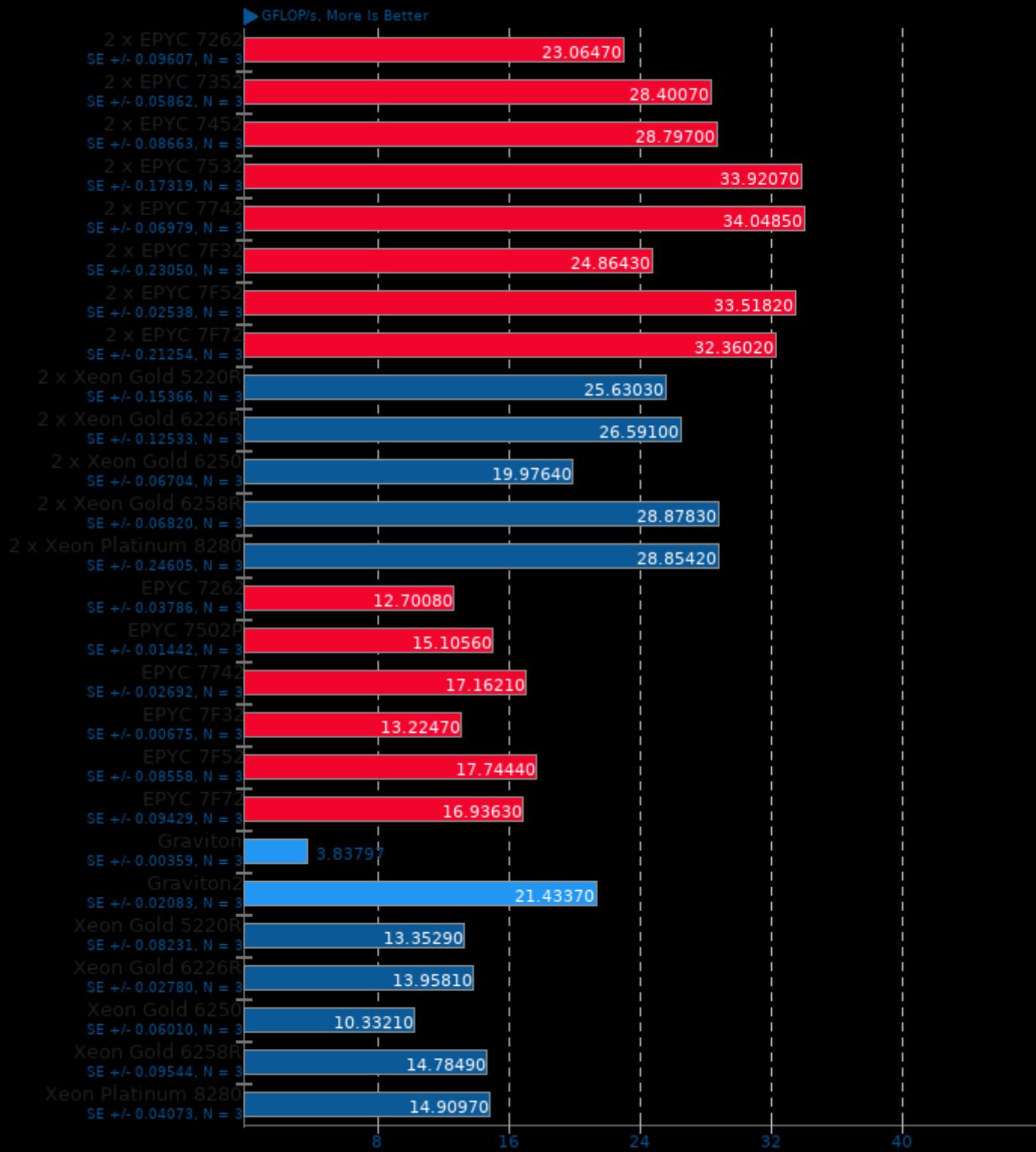
## High Performance Conjugate Gradient 3.1

Performance / Cost -



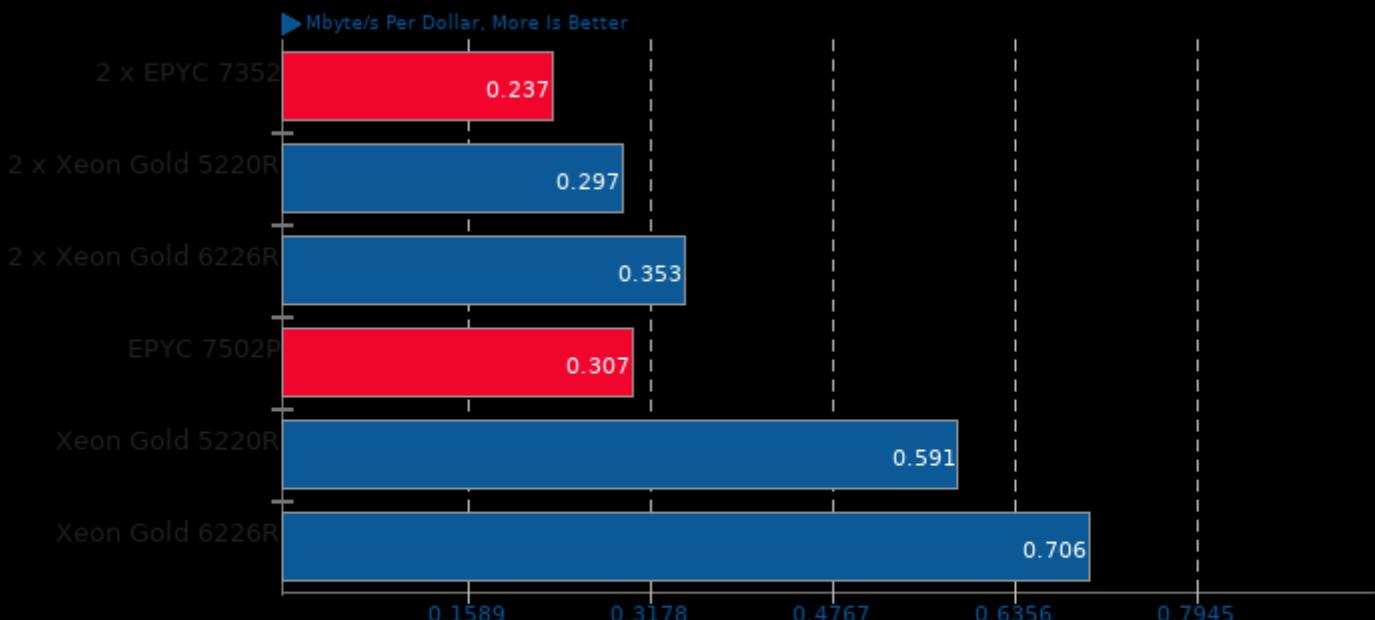
1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 reported cost.
3. 2 x Xeon Gold 6226R: \$2902 reported cost.
4. EPYC 7502P: \$2479 reported cost.
5. Xeon Gold 5220R: \$1726 reported cost.
6. Xeon Gold 6226R: \$1451 reported cost.

High Performance Conjugate Gradient 3.1



## Nettle 3.5.1

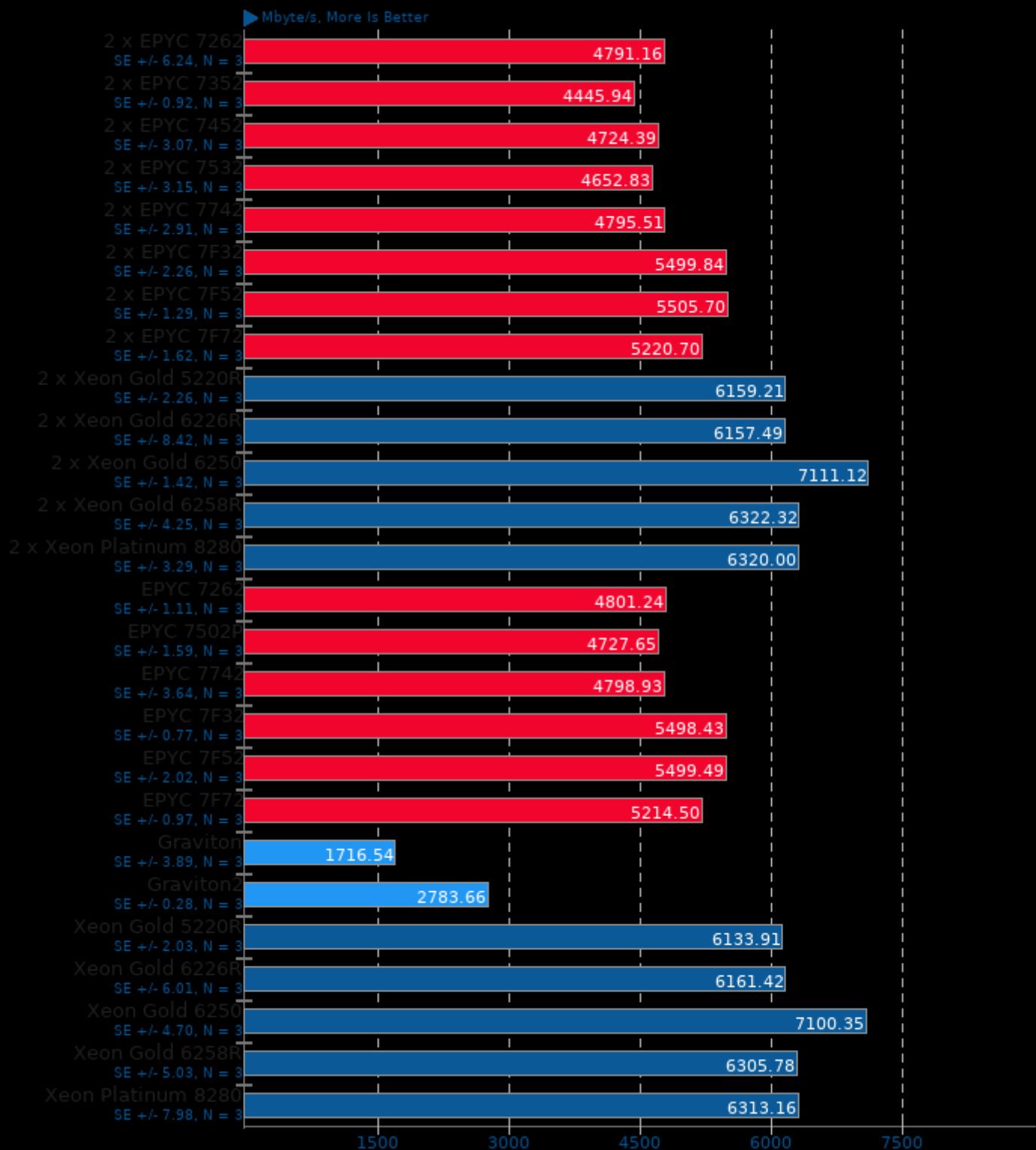
Performance / Cost - Test: chacha



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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

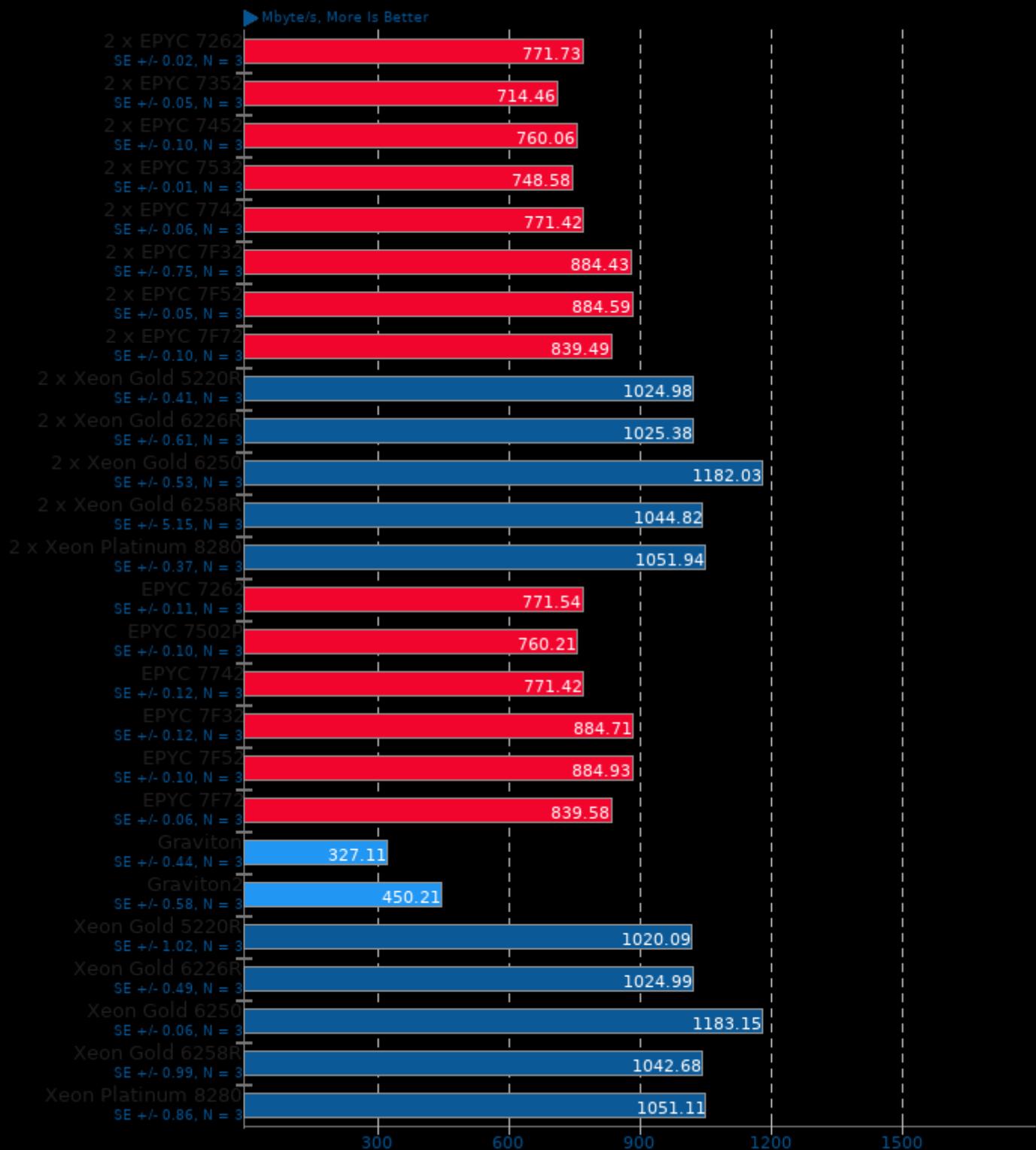
Test: aes256



1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

## Nettle 3.5.1

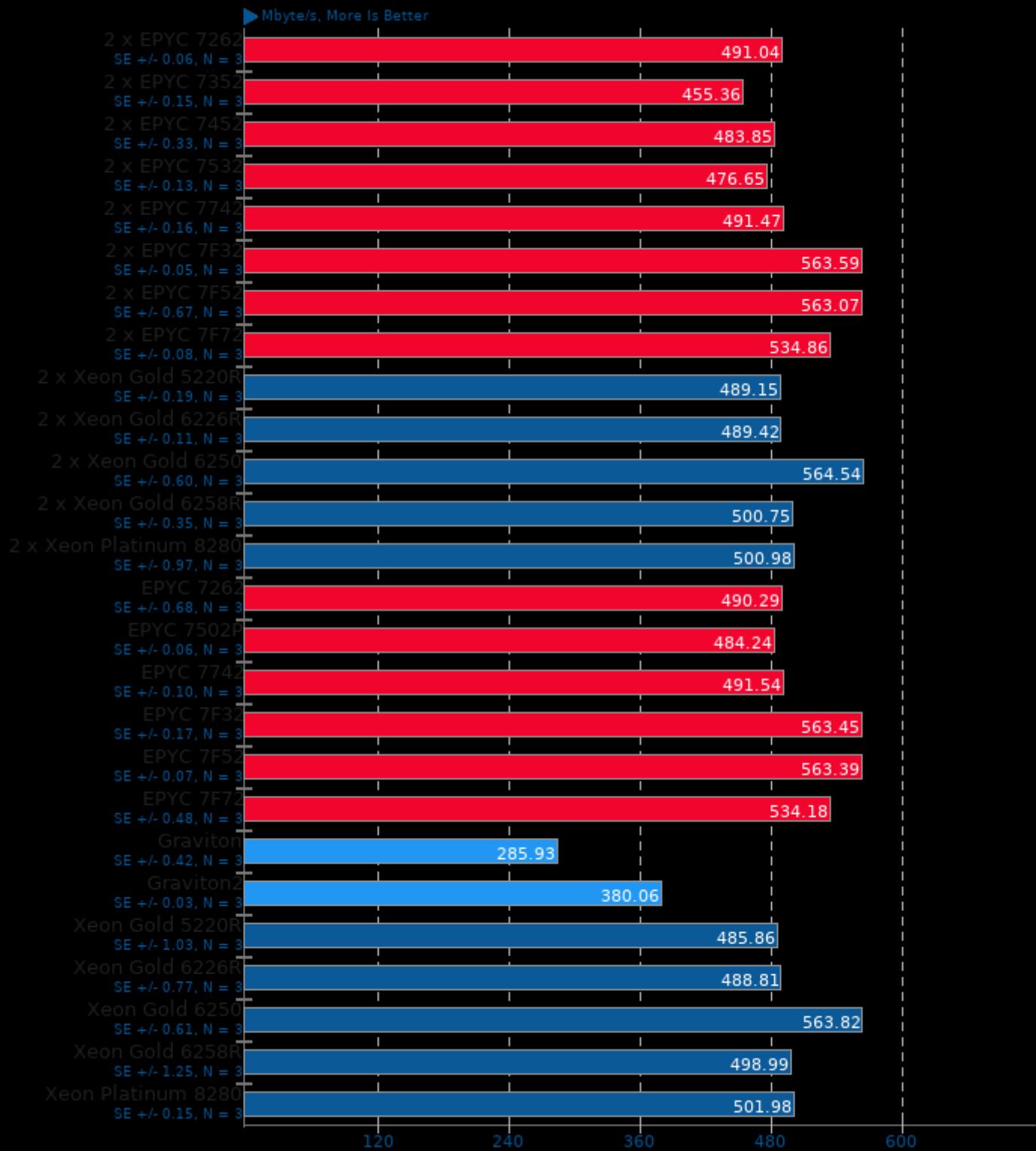
Test: chacha



1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

## Nettle 3.5.1

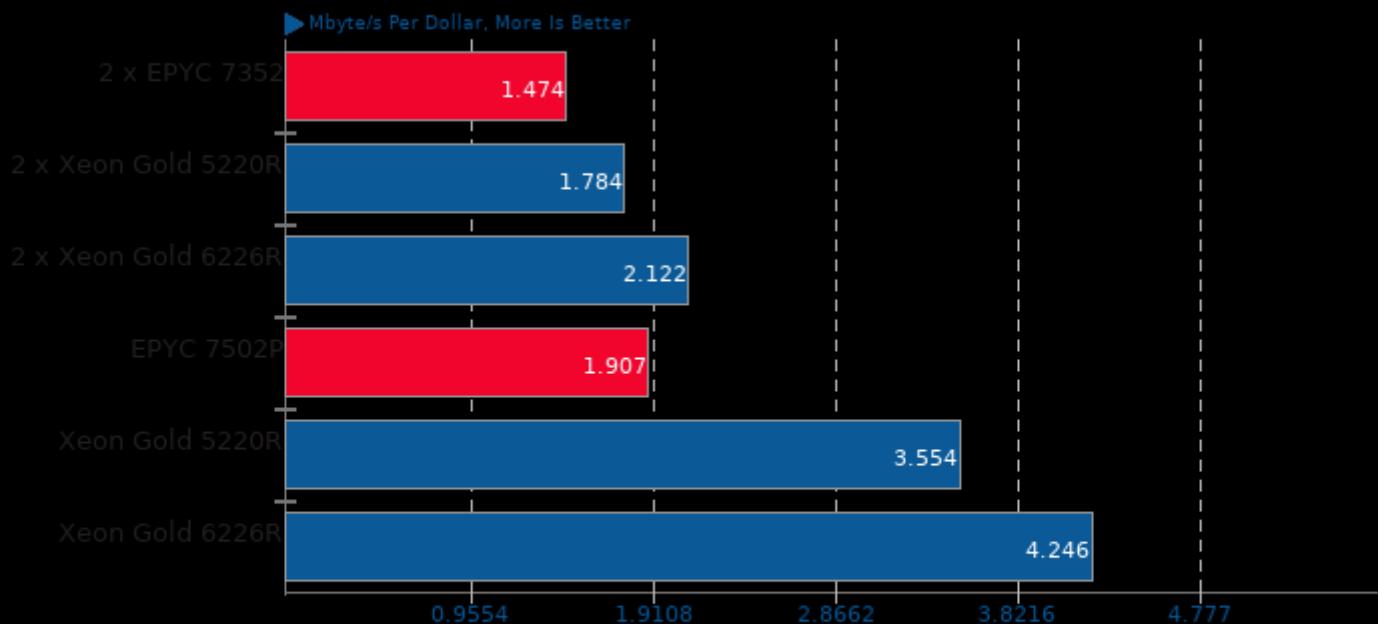
Test: sha512



1. (CC) gcc options: -O2 -ggdb3 -lnettle -lm -lcrypto

## Nettle 3.5.1

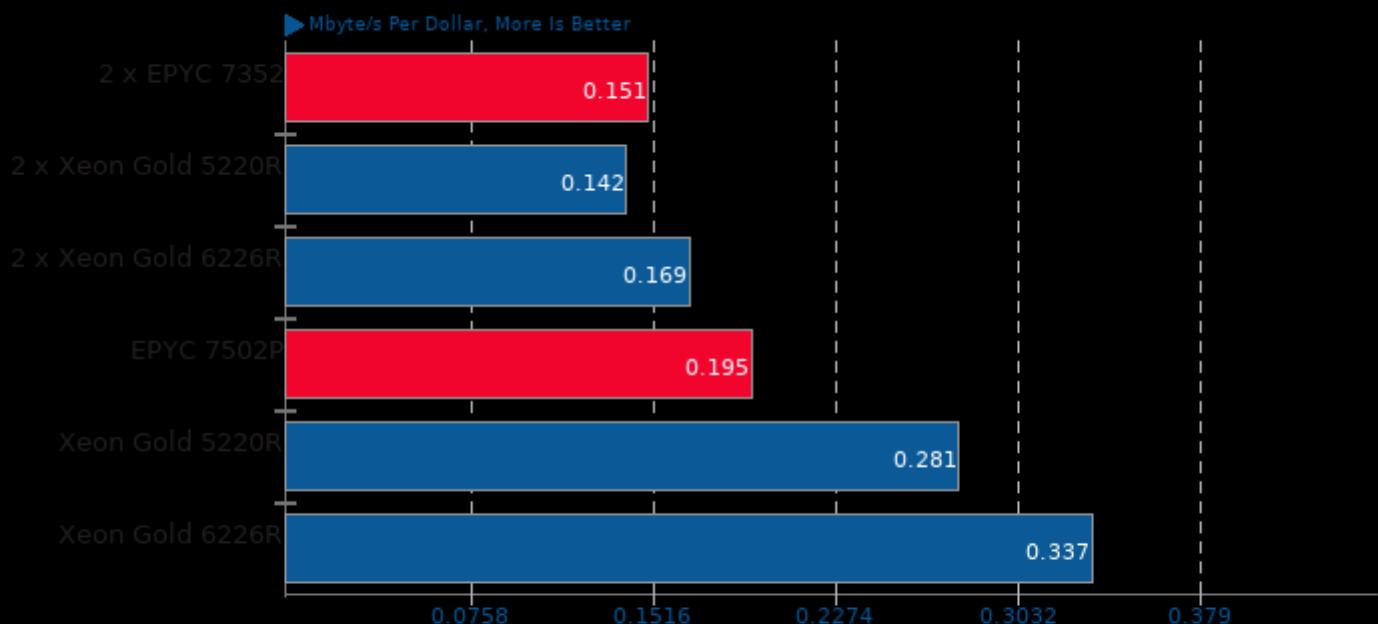
Performance / Cost - Test: aes256



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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

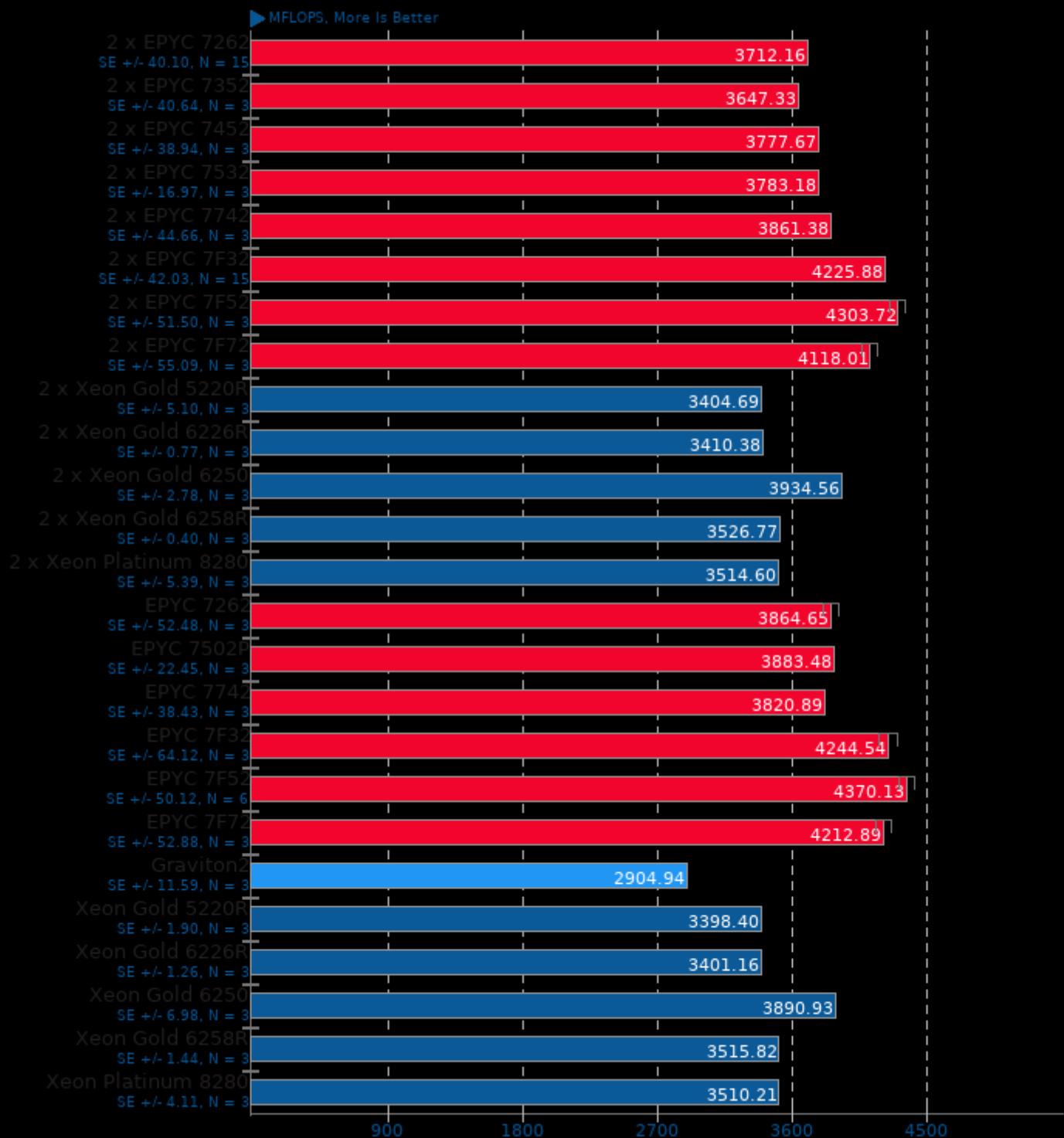
Performance / Cost - Test: sha512



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

## Himeno Benchmark 3.0

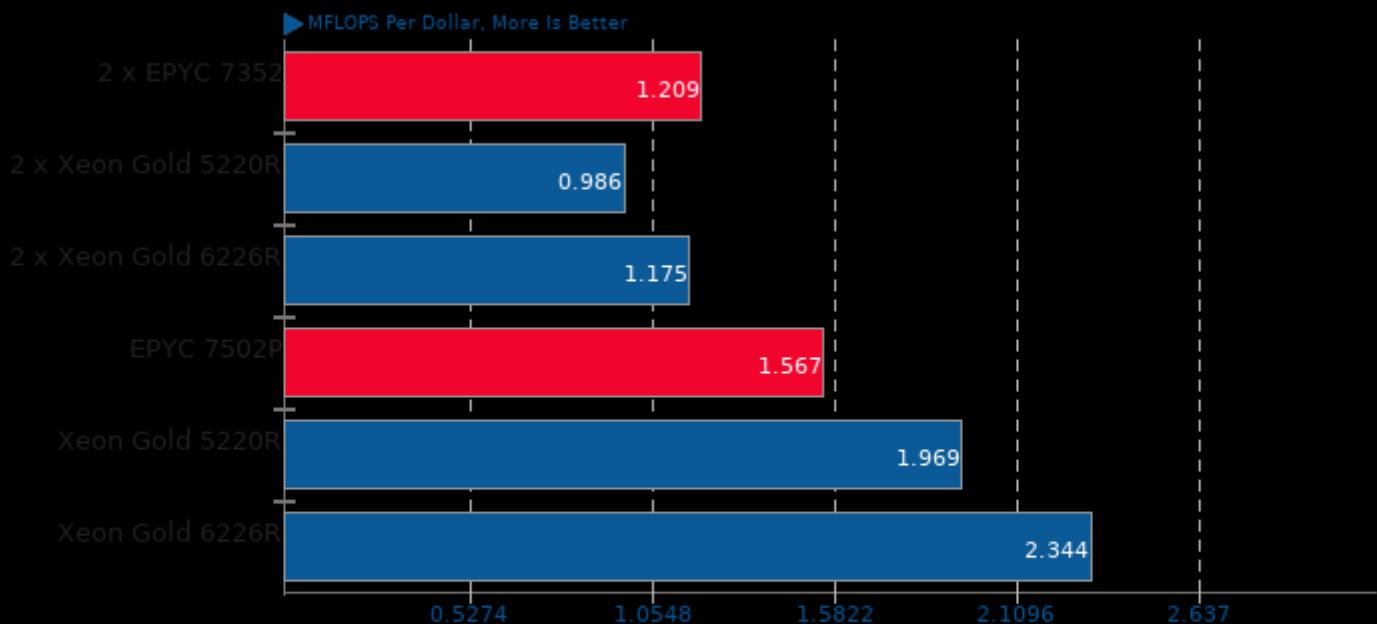
Poisson Pressure Solver



1. (CC) gcc options: -O3

## Himeno Benchmark 3.0

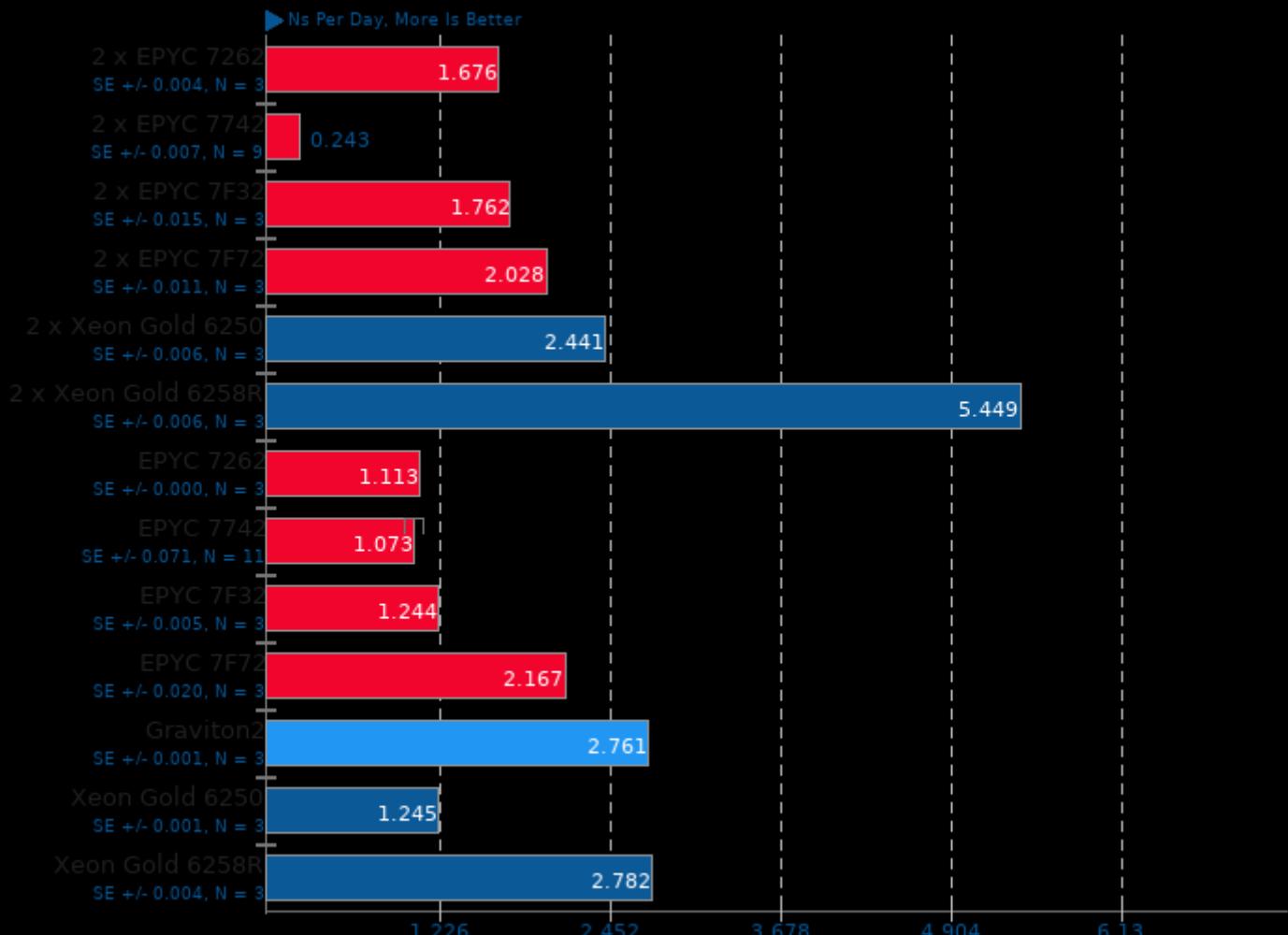
Performance / Cost - Poisson Pressure Solver



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

## GROMACS 2020.1

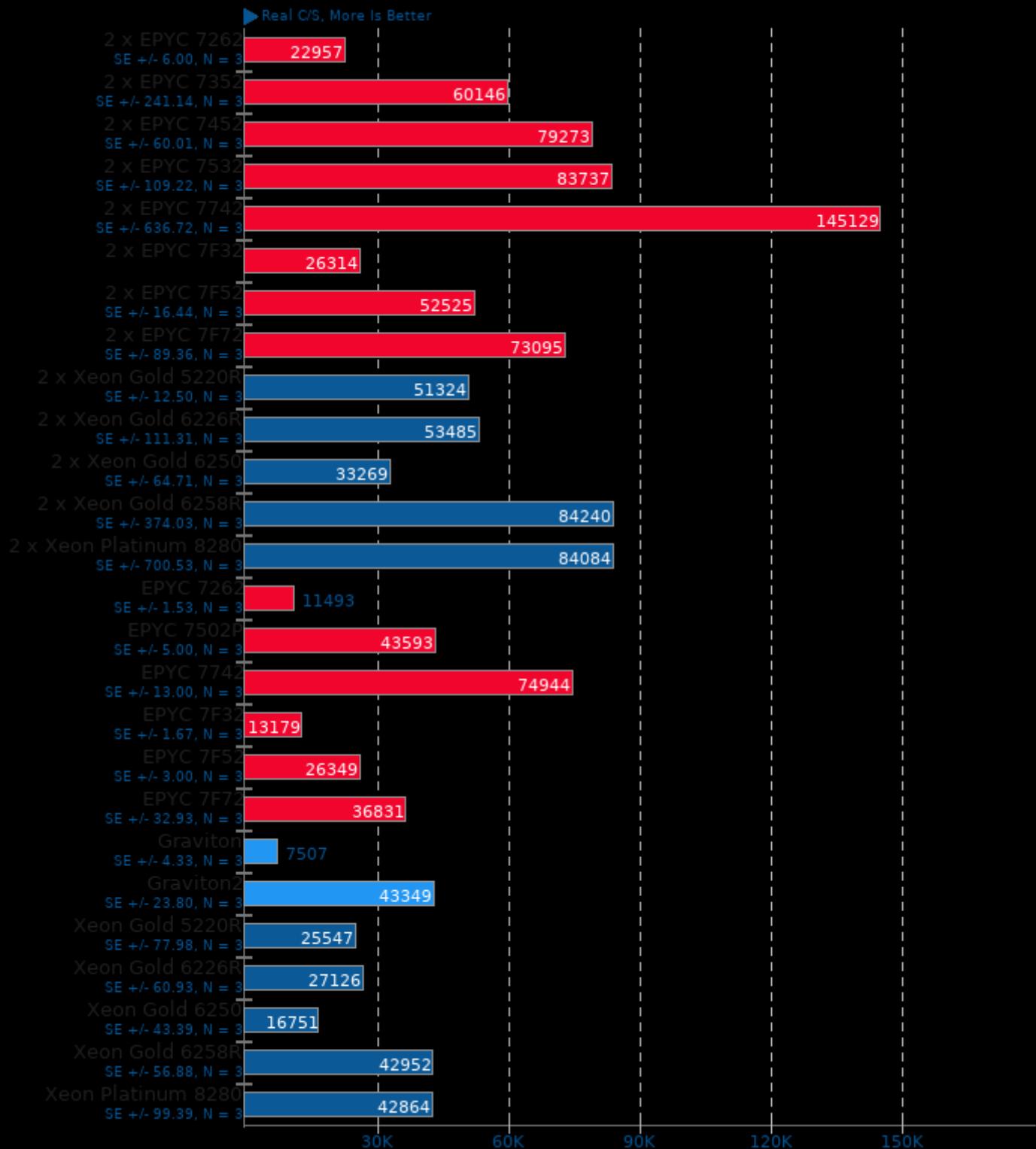
### Water Benchmark



1. (CXX) g++ options: -O3 -pthread -frt -fthread -lm

## John The Ripper 1.9.0-jumbo-1

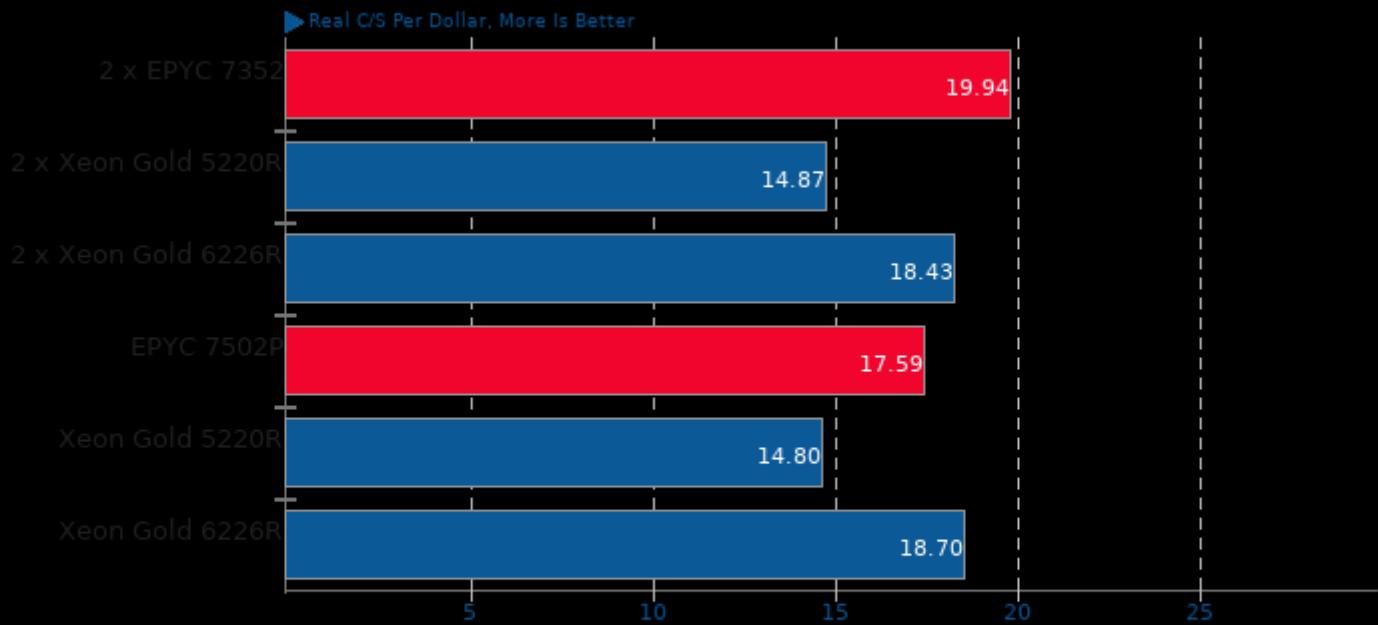
Test: Blowfish



1. (CC) gcc options: -fssl -lcrypto -fopenmp -pthread -lm -lz -ldl -lcrypt

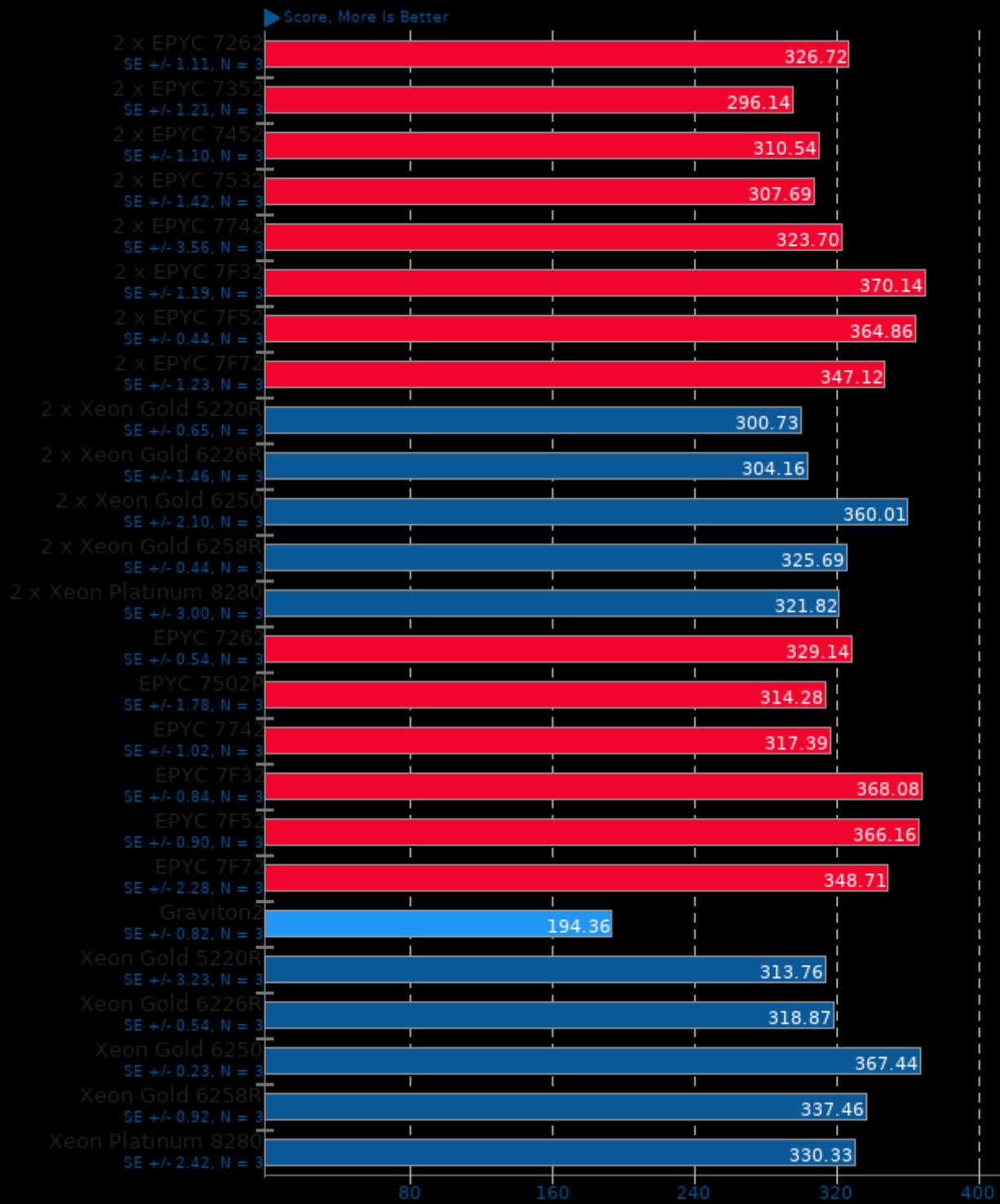
## John The Ripper 1.9.0-jumbo-1

Performance / Cost - Test: Blowfish



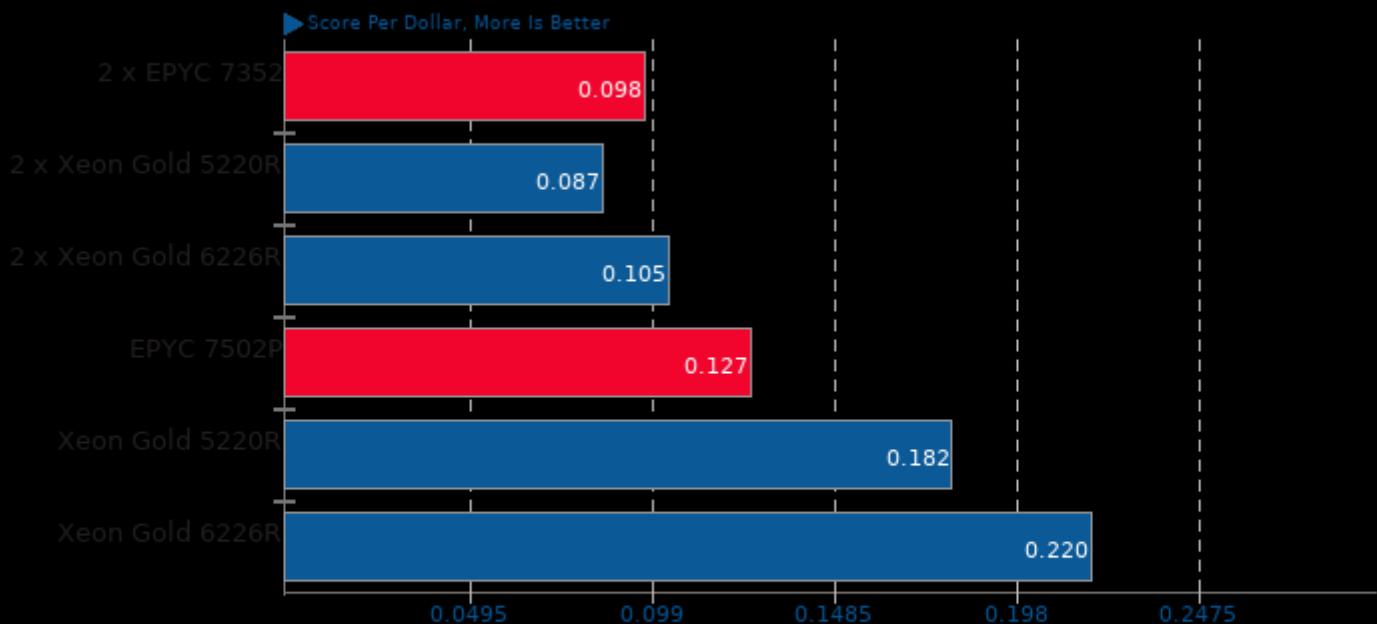
1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 reported cost.
3. 2 x Xeon Gold 6226R: \$2902 reported cost.
4. EPYC 7502P: \$2479 reported cost.
5. Xeon Gold 5220R: \$1726 reported cost.
6. Xeon Gold 6226R: \$1451 reported cost.

## Numpy Benchmark



## Numpy Benchmark

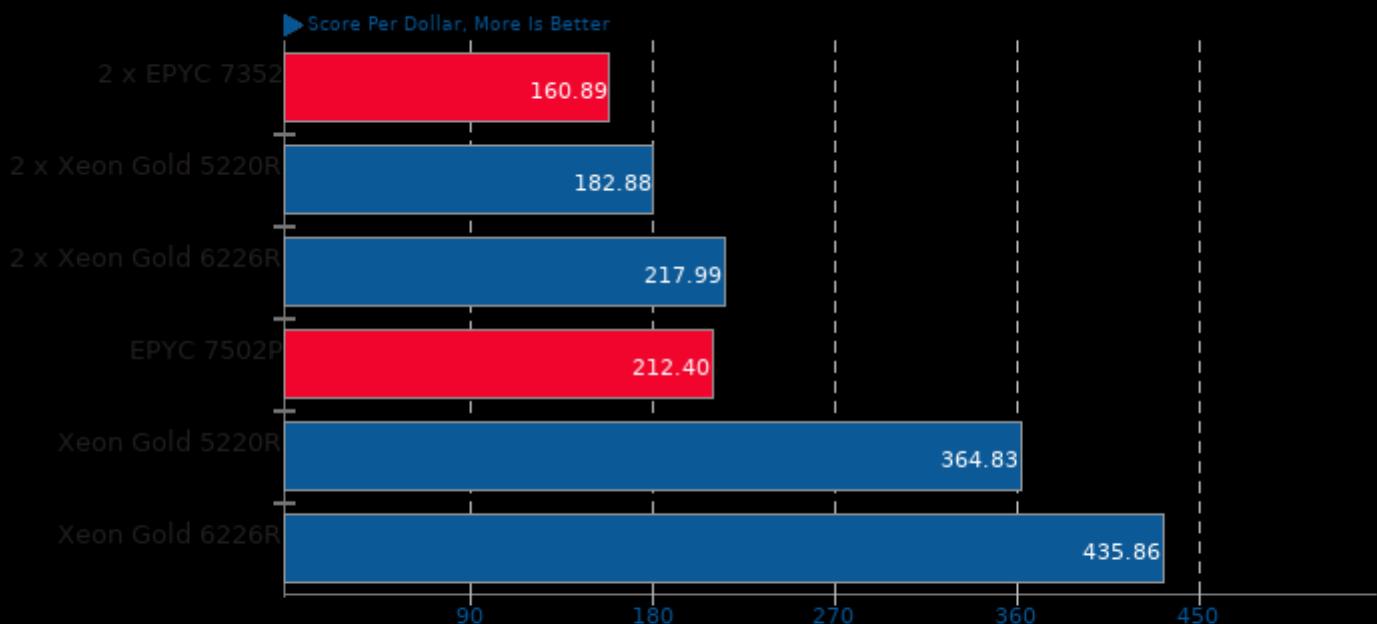
Performance / Cost -



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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

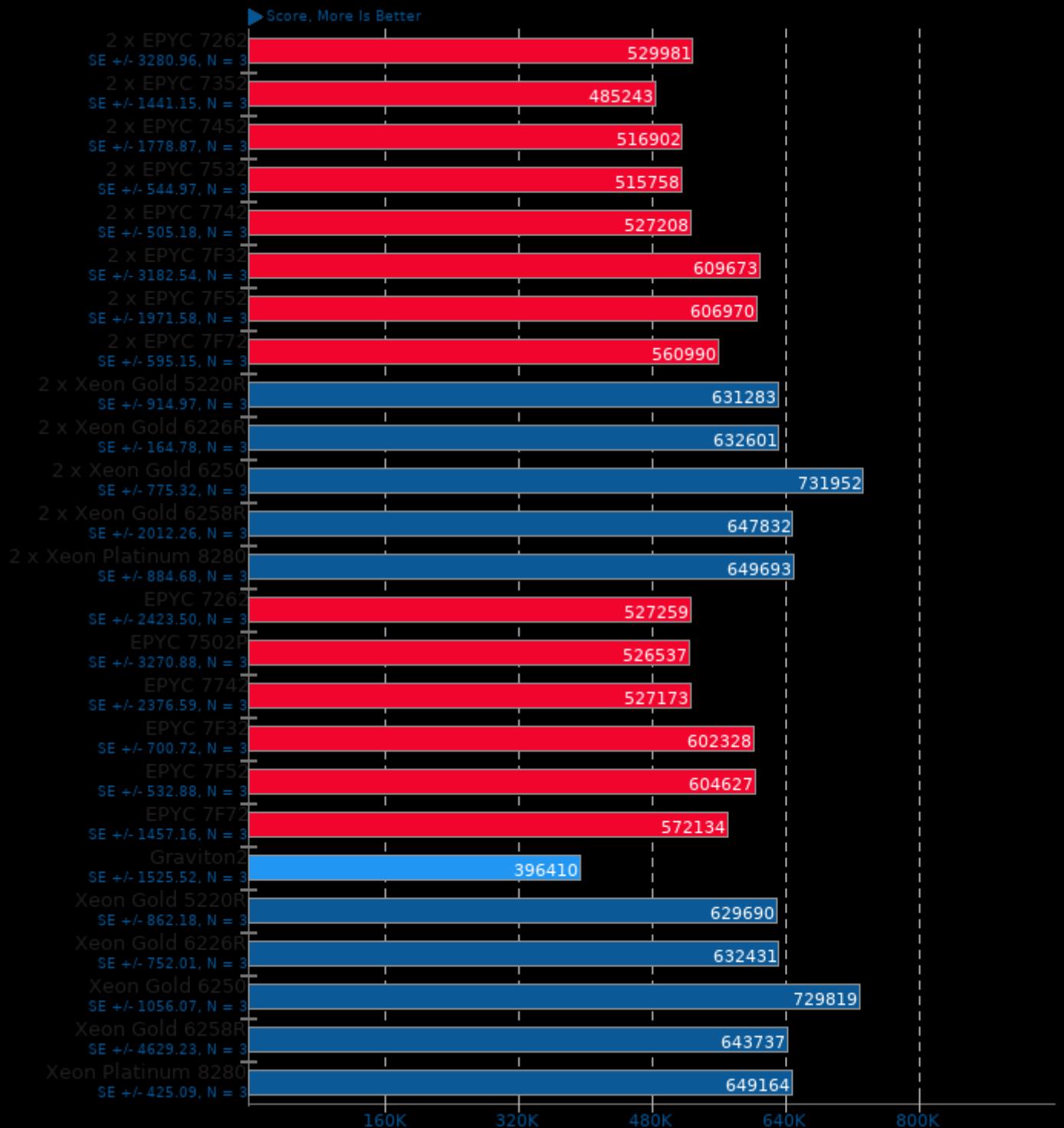
Performance / Cost - PHP Benchmark Suite



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

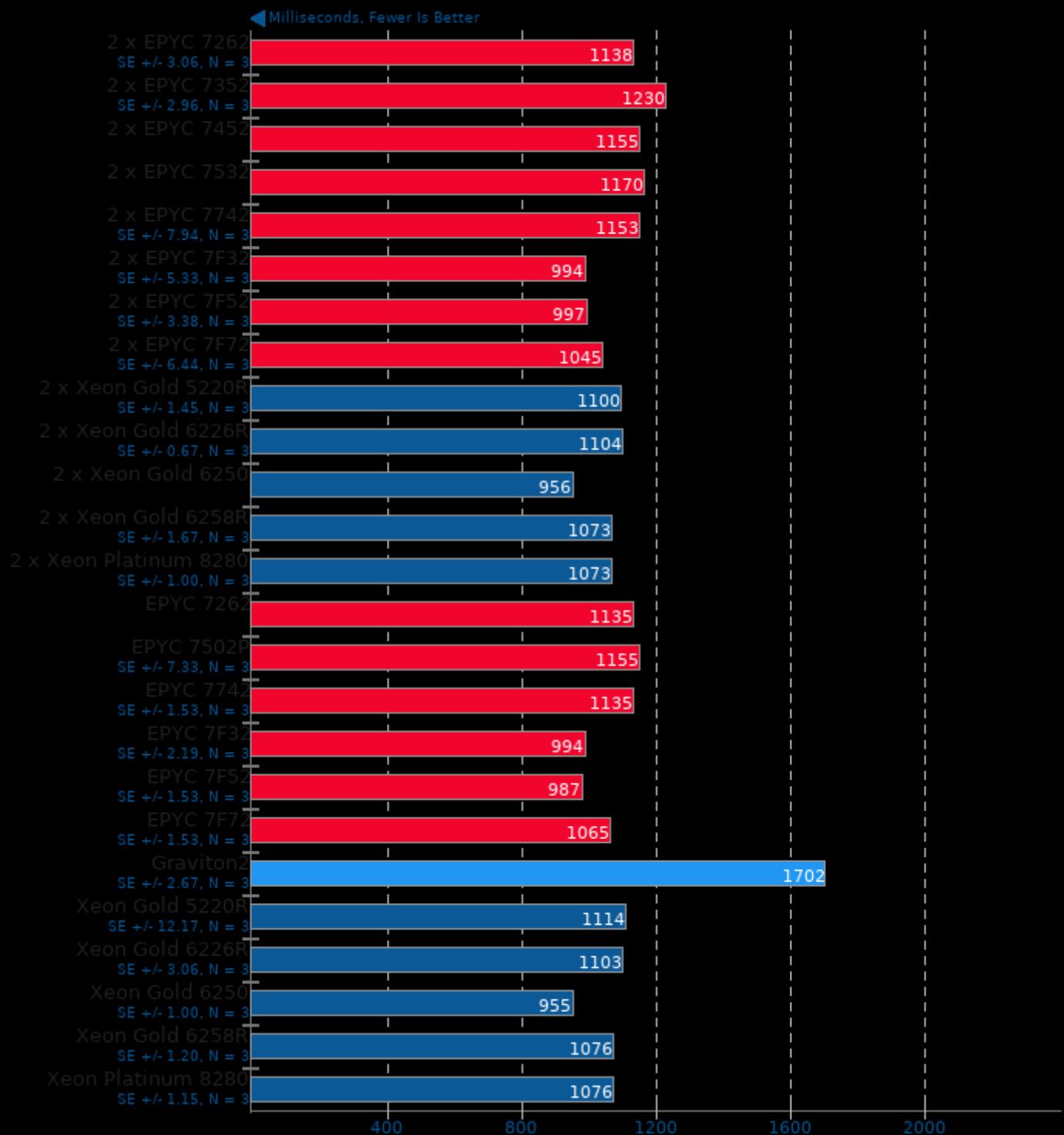
## PHPBench 0.8.1

PHP Benchmark Suite



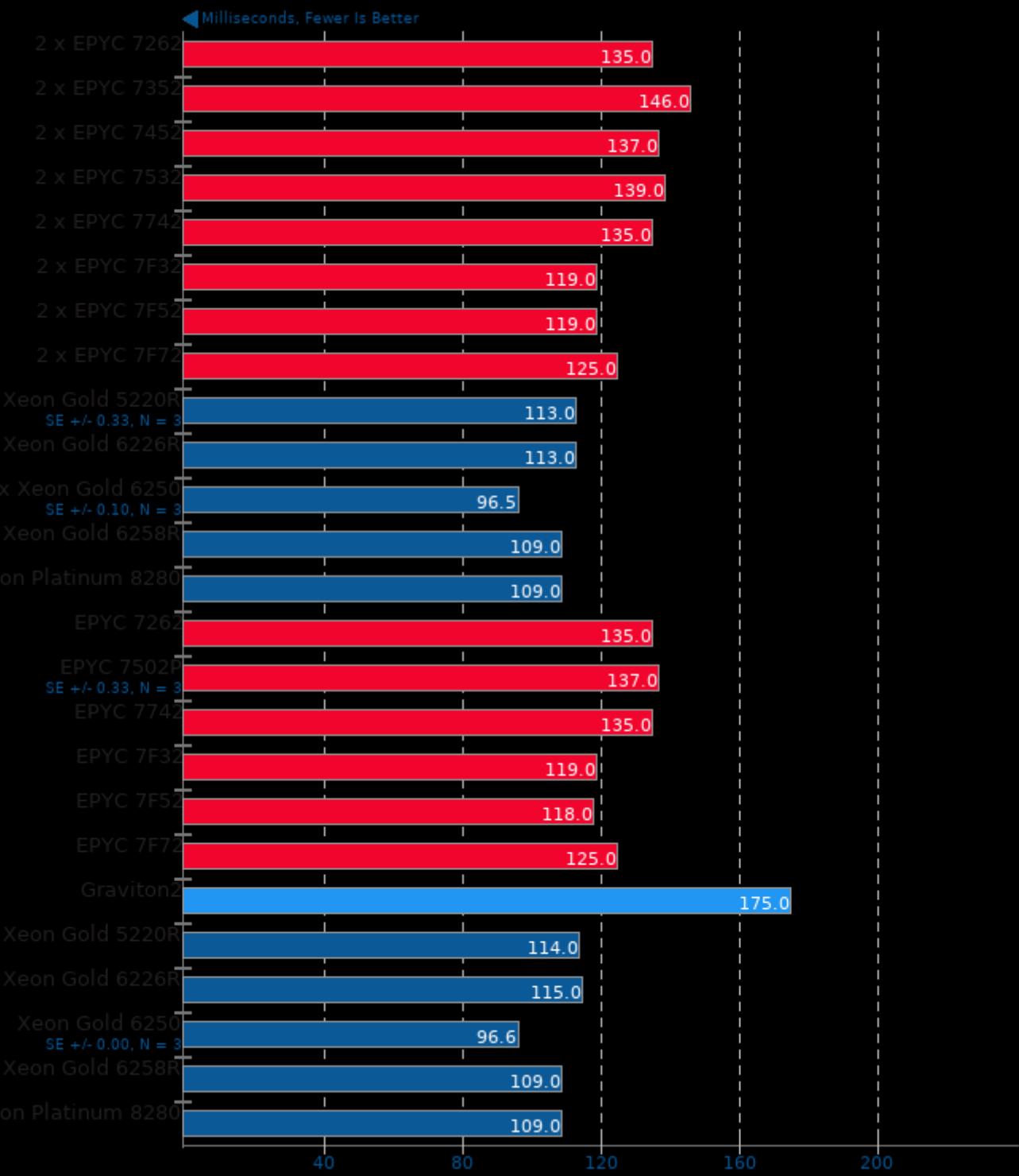
## PyBench 2018-02-16

Total For Average Test Times



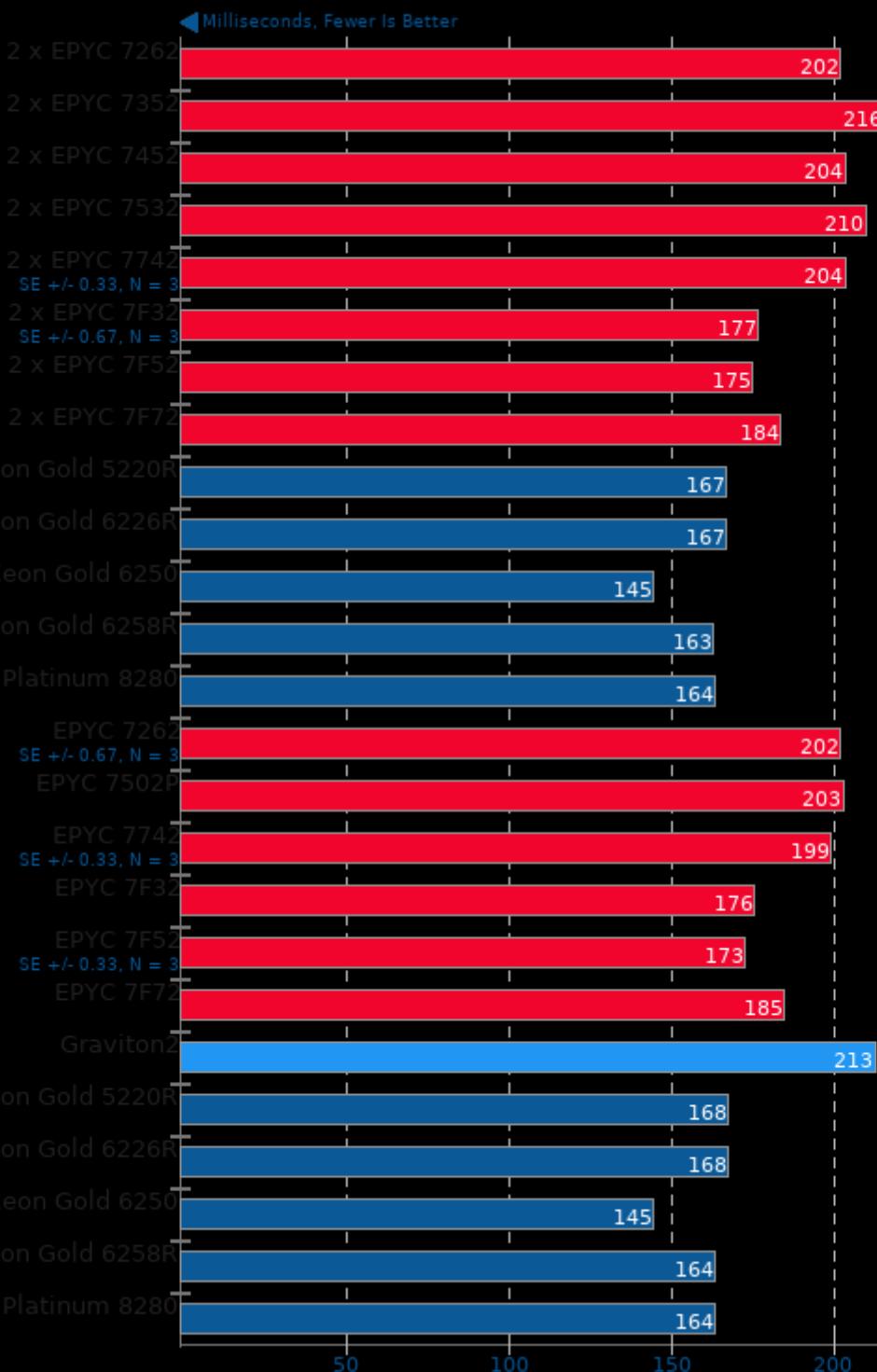
## PyPerformance 1.0.0

Benchmark: float



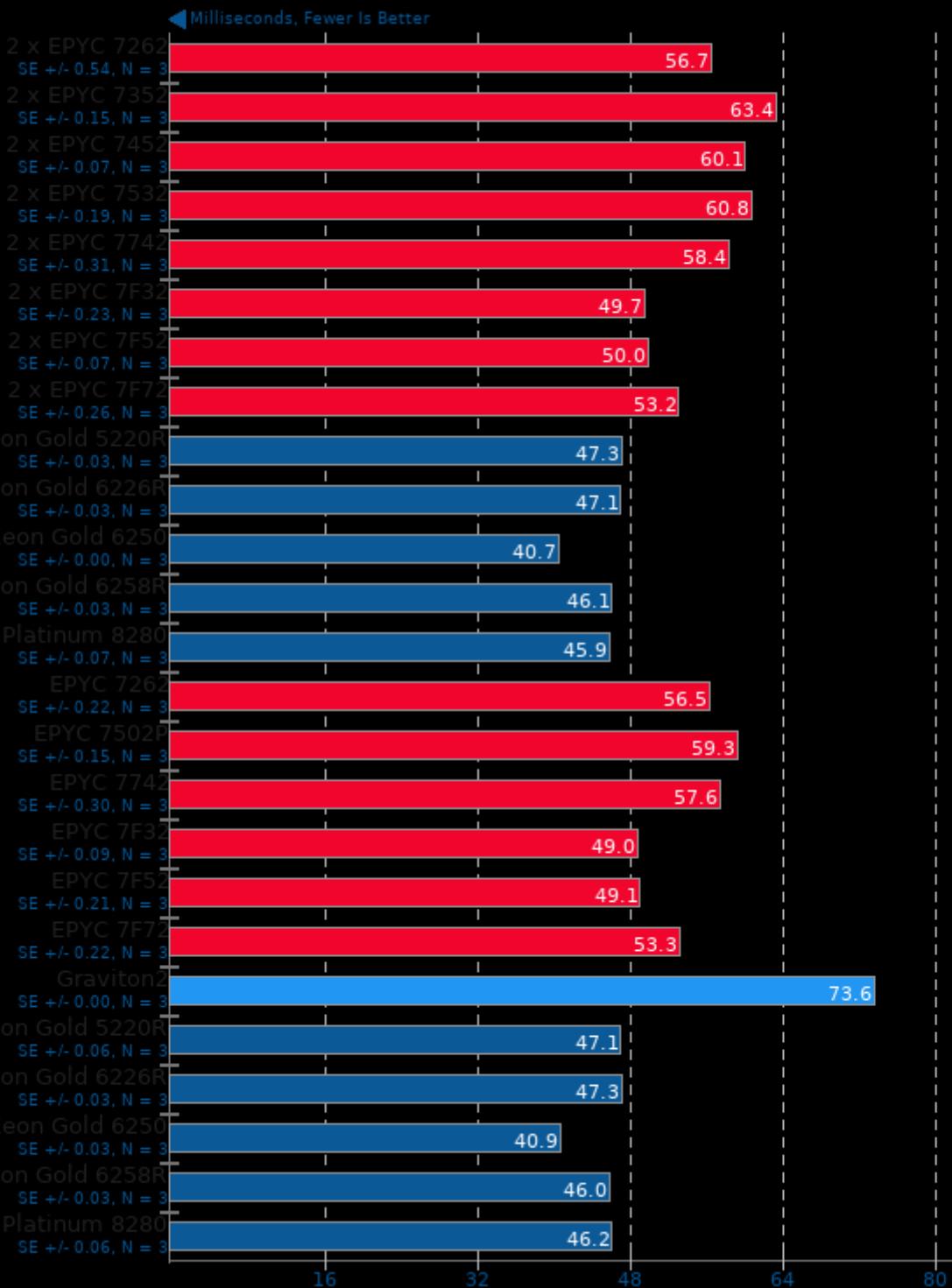
## PyPerformance 1.0.0

Benchmark: regex\_compile



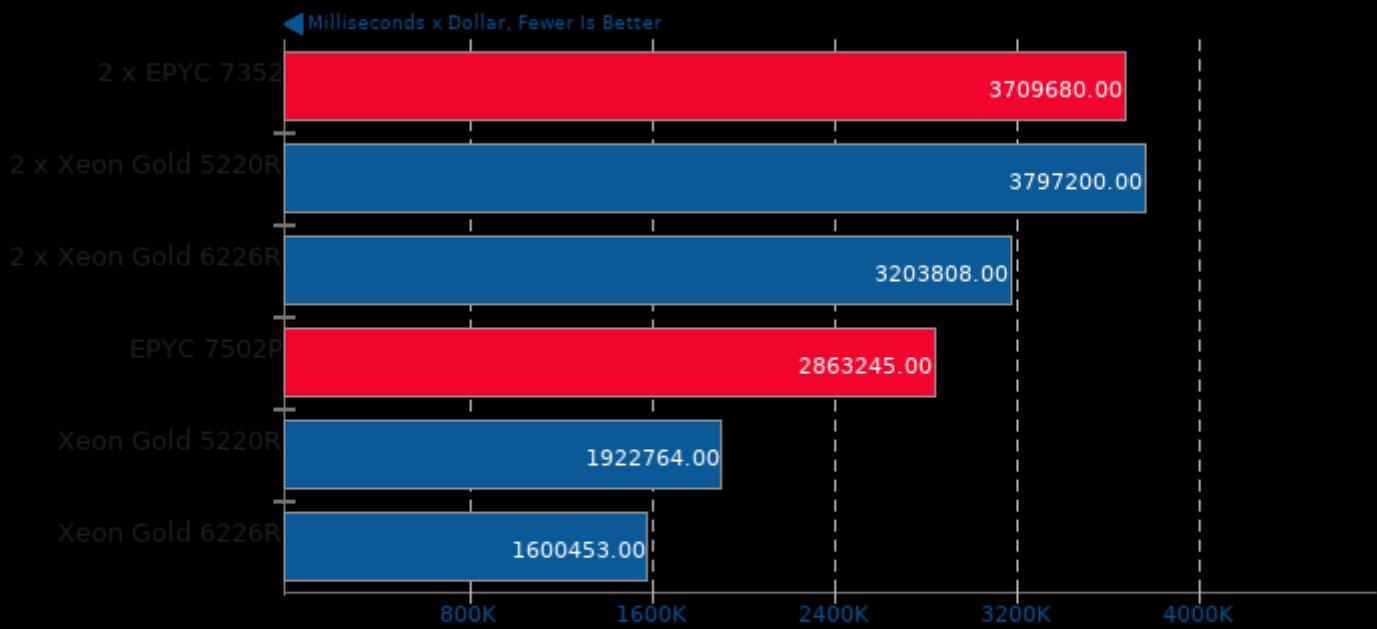
## PyPerformance 1.0.0

Benchmark: django\_template



## PyBench 2018-02-16

Performance / Cost - Total For Average Test Times



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

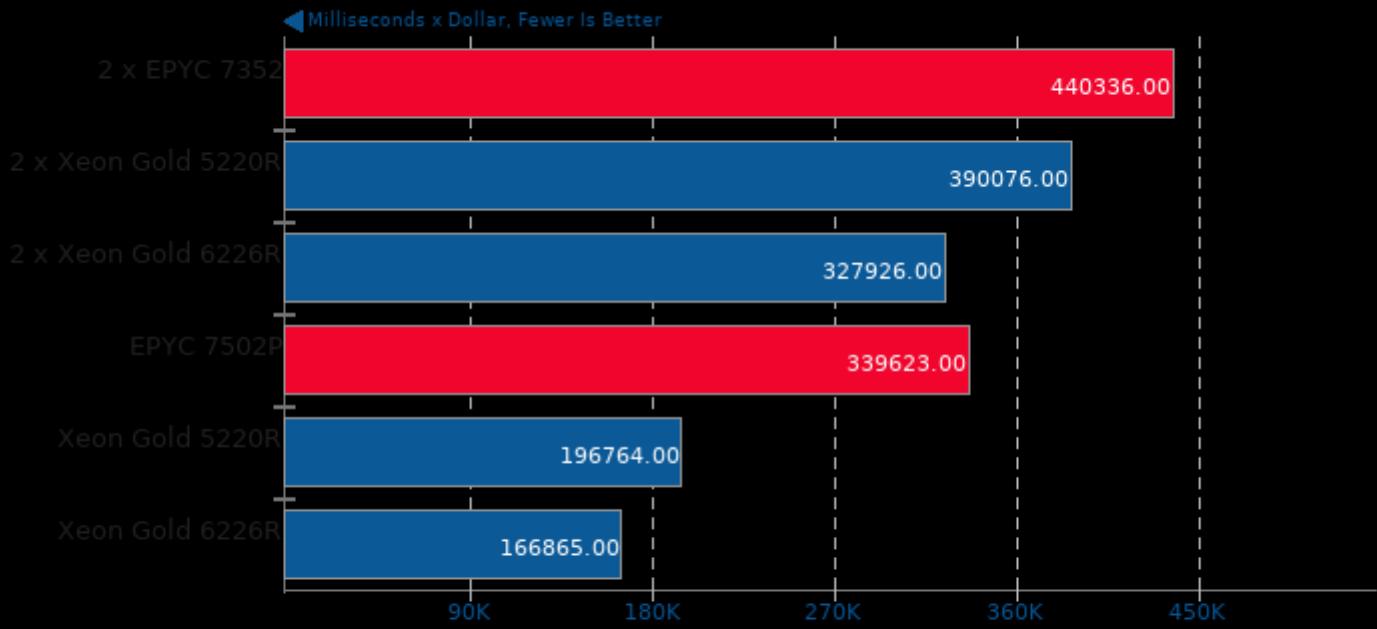
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## PyPerformance 1.0.0

Performance / Cost - Benchmark: float



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

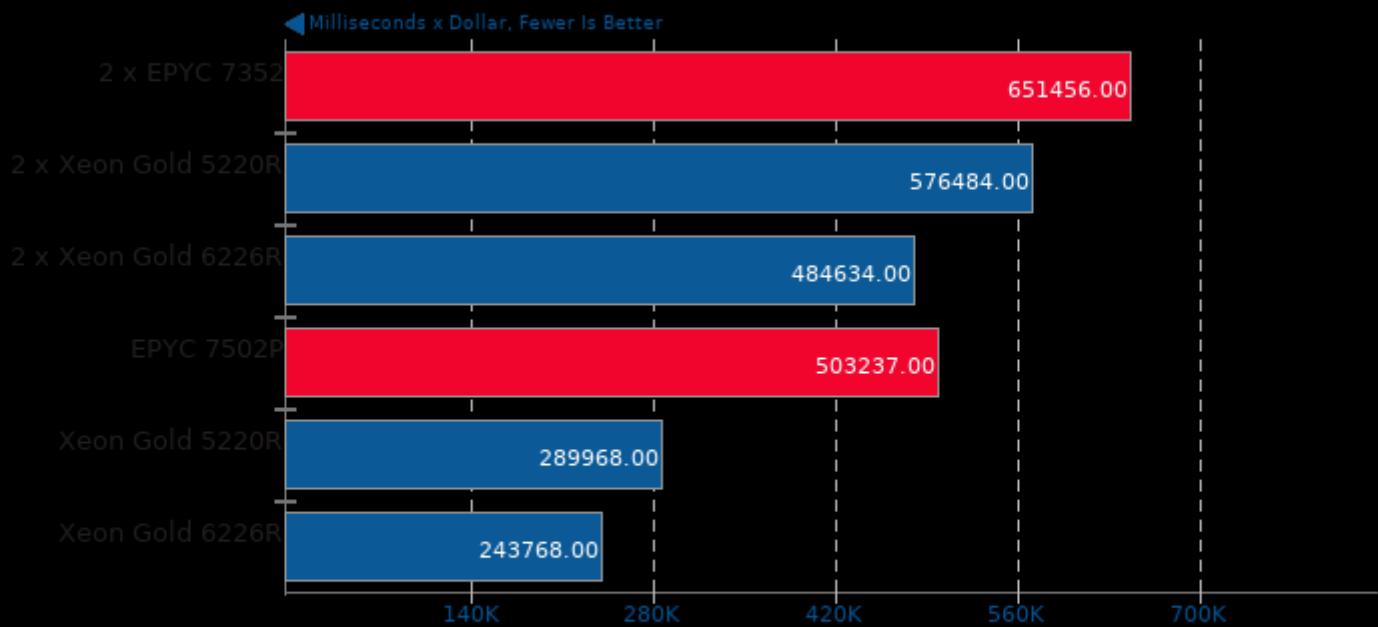
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## PyPerformance 1.0.0

Performance / Cost - Benchmark: regex\_compile



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

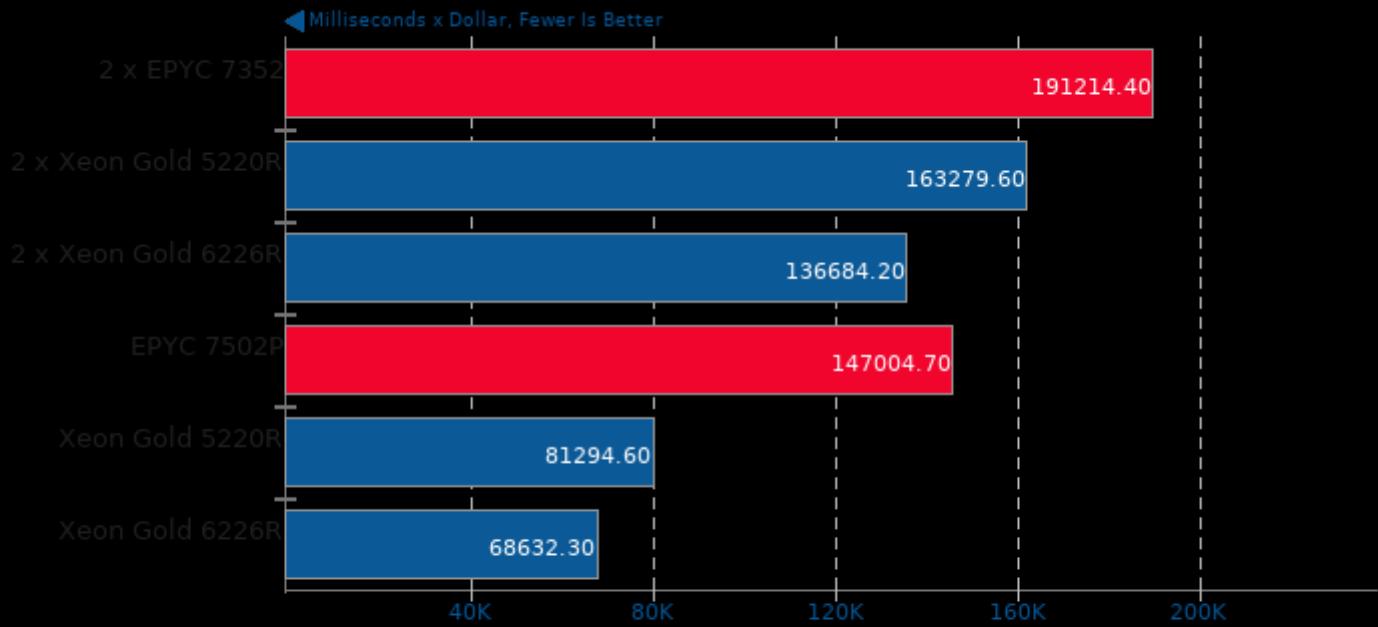
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## PyPerformance 1.0.0

Performance / Cost - Benchmark: django\_template



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

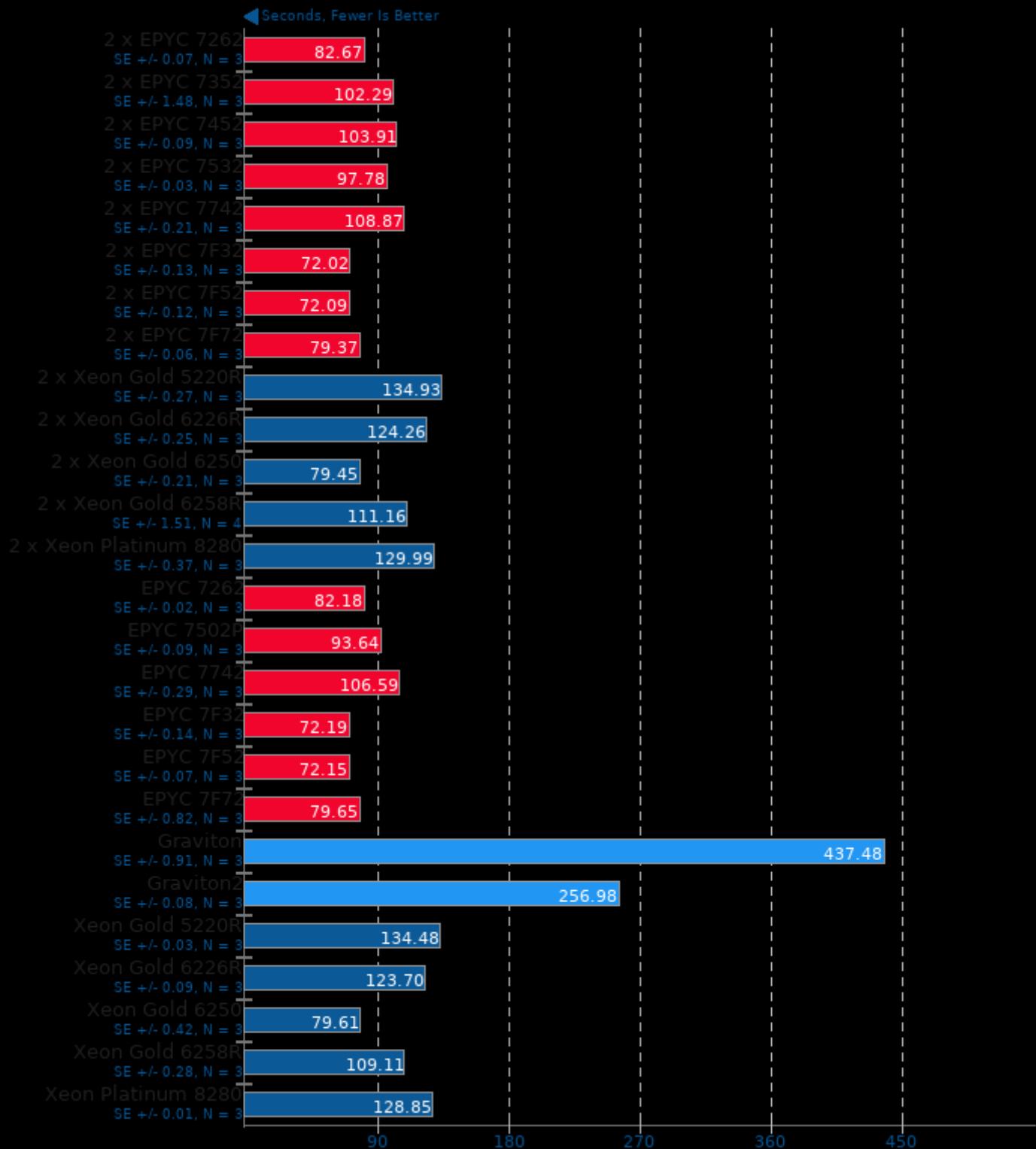
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Timed MrBayes Analysis 3.2.7

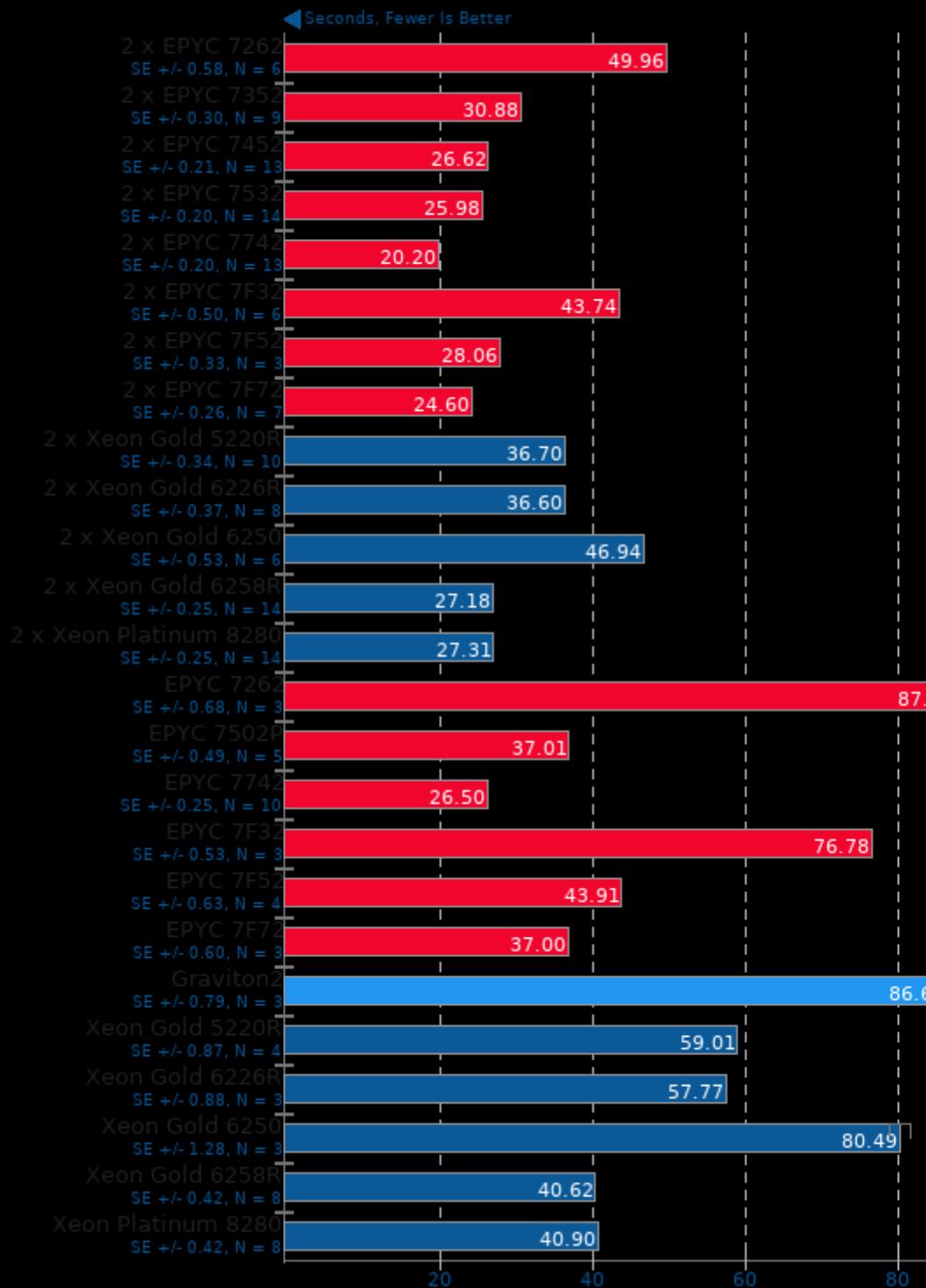
Primate Phylogeny Analysis



1. (CC) gcc options: -O3 -std=c99 -pedantic -lm

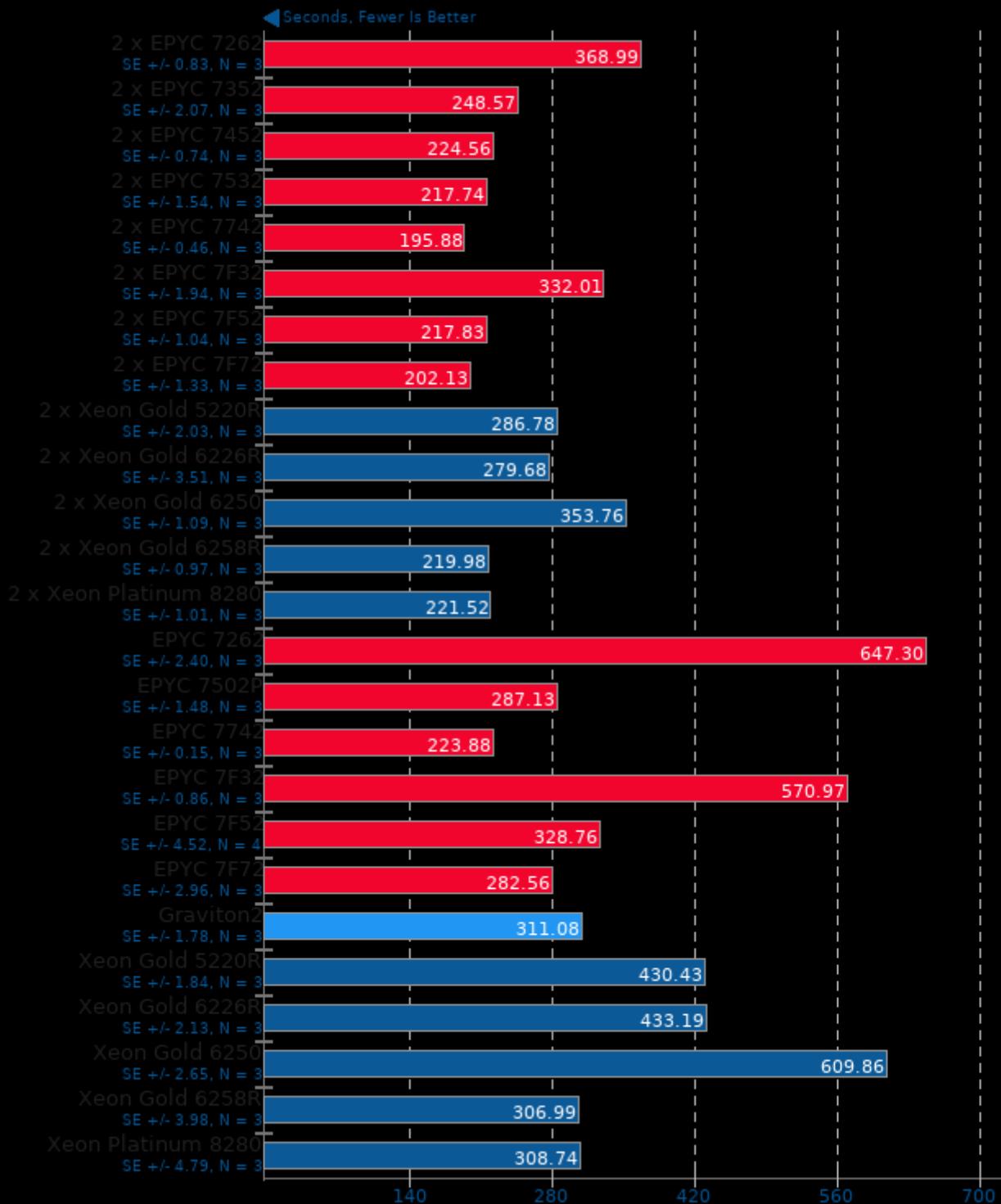
## Timed Linux Kernel Compilation 5.4

Time To Compile



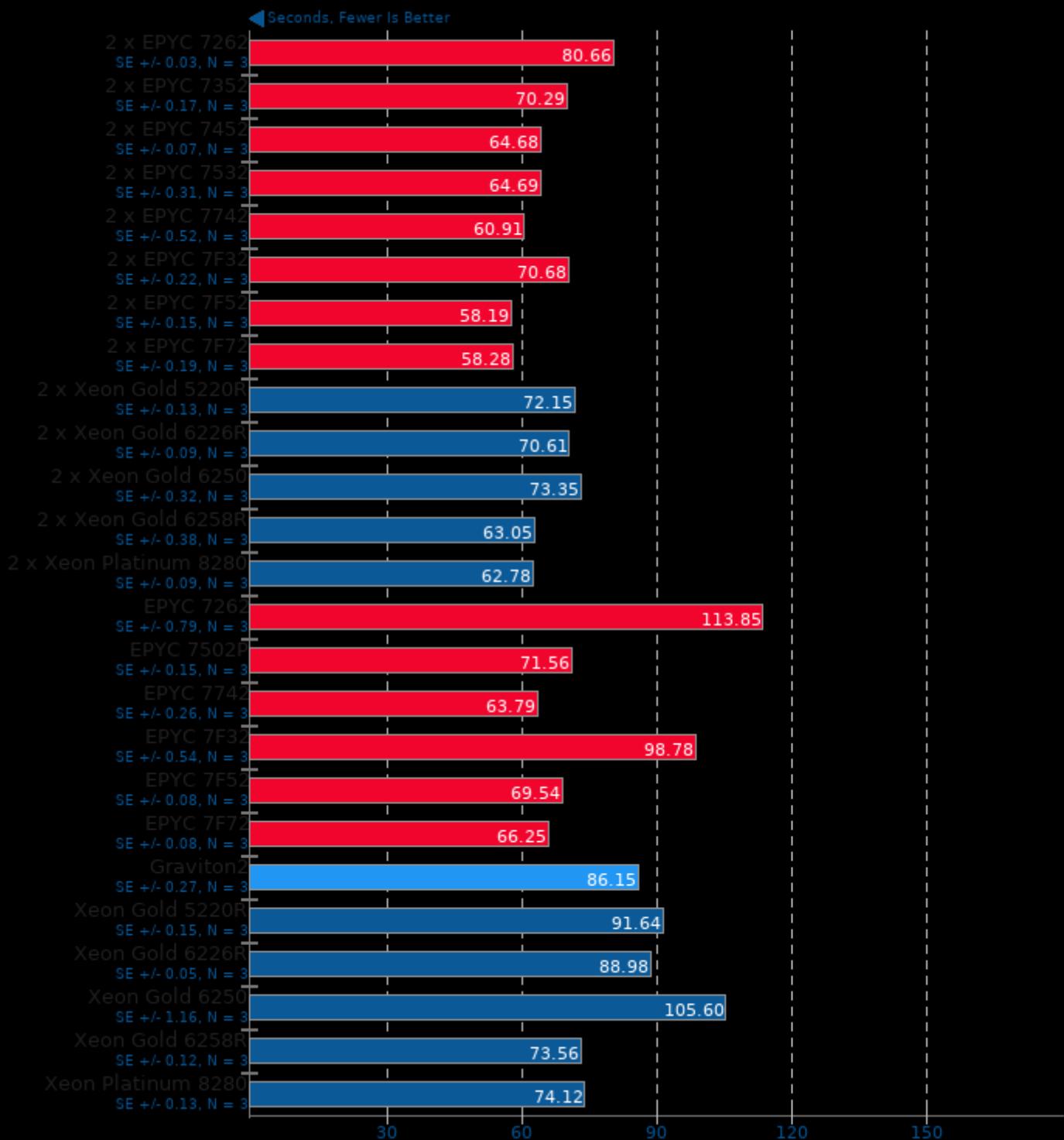
## Timed LLVM Compilation 10.0

Time To Compile



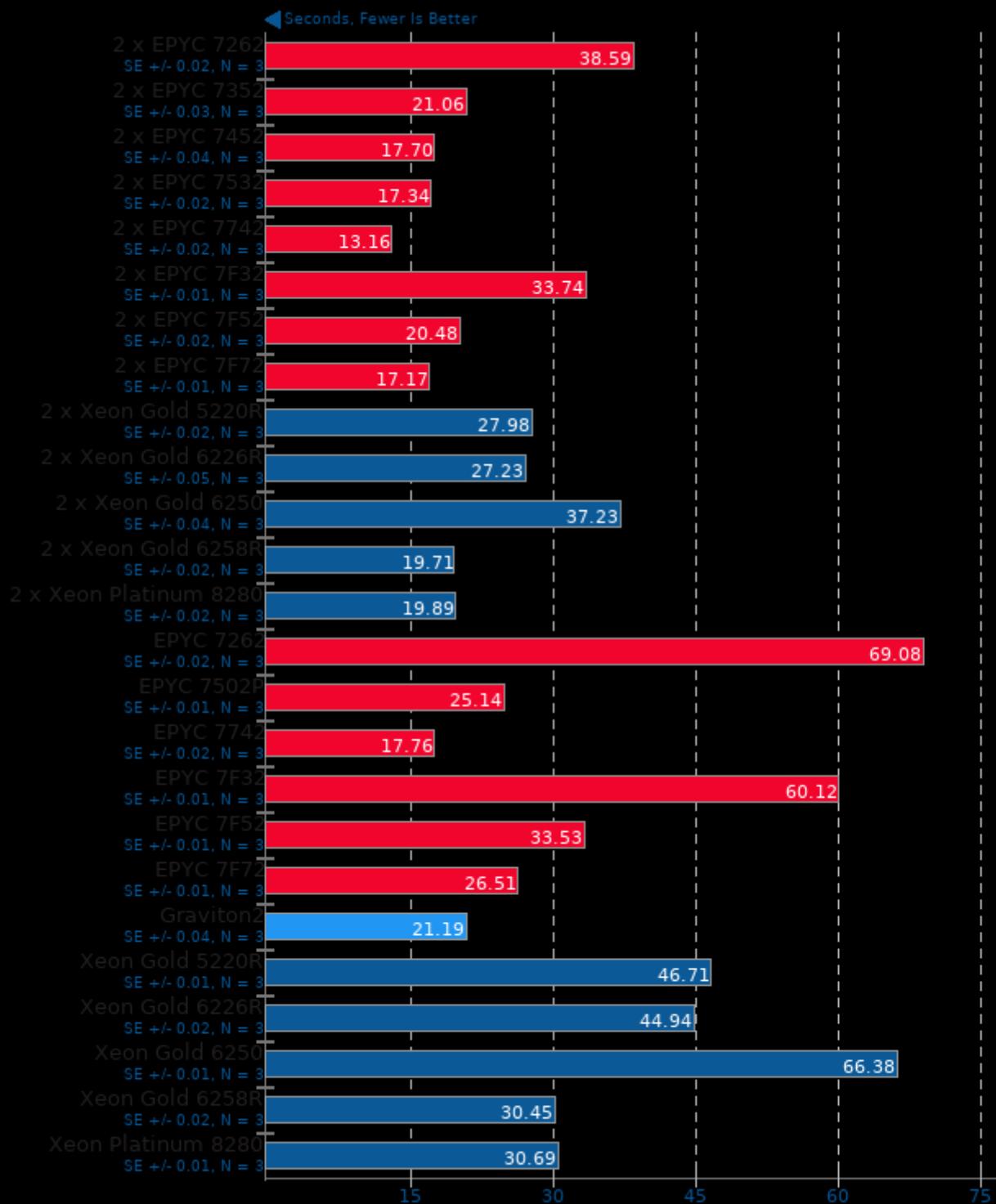
## Build2 0.12

Time To Compile



## Basis Universal 1.12

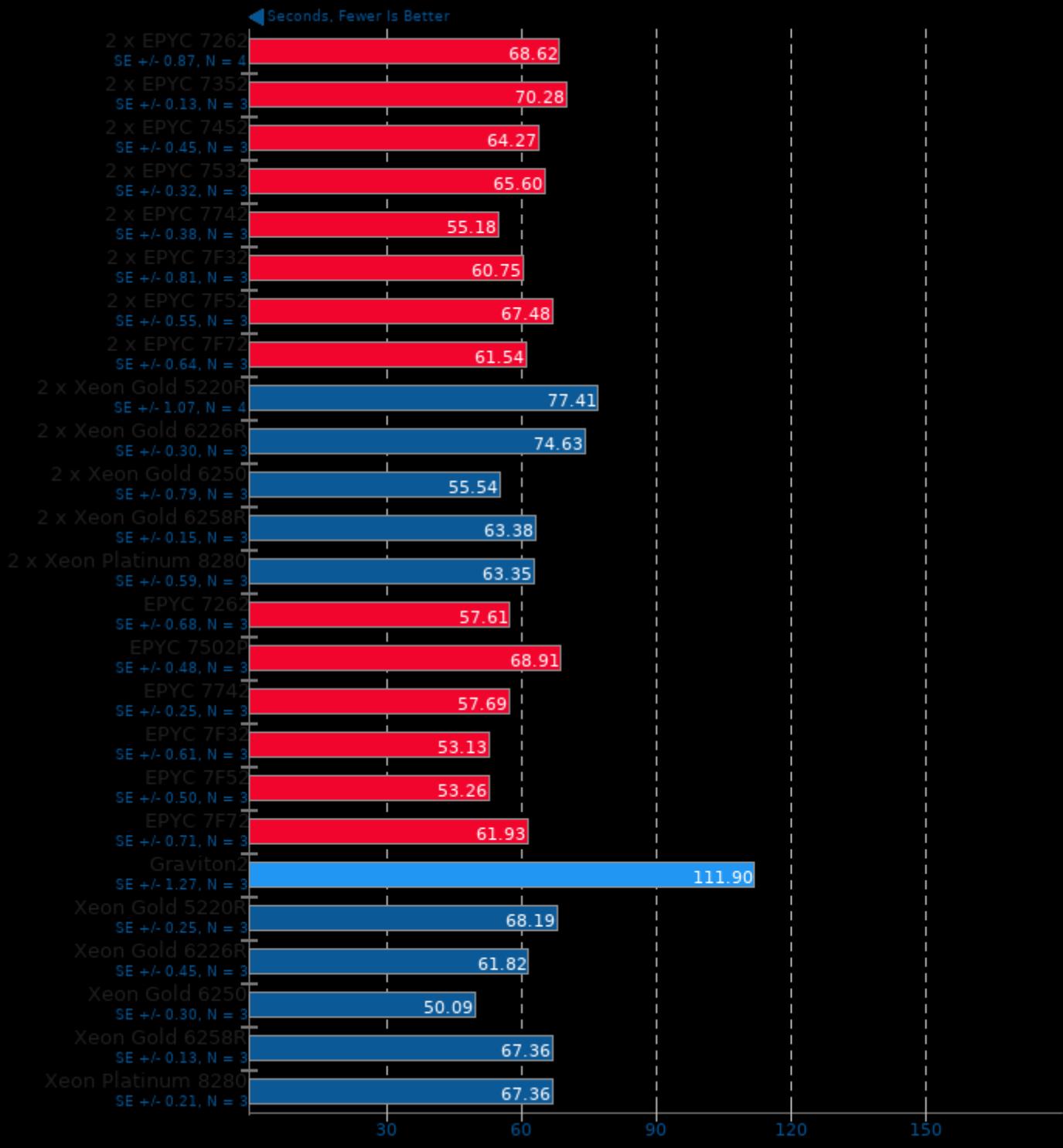
Settings: UASTC Level 3



1. (CXX) g++ options: -std=c++11 -fvisibility=hidden -fPIC -fno-strict-aliasing -O3 -rdynamic -lm -lpthread

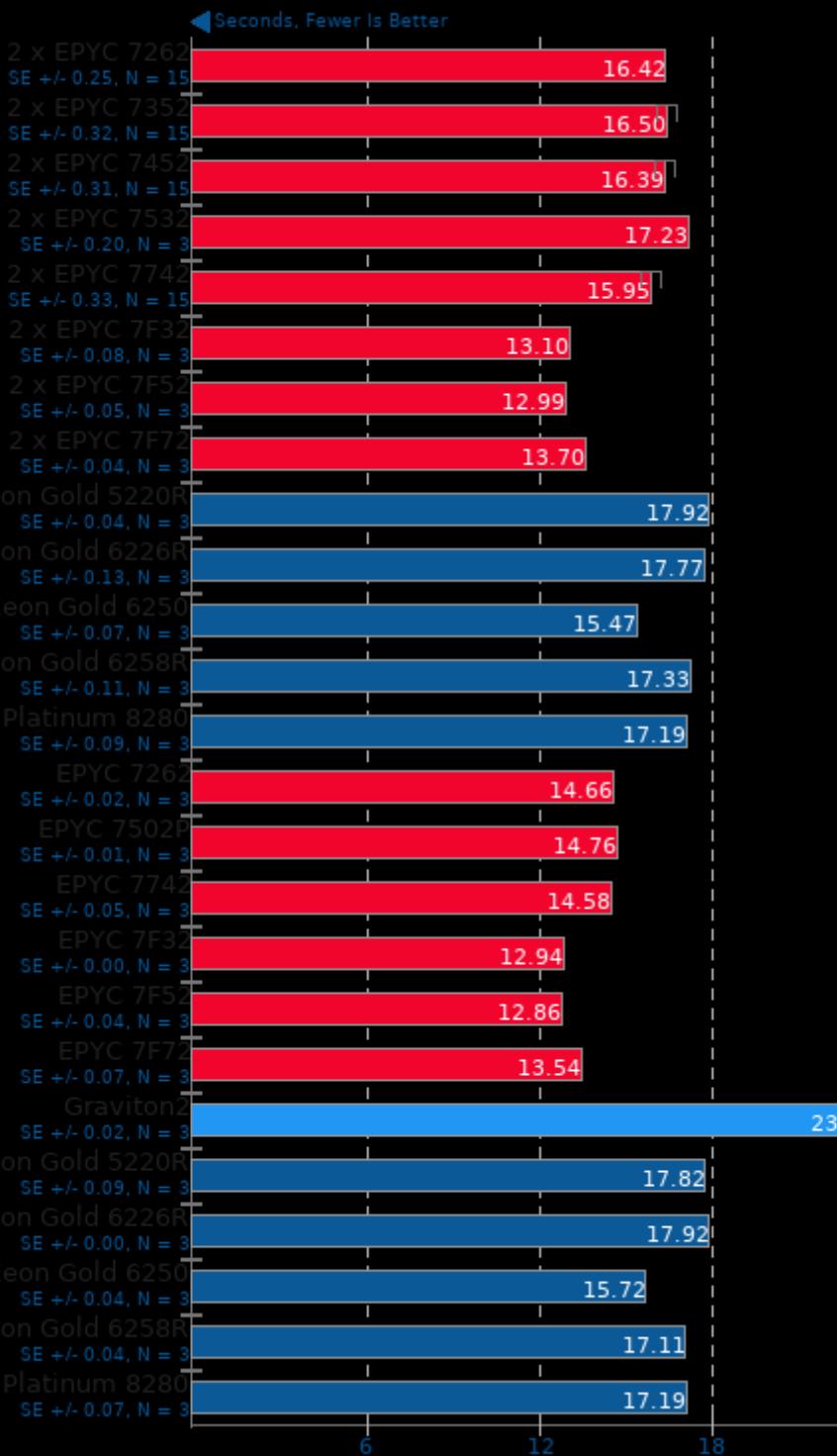
## Mlpack Benchmark

Benchmark: scikit\_ica



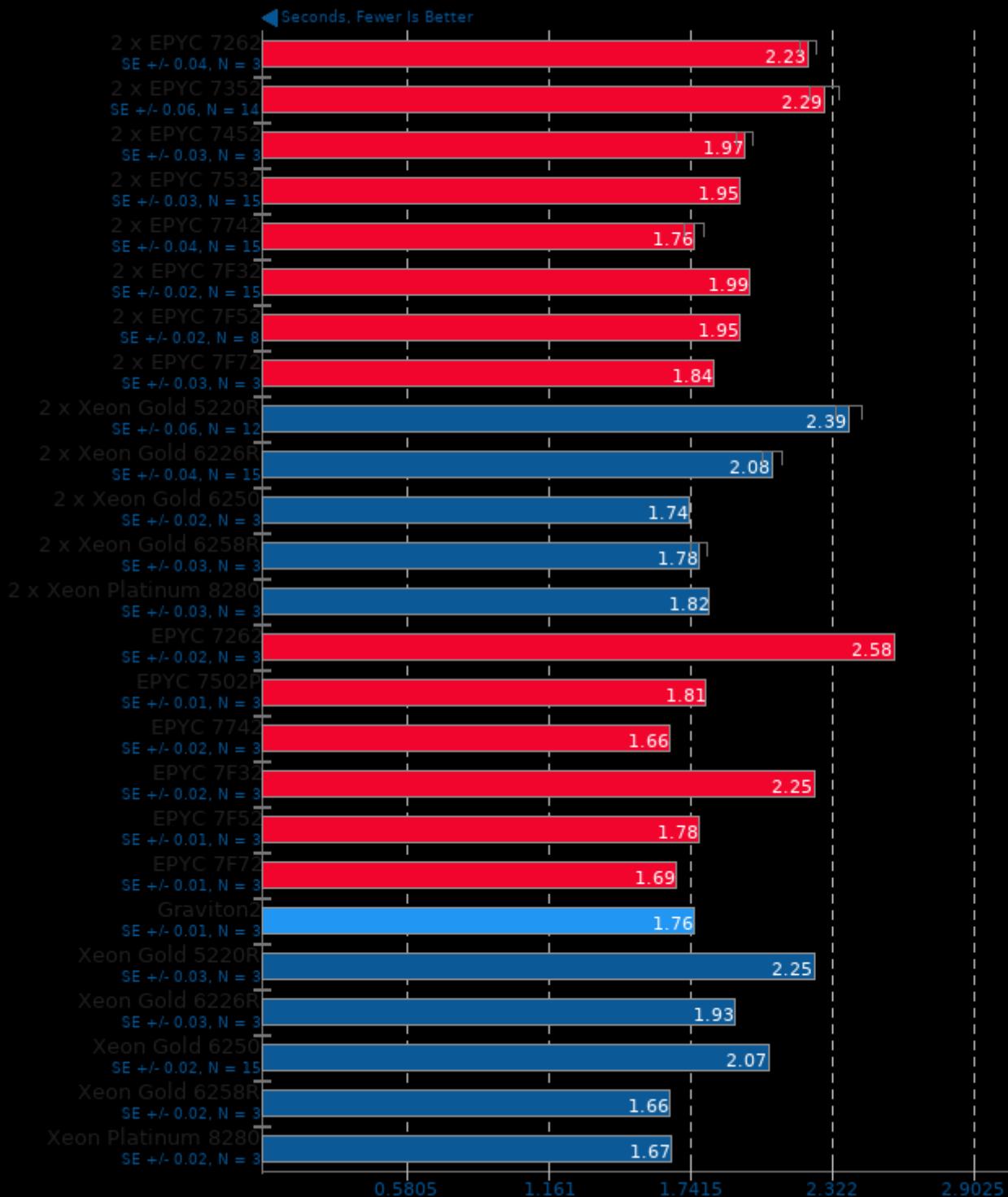
## Mlpack Benchmark

Benchmark: scikit\_svm

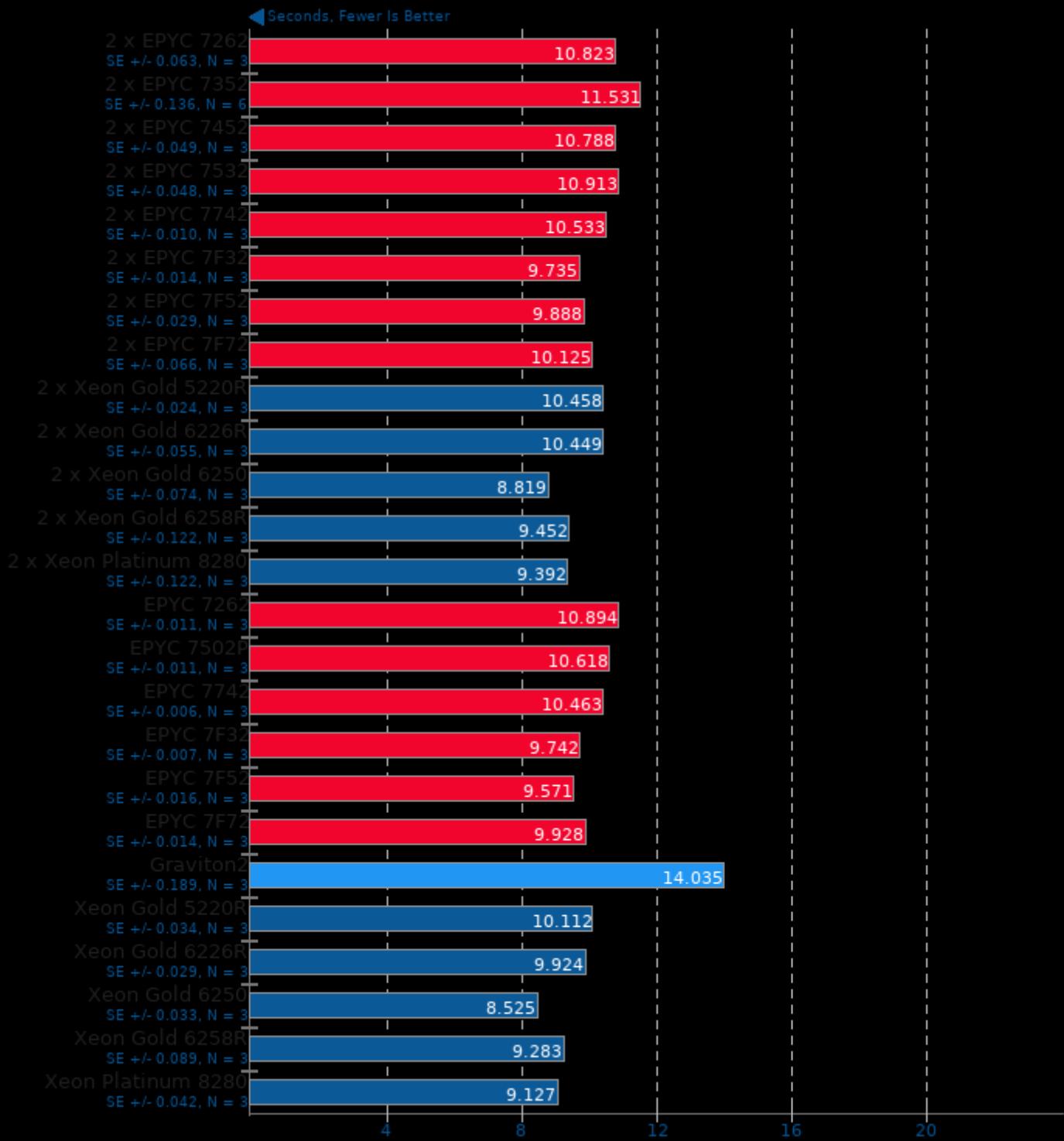


## Mlpack Benchmark

Benchmark: scikit\_linearridge\_regression

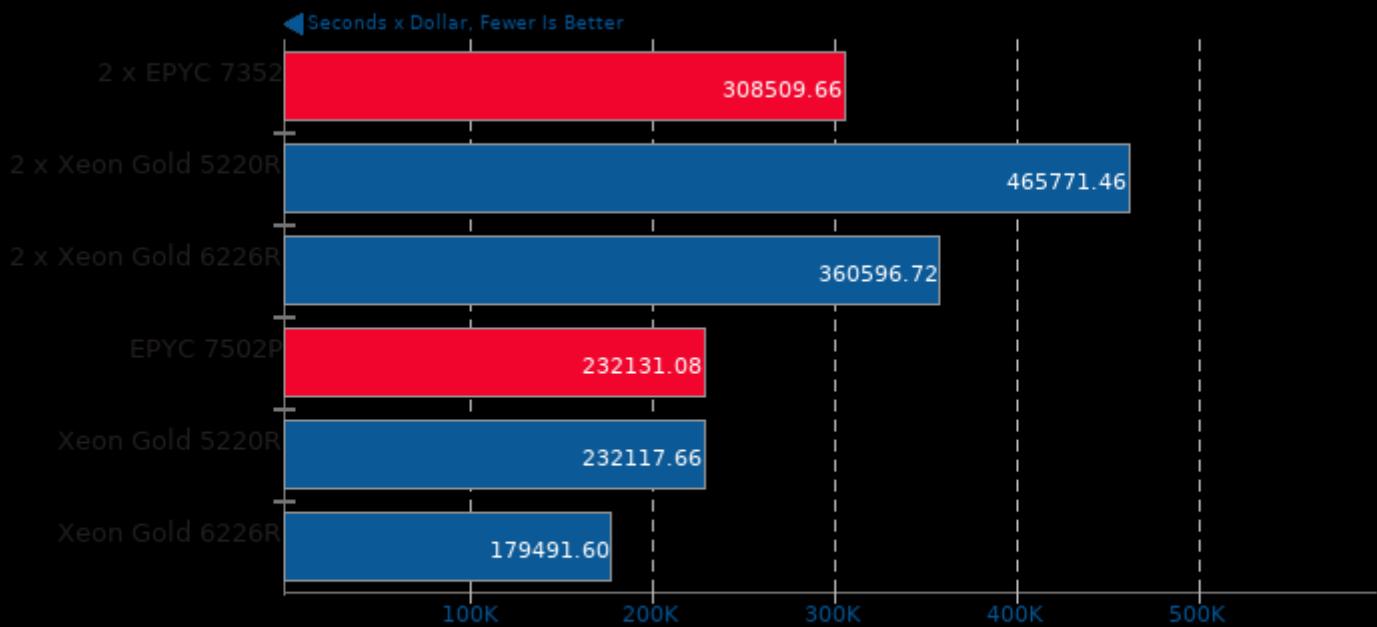


## Scikit-Learn 0.22.1



## Timed MrBayes Analysis 3.2.7

Performance / Cost - Primate Phylogeny Analysis



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

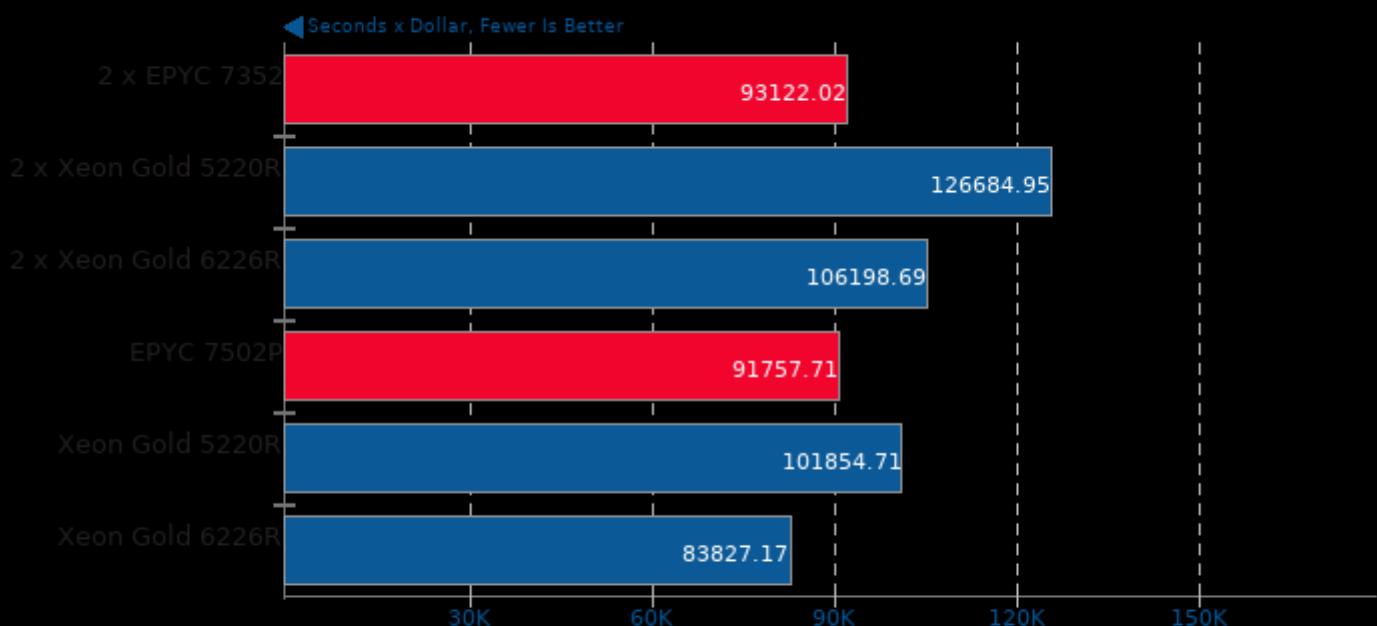
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Timed Linux Kernel Compilation 5.4

Performance / Cost - Time To Compile



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

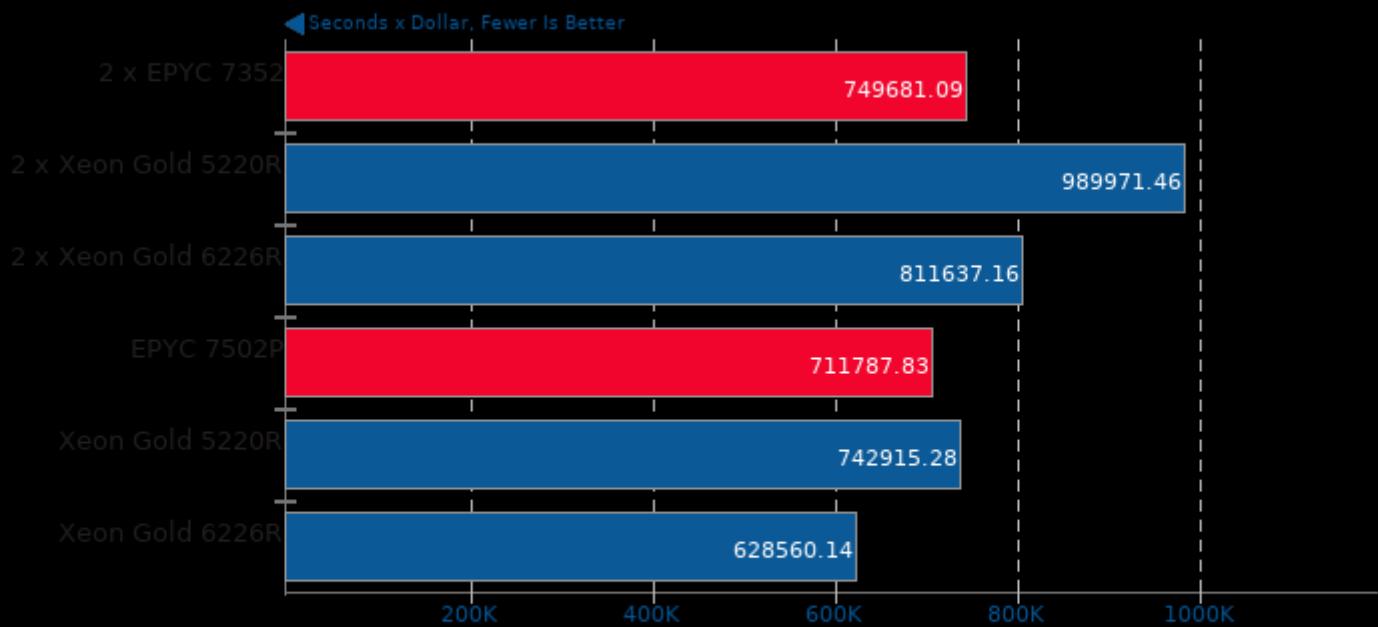
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Timed LLVM Compilation 10.0

Performance / Cost - Time To Compile



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

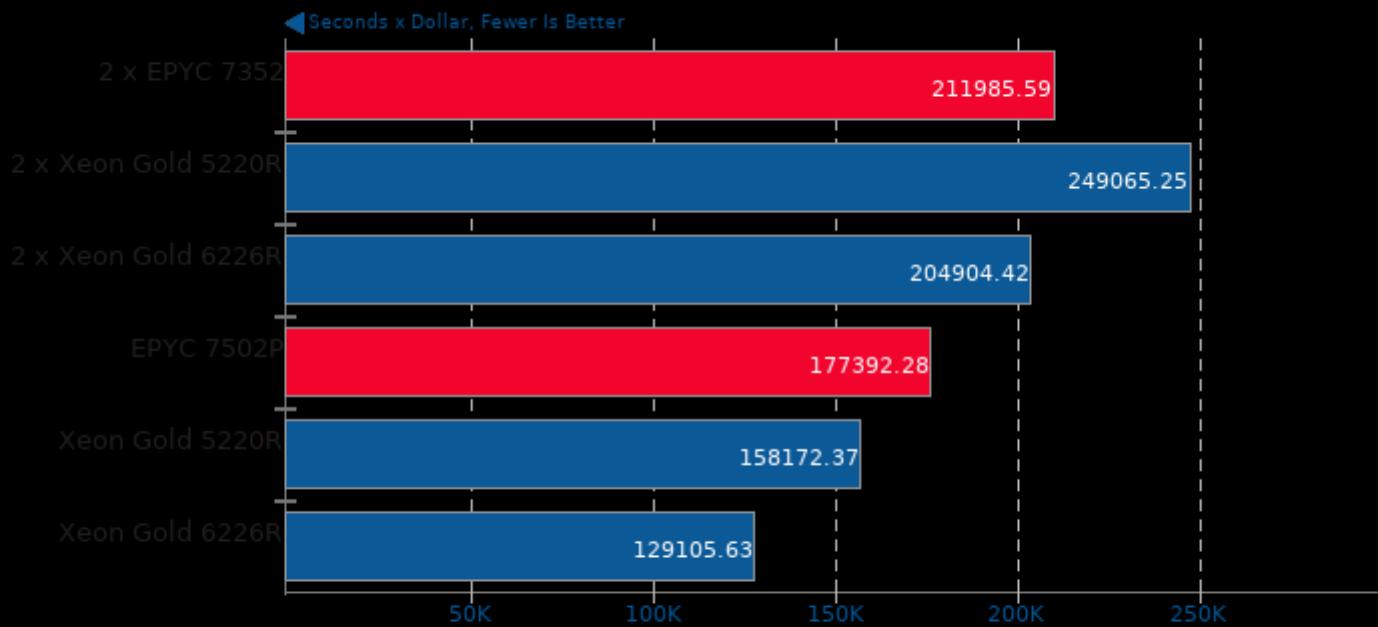
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Build2 0.12

Performance / Cost - Time To Compile



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

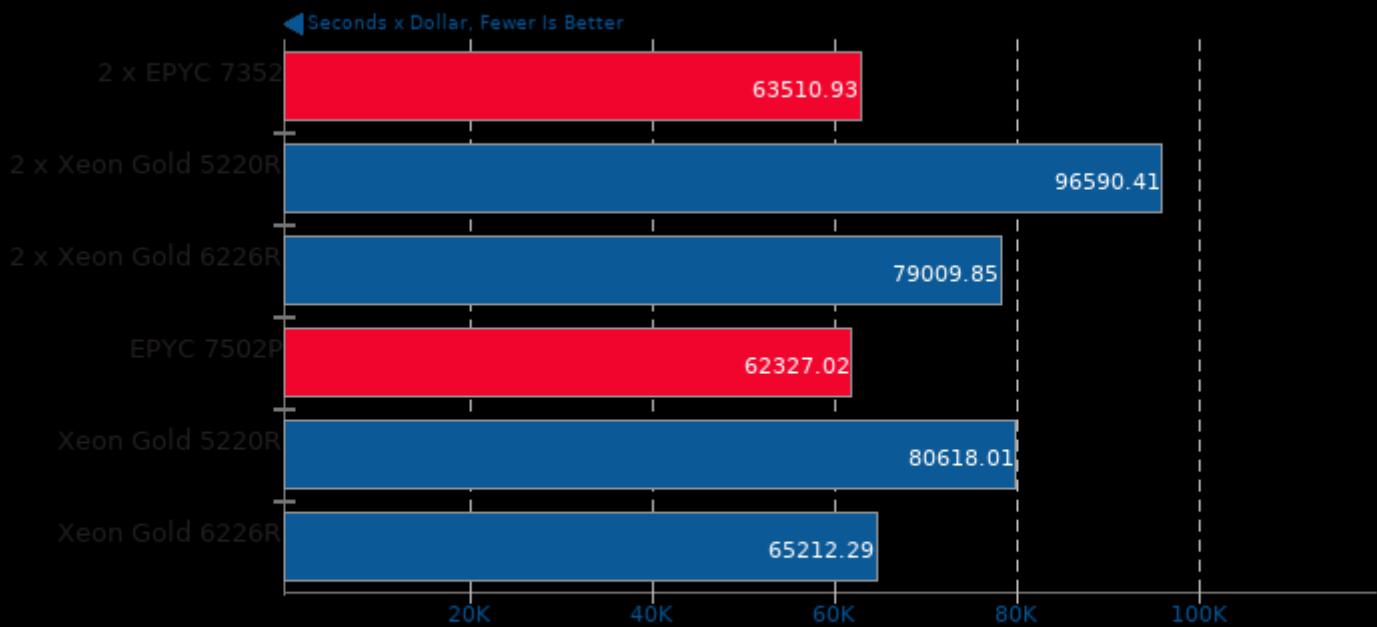
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Basis Universal 1.12

Performance / Cost - Settings: UASTC Level 3



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

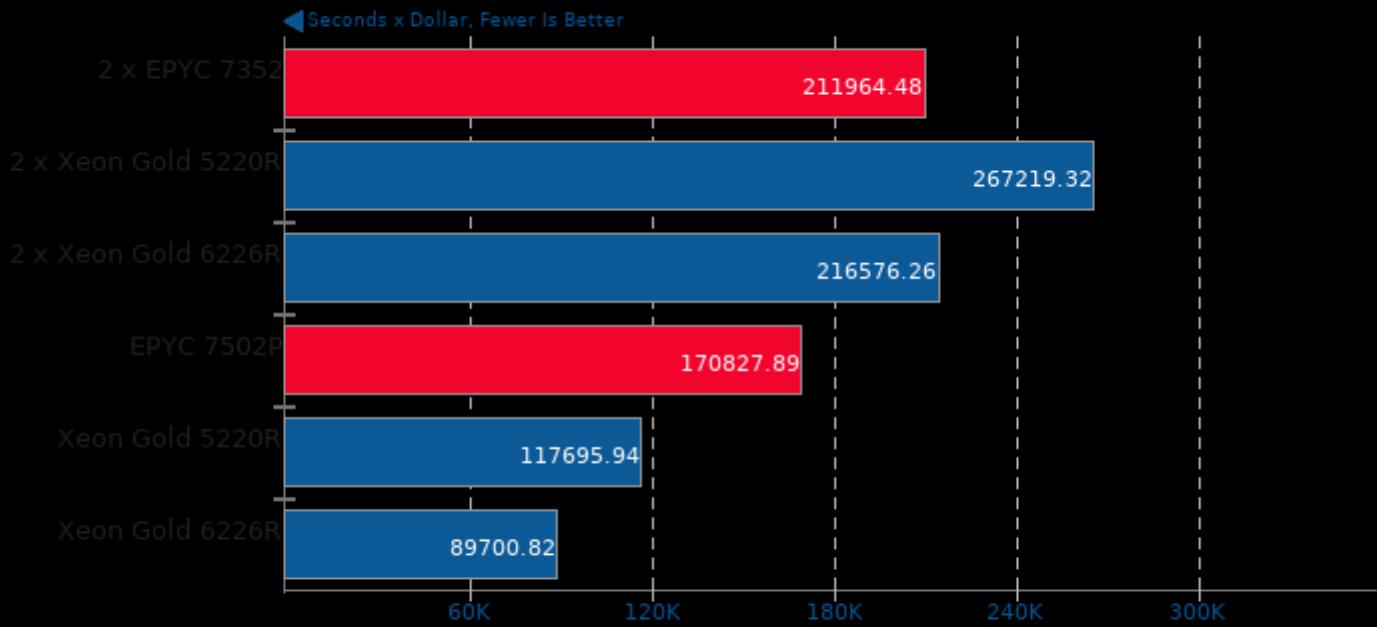
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Milpack Benchmark

Performance / Cost - Benchmark: scikit\_ica



1. 2 x EPYC 7352: \$3016 reported cost.

2. 2 x Xeon Gold 5220R: \$3452 reported cost.

3. 2 x Xeon Gold 6226R: \$2902 reported cost.

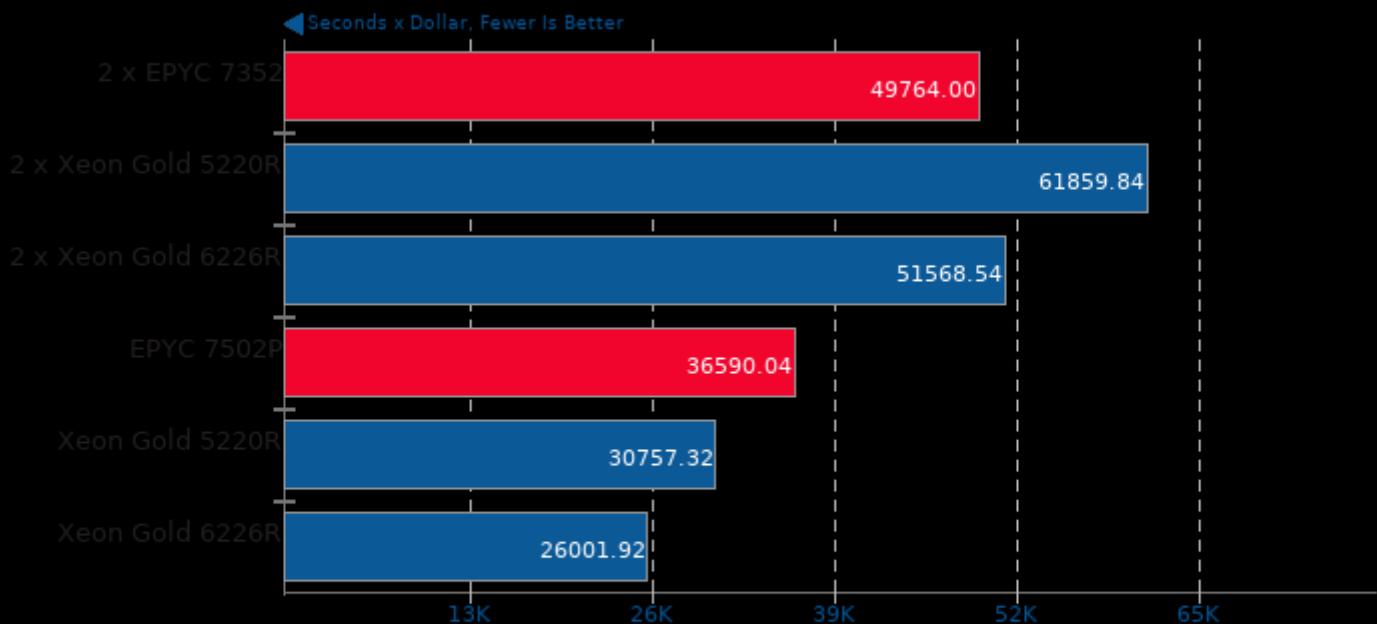
4. EPYC 7502P: \$2479 reported cost.

5. Xeon Gold 5220R: \$1726 reported cost.

6. Xeon Gold 6226R: \$1451 reported cost.

## Mlpack Benchmark

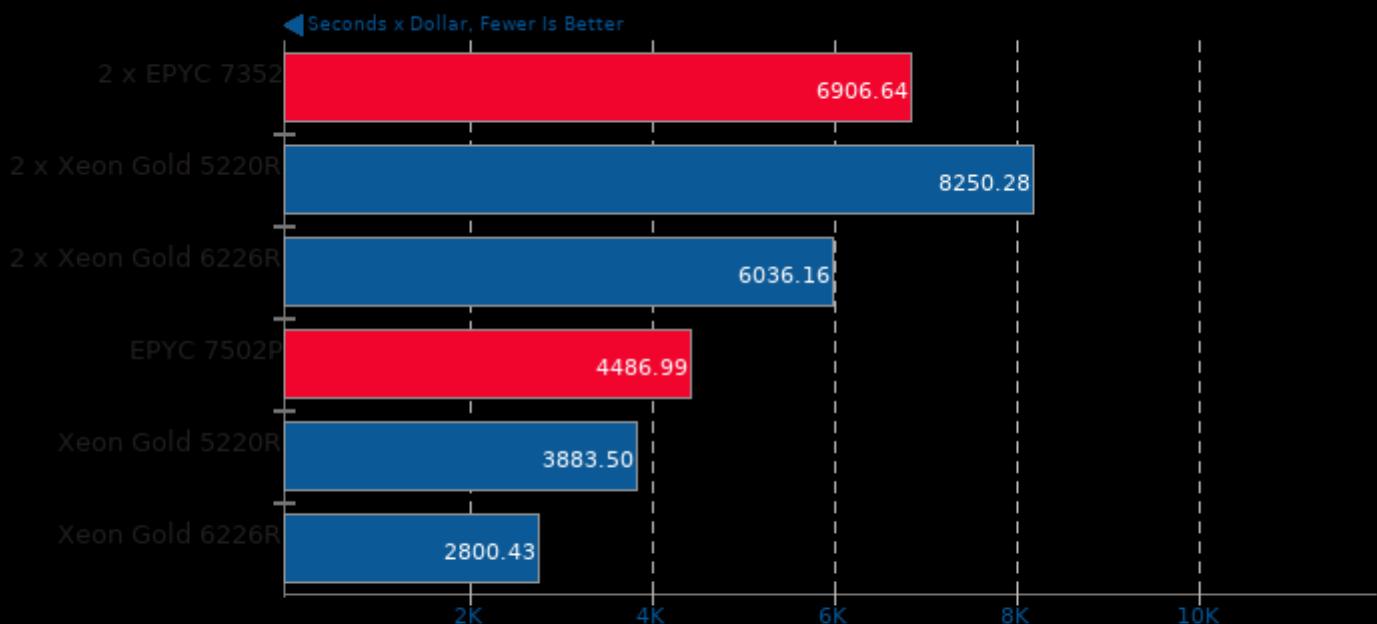
Performance / Cost - Benchmark: scikit\_svm



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

## Mlpack Benchmark

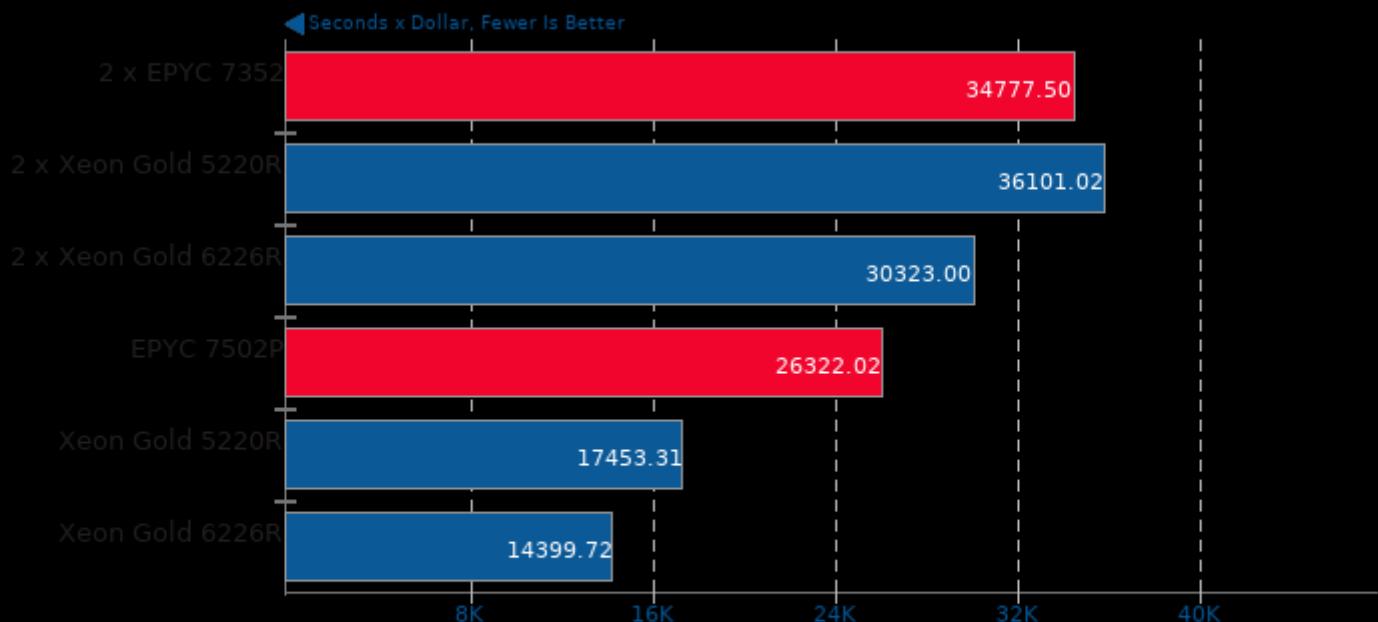
Performance / Cost - Benchmark: scikit\_linearregression



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

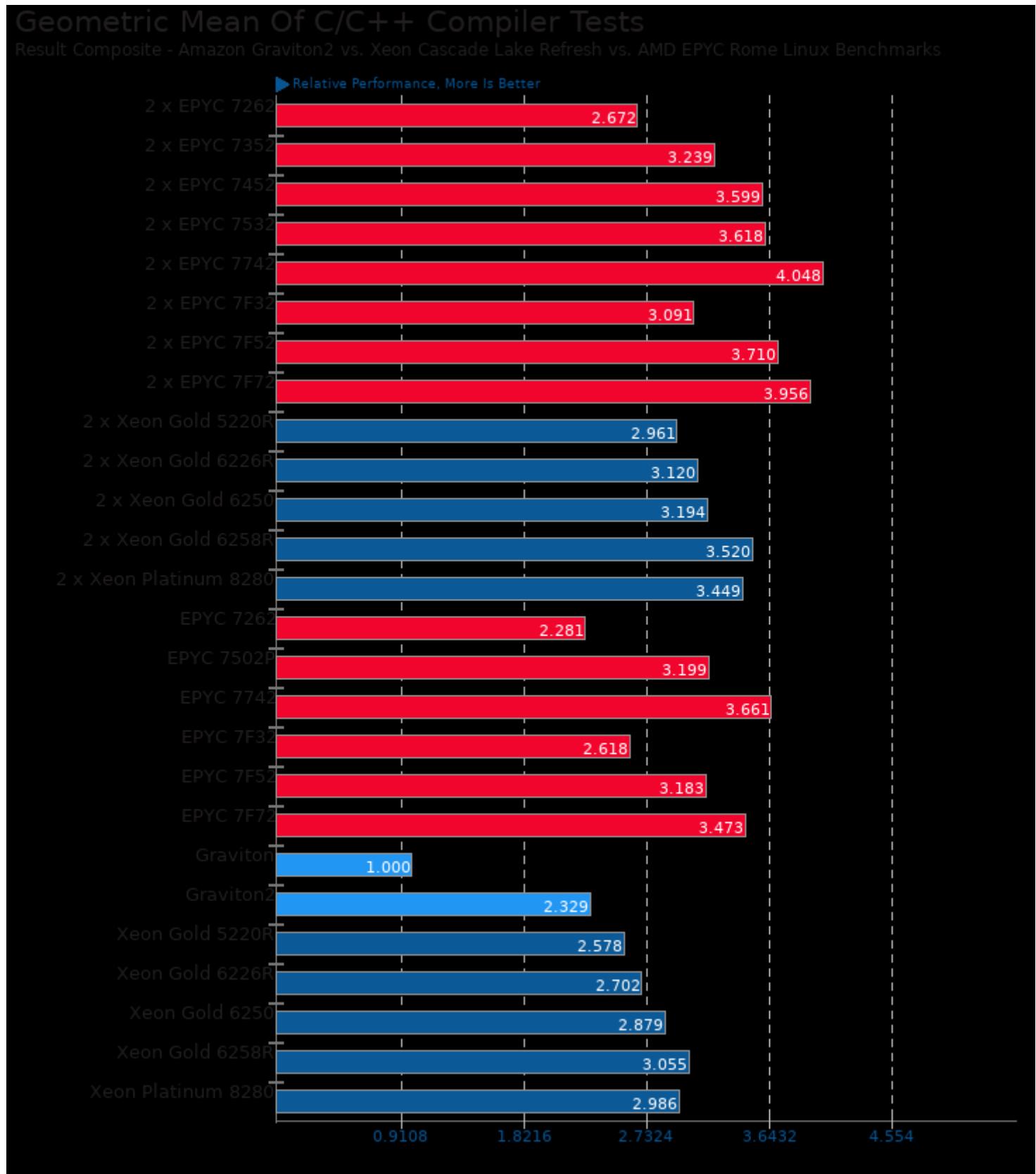
## Scikit-Learn 0.22.1

Performance / Cost -



1. 2 x EPYC 7352: \$3016 reported cost.
2. 2 x Xeon Gold 5220R: \$3452 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.

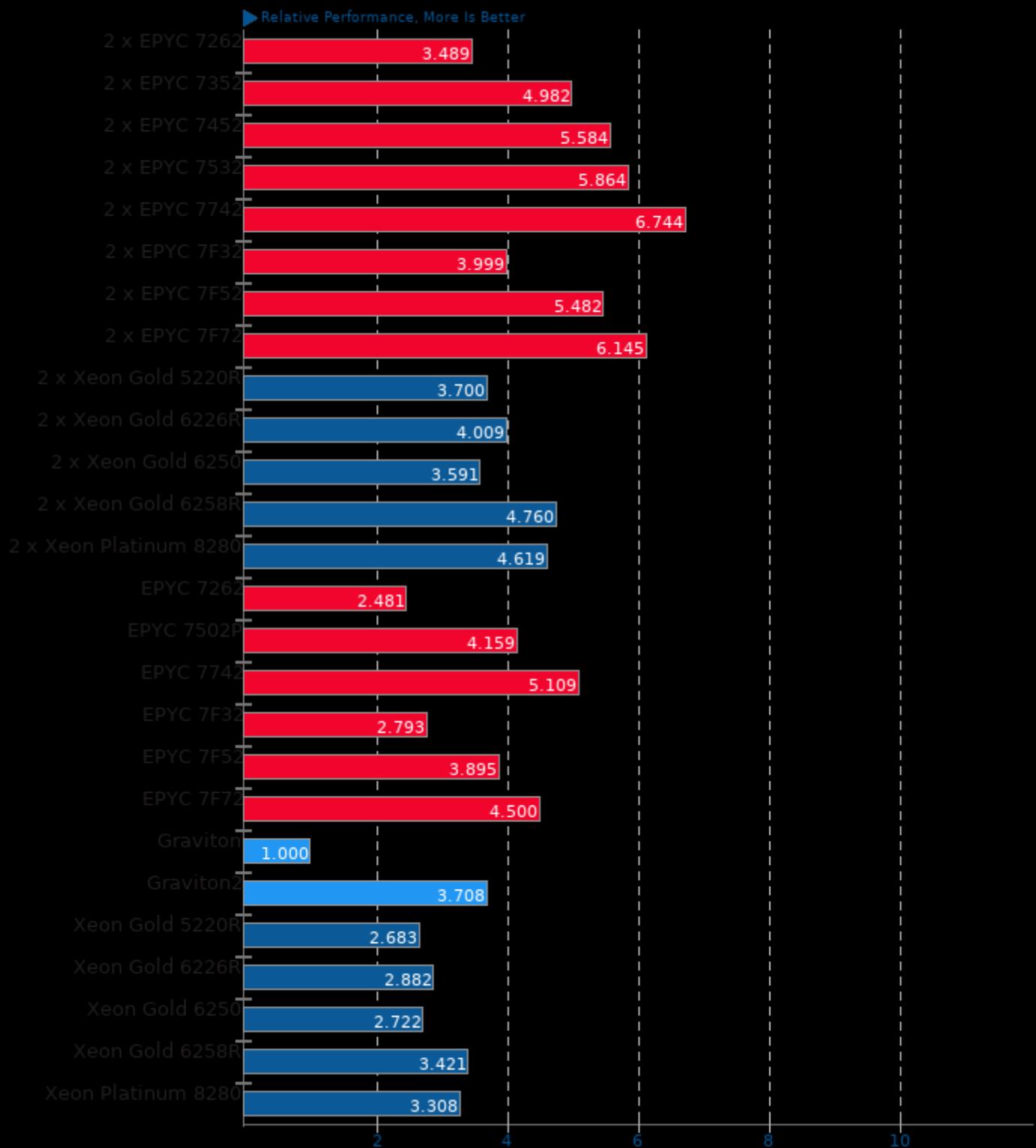
These geometric means are based upon test groupings / test suites for this result file.



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 Of CPU Massive Tests

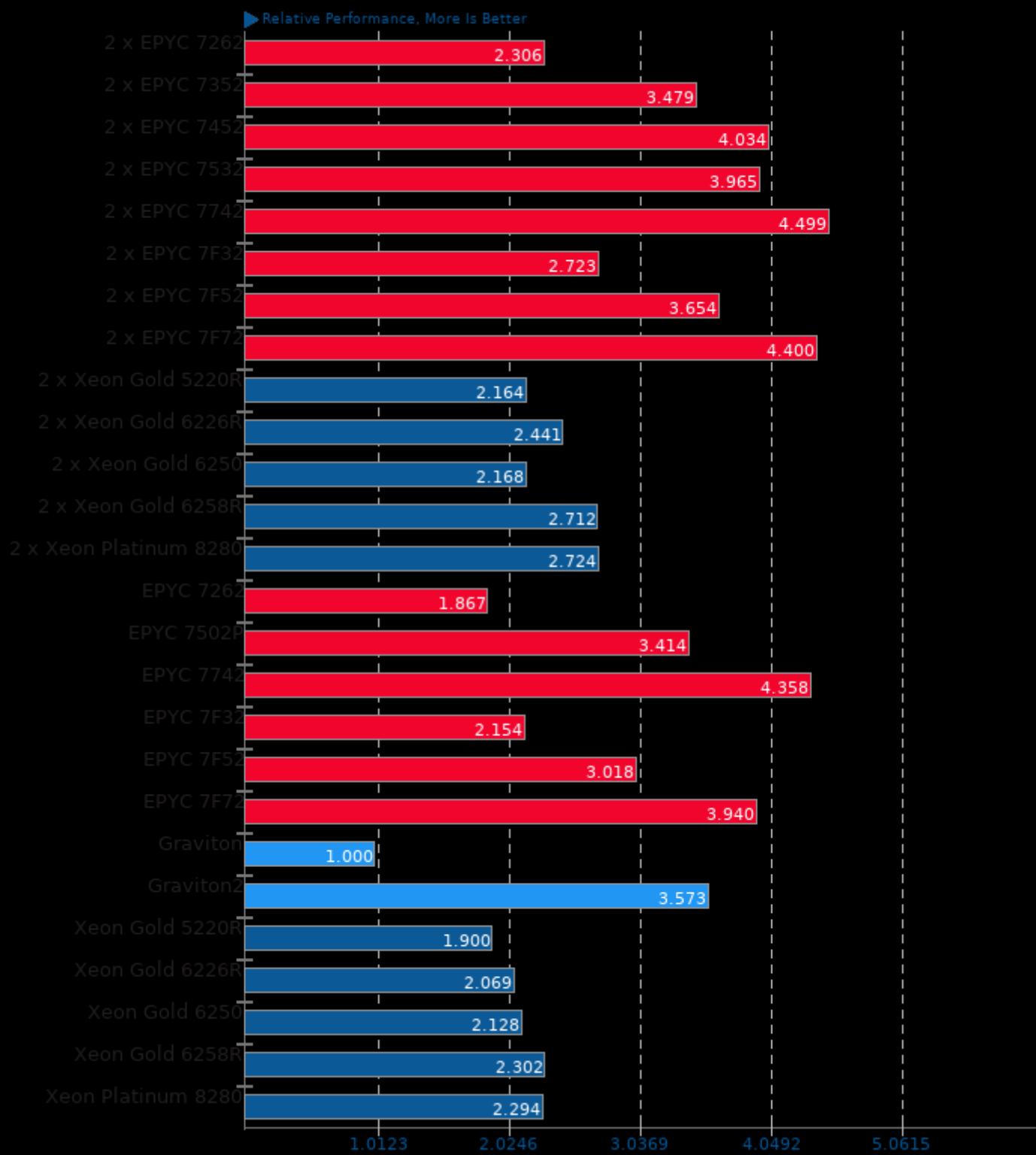
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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 Of Creator Workloads Tests

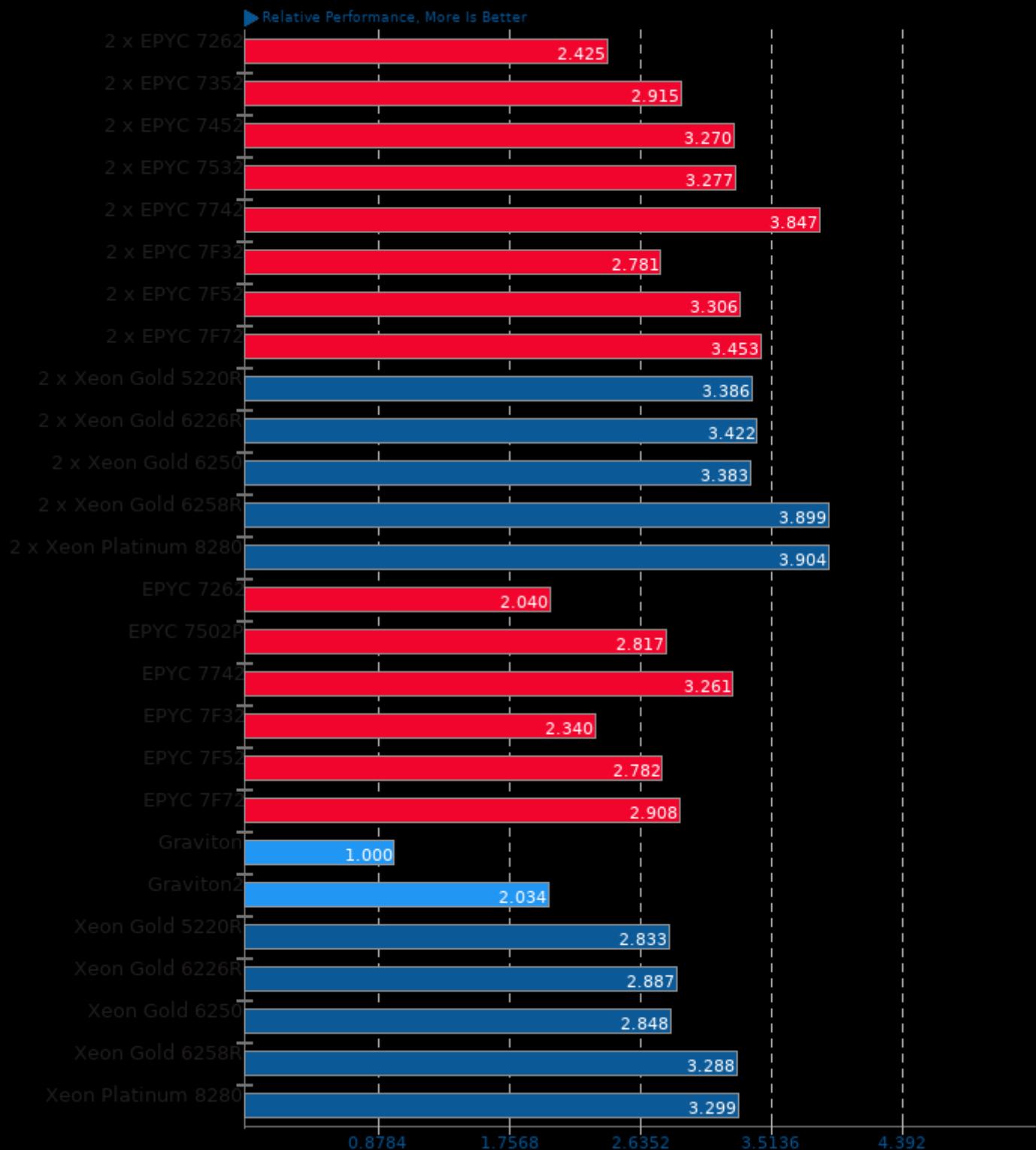
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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

## Geometric Mean Of Cryptography Tests

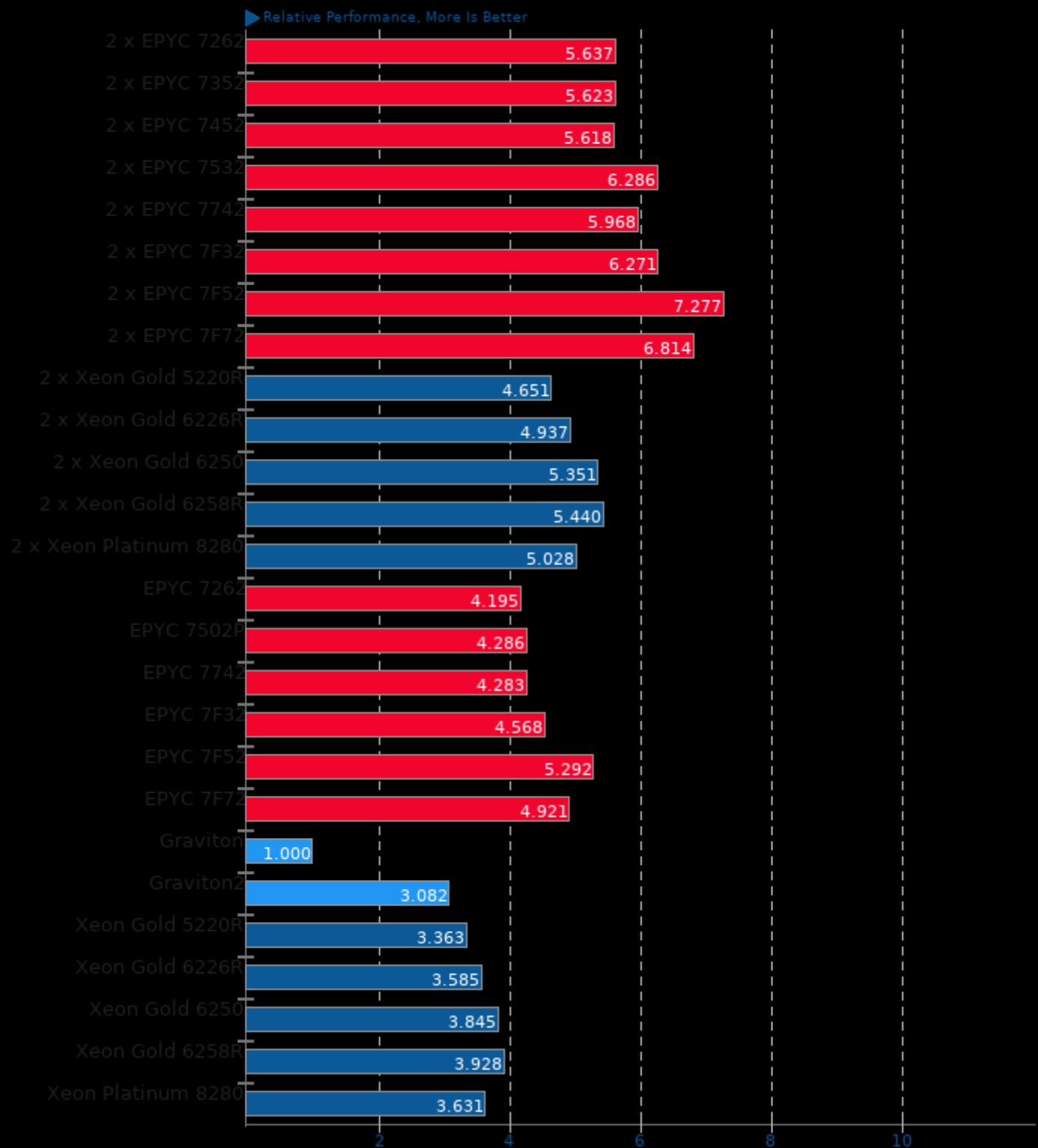
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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

## Geometric Mean Of HPC - High Performance Computing Tests

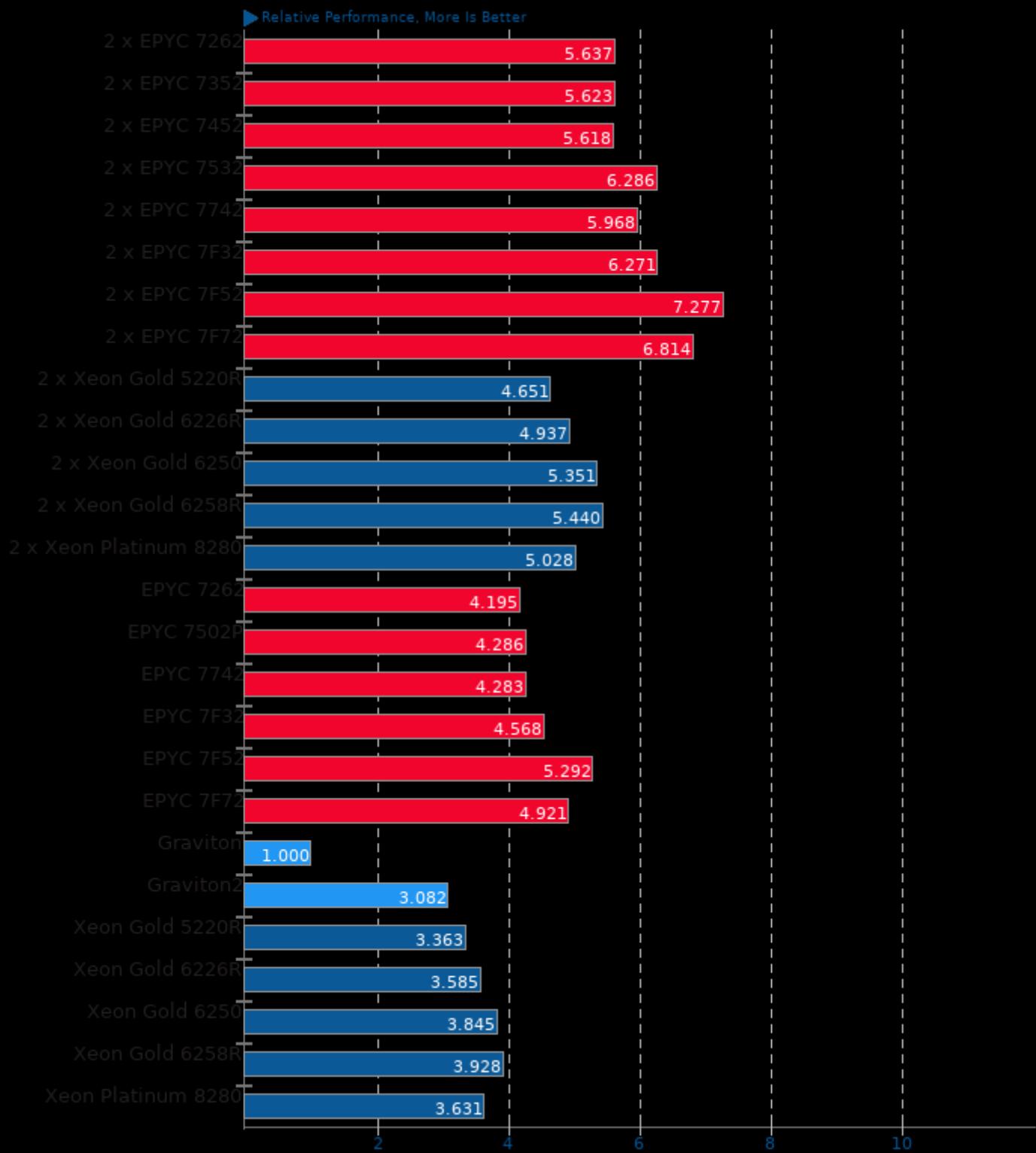
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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

## Geometric Mean Of MPI Benchmarks Tests

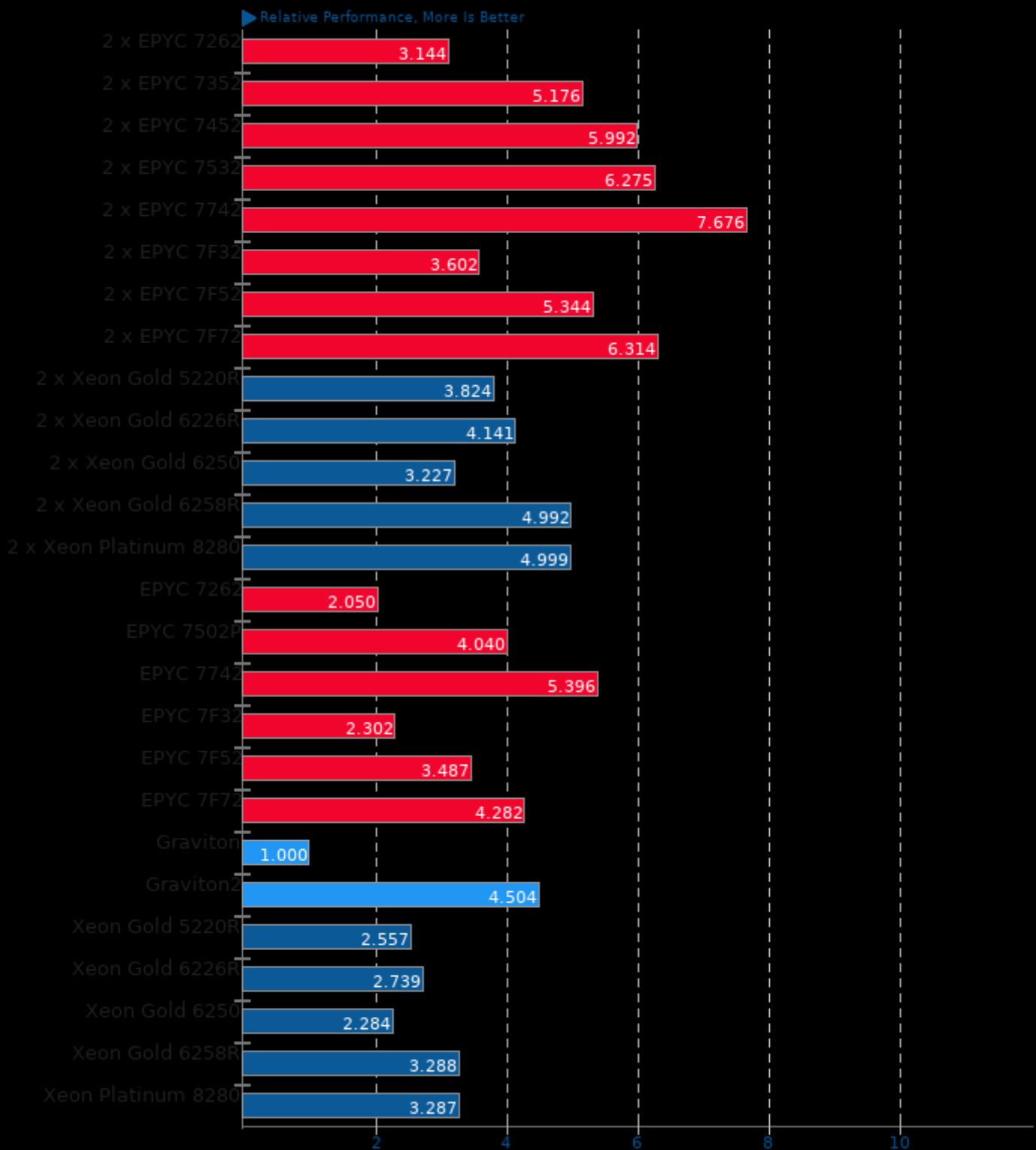
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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

## Geometric Mean Of Multi-Core Tests

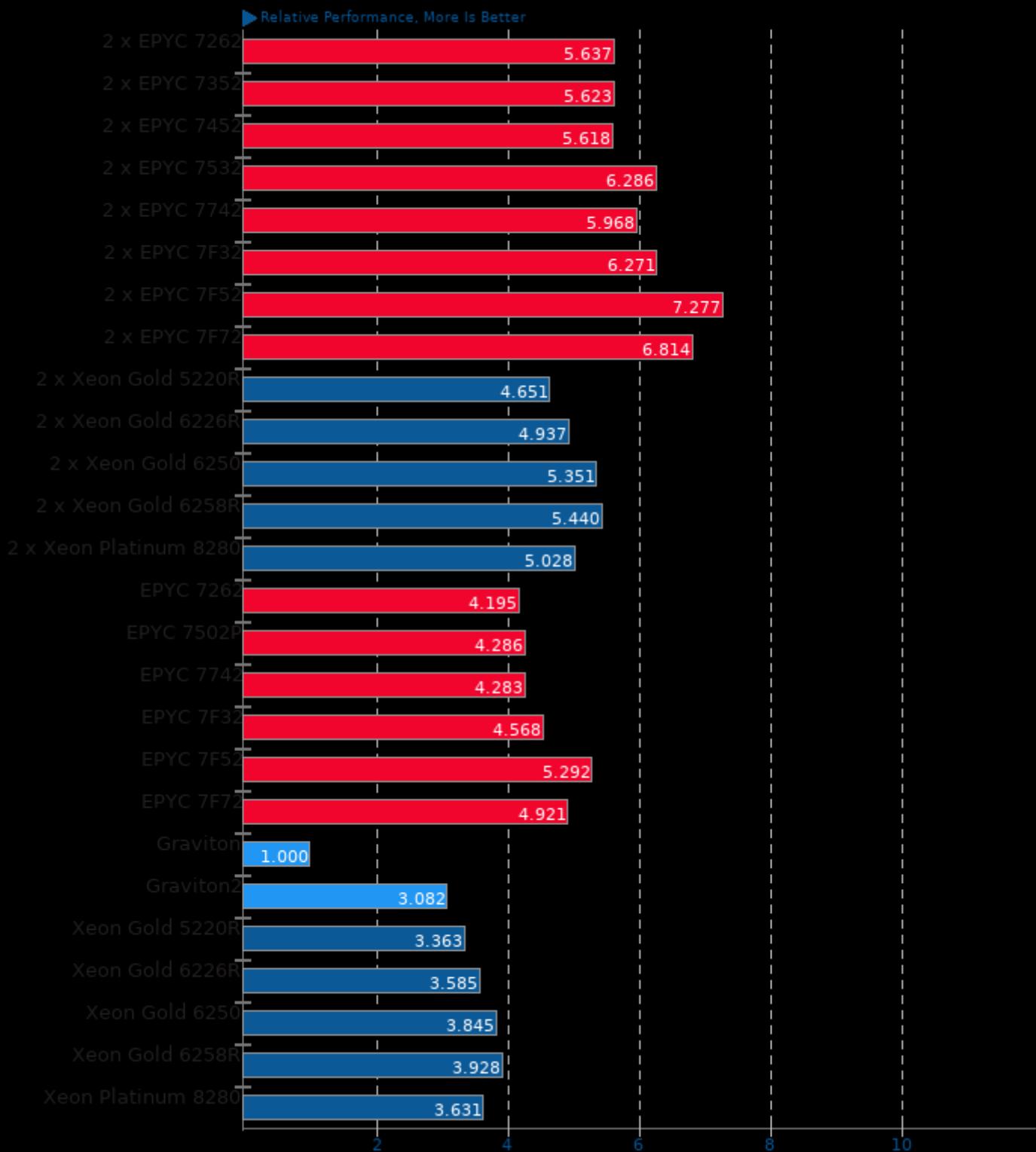
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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 Of OpenMPI Tests

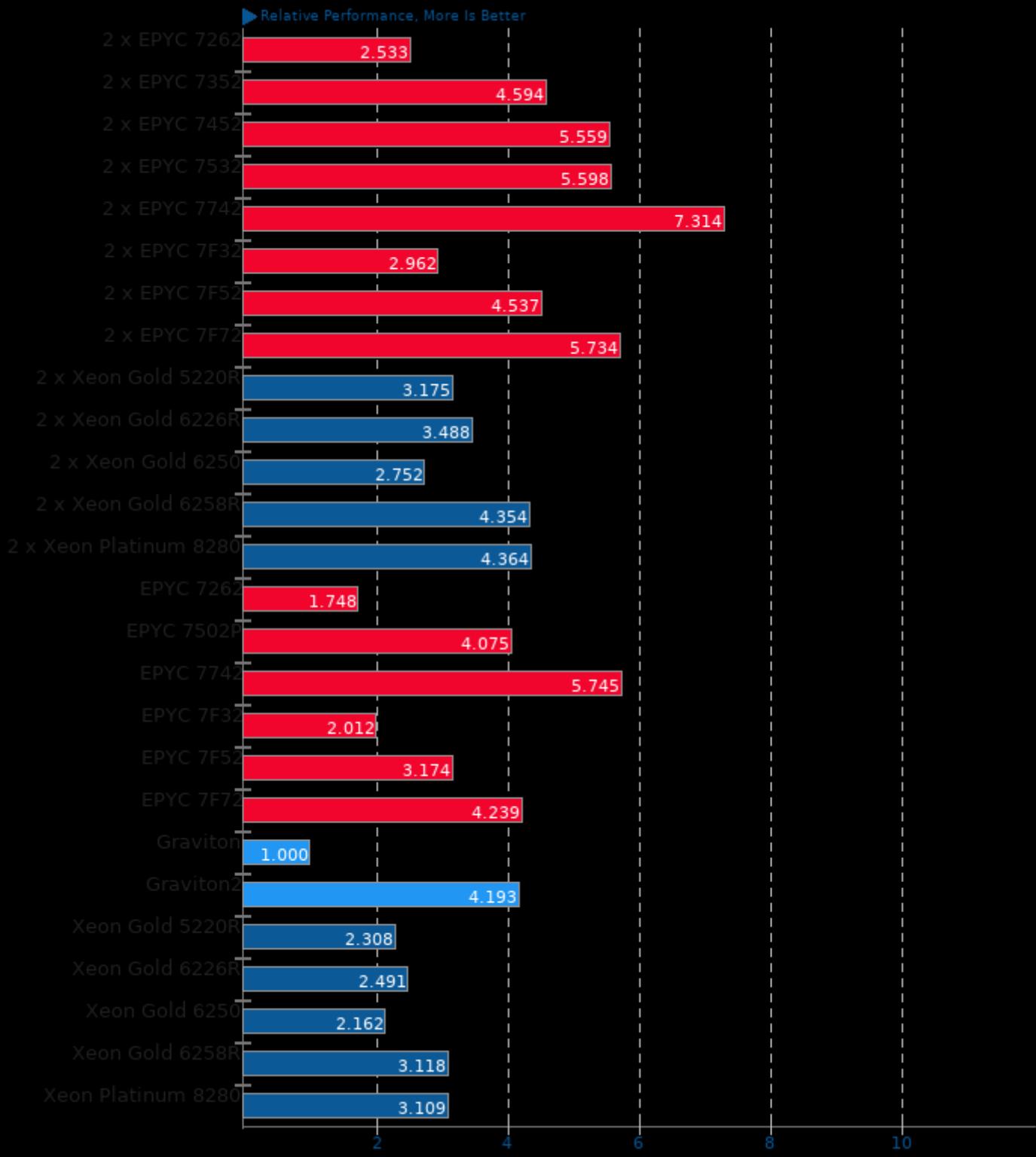
Result Composite - Amazon Graviton2 vs. Xeon Cascade Lake Refresh vs. AMD EPYC Rome Linux Benchmarks



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

## Geometric Mean Of Server CPU Tests

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



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 04:34.