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Ryzen 2700X PBO+XFR2 by Vulturex

Comparison of refurb xeons vs more modern CPUs

Automated Executive Summary

Core i9 7980XE had the most wins, coming in first place for 30% of the tests.

Based on the geometric mean of all complete results, the fastest (2 x Xeon Gold 6138) was 4.063x the speed of the slowest (Ryzen 5 2400G).

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

Flexible IO Tester (Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 592.063x
Flexible IO Tester (Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 322.113x
Schbench (Message Threads: 6 - Workers Per Message Thread: 4) at 216.761x
OpenArena (Resolution: 1920 x 1080 - Total Frame Time) at 37x
SQLite (Timed SQLite Insertions) at 19.6x
Flexible IO Tester (Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 11.857x
Tesseract (Resolution: 1920 x 1080) at 9.397x

OSBench (Test: Create Files) at 9.171x
Flexible IO Tester (Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 8.167x
Rodinia (Test: OpenMP LavaMD) at 6.934x.

Test Systems:

Ryzen 7 1700

Processor: AMD Ryzen 7 1700 Eight-Core @ 3.00GHz (8 Cores / 16 Threads), Motherboard: MSI B350 TOMAHAWK (MS-7A34) v1.0 (1.G0 BIOS), Chipset: AMD Family 17h, Memory: 16384MB, Disk: 525GB SABRENT + 120GB Samsung SSD 840, Graphics: AMD Radeon 8192MB, Audio: AMD Ellesmere, Monitor: DELL P2415Q, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.14+ + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB Protection

Ryzen 7 1800X

Processor: AMD Ryzen 7 1800X Eight-Core @ 3.60GHz (8 Cores / 16 Threads), Motherboard: MSI X370 XPOWER GAMING TITANIUM (MS-7A31) v1.0 (1.C0 BIOS), Chipset: AMD Family 17h, Memory: 16384MB, Disk: 525GB SABRENT + 120GB Force MP500, Graphics: MSI AMD Radeon RX 580 8192MB, Audio: AMD Ellesmere, Monitor: DELL P2415Q, Network: Intel I211 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.14+ + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline Protection

Ryzen 5 2400G

Processor: AMD Ryzen 5 2400G @ 3.60GHz (4 Cores / 8 Threads), Motherboard: ASUS PRIME B350M-E (3803 BIOS), Chipset: AMD Device 15d0, Memory: 16384MB, Disk: 525GB SABRENT, Graphics: ASUS AMD Radeon Vega 8

Mobile 2048MB, Audio: AMD Device 15de, Monitor: DELL P2415Q, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.14+ + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB Protection

Ryzen 5 2600X

Processor: AMD Ryzen 5 2600X Six-Core @ 3.60GHz (6 Cores / 12 Threads), Motherboard: MSI X470 GAMING M7 AC (MS-7B77) v1.0 (1.11T3 BIOS), Chipset: AMD Family 17h, Memory: 16384MB, Disk: 525GB SABRENT + 525GB Crucial_CT525MX3 + Samsung SSD 950 PRO 256GB, Graphics: MSI AMD Radeon RX 580 8192MB, Audio: AMD Ellesmere, Monitor: DELL P2415Q, Network: Qualcomm Atheros Killer E2500 Gigabit + Intel Wireless 8265 / 8275

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB Protection

Core i5 7600K

Processor: Intel Core i5-7600K @ 4.20GHz (4 Cores), Motherboard: Gigabyte Z270M-D3H-CF (F1 BIOS), Chipset: Intel Intel Kaby Lake + Z270, Memory: 16384MB, Disk: 250GB Samsung SSD 850 + 525GB SABRENT, Graphics: Intel HD 630 3072MB (1150MHz), Audio: Realtek ALC892, Monitor: DELL S2409W, Network: Intel Connection

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.14+ + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Core i5 8400

Processor: Intel Core i5-8400 @ 4.00GHz (6 Cores), Motherboard: MSI Z370M MORTAR (MS-7B54) v1.0 (1.10 BIOS), Chipset: Intel Device 3ec2, Memory: 16384MB, Disk: 525GB SABRENT + 128GB ADATA SX6000NP, Graphics: Intel HD 3072MB (1050MHz), Audio: Realtek ALC892, Monitor: DELL S2409W, Network: Intel Connection

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Core i7 8700K

Processor: Intel Core i7-8700K @ 4.70GHz (6 Cores / 12 Threads), Motherboard: ASUS PRIME Z370-A (0607 BIOS), Chipset: Intel Device 3ec2, Memory: 16384MB, Disk: 525GB SABRENT + Samsung SSD 950 PRO 256GB, Graphics: MSI AMD Radeon RX 580 8192MB, Audio: Realtek ALC1220, Monitor: DELL P2415Q, Network: Intel Connection

OS: Ubuntu 18.04, Kernel: 4.16.2-041602-generic (x86_64), Desktop: GNOME Shell 3.28.0, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Environment Notes: CXXFLAGS=-O3-march=native CFLAGS=-O3-march=native
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.14+ + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Core i7 6800K

Processor: Intel Core i7-6800K @ 3.80GHz (6 Cores / 12 Threads), Motherboard: MSI X99A WORKSTATION (MS-7A54) v1.0 (1.0C BIOS), Chipset: Intel Xeon E7 v4/Xeon, Memory: 16384MB, Disk: 2 x 120GB TOSHIBA-TR150 + 525GB SABRENT, Graphics: NV120 12288MB, Audio: Realtek ALC1150, Monitor: ASUS PB278, Network: Intel Connection

OS: Ubuntu 18.04, Kernel: 4.15.0-20-generic (x86_64), Desktop: GNOME Shell 3.28.1, Display Driver: modesetting 1.19.6, OpenGL: 4.3 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 2560x1440

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave
Graphics Notes: EXA
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

Core i9 7980XE

Processor: Intel Core i9-7980XE @ 4.40GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A (1004 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: 525GB SABRENT + 256GB INTEL SSDPEKKW256G8, Graphics: NV134 8192MB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.04, Kernel: 4.15.0-20-generic (x86_64), Desktop: GNOME Shell 3.28.1, Display Driver: modesetting 1.19.6, OpenGL: 4.3 Mesa 18.0.0-rc5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave
Graphics Notes: EXA
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

EPYC 7601

Processor: AMD EPYC 7601 32-Core @ 2.20GHz (32 Cores / 64 Threads), Motherboard: TYAN B8026T70AE24HR (V0.05.B10 BIOS), Chipset: AMD Family 17h, Memory: 129024MB, Disk: 525GB SABRENT + 280GB INTEL SSDPE21D280GA, Graphics: llvmpipe 128896MB, Monitor: VE228, Network: Broadcom Limited NetXtreme BCM5720 Gigabit PCIe

OS: Ubuntu 18.04, Kernel: 4.15.0-20-generic (x86_64), Desktop: GNOME Shell 3.28.1, Display Driver: modesetting 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 128 bits), Compiler: GCC 7.3.0, 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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: acpi-cpufreq ondemand
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline Protection

2 x Xeon Gold 6138

Processor: 2 x Intel Xeon Gold 6138 @ 3.70GHz (40 Cores / 80 Threads), Motherboard: TYAN S7106 (V1.00 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 96256MB, Disk: 525GB SABRENT + 256GB Samsung SSD 850 + 2000GB Seagate ST2000DM006-2DM1 + 2 x 120GB TOSHIBA-TR150, Graphics: llvmpipe 95360MB, Monitor: VE228, Network: Intel I210 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.15.0-20-generic (x86_64), Desktop: GNOME Shell 3.28.1, Display Driver: modesetting 1.19.6, OpenGL: 3.3 Mesa 18.0.0-rc5 (LLVM 6.0 256 bits), Compiler: GCC 7.3.0, 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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw,stripe=8191
Processor Notes: Scaling Governor: intel_pstate powersave
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline Protection

R7 2700X PBO+XFR2

Processor: AMD Ryzen 7 2700X Eight-Core @ 3.98GHz (8 Cores / 16 Threads), Motherboard: ASRock X370 Taichi

(L4.64 BIOS), Chipset: AMD Family 17h, Memory: 16384MB, Disk: 500GB Samsung SSD 850 + 125GB Corsair Neutron + 1000GB Seagate ST1000LM024 HN-M, Graphics: AMD Radeon R9 290X/390X 4096MB, Audio: AMD Hawaii HDMI Audio, Monitor: 2460G4, Network: Intel I211 Gigabit Connection

OS: Ubuntu 18.04, Kernel: 4.15.0-20-generic (x86_64), Desktop: GNOME Shell 3.28.1, Display Driver: modesetting 1.19.6, OpenGL: 4.5 Mesa 18.0.0-rc5 (LLVM 6.0.0), Compiler: GCC 7.3.0 + Clang 6.0.0-1ubuntu2, 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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-as=/usr/bin/x86_64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/x86_64-linux-gnu-ld --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Disk Notes: CFQ / data=ordered,errors=remount-ro,relatime,rw
Graphics Notes: GLAMOR
Python Notes: Python 2.7.15rc1 + Python 3.6.5
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB Protection

2x Xeon E5-2660 v3

Processor: 2 x Intel Xeon E5-2660 v3 (20 Cores / 40 Threads), Motherboard: Red Hat KVM (1.13.0-2.module_el8.3.0+555+a55c8938 BIOS), Memory: 16GB, Disk: 92GB, Graphics: qxldrmfb, Audio: QEMU Generic

OS: CentOS Linux 8, Kernel: 4.18.0-240.15.1.el8_3.x86_64 (x86_64), Compiler: GCC 8.3.1 20191121, File-System: xfs, Screen Resolution: 1024x768, System Layer: KVM

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=x86_64-redhat-linux --disable-libmpx --disable-libunwind-exceptions --enable-__cxa_atexit --enable-bootstrap --enable-cet --enable-checking=release --enable-gnu-indirect-function --enable-gnu-unique-object --enable-initfini-array --enable-languages=c,c++,fortran,lto --enable-multilib --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-arch_32=x86-64 --with-gcc-major-version-only --with-isl --with-linker-hash-style=gnu --with-tune=generic --without-cuda-driver
Processor Notes: CPU Microcode: 0x44
Disk Mount Options Notes: attr2,inode64,logbsize=32k,logbufs=8,noquota,relatime,rw,seclabel
Disk Details Notes: Block Size: 4096
Java Notes: OpenJDK Runtime Environment (build 1.8.0_275-b01)
Python Notes: Python 3.6.8
Security Notes: SELinux + itlb_multihit: Not affected + l1tf: Mitigation of PTE Inversion; VMX: flush not necessary SMT vulnerable + mds: Mitigation of Clear buffers; SMT Host state unknown + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	Ryzen 7 1700	Ryzen 7 1800X	Ryzen 5 2400G	Ryzen 5 2600X	Core i5 7600K	Core i5 8400	Core i7 8700K	Core i7 6800K	Core i9 7980XE	EPYC 7601	2 x Xeon Gold 6138	R7 2700X PBO+XFR2	2x Xeon E5-2660 v3
Blender - Barbershop - CPU-Only (sec)	1425	1253	2501	1513	**3111**	2086	1286					1089	**763.77**
Normalized	53.61%	60.97%	30.54%	50.48%	24.55%	36.61%	59.39%					70.14%	100%

Ryzen 2700X PBO+XFR2 by Vulturex

Rodinia - OpenMP CFD Solver (sec)	30.31	28.01	45.68	30.92	**60.21**	36.73	29.57					**23.54**	30.977
Normalized	77.66%	84.04%	51.53%	76.13%	39.1%	64.09%	79.61%					100%	75.99%
Standard Deviation	0.4%	0.6%	0.6%	0.6%	0.1%	0.3%	0.2%					1.8%	11%
Rodinia - OpenMP LavaMD (sec)	102.19	88.33	176.53	110.39	**187.78**	130.89	97.88					81.54	**27.082**
Normalized	26.5%	30.66%	15.34%	24.53%	14.42%	20.69%	27.67%					33.21%	100%
Standard Deviation	0.3%	0.1%	0.1%	0.4%	0.1%	0.1%	0.2%					0.5%	1.4%
Timed Linux Kernel Compilation - Time To Compile (sec)	92.75	81.51	151.48	94.94	**157.96**	107.09	77.99	100.26	37.29	38.65	**29.90**	68.90	
Normalized	32.24%	36.68%	19.74%	31.49%	18.93%	27.92%	38.34%	29.82%	80.18%	77.36%	100%	43.4%	
Standard Deviation	1.7%	1.5%	0.6%	0.7%	1%	1.2%	1.4%	2%	4.1%	5.3%	5.7%	1.3%	
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	328.96	374.90	212.75	326.89	**196.13**	275.14	**407.18**					390.65	314.918
Normalized	80.79%	92.07%	52.25%	80.28%	48.17%	67.57%	100%					95.94%	77.34%
Standard Deviation	0.2%	1%	1.2%	0.4%	0.1%	0.2%	0.4%					1.5%	10.7%
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS/Watt)		2.64		**2.09**			**3.28**						
Normalized		80.49%		63.72%			100%						
x264 - H.2.V.E (FPS)	64.53	74.18	33.96	63.98	**33.13**	55.05	73.45	54.60	**117.69**	108.16	108.85	72.58	101.81
Normalized	54.83%	63.03%	28.86%	54.36%	28.15%	46.78%	62.41%	46.39%	100%	91.9%	92.49%	61.67%	86.51%
Standard Deviation	0.1%	0.4%	3.4%	0.8%	3.3%	5.4%	0.6%	3.2%	17.9%	0.7%	2.1%	39%	0.7%
x264 - H.2.V.E (FPS/Watt)				**0.34**			**0.58**						
Normalized				58.62%			100%						
asmFish - 1.H.M.2.D (Nodes/s)	20805172	24348262	12394779	19758238	**10303238**	15702325	22956730					27772971	**45492169**
Normalized	45.73%	53.52%	27.25%	43.43%	22.65%	34.52%	50.46%					61.05%	100%
Standard Deviation	0.6%	2.2%	2.3%	1%	0.5%	0.6%	1.4%					1.8%	2.7%
asmFish - 1.H.M.2.D (Nodes/s/Watt)		130186		**103590**			**158630**						
Normalized		82.07%		65.3%			100%						
C-Ray - Total Time (sec)	9.62	8.31	**17.58**	10.41	16.55	11.74	9.57					8.89	**5.949**
Normalized	61.84%	71.59%	33.84%	57.15%	35.95%	50.67%	62.16%					66.92%	100%
Standard Deviation	0.1%	0.1%	3.2%	0.2%	0.1%	0.1%	0.1%					0.2%	0.7%
POV-Ray - Trace Time	63.58	55.43	109.56	65.55	**123.63**	86.66	60.84					48.41	**33.168**
Normalized	52.17%	59.84%	30.27%	50.6%	26.83%	38.27%	54.52%					68.51%	100%
Standard Deviation	0.2%	0.3%	0.4%	0.3%	0.4%	0.1%	0.3%					0.3%	0.2%

Ryzen 2700X PBO+XFR2 by Vulturex

OpenSSL - R.4.b.P (Signs/sec)	1381	1597		1286	**1154**	1673	1969					1745	**2604**
Normalized	53.03%	61.35%		49.39%	44.33%	64.24%	75.62%					67.03%	100%
Standard Deviation	0.2%	0%		0.1%	2.9%	0%	0.6%					0.2%	0%
OpenSSL - R.4.b.P (Signs/sec/Watt		10.28		**8.27**			**15.58**						
Normalized		65.98%		53.08%			100%						
7-Zip Compression - C.S.T (MIPS)	33486	37132	19277	32838	**17581**	26577	39379					46732	**68385**
Normalized	48.97%	54.3%	28.19%	48.02%	25.71%	38.86%	57.58%					68.34%	100%
Standard Deviation	0.1%	0.3%	0.5%	0.6%	0.1%	0.1%	0.8%					0.8%	2.5%
7-Zip Compression - C.S.T (MIPS/Watt)		228.59		**197.71**			**319.36**						
Normalized		71.58%		61.91%			100%						
Go Benchmarks -	7949240	6915520	**13786517**	8490690	1200834	8380235	7222159	9522295	3150158	3260295	**2599034**	6372873	4495194
Normalized	32.7%	37.58%	18.85%	30.61%	21.64%	31.01%	35.99%	27.29%	82.5%	79.72%	100%	40.78%	57.82%
Standard Deviation	0.4%	0.4%	1.5%	0.5%	0.2%	0.1%	0.3%	0.3%	0.3%	0.7%	1.8%	0.5%	1.2%
Redis - SET (Reqs/sec)	1547807	1773566	1743878	1813953	2210883	2204307	**2523606**					1620157	**1262484**
Normalized	61.33%	70.28%	69.1%	71.88%	87.61%	87.35%	100%					64.2%	50.03%
Standard Deviation	3.2%	5.6%	2.4%	1.2%	0.9%	0.6%	1.7%					1.6%	2.5%
Redis - GET (Reqs/sec)	2055336	2373722	2419508	2489722	3028286	2918360	**3344783**					2120660	**1531270**
Normalized	61.45%	70.97%	72.34%	74.44%	90.54%	87.25%	100%					63.4%	45.78%
Standard Deviation	4.1%	1.4%	1%	0.8%	2.3%	0.6%	4.2%					1.9%	4.2%
TTSIOD 3D Renderer - Performance / Cost - P.R.W.S.S.M (FPS/Dollar)	1.27	1.18	1.33	1.43	**0.84**	**1.55**	1.17						
Normalized	81.94%	76.13%	85.81%	92.26%	54.19%	100%	75.48%						
x264 - Performance / Cost - H.2.V.E (FPS/Dollar)	0.25	0.23	0.21	0.28	**0.14**	**0.31**	0.21						
Normalized	80.65%	74.19%	67.74%	90.32%	45.16%	100%	67.74%						
asmFish - Performance / Cost - 1.H.M.2.D	80329	76327	77467	86281	**44031**	**88215**	65779						
Normalized	91.06%	86.52%	87.82%	97.81%	49.91%	100%	74.57%						

Ryzen 2700X PBO+XFR2 by Vulturex

OpenSSL - Performance / Cost - R.4.b.P (Signs/sec/Dollar)	5.33	5.01		5.62	**4.93**	**9.40**	5.64					
Normalized	56.7%	53.3%		59.79%	52.45%	100%	60%					
7-Zip Compression - Performance / Cost - C.S.T (MIPS/Dollar)	129.29	116.40	120.48	143.40	**75.13**	**149.31**	112.83					
Normalized	86.59%	77.96%	80.69%	96.04%	50.32%	100%	75.57%					
Redis - Performance / Cost - SET (Reqs/sec/Dollar)	5976	**5560**	10899	7921	9448	**12384**	7231					
Normalized	48.26%	44.9%	88.01%	63.96%	76.3%	100%	58.39%					
Redis - Performance / Cost - GET (Reqs/sec/Dollar)	7936	**7441**	15122	10872	12941	**16395**	9584					
Normalized	48.4%	45.39%	92.23%	66.31%	78.93%	100%	58.46%					
SQLite - T.S.I (sec)							**31.24**	31.29	47.24	32.01	**612.31**	293.481
Normalized							100%	99.84%	66.13%	97.59%	5.1%	10.64%
Standard Deviation							0.2%	0.3%	0.9%	0.9%	3.2%	0.2%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (MB/s)							166	179	26.03	177	**0.63**	**373**
Normalized							44.5%	47.99%	6.98%	47.45%	0.17%	100%
Standard Deviation							0.7%	0.3%	3.4%	3.3%	1.7%	10.9%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (IOPS)							**42600**	45733		44967		**95333**
Normalized							44.69%	47.97%		47.17%		100%
Standard Deviation							1%	0.3%		2%		11%

Ryzen 2700X PBO+XFR2 by Vulturex

Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (MB/s)	145	152	23.40	153	**0.64**	**206.152**
Normalized	70.34%	73.73%	11.35%	74.22%	0.31%	100%
Standard Deviation		2.5%	0%		0.9%	100.3%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (IOPS)	**37200**	38800		38967		**103017**
Normalized	36.11%	37.66%		37.83%		100%
Standard Deviation		2.5%		0.4%		7.7%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (MB/s)	231	254	**30.53**	247	54.03	**362**
Normalized	63.81%	70.17%	8.43%	68.23%	14.93%	100%
Standard Deviation			0.2%		0.6%	11.5%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (IOPS)	59133	64633		63233	**13800**	**92550**
Normalized	63.89%	69.84%		68.32%	14.91%	100%
Standard Deviation	0.1%	0.9%		0.1%	0.7%	11.5%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (MB/s)	205	216	**26.57**	**217**	50.37	58.0
Normalized	94.47%	99.54%	12.24%	100%	23.21%	26.73%
Standard Deviation	0.6%	1.3%	0.6%	3.2%	2%	59.3%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (IOPS)	52633	55300		**55667**	**12867**	20200
Normalized	94.55%	99.34%		100%	23.11%	36.29%
Standard Deviation	0.5%	1.4%		3.2%	2%	45.5%
FS-Mark - 1.F.1.S (Files/s)	150.90	**154.93**	21.45	142.60	**16.40**	
Normalized	97.4%	100%	13.84%	92.04%	10.59%	
Standard Deviation	3.2%	3.3%	7.4%	3.2%	3.4%	

Ryzen 2700X PBO+XFR2 by Vulturex

FS-Mark - 5.F.1.S.4.T (Files/s)	**200.40**	167.53	**20.40**	169.13	25.33
Normalized	100%	83.6%	10.18%	84.4%	12.64%
Standard Deviation	1.7%	16.1%	3.4%	12.7%	4.8%
Compile Bench - Compile	**758.83**	936.10	1608	**1710**	
Normalized	44.38%	54.75%	94.04%	100%	
Standard Deviation	3.5%	1.8%	3.7%	0.7%	
Compile Bench - Initial Create (MB/s)	418.55	**522.94**	**355.54**	488.65	
Normalized	80.04%	100%	67.99%	93.44%	
Standard Deviation	11.1%	11.3%	8.5%	2.1%	
OpenArena - 1920 x 1080 (FPS)	145.67	**86.93**			**388.30**
Normalized	37.51%	22.39%			100%
Standard Deviation	0.2%	0.1%			0.9%
Tesseract - 1920 x 1080	99.94	**47.28**			**444.27**
Normalized	22.5%	10.64%			100%
Standard Deviation	0.3%	0.3%			2.7%
ParaView - Many Spheres - 1920 x 1080 (Frames / Sec)	10.29	**6.51**			**20.87**
Normalized	49.31%	31.19%			100%
Standard Deviation	0.1%	0.1%			0.4%
ParaView - Many Spheres - 1920 x 1080 (MiPolys / Sec)	1032	**652.03**			**2092**
Normalized	49.33%	31.16%			100%
Standard Deviation	0%	0.1%			0.4%
ParaView - Wavelet Volume - 1920 x 1080 (Frames	93.89	**81.35**			**248.68**
Normalized	37.76%	32.71%			100%
Standard Deviation	0.9%	1.7%			1.5%
ParaView - Wavelet Volume - 1920 x 1080	1502	**1302**			**3979**
Normalized	37.76%	32.71%			100%
Standard Deviation	0.9%	1.7%			1.5%

Ryzen 2700X PBO+XFR2 by Vulturex

ParaView - Wavelet Contour - 1920 x 1080 (Frames	68.04	**43.86**			**148.06**	
Normalized	45.95%	29.62%			100%	
Standard Deviation	0%	0%			3%	
ParaView - Wavelet Contour - 1920 x 1080 (MiPolys	709.09	**457.03**			**1543**	
Normalized	45.96%	29.62%			100%	
Standard Deviation	0%	0%			3%	
Timed MAFFT Alignment - M.S.A (sec)	3.65	**2.71**	3.69	**3.97**	2.89	3.416
Normalized	74.25%	100%	73.44%	68.26%	93.77%	79.33%
Standard Deviation	4.6%	6.9%	6.5%	15.6%	21.3%	9.6%
Go Benchmarks -	6459	5702	**20759**	8577	**5165**	7963
Normalized	79.97%	90.58%	24.88%	60.22%	100%	64.86%
Standard Deviation	0.1%	2.1%	0.5%	0.3%	0.4%	2.2%
Go Benchmarks -	178247 64504	**173980 68397**	234126 88103	214494 88561	174865 90239	**348225 39880**
Normalized	97.61%	100%	74.31%	81.11%	99.49%	49.96%
Standard Deviation	2.3%	3.2%	2.8%	1.2%	34.7%	0.9%
Go Benchmarks - garbage (ns/op)	**197365 1**	**706998**	874422	873338	130130 7	136460 6
Normalized	35.82%	100%	80.85%	80.95%	54.33%	51.81%
Standard Deviation	0.3%	0.3%	0.6%	1.9%	0.5%	0.5%
Java SciMark - Composite (Mflops)	2409	2415	2168	2216	**2942**	**1800**
Normalized	81.89%	82.1%	73.69%	75.33%	100%	61.18%
Standard Deviation	0.3%	1.3%	3.4%	1.2%	1.6%	1.7%
Java Gradle Build - Reactor (sec)	22.06	**21.54**	**26.68**	23.51	22.64	
Normalized	97.64%	100%	80.73%	91.62%	95.14%	
Standard Deviation	1.9%	3.1%	0.5%	1%	17.8%	
Botan - AES-256 - Encrypt (MiB/s)	3370	4041	4365	**3364**	**5990**	
Normalized	56.27%	67.47%	72.87%	56.16%	100%	
Standard Deviation	0.1%	3%	2.6%	0.7%	0.8%	

Ryzen 2700X PBO+XFR2 by Vulturex

Himeno Benchmark - P.P.S (MFLOPS)	2193	**2992**	**1025**	2596	1372	1820
Normalized	73.31%	100%	34.27%	86.78%	45.85%	60.82%
Standard Deviation	0.2%	2.5%	0.3%	0.3%	0.3%	0.3%
ebizzy (Records/s)	**213037**	634965	**1131951**	974667	574496	564805
Normalized	18.82%	56.09%	100%	86.11%	50.75%	49.9%
Standard Deviation	6.1%	5.8%	3.3%	5.4%	5.7%	5.9%
Stockfish - Total Time (ms)	3512	**2979**	**4508**	3727	3259	3794
Normalized	84.82%	100%	66.08%	79.93%	91.41%	78.52%
Standard Deviation	2.5%	0.1%	0.3%	1%	0.2%	0.5%
FLAC Audio Encoding - WAV To FLAC	10.82	**10.10**	**20.34**	11.60	11.71	13.354
Normalized	93.35%	100%	49.66%	87.07%	86.25%	75.63%
Standard Deviation	0.8%	0.9%	8.3%	3.8%	3.3%	1.6%
LAME MP3 Encoding - WAV To MP3	32.13	**28.14**	**42.73**	32.72	31.46	38.120
Normalized	87.58%	100%	65.86%	86%	89.45%	73.82%
Standard Deviation	0.3%	3%	0.1%	1.3%	0.1%	0.1%
FFmpeg - H.2.H.T.N.D (sec)	6.19	**13.65**	10.70		**6.11**	9.179
Normalized	98.71%	44.76%	57.1%		100%	66.56%
Standard Deviation	3.1%	1.2%	9.5%		17.6%	1.8%
Hackbench - 8 - Thread (sec)	**29.20**	16.33	16.00	**8.71**	15.81	22.635
Normalized	29.83%	53.34%	54.44%	100%	55.09%	38.48%
Standard Deviation	2.4%	18.2%	1.6%	0.7%	0.4%	0.1%
Hackbench - 8 - Process (sec)	**28.06**	11.69	13.38	**8.32**	15.55	22.161
Normalized	29.65%	71.17%	62.18%	100%	53.5%	37.54%
Standard Deviation	4.9%	3.3%	2.9%	1%	2.4%	0.1%
Stress-NG - Semaphores (Bogo Ops/s)	3903548	3169727	**1583147**	1748405	**4702328**	2957298
Normalized	83.01%	67.41%	33.67%	37.18%	100%	62.89%
Standard Deviation	0.5%	2.2%	0.6%	6.4%	0.1%	1.9%
Stress-NG - Socket Activity (Bogo Ops/s)	**3758**	11708	18154	**18644**	7690	8392
Normalized	20.16%	62.8%	97.37%	100%	41.25%	45.01%
Standard Deviation	5.5%	0.8%	3.1%	3.4%	1.2%	1%

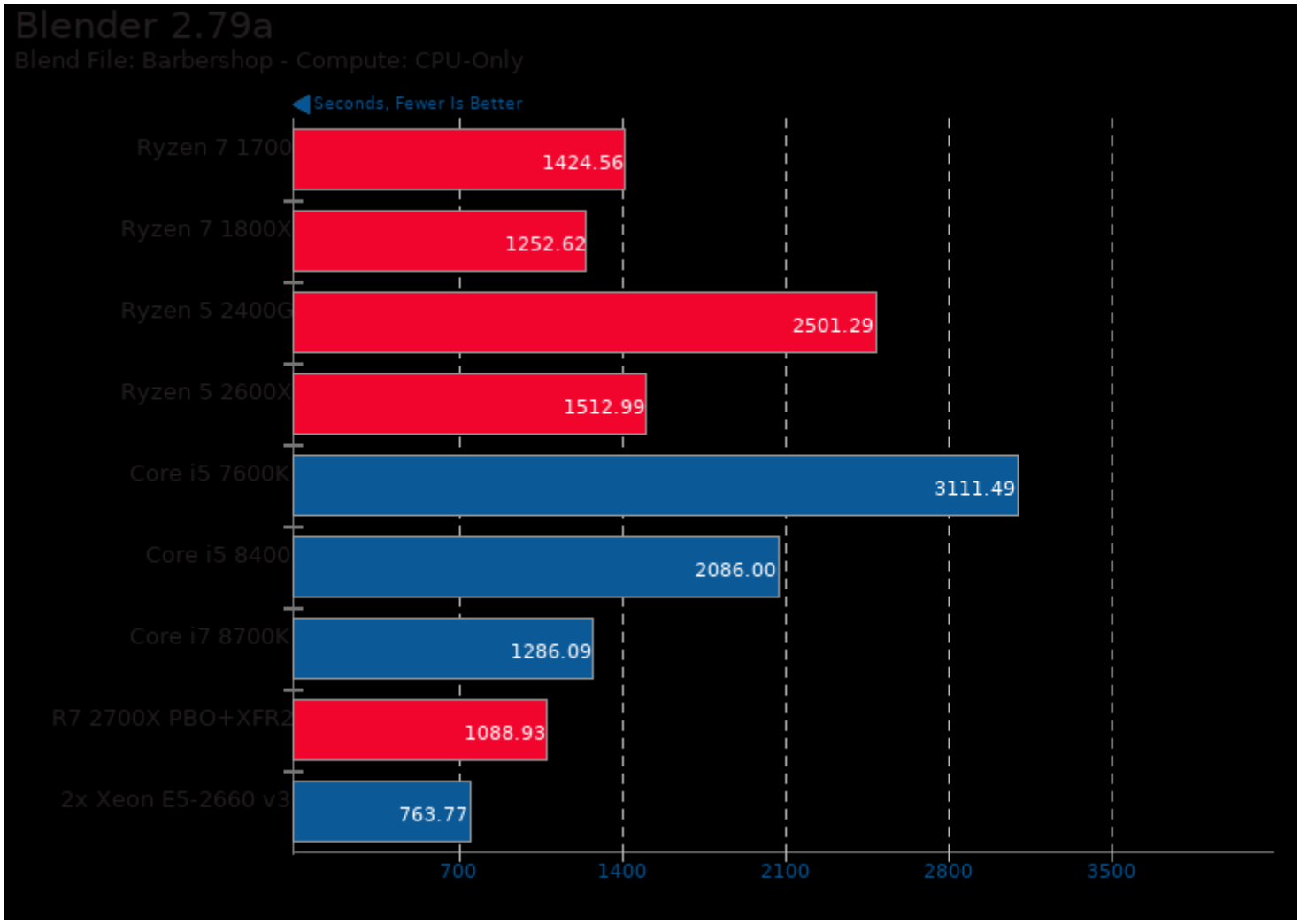
Ryzen 2700X PBO+XFR2 by Vulturex

Stress-NG - Context Switching (Bogo Ops/s)	**3409713**	15362862	13763806	**15419114**	4683035	4057083
Normalized	22.11%	99.64%	89.26%	100%	30.37%	26.31%
Standard Deviation	1.8%	2.4%	3.4%	8.8%	3%	1.6%
Stress-NG - S.V.M.P (Bogo Ops/s)	8781120	8284794	12415407	5172771	**16255583**	**3192473**
Normalized	54.02%	50.97%	76.38%	31.82%	100%	19.64%
Standard Deviation	0.1%	0.1%	0.9%	1.7%	1%	0.1%
PyBench - T.F.A.T.T (Milliseconds)	1471	**1205**	**2078**	1390	1529	1575
Normalized	81.92%	100%	57.99%	86.69%	78.81%	76.51%
Standard Deviation	0.3%	2.6%	0.3%	0%	0.5%	0.3%
NGINX Benchmark - S.W.P.S (Reqs/sec)	32215	**43220**	23468	29182	36958	**8977**
Normalized	74.54%	100%	54.3%	67.52%	85.51%	20.77%
Standard Deviation	3.4%	0.7%	1.3%	0.7%	3.4%	0.4%
Apache Benchmark - S.W.P.S (Reqs/sec)	27332	30371	18122	22084	**31943**	**6850**
Normalized	85.57%	95.08%	56.73%	69.14%	100%	21.45%
Standard Deviation	0.4%	1.2%	0.7%	0.3%	3%	2.3%
PHPBench - P.B.S (Score)	576969	**695123**	**393584**	587094	537640	470926
Normalized	83%	100%	56.62%	84.46%	77.34%	67.75%
Standard Deviation	2%	2.8%	0.7%	3.4%	0.8%	0.5%
Git - T.T.C.C.G.C (sec)	6.20	**5.32**	7.71	6.56	5.33	**8.157**
Normalized	85.81%	100%	69%	81.1%	99.81%	65.22%
Standard Deviation	2.9%	0.8%	6.2%	0.2%	4.2%	2.8%
Sunflow Rendering System - G.I.I.S (sec)	**1.80**	**0.90**	1.15	0.92	1.46	1.270
Normalized	50%	100%	78.26%	97.83%	61.64%	70.87%
Standard Deviation	0.8%	2.9%	2%	9.4%	3.9%	2.6%
OSBench - Create Files (us/Event)	14.49	**12.23**	19.06	16.44	13.20	**112.165709**
Normalized	84.4%	100%	64.17%	74.39%	92.65%	10.9%
Standard Deviation	0.6%	0.4%	1.4%	2.5%	0.1%	46.3%

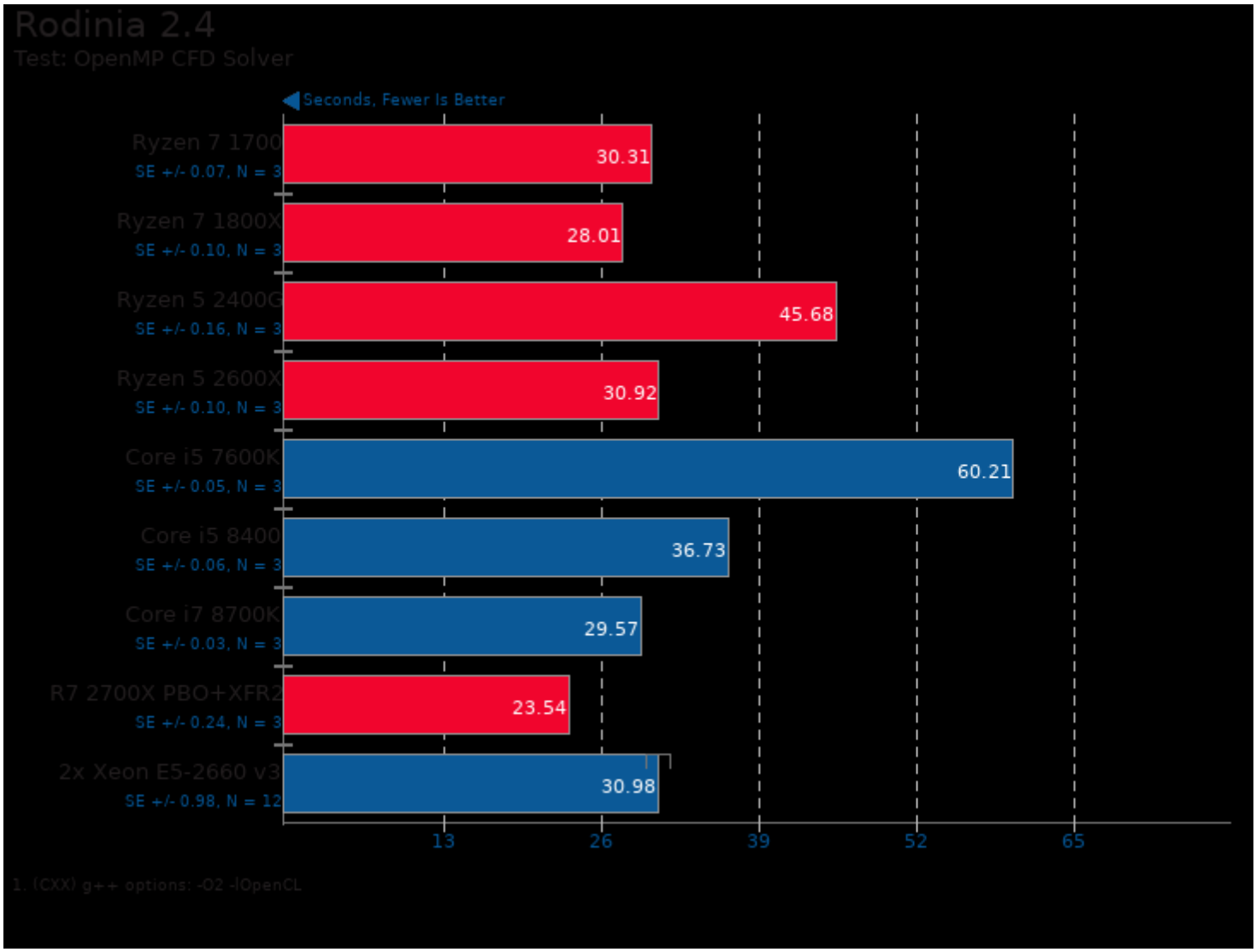
Ryzen 2700X PBO+XFR2 by Vulturex

OSBench - Create Threads (us/Event)	12.85	17.16	**37.70**	30.03	**11.30**	32.474200
Normalized	87.94%	65.85%	29.97%	37.63%	100%	34.8%
Standard Deviation	0.6%	1.9%	1.3%	3%	1.5%	1%
OSBench - Launch Programs (us/Event)	32.35	27.68	73.04	**90.24**	**26.23**	67.422390
Normalized	81.08%	94.76%	35.91%	29.07%	100%	38.9%
Standard Deviation	0.5%	1.5%	1.1%	4.2%	1.3%	2.3%
OSBench - Memory Allocations (Ns/Event)	82.55	71.95	94.44	96.05	**65.47**	**126.458327**
Normalized	79.31%	90.99%	69.32%	68.16%	100%	51.77%
Standard Deviation	0%	1.8%	0.5%	2.5%	0.2%	1.6%
Schbench - 6 - 4 (usec, 99.9th Latency Percentile)	**23627**	116	379	**109**	15035	4846
Normalized	0.46%	93.97%	28.76%	100%	0.72%	2.25%
Standard Deviation	1.6%	3%			2%	18.6%
Botan - AES-256 - Encrypt -	**3382**	4045	4430	3458	**5774**	
Normalized	58.57%	70.06%	76.72%	59.88%	100%	
Standard Deviation	0%	3.1%	0.2%	1.3%	6.9%	

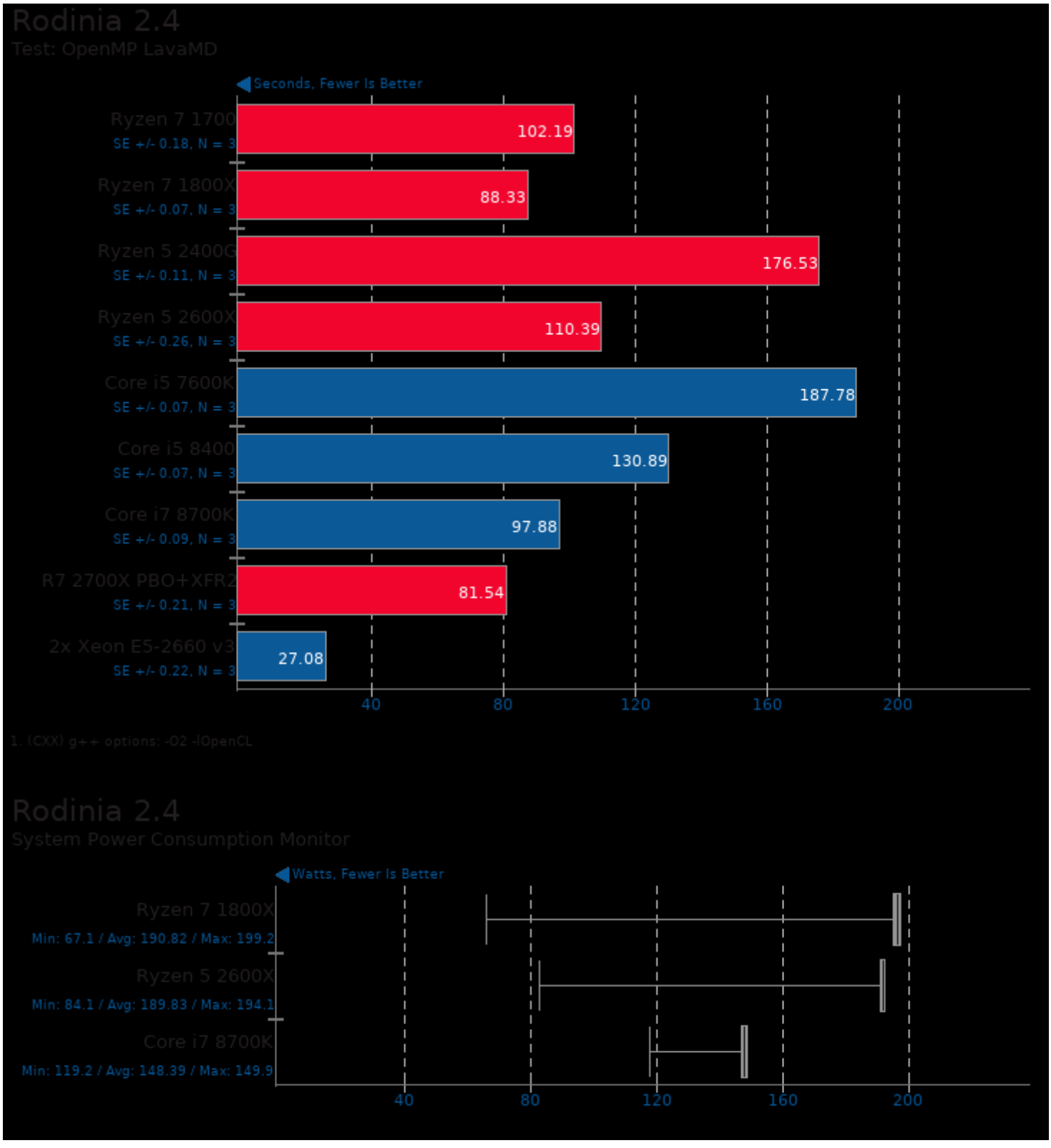
Ryzen 2700X PBO+XFR2 by Vulturex



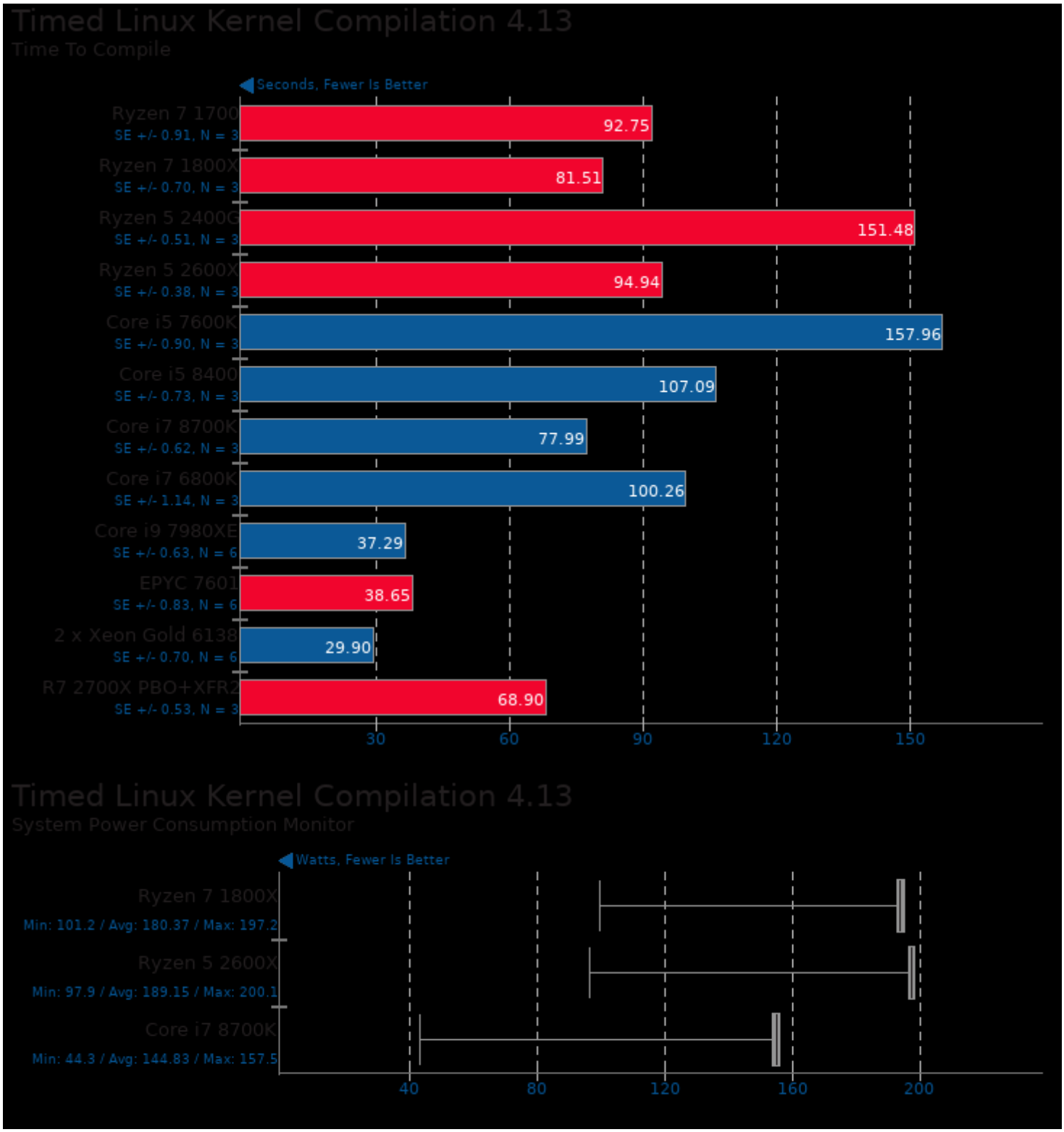
Ryzen 2700X PBO+XFR2 by Vulturex

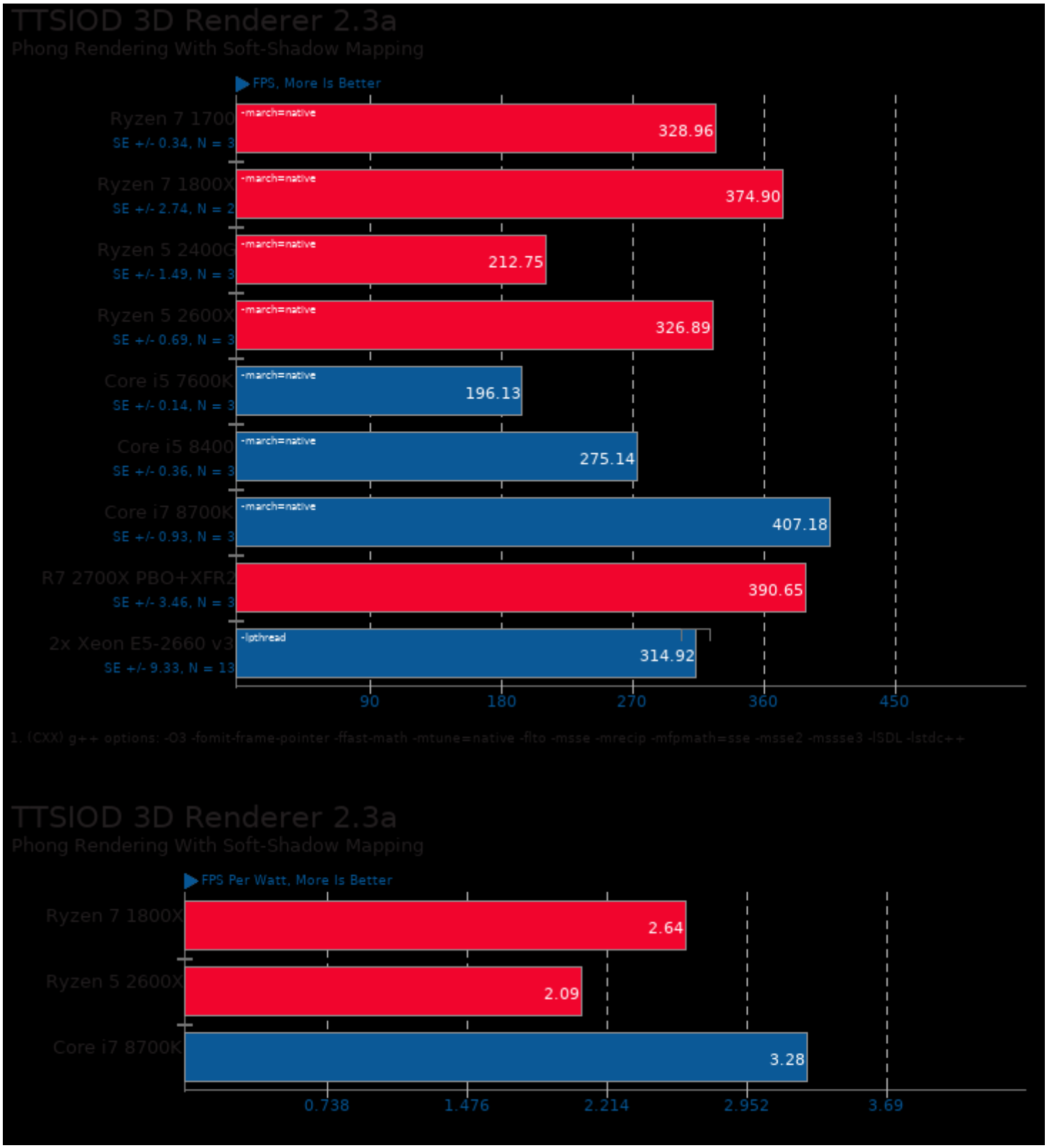


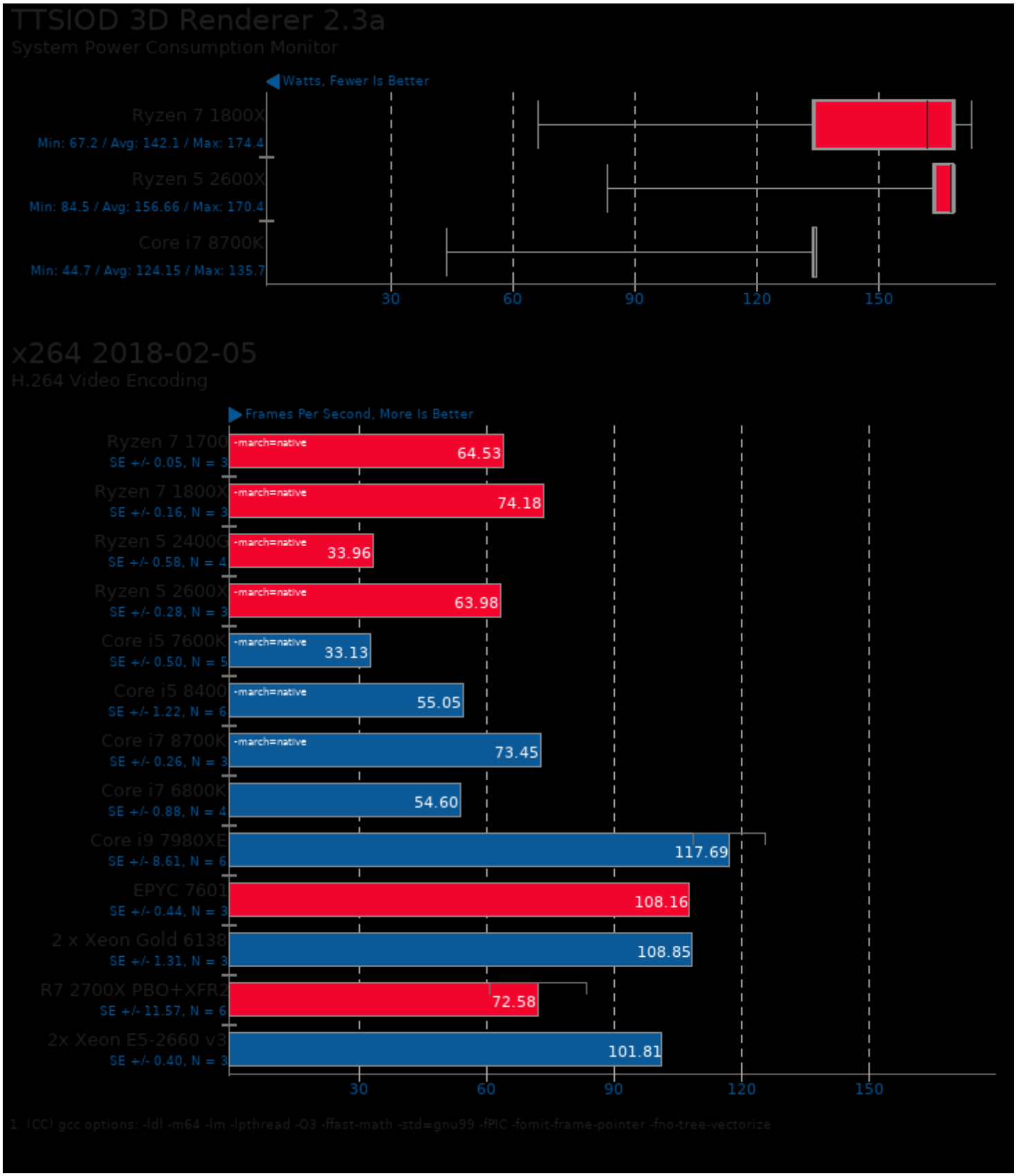
Ryzen 2700X PBO+XFR2 by Vulturex



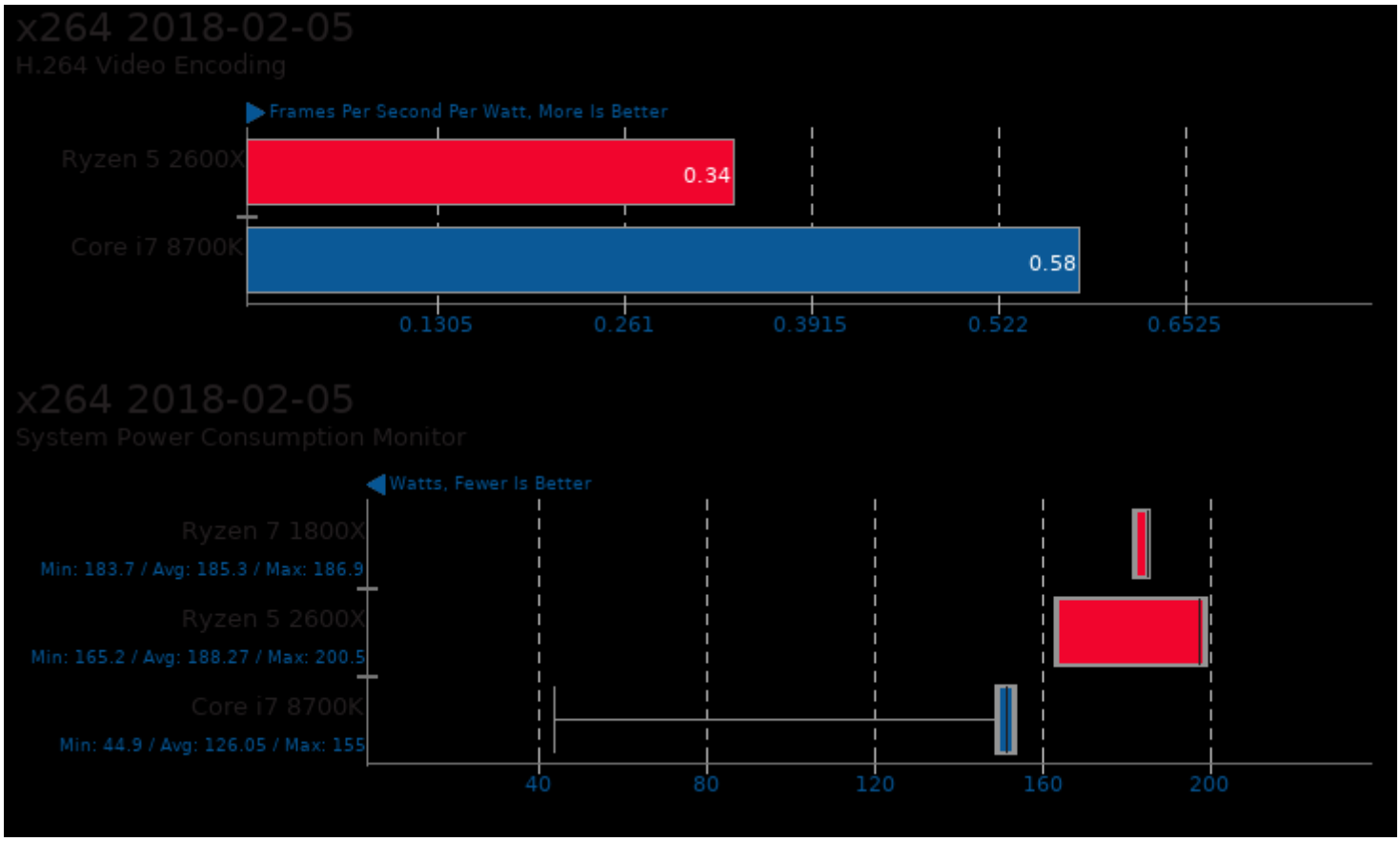
Ryzen 2700X PBO+XFR2 by Vulturex



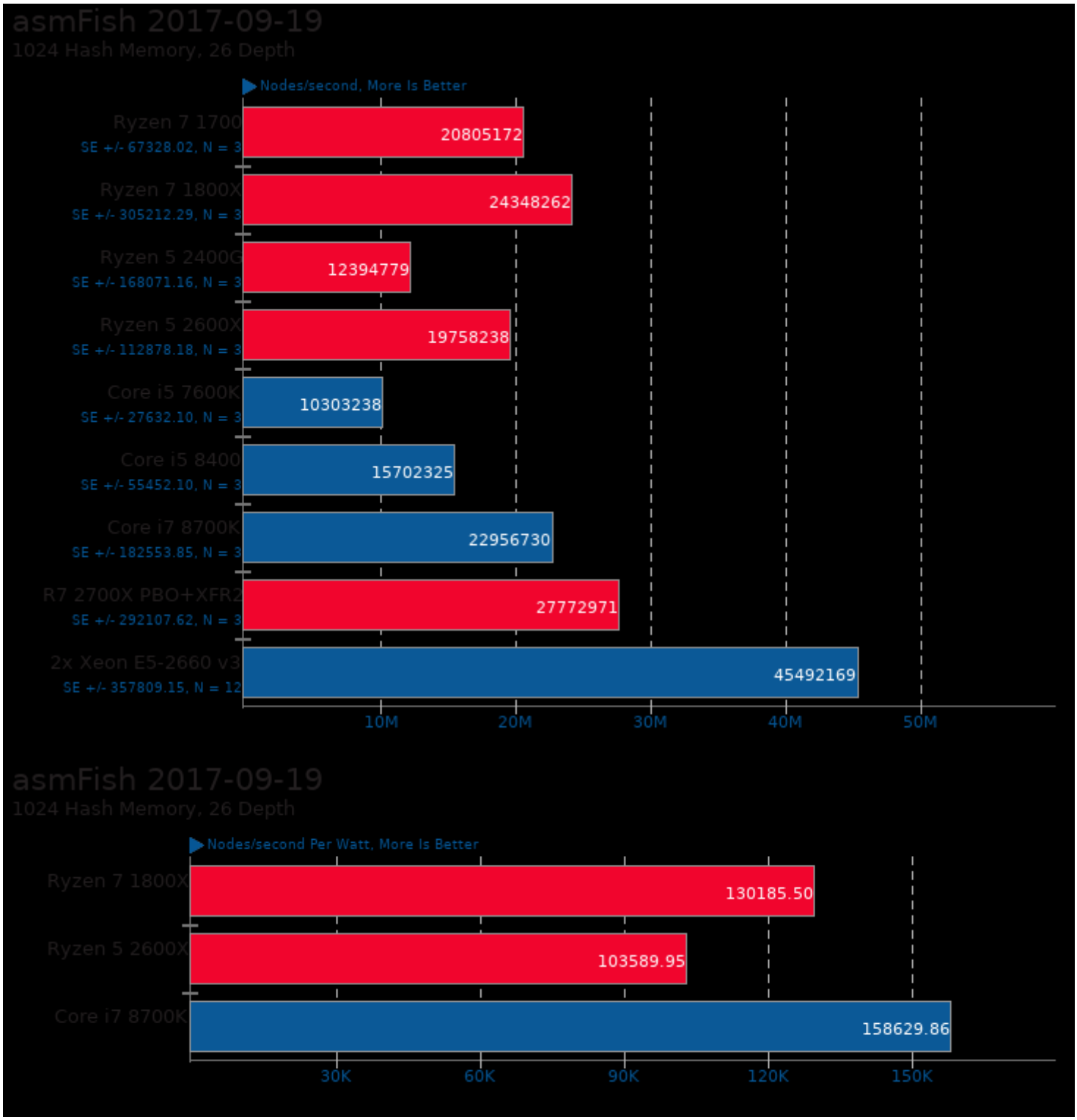

TTSIOD 3D Renderer 2.3a
Phong Rendering With Soft-Shadow Mapping
FPS, More Is Better
Ryzen 7 1700
SE +/- 0.34, N = 3
-march=native
328.96
Ryzen 7 1800X
SE +/- 2.74, N = 2
-march=native
374.90
Ryzen 5 2400G
SE +/- 1.49, N = 3
-march=native
212.75
Ryzen 5 2600X
SE +/- 0.69, N = 3
-march=native
326.89
Core i5 7600K
SE +/- 0.14, N = 3
-march=native
196.13
Core i5 8400
SE +/- 0.36, N = 3
-march=native
275.14
Core i7 8700K
SE +/- 0.93, N = 3
-march=native
407.18
R7 2700X PBO+XFR2
SE +/- 3.46, N = 3
390.65
2x Xeon E5-2660 v3
SE +/- 9.33, N = 13
-lpthread
314.92
90
180
270
360
450
1. (CXX) g++ options: -O3 -fomit-frame-pointer -ffast-math -mtune=native -flto -msse -mrecip -mfpmath=sse -msse2 -mssse3 -lSDL -lstdc++
TTSIOD 3D Renderer 2.3a
Phong Rendering With Soft-Shadow Mapping
FPS Per Watt, More Is Better
Ryzen 7 1800X
2.64
Ryzen 5 2600X
2.09
Core i7 8700K
3.28
0.738
1.476
2.214
2.952
3.69


TTSIOD 3D Renderer 2.3a
System Power Consumption Monitor
Watts, Fewer Is Better
Ryzen 7 1800X
Min: 67.2 / Avg: 142.1 / Max: 174.4
Ryzen 5 2600X
Min: 84.5 / Avg: 156.66 / Max: 170.4
Core i7 8700K
Min: 44.7 / Avg: 124.15 / Max: 135.7
30
60
90
120
150
x264 2018-02-05
H.264 Video Encoding
Frames Per Second, More Is Better
Ryzen 7 1700
SE +/- 0.05, N = 3
-march=native
64.53
Ryzen 7 1800X
SE +/- 0.16, N = 3
-march=native
74.18
Ryzen 5 2400G
SE +/- 0.58, N = 4
-march=native
33.96
Ryzen 5 2600X
SE +/- 0.28, N = 3
-march=native
63.98
Core i5 7600K
SE +/- 0.50, N = 5
-march=native
33.13
Core i5 8400
SE +/- 1.22, N = 6
-march=native
55.05
Core i7 8700K
SE +/- 0.26, N = 3
-march=native
73.45
Core i7 6800K
SE +/- 0.88, N = 4
54.60
Core i9 7980XE
SE +/- 8.61, N = 6
117.69
EPYC 7601
SE +/- 0.44, N = 3
108.16
2 x Xeon Gold 6138
SE +/- 1.31, N = 3
108.85
R7 2700X PBO+XFR2
SE +/- 11.57, N = 6
72.58
2x Xeon E5-2660 v3
SE +/- 0.40, N = 3
101.81
30
60
90
120
150
1. (CC) gcc options: -ldl -m64 -lm -lpthread -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize

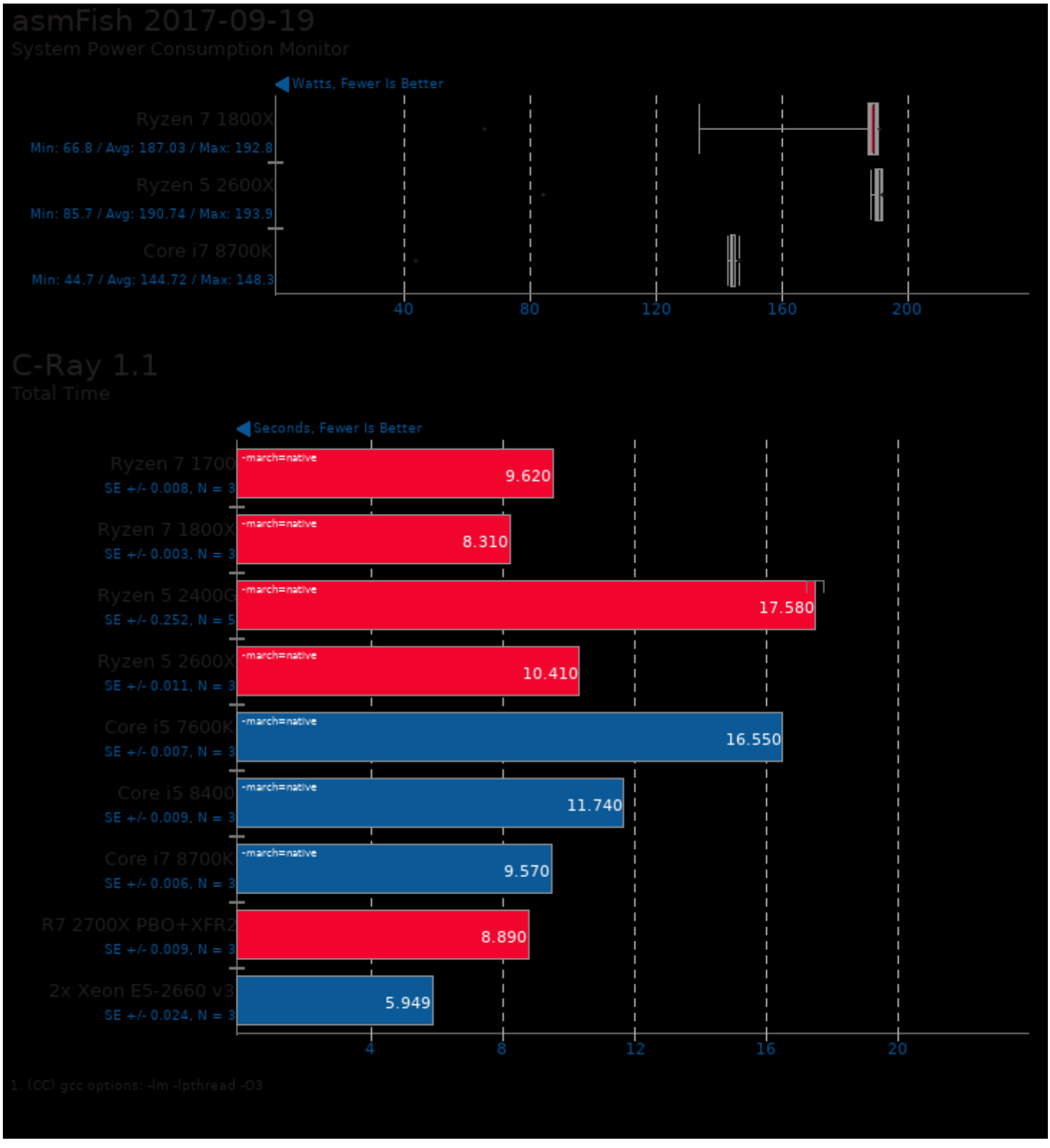
Ryzen 2700X PBO+XFR2 by Vulturex



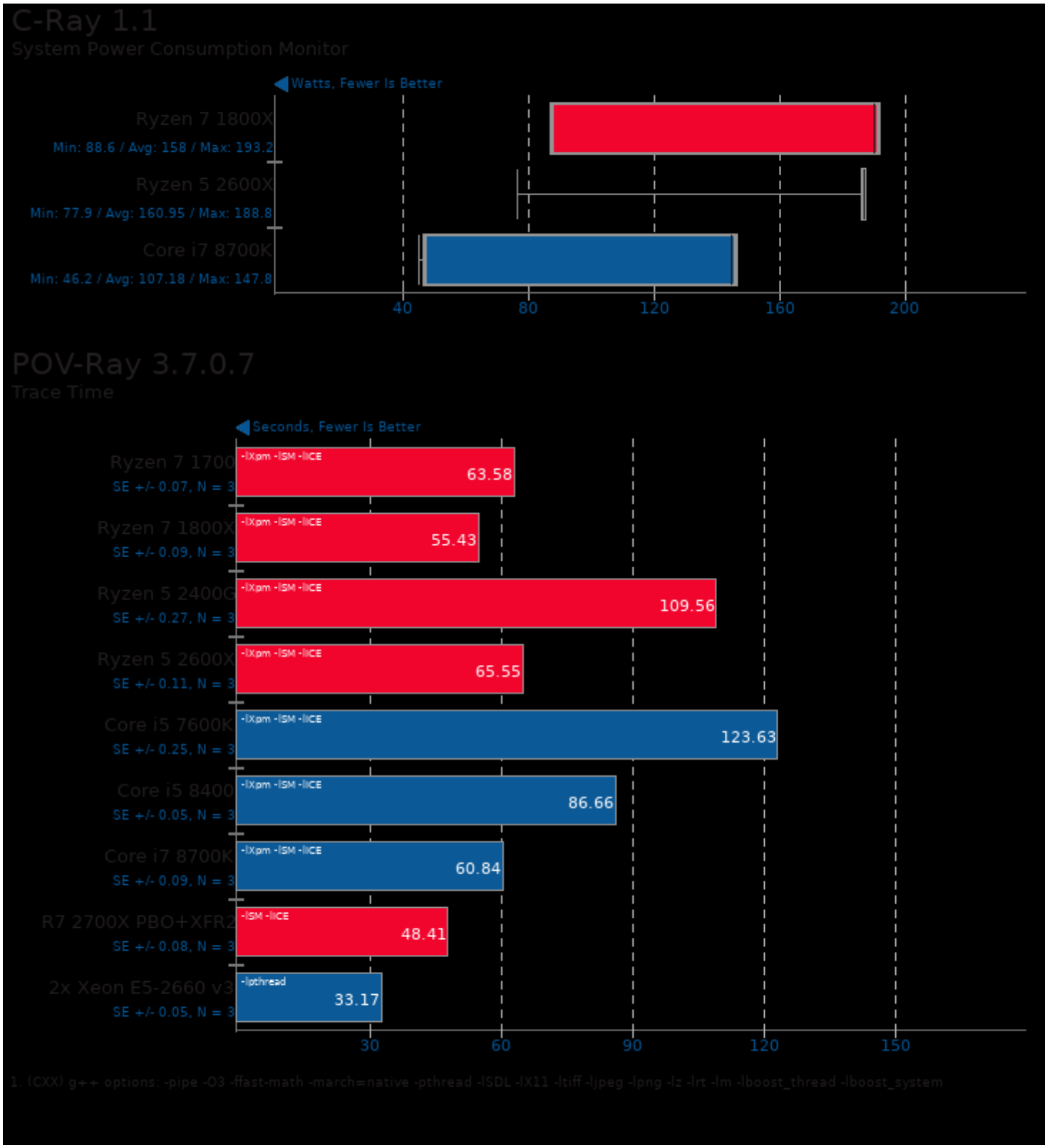
Ryzen 2700X PBO+XFR2 by Vulturex



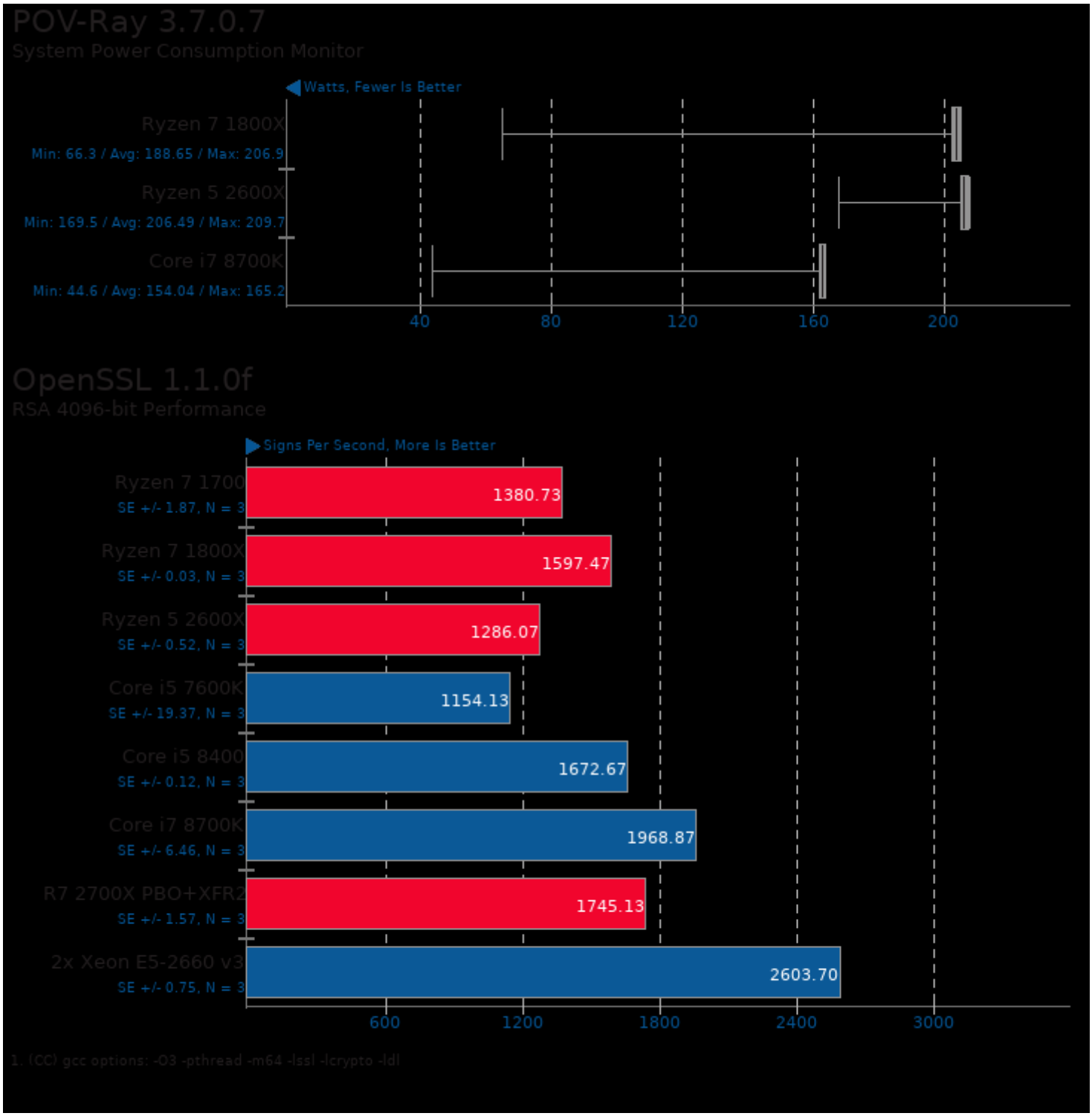
Ryzen 2700X PBO+XFR2 by Vulturex



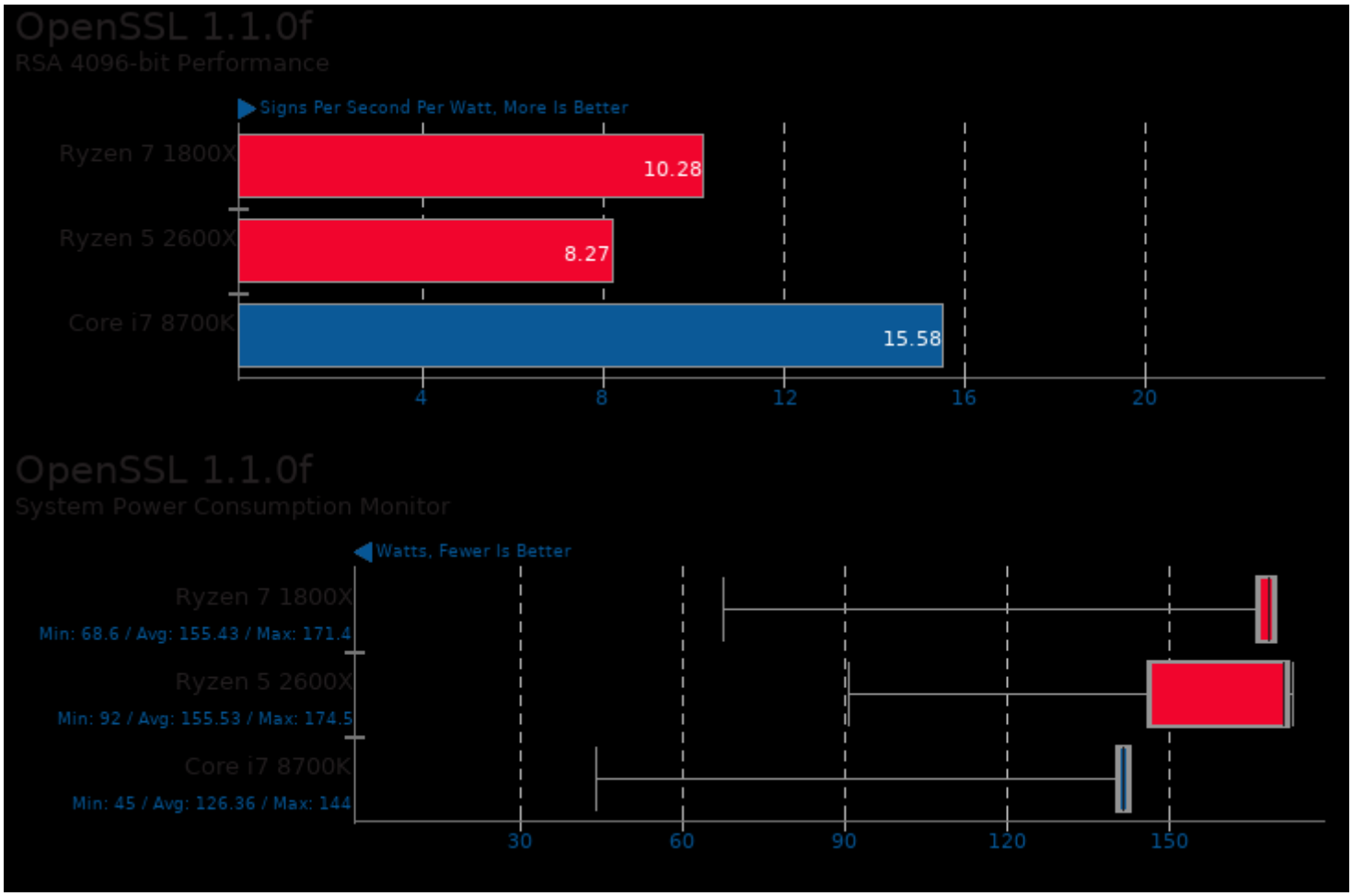
Ryzen 2700X PBO+XFR2 by Vulturex



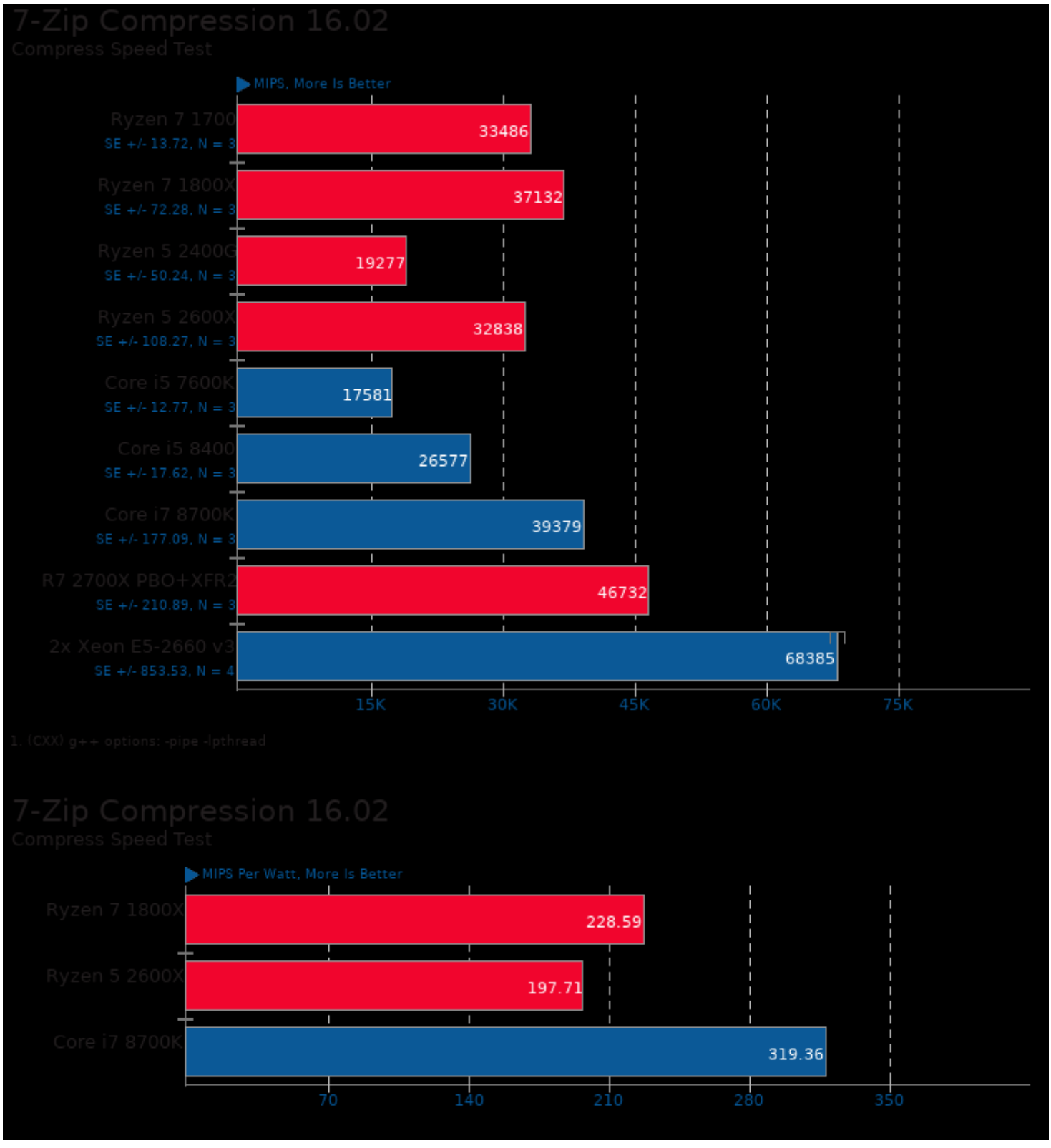
Ryzen 2700X PBO+XFR2 by Vulturex



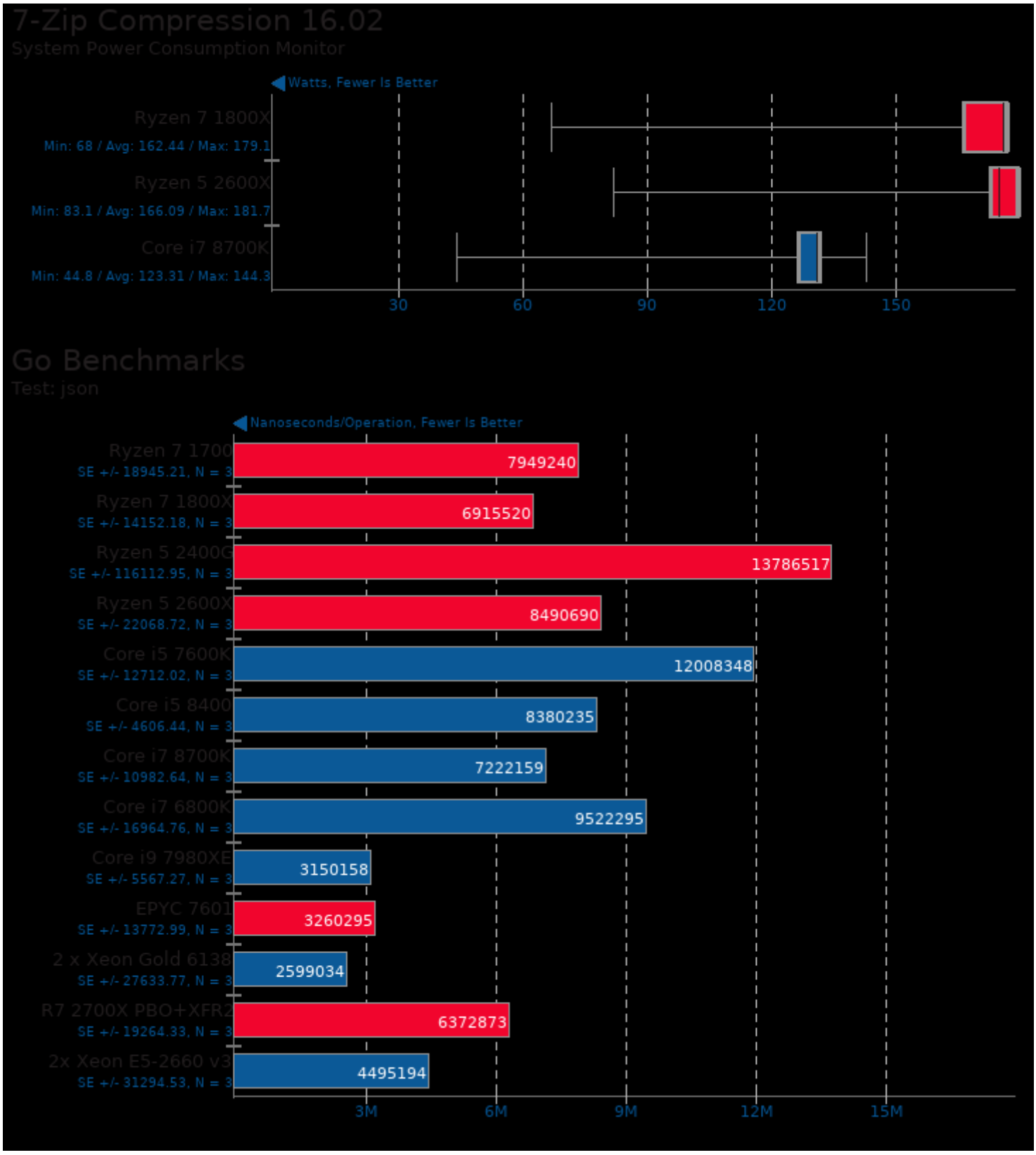
Ryzen 2700X PBO+XFR2 by Vulturex



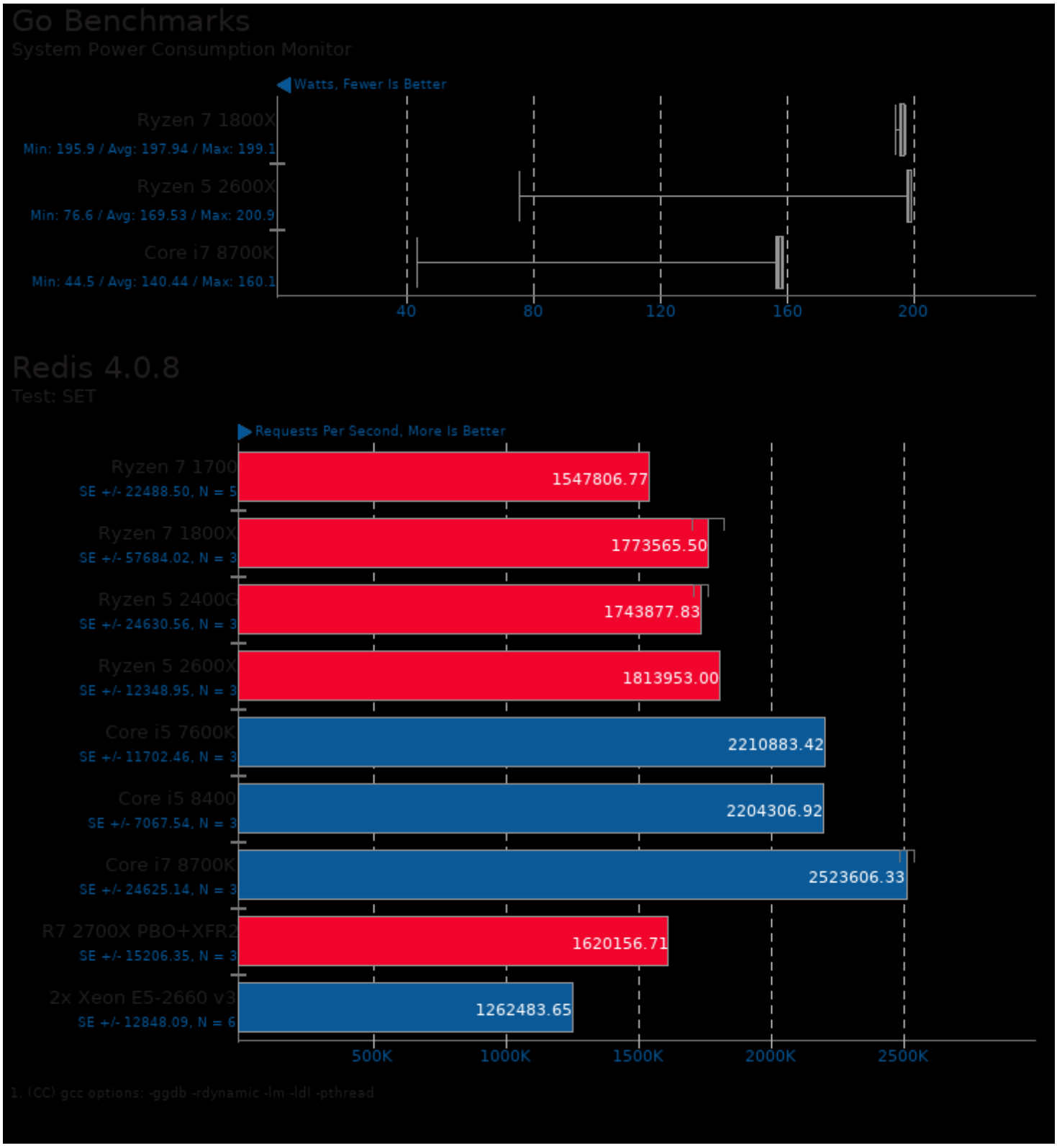
Ryzen 2700X PBO+XFR2 by Vulturex



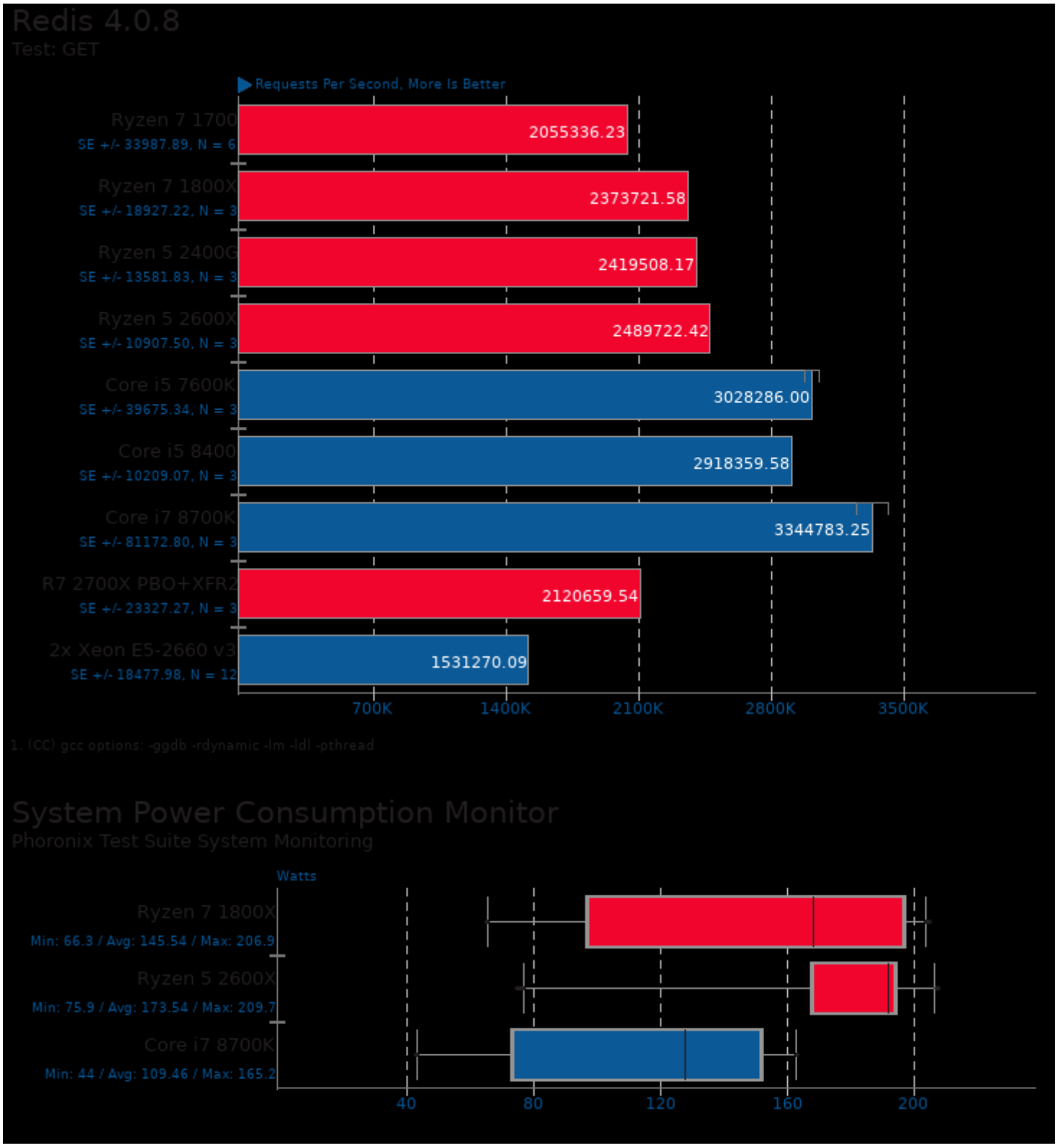
Ryzen 2700X PBO+XFR2 by Vulturex



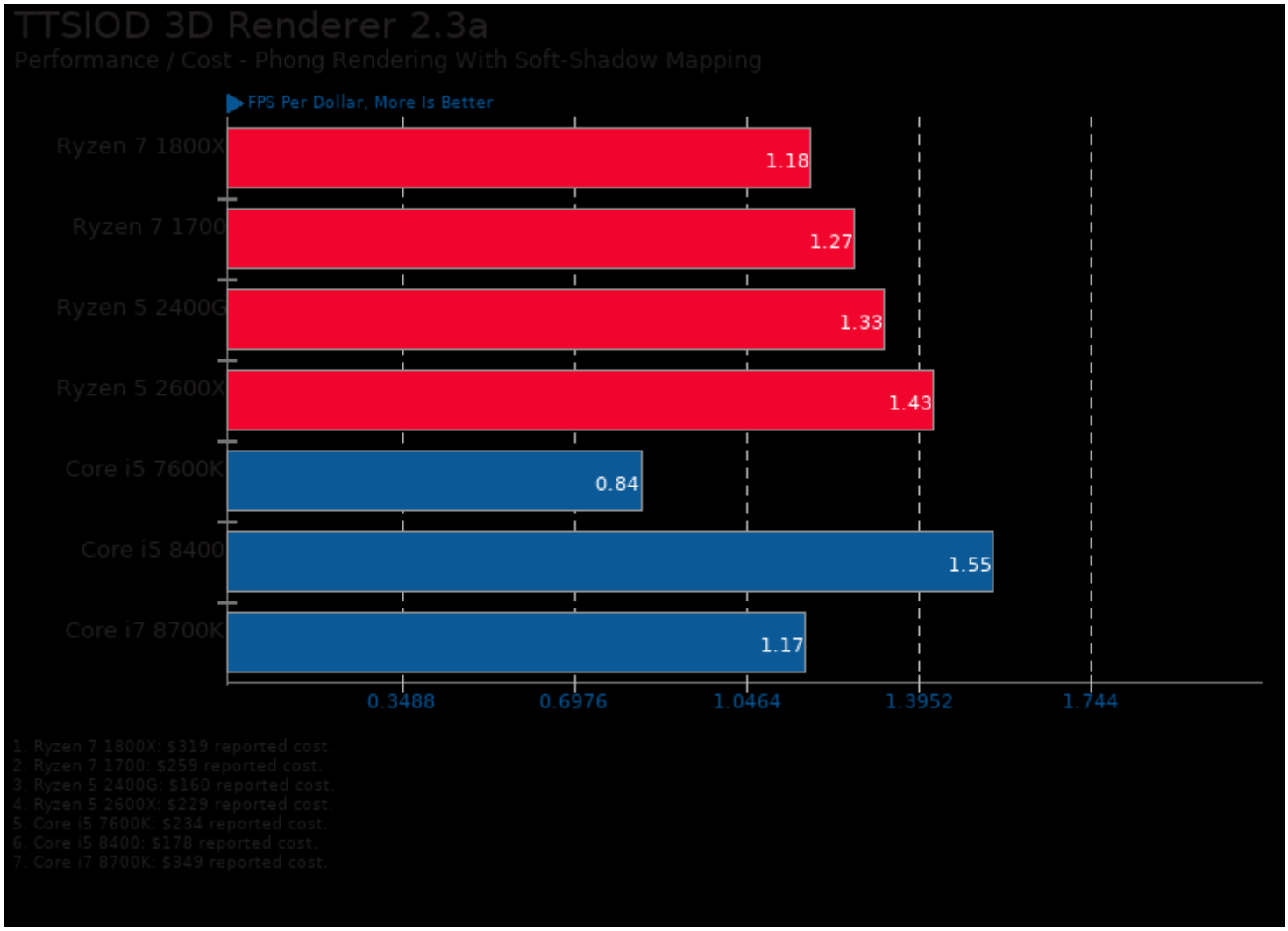
Ryzen 2700X PBO+XFR2 by Vulturex



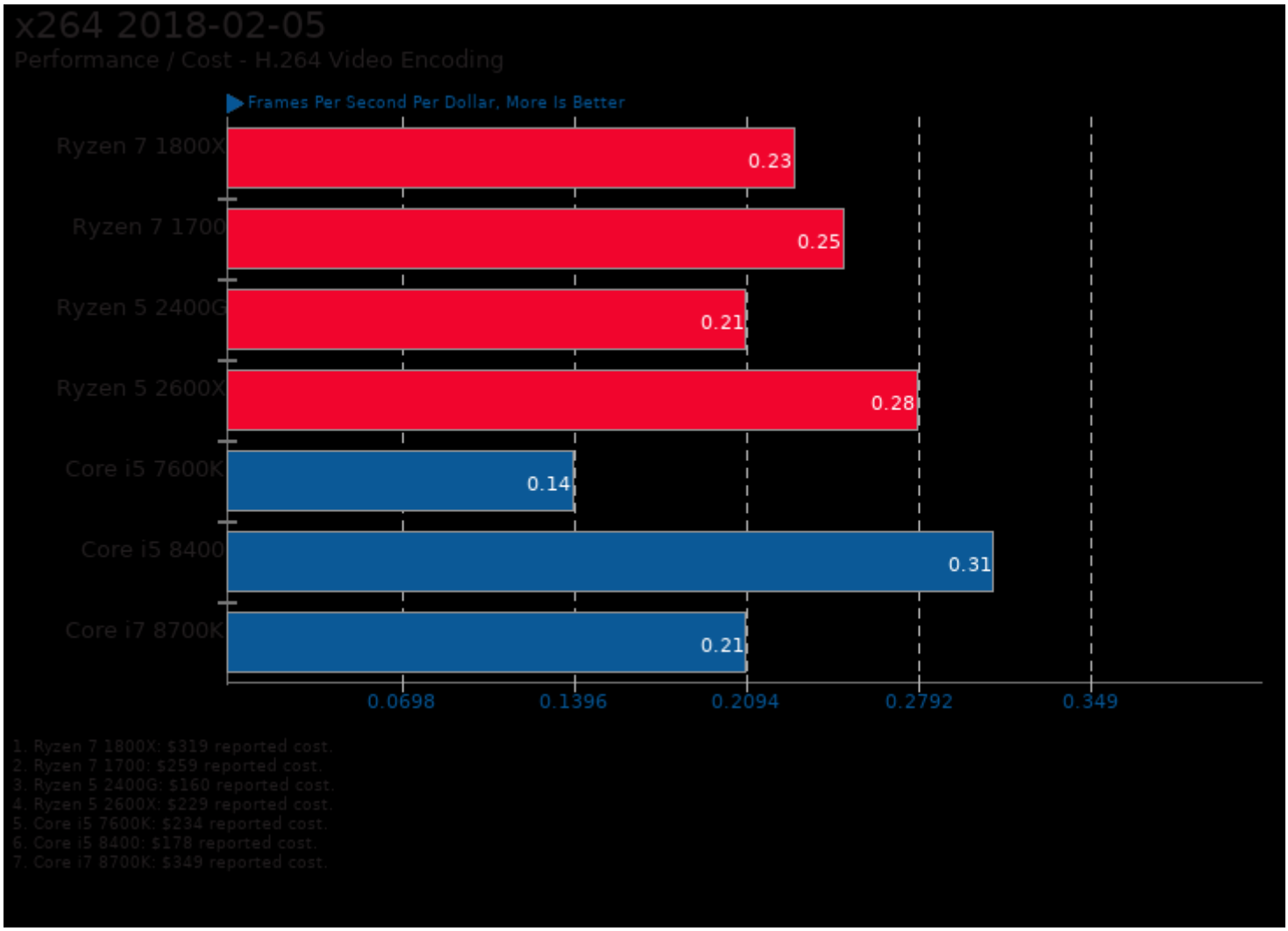
Ryzen 2700X PBO+XFR2 by Vulturex



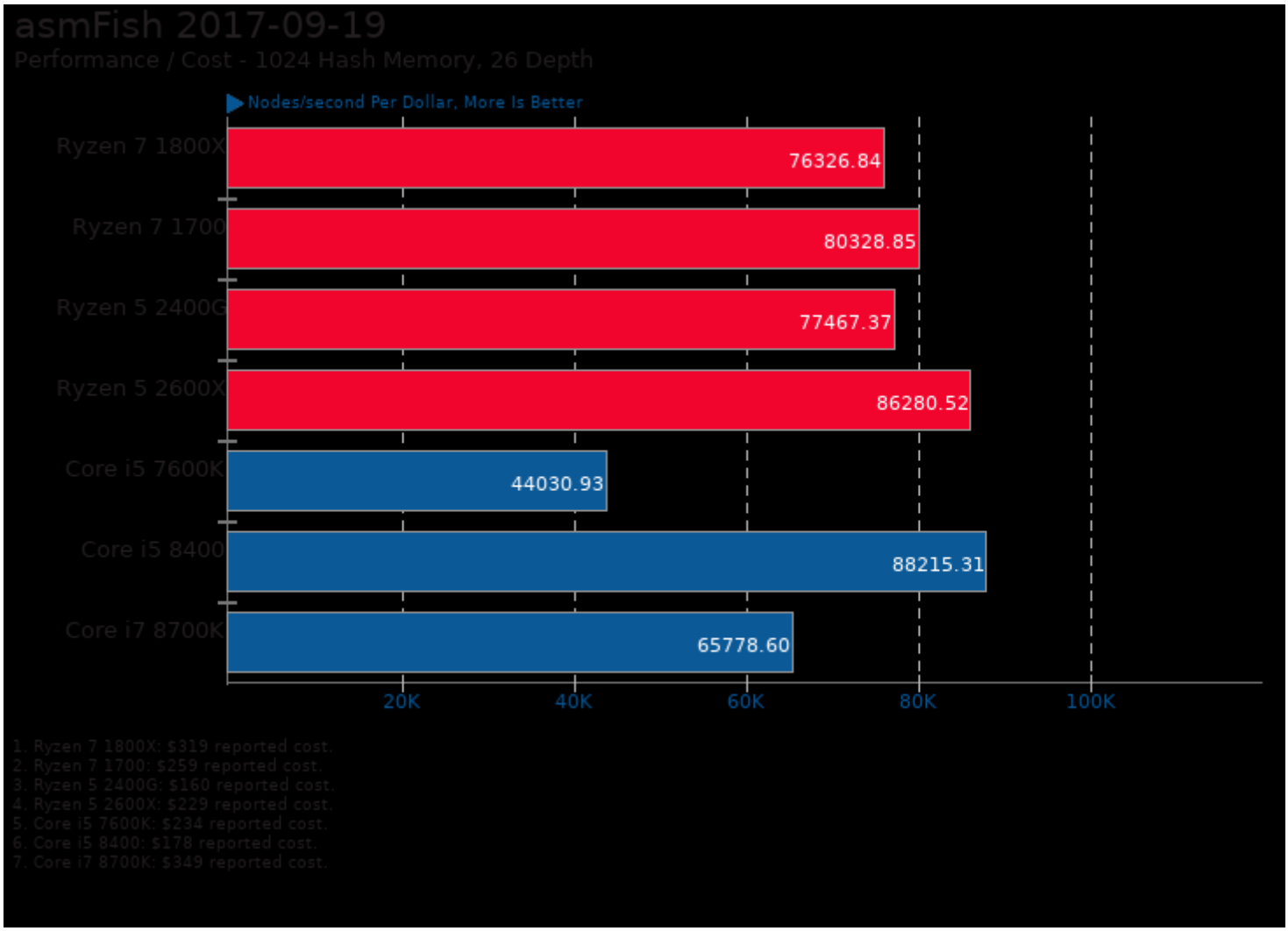
Ryzen 2700X PBO+XFR2 by Vulturex



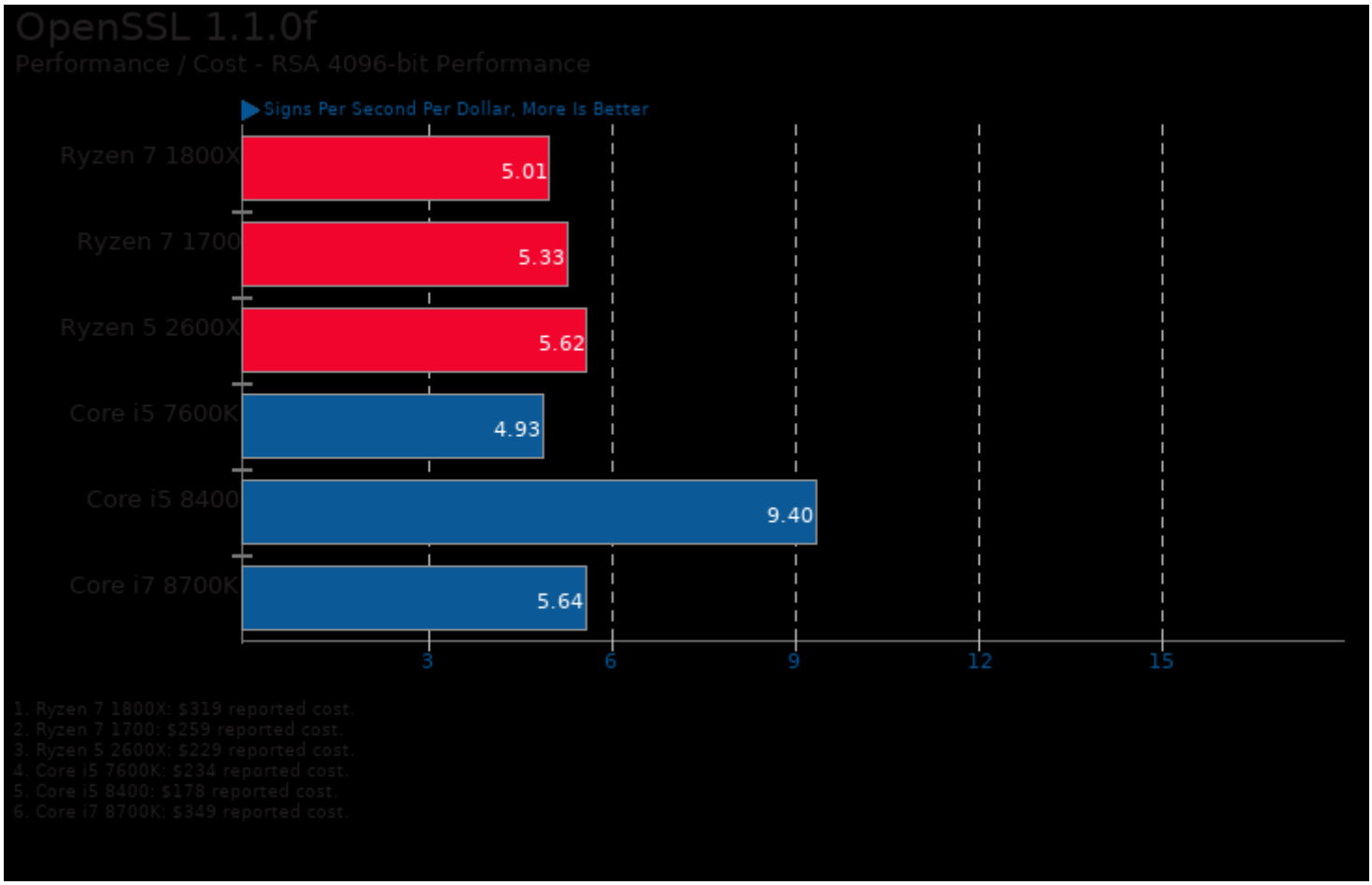
Ryzen 2700X PBO+XFR2 by Vulturex



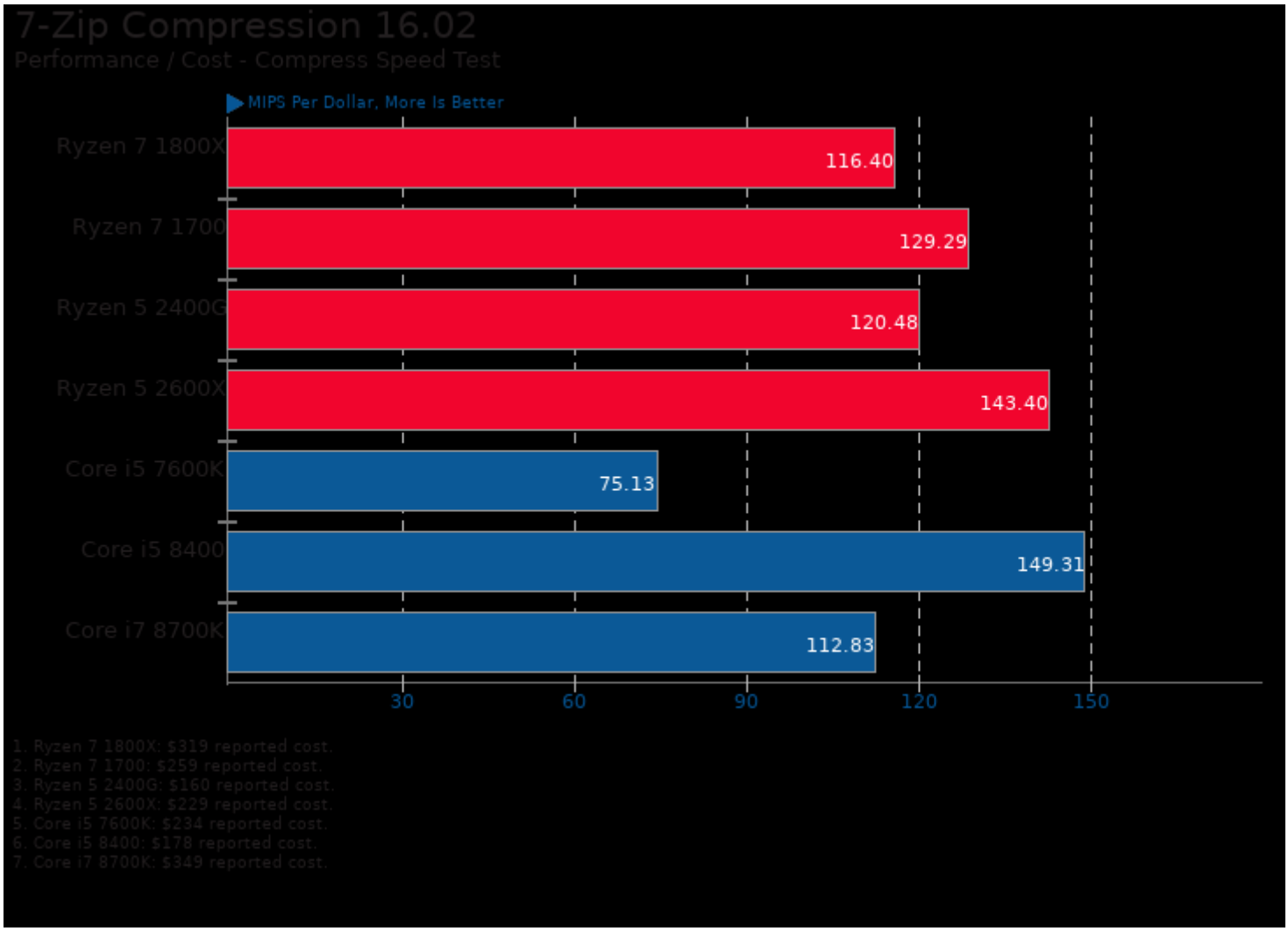
Ryzen 2700X PBO+XFR2 by Vulturex



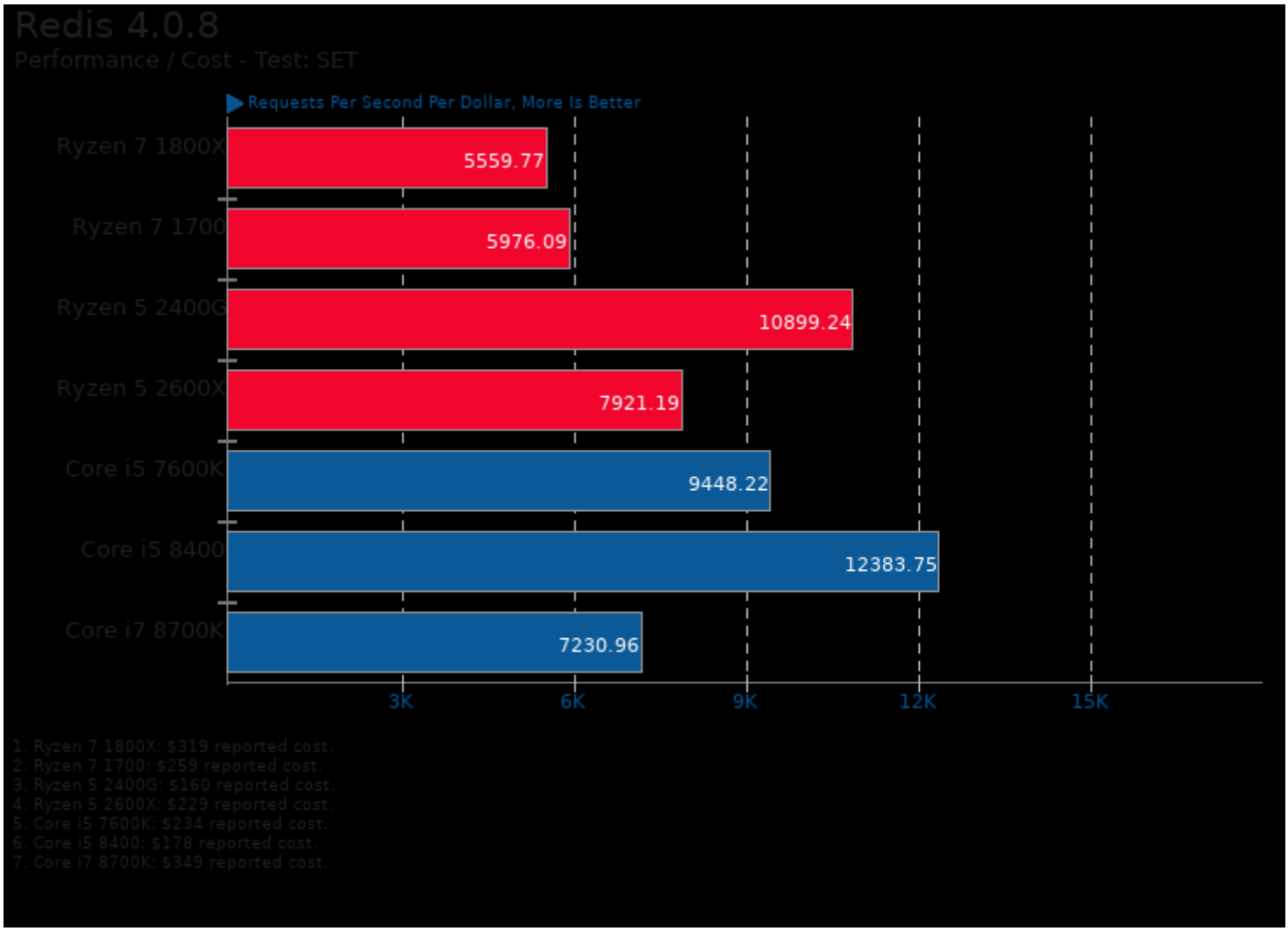
Ryzen 2700X PBO+XFR2 by Vulturex



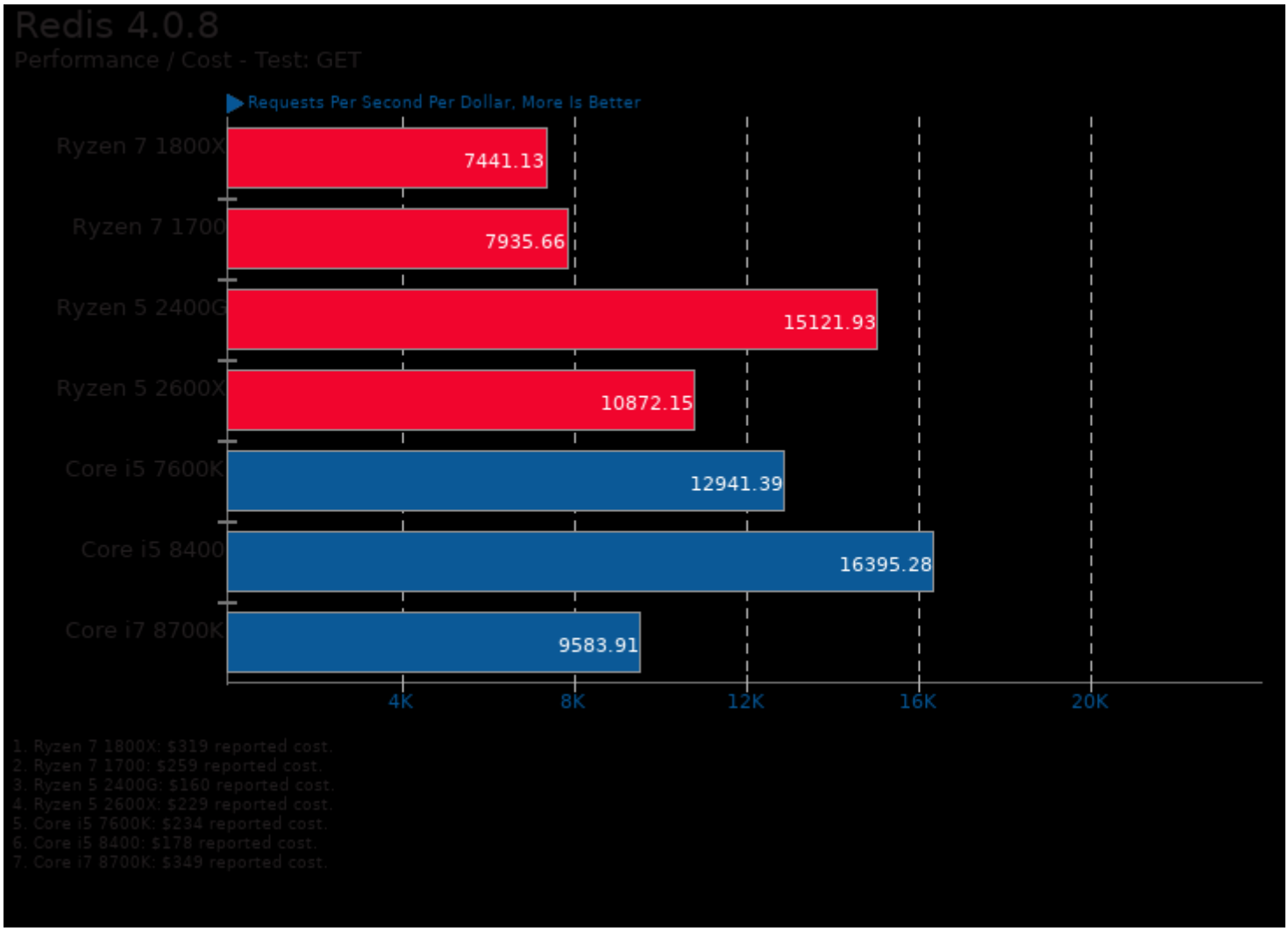
Ryzen 2700X PBO+XFR2 by Vulturex



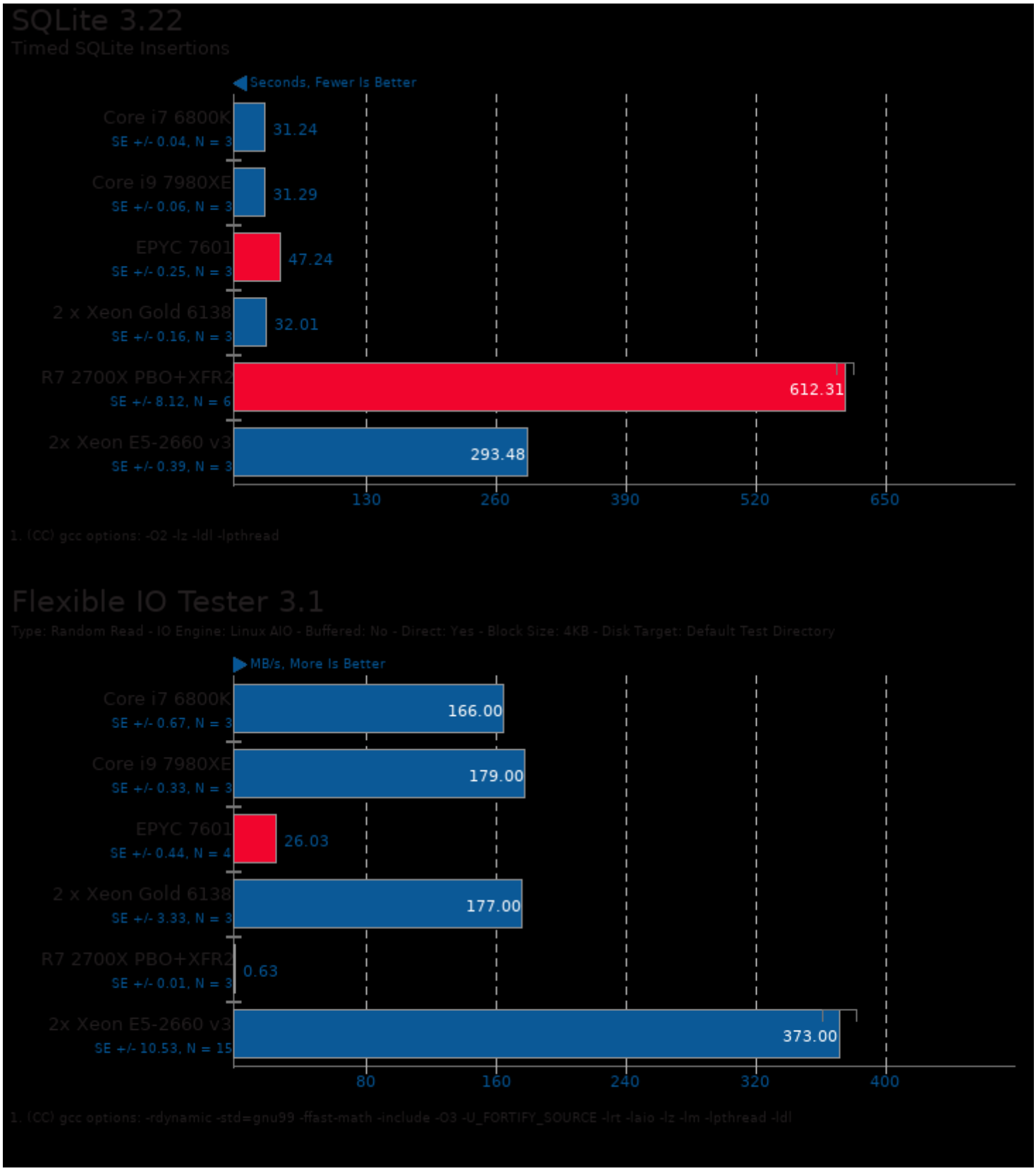
Ryzen 2700X PBO+XFR2 by Vulturex

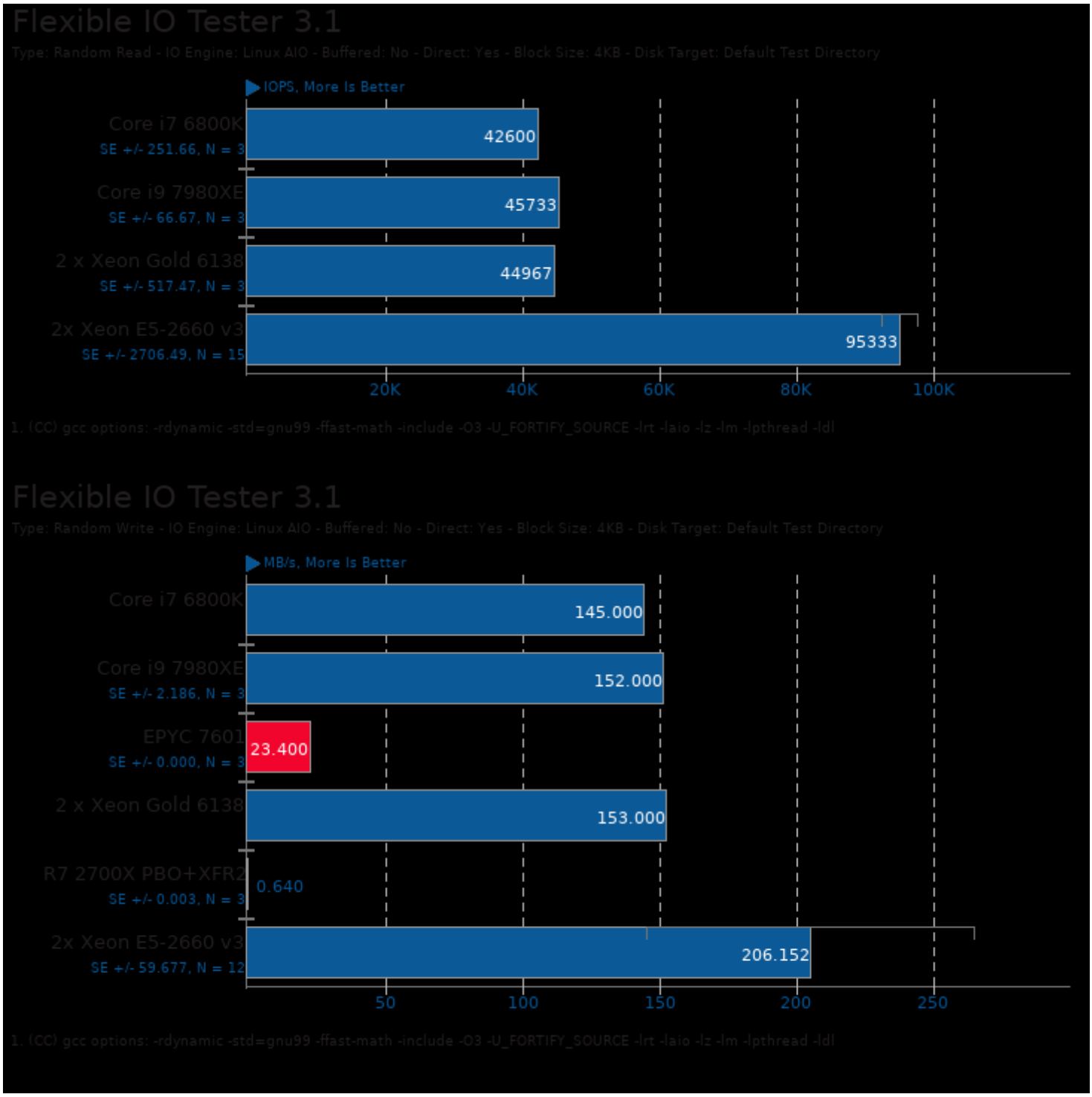


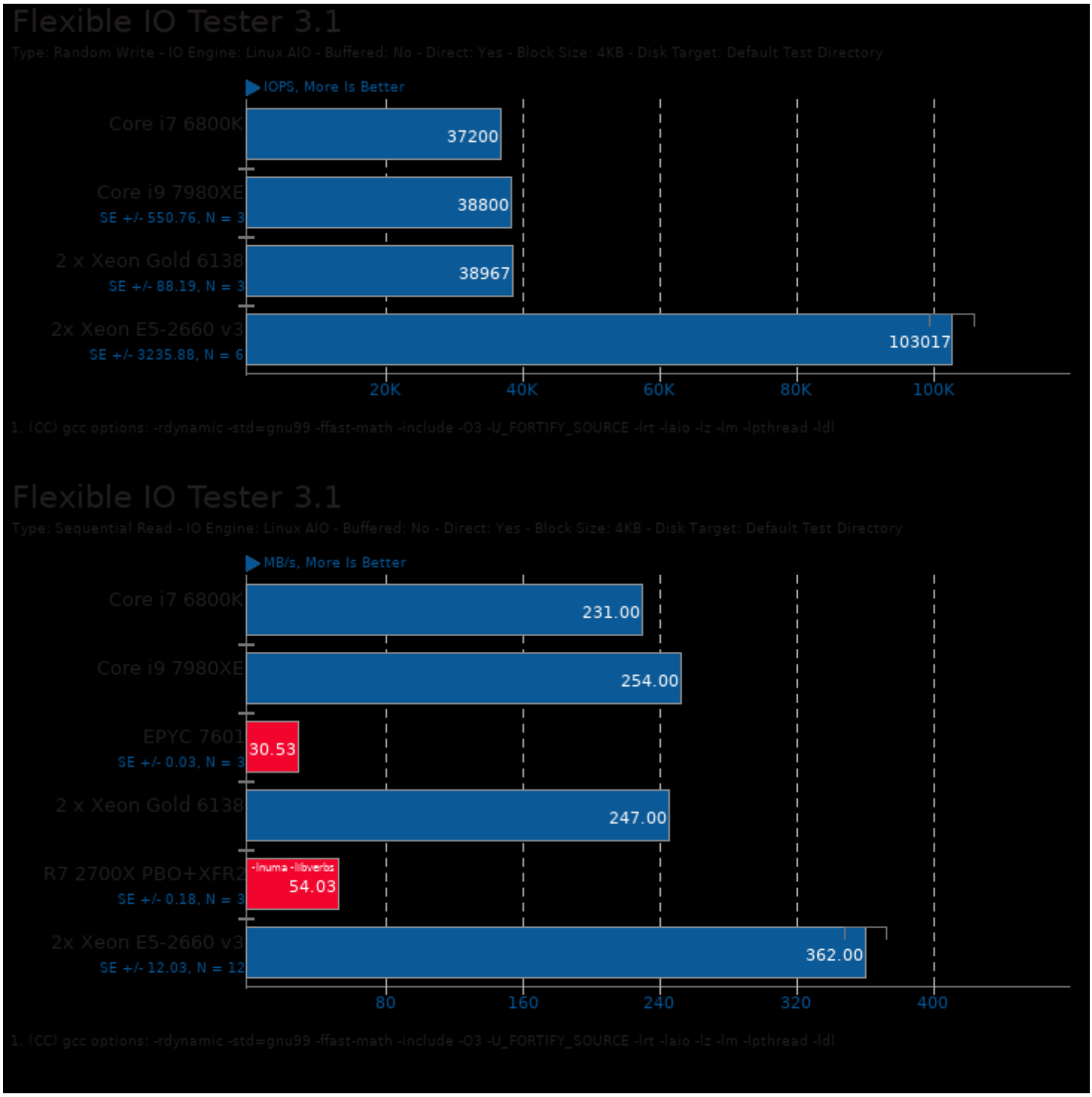
Ryzen 2700X PBO+XFR2 by Vulturex

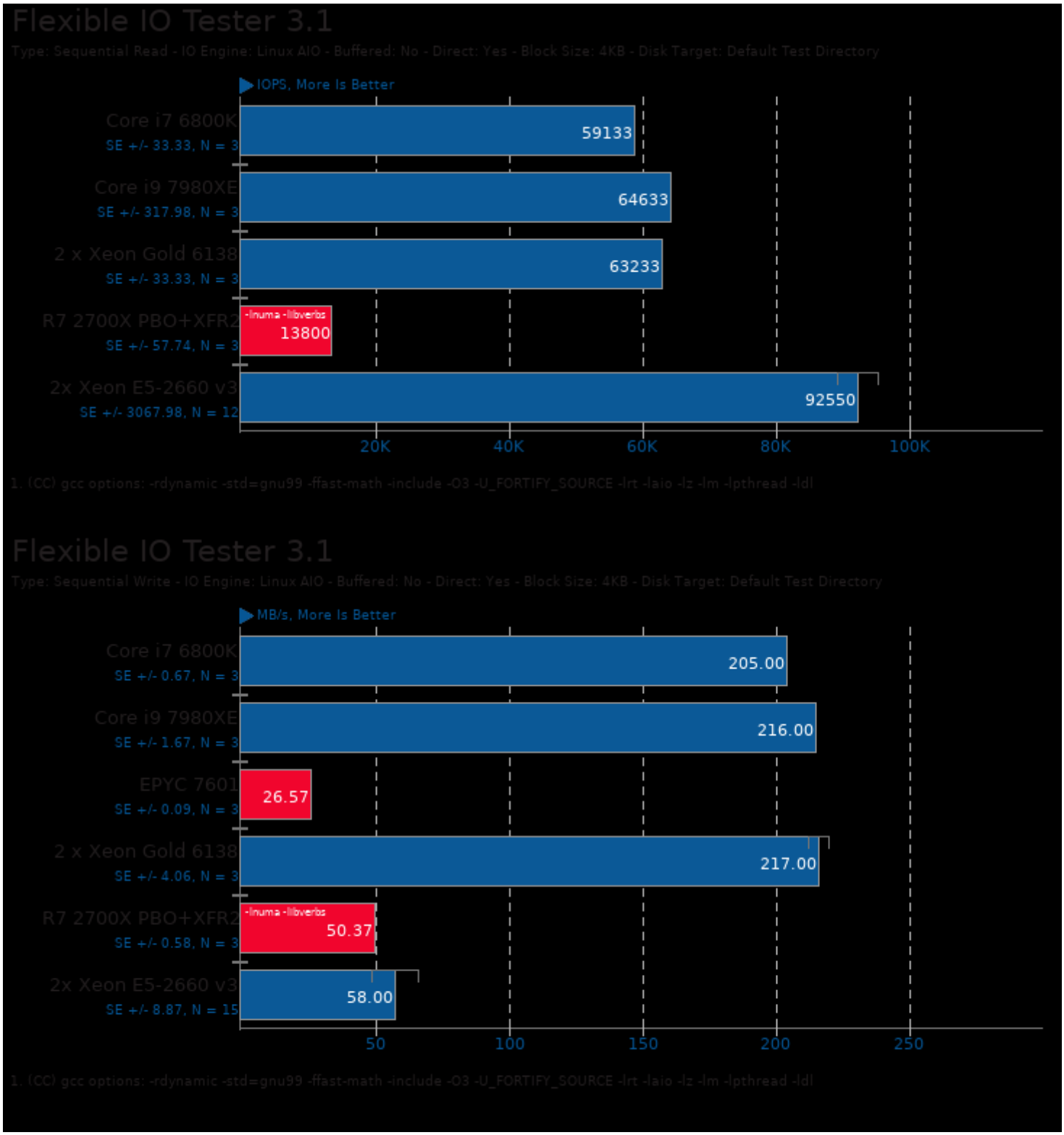


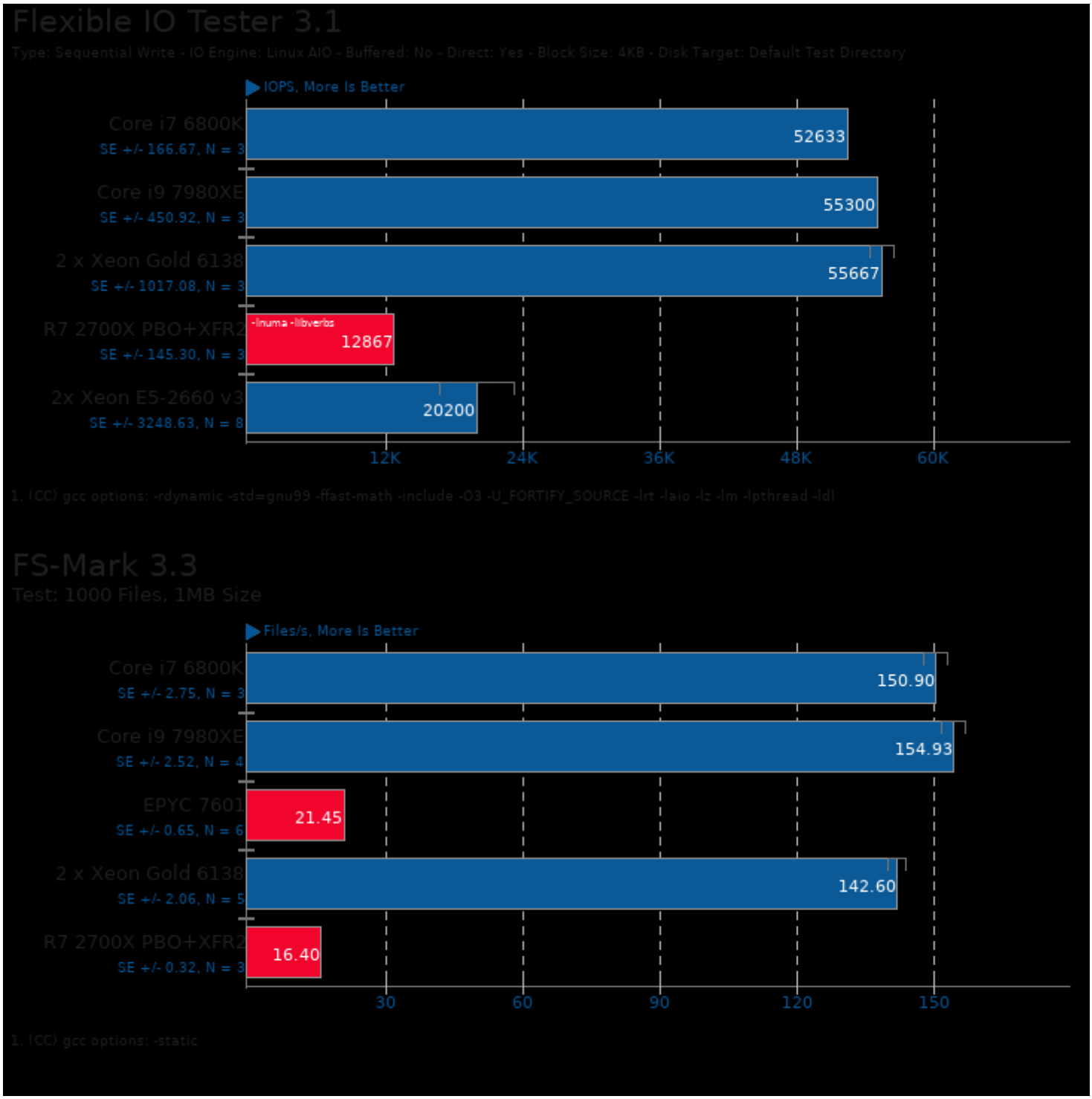
Ryzen 2700X PBO+XFR2 by Vulturex




Flexible IO Tester 3.1
Type: Random Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Core i7 6800K
SE +/- 251.66, N = 3
42600
Core i9 7980XE
SE +/- 66.67, N = 3
45733
2 x Xeon Gold 6138
SE +/- 517.47, N = 3
44967
2x Xeon E5-2660 v3
SE +/- 2706.49, N = 15
95333
20K
40K
60K
80K
100K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Core i7 6800K
145.000
Core i9 7980XE
SE +/- 2.186, N = 3
152.000
EPYC 7601
SE +/- 0.000, N = 3
23.400
2 x Xeon Gold 6138
153.000
R7 2700X PBO+XFR2
SE +/- 0.003, N = 3
0.640
2x Xeon E5-2660 v3
SE +/- 59.677, N = 12
206.152
50
100
150
200
250
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl

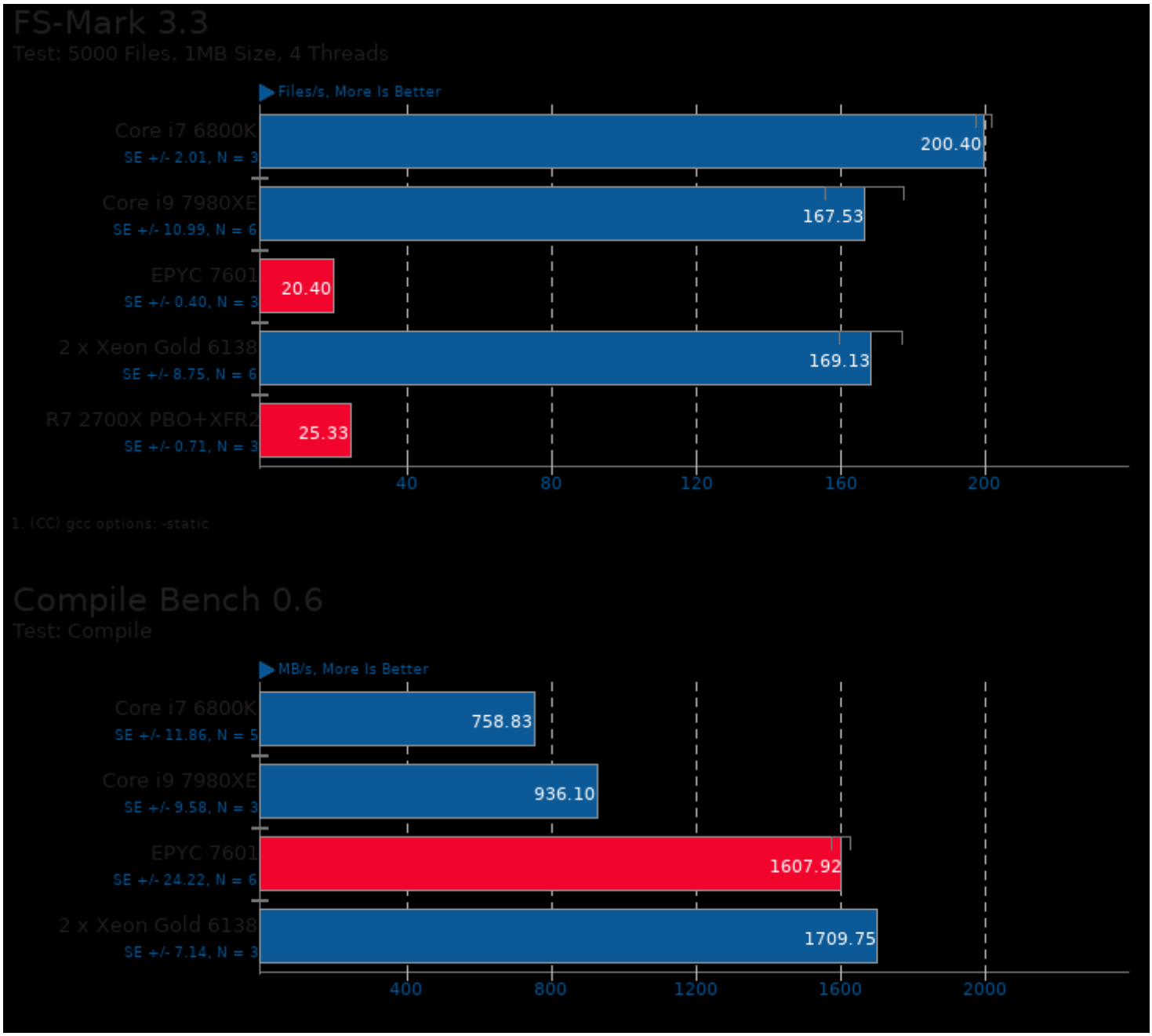

Flexible IO Tester 3.1
Type: Random Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Core i7 6800K
37200
Core i9 7980XE
SE +/- 550.76, N = 3
38800
2 x Xeon Gold 6138
SE +/- 88.19, N = 3
38967
2x Xeon E5-2660 v3
SE +/- 3235.88, N = 6
103017
20K
40K
60K
80K
100K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Core i7 6800K
231.00
Core i9 7980XE
254.00
EPYC 7601
SE +/- 0.03, N = 3
30.53
2 x Xeon Gold 6138
247.00
R7 2700X PBO+XFR2
SE +/- 0.18, N = 3
-lnuma -libverbs
54.03
2x Xeon E5-2660 v3
SE +/- 12.03, N = 12
362.00
80
160
240
320
400
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl


Flexible IO Tester 3.1
Type: Sequential Read - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Core i7 6800K
SE +/- 33.33, N = 3
59133
Core i9 7980XE
SE +/- 317.98, N = 3
64633
2 x Xeon Gold 6138
SE +/- 33.33, N = 3
63233
R7 2700X PBO+XFR2
SE +/- 57.74, N = 3
-lnuma -libverbs
13800
2x Xeon E5-2660 v3
SE +/- 3067.98, N = 12
92550
20K
40K
60K
80K
100K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl
Flexible IO Tester 3.1
Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
Core i7 6800K
SE +/- 0.67, N = 3
205.00
Core i9 7980XE
SE +/- 1.67, N = 3
216.00
EPYC 7601
SE +/- 0.09, N = 3
26.57
2 x Xeon Gold 6138
SE +/- 4.06, N = 3
217.00
R7 2700X PBO+XFR2
SE +/- 0.58, N = 3
-lnuma -libverbs
50.37
2x Xeon E5-2660 v3
SE +/- 8.87, N = 15
58.00
50
100
150
200
250
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl

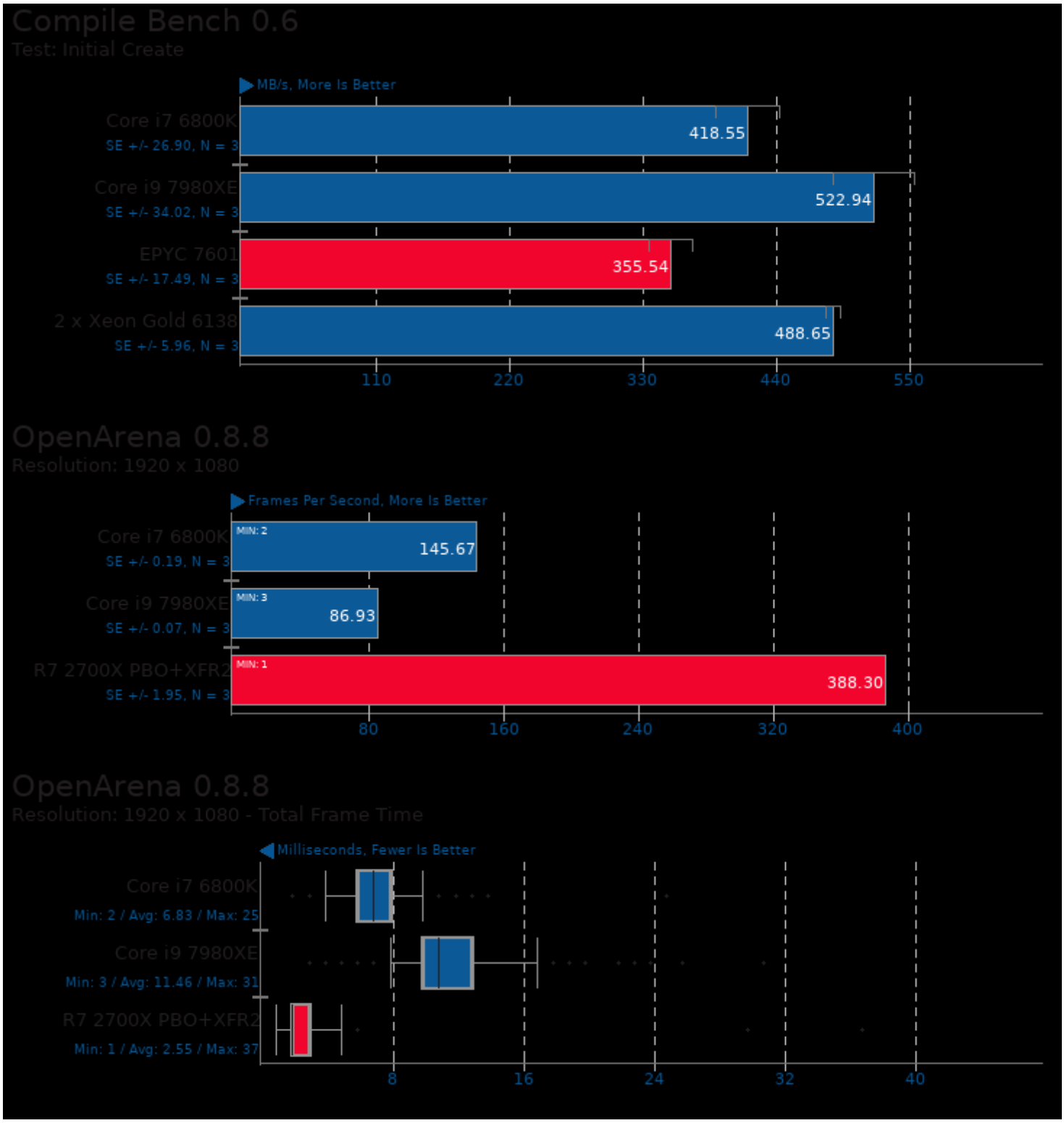

Flexible IO Tester 3.1
Type: Sequential Write - IO Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
Core i7 6800K
SE +/- 166.67, N = 3
52633
Core i9 7980XE
SE +/- 450.92, N = 3
55300
2 x Xeon Gold 6138
SE +/- 1017.08, N = 3
55667
R7 2700X PBO+XFR2
SE +/- 145.30, N = 3
-lnuma -libverbs
12867
2x Xeon E5-2660 v3
SE +/- 3248.63, N = 8
20200
12K
24K
36K
48K
60K
1. (CC) gcc options: -rdynamic -std=gnu99 -ffast-math -include -O3 -U_FORTIFY_SOURCE -lrt -laio -lz -lm -lpthread -ldl

FS-Mark 3.3
Test: 1000 Files, 1MB Size
Files/s, More Is Better
Core i7 6800K
SE +/- 2.75, N = 3
150.90
Core i9 7980XE
SE +/- 2.52, N = 4
154.93
EPYC 7601
SE +/- 0.65, N = 6
21.45
2 x Xeon Gold 6138
SE +/- 2.06, N = 5
142.60
R7 2700X PBO+XFR2
SE +/- 0.32, N = 3
16.40
30
60
90
120
150
1. (CC) gcc options: -static

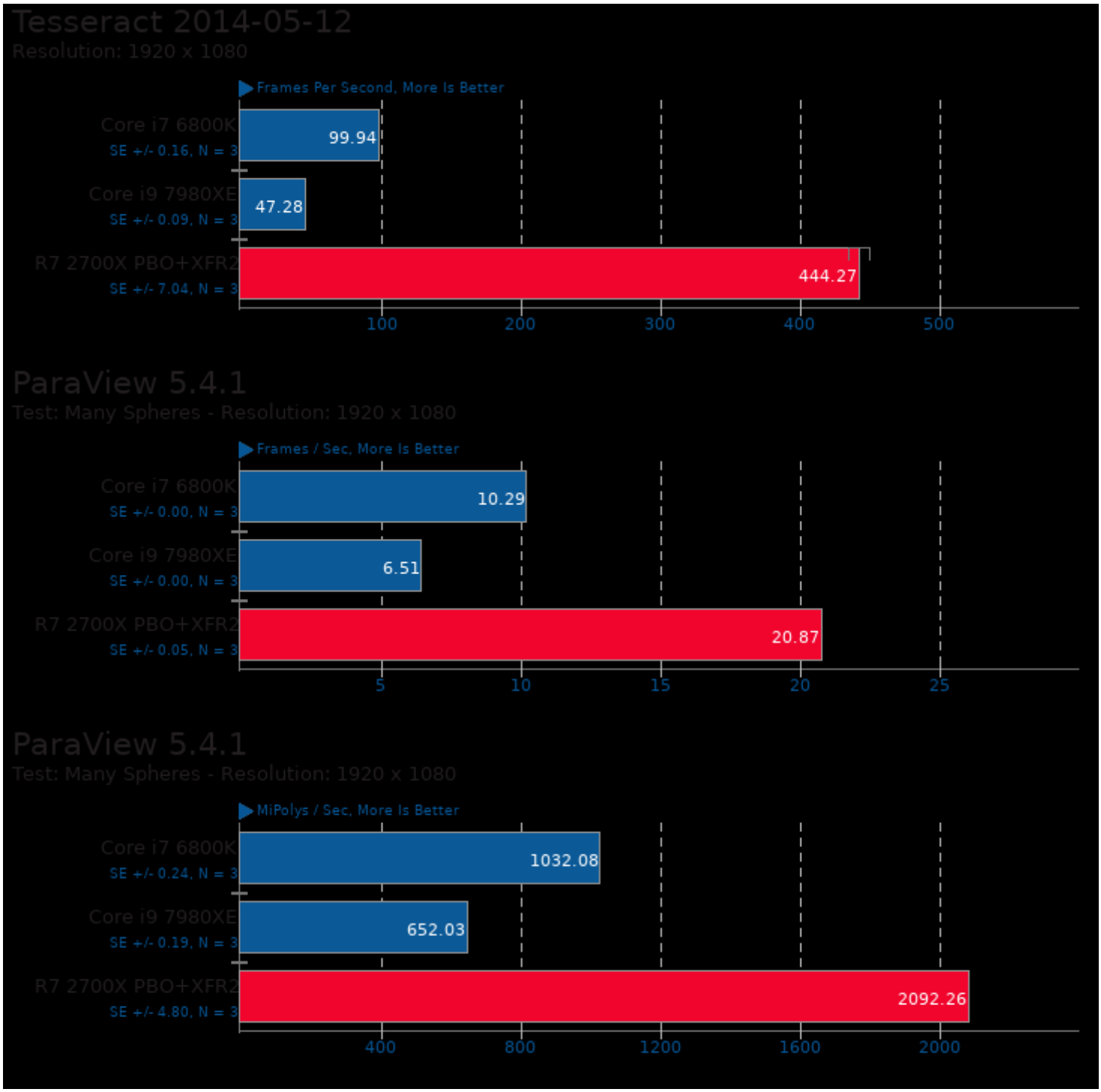
Ryzen 2700X PBO+XFR2 by Vulturex



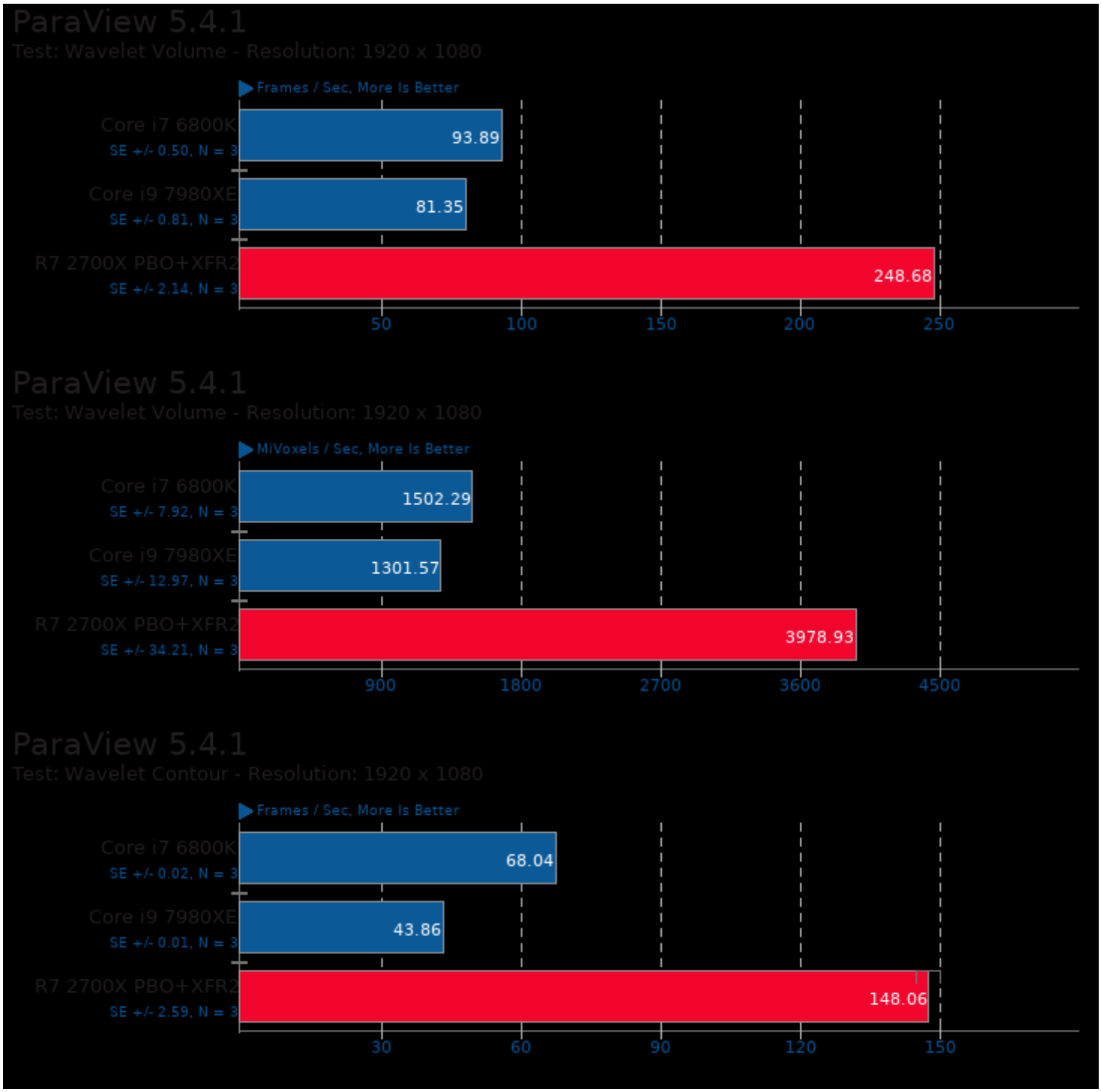
Ryzen 2700X PBO+XFR2 by Vulturex



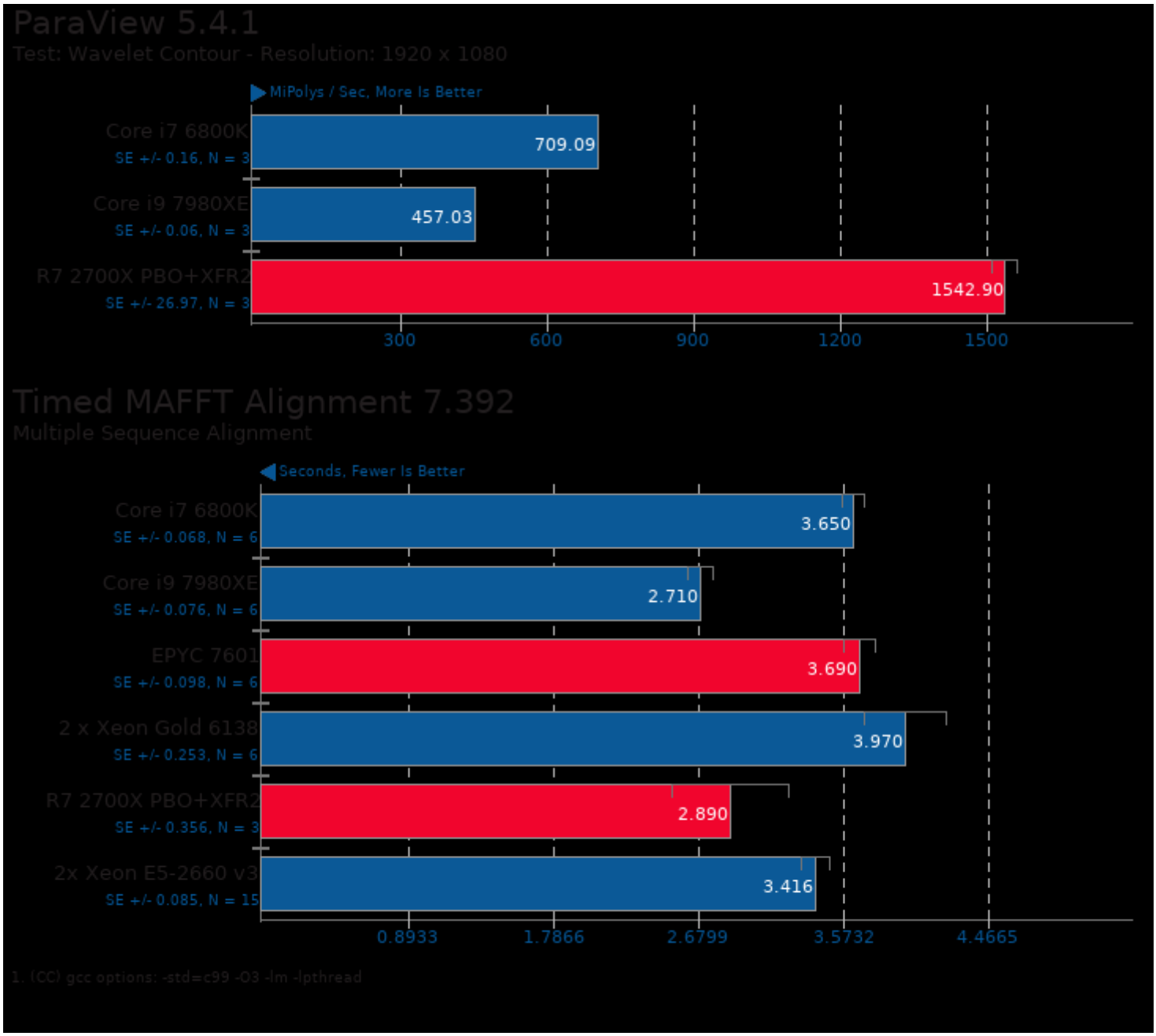
Ryzen 2700X PBO+XFR2 by Vulturex



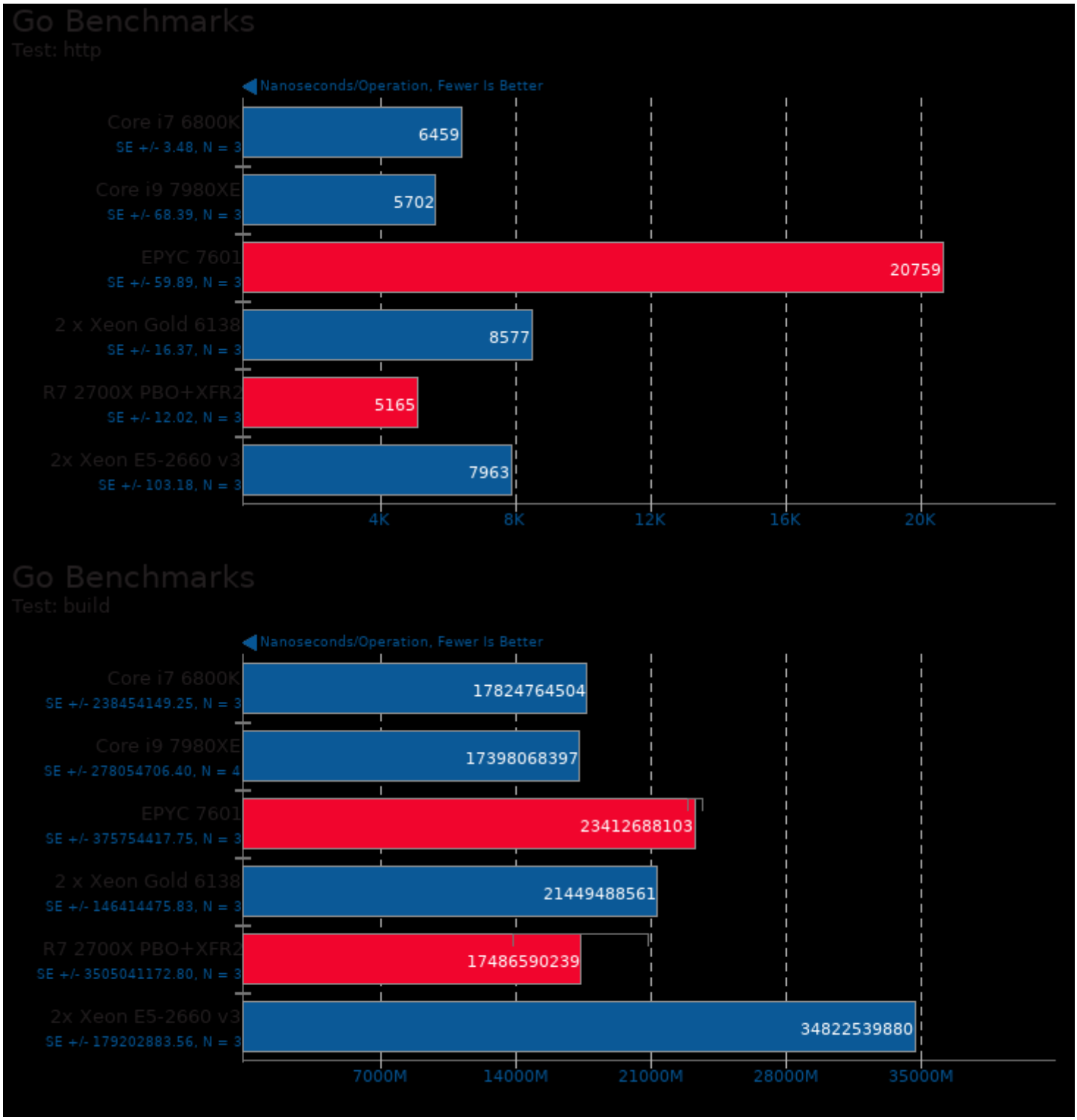
Ryzen 2700X PBO+XFR2 by Vulturex



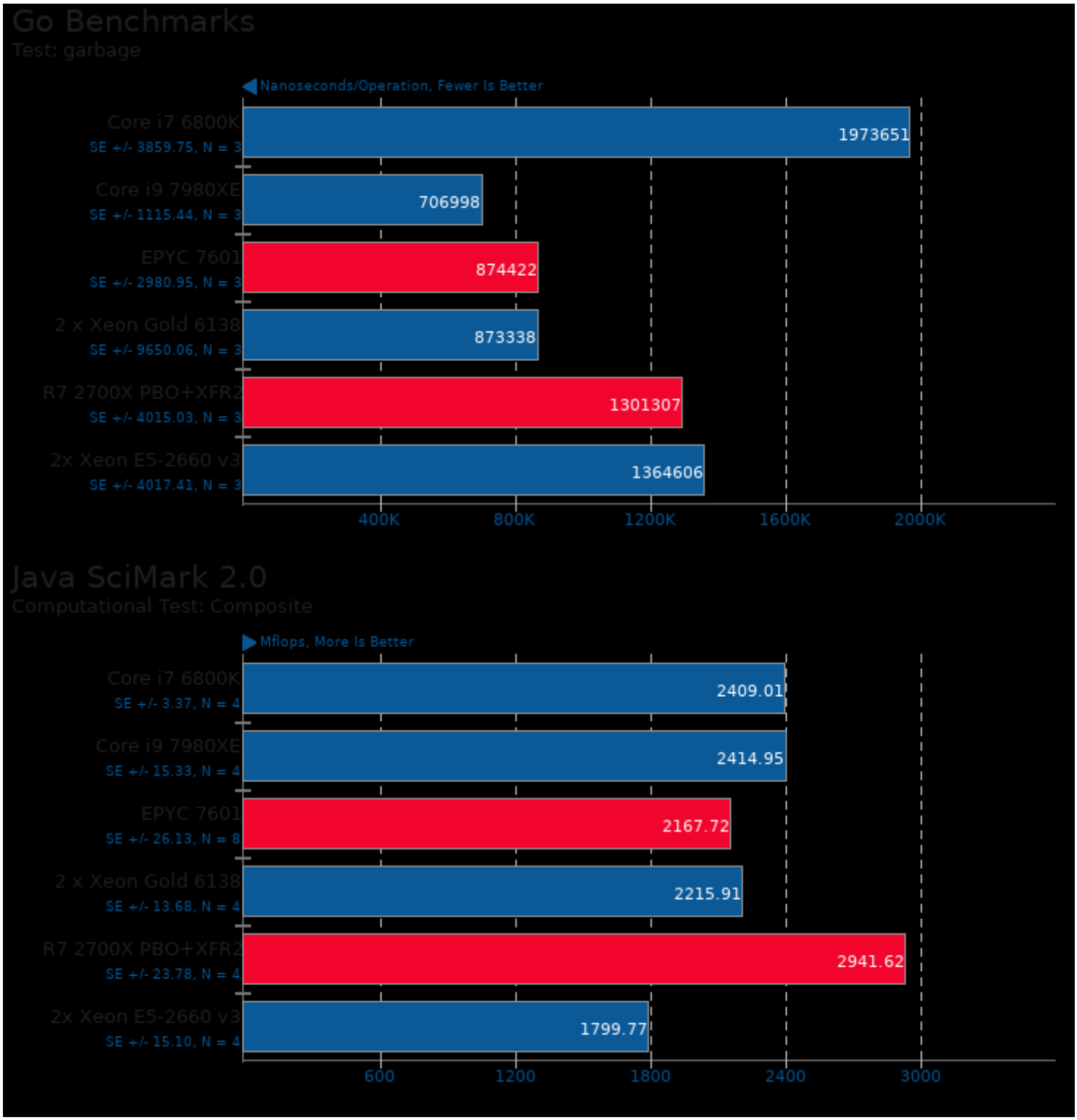
Ryzen 2700X PBO+XFR2 by Vulturex



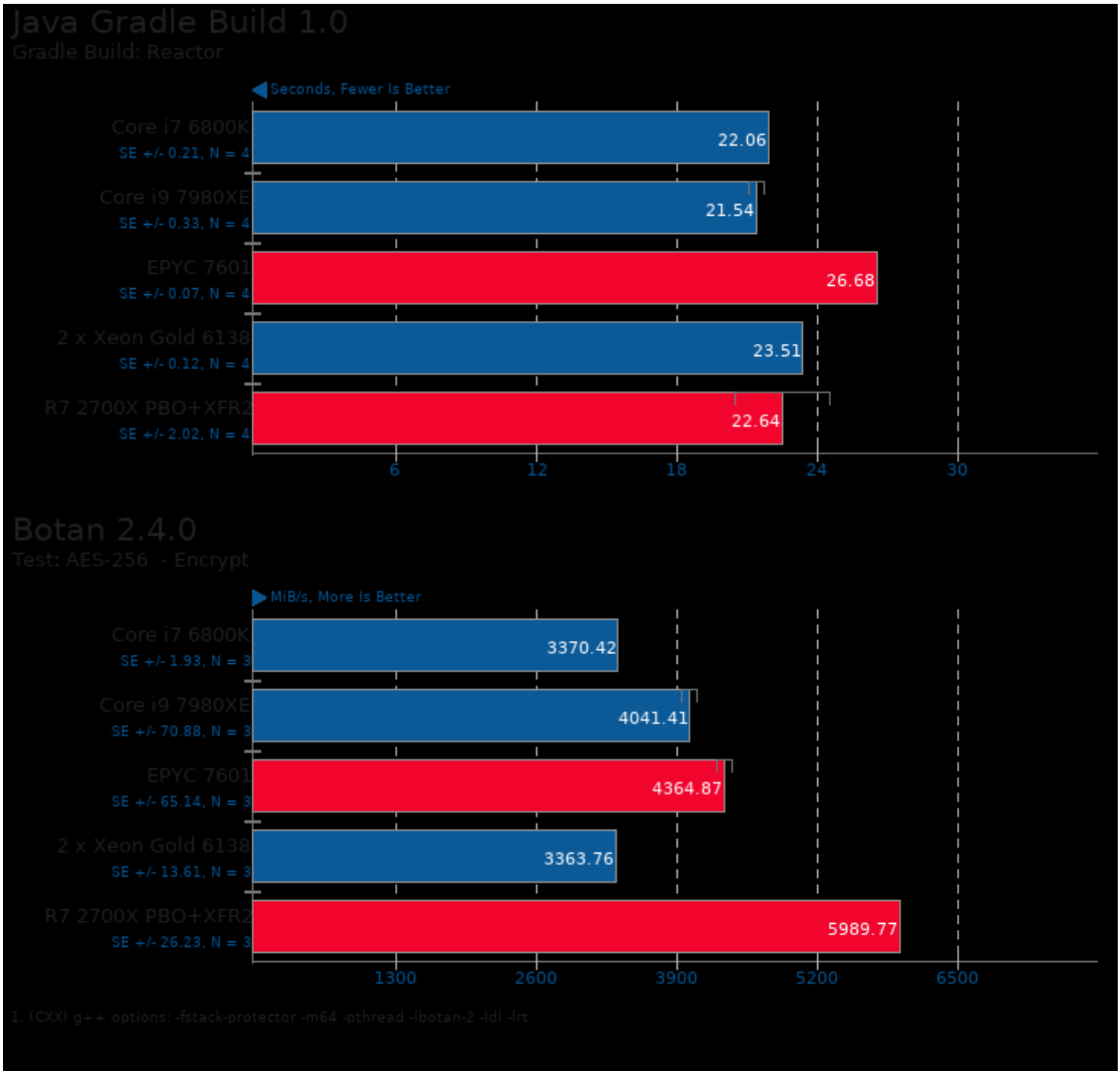
Ryzen 2700X PBO+XFR2 by Vulturex



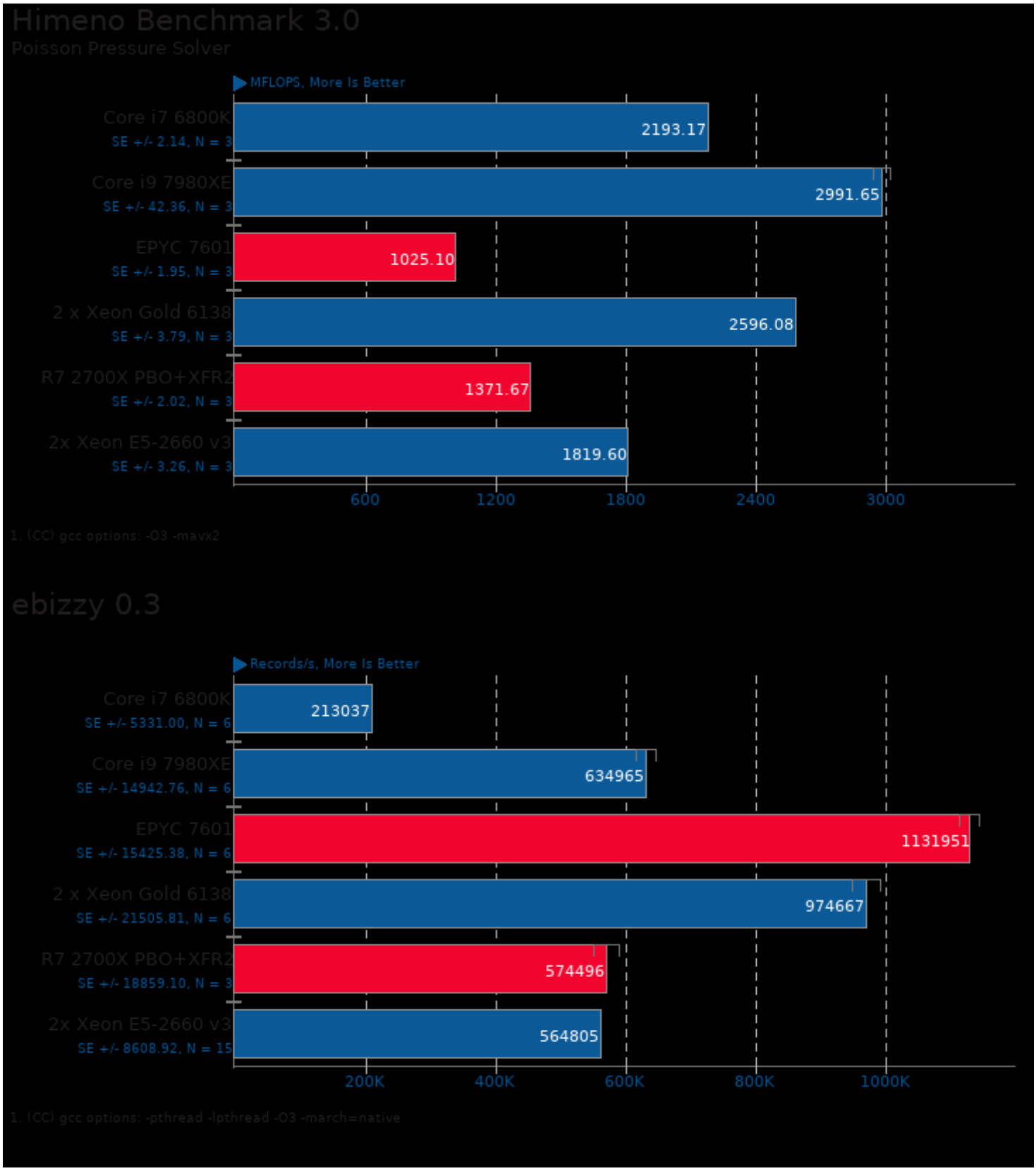
Ryzen 2700X PBO+XFR2 by Vulturex



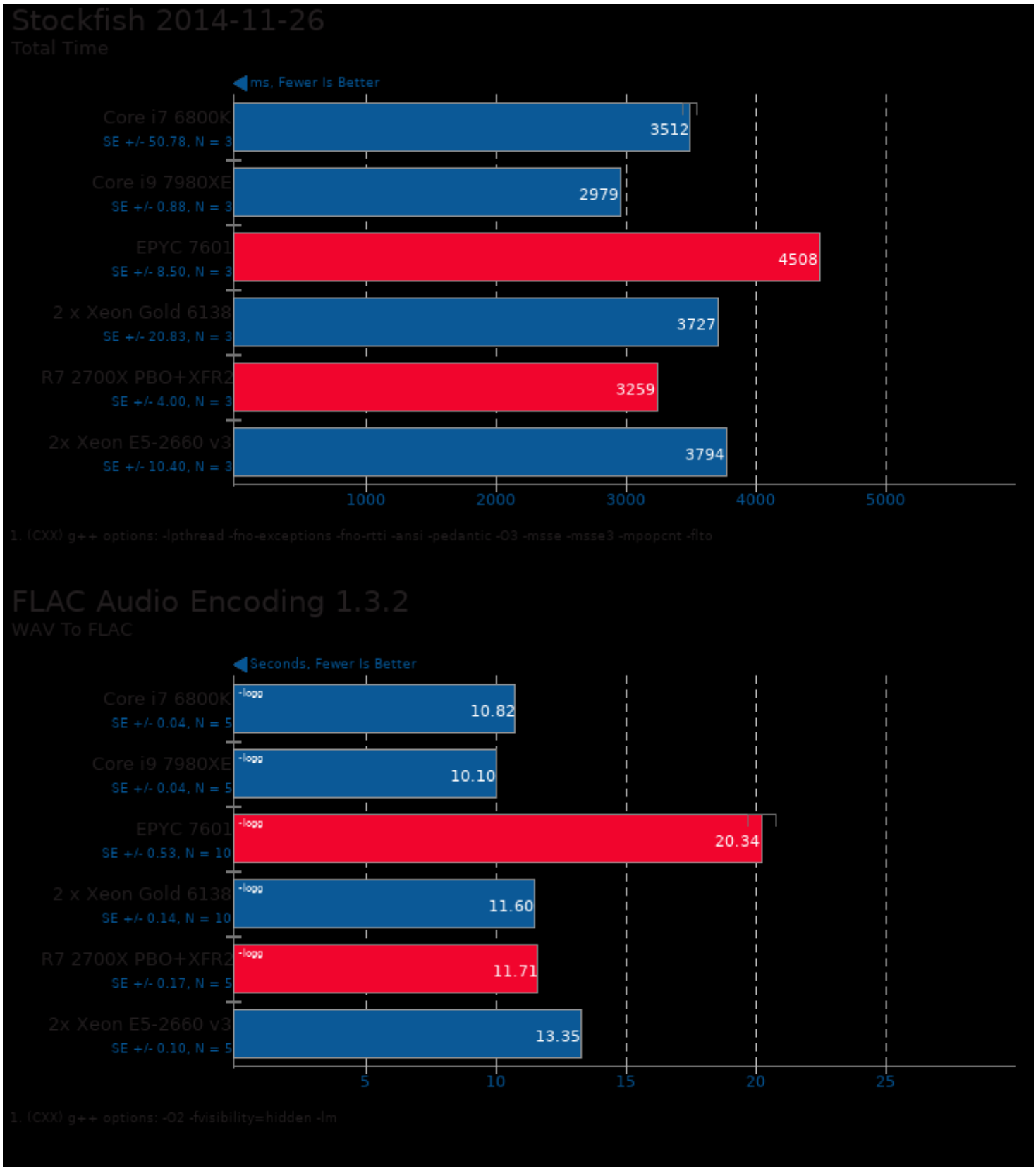
Ryzen 2700X PBO+XFR2 by Vulturex

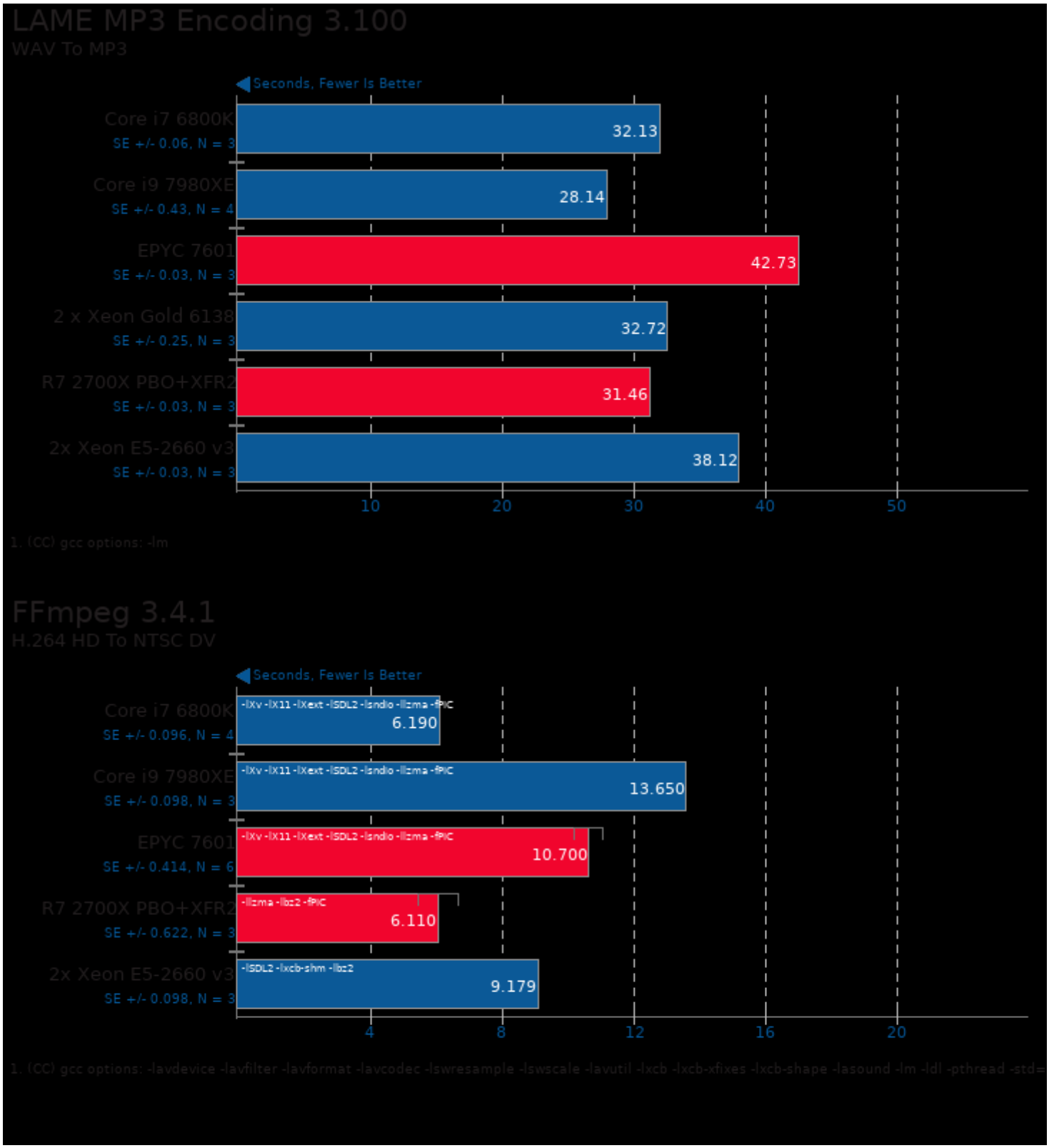


Ryzen 2700X PBO+XFR2 by Vulturex



Ryzen 2700X PBO+XFR2 by Vulturex

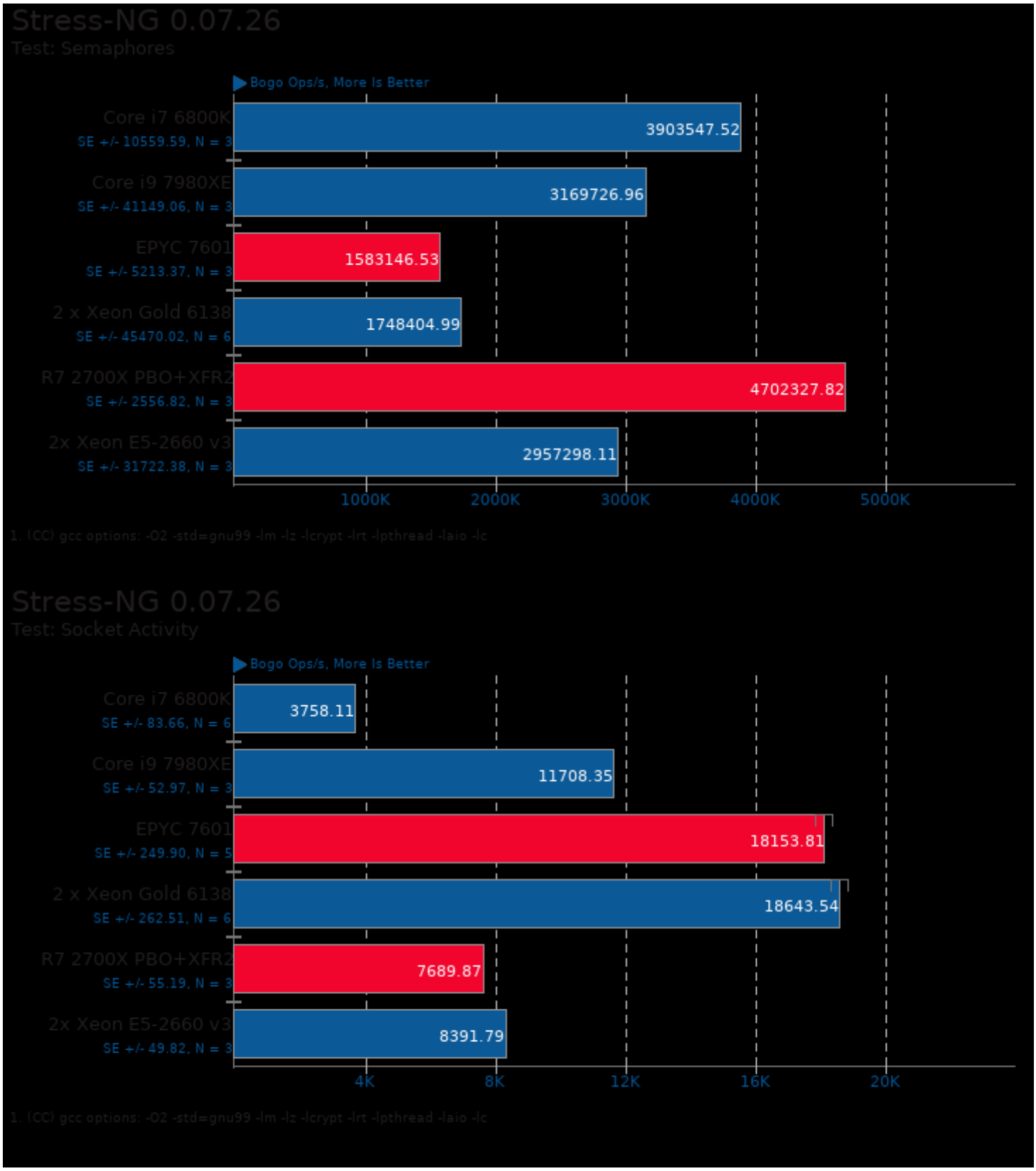



LAME MP3 Encoding 3.100
WAV To MP3
Seconds, Fewer Is Better
Core i7 6800K
SE +/- 0.06, N = 3
32.13
Core i9 7980XE
SE +/- 0.43, N = 4
28.14
EPYC 7601
SE +/- 0.03, N = 3
42.73
2 x Xeon Gold 6138
SE +/- 0.25, N = 3
32.72
R7 2700X PBO+XFR2
SE +/- 0.03, N = 3
31.46
2x Xeon E5-2660 v3
SE +/- 0.03, N = 3
38.12
10
20
30
40
50
1. (CC) gcc options: -lm
FFmpeg 3.4.1
H.264 HD To NTSC DV
Seconds, Fewer Is Better
Core i7 6800K
SE +/- 0.096, N = 4
-lXv -lX11 -lXext -lSDL2 -lsndio -llzma -fPIC
6.190
Core i9 7980XE
SE +/- 0.098, N = 3
-lXv -lX11 -lXext -lSDL2 -lsndio -llzma -fPIC
13.650
EPYC 7601
SE +/- 0.414, N = 6
-lXv -lX11 -lXext -lSDL2 -lsndio -llzma -fPIC
10.700
R7 2700X PBO+XFR2
SE +/- 0.622, N = 3
-llzma -lbz2 -fPIC
6.110
2x Xeon E5-2660 v3
SE +/- 0.098, N = 3
-lSDL2 -lxcb-shm -lbz2
9.179
4
8
12
16
20
1. (CC) gcc options: -lavdevice -lavfilter -lavformat -lavcodec -lswresample -lswscale -lavutil -lxcb -lxcb-xfixes -lxcb-shape -lasound -lm -ldl -pthread -std=

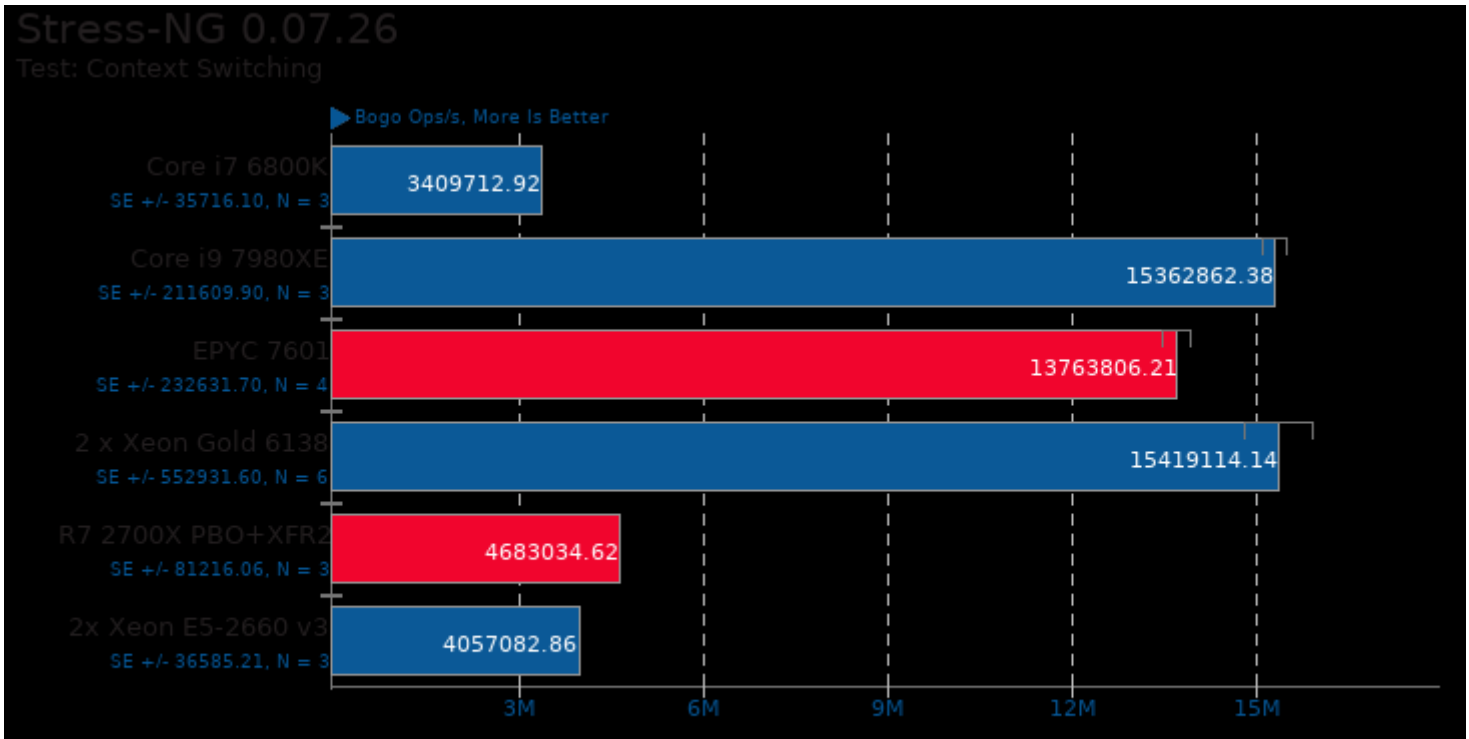
Ryzen 2700X PBO+XFR2 by Vulturex

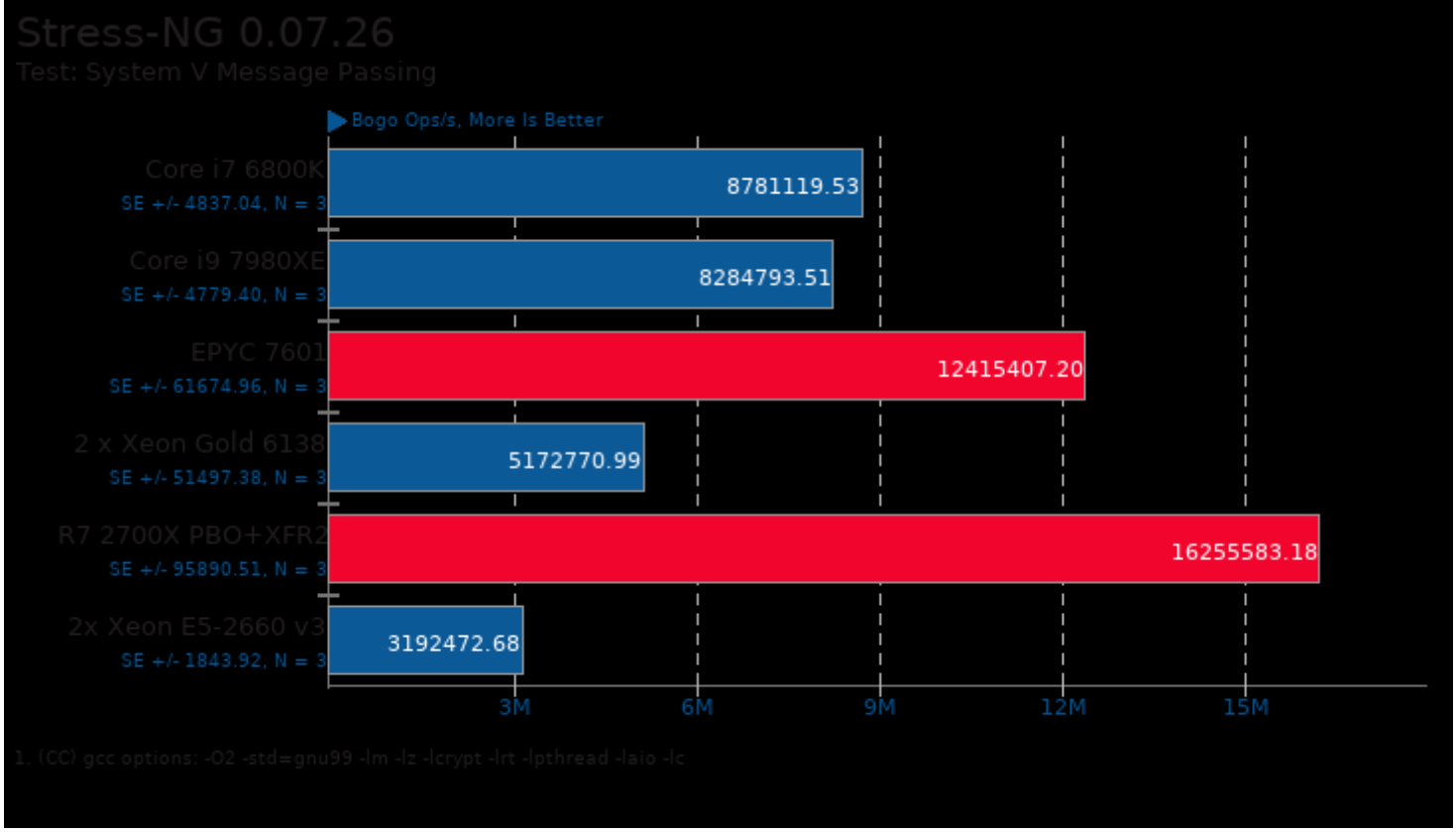


Ryzen 2700X PBO+XFR2 by Vulturex

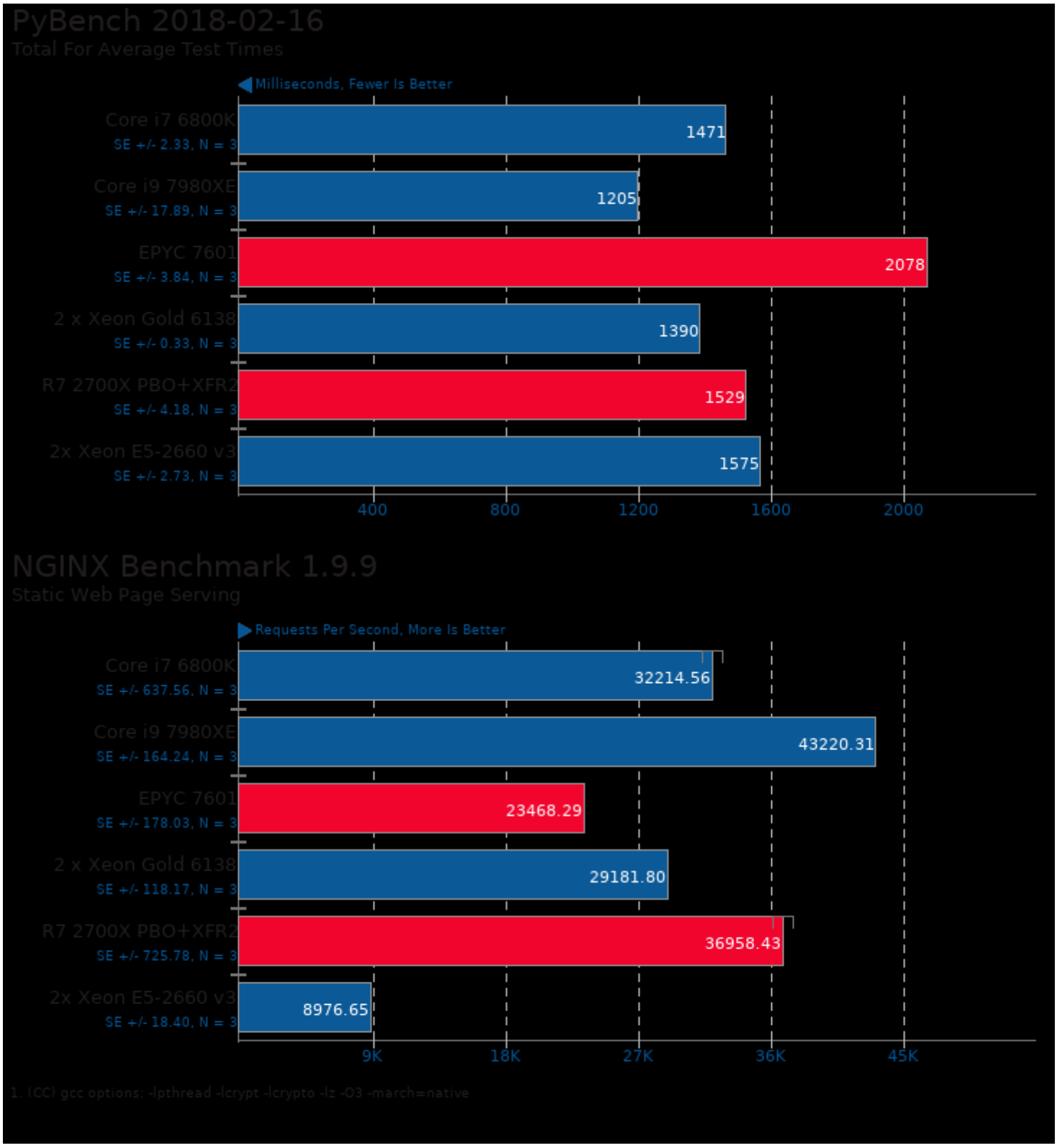


Ryzen 2700X PBO+XFR2 by Vulturex

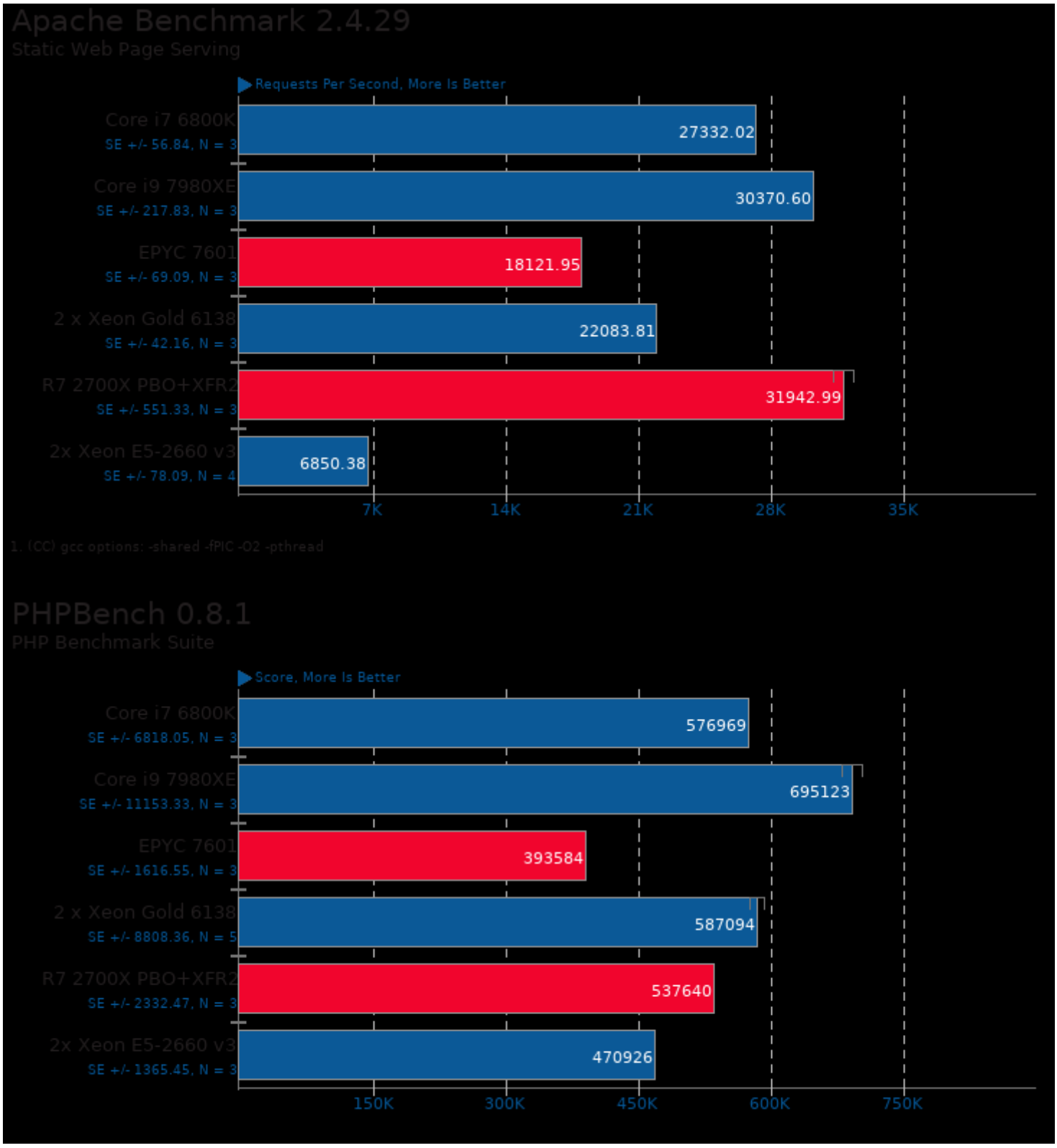




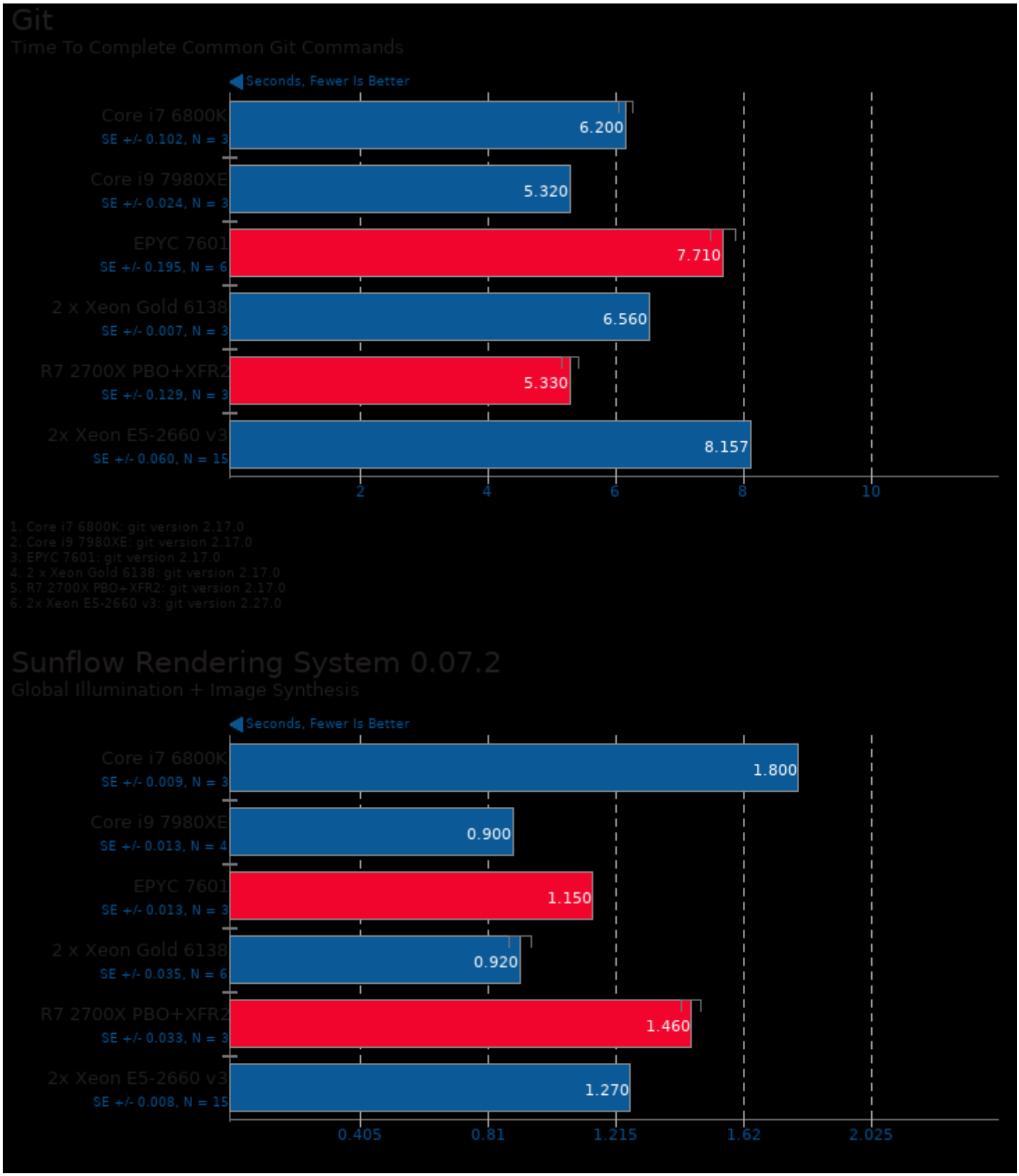
Ryzen 2700X PBO+XFR2 by Vulturex



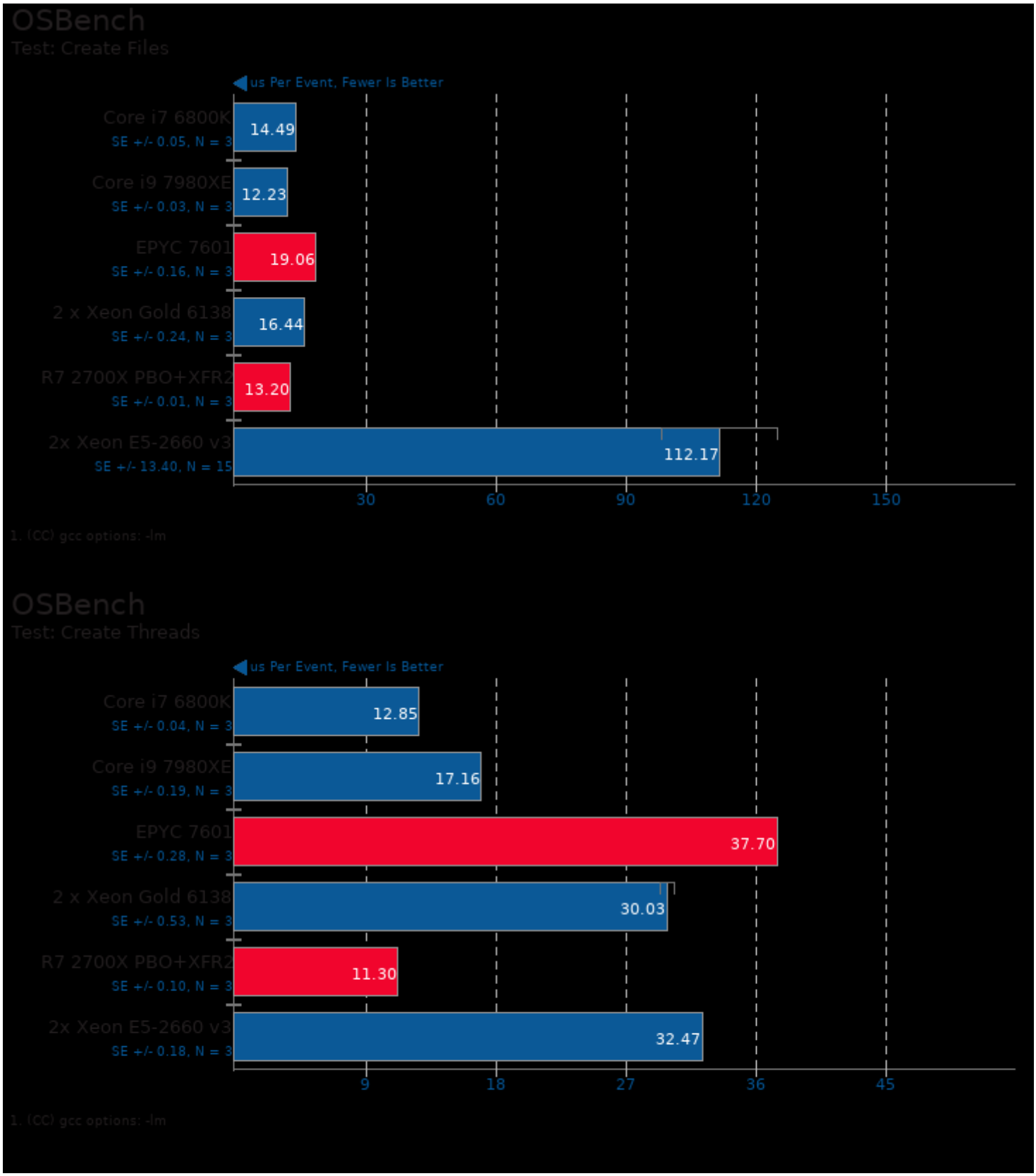
Ryzen 2700X PBO+XFR2 by Vulturex



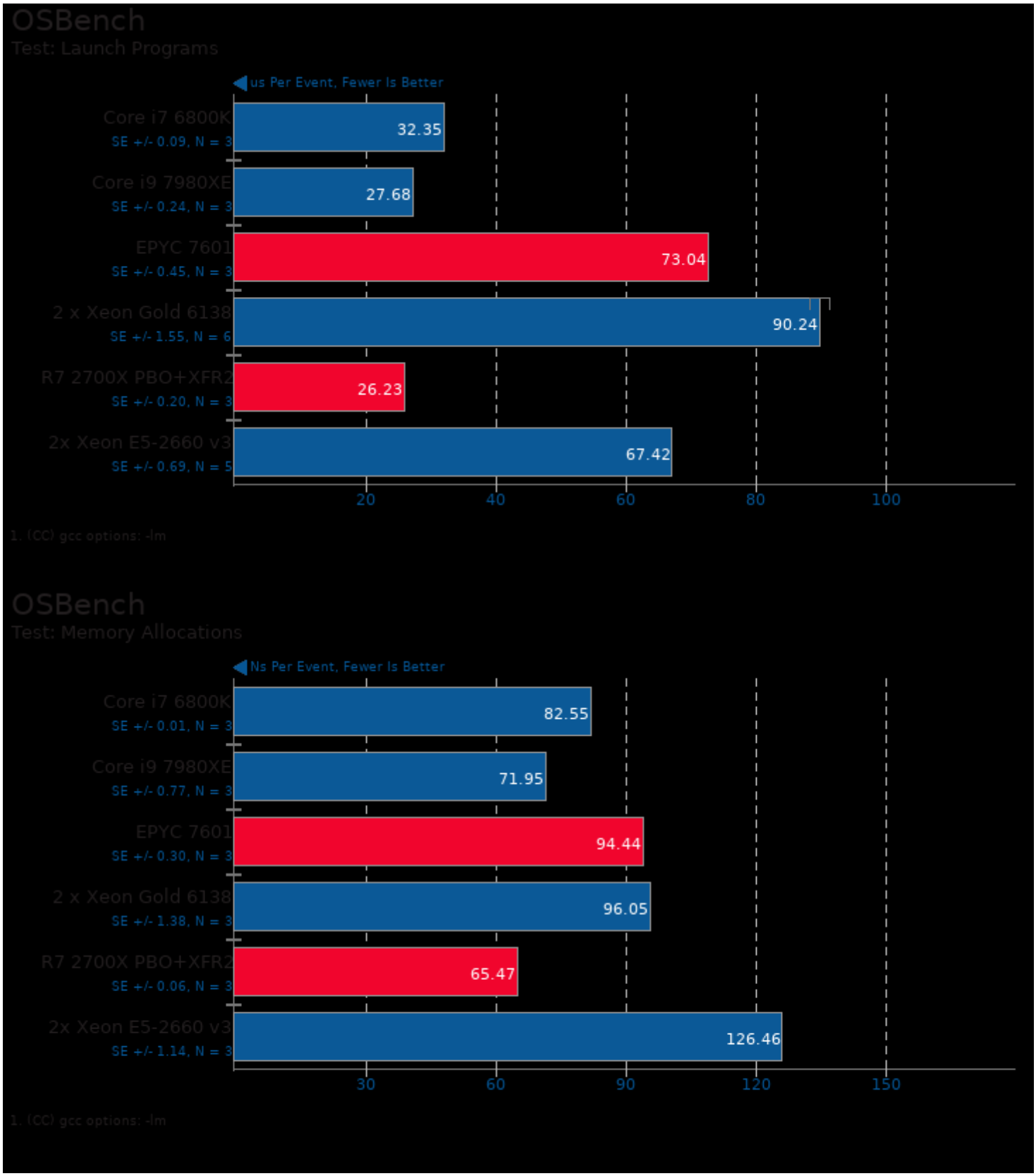
Ryzen 2700X PBO+XFR2 by Vulturex

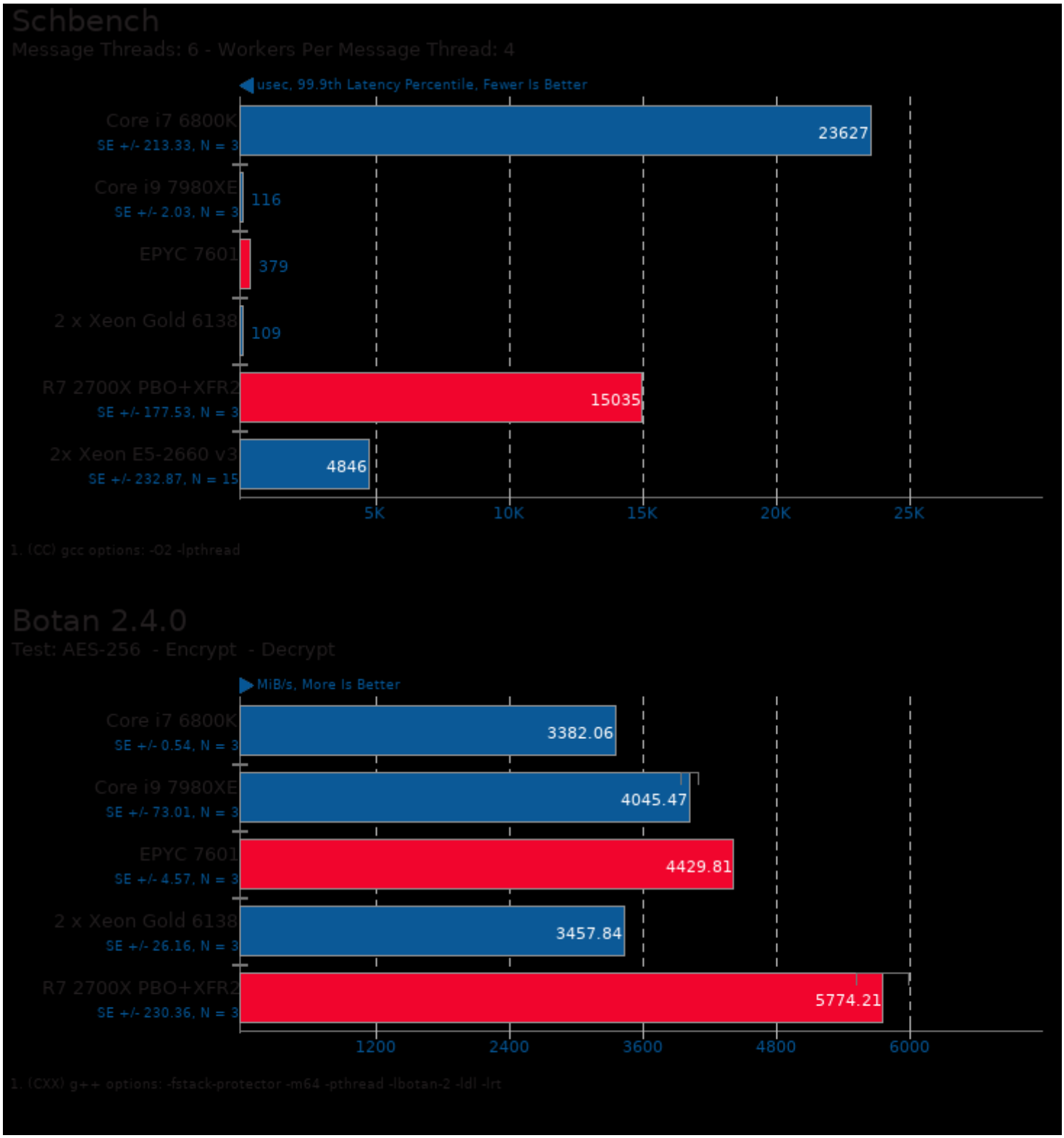


Ryzen 2700X PBO+XFR2 by Vulturex



Ryzen 2700X PBO+XFR2 by Vulturex





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