Phoronix Test Suite

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Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

AMD Ryzen 9 5950X 16-Core testing with a ASRock X470 Taichi Ultimate (P4.73 BIOS) and MSI AMD Radeon RX 5600 OEM/5600 XT / 5700/5700 8GB on Arch rolling via the Phoronix Test Suite.

Automated Executive Summary

Talos II 2 x 22c POWER 9 - Spec Kernel Only had the most wins, coming in first place for 41% of the tests.

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

PHPBench (PHP Benchmark Suite) at 8.679x
Rust Prime Benchmark (Prime Number Test To 200,000,000) at 8.514x
7-Zip Compression (Compress Speed Test) at 7.893x
7-Zip Compression (System Power Consumption Monitor) at 6.63x
Timed LLVM Compilation (System Power Consumption Monitor) at 6.465x
Stockfish (System Power Consumption Monitor) at 6.32x
PostgreSQL pgbench (System Power Consumption Monitor) at 6.1x
C-Ray (System Power Consumption Monitor) at 6.029x
POV-Ray (System Power Consumption Monitor) at 5.806x
Rust Prime Benchmark (System Power Consumption Monitor) at 5.732x.

Test Systems:

Core i9 7900X

Processor: Intel Core i7-7900X @ 4.50GHz (10 Cores / 20 Threads), Motherboard: ASRock X299 Extreme4 (P1.30 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Core i9 7960X

Processor: Intel Core i9-7960X @ 4.40GHz (16 Cores / 32 Threads), Motherboard: MSI X299 SLI PLUS (MS-7A93) v1.0 (1.A0 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Core i9 7980XE

Processor: Intel Core i9-7980XE @ 4.20GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A (1503 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel_pstate performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp + PTE Inversion; VMX: conditional cache flushes SMT vulnerable

Threadripper 2920X

Processor: AMD Ryzen Threadripper 2920X 12-Core @ 3.50GHz (12 Cores / 24 Threads), Motherboard: Gigabyte X399 AORUS Gaming 7 (F11e BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Qualcomm Atheros Killer E2500 Gigabit + Intel Wireless 8265 / 8275

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

Threadripper 2950X

Processor: AMD Ryzen Threadripper 2950X 16-Core @ 3.50GHz (16 Cores / 32 Threads), Motherboard: MSI MEG X399 CREATION (MS-7B92) v1.0 (1.10 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel I211 Gigabit Connection + Intel Wireless-AC 9260

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

Threadripper 2970WX

Processor: AMD Ryzen Threadripper 2970WX 24-Core @ 3.00GHz (24 Cores / 48 Threads), Motherboard: Gigabyte X399 AORUS Gaming 7 (F11e BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Qualcomm Atheros Killer E2500 Gigabit + Intel Wireless 8265 / 8275

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

Threadripper 2990WX

Processor: AMD Ryzen Threadripper 2990WX 32-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: ASUS ROG ZENITH EXTREME (1402 BIOS), Chipset: AMD Family 17h, Memory: 32768MB, Disk: 525GB 2115, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Network: Intel I211 Gigabit Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-999-generic (x86_64) 20181020, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 18.2.2 (LLVM 7.0.0), Compiler: GCC 8.2.0, 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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7rc1
Security Notes: __user pointer sanitization + Full AMD retpoline IBPB + SSB disabled via prctl and seccomp

Talos II 2 x 22c POWER9

Talos II 2 x 22c POWER 9 - Spec Kernel Only

Processor: POWER9 altivec supported @ 3.80GHz (44 Cores / 176 Threads), Motherboard: PowerNV T2P9D01 REV 1.01, Memory: 65536MB, Disk: Samsung SSD 960 EVO 500GB, Graphics: AMD Radeon RX Vega 8GB, Monitor: VE228, Network: Broadcom NetXtreme BCM5719 Gigabit PCIe

OS: Ubuntu 18.10, Kernel: 4.18.0-10-generic (ppc64le), Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 1920x1080

Environment Notes: CXXFLAGS=-O3-mtune=power9-mcpu=power9 CFLAGS=-O3-mtune=power9-mcpu=power9
Compiler Notes: --build=powerpc64le-linux-gnu --disable-libphobos --disable-multilib --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-secureplt --enable-shared --enable-targets=powerpcle-linux --enable-threads=posix --host=powerpc64le-linux-gnu --program-prefix=powerpc64le-linux-gnu- --target=powerpc64le-linux-gnu --with-cpu=power8 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-long-double-128 -v
Processor Notes: Scaling Governor: powernv-cpufreq performance
Python Notes: Python 2.7.15+ + Python 3.6.7
Security Notes: __user pointer sanitization ori31 speculation barrier enabled + Indirect branch serialisation (kernel only) + Kernel entry/exit barrier (eieio)

2x6386 32G ECC

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 32GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie

--enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

6262

Processor: AMD Opteron 6262 HE @ 1.60GHz (8 Cores / 16 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 16GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x600063e
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

test

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: VIKINGS KGPE-D16 v1.0 (4.11-ab8edda14a622ab46bdfd01b877d75c7bd385a4d BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 32GB, Disk: 180GB INTEL SSDSC2BF18, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: B226WL, Network: 2 x Intel 82574L

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 800x600

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RCS 6386

RCS6386

Processor: 2 x AMD Opteron 6386 SE @ 2.80GHz (16 Cores / 32 Threads), Motherboard: ASUS KGPE-D16 v1.0 (4.8-722-g32cdff5f08 BIOS), Chipset: AMD RD890 + SB7x0/SB8x0/SB9x0, Memory: 252GB, Disk: 180GB INTEL SSDSC2BF18 + 4 x 1920GB SAMSUNG MZ7KH1T9, Graphics: ASPEED, Audio: AMD SBx00 Azalia, Monitor: PL2274HD, Network: 2 x Intel 82574L + Mellanox MT27520

OS: Debian 10, Kernel: 5.10.0-0.bpo.3-amd64 (x86_64), Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq schedutil - CPU Microcode: 0x6000852
Python Notes: Python 2.7.16 + Python 3.7.3
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Ryzen 5950x

Processor: AMD Ryzen 9 5950X 16-Core @ 3.40GHz (16 Cores / 32 Threads), Motherboard: ASRock X470 Taichi Ultimate (P4.73 BIOS), Chipset: AMD Starship/Matisse, Memory: 32GB, Disk: 2048GB ADATA SX8200PNP + 8002GB TOSHIBA HDWG180 + 6001GB TOSHIBA HDWE160 + 3001GB Seagate ST3000DM001-9YN1, Graphics: MSI AMD Radeon RX 5600 OEM/5600 XT / 5700/5700 8GB (2100/875MHz), Audio: AMD Navi 10 HDMI Audio, Monitor: Q27V3 + GS27QHR DP + LG Ultra HD, Network: Intel I211 + Aquantia AQC107 NBase-T/IEEE + Intel Dual Band-AC 3168NGW

OS: Arch rolling, Kernel: 5.14.11-arch1-1 (x86_64), Desktop: KDE Plasma 5.22.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 21.2.3 (LLVM 12.0.1), Compiler: GCC 11.1.0 + Clang 12.0.1, File-System: f2fs, Screen Resolution: 5121x960

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --disable-libssp --disable-libstdcxx-pch --disable-libunwind-exceptions --disable-werror --enable-__cxa_atexit --enable-cet=auto --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-gnu-indirect-function --enable-gnu-unique-object --enable-install-libiberty --enable-languages=c,c++,ada,fortran,go,lto,objc,obj-c++,d --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-isl --with-linker-hash-style=gnu
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0xa201009
Python Notes: Python 3.9.7
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

5950x

Processor: AMD Ryzen 9 5950X 16-Core @ 3.40GHz (16 Cores / 32 Threads), Motherboard: ASRock X470 Taichi Ultimate (P4.73 BIOS), Chipset: AMD Starship/Matisse, Memory: 32GB, Disk: 2048GB ADATA SX8200PNP + 8002GB TOSHIBA HDWG180 + 6001GB TOSHIBA HDWE160 + 3001GB Seagate ST3000DM001-9YN1, Graphics: MSI AMD Radeon RX 5600 OEM/5600 XT / 5700/5700 8GB (2100/875MHz), Audio: AMD Navi 10 HDMI Audio, Monitor: Q27V3 + GS27QHR DP + LG Ultra HD, Network: Intel I211 + Aquantia AQC107 NBase-T/IEEE + Intel Dual Band-AC 3168NGW

OS: Arch rolling, Kernel: 5.14.12-arch1-1 (x86_64), Desktop: KDE Plasma 5.22.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 21.2.3 (LLVM 12.0.1), Compiler: GCC 11.1.0 + Clang 12.0.1, File-System: f2fs, Screen Resolution: 5121x960

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --disable-libssp --disable-libstdcxx-pch --disable-libunwind-exceptions --disable-werror --enable-__cxa_atexit --enable-cet=auto --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-gnu-indirect-function --enable-gnu-unique-object --enable-install-libiberty --enable-languages=c,c++,ada,fortran,go,lto,objc,obj-c++,d --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-isl --with-linker-hash-style=gnu
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0xa201009
Python Notes: Python 3.9.7
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

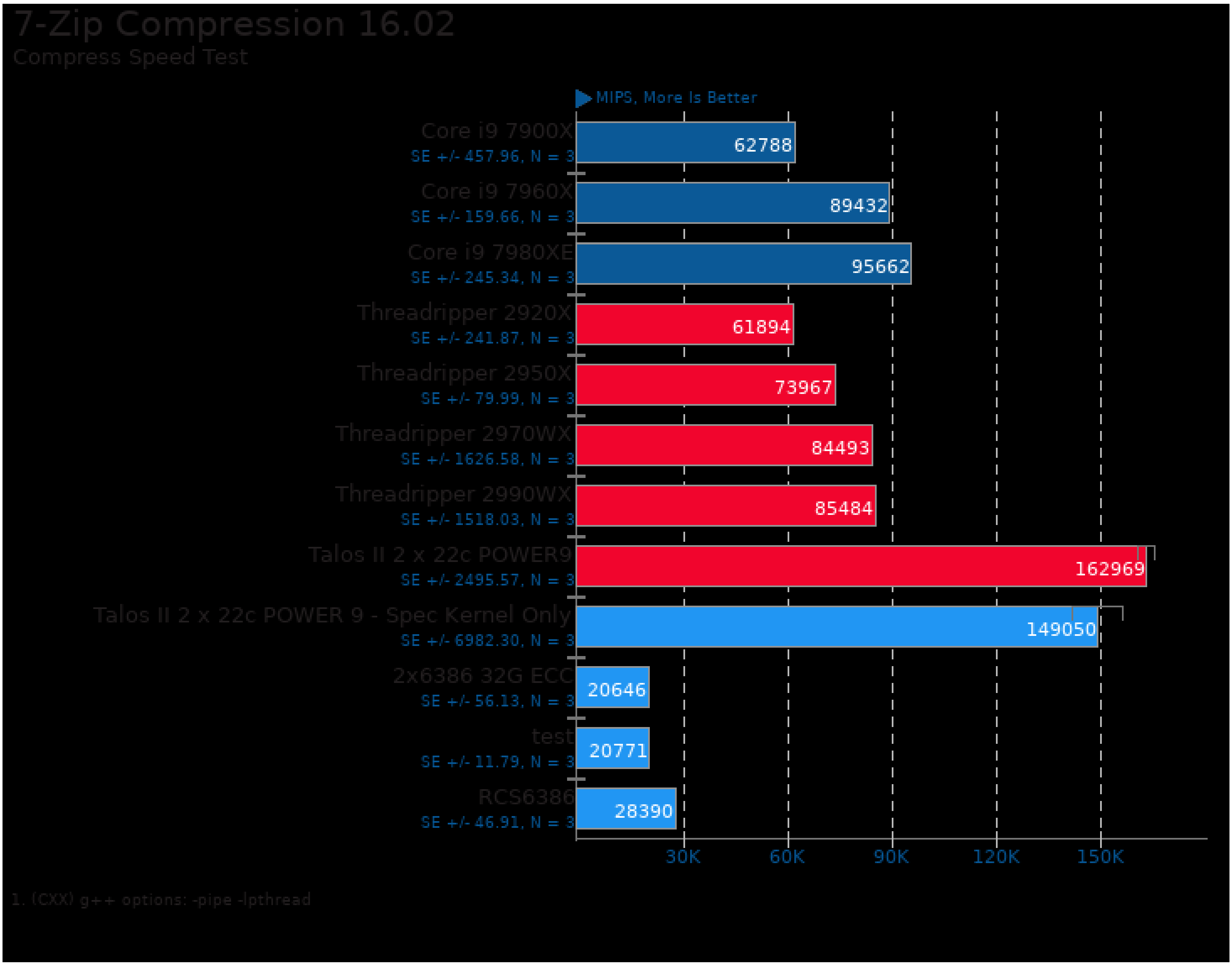
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

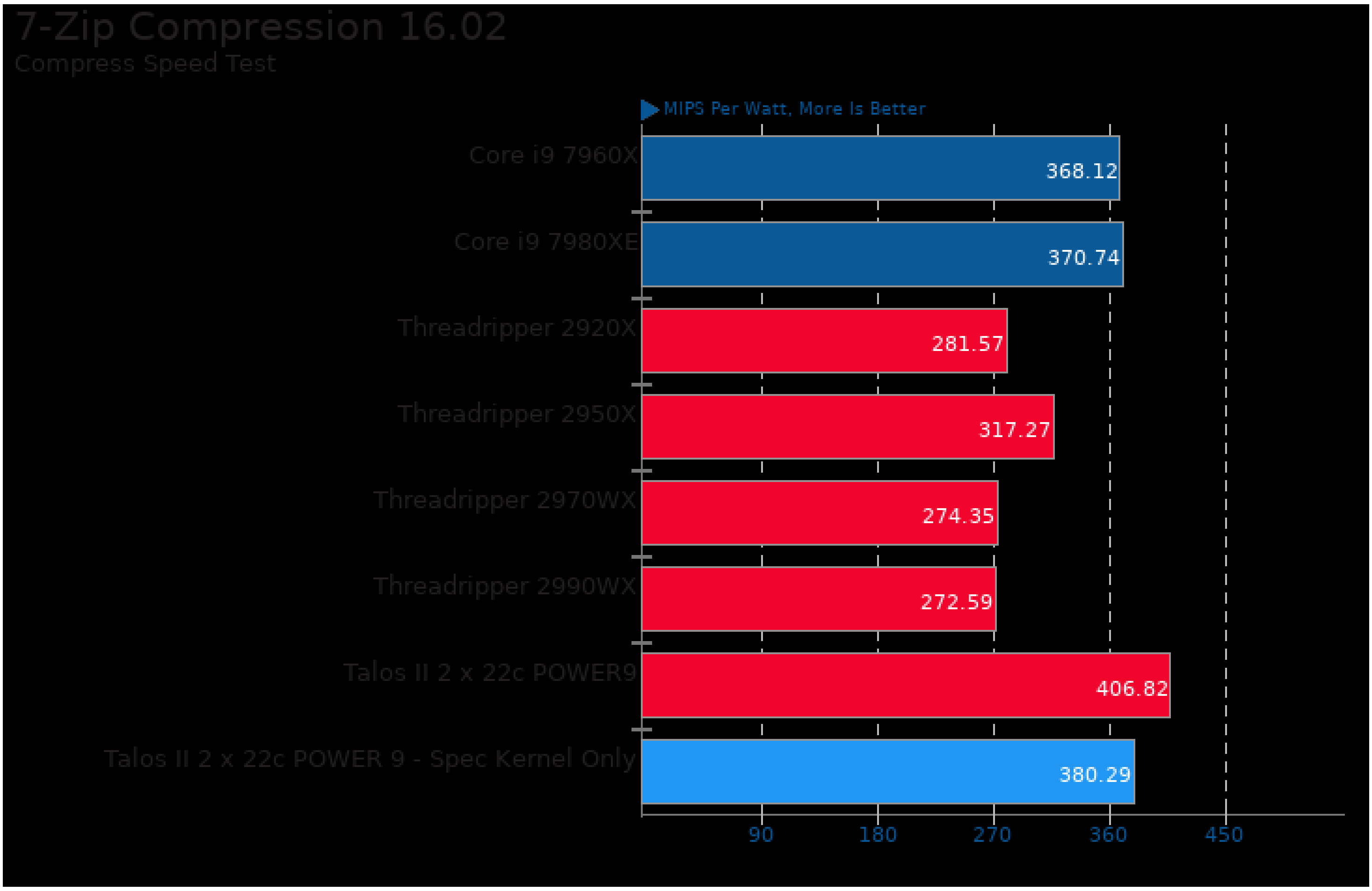
	Core i9 7900X	Core i9 7960X	Core i9 7980XE	Threadripper 2920X	Threadripper 2950X	Threadripper 2970WX	Threadripper 2990WX	Talos II 2 x 22c POWER9	Talos II 2 x 22c POWER 9 - Spec Kernel Only	2x6386 32G ECC	6262	test	RCS 6386	RCS6386	Ryzen 5950x	5950x
7-Zip Compression - C.S.T (MIPS)	62788	89432	95662	61894	73967	84493	85484	**162969**	149050	**20646**		20771		28390		
Normalized	38.53%	54.88%	58.7%	37.98%	45.39%	51.85%	52.45%	100%	91.46%	12.67%		12.75%		17.42%		
Standard Deviation	1.3%	0.3%	0.4%	0.7%	0.2%	3.3%	3.1%	2.7%	8.1%	0.5%		0.1%		0.3%		
7-Zip Compression - C.S.T (MIPS/Watt)		368.12	370.74	281.57	317.27	274.35	**272.59**	**406.82**	380.29							
Normalized		90.49%	91.13%	69.21%	77.99%	67.44%	67.01%	100%	93.48%							
C-Ray - Total Time - 4.1.R.P.P (sec)	51.28	35.71	33.51	41.30	33.08	23.12	**17.97**	19.14	19.09	76.950		**77.009**		76.994		33.194
Normalized	35.04%	50.32%	53.63%	43.51%	54.32%	77.72%	100%	93.89%	94.13%	23.35%		23.33%		23.34%		54.14%
Standard Deviation	0.1%	0.1%	0.1%	0.7%	0.1%	2%	0.2%	0.5%	1.2%	0%		0.1%		0%		0%
GNU Octave Benchmark (sec)	17.07	17.57	17.47	16.43	16.64	17.87	16.78	**14.92**	16.35	**37.886**		36.421		36.281		
Normalized	87.4%	84.92%	85.4%	90.81%	89.66%	83.49%	88.92%	100%	91.25%	39.38%		40.97%		41.12%		
Standard Deviation	0.6%	0.4%	0.3%	1.4%	0.4%	4.1%	1%	1.1%	1.5%	8.4%		11.8%		1.4%		
GNU Octave Benchmark (sec)																8.888
Standard Deviation																1%
OpenSSL - R.4.b.P (Signs/sec)	3059	4421	4686	2566	3287	4561	5821	7356	**7408**	2010		**2010**		2011		4451
Normalized	41.29%	59.68%	63.26%	34.64%	44.37%	61.57%	78.58%	99.3%	100%	27.13%		27.13%		27.14%		60.09%
Standard Deviation	0.4%	0.1%	0.3%	0.8%	0.5%	0.1%	0.3%	1.7%	0.7%	0.1%		0.1%		0%		0.1%
OpenSSL - R.4.b.P (Signs/sec/Watt)		**17.20**	15.88	**11.70**	13.40	14.64	17.12	17.00	15.90							
Normalized		100%	92.33%	68.02%	77.91%	85.12%	99.53%	98.84%	92.44%							

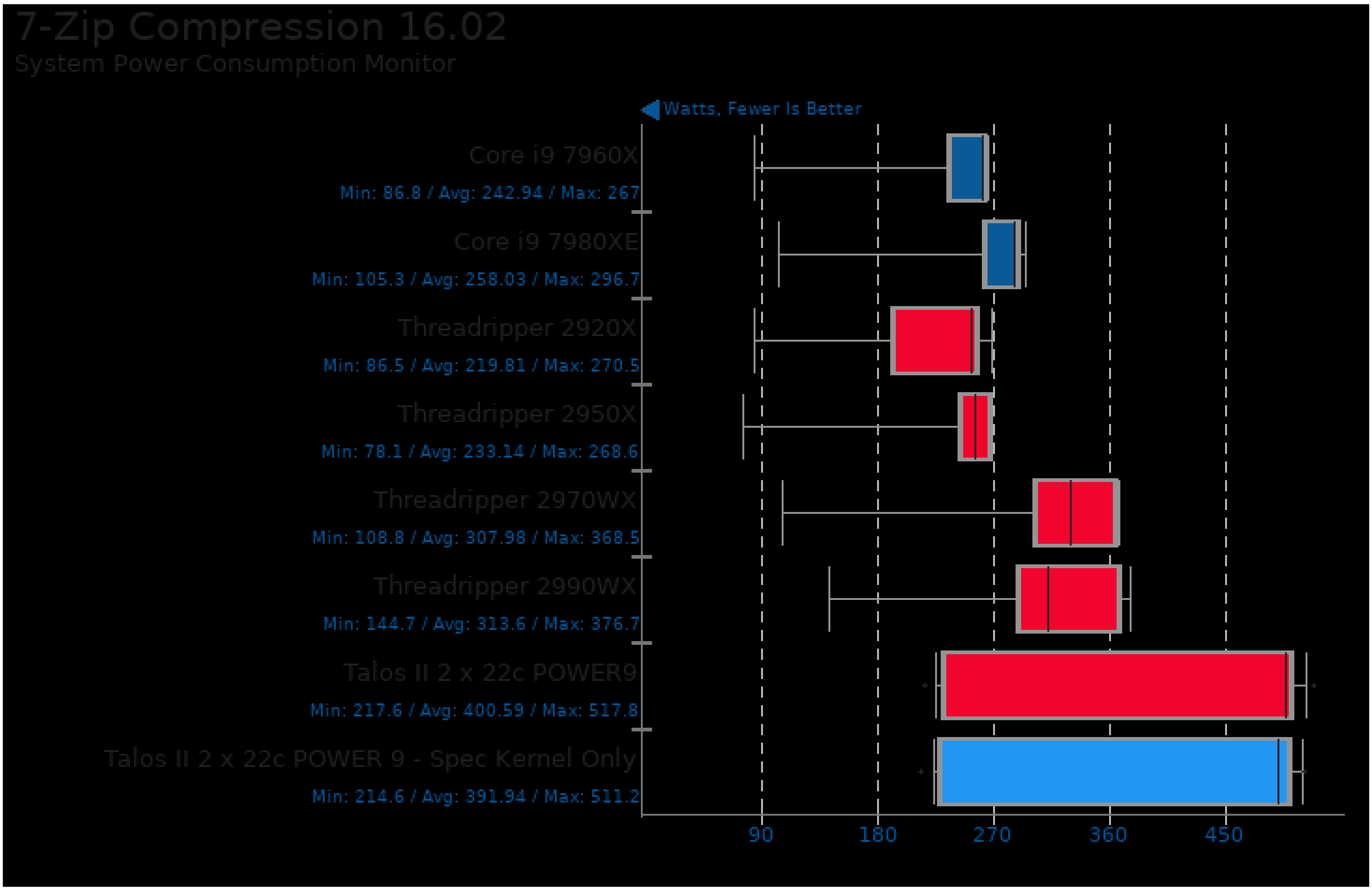
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

PHPBench - P.B.S	**717281**	701357	703666	535263	537467	520064	525276	**161286**	328546	323744	327452		323158		
Normalized	100%	97.78%	98.1%	74.62%	74.93%	72.5%	73.23%	22.49%	45.8%	45.13%	45.65%		45.05%		
Standard Deviation	0.9%	0.8%	0.1%	0.3%	0.8%	0.1%	0.2%	0.1%	0.6%	1.1%	1.1%		1.3%		
PHPBench - P.B.S (Score/Watt)		**6137**	5806	4525	4479	3492	3795	**707.13**	1419						
Normalized		100%	94.6%	73.72%	72.99%	56.9%	61.84%	11.52%	23.12%						
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	327587	493203	522155	271596	317019	430861	472250	544186	**574403**	**101566**	103743		109602		421324
Normalized	57.03%	85.86%	90.9%	47.28%	55.19%	75.01%	82.22%	94.74%	100%	17.68%	18.06%		19.08%		73.35%
Standard Deviation	1.2%	0.3%	0.4%	0.2%	0.1%	0.3%	2.3%	0.6%	0.2%	2%	1.8%		0.8%		0.5%
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS/Watt)		**2079**	1971	**1262**	1565	1496	1705	1596	1626						
Normalized		100%	94.77%	60.71%	75.24%	71.96%	82.01%	76.75%	78.21%						
POV-Ray - Trace Time (sec)	44.22	30.72	28.29	37.92	30.56	22.39	**17.92**	25.28	23.44	49.394	**49.537**		49.276		24.537
Normalized	40.52%	58.33%	63.34%	47.26%	58.64%	80.04%	100%	70.89%	76.45%	36.28%	36.17%		36.37%		73.03%
Standard Deviation	0.2%	0.2%	0.3%	0.6%	0.4%	1.8%	0.6%	0.3%	1.3%	0.2%	0.3%		0.3%		0.4%
PyBench - T.F.A.T.T (Millisecond	942	960	955	1133	1136	1165	1147	**4088**	1936	2269	2260		2259		**796**
Normalized	84.5%	82.92%	83.35%	70.26%	70.07%	68.33%	69.4%	19.47%	41.12%	35.08%	35.22%		35.24%		100%
Standard Deviation	0.6%		0.3%	0.6%	0.3%	0.1%	0.4%	0.3%	0.2%	0.5%	0.5%		0.3%		4.6%
Rodinia - OpenMP LavaMD	31.25	21.47	20.08	25.77	20.74	14.52	**11.75**	19.74	19.30	32.691	32.640	33.193	**33.290**	13.699	13.402
Normalized	37.6%	54.73%	58.52%	45.6%	56.65%	80.92%	100%	59.52%	60.88%	35.94%	36%	35.4%	35.3%	85.77%	87.67%
Standard Deviation	0.6%	0.9%	0%	1.8%	0.6%	0.8%	0.2%	5.9%	5.3%	0%	0.1%	2.7%	2.8%	0.3%	2.1%
Rust Prime Benchmark - P.N.T.T.2.0.0 (sec)	11.55	6.71	8.18	**30.14**	21.21	17.64	12.49	3.64	**3.54**	16.403	16.428		16.476		5.789
Normalized	30.65%	52.76%	43.28%	11.75%	16.69%	20.07%	28.34%	97.25%	100%	21.58%	21.55%		21.49%		61.15%
Standard Deviation	0%	0.1%	0.2%	0%	0.1%	0.2%	0.1%	12%	4.8%	0%	0.1%		0.7%		0.3%

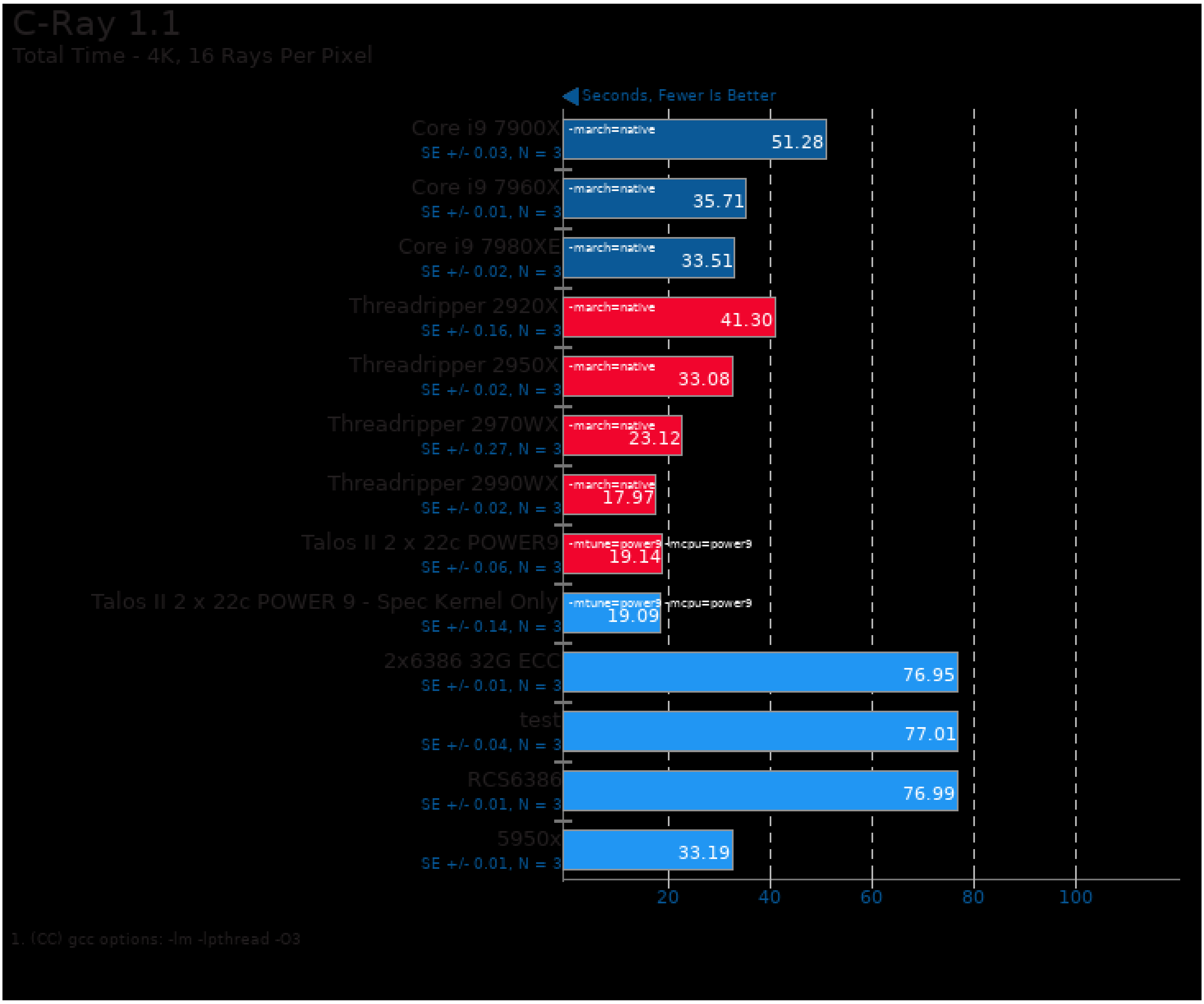
Stockfish - Total Time (Nodes/s)	28320368	43638299	46289588	33023827	41553292	54575580	67300757	79137127	**80530953**	**25582390**	25930236	27549921	54345397
Normalized	35.17%	54.19%	57.48%	41.01%	51.6%	67.77%	83.57%	98.27%	100%	31.77%	32.2%	34.21%	67.48%
Standard Deviation	1%	0.8%	1%	2%	1.2%	0.2%	1.4%	0.5%	1.9%	1.5%	0.9%	0.8%	2.5%
Stockfish - Total Time (Nodes/s/Watt)		148184	142237	**134942**	162569	153013	**182420**	159850	162777				
Normalized		81.23%	77.97%	73.97%	89.12%	83.88%	100%	87.63%	89.23%				
Timed LLVM Compilation - Time To Compile	359	248	227	373	303	255	221	183	**172**	916.158	**944.978**	740.446	250.962
Normalized	47.91%	69.35%	75.77%	46.11%	56.77%	67.45%	77.83%	93.99%	100%	18.77%	18.2%	23.23%	68.54%

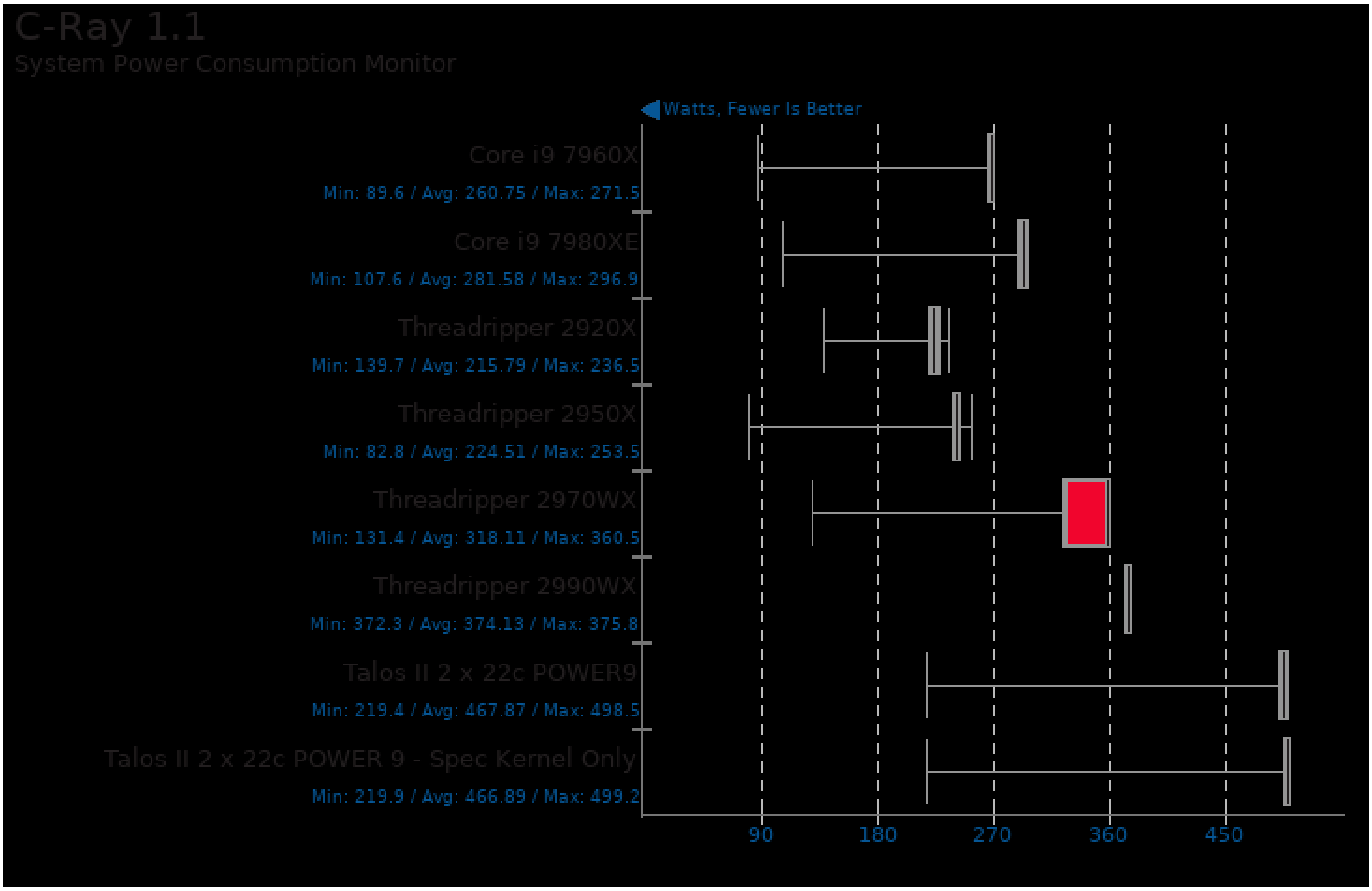

7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
Core i9 7900X
SE +/- 457.96, N = 3
62788
Core i9 7960X
SE +/- 159.66, N = 3
89432
Core i9 7980XE
SE +/- 245.34, N = 3
95662
Threadripper 2920X
SE +/- 241.87, N = 3
61894
Threadripper 2950X
SE +/- 79.99, N = 3
73967
Threadripper 2970WX
SE +/- 1626.58, N = 3
84493
Threadripper 2990WX
SE +/- 1518.03, N = 3
85484
Talos II 2 x 22c POWER9
SE +/- 2495.57, N = 3
162969
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 6982.30, N = 3
149050
2x6386 32G ECC
SE +/- 56.13, N = 3
20646
test
SE +/- 11.79, N = 3
20771
RCS6386
SE +/- 46.91, N = 3
28390
30K
60K
90K
120K
150K
1. (CXX) g++ options: -pipe -lpthread

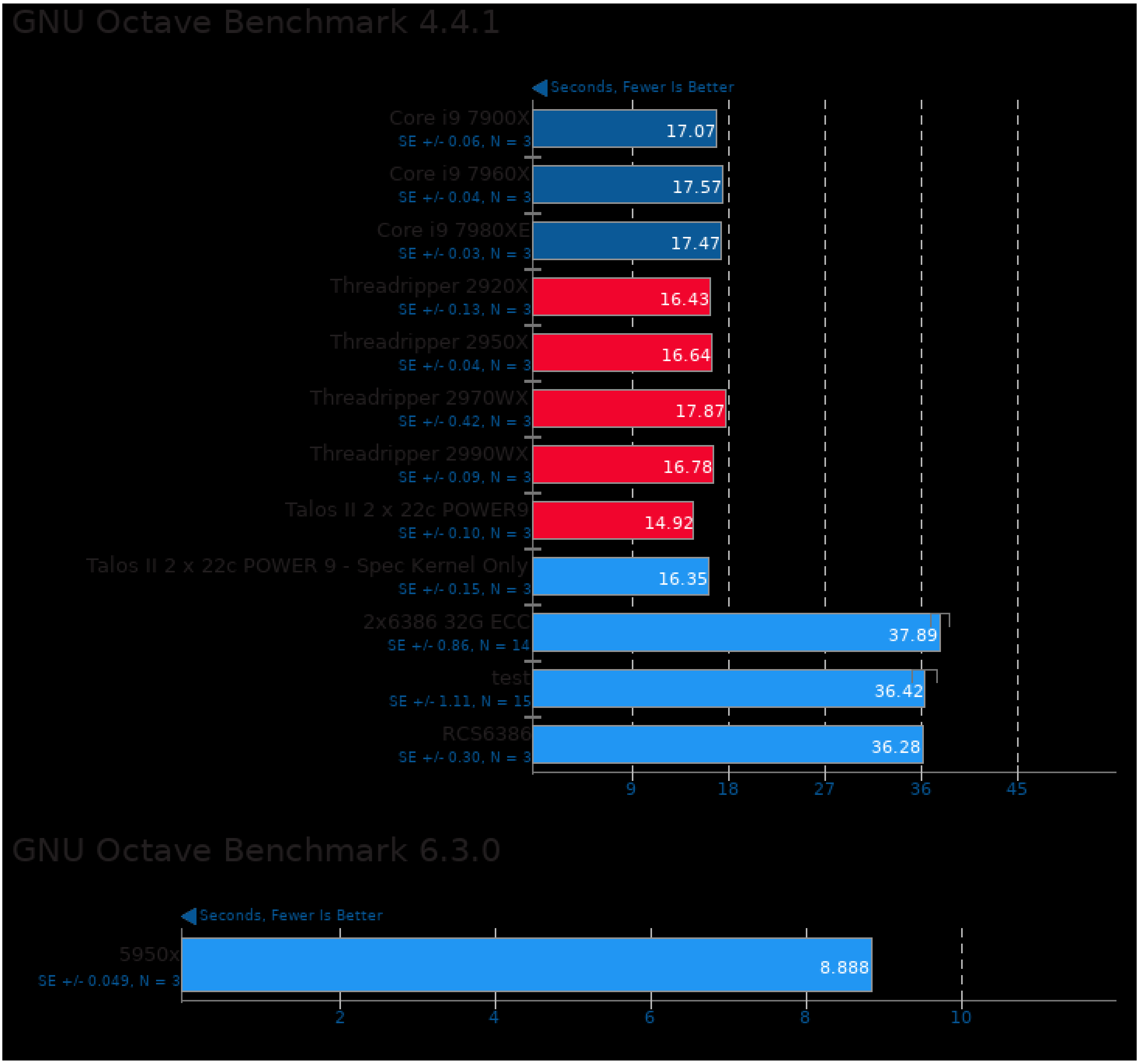

7-Zip Compression 16.02
Compress Speed Test
MIPS Per Watt, More Is Better
Core i9 7960X
368.12
Core i9 7980XE
370.74
Threadripper 2920X
281.57
Threadripper 2950X
317.27
Threadripper 2970WX
274.35
Threadripper 2990WX
272.59
Talos II 2 x 22c POWER9
406.82
Talos II 2 x 22c POWER 9 - Spec Kernel Only
380.29
90
180
270
360
450


7-Zip Compression 16.02
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 86.8 / Avg: 242.94 / Max: 267
Core i9 7980XE
Min: 105.3 / Avg: 258.03 / Max: 296.7
Threadripper 2920X
Min: 86.5 / Avg: 219.81 / Max: 270.5
Threadripper 2950X
Min: 78.1 / Avg: 233.14 / Max: 268.6
Threadripper 2970WX
Min: 108.8 / Avg: 307.98 / Max: 368.5
Threadripper 2990WX
Min: 144.7 / Avg: 313.6 / Max: 376.7
Talos II 2 x 22c POWER9
Min: 217.6 / Avg: 400.59 / Max: 517.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 214.6 / Avg: 391.94 / Max: 511.2
90
180
270
360
450

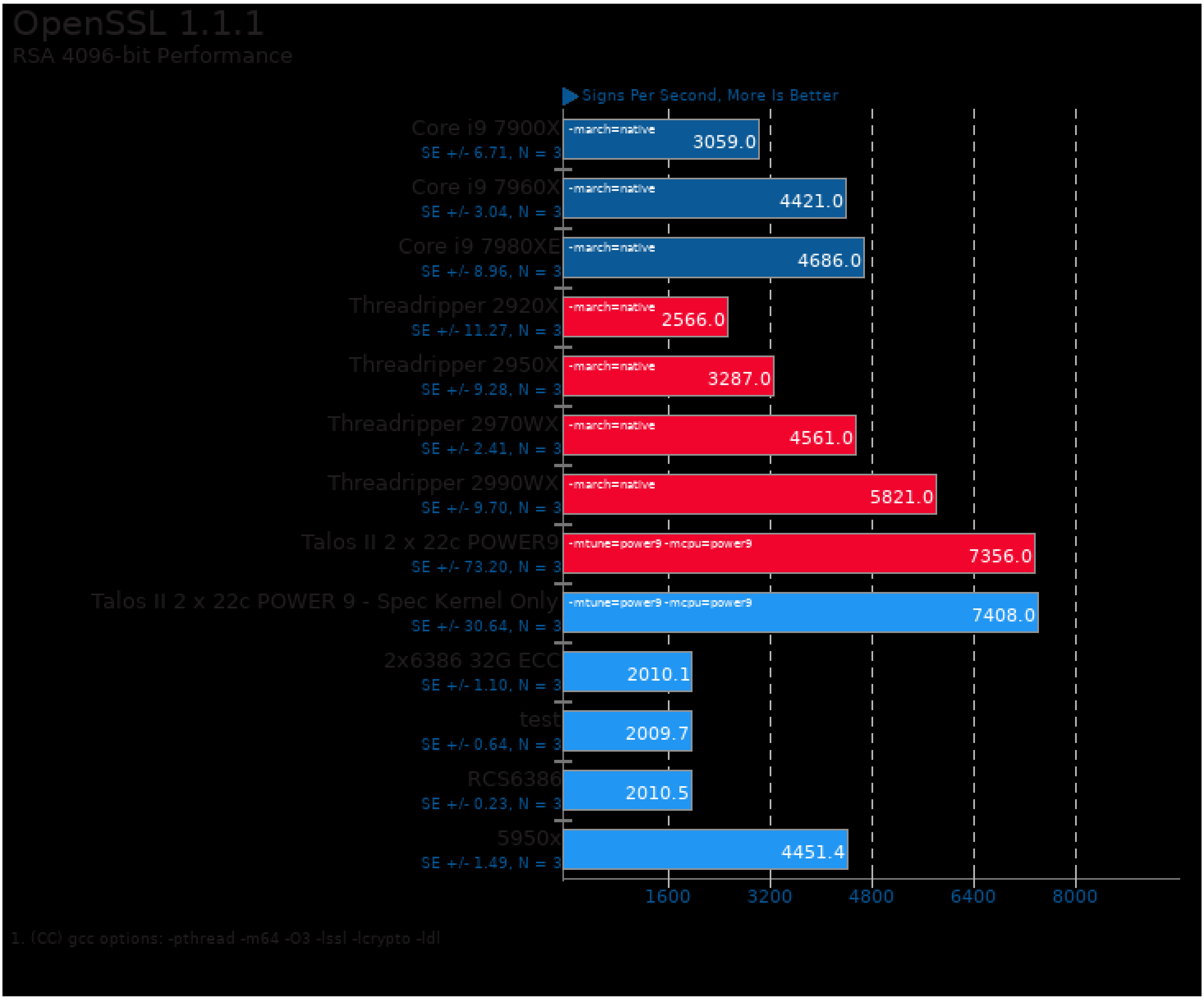
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

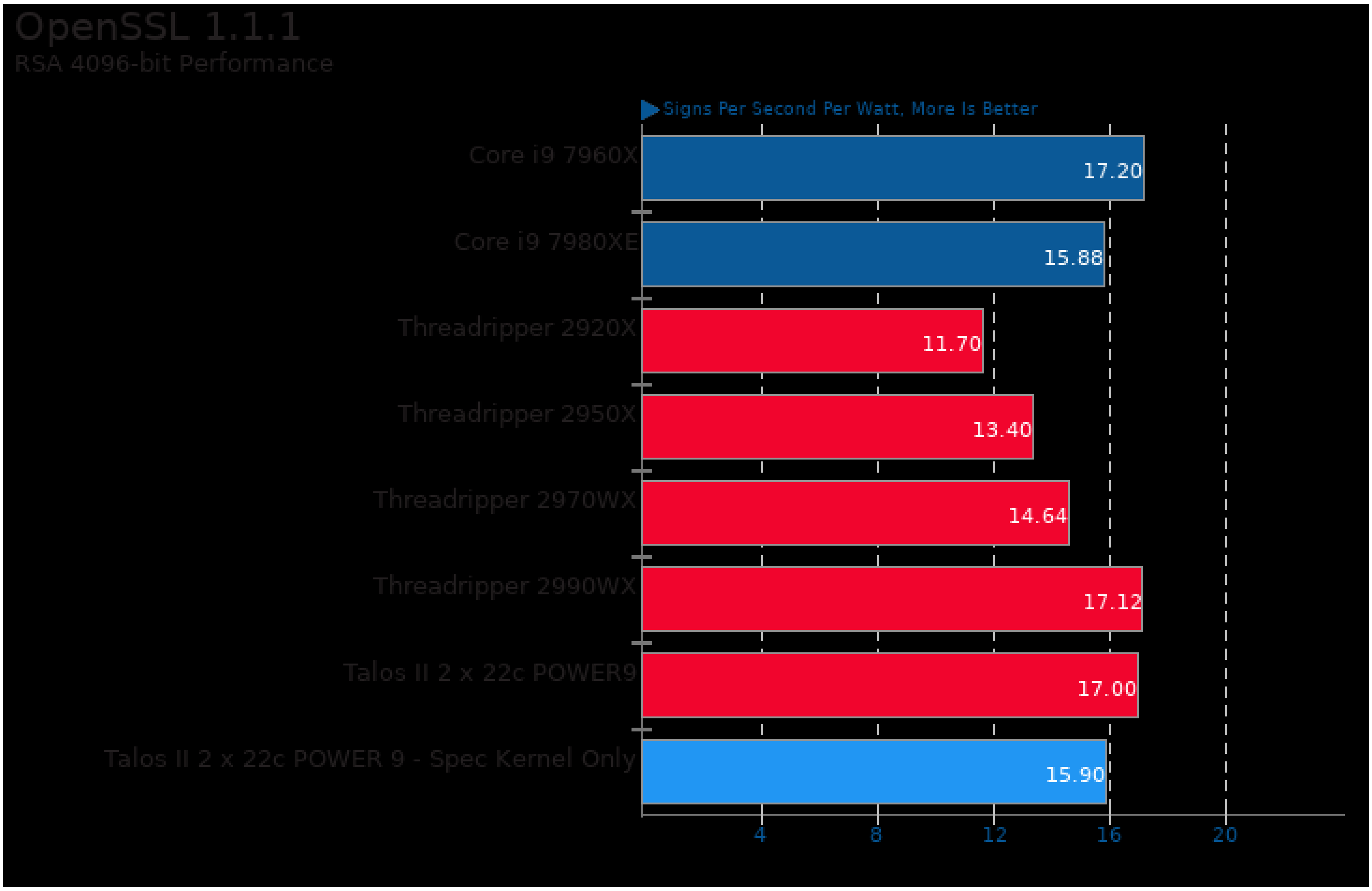


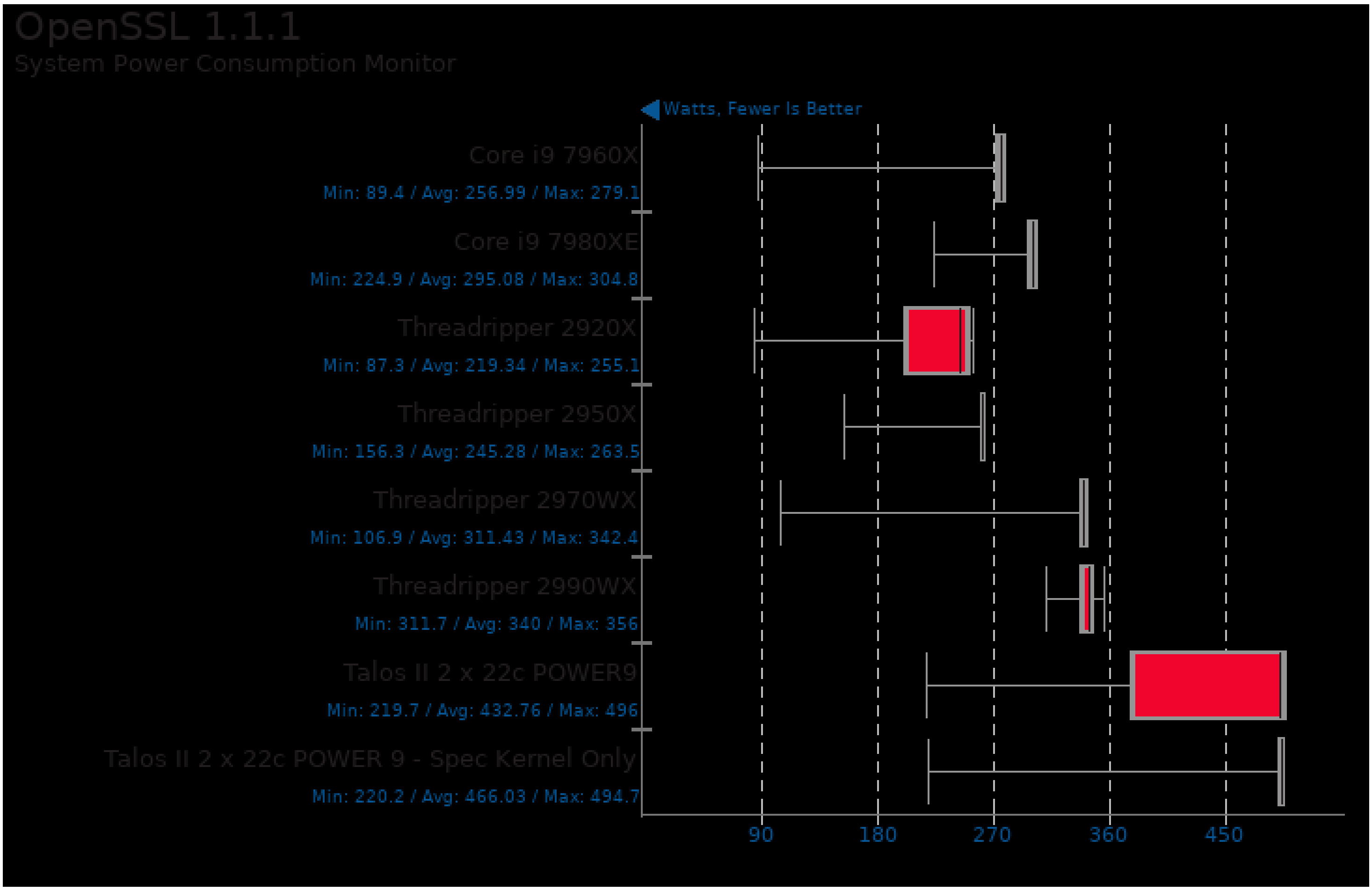

C-Ray 1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 89.6 / Avg: 260.75 / Max: 271.5
Core i9 7980XE
Min: 107.6 / Avg: 281.58 / Max: 296.9
Threadripper 2920X
Min: 139.7 / Avg: 215.79 / Max: 236.5
Threadripper 2950X
Min: 82.8 / Avg: 224.51 / Max: 253.5
Threadripper 2970WX
Min: 131.4 / Avg: 318.11 / Max: 360.5
Threadripper 2990WX
Min: 372.3 / Avg: 374.13 / Max: 375.8
Talos II 2 x 22c POWER9
Min: 219.4 / Avg: 467.87 / Max: 498.5
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.9 / Avg: 466.89 / Max: 499.2
90
180
270
360
450

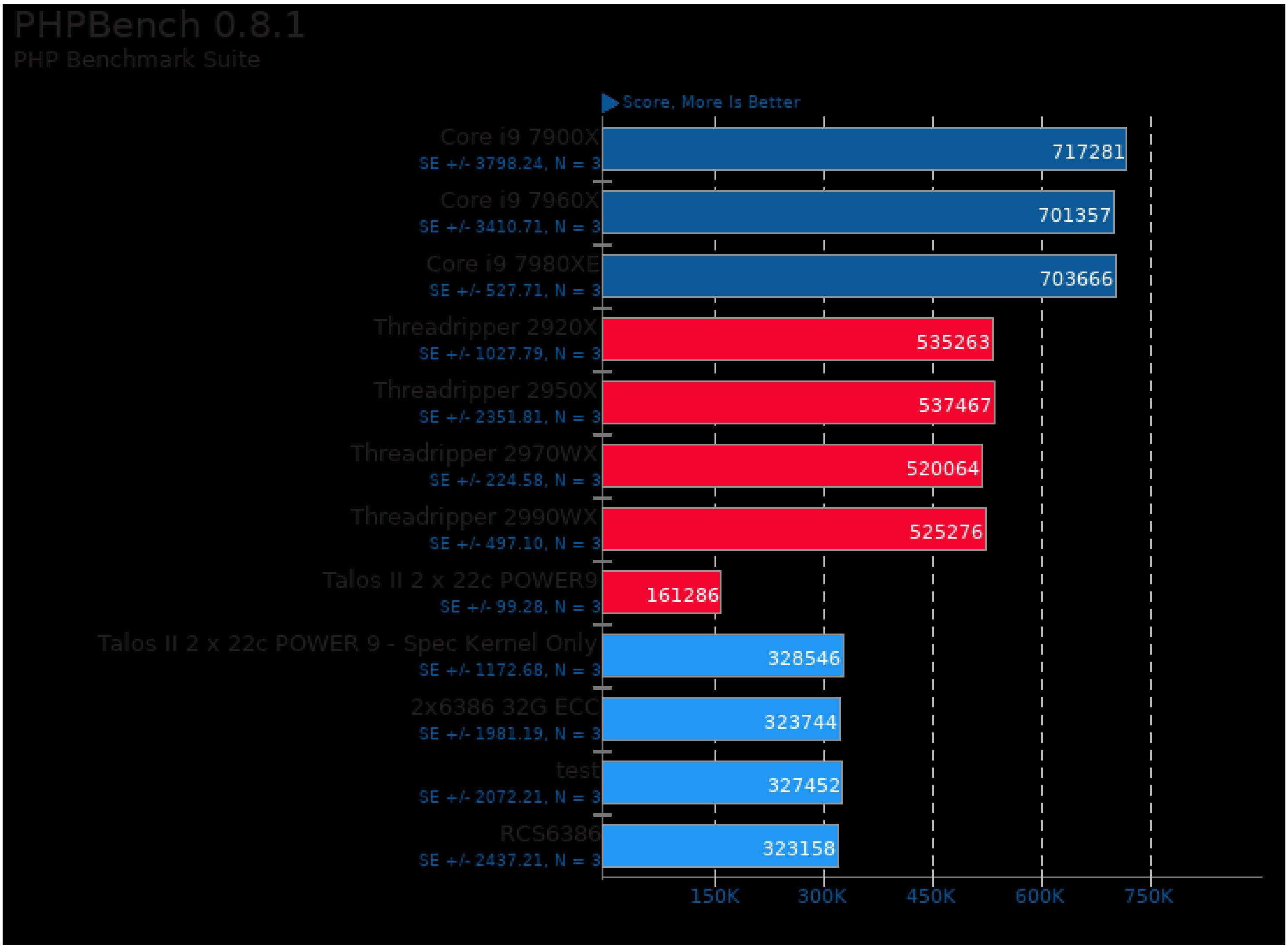

GNU Octave Benchmark 4.4.1
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.06, N = 3
17.07
Core i9 7960X
SE +/- 0.04, N = 3
17.57
Core i9 7980XE
SE +/- 0.03, N = 3
17.47
Threadripper 2920X
SE +/- 0.13, N = 3
16.43
Threadripper 2950X
SE +/- 0.04, N = 3
16.64
Threadripper 2970WX
SE +/- 0.42, N = 3
17.87
Threadripper 2990WX
SE +/- 0.09, N = 3
16.78
Talos II 2 x 22c POWER9
SE +/- 0.10, N = 3
14.92
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.15, N = 3
16.35
2x6386 32G ECC
SE +/- 0.86, N = 14
37.89
test
SE +/- 1.11, N = 15
36.42
RCS6386
SE +/- 0.30, N = 3
36.28
9
18
27
36
45
GNU Octave Benchmark 6.3.0
Seconds, Fewer Is Better
5950x
SE +/- 0.049, N = 3
8.888
2
4
6
8
10

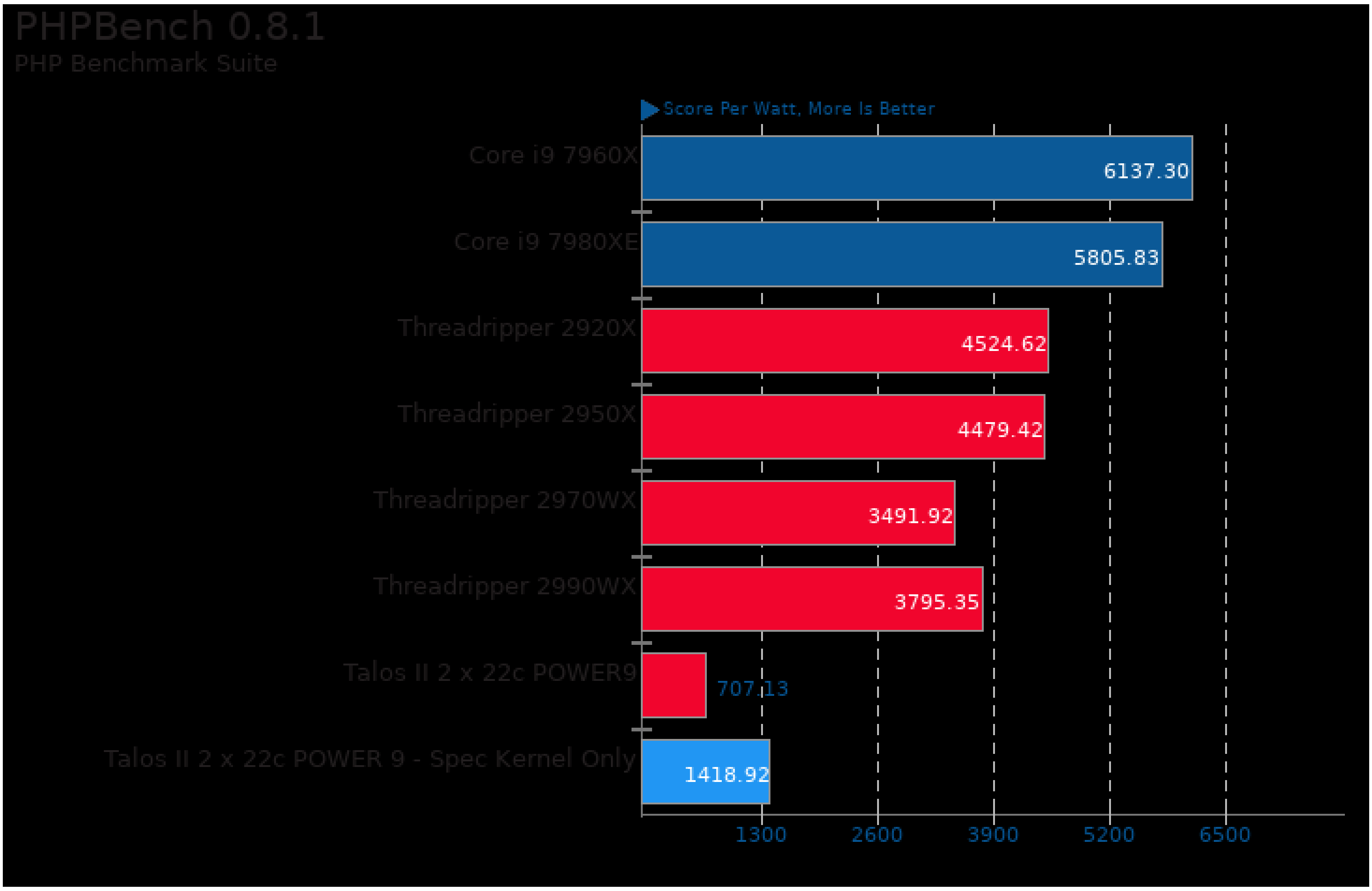
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

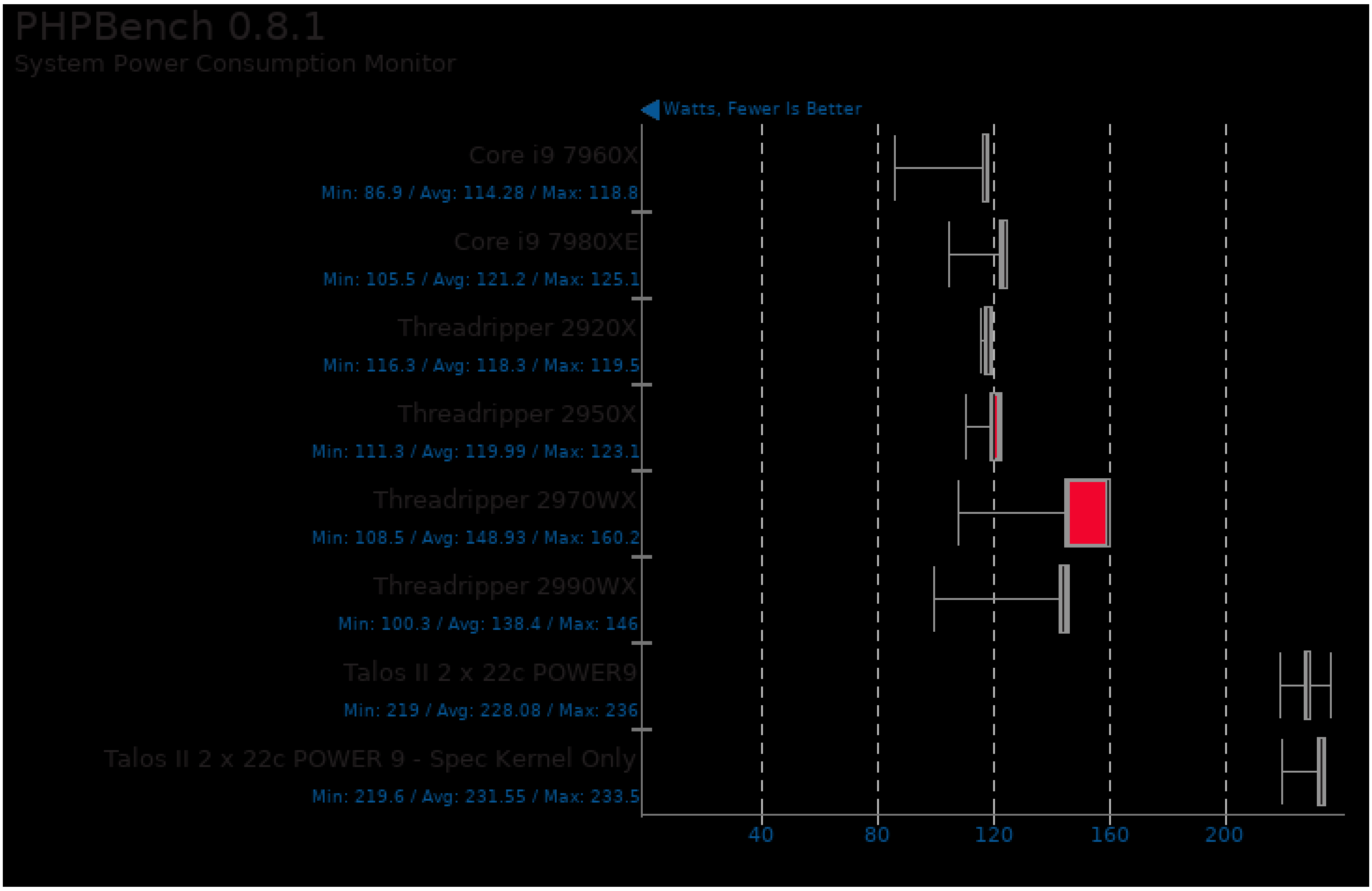



OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second Per Watt, More Is Better
Core i9 7960X
17.20
Core i9 7980XE
15.88
Threadripper 2920X
11.70
Threadripper 2950X
13.40
Threadripper 2970WX
14.64
Threadripper 2990WX
17.12
Talos II 2 x 22c POWER9
17.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
15.90
4
8
12
16
20

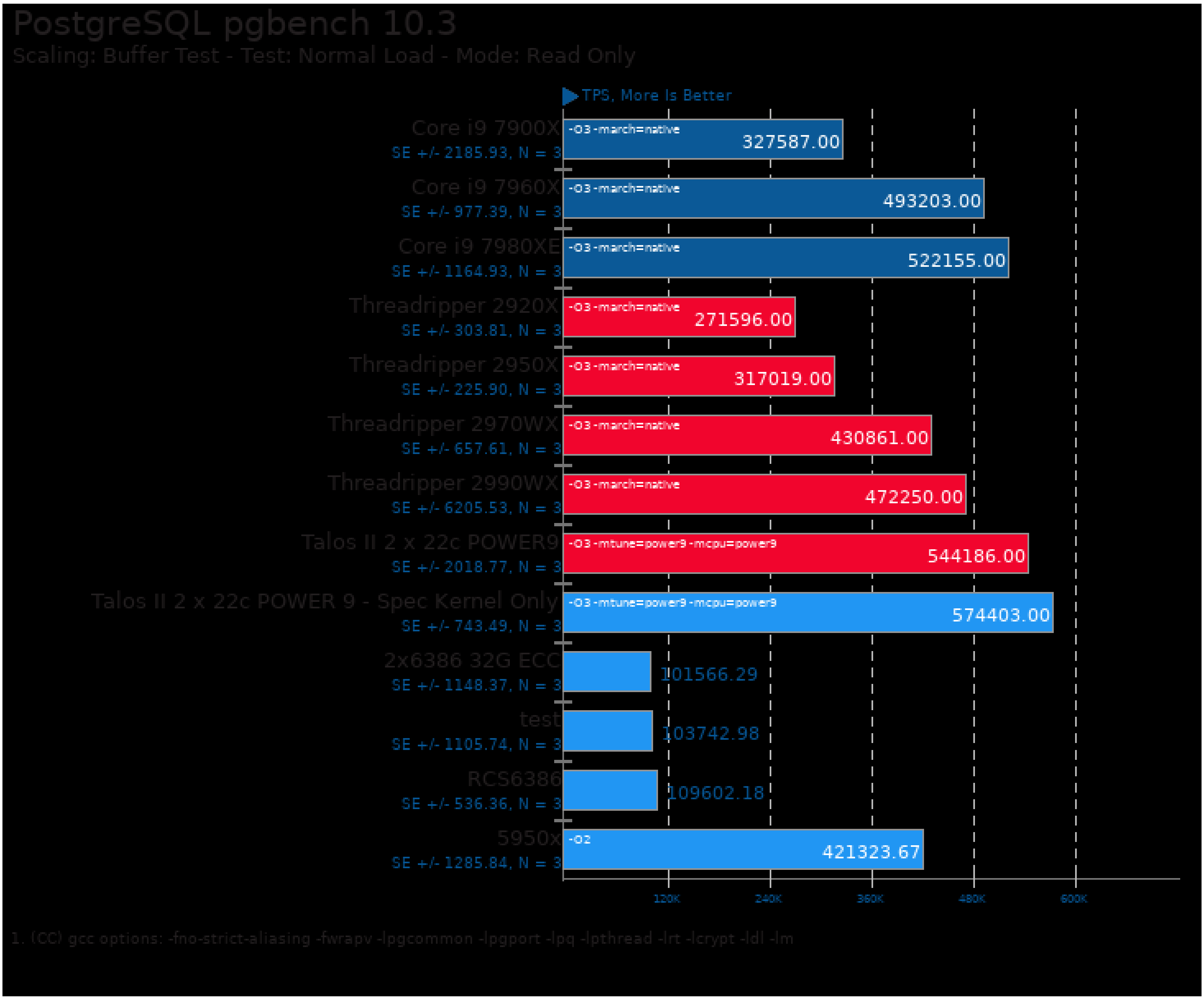

OpenSSL 1.1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 89.4 / Avg: 256.99 / Max: 279.1
Core i9 7980XE
Min: 224.9 / Avg: 295.08 / Max: 304.8
Threadripper 2920X
Min: 87.3 / Avg: 219.34 / Max: 255.1
Threadripper 2950X
Min: 156.3 / Avg: 245.28 / Max: 263.5
Threadripper 2970WX
Min: 106.9 / Avg: 311.43 / Max: 342.4
Threadripper 2990WX
Min: 311.7 / Avg: 340 / Max: 356
Talos II 2 x 22c POWER9
Min: 219.7 / Avg: 432.76 / Max: 496
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 220.2 / Avg: 466.03 / Max: 494.7
90
180
270
360
450

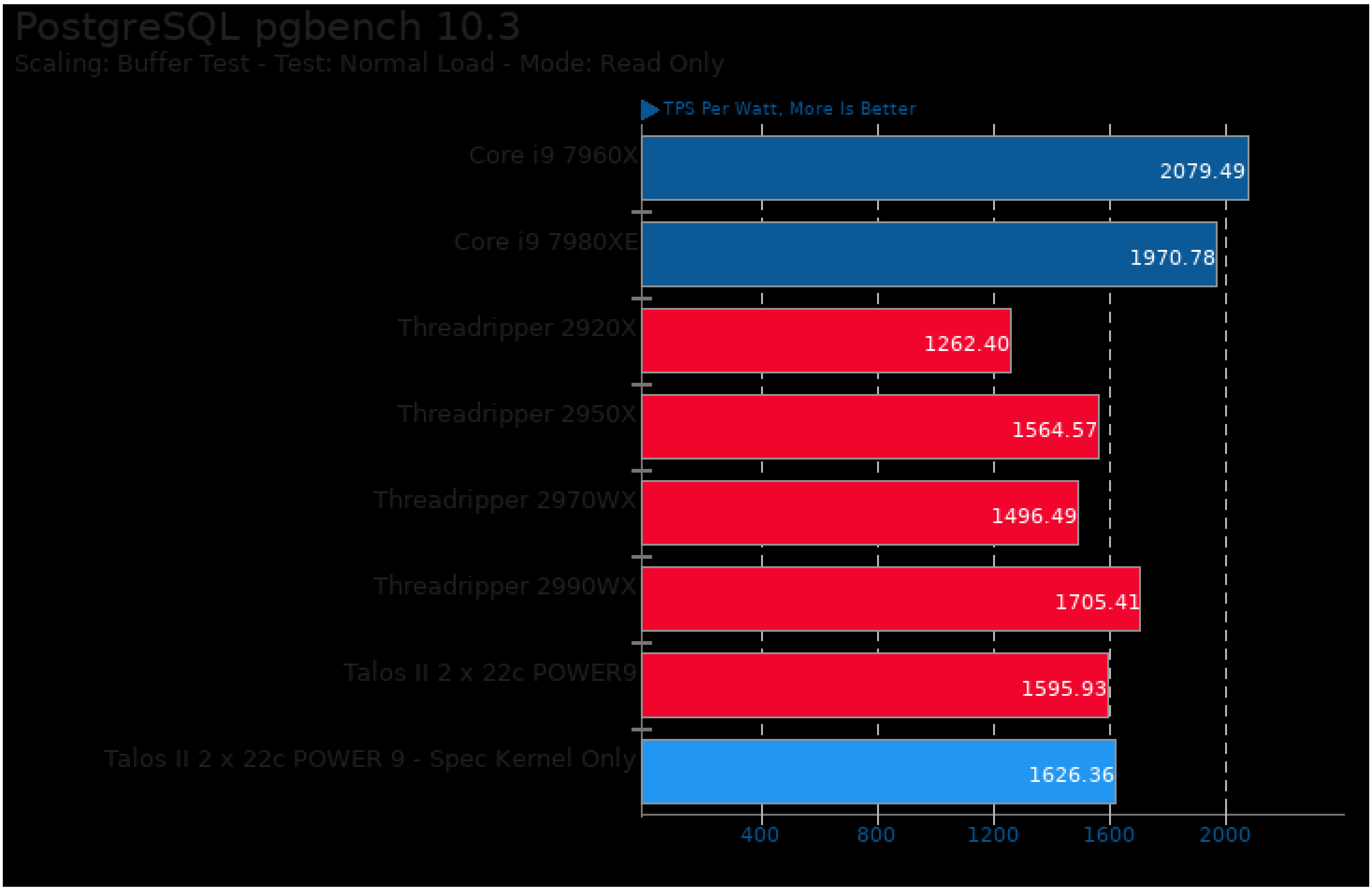

PHPBench 0.8.1
PHP Benchmark Suite
Score, More Is Better
Core i9 7900X
SE +/- 3798.24, N = 3
717281
Core i9 7960X
SE +/- 3410.71, N = 3
701357
Core i9 7980XE
SE +/- 527.71, N = 3
703666
Threadripper 2920X
SE +/- 1027.79, N = 3
535263
Threadripper 2950X
SE +/- 2351.81, N = 3
537467
Threadripper 2970WX
SE +/- 224.58, N = 3
520064
Threadripper 2990WX
SE +/- 497.10, N = 3
525276
Talos II 2 x 22c POWER9
SE +/- 99.28, N = 3
161286
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 1172.68, N = 3
328546
2x6386 32G ECC
SE +/- 1981.19, N = 3
323744
test
SE +/- 2072.21, N = 3
327452
RCS6386
SE +/- 2437.21, N = 3
323158
150K
300K
450K
600K
750K


PHPBench 0.8.1
PHP Benchmark Suite
Score Per Watt, More Is Better
Core i9 7960X
6137.30
Core i9 7980XE
5805.83
Threadripper 2920X
4524.62
Threadripper 2950X
4479.42
Threadripper 2970WX
3491.92
Threadripper 2990WX
3795.35
Talos II 2 x 22c POWER9
707.13
Talos II 2 x 22c POWER 9 - Spec Kernel Only
1418.92
1300
2600
3900
5200
6500

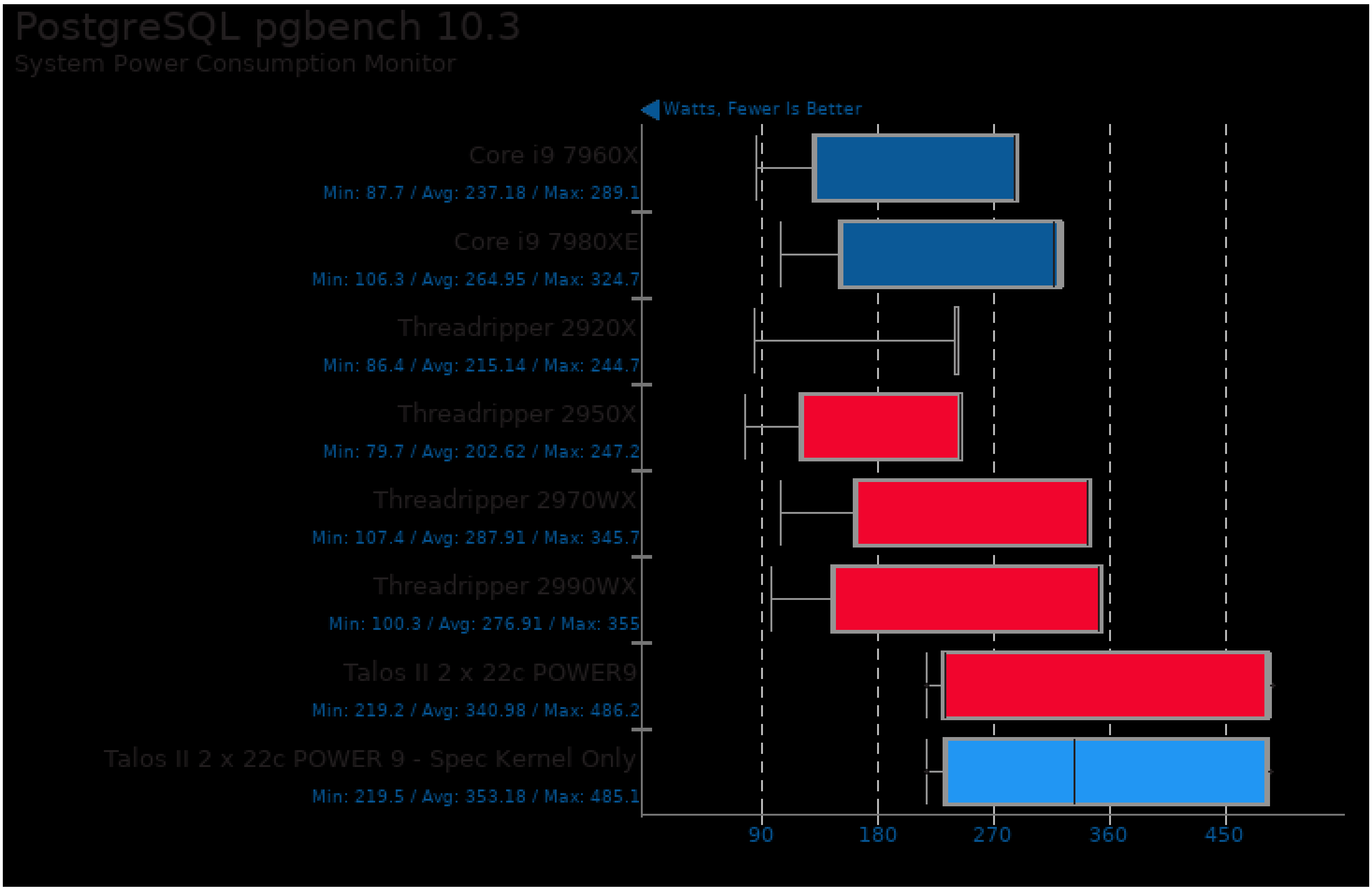

PHPBench 0.8.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 86.9 / Avg: 114.28 / Max: 118.8
Core i9 7980XE
Min: 105.5 / Avg: 121.2 / Max: 125.1
Threadripper 2920X
Min: 116.3 / Avg: 118.3 / Max: 119.5
Threadripper 2950X
Min: 111.3 / Avg: 119.99 / Max: 123.1
Threadripper 2970WX
Min: 108.5 / Avg: 148.93 / Max: 160.2
Threadripper 2990WX
Min: 100.3 / Avg: 138.4 / Max: 146
Talos II 2 x 22c POWER9
Min: 219 / Avg: 228.08 / Max: 236
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.6 / Avg: 231.55 / Max: 233.5
40
80
120
160
200

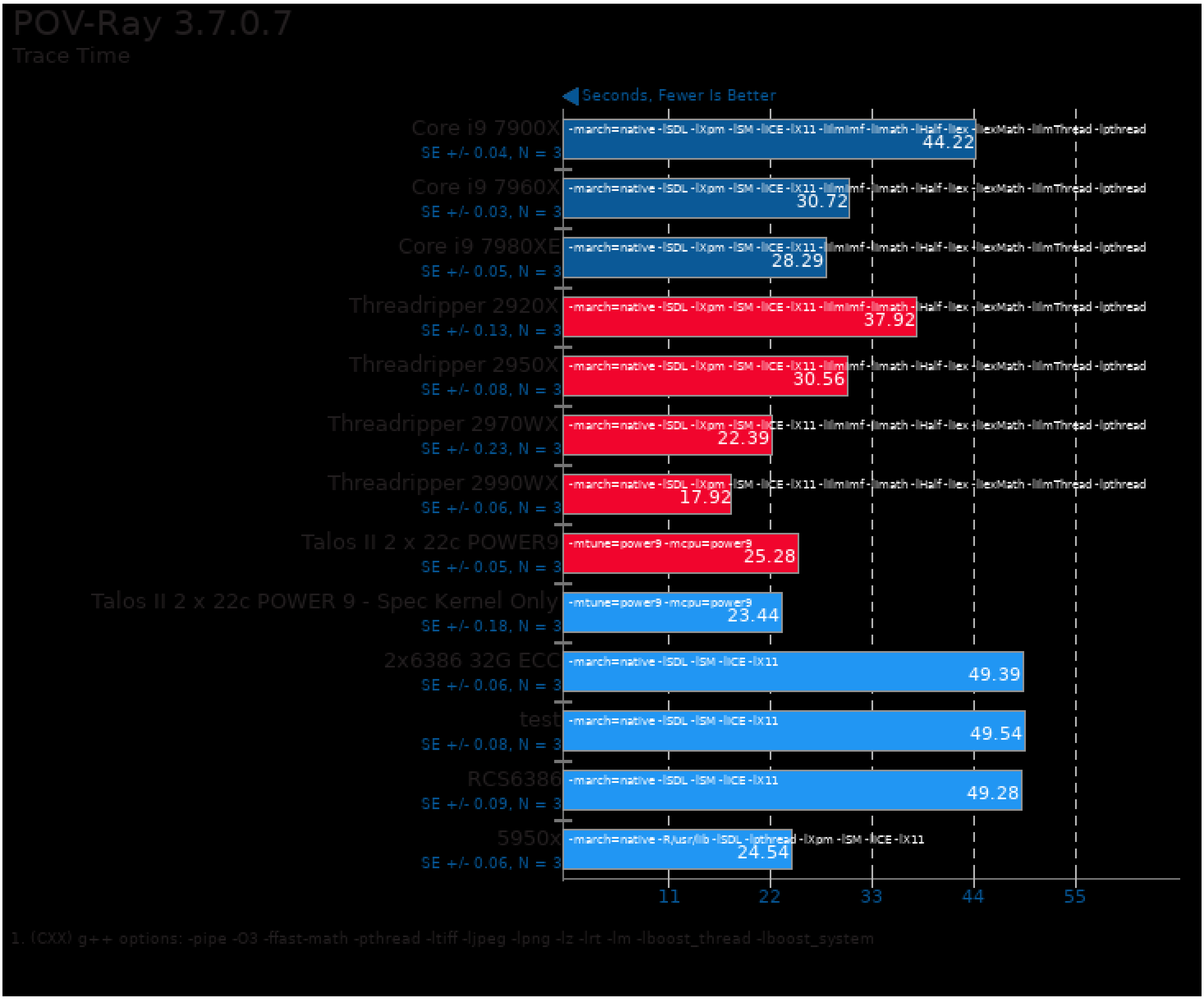
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

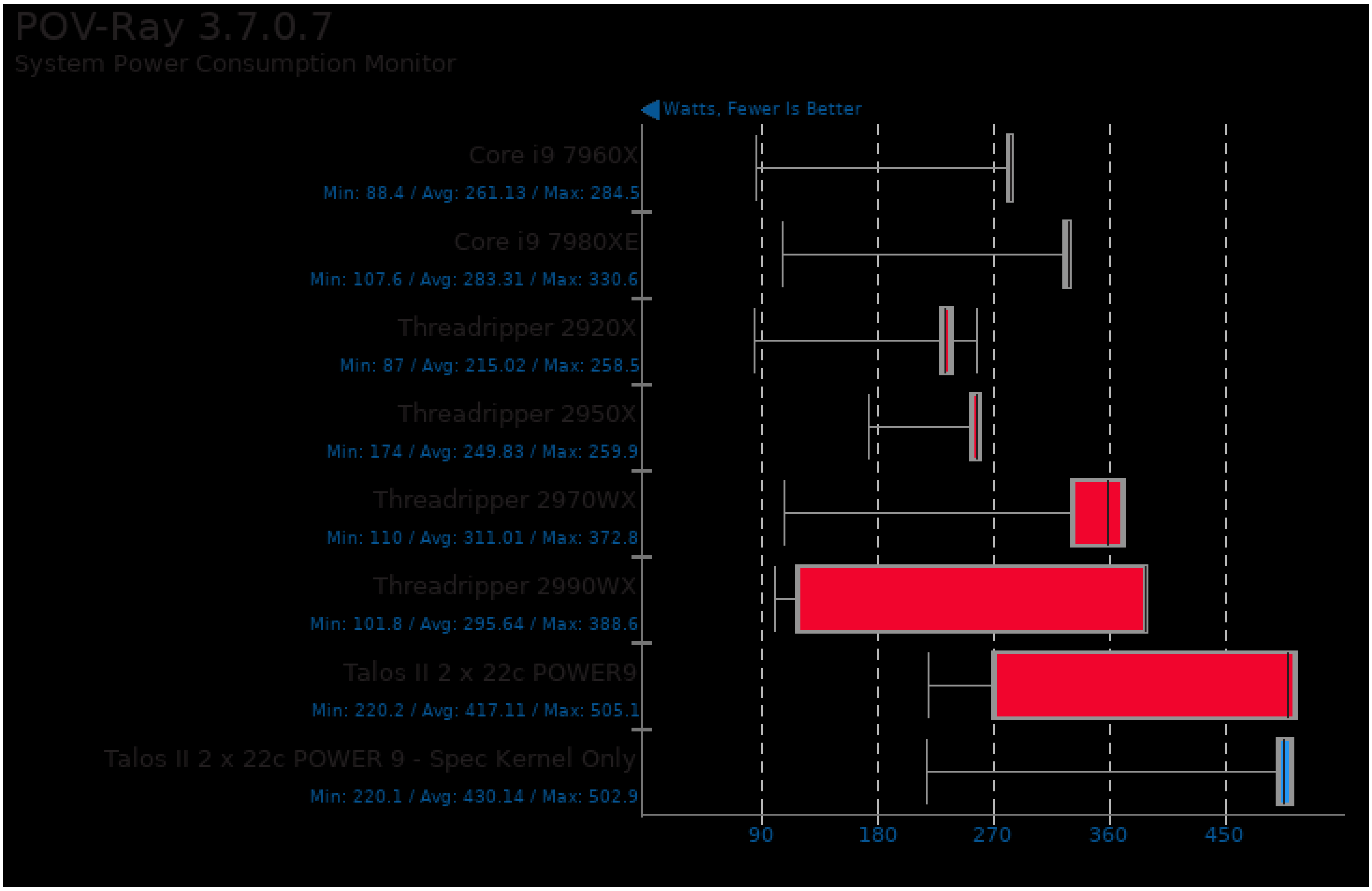



PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS Per Watt, More Is Better
Core i9 7960X
2079.49
Core i9 7980XE
1970.78
Threadripper 2920X
1262.40
Threadripper 2950X
1564.57
Threadripper 2970WX
1496.49
Threadripper 2990WX
1705.41
Talos II 2 x 22c POWER9
1595.93
Talos II 2 x 22c POWER 9 - Spec Kernel Only
1626.36
400
800
1200
1600
2000

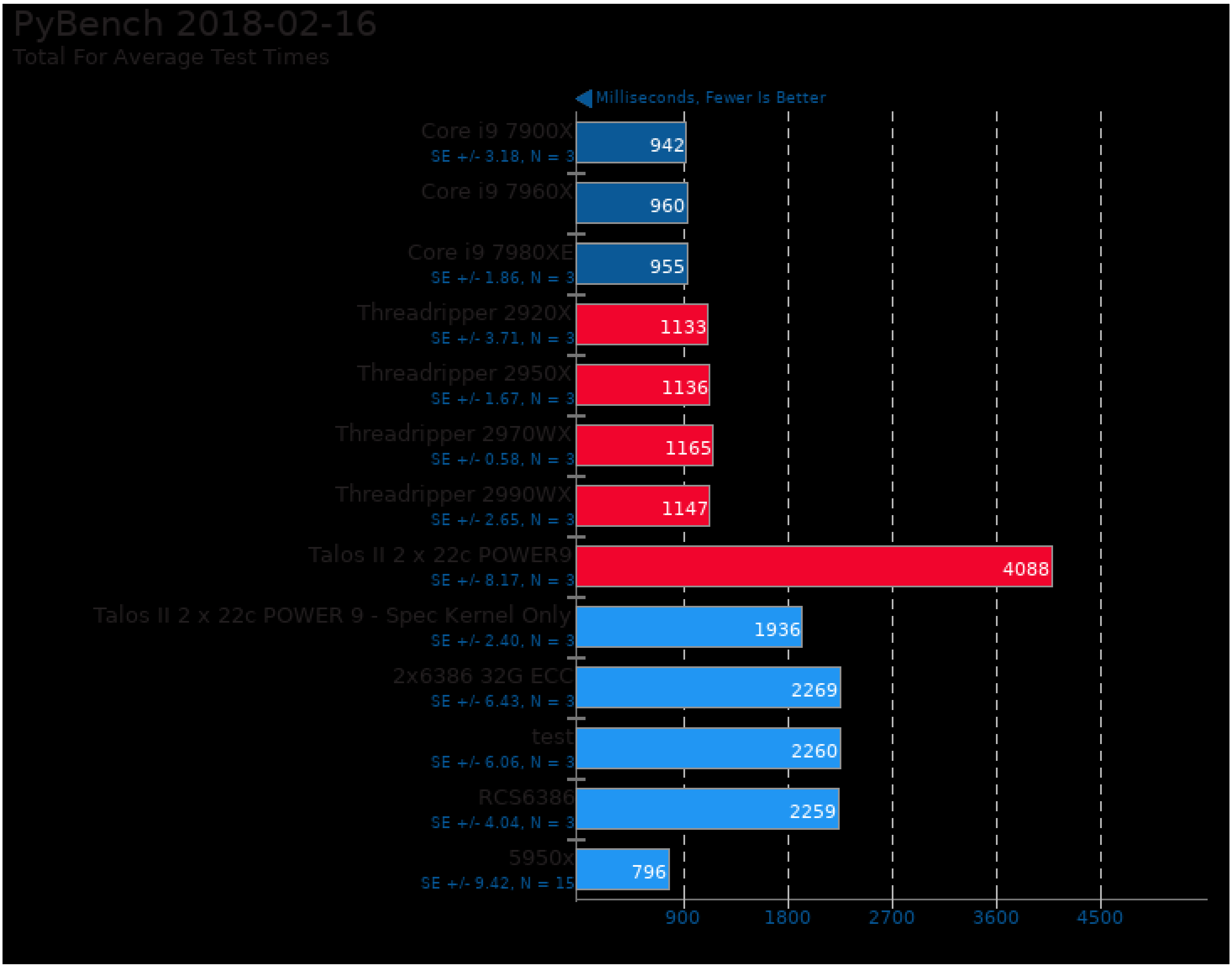
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

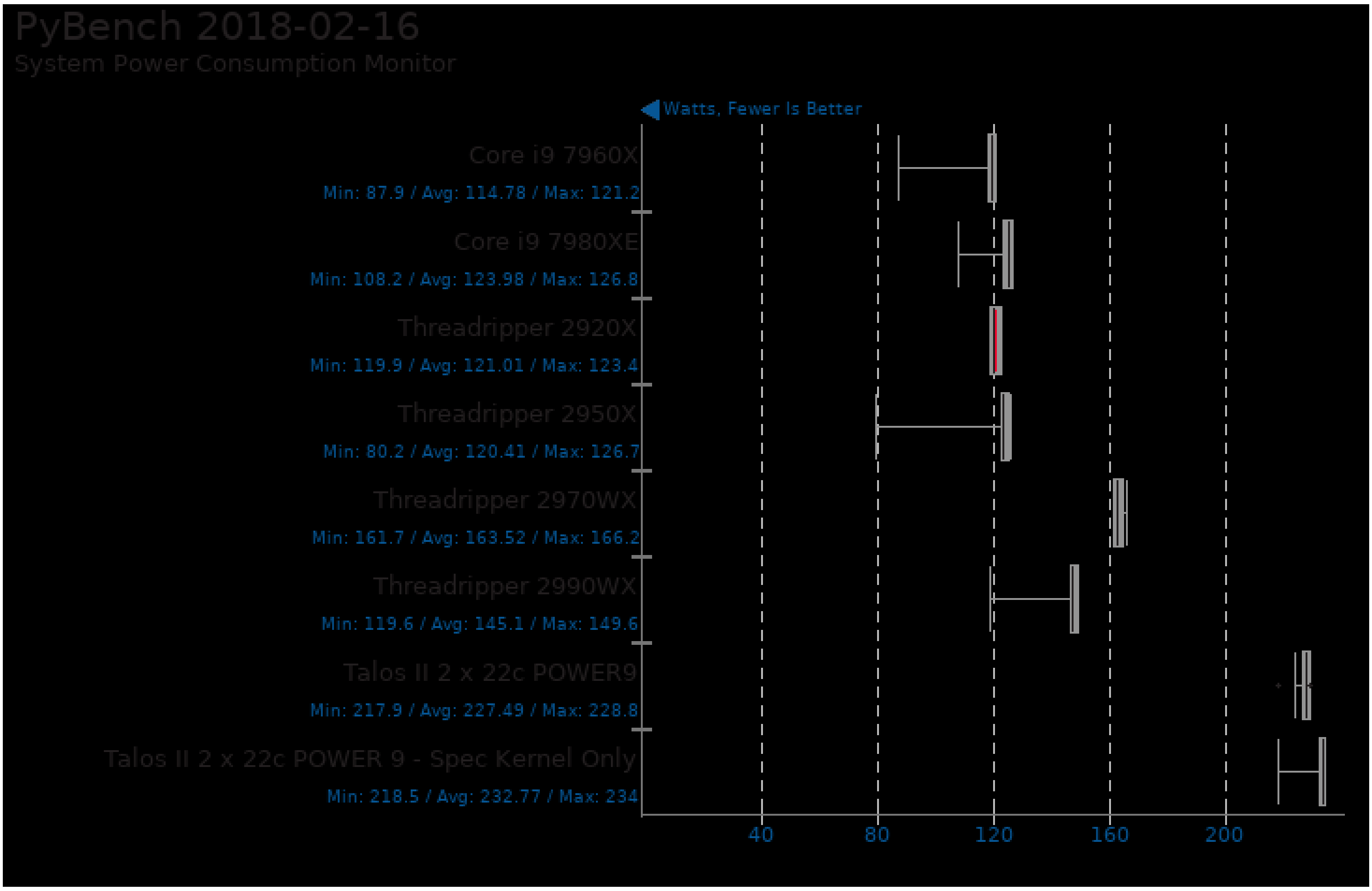


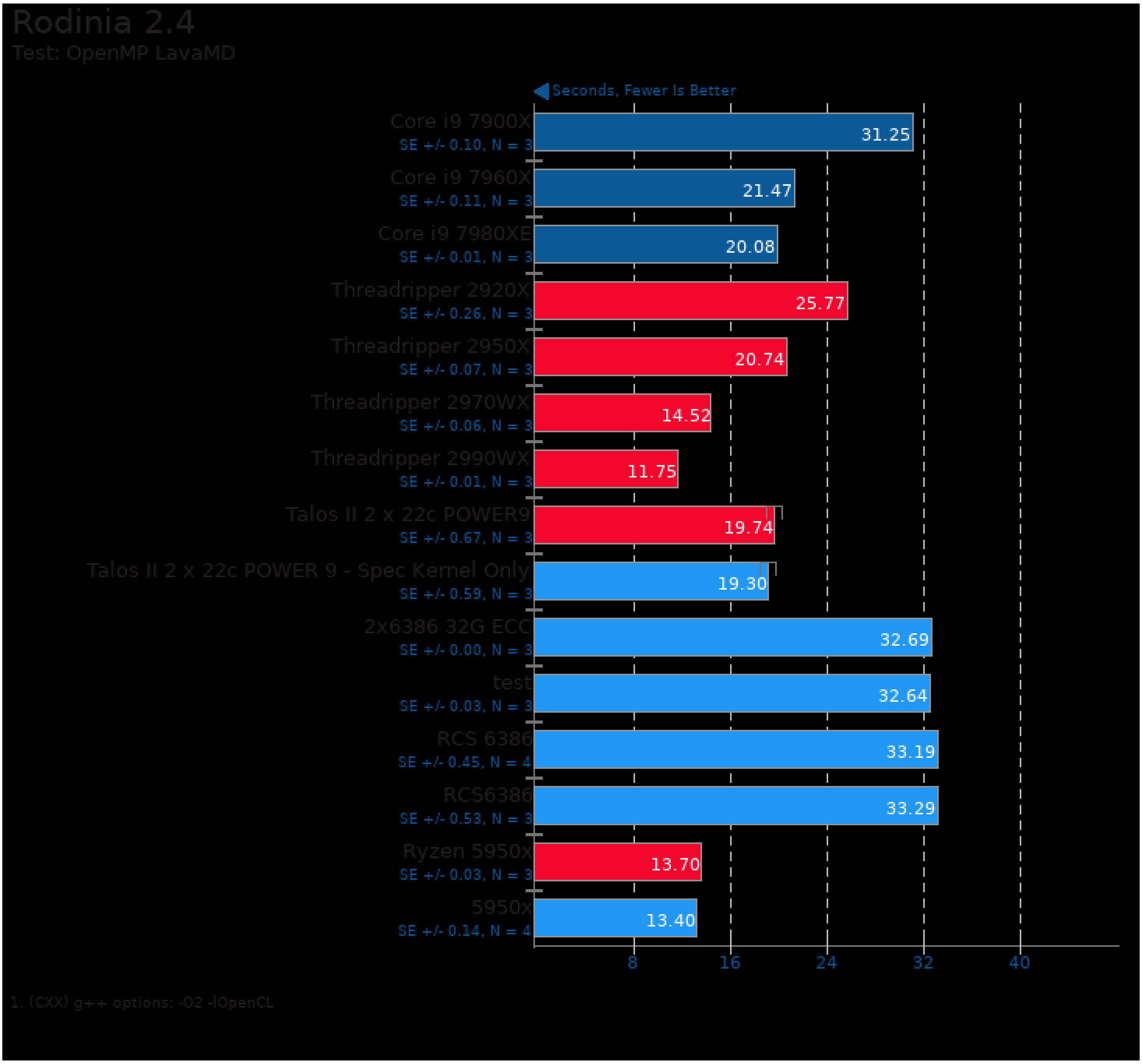

POV-Ray 3.7.0.7
Trace Time
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.04, N = 3
44.22
Core i9 7960X
SE +/- 0.03, N = 3
30.72
Core i9 7980XE
SE +/- 0.05, N = 3
28.29
Threadripper 2920X
SE +/- 0.13, N = 3
37.92
Threadripper 2950X
SE +/- 0.08, N = 3
30.56
Threadripper 2970WX
SE +/- 0.23, N = 3
22.39
Threadripper 2990WX
SE +/- 0.06, N = 3
17.92
Talos II 2 x 22c POWER9
SE +/- 0.05, N = 3
25.28
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.18, N = 3
23.44
2x6386 32G ECC
SE +/- 0.06, N = 3
49.39
test
SE +/- 0.08, N = 3
49.54
RCS6386
SE +/- 0.09, N = 3
49.28
5950x
SE +/- 0.06, N = 3
24.54
-march=native -lSDL -lXpm -lSM -lICE -lX11 -lIlmImf -lImath -lHalf -lIex -lIexMath -lIlmThread -lpthread
-mtune=power9 -mcpu=power9
-march=native -lSDL -lSM -lICE -lX11
-march=native -R/usr/lib -lSDL -lpthread -lXpm -lSM -lICE -lX11
11
22
33
44
55
1. (CXX) g++ options: -pipe -O3 -ffast-math -pthread -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system



POV-Ray 3.7.0.7
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 88.4 / Avg: 261.13 / Max: 284.5
Core i9 7980XE
Min: 107.6 / Avg: 283.31 / Max: 330.6
Threadripper 2920X
Min: 87 / Avg: 215.02 / Max: 258.5
Threadripper 2950X
Min: 174 / Avg: 249.83 / Max: 259.9
Threadripper 2970WX
Min: 110 / Avg: 311.01 / Max: 372.8
Threadripper 2990WX
Min: 101.8 / Avg: 295.64 / Max: 388.6
Talos II 2 x 22c POWER9
Min: 220.2 / Avg: 417.11 / Max: 505.1
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 220.1 / Avg: 430.14 / Max: 502.9
90
180
270
360
450

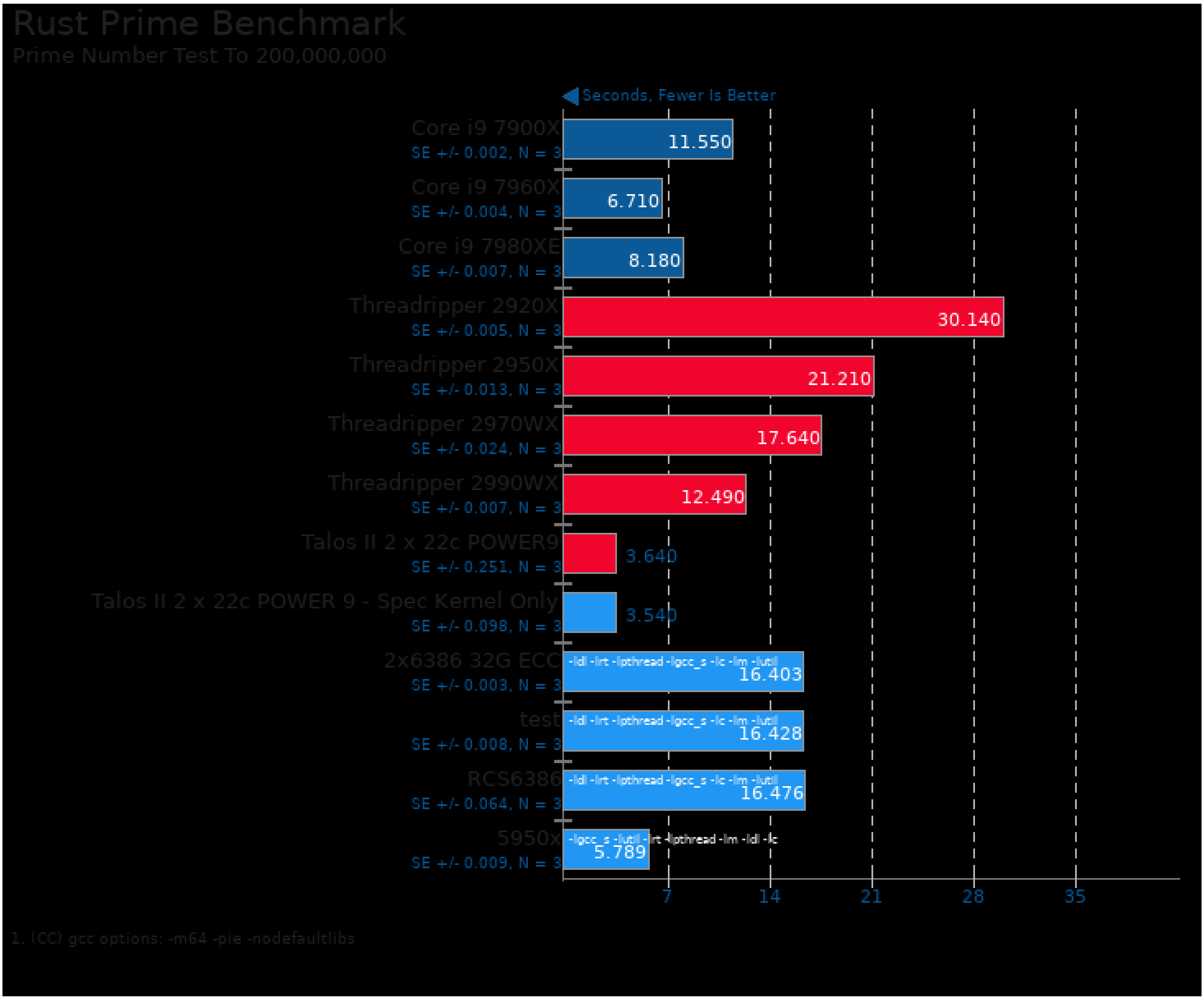

PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Core i9 7900X
SE +/- 3.18, N = 3
942
Core i9 7960X
960
Core i9 7980XE
SE +/- 1.86, N = 3
955
Threadripper 2920X
SE +/- 3.71, N = 3
1133
Threadripper 2950X
SE +/- 1.67, N = 3
1136
Threadripper 2970WX
SE +/- 0.58, N = 3
1165
Threadripper 2990WX
SE +/- 2.65, N = 3
1147
Talos II 2 x 22c POWER9
SE +/- 8.17, N = 3
4088
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 2.40, N = 3
1936
2x6386 32G ECC
SE +/- 6.43, N = 3
2269
test
SE +/- 6.06, N = 3
2260
RCS6386
SE +/- 4.04, N = 3
2259
5950x
SE +/- 9.42, N = 15
796
900
1800
2700
3600
4500

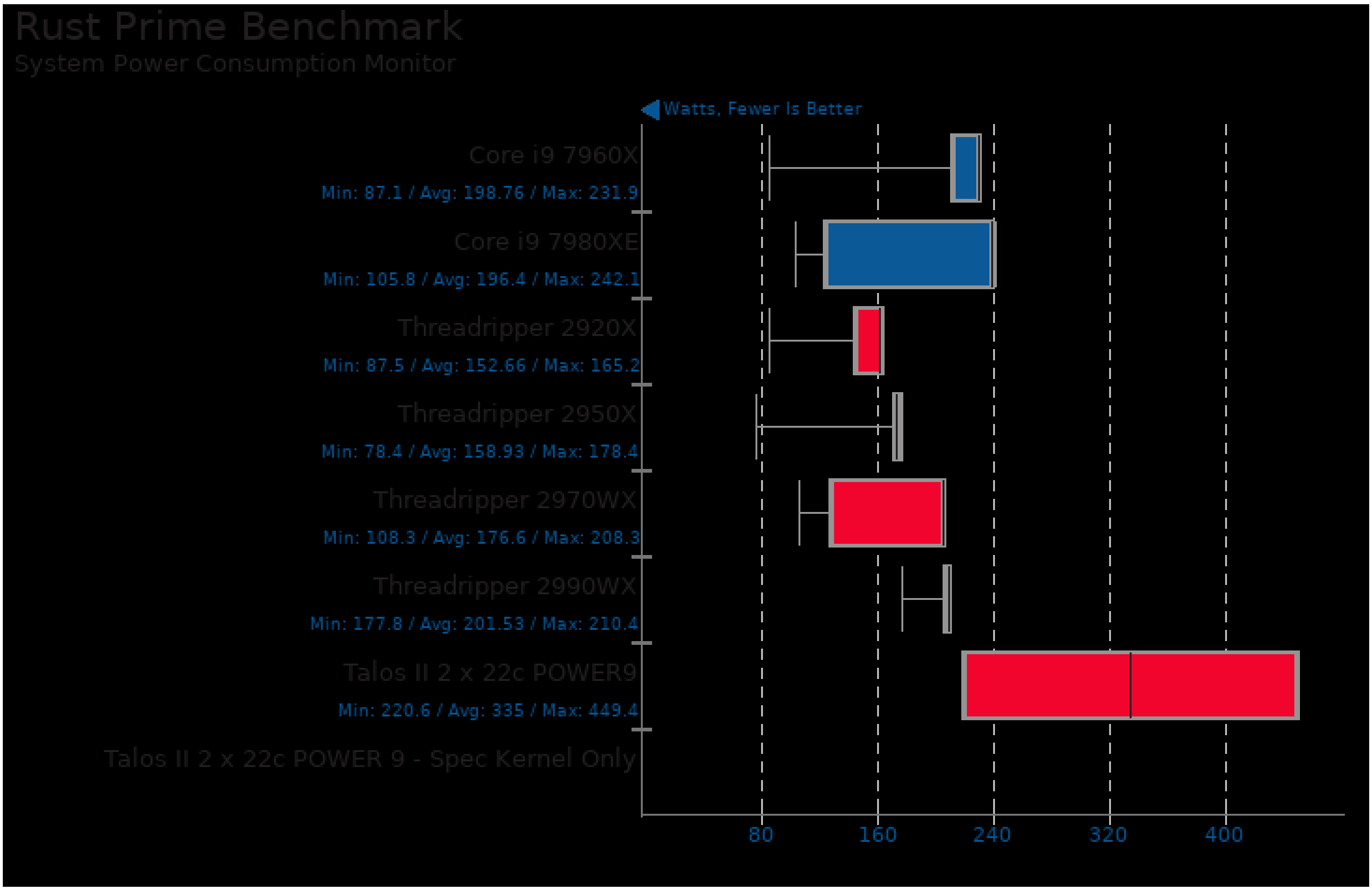

PyBench 2018-02-16
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 87.9 / Avg: 114.78 / Max: 121.2
Core i9 7980XE
Min: 108.2 / Avg: 123.98 / Max: 126.8
Threadripper 2920X
Min: 119.9 / Avg: 121.01 / Max: 123.4
Threadripper 2950X
Min: 80.2 / Avg: 120.41 / Max: 126.7
Threadripper 2970WX
Min: 161.7 / Avg: 163.52 / Max: 166.2
Threadripper 2990WX
Min: 119.6 / Avg: 145.1 / Max: 149.6
Talos II 2 x 22c POWER9
Min: 217.9 / Avg: 227.49 / Max: 228.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 218.5 / Avg: 232.77 / Max: 234
40
80
120
160
200

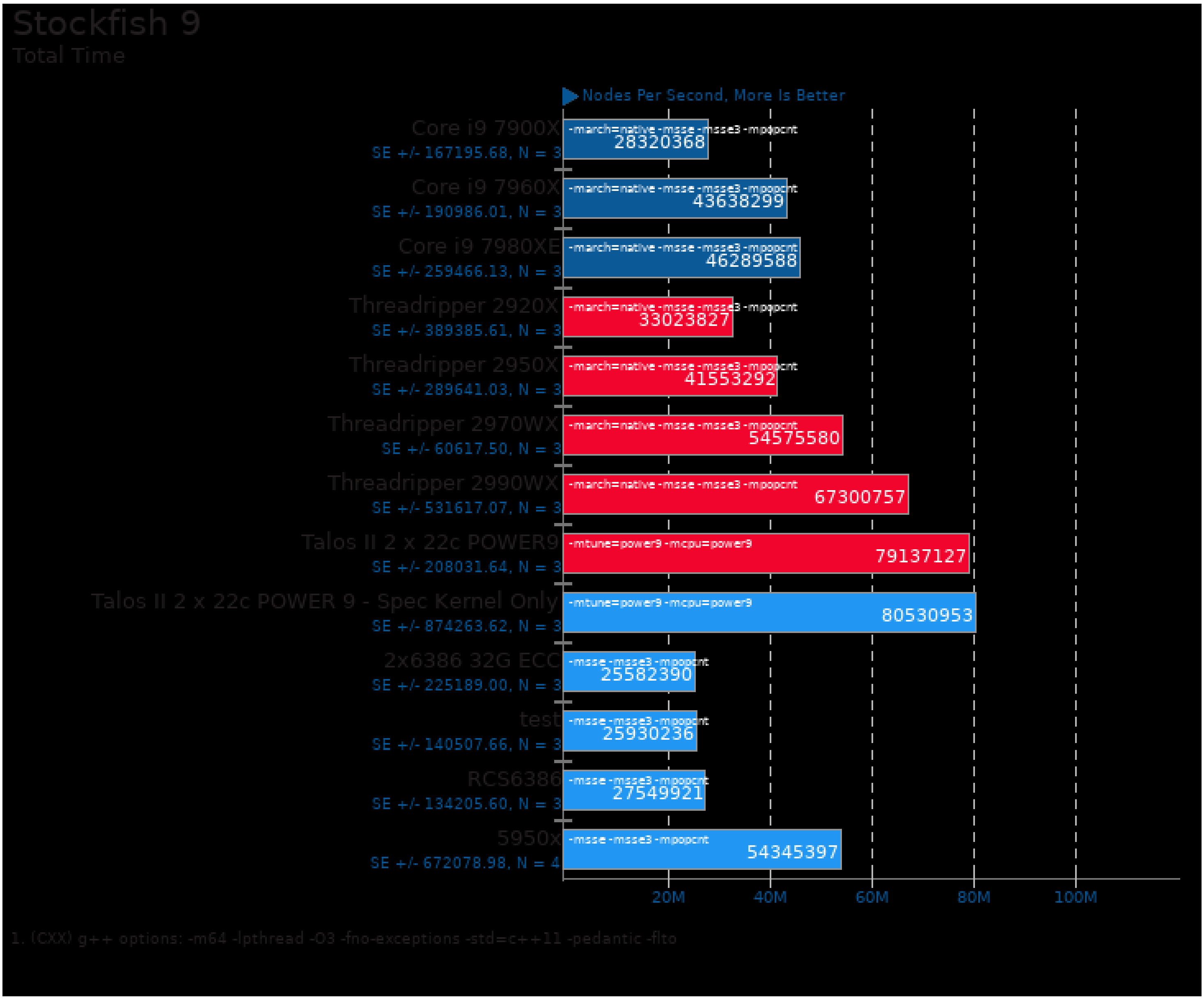


Rodinia 2.4
Test: OpenMP LavaMD
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.10, N = 3
31.25
Core i9 7960X
SE +/- 0.11, N = 3
21.47
Core i9 7980XE
SE +/- 0.01, N = 3
20.08
Threadripper 2920X
SE +/- 0.26, N = 3
25.77
Threadripper 2950X
SE +/- 0.07, N = 3
20.74
Threadripper 2970WX
SE +/- 0.06, N = 3
14.52
Threadripper 2990WX
SE +/- 0.01, N = 3
11.75
Talos II 2 x 22c POWER9
SE +/- 0.67, N = 3
19.74
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.59, N = 3
19.30
2x6386 32G ECC
SE +/- 0.00, N = 3
32.69
test
SE +/- 0.03, N = 3
32.64
RCS 6386
SE +/- 0.45, N = 4
33.19
RCS6386
SE +/- 0.53, N = 3
33.29
Ryzen 5950x
SE +/- 0.03, N = 3
13.70
5950x
SE +/- 0.14, N = 4
13.40
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL

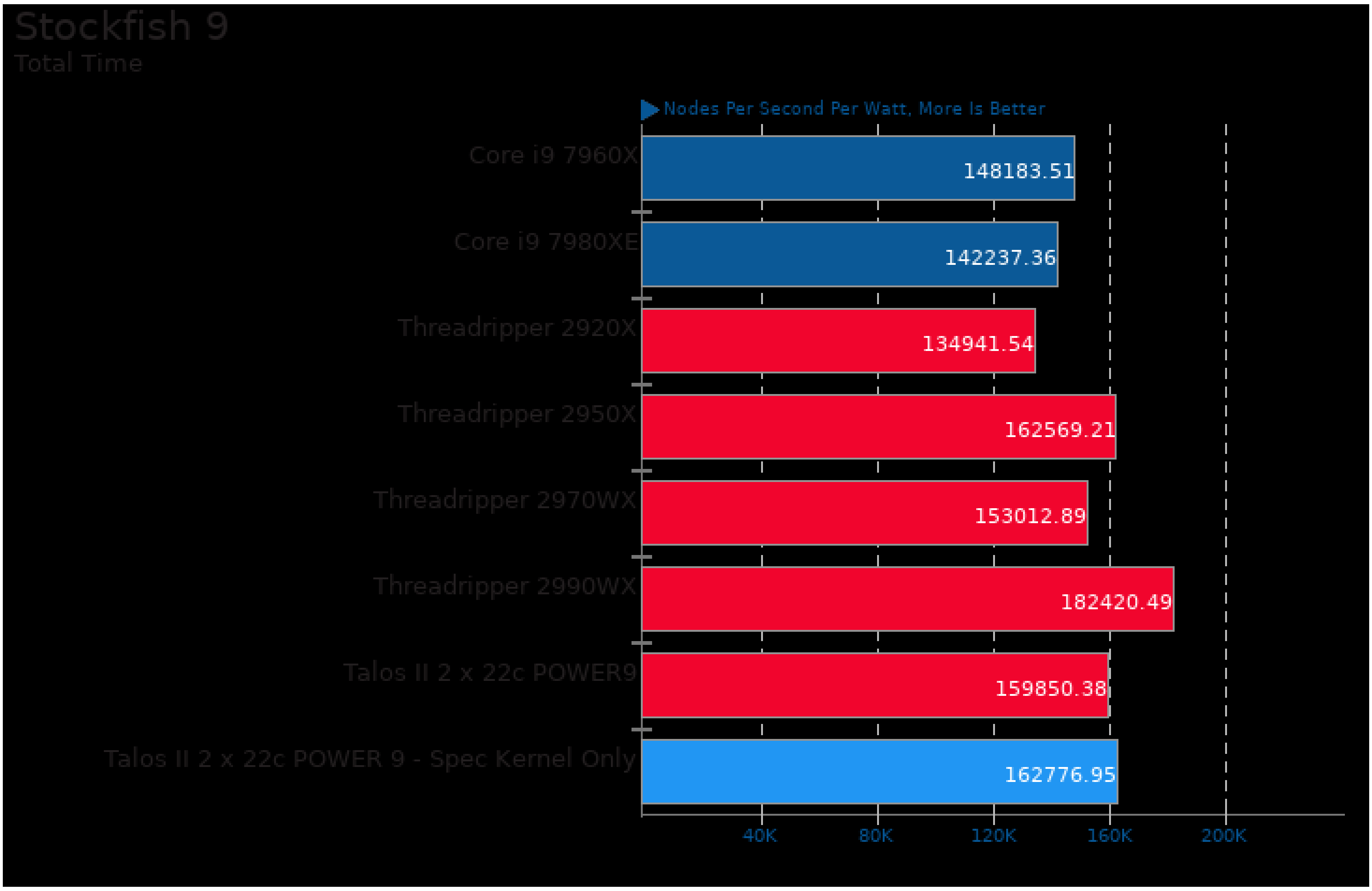
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks



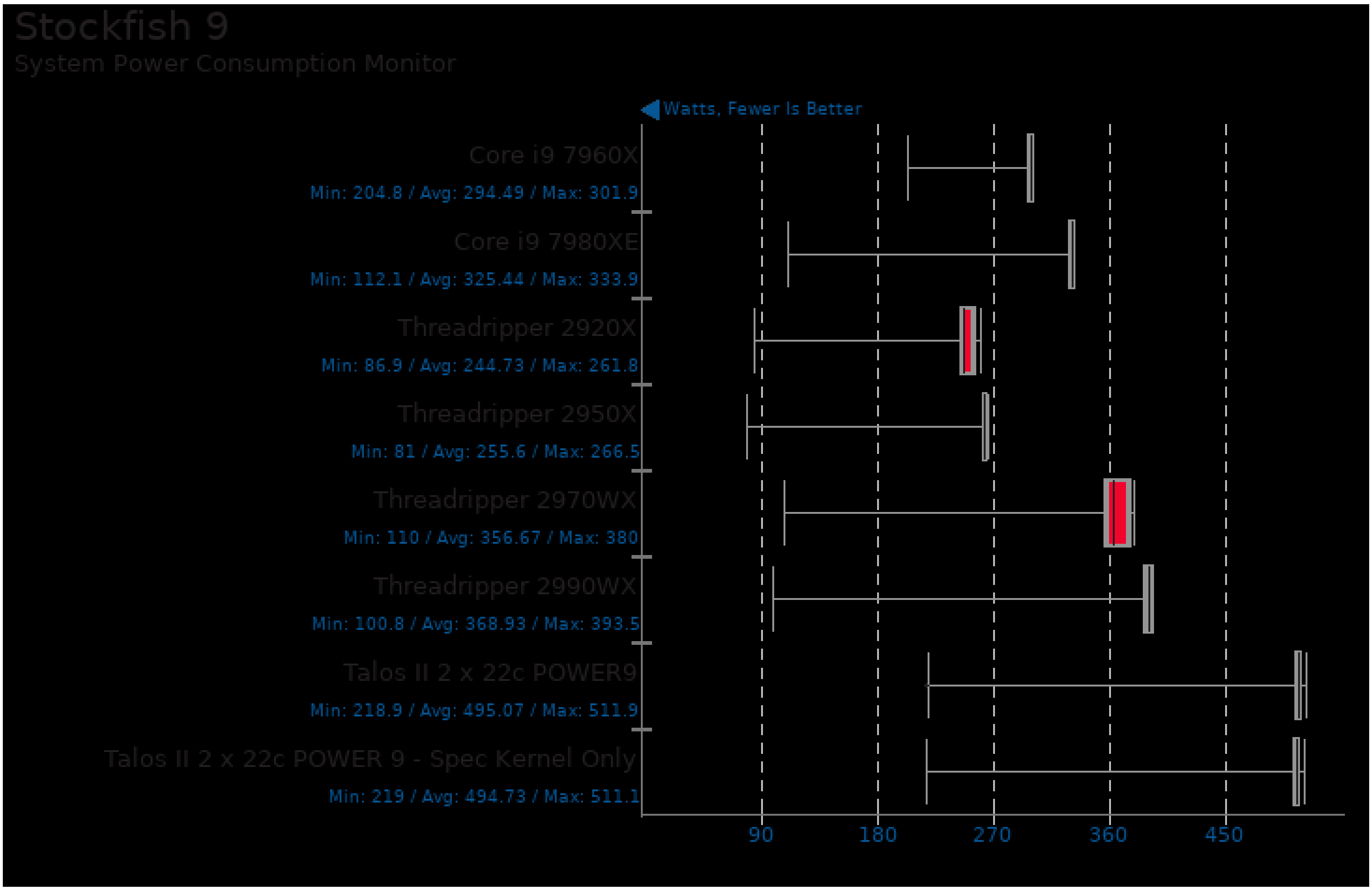

Rust Prime Benchmark
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 87.1 / Avg: 198.76 / Max: 231.9
Core i9 7980XE
Min: 105.8 / Avg: 196.4 / Max: 242.1
Threadripper 2920X
Min: 87.5 / Avg: 152.66 / Max: 165.2
Threadripper 2950X
Min: 78.4 / Avg: 158.93 / Max: 178.4
Threadripper 2970WX
Min: 108.3 / Avg: 176.6 / Max: 208.3
Threadripper 2990WX
Min: 177.8 / Avg: 201.53 / Max: 210.4
Talos II 2 x 22c POWER9
Min: 220.6 / Avg: 335 / Max: 449.4
Talos II 2 x 22c POWER 9 - Spec Kernel Only
80
160
240
320
400

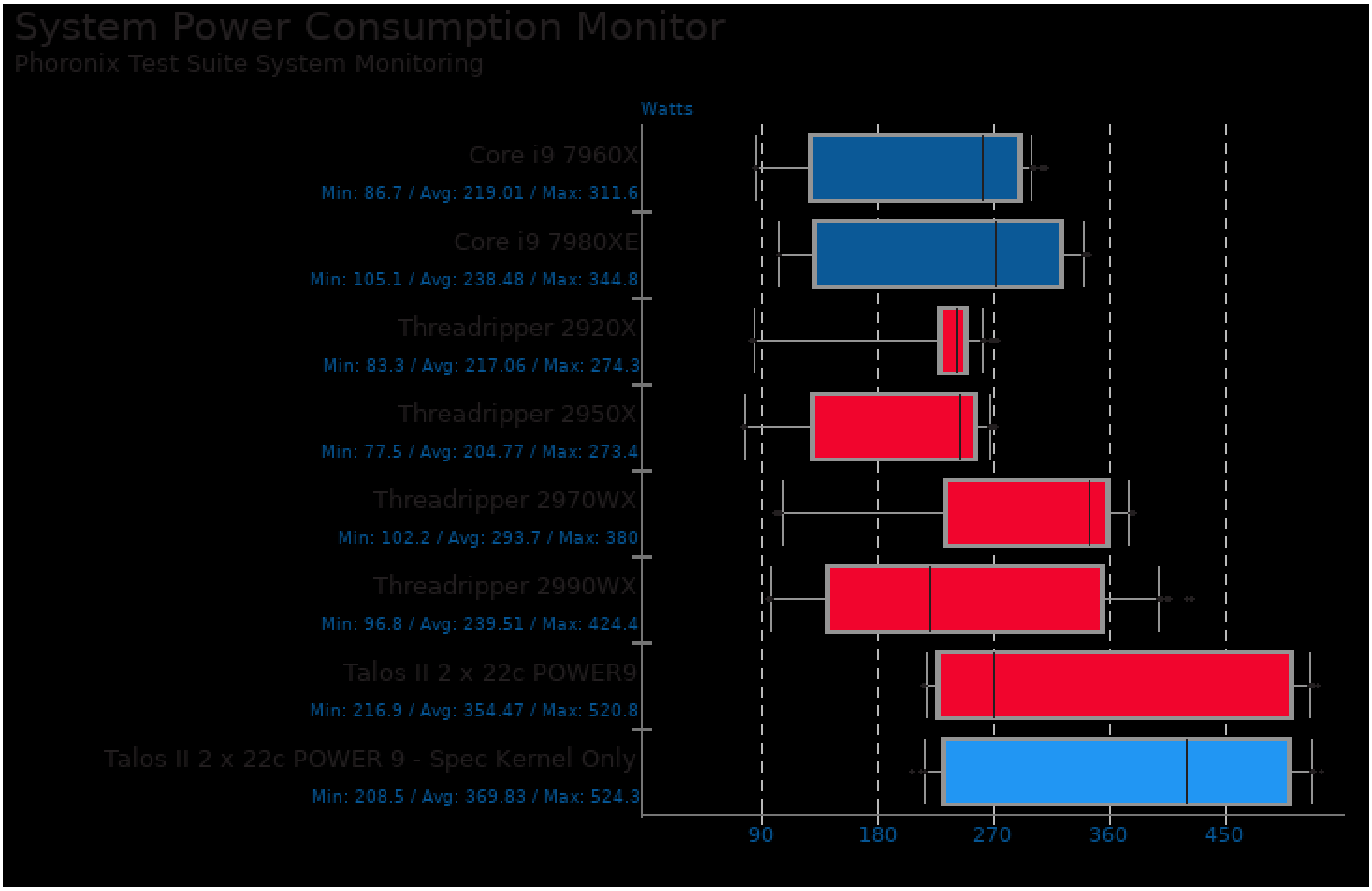


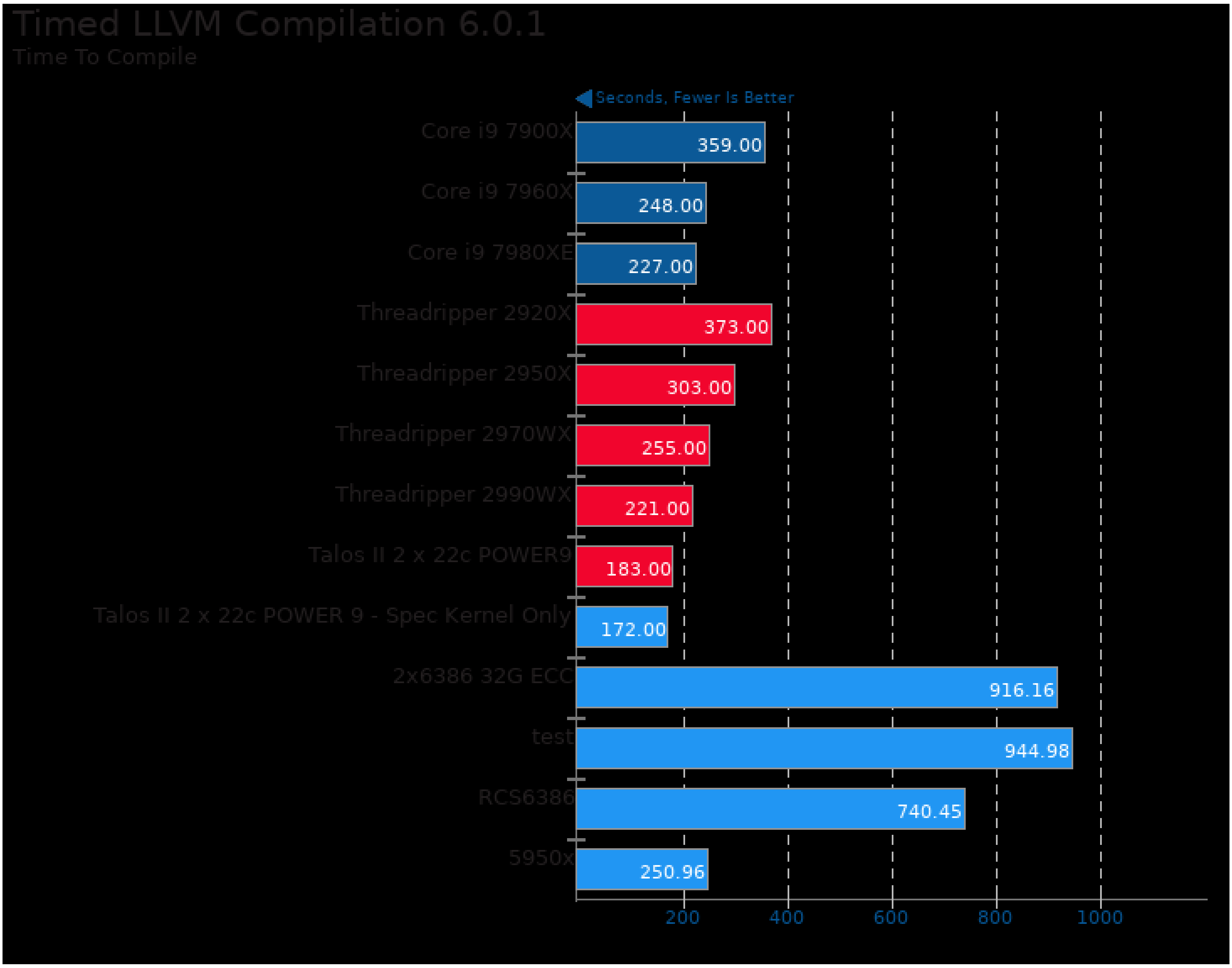
Stockfish 9
Total Time
Nodes Per Second, More Is Better
Core i9 7900X
SE +/- 167195.68, N = 3
-march=native -msse -msse3 -mpopcnt
28320368
Core i9 7960X
SE +/- 190986.01, N = 3
-march=native -msse -msse3 -mpopcnt
43638299
Core i9 7980XE
SE +/- 259466.13, N = 3
-march=native -msse -msse3 -mpopcnt
46289588
Threadripper 2920X
SE +/- 389385.61, N = 3
-march=native -msse -msse3 -mpopcnt
33023827
Threadripper 2950X
SE +/- 289641.03, N = 3
-march=native -msse -msse3 -mpopcnt
41553292
Threadripper 2970WX
SE +/- 60617.50, N = 3
-march=native -msse -msse3 -mpopcnt
54575580
Threadripper 2990WX
SE +/- 531617.07, N = 3
-march=native -msse -msse3 -mpopcnt
67300757
Talos II 2 x 22c POWER9
SE +/- 208031.64, N = 3
-mtune=power9 -mcpu=power9
79137127
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 874263.62, N = 3
-mtune=power9 -mcpu=power9
80530953
2x6386 32G ECC
SE +/- 225189.00, N = 3
-msse -msse3 -mpopcnt
25582390
test
SE +/- 140507.66, N = 3
-msse -msse3 -mpopcnt
25930236
RCS6386
SE +/- 134205.60, N = 3
-msse -msse3 -mpopcnt
27549921
5950x
SE +/- 672078.98, N = 4
-msse -msse3 -mpopcnt
54345397
20M
40M
60M
80M
100M
1. (CXX) g++ options: -m64 -lpthread -O3 -fno-exceptions -std=c++11 -pedantic -flto


Stockfish 9
Total Time
Nodes Per Second Per Watt, More Is Better
Core i9 7960X
148183.51
Core i9 7980XE
142237.36
Threadripper 2920X
134941.54
Threadripper 2950X
162569.21
Threadripper 2970WX
153012.89
Threadripper 2990WX
182420.49
Talos II 2 x 22c POWER9
159850.38
Talos II 2 x 22c POWER 9 - Spec Kernel Only
162776.95
40K
80K
120K
160K
200K

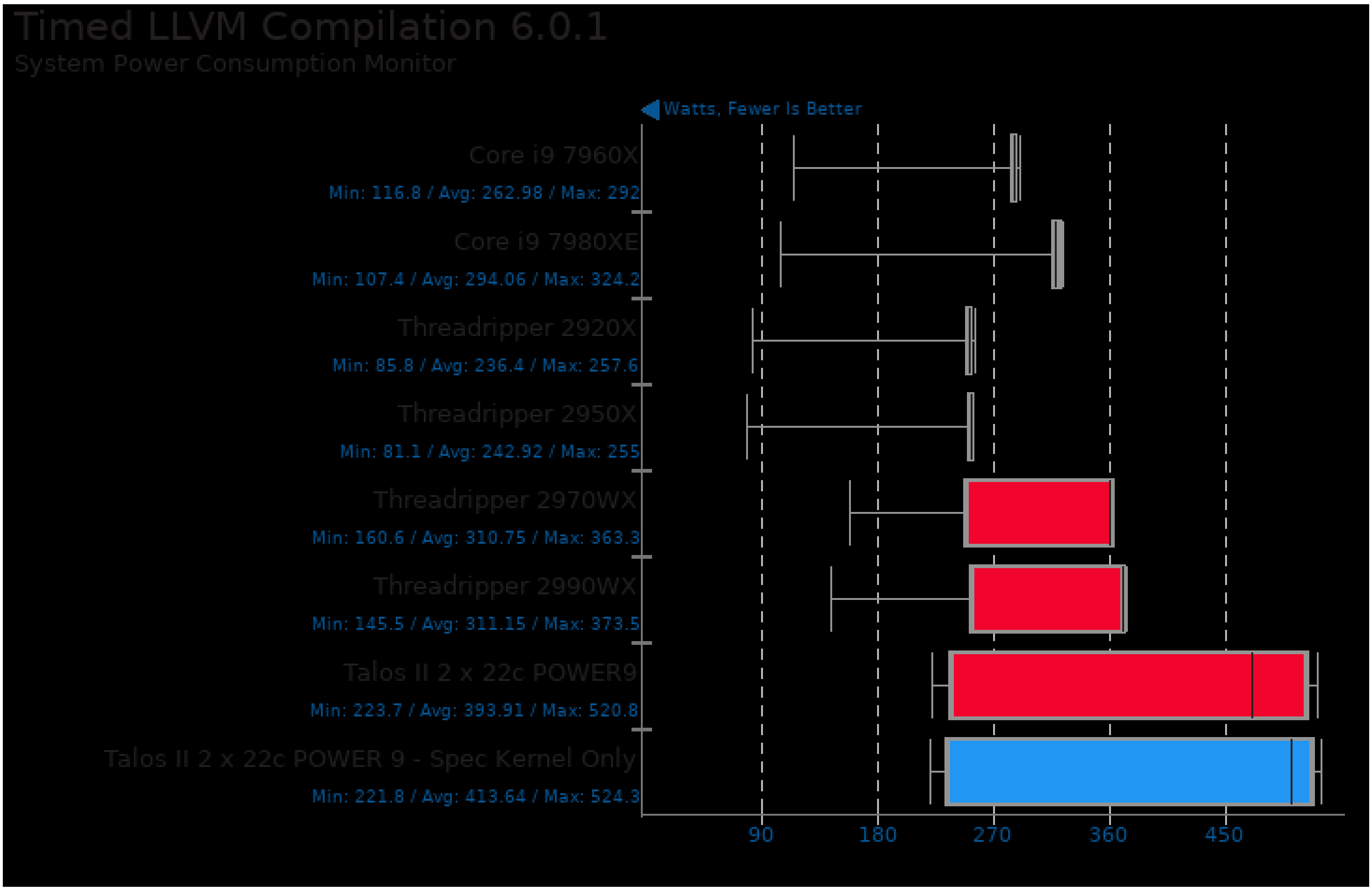
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks




System Power Consumption Monitor
Phoronix Test Suite System Monitoring
Watts
Core i9 7960X
Min: 86.7 / Avg: 219.01 / Max: 311.6
Core i9 7980XE
Min: 105.1 / Avg: 238.48 / Max: 344.8
Threadripper 2920X
Min: 83.3 / Avg: 217.06 / Max: 274.3
Threadripper 2950X
Min: 77.5 / Avg: 204.77 / Max: 273.4
Threadripper 2970WX
Min: 102.2 / Avg: 293.7 / Max: 380
Threadripper 2990WX
Min: 96.8 / Avg: 239.51 / Max: 424.4
Talos II 2 x 22c POWER9
Min: 216.9 / Avg: 354.47 / Max: 520.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 208.5 / Avg: 369.83 / Max: 524.3
90
180
270
360
450


Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
Core i9 7900X
359.00
Core i9 7960X
248.00
Core i9 7980XE
227.00
Threadripper 2920X
373.00
Threadripper 2950X
303.00
Threadripper 2970WX
255.00
Threadripper 2990WX
221.00
Talos II 2 x 22c POWER9
183.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
172.00
2x6386 32G ECC
916.16
test
944.98
RCS6386
740.45
5950x
250.96
200
400
600
800
1000

Talos II POWER9 vs. AMD / Intel HEDT Benchmarks



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