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Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

2 x AMD Opteron 6386 SE testing with a ASUS KGPE-D16 v1.0 (4.8-722-g32cdff5f08 BIOS) and ASPEED on Debian 10 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

Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

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

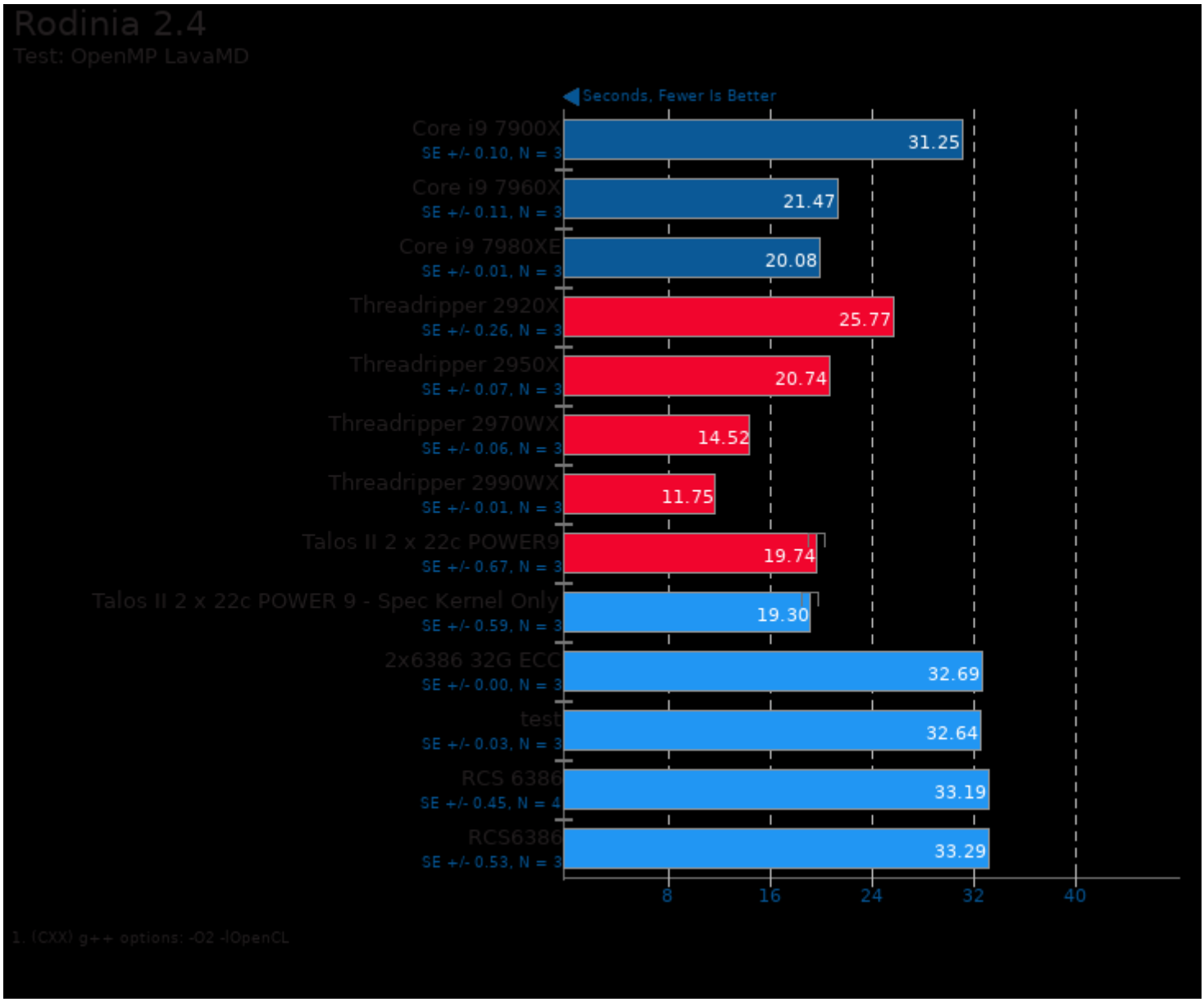
	Core i9 7900X	Core i9 7960X	Core i9 7980XE	Threadripper 2920X	Threadripper 2950X	Threadripper 2970WX	Threadripper 2990WX	Talos II 2 x 22c POWER9	Talos II 2 x 22c POWER 9 - Spec Kernel Only	2x6386 32G ECC	6262	test	RCS 6386	RCS6386
Rodinia - OpenMP LavaMD (sec)	31.25	21.47	20.08	25.77	20.74	14.52	**11.75**	19.74	19.30	32.691		32.640	33.193	**33.290**
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%
Standard	0.6%	0.9%	0%	1.8%	0.6%	0.8%	0.2%	5.9%	5.3%	0%		0.1%	2.7%	2.8%
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	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%					
Stockfish - Total Time (Nodes/s)	28320368	43638299	46289588	33023827	41553292	54575580	67300757	79137127	**80530953**	**25582390**		25930236		27549921
Normalized	35.17%	54.19%	57.48%	41.01%	51.6%	67.77%	83.57%	98.27%	100%	31.77%		32.2%		34.21%
Standard	1%	0.8%	1%	2%	1.2%	0.2%	1.4%	0.5%	1.9%	1.5%		0.9%		0.8%
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%					

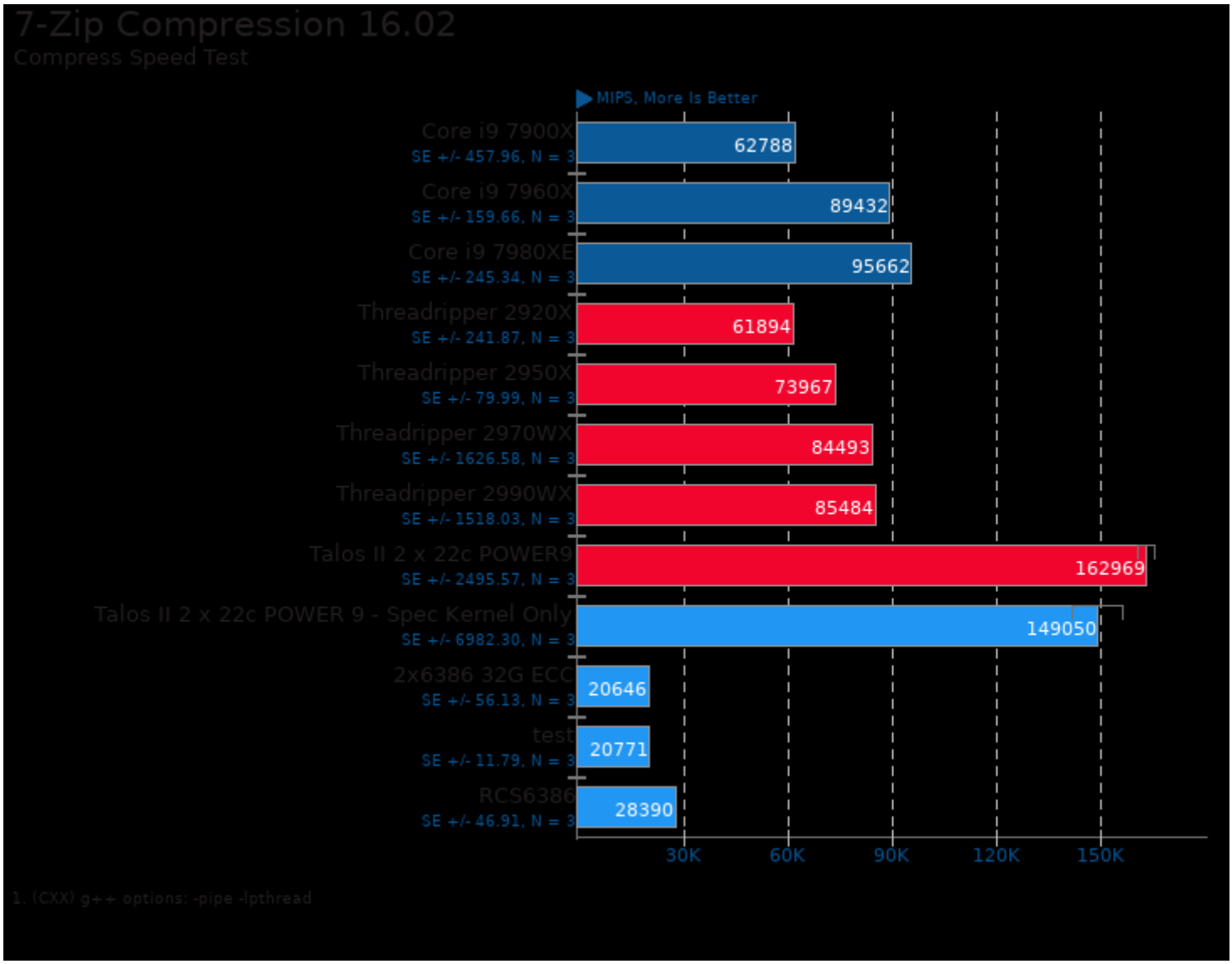
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

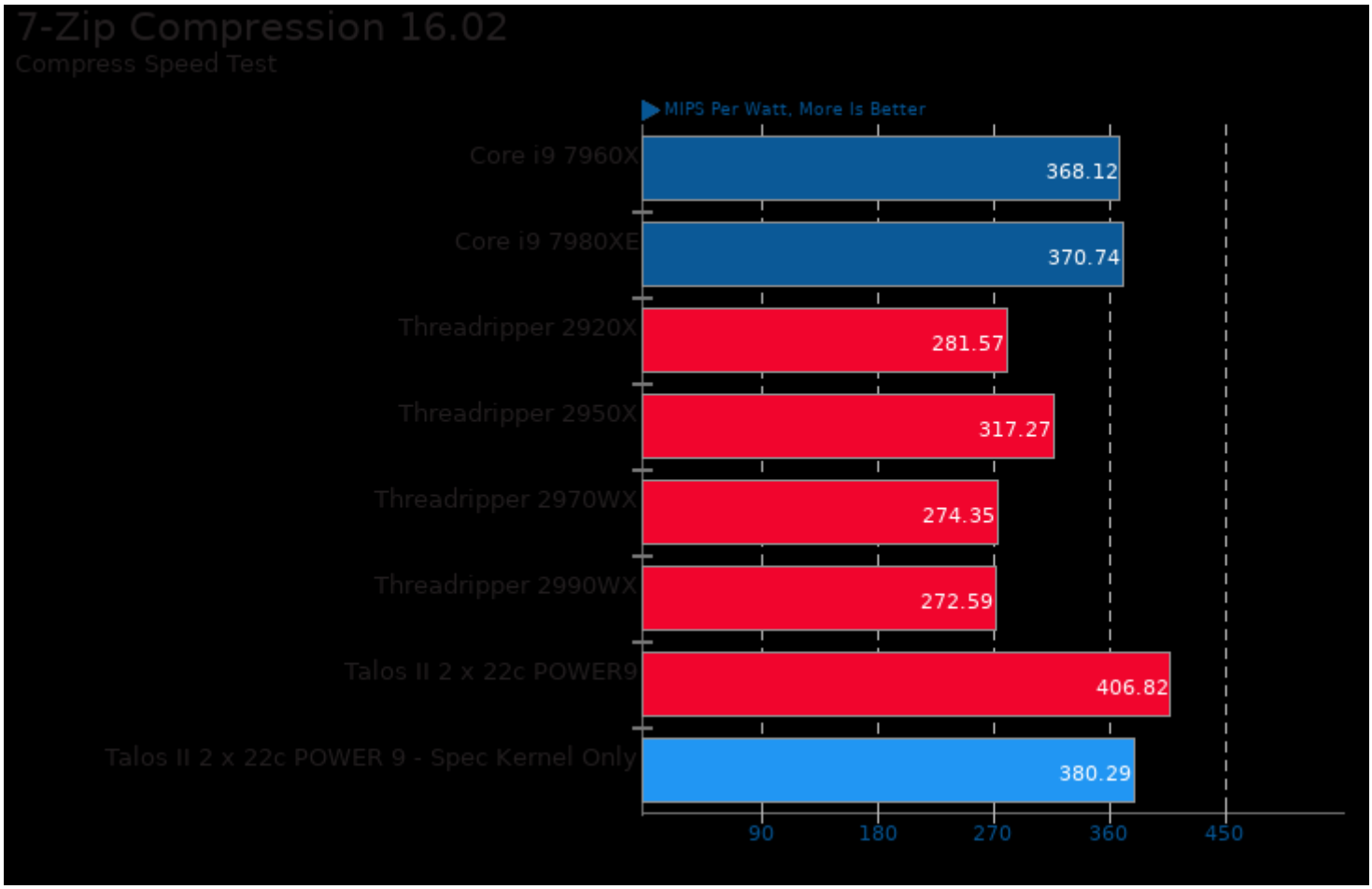
Timed LLVM Compilation - Time To Compile (sec)	359	248	227	373	303	255	221	183	**172**	916.158	**944.978**	740.446
Normalized	47.91%	69.35%	75.77%	46.11%	56.77%	67.45%	77.83%	93.99%	100%	18.77%	18.2%	23.23%
C-Ray - Total Time - 4.1.R.P.P (sec)	51.28	35.71	33.51	41.30	33.08	23.12	**17.97**	19.14	19.09	76.950	**77.009**	76.994
Normalized	35.04%	50.32%	53.63%	43.51%	54.32%	77.72%	100%	93.89%	94.13%	23.35%	23.33%	23.34%
Standard	0.1%	0.1%	0.1%	0.7%	0.1%	2%	0.2%	0.5%	1.2%	0%	0.1%	0%
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
Normalized	40.52%	58.33%	63.34%	47.26%	58.64%	80.04%	100%	70.89%	76.45%	36.28%	36.17%	36.37%
Standard	0.2%	0.2%	0.3%	0.6%	0.4%	1.8%	0.6%	0.3%	1.3%	0.2%	0.3%	0.3%
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
Normalized	30.65%	52.76%	43.28%	11.75%	16.69%	20.07%	28.34%	97.25%	100%	21.58%	21.55%	21.49%
Standard	0%	0.1%	0.2%	0%	0.1%	0.2%	0.1%	12%	4.8%	0%	0.1%	0.7%
OpenSSL - R.4.b.P (Signs/sec)	3059	4421	4686	2566	3287	4561	5821	7356	**7408**	2010	**2010**	2011
Normalized	41.29%	59.68%	63.26%	34.64%	44.37%	61.57%	78.58%	99.3%	100%	27.13%	27.13%	27.14%
Standard	0.4%	0.1%	0.3%	0.8%	0.5%	0.1%	0.3%	1.7%	0.7%	0.1%	0.1%	0%
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%			
PostgreSQL pgbench - Buffer Test - Normal Load - Read Only (TPS)	327587	493203	522155	271596	317019	430861	472250	544186	**574403**	**101566**	103743	109602
Normalized	57.03%	85.86%	90.9%	47.28%	55.19%	75.01%	82.22%	94.74%	100%	17.68%	18.06%	19.08%
Standard	1.2%	0.3%	0.4%	0.2%	0.1%	0.3%	2.3%	0.6%	0.2%	2%	1.8%	0.8%
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%			

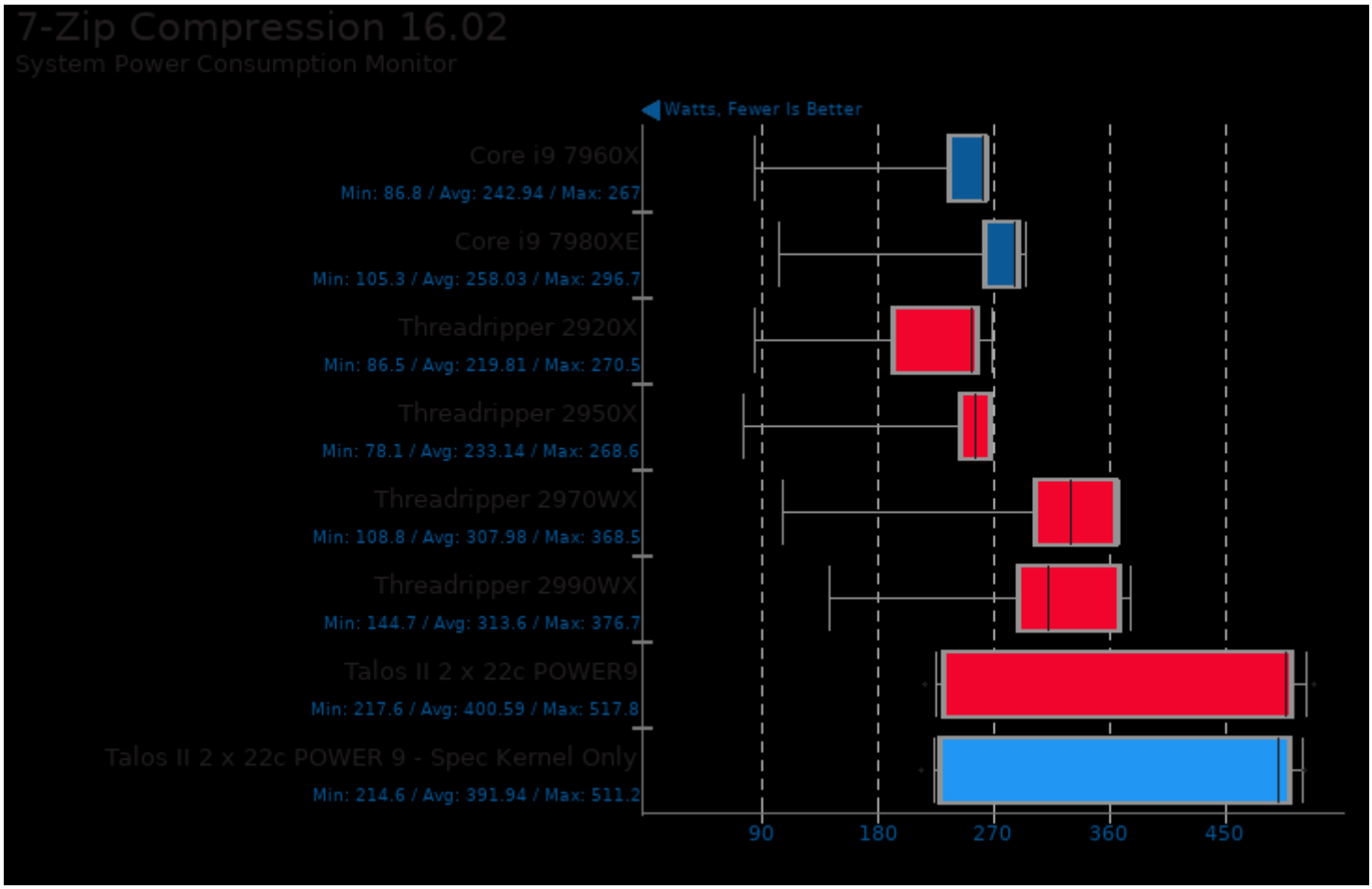
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

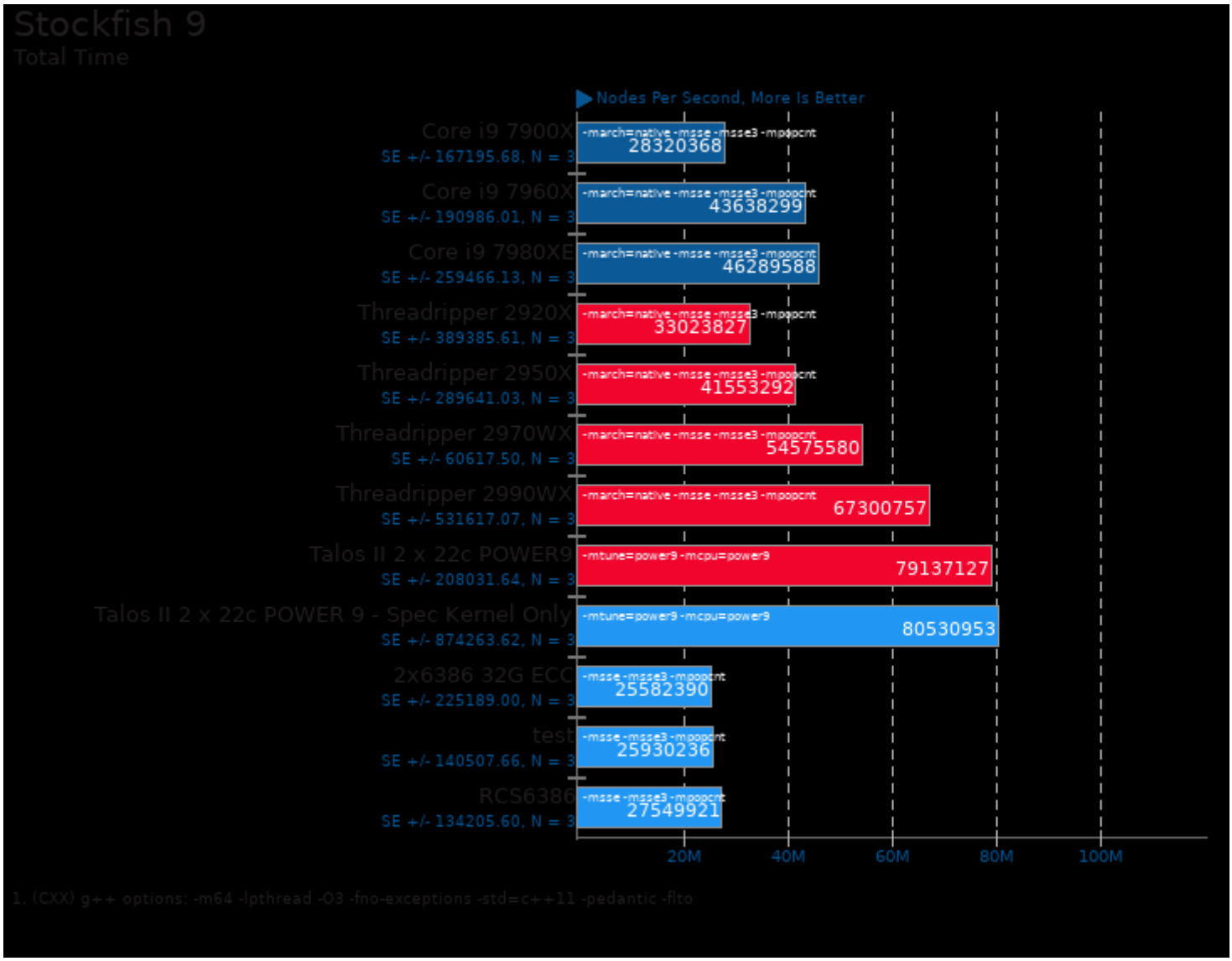
GNU Octave Benchmark (sec)	17.07	17.57	17.47	16.43	16.64	17.87	16.78	**14.92**	16.35	**37.886**	36.421	36.281
Normalized	87.4%	84.92%	85.4%	90.81%	89.66%	83.49%	88.92%	100%	91.25%	39.38%	40.97%	41.12%
Standard	0.6%	0.4%	0.3%	1.4%	0.4%	4.1%	1%	1.1%	1.5%	8.4%	11.8%	1.4%
PyBench - T.F.A.T.T (Milliseconds)	**942**	960	955	1133	1136	1165	1147	**4088**	1936	2269	2260	2259
Normalized	100%	98.13%	98.64%	83.14%	82.92%	80.86%	82.13%	23.04%	48.66%	41.52%	41.68%	41.7%
Standard	0.6%		0.3%	0.6%	0.3%	0.1%	0.4%	0.3%	0.2%	0.5%	0.5%	0.3%
PHPBench - P.B.S (Score)	**71728 1**	70135 7	70366 6	53526 3	53746 7	52006 4	52527 6	**16128 6**	32854 6	32374 4	32745 2	32315 8
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	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%			


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
8
16
24
32
40
1. (CXX) g++ options: -O2 -lOpenCL

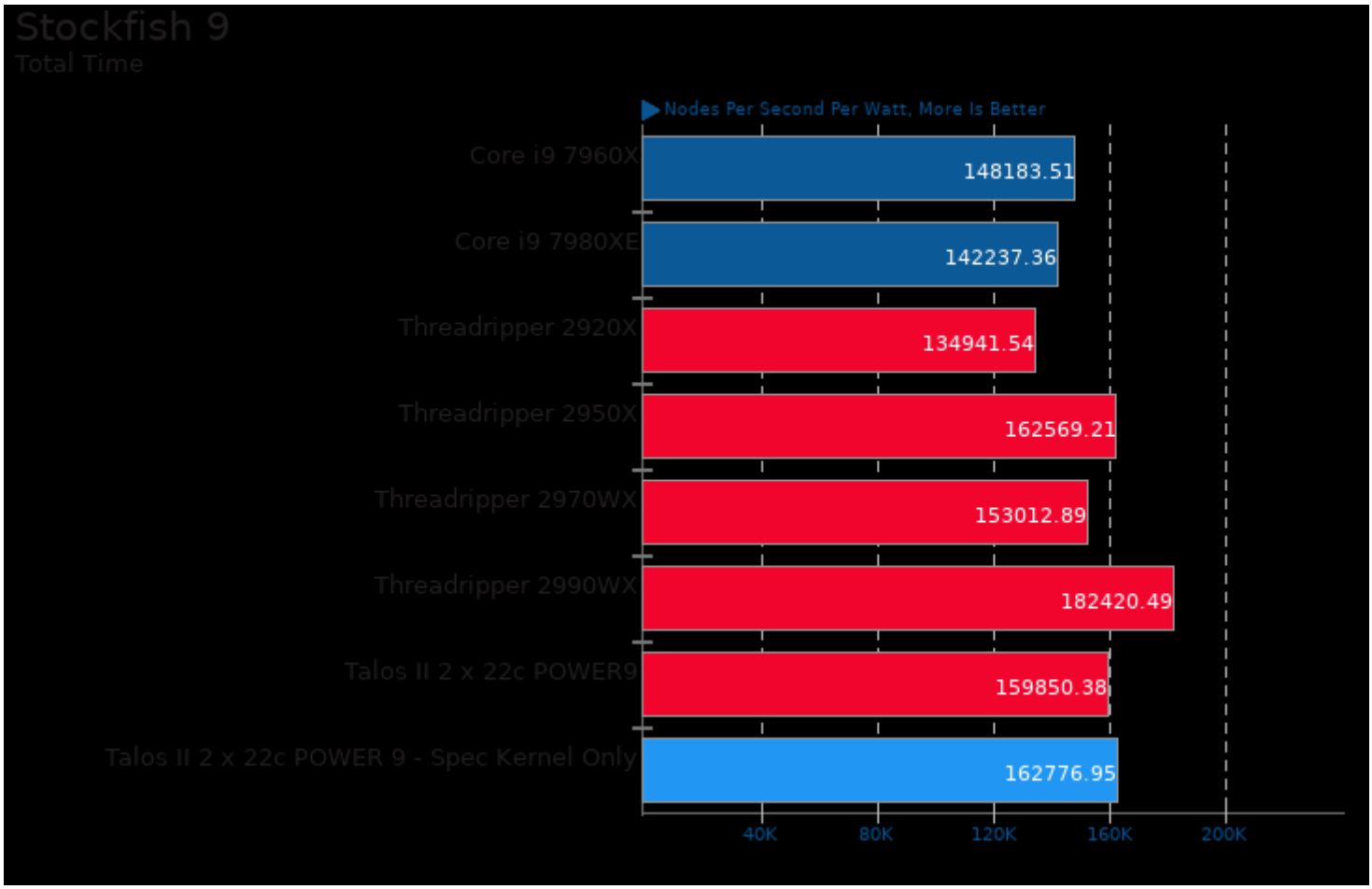

7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
Core i9 7900X
SE +/- 457.96, N = 3
62788
Core i9 7960X
SE +/- 159.66, N = 3
89432
Core i9 7980XE
SE +/- 245.34, N = 3
95662
Threadripper 2920X
SE +/- 241.87, N = 3
61894
Threadripper 2950X
SE +/- 79.99, N = 3
73967
Threadripper 2970WX
SE +/- 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

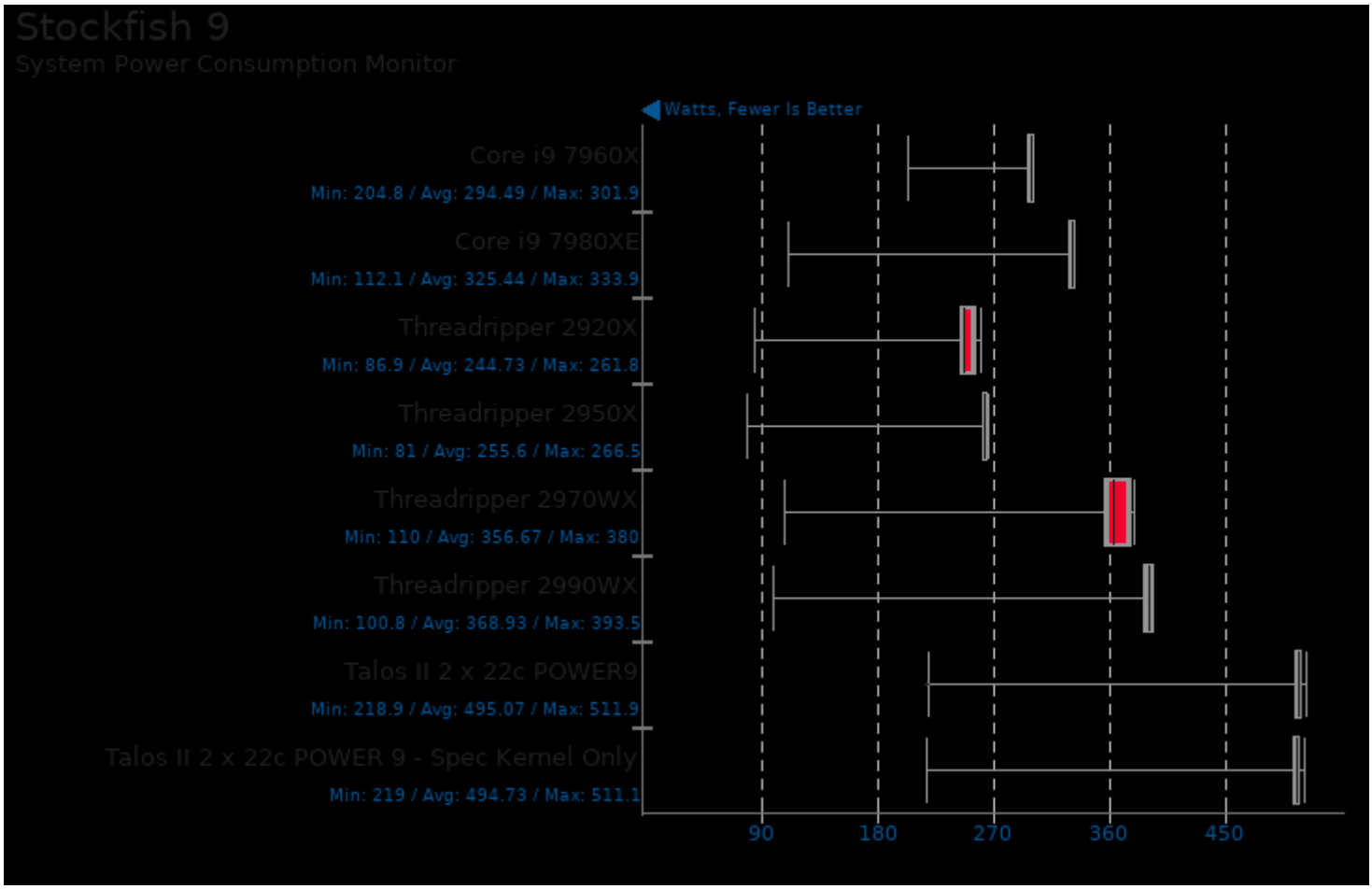

7-Zip Compression 16.02
Compress Speed Test
MIPS Per Watt, More Is Better
Core i9 7960X
368.12
Core i9 7980XE
370.74
Threadripper 2920X
281.57
Threadripper 2950X
317.27
Threadripper 2970WX
274.35
Threadripper 2990WX
272.59
Talos II 2 x 22c POWER9
406.82
Talos II 2 x 22c POWER 9 - Spec Kernel Only
380.29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

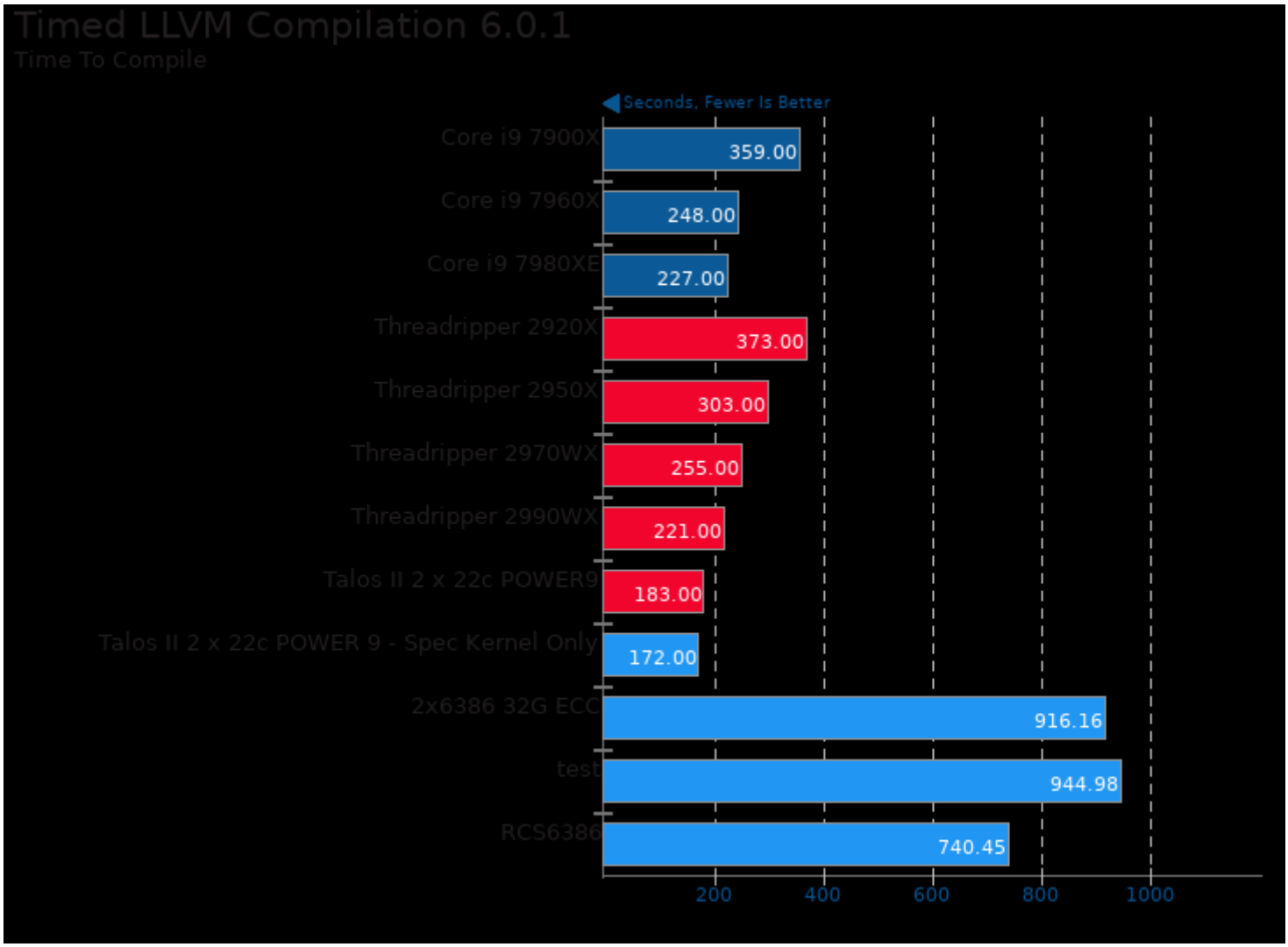

7-Zip Compression 16.02
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 86.8 / Avg: 242.94 / Max: 267
Core i9 7980XE
Min: 105.3 / Avg: 258.03 / Max: 296.7
Threadripper 2920X
Min: 86.5 / Avg: 219.81 / Max: 270.5
Threadripper 2950X
Min: 78.1 / Avg: 233.14 / Max: 268.6
Threadripper 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

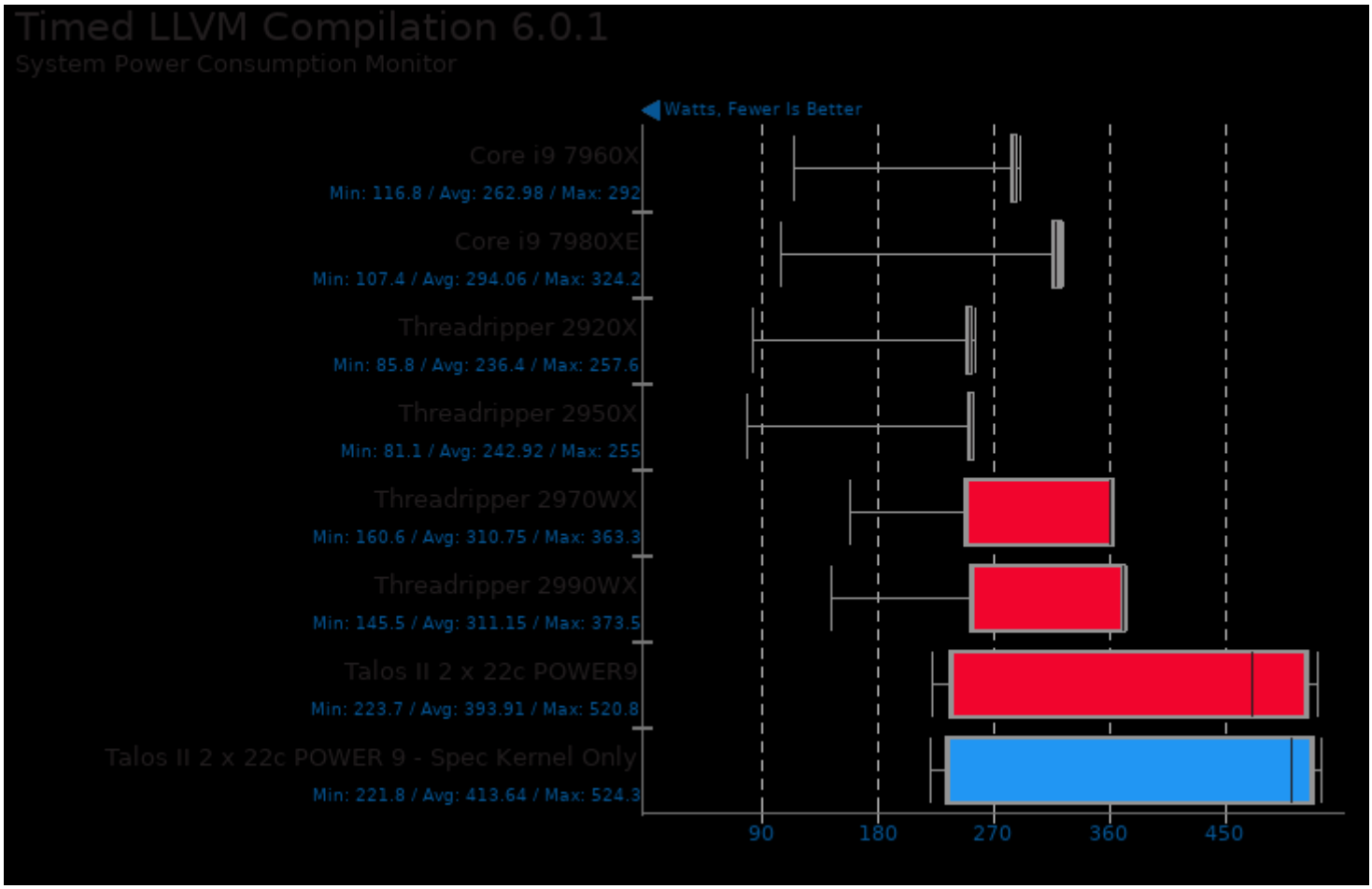

Stockfish 9
Total Time
Nodes Per Second, More Is Better
Core i9 7900X
SE +/- 167195.68, N = 3
-march=native -msse -msse3 -mpopcnt
28320368
Core i9 7960X
SE +/- 190986.01, N = 3
-march=native -msse -msse3 -mpopcnt
43638299
Core i9 7980XE
SE +/- 259466.13, N = 3
-march=native -msse -msse3 -mpopcnt
46289588
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
20M
40M
60M
80M
100M
1. (CXX) g++ options: -m64 -lpthread -O3 -fno-exceptions -std=c++11 -pedantic -flto

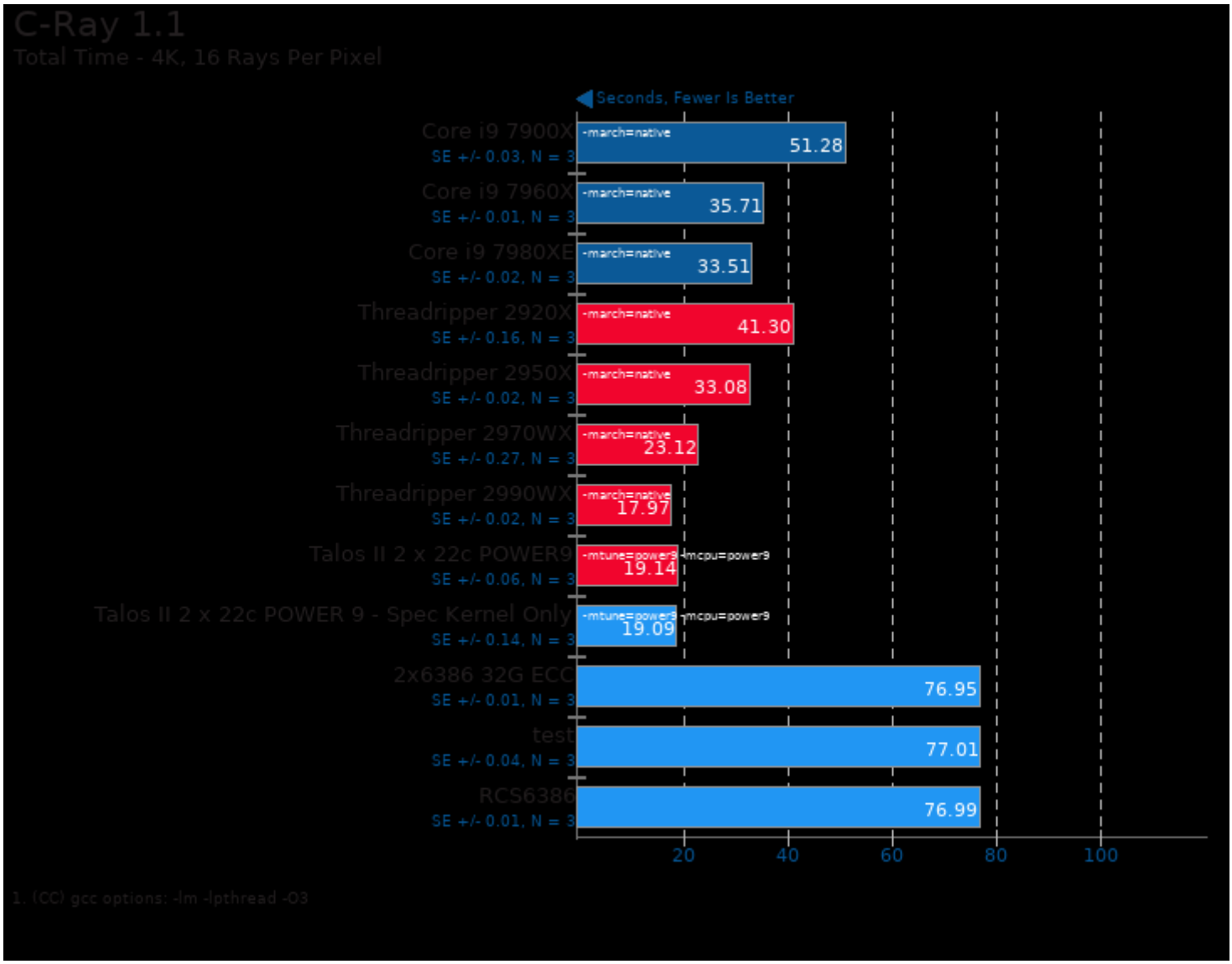
Talos II POWER9 vs. AMD / Intel HEDT Benchmarks

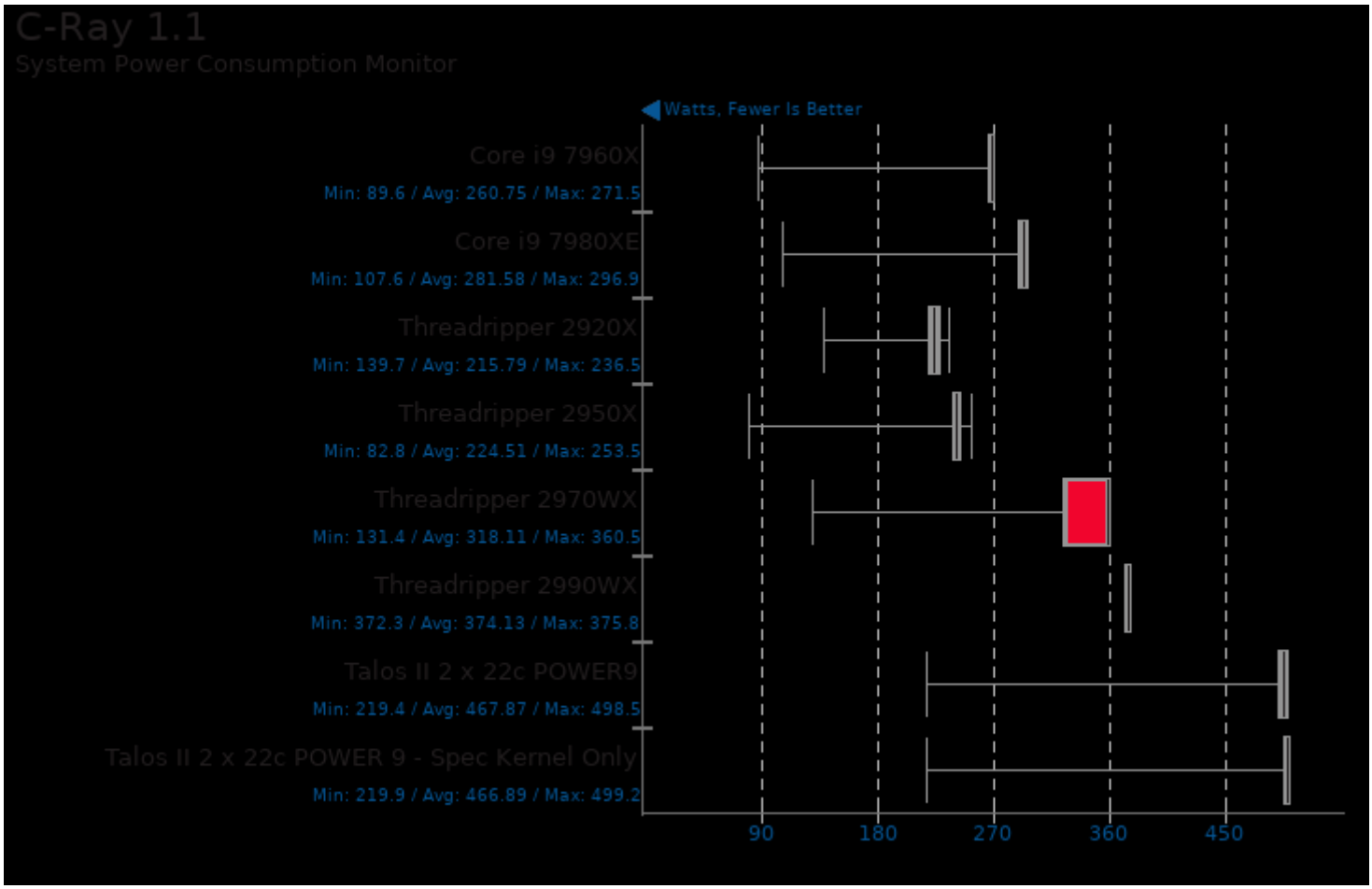


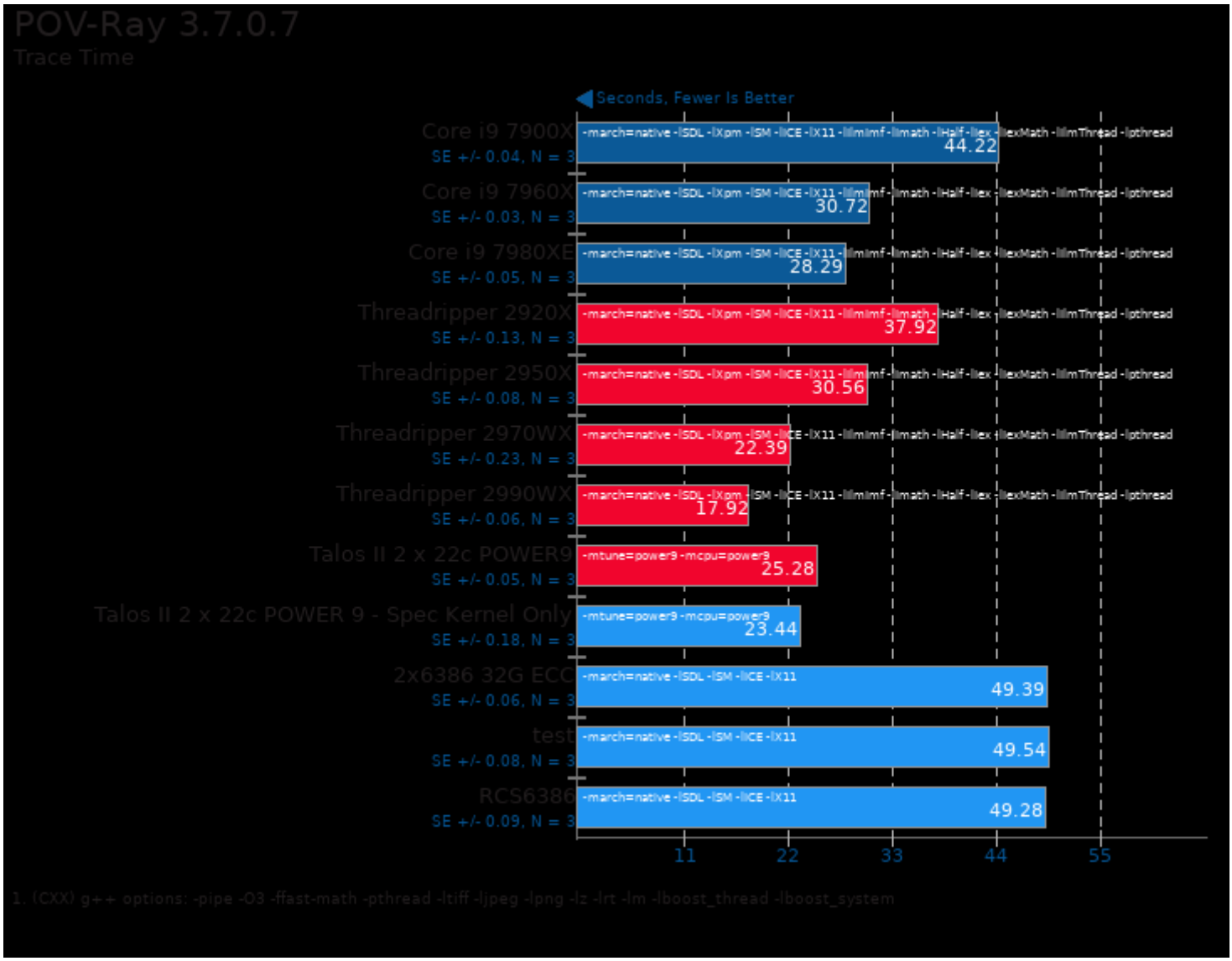

Stockfish 9
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 204.8 / Avg: 294.49 / Max: 301.9
Core i9 7980XE
Min: 112.1 / Avg: 325.44 / Max: 333.9
Threadripper 2920X
Min: 86.9 / Avg: 244.73 / Max: 261.8
Threadripper 2950X
Min: 81 / Avg: 255.6 / Max: 266.5
Threadripper 2970WX
Min: 110 / Avg: 356.67 / Max: 380
Threadripper 2990WX
Min: 100.8 / Avg: 368.93 / Max: 393.5
Talos II 2 x 22c POWER9
Min: 218.9 / Avg: 495.07 / Max: 511.9
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219 / Avg: 494.73 / Max: 511.1
90
180
270
360
450

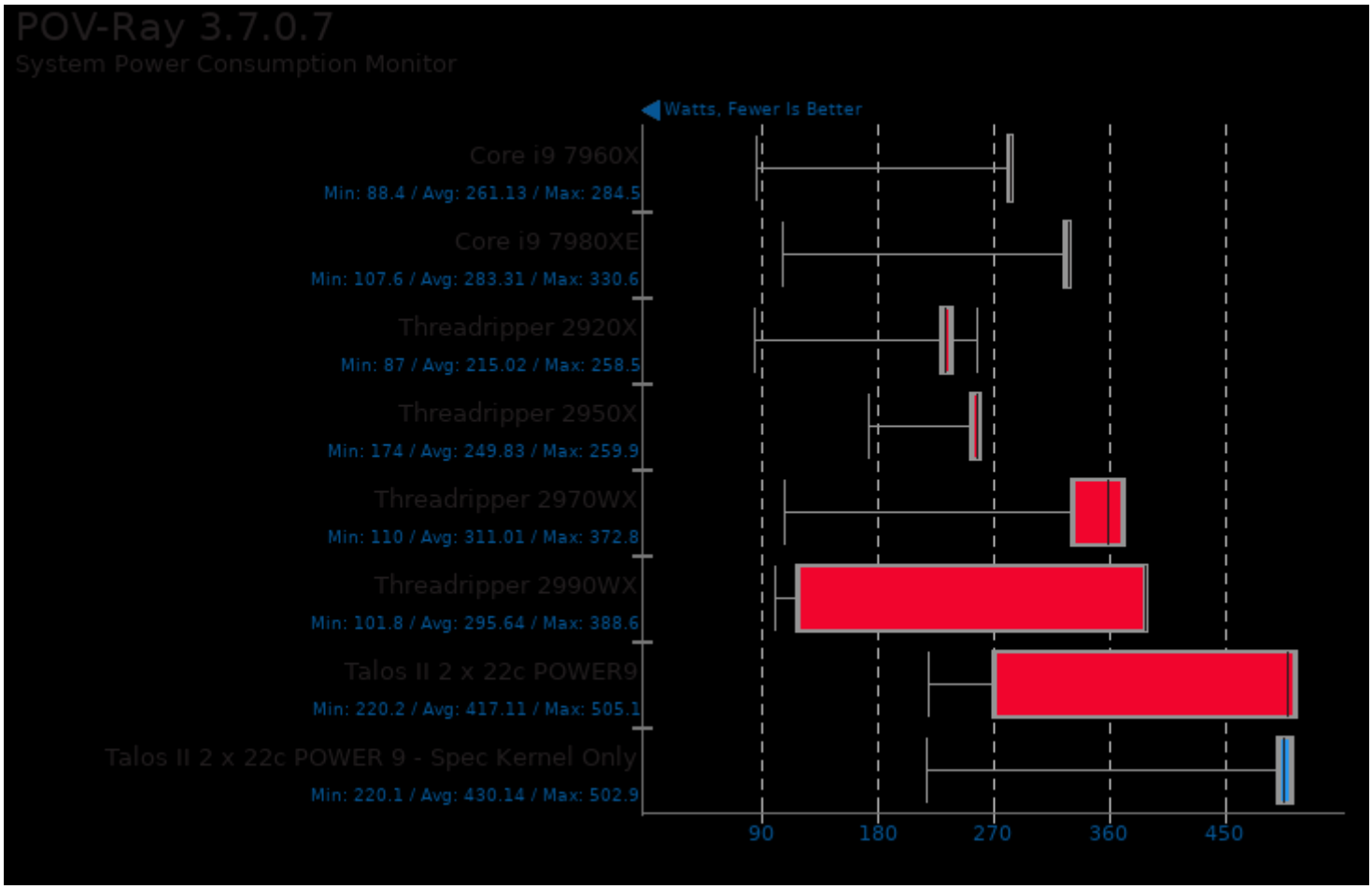

Timed LLVM Compilation 6.0.1
Time To Compile
Seconds, Fewer Is Better
Core i9 7900X
359.00
Core i9 7960X
248.00
Core i9 7980XE
227.00
Threadripper 2920X
373.00
Threadripper 2950X
303.00
Threadripper 2970WX
255.00
Threadripper 2990WX
221.00
Talos II 2 x 22c POWER9
183.00
Talos II 2 x 22c POWER 9 - Spec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

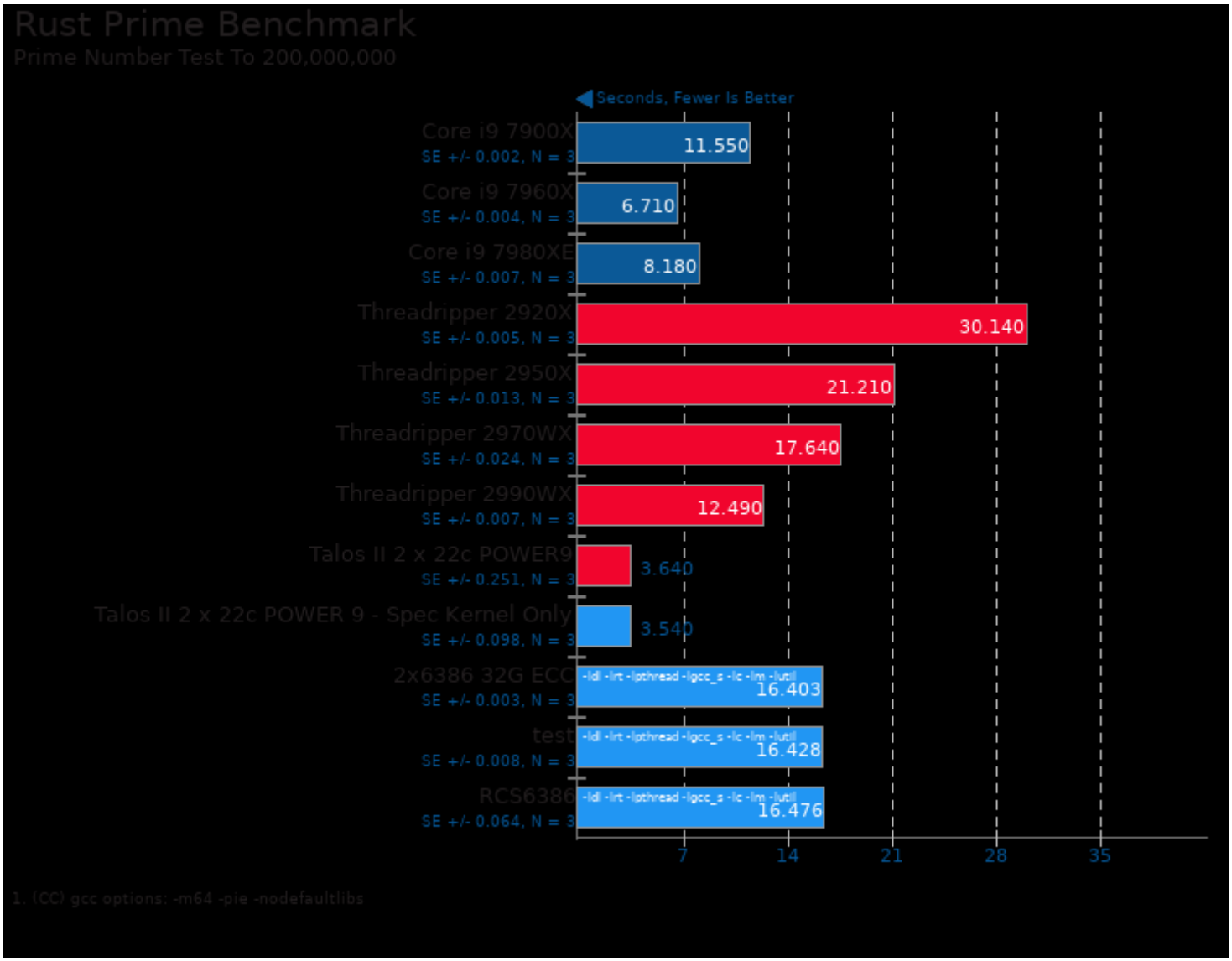

Timed LLVM Compilation 6.0.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 116.8 / Avg: 262.98 / Max: 292
Core i9 7980XE
Min: 107.4 / Avg: 294.06 / Max: 324.2
Threadripper 2920X
Min: 85.8 / Avg: 236.4 / Max: 257.6
Threadripper 2950X
Min: 81.1 / Avg: 242.92 / Max: 255
Threadripper 2970WX
Min: 160.6 / Avg: 310.75 / Max: 363.3
Threadripper 2990WX
Min: 145.5 / Avg: 311.15 / Max: 373.5
Talos II 2 x 22c POWER9
Min: 223.7 / Avg: 393.91 / Max: 520.8
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 221.8 / Avg: 413.64 / Max: 524.3
90
180
270
360
450

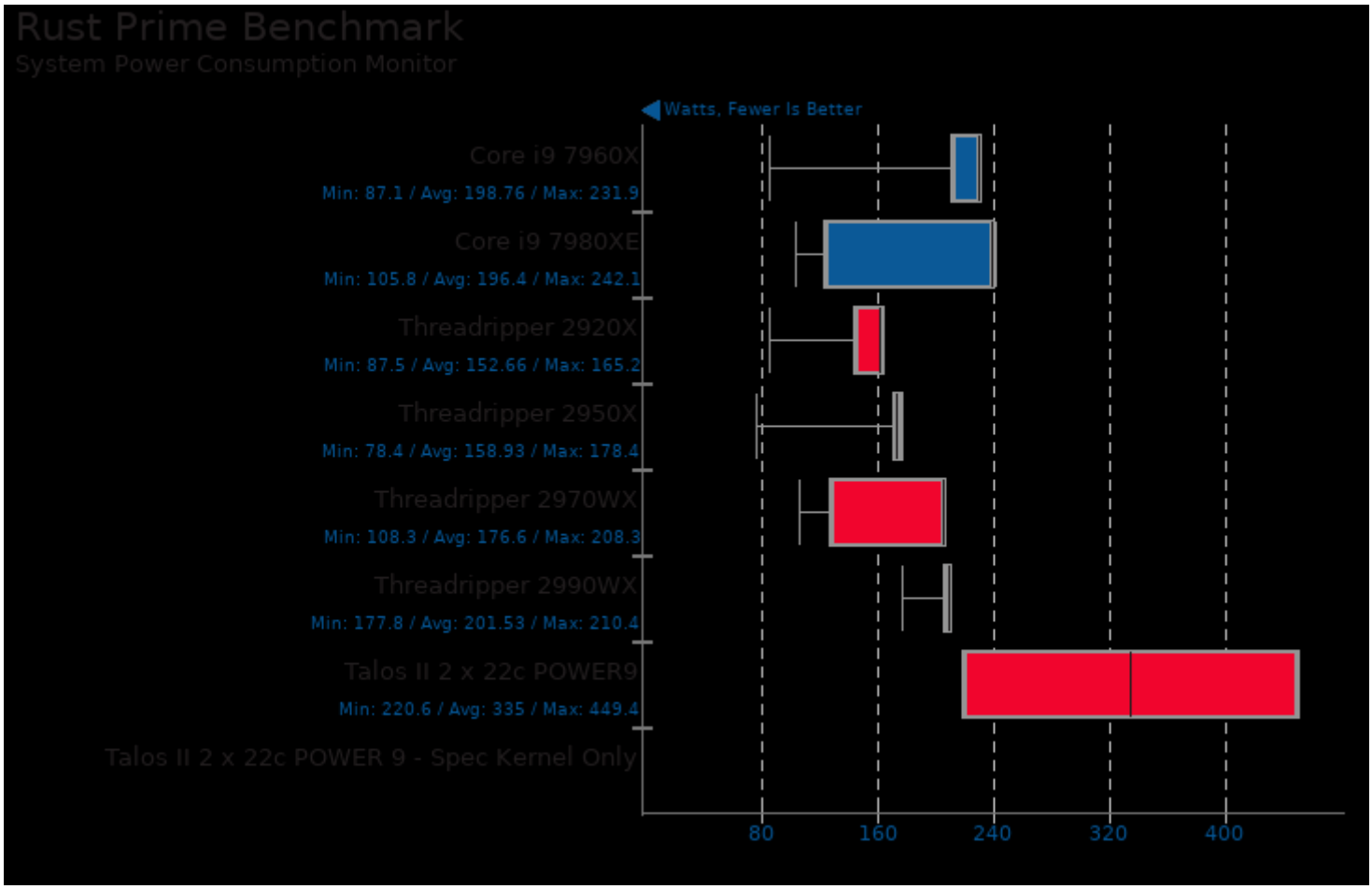

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.03, N = 3
-march=native
51.28
Core i9 7960X
SE +/- 0.01, N = 3
-march=native
35.71
Core i9 7980XE
SE +/- 0.02, N = 3
-march=native
33.51
Threadripper 2920X
SE +/- 0.16, N = 3
-march=native
41.30
Threadripper 2950X
SE +/- 0.02, N = 3
-march=native
33.08
Threadripper 2970WX
SE +/- 0.27, N = 3
-march=native
23.12
Threadripper 2990WX
SE +/- 0.02, N = 3
-march=native
17.97
Talos II 2 x 22c POWER9
SE +/- 0.06, N = 3
-mtune=power9
-mcpu=power9
19.14
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.14, N = 3
-mtune=power9
-mcpu=power9
19.09
2x6386 32G ECC
SE +/- 0.01, N = 3
76.95
test
SE +/- 0.04, N = 3
77.01
RCS6386
SE +/- 0.01, N = 3
76.99
20
40
60
80
100
1. (CC) gcc options: -lm -lpthread -O3

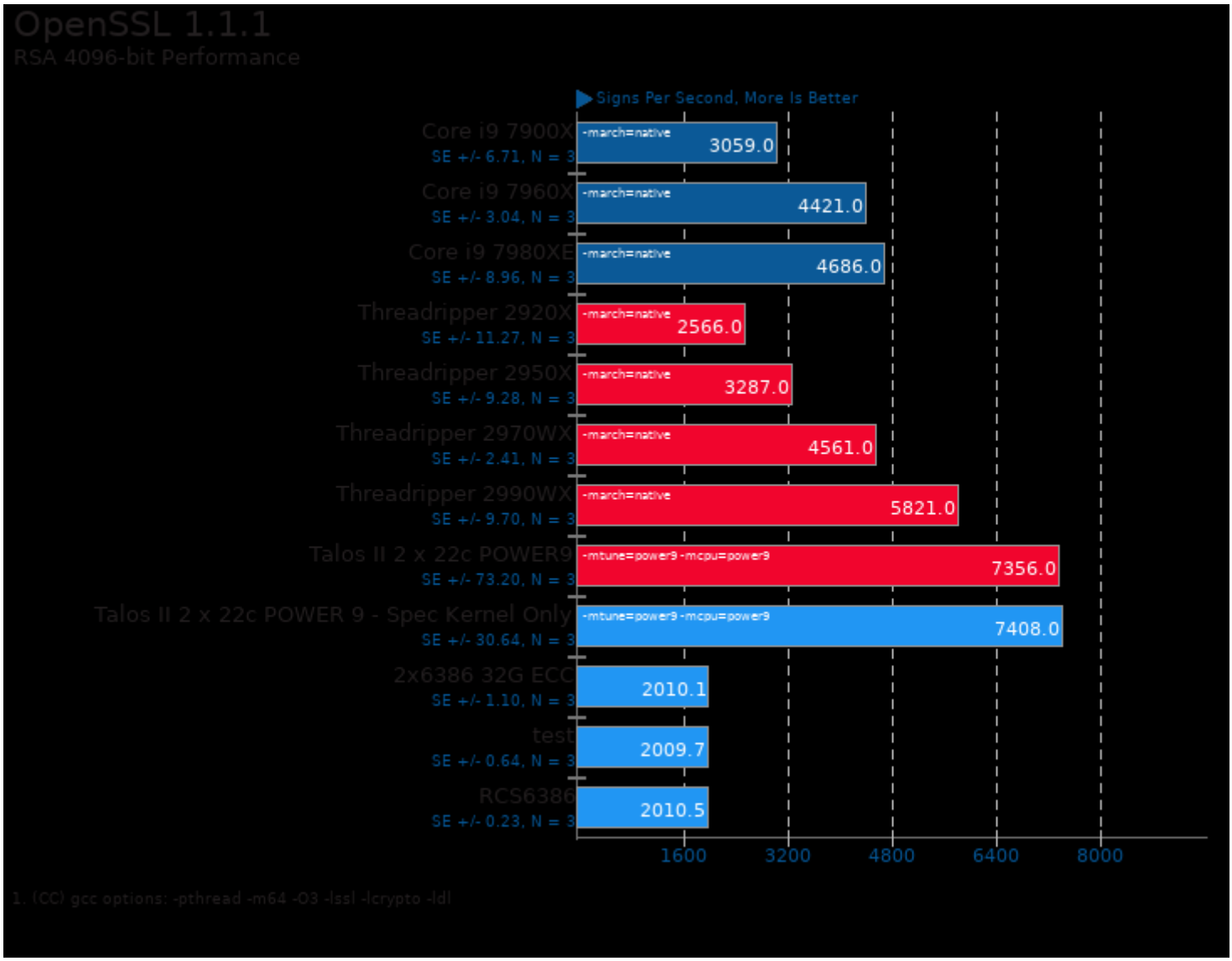

C-Ray 1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 89.6 / Avg: 260.75 / Max: 271.5
Core i9 7980XE
Min: 107.6 / Avg: 281.58 / Max: 296.9
Threadripper 2920X
Min: 139.7 / Avg: 215.79 / Max: 236.5
Threadripper 2950X
Min: 82.8 / Avg: 224.51 / Max: 253.5
Threadripper 2970WX
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

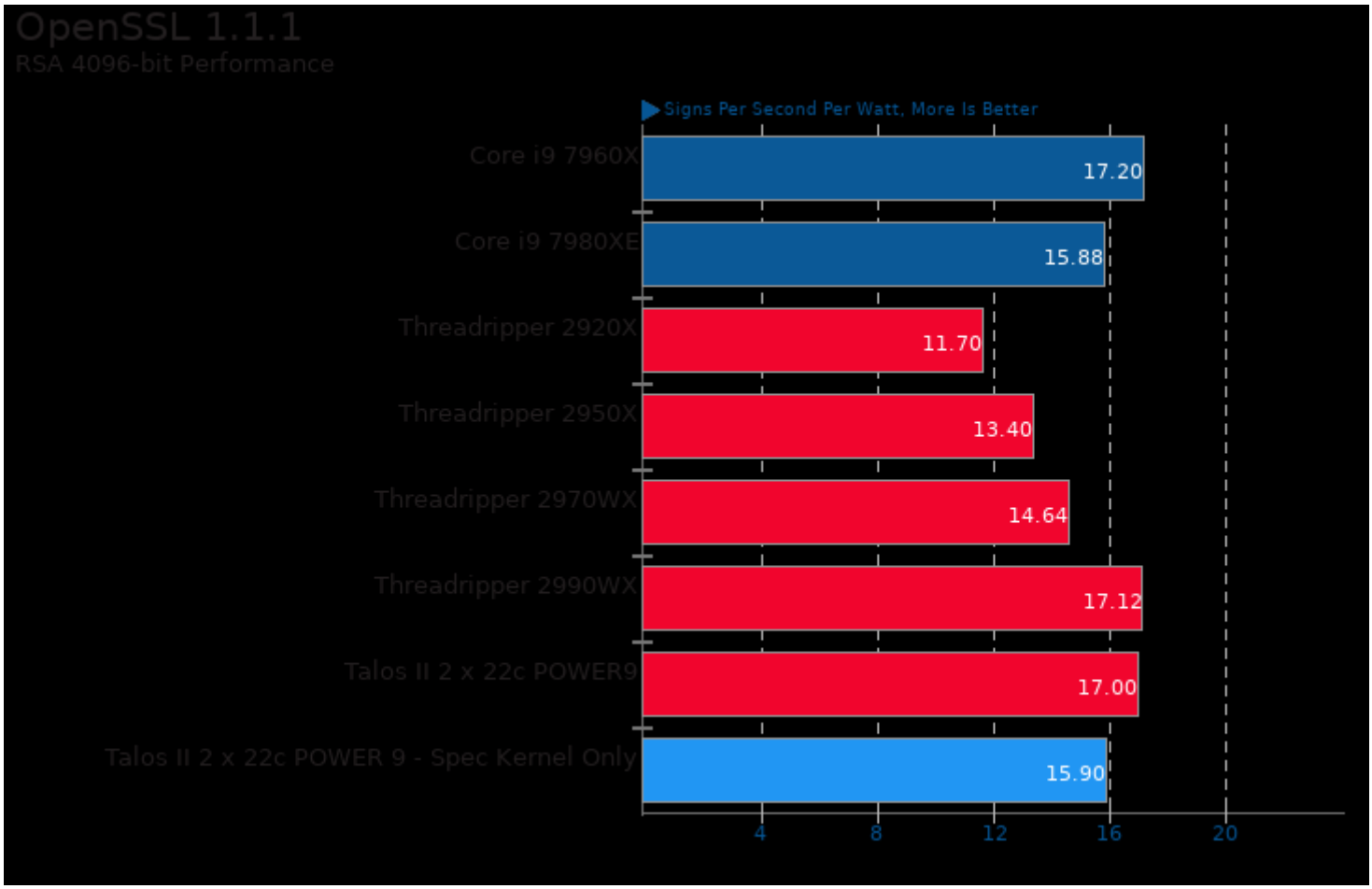

POV-Ray 3.7.0.7
Trace Time
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.04, N = 3
-march=native -ISDL -IXpm -ISM -lICE -lX11 -llimlmf -llmath -lHalf -llex -llexMath -llmThread -lpthread
44.22
Core i9 7960X
SE +/- 0.03, N = 3
30.72
Core i9 7980XE
SE +/- 0.05, N = 3
28.29
Threadripper 2920X
SE +/- 0.13, 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
-mtune=power9 -mcpu=power9
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
-march=native -ISDL -ISM -lICE -lX11
49.39
test
SE +/- 0.08, N = 3
49.54
RCS6386
SE +/- 0.09, N = 3
49.28
11
22
33
44
55
1. (CXX) g++ options: -pipe -O3 -ffast-math -pthread -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system

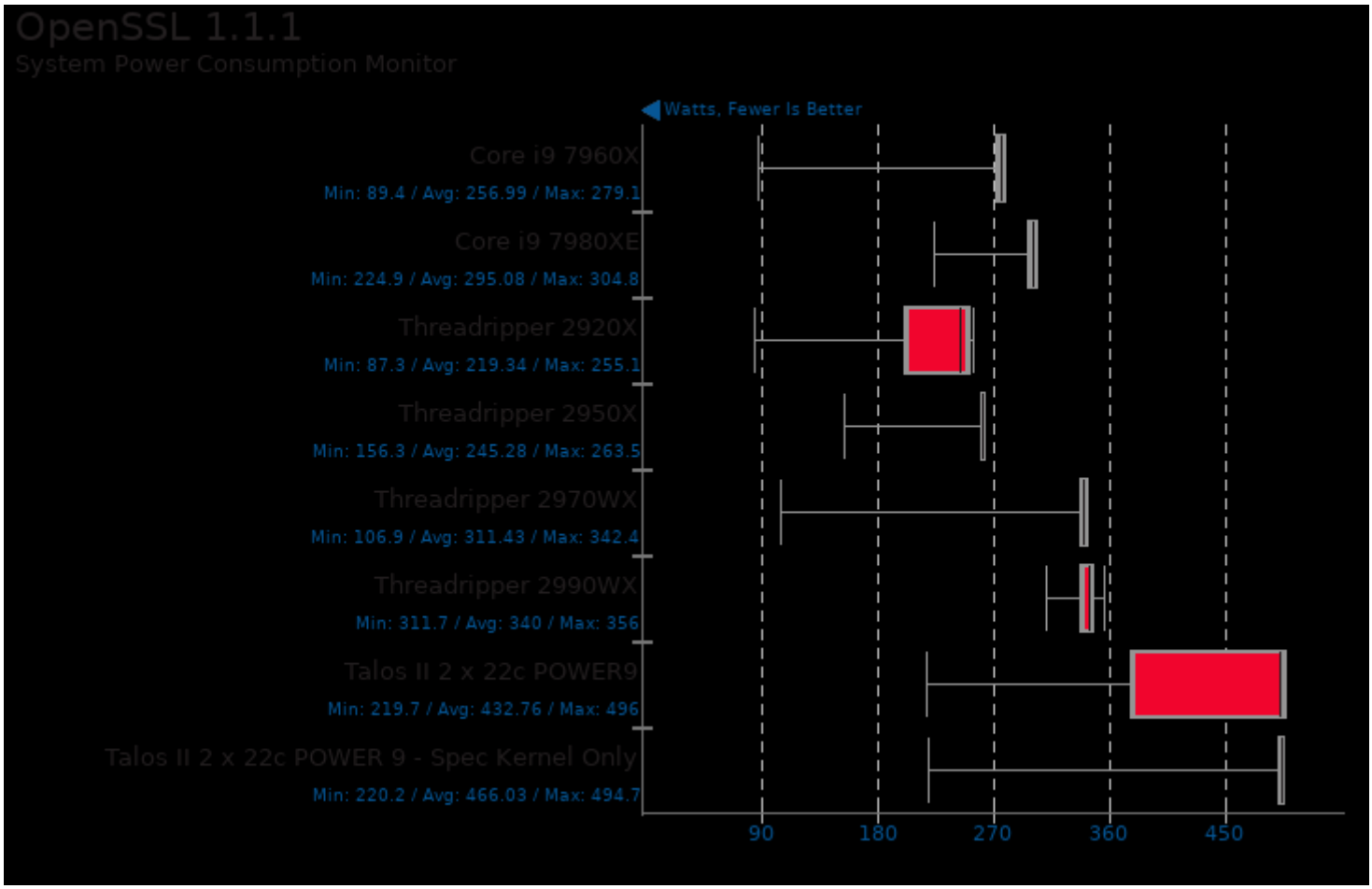

POV-Ray 3.7.0.7
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 88.4 / Avg: 261.13 / Max: 284.5
Core i9 7980XE
Min: 107.6 / Avg: 283.31 / Max: 330.6
Threadripper 2920X
Min: 87 / Avg: 215.02 / Max: 258.5
Threadripper 2950X
Min: 174 / Avg: 249.83 / Max: 259.9
Threadripper 2970WX
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

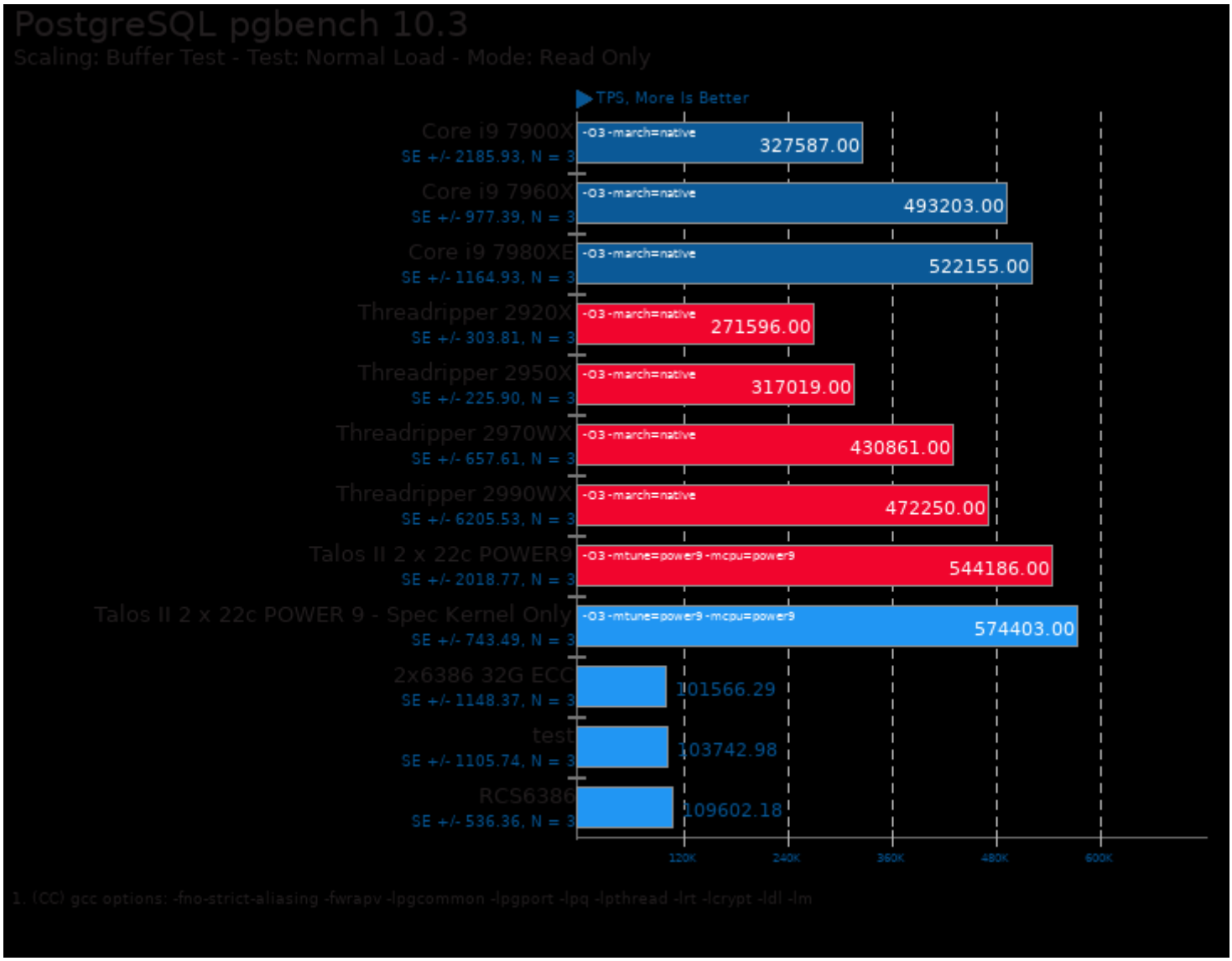

Rust Prime Benchmark
Prime Number Test To 200,000,000
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.002, N = 3
11.550
Core i9 7960X
SE +/- 0.004, N = 3
6.710
Core i9 7980XE
SE +/- 0.007, N = 3
8.180
Threadripper 2920X
SE +/- 0.005, N = 3
30.140
Threadripper 2950X
SE +/- 0.013, N = 3
21.210
Threadripper 2970WX
SE +/- 0.024, N = 3
17.640
Threadripper 2990WX
SE +/- 0.007, N = 3
12.490
Talos II 2 x 22c POWER9
SE +/- 0.251, N = 3
3.640
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 0.098, N = 3
3.540
2x6386 32G ECC
SE +/- 0.003, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.403
test
SE +/- 0.008, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.428
RCS6386
SE +/- 0.064, N = 3
-ldl -lrt -lpthread -lgcc_s -lc -lm -lutil
16.476
7
14
21
28
35
1. (CC) gcc options: -m64 -pie -nodefaultlibs

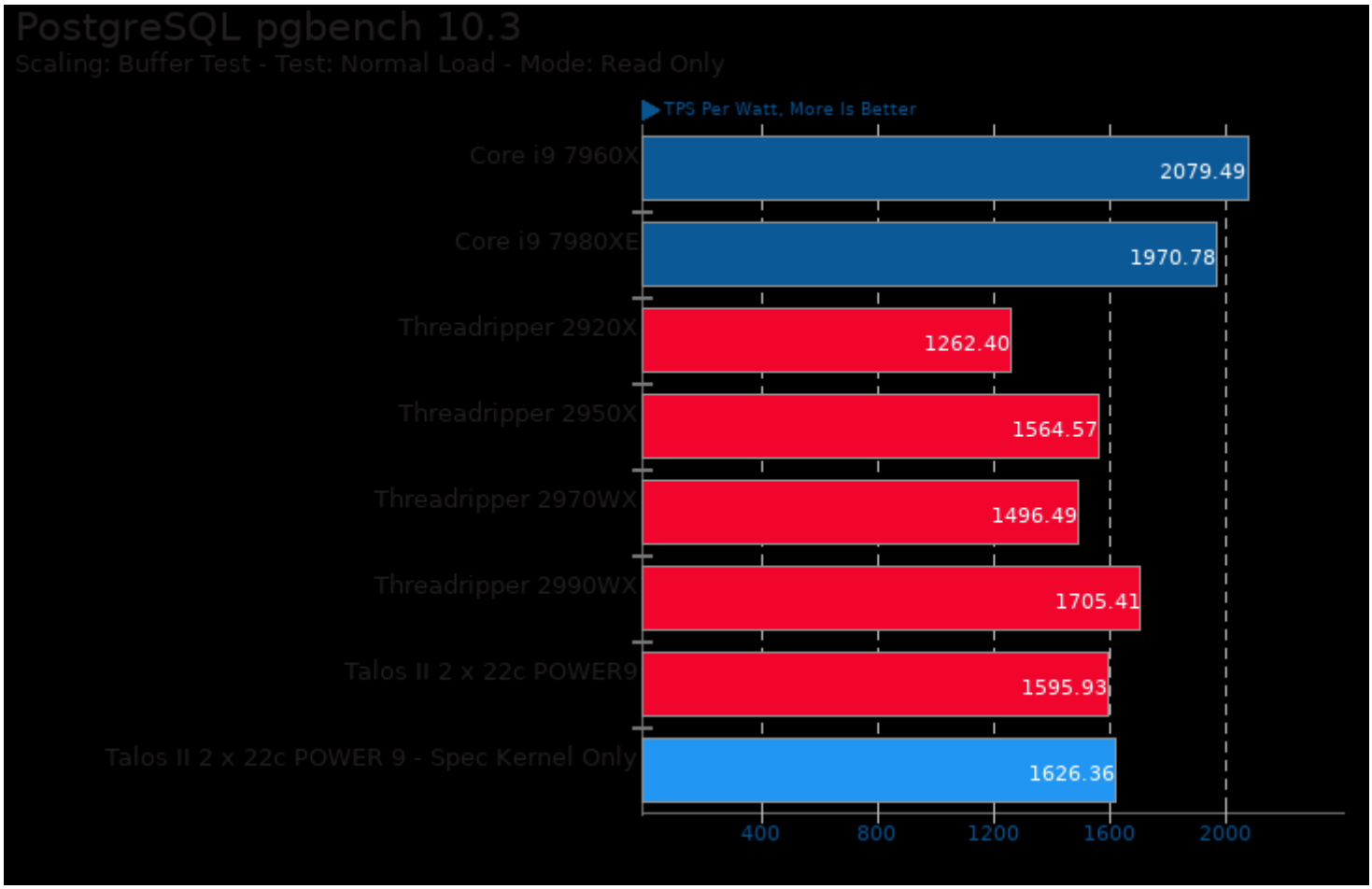

Rust Prime Benchmark
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 87.1 / Avg: 198.76 / Max: 231.9
Core i9 7980XE
Min: 105.8 / Avg: 196.4 / Max: 242.1
Threadripper 2920X
Min: 87.5 / Avg: 152.66 / Max: 165.2
Threadripper 2950X
Min: 78.4 / Avg: 158.93 / Max: 178.4
Threadripper 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

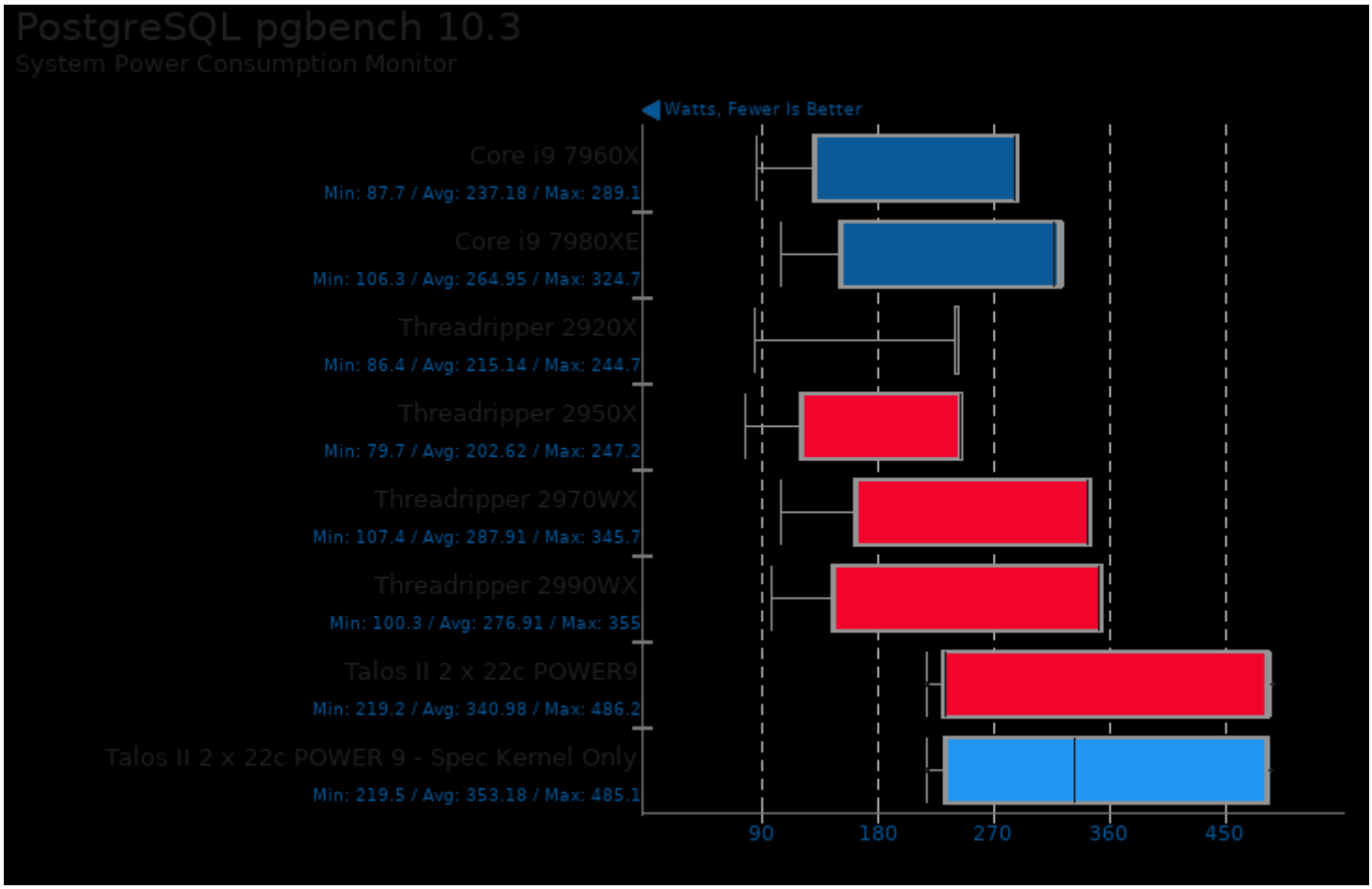

OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second, More Is Better
Core i9 7900X
SE +/- 6.71, N = 3
-march=native
3059.0
Core i9 7960X
SE +/- 3.04, N = 3
-march=native
4421.0
Core i9 7980XE
SE +/- 8.96, N = 3
-march=native
4686.0
Threadripper 2920X
SE +/- 11.27, N = 3
-march=native
2566.0
Threadripper 2950X
SE +/- 9.28, N = 3
-march=native
3287.0
Threadripper 2970WX
SE +/- 2.41, N = 3
-march=native
4561.0
Threadripper 2990WX
SE +/- 9.70, N = 3
-march=native
5821.0
Talos II 2 x 22c POWER9
SE +/- 73.20, N = 3
-mtune=power9 -mcpu=power9
7356.0
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 30.64, N = 3
-mtune=power9 -mcpu=power9
7408.0
2x6386 32G ECC
SE +/- 1.10, N = 3
2010.1
test
SE +/- 0.64, N = 3
2009.7
RCS6386
SE +/- 0.23, N = 3
2010.5
1600
3200
4800
6400
8000
1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl

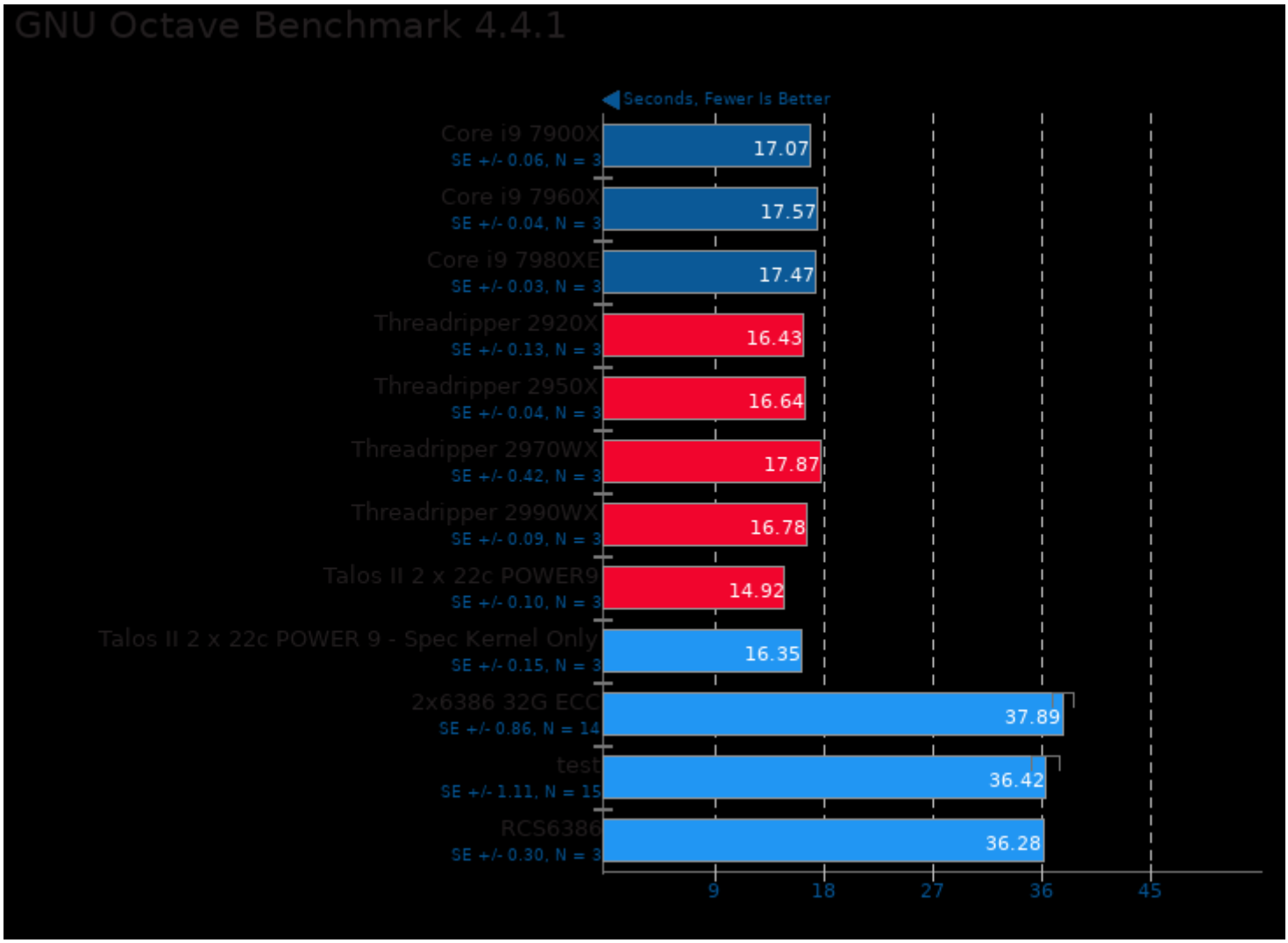

OpenSSL 1.1.1
RSA 4096-bit Performance
Signs Per Second Per Watt, More Is Better
Core i9 7960X
17.20
Core i9 7980XE
15.88
Threadripper 2920X
11.70
Threadripper 2950X
13.40
Threadripper 2970WX
14.64
Threadripper 2990WX
17.12
Talos II 2 x 22c POWER9
17.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
15.90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

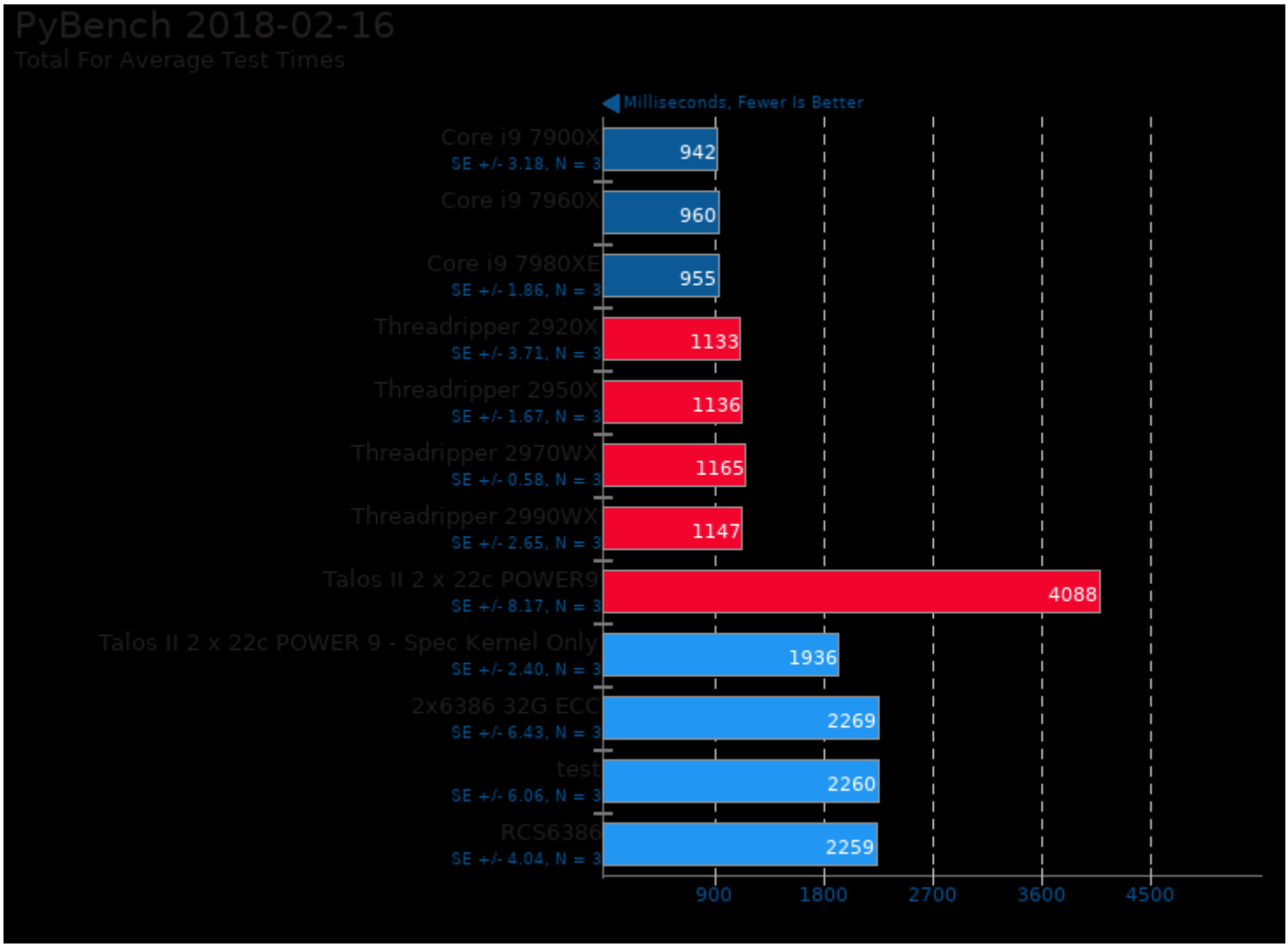

OpenSSL 1.1.1
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 89.4 / Avg: 256.99 / Max: 279.1
Core i9 7980XE
Min: 224.9 / Avg: 295.08 / Max: 304.8
Threadripper 2920X
Min: 87.3 / Avg: 219.34 / Max: 255.1
Threadripper 2950X
Min: 156.3 / Avg: 245.28 / Max: 263.5
Threadripper 2970WX
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

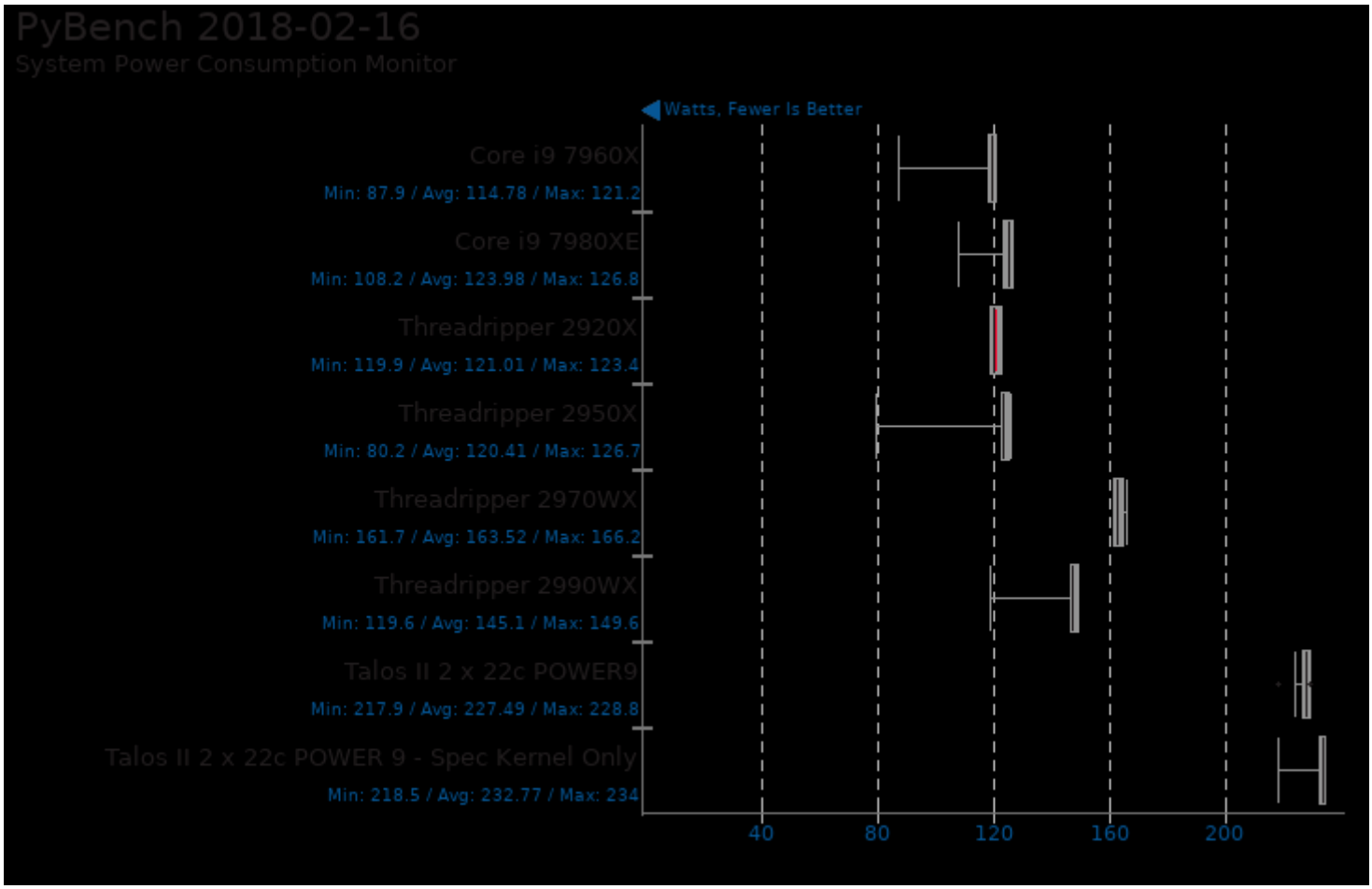

PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
Core i9 7900X
SE +/- 2185.93, N = 3
-O3 -march=native
327587.00
Core i9 7960X
SE +/- 977.39, N = 3
-O3 -march=native
493203.00
Core i9 7980XE
SE +/- 1164.93, N = 3
-O3 -march=native
522155.00
Threadripper 2920X
SE +/- 303.81, N = 3
-O3 -march=native
271596.00
Threadripper 2950X
SE +/- 225.90, N = 3
-O3 -march=native
317019.00
Threadripper 2970WX
SE +/- 657.61, N = 3
-O3 -march=native
430861.00
Threadripper 2990WX
SE +/- 6205.53, N = 3
-O3 -march=native
472250.00
Talos II 2 x 22c POWER9
SE +/- 2018.77, N = 3
-O3 -mtune=power9 -mcpu=power9
544186.00
Talos II 2 x 22c POWER 9 - Spec Kernel Only
SE +/- 743.49, N = 3
-O3 -mtune=power9 -mcpu=power9
574403.00
2x6386 32G ECC
SE +/- 1148.37, N = 3
101566.29
test
SE +/- 1105.74, N = 3
103742.98
RCS6386
SE +/- 536.36, N = 3
109602.18
120K
240K
360K
480K
600K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

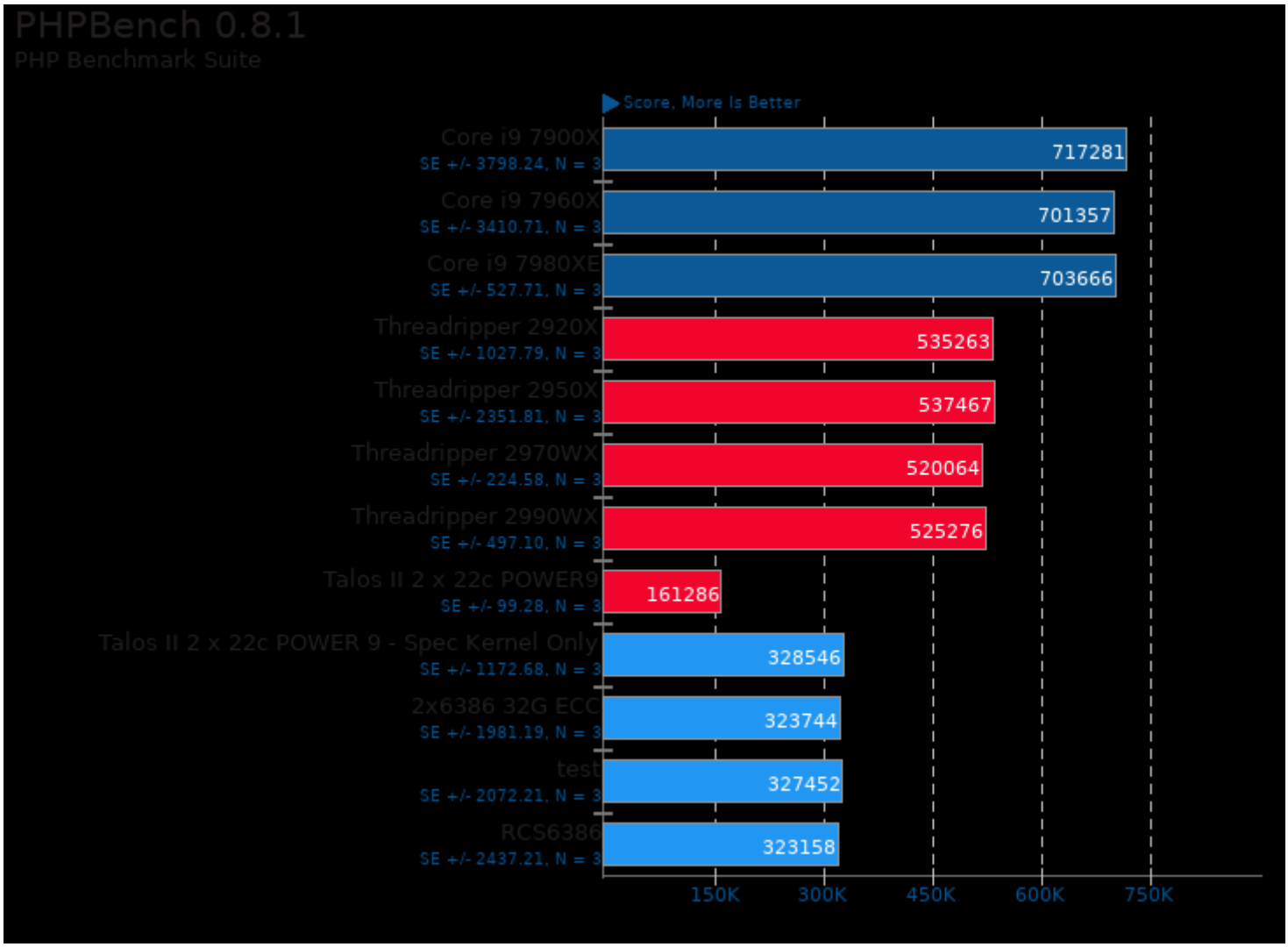

PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS Per Watt, More Is Better
Core i9 7960X
2079.49
Core i9 7980XE
1970.78
Threadripper 2920X
1262.40
Threadripper 2950X
1564.57
Threadripper 2970WX
1496.49
Threadripper 2990WX
1705.41
Talos II 2 x 22c POWER9
1595.93
Talos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

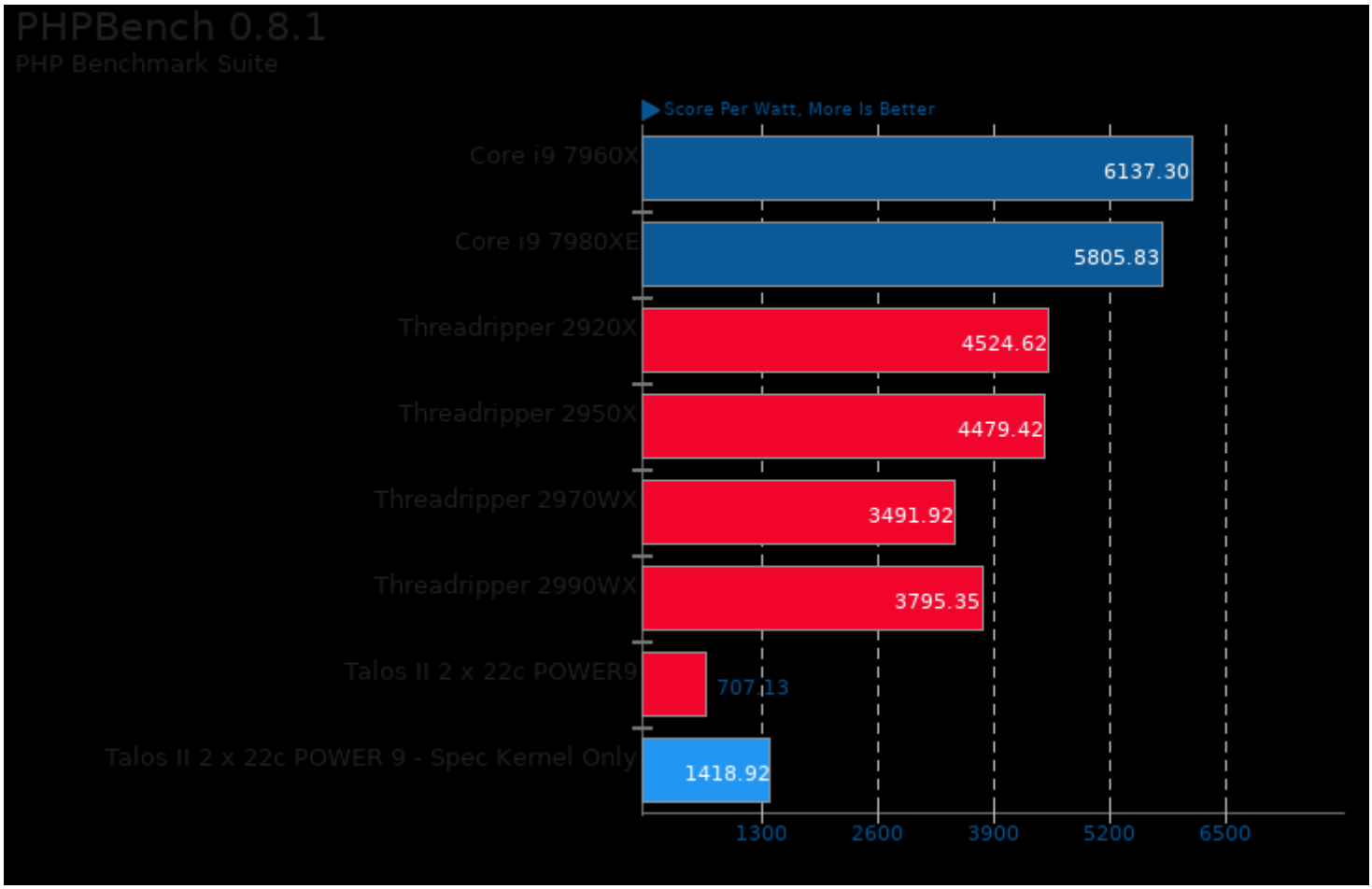

PostgreSQL pgbench 10.3
System Power Consumption Monitor
Watts, Fewer Is Better
Core i9 7960X
Min: 87.7 / Avg: 237.18 / Max: 289.1
Core i9 7980XE
Min: 106.3 / Avg: 264.95 / Max: 324.7
Threadripper 2920X
Min: 86.4 / Avg: 215.14 / Max: 244.7
Threadripper 2950X
Min: 79.7 / Avg: 202.62 / Max: 247.2
Threadripper 2970WX
Min: 107.4 / Avg: 287.91 / Max: 345.7
Threadripper 2990WX
Min: 100.3 / Avg: 276.91 / Max: 355
Talos II 2 x 22c POWER9
Min: 219.2 / Avg: 340.98 / Max: 486.2
Talos II 2 x 22c POWER 9 - Spec Kernel Only
Min: 219.5 / Avg: 353.18 / Max: 485.1
90
180
270
360
450

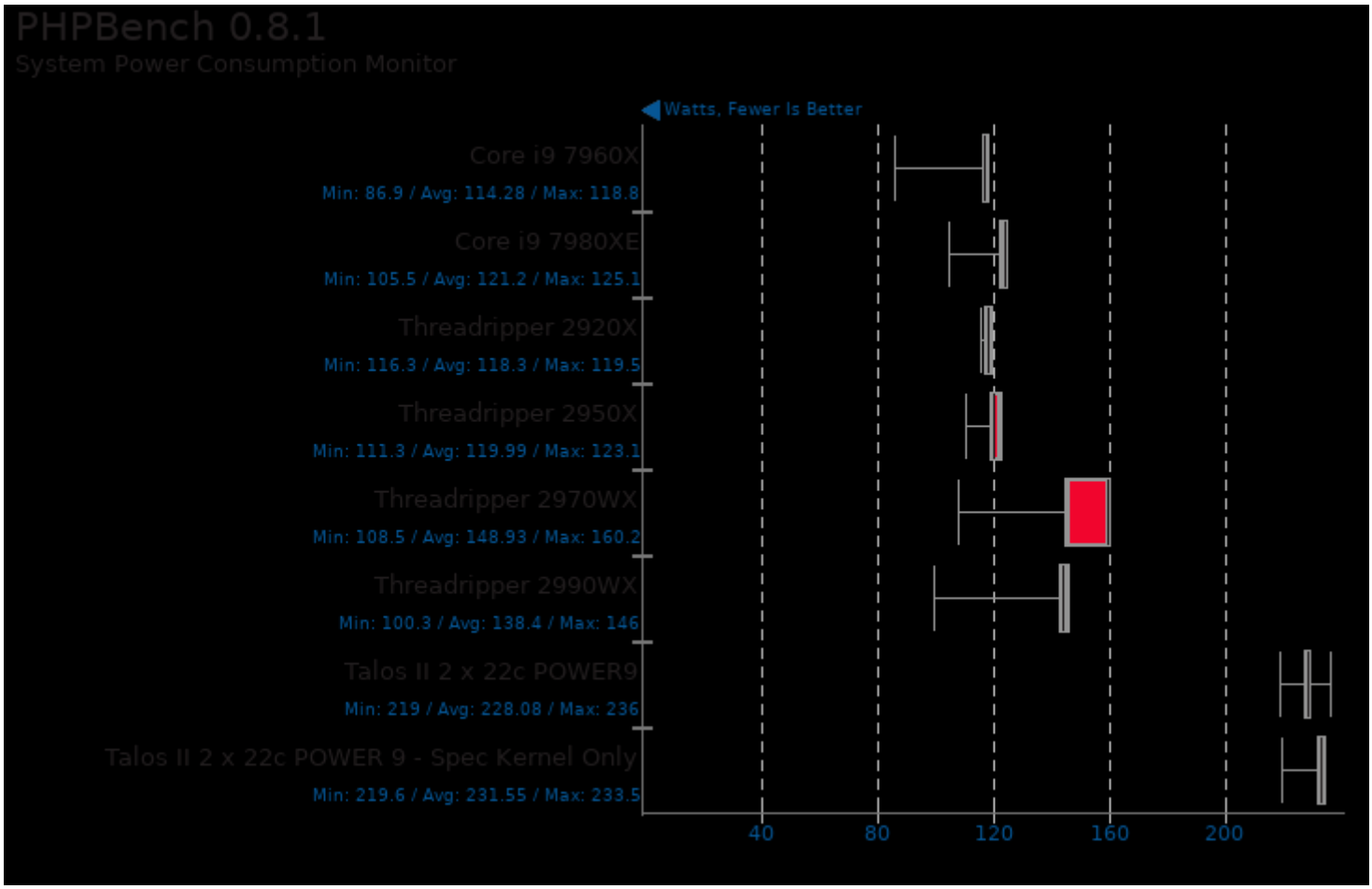

GNU Octave Benchmark 4.4.1
Seconds, Fewer Is Better
Core i9 7900X
SE +/- 0.06, N = 3
17.07
Core i9 7960X
SE +/- 0.04, N = 3
17.57
Core i9 7980XE
SE +/- 0.03, N = 3
17.47
Threadripper 2920X
SE +/- 0.13, N = 3
16.43
Threadripper 2950X
SE +/- 0.04, N = 3
16.64
Threadripper 2970WX
SE +/- 0.42, N = 3
17.87
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

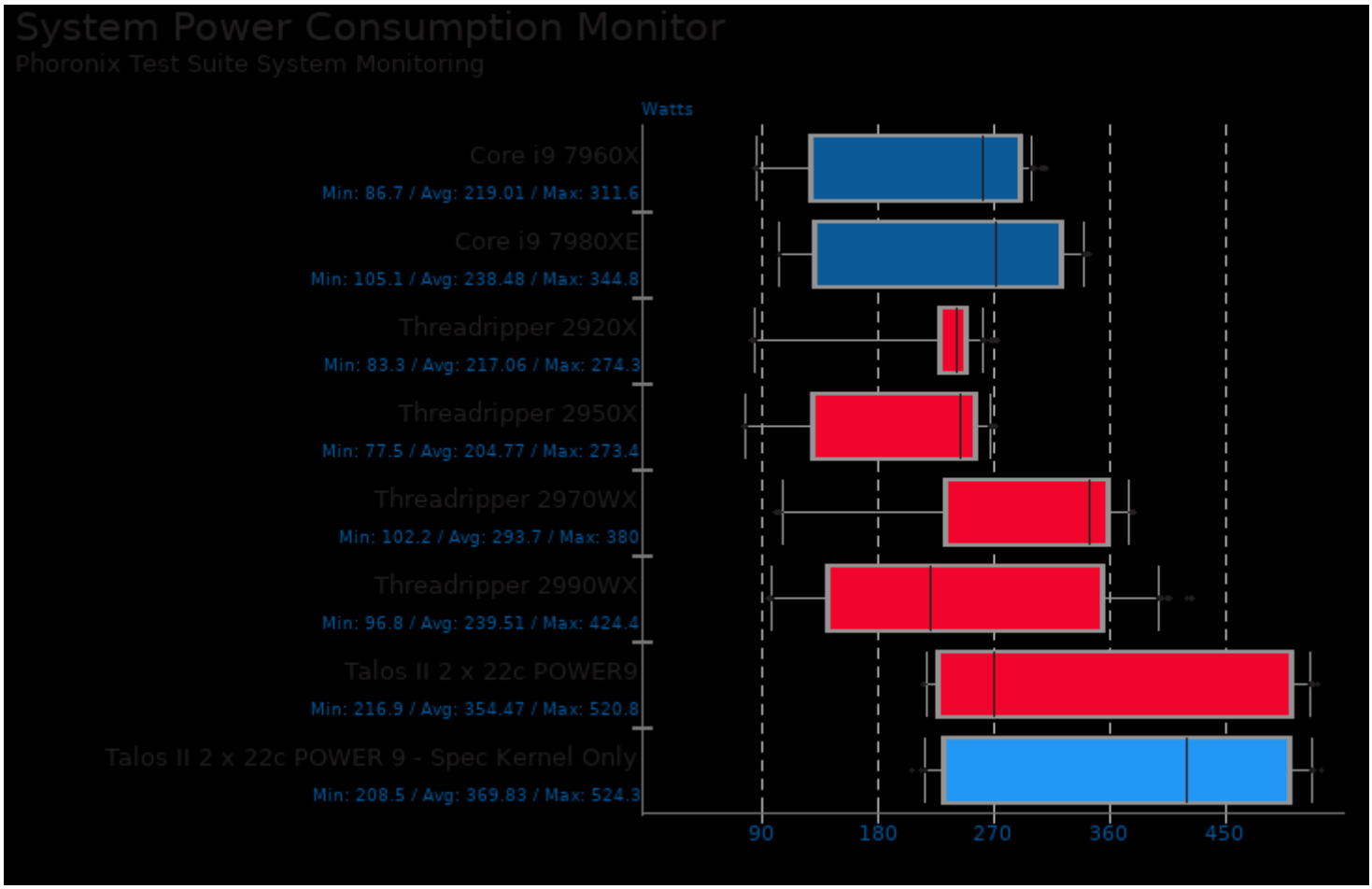

PyBench 2018-02-16
Total For Average Test Times
Milliseconds, Fewer Is Better
Core i9 7900X
SE +/- 3.18, N = 3
942
Core i9 7960X
960
Core i9 7980XE
SE +/- 1.86, N = 3
955
Threadripper 2920X
SE +/- 3.71, N = 3
1133
Threadripper 2950X
SE +/- 1.67, N = 3
1136
Threadripper 2970WX
SE +/- 0.58, N = 3
1165
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
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


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



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