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Various ARM Linux Benchmarks - Spetember 2018

ARM Workstation vs SBC

Automated Executive Summary

ClearFog-ITX came in first place for 90% of the tests.

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

Scikit-Learn at 76.705x
FLAC Audio Encoding (Performance / Cost - WAV To FLAC) at 67.581x
LAME MP3 Encoding (Performance / Cost - WAV To MP3) at 58.92x
Perl Benchmarks (Performance / Cost - Test: Pod2html) at 47.771x
PyBench (Performance / Cost - Total For Average Test Times) at 44.21x
AOBench (Performance / Cost - Size: 2048 x 2048 - Total Time) at 43.975x
Scikit-Learn (Performance / Cost -) at 40.034x
Hierarchical INTegration (Performance / Cost - Test: FLOAT) at 39.599x
C-Ray (Total Time - 4K, 16 Rays Per Pixel) at 38.043x
Git (Performance / Cost - Time To Complete Common Git Commands) at 37.559x.

Test Systems:

ALL-H3-CC H2+

Processor: ARMv7 rev 5 @ 0.91GHz (4 Cores), Motherboard: Allwinner sun8i Family Libre Board ALL-H3-CC H3, Memory: 493MB, Disk: 32GB SC32G, Monitor: VE228

OS: Ubuntu 18.04, Kernel: 4.14.65-sunxi (armv7l), Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --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-multilib --enable-multilib --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv7-a --with-as=/usr/bin/arm-linux-gnueabihf-as --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-gcc-major-version-only --with-ld=/usr/bin/arm-linux-gnueabihf-ld --with-mode=thumb --with-target-system-zlib -v
Processor Notes: Scaling Governor: cpufreq-dt ondemand
Python Notes: Python 2.7.15rc1 + Python 3.6.5

ALL-H3-CC H3

Processor: ARMv7 rev 5 @ 0.91GHz (4 Cores), Motherboard: Allwinner sun8i Family Libre Board ALL-H3-CC H3, Memory: 1024MB, Disk: 32GB GB1QT

OS: Ubuntu 18.04, Kernel: 4.14.65-sunxi (armv7l), Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-libitm --disable-libquadmath --disable-libquadmath-support --disable-sjlj-exceptions --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-multilib --enable-multilib --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch=armv7-a --with-as=/usr/bin/arm-linux-gnueabihf-as --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-gcc-major-version-only --with-ld=/usr/bin/arm-linux-gnueabihf-ld --with-mode=thumb --with-target-system-zlib -v
Processor Notes: Scaling Governor: cpufreq-dt ondemand
Python Notes: Python 2.7.15rc1 + Python 3.6.5

ALL-H3-CC H5

Processor: ARMVv8 Cortex-A53 (4 Cores), Motherboard: Libre Board ALL-H3-CC H5, Memory: 2048MB, Disk: 32GB GB1QT

OS: Raspbian 9.4, Kernel: 4.18.0-rc3-gfc36def997cf-dirty (aarch64), Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Python Notes: Python 2.7.13 + Python 3.5.3

AML-S905X-CC Le Potato

Processor: Unknown @ 1.51GHz (4 Cores), Motherboard: Libre Board AML-S905X-CC, Memory: 2048MB, Disk: 32GB SC32G, Monitor: Acer P243W

OS: Raspbian 9.4, Kernel: 4.14.53-00653-gc01abe8ba6bc (aarch64), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Processor Notes: Scaling Governor: arm-big-little ondemand
Python Notes: Python 2.7.13 + Python 3.5.3

Banana Pi M3

Processor: ARMv7 rev 5 @ 1.80GHz (8 Cores), Motherboard: sun8i, Memory: 2048MB, Disk: 32GB SC32G + 8GB M8G1GC, Graphics: PowerVR

OS: Raspbian 8.0, Kernel: 3.4.39-BPI-M3-Kernel (armv7l), Desktop: LXDE, Display Server: X Server 1.18.4, Compiler: GCC 4.9.2, File-System: ext4, Screen Resolution: 1280x720

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-float=hard --with-fpu=vfp -v
Processor Notes: Scaling Governor: sunxi-iks ondemand
Python Notes: Python 2.7.9 + Python 3.4.2

Firefly ROC-RK3328-CC

Processor: Rockchip @ 1.39GHz (4 Cores), Motherboard: Firefly ROC-RK3328-CC, Memory: 2048MB, Disk: 32GB GB1QT, Monitor: Acer P243W

OS: Ubuntu 18.04, Kernel: 4.4.114 (aarch64), Desktop: LXDE, Display Server: X Server 1.18.4, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1080p60

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-as=/usr/bin/aarch64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/aarch64-linux-gnu-ld -v
Processor Notes: Scaling Governor: cpufreq-dt performance
Python Notes: Python 2.7.15rc1 + Python 3.6.5

Jetson TX1

Processor: ARMv8 rev 1 @ 1.73GHz (4 Cores), Motherboard: jetson_tx1, Memory: 4096MB, Disk: 16GB 016G32, Graphics: NVIDIA TEGRA

OS: Ubuntu 16.04, Kernel: 4.4.38-tegra (aarch64), Desktop: Unity 7.4.5, Display Server: X Server 1.18.4, Display Driver: NVIDIA 1.0.0, Vulkan: 1.0.8, Compiler: GCC 5.4.0 20160609, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --build=aarch64-linux-gnu --disable-browser-plugin --disable-libquadmath --disable-werror --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --target=aarch64-linux-gnu --with-arch-directory=aarch64 --with-default-libstdcxx-abi=new -v
Processor Notes: Scaling Governor: tegra-cpufreq interactive
Python Notes: Python 2.7.12 + Python 3.5.2

Jetson TX2

Processor: ARMv8 rev 3 @ 2.04GHz (6 Cores), Motherboard: quill, Memory: 8192MB, Disk: 31GB 032G34, Graphics: NVIDIA TEGRA, Monitor: DELL P2415Q

OS: Ubuntu 16.04, Kernel: 4.4.38-tegra (aarch64), Desktop: Unity 7.4.5, Display Server: X Server 1.18.4, Display Driver: NVIDIA 1.0.0, Compiler: GCC 5.4.0 20160609, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=aarch64-linux-gnu --disable-browser-plugin --disable-libquadmath --disable-werror --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --target=aarch64-linux-gnu --with-arch-directory=aarch64 --with-default-libstdcxx-abi=new -v
Processor Notes: Scaling Governor: tegra_cpufreq schedutil
Disk Mount Options Notes: data=ordered,relatime,rw
Python Notes: Python 2.7.12 + Python 3.5.2

ODROID-C1+

Processor: ARMv7 rev 1 @ 1.54GHz (4 Cores), Motherboard: ODROIDC, Memory: 804MB, Disk: 32GB GB1QT, Graphics: ARM Mali

OS: Ubuntu 16.04, Kernel: 3.10.107-190 (armv7l), Display Server: X Server 1.18.4, Compiler: GCC 5.4.0 20160609, File-System: ext4, Screen Resolution: 1920x2160

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --disable-werror --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-multilib --enable-nls --enable-objc-gc --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb -v
Processor Notes: Scaling Governor: meson_cpufreq performance
Python Notes: Python 2.7.12 + Python 3.5.2

ODROID-C2

Processor: Amlogic @ 1.54GHz (4 Cores), Motherboard: ODROID-C2, Memory: 2048MB, Disk: 32GB GB1QT, Graphics: OSD

OS: Ubuntu 18.04, Kernel: 3.16.57-20 (aarch64), Display Server: X Server 1.19.6, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-as=/usr/bin/aarch64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/aarch64-linux-gnu-ld -v
Processor Notes: Scaling Governor: meson_cpufreq performance
Disk Mount Options Notes: errors=remount-ro,noatime,rw
Python Notes: Python 2.7.15rc1 + Python 3.6.5

Pine64 1GB

Processor: AArch64 rev 4 @ 1.15GHz (4 Cores), Motherboard: sun50iw1p1, Memory: 1024MB, Disk: 32GB SC32G

OS: Ubuntu 16.04, Kernel: 3.10.104 (aarch64), Display Server: X Server 1.18.4, Compiler: GCC 5.4.0 20160609, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=aarch64-linux-gnu --disable-browser-plugin --disable-libquadmath --disable-werror --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --target=aarch64-linux-gnu --with-arch-directory=aarch64 --with-default-libstdcxx-abi=new -v
Processor Notes: Scaling Governor: cpufreq-sunxi interactive
Disk Mount Options Notes: data=ordered,noatime,rw,stripe=1024
Python Notes: Python 2.7.12 + Python 3.5.2

Raspberry Pi 2 B

Processor: ARMv7 rev 5 @ 0.90GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 2 Model B Rev 1.1, Memory: 927MB, Disk: 32GB GB2MW, Graphics: BCM2708

OS: Raspbian 9.4, Kernel: 4.14.50-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0

20170516, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Disk Mount Options Notes: data=ordered,noatime,rw
Python Notes: Python 2.7.13 + Python 3.5.3

Raspberry Pi 3 B

Processor: ARMv7 rev 4 @ 1.20GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model B Rev 1.2, Memory: 927MB, Disk: 32GB GB1QT, Graphics: BCM2708

OS: Raspbian 9.4, Kernel: 4.14.62-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 656x416

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Disk Mount Options Notes: data=ordered,noatime,rw
Python Notes: Python 2.7.13 + Python 3.5.3

Raspberry Pi 3 B+

Processor: ARMv7 rev 4 @ 1.40GHz (4 Cores), Motherboard: BCM2835 Raspberry Pi 3 Model B Plus Rev 1.3, Memory: 927MB, Disk: 32GB GB2MW, Graphics: BCM2708

OS: Raspbian 9.4, Kernel: 4.14.62-v7+ (armv7l), Desktop: LXDE, Display Server: X Server 1.19.2, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1920x1200

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv6 --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfp --with-target-system-zlib -v
Processor Notes: Scaling Governor: BCM2835 Freq ondemand
Disk Mount Options Notes: data=ordered,noatime,rw
Python Notes: Python 2.7.13 + Python 3.5.3

Socionext Developerbox

Processor: Unknown (24 Cores), Motherboard: Socionext SynQuacer E- DeveloperBox (build #38 BIOS), Memory: 32768MB, Disk: 8GB M32508 + 1000GB Samsung SSD 970 EVO 1TB, Graphics: ASUS NVIDIA GeForce GT 710B 1024MB, Audio: NVIDIA GK208 HDMI/DP, Monitor: ASUS VG236

OS: Ubuntu 18.04, Kernel: 4.15.0-33-generic (aarch64), Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-as=/usr/bin/aarch64-linux-gnu-as --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-ld=/usr/bin/aarch64-linux-gnu-ld -v
Disk Notes: NONE / data=ordered,errors=remount-ro,relatime,rw
Python Notes: Python 2.7.15rc1 + Python 3.6.5

Tinker Board

Processor: ARMv7 rev 1 @ 1.80GHz (4 Cores), Motherboard: Rockchip (Device Tree), Memory: 2048MB, Disk: 32GB GB1QT, Monitor: Acer P243W

OS: Debian 9.0, Kernel: 4.4.16-00006-g4431f98-dirty (armv7l), Desktop: LXDE, Display Server: X Server 1.18.4, Compiler: GCC 6.3.0 20170516, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=arm-linux-gnueabihf --disable-browser-plugin --disable-libitm --disable-libquadmath --disable-sjlj-exceptions --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-gtk-cairo --enable-java-awt=gtk --enable-java-home --enable-languages=c,ada,c++,java,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=arm-linux-gnueabihf --program-prefix=arm-linux-gnueabihf- --target=arm-linux-gnueabihf --with-arch-directory=arm --with-arch=armv7-a --with-default-libstdcxx-abi=new --with-float=hard --with-fpu=vfpv3-d16 --with-mode=thumb --with-target-system-zlib -v
Processor Notes: Scaling Governor: cpufreq-dt interactive
Disk Mount Options Notes: data=ordered,noatime,rw
Python Notes: Python 2.7.13 + Python 3.5.3

Atomic Pi

Atomic Pi - Stock

Atomic Pi - Performance Governor

Processor: Intel Atom x5-Z8350 @ 1.92GHz (4 Cores), Motherboard: AAEON MF-001 (MFC1AM12 BIOS), Chipset: Intel Atom/Celeron/Pentium, Memory: 2048MB, Disk: 16GB M52516, Graphics: Intel Atom/Celeron/Pentium x5-E8000/J3xxx/N3xxx PCI Configuration Registers (500MHz), Monitor: DELL P2312H, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 18.04, Kernel: 4.15.18-dli (x86_64), Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-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 2.7.15rc1 + Python 3.6.7
Security Notes: KPTI + l1tf: Not affected + meltdown: Mitigation of PTI + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline

ClearFog-ITX

Processor: ARMv8 Cortex-A72 @ 2.00GHz (16 Cores), Motherboard: SolidRun LX2160A COM type 7 module, Memory: 14336MB, Disk: 250GB Samsung SSD 860 + 8GB SL08G + 63GB DF4064

OS: Ubuntu 19.04, Kernel: 4.14.83-dirty (aarch64), Compiler: GCC 8.3.0, File-System: ext4

Compiler Notes: --build=aarch64-linux-gnu --disable-libphobos --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only -v
Processor Notes: Scaling Governor: qoriq_cpufreq performance
Python Notes: Python 2.7.16 + Python 3.7.3

Various ARM Linux Benchmarks - Spetember 2018

Phoronix Test Suite

	ALL-H3-CC H2+	ALL-H3-CC H3	ALL-H3-CC H5	AML-S905X-CC Le Potato	Banana Pi M3	Firefly RO C-RK3328-CC	Jetson TX1	Jetson TX2	ODROID-C1+	ODROID-C2	Pine64 1GB	Raspberry Pi 2 B	Raspberry Pi 3 B	Raspberry Pi 3 B+	Sociox t Developerbox	Tinker Board	Atomic Pi	Atomic Pi - Stock	Atomic Pi - Performance Governo	ClearFog-ITX
TTSIOD 3D Renderer - P.R.W.S.S.M (FPS)	**10.73**	10.83	11.91	20.30			45.05		14.15	23.07	15.73	10.94	15.66	16.82	89.28	27.80		30.40	30.36	**239.50**
Normalized	4.48%	4.52%	4.97%	8.48%			18.81%		5.91%	9.63%	6.57%	4.57%	6.54%	7.02%	37.28%	11.61%		12.69%	12.68%	100%
Standard Deviation	0.2%	0.1%	0.1%	0.1%			0.3%		0.8%	0.1%	0.5%	0.3%	3.2%	0.3%	0.1%	0.1%		0.1%	0.2%	0.2%
TTSIOD 3D Renderer - Performance / Cost - P.R.W.S.S.M (FPS/Dollar)	0.43	0.36	0.30	0.45			0.09		0.29	0.37			0.45	0.42	**0.07**	**0.49**				
Normalized	87.76%	73.47%	61.22%	91.84%			18.37%		59.18%	75.51%			91.84%	85.71%	14.29%	100%				
x264 - Performance / Cost - H.2.V.E (FPS/Dollar)	0.05	0.04				0.04	**0.01**		0.03	0.05			0.06	0.05	**0.01**	**0.08**				
Normalized	62.5%	50%				50%	12.5%		37.5%	62.5%			75%	62.5%	12.5%	100%				
x264 - H.2.V.E (FPS)	1.13	1.14				2.12	5.96		1.46	2.89	2.12	**1.10**	2.03	2.09	12.41	4.42		4.28	4.30	**29.27**
Normalized	3.86%	3.89%				7.24%	20.36%		4.99%	9.87%	7.24%	3.76%	6.94%	7.14%	42.4%	15.1%		14.62%	14.69%	100%
Standard Deviation	0%	0.5%				0.5%	1.7%		0.7%	0.5%	0.3%	0.9%	0.8%	0.3%	0.1%	2%		0.3%	0.1%	1.3%

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Tinymembench - Standard Memcpy (MB/s)	827	912	1339	2095	738	1566	3862	3798	928	1688	1377	956	1297	1288	1543	1502	2627	2772	4877
Normalized	16.96%	18.7%	27.46%	42.96%	15.13%	32.11%	79.19%	77.88%	19.03%	34.61%	28.23%	19.6%	26.59%	26.41%	31.64%	30.8%	53.87%	56.84%	100%
Tinymembench - Standard Memset (MB/s)	2277	2278	2193	5535	1064	7336	10374	13991	2881	3604	3093	1177	1738	1871	7359	4192	2963	2971	14753
Normalized	15.43%	15.44%	14.86%	37.52%	7.21%	49.73%	70.32%	94.31%	19.53%	24.43%	20.97%	7.98%	11.78%	12.68%	49.88%	28.41%	20.08%	20.14%	100%
Tinymembench - Performance / Cost - Standard Memcpy (MB/s/Dollar)	33.08	30.40	33.48	46.56		31.32	8.10	6.91	18.94	26.81			37.07	32.38	1.29	26.42			
Normalized	71.05%	65.29%	71.91%	100%		67.27%	17.4%	14.84%	40.68%	57.58%			79.62%	69.54%	2.77%	56.74%			
7-Zip Compression - C.S.T (MIPS)	1162	1197	1301	2209	2654	1951	4526	5650	1477	2198		1125	1863	1796	9368	3472	3562	3584	23079
Normalized	5.03%	5.19%	5.64%	9.57%	11.5%	8.45%	19.61%	24.48%	6.4%	9.52%		4.87%	8.07%	7.78%	40.59%	15.04%	15.43%	15.53%	100%
Standard Deviation	0.2%		0.2%	0.3%	4.9%	0.1%	1.1%	0.4%	1.6%	1.4%		1.4%	0.4%	1.6%	1.1%	1.8%	0.3%	0.3%	0.4%
7-Zip Compression - Performance / Cost - C.S.T (MIPS/Dollar)	46.48	39.90	32.53	49.09		39.02	9.49	10.27	30.14	34.92			53.24	45.15	7.81	61.07			
Normalized	76.11%	65.33%	53.27%	80.38%		63.89%	15.54%	16.82%	49.35%	57.18%			87.18%	73.93%	12.79%	100%			

Various ARM Linux Benchmarks - Spetember 2018

Hierarchical INTegration - FLOAT (QUIPs)	346 378 80	346 403 33	340 037 20	591 213 88	679 353 71	611 296 12	883 813 13	103 988 087	557 298 81	676 732 61	501 852 04	359 526 60	500 091 35	579 571 93	441 503 76	807 553 25		737 558 54	737 360 27	141 488 654
Normalized	24.48%	24.48%	24.03%	41.79%	48.01%	43.2%	62.47%	73.5%	39.39%	47.83%	35.47%	25.41%	35.34%	40.96%	31.2%	57.08%		52.13%	52.11%	100%
Standard Deviation	0%	0%	0.1%	0%	0.3%	0.1%	0.9%	0.3%	1.1%	0%	0.1%	0.5%	0.3%	0.8%	0%	0%		0.1%	0.1%	0%
Hierarchical INTegration - Performance / Cost - FLOAT (QUIPs/Dollar)	138 551 5	115 467 8	850 093	131 380 9		122 259 2	185 290	189 073	113 734 5	107 503 2			142 924 1	145 694 3	367 92	142 049 8				
Normalized	95.1%	79.25%	58.35%	90.18%		83.91%	12.72%	12.98%	78.06%	73.79%			98.1%	100%	2.53%	97.5%				
Redis - GET (Reqs/sec			547 79	102 953	124 215	265 608	484 688	660 813	167 346	271 547	255 546	113 111	213 067	240 761	235 721	326 351		355 202	316 114	900 307
Normalized			6.08%	11.44%	13.8%	29.5%	53.84%	73.4%	18.59%	30.16%	28.38%	12.56%	23.67%	26.74%	26.18%	36.25%		39.45%	35.11%	100%
Standard Deviation			1.1%	0.4%	2.6%	3.3%	1%	0.7%	4.1%	0.5%	2.4%	2.9%	1%	0.8%	1.9%	2.4%		0.4%	2.7%	2.8%
Redis - SET (Reqs/sec			379 27	715 25	798 81	189 623	333 535	432 278	100 561	194 581	159 810	672 10	131 764	150 337	160 053	218 747		251 827	250 331	600 831
Normalized			6.31%	11.9%	13.3%	31.56%	55.51%	71.95%	16.74%	32.39%	26.6%	11.19%	21.93%	25.02%	26.64%	36.41%		41.91%	41.66%	100%
Standard Deviation			1.4%	1%	2.3%	0.3%	2%	0.2%	3.4%	2%	1.2%	1.9%	1.2%	0.8%	0.4%	2.2%		0.3%	1.5%	6%
Redis - Performance / Cost - GET (Reqs/sec/Dollar)			136 9	228 8		531 2	101 6	120 2	341 5	431 4			608 9	605 2	196. 43	574 1				
Normalized			22.49%	37.57%		87.24%	16.69%	19.73%	56.08%	70.84%			100%	99.39%	3.23%	94.27%				

Various ARM Linux Benchmarks - Spetember 2018

Redis - Performance / Cost - SET (Reqs/sec/Dollar)			948.18	1589		3792	699.25	785.97	2052	3091			3766	3779	133.38	3848			
Normalized			24.64%	41.31%		98.56%	18.17%	20.43%	53.34%	80.33%			97.87%	98.22%	3.47%	100%			
PHPBench - P.B.S (Score)	26622	26642	21324	37855	18202	53802	11197	13317	34052	59176	36988	20836	34420	40165	38922	66398	10374	10537	15690
Normalized	16.99%	17%	13.61%	24.16%	11.62%	34.34%	71.47%	84.99%	21.73%	37.77%	23.61%	13.3%	21.97%	25.63%	24.84%	42.38%	65.97%	66.08%	100%
Standard Deviation	0.2%	0.2%	0.1%	0.2%	0.8%	0.8%	1.7%	1.1%	0.4%	0.8%	0.1%	1.2%	0.3%	0.3%	0.1%	0.6%	0.1%	0%	1.4%
PHPBench - Performance / Cost - P.B.S (Score/Dollar)	1065	888.07	533.10	841.22		1076	234.76	242.14	694.94	940.05			983.71	1010	32.44	1168			
Normalized	91.18%	76.04%	45.64%	72.03%		92.13%	20.1%	20.73%	59.5%	80.49%			84.23%	86.45%	2.78%	100%			
PostgreSQL pgbench - Performance / Cost - Buffer Test - Normal Load - Read Only (TPS/Dolla				122.27		59.54	33.71	26.23	106.10	96.25			189.77	164.05	26.26	234.11			
Normalized				52.23%		25.43%	14.4%	11.2%	45.32%	41.11%			81.06%	70.07%	11.22%	100%			

Various ARM Linux Benchmarks - Spetember 2018

PostgreSQL pgbench - Buffer Test - Normal Load - Read Only			5502		2977	16079	14427	5199	6059	4555	3856	6640	6526	31506	13309		9910	9951	77507
Normalized			7.1%		3.84%	20.75%	18.61%	6.71%	7.82%	5.88%	4.98%	8.57%	8.42%	40.65%	17.17%		12.79%	12.84%	100%
Standard Deviation			1%		0.5%	1.2%	0.4%	0.6%	3.4%	0.4%	2.6%	1.6%	3.1%	0.4%	1.9%		0.5%	0.2%	0.1%
PostgreSQL pgbench - Buffer Test - Normal Load - Read			603		263	1222	1793	345	719	456	133	409	144	4166	1142		1140	1150	3089
Normalized			19.52%		8.51%	39.56%	58.04%	11.17%	23.28%	14.76%	4.31%	13.24%	4.66%	134.87%	36.97%		36.91%	37.23%	100%
Standard Deviation			0.6%		11.1%	1.6%	1.6%	9.1%	12.5%	1.5%	1.7%	5.5%	3.4%	0.1%	10.5%		0.6%	2.6%	15.2%
PostgreSQL pgbench - Performance / Cost - Buffer Test - Normal Load - Read Write			13.40		5.26	2.56	3.26	7.04	11.42			11.69	3.62	3.47	20.09				
Normalized			66.7%		26.18%	12.74%	16.23%	35.04%	56.84%			58.19%	18.02%	17.27%	100%				
PyBench - T.F.A.T.T (Milliseconds)	29409	29389	40680	22876	15990	14030	6348	5357	23773	12775	20196	37907	24349	20923	19386	9256	707	7061	4273
Normalized	14.53%	14.54%	10.5%	18.68%	26.72%	30.46%	67.31%	79.76%	17.97%	33.45%	21.16%	11.27%	17.55%	20.42%	22.04%	46.16%	60.43%	60.52%	100%
Standard Deviation	0.3%	0.2%	0.2%	0.4%	0.7%	0.6%	0.6%	0.5%	0.3%	2.3%	0.3%	0.2%	0.2%	0.7%	0.1%	0.3%	0.2%	0.3%	0.1%

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PyBench - Performance / Cost - T.F.A.T.T (Milliseconds x Dollar)	735225	881670	1627200	1029420		701500	3027936	2946297	1164877	804186			851972	832317	**23263200**	**52620400**			
Normalized	71.57%	59.68%	32.34%	51.12%		75.01%	17.38%	17.86%	45.17%	65.43%			61.76%	63.22%	2.26%	100%			
C-Ray - Total Time - 4.1.R.P.P (sec)	4166	4156	3088	1755	1669	1773	8516	6750	2720	1537	2342	**4375**	2357	2074	3918	1048	1526	1526	**1156**
Normalized	2.76%	2.77%	3.72%	6.55%	6.89%	6.49%	13.51%	17.04%	4.23%	7.48%	4.91%	2.63%	4.88%	5.54%	29.41%	10.97%	7.54%	7.54%	100%
Standard Deviation	0.3%	0.1%	0.3%	0.2%	2.3%	1%	21.5%	27%	0.3%	0.1%	0.3%	0.3%	1.2%	0.2%	0.7%	1%	0.1%	0.1%	5.7%
Primesieve - 1.P.N.G (sec)	**1975**	1940	1623	891	876	934	4011		1591	599	943	1897	1543	1113	133		342	341	**62.08**
Normalized	3.14%	3.2%	3.83%	6.97%	7.09%	6.65%	15.48%		3.9%	10.36%	6.58%	3.27%	4.02%	5.58%	46.68%		18.15%	18.21%	100%
Standard Deviation	1.9%	1.3%	3.6%	1%	3.5%	2.9%	11.5%		3.4%	0.9%	3.5%	0.5%	3.1%	1.7%	0.2%		0.1%	0.1%	0.8%
AOBench - 2048 x 2048 - Total Time (sec)	698	**700**	491	282	461	289	1654	1341	457	260	352	667	333	290	400	192	273	273	**92.60**
Normalized	13.27%	13.23%	18.86%	32.84%	20.09%	32.04%	56.12%	69.1%	20.26%	35.62%	26.31%	13.88%	27.81%	31.93%	23.15%	48.23%	33.92%	33.92%	100%
Standard Deviation	0%	0.1%	0.4%	0.1%	2%	0.1%	0.1%	0.1%	0.8%	0%	0.1%	0.1%	0.2%	3.3%	0.1%	0%	0.4%	0.2%	0%
Zstd Compression - C.u.1.0.3.s.i.i.C.L.1 (sec)	**1407**	1383	1219	808	1069	848	4411	4557	978	822	1034	1315	934	867	931	573	804	802	**356**
Normalized	25.3%	25.74%	29.2%	44.06%	33.3%	41.98%	80.73%	78.24%	36.4%	43.31%	34.43%	27.07%	38.12%	41.06%	38.24%	62.13%	44.28%	44.39%	100%
Standard Deviation	0.2%	0%	0.2%	0.3%	0.5%	0.5%	0.8%	0%	1.1%	0.2%	0.2%	0.8%	0.1%	0.1%	0.5%	0.2%	0.2%	0.3%	0.5%

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FLAC Audio Encoding - WAV To FLAC (sec)	537.27	537.42	566.38	334.63	279.92	293.37	78.86	65.15	344.23	263.28	352.20	534.59	387.09	336.07	390.76	122.05	64.18	64.17	59.00
Normalized	10.98	10.98	10.42	17.63	21.08	20.11	74.82	90.56	17.14	22.41	16.75	11.04	15.24	17.56	15.1	48.34	91.93	91.94	100%
Standard Deviation	0.3%	0.3%	0.1%	0.6%	0.9%	1.2%	1.1%	0.6%	1.1%	1.1%	0.1%	0.9%	0.3%	0.6%	0%	2.3%	3%	2.6%	0.1%
LAME MP3 Encoding - WAV To MP3 (sec)	535.90	536.62	518.51	300.96	266.35	296.20	113.14	95.91	331.01	266.80	350.19	514.11	352.66	301.98	406.39	145.59	176.07	175.85	90.69
Normalized	16.92	16.9	17.49	30.13	34.05	30.62	80.16	94.56	27.4	33.99	25.9	17.64	25.72	30.03	22.32	62.29	51.51	51.57	100%
Standard Deviation	0.1%	0.1%	0%	0.1%	1.6%	0.1%	0.2%	0.2%	0.5%	1.7%	0.1%	0.1%	0%	0.3%	0%	0.1%	0.2%	0.1%	0.1%
Perl Benchmarks - Pod2html (sec)	2.27366223869	2.26615629750	2.57579869113	1.49377750123	2.59638113	1.31366123	0.60071034	0.48746904	1.73162418	1.11893361	1.40449621	2.46504575	1.29447902	1.11833973	1.57088061	0.69415680	0.89794910	0.90904345	0.41899562
Normalized	18.43	18.49	16.27	28.05	16.14	31.9	69.75	85.95	24.2	37.45	29.83	17%	32.37	37.47	26.67	60.36	46.66	46.09	100%
Standard Deviation	0.7%	0.7%	0.8%	0.4%	1.9%	1.4%	0.9%	1.4%	8.5%	3.4%	0.6%	5.2%	0.6%	3.3%	0.8%	0.2%	0.3%	0.9%	0.5%
Perl Benchmarks - Interpreter (sec)	0.01012165	0.01010965	0.01057718	0.00776080	0.03473245	0.00514761	0.00235869	0.00987031	0.00814231	0.00551193	0.01025786	0.01345155	0.00842084	0.00742901	0.00658840	0.00428081	0.00787570	0.00487308	0.00253159
Normalized	25.01	25.04	23.93	32.62	7.29	49.18	107.3	25.65	31.09	45.93	24.68	18.82	30.06	34.08	38.42	59.14	32.14	51.95	100%
Standard Deviation	0.2%	0.5%	0.2%	1.9%	0.6%	0.9%	3% 1%	2.2%	0.1%	0.5%	1.9%	2.8%	8.3%	9.9%	0.4%	11.8 %	2.3%	0.3%	0.2%
Git - T.T.C.C.G.C (sec)	91.83	87.37	77.19	54.41		40.04	23.66	17.57	69.23	38.99	52.64	97.32	57.19	51.84	46.37	26.06	30.84	30.70	14.36
Normalized	15.64	16.44	18.6	26.39		35.86	60.69	81.73	20.74	36.83	27.28	14.76	25.11	27.7	30.97	55.1	46.56	46.78	100%
Standard Deviation	1.5%	5.1%	5.6%	6%		7.9%	9.8%	2%	4.2%	10.4 %	2.7%	4.6%	3.2%	10%	0%	9%	2.4%	2.4%	1%
Scikit-Learn (sec)		2246	1515	954	221	650	434		1631	664 %	853	2328	844	785	899	474	383	382	30.35
Normalized		1.35	2%	3.18	13.73	4.67	6.99		1.86	4.57	3.56	1.3%	3.6%	3.87	3.38	6.4%	7.92	7.95	100%
Standard Deviation		0.1%	0.1%	0.3%	0.2%	0.3%	0.7%		0.2%	0.3%	0.1%	0.6%	0.2%	0.3%	0.1%	0.5%	0.3%	0.1%	0.8%

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C-Ray - Performance / Cost - Total Time - 4.1.R.P.P (sec x Dollar)	104.150	124.680	123.520	789.75	886.50	405.918	371.243	133.280	967.54	824.71	825.04	469.200	595.79	
Normalized	57.2%	47.79%	48.23%	75.44%	67.21%	14.68%	16.05%	44.7%	61.58%	72.24%	72.21%	12.7%	100%	
Primesieve - Performance / Cost - 1.P.N.G (sec x Dollar)	493.75	582.00	649.20	400.95	467.00	191.273		779.59	377.07	539.90	442.75	159.600		
Normalized	76.37%	64.79%	58.08%	94.04%	80.74%	19.71%		48.37%	100%	69.84%	85.17%	23.63%		
AOBench - Performance / Cost - 2048 x 2048 - Total Time (sec x	174.50	210.00	196.40	126.90	144.50	787.03	736.99	223.93	163.67	116.52	115.36	480.000	109.15	
Normalized	62.55%	51.98%	55.58%	86.01%	75.54%	13.87%	14.81%	48.74%	66.69%	93.68%	94.62%	2.27%	100%	
Zstd Compression - Performance / Cost - C.u.1.0.3.s.i.i.C.L.1 (sec x Dollar)	351.75	414.90	487.60	363.60	424.00	210.353	250.245	479.22	517.45	326.81	344.89	111.720.0	325.75	
Normalized	92.61%	78.51%	66.81%	89.59%	76.83%	15.49%	13.02%	67.98%	62.95%	99.68%	94.45%	2.92%	100%	

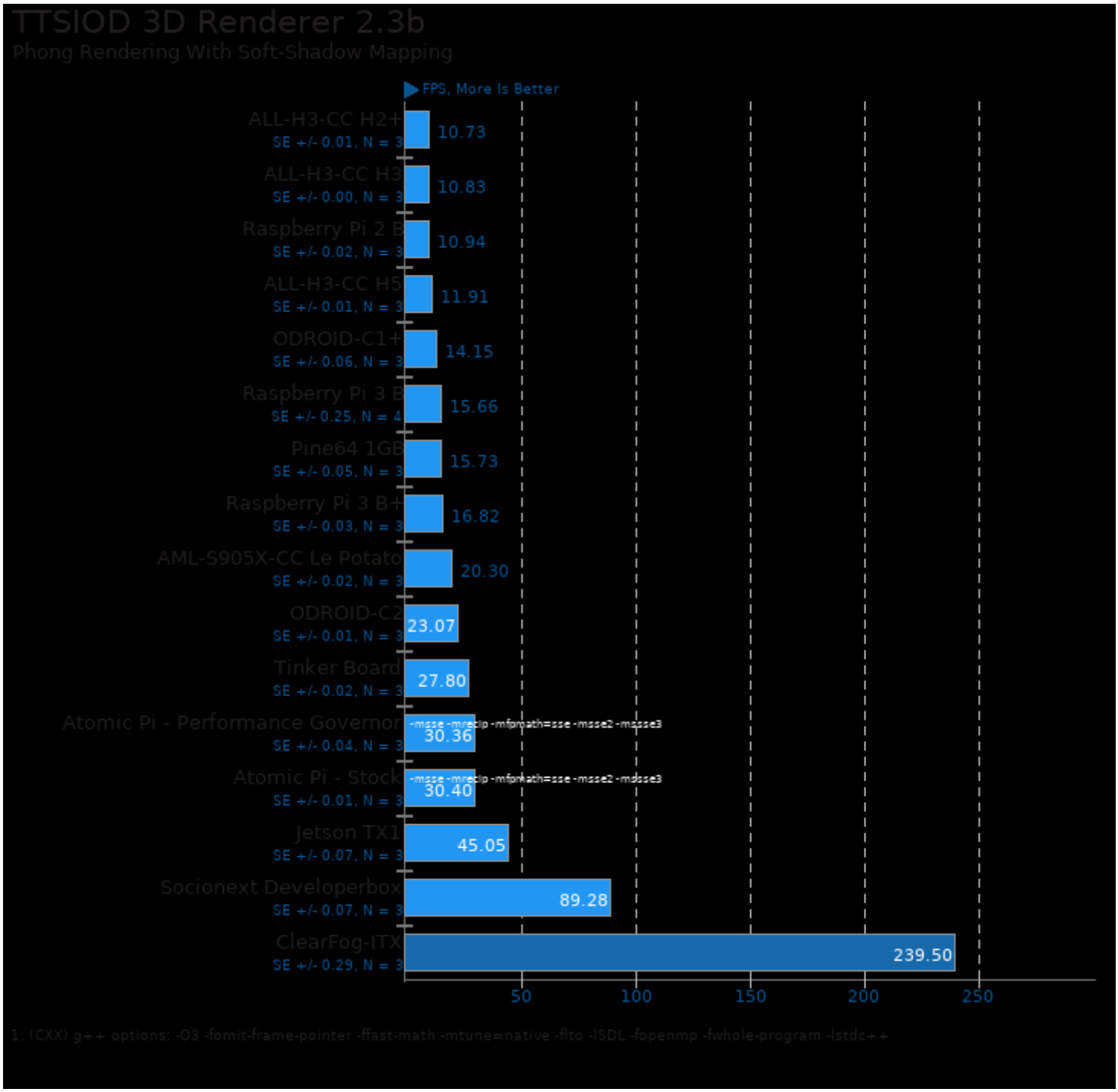
Various ARM Linux Benchmarks - Spetember 2018

FLAC Audio Encoding - Performance / Cost - WAV To FLAC (sec	134	161	226	150	146	376	358	168	165	135	133	**468**	**693**
	32	23	55	58	69	15	32	67	73	44	69	**912**	**9**
Normalized	51.66%	43.04%	30.63%	46.08%	47.3%	18.45%	19.36%	41.14%	41.87%	51.23%	51.9%	1.48%	100%
LAME MP3 Encoding - Performance / Cost - WAV To MP3 (sec	133	160	207	135	148	539	527	162	167	123	120	**487**	**827**
	98	99	40	43	10	67	50	19	95	40	13	**668**	**7**
Normalized	61.78%	51.41%	39.91%	61.11%	55.89%	15.34%	15.69%	51.03%	49.28%	67.08%	68.9%	1.7%	100%
Perl Benchmarks - Performance / Cost - Pod2html (sec x Dollar)	56.84	67.98	103.03	67.22	65.68	286.53	268.10	84.85	70.44	45.29	44.49	**1885**	**39.46**
Normalized	69.42%	58.05%	38.3%	58.7%	60.08%	13.77%	14.72%	46.51%	56.02%	87.13%	88.69%	2.09%	100%
Perl Benchmarks - Performance / Cost - Interpreter (sec x Dollar)	0.25	0.30	0.42	0.35	0.26	1.13	5.43	0.40	0.35	0.29	0.30	**7.91**	**0.24**
Normalized	96%	80%	57.14%	68.57%	92.31%	21.24%	4.42%	60%	68.57%	82.76%	80%	3.03%	100%

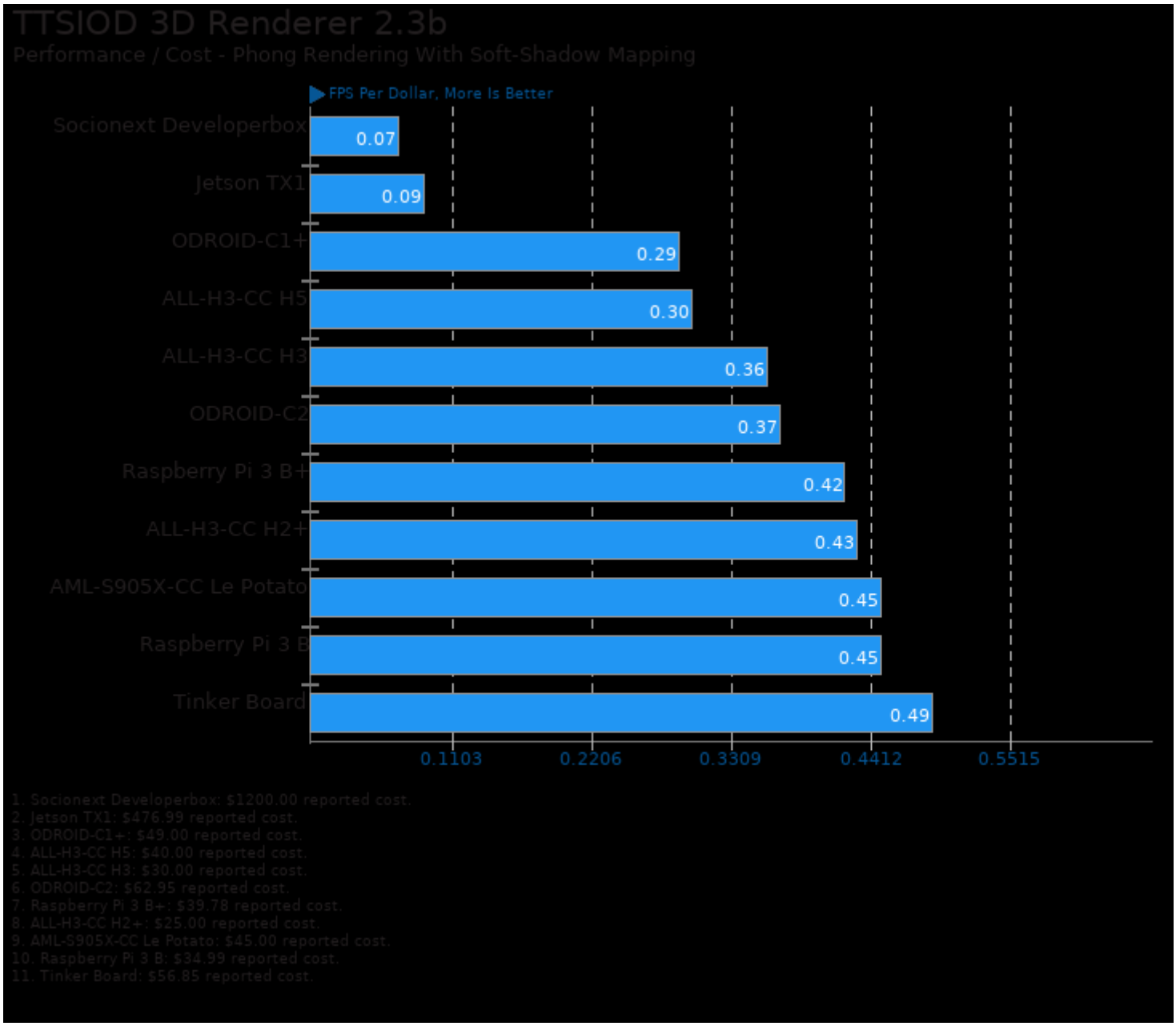
Various ARM Linux Benchmarks - Spetember 2018

Git - Performance / Cost - T.T.C.C.G.C (sec x Dollar)	2296	2621	3088	2448	2002	11286	9663	3392	2454	2001	2062	**55644**	**1482**
Normalized	64.53%	56.52%	47.98%	60.51%	74%	13.13%	15.33%	43.67%	60.36%	74.04%	71.84%	2.66%	100%
Scikit-Learn - Performance / Cost - (sec x Dollar)		67380	60600	42930	32500	20701		79919	41799	29532	31227	**107880**	**26947**
Normalized		39.99%	44.47%	62.77%	82.91%	13.02%		33.72%	64.47%	91.25%	86.29%	2.5%	100%

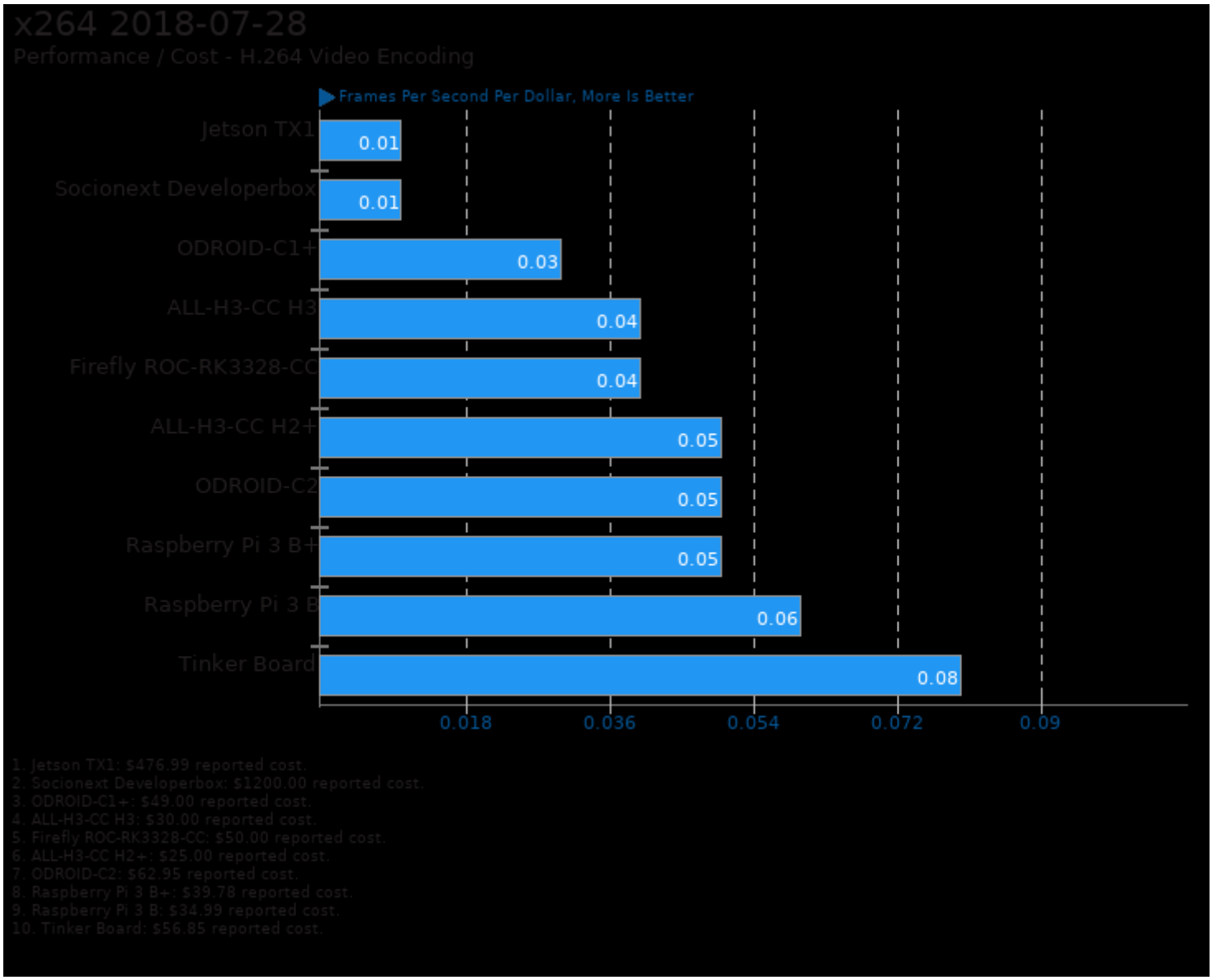
Various ARM Linux Benchmarks - Spetember 2018



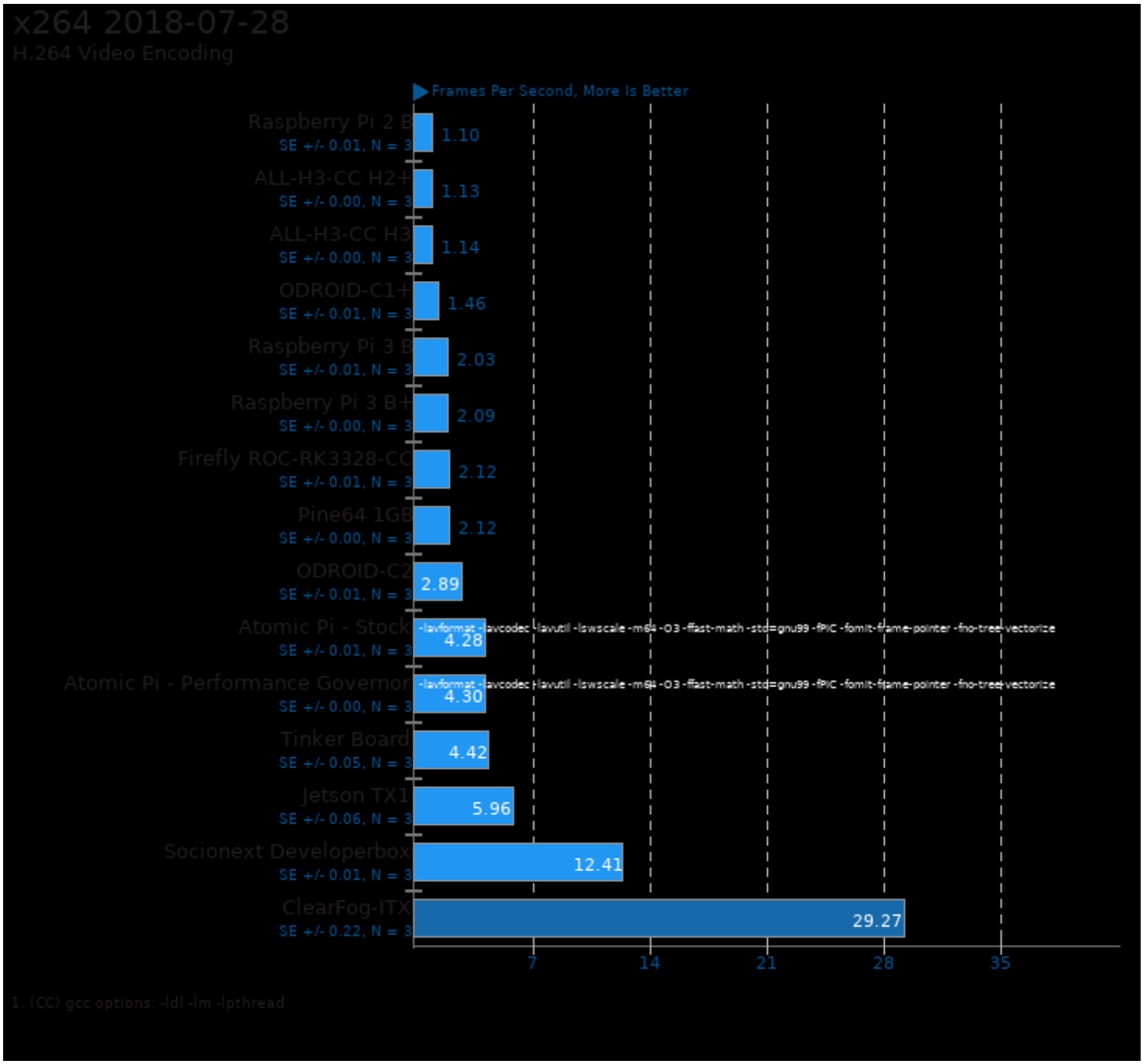
Various ARM Linux Benchmarks - Spetember 2018



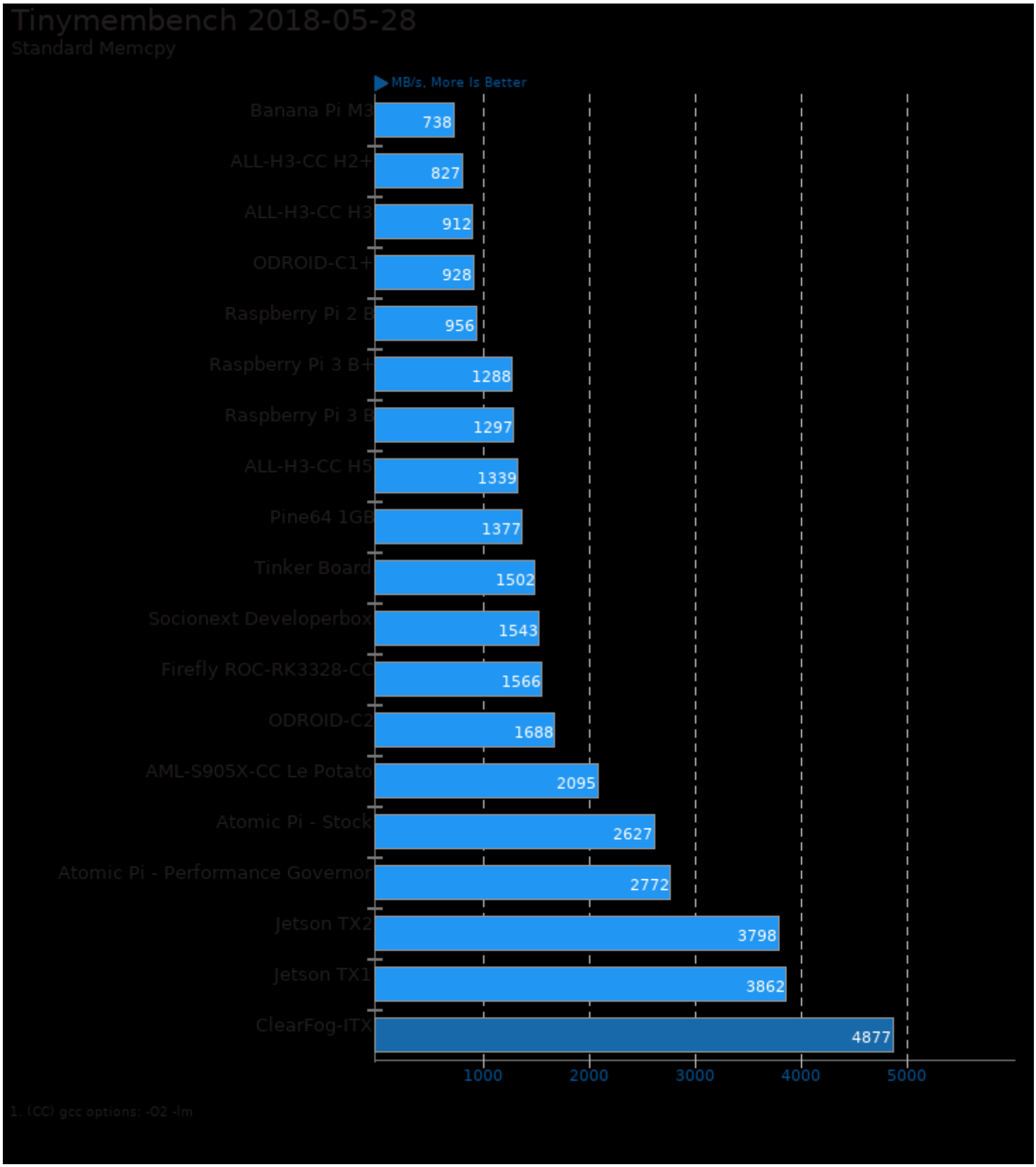
Various ARM Linux Benchmarks - Spetember 2018



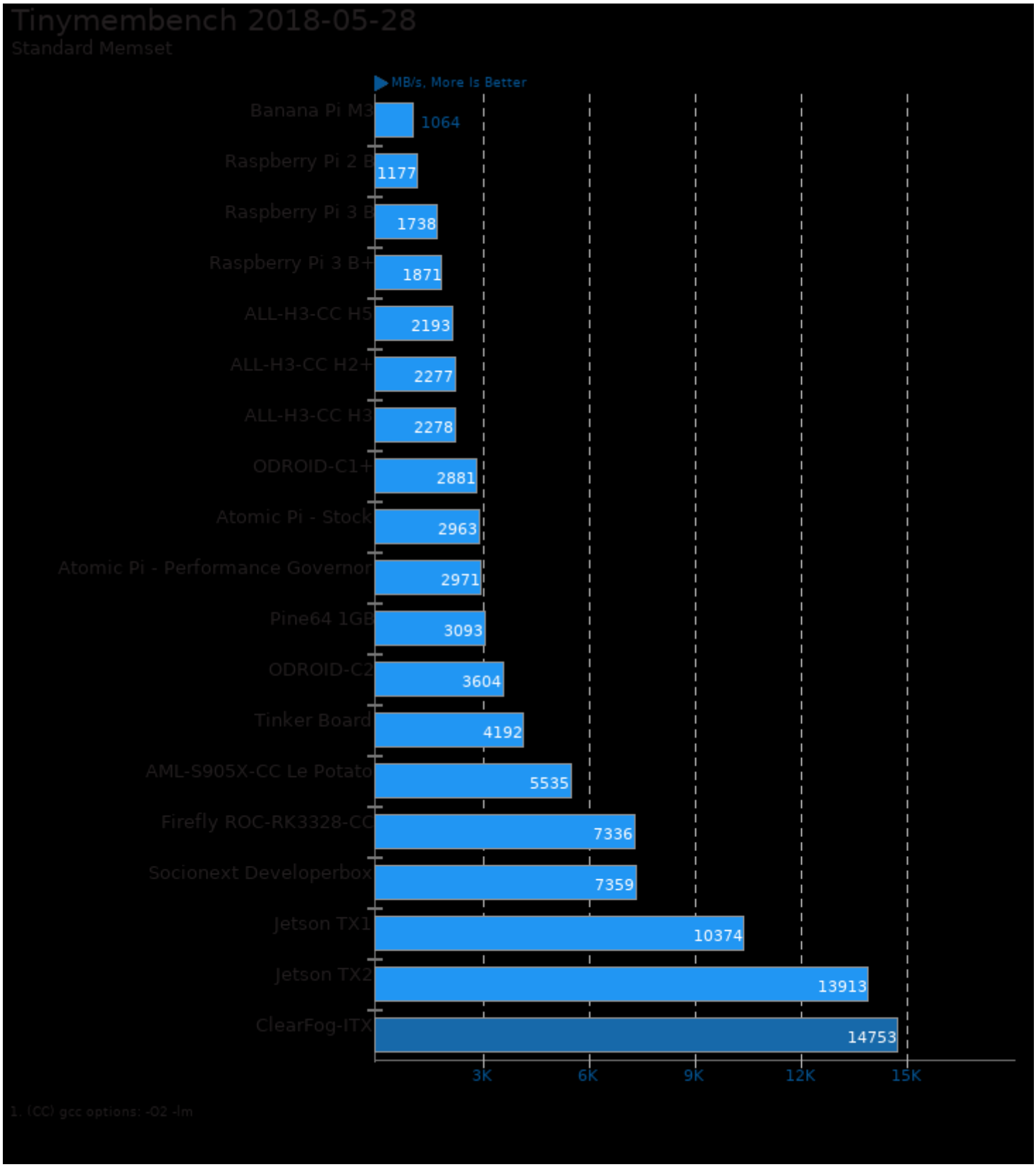
Various ARM Linux Benchmarks - Spetember 2018



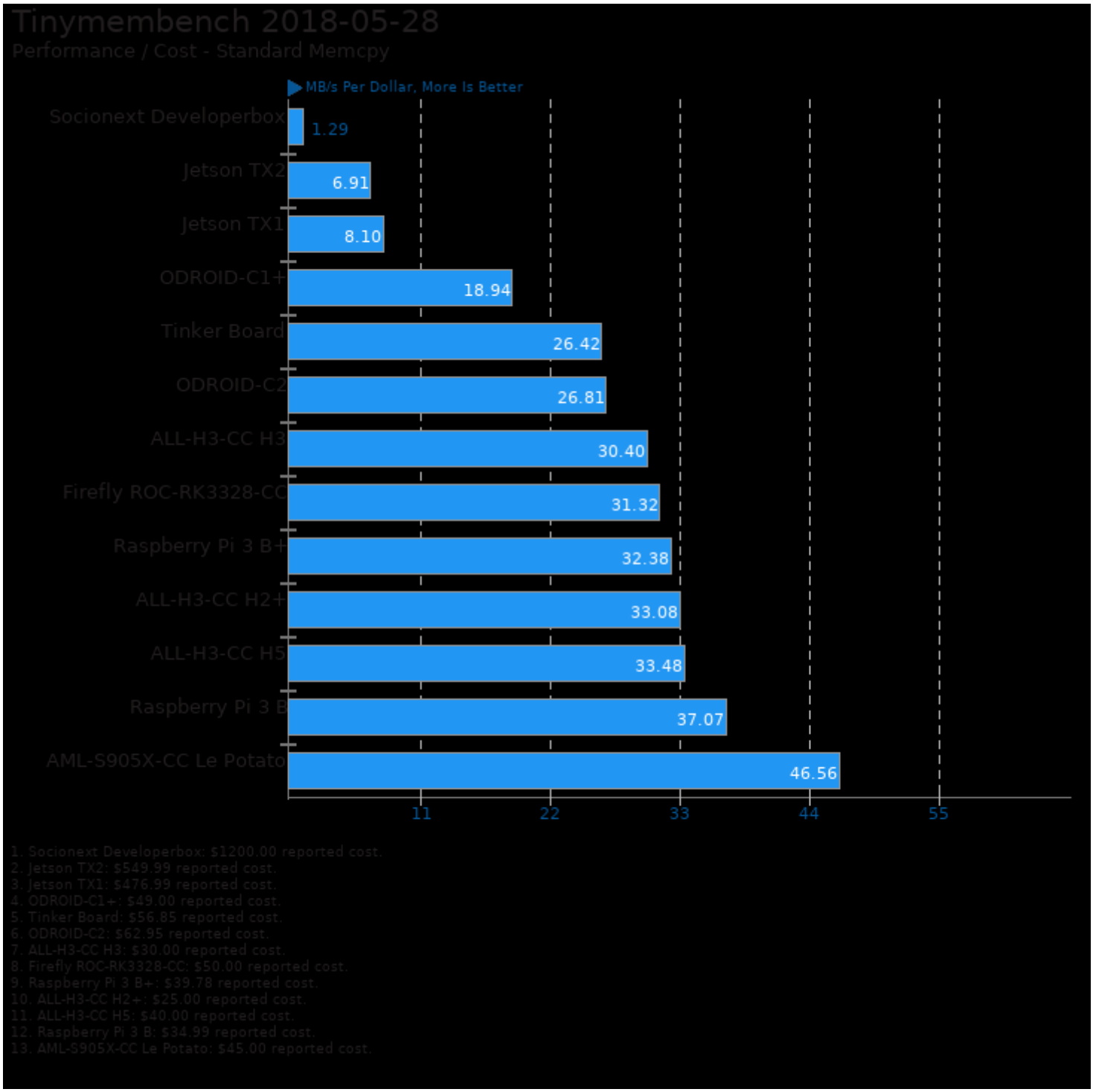
Various ARM Linux Benchmarks - Spetember 2018



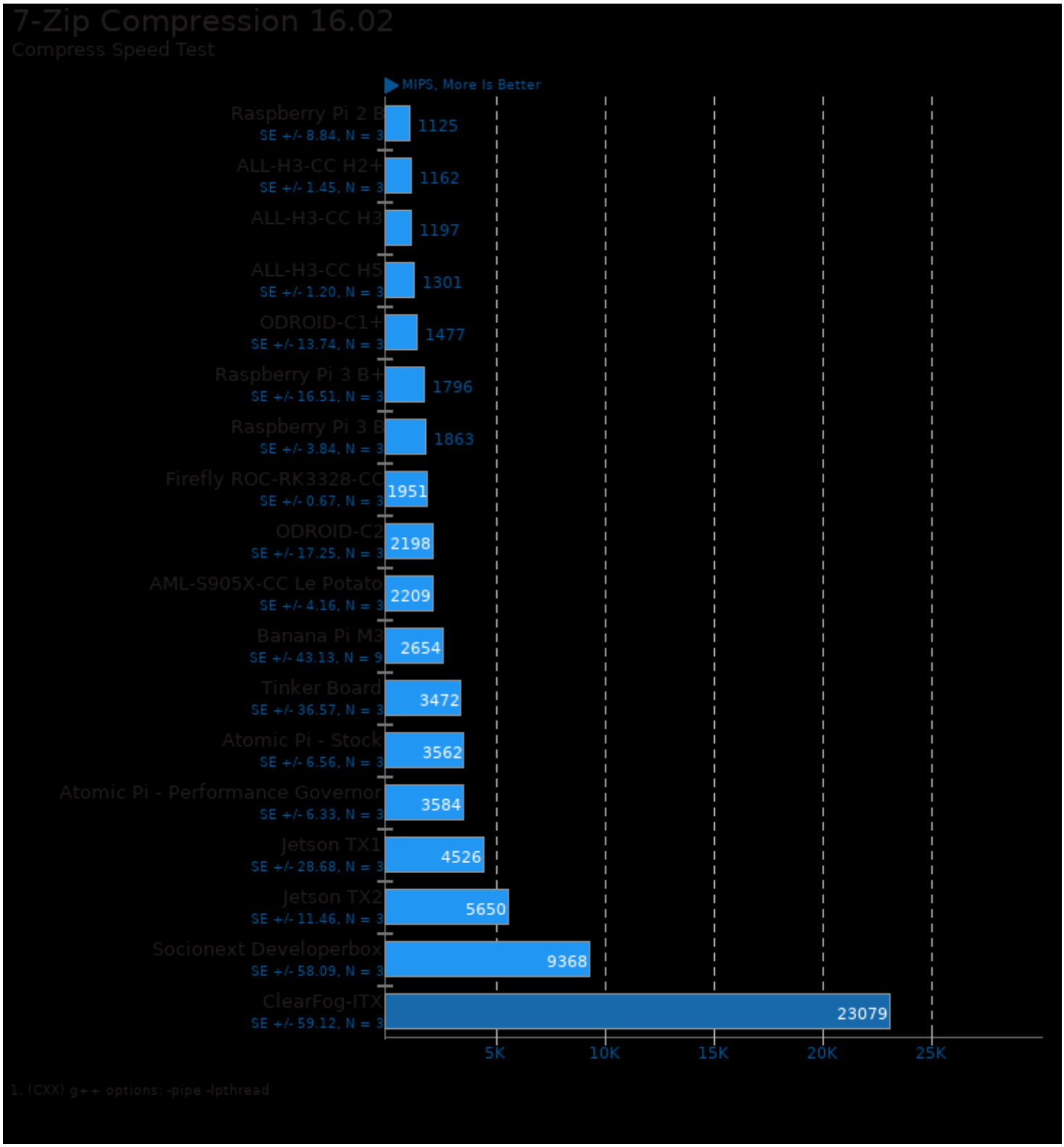
Various ARM Linux Benchmarks - Spetember 2018



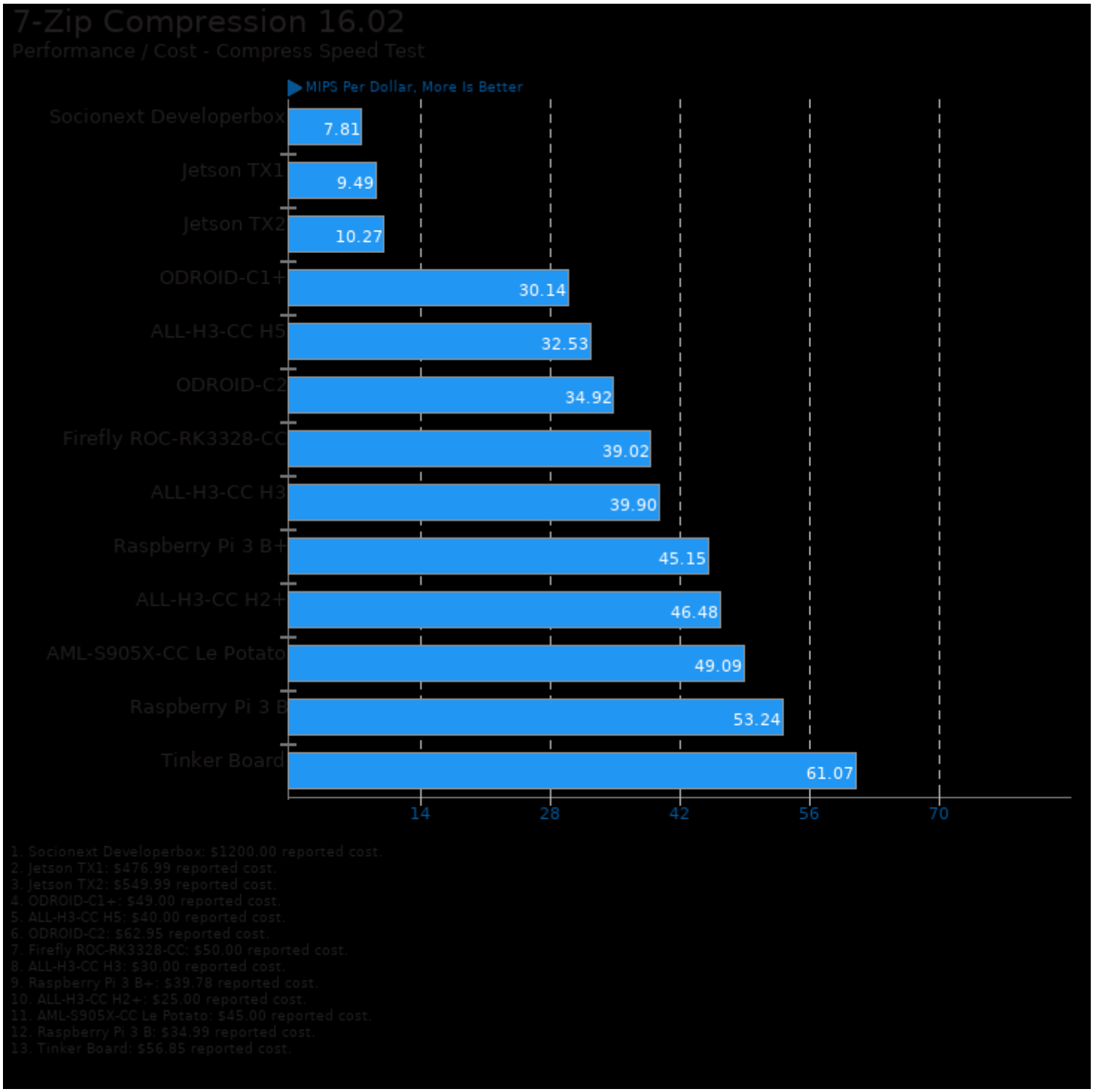
Various ARM Linux Benchmarks - Spetember 2018



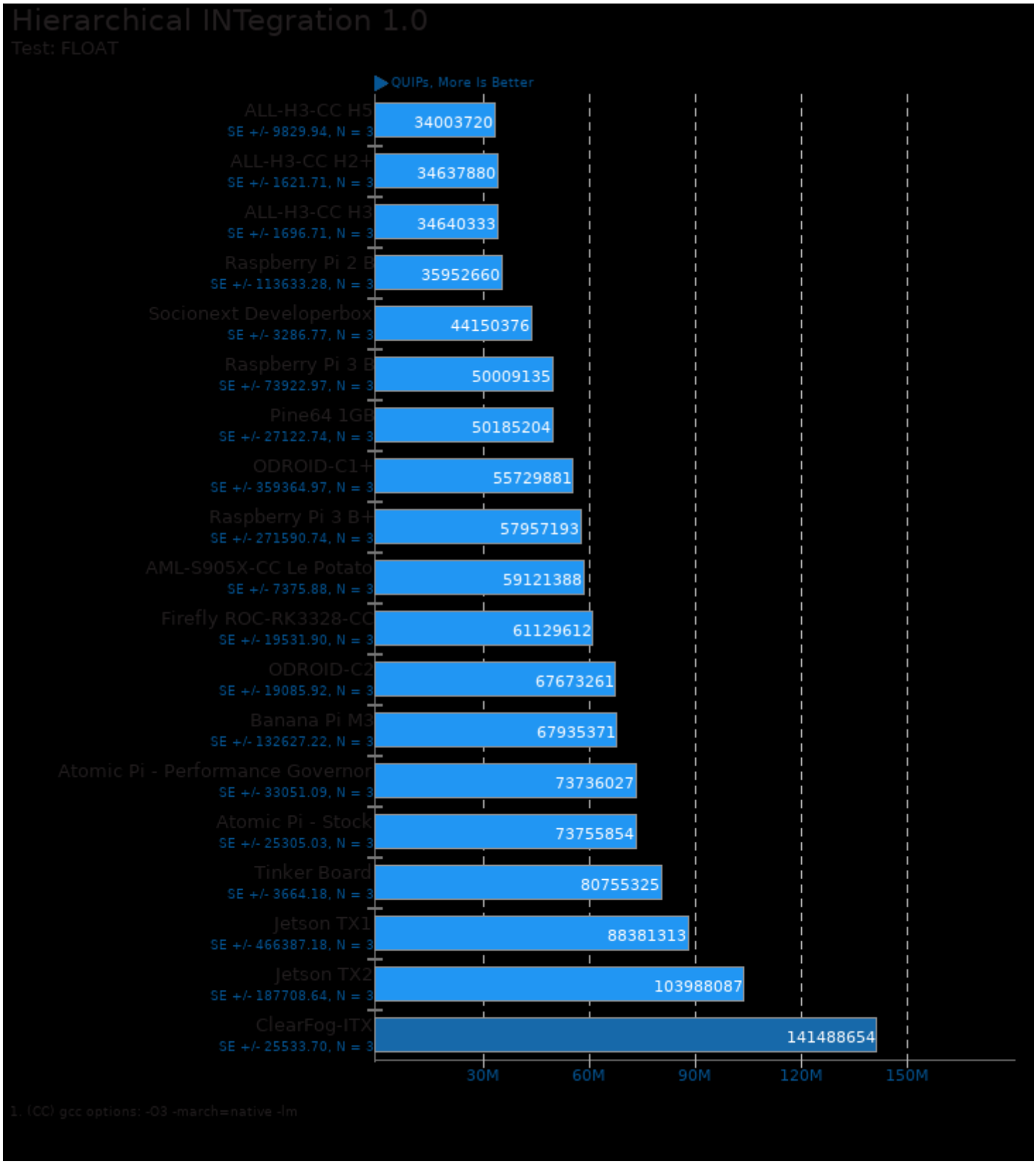
Various ARM Linux Benchmarks - Spetember 2018



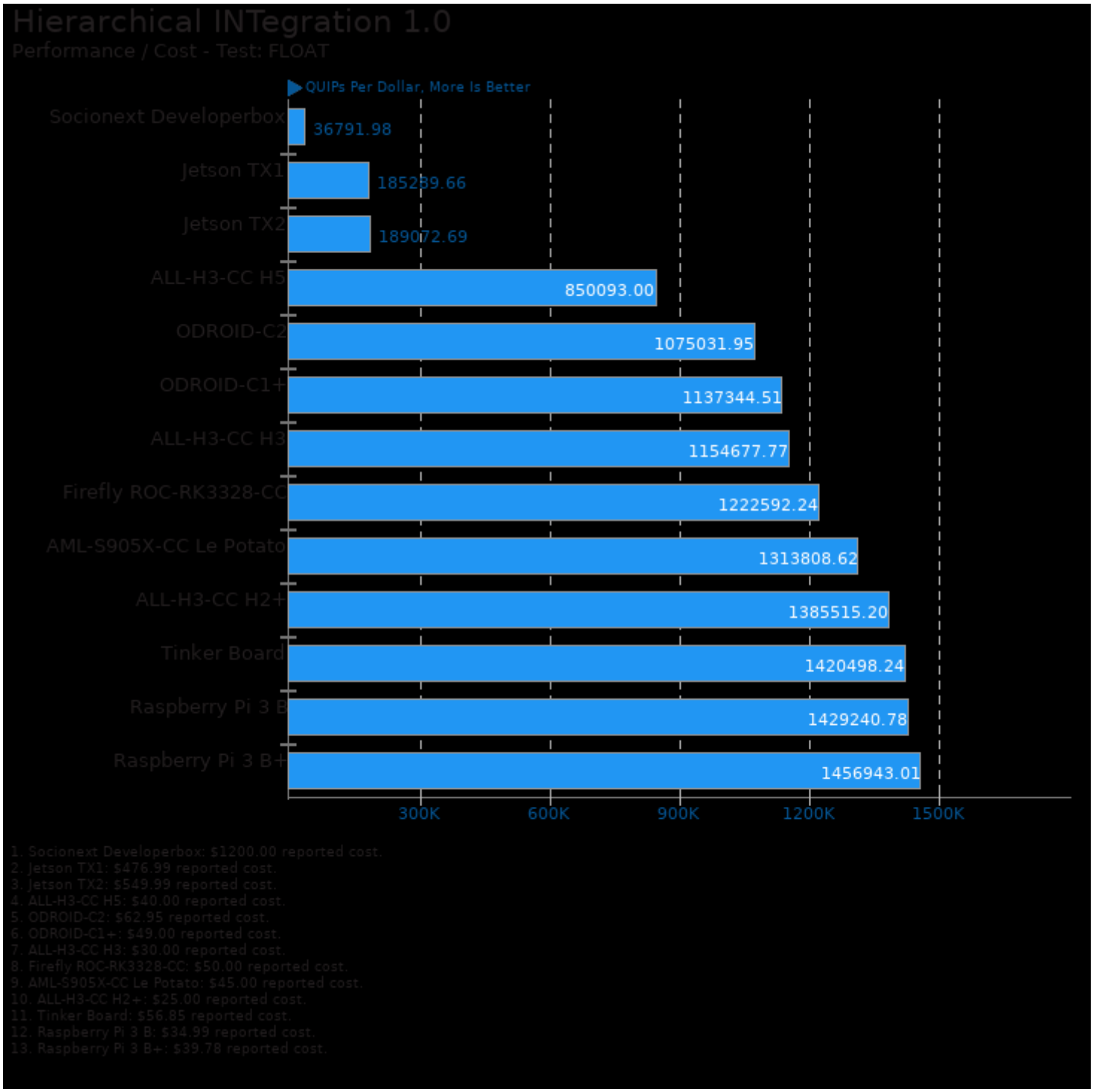
Various ARM Linux Benchmarks - Spetember 2018



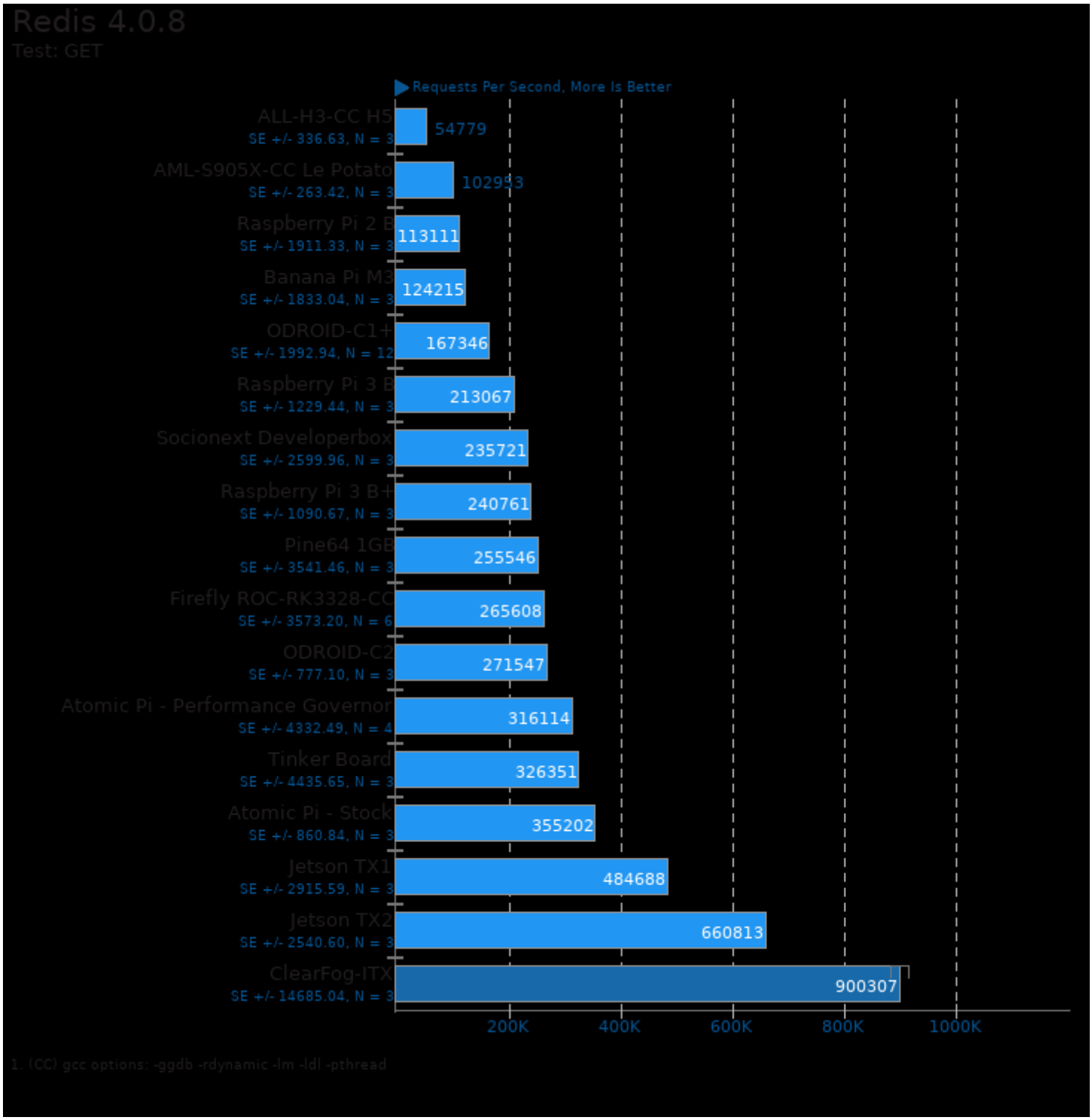
Various ARM Linux Benchmarks - Spetember 2018



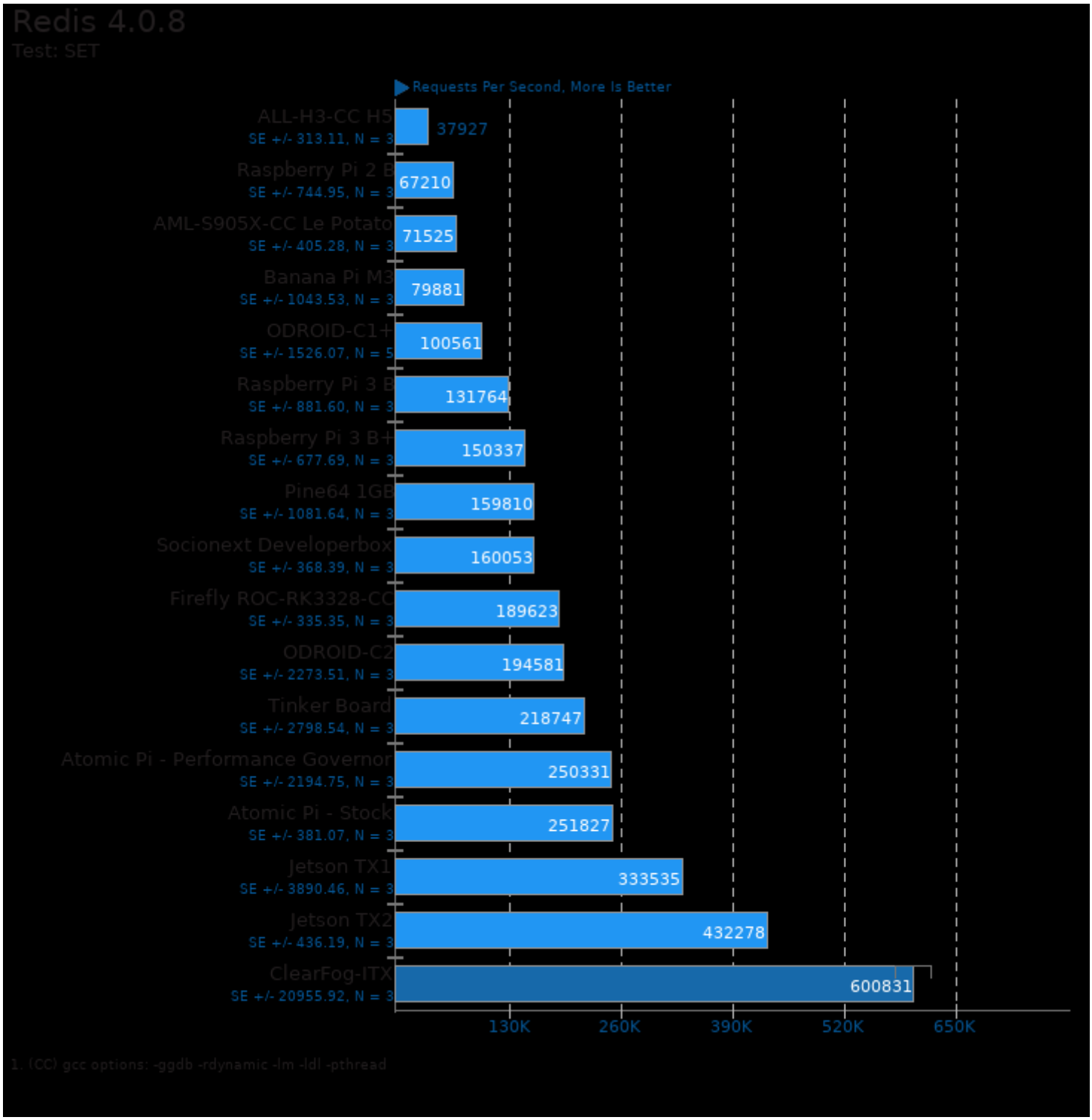
Various ARM Linux Benchmarks - Spetember 2018



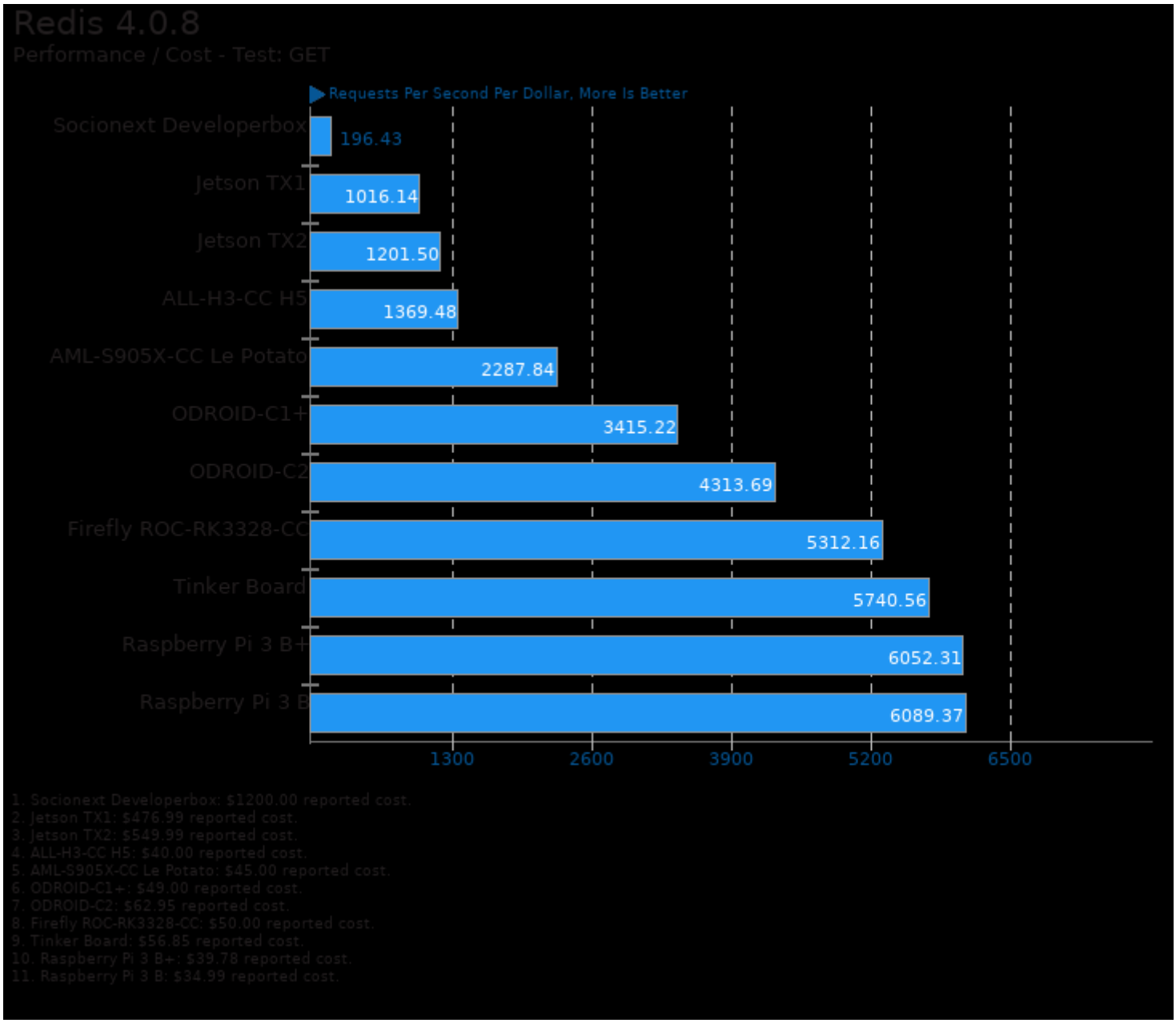
Various ARM Linux Benchmarks - Spetember 2018



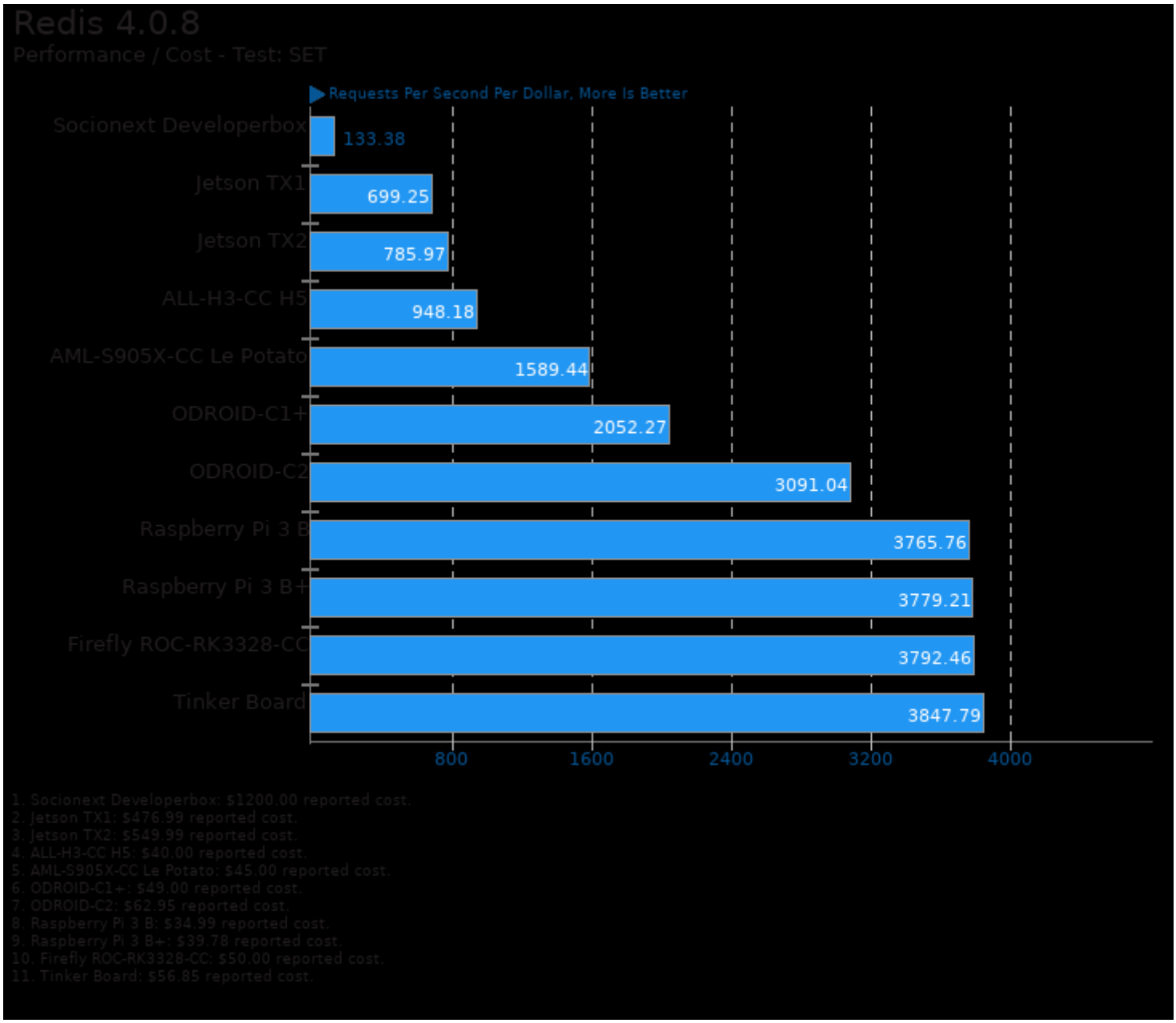
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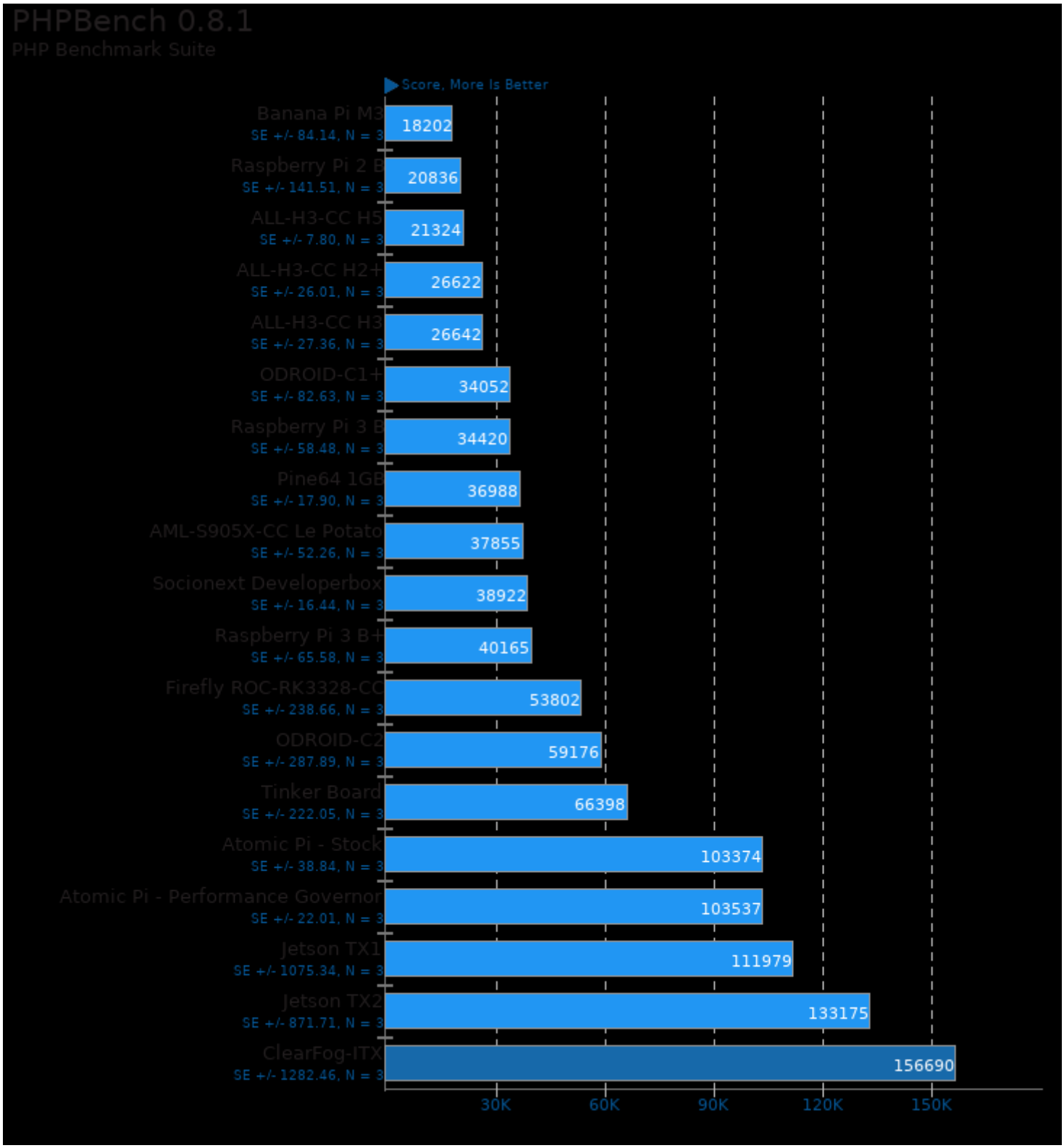
Various ARM Linux Benchmarks - Spetember 2018



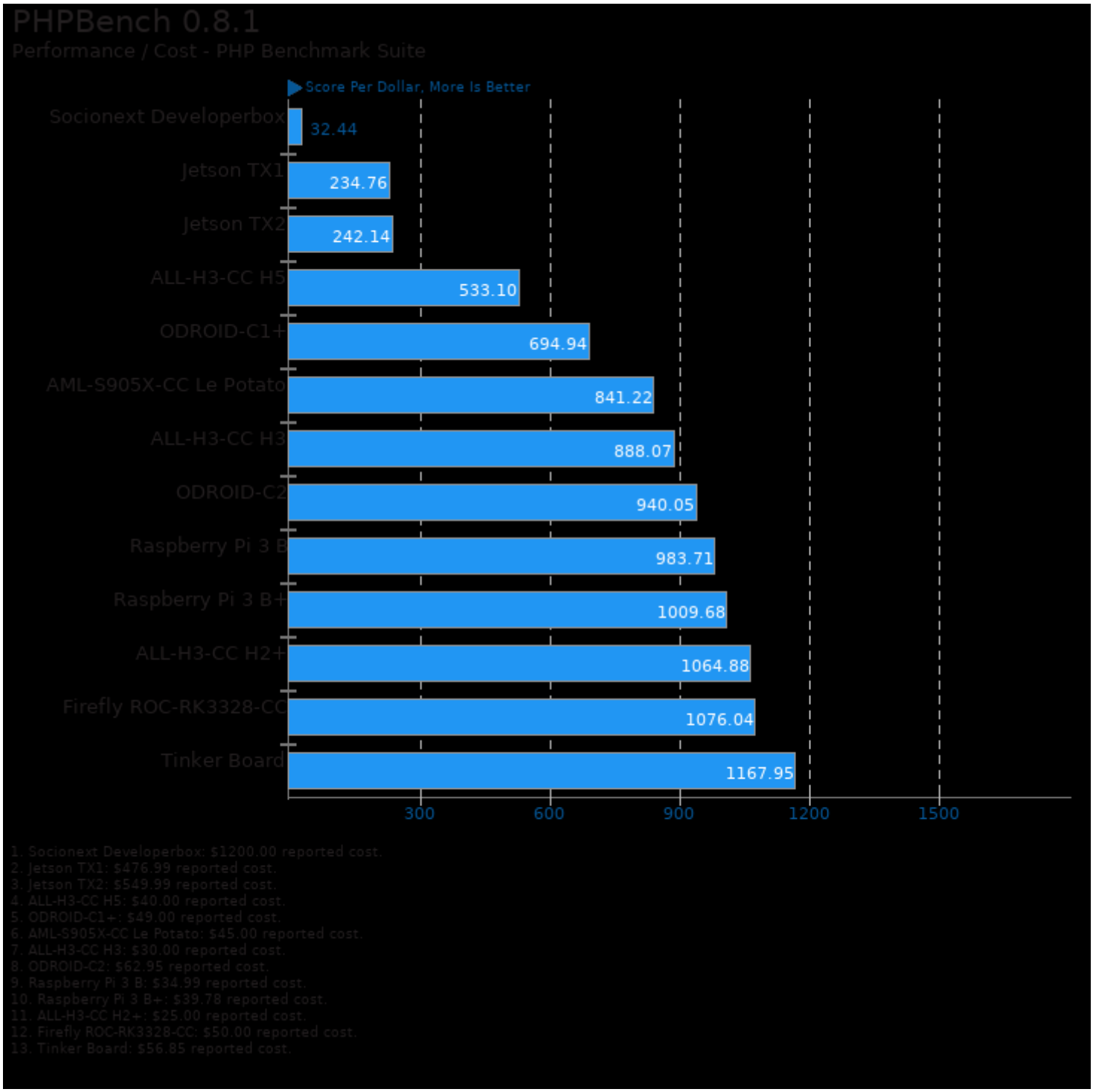
Various ARM Linux Benchmarks - Spetember 2018



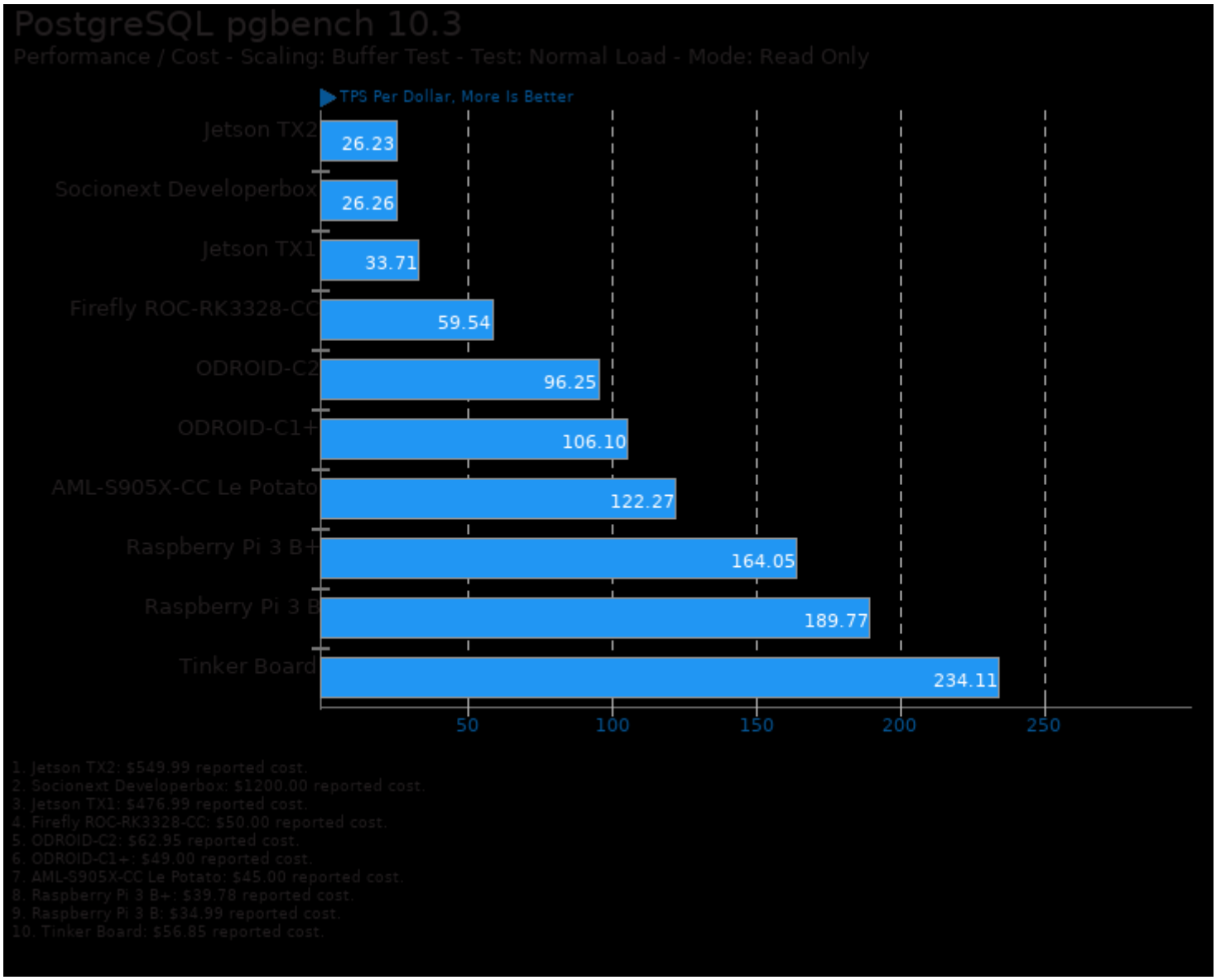
Various ARM Linux Benchmarks - Spetember 2018

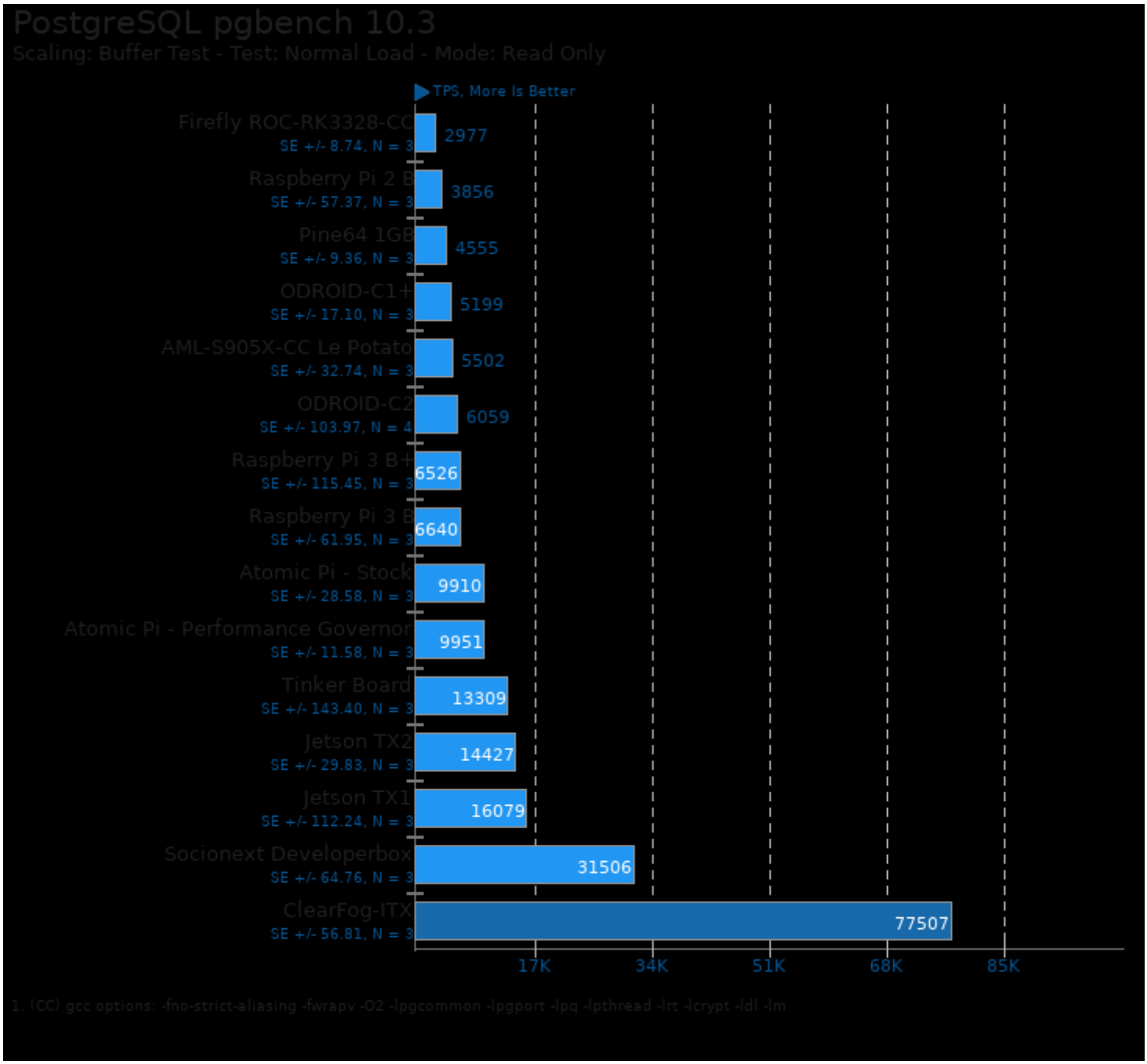


Various ARM Linux Benchmarks - Spetember 2018

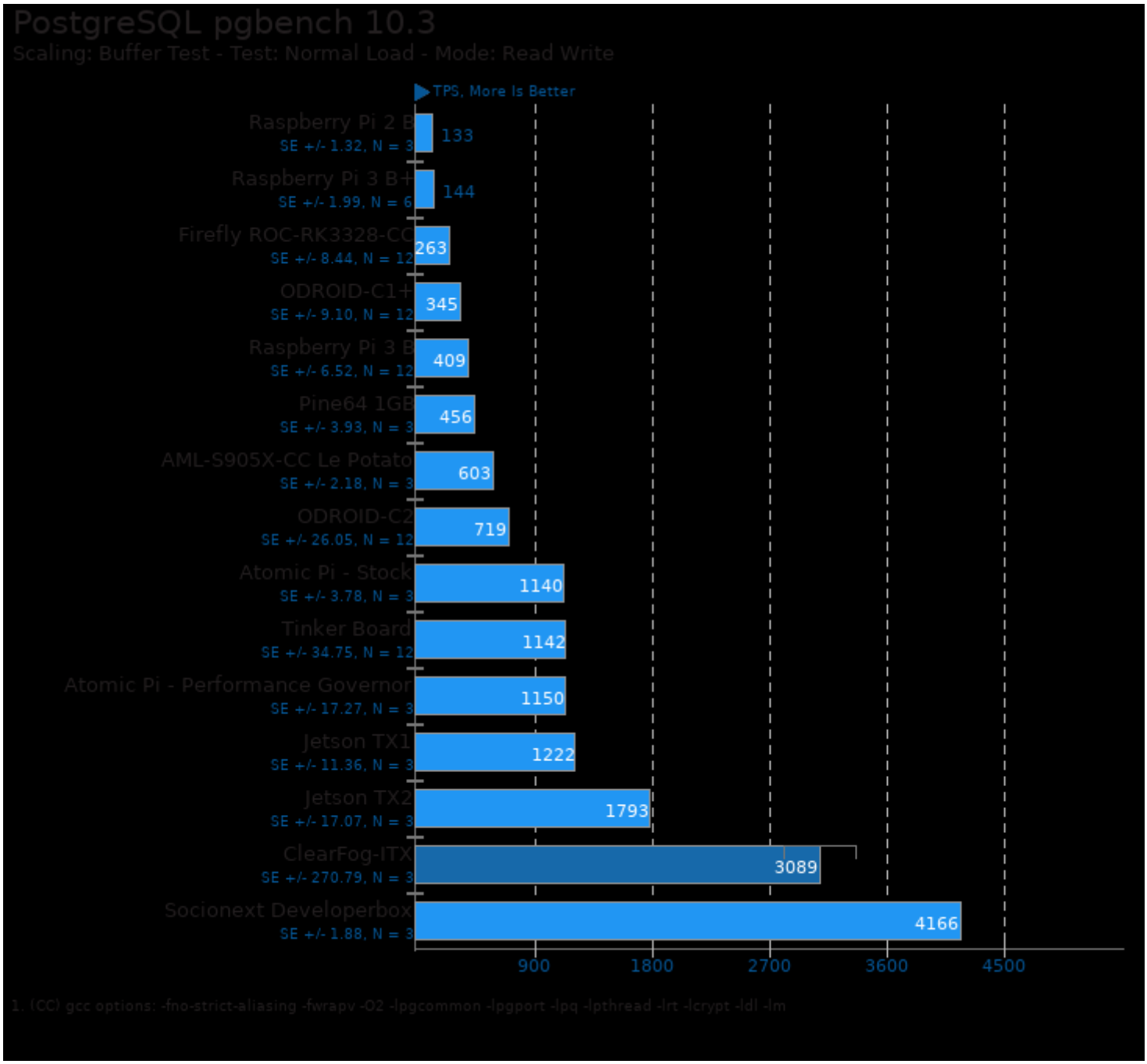


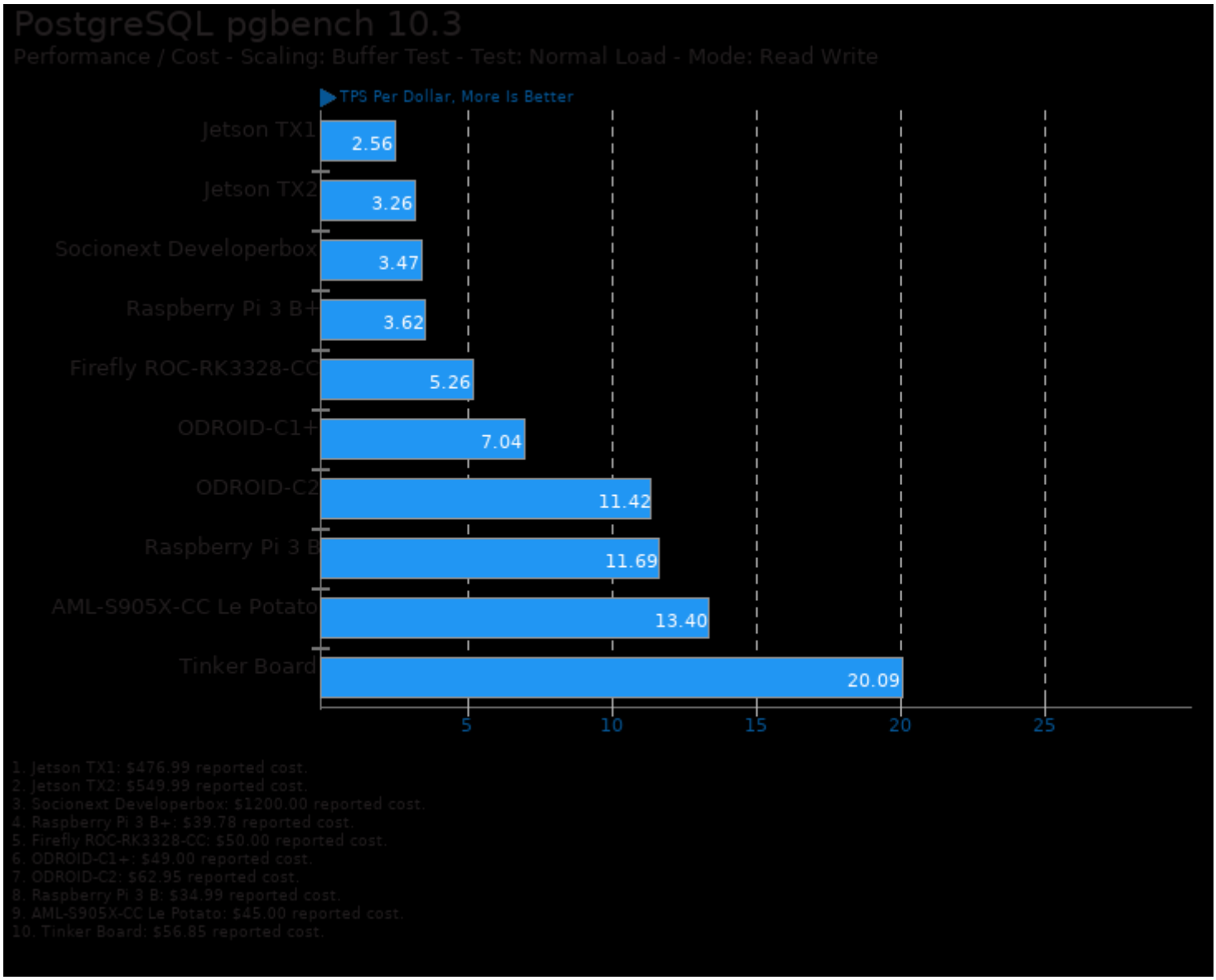
Various ARM Linux Benchmarks - Spetember 2018



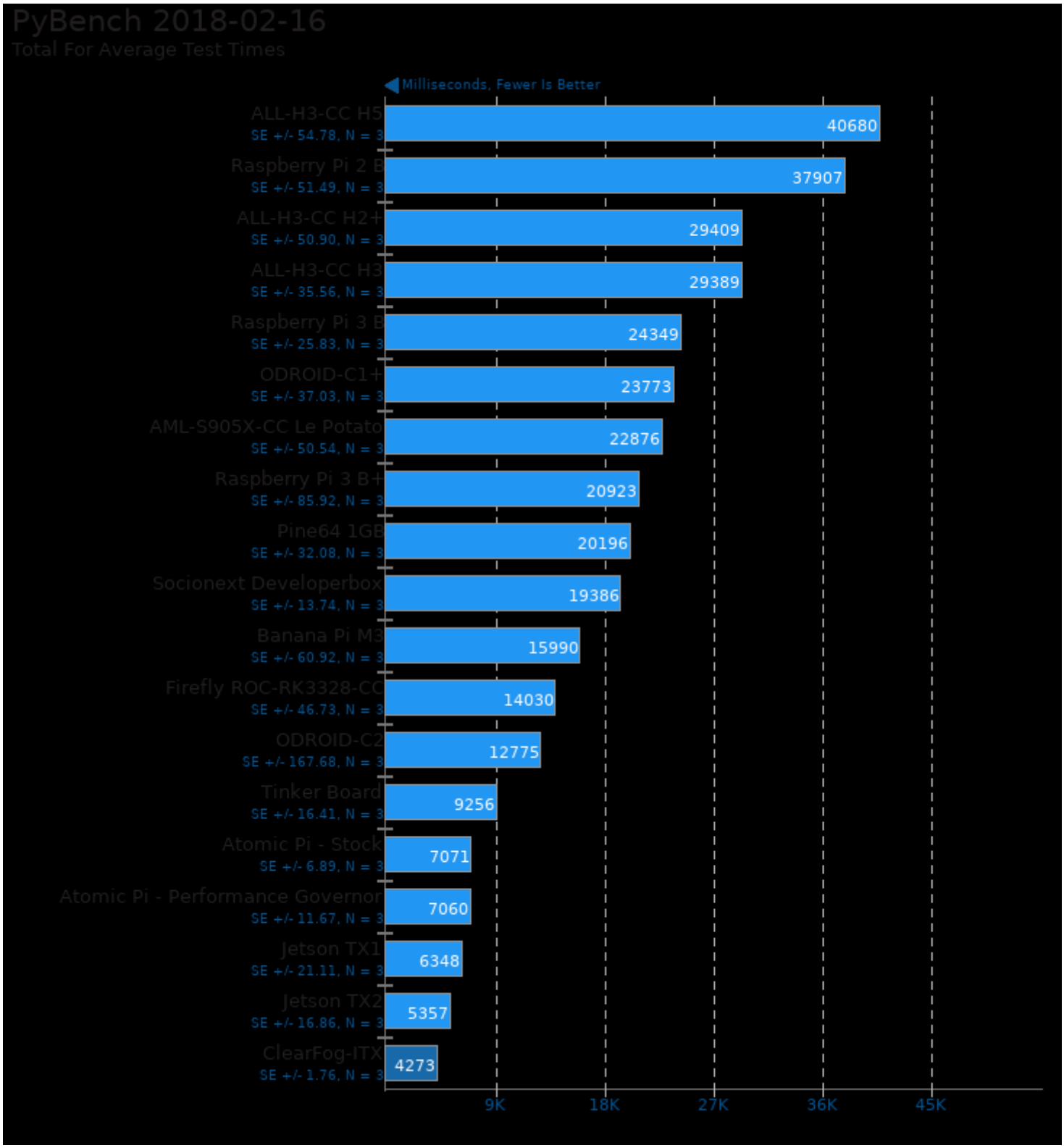

PostgreSQL pgbench 10.3
Scaling: Buffer Test - Test: Normal Load - Mode: Read Only
TPS, More Is Better
Firefly ROC-RK3328-CC
SE +/- 8.74, N = 3
2977
Raspberry Pi 2 B
SE +/- 57.37, N = 3
3856
Pine64 1GB
SE +/- 9.36, N = 3
4555
ODROID-C1+
SE +/- 17.10, N = 3
5199
AML-S905X-CC Le Potato
SE +/- 32.74, N = 3
5502
ODROID-C2
SE +/- 103.97, N = 4
6059
Raspberry Pi 3 B+
SE +/- 115.45, N = 3
6526
Raspberry Pi 3 B
SE +/- 61.95, N = 3
6640
Atomic Pi - Stock
SE +/- 28.58, N = 3
9910
Atomic Pi - Performance Governor
SE +/- 11.58, N = 3
9951
Tinker Board
SE +/- 143.40, N = 3
13309
Jetson TX2
SE +/- 29.83, N = 3
14427
Jetson TX1
SE +/- 112.24, N = 3
16079
Socionext Developerbox
SE +/- 64.76, N = 3
31506
ClearFog-ITX
SE +/- 56.81, N = 3
77507
17K
34K
51K
68K
85K
1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lpthread -lrt -lcrypt -ldl -lm

Various ARM Linux Benchmarks - Spetember 2018

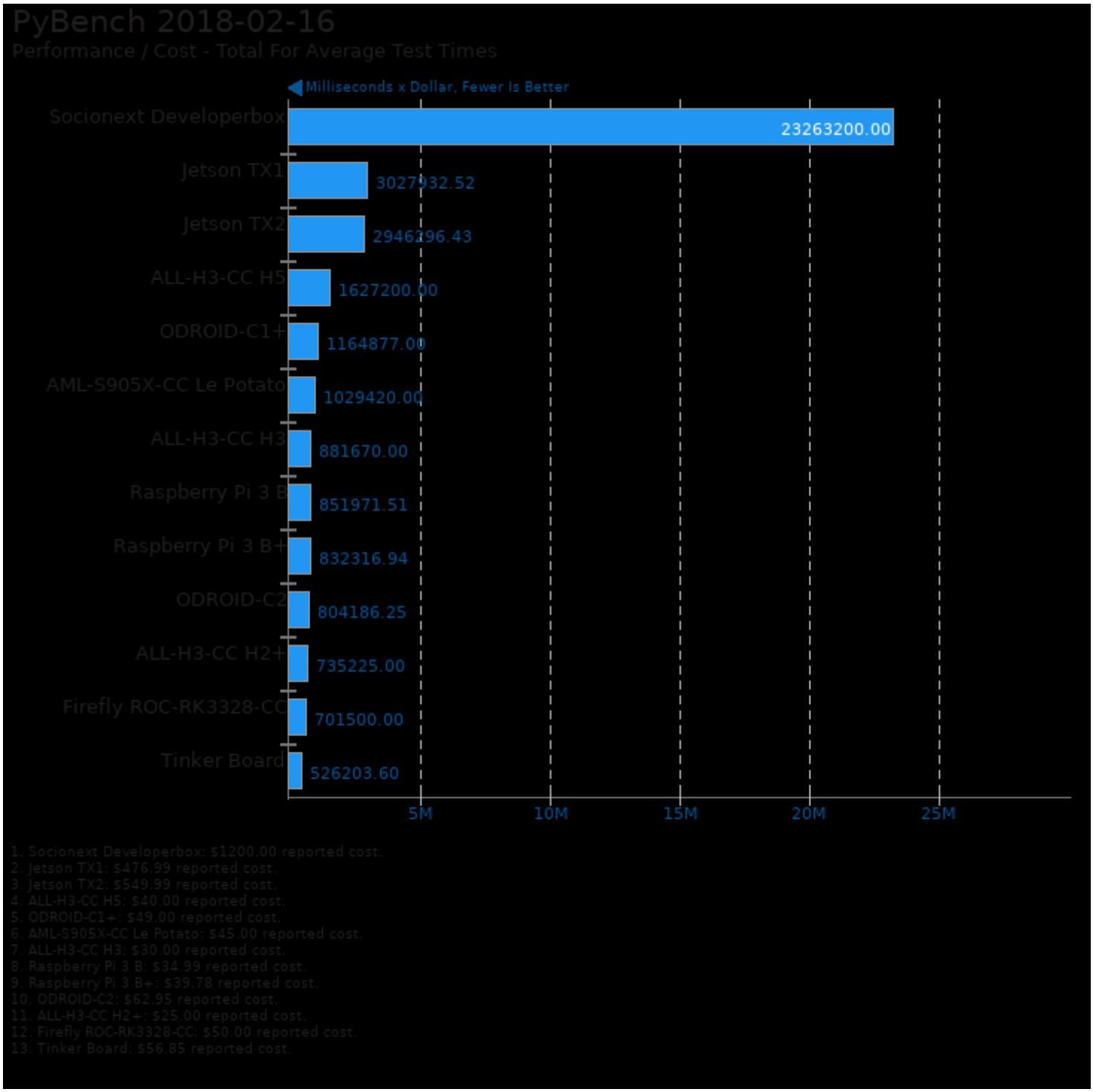


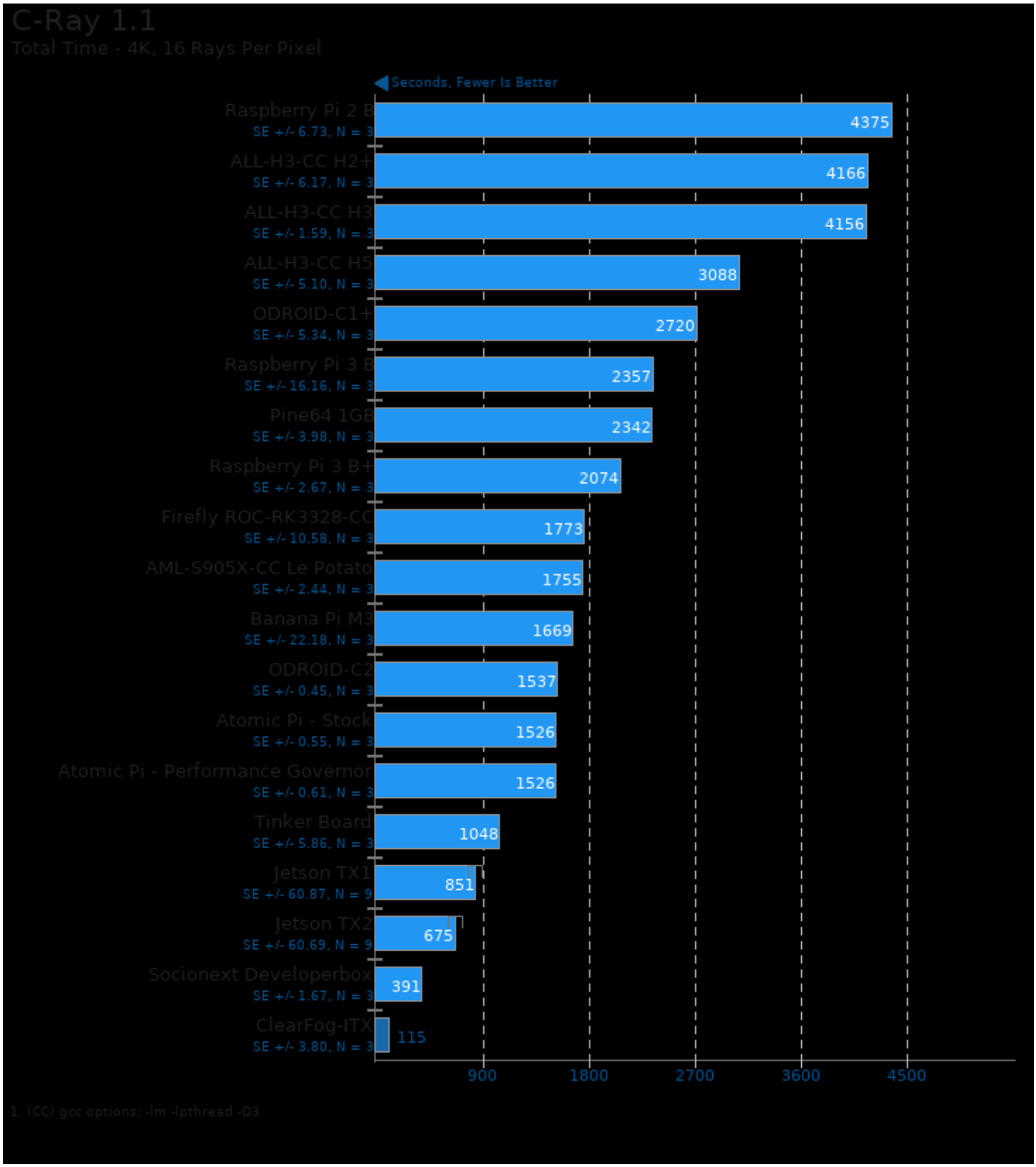

PostgreSQL pgbench 10.3
Performance / Cost - Scaling: Buffer Test - Test: Normal Load - Mode: Read Write
TPS Per Dollar, More Is Better
Jetson TX1
2.56
Jetson TX2
3.26
Socionext Developerbox
3.47
Raspberry Pi 3 B+
3.62
Firefly ROC-RK3328-CC
5.26
ODROID-C1+
7.04
ODROID-C2
11.42
Raspberry Pi 3 B
11.69
AML-S905X-CC Le Potato
13.40
Tinker Board
20.09
5
10
15
20
25
1. Jetson TX1: $476.99 reported cost.
2. Jetson TX2: $549.99 reported cost.
3. Socionext Developerbox: $1200.00 reported cost.
4. Raspberry Pi 3 B+: $39.78 reported cost.
5. Firefly ROC-RK3328-CC: $50.00 reported cost.
6. ODROID-C1+: $49.00 reported cost.
7. ODROID-C2: $62.95 reported cost.
8. Raspberry Pi 3 B: $34.99 reported cost.
9. AML-S905X-CC Le Potato: $45.00 reported cost.
10. Tinker Board: $56.85 reported cost.

Various ARM Linux Benchmarks - Spetember 2018

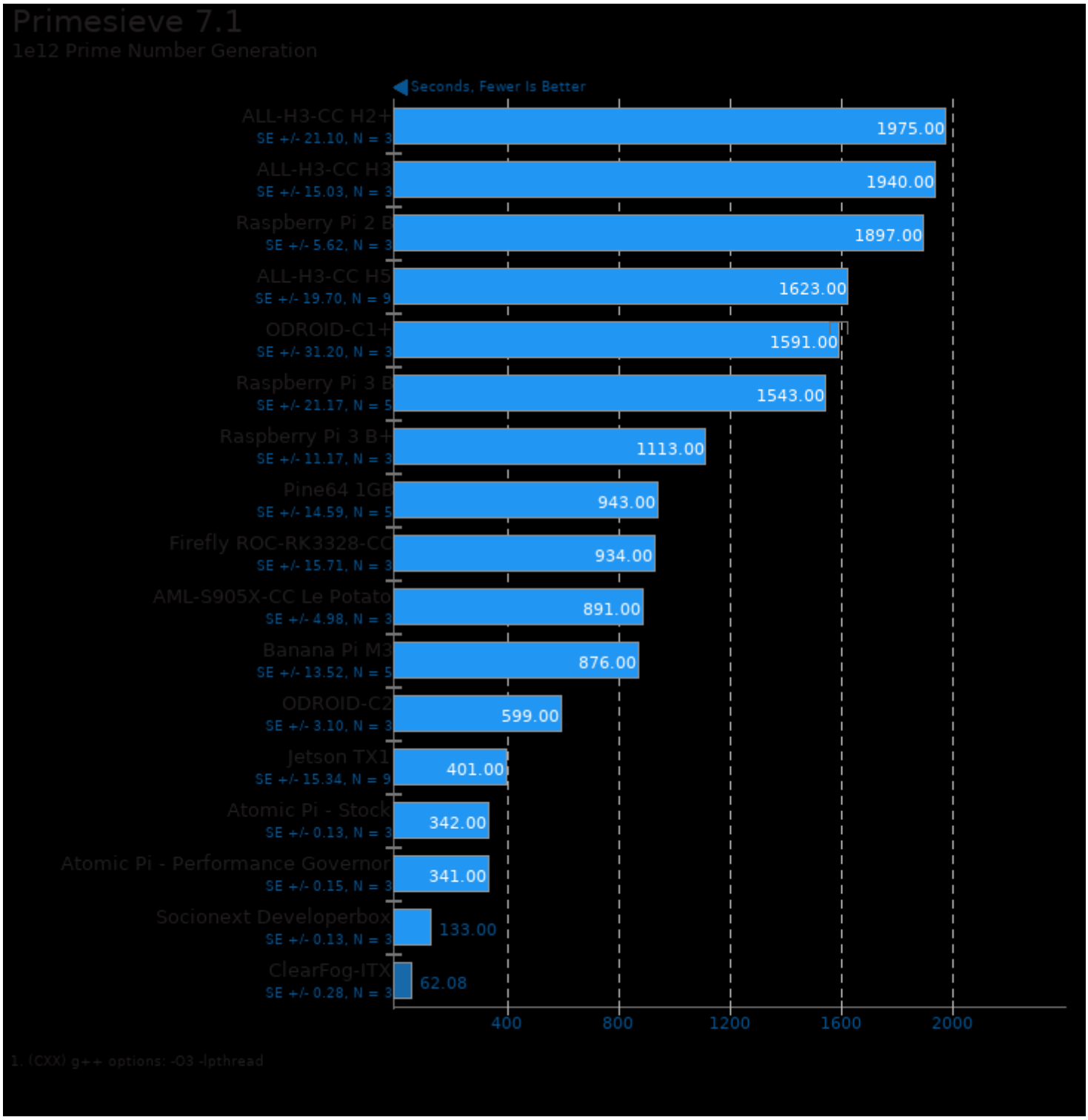


Various ARM Linux Benchmarks - Spetember 2018

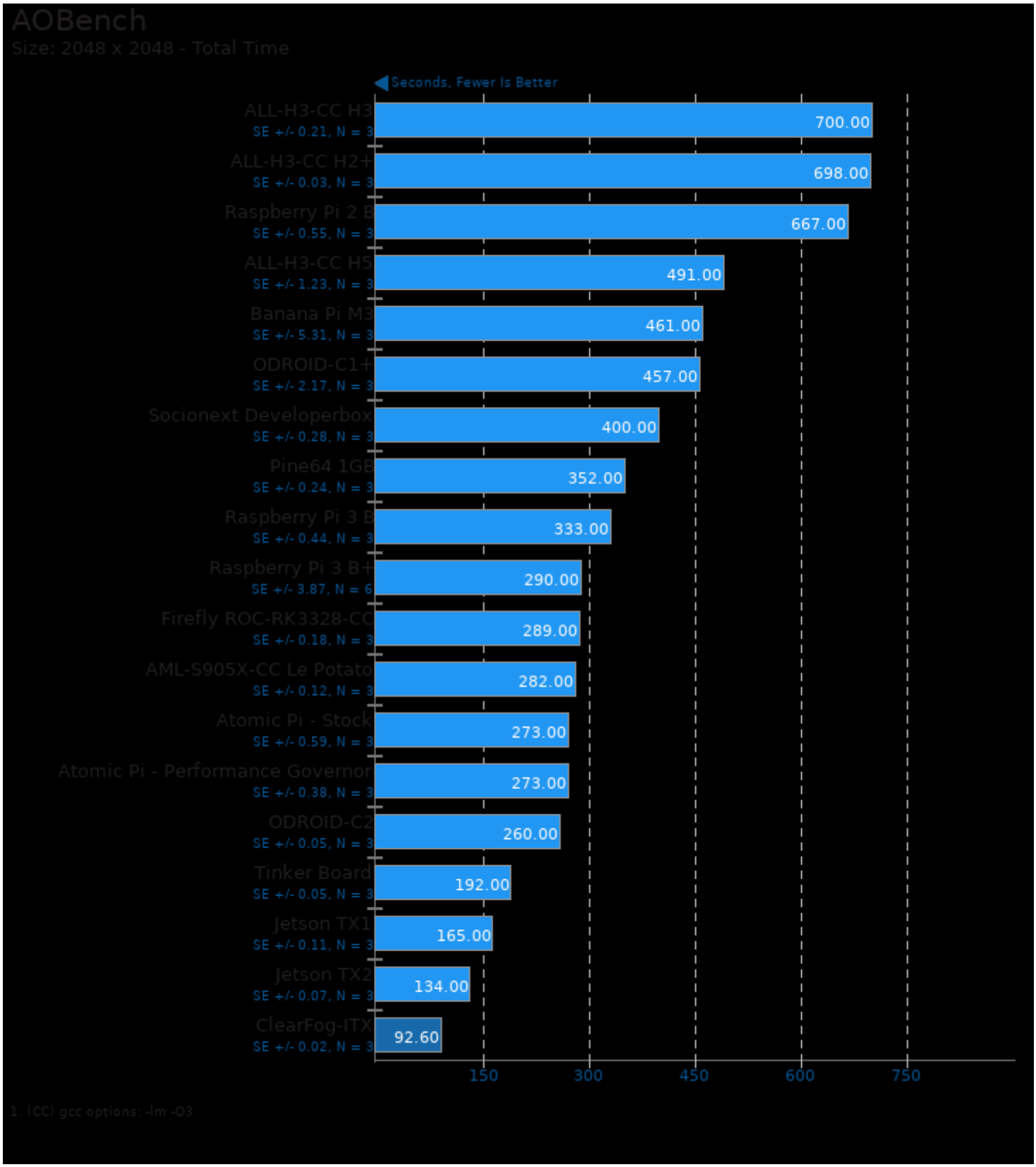



C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
Raspberry Pi 2 B
SE +/- 6.73, N = 3
4375
ALL-H3-CC H2+
SE +/- 6.17, N = 3
4166
ALL-H3-CC H3
SE +/- 1.59, N = 3
4156
ALL-H3-CC H5
SE +/- 5.10, N = 3
3088
ODROID-C1+
SE +/- 5.34, N = 3
2720
Raspberry Pi 3 B
SE +/- 16.16, N = 3
2357
Pine64 1GB
SE +/- 3.98, N = 3
2342
Raspberry Pi 3 B+
SE +/- 2.67, N = 3
2074
Firefly ROC-RK3328-CC
SE +/- 10.58, N = 3
1773
AML-S905X-CC Le Potato
SE +/- 2.44, N = 3
1755
Banana Pi M3
SE +/- 22.18, N = 3
1669
ODROID-C2
SE +/- 0.45, N = 3
1537
Atomic Pi - Stock
SE +/- 0.55, N = 3
1526
Atomic Pi - Performance Governor
SE +/- 0.61, N = 3
1526
Tinker Board
SE +/- 5.86, N = 3
1048
Jetson TX1
SE +/- 60.87, N = 9
851
Jetson TX2
SE +/- 60.69, N = 9
675
Socionext Developerbox
SE +/- 1.67, N = 3
391
ClearFog-ITX
SE +/- 3.80, N = 3
115
900
1800
2700
3600
4500
1. (CC) gcc options: -lm -lpthread -O3

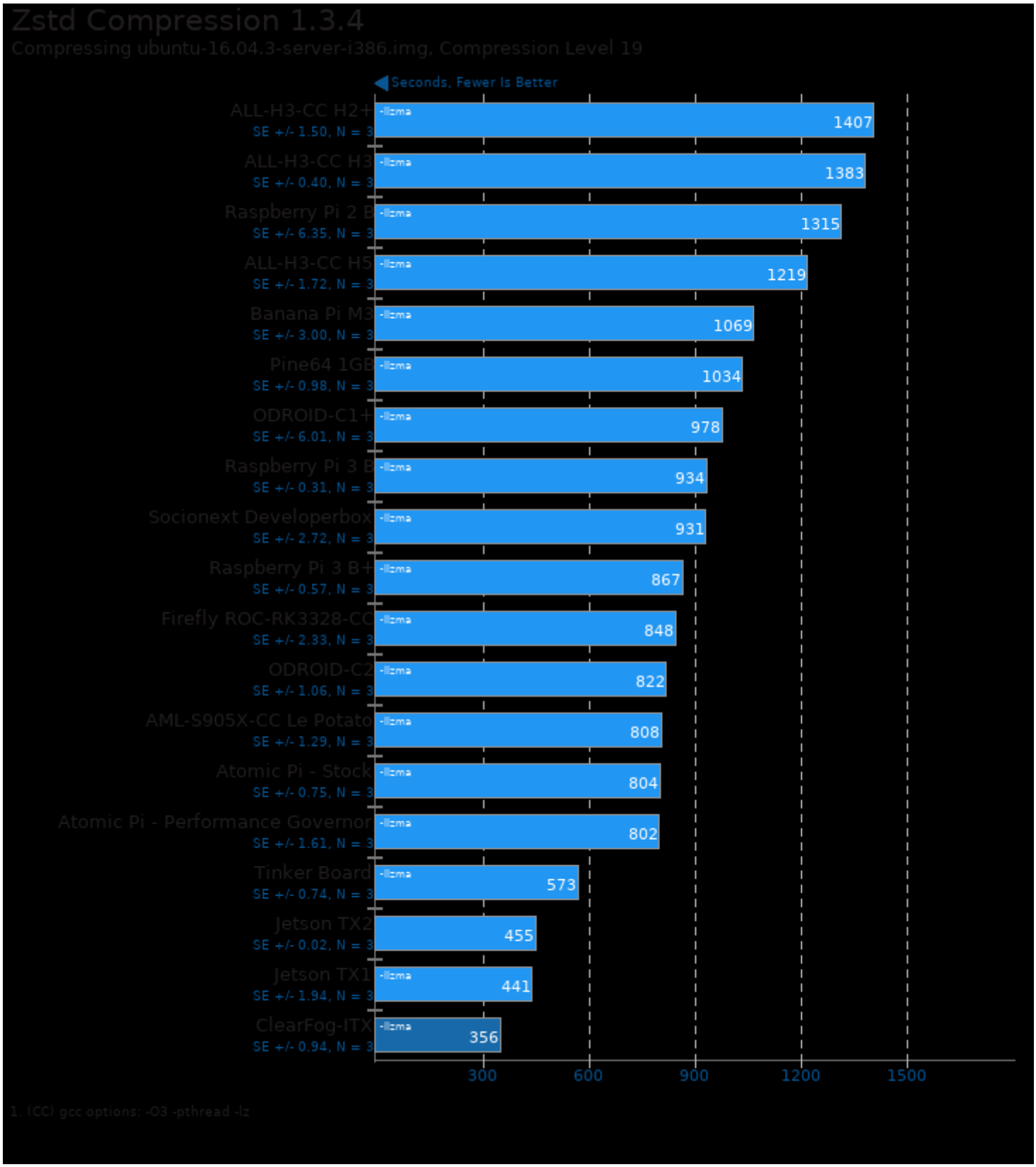
Various ARM Linux Benchmarks - Spetember 2018



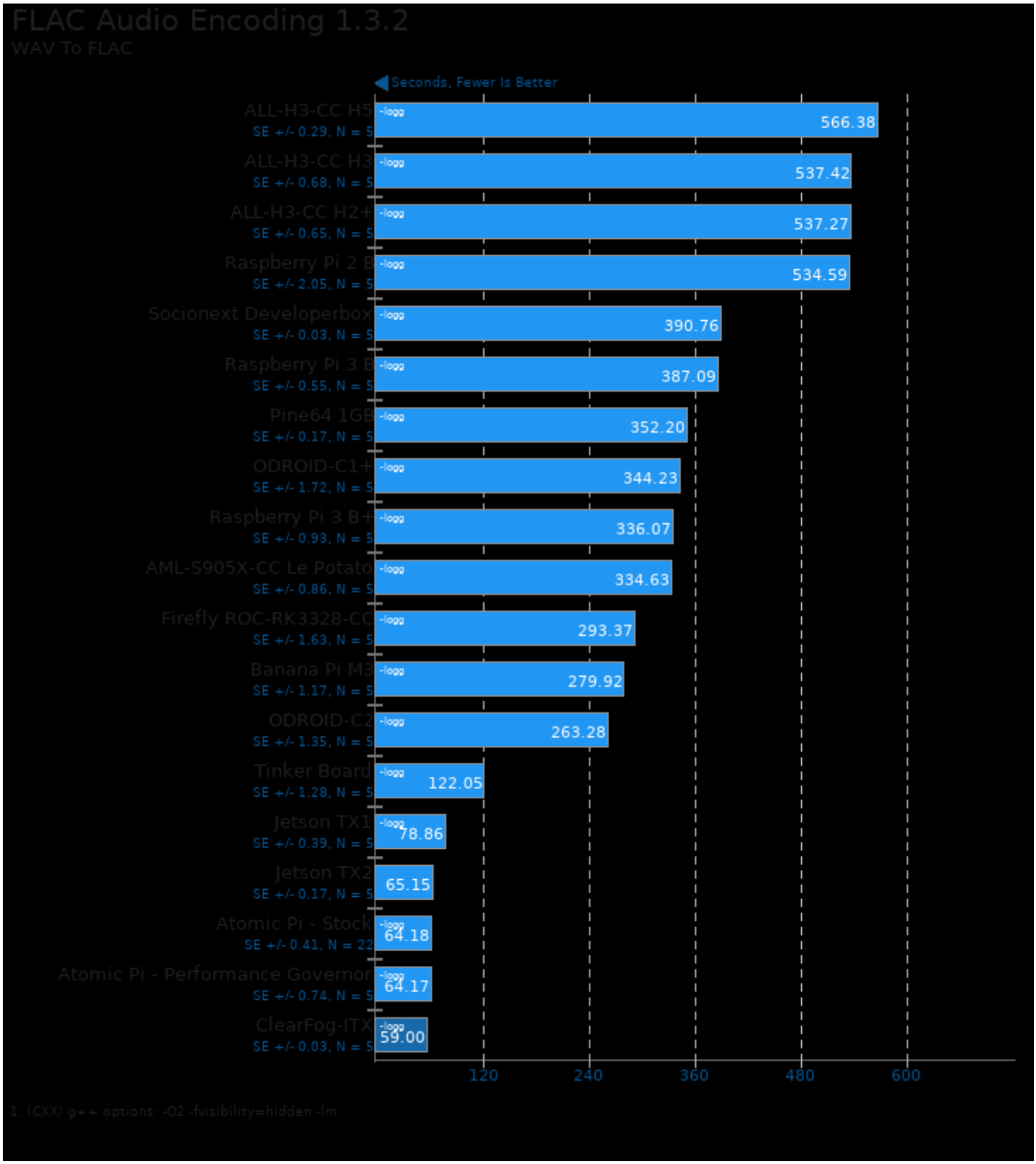
Various ARM Linux Benchmarks - Spetember 2018



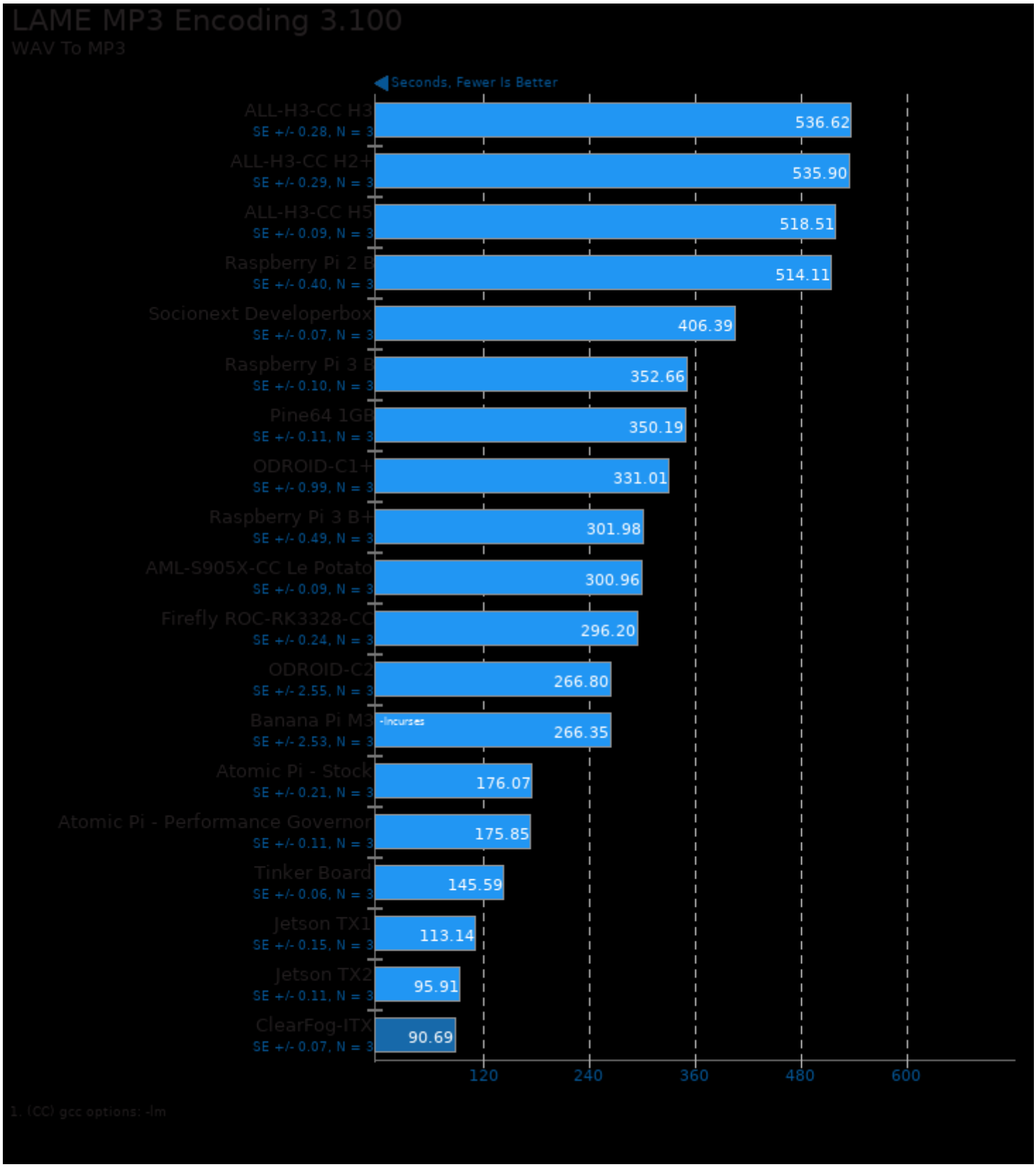
Various ARM Linux Benchmarks - Spetember 2018



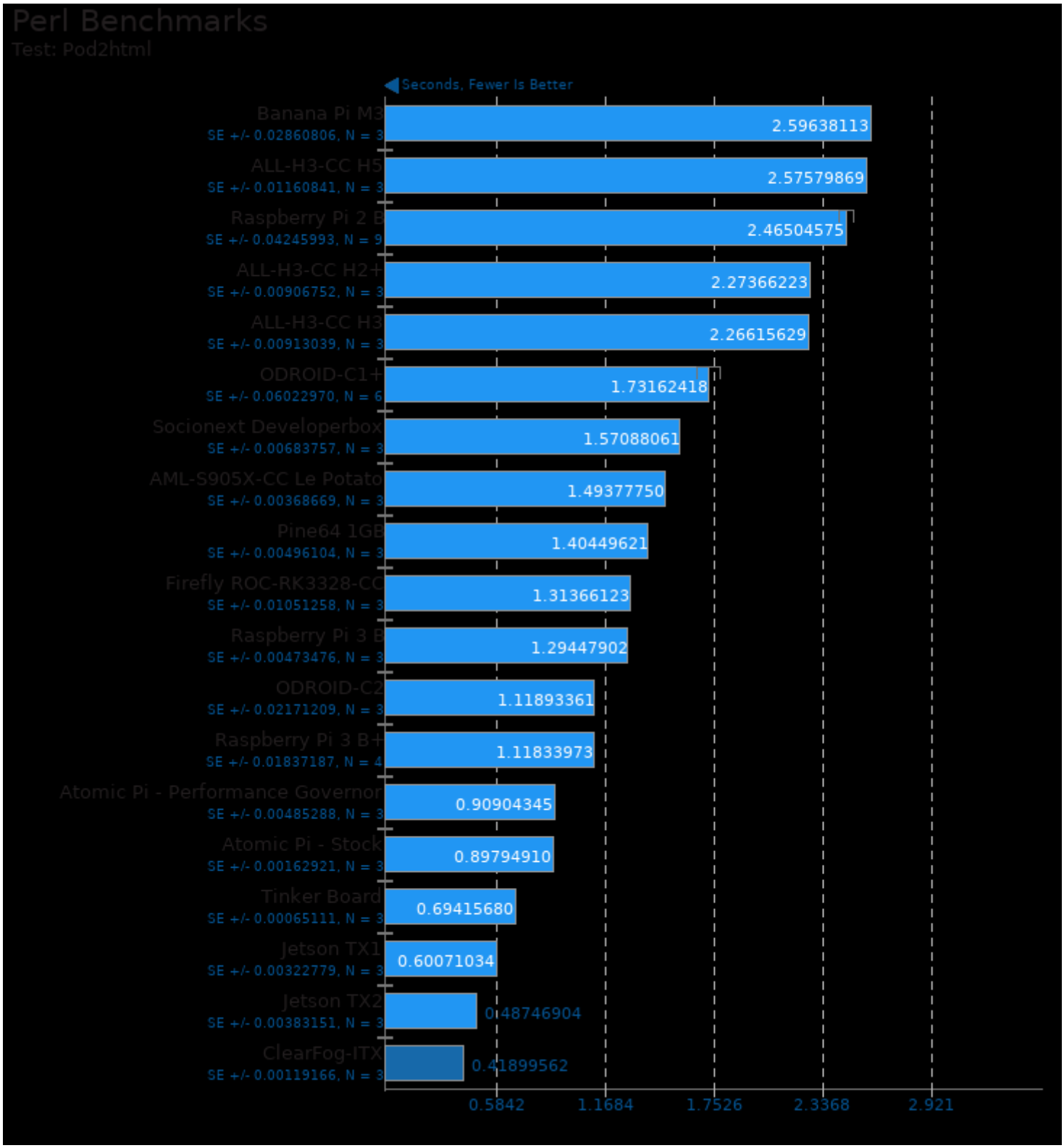
Various ARM Linux Benchmarks - Spetember 2018



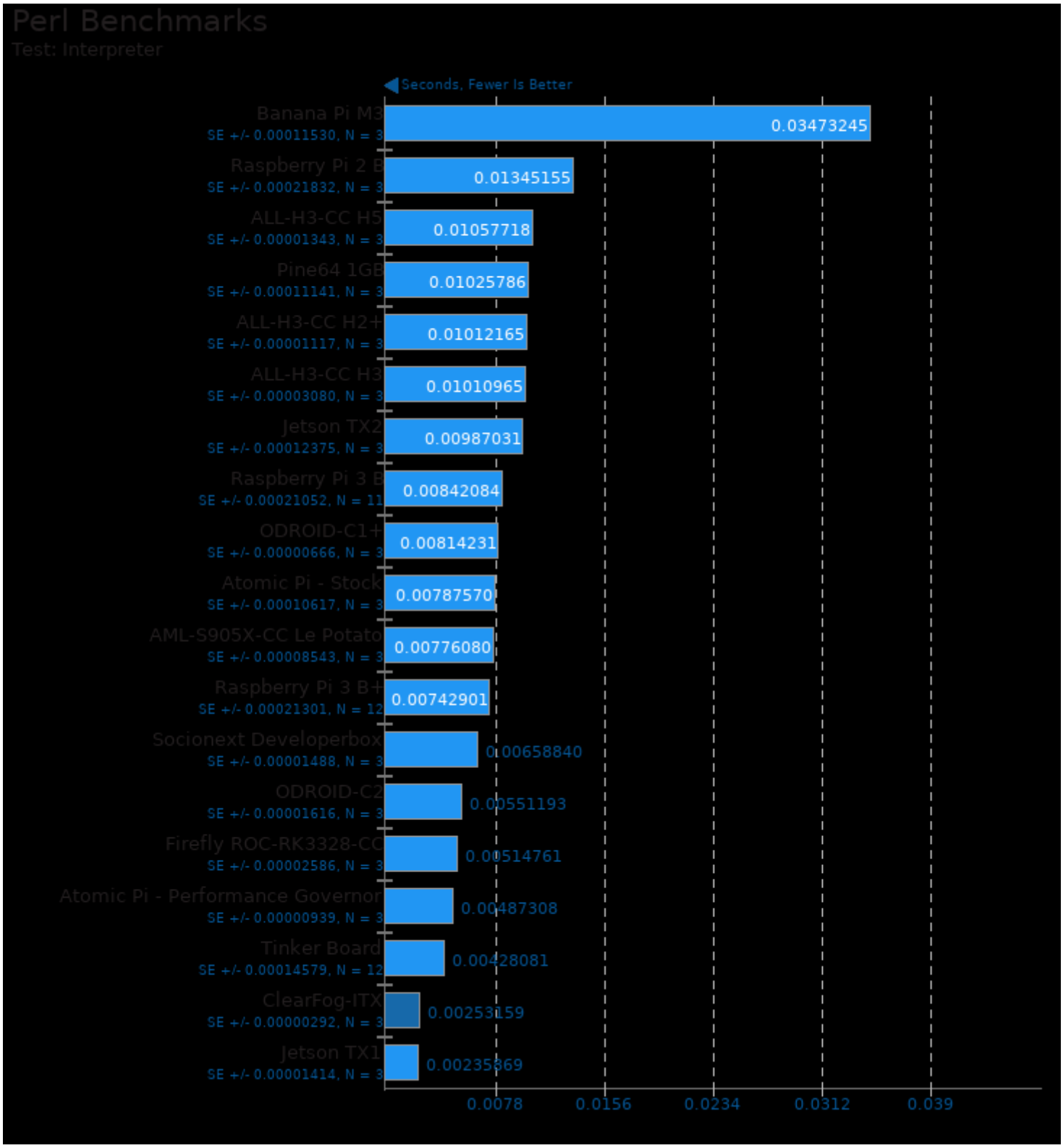
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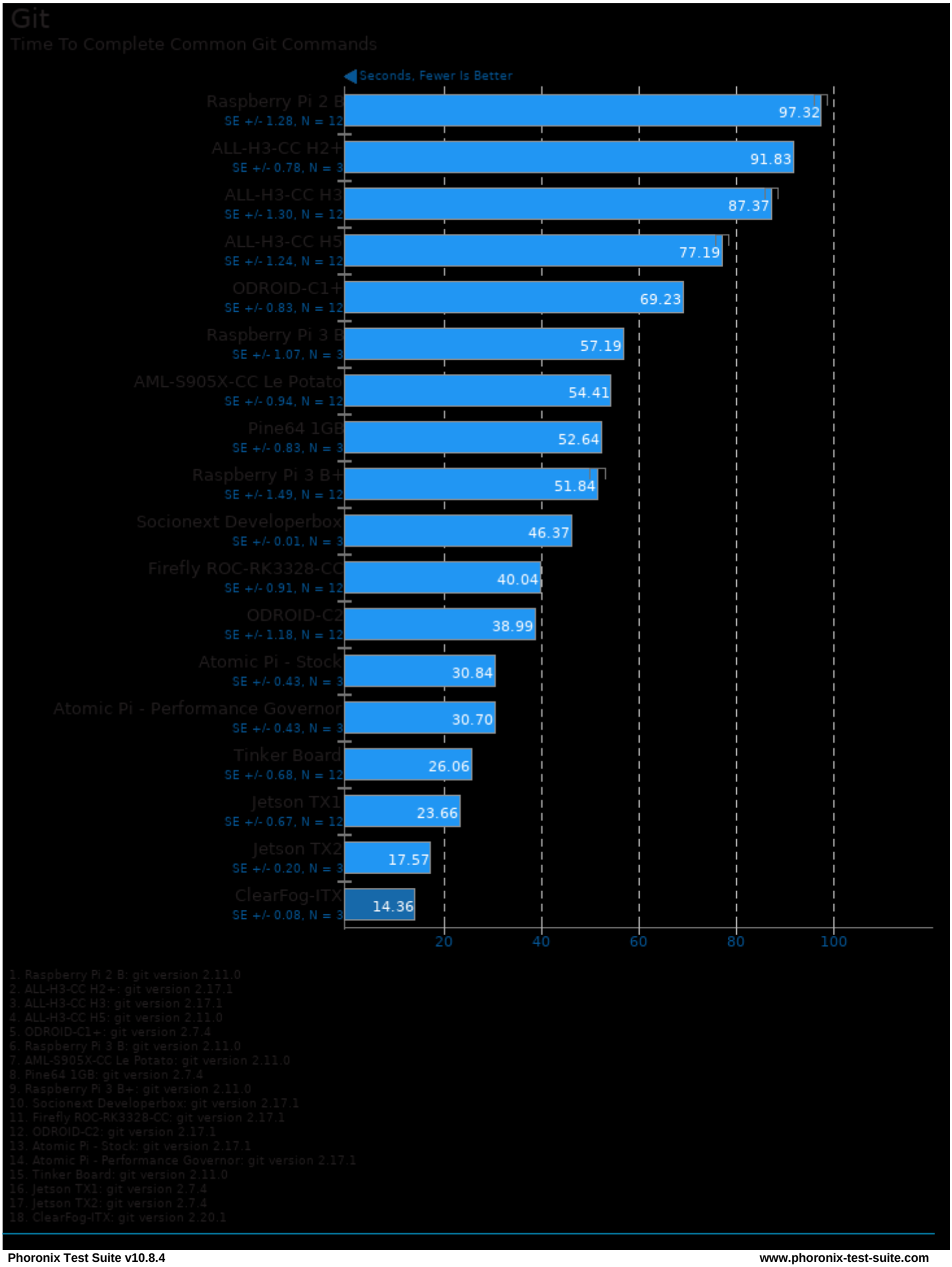
Various ARM Linux Benchmarks - Spetember 2018



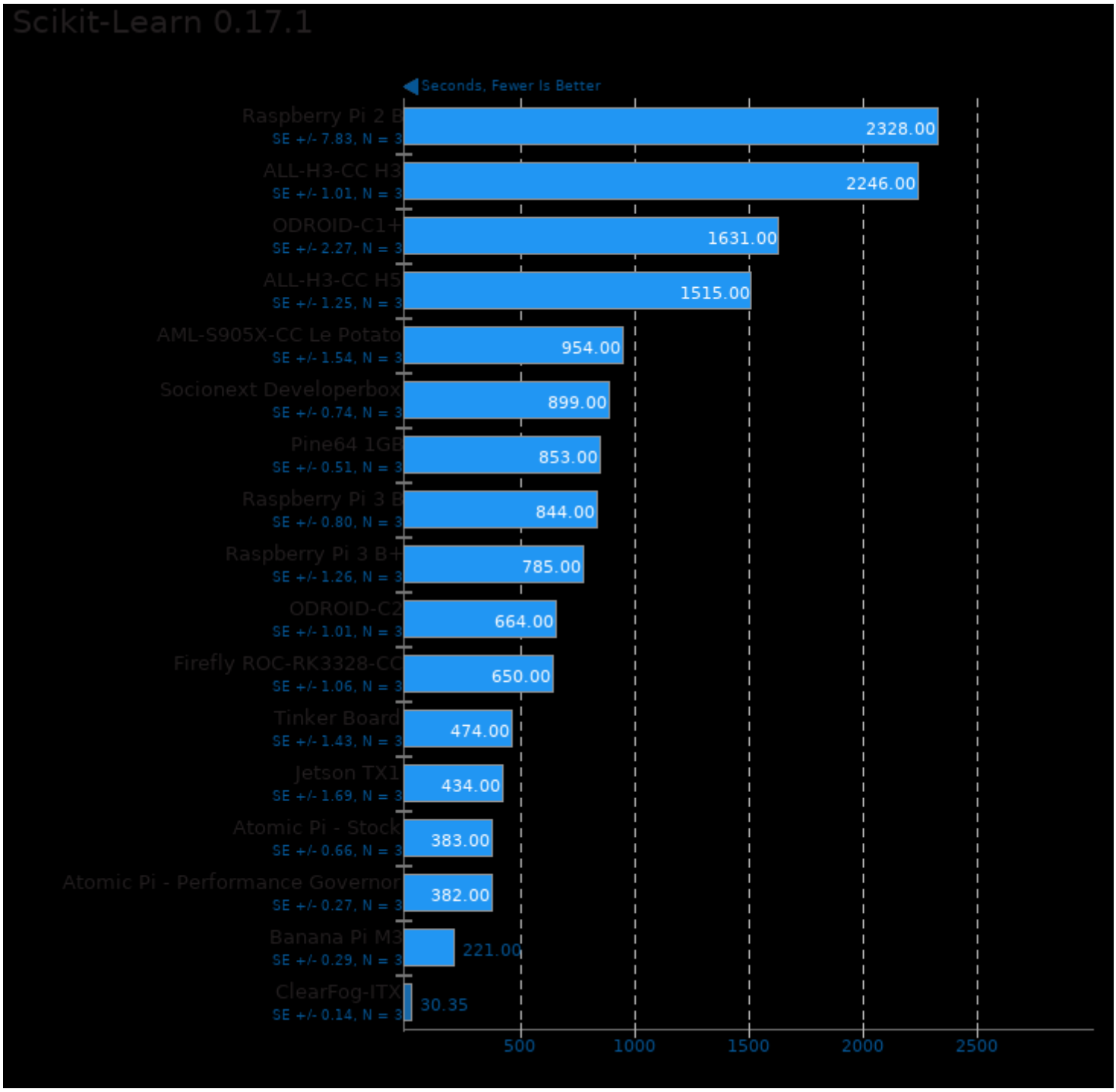
Various ARM Linux Benchmarks - Spetember 2018



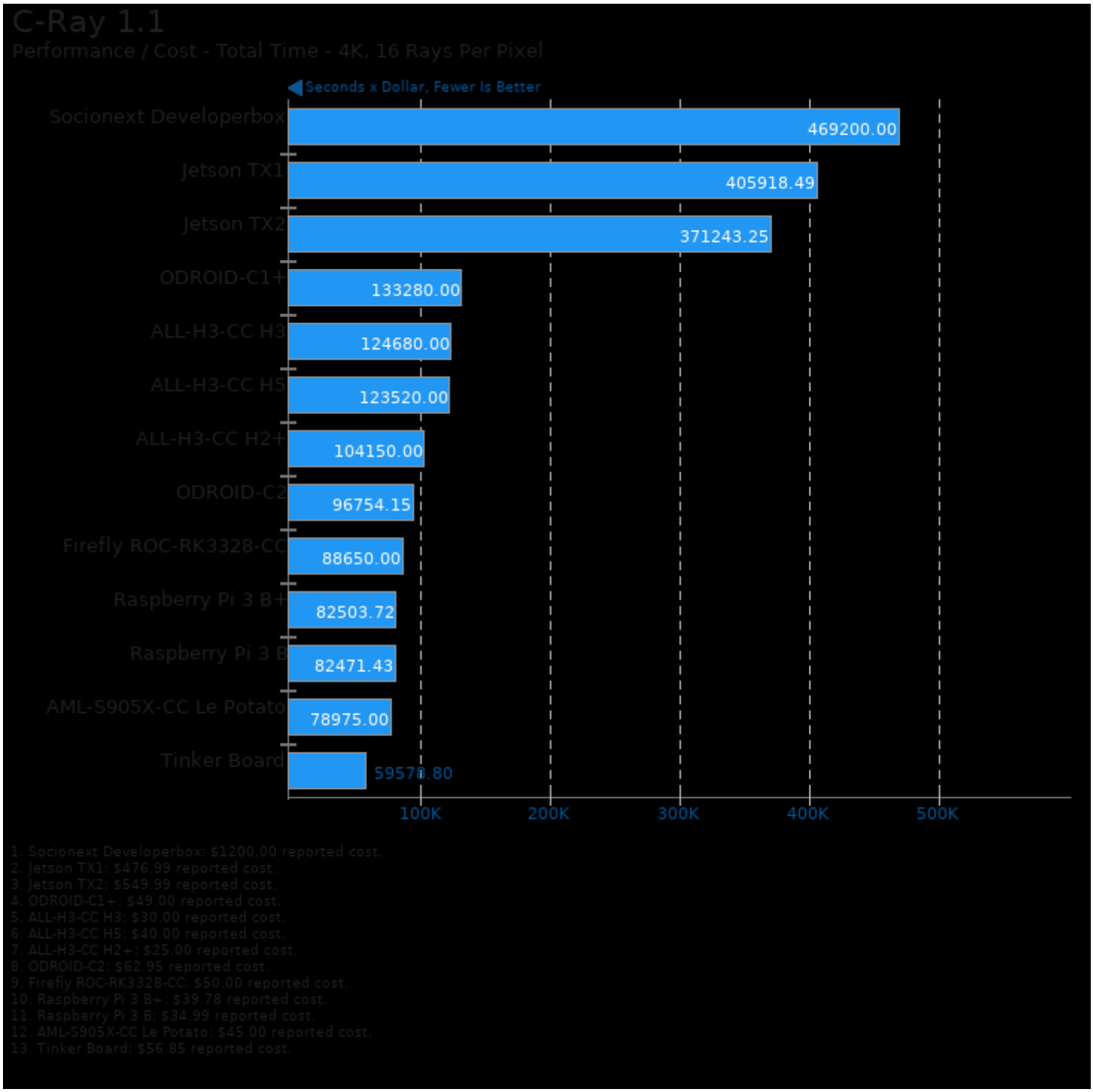
Various ARM Linux Benchmarks - Spetember 2018



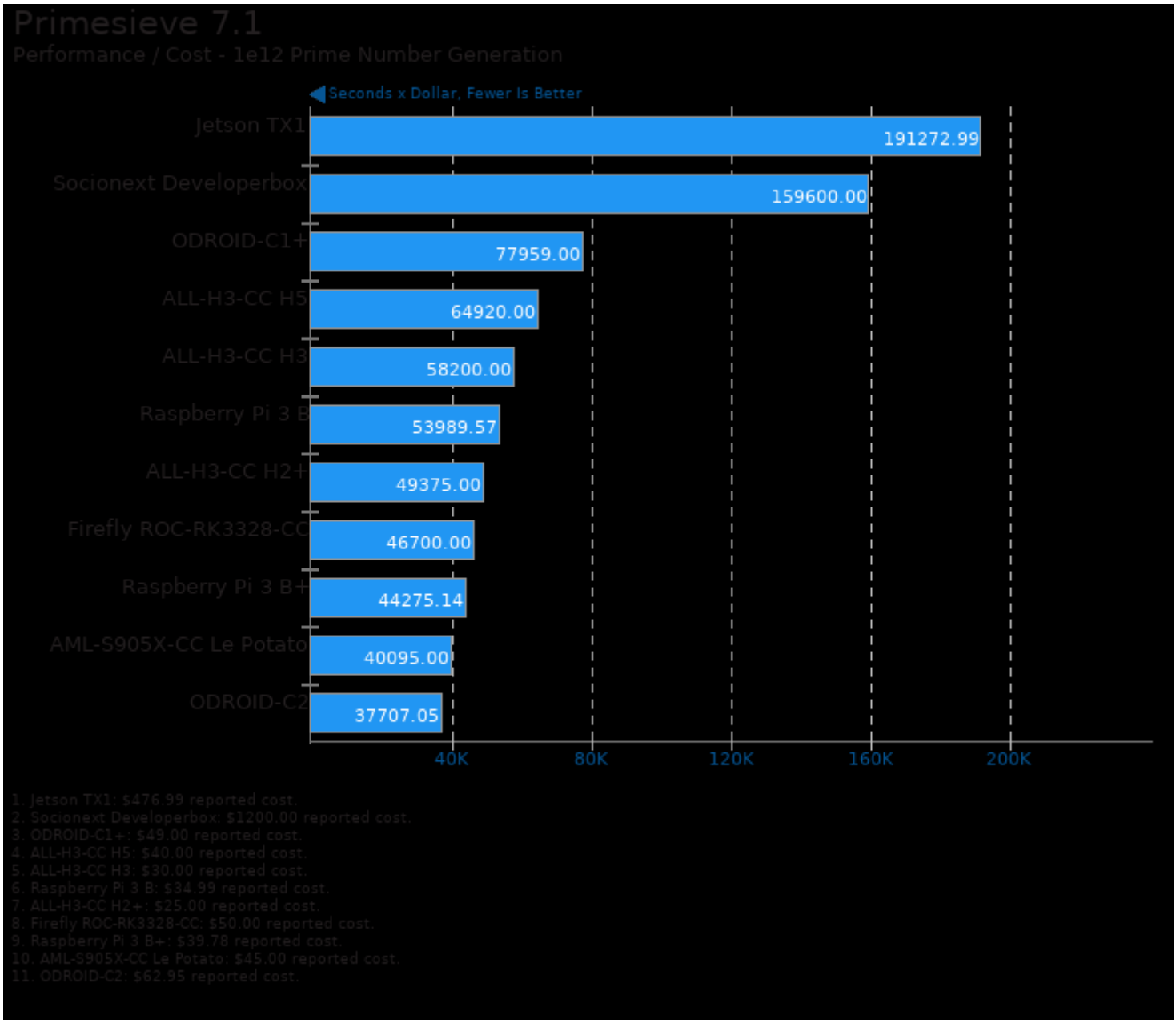
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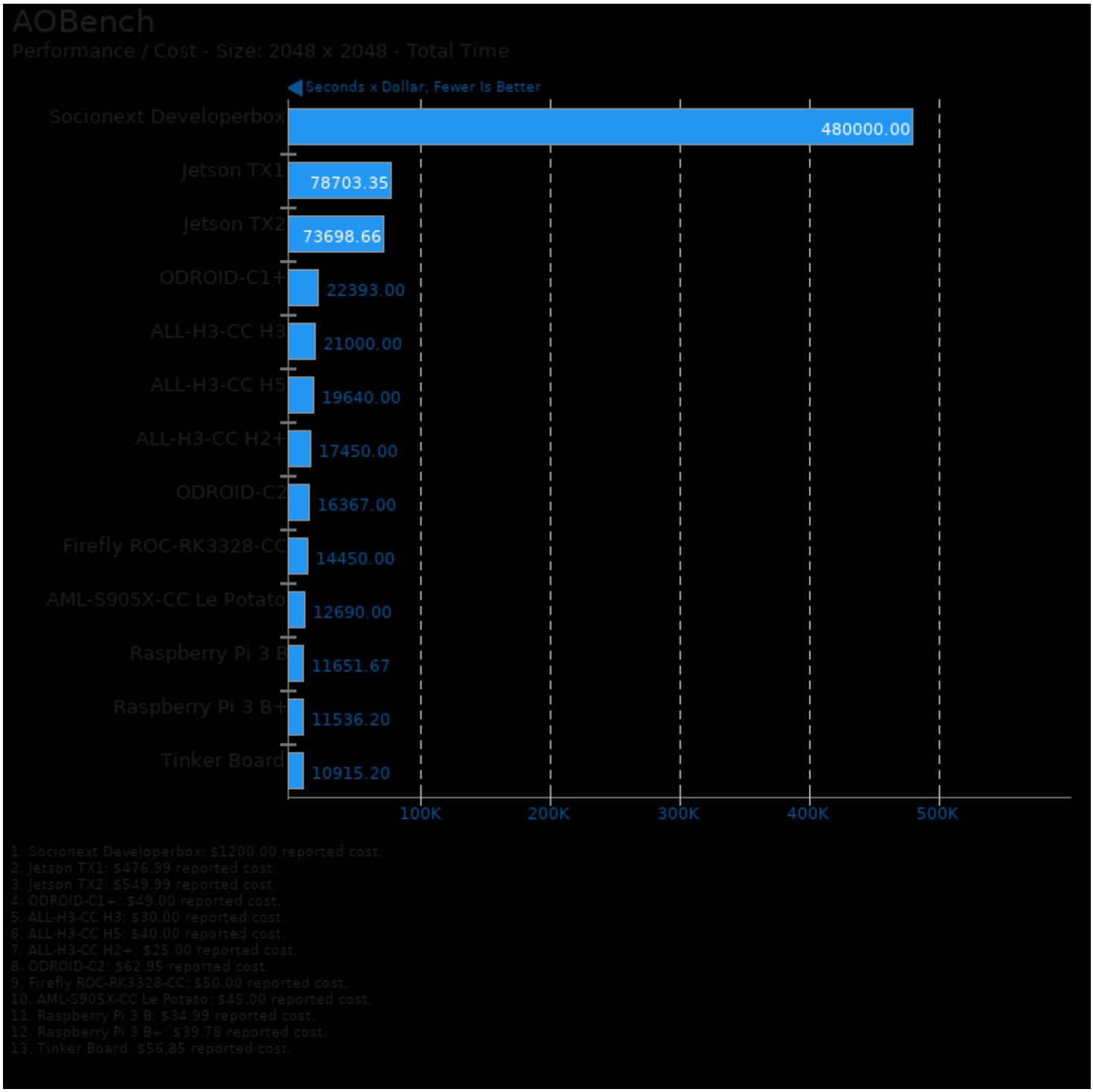
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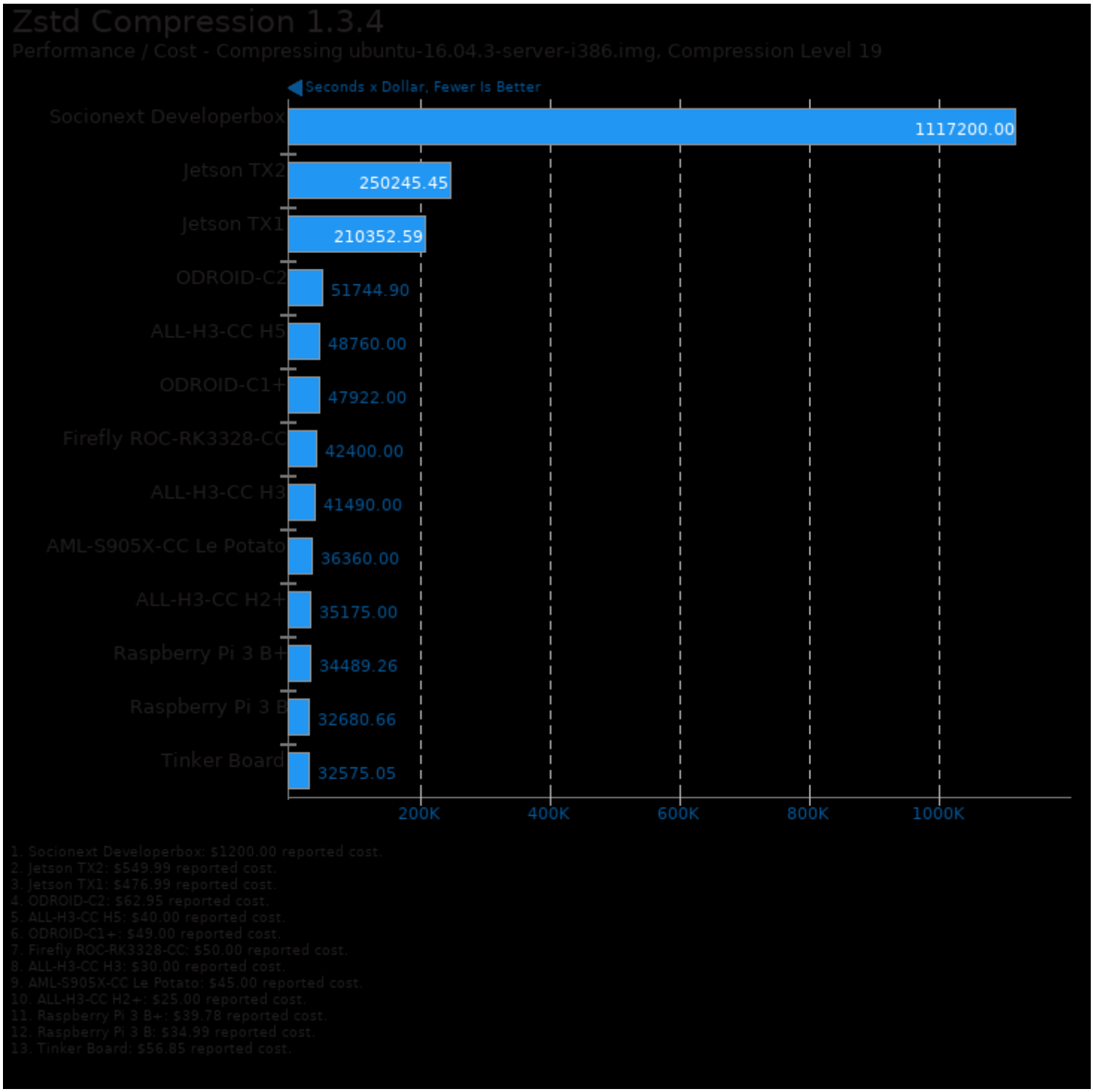
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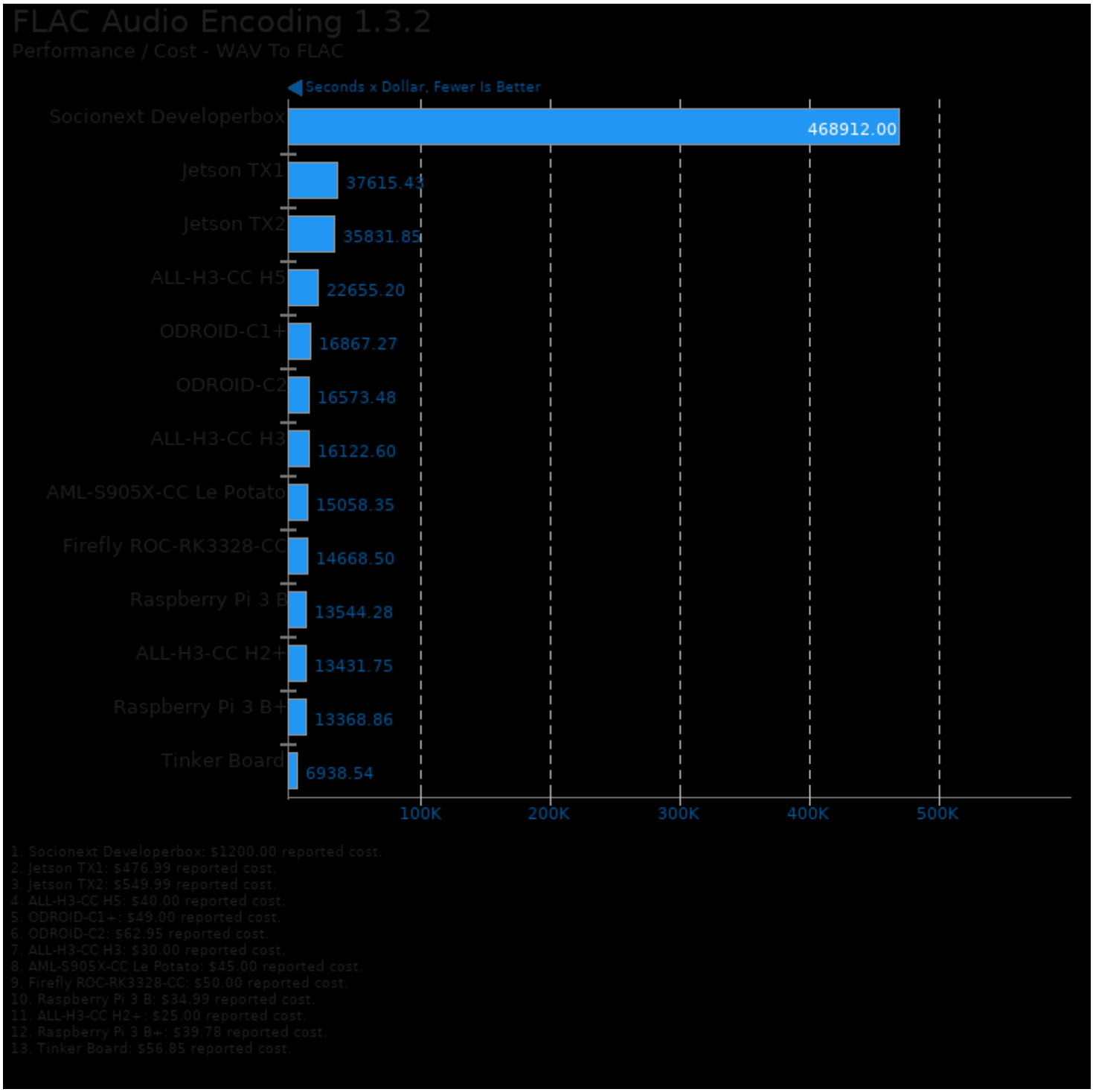
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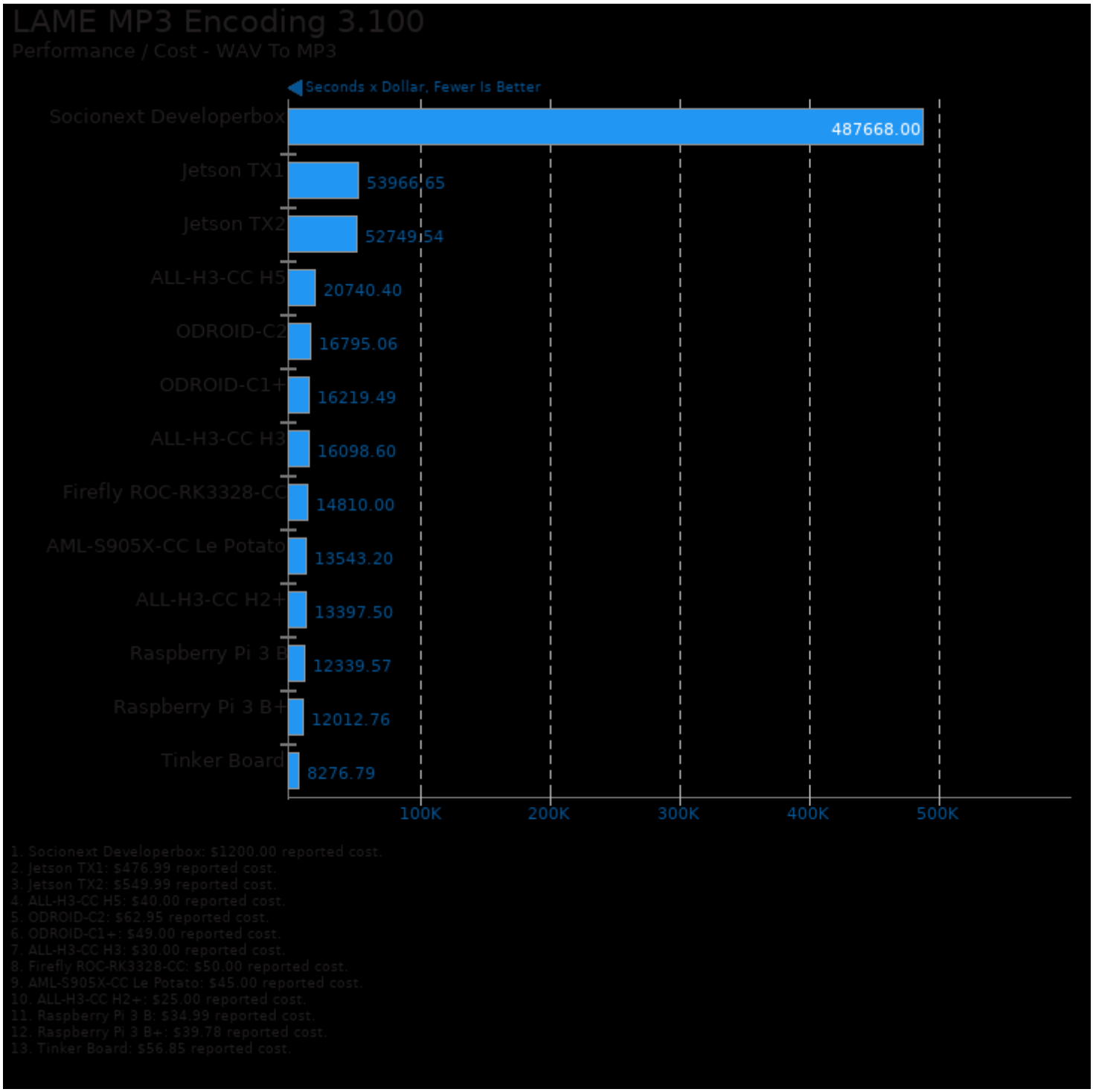
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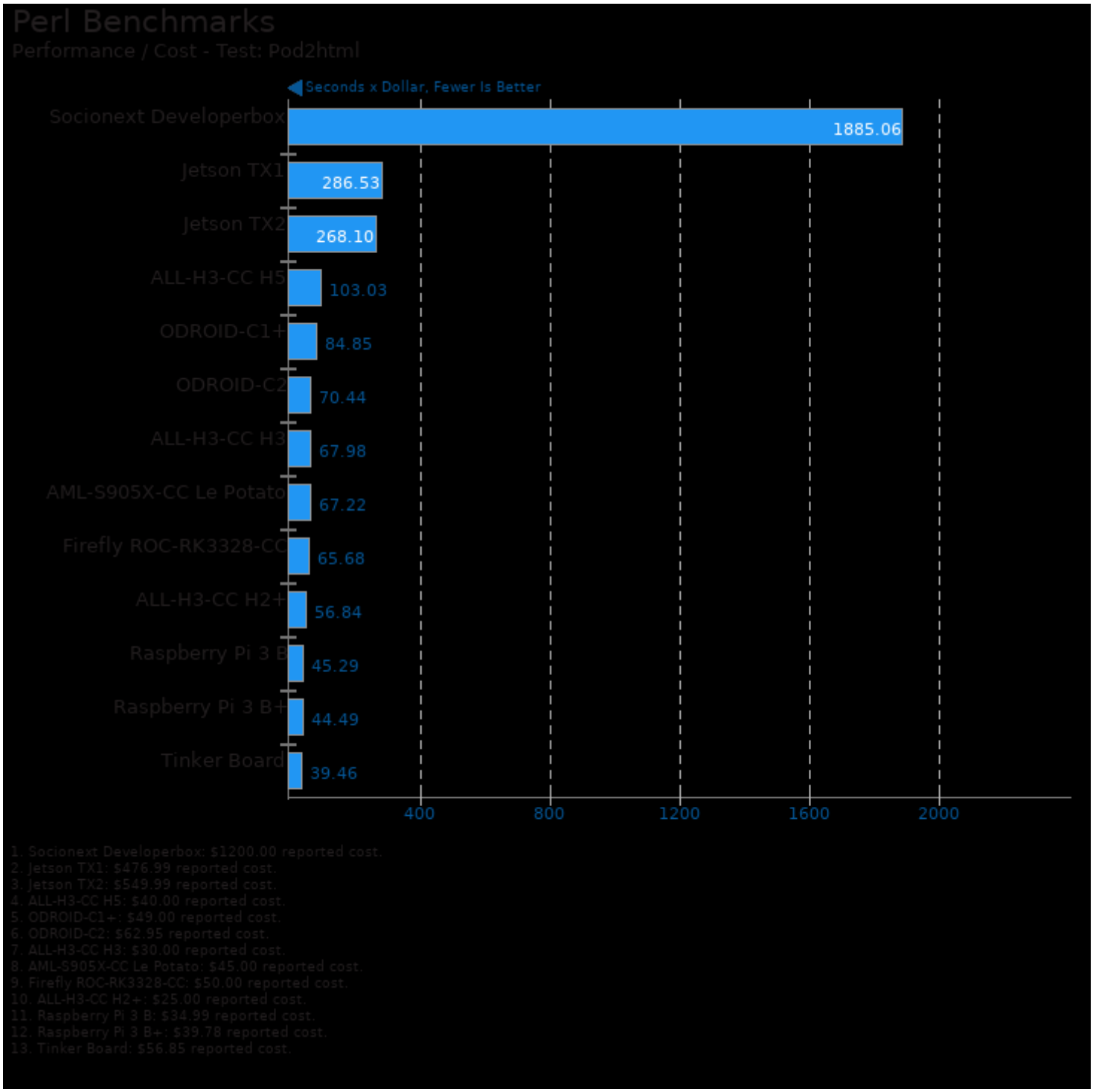
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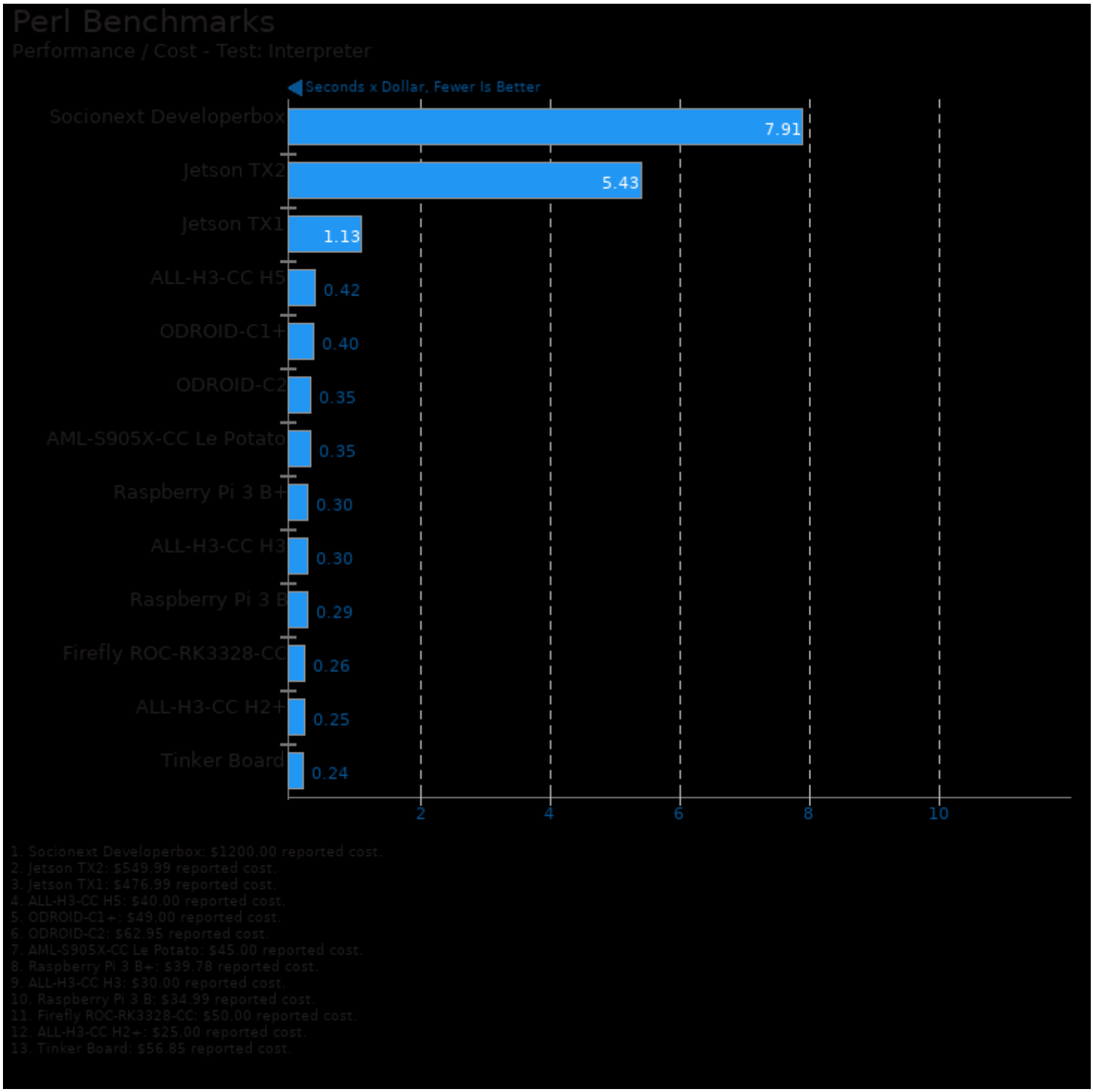
Various ARM Linux Benchmarks - Spetember 2018



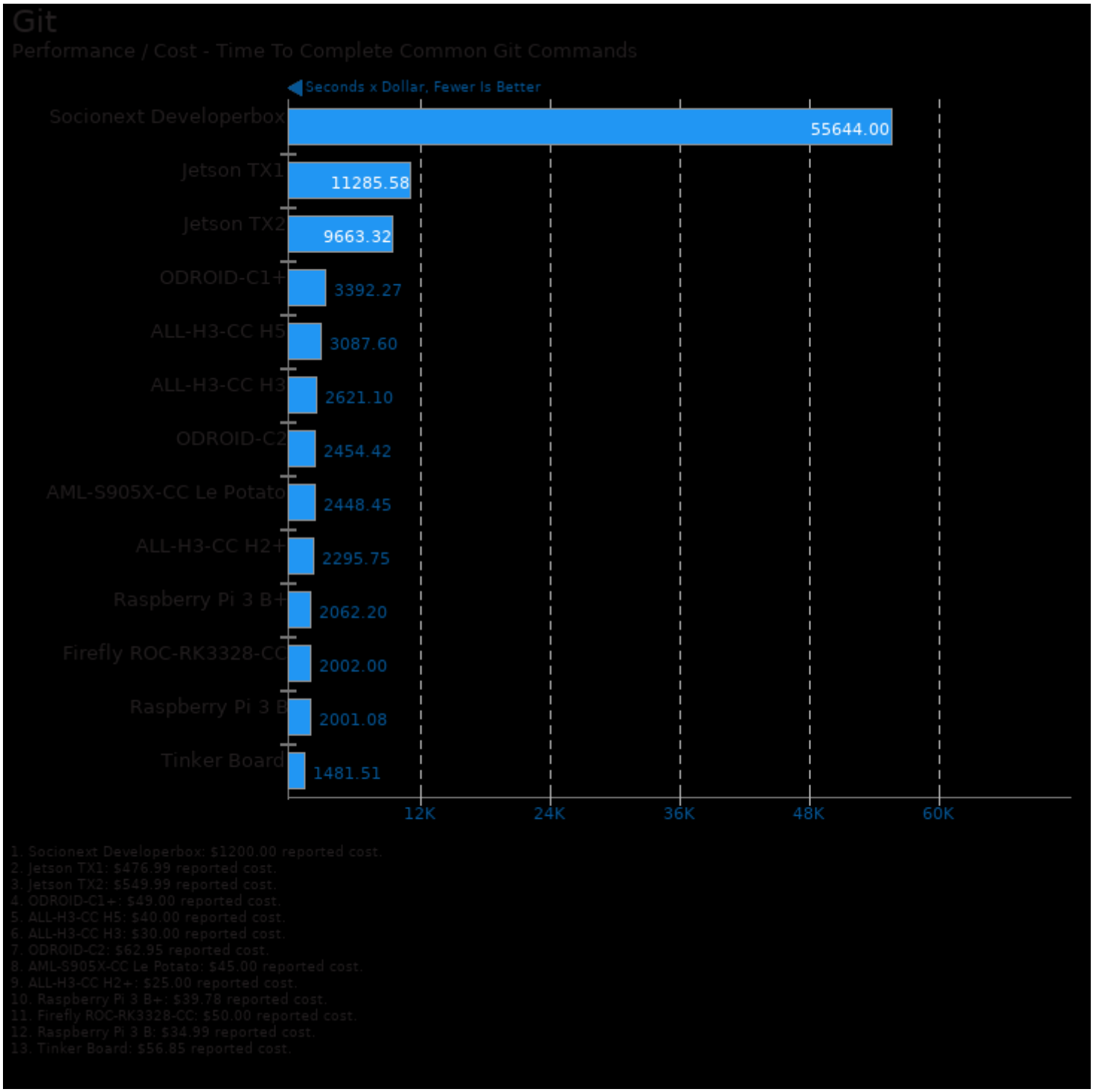
Various ARM Linux Benchmarks - Spetember 2018



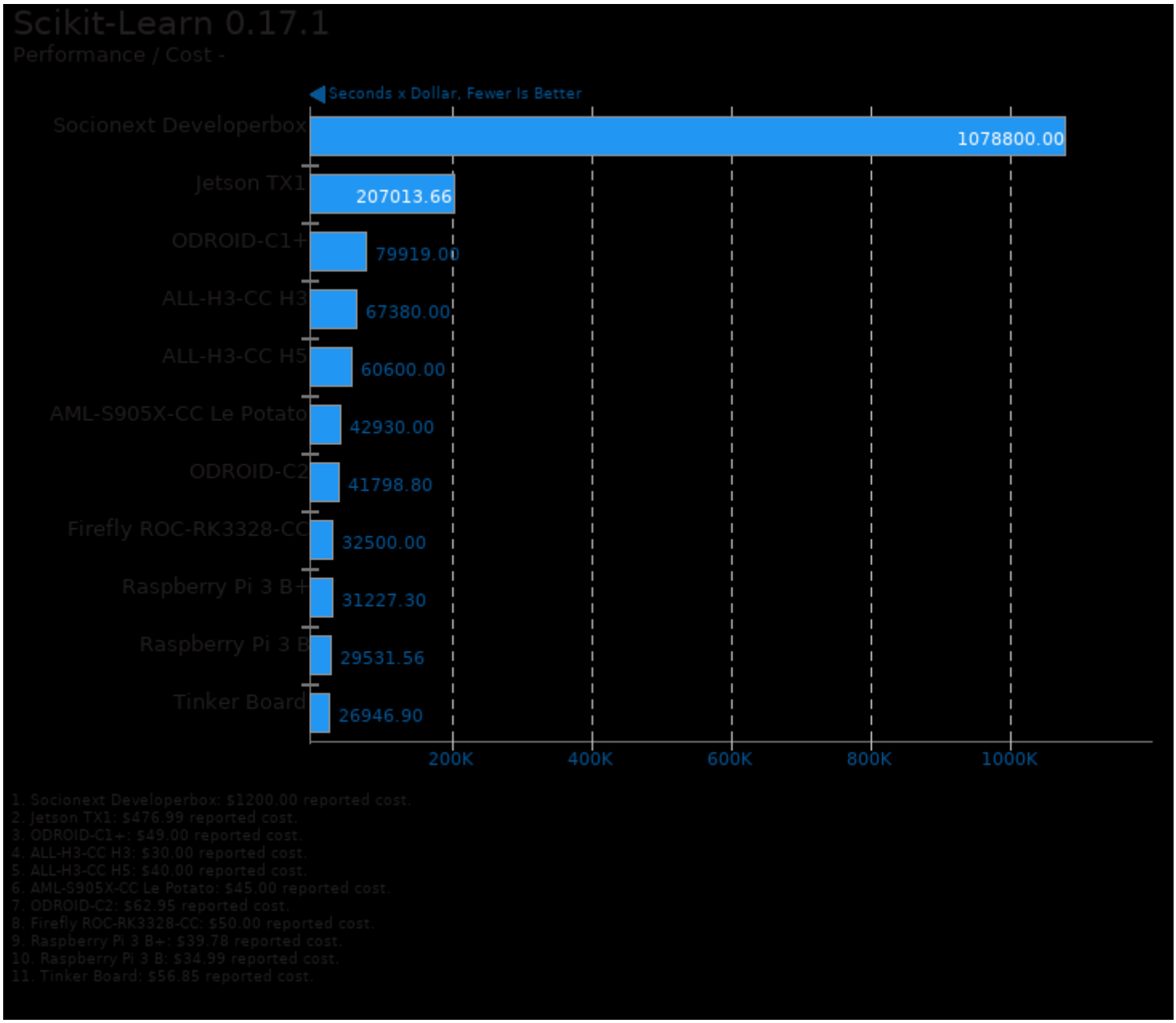
Various ARM Linux Benchmarks - Spetember 2018



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