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# Initial NVIDIA Jetson Xavier Linux Benchmarks

Various ARM board benchmarks... Tests for a future article on Phoronix.com by Michael Larabel with the NVIDIA Jetson Xavier.

## Test Systems:

### 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

# Initial NVIDIA Jetson Xavier Linux Benchmarks

## 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-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

## 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

## 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

## Jetson Xavier

Processor: ARMv8 rev 0 @ 1.19GHz (8 Cores), Motherboard: jetson-xavier, Memory: 16384MB, Disk: 31GB HBG4a2, Graphics: NVIDIA TEGRA

OS: Ubuntu 18.04, Kernel: 4.9.108-tegra (aarch64), Desktop: GNOME Shell 3.28.3, Display Server: X Server 1.19.6, Display Driver: NVIDIA 1.0.0, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1280x1440

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: tegra_cpufreq schedutil
Python Notes: Python 2.7.15rc1 + Python 3.6.6

## C2D

Processor: Intel Core 2 Duo T7100 @ 1.80GHz (2 Cores), Motherboard: TOSHIBA Portable PC (Version 1.40 BIOS), Chipset: Intel Mobile PM965/GM965/GL960 + ICH8M, Memory: 2048MB, Disk: 120GB FUJITSU MHW2120B, Graphics: Intel 965GM 384MB, Audio: Realtek ALC262, Network: Intel 82566MC Gigabit Connection + Intel PRO/Wireless

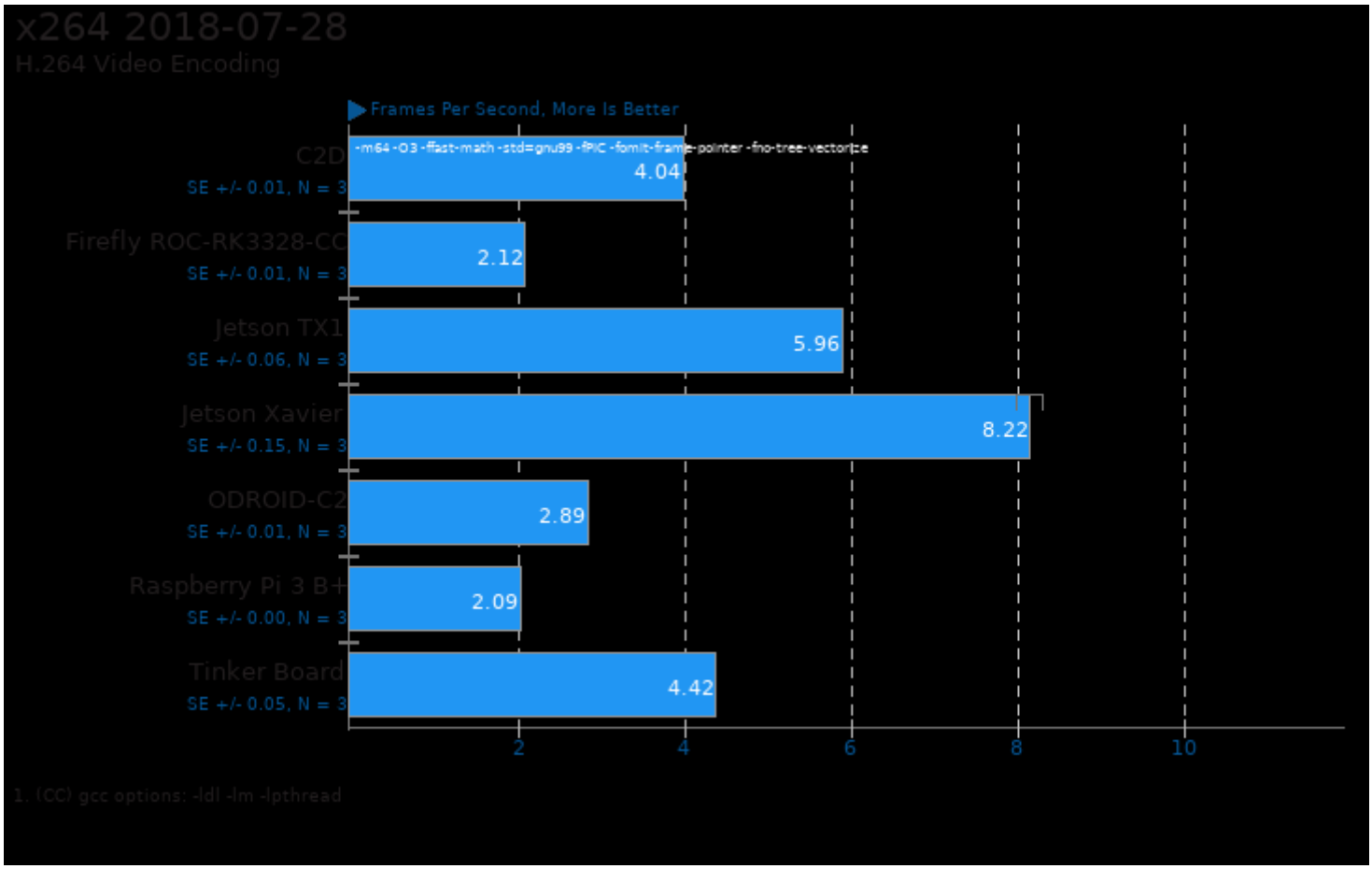
OS: Ubuntu 18.04, Kernel: 4.15.0-39-generic (x86_64), Desktop: GNOME Shell 3.28.3, Display Server: X Server 1.19.6, Display Driver: modesetting 1.19.6, OpenGL: 2.1 Mesa 18.0.5, Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1280x800

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 ondemand
Security Notes: KPTI + __user pointer sanitization + Full generic retpoline + PTE Inversion; VMX: EPT disabled

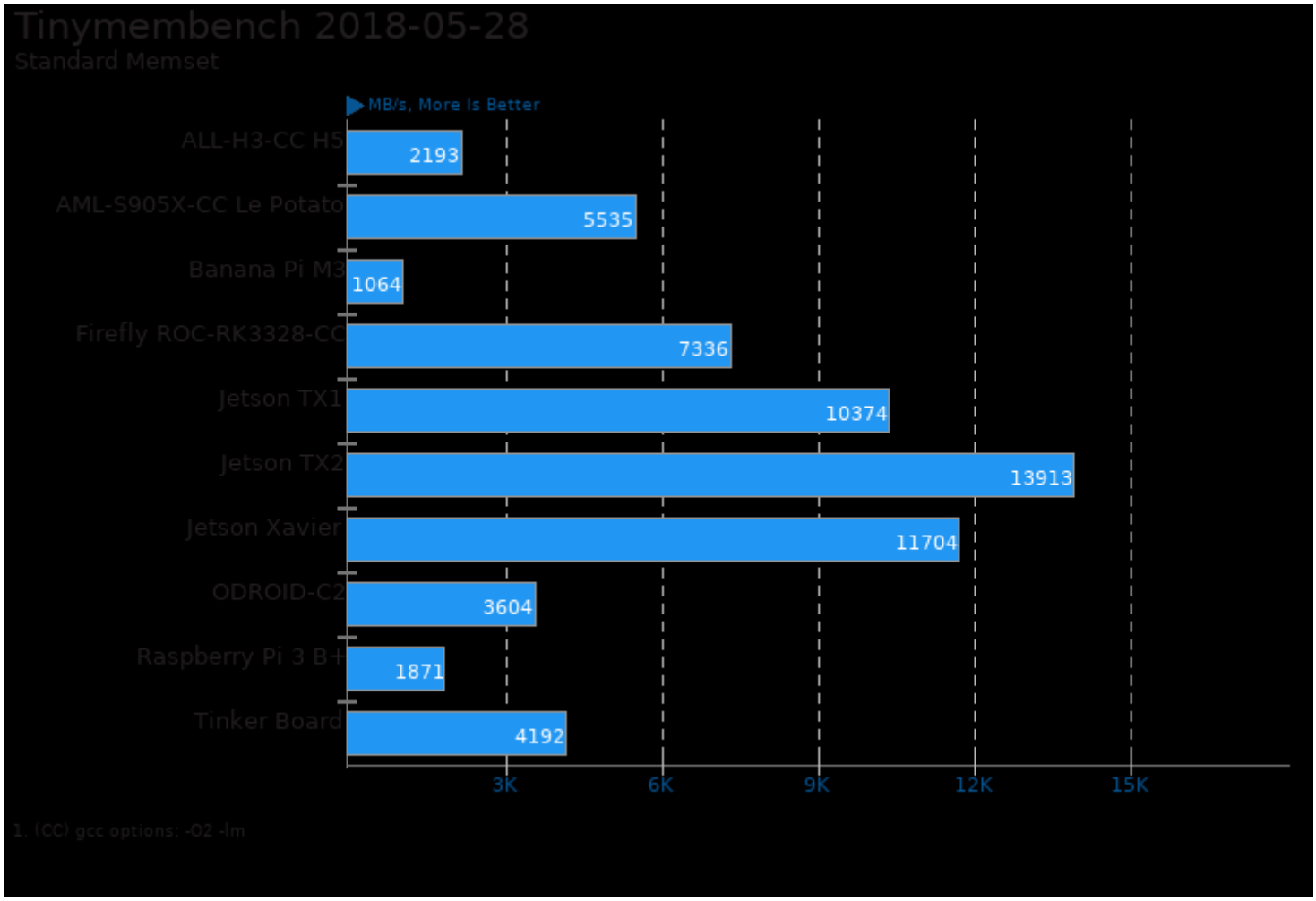
| | ALL-H3-CC H5 | AML-S905X-CC Le Potato | Banana Pi M3 | Firefly ROC-RK3328-CC | Jetson TX1 | Jetson TX2 | ODROID-C2 | Raspberry Pi 3 B+ | Tinker Board | Jetson Xavier | C2D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **x264 - H.2.V.E (FPS)** | | | | 2.12 | 5.96 | | 2.89 | **2.09** | 4.42 | **8.22** | 4.04 |
| **Normalized** | | | | 25.79% | 72.51% | | 35.16% | 25.43% | 53.77% | 100% | 49.15% |
| **Standard Deviation** | | | | 0.5% | 1.7% | | 0.5% | 0.3% | 2% | 3.2% | 0.2% |
| **Tinymembench - Standard Memset (MB/s)** | 2193 | 5535 | **1064** | 7336 | 10374 | **13913** | 3604 | 1871 | 4192 | 11704 | |
| **Normalized** | 15.76% | 39.78% | 7.65% | 52.73% | 74.56% | 100% | 25.9% | 13.45% | 30.13% | 84.12% | |

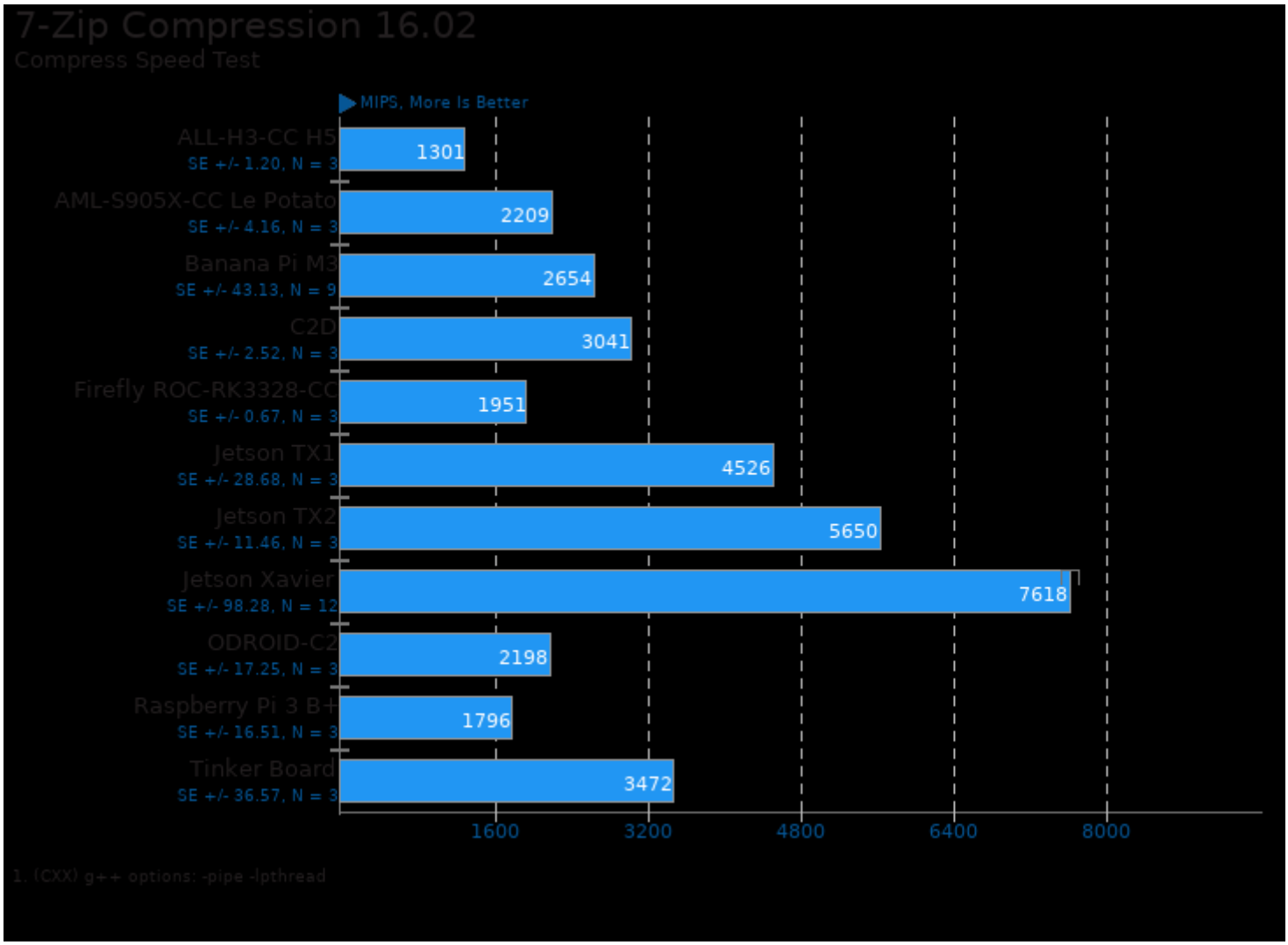
# Initial NVIDIA Jetson Xavier Linux Benchmarks

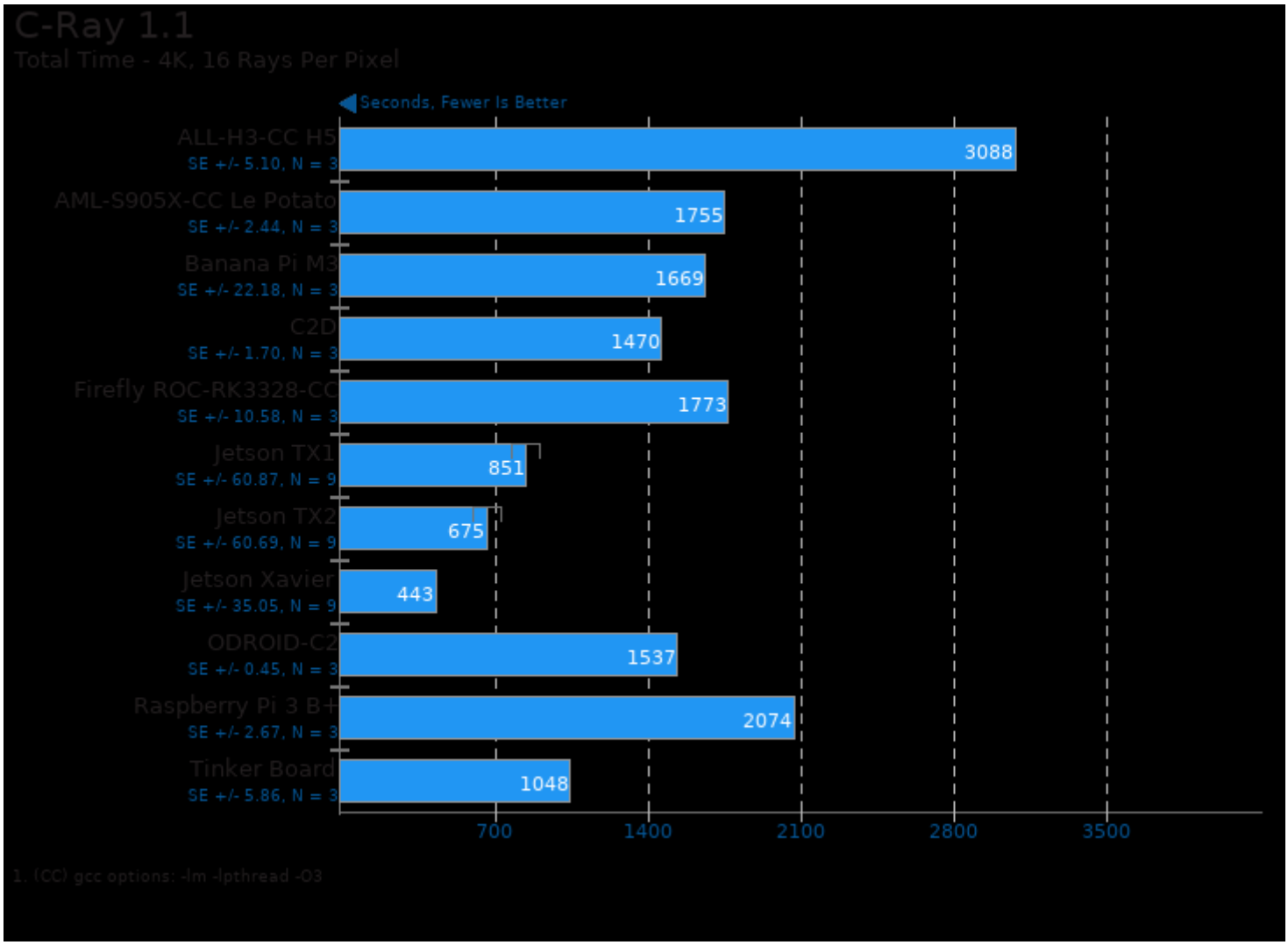
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **7-Zip Compression -** | **1301** | 2209 | 2654 | 1951 | 4526 | 5650 | 2198 | 1796 | 3472 | **7618** | 3041 |
| **Normalized** | 17.08% | 29% | 34.84% | 25.61% | 59.41% | 74.17% | 28.85% | 23.58% | 45.58% | 100% | 39.92% |
| **Standard Deviation** | 0.2% | 0.3% | 4.9% | 0.1% | 1.1% | 0.4% | 1.4% | 1.6% | 1.8% | 4.5% | 0.1% |
| **C-Ray - Total Time - 4.1.R.P.P (sec)** | **3088** | 1755 | 1669 | 1773 | 851 | 675 | 1537 | 2074 | 1048 | **443** | 1470 |
| **Normalized** | 14.35% | 25.24% | 26.54% | 24.99% | 52.06% | 65.63% | 28.82% | 21.36% | 42.27% | 100% | 30.14% |
| **Standard Deviation** | 0.3% | 0.2% | 2.3% | 1% | 21.5% | 27% | 0.1% | 0.2% | 1% | 23.7% | 0.2% |
| **Primesieve - 1.P.N.G (sec)** | **1623** | 891 | 876 | 934 | 401 | | 599 | 1113 | | **259** | 443 |
| **Normalized** | 15.96% | 29.07% | 29.57% | 27.73% | 64.59% | | 43.24% | 23.27% | | 100% | 58.47% |
| **Standard Deviation** | 3.6% | 1% | 3.5% | 2.9% | 11.5% | | 0.9% | 1.7% | | 7.8% | 0.1% |

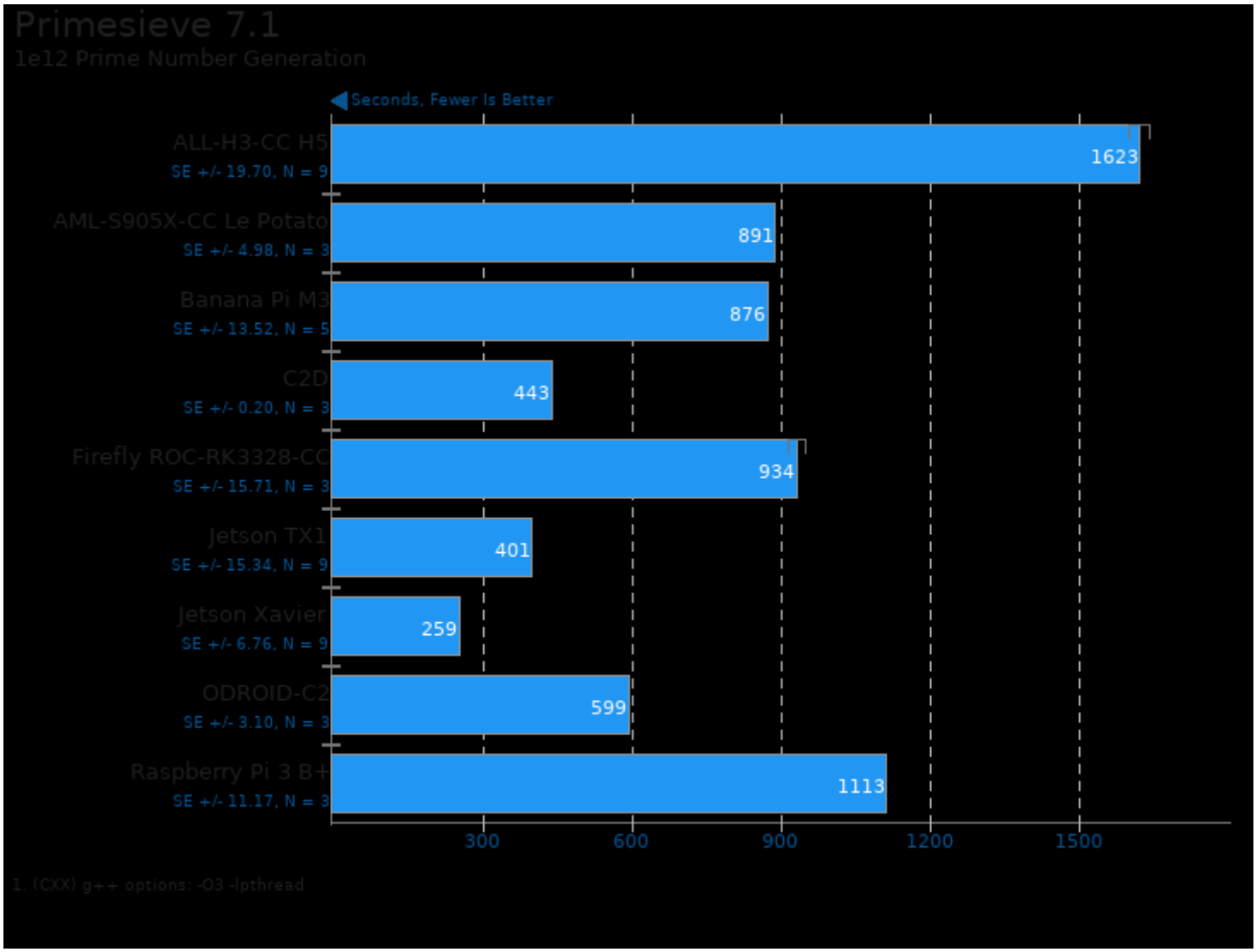

x264 2018-07-28
H.264 Video Encoding
Frames Per Second, More Is Better
-m64 -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize
C2D
SE +/- 0.01, N = 3
4.04
Firefly ROC-RK3328-CC
SE +/- 0.01, N = 3
2.12
Jetson TX1
SE +/- 0.06, N = 3
5.96
Jetson Xavier
SE +/- 0.15, N = 3
8.22
ODROID-C2
SE +/- 0.01, N = 3
2.89
Raspberry Pi 3 B+
SE +/- 0.00, N = 3
2.09
Tinker Board
SE +/- 0.05, N = 3
4.42
2
4
6
8
10
1. (CC) gcc options: -ldl -lm -lpthread

# Initial NVIDIA Jetson Xavier Linux Benchmarks

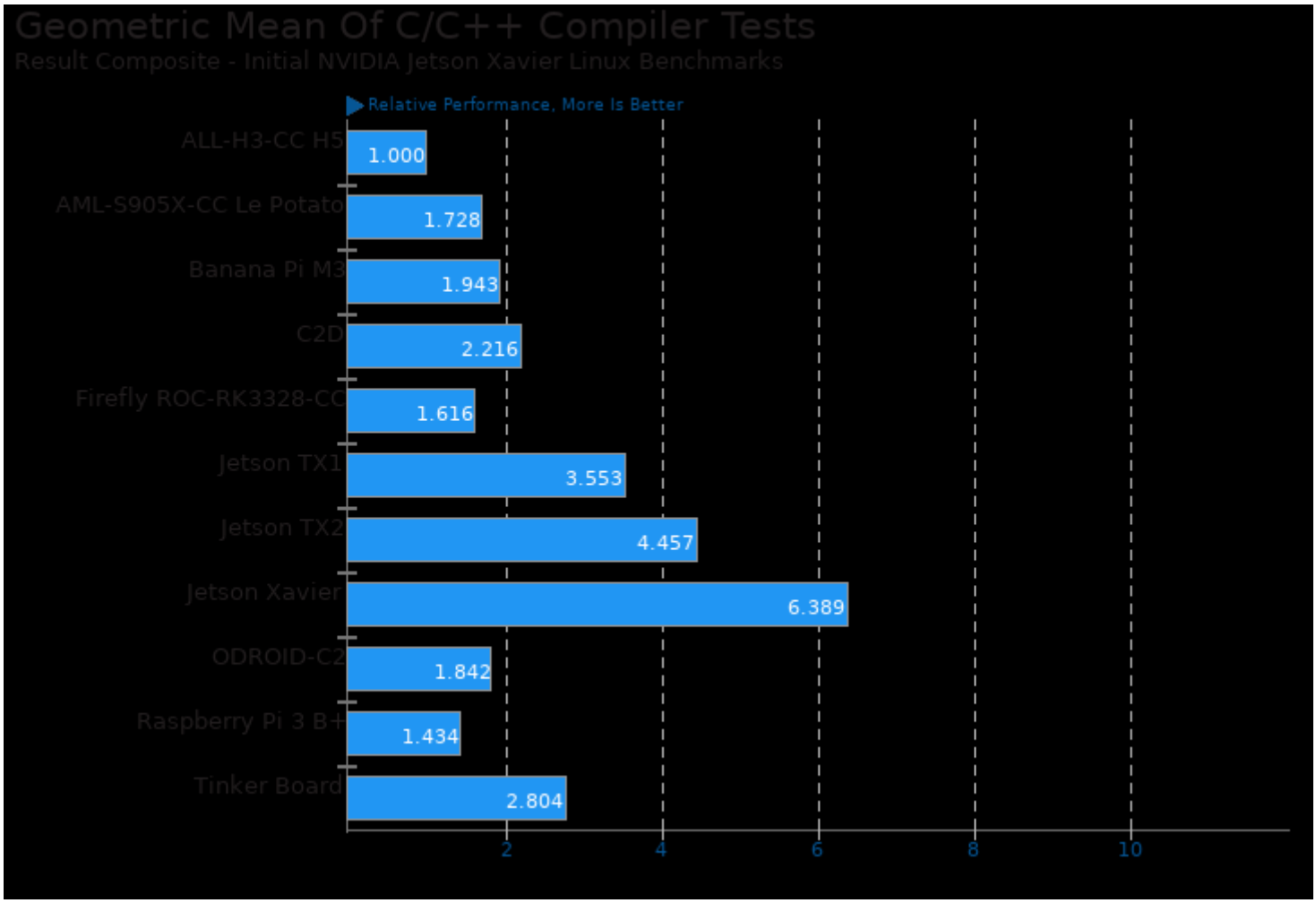



7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
ALL-H3-CC H5
SE +/- 1.20, N = 3
1301
AML-S905X-CC Le Potato
SE +/- 4.16, N = 3
2209
Banana Pi M3
SE +/- 43.13, N = 9
2654
C2D
SE +/- 2.52, N = 3
3041
Firefly ROC-RK3328-CC
SE +/- 0.67, N = 3
1951
Jetson TX1
SE +/- 28.68, N = 3
4526
Jetson TX2
SE +/- 11.46, N = 3
5650
Jetson Xavier
SE +/- 98.28, N = 12
7618
ODROID-C2
SE +/- 17.25, N = 3
2198
Raspberry Pi 3 B+
SE +/- 16.51, N = 3
1796
Tinker Board
SE +/- 36.57, N = 3
3472
1600
3200
4800
6400
8000
1. (CXX) g++ options: -pipe -lpthread

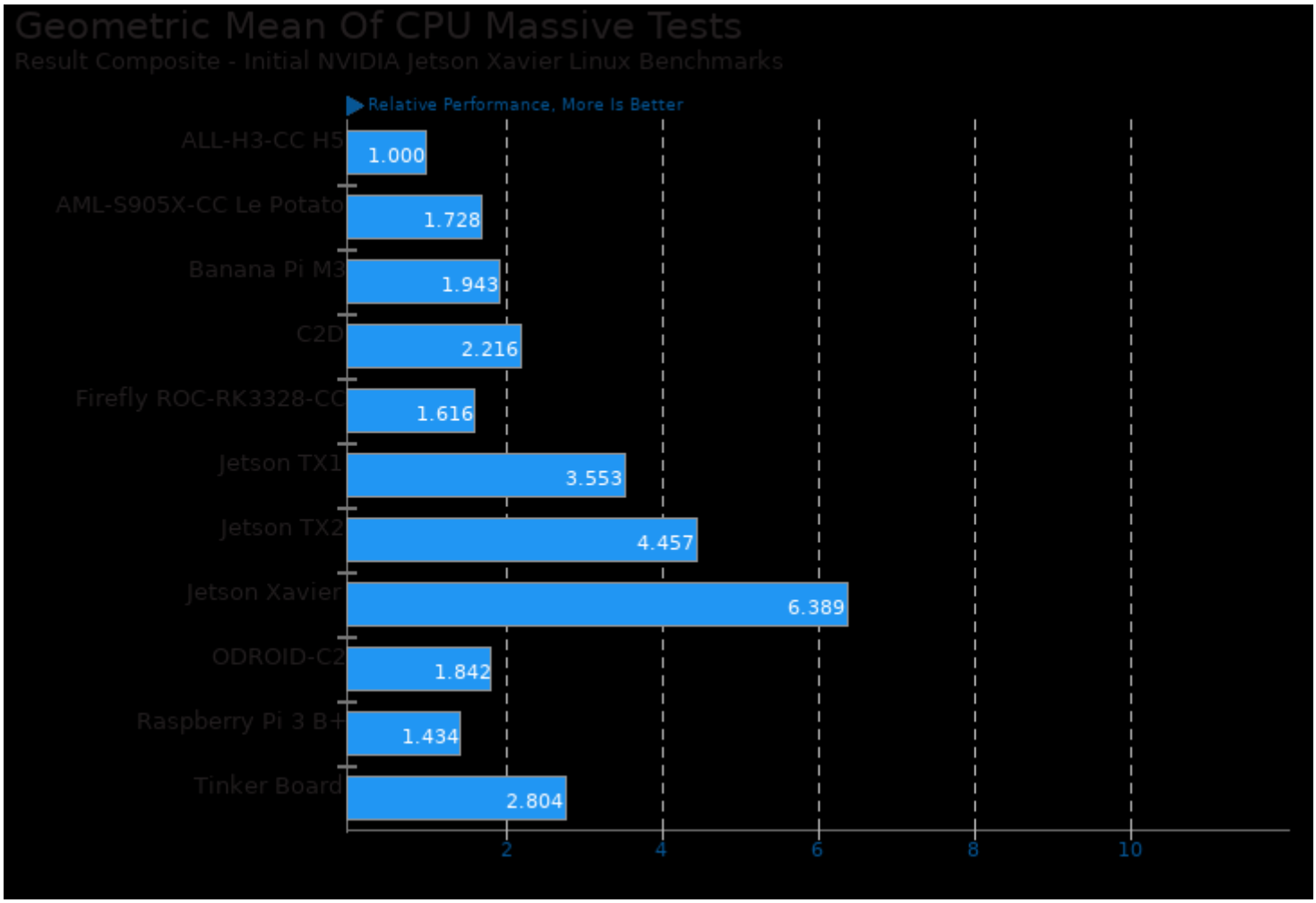

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
ALL-H3-CC H5
SE +/- 5.10, N = 3
3088
AML-S905X-CC Le Potato
SE +/- 2.44, N = 3
1755
Banana Pi M3
SE +/- 22.18, N = 3
1669
C2D
SE +/- 1.70, N = 3
1470
Firefly ROC-RK3328-CC
SE +/- 10.58, N = 3
1773
Jetson TX1
SE +/- 60.87, N = 9
851
Jetson TX2
SE +/- 60.69, N = 9
675
Jetson Xavier
SE +/- 35.05, N = 9
443
ODROID-C2
SE +/- 0.45, N = 3
1537
Raspberry Pi 3 B+
SE +/- 2.67, N = 3
2074
Tinker Board
SE +/- 5.86, N = 3
1048
700
1400
2100
2800
3500
1. (CC) gcc options: -lm -lpthread -O3


Primesieve 7.1
1e12 Prime Number Generation
Seconds, Fewer Is Better
ALL-H3-CC H5
SE +/- 19.70, N = 9
1623
AML-S905X-CC Le Potato
SE +/- 4.98, N = 3
891
Banana Pi M3
SE +/- 13.52, N = 5
876
C2D
SE +/- 0.20, N = 3
443
Firefly ROC-RK3328-CC
SE +/- 15.71, N = 3
934
Jetson TX1
SE +/- 15.34, N = 9
401
Jetson Xavier
SE +/- 6.76, N = 9
259
ODROID-C2
SE +/- 3.10, N = 3
599
Raspberry Pi 3 B+
SE +/- 11.17, N = 3
1113
300
600
900
1200
1500
1. (CXX) g++ options: -O3 -lpthread

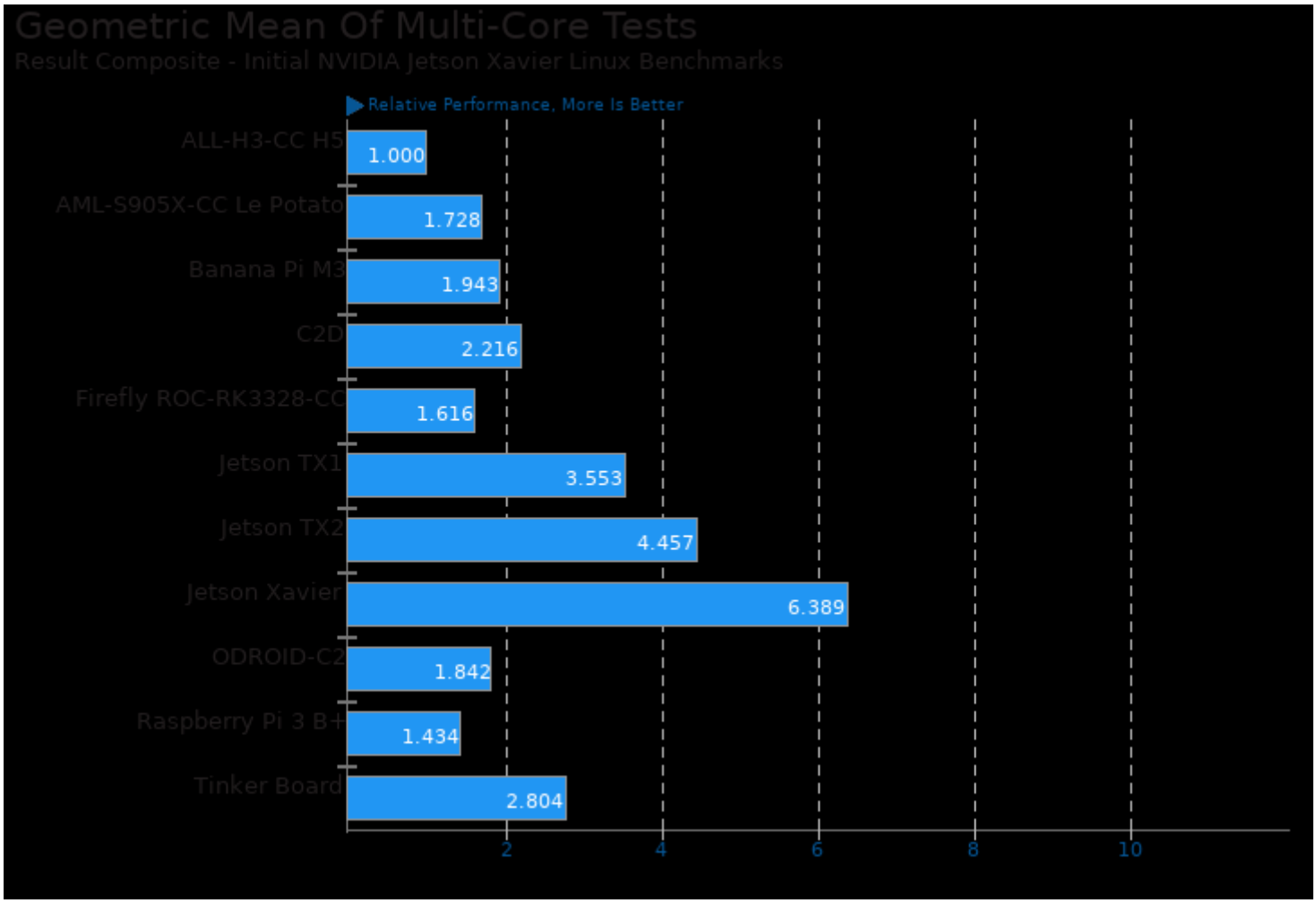
These geometric means are based upon test groupings / test suites for this result file.



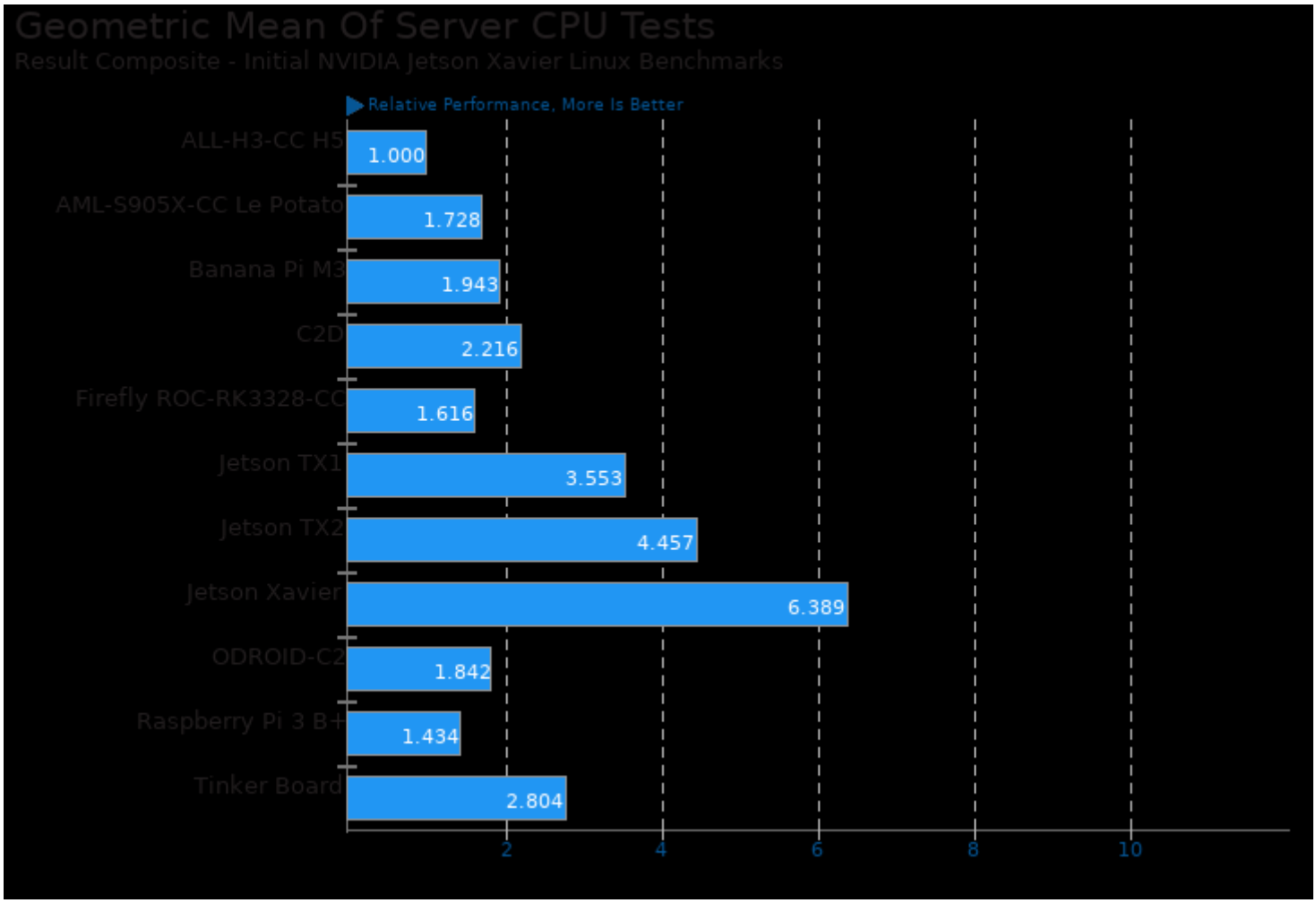

Geometric mean based upon tests: pts/c-ray, pts/compress-7zip and pts/x264




Geometric mean based upon tests: pts/c-ray, pts/compress-7zip, pts/x264 and pts/primesieve




Geometric mean based upon tests: pts/c-ray, pts/x264, pts/primesieve and pts/compress-7zip




Geometric mean based upon tests: pts/x264, pts/compress-7zip and pts/c-ray

*This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 03:26.*