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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

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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%	

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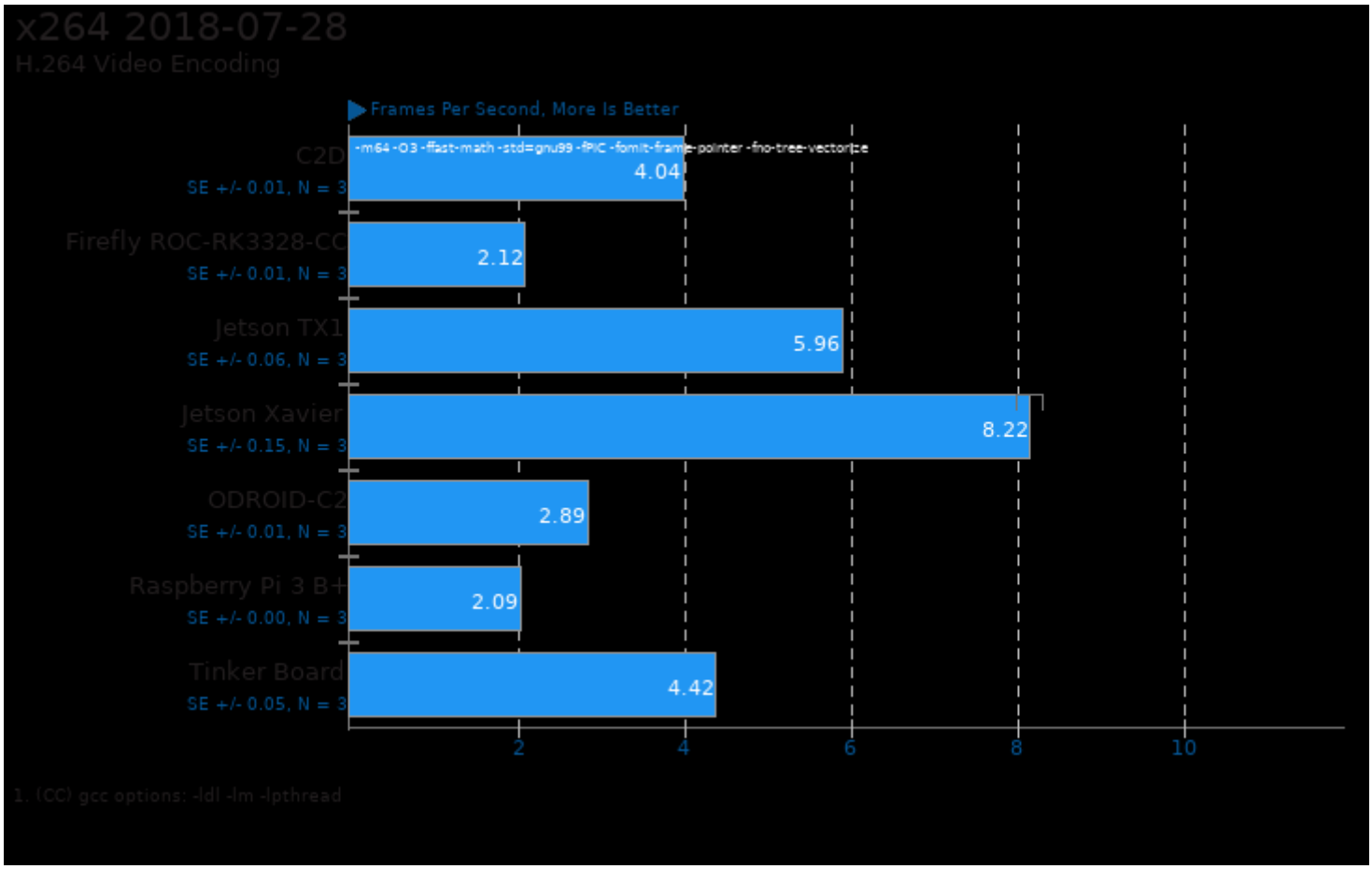
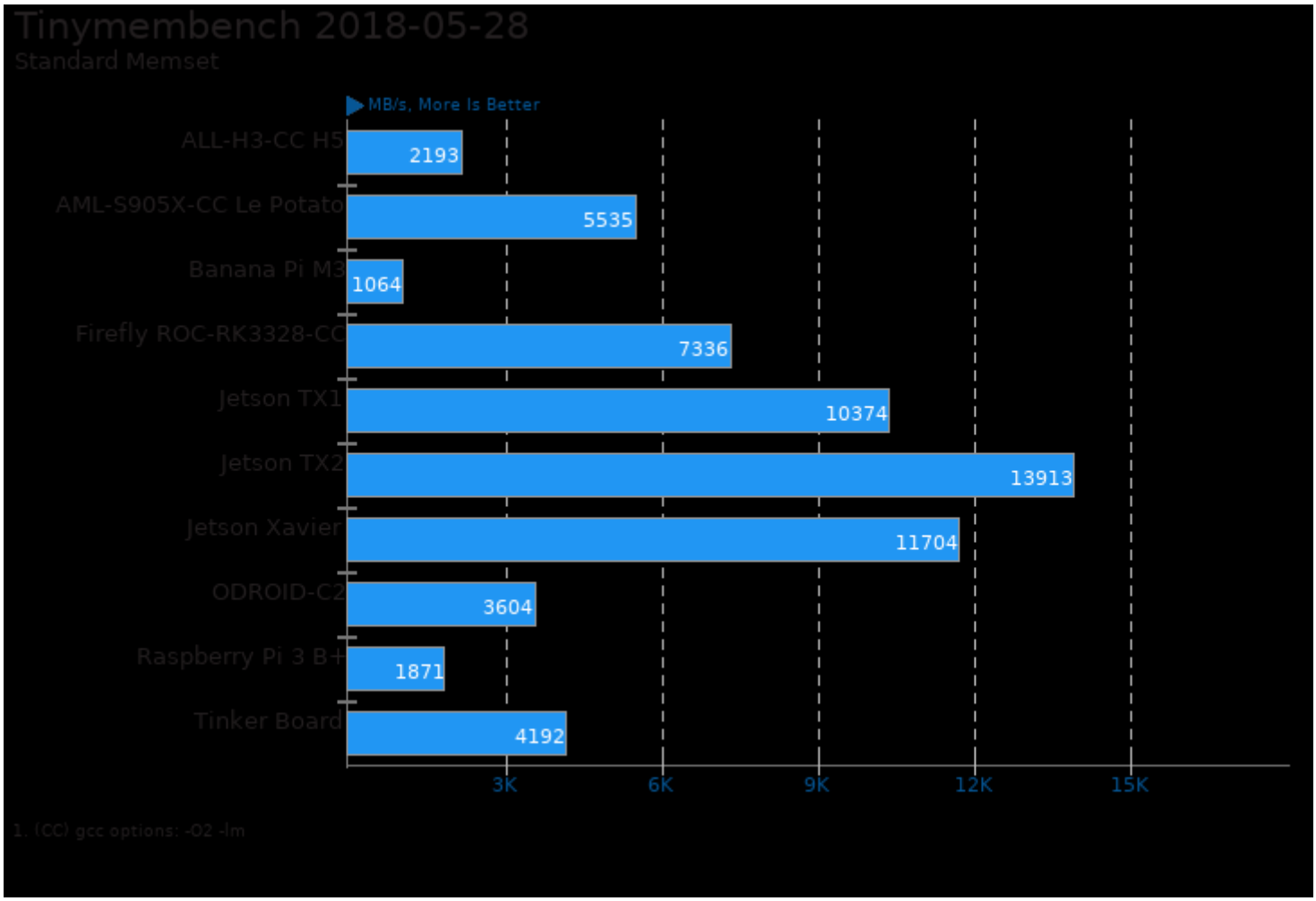
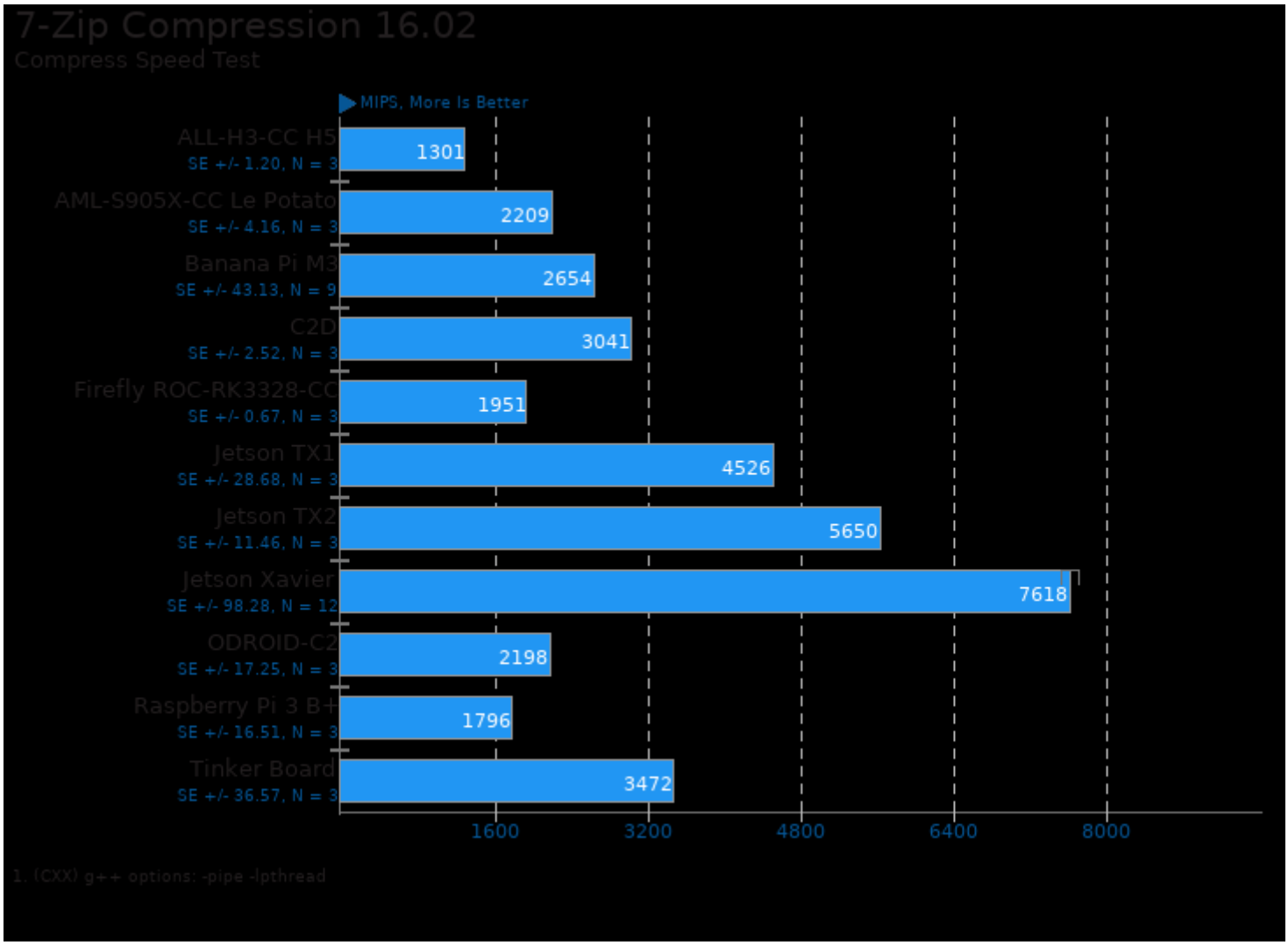
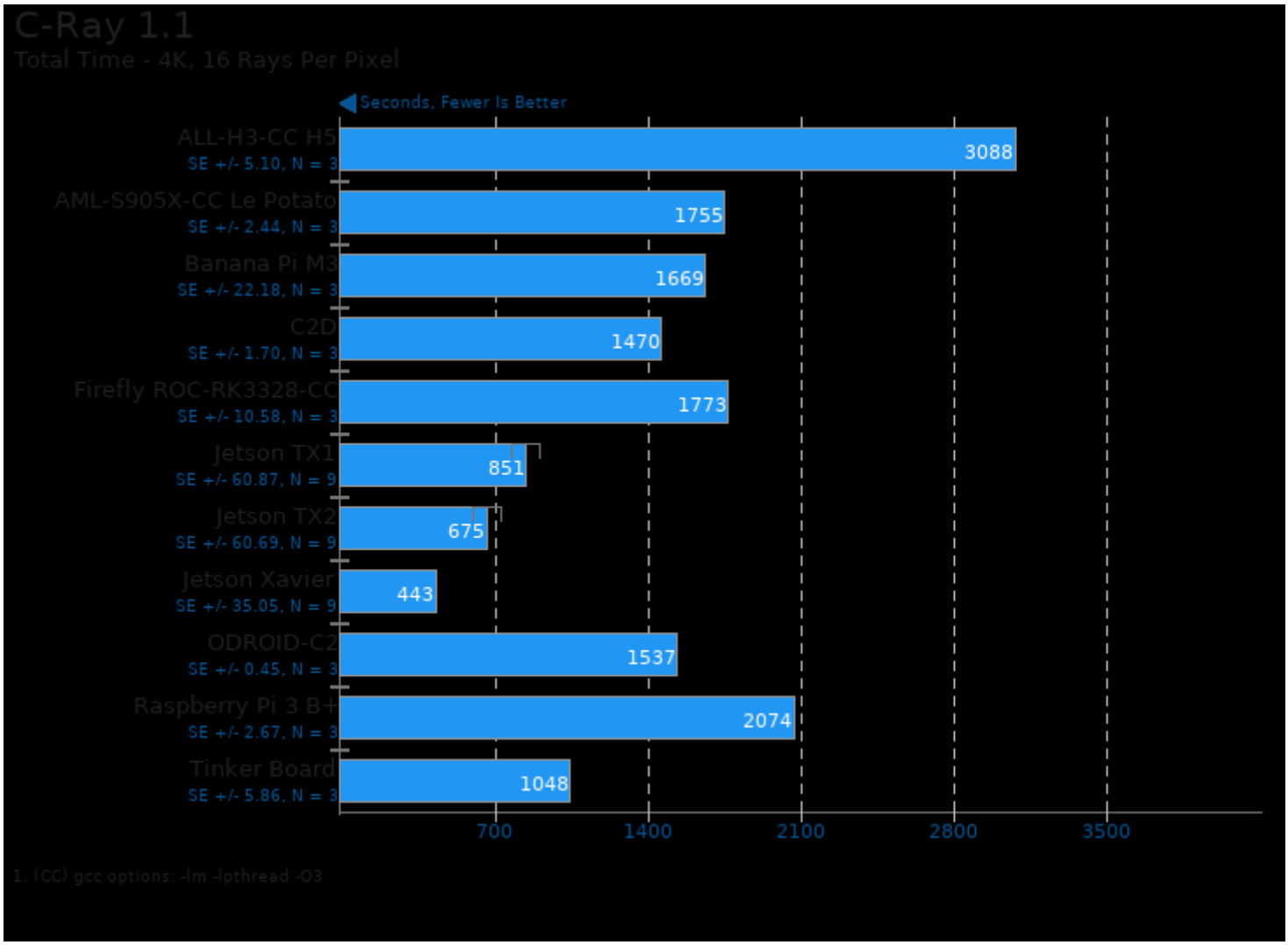
7-Zip Compression -	**1301**	2209	2654	1951	4526	5650	2198	1796	3472	**7618**	3041
Normalized	17.08%	29%	34.84%	25.61%	59.41%	74.17%	28.85%	23.58%	45.58%	100%	39.92%
Standard Deviation	0.2%	0.3%	4.9%	0.1%	1.1%	0.4%	1.4%	1.6%	1.8%	4.5%	0.1%
C-Ray - Total Time - 4.1.R.P.P (sec)	**3088**	1755	1669	1773	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%

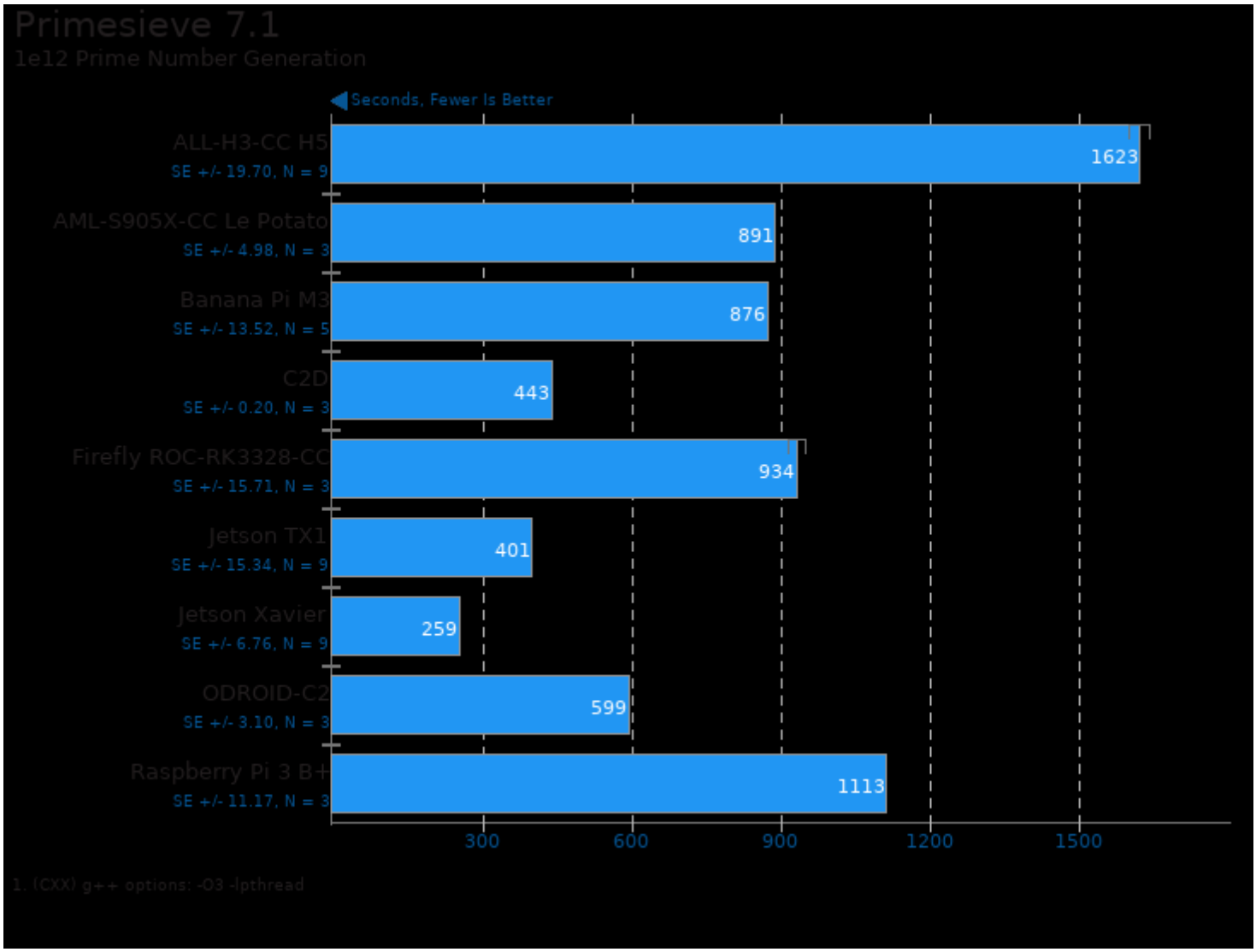

x264 2018-07-28
H.264 Video Encoding
Frames Per Second, More Is Better
-m64 -O3 -ffast-math -std=gnu99 -fPIC -fomit-frame-pointer -fno-tree-vectorize
C2D
SE +/- 0.01, N = 3
4.04
Firefly ROC-RK3328-CC
SE +/- 0.01, N = 3
2.12
Jetson TX1
SE +/- 0.06, N = 3
5.96
Jetson Xavier
SE +/- 0.15, N = 3
8.22
ODROID-C2
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

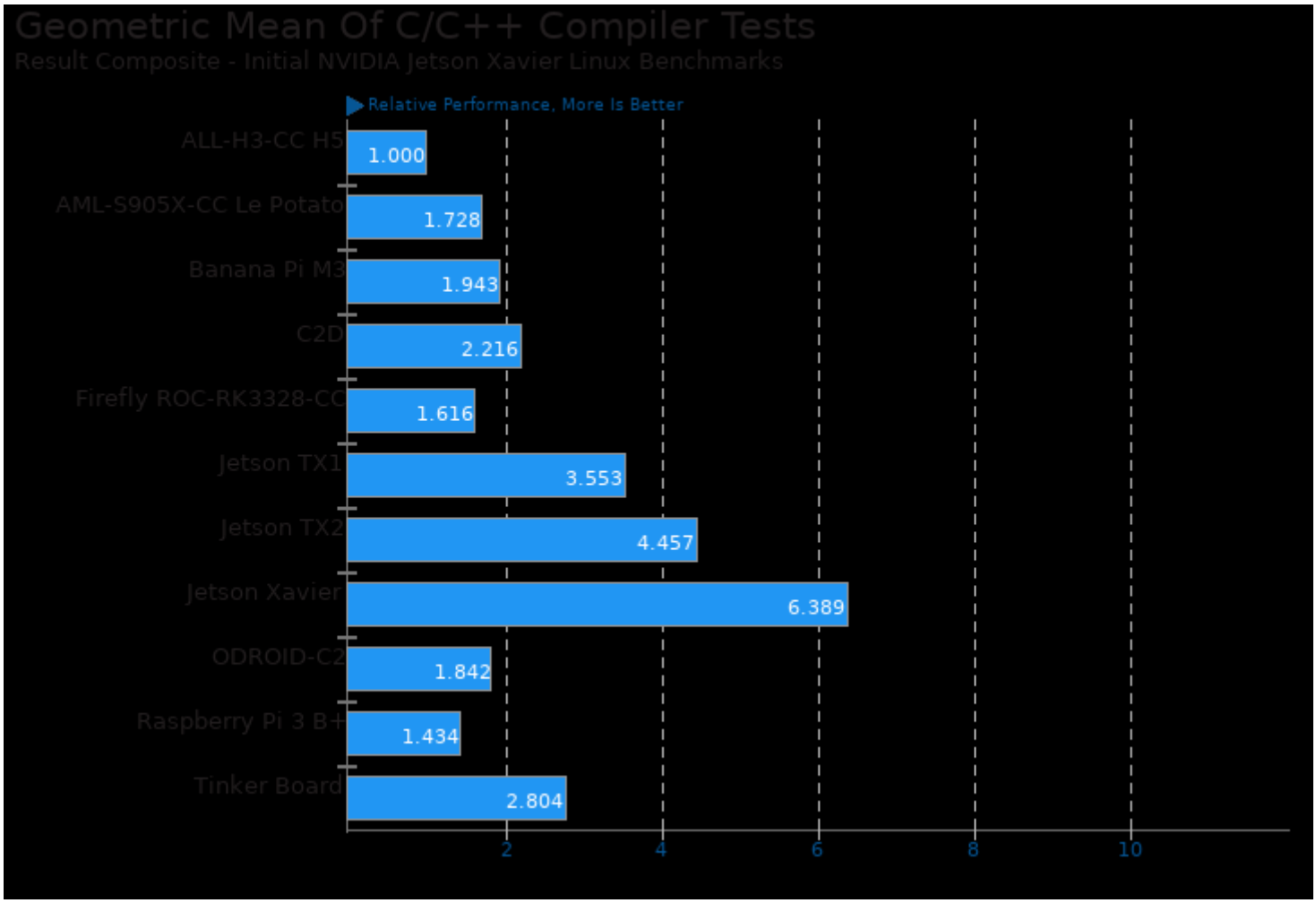



7-Zip Compression 16.02
Compress Speed Test
MIPS, More Is Better
ALL-H3-CC H5
SE +/- 1.20, N = 3
1301
AML-S905X-CC Le Potato
SE +/- 4.16, N = 3
2209
Banana Pi M3
SE +/- 43.13, N = 9
2654
C2D
SE +/- 2.52, N = 3
3041
Firefly ROC-RK3328-CC
SE +/- 0.67, N = 3
1951
Jetson TX1
SE +/- 28.68, N = 3
4526
Jetson 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

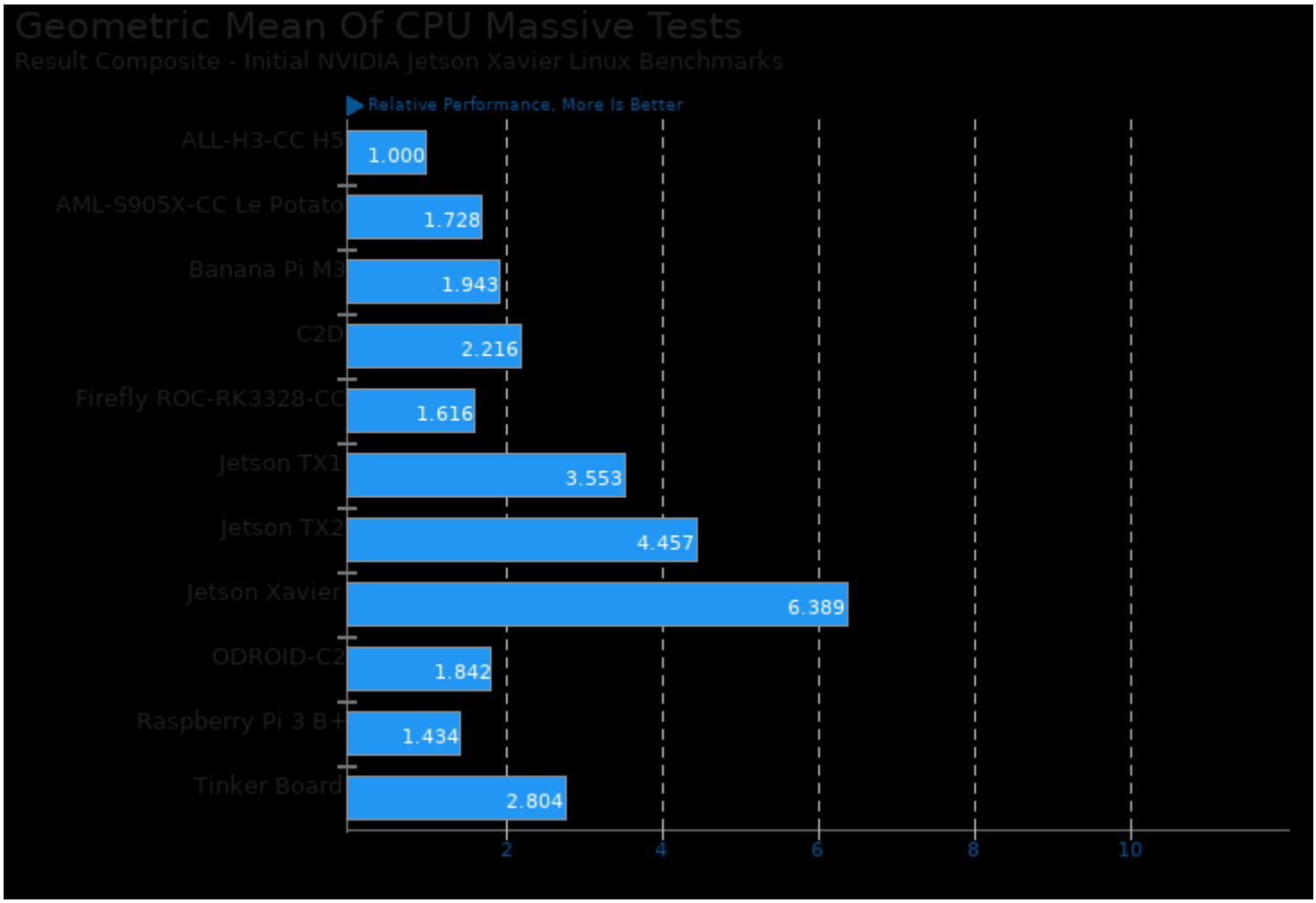

C-Ray 1.1
Total Time - 4K, 16 Rays Per Pixel
Seconds, Fewer Is Better
ALL-H3-CC H5
SE +/- 5.10, N = 3
3088
AML-S905X-CC Le Potato
SE +/- 2.44, N = 3
1755
Banana Pi M3
SE +/- 22.18, N = 3
1669
C2D
SE +/- 1.70, N = 3
1470
Firefly ROC-RK3328-CC
SE +/- 10.58, N = 3
1773
Jetson TX1
SE +/- 60.87, N = 9
851
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

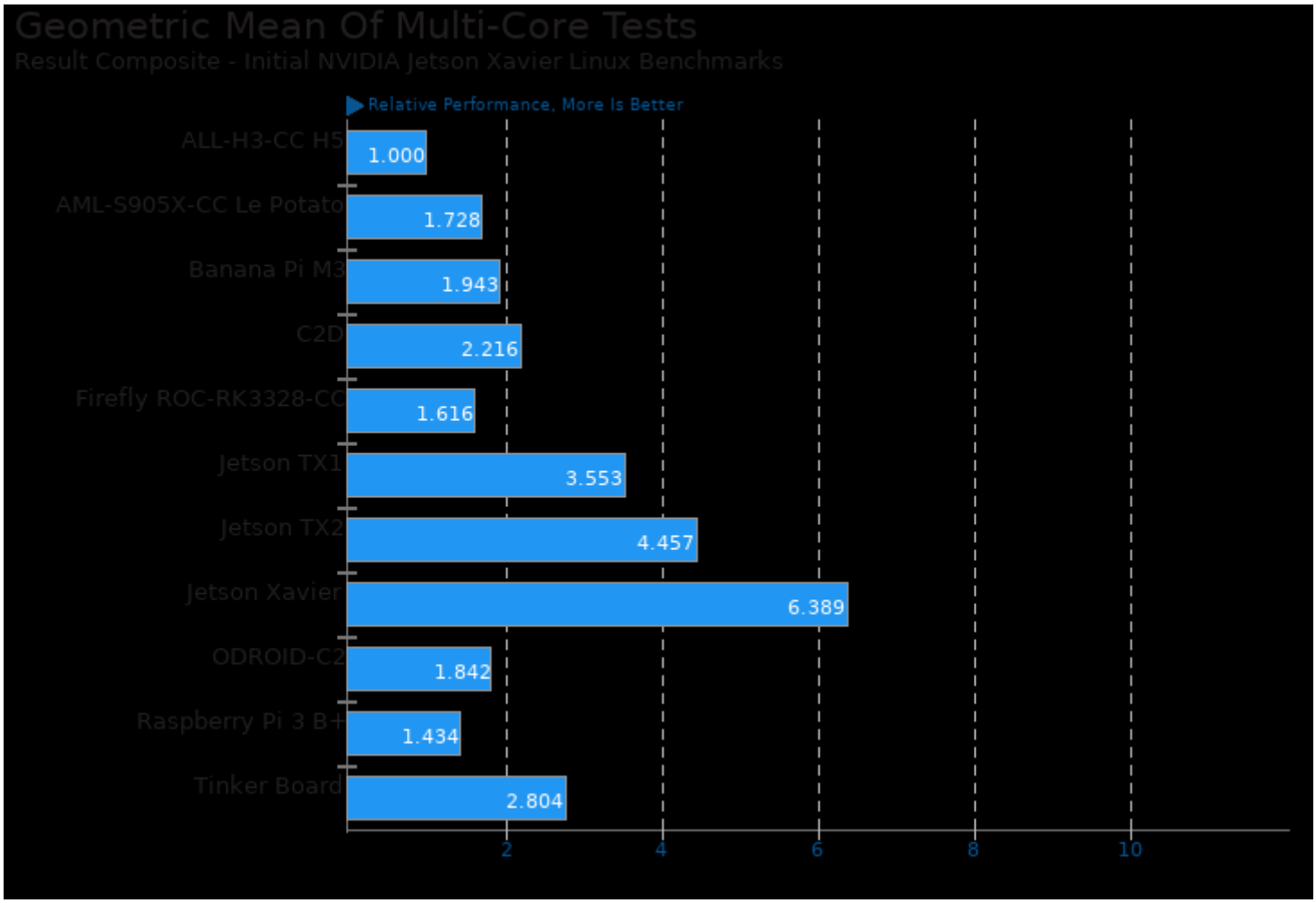
These geometric means are based upon test groupings / test suites for this result file.



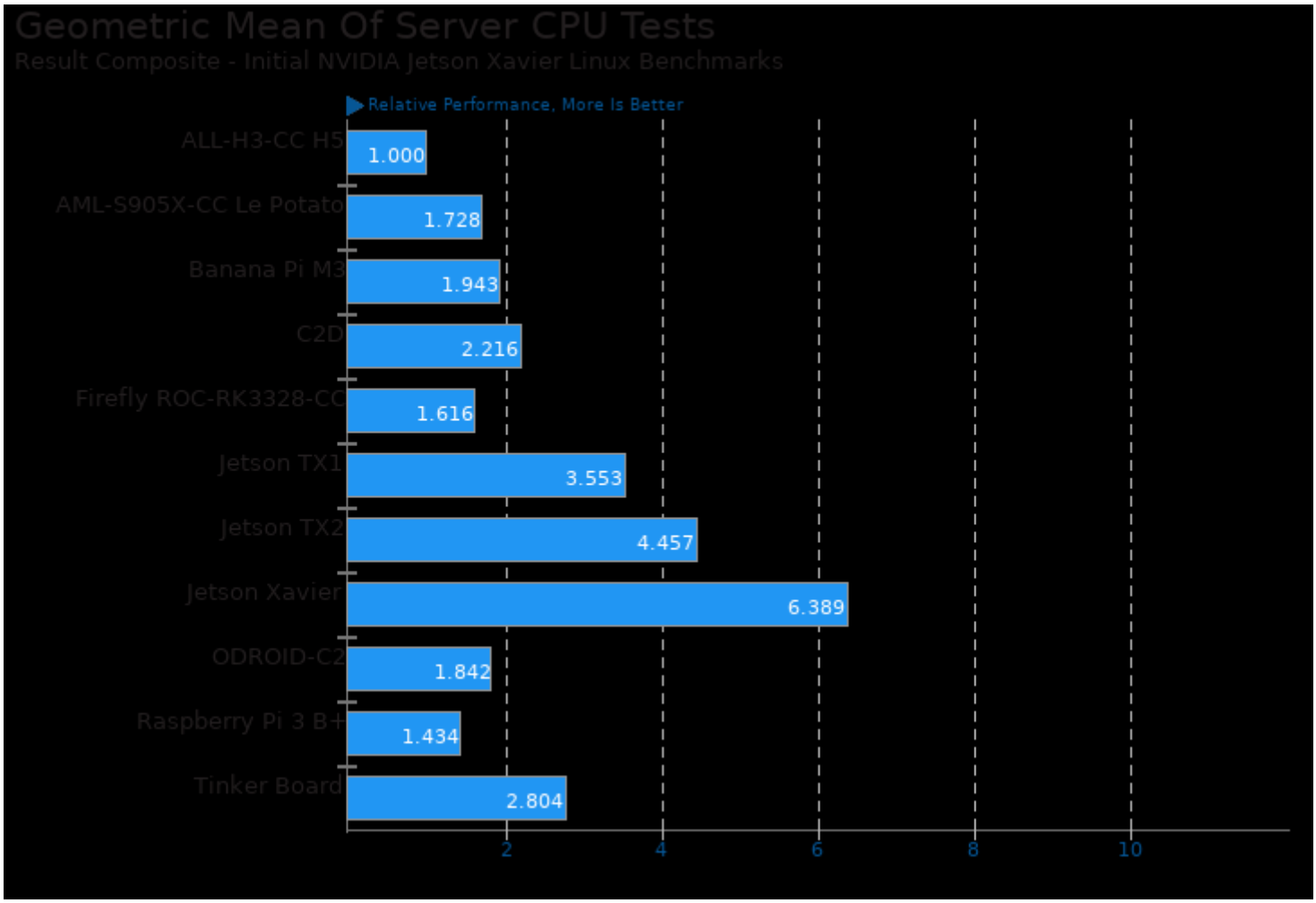
Geometric mean based upon tests: pts/c-ray, pts/compress-7zip and pts/x264



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 Thursday, 28 March 2024 16:17.