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# compulab-airtop-3-rtx-4000-compute

Intel Xeon E-2288G testing with a Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS) and NVIDIA Quadro RTX 4000 8GB on Ubuntu 20.10 via the Phoronix Test Suite.

**Automated Executive Summary**

*1 had the most wins, coming in first place for 66% of the tests.*

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

*RealSR-NCNN (Scale: 4x - TAA: Yes) at 1.091x*
*clpeak (OpenCL Test: Single-Precision Float) at 1.089x*
*Hashcat (Benchmark: 7-Zip) at 1.07x*
*Hashcat (Benchmark: MD5) at 1.069x*
*RealSR-NCNN (Scale: 4x - TAA: No) at 1.069x*
*Waifu2x-NCNN Vulkan (Scale: 2x - Denoise: 3 - TAA: Yes) at 1.065x*
*Hashcat (Benchmark: SHA1) at 1.064x*
*Hashcat (Benchmark: TrueCrypt RIPEMD160 + XTS) at 1.059x*
*Hashcat (Benchmark: SHA-512) at 1.058x*
*clpeak (OpenCL Test: Integer Compute INT) at 1.053x.*

# Test Systems:

## 1

## 1a

## 2

## 1b

## 1c

Processor: Intel Xeon E-2288G @ 5.00GHz (8 Cores / 16 Threads), Motherboard: Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 64GB, Disk: Samsung SSD 970 EVO Plus 250GB, Graphics: NVIDIA Quadro RTX 4000 8GB (1005/6500MHz), Audio: Intel Cannon Lake PCH cAVS, Monitor: VE228, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.10, Kernel: 5.8.0-26-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: NVIDIA 455.28, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.1.96, Vulkan: 1.2.142, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xd6 - Thermald 2.3
OpenCL Notes: GPU Compute Cores: 2304
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

## 1d

Processor: Intel Xeon E-2288G @ 5.00GHz (8 Cores / 16 Threads), Motherboard: Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 64GB, Disk: Samsung SSD 970 EVO Plus 250GB, Graphics: NVIDIA Quadro RTX 4000 8GB (300/405MHz), Audio: Intel Cannon Lake PCH cAVS, Monitor: VE228, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.10, Kernel: 5.8.0-26-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: NVIDIA 455.28, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.1.96, Vulkan: 1.2.142, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xd6 - Thermald 2.3
OpenCL Notes: GPU Compute Cores: 2304
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

## 1e

## NVIDIA Quadro RTX 4000

Processor: Intel Xeon E-2288G @ 5.00GHz (8 Cores / 16 Threads), Motherboard: Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 64GB, Disk: Samsung SSD 970 EVO Plus 250GB, Graphics: NVIDIA Quadro RTX 4000 8GB (1005/6500MHz), Audio: Intel Cannon Lake PCH cAVS, Monitor: VE228, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.10, Kernel: 5.8.0-26-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: NVIDIA 455.28, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.1.96, Vulkan: 1.2.142, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xd6 - Thermald 2.3
OpenCL Notes: GPU Compute Cores: 2304
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

## RTX 4000

Processor: Intel Xeon E-2288G @ 5.00GHz (8 Cores / 16 Threads), Motherboard: Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 64GB, Disk: Samsung SSD 970 EVO Plus 250GB, Graphics: NVIDIA Quadro RTX 4000 8GB (300/405MHz), Audio: Intel Cannon Lake PCH cAVS, Monitor: VE228, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.10, Kernel: 5.8.0-26-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: NVIDIA 455.28, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.1.96, Vulkan: 1.2.142, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xd6 - Thermald 2.3
OpenCL Notes: GPU Compute Cores: 2304
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

## NVIDIA RTX 4000

Processor: Intel Xeon E-2288G @ 5.00GHz (8 Cores / 16 Threads), Motherboard: Compulab SBC-ATCFL v1.2 (ATOP3.PRD.0.29.2 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 64GB, Disk: Samsung SSD 970 EVO Plus 250GB, Graphics: NVIDIA Quadro RTX 4000 8GB (1005/6500MHz), Audio: Intel Cannon Lake PCH cAVS, Monitor: VE228, Network: Intel I219-LM + Intel I210

OS: Ubuntu 20.10, Kernel: 5.8.0-26-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: NVIDIA 455.28, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 11.1.96, Vulkan: 1.2.142, Compiler: GCC

# compulab-airtop-3-rtx-4000-compute

10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xd6 - Thermald 2.3
OpenCL Notes: GPU Compute Cores: 2304
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Mitigation of TSX disabled + tsx_async_abort: Mitigation of TSX disabled

| | 1 | 1a | 2 | 1b | 1c | 1d | 1e | NVIDIA Quadro RTX 4000 | RTX 4000 | NVIDIA RTX 4000 |
|---|---|---|---|---|---|---|---|---|---|---|
| **RealSR-NCNN - 4x - No (sec)** | 12.552 | 12.604 | | 12.665 | 12.701 | 12.978 | 12.580 | 13.078 | **13.350** | **12.494** |
| **Normalized** | 99.54% | 99.13% | | 98.65% | 98.37% | 96.27% | 99.32% | 95.53% | 93.59% | 100% |
| **Standard Deviation** | 0.2% | 0.3% | | 0.5% | 0.5% | 0.1% | 0.2% | 0.3% | 0.2% | 0.2% |
| **RealSR-NCNN - 4x - Yes (sec)** | **80.445** | 81.129 | | 81.544 | 82.464 | 84.174 | 81.174 | 85.926 | **87.793** | 80.549 |
| **Normalized** | 100% | 99.16% | | 98.65% | 97.55% | 95.57% | 99.1% | 93.62% | 91.63% | 99.87% |
| **Standard Deviation** | 0.7% | 0.8% | | 0.9% | 0.8% | 0.7% | 0.8% | 0.9% | 0.5% | 0.8% |
| **Waifu2x-NCNN Vulkan - 2x - 3 - Yes (sec)** | **5.502** | 5.551 | | 5.572 | 5.671 | 5.694 | 5.571 | 5.785 | **5.861** | 5.540 |
| **Normalized** | 100% | 99.12% | | 98.74% | 97.02% | 96.63% | 98.76% | 95.11% | 93.87% | 99.31% |
| **Standard Deviation** | 0.2% | 0.7% | | 0.7% | 1.4% | 0.2% | 0.5% | 0.5% | 0.4% | 1.3% |
| **VkFFT (Benchmark Score)** | **25694** | 25585 | | 25486 | | 25027 | 25457 | 24684 | **24538** | 25593 |
| **Normalized** | 100% | 99.58% | | 99.19% | | 97.4% | 99.08% | 96.07% | 95.5% | 99.61% |
| **Standard Deviation** | 0.2% | 0.1% | | 0.2% | | 0.1% | 0.2% | | 0% | 0.1% |
| **Hashcat - MD5 (H/s)** | **2512196 6667** | 2494470 0000 | | 2483896 6667 | | 2425903 3333 | 2487690 0000 | 2384096 6667 | **2350686 6667** | 2507546 6667 |
| **Normalized** | 100% | 99.29% | | 98.87% | | 96.57% | 99.02% | 94.9% | 93.57% | 99.81% |
| **Standard Deviation** | 0.2% | 0% | | 0.1% | | 0% | 0.1% | 0.1% | 0% | 0.2% |
| **Hashcat - SHA1 (H/s)** | **8704500 000** | 8642000 000 | | 8615933 333 | | 8426866 667 | 8633500 000 | 8254033 333 | **8181566 667** | 8700533 333 |
| **Normalized** | 100% | 99.28% | | 98.98% | | 96.81% | 99.18% | 94.82% | 93.99% | 99.95% |
| **Standard Deviation** | 0.2% | 0.1% | | 0.1% | | 0.2% | 0.1% | 0.1% | 0.1% | 0.1% |
| **Hashcat - 7-Zip** | **446900** | 444300 | | 442667 | | 433300 | 443000 | 424633 | **417767** | 446400 |
| **Normalized** | 100% | 99.42% | | 99.05% | | 96.96% | 99.13% | 95.02% | 93.48% | 99.89% |
| **Standard Deviation** | 0.1% | 0.2% | | 0.1% | | 0.1% | 0.5% | 0.2% | 0.1% | 0.1% |
| **Hashcat - SHA-512 (H/s)** | **1102266 667** | 1095266 667 | | 1091033 333 | | 1070066 667 | 1092200 000 | 1049733 333 | **1041500 000** | 1100433 333 |
| **Normalized** | 100% | 99.36% | | 98.98% | | 97.08% | 99.09% | 95.23% | 94.49% | 99.83% |
| **Standard Deviation** | 0.1% | 0.1% | | 0.1% | | 0.2% | 0.2% | 0.2% | 0.2% | 0% |

# compulab-airtop-3-rtx-4000-compute

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Hashcat - T.R.X (H/s)** | 327233 | 326300 | 324033 | 317867 | 324267 | 312233 | **309400** | **327567** |
| **Normalized** | 99.9% | 99.61% | 98.92% | 97.04% | 98.99% | 95.32% | 94.45% | 100% |
| **Standard Deviation** | 0.3% | | 0.1% | 0% | 0.1% | 0.2% | | 0.4% |
| **FinanceBench - B.S.O (ms)** | 14.034 | **14.032** | **14.037** | 14.036 | 14.034 | 14.034 | 14.034 | **14.032** |
| **Normalized** | 99.99% | 100% | 99.96% | 99.97% | 99.99% | 99.99% | 99.99% | 100% |
| **Standard Deviation** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **ViennaCL - O.L.F (GFLOPS)** | 68.2883 | **68.4737** | 68.2546 | 68.3795 | 68.4059 | **68.0188** | 68.0204 | 68.2894 |
| **Normalized** | 99.73% | 100% | 99.68% | 99.86% | 99.9% | 99.34% | 99.34% | 99.73% |
| **Standard Deviation** | 0.3% | 0.3% | 0.7% | 0.2% | 0.1% | 0% | 0.2% | 0.1% |
| **cl-mem - Copy (GB/s)** | **283.0** | 282.6 | 282.1 | 281.1 | 282.1 | **278.7** | 278.8 | 282.1 |
| **Normalized** | 100% | 99.86% | 99.68% | 99.33% | 99.68% | 98.48% | 98.52% | 99.68% |
| **Standard Deviation** | 0.2% | 0% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% |
| **cl-mem - Read (GB/s)** | **379.7** | **379.2** | **379.2** | 379.3 | 379.3 | 379.3 | 379.3 | 379.3 |
| **Normalized** | 100% | 99.87% | 99.87% | 99.89% | 99.89% | 99.89% | 99.89% | 99.89% |
| **Standard Deviation** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **cl-mem - Write (GB/s)** | **325.5** | 320.4 | 321.1 | 321.1 | 322.5 | **318.4** | 319.4 | 323.0 |
| **Normalized** | 100% | 98.43% | 98.65% | 98.65% | 99.08% | 97.82% | 98.13% | 99.23% |
| **Standard Deviation** | 1% | 0.8% | 0.4% | 0.5% | 0.3% | 1.2% | 0.8% | 0.8% |
| **RedShift Demo** | | | | 382 | 381 | 391 | **393** | **379** |
| **Normalized** | | | | 99.21% | 99.48% | 96.93% | 96.44% | 100% |
| **Standard Deviation** | | | | 1.2% | 1% | 2.1% | 2.2% | 1.1% |
| **LuxCoreRender OpenCL - DLSC (M samples/sec)** | | | | **3.99** | **4.09** | 4.01 | 4.02 | |
| **Normalized** | | | | 97.56% | 100% | 98.04% | 98.29% | |
| **Standard Deviation** | | | | 7.1% | 0.4% | 0.7% | 0.2% | |
| **LuxCoreRender OpenCL - Food (M samples/sec)** | | | | **1.52** | **1.57** | 1.55 | 1.55 | |
| **Normalized** | | | | 96.82% | 100% | 98.73% | 98.73% | |
| **Standard Deviation** | | | | 9.4% | 1.2% | 0.7% | 1% | |
| **LuxCoreRender OpenCL - LuxCore Benchmark (M samples/sec)** | | | | **3.40** | **3.50** | 3.47 | 3.47 | |
| **Normalized** | | | | 97.14% | 100% | 99.14% | 99.14% | |
| **Standard Deviation** | | | | 6.6% | 0.9% | 0.6% | 1% | |
| **LuxCoreRender OpenCL - R.C.a.P (M samples/sec)** | | | | **10.42** | 10.78 | **10.79** | 10.73 | |
| **Normalized** | | | | 96.57% | 99.91% | 100% | 99.44% | |
| **Standard Deviation** | | | | 11.2% | 0.3% | 0.9% | 0.3% | |
| **FAHBench (Ns/Day)** | | | | 191.6264 | **191.8417** | **190.7594** | 190.8199 | |
| **Normalized** | | | | 99.89% | 100% | 99.44% | 99.47% | |
| **Standard Deviation** | | | | 0.4% | 0.3% | 0.2% | 0.3% | |

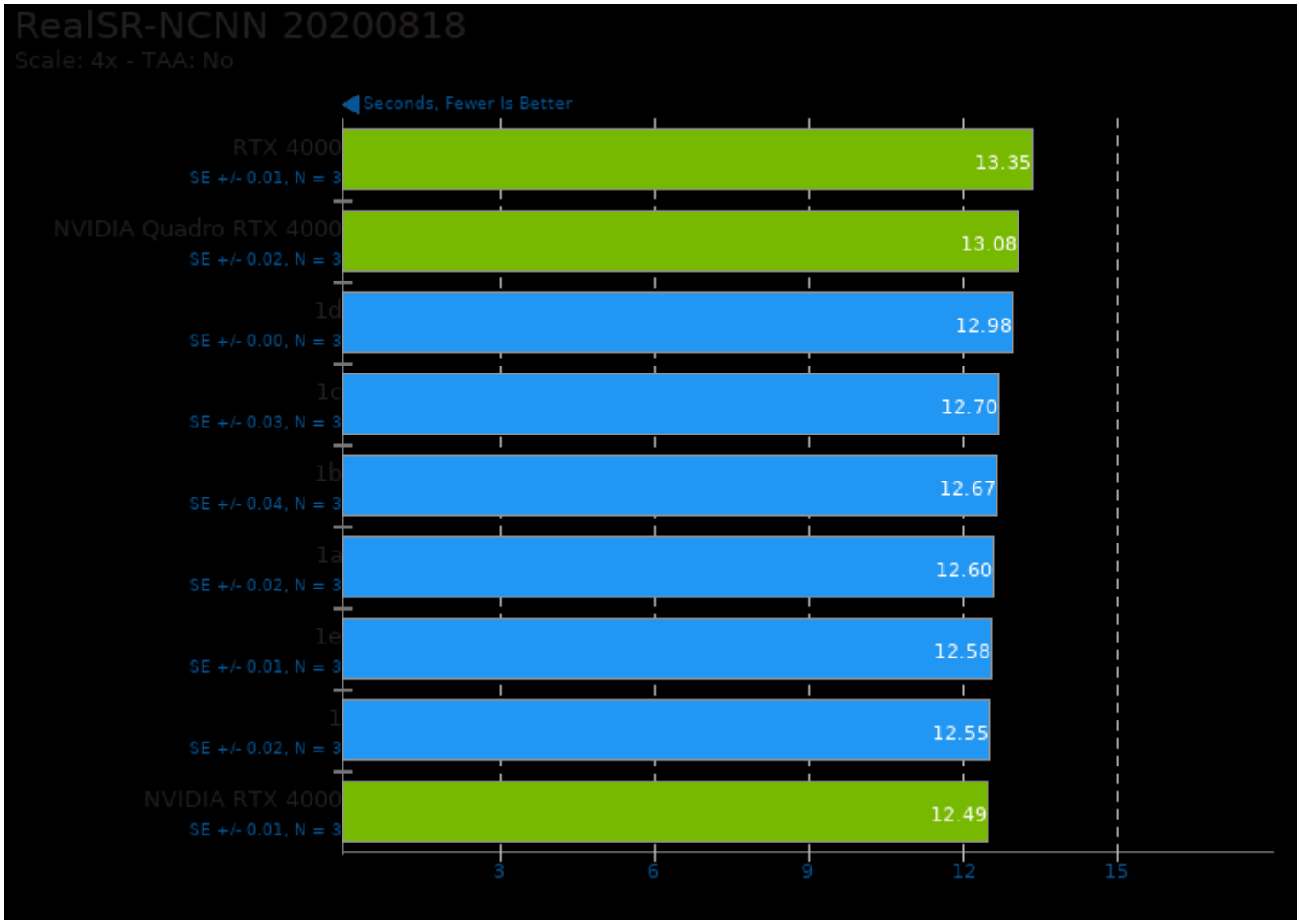
# compulab-airtop-3-rtx-4000-compute

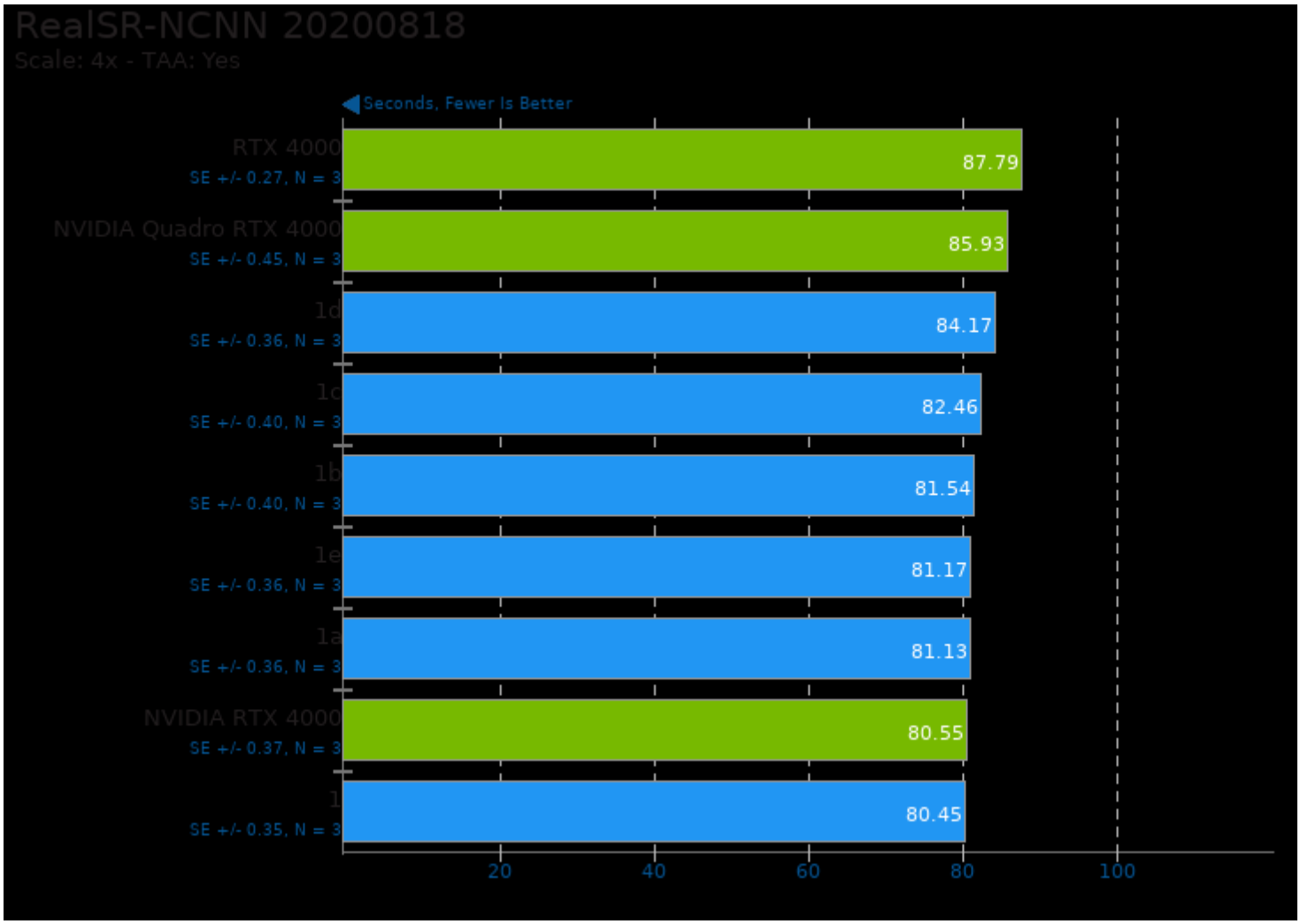
| | | | |
|---|---|---|---|
| **ArrayFire - C.G.O (ms)** | **2.247** | 2.255 | **2.257** |
| **Normalized** | 100% | 99.65% | 99.56% |
| **Standard Deviation** | 0.6% | 0.9% | 0.5% |
| **NCNN - Vulkan GPU - squeezenet** | **3.77** | 3.78 | **3.80** |
| **Normalized** | 100% | 99.74% | 99.21% |
| **Standard Deviation** | 0.5% | 0.6% | 0.3% |
| **NCNN - Vulkan GPU - mobilenet** | **4.66** | 4.67 | **4.86** |
| **Normalized** | 100% | 99.79% | 95.88% |
| **Standard Deviation** | 0.5% | 0.2% | 6.1% |
| **NCNN - Vulkan GPU-v2-v2 - mobilenet-v2 (ms)** | 1.48 | 1.48 | 1.48 |
| **Standard Deviation** | 3.9% | 0.4% | 0% |
| **NCNN - Vulkan GPU-v3-v3 - mobilenet-v3 (ms)** | **1.71** | **1.74** | **1.74** |
| **Normalized** | 100% | 98.28% | 98.28% |
| **Standard Deviation** | 0.3% | 0.3% | 0.3% |
| **NCNN - Vulkan GPU - shufflenet-v2** | **1.33** | 1.35 | **1.36** |
| **Normalized** | 100% | 98.52% | 97.79% |
| **Standard Deviation** | 0.4% | 0.4% | 0.4% |
| **NCNN - Vulkan GPU - mnasnet** | **1.52** | **1.54** | **1.54** |
| **Normalized** | 100% | 98.7% | 98.7% |
| **Standard Deviation** | 0.4% | 0% | 0% |
| **NCNN - Vulkan GPU -** | **2.73** | 2.75 | **2.76** |
| **Normalized** | 100% | 99.27% | 98.91% |
| **Standard Deviation** | 0.4% | 0.2% | 0% |
| **NCNN - Vulkan GPU - blazeface** | **0.63** | **0.63** | **0.64** |
| **Normalized** | 100% | 100% | 98.44% |
| **Standard Deviation** | 0.9% | 1.6% | 0% |
| **NCNN - Vulkan GPU - googlenet** | **3.32** | **3.40** | 3.37 |
| **Normalized** | 100% | 97.65% | 98.52% |
| **Standard Deviation** | 0.2% | 1.2% | 0% |
| **NCNN - Vulkan GPU - vgg16 (ms)** | **8.79** | **9.14** | 9.02 |
| **Normalized** | 100% | 96.17% | 97.45% |
| **Standard Deviation** | 0.7% | 2.4% | 0.8% |
| **NCNN - Vulkan GPU - resnet18** | 1.8 | **1.95** | **1.77** |
| **Normalized** | 98.33% | 90.77% | 100% |
| **Standard Deviation** | 4% | 11.7% | 3.9% |
| **NCNN - Vulkan GPU - alexnet (ms)** | **2.18** | 2.21 | **2.27** |
| **Normalized** | 100% | 98.64% | 96.04% |
| **Standard Deviation** | 1.2% | 0.5% | 2.7% |

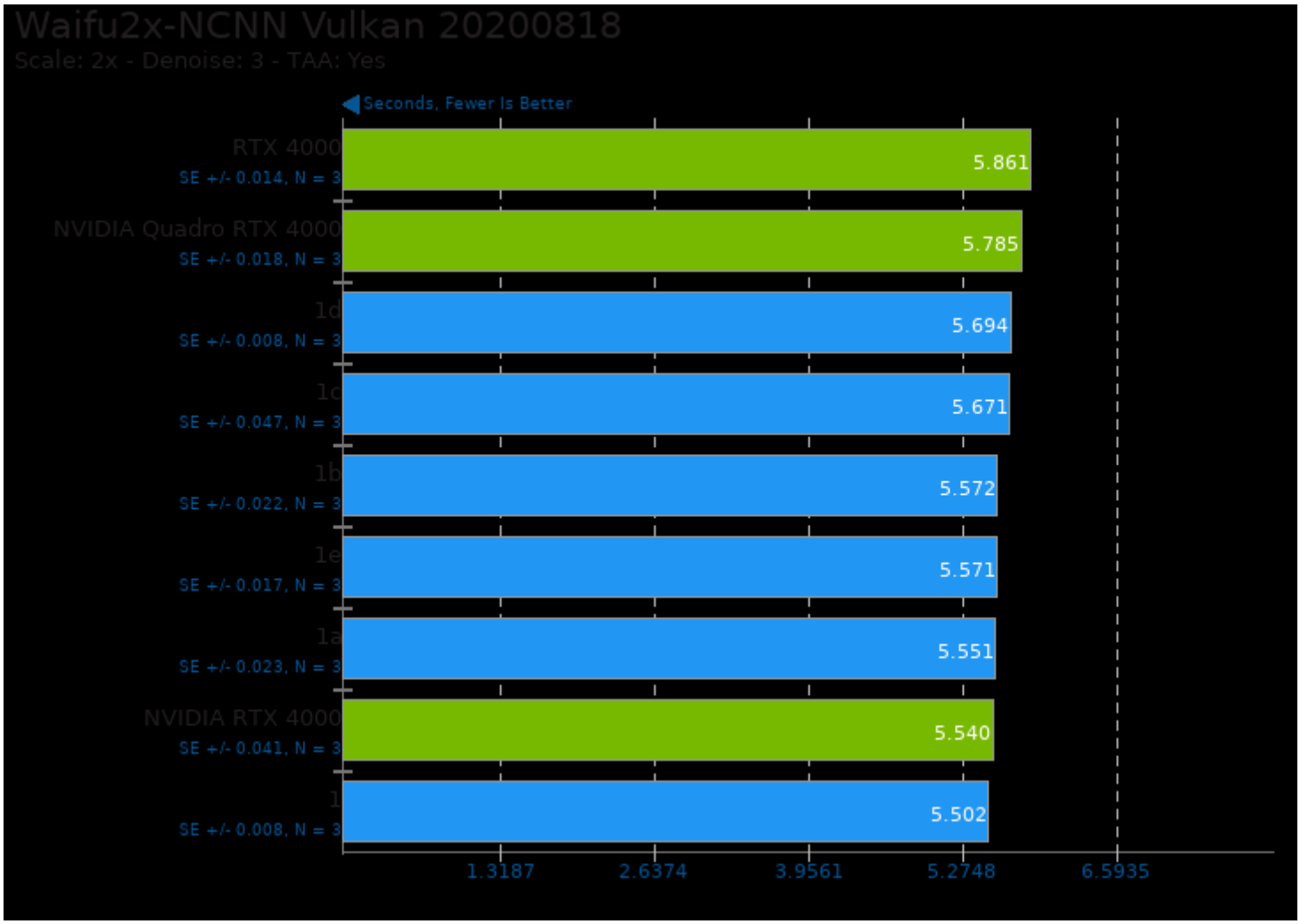
| | | | |
|---|---|---|---|
| **NCNN - Vulkan GPU - resnet50** | **3.89** | 3.93 | **4.08** |
| **Normalized** | 100% | 98.98% | 95.34% |
| **Standard Deviation** | 0.4% | 0.3% | 5.9% |
| **NCNN - Vulkan GPU - yolov4-tiny** | **8.62** | 8.33 | **8.22** |
| **Normalized** | 95.36% | 98.68% | 100% |
| **Standard Deviation** | 7.4% | 1.9% | 0.1% |
| **PlaidML - No - Inference - IMDB LSTM - OpenCL (FPS)** | **423.50** | 421.03 | **420.80** |
| **Normalized** | 100% | 99.42% | 99.36% |
| **Standard Deviation** | 0.2% | 0.5% | 0.1% |
| **PlaidML - No - Inference - Mobilenet - OpenCL** | **1490** | **1476** | 1480 |
| **Normalized** | 100% | 99.03% | 99.32% |
| **Standard Deviation** | 0.6% | 0.7% | 0.6% |
| **PlaidML - Yes - Inference - Mobilenet - OpenCL** | **1844** | 1834 | **1829** |
| **Normalized** | 100% | 99.48% | 99.21% |
| **Standard Deviation** | 0.9% | 0.2% | 0.8% |
| **PlaidML - No - Inference - DenseNet 201 - OpenCL (FPS)** | **140.54** | **138.91** | 139.15 |
| **Normalized** | 100% | 98.84% | 99.01% |
| **Standard Deviation** | 0.2% | 0.1% | 0.1% |
| **Blender - BMW27 - CUDA (sec)** | **57.80** | 58.10 | **58.41** |
| **Normalized** | 100% | 99.48% | 98.96% |
| **Standard Deviation** | 0.3% | 0.4% | 0.3% |
| **Blender - Classroom - CUDA** | **218.66** | **224.85** | 223.81 |
| **Normalized** | 100% | 97.25% | 97.7% |
| **Standard Deviation** | 1.2% | 2.8% | 2.5% |
| **Blender - Fishy Cat - CUDA (sec)** | **112.74** | **114.00** | 113.88 |
| **Normalized** | 100% | 98.89% | 99% |
| **Standard Deviation** | 0.4% | 0.2% | 0.3% |
| **Blender - Barbershop - CUDA (sec)** | **756.64** | **771.19** | 764.30 |
| **Normalized** | 100% | 98.11% | 99% |
| **Standard Deviation** | 0.6% | 0.3% | 0.2% |
| **Blender - BMW27 - NVIDIA OptiX (sec)** | **32.14** | 29.23 | **29.14** |
| **Normalized** | 90.67% | 99.69% | 100% |
| **Standard Deviation** | 39.1% | 0.5% | 0.3% |

# compulab-airtop-3-rtx-4000-compute

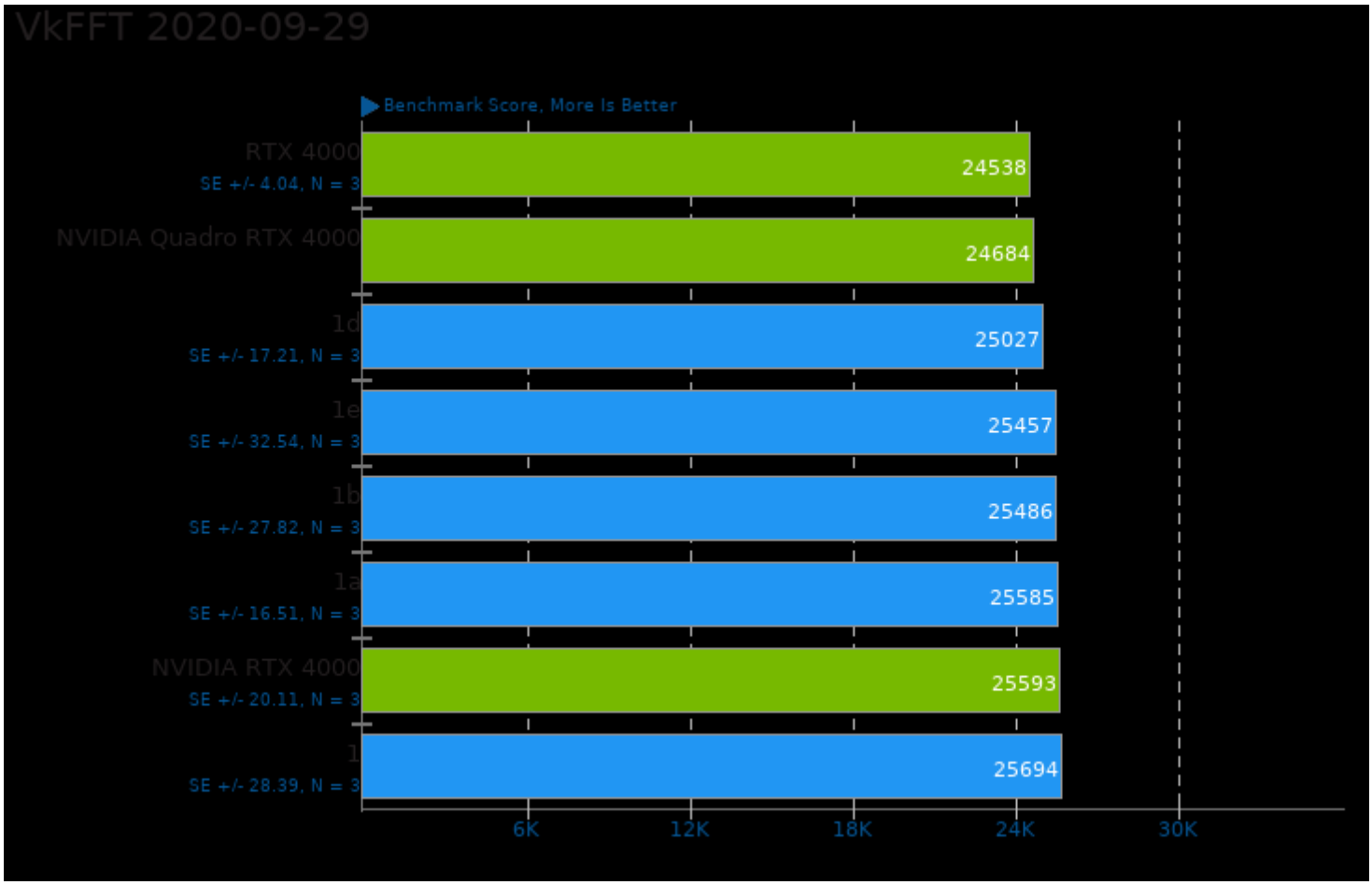
| | | | |
|---|---|---|---|
| **Blender - Classroom - NVIDIA** | **115.78** | **118.39** | 117.20 |
| **Normalized** | 100% | 97.8% | 98.79% |
| **Standard Deviation** | 1.3% | 0.8% | 0.8% |
| **Blender - Fishy Cat - NVIDIA OptiX** | **58.38** | **59.12** | 58.69 |
| **Normalized** | 100% | 98.75% | 99.47% |
| **Standard Deviation** | 0.6% | 0.7% | 0.6% |
| **Blender - Barbershop - NVIDIA OptiX (sec)** | **1307** | **1322** | 1307 |
| **Normalized** | 100% | 98.89% | 99.99% |
| **Standard Deviation** | 0.6% | 0.1% | 0.1% |
| **Blender - Pabellon Barcelona - CUDA (sec)** | 459.35 | **460.64** | **459.08** |
| **Normalized** | 99.94% | 99.66% | 100% |
| **Standard Deviation** | 0.4% | 0.6% | 0.2% |
| **Blender - Pabellon Barcelona - NVIDIA OptiX (sec)** | 160.82 | **160.95** | **159.09** |
| **Normalized** | 98.92% | 98.84% | 100% |
| **Standard Deviation** | 0.2% | 0.1% | 0.5% |
| **MandelGPU - GPU (Samples/sec)** | 2481224 13 | **2481771 51** | **2468570 18** |
| **Normalized** | 99.98% | 100% | 99.47% |
| **Standard Deviation** | 0.5% | 0.2% | 0.4% |
| **clpeak - I.C.I (GIOPS)** | **5712** | 5742 | **6014** |
| **Normalized** | 94.99% | 95.48% | 100% |
| **Standard Deviation** | 4.1% | 1.4% | 2.9% |
| **clpeak - S.P.F (GFLOPS)** | 6033 | **6004** | **6536** |
| **Normalized** | 92.3% | 91.86% | 100% |
| **Standard Deviation** | 1% | 1.6% | 2.6% |
| **clpeak - D.P.D (GFLOPS)** | **259.66** | 259.50 | **259.33** |
| **Normalized** | 100% | 99.94% | 99.87% |
| **Standard Deviation** | 0.2% | 0.1% | 0% |
| **clpeak - G.M.B (GBPS)** | **346.09** | **340.91** | 342.37 |
| **Normalized** | 100% | 98.5% | 98.93% |
| **Standard Deviation** | 2.4% | 2.3% | 2.6% |
| **NeatBench - GPU (FPS)** | **31.0** | 30.9 | **30.2** |
| **Normalized** | 100% | 99.68% | 97.42% |
| **Standard Deviation** | 8.2% | 8.6% | 8.1% |

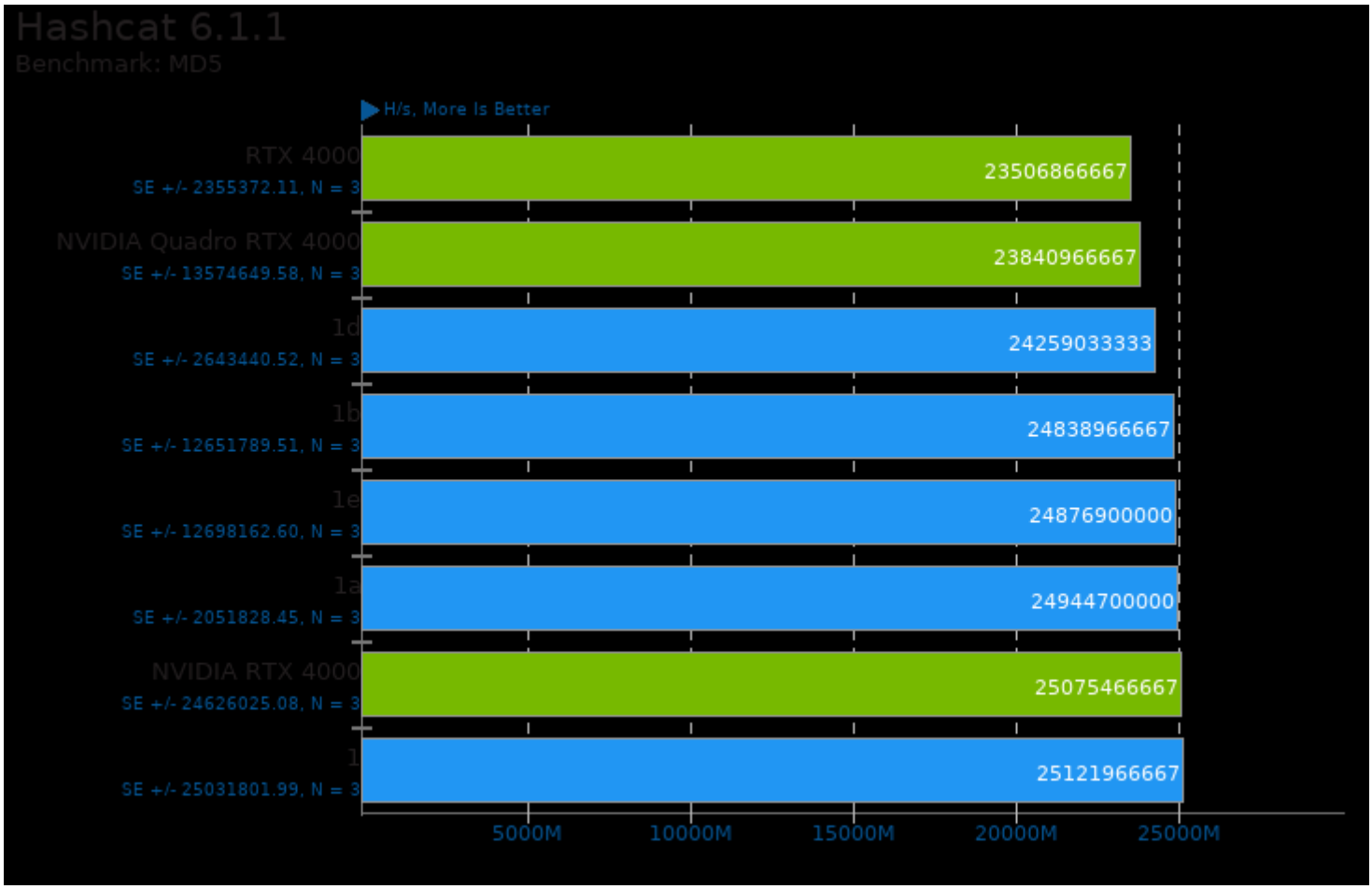

RealSR-NCNN 20200818
Scale: 4x - TAA: No
Seconds, Fewer Is Better
RTX 4000
SE +/- 0.01, N = 3
13.35
NVIDIA Quadro RTX 4000
SE +/- 0.02, N = 3
13.08
1d
SE +/- 0.00, N = 3
12.98
1c
SE +/- 0.03, N = 3
12.70
1b
SE +/- 0.04, N = 3
12.67
1a
SE +/- 0.02, N = 3
12.60
1e
SE +/- 0.01, N = 3
12.58
1
SE +/- 0.02, N = 3
12.55
NVIDIA RTX 4000
SE +/- 0.01, N = 3
12.49
3
6
9
12
15

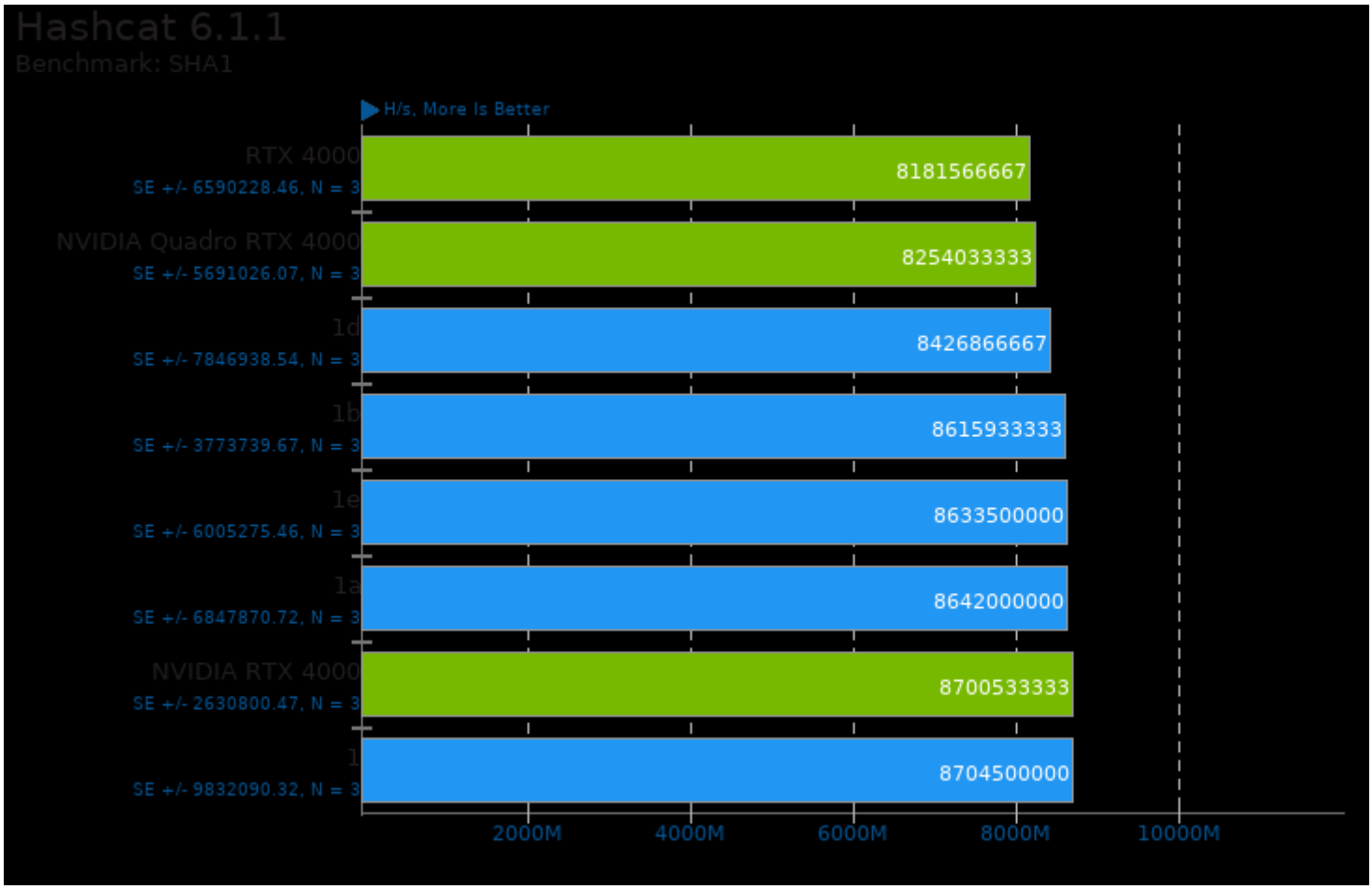

RealSR-NCNN 20200818
Scale: 4x - TAA: Yes
Seconds, Fewer Is Better
RTX 4000
SE +/- 0.27, N = 3
87.79
NVIDIA Quadro RTX 4000
SE +/- 0.45, N = 3
85.93
1d
SE +/- 0.36, N = 3
84.17
1c
SE +/- 0.40, N = 3
82.46
1b
SE +/- 0.40, N = 3
81.54
1e
SE +/- 0.36, N = 3
81.17
1a
SE +/- 0.36, N = 3
81.13
NVIDIA RTX 4000
SE +/- 0.37, N = 3
80.55
1
SE +/- 0.35, N = 3
80.45
20
40
60
80
100

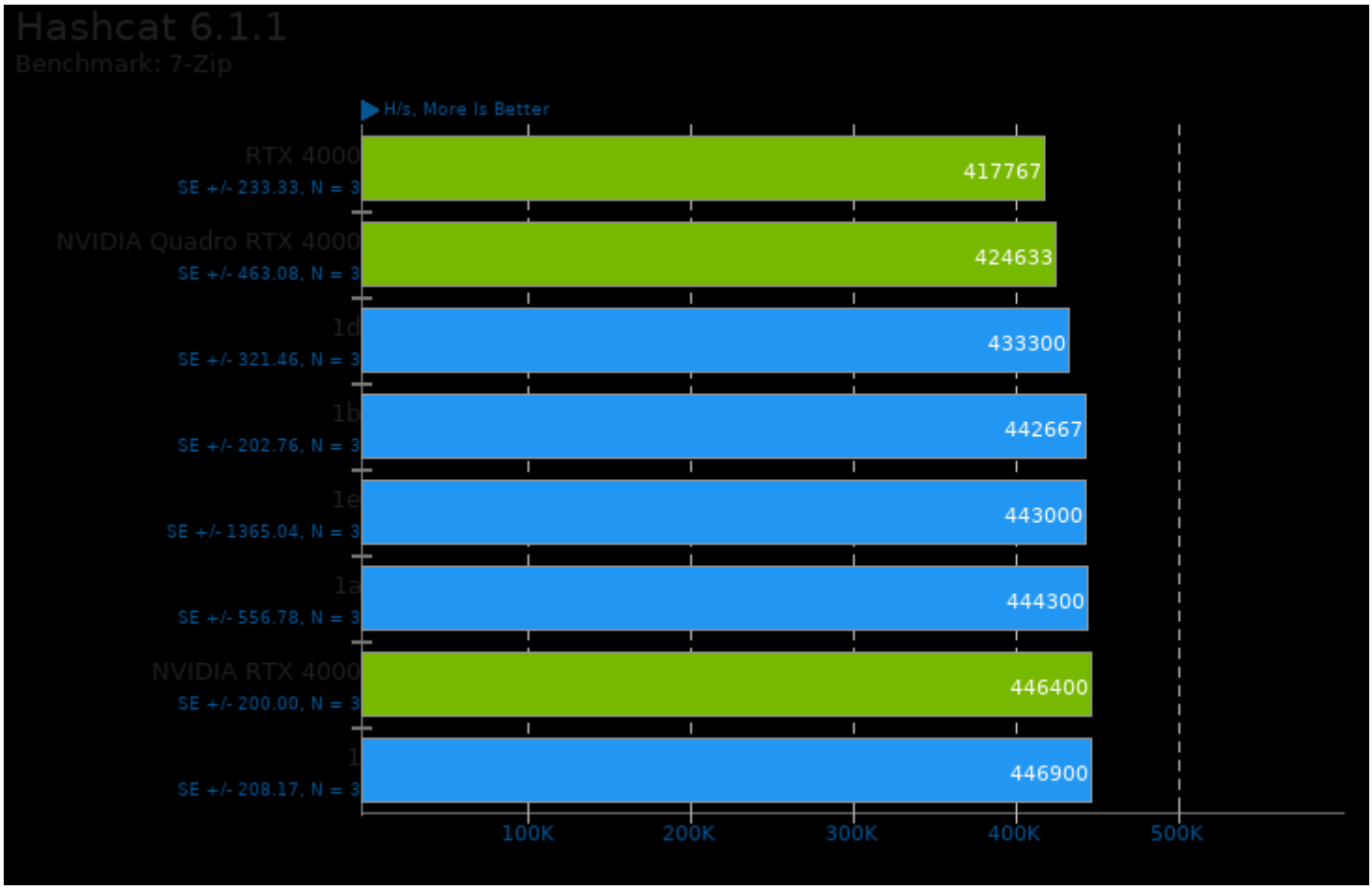

Waifu2x-NCNN Vulkan 20200818
Scale: 2x - Denoise: 3 - TAA: Yes
Seconds, Fewer Is Better
RTX 4000
SE +/- 0.014, N = 3
5.861
NVIDIA Quadro RTX 4000
SE +/- 0.018, N = 3
5.785
1d
SE +/- 0.008, N = 3
5.694
1c
SE +/- 0.047, N = 3
5.671
1b
SE +/- 0.022, N = 3
5.572
1e
SE +/- 0.017, N = 3
5.571
1a
SE +/- 0.023, N = 3
5.551
NVIDIA RTX 4000
SE +/- 0.041, N = 3
5.540
1
SE +/- 0.008, N = 3
5.502
1.3187
2.6374
3.9561
5.2748
6.5935

# compulab-airtop-3-rtx-4000-compute

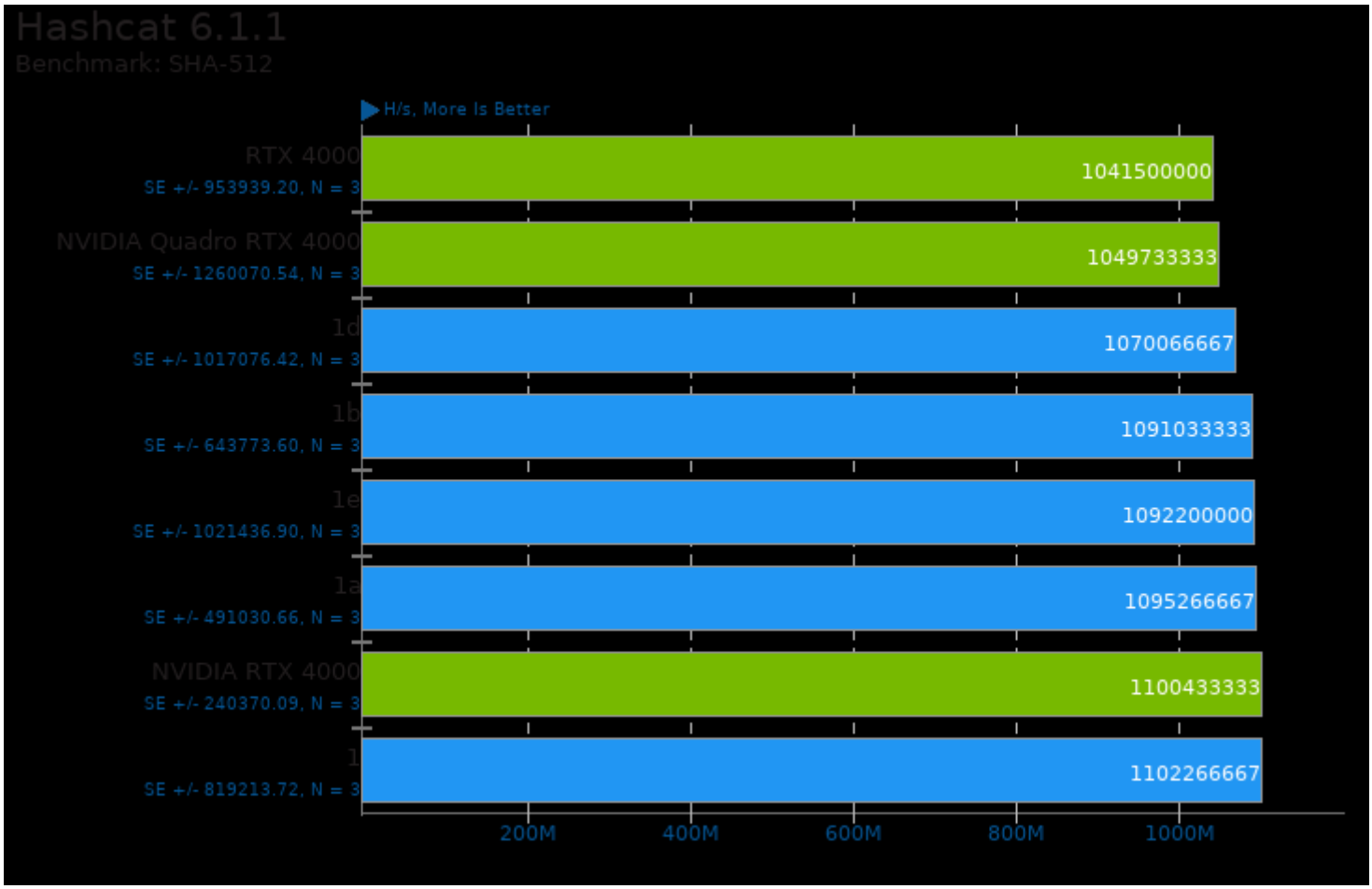


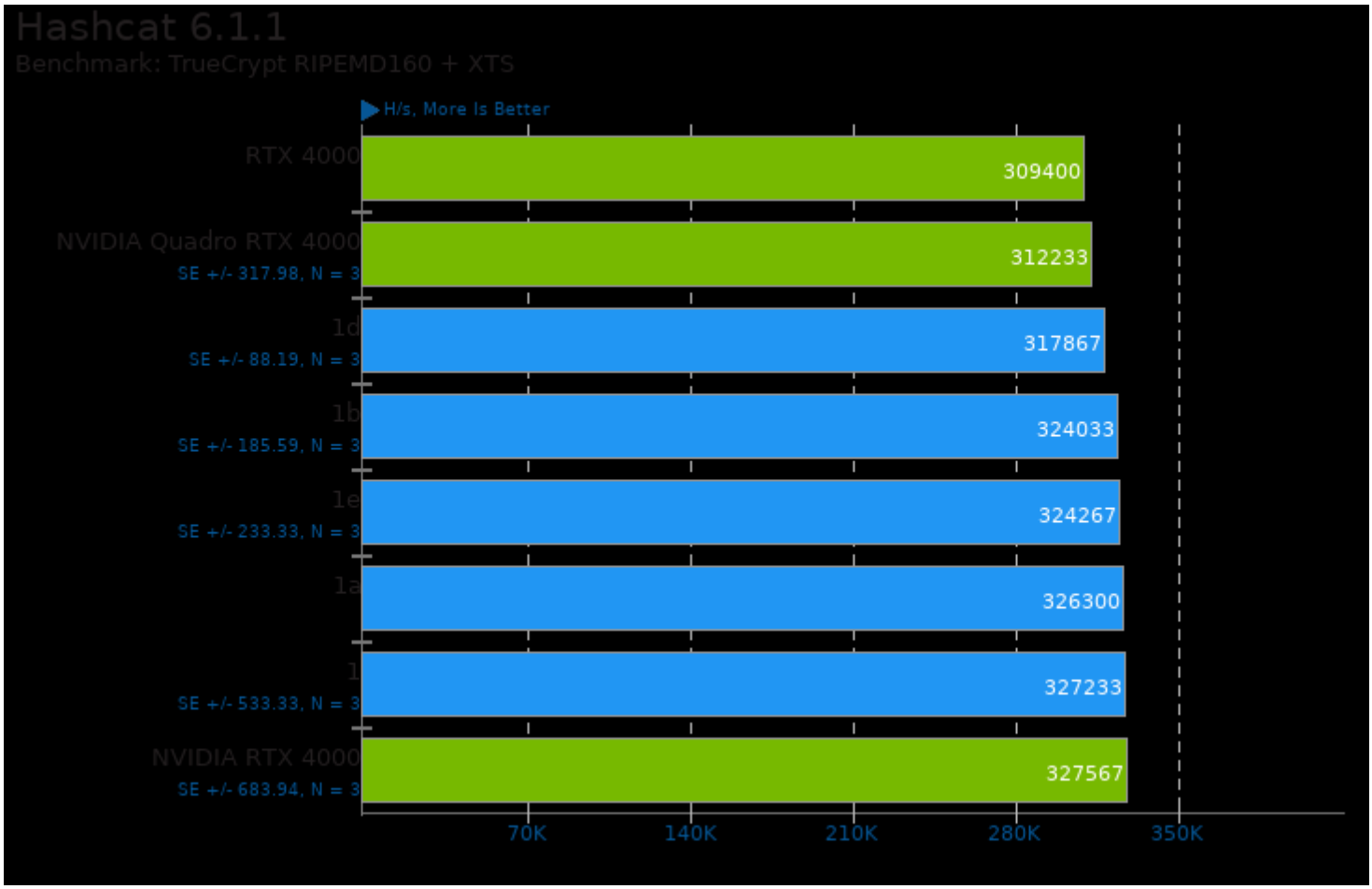

Hashcat 6.1.1
Benchmark: MD5
H/s, More Is Better
RTX 4000
SE +/- 2355372.11, N = 3
23506866667
NVIDIA Quadro RTX 4000
SE +/- 13574649.58, N = 3
23840966667
1d
SE +/- 2643440.52, N = 3
24259033333
1b
SE +/- 12651789.51, N = 3
24838966667
1e
SE +/- 12698162.60, N = 3
24876900000
1a
SE +/- 2051828.45, N = 3
24944700000
NVIDIA RTX 4000
SE +/- 24626025.08, N = 3
25075466667
1
SE +/- 25031801.99, N = 3
25121966667
5000M
10000M
15000M
20000M
25000M

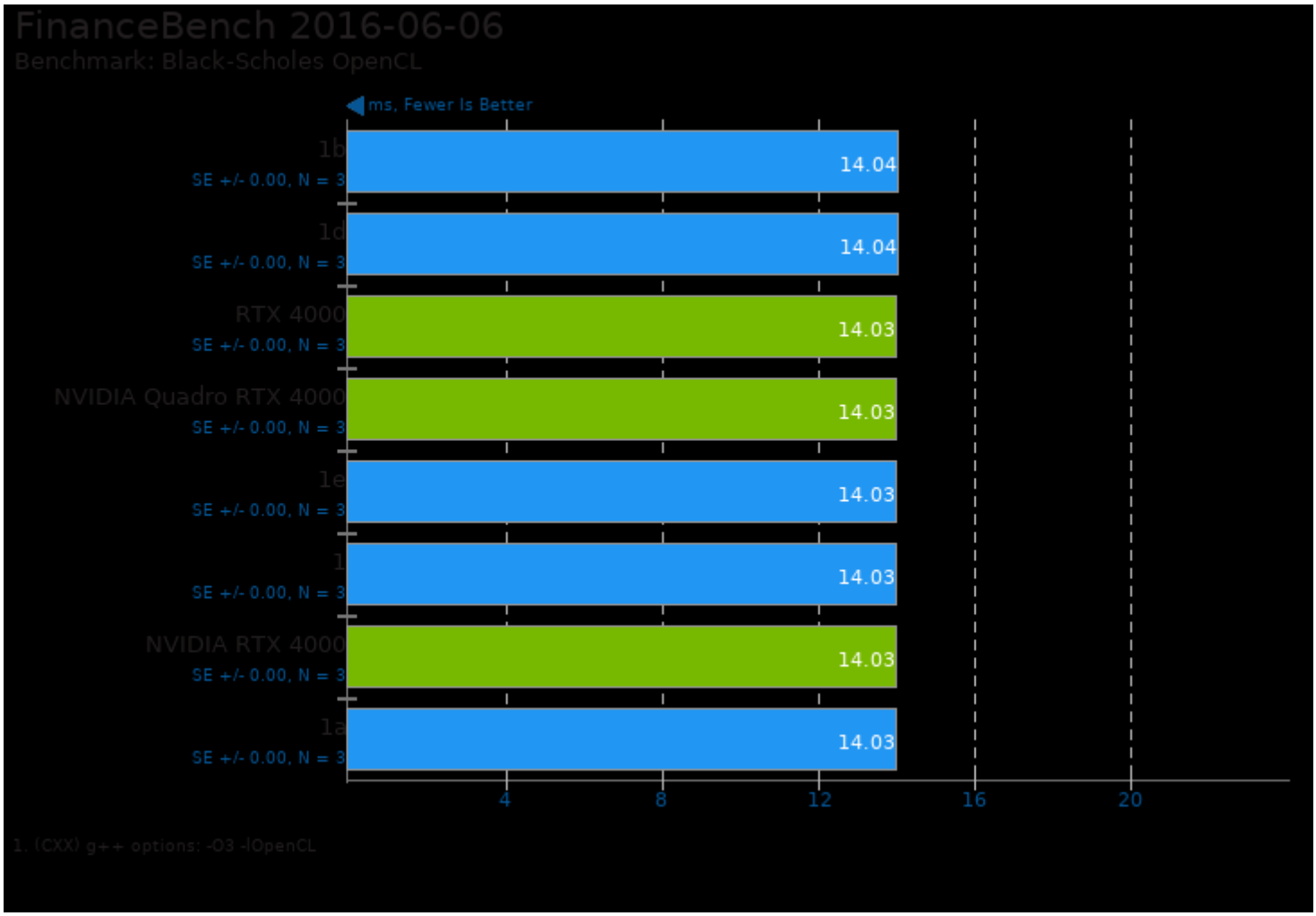

Hashcat 6.1.1
Benchmark: SHA1
H/s, More Is Better
RTX 4000
SE +/- 6590228.46, N = 3
8181566667
NVIDIA Quadro RTX 4000
SE +/- 5691026.07, N = 3
8254033333
1d
SE +/- 7846938.54, N = 3
8426866667
1b
SE +/- 3773739.67, N = 3
8615933333
1e
SE +/- 6005275.46, N = 3
8633500000
1a
SE +/- 6847870.72, N = 3
8642000000
NVIDIA RTX 4000
SE +/- 2630800.47, N = 3
8700533333
SE +/- 9832090.32, N = 3
8704500000
2000M
4000M
6000M
8000M
10000M

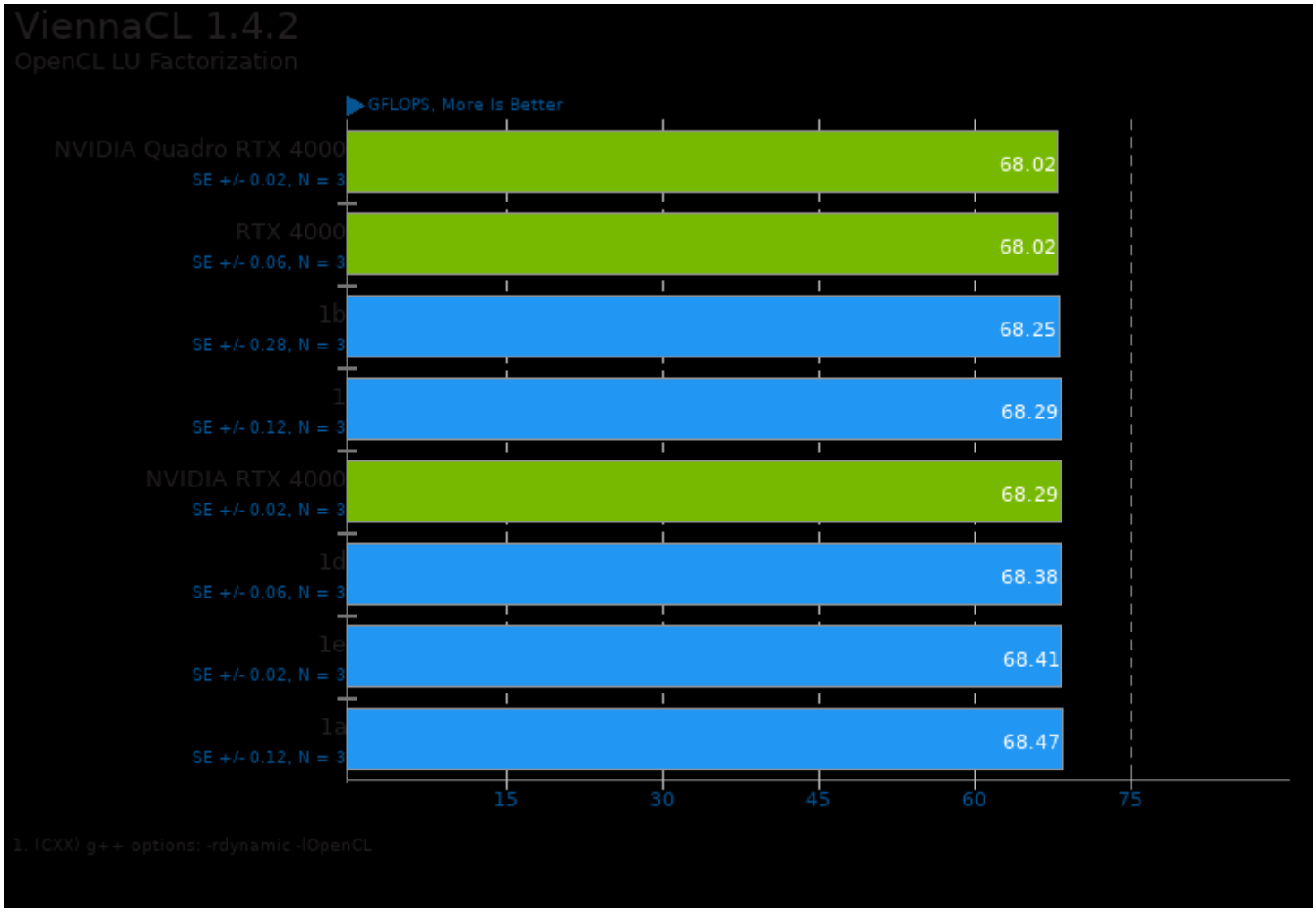

Hashcat 6.1.1
Benchmark: 7-Zip
H/s, More Is Better
RTX 4000
SE +/- 233.33, N = 3
417767
NVIDIA Quadro RTX 4000
SE +/- 463.08, N = 3
424633
1d
SE +/- 321.46, N = 3
433300
1b
SE +/- 202.76, N = 3
442667
1e
SE +/- 1365.04, N = 3
443000
1a
SE +/- 556.78, N = 3
444300
NVIDIA RTX 4000
SE +/- 200.00, N = 3
446400
SE +/- 208.17, N = 3
446900
100K
200K
300K
400K
500K

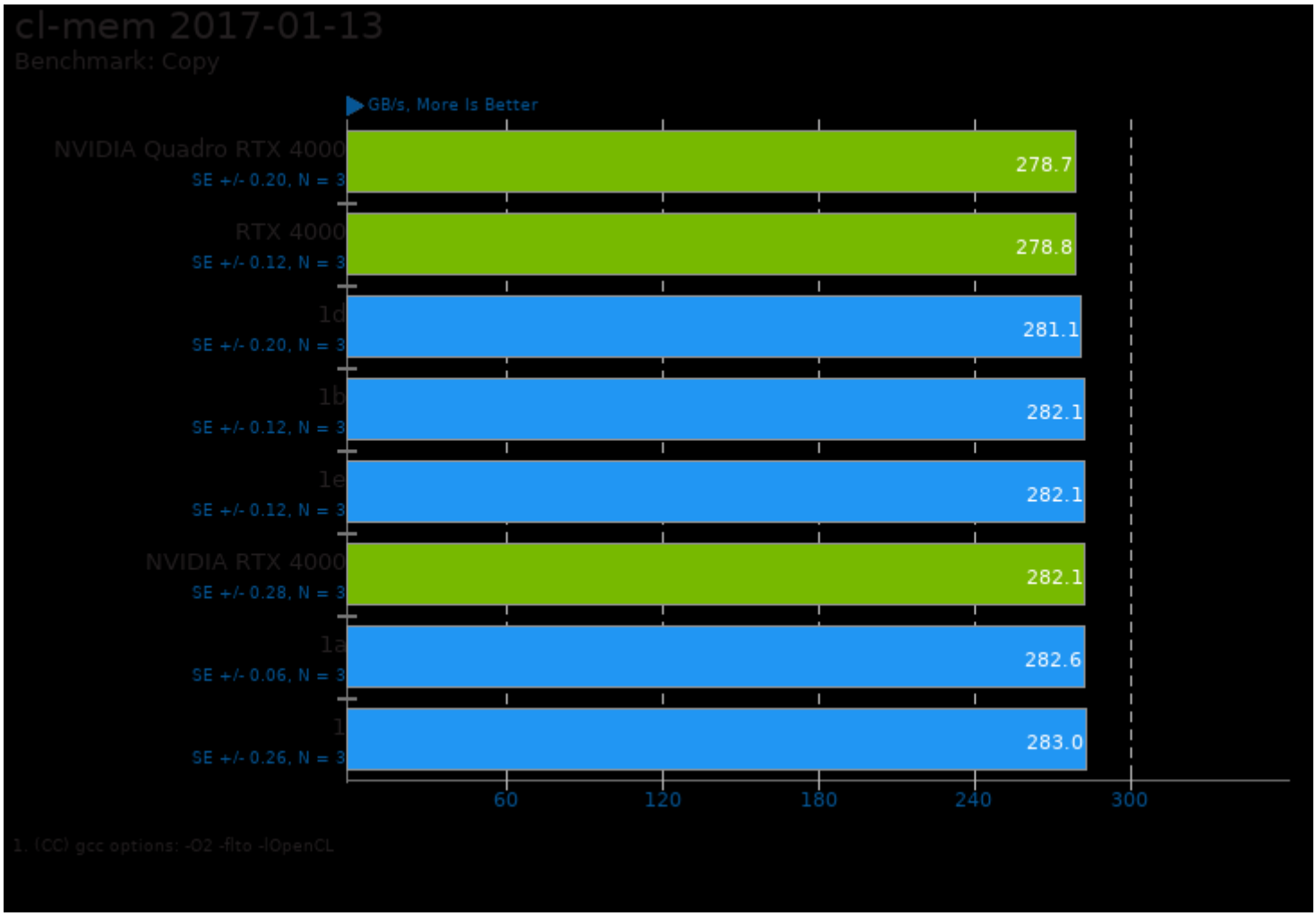
# compulab-airtop-3-rtx-4000-compute

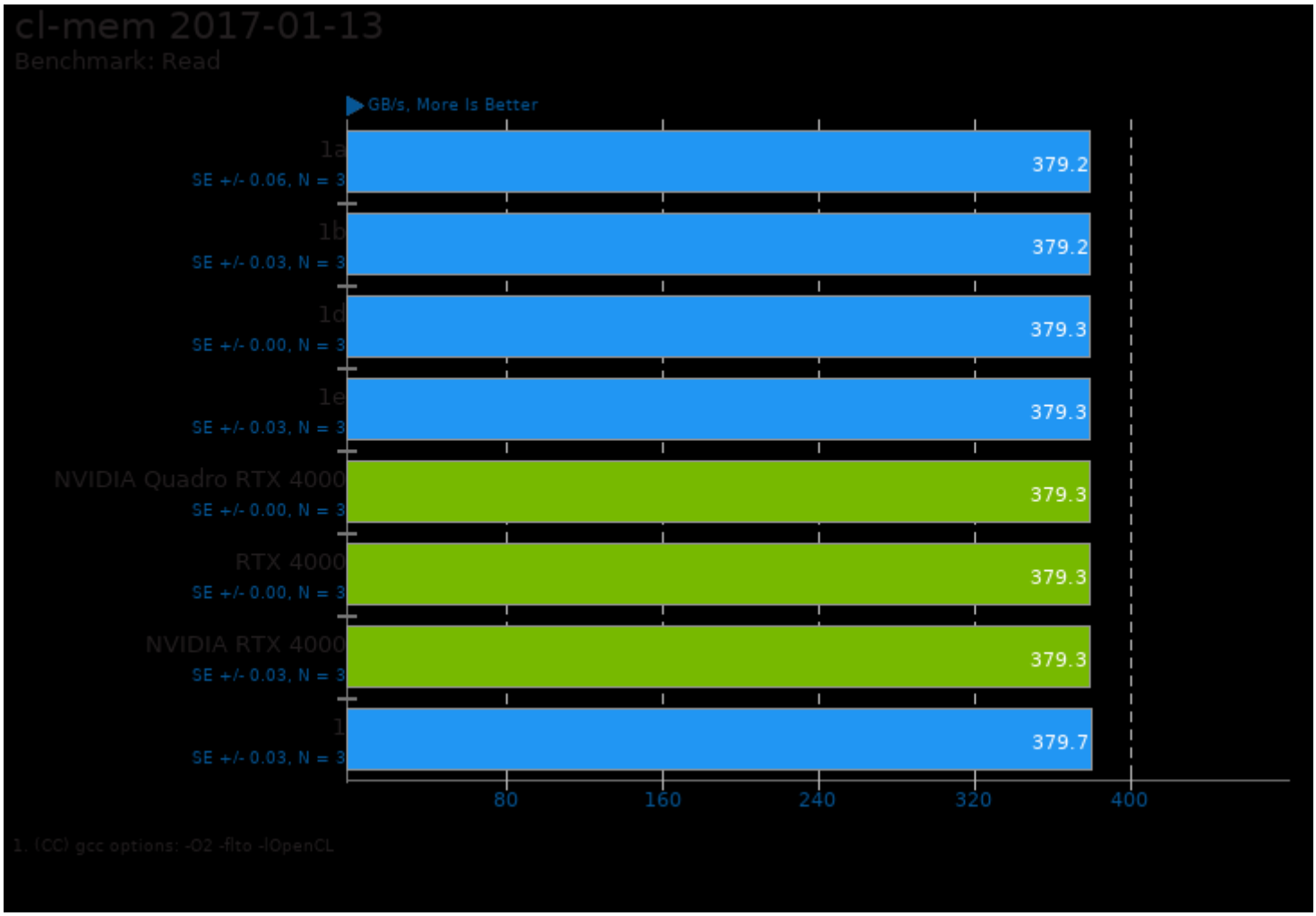


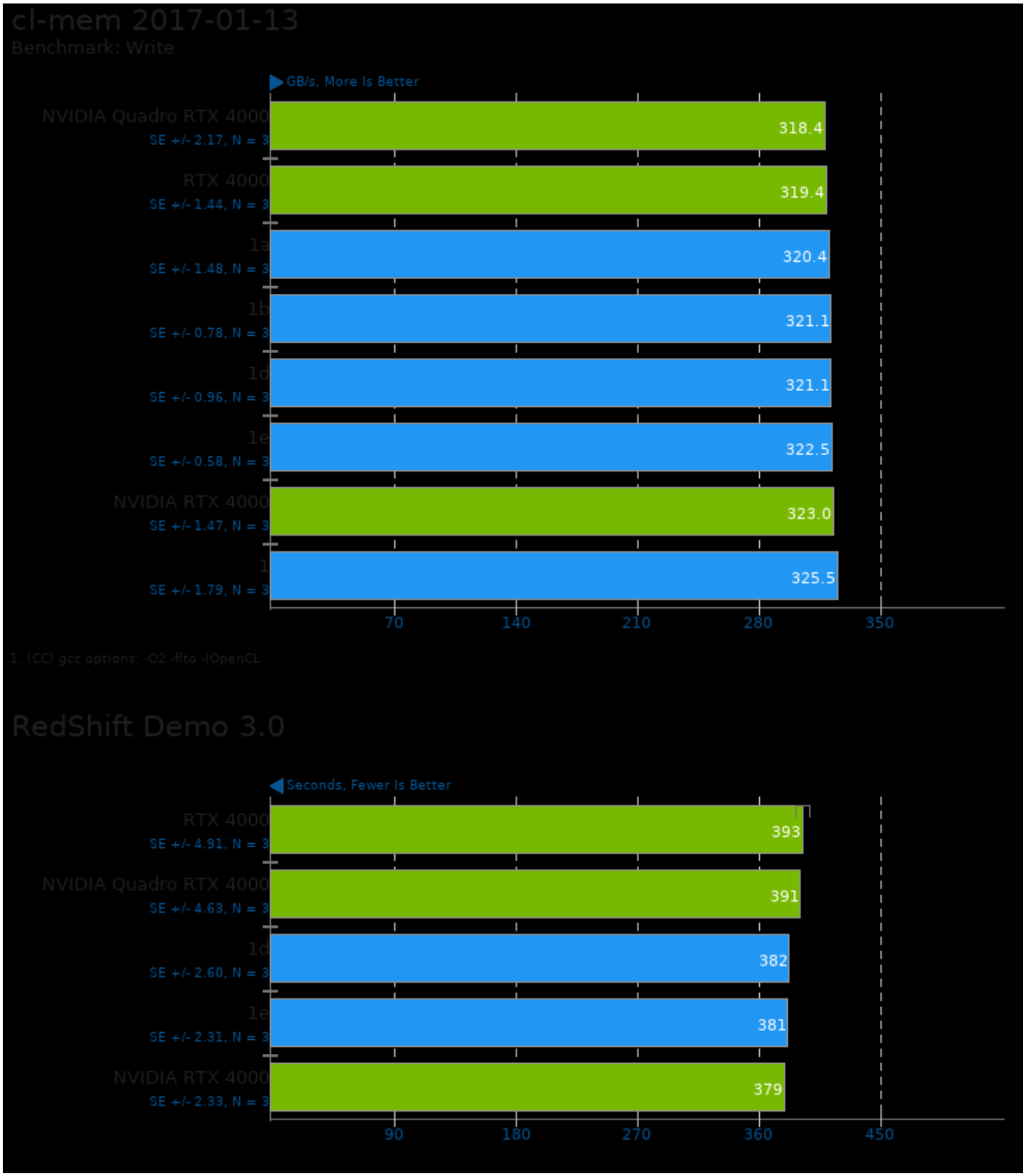

Hashcat 6.1.1
Benchmark: TrueCrypt RIPEMD160 + XTS
H/s, More Is Better
RTX 4000
309400
NVIDIA Quadro RTX 4000
SE +/- 317.98, N = 3
312233
1d
SE +/- 88.19, N = 3
317867
1b
SE +/- 185.59, N = 3
324033
1e
SE +/- 233.33, N = 3
324267
1a
326300
1
SE +/- 533.33, N = 3
327233
NVIDIA RTX 4000
SE +/- 683.94, N = 3
327567
70K
140K
210K
280K
350K


FinanceBench 2016-06-06
Benchmark: Black-Scholes OpenCL
ms, Fewer Is Better
1b
SE +/- 0.00, N = 3
14.04
1d
SE +/- 0.00, N = 3
14.04
RTX 4000
SE +/- 0.00, N = 3
14.03
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
14.03
1e
SE +/- 0.00, N = 3
14.03
1
SE +/- 0.00, N = 3
14.03
NVIDIA RTX 4000
SE +/- 0.00, N = 3
14.03
1a
SE +/- 0.00, N = 3
14.03
4
8
12
16
20
1. (CXX) g++ options: -O3 -lOpenCL

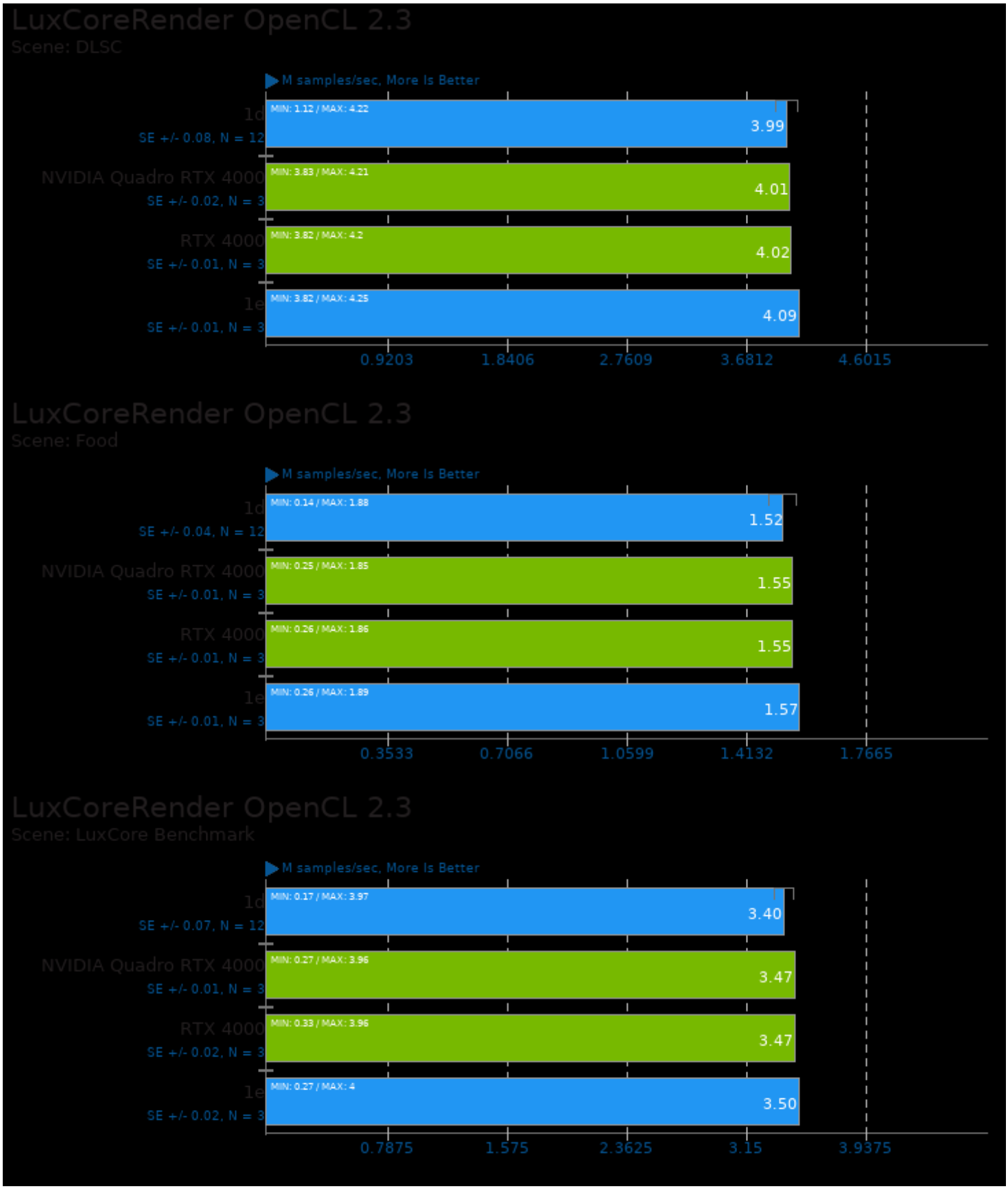

ViennaCL 1.4.2
OpenCL LU Factorization
GFLOPS, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.02, N = 3
68.02
RTX 4000
SE +/- 0.06, N = 3
68.02
1b
SE +/- 0.28, N = 3
68.25
1
SE +/- 0.12, N = 3
68.29
NVIDIA RTX 4000
SE +/- 0.02, N = 3
68.29
1d
SE +/- 0.06, N = 3
68.38
1e
SE +/- 0.02, N = 3
68.41
1a
SE +/- 0.12, N = 3
68.47
15
30
45
60
75
1. (CXX) g++ options: -rdynamic -lOpenCL

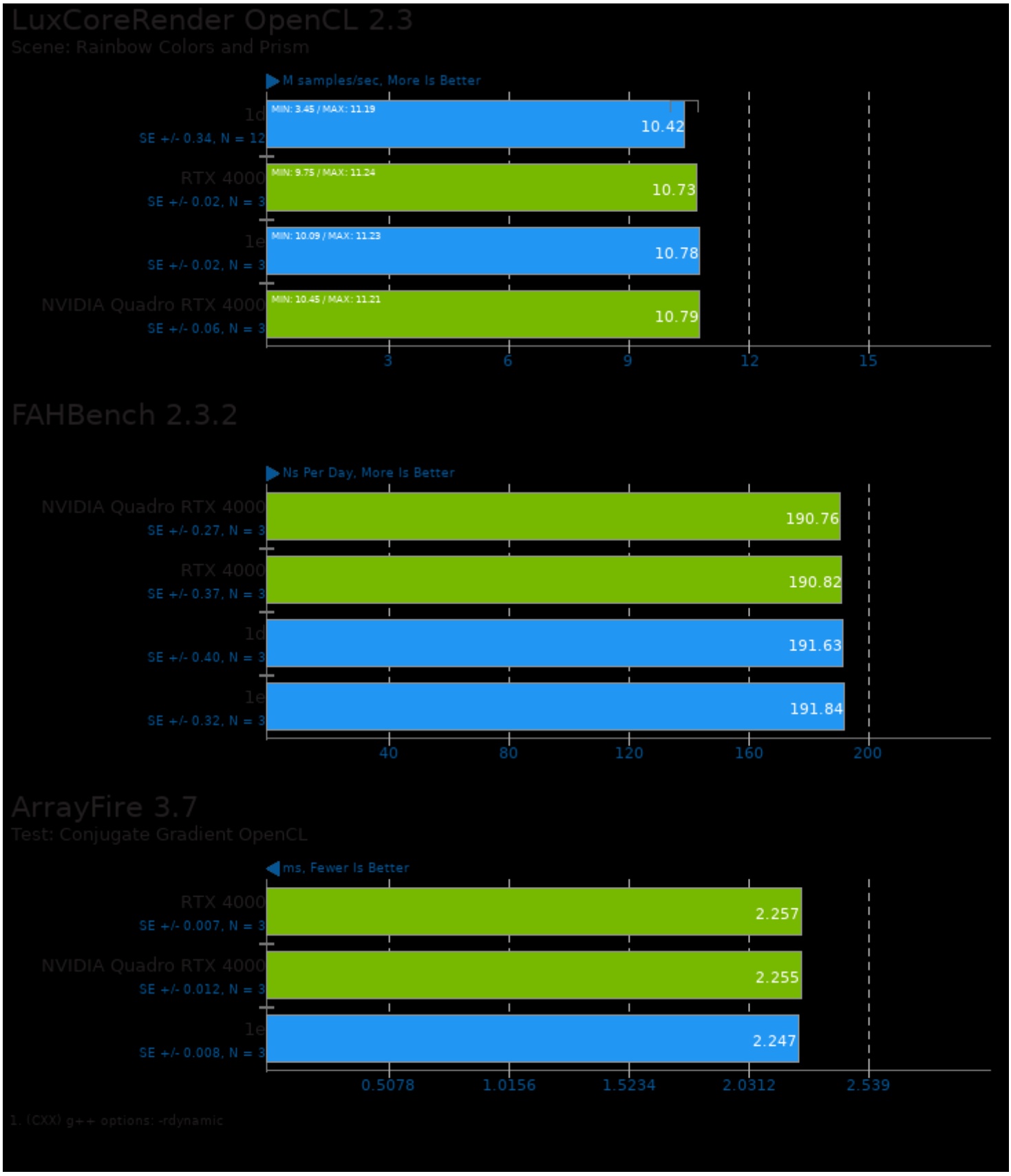

cl-mem 2017-01-13
Benchmark: Copy
GB/s, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.20, N = 3
278.7
RTX 4000
SE +/- 0.12, N = 3
278.8
1d
SE +/- 0.20, N = 3
281.1
1b
SE +/- 0.12, N = 3
282.1
1e
SE +/- 0.12, N = 3
282.1
NVIDIA RTX 4000
SE +/- 0.28, N = 3
282.1
1a
SE +/- 0.06, N = 3
282.6
1
SE +/- 0.26, N = 3
283.0
60
120
180
240
300
1. (CC) gcc options: -O2 -flto -lOpenCL

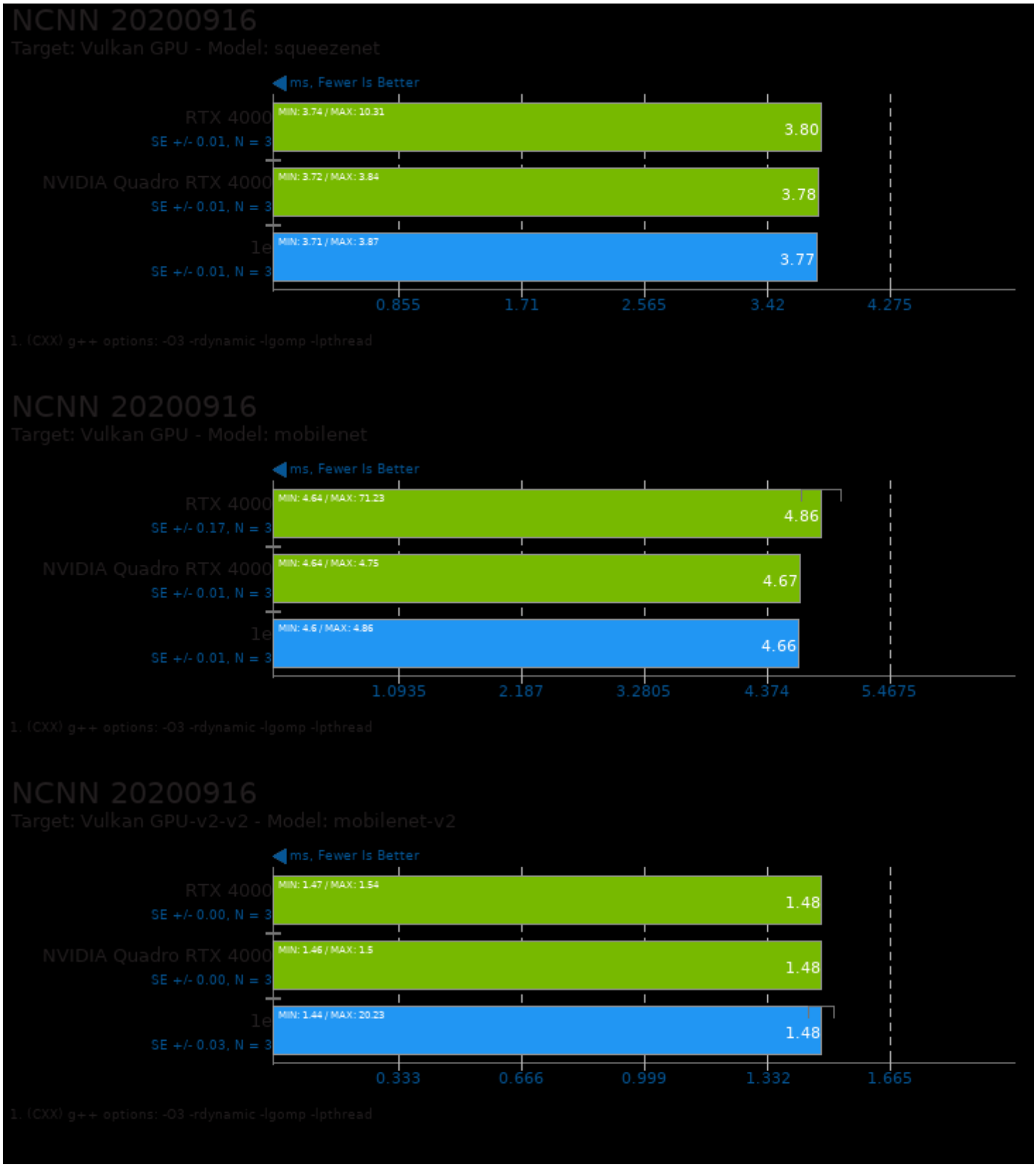

cl-mem 2017-01-13
Benchmark: Read
GB/s, More Is Better
1a
SE +/- 0.06, N = 3
379.2
1b
SE +/- 0.03, N = 3
379.2
1d
SE +/- 0.00, N = 3
379.3
1e
SE +/- 0.03, N = 3
379.3
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
379.3
RTX 4000
SE +/- 0.00, N = 3
379.3
NVIDIA RTX 4000
SE +/- 0.03, N = 3
379.3
1
SE +/- 0.03, N = 3
379.7
80
160
240
320
400
1. (CC) gcc options: -O2 -flto -lOpenCL

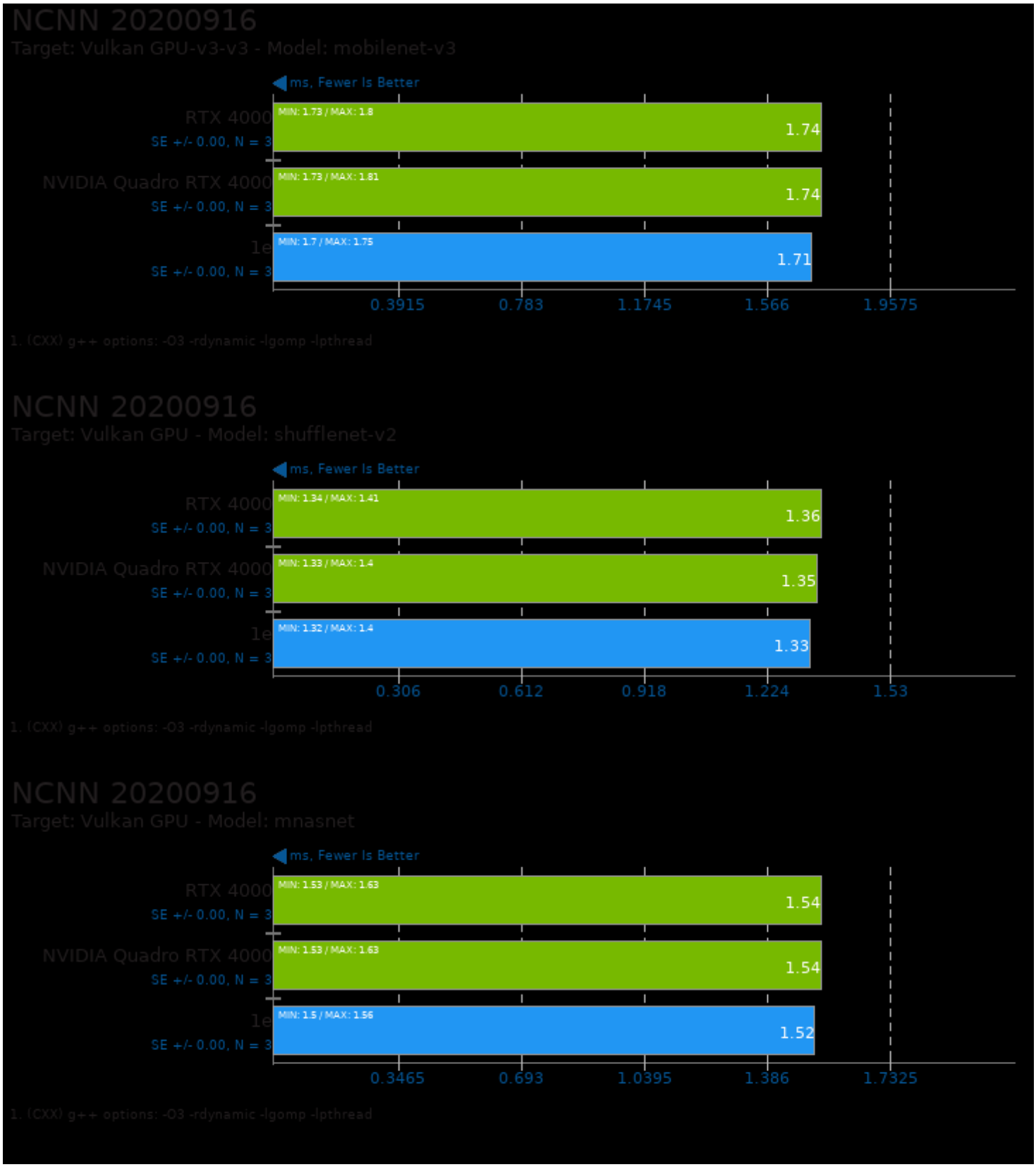

cl-mem 2017-01-13
Benchmark: Write
GB/s, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 2.17, N = 3
318.4
RTX 4000
SE +/- 1.44, N = 3
319.4
1a
SE +/- 1.48, N = 3
320.4
1b
SE +/- 0.78, N = 3
321.1
1d
SE +/- 0.96, N = 3
321.1
1e
SE +/- 0.58, N = 3
322.5
NVIDIA RTX 4000
SE +/- 1.47, N = 3
323.0
1
SE +/- 1.79, N = 3
325.5
70
140
210
280
350
1. (CC) gcc options: -O2 -flto -lOpenCL
RedShift Demo 3.0
Seconds, Fewer Is Better
RTX 4000
SE +/- 4.91, N = 3
393
NVIDIA Quadro RTX 4000
SE +/- 4.63, N = 3
391
1d
SE +/- 2.60, N = 3
382
1e
SE +/- 2.31, N = 3
381
NVIDIA RTX 4000
SE +/- 2.33, N = 3
379
90
180
270
360
450

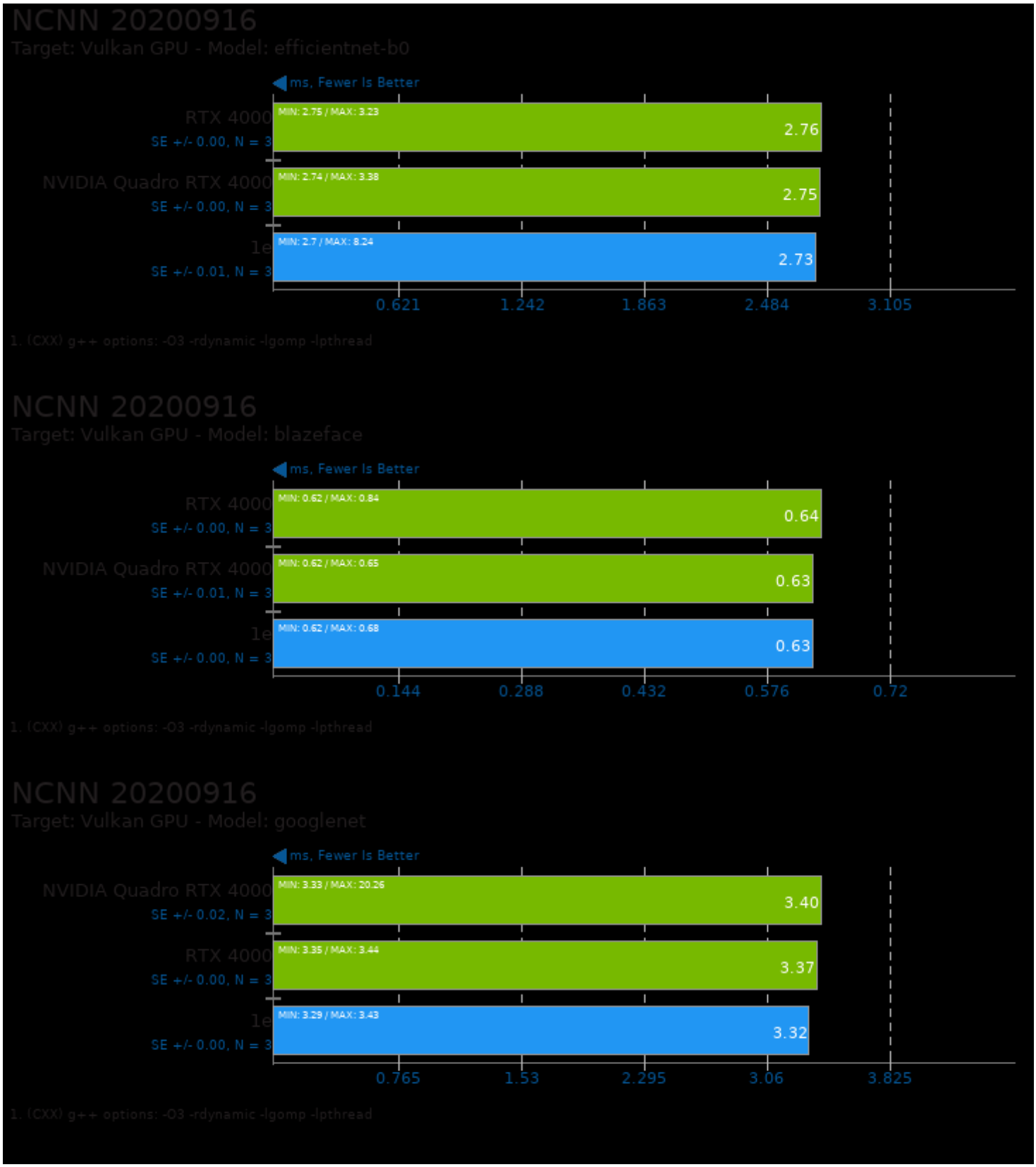
# compulab-airtop-3-rtx-4000-compute

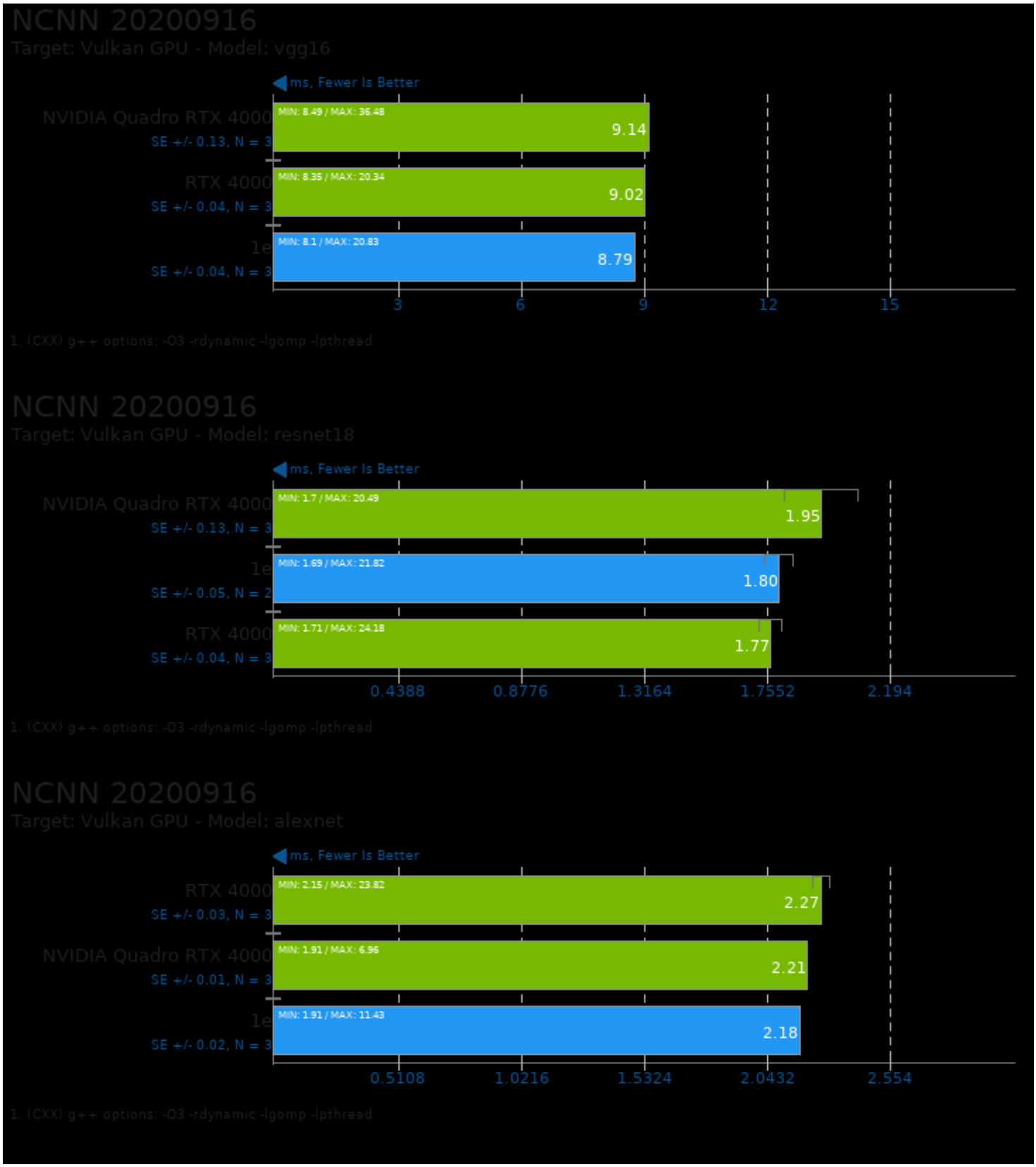


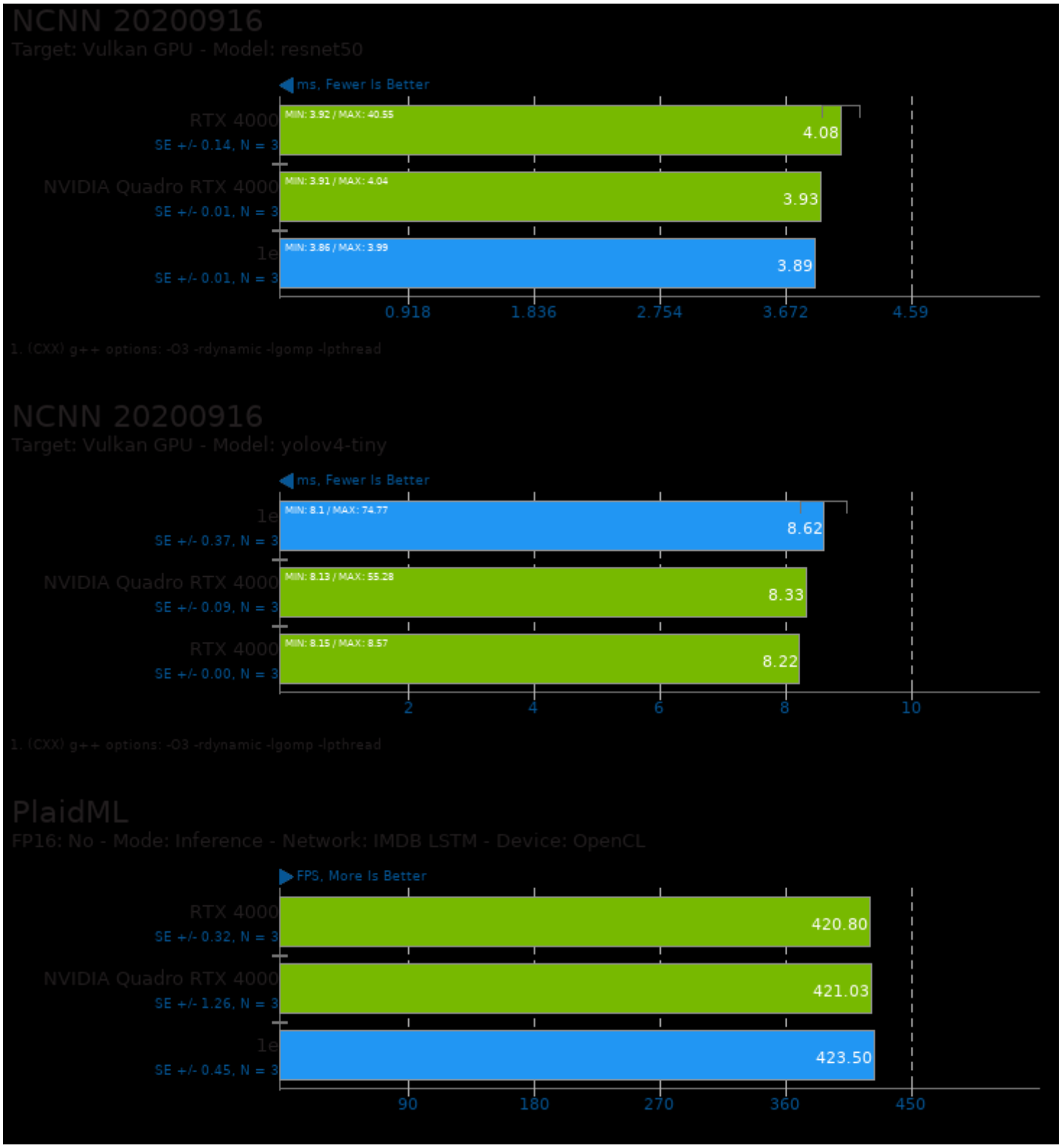

LuxCoreRender OpenCL 2.3
Scene: Rainbow Colors and Prism
M samples/sec, More Is Better
1d
SE +/- 0.34, N = 12
MIN: 3.45 / MAX: 11.19
10.42
RTX 4000
SE +/- 0.02, N = 3
MIN: 9.75 / MAX: 11.24
10.73
1e
SE +/- 0.02, N = 3
MIN: 10.09 / MAX: 11.23
10.78
NVIDIA Quadro RTX 4000
SE +/- 0.06, N = 3
MIN: 10.45 / MAX: 11.21
10.79
3
6
9
12
15
FAHBench 2.3.2
Ns Per Day, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.27, N = 3
190.76
RTX 4000
SE +/- 0.37, N = 3
190.82
1d
SE +/- 0.40, N = 3
191.63
1e
SE +/- 0.32, N = 3
191.84
40
80
120
160
200
ArrayFire 3.7
Test: Conjugate Gradient OpenCL
ms, Fewer Is Better
RTX 4000
SE +/- 0.007, N = 3
2.257
NVIDIA Quadro RTX 4000
SE +/- 0.012, N = 3
2.255
1e
SE +/- 0.008, N = 3
2.247
0.5078
1.0156
1.5234
2.0312
2.539
1. (CXX) g++ options: -rdynamic

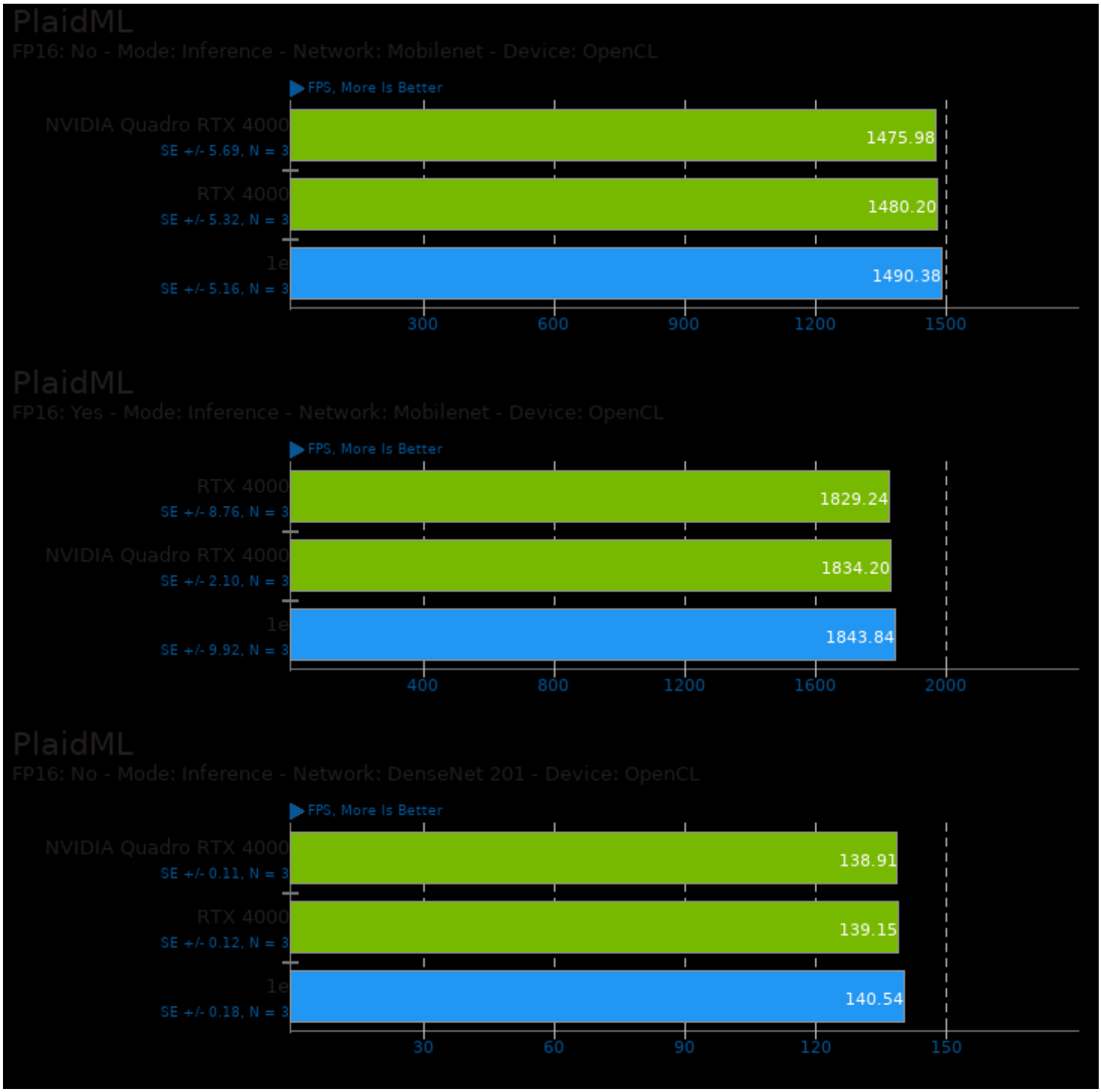

NCNN 20200916
Target: Vulkan GPU - Model: squeezenet
ms, Fewer Is Better
RTX 4000
SE +/- 0.01, N = 3
MIN: 3.74 / MAX: 10.31
3.80
NVIDIA Quadro RTX 4000
SE +/- 0.01, N = 3
MIN: 3.72 / MAX: 3.84
3.78
1e
SE +/- 0.01, N = 3
MIN: 3.71 / MAX: 3.87
3.77
0.855
1.71
2.565
3.42
4.275
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: mobilenet
ms, Fewer Is Better
RTX 4000
SE +/- 0.17, N = 3
MIN: 4.64 / MAX: 71.23
4.86
NVIDIA Quadro RTX 4000
SE +/- 0.01, N = 3
MIN: 4.64 / MAX: 4.75
4.67
1e
SE +/- 0.01, N = 3
MIN: 4.6 / MAX: 4.86
4.66
1.0935
2.187
3.2805
4.374
5.4675
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU-v2-v2 - Model: mobilenet-v2
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 1.47 / MAX: 1.54
1.48
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
MIN: 1.46 / MAX: 1.5
1.48
1e
SE +/- 0.03, N = 3
MIN: 1.44 / MAX: 20.23
1.48
0.333
0.666
0.999
1.332
1.665
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

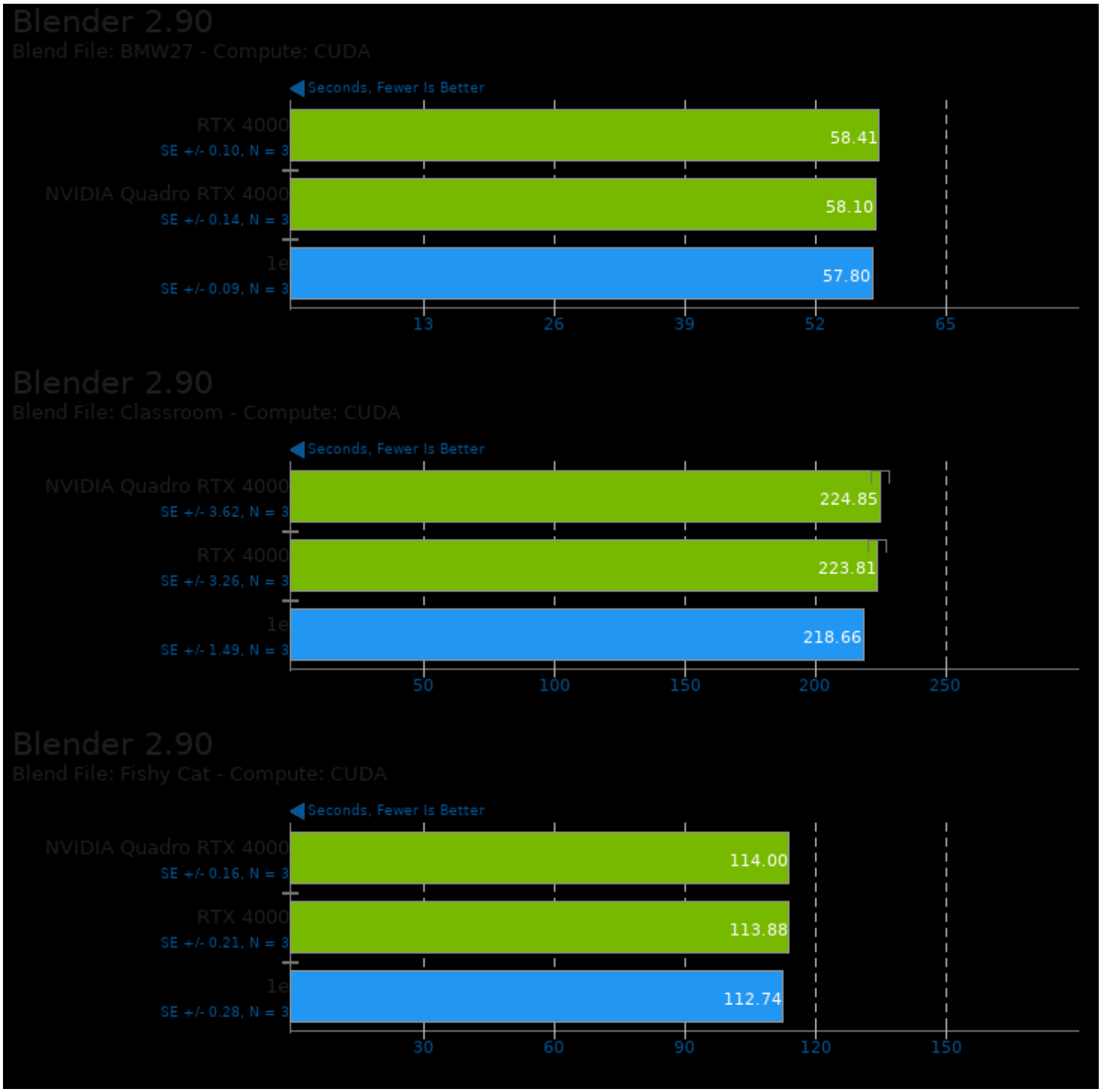

NCNN 20200916
Target: Vulkan GPU-v3-v3 - Model: mobilenet-v3
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 1.73 / MAX: 1.8
1.74
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
MIN: 1.73 / MAX: 1.81
1.74
1e
SE +/- 0.00, N = 3
MIN: 1.7 / MAX: 1.75
1.71
0.3915
0.783
1.1745
1.566
1.9575
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: shufflenet-v2
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 1.34 / MAX: 1.41
1.36
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
MIN: 1.33 / MAX: 1.4
1.35
1e
SE +/- 0.00, N = 3
MIN: 1.32 / MAX: 1.4
1.33
0.306
0.612
0.918
1.224
1.53
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: mnasnet
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 1.53 / MAX: 1.63
1.54
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
MIN: 1.53 / MAX: 1.63
1.54
1e
SE +/- 0.00, N = 3
MIN: 1.5 / MAX: 1.56
1.52
0.3465
0.693
1.0395
1.386
1.7325
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

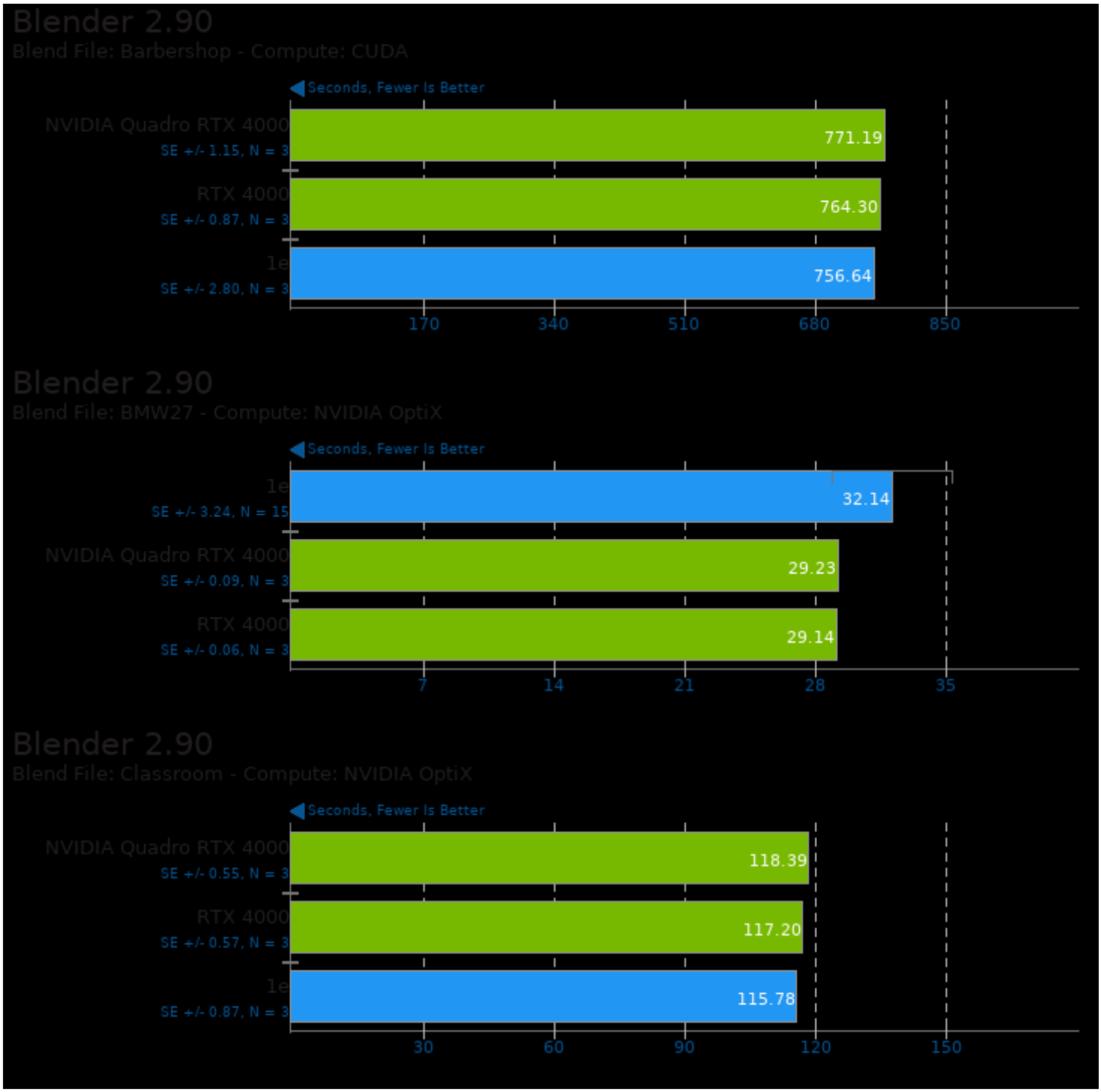

NCNN 20200916
Target: Vulkan GPU - Model: efficientnet-b0
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 2.75 / MAX: 3.23
2.76
NVIDIA Quadro RTX 4000
SE +/- 0.00, N = 3
MIN: 2.74 / MAX: 3.38
2.75
1e
SE +/- 0.01, N = 3
MIN: 2.7 / MAX: 8.24
2.73
0.621
1.242
1.863
2.484
3.105
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: blazeface
ms, Fewer Is Better
RTX 4000
SE +/- 0.00, N = 3
MIN: 0.62 / MAX: 0.84
0.64
NVIDIA Quadro RTX 4000
SE +/- 0.01, N = 3
MIN: 0.62 / MAX: 0.65
0.63
1e
SE +/- 0.00, N = 3
MIN: 0.62 / MAX: 0.68
0.63
0.144
0.288
0.432
0.576
0.72
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: googlenet
ms, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.02, N = 3
MIN: 3.33 / MAX: 20.26
3.40
RTX 4000
SE +/- 0.00, N = 3
MIN: 3.35 / MAX: 3.44
3.37
1e
SE +/- 0.00, N = 3
MIN: 3.29 / MAX: 3.43
3.32
0.765
1.53
2.295
3.06
3.825
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

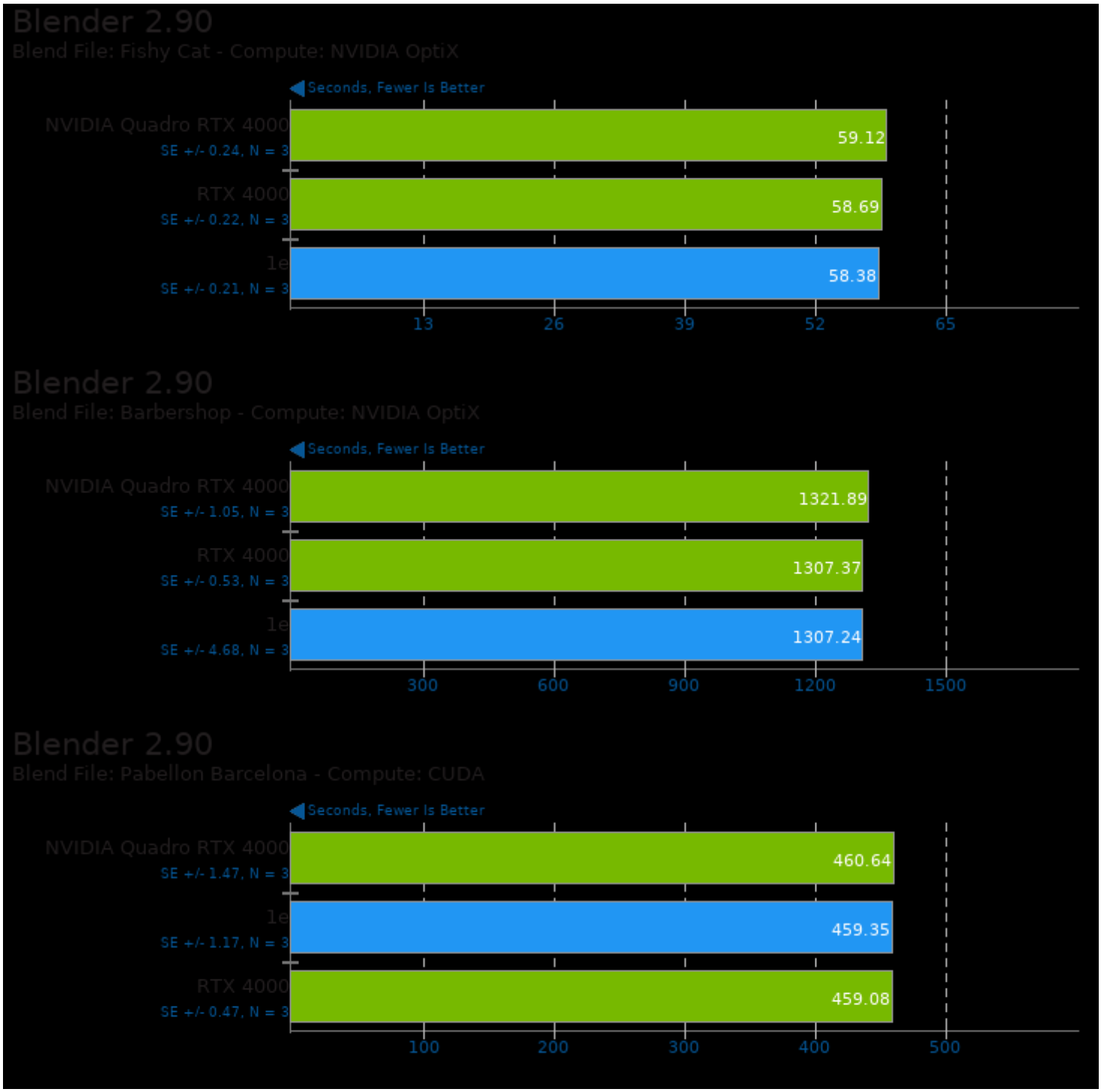

NCNN 20200916
Target: Vulkan GPU - Model: vgg16
ms, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.13, N = 3
MIN: 8.49 / MAX: 36.48
9.14
RTX 4000
SE +/- 0.04, N = 3
MIN: 8.35 / MAX: 20.34
9.02
1e
SE +/- 0.04, N = 3
MIN: 8.1 / MAX: 20.83
8.79
3
6
9
12
15
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: resnet18
ms, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.13, N = 3
MIN: 1.7 / MAX: 20.49
1.95
1e
SE +/- 0.05, N = 2
MIN: 1.69 / MAX: 21.82
1.80
RTX 4000
SE +/- 0.04, N = 3
MIN: 1.71 / MAX: 24.18
1.77
0.4388
0.8776
1.3164
1.7552
2.194
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: alexnet
ms, Fewer Is Better
RTX 4000
SE +/- 0.03, N = 3
MIN: 2.15 / MAX: 23.82
2.27
NVIDIA Quadro RTX 4000
SE +/- 0.01, N = 3
MIN: 1.91 / MAX: 6.96
2.21
1e
SE +/- 0.02, N = 3
MIN: 1.91 / MAX: 11.43
2.18
0.5108
1.0216
1.5324
2.0432
2.554
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

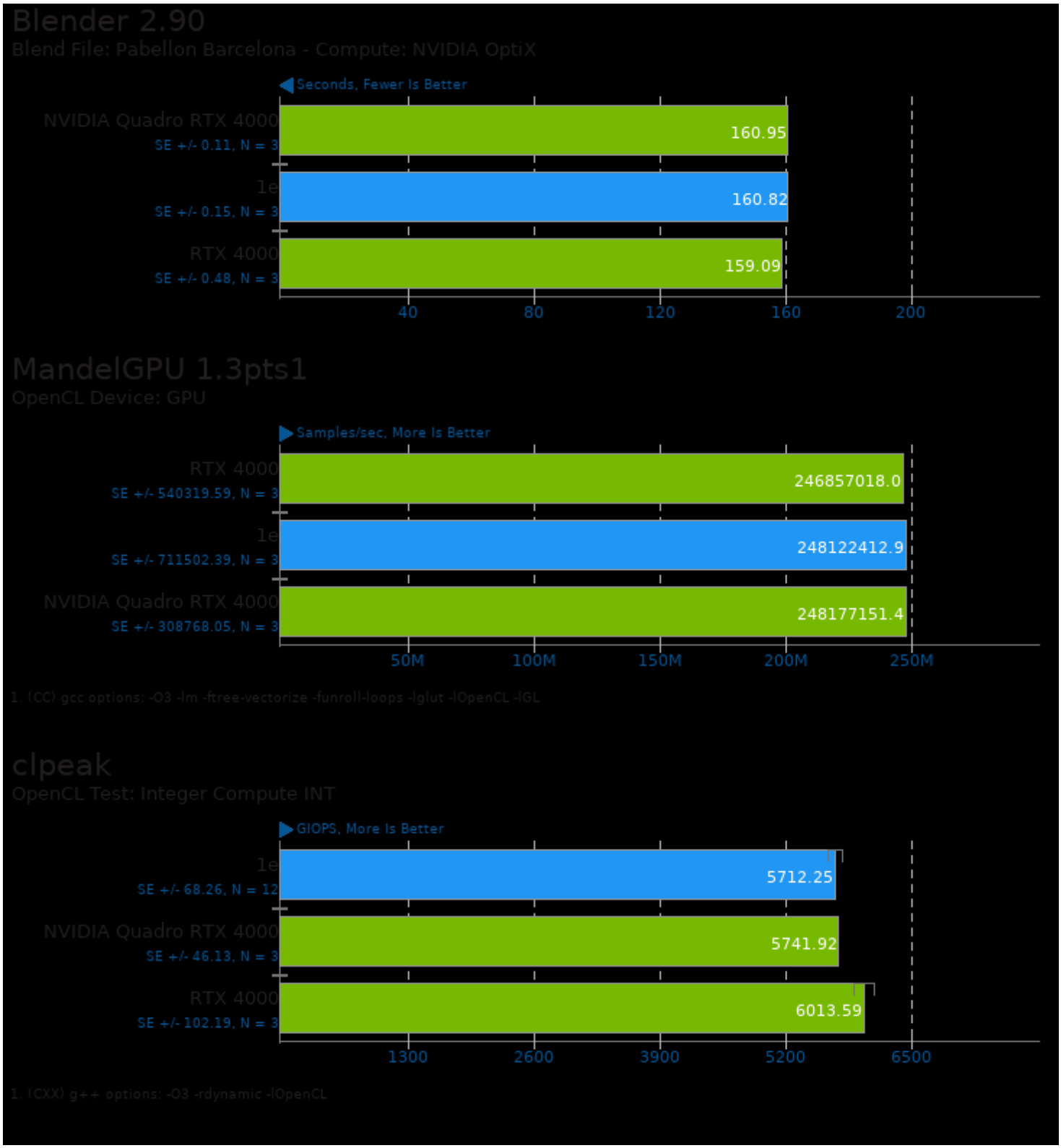

NCNN 20200916
Target: Vulkan GPU - Model: resnet50
ms, Fewer Is Better
RTX 4000
SE +/- 0.14, N = 3
MIN: 3.92 / MAX: 40.55
4.08
NVIDIA Quadro RTX 4000
SE +/- 0.01, N = 3
MIN: 3.91 / MAX: 4.04
3.93
1e
SE +/- 0.01, N = 3
MIN: 3.86 / MAX: 3.99
3.89
0.918
1.836
2.754
3.672
4.59
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: yolov4-tiny
ms, Fewer Is Better
1e
SE +/- 0.37, N = 3
MIN: 8.1 / MAX: 74.77
8.62
NVIDIA Quadro RTX 4000
SE +/- 0.09, N = 3
MIN: 8.13 / MAX: 55.28
8.33
RTX 4000
SE +/- 0.00, N = 3
MIN: 8.15 / MAX: 8.57
8.22
2
4
6
8
10
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
PlaidML
FP16: No - Mode: Inference - Network: IMDB LSTM - Device: OpenCL
FPS, More Is Better
RTX 4000
SE +/- 0.32, N = 3
420.80
NVIDIA Quadro RTX 4000
SE +/- 1.26, N = 3
421.03
1e
SE +/- 0.45, N = 3
423.50
90
180
270
360
450

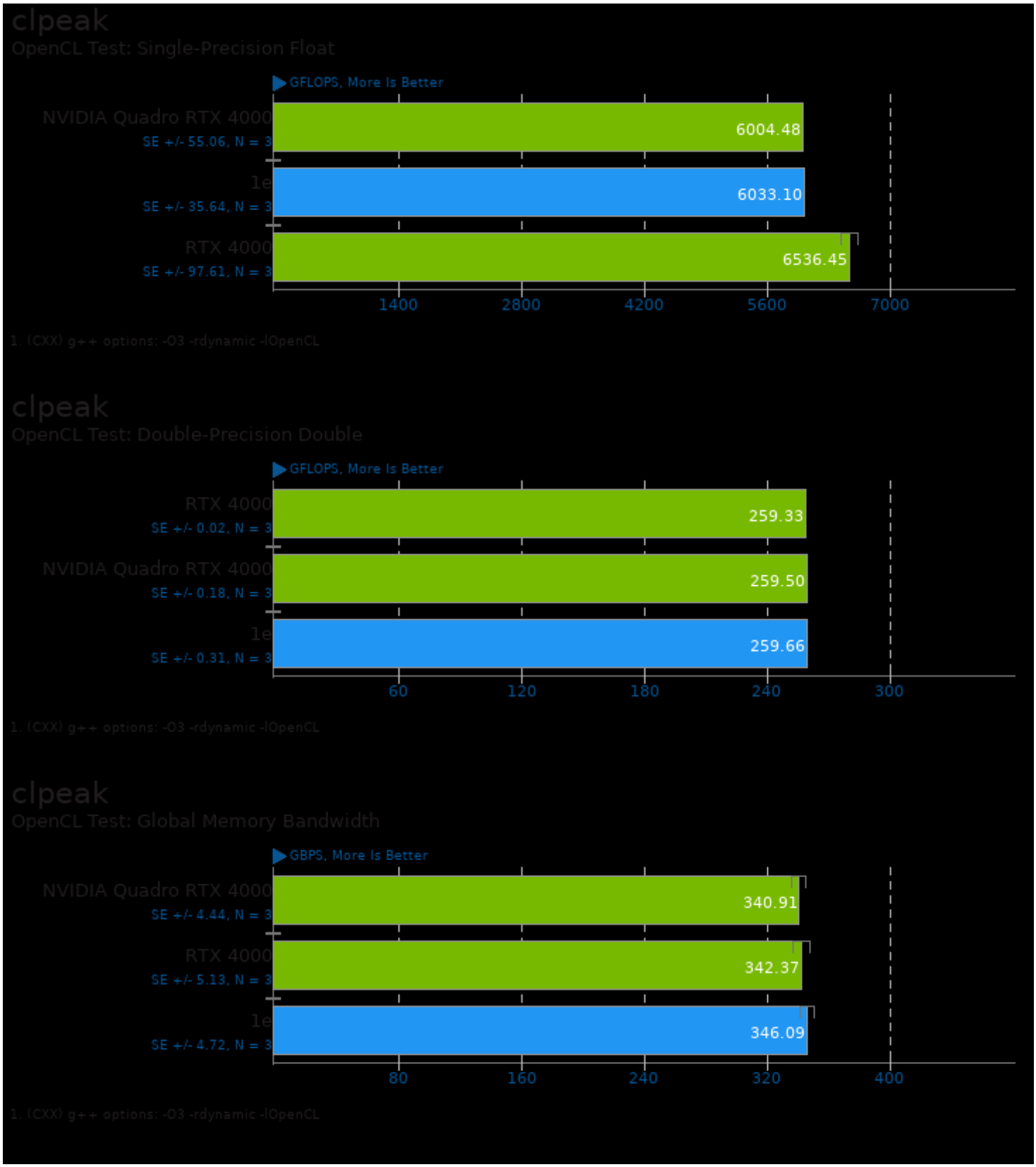

PlaidML
FP16: No - Mode: Inference - Network: Mobilenet - Device: OpenCL
FPS, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 5.69, N = 3
1475.98
RTX 4000
SE +/- 5.32, N = 3
1480.20
1e
SE +/- 5.16, N = 3
1490.38
300
600
900
1200
1500
PlaidML
FP16: Yes - Mode: Inference - Network: Mobilenet - Device: OpenCL
FPS, More Is Better
RTX 4000
SE +/- 8.76, N = 3
1829.24
NVIDIA Quadro RTX 4000
SE +/- 2.10, N = 3
1834.20
1e
SE +/- 9.92, N = 3
1843.84
400
800
1200
1600
2000
PlaidML
FP16: No - Mode: Inference - Network: DenseNet 201 - Device: OpenCL
FPS, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.11, N = 3
138.91
RTX 4000
SE +/- 0.12, N = 3
139.15
1e
SE +/- 0.18, N = 3
140.54
30
60
90
120
150

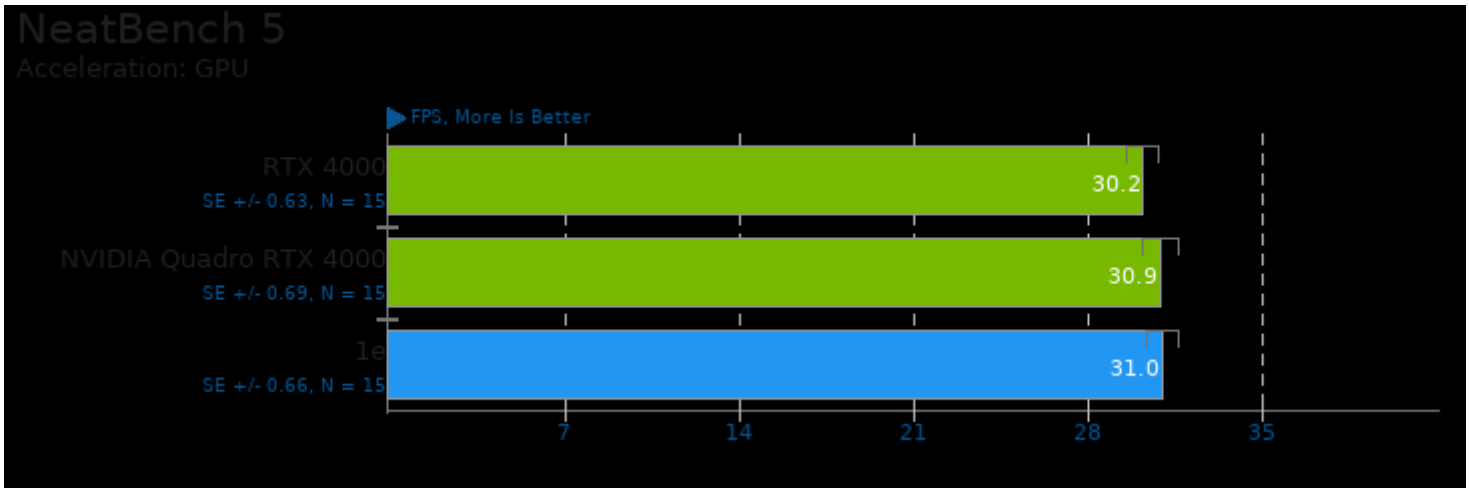

Blender 2.90
Blend File: BMW27 - Compute: CUDA
Seconds, Fewer Is Better
RTX 4000
SE +/- 0.10, N = 3
58.41
NVIDIA Quadro RTX 4000
SE +/- 0.14, N = 3
58.10
1e
SE +/- 0.09, N = 3
57.80
13
26
39
52
65
Blender 2.90
Blend File: Classroom - Compute: CUDA
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 3.62, N = 3
224.85
RTX 4000
SE +/- 3.26, N = 3
223.81
1e
SE +/- 1.49, N = 3
218.66
50
100
150
200
250
Blender 2.90
Blend File: Fishy Cat - Compute: CUDA
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.16, N = 3
114.00
RTX 4000
SE +/- 0.21, N = 3
113.88
1e
SE +/- 0.28, N = 3
112.74
30
60
90
120
150


Blender 2.90
Blend File: Barbershop - Compute: CUDA
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 1.15, N = 3
771.19
RTX 4000
SE +/- 0.87, N = 3
764.30
1e
SE +/- 2.80, N = 3
756.64
170
340
510
680
850
Blender 2.90
Blend File: BMW27 - Compute: NVIDIA OptiX
Seconds, Fewer Is Better
1e
SE +/- 3.24, N = 15
32.14
NVIDIA Quadro RTX 4000
SE +/- 0.09, N = 3
29.23
RTX 4000
SE +/- 0.06, N = 3
29.14
7
14
21
28
35
Blender 2.90
Blend File: Classroom - Compute: NVIDIA OptiX
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.55, N = 3
118.39
RTX 4000
SE +/- 0.57, N = 3
117.20
1e
SE +/- 0.87, N = 3
115.78
30
60
90
120
150


Blender 2.90
Blend File: Fishy Cat - Compute: NVIDIA OptiX
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.24, N = 3
59.12
RTX 4000
SE +/- 0.22, N = 3
58.69
1e
SE +/- 0.21, N = 3
58.38
13
26
39
52
65
Blender 2.90
Blend File: Barbershop - Compute: NVIDIA OptiX
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 1.05, N = 3
1321.89
RTX 4000
SE +/- 0.53, N = 3
1307.37
1e
SE +/- 4.68, N = 3
1307.24
300
600
900
1200
1500
Blender 2.90
Blend File: Pabellon Barcelona - Compute: CUDA
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 1.47, N = 3
460.64
1e
SE +/- 1.17, N = 3
459.35
RTX 4000
SE +/- 0.47, N = 3
459.08
100
200
300
400
500


Blender 2.90
Blend File: Pabellon Barcelona - Compute: NVIDIA OptiX
Seconds, Fewer Is Better
NVIDIA Quadro RTX 4000
SE +/- 0.11, N = 3
160.95
1e
SE +/- 0.15, N = 3
160.82
RTX 4000
SE +/- 0.48, N = 3
159.09
40
80
120
160
200
MandelGPU 1.3pts1
OpenCL Device: GPU
Samples/sec, More Is Better
RTX 4000
SE +/- 540319.59, N = 3
246857018.0
1e
SE +/- 711502.39, N = 3
248122412.9
NVIDIA Quadro RTX 4000
SE +/- 308768.05, N = 3
248177151.4
50M
100M
150M
200M
250M
1. (CC) gcc options: -O3 -lm -ftree-vectorize -funroll-loops -lglut -lOpenCL -lGL
clpeak
OpenCL Test: Integer Compute INT
GIOPS, More Is Better
1e
SE +/- 68.26, N = 12
5712.25
NVIDIA Quadro RTX 4000
SE +/- 46.13, N = 3
5741.92
RTX 4000
SE +/- 102.19, N = 3
6013.59
1300
2600
3900
5200
6500
1. (CXX) g++ options: -O3 -rdynamic -lOpenCL


clpeak
OpenCL Test: Single-Precision Float
GFLOPS, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 55.06, N = 3
6004.48
1e
SE +/- 35.64, N = 3
6033.10
RTX 4000
SE +/- 97.61, N = 3
6536.45
1400
2800
4200
5600
7000
1. (CXX) g++ options: -O3 -rdynamic -lOpenCL
clpeak
OpenCL Test: Double-Precision Double
GFLOPS, More Is Better
RTX 4000
SE +/- 0.02, N = 3
259.33
NVIDIA Quadro RTX 4000
SE +/- 0.18, N = 3
259.50
1e
SE +/- 0.31, N = 3
259.66
60
120
180
240
300
1. (CXX) g++ options: -O3 -rdynamic -lOpenCL
clpeak
OpenCL Test: Global Memory Bandwidth
GBPS, More Is Better
NVIDIA Quadro RTX 4000
SE +/- 4.44, N = 3
340.91
RTX 4000
SE +/- 5.13, N = 3
342.37
1e
SE +/- 4.72, N = 3
346.09
80
160
240
320
400
1. (CXX) g++ options: -O3 -rdynamic -lOpenCL




*This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 15:11.*