



OpenCL Testing

OpenCL tests for a future article on Phoronix.

Automated Executive Summary

GeForce GTX 1080 Ti #1 had the most wins, coming in first place for 85% of the tests.

Test Systems:

GeForce GTX 970

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: eVGA NVIDIA GeForce GTX 970 4096MB (1164/3505MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 1664
System Notes: GPU Compute Cores: 1664.

GeForce GTX 980

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 980 4096MB (135/324MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 2048
System Notes: GPU Compute Cores: 2048.

GeForce GTX 980 Ti

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 980 Ti 6144MB (999/3505MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 2816
System Notes: GPU Compute Cores: 2816.

GeForce GTX 1050

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: Zotac NVIDIA GeForce GTX 1050 2048MB (1316/3504MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 640
System Notes: GPU Compute Cores: 640.

GeForce GTX 1080 Ti #1

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 1080 Ti 11264MB (1468/5508MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 3584
System Notes: GPU Compute Cores: 3584.

GeForce GTX 1050 Ti

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: eVGA NVIDIA GeForce GTX 1050 Ti 4096MB (1341/3504MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 768
System Notes: GPU Compute Cores: 768.

GeForce GTX 1060

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 1060 6GB 6144MB (1505/4006MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 1280
System Notes: GPU Compute Cores: 1280.

GeForce GTX 1070

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 1070 8192MB (250/4006MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 1920
System Notes: GPU Compute Cores: 1920.

GeForce GTX 1080

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 1080 8192MB (84/5005MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
OpenCL Notes: GPU Compute Cores: 2560
System Notes: GPU Compute Cores: 2560.

GeForce GTX 1080 Ti #2

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: NVIDIA GeForce GTX 1080 Ti 11264MB (1472/5508MHz), Audio: Realtek ALC892, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.10.0-19-generic (x86_64), Desktop: Unity 7.5.0, Display Server: X Server 1.19.3, Display Driver: NVIDIA 381.09, OpenGL: 4.5.0, Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Processor Notes: Scaling Governor: intel_pstate powersave

Radeon RX 480

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: AMD Radeon RX 470/480 8192MB, Audio: Realtek ALC892, Monitor: Acer B286HK, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.8.0-040800-generic (x86_64), Display Driver: modesetting 1.19.3, OpenCL: OpenCL 2.0 AMD-APP (2348.3), Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave

Radeon RX 580

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: MSI AMD Radeon RX 470/480 8192MB, Audio: Realtek ALC892, Monitor: Acer B286HK, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.8.0-040800-generic (x86_64), Display Driver: modesetting 1.19.3, OpenCL: OpenCL 2.0 AMD-APP (2348.3), Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave

Radeon R9 Fury

Processor: Intel Core i7-7700K @ 4.50GHz (8 Cores), Motherboard: MSI Z270-A PRO (MS-7A71) v1.0, Chipset: Intel Device 591f + Z270, Memory: 16384MB, Disk: Samsung SSD 950 PRO 256GB, Graphics: Sapphire AMD Radeon R9 FURY / NANO 4096MB, Audio: Realtek ALC892, Monitor: Acer B286HK, Network: Realtek RTL8111/8168/8411

OS: Ubuntu 17.04, Kernel: 4.8.0-040800-generic (x86_64), Display Driver: modesetting 1.19.3, OpenCL: OpenCL 2.0 AMD-APP (2348.3), Vulkan: 1.0.42, Compiler: GCC 6.3.0 20170406, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-browser-plugin --disable-vtable-verify --disable-werror --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --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-arch-directory=amd64 --with-default-libstdcxx-abi=new --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic -v
Processor Notes: Scaling Governor: intel_pstate powersave
Graphics Notes: GLAMOR

	GeFor ce GTX 970	GeFor ce GTX 980	GeFor ce GTX 980 Ti	GeFor ce GTX 1050	GeFor ce GTX 1080 Ti	GeFor ce GTX 1050 Ti	GeFor ce GTX 1060	GeFor ce GTX 1070	GeFor ce GTX 1080	GeFor ce GTX 1080 Ti	Radeo n RX 480	Radeo n RX 580	Radeo n RX Fury
					#1					#2			
Darktable -			0.97		0.77	12.15	1.07	0.87	0.87		9.16	9.17	9.17
Server Room -													
OpenCL (sec)													
Normalized			79.38%		100%	6.34%	71.96%	88.51%	88.51%		8.41%	8.4%	8.4%
Standard Deviation			0.3%		0.3%	0.1%	0.1%	1.2%	0.2%		0.1%	0%	0.1%

OpenCL Testing

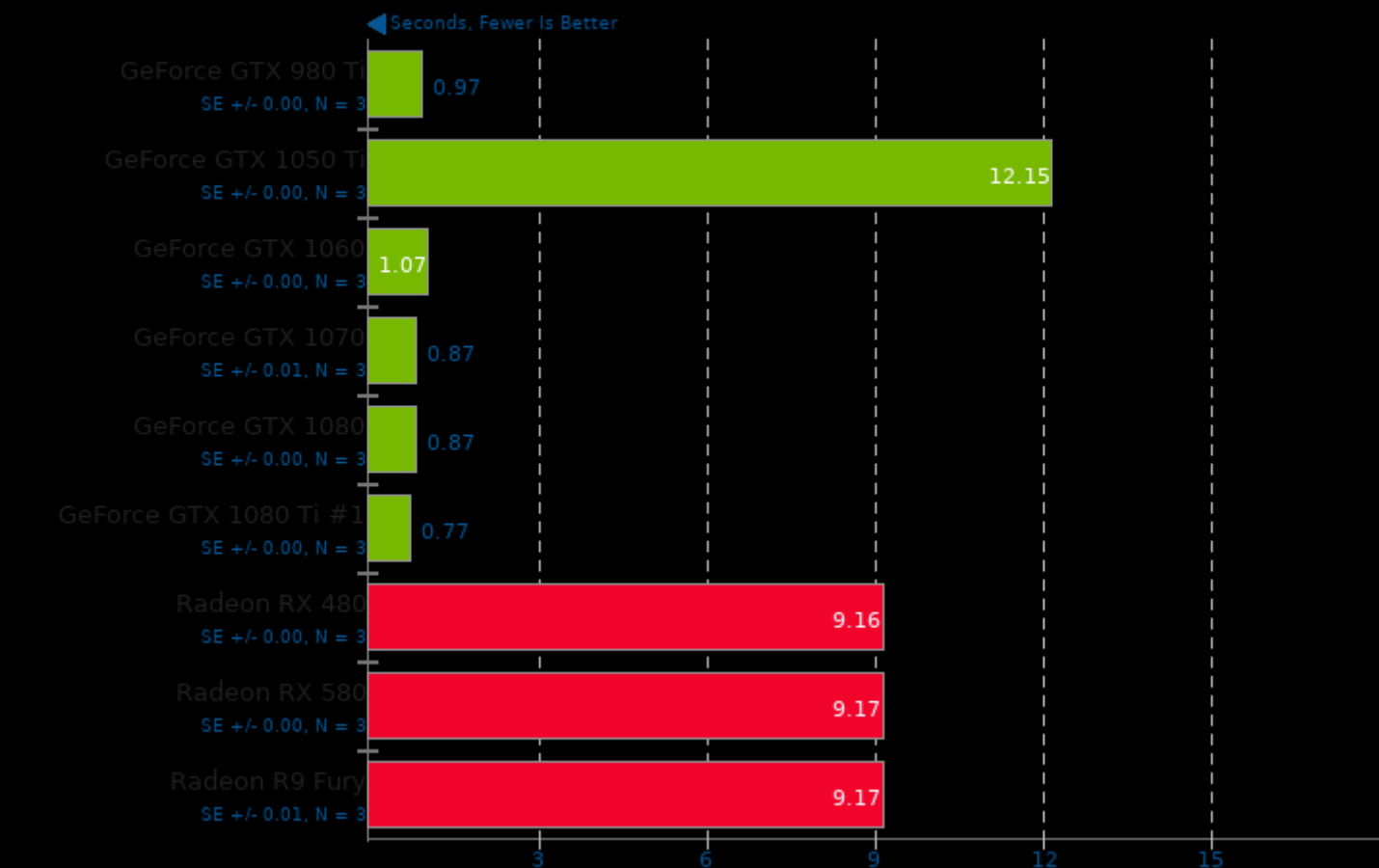
Darktable - Masskrug - OpenCL (sec)	5.46				5.28	18.40	5.53	5.35	5.35	18.68	18.69	18.69
Normalized	96.7%				100%	28.7%	95.48%	98.69%	98.69%	28.27%	28.25%	28.25%
Standard Deviation	0.4%				0.1%	0%	0.2%	0.5%	0.1%	0.1%	0.2%	0%
Darktable - Boat - OpenCL	3.58				2.78	16.30	4.27	3.46	3.28	26.36	26.37	26.36
Normalized	77.65%				100%	17.06%	65.11%	80.35%	84.76%	10.55%	10.54%	10.55%
Standard Deviation	0.1%				0.6%	0.1%	0.2%	0.7%	0.3%	0%	0.1%	0.1%
JuliaGPU - GPU (Samples/sec)	111315	121825	137239	665989	202729	803900	119921	151370	174049			
Normalized	54.91%	60.09%	67.7%	32.85%	100%	39.65%	59.15%	74.67%	85.85%			
Standard Deviation	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.4%	0.1%	0.2%			
cl-mem - Write (GB/s)	133.30	154.80	242.50	86.13	341.33	85.03	145.20	195.73	219.97	1.40	1.40	1.40
Normalized	39.05%	45.35%	71.05%	25.23%	100%	24.91%	42.54%	57.34%	64.44%	0.41%	0.41%	0.41%
Standard Deviation	0%	0%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0%	0%	0%
cl-mem - Read (GB/s)	143.63	164.57	265.83	94.83	337.87	94.10	153.23	204.90	229.03	2.67	2.70	2.70
Normalized	42.51%	48.71%	78.68%	28.07%	100%	27.85%	45.35%	60.64%	67.79%	0.79%	0.8%	0.8%
Standard Deviation	0%	0%	0%	0.1%	0.3%	0%	0.1%	0.1%	0.3%	2.2%	0%	0%
cl-mem - Copy (GB/s)	125.70	142.77	216.90	87.13	316.63	86.67	139.10	186.70	208.97	1.50	1.50	1.50
Normalized	39.7%	45.09%	68.5%	27.52%	100%	27.37%	43.93%	58.96%	66%	0.47%	0.47%	0.47%
Standard Deviation	0%	0%	0%	0.5%	0.3%	0.1%	0.1%	0.1%	0.2%	0%	0%	0%
SHOC Scalable HeterOgeneous Computing - OpenCL - T.R.B (GB/s)	280.99	333.16	351.70	271.76	592.43	301.62	380.73	450.04	520.35	14.89	14.89	14.89
Normalized	47.43%	56.24%	59.37%	45.87%	100%	50.91%	64.27%	75.97%	87.83%	2.51%	2.51%	2.51%
Standard Deviation	0.1%	0.7%	0.7%	1.6%	0.4%	1.9%	0.2%	0.8%	0.7%	0%	0%	0%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Readback (GB/s)	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	39.43	39.12	40.40
Normalized	32.6%	32.6%	32.6%	32.6%	32.6%	32.6%	32.6%	32.6%	32.6%	97.6%	96.83%	100%
Standard Deviation	0%	0%	0%	0%	0%	0%	0%	0%	0%	1.6%	1.3%	1.5%

OpenCL Testing

SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Download (GB/s)	12.81	12.81	12.81	12.81	12.81	12.81	12.81	12.81	12.81	39.81	40.20	41.20
Normalized	31.09%	31.09%	31.09%	31.09%	31.09%	31.09%	31.09%	31.09%	31.09%	96.63%	97.57%	100%
Standard Deviation	0%	0%	0%	0%	0%	0%	0%	0%	0%	3.5%	2.3%	1.2%
SHOC Scalable HeterOgeneous Computing - OpenCL - Max SP Flops (GFLOPS)	4333	4989	6157	2113	13089	2678	4776	7080	9342	130.20	130.21	130.16
Normalized	33.11%	38.12%	47.04%	16.14%	100%	20.46%	36.49%	54.09%	71.38%	0.99%	0.99%	0.99%
Standard Deviation	0%	0.7%	0.1%	0%	0.3%	0.3%	0.5%	0.5%	0.3%	0%	0%	0%
SHOC Scalable HeterOgeneous Computing - OpenCL - MD5 Hash (GHash/s)	6.57	7.59	9.34	3.25	19.81	4.13	7.34	10.69	14.23	0.08	0.08	0.08
Normalized	33.17%	38.31%	47.15%	16.41%	100%	20.85%	37.05%	53.96%	71.83%	0.4%	0.4%	0.4%
Standard Deviation	0%	0%	0%	0%	0.5%	0.3%	0.3%	0.2%	0.1%	0%	0.1%	0.1%
SHOC Scalable HeterOgeneous Computing - OpenCL - FFT SP (GFLOPS)	399.01	459.23	712.96	246.28	986.68	207.62	329.51	518.16	634.14	4.05	4.06	4.03
Normalized	40.44%	46.54%	72.26%	24.96%	100%	21.04%	33.4%	52.52%	64.27%	0.41%	0.41%	0.41%
Standard Deviation	0.9%	0.4%	5.2%	8.5%	0.4%	7.7%	1.8%	2.4%	0.5%	0.4%	1%	0.1%
SHOC Scalable HeterOgeneous Computing - OpenCL - Triad (GB/s)	11.82	11.94	12.20	11.40	12.41	11.38	11.88	12.11	12.21	8.39	8.40	8.42
Normalized	95.25%	96.21%	98.31%	91.86%	100%	91.7%	95.73%	97.58%	98.39%	67.61%	67.69%	67.85%
Standard Deviation	0%	0.1%	0.1%	0.1%	0%	0.1%	0%	0%	0%	0.5%	3.3%	1.7%

Darktable 2.2.1

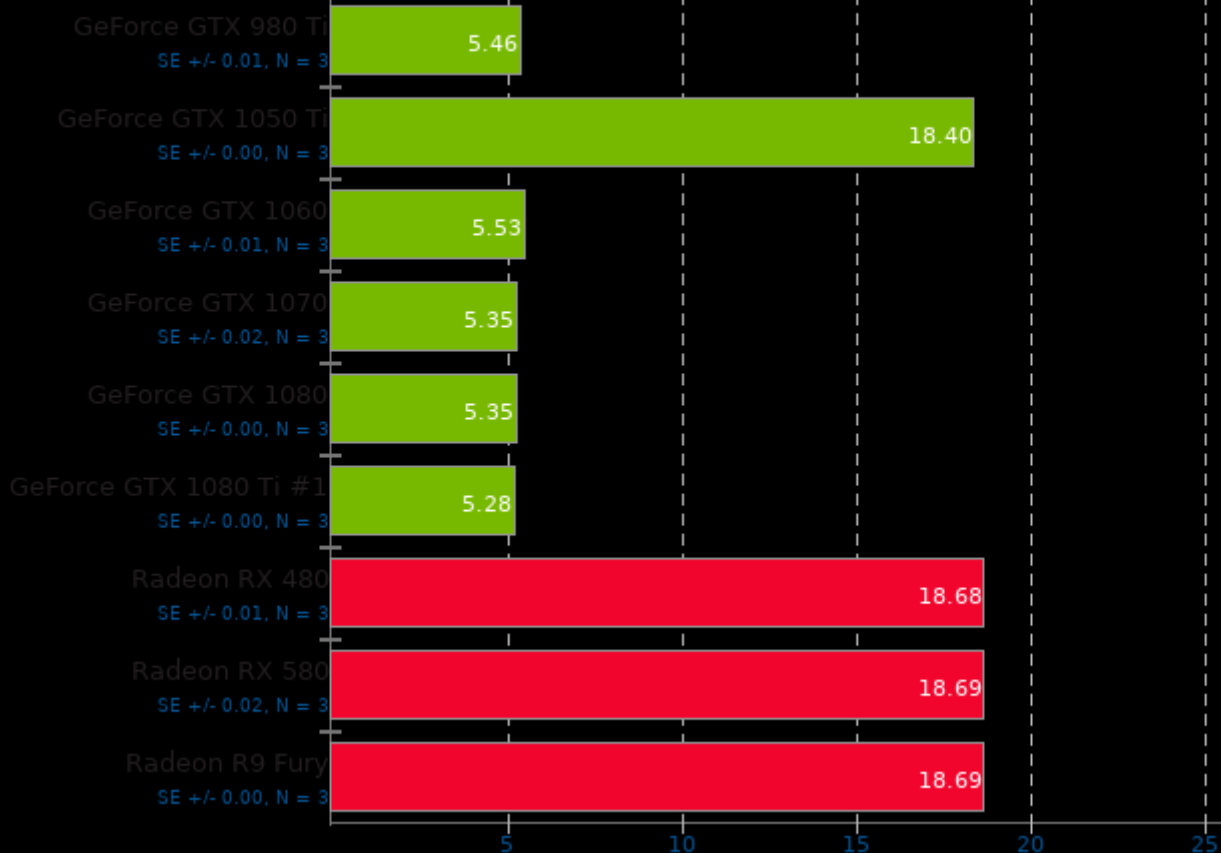
Test: Server Room - Acceleration: OpenCL



Darktable 2.2.1

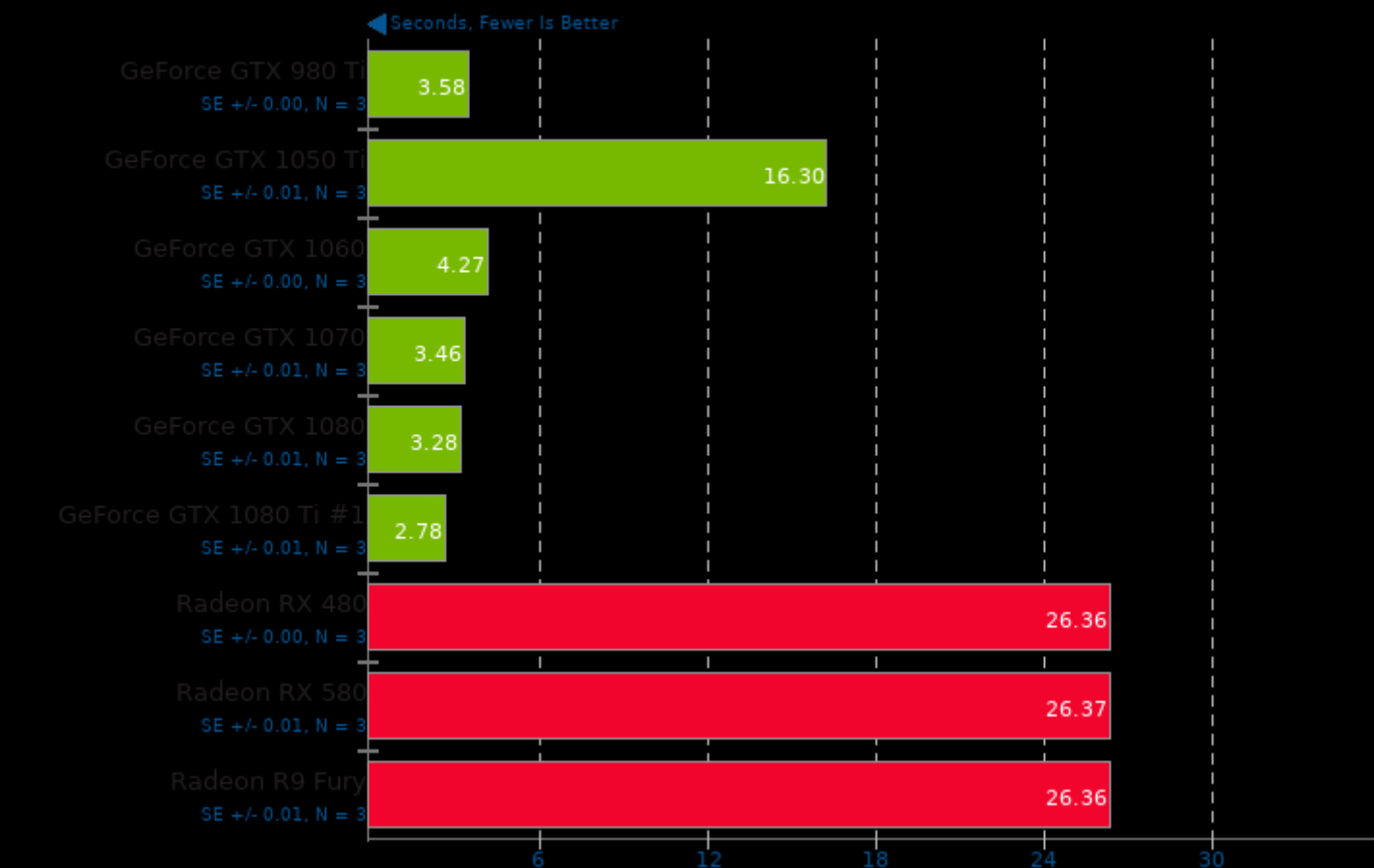
Test: Masskrug - Acceleration: OpenCL

Seconds, Fewer Is Better



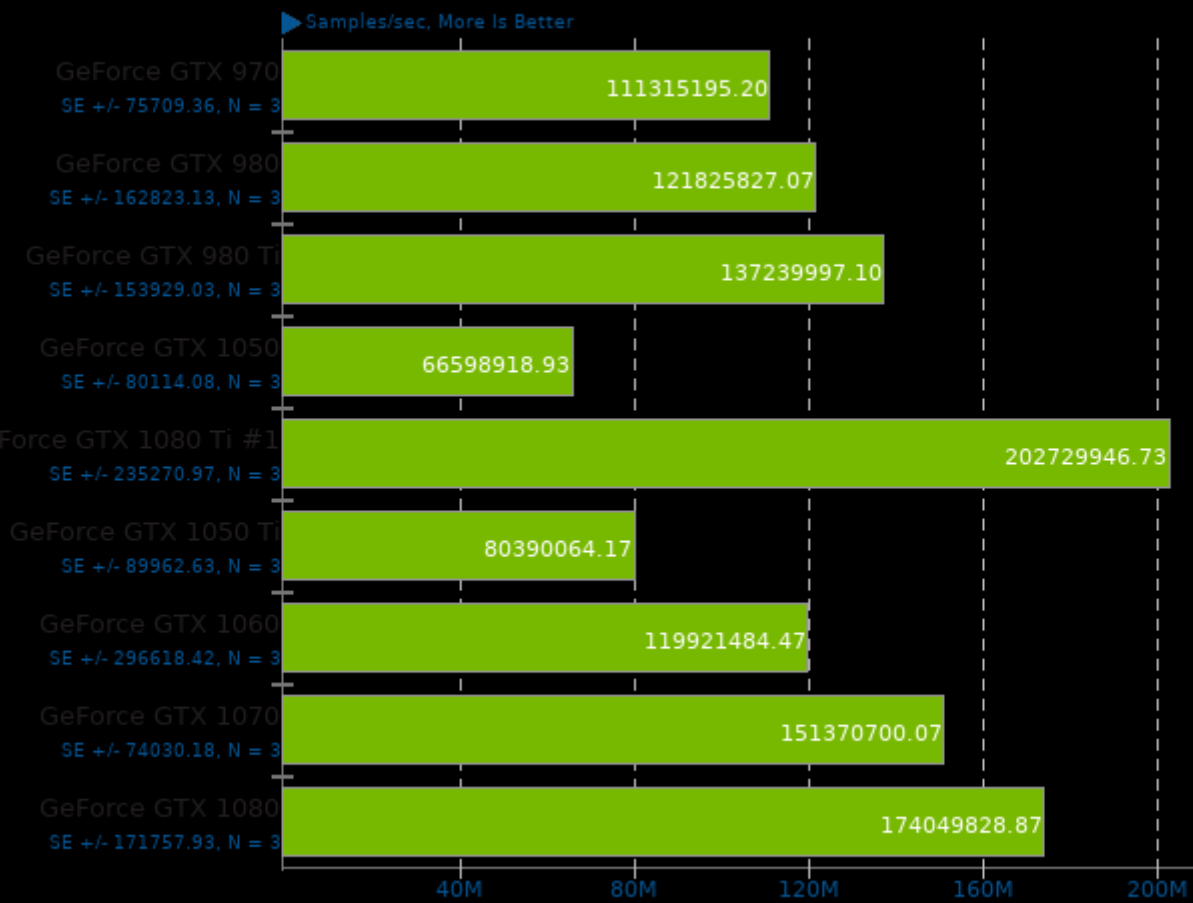
Darktable 2.2.1

Test: Boat - Acceleration: OpenCL



JuliaGPU 1.2pts1

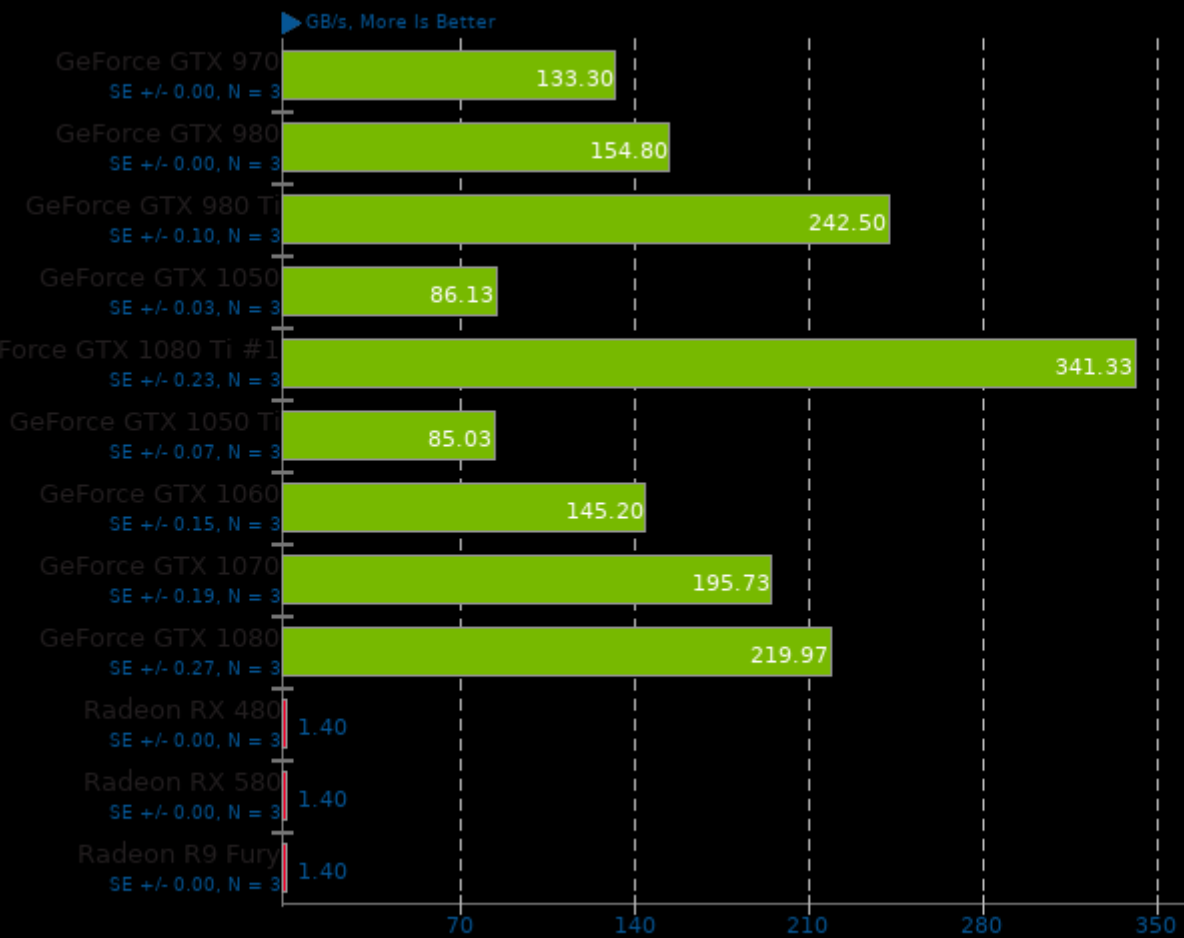
OpenCL Device: GPU



1. (CO) gcc options: -O3 -march=native -ftree-vectorize -funroll-loops -lglut -lOpenCL -lGL -lm

cl-mem 2017-01-13

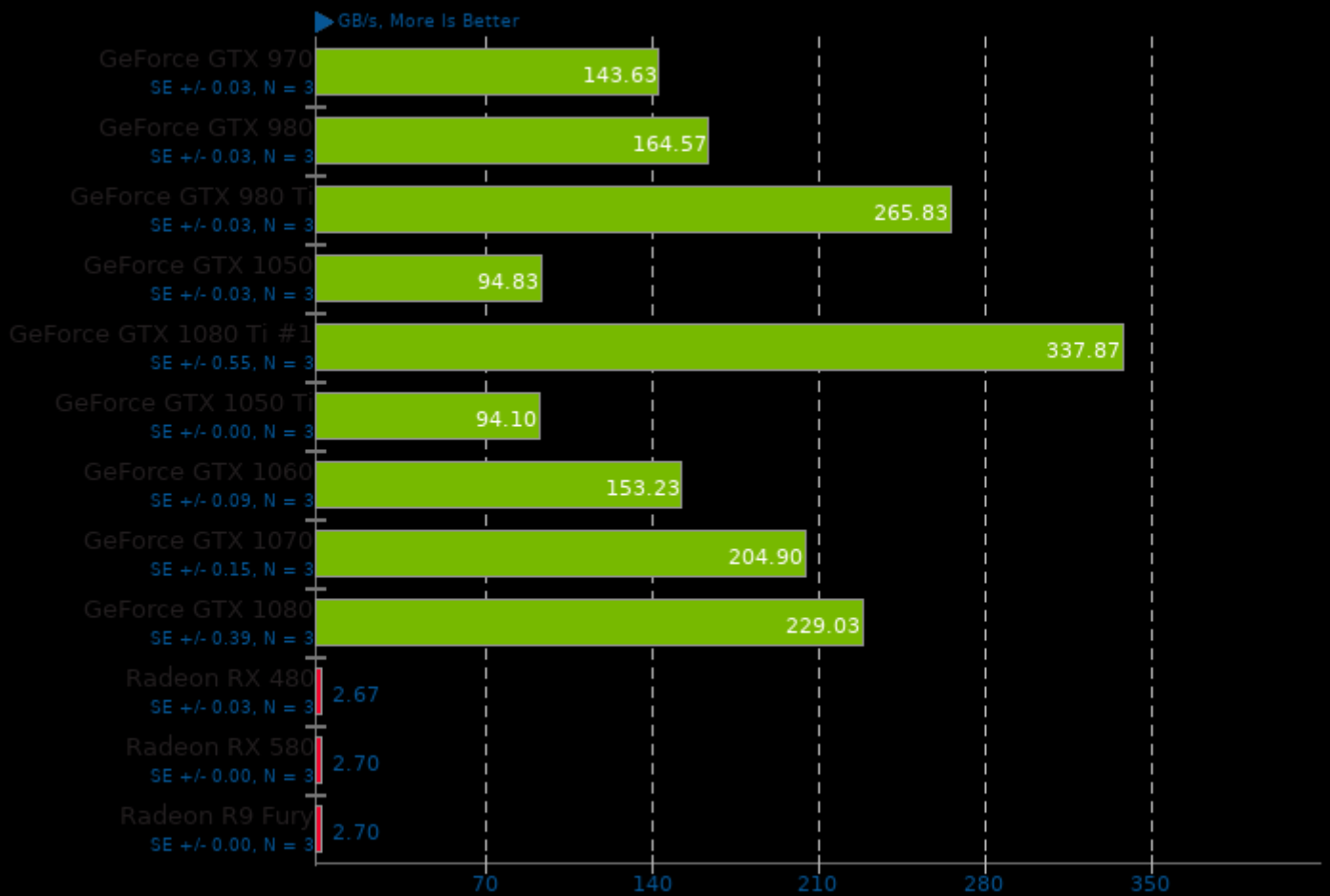
Benchmark: Write



1, (CC) gcc options: -O2 -fno -fOpenCL

cl-mem 2017-01-13

Benchmark: Read



1, (CC) gcc options: -O2 -fno -fOpenCL

cl-mem 2017-01-13

Benchmark: Copy



1, (CC) gcc options: -O2 -fno -fOpenCL

SHOC Scalable Heterogeneous Computing 2015-11-10

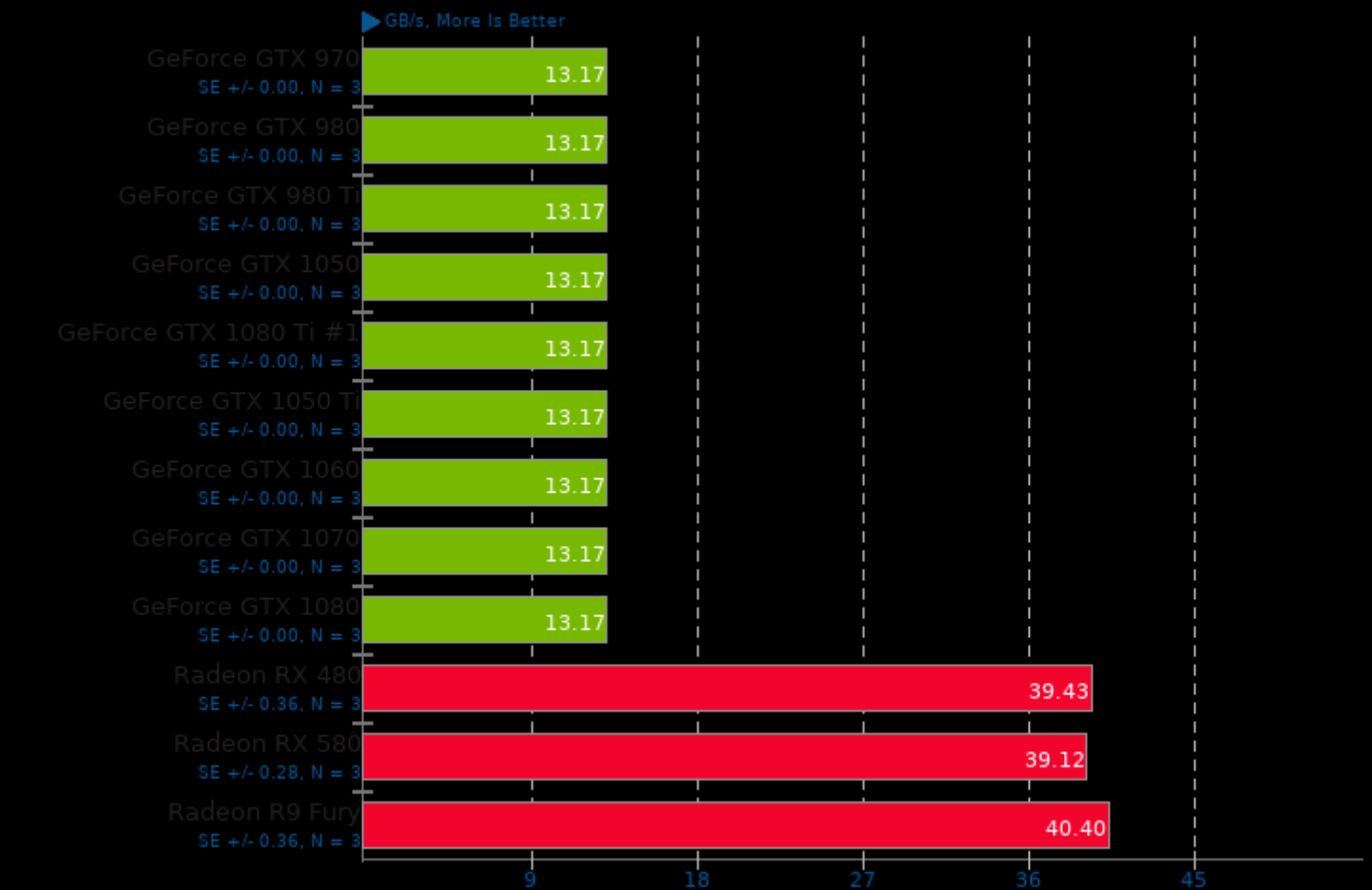
Target: OpenCL - Benchmark: Texture Read Bandwidth



1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt

SHOC Scalable HeterOgeneous Computing 2015-11-10

Target: OpenCL - Benchmark: Bus Speed Readback



1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt

SHOC Scalable Heterogeneous Computing 2015-11-10

Target: OpenCL - Benchmark: Bus Speed Download



1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt

SHOC Scalable Heterogeneous Computing 2015-11-10

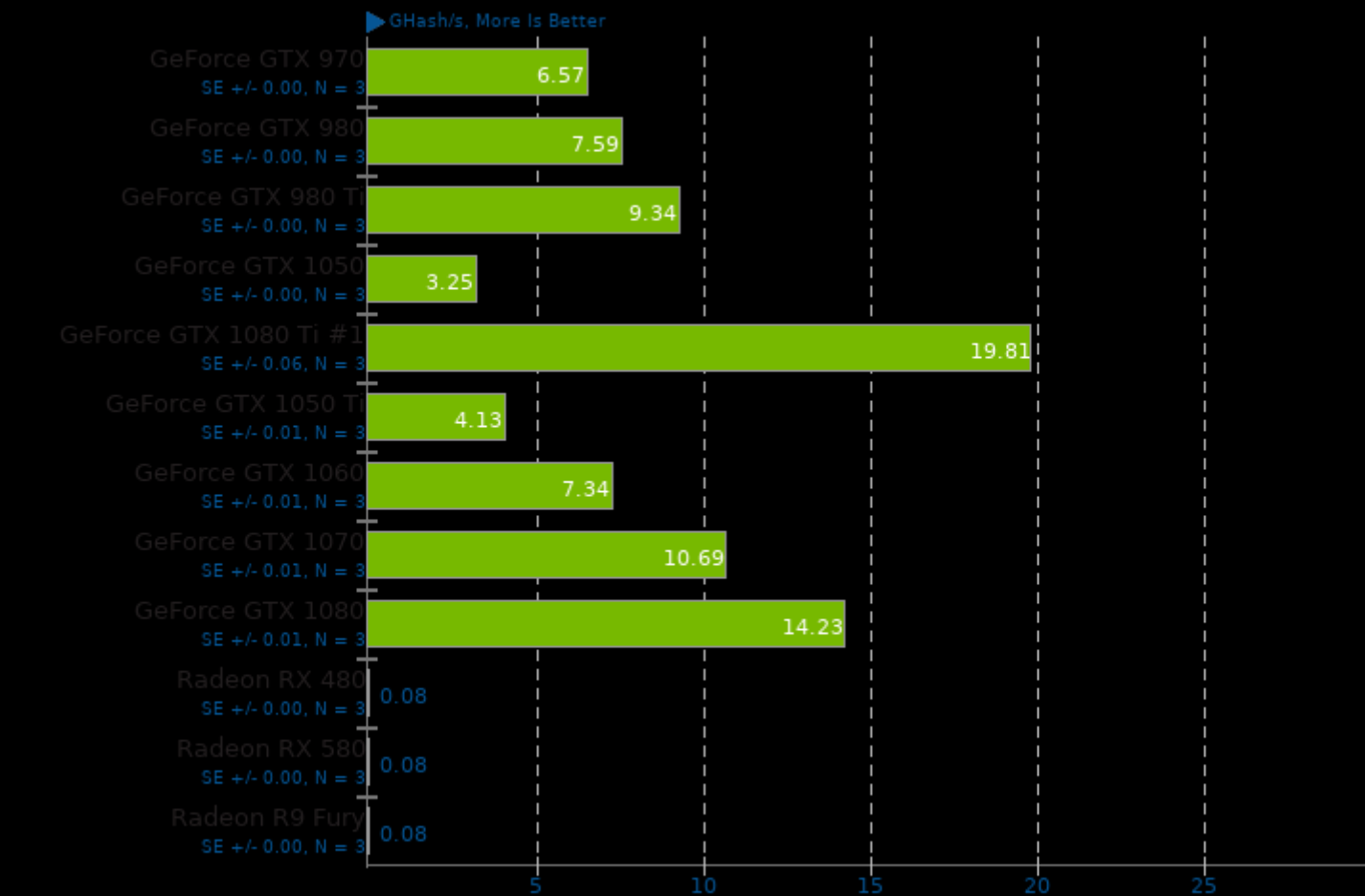
Target: OpenCL - Benchmark: Max SP Flops



1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt

SHOC Scalable Heterogeneous Computing 2015-11-10

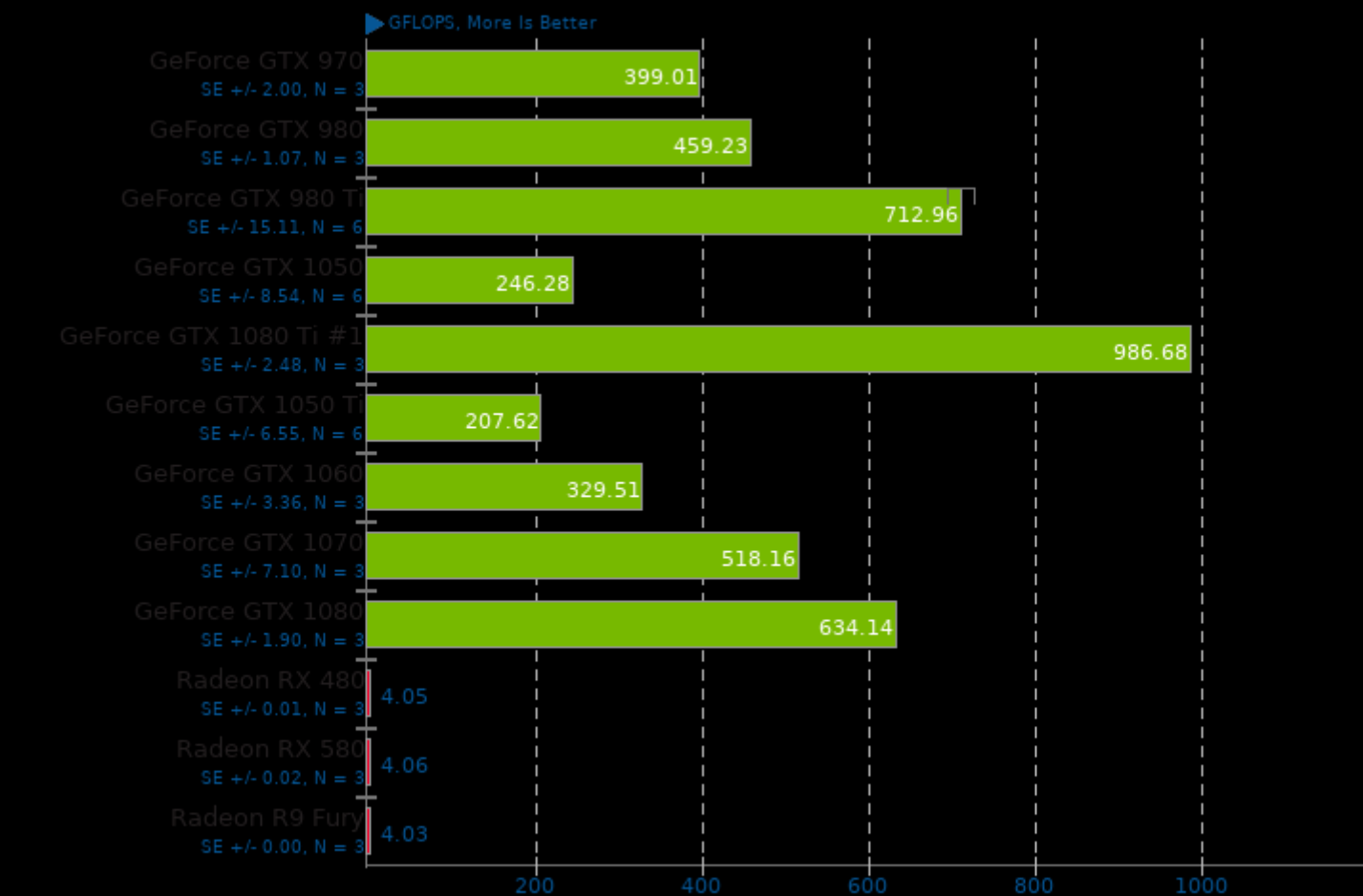
Target: OpenCL - Benchmark: MD5 Hash



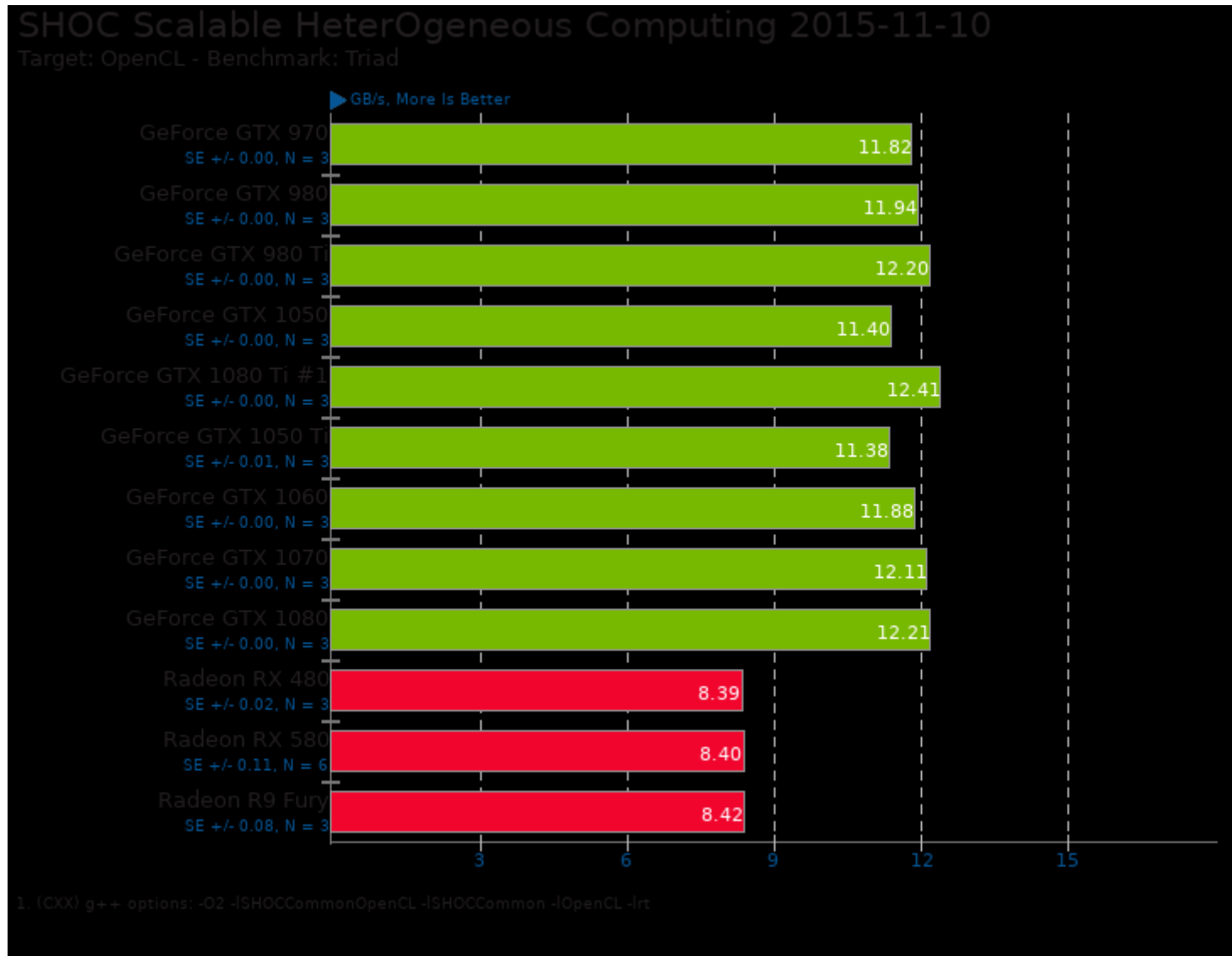
1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt

SHOC Scalable Heterogeneous Computing 2015-11-10

Target: OpenCL - Benchmark: FFT SP



1. (CXX) g++ options: -O2 -lSHOCCCommonOpenCL -lSHOCCCommon -lOpenCL -lrt



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