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# Vulkan RADV AMDGPU Kernel Comparison

Linux 4.20 kernel benchmarks by Michael Larabel.

**Automated Executive Summary**

*RX Vega 64: Linux 4.20 had the most wins, coming in first place for 83% of the tests.*

*Based on the geometric mean of all complete results, the fastest (RX Vega 64: Linux 4.20) was 1.46x the speed of the slowest (RX 580: Linux 4.18). RX Vega 64: Linux 4.17 was 0.986x the speed of RX Vega 64: Linux 4.16, RX Vega 64: Linux 4.18 was 0.997x the speed of RX Vega 64: Linux 4.17, RX Vega 64: Linux 4.19 was 0.995x the speed of RX Vega 64: Linux 4.18, RX Vega 64: Linux 4.20 was 1.141x the speed of RX Vega 64: Linux 4.19, RX 580: Linux 4.16 was 0.686x the speed of RX Vega 64: Linux 4.20, RX 580: Linux 4.17 was 0.999x the speed of RX 580: Linux 4.16, RX 580: Linux 4.18 was 1x the speed of RX 580: Linux 4.17, RX 580: Linux 4.19 was 1.001x the speed of RX 580: Linux 4.18, RX 580: Linux 4.20 was 1.009x the speed of RX 580: Linux 4.19.*

## Test Systems:

## RX Vega 64: Linux 4.16

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.16.0-041600-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW

## RX Vega 64: Linux 4.17

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.17.0-041700-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX Vega 64: Linux 4.18

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.18.0-041800-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX Vega 64: Linux 4.19

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-041900-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX Vega 64: Linux 4.20

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: AMD Radeon RX Vega 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.20.0-rc1-tip-pti (x86_64) 20181126, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: amdgpu 18.1.0, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp

## RX 580: Linux 4.16

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: MSI AMD Radeon RX 580 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.16.0-041600-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW

## RX 580: Linux 4.17

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS),

Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: MSI AMD Radeon RX 580 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.17.0-041700-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX 580: Linux 4.18

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: MSI AMD Radeon RX 580 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.18.0-041800-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX 580: Linux 4.19

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: MSI AMD Radeon RX 580 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.19.0-041900-generic (x86_64), Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB IBRS_FW + SSB disabled via prctl and seccomp

## RX 580: Linux 4.20

# Vulkan RADV AMDGPU Kernel Comparison

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (0602 BIOS), Chipset: Intel Cannon Lake PCH Shared SRAM, Memory: 16384MB, Disk: 2000GB SABRENT + Samsung SSD 970 EVO 250GB, Graphics: MSI AMD Radeon RX 580 8GB, Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel Connection

OS: Ubuntu 18.10, Kernel: 4.20.0-rc1-tip-pti (x86_64) 20181126, Desktop: GNOME Shell 3.30.1, Display Server: X Server 1.20.1, Display Driver: modesetting 1.20.1, OpenGL: 4.5 Mesa 19.0.0-devel padoka PPA (LLVM 8.0.0), Vulkan: 1.1.70, Compiler: GCC 8.2.0, File-System: ext4, Screen Resolution: 3840x2160

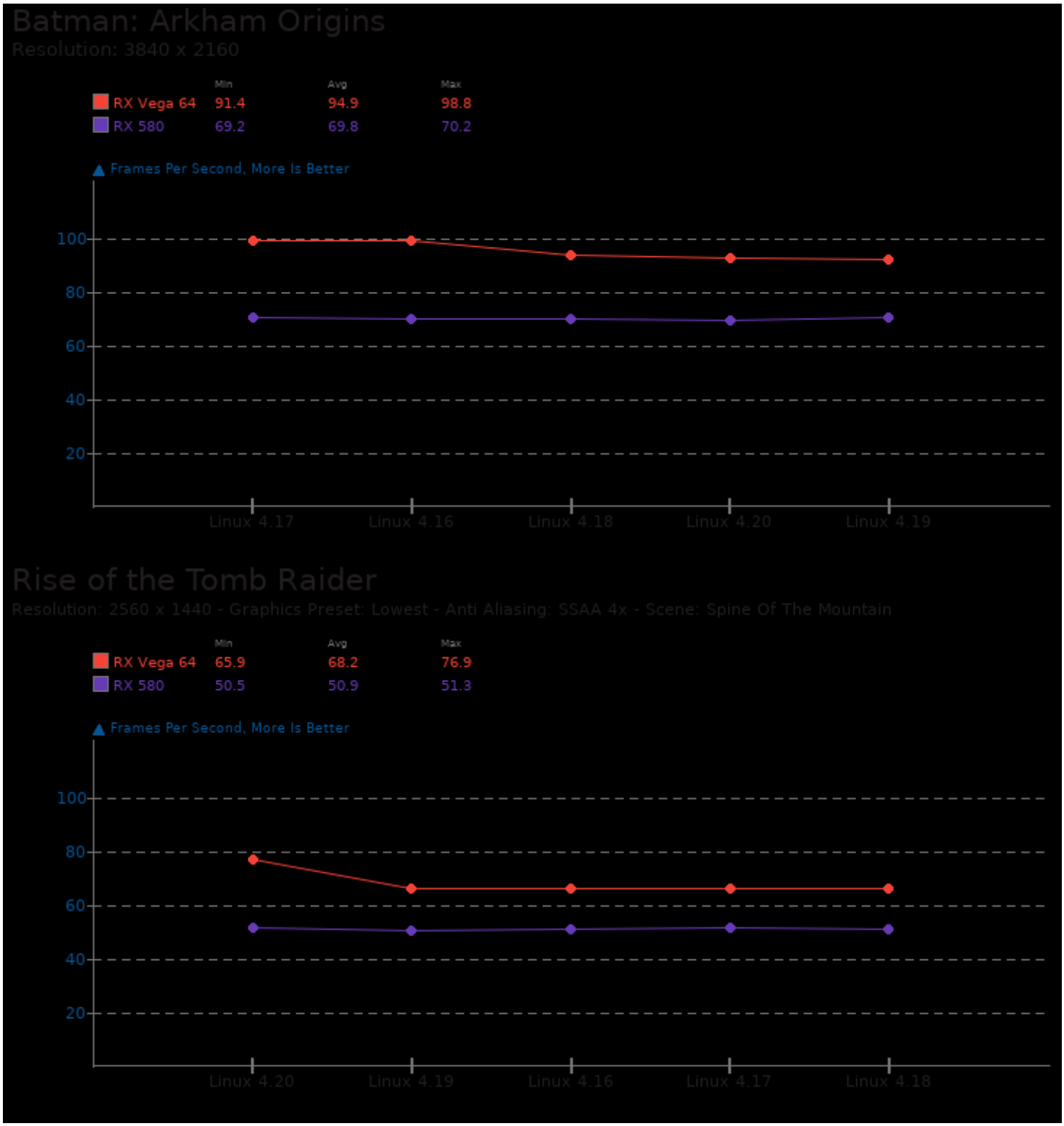
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance
Graphics Notes: GLAMOR
Security Notes: __user pointer sanitization + Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling + SSB disabled via prctl and seccomp

| | RX Vega 64: Linux 4.16 | RX Vega 64: Linux 4.17 | RX Vega 64: Linux 4.18 | RX Vega 64: Linux 4.19 | RX Vega 64: Linux 4.20 | RX 580: Linux 4.16 | RX 580: Linux 4.17 | RX 580: Linux 4.18 | RX 580: Linux 4.19 | RX 580: Linux 4.20 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batman: Arkham Origins - 3840 x 2160 (FPS)** | 98.74 | **98.78** | 93.47 | 91.36 | 92.21 | 69.81 | 70.24 | 69.48 | 70.13 | **69.23** |
| **Normalized** | 99.96% | 100% | 94.62% | 92.49% | 93.35% | 70.67% | 71.11% | 70.34% | 71% | 70.09% |
| **Standard Deviation** | 1.9% | 1.1% | 1% | 1.7% | 1.1% | 0.9% | 0.8% | 1.1% | 0.5% | 1% |
| **Rise of the Tomb Raider - 2560 x 1440 - Lowest - SSAA 4x - S.O.T.M** | 66.15 | 66.10 | 65.85 | 66.15 | **76.85** | 50.80 | 51.20 | 50.75 | **50.50** | 51.30 |
| **Normalized** | 86.08% | 86.01% | 85.69% | 86.08% | 100% | 66.1% | 66.62% | 66.04% | 65.71% | 66.75% |
| **Standard Deviation** | 1% | 0.9% | 0.5% | 0.3% | 0.8% | 0.3% | 0.3% | 1.5% | 1.1% | 0.3% |
| **Rise of the Tomb Raider - 2560 x 1440 - Lowest - SSAA 4x - Prophets Tomb (FPS)** | 40.00 | 39.90 | 39.95 | 40.25 | **44.15** | 27.70 | **27.40** | 27.70 | 27.65 | 28.40 |
| **Normalized** | 90.6% | 90.37% | 90.49% | 91.17% | 100% | 62.74% | 62.06% | 62.74% | 62.63% | 64.33% |
| **Standard Deviation** | 0.4% | 0.4% | 0.5% | 0.9% | 0.5% | 0.5% | 2.6% | 1% | 1.3% | 0.5% |
| **Rise of the Tomb Raider - 2560 x 1440 - Lowest - SSAA 4x - Geothermal Valley** | 48.10 | 47.80 | 48.65 | 48.75 | **53.50** | 34.75 | 34.75 | **34.65** | 34.80 | 35.65 |
| **Normalized** | 89.91% | 89.35% | 90.93% | 91.12% | 100% | 64.95% | 64.95% | 64.77% | 65.05% | 66.64% |
| **Standard Deviation** | 5% | 4.4% | 6% | 6.2% | 4.5% | 4.7% | 4.3% | 5.5% | 5.3% | 5% |

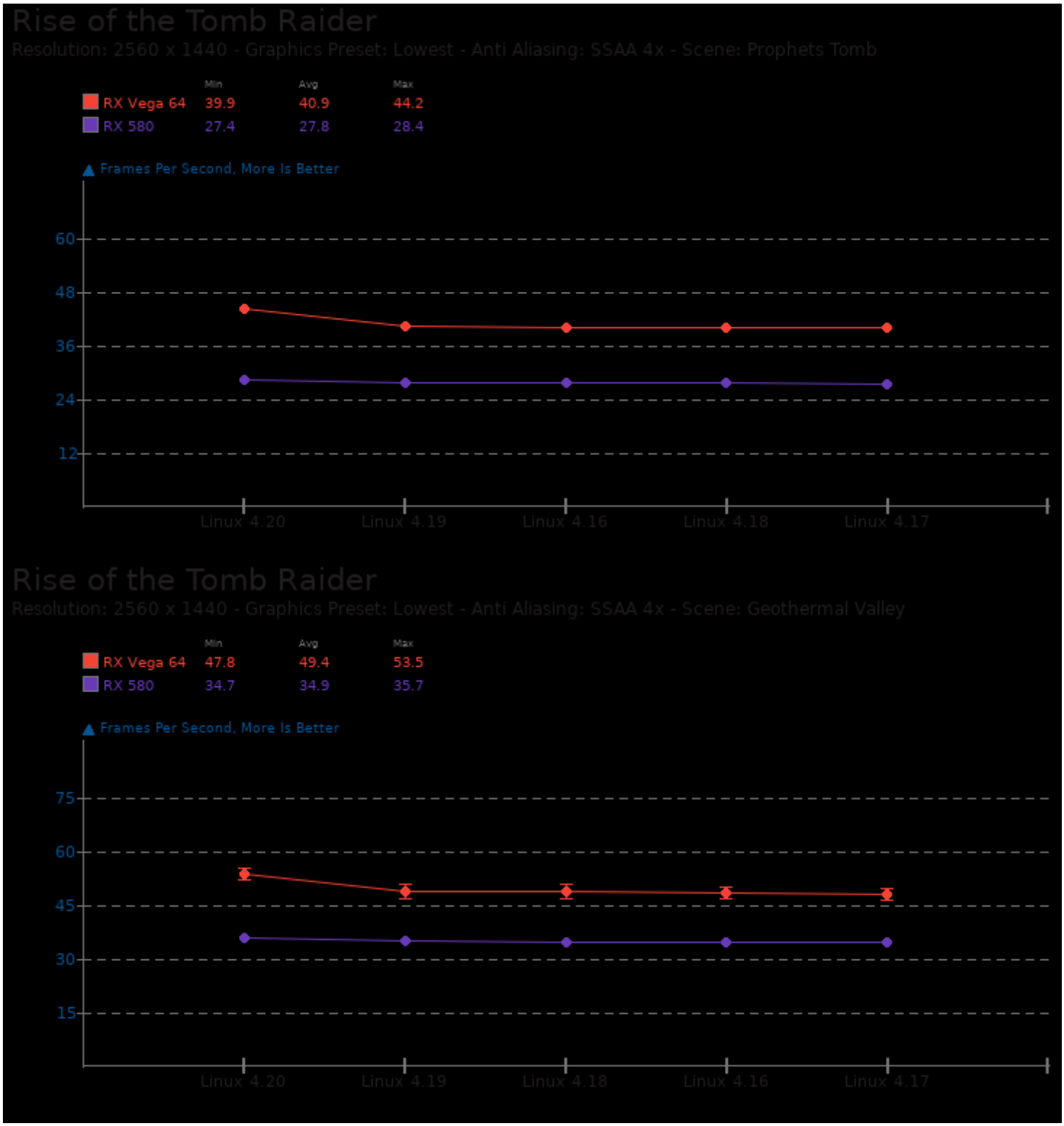
# Vulkan RADV AMDGPU Kernel Comparison

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|---|---|---|---|---|---|---|---|---|---|---|
| **Rise of the Tomb Raider - 2560 x 1440 - Medium - FXAA - S.O.T.M** | 99.00 | 99.85 | 98.80 | 100 | **109** | 77.95 | 78.05 | **77.70** | 78.50 | 79.70 |
| **Normalized** | 90.83% | 91.61% | 90.64% | 91.74% | 100% | 71.51% | 71.61% | 71.28% | 72.02% | 73.12% |
| **Standard Deviation** | 0.3% | 1.3% | 0.1% | 1.3% | 0.1% | 1.5% | 0.5% | 0.7% | 0.5% | 0.2% |
| **Rise of the Tomb Raider - 2560 x 1440 - Medium - FXAA - Prophets Tomb (FPS)** | 70.75 | 71.15 | 70.70 | 71.55 | **76.80** | 53.25 | 53.35 | 53.20 | **53.15** | 54.80 |
| **Normalized** | 92.12% | 92.64% | 92.06% | 93.16% | 100% | 69.34% | 69.47% | 69.27% | 69.21% | 71.35% |
| **Standard Deviation** | 0.3% | 0.9% | 0.4% | 1.5% | 0.6% | 0.1% | 0.4% | 0.3% | 0.4% | 0.3% |
| **Rise of the Tomb Raider - 2560 x 1440 - Medium - FXAA - Geothermal Valley (FPS)** | 76.40 | 76.55 | 76.65 | 77.05 | **87.60** | **58.55** | 58.60 | **58.55** | 58.60 | 60.35 |
| **Normalized** | 87.21% | 87.39% | 87.5% | 87.96% | 100% | 66.84% | 66.89% | 66.84% | 66.89% | 68.89% |
| **Standard Deviation** | 0.6% | 0.6% | 0.1% | 1.2% | 6.8% | 0.1% | 0.2% | 0.4% | 0% | 0.1% |
| **The Talos Principle - Vulkan - 3840 x 2160 (FPS)** | 63.27 | 63.20 | 63.20 | 63.43 | **75.53** | 44.23 | **43.65** | 44.23 | 44.25 | 43.77 |
| **Normalized** | 83.77% | 83.68% | 83.68% | 83.98% | 100% | 58.56% | 57.79% | 58.56% | 58.59% | 57.95% |
| **Standard Deviation** | 0.4% | 0.6% | 0.5% | 0.3% | 4.7% | 3.3% | 3.5% | 3.4% | 3.5% | 0.7% |
| **Total War: WARHAMMER II - 2560 x 1440 - High - F.G.B (FPS)** | 58.50 | 58.30 | 58.67 | 59.03 | **62.20** | **39.17** | 39.23 | 39.40 | 39.30 | 39.37 |
| **Normalized** | 94.05% | 93.73% | 94.32% | 94.9% | 100% | 62.97% | 63.07% | 63.34% | 63.18% | 63.3% |
| **Standard Deviation** | 0.2% | 2.4% | 0.8% | 0.5% | 0.9% | 0.4% | 0.4% | 0% | 0.7% | 0.4% |
| **VKMark - 2560 x 1440 (VKMark Score)** | 6299 | **5758** | 6022 | 5806 | **7974** | 6317 | 6240 | 6270 | 6224 | 6529 |
| **Normalized** | 78.99% | 72.21% | 75.52% | 72.81% | 100% | 79.22% | 78.25% | 78.63% | 78.05% | 81.88% |
| **Standard Deviation** | 1.5% | 3% | 2.8% | 3.5% | 0.6% | 1% | 0.7% | 0.9% | 2.3% | 0.2% |

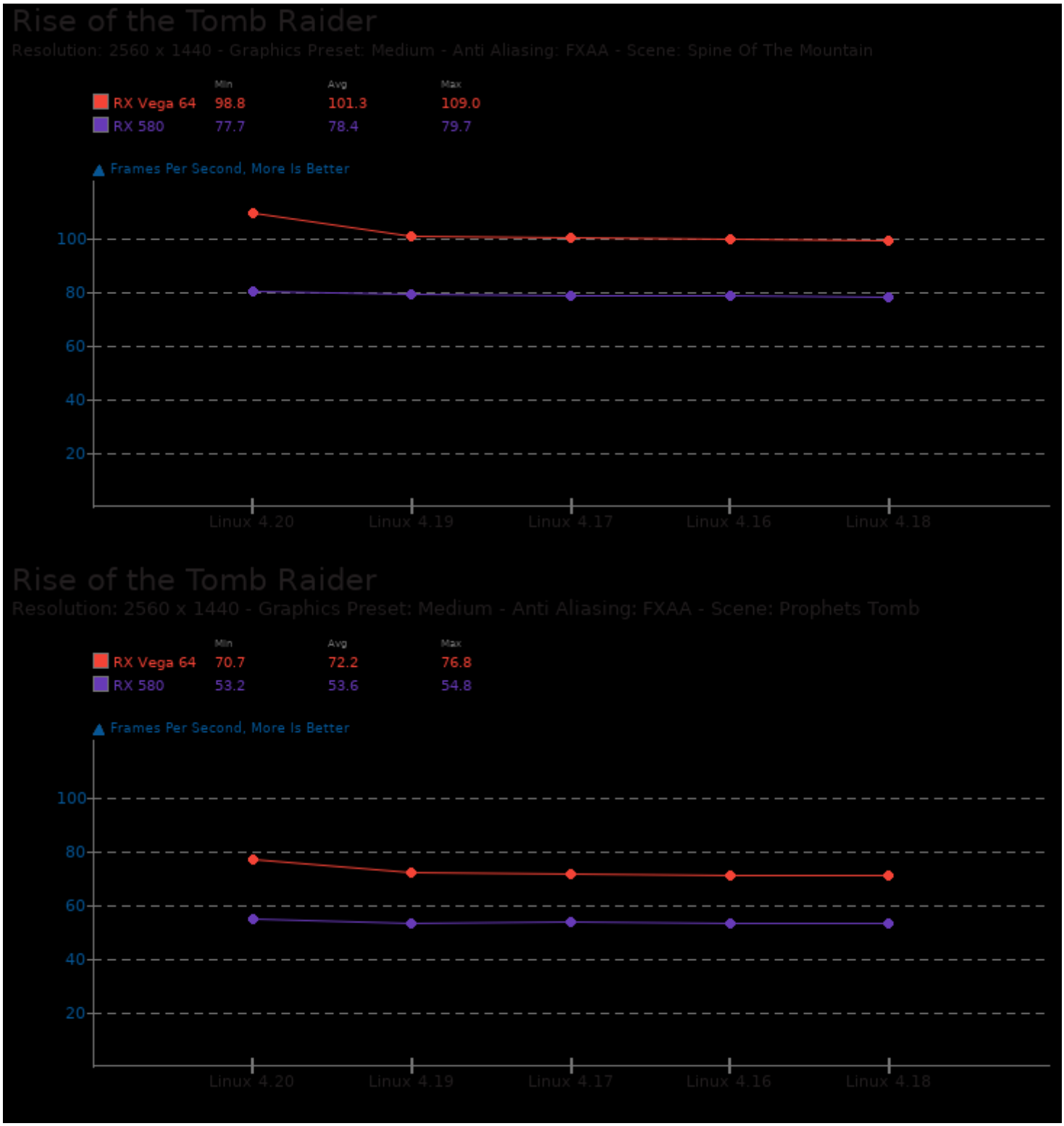
# Vulkan RADV AMDGPU Kernel Comparison



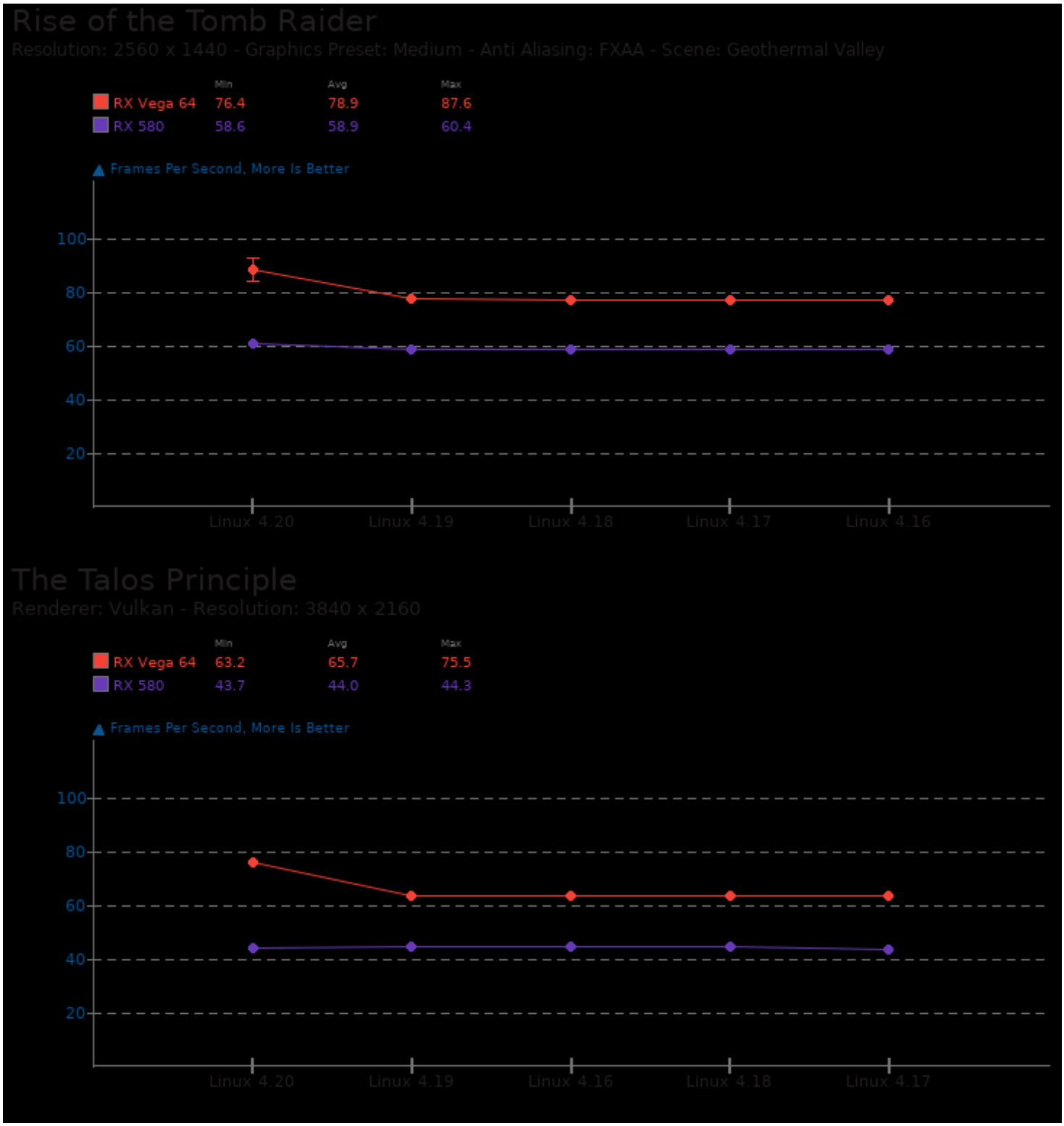
# Vulkan RADV AMDGPU Kernel Comparison



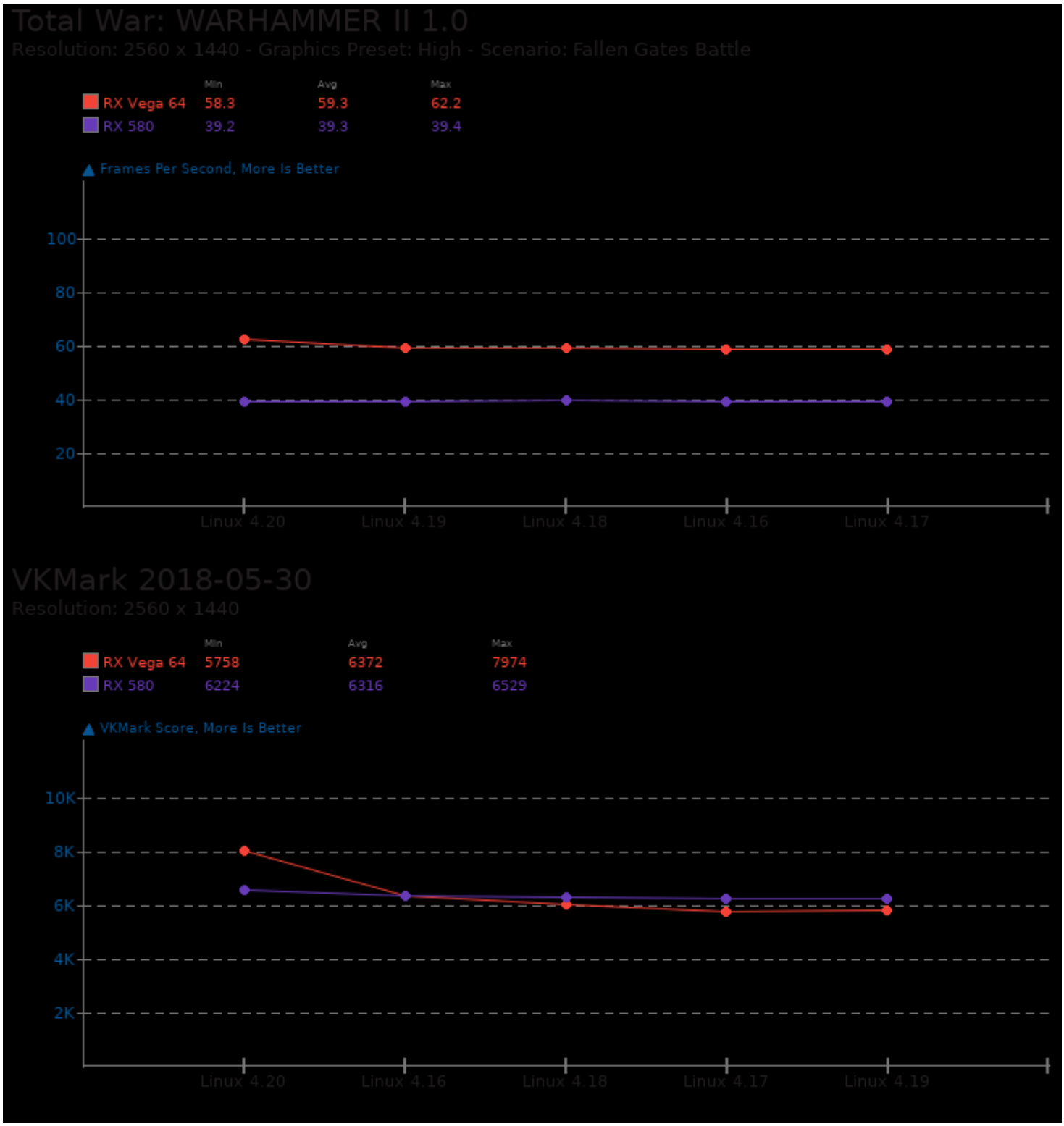
# Vulkan RADV AMDGPU Kernel Comparison



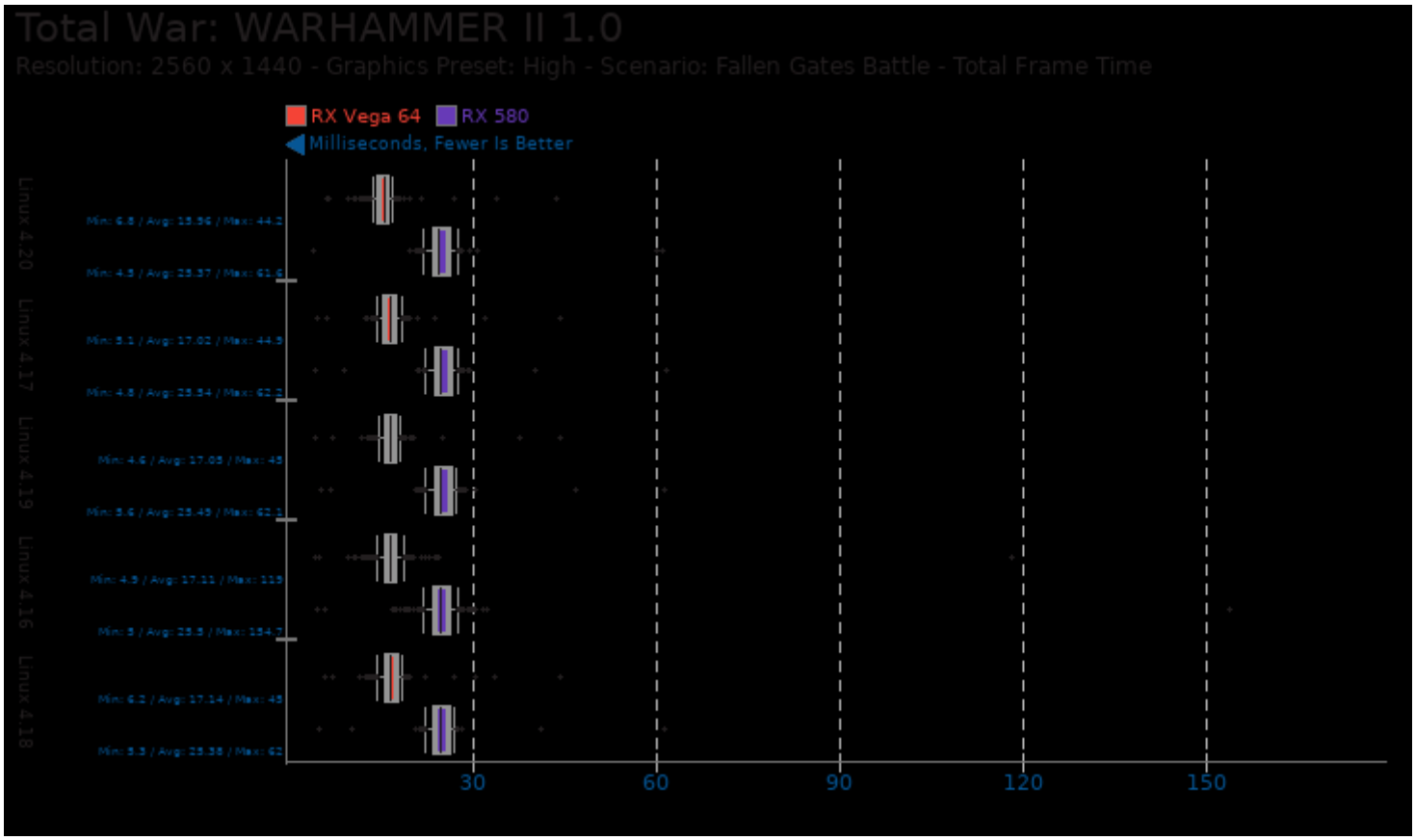
# Vulkan RADV AMDGPU Kernel Comparison



# Vulkan RADV AMDGPU Kernel Comparison



# Vulkan RADV AMDGPU Kernel Comparison




*This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 17:00.*