



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55

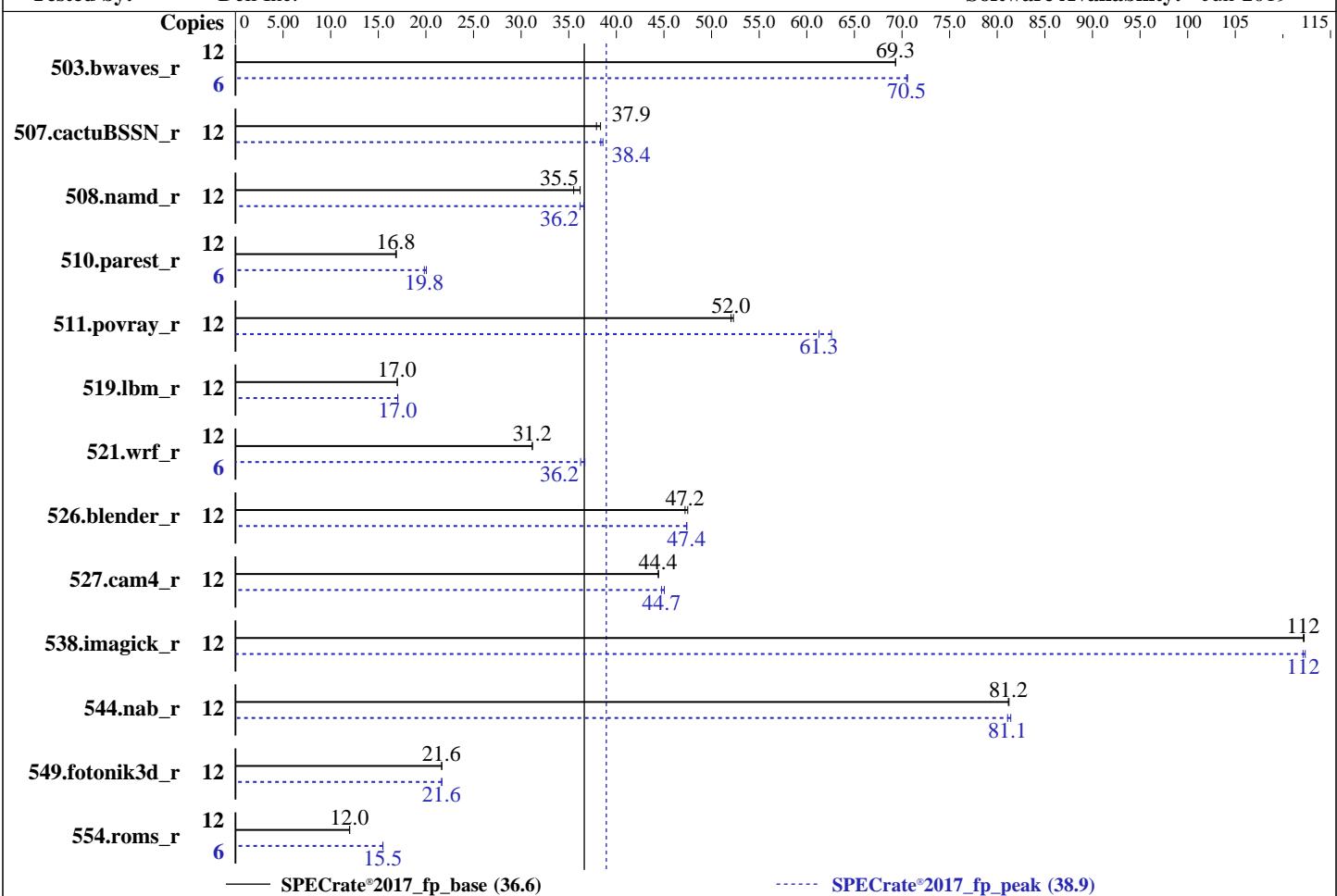
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Nov-2019

Hardware Availability: Dec-2019

Software Availability: Jun-2019



Hardware		Software	
CPU Name:	Intel Xeon E-2276G	OS:	SUSE Linux Enterprise Server 15 SP1
Max MHz:	4900		kernel 4.12.14-195-default
Nominal:	3800	Compiler:	C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
Enabled:	12 cores, 1 chip		Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
Orderable:	1 chips	Parallel:	No
Cache L1:	32 KB I + 32 KB D on chip per core	Firmware:	Version 2.1.6 released Nov-2019
L2:	256 KB I+D on chip per core	File System:	xfs
L3:	12 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other:	None	Base Pointers:	64-bit
Memory:	64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)	Peak Pointers:	64-bit
Storage:	1 x 960 GB SATA SSD	Other:	None
Other:	None	Power Management:	BIOS set to prefer performance at the cost of additional power usage.



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	12	1736	69.3	1736	69.3			6	854	70.5	852	70.6				
507.cactusBSSN_r	12	401	37.9	396	38.3			12	396	38.4	394	38.6				
508.namd_r	12	315	36.2	321	35.5			12	312	36.6	315	36.2				
510.parest_r	12	1866	16.8	1857	16.9			6	783	20.0	791	19.8				
511.povray_r	12	536	52.3	538	52.0			12	457	61.3	448	62.6				
519.lbm_r	12	745	17.0	744	17.0			12	742	17.1	742	17.0				
521.wrf_r	12	862	31.2	862	31.2			6	366	36.7	371	36.2				
526.blender_r	12	387	47.2	385	47.5			12	386	47.4	386	47.4				
527.cam4_r	12	473	44.4	472	44.4			12	466	45.0	469	44.7				
538.imagick_r	12	266	112	266	112			12	266	112	266	112				
544.nab_r	12	249	81.2	249	81.2			12	249	81.1	248	81.4				
549.fotonik3d_r	12	2161	21.6	2158	21.7			12	2158	21.7	2161	21.6				
554.roms_r	12	1593	12.0	1589	12.0			6	616	15.5	616	15.5				

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

General Notes (Continued)

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

Platform Notes

BIOS settings:

Virtualization Technology disabled

DCU Streamer Prefetcher disabled

System Profile set to Custom

CPU Performance set to Maximum Performance

C States set to Autonomous

C1E disabled

Uncore Frequency set to Dynamic

Energy Efficiency Policy set to Performance

Memory Patrol Scrub disabled

Logical Processor disabled

PCI ASPM L1 Link Power Management disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-g3ob Wed Nov 20 19:37:35 2019

SUT (System Under Test) info as seen by some common utilities.

For more information on this section, see

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo
model name : Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz
1 "physical id"s (chips)
12 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECCrate®2017_fp_base = 36.6

SPECCrate®2017_fp_peak = 38.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Platform Notes (Continued)

Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz
Stepping: 10
CPU MHz: 3800.000
BogoMIPS: 7584.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtTopology nonstop_tsc cpuid aperfmpfperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single pt1 ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_l1d

/proc/cpuinfo cache data
cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
node 0 size: 64131 MB
node 0 free: 62630 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65671032 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Platform Notes (Continued)

```
From /etc/*release* /etc/*version*
os-release:
  NAME="SLES"
  VERSION="15-SP1"
  VERSION_ID="15.1"
  PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault):	Mitigation: PTE Inversion
Microarchitectural Data Sampling:	Mitigation: Clear CPU buffers; SMT vulnerable
CVE-2017-5754 (Meltdown):	Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Indirect Branch Restricted Speculation, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 3 Nov 20 14:44 last=5

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        xfs   440G   34G  407G  8%  /
```

```
From /sys/devices/virtual/dmi/id
BIOS:    Dell Inc. 2.1.6 09/27/2018
Vendor:  Dell Inc.
Product: PowerEdge R240
Product Family: PowerEdge
```

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

```
2x 00AD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
2x 00AD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECCrate®2017_fp_base = 36.6

SPECCrate®2017_fp_peak = 38.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C           | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
           | 544.nab_r(base, peak)
-----
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
-----

=====
C++          | 508.namd_r(base, peak) 510.parest_r(base, peak)
-----
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
-----

=====
C++, C       | 511.povray_r(base, peak) 526.blender_r(base, peak)
-----
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
-----

=====
C++, C, Fortran | 507.cactusBSSN_r(base, peak)
-----
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R240 (Intel Xeon E-2276G, 3.80 GHz)

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Nov-2019

Hardware Availability: Dec-2019

Software Availability: Jun-2019

Compiler Version Notes (Continued)

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
=====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====
Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
=====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:

icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:

icpc -m64 icc -m64 -std=c11 ifort -m64



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R240 (Intel Xeon E-2276G, 3.80 GHz)

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

Test Date: Nov-2019

Hardware Availability: Dec-2019

Software Availability: Jun-2019

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactubSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both C and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R240 (Intel Xeon E-2276G, 3.80 GHz)

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

Test Date: Nov-2019

Hardware Availability: Dec-2019

Software Availability: Jun-2019

Peak Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64icc -m64 -std=c11 ifort -m64
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4
```

```
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

```
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 36.6

PowerEdge R240 (Intel Xeon E-2276G, 3.80 GHz)

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55

Test Date: Nov-2019

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2019

Tested by: Dell Inc.

Software Availability: Jun-2019

Peak Optimization Flags (Continued)

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

526.blender_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic19.0ul-official-linux64.2019-07-09.html>
<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE7.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic19.0ul-official-linux64.2019-07-09.xml>
<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE7.xml>



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R240 (Intel Xeon E-2276G, 3.80 GHz)

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 38.9

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Nov-2019

Hardware Availability: Dec-2019

Software Availability: Jun-2019

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2019-11-20 20:37:34-0500.

Report generated on 2019-12-13 10:29:41 by CPU2017 PDF formatter v6255.

Originally published on 2019-12-12.