



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Dell Inc.

SPECrate®2017\_fp\_base = 101

PowerEdge R740xd (Intel Xeon Gold 6208U, 2.90 GHz)

SPECrate®2017\_fp\_peak = 107

CPU2017 License: 55

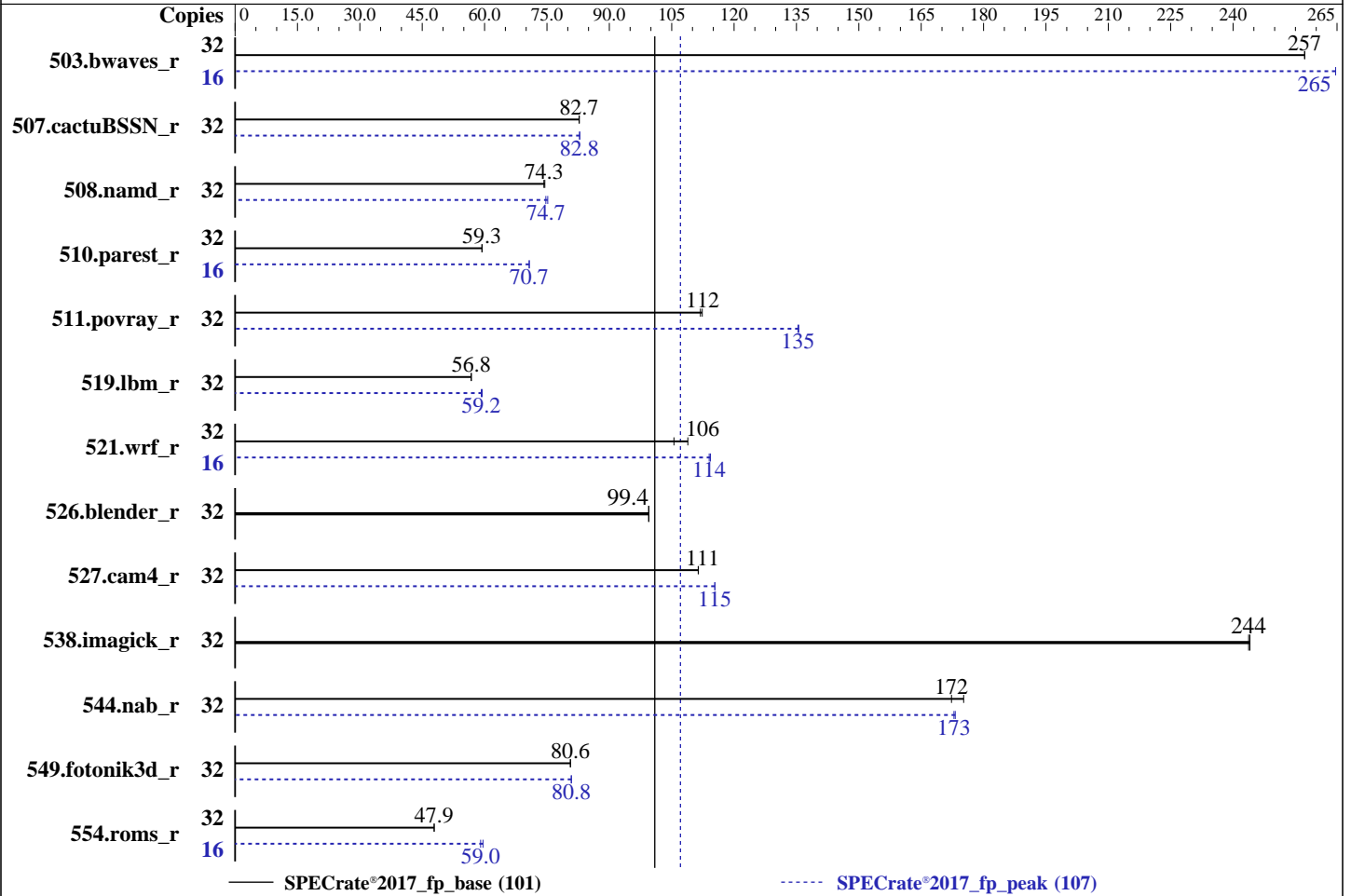
Test Date: Jan-2020

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2020

Tested by: Dell Inc.

Software Availability: Jun-2019



### Hardware

CPU Name: Intel Xeon Gold 6208U  
 Max MHz: 3900  
 Nominal: 2900  
 Enabled: 16 cores, 1 chip, 2 threads/core  
 Orderable: 1 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 22 MB I+D on chip per chip  
 Other: None  
 Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933V-R, running at 2933)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP1 kernel 4.12.14-195-default  
 Compiler: C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;  
 Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux  
 Parallel: No  
 Firmware: Version 2.5.4 released Jan-2020  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 Power Management: BIOS set to prefer performance at the cost of additional power usage.



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	32	1247	257	<b><u>1248</u></b>	<b><u>257</u></b>			16	606	265	<b><u>606</u></b>	<b><u>265</u></b>		
507.cactuBSSN_r	32	489	82.8	<b><u>490</u></b>	<b><u>82.7</u></b>			32	<b><u>489</u></b>	<b><u>82.8</u></b>	489	82.9		
508.namd_r	32	<b><u>409</u></b>	<b><u>74.3</u></b>	408	74.5			32	<b><u>407</u></b>	<b><u>74.7</u></b>	404	75.2		
510.parest_r	32	<b><u>1411</u></b>	<b><u>59.3</u></b>	1409	59.4			16	<b><u>592</u></b>	<b><u>70.7</u></b>	591	70.8		
511.povray_r	32	<b><u>668</u></b>	<b><u>112</u></b>	665	112			32	<b><u>552</u></b>	<b><u>135</u></b>	551	136		
519.lbm_r	32	594	56.8	<b><u>594</u></b>	<b><u>56.8</u></b>			32	568	59.4	<b><u>570</u></b>	<b><u>59.2</u></b>		
521.wrf_r	32	<b><u>679</u></b>	<b><u>106</u></b>	658	109			16	314	114	<b><u>314</u></b>	<b><u>114</u></b>		
526.blender_r	32	490	99.5	<b><u>490</u></b>	<b><u>99.4</u></b>			32	490	99.5	<b><u>490</u></b>	<b><u>99.4</u></b>		
527.cam4_r	32	502	111	<b><u>503</u></b>	<b><u>111</u></b>			32	<b><u>485</u></b>	<b><u>115</u></b>	485	115		
538.imagick_r	32	326	244	<b><u>327</u></b>	<b><u>244</u></b>			32	326	244	<b><u>327</u></b>	<b><u>244</u></b>		
544.nab_r	32	<b><u>313</u></b>	<b><u>172</u></b>	307	175			32	311	173	<b><u>312</u></b>	<b><u>173</u></b>		
549.fotonik3d_r	32	<b><u>1547</u></b>	<b><u>80.6</u></b>	1546	80.7			32	<b><u>1543</u></b>	<b><u>80.8</u></b>	1542	80.9		
554.roms_r	32	<b><u>1063</u></b>	<b><u>47.9</u></b>	1062	47.9			16	426	59.6	<b><u>431</u></b>	<b><u>59.0</u></b>		

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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 i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5  
NA: 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.

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## 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:

Sub NUMA Cluster enabled

Virtualization Technology 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 set to standard

Logical Processor enabled

CPU Interconnect Bus Link Power Management disabled

PCI ASPM L1 Link Power Management disabled

UPI Prefetch enabled

LLC Prefetch disabled

Dead Line LLC Alloc enabled

Directory AtoS disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on linux-g3ob Sun Jan 26 22:20:23 2020

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) Gold 6208U CPU @ 2.90GHz
```

```
1 "physical id"s (chips)
```

```
32 "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 : 16
```

```
siblings : 32
```

```
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

(Continued on next page)



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## Platform Notes (Continued)

From lscpu:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
Address sizes:          46 bits physical, 48 bits virtual
CPU(s):                 32
On-line CPU(s) list:   0-31
Thread(s) per core:    2
Core(s) per socket:    16
Socket(s):              1
NUMA node(s):          2
Vendor ID:              GenuineIntel
CPU family:             6
Model:                  85
Model name:             Intel(R) Xeon(R) Gold 6208U CPU @ 2.90GHz
Stepping:               7
CPU MHz:                2900.000
BogoMIPS:               5800.00
Virtualization:         VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               22528K
NUMA node0 CPU(s):     0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
NUMA node1 CPU(s):     1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
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 xtopology nonstop_tsc cpuid
aperfmpperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 22528 KB

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
node 0 size: 95277 MB

```

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## Platform Notes (Continued)

```

node 0 free: 94302 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
node 1 size: 96764 MB
node 1 free: 96090 MB
node distances:
node    0    1
  0:   10   11
  1:   11   10

```

```

From /proc/meminfo
MemTotal:      196650460 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

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):      Not affected
Microarchitectural Data Sampling:      Not affected
CVE-2017-5754 (Meltdown):              Not affected
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: Enhanced IBRS, IBPB: conditional,
RSB filling

```

run-level 3 Jan 26 10:37 last=5

```

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       xfs   440G   48G  393G  11% /

```

From /sys/devices/virtual/dmi/id

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## Platform Notes (Continued)

BIOS: Dell Inc. 2.5.4 01/13/2020  
Vendor: Dell Inc.  
Product: PowerEdge R740xd  
Product Family: PowerEdge  
Serial: F5BLC52

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 002C069D002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933  
7x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933  
3x 00AD063200AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933  
12x Not Specified Not Specified

(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,  
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```

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## Compiler Version Notes (Continued)

=====  
C++, C, Fortran | 507.cactuBSSN\_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.

=====  
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

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## Base Compiler Invocation (Continued)

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
```

## 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
```

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## Base Optimization Flags (Continued)

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
```

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

Benchmarks using Fortran, C, and C++:

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

## Peak Portability Flags

Same as Base Portability Flags



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## 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: basepeak = yes

544.nab\_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4

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

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  
-nonstandard-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 -nonstandard-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 -nonstandard-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

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## Peak Optimization Flags (Continued)

526.blender\_r: basepeak = yes

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-ic19.0u1-official-linux64.2019-07-09.html>  
<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml>  
<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU®2017 v1.1.0 on 2020-01-26 23:20:22-0500.

Report generated on 2020-03-02 11:50:50 by CPU2017 PDF formatter v6255.

Originally published on 2020-02-29.