



SPEC CPU®2017 Floating Point Rate Result

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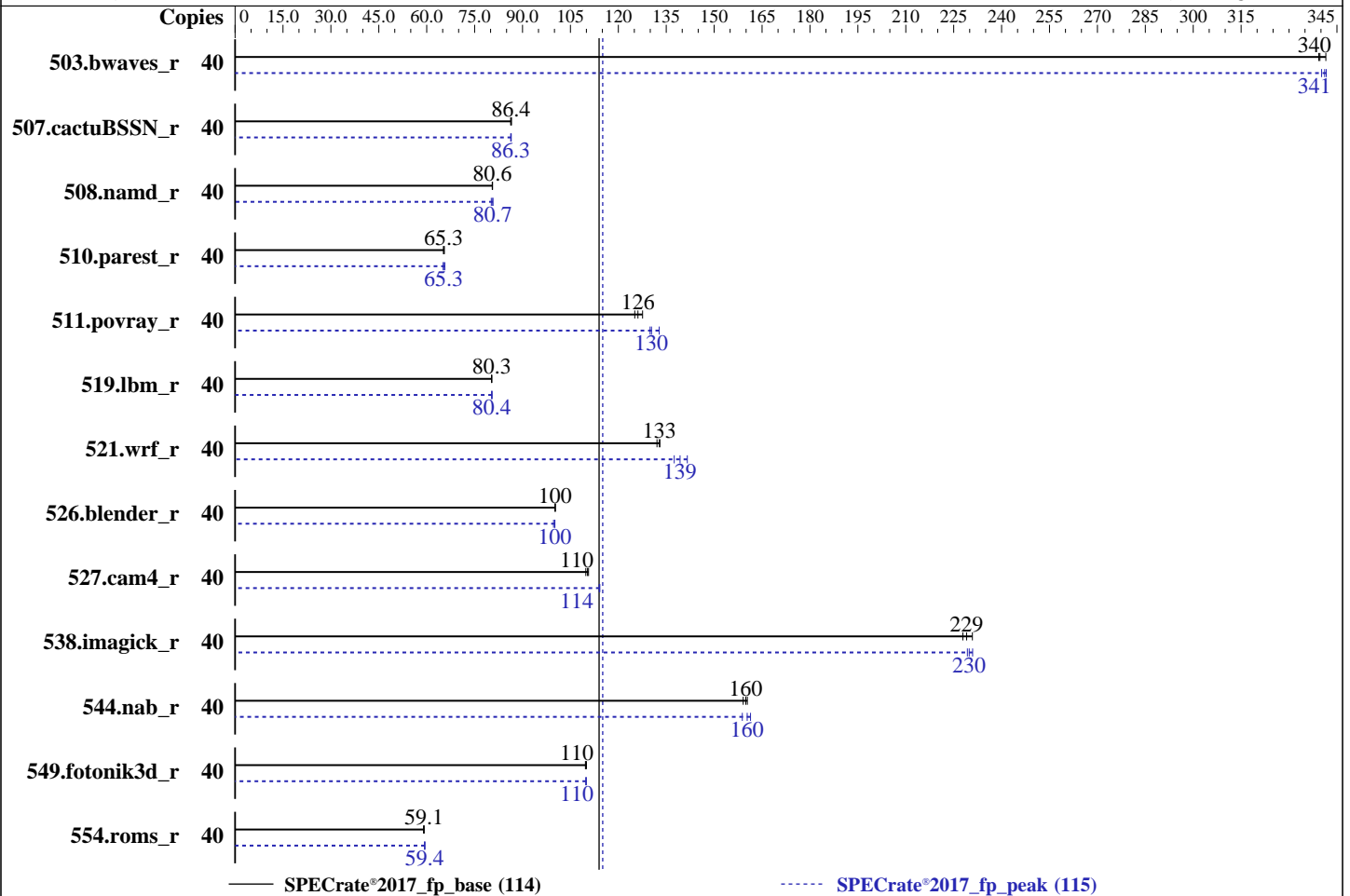
Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
AD400TR-28/R/T
(2.20 GHz, Intel Xeon Silver 4210)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 115

CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Netweb

Test Date: Oct-2019
Hardware Availability: Sep-2019
Software Availability: Aug-2019



Hardware

CPU Name: Intel Xeon Silver 4210
Max MHz: 3200
Nominal: 2200
Enabled: 20 cores, 2 chips, 2 threads/core
Orderable: 1, 2 (chip)s
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 13.75 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933P-R, running at 2400)
Storage: 1 x 480 GB SSD
Other: None

Software

OS: CentOS Linux release 7.7.1908 (Core)
3.10.0-1062.el7.x86_64
Compiler: C/C++: Version 19.0.4.243 of Intel C/C++ Compiler Build 20190416 for Linux;
Fortran: Version 19.0.4.243 of Intel Fortran Compiler Build 20190416 for Linux
Parallel: No
Firmware: Version 5.14 released May-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: None



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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	40	1181	340	1175	342	1182	339	40	1176	341	1179	340	1174	342
507.cactuBSSN_r	40	587	86.3	585	86.5	586	86.4	40	586	86.5	587	86.3	587	86.3
508.namd_r	40	471	80.6	472	80.6	472	80.5	40	474	80.2	471	80.7	471	80.7
510.parest_r	40	1603	65.3	1602	65.3	1597	65.5	40	1593	65.7	1606	65.2	1603	65.3
511.povray_r	40	732	128	740	126	746	125	40	716	130	703	133	719	130
519.lbm_r	40	525	80.3	525	80.3	525	80.4	40	525	80.4	524	80.4	525	80.4
521.wrf_r	40	674	133	678	132	674	133	40	643	139	652	137	633	142
526.blender_r	40	608	100	608	100	608	100	40	609	100	611	99.7	608	100
527.cam4_r	40	637	110	632	111	634	110	40	613	114	614	114	613	114
538.imagick_r	40	431	231	437	228	434	229	40	433	230	431	231	434	229
544.nab_r	40	421	160	423	159	420	160	40	417	161	420	160	424	159
549.fotonik3d_r	40	1417	110	1421	110	1420	110	40	1418	110	1420	110	1418	110
554.roms_r	40	1075	59.1	1077	59.0	1074	59.2	40	1070	59.4	1071	59.3	1070	59.4

SPECrate®2017_fp_base = **114**

SPECrate®2017_fp_peak = **115**

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

Compiler Notes

SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms.
Intel has granted a one-time waiver for this result.

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/ia32:/home/cpu2017/lib/intel64"



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General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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>
```

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.

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.

Platform Notes

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on NODE2 Fri Oct 11 17:09:59 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) Silver 4210 CPU @ 2.20GHz
```

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

```
40 "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 : 10
```

```
siblings : 20
```

```
physical 0: cores 0 1 2 3 4 8 9 10 11 12
```

```
physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

From lscpu:

```
Architecture: x86_64
```

```
CPU op-mode(s): 32-bit, 64-bit
```

```
Byte Order: Little Endian
```

```
CPU(s): 40
```

```
On-line CPU(s) list: 0-39
```

```
Thread(s) per core: 2
```

```
Core(s) per socket: 10
```

```
Socket(s): 2
```

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Platform Notes (Continued)

```

NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Stepping:              7
CPU MHz:               999.963
CPU max MHz:           3200.0000
CPU min MHz:           1000.0000
BogoMIPS:              4400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              14080K
NUMA node0 CPU(s):    0-9,20-29
NUMA node1 CPU(s):    10-19,30-39

```

```

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
aperfperf eagerfpu 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 epb cat_l3 cdp_l3 intel_ppin
intel_pt 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 avx512cd avx512bw avx512vl xsaveopt
xsavvec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_l1d arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 14080 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 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29
node 0 size: 195240 MB
node 0 free: 178860 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
node 1 size: 196608 MB
node 1 free: 182230 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

From /proc/meminfo

(Continued on next page)



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Platform Notes (Continued)

MemTotal: 394858364 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

```
centos-release: CentOS Linux release 7.7.1908 (Core)
centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)
os-release:
  NAME="CentOS Linux"
  VERSION="7 (Core)"
  ID="centos"
  ID_LIKE="rhel fedora"
  VERSION_ID="7"
  PRETTY_NAME="CentOS Linux 7 (Core)"
  ANSI_COLOR="0;31"
  CPE_NAME="cpe:/o:centos:centos:7"
redhat-release: CentOS Linux release 7.7.1908 (Core)
system-release: CentOS Linux release 7.7.1908 (Core)
system-release-cpe: cpe:/o:centos:centos:7
```

uname -a:

```
Linux NODE2 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 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: Load fences, __user pointer
sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB
```

run-level 3 Oct 11 15:48

SPEC is set to: /home/cpu2017

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/centos-home xfs   392G  134G  259G  35% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS: American Megatrends Inc. 5.14 05/16/2019
```

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

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Platform Notes (Continued)

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

12x NO DIMM NO DIMM

12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
-----
```

```
=====
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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
-----
```

```
=====
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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
-----
```

```
=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
-----
```

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.243 Build 20190416
```

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Compiler Version Notes (Continued)

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
-xCORE-AVX512 -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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -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-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

538.imagick_r: -xCORE-AVX512 -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-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

510.parest_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX512 -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-AVX512
-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-AVX512 -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-AVX512
-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: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -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-linux64.2019-07-15.html>

<http://www.spec.org/cpu2017/flags/Default-Platform-Flags.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.xml>

<http://www.spec.org/cpu2017/flags/Default-Platform-Flags.xml>

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

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