



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## NEC Corporation

SPECrate2017\_fp\_base = 118

Express5800/R120h-2M (Intel Xeon Gold 5115)

SPECrate2017\_fp\_peak = 121

CPU2017 License: 9006

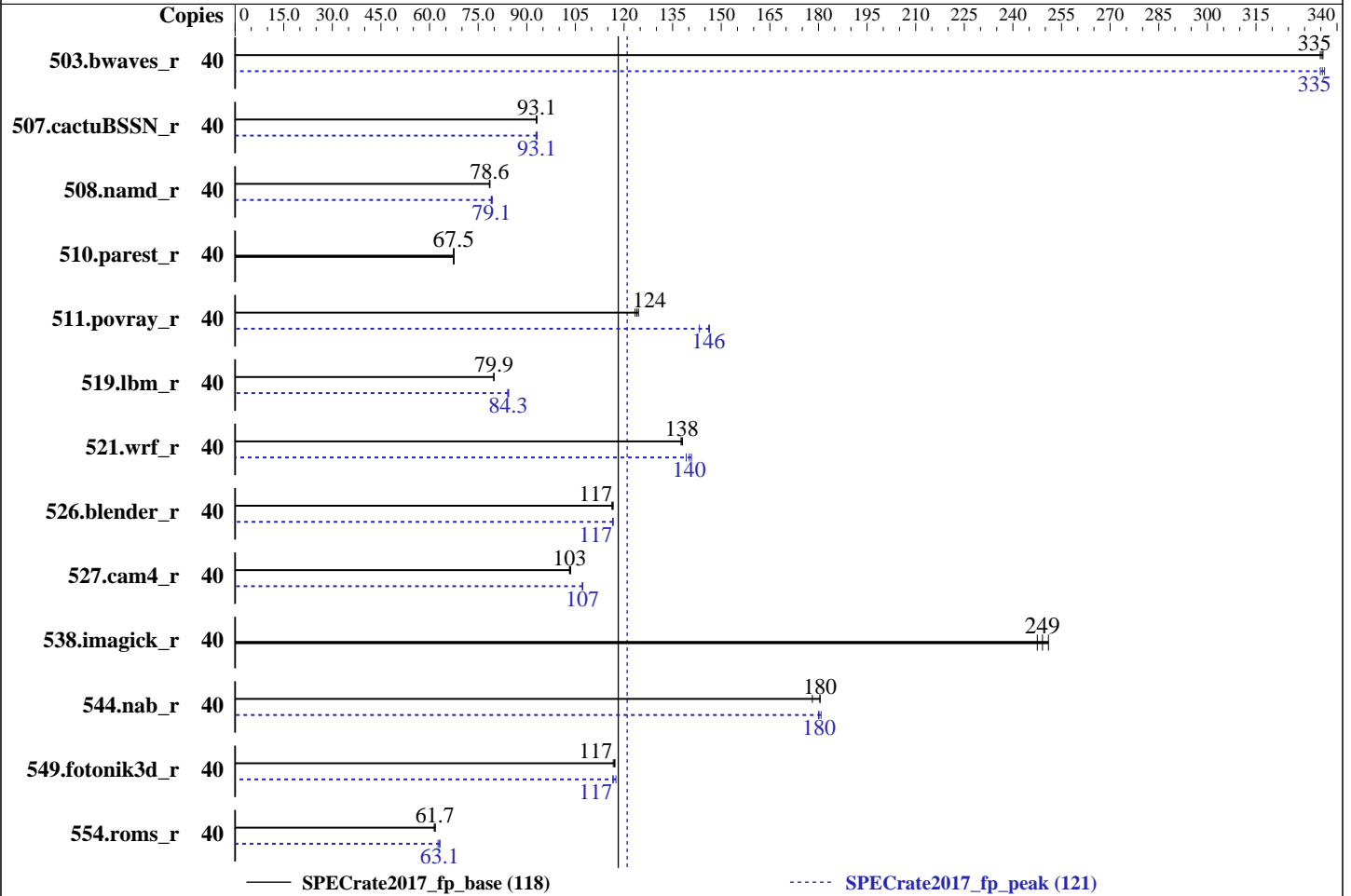
Test Date: Aug-2018

Test Sponsor: NEC Corporation

Hardware Availability: Jun-2018

Tested by: NEC Corporation

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Gold 5115  
 Max MHz.: 3200  
 Nominal: 2400  
 Enabled: 20 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 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: 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)  
 Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
 Kernel 3.10.0-693.21.1.el7.x86\_64  
 Compiler: C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: NEC BIOS Version U30 02/15/2018 released Mar-2018  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: 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	1198	335	<b><u>1196</u></b>	<b><u>335</u></b>	1195	336	40	1198	335	<b><u>1196</u></b>	<b><u>335</u></b>	1193	336
507.cactuBSSN_r	40	544	93.1	<b><u>544</u></b>	<b><u>93.1</u></b>	545	92.9	40	545	92.8	<b><u>544</u></b>	<b><u>93.1</u></b>	544	93.1
508.namd_r	40	484	78.4	483	78.6	<b><u>484</u></b>	<b><u>78.6</u></b>	40	481	79.1	<b><u>481</u></b>	<b><u>79.1</u></b>	479	79.3
510.parest_r	40	<b><u>1551</u></b>	<b><u>67.5</u></b>	1549	67.6	1553	67.4	40	<b><u>1551</u></b>	<b><u>67.5</u></b>	1549	67.6	1553	67.4
511.povray_r	40	<b><u>753</u></b>	<b><u>124</u></b>	750	124	757	123	40	638	146	652	143	<b><u>639</u></b>	<b><u>146</u></b>
519.lbm_r	40	528	79.9	<b><u>528</u></b>	<b><u>79.9</u></b>	528	79.8	40	501	84.1	500	84.4	<b><u>500</u></b>	<b><u>84.3</u></b>
521.wrf_r	40	649	138	<b><u>650</u></b>	<b><u>138</u></b>	651	138	40	<b><u>639</u></b>	<b><u>140</u></b>	644	139	636	141
526.blender_r	40	<b><u>523</u></b>	<b><u>117</u></b>	522	117	524	116	40	<b><u>523</u></b>	<b><u>117</u></b>	523	117	522	117
527.cam4_r	40	676	104	<b><u>678</u></b>	<b><u>103</u></b>	678	103	40	<b><u>653</u></b>	<b><u>107</u></b>	652	107	653	107
538.imagick_r	40	402	248	<b><u>399</u></b>	<b><u>249</u></b>	396	251	40	402	248	<b><u>399</u></b>	<b><u>249</u></b>	396	251
544.nab_r	40	378	178	373	180	<b><u>373</u></b>	<b><u>180</u></b>	40	372	181	374	180	<b><u>374</u></b>	<b><u>180</u></b>
549.fotonik3d_r	40	<b><u>1332</u></b>	<b><u>117</u></b>	1330	117	1336	117	40	1337	117	1327	118	<b><u>1336</u></b>	<b><u>117</u></b>
554.roms_r	40	<b><u>1031</u></b>	<b><u>61.7</u></b>	1029	61.8	1034	61.4	40	1015	62.6	1006	63.2	<b><u>1007</u></b>	<b><u>63.1</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"

## General Notes

Environment variables set by runcpu before the start of the run:

LD\_LIBRARY\_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-6700K 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>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)



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Hardware Availability: Jun-2018

Software Availability: Mar-2018

### General Notes (Continued)

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

BIOS Settings:

Thermal Configuration: Maximum Cooling

Workload Profile: General Throughput Compute

Memory Patrol Scrubbing: Disabled

LLC Dead Line Allocation: Disabled

LLC Prefetch: Enabled

Workload Profile: Custom

Sub-NUMA Clustering: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on r120h2m Tue Aug 21 19:37:30 2018

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 5115 CPU @ 2.40GHz

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

NUMA node(s): 2

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### Platform Notes (Continued)

```

Vendor ID:           GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Gold 5115 CPU @ 2.40GHz
Stepping:           4
CPU MHz:            2400.000
BogoMIPS:           4800.00
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
aperfmpperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 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 invpcid_single
intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase
tsc_adjust bml hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

```

```

/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: 97964 MB
node 0 free: 95460 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: 98303 MB
node 1 free: 95945 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

```

From /proc/meminfo
MemTotal:      197747508 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

(Continued on next page)



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### Platform Notes (Continued)

```

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.4 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VARIANT="Server"
  VARIANT_ID="server"
  VERSION_ID="7.4"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
Linux r120h2m 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown):          Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Aug 21 19:31

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       ext4  909G  396G  467G  46% /

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.
BIOS NEC U30 02/15/2018
Memory:
  24x HPE 876319-081 8 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

```

### Compiler Version Notes

```

=====
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
=====
icc (ICC) 18.0.2 20180210

```

(Continued on next page)



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### Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 519.lbm\_r(peak)  
-----

icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CXXC 508.namd\_r(base) 510.parest\_r(base, peak)  
-----

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CXXC 508.namd\_r(peak)  
-----

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CC 511.povray\_r(base) 526.blender\_r(base, peak)  
-----

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CC 511.povray\_r(peak)  
-----

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
FC 507.cactuBSSN\_r(base, peak)  
-----

icpc (ICC) 18.0.2 20180210  
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### Compiler Version Notes (Continued)

icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak) 554.roms\_r(base)

-----  
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 554.roms\_r(peak)

-----  
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 521.wrf\_r(base) 527.cam4\_r(base)

-----  
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 521.wrf\_r(peak) 527.cam4\_r(peak)

-----  
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

### Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

C++ benchmarks:  
icpc -m64

(Continued on next page)



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## Base Compiler Invocation (Continued)

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
```

## 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=3
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

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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=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

## 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

## Peak Optimization Flags

C benchmarks:

(Continued on next page)



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## Peak Optimization Flags (Continued)

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=3

538.imagick\_r: basepeak = yes

544.nab\_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3

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=3

510.parest\_r: basepeak = yes

Fortran benchmarks:

503.bwaves\_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -auto  
-nostandard-realloc-lhs

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=3 -auto -nostandard-realloc-lhs

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=3 -auto -nostandard-realloc-lhs

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=3

526.blender\_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs



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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.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).

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