



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Inspur Corporation

**SPECrate2017\_fp\_base = 91.1**

Inspur NS5162M5 (Intel Xeon Silver 4114)

**SPECrate2017\_fp\_peak = 89.2**

CPU2017 License: 3358

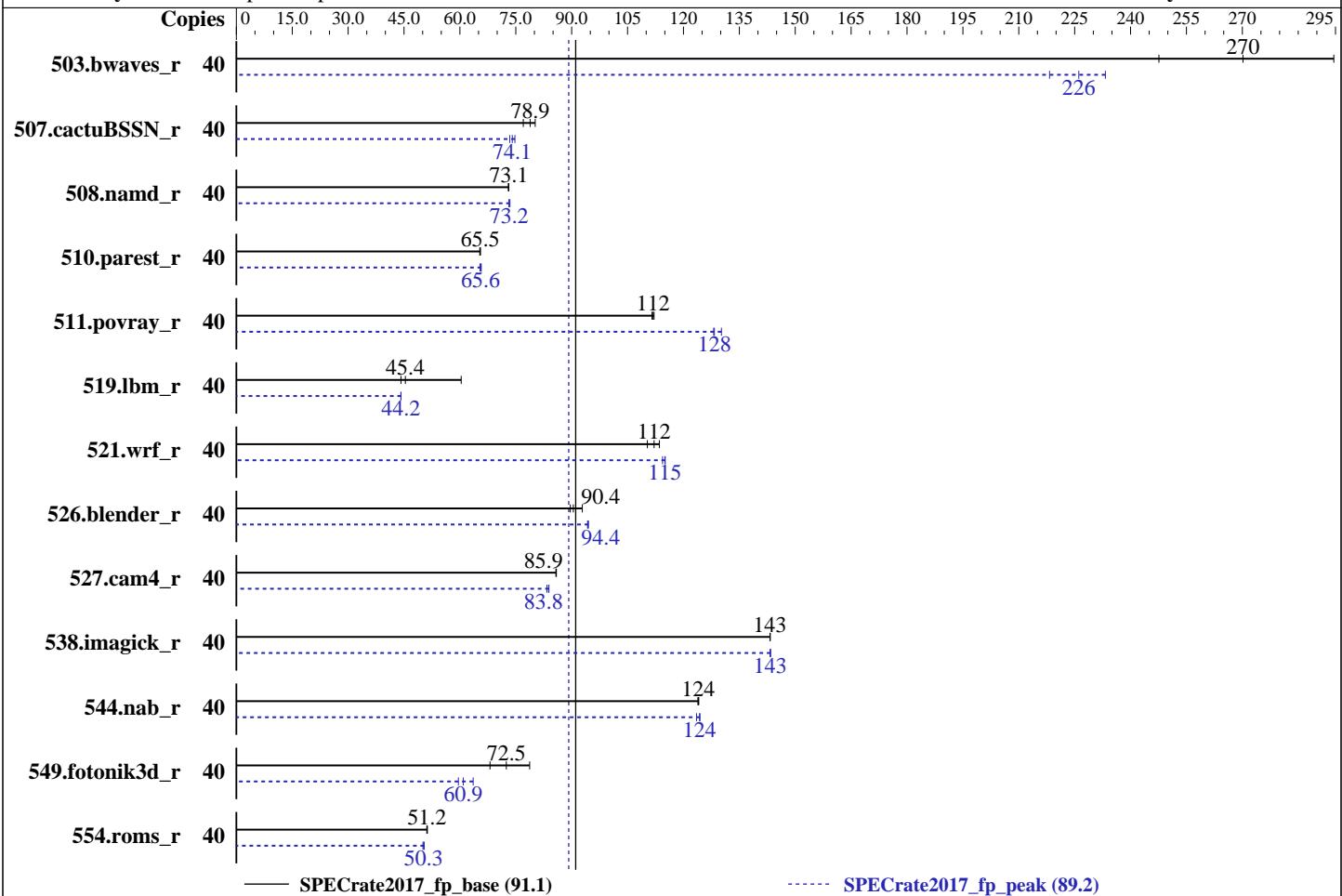
**Test Date:** May-2019

**Test Sponsor:** Inspur Corporation

**Hardware Availability:** Aug-2018

**Tested by:** Inspur Corporation

**Software Availability:** Mar-2018



Hardware		Software	
CPU Name:	Intel Xeon Silver 4114	OS:	SUSE Linux Enterprise Server 12 SP2
Max MHz.:	3000		4.4.120-92.70-default
Nominal:	2200	Compiler:	C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;
Enabled:	20 cores, 2 chips, 2 threads/core		Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
Orderable:	1,2 chips	Parallel:	No
Cache L1:	32 KB I + 32 KB D on chip per core	Firmware:	Version 4.0.1 released Aug-2018
L2:	1 MB I+D on chip per core	File System:	xfs
L3:	13.75 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other:	None	Base Pointers:	64-bit
Memory:	192 GB (12 x 16 GB 2Rx4 PC4-2666V-R, running at 2400)	Peak Pointers:	64-bit
Storage:	1 x 480 GB SATA SSD	Other:	None
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	1362	295	<b>1485</b>	<b>270</b>	1620	248	40	1720	233	<b>1774</b>	<b>226</b>	1838	218
507.cactusSSN_r	40	631	80.2	<b>642</b>	<b>78.9</b>	658	77.0	40	677	74.8	<b>684</b>	<b>74.1</b>	690	73.4
508.namd_r	40	<b>520</b>	<b>73.1</b>	521	73.0	520	73.1	40	518	73.4	519	73.2	<b>519</b>	<b>73.2</b>
510.parest_r	40	<b>1599</b>	<b>65.5</b>	1602	65.3	1598	65.5	40	1600	65.4	<b>1595</b>	<b>65.6</b>	1592	65.7
511.povray_r	40	837	112	<b>835</b>	<b>112</b>	833	112	40	729	128	717	130	<b>728</b>	<b>128</b>
519.lbm_r	40	699	60.3	<b>929</b>	<b>45.4</b>	954	44.2	40	954	44.2	955	44.2	<b>954</b>	<b>44.2</b>
521.wrf_r	40	812	110	<b>799</b>	<b>112</b>	789	114	40	779	115	783	114	<b>779</b>	<b>115</b>
526.blender_r	40	680	89.6	<b>674</b>	<b>90.4</b>	656	92.8	40	646	94.3	<b>645</b>	<b>94.4</b>	645	94.5
527.cam4_r	40	816	85.8	<b>815</b>	<b>85.9</b>	815	85.9	40	834	83.9	839	83.4	<b>835</b>	<b>83.8</b>
538.imagick_r	40	<b>694</b>	<b>143</b>	695	143	694	143	40	694	143	<b>694</b>	<b>143</b>	694	143
544.nab_r	40	542	124	<b>543</b>	<b>124</b>	543	124	40	541	124	545	124	<b>541</b>	<b>124</b>
549.fotonik3d_r	40	1980	78.7	<b>2151</b>	<b>72.5</b>	2290	68.1	40	2453	63.6	<b>2560</b>	<b>60.9</b>	2616	59.6
554.roms_r	40	<b>1242</b>	<b>51.2</b>	1244	51.1	1240	51.3	40	1269	50.1	<b>1264</b>	<b>50.3</b>	1261	50.4

**SPECrate2017\_fp\_base = 91.1**

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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 i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

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)

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## 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 and OS configuration:

SCALING\_GOVERNOR set to Performance

Hardware Prefetch set to Disable

VT Support set to Disable

C1E Support set to Disable

IMC (Integrated memory controller) Interleaving set to 1-way

Sub NUMA Cluster (SNC) set to Enable

Sysinfo program /home/CPU2017/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on linux-hma5 Wed Nov 16 19:22:47 2016

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 4114 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
NUMA node(s):	2
Vendor ID:	GenuineIntel

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## Platform Notes (Continued)

CPU family:	6
Model :	85
Model name:	Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz
Stepping:	4
CPU MHz:	2499.989
CPU max MHz:	3000.0000
CPU min MHz:	800.0000
BogoMIPS:	4389.65
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 aperfmpfperfeagerfpu pni pclmulqdq dtes64 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 ida arat epb invpcid_single pln pts dtherm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqmq mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqmq_llc cqmq_occup_llc

```
/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: 96208 MB
node 0 free: 84424 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: 96616 MB
node 1 free: 86532 MB
node distances:
node    0    1
 0: 10 21
 1: 21 10
```

```
From /proc/meminfo
MemTotal:      197452928 kB
HugePages_Total:        0
Hugepagesize:     2048 kB
```

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## Platform Notes (Continued)

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2

From /etc/*release* /etc/*version*
SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 2
    # This file is deprecated and will be removed in a future service pack or release.
    # Please check /etc/os-release for details about this release.

os-release:
    NAME="SLES"
    VERSION="12-SP2"
    VERSION_ID="12.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
Linux linux-hma5 4.4.120-92.70-default #1 SMP Wed Mar 14 15:59:43 UTC 2018 (52a83de)
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

run-level 3 Nov 16 08:15 last=5

SPEC is set to: /home/CPU2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5        xfs   404G   45G  359G  12% /home

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 Inspur 4.0.1 08/30/2018
Memory:
4x NO DIMM NO DIMM
12x Samsung M393A2K40CB2-CVF 16 GB 1 rank 2933, configured at 2400

(End of data from sysinfo program)
```



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## Compiler Version Notes

=====

CC 519.lbm\_r(base) 538.imagick\_r(base, peak) 544.nab\_r(base)

=====

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CC 519.lbm\_r(peak) 544.nab\_r(peak)

=====

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CXXC 508.namd\_r(base) 510.parest\_r(base)

=====

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CXXC 508.namd\_r(peak) 510.parest\_r(peak)

=====

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CC 511.povray\_r(base) 526.blender\_r(base)

=====

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CC 511.povray\_r(peak) 526.blender\_r(peak)

=====

icpc (ICC) 18.0.0 20170811

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## Compiler Version Notes (Continued)

FC 507.cactubSSN\_r(base)

```
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

FC 507.cactubSSN\_r(peak)

```
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

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

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

FC 554.roms\_r(peak)

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

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

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

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

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## Compiler Version Notes (Continued)

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

---

## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

fort

Benchmarks using both Fortran and C:

fort icc

Benchmarks using both C and C++:

icpcicc

Benchmarks using Fortran, C, and C++:

icpciccfort

## 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
```



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## Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-align array32byte
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -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=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-align array32byte
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```

Benchmarks using both Fortran and C:

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

Benchmarks using both C and C++:

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

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## Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

## Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## 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-AVX512  
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3

538.imagick\_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab\_r: Same as 519.lbm\_r

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## Peak Optimization Flags (Continued)

C++ benchmarks:

```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3  
-nstandard-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=3 -nstandard-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=3 -nstandard-realloc-lhs -align array32byte
```

Benchmarks using both C 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=3
```

Benchmarks using Fortran, C, 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=3 -nstandard-realloc-lhs -align array32byte
```

## Peak Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```

(Continued on next page)



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## Peak Other Flags (Continued)

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using both C and C++:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

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.html>

<http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.1-SKL.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.xml>

<http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.1-SKL.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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