



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Inspur Corporation

### Inspur NF8480M5 (Intel Xeon Gold 5218)

CPU2017 License: 3358

Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

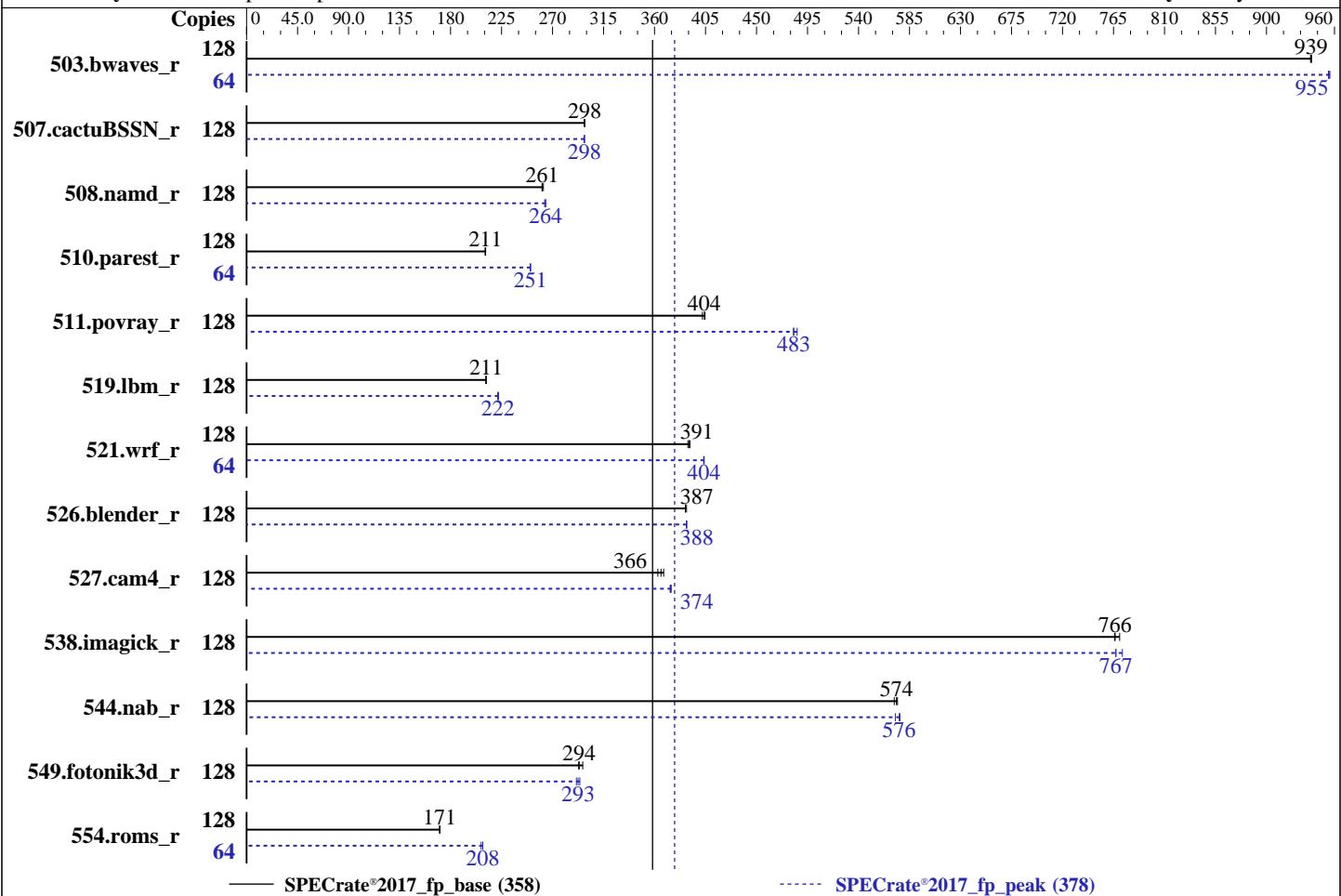
**SPECrate®2017\_fp\_base = 358**

**SPECrate®2017\_fp\_peak = 378**

**Test Date:** Sep-2019

**Hardware Availability:** Apr-2019

**Software Availability:** May-2019



## Hardware

CPU Name: Intel Xeon Gold 5218  
 Max MHz: 3900  
 Nominal: 2300  
 Enabled: 64 cores, 4 chips, 2 threads/core  
 Orderable: 2,4 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: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 1 TB SATA SSD  
 Other: None

## OS:

SUSE Linux Enterprise Server 12 SP4  
 4.12.14-94.41-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 4.1.07 released Aug-2019

## File System:

xfs

## System State:

Run level 3 (multi-user)

## Base Pointers:

64-bit

## Peak Pointers:

64-bit

## Other:

None

## Software

SUSE Linux Enterprise Server 12 SP4  
 4.12.14-94.41-default

C/C++: Version 19.0.4.227 of Intel C/C++  
 Compiler Build 20190416 for Linux;  
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## Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	1366	940	<b>1366</b>	<b>939</b>	1367	939	64	672	955	<b>672</b>	<b>955</b>	671	956		
507.cactusBSSN_r	128	544	298	<b>543</b>	<b>298</b>	543	298	128	<b>544</b>	<b>298</b>	544	298	<b>543</b>	298		
508.namd_r	128	466	261	<b>466</b>	<b>261</b>	464	262	128	461	264	462	263	<b>461</b>	<b>264</b>		
510.parest_r	128	1587	211	1591	210	<b>1588</b>	<b>211</b>	64	669	250	<b>668</b>	<b>251</b>	668	251		
511.povray_r	128	<b>740</b>	<b>404</b>	739	405	743	402	128	619	483	<b>619</b>	<b>483</b>	615	486		
519.lbm_r	128	<b>638</b>	<b>211</b>	639	211	638	211	128	609	222	<b>608</b>	<b>222</b>	607	222		
521.wrf_r	128	733	391	736	389	<b>734</b>	<b>391</b>	64	355	403	<b>355</b>	<b>404</b>	355	404		
526.blender_r	128	502	388	503	387	<b>503</b>	<b>387</b>	128	502	388	<b>502</b>	<b>388</b>	502	388		
527.cam4_r	128	<b>612</b>	<b>366</b>	608	368	617	363	128	597	375	<b>598</b>	<b>374</b>	599	374		
538.imagick_r	128	416	766	413	770	<b>415</b>	<b>766</b>	128	415	767	412	773	<b>415</b>	<b>767</b>		
544.nab_r	128	375	574	<b>376</b>	<b>574</b>	377	572	128	376	572	<b>374</b>	<b>576</b>	374	577		
549.fotonik3d_r	128	<b>1699</b>	<b>294</b>	1702	293	1681	297	128	1714	291	1696	294	<b>1705</b>	<b>293</b>		
554.roms_r	128	1193	170	1193	171	<b>1193</b>	<b>171</b>	64	488	208	491	207	<b>488</b>	<b>208</b>		

SPECrate®2017\_fp\_base = 358

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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/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X 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>

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## General Notes (Continued)

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

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-aixb Sat Sep 7 11:43:36 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) Gold 5218 CPU @ 2.30GHz

4 "physical id"s (chips)

128 "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

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

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

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

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 128

On-line CPU(s) list: 0-127

Thread(s) per core: 2

Core(s) per socket: 16

(Continued on next page)



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## Platform Notes (Continued)

```

Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 2300.000
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-3,8-11,64-67,72-75
NUMA node1 CPU(s): 4-7,12-15,68-71,76-79
NUMA node2 CPU(s): 16-19,24-27,80-83,88-91
NUMA node3 CPU(s): 20-23,28-31,84-87,92-95
NUMA node4 CPU(s): 32-35,40-43,96-99,104-107
NUMA node5 CPU(s): 36-39,44-47,100-103,108-111
NUMA node6 CPU(s): 48-51,56-59,112-115,120-123
NUMA node7 CPU(s): 52-55,60-63,116-119,124-127
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
aperfmpfperf 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_13 cdp_13
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept
vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqmq mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cqmq_llc cqmq_occup_llc cqmq_mbm_total cqmq_mbm_local
dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni
flush_ll1d 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: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 8 9 10 11 64 65 66 67 72 73 74 75
node 0 size: 192064 MB
node 0 free: 181013 MB
node 1 cpus: 4 5 6 7 12 13 14 15 68 69 70 71 76 77 78 79
```

(Continued on next page)



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## Platform Notes (Continued)

```
node 1 size: 193498 MB
node 1 free: 186838 MB
node 2 cpus: 16 17 18 19 24 25 26 27 80 81 82 83 88 89 90 91
node 2 size: 193527 MB
node 2 free: 186923 MB
node 3 cpus: 20 21 22 23 28 29 30 31 84 85 86 87 92 93 94 95
node 3 size: 193527 MB
node 3 free: 187148 MB
node 4 cpus: 32 33 34 35 40 41 42 43 96 97 98 99 104 105 106 107
node 4 size: 193527 MB
node 4 free: 178437 MB
node 5 cpus: 36 37 38 39 44 45 46 47 100 101 102 103 108 109 110 111
node 5 size: 193527 MB
node 5 free: 187134 MB
node 6 cpus: 48 49 50 51 56 57 58 59 112 113 114 115 120 121 122 123
node 6 size: 193527 MB
node 6 free: 187129 MB
node 7 cpus: 52 53 54 55 60 61 62 63 116 117 118 119 124 125 126 127
node 7 size: 193309 MB
node 7 free: 186889 MB
node distances:
node   0   1   2   3   4   5   6   7
  0: 10  11  21  21  31  31  21  21
  1: 11  10  21  21  31  31  21  21
  2: 21  21  10  11  21  21  31  31
  3: 21  21  11  10  21  21  31  31
  4: 31  31  21  21  10  11  21  21
  5: 31  31  21  21  11  10  21  21
  6: 21  21  31  31  21  21  10  11
  7: 21  21  31  31  21  21  11  10
```

From /proc/meminfo

```
MemTotal:      1583627000 kB
HugePages_Total:        0
Hugepagesize:     2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP4
```

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

```
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 4
  # 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:
```

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## Platform Notes (Continued)

```
NAME= "SLES"
VERSION= "12-SP4"
VERSION_ID= "12.4"
PRETTY_NAME= "SUSE Linux Enterprise Server 12 SP4"
ID= "sles"
ANSI_COLOR= "0;32"
CPE_NAME= "cpe:/o:suse:sles:12:sp4"
```

```
uname -a:
Linux linux-aixb 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
IBPB, IBRS_FW
```

```
run-level 3 Sep 7 02:33 last=5
```

```
SPEC is set to: /home/CPU2017
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	889G	59G	831G	7%	/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 4.1.07 08/14/2019

Memory:

48x Samsung M393A4K40CB2-CTD 32 GB 2 rank 2666

(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.
=====
```

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## Compiler Version Notes (Continued)

=====

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.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

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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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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

## 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-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
```

## 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
```

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## Peak Compiler Invocation (Continued)

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
```

```
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
```

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### Inspur NF8480M5 (Intel Xeon Gold 5218)

CPU2017 License: 3358

Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

SPECrate®2017\_fp\_base = 358

SPECrate®2017\_fp\_peak = 378

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## Peak Optimization Flags (Continued)

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/Inspur-Platform-Settings-V1.3-SKL.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/Inspur-Platform-Settings-V1.3-SKL.xml>

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