



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR850  
(1.90 GHz, Intel Xeon Gold 5119T)

**SPECrate2017\_fp\_base = 255**

**SPECrate2017\_fp\_peak = 261**

CPU2017 License: 9017

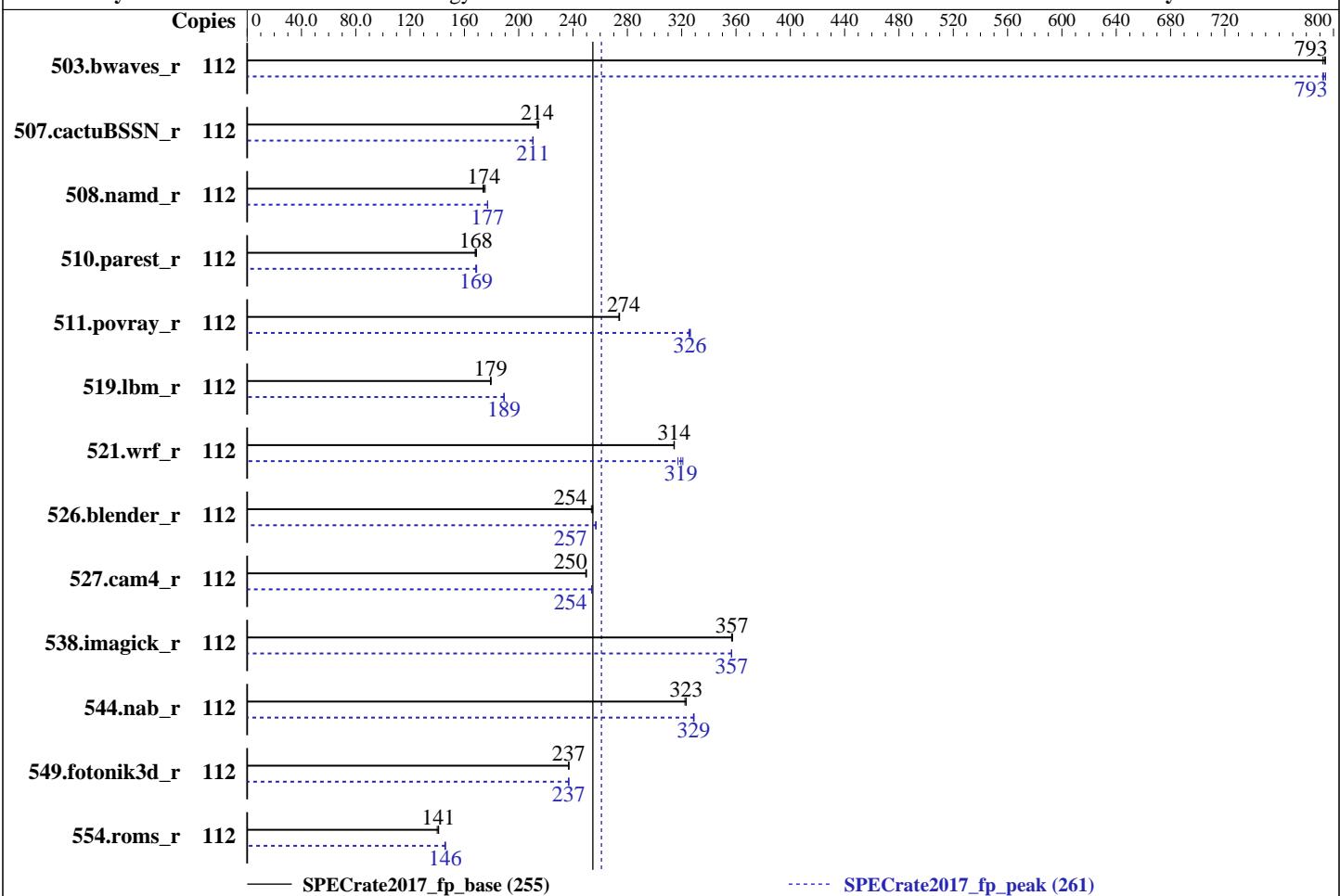
**Test Date:** Apr-2018

**Test Sponsor:** Lenovo Global Technology

**Hardware Availability:** Aug-2017

**Tested by:** Lenovo Global Technology

**Software Availability:** Feb-2018



— SPECrate2017\_fp\_base (255)

----- SPECrate2017\_fp\_peak (261)

### Hardware

CPU Name: Intel Xeon Gold 5119T  
Max MHz.: 3200  
Nominal: 1900  
Enabled: 56 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: 19.25 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)  
Storage: 1 x 800 GB SAS SSD  
Other: None

### OS:

SUSE Linux Enterprise Server 12 SP2 (x86\_64)  
Kernel 4.4.114-92.64-default

### Compiler:

C/C++: Version 18.0.0.128 of Intel C/C++  
Compiler for Linux;  
Fortran: Version 18.0.0.128 of Intel Fortran  
Compiler for Linux

### Parallel:

No  
Firmware: Lenovo BIOS Version TEE119R 1.22 released Feb-2018

### File System:

btrfs

### System State:

Run level 3 (multi-user)

### Base Pointers:

64-bit

### Peak Pointers:

64-bit

### Other:

None

### Software



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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	112	1418	792	1414	794	<b>1416</b>	<b>793</b>	112	1418	792	<b>1416</b>	<b>793</b>	1414	794	1414	794
507.cactusBSSN_r	112	661	215	664	214	<b>663</b>	<b>214</b>	112	<b>673</b>	<b>211</b>	673	211	674	210	674	210
508.namd_r	112	607	175	<b>610</b>	<b>174</b>	613	174	112	601	177	601	177	<b>601</b>	<b>177</b>	601	177
510.parest_r	112	<b>1740</b>	<b>168</b>	1735	169	1745	168	112	<b>1737</b>	<b>169</b>	1733	169	1740	168	1740	168
511.povray_r	112	955	274	954	274	<b>954</b>	<b>274</b>	112	801	326	804	325	<b>802</b>	<b>326</b>	802	326
519.lbm_r	112	<b>658</b>	<b>179</b>	659	179	657	180	112	624	189	<b>624</b>	<b>189</b>	623	189	623	189
521.wrf_r	112	798	314	<b>798</b>	<b>314</b>	797	315	112	<b>785</b>	<b>319</b>	791	317	782	321	782	321
526.blender_r	112	673	254	<b>670</b>	<b>254</b>	670	254	112	665	257	664	257	<b>664</b>	<b>257</b>	664	257
527.cam4_r	112	<b>784</b>	<b>250</b>	786	249	784	250	112	<b>772</b>	<b>254</b>	<b>772</b>	<b>254</b>	772	254	772	254
538.imagick_r	112	779	357	<b>780</b>	<b>357</b>	781	357	112	781	357	<b>781</b>	<b>357</b>	781	357	781	357
544.nab_r	112	<b>583</b>	<b>323</b>	585	322	583	323	112	573	329	<b>573</b>	<b>329</b>	574	329	574	329
549.fotonik3d_r	112	<b>1843</b>	<b>237</b>	1842	237	1843	237	112	1844	237	1843	237	<b>1843</b>	<b>237</b>	1843	237
554.roms_r	112	1262	141	1271	140	<b>1263</b>	<b>141</b>	112	<b>1220</b>	<b>146</b>	1222	146	1218	146	1218	146

**SPECrate2017\_fp\_base = 255**

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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/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"

LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/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 configuration:

Choose Operating Mode set to Maximum Performance

SNC set to Enable

MONITORMWAIT set to Enable

Execute Disable Bit set to Disable

DCA set to Enable

Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on linux-nx6k Fri Apr 20 14:17:32 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 5119T CPU @ 1.90GHz

4 "physical id"s (chips)

112 "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 : 14

siblings : 28

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

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

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

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

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 112

On-line CPU(s) list: 0-111

Thread(s) per core: 2

Core(s) per socket: 14

Socket(s): 4

NUMA node(s): 8

Vendor ID: GenuineIntel

(Continued on next page)



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## Platform Notes (Continued)

```

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5119T CPU @ 1.90GHz
Stepping: 4
CPU MHz: 1895.540
BogoMIPS: 3791.08
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0-3,7-9,56-59,63-65
NUMA node1 CPU(s): 4-6,10-13,60-62,66-69
NUMA node2 CPU(s): 14-17,21-23,70-73,77-79
NUMA node3 CPU(s): 18-20,24-27,74-76,80-83
NUMA node4 CPU(s): 28-31,35-37,84-87,91-93
NUMA node5 CPU(s): 32-34,38-41,88-90,94-97
NUMA node6 CPU(s): 42-45,49-51,98-101,105-107
NUMA node7 CPU(s): 46-48,52-55,102-104,108-111
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
aperfmpfperf 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 ida arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc

```

```
/proc/cpuinfo cache data
cache size : 19712 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 7 8 9 56 57 58 59 63 64 65
node 0 size: 193130 MB
node 0 free: 192903 MB
node 1 cpus: 4 5 6 10 11 12 13 60 61 62 66 67 68 69
node 1 size: 193528 MB
node 1 free: 193359 MB
node 2 cpus: 14 15 16 17 21 22 23 70 71 72 73 77 78 79
node 2 size: 193528 MB
node 2 free: 193297 MB
node 3 cpus: 18 19 20 24 25 26 27 74 75 76 80 81 82 83
node 3 size: 193528 MB

```

(Continued on next page)



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## Platform Notes (Continued)

```
node 3 free: 193218 MB
node 4 cpus: 28 29 30 31 35 36 37 84 85 86 87 91 92 93
node 4 size: 193528 MB
node 4 free: 193345 MB
node 5 cpus: 32 33 34 38 39 40 41 88 89 90 94 95 96 97
node 5 size: 193528 MB
node 5 free: 193372 MB
node 6 cpus: 42 43 44 45 49 50 51 98 99 100 101 105 106 107
node 6 size: 193528 MB
node 6 free: 193350 MB
node 7 cpus: 46 47 48 52 53 54 55 102 103 104 108 109 110 111
node 7 size: 193525 MB
node 7 free: 193249 MB
node distances:
node   0   1   2   3   4   5   6   7
  0: 10  11  21  21  21  21  31  31
  1: 11  10  21  21  21  21  31  31
  2: 21  21  10  11  31  31  21  21
  3: 21  21  11  10  31  31  21  21
  4: 21  21  31  31  10  11  21  21
  5: 21  21  31  31  11  10  21  21
  6: 31  31  21  21  21  21  10  11
  7: 31  31  21  21  21  21  11  10
```

From /proc/meminfo

```
MemTotal:      1584975140 kB
HugePages_Total:       0
Hugepagesize:     2048 kB
```

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-nx6k 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
```

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## Platform Notes (Continued)

x86\_64 x86\_64 x86\_64 GNU/Linux

run-level 3 Apr 20 14:15

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	btrfs	744G	282G	462G	38%	/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 Lenovo -[TEE119R-1.22]- 02/06/2018

Memory:

48x Samsung M393A4K40BB2-CTD 32 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)

=====

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  
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## Compiler Version Notes (Continued)

=====

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

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

icc (ICC) 18.0.0 20170811

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

=====

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

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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.

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## Compiler Version Notes (Continued)

=====

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)

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++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc fort



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## 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 -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=3 -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=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
```



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## 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

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



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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=3
```

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

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

C++ benchmarks:

```
-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
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
-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=3 -nostandard-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=3 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C 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
```

Benchmarks using Fortran, C, 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 -nostandard-realloc-lhs -align array32byte
```



# SPEC CPU2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR850  
(1.90 GHz, Intel Xeon Gold 5119T)

SPECrate2017\_fp\_base = 255

SPECrate2017\_fp\_peak = 261

CPU2017 License: 9017

Test Date: Apr-2018

Test Sponsor: Lenovo Global Technology

Hardware Availability: Aug-2017

Tested by: Lenovo Global Technology

Software Availability: Feb-2018

## Peak 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

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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.xml>

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