



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR860  
(3.00 GHz, Intel Xeon Gold 6136)

SPECrate2017\_fp\_base = 317

SPECrate2017\_fp\_peak = 324

CPU2017 License: 9017

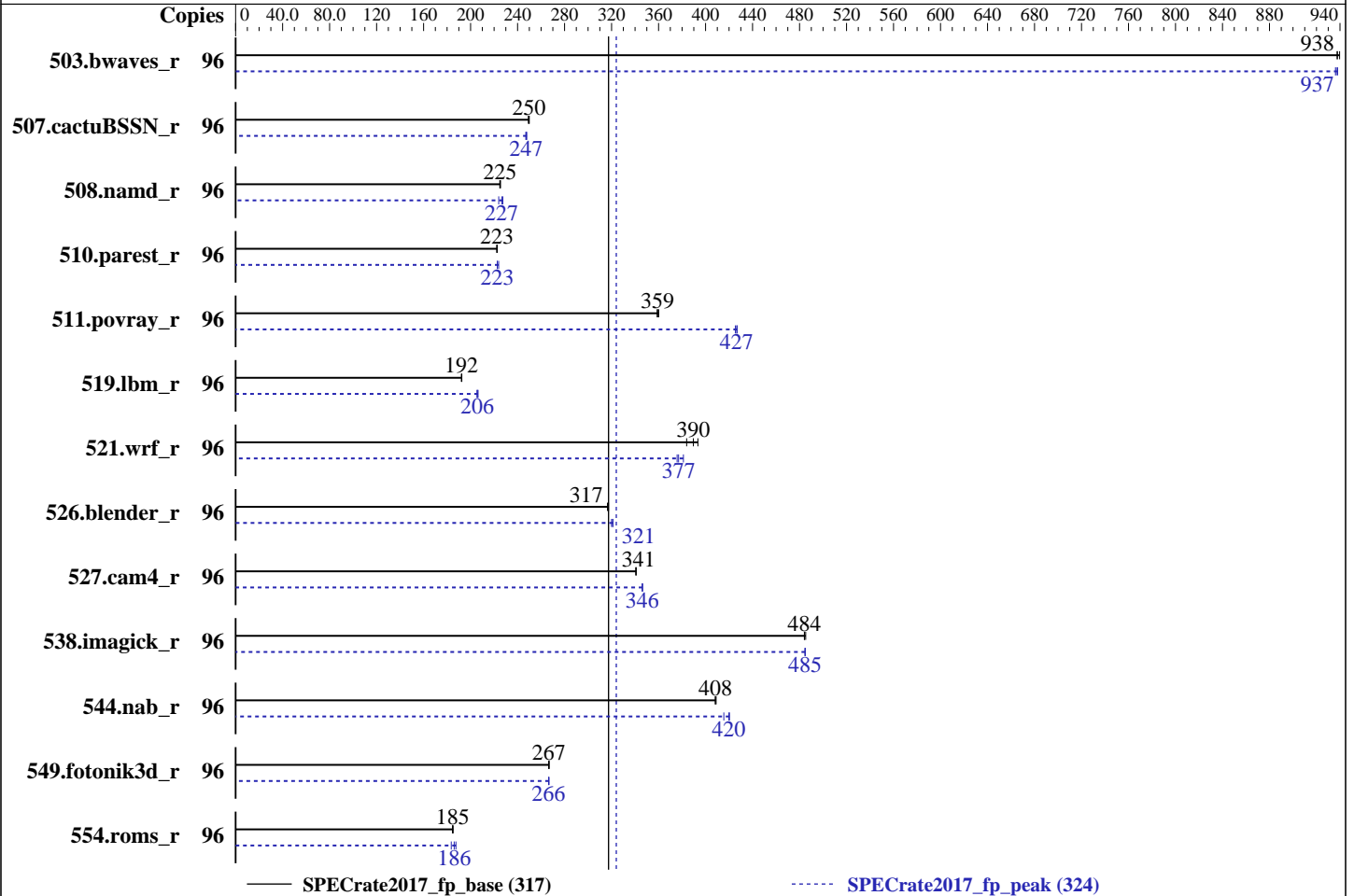
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2018

Hardware Availability: Nov-2017

Software Availability: Jan-2018



### Hardware

CPU Name: Intel Xeon Gold 6136  
 Max MHz.: 3700  
 Nominal: 3000  
 Enabled: 48 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: 24.75 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)  
 Storage: 1 x 800 GB SAS SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
 Kernel 3.10.0-693.11.6.el7.x86\_64  
 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 TEE117P 1.13 released Feb-2018  
 File System: xfs  
 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	96	1024	940	1027	938	<b>1027</b>	<b>938</b>	96	1028	936	1026	938	<b>1028</b>	<b>937</b>
507.cactuBSSN_r	96	488	249	<b>487</b>	<b>250</b>	486	250	96	492	247	<b>491</b>	<b>247</b>	490	248
508.namd_r	96	405	225	406	225	<b>405</b>	<b>225</b>	96	<b>403</b>	<b>227</b>	401	227	407	224
510.parest_r	96	1127	223	<b>1129</b>	<b>223</b>	1130	222	96	<b>1127</b>	<b>223</b>	1122	224	1128	223
511.povray_r	96	<b>624</b>	<b>359</b>	622	360	625	359	96	527	425	<b>526</b>	<b>427</b>	525	427
519.lbm_r	96	526	192	526	193	<b>526</b>	<b>192</b>	96	<b>492</b>	<b>206</b>	490	206	493	205
521.wrf_r	96	<b>552</b>	<b>390</b>	547	393	560	384	96	564	381	<b>570</b>	<b>377</b>	572	376
526.blender_r	96	<b>462</b>	<b>317</b>	461	317	462	317	96	457	320	<b>456</b>	<b>321</b>	455	321
527.cam4_r	96	493	341	493	341	<b>493</b>	<b>341</b>	96	<b>485</b>	<b>346</b>	485	346	485	346
538.imagick_r	96	492	485	<b>493</b>	<b>484</b>	493	484	96	492	485	493	485	<b>493</b>	<b>485</b>
544.nab_r	96	396	408	395	409	<b>396</b>	<b>408</b>	96	389	416	384	420	<b>385</b>	<b>420</b>
549.fotonik3d_r	96	1402	267	1404	266	<b>1402</b>	<b>267</b>	96	1404	266	1403	267	<b>1404</b>	<b>266</b>
554.roms_r	96	<b>826</b>	<b>185</b>	826	185	824	185	96	813	188	831	184	<b>820</b>	<b>186</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/cpu2017.1.0.2.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  
DCU Streamer Prefetcher set to Disable  
DCU IP Prefetcher set to Disable  
MONITORMWAIT set to Enable  
Per Core P-state set to Disable  
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on SR860 Mon May 21 19:13:19 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 6136 CPU @ 3.00GHz  
4 "physical id"s (chips)  
96 "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 : 12  
siblings : 24  
physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26  
physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26  
physical 2: cores 0 1 2 3 4 9 10 16 18 19 25 26  
physical 3: cores 0 1 2 3 4 9 10 16 18 19 25 26

From lscpu:  
Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 96  
On-line CPU(s) list: 0-95  
Thread(s) per core: 2  
Core(s) per socket: 12  
Socket(s): 4  
NUMA node(s): 8

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### Platform Notes (Continued)

```

Vendor ID:           GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Gold 6136 CPU @ 3.00GHz
Stepping:           4
CPU MHz:            3000.000
BogoMIPS:           6000.00
Virtualization:     VT-x
L1d cache:          32K
L1i cache:          32K
L2 cache:           1024K
L3 cache:           25344K
NUMA node0 CPU(s): 0-2,5,7,10,48-50,53,55,58
NUMA node1 CPU(s): 3,4,6,8,9,11,51,52,54,56,57,59
NUMA node2 CPU(s): 12-14,17,19,22,60-62,65,67,70
NUMA node3 CPU(s): 15,16,18,20,21,23,63,64,66,68,69,71
NUMA node4 CPU(s): 24-26,29,31,34,72-74,77,79,82
NUMA node5 CPU(s): 27,28,30,32,33,35,75,76,78,80,81,83
NUMA node6 CPU(s): 36-38,41,43,46,84-86,89,91,94
NUMA node7 CPU(s): 39,40,42,44,45,47,87,88,90,92,93,95
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 bmi1 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 : 25344 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 5 7 10 48 49 50 53 55 58
node 0 size: 97981 MB
node 0 free: 95383 MB
node 1 cpus: 3 4 6 8 9 11 51 52 54 56 57 59
node 1 size: 98304 MB
node 1 free: 95915 MB
node 2 cpus: 12 13 14 17 19 22 60 61 62 65 67 70
node 2 size: 98304 MB
node 2 free: 95941 MB
node 3 cpus: 15 16 18 20 21 23 63 64 66 68 69 71

```

(Continued on next page)



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### Platform Notes (Continued)

```

node 3 size: 98304 MB
node 3 free: 95856 MB
node 4 cpus: 24 25 26 29 31 34 72 73 74 77 79 82
node 4 size: 98304 MB
node 4 free: 95949 MB
node 5 cpus: 27 28 30 32 33 35 75 76 78 80 81 83
node 5 size: 98304 MB
node 5 free: 95924 MB
node 6 cpus: 36 37 38 41 43 46 84 85 86 89 91 94
node 6 size: 98304 MB
node 6 free: 95916 MB
node 7 cpus: 39 40 42 44 45 47 87 88 90 92 93 95
node 7 size: 98304 MB
node 7 free: 95869 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:          792250760 kB
HugePages_Total:      0
Hugepagesize:       2048 kB

```

```

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 SR860 3.10.0-693.11.6.el7.x86_64 #1 SMP Thu Dec 28 14:23:39 EST 2017 x86_64
x86_64 x86_64 GNU/Linux

```

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### Platform Notes (Continued)

run-level 3 May 21 10:37

SPEC is set to: /home/cpu2017.1.0.2.ic18.0  
Filesystem      Type   Size   Used Avail Use% Mounted on  
/dev/sdb4       xfs   686G   220G 467G 32% /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 -[TEE117P-1.13]- 02/06/2018  
Memory:  
48x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666

(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  
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.  
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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  
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-----

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

ifort (IFORT) 18.0.0 20170811  
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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:  
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





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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 SR860  
(3.00 GHz, Intel Xeon Gold 6136)

SPECrate2017\_fp\_base = 317

SPECrate2017\_fp\_peak = 324

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** May-2018

**Hardware Availability:** Nov-2017

**Software Availability:** Jan-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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