



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(2.90 GHz, Intel Xeon Platinum 8268)

SPECrate2017\_fp\_base = 1050

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 9017

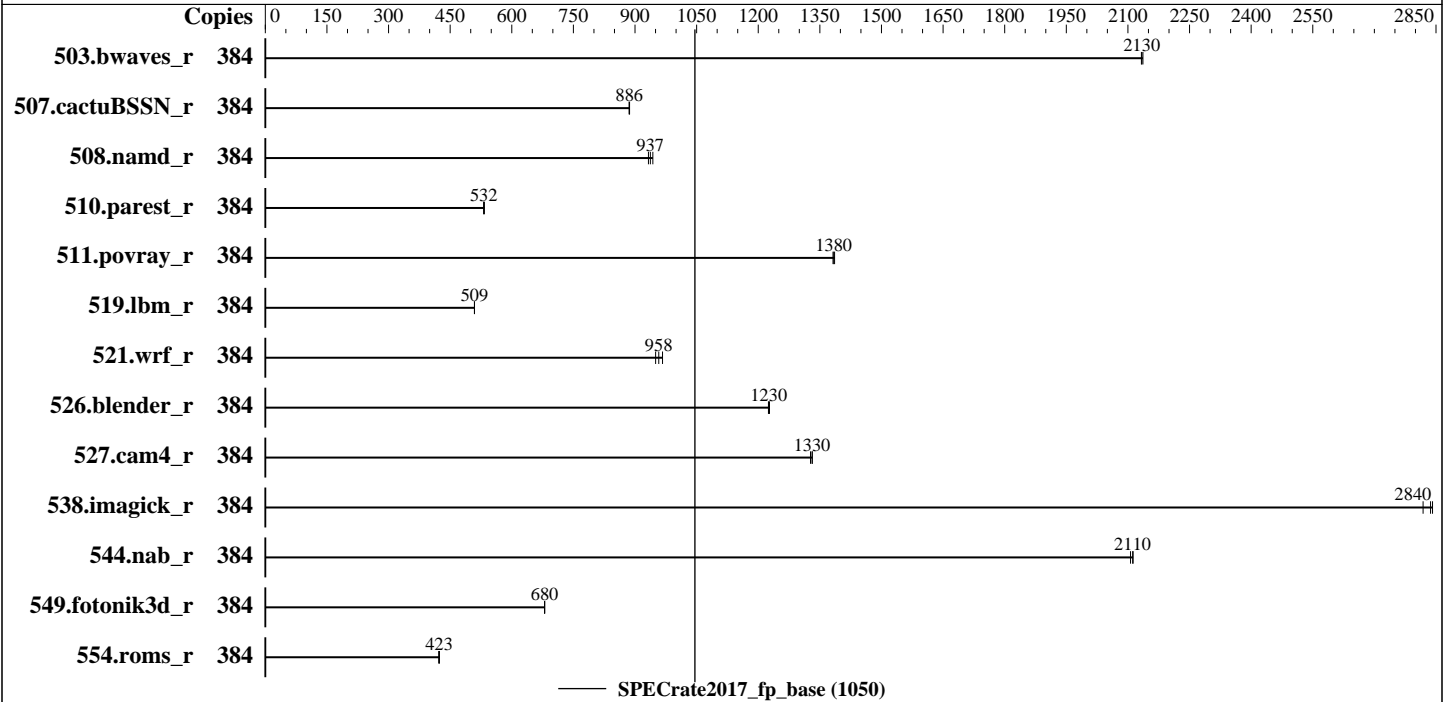
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2019

Hardware Availability: Apr-2019

Software Availability: Dec-2018



### Hardware

CPU Name: Intel Xeon Platinum 8268  
 Max MHz.: 3900  
 Nominal: 2900  
 Enabled: 192 cores, 8 chips, 2 threads/core  
 Orderable: 2,3,4,6,8 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 35.75 MB I+D on chip per chip  
 Other: None  
 Memory: 3 TB (96 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 960 GB tmpfs  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP4 (x86\_64)  
 Kernel 4.12.14-94.41-default  
 Compiler: C/C++: Version 19.0.0.117 of Intel  
 C/C++  
 Compiler for Linux;  
 Fortran: Version 19.0.0.117 of  
 Intel Fortran  
 Compiler for Linux  
 Parallel: No  
 Firmware: Lenovo BIOS Version PSE121C 1.50 released Jan-2019  
 File System: tmpfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 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	384	1802	2140	<b>1805</b>	<b>2130</b>	1805	2130							
507.cactuBSSN_r	384	<b>549</b>	<b>886</b>	548	887	549	886							
508.namd_r	384	391	933	<b>389</b>	<b>937</b>	387	943							
510.parest_r	384	<b>1889</b>	<b>532</b>	1889	532	1884	533							
511.povray_r	384	<b>648</b>	<b>1380</b>	647	1390	649	1380							
519.lbm_r	384	795	509	<b>795</b>	<b>509</b>	795	509							
521.wrf_r	384	890	967	905	950	<b>898</b>	<b>958</b>							
526.blender_r	384	477	1220	476	1230	<b>477</b>	<b>1230</b>							
527.cam4_r	384	506	1330	<b>505</b>	<b>1330</b>	504	1330							
538.imagick_r	384	339	2820	336	2840	<b>337</b>	<b>2840</b>							
544.nab_r	384	306	2110	307	2110	<b>306</b>	<b>2110</b>							
549.fotonik3d_r	384	2202	680	<b>2201</b>	<b>680</b>	2200	680							
554.roms_r	384	<b>1442</b>	<b>423</b>	1440	424	1445	422							

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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"  
Tmpfs filesystem can be set with:  
mount -t tmpfs -o size=960g tmpfs /home  
Process tuning setting:  
echo 50000 > /proc/sys/kernel/sched\_cfs\_bandwidth\_slice\_us  
echo 240000000 > /proc/sys/kernel/sched\_latency\_ns  
echo 5000000 > /proc/sys/kernel/sched\_migration\_cost\_ns  
echo 100000000 > /proc/sys/kernel/sched\_min\_granularity\_ns  
echo 150000000 > /proc/sys/kernel/sched\_wakeup\_granularity\_ns

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017-1.0.5-ic19/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5

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## General Notes (Continued)

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>

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.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.

## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance

Choose Operating Mode set to Custom Mode

MONITOR/MWAIT set to Enable

SNC set to Enable

Patrol Scrub set to Disable

Stale AtoS set to Enable

LLC dead line alloc set to Disable

sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on sles12sp4 Wed May 8 12:42:50 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) Platinum 8268 CPU @ 2.90GHz

8 "physical id"s (chips)

384 "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 : 24

siblings : 48

physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

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### Platform Notes (Continued)

```
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 4: cores 0 1 2 3 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 28 29
physical 5: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 7: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 21 22 25 26 27 28 29
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                384
On-line CPU(s) list:   0-383
Thread(s) per core:    2
Core(s) per socket:    24
Socket(s):              8
NUMA node(s):          16
Vendor ID:              GenuineIntel
CPU family:             6
Model:                 85
Model name:             Intel(R) Xeon(R) Platinum 8268 CPU @ 2.90GHz
Stepping:               6
CPU MHz:                2900.000
CPU max MHz:            3900.0000
CPU min MHz:            1200.0000
BogoMIPS:               5800.00
Virtualization:         VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               36608K
NUMA node0 CPU(s):     0-3,7,8,12-14,18-20,192-195,199,200,204-206,210-212
NUMA node1 CPU(s):     4-6,9-11,15-17,21-23,196-198,201-203,207-209,213-215
NUMA node2 CPU(s):     24-27,31-33,37-39,43,44,216-219,223-225,229-231,235,236
NUMA node3 CPU(s):     28-30,34-36,40-42,45-47,220-222,226-228,232-234,237-239
NUMA node4 CPU(s):     48-51,55-57,61-63,67,68,240-243,247-249,253-255,259,260
NUMA node5 CPU(s):     52-54,58-60,64-66,69-71,244-246,250-252,256-258,261-263
NUMA node6 CPU(s):     72-75,79-81,85-87,91,92,264-267,271-273,277-279,283,284
NUMA node7 CPU(s):     76-78,82-84,88-90,93-95,268-270,274-276,280-282,285-287
NUMA node8 CPU(s):     96-99,102-104,108-110,115,116,288-291,294-296,300-302,307,308
NUMA node9 CPU(s):     100,101,105-107,111-114,117-119,292,293,297-299,303-306,309-311
NUMA node10 CPU(s):    120-123,127,128,132-134,138-140,312-315,319,320,324-326,330-332
NUMA node11 CPU(s):    124-126,129-131,135-137,141-143,316-318,321-323,327-329,333-335
NUMA node12 CPU(s):    144-147,151-153,157-159,163,164,336-339,343-345,349-351,355,356
```

(Continued on next page)



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### Platform Notes (Continued)

NUMA node13 CPU(s):

148-150,154-156,160-162,165-167,340-342,346-348,352-354,357-359

NUMA node14 CPU(s):

168-171,175-177,181-183,187,188,360-363,367-369,373-375,379,380

NUMA node15 CPU(s):

172-174,178-180,184-186,189-191,364-366,370-372,376-378,381-383

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 aperfmperf 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\_l3 cdp\_l3 invpcid\_single ssbd mba ibrs ibpb stibp 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 intel\_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm\_llc cqm\_occup\_llc cqm\_mbm\_total cqm\_mbm\_local dtherm ida arat pln pts pku ospke avx512\_vnni flush\_lld arch\_capabilities

```
/proc/cpuinfo cache data
cache size : 36608 KB
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 16 nodes (0-15)

node 0 cpus: 0 1 2 3 7 8 12 13 14 18 19 20 192 193 194 195 199 200 204 205 206 210 211 212

node 0 size: 193120 MB

node 0 free: 192327 MB

node 1 cpus: 4 5 6 9 10 11 15 16 17 21 22 23 196 197 198 201 202 203 207 208 209 213 214 215

node 1 size: 193530 MB

node 1 free: 192834 MB

node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 216 217 218 219 223 224 225 229 230 231 235 236

node 2 size: 193530 MB

node 2 free: 192903 MB

node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 220 221 222 226 227 228 232 233 234 237 238 239

node 3 size: 193530 MB

node 3 free: 192902 MB

node 4 cpus: 48 49 50 51 55 56 57 61 62 63 67 68 240 241 242 243 247 248 249 253 254 255 259 260

node 4 size: 193530 MB

node 4 free: 192911 MB

node 5 cpus: 52 53 54 58 59 60 64 65 66 69 70 71 244 245 246 250 251 252 256 257 258 261 262 263

node 5 size: 193530 MB

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### Platform Notes (Continued)

```

node 5 free: 192914 MB
node 6 cpus: 72 73 74 75 79 80 81 85 86 87 91 92 264 265 266 267 271 272 273 277 278
279 283 284
node 6 size: 193530 MB
node 6 free: 192910 MB
node 7 cpus: 76 77 78 82 83 84 88 89 90 93 94 95 268 269 270 274 275 276 280 281 282
285 286 287
node 7 size: 193501 MB
node 7 free: 192882 MB
node 8 cpus: 96 97 98 99 102 103 104 108 109 110 115 116 288 289 290 291 294 295 296
300 301 302 307 308
node 8 size: 193530 MB
node 8 free: 192908 MB
node 9 cpus: 100 101 105 106 107 111 112 113 114 117 118 119 292 293 297 298 299 303
304 305 306 309 310 311
node 9 size: 193530 MB
node 9 free: 192917 MB
node 10 cpus: 120 121 122 123 127 128 132 133 134 138 139 140 312 313 314 315 319 320
324 325 326 330 331 332
node 10 size: 193530 MB
node 10 free: 192910 MB
node 11 cpus: 124 125 126 129 130 131 135 136 137 141 142 143 316 317 318 321 322 323
327 328 329 333 334 335
node 11 size: 193530 MB
node 11 free: 192912 MB
node 12 cpus: 144 145 146 147 151 152 153 157 158 159 163 164 336 337 338 339 343 344
345 349 350 351 355 356
node 12 size: 193530 MB
node 12 free: 192902 MB
node 13 cpus: 148 149 150 154 155 156 160 161 162 165 166 167 340 341 342 346 347 348
352 353 354 357 358 359
node 13 size: 193530 MB
node 13 free: 176239 MB
node 14 cpus: 168 169 170 171 175 176 177 181 182 183 187 188 360 361 362 363 367 368
369 373 374 375 379 380
node 14 size: 193530 MB
node 14 free: 192910 MB
node 15 cpus: 172 173 174 178 179 180 184 185 186 189 190 191 364 365 366 370 371 372
376 377 378 381 382 383
node 15 size: 193527 MB
node 15 free: 192912 MB
node distances:
node 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0: 10 11 21 21 31 31 21 21 21 21 31 31 31 31 31 31
1: 11 10 21 21 31 31 21 21 21 21 31 31 31 31 31 31
2: 21 21 10 11 21 21 31 31 31 31 21 21 31 31 31 31
3: 21 21 11 10 21 21 31 31 31 31 21 21 31 31 31 31

```

(Continued on next page)



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### Platform Notes (Continued)

4:	31	31	21	21	10	11	21	21	31	31	31	31	21	21	31	31
5:	31	31	21	21	11	10	21	21	31	31	31	31	21	21	31	31
6:	21	21	31	31	21	21	10	11	31	31	31	31	31	31	21	21
7:	21	21	31	31	21	21	11	10	31	31	31	31	31	31	21	21
8:	21	21	31	31	31	31	31	31	10	11	21	21	21	21	31	31
9:	21	21	31	31	31	31	31	31	11	10	21	21	21	21	31	31
10:	31	31	21	21	31	31	31	31	21	21	10	11	31	31	21	21
11:	31	31	21	21	31	31	31	31	21	21	11	10	31	31	21	21
12:	31	31	31	31	21	21	31	31	21	21	31	31	10	11	21	21
13:	31	31	31	31	21	21	31	31	21	21	31	31	11	10	21	21
14:	31	31	31	31	31	31	21	21	31	31	21	21	21	21	10	11
15:	31	31	31	31	31	31	21	21	31	31	21	21	21	21	11	10

From /proc/meminfo

```
MemTotal:      3170352564 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

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:

```
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 sles12sp4 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 May 8 02:20

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## Platform Notes (Continued)

SPEC is set to: /home/cpu2017-1.0.5-ic19

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
tmpfs	tmpfs	960G	11G	950G	2%	/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 -[PSE121C-1.50]- 01/16/2019

Memory:

96x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

=====  
CC 519.lbm\_r(base) 538.imagick\_r(base) 544.nab\_r(base)  
-----

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

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

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

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

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
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-----

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

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.0.117 Build 20180804

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

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.0.117 Build 20180804

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

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.0.117 Build 20180804

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804

Copyright (C) 1985-2018 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

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## Base Compiler Invocation (Continued)

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-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 -auto
-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 -auto
-nostandard-realloc-lhs -align array32byte
```

(Continued on next page)



# SPEC CPU2017 Floating Point Rate Result

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**Lenovo Global Technology**

ThinkSystem SR950  
(2.90 GHz, Intel Xeon Platinum 8268)

SPECrate2017\_fp\_base = 1050

SPECrate2017\_fp\_peak = Not Run

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** May-2019

**Hardware Availability:** Apr-2019

**Software Availability:** Dec-2018

## Base Optimization Flags (Continued)

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 -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-ic19.0-official-linux64.2019-01-15.html>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0-official-linux64.2019-01-15.xml>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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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