



SPEC® CPU2017 Floating Point Rate Result

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Lenovo Global Technology

SPECrate2017_fp_base = 1070

ThinkSystem SR950
(2.70 GHz, Intel Xeon Platinum 8270)

SPECrate2017_fp_peak = Not Run

CPU2017 License: 9017

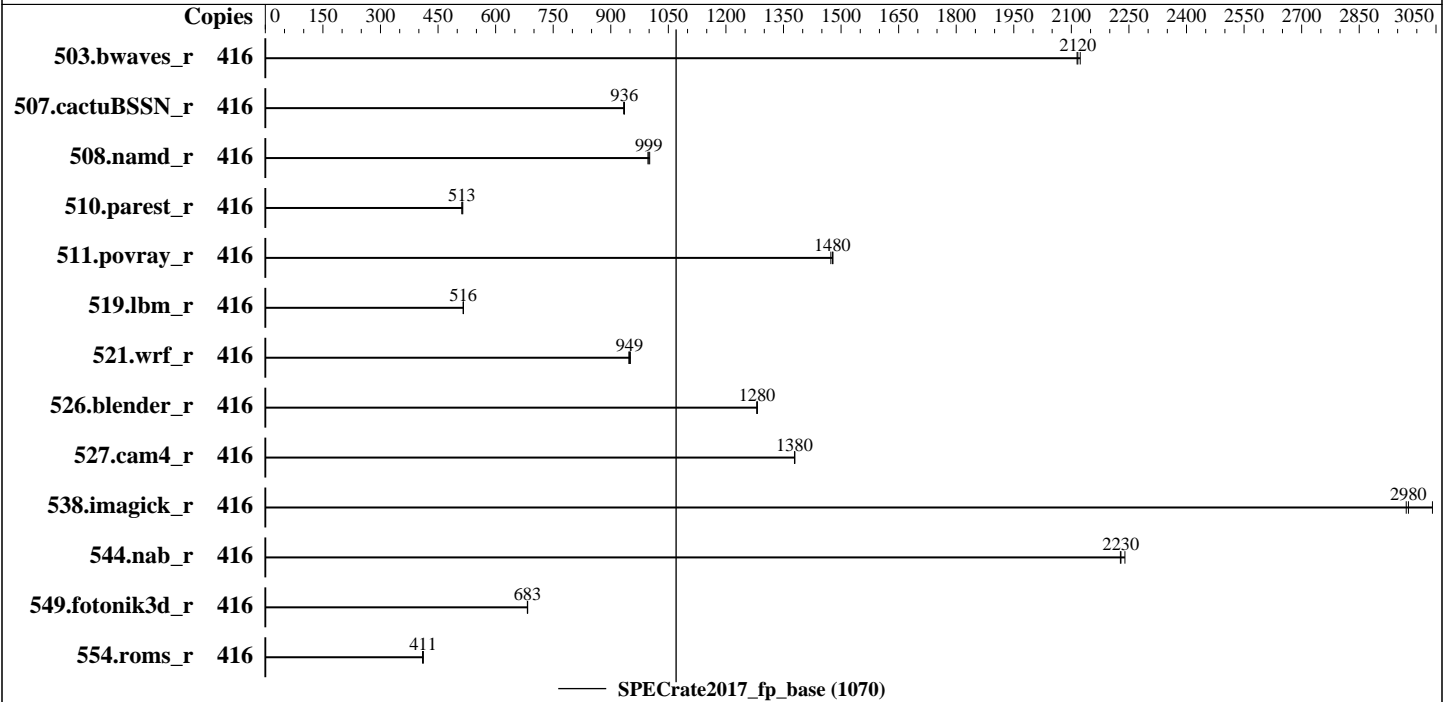
Test Date: May-2019

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2019

Tested by: Lenovo Global Technology

Software Availability: Dec-2018



Hardware

CPU Name: Intel Xeon Platinum 8270
 Max MHz.: 4000
 Nominal: 2700
 Enabled: 208 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	416	<u>1971</u>	<u>2120</u>	1965	2120	1972	2110							
507.cactuBSSN_r	416	563	936	564	934	<u>563</u>	<u>936</u>							
508.namd_r	416	396	997	395	1000	<u>396</u>	<u>999</u>							
510.parest_r	416	2125	512	2115	514	<u>2123</u>	<u>513</u>							
511.povray_r	416	<u>657</u>	<u>1480</u>	657	1480	659	1470							
519.lbm_r	416	850	516	850	516	<u>850</u>	<u>516</u>							
521.wrf_r	416	984	947	980	951	<u>982</u>	<u>949</u>							
526.blender_r	416	494	1280	<u>494</u>	<u>1280</u>	495	1280							
527.cam4_r	416	528	1380	527	1380	<u>528</u>	<u>1380</u>							
538.imagick_r	416	<u>347</u>	<u>2980</u>	340	3040	348	2970							
544.nab_r	416	313	2240	<u>314</u>	<u>2230</u>	314	2230							
549.fotonik3d_r	416	2372	684	<u>2374</u>	<u>683</u>	2374	683							
554.roms_r	416	1607	411	<u>1608</u>	<u>411</u>	1614	410							

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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

(Continued on next page)



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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 1 04:40:27 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 8270 CPU @ 2.70GHz
 8 "physical id"s (chips)
 416 "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 : 26
 siblings : 52
 physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 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 22 24 25 26 27 28

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Platform Notes (Continued)

```

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

```

From lscpu:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
CPU(s):                 416
On-line CPU(s) list:   0-415
Thread(s) per core:    2
Core(s) per socket:    26
Socket(s):              8
NUMA node(s):          16
Vendor ID:              GenuineIntel
CPU family:             6
Model:                  85
Model name:             Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz
Stepping:               6
CPU MHz:                2700.000
CPU max MHz:           4000.0000
CPU min MHz:           1000.0000
BogoMIPS:               5400.00
Virtualization:         VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               36608K
NUMA node0 CPU(s):     0-3,7-9,13-15,20-22,208-211,215-217,221-223,228-230
NUMA node1 CPU(s):     4-6,10-12,16-19,23-25,212-214,218-220,224-227,231-233
NUMA node2 CPU(s):     26-29,33-35,39-41,46-48,234-237,241-243,247-249,254-256
NUMA node3 CPU(s):     30-32,36-38,42-45,49-51,238-240,244-246,250-253,257-259
NUMA node4 CPU(s):     52-55,59-61,65-67,72-74,260-263,267-269,273-275,280-282
NUMA node5 CPU(s):     56-58,62-64,68-71,75-77,264-266,270-272,276-279,283-285
NUMA node6 CPU(s):     78-81,85-87,91-93,98-100,286-289,293-295,299-301,306-308
NUMA node7 CPU(s):     82-84,88-90,94-97,101-103,290-292,296-298,302-305,309-311
NUMA node8 CPU(s):

```

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Platform Notes (Continued)

104-107,111-113,117-119,124-126,312-315,319-321,325-327,332-334

NUMA node9 CPU(s):

108-110,114-116,120-123,127-129,316-318,322-324,328-331,335-337

NUMA node10 CPU(s):

130-133,137-139,143-145,150-152,338-341,345-347,351-353,358-360

NUMA node11 CPU(s):

134-136,140-142,146-149,153-155,342-344,348-350,354-357,361-363

NUMA node12 CPU(s):

156-159,163-165,169-171,176-178,364-367,371-373,377-379,384-386

NUMA node13 CPU(s):

160-162,166-168,172-175,179-181,368-370,374-376,380-383,387-389

NUMA node14 CPU(s):

182-185,189-191,195-197,202-204,390-393,397-399,403-405,410-412

NUMA node15 CPU(s):

186-188,192-194,198-201,205-207,394-396,400-402,406-409,413-415

Flags:

fpv 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
aperfmpperf 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 9 13 14 15 20 21 22 208 209 210 211 215 216 217 221 222 223
228 229 230

node 0 size: 193120 MB

node 0 free: 192255 MB

node 1 cpus: 4 5 6 10 11 12 16 17 18 19 23 24 25 212 213 214 218 219 220 224 225 226
227 231 232 233

node 1 size: 193530 MB

node 1 free: 192795 MB

node 2 cpus: 26 27 28 29 33 34 35 39 40 41 46 47 48 234 235 236 237 241 242 243 247 248
249 254 255 256

node 2 size: 193530 MB

node 2 free: 192853 MB

node 3 cpus: 30 31 32 36 37 38 42 43 44 45 49 50 51 238 239 240 244 245 246 250 251 252
253 257 258 259

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Platform Notes (Continued)

```

node 3 size: 193530 MB
node 3 free: 192851 MB
node 4 cpus: 52 53 54 55 59 60 61 65 66 67 72 73 74 260 261 262 263 267 268 269 273 274
275 280 281 282
node 4 size: 193530 MB
node 4 free: 176181 MB
node 5 cpus: 56 57 58 62 63 64 68 69 70 71 75 76 77 264 265 266 270 271 272 276 277 278
279 283 284 285
node 5 size: 193530 MB
node 5 free: 192855 MB
node 6 cpus: 78 79 80 81 85 86 87 91 92 93 98 99 100 286 287 288 289 293 294 295 299
300 301 306 307 308
node 6 size: 193530 MB
node 6 free: 192858 MB
node 7 cpus: 82 83 84 88 89 90 94 95 96 97 101 102 103 290 291 292 296 297 298 302 303
304 305 309 310 311
node 7 size: 193530 MB
node 7 free: 192859 MB
node 8 cpus: 104 105 106 107 111 112 113 117 118 119 124 125 126 312 313 314 315 319
320 321 325 326 327 332 333 334
node 8 size: 193530 MB
node 8 free: 192852 MB
node 9 cpus: 108 109 110 114 115 116 120 121 122 123 127 128 129 316 317 318 322 323
324 328 329 330 331 335 336 337
node 9 size: 193530 MB
node 9 free: 192854 MB
node 10 cpus: 130 131 132 133 137 138 139 143 144 145 150 151 152 338 339 340 341 345
346 347 351 352 353 358 359 360
node 10 size: 193530 MB
node 10 free: 192854 MB
node 11 cpus: 134 135 136 140 141 142 146 147 148 149 153 154 155 342 343 344 348 349
350 354 355 356 357 361 362 363
node 11 size: 193501 MB
node 11 free: 192829 MB
node 12 cpus: 156 157 158 159 163 164 165 169 170 171 176 177 178 364 365 366 367 371
372 373 377 378 379 384 385 386
node 12 size: 193530 MB
node 12 free: 192856 MB
node 13 cpus: 160 161 162 166 167 168 172 173 174 175 179 180 181 368 369 370 374 375
376 380 381 382 383 387 388 389
node 13 size: 193530 MB
node 13 free: 192860 MB
node 14 cpus: 182 183 184 185 189 190 191 195 196 197 202 203 204 390 391 392 393 397
398 399 403 404 405 410 411 412
node 14 size: 193530 MB
node 14 free: 192859 MB
node 15 cpus: 186 187 188 192 193 194 198 199 200 201 205 206 207 394 395 396 400 401

```

(Continued on next page)



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Platform Notes (Continued)

402 406 407 408 409 413 414 415

node 15 size: 193527 MB

node 15 free: 192859 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
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: 3170352592 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

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Platform Notes (Continued)

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 Apr 30 17:28

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

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Compiler Version Notes (Continued)

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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.

=====
FC 507.cactuBSSN_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

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

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Base Compiler Invocation (Continued)

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
```

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
```

(Continued on next page)



SPEC CPU2017 Floating Point Rate Result

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Lenovo Global Technology

SPECrate2017_fp_base = 1070

ThinkSystem SR950
(2.70 GHz, Intel Xeon Platinum 8270)

SPECrate2017_fp_peak = Not Run

CPU2017 License: 9017

Test Date: May-2019

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2019

Tested by: Lenovo Global Technology

Software Availability: Dec-2018

Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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
```

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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