



SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

SPECrate®2017_fp_base = 437

ThinkSystem SR850P
(2.10 GHz, Intel Xeon Gold 6230)

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017

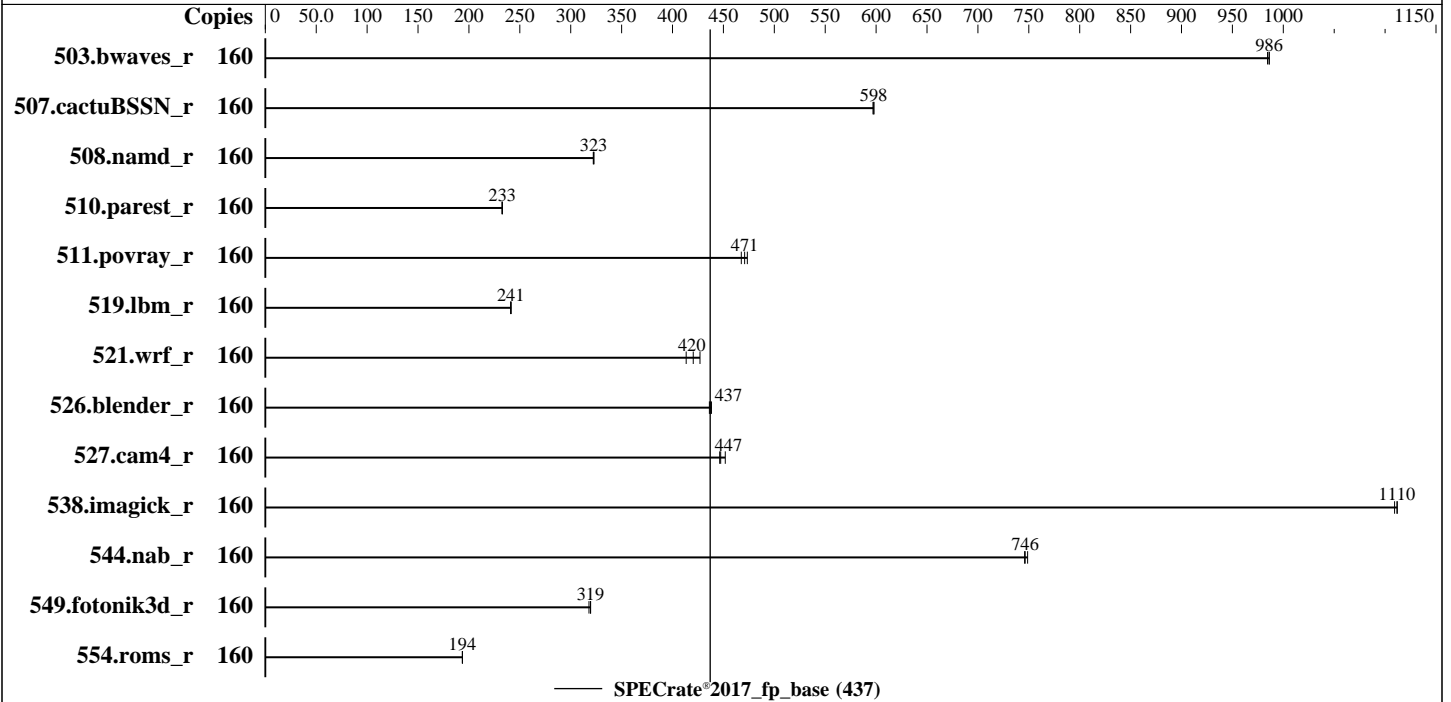
Test Date: Nov-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Jun-2020

Tested by: Lenovo Global Technology

Software Availability: Aug-2020



Hardware

CPU Name: Intel Xeon Gold 6230
 Max MHz: 3900
 Nominal: 2100
 Enabled: 80 cores, 4 chips, 2 threads/core
 Orderable: 4 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 27.5 MB I+D on chip per chip
 Other: None
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
 Storage: 1 x 960 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux 8.0 (Ootpa)
 Kernel 4.18.0-80.el8.x86_64
 Compiler: C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux;
 Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux
 Parallel: No
 Firmware: Lenovo BIOS Version TEE156L 2.61 released May-2020
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: jemalloc memory allocator V5.0.1
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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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	160	1627	986	1630	985	<u>1627</u>	<u>986</u>							
507.cactuBSSN_r	160	339	597	<u>339</u>	<u>598</u>	339	598							
508.namd_r	160	<u>471</u>	<u>323</u>	472	322	471	323							
510.parest_r	160	<u>1798</u>	<u>233</u>	1800	232	1797	233							
511.povray_r	160	<u>793</u>	<u>471</u>	789	473	799	468							
519.lbm_r	160	700	241	<u>699</u>	<u>241</u>	698	241							
521.wrf_r	160	<u>853</u>	<u>420</u>	867	413	839	427							
526.blender_r	160	<u>558</u>	<u>437</u>	559	436	556	438							
527.cam4_r	160	627	446	619	452	<u>626</u>	<u>447</u>							
538.imagick_r	160	359	1110	358	1110	<u>358</u>	<u>1110</u>							
544.nab_r	160	361	746	<u>361</u>	<u>746</u>	360	749							
549.fotonik3d_r	160	1961	318	<u>1952</u>	<u>319</u>	1951	320							
554.roms_r	160	1313	194	1313	194	<u>1313</u>	<u>194</u>							

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.0-ic19.lu2/lib/intel64:/home/cpu2017-1.1.0-ic19.lu2/j
e5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default

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General Notes (Continued)

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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode

MONITOR/MWAIT set to Enable

CPU P-state Control set to Cooperative

SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.lu2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on localhost.localdomain Tue Nov 17 22:32:00 2020

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 6230 CPU @ 2.10GHz

4 "physical id"s (chips)

160 "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 : 20

siblings : 40

physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

physical 3: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:

Architecture: x86_64

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Platform Notes (Continued)

```

CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              160
On-line CPU(s) list: 0-159
Thread(s) per core:  2
Core(s) per socket: 20
Socket(s):           4
NUMA node(s):        8
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
Stepping:             7
CPU MHz:              804.589
CPU max MHz:          3900.0000
CPU min MHz:          800.0000
BogoMIPS:             4200.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             28160K
NUMA node0 CPU(s):   0-2,5,6,10-12,15,16,80-82,85,86,90-92,95,96
NUMA node1 CPU(s):   3,4,7-9,13,14,17-19,83,84,87-89,93,94,97-99
NUMA node2 CPU(s):   20-22,25,26,30-32,35,36,100-102,105,106,110-112,115,116
NUMA node3 CPU(s):   23,24,27-29,33,34,37-39,103,104,107-109,113,114,117-119
NUMA node4 CPU(s):   40-42,45,46,50-52,55,56,120-122,125,126,130-132,135,136
NUMA node5 CPU(s):   43,44,47-49,53,54,57-59,123,124,127-129,133,134,137-139
NUMA node6 CPU(s):   60-62,65,66,70-72,75,76,140-142,145,146,150-152,155,156
NUMA node7 CPU(s):   63,64,67-69,73,74,77-79,143,144,147-149,153,154,157-159
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
aperfperf 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 fl6c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced 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 hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni flush_l1d arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 28160 KB

```

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

(Continued on next page)



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Platform Notes (Continued)

physical chip.

available: 8 nodes (0-7)

node 0 cpus: 0 1 2 5 6 10 11 12 15 16 80 81 82 85 86 90 91 92 95 96

node 0 size: 193148 MB

node 0 free: 192869 MB

node 1 cpus: 3 4 7 8 9 13 14 17 18 19 83 84 87 88 89 93 94 97 98 99

node 1 size: 193507 MB

node 1 free: 193230 MB

node 2 cpus: 20 21 22 25 26 30 31 32 35 36 100 101 102 105 106 110 111 112 115 116

node 2 size: 193531 MB

node 2 free: 193297 MB

node 3 cpus: 23 24 27 28 29 33 34 37 38 39 103 104 107 108 109 113 114 117 118 119

node 3 size: 193531 MB

node 3 free: 193356 MB

node 4 cpus: 40 41 42 45 46 50 51 52 55 56 120 121 122 125 126 130 131 132 135 136

node 4 size: 193531 MB

node 4 free: 192460 MB

node 5 cpus: 43 44 47 48 49 53 54 57 58 59 123 124 127 128 129 133 134 137 138 139

node 5 size: 193531 MB

node 5 free: 193315 MB

node 6 cpus: 60 61 62 65 66 70 71 72 75 76 140 141 142 145 146 150 151 152 155 156

node 6 size: 193531 MB

node 6 free: 193258 MB

node 7 cpus: 63 64 67 68 69 73 74 77 78 79 143 144 147 148 149 153 154 157 158 159

node 7 size: 193529 MB

node 7 free: 193323 MB

node distances:

node	0	1	2	3	4	5	6	7
0:	10	11	21	21	21	21	21	21
1:	11	10	21	21	21	21	21	21
2:	21	21	10	11	21	21	21	21
3:	21	21	11	10	21	21	21	21
4:	21	21	21	21	10	11	21	21
5:	21	21	21	21	11	10	21	21
6:	21	21	21	21	21	21	10	11
7:	21	21	21	21	21	21	11	10

From /proc/meminfo

MemTotal: 1584992600 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

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

os-release:

NAME="Red Hat Enterprise Linux"

VERSION="8.0 (Ootpa)"

ID="rhel"

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Platform Notes (Continued)

```
ID_LIKE="fedora"
VERSION_ID="8.0"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: No status reported
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling
```

```
run-level 3 Nov 17 22:29
```

```
SPEC is set to: /home/cpu2017-1.1.0-ic19.lu2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 839G 65G 774G 8% /home
```

```
From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE156L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR850P -[7D2HCTO1WW]-
Product Family: ThinkSystem
Serial: 1234567890
```

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.

```
Memory:
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)



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Compiler Version Notes

=====
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)

Intel(R) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C++ | 508.namd_r(base) 510.parest_r(base)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C++, C | 511.povray_r(base) 526.blender_r(base)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C++, C, Fortran | 507.cactuBSSN_r(base)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
Fortran | 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 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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Compiler Version Notes (Continued)

=====
Fortran, C | 521.wrf_r(base) 527.cam4_r(base)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200604
Copyright (C) 1985-2020 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

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

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Base Portability Flags (Continued)

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:

-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:

-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:

-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both C and C++:

-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-m64 -qnextgen -std=c11  
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles  
-nostandard-realloc-lhs -align array32byte -auto  
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc
```

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.html

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

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

http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.xml

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

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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