



# SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(2.70 GHz, Intel Xeon Platinum 8280)

SPECrate2017\_int\_base = 1240

SPECrate2017\_int\_peak = Not Run

CPU2017 License: 9017

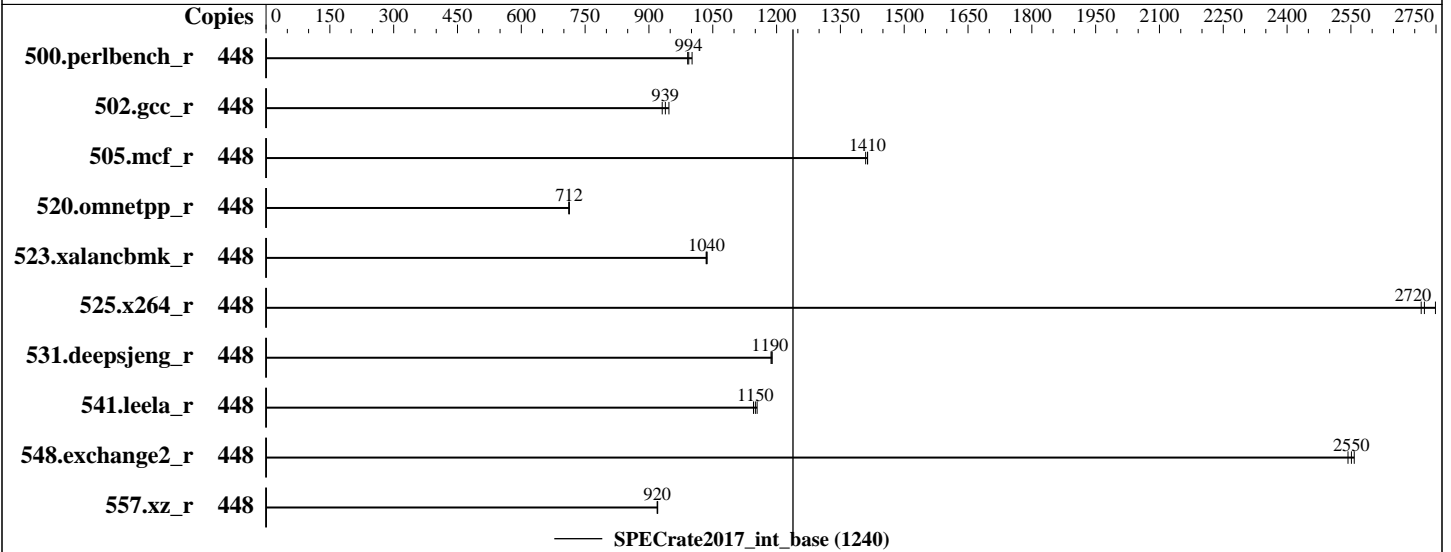
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Mar-2019

Hardware Availability: Apr-2019

Software Availability: Oct-2018



### Hardware

CPU Name: Intel Xeon Platinum 8280  
 Max MHz.: 4000  
 Nominal: 2700  
 Enabled: 224 cores, 8 chips, 2 threads/core  
 Orderable: 2,4,6,8 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 38.5 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: jemalloc memory allocator V5.0.1



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	448	720	991	<b>718</b>	<b>994</b>	712	1000							
502.gcc_r	448	<b>676</b>	<b>939</b>	670	947	681	931							
505.mcf_r	448	514	1410	<b>512</b>	<b>1410</b>	512	1410							
520.omnetpp_r	448	826	712	825	713	<b>825</b>	<b>712</b>							
523.xalancbmk_r	448	<b>457</b>	<b>1040</b>	457	1030	456	1040							
525.x264_r	448	289	2720	<b>288</b>	<b>2720</b>	285	2750							
531.deepsjeng_r	448	433	1190	432	1190	<b>432</b>	<b>1190</b>							
541.leela_r	448	<b>645</b>	<b>1150</b>	648	1150	643	1150							
548.exchange2_r	448	462	2540	459	2560	<b>460</b>	<b>2550</b>							
557.xz_r	448	526	921	<b>526</b>	<b>920</b>	526	920							

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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

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017-1.0.5-ic19/lib/ia32:/home/cpu2017-1.0.5-ic19/lib/intel64"  
LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/home/cpu2017-1.0.5-ic19/je5.0.1-32:/home/cpu2017-1.0.5-ic19/je5.0.1-64"  
Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
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) 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)

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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-2017-5715 (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.

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  
Trusted Execution Technology set to Enable  
DCU Streamer Prefetcher set to Disable  
SNC set to Enable  
Patrol Scrub set to Disable  
Stale AtoS set to Enable  
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on sles12sp4 Wed Mar 13 01:12:19 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 8280 CPU @ 2.70GHz
 8 "physical id"s (chips)
448 "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 : 28
siblings : 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
28 29 30
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
28 29 30
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
28 29 30
physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
28 29 30
```

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### Platform Notes (Continued)

physical 5: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30  
physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30  
physical 7: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

From lscpu:

Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 448  
On-line CPU(s) list: 0-447  
Thread(s) per core: 2  
Core(s) per socket: 28  
Socket(s): 8  
NUMA node(s): 16  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Platinum 8280 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: 39424K  
NUMA node0 CPU(s): 0-3,7-9,14-17,21-23,224-227,231-233,238-241,245-247  
NUMA node1 CPU(s): 4-6,10-13,18-20,24-27,228-230,234-237,242-244,248-251  
NUMA node2 CPU(s): 28-31,35-37,42-45,49-51,252-255,259-261,266-269,273-275  
NUMA node3 CPU(s): 32-34,38-41,46-48,52-55,256-258,262-265,270-272,276-279  
NUMA node4 CPU(s): 56-59,63-65,70-73,77-79,280-283,287-289,294-297,301-303  
NUMA node5 CPU(s): 60-62,66-69,74-76,80-83,284-286,290-293,298-300,304-307  
NUMA node6 CPU(s): 84-87,91-93,98-101,105-107,308-311,315-317,322-325,329-331  
NUMA node7 CPU(s): 88-90,94-97,102-104,108-111,312-314,318-321,326-328,332-335  
NUMA node8 CPU(s): 112-115,119-121,126-129,133-135,336-339,343-345,350-353,357-359  
NUMA node9 CPU(s): 116-118,122-125,130-132,136-139,340-342,346-349,354-356,360-363  
NUMA node10 CPU(s): 140-143,147-149,154-157,161-163,364-367,371-373,378-381,385-387  
NUMA node11 CPU(s): 144-146,150-153,158-160,164-167,368-370,374-377,382-384,388-391

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### Platform Notes (Continued)

NUMA node12 CPU(s):  
168-171,175-177,182-185,189-191,392-395,399-401,406-409,413-415  
NUMA node13 CPU(s):  
172-174,178-181,186-188,192-195,396-398,402-405,410-412,416-419  
NUMA node14 CPU(s):  
196-199,203-205,210-213,217-219,420-423,427-429,434-437,441-443  
NUMA node15 CPU(s):  
200-202,206-209,214-216,220-223,424-426,430-433,438-440,444-447

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  
aperfmpperf pni pclmulqdq dtes64 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 bml  
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 : 39424 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 14 15 16 17 21 22 23 224 225 226 227 231 232 233 238 239 240
241 245 246 247
node 0 size: 193089 MB
node 0 free: 192239 MB
node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 228 229 230 234 235 236 237 242 243
244 248 249 250 251
node 1 size: 193530 MB
node 1 free: 176443 MB
node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 252 253 254 255 259 260 261 266
267 268 269 273 274 275
node 2 size: 193530 MB
node 2 free: 193299 MB
node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 256 257 258 262 263 264 265 270
271 272 276 277 278 279
node 3 size: 193530 MB
node 3 free: 193258 MB
node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79 280 281 282 283 287 288 289 294
295 296 297 301 302 303
node 4 size: 193530 MB
node 4 free: 193380 MB
node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83 284 285 286 290 291 292 293 298
```

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```

299 300 304 305 306 307
node 5 size: 193530 MB
node 5 free: 193360 MB
node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107 308 309 310 311 315 316 317
322 323 324 325 329 330 331
node 6 size: 193530 MB
node 6 free: 193293 MB
node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111 312 313 314 318 319 320
321 326 327 328 332 333 334 335
node 7 size: 193530 MB
node 7 free: 193320 MB
node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135 336 337 338 339
343 344 345 350 351 352 353 357 358 359
node 8 size: 193530 MB
node 8 free: 193311 MB
node 9 cpus: 116 117 118 122 123 124 125 130 131 132 136 137 138 139 340 341 342 346
347 348 349 354 355 356 360 361 362 363
node 9 size: 193530 MB
node 9 free: 193293 MB
node 10 cpus: 140 141 142 143 147 148 149 154 155 156 157 161 162 163 364 365 366 367
371 372 373 378 379 380 381 385 386 387
node 10 size: 193530 MB
node 10 free: 193350 MB
node 11 cpus: 144 145 146 150 151 152 153 158 159 160 164 165 166 167 368 369 370 374
375 376 377 382 383 384 388 389 390 391
node 11 size: 193530 MB
node 11 free: 193368 MB
node 12 cpus: 168 169 170 171 175 176 177 182 183 184 185 189 190 191 392 393 394 395
399 400 401 406 407 408 409 413 414 415
node 12 size: 193530 MB
node 12 free: 193371 MB
node 13 cpus: 172 173 174 178 179 180 181 186 187 188 192 193 194 195 396 397 398 402
403 404 405 410 411 412 416 417 418 419
node 13 size: 193530 MB
node 13 free: 193381 MB
node 14 cpus: 196 197 198 199 203 204 205 210 211 212 213 217 218 219 420 421 422 423
427 428 429 434 435 436 437 441 442 443
node 14 size: 193530 MB
node 14 free: 193375 MB
node 15 cpus: 200 201 202 206 207 208 209 214 215 216 220 221 222 223 424 425 426 430
431 432 433 438 439 440 444 445 446 447
node 15 size: 193527 MB
node 15 free: 193362 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

```

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### Platform Notes (Continued)

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:      3170350776 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
```

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### Platform Notes (Continued)

run-level 3 Mar 13 01:10

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 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base) 525.x264\_r(base)  
557.xz\_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 520.omnetpp\_r(base) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base)  
541.leela\_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.

=====  
FC 548.exchange2\_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.





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## Base Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

## Base Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

## Base Optimization Flags

C benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

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>



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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).

Tested with SPEC CPU2017 v1.0.5 on 2019-03-12 13:12:18-0400.

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