



# SPEC® CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR850  
(2.10 GHz, Intel Xeon Platinum 8170M)

**SPECrate2017\_int\_base = 474**

**SPECrate2017\_int\_peak = 504**

CPU2017 License: 9017

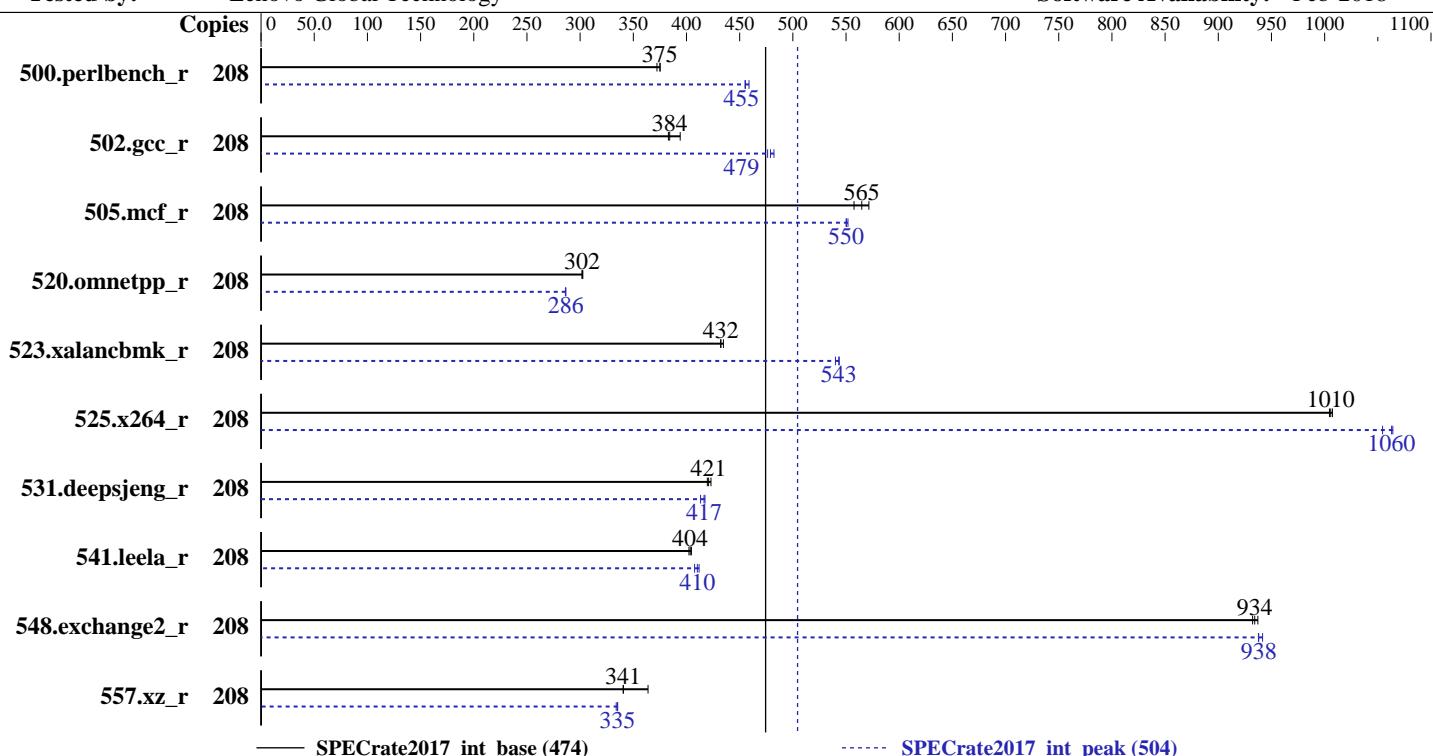
Test Date: Apr-2018

Test Sponsor: Lenovo Global Technology

Hardware Availability: Aug-2017

Tested by: Lenovo Global Technology

Software Availability: Feb-2018



— Specrate2017\_int\_base (474)

----- Specrate2017\_int\_peak (504)

### Hardware

CPU Name: Intel Xeon Platinum 8170M  
Max MHz.: 3700  
Nominal: 2100  
Enabled: 104 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: 35.75 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)  
Storage: 1 x 800 GB SAS SSD  
Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP2 (x86\_64)  
Compiler: Kernel 4.4.114-92.64-default  
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 TEE119R 1.22 released Feb-2018  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other: jemalloc: jemalloc memory allocator library 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	Seconds	Ratio
500.perlbench_r	208	<b>883</b>	<b>375</b>	890	372	882	375	208	722	459	728	455	<b>727</b>	<b>455</b>		
502.gcc_r	208	769	383	<b>767</b>	<b>384</b>	747	394	208	611	482	<b>615</b>	<b>479</b>	618	476		
505.mcf_r	208	588	572	<b>595</b>	<b>565</b>	603	558	208	611	550	<b>611</b>	<b>550</b>	609	552		
520.omnetpp_r	208	<b>904</b>	<b>302</b>	904	302	902	303	208	954	286	<b>953</b>	<b>286</b>	952	287		
523.xalancbmk_r	208	<b>508</b>	<b>432</b>	505	435	508	432	208	407	540	<b>404</b>	<b>543</b>	404	544		
525.x264_r	208	<b>362</b>	<b>1010</b>	362	1010	363	1000	208	345	1050	342	1060	<b>343</b>	<b>1060</b>		
531.deepsjeng_r	208	563	423	<b>566</b>	<b>421</b>	568	420	208	577	413	<b>572</b>	<b>417</b>	571	417		
541.leela_r	208	856	402	851	405	<b>854</b>	<b>404</b>	208	845	408	836	412	<b>840</b>	<b>410</b>		
548.exchange2_r	208	585	932	<b>583</b>	<b>934</b>	581	937	208	<b>581</b>	<b>938</b>	581	938	579	942		
557.xz_r	208	617	364	660	341	<b>660</b>	<b>341</b>	208	673	334	<b>670</b>	<b>335</b>	670	335		

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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>

jemalloc: configured and built at default for

32bit (i686) and 64bit (x86\_64) targets;

jemalloc: built with the RedHat Enterprise 7.4,

and the system compiler gcc 4.8.5;

jemalloc: sources available from jemalloc.net or

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### General Notes (Continued)

<https://github.com/jemalloc/jemalloc/releases>

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) 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

MONITORMWAIT set to Enable

Execute Disable Bit set to Disable

DCA set to Enable

Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on Electron-node-01 Mon Apr 2 17:54:38 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) Platinum 8170M CPU @ 2.10GHz

4 "physical id"s (chips)

208 "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  
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

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

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## Platform Notes (Continued)

CPU(s): 208  
On-line CPU(s) list: 0-207  
Thread(s) per core: 2  
Core(s) per socket: 26  
Socket(s): 4  
NUMA node(s): 8  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Platinum 8170M CPU @ 2.10GHz  
Stepping: 4  
CPU MHz: 2095.077  
BogoMIPS: 4190.15  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 36608K  
NUMA node0 CPU(s): 0-3,7-9,13-15,20-22,104-107,111-113,117-119,124-126  
NUMA node1 CPU(s): 4-6,10-12,16-19,23-25,108-110,114-116,120-123,127-129  
NUMA node2 CPU(s): 26-29,33-35,39-41,46-48,130-133,137-139,143-145,150-152  
NUMA node3 CPU(s): 30-32,36-38,42-45,49-51,134-136,140-142,146-149,153-155  
NUMA node4 CPU(s): 52-55,59-61,65-67,72-74,156-159,163-165,169-171,176-178  
NUMA node5 CPU(s): 56-58,62-64,68-71,75-77,160-162,166-168,172-175,179-181  
NUMA node6 CPU(s): 78-81,85-87,91-93,98-100,182-185,189-191,195-197,202-204  
NUMA node7 CPU(s): 82-84,88-90,94-97,101-103,186-188,192-194,198-201,205-207  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mttr 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 aperfmpfperf eagerfpu 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 ida arat epb invpcid\_single pln pts dtherm intel\_pt rsb\_ctxsw spec\_ctrl retpoline kaiser tpr\_shadow vnmi flexpriority ept vpid fsgsbase tsc\_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm\_llc cqm\_occup\_llc

/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: 8 nodes (0-7)  
node 0 cpus: 0 1 2 3 7 8 9 13 14 15 20 21 22 104 105 106 107 111 112 113 117 118 119 124 125 126  
node 0 size: 193129 MB  
node 0 free: 192891 MB

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### Platform Notes (Continued)

```
node 1 cpus: 4 5 6 10 11 12 16 17 18 19 23 24 25 108 109 110 114 115 116 120 121 122
123 127 128 129
node 1 size: 193528 MB
node 1 free: 193359 MB
node 2 cpus: 26 27 28 29 33 34 35 39 40 41 46 47 48 130 131 132 133 137 138 139 143 144
145 150 151 152
node 2 size: 193528 MB
node 2 free: 193319 MB
node 3 cpus: 30 31 32 36 37 38 42 43 44 45 49 50 51 134 135 136 140 141 142 146 147 148
149 153 154 155
node 3 size: 193528 MB
node 3 free: 193288 MB
node 4 cpus: 52 53 54 55 59 60 61 65 66 67 72 73 74 156 157 158 159 163 164 165 169 170
171 176 177 178
node 4 size: 193528 MB
node 4 free: 193393 MB
node 5 cpus: 56 57 58 62 63 64 68 69 70 71 75 76 77 160 161 162 166 167 168 172 173 174
175 179 180 181
node 5 size: 193528 MB
node 5 free: 193382 MB
node 6 cpus: 78 79 80 81 85 86 87 91 92 93 98 99 100 182 183 184 185 189 190 191 195
196 197 202 203 204
node 6 size: 193528 MB
node 6 free: 193292 MB
node 7 cpus: 82 83 84 88 89 90 94 95 96 97 101 102 103 186 187 188 192 193 194 198 199
200 201 205 206 207
node 7 size: 193525 MB
node 7 free: 193280 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: 1584973880 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

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

SuSE-release:

SUSE Linux Enterprise Server 12 (x86\_64)

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## Platform Notes (Continued)

```
VERSION = 12
PATCHLEVEL = 2
# 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-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
Linux Electron-node-01 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018
(c6ce5db) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 2 17:53

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        xfs   688G  274G  415G  40%  /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 -[TEE119R-1.22]- 02/06/2018
Memory:
48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)
```

## Compiler Version Notes

```
=====
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
    525.x264_r(base, peak) 557.xz_r(base, peak)
-----
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----
=====

CC 500.perlbench_r(peak) 502.gcc_r(peak)
-----
```

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## Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 520.omnetpp\_r(base) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base)  
541.leela\_r(base)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 520.omnetpp\_r(peak) 523.xalancbmk\_r(peak) 531.deepsjeng\_r(peak)  
541.leela\_r(peak)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
FC 548.exchange2\_r(base, peak)

ifort (IFORT) 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

## Base Portability Flags

500.perlbench\_r: -DSPEC\_LP64 -DSPEC\_LINUX\_X64

502.gcc\_r: -DSPEC\_LP64

505.mcf\_r: -DSPEC\_LP64

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## Base Portability Flags (Continued)

```
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
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```

## Peak Compiler Invocation

C benchmarks:

```
icc
```

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## Peak Compiler Invocation (Continued)

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

## Peak Portability Flags

500.perlbench\_r: -DSPEC\_LP64 -DSPEC\_LINUX\_X64  
502.gcc\_r: -D\_FILE\_OFFSET\_BITS=64  
505.mcf\_r: -DSPEC\_LP64  
520.omnetpp\_r: -DSPEC\_LP64  
523.xalancbmk\_r: -D\_FILE\_OFFSET\_BITS=64 -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

## Peak Optimization Flags

C benchmarks:

500.perlbench\_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib  
-ljemalloc

502.gcc\_r: -L/opt/intel/compilers\_and\_libraries\_2018/linux/lib/ia32  
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-32/lib -ljemalloc

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

525.x264\_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=3 -fno-alias  
-L/usr/local/je5.0.1-64/lib -ljemalloc

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## Peak Optimization Flags (Continued)

557.xz\_r: Same as 505.mcf\_r

C++ benchmarks:

```
520.omnetpp_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32  
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

531.deepsjeng\_r: Same as 520.omnetpp\_r

541.leela\_r: Same as 520.omnetpp\_r

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
```

## Peak Other Flags

C benchmarks (except as noted below):

-m64 -std=c11

502.gcc\_r: -m32 -std=c11

C++ benchmarks (except as noted below):

-m64

523.xalancbmk\_r: -m32

Fortran benchmarks:

-m64

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>



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

<http://www.spec.org/cpu2017/flags/Intel-icl8.0-official-linux64.xml>

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