# SPEC® CPU2017 Integer Speed Result

## Lenovo Global Technology

ThinkSystem SR630
(3.20 GHz, Intel Xeon Gold 6146)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>9.69</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>9.98</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** May-2018  
**Software Availability:** Feb-2018  

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Gold 6146</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>4200</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3200</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>24.75 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 800 GB SAS SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 12 SP2 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version IVE113W 1.12 released Feb-2018</td>
</tr>
<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library V5.0.1</td>
</tr>
</tbody>
</table>

### Software Availability

**Hardware Availability:** Aug-2017  
**Tested by:** Lenovo Global Technology  
**Test Sponsor:** Lenovo Global Technology  
**Software Availability:** Feb-2018

---

**Threads:**

<table>
<thead>
<tr>
<th>benchmark</th>
<th>threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>6.96</td>
<td>8.27</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>10.1</td>
<td>10.3</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>24</td>
<td>11.8</td>
<td>12.0</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>6.81</td>
<td>6.57</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>24</td>
<td>10.6</td>
<td>11.3</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>24</td>
<td>13.0</td>
<td>13.0</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>24</td>
<td>5.60</td>
<td>5.57</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>24</td>
<td>4.91</td>
<td>4.93</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>24</td>
<td>15.1</td>
<td>14.1</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24</td>
<td>22.8</td>
<td>22.7</td>
</tr>
</tbody>
</table>

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**Software:**

- OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
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- Firmware: Lenovo BIOS Version IVE113W 1.12 released Feb-2018
- File System: btrfs
- 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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Tested by: Lenovo Global Technology
Hardware Availability: Aug-2017
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>261</td>
<td>6.79</td>
<td>255</td>
<td>6.96</td>
<td>255</td>
<td>6.96</td>
<td>24</td>
<td>214</td>
<td>8.28</td>
<td>219</td>
<td>8.12</td>
<td>215</td>
<td>8.27</td>
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<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>395</td>
<td>10.1</td>
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<td>10.1</td>
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<td>10.3</td>
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<td>10.3</td>
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<tr>
<td>605.mcf_s</td>
<td>24</td>
<td>402</td>
<td>11.8</td>
<td>404</td>
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<td>401</td>
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<td>393</td>
<td>12.0</td>
<td>393</td>
<td>12.0</td>
<td>396</td>
<td>11.9</td>
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<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>245</td>
<td>6.67</td>
<td>236</td>
<td>6.90</td>
<td>239</td>
<td>6.81</td>
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<td>235</td>
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<td>257</td>
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<td>134</td>
<td>10.6</td>
<td>133</td>
<td>10.6</td>
<td>24</td>
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<td>11.3</td>
<td>124</td>
<td>11.5</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>24</td>
<td>136</td>
<td>12.9</td>
<td>136</td>
<td>13.0</td>
<td>136</td>
<td>13.0</td>
<td>24</td>
<td>136</td>
<td>13.0</td>
<td>136</td>
<td>13.0</td>
<td>136</td>
<td>12.9</td>
</tr>
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<td>24</td>
<td>256</td>
<td>5.60</td>
<td>255</td>
<td>5.61</td>
<td>256</td>
<td>5.59</td>
<td>24</td>
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<td>5.56</td>
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<td>5.58</td>
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<tr>
<td>641.leela_s</td>
<td>24</td>
<td>347</td>
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<td>4.91</td>
<td>347</td>
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<td>4.92</td>
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<td>4.93</td>
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<td>4.93</td>
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<tr>
<td>648.exchange2_s</td>
<td>24</td>
<td>194</td>
<td>15.1</td>
<td>194</td>
<td>15.2</td>
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<td>15.1</td>
<td>24</td>
<td>193</td>
<td>15.2</td>
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<td>15.0</td>
<td>195</td>
<td>15.1</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24</td>
<td>272</td>
<td>22.8</td>
<td>271</td>
<td>22.8</td>
<td>271</td>
<td>22.8</td>
<td>24</td>
<td>272</td>
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<td>22.7</td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 9.69
SPECspeed2017_int_peak = 9.98

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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"
OMP_STACKSIZE = "192M"

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
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;
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.
Lenovo Global Technology
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Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
MONITORMWAIT set to Enable
Adjacent Cache Prefetch set to Disable
Stale AtoS set to Enable
DCA set to Enable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on Cable-SPECcpu2006-SUSE12SP2 Sun May  6 17:35:38 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) Gold 6146 CPU @ 3.20GHz
  2 "physical id"s (chips)
  24 "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 : 12
    siblings : 12
    physical 0: cores 0 1 2 3 9 10 16 18 19 24 26 27
    physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 24
  On-line CPU(s) list: 0-23
  Thread(s) per core: 1
  Core(s) per socket: 12
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 6146 CPU @ 3.20GHz
  Stepping: 4
  CPU MHz: 3192.480
  BogoMIPS: 6384.96
  Virtualization: VT-x
  L1d cache: 32K
  L1i cache: 32K
  L2 cache: 1024K

(Continued on next page)
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</table>

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Test Date: May-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Platform Notes (Continued)

L3 cache: 25344K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
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
aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pclid 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 vmx flexpriority
epi vpid fsdtbase tsc_adjust bmi1 hle avx2 smep bmi2  invpcid rtm cqm mpx
avx512if avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavex xgetbvl cqm_llc cqm_occup_llc

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
node 0 size: 193109 MB
node 0 free: 192718 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 193504 MB
node 1 free: 192990 MB
node distances:
node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
MemTotal: 395892424 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
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"

(Continued on next page)
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SPECspeed2017_int_base = 9.69
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Platform Notes (Continued)

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 Cable-SPECcpu2006-SUSE12SP2 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 May 6 17:32

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 744G 263G 480G 36% /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 -[IVE113W-1.12]- 02/06/2018
Memory:
    24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CC  600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
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icc (ICC) 18.0.0 20170811
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CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
    641.leela_s(base)
==============================================================================

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**Compiler Version Notes (Continued)**

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

CXXC 620.omnetpp_s (peak) 623.xalancbmk_s (peak) 631.deepsjeng_s (peak)
641.leela_s (peak)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

FC 648.exchange2_s (base, peak)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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**Base Compiler Invocation**

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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**Base Portability Flags**

600.perlbench_s: –DSPEC_LP64 –DSPEC_LINUX_X64
602.gcc_s: –DSPEC_LP64
605.mcf_s: –DSPEC_LP64
620.omnetpp_s: –DSPEC_LP64
623.xalancbmk_s: –DSPEC_LP64 –DSPEC_LINUX
625.x264_s: –DSPEC_LP64
631.deepsjeng_s: –DSPEC_LP64
641.leela_s: –DSPEC_LP64
648.exchange2_s: –DSPEC_LP64
657.xz_s: –DSPEC_LP64
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## Base Optimization Flags

C benchmarks:

- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
- `-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`

C++ benchmarks:

- `icpc`

Fortran benchmarks:

- `ifort`

## Peak Portability Flags

600.perlbench_s: `--DSPEC_LP64 --DSPEC_LINUX_X64`

(Continued on next page)
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Peak Portability Flags (Continued)

602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/usr/local/je5.0.1-64/lib -ljemalloc

602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

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

625.x264_s: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR630
(3.20 GHz, Intel Xeon Gold 6146)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECspeed2017_int_base = 9.69
SPECspeed2017_int_peak = 9.98

Test Date: May-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Peak Optimization Flags (Continued)

623.xalancbmk_s: -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
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s
641.leela_s: Same as 620.omnetpp_s

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:
-m64 -std=c11

C++ benchmarks (except as noted below):
-m64

623.xalancbmk_s: -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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-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.

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