### Lenovo Global Technology

**ThinkSystem SD530**  
(2.60 GHz, Intel Xeon Silver 4112)

| Test sponsor: | Lenovo Global Technology  |
| Test date: | Aug-2017  |
| Test sponsor: | Lenovo Global Technology  |
| Hardware Availability: | Aug-2017  |
| Tested by: | Lenovo Global Technology  |
| Software Availability: | Apr-2017  |

**SPECfp®2006 = 101**  
**SPECfp_base2006 = 98.1**

#### Hardware

| CPU Name: | Intel Xeon Silver 4112 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.00 GHz |
| CPU MHz: | 2600 |
| FPU: | Integrated |
| CPU(s) enabled: | 8 cores, 2 chips, 4 cores/chip |
| CPU(s) orderable: | 1,2 chips |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 1 MB I+D on chip per core |

#### Software

| Operating System: | SUSE Linux Enterprise Server 12 SP2 (x86_64) |
| Operating System: | Kernel 4.4.21-69-default |
| Compiler: | C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux; |
| Compiler: | Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |

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Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>28.2</td>
<td>482</td>
<td>28.2</td>
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<tr>
<td>416.gamess</td>
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<td>39.3</td>
<td>468</td>
<td>41.8</td>
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<td>433.milc</td>
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<tr>
<td>434.zeusmp</td>
<td>50.6</td>
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<td>179</td>
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<tr>
<td>435.gromacs</td>
<td>142</td>
<td>50.3</td>
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<td>592</td>
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<tr>
<td>437.leslie3d</td>
<td>38.0</td>
<td>247</td>
<td>38.0</td>
<td>248</td>
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<tr>
<td>444.namd</td>
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<td>279</td>
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<tr>
<td>447.dealII</td>
<td>195</td>
<td>58.6</td>
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<td>58.5</td>
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<tr>
<td>450.soplex</td>
<td>230</td>
<td>36.2</td>
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<td>36.2</td>
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<tr>
<td>453.povray</td>
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<td>56.7</td>
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<td>56.7</td>
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<td>454.calculix</td>
<td>135</td>
<td>60.9</td>
<td>136</td>
<td>60.9</td>
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<tr>
<td>459.GemsFDTD</td>
<td>62.5</td>
<td>170</td>
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<td>169</td>
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<tr>
<td>465.tonto</td>
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<td>481.wrf</td>
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<tr>
<td>482.sphinx3</td>
<td>310</td>
<td>62.8</td>
<td>310</td>
<td>62.8</td>
</tr>
</tbody>
</table>

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"

Platform Notes

BIOS Configuration:
Choose Operating Mode set to Maximum Performance
LLC dead line alloc set to Disable
Patrol Scrub set to Disable
DCU Streamer Prefetcher set to Disable
DCA set to Enable
Hyper-Threading set to Disable
Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
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SPECfp2006 = 101
SPECfp_base2006 = 98.1

CPU2006 license: 9017
Test sponsor: Lenovo Global Technology
Test date: Aug-2017
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Hardware Availability: Aug-2017
Software Availability: Apr-2017

Platform Notes (Continued)

running on stark-02-02 Tue Aug 1 06:38:31 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
2 "physical id"s (chips)
8 "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 : 4
siblings : 4
physical 0: cores 1 2 4 5
physical 1: cores 1 2 3 4
cache size : 8448 KB

From /proc/meminfo
MemTotal:       395894096 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"
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 stark-02-02 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
(x86_64) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 1 06:36

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 689G 47G 643G 7% /home
Additional information from dmidecode:

Continued on next page
Platform Notes (Continued)

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 -[TEE113J-1.00]– 06/03/2017
Memory:
4x NO DIMM NO DIMM
12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz, configured at 2400 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"
OMP_NUM_THREADS = "8"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.2
Transparent Huge Pages disabled with:
echo never > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run

Base Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64

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## Lenovo Global Technology

**CPU2006 license:** 9017  
**Test sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test date:** Aug-2017  
**Hardware Availability:** Aug-2017  
**Software Availability:** Apr-2017

### SPEC CFP2006 Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Score</th>
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<tbody>
<tr>
<td>Lenovo Global Technology</td>
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<tr>
<td></td>
<td>SPECfp_base2006 = 98.1</td>
</tr>
</tbody>
</table>

### Base Portability Flags (Continued)

- `435. gromacs`: `-DSPEC_CPU_LP64` `-nofor_main`
- `436. cactusADM`: `-DSPEC_CPU_LP64` `-nofor_main`
- `437. lesie3d`: `-DSPEC_CPU_LP64`
- `444. namd`: `-DSPEC_CPU_LP64` `-nofor_main`
- `447. dealII`: `-DSPEC_CPU_LP64`
- `450. soplex`: `-DSPEC_CPU_LP64`
- `453. povray`: `-DSPEC_CPU_LP64`
- `454. calculix`: `-DSPEC_CPU_LP64` `-nofor_main`
- `459. GemsFDTD`: `-DSPEC_CPU_LP64`
- `465. tonto`: `-DSPEC_CPU_LP64`
- `470. lbm`: `-DSPEC_CPU_LP64`
- `481. wrf`: `-DSPEC_CPU_LP64` `-DSPEC_CPU_CASE_FLAG` `-DSPEC_CPU_LINUX`
- `482. sphinx3`: `-DSPEC_CPU_LP64`

### Base Optimization Flags

#### C benchmarks:
- `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-parallel` `-qopt-prefetch`

#### C++ benchmarks:
- `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-qopt-prefetch`

#### Fortran benchmarks:
- `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-parallel` `-qopt-prefetch`

#### Benchmarks using both Fortran and C:
- `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-parallel` `-qopt-prefetch`

### Peak Compiler Invocation

#### C benchmarks:
- `icc` `-m64`

#### C++ benchmarks:
- `icpc` `-m64`

#### Fortran benchmarks:
- `ifort` `-m64`

#### Benchmarks using both Fortran and C:
- `icc` `-m64` `ifort` `-m64`
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**SPEC CFP2006 Result**

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**Software Availability:** Apr-2017

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**Peak Portability Flags**

Same as Base Portability Flags

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**Peak Optimization Flags**

C benchmarks:

- 433.milc: basepeak = yes
- 470.lbm: basepeak = yes
- 482.sphinx3: basepeak = yes

C++ benchmarks:

- 444.namd: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
  -no-prec-div(pass 2) -fno-alias -auto-ilk32
- 447.dealII: basepeak = yes
- 450.soplex: basepeak = yes
- 453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
  -no-prec-div(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

- 410.bwaves: basepeak = yes
- 416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
  -no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-
- 434.zeusmp: basepeak = yes
- 437.leslie3d: basepeak = yes
- 459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
  -no-prec-div(pass 2) -unroll2 -inline-level=0  
  -qopt-prefetch -parallel
- 465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
  -no-prec-div(pass 2) -inline-calloc -qopt-malloc-options=3  
  -auto -unroll4

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| Test date: | Aug-2017 |
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**Peak Optimization Flags (Continued)**

Benchmarks using both Fortran and C:

- 435.gromacs: basepeak = yes
- 436.cactusADM: basepeak = yes
- 454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32
- 481.wrf: basepeak = yes

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

- [http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.html](http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.html)

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

- [http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.xml](http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.xml)

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