Lenovo Global Technology

ThinkSystem SR950
(3.20 GHz, Intel Xeon Gold 6134)

**SPECfp®2006 = 159**

**SPECfp_base2006 = 153**

<table>
<thead>
<tr>
<th>Test sponsor</th>
<th>Lenovo Global Technology</th>
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<tbody>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>CPU2006 license</td>
<td>9017</td>
</tr>
<tr>
<td>Test date</td>
<td>Nov-2017</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Apr-2017</td>
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</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 6134</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>3200</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>32 cores, 4 chips, 8 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>2.4 chips</td>
</tr>
<tr>
<td>Primary Cache</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache</td>
<td>1 MB I+D on chip per core</td>
</tr>
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</table>

### Software

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12 SP2 (x86_64) Kernel 4.4.21-69-default</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>
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SPEC CFP2006 Result
Copyright 2006-2017 Standard Performance Evaluation Corporation

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L3 Cache: 24.75 MB I+D on chip per chip
Base Pointers: 64-bit

Other Cache: None
Peak Pointers: 32/64-bit
Other Software: None

Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Other Hardware: None

Disk Subsystem: 1 x 800 GB SAS SSD

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>7.03</td>
<td>1930</td>
<td>6.79</td>
<td>2000</td>
<td>6.78</td>
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<tr>
<td>416.gamess</td>
<td>397</td>
<td>49.4</td>
<td>396</td>
<td>49.4</td>
<td>397</td>
<td>49.4</td>
</tr>
<tr>
<td>433.milc</td>
<td>126</td>
<td>72.8</td>
<td>126</td>
<td>72.7</td>
<td>128</td>
<td>71.9</td>
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<tr>
<td>434.zeusmp</td>
<td>40.6</td>
<td>224</td>
<td>40.6</td>
<td>224</td>
<td>40.9</td>
<td>222</td>
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<tr>
<td>435.gromacs</td>
<td>111</td>
<td>64.4</td>
<td>111</td>
<td>64.4</td>
<td>111</td>
<td>64.2</td>
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<tr>
<td>436.cactusADM</td>
<td>8.37</td>
<td>1430</td>
<td>8.62</td>
<td>1390</td>
<td>8.45</td>
<td>1410</td>
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<tr>
<td>437.leslie3d</td>
<td>18.9</td>
<td>496</td>
<td>19.1</td>
<td>492</td>
<td>18.7</td>
<td>504</td>
</tr>
<tr>
<td>444.namd</td>
<td>225</td>
<td>35.6</td>
<td>225</td>
<td>35.6</td>
<td>225</td>
<td>35.6</td>
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<tr>
<td>447.dealII</td>
<td>160</td>
<td>71.6</td>
<td>160</td>
<td>71.6</td>
<td>160</td>
<td>71.6</td>
</tr>
<tr>
<td>450.soplex</td>
<td>163</td>
<td>51.0</td>
<td>162</td>
<td>51.6</td>
<td>162</td>
<td>51.5</td>
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<tr>
<td>453.povray</td>
<td>76.4</td>
<td>69.6</td>
<td>76.3</td>
<td>69.8</td>
<td>76.1</td>
<td>69.9</td>
</tr>
<tr>
<td>454.calculix</td>
<td>109</td>
<td>75.4</td>
<td>110</td>
<td>75.2</td>
<td>110</td>
<td>75.1</td>
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<tr>
<td>459.GemsFDTD</td>
<td>52.2</td>
<td>203</td>
<td>53.8</td>
<td>197</td>
<td>52.1</td>
<td>204</td>
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<tr>
<td>465.tonto</td>
<td>178</td>
<td>55.2</td>
<td>184</td>
<td>53.5</td>
<td>175</td>
<td>56.2</td>
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<tr>
<td>470.lbm</td>
<td>6.51</td>
<td>2110</td>
<td>6.47</td>
<td>2120</td>
<td>6.53</td>
<td>2100</td>
</tr>
<tr>
<td>481.wrf</td>
<td>81.5</td>
<td>137</td>
<td>81.8</td>
<td>136</td>
<td>82.6</td>
<td>135</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>237</td>
<td>82.1</td>
<td>236</td>
<td>82.5</td>
<td>238</td>
<td>82.0</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
Hyper-Threading set to Disable
LLC dead line alloc set to Disable
Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4e51ed28d7f98696cbe290c1)
running on linux-ciok Sat Nov 18 12:40:38 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see: Continued on next page
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Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo

model name: Intel(R) Xeon(R) Gold 6134 CPU @ 3.20GHz
4 "physical id"s (chips)
32 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 8
siblings : 8
physical 0: cores 0 2 3 9 16 19 26 27
physical 1: cores 0 4 5 6 16 19 20 22
physical 2: cores 0 2 3 9 16 19 26 27
physical 3: cores 0 1 2 3 10 11 24 27
cache size : 25344 KB

From /proc/meminfo
MemTotal: 1584767344 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:
(9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 18 12:39

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 445G 31G 415G 7% /

Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program
reads system data which is "intended to allow hardware to be accurately
Continued on next page
Platform Notes (Continued)

determined", but the intent may not be met, as there are frequent changes to
hardware, firmware, and the "$DMTF SMBIOS" standard.

BIOS Lenovo -[PSE105X-1.00]- 08/17/2017
Memory:
48x NO DIMM NO DIMM
48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz

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 = "32"

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
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
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Base Portability Flags (Continued)

437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
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:
ilc -m64

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

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-llp32

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

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes

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</tr>
</tbody>
</table>

Peak Optimization Flags (Continued)

454.calculix: -xCORE-AVX2 -ipo -03 -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/Intel-ic17.0-official-linux64-revF.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-E.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-E.xml

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