Lenovo Global Technology

ThinkSystem SR630
(2.10 GHz, Intel Xeon Platinum 8170)

**SPECfp®2006 = 149**

**SPECfp_base2006 = 142**

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8170</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2100</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>52 cores, 2 chips, 26 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>32 KB L1 + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache:</td>
<td>1 MB L1+D on chip per core</td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 SP2 (x86_64) Kernel 4.4.21-69-default</th>
</tr>
</thead>
<tbody>
<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>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>

**Test date:** Jul-2017

**Hardware Availability:** Aug-2017

**Software Availability:** Apr-2017

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## Lenovo Global Technology

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

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>12.2</td>
<td>1110</td>
<td>12.5</td>
<td>1090</td>
<td>12.4</td>
<td>1090</td>
<td>12.2</td>
<td>1110</td>
<td>12.4</td>
<td>1090</td>
</tr>
<tr>
<td>416.gamess</td>
<td>406</td>
<td>48.3</td>
<td>406</td>
<td>48.3</td>
<td>379</td>
<td>51.7</td>
<td>379</td>
<td>51.7</td>
<td>379</td>
<td>51.7</td>
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<tr>
<td>433.milc</td>
<td>124</td>
<td>73.9</td>
<td>121</td>
<td>75.6</td>
<td>122</td>
<td>75.1</td>
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<td>73.9</td>
<td>122</td>
<td>75.1</td>
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<tr>
<td>434.zeusmp</td>
<td>34.3</td>
<td>265</td>
<td>33.7</td>
<td>270</td>
<td>34.2</td>
<td>266</td>
<td>34.3</td>
<td>265</td>
<td>33.7</td>
<td>270</td>
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<tr>
<td>435.gromacs</td>
<td>154</td>
<td>46.3</td>
<td>155</td>
<td>46.2</td>
<td>154</td>
<td>46.3</td>
<td>155</td>
<td>46.2</td>
<td>154</td>
<td>46.3</td>
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<tr>
<td>436.cactusADM</td>
<td>8.44</td>
<td>1420</td>
<td>8.39</td>
<td>1420</td>
<td>8.55</td>
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<td>8.44</td>
<td>1420</td>
<td>8.39</td>
<td>1420</td>
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<td>437.leslie3d</td>
<td>19.0</td>
<td>494</td>
<td>19.2</td>
<td>489</td>
<td>20.0</td>
<td>471</td>
<td>19.0</td>
<td>494</td>
<td>19.2</td>
<td>489</td>
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<td>444.namd</td>
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<td>35.6</td>
<td>225</td>
<td>35.6</td>
<td>225</td>
<td>35.6</td>
<td>220</td>
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<td>222</td>
<td>36.5</td>
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<td>447.dealII</td>
<td>158</td>
<td>72.3</td>
<td>159</td>
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<td>158</td>
<td>72.3</td>
<td>158</td>
<td>72.3</td>
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<td>450.soplex</td>
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<td>52.0</td>
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<tr>
<td>453.povray</td>
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<td>69.9</td>
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<td>69.9</td>
<td>76.1</td>
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<td>79.2</td>
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<tr>
<td>454.calculix</td>
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<td>71.4</td>
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<td>71.1</td>
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<td>71.2</td>
<td>108</td>
<td>76.6</td>
<td>107</td>
<td>76.8</td>
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<tr>
<td>459.GemsFDTD</td>
<td>42.4</td>
<td>250</td>
<td>42.1</td>
<td>252</td>
<td>43.7</td>
<td>243</td>
<td>35.0</td>
<td>303</td>
<td>35.4</td>
<td>300</td>
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<tr>
<td>465.tonto</td>
<td>217</td>
<td>45.3</td>
<td>213</td>
<td>46.2</td>
<td>218</td>
<td>45.1</td>
<td>148</td>
<td>66.4</td>
<td>149</td>
<td>66.0</td>
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<tr>
<td>470.lbm</td>
<td>8.06</td>
<td>1710</td>
<td>8.04</td>
<td>1710</td>
<td>8.06</td>
<td>1700</td>
<td>8.06</td>
<td>1710</td>
<td>8.04</td>
<td>1710</td>
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<tr>
<td>481.wrf</td>
<td>83.8</td>
<td>133</td>
<td>83.7</td>
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<td>83.9</td>
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<td>83.8</td>
<td>133</td>
<td>83.7</td>
<td>133</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>312</td>
<td>62.4</td>
<td>307</td>
<td>63.6</td>
<td>306</td>
<td>63.6</td>
<td>312</td>
<td>62.4</td>
<td>307</td>
<td>63.6</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 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on Cable-SPECcpu2006-SUSE12SP2 Wed Jul 26 17:45:46 2017
```

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

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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) Platinum 8170 CPU @ 2.10GHz
   2 "physical id"s (chips)
   52 "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 : 26
   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
   cache size : 36608 KB

From /proc/meminfo
   MemTotal: 395892352 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 Cable-SPECcpu2006-SUSE12SP2 4.4.21-69-default #1 SMP Tue Oct 25
   10:58:20 UTC 2016 (9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jul 26 17:44

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
   Filesystem   Type   Size  Used Avail Use% Mounted on
   /dev/sda2    btrfs  744G  180G  563G  25% /home

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

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info@spec.org
http://www.spec.org/
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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 -[IVE109Q-1.00]- 06/28/2017
Memory:
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666 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 = "52"

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.zesmp: -DSPEC_CPU_LP64
 435.gromacs: -DSPEC_CPU_LP64 -nofor_main
 436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
 437.leslie3d: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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 -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

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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Peak Optimization Flags (Continued)

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/Intel-ic17.0-official-linux64-revF.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/Intel-ic17.0-official-linux64-revF.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.xml

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