# SPEC® CFP2006 Result

## Lenovo Global Technology

**ThinkSystem SR530**  
(2.10 GHz, Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECfp®2006 =</th>
<th>113</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006 =</td>
<td>108</td>
</tr>
</tbody>
</table>

### CPU2006 license: 9017

**Test sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

<table>
<thead>
<tr>
<th>Test date:</th>
<th>Jul-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2016</td>
</tr>
</tbody>
</table>

### Hardware

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong></td>
<td>Intel Xeon Silver 4110</td>
</tr>
<tr>
<td><strong>CPU Characteristics:</strong></td>
<td>Intel Turbo Boost Technology up to 3.00 GHz</td>
</tr>
<tr>
<td><strong>CPU MHz:</strong></td>
<td>2100</td>
</tr>
<tr>
<td><strong>FPU:</strong></td>
<td>Integrated</td>
</tr>
<tr>
<td><strong>CPU(s) enabled:</strong></td>
<td>16 cores, 2 chips, 8 cores/chip</td>
</tr>
<tr>
<td><strong>CPU(s) orderable:</strong></td>
<td>1.2 chips</td>
</tr>
<tr>
<td><strong>Primary Cache:</strong></td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>Secondary Cache:</strong></td>
<td>1 MB I+D on chip per core</td>
</tr>
</tbody>
</table>

### Software

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating System:</strong></td>
<td>SUSE Linux Enterprise Server 12 SP2 (x86_64)</td>
</tr>
<tr>
<td></td>
<td>Kernel 4.4.21-69-default</td>
</tr>
<tr>
<td><strong>Compiler:</strong></td>
<td>C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td><strong>Auto Parallel:</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>File System:</strong></td>
<td>btrfs</td>
</tr>
<tr>
<td><strong>System State:</strong></td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>

## Benchmarks

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECfp®2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>682</td>
<td>811</td>
</tr>
<tr>
<td>416.gamess</td>
<td>37.6</td>
<td>41.9</td>
</tr>
<tr>
<td>433.milc</td>
<td>64.9</td>
<td>206</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>42.4</td>
<td></td>
</tr>
<tr>
<td>435.gromacs</td>
<td>811</td>
<td></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>348</td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>29.6</td>
<td></td>
</tr>
<tr>
<td>444.namd</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td>447.dealII</td>
<td>58.2</td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td>64.3</td>
<td></td>
</tr>
<tr>
<td>454.calculix</td>
<td>61.9</td>
<td></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>57.9</td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>54.9</td>
<td></td>
</tr>
<tr>
<td>470.lbm</td>
<td>39.7</td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
<td>95.3</td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>57.5</td>
<td></td>
</tr>
</tbody>
</table>

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**Continued on next page**
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**Test sponsor:** Lenovo Global Technology  
**Hardware Availability:** Aug-2017  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Nov-2016

- **L3 Cache:** 11 MB I+D on chip per chip  
- **Other Cache:** None  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)  
- **Disk Subsystem:** 1 x 800 GB SATA SSD  
- **Other Hardware:** None

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Pointers</th>
<th>Peak Pointers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>410.bwaves</td>
<td>19.8</td>
<td>685</td>
</tr>
<tr>
<td>416.gamess</td>
<td>520</td>
<td>37.6</td>
</tr>
<tr>
<td>433.milc</td>
<td>141</td>
<td>65.1</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>44.2</td>
<td>206</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>168</td>
<td>42.4</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>14.7</td>
<td>815</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>27.0</td>
<td>348</td>
</tr>
<tr>
<td>444.namd</td>
<td>278</td>
<td>28.9</td>
</tr>
<tr>
<td>447.dealII</td>
<td>198</td>
<td>57.8</td>
</tr>
<tr>
<td>450.soplex</td>
<td>219</td>
<td>38.0</td>
</tr>
<tr>
<td>453.povray</td>
<td>93.8</td>
<td>56.7</td>
</tr>
<tr>
<td>454.calcuix</td>
<td>142</td>
<td>58.0</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>50.4</td>
<td>211</td>
</tr>
<tr>
<td>465.tonto</td>
<td>248</td>
<td>39.7</td>
</tr>
<tr>
<td>470.lbm</td>
<td>16.1</td>
<td>855</td>
</tr>
<tr>
<td>481.wrf</td>
<td>118</td>
<td>95.0</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>338</td>
<td>57.6</td>
</tr>
</tbody>
</table>

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

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**Operating System Notes**

Stack size set to unlimited using "ulimit -s unlimited"

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**Platform Notes**

- BIOS configuration: Operating Mode set to Maximum Performance
- Hyper-Threading set to Disabled
- Uncore Frequency Scaling set to Disable
- LLC dead line alloc set to Disable
- Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1) running on linux-ickx Mon Jul 17 05:53:43 2017

Continued on next page
Platform Notes (Continued)

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 4110 CPU @ 2.10GHz
   2 "physical id"s (chips)
   16 "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 : 8
   siblings : 8
   physical 0: cores 0 1 2 3 4 5 6 7
   physical 1: cores 0 1 2 3 4 5 6 7
   cache size : 11264 KB

From /proc/meminfo
   MemTotal: 395883640 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 Jul 17 05:53

SPEC is set to: /home/cpu2006-1.2-ic17.0
Filesystem Type Size Used Avail Use% Mounted on
 /dev/sda2 btrfs 744G 109G 634G 15% /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
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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 -[TEE105Z-1.00]- 04/27/2017
Memory:
12x Hynix HMA84GR7AFR4N-VK 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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"
OMP_NUM_THREADS = "16"

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

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 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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-ilp32

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.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.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.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.xml

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For other inquiries, please contact webmaster@spec.org.

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