# SPEC® CFP2006 Result

## Lenovo Global Technology

**ThinkSystem SR550**  
(2.10 GHz, Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>107</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 9017  
**Test sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**CPU Name:** Intel Xeon Silver 4110  
**CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz  
**CPU MHz:** 2100  
**FPU:** Integrated  
**CPU(s) enabled:** 16 cores, 2 chips, 8 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  

## Hardware

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>42.9</td>
</tr>
<tr>
<td>416.gamess</td>
<td>38.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>68.4</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>212</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>42.7</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>725</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>334</td>
</tr>
<tr>
<td>444.namd</td>
<td>29.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>59.0</td>
</tr>
<tr>
<td>450.soplex</td>
<td>39.8</td>
</tr>
<tr>
<td>453.povray</td>
<td>64.2</td>
</tr>
<tr>
<td>454.calculix</td>
<td>62.1</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>266</td>
</tr>
<tr>
<td>465.tonto</td>
<td>55.7</td>
</tr>
<tr>
<td>470.lbm</td>
<td>40.3</td>
</tr>
<tr>
<td>481.wrf</td>
<td>95.3</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>59.4</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 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>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:** Nov-2016  

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**Note:** Continued on next page
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<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: Nov-2016</td>
</tr>
<tr>
<td>L3 Cache: 11 MB I+D on chip per chip</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other Cache: None</td>
<td>Peak Pointers: 32/64-bit</td>
</tr>
<tr>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)</td>
<td>Other Software: None</td>
</tr>
<tr>
<td>Disk Subsystem: 1 x 800 GB SATA SSD</td>
<td>Other Hardware: None</td>
</tr>
</tbody>
</table>

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>410.bwaves</td>
<td>20.8</td>
<td>653</td>
</tr>
<tr>
<td>416.gamess</td>
<td>508</td>
<td>38.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>139</td>
<td>66.3</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>42.7</td>
<td>213</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>167</td>
<td>42.6</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>16.2</td>
<td>736</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>28.2</td>
<td>334</td>
</tr>
<tr>
<td>444.namd</td>
<td>278</td>
<td>28.9</td>
</tr>
<tr>
<td>447.dealII</td>
<td>195</td>
<td>58.6</td>
</tr>
<tr>
<td>450.soplex</td>
<td>210</td>
<td>39.8</td>
</tr>
<tr>
<td>453.povray</td>
<td>94.1</td>
<td>56.6</td>
</tr>
<tr>
<td>454.cylc</td>
<td>142</td>
<td>58.1</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>49.8</td>
<td>213</td>
</tr>
<tr>
<td>465.tonto</td>
<td>244</td>
<td>40.3</td>
</tr>
<tr>
<td>470.fpm</td>
<td>19.1</td>
<td>720</td>
</tr>
<tr>
<td>481.wrf</td>
<td>117</td>
<td>95.7</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>327</td>
<td>59.6</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:
- 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)
routing on linux-yyst Tue Jul 11 18:17:39 2017
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SPECfp2006 = 112
SPECfp_base2006 = 107

CPU2006 license: 9017
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Test date: Jul-2017
Hardware Availability: Aug-2017
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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: 395883104 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 11 18:16

SPEC is set to: /home/cpu2006-1.2-ic17.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 744G 210G 532G 29% /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 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-ic17.0/ibs/32:/home/cpu2006-1.2-ic17.0/ibs/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 enabled by default.

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
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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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