## SPEC CFP2006 Result

### Lenovo Global Technology

**ThinkSystem ST550**  
(2.00 GHz, Intel Xeon Platinum 8153)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>119</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 9017  
**Test date:** Aug-2017  
**Test sponsor:** Lenovo Global Technology  
**Hardware Availability:** Aug-2017  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Nov-2016

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8153</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 2.80 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2000</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>32 cores, 2 chips, 16 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1,2 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>
</tbody>
</table>

### Software

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

**SPECfp2006 = 125**
### Lenovo Global Technology

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<td>Test sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>L3 Cache:</td>
<td>22 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>None</td>
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</table>

### SPEC CFP2006 Result

**SPECfp2006 =** 125  
**SPECfp_base2006 =** 119

<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>
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</thead>
<tbody>
<tr>
<td>Base</td>
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<tr>
<td>410.bwaves</td>
<td>12.5</td>
<td>1080</td>
<td>12.7</td>
<td>1070</td>
<td>12.4</td>
<td>1090</td>
<td>12.5</td>
<td>1080</td>
<td>12.7</td>
<td>1070</td>
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<tr>
<td>416.gamess</td>
<td>525</td>
<td>37.3</td>
<td>524</td>
<td>37.4</td>
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<td>40.0</td>
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<td>433.milc</td>
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<td>70.9</td>
<td>131</td>
<td>70.3</td>
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<td>70.8</td>
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<td>70.3</td>
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<td>434.zeusmp</td>
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<td>435.gromacs</td>
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<td>40.3</td>
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<td>40.3</td>
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<td>40.3</td>
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<tr>
<td>436.cactusADM</td>
<td>11.8</td>
<td>1010</td>
<td>11.6</td>
<td>1030</td>
<td>11.6</td>
<td>1030</td>
<td>11.8</td>
<td>1010</td>
<td>11.6</td>
<td>1030</td>
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<td>437.leslie3d</td>
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<td>431</td>
<td>22.7</td>
<td>414</td>
<td>22.3</td>
<td>422</td>
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<td>431</td>
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<td>414</td>
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<td>444.namd</td>
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<td>26.9</td>
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<td>447.dealII</td>
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<td>450.soplex</td>
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<td>43.5</td>
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<td>43.9</td>
<td>193</td>
<td>43.2</td>
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<td>453.povray</td>
<td>101</td>
<td>52.9</td>
<td>101</td>
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<td>454.calculix</td>
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<td>55.7</td>
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<td>459.GemsFDTD</td>
<td>41.4</td>
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<td>249</td>
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<td>465.tonto</td>
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<td>38.7</td>
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<td>53.4</td>
<td>184</td>
<td>53.5</td>
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<tr>
<td>470.lbm</td>
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<td>1230</td>
<td>11.1</td>
<td>1240</td>
<td>11.2</td>
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<td>11.1</td>
<td>1230</td>
<td>11.1</td>
<td>1240</td>
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<tr>
<td>481.wrf</td>
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<td>98.1</td>
<td>114</td>
<td>98.3</td>
<td>114</td>
<td>99.0</td>
<td>113</td>
<td>98.1</td>
<td>114</td>
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<tr>
<td>482.sphinx3</td>
<td>328</td>
<td>59.5</td>
<td>324</td>
<td>60.1</td>
<td>323</td>
<td>60.3</td>
<td>328</td>
<td>59.5</td>
<td>324</td>
<td>60.1</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
  - Per Core P-state 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 (b5e8d4b4eb51ed28d7f98696cfbe290c1)
  - running on ST550 Thu Aug 24 08:57:32 2017

This section contains SUT (System Under Test) info as seen by

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Lenovo Global Technology
ThinkSystem ST550
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CPU2006 license: 9017
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 SPECfp2006 = 125
 SPECfp_base2006 = 119

Platform Notes (Continued)

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) Platinum 8153 CPU @ 2.00GHz
  2 "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
caution.)
cpu cores : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
cache size : 22528 KB

From /proc/meminfo
MemTotal:       395883768 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 ST550 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 Aug 23 18:24

SPEC is set to: /home/cpu2006-1.2-ic17.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 744G 158G 586G 22% /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
determined", but the intent may not be met, as there are frequent changes to

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Software Availability: Nov-2016

Platform Notes (Continued)

hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Lenovo -[O0E105R-1.00]- 04/27/2017
Memory:
12x Hynix HMA84GR7AFR4N-VK 32 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-icl17.0/libs/32:/home/cpu2006-1.2-icl17.0/libs/64:/home/cpu2006-1.2-icl17.0/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 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 -nofor_main
  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
  453.povray: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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
## Lenovo Global Technology

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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.

Tested with SPEC CPU2006 v1.2.
Originally published on 19 September 2017.