# Lenovo Global Technology

**ThinkSystem SR650**  
(3.60 GHz, Intel Xeon Gold 5122)

<table>
<thead>
<tr>
<th>Test sponsor</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 9017  
**CPU Name:**  
Intel Xeon Gold 5122  
**CPU Characteristics:**  
Intel Turbo Boost Technology up to 3.70 GHz  
**CPU MHz:** 3600  
**FPU:** Integrated  
**CPU(s) enabled:** 8 cores, 2 chips, 4 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

| Software Operating System: | SUSE Linux Enterprise Server 12 SP2 (x86_64)  
<table>
<thead>
<tr>
<th></th>
<th></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>
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<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>
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</tbody>
</table>

## SPECfp®2006

- **SPECfp2006 = 123**
- **SPECfp_base2006 = 121**

## Software

**Operating System:** SUSE Linux Enterprise Server 12 SP2 (x86_64)  
**Kernel:** 4.4.21-69-default  
**Compiler:** 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  
**Auto Parallel:** Yes  
**File System:** btrfs  
**System State:** Run level 3 (multi-user)

**Hardware**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Aug-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2017</td>
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<tr>
<td>Software Availability:</td>
<td>Apr-2017</td>
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>51.7</td>
</tr>
<tr>
<td>416.gamess</td>
<td>49.1</td>
</tr>
<tr>
<td>433.milc</td>
<td>71.8</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>213</td>
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<tr>
<td>435.gromacs</td>
<td>68.4</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>754</td>
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<tr>
<td>437.leslie3d</td>
<td>315</td>
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<td>444.namd</td>
<td>36.5</td>
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<tr>
<td>447.dealII</td>
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<tr>
<td>450.soplex</td>
<td>46.6</td>
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<tr>
<td>453.povray</td>
<td>79.3</td>
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<td>454.calculix</td>
<td>76.2</td>
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<tr>
<td>459.GemsFDTD</td>
<td>200</td>
</tr>
<tr>
<td>465.tonto</td>
<td>66.3</td>
</tr>
<tr>
<td>470.lbm</td>
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<tr>
<td>481.wrf</td>
<td>95.0</td>
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<tr>
<td>482.sphinx3</td>
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Lenovo Global Technology
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CPU2006 license: 9017
Test sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test date: Aug-2017
Hardware Availability: Aug-2017
Software Availability: Apr-2017

L3 Cache: 16.5 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 1 x 800 GB SAS SSD
Other Hardware: None
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>233</td>
<td>83.7</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
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 Cyborg-SPECcpu2006-SUSE12SP2 Fri Aug 25 01:50:56 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
Lenovo Global Technology
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SPECfp2006 = 123
SPECfp_base2006 = 121

CPU2006 license: 9017
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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 5122 CPU @ 3.60GHz
  2 "physical id"s (chips)
  8 "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 : 4
siblings : 4
physical 0: cores 5 8 10 11
physical 1: cores 1 10 11 12
cache size : 16896 KB

From /proc/meminfo
MemTotal:       395893692 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 Cyborg-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 Aug 25 01:50

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
  Filesystem    Type Size Used Avail Use% Mounted on
  /dev/sdb2     btrfs 744G 36G 706G 5% /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
hardware, firmware, and the "DMTF SMBIOS" standard.

Continued on next page
**SPEC CFP2006 Result**

**Lenovo Global Technology**

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<table>
<thead>
<tr>
<th>SPECfp2006 =</th>
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<tr>
<td>SPECfp_base2006 =</td>
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</table>

**CPU2006 license:** 9017  
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**Hardware Availability:** Aug-2017  
**Software Availability:** Apr-2017

---

**Platform Notes (Continued)**

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 = "8"  

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
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
470.1bm: -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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CPU2006 license: 9017
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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-ii32
- 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

Continued on next page
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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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For other inquiries, please contact webmaster@spec.org.

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