Lenovo Global Technology  
ThinkSystem SR650  
(2.10 GHz, Intel Xeon Silver 4116)

**SPECfp®2006 = 120**  
**SPECfp_base2006 = 115**

**CPU2006 license:** 9017  
**Test date:** Aug-2017

**Test sponsor:** Lenovo Global Technology  
**Hardware Availability:** Aug-2017

**Tested by:** Lenovo Global Technology  
**Software Availability:** Apr-2017

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**Hardware**

**CPU Name:** Intel Xeon Silver 4116  
**CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz

**CPU MHz:** 2100  
**FPU:** Integrated

**CPU(s) enabled:** 24 cores, 2 chips, 12 cores/chip  
**CPU(s) orderable:** 1.2 chips

**Primary Cache:** 32 KB L1 + 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)  
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)
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L3 Cache: 16.5 MB I+D on chip per chip  
Base Pointers: 64-bit  
Other Cache: None  
Peak Pointers: 32/64-bit  
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400 MHz)  
Other Software: None

Disk Subsystem: 1 x 800 GB SAS SSD  
Operating System Notes

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>
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<td>56.2</td>
<td>347</td>
<td>56.2</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 Wed Aug 16 00:26:09 2017

This section contains SUT (System Under Test) info as seen by
Continued on next page
Lenovo Global Technology
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(2.10 GHz, Intel Xeon Silver 4116)

SPEC CFP2006 Result

| SPECfp2006 | 120 |
| SPECfp_base2006 | 115 |

CPU2006 license: 9017
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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) Silver 4116 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 24 "processors"
- cores, siblings (Caution: counting these is hw and system dependent. The
  following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
  - cpu cores : 12
  - siblings : 12
  - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
- 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 (9464f6d) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 16 00:25

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
Continued on next page
SPEC CFP2006 Result

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Platform Notes (Continued)

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, 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-ic17.0u3/lib/ia32:/lib/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2*
OMP_NUM_THREADS = "24"

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

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Base Portability Flags (Continued)

- 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-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-revF.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-revF.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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