Lenovo Global Technology

ThinkSystem SR950
(2.10 GHz, Intel Xeon Platinum 8160T)

**SPECfp®2006 =** 148
**SPECfp_base2006 =** 141

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**Hardware**

- **CPU Name:** Intel Xeon Platinum 8160T
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.70 GHz
- **CPU MHz:** 2100
- **FPU:** Integrated
- **CPU(s) enabled:** 96 cores, 4 chips, 24 cores/chip
- **CPU(s) orderable:** 24 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)
  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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**Test date:** Nov-2017
**Test sponsor:** Lenovo Global Technology
**Hardware Availability:** Sep-2017
**Software Availability:** Apr-2017

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**410.bwaves**

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**416.gamess**

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**433.milc**

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**434.zeusmp**

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**435.gromacs**

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**436.cactusADM**

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**437.leslie3d**

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**444.namd**

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**447.dealII**

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**450.soplex**

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**453.povray**

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**454.calculix**

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**459.GemsFDTD**

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**465.tonto**

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**470.lbm**

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**481.wrf**

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**482.sphinx3**

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**SPECfp_base2006 = 141**

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**Software Availability:** Apr-2017

**L3 Cache:** 33 MB I+D on chip per chip

**Other Cache:** None

**Memory:** 1536 GB (48 x 32 GB 2Rx4 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

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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Seconds Ratio</th>
<th>Seconds Base</th>
<th>Seconds Ratio</th>
<th>Seconds Base</th>
<th>Seconds Ratio</th>
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<th>Seconds Ratio</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>8.49 1600</td>
<td>8.17 1660</td>
<td>8.28 1640</td>
<td></td>
<td>8.49 1600</td>
<td>8.17 1660</td>
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<tr>
<td>416.gamess</td>
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<td>407 48.1</td>
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<td>379 51.2</td>
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<td>434.zeusmp</td>
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<td>51.2 178</td>
<td>50.2 181</td>
<td>49.2 185</td>
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<td>435.gromacs</td>
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<td>8.60 1930</td>
<td>8.37 1430</td>
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<td>8.52 1400</td>
<td>8.60 1930</td>
<td>8.37 1430</td>
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<td>22.4 419</td>
<td>24.5 383</td>
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<td>225 418</td>
<td>22.4 419</td>
<td>24.5 383</td>
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<td>444.namd</td>
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<td>220 36.5</td>
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<td>447.dealII</td>
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<td>160 71.6</td>
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<td>163 51.1</td>
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<td>453.povray</td>
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<td>76.2 69.8</td>
<td>76.5 69.5</td>
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<td>67.3 79.0</td>
<td>67.4 78.9</td>
<td>67.1 79.2</td>
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<td>107 76.9</td>
<td>108 76.4</td>
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<td>459.GemsFDTD</td>
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<td>78.5 135</td>
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<td>67.1 158</td>
<td>67.6 157</td>
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<td>215 45.7</td>
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<td>147 67.1</td>
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<td>481.wrf</td>
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<td>86.8 129</td>
<td>87.7 127</td>
<td>86.9 129</td>
<td></td>
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<tr>
<td>482.sphinx3</td>
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<td>298 65.3</td>
<td>299 65.3</td>
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<td>298 65.3</td>
<td>298 65.3</td>
<td>299 65.3</td>
<td></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"

---

### Platform Notes

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
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 linux-uyxw Wed Nov 29 10:11:51 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see: Combined on next page

---

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo

  model name : Intel(R) Xeon(R) Platinum 8160T CPU @ 2.10GHz
  4 "physical id"s (chips)
  96 "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 : 24
  siblings : 24
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
             27 28 29
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
             27 28 29
  physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
             27 28 29
  physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
             27 28 29
  cache size : 33792 KB

From /proc/meminfo

  MemTotal:       1584767360 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 Nov 29 10:09

  SPEC is set to: /home/cpu2006-1.2-ic17.0u3
  Filesystem     Type   Size  Used Avail Use% Mounted on
  /dev/sda2      btrfs  744G  32G  712G   5% /home

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Hardware Availability: Sep-2017
Software Availability: Apr-2017

Platform Notes (Continued)

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.

BIOS Lenovo -[PSE103K-1.00]- 06/19/2017
Memory:
48x NO DIMM NO DIMM
48x Samsung M393A4K40BB2-CTD 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-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"
OMP_NUM_THREADS = "96"

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

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Base Portability Flags (Continued)

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.lesie3d: -DSPEC_CPU_LP64 -nofor_main
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64 -nofor_main
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

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http://www.spec.org/
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SPEC CFP2006 Result

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Peak Portability Flags

Same as Base Portability Flags

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-iipt32

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

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
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-E.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-E.xml

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