### Lenovo Global Technology

ThinkSystem SR950  
(2.50 GHz, Intel Xeon Platinum 8180)

| SPECfp®2006 | 134 |
| SPECfp_base2006 | 127 |

**CPU2006 license:** 9017  
**Test sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test date:** Jun-2017  
**Hardware Availability:** Sep-2017  
**Software Availability:** Apr-2017

#### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Platinum 8180</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.80 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>2500</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>224 cores, 8 chips, 28 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>2,4,8 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12 SP2 (x86_64)</td>
</tr>
<tr>
<td></td>
<td>Kernel 4.4.21-69-default</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux</td>
</tr>
<tr>
<td></td>
<td>Fortran: Version 17.0.3.191 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>

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L3 Cache: 38.5 MB I+D on chip per chip
Other Cache: None
Memory: 3 TB (96 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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>410.bwaves</th>
<th>416.gameess</th>
<th>433.milc</th>
<th>434.zeusmp</th>
<th>435.gromacs</th>
<th>436.cactusADM</th>
<th>437.leslie3d</th>
<th>444.namd</th>
<th>447.dealII</th>
<th>450.soplex</th>
<th>453.povray</th>
<th>454.calculix</th>
<th>459.GemsFDTD</th>
<th>465.tonto</th>
<th>470.lbm</th>
<th>481.wrf</th>
<th>482.sphinx3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>12.4</td>
<td>399</td>
<td>127</td>
<td>74.6</td>
<td>174</td>
<td>10.4</td>
<td>36.0</td>
<td>216</td>
<td>157</td>
<td>162</td>
<td>82.2</td>
<td>121</td>
<td>191</td>
<td>218</td>
<td>2.22</td>
<td>89.3</td>
<td>270</td>
</tr>
<tr>
<td>Ratio</td>
<td>1100</td>
<td>49.1</td>
<td>72.1</td>
<td>74.0</td>
<td>41.0</td>
<td>1140</td>
<td>261</td>
<td>37.1</td>
<td>72.7</td>
<td>51.5</td>
<td>64.7</td>
<td>67.9</td>
<td>55.4</td>
<td>45.0</td>
<td>6190</td>
<td>125</td>
<td>72.3</td>
</tr>
<tr>
<td>Seconds</td>
<td>12.4</td>
<td>397</td>
<td>129</td>
<td>74.0</td>
<td>178</td>
<td>11.3</td>
<td>40.8</td>
<td>219</td>
<td>158</td>
<td>160</td>
<td>82.0</td>
<td>122</td>
<td>189</td>
<td>227</td>
<td>1.72</td>
<td>88.8</td>
<td>273</td>
</tr>
<tr>
<td>Ratio</td>
<td>1090</td>
<td>49.3</td>
<td>71.1</td>
<td>123</td>
<td>40.2</td>
<td>1060</td>
<td>230</td>
<td>36.7</td>
<td>72.5</td>
<td>52.0</td>
<td>64.9</td>
<td>67.4</td>
<td>56.2</td>
<td>43.4</td>
<td>8010</td>
<td>126</td>
<td>71.5</td>
</tr>
<tr>
<td>Seconds</td>
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<td>397</td>
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<td>189</td>
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<td>1.79</td>
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<td>37.2</td>
<td>72.8</td>
<td>49.9</td>
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<td>56.3</td>
<td>43.4</td>
<td>8010</td>
<td>126</td>
<td>71.9</td>
</tr>
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</table>

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 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 Proton8S-SUSE12SP2 Wed Jun 14 17:06:06 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
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SPEC CFP2006 Result

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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) Platinum 8180 CPU @ 2.50GHz
8 "physical id"s (chips)
224 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 5: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30
physical 7: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
25 26 27 28 29 30

cache size : 39424 KB

From /proc/meminfo

MemTotal: 3170209480 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:

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**Lenovo Global Technology**

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**Test sponsor**: Lenovo Global Technology  
**Tested by**: Lenovo Global Technology

**Platform Notes (Continued)**

```
run-level 3 Jun 13 21:21
SPEC is set to: /home/cpu2006-1.2-ic17.0u3
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdb3 btrfs 743G 56G 678G 8% /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.
  BIOS Lenovo -[PSE105H-1.00]- 06/01/2017
  Memory: 96x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz
```

**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 = "224"

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 with:
    echo never > /sys/kernel/mm/transparent_hugepage/enable
  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`
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**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.leshe3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
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-AVX512 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX512 -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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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-AVX512(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-AVX512(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-AVX512(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-AVX512(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-AVX512(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-AVX512 -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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