Lenovo Global Technology
ThinkSystem ST550
(2.40 GHz, Intel Xeon Gold 5115)

SPECfp®2006 = 126
SPECfp_base2006 = 120

CPU2006 license: 9017  
Test sponsor: Lenovo Global Technology  
Tested by: Lenovo Global Technology

Hardware
CPU Name: Intel Xeon Gold 5115  
CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz  
CPU MHz: 2400  
FPU: Integrated  
CPU(s) enabled: 20 cores, 2 chips, 10 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)  
Compiler: C/C++: Version 17.0.0.098 of Intel C/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)

Test date: Aug-2017  
Hardware Availability: Aug-2017  
Software Availability: Nov-2016

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L3 Cache: 13.75 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)
Disk Subsystem: 1 x 800 GB SATA 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>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>19.3</td>
<td>704</td>
<td>19.6</td>
<td>694</td>
<td>19.1</td>
<td>711</td>
</tr>
<tr>
<td>416.gamess</td>
<td>460</td>
<td>42.5</td>
<td>(underlined) 460</td>
<td>42.5</td>
<td>461</td>
<td>42.5</td>
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<tr>
<td>433.milc</td>
<td>128</td>
<td>71.5</td>
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<td>70.9</td>
<td>127</td>
<td>72.2</td>
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<tr>
<td>434.zeesmp</td>
<td>38.1</td>
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<td>39.2</td>
<td>232</td>
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<td>237</td>
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<tr>
<td>435.gromacs</td>
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<td>48.3</td>
<td>(underlined) 148</td>
<td>48.3</td>
<td>148</td>
<td>48.3</td>
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<td>436.cactusADM</td>
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<td>896</td>
<td>13.2</td>
<td>902</td>
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<tr>
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<td>22.7</td>
<td>415</td>
<td>22.2</td>
<td>424</td>
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<tr>
<td>444.namd</td>
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<td>30.8</td>
<td>260</td>
<td>30.8</td>
<td>261</td>
<td>30.8</td>
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<tr>
<td>447.dealII</td>
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<td>62.3</td>
<td>182</td>
<td>63.0</td>
<td>182</td>
<td>62.9</td>
</tr>
<tr>
<td>450.soplex</td>
<td>190</td>
<td>44.0</td>
<td>(underlined) 190</td>
<td>43.9</td>
<td>191</td>
<td>43.7</td>
</tr>
<tr>
<td>453.povray</td>
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<td>87.7</td>
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<tr>
<td>454.calculix</td>
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<td>62.2</td>
<td>133</td>
<td>62.2</td>
<td>133</td>
<td>62.2</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
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<td>42.6</td>
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<td>255</td>
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<tr>
<td>465.tonto</td>
<td>221</td>
<td>44.6</td>
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<td>44.5</td>
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<tr>
<td>470.lbm</td>
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<td>15.1</td>
<td>908</td>
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<td>909</td>
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<tr>
<td>481.wrf</td>
<td>99.4</td>
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<tr>
<td>482.sphinx3</td>
<td>287</td>
<td>68.0</td>
<td>287</td>
<td>67.9</td>
<td>287</td>
<td>67.9</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 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on ST550 Sat Aug 26 23:56:48 2017

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Lenovo Global Technology
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Platform Notes (Continued)

This section contains SUT (System Under Test) info as seen by 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) Gold 5115 CPU @ 2.40GHz
   2 "physical id"s (chips)
       20 "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 : 10
       siblings : 10
       physical 0: cores 0 1 2 3 4 8 9 10 11 12
       physical 1: cores 0 1 2 3 4 8 9 10 11 12
   cache size : 14080 KB

From /proc/meminfo
   MemTotal:       395883500 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 26 19:29

SPEC is set to: /home/cpu2006-1.2-ic17.0
Filesistem       Type  Size  Used  Avail  Use%  Mounted on
   /dev/sdb2      btrfs  744G 131G  611G  18%  /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
Continued on next page
**SPEC CFP2006 Result**

**Lenovo Global Technology**

ThinkSystem ST550
(2.40 GHz, Intel Xeon Gold 5115)

<table>
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---

**Platform Notes (Continued)**

```
determined", but the intent may not be met, as there are frequent changes to 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, configured at 2400 MHz
```

(End of data from sysinfo program)

---

<table>
<thead>
<tr>
<th>General Notes</th>
</tr>
</thead>
</table>
| Environment variables set by runspec before the start of the run:  
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"
OMP_NUM_THREADS = "20"

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
- 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

Continued on next page
Base Portability Flags (Continued)

- 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
Lenovo Global Technology
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**SPEC CFP2006 Result**

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**Hardware Availability:** Aug-2017
**Tested by:** Lenovo Global Technology
**Software Availability:** Nov-2016

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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-llp32

- 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)  
  -unroll2  
  -inline-callloc  
  -qopt-malloc-options=3  
  -auto  
  -unroll4

**Benchmarks using both Fortran and C:**

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

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Lenovo Global Technology

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</tbody>
</table>

Test date: Aug-2017
Hardware Availability: Aug-2017
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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.

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