Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp\textsuperscript{2006} = 121
SPECfp\textsubscript{base2006} = 115

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 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 SP3 (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)
Lenovo Global Technology

ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

**SPECfp2006 =** 121
**SPECfp_base2006 =** 115

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>18.6</td>
<td>733</td>
<td>17.9</td>
<td>759</td>
<td>18.0</td>
<td>753</td>
<td>18.6</td>
<td>733</td>
<td>17.9</td>
<td>759</td>
</tr>
<tr>
<td>416.gamess</td>
<td>506</td>
<td>38.7</td>
<td>507</td>
<td>38.6</td>
<td>507</td>
<td>38.7</td>
<td>466</td>
<td>42.0</td>
<td>467</td>
<td>41.9</td>
</tr>
<tr>
<td>433.milc</td>
<td>142</td>
<td>64.7</td>
<td>141</td>
<td>65.2</td>
<td>140</td>
<td>65.3</td>
<td>142</td>
<td>64.7</td>
<td>141</td>
<td>65.2</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td><strong>41.0</strong></td>
<td>222</td>
<td>41.0</td>
<td>222</td>
<td>40.8</td>
<td>223</td>
<td><strong>41.0</strong></td>
<td>222</td>
<td>41.0</td>
<td>222</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>169</td>
<td>42.1</td>
<td>169</td>
<td>42.2</td>
<td>169</td>
<td>42.3</td>
<td>169</td>
<td>42.1</td>
<td>169</td>
<td>42.2</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>11.6</td>
<td>1030</td>
<td>11.3</td>
<td>1060</td>
<td>11.4</td>
<td>1050</td>
<td>11.6</td>
<td>1030</td>
<td>11.3</td>
<td>1060</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>23.7</td>
<td>396</td>
<td>23.7</td>
<td>396</td>
<td>23.8</td>
<td>395</td>
<td><strong>23.7</strong></td>
<td>396</td>
<td>23.7</td>
<td>396</td>
</tr>
<tr>
<td>444.namd</td>
<td>278</td>
<td>28.9</td>
<td>278</td>
<td>28.9</td>
<td><strong>278</strong></td>
<td>28.9</td>
<td>271</td>
<td>29.6</td>
<td>271</td>
<td>29.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>196</td>
<td>58.4</td>
<td>195</td>
<td>58.8</td>
<td>194</td>
<td>58.8</td>
<td>196</td>
<td>58.4</td>
<td><strong>195</strong></td>
<td>58.8</td>
</tr>
<tr>
<td>450.soplex</td>
<td>203</td>
<td>41.1</td>
<td>203</td>
<td>41.2</td>
<td>203</td>
<td>41.2</td>
<td>203</td>
<td>41.1</td>
<td><strong>203</strong></td>
<td>41.2</td>
</tr>
<tr>
<td>453.povray</td>
<td><strong>93.8</strong></td>
<td>56.7</td>
<td>93.7</td>
<td>56.8</td>
<td>93.8</td>
<td>56.7</td>
<td><strong>82.7</strong></td>
<td>64.4</td>
<td>82.6</td>
<td>64.4</td>
</tr>
<tr>
<td>454.calculix</td>
<td>142</td>
<td>58.1</td>
<td>142</td>
<td>58.1</td>
<td>142</td>
<td>58.0</td>
<td>132</td>
<td>62.4</td>
<td><strong>133</strong></td>
<td><strong>62.2</strong></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>44.1</td>
<td>240</td>
<td>43.0</td>
<td>247</td>
<td><strong>43.9</strong></td>
<td><strong>242</strong></td>
<td>36.0</td>
<td>295</td>
<td>36.3</td>
<td>292</td>
</tr>
<tr>
<td>465.tonto</td>
<td>246</td>
<td>40.0</td>
<td>247</td>
<td>39.9</td>
<td><strong>247</strong></td>
<td><strong>39.9</strong></td>
<td>177</td>
<td>55.7</td>
<td>178</td>
<td>55.4</td>
</tr>
<tr>
<td>470.lbm</td>
<td>12.4</td>
<td>1100</td>
<td>12.5</td>
<td>1100</td>
<td><strong>12.5</strong></td>
<td><strong>1100</strong></td>
<td>12.4</td>
<td>1100</td>
<td>12.5</td>
<td>1100</td>
</tr>
<tr>
<td>481.wrf</td>
<td>110</td>
<td>102</td>
<td>111</td>
<td>100</td>
<td>109</td>
<td>103</td>
<td><strong>110</strong></td>
<td>102</td>
<td>111</td>
<td>100</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>330</td>
<td>59.0</td>
<td>329</td>
<td>59.2</td>
<td>329</td>
<td>59.3</td>
<td>330</td>
<td>59.0</td>
<td><strong>329</strong></td>
<td><strong>59.2</strong></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
Execute Disable Bit set to Disable
MONITORMWAIT set to Enable
Per Core P-state set to Disable
XPT Prefetcher set to Enable
LLC Deadline Alloc set to Disable
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993

Continued on next page
Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp2006 = 121
SPECfp_base2006 = 115

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

Platform Notes (Continued)
Revision 6993 of 2015-11-06 (b5e8d4e4b51ed28d7f98696cbe290c1)
running on SR590-2 Mon Nov 20 15:24:41 2017

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) 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 caution.)
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: 395779220 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release: SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # 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-SP3"
    VERSION_ID="12.3"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
  Linux SR590-2 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4)
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 20 15:24

SPEC is set to: /home/cpu2006-1.2-ic17.0
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdb2 btrfs 744G 103G 641G 14% /home
Additional information from dmidecode:
Continued on next page
## Lenovo Global Technology

ThinkSystem SR590  
(2.10 GHz, Intel Xeon Silver 4116)

<table>
<thead>
<tr>
<th>SPECfp2006</th>
<th>121</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>115</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

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 -[TEE119J-1.20]- 09/06/2017  
Memory:  
12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666 MHz, configured at 2400 MHz  
4x NO DIMM NO DIMM

(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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/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`

### 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
Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp2006 = 121
SPECfp_base2006 = 115

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

Test date: Nov-2017
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Base Portability Flags (Continued)

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
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
463.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
Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp2006 = 121
SPECfp_base2006 = 115

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

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-ill32

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

Continued on next page
Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp2006 = 121
SPECfp_base2006 = 115

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

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.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.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-E.xml

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Originally published on 15 December 2017.