



# SPEC® CFP2006 Result

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## Lenovo Global Technology

ThinkSystem SN550  
(2.10 GHz, Intel Xeon Platinum 8176)

SPECfp®2006 = 151

SPECfp\_base2006 = 143

CPU2006 license: 9017

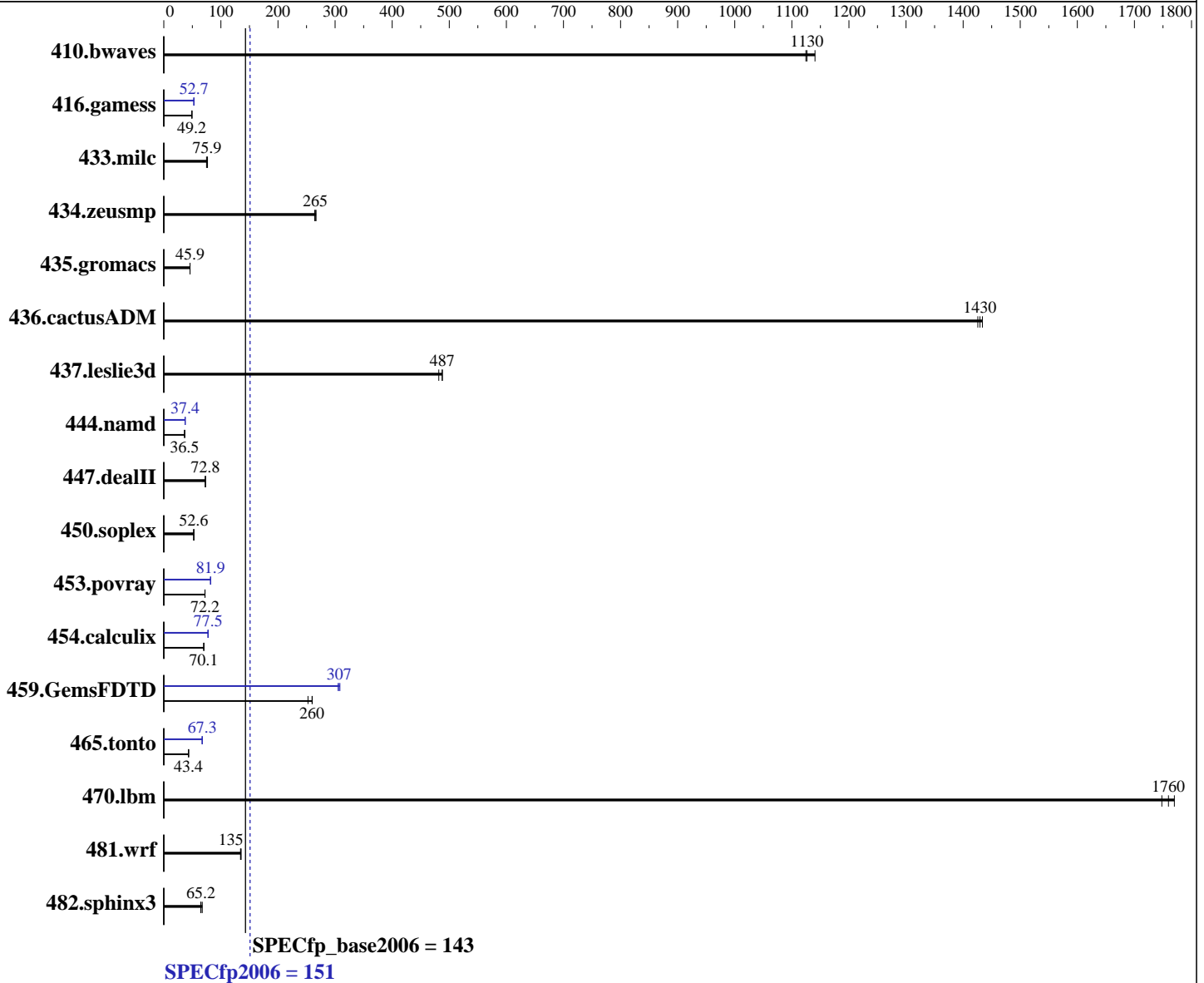
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Jun-2017

Hardware Availability: Aug-2017

Software Availability: Nov-2016



### Hardware

CPU Name: Intel Xeon Platinum 8176  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.80 GHz  
 CPU MHz: 2100  
 FPU: Integrated  
 CPU(s) enabled: 56 cores, 2 chips, 28 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

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### Software

Operating System: SUSE Linux Enterprise Server 12 SP2 (x86\_64)  
 Kernel 4.4.21-69-default  
 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: xfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 38.5 MB I+D on chip per chip  
Other Cache: None  
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)  
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

| Benchmark     | Base        |             |             |             |             |             | Peak        |             |             |             |             |             |
|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|               | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       |
| 410.bwaves    | 11.9        | 1140        | 12.1        | 1120        | <u>12.1</u> | <u>1130</u> | 11.9        | 1140        | 12.1        | 1120        | <u>12.1</u> | <u>1130</u> |
| 416.gamess    | 398         | 49.2        | 398         | 49.2        | <u>398</u>  | <u>49.2</u> | 372         | 52.6        | <u>371</u>  | <u>52.7</u> | 371         | 52.8        |
| 433.milc      | 123         | 74.8        | 120         | 76.5        | <u>121</u>  | <u>75.9</u> | 123         | 74.8        | 120         | 76.5        | <u>121</u>  | <u>75.9</u> |
| 434.zeusmp    | 34.4        | 264         | <u>34.3</u> | <u>265</u>  | 34.1        | 267         | 34.4        | 264         | <u>34.3</u> | <u>265</u>  | 34.1        | 267         |
| 435.gromacs   | 155         | 46.0        | 156         | 45.9        | <u>156</u>  | <u>45.9</u> | 155         | 46.0        | 156         | 45.9        | <u>156</u>  | <u>45.9</u> |
| 436.cactusADM | <u>8.36</u> | <u>1430</u> | 8.33        | 1430        | 8.38        | 1430        | <u>8.36</u> | <u>1430</u> | 8.33        | 1430        | 8.38        | 1430        |
| 437.leslie3d  | 19.5        | 482         | <u>19.3</u> | <u>487</u>  | 19.3        | 488         | 19.5        | 482         | <u>19.3</u> | <u>487</u>  | 19.3        | 488         |
| 444.namd      | 220         | 36.5        | 220         | 36.5        | <u>220</u>  | <u>36.5</u> | 214         | 37.4        | <u>214</u>  | <u>37.4</u> | 214         | 37.4        |
| 447.dealII    | 157         | 72.9        | <u>157</u>  | <u>72.8</u> | 157         | 72.7        | 157         | 72.9        | <u>157</u>  | <u>72.8</u> | 157         | 72.7        |
| 450.soplex    | <u>158</u>  | <u>52.6</u> | 158         | 52.6        | 159         | 52.3        | <u>158</u>  | <u>52.6</u> | 158         | 52.6        | 159         | 52.3        |
| 453.povray    | <u>73.7</u> | <u>72.2</u> | 73.7        | 72.2        | 73.9        | 72.0        | <u>65.0</u> | <u>81.9</u> | 64.9        | 82.0        | 65.0        | 81.9        |
| 454.calculix  | 118         | 70.2        | <u>118</u>  | <u>70.1</u> | 118         | 69.9        | 106         | 77.7        | 107         | 77.4        | <u>107</u>  | <u>77.5</u> |
| 459.GemsFDTD  | <u>40.9</u> | <u>260</u>  | 42.0        | 253         | 40.8        | 260         | 34.4        | 308         | <u>34.6</u> | <u>307</u>  | 34.8        | 305         |
| 465.tonto     | 227         | 43.3        | 226         | 43.5        | <u>227</u>  | <u>43.4</u> | 146         | 67.3        | <u>146</u>  | <u>67.3</u> | 147         | 67.2        |
| 470.lbm       | 7.76        | 1770        | 7.86        | 1750        | <u>7.81</u> | <u>1760</u> | 7.76        | 1770        | 7.86        | 1750        | <u>7.81</u> | <u>1760</u> |
| 481.wrf       | 82.4        | 135         | 83.1        | 134         | <u>83.0</u> | <u>135</u>  | 82.4        | 135         | 83.1        | 134         | <u>83.0</u> | <u>135</u>  |
| 482.sphinx3   | <u>299</u>  | <u>65.2</u> | 289         | 67.4        | 301         | 64.8        | <u>299</u>  | <u>65.2</u> | 289         | 67.4        | 301         | 64.8        |

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

LLC dead line alloc set to Disable

Patrol Scrub set to Disable

DCU Streamer Prefetcher set to Disable

DCA set to Enable

Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993

Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)

running on SN550-01 Sat Jun 3 13:49:03 2017

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**Test date:** Jun-2017

**Test sponsor:** Lenovo Global Technology

**Hardware Availability:** Aug-2017

**Tested by:** Lenovo Global Technology

**Software Availability:** Nov-2016

### 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) Platinum 8176 CPU @ 2.10GHz
 2 "physical id"s (chips)
 56 "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
cache size     : 39424 KB

```

From /proc/meminfo

```

MemTotal:      792244984 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 SN550-01 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 Jun 3 13:47

SPEC is set to: /home/cpu2006-1.2-ic17.0

```

Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   689G  192G  498G  28% /home

```

Additional information from dmidecode:

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## 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 -[IVE109A-1.00]- 04/27/2017

Memory:

24x 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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"

OMP\_NUM\_THREADS = "56"

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.

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

436.cactusADM: -DSPEC\_CPU\_LP64 -nofor\_main

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## Base Portability Flags (Continued)

```

437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.deall: -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.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](mailto:webmaster@spec.org).

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