



# SPEC® CFP2006 Result

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## Lenovo Global Technology

ThinkSystem SN850  
(2.10 GHz, Intel Xeon Platinum 8170)

SPECfp®2006 = 148

SPECfp\_base2006 = 140

CPU2006 license: 9017

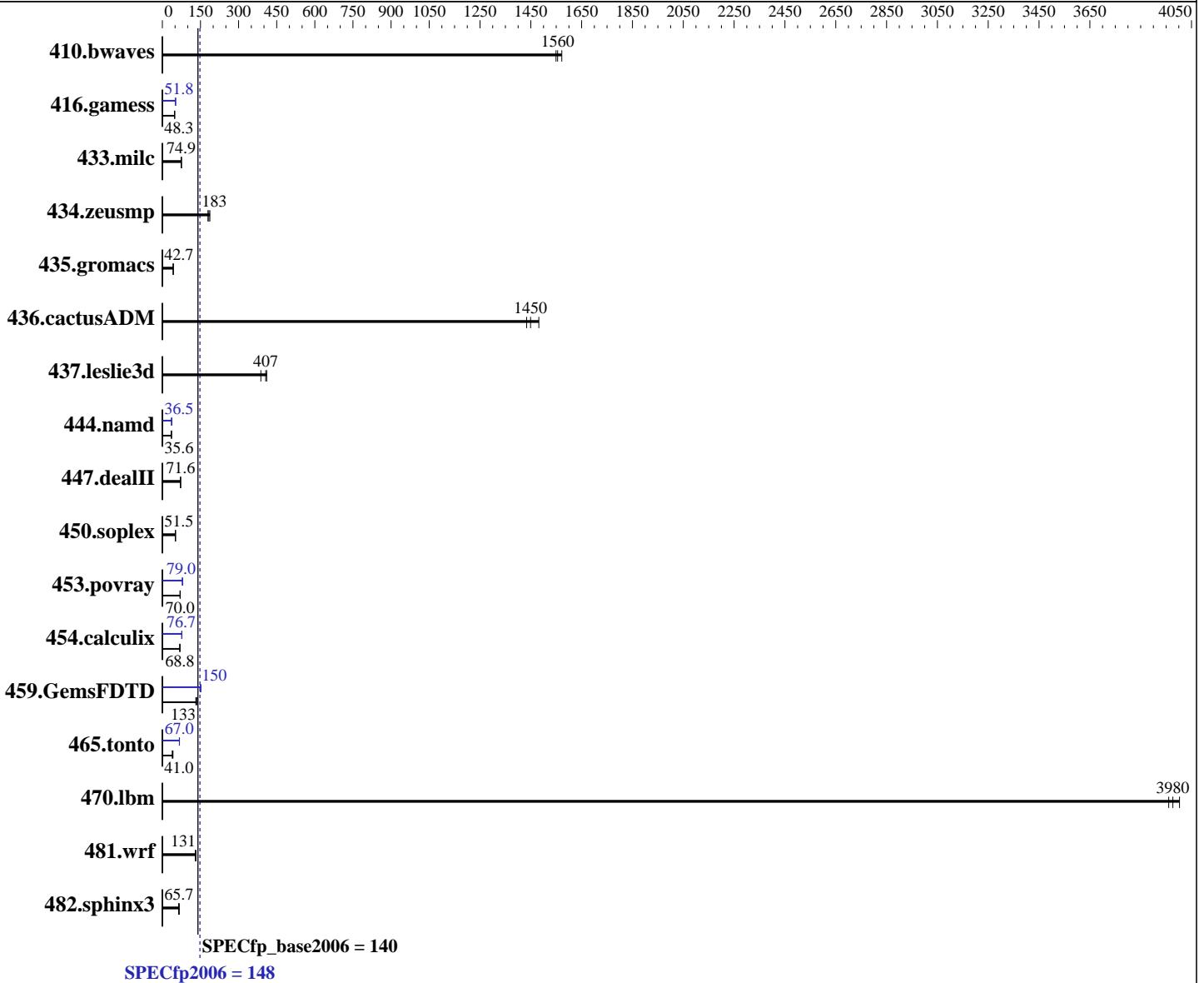
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Aug-2017

Software Availability: Nov-2016



### Hardware

CPU Name: Intel Xeon Platinum 8170  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 2100  
 FPU: Integrated  
 CPU(s) enabled: 104 cores, 4 chips, 26 cores/chip  
 CPU(s) orderable: 2,4 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: 35.75 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 960 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	<b>8.74</b>	<b>1560</b>	8.65	1570	8.77	1550	<b>8.74</b>	<b>1560</b>	8.65	1570	8.77	1550
416.gamess	<b>406</b>	<b>48.3</b>	405	48.3	406	48.2	378	51.8	<b>378</b>	<b>51.8</b>	377	51.9
433.milc	123	74.5	122	75.0	<b>123</b>	<b>74.9</b>	123	74.5	122	75.0	<b>123</b>	<b>74.9</b>
434.zeusmp	<b>49.7</b>	<b>183</b>	50.7	179	48.7	187	<b>49.7</b>	<b>183</b>	50.7	179	48.7	187
435.gromacs	166	43.0	168	42.6	<b>167</b>	<b>42.7</b>	166	43.0	168	42.6	<b>167</b>	<b>42.7</b>
436.cactusADM	8.07	1480	<b>8.25</b>	<b>1450</b>	8.34	1430	8.07	1480	<b>8.25</b>	<b>1450</b>	8.34	1430
437.leslie3d	22.9	411	24.3	388	<b>23.1</b>	<b>407</b>	22.9	411	24.3	388	<b>23.1</b>	<b>407</b>
444.namd	225	35.6	<b>225</b>	<b>35.6</b>	225	35.6	<b>220</b>	<b>36.5</b>	220	36.4	220	36.5
447.dealII	<b>160</b>	<b>71.6</b>	160	71.7	160	71.5	<b>160</b>	<b>71.6</b>	160	71.7	160	71.5
450.soplex	<b>162</b>	<b>51.5</b>	162	51.4	162	51.6	<b>162</b>	<b>51.5</b>	162	51.4	162	51.6
453.povray	<b>76.0</b>	<b>70.0</b>	76.0	70.0	76.1	69.9	<b>67.4</b>	<b>78.9</b>	<b>67.3</b>	<b>79.0</b>	67.2	79.2
454.calculix	120	69.0	120	68.8	<b>120</b>	<b>68.8</b>	<b>108</b>	<b>76.7</b>	108	76.7	108	76.5
459.GemsFDTD	78.4	135	<b>79.6</b>	<b>133</b>	80.5	132	70.7	150	<b>70.7</b>	<b>150</b>	70.0	152
465.tonto	236	41.7	254	38.7	<b>240</b>	<b>41.0</b>	<b>147</b>	<b>67.0</b>	147	67.0	146	67.4
470.lbm	<b>3.46</b>	<b>3980</b>	3.43	4000	3.47	3960	<b>3.46</b>	<b>3980</b>	3.43	4000	3.47	3960
481.wrf	<b>85.5</b>	<b>131</b>	84.6	132	85.8	130	<b>85.5</b>	<b>131</b>	84.6	132	85.8	130
482.sphinx3	294	66.2	305	63.9	<b>297</b>	<b>65.7</b>	294	66.2	305	63.9	<b>297</b>	<b>65.7</b>

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  
DCA set to Disable  
Patrol Scrub 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 SN850-01 Mon Aug 28 15:16:13 2017

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**Hardware Availability:** Aug-2017

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**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 8170 CPU @ 2.10GHz
 4 "physical id"s (chips)
 104 "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      : 26
siblings       : 26
physical 0:    cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
                26 27 28 29
physical 1:    cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
                26 27 28 29
physical 2:    cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
                26 27 28 29
physical 3:    cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
                26 27 28 29
cache size     : 36608 KB

```

From /proc/meminfo

```

MemTotal:      1584966120 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 SN850-01 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 Aug 28 15:15

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## Platform Notes (Continued)

SPEC is set to: /home/cpu2006-1.2-ic17.0  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda4 xfs 836G 294G 543G 36% /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 -[IVE109A-1.00]- 04/27/2017  
Memory:  
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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"  
OMP\_NUM\_THREADS = "104"

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

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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.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
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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## 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-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

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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.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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