



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Global Technology

ThinkSystem SN550  
(2.10 GHz, Intel Xeon Silver 4116)

SPECfp<sup>®</sup>2006 = **121**

SPECfp\_base2006 = **115**

CPU2006 license: 9017

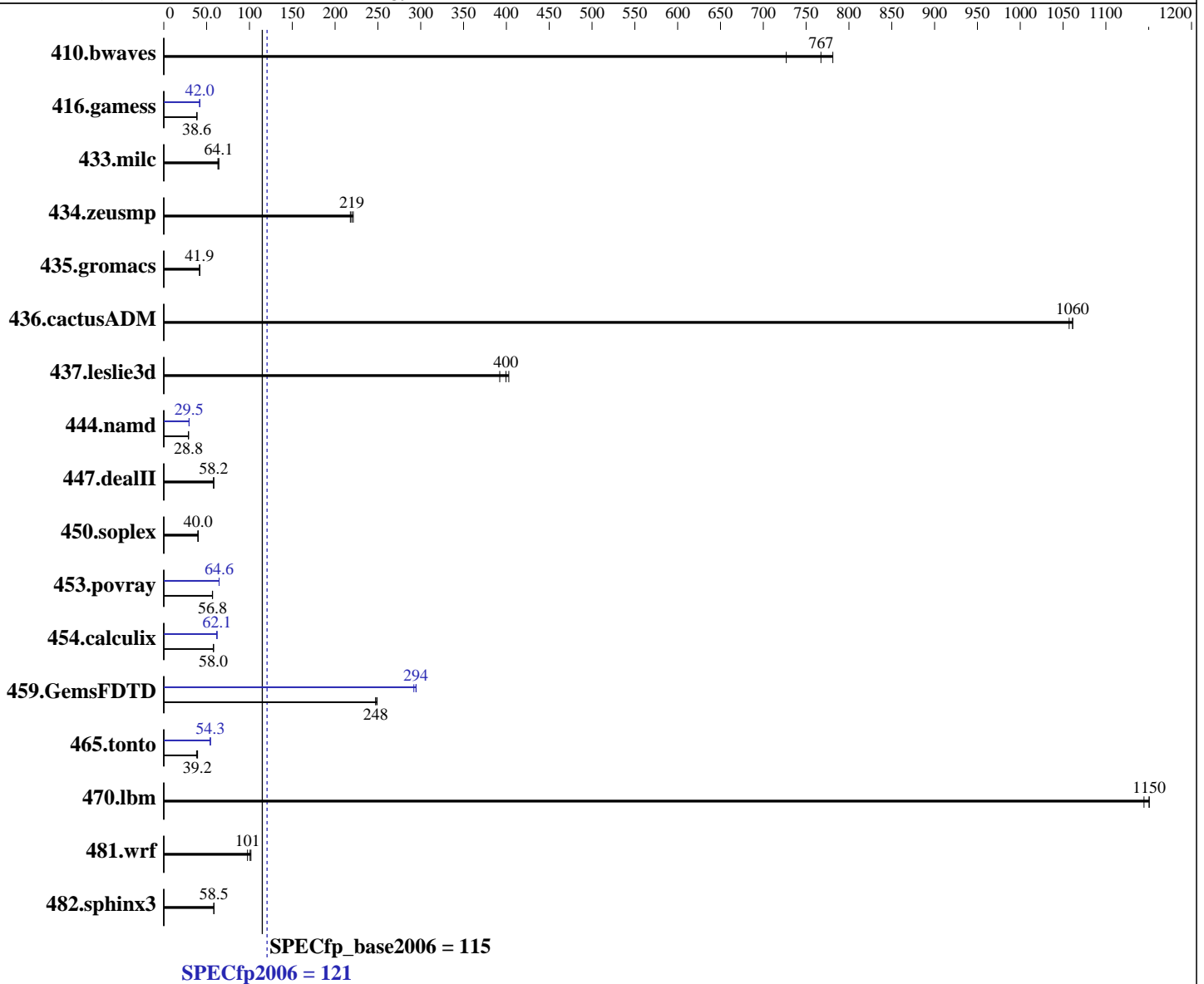
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Aug-2017

Software Availability: Nov-2016



**Hardware**

CPU Name: Intel Xeon 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

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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: 16.5 MB I+D on chip per chip  
Other Cache: None  
Memory: 768 GB (24 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

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	18.7	727	17.4	781	<b>17.7</b>	<b>767</b>	18.7	727	17.4	781	<b>17.7</b>	<b>767</b>
416.gamess	<b>507</b>	<b>38.6</b>	507	38.6	507	38.6	467	42.0	467	41.9	<b>467</b>	<b>42.0</b>
433.milc	145	63.2	143	64.2	<b>143</b>	<b>64.1</b>	145	63.2	143	64.2	<b>143</b>	<b>64.1</b>
434.zeusmp	<b>41.5</b>	<b>219</b>	41.8	218	41.1	221	<b>41.5</b>	<b>219</b>	41.8	218	41.1	221
435.gromacs	170	42.0	<b>170</b>	<b>41.9</b>	171	41.8	170	42.0	<b>170</b>	<b>41.9</b>	171	41.8
436.cactusADM	11.3	1060	<b>11.3</b>	<b>1060</b>	11.3	1060	11.3	1060	<b>11.3</b>	<b>1060</b>	11.3	1060
437.leslie3d	23.3	403	<b>23.5</b>	<b>400</b>	24.0	392	23.3	403	<b>23.5</b>	<b>400</b>	24.0	392
444.namd	278	28.8	279	28.8	<b>278</b>	<b>28.8</b>	272	29.5	<b>272</b>	<b>29.5</b>	272	29.5
447.dealII	<b>196</b>	<b>58.2</b>	196	58.2	197	58.2	<b>196</b>	<b>58.2</b>	196	58.2	197	58.2
450.soplex	208	40.2	209	39.8	<b>209</b>	<b>40.0</b>	208	40.2	209	39.8	<b>209</b>	<b>40.0</b>
453.povray	<b>93.7</b>	<b>56.8</b>	93.8	56.7	93.3	57.0	82.4	64.6	<b>82.4</b>	<b>64.6</b>	82.4	64.5
454.calculix	142	58.1	<b>142</b>	<b>58.0</b>	143	57.8	<b>133</b>	<b>62.1</b>	133	62.0	133	62.1
459.GemsFDTD	42.6	249	<b>42.9</b>	<b>248</b>	42.9	247	<b>36.0</b>	<b>294</b>	36.0	295	36.3	292
465.tonto	249	39.4	257	38.2	<b>251</b>	<b>39.2</b>	181	54.4	<b>181</b>	<b>54.3</b>	181	54.2
470.lbm	<b>11.9</b>	<b>1150</b>	11.9	1150	12.0	1140	<b>11.9</b>	<b>1150</b>	11.9	1150	12.0	1140
481.wrf	110	102	114	97.7	<b>111</b>	<b>101</b>	110	102	114	97.7	<b>111</b>	<b>101</b>
482.sphinx3	<b>333</b>	<b>58.5</b>	334	58.4	332	58.7	<b>333</b>	<b>58.5</b>	334	58.4	332	58.7

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

DCU Streamer Prefetcher 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)

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Hardware Availability: Aug-2017

Tested by: Lenovo Global Technology

Software Availability: Nov-2016

### Platform Notes (Continued)

running on SN550 Tue Aug 1 11:22:38 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: 792245660 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 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 1 11:21

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

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 687G 36G 652G 6% /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, configured at 2400 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 = "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

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

437.leslie3d: -DSPEC\_CPU\_LP64

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## Base Portability Flags (Continued)

```

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

```

## Peak Portability Flags

Same as Base Portability Flags



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Software Availability: Nov-2016

## 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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**Software Availability:** Nov-2016

## 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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