



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Global Technology

ThinkSystem SR650  
(2.30 GHz, Intel Xeon Gold 6140)

**SPECfp<sup>®</sup>2006 = 148**

**SPECfp\_base2006 = 141**

CPU2006 license: 9017

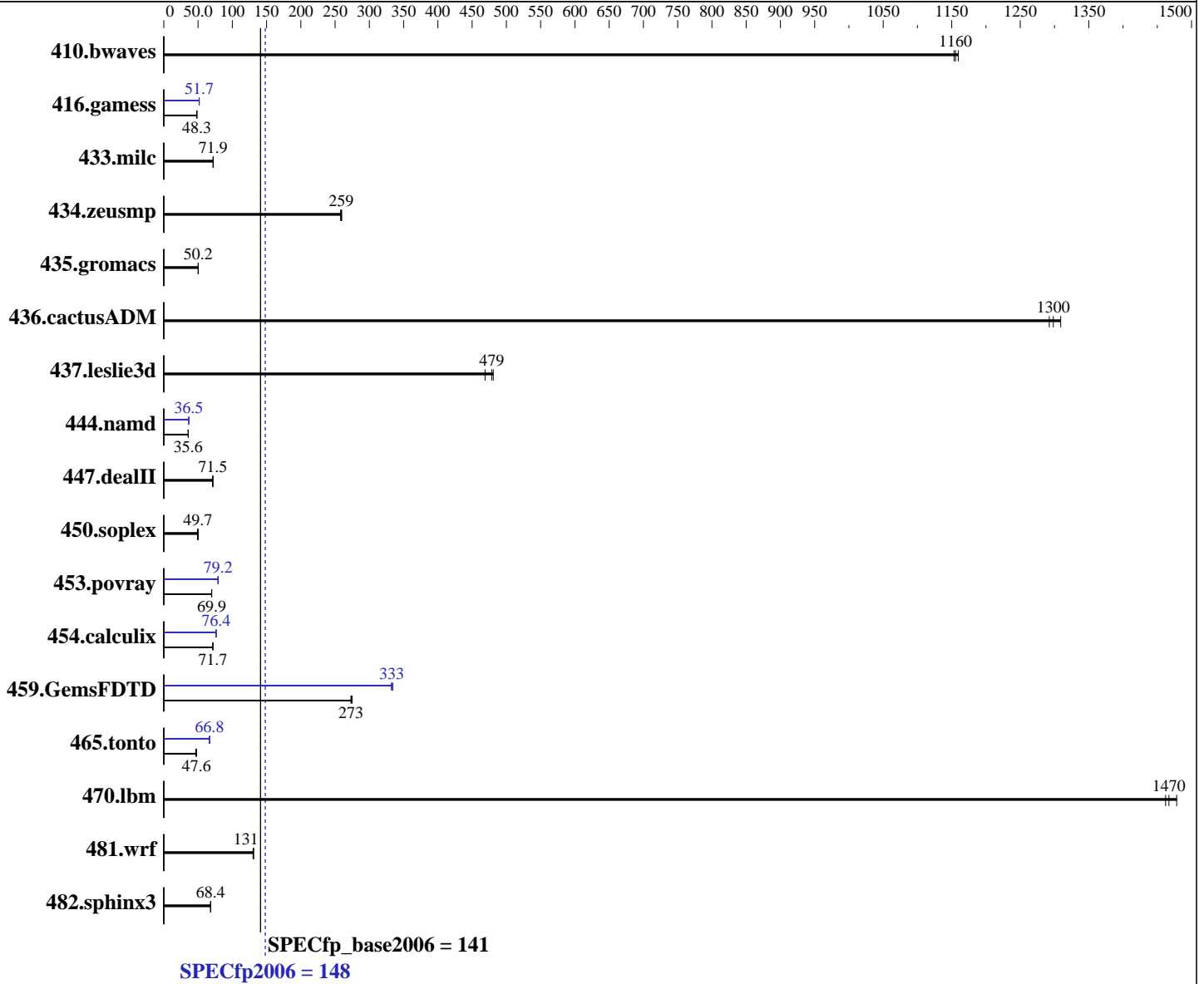
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Aug-2017

Software Availability: Apr-2017



**Hardware**

CPU Name: Intel Xeon Gold 6140  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 2300  
 FPU: Integrated  
 CPU(s) enabled: 36 cores, 2 chips, 18 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 17.0.3.191 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux  
 Auto Parallel: Yes  
 File System: btrfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 24.75 MB I+D on chip per chip  
Other Cache: None  
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)  
Disk Subsystem: 1 x 800 GB SAS 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	11.8	1150	<b><u>11.8</u></b>	<b><u>1160</u></b>	11.7	1160	11.8	1150	<b><u>11.8</u></b>	<b><u>1160</u></b>	11.7	1160
416.gamess	<b><u>406</u></b>	<b><u>48.3</u></b>	405	48.3	406	48.3	379	51.7	<b><u>379</u></b>	<b><u>51.7</u></b>	379	51.6
433.milc	<b><u>128</u></b>	<b><u>71.9</u></b>	128	71.9	127	72.3	<b><u>128</u></b>	<b><u>71.9</u></b>	128	71.9	127	72.3
434.zeusmp	35.3	258	<b><u>35.1</u></b>	<b><u>259</u></b>	35.0	260	35.3	258	<b><u>35.1</u></b>	<b><u>259</u></b>	35.0	260
435.gromacs	<b><u>142</u></b>	<b><u>50.2</u></b>	142	50.4	142	50.1	<b><u>142</u></b>	<b><u>50.2</u></b>	142	50.4	142	50.1
436.cactusADM	<b><u>9.20</u></b>	<b><u>1300</u></b>	9.13	1310	9.25	1290	<b><u>9.20</u></b>	<b><u>1300</u></b>	9.13	1310	9.25	1290
437.leslie3d	19.5	481	20.0	469	<b><u>19.6</u></b>	<b><u>479</u></b>	19.5	481	20.0	469	<b><u>19.6</u></b>	<b><u>479</u></b>
444.namd	225	35.6	225	35.6	<b><u>225</u></b>	<b><u>35.6</u></b>	220	36.5	220	36.5	<b><u>220</u></b>	<b><u>36.5</u></b>
447.dealII	160	71.3	<b><u>160</u></b>	<b><u>71.5</u></b>	159	71.8	160	71.3	<b><u>160</u></b>	<b><u>71.5</u></b>	159	71.8
450.soplex	166	50.2	170	49.2	<b><u>168</u></b>	<b><u>49.7</u></b>	166	50.2	170	49.2	<b><u>168</u></b>	<b><u>49.7</u></b>
453.povray	<b><u>76.2</u></b>	<b><u>69.9</u></b>	76.1	69.9	76.2	69.8	67.1	79.3	67.2	79.1	<b><u>67.2</u></b>	<b><u>79.2</u></b>
454.calculix	115	71.8	<b><u>115</u></b>	<b><u>71.7</u></b>	115	71.4	108	76.5	<b><u>108</u></b>	<b><u>76.4</u></b>	108	76.3
459.GemsFDTD	<b><u>38.8</u></b>	<b><u>273</u></b>	38.6	275	38.8	273	<b><u>31.9</u></b>	<b><u>333</u></b>	31.9	332	31.7	334
465.tonto	<b><u>207</u></b>	<b><u>47.6</u></b>	211	46.5	206	47.8	147	66.9	<b><u>147</u></b>	<b><u>66.8</u></b>	148	66.5
470.lbm	<b><u>9.37</u></b>	<b><u>1470</u></b>	9.29	1480	9.40	1460	<b><u>9.37</u></b>	<b><u>1470</u></b>	9.29	1480	9.40	1460
481.wrf	85.7	130	<b><u>85.3</u></b>	<b><u>131</u></b>	85.2	131	85.7	130	<b><u>85.3</u></b>	<b><u>131</u></b>	85.2	131
482.sphinx3	<b><u>285</u></b>	<b><u>68.4</u></b>	286	68.2	284	68.5	<b><u>285</u></b>	<b><u>68.4</u></b>	286	68.2	284	68.5

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:  
Operating Mode set to Maximum Performance  
Hyper-Threading set to Disabled  
LLC dead line alloc set to Disable  
Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on Cyborg-SPECcpu2006-SUSE12SP2 Tue Aug 8 01:58:10 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:

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**Hardware Availability:** Aug-2017

**Tested by:** Lenovo Global Technology

**Software Availability:** Apr-2017

### Platform Notes (Continued)

<http://www.spec.org/cpu2006/Docs/config.html#sysinfo>

```

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
 2 "physical id"s (chips)
 36 "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 : 18
  siblings  : 18
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
cache size : 25344 KB

```

```

From /proc/meminfo
MemTotal:      395892648 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 Cyborg-SPECcpu2006-SUSE12SP2 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 8 00:22

```

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sdb2        btrfs    744G   31G  712G   5% /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.

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## Platform Notes (Continued)

BIOS Lenovo -[IVE109Q-1.00]- 06/28/2017

Memory:

24x Samsung M393A2K43BB1-CTD 16 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,0,3"

LD\_LIBRARY\_PATH = "/home/cpu2006-1.2-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"

OMP\_NUM\_THREADS = "36"

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

Filesystem page cache cleared with:

shell invocation of 'sync; echo 3 > /proc/sys/vm/drop\_caches' prior to run

## 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

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## Base Portability Flags (Continued)

```

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-revF.html>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.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-revF.xml>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.20171004.xml>

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