



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Global Technology

ThinkSystem SR950  
(3.60 GHz, Intel Xeon Platinum 8156)

SPECfp<sup>®</sup>\_rate2006 = 2130

SPECfp\_rate\_base2006 = 2090

CPU2006 license: 9017

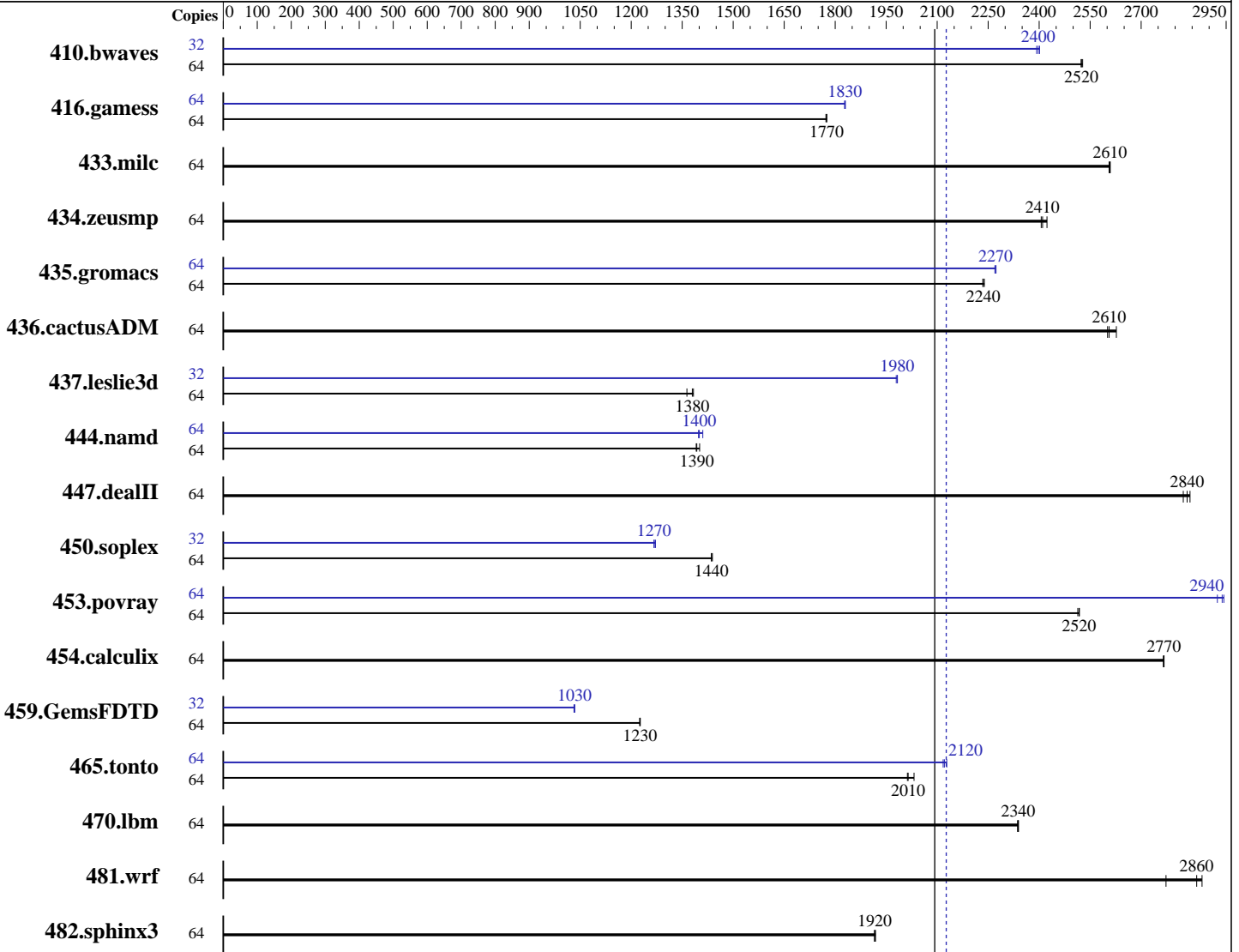
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Sep-2017

Software Availability: Apr-2017



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### Hardware

CPU Name: Intel Xeon Platinum 8156  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 3600  
 FPU: Integrated  
 CPU(s) enabled: 32 cores, 8 chips, 4 cores/chip, 2 threads/core  
 CPU(s) orderable: 2,4,8 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: tmpfs  
 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: 3 TB (96 x 32 GB 2Rx4 PC4-2666V-R)  
Disk Subsystem: 800 GB tmpfs  
Other Hardware: None

Base Pointers: 32/64-bit  
Peak Pointers: 32/64-bit  
Other Software: None

## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	64	344	2530	<b><u>345</u></b>	<b><u>2520</u></b>	345	2520	32	182	2390	181	2400	<b><u>181</u></b>	<b><u>2400</u></b>
416.gamess	64	<b><u>706</u></b>	<b><u>1770</u></b>	706	1780	707	1770	64	685	1830	686	1830	<b><u>685</u></b>	<b><u>1830</u></b>
433.milc	64	225	2610	225	2610	<b><u>225</u></b>	<b><u>2610</u></b>	64	225	2610	225	2610	<b><u>225</u></b>	<b><u>2610</u></b>
434.zeusmp	64	240	2420	<b><u>242</u></b>	<b><u>2410</u></b>	242	2410	64	240	2420	<b><u>242</u></b>	<b><u>2410</u></b>	242	2410
435.gromacs	64	204	2240	<b><u>204</u></b>	<b><u>2240</u></b>	205	2230	64	201	2270	<b><u>201</u></b>	<b><u>2270</u></b>	201	2270
436.cactusADM	64	291	2630	294	2600	<b><u>294</u></b>	<b><u>2610</u></b>	64	291	2630	294	2600	<b><u>294</u></b>	<b><u>2610</u></b>
437.leslie3d	64	<b><u>436</u></b>	<b><u>1380</u></b>	435	1380	441	1360	32	<b><u>152</u></b>	<b><u>1980</u></b>	152	1980	152	1980
444.namd	64	366	1400	369	1390	<b><u>368</u></b>	<b><u>1390</u></b>	64	364	1410	367	1400	<b><u>367</u></b>	<b><u>1400</u></b>
447.dealII	64	257	2840	<b><u>258</u></b>	<b><u>2840</u></b>	259	2820	64	257	2840	<b><u>258</u></b>	<b><u>2840</u></b>	259	2820
450.soplex	64	372	1440	<b><u>372</u></b>	<b><u>1440</u></b>	371	1440	32	211	1270	210	1270	<b><u>211</u></b>	<b><u>1270</u></b>
453.povray	64	135	2520	135	2510	<b><u>135</u></b>	<b><u>2520</u></b>	64	116	2940	116	2920	<b><u>116</u></b>	<b><u>2940</u></b>
454.calculix	64	191	2770	191	2770	<b><u>191</u></b>	<b><u>2770</u></b>	64	191	2770	191	2770	<b><u>191</u></b>	<b><u>2770</u></b>
459.GemsFDTD	64	554	1230	554	1220	<b><u>554</u></b>	<b><u>1230</u></b>	32	328	1030	329	1030	<b><u>329</u></b>	<b><u>1030</u></b>
465.tonto	64	<b><u>313</u></b>	<b><u>2010</u></b>	313	2010	310	2030	64	296	2130	<b><u>297</u></b>	<b><u>2120</u></b>	297	2120
470.lbm	64	376	2340	<b><u>376</u></b>	<b><u>2340</u></b>	376	2340	64	376	2340	<b><u>376</u></b>	<b><u>2340</u></b>	376	2340
481.wrf	64	248	2880	258	2770	<b><u>250</u></b>	<b><u>2860</u></b>	64	248	2880	258	2770	<b><u>250</u></b>	<b><u>2860</u></b>
482.sphinx3	64	<b><u>651</u></b>	<b><u>1920</u></b>	650	1920	651	1920	64	<b><u>651</u></b>	<b><u>1920</u></b>	650	1920	651	1920

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Tmpfs filesystem can be set with:

```
mount -t tmpfs -o size=800g tmpfs /home
```

Process tuning setting:

```
echo 50000 > /proc/sys/kernel/sched_cfs_bandwidth_slice_us
echo 240000000 > /proc/sys/kernel/sched_latency_ns
echo 5000000 > /proc/sys/kernel/sched_migration_cost_ns
echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
```

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## Operating System Notes (Continued)

```
echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns
```

## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance

SNC set to Enable

DCU Streamer Prefetcher set to Disable

Stale AtoS set to Enable

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 Proton8S-SUSE12SP2 Wed Aug 23 11:41:51 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) Platinum 8156 CPU @ 3.60GHz

8 "physical id"s (chips)

64 "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 : 4

siblings : 8

physical 0: cores 0 3 10 13

physical 1: cores 1 5 9 13

physical 2: cores 1 2 5 11

physical 3: cores 1 5 9 13

physical 4: cores 1 2 5 11

physical 5: cores 1 5 9 13

physical 6: cores 1 5 9 13

physical 7: cores 1 5 9 13

cache size : 16896 KB

From /proc/meminfo

MemTotal: 3170207836 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:

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## Platform Notes (Continued)

```

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 Proton8S-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 23 04:06

```

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs           tmpfs     800G  3.7G  797G   1% /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 -[PSE105L-1.00]- 06/22/2017

Memory:

96x 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:

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"

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  
Filesystem page cache cleared with:  
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop\_caches' prior to run  
runspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>

## Base Compiler Invocation

C benchmarks:

icc -m64

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## Base Compiler Invocation (Continued)

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  
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 -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3



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## Peak Compiler Invocation

C benchmarks:

icc -m64

C++ benchmarks (except as noted below):

icpc -m64

450.soplex: icpc -m32 -L/opt/intel/compilers\_and\_libraries\_2017/linux/lib/ia32

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

## Peak 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.deallI: -DSPEC\_CPU\_LP64  
 450.soplex: -D\_FILE\_OFFSET\_BITS=64  
 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

## Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

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## Peak Optimization Flags (Continued)

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  
-qopt-mem-layout-trans=3

447.dealII: basepeak = yes

450.soplex: -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) -qopt-malloc-options=3  
-qopt-mem-layout-trans=3

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 -qopt-mem-layout-trans=3

### Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

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: Same as 410.bwaves

459.GemsFDTD: Same as 410.bwaves

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) -unroll4 -auto -inline-calloc  
-qopt-malloc-options=3

### Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32  
-qopt-mem-layout-trans=3

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: basepeak = yes



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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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