



# SPEC® CFP2006 Result

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## Lenovo Group Limited

SPECfp®2006 = 126

Lenovo Flex System x240 M5  
(2.60 GHz, Intel Xeon E5-2690 v4)

SPECfp\_base2006 = 120

CPU2006 license: 9017

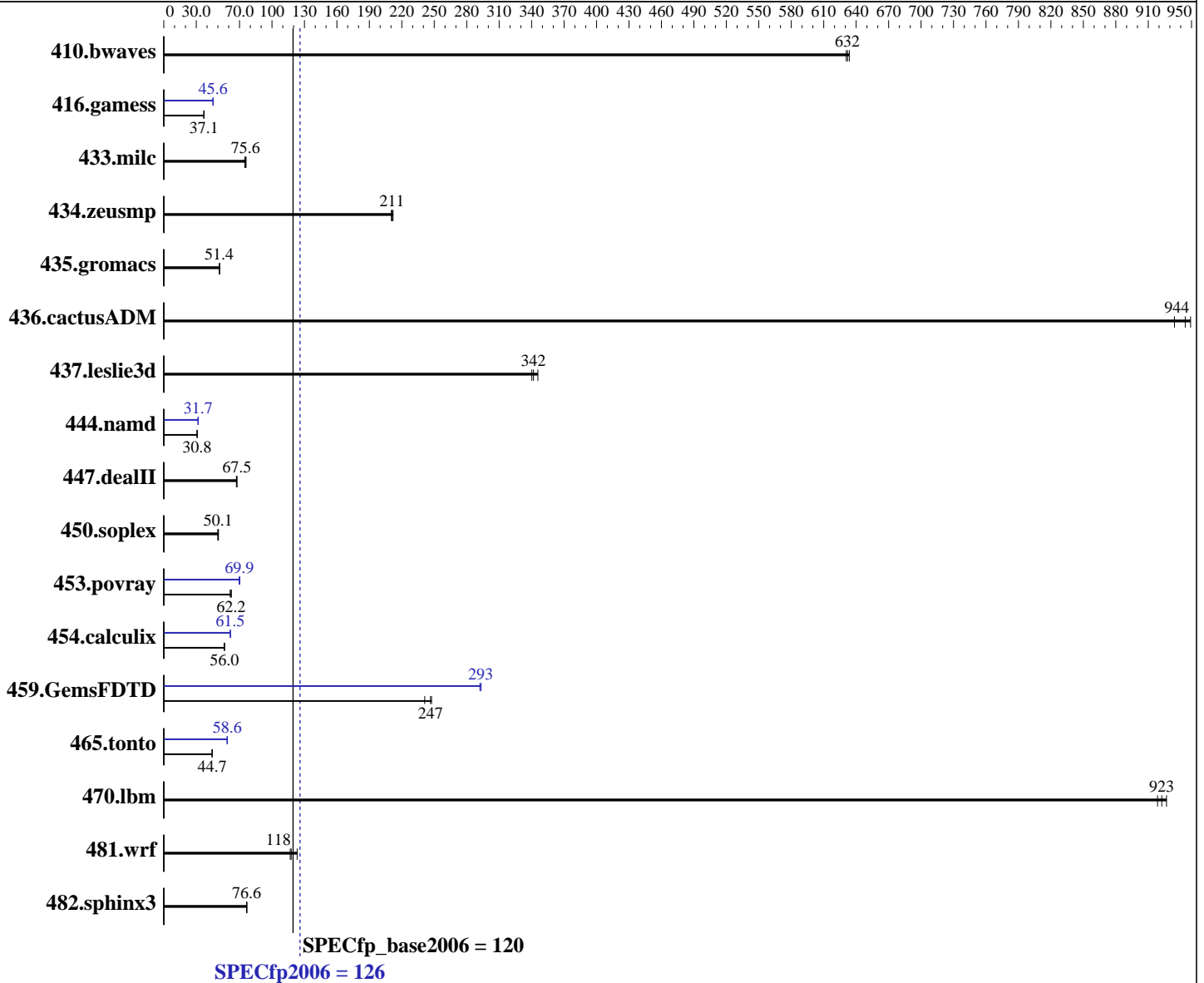
Test date: Apr-2016

Test sponsor: Lenovo Group Limited

Hardware Availability: Mar-2016

Tested by: Lenovo Group Limited

Software Availability: Dec-2015



### Hardware

CPU Name: Intel Xeon E5-2690 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.50 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 28 cores, 2 chips, 14 cores/chip  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 256 KB I+D on chip per core

Continued on next page

### Software

Operating System: SUSE Linux Enterprise Server 12 SP1 (x86\_64)  
 Kernel 3.12.49-11-default  
 Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;  
 Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux  
 Auto Parallel: Yes  
 File System: xfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 35 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)  
Disk Subsystem: 2 x 300 GB 10000 RPM SAS, RAID 0  
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	21.5	631	<b><u>21.5</u></b>	<b><u>632</u></b>	21.4	634	21.5	631	<b><u>21.5</u></b>	<b><u>632</u></b>	21.4	634
416.gamess	530	37.0	<b><u>528</u></b>	<b><u>37.1</u></b>	526	37.2	429	45.6	431	45.4	<b><u>430</u></b>	<b><u>45.6</u></b>
433.milc	123	74.8	121	76.0	<b><u>121</u></b>	<b><u>75.6</u></b>	123	74.8	121	76.0	<b><u>121</u></b>	<b><u>75.6</u></b>
434.zeusmp	42.9	212	43.3	210	<b><u>43.1</u></b>	<b><u>211</u></b>	42.9	212	43.3	210	<b><u>43.1</u></b>	<b><u>211</u></b>
435.gromacs	138	51.7	139	51.3	<b><u>139</u></b>	<b><u>51.4</u></b>	138	51.7	139	51.3	<b><u>139</u></b>	<b><u>51.4</u></b>
436.cactusADM	12.6	949	12.8	934	<b><u>12.7</u></b>	<b><u>944</u></b>	12.6	949	12.8	934	<b><u>12.7</u></b>	<b><u>944</u></b>
437.leslie3d	<b><u>27.5</u></b>	<b><u>342</u></b>	27.2	346	27.6	340	<b><u>27.5</u></b>	<b><u>342</u></b>	27.2	346	27.6	340
444.namd	261	30.8	<b><u>260</u></b>	<b><u>30.8</u></b>	260	30.9	252	31.8	<b><u>253</u></b>	<b><u>31.7</u></b>	254	31.6
447.dealII	170	67.1	169	67.6	<b><u>169</u></b>	<b><u>67.5</u></b>	170	67.1	169	67.6	<b><u>169</u></b>	<b><u>67.5</u></b>
450.soplex	165	50.6	167	50.0	<b><u>166</u></b>	<b><u>50.1</u></b>	165	50.6	167	50.0	<b><u>166</u></b>	<b><u>50.1</u></b>
453.povray	<b><u>85.5</u></b>	<b><u>62.2</u></b>	85.2	62.4	86.7	61.3	<b><u>76.1</u></b>	<b><u>69.9</u></b>	75.7	70.3	76.4	69.7
454.calculix	147	56.1	<b><u>147</u></b>	<b><u>56.0</u></b>	148	55.9	<b><u>134</u></b>	<b><u>61.5</u></b>	134	61.5	134	61.5
459.GemsFDTD	44.0	241	42.9	248	<b><u>43.0</u></b>	<b><u>247</u></b>	36.3	292	36.2	293	<b><u>36.2</u></b>	<b><u>293</u></b>
465.tonto	<b><u>220</u></b>	<b><u>44.7</u></b>	220	44.8	221	44.6	<b><u>168</u></b>	<b><u>58.6</u></b>	167	58.8	168	58.6
470.lbm	15.0	919	<b><u>14.9</u></b>	<b><u>923</u></b>	14.8	927	15.0	919	<b><u>14.9</u></b>	<b><u>923</u></b>	14.8	927
481.wrf	90.6	123	<b><u>94.8</u></b>	<b><u>118</u></b>	95.6	117	90.6	123	<b><u>94.8</u></b>	<b><u>118</u></b>	95.6	117
482.sphinx3	254	76.9	255	76.5	<b><u>254</u></b>	<b><u>76.6</u></b>	254	76.9	255	76.5	<b><u>254</u></b>	<b><u>76.6</u></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:  
Operating Mode set to Maximum Performance  
Hyper-Threading set to Disabled  
COD Preference set to Disable  
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
running on x240m5-cpu2006 Thu Apr 28 07:38:18 2016

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

Continued on next page



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Software Availability: Dec-2015

### Platform Notes (Continued)

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

```

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2690 v4@ 2.60GHz
 2 "physical id"s (chips)
 28 "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 : 14
  siblings  : 14
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 35840 KB

```

```

From /proc/meminfo
MemTotal:      263828808 kB
HugePages_Total:    0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 1
# 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-SP1"
VERSION_ID="12.1"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"

```

```

uname -a:
Linux x240m5-cpu2006 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux

```

run-level 3 Apr 28 02:47

```

SPEC is set to: /home/cpu2006-1.2-ic16.0
Filesystem      Type      Size      Used Avail Use% Mounted on
/dev/sda4        xfs       515G      7.1G  508G   2% /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 -[C4E123H-2.10]- 03/25/2016

Memory:

16x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz

8x NO DIMM Unknown

(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-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"

OMP\_NUM\_THREADS = "28"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1

Transparent Huge Pages enabled with:

echo always > /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

444.namd: -DSPEC\_CPU\_LP64

447.dealII: -DSPEC\_CPU\_LP64

450.soplex: -DSPEC\_CPU\_LP64

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## Base Portability Flags (Continued)

```

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 -opt-prefetch  
-ansi-alias

C++ benchmarks:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

Fortran benchmarks:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

Benchmarks using both Fortran and C:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch  
-ansi-alias

## 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: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)  
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)  
-par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias  
-auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)  
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)  
-par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4  
-ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)  
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)  
-par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2  
-inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)  
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)  
-par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2  
-inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)  
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)  
-par-num-threads=1(pass 1) -prof-use(pass 2) -inline-calloc  
-opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

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## Peak Optimization Flags (Continued)

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

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-ic16.0-official-linux64.html>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-BDW-B.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-BDW-B.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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