



SPEC® CFP2006 Result

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Lenovo Group Limited

SPECfp®2006 = 126

Lenovo System x3650 M5
(2.30 GHz, Intel Xeon E5-2697 v4)

SPECfp_base2006 = 118

CPU2006 license: 9017

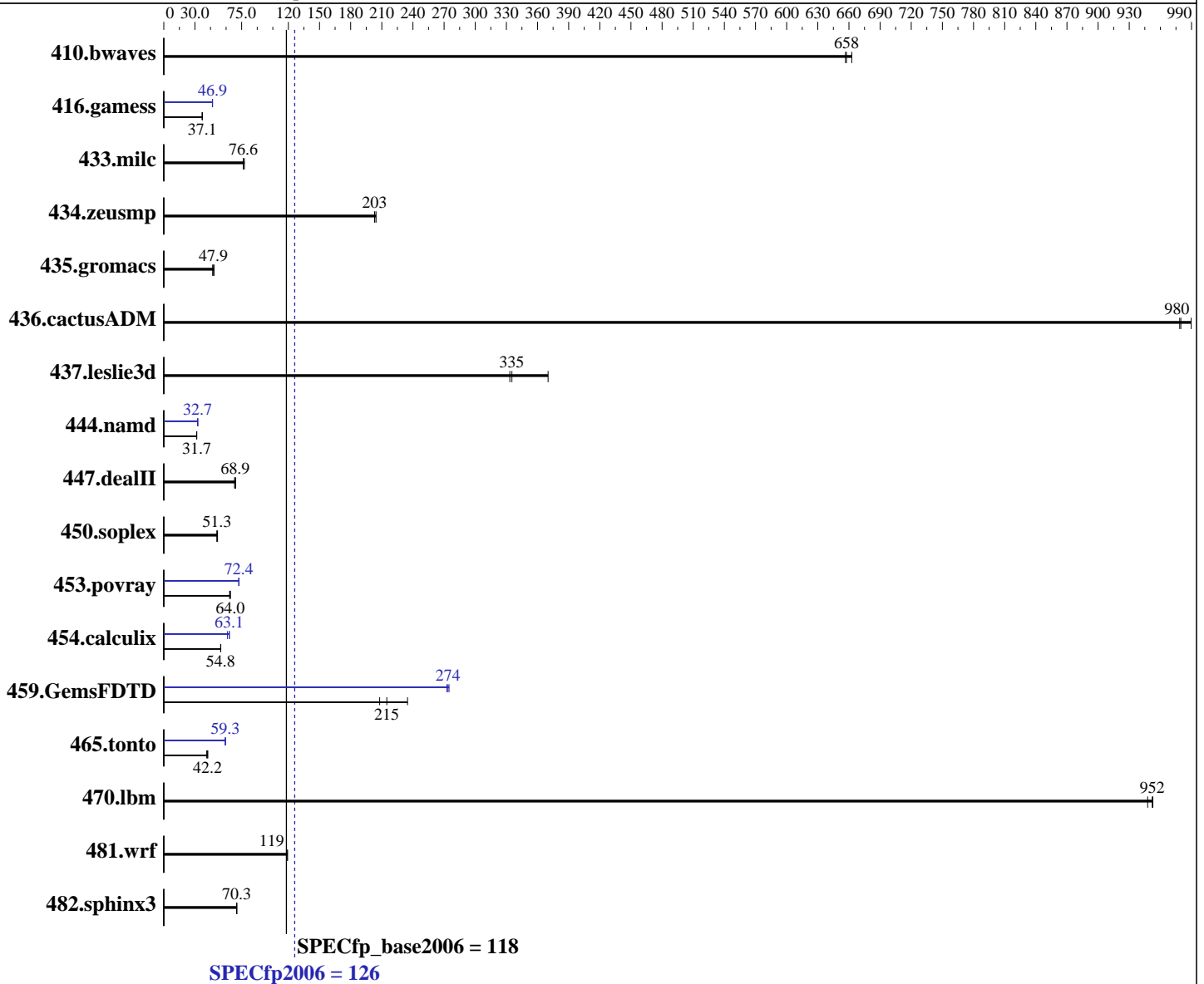
Test date: May-2016

Test sponsor: Lenovo Group Limited

Hardware Availability: Mar-2016

Tested by: Lenovo Group Limited

Software Availability: Dec-2015



Hardware

CPU Name: Intel Xeon E5-2697 v4
 CPU Characteristics: Intel Turbo Boost Technology up to 3.60 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: 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: 45 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
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 | <u>20.7</u> | <u>658</u> | 20.7 | 657 | 20.5 | 663 | <u>20.7</u> | <u>658</u> | 20.7 | 657 | 20.5 | 663 |
| 416.gamess | 528 | 37.1 | <u>528</u> | <u>37.1</u> | 529 | 37.0 | 417 | 47.0 | <u>417</u> | <u>46.9</u> | 418 | 46.9 |
| 433.milc | 120 | 76.5 | <u>120</u> | <u>76.6</u> | 118 | 77.7 | 120 | 76.5 | <u>120</u> | <u>76.6</u> | 118 | 77.7 |
| 434.zeusmp | 44.5 | 204 | 44.8 | 203 | <u>44.8</u> | <u>203</u> | 44.5 | 204 | 44.8 | 203 | <u>44.8</u> | <u>203</u> |
| 435.gromacs | 148 | 48.4 | <u>149</u> | <u>47.9</u> | 152 | 47.0 | 148 | 48.4 | <u>149</u> | <u>47.9</u> | 152 | 47.0 |
| 436.cactusADM | 12.2 | 979 | <u>12.2</u> | <u>980</u> | 12.1 | 990 | 12.2 | 979 | <u>12.2</u> | <u>980</u> | 12.1 | 990 |
| 437.leslie3d | 28.2 | 333 | <u>28.0</u> | <u>335</u> | 25.4 | 370 | 28.2 | 333 | <u>28.0</u> | <u>335</u> | 25.4 | 370 |
| 444.namd | 253 | 31.7 | <u>253</u> | <u>31.7</u> | 253 | 31.7 | 245 | 32.7 | <u>245</u> | <u>32.7</u> | 246 | 32.7 |
| 447.dealII | 165 | 69.2 | <u>166</u> | <u>68.9</u> | 168 | 68.1 | 165 | 69.2 | <u>166</u> | <u>68.9</u> | 168 | 68.1 |
| 450.soplex | <u>162</u> | <u>51.3</u> | 161 | 51.8 | 163 | 51.2 | <u>162</u> | <u>51.3</u> | 161 | 51.8 | 163 | 51.2 |
| 453.povray | 83.0 | 64.1 | 83.9 | 63.4 | <u>83.1</u> | <u>64.0</u> | 73.7 | 72.1 | 73.5 | 72.4 | <u>73.5</u> | <u>72.4</u> |
| 454.calculix | 150 | 54.9 | <u>150</u> | <u>54.8</u> | 151 | 54.8 | 131 | 63.1 | <u>131</u> | <u>63.1</u> | 135 | 61.2 |
| 459.GemsFDTD | <u>49.4</u> | <u>215</u> | 51.0 | 208 | 45.2 | 235 | <u>38.8</u> | <u>274</u> | 38.9 | 273 | 38.6 | 275 |
| 465.tonto | 232 | 42.4 | <u>233</u> | <u>42.2</u> | 239 | 41.2 | 166 | 59.2 | <u>166</u> | <u>59.3</u> | 166 | 59.4 |
| 470.lbm | 14.5 | 948 | 14.4 | 953 | <u>14.4</u> | <u>952</u> | 14.5 | 948 | 14.4 | 953 | <u>14.4</u> | <u>952</u> |
| 481.wrf | <u>94.2</u> | <u>119</u> | 93.6 | 119 | 94.3 | 118 | <u>94.2</u> | <u>119</u> | 93.6 | 119 | 94.3 | 118 |
| 482.sphinx3 | 277 | 70.3 | 278 | 70.2 | <u>277</u> | <u>70.3</u> | 277 | 70.3 | 278 | 70.2 | <u>277</u> | <u>70.3</u> |

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

Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914

\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1

running on XinYi-03 Tue May 10 03:55:41 2016

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>

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Platform Notes (Continued)

```

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2697 v4 @ 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 : 46080 KB

```

```

From /proc/meminfo
MemTotal:      263958820 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 XinYi-03 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 May 9 23:08

```

SPEC is set to: /home/cpu2006-1.2-ic16.0
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   688G  7.6G  681G   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 -[TCE124I-2.10]- 04/27/2016

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 = "36"

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

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

444.namd: -DSPEC_CPU_LP64

447.dealII: -DSPEC_CPU_LP64

450.soplex: -DSPEC_CPU_LP64

453.povray: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

```

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-Settings-V1.2-BDW-revC.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-Settings-V1.2-BDW-revC.xml>

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