# SPEC® CFP2006 Result

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## Lenovo Group Limited

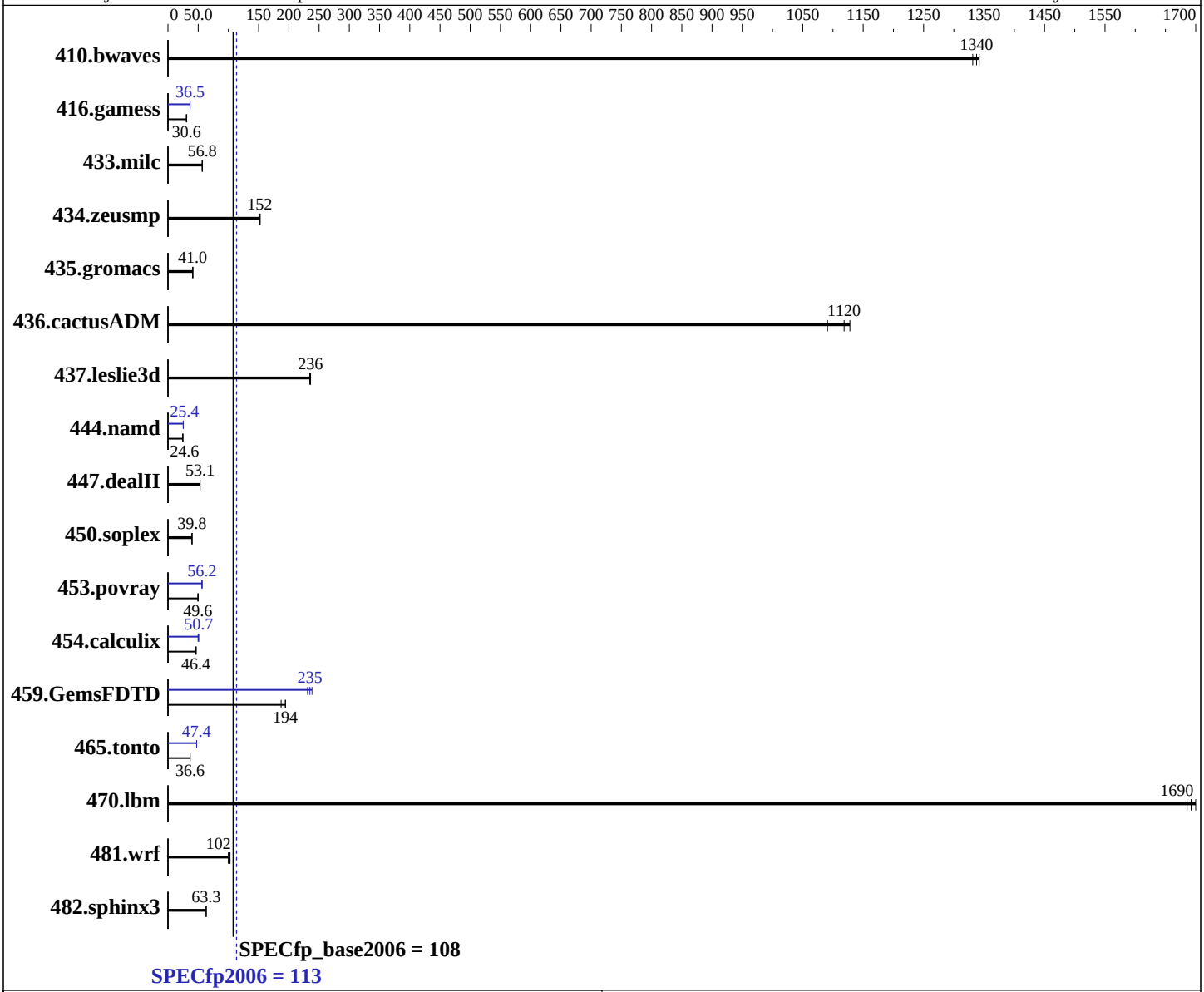
Lenovo System x3850 X6
(2.10 GHz, Intel Xeon E7-4850 v4)

SPECfp®2006 = 113

SPECfp_base2006 = 108

**CPU2006 license:** 9017
**Test sponsor:** Lenovo Group Limited
**Tested by:** Lenovo Group Limited

**Test date:** Jul-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Dec-2015




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-4850 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 2.80 GHz |
| CPU MHz: | 2100 |
| FPU: | Integrated |
| CPU(s) enabled: | 64 cores, 4 chips, 16 cores/chip |
| CPU(s) orderable: | 2,4 chips |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |

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## Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 12 SP1 (x86_64)<br>Kernel 3.12.49-11-default |
| Compiler: | C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;<br>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: 40 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1333 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 | 10.2 | 1330 | 10.1 | 1340 | **10.2** | **1340** | 10.2 | 1330 | 10.1 | 1340 | **10.2** | **1340** |
| 416.gamess | **639** | **30.6** | 640 | 30.6 | 639 | 30.6 | **536** | **36.5** | 536 | 36.5 | 536 | 36.5 |
| 433.milc | **162** | **56.8** | 162 | 56.8 | 162 | 56.7 | **162** | **56.8** | 162 | 56.8 | 162 | 56.7 |
| 434.zeusmp | **59.8** | **152** | 59.7 | 153 | 60.2 | 151 | **59.8** | **152** | 59.7 | 153 | 60.2 | 151 |
| 435.gromacs | 174 | 41.0 | 174 | 41.1 | **174** | **41.0** | 174 | 41.0 | 174 | 41.1 | **174** | **41.0** |
| 436.cactusADM | **10.7** | **1120** | 10.6 | 1130 | 11.0 | 1090 | **10.7** | **1120** | 10.6 | 1130 | 11.0 | 1090 |
| 437.leslie3d | 40.1 | 234 | **39.9** | **236** | 39.8 | 236 | 40.1 | 234 | **39.9** | **236** | 39.8 | 236 |
| 444.namd | 326 | 24.6 | 326 | 24.6 | **326** | **24.6** | 316 | 25.4 | **316** | **25.4** | 316 | 25.4 |
| 447.dealII | 215 | 53.1 | 216 | 53.0 | **216** | **53.1** | 215 | 53.1 | 216 | 53.0 | **216** | **53.1** |
| 450.soplex | 210 | 39.7 | **209** | **39.8** | 209 | 39.8 | 210 | 39.7 | **209** | **39.8** | 209 | 39.8 |
| 453.povray | 107 | 49.9 | **107** | **49.6** | 107 | 49.6 | 94.7 | 56.2 | 94.2 | 56.4 | **94.6** | **56.2** |
| 454.calculix | 178 | 46.4 | **178** | **46.4** | 178 | 46.5 | 162 | 50.8 | **163** | **50.7** | 166 | 49.7 |
| 459.GemsFDTD | 54.6 | 194 | 56.7 | 187 | **54.6** | **194** | **45.2** | **235** | 44.5 | 238 | 45.9 | 231 |
| 465.tonto | **269** | **36.6** | 270 | 36.5 | 269 | 36.6 | 207 | 47.4 | **207** | **47.4** | 207 | 47.4 |
| 470.lbm | **8.12** | **1690** | 8.08 | 1700 | 8.15 | 1690 | **8.12** | **1690** | 8.08 | 1700 | 8.15 | 1690 |
| 481.wrf | 109 | 103 | 112 | 99.8 | **109** | **102** | 109 | 103 | 112 | 99.8 | **109** | **102** |
| 482.sphinx3 | 308 | 63.3 | 314 | 62.1 | **308** | **63.3** | 308 | 63.3 | 314 | 62.1 | **308** | **63.3** |

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 Disable
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on Draco-01 Thu Jul 21 23:16:36 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

## Platform Notes (Continued)

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

    From /proc/cpuinfo
       model name : Intel(R) Xeon(R) CPU E7-4850 v4 @ 2.10GHz
          4 "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 : 16
          siblings  : 16
          physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
          physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
          physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
          physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       cache size : 40960 KB

    From /proc/meminfo
       MemTotal:       529163300 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 Draco-01 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 Jul 21 17:17

    SPEC is set to: /home/cpu2006-1.2-ic16.0
       Filesystem     Type  Size  Used Avail Use% Mounted on
       /dev/sda4      xfs   688G  4.4G  684G   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
```

Continued on next page

## Platform Notes (Continued)

```
     determined", but the intent may not be met, as there are frequent changes to
     hardware, firmware, and the "DMTF SMBIOS" standard.

    BIOS LENOVO -[A9E135CUS-3.10]- 06/16/2016
    Memory:
     32x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 1333 MHz
     64x 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 = "64"

 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

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## Base Portability Flags (Continued)

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 -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

# 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:

Continued on next page

## 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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