# SPEC® CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

$SPECfp^{®}\_rate2006 = $ 2130

$SPECfp\_rate\_base2006 = $ 2080

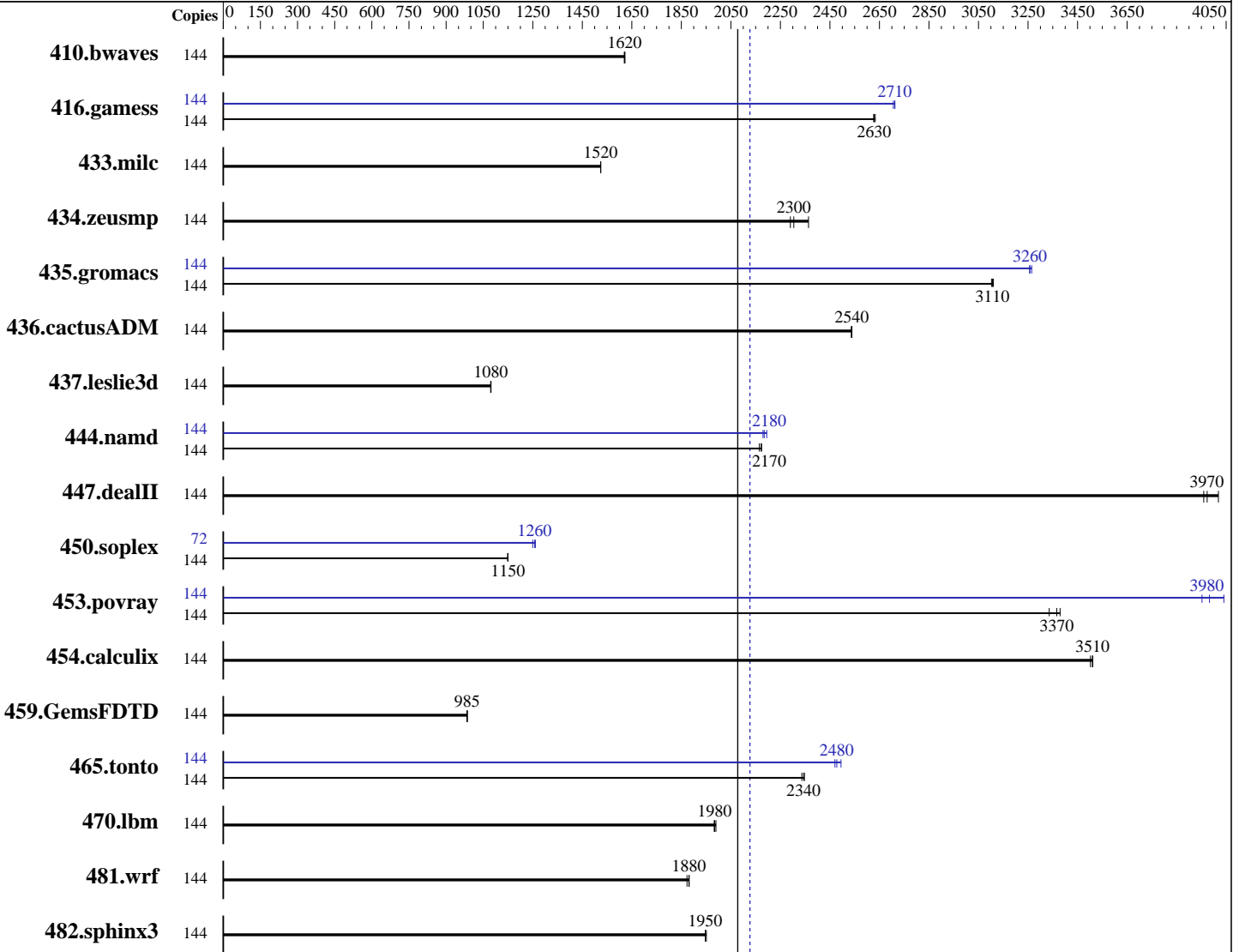| | |
|---|---|
| **CPU2006 license:** 9017 | **Test date:** Jul-2016 |
| **Test sponsor:** Lenovo Group Limited | **Hardware Availability:** Jun-2016 |
| **Tested by:** Lenovo Group Limited | **Software Availability:** Mar-2016 |

**Copies** 0 150 300 450 600 750 900 1050 1250 1450 1650 1850 2050 2250 2450 2650 2850 3050 3250 3450 3650 4050

| Benchmark | Copies | Value |
|---|---|---|
| 410.bwaves | 144 | 1620 |
| 416.gamess | 144 | 2710 |
| 416.gamess | 144 | 2630 |
| 433.milc | 144 | 1520 |
| 434.zeusmp | 144 | 2300 |
| 435.gromacs | 144 | 3260 |
| 435.gromacs | 144 | 3110 |
| 436.cactusADM | 144 | 2540 |
| 437.leslie3d | 144 | 1080 |
| 444.namd | 144 | 2180 |
| 444.namd | 144 | 2170 |
| 447.dealII | 144 | 3970 |
| 450.soplex | 72 | 1260 |
| 450.soplex | 144 | 1150 |
| 453.povray | 144 | 3980 |
| 453.povray | 144 | 3370 |
| 454.calculix | 144 | 3510 |
| 459.GemsFDTD | 144 | 985 |
| 465.tonto | 144 | 2480 |
| 465.tonto | 144 | 2340 |
| 470.lbm | 144 | 1980 |
| 481.wrf | 144 | 1880 |
| 482.sphinx3 | 144 | 1950 |

SPECfp_rate_base2006 = 2080

SPECfp_rate2006 = 2130

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-8860 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.20 GHz |
| CPU MHz: | 2200 |
| FPU: | Integrated |
| CPU(s) enabled: | 72 cores, 4 chips, 18 cores/chip, 2 threads/core |
| 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 |

*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 16.0.2.181 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.2.181 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | No |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |

*Continued on next page*

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

SPECfp_rate2006 = 2130

SPECfp_rate_base2006 = 2080

| | |
|---|---|
| **CPU2006 license:** 9017 | **Test date:** Jul-2016 |
| **Test sponsor:** Lenovo Group Limited | **Hardware Availability:** Jun-2016 |
| **Tested by:** Lenovo Group Limited | **Software Availability:** Mar-2016 |

| | | | |
|---|---|---|---|
| L3 Cache: | 45 MB I+D on chip per chip | Base Pointers: | 32/64-bit |
| Other Cache: | None | Peak Pointers: | 32/64-bit |
| Memory: | 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz) | Other Software: | None |
| Disk Subsystem: | 1 x 800 GB SATA SSD | | |
| Other Hardware: | None | | |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 144 | 1206 | 1620 | 1208 | 1620 | **1208** | **1620** | 144 | 1206 | 1620 | 1208 | 1620 | **1208** | **1620** |
| 416.gamess | 144 | 1071 | 2630 | 1073 | 2630 | **1073** | **2630** | 144 | 1042 | 2710 | 1040 | 2710 | **1040** | **2710** |
| 433.milc | 144 | **867** | **1520** | 867 | 1520 | 867 | 1520 | 144 | **867** | **1520** | 867 | 1520 | 867 | 1520 |
| 434.zeusmp | 144 | 572 | 2290 | 554 | 2360 | **569** | **2300** | 144 | 572 | 2290 | 554 | 2360 | **569** | **2300** |
| 435.gromacs | 144 | 331 | 3100 | 331 | 3110 | **331** | **3110** | 144 | **316** | **3260** | 315 | 3260 | 316 | 3260 |
| 436.cactusADM | 144 | 678 | 2540 | **678** | **2540** | 679 | 2540 | 144 | 678 | 2540 | **678** | **2540** | 679 | 2540 |
| 437.leslie3d | 144 | **1253** | **1080** | 1252 | 1080 | 1253 | 1080 | 144 | **1253** | **1080** | 1252 | 1080 | 1253 | 1080 |
| 444.namd | 144 | 533 | 2160 | 531 | 2170 | **532** | **2170** | 144 | 530 | 2180 | 526 | 2190 | **529** | **2180** |
| 447.dealII | 144 | 416 | 3960 | **415** | **3970** | 410 | 4020 | 144 | 416 | 3960 | **415** | **3970** | 410 | 4020 |
| 450.soplex | 144 | 1044 | 1150 | **1045** | **1150** | 1046 | 1150 | 72 | 476 | 1260 | 480 | 1250 | **477** | **1260** |
| 453.povray | 144 | **228** | **3370** | 227 | 3380 | 230 | 3340 | 144 | 190 | 4040 | **192** | **3980** | 194 | 3950 |
| 454.calculix | 144 | 338 | 3510 | **338** | **3510** | 339 | 3500 | 144 | 338 | 3510 | **338** | **3510** | 339 | 3500 |
| 459.GemsFDTD | 144 | **1551** | **985** | 1552 | 984 | 1550 | 986 | 144 | **1551** | **985** | 1552 | 984 | 1550 | 986 |
| 465.tonto | 144 | **605** | **2340** | 606 | 2340 | 604 | 2350 | 144 | 574 | 2470 | 568 | 2490 | **572** | **2480** |
| 470.lbm | 144 | 994 | 1990 | **997** | **1980** | 998 | 1980 | 144 | 994 | 1990 | **997** | **1980** | 998 | 1980 |
| 481.wrf | 144 | 859 | 1870 | 855 | 1880 | **855** | **1880** | 144 | 859 | 1870 | 855 | 1880 | **855** | **1880** |
| 482.sphinx3 | 144 | 1442 | 1950 | **1442** | **1950** | 1438 | 1950 | 144 | 1442 | 1950 | **1442** | **1950** | 1438 | 1950 |

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"
Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
 echo 1 > /proc/sys/vm/drop_caches

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

SPECfp_rate2006 = 2130

SPECfp_rate_base2006 = 2080

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

**Test date:** Jul-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016

## Platform Notes

```
BIOS Configuration:
 Operating Mode set to "Maximum Performance"
 COD Preference set to Enable
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on Draco-01 Sat Jul 30 05:03:33 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

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E7-8860 v4 @ 2.20GHz
      4 "physical id"s (chips)
      144 "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  : 36
      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
      physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
   cache size : 23040 KB

From /proc/meminfo
   MemTotal:       529153472 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
```

Continued on next page

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

$SPECfp\_rate2006 =$ 2130

$SPECfp\_rate\_base2006 =$ 2080

| | | | |
|---|---|---|---|
| **CPU2006 license:** 9017 | | **Test date:** | Jul-2016 |
| **Test sponsor:** Lenovo Group Limited | | **Hardware Availability:** | Jun-2016 |
| **Tested by:** Lenovo Group Limited | | **Software Availability:** | Mar-2016 |

## Platform Notes (Continued)

```
  run-level 3 Jul 29 15:41

  SPEC is set to: /home/cpu2006-1.2-ic16.0
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/sda4      xfs   688G  4.5G  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
     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 1600 MHz
   64x NO DIMM Unknown

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

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB
 memory using RedHat EL 7.2 glibc 2.17
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 echo 1>        /proc/sys/vm/drop_caches
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

## 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

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

SPECfp_rate2006 =      2130

SPECfp_rate_base2006 =  2080

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

**Test date:** Jul-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016

## 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 -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

Fortran benchmarks:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
```

Benchmarks using both Fortran and C:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

## 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_2016/linux/compiler/lib/ia32_lin
```

Continued on next page

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

$SPECfp\_rate2006 =$     2130

$SPECfp\_rate\_base2006 =$  2080

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

**Test date:** Jul-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016

## Peak Compiler Invocation (Continued)

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.dealII: -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:

```
       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) -opt-mem-layout-trans=3(pass 2)
                 -prof-use(pass 2) -fno-alias -auto-ilp32

       447.dealII: basepeak = yes
```

# SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

SPECfp_rate2006 = 2130

SPECfp_rate_base2006 = 2080

| | | | |
|---|---|---|---|
| **CPU2006 license:** 9017 | | **Test date:** | Jul-2016 |
| **Test sponsor:** Lenovo Group Limited | | **Hardware Availability:** | Jun-2016 |
| **Tested by:** Lenovo Group Limited | | **Software Availability:** | Mar-2016 |

## Peak Optimization Flags (Continued)

    450.soplex: -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) -opt-mem-layout-trans=3(pass 2)
                -prof-use(pass 2) -opt-malloc-options=3

    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) -opt-mem-layout-trans=3(pass 2)
                -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: basepeak = yes

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

Benchmarks using both Fortran and C:

    435.gromacs: -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) -opt-mem-layout-trans=3(pass 2)
                 -prof-use(pass 2) -opt-prefetch -auto-ilp32

    436.cactusADM: basepeak = yes

    454.calculix: basepeak = yes

    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

# SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

## Lenovo Group Limited

Lenovo System x3850 X6
(Intel Xeon E7-8860 v4, 2.20 GHz)

$SPECfp\_rate2006 = \qquad 2130$

$SPECfp\_rate\_base2006 = \ 2080$

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

**Test date:** Jul-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016

SPEC and SPECfp are registered trademarks of the Standard Performance
Evaluation Corporation.  All other brand and product names appearing in
this result are trademarks or registered trademarks of their respective
holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Wed Aug 24 13:14:33 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 23 August 2016.