# SPEC® CFP2006 Result

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## Lenovo Global Technology

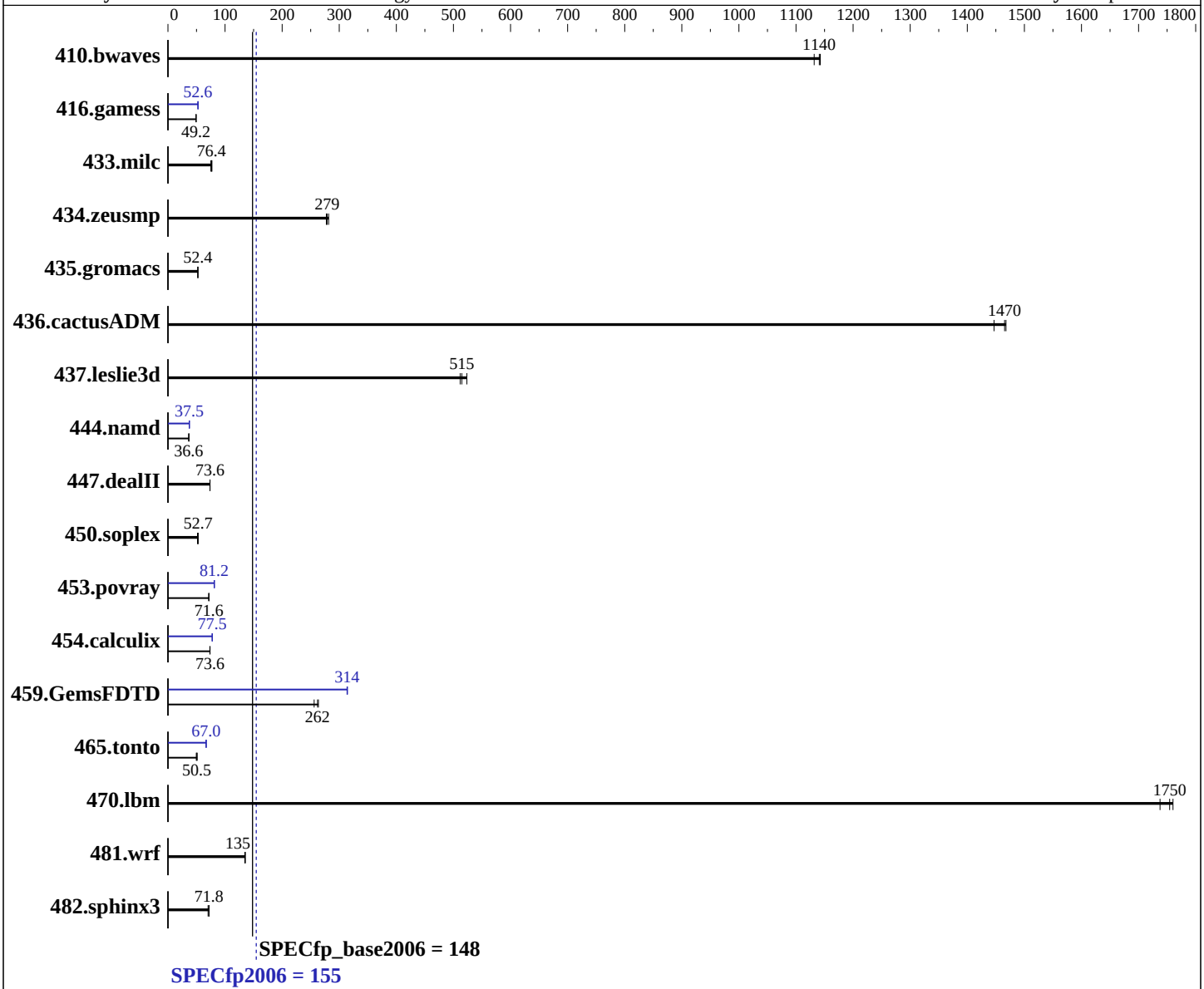
ThinkSystem SR650
(2.50 GHz, Intel Xeon Platinum 8180)

SPECfp®2006 = 155

SPECfp_base2006 = 148

**CPU2006 license:** 9017
**Test sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test date:** May-2017
**Hardware Availability:** Aug-2017
**Software Availability:** Apr-2017




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Platinum 8180 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.80 GHz |
| CPU MHz: | 2500 |
| FPU: | Integrated |
| CPU(s) enabled: | 56 cores, 2 chips, 28 cores/chip |
| CPU(s) orderable: | 1,2 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)<br>Kernel 4.4.21-69-default |
| Compiler: | C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;<br>Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux |
| Auto Parallel: | Yes |
| File System: | btrfs |
| System State: | Run level 3 (multi-user) |

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L3 Cache: 38.5 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 1 x 800 GB SAS 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 | 12.0 | 1130 | 11.9 | 1140 | **11.9** | **1140** | 12.0 | 1130 | 11.9 | 1140 | **11.9** | **1140** |
| 416.gamess | **398** | **49.2** | 397 | 49.3 | 398 | 49.1 | 373 | 52.5 | 372 | 52.7 | **372** | **52.6** |
| 433.milc | 122 | 75.1 | 119 | 77.0 | **120** | **76.4** | 122 | 75.1 | 119 | 77.0 | **120** | **76.4** |
| 434.zeusmp | 32.8 | 277 | 32.3 | 281 | **32.6** | **279** | 32.8 | 277 | 32.3 | 281 | **32.6** | **279** |
| 435.gromacs | **136** | **52.4** | 137 | 52.3 | 136 | 52.5 | **136** | **52.4** | 137 | 52.3 | 136 | 52.5 |
| 436.cactusADM | 8.26 | 1450 | 8.14 | 1470 | **8.16** | **1470** | 8.26 | 1450 | 8.14 | 1470 | **8.16** | **1470** |
| 437.leslie3d | **18.3** | **515** | 18.0 | 524 | 18.4 | 512 | **18.3** | **515** | 18.0 | 524 | 18.4 | 512 |
| 444.namd | 219 | 36.5 | **219** | **36.6** | 219 | 36.6 | **214** | **37.5** | 214 | 37.5 | 214 | 37.4 |
| 447.dealII | 156 | 73.5 | **155** | **73.6** | 155 | 73.7 | 156 | 73.5 | **155** | **73.6** | 155 | 73.7 |
| 450.soplex | 158 | 52.8 | **158** | **52.7** | 161 | 51.7 | 158 | 52.8 | **158** | **52.7** | 161 | 51.7 |
| 453.povray | **74.3** | **71.6** | 74.4 | 71.5 | 74.1 | 71.8 | 65.5 | 81.2 | **65.5** | **81.2** | 65.6 | 81.1 |
| 454.calculix | 112 | 73.7 | **112** | **73.6** | 112 | 73.4 | 106 | 77.8 | **106** | **77.5** | 107 | 77.4 |
| 459.GemsFDTD | 41.4 | 256 | **40.5** | **262** | 40.3 | 264 | **33.8** | **314** | 33.7 | 314 | 33.8 | 314 |
| 465.tonto | 192 | 51.2 | **195** | **50.5** | 198 | 49.6 | **147** | **67.0** | 147 | 67.1 | 148 | 66.6 |
| 470.lbm | **7.83** | **1750** | 7.91 | 1740 | 7.81 | 1760 | **7.83** | **1750** | 7.91 | 1740 | 7.81 | 1760 |
| 481.wrf | 82.6 | 135 | **82.6** | **135** | 83.0 | 135 | 82.6 | 135 | **82.6** | **135** | 83.0 | 135 |
| 482.sphinx3 | 271 | 72.0 | 278 | 70.2 | **271** | **71.8** | 271 | 72.0 | 278 | 70.2 | **271** | **71.8** |

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
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 Cyborg-SPECcpu2006-SUSE12SP2 Sun Jun  4 21:11:29 2017

 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) Platinum 8180 CPU @ 2.50GHz
          2 "physical id"s (chips)
          56 "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 : 28
          siblings  : 28
          physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
          25 26 27 28 29 30
          physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
          25 26 27 28 29 30
       cache size : 39424 KB

    From /proc/meminfo
       MemTotal:       395892532 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:
          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 Cyborg-SPECcpu2006-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 Jun 4 05:36

    SPEC is set to: /home/cpu2006-1.2-ic17.0u3
       Filesystem     Type   Size  Used Avail Use% Mounted on
       /dev/sda2      btrfs  744G   62G  681G   9% /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
```

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## 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 -[IVE109B-1.00]- 05/05/2017
    Memory:
     24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666 MHz

  (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-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"
OMP_NUM_THREADS = "56"

 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 with:
 echo never > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
```

## 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

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## Base Portability Flags (Continued)

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 -parallel -qopt-prefetch

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

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

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

## 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: -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

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

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: basepeak = yes

459.GemsFDTD: -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
-qopt-prefetch -parallel

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

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

Continued on next page

# Peak Optimization Flags (Continued)

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

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-ic17.0-official-linux64-revF.html`
`http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.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.xml`


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