# SPEC® CFP2006 Result

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## Lenovo Global Technology

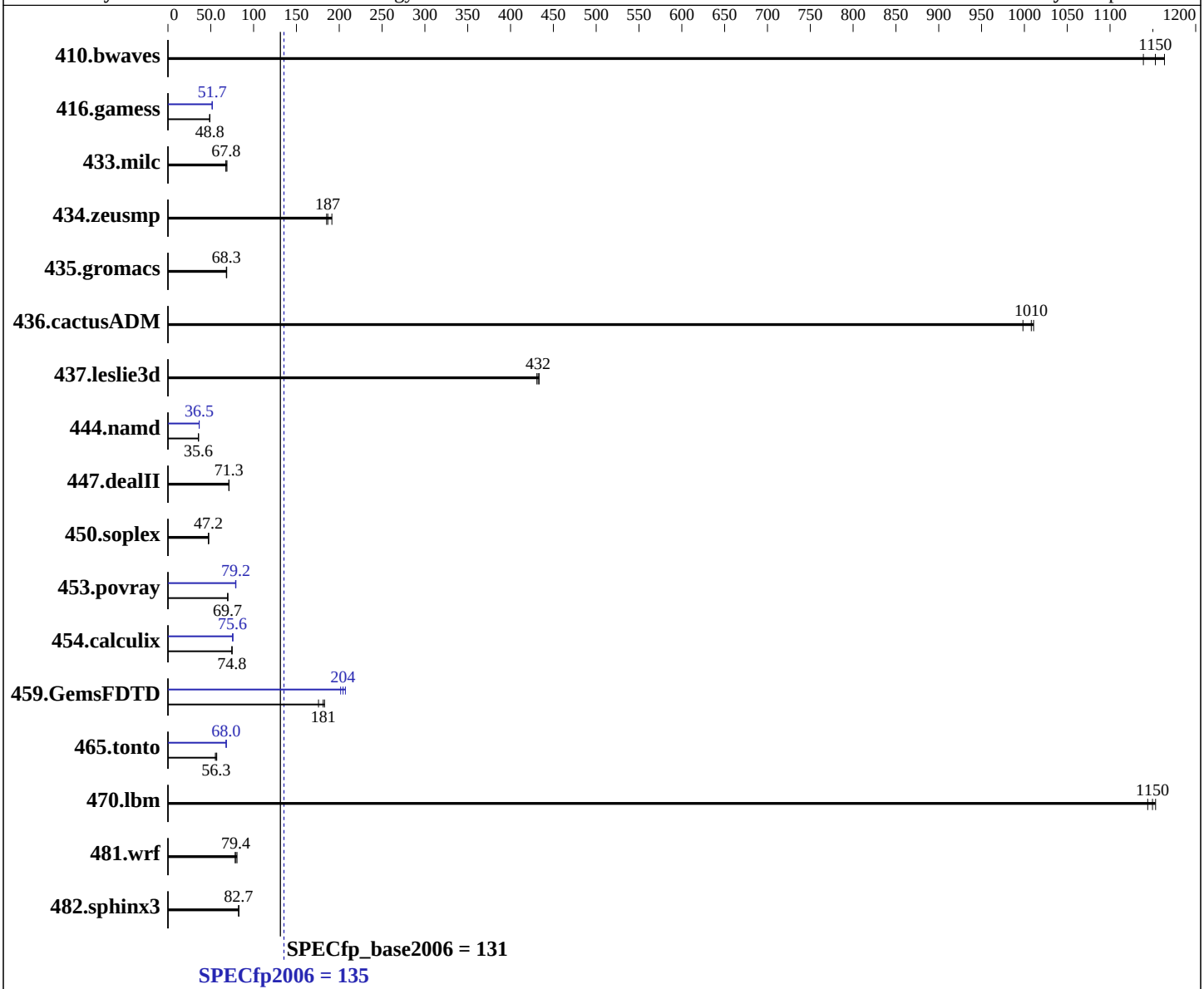
ThinkSystem SR950
(3.60 GHz, Intel Xeon Gold 5122)

SPECfp®2006 = 135

SPECfp_base2006 = 131

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

**Test date:** Nov-2017
**Hardware Availability:** Sep-2017
**Software Availability:** Apr-2017




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 5122 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.70 GHz |
| CPU MHz: | 3600 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 4 chips, 4 cores/chip |
| CPU(s) orderable: | 2,4 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: 16.5 MB I+D on chip per chip
Other Cache: None
Memory: 1536 GB (48 x 32 GB 2Rx4 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 | 11.9 | 1140 | 11.7 | 1160 | **11.8** | **1150** | 11.9 | 1140 | 11.7 | 1160 | **11.8** | **1150** |
| 416.gamess | 401 | 48.8 | **401** | **48.8** | 401 | 48.8 | **379** | **51.7** | 379 | 51.7 | 379 | 51.7 |
| 433.milc | 133 | 68.9 | **135** | **67.8** | 136 | 67.7 | 133 | 68.9 | **135** | **67.8** | 136 | 67.7 |
| 434.zeusmp | 49.1 | 185 | **48.8** | **187** | 47.5 | 191 | 49.1 | 185 | **48.8** | **187** | 47.5 | 191 |
| 435.gromacs | 105 | 68.3 | **104** | **68.3** | 104 | 68.6 | 105 | 68.3 | **104** | **68.3** | 104 | 68.6 |
| 436.cactusADM | 12.0 | 998 | 11.8 | 1010 | **11.9** | **1010** | 12.0 | 998 | 11.8 | 1010 | **11.9** | **1010** |
| 437.leslie3d | **21.8** | **432** | 21.7 | 433 | 21.8 | 431 | **21.8** | **432** | 21.7 | 433 | 21.8 | 431 |
| 444.namd | 225 | 35.6 | **225** | **35.6** | 225 | 35.6 | **220** | **36.5** | 220 | 36.5 | 220 | 36.5 |
| 447.dealII | 161 | 71.0 | 160 | 71.4 | **160** | **71.3** | 161 | 71.0 | 160 | 71.4 | **160** | **71.3** |
| 450.soplex | **177** | **47.2** | 175 | 47.7 | 177 | 47.1 | **177** | **47.2** | 175 | 47.7 | 177 | 47.1 |
| 453.povray | 76.3 | 69.7 | **76.3** | **69.7** | 76.1 | 69.9 | 67.4 | 78.9 | **67.1** | **79.2** | 67.1 | 79.3 |
| 454.calculix | 110 | 74.7 | 110 | 74.8 | **110** | **74.8** | 109 | 75.5 | 109 | 75.9 | **109** | **75.6** |
| 459.GemsFDTD | 58.0 | 183 | 60.4 | 176 | **58.5** | **181** | 52.6 | 202 | **51.9** | **204** | 51.2 | 207 |
| 465.tonto | 178 | 55.3 | 173 | 57.0 | **175** | **56.3** | **145** | **68.0** | 145 | 68.1 | 145 | 68.0 |
| 470.lbm | 11.9 | 1150 | **12.0** | **1150** | 12.0 | 1140 | 11.9 | 1150 | **12.0** | **1150** | 12.0 | 1140 |
| 481.wrf | 142 | 78.4 | 139 | 80.6 | **141** | **79.4** | 142 | 78.4 | 139 | 80.6 | **141** | **79.4** |
| 482.sphinx3 | 236 | 82.5 | 236 | 82.7 | **236** | **82.7** | 236 | 82.5 | 236 | 82.7 | **236** | **82.7** |

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:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
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 Proton4S-SUSE12SP2 Tue Nov 21 17:45:21 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) Gold 5122 CPU @ 3.60GHz
          4 "physical id"s (chips)
          16 "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 : 4
          siblings  : 4
          physical 0: cores 1 2 5 11
          physical 1: cores 0 1 12 13
          physical 2: cores 2 3 4 10
          physical 3: cores 1 5 9 13
       cache size : 16896 KB

    From /proc/meminfo
       MemTotal:       1584766852 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 Proton4S-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 Nov 21 17:42

    SPEC is set to: /home/cpu2006-1.2-ic17.0u3
       Filesystem     Type   Size  Used Avail Use% Mounted on
       /dev/sda3      btrfs  743G  182G  561G  25% /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 -[PSE105X-1.00]- 08/17/2017
   Memory:
    48x NO DIMM NO DIMM
    48x Samsung M393A4K40BB2-CTD 32 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 = "16"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 Transparent Huge Pages disabled 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
```

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## Base Portability Flags (Continued)

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 -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-E.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-E.xml`


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