# SPEC® CFP2006 Result

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## Lenovo Global Technology

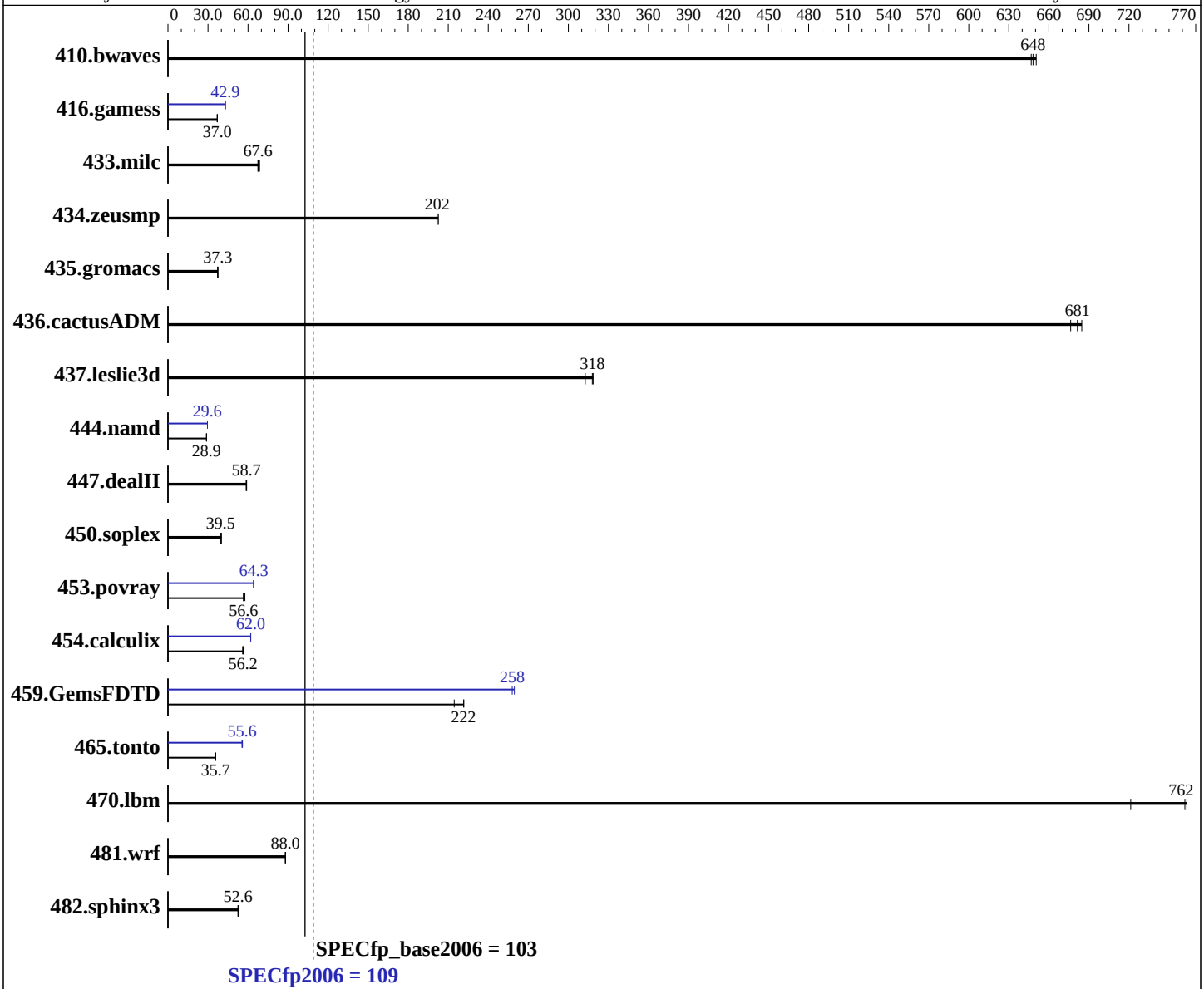
ThinkSystem ST550
(1.80 GHz, Intel Xeon Silver 4108)

SPECfp®2006 = 109

SPECfp_base2006 = 103

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

**Test date:** Jul-2017
**Hardware Availability:** Aug-2017
**Software Availability:** Nov-2016




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Silver 4108 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.00 GHz |
| CPU MHz: | 1800 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 2 chips, 8 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 17.0.0.098 of Intel C/C++ Compiler for Linux;<br>Fortran: Version 17.0.0.098 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: 11 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 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 | 20.9 | 651 | 21.0 | 647 | **21.0** | **648** | 20.9 | 651 | 21.0 | 647 | **21.0** | **648** |
| 416.gamess | 530 | 37.0 | 530 | 36.9 | **530** | **37.0** | **456** | **42.9** | 456 | 42.9 | 456 | 42.9 |
| 433.milc | 136 | 67.4 | **136** | **67.6** | 134 | 68.6 | 136 | 67.4 | **136** | **67.6** | 134 | 68.6 |
| 434.zeusmp | 44.9 | 203 | 45.2 | 202 | **45.1** | **202** | 44.9 | 203 | 45.2 | 202 | **45.1** | **202** |
| 435.gromacs | 191 | 37.4 | 192 | 37.3 | **191** | **37.3** | 191 | 37.4 | 192 | 37.3 | **191** | **37.3** |
| 436.cactusADM | 17.5 | 685 | 17.7 | 676 | **17.5** | **681** | 17.5 | 685 | 17.7 | 676 | **17.5** | **681** |
| 437.leslie3d | **29.6** | **318** | 30.1 | 313 | 29.5 | 319 | **29.6** | **318** | 30.1 | 313 | 29.5 | 319 |
| 444.namd | 278 | 28.9 | **278** | **28.9** | 278 | 28.9 | **271** | **29.6** | 271 | 29.6 | 271 | 29.6 |
| 447.dealII | 194 | 59.0 | 195 | 58.7 | **195** | **58.7** | 194 | 59.0 | 195 | 58.7 | **195** | **58.7** |
| 450.soplex | **211** | **39.5** | 208 | 40.1 | 214 | 39.0 | **211** | **39.5** | 208 | 40.1 | 214 | 39.0 |
| 453.povray | 92.3 | 57.7 | 94.0 | 56.6 | **94.0** | **56.6** | **82.8** | **64.3** | 82.7 | 64.3 | 83.0 | 64.1 |
| 454.calculix | 146 | 56.4 | **147** | **56.2** | 147 | 56.0 | 133 | 62.1 | **133** | **62.0** | 133 | 62.0 |
| 459.GemsFDTD | **47.9** | **222** | 47.9 | 222 | 49.5 | 214 | 40.9 | 260 | **41.1** | **258** | 41.3 | 257 |
| 465.tonto | 277 | 35.6 | **275** | **35.7** | 275 | 35.7 | 177 | 55.5 | **177** | **55.6** | 176 | 55.8 |
| 470.lbm | 18.0 | 763 | 19.0 | 721 | **18.0** | **762** | 18.0 | 763 | 19.0 | 721 | **18.0** | **762** |
| 481.wrf | 127 | 88.2 | 128 | 87.2 | **127** | **88.0** | 127 | 88.2 | 128 | 87.2 | **127** | **88.0** |
| 482.sphinx3 | 370 | 52.7 | **371** | **52.6** | 372 | 52.5 | 370 | 52.7 | **371** | **52.6** | 372 | 52.5 |

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
 Per Core P-state set to Disable
 LLC dead line alloc set to Disable
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on ST550 Fri Jul 21 18:33:12 2017
```

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## Platform Notes (Continued)

```
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) Silver 4108 CPU @ 1.80GHz
      2 "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 : 8
      siblings  : 8
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7
   cache size : 11264 KB

From /proc/meminfo
   MemTotal:       395884028 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 ST550 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 Jul 21 18:31

SPEC is set to: /home/cpu2006-1.2-ic17.0
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sdb2      btrfs  744G  124G  619G  17% /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 -[O0E105R-1.00]- 04/27/2017
    Memory:
     12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666 MHz, configured at 2400 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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/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 enabled by default.
```

# 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
```

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## Base Portability Flags (Continued)

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.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.xml`
`http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.xml`


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Tested with SPEC CPU2006 v1.2.
Report generated on Wed Sep 20 11:03:53 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 19 September 2017.