SPEC® CFP2006 Result
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Lenovo Global Technology

ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6130T)

$SPECfp^{®}2006 =$ 142

$SPECfp\_base2006 =$ 134
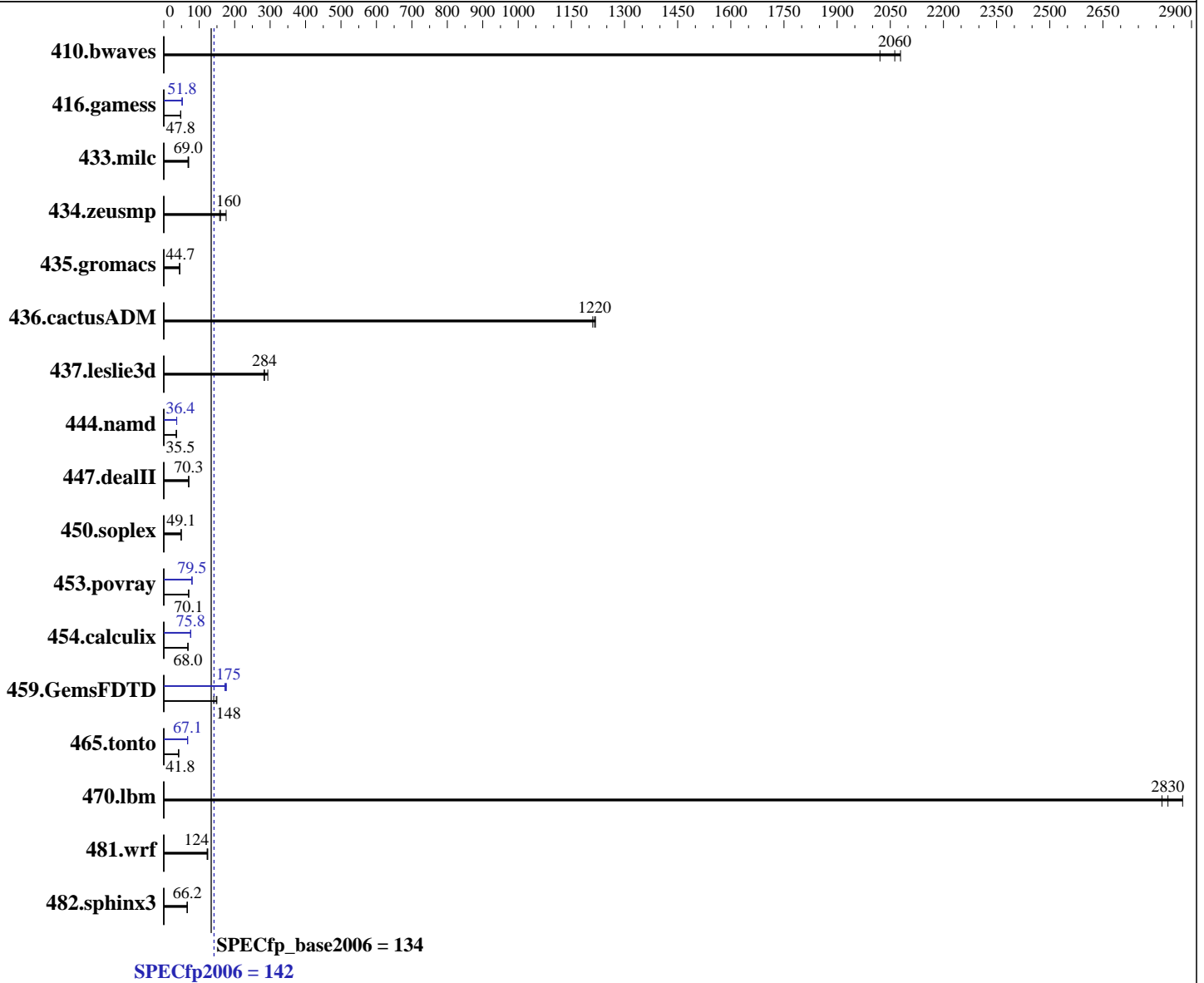
CPU2006 license: 9017
Test sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test date: Sep-2017
Hardware Availability: Aug-2017
Software Availability: Nov-2016

Benchmark	Result
410.bwaves	2060
416.gamess	51.8 / 47.8
433.milc	69.0
434.zeusmp	160
435.gromacs	44.7
436.cactusADM	1220
437.leslie3d	284
444.namd	36.4 / 35.5
447.dealII	70.3
450.soplex	49.1
453.povray	79.5 / 70.1
454.calculix	75.8 / 68.0
459.GemsFDTD	175 / 148
465.tonto	67.1 / 41.8
470.lbm	2830
481.wrf	124
482.sphinx3	66.2

SPECfp_base2006 = 134
SPECfp2006 = 142

Hardware

CPU Name: Intel Xeon Gold 6130T
CPU Characteristics: Intel Turbo Boost Technology up to 3.70 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: 1 MB I+D on chip per core

Continued on next page

Software

Operating System: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Kernel 4.4.21-69-default
Compiler: C/C++: Version 17.0.0.098 of Intel C/C++
Compiler for Linux;
Fortran: Version 17.0.0.098 of Intel Fortran
Compiler for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)

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L3 Cache:	22 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)	Other Software:	None
Disk Subsystem:	1 x 960 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**6.59**	**2060**	6.54	2080	6.72	2020	**6.59**	**2060**	6.54	2080	6.72	2020
416.gamess	411	47.7	410	47.8	**410**	**47.8**	378	51.8	**378**	**51.8**	378	51.9
433.milc	**133**	**69.0**	134	68.4	130	70.4	**133**	**69.0**	134	68.4	130	70.4
434.zeusmp	51.7	176	**56.8**	**160**	57.7	158	51.7	176	**56.8**	**160**	57.7	158
435.gromacs	159	44.8	160	44.6	**160**	**44.7**	159	44.8	160	44.6	**160**	**44.7**
436.cactusADM	9.81	1220	9.87	1210	**9.83**	**1220**	9.81	1220	9.87	1210	**9.83**	**1220**
437.leslie3d	33.2	283	**33.1**	**284**	32.0	294	33.2	283	**33.1**	**284**	32.0	294
444.namd	226	35.5	226	35.5	**226**	**35.5**	**220**	**36.4**	220	36.4	220	36.4
447.dealII	162	70.5	**163**	**70.3**	163	70.1	162	70.5	**163**	**70.3**	163	70.1
450.soplex	170	49.1	171	48.9	**170**	**49.1**	170	49.1	171	48.9	**170**	**49.1**
453.povray	76.0	70.0	75.8	70.2	**75.9**	**70.1**	66.9	79.5	66.9	79.6	**66.9**	**79.5**
454.calculix	121	68.3	**121**	**68.0**	121	68.0	109	76.0	**109**	**75.8**	109	75.7
459.GemsFDTD	**71.6**	**148**	75.3	141	70.8	150	61.6	172	**60.7**	**175**	60.1	177
465.tonto	**235**	**41.8**	237	41.6	235	41.9	**147**	**67.1**	147	67.0	146	67.3
470.lbm	4.78	2870	**4.85**	**2830**	4.88	2820	4.78	2870	**4.85**	**2830**	4.88	2820
481.wrf	90.1	124	**90.4**	**124**	91.4	122	90.1	124	**90.4**	**124**	91.4	122
482.sphinx3	294	66.3	**294**	**66.2**	296	65.9	294	66.3	**294**	**66.2**	296	65.9

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
 DCA set to Disable
 Patrol Scrub 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 SN850 Mon Sep  4 10:25:54 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) Gold 6130T CPU @ 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 : 22528 KB

From /proc/meminfo
   MemTotal:       1584968332 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 SN850 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 Sep 4 10:11

SPEC is set to: /home/cpu2006-1.2-ic17.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   836G  7.4G  829G   1% /home
Additional information from dmidecode:
```
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Platform Notes (Continued)

```
    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 -[IVE109A-1.00]- 04/27/2017
  Memory:
    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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"
OMP_NUM_THREADS = "64"

 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
```

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
```

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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`

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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.20171004.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.20171004.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Wed Oct 4 12:39:49 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 3 October 2017.