SPEC® CFP2006 Result
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Lenovo Group Limited

Lenovo System x3950 X6
(2.10 GHz, Intel Xeon E7-8855 v4)

$SPECfp^{®}2006 =$ 112

$SPECfp\_base2006 =$ 105
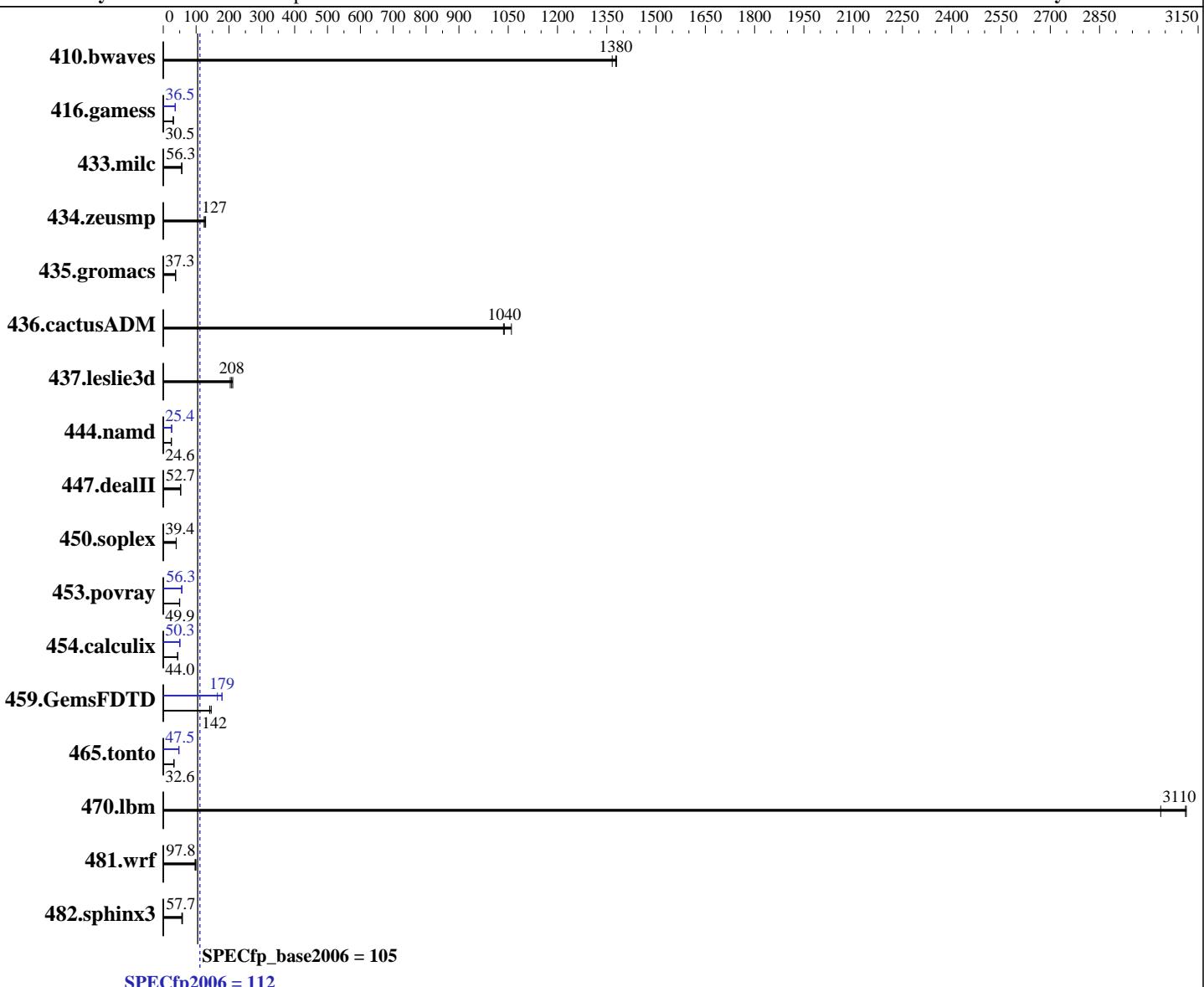
CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jul-2016
Hardware Availability: Jun-2016
Software Availability: Dec-2015

Benchmark	Value
410.bwaves	1380
416.gamess	36.5 / 30.5
433.milc	56.3
434.zeusmp	127
435.gromacs	37.3
436.cactusADM	1040
437.leslie3d	208
444.namd	25.4 / 24.6
447.dealII	52.7
450.soplex	39.4
453.povray	56.3 / 49.9
454.calculix	50.3 / 44.0
459.GemsFDTD	179 / 142
465.tonto	47.5 / 32.6
470.lbm	3110
481.wrf	97.8
482.sphinx3	57.7

SPECfp_base2006 = 105

SPECfp2006 = 112

Hardware

CPU Name: Intel Xeon E7-8855 v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.80 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 112 cores, 8 chips, 14 cores/chip
CPU(s) orderable: 4,8 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 16.0.0.101 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)

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L3 Cache:	35 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	1 TB (64 x 16 GB 2Rx4 PC4-2133P-R, running at 1333 MHz)	Other Software:	None
Disk Subsystem:	2 x 600 GB 15000 RPM SAS, RAID 1		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**9.87**	**1380**	9.85	1380	9.94	1370	**9.87**	**1380**	9.85	1380	9.94	1370
416.gamess	642	30.5	**642**	**30.5**	643	30.5	**537**	**36.5**	536	36.6	538	36.4
433.milc	**163**	**56.3**	163	56.2	163	56.3	**163**	**56.3**	163	56.2	163	56.3
434.zeusmp	73.2	124	**71.6**	**127**	70.6	129	73.2	124	**71.6**	**127**	70.6	129
435.gromacs	**192**	**37.3**	192	37.2	189	37.8	**192**	**37.3**	192	37.2	189	37.8
436.cactusADM	11.5	1040	11.3	1060	**11.5**	**1040**	11.5	1040	11.3	1060	**11.5**	**1040**
437.leslie3d	**45.2**	**208**	44.4	212	46.1	204	**45.2**	**208**	44.4	212	46.1	204
444.namd	**326**	**24.6**	326	24.6	326	24.6	**316**	**25.4**	316	25.4	316	25.4
447.dealII	216	52.9	**217**	**52.7**	217	52.7	216	52.9	**217**	**52.7**	217	52.7
450.soplex	212	39.3	**212**	**39.4**	211	39.5	212	39.3	**212**	**39.4**	211	39.5
453.povray	**107**	**49.9**	108	49.3	106	50.0	**94.5**	**56.3**	94.6	56.2	94.4	56.4
454.calculix	187	44.2	189	43.7	**187**	**44.0**	162	51.0	166	49.7	**164**	**50.3**
459.GemsFDTD	75.1	141	72.6	146	**74.8**	**142**	**59.4**	**179**	59.3	179	64.4	165
465.tonto	302	32.6	**302**	**32.6**	305	32.2	206	47.7	**207**	**47.5**	208	47.4
470.lbm	**4.42**	**3110**	4.41	3110	4.53	3040	**4.42**	**3110**	4.41	3110	4.53	3040
481.wrf	112	99.7	115	96.9	**114**	**97.8**	112	99.7	115	96.9	**114**	**97.8**
482.sphinx3	**338**	**57.7**	345	56.4	334	58.3	**338**	**57.7**	345	56.4	334	58.3

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 Disable
    Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on X3950-01-SLES12SP1 Fri Jul 8 02:55:57 2016

    This section contains SUT (System Under Test) info as seen by
    some common utilities. To remove or add to this section, see:

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Platform Notes (Continued)

```
     http://www.spec.org/cpu2006/Docs/config.html#sysinfo

  From /proc/cpuinfo
     model name : Intel(R) Xeon(R) CPU E7-8855 v4 @ 2.10GHz
        8 "physical id"s (chips)
        112 "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 : 14
        siblings  : 14
        physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 5: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 7: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
     cache size : 35840 KB

  From /proc/meminfo
     MemTotal:       1058558348 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 X3950-01-SLES12SP1 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC
     2015 (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Jul 7 20:52

  SPEC is set to: /home/cpu2006-1.2-ic16.0
     Filesystem      Type   Size   Used Avail Use% Mounted on
     /dev/sda4       xfs    512G   6.5G  506G   2% /home
```

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Platform Notes (Continued)

```
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 IBM -[A9E135CUS-3.10]- 06/16/2016
  Memory:
  128x NO DIMM Unknown
  64x Samsung M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1333 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-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"
OMP_NUM_THREADS = "112"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
 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

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Base Portability Flags (Continued)

```
 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 -parallel -opt-prefetch
-ansi-alias
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias
```

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
```

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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: -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) -fno-alias
-auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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) -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: -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 -opt-prefetch -parallel

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) -inline-calloc

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Peak Optimization Flags (Continued)

465.tonto (continued):
```
-opt-malloc-options=3 -auto -unroll4
```

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

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

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

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Tested with SPEC CPU2006 v1.2.
Report generated on Thu Jul 28 11:38:13 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 27 July 2016.