SPEC® CFP2006 Result
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Lenovo Group Limited

Lenovo System x3850 X6 Essential
(2.20 GHz, Intel Xeon E7-8890 v4)
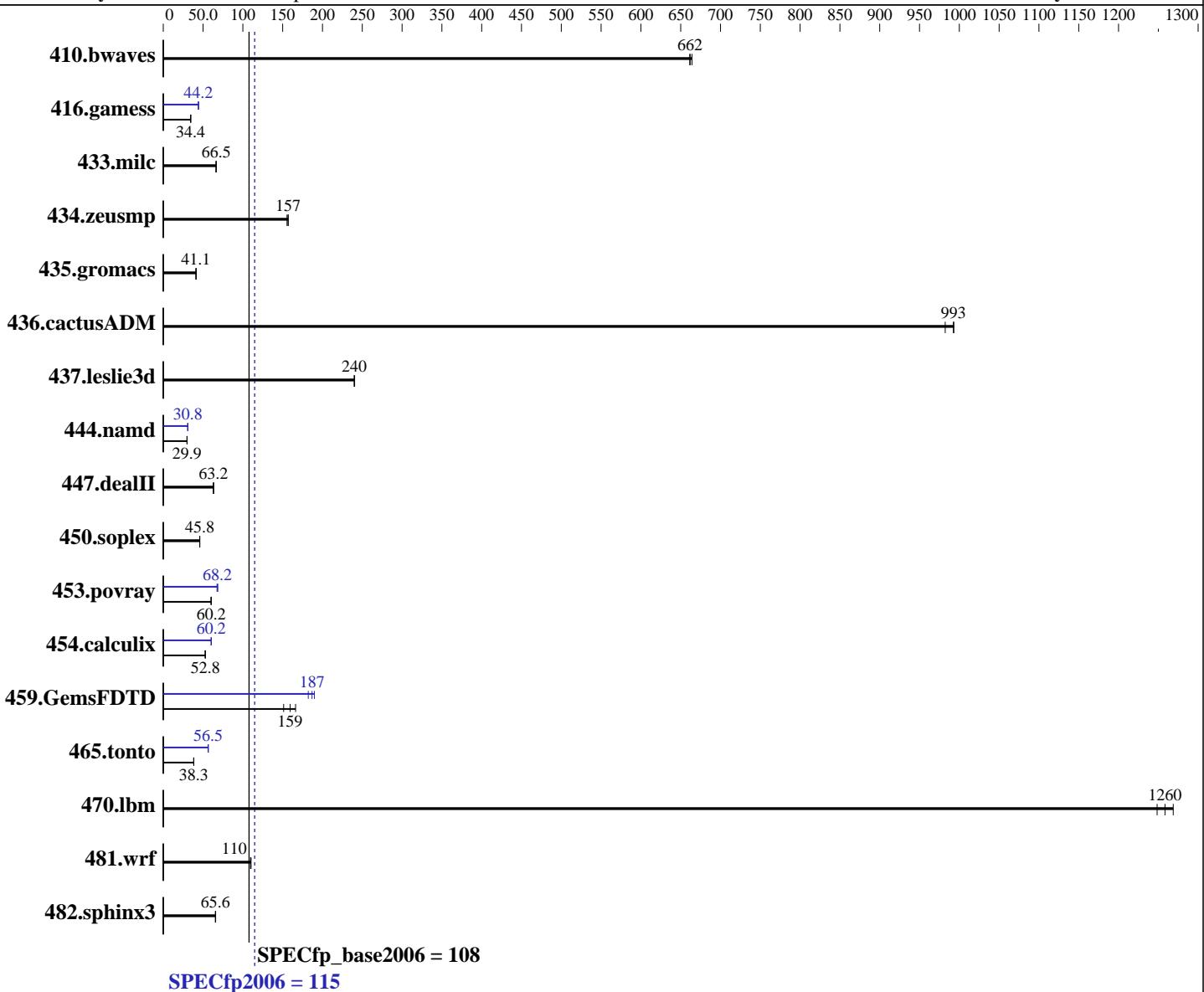
$SPECfp®2006 =$ 115

$SPECfp\_base2006 =$ 108

CPU2006 license: 9017	**Test date:** Jul-2016
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Jul-2016
Tested by: Lenovo Group Limited	**Software Availability:** Dec-2015

SPECfp_base2006 = 108

SPECfp2006 = 115

Hardware

CPU Name:	Intel Xeon E7-8890 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz:	2200
FPU:	Integrated
CPU(s) enabled:	96 cores, 4 chips, 24 cores/chip
CPU(s) orderable:	2,4 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:	60 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	512 GB (16 x 32 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)	Other Software:	None
Disk Subsystem:	1 x 800 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	20.5	664	20.5	661	**20.5**	**662**	20.5	664	20.5	661	**20.5**	**662**
416.gamess	**568**	**34.4**	571	34.3	566	34.6	442	44.3	443	44.2	**443**	**44.2**
433.milc	138	66.5	139	66.2	**138**	**66.5**	138	66.5	139	66.2	**138**	**66.5**
434.zeusmp	58.5	155	**58.0**	**157**	58.0	157	58.5	155	**58.0**	**157**	58.0	157
435.gromacs	172	41.6	174	40.9	**174**	**41.1**	172	41.6	174	40.9	**174**	**41.1**
436.cactusADM	**12.0**	**993**	12.0	993	12.2	982	**12.0**	**993**	12.0	993	12.2	982
437.leslie3d	39.2	240	**39.2**	**240**	39.1	240	39.2	240	**39.2**	**240**	39.1	240
444.namd	268	29.9	**268**	**29.9**	268	29.9	261	30.8	260	30.8	**260**	**30.8**
447.dealII	181	63.2	182	62.9	**181**	**63.2**	181	63.2	182	62.9	**181**	**63.2**
450.soplex	182	45.9	182	45.8	**182**	**45.8**	182	45.9	182	45.8	**182**	**45.8**
453.povray	**88.3**	**60.2**	88.8	59.9	88.0	60.4	77.8	68.4	78.8	67.5	**78.0**	**68.2**
454.calculix	156	52.8	156	52.7	**156**	**52.8**	137	60.3	137	60.2	**137**	**60.2**
459.GemsFDTD	63.8	166	**66.6**	**159**	70.2	151	58.2	182	55.9	190	**56.8**	**187**
465.tonto	258	38.2	**257**	**38.3**	256	38.4	**174**	**56.5**	174	56.4	174	56.5
470.lbm	11.0	1250	10.8	1270	**10.9**	**1260**	11.0	1250	10.8	1270	**10.9**	**1260**
481.wrf	102	110	**101**	**110**	101	110	102	110	**101**	**110**	101	110
482.sphinx3	298	65.5	**297**	**65.6**	296	65.8	298	65.5	**297**	**65.6**	296	65.8

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 Disable
    Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on Draco-02 Mon Jul 11 15:09:17 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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Test date: Jul-2016
Hardware Availability: Jul-2016
Software Availability: Dec-2015

Platform Notes (Continued)

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

 From /proc/cpuinfo
    model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
       4 "physical id"s (chips)
       96 "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 : 24
       siblings  : 24
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
    cache size : 61440 KB

 From /proc/meminfo
    MemTotal:       529159976 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 Draco-02 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 11 10:05

 SPEC is set to: /home/cpu2006-1.2-ic16.0
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   688G  4.9G  683G   1% /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 LENOVO -[A9E135CUS-3.10]- 06/16/2016
    Memory:
    16x Hynix HMA84GR7MFR4N-UH 32 GB 2 rank 2400 MHz, configured at 1600 MHz
    80x NO DIMM Unknown

  (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 = "96"

 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

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Tue Sep 6 16:58:19 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 6 September 2016.