SPEC® CFP2006 Result

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Lenovo Group Limited

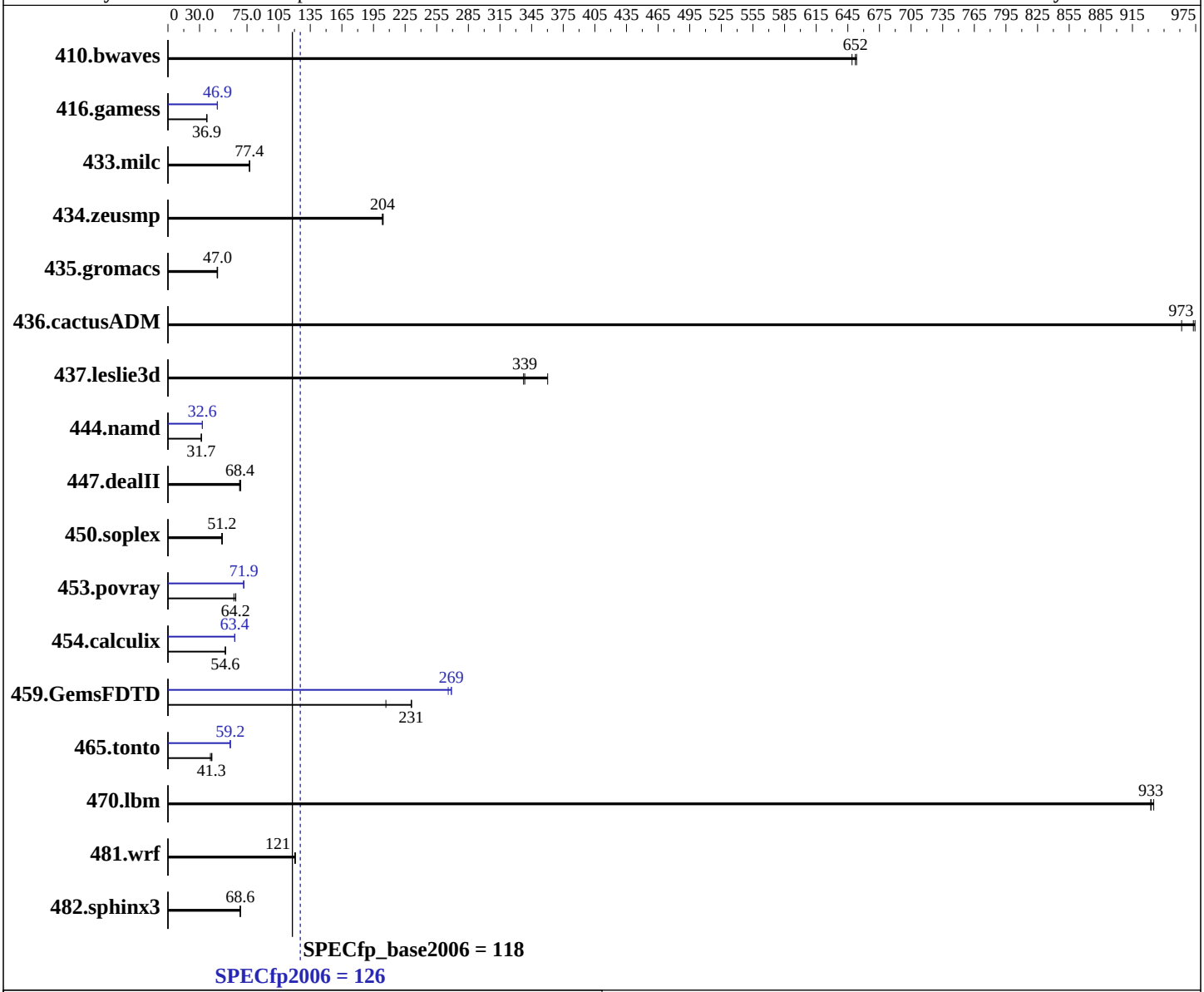
Lenovo Flex System x240 M5
(2.30 GHz, Intel Xeon E5-2697 v4)

SPECfp®2006 = 126

SPECfp_base2006 = 118

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: May-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015



Hardware

CPU Name:	Intel Xeon E5-2697 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	2300
FPU:	Integrated
CPU(s) enabled:	36 cores, 2 chips, 18 cores/chip
CPU(s) orderable:	1,2 chips
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core

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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: 45 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
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	**20.8**	**652**	20.8	653	20.9	649	**20.8**	**652**	20.8	653	20.9	649
416.gamess	532	36.8	531	36.9	**531**	**36.9**	417	47.0	419	46.7	**417**	**46.9**
433.milc	119	77.4	**119**	**77.4**	119	77.4	119	77.4	**119**	**77.4**	119	77.4
434.zeusmp	**44.7**	**204**	44.7	203	44.6	204	**44.7**	**204**	44.7	203	44.6	204
435.gromacs	**152**	**47.0**	153	46.6	152	47.0	**152**	**47.0**	153	46.6	152	47.0
436.cactusADM	12.3	974	**12.3**	**973**	12.4	962	12.3	974	**12.3**	**973**	12.4	962
437.leslie3d	26.1	360	27.9	337	**27.8**	**339**	26.1	360	27.9	337	**27.8**	**339**
444.namd	253	31.7	253	31.7	**253**	**31.7**	**246**	**32.6**	246	32.6	246	32.7
447.dealII	166	69.1	**167**	**68.4**	168	68.0	166	69.1	**167**	**68.4**	168	68.0
450.soplex	161	51.7	163	51.1	**163**	**51.2**	161	51.7	163	51.1	**163**	**51.2**
453.povray	**82.9**	**64.2**	82.7	64.4	85.1	62.6	74.1	71.8	**73.9**	**71.9**	73.9	72.0
454.calculix	152	54.4	151	54.6	**151**	**54.6**	130	63.4	130	63.3	**130**	**63.4**
459.GemsFDTD	45.9	231	51.3	207	**46.0**	**231**	39.9	266	**39.5**	**269**	39.5	269
465.tonto	236	41.7	244	40.3	**238**	**41.3**	**166**	**59.2**	167	59.0	166	59.2
470.lbm	14.7	932	14.7	935	**14.7**	**933**	14.7	932	14.7	935	**14.7**	**933**
481.wrf	92.4	121	**92.6**	**121**	92.8	120	92.4	121	**92.6**	**121**	92.8	120
482.sphinx3	284	68.5	**284**	**68.6**	283	68.8	284	68.5	**284**	**68.6**	283	68.8

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 Disabled
 COD Preference set to Disable
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on Bonnevil-02 Wed May 25 20:06:10 2016

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) CPU E5-2697 v4 @ 2.30GHz
          2 "physical id"s (chips)
          36 "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 : 18
          siblings  : 18
          physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
          physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
       cache size : 46080 KB

    From /proc/meminfo
       MemTotal:       263828476 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 Bonnevil-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 May 25 15:18

    SPEC is set to: /home/cpu2006-1.2-ic16.0
       Filesystem     Type  Size  Used Avail Use% Mounted on
       /dev/sda4      xfs   688G   42G  647G   6% /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
       determined", but the intent may not be met, as there are frequent changes to
       hardware, firmware, and the "DMTF SMBIOS" standard.
```

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Platform Notes (Continued)

```
    BIOS LENOVO -[C4E124J-2.10]- 05/05/2016
    Memory:
     16x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz
     8x 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 = "36"

 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
    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
```

Continued on next page

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 -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

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 -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

Continued on next page

Peak Optimization Flags (Continued)

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-Settings-V1.2-BDW-revC.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-Settings-V1.2-BDW-revC.xml`

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For other inquiries, please contact webmaster@spec.org.

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