SPEC® CFP2006 Result
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Lenovo Group Limited

Lenovo System x3650 M5
(3.20 GHz, Intel Xeon E5-2667 v4)

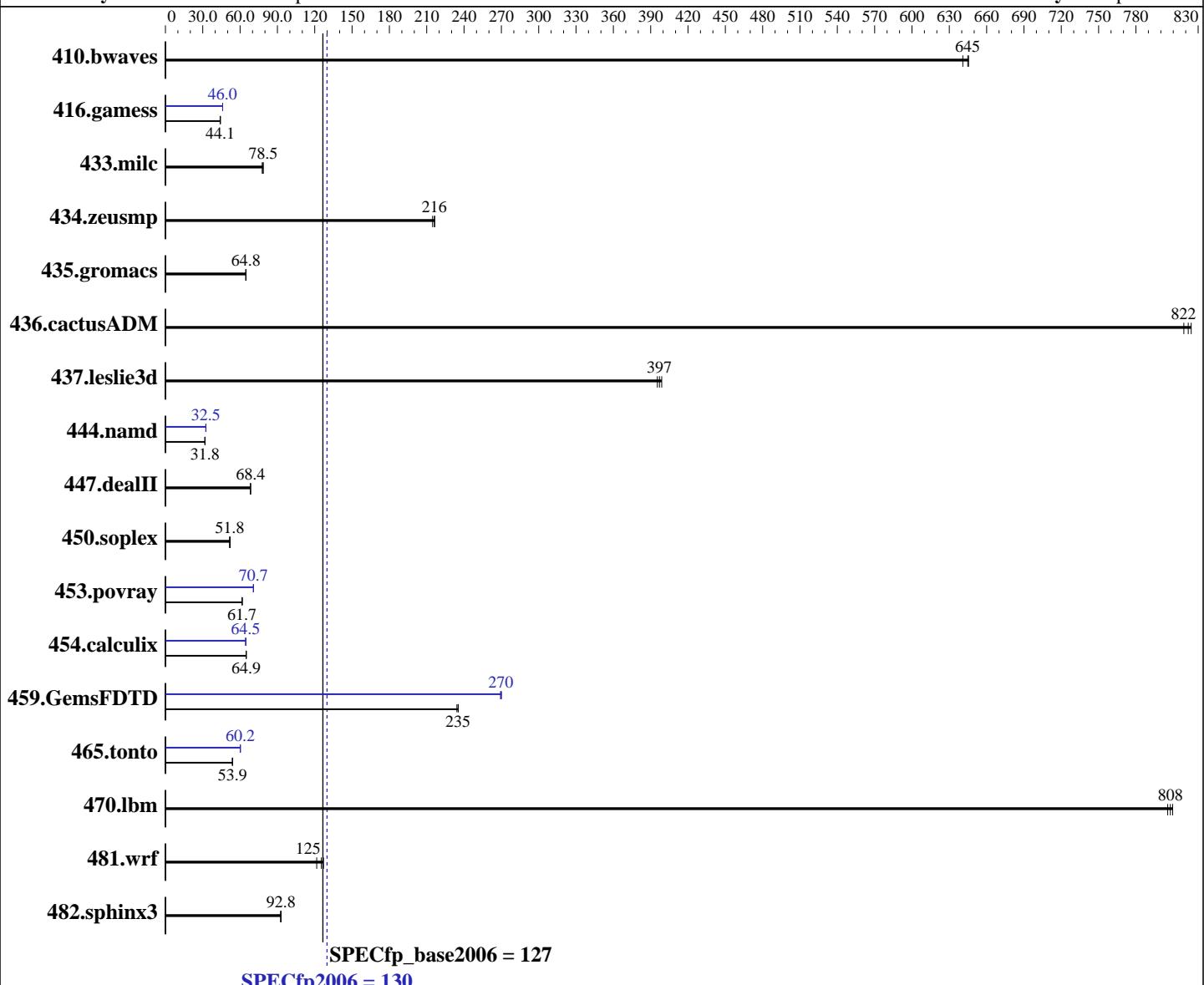$SPECfp^{®}2006 = $ 130

$SPECfp_base2006 = $ 127

CPU2006 license: 9017

Test sponsor: Lenovo Group Limited

Tested by: Lenovo Group Limited

Test date: Jan-2017

Hardware Availability: Mar-2016

Software Availability: Sep-2016

Benchmark	Value
410.bwaves	645
416.gamess	46.0 / 44.1
433.milc	78.5
434.zeusmp	216
435.gromacs	64.8
436.cactusADM	822
437.leslie3d	397
444.namd	32.5 / 31.8
447.dealII	68.4
450.soplex	51.8
453.povray	70.7 / 61.7
454.calculix	64.5 / 64.9
459.GemsFDTD	270 / 235
465.tonto	60.2 / 53.9
470.lbm	808
481.wrf	125
482.sphinx3	92.8

SPECfp_base2006 = 127

SPECfp2006 = 130

Hardware

CPU Name: Intel Xeon E5-2667 v4

CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz

CPU MHz: 3200

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: 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 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:	25 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)	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	21.2	641	21.1	645	**21.1**	**645**	21.2	641	21.1	645	**21.1**	**645**
416.gamess	**444**	**44.1**	446	43.9	443	44.2	**426**	**46.0**	426	46.0	426	46.0
433.milc	**117**	**78.5**	117	78.5	118	77.8	**117**	**78.5**	117	78.5	118	77.8
434.zeusmp	**42.1**	**216**	42.4	215	42.0	216	**42.1**	**216**	42.4	215	42.0	216
435.gromacs	111	64.5	110	64.8	**110**	**64.8**	111	64.5	110	64.8	**110**	**64.8**
436.cactusADM	14.5	824	14.6	819	**14.5**	**822**	14.5	824	14.6	819	**14.5**	**822**
437.leslie3d	23.8	395	**23.7**	**397**	23.6	399	23.8	395	**23.7**	**397**	23.6	399
444.namd	252	31.8	252	31.8	**252**	**31.8**	247	32.5	247	32.5	**247**	**32.5**
447.dealII	167	68.4	168	68.3	**167**	**68.4**	167	68.4	168	68.3	**167**	**68.4**
450.soplex	162	51.6	160	52.0	**161**	**51.8**	162	51.6	160	52.0	**161**	**51.8**
453.povray	**86.3**	**61.7**	86.1	61.8	86.4	61.6	**75.2**	**70.7**	75.1	70.8	75.3	70.7
454.calculix	127	64.9	127	65.0	**127**	**64.9**	**128**	**64.5**	128	64.5	128	64.6
459.GemsFDTD	45.3	234	**45.1**	**235**	45.1	235	39.4	269	**39.4**	**270**	39.3	270
465.tonto	182	53.9	**183**	**53.9**	183	53.9	164	60.1	163	60.3	**163**	**60.2**
470.lbm	**17.0**	**808**	17.0	810	17.1	806	**17.0**	**808**	17.0	810	17.1	806
481.wrf	**89.1**	**125**	91.9	122	87.9	127	**89.1**	**125**	91.9	122	87.9	127
482.sphinx3	211	92.6	**210**	**92.8**	210	92.9	211	92.6	**210**	**92.8**	210	92.9

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"
Transparent Huge Pages disabled with:
echo never > /sys/kernel/mm/transparent_hugepage/enabled
```

Platform Notes

```
BIOS Configuration:
 Operating Mode set to Maximum Performance
 Hyper-Threading set to Disabled
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on XinYi-MLK-06 Sun Jan 22 20:18:58 2017

This section contains SUT (System Under Test) info as seen by
```

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Platform Notes (Continued)

```
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) CPU E5-2667 v4 @ 3.20GHz
      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 2 3 4 8 10 11 12
      physical 1: cores 0 2 3 4 8 10 11 12
   cache size : 25600 KB

From /proc/meminfo
   MemTotal:       263961608 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 XinYi-MLK-06 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 Jan 22 08:02

SPEC is set to: /home/cpu2006-1.2-ic17.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   690G  101G  590G  15% /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
```

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Platform Notes (Continued)

```
    hardware, firmware, and the "DMTF SMBIOS" standard.

    BIOS LENOVO -[TCE125O-2.20]- 09/07/2016
    Memory:
    8x NO DIMM Unknown
    16x Samsung M393A2G40DB1-CRC 16 GB 2 rank 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
```

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
    453.povray: -DSPEC_CPU_LP64
```

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Base Portability Flags (Continued)

```
  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-BDW-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-BDW-C.xml

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