SPEC® CFP2006 Result

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Lenovo Group Limited

Lenovo System x3650 M5
(2.30 GHz, Intel Xeon E5-2697 v4)

$SPECfp^{®}\_rate2006 =$ 1050

$SPECfp\_rate\_base2006 =$ 1020

Benchmark	Copies	Result
410.bwaves	72	702
416.gamess	72	1410
416.gamess	72	1360
433.milc	72	663
434.zeusmp	72	1140
435.gromacs	72	1720
435.gromacs	72	1650
436.cactusADM	72	1310
437.leslie3d	72	499
444.namd	72	1140
444.namd	72	1140
447.dealII	72	2080
450.soplex	36	615
450.soplex	72	519
453.povray	72	2090
453.povray	72	1770
454.calculix	72	1980
459.GemsFDTD	72	482
465.tonto	72	1260
465.tonto	72	1190
470.lbm	72	969
481.wrf	72	832
482.sphinx3	72	940

SPECfp_rate_base2006 = 1020

SPECfp_rate2006 = 1050

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, 2 threads/core
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 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: No
File System: xfs
System State: Run level 3 (multi-user)

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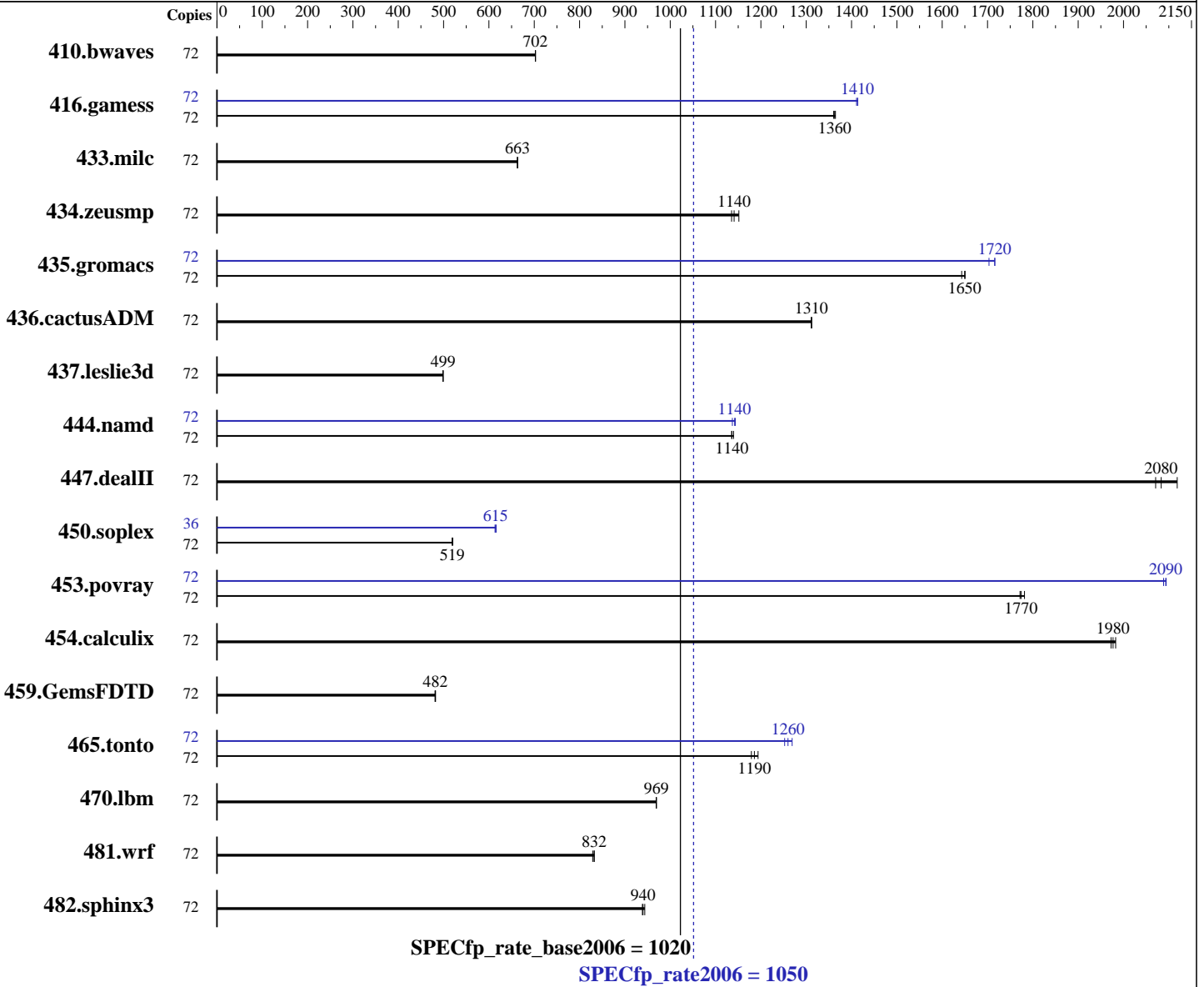|	
CPU2006 license: 9017	**Test date:** May-2016
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Mar-2016
Tested by: Lenovo Group Limited	**Software Availability:** Dec-2015

L3 Cache:	45 MB I+D on chip per chip	Base Pointers:	32/64-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 Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Peak Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	72	**_1393_**	**_702_**	1393	702	1392	703	72	**_1393_**	**_702_**	1393	702	1392	703
416.gamess	72	1033	1360	**_1035_**	**_1360_**	1036	1360	72	997	1410	**_998_**	**_1410_**	999	1410
433.milc	72	997	663	**_997_**	**_663_**	997	663	72	997	663	**_997_**	**_663_**	997	663
434.zeusmp	72	577	1140	569	1150	**_574_**	**_1140_**	72	577	1140	569	1150	**_574_**	**_1140_**
435.gromacs	72	311	1650	313	1640	**_312_**	**_1650_**	72	**_300_**	**_1720_**	302	1700	300	1720
436.cactusADM	72	**_656_**	**_1310_**	656	1310	656	1310	72	**_656_**	**_1310_**	656	1310	656	1310
437.leslie3d	72	1356	499	**_1357_**	**_499_**	1357	499	72	1356	499	**_1357_**	**_499_**	1357	499
444.namd	72	507	1140	**_508_**	**_1140_**	509	1140	72	508	1140	505	1140	**_506_**	**_1140_**
447.dealII	72	**_395_**	**_2080_**	398	2070	389	2120	72	**_395_**	**_2080_**	398	2070	389	2120
450.soplex	72	1154	520	1157	519	**_1156_**	**_519_**	36	489	613	487	616	**_488_**	**_615_**
453.povray	72	215	1780	**_216_**	**_1770_**	216	1770	72	183	2090	**_183_**	**_2090_**	183	2090
454.calculix	72	300	1980	**_300_**	**_1980_**	301	1970	72	300	1980	**_300_**	**_1980_**	301	1970
459.GemsFDTD	72	**_1586_**	**_482_**	1584	482	1588	481	72	**_1586_**	**_482_**	1584	482	1588	481
465.tonto	72	593	1190	**_598_**	**_1190_**	601	1180	72	566	1250	558	1270	**_562_**	**_1260_**
470.lbm	72	1021	969	1020	970	**_1021_**	**_969_**	72	1021	969	1020	970	**_1021_**	**_969_**
481.wrf	72	**_966_**	**_832_**	970	829	966	832	72	**_966_**	**_832_**	970	829	966	832
482.sphinx3	72	**_1493_**	**_940_**	1495	939	1487	944	72	**_1493_**	**_940_**	1495	939	1487	944

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
 echo 1 > /proc/sys/vm/drop_caches

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Tested by: Lenovo Group Limited

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

Platform Notes

```
BIOS Configuration:
 Operating Mode set to "Maximum Performance"
 COD Preference set to Enable
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on XinYi-03 Wed May 11 08:19:38 2016

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) CPU E5-2697 v4 @ 2.30GHz
      2 "physical id"s (chips)
      72 "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  : 36
      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 : 23040 KB

From /proc/meminfo
   MemTotal:       263954072 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-03 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 10 19:54
```

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Platform Notes (Continued)

```
  SPEC is set to: /home/cpu2006-1.2-ic16.0
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   688G  7.6G  681G   2% /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.

  BIOS LENOVO -[TCE124I-2.10]- 04/27/2016
  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:
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"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 echo 1>       /proc/sys/vm/drop_caches
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

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

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CPU2006 license: 9017

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Test date: May-2016

Hardware Availability: Mar-2016

Software Availability: Dec-2015

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
     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 -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

Fortran benchmarks:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
```

Benchmarks using both Fortran and C:

```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

Peak Compiler Invocation

C benchmarks:

```
    icc   -m64
```

C++ benchmarks (except as noted below):

```
    icpc  -m64
```

```
  450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
icc   -m64 ifort -m64
```

Peak 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: -D_FILE_OFFSET_BITS=64
     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
```

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) -opt-mem-layout-trans=3(pass 2)
                -prof-use(pass 2) -fno-alias -auto-ilp32
```

```
      447.dealII: basepeak = yes
```

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Peak Optimization Flags (Continued)

```
 450.soplex: -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) -opt-mem-layout-trans=3(pass 2)
             -prof-use(pass 2) -opt-malloc-options=3

 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) -opt-mem-layout-trans=3(pass 2)
             -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: basepeak = yes

  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) -unroll4 -auto
             -inline-calloc -opt-malloc-options=3
```

Benchmarks using both Fortran and C:

```
 435.gromacs: -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) -opt-mem-layout-trans=3(pass 2)
             -prof-use(pass 2) -opt-prefetch -auto-ilp32

 436.cactusADM: basepeak = yes

 454.calculix: basepeak = yes

   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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