Lenovo Group Limited
Lenovo Flex System x240 M5
(2.20 GHz, Intel Xeon E5-2699 v4)

**SPECfp®2006 = 126**

**SPECfp_base2006 = 118**

<table>
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<tr>
<th>SPECf (ID)</th>
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<tr>
<td>410.bwaves</td>
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<td>416.gamess</td>
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<td>433.milc</td>
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<tr>
<td>435.gromacs</td>
<td>45.6</td>
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<tr>
<td>436.cactusADM</td>
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<td>437.leslie3d</td>
<td>368</td>
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<td>470.lbm</td>
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<td>68.1</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>230</td>
</tr>
</tbody>
</table>

**Hardware**

- CPU Name: Intel Xeon E5-2699 v4
- CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz
- CPU MHz: 2200
- FPU: Integrated
- CPU(s) enabled: 44 cores, 2 chips, 22 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

**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)
**Lenovo Group Limited**

**Lenovo Flex System x240 M5**  
(2.20 GHz, Intel Xeon E5-2699 v4)

**CPU2006 license:** 9017

**Test sponsor:** Lenovo Group Limited

**Tested by:** Lenovo Group Limited

**L3 Cache:** 55 MB I+D on chip per chip

**Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)

**Disk Subsystem:** 2 x 300 GB 10000 RPM SAS, RAID 0

**Other Hardware:** None

**Base Pointers:** 64-bit

**Peak Pointers:** 32/64-bit

**Other Software:** None

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
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</tr>
<tr>
<td>482.sphinx3</td>
<td>286</td>
<td>68.1</td>
</tr>
</tbody>
</table>

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  
Intel Hyperthreading set to Disabled  
COD Preference set to Disable  
Early Snoop Preference set to Disable  
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914  

This section contains SUT (System Under Test) info as seen by
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 E5-2699 v4 @ 2.20GHz
   2 "physical id"s (chips)
   44 "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 : 22
   siblings : 22
   physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
   28
   physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
   28
   cache size : 56320 KB

From /proc/meminfo
   MemTotal:       263826632 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:
   (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 8 09:12

SPEC is set to: /home/cpu2006-1.2-ic16.0
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda4 xfs 515G  7.0G  508G  2% /home
Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program
Continued on next page
Lenovo Group Limited
Lenovo Flex System x240 M5
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SPECfp2006 = 126
SPECfp_base2006 = 118

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

Platform Notes (Continued)

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 -[C4E123DUS-2.10]- 02/23/2016
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 = "44"

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

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## Lenovo Group Limited

Lenovo Flex System x240 M5
(2.20 GHz, Intel Xeon E5-2699 v4)

**SPECfp2006** = 126
**SPECfp_base2006** = 118

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<thead>
<tr>
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<tr>
<td>9017</td>
<td>Feb-2016</td>
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<table>
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<tr>
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<th>Hardware Availability</th>
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<tr>
<td>Lenovo Group Limited</td>
<td>Mar-2016</td>
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<td>Lenovo Group Limited</td>
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### Base Portability Flags (Continued)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>444.namd</td>
<td>-DSPEC_CPU_LP64</td>
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<td>447.dealII</td>
<td>-DSPEC_CPU_LP64</td>
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<td>-DSPEC_CPU_LP64</td>
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<td>-DSPEC_CPU_LP64</td>
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<tr>
<td>454.calculix</td>
<td>-DSPEC_CPU_LP64 -nofor_main</td>
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<td>459.GemsFDTD</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>465.tonto</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>470.lbm</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>481.wrf</td>
<td>-DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
</tbody>
</table>

### 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
Lenovo Group Limited
Lenovo Flex System x240 M5
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp2006 = 126
SPECfp_base2006 = 118

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

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

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-callc

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Lenovo Group Limited
Lenovo Flex System x240 M5
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Tested by: Lenovo Group Limited

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

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-A.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-A.xml

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

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