Lenovo Group Limited
Lenovo Flex System x240 M5
(2.20 GHz, Intel Xeon E5-2618L v4)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>113</td>
<td>107</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwaves</td>
<td>410</td>
</tr>
<tr>
<td>gamess</td>
<td>416</td>
</tr>
<tr>
<td>milc</td>
<td>433</td>
</tr>
<tr>
<td>zeusmp</td>
<td>434</td>
</tr>
<tr>
<td>gromacs</td>
<td>435</td>
</tr>
<tr>
<td>cactusADM</td>
<td>436</td>
</tr>
<tr>
<td>leslie3d</td>
<td>437</td>
</tr>
<tr>
<td>namd</td>
<td>444</td>
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<tr>
<td>dealII</td>
<td>447</td>
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<tr>
<td>soplex</td>
<td>450</td>
</tr>
<tr>
<td>povray</td>
<td>453</td>
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<tr>
<td>calculix</td>
<td>454</td>
</tr>
<tr>
<td>GemsFDTD</td>
<td>459</td>
</tr>
<tr>
<td>tonto</td>
<td>465</td>
</tr>
<tr>
<td>lbm</td>
<td>470</td>
</tr>
<tr>
<td>wrf</td>
<td>481</td>
</tr>
<tr>
<td>sphinx3</td>
<td>482</td>
</tr>
</tbody>
</table>

SPECfp2006 = 113
SPECfp_base2006 = 107

### Hardware
- **CPU Name:** Intel Xeon E5-2618L v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.20 GHz
- **CPU MHz:** 2200
- **FPU:** Integrated
- **CPU(s) enabled:** 20 cores, 2 chips, 10 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

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

| 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, running at 2133 MHz) | Other Software: | None |
| Disk Subsystem: | 2 x 600 GB 15000 RPM SAS, RAID 1 | Other Hardware: | None |

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>410.bwaves</strong></td>
<td>25.2</td>
<td>25.2</td>
</tr>
<tr>
<td><strong>416.gamess</strong></td>
<td>604</td>
<td>468</td>
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<tr>
<td><strong>433.milc</strong></td>
<td>126</td>
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</tr>
<tr>
<td><strong>434.zeusmp</strong></td>
<td>49.6</td>
<td>49.6</td>
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<tr>
<td><strong>435.gromacs</strong></td>
<td>168</td>
<td>168</td>
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<tr>
<td><strong>436.cactusADM</strong></td>
<td>156</td>
<td>156</td>
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<tr>
<td><strong>437.leslie3d</strong></td>
<td>27.4</td>
<td>27.4</td>
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<td><strong>444.namd</strong></td>
<td>284</td>
<td>276</td>
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<td><strong>447.dealII</strong></td>
<td>181</td>
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<tr>
<td><strong>450.soplex</strong></td>
<td>178</td>
<td>178</td>
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<td><strong>453.povray</strong></td>
<td>93.0</td>
<td>82.0</td>
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<td><strong>454.calculix</strong></td>
<td>157</td>
<td>141</td>
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<tr>
<td><strong>459.GemsFDTD</strong></td>
<td>49.6</td>
<td>41.3</td>
</tr>
<tr>
<td><strong>465.tonto</strong></td>
<td>260</td>
<td>180</td>
</tr>
<tr>
<td><strong>470.lbm</strong></td>
<td>17.9</td>
<td>17.9</td>
</tr>
<tr>
<td><strong>481.wrf</strong></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>482.sphinx3</strong></td>
<td>304</td>
<td>304</td>
</tr>
</tbody>
</table>

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

### Operating System Notes

- BIOS size set to unlimited using "ulimit -s unlimited"

### Platform Notes

- Operating Mode set to "Maximum Performance"
- Hyper-Threading set to Disabled
- COD Preference set to Disabled
- Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914

---

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

Continued on next page
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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 E5-2618L v4 @ 2.20GHz
  2 "physical id"s (chips)
  20 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 10
siblings : 10
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
cache size : 25600 KB

From /proc/meminfo
MemTotal: 263830652 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 Jun 16 19:04

SPEC is set to: /home/cpu2006-1.2-ic16.0
  Filesystem   Type  Size  Used Avail Use% Mounted on
  /dev/sda4     xfs  502G  6.6G  496G  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
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Platform Notes (Continued)

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

BIOS LENOVO -{C4E124J-2.10} - 05/05/2016
Memory:
16x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 2133 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 = "20"

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 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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

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: -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:

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</table>

**SPEC CFP2006 Result**

```
SPECfp2006 = 113
SPECfp_base2006 = 107
```

### 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/Lenovo-Platform-Flags-V1.2-BDW-B.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/Lenovo-Platform-Flags-V1.2-BDW-B.xml](http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-BDW-B.xml)

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

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