## Lenovo Group Limited

**Lenovo System x3650 M5**  
*(2.60 GHz, Intel Xeon E5-2697A v4)*

**SPECfp®2006** = 124  
**SPECfp_base2006** = 120

### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E5-2697A v4</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.60 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>2600</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>32 cores, 2 chips, 16 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Primary Cache</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12 SP1 (x86_64)</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 17.0.0.0.098 of Intel C/C++</td>
</tr>
<tr>
<td></td>
<td>Compiler for Linux</td>
</tr>
<tr>
<td></td>
<td>Fortran: Version 17.0.0.0.098 of Intel Fortran</td>
</tr>
<tr>
<td></td>
<td>Compiler for Linux</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>
## Lenovo Group Limited

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio</th>
<th>Seconds Peak</th>
<th>Seconds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>18.7</td>
<td>726</td>
<td>18.5</td>
<td>736</td>
</tr>
<tr>
<td>416.gamess</td>
<td>124</td>
<td>73.9</td>
<td>124</td>
<td>73.9</td>
</tr>
<tr>
<td>433.milc</td>
<td>124</td>
<td>73.8</td>
<td>124</td>
<td>73.9</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>44.0</td>
<td>209</td>
<td>44.0</td>
<td>207</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>136</td>
<td>51.3</td>
<td>136</td>
<td>51.8</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>11.7</td>
<td>1010</td>
<td>11.8</td>
<td>1010</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>28.2</td>
<td>327</td>
<td>28.2</td>
<td>337</td>
</tr>
<tr>
<td>444.namd</td>
<td>253</td>
<td>32.5</td>
<td>247</td>
<td>32.5</td>
</tr>
<tr>
<td>447.dealII</td>
<td>175</td>
<td>65.4</td>
<td>175</td>
<td>65.4</td>
</tr>
<tr>
<td>450.soplex</td>
<td>167</td>
<td>49.8</td>
<td>167</td>
<td>49.9</td>
</tr>
<tr>
<td>453.povray</td>
<td>97.2</td>
<td>54.4</td>
<td>85.0</td>
<td>62.6</td>
</tr>
<tr>
<td>454.calculix</td>
<td>144</td>
<td>57.1</td>
<td>141</td>
<td>58.7</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>45.5</td>
<td>234</td>
<td>38.1</td>
<td>279</td>
</tr>
<tr>
<td>465.tonto</td>
<td>221</td>
<td>44.5</td>
<td>186</td>
<td>52.9</td>
</tr>
<tr>
<td>470.lbm</td>
<td>14.6</td>
<td>944</td>
<td>14.6</td>
<td>944</td>
</tr>
<tr>
<td>481.wrf</td>
<td>92.2</td>
<td>121</td>
<td>92.2</td>
<td>121</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>255</td>
<td>76.3</td>
<td>256</td>
<td>76.3</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"  
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 Disable  
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f96596b290c1)  
running on x3650m5 Wed Mar 8 18:37:05 2017

This section contains SUT (System Under Test) info as seen by
Continued on next page
Lenovo Group Limited

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

SPECfp2006 = 124
SPECfp_base2006 = 120

CPU2006 license: 9017
Test date: Mar-2017
Test sponsor: Lenovo Group Limited
Hardware Availability: Mar-2016
Tested by: Lenovo Group Limited
Software Availability: Sep-2016

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 E5-2697A v4 @ 2.60GHz
2 "physical id"s (chips)
32 "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 : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
cache size : 40960 KB

From /proc/meminfo
MemTotal: 263959944 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 x3650m5 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 Mar 8 13:48

SPEC is set to: /home/cpu2006-1.2-ic17.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 746G 11G 734G 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
Lenovo Group Limited

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

SPECfp2006 = 124
SPECfp_base2006 = 120

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

Test date: Mar-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Platform Notes (Continued)

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

BIOS LENOVO -[TCE1250-2.20]- 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 = "32"

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
444.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64

Continued on next page
Lenovo Group Limited
Lenovo System x3650 M5
(2.60 GHz, Intel Xeon E5-2697A v4)

SPECfp2006 = 124
SPECfp_base2006 = 120

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
**Lenovo Group Limited**  
Lenovo System x3650 M5  
(2.60 GHz, Intel Xeon E5-2697A v4)  

**SPECfp2006** = 124  
**SPECfp_base2006** = 120

<table>
<thead>
<tr>
<th>CPU2006 license:</th>
<th>Lenovo Group Limited</th>
<th>Test date:</th>
<th>9017</th>
<th>Mar-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor:</td>
<td>Lenovo Group Limited</td>
<td>Hardware Availability:</td>
<td>Lenovo Group Limited</td>
<td>Mar-2016</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Group Limited</td>
<td>Software Availability:</td>
<td>9017</td>
<td>Sep-2016</td>
</tr>
</tbody>
</table>

### 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-ll32`

- 447.dealII: basepeak = yes
- 450.soplex: basepeak = yes

#### 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)`  
  - `unroll4`  
  - `ansi-alias`

- 434.zeusmp: basepeak = yes
- 437.leslie3d: basepeak = yes

#### For benchmarks using both Fortran and C:
- 435.gromacs: basepeak = yes
- 436.cactusADM: basepeak = yes

Continued on next page
Lenovo Group Limited

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

SPECfp2006 = 124
SPECfp_base2006 = 120

CPU2006 license: 9017
Test date: Mar-2017
Test sponsor: Lenovo Group Limited
Hardware Availability: Mar-2016
Tested by: Lenovo Group Limited
Software Availability: Sep-2016

Peak Optimization Flags (Continued)

454.calcx: -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-D.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-D.xml

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Tue Apr 4 16:57:09 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 4 April 2017.