## Lenovo Group Limited

Lenovo ThinkServer TD350  
(2.10 GHz, Intel Xeon E5-2620 v4)

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-2016</td>
<td>Mar-2016</td>
<td>Mar-2016</td>
</tr>
</tbody>
</table>

### CPU2006 license: 9017

<table>
<thead>
<tr>
<th>Tested by</th>
<th>Lenovo Group Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor</td>
<td>Lenovo Group Limited</td>
</tr>
</tbody>
</table>

### SPECfp®2006 = 111

### SPECfp_base2006 = 105

<table>
<thead>
<tr>
<th>Software Availability</th>
<th>Hardware Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-2016</td>
<td>Mar-2016</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E5-2620 v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz
- **CPU MHz:** 2100
- **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

### 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 ThinkServer TD350
(2.10 GHz, Intel Xeon E5-2620 v4)

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

L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R, running at 2133 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>410.bwaves</td>
<td>24.8</td>
<td>549</td>
<td>24.6</td>
<td>553</td>
<td>24.2</td>
<td>562</td>
<td>24.8</td>
<td>549</td>
<td>24.6</td>
<td>553</td>
</tr>
<tr>
<td>416.gamess</td>
<td>598</td>
<td>32.8</td>
<td>597</td>
<td>32.8</td>
<td>597</td>
<td>32.8</td>
<td>473</td>
<td>41.4</td>
<td>471</td>
<td>41.6</td>
</tr>
<tr>
<td>433.milc</td>
<td>131</td>
<td>69.9</td>
<td>130</td>
<td>70.5</td>
<td>130</td>
<td>70.6</td>
<td>131</td>
<td>69.9</td>
<td>130</td>
<td>70.5</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>49.8</td>
<td>183</td>
<td>49.8</td>
<td>183</td>
<td>50.1</td>
<td>182</td>
<td>49.8</td>
<td>183</td>
<td>49.8</td>
<td>183</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>155</td>
<td>46.0</td>
<td><strong>155</strong></td>
<td><strong>45.9</strong></td>
<td>156</td>
<td>45.7</td>
<td>155</td>
<td>46.0</td>
<td><strong>155</strong></td>
<td><strong>45.9</strong></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>17.5</td>
<td>684</td>
<td>17.2</td>
<td>694</td>
<td><strong>17.4</strong></td>
<td><strong>687</strong></td>
<td>17.5</td>
<td>684</td>
<td>17.2</td>
<td>694</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>29.8</td>
<td>315</td>
<td>30.6</td>
<td>308</td>
<td><strong>30.0</strong></td>
<td><strong>313</strong></td>
<td>29.8</td>
<td>315</td>
<td>30.6</td>
<td>308</td>
</tr>
<tr>
<td>444.namd</td>
<td>285</td>
<td>28.2</td>
<td><strong>285</strong></td>
<td><strong>28.1</strong></td>
<td>285</td>
<td>28.1</td>
<td><strong>277</strong></td>
<td><strong>29.0</strong></td>
<td>276</td>
<td>29.0</td>
</tr>
<tr>
<td>447.dealII</td>
<td>184</td>
<td>62.3</td>
<td><strong>183</strong></td>
<td><strong>62.5</strong></td>
<td>183</td>
<td>62.5</td>
<td>184</td>
<td>62.3</td>
<td><strong>183</strong></td>
<td><strong>62.5</strong></td>
</tr>
<tr>
<td>450.soplex</td>
<td>188</td>
<td>44.4</td>
<td><strong>188</strong></td>
<td><strong>44.3</strong></td>
<td>188</td>
<td>44.2</td>
<td>188</td>
<td>44.4</td>
<td><strong>188</strong></td>
<td><strong>44.3</strong></td>
</tr>
<tr>
<td>453.povray</td>
<td><strong>93.8</strong></td>
<td>56.7</td>
<td>93.1</td>
<td>57.1</td>
<td>94.2</td>
<td>56.5</td>
<td><strong>82.7</strong></td>
<td><strong>64.3</strong></td>
<td>82.3</td>
<td>64.6</td>
</tr>
<tr>
<td>454.calcix</td>
<td><strong>156</strong></td>
<td><strong>53.0</strong></td>
<td>156</td>
<td>53.1</td>
<td>156</td>
<td>52.9</td>
<td>141</td>
<td>58.4</td>
<td><strong>142</strong></td>
<td><strong>58.3</strong></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td><strong>50.6</strong></td>
<td><strong>210</strong></td>
<td>50.5</td>
<td>210</td>
<td>50.9</td>
<td>209</td>
<td>43.8</td>
<td>242</td>
<td><strong>43.7</strong></td>
<td><strong>243</strong></td>
</tr>
<tr>
<td>465.tonto</td>
<td><strong>244</strong></td>
<td>40.3</td>
<td>244</td>
<td>40.3</td>
<td>245</td>
<td>40.1</td>
<td>181</td>
<td>54.3</td>
<td><strong>181</strong></td>
<td><strong>54.5</strong></td>
</tr>
<tr>
<td>470.lbm</td>
<td>19.2</td>
<td>714</td>
<td>19.2</td>
<td>716</td>
<td><strong>19.2</strong></td>
<td><strong>715</strong></td>
<td>19.2</td>
<td>714</td>
<td>19.2</td>
<td>716</td>
</tr>
<tr>
<td>481.wrf</td>
<td><strong>103</strong></td>
<td><strong>108</strong></td>
<td>106</td>
<td>106</td>
<td>103</td>
<td>109</td>
<td><strong>103</strong></td>
<td><strong>108</strong></td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>283</td>
<td>68.9</td>
<td><strong>281</strong></td>
<td><strong>69.3</strong></td>
<td>281</td>
<td>69.3</td>
<td>283</td>
<td>68.9</td>
<td><strong>281</strong></td>
<td><strong>69.3</strong></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:
- Hyper-Threadig set to Disabled
- Cluster On Die set to Disabled
- Early Snoop set to Enabled
- Performance Profile set to Custom
- C1E Support set to Disabled
- Core C3 set to Disabled
- Core C6 set to Disabled
- Thermal Profile set to Max Performance

Continued on next page

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
Lenovo Group Limited

Lenovo ThinkServer TD350 (2.10 GHz, Intel Xeon E5-2620 v4)

SPECfp2006 = 111
SPECfp_base2006 = 105

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

Platform Notes (Continued)

Memory Power Savings set to Disabled
Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1

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 E5-2620 v4 @ 2.10GHz
  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
cautions.)
cpu cores : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
cache size : 20480 KB

From /proc/meminfo
MemTotal: 264560216 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 Sep 21 17:08

SPEC is set to: /home/cpu2006-1.2-ic16.0

Filesystem Type Size Used Avail Use% Mounted on
Continued on next page
Lenovo Group Limited

Lenovo ThinkServer TD350
(2.10 GHz, Intel Xeon E5-2620 v4)

SPECfp2006 = 111
SPECfp_base2006 = 105

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

Platform Notes (Continued)

/dev/sda4 xfs 689G 8.0G 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 TB5TS362 03/24/2016
Memory:
16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at
2133 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-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"
OMP_NUM_THREADS = "16"

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

Continued on next page
Lenovo Group Limited
Lenovo ThinkServer TD350
(2.10 GHz, Intel Xeon E5-2620 v4)

SPECfp2006 = 111
SPECfp_base2006 = 105

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

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

Base Portability Flags (Continued)

434.zeusmp: -DSPEC_CPU_LP64 -noperf_main
435.gromacs: -DSPEC_CPU_LP64 -noperf_main
436.cactusADM: -DSPEC_CPU_LP64 -noperf_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 -noperf_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
Lenovo Group Limited
Lenovo ThinkServer TD350
(2.10 GHz, Intel Xeon E5-2620 v4)

SPECfp2006 = 111
SPECfp_base2006 = 105

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

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

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-calloc

Continued on next page
Lenovo Group Limited

Lenovo ThinkServer TD350
(2.10 GHz, Intel Xeon E5-2620 v4)

SPECfp2006 = 111
SPECfp_base2006 = 105

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

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

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-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

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.
Originally published on 18 October 2016.