**Lenovo Group Limited**

Lenovo ThinkServer TD350  
(2.00 GHz, Intel Xeon E5-2660 v4)

<table>
<thead>
<tr>
<th>SPECint2006</th>
<th>65.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECint_base2006</td>
<td>63.0</td>
</tr>
</tbody>
</table>

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

### 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  
- **Auto Parallel:** Yes  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 32/64-bit  
- **Peak Pointers:** 32/64-bit  
- **Other Software:** Microquill SmartHeap V10.2

### Hardware

- **CPU Name:** Intel Xeon E5-2660 v4  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.20 GHz  
- **CPU MHz:** 2000  
- **CPU(s) enabled:** 28 cores, 2 chips, 14 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  
- **L3 Cache:** 35 MB I+D on chip per chip  
- **Other Cache:** None  
- **Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)  
- **Disk Subsystem:** 1 x 800 GB SATA SSD  
- **Other Hardware:** None

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECint2006</th>
<th>SPECint_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>bzip2</td>
<td>37.6</td>
<td></td>
</tr>
<tr>
<td>gcc</td>
<td>35.4</td>
<td>60.0</td>
</tr>
<tr>
<td>mcf</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td>gobmk</td>
<td>27.6</td>
<td></td>
</tr>
<tr>
<td>hmer</td>
<td>78.3</td>
<td></td>
</tr>
<tr>
<td>sjeng</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>libquantum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h264ref</td>
<td>51.9</td>
<td></td>
</tr>
<tr>
<td>omnetpp</td>
<td>53.1</td>
<td></td>
</tr>
<tr>
<td>astar</td>
<td>40.7</td>
<td>13.7</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>33.8</td>
<td>78.4</td>
</tr>
</tbody>
</table>

Total SPECint2006 = 63.0
## Lenovo Group Limited

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**SPECint2006 =** 65.6  
**SPECint_base2006 =** 63.0

---

### 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>
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</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>260</td>
<td>37.6</td>
<td>261</td>
<td>37.5</td>
<td>260</td>
<td>37.6</td>
<td>238</td>
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<tr>
<td>401.bzip2</td>
<td>421</td>
<td>22.9</td>
<td>420</td>
<td>23.0</td>
<td>422</td>
<td>22.9</td>
<td>414</td>
<td>23.3</td>
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<tr>
<td>403.mcf</td>
<td>154</td>
<td>59.1</td>
<td>153</td>
<td>59.4</td>
<td>152</td>
<td>59.8</td>
<td>154</td>
<td>59.4</td>
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<tr>
<td>445.gobmk</td>
<td>379</td>
<td>27.7</td>
<td>380</td>
<td>27.6</td>
<td>380</td>
<td>27.6</td>
<td>385</td>
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<tr>
<td>456.hmmer</td>
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<td>31.8</td>
<td>376</td>
<td>32.2</td>
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<tr>
<td>462.libquantum</td>
<td>3.27</td>
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<td>464.h264ref</td>
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<td>51.8</td>
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<td>471.omnetpp</td>
<td>154</td>
<td>40.7</td>
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<td>40.8</td>
<td>118</td>
<td>53.1</td>
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<tr>
<td>473.astar</td>
<td>209</td>
<td>33.6</td>
<td>208</td>
<td>33.8</td>
<td>208</td>
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<td>33.7</td>
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<tr>
<td>483.xalancbmk</td>
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<td>70.0</td>
<td>98.5</td>
<td>70.0</td>
<td>98.3</td>
<td>70.2</td>
<td>88.0</td>
<td>78.4</td>
</tr>
</tbody>
</table>

- Results appear in the order in which they were run. Bold underlined text indicates a median measurement.
- The config file option 'submit' was used.
- Stack size set to unlimited using "ulimit -s unlimited"

---

### BIOS Configuration:
- Hyper-Threading 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
- 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

---

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

SPECint2006 = 65.6
SPECint_base2006 = 63.0

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

Platform Notes (Continued)

model name : Intel(R) Xeon(R) CPU E5-2660 v4@ 2.00GHz
  2 "physical id"s (chips)
  28 "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 : 14
siblings : 14
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 35840 KB

From /proc/meminfo
MemTotal: 264558768 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 14 14:21

SPEC is set to: /home/cpu2006-1.2-ic16.0
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sda4  xfs  689G  107G  582G  16% /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:
SPEC CINT2006 Result

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| SPECint2006 | 65.6 |
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Test date: Sep-2016
Hardware Availability: Mar-2016
Software Availability: Mar-2016

Platform Notes (Continued)

16x Hynix Semiconductor HMA42GR7AFR4N-UH 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=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 = "28"

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

Base Compiler Invocation

C benchmarks:
  icc -m64

C++ benchmarks:
  icpc -m64

Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
  -xCORE-AVX2 -ipo -03 -no-prec-div -parallel -opt-prefetch -auto-p32

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Base Optimization Flags (Continued)

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
- W1,-z,muldefs -L/sh -lsmartheap64

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64
400.perlbench: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
445.gobmk: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
C++ benchmarks (except as noted below):
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
473.astar: icpc -m64

Peak Portability Flags

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
Peak Optimization Flags

C benchmarks:

400.perlbench: -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) -opt-prefetch
-ansi-alias

401.bzip2: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)
-ipo (pass 2) -O3 (pass 2) -no-prec-div
-par-num-threads=1 (pass 1) -prof-use (pass 2) -auto-ilp32
-opt-prefetch -ansi-alias

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
-opt-malloc-options=3 -auto-ilp32

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
-opt-prefetch -auto-p32

445.gobmk: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)
-prof-use (pass 2) -par-num-threads=1 (pass 1) -ansi-alias

456.hmmer: basepeak = yes

458.sjeng: -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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -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)
-opt-ra-region-strategy=block -ansi-alias
-Wl,-z,muldefs -L/sh -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-auto-p32 -Wl,-z,muldefs -L/sh -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap
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Peak Other Flags

C benchmarks:

403.gcc -Dalloca=_alloca

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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