### Lenovo Group Limited

**Lenovo ThinkServer TD350** (Intel Xeon E5-2620 v3, 2.40 GHz)

<table>
<thead>
<tr>
<th>CPU2006 license:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor:</td>
<td>Lenovo Group Limited</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Group Limited</td>
</tr>
</tbody>
</table>

**Test date:** Dec-2014

**Hardware**

- **CPU Name:** Intel Xeon E5-2620 v3
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.20 GHz
- **CPU MHz:** 2400
- **FPU:** Integrated
- **CPU(s) enabled:** 12 cores, 2 chips, 6 cores/chip, 2 threads/core
- **CPU(s) orderable:** 1.2 chip
- **Primary Cache:** 32 KB I + 32 KB D on chip per core
- **Secondary Cache:** 256 KB I+D on chip per core
- **L3 Cache:** 15 MB I+D on chip per chip
- **Other Cache:** None
- **Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)
- **Disk Subsystem:** 1 x 120 GB SATA SSD
- **Other Hardware:** None

**Software**

- **Operating System:** Red Hat Enterprise Linux Server release 6.5 (Santiago) 2.6.32-431.el6.x86_64
- **Compiler:** C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux
- **Auto Parallel:** No
- **File System:** ext4
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 32-bit
- **Peak Pointers:** 32/64-bit
- **Other Software:** Microquill SmartHeap V10.0

**SPECint®_rate2006 = 517**

**SPECint_rate_base2006 = 500**

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECint_rate2006</th>
<th>SPECint_rate_base2006</th>
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<tbody>
<tr>
<td>perlbench</td>
<td>453</td>
<td>400</td>
</tr>
<tr>
<td>bzip2</td>
<td>571</td>
<td>500</td>
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<tr>
<td>gcc</td>
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<td>340</td>
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<td>mcf</td>
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<td>620</td>
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<tr>
<td>gobmk</td>
<td>333</td>
<td>300</td>
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<tr>
<td>hammer</td>
<td>732</td>
<td>660</td>
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<td>sjeng</td>
<td>721</td>
<td>650</td>
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<tr>
<td>libquantum</td>
<td>5140</td>
<td>4600</td>
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<td>h264ref</td>
<td>591</td>
<td>540</td>
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<td>omnetpp</td>
<td>293</td>
<td>260</td>
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<td>astar</td>
<td>280</td>
<td>250</td>
</tr>
<tr>
<td>xalancbmk</td>
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**SPECint_rate2006 = 517**

**SPECint_rate_base2006 = 500**
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CPU2006 license: 9017
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>632</td>
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<td>239</td>
<td>963</td>
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<td>403.mcf</td>
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<td>502</td>
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<td>503</td>
<td>384</td>
<td>496</td>
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<td>96.8</td>
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<td>471.omnetpp</td>
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<td>543</td>
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<td>473.astar</td>
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<td>483.xalancbmk</td>
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<td>576</td>
<td>288</td>
<td>576</td>
<td>288</td>
<td>576</td>
</tr>
</tbody>
</table>

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

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

Platform Notes

BIOS configuration:
Cluster On Die set to Auto
Early Snoop set to Auto
Performance Profile set to Custom
C1E Support set to Disabled
Core C3 set to Disabled
Core C6 set to Disabled
Thermal Profile set to High Fan Speed
Memory Power Savings set to Disabled
Sysinfo program /usr/cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on TD350 Tue Dec 30 10:14:34 2014

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

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SPECint_rate_base2006 = 500

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Lenovo Group Limited

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Platform Notes (Continued)

From /proc/cpuinfo
  model name : Intel(R) Xeon(R) CPU E5-2620 v3 @ 2.40GHz
  2 "physical id"s (chips)
  24 "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 : 6
    siblings : 12
    physical 0: cores 0 1 2 3 4 5
    physical 1: cores 0 1 2 3 4 5
  cache size : 15360 KB

From /proc/meminfo
  MemTotal:       264412996 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
  Red Hat Enterprise Linux Server release 6.5 (Santiago)

From /etc/*release* /etc/*version*
  redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
  system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)

uname -a:
  Linux TD350 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST 2013 x86_64
  x86_64 x86_64 GNU/Linux

run-level 3 Dec 30 10:13

SPEC is set to: /usr/cpu2006
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda2 ext4 107G 54G 54G 54% /

Additional information from dmidecode:
  BIOS LENOVO TB5TS110 10/06/2014
  Memory:
    16x  16 GB
    16x Micron 36ASF2G72PZ-2G1A2 16 GB 1866 MHz 2 rank

(End of data from sysinfo program)
TD350 support 4 channels and 8 DIMMs per processor, total 8 channels and
16 DIMMs. All 16 DIMM slots installed with 16 GB DIMM for this run.

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"
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Test date: Dec-2014
Tested by: Lenovo Group Limited
Hardware Availability: Sep-2014
Software Availability: Jan-2014

General Notes (Continued)
Binaries compiled on a system with 1x Core i7-860 CPU + 8GB memory using RedHat EL 6.4
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/redhat_transparenthugepage/enabled
Filesystem page cache cleared with:
echo 1> /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Base Compiler Invocation
C benchmarks:
  icc  -m32
C++ benchmarks:
  icpc -m32

Base Portability Flags
400.perlbench: -DSPEC_CPU_LINUX_IA32
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Base Optimization Flags
C benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
  -opt-mem-layout-trans=3
C++ benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
  -opt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh -lsmartheap

Base Other Flags
C benchmarks:
  403.gcc: -Dalloca=_alloca
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Software Availability: Jan-2014

Peak Compiler Invocation

C benchmarks (except as noted below):
  icc  -m32
  400.perlbench: icc  -m64
  401.bzip2: icc  -m64
  456.hmmer: icc  -m64
  458.sjeng: icc  -m64

C++ benchmarks:
  icpc  -m32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -xCORE-AVX2(pass 2)  -prof-gen(pass 1)  -ipo(pass 2)
  -O3(pass 2)  -no-prec-div(pass 2)  -prof-use(pass 2)
  -auto-ilp32

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

403.gcc: -xCORE-AVX2  -ipo  -O3  -no-prec-div

429.mcf: basepeak = yes

445.gobmk: -xCORE-AVX2(pass 2)  -prof-gen(pass 1)  -prof-use(pass 2)
  -ansi-alias  -opt-mem-layout-trans=3

456.hmmer: -xCORE-AVX2  -ipo  -O3  -no-prec-div  -unroll2  -auto-ilp32

458.sjeng: -xCORE-AVX2(pass 2)  -prof-gen(pass 1)  -ipo(pass 2)
  -O3(pass 2)  -no-prec-div(pass 2)  -prof-use(pass 2)
  -unroll4  -auto-ilp32

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Peak Optimization Flags (Continued)

462.libquantum: basepeak = yes
464.h264ref:
   -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
   -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
   -unroll2 -ansi-alias

C++ benchmarks:
471.omnetpp:
   -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
   -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
   -ansi-alias -opt-ra-region-strategy=block -Wl,-z,muldefs
   -L/sh -lsmartheap
473.astar: basepeak = yes
483.xalancbmk: basepeak = yes

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-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revA.xml

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

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