Lenovo Group Limited

Lenovo ThinkServer RD350 (1.70 GHz, Intel Xeon E5-2603 v4)

**SPECfp®2006 = 68.4**

**SPECfp_base2006 = 66.3**

**Hardware**

<table>
<thead>
<tr>
<th>Software</th>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 SP1 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
<td></td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>CPU Name:</th>
<th>Intel Xeon E5-2603 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>CPU MHz:</td>
<td>1700</td>
</tr>
<tr>
<td></td>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td></td>
<td>CPU(s) enabled:</td>
<td>12 cores, 2 chips, 6 cores/chip</td>
</tr>
<tr>
<td></td>
<td>CPU(s) orderable:</td>
<td>1,2 chips</td>
</tr>
<tr>
<td></td>
<td>Primary Cache:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td></td>
<td>Secondary Cache:</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 9017

**Test sponsor:** Lenovo Group Limited

**Tested by:** Lenovo Group Limited

**Test date:** May-2016

**Hardware Availability:** Mar-2016

**Software Availability:** Dec-2015

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*Continued on next page*
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CPU2006 license: 9017
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L3 Cache: 15 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R, running at 1866 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>
<th>Seconds</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>34.8</td>
<td>391</td>
<td>34.9</td>
<td>390</td>
<td>35.6</td>
<td>382</td>
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<td>35.6</td>
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<tr>
<td>416.gamess</td>
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<td>435.gromacs</td>
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<td>31.4</td>
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<td>459.GemsFDTD</td>
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<tr>
<td>482.sphinx3</td>
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<td>48.4</td>
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<td>48.5</td>
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<td>48.4</td>
<td>403</td>
<td>48.4</td>
<td></td>
<td></td>
<td></td>
<td></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-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 High Fan Speed

Continued on next page
**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  
running on RD350-MLK Sat May 28 17:59:45 2016

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 E5-2603 v4@ 1.70GHz  
2 "physical id"s (chips)  
12 "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 : 6  
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:  264561152 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 May 28 08:43

SPEC is set to: /home/cpu2006-1.2-ic16.0  
Filesystem Type Size Used Avail Use% Mounted on  
Continued on next page
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Hardware Availability: Mar-2016
Software Availability: Dec-2015

Platform Notes (Continued)
/dev/sda4 xfs 689G 4.0G 685G 1% /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 VB3TS332 12/28/2015
Memory:
16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 1866 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 = "12"

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

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Base Portability Flags (Continued)

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
447.dealII: -DSPEC_CPU_LP64
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
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
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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

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Peak Optimization Flags (Continued)

465.tonto (continued):
- opting-flags=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

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

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