Lenovo Group Limited
Lenovo NeXtScale nx360 M4
(Intel Xeon E5-2603 v2, 1.80 GHz)

"SPECfp®2006 = 51.1"
"SPECfp_base2006 = 49.6"

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

Test date: Nov-2014
Hardware Availability: Nov-2013
Software Availability: Sep-2013

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410.bwaves
416.gamess
433.milc
434.zeusmp
435.gromacs
436.cactusADM
437.leslie3d
444.namd
447.dealII
450.soplex
453.povray
454.calculix
459.GemsFDTD
465.tonto
470.lbm
481.wrf
482.sphinx3

---

Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2603 v2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU MHZ:</td>
<td>1800</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>8 cores, 2 chips, 4 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>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 6.4 (Santiago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux; Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>ext4</td>
</tr>
</tbody>
</table>

Continued on next page
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System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

L3 Cache: 10 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (8 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1333 MHz)
Disk Subsystem: 2 x 250 GB SATA, 7200 RPM, RAID 0
Other Hardware: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>58.4</td>
<td>233</td>
<td>57.0</td>
<td>238</td>
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<tr>
<td>416.gamess</td>
<td>1070</td>
<td>18.3</td>
<td>1069</td>
<td>18.3</td>
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<tr>
<td>433.milc</td>
<td>238</td>
<td>38.6</td>
<td>238</td>
<td>38.6</td>
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<tr>
<td>434.zeusmp</td>
<td>102</td>
<td>88.8</td>
<td>103</td>
<td>88.7</td>
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<td>435.gromacs</td>
<td>291</td>
<td>24.6</td>
<td>291</td>
<td>24.5</td>
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<tr>
<td>436.cactusADM</td>
<td>49.0</td>
<td>244</td>
<td>50.0</td>
<td>239</td>
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<tr>
<td>437.leslie3d</td>
<td>76.8</td>
<td>122</td>
<td>77.2</td>
<td>122</td>
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<td>444.namd</td>
<td>642</td>
<td>12.5</td>
<td>642</td>
<td>12.5</td>
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<tr>
<td>447.dealII</td>
<td>394</td>
<td>29.0</td>
<td>393</td>
<td>29.1</td>
</tr>
<tr>
<td>450.soplex</td>
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<td>22.9</td>
<td>364</td>
<td>22.9</td>
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<tr>
<td>453.povray</td>
<td>225</td>
<td>23.7</td>
<td>224</td>
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<td>454.calculix</td>
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<td>25.8</td>
<td>320</td>
<td>25.8</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
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<td>102</td>
<td>104</td>
<td>102</td>
</tr>
<tr>
<td>465.tonto</td>
<td>443</td>
<td>22.2</td>
<td>439</td>
<td>22.4</td>
</tr>
<tr>
<td>470.lbm</td>
<td>55.6</td>
<td>247</td>
<td>55.0</td>
<td>250</td>
</tr>
<tr>
<td>481.wrf</td>
<td>234</td>
<td>47.8</td>
<td>229</td>
<td>48.7</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>450</td>
<td>43.3</td>
<td>450</td>
<td>43.3</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"
Zone reclaim mode enabled with:
echo 1 > /proc/sys/vm/zone_reclaim_mode
Intel Idle Driver disabled with the following Linux kernel parameter in /etc/grub.conf:
intel_idle.max_cstate=0

Platform Notes
BIOS setting:
Operating Mode set to Maximum Performance
Sysinfo program /home/SPECcpu-20140116-ic14.0/config/sysinfo.rev6874
$Rev: 6874 $ $Date:: 2013-11-20 #$ 654bd3fcf53b06faef0efe54ed011998
running on nx360M4 Tue Nov 18 20:41:43 2014
Continued on next page
Lenovo Group Limited

Lenovo NeXtScale nx360 M4
(Intel Xeon E5-2603 v2, 1.80 GHz)

| SPECfp2006 = | 51.1 |
| SPECfp_base2006 = | 49.6 |

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

Platform Notes (Continued)

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 v2 @ 1.80GHz
- 2 "physical id"s (chips)
- 8 "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 : 4
  - siblings : 4
  - physical 0: cores 0 1 2 3
  - physical 1: cores 0 1 2 3
- cache size : 10240 KB

From /proc/meminfo
- MemTotal:       132091124 kB
- HugePages_Total:       0
- Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
- Red Hat Enterprise Linux Server release 6.4 (Santiago)

From /etc/*release* /etc/*version*
- redhat-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)
- system-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)

uname -a:
- Linux nx360M4 2.6.32-358.el6.x86_64 #1 SMP Tue Jan 29 11:47:41 EST 2013
- x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 17 15:44

SPEC is set to: /home/SPECcpu-20140116-ic14.0

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_nx360m4-lv_home
  ext4 403G 14G 370G 4% /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 IBM -[FHE107NUS-1.20]- 06/03/2014
Memory:
- 8x Samsung M393B2G70QH0-CMA 16 GB 2 rank 1866 MHz, configured at 1333 MHz

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Lenovo Group Limited

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Platform Notes (Continued)

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,0,1"
LD_LIBRARY_PATH = "/home/SPECcpu-20140116-ic14.0/1ibs/32:/home/SPECcpu-20140116-ic14.0/1ibs/64:/home/SPECcpu-20140116-ic14.0/sh"
OMP_NUM_THREADS = "8"

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_transparent_hugepage/enabled
runcspec command invoked through numactl i.e.:
umactl --interleave=all runspec <etc>

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
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

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**Base Portability Flags (Continued)**

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:
- -xAVX  -ipo  -O3  -no-prec-div  -parallel  -opt-prefetch  -ansi-alias

C++ benchmarks:
- -xAVX  -ipo  -O3  -no-prec-div  -opt-prefetch  -ansi-alias

Fortran benchmarks:
- -xAVX  -ipo  -O3  -no-prec-div  -parallel  -opt-prefetch

Benchmarks using both Fortran and C:
- -xAVX  -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

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:
433.milc: -xAVX(pass 2)  -prof-gen(pass 1)  -ipo(pass 2)  -O3(pass 2)
- -no-prec-div(pass 2)  -prof-use(pass 2)  -auto-ilp32
- -ansi-alias

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Peak Optimization Flags (Continued)

470.lbm: basepeak = yes

482.sphinx3: -xAVX -ipo -O3 -no-prec-div -unroll2 -ansi-alias -parallel

C++ benchmarks:

444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
 -no-prec-div(pass 2) -prof-use(pass 2) -fno-alias
 -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
 -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
 -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
 -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
 -inline-level=0 -opt-prefetch -parallel

465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
 -no-prec-div(pass 2) -prof-use(pass 2) -inline-calloc
 -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xAVX -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

481.wrf: basepeak = yes
**SPEC CFP2006 Result**

**Lenovo Group Limited**

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**SPECfp2006 =** 51.1  
**SPECfp_base2006 =** 49.6

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</tbody>
</table>

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/IBM-Platform-Flags-V1.2-IVB-C.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/IBM-Platform-Flags-V1.2-IVB-C.xml

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

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