Lenovo Group Limited

Lenovo NeXtScale nx360 M5
(2.10 GHz, Intel Xeon E5-2695 v4)

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

SPECint®2006 = 68.0
SPECint_base2006 = 66.7

Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2695 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.30 GHz</td>
</tr>
<tr>
<td>CPU MHZ:</td>
<td>2100</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>36 cores, 2 chips, 18 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>
<tr>
<td>L3 Cache:</td>
<td>45 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
</tbody>
</table>

Software

<table>
<thead>
<tr>
<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</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>Microquill SmartHeap V10.2</td>
</tr>
</tbody>
</table>

Test date: May-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>252</td>
<td>38.8</td>
<td>254</td>
<td>38.4</td>
<td></td>
<td></td>
<td>252</td>
<td>38.8</td>
<td>233</td>
<td>41.9</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>412</td>
<td>23.4</td>
<td>413</td>
<td>23.4</td>
<td></td>
<td></td>
<td>415</td>
<td>23.2</td>
<td>413</td>
<td>23.4</td>
</tr>
<tr>
<td>403.mcf</td>
<td>226</td>
<td>35.7</td>
<td></td>
<td>226</td>
<td>35.6</td>
<td></td>
<td>226</td>
<td>35.6</td>
<td>221</td>
<td>36.4</td>
</tr>
<tr>
<td>429.mcf</td>
<td>146</td>
<td>62.4</td>
<td>147</td>
<td>62.1</td>
<td></td>
<td></td>
<td>147</td>
<td>62.1</td>
<td>153</td>
<td>59.6</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>373</td>
<td>28.1</td>
<td>373</td>
<td>28.1</td>
<td></td>
<td></td>
<td>373</td>
<td>28.2</td>
<td>378</td>
<td>27.8</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>115</td>
<td>81.3</td>
<td>115</td>
<td>81.2</td>
<td></td>
<td></td>
<td>115</td>
<td>81.1</td>
<td>115</td>
<td>81.2</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>366</td>
<td>33.1</td>
<td>366</td>
<td>33.1</td>
<td></td>
<td></td>
<td>365</td>
<td>33.1</td>
<td>361</td>
<td>33.5</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>2.56</td>
<td>8090</td>
<td>2.48</td>
<td>8360</td>
<td></td>
<td></td>
<td>2.49</td>
<td>8320</td>
<td>2.56</td>
<td>8090</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>430</td>
<td>51.5</td>
<td>430</td>
<td>51.5</td>
<td></td>
<td></td>
<td>430</td>
<td>51.5</td>
<td>430</td>
<td>51.5</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>131</td>
<td>47.7</td>
<td>134</td>
<td>46.7</td>
<td>133</td>
<td>47.1</td>
<td>119</td>
<td>52.6</td>
<td>119</td>
<td>52.5</td>
</tr>
<tr>
<td>473.astar</td>
<td>205</td>
<td>34.2</td>
<td>203</td>
<td>34.6</td>
<td>203</td>
<td>34.6</td>
<td>206</td>
<td>34.1</td>
<td>206</td>
<td>34.1</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>94.2</td>
<td>73.2</td>
<td>94.0</td>
<td>73.4</td>
<td>94.1</td>
<td>73.3</td>
<td>86.5</td>
<td>79.8</td>
<td>86.2</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes
The config file option 'submit' was used.

Operating System Notes
Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS Configuration:
- Operating Mode set to "Maximum Performance"
- Hyper-Threading set to Disabled
- COD Preference set to Disable

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 E5-2695 v4 @ 2.10GHz
2 "physical id"s (chips)
36 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

Continued on next page
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Platform Notes (Continued)

- Physical cores: 18
- Siblings: 18
- Physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
- Physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
- Cache size: 46080 KB

From /proc/meminfo:
- MemTotal: 263965104 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 25 19:22

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

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 703G 8.0G 695G 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.

Memory:
- 16x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz

(End of data from sysinfo program)
**Lenovo Group Limited**

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---

**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 = "36"`

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 -O3 -no-prec-div -parallel -opt-prefetch -auto-p32`

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

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Peak Optimization Flags (Continued)

401.bzip2 (continued):
- 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

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-Flags-V1.2-BDW-B.html
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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-Flags-V1.2-BDW-B.xml

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

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