Lenovo Group Limited

Lenovo System x iDataPlex dx360 M4
(Intel Xeon E5-2620 v2, 2.10 GHz)

**SPECint®2006 =** 43.0
**SPECint_base2006 =** 40.2

**CPU2006 license:** 9017
**Test date:** Nov-2014
**Test sponsor:** Lenovo Group Limited
**Hardware Availability:** Dec-2013
**Tested by:** IBM Corporation
**Software Availability:** Sep-2013

**Hardware**

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E5-2620 v2</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.60 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>12 cores, 2 chips, 6 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s)ordableable</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>15 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 PC3-14900R-13, ECC, running at 1600 MHz)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>1 x 500 GB SATA, 7200 RPM</td>
</tr>
<tr>
<td>Other Hardware</td>
<td>None</td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Red Hat Enterprise Linux Server release 6.4 (Santiago)</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>ext4</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 V10.0</td>
</tr>
</tbody>
</table>
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SPECint2006 =  43.0
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Let's take a closer look at the results for the Lenovo System x iDataPlex dx360 M4, which uses an Intel Xeon E5-2620 v2 processor running at 2.10 GHz. The system was tested by IBM Corporation on November 20, 2014, and the test sponsor was Lenovo Group Limited.

The table below shows the results for various benchmarks:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Seconds Peak</th>
<th>Ratio Base</th>
<th>Seconds Base</th>
<th>Seconds Peak</th>
<th>Ratio Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>397</td>
<td>396</td>
<td>24.7</td>
<td>396</td>
<td>24.6</td>
<td>396</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>539</td>
<td>539</td>
<td>17.9</td>
<td>539</td>
<td>17.9</td>
<td>539</td>
</tr>
<tr>
<td>403.gcc</td>
<td>314</td>
<td>169</td>
<td>53.9</td>
<td>312</td>
<td>53.9</td>
<td>319</td>
</tr>
<tr>
<td>429.mcf</td>
<td>170</td>
<td>169</td>
<td>53.9</td>
<td>169</td>
<td>53.9</td>
<td>169</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>559</td>
<td>559</td>
<td>18.8</td>
<td>559</td>
<td>18.8</td>
<td>559</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>205</td>
<td>207</td>
<td>45.2</td>
<td>208</td>
<td>44.8</td>
<td>208</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>551</td>
<td>551</td>
<td>22.0</td>
<td>550</td>
<td>22.0</td>
<td>550</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>10.1</td>
<td>10.1</td>
<td>2050</td>
<td>10.1</td>
<td>2050</td>
<td>10.1</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>606</td>
<td>605</td>
<td>36.6</td>
<td>604</td>
<td>36.6</td>
<td>604</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>316</td>
<td>315</td>
<td>19.8</td>
<td>297</td>
<td>21.1</td>
<td>297</td>
</tr>
<tr>
<td>473.astar</td>
<td>295</td>
<td>293</td>
<td>24.0</td>
<td>293</td>
<td>24.0</td>
<td>293</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"
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:
in tel_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 $ @ @ 654bd3fcf53b06faef0e6e54ed011998
running on dx360M4 Wed Nov 19 04:02:47 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

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz
  2 "physical id"s (chips)
  2 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The Continued on next page
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CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
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Platform Notes (Continued)

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: 264642460 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 dx360M4 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 15:39

SPEC is set to: /home/SPECcpu-20140116-ic14.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_td2-lv_home
  ext4 380G 174G 187G 49% /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 -[TDE139OUS-1.50]- 02/21/2014
Memory:
  16x Samsung M393B2G7Q40CMA 16 GB 2 rank 1866 MHz, configured at 1600 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
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 = "12"

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

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:
  -xAVX -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32

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

Base Other Flags
C benchmarks:

Continued on next page
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Base Other Flags (Continued)

403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
  icc -m64

  400.perlbench: icc -m32
  445.gobmk: icc -m32
  464.h264ref: icc -m32

C++ benchmarks (except as noted below):
  icpc -m64

  471.omnetpp: icpc -m32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

  400.perlbench: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
  -no-prec-div(pass 2) -prof-use(pass 2) -opt-prefetch
  -ansi-alias

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

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

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Peak Optimization Flags (Continued)

- 429.mcf: basepeak = yes
- 445.gobmk: -xAVX(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
  - ansi-alias
- 456.hmmer: basepeak = yes
- 458.sjeng: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -03(pass 2)
  - no-prec-div(pass 2) -prof-use(pass 2) -unroll4
- 462.libquantum: basepeak = yes
- 464.h264ref: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -03(pass 2)
  - no-prec-div(pass 2) -prof-use(pass 2) -unroll2
  - ansi-alias

C++ benchmarks:

- 471.omnetpp: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -03(pass 2)
  - no-prec-div(pass 2) -prof-use(pass 2)
  - opt-ra-region-strategy=block
  - ansi-alias
  - 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/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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