# Lenovo Group Limited

**IBM System x iDataPlex dx360 M4**  
(Intel Xeon E5-2648L v2, 1.90 GHz)

| SPECint®2006 | 43.9 |
| SPECint_base2006 | 40.5 |

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>23.1</td>
</tr>
<tr>
<td>bzip2</td>
<td>17.5</td>
</tr>
<tr>
<td>gcc</td>
<td>25.7</td>
</tr>
<tr>
<td>mcf</td>
<td>19.7</td>
</tr>
<tr>
<td>gobmk</td>
<td>26.2</td>
</tr>
<tr>
<td>hammer</td>
<td>51.6</td>
</tr>
<tr>
<td>sjeng</td>
<td>21.8</td>
</tr>
<tr>
<td>libquantum</td>
<td>21.4</td>
</tr>
<tr>
<td>h264ref</td>
<td>32.2</td>
</tr>
<tr>
<td>omnetpp</td>
<td>26.8</td>
</tr>
<tr>
<td>astar</td>
<td>23.3</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>42.8</td>
</tr>
</tbody>
</table>

**Hardware**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E5-2648L v2</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.50 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>1900</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>20 cores, 2 chips, 10 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>25 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)</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>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Red Hat Enterprise Linux Server release 6.4 (Santiago) 2.6.32-358.el6.x86_64</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>
## Lenovo Group Limited

IBM System x iDataPlex dx360 M4 (Intel Xeon E5-2648L v2, 1.90 GHz)

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**SPECint_base2006** = 40.5

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

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>424</td>
<td>23.1</td>
<td>423</td>
<td>23.1</td>
<td>336</td>
<td>29.1</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>559</td>
<td>17.3</td>
<td>558</td>
<td>17.3</td>
<td>554</td>
<td>17.4</td>
</tr>
<tr>
<td>403.mcf</td>
<td>176</td>
<td>51.7</td>
<td>177</td>
<td>51.6</td>
<td>176</td>
<td>51.7</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>614</td>
<td>17.1</td>
<td>614</td>
<td>17.1</td>
<td>532</td>
<td>19.7</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>214</td>
<td>43.7</td>
<td>214</td>
<td>43.7</td>
<td>214</td>
<td>43.7</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>565</td>
<td>21.4</td>
<td>565</td>
<td>21.4</td>
<td>554</td>
<td>21.8</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>7.70</td>
<td>2690</td>
<td>7.70</td>
<td>2690</td>
<td>7.70</td>
<td>2690</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>689</td>
<td>32.1</td>
<td>687</td>
<td>32.2</td>
<td>525</td>
<td>42.1</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>232</td>
<td>27.0</td>
<td>235</td>
<td>26.6</td>
<td>175</td>
<td>35.8</td>
</tr>
<tr>
<td>473.astar</td>
<td>302</td>
<td>23.3</td>
<td>301</td>
<td>23.3</td>
<td>302</td>
<td>23.3</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>161</td>
<td>42.8</td>
<td>161</td>
<td>42.8</td>
<td>161</td>
<td>42.8</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  
Hyper-Threading set to Disable  
Sysinfo program /home/SPECcpu-20140116-ic14.0/config/sysinfo.rev6874  
$Rev: 6874 $ $Date:: 2013-11-20 #$ 654bd3fcf53b06faef0eef54ed011998  
running on dx360M4 Fri Oct 24 02:09:36 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 E5-2648L v2 @ 1.90GHZ  
2 "physical id"s (chips)  
20 "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 : 10

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<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>siblings : 10</td>
</tr>
<tr>
<td>physical 0: cores 0 1 2 3 4 8 9 10 11 12</td>
</tr>
<tr>
<td>physical 1: cores 0 1 2 3 4 8 9 10 11 12</td>
</tr>
<tr>
<td>cache size : 25600 KB</td>
</tr>
</tbody>
</table>

From /proc/meminfo
- MemTotal: 264642980 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 Oct 24 02:04

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

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 M393B2G70QH0-CMA 16 GB 2 rank 1866 MHz, configured at 1867 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/libs/32:/home/SPECcpu-20140116-ic14.0/libs/64:/home/SPECcpu-20140116-ic14.0/sh"
- OMP_NUM_THREADS = "20"

Binaries compiled on a system with 1x Core i7-860 CPU + 8GB memory using RedHat EL 6.4
Transparent Huge Pages enabled with:

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General Notes (Continued)

```
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

- C benchmarks:
  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`

- C++ benchmarks:

Base Optimization Flags

- C benchmarks:
  `-xSSE4.2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32`

- C++ benchmarks:
  `-xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
  -Wl,-z,muldefs -L/sh -lsmartheap64`

Base Other Flags

- C benchmarks:
  `403.gcc: -Dalloca=_alloca`
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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: -xSSE4.2(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: -xSSE4.2(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: -xSSE4.2 -ipo -o3 -no-prec-div -inline-calloc
-opt-malloc-options=3 -auto-ilp32

429.mcf: basepeak = yes

445.gobmk: -xSSE4.2(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
-ansi-alias

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Peak Optimization Flags (Continued)

456.hmmer: -xSSE4.2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
ansi-alias

458.sjeng: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-unroll4

462.libquantum: basepeak = yes

464.h264ref: -xSSE4.2(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: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-opt-ra-region-strategy=block
-Wl,-z,muldefs -L/sh -lsmartheap
ansi-alias

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.

Tested with SPEC CPU2006 v1.2.
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