Lenovo Group Limited

IBM Flex System x240 M5
(Intel Xeon E5-2690 v3, 2.60 GHz)

SPEClnt\_rate2006 = 1100
SPEClnt\_rate\_base2006 = 1060

Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2690 v3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.50 GHz</td>
</tr>
<tr>
<td>CPU MHZ:</td>
<td>2600</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>24 cores, 2 chips, 12 cores/chip, 2 threads/core</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>30 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 PC4-2133P-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 1 TB SAS, 7200 RPM</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
</tbody>
</table>

Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 6.5 (Santiago)</th>
</tr>
</thead>
<tbody>
<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>No</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-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 Flex System x240 M5
(Intel Xeon E5-2690 v3, 2.60 GHz)

CPU2006 license: 11
Test sponsor: Lenovo Group Limited
Tested by: IBM Corporation

SPECint_rate2006 = 1100
SPECint_rate_base2006 = 1060

Test date: Jan-2015
Hardware Availability: Dec-2014
Software Availability: Nov-2013

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Rate</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>48</td>
<td>557</td>
<td>841</td>
<td>554</td>
<td>847</td>
<td>556</td>
<td>843</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>48</td>
<td>865</td>
<td>536</td>
<td>857</td>
<td>540</td>
<td>858</td>
<td>540</td>
</tr>
<tr>
<td>403.gcc</td>
<td>48</td>
<td>476</td>
<td>812</td>
<td>476</td>
<td>811</td>
<td>476</td>
<td>813</td>
</tr>
<tr>
<td>429.mcf</td>
<td>48</td>
<td>307</td>
<td>1430</td>
<td>306</td>
<td>1430</td>
<td>306</td>
<td>1430</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>48</td>
<td>680</td>
<td>741</td>
<td>680</td>
<td>740</td>
<td>680</td>
<td>740</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>48</td>
<td>306</td>
<td>1460</td>
<td>304</td>
<td>1470</td>
<td>304</td>
<td>1470</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>48</td>
<td>743</td>
<td>781</td>
<td>731</td>
<td>794</td>
<td>745</td>
<td>779</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>48</td>
<td>101</td>
<td>9890</td>
<td>100</td>
<td>9900</td>
<td>100</td>
<td>9910</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>48</td>
<td>834</td>
<td>1270</td>
<td>839</td>
<td>1270</td>
<td>838</td>
<td>1270</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>48</td>
<td>523</td>
<td>574</td>
<td>531</td>
<td>565</td>
<td>530</td>
<td>567</td>
</tr>
<tr>
<td>473.astar</td>
<td>48</td>
<td>578</td>
<td>583</td>
<td>585</td>
<td>576</td>
<td>578</td>
<td>583</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>48</td>
<td>300</td>
<td>1110</td>
<td>301</td>
<td>1100</td>
<td>298</td>
<td>1110</td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

Operating Mode set to Maximum Performance in BIOS
Fan speed set to 100%
Sysinfo program /cpu2006.1.2/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on Bonneville-SPECcpu Thu Jan  1 15:21:36 2015

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 E5-2690 v3 @ 2.60GHz
  2 "physical id"s (chips)
  48 "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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**SPECint_rate2006 =** 1100
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<table>
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<tr>
<th>CPU2006 license:</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor:</td>
<td>Lenovo Group Limited</td>
</tr>
<tr>
<td>Tested by:</td>
<td>IBM Corporation</td>
</tr>
<tr>
<td>Test date:</td>
<td>Jan-2015</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2014</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2013</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```
cpu cores : 12
siblings : 24
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size : 15360 KB
```

From `/proc/meminfo`
```
MemTotal:       264119260 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

From `/etc/*release* /etc/*version*`
```
redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

```
uname -a:
Linux Bonneville-SPECcpu 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST 2013 x86_64 x86_64 x86_64 GNU/Linux
run-level 3 Jan 1 15:21 last=5
```

```
SPEC is set to: /cpu2006.1.2
Filesystem                          Type  Size  Used  Avail  Use%  Mounted on
/dev/mapper/vg_bonnevillespe-lv_root  ext4  356G   14G  324G   5%  /
```

**Additional information from dmidecode:**
```
BIOS IBM -[C4E103EUS-1.00]- 11/25/2014
Memory:
  8x NO DIMM Unknown
  16x Samsung M393A2G40DB0-CPB 16 GB 2133 MHz 2 rank
```

**(End of data from sysinfo program)**

**General Notes**

Environment variables set by runspec before the start of the run:
```
LD_LIBRARY_PATH = "/cpu2006.1.2/libs/32:/cpu2006.1.2/libs/64:/cpu2006.1.2/sh"
```

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
Filesystem page cache cleared with:
echo 1> /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
```
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Base Compiler Invocation

C benchmarks:
  icc  -m32

C++ benchmarks:
  icpc  -m32

Base Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_IA32
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
  -xCORE-AVX2  -ipo  -o3  -no-prec-div  -opt-prefetch
  -opt-mem-layout-trans=3

C++ benchmarks:
  -xCORE-AVX2  -ipo  -o3  -no-prec-div  -opt-prefetch
  -opt-mem-layout-trans=3  -Wl,-z,muldefs  -L/sh -lsmartheap

Base Other Flags

C benchmarks:
  403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
  icc  -m32

  400.perlbench: icc  -m64
  401.bzip2: icc  -m64
  456.hmmer: icc  -m64
  458.sjeng: icc  -m64

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Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc -m32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-auto-ilp32

401.bzip2: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-opt-prefetch -auto-ilp32 -ansi-alias

403.gcc: basepeak = yes
429.mcf: basepeak = yes

445.gobmk: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
-ansi-alias -opt-mem-layout-trans=3

456.hmmer: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32

458.sjeng: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-unroll4 -auto-ilp32

462.libquantum: basepeak = yes

464.h264ref: -xCORE-AVX2(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:

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Peak Optimization Flags (Continued)

471.omnetpp: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)  
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)  
-ansi-alias -opt-ra-region-strategy=block -Wl,-z, muldefs  
-L/sh -lsamartheap

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-HSW-B.20141021.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-HSW-B.20141021.xml

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

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