Lenovo Group Limited

Lenovo System x3500 M4
(Intel Xeon E5-2670 v2, 2.50 GHz)

SPECint\textsubscript{rate}\textsubscript{2006} = 810

SPECint\textsubscript{rate base}\textsubscript{2006} = 782

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System: Red Hat Enterprise Linux Server release 6.4 (Santiago)</td>
<td></td>
</tr>
<tr>
<td>Compiler: ICC++: Version 14.0.0.0.080 of Intel C++ Studio XE for Linux</td>
<td></td>
</tr>
<tr>
<td>Auto Parallel: No</td>
<td></td>
</tr>
<tr>
<td>File System: ext4</td>
<td></td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td></td>
</tr>
<tr>
<td>Base Pointers: 32-bit</td>
<td></td>
</tr>
<tr>
<td>Peak Pointers: 32/64-bit</td>
<td></td>
</tr>
<tr>
<td>Other Software: Microquill SmartHeap V10.0</td>
<td></td>
</tr>
<tr>
<td>CPU Name: Intel Xeon E5-2670 v2</td>
<td></td>
</tr>
<tr>
<td>CPU Characteristics: Intel Turbo Boost Technology up to 3.30 GHz</td>
<td></td>
</tr>
<tr>
<td>CPU MHZ: 2500</td>
<td></td>
</tr>
<tr>
<td>FPU: Integrated</td>
<td></td>
</tr>
<tr>
<td>CPU(s) enabled: 20 cores, 2 chips, 10 cores/chip, 2 threads/core</td>
<td></td>
</tr>
<tr>
<td>CPU(s) orderable: 1.2 chips</td>
<td></td>
</tr>
<tr>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
<td></td>
</tr>
<tr>
<td>Secondary Cache: 256 KB I+D on chip per core</td>
<td></td>
</tr>
<tr>
<td>L3 Cache: 25 MB I+D on chip per chip</td>
<td></td>
</tr>
<tr>
<td>Other Cache: None</td>
<td></td>
</tr>
<tr>
<td>Memory: 256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC)</td>
<td></td>
</tr>
<tr>
<td>Disk Subsystem: 1 x 1 TB SATA, 7200 RPM</td>
<td></td>
</tr>
<tr>
<td>Other Hardware: None</td>
<td></td>
</tr>
</tbody>
</table>
Lenovo Group Limited
Lenovo System x3500 M4
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CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: IBM Corporation

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copies</td>
<td>Seconds</td>
</tr>
<tr>
<td>400.perlbench</td>
<td>40</td>
<td>660</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>40</td>
<td>913</td>
</tr>
<tr>
<td>403.gcce</td>
<td>40</td>
<td>521</td>
</tr>
<tr>
<td>429.mcf</td>
<td>40</td>
<td>311</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>40</td>
<td>721</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>40</td>
<td>348</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>40</td>
<td>836</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>40</td>
<td>160</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>40</td>
<td>896</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>40</td>
<td>590</td>
</tr>
<tr>
<td>473.astar</td>
<td>40</td>
<td>635</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>40</td>
<td>332</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"
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 x3500M4 Sun Dec 28 07:15:20 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 E5-2670 v2 @ 2.50GHz
    2 "physical id"s (chips)

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SPECint_rate2006 = 810
SPECint_rate_base2006 = 782

Platform Notes (Continued)

40 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 10
siblings : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
cache size : 25600 KB

From /proc/meminfo
MemTotal: 264653464 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 x3500M4 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 Dec 27 22:26
SPEC is set to: /home/SPECcpu-20140116-ic14.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_intelcrb-lv_home
ext4 863G 40G 779G 5% /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 -[Y5E139ZUS-1.70]- 06/25/2014
Memory:
8x Not Specified Not Specified
16x Samsung M393B2G70QH0-CMA 16 GB 2 rank 1866 MHz, configured at 1867 MHz

(End of data from sysinfo program)
SPEC CINT2006 Result

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Test sponsor: Lenovo Group Limited
Tested by: IBM Corporation

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

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = */home/SPECcpu-20140116-ic14.0/libs/32:/home/SPECcpu-20140116-ic14.0/libs/64:/home/SPECcpu-20140116-ic14.0/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>

Base Compiler Invocation

C benchmarks:
  icc  -m32

C++ benchmarks:
  icpc -m32

Base Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_TA32
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
  -xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -opt-mem-layout-trans=3

C++ benchmarks:
  -xSSE4.2 -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
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Hardware Availability: Dec-2013
Software Availability: Sep-2013

Peak Compiler Invocation

C benchmarks (except as noted below):

```bash
icc -m32
```

```bash
400.perlbench: icc -m64
```

```bash
401.bzip2: icc -m64
```

```bash
456.hmmer: icc -m64
```

```bash
458.sjeng: icc -m64
```

C++ benchmarks:

```bash
icpc -m32
```

Peak Portability Flags

```bash
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:

```bash
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)
-auto-ilp32
```

```bash
401.bzip2: -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 -auto-ilp32 -ansi-alias
```

```bash
403.gcc: basepeak = yes
```

```bash
429.mcf: basepeak = yes
```

```bash
445.gobmk: -xSSE4.2(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
-ansi-alias -opt-mem-layout-trans=3
```

```bash
456.hmmer: -xSSE4.2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
```

```bash
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 -auto-ilp32
```

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Software Availability: Sep-2013

Peak Optimization Flags (Continued)

462.libquantum: basepeak = yes

464.h264ref:
   -xSSE4.2(pas 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)
   -ansi-alias -opt-ra-region-strategy=block -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 questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.