IBM Corporation

IBM System x3500 M4 (Intel Xeon E5-2650L)

| SPECint\_rate2006 | 460 |
| SPECint\_rate_base2006 | 441 |

**CPU2006 license:** 11

**Test date:** Apr-2012

**Test sponsor:** IBM Corporation

**Hardware Availability:** Mar-2012

**Tested by:** IBM Corporation

**Software Availability:** Oct-2011

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### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E5-2650L</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.30 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>1800</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>16 cores, 2 chips, 8 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>20 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>64 GB (16 x 4 GB 2Rx8 PC3-12800R-11, ECC)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>1 x 300 GB SAS, 15000 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 6.1 (Santiago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 12.1.0.225 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 V9.01</td>
</tr>
</tbody>
</table>
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>400.perlbench</td>
<td>32</td>
<td>987</td>
<td>317</td>
<td>1012</td>
<td>309</td>
<td>1009</td>
<td>310</td>
<td>32</td>
<td>860</td>
<td>364</td>
<td>858</td>
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<tr>
<td>401.bzip2</td>
<td>32</td>
<td>1271</td>
<td>243</td>
<td>1279</td>
<td>241</td>
<td>1277</td>
<td>242</td>
<td>32</td>
<td>1232</td>
<td>251</td>
<td>1233</td>
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<tr>
<td>403.gcc</td>
<td>32</td>
<td>708</td>
<td>364</td>
<td>707</td>
<td>364</td>
<td>706</td>
<td>365</td>
<td>32</td>
<td>705</td>
<td>365</td>
<td>706</td>
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<tr>
<td>429.mcf</td>
<td>32</td>
<td>399</td>
<td>732</td>
<td>399</td>
<td>731</td>
<td>400</td>
<td>729</td>
<td>32</td>
<td>399</td>
<td>732</td>
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<tr>
<td>445.gobmk</td>
<td>32</td>
<td>1066</td>
<td>315</td>
<td>1067</td>
<td>315</td>
<td>1066</td>
<td>315</td>
<td>32</td>
<td>1039</td>
<td>323</td>
<td>1047</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>32</td>
<td>557</td>
<td>536</td>
<td>558</td>
<td>536</td>
<td>560</td>
<td>533</td>
<td>32</td>
<td>466</td>
<td>640</td>
<td>464</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>32</td>
<td>1233</td>
<td>314</td>
<td>1233</td>
<td>314</td>
<td>1231</td>
<td>315</td>
<td>32</td>
<td>1185</td>
<td>327</td>
<td>1187</td>
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<tr>
<td>462.libquantum</td>
<td>32</td>
<td>259</td>
<td>2560</td>
<td>259</td>
<td>2560</td>
<td>259</td>
<td>2560</td>
<td>32</td>
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<tr>
<td>464.h264ref</td>
<td>32</td>
<td>1293</td>
<td>548</td>
<td>1286</td>
<td>550</td>
<td>1285</td>
<td>551</td>
<td>32</td>
<td>1285</td>
<td>551</td>
<td>1274</td>
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<tr>
<td>471.omnetpp</td>
<td>32</td>
<td>704</td>
<td>284</td>
<td>704</td>
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<td>704</td>
<td>284</td>
<td>32</td>
<td>657</td>
<td>304</td>
<td>658</td>
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<tr>
<td>473.astar</td>
<td>32</td>
<td>842</td>
<td>267</td>
<td>841</td>
<td>267</td>
<td>848</td>
<td>265</td>
<td>32</td>
<td>842</td>
<td>267</td>
<td>841</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>32</td>
<td>463</td>
<td>477</td>
<td>464</td>
<td>476</td>
<td>464</td>
<td>476</td>
<td>32</td>
<td>463</td>
<td>477</td>
<td>464</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

Platform Notes

BIOS Settings:
Operating Mode set to Maximum Performance
Sysinfo program /root/SPECcpu-v1.2/config/sysinfo.rev6800
$Rev: 6800 $ $Date:: 2011-10-11 #$ 6f2ebdff5032aaa42e583f96b07f99d3
running on x3500M4 Fri Apr 20 16:13:33 2012

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 E5-2650L 0 @ 1.80GHz
  2 "physical id"s (chips)
  32 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
Continued on next page
### Platform Notes (Continued)

Following excerpts from `/proc/cpuinfo` might not be reliable. Use with caution.

- CPU cores: 8
- Siblings: 16
- Physical 0: Cores 0 1 2 3 4 5 6 7
- Physical 1: Cores 0 1 2 3 4 5 6 7
- Cache size: 20480 KB

From `/proc/meminfo`

- MemTotal: 66044804 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.1 (Santiago)
```

From `/etc/*release*` /`/etc/*version*`

- redhat-release: Red Hat Enterprise Linux Server release 6.1 (Santiago)
- system-release: Red Hat Enterprise Linux Server release 6.1 (Santiago)

```
uname -a:
Linux x3500M4 2.6.32-131.0.15.el6.x86_64 #1 SMP Tue May 10 15:42:40 EDT 2011
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Apr 20 15:48

```
SPEC is set to: /root/SPECcpu-v1.2
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_x3500m4-lv_root
  ext4  210G  8.8G  191G  5% /
```

Additional information from `dmidecode`:

- Memory: 16x Samsung M393B5273DH0-CK0 4 GB 1600 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 = "/root/SPECcpu-v1.2/libs/32:/root/SPECcpu-v1.2/libs/64"
```

Binaries compiled on a system with 1x Core i7-860 CPU + 8GB memory using RHEL5.5

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:
  -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/smartheap  -lsmartheap

Base Other Flags

C benchmarks:
  403gcc: -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

C++ benchmarks:
  icpc  -m32
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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: -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

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

403.gcc: -xSSE4.2 -ipo -O3 -no-prec-div

429.mcf: basepeak = yes

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

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

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

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)
               -ansi-alias -opt-ra-region-strategy=block -Wl,-z,muldefs
               -L/smartheap -lsmartheap

473.astar: basepeak = yes

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Peak Optimization Flags (Continued)

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-ic12.1-official-linux64.20111122.html
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-SNB-C.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20111122.xml
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-SNB-C.xml

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