IBM Corporation
IBM System x3650 M4 (Intel Xeon E5-2690)

SPECint®2006 = 59.4
SPECint_base2006 = 55.1

CPU2006 license: 11
Test sponsor: IBM Corporation
Test date: Mar-2012
Hardware Availability: Mar-2012
Tested by: IBM Corporation
Software Availability: Mar-2012

CPU Name: Intel Xeon E5-2690
CPU Characteristics: Intel Turbo Boost Technology up to 3.80 GHz
CPU MHz: 2900
FPU: Integrated
CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip, 2 threads/core
CPU(s) orderable: 1,2 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core
L3 Cache: 20 MB I+D on chip per core
Other Cache: None
Memory: 128 GB (16 x 8 GB 2Rx8 PC3-12800R-11, ECC)
Disk Subsystem: 1 x 1 TB SAS, 7200 RPM
Other Hardware: None

Operating System: Red Hat Enterprise Linux Server release 6.1 (Santiago)
Compiler: C/C++: Version 12.1.0.225 of Intel C++ Studio XE for Linux
Auto Parallel: Yes
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V9.01

Software

Hardware

400.perlbench
401.bzip2
403.gcc
429.mcf
445.gobmk
456.hmmer
458.sjeng
462.libquantum
464.h264ref
471.omnetpp
473.astar
483.xalancbmk

3300

Software

Operating System: Red Hat Enterprise Linux Server release 6.1 (Santiago)
Compiler: C/C++: Version 12.1.0.225 of Intel C++ Studio XE for Linux
Auto Parallel: Yes
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V9.01
IBM Corporation
IBM System x3650 M4 (Intel Xeon E5-2690)

SPECint2006 = 59.4
SPECint_base2006 = 55.1

CPU2006 license: 11
Test sponsor: IBM Corporation
Test date: Mar-2012
Hardware Availability: Mar-2012
Tested by: IBM Corporation
Software Availability: Mar-2012

Results Table

<table>
<thead>
<tr>
<th>Benchmark</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>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>289</td>
<td>33.8</td>
<td>288</td>
<td>34.0</td>
<td>289</td>
<td>33.8</td>
<td>242</td>
<td>40.3</td>
<td>242</td>
<td>40.3</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>384</td>
<td>25.2</td>
<td>383</td>
<td>25.2</td>
<td>383</td>
<td>25.2</td>
<td>376</td>
<td>25.7</td>
<td>375</td>
<td>25.7</td>
</tr>
<tr>
<td>403.gcc</td>
<td>230</td>
<td>34.9</td>
<td>231</td>
<td>34.9</td>
<td>230</td>
<td>34.9</td>
<td>227</td>
<td>35.5</td>
<td>236</td>
<td>34.0</td>
</tr>
<tr>
<td>429.mcf</td>
<td>130</td>
<td>69.9</td>
<td>129</td>
<td>70.7</td>
<td>129</td>
<td>70.9</td>
<td>130</td>
<td>69.9</td>
<td>129</td>
<td>70.7</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>398</td>
<td>26.4</td>
<td>397</td>
<td>26.4</td>
<td>398</td>
<td>26.4</td>
<td>361</td>
<td>29.1</td>
<td>361</td>
<td>29.1</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>163</td>
<td>57.3</td>
<td>163</td>
<td>57.2</td>
<td>163</td>
<td>57.2</td>
<td>163</td>
<td>57.1</td>
<td>163</td>
<td>57.1</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>392</td>
<td>30.9</td>
<td>392</td>
<td>30.9</td>
<td>392</td>
<td>30.9</td>
<td>390</td>
<td>31.1</td>
<td>390</td>
<td>31.0</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>6.28</td>
<td>3300</td>
<td>6.28</td>
<td>3300</td>
<td>6.28</td>
<td>3300</td>
<td>6.28</td>
<td>3300</td>
<td>6.28</td>
<td>3300</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>464</td>
<td>47.7</td>
<td>468</td>
<td>47.3</td>
<td>462</td>
<td>47.9</td>
<td>373</td>
<td>59.3</td>
<td>373</td>
<td>59.4</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>233</td>
<td>26.8</td>
<td>232</td>
<td>26.9</td>
<td>233</td>
<td>26.8</td>
<td>165</td>
<td>37.8</td>
<td>198</td>
<td>31.6</td>
</tr>
<tr>
<td>473.astar</td>
<td>208</td>
<td>33.7</td>
<td>210</td>
<td>33.5</td>
<td>210</td>
<td>33.4</td>
<td>208</td>
<td>33.7</td>
<td>210</td>
<td>33.5</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>121</td>
<td>56.8</td>
<td>123</td>
<td>56.3</td>
<td>121</td>
<td>56.9</td>
<td>119</td>
<td>57.8</td>
<td>120</td>
<td>57.6</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

Platform Notes

BIOS Settings:
Operating Mode set to Maximum Performance
Sysinfo program /root/SPECCpu-v1.2/config/sysinfo.rev6800
$Rev: 6800 $ $Date:: 2011-10-11 #$ 6f2ebdfe5032aaa42e583f96b07f99d3
running on x3650M4 Sun Mar 4 23:56:18 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 E5-2690 0 @ 2.90GHz
  2 "physical id"s (chips)
  32 "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 : 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

Continued on next page
IBM Corporation

IBM System x3650 M4 (Intel Xeon E5-2690)

SPECint2006 = 59.4
SPECint_base2006 = 55.1

CPU2006 license: 11
Test sponsor: IBM Corporation
Test date: Mar-2012
Hardware Availability: Mar-2012
Tested by: IBM Corporation
Software Availability: Mar-2012

Platform Notes (Continued)

cache size : 20480 KB

From /proc/meminfo
MemTotal: 132113224 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 x3650M4 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 Mar 2 16:41

SPEC is set to: /root/SPECcpu-v1.2

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_x3650m4-lv_root ext4 790G 69G 681G 10% /

Additional information from dmidecode:
Memory:
16x Samsung M393B1K70DH0-CK0 8 GB 1600 MHz 2 rank

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/root/SPECcpu-v1.2/libs/32:/root/SPECcpu-v1.2/libs/64"
OMP_NUM_THREADS = "16"

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

Base Compiler Invocation

C benchmarks:
icc -m64

Continued on next page
SPEC CINT2006 Result

IBM Corporation
IBM System x3650 M4 (Intel Xeon E5-2690)

\( \text{SPECint2006} = 59.4 \)
\( \text{SPECint\_base2006} = 55.1 \)

CPU2006 license: 11
Test sponsor: IBM Corporation
Tested by: IBM Corporation

Test date: Mar-2012
Hardware Availability: Mar-2012
Software Availability: Mar-2012

Base Compiler Invocation (Continued)

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/smartheap -lsmartheap64
```

Base Other Flags

```
C benchmarks:
403.gcc: -Dalloca=_alloca
```

Peak Compiler Invocation

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

  400.perlbench: icc -m32
  445.gobmk: icc -m32
```

Continued on next page
**IBM Corporation**

IBM System x3650 M4 (Intel Xeon E5-2690)

| SPECint2006 = | 59.4 |
| SPECint_base2006 = | 55.1 |

- **CPU2006 license:** 11
- **Test date:** Mar-2012
- **Hardware Availability:** Mar-2012
- **Test sponsor:** IBM Corporation
- **Software Availability:** Mar-2012
- **Tested by:** IBM Corporation

---

### Peak Compiler Invocation (Continued)

```
464.h264ref: icc -m32
```

C++ benchmarks (except as noted below):
```
icpc -m32
```

```
473.astar: icpc -m64
```

---

### 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_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
```

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

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

```
456.hmmer: -xAVX -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
     -ansi-alias
```

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

---

Continued on next page
IBM Corporation

IBM System x3650 M4 (Intel Xeon E5-2690)

SPECint2006 = 59.4
SPECint_base2006 = 55.1

CPU2006 license: 11
Test sponsor: IBM Corporation
Tested by: IBM Corporation

Test date: Mar-2012
Hardware Availability: Mar-2012
Software Availability: Mar-2012

Peak Optimization Flags (Continued)

462.libquantum: basepeak = yes

464.h264ref: -xAVX(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: -xAVX(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 -ansi-alias
             -Wl,-z,muldefs -L/smartheap -lsmartheap

473.astar: basepeak = yes

483.xalancbmk: -xAVX -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias
                -Wl,-z,muldefs -L/smartheap -lsmartheap

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

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-A.20120328.xml

SPEC and SPECint are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Originally published on 27 March 2012.