**IBM Corporation**

**IBM System x3530 M4 (Intel Xeon E5-2470)**

| Test Date: | May-2012 |
| Hardware Availability: | Jun-2012 |
| Software Availability: | Dec-2011 |

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

**Hardware**

| CPU Name: | Intel Xeon E5-2470 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.10 GHz |
| CPU MHz: | 2300 |
| 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 |

**Software**

| Operating System: | Red Hat Enterprise Linux Server release 6.2 (Santiago) |
| Compiler: | CIC++: Version 12.1.0.225 of Intel C++ Studio XE for Linux; Fortran: Version 12.1.0.225 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | Yes |
| File System: | ext4 |

**SPECfp®2006 = 76.1**  
**SPECfp_base2006 = 72.7**
Results Table

<table>
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<tr>
<th>Benchmark</th>
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<td>303</td>
<td>64.3</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 $ $Date:: 2011-10-11 #$ 6f2ebdf5032aaa42e583f96b07f99d3
running on localhost.localdomain Thu May 10 00:59:24 2012

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
Continued on next page
SPEC CFP2006 Result

IBM Corporation
IBM System x3530 M4 (Intel Xeon E5-2470)

SPECfp2006 = 76.1
SPECfp_base2006 = 72.7

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

Test date: May-2012
Hardware Availability: Jun-2012
Software Availability: Dec-2011

Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
  model name : Intel(R) Xeon(R) CPU E5-2470 0 @ 2.30GHz
    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
  cache size : 20480 KB

From /proc/meminfo
  MemTotal:       99042040 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
  Red Hat Enterprise Linux Server release 6.2 (Santiago)

From /etc/*release* /etc/*version*
  redhat-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)
  system-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)

uname -a:
  Linux localhost.localdomain 2.6.32-220.el6.x86_64 #1 SMP Wed Nov 9 08:03:13
  EST 2011 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 9 11:59

SPEC is set to: /root/SPECcpu-v1.2
  Filesystem    Type    Size  Used Avail Use% Mounted on
  /dev/mapper/vg_x3530m4-lv_root ext4  133G  15G  111G  12% /

Additional information from dmidecode:
  Memory:
    12x 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/libs32:/root/SPECcpu-v1.2/libs64"
  OMP_NUM_THREADS = "16"

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General Notes (Continued)

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
```
C++ benchmarks:
```
icpc -m64
```
Fortran benchmarks:
```
ifort  -m64
```
Benchmarks using both Fortran and C:
```
icc  -m64 ifort  -m64
```

Base Portability Flags

| 410.bwaves: -DSPEC_CPU_LP64 |
| 416.gamess: -DSPEC_CPU_LP64 |
| 433.milc: -DSPEC_CPU_LP64 |
| 434.zeusmp: -DSPEC_CPU_LP64 |
| 435.gromacs: -DSPEC_CPU_LP64 -nofor_main |
| 436.cactusADM: -DSPEC_CPU_LP64 -nofor_main |
| 437.leslie3d: -DSPEC_CPU_LP64 |
| 444.namd: -DSPEC_CPU_LP64 |
| 447.dealII: -DSPEC_CPU_LP64 |
| 450.soplex: -DSPEC_CPU_LP64 |
| 453.povray: -DSPEC_CPU_LP64 |
| 454.calculix: -DSPEC_CPU_LP64 -nofor_main |
| 459.GemsFDTD: -DSPEC_CPU_LP64 |
| 465.tonto: -DSPEC_CPU_LP64 |
| 470.lbm: -DSPEC_CPU_LP64 |
| 481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX |
| 482.sphinx3: -DSPEC_CPU_LP64 |

Base Optimization Flags

C benchmarks:
```
-xAVX -ipo -O3 -no-prec-div -static -parallel -opt-prefetch -ansi-alias
```
SPEC CFP2006 Result

IBM Corporation

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Base Optimization Flags (Continued)

C++ benchmarks:
- xAVX -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias

Fortran benchmarks:
- xAVX -ipo -O3 -no-prec-div -static -parallel -opt-prefetch

Benchmarks using both Fortran and C:
- xAVX -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
  -ansi-alias

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

433.milc: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
  -no-prec-div(pass 2) -prof-use(pass 2) -static -auto-ilp32
  -ansi-alias

470.lbm: basepeak = yes

482.sphinx3: -xAVX -ipo -O3 -no-prec-div -unroll2 -ansi-alias
  -parallel

C++ benchmarks:

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</tbody>
</table>

**Peak Optimization Flags (Continued)**

444.namd: -xAVX(pass 2) -prof-gen(pass l) -ipo(pass 2) -03(pass 2)
- no-prec-div(pass 2) -prof-use(pass 2) -fno-alias
- auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xAVX(pass 2) -prof-gen(pass l) -ipo(pass 2) -03(pass 2)
- no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: -xAVX -ipo -03 -no-prec-div -opt-prefetch -parallel
- static

416.gamess: -xAVX(pass 2) -prof-gen(pass l) -ipo(pass 2) -03(pass 2)
- no-prec-div(pass 2) -prof-use(pass 2) -unroll2
- inline-level=0 -scalar-rep -static

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xAVX(pass 2) -prof-gen(pass l) -ipo(pass 2) -03(pass 2)
- no-prec-div(pass 2) -prof-use(pass 2) -unroll2
- inline-level=0 -opt-prefetch -parallel

465.tonto: -xAVX(pass 2) -prof-gen(pass l) -ipo(pass 2) -03(pass 2)
- no-prec-div(pass 2) -prof-use(pass 2) -inline-calloc
- opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xAVX -ipo -03 -no-prec-div -auto-ilp32 -ansi-alias

481.wrf: basepeak = yes

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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