SPEC® CFP2006 Result
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IBM Corporation

IBM System x3650 M4
(Intel Xeon E5-2690 v2, 3.00 GHz)

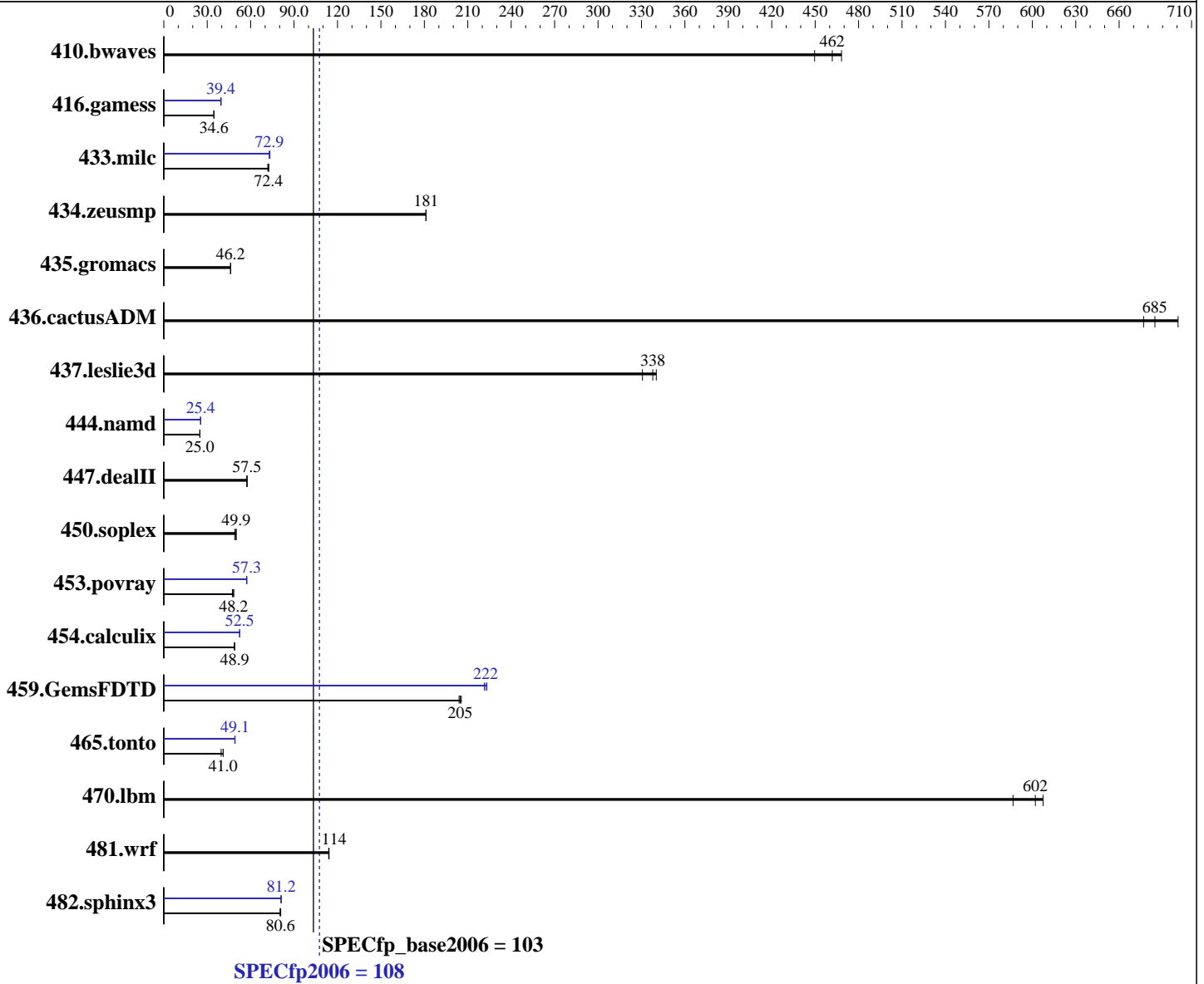$SPECfp^{®}2006 =$ 108

$SPECfp\_base2006 =$ 103

CPU2006 license: 11	**Test date:** May-2014
Test sponsor: IBM Corporation	**Hardware Availability:** Dec-2013
Tested by: IBM Corporation	**Software Availability:** Sep-2013

Benchmark results (scale 0 to 710):

- **410.bwaves** — 462
- **416.gamess** — 39.4 / 34.6
- **433.milc** — 72.9 / 72.4
- **434.zeusmp** — 181
- **435.gromacs** — 46.2
- **436.cactusADM** — 685
- **437.leslie3d** — 338
- **444.namd** — 25.4 / 25.0
- **447.dealII** — 57.5
- **450.soplex** — 49.9
- **453.povray** — 57.3 / 48.2
- **454.calculix** — 52.5 / 48.9
- **459.GemsFDTD** — 222 / 205
- **465.tonto** — 49.1 / 41.0
- **470.lbm** — 602
- **481.wrf** — 114
- **482.sphinx3** — 81.2 / 80.6

SPECfp_base2006 = 103
SPECfp2006 = 108

Hardware

CPU Name:	Intel Xeon E5-2690 v2
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	3000
FPU:	Integrated
CPU(s) enabled:	20 cores, 2 chips, 10 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

Continued on next page

Software

Operating System:	Red Hat Enterprise Linux Server release 6.4 (Santiago)
	2.6.32-358.el6.x86_64
Compiler:	C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux;
	Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux
Auto Parallel:	Yes
File System:	ext4

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L3 Cache:	25 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 400 GB SAS SSD, RAID 0	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	29.0	468	**29.4**	**462**	30.2	450	29.0	468	**29.4**	**462**	30.2	450
416.gamess	566	34.6	565	34.6	**566**	**34.6**	**497**	**39.4**	494	39.7	498	39.4
433.milc	**127**	**72.4**	127	72.5	128	71.8	125	73.3	126	72.9	**126**	**72.9**
434.zeusmp	**50.2**	**181**	50.2	181	50.2	181	**50.2**	**181**	50.2	181	50.2	181
435.gromacs	154	46.3	155	46.0	**155**	**46.2**	154	46.3	155	46.0	**155**	**46.2**
436.cactusADM	17.1	701	17.7	677	**17.5**	**685**	17.1	701	17.7	677	**17.5**	**685**
437.leslie3d	27.6	340	**27.8**	**338**	28.4	331	27.6	340	**27.8**	**338**	28.4	331
444.namd	323	24.8	321	25.0	**321**	**25.0**	316	25.4	**315**	**25.4**	315	25.5
447.dealII	199	57.5	**199**	**57.5**	199	57.5	199	57.5	**199**	**57.5**	199	57.5
450.soplex	**167**	**49.9**	167	50.0	170	49.1	**167**	**49.9**	167	50.0	170	49.1
453.povray	110	48.3	**110**	**48.2**	112	47.4	92.8	57.3	**92.8**	**57.3**	93.0	57.2
454.calculix	168	49.0	**169**	**48.9**	169	48.8	157	52.5	158	52.3	**157**	**52.5**
459.GemsFDTD	52.0	204	51.6	206	**51.8**	**205**	47.9	221	47.5	223	**47.7**	**222**
465.tonto	**240**	**41.0**	248	39.6	240	41.0	201	49.0	200	49.3	**200**	**49.1**
470.lbm	22.6	607	23.4	587	**22.8**	**602**	22.6	607	23.4	587	**22.8**	**602**
481.wrf	97.8	114	**98.0**	**114**	98.0	114	97.8	114	**98.0**	**114**	98.0	114
482.sphinx3	243	80.3	**242**	**80.6**	241	80.8	**240**	**81.2**	241	80.8	240	81.2

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
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.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on x3650M4 Wed May 21 10:10:00 2014
```

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Platform Notes (Continued)

```
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 v2 @ 3.00GHz
      2 "physical id"s (chips)
      40 "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 : 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:       264339612 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)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

uname -a:
   Linux x3650M4 2.6.32-358.18.1.el6.x86_64 #1 SMP Fri Aug 2 17:04:38 EDT 2013
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 16 11:21

SPEC is set to: /home/SPECcpu-20140116-ic14.0
   Filesystem     Type     Size  Used Avail Use% Mounted on
   /dev/mapper/vg_x3650m4-lv_home
                  ext4     313G  114G  184G  39% /home

Additional information from dmidecode:
  BIOS IBM -[VVE135VUS-1.60]- 12/05/2013
  Memory:
   8x Not Specified Not Specified
   16x Samsung M393B2G70QH0-CMA 16 GB 1867 MHz 2 rank

(End of data from sysinfo program)
```

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General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/SPECcpu-20140116-ic14.0/libs/32:/home/SPECcpu-20140116-ic14.0/libs/64:/home/SPECcpu-20140116-ic14.0/sh"
OMP_NUM_THREADS = "20"

 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
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

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
```

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Base Optimization Flags

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

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

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

Benchmarks using both Fortran and C:
```
-xAVX -ipo -O3 -no-prec-div -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) -auto-ilp32
          -ansi-alias
```

```
470.lbm: basepeak = yes
```

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

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Peak Optimization Flags (Continued)

C++ benchmarks:

445.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(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 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(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 1) -ipo(pass 2) -O3(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 -O3 -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-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-IVB-B.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-B.xml

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

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