SPEC® CFP2006 Result
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IBM Corporation

IBM BladeCenter HS23
(Intel Xeon E5-2640 v2, 2.00 GHz)

$SPECfp®\_rate2006 = 450$
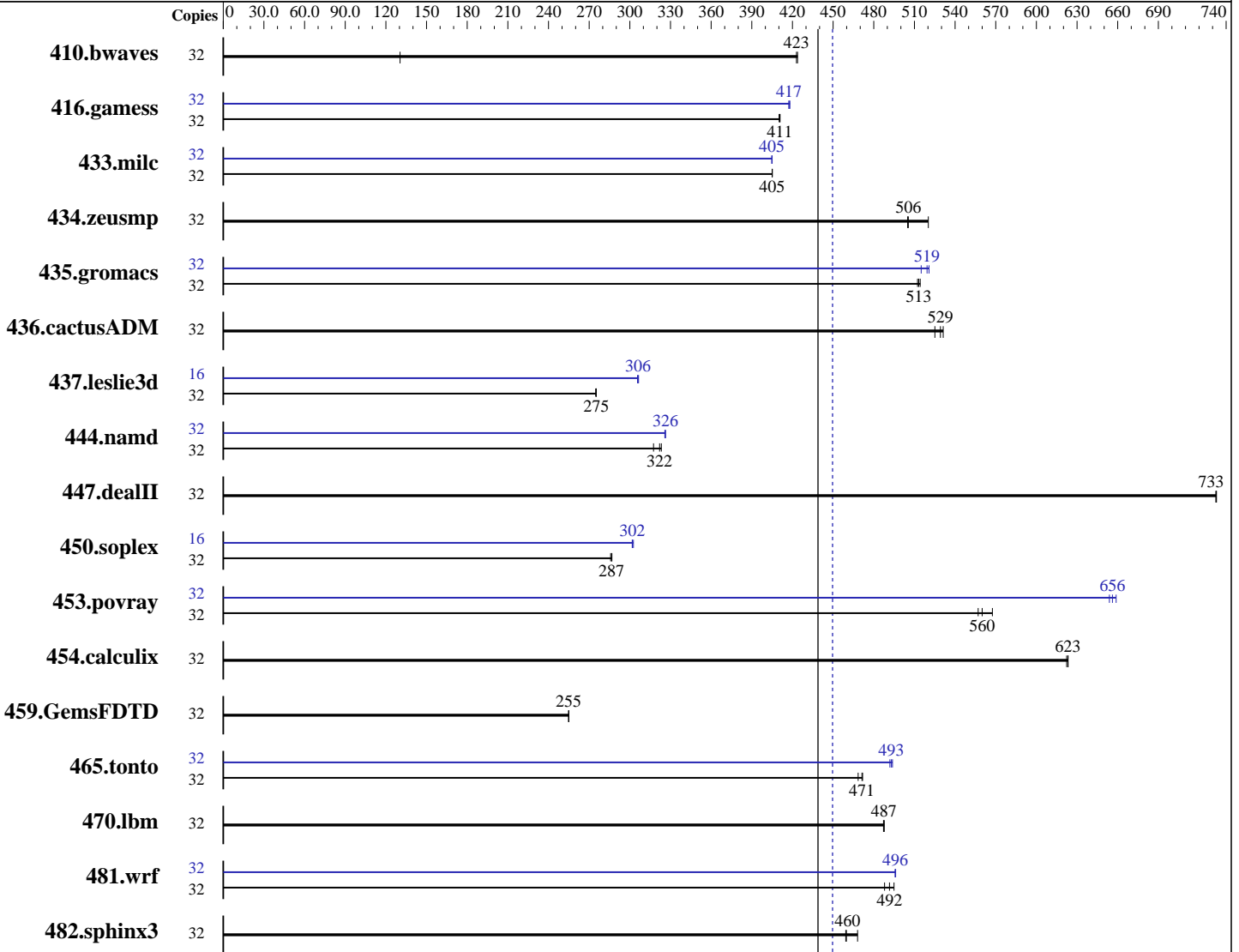
$SPECfp\_rate\_base2006 = 439$

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

Copies scale: 0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 630 660 690 740

Benchmark	Copies	Value
410.bwaves	32	423
416.gamess	32 / 32	417 / 411
433.milc	32 / 32	405 / 405
434.zeusmp	32	506
435.gromacs	32 / 32	519 / 513
436.cactusADM	32	529
437.leslie3d	16 / 32	306 / 275
444.namd	32 / 32	326 / 322
447.dealII	32	733
450.soplex	16 / 32	302 / 287
453.povray	32 / 32	656 / 560
454.calculix	32	623
459.GemsFDTD	32	255
465.tonto	32 / 32	493 / 471
470.lbm	32	487
481.wrf	32 / 32	496 / 492
482.sphinx3	32	460

SPECfp_rate_base2006 = 439

SPECfp_rate2006 = 450

Hardware

CPU Name:	Intel Xeon E5-2640 v2
CPU Characteristics:	Intel Turbo Boost Technology up to 2.50 GHz
CPU MHz:	2000
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

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:	No
File System:	ext4

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L3 Cache:	20 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-bit
Memory:	128 GB (8 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1600 MHz)	Peak Pointers:	32/64-bit
		Other Software:	None
Disk Subsystem:	1 x 300 GB SAS, 10000 RPM		
Other Hardware:	None		

Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	3334	130	**1028**	**423**	1026	424	32	3334	130	**1028**	**423**	1026	424
416.gamess	32	1525	411	1528	410	**1526**	**411**	32	**1501**	**417**	1499	418	1501	417
433.milc	32	**725**	**405**	725	405	725	405	32	**726**	**405**	726	405	725	405
434.zeusmp	32	560	520	577	505	**576**	**506**	32	560	520	577	505	**576**	**506**
435.gromacs	32	446	512	444	514	**445**	**513**	32	444	515	**440**	**519**	439	521
436.cactusADM	32	720	531	728	525	**723**	**529**	32	720	531	728	525	**723**	**529**
437.leslie3d	32	1093	275	1095	275	**1093**	**275**	16	492	306	491	306	**491**	**306**
444.namd	32	808	317	794	323	**797**	**322**	32	787	326	**787**	**326**	788	326
447.dealII	32	**500**	**733**	500	733	500	732	32	**500**	**733**	500	733	500	732
450.soplex	32	**931**	**287**	931	287	934	286	16	**442**	**302**	442	302	441	303
453.povray	32	300	568	306	557	**304**	**560**	32	260	654	**259**	**656**	258	659
454.calculix	32	424	622	424	623	**424**	**623**	32	424	622	424	623	**424**	**623**
459.GemsFDTD	32	1331	255	1332	255	**1332**	**255**	32	1331	255	1332	255	**1332**	**255**
465.tonto	32	667	472	**668**	**471**	672	468	32	640	492	**639**	**493**	638	494
470.lbm	32	**902**	**487**	902	488	902	487	32	**902**	**487**	902	488	902	487
481.wrf	32	722	495	**727**	**492**	733	488	32	720	496	**721**	**496**	721	496
482.sphinx3	32	1358	459	**1356**	**460**	1333	468	32	1358	459	**1356**	**460**	1333	468

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"

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Platform Notes

```
Operating Mode set to Maximum Perfomance in BIOS
Sysinfo program /cpu2006.1.2_14.0_updated/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on HS23-IVB Wed Feb  5 11:44:43 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 E5-2640 v2 @ 2.00GHz
      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:        132130556 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 HS23-IVB 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 Feb 4 21:30

SPEC is set to: /cpu2006.1.2_14.0_updated
   Filesystem     Type     Size  Used Avail Use% Mounted on
   /dev/mapper/vg_hs23ivb-lv_root
                  ext4      50G  7.0G   40G  15% /

Additional information from dmidecode:
  BIOS IBM -[TKE135FUS-1.50]- 08/14/2013
  Memory:
   8x Micron 36JDZS2G72PZ-1G9E1 16 GB 1600 MHz 2 rank
   8x Not Specified Not Specified
```

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Platform Notes (Continued)

```
  (End of data from sysinfo program)
 Memory speed from dmidecode lists the downclocked speed of the run.
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/cpu2006.1.2_14.0_updated/libs/32:/cpu2006.1.2_14.0_updated/libs/64:/cpu2006.1.2_14.0_updated/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   -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
```

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Base Portability Flags (Continued)

```
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 -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

Peak Compiler Invocation

C benchmarks:
```
icc   -m64
```

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

```
450.soplex: icpc -m32
```

Fortran benchmarks:
```
ifort -m64
```

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

Peak Portability Flags

```
410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
```

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

Peak Portability Flags (Continued)

```
   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
    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
```

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) -opt-mem-layout-trans=3(pass 2)
             -prof-use(pass 2) -auto-ilp32

    470.lbm: basepeak = yes

 482.sphinx3: basepeak = yes
```

C++ benchmarks:

```
    444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
             -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
             -prof-use(pass 2) -fno-alias -auto-ilp32

   447.dealII: basepeak = yes

  450.soplex: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
             -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
             -prof-use(pass 2) -opt-malloc-options=3

  453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
             -no-prec-div(pass 2) -opt-mem-layout-trans=3(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-
```

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Peak Optimization Flags (Continued)

```
    434.zeusmp: basepeak = yes

    437.leslie3d: -xAVX -ipo -O3 -no-prec-div -opt-prefetch

  459.GemsFDTD: basepeak = yes

     465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -auto
                -inline-calloc -opt-malloc-options=3
```

Benchmarks using both Fortran and C:

```
    435.gromacs: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                 -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
                 -prof-use(pass 2) -opt-prefetch -auto-ilp32

  436.cactusADM: basepeak = yes

    454.calculix: basepeak = yes

        481.wrf: -xAVX -ipo -O3 -no-prec-div -auto-ilp32
```

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-A.html

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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-A.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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